Tacoma Community College District Twenty-Two

2245-15+

Board of Trustees

AGENDA

REGULAR MEETING

N N N

2:00 p.m. - Open Meeting 5-24-79 John H. Binns Room 5900 South 12th Street Tacoma, Washington

- I. GENERAL MATTERS
 - A. Call to Order
 - B. Changes or Additions; Approval of Agenda
 - C. Approval of Minutes of April 24 and 26, 1979
 - D. Int oductions of Guests/Presentations

II. OLD BUSINESS

A. Instructional Services

None

B. Student Services

Ratification of the Constitution of the Associated Students of Tacoma Community College

Resolution 79-6, ASTCC Constitution

C. Administrative Services

Affirmative Action Plan, approval of

Tab II, Item C

Tab II, Item B.1

D. Business Services and Planning

None

Tab I, Item C

Agenda - Page Two (May 24, 1979)

- NEW BUSINESS III.
 - Instructional Services Α.

Tab III, Item A Professional Development Request, 1979-80 Fluid Power Popul Tab III, Item A. 2 Ed Zimmerman Energy Management Tab III, \$tem A.3.

Student Services в.

None

Administrative Services C.

None

Business Services and Planning D.

> 1979-80 Budget for Bookstore and Food Services, acceptance for study

1979-80 Associated Student Services and Activities Fee Budget, acceptance for study

INFORMATION REPORTS IV.

Associated Students of Tacoma Community Α. College (ASTCC)

None

Tacoma Community College Federation of в. Teachers (TCCFT)

None

Washington Federation of State с. Employees (WFSE)

None

Instructional Services D.

April Report

Student Services Ε.

April Report

Tab IV, Item D

Tab IV, Item E

Tab III, Item D.1

TabIL, C R. Rhule's Request for administrative leave without-pay.

Tab III, Item D.2

Agenda - Page Three (May 24, 1979)

F. Administrative Services

None

G. Business Services & Planning

None

V. CORRESPONDENCE

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Α.	Letter of appreciation; J	oe Kosai	Tab	v,	Item	A
в.	Letter of appreciation; J	oe Kosai	Tab	v,	Item	в
с.	Letter of appreciation; R	lichard Spangler	Tab	v,	Item	с
D.	Letter of appreciation; D	Dr. Ron Magden	Tab	v,	Item	D
E.	Donation of bleachers to Field by the Exchange Clu		Tab	v,	Item	E

VI. CITIZEN REMARKS

VII. MEMBERS OF THE BOARD OF TRUSTEES REMARKS

VIII. NEXT MEETING

Board Study Session -	June 26, 1979 7:00 p.m. John H. Binns Room
Board Regular Meeting -	June 28, 1979 2:00 p.m. John H. Binns Room

IX. ADJOURN REGULAR MEETING

TACOMA COMMUNITY COLLEGE

BOARD OF TRUSTEES

MINUTES OF MEETING

May 24, 1979

The regular session of the Board of Trustees was held on May 24, 1979 in the John H. Binns room

MEMBERS OF THE BOARD

Mrs. Ellen Pinto, Chairman Mrs. Sally Starke, Vice-Chairman Mrs. Mildred Jeynes Dr. Barbara Wesley

WASHINGTON FEDERATION OF STATE EMPLOYEES

Ellen Douthett

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STAFF, VISITORS, AND GUESTS

Susan Allison Priscilla Bell Tanya Brunke Jim Call R. E. Clark Joan Fandel Albert G. Gayda Kelly Gordon

Stewart L. Harp Jack H. Hyde Mary Kennedy T. W. Krasnoff Ivonna McCabe William S. Packard John G. Thorpe George Rother

ADMINISTRATIVE OFFICERS OF THE COLLEGE

Dr. Larry Stevens Dr. Robert Rhule Mr. Carl Brown Dr. Richard Batdorf Mr. Donald Gangnes

TACOMA COMMUNITY COLLEGE FEDERATION OF TEACHERS

Jerry McCourt

William J. Grostick Marc Simon Dan Small Darlene Solvason Dick Spangler Lorraine Stephan Susan Talbert Ed Zimmerman

CALL TO ORDER

The meeting was called to order by Chairman Pinto at 2:14 p.m. The roll was called and Chairman Pinto announced that a quorum was present.

Minutes of Meeting - Page Two (May 24, 1979)

ADMENDMENT TO AGENDA

Dr. Stevens requested that Tab III, Item C (Dr. Rhule's request for Administrative Leave Without Pay) be included in the agenda. The Board approved.

APPROVAL OF MINUTES

The Minutes of the Regular Meeting on April 26, and the Study Session held on April 24, 1979 were reviewed by the Board of Trustees. There having been no corrections and/or additions, the Minutes of April 24 and 26 were approved as published.

NEW BUSINESS

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Dr. Richard Batdorf introduced to the Board the newly ratified Associated Students of Tacoma Community College (ASTCC) New Consitution, for the Board's approval. The constitution had been lodged with the Board at the April 26, 1979 Board Meeting for study. The President recommended that the Board of Trustees formally approve and ratify the new Constitution of the Associated Students of Tacoma Community College as set forth on the attached Resolution 79-6.

> MOTION: Dr. Wesley moved that the new ASTCC Constitution be approved. Sally Starke seconded the motion. <u>The motion was</u> carried unanimously.

Mr. Carl Brown reviewed the status of the Affirmative Action Program, which the Board has been studying, along with a sheet reflecting the section and content of the revisions and additions. The President recommended that the Board of Trustees adopt the College's Affirmative Action Program as revised.

