

# Optical Special Effects

CPSC 8150

Diagrams: *Special Effects: The History and Technique* by Richard Rickitt

**Figure 4 FILM GENERATIONS**

When films are copied from negatives or positives, they are named according to their place in the production chain. Each copy is known as a generation, and each generation can be given a number of names.



1 *Original camera negative*. The film that is held in the camera during photography and subsequently developed into a negative. Also called the *master negative*.



2 *Master positive*. First-generation copy of original negative. Such copies are used in the production of special effects where a positive image of the highest quality is required – for rear projection, for example. Also called the *interpositive*.



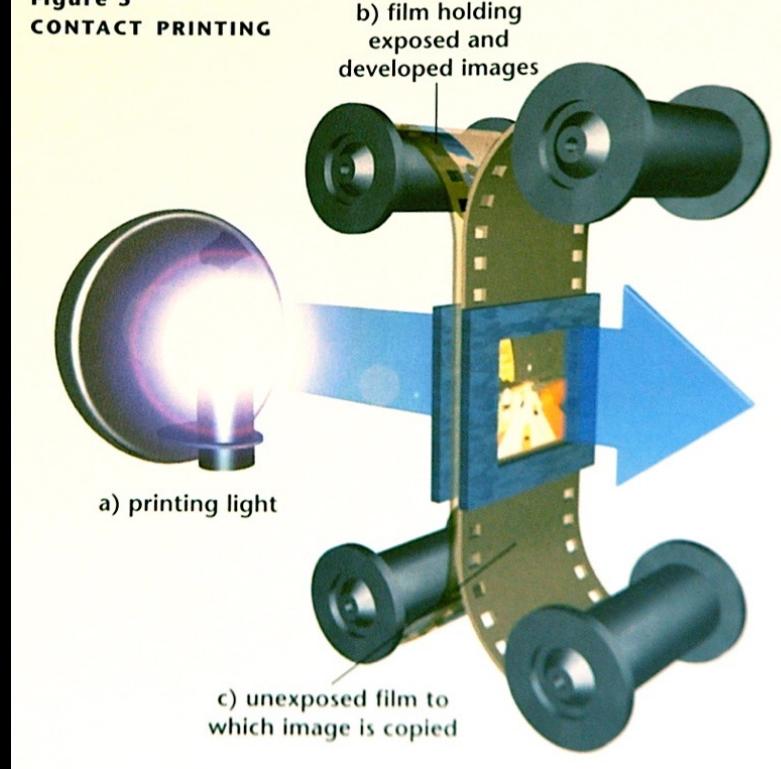
3 *Internegative*. Made from copying the master negative on to reversal film to produce another negative, or by copying the master positive on to negative film. Many additional positives can be struck from this film – edited release prints, for example. Also called an *interdupe* or *colour reversal intermediate*.



4 *Release print*. Thousands of release prints may be made of a film to be sent to cinemas around the world.

# film basics

**Figure 5  
CONTACT PRINTING**



**Figure 6 FILM FORMATS**



Academy Ratio 1:33:1  
(35mm unmasked)



Widescreen ratio 1:85:1  
(35mm masked)



Anamorphic, 2.35:1, squeezed and unsqueezed



65mm negative



70mm print



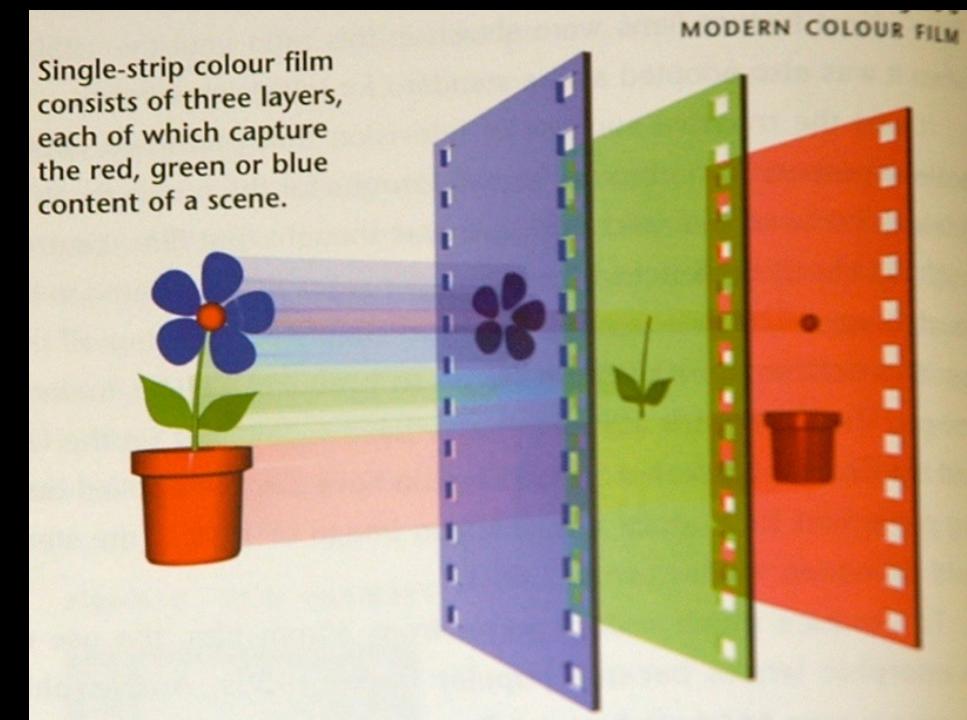
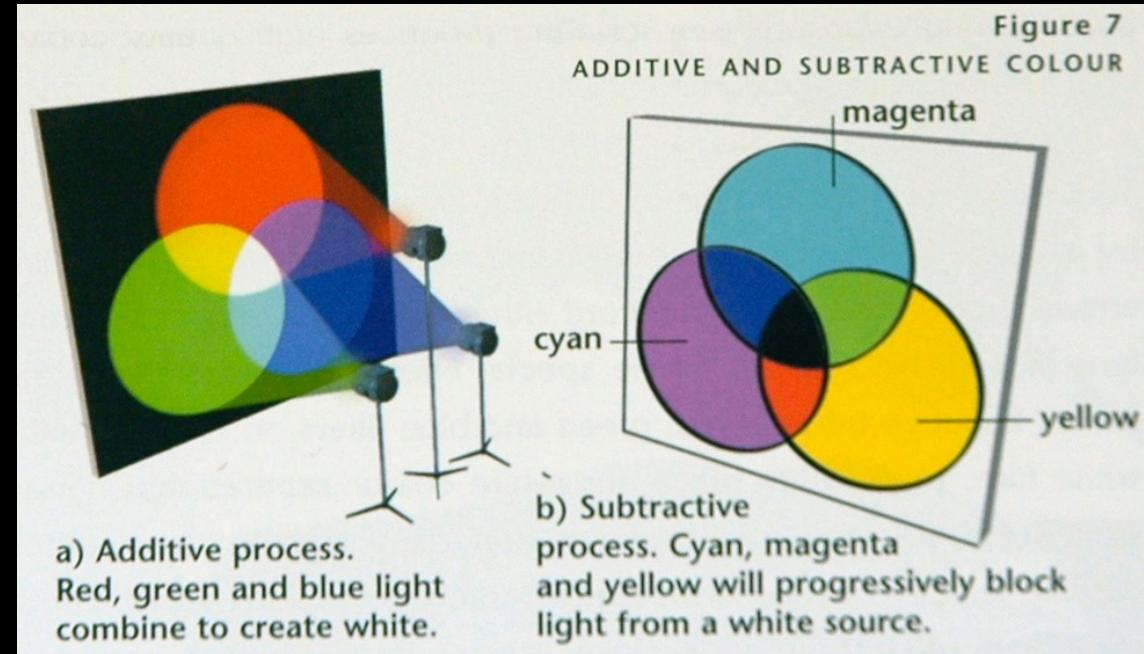
VistaVision,  
also known as '8' perf.

