a parallel image
At fourteen, while tilling a potato field on his family's farm in Idaho, Farnsworth saw the neat, parallel lines of furrows in front of him, and it occurred to him - in a single, blinding moment - that a picture could be sent electronically through the airwaves in the same way, broken down into easily transmitted lines and then reassembled into a complete picture at the other end. [1]
Introduction – An Incomplete Outline of Early Television History

In 1880 the French engineer Maurice Leblanc defined for the first time the principle for transmitting images with electricity, which is still valid today. [2] The basis for this was the idea that
- an image to be transmitted is broken down into lines,
- the light impulses are transformed into electrical currents,
- the sender and receiver of the image must be synchronized,
- the transmitted electric signals are ultimately transposed into light values on a screen again,
- and that the picture lines are then recomposed synchronously in time.

The breakdown of images already proposed at that time first became practically possible with the conception of the Nipkow disk by Paul Nipkow in 1883. This was successfully employed for the first time in 1926 by the Scotsman John Logie Baird in an electromechanical television system, the televisor¹. [3]

Electronic television, in its form that has remained largely unchanged up to the early 21st century, first presented in 1928 by Philo T. Farnsworth and later commercially standardized by Vladimir Zworykin at RCA, is also based on this principle idea of breaking down images into image lines and the therefore requisite time synchronization between sender and receiver. [5]

This way of chopping up moving images into frames, fields and lines is one of the most universal and powerful continuities in the development of electronic image media. This kind of image transmission can be called serial, because a coaxial cable or radio channel suffices to transmit the image signal from the sender to the receiver.

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Fig. 2. Excerpt from the publication “Etude sur la transmission électrique des impressions lumineuses” by Maurice Leblanc, in which breaking down an image into lines is illustrated for the first time in 1880 [2]
"A Parallel Image" starts from the assumption that the development just described never happened. Would the absence of the idea of breaking down an image into lines have led to the lack of a procedure for live transmission any time soon? Or would the desire of our technological civilization to have an immediate transmission medium have been so great that a completely different, more complicated way would have been accepted?

With this claim I attempt to develop a television format that is useless in its efficiency, but nevertheless technically entirely feasible. My format chooses a parallel transmission of every single pixel, which makes a technically elaborate synchronization in time between sender and receiver superfluous².

To this end, I will design an apparatus that links every pixel on the “camera” side with every pixel on the “monitor” side in the technically simplest way possible. Taking this idea to its logical conclusion, this leads to an absurd system that connects a grid of 2,500 photoconductors³ on the sender side with 2,500 small light bulbs on the receiver side, pixel by pixel, using a total of 2,500 copper wires. In addition, there are wires that supply each of these “image transmission - micro units” with electricity.

This results in a relatively gigantic unit consisting of camera, transmission route and monitor, which in its sheer size, complexity and power consumption recalls the mainframes of the early 1940s⁴ or old-fashioned electro-mechanical telephone switching centers (telephone exchanges).

Unlike familiar serial image transmission, the technology of “A Parallel Image” is completely transparent even to the lay viewer. An object held in front of the “camera” side of the installation appears as a shadow outline on the “monitor” side. The signal path can be followed simply by tracing the wires from each photoconductor to each light bulb.

The resultant medium has an experiential quality that would be more probably attributed to film. Like film, and contrary to the conventional television system, there is a correspondence here between the real world and the transmission that can be sensually experienced. The television image is imbued with the directness of a film frame without the coding that normally takes place in the transmission of a television signal and does not allow for an easily comprehensible connection between the base image and the recorded signal (e.g. on video tape)⁵. In its directness “A Parallel Image” is a radically new live medium that returns the visibility and comprehensibility of the process to electronic image transmission⁶.

Unlike my earlier work “VinylVideo” [7], a device for storing analog TV signals on LP records, which I called a missing link in the development of audiovisual media, “A Parallel Image” results from the opposite, so to speak, from the assumption that a developmental step in media history did not take place.

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Fig. 3. Detailed view of the camera side of the installation: strip-board panel with photoconductors (section, 50 of 2,500 elements)
The Installation in Space

In the exhibition space one sees a camera-monitor unit: two one meter by one meter printed circuit boards made of epoxy are hung from the ceiling about three meters apart from one another (see Fig. 8, schematic representation). The circuit board defined as camera is loaded with a grid of 50 x 50 light-sensitive photoconductors. The circuit board defined as monitor is loaded with a grid of 50 x 50 small light bulbs (3.5 Volt, 250 Milliampere).

Large quantities of 0.4 mm thin copper magnet wire (a total of about 7,500 meters) connect the two circuit boards. Additional wires lead to an external electricity supply.

The techno-sculptural beauty of the installation is a side effect, so to speak, and inevitable.

A photo lens can optionally be mounted in front of the camera side, which projects an image of the surroundings to the surface of the photoconductors. This requires a reduction of brightness in the space to avoid stray light.

