

PROJECT ADMINISTRATION DATA SHEET

ORIGINAL  REVISION NO. \_\_\_\_\_

Project No. A-3651 GTRI/~~XXX~~ DATE 9 / 21 / 83

Project Director: Michael J. Sinclair ~~XXX~~ Lab EML

Sponsor: IVEX Corporation

Type Agreement: Standard Research Project Agreement

Award Period: From 9/9/83 To 9/8/84 (Performance) \_\_\_\_\_ (Reports)

Sponsor Amount: 3-30-84 This Change Total to Date

Estimated: \$ \_\_\_\_\_ \$ \_\_\_\_\_

Funded: \$ 529,173\* \$ 529,173

Cost Sharing Amount: \$ \_\_\_\_\_ Cost Sharing No: \_\_\_\_\_

Title: "Interactive 3D Video Investigation and Prototype Construction"

ADMINISTRATIVE DATA

OCA Contact Frank Huff

1) Sponsor Technical Contact:

2) Sponsor Admin/Contractual Matters:

Mr. Ilow Roque

ATDC

IVEX Corporation

9211 Holyoke Court

Indianapolis, IN 46268

Defense Priority Rating: \_\_\_\_\_ Military Security Classification: \_\_\_\_\_

(or) Company/Industrial Proprietary: Non-disclosure agreement\*

RESTRICTIONS

See Attached \_\_\_\_\_ Supplemental Information Sheet for Additional Requirements.

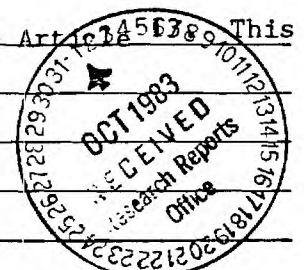
Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of \$500 or 125% of approved proposal budget category.

Equipment: Title vests with N/A; none proposed. All items in proposal budget treated as M&S.

COMMENTS:

Company has agreed to pay \$30,000 for patent and data rights. See Art 12.15. This is in addition to project funds of \$529,173.

**\*\*Non-Disclosure Agreement negotiated.**



REFERENCES TO:

Project Director  
Research Administrative Network  
Contract Management

Procurement/EES Supply Services  
Research Security Services  
Reports Coordinator (OCA) ✓

GTRI  
Library  
Project File

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

SP 458  
8-19

Date 4/2/86

Project No. A-3651 ~~XSXXX~~/Lab EML

Includes Subproject No.(s) N/A

Project Director(s) M. J. Sinclair GTRC/XGM

Sponsor IVEX Corporation

Title "Interactive 3D Video Investigation and Prototype Construction"

Effective Completion Date: 3/30/84 (Performance) \_\_\_\_\_ (Reports)

Grant/Contract Closeout Actions Remaining:

IMPORTANT NOTE: NO DOCUMENTS OF ANY KIND ARE TO BE SUBMITTED DIRECTLY TO SPONSOR. ANY DOCUMENT ANYONE HAS FOR SPONSOR MUST BE ROUTED THROUGH LEGAL DEPT., ATTENTION MICHAEL DREW SINCE THIS PROJECT IS INVOLVED IN LITIGATION.

- None
- Final Invoice or Final Fiscal Report
- Closing Documents
- Final Report of Inventions
- Govt. Property Inventory & Related Certificate
- Classified Material Certificate
- Other \_\_\_\_\_

Continues Project No. \_\_\_\_\_ Continued by Project No. \_\_\_\_\_

COPIES TO:

- Project Director
- Research Administrative Network
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- Procurement/EES Supply Services
- Research Security Services
- Reports Coordinator (OCA)
- Legal Services

- Library
- GTRI
- Research Communications (2)
- Project File
- Other M. Heyser
- A. Jones
- R. Embry

TECHNICAL REPORT #1

AND

COST AND PERFORMANCE REPORT #1

Report Period

September 9 through September 30, 1983

MICHAEL J. SINCLAIR

Purchase Order

EES Project A-3651

Effective Date: 9 September 1983

Expiration Date: 9 September 1984

Prepared For

IVEX Corporation  
9211 Holyoke Court  
Indianapolis, Indiana 46268

Prepared By

Engineering Experiment Station  
Georgia Institute of Technology  
Atlanta, Georgia 30332

