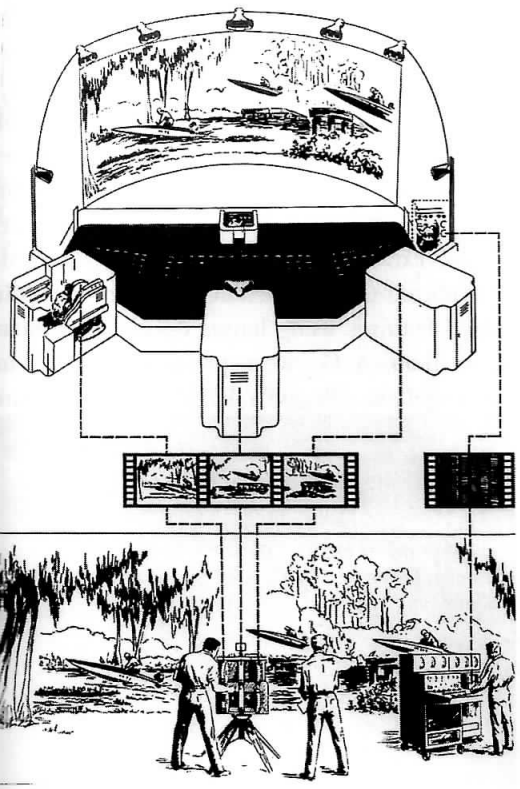
ly improved for use with widescreen—until 1975, astmancolor negatives to produce its matrices.) the system has since come to be known by the mes of the studios who pay to use it (Warnercolor, olor, Pathécolor) or the labs that do the processing ab, Technicolor, Deluxe), it was Kodak Eastman- hich inaugurated and sustained the full-color age tegral tripack and dye-coupler printing, and by en the Technicolor Corporation had converted to ng process similar to Eastman's.[4] Since the 1950s, as become an infinitely more subtle medium than nd white (which does *not* mean that black-and- originals have anything to gain aesthetically from terized colorization), and color cinematography lay reached an unparalleled degree of sophistica- y 1979, 96 percent of all American feature films eing made in color.



.1 A schematic diagram of the multiple-camera nerama photography and projection process. Reprinted th permission of the University of California Press from *e Quarterly of Film, Radio, and Television*, 12, no. 2 inter 1956): 126.

Widescreen[5] and 3-D

MULTIPLE-CAMERA/PROJECTOR WIDESCREEN: CINERAMA

In a simultaneous attempt to exploit the *size* of the screen image, Hollywood began to experiment with new optical systems that lent greater width and depth to the image. The earliest of the new formats was a multiple-camera/projector widescreen process called **Cinerama,** introduced in September 1952, that was similar to the Polyvision process Abel Gance had used in *Napoléon* (1927) some twenty-five years before (see Chapter 9) and that was originally devised as a battle simulator for gunnery training during World War II by the inventor Fred Waller (1886–1954). In Cinerama, three synchronized 35mm cameras linked together in an arc would simultaneously record a wide-field image, which three similarly linked projectors would later cast upon a vast wraparound screen (actually a three-screen triptych). The projected image was thus three times as wide as the standard 35mm image; it was also nearly twice as tall because of two extra sprocket holes (six instead of four) per frame on the film strip.[6] The seams between the three images were concealed by a slight overlapping of

4. The problem with the Eastman-based systems, unforeseen at the time of their introduction and not manifest until a decade afterward, is that dye-coupling produces color much less stable (i.e., more subject to fading) than Technicolor's older imbibition process. (Ironically, the only Technicolor imbibition printing plant in operation in the world today is in the People's Republic of China.) While all color prints are subject to fading, most color films and negatives made in dye-coupler processes—that is, most American films made between 1955 and the present—are in imminent danger of extinction, and preserving them is the number-one problem facing film archivists today.

5. Several scholars (e.g., Bruce F. Kawin in *How Movies Work* [New York: Macmillan, 1987]) use the term "widescreen" to refer specifically to flat (i.e., nonprocessed) film formats with aspect ratios of 1.66:1 (European standard) or 1.85:1 (American standard), which are achieved by either masking 35mm film or using one of several wide-film systems. Here and throughout the book, I use the term more broadly to denote *all* formats that give a screen image wider than the Academy ratio of 1.33:1, whether processed or not. (See pp. 392–93.)

6. The Cinerama aspect ratio varied from 3:1 to 2.6:1; it covered a visual field that extended 146 degrees horizontally and 55 degrees vertically, approximating the cone of human sight (180 degrees horizontally and 90 degrees vertically). Furthermore, Cinerama was originally shot and projected at 26 fps to achieve crisper resolution and heighten the illusion of actuality.

the camera lenses and by floating metal combs in the projectors, a technique that never proved wholly satisfactory. Nevertheless, the Cinerama image was six times the standard size, and its curvilinear shape added the phenomenon of peripheral vision to the screen. Cinerama also surrounded its audience with seven-track stereophonic sound, recorded magnetically rather than optically on a separate strip of 35mm film, which permitted a directional use of sound appropriate to its sprawling image. All of these factors combined to create an illusion of depth and spectator involvement that was thrilling to audiences accustomed to the flat, rectilinear screen of decades past, and for a time Cinerama became immensely popular.

But the process was cumbersome and very expensive for both filmmaker and exhibitor, and therefore for the paying public. Only theaters in large cities could afford to install the complicated projection equipment and the huge three-panel screens (the installation cost $75,000), and so it was as a costly urban novelty that Cinerama enjoyed its initial success. Accordingly, it offered its audiences circuses rather than narrative. Films like *This Is Cinerama* (1952),[7] *Cinerama Holiday* (1955), *The Seven Wonders of the World* (1956), *Search for Paradise* (1957), *Cinerama South Seas Adventure* (1958), and *Windjammer* (1958—shot in a rival process called Cinemiracle, which had been bought out by the Cinerama Corporation) featured a succession of wild rides, extravagant spectacles, and exotic travelogues, but no stories. The first story films made in Cinerama, *How the West Was Won* (1962) and *The Wonderful World of the Brothers Grimm* (1962), proved that the multiple-camera process was simply too clumsy and costly for the production of conventional narratives.[8] *How the West Was Won*, for example, required the services of three directors (John Ford, Henry Hathaway, and George Marshall) and four cinematographers; it cost the then-staggering sum of $14 million to shoot.