Unlike most media systems today, a direct experience is possible with “A Parallel Image”. Visitors can intervene directly in this interactive sculpture: the outlines of their bodies appear without delay on the monitor. It is possible to play with this image by changing the distance to the camera, etc.

Swivelling the photo lens (or projecting a film onto the camera surface) also makes it possible to render bodies and objects in their gradations of brightness and their plasticity. The starkly reduced resolution of this camera obscura leads at the same time to an image that clearly indicates the process it is based on in its quality.

Graphic Generator

In addition, there is a graphic generator also located in the exhibition space, which follows the same principle. Here a grid of 30 x 30 switches on the sender side can depict a simple light bulb graphic on the receiver side. This second installation can also be operated intuitively by viewers.

Fig. 4. Detailed view of the monitor side of the installation: strip-board panel with light bulbs (section, 24 of 2,500 elements)
Fig. 5. Side view of the array of light bulbs of the monitor of “A Parallel Image” (9 of 2,500 elements)

Fig. 6. Side view of the array of switches of the graphic generator of “A Parallel Image” (9 of 900 elements)
Fig. 7. Detailed view of the graphic generator: stripboard panel with switches (section, 40 of 900 elements)
Fig. 8. Schematic representation of the installation

Mounted hanging from the ceiling

Width 1 meter

Height 1 Meter

Image transmission: copper magnet wire with a diameter of 0.4 mm, 2,500 x 3 meters

Monitor: 2,500 light bulbs (3.5 Volt, 250 Milliampere)
 Mounted hanging from the ceiling

Height 1 meter

Width 1 meter

Camera: 2,500 photoconductors

Photographic lens (optional)

Power supply: copper magnet wire
Installation views
On My Artistic Strategy

Along with my ongoing interest in topics such as media archaeology, low tech and auto-generative art, my work is substantially marked by an approach of taking technically strange and highly complicated detours to achieve things that could be realized much more simply in other ways. At the same time, it is increasingly important to me to be able to control the steps required for creating an art work myself as far as possible. Whereas with my installation “VSSTV – Very Slow Scan Television” [8], for instance, I was really only able to take over the conception and maintenance of the machine built by a team, with “A Parallel Image” I attempt to develop a principle that I can in fact realize by myself. The trade-off seems obvious: setting up an installation in a manner in keeping with my limited understanding of technology necessitates an enormous amount of time for soldering about 2,500 cables.
The Californian artist Chris Burden, who recreated Baird’s apparatus in 1973 as “C.B.T.V – Chris Burden Television”, speaks in conjunction with his work of a fact that is also important to me with “A Parallel Image”: “I believe that as a technological invention this apparatus is of extreme significance, as it is a most successful solution to man’s historic desire to “see beyond” his immediate surroundings. As technology becomes more and more complex, fewer and fewer people have any understanding of how anything really works. By reduplicating and demonstrating this apparatus in its original “simple” form, I hope to aid people in understanding this complex instrument, which has made instant visual communication possible.” [4]

In his art work “The Messenger” Paul de Marinis picked up the historically passed on idea of a telegraph system that works with parallel signal paths. On this he writes: “Salvá’s first proposal is similar to the one described in Scot’s Magazine. It uses a separate wire for each letter of the alphabet, a Leyden jar to transmit a spark across these wires, but peculiarly, instead of the pith ball electroscopes and indicators, Salvá specifies a number of people, one for each wire. Upon receiving a sensible shock, each of these people, presumably servants, was to call out the name of the letter of the alphabet to which he corresponded. A twenty seventh person, presumably literate, was to write down the message so shockingly spelled out. This is probably the system that Salvá operated between Madrid and Aranjuez in 1798. Whether Salvá’s abandonment of pith-ball electroscopes in favor of human receivers was due to problems with electrical dissipation in the moister climate of Barcelona, a cheaper labor pool, or the relative ease of transcription of 26 vocal sources into a coherent message are questions that only further researches into his work might reveal. Nonetheless, the scene of a hall filled with the sighs, whispers and moans of humanity being shocked into literacy seems an appropriate and emblematic image for the events of 1789.” [6]

Photoconductors are simple electronic components that change their resistance depending on the incidence of lightness, so that they are able to control the brightness of a connected illuminant in a simple circuit.

Such as the early electromechanical calculators of Turing and Zuse or von Neumann’s EDVAC.

Recording the television signal from “A Parallel Image”, for instance on magnetic tape or a punch tape system with 2,500 parallel tracks, as yet to be constructed, appears illusory even to me.

In the image transmission procedure proposed in “A Parallel Image”, it is also interesting that, unlike all other systems, analog or digital, no discretization occurs, so that one cannot speak of a defined number of transmitted images per second. Only the inertia of photoconductor and light bulb limit the temporal resolution.