# color and film

early effects work in B & W

technicolor used three strips

effects techniques needed  
change with color



# mattes

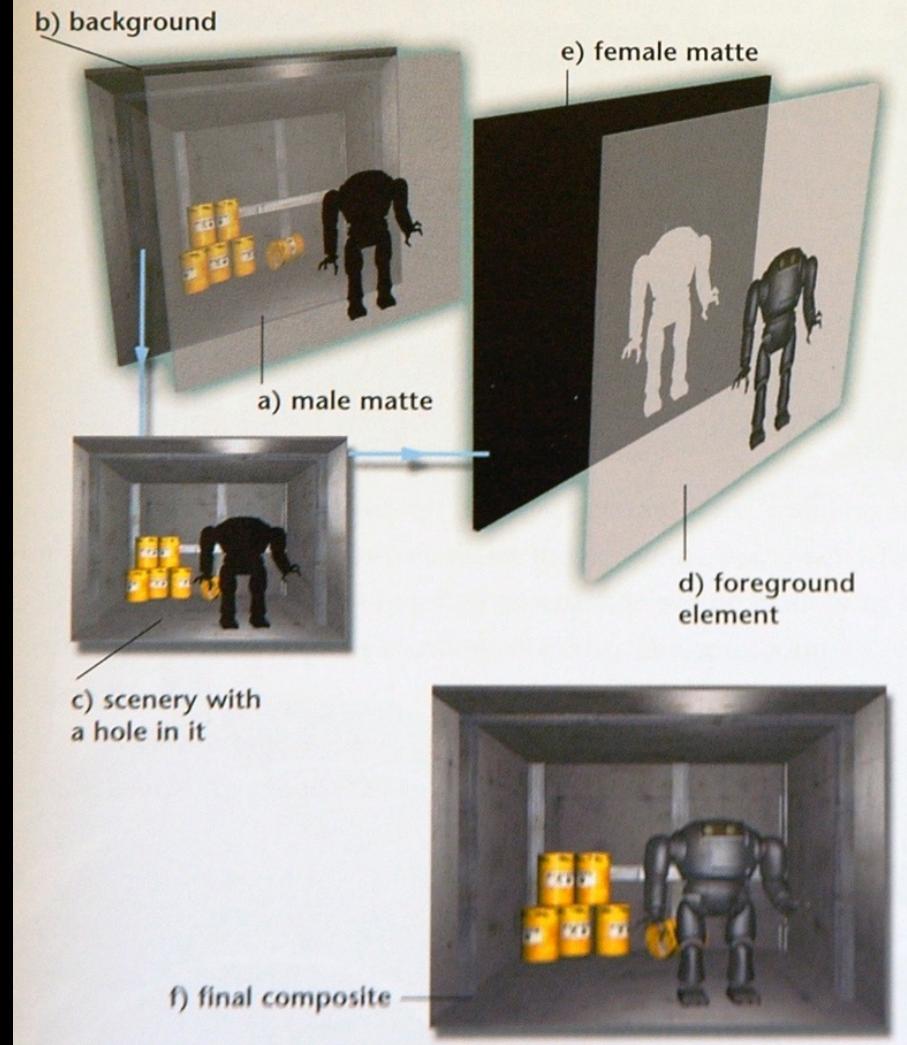
## mattes and film travelling mattes

Figure 9 THE NEED FOR TRAVELLING MATTES

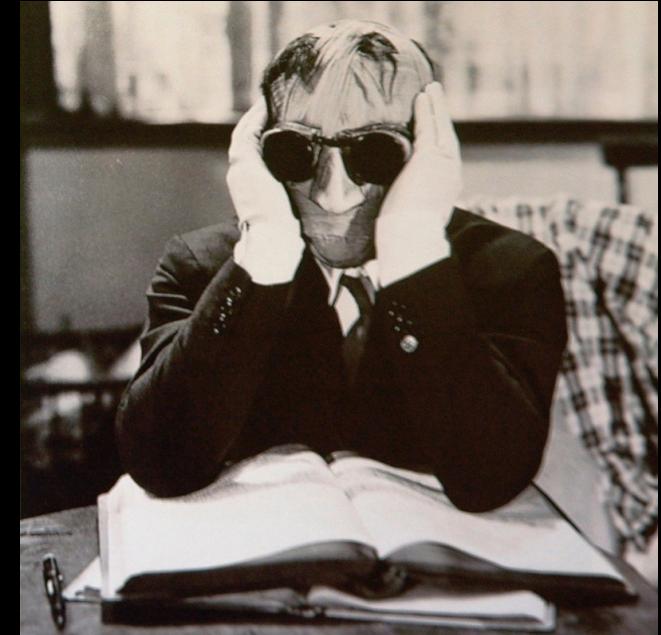
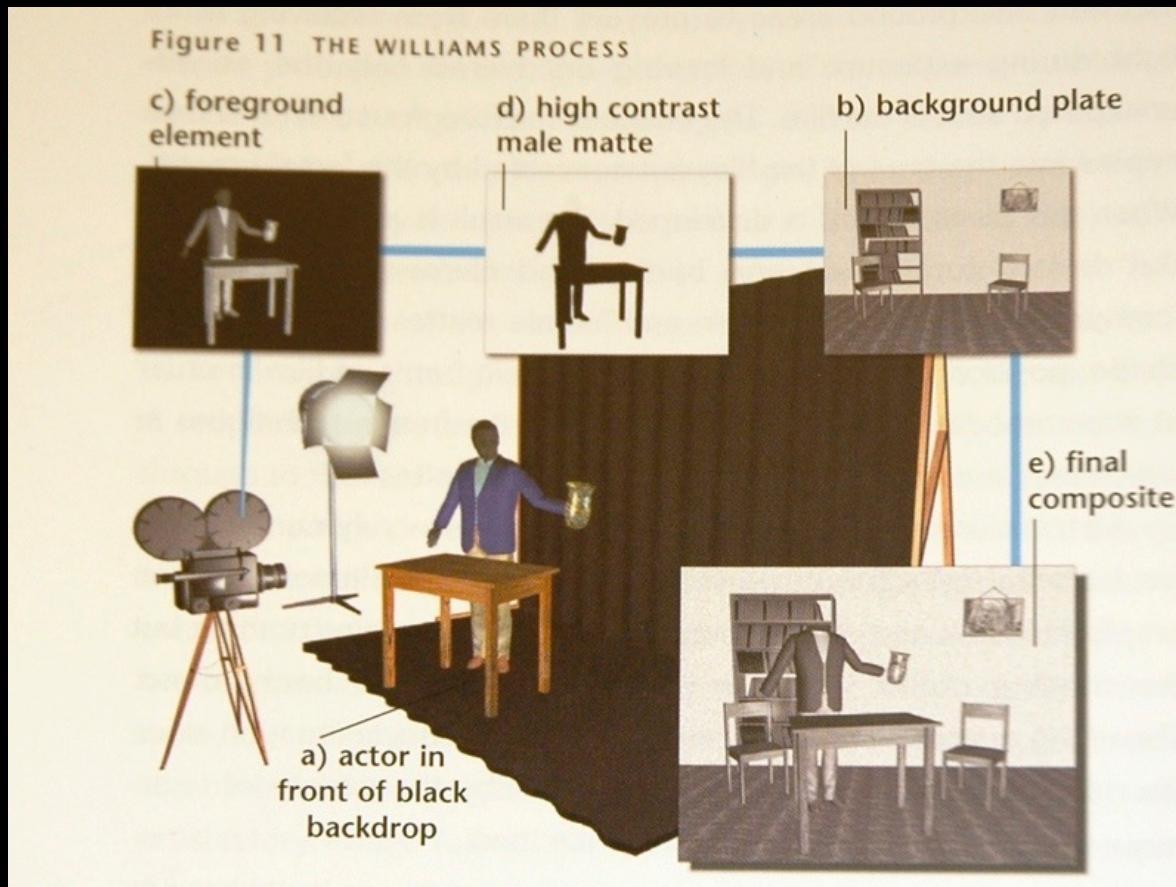


Without mattes the combination of two film elements leads to the ghosting of images.

