THE VASULKAS, INC.
100 ROUTE 6
SANTA FE, NEW MEXICO 87501
TEL. (505) 471-7181/FAX. (505) 473-0614

December 30, 1991

Dear Sherry and Ralph,

Your FAX of December 29th was astounding. We are completely amazed at the extensiveness of your archives, and the thorough documentation of the machines.

The Yaklut manuscript looks very interesting. However, Woody is most anxious to review the nomenclature as referred to in the Image Processing Manual table of contents. This manual appears to be 20 pages in length. Woody would really appreciate it if you could FAX this document or sample pages from this document. As you indicate we also do not have a number of the manuscripts that you have cited. We have only those that are checked. Would it be possible to mail copies of the other documents? We, of course, will reimburse the expenses.

You may not know, but on January 30th, Woody and Steina must be in New York to accept the Maya Deren Film & Video Award. They are seriously considering a trip to Binghampton. Would that be convenient?

I also hope to meet you at some time. We are still waiting for Katharina's report of her journey throughout the US, and are still trying to confirm the scope of the project with Ars Electronica and the museum in Linz. We are not sure of the size of the catalogue, but will keep you informed as soon as we know more.

Warm regards,

MaLin Wilson
Special Projects Coordinator

Steina and Woody Vasulka   FAX 505 473-0614

Following is some preliminary info.
 Tables of contents for Jud Yalkut book and for ETC Manual
 Essays and books I've listed only those which you might not have. We've
   got lots more stuff...
 Interviews transcribed only
 Condensed outline of The Book with indications of what's "done"

We have a four page funding history of ETC, which provides a chronology of
the R and D activities.

Katharina asked me to write an essay about the Center (10-12 pgs) for the ✷
catalog. If you have any different information, please let me know.

You can respond to David Jones FAX 607 687-5898.

Sherry + Ralph

12/29/91

→ WILL SEND WITHIN
  2 DAYS —

Jud Yalkut
Electronic Zen   1984
(not published)

CONTENTS

PREFACE

ACKNOWLEDGEMENTS

CONTENTS

Page Two

PG 2

Experimental Television Center Ltd.
180 Front Street
Owego, New York 13827
(607) 687-4341

Essays and Books in our files. Very partial list. Have many catalogs and books not included. Also bibliographies. Here are only things you may not have in your files...
 Jon Burris.   Introduction, beginning "To the Sight, Three things are required". no date. approx. 29 pgs.

 Peer Bode. "Representation and Abstraction in Video", for Rutgers University, August 1981. 9 pgs.

 Maureen Turim. "Designs of Motion: A Correlation Between Early Serial Photography and the Recent Avant Garde".   no date.   21 pgs. more film referents than video.

                "Video Art - Theory for a Future". 1981. 11 pgs.

                transcript of presentation at ETC. circa 1981.

 Nikos Metallinos. "The Composition of the TV Picture". 1977. 8 pgs.

 Jud Yalkut. Electronic Zen. 1984. book-length manuscript. This was sponsored by the Center and funded by NYSCA.

✔Alan Powell. Masters thesis: Survey of Video Art. 1987. 56 pgs. Chapters: Foundations; Broadcast and Video Art; Technology and Artists; Video Coops and Media Centers; Electron Movers...

✔Harald Bode. "History of Electronic Sound Modification". 1984. 9 pgs.

 Jean-Pierre Boyer. "Noise to Signal Ratio". 1977. 18 pgs.

✓Barbara Buckner. "Light and Darkness: Some Aspects of the Video Image". 1978. 20 pgs.

 Nam June Paik. "How to Keep Experimental Video on PBS". paper for Rockefeller Foundation sponsored conference "TV Maker and Public Communications Policy.

 Sherry Miller. "Electronic Video Image Processing: Notes Toward a Definition". 1982. Society for Photographic Education. Exposure. 2 pgs.

 Sara Hornbacher (ed). Art Journal. 1985. Cindy Furlong: Tracking Video Art and Barbara London Chronology (to 83).

✔Margot Lovejoy. Postmodern Currents: Art and Artists in the Age of Electronics. Chapter: Video - New Time Art. 1989. 50 pgs.

pg 4

Interviews transcribed
Rutt-Burris
Etra-Vasulka
Washer-Burris
Leopold-Burris
Beck-Vasulka
DeWitt-Burris
Sandine-Vasulka
Hearn-Vasulka
Gwin-Burris
Beck-Vasulka
  Peer Bode, George Quasha, Gary Hill 1978
  Peer Bode, Paul Davis, Gary Hill, Ralph Hocking, Willoughby Sharpe, George
    Quasha 1978

We have hours of tapes, a lot with Walter, one with Steina and Walter,
Ralph and others. A few are transcribed.

Hardware/Software Documentation and Descriptions
Jones and ETC
  Keyer (76) Rich Brewster documentation; (85) Doc. & Desc.
  4 Channel Sequencer; 8 Channel Sequencer (85)
  4 Channel Colorizer (75); 6 Channel (85)
  Main Nec software for print program using Z-80 with CAT Buffer
  Oscillator bank (85)
  ETC Analog system, used PAIA and Serge with some original designs (78; 84)
  Buffer (85), with Amiga interface
Paik/Abe Video Synthesizer
  documentation by Jones, Wright, Ron Hays
Paik Raster Control System (aka Wobbulator)
  documentation by Brewster, Miller (80)
Rutt/Etra
  Sid Washer documentation; Jeff Schier doc.; manual
Sandine IP
Siegel
Hearn
  Videolab manual; Ernie Gusella info (79)
Washer Synthesizer (c 72) description only
Videola Hallock; brief description w/ museum notes
Archetron Tadlock; description by J. Yalkut
VMS (Berkeley) description; TRS-80, Z-80, PDP-11 compatible
Pantograph DeWitt
Spectre Video Synthesizer (74); Monkhouse; description; handbook
IMAGO Frampton buffer software for Z-80
Vasulka System Schier (78) w/ block diagrams
Serge Modular Music System handbook
Synthi
Harpo (79) software for 8080 based systems
Hocking system extensive documentation including CAT-100 frame store; D+7A
1/0 (79);

there's more in storage.

pg 5

This is a condensed outline of The Book, with indications of which parts exist. There's a 3 pg outline with more detail.

Outline 3 pgs
Introduction   10 pgs. notes in outline form
Perception   8 pgs typed draft
Signal, Sync, Scanning   16 pgs typed draft
Systems and Architecture   8 pgs. rough draft
  Signal Generation:
    Optical Image Generation   10 pgs. typed draft b/w camera only
    Non Optical Generation - Oscillators notes only; general description
      within Paik Raster system description
    Signal Display: monitor b/w only 8 pgs rough draft
    Loops and closed systems (feedback) reference to Bill Gwin and Ron Hays
Processors
    Temporal Combinations of Singals - switching, mixing, comparing 8 pgs
      typed draft
    Scan Processors 16 pgs typed draft; Paik, Washer, Hearn, Hallock,
      Scanimate, Caesar
    Colorizers
      basic color theory 10 pgs typed draft; not include colorization
      Colorizers not written Paik, Hearn, Jones, Siegel
Processors/Controllers   (not written)
    Manual Control- Paik
    Voltage ETC, Sandine
    Computer ETC, Vasulka; info on McArthur SAID; LSI-11; SONY-GESI; CAT and
      Jonees
Systems Structures
    Hearn Videolab; Sandine IP; P/AVS; ETC; Hocking; Vasulka

ol. 6

Portable video technology was first introduced to the United States in the late 1960's, when SONY first began to market what was known as the **CV** series of video equipment At first **CV** stood for Consumer **Video**. When it became apparent that the machines were not selling to ordinary folks, SONY changed the idea to Classroom **Video**. This was soon followed by other manufacurers versions of the same idea. First generation video recorders were all reel to reel but not compatible with each other in terms of signal standards. ie. A tape made on a machine manufactured by Sony could not be played on a machine made by Panasonic and vice versa. A little later the EIAJ standard was agreed upon by all manufacturers. This lasted until the introduction of Betamax and the VHS 1/2" videocassete format.