> MOTION: Sally Starke moved that the revised Affirmative Action Program be approved. Dr. Wesley seconded the motion. <u>The motion was carried</u> unanimously.

Minutes of Meeting - Page Three (May 24, 1979)

Dr. Robert Rhule introduced Edward Zimmerman to the Board of Trustees. Ed Zimmerman explained his request for Professional Development for 1979-80 to the Board along with the clarification that he will apply for Professional Leave through the correct channels at a later date. Since Ed Zimmerman's request is in keeping with the Philosophy of the Board in relationship to extending experience and enhancing education, the President recommends that Ed Zimmerman be granted leave.

> MOTION: Mildred Jeynes moved that the Board grant Ed Zimmerman leave to accept the position at WSU for 1979-80 and that the College compensate for the difference in earned income through a professional development grant to Mr. Zimmerman with the stipulation that Ed Zimmerman will apply for professional leave through the correct channels. Sally Starke seconded the motion. The motion was carried unanimously.

Dr. Stevens recommended to the Board of Trustees that Dr. Robert Rhule's request to be placed on Administrative Leave Without Pay from July 1 through September 8, 1979 be approved.

MOTION:

Dr. Barbara Wesley moved that Robert Rhule be granted administrative leave without pay status from July 1, 1979 through September 8, 1979. Sally Starke seconded the motion. <u>The motion was</u> carried unanimously.

Dean Don Gangnes presented to the Board the budget for 1979-80 for the Bookstore and Food Services department.

MOTION: Mildred Jeynes moved that the Board accept the 1979-80 Budget for Bookstore and Food Services for study. Sally Starke seconded the motion. <u>The motion</u> was carried unanimously. Minutes of Meeting - Page Four (May 24, 1979)

Dean Don Gangnes presented to the Board the 1979-80 Budget for Student Services and Activities Fee.

> MOTION: Dr. Barbara Wesley moved that the Board accept for study the 1979-80 Budget for Student Services and Activities Fee. Mildred Jeynes seconded the motion. <u>The motion was carried</u> unanimously.

Marc Simon was commended for his outstanding work done on the budget. He reported to the Board that he would available to the Board for any assistance during the Board's time spent studying this budget.

With the Board's permission, Dr. Stevens requested amendment to the agenda to refer back to Tab III, Items A.2 and Items A.3 which are two new course proposals. Russ Clark (Tacoma Community College) introduced the following members of the Energy Management and Fluid Power Committee: Bill Crostick, Jon Thorpe, Al Gayda, and Stewart Harp. These men were commended by the Board for their time and work willingly given to the College. Lorraine Stephan gave a brief description of the Energy Management and Fluid Power Programs. She listed the following thanking them for their time and work spent on this project; Advisory Committees, Ivonna McCabe and Math Science Division, Ed Zimmerman, Paul Jacobson, Gary Sigmen, Business Services and Planning Department, Don Gangnes, Anne Koenig, Susan Allison, Bob Rhule, Print Shop, Model Office, Russ Clark, Engineers, Department of Energy, Council for Vocational Education, Architects, Weyerhauser, Port of Tacoma, Military, Robbins Company, Keyser, Tacoma City Lights, National Electrical Contractors Association, and the IBEW.

> MOTION: Dr. Wesley moved that the Fluid Power Program be adopted. Sally Starke seconded the motion. <u>The motion</u> was carried unanimously.

MOTION: Mildred Jeynes moved that the Energy Management Program be adopted. Dr. Wesley seconded the motion. <u>The motion was</u> carried unanimously. Minutes of Meeting - Page Five (May 24, 1979)

INFORMATION REPORTS

A. Associated Students of Tacoma Community College.

None

B. Tacoma Community College Federation of Teachers.

None

C. Washington Federation of State Employees (WFSE).

None

D. Instructional Services.

Dr. Robert Rhule presented to the Board Tanya Brunke who in turn presented Joan Fandel who is the Peninsula Area Coordinator for Tacoma Community College. Tanya Brunke reported to the Board on the recently held "Management Leadership Workshop" conducted by Skip Marshall, Coordinator for Small Business Management Education.

The Tacoma Community College/Community Organization Project is scheduled to begin in May. The "hilltop" project is co-sponsored by Tacoma Community Organization and is funded by a Title 1A grant from the state Department of Planning and Community Aid.

Through a request from the Metropolitan Development Council, Tacoma Community College has been selected by CETA to provide the instruction for a new training project.

A review of the following trades programs at McNeil Island has been done; welding, electronics, small engine repair, and barbering. Lorraine Stephan will be working with the Degree Committee and the Curriculum Committee to propose approval of credits for each of the programs.

A letter has been received from the Technical Education Research Center of Waco, Texas, formally inviting Tacoma Community College to participate in the Energy Conservation and Use Technician Program as a field test site beginning Fall, 1979.

New Courses approved by the Curriculum Committee and the President were reviewed by the Board.

Minutes of Meeting - Page Six (May 24, 1979)

E. Student Services.

The financial problem encountered by the Iranian Students has been solved with the students being able to continue attending Tacoma Community College and funding forthcoming from Iran. Special thanks to Mary Palo, Donna Long and the Office of Business Services and Planning for their care in achieving a solution to the problem.

The annual process of developing a Service and Activity Fee Budget was completed. The Advisory Board, the Senate, and the Coordinator of Student Programs and her staff were commended for their exemplary performance under an extraordinarily difficult set of circumstances

The Child Care Center, the quality and quantity of the program, and the need for this program was presented to the Board by Dr. Richard Batdorf. Dr. Batdorf stated that the exceptionally high quality of the staff in the Child Care Center and the outstanding educational program which they offer to the children can be a source of great pride and satisfaction for the entire campus community.

