

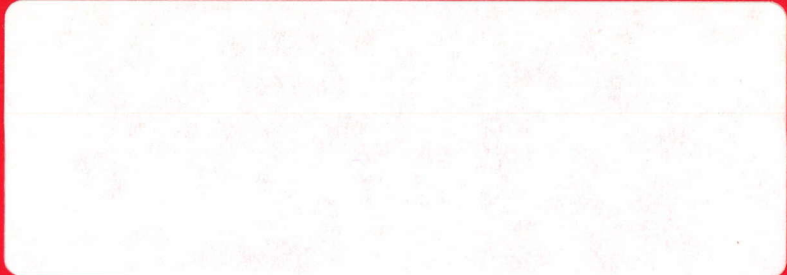
SERI/MR-13-318

July 1979



Wind Energy Innovative Systems Technical Status Report

May 1979

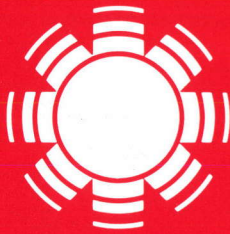


SOLAR ENERGY RESEARCH INSTITUTE
Solar Energy Information Center

JUL 30 1979

GOLDEN, COLORADO 80401

Irwin E. Vas
Richard L. Mitchell



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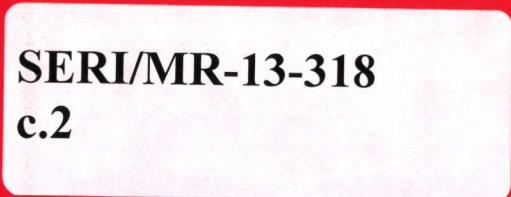
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WIND ENERGY INNOVATIVE SYSTEMS
TECHNICAL STATUS REPORT
MAY 1979

IRWIN E. VAS
RICHARD L. MITCHELL

SOLAR ENERGY RESEARCH INSTITUTE
Solar Energy Information Center

JUL 30 1979

JULY 1979

GOLDEN, COLORADO 80401

PREPARED UNDER TASK NO. 1321

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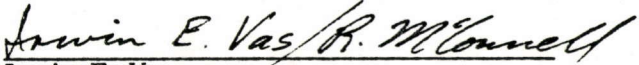
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Prepared for the
U.S. Department of Energy
Contract No. EG-77-C-01-4042

FOREWORD

This technical status report was performed in compliance with Contract Number EG-77-C-01-4042 for the Division of Solar Technology of the U.S. Department of Energy. The report was prepared by the Staff of the Special Programs Office of the Solar Energy Research Institute, a Division of Midwest Research Institute.

Report No: SERI/MR 13-318
Date: July 1979
Period Covered: May 1-31, 1979
Program: Wind Energy Innovative Systems
Special Programs Office
Task: 1321.01
Contract: EG-77-C-01-4042
Start Date: November 1977
Completion Date: Continuous
Contractor: Solar Energy Research Institute
1536 Cole Boulevard
Golden, Colorado 80401


Irwin E. Vas
Systems Analysis Branch

Approved for:

SOLAR ENERGY RESEARCH INSTITUTE



E. L. Dowty
Special Programs Office

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SECTION 1.0

PROGRAM OVERVIEW

The Solar Energy Research Institute (SERI) is authorized by the U.S. Department of Energy (DOE) to provide technical management of the Wind Energy Innovative Systems (WEIS) program which is currently comprised of eight research and development contracts and six short term generic studies. These research efforts are aimed at determining technical and economic feasibility of innovative concepts and systems utilizing wind energy.

The Technical Status Report is a planned monthly publication that reviews the progress and areas of concern of each project and presents the financial status of the program. This report reviews the progress of the continuing projects for the period May 1-31, 1979. A list of the projects (Table A-1) and a summary of the WEIS program indicating important milestones for the projects (Figure A-1) are presented with this report.

Major events and areas of concern of the program for the reporting period are as follows:

Major Events:

Awarded a follow-on contract to Grumman Aerospace Corporation for the further investigations of the "Diffuser Augmented Wind Turbine" at a funding level of \$89K.

Hosted the "Wind Energy Innovative Systems Conference," May 22-25, 1979.

Approved no cost extensions for Grumman—Tornado, Aerovironment—High Lift, Tetra-Tech—HAWT, and Washington University Technical Associates—Sail Wing to allow for circumstances which are explained in the subcontractors project status sheet.

Areas of Concern:

None

Listing of Current Contracts for the WEIS Program:

The Special Programs Office is managing 14 projects in the Wind Energy Innovative Systems program at the present time. A list of these projects with the basic nomenclature that will be used in subsequent sections of this report is provided in Table A-1. Also presented in the table are the costs, current and total-to-date.

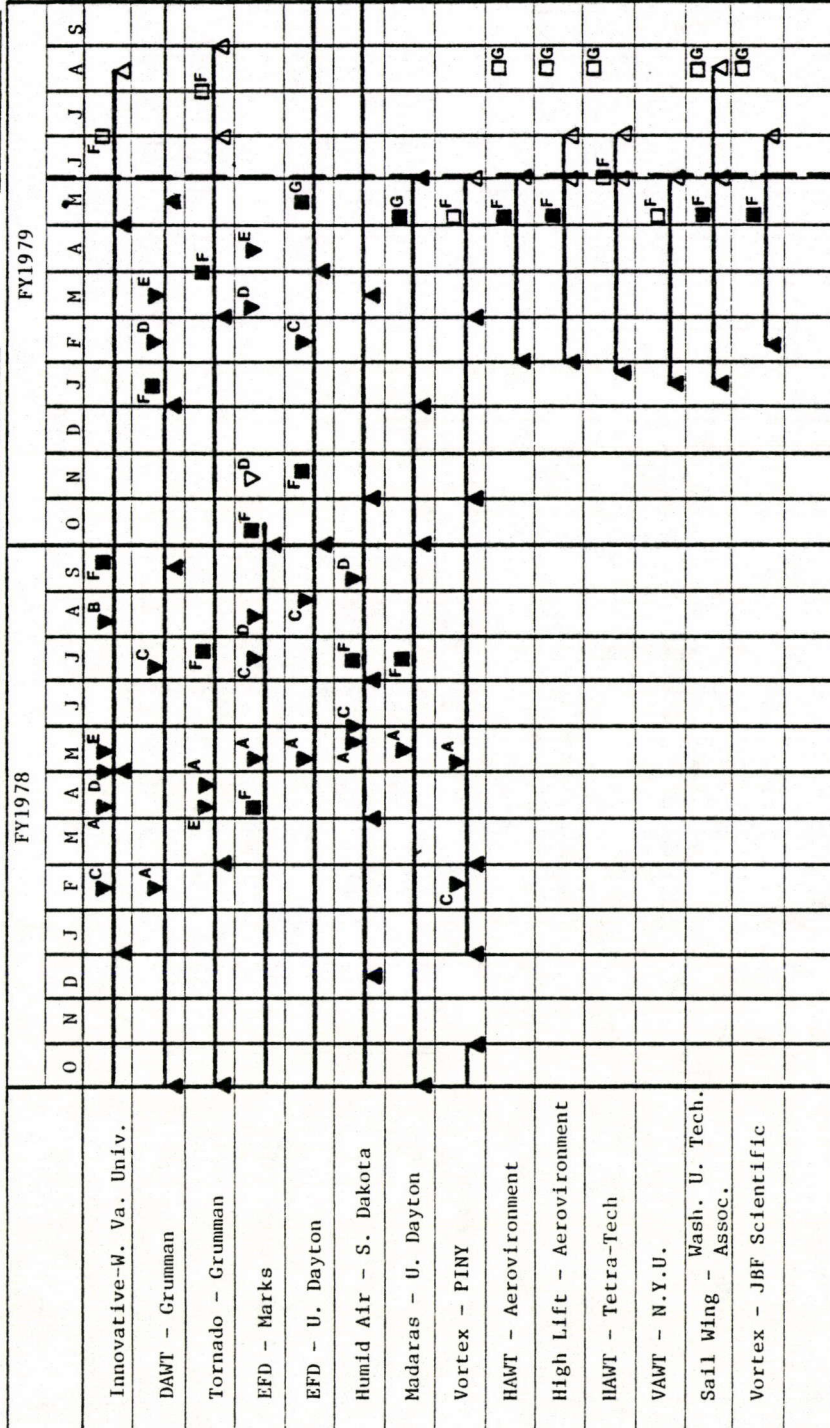
Program and Project Summary Review:

A schedule of important events for all of the WEIS projects is presented in Figure A-1 for FY78/FY79. The period of performance, and major task milestones (planned and completed) are identified in this figure.

Table A-1. PRINCIPAL SUBCONTRACTORS FOR FY79 PROJECTS

Project Title	Subcontractor	Project Code	Contract No.	Principal Investigator	funding level current/total
Innovative Wind Turbine	West Virginia University	WVU	EY-76-C-05-5135	Richard E. Walters	99,888/412,641
Diffuser Augmented Wind Turbines (DAWT)	Gruman Aerospace	G-D	XH-9-8073-1	Ken Foreman	89,293/557,224
Tornado-Type Wind Energy Systems Phase II (Tornado)	Gruman Aerospace	G-T	EX-76-C-01-2555	James T. Yen	236,115/434,710
Tests and Devices for Wind/Electric Power Charged Aerosol Generators (EFD)	Marks Polarized	MP	EG-77-C-01-2774	Alvin M. Marks	99,400/199,200
Electrofluid Dynamic Wind Generator Program (EFD)	University of Dayton	UDE	XH-9-8074-1	John E. Minardi	117,523/314,817
Energy from Humid Air (Humid Air)	South Dakota School of Mines and Technology	SD	DE-AC01 79ET23052	Thomas K. Oliver	68,975/168,522
The Madaras Rotor Power Plant Phase I (Madaras)	University of Dayton Research Institute	UDM	EX-76-S-01-2554	Dale H. Whitford	143,170/143,170
Vortex Augmentors for Wind Energy Conversion (Vortex)	Polytechnic Institute of New York	PINY	E(49-18)2358	Pasquale M. Sforza	43,924/379,927
A Definitive Generic Study of Augmented Horizontal Axis WES (HAWT)	Aerovironment, Inc.	AH	AH-9-8003-1	Peter Lissaman	21,827/ 21,827
A Definitive Generic Study of High Lift Device WES (High Lift)	Aerovironment, Inc.	AHL	AH-9-8003-2	Peter Lissaman	22,772/ 22,772
A Definitive Generic Study of Augmented Horizontal Axis WES (HAWT)	Tetra-Tech, Inc.	TT	AH-9-8003-3	Mark Harper	24,677/24,677
A Definitive Generic Study of Augmented Vertical Axis WES (VAWT)	New York University	NYU	AH-9-8003-4	Martin Hoffert	24,951/ 24,951
A Definitive Generic Study of Sail Wing WES (Sail Wing)	Washington University Technical Associates	WUTA	AH-9-8003-5	K. H. Hohenemser	22,500/ 22,500
A Definitive Generic Study of Vortex Extraction WES (Vortex Extraction)	JBF Scientific Corp.	JBF	AH-9-8003-6	Theodore R. Kornreich	24,950/ 24,950

CONTRACT NO. EG-77-C-01-4042 PRINCIPAL INVESTIGATOR Irwin E. Vas
 CONTRACTOR SPO/SERI TITLE Wind Energy Innovative Systems PHONE NO. (303) 231-1935



EXPLANATION

A Contract Review, Site Visit
 B Semi-Annual Report
 C Proposal Submission
 D Proposal Resubmission

E Procurement Initiation
 F Draft Final Report
 G Final Report

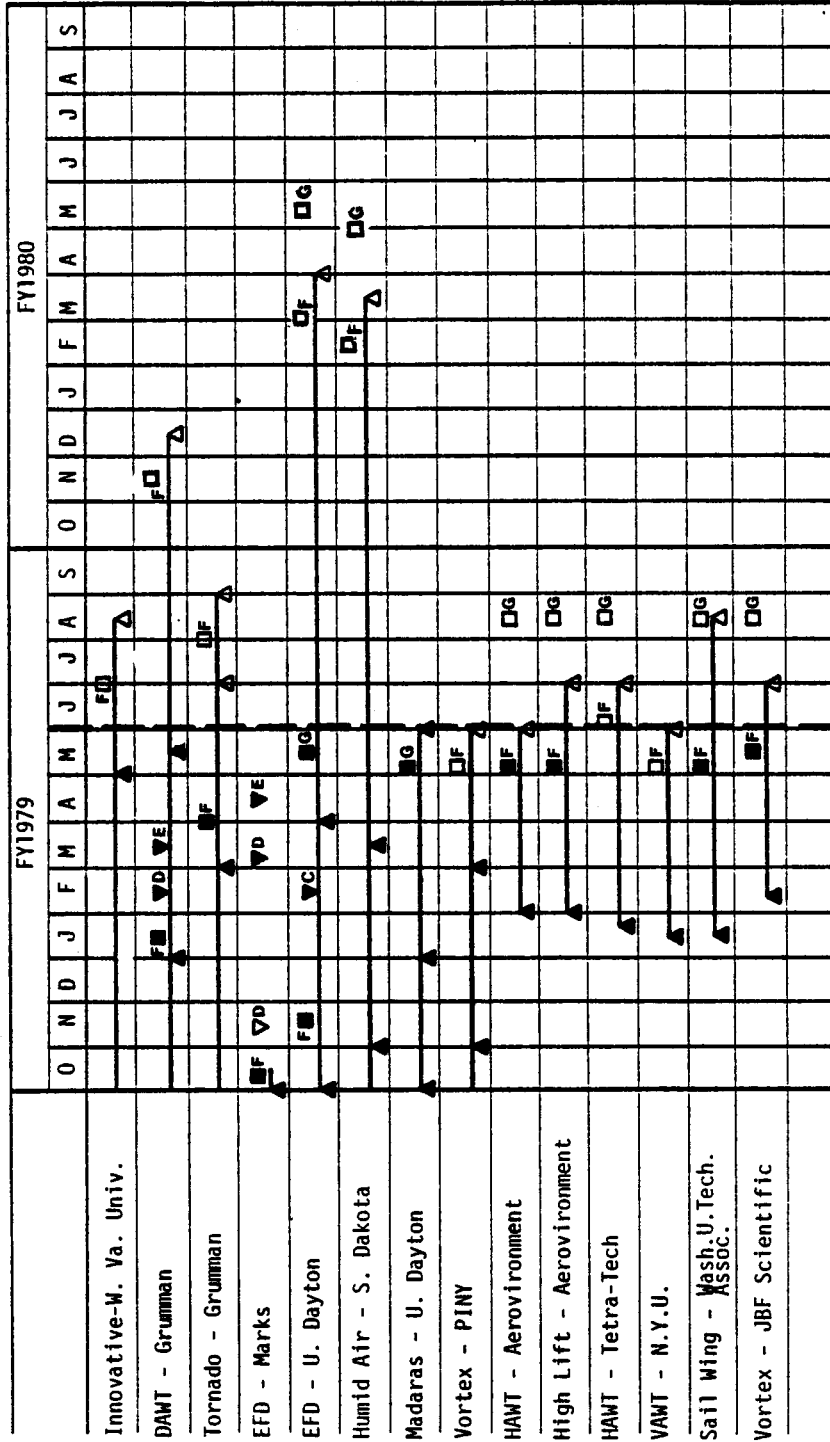
▽ Intermediate Event
 △ Milestone
 □ Report

Delivered-Filled Symbol
 Planned-Open Symbol

Figure A-1. MAJOR MILESTONE CHART FOR WEIS PROJECTS IN FY78 AND FY79.

CONTRACT NO. EG-77-C-01-4042 PRINCIPAL INVESTIGATOR Irwin E. Vas

CONTRACTOR SPO/SERI TITLE Wind Energy Innovative Systems PHONE NO. (303) 231-1935



- A Contract Review, Site Visit
- B Semi-Annual Report
- C Proposal Submission
- D Proposal Resubmission
- E Procurement Initiation
- F Draft Final Report
- G Final Report
- Intermediate Event
- Milestone
- Report
- EXPLANATION
- Delivered - Filled Symbol
- Planned - Open Symbol

Figure A-2. MAJOR MILESTONE CHART FOR WEIS PROJECTS IN FY79 AND FY80.

