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Nam June Paik's "Sloppy Machine": The Development, Functions and Legacy of the Paik-Abe Video Synthesizer

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Nam June Paik's "Sloppy Machine": The Development, Functions and Legacy of the Paik-Abe Video Synthesizer — Chris Meigh-Andrews

> Paik-Abe Video Synthesizer is a humble effort for this day, putting 1,001 ways of instant TV making. We gave up High Fidelity but we won the Super Infidelity.[1]

Initially a jumble of second-hand video equipment pulled together by Nam June Paik and his artist/engineer collaborator Shuya Abe, this hybrid machine was created to provide Paik with what he described as a "smorgasboard of video art."[2]

With a vision of video as *the* medium for a new generation of artists, Paik envisioned an electronic instrument with which he could distort, transform and manipulate the video image to emulate the malleability and fluidity of painting. With the support of WGBH TV in Boston and funding from the Rockefeller Foundation, Paik was able to construct his first video synthesizer, completing it in time for his four-hour broadcast *Video Commune – the Beatles from Beginning to End* at the beginning of August 1970.

Essentially a combination video colouriser /switcher and scan modulator with multiple channel feeds, the Paik-Abe Video Synthesizer was capable of generating video colours and hues and misshaping the television image to build layers of transformed electronic imagery during a live broadcast transmission.

In this paper I will discuss the origins and development of the Paik-Abe Video Synthesizer and the various versions that followed, examining Paik's vision, ideas and aspirations and exploring the machine's operation, functions and capabilities, as well as its influence and legacy.

In an early issue of *Radical Software*, Nam June Paik wrote of his desire to be able to work with his chosen medium unaided, alone and without hindrance, emulating a Romantic notion of the lone poet/artist freezing in his garret:

> *In the heated atmosphere of TV-control room, I yearn for the solitude of a Franz Schubert, humming a new song in the unheated attics in Vienna.*[3]

However ironically Paik described his ambition to recreate this idealised image of the isolated artistic genius, his desire to maintain full control over the video signal and its fluid moving image could be seen as a genuine and desirable aspiration. In 1969, during his period as video artist in residence at WGBH TV in Boston, Paik finally had the opportunity and the means to build what he considered to be his "anti-machine machine".

Frustrated and daunted by the experience of trying to create work within a conventional TV studio environment with its array of specialised machines and delineated technical functions and processes and with a full complement of attendant operators and personnel, Paik sought to create what he termed a "real time video piano", an instrument capable of providing direct control over the television image to match its live instantaneous broadcast capabilities and potentials.

Paik's visionary ideas were complimented by the engineering skills of his collaborator and technical mentor Shuya Abe:

> *Video synthesizer is the accumulation of my nine year's TV-shit····turned into a real-time video piano by the Golden Finger of Shuya Abe, my great mentor. Big TV studio always scares me. Many layers of "Machine Time" parallely running, engulfs my identity.*[4]

Paik had first met Shuya Abe in 1962, during the period when Abe was working as an

1 Nam June Paik, "Video Synthesizer Plus," *Radical Software*, vol. 1, no. 2 (1970), http://www.radicalsoftware.org/volume1nr2/pdf/VOLUME1NR2_0027.pdf

2 Quoted in "Paik – Abe Video Synthesizer" http://vasulka.org/Kitchen/PDF_Eigenwelt/pdf/126-129.pdf

3 Nam June Paik, "Video Synthesizer Plus."

4 Ibid.

electronics engineer at the Tokyo Broadcasting Station (TBS). Impressed with Abe and his abilities and ideas and with a common interest in innovative approaches to art and technology, they initially collaborated on a project involving the creation of inexpensive colour video images via the superimposition of three monochrome TV cameras in 1963. Although Paik subsequently moved to New York, the two remained in contact, exchanging ideas about the potentials and possibilities for the creation of synthesised colour video. In the autumn of 1969 Paik returned to Tokyo to meet with Abe, intent on discussing the basic idea for his video synthesizer.[5]

