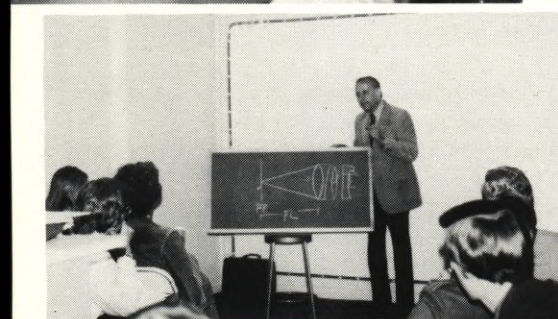
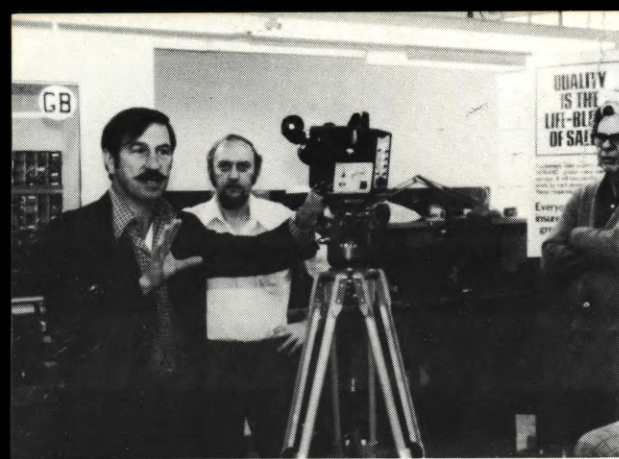


American Cinematographer

NOVEMBER 1974/ONE DOLLAR

**ANATOMY OF A
"SUPER-COLOSSAL"
CINEMATIC EVENT**





A Stitch in Time..

Our CP-16 Maintenance Training Seminars are a vital aspect of our total product back-up and service philosophy.

We believe that knowing how to carry out some immediate repairs on your CP-16 camera in the field may well be the critical difference between "blowing" an assignment or carrying it out successfully.

Designed for TV-newsfilm/documentary cameramen, TV station and dealer service technicians, our CP-16 workshop/seminars emphasize effective trouble-shooting, preventive care and simple repairs under field conditions.

Among those attending our first CP-16 training seminar was Charles Darling, Newsfilm Production Supervisor at KMGH-TV7 in Denver, Colorado. KMGH-TV recently won the 1974 National Press Photographers Association "News Station of the Year" Award. Darling's evaluation of the seminar follows:

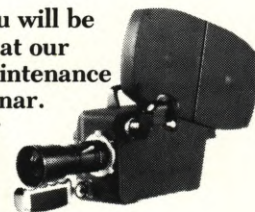
"Any professional motion picture camera, subject to the abuse of news situations, will eventually develop problems. It is rare, however, that a working photographer can receive a factory 'crash' course in servicing his own reflex sound camera.

"The time spent in the mechanical and electronic phase of instruction will enable us to evaluate problems on the spot, without expensive and time-consuming guess work, and minimize downtime. Of special importance was the ready access to factory production and engineering personnel. The segment on optical components, conducted by Angenieux Corporation, was an added bonus that completed the program.

"Cinema Products is to be congratulated for demonstrating its leadership as a manufacturer of 16mm newsreel equipment and for its continuing response to the rapidly changing demands of TV communications."

We hope you will be able to join us at our next CP-16 Maintenance Training Seminar.

For further information, please phone or write to:



cinema E products CORPORATION


Technology in the Service of Creativity
2037 Granville Avenue, Los Angeles, California 90025
Telephone: (213) 478-0711 ■ Telex: 69-1339 ■ Cable: Cinedevco

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We built our company on service; and our reputation on being where you need us—when you need us.

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Bernie O'Doherty is alive and well at

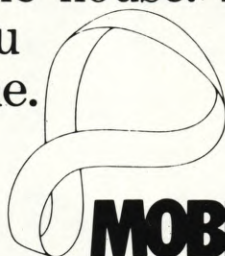
Mobius

Bernie O'Doherty, one of the top factory-trained Eclair technicians in the country, has joined us as Service Manager. Now, to our repair expertise in Angenieux, Arriflex, Auricon, B&H, CP-16, Frezzolini, Nagra and the rest, we add the finest in Eclair service.

so we're

celebrating with a sale.

We're celebrating Bernie's arrival with a monstrous sale on Eclair, Arriflex, Angenieux and everything else in the house. You'll probably never see prices like this again. And you owe it all to Bernie. And maybe Sy Cane.



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American Cinematographer

International Journal of Motion Picture Photography and Production Techniques

The American Society of Cinematographers is not a labor union nor a guild, but is an educational, cultural and professional organization. Membership is by invitation to those who are actively engaged as Directors of Photography and have demonstrated outstanding ability. Not all cinematographers can place the initials A.S.C. after their names. A.S.C. membership has become one of the highest honors that can be bestowed upon a professional cinematographer, a mark of prestige and distinction.

NOVEMBER, 1974

VOL. 55, NO. 11

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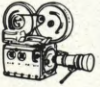
ON THE COVER: Graphic representations of the vast scope of "EARTHQUAKE", Universal-Filmakers Group production, produced and directed by Mark Robson. Because "EARTHQUAKE" is possibly the most intricate film ever made in Hollywood, this entire issue of American Cinematographer is devoted to it. Cover layout and artwork courtesy of Universal City Studios.

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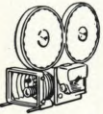
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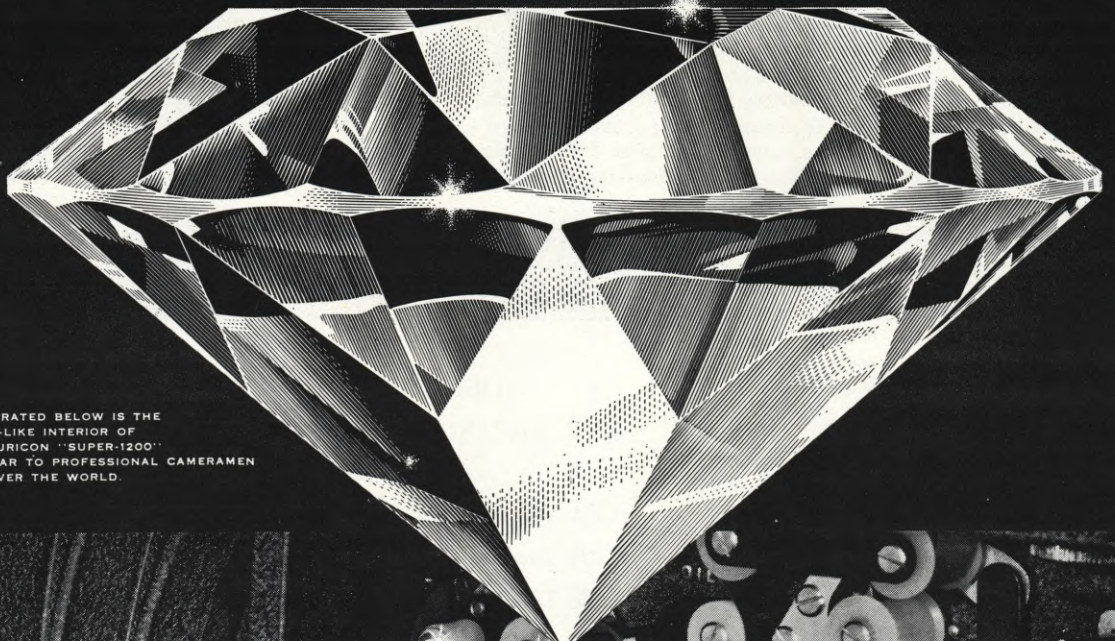


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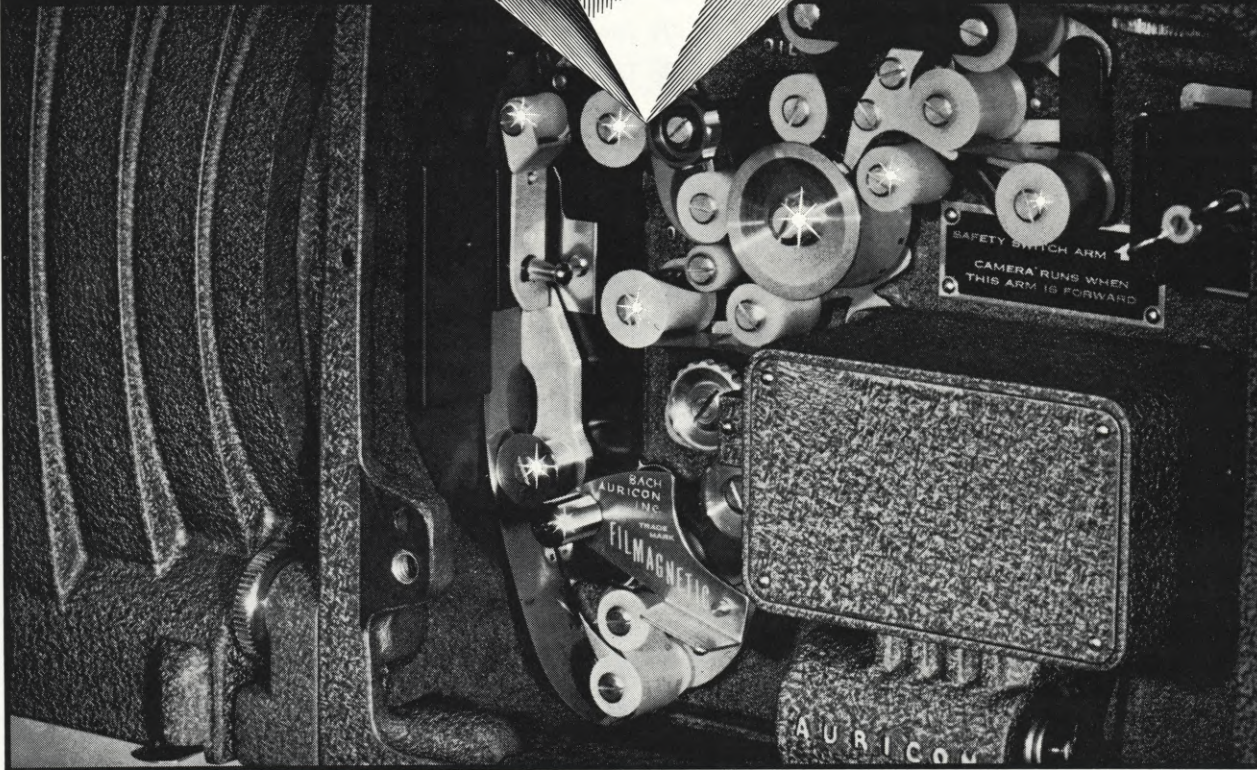
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...and know the real
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The Auricon "Super-1200", like all Auricon 16mm Professional Cameras, is a superb picture-taking instrument. Every precision-engineered part of this finest of all 16mm Cameras is carefully built and assembled with the rare watch-maker skill of old-world craftsmanship, combined with modern, space-age know-how in optics and electronics. The Auricon "Super-1200" actually contains jewels in the Camera-Gate! This polished Sapphire Film-Gate is guaranteed frictionless and wear-proof for in-focus and scratch-free pictures, regardless of how much film you run through the Camera! Among the many professional features of the "Super-1200" is Reflex Ground-Glass Focusing through the Camera lens. All this, and high-fidelity, optical or magnetic, single-system or double-system sound-recording capabilities which are unmatched by any other camera in the world! Write for free, illustrated Auricon Catalog fully describing this rare jewel of fine craftsmanship.

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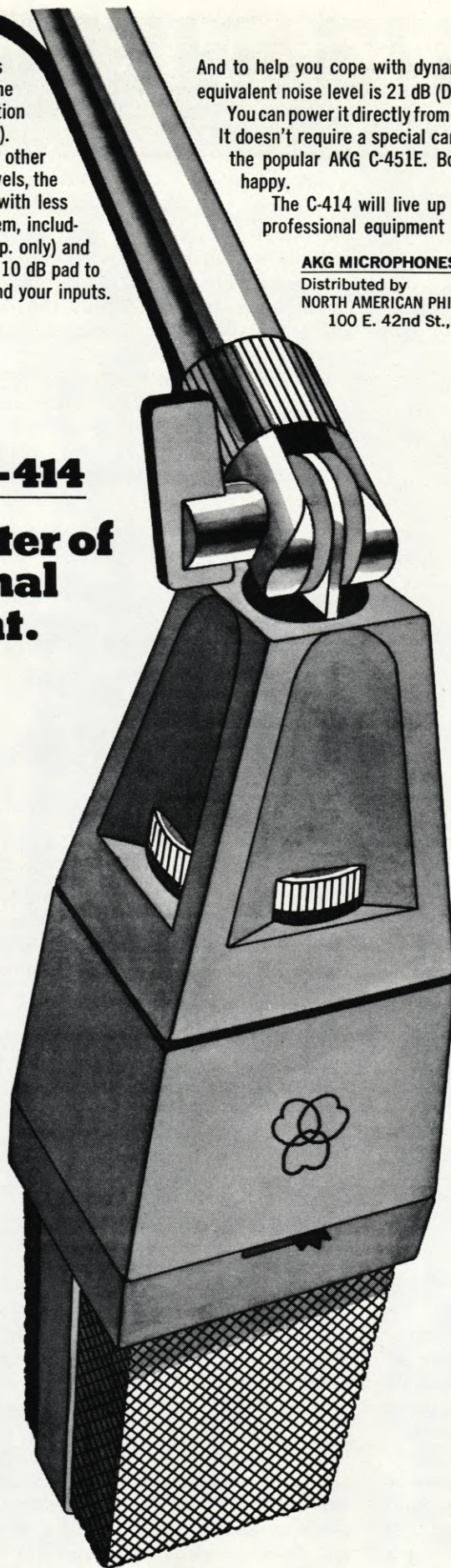
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WHAT'S NEW

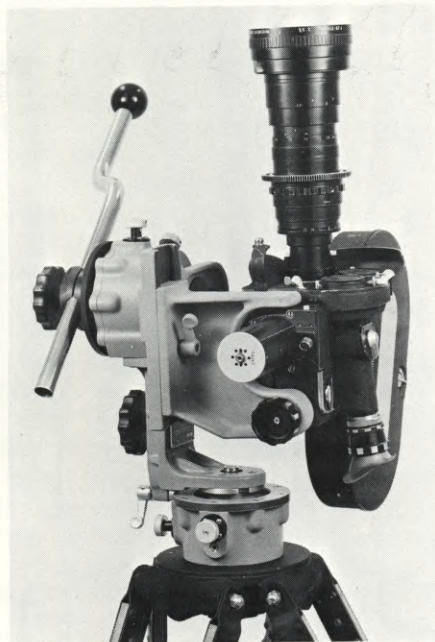
IN PRODUCTS, SERVICES AND LITERATURE

NEW "CINE-PRO" FAST T9 24-480mm ZOOM LENS NOW AVAILABLE FROM CINEMA PRODUCTS

Cinema Products Corporation, announces the availability of the new "Cine-Pro" fast T9 24-480mm zoom lens.

Designed for professional 35mm motion picture photography, the new "Cine-Pro" T9 24-480mm zoom lens (with BNCR-type mount) is supplied with follow-focus and zoom gears. The lens is priced at \$7,500.

For further information, please write to Cinema Products Corporation, 2037 Granville Avenue, Los Angeles, California 90025.



BALANCED FLUID HEAD NOW AVAILABLE WITH ADJUSTABLE FLUID TENSION.

Pearson Photographics announces a new, model A-4000, Weaver/Steadman Balanced Fluid Head with adjustable fluid tension. The BFH is constructed with multiple drums in both the pan and tilt cylinders which can be selectively engaged to provide the operator with varying degrees of fluid tension that remains constant throughout 360 degrees of tilt and pan; the camera virtually floats on its own center of gravity.

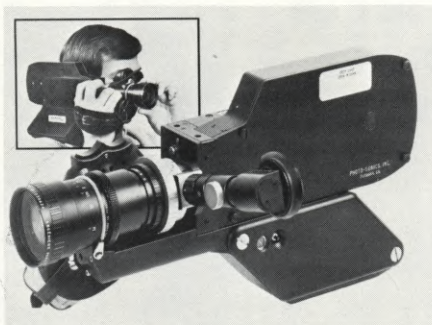
Camera cradles are available for: 16mm Eclair NPR, 35mm Arri 2C, and

35mm Arri BL.

Super-light magnesium castings keep the overall weight down to under 15 pounds, and that includes tripod ball mount assembly. The adjustable control handle is stainless steel. The tilt and pan lock assemblies are chrome-plated brass, and other hardware is stainless.

Prices start around \$1500.00

West coast contact: Pearson Photographics, 10530 Burbank Blvd., North Hollywood, Ca. 91601 AC (213) 769-7929. East coast contact: Ferco



SMALLEST 16mm HIGH-SPEED HAND-HELD CAMERA AVAILABLE

The new Photo-Sonics Actionmaster/200, the smallest high-speed hand-held 16mm camera available today, is announced by Instrumentation Marketing Corporation, exclusive distributors, Burbank, California.

The self-contained lightweight system is especially suited for use in confined areas, while still permitting maximum operator mobility. It utilizes the field-proven Photo-Sonics intermittent movement incorporating 2 pull-down and 2 register pins housed in each magazine, with capacities of 50' and 100' daylight load, 65', 100', 200' coaxial darkroom load.

Outstanding features include speeds of 24, 48, 64, 100, 150 and 200 fps; magazines interchange in a few seconds; Angenieux 12.5-75mm f2.2 zoom lens with motorized variable speed zoom control, variable zoom rate adjustment and thumb-actuated run button are located on hand grip; internal rechargeable battery pack is removable to provide minimum weight when external power is used; tripod mounting bracket and sturdy-carrying case are available.

Price: \$6440.00 complete with camera body, lens and viewing optics, 200' magazine, shoulder mount/hand grip with battery pack with test meter,

recharger, tripod adapter and carrying case. *Delivery:* 90 days. Literature on request.

For further information contact: R. Freeborg, Pres.; Instrumentation Marketing Corporation; 820 South Mariposa Street; Burbank, California 91506; Phone: (213) 849-6251; Telex: 67-3205.



BAUER C ROYAL 10E MACRO MOVIE CAMERA ANNOUNCED BY AIC PHOTO, INC.

A new Bauer Super-8 movie camera with 10X power zoom and macrofocusing capability has been announced by AIC Photo, Inc.

The camera, designed for the professional and serious cinematographer, incorporates a powerful 10:1 (7 to 70mm) zoom lens with macrofocusing capability down to the front of the lens. In the normal focusing mode, the 7-70mm zoom range is comparable to a 35-250mm range in a 35mm still camera. The Bauer Super-8 Macro offers a choice of speeds of 12, 18, 24 frames per second as well as a 54 fps instant slow motion feature from any setting. It incorporates an intervalometer for fast motion study at automatically controlled speeds from one frame per minute to 6 frames per second.

A built-in low-light (moonlight) meter element computer-controls single frame shutter speeds from 1/10 second to one minute per frame. Fade-ins, fade-outs and lap dissolves are made possible through an automatic push-button control.

The camera comes equipped with lens hood and eye cup, remote control, wrist strap and sync plug for flash synchronization. Accessories available include a leather pouch, with special compartment for film and accessory storage. An optional sound conversion is also available to accommodate the Opta-sound system for lip-synch sound recording. Suggested retail for the camera is \$879.95.

Continued on Page 1343



GORDON STAR FILTERS

These are the extremely popular special effects filters that produce starlike patterns in highlights. One filter produces a four-point star or they can be stacked for additional starlike effects. Supplied in 1mm, 2mm or 3mm spacing. 1mm spacing produces most patterns in highlights. Please indicate millimeter spacing desired when ordering.

PRICES:

Series 6 — List, \$12.50. **SALE, \$10.00**
 Series 7 — List, \$19.50. **SALE, \$15.60**
 Series 8 — List, \$24.95. **SALE, \$19.95**
 Series 9 — List, \$34.50. **SALE, \$27.60**

72mm for 12-120 Angenieux — List, \$34.50. **SALE, \$27.60**
 2" Square — List, \$19.50. **SALE, \$15.60**
 3" Square — List, \$27.50. **SALE, \$22.00**
 4½" Round for 25-250 Angenieux — List, \$69.50. **SALE, \$55.60**

Gordon Star Filters are also available to fit in TV Camera filter slots. Write for prices and details.



GORDON MULTIPLE IMAGE "MIRAGE" LENS

"Mirage" lens reproduce the same image in various patterns on a single frame. Patterns available include five and six image circular, three image circular and three image parallel. Come in rotating mount which attaches to taking lens. Available in series sizes, 72mm, 4½" round. Write for sale prices.

SAVE 20%

Alan Gordon Enterprises Giant Filter Sale



Save 20% off list price on all items in this ad. Be sure and mention filter sales ad when ordering. Sale prices good through December 31, 1974.

DIFFUSION FILTERS

Used to soften pictures and for reducing hard lines and blemishes in close-ups. Also reduce contrast, soften shadows and colors. Amount of diffusion ranges from 1 (least) through 10 (most). Available in series sizes, 72mm, 4½" round, or square. Write for sale prices.



FOG EFFECT FILTERS

Create fog effects on clear days or nights. Come in densities 1 (least) through 10 (most) and can be used in combination. Available in series sizes, 72mm, 138mm, 4½" round, or square. Write for sale prices.

TIFFEN LOW CONTRAST FILTERS

Desaturate and mute on-screen colors by pre-selected degrees. Soften shadows and blend make-up without altering light. Can be used indoors or out, come in ranges 1 (least) through 5 (most). Available in series sizes, 72mm, 4½" round, or square. Write for sale prices.

HARRISON GRADUATE (SKY) FILTERS

Allow for correct overall exposure of scenes that have a foreground and background or a shadow and sunlight area where the latitude of the film is not enough to cover the entire picture. Filters are half clear and half neutral density. Densities of 1 stop, 2 stops, 3 stops available. Please specify when ordering. Available in series sizes, 72 mm, 4½" round, or square. Write for sale prices.



TIFFEN SPLIT-FIELD LENSES

Allow extreme close-ups to be combined with sharp detail in background. Available in ½, 1, 2 and 3 diopters. Available in series sizes 6 through 9, 4½" round, 93mm and 138mm. Write for sale prices.

TIFFEN CLOSE-UP LENSES

Extends close-up capabilities of your camera's lens. Available in diopters of ½, 1, 2, 3. Available in series sizes, direct screw-in, 4½" and 138mm. Write for sale prices.

MISCELLANEOUS

72mm SCREW-IN RUBBER W/A SUN SHADE for ANGENIEUX 12-120 ZOOM LENS: List, \$12.00. **SALE PRICE, \$10.95.**
 REPLACEMENT LENS CAP FOR 12-120 ANGENIEUX: Angenieux price, \$13.00. **AGE PRICE, \$7.95.**

AGE 72mm SCREW-IN POLARIZER: List Price, \$19.95. **SALE PRICE, \$15.95.**

COMPLETE LINE OF EK GELS AVAILABLE IN 2x2, 3x3, 4x4 SIZES.

Many filters available in standard screw-in as well as series sizes.

AGE Inc. carries a full line of professional filters for all purposes. Check with our Lens Department for your specific needs.

TIFFEN FILTERS FOR COLOR FILM

Clear — Protects optical glass with no color shift.

Sky 1A — Adds warmth, reduces blue outdoors and in open shade.

Haze 1 — Reduces blue caused by haze and ultra-violet rays. Ideal for mountain, and marine scenes.

Haze 2A — Greater ultra-violet correction than Haze 1.

UV17 — Greater haze correction, reduces blue in shade.

80A — Converts daylight film for use with 3200°K lamps.

80B — Converts daylight film for use with 3400°K lamps.

81 — Yellowish, warming filter.

81A — Corrects Type B films for use with 3400°K lamps. Prevents excessive blue.

85 — Converts Type A film to Daylight.

85B — Converts Type B film to Daylight.

85C — Helps prevent overexposure of blue record layer.

CC30R — For underwater photography to correct color. Also, to compensate for distortion of color when shooting through transparent windows, such as Vistadomes in trains.

TIFFEN FLUORESCENT COLOR CORRECTION FILTERS

FLB — Eliminates the deep blue-green cast ordinarily resultant from shooting color films with fluorescent lights. For use with Type B films.

FLD — Same as above, but for use with Daylight films.

TIFFEN NEUTRAL DENSITY FILTERS

ND .1 through ND 1.0 — Enable the cinematographer to control high-speed films by reducing the intensity of light transmitted. ND .1 has density of .10, 80% light transmission, ½ stop increase. ND 1.0 has density of 1.0, 10% light transmission, 3¼ stops increase.

TIFFEN COMBINATION FILTERS

3N5 — Combines #3 with 0.5 neutral density.

8N5 — Combines #8 (Yellow 2) with 0.5 neutral density for control of high speed films.

85N3 — Combines 85 with ND 0.3. Converts Type A film to Daylight.

85N4 — Combines 85 with ND 0.4. Converts Type A film to Daylight.

85N6 — Combines 85 with ND 0.6. Converts Type A film to Daylight.

85N9 — Combines 85 with ND 0.9. Converts Type A film to Daylight.

85N1-0 — Combines 85 with ND 1.0. Converts Type A film to Daylight.

85POL — Combines 85 with Polarizer. Converts Type A film to Daylight with advantages of Polarizer.

85BN3 — Combines 85B with ND 0.3. Converts Type B film to Daylight.

85BN6 — Converts 85B with ND 0.6. Converts Type B film to Daylight.

85BN1.0 — Combines 85B with ND 1.0. Converts Type B film to Daylight.

85BPOL — Combines 85B with Polarizer. Converts Type B film to Daylight.

23A + 56 — Creates night effects in daylight with pan film only.

Above filters available in Series 6, 7, 8 and 9; 93mm; 138mm; 4½" Round; 2x2, 3x3, 4x4, 5x5 and 6x6. Write or call for special sale prices.

11/74

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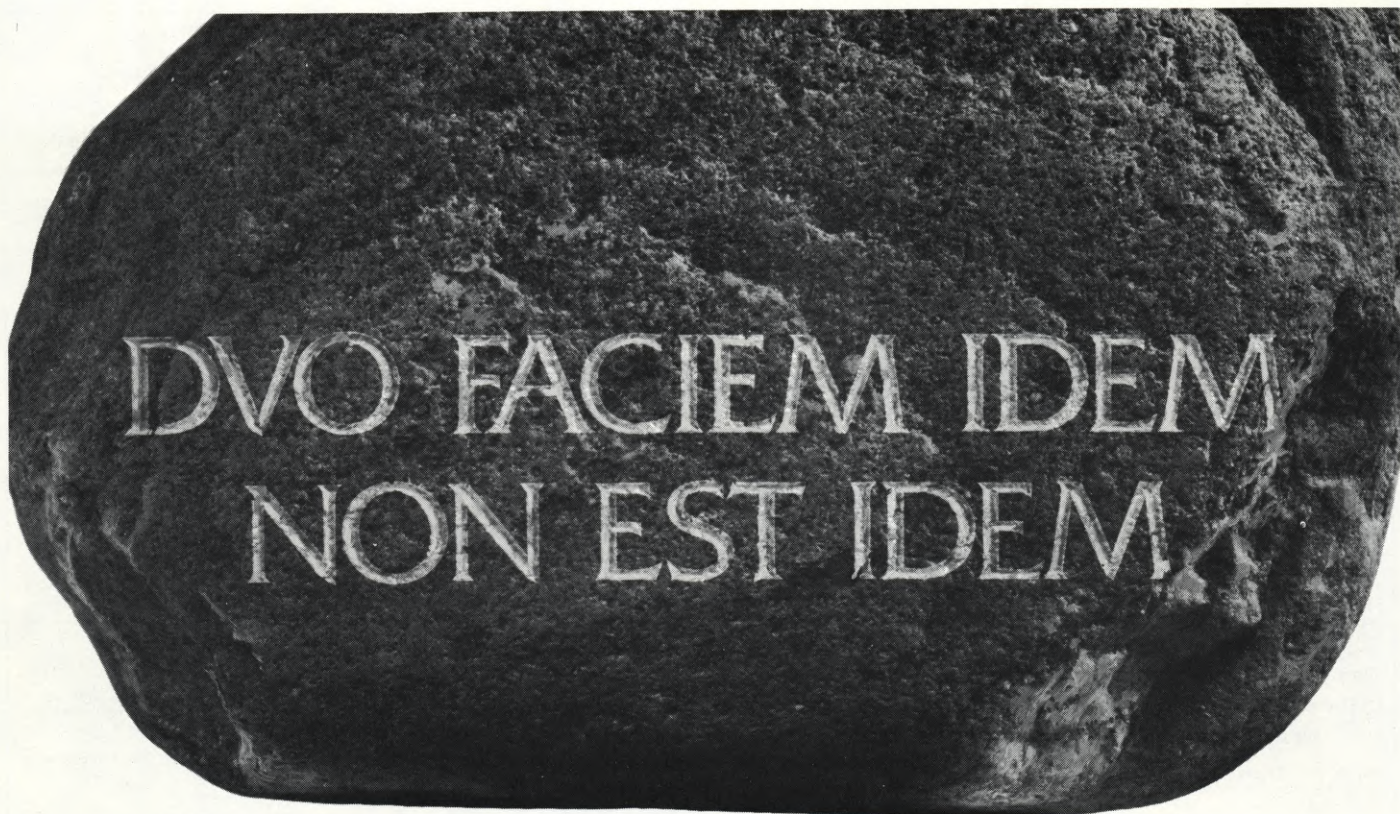
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1st Cent. B.C.

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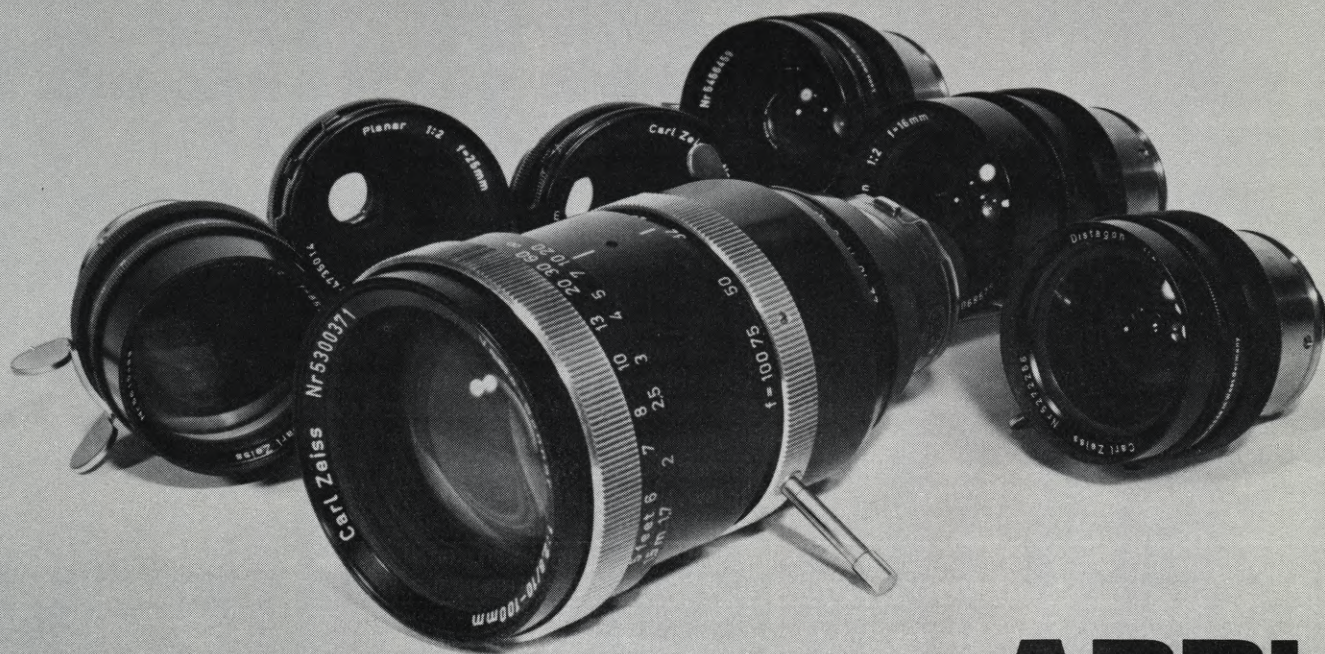
what's the yardstick for choosing a zoom lens?

Sharpness! But how sharp? As sharp as the best equivalent fixed focal length lenses — throughout its entire zoom range! The Zeiss 10-100mm Vario Sonnar is an advanced 16 element zoom optic that satisfies this scrupulous standard of quality. Unquestionably. And when

you compare Zeiss to Zeiss, you're measuring with the most exacting yardstick in the world of optics.

So if you're looking for a superb zoom lens — that will continue to perform reliably year after year—look to the Vario Sonnar. You'll see what makes it a Zeiss.

Zeiss 10-100 Vario Sonnar



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rosco says

ROSCOFLEX

...further
reflections on
light control.

Part II

In Part I, some history was offered, and we suggested the use of ROSCOFLEX-H and -S as the replacements for the old "hard" and "soft" materials used on reflector boards. These tough, stable reflecting surfaces are only a part of the full range of reflectors in the ROSCOFLEX part of the Cinegel family of Light Control Media.

In using reflectors, sometimes the sun is not in the right place for a shot relative to immovable scenic elements such as buildings and geographical features. ROSCOFLEX-M (Mirror) provides a mirror surface for relaying the sun into the reflector boards in such situations. It is also applicable as a long-throw reflector.

Some cameramen would never use the old type reflectors at all, feeling that they produced too harsh a look. ROSCOFLEX-SS (Super Soft) has become popular with many of these people due to the very soft character of the reflected light, and the extremely wide field it produces. It is about 1½ to 2 stops lower reflection compared to the ROSCOFLEX-S. It allows the placement of the reflector board close to the action, where desirable.

ROSCOSCRIM is a dual purpose material. It has the same sandwich type of construction as the other 'FLEXES, except that it has a black backing and is perforated. The front has approximately the same reflection characteristics as the ROSCOFLEX-S. When used as a scrim it reduces the transmitted light 2 stops. It is also an excellent sunshade for equipment and personnel.

These five materials, including the ROSCOFLEX-H and -S, are all supplied in 54 inch wide rolls, and represent a complete family of Light Control Media. All of these have different reflecting characteristics without changing the color balance of the reflected light. Once again, Rosco offers a selection of tools to do the job. Part III will deal with Light Control Media for simultaneously reflecting and filtering with a single material.

rosco

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QUESTIONS & ANSWERS

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

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



Q Could you tell me what a "lavender" is and how it is used? I believe it is a light purple colored net similar to an open-end single net, only lavender in color instead of black. Is a "lavender" the same as a "blue" net?

A Open-end nets are placed before a light source to reduce the amount of light striking parts of the subject and/or foreground objects to bring the scene into light balance. Thus a person wearing a very white coat will probably photograph better if the light on the coat is reduced by having an open-end net or scrim placed in front of the key light. The proper absorption of the light is of importance. Very light nets, medium density nets and heavy nets or scrims are, therefore, kept at hand. Colloquial names have been adopted (probably taken from the color of the original nets used) to quickly communicate to the grips the type of net desired. "Lavender" means the least dense net, "blue" indicates a medium density net, while "black" signifies the heaviest light absorbing net or scrim. The color of the net has nothing to do with the main function for which these nets are employed—light reduction. In many cases, these nets are doubled or tripled in thickness to provide more flexibility in light control.

Q If a Mitchell 35mm NC camera is mounted on a helicopter or fixed-wing aircraft for aerial photography, is it possible to close the shutter to 10° and operate the camera at 24 fps to take advantage of the 1/864 second exposure as a means of eliminating vibration, without creating a screen jump between each frame due to the extra long time of no exposure between frames.

A In aerial photography the shutter should never be closed beyond 90° at 24 fps. Even with this combination, undesirable "stop motion" effects are sometimes obtained. When the action permits, use a camera motor speed of 32 fps (175° shutter), which will eliminate most vibration effects when shooting from helicopter or fixed-wing aircraft.

Q When shooting Ektachrome out of doors, should a CC filter be used in addition to the Wratten No. 85 filter to balance color when shooting early in the morning or late afternoon? Can one be of gelatin and the other glass?

A The purpose of the No. 85 filter is to convert daylight to the proper color temperature for Ektachrome. When shooting from morning to late afternoon, color temperature of daylight changes progressively. Therefore, to obtain optimum color rendition in your photography at all times, it would be necessary to take color temperature readings of the daylight at intervals, as well as exposure readings; then, with the proper filters, make the necessary corrections of the light to effect consistent results.

As regards the filters, both glass and gelatin filters give good results, and the two types can be used together with success. Glass filters should be optically ground to insure definition of image.

Q What method is used to obtain a steady level image when photographing subject matter at sound speed from a small boat on open water?