To facilitate organization of the material in this status report by project, figures are numbered according to project number. Figure 1-1, therefore, is the first figure for project 1.0, and is followed by Figure 1-2, 1-3, etc. Exceptions to this numbering system are Figures A-1 through A-4 which are not project-related. The "A" is used to designate the difference between the program-related figures and the project-related figures. Table A-1, likewise, is program-related.

In order to convey more information about completed and planned activities, FY79 and FY80 milestone charts and FY80 cost management charts for some projects have been included in this report.

SERIO 

SECTION 2.0

WIND ENERGY INNOVATIVE SYSTEMS

PROJECT SUMMARY

SERI is responsible to DOE for technical management of the WEIS program. This program includes eight research and development contracts and six short-term generic studies. This section reviews the current technical status of the overall WEIS program and the individual 14 projects.

Each project is reviewed on a project status sheet which is followed by a project milestone chart and a project cost management chart. Each project status sheet is comprised of a project description and the following six sections:

- Contract Objective
- Contract Tasks (Accomplishments)
- Technical Approach or Work Plan Changes
- Variances
- Open Items
- Summary Status Assessment and Forecast

Under the Contract Tasks heading, tasks are defined and task accomplishments discussed with the task numbers, given in parenthesis, following each task statement. These provide the reader with a reference to the description of each project task and are either given in previous Wind Energy Innovative System Technical Status Reports, or defined under the Contract Tasks heading of the appropriate project status sheet.

The milestones listed below are indicated on the milestone chart presented in this section for the program and for each project. These will be modified as deemed necessary in the future reports.

- (1) Task completion.
- (2) Task stopped.
- (3) Redirected effort.
- (4) No cost extension provided.
- (5) Draft final report submitted.
- (6) Site visit-project review.
- (7) Wind tunnel phase completion.
- (8) Preliminary design review.
- (9) Design review.
- (10) Terminated due to DOE decision.
- (11) Method validated.
- (12) Results analyzed.
- (13) Task completed during previous fiscal year.
- (14) Final report.
- (15) Monthly report.
- (16) Quarterly report.
- (17) Draft final report review completed.
- (18) Final report submitted.
 - A. Task of project to be funded; contract negotiations underway.

Project Title: Wind Energy Innovative Systems (WEIS)
Contract: WEIS Program Management

Number: EG-77-C-01-4042
Start Date: November 1977
Completion Date: Continuous

Contractor: Solar Energy Research Inst.
1536 Cole Blvd.
Golden, CO 80401

Contract Objective

Determine technical and economic feasibility of innovative wind energy systems.

Contract Tasks (Accomplishments)

Hosted the "Wind Energy Innovative Systems Conference", May 23-25, at which contractors presented papers in their studies. (Task 3)

Completed a review of the unsolicited proposal entitled "Diffuser Turret Aerogenerator" by Major David Gay. Comments were submitted to WSB. (Task 6)

The proposals received in response to RFP RH-9-8085 were evaluated by an external committee and rank ordered during May 1979. (Task 7)

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

None

Summary Status Assessment and Forecast

Contract negotiations for the proposals received in response to RFP RH-9-8085 are to be completed in July 1979.

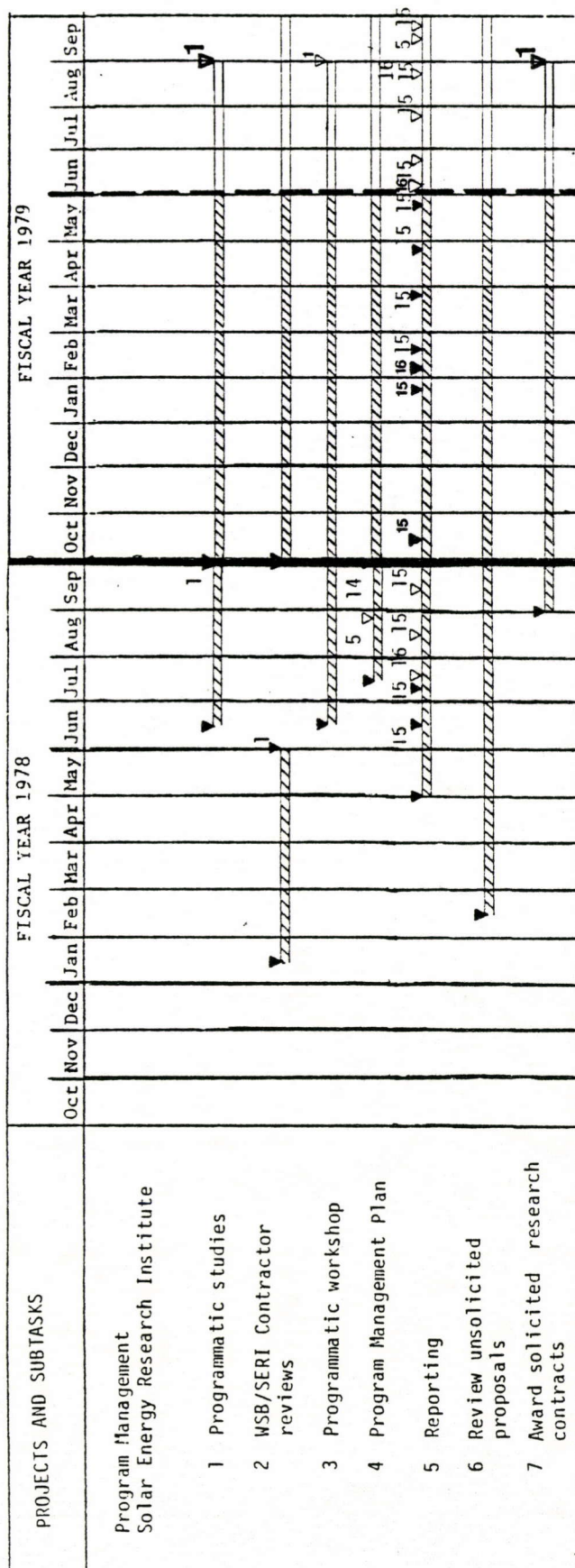


Figure A-3 FY78 and FY79 Milestone Chart for SERI Wind Energy Innovative Systems Program Management

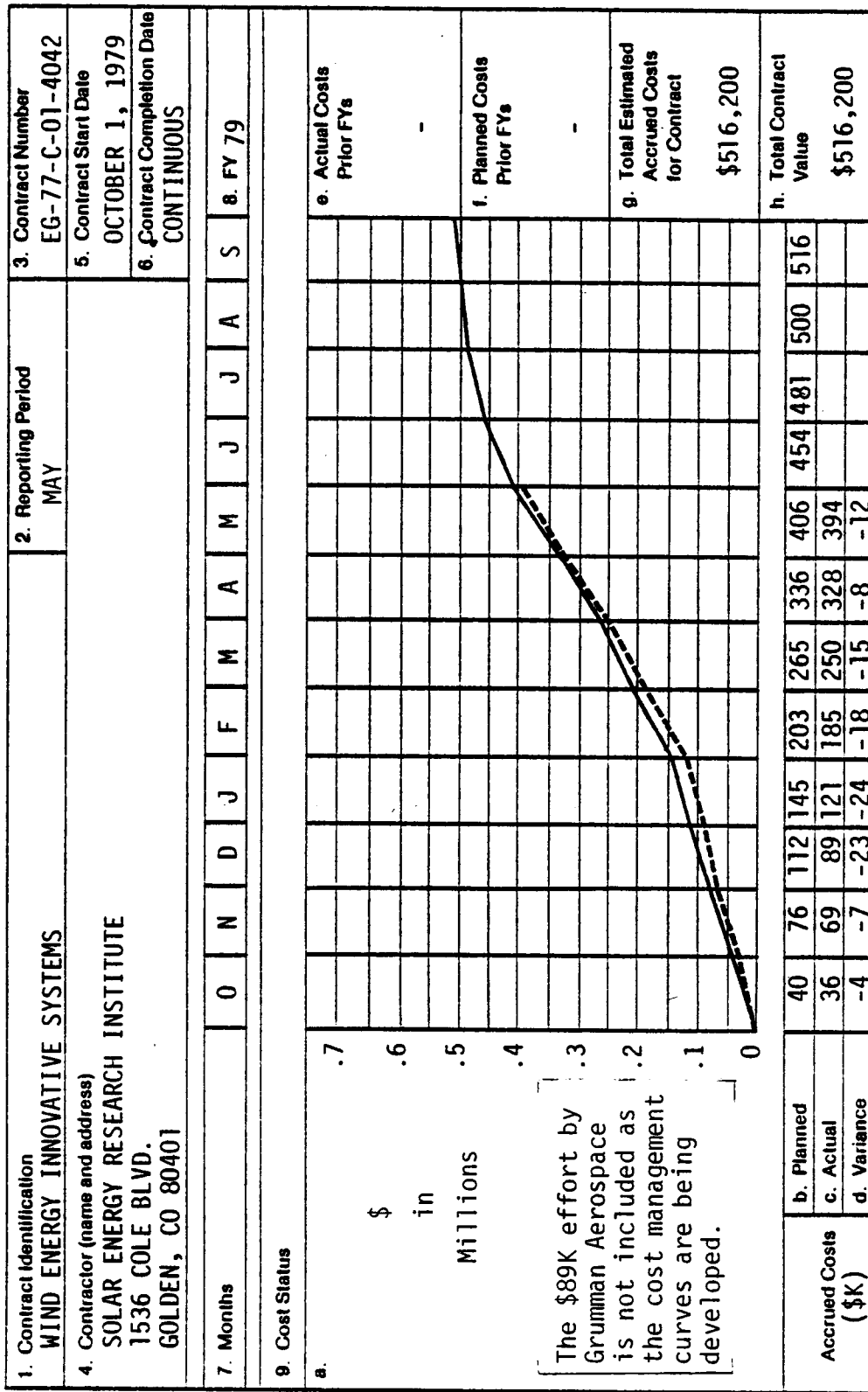


FIGURE A-4 FY79 Cost Management Chart for the SERI Wind Energy Innovative Systems Program Management

Project Title: Innovative Wind Turbines
Contract: Project 1

Number: EY-76-C-05-5135
Start Date: March 1, 1975
Completion Date: August 15, 1979

Contractor: West Virginia University
Morgantown, WV 26506

Contract Objective

Investigate the technical and economic feasibility of a vertical axis wind turbine having straight blades constructed with circulation control airfoil sections.

Contract Tasks (Accomplishments)

Completed circulation controlled blade construction. (Task 1.8)

Continued tests of the conventional blade to measure blade lift, drag, and pitching moment. (Task 1.9)

Technical Approach or Work Plan Changes

None

Variations

None

Open Items

The final report which includes the results of Tasks 1.1 to 1.6 is to be delivered in June 1979.

Summary Status Assessment and Forecast

A paper entitled "Innovative Straight-Bladed Vertical Axis Wind Turbine" was presented by the contractor at the WEIS conference May 23-25, 1979.

The project is to be completed as scheduled, August 15, 1979.

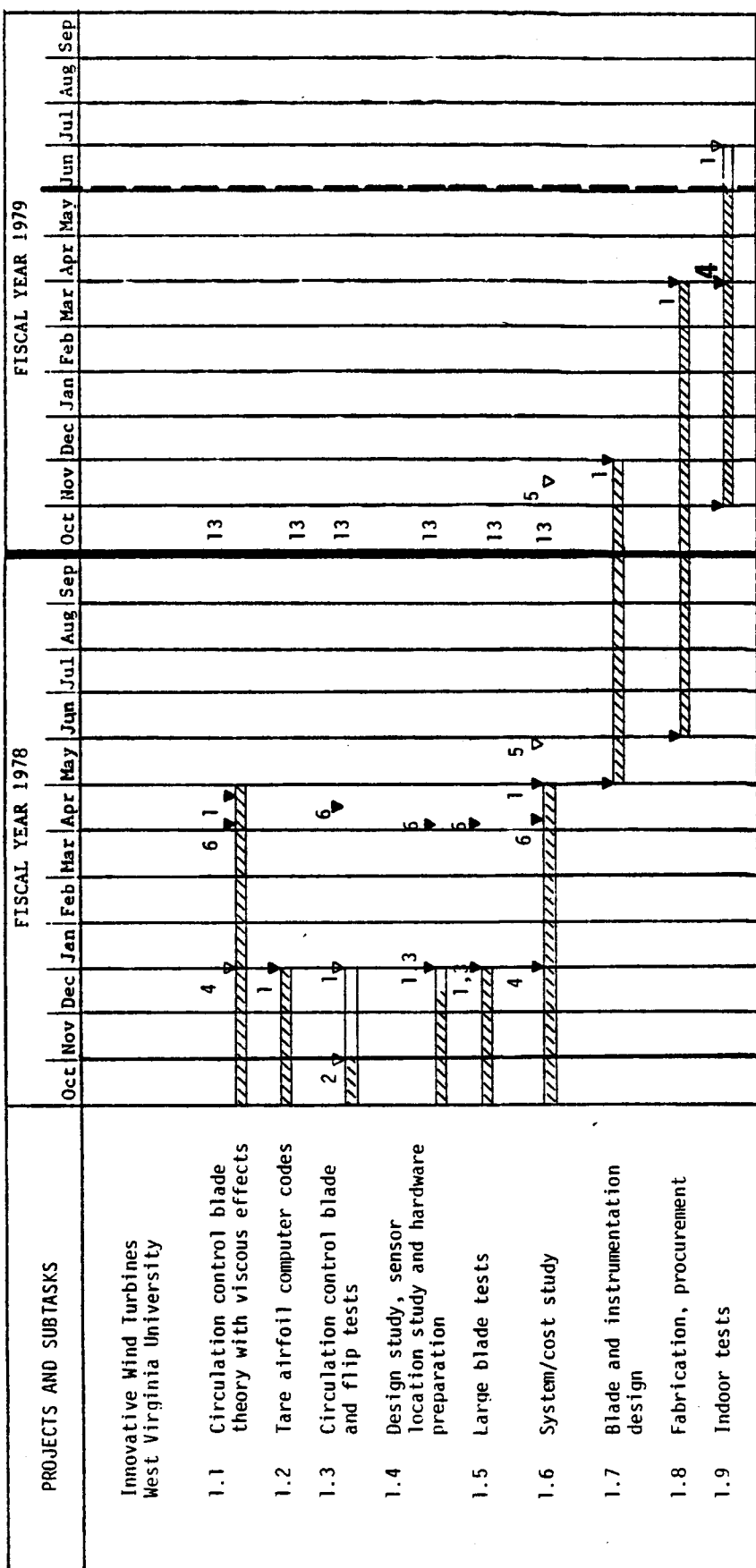


Figure 1-1 FY78 and FY79 Milestone Chart for the Innovative Wind Turbines Project