Fred Barzyk, the director of the New Television Workshop at WGBH in Boston first heard about Paik's idea during a discussion over lunch in the summer of 1969:

> *Nam June's vision was immense. His language was somewhat limited and his communication with engineers (and his ideas had a lot to do with engineering) were threatening to a lot of people. Nam June had an engineer friend in Tokyo, Mr. Abe, and he came to me with an idea that he would create a machine for himself that would be away from the requirements of the [WGBH] engineers. I remember he and I had lunch with Michael Rice [president of WGBH] and he laid out this huge piece of paper which tried to describe the synthesizer and what it was like and what it was going to do. I don't think Michael really understood, but he knew that Nam June would be gone for three months and we got the money needed to send him to Tokyo and to develop and devise this thing and bring Mr. Abe to help set it up here in the United States.*[6]

Although the diagram plan for the synthesizer Abe was shown at their Tokyo meeting later that year seemed to the engineer to be feasible in principle, the engineer had plenty of misgivings, feeling Paik's plan was, in his own words, reckless. He was aware that the colour encoder component of the proposed synthesizer would need to produce an image quality three times that of domestic video of the time! Furthermore, the scarcity and cost of suitable electronic components to build the machine within the allocated budget of $10,000 was prohibitive. This fund had to cover the building of the synthesizer, the purchasing of any additional equipment required – such as cameras and display monitors, as well as transport to the USA. Abe confessed in an interview with Japanese video artist Taki Kentaro made in 2011 that he felt unable to refuse Paik's request to take on the project, as it was clear that Nam June had risked his reputation on it, and had an absolute conviction and the determination that it could be done.[7]

The plan called for two working machines to be built in Japan and shipped via airfreight to the USA. Because of the very tight budget, Abe was aware that at least some of the key components, such as the colour encoder and the scan converter would have to built from scratch, although in subsequent editions of the PAVS, an "off the shelf " Sony colour encoder was used.[8]

After developing an initial schematic diagram, Abe began collecting the components, deciding to purchase three small racks to facilitate the building of Paik's machine – the first rack for the video inputs and the second and third for the colour encoder and the video output stage. Abe worked every weekend without a break for five months to construct the two machines, and they were shipped in a partially assembled state to the USA in the spring of 1970. The first was to be sent to WGBH in Boston and the second to Calarts to be assembled later by Abe and Paik.

The first Paik-Abe Video Synthesizer was installed and tested at WGBH in May 1970. Comprising of a scan converter, modulator, colouriser, processor and switcher, the machine accepted from one to seven video or audio inputs. The synthesizer system

5 **Sang Ae Park, "Paik-Abe Video Synthesizer," in *Paik-Abe Video Synthesizer, as Freely as Picasso, as Colorfully as Renoir*, Nam June Paik Art Center, Yongin, 2011.**

6 **Quoted in George Fifield, "The Paik/Abe Synthesizer," http://davidsonsfiles.org/paikabesythesizer.html**

7 **Taki Kentaro, unpublished interview with Shuya Abe, 2011.**

8 **David Jones, "The Paik-Abe Video Synthesizer," Video History Project Early Media Instruments, ETC Ltd, 2005.**

included a synch generator, an input patch panel for cameras and oscillators, a video colouriser and video processing amplifier, audio oscillators and amplifiers and, as per Paik's original specification and requirements, was capable of producing a broadcast quality colour video output.

As all input video signals had to be in synch with the system, any pre-recorded video material had to be rescanned on a monitor via a TV camera. A special rescan monitor dubbed the 'Wobbulator' by Paik was included as part of the synthesizer system.[9] This modified monitor was a unique feature of the synthesizer, providing the potential to distort video images by the manipulation and adjustment of a number of yokes and controls on the machine. The orientation and the size of the image on the Wobbulator screen could be adjusted, the image could be inverted, and/or mirrored, and the image size could be adjusted horizontally or vertically, and/or in combination. Additionally the Wobbulator had two other yokes – a colour receiver yoke and a continuous wind yoke, both driven by audio amplifiers capable of pulling the video images side-to-side and top to bottom. All of these adjustments and controls corresponded directly to the waveform and frequency of the oscillator inputs.

