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New Animation and Super 8
Cinemascope
The Politics of Avant-Garde Practice
New Photography

UNDERCUT

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Scope!
Richard Philpott

Contrary to popular belief, the search for effective widescreen processes has been around for almost as long as cinema itself.

The earliest known presentation was P. Moessard's Cylindographe, a panoramic cinema, at the Versailles Photographic Society in July 1884. In 1896, Raoul Grimoin Sanson demonstrated his 10-projector (synchronised) Cineorama and showed it again at the Paris Exhibition of 1900, where the Lumieres were also showing their 75mm Cinematographe Géant.

In America, Lyman H. Howe used short focal-length lenses to show travelogues on a widescreen and in 1920, Prof. J. Louis Peck showed a film on a huge curved screen at New York Rivoli Theater and the following year George W. Bingham showed a wide-angle projection system using two projectors running side-by-side, thus doubling the width, called Widescope.

The next major step came in 1926 with Lorenzo del Riccio's Magnascope in which a new lens was introduced into existing pictures to expand the image to four times its regular size. Scenes from *Chang, Old Ironsides* and *Wings* were subjected to this process, which so excited Jesse Lasky at Paramount that his company were to develop it into their Magnafilm, a 56mm process utilising a 1:1.85 ratio (based on del Riccio's studies of the old masters' pictures in the Metropolitan Museum!) and first appeared in 1929 in the film *We're In The Army Now*, though it was little used thereafter.

In the late 1920s, George K. Spoor and P. John Berggen presented a 70mm widescreen process called Natural Vision, in distinction to Edison's now-standard 35mm film. The Essanay Studios had closed down in 1916 to develop their widescreen process. The result required the use of a camera four times the normal size and was not only projected onto a widescreen (34 ft. by 70 ft.) but was projected onto two screens, one behind the other, one transparent and one opaque, and using mechanical and optical shutters in the projector, allegedly producing a stereoscopic effect. A similar effect, overpowering and highly illusionistic, was a 70mm film produced by the Gramercy Studio of the Radio Corporation of America and shown on a glass screen 30 ft. by 52 ft. Its success urged Fox to purchase the rights to Natural Vision, improve the system and rename it Grandeur. A newsreel, which included some of the original Natural Vision material, was shown with success but the accompanying first feature of the process, *Fox Movietone Follies of 1929*, presented at the Gaiety Theater, New York on September 17th, was not as successful since it had not been shot as a widescreen presentation. Despite Fox's optimism, the prevailing economics would not permit the wide application of the system. Even though Fox had produced a new screen with ground glass spread on top (presumable providing greater reflectivity and able to be seen through wider angles of incidence, like our modern day beaded screens) and that the film was now able to carry better sound (three times as wide as 35mm) and that General Theaters Equipment Inc. developed a machine that could project both 70mm and 35mm; the fact that great expenses would be incurred in both production (new cameras and printing machines, larger sets and increased lighting) and in exhibition (new projectors and new screens) and the additional fact that many exhibitors were already in debt after installing sound equipment for the first time, meant that Grandeur, which would possibly have become the standard widescreen format (as Fox had hoped in producing *Happy Days*, 1929 and *The Big Trail*, 1930) finally collapsed.

Similar processes were to be no more successful. MGM developed Realife, which involved shooting in 65mm (the standard widescreen stock in large studios other than Fox), optically reduing it to 35mm in printing and projecting through a special lens to magnify the image. Only *Billy the Kid* (1930) and *Great Meadow* (1931) were ever completed. In 1930, Warner Brothers released their new Vitascope with *Kismet* (1930) but only ever followed this with *The Lash* (1931). In 1930, Joseph Schenk had *Bat Whispers* shot in 65mm at United Artists. It too failed to make a significant impact and, despite Eisenstein's suggestion to the Academy of Motion Picture Arts and Sciences (during his 1930 visit to Hollywood) that extended action and large screen presentations become standard, Hollywood had had enough. Similarly, Abel Gance's triptych and panoramic experiments in *Napoleon* (1927) were never to be repeated commercially.