F. Administrative Services.

None

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G. Business Services and Planning.

None

V. CORRESPONDENCE

A letter of appreciation to Joe Kosai for his work done as a speaker at Fort Lewis Unit Equal Opportunity Seminar and Management Course was reviewed by the Board.

The Board reviewed a letter to Joe Kosai from Willapa Valley Schools commending him for attending the U.S. Air Force Academy Educator Airlift briefing in Colorado.

A letter to Richard Spangler, Tahoma Vista Village, expressing appreciation from Tanya Brunke, Associate Dean, concerning Tacoma Community College providing services for Vista Village residents. Minutes of Meeting - Page Seven (May 24, 1979)

A letter to Dr. Magden expressing appreciation to him for hosting the AACJC television project, was reviewed by the Board.

Dr. Stevens presented to the Board a letter from the Exchange Club of Tacoma presenting a set of bleachers to Tacoma Community College for use at the Sam Minnitti Playfield.

CITIZEN REMARKS

None

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MEMBERS OF THE BOARD OF TRUSTEES REMARKS

NEXT MEETING

The next regular meeting of the Board of Trustees will be held June 28, 1979, at 2:00 p.m. in the John H. Binns room.

There being no further business to come before the Board, the meeting was adjourned at 3:08.

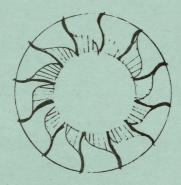
Respectfully submitted,

Stevenz

Larry P. Stevens Secretary to the Board

Exhibit A





FLUID POWER TECHNICIAN PROGRAM

TACOMA COMMUNITY COLLEGE

LORRAINE STEPHAN Associate Dean for Occupational Education

> Russel E. Clark Coordinator of Program Developmen Fluid Pomer Technology Program

FLUID POWER TECHNICIAN PROGRAM

A PROPOSAL

DENNIS FINDLEY ANNE KOENIG

EDITED BY:

DONALD R. GANGNES

MAY, 1979

PROGRAM PLANNING BY:

LORRAINE STEPHAN ASSOCIATE DEAN FOR OCCUPATIONAL EDUCATION

ALL ALLAN

RUSSEL E. CLARK COORDINATOR OF PROGRAM DEVELOPMENT FLUID POWER TECHNOLOGY PROGRAM

DOCUMENT PREPARATION BY:

DENNIS FINDLEY ANNE KOENIG

DONALD R. GANGNE

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I. INTRODUCTION

INTRODUCTION

INTRODUCTION - (COI

Industry has, over a period of time, changed old equipment for cutting, shearing, bending and lifting to hydraulically and pneumatically controlled machines. Fluid power is taking over the chores of industry requiring "muscle." Hydraulics are employed when heavy objects are to be moved or positioned, and pneumatics are used when high speed operation or smooth, steady motion is required. In fluid power systems, energy is transmitted by means of pressurized fluid (oil--a solid fluid, or air-a non solid fluid) flowing through tubes, hoses, or pipes rather than the use of gears, levers, chains, belts or shafts.

The industry has an increasing demand for fluid power technicians: people trained in hydraulics and/or pneumatics. People trained in this technology are needed for sales oriented jobs (inside or outside sales); field servicing of equipment; maintenance, repair or trouble shooting of equipment; and design and development of new equipment.

Spokane Community College is presently the only school in the Northwest training fluid power technicians. In fact, it has the only training program for fluid power technicians west of Granite Falls, Minnesota. Because of increasing manpower needs, the industries of Western Washington are frequently forced to recruit fluid power trainees before they complete the first year of Spokane's program. Very few students survive recruitment by industry to enter the second year of the program.

This inability to meet the needs for trained fluid power technicians, prompted Dean L. Croskrey, SCC's fluid power coordinator/instructor to suggest to Lorraine Stephan, Associate Dean for Occupational Education that TCC investigate the possibility of starting a program. In response to this suggestion, TCC representatives studied SCC's program in detail. The results of this study prompted the College to file an alert with the State Board for Community College Education and to designate Russell E. Clark, TCC instructor, as the individual to develop the program for possible implementation in the fall of 1979. The development activities performed to date are described in this proposal for a Fluid Power Technology Program. The staff has relied heavily on the experiences of Spokane Community College in structuring a proposed curriculum and establishing the need for staff, supplies and equipment. An advisory committee has been established for the program and met several times. The advisory committee members are listed in Appendix A.

a non solid fluid) flowing through tubes, noses, or pipes raties change use of gears, levers, chains, belts or shafts.

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II. DESCRIPTION OF PROGRAM

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II. DESCRIPTION OF PROGRAM

Fluid power mechanics involves the industrial uses of air (pneumatics) and oils (hydraulics) in mechanical systems. The definition of a Fluid Power Mechanic, as stated in the <u>Dictionary of Occupations and Titles</u>, published by the U. S. Department of Labor is as follows:

FLUID POWER MECHANIC (any industry)

"Fabricates, assembles, services, maintains, repairs and tests fluid power equipment, such as power steering units and components, following blueprints, schematics or drawings, using handtools, power tools and testing devices and applying knowledge of hydraulic, pneumatic and electrical principles: Analyzes blueprints, schematics, diagrams and drawings to determine fabrication specifications. Sets up and operates milling machines, lathes, shapers, grinders, drill presses and welders to make precision parts. Verifies conformance to specifications, using instruments, such as micrometers, verniers and calipers. Assembles fluid power components, such as pumps, cylinders, valves, reservoirs, motors, accumulators, filters and controls, using handtools and holding devices. Connects unit to test equipment and analyzes and records data, such as fluid pressure, flow measure and power loss due to friction and parts wear. Recommends modifications in unit and in test procedures, instrumentation or setup, based on analysis of test results."