The video colouriser was at the heart of the Paik-Abe Video Synthesizer. The machine was able to take up to seven separate inputs – all from camera sources. According to David Jones, the technical consultant at Experimental Television Center (ETC) in New York, the synthesizer was mainly designed to add colour to B&W camera sources, as colour cameras were prohibitively expensive at the time. The synthesizer at ETC, which was the second machine to be constructed, was built around a Sony encoder board taken from a colour camera. To enable the synthesizer to produce a wide range of colours from monochrome inputs, Abe built a set of amplifiers that were capable of solarizing the images, reversing the relationship between the bright and dark parts of the video signal, and therefore enabling colours to be added to the different tones within the original monochrome source.

Each camera image could be fed into a separate channel and these could then be overlapped to create additional colours, making it possible to produce not simply the primary component colours of Red, Green & Blue(RGB), but also the subtractive primary colours – Magenta, Cyan, Yellow(CMY). There was a level control for each of the seven inputs as well as a switch to turn each of them off or on. Each channel also had controls for contrast, brightness, colour hue and saturation, as well as control over the luminance (brightness) level of the monochrome signal that affected the level of the solarising effect and thus the balance between the colours within the image.

In addition to the colour effects produced by the colouriser and the electronic image manipulation via the Wobbulator, Paik installed a record turntable that could be used to rotate photographic images and small three-dimensional objects. These rotating images could then be fed into the synthesizer via one of the monochrome cameras, processed and further manipulated if desired.[10]

Debut and First Broadcast

The Paik-Abe Video Synthesizer had its TV debut at 9PM on August 1st 1970, with the live four-hour broadcast of *Video Commune-The Beatles from Beginning to End* on WGBH, channel 44. Paik had previously discovered that WGBH had a licensing agreement that gave them rights to air all the Beatles songs and *Video Commune* was an exuberant and colourful four-hour long broadcast performance of densely layered and slowly shifting images to a Beatles soundtrack.

9 Note: "An electronic device primarily used for the alignment of receiver or transmitter intermediate frequency strips. It is usually used in conjunction with an oscilloscope, to enable a visual representation of a receiver's passband to be seen, hence simplifying alignment; it was used to tune early consumer AM radios. The term "wobbulator" is a portmanteau of wobble and oscilator." https://en.wikipedia.org/wiki/Wobbulator

10 This description is based on viewing the Paik-Abe Video Synthesizer demo by David Jones. *Video History Project Early Media Instruments*, ETC Ltd, 2005.

Susan Dowling, later director of the New Television Workshop, gave her impression of *Video Commune*:

> *All the images on the show – surreal landscapes (crushed tin foil), eerie abstractions (shaving cream), bursts of color (wrapping paper) – were transmogrified by the Synthesizer at the very moment of broadcast: "live" television at its most unexpected.* (Fifield, 2000)[11]

Blended and mixed with the image-processed video and Beatles music (up to and including music from the so-called *Double White Album*(1968)) were clips from a variety of sources including a pre-recorded tape of Japanese television programmes and TV commercials, (in Japanese, with no subtitles!), extracts from the Beatles films *A Hard Day's Night*(1964) and *Help*(1965), and video documentation of a number of Charlotte Moorman performances playing the cello and playing Paik's back as if it were a cello.

On the sound track at various times throughout the four-hour programme a narrator explained the nature of this experimental broadcast: "This is participation TV", the voice declared, encouraging the audience to play with the dials of their television set, adjusting brightness and colour. Viewers limited to black-and-white sets were also encouraged to become involved by "distorting [their] picture with a strong magnet". All audiences were urged to "do your own thing and treat it like electronic wallpaper."[12] Undoubtedly, the viewers who tuned in to WGBH on that evening in August 1970 would never have experienced anything like it!