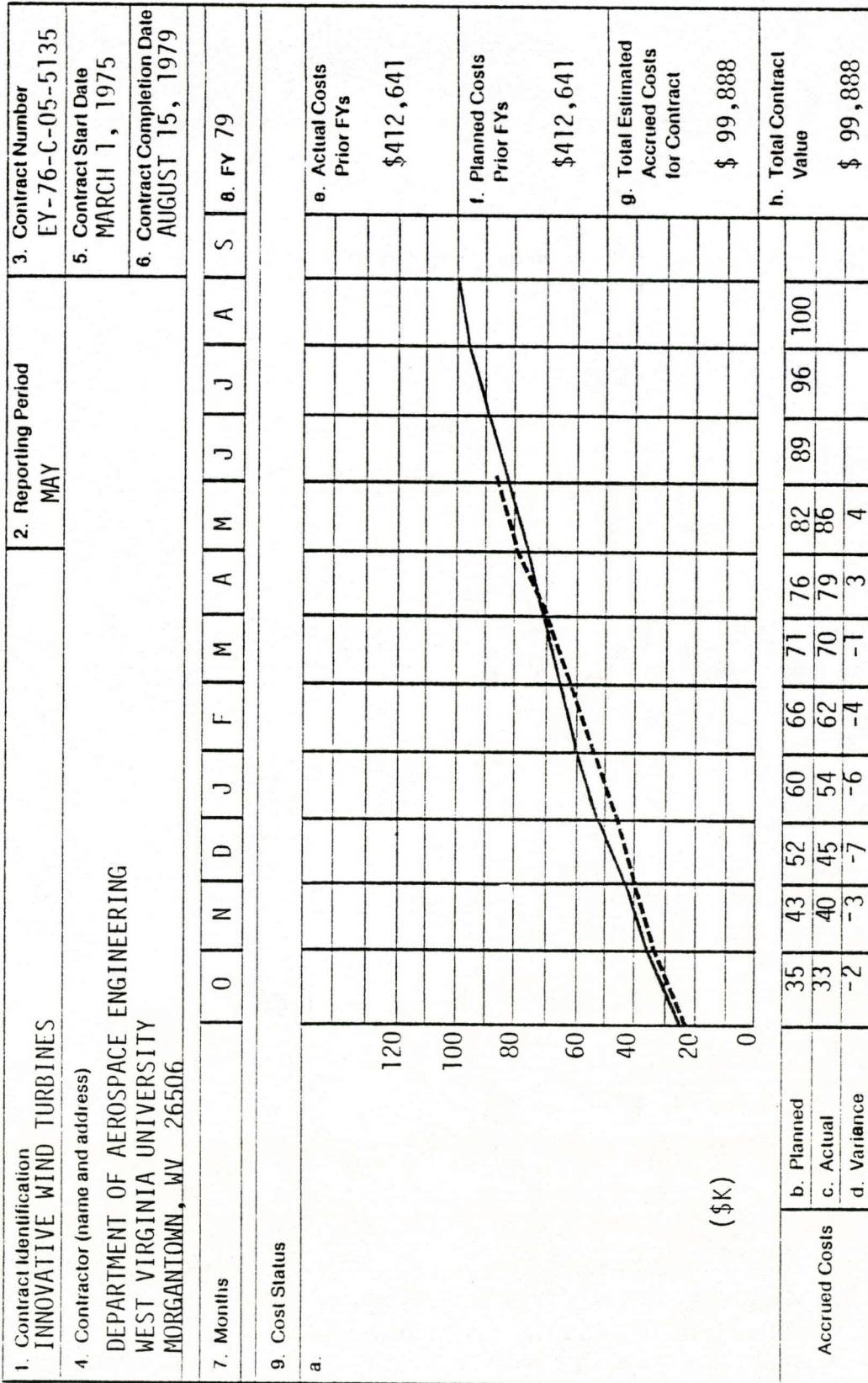


FIGURE 1-2 FY79 Cost Management Chart for the Innovative Wind Turbines Project

Project Title: Further Investigations of Diffuser Augmented Wind Turbines
Contract: Project 2

Number: XH-9-8073-1
Start Date: September 26, 1977
Completion Date: December 15, 1979

Contractor: Grumman Aerospace Corp.
South Oyster Bay Road
Bethpage, NY 11714

Contract Objective

Establish the performance and engineering design of a diffuser augmented wind turbine and determine its potential for commercial sized machines.

Contract Tasks (Accomplishments)

All technical tasks for the FY78 funded effort were completed. A draft final report was submitted in January 1979 and reviewed in April 1979.

Technical Approach or Work Plan Changes

None

Variations

None

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Technical Development of the Diffuser Augmented Wind Turbine (DAWT) Concept" was presented by the contractor at the WEIS conference May 23-25, 1979.

A follow-on contract was awarded May 15, 1979 to run from May 15, 1979 to December 15, 1979 at a funding level of \$89,293. A milestone chart and cost management chart for this follow-on effort are to be developed and submitted by the principal investigator by July 16, 1979.

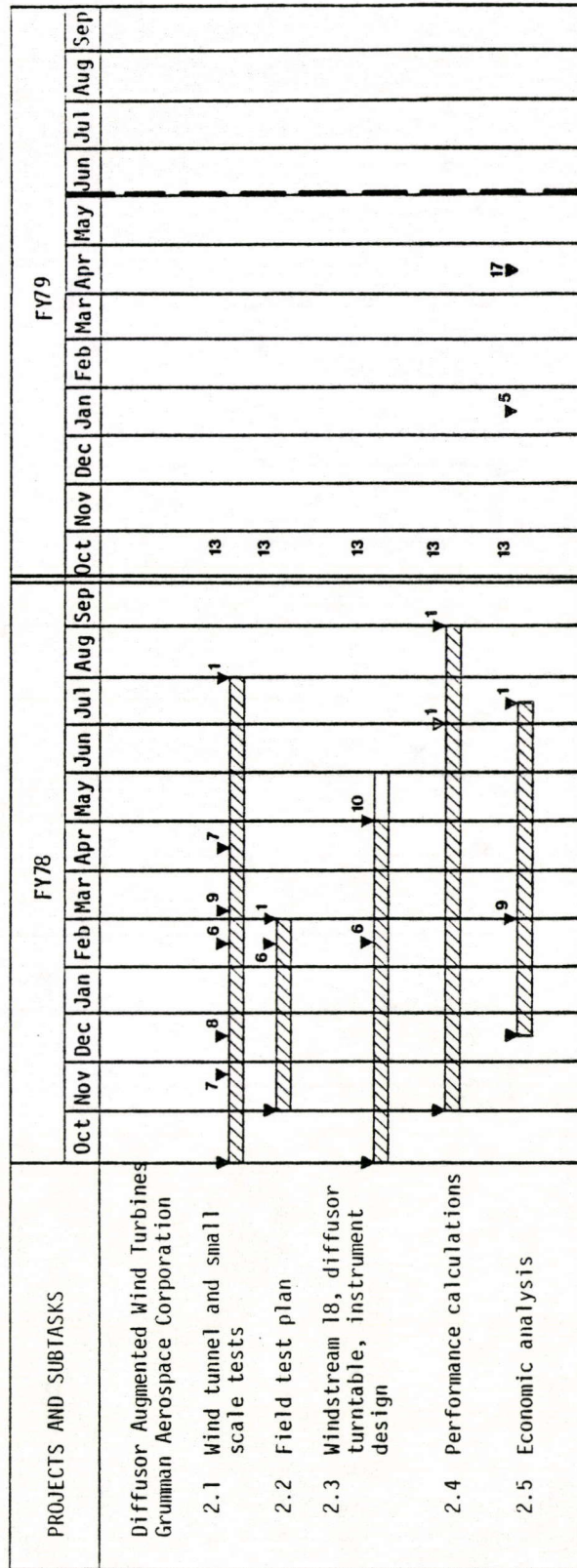


Figure 2-1 FY78 and FY79 Milestone Chart for the Diffusor Augmented Wind Turbines Project

1. Contract Identification FURTHER INVESTIGATIONS OF DIFFUSER AUGMENTED WIND TURBINES													2. Reporting Period MAY													3. Contract Number XH-9-8073-1												
4. Contractor (name and address) GRUMMAN AEROSPACE CORPORATION SOUTH OYSTER BAY ROAD BETHPAGE, NY 11714																										5. Contract Start Date SEPT. 30, 1977												
																										6. Contract Completion Date DEC. 15, 1979												
7. Months													O	N	D	J	F	M	A	M	J	J	A	S	8. FY 79													
9. Cost Status																																						
a.																										e. Actual Costs Prior FYs \$557,224												
The cost management chart for the current follow-on contract is being developed by the principal investigator and will appear in the June, 1979 WEIS monthly Technical Status Report																										f. Planned Costs Prior FYs \$557,224												
																										g. Total Estimated Accrued Costs for Contract \$ 89,293												
																										h. Total Contract Value \$ 89,293												
Accrued Costs													b. Planned													c. Actual												
																										d. Variance												

FIGURE 2-2 FY79 Cost Management Chart for the Diffuser Augmented Wind Turbines Program

Project Title: Tornado-Type Wind Energy System Phase II
Contract: Project 3

Number: EX-76-C-01-2555
Start Date: September 27, 1976
Completion Date: August 30, 1979

Contractor: Grumman Aerospace Corp.
South Oyster Bay Road
Bethpage, NY 11714

Contract Objective

Determine technical and economic feasibility of the tornado type machine.

Contract Tasks (Accomplishments)

Continued analysis of data collected in task 3.2 and reached an average C_p 0.10 based on tower frontal area. (Task 3.2)

Initiated construction of three high speed models of 10 in., 15 in. and 20 in. diameters. Each model will use the same 4 in. turbine and will be tested in a wind tunnel at wind speeds of up to 100 mph. (see Technical Approach and Work Plan Changes section). (Task 3.5)

Technical Approach or Work Plan Changes

Task 3.5 has been altered to include the construction of three high speed vaned models.

Task 3.6 has been altered to include testing of the three high speed models in a wind tunnel and field testing of the 6 ft diameter model.

Variances

The major cost variance is a result of the wind tunnel tests not being performed to date. As it is not clear when the tests can be initiated, the cost projection does not reflect that detail.

A no-cost extension has been approved to modify the completion date from June 30, 1979 to August 30, 1979 to allow for the delay in wind tunnel testing.

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Recent Developments of Tornado-type Wind Energy Systems" was presented by the contractor at the WEIS conference May 23-25, 1979.

The ongoing work is on schedule except for wind tunnel testing. Facilities for the Wind tunnel tests on the large model are still being sought for the large model. It is anticipated that the 10 in., 15 in., and 20 in. diameter tower models will be tested in the V/STOL wind tunnel in June or July 1979.

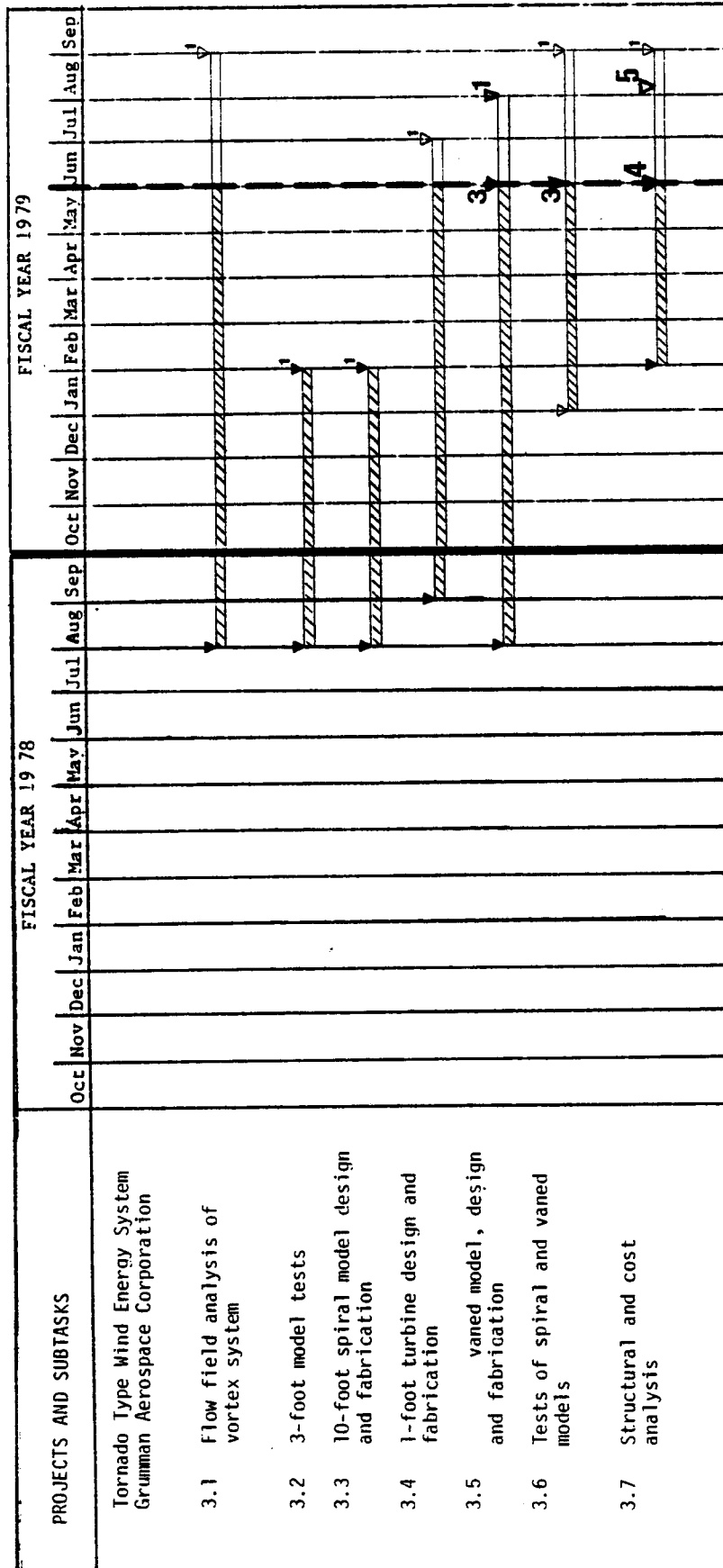


Figure 3-1 FY78 and FY79 Milestone Chart for the Tornado-Type Wind Energy Systems Project

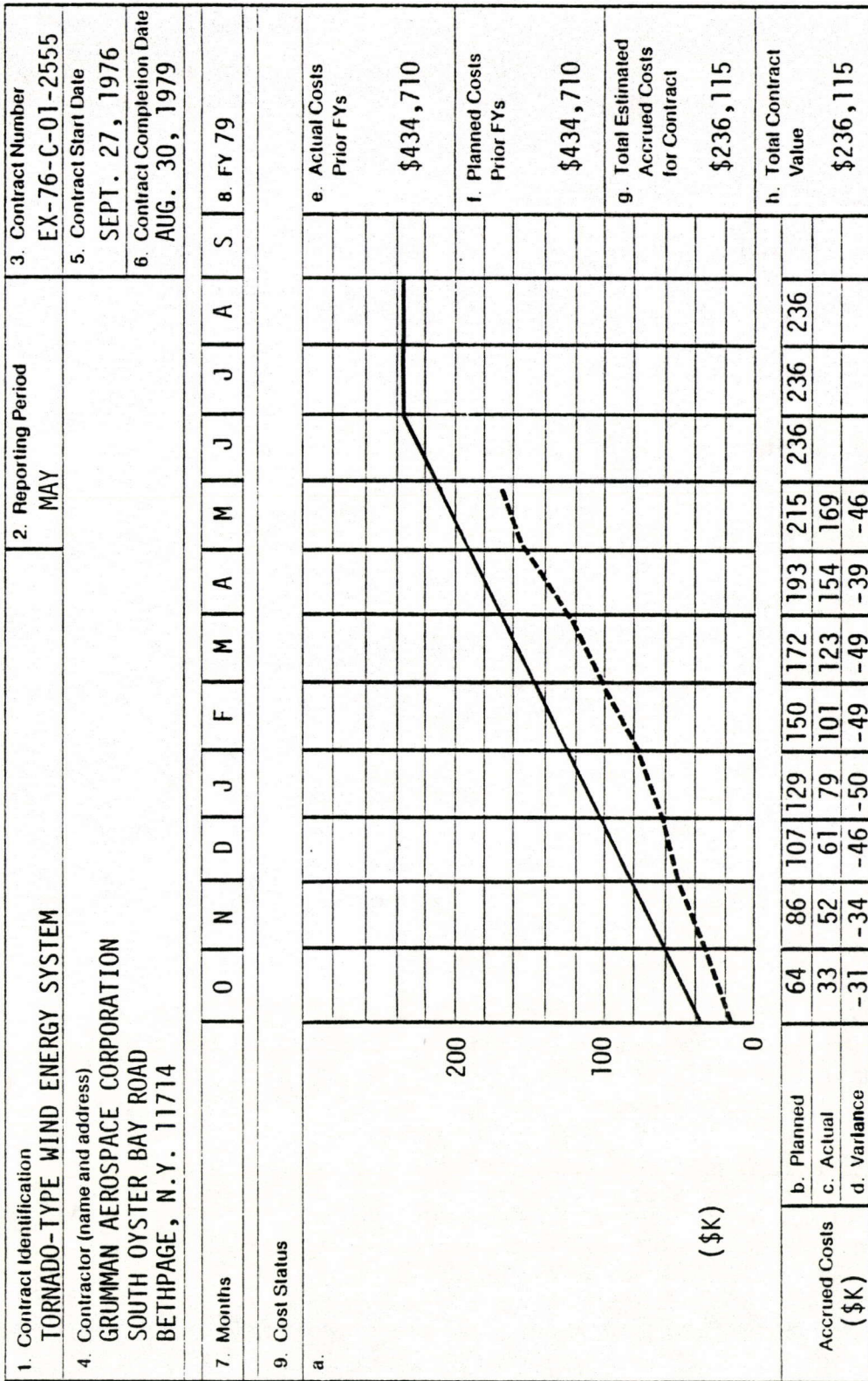


FIGURE 3-2 FY79 Cost Management Chart for the Tornado-Type Wind Energy System Project

Project Title: Test and Devices for Wind/Electric Power Charged Aerosol Generator
Contract: Project 4

Number: EG-77-C-01-2774
Start Date: September 28, 1977
Completion Date: September 27, 1978

Contractor: Marks Polarized Corp.
153-16 Tenth Avenue
Whitestone, NY 11357

Contract Objective

Experimentally evaluate four methods of producing charged droplets and compare the results with available predictions.