In England in 1928, George Hill, an engineer, and Prof. Alberini, an inventor, developed a relatively obvious solution: run the film horizontally through camera and projector, enabling simultaneous exposure of the equivalent of two 35mm frames. Though Hill did some filming in Picaddilly Circus, lack of finance and lack of financial interest (literally) prevented any further development until Paramount picked-up the idea in 1954 (when the industry was desperately in need of some new attractions) and named it VistaVision. A projectionist at the Regal Theatre in London also developed a system in 1930 but this too quickly faded into oblivion under financial disinterest and commercial fear.

Adolph Zukor of Paramount summed-up the situation with a successful capitalist's clear commercial foresight: "It would be folly to bring out the wide film and place additional burdens on the exhibitors. I can assure you that the producers of America have decided to delay the advent of the wide film until such time as it is necessary again to provide an attraction to the public". So it was that what was effectively a pragmatic capitalist American trust (the Producers' Association of America) decided that there was no point in feeding pearls to swine as long as the swine were still providing vast profits for the producers of standard format films (though, admittedly, with sound). But when the swine begin to stay from the cinema pen the producers would be ready with a trick up their sleeves to pull them back — after all, by the early 50s, widescreen had virtually been forgotten, as contemporary testimony demonstrates, and could therefore be reintroduced as a novelty. In the meantime, Hollywood world hegemony reigned under the slogan

Miklos Jancos The Round-Up

'maximum return for minimum investment'.*
After their disenchantments with the financial returns from the widescreen features of the early 30s, Hollywood producers were to wait twenty years before they would be willing to invest once again — or rather until falling profits, the need for novelty and the renewed possibility of investment after the sound revolution had been consolidated, once again made it a relatively safe commercial proposition. During the intervening twenty years, of course, conditions changed radically: theatres had recovered their costs and repaid the debts they incurred in installing sound equipment; talkies were no longer seen by the cinema-going public as a novelty but rather as a necessity for all cinemas; television had been introduced and with near or long-sighted anticipation

* For further notes on cinematic experimentation during the introduction of sound, see my article 'Whose Napoleon' in *Framework* n.20, 1983.

(whichever way you want to look at it) the studio front offices began to wonder about their futures; the high water mark of cinema attendances in the US, Europe and internationally, had passed and, finally, Fred Waller had refused to share the investors' disillusionment with widescreen and had continued with his experiments. At the 1939 World's Fair in New York, the petroleum industry's exhibit became a focus for audience amazement. Outdoing the 1896 Cineorama by one projector, Waller's Vitarama used eleven synchronised projectors throwing their beams onto a huge screen which curved vertically and horizontally like a quarter-dome, to tell the history of petroleum. Needless to say, the studio bosses were not queueing-up to exploit the invention in the international markets! But Waller continued with his experiments and retaining the curved screen that Hollywood had ditched twenty years before, he eventually managed to eliminate the need for a dome

and reduced the number of projectors required to three. In 1952, the process was renamed and launched onto an unsuspecting public as Cinerama with the film *This is Cinerama*, a kind of travelogue with various point-of-view shots from airplane, helicopter and, most excitingly, roller coaster. The system required three cameras to shoot 35mm negative with six perferations per frame, creating an aspect ratio of 2.77:1 in projection at 26 frames per second with seven magnetic soundtracks and requiring twelve operators (though a projectionists' union originally struck for 17 operators). It was an enormous, instant, record-breaking success and ran for over three years in 13 US cities, taking $20 million at the box office, and finally breaking New York's record run of 108 weeks — then held by Powell/Pressburger's *The Red Shoes*.

Cinerama became a 'roadshow' event at cities across North America but soon many of them had their own cinemas adapted for the process. With overwhelming evidence of public interest in widescreen the world markets were quickly seized upon as open to new exploitation and new portable equipment was installed in captial cities in South America, Europe, the Middle East and the Far East. But widescreen still had a long way to go if it was to effectively conquer domestic and world markets and lead consumers passively back into the cinema.