Figure 10 THE PRINCIPLES OF TRAVELLING MATTES



The Williams Process  
patented in 1918 by one-time  
Keystone Kops cameraman  
Frank Williams, also called the  
black-backing travelling matte  
process.

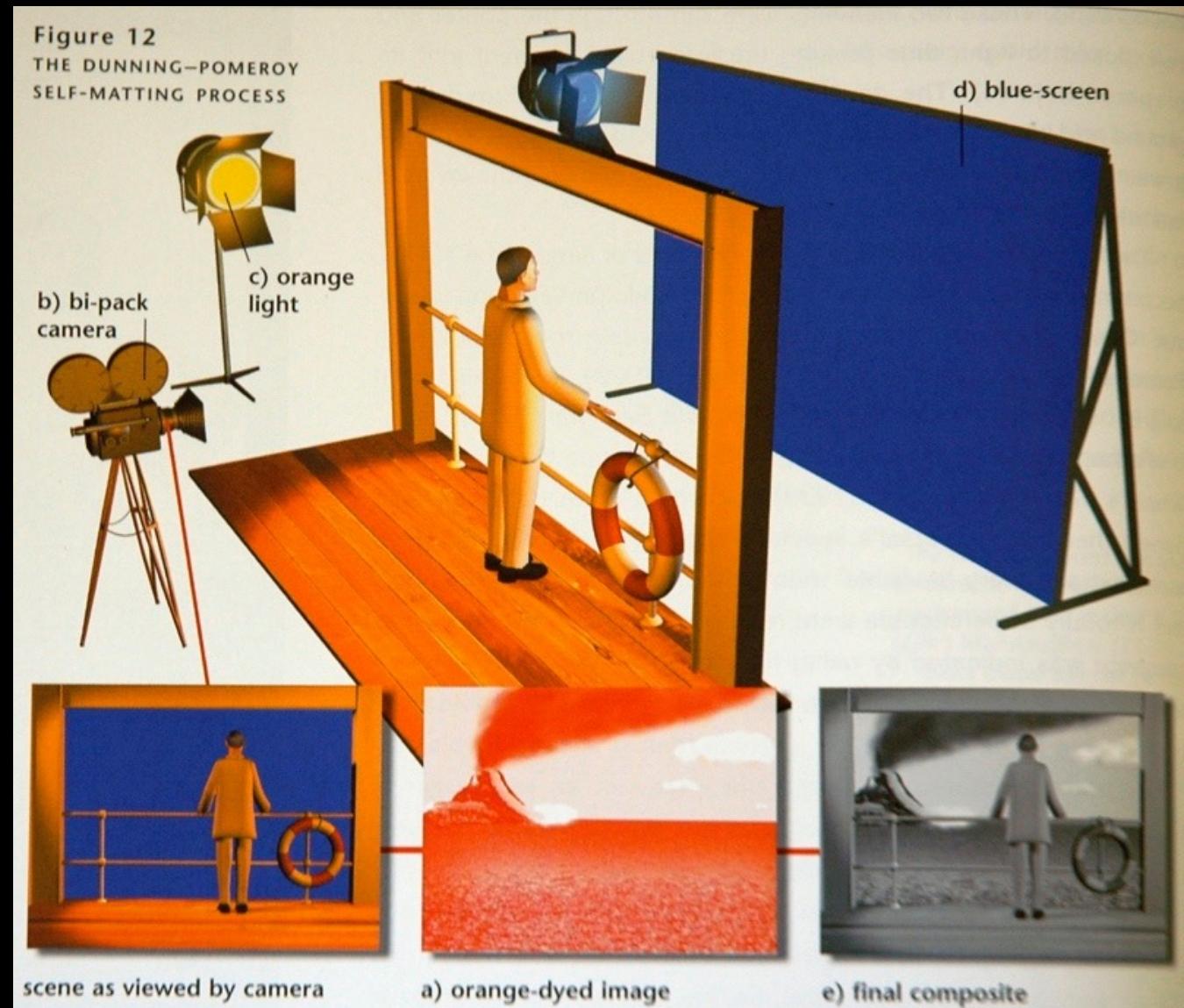


John P. Fulton's *The Invisible Man* (1933) with Claude Rains.



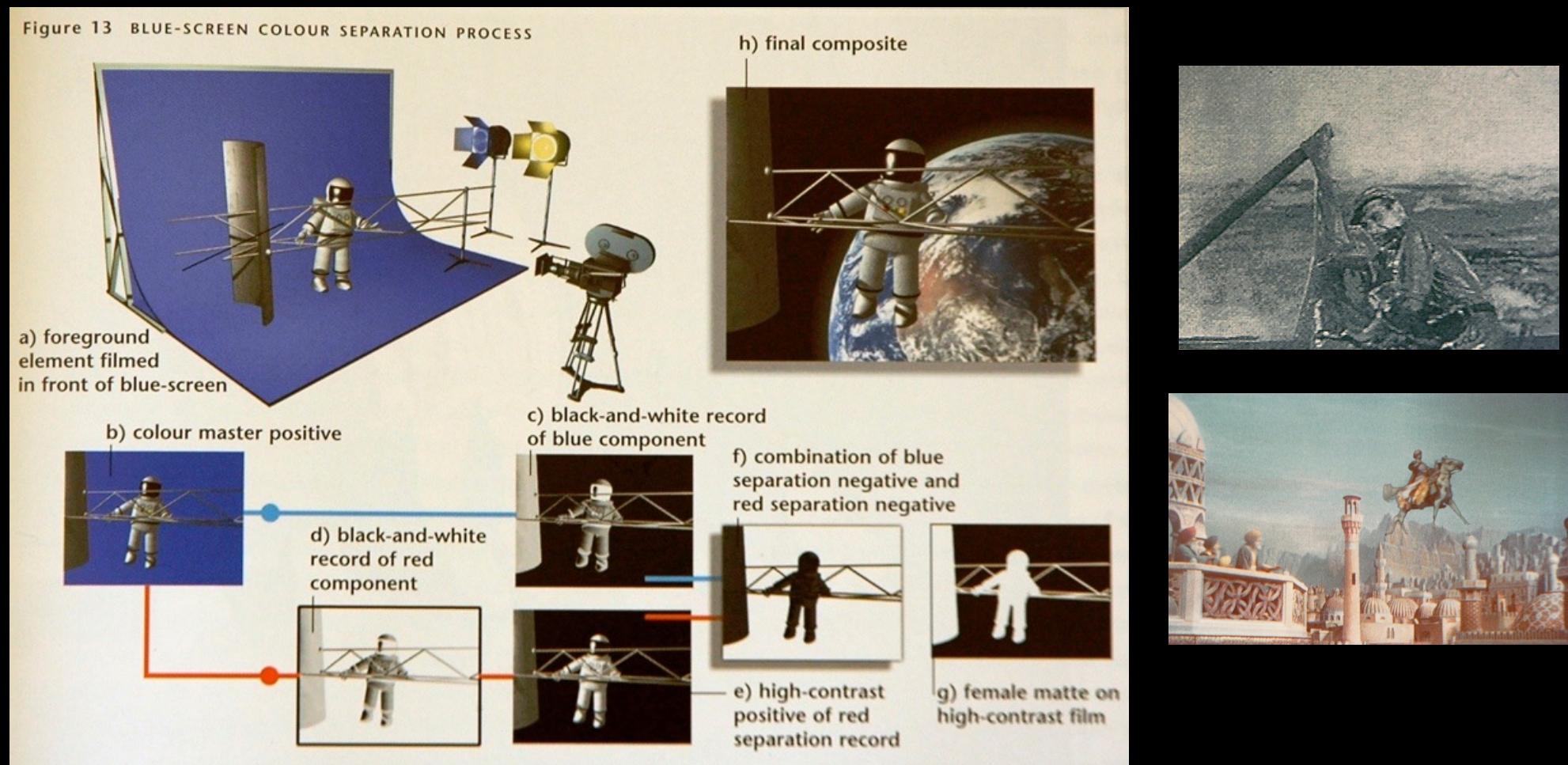
Cecil B. DeMille's  
*Manslaughter* (1922).