In 1963, driven by economic necessity, Cinerama appropriated a single-lens wide-film widescreen system (Ultra Panavision 70) for its next film, *It's a Mad, Mad, Mad, Mad World* (1963), and finally adopted its own wide-film system, Super Cinerama, which, combined with a special elliptical projection lens, allowed it to keep and fill its deeply curved screen. Given its great expense and peculiar technology, multiple-camera Cinerama never really had a chance of becoming a widely used process. At the height of its popularity, only a hundred cities all over the world were equipped to show Cinerama films. But the astounding success of Cinerama in the early 1950s was the catalyst that started the widescreen revolution and brought audiences back into the theaters again in large numbers for the first time since 1946. For this reason alone, Cinerama holds a special place in the history of film.

DEPTH: STEREOSCOPIC 3-D

Hollywood's next experiment with new optical formats was considerably less successful, although, like Cinerama, it was initially quite popular. Stereoscopic 3-D had precedents in the cinema's earliest days, when such pioneers as William Friese-Greene and the Lumières experimented with anaglyphic systems. In these, two strips of film, one tinted red and the other blue-green, were projected simultaneously for an audience wearing glasses with red and blue-green filtered lenses. The effect was stereoscopic synthesis in monochrome,[9] and experiments with anaglyphic 3-D continued into the 1920s, when Harry K. Fairall produced the first feature film, *The Power of Love* (1922), in the process. In the late 1930s, MGM released a series of anaglyphic shorts produced by Pete Smith under the title of "Audioscopiks," but in the meantime Edwin Land had developed polarized filters that permitted the production of full-color 3-D images. Polarized features using lenses developed concurrently by Zeiss Ikon, A. G., were produced in Italy in 1936 (*Nozze vagabone [Beggar's Wedding]*) and Germany in

7. Coproduced by Merian C. Cooper, with a prologue directed by Ernest B. Schoedsack—the creators of *King Kong* twenty years before.

8. In fact, to simplify logistics, portions of both films were shot with a single-camera 65mm system whose negative was optically divided into three 35mm positive prints for Cinerama projection.

9. In stereoscopy, as in reality, depth perception is a function of binocular vision: because our eyes function separately and are spaced apart, each has a slightly different perspective on the same image; the brain resolves the two images into a single one with a depth dimension. Stereoscopy depends upon photographic mimicry of this process: the viewer is presented with a set of paired images, each of which represents the angle of vision of the left or the right eye and is accessible to that eye only (e.g., through anaglyphasis, or polarization), so that the brain is forced to process the two images as a single three-dimensional one, even though both are flat.

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12.2 A contemporary advertisement for *Kiss Me Kate* (George Sidney, 1953), giving a fanciful impression of 3-D illusion: Howard Keel and Kathryn Grayson. MGM.

1937 (*Zum Greifen Nah [You Can Nearly Touch It]*) and 1939 (*Sech Madel Rollen in Wochenend [Six Girls Drive into the Weekend]*), and the Chrysler Corporation presented a polarized 3-D short in Technicolor at the New York World's Fair in 1939 (also the site of "the Perisphere," Fred Waller's first multiple-camera/projector demonstration), but the war postponed further exploitation of the process.

In November 1952, however, the independent producer Arch Oboler (1909–1987) introduced a polarized 3-D process called Natural Vision, which had been invented by a team of opticians and camera engineers, in the Anscocolor feature *Bwana Devil*. In Natural Vision, two interlocked cameras whose lenses were positioned to approximate the distance between the human eyes recorded a scene on two separate negatives. In the theater, when the two positive prints were projected simultaneously onto the screen from the same angles as the camera lenses, spectators wearing disposable glasses with polarized lenses perceived them as a single three-dimensional image. Roundly trashed by reviewers, *Bwana Devil* nevertheless became a phenomenal box-office hit, and the studios were so impressed that most of them rushed into 3-D production, using either Natural Vision or some other stereoscopic process. As Arthur Knight points out, the great appeal of Natural Vision for Hollywood was that it required no large-scale conversion of existing equipment, as did Cinerama, but only the addition of a twin-lens Natural Vision camera. Similarly, the cost of projector installation to exhibitors was less than $2,000, a bargain compared with Cinerama's $75,000. The second Natural Vision feature, Warner Bros.' *House of Wax* (André De Toth, 1953; rereleased in 1971), featuring six-track stereophonic sound, was a critical as well as a popular success, returning $5.5 million on an investment of $680,000, and the race to produce "depthies," as the trade press was now calling them, became a stampede.

Between 1953 and 1954 Hollywood produced sixty-nine features in 3-D, mostly action films that could exploit the depth illusion—Westerns like *The Charge at Feather River* (Gordon Douglas, 1953) and *Taza, Son of Cochise* (Douglas Sirk, 1954), science-fiction films like *It Came from Outer Space* (Jack Arnold, 1953), and horror films like *Creature from the Black Lagoon* (Jack Arnold, 1954.)[1]

12.3 A 1953 audience wearing 3-D glasses.

1. *Creature from the Black Lagoon* was the first 3-D feature exhibited in a single-strip process with the two stereoscopic layers stacked one above the other in alternating frames. Such systems vastly simplified the projection of stereoscopic films and received considerable attention in the waning days of the 3-D craze. Today, all commercially viable systems rely on stacked imagery and single-projector polarization, whether they employ one or two cameras in the production process. Some mention should be made here of the Soviet lenticular stereoscopic system, known as Stereokino, perfected by S. P. Ivanov during the 1940s. This system, introduced to the public in the feature *Robinson Crusoe* (1946) and still used today, employs an intricately ribbed glass screen to reflect the left and right stereoscopic images into the corresponding eye of the viewer, and it requires no glasses.