Price structure of a basic system Sony CV system was:

Battery operated video recorder/camera with zoom lens, microphone and	$1250.00
Sony-Matic Videocorder	795.00
Monitor /Receiver 8" B/W Screen	195.00
Videotape, 20 Minute reel	14.95

The CV portapak consisted of a black and white camera with a zoom lens. It was connected to a separate recording deck that was usually worn from a shoulder strap and could operate from A/C or 12 volt battery. An external microphone was mounted on the top of the camera. The ten pin cable connecting the camera and the recorder carried the video and audio signals from the camera along with power and electronic timing information signals (SYNC) to the camera. The camera image was monitored through the viewfinder on a small Cathode Ray Tube (CRT), similar to the current methods. An in-ear speaker connected to the recorder monitored the sound. The system was powered either by 2 internal gel cell batteries or by an external AC adapter. Because these decks were not able to play back tapes, the only rewind capability was manual using a lever provided specifically for that purpose. The system was able to record a maximum of 20 minutes of video and audio on 1/2" reel to reel tape.

To screen the prerecorded information, the tape was played back on a different deck, which was connected to a monitor or a television set via RF converter. The playback deck was A/C powered, and offered basic play, fast forward and rewind capabilities. It was not possible to still-frame the image accurately, nor did it have scan mode capability.

Several factors influenced the rise of individual and group or collective activity in the production of television. The cost of the system was within the range of possibility. The system was portable and not limited to use in a studio. Videotape was inexpensive compared to film stock and processing. But mainly it was the lure of being able to make television without the constraints of the television industry or cultural censorship.

Groups formed to try to develop alternative information that they hoped would affect the television industry.

To distinguish between the two ideas the term "Video" became synonymous with the alternative television movement.

The **CV** portapak was the first availible form of individual television production and has evolved into what is now known as the camcorder.

EXPERIMENTAL TELEVISION CENTER LTD.
180 FRONT ST.
OWEGO, NEW YORK 13827
607-687-1423

received
April 8 '92

Tapes
     Gary Hill   Videogram 1980 6:50

     Walter Wright Dolphin 10/7/72 12:00
                    Mahavishnu 11/5/72 2 tapes each 30:00

In the Center's collection we have Walter's originals, the complete works of
Barbara Buckner and the tapes below.
   Wright
     Rutt Laboratories 12/24/72 20:00 original Steve Rutt labs
     Dead Wasp 8/19/73 30:00 his first tape on Paik/Abe video synthesizer
     Colorizer Test 4/16/75 10:00 his first tape on Jones colorizer
     Dream 7/4/75 12:00 first edited work on Jones colorizer
     David's SAID 12/75 30:00 may be David's prototype for Gary Hill

   Barbara Buckner Pictures of the Lost 1978 23:00 P/A

   Nick Ray You Can't Go Home Again   1972 c unedited (of Rebel Without a
Cause fame); processed film imagery for film shown in Cannes, produced while
Ray was teaching at SUNY-Binghamton

   Rudi Stern with Walter Wright Mime 1973 c Paik/Abe

   Ralph Hocking Transparent Body 1973 c Paik/Abe

   Don McArthur Computer Controlled Synthesis 1976 b/w lecture at Everson
                Museum, shot I think by Peer Bode 90:00

   Cloud Music at ETC 1976 b/w performance at ETC

   The Making of the Selling of NY   1972 b/w   60:00 unedited about Paik's
production with WNET at the Center. Done because the Lab's Paik/Abe wasn't
completed.

   Vasulkas at ETC 1972 b/w workshop at ETC

   ETC systems explained 1977 and 1979 by Sara Hornbacher, Rich Brewster

   David Jones A Tape for Ralph and Sherry 1977 David's machines by David

   Ken Dominick Video Bed colorized and b/w versions on "Paik's" bed
                installation

   Arnie Zane and Bill T Jones Works 1971-73 b/w mostly non-processed; have

other later works, using processing, of dances
at ETC by Zane/Jones.

Jean Pierre Boyer Video Post Card b/w N.D. about the Center
Inter-face After Ace 1976 Rutt/Etra images colorized
at ETC

These tapes haven't been played in many years; if you are interested in
anything, we would need first to see if it is playable and transferrable.

Schematics
Paik Abe colorizer   schematics sent with machine
CVI camera and quantizer copied; to be sent
SAID we have no documentation
Rutt/Etra you already have
Putney we have no documentation

Xeroxes and "photos" of ephemera are in progress

606 VIDEO QUANTIZER

Srw #	REMARKS	S/N	MODEL		DATE
163	W-P AFB	001	21 Chan		1-15-70
162	Hyer	002			1-15-70
574	U of Iowa	003			1-15-70
310	Integrerad, Sweden	004			3-1-70
	IBM	005			3-1-70
268	Telejockey	006	A *		4-2-70
372	U of San Diego	007			4-2-70
255	Rensselear	008			4-2-70
385	KGM, England	009			4-2-70
270	WFAA - Dallas	010	A *		10-20-70
450	Ft. Geo. Meade, MD	011	A		12-14-70
*	Salvaged Richard Taylor	012	-5 Slicer		12-14-70
	??	013			
390	Brown Boveri & Co, Switzerland	014			9-13-71
389	Lockheed Missile + Space	015			9-13-71
459	Univ of Illinois	016	P		9-17-71
420	LDS Hospital, Salt Lake City	017			9-17-71
422	Hughes	018	C		11-22-71
1240	Jorgen Andersen	019			3-10-72
576	Cramer	020			4-24-72
548	Dupont	021	A		4-24-72
711	Marshall Space Flt Ctr	022			4-24-72
711	" " " "	023			4-24-72
493	Datex	024	A		4-24-72
820	KODAK	025	"C"		6-8-72
1158 553	Museum of Science (Boston) Tech Corp	026	A		8-28-72
670	Tech Corp	027	A		1-30-73
701	DIAMOND Power Specialty Corp.	028	A		4-25-73
735	Marshall Space Flt Ctr, NASA	029	STD(16)		6-5-73
863	Raytheon	030	" "		6-26-73
1020	Mass. Analy - John Roach.	031	" "		7-10-73
1130	IBM - Fishkill	032	" "		1-22-74
1099	IBM - Owego. ? ETC	033	"C"		3-26-74
38	Sperry	034	"		"
1456	Colo Camellia - Mexico	035	"		"

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Ars Electronica Exhibition June 1992
Equipment Inventory

Note: All measurements in inches and pounds

	Height	Width	Depth	Weight	S/N
Paik/Abe Video Synthesizer	10.5"	19	12	21	none
Control Box	4	19	12	8	none
Paik Scan Processor (Wobbulator)					
Display	10	18	29.5	35	SMC156B
Control Box	4.5	14.5	10	5	none
McIntosh Amp Model MC-60	8.5	14.5	10.5	50	1950
Heath Kit Amp Model AA151	5.5	16	12	25	none
Rutt/Etra R/E-4					
Control Box Oscillators	9	19	15	14	none
Control Box Display	9	19	21.5	22	none
Ramps	4	19	12	4	none
Audio Interface	5.5	19	9	6	none
Power Supply	9	19	20.25	35	none
Display	9	19	16.25	24	none
Tube 1040AKB4	11	8	7	2	9006
Colorado Video Data Camera 502	6	6	12	6	019
Control Box	4	19	12	8	019
Power Supply	4	19	15	12	019
Colorado Video Quantizer 606C	12	19	12	21	033
Encoder for Quantizer	4	19	12	8	none
Colorado Video Control Box	5	14	10	8	none
Putney					
Main Unit Synthi VCS3a	17.5	17.5	17.5	20	189
Keyboard Synthi Model DK2	3.5	30	9.25	11	2387
Pitch to Volume Model 739/3	3.25	20	7.5	7	5266P
Cables					
Spatial and Intensity Digitizer					
Main Unit	20	21	12	25	none
Control Box	5	14	10	8	none
Output Amp	5	14.5	12	6	none