A The camera should be mounted on what is known as a gimbal tripod. This has a weighted free-swinging pendulum suspended from the center of the head on which the camera is mounted. As the craft rolls with the sea, the tripod moves with the craft but the pendulum remains fairly perpendicular. Where the pendulum swings too freely, some dampening can be effected by extending heavy rubber bands from the weighted end of the pendulum to each of the tripod legs. For extremely low camera setups, an inverted gimbal should be used. Here the camera hangs in a cradle suspended from the universal joint at the top of the gimbal tripod. The camera's weight (or with added weight, if necessary) keeps the camera level. Also, some manual control is usually necessary to stabilize the pendulum in either type of gimbal described above. ■

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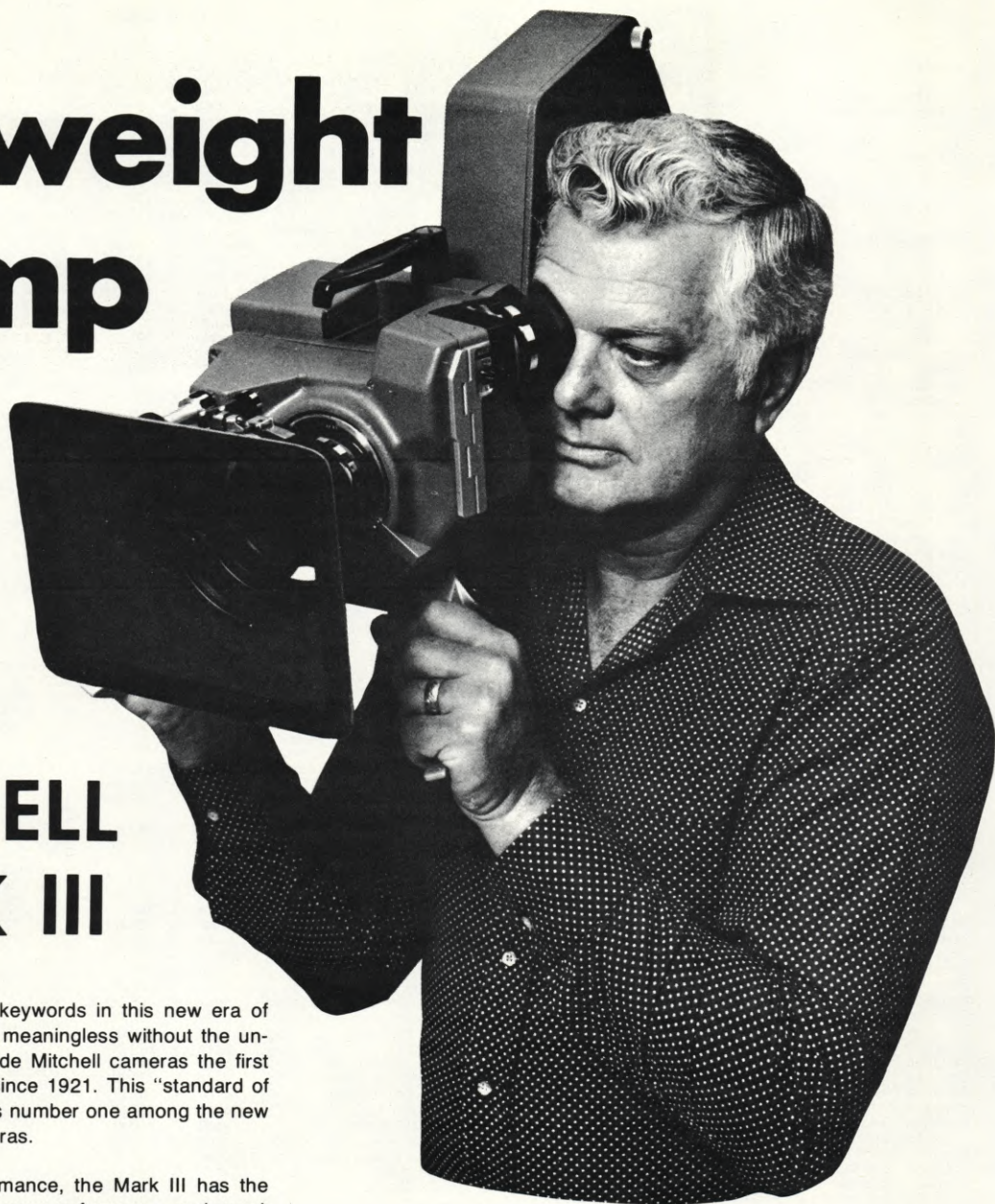


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CINEMA WORKSHOP



By ANTON WILSON

LOST LOOPS

Many of you may be aware that in addition to writing for *AMERICAN CINEMATOGRAPHER* and shooting film, I travel quite a bit in the capacity of speaker or lecturer. One is likely to find me at a local SMPTE meeting, lab workshop, union meeting, etc. It is during these sojourns that I get a chance to talk to many cameramen and receive some feedback on these articles which I write for the *Cinematographer*. Over the years, the comments about *Cinema Workshop* have begun to form a pattern. A typical comment would begin, "I read your column every month; all that theory is really interesting, *but...*" And the cameraman would then relate to me a specific mysterious problem that has plagued him for 17 years and tell me that not even prayer has helped him. In many cases his problem is not unique and quite often there is a simple solution. Of course there are certain problems that *are* unique.

Like the cameraman from Cincinnati who was filming a seance and wanted to know what film stock would best record ghosts. In other problems, the solution should be fairly obvious to most cam-

eramen—like the man from Des Moines who left his lens cap on and wanted to know if "flashing" would bring out some details.

In any case, I have decided to direct some time to those problems that seem to have the greatest popularity. We will still discuss theory, but the emphasis will be on the practical aspects.

One of the most frequent complaints concerns the loss of the film loop in the newer cameras with quick-change magazines. Unfortunately, a rumor has begun that this is a chronic problem with these cameras. Not so! There is a simple procedure that can assure against loop-loss in these cameras. I use one of these cameras and have never lost a loop even during a rock concert where I shot 43 magazines in one evening. The trick is twofold. When loading the magazine, one should favor the lower loop by one-half to one frame. That is, if there is any question as to the size of the upper and lower loop, it is better to have the lower loop slightly larger by about one-half frame, but not more than one frame.

More important, when the magazine is snapped onto the camera, the inching

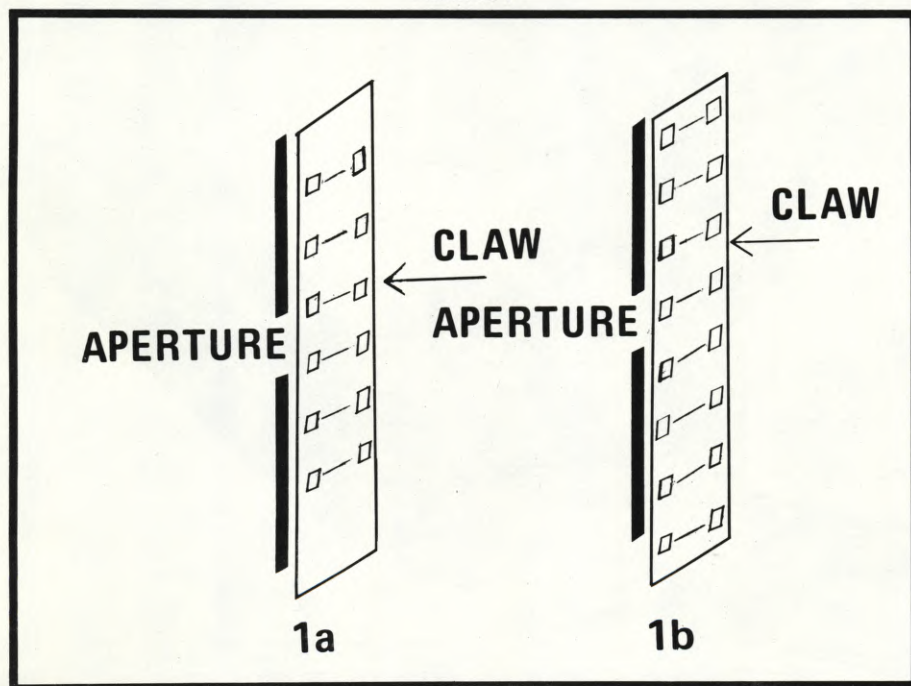
knob should be turned several times by hand *before* the motor is turned on for the first time. Likewise, if the magazine is removed and then refitted, or if the camera is transported, the inching knob should again receive several twists before the motor is turned on. That's all there is to it. No more lost loops or jam-ups.

There is a simple explanation for the lost loop problem and the subsequent easy solution, and I would feel remiss if I did not explain it (with at least one diagram). When the magazine is snapped onto the camera, the odds are a thousand to one that the sprocket hole will fall exactly on the spot where the pulldown claw enters the film. (FIGURE 1A) More likely the sprocket hole will fall somewhere mid-frame, as in FIGURE 1b. When the camera is turned on for the first time, the claw attempts to enter the film. The claw is spring-loaded so that when it hits the film where the sprocket hole is not present (FIGURE 1b), it will just stop at the film surface and not puncture the film (as would be the case with some mis-loaded cam/registration pin-movement cameras). As the downward advance motion starts, the claw will slide along the film surface until it reaches the sprocket hole, at which time, if everything goes well, it will fall into the sprocket hole engaging the film. As the claw finishes its stroke, it pulls the film into proper registration. Upon the next stroke of the claw, the sprocket holes are now all lined up and the claw will directly enter the hole before the downward motion commences. (FIGURE 1a)

There is one slight problem. Going back to FIGURE 1b, the claw is sliding along the film on its downward stroke. With the new high-torque crystal motors, the claw can reach maximum velocity by the time it reaches the sprocket hole halfway down its stroke. At this point it can be going so fast that it slides right over the hole, not having enough time to drop in—much like a golfer who putts too hard, causing the ball to go right over the hole. Once the claw has passed over the sprocket hole in this manner, the odds are it will do it several times again before engaging. By

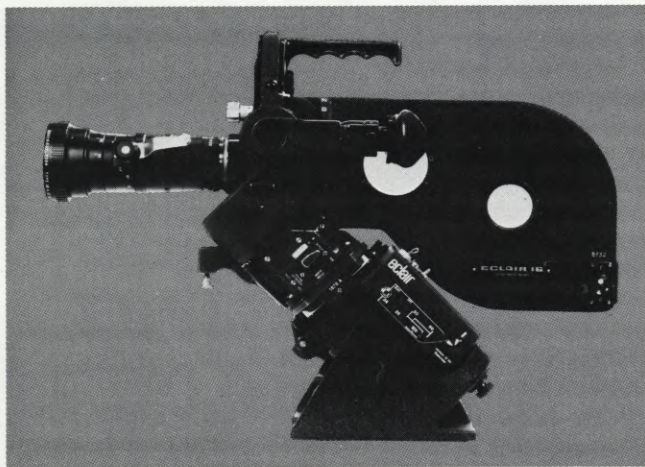
Continued on Page 1341

FIGURE 1



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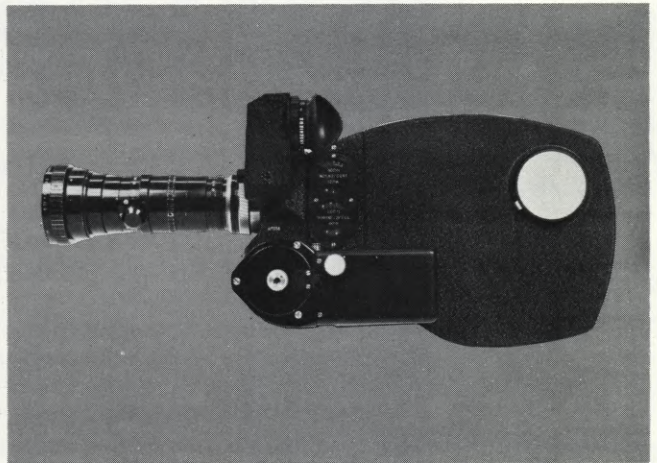


Eclair 16mm NPR

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The ACL has an all-new, heavy duty, variable speed crystal control motor that incorporates the most mod-



Eclair 16mm ACL

ern electronic components and offers total reliability plus filming speeds of 8, 12, 24 or 25, 50 and 75 fps. And, a complete range of instant snap-on coaxial magazines, both 200 and 400-foot capacities.

Be sure to specify "Made in France" when ordering your new Eclair. Accept no substitutes. French Eclairs are available for immediate delivery. Again!

For the complete line of French Eclair cameras, including the NPR, ACL, Cameflex CM-3, GV-16 and GV-35, contact your local dealer or the E-Cam Company.

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What the pros say about the Bolex 16 Pro.

On the drawing board the Bolex 16 Pro out-performs every 16mm camera we can think of. Of course, the only test that really counts doesn't happen on the drawing board. It happens on location. Here's how the Bolex Pro did there.



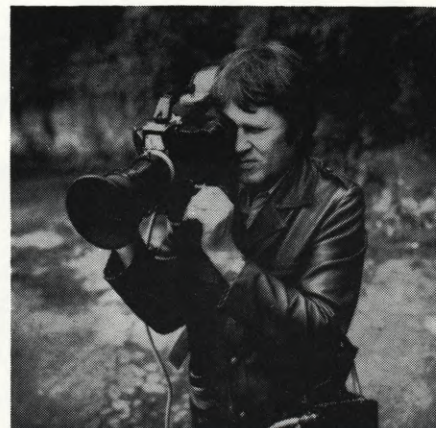
"We made an educational documentary about the Hindu Festival Thaipusam in Malaysia...the participants go into trance and are able to shut out any awareness of pain as they are pierced with small and large needles and hooks. Our shooting ratio during these tense moments...was one to one with only the head and tail frame getting lost in the splicing process matching original to work print....I must attribute these exciting moments in our films mainly to the uncanny abilities of the Pro to accept a new magazine, to thread itself and to film again in a fraction of the time usually needed with other cameras. This allowed me to roll nearly continuously at the most crucial moments..."

Gunter Pfaff, Filmmaker
Michigan State University



"...One year and 250,000 feet of film later...this camera has performed faultlessly. From the Peruvian Andes to the Arctic Circle, the ease of loading and the speed of operation afforded by the power systems have proven a tremendous boon. The automatic iris and the instant start and stop, without losing a single frame, are invaluable where lighting conditions cannot be controlled and time will not permit conventional editing. The self loading is so amazing that after more than six hundred magazines I occasionally peek into the take-up side, and sure enough—it worked."

Tom McEnry, Staff Cameraman CBS News



"It is the first time I had a camera which I did not have to bring in for repairs during such a long period.... Of special advantage to me are... motorized zoom and motorized follow focus....On my job in Alaska...where I had to work without assistance, I first discovered the advantages of the motorized focus. It was like having an extra hand. I also relied on many occasions on the automatic iris which is built in the camera and it worked more than satisfactorily..."

...in Rochester Heights Hospital I appreciated the quick changes of the magazine and automatic threading of the camera, which enabled me to film surgical operations without loss of any phase.... Many times I have occasion to use the camera handheld ... and find that the well balanced design of the camera enables me to work freely and relatively tireless in these confined areas."

Rudy Herrmann, Documatic Films, Inc.



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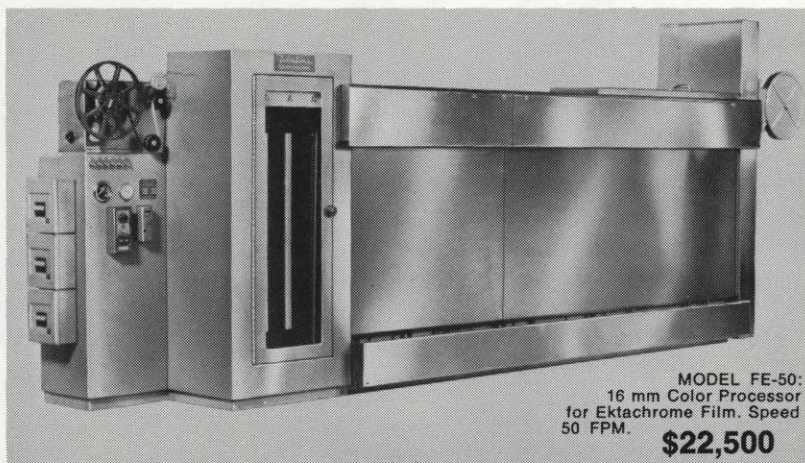
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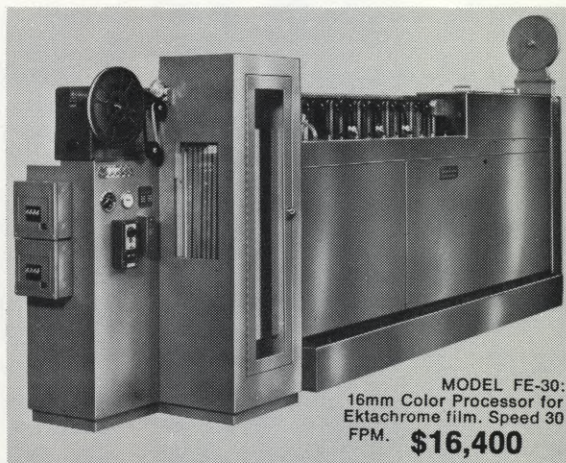
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THE BOOKSHELF

By GEORGE L. GEORGE

MAINLY TECHNICAL

Filmmaker Joan Horvath, whose work appears regularly on TV's *Sesame Street*, has come up with a compact, useful and informative book, **FILM-MAKING FOR BEGINNERS**. In straightforward language, she tackles the technical and creative aspects, giving a clear idea of camera work, script, editing and sound, how to handle actors and what it means to "express yourself on film." (Thos. Nelson \$5.95)

Basic information that will facilitate the proper photography of make-up is expertly supplied in **THE THEATRE CRAFTS BOOK OF MAKE-UP, MASKS AND WIGS**. This notable collection of 20 articles by top practitioners of the craft explains make-up in its broader sense and how it is used in film and television, as well as on the stage. (Rodale \$6.95)

Peter Travers and Stephanie Reiff, the only reporters allowed to watch the shooting of Billy Friedkin's exercise in demonology, tell all in **THE STORY BEHIND 'THE EXORCIST'**. Spellbinding and well researched, their illustrated chronicle covers in fascinating detail the filming and its extensive preliminaries, and the controversies that ensued. (Crown \$6.95)

The new paperback edition of Prof. Rudolf Arnheim's classical study, **ART AND VISUAL PERCEPTION**, should entice film scholars into taking a fresh look at this theory of the "psychology of the creative art" in the context of cinematic discovery. (California U. Press \$4.50)

MASTER CRAFTSMEN

In Vol. 3 of **THE HOLLYWOOD PROFESSIONALS** series, John Belton surveys in a concise and knowledgeable text the careers of directors Howard Hawks, Frank Borzage and Edgar G. Ulmer, affording interesting comparisons of the importance of camerawork in the visual styles of these masters of their craft. (Barnes \$2.95)

Vincente Minnelli's autobiography, **I REMEMBER IT WELL**, is as absorbing when he writes about his personal life as when he discusses his work as a director, mentioning George Folsey's outstanding photography on *Meet Me In St. Louis*, and calling "the movement of the camera a form of choreography." (Doubleday \$10.95)

The hurly-burly of Hollywood's Golden Era is glowingly recalled in director Raoul Walsh's rollicking

memoirs, **EACH IN HIS TIME**. It's an exciting tale, candid almost beyond belief, and packed with on-&-off screen action of the most vivid type. (Farrar Straus Giroux \$10.)

In **CLINT EASTWOOD: MOVING ON**, the actor-director's accomplishments are perceptively assessed by Peter Douglas, particularly his commitment to separate his quiet, private family life from the violence that pervades his films, on which cameraman Bruce Surtees is a recurring collaborator. (Regnery \$7.95)

BOOKS INTO FILMS

Editor Richard J. Anobile launches the "Film Classics Library" with John Huston's **THE MALTESE FALCON** and James Whale's **FRANKENSTEIN** in attractive large format volumes, using over 1,000 sequential stills and the complete dialogue to convey fully the plot, characterizations, and flavor of these perennial screen favorites. (Avon \$4.95 ea.)

The script of Lindsay Anderson's satirical comedy, **O LUCKY MAN!**, written by the director in collaboration with David Sherman, is as exciting and entertaining to read as it was to see on the screen where it so brilliantly pictured the madness of our times. (Grove \$3.95)

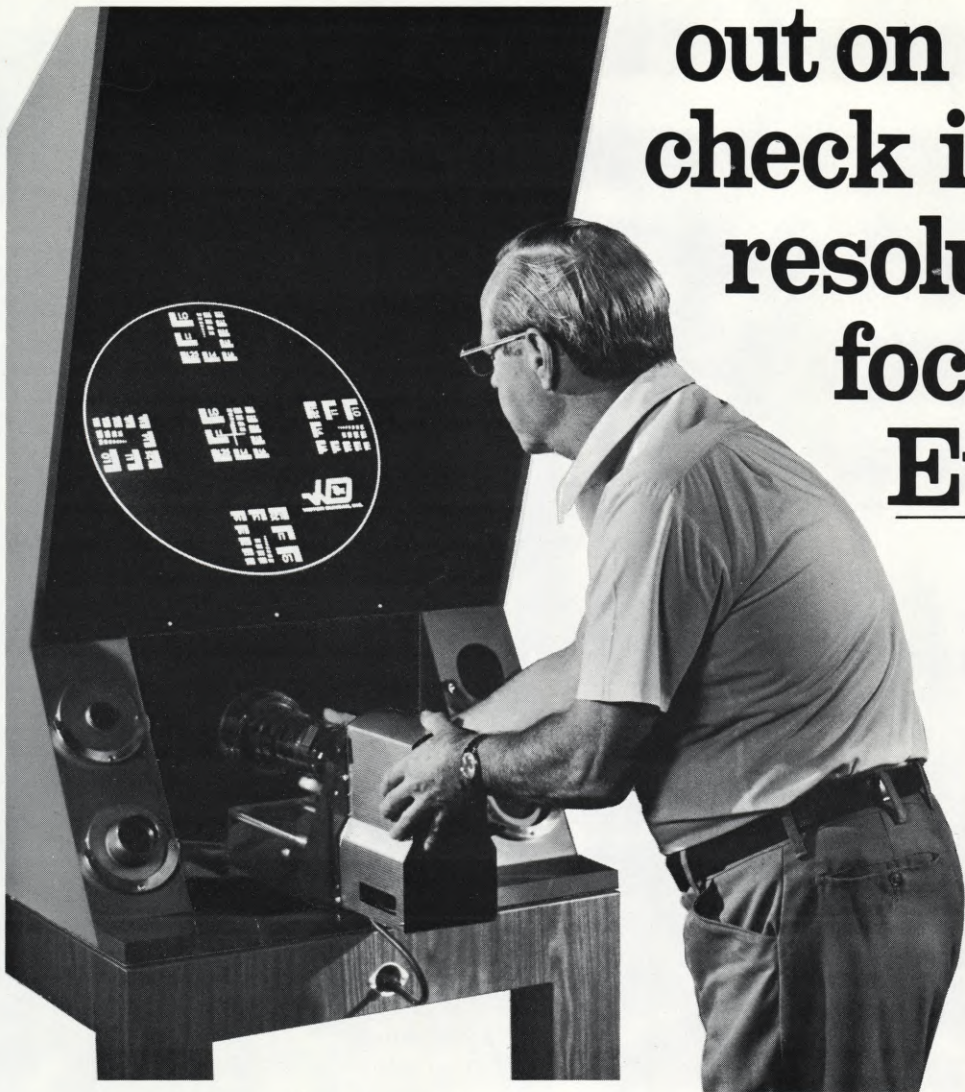
An intensely personal and searing document, **SCENES FROM A MARRIAGE** is the script of Ingmar Bergman's three-hour movie. As a realistic depiction of married life today, it packs a considerable emotional wallop in its nuanced approach to the dramatic story of a couple's neurotic upheavals. (Pantheon \$6.95)

The characteristics of English Gothic literature are examined in **A HERITAGE OF HORROR**, David Pirie's effective study of his country's Gothic movies since 1946. That year, Hammer Films and other studios revived the genre, boosting it with transfusions of sex and surrealism, and establishing it as a major tradition of British filmmaking. (Avon \$2.95)

Graham Greene's 40 years association with the cinema is the subject of Gene D. Phillips' in-depth analysis, **GRAHAM GREENE: THE FILMS OF HIS FICTION**. Based on extensive interviews with the British novelist, this noteworthy study combines a thoughtful and sensitive search of Greene's ability as a screenwriter with a discussion of the differences between the literary and the visual media. (Teachers College Press \$10.50/5.95)

Continued on Page 1370

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PROFILE: A.S.C.

HASKELL BOGGS, ASC

In the Simi Valley, near Los Angeles, on the outdoors set of the new television series, "Little House on the Prairie," we encountered director of photography Haskell Boggs the other day. He was huddled with director Alf Kjellin under a multi-colored umbrella, alongside one of two Panavision cameras.

"It's good to be back working in a television series," Boggs remarked. "I photographed something like 250 'Bonanza' shows, but other than that, I've always concentrated on features."

One good reason why Boggs ("Buzz" to his friends) is on this particular series is that it stars Michael Landon, one of the leads in the now-defunct "Bonanza". Boggs always had a strong rapport with Landon, Lorne Greene and the late Dan Blocker, so it was understandable that Landon should seek him out for the new series.

"I've been very fortunate to be associated with the top talent in our business," Boggs commented. "Nowadays, I really don't see too much difference between working in motion pictures or television, just so long as you're working with top people."

Haskell Boggs, A.S.C., is numbered himself among those "top people" he admires so much. During a career that has spanned four decades, Boggs has photographed many great motion pictures. He worked for Cecil B. DeMille for many years, and he focused his cameras on such celluloid greats as Clark Gable, Carole Lombard, Madeleine Carroll, Doris Day, James Cagney, Jerry Lewis and Dean Martin.

"Buzz" started out at Paramount in 1934, and except for a three-year stint at Warners in the late-1960s, he has been there ever since.

He first became interested in photography when he was in grade school, in Oklahoma City. In junior high school, he "dabbled" in cameras. He built his own camera—it took him more than two years in the making—before he had left high school.

It was this intimate working knowledge of cameras that eventually resulted in his being credited with the invention of a new focusing device for a studio camera, not long after he started work at Paramount.

In Oklahoma, he was nicknamed "Buster" Boggs, but he says Carole Lombard changed all that.

"When she first met me, she said, 'We ought to call you Buzz, because you're always buzzing around on the set!'" Boggs recalled. "And the nickname has stuck."

Like most members of the esteemed American Society of Cinematographers, "Buzz" has many stories to tell of the famous people he's worked with over the years. One such story concerns the legendary DeMille, when they were working on a picture titled "The Crusaders", in the early 1930s.

"We had built a huge set at Paramount, with hundreds of extras in this particular scene. It was a sequence in an arena, with slave girls up for sale. C.B. had his hand microphone, telling the girls what they were supposed to be doing when the cameras rolled.

"He spotted two girls talking, while he was giving the instructions. So he said, 'You two girls over there—you must be talking about something really important. What is it?' The girls got scared, but finally one of them—I think she was Ann Harding, who was then a starlet—answered him.

"She said: 'If you really want to know, we were wondering when that bald-headed sonofabitch over there was going to call lunch!'"

Boggs grinned. "You know what? C.B. immediately called lunch!"

Another big story-teller, as everyone in the film business was aware, was Dan Blocker. His jokes—and his pranks—were the cause of many a red face. When Blocker found out Boggs was from Oklahoma, the "Okie" jokes flowed fast and furious. Finally, "Buzz" turned the tables on Big Dan, who was what Boggs calls "a professional Texan."

"It was shortly after the U.S. Pueblo had been captured by the North Koreans, and the crew taken prisoner. I asked Blocker one day, 'Dan, did you hear the news? The Pueblo has been released by the North Koreans.'

"Blocker said he hadn't heard the news. So I added, yes, the North Koreans found out there were two Texans on board the ship. They figured that if they had Texans on board, it really couldn't be an intelligence ship. So they let them go!"

It's easy to understand why Boggs has enjoyed his career in cinematography. He likes the work, and he gets along with people. Also, his camera crews readily take supervision from him. They acknowledge his craftsmanship and his great experience.

"I always make a point on a picture, too—whether we're working in a feature or for television—to establish a good relationship with the director," he noted.

The "Little House on the Prairie" series is one example. Boggs invariably spends one or two days with the director of each show, prior to shooting, looking over potential camera set-ups.

"We're not setting any new pattern. Directors of photography—if they're any good—will always try to work this way with the director. We know that, by selecting filming sites ahead of time, the production company will save time and money. And that's the kind of music the producer likes to hear!"

"Buzz" resides in Studio City, in the San Fernando Valley, with his wife, Evelyn and an 18-years-old daughter, Debra. His main hobby is machine work, which is readily apparent when visitors view the impressive array of power tools in the back yard of his English farm-style home.

Indeed, Haskell "Buzz" Boggs is a happy man, doing the thing he likes to do the most.

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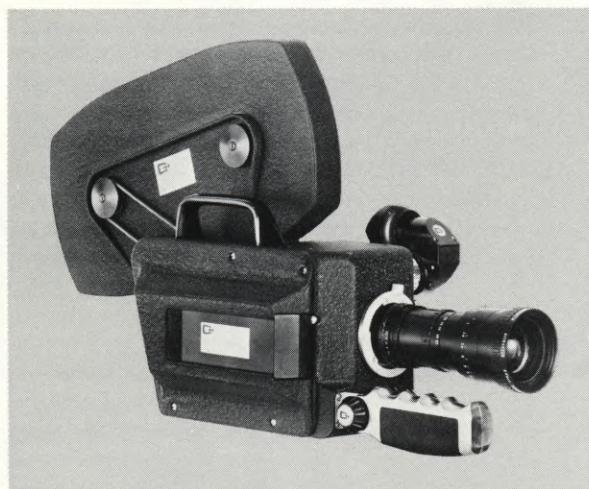
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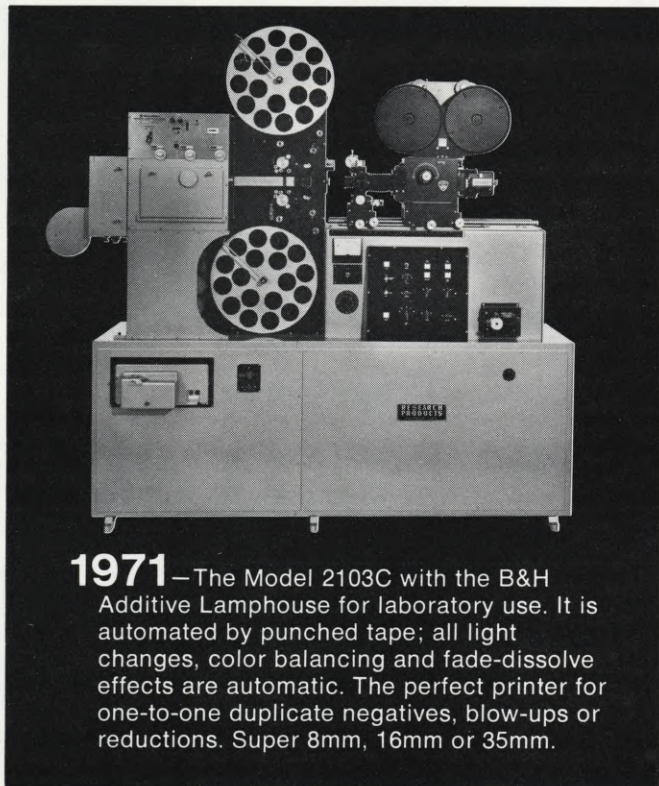
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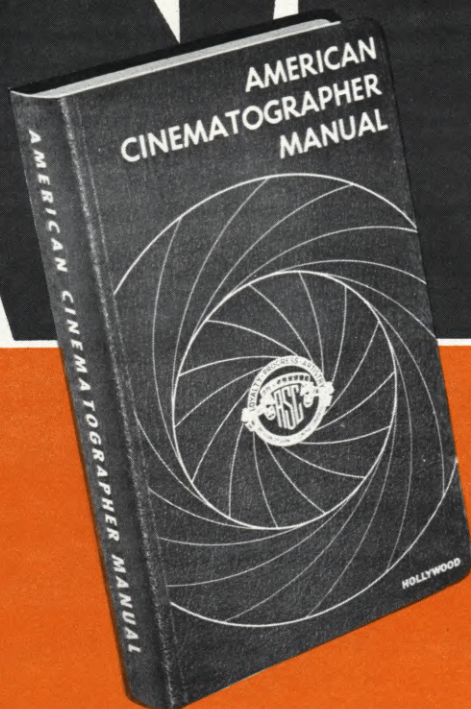
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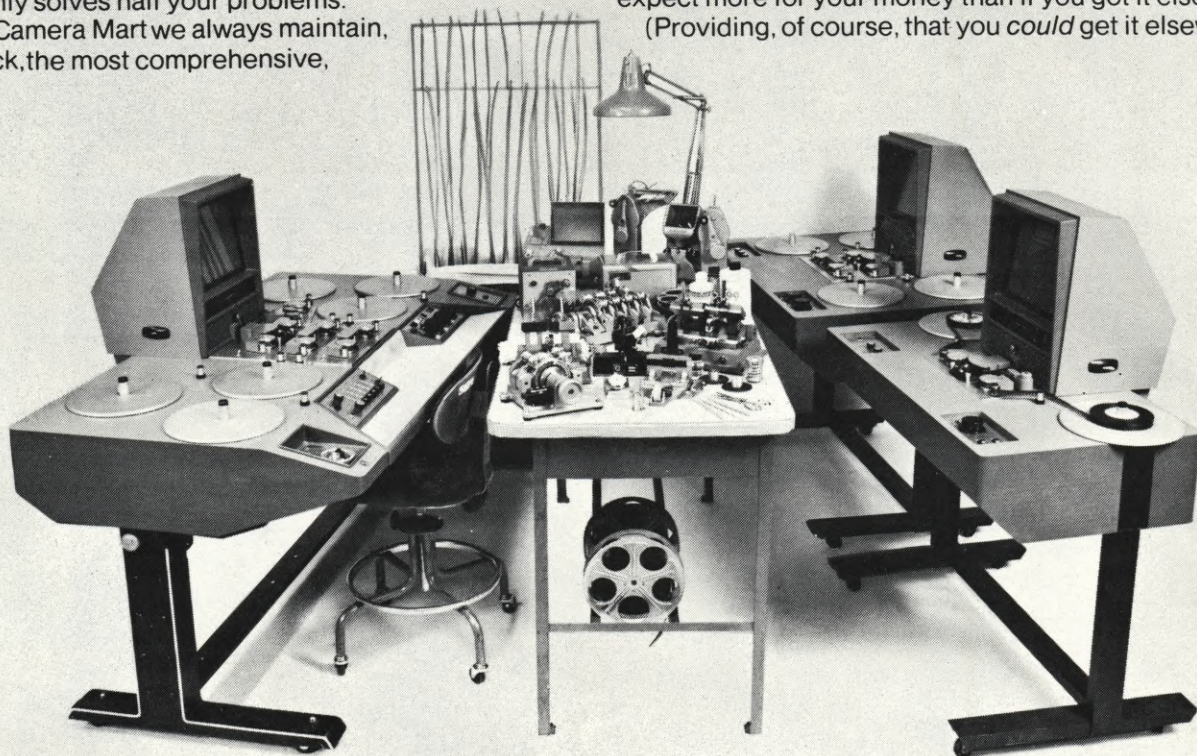
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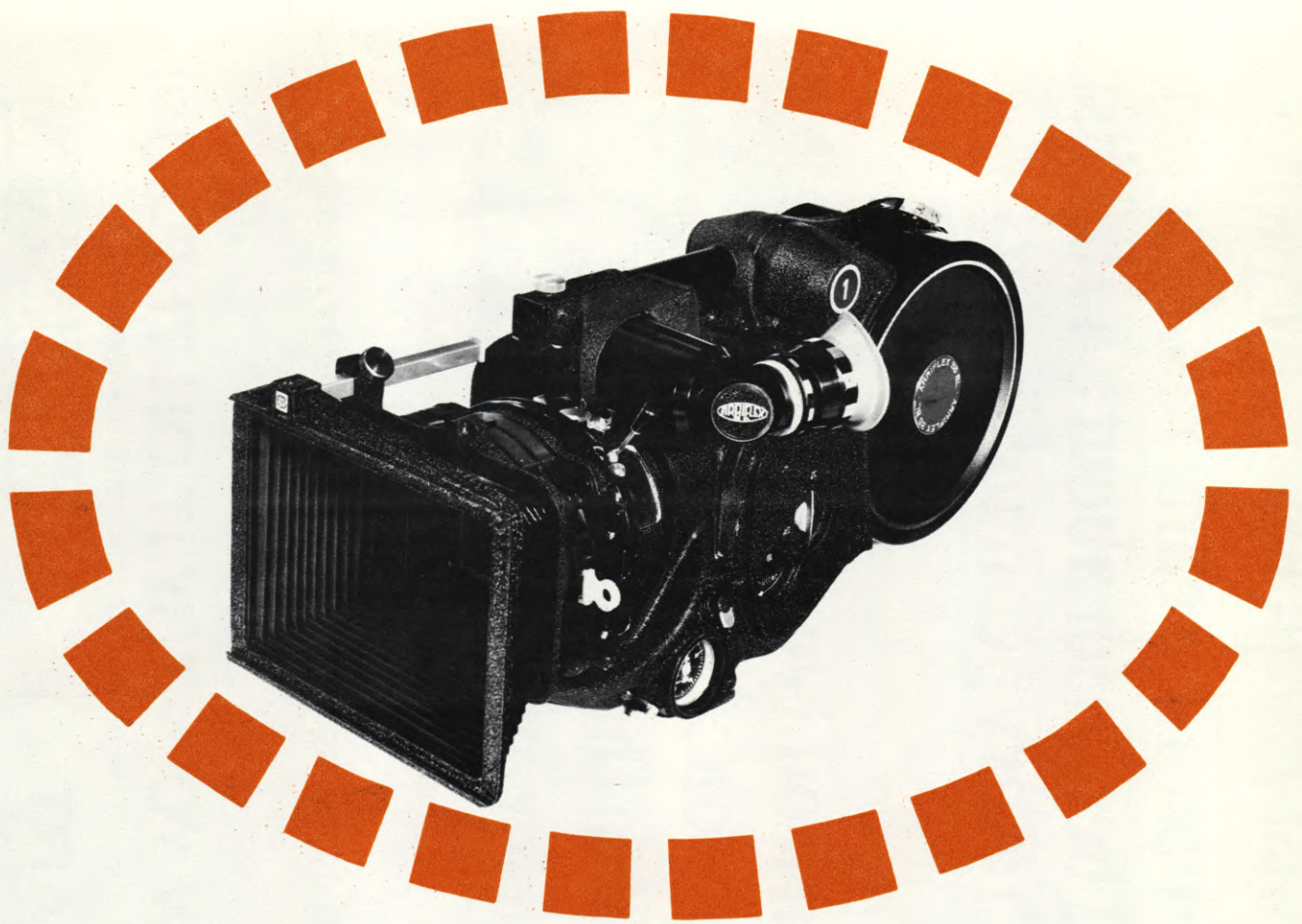
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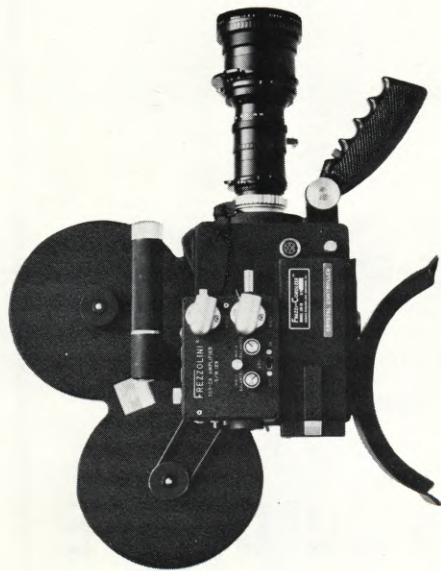
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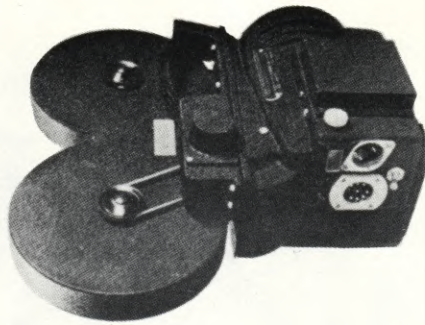
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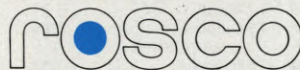


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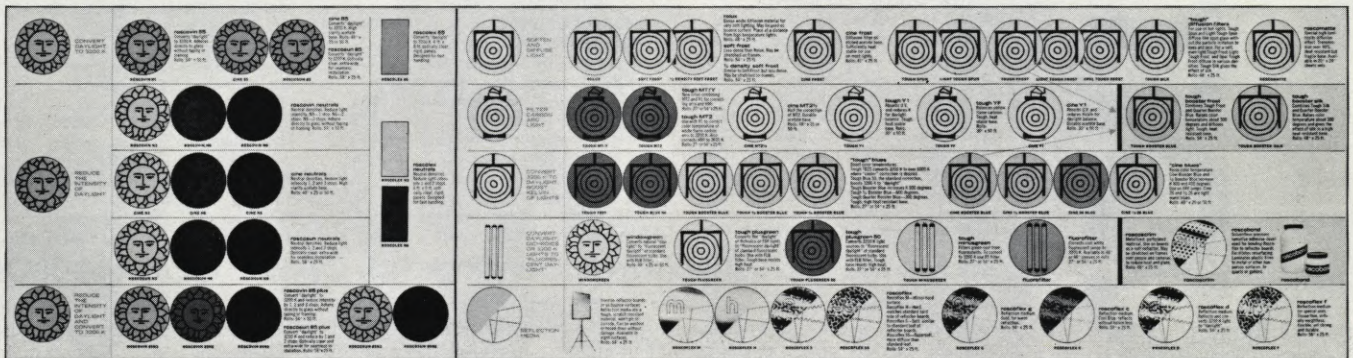
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Purchase a new Beaulieu 16mm camera during the Christmas Season, and you will receive FREE OF CHARGE 16mm accessory equipment which will not only represent a **substantial savings**, but will also prove valuable to you in your work.