## PROJECT STATEMENT

This project is comprised of a three month investigation followed by a nine month hardware construction phase of an arcade quality three dimensional (perspective 3D, not stereo) interactive video game. The efforts of the project will be toward the production and eventual manufacture of a device that gives the player the illusion of piloting a vehicle in a three dimensional theater and having a complete three-space fly around capability. The quality of the video will be much superior to present day arcade games and may incorporate actual video photographically collected by filming a 3D model or actual terrain. In addition to the 3D piloting capabilities, the game will be capable of exhibiting an interesting and competitive game scenario such as chasing and firing upon another vehicle or executing a rescue type mission. Artificial intelligence aspects of the gaming algorithms will be investigated to present a more enticing experience than can be had with arcade games of today. The AI approach will be knowledge based to the extent of being able to learn the capabilities of the player and react accordingly providing an interesting and tempting play for the novice as well as a competitive level of challenge for the experienced player.

The three-space fly around simulation should give the player an illusion of having complete control of his world and no apparent constraints imposed due to shortcomings of the hardware or software. This illusion could be best described as having an immediate access (frame to frame) of an infinite video data base. If, for example, one were to photograph and commit to video storage, every foot increment of the three dimensional Atlanta cityscape, one would have a video frame base of about  $7 \times 10^{12}$  frames (10 X 10 X 1/2 miles), an obvious impracticality in the collection, storage, and instant access of the frame base. The state-of-the-art commercial video disk has the capability of

archiving about 54,000 resolution video frames. A severe compromise must be realized should one commit the Atlanta cityscape to one or a reasonable number of video disks. This compromise may consist of, but not be limited to: a coarser spatial resolution, reduction of the frame resolution, limited access to certain portions of the frame base, video compression techniques, or a reduction of the frame rate.

Frame to frame access time also poses a severe requirement on the frame base retrieval. Most commercially available video or large capacity magnetic disks are restricted mechanically to access times from about 100 msec to seconds (in the case of the PIONEER 7820 computer controlled video disk player).

If one were to shift the burden of storing and retrieval of such a large frame base to a computer generation of the scenes in real time, such as Evans and Southerland's multi-million dollar visual system simulator, real time graphics hardware would be required in every copy of the arcade device - an expensive proposition. The ultimate goal of this project will be to produce a prototype device capable of as many of the desired illusionary requirements as possible as well as keeping the cost of the eventual manufactured unit within reasonable limits.

#### WORK PERFORMED DURING THIS REPORT PERIOD

During this report period a preliminary patent and technical literature search was initiated through the Georgia Tech Library. The subject matter of the patent search was video disks, interactive video disks, and optical storage systems. The literature search consisted of technical articles relating to video disks, interactive video disks, electronic games, video disks in games, video compression techniques, and NTSC video standards and implementations.

Weekly meetings with the project staff were provided for the round table discussions of specific topics and sharing of

thoughts. Major topics to be researched and discussed were:

Graphics and software algorithms	-	Finlay
Video manipulation and compression	-	Tumblin
Graphics and video disk hardware	-	Sinclair
Patent search	-	Becker
Literature search	-	Backhaus
A.I. in gaming and graphics	-	Gilmore
Evans and Southerland demonstration	-	Loefer

Even though it is generally believed that video disk technology will hold the key to this project's success, all aspects of state-of-the-art storage and graphics technology will be investigated. This includes magnetic disk systems, real time graphics, and other video storage and manipulation techniques.

A demonstration and sales meeting will be arranged with Evans and Southerland Company on their high speed graphics and visual systems.

#### PROBLEMS ENCOUNTERED DURING THIS REPORT PERIOD

No problems were encountered during this report period.

**COST INFORMATION**

The following charges have been incurred against the contract for the period 9 September \*through 30 September 1983:

Personal Services (PS)	\$3,274.61
Materials and Supplies (MS)	325.00
Computer	-0-
Fringe Benefits	713.29
Overhead	\$2,130.57
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TOTAL	\$6,443.47

The current financial status of the contract is as follows:

DESCRIPTION	BUDGET	EXPENDED	FREE BALANCE
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Personal Services	\$159,756	\$3,274.61	\$156,481.39
Materials & Supplies	154,900	325.00	154,575.00
Computer	2,000	-0-	2,000.00
Fringe Benefits	37,543	713.29	36,829.71
Overhead	174,974	2,130.57	172,843.43
 TOTAL	 \$529,173	 \$6,443.47	 \$522,729.53