Ars Electronica Exhibition June 1992
Equipment Inventory
Page three

	Height	Width	Depth	Weight	S/N
ETC CCU					
5 units (each)	8	10	3	4	none

Cables
   `Rutt/Etra
Paik Scan Processor
Putney
CVI Data Camera
10 pin camera cables 16 units
Paloma cables for R/E 27 units

3/29/92

Ars Electronica Exhibition June 1992
Equipment Inventory
Page two

	Height	Width	Depth	Weight	S/N
Portable Cameras					
21 units (each)					
AVC 3450 #12783	8	6	9.5	4	
AVC 3400 #42323					
AVC 3450 #11033					
AVC 3450 #34557					
AVC 3400 #11013					
AVC 3450 #13546					
AVC 3450 #18272					
AVC 3450 #16443					
AVC 3400 #29678					
AVC 3400 #32912					
AVC 3400 #53153					
AVC 3400 #42917					
AVC 3400 #45381					
DVC 2400 #26782					
DVC 2400 #27731					
SONY #ETC82					
SONY #ETC83					
SONY #ETC84					
AVC 3400 #29964					
AVC 3400 #26155					
AVC 3400 #51129					
Portapack Lenses					
20 units (each)					
SONY Zoom #780679	5.5	2 diameter			
SONY Zoom #134383					
Canon Zoom #18247					
SONY Zoom #182229					
Canon Zoom #61748					
SONY Zoom #410430					
Canon Zoom #22004					
SONY Zoom #1470					
SONY Zoom #205819					
ʼnon Zoom #23281					
ʼY Zoom #412068					
Zoom #811463					
ʼom #126826					
ʼʼ #772252					
#772492					
ʼ11924					
ʼ0602					
ʼ85					
ʼ					

The MACHINE IN The BARN, RASTER Controller,
WAS GIVEN TO ME BY BARBARA BUCKNER.
JT WAS GIVEN TO HER BY EITHER RUTT or ETRA
It WAS AN EARLY prototype For The R/E
BARBARA DID NOT BUILD It — This is
My UNDERSTANDING — I HAVE pictures
Of it For You. I HAVE 21 CAMERAS
That ARE working, I'll SEND Them ALL.
Should have WEIGHTS + MEASURES BY
Tomorrow. ARE You SENDING TAPES?
The HEAVY ITEM is A 60W McIntosh Am
For The WOBB. 45 LB — TUBES — It Is The
only Thing that will Drive The HANDWOUND coil
A McI 30 WATT would work, is lighter Do you have
            anything Like that?

received

2/15/92

Dear Woody,

We are and have been and will be amateurs, you understand. amateur [F,fr.L **amator** lover, fr. **amatus**, pp. of **amare** to love]

Gus has consulted with his IBM employed girlfriend (he calls her her) She (her) say´s her half of the Suburban is not to be used for our purposes. Her reasoning is connected to this machine lasting until her retirement and our proposed trip will wear the thing out quicker. Gus is not prepared to argue since she has more money and control than he has. BUT, he will drive his not so good looking but it will make it station wagon instead. The only problem is that it is smaller. The Cloud/Moog stuff might make it impossible. Give me exact measurements of them if you still want him to go south. I would trust him without hesitation to get the stuff there. He is an ex-paratrooper, knows more about internal combustion than either of us, guards with ferocity his friends, is absolutely suspicious of what he doesn´t understand, traps, hunts, trains dogs, loves his mother´s memory, and is a person who will do what he says he will do. Don´t worry, measure. Quick.

love,

BINGHAMTON
NO^P

Some thoughts,

MAKE the credit line Read |
ETC AND SUNY NOT ETC, SUNY.

IN Relation to the PUTNEY —) also have
a Synth. — interested ? —NO KeyBoard)

BARBARA Buckner has NO R/E — I
Bought it from her. —— WNET HAS
                            NOT — I HAVE IT

STILL weighing + measuring

More Soon

March 12, 1992

Experimental Television Center Ltd.
Fax. 607/687-1341

Dear Ralph,

The Austrians are holding us hostage. No more dough until they have a complete list of equipment with their sizes, weights and insurance values. I know that Woody has talked to you about transporting all your goodies sometime soon (circa March 15th) to David Muller - our technician in Iowa. David says that he's ready and has a good, safe place to work on them.

And, so. Do you have a scale, or some way to give us approximate sizes and weights? Next - Is there any trusty student willing to drive your stuff from Binghampton to Iowa City? If so - great! If no - we'll need to make arrangements to ship, for which I will need the same information. North American Van Lines has air ride trucks for specialty loads - electronics, art, antiques, etc. I used them when I was a curator at the University of New Mexico. They will also need to know if and how machines are packed. Woody has purchased some very fancy aluminum packing cases from Los Alamos salvage for the packing and shipping to Linz. An experienced fine art packer here will develop the system of bubble wrap and custom-cut foam to pack the pieces for final shipping.

The items that we are depending on you to send are:
Paik/Abe Video Synthesizer
Paik's "Wobbulator"
CVI Quantizer
CVI Data Camera
Putney Synthesizer
Rutt/Etra Scan Processor
MacArthur SAID (Spatial and Instnesity Digitizer)
Lots of camera - all of the seventeen lightweight black and white cameras that you have in working condition

I'm also sending the data sheets for each tool that we are trying to complete. As you know Woody wants as complete a documentation on each machine as possible for the catalogue and laserdisc. We need photos taken of the makers at the time of their inventions. Woody said you were photographing each tool now. Woody is also curious if you have a photo of Barbara Buckner's machine that illustrates her idiosyncratic - anti-craft approach.

With gratitude,

3/9/92
Dear Woody,

And now for politics. The University administration has mini orgasms every time there is a mention of the university in print. One time one of the ex deans sent me a letter describing his disappointment that the university wasn't mentioned in an article about the TV Center. I replied that I thought he was being shortsighted and P/R was not the only reason for existence. He is gone, I am still here listening to new people rant about P/R. So.. if it is possible and appropriate for some mention of the university, ie; The Cinema Department of The State University of New York (SUNY) at Binghamton has contributed to the exhibition. Some of the cameras were actually from the university but keep it nebulous. Or if you mention me add that I am Professor, Chairman of Cinema at SUNY Binghamton. Whatever. If it will not fit I am not demanding anything. I don't have sympathy for this group. They are heading toward an existence based in marketing and free enterprise and away from the state support that we once had. The culture is fucked up. Not much hope for the immediate future. Maybe it is time to look at the past.

Cameras: From looking at your drawings it seems you will need about 12 to 17 cameras. I can do that and a couple of spares. One issues is that the early CMAs had sixpin in/outs so something needs to be modified for their use. Another thing is that the CMA 6 (I have 3) are for color and take up a lot of room for what you get. I think it would be easier to build a unit for each installation. 12 volt Power and a box to distribute sync and get out video. It's a matter of a few connectors and a small circuit to reverse sync for the Sonys. The setups that need only one camera can be covered by the small CMA's I have. So....