A program to train Fluid Power Mechanics must provide classroom and laboratory experiences involving the study of transmitting power with fluids under high pressure (3,000 p.s.i.), the operation and application of pneumatic and hydraulic system components, the installation and repair of pneumatic and hydraulic system components, the use of shop tools to perform a variety of functions (i.e., make hose assemblies, bend and flare tubing, thread and weld pipe, construct basic hydraulic power units, etc.), the reading of blueprints, the computation of forces developed in fluids under pressure, etc.

The graduate of a Fluid Power Technology program must be trained to work with both pneumatic and hydraulic systems and perform activities which range from trouble shooting and repairing existing equipment to selling new and used equipment to assisting in the design and development of new equipment. The program and student goals for the Fluid Power Technology program are included in Appendix B.

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The Fluid Power Technician program emphasizes "hands-on" experiences. It is recommended that students spend ten hours per week in laboratoryworkshop activities gaining practical knowledge of the field. These experiences, when coupled with field trips, give the students the added dimension of on the job application. The equipment and fluid power components used in laboratory experiences will be taken directly from field applications.

The two year program is structured in two distinct phases. The first year is designed to give the student the basic knowledge required to work in the field in the areas of maintenance and repair of existing equipment, sales, or design and development of new equipment. The second year is intended to provide the students training in more advanced work in fluid power as well as training in those additional shop skills, beyond welding, required on the job.

Because the fluid power industries are recruiting a number of students who have completed only the first year of the program (SCC found only four students returning for the second year), the College is planning to provide a second year program for students hired at the end of the first year, that will allow them to continue working while they learn. The program for these people will utilize continuing education as the mode of instruction. Site visits by the instructor, contracted learning, and classes at TCC on Saturdays or evenings will be a part of the cooperative education program for the second year of the program.

The Fluid Power Advisory Committee is recommending that the College award certificates to students when they have completed the first three quarters of the program at TCC. An Associate of Technical Arts Degree is to be awarded to students who complete the second year of the program which will include English 104 and possibly Industrial Safety and Hygiene.

work with both pneumatic and hydraulic systems and perform activities which range from trouble shooting and repairing existing equipment to selling new and used equipment to assisting in the design and development of new equipment The program and student goals for 3the Fluid Power Technology program are included to Amoundix A II. <u>DESCRIPTION OF PROGRAM</u> - (Cont.)

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The Fluid Power Technology program outline is as follows:

CER	TIFICATE	3 Quarters	
ASS	OCIATE DEGREE IN TECHNICAL ARTS	6 Quarters	
FIR	ST YEAR:		
	First Quarter		Credits
	Introduction to Fluid Power 111 Practical Applications of Fluid Pow Welding (Arc) 113	ler 112	5
	Second Quarter		
	Principles of Fluid Power 121 Practical Applications of Fluid Pow Welding (Oxy-Acet) 123	ler 122	5
•	Third Quarter	•	10
	Advanced Fluid Power 131 Practical Applications of Fluid Pow Speech 200	er 132	5
SECO	OND YEAR: COOPERATIVE EDUCAT	ION	
	Fourth Quarter		
	Fluid Power Theory IV 141 Fluid Power Lab IV 142	••••••	··· <u>10</u>
	Fifth Quarter		15
	Hydraulics 151 Practical Application of Hydraulics	152	5 10 15
	Sixth Quarter		
	Fluid Power Machine Shop 161 Component Repair 162	•••••••••••••••••••••••••••••••••••••••	5 <u>10</u> 15

III. ASSESSMENT OF NEED

III. ASSESSMENT OF NEED

One of the first planning activities generally performed by a college when considering a new occupational program is a needs assessment. Unable to locate current information on the needs for Fluid Power Technicians in Pierce County, the College performed its own survey during March of this year.

Ninety-two questionnaires were mailed to employees in the area. A list of the employers' surveyed is included as Appendix C. The survey instrument, a modification of the one used by Spokane Community College, asked employers to respond to eight items concerned with such things as: employment needs, required training levels, availability of trained people, present methods of training, etc. A copy of the survey instrument is included as Appendix D.

The response to the mail out survey was good. By April 18, 1979, thirty-four (34) employers or 37% of the companies surveyed had responded. The results based on the tally of the 34 surveys are as follows:

Item Responses:

- Q 1. 91% of the respondents stated they hired people with fluid power skills.
- Q 2. Eight (8) respondents stated they had a source of trained employees; 25 respondents stated they did not.
- Q 3. 50% of the respondents stated they provided job training in some form.
- Q 4. The respondents projected a total of 108 openings in fluid power for next year. A telephone follow-up survey verified 65 of the 108 openings; 42 of the 65 openings are new positions.

105 of the 108 positions reported were listed as openings in the following areas:

Servic	ing-r	naintaining	95
Sales			7
Design	and	Development	3

- Q 5. In responding to the level of job skills that individuals must have to be employable, the greatest number of responses indicated level 2 (skills adequate for trouble shooting). The portion of question (5) dealing with Continuing Education gave a fairly light response averaging about 5 responses each classification.
- Q 6. Question 6 attempts to define the number of unions serving the industries involved in Fluid Power.

43 responded to the question, "Does your employee have to belong to a union?" Yes - 23; No - 20.

