

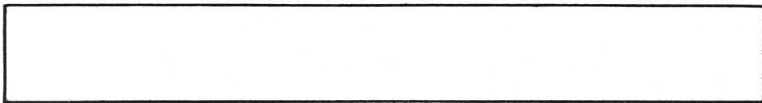
FILMING  
CINE' MASTERS  
FOR  
TRANSLATION  
INTO  
MULTIPLEX  
HOLOGRAMS

# INTRO

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The Multiplex holographic technique is the first to combine motion picture photography with laser holography. The result is a unique holographic form, a three-dimensional rainbow-colored, moving picture that is white-light viewable (a regular, clear incandescent bulb is all that is needed), and offers the widest possible variety of subject matter — in fact, any subject offering sequential perspective change is possible.

To date Multiplex holograms have been made of subjects on turntables (The Kiss), outdoor scenes (Train, Cable Car), computer graphics (molecular models, three-dimensional graphs, kinetic pieces), x-ray footage and animation (cells and clay).



## Here is how it's done:

- First, a regular 35-mm movie of the subject using conventional equipment and lighting, is made.
- Second, the processed 35-mm film is put through a special Multiplex printer, where each frame is illuminated by a laser beam and projected through a cylindrical lens, which focuses the image into a vertical line. This narrow vertical line is recorded holographically on high resolution film twice per 35-mm frame.

When this final product is mounted on a curved or circular display, the observer sees a realistic composite image of the original subject. The many individual frames containing many different views form, in effect, a single hologram.

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# HOW TO FILM CINÉ MASTERS FOR TRANSLATION INTO MULTIPLEX HOLOGRAMS

## The First Step — Equipment

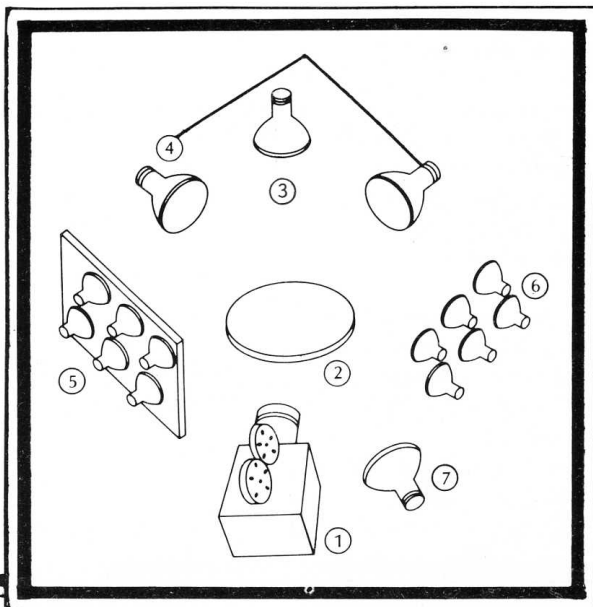
- A. **A 35-mm Motion Picture Camera** — Vertical registration of the subject from frame to frame is critical for a successful Multiplex hologram. Therefore, we recommend a Mitchell or other pin-registered camera.

A good 16-mm camera may be substituted, but for holographic translation, the print must be blown up to 35-mm.

- B. **A Tripod** — The steadiness of the camera is as important as its registration: a rock-solid tripod is essential.

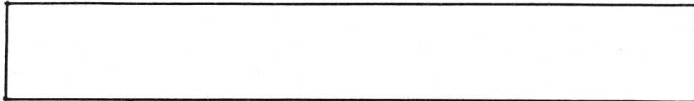
- C. **Film** — Filming at Multiplex Co. is done on Kodak Plus-X Negative (Black and White) Bell and Howell perforated, 35-mm motion picture film. The hologram is made from a positive print of this negative.

- D. **Lights** — Lighting requirements will differ with the size, color and contrast of the subject. Multiplex uses the following arrangement around an eight-foot turntable.



- ① Camera
- ② Turntable
- ③ 500 watt overhead spotlight.
- ④ Two 1000 watt backlights to provide good definition between subject and black background.
- ⑤ A bank of six, five-hundred watt photo floods are mounted in a three-foot square light box and covered with a diffusion screen. This minimizes high contrast shadows from moving across the subject as it rotates.
- ⑥ Key light with a cluster of six, five-hundred watt photo floods.
- ⑦ An auxiliary fill light is sometimes used to balance out the light.

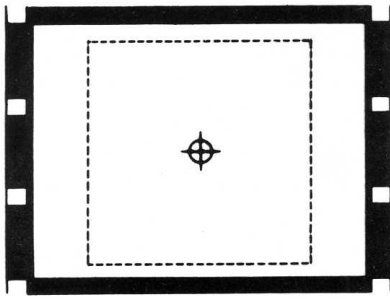
**E. Turntable** — The turntable should be large enough to accommodate the subject, and speed-adjustable to compensate for its weight. A turntable speed of one-and-one-third R.P.M. (one revolution in forty-five seconds) has been adopted as the Multiplex standard. It is preferable that rotation of the turntable be clockwise, although material shot counter-clockwise can be adapted.



## The Second Step — Procedure

- A. Set-up** — Set up the camera on the tripod, and center the viewfinder cross-hairs on the vertical axis of the turntable. Ideally, the lens should point straight (horizontally) across the turntable. Tilting up or down will result in optical distortion in the hologram.
- B. Framing** — The subject, as seen through the viewfinder, should not at any point during the filming extend outside a square aperture in the center of the frame. This aperture is  $\frac{7}{8}$  of the frame-height high, and an equal distance wide, bisected vertically by the axis of rotation of the turntable. (See diagram on following page) Some cameras have a removable ground glass focusing screen. At Multiplex, we have drawn a square indicating the subject area limits right on this screen so that we can be assured that the subject will remain within these limits at all times. (Note — Silent Aperture (Full Frame), See American Cinematographer's Manual.)

## 35-mm Film Frame



--- Multiplex Frame  
7/8 of silent frame aperture

- C. **Lighting** — Light the subject as described in Part “D” of the preceding section. Pure whites and blacks are to be avoided in the subject matter, including clothing. Blacks will tend to disappear against the black backdrop (especially black hair, if inadequately top lighted). Pure white will “burn out” leaving a visible trace on the holographic film, when filmed in conjunction with darker shades. It is best to have the subject wear clothing that photographs grey, in a zone that is similar to the subject’s flesh tone.
- D. **Action** — The subject should now rehearse his or her action as the turntable rotates, while the cameraman or director watches the lighting for undesirable shadows, particularly shadows passing across the face. Be certain that the subject remains within the Multiplex frame limits throughout the sequence. The subject must move smoothly at about one-third normal speed. Any fast or jerky movement will result in distortion on the finished hologram.
- E. **Footage** — For a 120° Multiplex hologram, a twenty-five foot, (four-hundred frames) 35-mm positive print must be submitted.

For a 360° Multiplex hologram, please submit a seventy foot positive print. This is two and one-half feet more than the sixty-seven and one-half feet (one-thousand and eighty frames) required for a full rotation of the subject, and provides a lead-in and lead-out for printing and splicing. Your Multiplex hologram will be returned to you within thirty days.

**\$2.00**

Send film to:

**The MULTIPLEX CO.**

454 Shotwell St., San Francisco, CA 94110

Pricing:

120° Custom Multiplex Hologram .....	\$170.00
120° Daytime Proof .....	\$ 55.00
360° Custom Multiplex Hologram .....	\$400.00
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