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Zeiss Ikon and Television: Fernseh AG

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The name “Zeiss” is associated with optics. Less well-known was Zeiss Ikon’s active involvement for ten years, from 1929 to 1939, in the formative stages of the development of television.

On 21st June 1929, a new television company called Fernseh AG was established in Berlin, founded jointly by four firms: Robert Bosch AG, Stuttgart; Loewe Radio GmbH, Berlin; Baird Television Ltd, London; and Zeiss Ikon AG, Dresden. Pioneer John Logie Baird of British Television was frustrated by the British Broadcasting Corporation's lack of interest and support gravitated to the positive and supportive interest shown by the German Reichspost.

Why was Zeiss Ikon involved? A “fusion” of four firms in 1926, Zeiss Ikon AG under the leadership of Emanuel Goldberg was, in effect, the photographic division of the Zeiss conglomerate. Most, but not all, of its shares were owned by Carl Zeiss Jena.

Internationally famous for its cameras and movie projectors, but always having other non-photographic products, notably auto accessories, security locks, even streetlight reflectors, Zeiss Ikon always looked toward new ideas.

In part, Zeiss Ikon's venture into television seems to have been a preventative move. Zeiss Ikon already had become a world leader in movie cameras, especially with the magnificent movie theater projectors built by the Ernemann company, one of the four firms of the “fusion,” and the compact, spring-driven Kinamo cameras designed by Emanuel Goldberg at ICA, another of the four firms. Indeed, outside the USA, Zeiss Ikon had a near monopoly of large movie theater projectors throughout Europe.

But Zeiss Ikon found itself seriously hindered in the transition to sound movies because it lacked access to a crucial patent. Goldberg's son, Herbert, has suggested that Goldberg believed that an early collaborative initiative in television technology would have placed German industry in general, and Zeiss Ikon in particular, in a good strategic position in television with its enormous commercial potential.

Zeiss Ikon, however, was unavoidably concerned with electronics anyway because of the photoelectric cells needed for sound cinematography and for camera exposure meters. A significant problem with early photoelectric cells was their need for more effective sensitivity.

Overcoming this limitation as well as improving the cells demanded great ingenuity. One may speculate that Goldberg’s role, enthusiasm, and highly inventive mind brought decisive moves to extend Zeiss Ikon's existing involvement with imaging and with electronics into electronic imaging.

In addition to his expertise in optics, photography, and graphics, Goldberg was an acknowledged master of printing techniques. He authored significant technical publications on engraving and color printing before Zeiss recruited him from a professorship of reprographics at Leipzig in 1917. Goldberg had already been captivated by electronics and continued his research and inventing despite his administrative responsibilities as head of Zeiss Ikon. In his home workshop, he experimented with new radio techniques, including the superheterodyne.

He received a television-related patent, US Patent 1,973,203 for *A method of making Nipkow disks or plates for television*. Analog television systems were based on copying and reproducing images by examining and reproducing the lightness of one small spot of the image at a time. In practice this is done by scanning the image in a series of horizontal rows, one after the other. Done fast enough, and with enough rows, an image appeared and the dot and the rows ceased to be noticeable.

Early television technology was partly mechanical and achieved this scanning by using a rotating disk (Nipkow disk) with small holes so that one at a time, they defined the small dot to be scanned or projected. Goldberg's patent was for mounting small lenses on the disk to gather more light for the photocell than mere holes could transmit. See Figure 1.

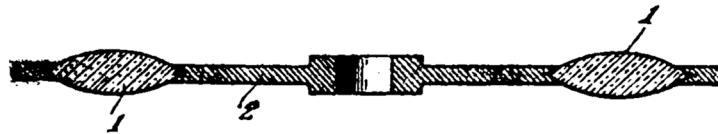


Figure 1. Emanuel Goldberg's patent for a Nipkow disk lens: US Patent 1,973,203 comprised an artificial resin body (2), having properly working ground lenses (1) pressed directly into it during the molding.