The Dunning-Pomeroy Process: Pioneered by C. Dodge Dunning and later refined by Roy J. Pomeroy. Combined simultaneously using orange-dyed print of background in a bi-pack camera. It was used somewhat through the late 20s and early 30s in such films as *Trader Horn* (1931) and *Tarzan and the Ape Man* (1932).

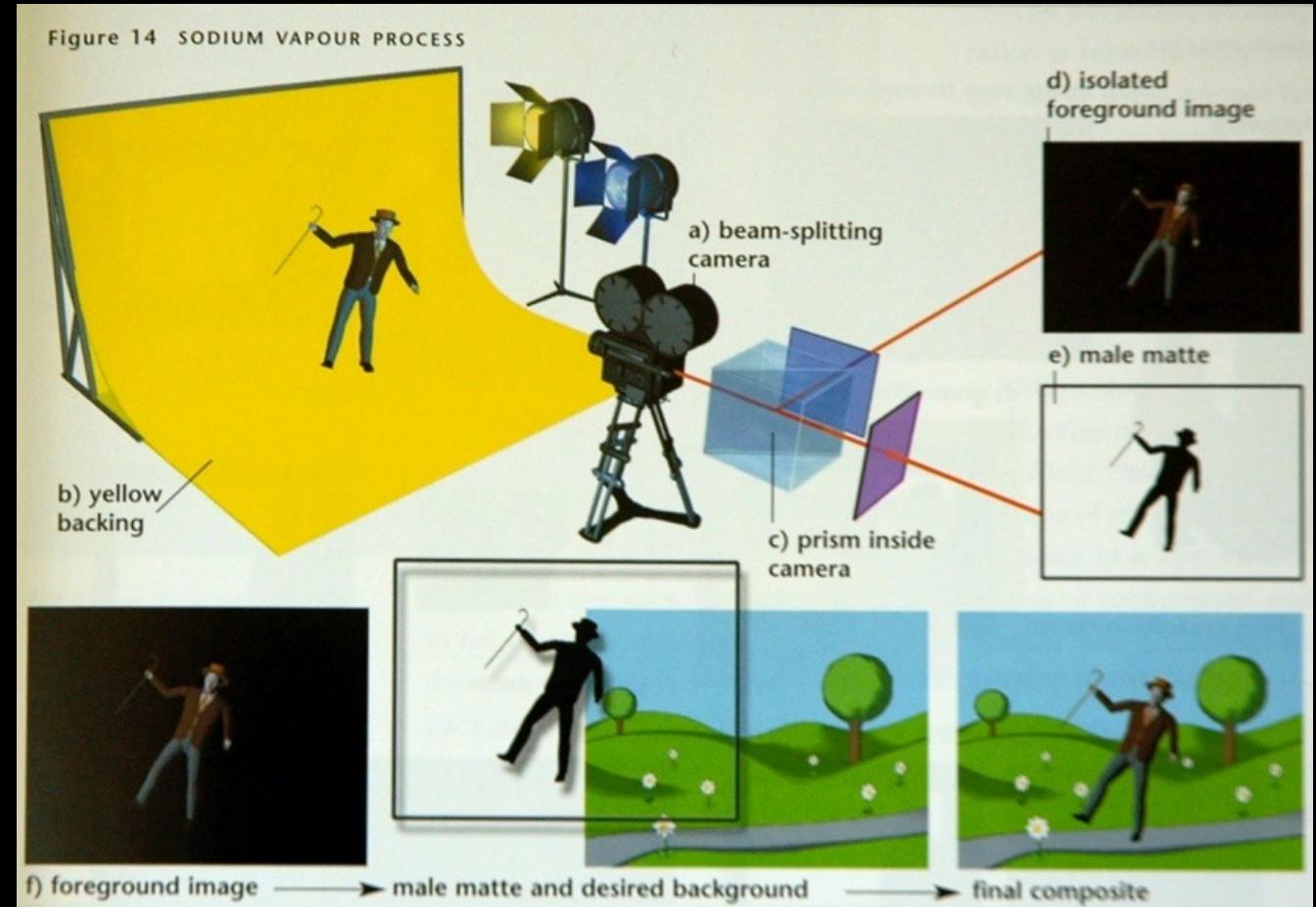


# Blue-Screen Color Separation Process

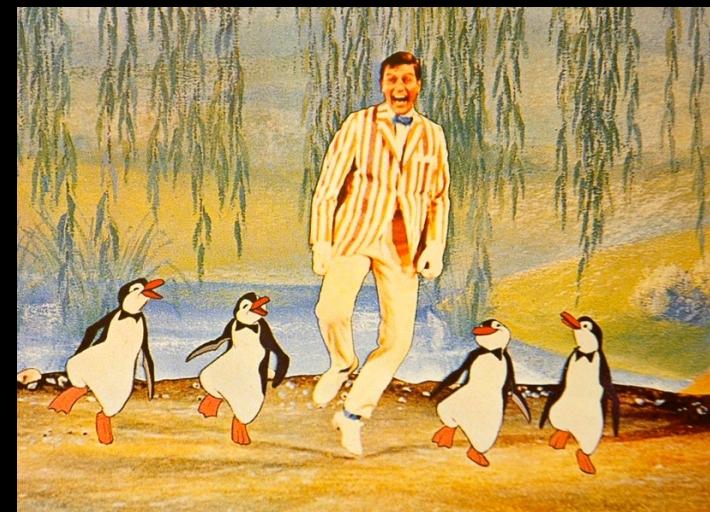
Figure 13 BLUE-SCREEN COLOUR SEPARATION PROCESS



Devised in France in the mid-1950s, developed practically by the Arthur J. Rank Organisation in England. Adopted and further developed by Ub Iwerks and others at the Walt Disney Studio. Used in many other films such as *The Birds* (1963) by Hitchcock.



# Sodium-Vapour Process



# Blue-Screen Color Difference Process: Developed and patented by Petro Vlahos of the Motion Picture Research Council. Widely used from the mid-1960s until digital alternatives in the late 1980s.