Contract Tasks (Accomplishments)

No effort has been expended by the principal investigator. All technical tasks have been completed or terminated. (See SERI/MR-13-125)

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

The draft final report for the previous effort was not submitted by the principal investigator in April as planned. The principal investigator has stated that it will be submitted during June 1979.

Summary Status Assessment and Forecast

A paper entitled "Wind/Electric Power Transduction Using Charged Aerosols Under Various Atmospheric Conditions" was presented by the contractor at the WEIS conference May 23-25, 1979.

Contract negotiations for a follow-on effort are expected to be completed during June 1979.

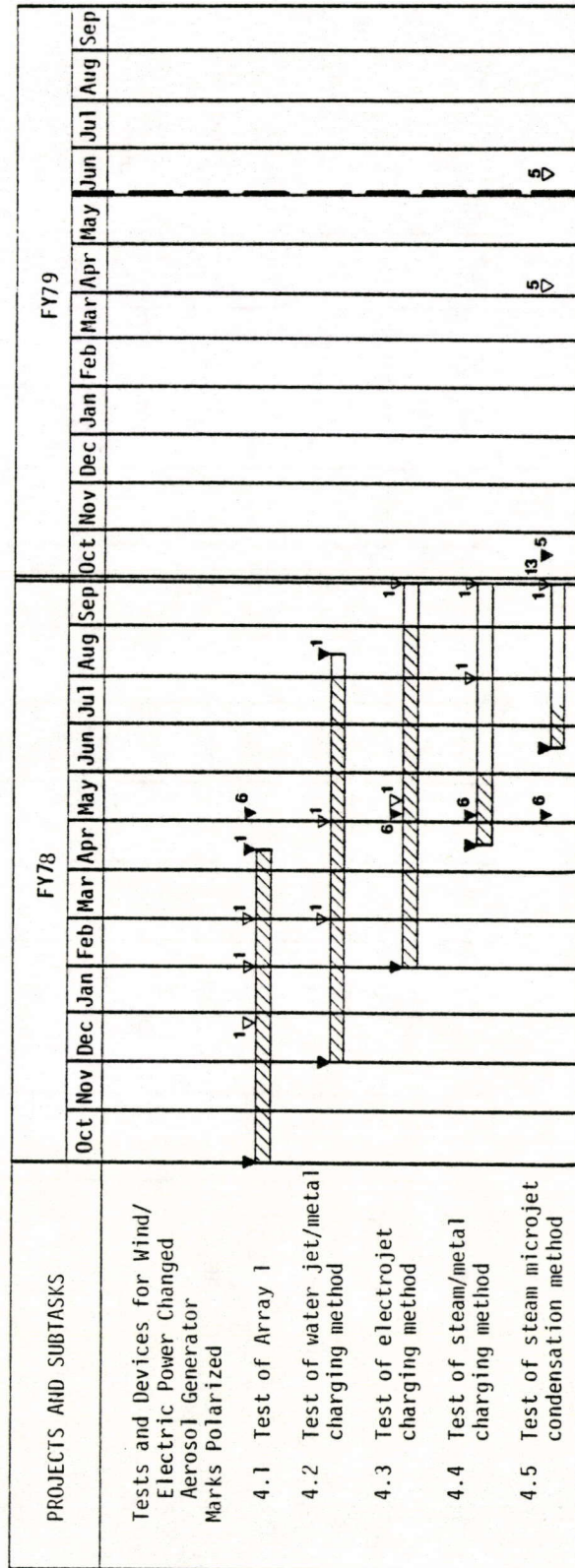


Figure 4-1 FY78 and FY79 Milestone Chart for the Marks EFD Project

1. Contract Identification		TESTS AND DEVICES FOR WIND/ELECTRIC POWER CHARGED AEROSOL GENERATOR												2. Reporting Period		3. Contract Number	
POWER CHARGED AEROSOL GENERATOR														MAY		EG-77-C-01-2774	
4. Contractor (name and address)																5. Contract Start Date	
MARKS POLARIZED CORPORATION 153-16 TENTH AVENUE WHITESTONE, NY 11357																SEPT. 28, 1977	
																6. Contract Completion Date	
7. Months		0	N	D	J	F	M	A	M	J	J	A	S	8. FY 79			
9. Cost Status																	
a.		NO FY79 FUNDING TO DATE A FOLLOW-ON EFFORT OF \$65K HAS BEEN PROPOSED AND IS EXPECTED TO BE INITIATED DURING JUNE 1979.															
														e. Actual Costs Prior FYs		\$199,200	
														f. Planned Costs Prior FYs		\$199,200	
														g. Total Estimated Accrued Costs for Contract			
														h. Total Contract Value			
Accrued Costs																	
b. Planned																	
c. Actual																	
d. Variance																	

FIGURE 4-2 FY79 Cost Management Chart for the Marks EFD Project

Project Title: Electrofluid Dynamic Wind Generator Program
Contract: Project 5

Number: XH-9-8074-1
Start Date: September 15, 1977
Completion Date: March 31, 1980

Contractor: University of Dayton
Research Institute
Dayton, OH 45469

Contract Objective

Provide a sufficient density of charged water droplets of low-mobility to experimentally evaluate EFD generator geometries; and develop techniques for providing low-mobility charged water droplets for wind energy applications in a cost effective manner.

Contract Tasks (Accomplishments)

Completed a review of the literature on the production of bubbles and submicron droplets. Conducted studies to determine the effects of water distribution requirements on generator geometry. Continued work on the design of a larger diameter electrode generator. (Task 5.6)

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Electrofluid Dynamic Wind Driven Generators" was presented by the contractor at the WEIS conference May 23-25, 1979.

The final report of the FY78 funded effort entitled "Third Annual Progress Report on the Electrofluid Dynamic Wind Generator", COO/41330-2, has been submitted.

The current follow-on effort is on schedule.

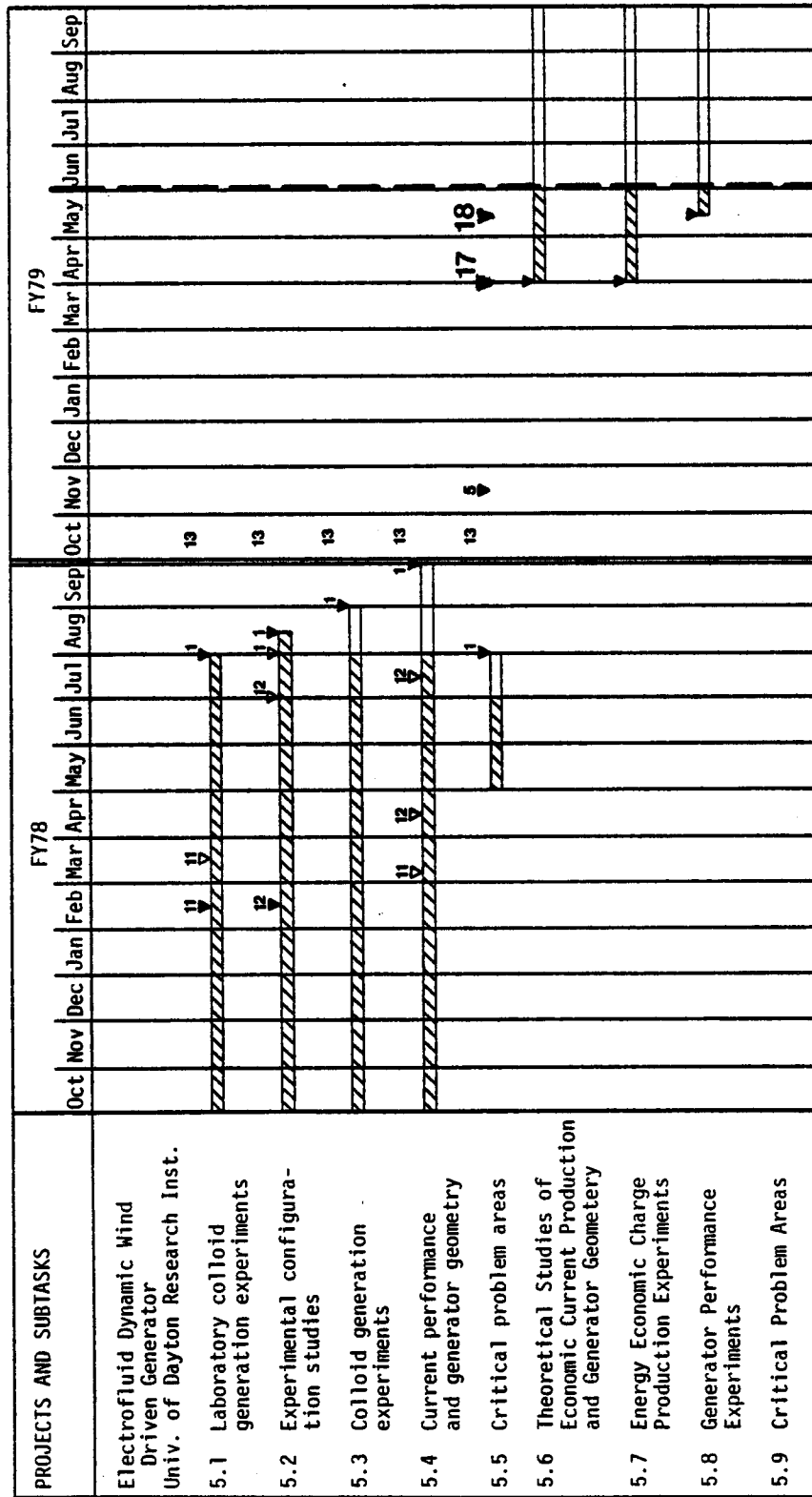


Figure 5-1. FY78 and FY79 Milestone Chart for the Dayton EFD Project

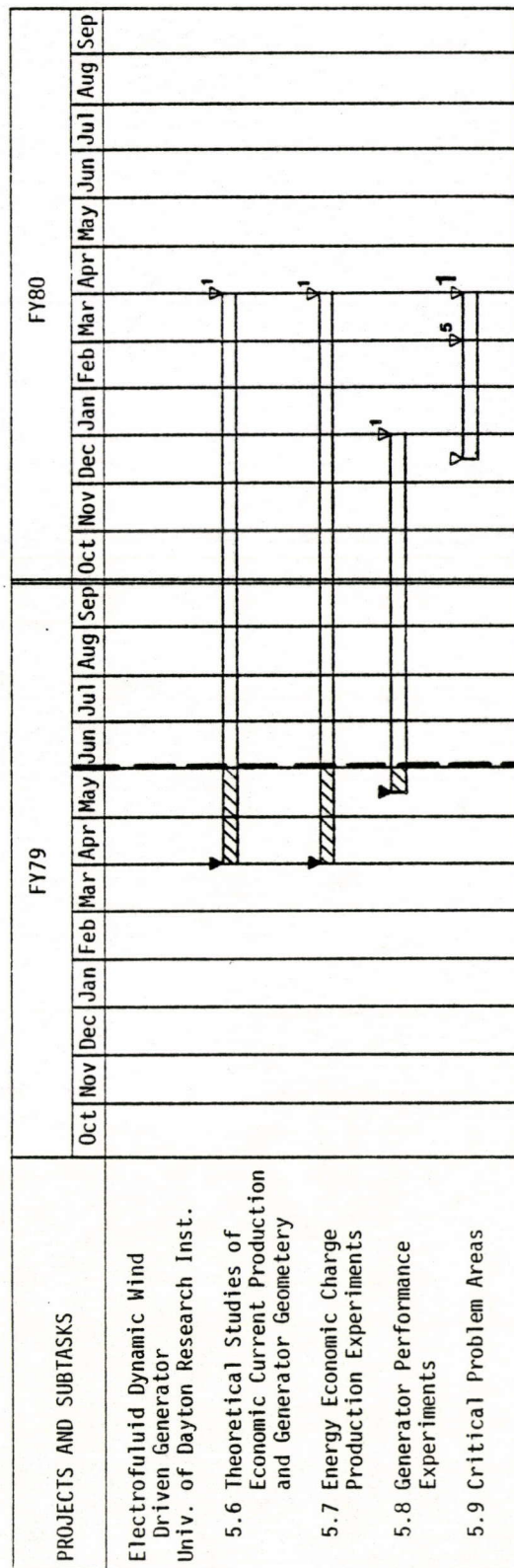


Figure 5-2 FY79 and FY80 Milestone Chart for the Dayton EFD Project

1. Contract Identification ELECTROFLUID DYNAMIC WIND DRIVEN GENERATOR													2. Reporting Period MAY												3. Contract Number XH-9-8074-1		
4. Contractor (name and address) UNIVERSITY OF DAYTON RESEARCH INSTITUTE 300 COLLEGE PARK AVENUE DAYTON, OHIO 45469													5. Contract Start Date SEPT. 15, 1977			6. Contract Completion Date MARCH 31, 1980			7. Months O N D J F M A M J J A S			8. FY 79					
9. Cost Status																									e. Actual Costs Prior FYs \$314,817		
a.																									f. Planned Costs Prior FYs \$314,817		
(\$K)																									g. Total Estimated Accrued Costs for Contract \$117,523		
b. Planned																									h. Total Contract Value \$117,523		
c. Actual																											
d. Variance																											
140																											
120																											
100																											
80																											
60																											
40																											
20																											
10																											
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-5																											
-4																											
69																											

FIGURE 5-3 FY79 Cost Management for the Dayton EFD Project

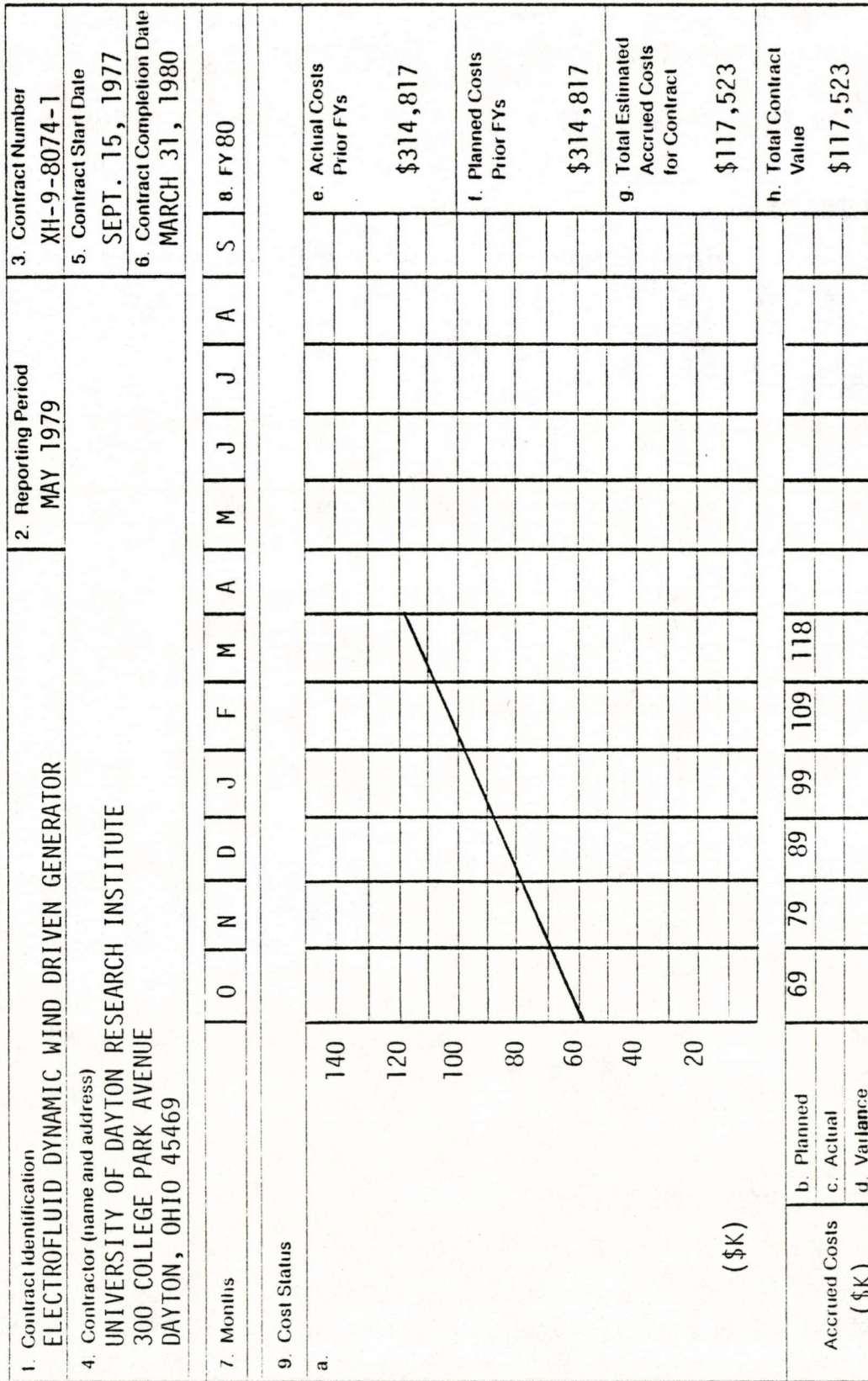


FIGURE 5-4 FY80 Cost Management for the Dayton EFD Project

Project Title: Energy from Humid Air
Contract: Project 6

Number: DE-AC01-79ET23052
Start Date: October 1, 1976
Completion Date: March 12, 1980

Contractor: South Dakota School of
Mines and Technology
Rapid City, SD 57701

Contract Objective

Determine a cost effective method of converting the latent heat of water vapor in humid air into mechanical work.