Other multiple projector systems followed Cinerama, but such was Cinerama's reputation that Cinemiracle ('seamless Cinerama' — no joining lines between images), Thrillarama (two 35mm projectors creatring a system similar to the contemporary Todd-AO 70mm system) and the bizarre Wonderama (which required shooting on 70mm, splitting the film in two and reconstituting it on different parts of a conventional frame via complex lenses) were all effectively released as Cinerama though none of them got beyond first productions apart from the Soviet three-strip widescreen system, Kinopanoram. But despite the success of Cinerama (and its followers), the company did not enter production until after 1960 when they signed a contract with MGM which allowed later reduction onto 'squeezed' prints for general CinemaScope release in cinemas not equipped with Cinerama but equipped with widescreens for single-machine anamorphic projection. Thus it was not until 1962 that the first three-camera Cinerama film was produced — *How The West Was Won.*

The immediate success of Cinerama also created a brand new competitive market in which the various studios might struggle to 'get ahead'. Twentieth Century-Fox were the first to move and, in doing so, were also able to set a 'standard' which would clearly prove one of the studio's more lucrative assets. The anamorphic lens was the answer to the industry's dreams of cheaper widescrean production and exhibition — particularly the latter since the bigger the market for exploiting the novelty, production costs can more closely be underwritten or, ultimately, written-off. The attraction of the widescreen was not only proving effective in reviving audience figures but capitalist bankers soon realised that anyone who could patent a single-projector system would be able to take widescreen films virtually anywhere in the world at a tiny fraction of the cost of introducing Cinerama and could also create a 'standard' as commercially important and exploitative as Edison's 35mm film.

The anamorphic lens 'squeezes' the image through the horizontal plane so that through the camera viewfinder and on the projected frame a fat man looks slim but of the same height as he would with a 'standard' lens. The same lens is then used in projection to 'unsqueeze' the image. Historically, the oldest patent for the idea was filed in Britain in 1862 by Sir David Brewster and later in Germany in 1898 by Prof. Ernst Abbe of the Zeiss Company. In 1930, Dr. H. Sidney Newcomer showed his anamorphic films to a disinterested film industry (much of which had got burnt fingers in the still current talkie revolution which accounted for all the available industrial film capital). In 1927 Dr. Henri Chretien had presented a paper on the subject and four years later developed his anamorphic lens. Paramount finally took an option on the system four years later and shot ten reels of tests — but no more. Two years later, in 1937, the system was exhibited at the Paris Exhibition. In 1951 the Director General of the Center National de la Cinematographie, Jacques Flaud, told French producers that they should hurriedly put the Chretien process to use. By December 18, 1952, it was already too late. Twentieth Century-Fox took the option on Chretien's system and renamed it CinemasScope. Less than a year later, on September 16, 1953, *The Robe*, an otherwise unremarkable 'epic' about early christianity, opened at the Roxy Theatre in New York to public acclaim and critical disinterest. But the new 2.55:1 aspect ratio had proved it had a bright future and, despite the fact that the French had turned it down as well as J. Arthur Rank in Britain, Fox president Spyros Skouras announced that all future production would be in CinemaScope. Fox's commercial success with the process quickly urged all other majors, with the exception of Warner Brothers, Paramount, RKO and Republic, to announce CinemaScope productions. Among those productions that immediately followed *The Robe* were some, including its sequel, *Demetrius and the Gladiators,* which managed to use the wide screen to effect, such as Preminger's *River of No Return* and Lang's *Moonfleet.*

Warner Brothers intended to use their own anoamorphic system developed by Zeiss-Opton in Germany and called WarnerSuperScope but later renamed WarnerScope, but was in reality Visterama since the Zeiss lenses didn't arrive on time. Industrial pressure to standardise (though, in fact, the lenses are all basically the same — suggesting more covert financial machinations) brought Warners into line with Fox and, despite being three weeks into shooting, production of *A Star is Born* was halted and restarted in CinemaScope (ie, using lenses leased from Fox rather than Vistarama). The promoter of Vistarama, Carl Dudley, was much more honest about the system (developed by the Simpson Optical Company of Chicago) than his competitors; 'CinemaScope, WarnerScope and Visterama are all one in the same, each being merely a trade name for a squeeze-type motion picture employing anamorphic lenses ....Any theatre equipped with any anamorphic lens can project any picture made under any of these trade names.' But could they? It would certainly have been consistent with any studio's practice to have barred exhibition of any competitor's widescreen processes at theatres that were either owned or had been equipped by any other studio — especially with respect to Fox's multi-million dollar investment. To have equipped a cinema chain (anywhere in the world) to screen films made under another process (ie. not having to hire CinemaScope equipment) by another studio would have been highly inconsistent in an industry so competitive as to fight for control of chains of cinemas across the globe.