TECHNICAL REPORT #2

AND

COST AND PERFORMANCE REPORT #2

Report Period

October 1 through October 31, 1983

MICHAEL J. SINCLAIR

Purchase Order

EES Project A-3651

Effective Date: 9 September 1983

Expiration Date: 9 September 1984

Prepared For

IVEX Corporation  
9211 Holyoke Court  
Indianapolis, Indiana 46268

Prepared By

Engineering Experiment Station  
Georgia Institute of Technology  
Atlanta, Georgia 30332



### Work Performed During This Period

The literature and patent search is approximately 80% complete with specific selections from the references to be obtained. A graphics and video movie simulator is being constructed of the existing video and graphics facilities of EML for various algorithmic investigations involving scene generation, game description, and tradeoffs in hardware and software. A salesman from Evans and Southerland Graphics and Visual systems gave a video tape demonstration of some of their systems. Of particular interest to this project is the PS 340 which is capable of displaying and manipulating up to 90,000 vectors per second. With an optional frame buffer, the vector figures could be shaded using their firmware. The PS 340 would give the IVEX workstation the capability of generating a vector representation of the game in realtime allowing for the display and change of any flight, object or terrain configuration, or gaming algorithm conceived. The unit with the frame buffer and shading/filling firmware would also be capable of producing the video for generating a 1" video mastering tape for a video disk.

One of the main confirmations of the literature and patent search is that scene generation in realtime is too expensive and impractical for inclusion in each arcade unit and as much off-line processing as possible seems to be the only plan for a manufacturable device to be economically practical. Thus, low cost, high capacity video frame storage will be the project's main key to success. Optical video disks approach filling this requirement. One deficiency in the video disk technology of today is in the area of frame access. Most players require the laser beam reader to be mechanically moved from one track or frame to another by an electric motor causing up to a second delay between frame accesses. A call to Frany Raetzer of North American Philips Corporation in Knoxville, Tennessee revealed that company's soon to be introduced VP 832 video disk player

with instant jump capability. According to Franz, the instant jump is accomplished by a galvanometer scanned mirror to access  $\pm 100$  frames within 5 msec. He also believes that if the optics were redesigned,  $\pm 1000$  frames could be achieved. With this capability, we would have access to a new frame (within the 200 frame instantaneous field of view) every 15 msec using a frame buffer and a 30 msec refresh rate. We will contact Philips for a possible joint engineering development arrangement for Georgia Tech to redesign the optical system.

Problems Encountered During This Report Period

No problems were encountered during this reporting period.

### COST INFORMATION

The following charges have been incurred against the contract during the period 1 October 1983 to 31 October 1983:

Personal Services	\$9,899.53
Materials and Supplies	401.14
Computer	57.66
Fringe Benefits	2,143.45
Overhead	<u>6,175.88</u>
 Total	 \$18,677.66

The current financial status of the contract is as follows:

<u>Description</u>	<u>Budget</u>	<u>Expended</u> (YTD)	<u>Free Balance</u>
Personal Services	\$159,756.00	\$13,174.14	\$146,851.86
Materials & Supplies	154,900.00	726.14	154,173.86
Computer	2,000.00	57.66	1,942.34
Fringe Benefits	37,543.00	2,856.74	34,686.26
Overhead	<u>174,974.00</u>	<u>8,306.45</u>	<u>166,667.55</u>
 Total	 \$529,173.00	 \$25,121.13	 \$504,051.87

TECHNICAL REPORT #3  
AND  
COST AND PERFORMANCE #3

Report Period  
November 1 through November 30, 1983

MICHAEL J. SINCLAIR

Purchase Order  
EES Project A-3651

Effective Date: 9 September 1983  
Expiration Date: 9 September 1984

Prepared For  
IVEX Corporation  
ATDC  
151 6th Street  
Atlanta, Georgia 30313

Prepared By  
Engineering Experiment Station  
Georgia Institute of Technology  
Atlanta, Georgia 30332

### Work Performed During This Period

The literature and patent search is complete and information regarding the latest technology dealing with video disc players, graphics systems, and visual simulation systems have been researched. The majority of the new laser disc players having random access boast of an instant jump capability of about  $\pm$  100 frames within a vertical video interval. It is generally believed that any video rate graphics processor is still too expensive to include in IVEX's production unit though there have been tremendous advances in VLSI technology and graphics engines. The general vehicle behind most visual simulation systems is some sort of high speed digital image processor with a variety of hardware and software tricks to reduce data rates and is beyond the scope of this project.