Figure 15 BLUE-SCREEN COLOUR DIFFERENCE PROCESS

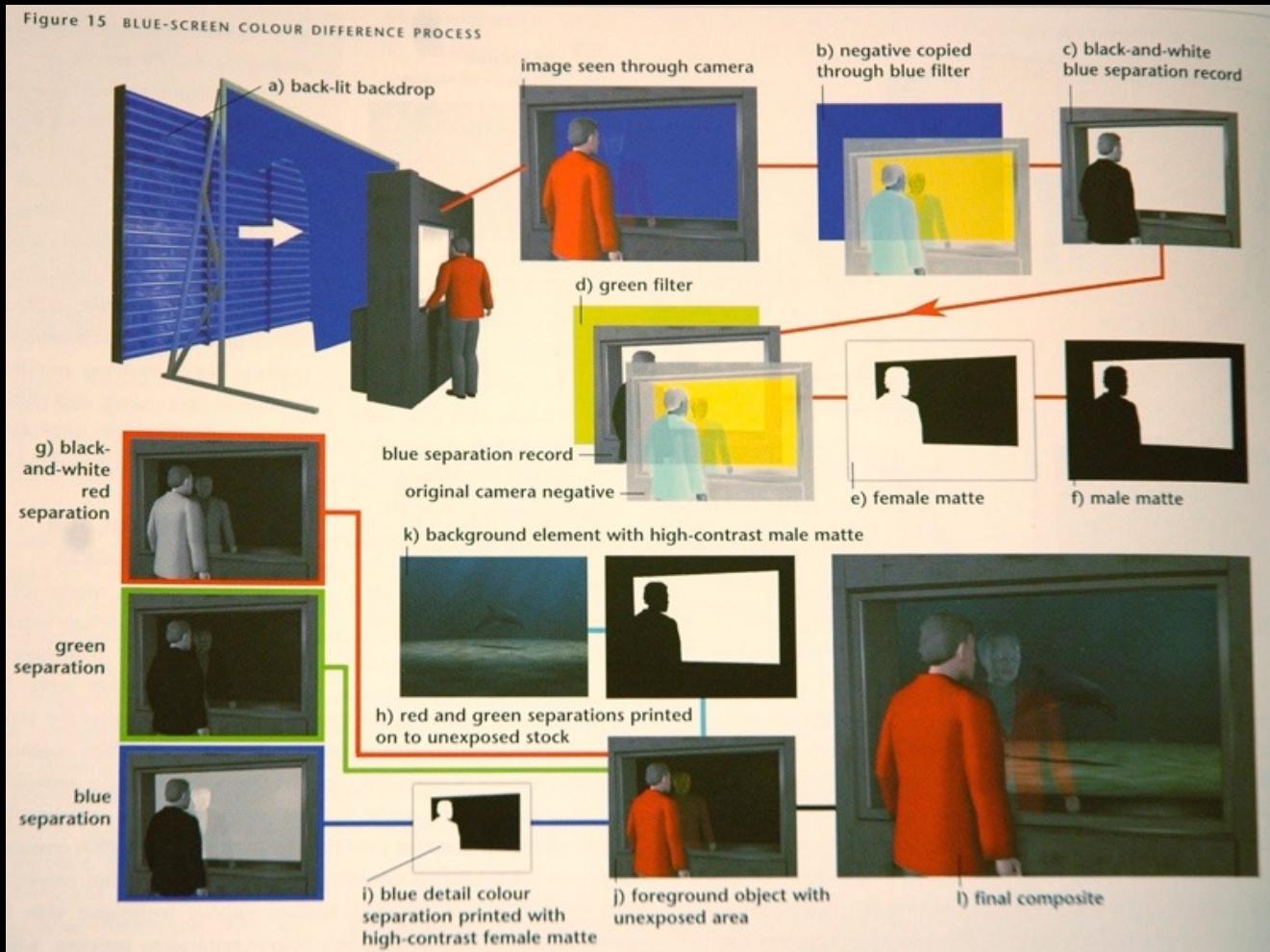


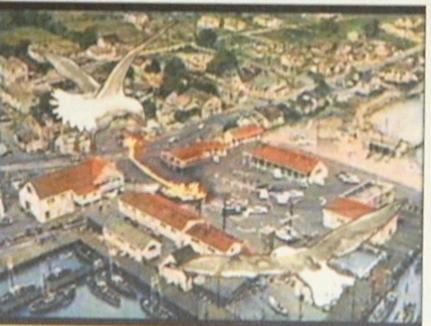
Figure 19 HAND-DRAWN MATTES  
IN THE BIRDS



a) hand-drawn mattes



b) mattes and backdrop combined



c) final composite

# Hand-Drawn Mattes and Rotoscoping

Figure 16 THE ROTOSCOPE

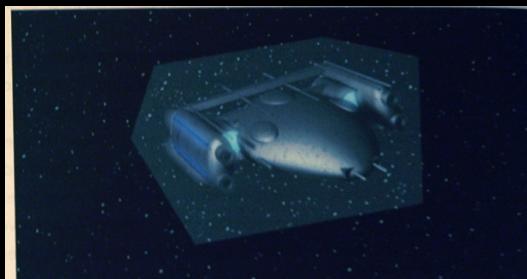
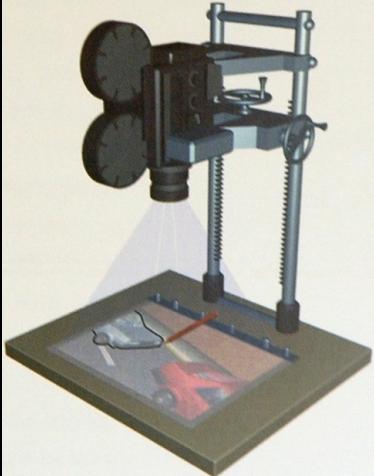
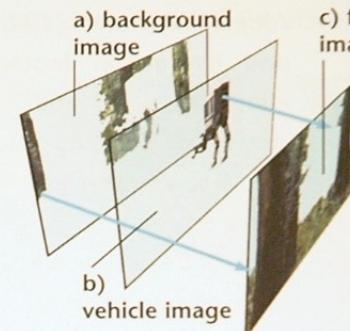


Figure 20 GARBAGE MATTES  
These often show up as low-contrast boxes around flying objects when shown on television.

Figure 18 ROTOSCOPING



c) foreground image



By using various combinations of mattes,  
a composite can be built up in 'layers'.

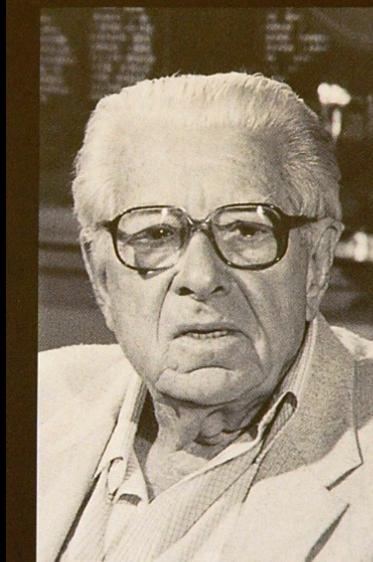
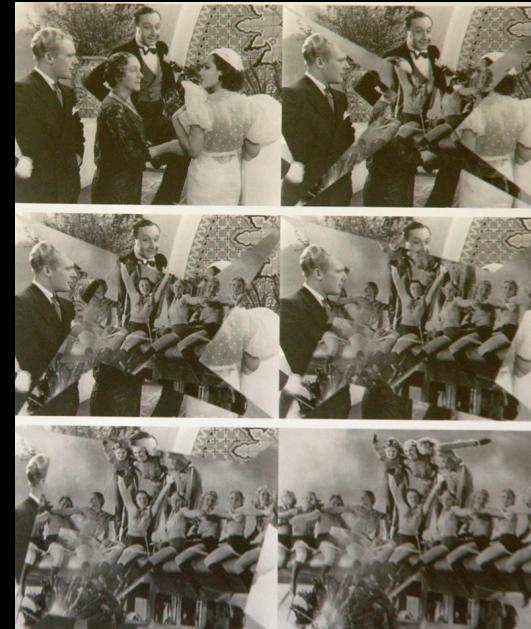


Figure 21

A SINGLE-HEADED OPTICAL PRINTER, as shown below, would be used for basic copying of film and adding simple fades or wipes.



