DON McARTHUR

SAID (Spatial and Intensity Digitizer), 1976

I THINK ONE ALWAYS REMEMBERS the moment of change of an esthetic norm in one's mind, first the photographic and film recollections from the memories of others, then our own experiences with first seeing video and holography. Such a moment happened to us in, of all places, Binghamton N.Y: looking at a digital image broken down into the numbers and reassembled again in real-time. That's how we met Don McArthur and his real-time digital buffer. In our greed for new images, without even discussing it, he was hired. A year later, he designed the basic skeleton of our first true digital image generator. We agreed with Ralph Hocking on the purchase of his flesh, under condition that the project would have a binary benefit for both places, ours in Buffalo and at ETC. The project would mirror all hardware and software development and Walter Wright would write the first program.

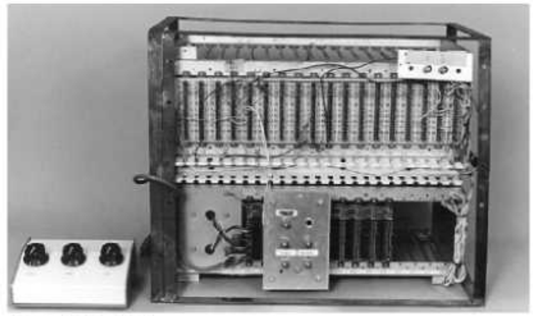
It only got half way through. Eventually we pulled it through without ETC by enlisting another character in this drama, Jeffy Schier. —W.V.

1938 WAS THE YEAR Donald E. McArthur was born in Holdrege, Nebraska. He received a Ph.D. in Theoretical Physics from the University of Nebraska in 1967. After teaching physics at SUNY in the mid-seventies, he began designing digital imaging systems for video. His creations include the Spatial and Intensity Digitizer for the Experimental Television Center in Binghamton, New York; and the McArthur/Schier Digital Image Generator developed with Jeff Schier for the Vasulkas. McArthur's interests include heuristic programming, digital electronics, video systems, and electronic music.

"AS SCIENCE ADVANCES, with the resulting advances in technology, we have new tools and new capabilities which influence our world in many ways. This new technology not only influences the traditional art forms but also produces new forms of art. The development of high speed electronic components and circuits, the cathode ray tube, the video camera, and inexpensive video tape recorders enabled the development of video art. Advances in integrated circuit design and fabrication techniques have led to the development of small but powerful computer systems which can be utilized by the video artist to achieve a new dimension of control over the video image. With a computer-based video synthesizer (CBVS), one can generate a sequence of images while controlling each individual image with detail and precision that is many orders of magnitude greater than is possible with manual control.

The ability to control the dynamics of the image is especially useful to the artist if the system is capable of generating the image in real time. With this requirement in mind, the natural choice of devices for converting electrical signals to visual images is the conventional video system. This choice also gives the capability of recording the video compositions with a conventional video tape recorder and of broadcasting to a large audience through existing network systems.

There are basically two modes of operation of the system: interactive-compositional mode and automatic-production mode. In the compositional mode, the artist can enter programs and parameters through the keyboard, observe the resulting sequence of images, and then modify parameters through either the keyboard or a real time input and thus build up a data set for a complete piece. The data set, representing all the aesthetic decisions made by the artist, is stored in the computer at each stage of the composition. When the composition is finished the system will operate in the automatic-production mode generating the final video signal in real time with no intervention by the artist. The artist may also choose to use a combination of these two modes in an interactive performance or to allow an audience to interact with the system operating automatically. The system is structured so that all of these variations can be accommodated by appropriate programming.



Above: SAID, 1976.
Left: Don McArthur.

The system may be operated as a generating synthesizer which produces a video signal entirely from internal signals or as a processing synthesizer which utilizes video signals of external origin such as a camera. Either of these two types of operations is carried out by a configuration of elements modules, each of which performs a class of functions, with the specific function during one frame being determined by the control parameters received from the computer.

From: "A Computer Based Video Synthesis System" —Donald E. MacArthur, June 1977

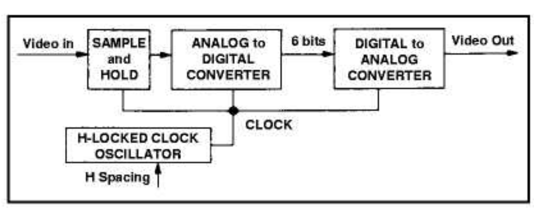
THE SPATIAL AND INTENSITY DIGITIZER,

or "SAID", arose from an early attempt to create a low cost video-speed Analog to Digital converter (A/D). In 1976 no monolithic silicon A/D converters existed, and the cost of equivalent industrial modules was outside the range of most video art budgets. As this component was basic to digital video processing, a 6 bit A/D converter was attempted. An A/D converter of 4 bits or less was commonly constructed using strings of high speed comparators, but resolutions greater than 4 bits was difficult to perfect.

A video A/D converter is built from three main components. A sample and hold input amplifier, an analog to digital conversion circuit, followed by a binary encoding stage to generate a unique binary number for each of the analog to digital thresholds. The sample and hold amplifier picks out a sample of the video voltage, and holds its value until it is fully converted into digital form. The conversion from an analog voltage to a digital value is followed by the binary encoder that develops a digital output as a stream of 6 bit binary numbers, representing 64 video grey values.

The total conversion time of all elements determines the highest clock speed possible. The conversion time was slower than desired, so a horizontally locked oscillator was used to slow down the clock rate until the conversion was stable. This was generalized to allow wide variation of oscillator speed to horizontally sample the image. The output of the A/D converter is fed to a companion Digital to Analog converter of 6 bit resolution, completing the conversion process from analog to digital then back to analog.

The purpose of this circuit is to digitize the video signal into numerous digital thresholds and then sample them along the horizontal time axis to create vertical strips. The spacing or width of the vertical strips of video is adjustable through an oscillator knob. A switch to turn off selected digital bits is also available. This is an early example of the "posterize" function (bit selection), while the stripes are the horizontal component of a "mosaic" function, both found in digital video effect devices. —J.S.



FRAME 136 step through next 2 frames

STEP FORWARD

STEP BACK

INFO frame 45562 to 46625