Buy a Beaulieu R16B(PZ)

Buy a Beaulieu R16B(PZ) camera with Angenieux 12-120mm zoom lens, and receive the following accessories **FREE** from Hervic:

	Suggested List
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**TOTAL VALUE: \$738.80
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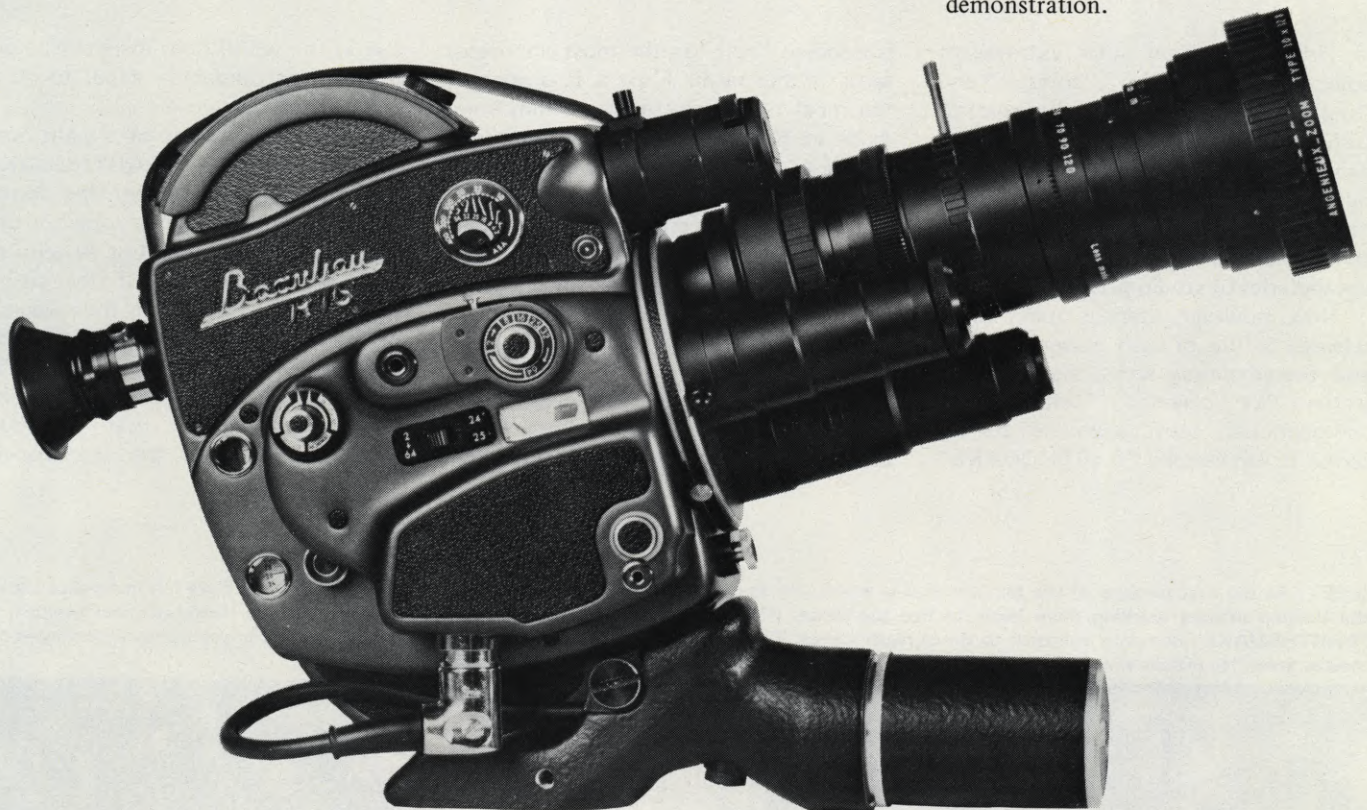
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Universal's stunning new action epic, produced on a grand scale and probably the most technically intricate film ever made in Hollywood, required services of an army of specialists in the most exotic crafts of film-making

GIGANTIC!
COLOSSAL!
STUPENDOUS!

By BOOKER McCLAY

Time was when such extravagant adjectives as "gigantic", "colossal" and "stupendous" were routinely used to ballyhoo the steady stream of pictures emerging from the Hollywood movie mills. Ultimately, and inevitably, these highly-charged adjectives fell into disuse through overuse and vanished from the vocabularies of studio press agents.

Now, however, there is about to be released a film of such powerful sweep and overwhelming scope that only adjectives like "gigantic", "colossal" and "stupendous" seem adequate to describe it. Universal's "EARTHQUAKE"

is a screen "epic" in the most elaborate sense of the term. Also, it is probably the most technically intricate film ever made in Hollywood, requiring the services of an army of specialists in the most exotic crafts of film-making. In several cases it was necessary to coax these experts out of retirement because no one among the younger technicians could be found who possessed their unique skills and lifetimes of experience.

It is safe to say that "EARTHQUAKE" is a film that could only have been made in Hollywood, since nowhere

else in the world does there exist a pool of technical expertise equal to its requirements.

Against the canvas of a giant megalopolis, Universal's "EARTHQUAKE" dramatizes the raging fury, the destructive force and the apocalyptic horror of a temblor that strikes Los Angeles and reduces a great part of the city to rubble. Movies depicting the ravages of nature have been attempted before, but never on the massive scale of "EARTHQUAKE", a Mark Robson-Filmakers Group production that introduces special effects and the startling new

(LEFT) As the first rumbles of the temblor that is eventually to devastate Los Angeles in Universal's "EARTHQUAKE" are felt in a police station, the startled officers working there begin to flee the scene. (RIGHT) Gathered on the former New York street of Universal's vast backlot, the "EARTHQUAKE" company prepares to shoot night scenes. The cataclysm that strikes and levels one of America's largest cities is portrayed on a massive scale. No efforts were spared to involve the audience in what is literally a shattering experience.

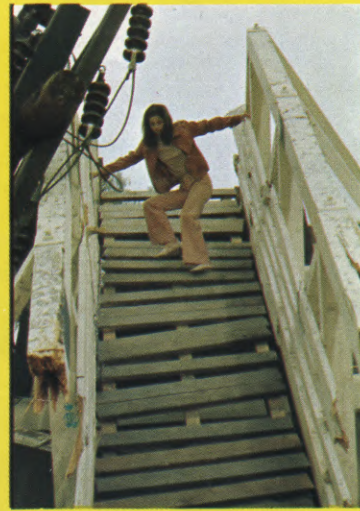




(LEFT) Injured victims of the main quake are given makeshift comfort in a hastily improvised first aid station. (CENTER) With roof beams and walls falling down about her ears, Ava Gardner frantically tries to escape injury. (RIGHT) Three cameras are set up to shoot one of the hundreds of intricate special effects which lend unprecedented impact to "EARTHQUAKE". Multiple cameras were often used to film "one take" scenes so intricately rigged that they could not be restaged.



(LEFT) Terrified pedestrians struggle to retain their footing as huge chunks of concrete come crashing down from the skyscraper above them. (CENTER) In the aftermath of the main quake, a Hollywood street is filled with rubble. (RIGHT) An overview of devastated Los Angeles as seen from the stripped upper floors of a 25-story building. What happens in "EARTHQUAKE" is a cataclysm on a scale unheard of in modern history—an earthquake registering between 10 and 11 on the Richter scale.



(LEFT) Hapless victims, caught in the upper stories of a skyscraper, go plunging to their doom as the structure is violently shaken. More than 140 stunt people were employed on "EARTHQUAKE", the largest group of such specialists ever assembled for a single motion picture. (CENTER) With elevators and stairways destroyed, survivors trapped in the heights of the skyscraper lower themselves down by whatever means possible. (RIGHT) Genevieve Bujold flees down a shaky catwalk as a hillside home comes crashing down above her.

"Sensurround" system (patent pending), designed to give moviegoers the sense of being in the epicenter of a major earthquake.

"EARTHQUAKE" was produced and directed by Mark Robson, and stars Charlton Heston, Ava Gardner, George Kennedy, Lorne Greene, Genevieve Bujold, and Richard Roundtree, with Marjoe Gortner, Barry Sullivan, Lloyd Nolan, Victoria Principal and Pedro Armendariz, Jr. heading the co-star cast. Over a thousand actors, stunt people,

atmosphere and extra players appear with them as personae in the gallery of characters caught up in the quake's devastation. Jennings Lang is executive producer of the large-scale motion picture, written as a screenplay by George Fox and Mario Puzo, author of the best seller "The Godfather".

The revolutionary "Sensurround" system, developed by MCA-Universal engineers as a new motion picture dimension of theatrical sound and sense involvement, utilizes a control track to a

fourth channel of the conventional sound track. Orchestrated to the action of the film drama, and building to a crescendo as the quake registers between 10 and 11 on the Richter scale, the control track accommodates non-aural aspects of an earthquake.

Before cameras turned, Mark Robson worked with art directors Alex Golitzen and Preston Ames for months in planning the production design. During the quarter-year of filming, three special effects wizards—Frank Brendel, Glen



Preparing to shoot on a rubble-strewn section of Universal's backlot, cast and crew members of "EARTHQUAKE" survey the scene. Producer/director Mark Robson stands at the top of the ladder, with Charlton Heston just below him. Seated at front right is highly-skilled Director of Photography Philip Lathrop, ASC. Months of meticulous pre-planning preceded the actual shooting of the film, making possible the creation of a motion picture with tremendous production value on a relatively low budget.

A helicopter and ambulances move in for a rescue mission on the street. It is safe to say that "EARTHQUAKE" is a film that could only have been made in Hollywood, since nowhere else in the world does there exist a pool of technical expertise equal to such demanding requirements. In several cases it was necessary to coax out of retirement experts with very special skills, since their expertise had not been passed on to younger technicians.



Robinson, and Jack McMasters—with their own crews of almost a hundred specialists, worked night and day to create specific phases of a cataclysmic earthquake and the incredible destructive aftermath of a city in ruins. There are shaking and crumbling buildings, falling elevators crowded with people, toppling high tension towers, broken bridges, trapped people, a dam breaking, flood waters, buckling streets, broken bridges, twisting freeways, tumbling vehicles, people falling from high places, cracking earth, collapsing houses, explosions and fires. The consensus among the experts assigned to simulate the giant temblor was that "EARTHQUAKE" features more special effects than any film in Hollywood history.

Because of the unusual amount of dangerous action, 141 stunt men and women—the largest number ever used in a single motion picture, according to veteran stunt coordinator Jack Daheim—were engaged for the earthquake sequences. The action called for the film daredevils to be buried alive by cave-ins under concrete and rubble, caught in exploding houses, struck by falling beams, washed away by floods, trapped in crumbling structures, and to jump from buildings and risk their necks in countless other stunts.

Special effects men and stunt coordinator Daheim, under Robson's direction, spent weeks rehearsing the action. In one hazardous street scene, buildings collapse and debris rains down on the people below. Five days of planning, rigging and rehearsing were required before filming could begin. Actors and stunt people were given specific marks to hit at a certain time and 55 special effects men were charged with releasing falling objects.

"Up until the time we were ready to make a take, we were on safety," says Robson. "When ready to shoot, we took them off safety and watched everything like hawks."

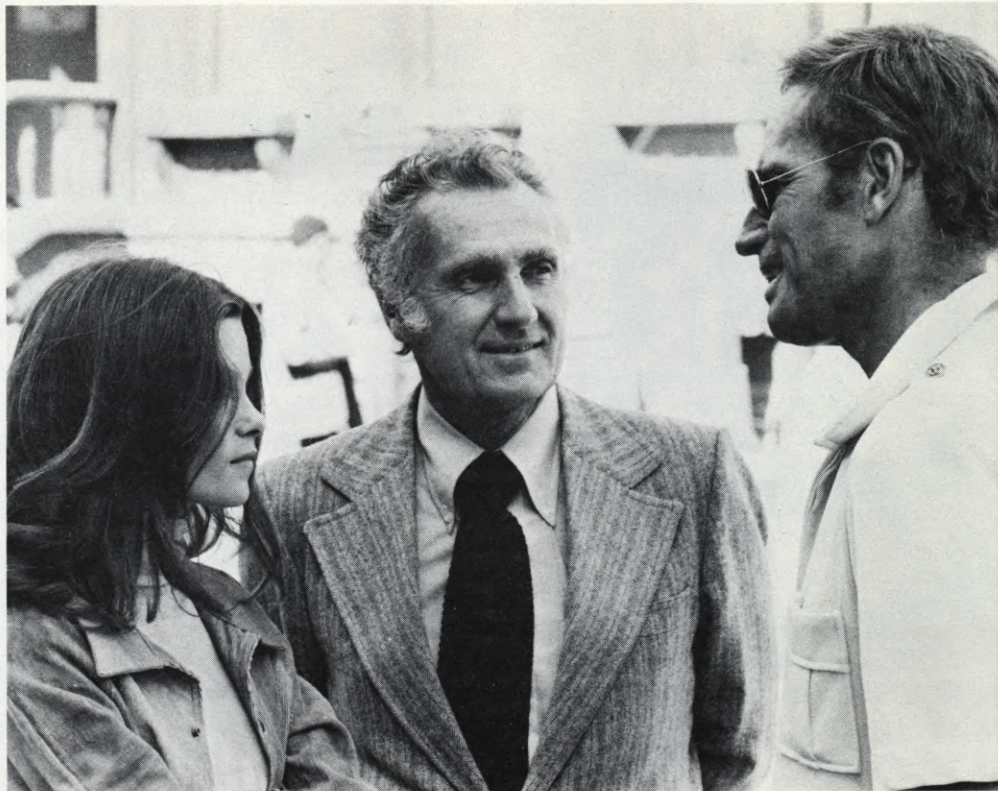
When Robson was satisfied with the run-through he polled each department head. Were their crews on full alert? Were the stuntmen, bit players and extras ready? Were Charlton Heston and Ava Gardner, who play a married couple having an argument as they walk out of a building, in their places?

"Earthquake!" shouted the producer-director, and on signal, the complex choreography of people caught in the fury of a powerful tremor began. Heston, shielding Miss Gardner, found safety with her underneath a parked car. A second later, great chunks of concrete slammed down on cue, hitting, as pre-planned, within inches of the stars. All around them actors and stuntmen fell to

the ground, dodged falling fragments, and were caught in a hail of metal and plaster. While some of the material was fashioned of styrofoam as a safety measure (with steel reinforcing bars inserted to speed descent), large signs, concrete boulders and cement walls were real (the broken concrete that crushes two cars within six feet of Heston and Miss Gardner weighed over six tons.)

Many of the earthquake scenes were created by employing a combination of techniques, some of them completely new. One method was the construction of a tremendous rocker platform on which the sets were mounted; the huge springs with hydraulic rams were controlled by variable motors to permit the programming of an earthquake of any degree of intensity. Another device developed by cinematographer Philip Lathrop, ASC and Louis Ami, Universal machine shop head, was a special camera shaker mount with both vertical and side motion, which is shaken by eccentric motors with rheostats to gauge the violence of the motion. This innovation made it possible to simulate seismological movements of stationary objects with unbelievable verisimilitude when combined with the rocker platform or other actual physical movement of objects.

A veteran of almost thirty years in the motion picture industry, associated with outstanding films that range from adventure-drama to comedy, producer-director Mark Robson for the first time in his career put his stamp on a motion picture in the *genre* of "EARTHQUAKE". His acclaimed successes include "THE BRIDGES AT TOKO-RI", "THE HARDER THEY FALL", "VON RYAN'S EXPRESS", "RETURN TO PARADISE", "THE INN OF THE SIXTH HAPPINESS", "NINE HOURS TO RAMA", "CHAMPION", "HOME



Booker McClay, who was in charge of all publicity and promotion on "EARTHQUAKE" during its filming and on through arrangements for premiere engagements in 100 theatres throughout America, chats with French-Canadian actress Genevieve Bujold and Charlton Heston, two of the many stars of the film. During the filming, most of the stars performed their own stunts, exposing themselves to very real dangers in many instances. Their willingness to do so adds a high degree of verisimilitude to the action.

OF THE BRAVE", "PEYTON PLACE", "THE PRIZE", and "VALLEY OF THE DOLLS".

Robson is partnered in The Filmmakers Group with Robert Wise, Bernard Donnfeld and James Bridges.

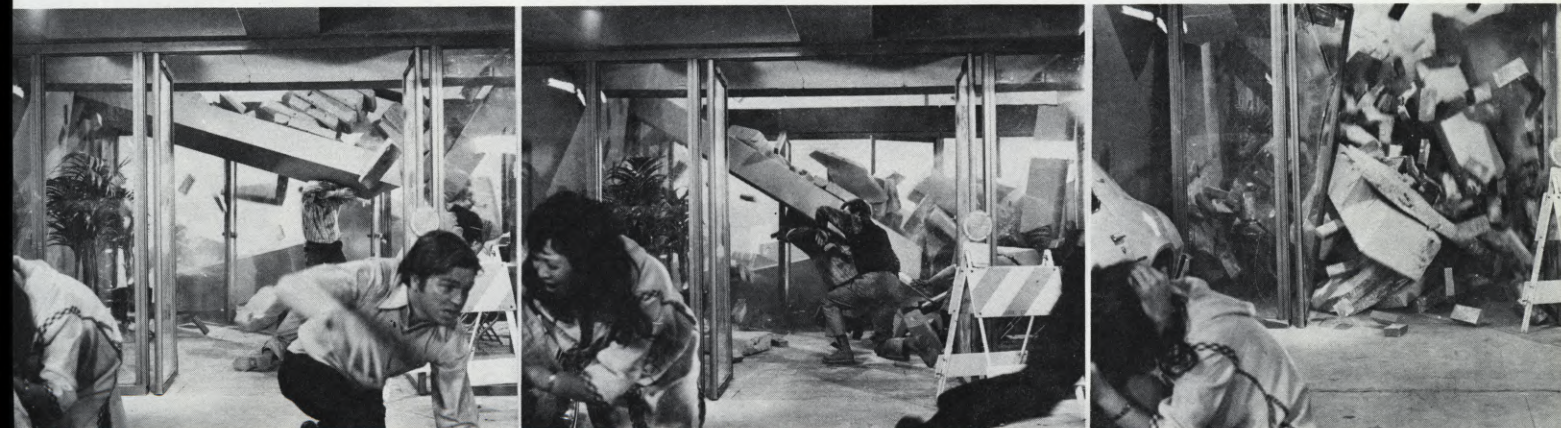
Universal Vice President Jennings Lang was concerned with two of the studio's other major productions for the year while "EARTHQUAKE" was being filmed. He also served as executive producer of "THE FRONT PAGE", the Billy Wilder film starring Jack Lemmon, Walter Matthau and Carol Burnett, and

supervised production of the air suspense drama, "AIRPORT 1975", with an all-stellar cast headed by Charlton Heston, Karen Black, George Kennedy, Susan Clark, Gloria Swanson and Helen Reddy.

A few hours before cameras turned on "EARTHQUAKE" in January 1974, a tremor rocked Los Angeles, registering 3.5 on the Richter scale, with its epicenter just five miles from the film's location sites. The temblor, prophetic in its timing, came almost three years to

Continued on Page 1322

As the entire building shakes, people scatter and the ceiling gives way, raining down tons of rubble. Stunt people were actually trapped under the carefully rigged debris, miraculously escaping serious injury. "EARTHQUAKE" involved more intricate special effects than any film ever made in Hollywood. All of the magic of the most skilled technicians in the film industry was concentrated to provide the audience with an unforgettable experience.



THE PRODUCTION

How to make a film that is truly an "event" and which looks on the screen like it cost three times as much as it actually did

By JENNINGS LANG

Executive Producer

At MCA/Universal we have felt for many years that in order to attract large audiences into the theatres to see feature films we would have to offer them some sort of "event", something that would not be accessible to them on the home television screen. We are very large suppliers to the home television

screen, so we consider ourselves to be somewhat expert in that field.

People who make up audiences have a certain amount of money to spend when they go outside the home for entertainment and we know that we have to provide something very special so that they will chose to spend it in the

movie theatre, rather than in the ball park or the concert hall or taking a trip. With that in mind, we have tried to come up with "events" for the motion picture theatre.

As far as the film "EARTHQUAKE" is concerned, we feel that it is not only an event, but a very important event—

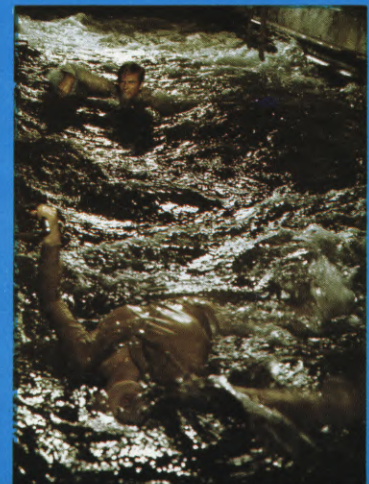
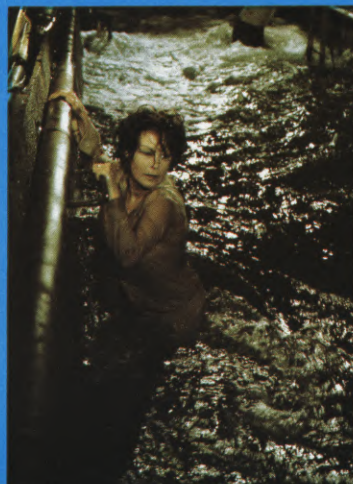
(LEFT) A scene from "EARTHQUAKE" in which injured victims of the main quake are cared for at an improvised first aid station set up in a subterranean garage, little realizing that aftershocks will soon send terror raining down upon them again. (CENTER) Ava Gardner picks her way through a disorganized crowd in the aftermath of the quake. (RIGHT) Fires rage on Universal Studios backlot "New York Street", which was refurbished to resemble Hollywood Boulevard.



(LEFT) In the wake of the earthquake, a dazed survivor picks her way through the rubble, while fires spring up in the background. (CENTER) Tension breaks out in the streets following the earthquake, as troops are brought in to maintain order. (RIGHT) Survivors claw at each other in their anxiety to climb out of a storm drain, after having been trapped underground by the collapse of a skyscraper above them.



(LEFT) George Kennedy and Charlton Heston jack-hammer their way through double concrete walls to provide an escape hatch for survivors trapped underground. Art Director used special "soft" cement in building the walls so that they could be drilled through quickly, but special cement set up so hard that it took several hours to penetrate. (CENTER) Ava Gardner clings to pipe as a wall of water comes surging through the storm drain. (RIGHT) She loses her grip and is carried away.



by virtue of its very subject, its cost and the dramatic ingredients which it contains, plus the fact that it would be an impossibility to develop such an event for the home television screen. As an aftermath of the successful release of "AIRPORT", the logical follow-up might have seemed to be a similar adventure taking place on or under the sea, on a train or in a bus. However, it occurred to me that it might be more original to build the film around a hazardous, common disaster that comes to the people; rather than having them go to a boat or a plane or a certain building. We wanted to show people just living a normal life—at home, in transit, going to work or going to school—when some literally earth-shaking thing happens to them, something against which there is absolutely no defense. There are no seatbelts to fasten, no life jackets to put on; they just sit there and wait—and are absolutely helpless.

We felt that the dramatization of this kind of subject would attract a very large audience everywhere, because many people have experienced tremors and earthquakes throughout the world—not only in Los Angeles and San Francisco, but in Chile, Italy, Japan, Nicaragua and many other places. The publicity about such disasters has been so widely circulated that even if the film were exhibited in a city that had never experienced such a thing, it would stimulate interest and excitement. We felt that the subject was universal and that it could provide entertainment, as well as a warning.

At this point, I should explain how I define the word "entertainment". Entertainment (which is the prime motive for making films) is not limited to happy experiences; it also includes *emotional* experiences. Such experiences may be expressed by tears or fear or any kind of excitement that makes the viewer feel fulfilled. He may not be happily rewarded by the experience, but he will be emotionally rewarded by it.

As I thought more about an earthquake as a possible focal point for a screen drama, I began to feel that it was especially important for us to make such a film, because we are in an industry that is located in an earthquake area: Hollywood. We also had been told by scientists and ecologists that there was going to be a great earthquake, either in San Francisco or Los Angeles. We felt that a film on the subject would not only be entertaining, but that it might make people stop and think that perhaps it isn't right to build tall buildings in earthquake areas.

As we discussed the project in greater depth, we began to feel that people

around the world would not only like to witness an earthquake, but that they would even like to feel as if they were part of it. That's what led to the development of *SENSURROUND*, the theatre-installed effect system that really makes them feel like they're part of the earthquake.

When we agreed to go ahead with the project I was hoping to find a writer who was experienced in the novel form, as well as in multiple-character storytelling, which is what this kind of film is. After trying to reach Arthur Hailey (who is an expert in this form) to develop material based on our notion, we heard of the availability of Mario Puzo, who decided that he wanted to write the screenplay himself. Although the script that he wrote had some good things in it, his lack of experience in actual screenplay writing, plus the fact that we didn't supervise his efforts, resulted in a screenplay that was almost unshootable because it was so expensive, so uncontrollable. But there were some good things in it and, through Puzo, we learned of a writer named George Fox.

At this time the name of Mark Robson came to my mind. Years ago I had been one of his agents at the Sam Jaffe agency and I knew that Mark was

Crew prepares to shoot a night scene of flood waters sweeping through the streets. In the background are dump tanks capable of hurling thousands of gallons of water at a time. Following the earthquake, the film becomes almost wall-to-wall special effects, utilizing just about every type-of movie magic ever devised. The sum total adds up to a stunning experience for the audience.



Producer/director Mark Robson and Executive Producer Jennings Lang sit in the midst of the rubble on the Universal backlot. They worked in very close rapport during filming.



the time when the idea of "EARTHQUAKE" was conceived, it occurred to me that perhaps there was a way to make the film more attractive to filmgoers, something that we could do to augment their experience in the theatre. I had a feeling that there was a way of creating the impression of the theatre shaking during the scenes when the earthquake was taking place. Our special effects fellows and our sound department got together and came up with *SENSURROUND*. It's a very valid experience, evidenced by the fact that people who manage our offices in Nicaragua and Chile ran out of the room when it was demonstrated. They thought it was real.

We decided to use *SENSURROUND*, not only to create the sensation of shaking during the quake, but also in the last reel when the dam breaks and you get the feeling that the water is rushing right into the theatre. We think we've hit upon something—not only for this picture, but for other pictures that will lend themselves to such an effect. It's a way of adding extra excitement to a film.

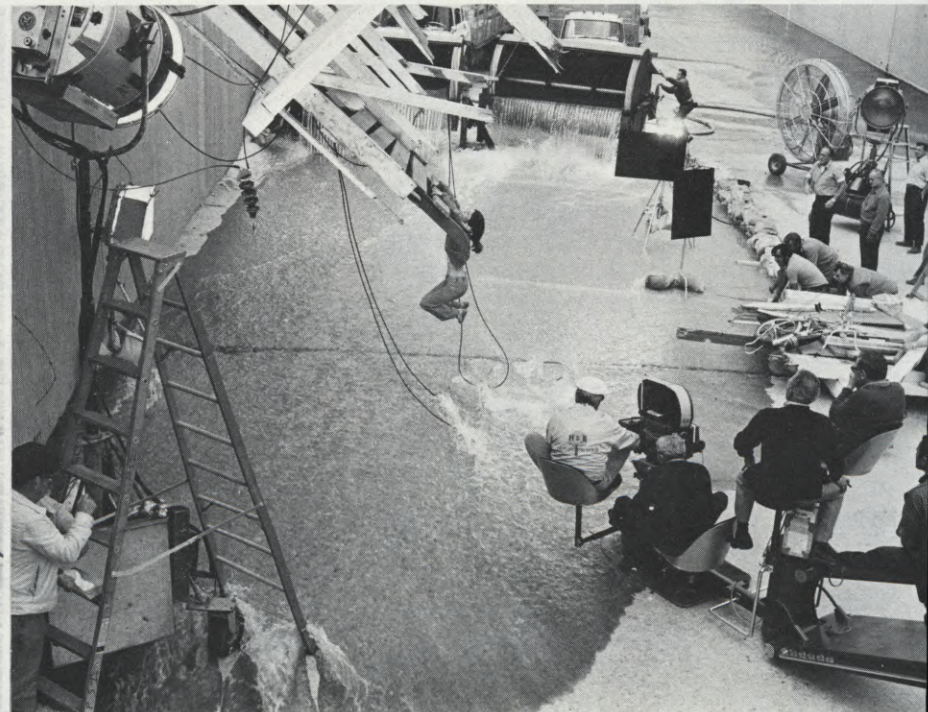
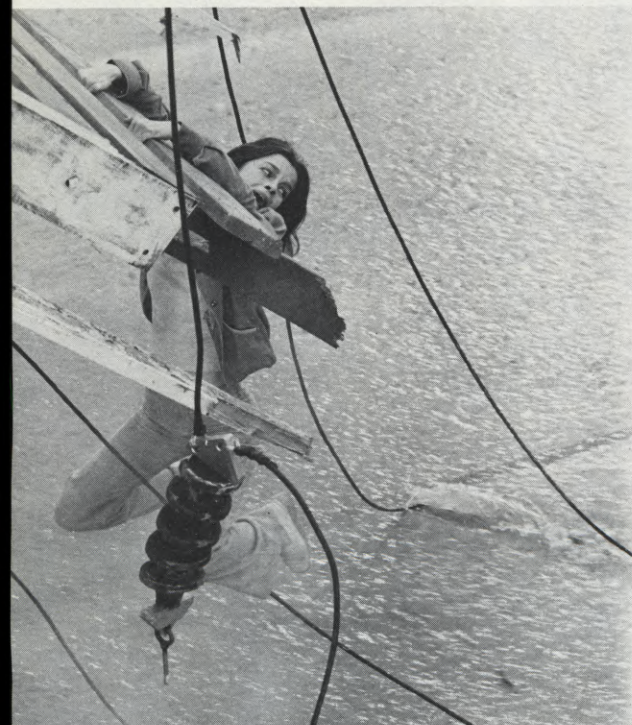
The final budget on "EARTHQUAKE" ran to about \$7,500,000, but that included a lot of capital expenditures. One of the advantages of having a technically experienced man like Mark Robson directing the film is his ability to adapt certain ambitious scenes to the budget without losing any of the production values. The audience gets complete fulfillment and there is no waste. In the rewrite of the Puzo script, for example, certain potentially very expensive scenes were reconstructed to get the same dramatic effect, while saving a

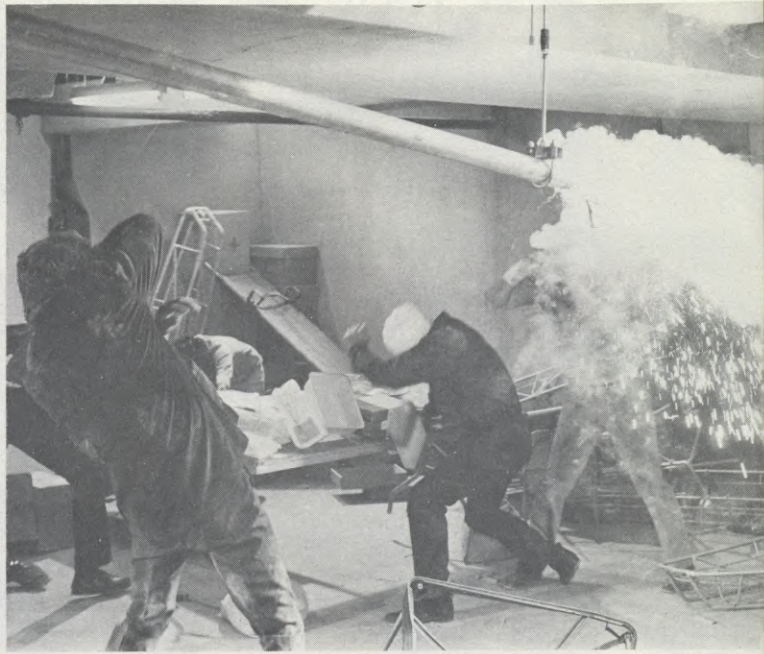
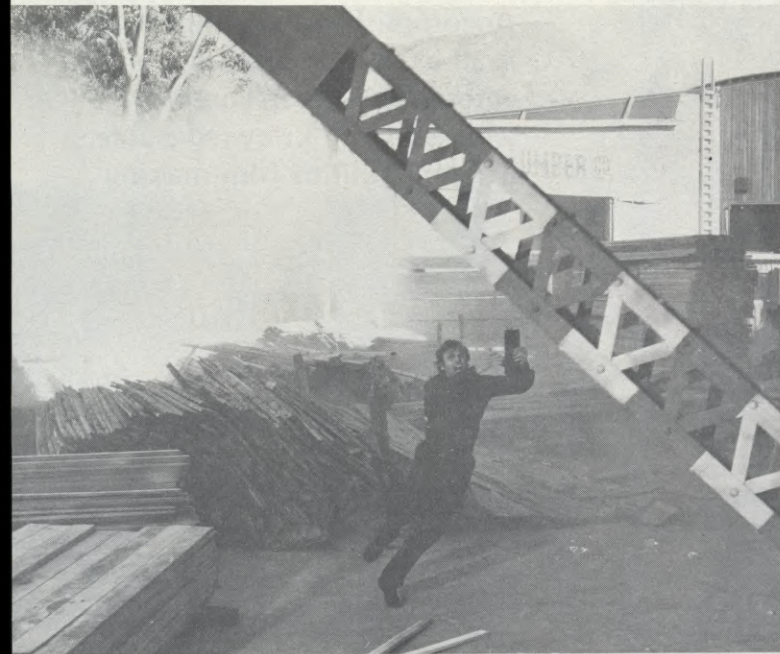
probably either the best or one of the best-equipped directors to make this type of film, due to his extensive technical background. He had originally come from the editing room; he knew all about special effects photography; he was very innovative in this particular field and in the handling of large groups of people. When I told him the idea he became very, very enthusiastic. The

next step was to get him together with George Fox, and he and Fox actually wrote the screenplay which was used. I made a few contributions and there were a couple of things left over from Puzo's original screenplay, but it was George Fox who did the physical writing and it was Mark Robson who collaborated on the structure of the script.