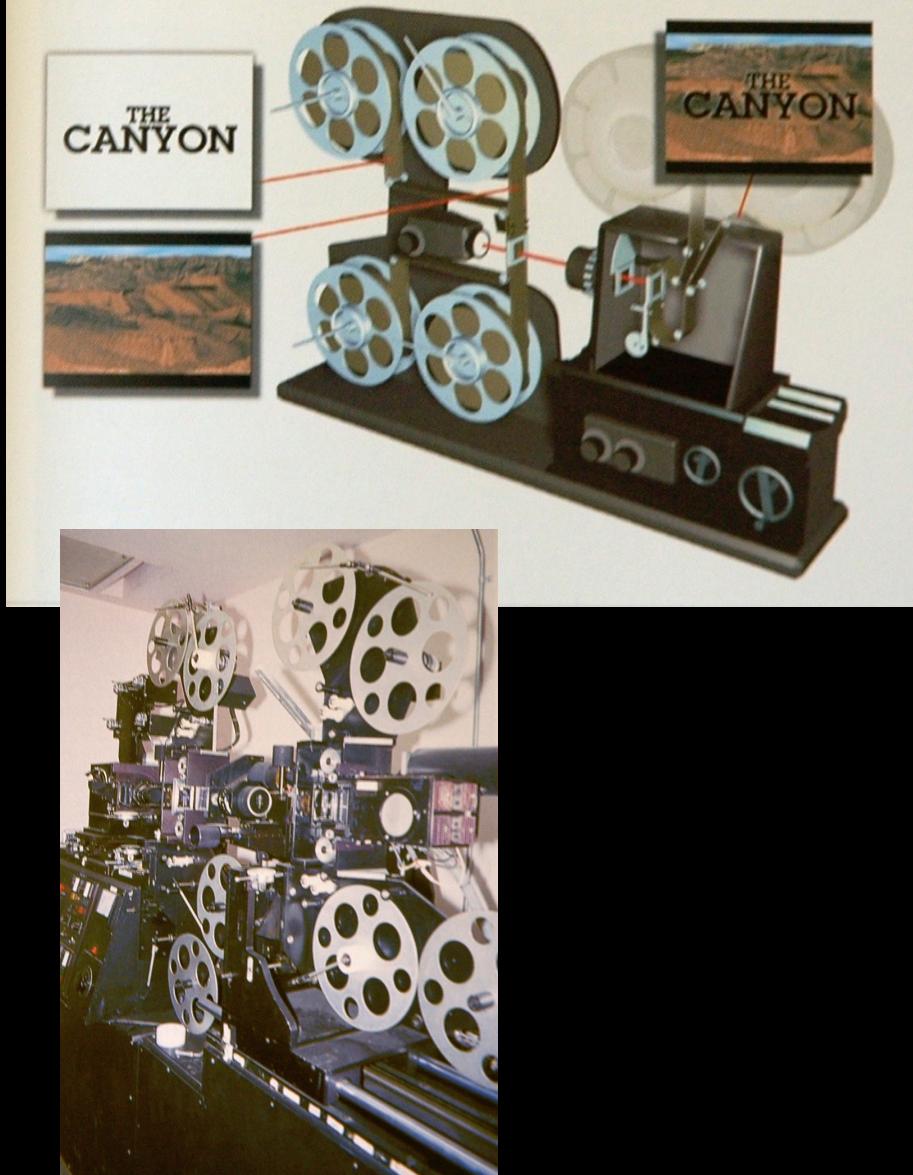
# Optical Printing



Linwood G. Dunn (1904–1998) began his working life in the movie business as an assistant cameraman for Pathé in 1925. After moving from New York to Hollywood, Dunn worked at a number of different studios until, in 1929, he was asked to do two days' work in the photographic effects department of the newly established RKO Radio Pictures in Hollywood.

Figure 22 A TWO-HEADED OPTICAL PRINTER

This can combine two images in each pass, making it ideal for creating titles. In the example shown, the black-and-white title card acts as its own matte.



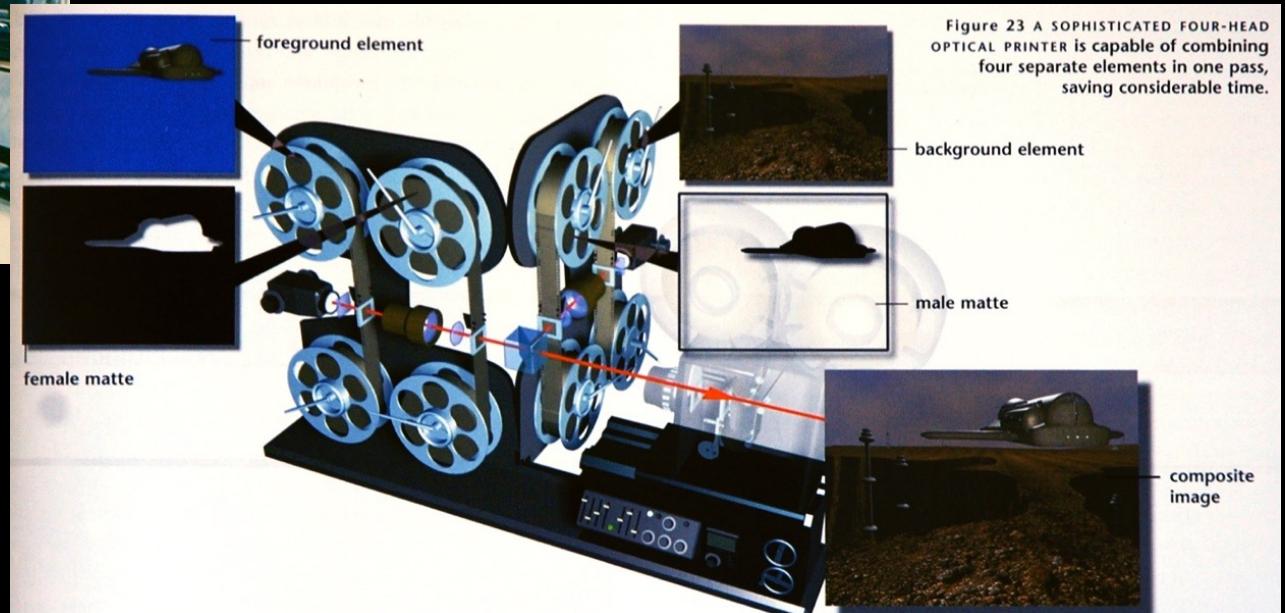
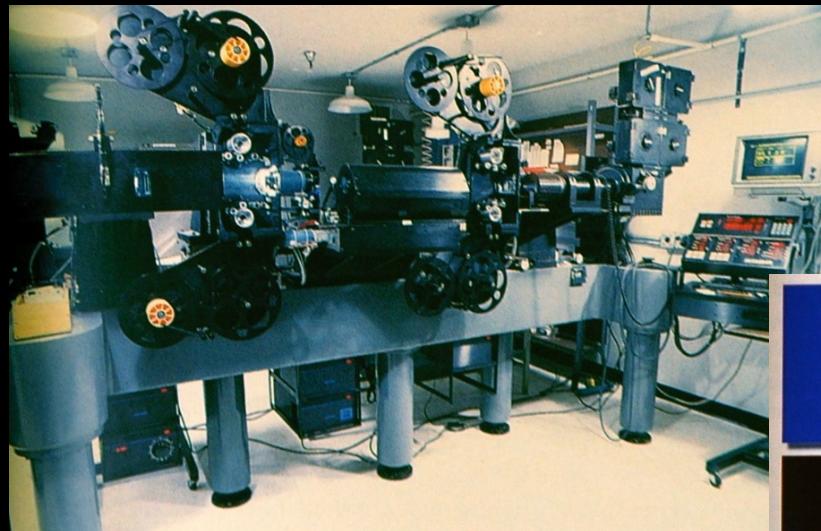
# Advances in Optical Printing



SCENE	THIS ELEMENT	THIS ELEMENT												CUT LENGTH	TOTAL LENGTH	KEY #
		1	2	3	4	5	6	7	8	9	10	11	12			
IP	SET CM	IM	BC											13Y 58 225 346	13Y 58 225 346	
BG PLATE TR. 1														53181 492 - 572		
SHIP PLATE														53181 566 - 601		
FLICKER PASS TR. 3														53181 522 - 565		
ROCKS IN PLATE														53181 522 - 565		
PIRO MATTE														53181 522 - 565		
WATER (SAL)														53181 522 - 565		
THROAT TR. 7														53181 522 - 565		
LIPER														53181 522 - 565		
LIPER THROAT														53181 522 - 565		
LIPER THROAT														53181 522 - 565		
SMOKE														53181 522 - 565		
TR. MATTE														53181 522 - 565		
MEAN ASYLIC MATTE														53181 522 - 565		
REPO INFO														53181 522 - 565		
MADE														53181 522 - 565		
FLIP FLOP														53181 522 - 565		
ACTION														53181 522 - 565		
CHANGES TO BEING CROSSED																
PRO THROAT 46 FRAME																
** 1120 FRAME FIVE IN																
** 65 FRAME																
REVERSE PRINT																
2 PASSES FOR LENGTH																
REVERSE PRINT																
314 PASSES FOR LENGTH 36 FRAME FIVE IN																
ROTATE																
Society of Visual Effects Member																
"Shattered" - Academy Award Nominee																