Footnotes

1 The Californian artist Chris Burden, who recreated Baird’s apparatus in 1973 as “C.B.T.V – Chris Burden Television”, speaks in conjunction with his work of a fact that is also important to me with “A Parallel Image”: “I believe that as a technological invention this apparatus is of extreme significance, as it is a most successful solution to man’s historic desire to “see beyond” his immediate surroundings. As technology becomes more and more complex, fewer and fewer people have any understanding of how anything really works. By reduplicating and demonstrating this apparatus in its original “simple” form, I hope to aid people in understanding this complex instrument, which has made instant visual communication possible.” [4]

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References

Zitat
At fourteen, while tilling a potato field on his family’s farm in Idaho, Farnsworth saw the neat, parallel lines of furrows in front of him, and it occured to him · in a single, blinding moment · that a picture could be sent electronically through the airwaves in the same way, broken down into easily transmitted lines and then reassembled into a complete picture at the other end. [1]

Einführung - ein unvollständiger Abriss der frühen Fernsehgeschichte
Im Jahr 1880 definierte der französische Ingenieur Maurice Leblanc erstmals das bis heute gültige Prinzip der Übertragung von Bildern durch Elektrizität [2]. Dem zugrunde lag die Idee, dass:
· ein zu übertragendes Bild in Zeilen zerlegt wird,
· die Lichtimpulse in elektrische Ströme umgewandelt werden,
· Bildsender und -empfänger synchronisiert werden müssen,
· zuletzt die übertragenen elektrischen Signale auf einem Bildschirm wieder in Helligkeitswerte umgesetzt werden.
Praktisch möglich wurde diese bereits damals vorgeschlagene Bildzerlegung erst durch die Konzeption der Nipkow-Scheibe durch Paul Nipkow 1883, die dann erst 1926 von dem Schotten John Logie Baird erstmals erfolgreich in einem elektromechanischen Fernsehsystem, dem Televisor, eingesetzt wurde¹.

Die Installation im Raum
Im Ausstellungsraum sieht man eine Kamera-Bild-

**Grafikgenerator**


**Zu meiner künstlerischen Strategie**


**Fussnoten**

1 Der kalifornische Künstler Chris Burden, der 1973 den Baird- schen Apparat als “C.B.T.V - Chris Burden Television” nachbaute, spricht zu seiner Arbeit von einem Umstand, der auch mir bei “A Parallel Image” wichtig ist: “I believe that as a technological invention this apparatus is of extreme significance, as it is a most successful solution to man’s historic desire to “see beyond” his immediate surroundings. As technology becomes more and more complex, fewer and fewer people have any understanding of how anything really works. By reduplicating and demonstrating this apparatus in its original “simple” form, I hope to aid people in understanding this complex instrument, which has made instant visual communication possible.” [4]

2 Paul deMarinis hat in seinem Kunstwerk “The Messenger” (1998) die historisch überlieferte Idee eines mit parallelen Signalwegen funktionierenden Telegrafen- systems aufgegriffen. Er schreibt dazu: “Salvá’s first proposal is similar to the one described in Scott’s Magazine. It uses a separate wire for each letter of the alphabet, a Leyden jar to transmit a spark across these wires, but peculiarly, instead of the pith ball electroscopes and indicators, Salvá specifies a number of people, one for each wire. Upon receiving a sensible shock, each of these people, presumably servants, was to call out the name of the letter of the alphabet to which he corresponded. A twenty seventh person, presumably literate, was to write down the message so shockingly spelled out. This is probably the system that Salvá operated between Madrid and Aranjuez in 1798.4 Whether Salvá’s abandonment of pith-ball electroscopes in favor of human receivers was due to problems with electrical dissipation in the moister climate of Barcelona, a cheaper labor pool, or the relative ease of transcription of 26 vocal sources into a coherent message are questions that only further researches into his work might reveal. Nonetheless, the scene of a hall filled with the sighs, whispers and moans of humanity being shocked into literacy seems an appropriate and emblematic image for the events of 1789.” [6]

3 Fotowiderstände sind einfache elektronische Bauteile, die ihren Widerstand je nach eintreffender Helligkeit ändern und so in einer einfachen Schaltung die Helligkeit eines verbundenen Leuchtkörpers steuern können. 

4 So wie die frühen elektromechanischen Rechner von Turing und Zuse oder der von Neumannsche EDVAC.

5 Eine Aufzeichnung des Fernsehsignals von “A Parallel Im- age”, etwa auf ein noch zu konstruierendes Tonband- oder Lochstreifensystem mit 2.500 parallelen Spuren, erscheint sogar mir illusorisch.

A Parallel Image
an installation by Gebhard Sengmüller, in collaboration with Franz Büchinger

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Contact
Gebhard Sengmüller
Leopoldsgasse 6-8/8
A-1020 Vienna, Austria
tel +43 699 15 45 59 29
tax +43 1 545 59 29
temail gebseng@gebseng.com
http://www.gebseng.com

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Translation: Aileen Derieg