A Terminus Design, Inc. microcomputer with an Arcade 50 video and sound generation printed circuit board has been purchased to exploit graphic overlays and sound synthesis. Fbasic was also purchased to facilitate programming. This is a modified BASIC process control language which contain verbs to manipulate various registers in the Arcade 50 peripheral. The Arcade 50 board enables the user to synthesize sounds from three separate sound generators and contains a TMS 9918 Video Graphics Generator capable of producing 32 graphic sprites on a overall resolution field of 256 x 192. Preliminary investigation has been initiated toward the purchase of an Evans and Southerland PS 340 graphics system. Some of the features of interest of the PS 340 are:

- 4096 x 4096 resolution
- 4096 colors out of a palette of 16 million
- 45,000 3D vectors per screen
- unlimited coordinate transformations concurrent
- depth queing
- 2 mbyte display list memory

- raster graphics monitor with shading firmware
- vector transformations controlled by rotary knobs.

A stepper motor and linkage system was installed on our Videotek color monitor to achieve image rotation. It was feared that convergence and/or purity would suffer when the yoke was rotated but this was not apparent as acceptable image quality was maintained throughout a  $\pm 60^\circ$  rotation. Work is also being performed on integrating the AP130 array processor into the compilation of the image frames for VISITOR software as it will speed up this process. A video disc simulator has been written and debugged and is presently running on the Nova Eclipse with the DeAnza graphics display system.

A path computer was also written to select the frame base to be incorporated in the simulation. The computer is compatible and runs with VISITOR software. Currently, the software is capable of generating a 128 x 128 x 8 scene approximately every 2.5 minutes with a total frame capacity of about 5000 frames. Atmospheric effects were discussed but will be implemented later.

A full up digital approach is being discussed as a future upgrade. This version will use the optical disc as a digital rather than analog storage medium. High speed image processors will be able to interpolate between frames spaced a considerable distance apart thus enabling an infinite graduation of views anywhere in the data base. The system is based on frame predictors which are capable of deriving the scene content from a frame of reference within the data base with limited input information.

#### Problems Encountered During This Period

The 2.5 minutes per frame requirement to produce a data base places a nine day, 24 hour requirement for completing a simulation of 5000 frames. Investigations will be attempted to reduce this time. No other problems were encountered during this period.

Work to be Performed During the Next Period

Negotiations with Philips will be continued in hopes that a disc player may be procured. A major proof of concept demonstration is planned for late December or early January. Improvements to the existing data base or a new area such as North Georgia or Hawaii will be incorporated. Evans and Southerland will be contacted for information regarding the purchase of a PS 340 system.

## COST INFORMATION

The following charges have been incurred against the contract during the period November 1983 to 30 November 1983:

Personal Services	\$11,051.66
Materials and Supplies	545.19
Computer	180.40
Fringe Benefits	2,373.98
Overhead	6,990.71
<b>Total</b>	<b>21,141.94</b>

The current financial status of the contract is as follows:

<u>Description</u>	<u>Budget</u>	<u>Expended</u> (YTD)	<u>Free Balance</u>
Personal Services	\$159,756.00	24,225.80	135,530.20
Materials & Supplies	154,900.00	1,271.33	152,883.67
Computer	2,000.00	238.06	1,761.94
Fringe Benefits	37,543.00	5,230.72	32,312.28
Overhead	174,974.00	15,297.16	159,676.84
<b>Total</b>	<b>\$529,173.00</b>	<b>46,263.07</b>	<b>482,164.93</b>



TECHNICAL REPORT #4  
AND  
COST AND PERFORMANCE REPORT #4

Report Period  
December 1 through December 31, 1983

MICHAEL J. SINCLAIR

Purchase Order  
EES Project A-3651

Effective Date: 9 September 1983  
Expiration Date: 9 September 1984

Prepared For  
IVEX Corporation  
ATCD  
151 6th Street  
Atlanta, Georgia 30313

Prepared by  
Engineering Experiment Station  
Georgia Institute of Technology  
Atlanta, Georgia 30332

### Work Performed During This Period

A trip to North American Philips Corporation in Knoxville was taken on December 16 by M. J. Sinclair and Ivex personnel to arrange a joint engineering agreement between Georgia Tech/IVEX and Philips. The agreement would be for laser disc player development, especially in the area of track to track access, in return for two VP931 disc players. We met with Franz Raetzer, a video disc design engineer, Frank Kot, the manager of video products; and other engineers to talk about mutual goals and Georgia Tech/IVEX's plans for production. The meeting affirmed that Philips would send two disc players the following week (December 23). No players have been received to date though repeated calls to Philips fail to indicate the problem.