To get back to *SENSURROUND*, at

(LEFT) French-Canadian film star Genevieve Bujold expresses not-so-false terror, as she dangles from a broken wooden catwalk that has come skidding down a hillside. Live wires dragging in the water do not add to her peace of mind. (RIGHT) Not quite alone, Miss Bujold is surrounded by a camera crew, complete with lights and wind and water machines. The sequence was filmed in the concretized bed of the Los Angeles river, but they had to bring their own water, since the river was dry at that time of year.





Explosions, falling beams and spectacular electrical short circuits are all part of the excitement of "EARTHQUAKE". The intent was to make a film that would be an "event", something audiences could not see on their home television screens. The challenge was to give the film an epic scope, while still remaining within a feasible budget. A total of \$7,500,000 was spent on the film, including some capital expenditures, but the spectacular result on the screen looks as though it cost several times that amount.

great deal of money. Consequently, I feel that if people seeing the film—even experienced motion picture people—were asked to make a judgment as to what the picture cost, their judgment would be two or three times greater than what it actually cost. It's all up there on the screen.

It's fascinating to consider the fact that a picture as big and as important as "EARTHQUAKE" was actually produced on a budget smaller than that of our original "AIRPORT", which was made a long time ago when things were much cheaper. The production values in this picture are much greater than those of "AIRPORT", as well. All of this just proves that pre-planning and expertise are very, very important in the production phase, as well as in the preparation of the script.

In terms of what I've just been discussing, our Director of Photography, Phil Lathrop, was a fantastic asset on this kind of picture, because he was so experienced and so adaptable. He kept coming up with suggestions on how to make certain shots that would create a tremendous effect, while still staying within the budget. Al Whitlock, who is a genius at matte shots, worked closely with Mark and Phil and the end results are fantastic big production shots made at a comparatively economical production cost. I think we all have to work that way these days; otherwise, there won't be any big pictures made.

An interesting sidelight on "EARTHQUAKE" is that it got a lot of people out of retirement, highly trained special-

ists in some of the most intricate skills of film-making. The fact is that in recent years most of the pictures have been made in a "restrictive filming" sort of way—lacking great scope and production values. Some were very good and some not so good, but they were either love stories or mysteries or westerns—the traditional types of films. So, some of the most highly skilled special effects people just retired. We went out and found these fellows who hadn't worked for a while and were in their sixties. They were delighted to come back for "EARTHQUAKE" and they've made a very great contribution to this film.

I've been involved with "EARTHQUAKE" from its very inception and I still am, even though the film is completed, because I've promised to stay involved through many of the special screenings that have been set up all over the world. "EARTHQUAKE" started from a blank piece of paper and there hasn't been a time since then that I was "disinvolved" with it—even though I was also deeply involved with "THE FRONT PAGE" and "AIRPORT 1975" at the same time.

As for my continuing involvement with "EARTHQUAKE", I don't think it stops with the delivery of the picture. That has been a weakness in our industry since the divorcement of the theatres from the picture-makers—less and less communication between the producer, the distributor and the exhibitor. When you do a play on Broadway, you don't just deliver the play to the theatre and then run away from it. You

see that it is presented well in that theatre. That's what we're doing with *SENSURROUND*. I feel that if there were more of this close cooperation between the production companies and the exhibitors, it would be a great help to the industry. ■

Executive Producer Jennings Lang congratulates Miss Bujold on her fine performance and for being "good trouper" enough to do her own stunts, as did most of the stars of "EARTHQUAKE".





Accomplishing the impossible is all in the day's work for veteran Producer/Director who is highly knowledgeable in every skill of film-making

THE DIRECTION

By MARK ROBSON

Producer/Director

I could write a book about how I first became involved in the project and ultimately followed it through. But to put it simply, it all began when I was given the title, "EARTHQUAKE", and some material that had been written by Mario Puzo. The studio had toyed with the idea for some time, but found that, as written, there wasn't enough money in the world to put it on the screen. Also, it was unmanageable in terms of storyline and characters—that is, if you wanted to contain it in a film running roughly two-and-a-half hours.

My first inclination was to reject it, and so I told them that I wasn't interested in the subject. Months went by. Then Jennings Lang contacted me and said: "Read this material again and think about it—and maybe you can come up with a method of doing it. We'll get a writer; you can work with him and maybe you can do something with that particular title that would be rather interesting."

On his favorite perch riding the boom, Producer/Director Mark Robson never likes to be very far from the camera when a shot is being set up.



Beginning his career as a part-time assistant propman at the old Fox Studios prior to graduating from UCLA, Robson worked his way up to film editor at the RKO Studios, where he refined his knowledge of technique and later directed his first picture. Known as a consummate perfectionist who is also adaptable, he is highly respected by crews for his comprehensive technical skill and unflinching good humor.

So I sat in my office for two or three weeks attempting to structure the material. There were some problematical questions: If you have an earthquake at the beginning of the film, what do you do for the next two hours? If you have it in the middle, what do you do at the front end and the tail end? If you have it at the very end of the film, what do you do up until it happens?

One day I got an idea that struck me immediately as being feasible. The moment I thought of it I felt good about it. I got hold of Bernard Donnenfeld, who works with us, and asked him to come with me. We took a car and

drove up to the Hollywood Dam that contains the reservoir above the city. We climbed a hill and, pointing to the dam, I said to him: "That's how we'll do the story."

He wasn't quite sure what I was talking about, but I said: "The center of the story is that dam and the characters who people the story live all around it. Some of the people live above the dam and some live below it—and if that dam breaks, it's going to take all of Hollywood out. It's going to go roaring downtown in a channel that is very likely to reach Wilshire Blvd. Dispersing somewhat, it may even go all the way to



the sea, but it's going to cause enormous damage."

From that fundamental notion, I knew I had at least a beginning, a middle and an end. I knew that I could deal with the idea of an earthquake in relation to that dam. I could deal with the earthquake in the body of the story and the breaking of the dam as a result of the earthquake and its aftershocks.

The structure of the piece was now set. From there on it was very hard work assembling a group of characters and working out their relationships. I collaborated closely with George Fox, who wrote the screenplay that we used, and we worked out the details of the story. That visit to the dam had solved the problem from the structural standpoint, but now came the problems of feasibility. I sat down and wrote the earthquake section of the story, because I knew that was going to be the most difficult area in terms of cost. To get a notion of what the budget would be, I had to decide what would be the parameters of our film story. The question was: if we dealt with the characters up until the earthquake and then pursued the storyline after the earthquake, including all the events that took place in terms of rescue, would it be manageable from a budget standpoint? Only after we were sure it would did we begin our actual script writing.

I must say that we didn't deviate much from our original concept of the earthquake in terms of budget. As we continued to work we improved upon it vastly. As the studio gave us more latitude, we did become far more ambitious than they ever contemplated, but the film remained feasible as to budget.

We took the New York street on the Universal backlot and converted it into Hollywood Blvd. Then we destroyed it. It was an incredible sight. To my knowl-

edge, that's never been done in Hollywood before. We literally devastated a large area of the backlot—six to ten blocks, including the side streets. Of course, we had to restore it afterwards, but the cost of that restoration was in the budget, as well.

We pulled no punches in destroying that vast set. We used fire, smoke and, in some cases, real construction materials. We had three huge cranes stretching 150 feet into the air which we were able to squeeze in close to the camera. Each crane carried about 20 tons of material, including concrete, reinforcing steel and all other kinds of debris. There were men working on the platforms of each of these cranes to throw the material down past the camera. We also had men working from the sides. Several times we had 50 to 75 special effects experts on the set to operate all the effects. Shots like that were meticulously prepared. We rehearsed them time and time again. But once you said "Okay, let's go!"—that was it. You could then release most of the 75 men. In other words, you would use 75 men for a period of three hours, then let them go and come down to maybe 10 or 12 men to continue shooting. That's how we kept the cost down.

Most of the stars in the film—Ava Gardner, Genevieve Bujold, Charlton Heston—did their own stunts, and some of them were very dangerous. For example, there was a scene in which a great big cast-iron pipe was to come crashing down on Ava Gardner, missing her by inches. If something happened and she missed her mark, she'd be crushed, wiped out. We set it up and I said to Ava: "Will you do it? We'll be very careful. If you hit your mark, you're going to be absolutely safe. If you don't hit your mark, we'll be watching and we won't trip the effect."



Dwarfed by a huge wind machine, Robson stands under the camera, as a scene is about to be shot on the rubble-strewn former New York Street on the Universal Studios backlot.

She said: "Sure, I'll do it."

And Ava did it. That heavy pipe came crashing down, missing her by what seemed like a fraction of an inch. But after she did it, she was kind of exhilarated by it. As a matter of fact, the same thing happened with Genevieve and the rest of our actors. There's a certain exhilaration to having gone through danger, wondering if you're going to survive it. The actors get a terrific kick out of it.

From the safety standpoint, of course, the precautions that must be taken in filming this kind of action are

Of these scenes, Robson says: "We took the New York Street on the Universal backlot and converted it into Hollywood Boulevard. Then we destroyed it. It was an incredible sight. To my knowledge, that's never been done in Hollywood before. We literally devastated a large area of the backlot—six to ten blocks, including the side streets. Of course, we had to restore it afterwards, but the cost of restoration was figured in the budget, as well."





Robson gives direction to a bleary-eyed barfly type who is listed in the cast credits as "Walter Matuschanskayasky". He is actually famed comedy star Walter Matthau, doing an anonymous cameo bit for his friend. "EARTHQUAKE" boasts an impressive roster of stars and featured players.

enormous. Each separate effect that is to be tripped has a double safety-catch on it. When we get ready to shoot the scene the safety-catches are taken off and the individual effects can then be tripped. This is done either manually or by means of an explosive charge. Even

so, this kind of thing is treacherous and people can get badly injured. The action is choreographed to a count, like a ballet. Each special effects man who operates an effect is assigned to watch one character during the scene and when that character hits his mark, the

Concrete blocks rain down upon terrified survivors as aftershock strikes. Mark Robson takes such intricate mass action scenes in stride. He says: "I've made a lot of action films, but never one like this. I feel that action and adventure films like 'EARTHQUAKE' come closer than anything to the true use of the motion picture camera."



effect is tripped. If the character doesn't exactly hit the mark or seems in jeopardy, the effect isn't tripped. It takes precise timing to get everything to happen in proper sequence—and safely—but you just can't take a chance. It takes four or five days to rig an elaborate scene that will be on the screen for only a matter of seconds. We cover it with multiple cameras, hoping to get it in one take, but if something goes wrong, we have to start all over again.

Creating the illusion of violent shaking during the earthquake sequences was something of a challenge. Up until now the effect has been simulated by building whole sets on platforms that are rocked by means of hydraulic rams. This was the method used in filming "SAN FRANCISCO" and we used it in certain sequences, also. But it has its limitations. For example, how can you put a whole city block on a rocker platform? Obviously, what was needed was some kind of device to shake the camera. At first we attempted to use eccentric motors affixed to the cameras, but even though the motors could be controlled by rheostats, we never could quite document and repeat what we had done before. Our Director of Photography, Phil Lathrop, working with Lou Ami of the Universal Studios machine shop, came up with a camera shaker that would provide horizontal and vertical movement and could be programmed to repeat effects precisely. It worked out very well.

Toward the end of "EARTHQUAKE" there is a sequence that takes place down in the Los Angeles sewer system. We certainly couldn't use the city's actual sewer system, because of lighting problems and so forth, so we had to build our own at the studio. The tricky part was that we needed water to come rushing through this storm drain at a tremendous rate, rising to five or six feet almost instantaneously. We built the storm drains out of concrete, just below one of the lakes on the backlot. When the hydraulic gates were opened the water would fall into the storm drain and, by means of gravity, rush to the end of the tunnel for a fast exit into another lake.

In order to raise the water level rapidly, a weir was created through the use of baffle boards. This restricted the early flow of water to create a base, a build-up of the rushing water so that it would inundate the storm drain suddenly. The whole set was tarped so that we could get our cameras through holes in the ceiling of the storm drain. Our cameras were on arms reaching into the drain. On one take, the action of the weir was miscalculated, so that the

water started to build up too rapidly. It suddenly surged up over the camera ports and, unfortunately, one of the cameras got wet. Phil Lathrop did have the presence of mind to rush the film to the lab immediately, before it acquired water spots and they were able to dry it and send it right through the processing machine. We were very lucky that the film wasn't really damaged. The end was, but the scenes were entirely usable.

The storm-drain sequence presented certain dangers to the actors. For example, with the wall of water suddenly gushing down the tunnel, there was every possibility that some of the actors and stunt people might be smashed against the walls. To prevent this, some sturdy types in wet suits stood by just out of camera range to lift people out of the water and get them clear of the exit gates. It was a very ticklish proposition, but fortunately nobody was hurt—though I think a few people were shaken up a bit.

One of the more dramatic rescue attempts in the aftermath of the earthquake takes place in the top five-and-a-half stories of a 25-story office building made of structural steel. In order to accommodate this giant set, the floor of Stage 12 (the studio's highest) was dug out to a depth of 20 feet. The set represented a corner of the building, complete with stair well and offices on both sides of the corner. The people are stuck up there and can't get out because the elevators are not operating and the fire stairway has been destroyed. This set was actually constructed of structural steel, just as you would build a real office building to sustain and support enormous weights.

As I mentioned before, several of our sets were built on ram-shaker platforms, but if I had it to do over again I don't think I'd use the ram-shakers at all. I would use the special agitator camera mount that worked out so well. One of the purposes the ram-shakers served, however, was to establish a pattern of human movement as it is altered in rooms that are being shaken violently. Using that as a reference, some of the most convincing "earthquake" movement was simulated by actors who were actually standing on *terra firma* and were able to act out the problem. I think Genevieve Bujold's movement, which took place on a hillside, is the best of all. It's wonderful that the actors were able to simulate the movement so well, especially in the long shots where we used hundreds of stunt people. They were able to simulate the effects of an earthquake very realistically. I think it would be a good idea, if one were going to make an earthquake picture, to use



(LEFT) Stuntmen jump from the top of a 50-foot structure, representing the upper floors of a 25-story skyscraper. The set was built of structural steel on Universal's Stage 12, after a 20-foot pit had been dug in the floor. (RIGHT) The camera, on a crane, moves into the set.

the ram-shaker platform as a kind of conditioning device to let the actors know how it feels to be really shaken up. Having once had that experience, they could then walk over to the stationary set and act out the responses that they'd felt.

There was one amusing situation that occurred during the filming. We were getting ready to shoot a sequence involving the escape of a group of people trapped in a garage area three levels below a very large building. The garage is sealed off from the rest of the building, which has collapsed around them, blocking all exits. They are supposed to drill their way through two foot-thick concrete walls (separated by an air space), with air hammers. The Art Director went to the cement people to find out what kind of mixture he could use that would crumble like real concrete, but would permit drilling through the walls in a much faster time. They gave him a mixture that included a substantial amount of sugar and he built the walls with it. Well, the stuff set up so hard that to actually drill through the two walls would take four or five hours. The drill could hardly get through it. We were stuck with it and had to drill and drill to fight our way through, using cutaways to something else to telescope the time. We were in there for days.

In a film like "EARTHQUAKE" there is always the possibility that the immensity of the cataclysm will overwhelm the characters. We avoided this pitfall by spending a great deal of time

on the characters and really involving them in the earthquake. Genevieve Bujold was certainly involved; we threw a house at her. One of those cliff-hanging mountain houses collapses and tumbles down right past her. The same was true of Victoria Principal. She
Continued on Page 1364

Robson, riding the boom with Cinematographer Phil Lathrop, who calls him "a pleasure and a delight for a cameraman, because of his terrific technical background."



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THE PHOTOGRAPHY

By PHILIP H. LATHROP, ASC

Director of Photography

When I was assigned as Director of Photography on "EARTHQUAKE", I had many discussions with producer/director Mark Robson, who is one of the finest gentlemen and directors I've worked with during my entire career. He is a pleasure and delight for a cameraman because of his terrific technical background.

We talked about many aspects of the production and especially the "look" that the picture was to have. He wanted it to look natural, but not in the documentary sense. It's obviously a

motion picture, but a motion picture that has been made to look real. We didn't make it look hard and dirty, but it does have a sense of realism. It's low-key in the spots where it should be low-key, and high-key in the spots that call for high-key.

There were many problems involved in giving the picture vast scope without running over budget, because the cost of making a picture like this today is extremely high. The scope was achieved by means of front-projection shots, miniature shots and a great number of

matte shots excellently done by Al Whitlock, who is one of the best in the business today. He's done some fantastic work.

The greatest photographic challenge of the project was to make the earthquake really *look* like an earthquake, because that's the high point of the picture. We made a lot of tests of different techniques and procedures that had been suggested by various people. Some of them were good and others were not successful at all.

It seemed to me that we would have to come up with something that would give us a consistent illusion all the time, something that we could control and always come back to, because we wouldn't be shooting the earthquake scenes all at one time. We would do some of them and then do some more later, alternating with straight action scenes. That's why it was important to arrive at something consistent that could be repeated just the same way at any time.

Trying to create an illusion of what an earthquake looks like is more difficult than it sounds, because everybody has a different idea on the subject. Most of us have the feeling that an earthquake involves side movement with a little bit of up and down movement. We tried shaking the camera, which was no good at all, because what it does is vibrate the film in the gate and it looks exactly like what it is.

Of course, it was obvious that some of the sets could be built on shaker platforms, but we couldn't do that all the time. For example, how do you shake an entire city block? So, with the help of the head of Universal's machine shop, Lou Ami, we came up with a mount for the camera that could be calibrated to shake exactly like we wanted it to shake at any time that we wanted the earthquake effect. It had a horizontal movement linked with a motor drive and rheostat control so that we could get it to shake at any speed. On the front of the camera, as part of the same mount, there was a cam that produced up and down movement. This cam was made so that the up and down movement wasn't the same all the time; there would be a little, then a lot, then a little.

On the Universal backlot, the camera crew shoots a scene of survivors emerging from a manhole, after being trapped underground and effecting a precarious escape through the storm drains. The photographic style of "EARTHQUAKE" is "natural", without being actually documentary. "Realism" is the key word and no attempt was made to distort the lighting to make the female stars look attractive.



This shaker mount created an amazing illusion. You'd swear that the ground was going up and down and moving sideways, when, of course, it wasn't moving at all. There were a few times when it didn't work; you had to have the right camera set-up, but at least we had a very accurate record of how we did each effect, and if a certain one was very successful, we could always come back to that same combination. The illusion is there, and it's pretty scary at times.

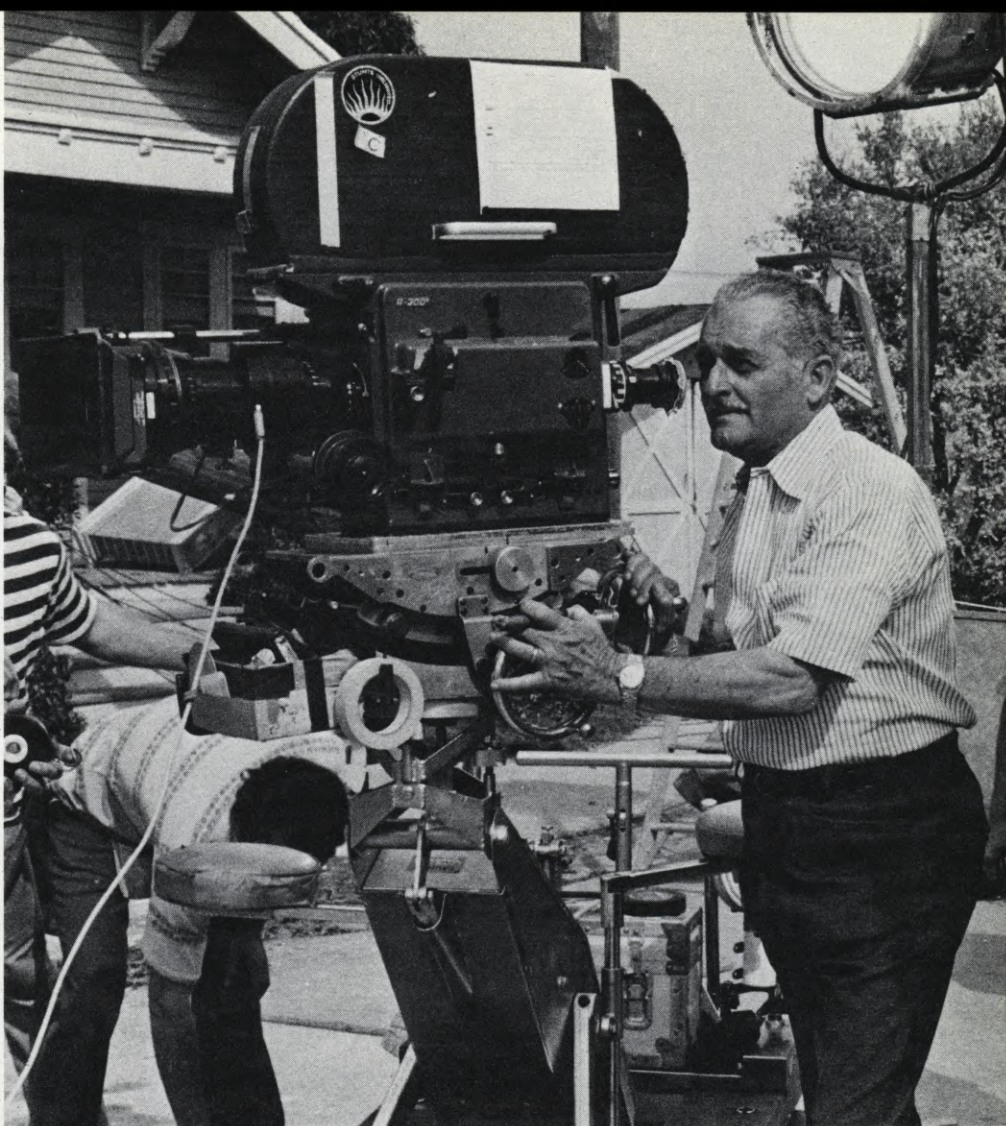
There were some scenes in the picture that we couldn't shake—composite scenes involving double exposures or mattes. In such cases the shake was added afterwards. It took quite some time, but with a lot of experimentation the Optical Department came up with an optical shake effect that matched what we had been doing in the camera. It's a very consistent illusion.

Several of the sets were built on shaker platforms, including a seismological lab that was supposed to be at Cal-Tech. We couldn't build all the sets on shakers because it's extremely expensive, but we built several and used these in conjunction with our camera shake effect. Such scenes were especially successful because we had everything working, including what seemed like a million wires to pull things down in the set.

Probably the hardest thing to do, in the sets that were not on shaker platforms, was to get the actors to move as if they were responding to an earthquake, when there wasn't one. This is very hard to do when the set isn't moving and everyone does it differently. Some of the actors did it great and others didn't do it very well at all. But when the separate cuts were all edited together it looked fine. It really scares you.

Using the camera mounted on the shaker, we found that the effect was better when we had something prominent in the foreground to establish a relationship of depth between the planes. The horizontal movement of the camera could be varied from a quarter of an inch to two inches, as the quake got heavier. Two inches of horizontal movement in relationship to something 50 feet away isn't noticeable, but in relationship to something close to the lens it's quite a lot of movement.

The most ambitious full-size set in the picture is a five-story section of what is supposed to be a 25-story building. This set was built inside Stage 12, the highest in the studio, and it was necessary to dig down 20 feet into the floor of the stage in order to accommodate it. A lot of spectacular action takes



Director of Photography Philip Lathrop, ASC lines up the Panavision R-200 camera for a shot. "EARTHQUAKE" was filmed almost entirely on the sound stages and backlot of Universal Studios, rather than in natural locations, due to the fact that an extraordinary degree of control was required to execute the mass of special effects which give the picture its impact.

place in this set when the quake hits. The windows break and a lot of things inside the offices collapse. The elevator breaks loose from its cable and falls with a bunch of people inside it. As the survivors try to flee from the top floors down the fire escape the front of the building falls off (which we do in a miniature and also in a matte shot) and there is no way they can go any farther, because the stairways have fallen down. The rescue of some of the people is effected by letting them down in a chair hung from a firehose.

We shot action on all five stories. We made high shots looking down, with the building extended downward by means of mattes. The sequence was quite tricky to shoot because we had the problem of putting 45 people up 50 feet in the air. As part of the story line some of the people fell off, but these were stuntmen, of course.

The photography of this sequence was difficult because of the way we had

Producer/director Robson and Cinematographer Lathrop share a ladder under the camera crane. High angles were often used, but no zoom shots nor extraneous camera movement.



Continued on Page 1332

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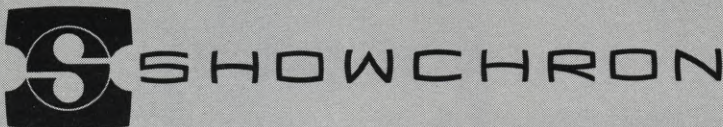
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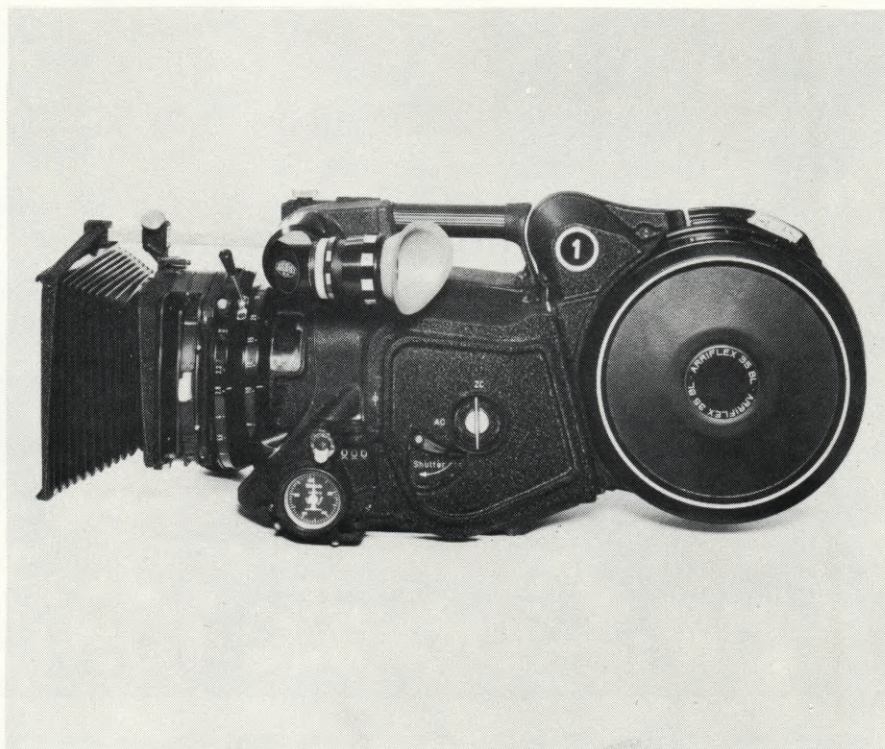
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THE SPECIAL MECHANICAL EFFECTS

Crumbling buildings, falling elevators, toppling high-tension towers, trapped people, a broken dam, flooding waters, buckling streets, broken bridges . . . all in the day's work during the filming of "EARTHQUAKE"

By GARY RAND

"Special effects in motion pictures is the creation of the impossible in a very short time," says Frank Brendel, expert on the subject.

Brendel was discussing his role in assisting producer-director Mark Robson to create a massive earth tremor that destroys much of Los Angeles in the large-scale motion picture "EARTHQUAKE".


The film called for every conceivable mechanical special effect that accompanies a devastating earthquake—crumbling buildings, falling elevators, toppling high-tension towers, trapped people, a broken dam, flooding waters, buckling streets, broken bridges . . .

Brendel was one of a team of three specialists on the film. His assignment was full-scale action, while Glen Robinson and Jack McMasters had the responsibility of miniatures and special rigging, respectively.

"Mark Robson would outline what he wanted and we would work with him to get it," said Brendel.

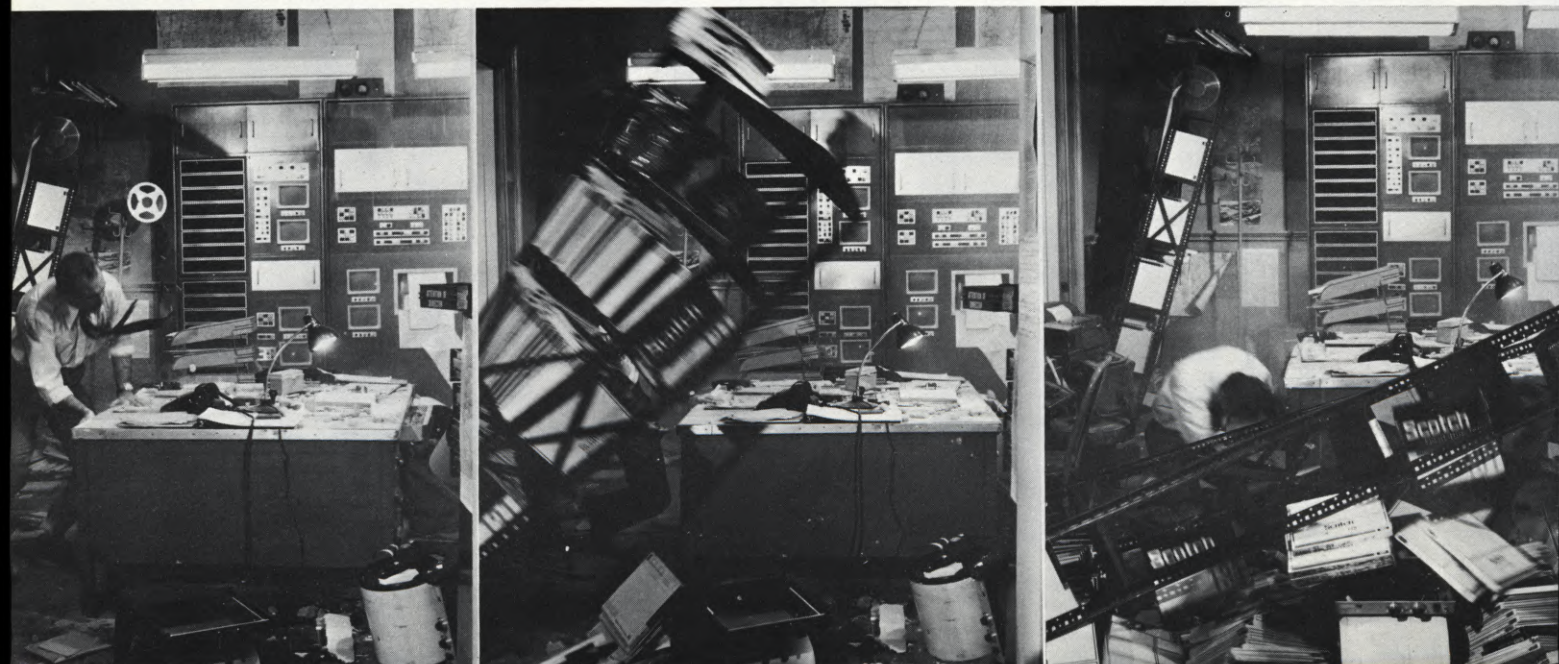
"Safety was our biggest concern. Anyone can create the effect but to do it without hurting someone is a big challenge."

One of the most difficult and dangerous scenes was in the street when the big earthquake strikes and buildings start collapsing, with rubble and debris raining down on the people below,



Charlton Heston and Ava Gardner seek refuge under a car, as concrete blocks (in this case, weighted styrofoam) rain down upon them. Very nearby, tons of real debris flattened a Cadillac into an 18-inch steel pancake. More than 140 stunt people were involved in these violent action scenes, their movements being very carefully orchestrated to the tripping of a multitude of complex mechanical effects.

Certain sets were built on shaker platforms operated by hydraulic rams, while dozens of wires were rigged to topple furniture and props on cue. In many cases, stunt people were provided with sheltered areas which they could roll into, while debris seemingly buried them. In such cases, a slight miscalculation in timing could mean serious injury. Miraculously, only a couple of people were slightly injured during all of the complex action that was staged for the film.





A small house topples and collapses. Breakaway construction of the building was designed by Art Directors, but the rigging for destruction was worked out by expert riggers of the special mechanical effects team. The effect shown here was relatively simple to prepare, but some of the more complex effects required four or five days to rig, with the rigging crew constantly working ahead of the shooting schedule.

Three giant Galloway cranes, with 150-foot arms, were grouped around the camera with platforms from which tons of debris were thrown down.



**EFFECTS PLANNED FOR EXTERIOR GADDIS BUILDING:
(LISTED NUMERICALLY)**

- 1 Buckling Metal Wall
- 2 Grape Trunk to trip and fall
- 3 Breakaway glass—beam over entrance door
- 4 Breakaway glass—beam, floral shop window
- 5 Metal Column collapsing
- 6 Crack in pavement — air bags
- 7 Truck goes through railing, hits guard shack, water hydrant spout
- 8 Lamp post falls
- 9 "Bail Bond" sign on yellow building falls through canopy
- 10 Oval "Photo Marine" sign falls
- 11 (reverse) Building 1—balustrade topples from the top
- 12 Parking lot wall undulates (build piece of wall with camera peephole).
- 13 Corner of wall collapses
- 14 Five tree boxes rocking
- 15 F.I. Sign #1 trips
- 16 Wilson Plaza Parking sign falls
- 17 F.I. Sign #2 trips and dangles
- 18 Debris falls from platforms A, B & C — large slabs and blocks
- 19 Three cranes — 2 trips on each:
 - Crane A — stairs & debris
 - Crane B — concrete with bars
 - Crane C — concrete with bars
- 20 Platform above Gaddis—furniture, rails, concrete with bars, beams, and glass
- 21 All parked cars to be on earthquake shakers

Call sheet list detailing the special mechanical effects required to be rigged for the shooting of a single sequence. Almost every day of shooting required a different list similar to this. For some sequences, as many as 55 special effects experts were assigned, with each man responsible for tripping a specific effect.

The use of explosives was one of the many types of mechanical special effects employed on "EARTHQUAKE". Rarely has a film been made that required such a diversity of special effects expertise. In this case, a stuntman goes flying off the porch as the explosion is triggered, a matter of split-second timing to avoid injury.

Brendel pointed out. This was a scene with Charlton Heston and Ava Gardner.

"I had 55 special effects men working on that," he continued.

"I worked very closely with Johnny Daheim, the action coordinator, who furnished the stunt people and was watching out for their safety. Where stunt people are involved, there's always an element of timing that can be critical. On one side there's safety; just a split-second away, there's disaster. A fraction of an instant or one misstep can put a stuntman in a lot of trouble. These people are understandably very ambitious; they're reaching out and trying to make names for themselves. But I've had stuntmen try to over-reach themselves and push to the point where

Continued on Page 1340



THE STUNT ACTION

By JOHN DAHEIM

Stunt Action Coordinator

"EARTHQUAKE" employed the services of 141 stunt people—more than have worked on any single picture at least in the last 10 years, and possibly ever. It's not surprising when you consider that this film was about 75% action and it included people falling out of buildings, and getting crushed under debris and swept away by a flood. It was all done on a very large scale, with no punches pulled to make it as realistic and exciting as possible.

It wasn't easy to find that many stunt people to do all of the various types of stunts required. Stunt people tend to be specialists and some of them do only one kind of stunt—like falling off of horses, for example. All of them have to be in very good shape physically and they have to be mentally alert. Even so, accidents can happen and they do get hurt. In the theatre sequence in this film, a huge sign fell off a building, slid down a pole and pinned a couple of stunt people (a brother and sister team) inside a car. Luckily, they were only slightly hurt. Considering how many stunt people were used on "EARTHQUAKE" and how complex some of the stunts were, we were very fortunate that there weren't more injuries—and more serious ones.

A record number of stunt people, unsung heroes of "EARTHQUAKE" took dangerous risks to make the film one of the most exciting ever

Probably the most challenging sequence, in terms of stunts, was the action staged on the breakaway skyscraper set that was built on Stage 12 at Universal. The set was designed to represent the top five stories of the structure. During the earthquake, the facade breaks away and some of the people trapped on top come running down the fire stairway. They don't realize that the stairway has broken off and, when they reach that point, some of them are carried away by the momentum and can't stop. They fall off and others are pushed off by those behind them.

They had to fall about 40 feet and one of the most difficult stunts to do is to fall from such a height without preparing yourself properly. These people couldn't prepare because they just had to keep right on going. I had two girls and a man doing that stunt. The man fell onto a window, but the girls were just pushed out into space. It was a great shot and it looked very realistic. To prepare for it I had watched films of a New Orleans fire in which women were dropping from the 20th and 30th floors. They were dropping straight down and, obviously they were killed. It was a terrible thing to watch, but our girls managed to duplicate the



In the shambles caused by the earthquake, Stunt Action Coordinator, John Daheim discusses a complex action problem with Producer/director Robson. More than 140 stunt people were employed.

Stunt men and women scramble in a desperate attempt to avoid getting hit by huge chunks of concrete falling from the violently shaken skyscraper above them. Although the concrete chunks were made of styrofoam, they were heavily weighted with steel inside to make them fall realistically. Planning such an action pattern is like designing a complex choreography, with each stunt person required to hit his mark precisely.



movements very realistically.

For the sake of safety, we had big 15 by 20-foot airbags spread out everywhere under the set to break the fall of the stunt people who were jumping off. These worked very well, because everyone managed to clear the building all right, but if a jump had fallen short and someone had hit a piece of the metal structure on the way down, it would have been all over. We had no way of protecting the people against such an accident. Incidentally, I understand that these big airbags are starting to be used in fire rescues. They represent an innovation that should save a lot of lives.