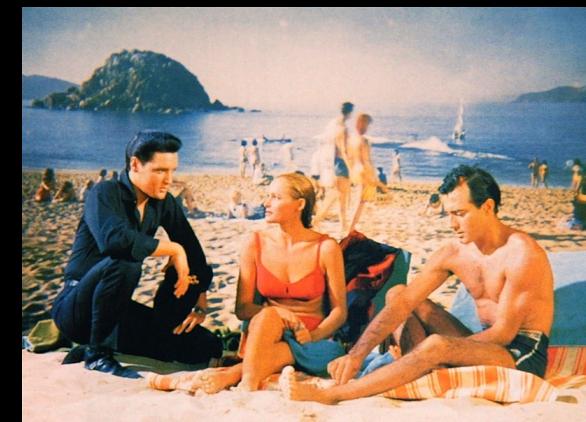
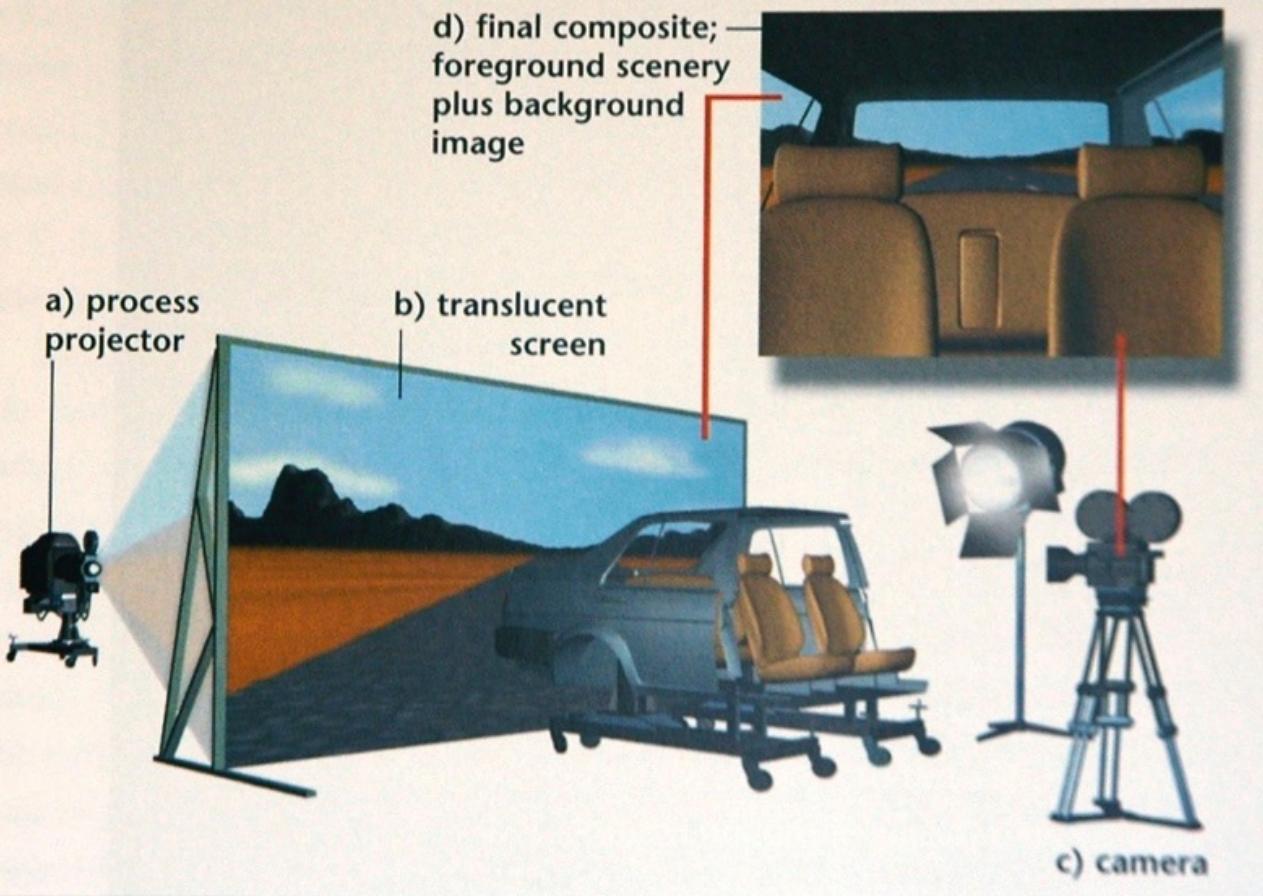


Widely used until the late 1980s.  
Still in use today, though.