The craze for stereoscopic 3-D reached its peak in June 1953, when Warners announced that two of its upcoming superproductions, *A Star Is Born* and *East of Eden*, would be shot in Natural Vision. In fact, the only (relatively) big-budget films made in 3-D turned out to be the independently produced *Hondo* (John Farrow, 1953; distributed by Warners'), Columbia's *Miss Sadie Thompson* (Curtis Bernhardt, 1953), MGM's *Kiss Me Kate* (George Sidney, 1953), and Warners' *Dial M for Murder* (Hitchcock, 1954), the latter two nationally released flat[2] in 1954 because the popularity of the process had taken a nosedive and Natural Vision suddenly had become, in the Hollywood phrase, box-office poison.

Stereoscopic 3-D died in that year for a number of reasons. One was that producers found it difficult to make serious narrative films in such a gimmicky process, although Hitchcock's work, as usual, was an exception. Most of the 3-D films of 1953–54 were blatant attempts to exploit the illusion of stereoscopic depth by having animals leap and people hurl objects into the Natural Vision camera lens. Another problem was that the illusion of depth created by 3-D was not particularly authentic or satisfying because the planes of depth within the image were highly stratified. Things appeared not in the round, as they do in a hologram,[3] but as a series of stratified two-dimensional planes. In fact, deep-focus widescreen photography is actually capable of producing a greater illusion of depth than stereoscopic 3-D. Also, people disliked wearing the polarized glasses necessary to achieve the 3-D effect; many complained of eyestrain and headaches. But the biggest single factor in 3-D's demise was probably the sweeping nationwide success in the fall of 1953 of a self-proclaimed rival, the anamorphic widescreen process patented by 20th Century–Fox as CinemaScope (see pp. 392–95). Though nonstereoscopic, this process exploited depth through peripheral vision and advertised itself to 3-D's disadvantage as "The Modern Miracle You See Without Glasses."

Attempts to revive 3-D in the last three decades have met with varying degrees of success. Arch Oboler's *The Bubble* (1966; rereleased as *Fantastic Invasion of Planet Earth*, 1976) was a commercial failure, but the 1969 softcore pornographic feature *The Stewardesses* (Alf Silliman) grossed $26 million and sparked an X-rated 3-D miniboom, culminating in *Andy Warhol's Frankenstein* (Paul Morrissey, 1974). Then, in the summer of 1981, the unexpected success of the independently produced Western *Comin' at Ya!* (Ferdinando Baldi) demonstrated the continuing popularity of 3-D with general audiences and led to the production of several mainstream Hollywood features in the process (*Friday the 13th, Part III*, Steve Miner; *Jaws* 3-D, Joe Alves—both 1983), whose commercial success proved that stereoscopic 3-D could once again sustain a pattern of wide general release. At about the same time, vintage 3-D films from the 1950s began to be broadcast over the air on commercial television. Today, the notion of an authentically three-dimensional cinema continues to fascinate filmmakers and audiences alike, as Hollywood's recent experiments with holographic photography and such nonstereoscopic 3-D processes as Showscan and Omnimax make clear. Furthermore, stereoscopic 3-D achieved a landmark of sorts with the production of *Wings of Courage* (Jean-Jacques Annaud, 1995)—the first feature in the giant-screen IMAX 3-D process, using cordless liquid-crystal glasses whose lenses are synchronized with the shutters of the dual-filmstrip projector by infrared signal.

THE ANAMORPHIC WIDESCREEN PROCESSES

The new optical format that came to stay during the war with television was **CinemaScope,** which arrived in September 1953 with 20th Century–Fox's biblical epic *The Robe* (Henry Koster). This system was based on the "Hypergonar" anamorphic distorting lens invented by Dr. Henri Chrétien (1879–1956) and first used in film as early as 1928 (in Claude Autant-Lara's *Pour construire un feu* [*Origins of Fire*]; released 1930). In it, a wide-field image is "squeezed" laterally by a cylindrical lens with a compression ratio of 2:1 onto conventional 35mm film stock and redeemed as a widescreen image by a compensating lens in projection. The conventional **aspect ratio** of the cinema screen (the ratio of width to height), known as the **Academy aperture,** had been standardized at 4:3, or 1.33:1, in 1932 by the Academy of Motion Picture Arts and Sciences.[4] CinemaScope offered a radically new ratio

2. Both have subsequently been rereleased in 3-D several times.

3. An image produced through holography—a process of photography that uses lasers to create perfect three-dimensional facsimiles of objects photographed.

4. This was done to achieve a uniform international standard for the gauge of sound film, although in practice most films had conformed to

12.4 When "unsqueezed" in projection, this close shot of Marilyn Monroe in Fox's CinemaScope production of *How to Marry a Millionaire* (Jean Negulesco, 1953) reveals distortion and lots of wasted space.

of 2.55:1 (approximately 8:3), subsequently reduced to 2.35:1, which gave the screen image a broadly oblong shape like that of Cinerama and similarly enhanced peripheral vision when used in combination with a curved screen. The process also featured four-track stereophonic sound recorded magnetically on the film strip, and it was aggressively marketed by Fox as a cost-effective alternative to both 3-D and Cinerama. CinemaScope had the distinct advantage of requiring no special cameras, film stock, or projectors, only special lenses, a metallized wide screen, and a four-track magnetic stereophonic sound system available in a package costing between $15,000 and $25,000, depending on the size of the theater (the price dropped considerably in July 1954 when Fox made the stereo equipment optional). Its initial disadvantages were a loss of picture brightness since standard projectors were designed to illuminate less than half the screen area required for widescreen (Fox's reflective Miracle Mirror screen helped to compensate for this loss by directing light into the useful seating area of the theater), and problems of geometrical distortion inherent in the early lenses manufactured by Bausch & Lomb. Because these were curved outward to extend their peripheries, objects in close-up appeared disproportionately large and horizontal lines seemed to run the wrong way at the edges of the frame; distortion was also common in lateral movement across the frame and in tracking shots. Finally textures could become grainy and colors indistinct through the blowing-up process: the early **Scope** image was often described as fuzzy. Nevertheless, CinemaScope brought the widescreen revolution to the everyday world of functional filmmaking because, unlike Cinerama and 3-D, it was cheap, flexible, and simple enough to be used on a regular basis in the commercial cinema.