The staging of the stunt action for the earthquake scenes that take place out in the street required a lot of very complicated pre-planning. All kinds of heavy objects are falling into the street from above—concrete blocks and pieces of steel and heavy signs—things that could really kill or seriously injure anybody unlucky enough to be directly underneath.

When you plan the action for that many stunt people in such a scene, it's like working out a complex choreography. Each stunt person has his own action pattern which he must follow precisely, hitting his pre-determined mark exactly. If he is off the mark by just a little bit he might get hit by one of the heavy objects rigged to fall from above. We have a spotter for each man to see that he hits his mark right on the button before anything is tripped to fall near him, but if the timing were off just a bit, a serious accident could happen.



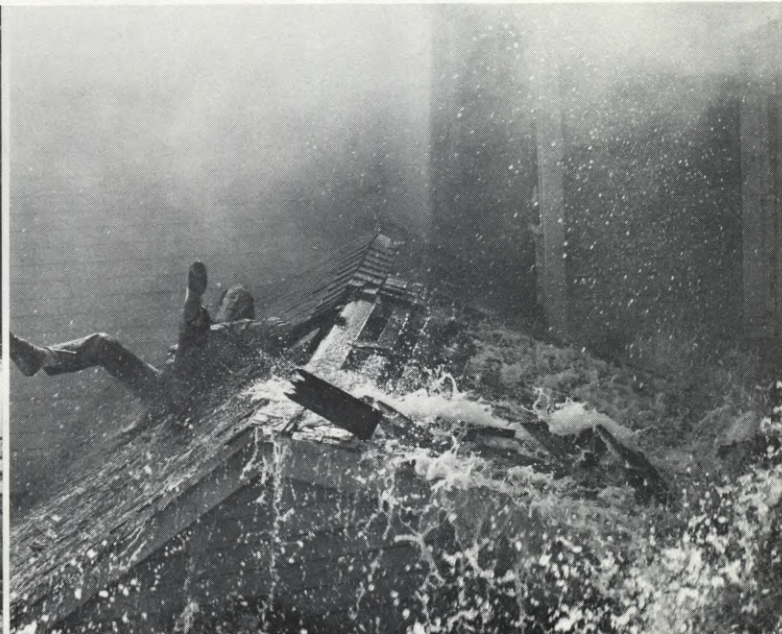
As quake strikes, a terrified crowd rushes down the fire stairway, only to find that it has broken off. Carried forward by the momentum and unable to stop, several fall or are pushed over the edge, plummeting 40 feet to land on large airbags below. Falls like this, without preparation, are among the most difficult stunts.

Sometimes unexpected things do occur while the cameras are turning, but the stunt people are all good at improvising to roll with whatever happens and take advantage of it, if possible. That's why they're stunt people.

One thing that we have to try to do

is to make sure that none of the stars get injured during the shooting of these action sequences. For that reason, when we shot the skyscraper sequence I mentioned before we took great pains to protect Lorne Greene, Monica Lewis
Continued on Page 1359

After the Hollywood Dam breaks, a wall of water roars through the streets of Hollywood, uprooting buildings and carrying many people to their doom. Stunt people, specially trained to cope with violent water action, were employed for these scenes, but there was a genuine risk of their being smashed against buildings and other hard objects. Most stunt people are experts who specialize in a certain type of stunt.



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"SENSURROUND"

Unique and exciting new system developed specially for the presentation of "EARTHQUAKE" adds an extra emotional dimension to viewing of film by surrounding the audience with the full fury of nature's violent cataclysm

Universal's new *SENSURROUND* system, developed by MCA/Universal, is a revolutionary development that adds the sense of feeling to sight and hearing in motion picture theatres.

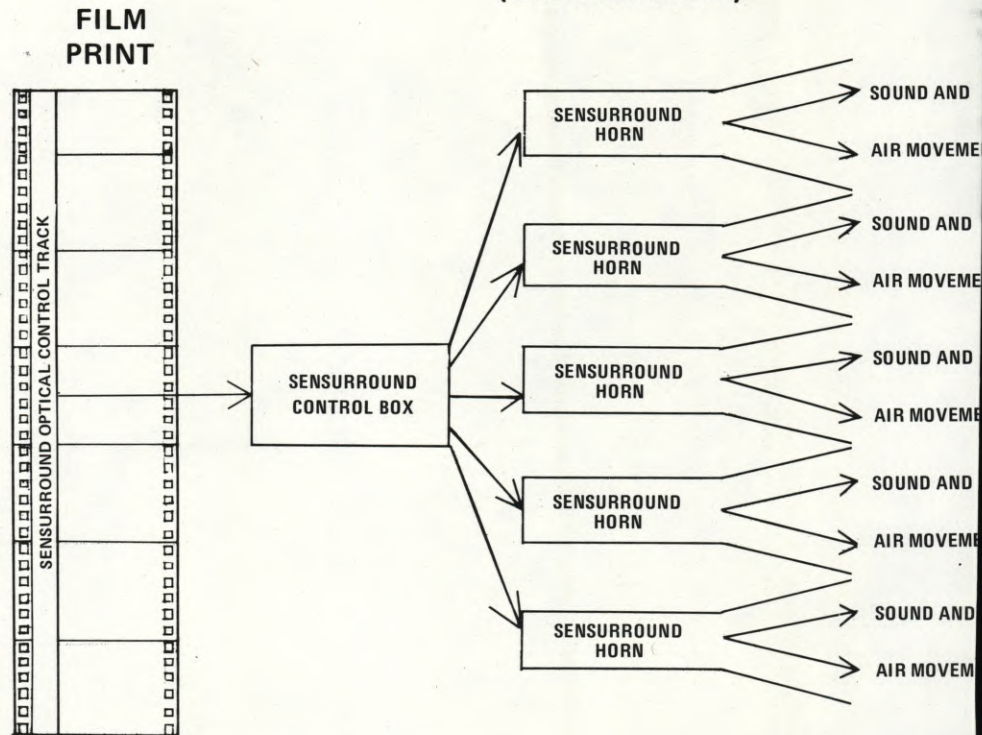
The *SENSURROUND* system is being introduced for the first time in many theatres exhibiting Universal's large-scale production of "EARTHQUAKE" and adds the dramatic and powerful illusion of audience participation to the total moviegoing experience.

Augmenting normal sight and hearing enjoyment of motion pictures, *SENSURROUND*, a derivation of the words "sense" and "surround", permits the audience literally to feel low-frequency sound and air vibrations generated by powerful electro-acoustic transducer horns placed near the screen and in the rear of theatres.

The physical-audible effects, hitherto impossible to produce on theatre sound systems, give the viewers of "EARTHQUAKE" the sense of being in the epicenter of a rumbling, violent temblor as well as being an eye-witness as the Hollywood Dam breaks and the surging water washes away people and buildings.

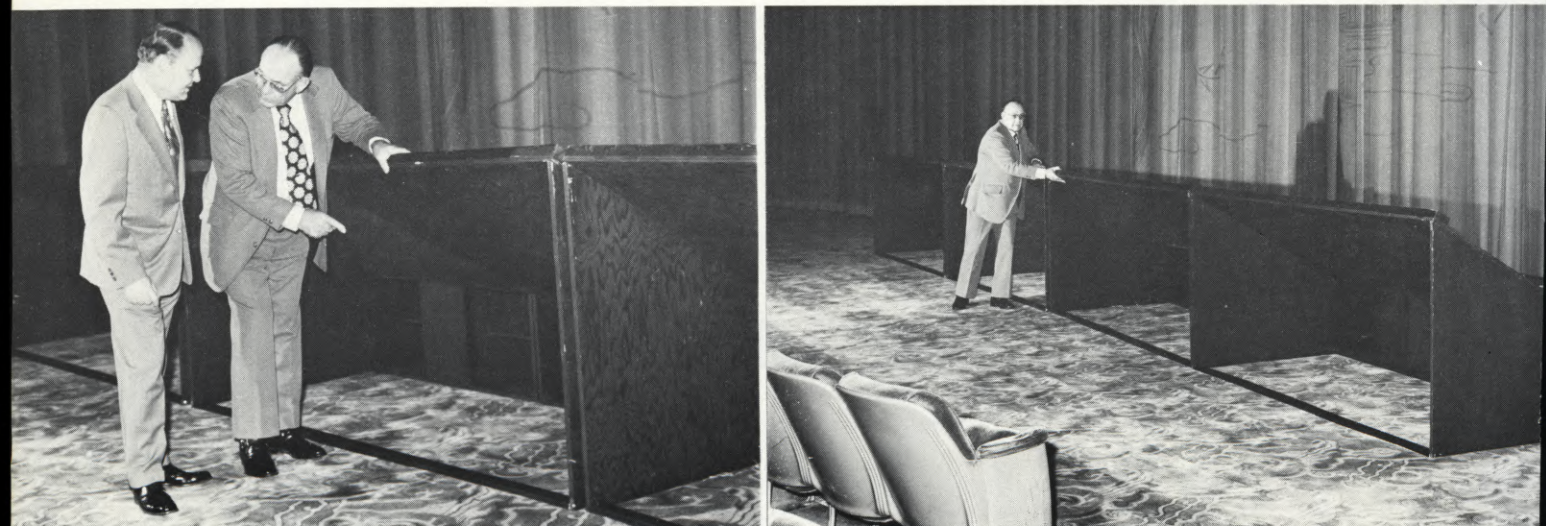
Development of the *SENSURROUND* system was sparked when Jennings Lang, Universal vice-president and executive producer of "EARTH-

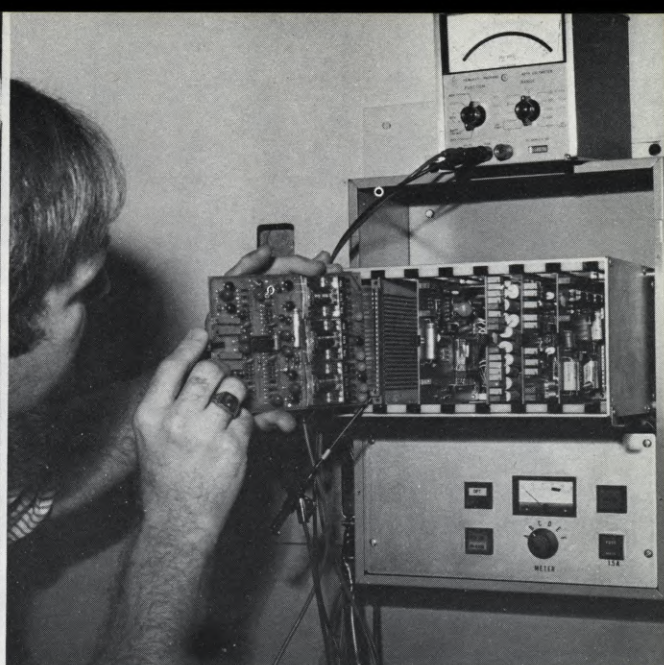
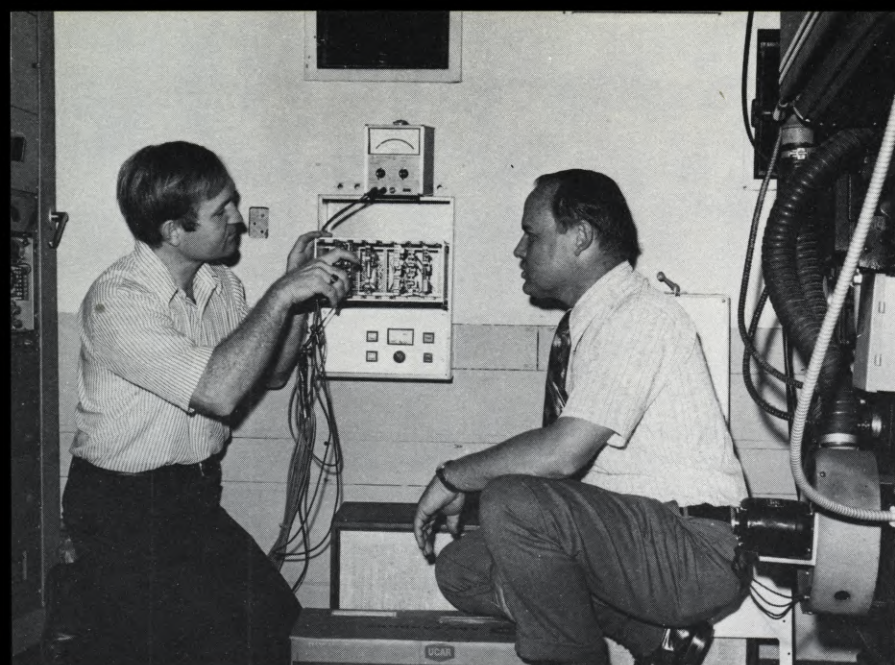
SENSURROUND SYSTEM (SIMPLIFIED)



A highly simplified schematic diagram showing how MCA/Universal's new *SENSURROUND* system operates. The extreme low frequencies generated by the system fall into the audible and sub-audible ranges. This program material is recorded on the optical track of the print. It is fed through a special control box and then out through the unique *SENSURROUND* horns installed at the front and rear of the theatre.

(LEFT) Richard Stumpf, head of Universal Studio's sound department, and W.O. Watson, former head of the department and now special consultant to the studio, inspect a test installation of *SENSURROUND* horns made at the Chinese Theatre in Hollywood, where "EARTHQUAKE" will open on November 15. (RIGHT) In this test, Model M modular horns were installed in front of the screen to a total width of 32 feet, but it was found that, in this particular case, the effect was too loud for the first few rows of seats. Final installation places a Model W horn and a Model C horn on each side of the screen.





Robert Leonard, technical assistant in Universal Studios sound department, (LEFT) and sound department head, Richard Stumpf, worked with W.O. Watson on the development of the SENSURROUND system. They are shown here installing the special control box in projection room of the Academy Award Theatre in Hollywood. The unique 1000-watt amplifiers used in the system were designed to Universal's specifications and are not for general use, since they concentrate mainly on the rendition of extreme low frequencies.

QUAKE", asked the MCA/Universal technical experts to devise some new dimension in film exhibition to make this motion picture a special event, one that could not be duplicated on television.

After many meetings with the studio creative technical experts, studio general manager Joseph Hiatt assigned responsibility for developing a new system to W. O. Watson, former studio sound director and now a special consultant, and Dick Stumpf, studio sound director.

Several months later, the day before producer-director Mark Robson began filming "EARTHQUAKE", Watson and Stumpf and their crew of technical experts had completed the preliminary working model of SENSURROUND.

A special "EARTHQUAKE" demonstration reel, with some of the first footage from the picture, was constructed by editorial supervisor Phil Scott, and this was screened with the SENSURROUND system for more than three months for several thousand tourists visiting the studio.

These experimental screenings and enthusiastic reactions from the audiences enabled these experts to refine the SENSURROUND system, a new sense-sound dimension in motion picture that will be adapted to future films when appropriate.

For the technical-minded, SENSURROUND is designed to surround and engulf an audience with special audible and sub-audible effects, below the human hearing range, not possible to record or reproduce on present theatre sound systems.

The audience experiences the illusion

of participation by feeling the air movement, generated by powerful electro-acoustic traducer SENSURROUND horns, which vibrate against a person's body and ears with a sound pressure waveform comparable to that of an actual earthquake. As the vibrating sen-

sation is airborne rather structure-shaking, there is no physical danger to an audience.

In the United States, the SENSURROUND system initially will be installed and maintained by RCA, under Continued on Page 1345

W.O. Watson examines a bank of Model W horns of the type installed on either side at the rear of the theatre. All of the special SENSURROUND program material is fed through these speakers, as well as conventional sound in certain sequences (the dam breaking, for example), in order to have these sounds surround and seem to completely engulf the audience. The degree of audience involvement stimulated by SENSURROUND is phenomenal—a new high in showmanship.



THE SOUND EFFECTS

"EARTHQUAKE" required a huge number of sound effects. Some came from Universal's 100,000-effect library. Others were specially created

By JERRY CHRISTIAN

Special Effects Supervisor

"EARTHQUAKE" was an unusual challenge for us, primarily because of the horrendous number of sound effects that were called for. We had more than 20 sound effects editors working on it simultaneously, and I don't think there's ever been a picture that employed that many all at once. It took an unusual amount of coordination to pull them all together for the job.

The sounds required covered quite a range—various types of crashes, creaks, cement crumbling, girders tearing—to name just a few. Our concern was to get good clean sounds that wouldn't all run together, because we didn't want to lose the impact of the individual crashes. It was almost impossible to use any of the actual sounds that occurred during the filming. The fake glass and timbers and concrete that they use don't record in a manner that would sound like anything. Also, many of the most spectacular scenes were derived from matte shots or miniatures which, of course, were shot silent.

As it turned out, we had more than 550 looped lines to record, which is an unusually high number. The reasons for

this is that all of the mechanical special effects happening in the scene (buildings falling, water flooding, etc.) made sounds that were not usable for our purposes, but they managed to drown out a lot of the dialogue. Then, too, they sometimes used small unblimped cameras to get into tight spaces and the camera noise wiped us out. There were times when we didn't even get a good cue track. We had to depend upon the actors' memories and kind of read their lips and check with the script—and hope we got it.

The fact is that in most cases we had to create our tracks from scratch, building them up from the background sounds to the big impact stuff. We were able to get a lot of effects from our own sound library at Universal, which is so large that if you played it all back on 1/4-inch tape it would take about five hours. That's a lot of effects—probably about 100,000.

Most of our really big crashes came from the library, but we created a lot of sounds on the Foley stage—individual footsteps, glass breaking, debris falling—that type of thing. We worked in there

for two weeks and kept accumulating more and more debris and rocks and boulders and motorcycles. In one case we picked a motorcycle up and dropped it 15 feet to get the sound of it hitting a wood ramp. By the time we got finished with all this the stage looked like part of a city had collapsed inside it.

There were times when we were called upon to create sounds for a type of happening none of us had ever witnessed—the breaking of the dam, for example. In that case we started out with a big crash of cement breaking and then started adding onto it—such things as creaking and various kinds of water noises. We ended up with eight tracks for the dam breaking and the water rushing out. And, of course, we had no idea whether it was going to work or not until we took those tracks over to the dubbing stage and put them all together.

Ron Pierce helped the dam sequence a lot by electronically adding reverberation to the water sounds in order to make them bigger and bolder than what we had before. That sequence is run through the *SENSURROUND* system, also, which adds another big volume of sound to the effect.

There was a big round sort of drain thing adjacent to the dam and Mark Robson asked for a special, unusual sort of noise that he could use for a shocker. We put together some half-dozen tracks and came up with something that is rather unusual and very effective.

My crew of sound editors had nothing to do with the effects for *SENSURROUND* (if you can call them *effects*), because all of those are created electronically during the dubbing session. I've noticed that there is one interesting difference in dubbing in *SENSURROUND*, as compared to a normal track—namely, that the rumble is so noisy that after a short time it becomes fatiguing; it wears you out. It's partly the vibrations, I suppose, but also the tremendous amount of concentration that the mixers have to apply because of all the extra controls there are.

We found out, also, that the system made so much noise that it was distracting to the people working on the adjacent music scoring stage. As a result, we ended up doing quite a lot of night work. ■

Mark Robson checks over one of the complex dubbing charts with Special Effects Supervisor Jerry Christian and Supervising Sound Mixer Ronald Pierce. One reel alone required the mixing down of 54 separate tracks, including dialogue, music and effects. Some effects created specially for the film included sounds never before heard by man—such as, the breaking of the Hollywood Dam.



THE SOUND MIXING

The blending of a myriad of sounds to create what is probably the most stunning track in cinema history—including the new *SENSURROUND*

By RONALD PIERCE

Supervising Sound Mixer

There were two major challenges in the mixing of the sound tracks for "EARTHQUAKE". The first challenge had to do with the use of the *SENSURROUND* system—which is something absolutely new in film production.

The second challenge was the sheer number of separate sound elements that had to be laid in, balanced and blended in order to produce the final track. For example, in one reel we had 54 tracks that had to be pre-dubbed and mixed to get the ultimate effect. In the "easy" reels there were 12 to 15 tracks.

But to speak about *SENSURROUND* first—it's something that's never been done before, so we've had our share of growing pains. But there's no doubt that it's going to be very effective and, I think, quite thrilling for the audiences that experience it.

The system puts out low-frequency vibrations in a range down around 40 cycles. The sub-audible portion of it makes no noise, of course, but it moves the air around. You can actually feel your clothes move. The audible portion can be heard as a deep rumble.

"EARTHQUAKE" will be shown in both monaural and stereophonic versions, depending upon the facilities of individual theatres. For the monaural prints, the *SENSURROUND* control signals are located on the optical track along with the film's conventional sound. These are dual-purpose prints and can be used with or without the *SENSURROUND* equipment.

The stereophonic prints have four magnetic tracks which handle the conventional sound, and an optical track that accommodates the *SENSURROUND* signals only.

In order to make the optical track, I had to work from our stereophonic version (which has a dialogue track and stereo music and effects tracks). I had to take the two outside music and effects stereo channels and pull the level down, because the optical will take only so much level. Then the dialogue track was laid in and rebalanced with the stereo track. This had to be done on each reel.

One tricky characteristic of the *SENSURROUND* system is the fact that, because of the low frequencies involved, it has to travel the length of the theatre before it stops. As a result, if you shut it off when the cut appears on the screen,

you will have a carryover of perhaps as much as two seconds. You have to anticipate that and get it shut off in time so that it will stop right on the cut.

To get back to the second challenge I mentioned—the unusually large number of separate sound elements that had to be handled—there was an awful lot of preparation and paperwork involved.

The reel that had 54 sound tracks included crashes, buildings falling, people screaming, cement breaking up and a lot more. We pre-dubbed these tracks to get them down to seven tracks that would be used to make the final mix. We had to keep a careful continuity of the various sounds and effects, so that when we wound up with the seven tracks, we could still change the levels and the balance without bothering anything else that was on the same track. It was essential that everything be laid out very carefully in advance. On that particular reel it took me about three days just to get the paperwork done before we could start combining the tracks. I'd say that the toughest sound problem on "EARTHQUAKE" was getting those 54 tracks

down to a form that could be handled, so that we could go ahead and dub the reel.

In a film like this it's almost a matter of personal judgment as to how loud certain sounds should be in relation to others and, of course, Mark Robson was the one to make the final decision in each case. We would look at the picture and establish for each track a level which we thought would work well when all of the other tracks were blended together. When we had all the levels lined up, we would call Mark over to look and listen. There were always a few little things that he would like raised or lowered in volume, but, for the most part, we'd have it into quite good shape before we'd even call him. It was mainly up to us to get it into, let's say, "first cut".

We didn't distort sounds or exaggerate them for dramatic effect. I'd say that the treatment of the sound was quite normal, except for the addition of *SENSURROUND*, of course. We did, however, add a bit of reverberation to the water effects to give them the larger

Continued on Page 1344

Mark Robson (Top row left) poses with a partial group of the technicians required to mix the incredibly intricate sound track for "EARTHQUAKE". The incorporation of the *SENSURROUND* system—brand new and a totally unknown quantity—added to the tremendous challenge. It took three weeks of intense work to prepare the tracks for dubbing and another three weeks to do the actual mix.



THE FILM EDITING

The creative process of putting all that "EARTHQUAKE" action together—a gargantuan task—was skilfully handled by a petite, soft-spoken lady with feature editing credits as long as your arm

By DOROTHY SPENCER

Film Editor

Since I'm semi-retired and living in the country, I come into Hollywood these days to work on only the pictures I like. When I was offered the assignment of editing "EARTHQUAKE", it was such a different type of story that I couldn't resist it. This picture has been a great challenge, but a very pleasurable experience, because I was working with a wonderful crew, a wonderful camera-man and a wonderful director.

Of course, I've worked with Mark Robson before—on eight features to be exact. We have a very nice relationship and I like working with him. Although he is a top-notch editor himself, he gives me free rein to exercise my own creative individuality in cutting a sequence the way I feel it should go. Then we go over it together and he either likes it or he doesn't. If changes are required, I make them, but at least I've had an opportunity to follow through on my own concept. I guess he has confidence in me by now.

There aren't many directors like that

around these days. With most directors, you cut it exactly the way they want it, and there's no room for editorial creativity. During my career I've worked with all kinds of directors. I've worked with Hitchcock and Hathaway and Mankiewicz and Preminger and John Ford. Ford never told me anything and he never looked at the picture until it was finished.

The fact that Mark Robson had been a working editor for a long time has great advantages. He understands an editor's problems and he makes sure that he shoots everything that is needed to cut a sequence together smoothly, but he doesn't shoot a lot of superfluous material. Even so, there was an enormous amount of footage shot for "EARTHQUAKE", about 200,000 feet, but this was mainly because multiple cameras had to be used in so many of the scenes. There were at least four cameras on most of our action material and I would select what I thought was best and put it into first cut. Mr.

Robson and I worked pretty long hours on it, but I enjoyed it. I like working.

We started cutting right after the first day's shooting. As soon as the dailies were cleared, the film was coded and sent up to my cutting room. I keep up to date, so that by the time a sequence is more or less finished shooting, I'm pretty well set on it and have it all cut. I generally work that way. I don't like to get behind.

Inevitably, there were some delays because of the great amount of second unit material—trick shots and miniatures and matte shots. This kind of work takes time to do, and we had to wait until we could intercut these scenes with the first unit material. In spite of these unavoidable delays, I had my first cut of the picture completed seven days after shooting ended.

Mark Robson looked at the first cut and then we went into our changes. We scrambled sequences around and trimmed scenes until we got it the way he wanted it—ahead of schedule.

In editing a picture with as much action as "EARTHQUAKE", you adhere to the script as much as you can, and from that point on it's a matter of isolating the most exciting bits and putting them together. I tried to get as much action into it as possible. For some reason I always seem to get assigned to pictures that are very physical. I don't know why. Pictures like "NORTH TO ALASKA" and "THE YOUNG LIONS" and "BROKEN LANCE" all had a lot of physical action—fighting and brawling and things like that. "EARTHQUAKE" is packed with action and that suited me fine, because I like working on action pictures very, very much. They're more flexible and I think you can do a lot more with them. I like dialogue pictures, too, but, still and all, you're locked down with dialogue.

There was so much going on during the actual earthquake sequences that, in order to put it together, I had to develop a "feel" for the material—as if I were actually experiencing an earthquake. The earthquake action was shot in many different phases, not all at once as you see it on the screen now. I would cut together a part of it that had been completed in the shooting. Then I would put that aside and wait until the

Mark Robson, a highly skilled editor in his own right, discusses a cutting problem on the set with Assistant Film Editor Ed Broussard and Film Editor Dorothy Spencer. Miss Spencer has cut eight of Robson's features and they enjoy a very close working rapport. She had a first cut of "EARTHQUAKE" ready seven days after shooting was completed.

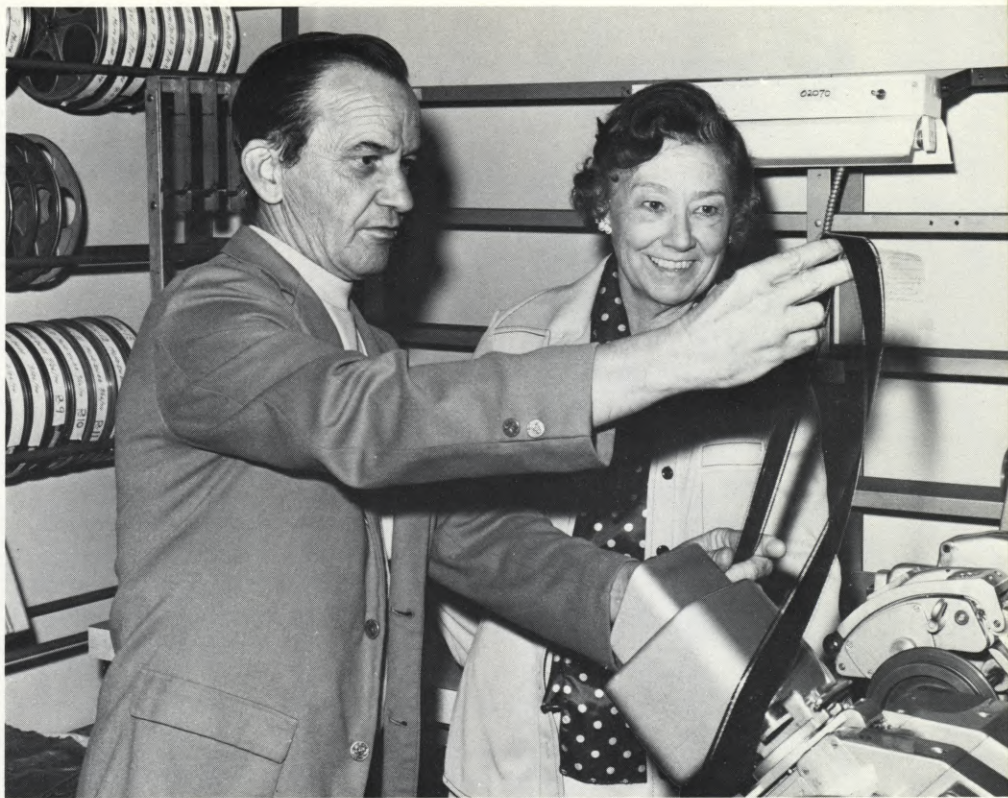


rest of the material came in. After that, it was a matter of getting it to all mesh together.

The unique element in the earthquake sequences that was a bit tricky was the fact that most of these scenes were shot with a certain amount of camera shake. The thing that worried me the most was that in the long shots that were made first, the shake wasn't very noticeable because there was nothing in the foreground to serve as a reference for the degree of background movement. I was afraid to leave those scenes on the screen too long, for fear the audience would be watching the background. Therefore, those cuts were short. In the shooting that was done afterward, Mr. Robson and Mr. Lathrop always made sure that there was something in the foreground to accentuate the shake.

Some of the matte shots and other trick shots that couldn't be filmed with the shake were later sent to the optical department and they added what they called "agitation". I would give them a sample of the shots that were to go before or after the cut and they would try to duplicate the same degree of shake. Sometimes the optical department would also add dust or smoke to certain production scenes so they would match the matte shots made by Mr. Whitlock.

There were many shots in this picture of a type that are never found in a normal type of picture, and that's what I liked about it. There was a chance to try something different. Twenty years ago when Fred Zinnemann was filming "THE NUN'S STORY", he decided to use no dissolves. He timed the scenes so that you could cut directly from one location to another smoothly, without using a dissolve. It worked, and now everybody does it that way. Dissolves are rarely used anymore. Television has



Broussard and Miss Spencer run an "EARTHQUAKE" scene through the trusty Moviola. Through the years, her extensive feature credits have included such classics as: John Ford's original (1939) version of "STAGECOACH", Hitchcock's "FOREIGN CORRESPONDENT" and "LIFEBOAT", "THE YOUNG LIONS", "VON RYAN'S EXPRESS", "A HATFUL OF RAIN" and "CLEOPATRA".

educated people to jump from one thing to another. Everyone wants to have everything happen quickly. They don't want to wait for anything. That's why we had to make some jump cuts in the earthquake scenes. We did that to tighten the action up. Mr. Robson would say "Take the air out."—and I would sometimes cut eight or ten feet out of the middle of the scene, hoping that the cut wouldn't be obvious or jarring to the audience.

What made these jump cuts more difficult to do was the camera shaking that was going on. I would do it by

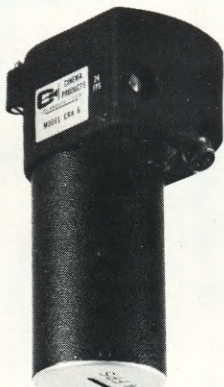
determining exactly where the eye would be focused in the scene and then cut in on another spot where it would be focused in the same place. Sometimes I would do it by laying one piece of the film on top of another to find a frame where the shake coincided.

Most of these jump cuts turned out very smoothly. There's only one that I wasn't quite happy with. It was a shot that was done with two different agitation elements. It was shot with a certain amount of shake on the set and then the optical people really shook it up later. I
Continued on Page 1336

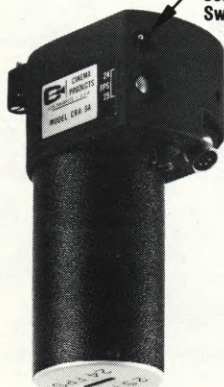
The unexpected was put to good use in the cutting room. In "EARTHQUAKE", Richard Roundtree plays a daredevil stunt motorcyclist whose loop is thrown for a loop by the earthquake (RIGHT). During shooting, the stunt double took a spectacular fall which was not in the script. The scene was held aside and later edited in, after a tie-in close shot of Roundtree had been filmed to match. One more thrill for an already super-exciting movie.



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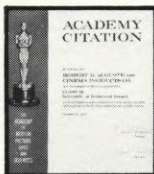


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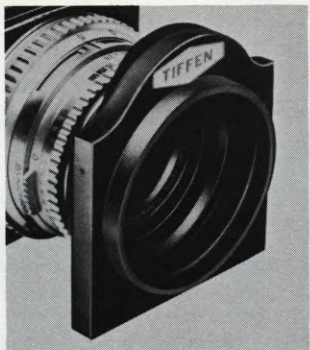


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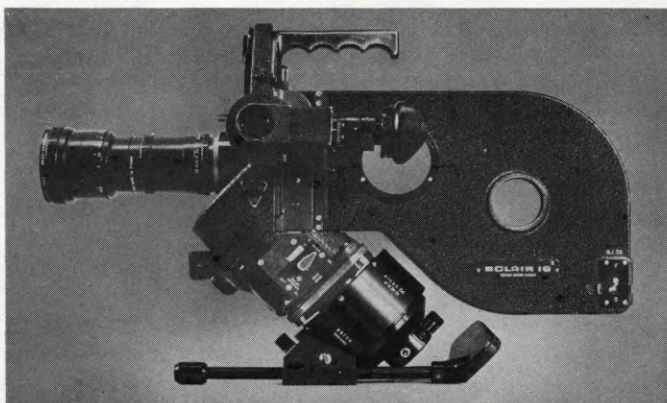
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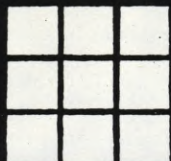
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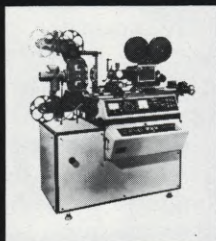


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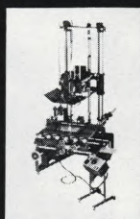
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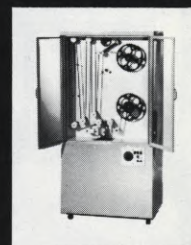
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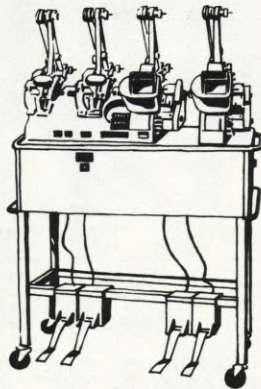
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"EARTHQUAKE"

Continued from Page 1289

the date of the 1971 disaster that rocked the city, killing 64 people, destroying or damaging thousands of homes, buildings, including some hospitals, and freeways; and threatening the lives of some 80,000 people as frantic engineers pumped water out of the collapsing Van Norman Dam reservoir. By an eerie coincidence, the first scenes scheduled to be filmed were at the Hollywood Dam in the hills overlooking the highly populated area extending from the intersection of Hollywood and Vine to Wilshire Boulevard.

The storm drain set constructed for the sequence in which a dam crumbles was a ten-foot-high, 125-foot-long tunnel with turns at both ends. It was situated on the studio back lot between two lakes, one of which was at a lower elevation than the other, allowing water to rush through by gravity flow at the rate of 360,000 gallons a minute. The water was controlled by weirs which could be opened and closed. A wire netting at the lower tunnel end kept the actors and stunt personnel from being carried into the lower lake. Special effects men in scuba diving suits were on hand for rescue purposes.

All of the filming on "EARTHQUAKE" took place in and around Los Angeles with the exception of the opening scene of the Carrizo Plains, a hundred miles north of the city, where the San Andreas fault has ruptured the earth with an ugly gash. A number of buildings and houses in the Los Angeles area scheduled to be razed were photographed during actual demolition. Other locales were in the Hollywood and Vine sector, and at several high-rise buildings in the Wilshire and downtown areas.

An 80-foot-high building was emplaced in a 20-foot pit dug into the floor of Universal's sound stage 12, almost the size of a football field. Lorne Greene, as a business tycoon, and Monica Lewis, playing his secretary, volunteered to be lowered from the structure in chairs secured by a fire hose. Two stunt women and a stunt man took falls from the building into airbags during a scene in which some 35 people, rushing to escape, arrive at a point where the stairs have broken away.

Charlton Heston performed many of his own stunts, and the film's two female stars, Ava Gardner and Genevieve Bujold, won the admiration of the crew by attempting difficult physical scenes—Miss Gardner in churning, cold water that swept her over a hundred feet down the underground storm tun-

nel, and Miss Bujold climbing down a steep broken bridge and hanging by her hands, then dropping into a river bed, and again grabbing a tree and holding on for dear life as a house just above her collapses.

Cinematographer Philip Lathrop, ASC, to whom fell the complex task of photographing an earthquake with all the graphic impact of spot camera coverage, has lensed more than 50 important motion pictures, including "MAME", "DAYS OF WINE AND ROSES", "THE CINCINNATI KID", and "THE AMERICANIZATION OF EMILY", for which he received an Academy Award nomination. Immediately upon completion of "EARTHQUAKE", he began photography on "AIRPORT 1975".