IV. DEVELOPMENT OF CURRICULUM

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IV. DEVELOPMENT OF CURRICULUM

A. FLUID POWER CURRICULUM COMPONENTS - (Con

The advisory committee reviewed the Spokane Community College curriculum and modified it through deletion and addition to develop a curriculum for Tacoma's program. The committee studied the fall, winter and spring course components of the SCC program in relationship to employment/job needs. The committee's curriculum components, as modified, becomes the objectives of the students. The material to be completed by an instructor by the end of the first year is listed below:

A. FLUID POWER CURRICULUM COMPONENTS

Fall Quarter - Components

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Basic Hydraulics - Theory - Math Calculations Pressure, Pressure drop, Pressure differential Flow Fluid Physics 100150 VD seque taggog bas foogs - seview nik Volume and Velocity Relationships Electrical Principles and Devices Hydraulic Components Identification, Operation, Int. Parts, Mfg. Info.Schem, Symbol Pumps - gear, vane, piston (inline bent axis) Press Controls - relief valve, press, reducing, sequence - Counter balance, brake valve Directional Control Mobile - Manual Industrial - manual sol. direct oper., sol., pilot operation Flow Control Valves 2-port compensated and non compensated 3-port press. comp. Fluid Conditioners Filter press and return line Heat exchanger air and water type Tank heater Limitations of conditioners Filters Chemical Conditioning Hydraulic Fluid Viscosity - viscosity index Effects of heat, dirt, water Types and Properties Hydraulic contamination Particulate matter Chemical (acids - etc.) Control and Testing

A. FLUID POWER CURRICULUM COMPONENTS - (Cont.)

Fall Quarter - Components - (Cont.)

Seals and Fluid Compatibility

Hydraulic Plumbing

Hydraulic Accessories and tanks Reservoir construction and components Accumulator

Study and draw hydraulic schematics for 5 basic systems (symbols included)

Winter Quarter - Components

Basic Pneumatic - theory

Pneumatic Components Identification, Operation, Mfg. Info. Air valves - spool and poppet type, CV calculations Air Cylinders Air Compressors Air lines Air treatment equipment

Blueprint Reading (schematics & piping drawings)

Shop Sketching (using small drawing boards)
 Hydraulic oil reservoir
 Coupling guard
 Brackets (pump, pipe, motor, filter, return line)
 Simple multi-port manifold
 Switches (selector, limit, pressure, push button)
 Relay (std. mtg. and plug-in types)
 Timers (electric, pneumatic, electronic)

Systems Sequence of Operation

Pneumatic Control Methods

A. FLUID POWER CURRICULUM COMPONENTS - (Cont.)

Spring Quarter - Components

Student Machine Design Project

Hydraulic drawings and billing mat'ls. mfg. part no. Elect Control schematic and bill matl.

Layout power unit

Electric motor nomenclature and hookup (matching of H.P. to Hydr. pump) Motor starter, conduits, and wire sizes

Couplings Pump Valves Manifold Piping, hose, tubing, fittings, etc. Reservoir Filters

Student Reports

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Obtain mfg. info. on hyd. component (part no., operational units, repair kits, etc.)

Application

Use of measuring devices (calipers, micrometers, dial helio, etc.) Determine hyd. pipe sizes Determine hyd. pipe fittings (mal. iron, forged steel) Determine steel tubing (wall thickness and safety factor) Determine tube bending radium Determine tube flaring and cutting Determine tube fittings (bite type, flared JIC and SAE and application)

Types of hyd. hoses & applications Types of hose fittings & adapters

Shop demonstration - hose assy, bending tubing, cut and flare tubing, cut and flare pipe. Hydradynamics

Vibration Harmonics

Upon completion of the first year, the student will receive a certificate. The certificate will state that the student completed a program for the training of a Fluid Power Technical Assistant.

Students completing the second year's work in Fluid Power Technology and English 104 will receive an Associate of Technical Arts degree. Also, a course in Industrial Safety and Hygiene will be provided. The recommended mode of instruction for the second year is Cooperative Education. The instructor/coordinator of the program will serve as TCC's representative in the field. Spokane Community College students in the area may be a possible source of students for the second year program. The second year's work is listed below:

Second Year - Cooperative Work Experience

	<u>Course Title</u>	Course	No.	Credits
•	Fluid Power Theory Fluid Power Laboratory	141 142		5 10
	Hydraulics	151		Stu Zant
	Practical Applications of Hydraulics	152	btain mfg. info. o repair kits, etc.)	10
	Fluid Power Machine Shop Skills Component Repair	161 162	ppifcation easuring devices (etermine hyd. pipe etermine hyd. pipe	

Upon completion of the first year, the student will receive a certificate. The certificate will state that the student completed a program for the training of a Fluid Power Technical Assistant.

B. CATALOG DESCRIPTIONS PROGRAM COURSES

WELDING TECHNOLOGY (ACETYLENE AND ARC)

(2 Quarters)

101 Basic Concepts of Oxy-Acetylene Welding 3 Credits

Introduction to theory and practice of gas welding, including industrial welding and fuel gas manufacture. Health hazards and safety rules and regulations. Metal weldability, joint configuration, and cuttability. An overview of the practical aspects of oxyacetylene encompassing a variety of metals. Types of joints, positions of welds, and various techniques of metal deposition. Flamecutting, brazing, and silver soldering are demonstrated, with some practice required in the first two categories. Sound safety practices and specific rules regarding health hazards are illustrated and emphasized.