R/E	2 Cameras (have cma's or build unit)
Brown/Segal	4 Cameras (build unit)
P/AVS-Wobbulator	4 Cameras (build unit)
SAID	1 Camera (have cma)
Data Camera	
feeds Quantizer	No camera or CMA but needs sync
Jones line buffer	1 Camera (have cma)
McArthur/Shier	4 Cameras? (wild guess) (build unit?)
Beck	No idea

By building some stuff we can standardize the connectors and cables. The unit I have in my system is a bit funky and requires two cables instead of one. I have only 4 cables built for it so I would have to build 3 more. I have enough 12v supplies or can buy good ones locally for about 20.00. I makes sense to make these boxes if we are thinking of continuing the adventure after June.
David is working on the interface for the data camera and Rich will be finished this week with P/A-Wobb rebuild and interface. The camera boxes shouldn't take long. What do you think?

received
March 3 '92

3/2/92
Hello Y'all,

A report:

Rich Brewster was offered the job of driving stuff to you, working for a week or two and became excited. Two days later showed up to pick up stuff to fix and said he thought it over and decided he was too old. David Jones was approached with the same idea and he to decided against it. Similar understandings. I still have these young, virile, tumescent, males ready to go (I think my student Dan is trying to talk his cousin into the trip, no cost to us).

In the meantime, Rich has P/AVS to reconstruct, in addition to Wobbulator and he is constructing a public interface that will allow control over oscillators and raster flips right-left and top-bottom.
David has the Don SAID and is going to try to do it.
He also has CVS Data comera and will try to construct an interface to control the deflection circuits. Oscillators and amps in a box extended 6-10 feet.
No way we will extend Quantizer controls.

Questions still about CV Slow scan Me or you? What else? Portapak Cameras? If so How many? Where are we? My list is:

        P/AVS
        Wobbulator -- with all stuff needed
        CVI Quantizer
        CVI Data Camera
        Putney
        R/E
        SAID (Maybe)
        Photos of old R/E Early machine (6x9)

        other stuff follows.

                        love,

SECTION 1

GENERAL DESCRIPTION

1.1   INTRODUCTION

This instruction manual is to be used as a guide to the installation, adjustment, operation, and maintenance of the CVI Model 606C Video Quantizer.

1.2   PURPOSE OF EQUIPMENT

The Model 606C is an instrument designed to process the greyscale characteristics of a monochrome video input signal in order to achieve radical alterations in output linearity or, alternately, to synthesize color signals from different shades of grey.

The unit operates on the input video signal by selecting from 1 to 21 separate narrow "slices" which are adjustable to any amplitude level between black and white. Selection of the thresholds may be on a linear, logarithmic, antilog, or other arbitrary basis. An integral patch panel provides a means of combining the outputs of the 21 quantizers to achieve a wide range of visual effects. The unit also contains a linear video amplifier, the output of which may be mixed with the quantized signals for additional versatility.

1.3   DESCRIPTION OF EQUIPMENT

The Model 606C Video Quantizer mounts in a standard 19" rack, occupies 14" of vertical space, and utilizes completely solid state circuitry. All major circuit elements are mounted on plug-in cards.

Normal operating and setup controls are front panel mounted, and all signal interconnections are located on the rear of the chassis. BNC connectors are used for video and drive inputs.

1

1.4   SPECIFICATIONS

Size: 14" x 19" x 12"

Mounting: Standard 19" rack

Construction: Plug-in cards, solid state, silicon

Power: 117 VAC, 60 Hertz

Inputs: Video   1V, 75 ohms

                 Ext. Signal   0 to +1V, 75 ohms
                                    DC to 15 MHz

                 Horiz. DR   4V, 1K ohms

                 Blanking   4V, 1K ohms

Outputs: Video Red   1V, 75 ohms

                 Video Green   1V, 75 ohms

                 Video Blue   1V, 75 ohms

                 Sync   3.5V, 75 ohms

Controls: AC Power

                 Input Level

                 Bias

                 Analog Level

                 Quant.: Int/Ext/Test

                 Quant. Thresholds: 1 through 21

                 Quant: Output Level: 1 through 21

                 Red Level

                 Green Level

                 Blue Level

Connectors: BNC

Good evening,

        You are right I don't write clearly. I spent Hours and
Hours after school making loops and other drill like stupidities
because I couldn't get it right. I quit school as a freshman in
high school and joined the navy. american that is. They, among
other things, taught me to type. I should stick to typing.

        I'm looking for clarity. Diogenes i'm not. I am not
critical. The question, a question is; do you want me to make
interfaces to the world from the machines, or do you want me to
describe the functions of the machines, or do you just want me to
send you the machines? Any or all of it is ok with me.

        I have putney including a putney sequencer. AHA he
says. are you using this current list as negotiation or do you
want me to send putney, rutt/etra and all that other stuff?

        We can make a portapak interface for b/w portapak
cameras. I have many cables. At least some. fittings for sync
can be had etc.

        I think this should be the first attempt at history.
You should do this again and generate money for curating to
support you plural and we will cooperate with the collection. We
don't need the money to keep it together.

        A trip would be fun but not mandatory. You should
strike the best deal you can to make happen what you want. We
will support you.

        Many things are coming out of the woodwork because of
these efforts. Most of them cannot be developed for this show.

        Art Hardware???

        A new and much welcomed viewpoint for museums.

        Tell me how far to go how soon, tell me soon, Like
now..

        Communication is such fun. The problem is that we have
not learned to use the phone as well as we use paper. If we all
had autorecord phones then we could refer to conversations as we
do with paper, printout conversations, listen to them again, but
no, we use the conversation machine to transmit paper. Oh well.

                        Love

Feb25/92

Feb-26-92

I'm thinking of hiring a student with VW van (or rental) to drive the stuff to Santa Fe or to Iowa. He is also a good mechanic and could help you build etc. Smart kid. What do you think? I have little in the way of shipping crates and a lot to ship.

The R/Eport:

I have 2.   One is from WNET and has no display. The other is complete, works, no burn prevention circuit, at least the tube is burned. Has an audio interface and ramps.

The quantizer is not the problem. The data camera is. It is a very peculiar machine, not easily managed but I will send it if you want.

Putney is most elegant with keyboard and pitch to voltage converter. I misspoke sequencer. I hope NJP doesn't show up with his piano axe.

On extending controls. How far do you anticipate the public interface from the machine? This will determine the possibility of extending P/AVS, Quantizer, and data camera. 3 Feet, Three Yards? Let me know distance and I'll talk to David about feasibility.

Faxing anytime is ok.

A guy Just called & sold me
a MINI MOOG and a MICRO MOOG.
for 300⁰⁰ for Both, — collecting goes on.

For a total workshop budget in 1974-75 of $3,000 over 1500 people have been reached to date at a cost of less than $2 per person. Four additional workshops have been scheduled for April. Unforseen expenses were incurred this year relating to equipment maintenance and repair: the wear and tear caused by transporting the machine and accidental damage caused by experimentation. These expenses were absorbed by the operating budget of the Center. For this reason an additional item is included in this next year's budget. The stipend covers time spent administering the program and time spent in returning and repairing the equipment between workshop bookings.

> See attachment #1 for a list of workshops
> Workshop Series cost: $5,300
> > See itemized budget

Language Development: As an extension of this year's workshops the Center will replace the Paik/Abe Video Synthesizer with the ETC hybrid synthesizer consisting of the Jones' voltage controlled colorizer and the Intel computer system. The workshops will be expanded to deal with techniques for video synthesis and computer programming - voltage controlled synthesizer modules, interface between synthesizer and computer and computer techniques for composition, using the computer to develop a score for image processing.