Art directors Alex Golitzen and Preston Ames, who both received Academy Award nominations for "AIRPORT", were reunited on the epic film. Film editor Dorothy Spencer was associated with Mark Robson for the seventh time. Her credits include the original "STAGECOACH", "THE SNAKE PIT", "DECISION BEFORE DAWN" and "CLEOPATRA".

Costumer Burton Miller drew the unusual assignment of making clothes appear as if they had gone through a major disaster. The average film uses some 200 pieces of wardrobe; for "EARTHQUAKE", Miller supplied over 5,000 garments. As many as five duplicates for each of the stars' costumes during the quake sequences were required.

John Williams wrote the original music score and conducted the orchestra for the picture. Williams has been musical director for some 30 major motion pictures, was recipient of one Academy Award and seven nominations, and has composed jazz and symphonic works that have been played by leading American orchestras.

Wallace Worsley was production manager, with Fred R. Simpson and Murray Schwartz serving as assistant directors. ■

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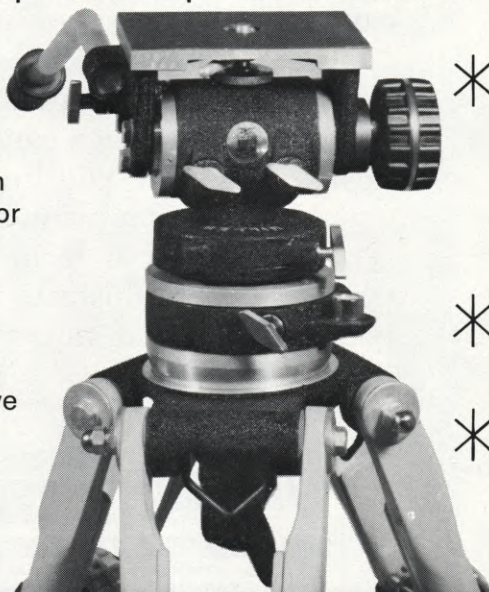
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THE COSTUMES

More than 5,000 separate pieces of wardrobe to show various stages of disintegration for 1,000 players totals up to an enormous challenge for designer of "EARTHQUAKE" costumes

"Dressing people for an earthquake is easy," declared Burton Miller, Hollywood costume designer, "it's dressing them for the destructive aftermath that's difficult."

Miller was discussing his responsibility for costuming over a thousand people appearing in the motion picture "EARTHQUAKE".

"Before the earthquake strikes and destroys much of Los Angeles," Miller pointed out, "everyone in the film is dressed in the normal everyday manner. It's during the quake and the adventures afterward that we faced costuming problems.

"When a person goes through a major disaster and everything ends up in a shambles, the costumes must go through many stages, and the disintegration of the costumes must be believable. The clothing may age 20 years in one day.

"In the average picture, you may use 200 pieces of wardrobe, but in 'EARTHQUAKE' we must have used over 5000 different garments for some 1000 actors, stunt people, atmosphere

and extra players.

"In the cases of Charlton Heston, Ava Gardner, George Kennedy, Genevieve Bujold and some of the other stars, we had to provide them with at least six different versions of each wardrobe change.

"Each change represented a different stage of action before, during, and after the earthquake strikes and leaves the city pretty much in ruins.

"In the case of Ava Gardner, she wears an elegant beige suit to meet her rich father—played by Lorne Greene—at a fashionable restaurant for lunch.

"Later, she meets her husband—that's Charlton Heston—when the big quake strikes. They scramble under a car for safety, as rubble and debris shower down from the buildings.

"When they come out, their clothing is pretty soiled already and Ava's beautiful suit is actually torn. This is just the beginning of their adventures and, before it's over, Ava is trapped by an aftershock in a subterranean basement, climbs through a dirty tunnel, and falls

Costume Designer Burton Miller discusses his unique wardrobe problem with Executive Producer Jennings Lang and actress Monica Lewis on the set of "EARTHQUAKE". The basic problem was one of sheer numbers. Whereas the average picture requires 200 pieces of wardrobe, 5,000 were needed for "EARTHQUAKE" to dress 1,000 actors, extras and stunt people to show various stages of wear and tear as they are affected by the violent action.



It takes more than torn and soiled wardrobe to destroy the glamour of perennial superstar Ava Gardner, shown here on the set with wardrobe supervisor Sheila Mason.

into a muddy storm drain with cold, rushing water.

"Each different adventure had to be reflected in a corresponding costume disintegration. And the same applied to all the other actors."

In the "old Hollywood tradition", Miller continued, the designer was usually called upon to protect the stars and for some reason the female stars were never too disheveled. "You know, whatever happens, the female star must be protected," he said.

"But not in 'EARTHQUAKE'. Both Ava Gardner and Genevieve Bujold were really good sports. They took a lot of roughing-up and never once let their physical appearance interfere with the action called for in the script." ■

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THE PRODUCTION DESIGN

The challenge: to design 96 sets, ranging from several city blocks to the inside of a storm drain, so that they would look correct, yet disintegrate realistically on cue in the wake of earthquake and flood

By HERB A. LIGHTMAN

To design 96 separate sets for a single feature motion picture is chore enough in itself—but to design almost all of those sets *twice* becomes a mind-boggling proposition. Yet, in essence, that is what had to be done in the course of production design for "EARTHQUAKE". The sets, first of all, had to look right in their normal aspect—but, perhaps more importantly, they also had to be designed in such a way that they would break up realistically (and on cue) when subjected to the violence of earthquake and flood.

Selected to meet this demanding and far-out-of-the-ordinary challenge were two of Hollywood's most skilled and experienced technicians in the field.

Named as Production Designer for the massive project was Alexander Golitzen, Executive Art Director for Universal Pictures. Born in Moscow and an artist in his youth, he came to America in 1923 and graduated as an architect from the University of Washington. He entered the motion picture industry as an illustrator at MGM, two of his first assignments being Greta Garbo's "QUEEN CHRISTINA" and Joan Crawford's "RAIN". He was later named Art Director for the Samuel Goldwyn Studios, working first on "CALL OF THE WILD". His numerous credits include: John Ford's "STAGE-COACH", "HURRICANE", "FOREIGN CORRESPONDENT", "MARCO POLO", "WUTHERING HEIGHTS",

"PHANTOM OF THE OPERA", "THE INCREDIBLE SHRINKING MAN", "SPARTACUS", "FLOWER DRUM SONG", "TO KILL A MOCKINGBIRD", "THOROUGHLY MODERN MILLIE", "SWEET CHARITY", "AIRPORT" and "SLAUGHTERHOUSE FIVE".

Golitzen has been the recipient of thirteen Academy Award nominations, and has won the golden "Oscar" three times for Best Art Direction on "PHANTOM OF THE OPERA", "SPARTACUS" and "TO KILL A MOCKINGBIRD" (co-credit with Henry Bumstead).

Working with Golitzen as Art Director on "EARTHQUAKE" was Preston Ames, whose own illustrious credits include: "BRIGADOON", "LUST FOR LIFE", "KISMET", "GIGI", "THE UNSINKABLE MOLLY BROWN", "QUICK, BEFORE IT MELTS", "AIRPORT", Ross Hunter's "LOST HORIZON" and "THE PRISONER OF SECOND AVENUE"—among many others.

"Preston, who is my very good friend, had worked with me on 'AIRPORT' and a few other pictures," Golitzen explains. "For 'EARTHQUAKE', we divided up the work. I laid out the overall production design. Then he took over on all of the straight sets, while I concentrated on the effects, the miniatures and all the disaster stuff. However, our efforts overlapped in

Continued overleaf



Universal Pictures' Executive Art Director Alexander Golitzen, who served as Production Designer on "EARTHQUAKE", discusses set designs with Producer/director Mark Robson.

Design of the many breakaway sets in "EARTHQUAKE" required a great deal of engineering know-how, as well as architectural skill. After basic designs were drawn up, the Production Designer worked very closely with special mechanical effects experts, outlining breakaway elements step-by-step, so that sets could be built accordingly. In photo series below, an entire rubble-laden ceiling comes down, appearing to bury stunt people directly underneath.





The Production Design challenges for "EARTHQUAKE" included designing sets as large as an entire street to be destroyed (LEFT) and as small as the inside of a storm drain (RIGHT), which would be capable of standing up under a powerful surge of water. It was not sufficient to design sets that would look authentic on the screen, as in a normal production. Required also were detailed mechanical plans for making those sets come apart realistically under the impact of earthquakes and floods.

(BELOW) A few of the hundreds of production design sketches created for "EARTHQUAKE". The entire production was storyboarded in advance, permitting complex effects to be pre-planned. The top row of sketches shows progressive stages in the breaking of the Hollywood Dam. The second row has sketches of a street before and after it has been demolished.





Mark Robson goes over one of several hundred miniatures with Art Director Preston Ames. Miniatures were a very important element in creating the illusion of destruction on a massive scale. They had to be as carefully designed as full-size sets and, in many cases, had to match actual structures in precise detail. After miniature designs were completed, they were passed on to specialist Glen Robinson for construction.

Even the Destruction had to be carefully designed. It was not simply a matter of placing a pile of rubble here and there, but of deciding (and designing) just exactly how a huge wall might crash down and exactly where the debris would land. Production design was closely interlocked with special mechanical effects, stunt action staging and cinematography.



many areas."

One of the main problems was finding technicians who were experts at such exotica as breakaways, miniatures and the like, since they have become a vanishing breed in modern-day filmmaking.

"We were very fortunate to be able to coax Cliff Stine out of retirement to photograph the miniatures," Golitzen observes. "He and I had worked together on 'SPARTACUS' and he'd done some marvelous things. Several years ago he retired to live in Spain and then moved to Jackson, Mississippi. It took a bit of detective work, but we managed to track him down there and persuaded him to work on 'EARTHQUAKE'.

"We were also very lucky to get Glen Robinson back to build our miniatures. He's a top expert in the field, but since not much miniature work is being done in films these days, he had been working out at the Magic Mountain amusement park, devising some of the fascinating tricks and illusions they've got going out there."

Miniatures figure very prominently in the effect of massive destruction that is the keynote of "EARTHQUAKE". Many of them were scale-model replicas of actual existing structures, so they had to be designed to scale with the utmost precision in order to insure realism. The designs for these models were worked out very carefully by the Production Designer and then passed on to Glen Robinson for construction.

"Our greatest concern in building and filming the miniatures was to do it so that they would not be obvious as miniatures," says Golitzen, "and we used several methods to make sure that they would not be spotted by the audience as fakes. First of all, they were interspersed with full-scale structures throughout the film—not lumped all together, as they often are in the Japanese monster pictures.

"In order to have a miniature come off believably in a film, you first have to pre-sell the audience on the reality of it by planting a psychological seed. For example, if you first show a building at Wilshire and Western with the cars passing by and people going in and out, you can then cut directly to the miniature and, if you've done it skilfully enough, the audience will believe they're watching the same structure breaking apart. In one sequence we show actual cantilevered houses in Coldwater Canyon, the kind that hang off the hillside on stilts. The audience sees a man on one of the balconies and Genevieve Bujold walking under the real houses. We thoroughly familiarize the audience with the actual houses. Then

we cut to the miniatures as the houses start shaking and collapsing and sliding down the hill.

"In another sequence we see a truck rolling along the Los Angeles freeway with a load of cattle. The driver is drinking a Coke as he rides along when, suddenly, all hell breaks loose. Obviously, we couldn't actually cave in the freeway as the real earthquake did when it hit Sylmar, but we cut to a piece of unfinished freeway near Glendale where we could stage erratic action with a dozen cars and our own truck. Then we cut to the miniature, as the freeway collapses and the truck comes crashing over the side, cattle and all. It's very convincing on the screen, because we pre-sold the effect by showing full-scale action first."

The biggest miniature in "EARTHQUAKE" is the 56-foot model of the Hollywood Dam, built to 3/4-inch scale to represent the actual dam, which is 880 feet wide.

"We were taking quite a chance in working to a scale that small on the dam," Golitzen observes, "because fire and water are the two bugaboos in miniature work. A drop of water and a flame remain the same size, no matter what the scale, and this gives it away if the scale is too small. Fortunately, we were able to shoot it at dusk with a day-for-night effect, which hides a multitude of sins. If we had shot it in full daylight, the miniature would have had to be built about four times larger."

In commenting on his work on the film, Preston Ames says, with something like awe in his voice: "It was very stimulating to work with Mark Robson. He's an enormously creative man. He would have 72 ideas in the morning and another 72 in the afternoon. On this picture our motto was: 'The impossible we do immediately; the miraculous takes a little longer.' But every picture is different and you learn something new on each one. You may think you have all the answers, but you find out soon that you don't."

One of Ames' many projects on "EARTHQUAKE" was the designing of an earthquake fault, a huge crevice in the earth stretching to the horizon. The farthest part of the fault, diminishing in the distance was taken care of by a matte painting executed by Albert Whitlock, but the foreground portion had to be built full-scale, because of the action going on around it.

"It turned out to be more complicated than it sounded at first," Ames recalls. "It couldn't simply be dug like a regular trench. It had to be reinforced and shored up so that it wouldn't actually cave in and kill the actors."



Alexander Golitzen shown with Panavision-adapted Arriflex camera mounted on a special shaker device worked out by Director of Photography Phil Lathrop and Lou Ami, head of Universal's machine shop. The shaker provided programmed vertical and horizontal movement in pre-conceived erratic patterns. The degree of vibration could be widely varied and a particular set of movements could be repeated precisely, if needed.

Prior to the completion of the script and the designing of the sets, no effort was spared to make the earthquake detail as authentic as possible. "We did exhaustive research," says Golitzen. "We got a lot of material from the California Institute of Technology and studied Japanese film of actual earthquakes. Then Mark Robson and I went out to the Cal-Tech seismological laboratory to talk with Dr. Clarence Allen. He said to us: 'Before I'll even agree to cooperate, you'll have to promise me that you won't have the earth opening up and swallowing people and then closing up again. Every earthquake picture I've seen, including MGM's SAN FRANCISCO, has had a sequence like that in it—and that's something that earthquakes never do.'

"We promised him that we would keep the film accurate in every way, and he was most cooperative. We found out, during those discussions with Dr. Allen, that there are various types of earthquakes and that each one has a different kind of movement. They have, for example, a model of a tall building mounted on a shaker platform. If you turn on a certain kind of wave motion, only the middle of the building will shake. If you turn on a different kind of wave motion, maybe the top and

bottom will shake, while the middle part remains still. This was helpful to us in designing the shaker platforms that we built some of our full-scale sets on.

"One of these sets was a small neighborhood bar and it's here that the first tremor becomes discernible. The billiard balls on the pool table begin to roll around and click against each other. Then the bottles start falling off the shelves, as the movement becomes more violent. The shaking platform was geared to simulate the rhythm of an actual earthquake."

Before any of the sets were built for "EARTHQUAKE", the entire script was storyboarded. Hundreds of color sketches were made to show the before-and-after phases of each set. "I had two artists working with me," says Golitzen, "and we laid everything out scene-by-scene, sketch-by-sketch. Sometimes we had to deviate a bit from the sketches, but at least we had this 'bible', as we called it, to go by. It was a great help to everybody—to the cameraman, to the effects people, and even to the editor in putting the picture together."

Designing the breakaway sets was a tricky business and Golitzen worked very closely with the special mechanical effects people on that phase of the

Continued on Page 1342

SPECIAL PHOTOGRAPHIC EFFECTS

A top expert in the almost-lost-art of matte painting creates forty compositions that lend tremendous scope and extensive production value to "EARTHQUAKE"—and at a very low cost

By ALBERT WHITLOCK

Photographic Effects Specialist

When I first heard about "EARTHQUAKE" it seemed like it would be an overwhelming project. Mark Robson, however, was very positive in his approach. He knew exactly what he wanted—which was a great help—and there was no vacillation in making decisions.

I had twelve weeks to complete paintings for 40 scenes, which works out to better than three paintings a week, but we were fortunate in that nothing went wrong on the picture. Everything turned out pretty much as was hoped—except, perhaps for the tag, the final scene in the film. It shows dazed survivors milling about in an utterly devastated city. I completed the painting of a panoramic "long shot" of the destroyed metropolis, leaving a blacked out central area to matte in the live action scene of the survivors.

Ideally, Mark Robson would have liked to start in close on these people and then have the camera pull back to reveal the total destruction around them. There's no question that it would have been dramatically very effective, but it would have meant venturing into a very hazardous technical area. What happens when you try to interlock effects over a painting, or even a miniature, is that you get a "drift" or "scissoring" of the two images, which can be a dreadful giveaway.

Of course, the effect could have been achieved rather easily on the optical printer by simply doing an optical pull-back from the composite matte shot, but that would have meant going to an extra generation, with the assurance that today's highly sophisticated audiences would have spotted the scene for a dupe. That's why one must always,

whenever possible, create effects on original negative that will be of exactly the same technical quality as the original negative used to film the live action.

When I explained the risks involved in getting what he wanted, Mark was very good about it. He said: "Well, let's get a very good comprehensive look at the city—one quick shot." And so, while he settled for what was, in effect, a much less ambitious idea, I think it worked out very well.

In making a composite matte painting shot, the live action inset is always shot first, and I'm always actually on the set when it is being filmed. The area that is to be a painting is blacked out, so that only the live action area is recorded on the first pass through the camera. Being there during this live action filming gives me the opportunity to visualize the complete final scene and make sure that we are getting a composition that will work.

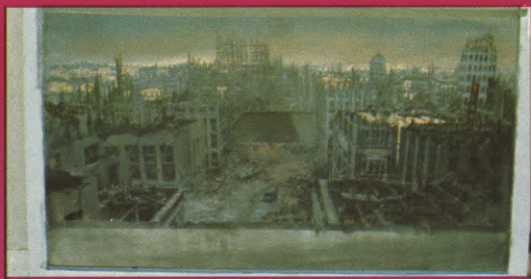
I work very closely with the Director of Photography during this phase, because he knows what he's done with the rest of the picture. I work to the f-stop he used in shooting the live action when I'm filming the painting later. This gives us the best chance of matching the densities of the two elements. Precise matching requires shooting 200 or 300 feet of test footage with the matte in. It's a sort of building operation. I don't get too far into a complete painting before I make my first test. The composition is roughed in, just a sketch, actually. But it gives me my first clues on key, and key is very important. For example, if the original live action photography is a little low in exposure—which can happen—then the painting should be a little bit on the low side, so that it will have the same look. In shooting the paintings I always work to a set lighting. If my first test indicates that the painting is too light or too dark, I make a radical change right then in the key of the painting. However, if you get too much done on the painting (fall in love with it, so to speak) before you make your first test, and it turns out to be the wrong key, you can be in trouble. If you try pushing it one way or the other to get it in line with the original photography, you lose control. In other words, the tones, which would

Albert Whitlock, widely acknowledged to be the top matte painting artist in the Hollywood film industry, works on one of the forty paintings he did for "EARTHQUAKE". The paintings are done on glass, a good working surface. The painting shown originated from a photograph taken from a hill directly above the A.S.C. clubhouse in Hollywood—a sobering thought.





A few of the many matte paintings which Whitlock created for "EARTHQUAKE". The blacked-out portions represent areas where live action or other full-scale photography will be matted in. (ABOVE LEFT) Hollywood, after the quake. (CENTER) The earthquake fault, stretching to infinity. (RIGHT) A Los Angeles thoroughfare, devastated. (BELOW LEFT) A section of the Los Angeles River spillway. (CENTER) The final shot of "EARTHQUAKE", showing Los Angeles laid waste, with the glow of fires still smoldering in the background. (RIGHT) A section of Hollywood, with the famous HOLLYWOOD sign in the background.



appear to be normal, will suddenly start jumping. I mean, you could be in deep water because it's the wrong key.

When I get the printing lights back on the original photography, I know then whether it's in the middle of the scale or not. If it is, I have a pretty good idea of what kind of painting I have to do. Even if it isn't—if it's a little bit on the dark side, for example—I know also what kind of adjustment I have to make. Making such judgments is something instinctive, a kind of "feel" you acquire after long experience.

Since, as I've said before, I believe in working with original negative in order to maintain the best quality, the original negative of the live action is neither developed nor printed immediately after it is shot. It is brought back to the studio and kept in the refrigerator, because it will not be a completed thing until the painting has also been exposed onto it.

Incidentally, when shooting the original scene, we often set a "B" camera up to cover a duplicate of the action, or we make an extra take on the matte camera, so that the editor will have something to work with while we're shooting the painting to complete the scene.

When the test footage has been shot—I shoot a piece with the matte in and a piece without the matte—that goes to the lab. When I get that back with its printing lights, I know whether it's printing high or low. In taking the matte away, I can see the whole scene as it was and I take my key from that

piece without the matte. It also gives me a source light direction. There are always objects in the scene, trees or whatever, that cast shadows and I can duplicate those shadow angles in my painting.

The first painting I completed for "EARTHQUAKE" was that of a fault, a great gash in the earth running apparently for miles into the horizon. From my standpoint it was quite easy because it was just a straight painting and didn't involve any animation. They had wanted to shoot the scene using an actual fault, but they couldn't find a fault that was photogenic. They even flew over one of the actual faults, but they couldn't get the kind of image they were looking for. So they dug a big ditch on the backlot for the foreground of the fault, because they had action going on there, and I painted in the rest of the fault, creating a scene that otherwise would have been impossible to shoot.

What makes many of the paintings in "EARTHQUAKE" really work well is that we often put people in action right in front of the painting. For example, you see people running in front of a painting of the completely demolished Hollywood Boulevard. This gives the scene a sense of depth. Of course, it involves rotoscoping, the tedious cell-by-cell inking of individual frames to be filmed as a matte in order to superimpose the people on the painting.

Rotoscoping came into this picture quite a bit. For example, there is the

scene in which people are falling to their doom from the upper stories of a violently shaking skyscraper. Sometimes it took only a half-dozen frames to take the falling figure over the area where a pad had been placed down below to break the stuntman's fall. Even in such a short cut the audience gets the feeling that, since the man has fallen that far, he will fall all the way.

To shoot the live action for another similar down-shot, we went up onto the roof of the Universal-Sheraton Hotel and shot down on people running in the hotel's parking lot. We had to take very careful measurements in order to get the correct angle.

There was one miniature scene in the film which turned out to be rather interesting. I didn't shoot the miniature, of course; it was shot by Cliff Stine with several cameras to get the breaking up of the Ahmanson Theatre in the Los Angeles Music Center. When we were down at the Ahmanson shooting live action scenes of 300 people running away from the camera, I said to Mark Robson: "The miniature is an exact scale replica of the Ahmanson. We have 300 people here. If we shot a scene of them running away from the actual building and then computed our position and set up a camera exactly in the appropriate spot on the miniature, we could make a split and have the people running below while the building was collapsing above them."

Mark readily accepted the idea and it

Continued on Page 1360



Inside the storm drain, Charlton Heston attempts to rescue Ava Gardner as she is being swept away by the turbulent flood waters. Since there was no way to place conventional lighting units inside this enclosed tunnel, Lathrop used the 100-watt mechanics' worklights carried by the actors to light the scene, plus a few inky-dinkies to put a backlight on the water and a crosslight here and there.

THE PHOTOGRAPHY

Continued from Page 1301

to light the set. The source was supposed to be sunlight, but with the action taking place right up against the grid of the stage, where do you go to hang lights above it? It would have been ideal if they could have built this set outdoors, but I guess they didn't want to take chances with the weather. At any rate, in order to light it, I went clear up above the grids with four arcs pointed down to simulate the angle of the sun. I matched each of the arcs on the way down and didn't overlap them, nor did I use any fill light at all. It was exactly as if we had been outside, with the light coming from the single sun source. When we moved in closer we still had that same source. Once we got it lit it was lit forever. I never had to change it because, at that point in the script, we could go quite documentary, with everything really hard and sharp and crisp. Even the women didn't have to look beautiful; they had to look bad because they'd been through this earthquake.

It was an exciting sequence to shoot. When we got the matte shots in there so that you could see the enormous height and the destruction and the city burning in the background, it was quite ef-

factive.

Toward the end of the picture, after the earthquake and the aftershock have done their damage, a group of about 70 people is being taken care of in a makeshift first aid station three stories underground, beneath a building that had remained intact after the main earthquake. But now the aftershock has caused the building to collapse above them and they are trapped underground. Charlton Heston, who plays the architect who designed the building, knows that the storm drains are only three or four feet from the base of the building, so they tunnel through, hoping to escape through the storm drains.

The studio built exact replicas of the Los Angeles storm drains. The main one was about 10 feet in diameter and off of that led smaller drains about six feet in diameter. Parts of those drains were crumbled, so that the people had to crawl underneath. There was actually no way to light those tunnels, no way at all. I noted that when the people came down there they had taken with them mechanics' worklights, just 100-watt bulbs on extension cords (we had already established the fact that there was a portable generator working up above), so I had a lot of those 100-watt bulbs strung on cords and the people carried them in and hooked them on the wall.

That was their key light. I lit the whole tunnel with 100-watt bulbs. We had about 50 footcandles of light and forced the development one stop. We could have done it with flashlights, but that's corny. If they're going to come down and rescue somebody, they aren't going to do it with flashlights.

After the wall has been broken through and the people crawl through into the storm drain, it looks as though they're home free. But meanwhile, having been weakened by the aftershock, the Hollywood Dam breaks and a wall of water comes roaring down into the city, finding its way into the storm drains. There was no way they could have built those storm drain tunnels on a sound stage to get that all-out surge of water rushing through them. Fortunately, Universal has two lakes on the backlot and one of them is about ten feet above the other. So they built this tunnel in between the two lakes and all they had to do when they wanted a wall of water to come gushing through the tunnel was open up the gate in the upper lake and let gravity take the water through. This arrangement worked so well that it almost flooded us out of the place.

In the large tunnel, in addition to the 100-watt "key" lights, I had to put in a few inkie-dinkies to get a little back

Fifty feet above the floor of Universal's Stage 12, Lathrop lines up the camera on a backing showing the devastated city. Creating a sun-light source near the ceiling was difficult.



light on the water and a cross light here and there. It was very sketchy, but it looked quite real. We were really working in close quarters in those tunnels because they were solid, except for a couple of ports to get the camera in, and there weren't any wild walls you could take out to make the shooting easier. I think that's good. Sometimes, when you can't take walls and ceilings out, you end up lighting it better than if you had taken a wall out. It's tough to light, but it keeps you from putting *too much* light in there.

These days many films are being shot in natural sets instead of on studio sound stages and there is a lot to be said for this in terms of getting realistic backgrounds, but I think you work much more slowly in natural sets and it also ties a director down in the sense that he's limited in staging his action. We could have gone into a lot of natural sets for "EARTHQUAKE", but that would have been very limiting for a picture like this. In this case, the picture has a much better look because we were able to build sets and control the lighting and do things with the camera that would have been impossible in a natural set.

The picture I photographed just before "EARTHQUAKE" was a comedy called "THE PRISONER OF SECOND AVENUE" and it called for a completely different photographic style. It all takes place in one apartment and it's brightly lighted, because that's what the director wanted. He wanted a high-key comedy.

The photographic style for "EARTHQUAKE" is the complete opposite. When I came onto the picture I asked Mark Robson: "What kind of look do you want this picture to have?" and he said: "I want it to look real. If the scene is supposed to be dark, I want it dark. I don't want the actors in half-light." To me that meant that I didn't have to use much fill light and that I could use cross light a bit more. Also, I didn't have to flatter anybody, photographically speaking. It's a completely different style, but I find the "EARTHQUAKE" style more enjoyable to work with. For me it's more of a challenge, but it's a challenge I like to face because it gives me a chance to do things that are different.

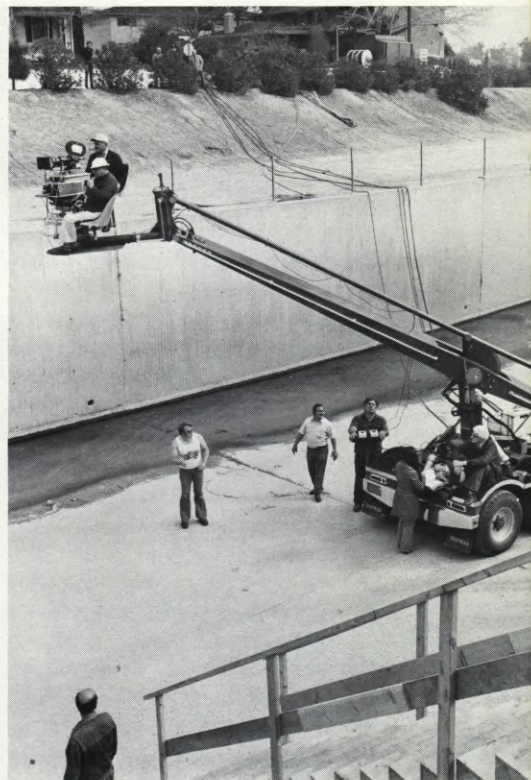
There are practically no zoom shots in "EARTHQUAKE" because Mark Robson doesn't care for zoom shots. We occasionally used the zoom lens simply as a long lens, without zooming, but there are no zoom shots for impact or anything like that, because they just wouldn't have fit this picture. The camera moves we did were very straight-

forward and unobtrusive. Nothing was done simply for the camera's sake. We used the camera to tell the story, so that people would understand it and enjoy it, not so they would notice the mechanics and say: "Gee, what a great camera move that was!"

Working with Mark Robson is a pleasure because he's a great technician. He knows his cutting; he knows what he needs and how he's going to use it. A lot of the tricky things that are done in films today are just baloney. Don't get me wrong—I think that in some pictures a specific kind of camera move can enhance a scene. But in the kind of story we were telling complex camera moves weren't necessary. The role of the camera was to be unobtrusive and simply tell the story. We had enough going on in front of the lens without resorting to camera tricks. We told the story with simple camera moves and no zoom shots.

I'm not against zoom lenses. There are times when a zoom shot can be very effective, but there are a lot of people who don't quite understand how a zoom lens should be used, and they use it incorrectly. It's a tool like any other camera tool. If it's used right, it's terrific—but to use it just because
Continued on Page 1367

Heston and Lathrop had the same reason for working hard to complete "EARTHQUAKE" on schedule. As soon as the last scene was in the can, with not even a day off, they both began work on "AIRPORT 1975", also for Universal. Despite the enormous complexity involved in making a picture like "EARTHQUAKE", everything went smoothly—a tribute to the army of top "pros" who worked on the film.



The camera on a Chapman crane moves into position in the floodway of the Los Angeles River, fortunately dry at that time of the year.



THE MINIATURES

An expert at making mountains out of molehills for the silver screen comes out of retirement to add his unique expertise to the filming of miniatures for "EARTHQUAKE"

By CLIFFORD STINE, ASC

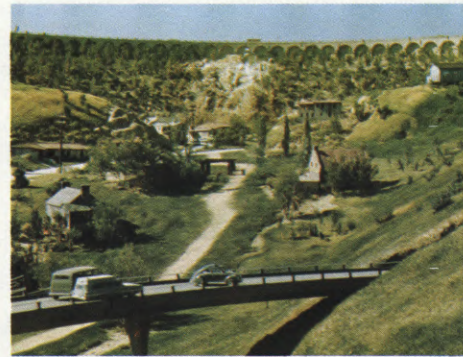
Miniatures Cinematographer

During the Golden Age of Hollywood, when production costs were relatively low and the theatrical motion picture audience in America averaged 90,000,000 a week, many films were made on a vast scale which required the expertise of specialists in the more

elaborate and exotic cinematic techniques.

With the advent of the Age of Television (and the subsequent decline in theatrical film attendance) fewer and fewer of these epic films were made. Consequently, many of the highly

trained and vastly experienced specialists left the industry for more secure professions. Others retired and some passed away. Today, the skills which many of these men had so painstakingly perfected have all but become "lost arts".



Sequential photography showing the bursting of the Hollywood Dam, as portrayed with chilling reality in the final reel of "EARTHQUAKE". Though technically a "miniature", the model of the dam was actually 56 feet wide, built to a 3/4-inch scale. It was constructed on a hilltop above the Universal Studios backlot and the action was recorded by nine cameras rolling at speeds from 96 to 120 frames per second. The elaborate model included, besides the dam itself, the surrounding hills, the canyon and houses below.



When recently such all-but-extinct skills were needed to lend vast scope to Universal's epic production of "EARTHQUAKE", it became necessary to coax several of these specialists out of retirement to work on the film. One such expert was Clifford Stine, ASC, credited on the production as "Miniature Cinematographer".

Mr. Stine began his cinematic career soon after graduating high school. His first job was at the old Cecil B. DeMille Studio in Culver City. After six years there, he went to RKO Studios as an assistant cameraman and was given a job in the "trick" department. He spent 20 years there, including four years devoted to military service.

When RKO was sold to Howard Hughes in 1949 and the studio became dormant, Cliff Stine went to Universal where he headed the trick department for a while and also made many pictures as a first cameraman.

In 1968 he retired and he and his wife went to Europe. They lived in Spain for four years and then moved back to the States, settling in Mississippi. It was there that producer/director Mark Robson (whom he had known since the days when they were both "growing up" at RKO) tracked him down and asked him to come out of retirement to film the complicated miniature shots for "EARTHQUAKE". Mr. Stine accepted and, in the following interview, details some of the techniques and the problems involved in executing this very special and demanding type of cinematography:

QUESTION: What would you say was your most demanding challenge in photographing the miniatures for "EARTHQUAKE"?

STINE: *The most demanding challenge was creating in miniature the effect of buildings being shaken down during an earthquake. It was difficult to get them to appear as if they were really being shaken down, rather than torn down or blown down by an explosion. It was a challenge for the boys to construct the miniatures in such a way that they would come down in a manner that looked like they were being shaken down. The miniatures were marvelous in their detail and construction. Even so, there were occasions when we had to repeat a shot two or three times because they didn't come apart in just the way we hoped they would. Photographically it wasn't all that difficult. We made a series of tests shooting at various camera speeds, which is a requirement because of the scale. The miniatures were built*



Miniatures cinematographer Clifford Stine, ASC, stands with Producer/director Mark Robson and Director of Photography Philip Lathrop, ASC, on the causeway atop the real Hollywood Dam, as they plan its destruction in miniature. Robson and Lathrop are holding Art Director's sketch of one phase of the flooding that follows the dam's break-up. The model of the dam was the largest miniature used in the picture and the trickiest to shoot, but filming went off without a hitch.

to different scales—some two-inch, some an inch-and-a-half, others one-inch. The smallest scale was 3/4-inch to a foot. The scale governs your camera speed to some extent.

QUESTION: What would you say was the average frame rate you used for this kind of shooting?

STINE: *We turned the cameras anywhere from four times 24 frames to five times 24—which is 96 to 120 frames per second. You get different objects falling at different speeds, due to the construction of the miniatures. This would also hold true with a normal, full-scale building, depending upon the steelwork involved, and so on. Certain things, like cornices, will fall faster than elements of the steel structure, so you have different speeds to contend with. We struck a pretty good medium in our shooting so that everything looked quite normal.*

QUESTION: In order to get the realistic movement of buildings being shaken

down did you have to put the miniature buildings on shaking machines?

STINE: *Yes, we did. The buildings were constructed on shakers which, of course, were hidden and which were manipulated by means of electronic controls. In certain scenes some buildings would shake more than others. We had, for example, a split-screen matte shot where we incorporated people falling out of full-scale buildings with miniature buildings that were shaking. However, the miniature building directly adjoining the full-scale set (which happened to be the Capitol Records Building) was held stationary, so that the split could be made on a steady line. Then, if they wanted to add to the movement of the overall composite later, this could possibly be done optically.*

QUESTION: What was the biggest miniature used in the filming of "EARTHQUAKE"?

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THE FILM EDITING

Continued from Page 1317

didn't realize that it had moved a fraction. If I had, I could have smoothed it out a bit, but by that time the negative had been cut. It's obvious to me because I've seen it a hundred times now. The more you see a film the more critical you get. But a paying audience sees the film only once, so perhaps they won't catch it.

Even with all of the control exercised in the filming of "EARTHQUAKE" unexpected things happened now and then. For example, in the film Richard Roundtree plays the role of a daredevil motorcyclist. The double who was doing the stunt for him took a spectacular spill that wasn't in the script. He wasn't hurt too badly—just shook up a bit. Anyway, we held that take aside and later actually used it in the picture. We simply shot another scene of Richard Roundtree duplicating the last part of the action. It wasn't intended and we tricked it up, but it added to the excitement of the sequence.

The shooting script of "EARTHQUAKE" is designed in such a way that it deals with many different characters in separate situations. The storyline finally brings them together in time to be interrelated during the earthquake. We would never stay on a sequence about a particular character or pair of characters for any length of time. There would be a sequence to establish a character and tell a bit about him and then we would move on to another. The important thing was to plant the characters in places and situations, so that when the earthquake started the audience would know exactly where they were and wouldn't lose track of them.

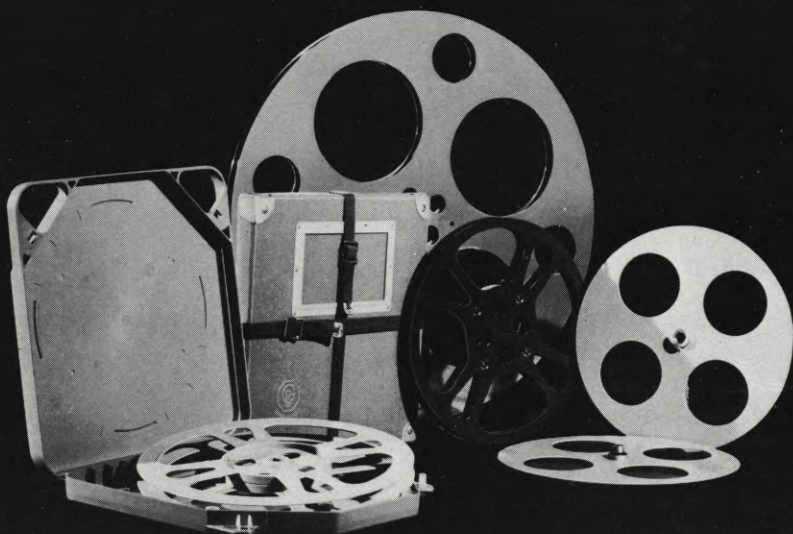
I can say that the only sequence in the film that really gave me any kind of problem was the one where 70 people are trapped underground and they tunnel through into the storm drain. I sort of put that sequence aside as long as I could, because I wanted the chance to think out what I could do to improve the timing. There was a lot of material shot for that sequence and the problem was to let the audience know that 70 people had gotten out, without having the sequence grow tedious. The part where Charlton Heston and George Kennedy were drilling through the wall took an endless amount of footage. We didn't want to dissolve the scene, but we also didn't want to hold the audience there until they cut this big hole through the cement.