102 Principles and Theory of Arc. Welding 3 Credits

Designed to familiarize the student with metal arc welding as applied to various metals. Covers various electrodes, types of coatings, types of welding machines and their welding characteristics. Introduction to a variety of welding machines, welding electrodes, and welding materials related to modern production. Various joint configurations, positions of welding, and modern welding techniques. The hazards of metal arc welding along with good safety rules and regulations are covered in detail.

sequence of operations to produce outh pressure

FLUID POWER

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3 Quarters

111Introduction to Fluid Power10 Credits112Practical Applications of Fluid Power5 Credits

Basic mathematics required to calculate areas of circles, volume in cylinders, conversion tables, and simple ratio problems. Physics required to understand fluid flow and pressure. Learn names and schematic symbols for hydraulic components. Identify component parts and functions. Study of various combinations of components to make system. Prerequisite: None

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141 FLUID POWER THEORY 5 credits

142 FLUID POWER LAB

10 credits

Useof hard tools to disassemble and rebuild and test hydraulic components, pumps, valves, cylinders, hydraulic motors. Use parts drawing to order repair parts. Develop good shop practices. Test facility for pressure testing and measuring flow and leakage in drain lines. Safe operation of test stands. Run through series of basic operations on self-contained shop tool. Learn to operate or become familiar with the shop machines. Safety features, type of work each machine performs relative to hydraulic and pneumatic equipment.

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Prerequisite: FLUID POWER (131-132)

151HYDRAULICS5 credits152PRACTICAL APPLICATION OF HYDRAULICS10 credits

Set up and operate five basic hydraulic power units. Become familiar with their operation and general application. Operate basic production machines that are electrically controlled, hydraulically operated. Take field trips to local plants to see larger hydraulically operated electrically controlled production equipment. Develop procedure for trouble shooting industrial equipment using basic hydraulic schematics, electrical schematics, understanding of machine sequence of operations to produce both pressure and line testing to determine trouble area before actually working on machine

Prerequisite: FLUID POWER (151-152)

161 FLUID POWER MACHINE SHOP 5 credits

162 COMPONENT REPAIR 10 credits

Students will overhaul or rebuild piece of major hydraulic equipment. Build a pressure unit and install all major components, pump, electric motor, couplings, lines, manifold, return line filter. Design and build manifold using milling machine, drill press, machine cylinder piston rod or valve part. Straighten cylinder rod.

Prerequisite: FLUID POWER (151-152)

121 Principles of Fluid Power122 Practical Applications of Fluid Power

10 Credits 5 Credits

Relationship of fluid flow and pressure drop in hydraulic lines. Calculate fluid velocity in pipes, tubing, and fitting. Study air prepreration equipment (filter regulator and lubricator), air valve, and cylinders. Schematic symbols; draw simple systems. Students become acquainted with electric controls and schematics involving valves. Prerequisite: Fluid Power 111 and 112

131 Advanced Fluid Power 132 Practical Applications of Fluid Power

10 Credits 5 Credits

Calculate hydraulic system requirements to replace electric motor with hydraulic motor. Make complete hydraulic system layout, including hydraulic schemat, bill material, piping layout and selection fittings, tubing, pipe and hose. Develop systematic approach to trouble shooting hydraulic systems, preventative maintenance program for hydraulic and pneumatic equipment and spare parts program.

Prerequisite: Fluid Power 121 and 122

The Fluid Power Program will enroll students in the following existing courses offered by departments:

SPEECH 200 5 credits ENGLISH 104 5 credits INDUSTRIAL SAFETY AND HYGIENE - X credits

The balance of the Fluid Power program will be new courses specifically designed for the technician. The students will be enrolled in the Fluid Power Program from 8:30 a.m. to approximately 1:30 p.m. with breaks and lunch. The welding course will be offered in the early afternoon. The College could offer community service welding courses during other time periods.

V. IDENTIFICATION OF RESOURCE REQUIREMENTS

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V. IDENTIFICATION OF RESOURCE REQUIREMENTS

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The fluid power program has resource requirements typical of technology programs in that the first year costs are much higher than the costs to maintain the program. The first year costs are due to the need for facility modifications, new equipment, supplies, audio-visual equipment and materials. library materials, new staff, etc. The Fluid Power instructional program and

services that will be a part of the program are illustrated in the following diagram, Chart A.

The instructional program and services functions included in Chart A will require a number of instructional support spaces with specialized services, equipment and furniture. The types of space and the inter-relationship of those spaces are diagramed on Chart B, page