Contract Tasks (Accomplishments)

Initiated the development of the computer model with discussions of its methodology. (Task 6.5)

Initiated a search of current literature and published data. (Task 6.6)

Technical Approach or Work Plan Changes

None

Variations

None

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Energy From Humid Air" was presented by the contractor at the WEIS conference May 23-25, 1979.

The final report for the previously contracted effort was delivered and is to be reviewed by June 1979.

The current follow-on effort is on schedule.

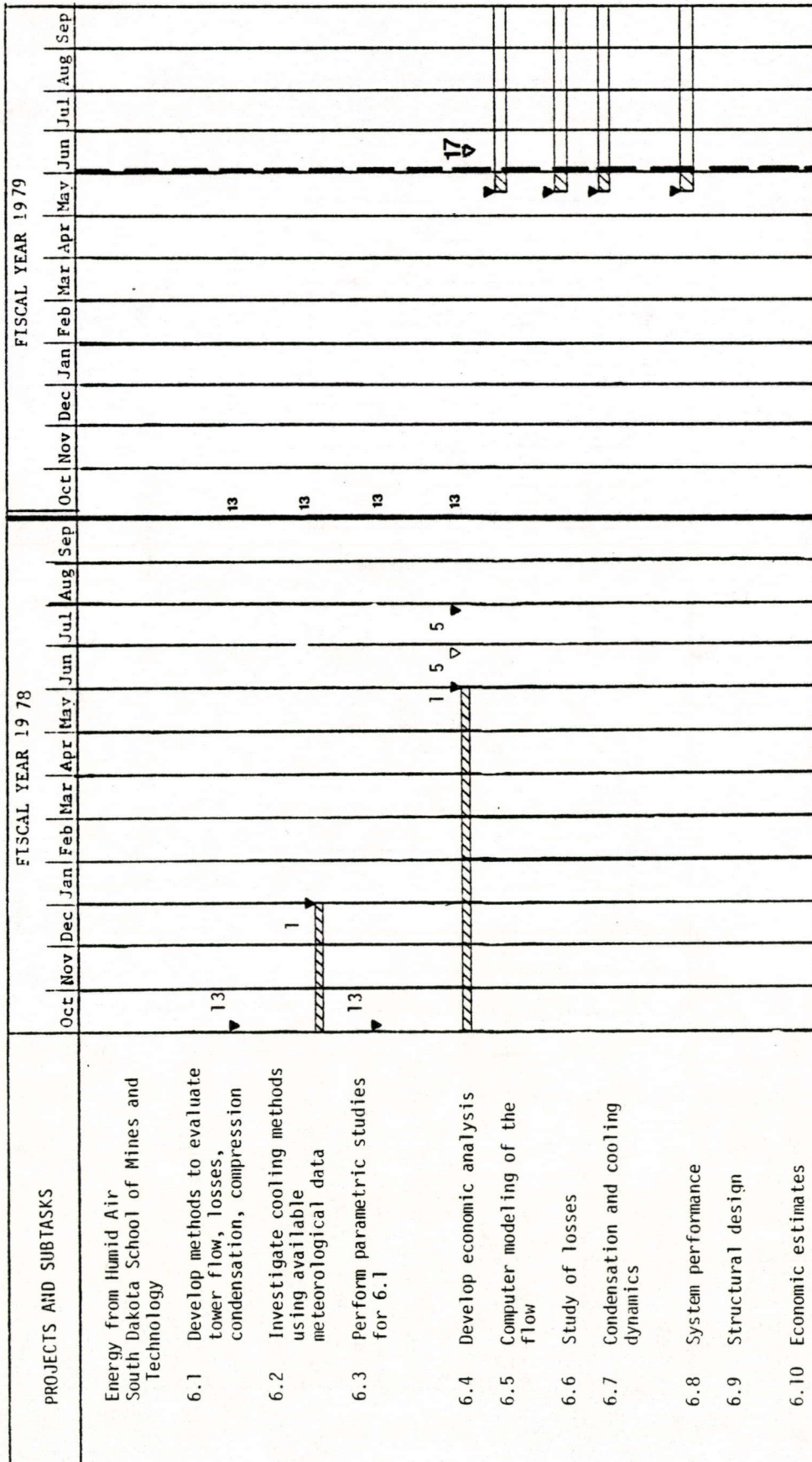


Figure 6-1 FY78 and FY79 Milestone Chart for the Humid Air Project

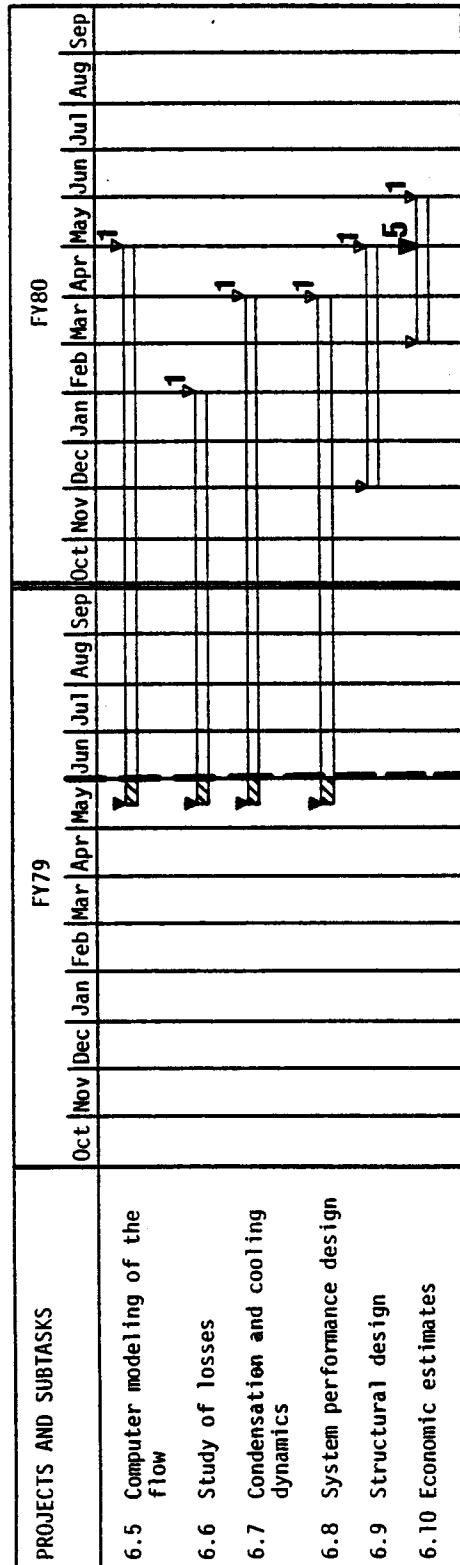


Figure 6-2. FY79 and FY80 Milestone Chart for the Humid Air Project

1. Contract Identification ENERGY FROM HUMID AIR													2. Reporting Period MAY			3. Contract Number DE-AC01-79ET23052		
4. Contractor (name and address) SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY RAPID CITY, SD 57701													5. Contract Start Date SEPT. 20, 1976			6. Contract Completion Date MARCH 12, 1980		
7. Months			0	N	D	J	F	M	A	M	J	J	A	S	8. FY 79			
9. Cost Status																		
a.	70 60 50 40 30 20 10 0															9. Actual Costs Prior FYs		\$168,522
																f. Planned Costs Prior FYs		\$168,522
																g. Total Estimated Accrued Costs for Contract		\$ 68,975
																h. Total Contract Value		\$ 68,975
Accrued Costs (\$K)																		
		b. Planned																
		c. Actual																
		d. Variance																

FIGURE 6-3 FY79 Cost Management Chart for the Humid Air Project

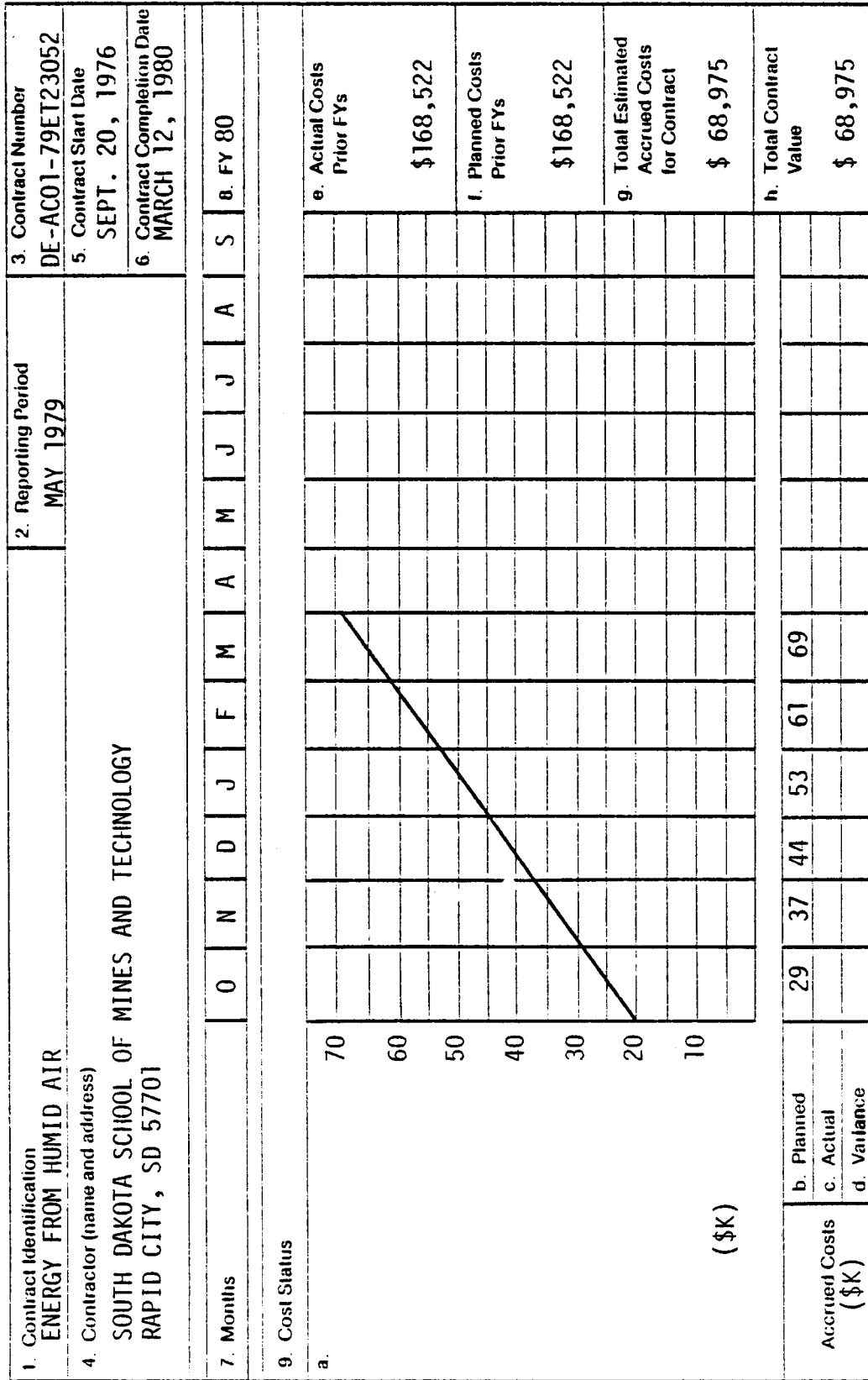


FIGURE 6-4 FY80 Cost Management Chart for the Humid Air Project

Project Title: An Analysis of the Madaras Rotor Power Plant
Contract: Project 7

Number: EX-76-S-01-2554
Start Date: October 1, 1976
Completion Date: May 31, 1978

Contractor: University of Dayton
Research Institute
300 College Park Avenue
Dayton, OH 45469

Contract Objective

Determine the cost effectiveness of a Madaras Rotor Power Plant in the 100 MW to 200 MW Range.

Contract Tasks (Accomplishments)

No Activity - All technical tasks have been completed and the draft final report submitted, reviewed, and comments incorporated.

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "The Madaras Rotor Power Plant — An Alternate Method for Extracting Large Amounts of Power from the Wind" was presented by the contractor at the WEIS conference May 23-25, 1979.

The final report entitled "An Analysis of the Madaras Rotor Power Plant — An Alternative Method of Extracting Large Amounts of Power from the Wind", HQS-2554-78/2, has been submitted by the principal investigator.

No follow-on activities are planned for this project.