Most important, the public adored it. *The Robe* was an indifferent DeMille-like spectacle, but its box-office receipts of over $17 million in the year of its release made it the third most lucrative production in the history of American film, after *The Birth of a Nation* (1915) and *Gone with the Wind* (1939). Within the next few months, the anamorphic process took Hollywood by storm as Fox agreed to sell its CinemaScope lenses and conversion kits to rival production companies. At first, Fox president Spyros Skouras insisted that all CinemaScope productions be shot in full color and with four-track stereo, but he soon relaxed these conditions in order to accommodate smaller producers and exhibitors who could not afford to convert their sound systems.

By the end of 1953, every major studio in Hollywood except Paramount had been licensed to make CinemaScope films, 75 full-color anamorphic features were in production, and 5,000 theater installations had been performed. A year later the latter figure had tripled, and by 1957 CinemaScope had virtually saturated the market, with 84.5 percent of all U.S. and Canadian theaters (17,644 of 20,971) converted to the process. Indeed, the widescreen look had become so popular that films still shot in the old ratio of 1.33:1 were cropped for exhibition—that is, their tops and bottoms were masked in projection and the image was cast over a wider area of the screen, which was ultimately standardized at 1.85:1 in the United States and 1.66:1 in Europe. (This unfortunate practice forced directors working in the old format or, later, in VistaVision to compose shots "loose," so that action would be kept away from the top and bottom of

the 4:3 ratio since the early 1890s, when Edison standardized the width of theatrical film at 35mm. The Academy aperture is the aperture plate dimension 0.864 inches by 0.63 inches in printer and projector that produces the Academy ratio on-screen. The camera uses a full-screen aperture of 0.98 inches by 0.735 inches in order to create the largest possible negative for printing.

the frame. Many directors today, acutely aware that their widescreen films will eventually appear on television screens whose shape was modeled on the Academy frame, attempt to keep significant action in the midframe, "TV-safe," or "safe-action," area, which imposes similar artistic constraints.)[5] In the next few years, a great many problems with the CinemaScope system were solved. The aspect ratio was reduced from 2.55:1 to 2.35:1, which gave the image more visual density in projection,[6] and the anamorphic lenses were consistently improved to give a sharper and clearer screen image.

In 1960, Robert E. Gottschalk invented the variable prismatic **Panavision** lens, which offered a nearly distortion-free definition of image to anamorphic films, and Panavision gradually replaced CinemaScope as the leading anamorphic system. Today it is practically the only process used in 35mm widescreen cinematography.[7] By the mid-1950s, the conversion to anamorphic widescreen films in America was nearly total, and the process spread rapidly to other parts of the world as foreign audiences found themselves suddenly confronted by a bewildering array of "scopes." In 1956 alone, France introduced Franscope and Dyaliscope, Italy contributed Ultrascope and Colorscope, Sweden Agascope, the USSR Sovscope, and Japan Tohoscope, Daieiscope, and Nikkatsuscope; all were variations of the CinemaScope system.

There was a single holdout in Hollywood, however. Paramount had refused to adopt an anamorphic process on the advice of its technicians, who said that the squeezing and blowing-up process would debase the visual quality of the image. They also thought that the ribbonlike CinemaScope image was too long and narrow to permit good composition. Accordingly, in April 1954 in *White Christmas* (Michael Curtiz), Paramount introduced its own widescreen system called **Vista Vision.** This was a unique nonanamorphic process in which 35mm film stock was run through the camera horizontally rather than vertically to produce a double-frame negative (eight sprocket holes per frame) twice as wide as the conventional 35mm frame, and slightly taller. The negative was then optically rotated 90 degrees in the printing process so that the positive prints could run vertically on any projector. (Vista Vision films were occasionally shown full-frame on horizontal transport projectors—as, for example, at the system's premiere at Radio City Music Hall, where *White Christmas* appeared on a giant 55-by-30-foot screen—but the normal practice was to reduce the image in printing to standard 35mm stock, increasing not its size but its density.) The Vista Vision aspect ratio was variable from 1.33:1 to 1.96:1 and could, therefore, accommodate any theater, but Paramount recommended projection in the "golden

5. The shape of the American television screen, standardized by the FCC in 1939, was and is modeled on the Academy frame so that all widescreen films lose image space when shown on TV or released on videotape or videodisc, often as much as 50 percent. To restore lost visual information, video technicians commonly employ a process known as "panning and scanning" that follows significant dramatic action back and forth across the width of the frame, in effect redirecting the film and creating camera movement that wasn't originally there. (At first, scanning was performed optically with a telecine converter; today, it is done electronically by a flying-spot scanner that scans each frame line by line for translation as a video image.) Worse, in scenes where side-to-side action or dialogue occurs too rapidly for scanning to follow, technicians resort to cutting from one side of the frame to the other as if they were separate shots. In either case, the original composition and structure of the image is badly compromised. Furthermore, title and credit sequences of anamorphic films are usually shown squeezed on television, so that their printed matter will remain within the borders of the screen. Add to this the fact that a film's light levels, color balance, and sound values all must be adjusted for the conditions of electronic transmission and in-home viewing, and you will have a good sense of how different the experience of watching a film in video format can be from a theatrical screening. In this light, in fact, the threat of colorization becomes one more step in the long-term process of the degrading of the filmic image in the name of "enhancing" it for television. See John Belton, "Pan and Scan Scandals," *Perfect Vision* 1, 3 (Indian Summer 1987): 40–49.