A demonstration is being developed to show a full up implementation of the IVEX arcade product. A North Georgia data base has been acquired and will be incorporated into the demonstration. The elevation will be accentuated to provide for more topographic interest. The colors will be differentiated according to the three bit class and 5 bit grey level classification. The 6809 microcomputer system has been programmed to provide synthetic background sounds of passing objects (terrain) close on the left or right complete with doppler shift. The startup sequence will be turbine type engine warm up with an explosion like sound simulating an afterburner at take off. Left and right control surface servo sounds are also provided for. The microcomputer interfaces a remote joystick to the Nova computer.

A commitment by IVEX has been established to purchase the Evans and Southerland PS340 graphics system. A secure location is now being researched to house the IVEX project and this equipment as well as being able to carry out the rest of the project with a reasonable degree of confidentiality. Sufficient exposure around the laboratory has been observed due to the

nature of this project and it is our opinion the remainder of the project be carried out in a private environment due to the non-disclosure agreement.

Preliminary hardware discussions have started concerning video manipulation. A scheme comprising multiple images per frame with a minimum of hardware required to perform zooming, panning, and tilting has been conceived. Initial contacts have been made with manufacturers making charge coupled devices as well as high speed data conversion devices relating to video storage. The workstation host computer is presently being investigated and the field narrowed down to Digital Equipment Corporation, Masscamp, and Apollo.

COST INFORMATION

The following charges have been incurred against the contract during the period December 1983 to 31 December 1983:

Personal Services	9,861.61
Materials and Supplies	829.74
Computer	0.00
Fringe Benefits	1,700.54
Overhead	6,121.59
Total	

The current financial status of the contract is as follows:

<u>Description</u>	<u>Budget</u>	<u>Expended</u> (YTD)	<u>Free Balance</u>
Personal Services	\$159,756.00	34,087.41	125,668.59
Materials & Supplies	154,900.00	2,101.07	152,478.93
Computer	2,000.00	238.06	1,761.94
Fringe Benefits	37,543.00	6,931.29	30,611.74
Overhead	174,974.00	21,418.75	153,555.25
Total	\$529,173.00	64,776.55	464,076.45

TECHNICAL REPORT #5  
AND  
COST AND PERFORMANCE REPORT #5

Report Period

January 1 through January 31, 1984

MICHAEL J. SINCLAIR

Purchase Order  
EES Project A-3651

Effective Date: 9 September 1983  
Expiration Date: 9 September 1984

Prepared For  
IVEX Corporation  
ATDC  
151 6th Street  
Atlanta, Georgia 30313

Prepared By

Engineering Experiment Station  
Georgia Institute of Technology  
Atlanta, Georgia 30332

### Work Performed During This Period

A full demonstration of the IVEX simulator was presented to officers of the DALECO board as well as Bill Jacobs and John Van Lessen of Mylstar Electronics. The simulation was performed on the Nova Eclipse with the De Anza graphics processor providing the display output which was in turn cabled to a projector CRT for display. Complete sound synthesis was provided as well as image roll corresponding to vehicular banking. The demonstration was well received by all. A high resolution movie was decided on to exploit the full resolution capabilities and frame rate of the final product as well as the possible inclusion of animated objects. The movie is scheduled to complete in early February. The movie will be made in non-realtime using the DeAnza graphics processor and a 16 mm movie camera with single frame capabilities.

The image rotation problem was resolved temporarily but a detailed study and complete electronic solution is scheduled. The full digital approach was also investigated and discussed. It was also believed that this approach, though much more flexible and programmable than the present analog solution, would not be seriously considered at the present time because of the complicated solution. A video disc software production house was also discussed as a viable entry into the future generation of games or related video by both IVEX and other outside companies who would compensate IVEX for the use of the facility.

### Problems Encountered During This Period

Continued communication with N. A. Philips proved useless in procuring the promised disc players. It is feared that a possible joint venture with another game company may be responsible for the apparent lack of cooperation.

### Work to be Performed During the Next Period

As stated earlier, the high resolution movie generation is scheduled to complete by the first of February with a conversion to 3/4" video tape soon thereafter. A trip is scheduled for a

visit to A.S.I. in February to discover any new innovations in the arcade industry.