The broadcast of *Video Commune* was directed by Fred Barzyk of WGBH with Paik managing the overall look and content of the programme and Shuya Abe, who had been flown over from Tokyo to work with Paik, at the controls of the synthesizer. Aside from the regular TV studio personnel, members of the general public were also invited into the studio to participate in the operation of the synthesizer and to provide imagery – often, according to Johanna Gill, including their own faces, thus fulfilling one of Paik's aspirations for his anti-machine, taking the first step towards a day when "ordinary citizens" might participate directly in the making and controlling of TV images.[13]

Later the same year, both Paik and Abe began to lecture at the California Institute of the Arts, and whilst there, in addition to their teaching, they oversaw the production of an improved and more compact version of the synthesizer. This improved version was the second of three editions of the machine – the original and first version is now in the permanent collection of the Kunsthalle in Bremen, Germany. The second version was installed at Calarts and the third, completed in 1972 with financial support from WNET, was installed at the Experimental TV Center in Binghamton New York. There were also a number of other versions produced at Calarts under Paik and Abe's supervision, including one that has been recently restored at the Nam June Paik Center in Seoul.[14]

In November and December 1971, the year after the *Video Commune* broadcast at WGBH, the synthesizer was the star attraction at the exhibition "Paik-Abe Video Synthesizer with Charlotte Moorman, Electronic Art III." Paik and Abe installed their machine at the Galeria Bonino, in New York, inviting visitors to engage directly with it, both in front of the cameras and at the controls. With this exhibition Paik was attempting to extend his ambition to create a (comparatively) inexpensive method and hands-on approach to transforming and manipulating the television image, helping to inspire and initiate an almost utopian cultural sea-change in broadcast programming.

11 **Quoted in Fifield, http://davidsonsfiles.org/paikabesythesizer.html**

12 **http://main.wgbh.org/wgbh/NTW/FA/TITLES/Video347.HTML**

13 **Johanna Branson Gill, "Video: State of the Art," in *Pioneers of Electronic Art*, Ars Electronica, Austria, 1992.**

14 **Sang Ae Park and Abe Shuya, "Synthesizer Restoration Project," in *Paik-Abe Video Synthesizer, as Freely as Picasso, as Colorfully as Renoir*, Nam June Paik art Center, Youngin, 2011.**

In the catalogue essay for this exhibition Paik described his aspirations and ambitions for his machine and its subsequent developments, clearly identifying his intention to challenge and rival painting as the pre-eminent mode of artistic expression:

The versatile color TV synthesizer will enable us to shape the TV canvas

as precisely	*as Leonardo*
as freely	*as Picasso*
as colorfully	*as Renoir*
as profoundly	*as Mondrian*
as violently	*as Pollack and*
as lyrically	*as Jasper Johns.*[15]

Legacy

> *The handful of videos he made with the Synthesizer had an effect far beyond their audience. Suddenly the idea of video art made sense in a way that it hadn't before. Video became a canvas that the artist could literally paint on. The freedom of creative thought that Paik's creation spawned spread like wildfire. The Paik-Abe synthesizer and others like it were used by an entire generation of artists interested in the formal beauty of the abstract video image. Suddenly artists started inventing new electronic tools as fast as they needed them, twisting video signals through a whole new language of feedback and colorization, processing and disruption.*[16]

The legacy of the Paik-Abe Video Synthesizer is complex and wide-reaching, and its impact is still in evidence. The most important aspects of this legacy centre on Paik's profound grasp of the power and potential of television as a medium for cultural, social and political change and the desire to manipulate and control the moving image to explore and create new possibilities, and in this way to extend the TV medium to a much more inclusive and less elite group.

Although the Paik-Abe Video Synthesizer was not the first image-manipulation machine developed by an artist, it has arguably had the widest and most lasting impact. The synthesizer that Paik and Abe built did much more than expand and enhance the technological grammar of television – though of course it also did that. Not only did numerous other video artists work with it, but Paik's anti-machine also inspired and spawned other, more sophisticated and specialised video instruments that followed, including the Rutt-Etra Scan processor, the Sandin Image Processor, Stephen Beck's Direct Video Synthesizer, and numerous others that followed.