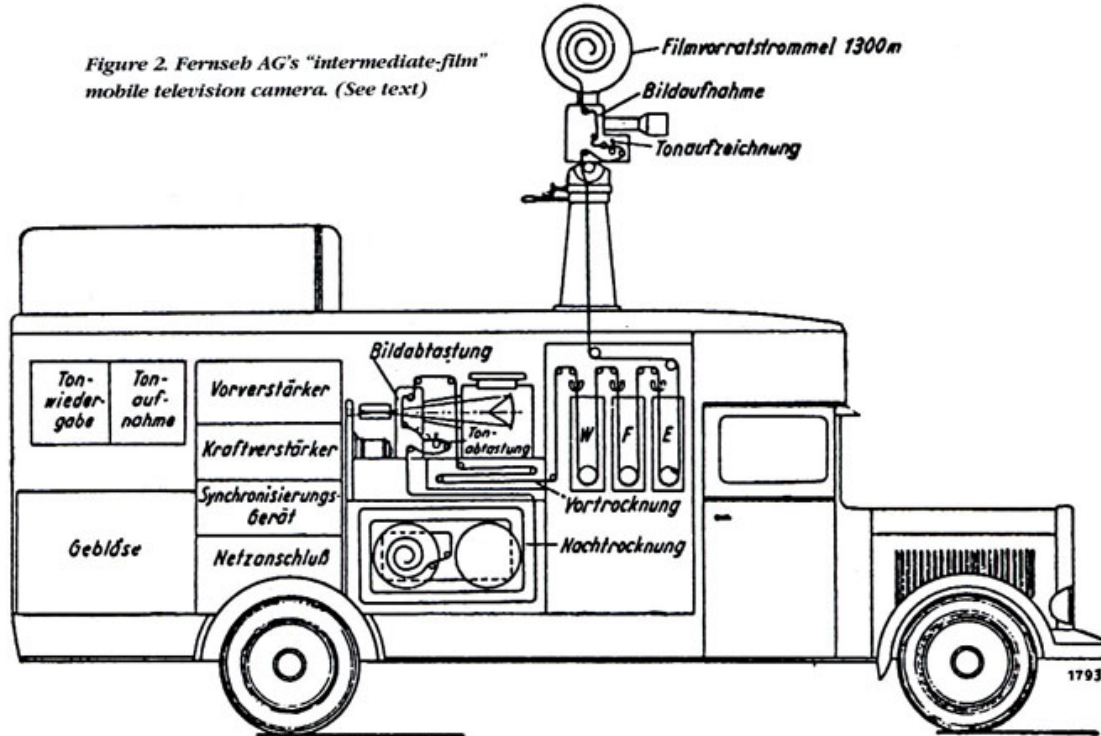
With his Ph.D summa cum laude in physical chemistry, Goldberg also enjoyed the scientific background to appreciate possibilities inherent in television. Might Goldberg have foreseen the electronics imaging industry becoming a rival or eclipse of photography? Had he wished to re-position Zeiss Ikon in order to profit from such a development? Such views might not have pleased some Zeiss managers, but might fully explain Goldberg's enthusiasm for Zeiss Ikon's participation in Fernseh AG.

The initial board of directors of Fernseh AG included Emanuel Goldberg, Oliver George Hutchinson (for Baird), David Ludwig Loewe, and Erich Carl Rassbach (for Bosch). Eberhard Falkenstein, who did legal work for Zeiss Ikon, was also involved. Zeiss Ikon's Goerz factory in Zehlendorf, Berlin, became the company's headquarters. Two large strong firms with substantial financial resources (Bosch and Zeiss Ikon) linked with two small firms having specialized technological knowledge (Baird and Loewe) proved an uneven combination. In 1932, Erich Rassbach of Bosch expressed his dissatisfaction with Fernseh AG in a letter to August Kotthaus at Carl Zeiss Jena, perhaps hoping to bring indirect influence on Zeiss Ikon.

He complained that no long-term work plan was ever made. He found Goldberg's technical talk difficult to understand and he thought that Goldberg's attitude to Fernseh AG was possessive (*"habhaft"*). He suggested to Kotthaus that either Bosch or Zeiss Ikon should buy out the other investors.