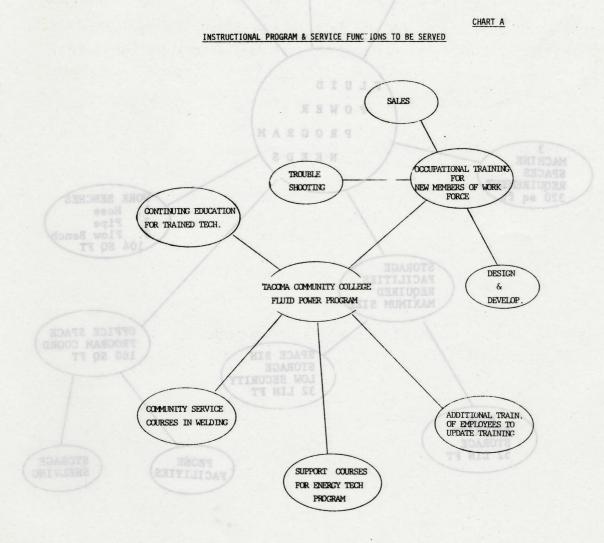
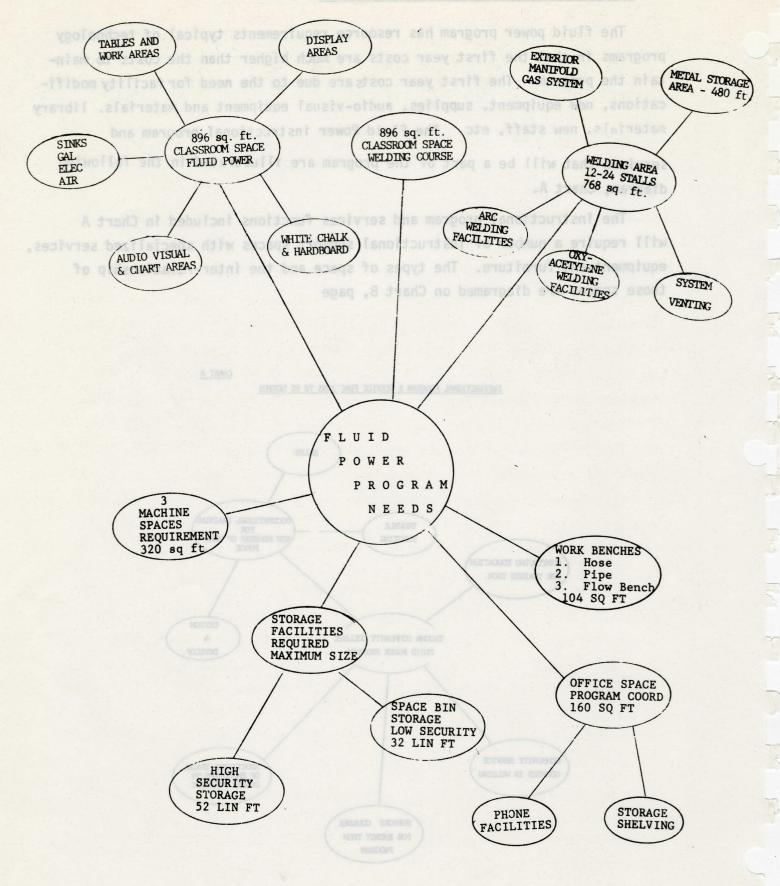


CHART B





V. IDENTIFICATION OF RESOURCE REQUIREMENTS - (Cont.)

SPACE REQUIREMENTS AND SPECIFICATIONS FOR SPACES REQUIRED

1. Instructional Program

The instructional program for fluid power will require several types of space. A general classroom will be required to serve both the fluid power courses and the welding course. The ability to handle small groups will require additional classroom facilities. The welding classroom must be adjacent to the welding facilities. The program will also involve exhibits, workshop activities, and special demonstrations. The welding facility may require a "drop-in" type of program as well as general class work.

2. General Classrooms

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The fluid power program will require the use of one classroom (approximately 1,000 sq. ft.) for a period of five (5) hours per day. The classroom is to be furnished with two student, moveable tables and chairs, and have a maximum capacity of 30 students. The classroom is to have easy-wipe write on boards--both white and chalk, audio-visual screens and equipped with overhead and slide projectors. The classroom should be adjacent to the welding facilities so that it can serve both functions (fluid power program and the welding course). Wall space should be provided for charts and drawings. Also, the classroom should have lockable storage cabinets.

The general classroom will need sinks, gas, electricity (110 and 230 volts) and air.

3. Workshop - Lab - Storage Area

The fluid power program requires storage capacity of about 90 linear feet of cupboards ($\frac{1}{2}$ of which should be lockable). Work areas are required necessitating benches for mounting hose attachment equipment, vises, and a flow test bench of about standard size as well as work areas for students. The shop area requires room for (3) large hydraulic machines (such as paper bailer), pipe, threading machines, and wall storage for pipe (pipe racks) and hoses. Maximum use of wall space is desirable having the central area for work benches.

The workshop-lab area requires water, 110 and 230 volt power sources, pressurized air supply and hydraulic fluid pressure generating source of some kind for testing equipment. Some facility should be provided for cleaning of used equipment.

V. IDENTIFICATION OF RESOURCE REQUIREMENTS - (Cont.)

4. Office Area

One office space of approximately 120 sq. ft. containing a desk with chair, phone, shelving for reference materials and lockable cupboards for storage. A window is desired between the office, the workshop area and the general classroom due to the nature of the equipment and lab work. Doors with locks should be into both the workshop area and the classroom.

The office requires the use of a phone with both campus and long distance capabilities. The office should be large enough for small group conferences and so a table with chairs would be necessary.

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5. Welding Room

The welding room will be utilized by a number of programs. The facility should be large enough for twenty-four (24) welding booths and be adequately vented to remove welding fumes. The sub-division of the room into booths is a safety requirement. Each booth is to be equipped to provide students with the following: (See Appendix I.)

1. Both electric arc and oxy-acetylene welding support systems.

 An individually vented work space utilizing venting systems currently used by other schools.

3. A work space having side walls of non-combustible materials.

- 4. A work space with a work bench and stool.
- A work space with the necessary mounts, brackets and overhead support systems to allow various welding positions (i.e., bench, floor and overhead).

It is recommended that the arc welding units for the welding lab be installed outside of the lab in a bank. This approach will require special wiring and controls for individual operation and control at each booth.

The tanks for oxy acetylene welding are to be located outside of the laboratory and connected into a manifold system equipped with a flash back safety device. The manifold setup will distribute the gases to each booth. The College should own sufficient tanks to have reserve tanks on line at all times. V. IDENTIFICATION OF RESOURCE REQUIREMENTS - (Cont.)