An important development at the Center during the 1974-75 period is the hybrid synthesizer system. David Jones has developed voltage controlled circuits for a colorizer module. The colorizer processes four separate black and white video inputs. Each video input has controls for video level, pedestal, key clip, chroma level and red, green and blue color mix. The colorizer can be controlled manually or by the application of a voltage (0-10 volts) at the appropriate control input. Control voltages are generated by an oscillator bank (four low speed oscillators and four high speed oscillators) or by the Intel computer (eight D/A converters). An 8x8 matrix input switcher is also controlled by the computer.

The computer will be used to preprogram a series of images and transformations which would be impossible to achieve with manual controls. The programs can be edited and combined to build completed scores for the synthesizer. Programs will be stored on audio cassettes.

The ability to program will require the development of a special language for the computer and a visual notation system for composition. The language will be based on new programming techniques, control programs for special hardware components such as the 8x8 switcher and the manual controls. Graphic programs will be of a generalized nature and may be easily translated for implementation on similar computer controlled video systems.
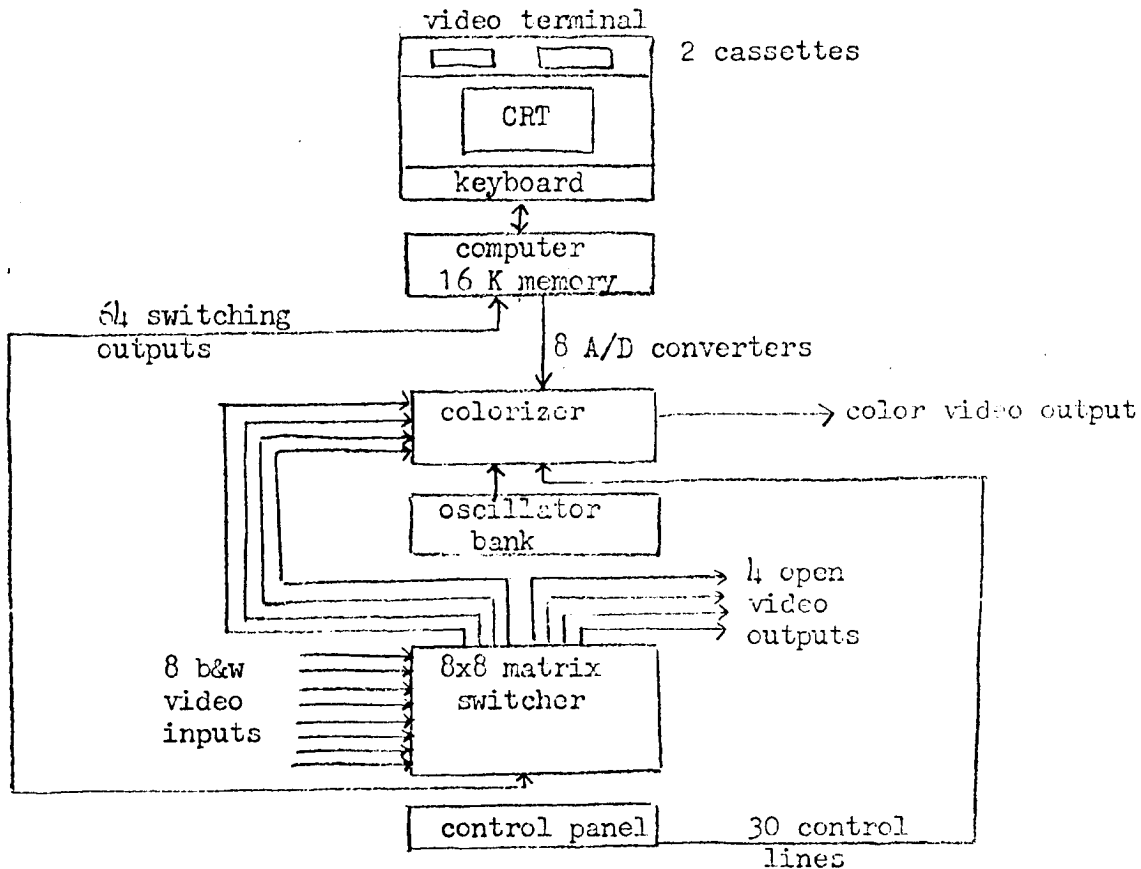
Documentation of circuits, construction techniques, programs and the preparation of manuals for the computer and video modules will be part of this project. This material will be distributed at cost through the Center.

> See attachment #2 for notes on programs to be developed
> Language Development cost: $10,000
> > See itemized budget

Block diagram for hybrid synthesizer:

```
                    video terminal
                   ┌──────────────┐    2 cassettes
                   │ ┌──┐   ┌──┐  │
                   │ └──┘   └──┘  │
                   │  ┌────────┐  │
                   │  │  CRT   │  │
                   │  └────────┘  │
                   │   keyboard   │
                   └──────┬───────┘
                          ↕
                   ┌──────────────┐
                   │   computer   │
     64 switching  │  16 K memory │
        outputs    └──────┬───────┘
                          ↑        8 A/D converters
                   ┌──────────────┐
                   │  colorizer   │ ─────────→ color video output
                   └──────────────┘
                   ┌──────────────┐
                   │  oscillator  │
                   │     bank     │         4 open
                   └──────────────┘         video
                                            outputs
      8 b&w        ┌──────────────┐
      video        │  8x8 matrix  │
      inputs       │   switcher   │
                   └──────────────┘
                   ┌──────────────┐
                   │ control panel│  30 control
                   └──────────────┘     lines
```
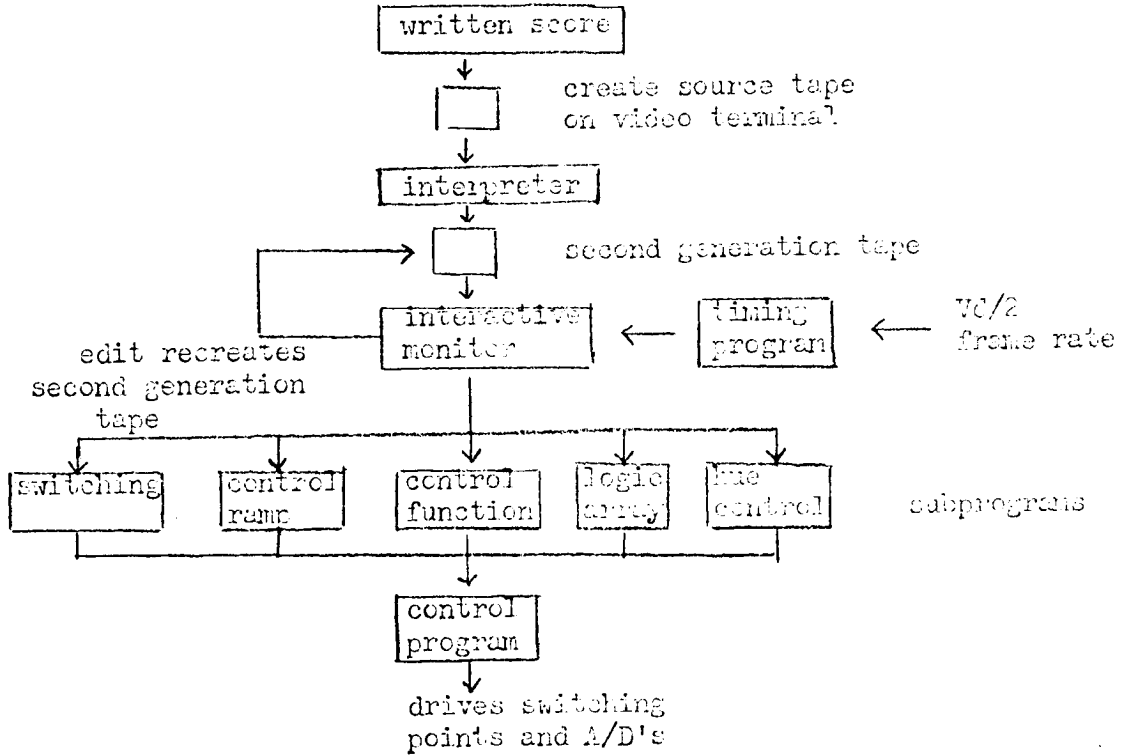
Interpreter is a program designed to translate a source tape of commands and produce a second generation tape in machine language which becomes the score to be used by the Interactive monitor. Commands will specify control sequences such as switching sequences, control ramp generation, control function generation, loading of programmable logic arrays and hue control. This source tape also includes timing information and control level values.