6. The immediate reason for the change was to provide space on the film strip for a combined magnetic and optical sound track in response to exhibitor demand. In the original CinemaScope system, stereophonic sound was recorded on four magnetic tracks running on either side of the perforations, which were reduced in size to accommodate them. In July 1954, under pressure to lower installation costs, Fox agreed to make its features available in a choice of four-track magnetic, single-track magnetic, or single-track optical sound, which, of course, meant striking three separate prints per film. By 1956, however, only 4,609 of the 17,591 CinemaScope theaters in America had converted to magnetic sound. So in June of that year, Fox announced that it would release all future product with both magnetic *and* optical tracks, requiring a 10 percent reduction in picture area per print.

7. Panavision's success stemmed from its resolving many of CinemaScope's optical problems. For one thing, its images are better illuminated because the system uses a smaller picture area (the Academy aperture) for its squeeze and reduces its aspect ratio to 2.25:1. Furthermore, Panavision eliminated CinemaScope's wide-angle distortion almost entirely through the use of highly curved spherical lenses.

ratio" of 1.85:1 to achieve a modified widescreen effect. The enhanced picture resolution and clarity produced by Vista Vision's larger negative was immediately apparent to audiences, and exhibitors liked the system because it required no modification of existing equipment. Vista Vision films were released in Perspecta sound, an audio process that used a single optical track for playback through a conventional single speaker but that could be combined with a Perspecta Sound Integrator to produce a simulated stereo effect through three horns. The Perspecta Sound Integrator and speakers cost less than half the price of Fox's four-track stereo, and the process was a highly effective marketing tool for Paramount among exhibitors. (In fact, it was competition from Vista Vision and Perspecta sound that initially caused Fox to make CinemaScope prints available in both magnetic and optical versions.) Paramount continued to use the Vista Vision process throughout the decade. In 1961, following the release of *One-Eyed Jacks* (Marlon Brando), the studio converted to the perfected Panavision anamorphic process for financial reasons, but Vista Vision is still used extensively today in optical special-effects work.

THE NONANAMORPHIC, OR WIDE-FILM, WIDESCREEN PROCESSES

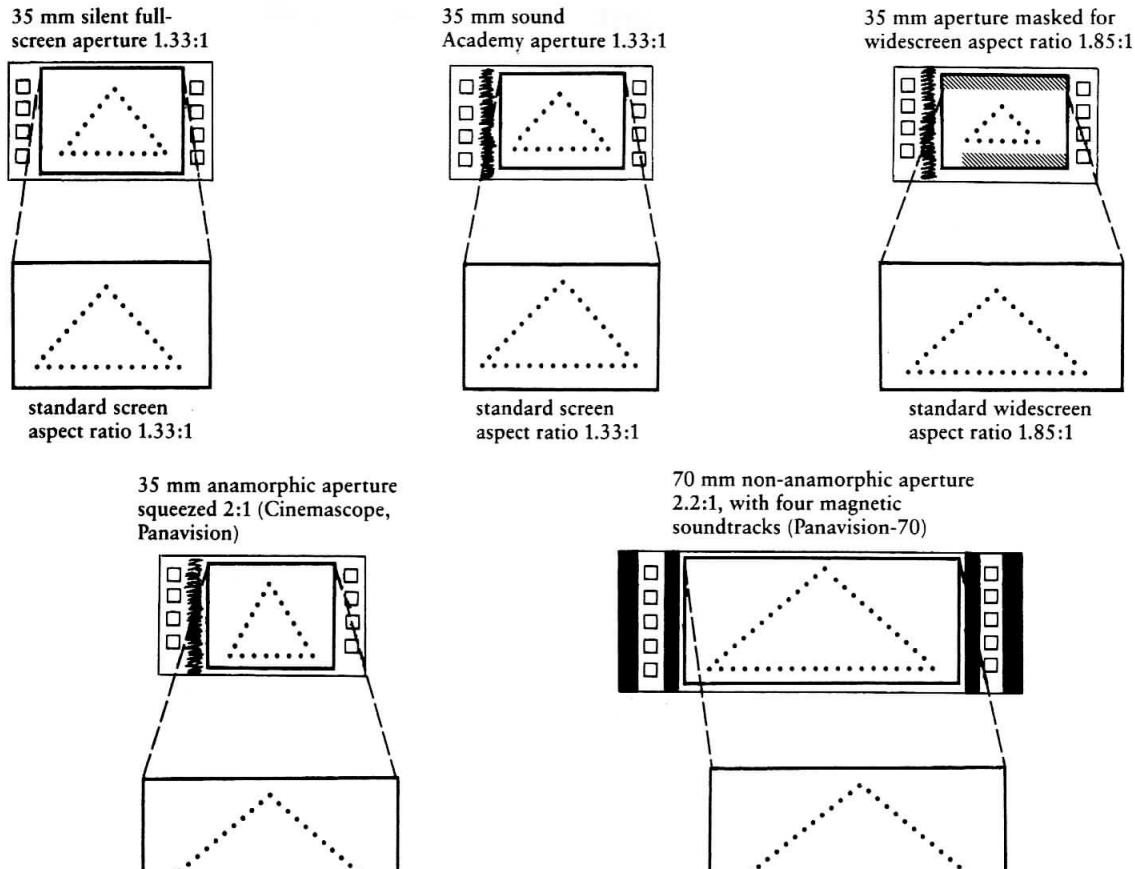
As theater screens grew increasingly large in response to public demand (many measuring three to four times their original size), one of the reasons for Paramount's dissatisfaction with CinemaScope became apparent. The anamorphic image cast on a 60-by-30-foot screen lost clarity and brightness because its visual information was distributed across too large a field through the magnification process. The only technical answer to this problem was to increase the actual width of the film stock itself so that it would correspond to the wide field of the camera lens. Then the visual information from the photographic field and the visual information recorded on the negative film stock would be approximately proportional in scale, and the positive print would reproduce the density of the photographic field in projection. But the introduction of wide-gauge film would require special wide-gauge projectors, and the studios were loath to force another expensive conversion upon the exhibitors, with whom relations had become increasingly strained since the Paramount decrees of 1948 (see Chapter 11). One way to meet the problem was to shoot a wide-film negative and reduce it photographically to 35mm for projection, which would increase the visual density of the image without altering its shape. This was the method used most often by Vista Vision and Fox's experimental wide-film process, CinemaScope 55.[8]