But RKO and Republic still held out — for a while. In April 1954 both SuperScope and Panavision were launched. Both were capable of screening with variable aspect ratios between 1.33:1 and 3:1 at the turn of a knob, enabling them to be used for showing anamorphic prints in either range — 1.875:1 (for screening between 1.75:1 and 2:1) or 2.15:1 (for screening between 2:1 and 2.25:1)dependin on the cinema's capabilities. SuperScope, inve[illegible]d by the Tushinsky Brothers at RKO, produced either 2:1 or 2.35:1 release prints, with the latter becoming accepted as standard. Robert Aldrich's *Vera Cruz*, released by United Artists in 1954, was the first feature to use the process, which in England was called RKOScope. But in either case, it soon disappeared in favour of CinemaScope, aided by the demise of the RKO studios themselves. Panavision, on the other hand,

Max Ophuls Lola Montez

became the more successful of the two despite having the same 2:1 compression ratio. Panavision, of course, also developed wide film processes and processes utilising both wide film and anamorphosis. The purely anamorphic Panavision system, which is similar to the SuperScope system, is also known as Panavision 35 as it also uses 35mm negative.

Paramount, who had not touched widescreen since developing Magnifilm from del Riccio's Magna Scope in 1939, and who had failed to take up their option on Chretien's invention now so successfully exploited by Fox, finally took the plunge in 1954 and yet another system — this time called VistaVision. As mentioned earlier, the idea of moving film horizontally instead of vertically had been around since at least 1928. In 1953 a creator of Broadway advertising displays, Douglas Leigh, reintroduced the process as Glamorama and Superama. Though not an anamorphic process, special lenses were needed during early screenings to turn the vertical image through 90-degrees, Paramount made several changes to the system (including projecting the film horizontally, negating the need for a special lens) and named it VistaVision. 1.85:1 was retained as the standard ratio from the days of Magnifilm and the film was exposed horizontally (approximately the equivalent of two Academy frames per VistaVision frame) and reduced in printing for standard vertical projection. After the premiere of the first production, *White Christmas*, in April 1954, VistaVision soon became one of the more prestigious widescreen systems on offer and was used for de Mille's *The Ten Commandments*, Curtiz's *We're No Angels*, Hitchcock's *To Catch a Thief* (which won an Oscar for VistaVision and another for the best colour cinematography) and was leased to Warners for Ford's *The Searchers*, to MGM for *High Society* and to United Artists for Kramer's *The Pride and the Passion*. The final demonstration of the process at its best was Marlon Brando's only feature as director *One-Eyed Jacks* in 1961.

Republic launched their own Naturama, based on the French Cinepanoramique, with *The Maverick Queen* in 1956. It too had a 2.35:1 aspect ratio and was almost identical to CinemaScope but saved renting the lenses from Fox. The Original CinemaScope ratio which had begun as 2.66:1 and reduced to 2.55:1 when magnetic sound was added, had now become standardised as 2.35:1 making it possible for nearly all cinemas to screen. It is interesting to note, with reference to the work of film historians and theorists who have sought to investigate the hegemony of 'realism' (notably in the book *The Cinematic Apparatus* edited by Teresa de Laurentis and Stephen Heath), that Fox further sought to determine that all CinemaScope productions should also be in colour!

Following VistaVision's success with prestigious productions combining widescreen with large format film, two new systems were introduced — Todd-AO and CinemaScope 55. With developments of anamorphosis, wide film had virtually been discarded. Producer Mike Todd, however, sold his stock and left Cinerama in 1953 to join the American Optical Company and make panoramic films of 65mm stock perfected by the company's Dr. Brian O'Brien. The same 65mm cameras as had been used by Lorenzo del Riccio at Paramount in the 20s were put to service once again, to produce a 2.21:1 aspect ratio on specially produced screens projected on new 65mm machines that Todd claimed

Sergio Leone A Fistful of Dollars

Jean-Luc Godard Le Mepris

would come to replace the 35mm stock used since Edison. Rogers and Hammerstein were so impressed with the system that they permitted Todd to produce *Oklahoma* at MGM, having turned down all previous offers. The oppening in 1955 was a great success and it played at Todd-AO theatres (where the proud management refused to sell popcorn!) for a year before being reduced to 35mm CinemaScope for regular screenings with anamorphic lens. When *Around The World in 80 Days* replaced *Oklahoma* in Todd-AO theatres, the process's special reputation was consolidated and won several Academy Awards.