In addition to that, there was some trouble in the storm drain part of the

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sequence, because the water hadn't come up to the right level. I waited until those scenes had been re-shot and then ran all of the material for the sequence—eleven reels of it. I first put it together rather loosely, but it ran much too long. The only way to keep it moving and get it down to proper length was to take a certain license with cutaways and tighten the action up. That's what we did and it worked out quite well.

All of this called for a lot of patience, and when young cinema students ask me—as they often do—what it takes to become a film editor, I always tell them that *patience* is the first requirement. For example, there was a situation on this picture where we wanted to delete a scene, but I didn't have enough material to cover the cut. Mark Robson told me that I wouldn't have the patience to solve the problem, but I said: "It's a challenge, and I'll lick it." I just insisted that there had to be a way of doing it. There's *always* a way. Well, I found a way and he liked it. He just walked away shaking his head, but I thought it was fun.

Besides patience, I think you have to be dedicated to become a film editor. That's always been more important to me than anything else. I guess my whole life has been made up of wanting to do the best I could. I enjoy editing, and I think that's necessary, because editing is not a watching-the-clock job. I've been on pictures where I never even knew it was lunchtime, or time to go home. You get so involved in what you're doing, in the challenge of creating—because I think cutting is very creative.

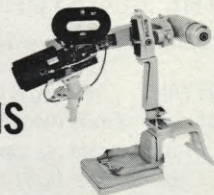
When I first became an editor, I would dread going onto a picture with a new director because I was afraid I wouldn't be able to cut the mustard. Then one director told me: "Never be afraid of a man who knows." I remembered that and it certainly applies to Mark Robson. He knows editing. He's been an editor and he's well aware of the problems. When you work with a new director who has never had any editing experience, he often asks for the impossible. You can't tell him it won't work. You just have to do it his way and let him realize that maybe he was wrong. With Mr. Robson it's quite different. He let's me do what I want and then comes up to the cutting room so that I can show it to him on the Moviola. If he thinks something doesn't work, we just forget it. I guess we just understand each other. We talk things over. Sometimes he doesn't agree or I don't agree—but there's no big problem. We just get on with it and eventually arrive at something that we're both happy with.



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THE MINIATURES

Continued from Page 1335

STINE: *The biggest was the miniature of the Hollywood Dam. Built to a 3/4-inch scale, it was 56 feet wide and, of course, we built the hills surrounding it and the canyon and houses below it—all to the same scale. When we shot the breaking up of the dam, we used nine cameras. It was well-covered. Fortunately, it all went off as planned.*

QUESTION: In the sequence of the dam breaking up you had the added element of water, which presents its own peculiar problems in miniature shooting, doesn't it?

STINE: *Yes, I considered that at great length in determining the scale to be used. While the scale ended up as 3/4-inch to the foot, it was large enough so that the water took on a pretty normal movement. I had three cameras up close to the dam itself, where the action of the water was cross-screen, so these cameras were turning at five times normal. Halfway down I had another camera that was shooting three-quarters into the ravine and I turned four times normal on that. All the cameras I had down below (which were shooting straight up the canyon) were turning four times normal, because the movement of the water was straight toward us. Whenever an object is coming toward you or going away from you, it has a feeling of speed that is different from the speed of an object going cross-screen. At any rate, the footage of the dam breaking up turned out very well.*

QUESTION: What about the choice of lenses in respect to the perspectives necessary to make miniatures look real on the screen?

STINE: *It's very important to use wider-angle lenses in order to retain correct perspectives. Generally, in the 35mm anamorphic format (which was used to film "EARTHQUAKE"), a 40mm or 50mm lens gives you a pretty good depth of field. There are times when we use longer lenses to shoot individual areas of the sets for intercutting. But in such instances, we're not so concerned about perspective or depth of field. Usually the wider-angle lenses are used to exaggerate perspective and, in some cases, we force the perspective by other means. Going back to the Capitol Records Building, for example, the building itself in the foreground was built to the 3/4-inch scale. Then we placed very small-scale miniatures approximately 50 feet beyond, which produced an apparent depth of about a quarter of a mile. Beyond that we saw the Valley with its real structures, and everything tied in beautifully.*

QUESTION: Referring to your use of a wide-angle lens to shoot miniatures, in addition to its exaggerated perspective, it also has an inherently greater depth of field. This would seem to be very necessary, especially in longer shots where you have elements in several planes. A lens with a shallower depth of field would render some of those planes out of focus, which would give the effect away. Isn't that so?

STINE: *Yes. It isn't only the perspec-*

tive that you have to consider. There are many times, in working with miniatures, when you have a focus problem, as well. Fortunately, most of our miniatures were shot outdoors, where we could stop down sufficiently to get considerable depth of field, so we generally had no focus problems. We did have one night miniature scene which was a challenge, because we were turning five times normal and, while it was night and the exposure could be less than it would have been for a day shot, we had to pour a lot of light on it. We made tests of the building itself with the debris falling, not only for camera speeds, but because of the focus problem. It gave us a bit of trouble, but it worked out all right.

QUESTION: What kind of lighting did you use to shoot that scene?

STINE: *I used Brute arcs only in the background because I didn't want to take a chance on a Brute flickering or going out at the wrong time. I used 10K's and inkie lights on the immediate foreground area, which was the most important part of the shot, and on the background I put Brutes and, in some cases, colored light. We had fires going on in the background also.*

QUESTION: What light level did you use?

STINE: *I had 600 footcandles of light on the miniature and, as I recall, I was able to stop down to something like F/4.5. I didn't push the film in development. I didn't find that necessary.*

When one has to destroy a huge building for a motion picture (as these "before and after" shots indicate), the only practical way to do it is through the use of miniatures. However, the utmost skill is required to make them look real and "full size" on the screen. In "EARTHQUAKE" the greatest difficulty lay in making the miniatures appear to be shaken down, rather than torn down or blown down by an explosion. Such sets were built on concealed shakers operated by electronic controls.





A typical cantilevered Hollywood hillside home collapses and crashes down the hill as the earthquake strikes. Many expert tricks are used to make miniatures look real. In this film, almost all the miniatures were exact replicas of existing buildings, which were shown on the screen in their "real" state before being destroyed in miniature. The combining of live action scenes with miniatures, by means of matting or other methods, also added greatly to the realism.

QUESTION: Is the scale of the miniature the only element taken into consideration when establishing the frame rate at which a miniature scene should be shot?

STINE: There are occasionally other elements, but the first consideration one has in photographing this type of material is the scale of the miniature. If it gets down to 1/2-inch or 1/4-inch to the foot it's getting quite small and the camera has to turn pretty fast. Our cameras will turn up to as much as 5-1/2 times (or 132 frames per second), but that's about tops. Anything beyond that begins to "punch" and, since some of these scenes are shot for background plates and have to be rock-steady, we couldn't take a chance on any punching or anything else that would cause movement in the background. Actually we had very good luck with our cameras. In all of the shooting we did we had only one camera buckle and, fortunately, that one happened before the action started and we were able to catch it in time. We always had three or four cameras going on a scene and on the dam-breaking sequence, as I've said, we had nine cameras shooting.

QUESTION: Besides the dam-breaking scene, what other shot did you find especially challenging?

STINE: One of the most important, and most challenging, miniature scenes was a high-angle shot with the camera pointing straight down past four stories of a building to a plaza below. During the scene the building (which is a miniature) begins to crumble and ultimately gets

shaken down, with debris falling on the people below. This had to be a blue-backing matte shot and the live action part of it was shot on Stage 12, which is Universal's highest stage. We took out a lot of the superstructure near the ceiling of the stage and mounted the camera right up near the very roof, shooting down into an area below where there were 200 people. Everything was timed with cues so that the people would react at the proper time to the falling miniature. We also shot a cut of a miniature chandelier, showing it beginning to swing and the ceiling starting to crack. That was intercut with the down-shot showing people scrambling around below and it's one of the most exciting shots in the picture.

QUESTION: You said earlier that most of the miniatures were shot outdoors and that this offered certain advantages. Were there also times when the weather gave you problems?

STINE: Yes, there was one situation in which the weather seemed to be against us. We had a miniature built on a hill—the Capitol Records Building again—that required morning light for filming. Now, the reason it required morning light was so it would match the lighting we had used on the stage to shoot scenes of the full-scale building, in which people were falling and furniture and windows were breaking. In shooting those scenes, our source light had been directed into the building, so the miniature was placed on the hill in the only location where we could get the proper background—but it required morning light for the match. We made a test in

clear morning light and everything was fine, but when we got ready to shoot it for real there was nothing but overcast for about two weeks. Of course, we were doing other things in the meantime, but we finally, in desperation, made a shot of it in the overcast light. Well, it didn't work out, so the boys had to put the miniature back together again and we kept on waiting to shoot it in morning light. It was getting to the point where I thought the best thing to do was to put some of the large Titan arcs on it to get something that looked like morning light, at least across the immediate foreground of the miniature. Fortunately, on the morning that we were going to do that, we had beautiful morning sunlight—so it worked out very well.

QUESTION: Can you tell me some of the problems associated with trying to get miniature action to look correct in "real" time, when you're actually shooting it four or five times as fast.

STINE: A problem very definitely arises when you're shooting a miniature in which several things are happening, not simultaneously, but within split seconds of each other. Your film is going through the camera so fast that in 100 feet you could get a very interesting shot, but it would look too slow when projected in "real" time. In other words, the timing would be wrong. You have all your boys cued in and you tell them: "Everybody does his thing on the word GO!" But you can almost depend on the fact that one man may be delayed in his thinking for a fraction of
Continued on Page 1354

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SPECIAL MECHANICAL EFFECTS

Continued from Page 1307

they got pretty badly scratched up. It was part of Johnny's responsibility to see that this didn't happen.

"Before a complicated scene was scheduled to be shot, he and I would spend two or three hours discussing it. Then, after Mark Robson had rehearsed the scene the way he wanted it, we'd let Phil Lathrop (the cinematographer) get his cameras set and the lighting done.

"At the last minute—just before a take was to be made—we'd get all of the stunt people out and I'd assign all of my men to their battle stations. We'd walk the action through slowly and I'd point out to each fellow on my crew that when a certain actor reached a given point, he was to drop his particular debris, or release the glass to fly out of a florist's window, or hit the trip that would make a tree fall over or a column break.

"Each man would have his bit to do in the scene and he would have only one thing to concentrate on—one actor and that actor's safety. We would rehearse it once at slow tempo. Then we'd do it again at normal speed, with each effects man calling out his action at the proper time.

"In this way, nothing would come as a surprise when they yelled 'roll it!' and everybody began running and screaming. Everyone would know what was going to happen and he would be alerted to it."

After a full-scale action scene had been shot, Glen Robinson would look at the footage and match his miniatures to it. He and Brendel would work in very close cooperation to make sure that the miniatures exactly matched the live action.

"I had anywhere from three to six assistants working with me on a scene, depending upon its complexity, and each of them would be responsible for a particular segment of the action," Brendel points out. "No one man can keep his finger on everything that is going on. I believe in delegating authority and letting each man be responsible for carrying out a certain segment of the job."

The rigging crew, under the supervision of Jack McMasters, would work ahead of Brendel to rig such things as dump tanks, hydraulic rams and the cables that would hold entire walls in place until it was time for them to be dumped into the street. It often took four or five days to rig the mechanical effects for a complicated scene and to make sure that all of the trips would work when they were activated.

Two rotary dump tanks, each holding 2,000 gallons of water, were specially built to shoot the flood sequence for "EARTHQUAKE". Together with an existing tank that held 1,500 gallons, these devices could dump 5,500 gallons of water in three or four seconds.

"One of our most spectacular mechanical effects had to do with the elevator full of people that is supposed to fall 23 stories when the quake shorts the cable out," said Brendel. "When it hits bottom, the 13 people inside it are supposed to be crushed down to about a three-foot package. The first thought was to shoot it upside down, but I couldn't see it being done that way. Instead, we rigged a hydraulic ram operated on nitrogen and, on a given cue, dropped the floor of the elevator from underneath the people. The cage was standing on the floor of the stage and it only dropped about three feet, but it happened so fast that, for an instant, there was nothing but feet in the air. Then the ceiling (which was made of polyethylene rubber) came crashing down with an impact that just crushed them right in. Even the cage actually bent. We had it built so that it would twist and collapse. That stunt worked out better than anyone had anticipated. It sure looked real.

"When I worked on 'SAN FRANCISCO' at MGM, I was just a freshman—a prop-maker. We used rear-projection exclusively in the earthquake sequence to show balconies or timbers falling. All of that was shot without people in the scene. Then we'd put Clark Gable or Jeannette McDonald in front of the process plate and let a burning beam drop close by. In those days, if something was going to fall on someone, it was done with rear-projection. But not on 'EARTHQUAKE'. Mark Robson went for broke. Everything was done for real, and that's why it looks real." ■

CINEMA WORKSHOP

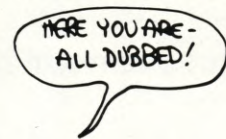
Continued from Page 1264

this time it is too late. For, while the film has remained idle in the gate, the lower sprocket wheel has been turning, taking up all the slack in the lower loop.

The solution becomes obvious: by slowly turning the inching knob, the claw is assured of engaging the film on its first down stroke, thus registering the film. Now, when the motor is turned on, the claw will directly engage a sprocket hole before the pulldown.

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PRODUCTION DESIGN

Continued from Page 1329

design. "I would arrive at a design for what was supposed to happen, trying to keep each small detail as realistic as possible. Then I would meet with the special effects people to figure out how the set should disintegrate. It had to be outlined in a kind of step sequence. First, one corner would start peeling off. Then a column would collapse, followed by a window breaking. I practically had to give them a step-by-step continuity, so that they could build the set and rig the trips accordingly.

"The screenplay we shot was quite different from the first script that was submitted. That one had things like a scene at Playa del Rey, with yachts washing up onto the freeway. It would have cost twenty million dollars to shoot it that way. But Mark Robson and I and some other people worked it over, retaining about half of the episodes and planning things out so that it would be practical to shoot. I actually think that this made a better story out of it.

"This picture was a challenge to every department, because nothing on such a scale had ever been done before. We managed to maintain a good tempo throughout and the editor, Dorothy Spencer, put it together to maximize the excitement. She's fantastic!

"I can remember reading in the newspaper, while we were shooting the picture, that there were some severe tornadoes back east and that a lot of people from the tornado area were moving to California. Well, after they see 'EARTHQUAKE', I'll bet you that a lot of them will be moving back again." ■

REMOTE BATTERY CABLE NOW AVAILABLE FOR CP-16 AND CP-16/A CAMERAS FOR FILMING IN EXTREME COLD

Cinema Products Corporation announces that a *remote battery cable* is now available for CP-16 and CP-16/A camera models. The new *remote battery cable* permits the removal of the battery from CP-16 or CP-16/A cameras for placement in the cameraman's pocket (or some other protected area) when filming in *extreme cold*.

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WHAT'S NEW

Continued from Page 1256

MOVIOLA FLATBED EDITING SERVICEMEN REVEAL NEW USES; AS PREVIEW MACHINE, ELIMINATING SCREENING ROOM.

Following a recent three-day crash course on the servicing and repairing of the Moviola flatbed editing equipment held at their North Hollywood factory, dealer servicemen from the U.S., Canada and Mexico revealed new uses for the Moviola.

"Independent producers, TV stations, universities, the U.S. government are using the machine as a preview machine eliminating screening rooms," said Walter H. Mills, executive vice president of Magnasync/Moviola Corporation.

"Bill Arasmith, engineer in charge of flatbeds, revealed that advertising agencies were using the Moviola to time commercials with the machine's electronic counting system," Mr. Mills continued. "Film labs have been using it as a quality control checking device."

The service personnel were brought to the factory to teach them to maintain, and repair any unforeseen emergency malfunctions of the Moviola "in the field, out of Hollywood," added Mr. Mills.

SPOTLIGHT "DESIGNER PATTERNS" INTRODUCED BY BERKEY COLORTAN

Berkey Colortan has announced a new line of "Designer Patterns" for use in framing (ellipsoidal reflector) spotlights. Designed by America's leading set designers and custom fabricated from thin section stainless steel, they are strong enough to be used in any make 4-1/2 inch to 12 inch diameter lens unit and can be cut to size with scissors.

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Actual pattern size is three inches in diameter, supported in a universal 3-7/8 by 4-7/8 inch frame that can be cut to fit almost any pattern holder or slot.

Prices for the patterns are: single units, \$6.00; kits of six, \$29.50; set of 24, \$99.50. They are available from any Colortan dealer or directly from Berkey Colortan, Inc.

A descriptive catalog sheet of the patterns can be obtained by writing "Patterns", Berkey Colortan, Inc., 1015 Chestnut Street, Burbank, California 91502.

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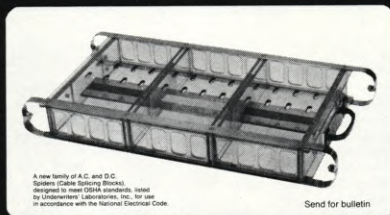
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THE SOUND MIXING

Continued from Page 1315

sound of a flood.

We used several different loops to good advantage in the dubbing. For example, when we were working on the sequence in the police station there was supposed to be a big crash, but it didn't come through. It was probably in one of the tracks, but somehow I missed it. Rather than take the time to cut a sound effect, we simply threaded up a loop and put the crash in that way. We used loops quite a bit during the earthquake sequence to record tearing noises and crashes that were off-camera. We also got several rumble loops from the effects library to add to the din.

Dubbing in the *SENSURROUND* material was tricky because it's all brand new. It has to be anticipated going on and going off. As it goes on it will raise the volume at the screen by 60 db. You have to put the rumble in and pick some of the sound off of the front speakers and put it through the *SENSURROUND* speakers at the rear of the theatre. It has to be controlled with potentiometers in the same way that we control our regular sound levels. You have to be very careful what sounds you put through the rear speakers. Music, for example, shouldn't go back there because it would be very confusing.

It was a challenge to make an optical track that could be used with or without *SENSURROUND* and still sound good. We had to do it in such a way that it could hold up without the *SENSURROUND*. Then we enhanced it after it was done. It will definitely be better with *SENSURROUND*, but it will still be a good picture without it.

When the picture is released in 70mm, we will have to take the four tracks from our 35mm stereophonic version and extend them to six tracks. This is done by a process of expansion in which two of the tracks are made into four and spread out to fill the screen. The center track is left as it is. This provides five tracks for the speakers behind the screen, with the sixth track going to the surround speakers.

John Williams did an excellent job in composing the music for "EARTHQUAKE", but it isn't the type of picture that calls for a lot of music. His music keeps the dramatic mood going in the areas where we're rather slack on sound effects, but when we go into the big sound effects, there is no music at all. He stayed away from it entirely, so that we wouldn't get mixed up trying to have both. ■



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"SENSURROUND"

Continued from Page 1313

contract to MCA, in those theatres exhibiting "EARTHQUAKE" with *SENSURROUND*. The equipment will be supplied to MCA by Cerwin-Vega, Inc., manufacturer of high-fidelity speaker systems and electronics.

In the following interview, W.O. Watson talks about *SENSURROUND* and explains how and why it works:

QUESTION: Can you give me some background on how *SENSURROUND* came to be developed?

WATSON: It was back in January that we first heard about the "EARTHQUAKE" script and I was interested because I had been in on an earlier adventure with an earthquake picture. We made one at Republic years ago and it was a good earthquake picture, but we failed to get the effect that we're getting now with *SENSURROUND* because there was no equipment available at the time that could accomplish it. There was no way to create the type of terrific vibration that would be a sensational aid to the impact of the picture. But when I saw the "EARTHQUAKE" script I realized that, with the state-of-the-art as it is today, we would be able to come up with a form of audience participation—something that would make the viewers feel that they were part of the action that was going on. Our first demonstration was made using some very high-powered speakers and amplifiers. Our earthquake generator, incidentally, produces the same wave form as the Sylmar earthquake. I have tape recordings of the wave form of that earthquake and our wave form has been generated to match it. It's not quite as low in frequency as the Sylmar wave form, because that's pretty difficult to achieve except at far greater expense—but we get the same sensation regardless by moving the frequency up a little bit.

QUESTION: What effect do these frequencies actually have on the audience?

WATSON: We generate both sub-audible and audible frequencies that actually vibrate the torso and the diaphragm inside the body. You feel something going on in your flesh and the auditory nerves are also responding to the sensation. The result is a strong sense of participation, with the viewer feeling like he's actually experiencing an earthquake. He feels that the building is shaking. It isn't really, but it feels that way. If you touch a thin plaster wall (not a brick wall) in the theatre, or if

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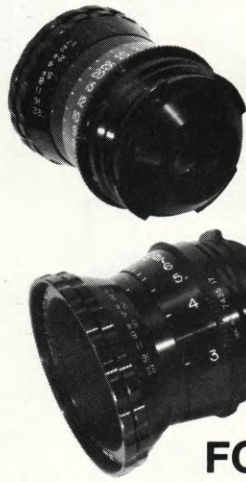
The price of the Crystal Camera Control is \$250. An inexpensive Crystal Sync Generator is also available (\$150) for recording in sync with any stereo tape recorder.

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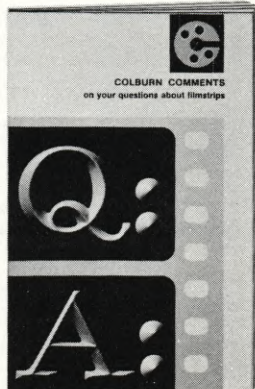
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you touch a theatre seat that has metal in it, you find that these are actually vibrating. The way we accomplish this is by acoustically coupling into the walls of the theatre, so that the theatre becomes part of this electro-acoustical transducer. What we are doing is converting these electronic waves into an acoustical power and it comes right out of the building, so to speak. It envelops the whole interior of the theatre. The sound pressure level runs anywhere from 110 to 120 db at these extremely low frequencies, so that, again, the audience is vibrating and the chairs that they're sitting in are vibrating. In some cases the floor vibrates, depending upon the type of floor construction. If it were a concrete slab poured on ground I don't think you'd feel anything, but if it were hollow underneath you would feel it.

QUESTION: It would seem, then, that each theatre would have its own individual vibrational characteristics. How do you determine what they are?

WATSON: Prior to making our installation in the Chinese Theatre in Hollywood, we went over every portion of the theatre, including the chandelier areas at the top of the ceiling. We went down into the basement area under the stage and, even though this is all solid reinforced concrete, we could feel vibration down there—pipes rattling, and so forth. That just proves that we were vibrating parts of the structure, although we were not actually shaking the theatre. The frequencies at which the building would be in resonance are extremely low—down below five cycles—maybe two, three or four cycles, somewhere in there—so what we are doing would never damage the theatre.

QUESTION: What sort of equipment is involved in creating the effect?

WATSON: We have horns that are designed for these extremely low frequencies and we've gone through several horn designs in developing the system. We have specially designed acoustical transducers in the horns that deliver the high-power signal wave form. The horns resemble 18-inch loudspeakers, but they are sensitive only to low frequencies and the cone travel is about 50 times greater than that of a normal hi-fi speaker. So they deliver tremendous amounts of power and the amplifiers that drive them are capable of 1000 watts of audio power. The equipment that programs the earthquake sound is picking up signals from the sound track. There are some discreet tones on the sound track

that turn the program on or off when the earthquake generator is on or off, and the amount of amplitude—how loud it is—sort of undulates. Sometimes it also turns on program materials that are recorded on the conventional sound track and feeds them into the SENSURROUND system. For example, when the dam breaks and this big flood of water comes down, that sound turns on into the SENSURROUND system and makes you feel like you're running away from the flood. These really high-powered surround sounds and vibrations really have an impact on the audience.

QUESTION: Are there any other instances in which the regular sounds from the track are fed into the SENSURROUND system?

WATSON: There are certain sounds during the earthquake—falling debris, for example. If you were in a violent earthquake you would hear the sounds of buildings and debris falling down behind you and all around you. Those sounds are played through the screen speakers in the normal fashion, but we also pick that same material off of one of the recorded channels on the film and cue it into the SENSURROUND system. We regulate the amount of volume that comes out of the SENSURROUND speakers from that track, as well as the regulated volume of the earthquake generator.

QUESTION: When these normal sounds from the track are fed through the SENSURROUND system, are low frequencies added to them, also?

WATSON: No, our intent is not to add lower frequencies to them. We're only concerned with putting that program material all around the theatre at a good loud level. It's true that there may be a little more of the low frequencies coming through because of the design of the electro-acoustic transducer and horns, but this was not by deliberate intent. We simply wanted to have the falling debris and the flooding waters actually seem to surround the theatregoers.

QUESTION: I would assume that your installation in the Chinese Theatre is a rather sophisticated one. Could you tell me how many horns are used and how they are placed?

WATSON: We have two horns on each side of the stage behind the screen curtains. One of these is the Model W folded horn, which is quite large. The other is a corner type horn (Model C) which uses the theatre walls as a con-

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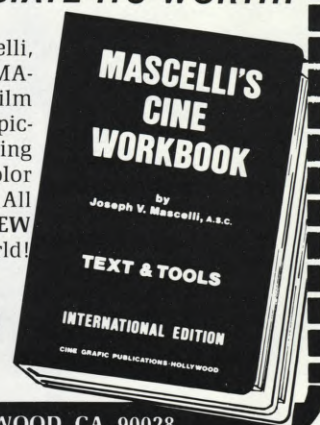
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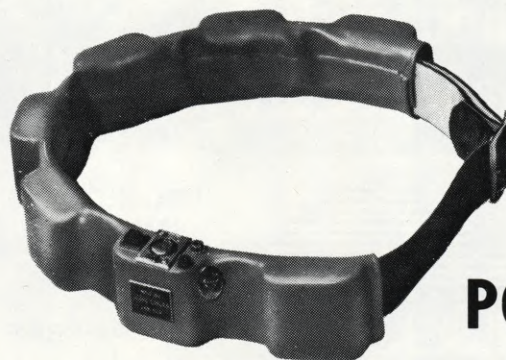
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tinuation of the horn section. So there is a *W* horn and a *C* horn on each side of the screen. We made some tests using Model *M* horns down in front of the theatre, between the screen and the first row of seats. We had eight modular horns there, adding up to a total horn width of 32 feet and standing four feet high. The problem was that the level was too high for the first few rows of seats, so we couldn't use them in that way in that particular theatre. In some theatres it would be all right. There might be more distance or there might be more spread, depending upon the construction of the theatre. The final configuration depends upon which horns we use and how we place them. At the back of the Chinese Theatre, for example, there are two loge sections—one on each side at the auditorium level—and there's about 15 seats in each of those loge sections. We built a platform over the tops of the seats and put a Model *W* horn on each one. These horns feed the back of the theatre. Between now and the opening date, which is November 15, we may go in there and add some more horns—possibly a couple of Model *W* horns in the rear, one on each side.

QUESTION: Are all of these horns you're speaking of suitable only for the SENSURROUND system?

WATSON: That's all they're for.

QUESTION: How many speakers are there for the regular sound track?

WATSON: For our picture the Chinese Theatre will have three sets of horns behind the screen—three channels—and they're part of the theatre equipment. The only thing we've done to them is try to correct the frequency response, balance the levels, and so forth.

QUESTION: For the Chinese and other first-run showcase situations, will the film be run in 70mm blow-up?

WATSON: There will not be any 70mm prints run in the United States—just 35mm anamorphic prints. But in Europe and Japan there are quite a few situations where it will be shown in 70mm.

QUESTION: When the picture gets down to neighborhood theatres for the subsequent runs, what will happen there as far as SENSURROUND is concerned?

WATSON: The neighborhood theatres will be able to show the film with SENSURROUND, if they wish to. The

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equipment that is now on lease to the first-run theatres would also be available on lease for the subsequent runs. We would simply move that equipment out and install the amount of equipment in the neighborhood theatres that is necessary, if they desire it.

QUESTION: Suppose a neighborhood theatre can't afford or can't accommodate or, for some reason, just doesn't want the SENSURROUND equipment—how much of the effect would be lost?

WATSON: A considerable amount. There's quite a difference between the two experiences. You would not get the sensation that you would get from SENSURROUND. You'd get loud and very effective sound from the screen speakers and the picture is a very exciting one, but you would not get the actual physical sensation from the normal screen speakers that you would get from SENSURROUND.

QUESTION: In other words, you wouldn't vibrate.

WATSON: That's right. You wouldn't get the sensation of your flesh or the diaphragm inside you or your auditory nerves actually vibrating. The vibration also affects the little cavities behind your ears that give you balance when you walk. If you were subjected to this vibration continuously for an hour or two you would find that you were a bit unsteady on your feet. That unsteadiness would go away in about 15 minutes, however, with no harm done. In "EARTHQUAKE" the periods of vibration are short enough and spread out enough so that you wouldn't experience that effect, unless you happened to be super-sensitive.

QUESTION: Who manufactures the SENSURROUND equipment?

WATSON: I design the horns and we manufacture them ourselves, right on the Universal lot. We have two companies manufacturing the amplifiers for us. These amplifiers are built for us to our specifications and are not for general use, although after the picture has finally run its course it might be possible to sell them.

QUESTION: But would these amplifiers be adaptable to anything else other than a SENSURROUND installation?

WATSON: I'm sure there are some hi-fi buffs who would like to brag about having 1000-watt amplifiers in their hi-fi systems. Of course, these amplifiers as



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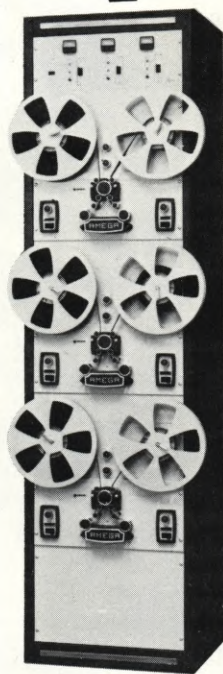
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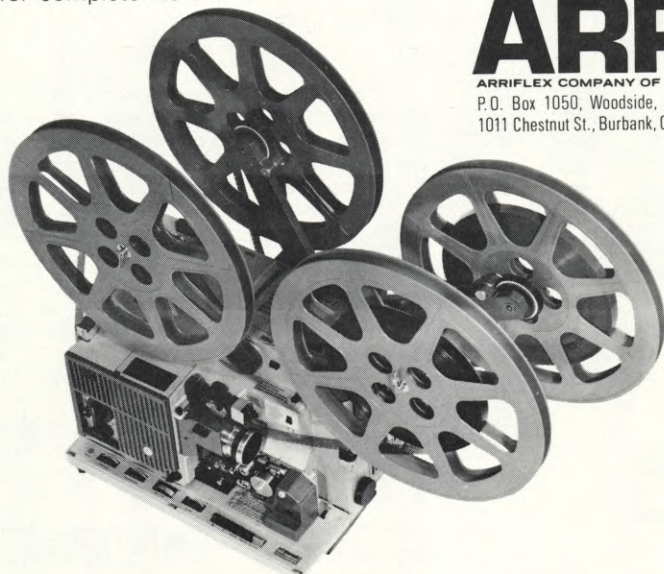


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they are now used are not particularly interested in high frequencies, but they're excellent amplifiers. They have to be and they have to be able to take a beating. The ordinary hi-fi amplifier doesn't have to handle the kind of wave lengths that we are applying to ours. Both the amplifiers and the drivers used in the horns are built to our specifications. We've gone through quite a few changes in the design and structure to arrive at the final units that we are now using.

QUESTION: When you speak of ultra-low frequencies for the SENSURROUND effect, what kind of range do you mean?

WATSON: Much of the power is down in that region below the normal audible range of your hearing. It's sub-audible, and that's the part that vibrates you. Above that you come into the audible range. This part affects your hearing, of course, and you get these pulses in your eardrums.

QUESTION: How long does it take to make the SENSURROUND installation in an average theatre?

WATSON: We are planning on an average of three days. When I installed the equipment in the Chinese Theatre just for a test I did it very hurriedly and it took two days, but when we went back to make the permanent installation it took four or five mornings—about the equivalent of three eight-hour days.

QUESTION: How big are the individual horns that are used?

WATSON: The Model W horn is approximately four feet deep, four feet high and eight feet long. The Model C horn, the modular unit, is 76 inches high and 24 inches wide, but after it has been installed in the corner of a room the open mouth part of it is 12 inches wide and 76 inches high. Using these modular horns, there's no limit to how wide the installation can be. For example, we used 32 feet of horns at the Chinese for test purposes and we could have gone across the whole screen—which is 50 or 60 feet wide. We could go as wide as the whole theatre, as far as that's concerned.

QUESTION: What dictates how wide you would actually go?

WATSON: The seating capacity of the theatre. There's a point beyond which you would be going overboard. You could keep adding and adding and add-

ing until finally you would reach a point where you would shake a few things loose. But to subject the audience to the sensation, you need only a certain level of power and there's no sense in going beyond that. ■

FACTS ABOUT SENSURROUND FROM MCA/UNIVERSAL

"SENSURROUND" is derived from the words senses and surround. In *SENSURROUND* we have added the sense of feeling to sight and hearing in motion pictures.

The *SENSURROUND*tm system developed by MCA/Universal is designed to surround and engulf an audience with special audible and *sub audible* effects, below the human hearing range, not possible to record or reproduce on present theater sound systems. The audience experiences the illusion of participation by feeling the air movement, generated by the powerful *SENSURROUND* horns, which vibrates against a person's body and ears with a sound pressure waveform comparable to an actual earthquake. As the vibrating sensation is airborne rather than structure shaking, there is *no* physical *danger* to an audience.

In the United States, the *SENSURROUND* system will initially be installed and maintained by RCA, under contract to MCA, in those theaters exhibiting in *SENSURROUND*.

Arrangements are being made on foreign installations, but no decision has been reached to date.

The *SENSURROUND* horns will usually be placed near the screen and in back of the theater for maximum response.

The *SENSURROUND* control box located in the projection booth automatically controls both the activation of the *SENSURROUND* horns and any sound volume changes. A simple ON/OFF switch activates or de-activates the system.

RCA will instruct whomever necessary in the use of this equipment and will maintain it throughout the run of the picture. Under *no circumstances* is anyone, other than RCA or MCA/Universal personnel, to open the sealed *SENSURROUND* control box or horns. If repairs *are* required, RCA has the knowledge and spare part units necessary for immediate replacement.

For the *Projectionist*, there is nothing added or different in projecting a *SENSURROUND* 35mm 4-Track Magnetic, Standard Optical, or 70mm print other than—

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4DB on 70mm 6-Track Magnetic Prints
6DB on Optical Track Prints

On 4-Track Magnetic *SENSURROUND* prints *only* the projector optical sound system *must be used simultaneously* with the 4 magnetic tracks to scan the *SENSURROUND control track*, which is *optically* printed on the release print.

Also, to lessen system noise (horn hiss) the pre-amplifier for track 4, going to the *theater permanent surround speakers*, should be de-activated (pulled).

NOTE: RCA will make the necessary adjustments in the theater system.

On 70mm prints all six tracks must be working as channels 2 and 4 contain the *SENSURROUND control tracks*. Channels 1-3-5 go to the screen front horns. Channel 6 goes to the *theater's permanent surround speakers*.

NOTE: Service organization in Europe should check that all 6 tracks are reproducing.

3 TYPES OF SENSURROUND PRINTS AVAILABLE AND THEIR USAGE

(A) *SENSURROUND*—35mm 4-TRACK MAGNETIC (Fox Holes) with *OPTICAL CONTROL TRACK*

NOTE: *NOT USABLE* as standard optical prints The optical track on these prints contains the *SENSURROUND Control Track only*. If run as a standard optical print *only control tones* would be heard.

These prints could subsequently be used as *normal* 4-Track prints *without SENSURROUND* by turning off the *SENSURROUND control box*.

35mm 4-TRACK MAGNETIC prints are made and shipped from Technicolor, Hollywood *ONLY*.

(B) *SENSURROUND*—35mm OPTICAL (Standard Perforations)

NOTE: These prints are *DUAL PURPOSE PRINTS* and can be used either *WITH* or *WITHOUT SENSURROUND* equipment.

(C) *SENSURROUND*—70mm 6-TRACK MAGNETIC

NOTE: These prints could subsequently be used as normal 70mm prints without *SENSURROUND* by de-activating (pulling) pre-amplifiers for channels 2 and 4 which

contain the *SENSURROUND* control tracks.

FOR 70mm SENSURROUND PRINTING (In London)

A 35mm 6 track magnetic printing master and a 35mm CRI for blowup printing in London will be supplied from the Studio and Technicolor, Hollywood.

FOR 70mm SENSURROUND FOREIGN DIALOGUE PRINTS (In Europe)

A (*minus English dialogue*) 6-track mufex master will be available from the Studio in due course.

FOR 35mm SENSURROUND 4-TRACK MAGNETIC PRINTING (Fox Holes)

All 35mm 4 track magnetic prints will be sounded by the Studio and shipped from Technicolor, Hollywood. As our sounding output is limited, it is necessary that print orders be placed early enough to meet playdate requirements.