David Jones, an artist and electronics engineer who began working with the Experimental Television Center in 1974, modified, upgraded and repaired the Paik-Abe Video Synthesizer over many years, and inspired by the Paik-Abe machine, went on to develop and produce his own image processors and digital imaging machines and these in turn have been used by many video artists working during the 1980's & 90's including Dan Graham, Gary Hill, and Steina and Woody Vasulka.[17]

Since its introduction at the beginning of the 1970's, there is an extremely long list of artists who have produced work using the Paik-Abe Video Synthesizer, especially those who have had access to the machines at Calarts and the one that formed the hub of the video processing and production facilities at The Experimental TV Center (ETC)

15 **Nam June Paik(1969), "Versatile Color TV Synthesizer," Reprinted in *Nam June Paik, Videa 'n' Videology: 1959–1973*, Edited by Judson Rosebush, 55. New York.**

16 **Fifield, "The Paik/Abe Synthesizer," http://davidsonsfiles.org/paikabesythesizer.html**

17 ***Pioneers of Electronic Art*, Ars Electronica, Austria, 1992, 141.**

founded by Ralph Hocking in Binghamton, New York.

In the period between 1973–1976, Ed Emshwiller worked as artist-in-residence at ETC and made a series of pioneering video performances, touring public access centres, colleges and galleries with the Paik-Abe Video Synthesizer which in turn encouraged many others to explore and extend the creative potential of video imagery.[18]

The very first PAVS was assembled by Paik and Abe at the Experimental Television Center (ETC) during its developmental phase in 1970 and was then located at WNET in NY. The second system to be built at ETC was subsequently made available through an extensive residency programme that ran until 2009, providing many artists with the opportunity to experiment with Paik and Abe's so-called "anti machine."[19]

The influence of Paik and Abe's hybrid instrument was not just due to its functions and capabilities. The Paik-Abe Video Synthesizer's long-term influence, legacy and impact was also due to its underlying philosophy and its implications for the nature and creative possibilities of the video medium. Paik had a radical and visionary understanding of the potential of television: the medium's immediacy – the power of its live and continuous fluid image and instantaneous feedback, the luminosity of the back-lit display screen, the vibrancy of its palette, the malleability and fluidity of the signal, its harmonious relationship to music and sound, the breadth and potency of its social power and its all-pervasive and ubiquitous domestic presence.

More than any other artist working in the period, Nam June Paik had a clear and urgent sense of the possibilities of video and its potential role as a medium for artists, and beyond this anticipated the digital broadcast revolution that lie ahead. Nam June Paik's infectious blend of energy, commitment, determination and humour is clearly embedded within the synthesizer that he and Shuya Abe first began to develop in 1969, and its legacy and influence are still very much alive today.

What is ART?
Is it the moon?
or
the fingertip which points to this moon? (Paik, 1970)*[20]

* With this quotation, Paik was paraphrasing Confucius:
When the wise man points at the Moon, the idiot looks at the finger.

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18 **https://en.wikipedia.org/wiki/Video_synthesizer**

19 **Ralph and Sherry Miller Hocking "Radical Learning, Radical Perception: The History of The Experimental Television Center," *ETC Experimental Television Center: 1969-2009.***

20 **http://vasulka.org/Kitchen/PDF_Eigenwelt/pdf/126-129.pdf**

Chris Meigh-Andrews is an artist, writer and curator who has been making and exhibiting video and moving image installations internationally since the mid 1970s. His site-specific and commissioned installations often incorporate renewable energy systems and establish direct relationships with the natural and constructed environment.
He has written extensively on the history and context of artists' video. *A History of Video Art* (Berg, 2006, Bloomsbury Academic, 2013 & Sangensha, 2013) provides an overview of the development of artists' video since its inception.
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