Meanwhile, Fox decided that they would benefit from a wider negative and adopted a 55.6mm negative for camera and projection in their new CinemaScope 55 process which still used the same 2x compression and was reduced onto 35mm in printing to avoid further theatre conversion. The complete CinemaScope 55 process was rarely used since it also required optical reduction in printing since the film was advanced 6 perforations in projection but 8 perforations in the camera. Even the first two productions, also Rogers and Hammerstein musicals like the first Todd-AO productions, *Carousel* and *The King and I,* were only shown on 35mm. Fox had announced that CinemaScope 55 was only to be used for spectaculars, but when they gained distribution rights for Todd-AO's *South Pacific* Fox decided that they prefered their rival's large format, non-anamorphic film to their large format, anamorphic but optically reduced prints. They announced, after buying control of Todd-AO's controlling company, Magna Theatre Corporation, that Twentieth Century-Fox's future large negative productions would be in Todd-AO. After all, Fox had nothing to lose but competition (somewhat 'better' competition by most accounts' since theatres equpped for Todd-AO presentations and projectors that could show *any* film on any format larger than 35mm (including, of course CinemaScope) and at 24 or 30 f.p.s. and with up to seven sound tracks whether optical or magnetic.

Technicolour, a name which still has the ring of industrial authority to it, like Panavision and CinemaScope, were not to be entirely left-out of the race. Their Technirama process was similar to VistaVision, Todd-AO and Panavision in effect but more like VistaVision's predecessor, Glamorama, in mechanics, since it uses standard 35mm stock exposed horizontally but then also compresses the image to a factor of 1.5 through the horizontal plane. Unlike Glamorama, however, the 90-degree correction is achieved during optical printing and not in projection. The advantage of the process is that in reduction printing a further 1.33:1 anamorphic lens can be used to produce ordinary 35mm prints for projection on standard CinemaScope equipment. But because of the original negative's aspect ratio, it can easily be blown-up for non-anamorphic projection on 70mm print stock. When Technirama 70, using 70mm camera negative, was introduced, prestigious productions such as Kubrick's *Spartacus*, Mann's *El Cid,* Ray's *King of Kings* and Lean's *Lawrence of Arabia* were shot using the process, although the first was as usual, an unremarkable feature, this time called *Night Passage* and released in 1957. Six years later Technicolour introduced yet another widescreen system, though this time the aim was to reduce the cost of camera stock. This was 35mm, and while the full Academy ratio in the horizontal was exposed each frame, only two perforations instead of eight in the vertical plane was exposed for each frame. In printing, the image is expanded by a factor of two to become exactly the same in projection as Technirama, that is to say with a standard Scope ratio of 2.35:1. Using only standard camera lenses, the system has been used extensively in Europe as well as the US, including Leone's first spectacular spagetti Western *A Fistful of Dollars* and Franco Rosi's ceremonious and ritualistic *Moment of Truth*.

But between the introduction of Technirama in 1956 and Techniscope in 1963, Panavision introduced Super Panavision in 1958 which uses 65mm camera stock, no anamorphic lenses and prints onto 70mm and is also known as Panavision 70 when shown as 70mm — such as *Ben Hur*. Ultra Panavision 70 also uses 65mm camera film but adds special Panavision 1.25:1 anamorphic lenses. This is a favourite production tool since it permits the full range of print fromats to be produced from the large 70mm picture produced via a 1.25:1 anamorphic projector lens to a standard 35mm print requiring 2:1 anamorphic and even Cinerama (3-projector 35mm) can be produced (as in *Ben Hur*) since the aspect ratio is the same and Cinerama-type prints can be made by scanning the negative three times to produce three projector prints.