Interactive monitor is a group of programs to play back a prepared score and to edit this score. Switching, ramp generation, function generation, array loading and hue subprograms will translate the commands which make up the score and frame by frame create the address and data words required by the Control program to realize the score.
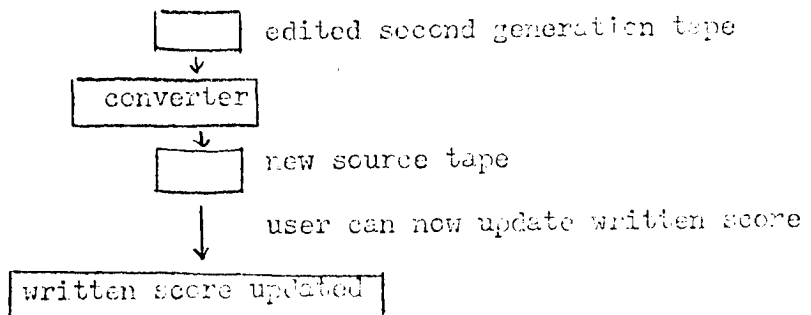
Timing program maintains a frame count. Vd/2 is used to interrupt the Monitor and allow the program to increment a preassigned word in word in memory containing the frame count. Control then passes back to the monitor.

Block diagram of programs

```
                        ┌──────────────┐
                        │ written score│
                        └──────┬───────┘
                               ↓
                            ┌─────┐     create source tape
                            │     │     on video terminal
                            └──┬──┘
                               ↓
                        ┌────────────┐
                        │ interpreter│
                        └─────┬──────┘
                               ↓
              ┌──────────→  ┌─────┐     second generation tape
              │             │     │
              │             └──┬──┘
              │                ↓
              │         ┌────────────┐      ┌─────────┐        Vd/2
              │         │ interactive│  ←   │ timing  │  ←     frame rate
              │         │  monitor   │      │ program │
   edit recreates       └─────┬──────┘      └─────────┘
   second generation          │
        tape                  │
   ┌─────────┬─────────┬──────┼──────┬─────────┐
   ↓         ↓         ↓      ↓      ↓         ↓
┌────────┐┌────────┐┌────────┐┌──────┐┌────────┐
│switching││control ││control ││logic ││line    │      subprograms
│         ││ ramp   ││function││array ││control │
└────────┘└────────┘└────┬───┘└──────┘└────────┘
                         ↓
                    ┌─────────┐
                    │ control │
                    │ program │
                    └────┬────┘
                         ↓
                    drives switching
                    points and A/D's
```

Control program drives the analog to digital converters and switching points. The program outputs an address which specifies a particular A/D or bank of eight switches and a data word indicating voltage level or on/off settings.

Converter is a program which creates a new source tape from a fully edited second generation tape. This is necessary because the second generation is in machine language and must be reformatted as commands for the user to understand.

```
              ┌─────┐     edited second generation tape
              │     │
              └──┬──┘
                 ↓
           ┌──────────┐
           │ converter│
           └────┬─────┘
                ↓
              ┌─────┐     new source tape
              │     │
              └──┬──┘
                 │
                 ↓        user can now update written score
       ┌──────────────────┐
       │written score updated│
       └──────────────────┘
```

Composition programs will be developed for use on larger computer systems:
programs to randomize a score, automatically generate control sequences,
generate transformations between sequences or images and data structuring
techniques to organize sequences or images.

Attachment: Itemized Budget

	Workshop	Language Development
Stipend:		
Walter Wright	3,500.00	$2,500.00
Travel:	1,500.00	
Video parts:		1,000.00
Printing:publications		2,000.00
Maintenance and repair	300.00	
Equipment:		
Video terminal with cassette memory		500.00
Intel Computer system 8 D/A 64 switching outputs		2,500.00
Matrix Switcher		500.00
Color sync generator		500.00
Cameras		500.00
	$5,300.00	$10,000.00

Attachment

Don McArthur has been working at the Center for about six months. In this time
he has designed and partially constructed the Spatial and Intensity Digitizer
which is considered by several artists to be a major step forward in the
development of systems for the artist. A videotape will be sent to the Council
under separate cover which illustrates the machine in operation. His extensive
background in the area of theoretical physics and his work with computers as
well as his open and creative approach to systems design make him a unique and
extremely valuable contributor to the development of video art tools. In the
time that he has been with us he has had a powerful influence on the directions
of the Center and has encouraged us to carefully consider the needs of the
working video artist. We have long felt that the artist needs innovative tools
with precise control, and Don has the knowledge and interest to design these
systems at low cost. As indicated in the Center's proposal one of our main
directions for 1975-76 will be the development of new video systems and the
interface of computer control with image processing equipment such as the
two types of colorizers available at the Center, the Paik/Abe Synthesizer
and the Jones Gray Level Voltage Controlled Colorizer. As these tools are
developed they will be made available to working artists at the Center and
the information will be distributed to interested groups and individuals.
The working relationship of Don McArthur, Walter Wright, Steina and Woody
Vasulka, Nam June Paik and David Jones which the Center hopes to support will
prove to be a vital influence on the evolution of the art. Don McArthur is
central to this productive relationship, and we ask the Council to help sup-
port him. It should be noted that the Center intends to seek further support
from other foundations, particularly the Rockefeller Foundation, for the
support of Mr. McArthur's projects.

The goal of this project is the development of a system for synthesizing, processing and controlling video images with greater flexibility, reproducibility, and precision than is presently possible. To extend the range available to the artist for image processing and generation, new components will be designed for the system and will include spatial and intensity digitizer, function generator, digital memory, analog to digital converter, digital to analog converter, sync generator with gen lock, time base correction and chroma keyer. The system will also consist of conventional processing devices such as colorizers, keyers and special effects generators. The processing components require control signals which can be controlled by the artist using the computer interface.

The flow of information is shown in the attached diagram.

The video image is produced by an electrical signal; for a picture with fine detail the signal must be determining at time intervals of one-ten millionth of a second (100 ns). Consequently the artist must have devices which produce control signals at this rate in order to have maximum control of image production. These signals will be generated by control modules which are themselves controlled by signals from the computer. The computer processes information given to it by the artist in the form of program requests and numerical parameters. This information is analogous to a musical score. The computer behaves as an orchestra conductor in giving instructions to the control modules as required by the score but no faster than one set per frame. The control module, instrument operator, then executes the instructions producing point by point control signals for the processing modules. The processing modules correspond to the musical instruments in the orchestra.

Advantages of computer controlled systems include:
    Low system cost due to economics gained by small amount of general purpose hardware.
    Reliability with fewer control breakdowns
    Flexibility because set of general purpose modules behave in a specific way under computer control
    Speed
    Increased control over production by artists of precise imagery

        Program cost: $14,948.00
            see itemized budget

In March 1975 the Center held a small conference on future developments in video processing and control machines; possible methods of interfacing computers with image manipulating systems were also discussed.