Nevertheless, in 1955 a 70mm wide-film process was introduced to selected American theaters in a film version of the 1943 Rodgers and Hammerstein Broadway hit *Oklahoma!* (Fred Zinnemann), independently produced by Michael Todd (1909–1958). The process, called Todd-AO, was developed by the American Optical Company and designed to compete not only with CinemaScope, but with Cinerama as well since its wide-gauge film and wide-angle lenses offered the wraparound visual coverage of that process without resorting to its multiple cameras and projectors. Designed for running at 30 fps to enhance its resolution, Todd-AO proved to be a beautifully precise optical system, and *Oklahoma!*, which also featured six-track stereophonic sound, was a huge financial success. (The Todd-AO negative was 65mm; the projection print was 70mm, with the extra 5mm carrying the six magnetic sound tracks, plus a seventh for audio control.) Todd produced two more blockbusters using the process—the elephantine *Around the World in 80 Days* (Michael Anderson, 1956)[9] and the spectacularly garish *South Pacific* (Joshua Logan, 1958)—then died in a plane crash in 1958. Fox purchased the rights to the system at that time and produced eight films in Todd-AO thereafter, including the multimillion-dollar *Cleopatra* (1963) and *The Sound of Music* (1965).

Other wide-film systems developed simultaneously with Todd-AO were Super Panavision (aka Panavision 70), which used an unsqueezed 65mm negative for projection in either a 35mm or 70mm format, and Ultra Panavision 70 (originally called MGM Camera 65 when introduced in 1956), which combined anamorphic and wide-gauge

8. Introduced in 1955 and used in only two productions (*Carousel* [Henry King, 1956] and *The King and I* [Walter Lang, 1956]), CinemaScope 55 was an anamorphic system that used a 55mm negative for striking 35mm prints. The squeeze ratio was the same as for standard CinemaScope, 2:1, but reducing the image size increased grain and definition, rendering a vastly improved picture in projection.

9. Todd had *Oklahoma!* and *Around the World in 80 Days* shot simultaneously in both 65mm Todd-AO and 35mm CinemaScope, using dual camera setups. He took this unusual step to insure that 35mm anamorphic prints of the films would be available to the many theaters that had not yet converted to 70mm projection.



12.5 A schematic diagram of standard film gauges and screen aspect ratios for silent, sound, and widescreen cinema. Please note that, with the exception of 12.7, all of the widescreen stills in this chapter have been cropped for publication. This practice will be duly noted in subsequent chapters, where it occurs.

principles to squeeze a wide-field image onto 65mm stock (the squeeze ratio was only 1.25:1; but since the picture area was already 2.25:1, the 70mm anamorphic positive projected an image with the enormous aspect ratio of 2.75:1, which was perfect for epic spectacle but probably not much else—MGM's gargantuan *Mutiny on the Bounty* [1962], e.g., used this process). All of these other wide-film systems, however, were subject to the same limitations as Todd's process. Wide-film cameras are bulky (at least twice the normal size) and difficult to move, especially since wide-angle lenses are subject to distortion in panning. And, like Cinerama, the wide-film processes are very expensive to use; film stock, shooting, processing, exhibition (often at a higher than normal frames-per-second rate)—everything—costs about twice as much as it would in a conventional 35mm film. For these reasons, the wide-film systems and Cinerama in the 1960s were used almost solely for spectacular productions like *Spartacus* (Stanley Kubrick, 1960), *El Cid* (Anthony Mann, 1961), *Lawrence of Arabia* and *Doctor Zhivago* (David Lean, 1965), *Grand Prix* (John Frankenheimer, 1966), and *2001: A Space Odyssey* (Stanley Kubrick, 1968), which could be "road-shown"—toured from city to city for exclusive engagements at inflated admission prices to recoup high production costs. For general release, such films were usually reduced to 35mm prints for anamorphic projection. Wide-film systems continue to provide the most optically flawless

widescreen image, but today it is rare for films to be shot in a 65mm negative because of the expense. Instead, the vast majority of widescreen films—which is to say the vast majority of films—are either made in an anamorphic process or shot in 35mm and blown up to 70mm prints for special showing through such processes as Super Technirama 70.

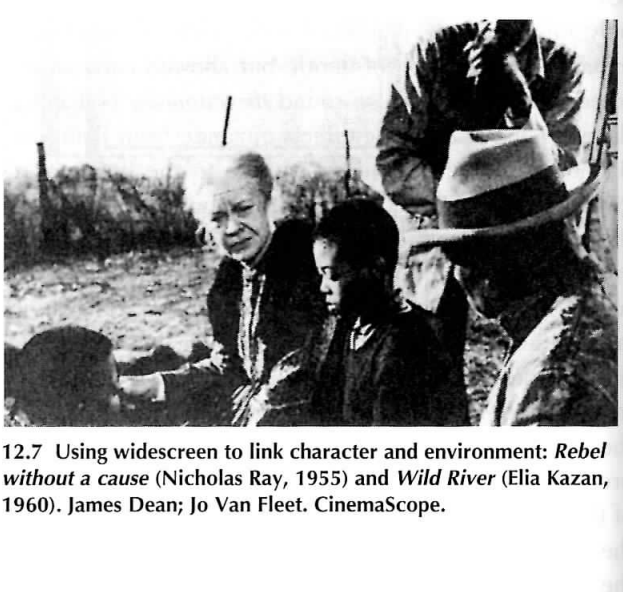
An important footnote to the coming of the widescreen processes is that it produced a nearly total conversion from optical to magnetic sound recording (though sound was still played back optically in exhibition). As already noted, most early widescreen films—whatever their process—were accompanied by multiple-track stereophonic sound recorded magnetically either on a separate strip (Cinerama) or on the film strip itself (CinemaScope, Todd-AO, etc.). Multiple-track stereo not only inundated the audience with realistic sound and enhanced the illusion of depth, but allowed early widescreen filmmakers to use sound *directionally* by having dialogue and naturalistic effects emanate from that portion of the huge screen appropriate to the image at a given moment. Thus, stereophonic sound permitted a director to differentiate aurally what was often undifferentiated visually within the vast space of the early widescreen frame. As we have seen, most theaters outside of large cities could not afford the conversion to stereophonic speaker systems in the 1950s, and even today many still use optical playback equipment only. But after the widescreen revolution, magnetic sound became the preferred means of recording and mixing in all segments of the industry because of its flexibility, its accuracy, and the compactness of its equipment. By the late 1970s, the use of a wireless eight-track recording system that employs miniature radio microphones and the **Dolby** noise reduction system (see Chapter 20) for playback in exhibition was increasingly common.