COST INFORMATION

The following charges have been incurred against the contract during the period 1 January 1984 to 31 January 1984:

Personal Services	\$7,633.80
Materials and Supplies	734.82
Computer	224.69
Fringe Benefits	1,536.74
Overhead	5,004.24
TOTAL	\$15,134.29

The current financial status of the contract is as follows:

<u>Description</u>	<u>Budget</u>	<u>Expended</u> (YTD)	<u>Free Balance</u>
Personal Services	\$159,756.00	\$41,721.21	\$118,034.79
Materials & Supplies	154,900.00	2,835.89	20,618.36
Computer	2,000.00	462.75	1,537.25
Fringe Benefits	37,543.00	8,468.00	29,075.00
Overhead	174,974.00	26,422.99	148,551.01
TOTAL	\$529,173.00	\$79,910.84	\$449,012.16



TECHNICAL REPORT #6  
AND  
COST AND PERFORMANCE REPORT #6

Report Period

February 1 through February 29, 1874

MICHAEL J. SINCLAIR

Purchase Order  
EES Project A-3651

Effective Date: 9 September 1983  
Expiration Date: 9 September 1984

Prepared For  
IVEX Corporation  
ATDC  
151 6th Street  
Atlanta, Georgia 30313

Prepared By

Engineering Experiment Station  
Georgia Institute of Technology  
Atlanta, Georgia 30332

### Work Performed During This Period

The high resolution movie was completed and was successful. Animated objects were included in the form of brightly colored rotating pyramids. The 6809 based computer system was configured with hardware and software to automatically advance the 16 mm still frame movie camera. A full complement of electronics is being ordered for the 6809 computer system to replace the borrowed equipment. It is believed this system will prove valuable in the future for similar tasks as well as a prototyping base should a function be performed by a 6809 in the final product.

Two each of the Hitachi and Pioneer disc players were ordered for evaluation and exploitation. N. A. Philips have shown a reluctance to cooperate so they are no longer being considered as a player source. A circuit card is being designed to interface the 6809 system to the PIONEER LD-V1000 parallel port. All electronic documentation on both players have been received. The interface to the Hitachi player is 9600 baud RS232 and will present no problems for hardware interfacing.

Continued efforts are being devoted toward the generation and inclusion of high resolution animated objects. Also a video disc track editor/generator is being written with emphasis on future computer graphics simulation for proof of concept. It was decided that the VAX 11-750 would be the standard processor to be used in the production facility as well as the host to the Evans and Sutherland PS340 display system. Though the cost is relatively high and the delivery at three months, the 11-750 is attractive because of its power, large installed user base, friendly and proven software, and support. There exist more powerful machines but none so proven as the VAX.

A partitioned room was erected across from room 249 in the Baker Building to house the Evans and Sutherland graphics machine as well as terminals to the EES VAX 11-750. The sponsor had requested a level of security that cannot be afforded him in the

present environment due to the publicity of the project. It is believed this new room will offer IVEX the privacy requested.

Problems Encountered During this Period

The current EES Research Agreement is being renegotiated resulting from a disagreement in its interpretations.

Work to be Performed Next Period

The EEX VAX should be in place in room 249 with the PS340 interfaced to it. A data base will be installed in the PS340 and familiarization with the workstation will be accomplished. The standard PS340 short course is scheduled for April 9, 1984 at EES.

Initial exploitation will begin on the Hitachi and Pioneer video disc players when they arrive. Investigations will consist of frame access time, reliability, integrity of construction, and future enhancements by this project.

COST INFORMATION

The following charges have been incurred against the contract during the period 1 February 1984 to 29 February 1984:

Personal Services	\$11,761.84
Materials and Supplies	238.68
Computer	1,076.19
Fringe Benefits	2,303.95
Overhead	1,598.05
TOTAL	\$22,978.71

The current financial status of the contract is as follows:

<u>Description</u>	<u>Budget</u>	<u>Expended</u> (YTD)	<u>Free Balance</u>
Personal Services	\$159,756.00	\$53,483.05	\$106,272.95
Materials & Supplies	154,900.00	3,074.57	20,206.96
Computer	2,000.00	1,538.94	461.06
Fringe Benefits	37,543.00	10,771.95	26,771.05
Overhead	174,974.00	34,021.04	140,952.96
TOTAL	\$529,173.00	\$102,889.55	\$425,860.73