It has already been noted that Naturama developed from the French Cinepanoramique. This had been invented by Prof. Ernst Abbe who had patented one of the earliest anamorphic systems in 1898. Introduced in 1953, Panoramique was renamed Franscope in 1956 and *Dimanche* became the first film released using the system which was later to be used to such effect by Raoul Coutard and Jean-Luc Godard in *Le Mepris*. Launched the same year, and also compatible with Cinemascope, was Dyaliscope which became widely used throughout Europe (including Resnais' *Last Year In Marienbad*). In Italy, Ultrascope was the leading trade name in anamorphic film processes. Others included Superfilmscope, Colorscope and Supercinescope. Norwayscope was able to project everything from 8mm to Cinemascope and Agascope, developed by the aga laboratories in Stockholm, was compared to Cinemascope 55 for its clarity — as is demonstrated by the early films of Miklos Jancso who uses black and white wide-format film to produce such remarkable compositional effects. Names of other systems also refer only to trade names rather than distinct processes and all the following are compatible with Cinemascope: Sovscope in the Soviet Union; Tohoscope, Daieiscope, Nikkatuscope etc. in Japan, each being named after the studios of production companies that used them; Mexiscope in Mexico; Sinoscope in West Germany; Totalscope and TotalVision in East Germany; and Alexescope in Argentina. In Britain, the French Cinepanoramique became CameraScope whilst Hammer, of course, used Hammerscope and Archway Film Distributors Ltd. developed a process called Cosmoscope.

The purpose of this article has been to look briefly at the history of widescreen processes in accompanienment to an exhibition and short season of films at the London Film Makers' Co-op. It may, however, be interesting, or at least entertaining, to glimpse some of the more fantastic developments in this field (of vision).

Septorama was developed by designer Charles Eames for the US Information Service section of the American Exhibit in Moscow, August 1959. It consisted of 2,000 photograghs divided into 300 sets of 7 and projected onto 7 screens (arranged in two rows of four above and three below) in 13 minutes within a geodesic dome. The Vista-Dome, or Cine-Sphere, process was developed by the Jam Handy Organisation of Detroit and was first shown at the Chevrolet Exhibit at the Detroit Auto Show of 1958, utilising a hemisperical lens with a horizontal field of 180-degrees and a vertical view of 90-degrees and shown on a screen shaped like a quarter of a sphere. Cinedome was developed by the US government and first shown at the World Agricultural Fair in New Delhi in 1959. The opening shot of the film screened, *The Atom On The Farm*, gave the audience the impression of being inside an atom with electrons hurling around them, since they were surrounded by a dome-like screen. The Cinetarium was the first 360-degree process and was developed by the German documentary filmmaker Adalbert Baltes. The process requires a camera to film from below a reflective silver ball which is hung suspended above the scene to be

Roger Corman The Pit and the Pendulum

Nagisa Oshima The Ceremony

Akira Kurosawa Mojimbo

represented. The resulting scene is projected from a hole in the centre of the floor of a building and is equidistant from all points of the semi-spherical silver-coated screen while the audience follows the action in swivel chairs placed in the centre.

It is interesting to note, once again, how the contradictions of 'illusionism' and 'realism' are married in the production and exploitation of technological innovations. The illusion that is cinema is given greater force via the developments of ever more 'fantastic' technology whilst the first productions of the new form are almost always 'documentarist' in approach. The illusion and fantasy that must underpin any concept of 'reality' allow us to drift-off, once again, into the dream-world of cinema. The constant use of travelogue films (to demonstrate new film technology), or films which combine the 'real' and the 'exotic', the documentarist's experience/camera and the audience's lack of experience/desirous subjectivity, cannot be reduced to mere coincidence, convenience or expedience. The net effect of widescreen (or sound, or colour, for that matter) is a clear confirmation of the fantasy of 'realism'.

** The centrepiece at the National Museum of Photograghy, Film and Television in Bradford is IMAX, a Canadian projection system developed in the 70's. The system projects 70mm film horizontally and uses a 68% shutter to provide one-third more light (provided by a 4 kilowatt xenon lamp) than the conventional 50% shutter. The screen is 45 ft. by 62 ft. (equivalent to a five storey building) and is the largest in Britain. The film is called *To Fly!* and subjects the viewer to aerial footage of jets and hang-gliders accompanied by six-track sound. In 'Sight and Sound', Summer 1983, John Pym wrote "Not since I watched This Is Cinerama have I sat in a cinema feeling quite so queasy" and "one experiences something akin to the reaction of those bewildered early spectators who ducked at the approach of the silent locomotive."

Bibliography

"Widescreen Motion-Picture Systems" (Society of Motion Picture and Television Engineers pamphlet; N.Y. 1965)
Four Aspects of the Film, James L. Limbacher (N.Y, 1969)
Widescreen and Stereophonic Sound, Michael Z. Wysotsky (Focal Press, London & N.Y. 1969 – a very technical work.