This conference was an outgrowth of discussions between the Center and the Vasulkas. We felt the need to formalize a situation and invite several other people who we felt would contribute toward a definitive plan of development.

We are asking for partial support for the costs of transportation and subsistence to have three similar conferences in 1975-76 at the Center. We intend to publish the result of the first conference as well as the three proposed.

Participants in the first conference included: Woody Vasulka, Steina Vasulka, Walter Wright, Ralph Hocking, Sherry Miller, David Jones, Don McArthur, Nam June Paik and Larry Gottheim. In the proposed three conferences the group would be similar.
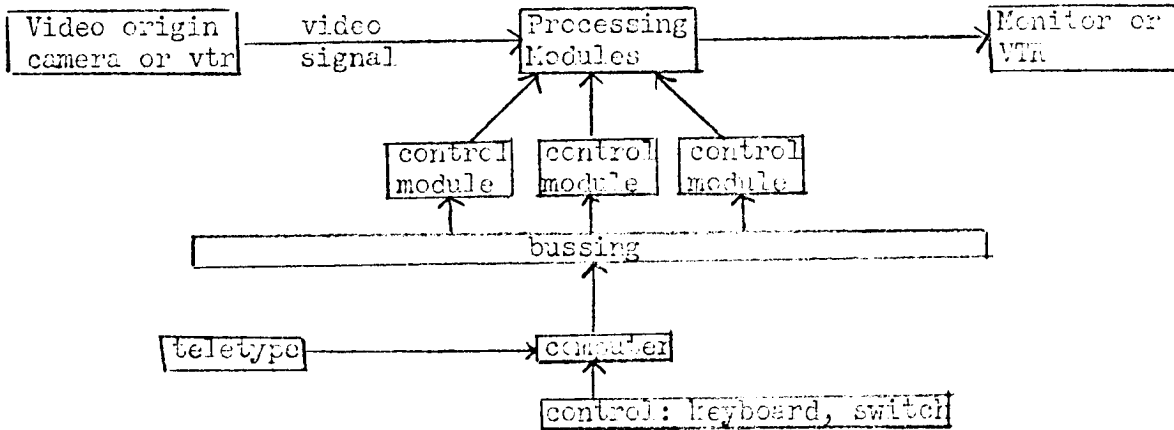
    Project cost: $1,000

Budget

    Travel and subsistence $1,000.00

Flow of Information in System Proposed:

Budget:
    Parts:
        Costs to build following integrated circuits

Programmable logic array	10	$ 50.00
Line storage	2	500.00
Sync generator with gen lock	1	50.00
A/D	2	100.00
Multiplying A/D	4	80.00
Proc amp	2	20.00
Address decoder		100.00
Word latch		100.00
Keyer	4	60.00
D/A converter	50	500.00
		1560.00

        Other necessary parts:

resistors		100.00
capacitors		100.00
connectors		100.00
bins	4	116.00
power supplies	16	800.00
pc cards	84	420.00
switches	84	252.00
solder, wire and hardware		50.00
chemicals to etch printed circuits		200.00

    Equipment: 2138.00

Intel computer	2,000.00
12" Trinitron receiver with monitor modification	450.00
Repair of Textronic scope	500.00
Stipend	8,000.00
Travel and subsistence purchase of parts in Boston area	300.00
	$14,948.00

December 6, 1991
Hey S/W,

        I have a list.

These work I think,

        Paik Abe second or third one
        Jones Keyers & colorizer original prototypes
                Oscilators and Sequnecer
        Rutt Etra one complete, one from WNET no display
        Hearn A&B
        Serge Old ones from Gary Hill & newer ones we built.
        George Brown Keyer

These don't but could.

        First raster scan we built ala NJP. Walter dubbed it
        a "wobbulator".

        McArthur Spatial and Intensity Digitizer. (SAID)

        An early Rutt and or Etra something or other that
        Barbara Buckner left here. A picture enclosed. (Sitting
        next to a couple of wire recorders)

    Lots of early commercial stuff ie a CV portapak in like new
condition. CAT frame buffer controlled by Cromemco computer.
Buchla, Synthi, Arp, etc. Lots of Apple stuff, other computers
etc. Time for inventory. I have a student next semester willing
to do this kind of work but that won't help much now. If you are
mainly interested in the non-commercial stuff then I think that
this list is close. David could be more precise about his stuff.

                        Love,

                        R/S

1971-72
     NYSCA funding to the Center for construction of Paik/Abe Video Synthesizer. One system was designed and built at the Center by Shuya Abe and Nam June Paik for eventual placement at the TV Lab at WNET-TV in 1972.. This system was used while still at the Center to produce a portion of Paik's "The Selling of New York",included in the PBS series "Carousel", broadcast 1972 by WNET. A second system was built for the Artist in Residency program at the Center and used in 72 by artists such as Ernie Gehr, Hollis Frampton, Jackson MacLow and Nick Ray, and also included in an exhibition at the Everson Museum. A raster scan manipulation devise was also constructed, the principles of which were defined by Paik's early tv experiments such as Dancing Patterns.

1972-73
     The Residency Program continued; the system was used by artists such as Tom DeWitt and Bill T. Jones and Arnie Zane, John Reilly and Rudi Stern and Peer Bode. Walter Wright was an Artist in Residence, attached to the Center through funding from the NYSCA. Workshops in image processing were conducted for the New York State Art Teachers Annual Conference, and at the Everson Museum and The Kitchen. Community produced tapes as well as artists' tapes were cablecast weekly in the series "Access", produced by the Center.

1973-74
     David Jones became technician at the Center. Artists participating in the Residency program included Taka Iimura, Doris Chase, and Michael Butler. Workshops in imaging were held regularly at the Center, and also at Global Village and at York University in Toronto.Oscillators were designed for use as signal inputs to the Synthesizer. Initial research into the Jones gray level keyer and production of a black and white keyer. Modification of an existing SEG for direct sync interface with the Paik/Abe, with provision for external wipe signal input.

1974-75
     Workshops and performances based on image processing were conducted at The Kitchen, Anthology Film Archives and the Contemporary Art Museum in Montreal. NYSCA supported a series of travelling performances by Walter Wright on the video synthesizer. Over ten organizations throughout New York State and Canada took part. The workshop program at the Center continued. NYSCA provided funding for the development of the Jones Colorizer, a four channel voltage controllable colorizer with gray level keyers. The oscillator bank was completed and installed. The SAID (Spatial and Intensity Digitizer) was developed by Dr. Don McArthur (by April 75), as an outgrowth of research on b/w time base correction. Work was begun by David Jones, Don McArthur and Walter Wright on a project to explore computer-based imaging, and the interface of a computer with a video processing system. Artists in Residence included Neil Zusman and Gary Hill.

1975-76
     The Residency Program included artists Nam June Paik, Phil Jones of Ithaca Video Projects, Ken Marsh and Ken Jacobs. The NEA in 1975 provided support for initial research into the computer-video processing project, which was expanded by Jones, McArthur, Wright and Brewster to incorporate parallel research efforts by Woody and Steina Vasulka and Jeffrey Schier. The LSI-11 computer was chosen as the standard. Jones developed hard and

soft edged keyers and a sequential switcher, which along with the Jones Colorizer was incorporated into the processing system. A commercially available SEG was modified to incorporate these keyers. A 64 point switching push button switching matrix was designed and built. We began to write a manual, developed initially to be used as a operator's guide to 1/2" reel to reel equipment, porta paks, editing equipment and the like. The concept was later broadened to include step-by-step construction information on a Paik Raster Control Unit. By 1985, the information was expanded to include systems structure and theory of electronic signals and processing techniques. These manuals have been distributed to many individuals and organizations over the years. Cloud Music by David Watts, David Behrman and Bob Diamond presented at ETC.