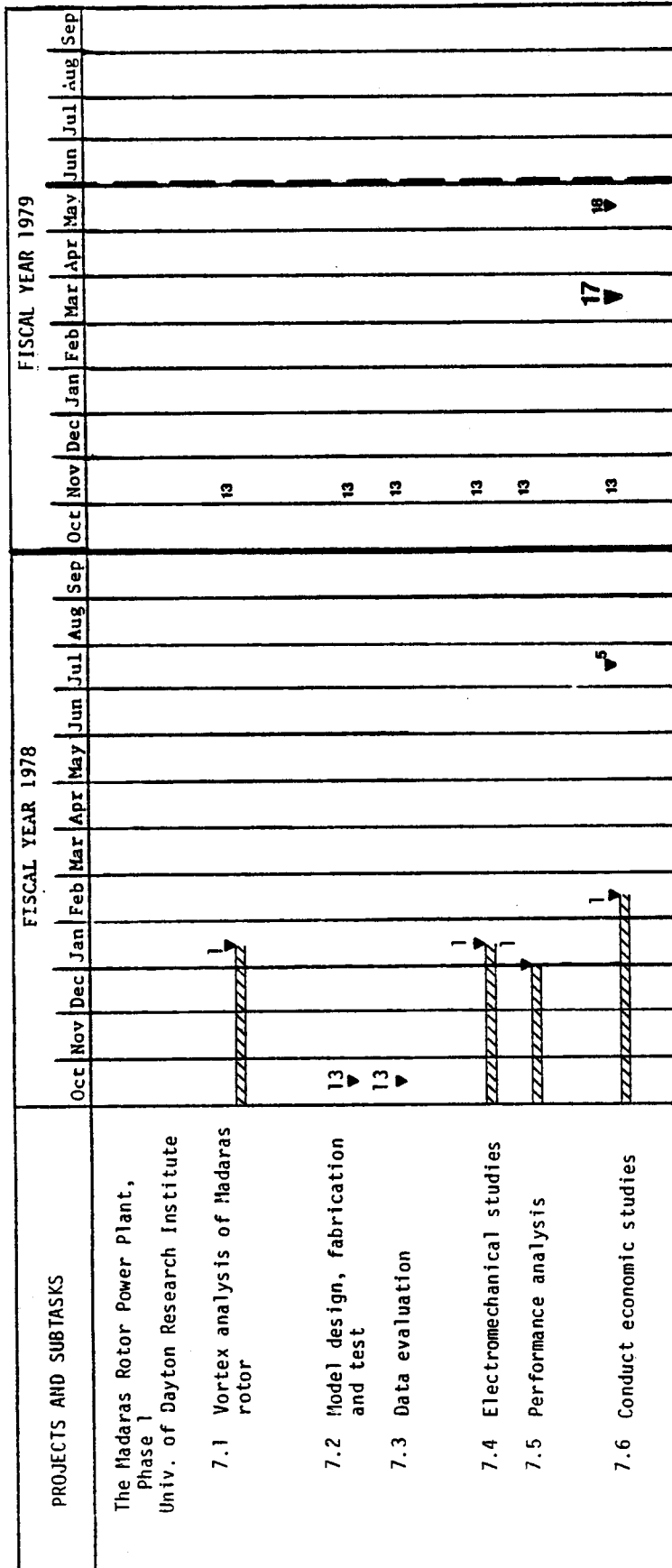


Figure 7-1 FY78 and FY79 Milestone Chart for the Madaras Project

1. Contract Identification MADARAS ROTOR POWER PLANT		2. Reporting Period MAY												3. Contract Number EX-76-S-01-2554	
4. Contractor (name and address) UNIVERSITY OF DAYTON RESEARCH INSTITUTE 300 COLLEGE PARK AVENUE DAYTON, OH 45469														5. Contract Start Date OCTOBER 1, 1976	
														6. Contract Completion Date	
7. Months		0	N	D	J	F	M	A	M	J	J	A	S	8. FY 79	
9. Cost Status															
a. NO FOLLOW-ON FUNDING IS PLANNED FOR FY79. NO FOLLOW-ON ACTIVITIES ARE EXPECTED.														e. Actual Costs Prior FYs \$143,170	
														f. Planned Costs Prior FYs \$143,170	
														g. Total Estimated Accrued Costs for Contract	
Accrued Costs														h. Total Contract Value	
b. Planned c. Actual d. Variance															

FIGURE 7-2 FY79 Cost Management Chart for the Madaras Project

Project Title: Vortex Augmentors for Wind Energy Conversion
Contract: Project 8

Number: ET-77-C-01-2358
Start Date: March 1, 1978
Completion Date: May 31, 1979

Contractor: Polytechnic Institute of
New York
Route 110
Farmington, NY 11735

Contract Objective

Determine the technical feasibility, performance, and economic potential of the delta wing type vortex augmentor concept.

Contract Tasks (Accomplishments)

Continued field testing during this period. Stability and control characteristics were unchanged and safety characteristics were satisfactory. Performance mapping is now being done routinely due to more favorable weather conditions. (Task 8.1)

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

None

Summary Status Assessment and Forecast

The project is not on schedule due to earlier testing delays for weather and a no cost extension to change the contract completion date from May 31, 1979 to August 31, 1979 has been requested.

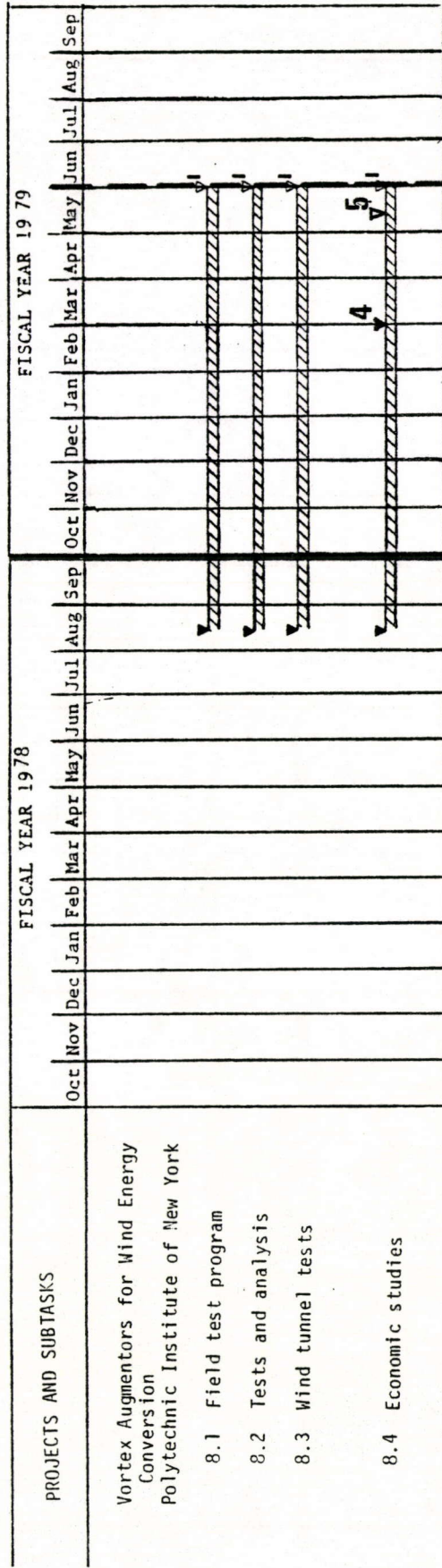


Figure 8-1 FY78 and FY79 Milestone Chart for the Vortex Augmentor Project

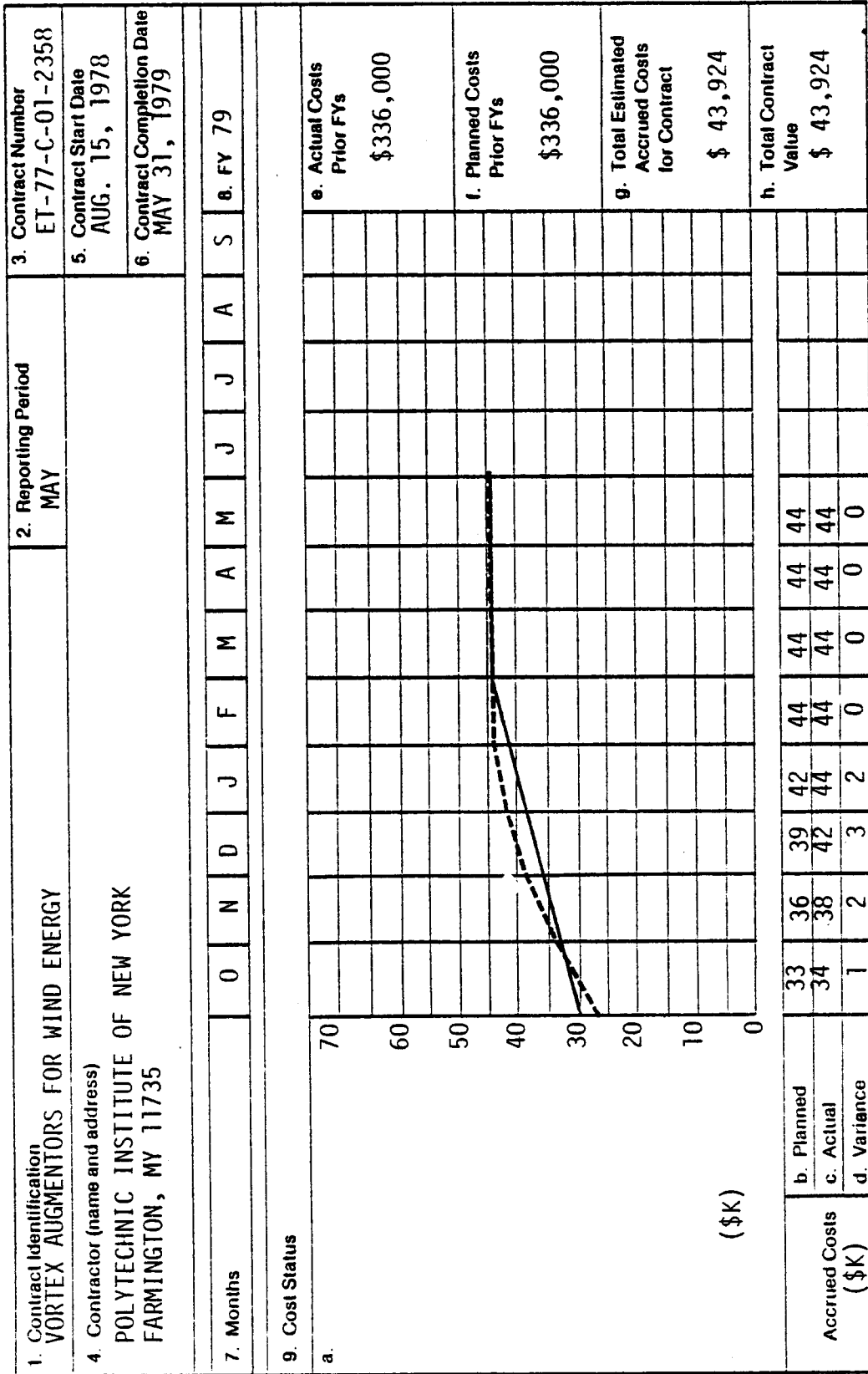


FIGURE 8-2 FY79 Cost Management Chart for the Vortex Augmentor Project

Project Title: A Definitive Generic Study of Augmented Horizontal Axis Wind Energy Systems
Contract: Project 9

Number: AH-9-8003-1
Start Date: January 30, 1979
Completion Date: May 31, 1979

Contractor: Aerovironment, Inc.
145 Vista Avenue
Pasadena, CA 91107

Contract Objective

Provide a critical evaluation of the potential cost effectiveness of augmented horizontal axis wind energy systems.

Contract Tasks (Accomplishments)

No Activity — All technical tasks have been completed and the draft final report submitted.

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "A Definitive Generic Study of Augmented Horizontal Axis Wind Energy Systems" was presented by the contractor at the WEIS conference May 23-25, 1979.

The draft final report entitled "A Definitive Generic Study of Augmented Horizontal Axis Wind Energy Systems" has been submitted and is to be reviewed during June 1979.

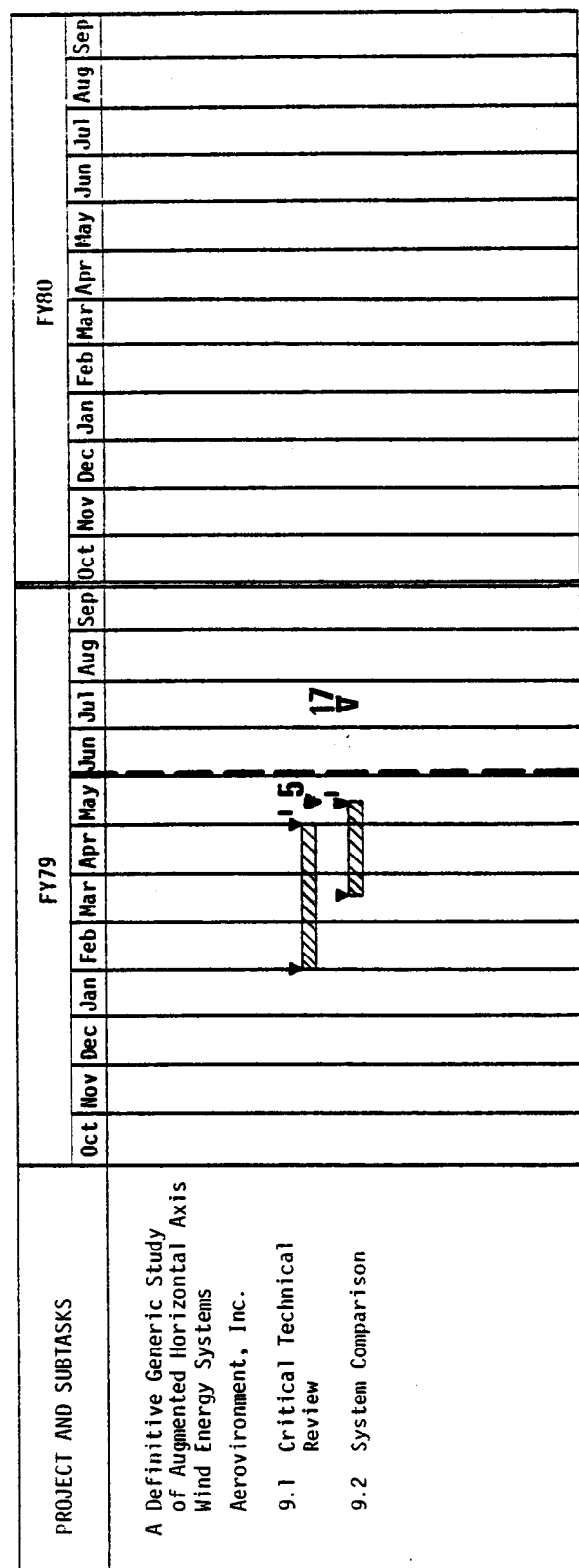


Figure 9-1 FY79 and FY80 Milestone Chart for the Aerovironment Augmented HAWT Project

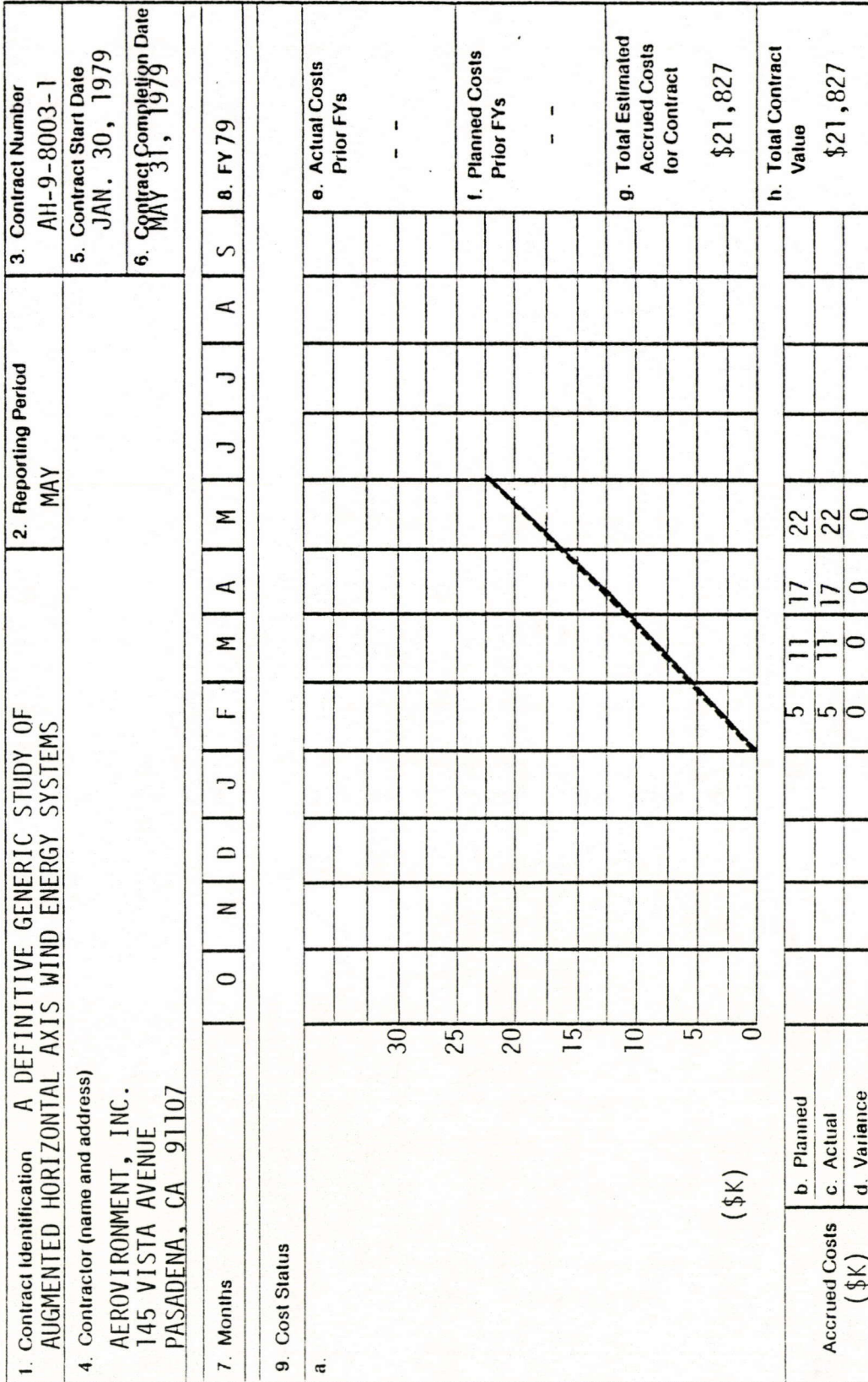


FIGURE 9-2 FY79 Cost Management Chart for the Aerovirement Augmented IIAWT Project

Project Title: A Definitive Generic Study of High Lift Device Wind Energy Systems
Contract: Project 10

Number: AH-9-8003-2
Start Date: January 30, 1979
Completion Date: June 30, 1979

Contractor: Aerovironment, Inc.
145 Vista Avenue
Pasadena, CA 91107

Contract Objective

Provide a critical evaluation of the potential cost effectiveness of high lift wind energy systems.