ADJUSTING TO WIDESCREEN

The advent of the widescreen processes in many ways parallels the introduction of sound. Once again, a financially troubled industry gambled on a novelty long implicit in the medium, and once again the novelty produced a technological and aesthetic revolution that changed the narrative form of the cinema. Like sound, widescreen photography presented many difficulties to filmmakers used to an older mode of production. Close-ups were suddenly problematic, given the vast size of widescreen images and the tendency of early anamorphic lenses to distort them. Even undistorted, on a 60-foot screen close-ups frequently appeared ludicrous, menacing, or both, which made critics wonder whether intimate scenes would be possible in the widescreen medium at all. Montage became problematic for the same reason: the perceptual disorientation produced by the rapid intercutting of widescreen images was less exciting than simply confusing. Focal shifts and tracking shots were similarly subject to distortion. Finally, composition and lighting for the widescreen image were difficult for directors and camera operators accustomed to the 4:3 rectangle of the Academy frame. Because early anamorphic lenses had short focal lengths (and, therefore, shallow depth of field), for example, deep focus composition was initially out of the question. There was, moreover, the purely practical problem of how to fill and balance all that newly available space. For these reasons, many felt that the widescreen processes would destroy the cinema as an art form, and it is true that, like the first sound films, the first widescreen films were static and theatrical, with a heavy-handed emphasis on spectacle.

But as widescreen filmmaking practices and optics were refined throughout the 1950s and into the 1960s, it became apparent that many of the initial assumptions about the limitations of widescreen were false. With certain stylistic modifications, close-ups and montage were not only possible, but more effective in widescreen than in the old format; intimate scenes *could* be played with total authenticity in widescreen; and the cinema did *not* ultimately succumb to circus spectacle as a result of its new shape and size. For one thing, a director using widescreen could bring his characters into a tight close-up without eliminating the background and middleground of the shot, as often happened in Academy ratio close-ups of the 1930s and 1940s. He could also have two or even three speaking characters in close-up, with ample space between their faces, instead of having to cut back and forth from one to the other or to squeeze them together artificially within the narrow borders of the Academy frame. Furthermore, with the introduction of distortion-free variable-focus Panavision lenses in the early 1960s, it became clear that widescreen could greatly enhance the image's capacity for depth (and thus for spectator involvement) as well as width, due to increased peripheral vision. Whereas early widescreen pioneers like Otto

12.6 Widescreen potential: dialogue in close-up without cutting in *The Wild Bunch* (Sam Peckinpah, 1969, Panavision). William Holden, Ernest Borgnine.



12.7 Using widescreen to link character and environment: *Rebel without a cause* (Nicholas Ray, 1955) and *Wild River* (Elia Kazan, 1960). James Dean; Jo Van Fleet. CinemaScope.

Preminger (*River of No Return*, 1954), Elia Kazan (*East of Eden*, 1955), and Nicholas Ray (*Rebel without a Cause*, 1955) had been able to exploit compositional depth only by pushing against the limits of their technology (by using big, brightly lit sets or by shooting out of doors in direct sunlight, for example, which enabled them to stop down their lens apertures), by the mid-1960s, for all practical purposes, the deep-focus capacity that Welles and Toland had labored so hard to attain in *Citizen Kane* (1941) had suddenly become available to any director who possessed the imagination to use it. Finally, for a variety of reasons, widescreen encouraged the use of longer-than-average takes, and it seems clear today that the widescreen processes created the functional grounds for a new film aesthetic based upon composition in width and depth, or *mise-en-scène*, rather than upon montage.

In this new aesthetic, which might be called the long-take, or *mise-en-scène*, aesthetic, the major emphasis would shift from editing to shooting since a long take composed in width and depth is capable of containing a long shot, medium shot, and close-up, action and reaction, within a single frame without resorting to fragmentation of the image. At least one veteran Hollywood director recognized this as early as 1955. In an interview with the British film journal *Sight and Sound*, Henry King said: "This lens [the anamorphic] enables the director . . . for the first time to show on the screen cause and effect in the same shot, whereas before we used to have to *cut* from cause to effect in a story" (my italics). Obviously, film narratives would continue to be assembled through the editing process, but the primary unit of narration would no longer be the dialectical shot (or "montage cell," in Eisenstein's phrase) but the long take or sequence shot composed in width and depth and/or constantly moving to reframe significant dramatic action. Theorists of the long-take aesthetic like André Bazin and his follower Charles Barr would later maintain (in *Cahiers du cinéma* and the British journal *Movie*, respectively) that the long take preserves the integrity of time and space by linking foreground, middle ground, and background within the same shot, whereas montage destroys it. The close-up is a case in point (ironically, since early critics thought widescreen incapable of close-ups). In montage, the figure in close-up is divorced from its background by virtue of both focal limitations and the rapidity with which images flash upon the screen. In the long-take close-up, the figure in close-up is temporally and spatially linked with its environment by virtue of the shot's *mise-en-scène*.

and for Bazin and Barr, at least, this constitutes a more authentic mode of representation than the dissociated close-up of montage.