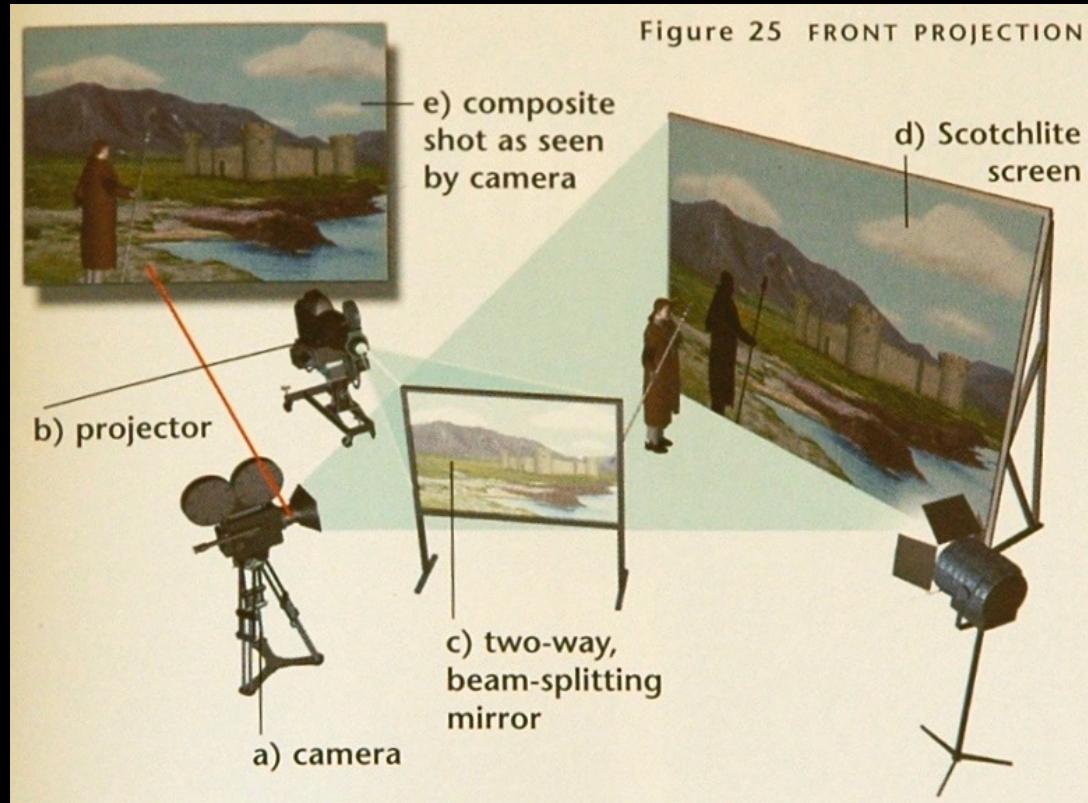


# Rear Projection

Figure 24 BASIC REAR-PROJECTION SET-UP



# Front Projection

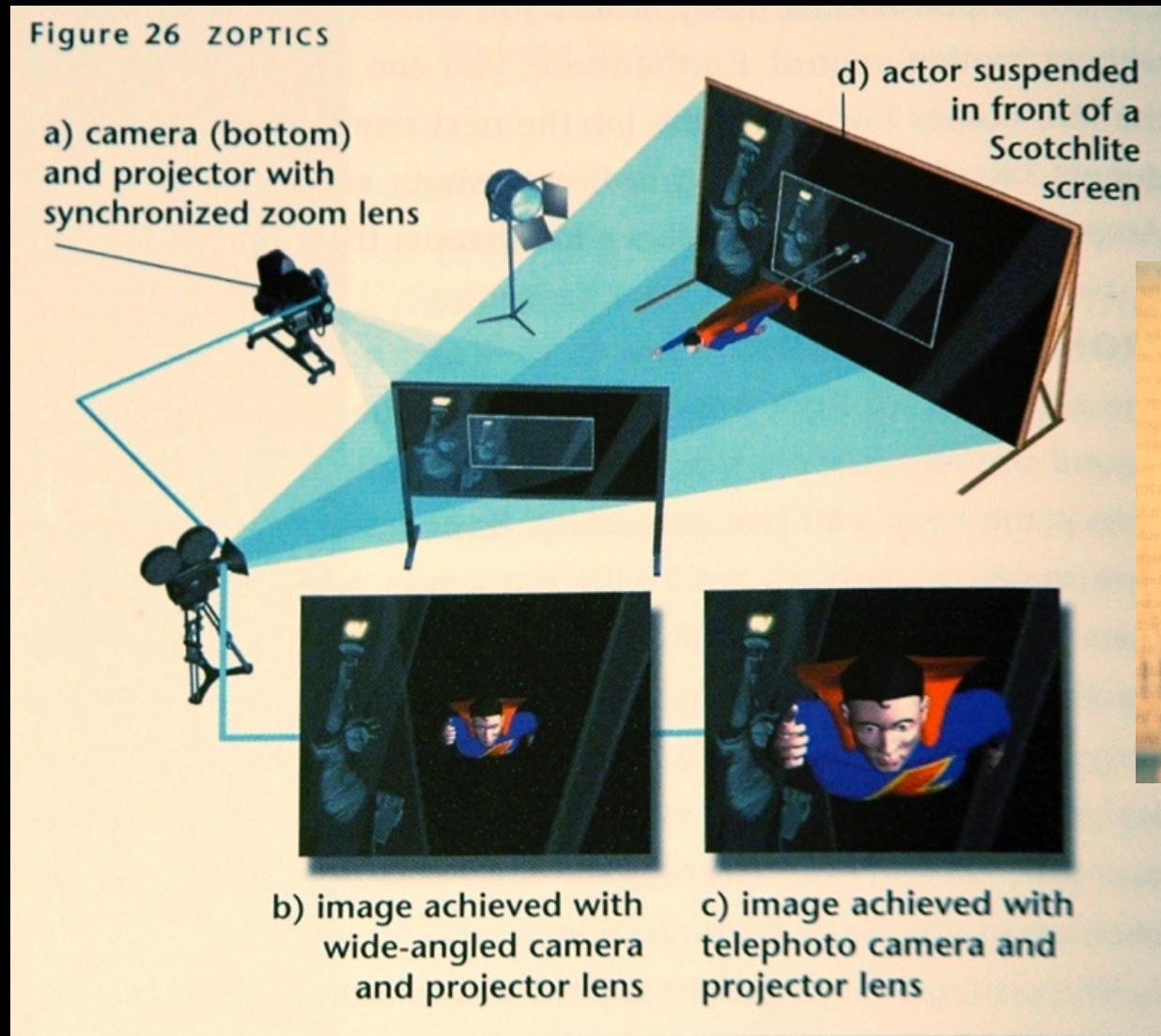


First used in a feature for Kubrick's  
*2001: A Space Odyssey* (1968).



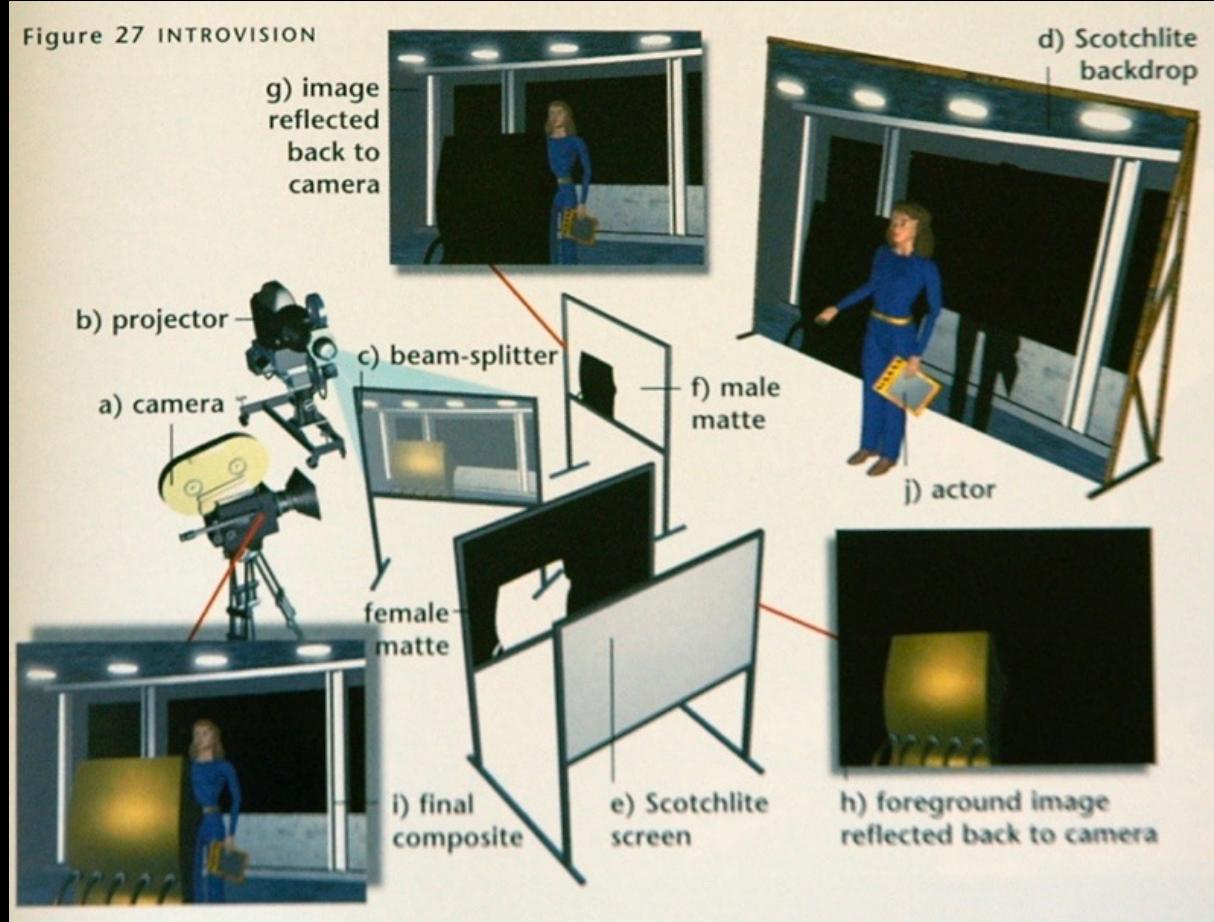
# Zoptics

Figure 26 ZOPTICS



# Introvision

Figure 27 INTROVISION



An odd era of analog video mixed in with early digital development.