Contract Tasks (Accomplishments)

No Activity — All technical tasks have been completed and the draft final report has been submitted.

Technical Approach or Work Plan Changes

None

Variances

A no cost extension has been approved to modify the completion date from May 31, 1979 to June 30, 1979 to allow for the inclusion of review comments into the final report.

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Definitive Generic Study for High Lift Devices" was presented by the contractor at the WEIS conference May 23-25, 1979.

The draft final report entitled "Definitive Generic Study for the Effect of High Lift Airfoils on Wind Turbine Cost Effectiveness" has been submitted and is to be reviewed during June 1979.

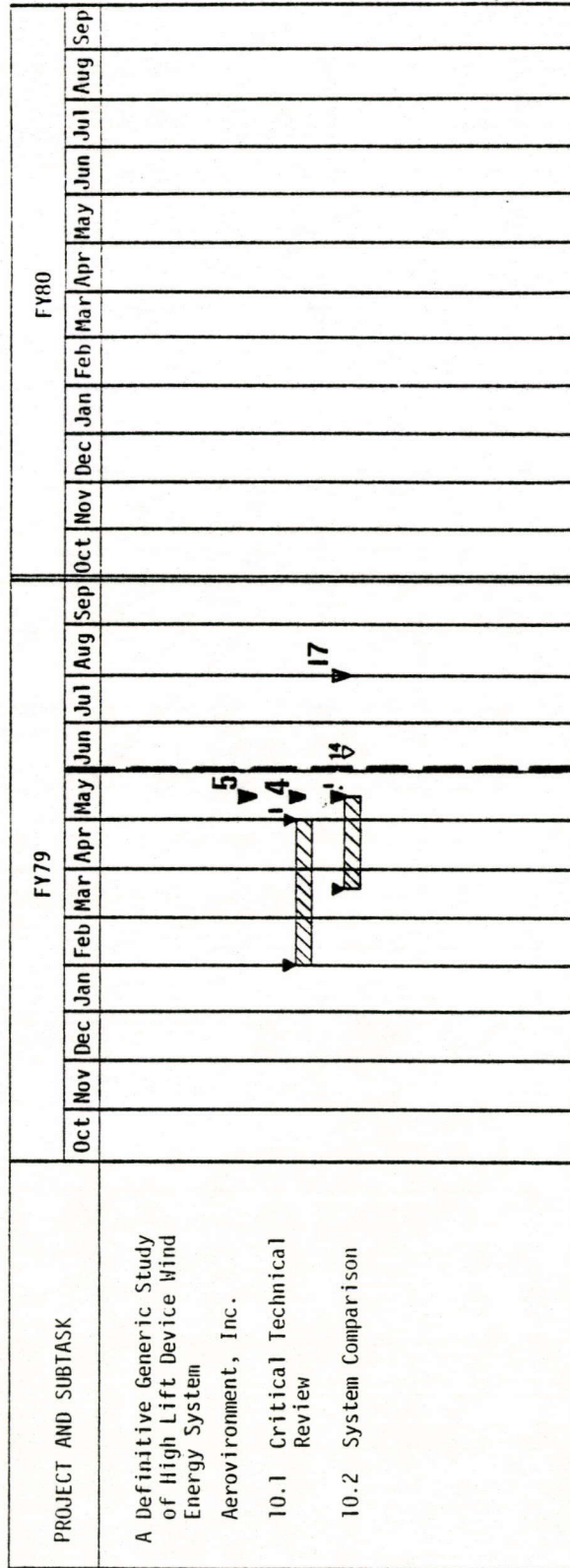


Figure 10-1 FY79 and FY80 Milestone Chart for the High Lift Device Project

1. Contract Identification A DEFINITIVE GENERIC STUDY OF HIGH LIFT DEVICE WIND ENERGY SYSTEMS												2. Reporting Period MAY			3. Contract Number AH-9-8003-2																																																																																																																																																																																																																																																																																																																										
4. Contractor (name and address) AEROVIRONMENT, INC. 145 VISTA AVENUE PASADENA, CA 91107												5. Contract Start Date JAN. 30, 1979			6. Contract Completion Date JUNE 30, 1979																																																																																																																																																																																																																																																																																																																										
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FIGURE 10-2 FY79 Cost Management Chart for the High Lift Device Project

Project Title: A Definitive Generic Study of Augmented Horizontal Axis Wind Energy Systems

Contract: Project 11

Number: AH-9-8003-3
Start Date: January 26, 1979
Completion Date: June 30, 1979

Contractor: Tetra-Tech, Inc.
1911 Fort Myer Drive
Suite 601
Arlington, VA 22206

Contract Objective

Provide a critical evaluation of the potential cost effectiveness of augmented horizontal axis wind energy systems.

Contract Tasks (Accomplishments)

No Activity — All technical tasks have been completed and the draft final report is being prepared.

Technical Approach or Work Plan Changes

None

Variances

A no cost extension has been approved to modify the completion date from May 31, 1979 to June 30, 1979 to allow the completion of the draft final report.

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Augmented Horizontal Axis Wind Energy Systems Assesment" was presented by the contractor at the WEIS conference May 23-25, 1979.

The draft final report is to be submitted during June 1979 and reviewed in July 1979.

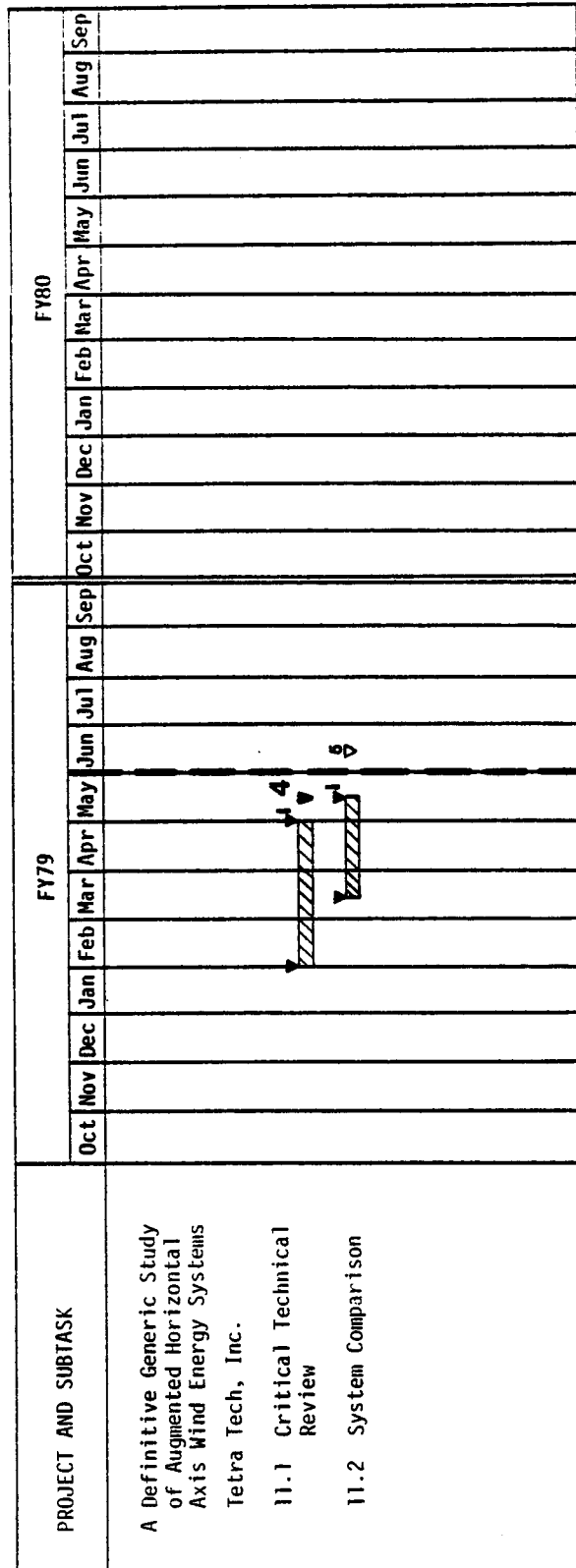


Figure 11-1 FY79 and FY80 Milestone Chart for the Tetra-Tech Augmented HAWT Project

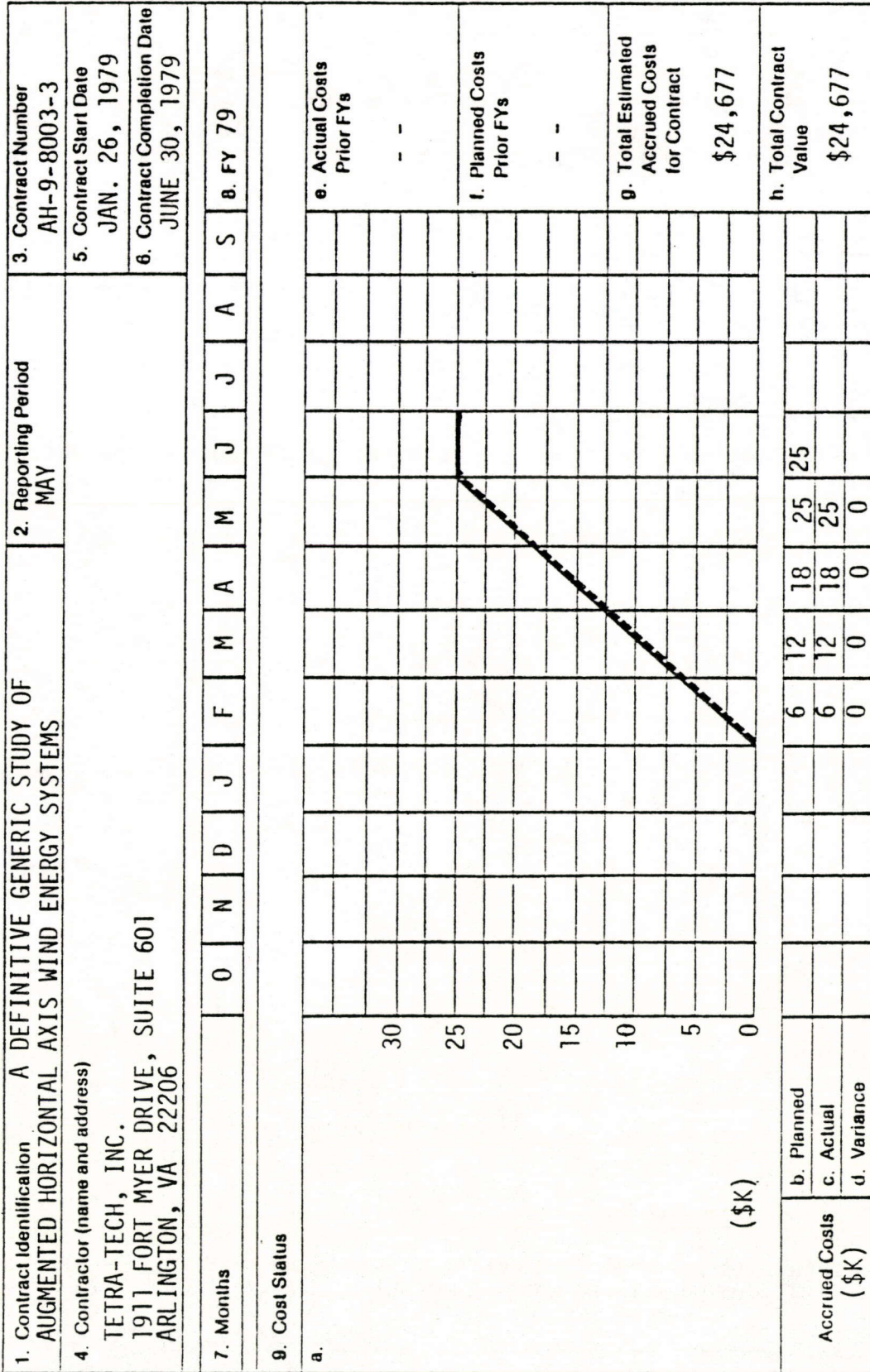


FIGURE 11-2 FY79 Cost Management Chart for the Tetra-Tech Augmented HAWT Project

Project Title: A Definitive Generic Study of Augmented Vertical Axis Wind Energy Systems

Contract: Project 12

Number: AH-9-8003-4
Start Date: January 15, 1979
Completion Date: May 31, 1979

Contractor: New York University
Dept. of Applied Science
New York, NY 10003

Contract Objective

Provide a critical evaluation of the potential cost effectiveness of augmented vertical axis wind energy systems.

Contract Tasks (Accomplishments)

No Activity — All technical tasks have been completed and the draft final report is being prepared.

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

The draft final report was not submitted by the principal investigator during May as planned.

Summary Status Assessment and Forecast

A paper entitled "Augmented Vertical Axis Wind Energy System Evaluation" was presented by the contractor at the WEIS conference May 23-25, 1979.

The draft final report is to be delivered in June 1979 and reviewed in July 1979.