According to the long-take theorists, montage evolved over time because it was the first technologically feasible way to structure film, or to give it "speech." But in the 1950s and 1960s, they argued, the technology of cutting was usurped by the technology of shooting, so that the radical fragmentation of montage could be replaced by the organization of complex images within the frame. This is certainly true to the extent that the widescreen image, composed in depth, is capable of containing much more visual information than the old Academy frame, and its greater visual density makes it the perfect medium for rendering detail, texture, and atmosphere in relation to character. Finally, both Bazin and Barr insisted that the width and depth perspective created by the widescreen long take offers the viewer a "democratic" and "creative" alternative to the manipulative process of montage. Though shot composition can guide his or her seeing to some extent, they reasoned, the viewer of a long take can choose which details or actions to concentrate upon within a given shot,[1] rather than have them pointed out to him or her by close-ups or be drawn to some inexorable conclusion through a montage sequence like Eisenstein's massacre on the Odessa steps. Although montage was the traditional aesthetic of the cinema, extending from Griffith through Eisenstein to the classical Hollywood paradigm of the studio years, Bazin and his followers were able to construct a historical countertradition for the long-take aesthetic stretching back to Feuillade and including the "integral style" of von Stroheim and Murnau, the deep-focus "realism" of Renoir and Welles, and the postwar neorealism of Rossellini and De Sica. According to this version of film history, Welles began the revolution in favor of the long take with *Citizen Kane* in 1941, and the arrival of widescreen technology in the early 1950s assured its permanent success. As a corrective to the influence of Soviet-style montage and three decades of classical Hollywood continuity editing, the Bazinian view was healthy, if impressionistic (overlooking, e.g., the integration of montage and *mise-en-scène* in *both* Griffith and Welles). But in any case, it took the widescreen aesthetic yet another decade to evolve, and the years 1953–60, like the years 1928–35, witnessed much experimental blundering before the major artists of the new form of cinema could emerge.

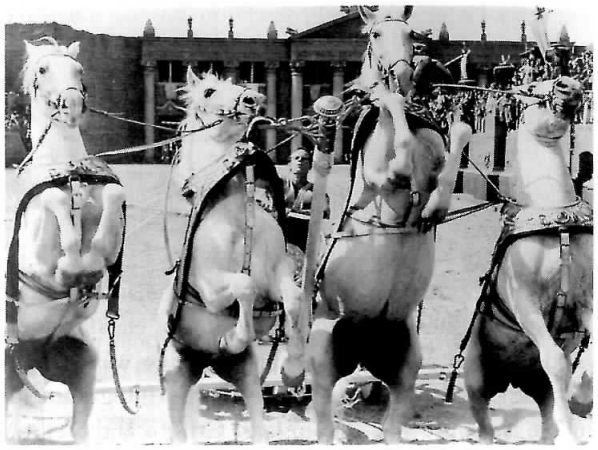
12.8 **The "democratic" perspective of widescreen, preserving the integrity of real time and space: *Bad Day at Black Rock* (John Sturges, 1955, CinemaScope). Spencer Tracy.**

THE WIDESCREEN "BLOCKBUSTER"

In Hollywood, the emergence of a widescreen aesthetic was delayed by the sudden proliferation of a venerable film type known as the "blockbuster,"[2] newly renovated to exploit the physical novelty of the big screen. These inflated multimillion-dollar productions were the widescreen counterparts of the "100 percent all-talking, all-singing, all-dancing" films of the early sound period—lavish and excessively lengthy superspectacles in the DeMille tradition, every element of which was made to subserve sheer visual magnitude. The blockbuster craze started in 1956 when King Vidor's *War and Peace* (Vista Vision; 3 hours, 28 minutes), Michael Anderson's *Around*

1. The classical example of this laissez-faire composition for the long-take theorists was the raft sequence in Preminger's *River of No Return* (1954), described here by V. F. Perkins: "As Harry . . . lifts Kay from the raft, she drops the bundle which contains most of her 'things' into the water. Kay's gradual loss of the physical tokens of her way of life has great symbolic significance. But Preminger is not overimpressed. The bundle simply floats away offscreen while Harry brings Kay ashore. It would be wrong to describe this as understatement. The symbolism is in the event, not in the visual pattern, so the director presents the action clearly and leaves the interpretation to the spectator." (*Film as Film: Understanding and Judging Movies* [Baltimore: Penguin, 1972], p. 80.)

2. A term traditionally used in Hollywood to designate any large-scale, big-budget production. *Intolerance* (1916) and *Gone with the Wind* (1939) were the "blockbusters" in their day. The term now means a film costing more than $100 million.



12.9 A shot from the chariot race in the blockbuster *Ben-Hur* (William Wyler, 1959, MGM Camera 65): Charlton Heston.

12.10 *Lawrence of Arabia* (David Lean, 1962, Super Panavision; restored and rereleased, 1989): exploiting the new width and depth for spectacle. Peter O'Toole.

the World in 80 Days (Todd-AO; 2 hours, 58 minutes), and C. B. DeMille's remake of his own *The Ten Commandments* (VistaVision; 3 hours, 39 minutes) were all released simultaneously in wide-film widescreen processes and full stereophonic sound. Because the production costs for blockbusters were abnormally high, the films had to have a correspondingly high box-office gross simply to break even, and this factor, combined with their artistic unwieldiness, would ultimately destroy them. But for a while they reigned supreme. *Around the World in 80 Days*, for example, which cost $6 million to produce, grossed over $22 million in the year of its release, and *The Ten Commandments*, which cost $13.5 million, grossed nearly $43 million.

Other major blockbusters of the era were Joshua Logan's *South Pacific* (1958—Todd-AO; 3 hours), William Wyler's *Ben-Hur* (1959—MGM Camera 65; 3 hours, 37 minutes), Stanley Kubrick's *Spartacus* (1960—Super Technirama 70; 3 hours, 16 minutes), Otto Preminger's *Exodus* (1960—Super Panavision; 3 hours, 33 minutes), Anthony Mann's

12.11 A scene from *Cleopatra* (Joseph L. Mankiewicz, 1963, Todd-AO), the blockbuster that nearly sank 20th Century–Fox.