1976-77

Artists such as Barbara Buckner, Aldo Tambellini, Nam June Paik and the ADA continued to participate in the Residency Program. The computer project continued. The exhibition series, Video by Videomakers, was begun, introducing to this region video works by Beryl Korot and Barbara Buckner. The computer was installed as part of the system and made available to artists; software research began. For the second year, we conducted a series of workshops in school districts throughout the region, in collaboration with Binghamton's major arts center, the Roberson Center.

1977-78

NYSCA funding helped support the development by Jones and Richard Brewster of the Analog Control Box, allowing the production of electronic sounds and also signals which controlled parameters of the video signal. The computer project proceeded, assisted by Paul Davis, then director of the student computer lab at the School for Advanced Technology at SUNY-Binghamton. Artists in Residence included Shalom Gorewitz, Sara Hornbacher, Hank C. Linhart and Hank Rudolph. We conduct workshops for the City of Binghamton, Headstart, Tri Cities Opera, 4H Program and Center for Media Studies.

1979-80

The processing system computer is the Z-2, an 8 bit system with an S-100 bus, and dual floppy drives. A CAT digital frame buffer is interfaced to the computer; at the time this is one of the only commercially available "low-cost" digital devices which has incorporated concepts of video, and recordable signal output. The Z-80 is interfaced also with the analog box. Software begins to be developed for specific video uses. Artists include Alan Powell and Connie Coleman, Charles Atlas, Victor Velt, Jud Yalkut and Ren Weidenaar. "The Electronic Workshop" was a series of lecture/demonstrations concerning image processing for 17 organizations around New York State

1980-81

The need for artist-oriented software increases. The Print Program is developed by Jones, allowing artists to develop videographic still frames, captured on disk, then printed out with variable gray level control. Additional software is developed by graduate-level interns under the direction of Davis and Ralph Hocking. Artists include Dan Reeves and Jon Hilton, Celia Shapiro and Peter D'Agostino.

1981-82
Artists include Frank Dietrich, Thierry Kuntzel, Alex Roshuk and Matt Schlanger.

1982-83
        NYSCA provides funding for a General Purpose Interface Board, which interfaces analog imaging equipment with an 8 bit computer, allowing manually-changed knob settings to be "remembered". Jones and Peer Bode collaborated on the initial research for a real-time frame buffer, which digitizes in real time analog video images, with a resolution of 256x256, 16 shades of gray. The Pattern Program, a software project, is designed an an internship project by Master's candidates at SUNY. Patterns or textures can be drawn and then stored and used as movable matts or windows.Artists include Nancy Buchanan, Amy Greenfield, George Stoney, Barbara Sykes and Ann Wooster.

1983-84
        Along with Matt Schlanger, Jones continues work on the Four Board Project, a four channel colorizer, keyers, multi-channel programmable sequencer, and oscillators. One intention of the project, in addition to providing equipment for the Residency Program, is to define a comprehensive, low-cost imaging system and to then help artists to acquire or to build the tools. We begin to study the newly available Amiga computer. Artists include Shigeko Kubota and Paul Garrin, and Arthur Tsuchiya.

1984-85
        The Four Board Project is completed and the devises are installed at the Center. Jones and Schlanger begin work on the documentation, later assisted by Coleman and Powell. The equipment manual is revised to include the new tools, and to explicate such processes as keying, colorization, switching. Artists include Merrill Aldighieri and Joe Tripician, David Blair, Peter Rose and Kathy High.

1985-86
        The Four Board Project is premiered at the Media Alliance Annual Conference at The Kitchen. NYSCA funds the development of a black and white frame buffer by Jones and Peer Bode to be interfaced to the Amiga computer. Artists include Linda Gibson, Lee Eiferman, Richard Kostelanetz and Roberts and Ghirardo.

1986-87
        The Print Program is revised for the Amiga. Customized software is devised to allow the computer to control the frame buffer. With support from the NYSCA, the Amiga is expanded with gen-lock and additional memory. Artists include Irit Batsry, Jon Burris, Phil Edelstein, Alex Hahn, Michael Schell, Mary Ann Toman and Charlie Woodman.

1987-88
        We work on devising educational strategies to help artists to become fluent on the computer and digital devises as quickly as possible. A second Amiga is added to the system, one dedicated to buffer control, and one for videographics and audio software and control. Artists include Shu Lea Cheang, Bob Doyle, Ernie Gusella and Barbara Hammer.

1988-89
   The audio section of the system is expanded to include a Mirage and mixing capacity. We begin work on MIDI and control voltage exchange boxes. Artists include Laurie Beth Clark, Peter Callas, Vanalyne Green, Jon Knecht and Sherry Millner.

1989-90
   The audio system continues to be expanded. With NYSCA support Megan Roberts and Ray Ghirardo design a digital interface to allow a computer to control multiple audio and video playback sources in three dimensional arrays. Artists include Benton Bainbridge, Kevin Cook, Francis James, Bianca Miller and Eva Schicker.

1990-91
   With assistance from the NYSCA, a third Amiga is to be added, along with the Toaster, to further expand the digital imaging potential of the system.

R&D Program Concepts:
   1. Modification of existing equipment: to expand its capabilities; to bring out all possible controls to the artist.

   2. Design and construction of image processing equipment: to expand the Center's system; to make equipment and/or information available to individual artists.

   3. Development of print information and educational strategies to teach artists and others the principles of image processing; to encourage artists to approach video as a directly mediated art practice; to encourage artists to use tools themselves in art-making; to encourage artists to build or purchase equipment for their personal studios.

Design Considerations:
   Flexibility; low cost; ease of use; greatest number of possibilities for image and sound generation, manipulation and control.

Paik/Abe Video Synthesizer

1968 funding to WGBH from Ford Foundation to work with artists
     Paik and Abe design VS
1969 this led to "The Medium is the Medium". WGBH
     first Paik/Abe VS built at WGBH
1970 first synthesizer to be used for broadcast TV in Video Commune, a four
     hour live show using Beatles music, WGBH
1970-71 California Institute of Arts - some PAVS built by students, with
     Shuya Abe.
1971 ETC begins to build 1st PAVS for WNET and 2nd for ETC. Funding for ETC
     from New York State Council on the Arts.
1972 WNET system used by WNET at ETC for"Selling of New York".
     ETC builds second system for ETC.
     WNET system placed at TV Lab.

Paik Scan Processor

1963 Cologne experiments: use of sound to distort image; use of microphones to do same. Use of B/W tvs. Exhibition EXPosition of music ELectronic television, at Galerie Parnass, Wuppertal, Germany. Text of experiments printed in Fluxus, June 1965 issue.

1963-64 Paik met Shuya Abe; experimented with color sets.

1965 exhibition at New School, New York City; altered tvs
      exhibition at Bonino Gallery magnets to distort raster.
      essay in Flykingen Bulletin

1966 Paik discovers or names "dancing patterns", produced on color tvs by audio signals as inputs.

1968 Stony Brook, research supported ny Rockefeller Foundation
      Bonino Gallery exhibition of results of research above; Marshall McButterfly, magnetic distortions of McLuhan's image

1968-70 Museum of Modern Art; Howard Wise; other exhibitions

McArthur Spatial and Intensity Digitizer

1975 Don McArthur completes work on SAID, begun as experiment in construction of low cost black and white time base corrector.

1975-77 McArthur works at ETC (Fall 75 to Fall 77) and with Vasulkas on development of computer-based video system, LSI-11