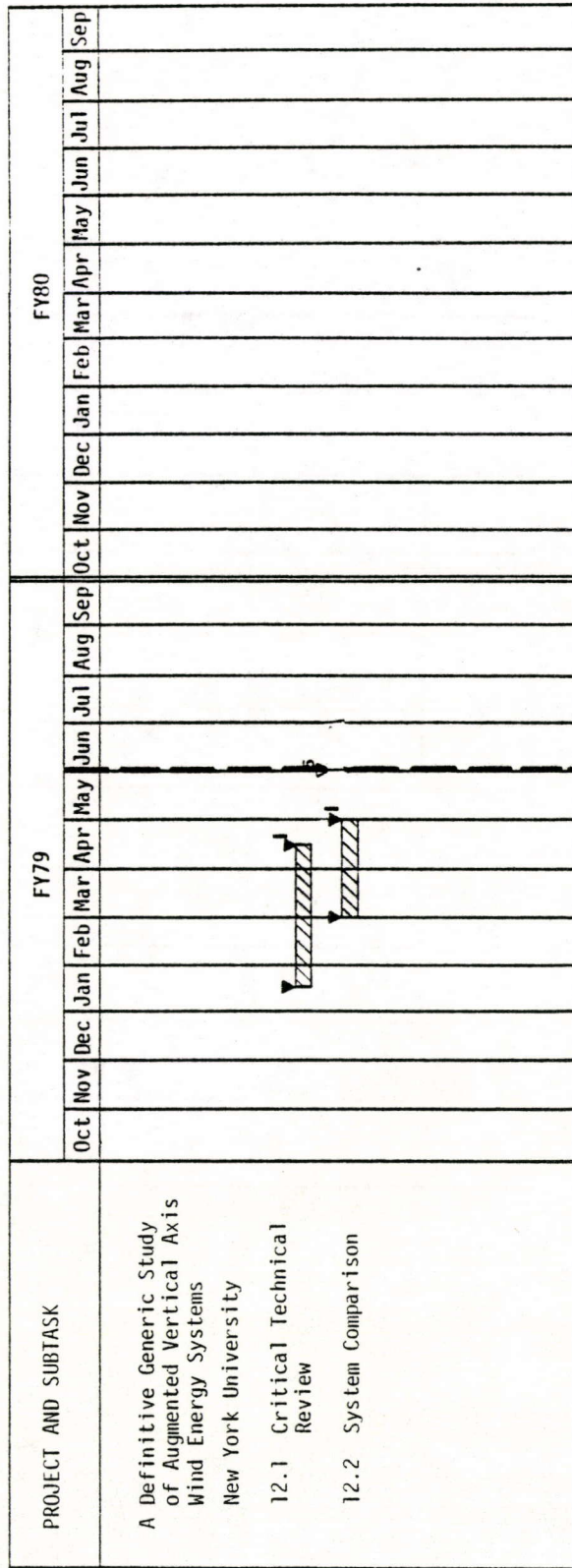


Figure 12-1 FY79 and FY80 Milestone Chart for the Augmented VAWT Project

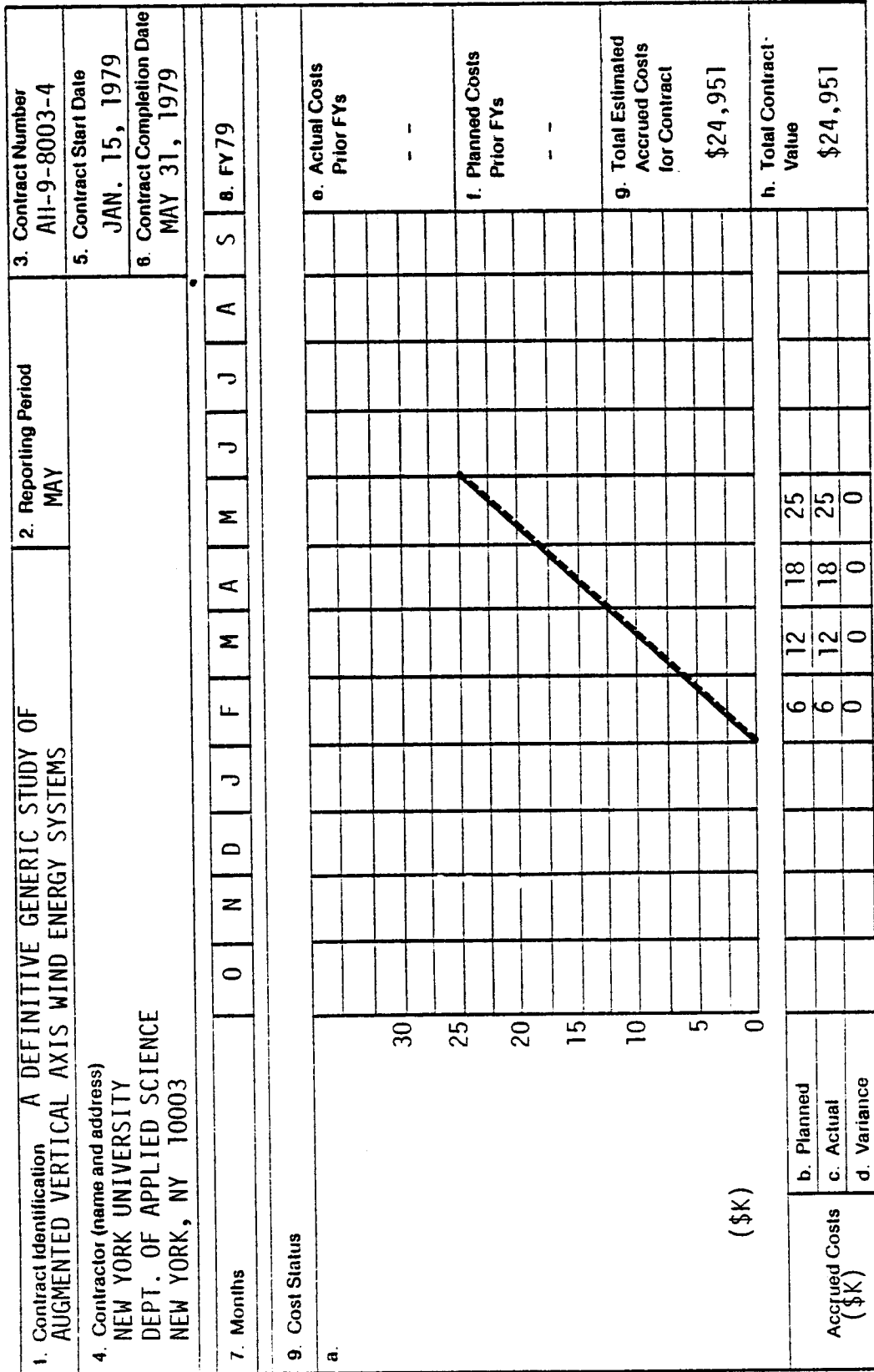


FIGURE 12-2 FY79 Cost Management Chart for the Augmented VAWT Project

Project Title: A Definitive Generic Study of Sail Wing Wind Energy Systems
Contract: Project 13

Number: AH-9-8003-5
Start Date: January 15, 1979
Completion Date: August 15, 1979

Contractor: Washington University
Tech. Assoc., Inc.
Dept. Mech. Eng.
St. Louis, MO 63130

Contract Objective

Provide a critical evaluation of the potential cost effectiveness of sail wing wind energy systems.

Contract Tasks (Accomplishments)

Completed all technical tasks and the draft final report has been submitted.

Technical Approach or Work Plan Changes

None

Variances

A no cost extension has been approved to modify the completion date from May 31, 1979 to 30 days after the receipt of SERI comments of the draft final report. This date is anticipated to be August 15, 1979.

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Sailwing Wind Energy Systems Assessment" was presented by the contractor at the WEIS conference May 23-25, 1979.

The draft final report entitled "A Definitive Generic Study for Sailwing Wind Energy Systems" has been submitted and is to be reviewed during June 1979.

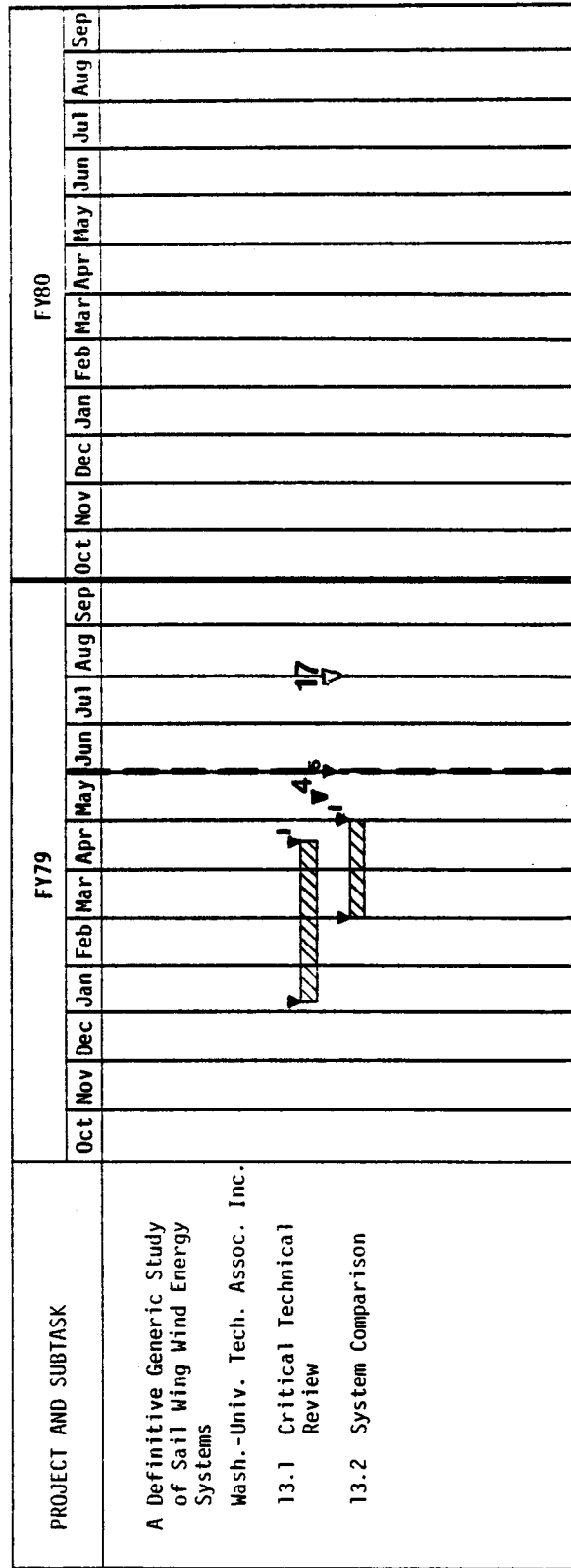


Figure 13-1 FY79 and FY80 Milestone Chart for the Sail Wing Project

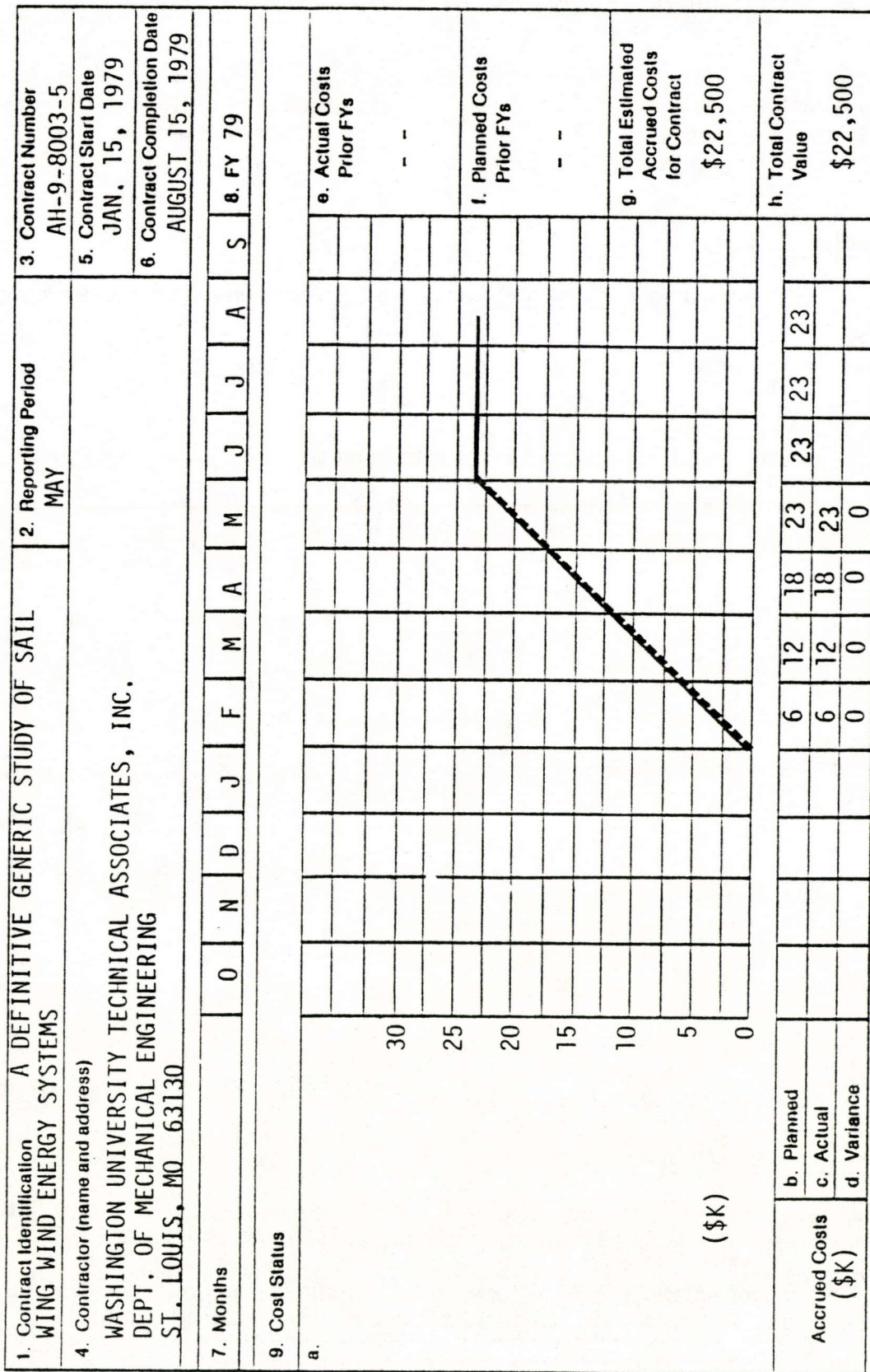


FIGURE 13-2 FY79 Cost Management Chart for the Sail Wing Project

Project Title: A Definitive Generic Study of Vortex Extraction Wind Energy Systems
Period: Project 14
Contract:

Number: AH-9-8003-6
Start Date: February 15, 1979
Completion Date: June 31, 1979

Contractor: JBF Scientific Corp.
2 Jewel Drive
Wilmington, MA 01887

Contract Objective

Provide a critical evaluation of the potential cost effectiveness of vortex extraction wind energy systems.

Contract Tasks (Accomplishments)

No Activity — All technical tasks have been completed and the draft final report submitted.

Technical Approach or Work Plan Changes

None

Variances

None

Open Items

None

Summary Status Assessment and Forecast

A paper entitled "Preliminary Technical and Economic Evaluation of Vortex Extraction Devices" was presented by the contractor the WEIS conference May 23-25, 1979.

The draft final report entitled "Preliminary Technical and Economic Evaluation of Vortex Extraction Devices" has been submitted and is to be reviewed during June 1979.

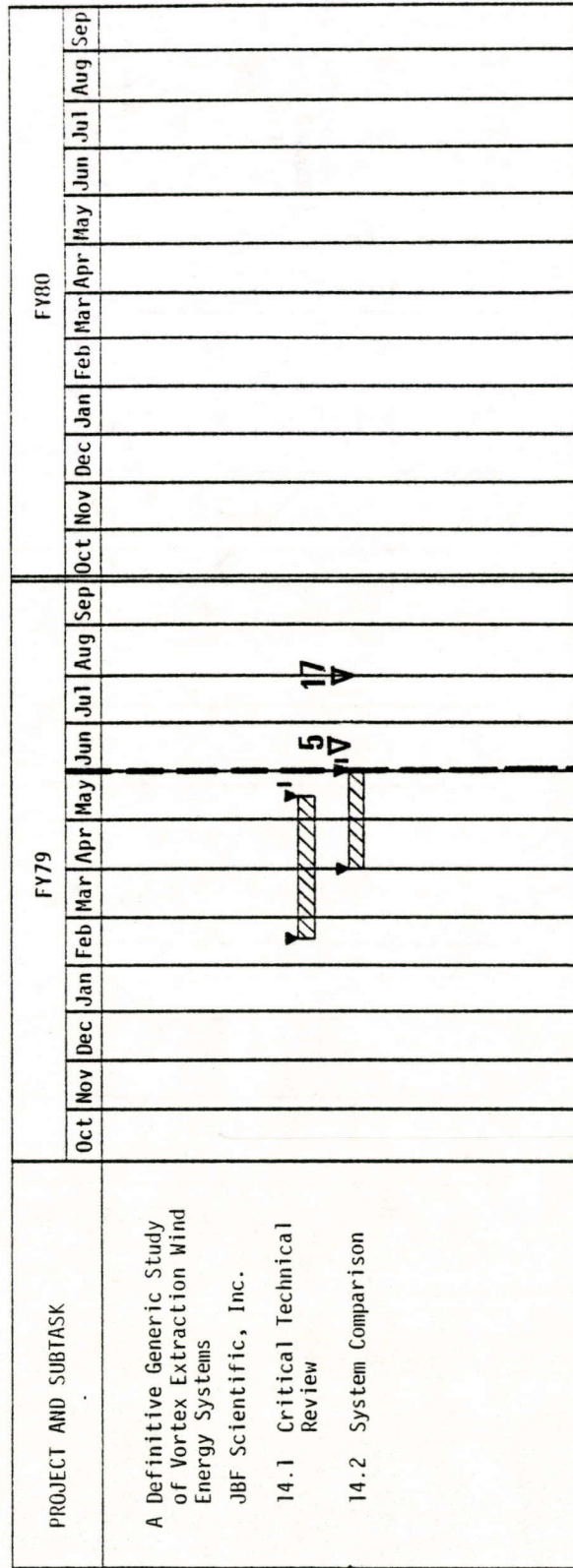


Figure 14-1 FY79 and FY80 Milestone Chart for Vortex Extraction Project



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