NOTE: An *optical* track is printed on all 4-track magnetic prints which contains the *SENSURROUND* control track only.

FOR 35mm SENSURROUND OPTICAL TRACK PRINTING and 35mm NORMAL OPTICAL PRINTS (Standard Perforations)

A *DUAL PURPOSE* optical sound track will be provided to make optical prints. These prints can be run either *with or without SENSURROUND* equipment.

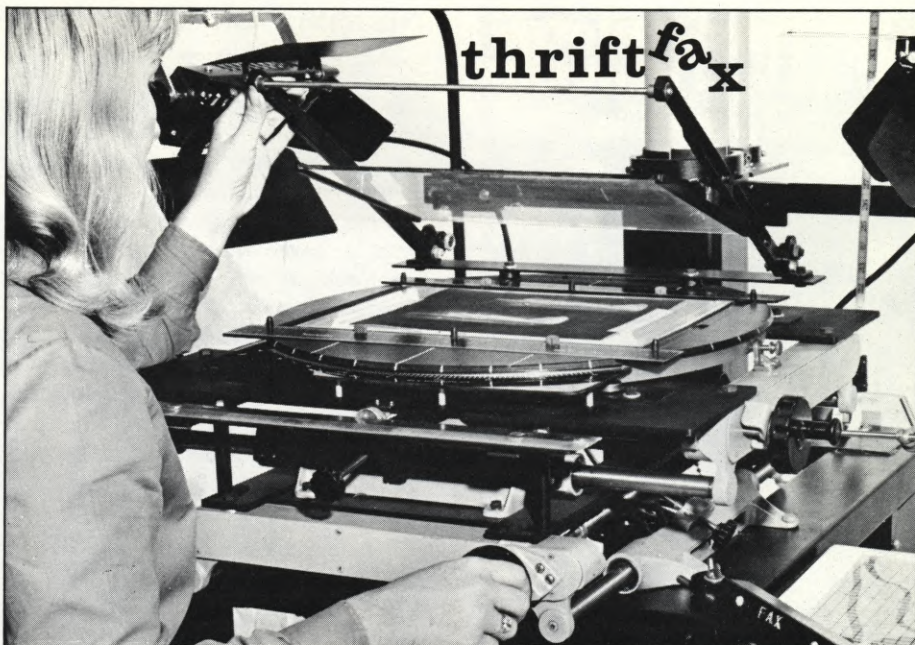
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The regular trailer will be the next. On this, *only SENSURROUND* optical prints will be made as they are most adaptable to use in theaters either *with or without SENSURROUND* equipment.

However, again the *SENSURROUND* Announcement Title should remain attached if trailer is run with *SENSURROUND* equipment or removed if not using *SENSURROUND*. ■



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THE MINIATURES

Continued from Page 1339

a second—just enough to throw the timing off. One of the saving factors to avoid this problem is to shoot the scene from different angles using three or four cameras. This gives you several things to cut to in order to tighten up the action. The timing is very tricky in miniature work because of the many things that are happening—or should be happening—within a very short time duration. You have to remind everyone not to forget that the cameras are turning at four or five times normal speed and everything's got to go NOW. If you're shooting something like a fire or an explosion there's generally no timing problem, but when you have a lot of elements going on in different areas of the set and you're trying to squeeze them all into a 30-foot piece of film, with the cameras turning at high-speed, timing becomes a very important element.

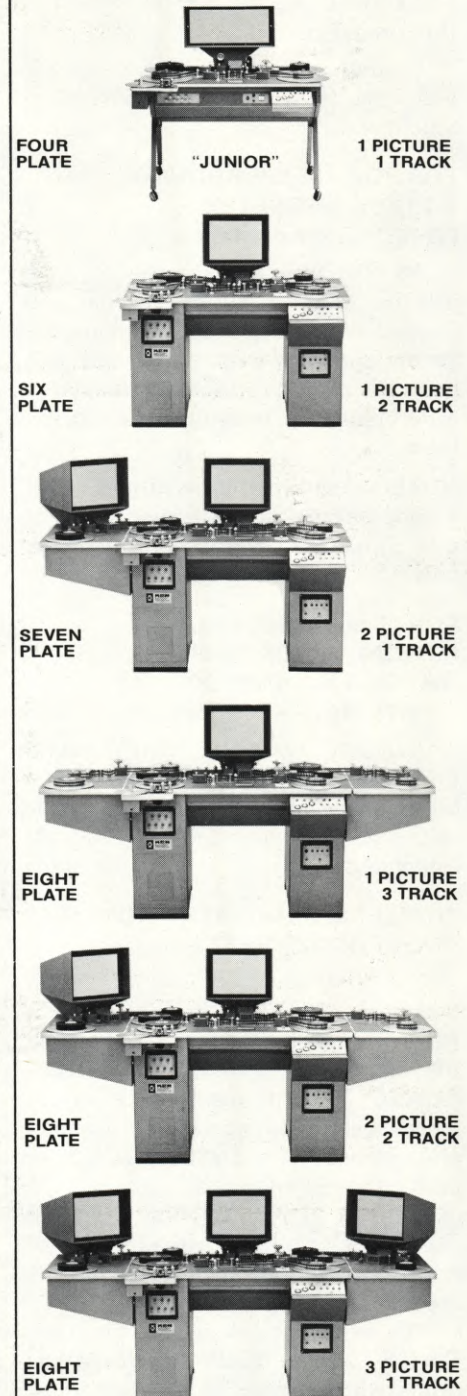
QUESTION: You spoke of shooting some of the miniatures for plates. What method was used to make your composites: rear-projection, front-projection, blue-screen or what?

STINE: Well, let's take, for example, the sequence I mentioned where the four-story building is shaken down on the people in the plaza. We shot the live action scene straight down on the people and we also shot straight down on the four-story miniature with the debris falling and the building collapsing, but we also built one of the walls so that we could shoot horizontally into it. That set was about seven feet across and four feet high, and it was built to collapse also. In that case, the composite was made by means of front-projection. We have a 70-foot front-projection screen at Universal and, as I recall, we projected a 60-foot picture onto it. In the foreground we had about six full-scale columns and an escalator. Now, all these people are trapped in the lower region of the underground parking area of the plaza, as these big full-scale columns in the foreground are beginning to shake. Using front-projection, we timed the live action shot of the people with the miniature plate I had made, so that when the miniature building began to crumble, those big columns (which were made of special construction material) fell down across the people, along with other debris. Besides the front-projection camera, we had three cameras way up high shooting down into the set in order to give us several angles for intercutting. We had a pretty lively thing going there for a while, but it

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worked out very well.

QUESTION: How do you rate front-projection as compared to some of the other composite techniques, that are available?

STINE: The front-projection we've done has been very successful. We haven't done a lot of it because it isn't required unless you need the expanse of a 50, 60 or 70-foot screen. In rear-projection it's virtually impossible to get such a wide spread, unless you use a combination of several screens and several projectors—and so, front-projection has great merit in such cases. Also, the reflective quality of the screen is so great that you can work at a very deep stop. Of course, I was shooting with a key light of 500 or 600 footcandles, because you're shooting through a partial mirror in front of the camera and this cuts the light down about a third of a stop. With 600 footcandles I was able to work at F/5.6 or F/7, as I recall. When you're working with longer lenses you require considerable depth of field and it's feasible because you get so much illumination back from the screen. When we first got the screen I made a test in which I put 1,400 footcandles of light on each of three people placed within an area of about 200 feet. I stopped down to F/8 and carried them all quite sharp, including the background.

QUESTION: Do you think it has advantages over the blue-screen technique?

STINE: In certain ways I think it does. However, each technique has its particular advantages. One of the most important plus factors of front-projection is the fact that you can see your background while you're shooting the foreground action and work to it. Of course, you can only see the background if you're standing very close to the line of the camera. If you get 20 feet off to the side you can see the background only vaguely. In order to balance your light you have to look directly through the lens. But, by and large, you can virtually see what is happening with the background and foreground action simultaneously, whereas with blue screen you'd have to run a projector off to the side in order to time the foreground action to your background plate. But blue-screen has its advantages, too—especially when you're shooting at an odd angle where it would be impossible to place the foreground action in front of a screen. There are areas for using all of these techniques: rear-projection, front-projection and blue-screen. ■

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INDUSTRY ACTIVITIES

USIA OFFERS STUDENT GRANTS FOR BICENTENNIAL YEAR FILMS

The U.S. Information Agency has announced a nationwide Bicentennial Student Filmmaking program that will provide individual grants up to \$3,000 for the production of sound films or videotapes for distribution and screening in foreign countries.

Robert S. Scott, USIA Assistant Director for Motion Pictures and Television, said that films or videotapes funded under the grant program would be shown to foreign audiences by 189 U.S. Information Service posts in 110 countries as part of the overall celebration of the 200th anniversary of the United States.

"Hopefully," Scott said, "these Bicentennial grants will encourage young American artists to communicate their unique heritage, their diverse culture and their hopes for the future through the visual power of film and television."

The American Revolution Bicentennial Administration has divided the Bicentennial into three areas: *Heritage '76*, "a nationwide summons to recall our heritage and to place it in its historical perspective... to re-examine our origins, our values, and the meaning of America—to take pride in our accomplishments and to dramatize our development"; *Festival USA*, "sharing with fellow Americans and the people of the world the traditions, the culture, the hospitality and the character of the United States and its people"; *Horizons '76*, "a nationwide summons to the people of each community to formulate goals... where should we be, and what should we do" in America's third century as a republic. One or more of these Bicentennial areas are suitable subject matter for a Bicentennial Student Filmmaking Grant proposal.

The Agency said that the submission of proposals for films and videotapes costing less than \$3,000 is encouraged. The films and videotapes produced under the grant program should not exceed 30 minutes in length and may be either documentary, dramatization, animated, verbal or non-verbal.

Persons requesting a Bicentennial Student Filmmaking grant application should contact: Mr. Phillip Bonnell; United States Information Agency; Room 2406, Patrick Henry Building; 6th and D Streets, N.W.; Washington, D.C. 20547; Office Phone: (202) 376-7734.

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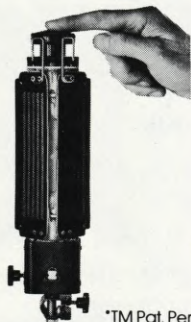
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sample film, (8mm, 16mm or 35mm), or videotape (one-half inch or three-quarters inch cassettes), a story proposal of 500 words or less typed double-spaced outlining the scope and content of the project and its relationship to one or more of the three areas of the Bicentennial themes, an estimate of the cost of the proposed film or videotape, and the Bicentennial grant application.

Deadline for the receipt of applications and materials is December 1, 1974.

Recommendations for the awarding of Bicentennial Student Filmmaking grants will be made to the Agency by an independent panel of distinguished film and television experts.

Eligibility rules require that the applicant be a full-time graduate or undergraduate student in the area of cinema, television or communications, or a part-time graduate or undergraduate student who has completed a minimum of 75 percent of the units necessary toward their degree objective in the above areas.

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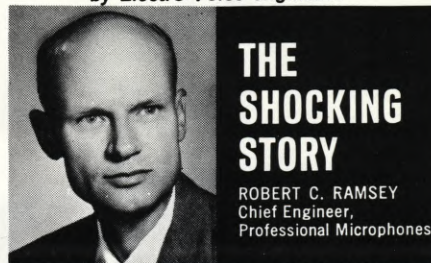
U.S. FILMS WIN TOP HONORS AT VENICE AND CANADIAN FILM FESTIVALS

Five American films were honored with distinguished awards at June film festival abroad, reports the Council on International Nontheatrical Events (CINE). Two American documentary films were honored at the 17th Annual International Contest of Industrial and Commercial Films, sponsored by the Venice Chamber of Commerce. Three other American films also received recognition at the Canadian International Amateur Film Festival in Ontario.

Portrait of a Railroad won the Grand Prix "Golden Mercury" Trophy at the Venice Festival in competition with 70 other high level productions entered from 14 countries. *Portrait* was directed by Harvey Lloyd and produced by Francis Thompson Inc., for Burlington Northern Railroad of St. Paul, Minn. This outstanding documentary presents the railroad in the framework of the country in which it operates, and pictures the men who are its actual soul.

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THE SHOCKING STORY

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Making a shock mount that really serves its purpose is no simple matter. One must consider the nature of the expected energy that might be transmitted to the microphone, as well as the sensitivity of the microphone itself to mechanical excitation.

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In addition, three separate steps have been taken in the DL42 shock mount to reduce noise transmitted through the stand or boom. First, the bail includes 2 large-radius flex sections that effectively damp low-frequency vibration, even at high amplitudes. Strongly affecting the bail design were the needs to accommodate fast panning of the microphone, the total mass of the unit, and the maintenance of good balance. The center of gravity of the microphone is vertically centered on the support point with equal mass fore and aft, and does not change with shock mount flexure.

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In hand-held applications the low-frequency isolation problem is less severe (the human body provides a good measure of attenuation normally) and thus the bail can be eliminated and the handle screwed directly into the ring mount. High frequency noise control is still maintained while bulk is reduced.

While the concept was created as an integral part of the DL42 design, the advantages of a similar bail for low frequency absorption are now available for several other E-V models as an accessory mount. In order to operate effectively, this accessory bail includes weights that add mass at the center of gravity that lower system resonance to the sub-audible region.

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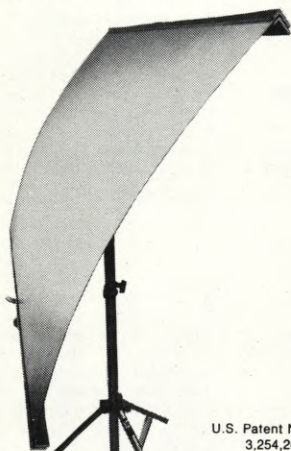
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for Pioneer Hi-Bred International, Inc., was awarded the Gold Medal of the Agricultural film category for its documentation on the importance of hybridization and for its clear images, commentaries and proper use of precise animation.

The Knight Fell Softly, the work of a young amateur, won dual recognition at the Canadian International Amateur Film Festival by receiving both the Best Youth Trophy and the Best Animation Trophy. "The Knight Fell Softly" is a cartoon comedy featuring the character Sir Aloysius Alphonse Gaston Galahad in his battle with "Hot Lips", a wily dragon. It was produced by Eric Goldberg of Cherry Hill, N.J.

A Field of Honor received the Commendation for Excellence in Production from the Canadian festival. It was produced, directed and written by Robert Zemeckis, a student in the Division of Cinema at the University of Southern California. "A Field of Honor" is a comic story about a young man's release from a mental hospital, and looks at definitions of sanity and insanity in an aggressive and violent society.

At the same festival, *Jerald Silva: A Painter* was honored with the Best Documentary Film Trophy. It was produced by John Krisik of K R Productions, and is narrated by Jerald Silva, the artist whose work it displays. "Jerald Silva" follows the creation of one of Silva's paintings, and includes an animated version of its development.

Each year, CINE selects outstanding U.S. films for submission at film festivals abroad. This year's Showcase of CINE Golden Eagle (Professional) winners and CINE Eagle (Amateur) films, and Annual Awards Ceremonies, at which awards won at festivals are presented to the film makers by ambassadors or high diplomatic officials of the countries hosting the festival, will be held Nov. 20 and 21 at the Mayflower Hotel in Washington, D.C.

For further information contact: CINE, 1201 Sixteenth St., N.W., Washington, D.C. 20036; Tel: (202) 785-1136.

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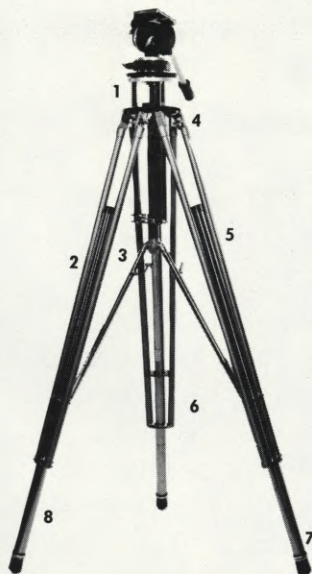
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THE STUNT ACTION

Continued from Page 1309

and some of the other principals who were up on top. They were wired with concealed safety cables, so that if one of them made a misstep and fell overboard, he wouldn't fall to his death. He'd simply hang there until he was rescued.

The insurance company takes a very dim view of stars doing their own stunts—and understandably so. It's purely a matter of business, because if a star got injured in the middle of the picture, the shooting might have to close down until he recovered. If he were unfortunate enough to get himself killed, it might be necessary to shoot most of the footage over again. All sentiment aside, it would be a very expensive situation either way.

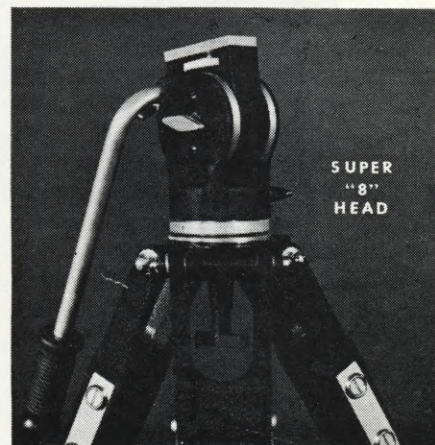
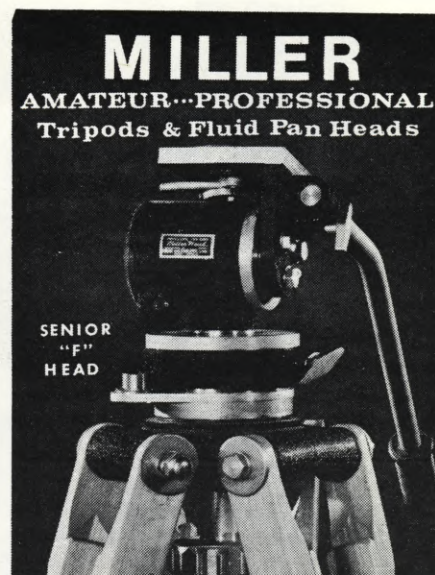
However, in spite of all this, several of the top stars in "EARTHQUAKE" did many of their own stunts—at considerable risk, I might add. These included Charlton Heston, Ava Gardner and Genevieve Bujold. They were all great troupers, but it was Genevieve who surprised me when she turned out to be the most talented physically in this respect. When we first started the film, she said to me: "I want to do everything that it's possible for me to do physically, because I'm very strong." She looks so tiny and fragile but, my God, she did some marvelous things. As the earthquake starts, she's on a hillside and she grabs a tree just as the house above her collapses. Part of the house and a man come rolling down the hill past her as she's hanging onto the tree. With all of that debris and stuff falling, we had no way of telling exactly where it was going to go. Some of it could possibly have hit that tree, but she insisted on doing the scene herself and, in fact I didn't use a double for her once during the entire filming of the picture. She's just marvelous. She gets involved in her role 100%, and I have a lot of respect for her.

A great many extremely talented people—both actors and technicians—were involved in the making of "EARTHQUAKE", and I feel that the stunt people did their fair share to make it a very exciting picture. Stunt people are a unique breed, and they're really artists in their own special way. ■

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Continued from Page 1331

was shot that way. The crucial problem came in trying to find the spot to place the camera in order to get exactly the same angle for filming the miniature. We made many measurements from the actual building to the camera, took note of the lens used and the degree of tilt on the camera and, once having got all that data, we scaled it down and found the exact spot from which to shoot the miniature. After the miniature was shot, it was only a matter of splitting the two scenes and putting the pieces together.

There was one sequence in which we used the same painting for a daylight shot and a night shot. When we shot the original live action scene, we shot the daylight first and then kept the camera in place, waiting for night to come down. We didn't shoot the second scene in the dead of night, but rather at the "magic hour" when there was still a bit of dusk but it was dark enough for the incandescent lighting to show up.

I used the same painting for the evening shot, painting over the original to darken the sky and the building. Repainting was much quicker than doing a completely new painting, and we were on a tight schedule. When I asked them what time of day they wanted for the daylight painting, they said: "It's evening, a bit overcast, if you like." I decided to put sunlight up on the facade and drop the exposure a little. When it was shot, it looked like dusk, with the last rays of the sun blasting onto the building. This established the time of day. I was then able to give them the night shot with the sun gone, but I think the daylight shot was more dramatic because you could see the broken windows more graphically in that kind of light.

There are several shots in "EARTH-QUAKE" showing panoramic views of the devastated city on fire. To create such a scene, the painting was shot first and then, using a very thin print, we were able to trim one single frame and mount it on register pins in the optical system of the Mitchell camera, rack over and look through it. We then went onto our stage which was blacked out with an 80-foot-wide black cloth. While I looked through the frame of the painting, the special effects men placed themselves with their fire in different spots on the stage where we thought fire should be. We couldn't shoot it all at once, for the reason that it had to be done in layers in order to create the feeling of depth. We shot seven different scenes of fire, ranging in distance progressively from the background to the foreground. I placed

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seven different mattes in the camera so that some of the fire goes behind buildings and some goes in front. We even managed to effect a refinement that allowed us to put a reflective flicker of fire onto the facade of a building, so that you see the effect of a fire burning nearby. All of this helps to create the illusion. It's a lot of work, but if you don't do a thorough job it won't have an acceptable look.

We have our own separate crew to do this kind of work. I do all the painting. There's a camera operator and an assistant. There's a lady who does the roto-scoping. She has her own set-up with a projector, so that she can ink the cells. Then there's a grip who does all the necessary sort of woodwork and builds parallels and things for the camera. It's almost getting to the point where I need him all the time.

Incidentally, we're using a new method of roto-scoping—actually the further development of an idea I heard about at MGM. Formerly we used large sheets of glass for every frame, but I always felt that this was very ponderous and totally impractical. We originally used glass because it made possible the use of internegative stock. This stock called for a tremendous amount of lighting, so you couldn't use cells because they would burn up under the 900 foot-candles of light needed to illuminate the painting.

This was a clumsy method at best, so I decided to go to YCM's and use cells. It only involves making two runs. There are special instances when we have to make six or seven, but that only means putting cells on a pegboard and taking them off very quickly, which is a much easier thing than very carefully lifting 160 sheets of glass out of a frame and putting them back again twice.

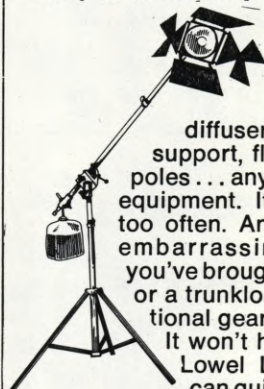
While I think a knowledge of photography is vital to this kind of work, I don't mean that in the scientific sense. I don't get too deeply into it on that level. If I want something shot in a certain way, I might say to the cameraman: "Give me high contrast and good speed." It's up to him to find the proper stock for that result and I don't have to fill my mind with a lot of numbers. I know the potential of film and the requirements thereof, and I leave it at that.

As for the style of the paintings, it comes very close to that of French Impressionism, strange as that may seem. It's much more like that than like academic painting. If you look at one of these paintings very closely, you will note that it's not that carefully painted. With frequently only five hours to do a complete painting, I don't have the time

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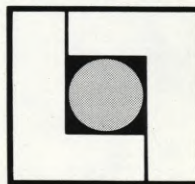
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to do a highly finished job, but I've found out through experience that this isn't necessary in order to get the result.

When I first started in this work my style was so tight that I was tied up in knots all the time. But then I made a discovery. I would do a very rough sketch just to make my first test and then, when I saw it, I'd say: "My God, that little bit of stuff over there looks finished and I haven't done a thing to make it look that way. It's just an impression, but it has life to it and it moves."

The same thing happened many times and, through the years, I learned where to put the work, and to what degree. I am more concerned with phenomena than with objects—the fading and infusion of light and the feeling of backlight.

On "EARTHQUAKE" there were paintings dealing with a wrecked city, so I could do a little bit of flashing around with the brush without doing too much harm. But there's an awful lot of precision painting, too, that makes the result look right—the windows and details of the buildings, for example. I couldn't get too sloppy with that. It's amazing, how the effect can be that of very carefully painted detail when, in fact, it isn't. It's strictly impressionistic. Every now and then you put finished work into a little area and it gives an overall effect of finish.

Of course, all that may change when we begin to shoot with the new ultra-sharp Eastman 5247 color negative, which I haven't had a chance to try yet. I've heard some alarming rumors about it, mostly relating to lab problems. But the problem that could arise for me has to do with its finer grain and sharper definition. The paintings we have used to date are what I call the "maximum-minimum" size. By that I mean that they're not so big that I'm going to get a hernia every time I pick one up, and they're not so small that the painting is going to look like a painting, in terms of visible brushstrokes. When the new stock comes into use, it's very obvious that the painting will have to be more precise. If it isn't more precise, it will have to be bigger—which is probably the way it will go. It works on the same theory as the artist who wants to reproduce a nice little line drawing to go at the head of a chapter in a book. He doesn't do it that size; he does it 20 inches wide and, when it gets reduced down, it looks beautiful. The same thing applies here. I'm just going to have to get into bigger paintings, and if I can't lift them myself, I'm going to have to get somebody to push them in and out. In other words, within a year, these

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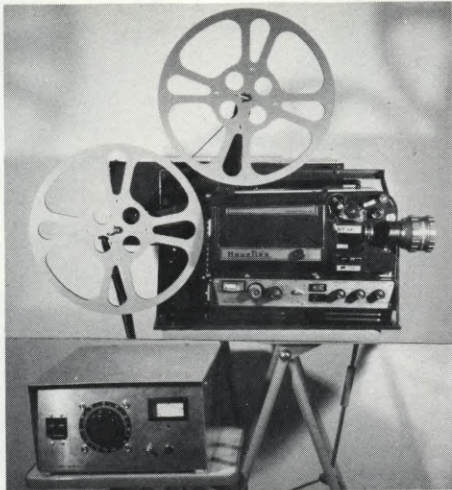
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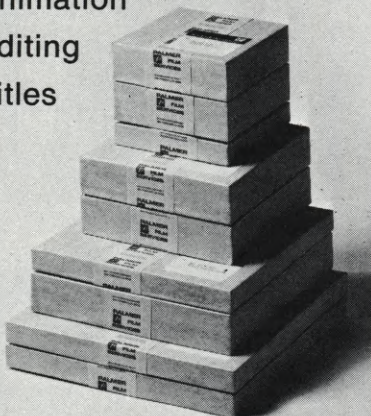
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paintings could well be half again as large in order to produce the same result.

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Whenever possible, I use photographs as guidelines to my paintings. Once in a while I project the photograph, because that's a great time-saver, but more often I simply work with the photograph in my hand, looking at it and copying the detail. Usually the picture is in color, but if you're doing a period piece you're only going to find black and white photographs. Quite often the photograph in your hand is little more than a crutch, especially if it's a newspaper clipping, but it's just something to give you a feeling for what you're doing. Sometimes there are no photographs available at all and I have to make the entire scene up out of researched elements.

In "EARTHQUAKE" the scenes in which paintings were used were essentially fixed shots. If they had been looking for any kind of camera movement, they would have been out of luck, as far as I'm concerned—but I don't think that this impaired the picture at all. A good director and a good editor can achieve an awfully good sense of movement through precise editing. Hitchcock says that the most interesting kind of movement comes about through fixed shots carefully edited together. Eisenstein and the other early film masters used the moving camera only very rarely, but their sense of movement was tremendous—much more cinematic than that of today's "trombone artists" with their zoom lenses. ■

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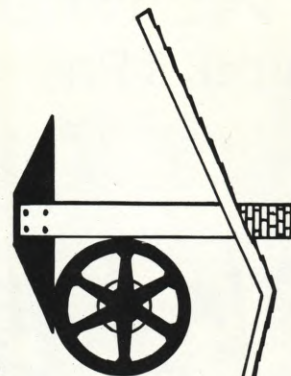
Continued from Page 1297

comes running out of the theatre with the sidewalk buckling and a whole wall of the building falling down just a hair's breadth from her. I've already mentioned the scene with Ava Gardner where the pipe comes smashing down and just misses her. This was all very difficult to do because of the precise timing required and the need to hit marks exactly. All of the actors were pretty well integrated into the earthquake action and there was very little use of doubles.

Although many characters are dealt with separately and in relationship to each other, the screenplay doesn't follow the structure of the so-called "Grand Hotel" formula—which usually has everything happening in the same place. The characters are not related to each other at the beginning of the story, but their paths do cross and they become interrelated later on.

Certainly, the earthquake itself could be called the "star" of this show, but I haven't let it overshadow the personal stories. I'm a sort of eclectic director who does many different kinds of films. Some of them have been action films and some of them have been very tight introspective films. It's probably very good that I've experienced both kinds of films, and maybe I've brought a little of each together in this one. The characters are very close and very interesting and one feels a certain tenderness towards them. The characters, I think, live. There's not a great deal of conventional structure in relation to their personal stories. They simply meet and react to one another.

In a film like this that relies so heavily on special effects one might think there would be a preoccupation with mechanics, to the detriment of the dramatic values, but that hasn't happened. When you have people close to the camera and an extraordinary number of effects happening and the street's on fire, you think, at first, that all this is going to detract from your observation of the scene. But after you've shot a certain number of scenes like this, you become rather *blasé* about them, and you are now able to focus on what's happening to the people and see them very clearly, regardless of what's going on around them. You begin to accept the background as something that is normal and you watch the people very carefully. It's simply that I think we become jaded with our effects after a while and are able to look at them in their proper light. For example, let's say that you have a scene with people



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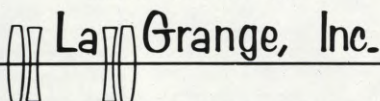
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coming down a street. Everything is on fire and all kinds of things are happening in the background. Yet, after you've had a couple of practice runs and you see that the background is going to work properly, you settle down and watch the people. That's generally what happens. It seemed to us, while we were shooting the film, that every day we were engaged in some extraordinary special effects problem. If it wasn't for the whole sequence, certainly it was for a couple of shots. We had to do a certain amount of this kind of work every day, so we were then able to accept the background, plan it, think about it, look at it and put our people into it. It became quite normal to us—a way of life.

The earthquake in our film lasts for several minutes on the screen. This is considerably longer than the duration of a normal earthquake. But ours is no normal earthquake. It's an earthquake of a kind that has never happened in recorded history, so it's beyond anything that we know of. However, it's possible that such a thing could happen. Our knowledge of earthquakes is limited by the instrumentation that we have presently. I would say that the earth, during the millions of years that it has existed, has probably gone through this type of cataclysm before—and on a scale that would outdo ours. Consider the fact that the Mediterranean was once a dry sea and that where Gibraltar now stands there was a block. One day there occurred a break in that block. At first there was a waterfall, then the shattering of the break. Then the water leveled off and the seas became the same height. At the moment that the break occurred there must have been an enormous cataclysm. So I guess our earthquake isn't too far-fetched.

"EARTHQUAKE" was conceived as an entertainment film, not as a message film. But I think the film leaves one with a message, stated or unstated, that is inevitable. It has to do with the planning of our cities, our resources, our utilities, and our methods of construction. The reasons for construction in certain areas must be very, very closely examined.

When you see "EARTHQUAKE" you are going to have certain feelings about living in the environment of a large city. You are going to be concerned about the power lines about you, the height of buildings, the safety of elevators and the probability of fire. You are going to be more concerned about all of your environment.

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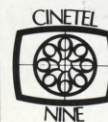
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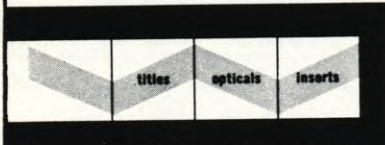
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I think we should concern ourselves with how to evacuate a city, if we had to. I don't think there's been an extraordinary amount of planning in that respect. The average person wouldn't know where to go or what to do.

I feel that a lot of sociological questions will be raised by this film. So, in that respect, it does have a very, very strong statement to make. It's the best kind of statement, because nobody gets upon a soapbox and tells you that you've got to change the world. You make your own decision about how you've got to change the world.

I imagine our own building and safety people will be interested in this film. I don't know that all the real estate operators will love us, and I don't care—but I think it should be a matter of concern to them, too.

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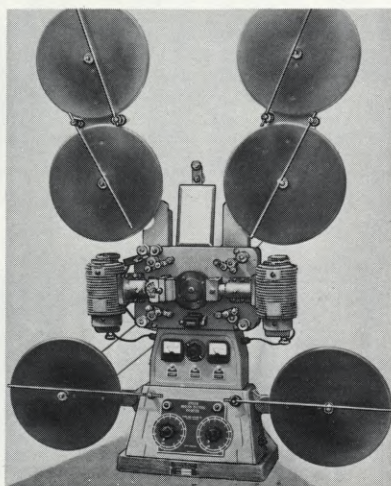
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THE PHOTOGRAPHY

Continued from Page 1333

you've got a zoom lens and say: "Look what I did. I zoomed into a close-up!" . . . Who cares?

Besides being very knowledgeable—probably the most knowledgeable director around, in terms of technical skill—Mark Robson is very adaptable. If a certain thing won't work one way, he'll find another way to do it. I think that's a fine trait in a director—the ability to change, to stay flexible.

There were a lot of exteriors in "EARTHQUAKE", and most of them were shot on the Universal backlot. We completely destroyed the New York Street. False fronts were put onto the buildings so that they could fall down during the quake. There were people running out of buildings and debris falling and fires breaking out and, when the dam breaks, 20,000 gallons of water come pouring out at one time.

Perhaps the most difficult thing in the picture, from the photographic standpoint, was shooting the interior scenes that took place in sets mounted on the shaking platforms. It's been a long time since a picture like this was made, one that relies so heavily on intricate special effects and there were a lot of things that could go wrong. For example, the trips didn't work on the falling ceilings and we had to do it all over again. As for lighting these interiors that were built to shake, what shakes? The lighting has to be part of the set, but how do you keep from showing the shadows shaking? If you put your lights up on parallels, the set is shaking underneath and you've got all kinds of movement in the shadows. It would be fine if you had a source light coming through the window from someplace outside the building—that would give it added movement—but when you don't have that and you're inside, where do you light the set from? We had to think up ingenious ways to maintain consistency and not show the lighting in relationship to the set moving. To me that was the most challenging thing on the picture, but it worked out quite well and it looks real.

I would like to say that Universal does a fantastic job of making this type of picture and it was great to be able to do it there. The upper echelon at Universal was a pleasure to work with. They really make a big picture the way it should be made. Nobody bothers you, and the publicity that surrounds the picture is really terrific. They know the answers. It was a wonderful experience for me to work there after all these years.

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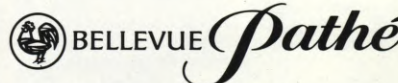
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WANTED: Good used RCA or Westrex 16mm. optical sound recorder, complete with amplifier, LERT SLIP FILM LAB, 11/14 Opp. Coliseum Theatre, Petchburi Road, Bangkok, Thailand.

AURICON MA 11 recording head, DX 1000 inverter. HARRIS, 55 Amicita, Mill Valley, CA 94941 (415) 383-5994.

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SCRIPTS wanted by producer for feature production. Partnership investors available. RODGERS PRODUCTIONS, 18525 Torrance, Lansing, Illinois 60438.

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BOOKSHELF

Continued from Page 1268

OLDIES BUT GOODIES

An engaging biography of Mary Pickford, *SWEETHEART* by Robert Windeler, achieves a well-rounded portrait of the actress who graced many a youthful dream during Hollywood's yesteryears. (Praeger \$7.95)

Judy Garland's innumerable fans will undoubtedly relish Al DiOrio's emotional tribute, *LITTLE GIRL LOST*. It is a conscientious job of data compilation—uncritical, but detailed and extensively illustrated. (Arlington \$8.95)

A distinguished actor's progress is surveyed in Michael B. Druxman's *PAUL MUNI, HIS LIFE AND HIS FILMS*, describing with considerable emotion the professional and personal problems the performer had to face during his Broadway and Hollywood careers. (Barnes \$10.)

Lewis Yablonsky provides in *GEORGE RAFT* an intimate and richly documented biography, delving into the social milieu that Raft symbolized on the screen while retaining his real life ties to its less than savory characters. (McGraw-Hill \$8.95)

In *GABLE AND LOMBARD*, Warren G. Harris has caught the personalities of the two performers, whose emotional immaturity was carefully nurtured by the powers-that-be, and efficiently parlayed into overwhelming fame, fortune and eventual tragedy. (Simon & Schuster \$7.95)

"Duke" Wayne's career, nearing the half-century mark, is told in colorful and sympathetic detail by Maurice Zolotow in *SHOOTING STAR*. It goes a long way to explain the actor's many contradictory character traits, assigning his all-too-human failings to his towering machismo. (Simon & Schuster \$9.95)

In *JAMES DEAN: THE MUTANT KING* by David Dalton, the screen image of what was basically a confused youth is sensitively assessed in the light of the romantic myths that were woven around his charismatic personality. (Straight Arrow \$9.95)

A fascinating portrait of the French film and stage world, *MEMORIES FOR TOMORROW*, is the autobiography of Jean-Louis Barrault, star of Marcel Carné's *Les Enfants du Paradis*, whose talent as actor, and director reflects the apogee of France's cultural achievements. (Dutton \$10.)

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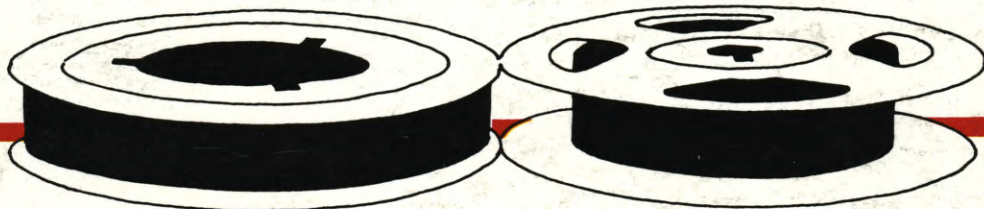
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