Meanwhile, Fernseh AG made considerable technical advances, acquiring many patents, and some commercial progress. In particular, as was appropriate for a firm affiliated with Zeiss Ikon, they developed amazing "intermediate" systems that combined film and television technology both for sending and for receiving.

Early television cameras could not work out of doors, let alone be used to cover mobile news. Figure 2 shows the Fernseh AG solution. An ordinary movie camera mounted on a truck took a conventional photographic films and sound recording of whatever was to be transmitted.



The exposed, but unprocessed film went immediately down a light-tight tube into a development tank (E), into a fixing tank (F), through a washing tank (W), and a preliminary drying process (*Vortrocknung*). Then it passed an "indoor" television camera that copied the image (*Bildabtastung*) and a sensor that copied the sound track (*Tonabtastung*). The film was then given additional drying (*Nachrocknung*) and wound onto a take-up spool. Electronic equipment transmitted the image and sound signals within sixty seconds of the filming.

In another version, the movie camera used a continuous loop of film that was exposed, processed, copied, cleaned, resensitized, and reused. As of 1937 the time interval for the film loop cycle from movie camera exposure through development, fixing, television camera copying, clearing, re-sensitizing, and re-exposure was down to 90 seconds. All of this was superseded as electronic technology improved, and mechanical components such as Nipkow disks and rotating offset mirrors were replaced by fully electronic devices.

Combining film and electronic technologies derived validity because storing television images was yet to be invented. Fernseh AG publicity pointed out that phonographs and radio coexisted. Undated lecture notes of Goldberg contain the observation that the inability to store electronic images assured the future of film. But when he saw a magnetic tape-recorder in the late 1940s, he correctly predicted that video recordings would be commonplace within forty years and that electronic imaging would displace photographic film.

In an effort to educate and impress the Fernseh AG shareholders, Goldberg is said to have addressed a shareholders' meeting using closed-circuit television. But Goldberg was kidnapped in April 1933 and forced to leave Germany, thereby ending his role in Fernseh AG. At Zeiss

Ikon, television was associated with movie equipment in the Ernemann works and liaison with Fernseh AG was through Hermann Joachim, an authority on movie projectors.

The Zeiss Ikon managers decided that television was not central to Zeiss Ikon's interests. They noted that Fernseh AG was not only losing money, but needed a substantial infusion of capital. They preferred that Zeiss Ikon supply specialized parts without the responsibilities of ownership. In 1939, Zeiss Ikon sold its interest in Fernseh AG to Robert Bosch AG.

Bosch acquired complete ownership of Fernseh AG which continued after World War II as Fernseh GmbH and, after 1972, as Fernsehanlagen GmbH. In 1986, in a partnership between Bosch and Philips, it became part of Broadcasting Television Systems GmbH, wholly owned by Philips since 1993.

Conceivably, had Goldberg's career continued in Germany, Zeiss Ikon, unlike other photographic firms, might have developed a strong and early position in electronic imaging.

Further reading:

- *Fernseh*, July 1939, pp. 109-122, published by Fernseh AG. This issue of their technical journal contained an illustrated review of the firm's activities and products during its first ten years, precisely the period of Zeiss Ikon's involvement.
- Guenther, Hans. *Das grosse Fernsehbuch*. Stuttgart: Franckh, 1938. Descriptions of Fernseh AG's "intermediate" technology combining film and television technologies can be found in English and German books of the late 1930s on television technology, notably Guenther.
- Archival material on Zeiss Ikon's involvement in Fernseh AG survives in Jena (Carl Zeiss archives, file 22413) and in Dresden (State archives, Ernemann and Zeiss Ikon papers, file 154).
- Buckland, Michael. *Emanuel Goldberg and his Knowledge Machine: Information, Invention, and Political Forces*. Westport, CT: Libraries Unlimited, 2006, pp. 133-39 & 238-40. German edition: *Vom Mikروفilm zur Wissensmaschine: Emanuel Goldberg zwischen Medientechnik und Politik*. Berlin: Avinus Verlag, 2010, pp. 181-91 & 326-30.

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