B. SUPPLY AND EQUIPMENT NEEDS FOR FLUID POWER PROGRAM

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The following is a summary of the supply and equipment needs for the fluid power program. Appendix E is a list of the supplies and miscellaneous needs for the classroom and workshop areas. Equipment needs for each quarter are given in Appendix F. Welding equipment and supply needs are included as Appendix G.

Staff, Equipment, and Supplies for

Fluid Power

Summary of Needs

Curriculum	194 Sul 8		Staff	Supplies	Equipment
lst Qtr - 1st Year Co	urse No.	Qtr Hrs			
Intro to Fluid power (10)	111	10	\$ 520 WS	7,850	\$ 12,105
Practical App. of F.P.(10)	112	5	6,000 FT		
Arc Welding *(2-4)		3	1,290 PT	2,664	10,969
ufacturing Engineers . Michigan		18		10,514	23.074
n, Harvey & Gump, 1965					
2nd Qtr Series <u>rtQ bn2</u>		10	500 110		0.000
Prin of Fluid Power (10)		10	520 WS		2,000
Practical App of F.P. (10)	122	5	6,000 FT		
Acet Welding *(2-4)		3	1,290 PT	500	1,200
	Total	18		\$ 500	\$ 3,200
d. Publication					
and litr	P.O. Box Dallas.				
Advanced Fluid Power (10)	131	10	520 WS		6,275
Practical App of F.P. (10)	132	5	6,000 FT		
Speech 200		5	1,145 PT		
Travel Expenses (1st year)			1,250	Fall & Wint	
	Total	20	\$23,225	\$12,264	\$ 32,549
2nd Year Courses	P.U. BO.				
Fluid Power-Theory (Fall)	141	5			
Fluid Power-Lab (Fall)	142	10	Cooperati	ve Education	1
Hydraulics (Wtr)	151	5	Contracts	(2nd Year 1	980-81)
Practical App of Hydr (Wtr)	152	10			
Fluid Power Mach Shop (Spr)	161 ²⁹¹⁰	5 Date			
Component Repair (Spr)	162	10			
Electives (F,W, Spr)		3-6			

V. IDENTIFICATION OF RESOURCE REQUIREMENTS - (Cont.)

C. LIST OF RECOMMENDED TEXTS AND REFERENCE MATERIALS

Texts and References

The following is a summary of the supply and equipment needs for the

needs for the classroom and workshop areas. Equipment needs for each quarter

Books

2nd Quarter (Womach)

2nd Quarter

3rd Quarter (Womach)

(Womach)

(Vickers)

Fall & Winter Quarter

lst Quarter (Vichery) and Industrial Hydroulics Manual 1st Edition, 1970 Troy, Michigan 48084 13th Printing

\$6.70

Fluid Power Elec Central Blue Print Reading for Industry by Walter & Brown 6.95 The Goodheart-Wilcox Co., Inc. So. Holland, ILL 1972

Pneumatic Controls for Industrial Application 10.00 (ASTME) American Society of Tool & Manufacturing Engineers Dearborn, Michigan by Wilson, Harvey & Gump, 1965 Manufacturing Data Series

Fluid Power 6.85 in Plant and Field

Fluid Power .50 Data Dook

Womach Ed. Publication P.O. Box 35027 Dallas, Texas 75235 Sperry Rand Corp. Troy, Michigan 48084

Welding Text Pocket Welding Guide 1.00 Hobart Brothers Company P.O. Box EW-443 Troy, Ohio 45373

> \$ 32.00 waraulics (Wcr)

J.I.C. (Joint Ind. Council) Minutes

V. IDENTIFICATION OF RESOURCE REQUIREMENTS - (Cont.)

D. AUDIO VISUAL NEEDS FOR FLUID POWER PROGRAM

 Charts: Rexroth Wall Charts -Hydromatic Charts

2.

12.

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Slides: a. Parker and Slides w/cassette tapes (Hydraulic & Air) 0299-57 \$86.00 0299-56 83.00 0299-55 82.00 0299-58 110.00 0299-51 114.00 0299-52 126.00 0299-53 104.00 0299-54 86.00 b. Sundstrand Training Slides 200.00 Sundstrand 15 U 75.00 Sundstrand 15 Split 55.00 Sundstrand Corp. 2300 East 13th Street Omes, Iowa 50010 Vicher set of slides (to go w/Text - 1st Qtr. с. 300.00 Film Strips - old copies from Parker d.

\$ 1,421,00

VI. RECOMMENDATIONS

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<u>RECOMMENDATION 1</u>: IT IS RECOMMENDED THAT TACOMA COMMUNITY COLLEGE IMPLEMENT A FLUID POWER TECHNOLOGY PROGRAM AND THAT THE PROGRAM COMMENCE FALL QUARTER, 1979.

4. Renovation of existing space in the science building (building

The final tally of the needs survey described in Section III of this proposal documents a need for 137 fluid power technicians in the Puget Sound region next year. Of the 137 jobs reported, approximately 70% of 95 are new positions. At the present time, no community college in Western Washington offers a Fluid Power Technology program. In fact, the only community college program of this kind west of Minnesota is offered at Spokane Community College. The proposed program, as designed, will be able to enroll 30 students. The students completing the first year of the program should face a job market in which each individual has an average of four (4) job openings from which to choose.

RECOMMENDATION 2. IT IS RECOMMENDED THAT TACOMA COMMUNITY COLLEGE HIRE A FULL-TIME INSTRUCTOR/COORDINATOR FOR THE FLUID POWER PROGRAM AS SOON AS POSSIBLE AFTER JULY 1, 1979, AND THAT THE COLLEGE BUDGET ADDITIONAL DOLLARS FOR PART-TIME FACULTY AND OTHER STAFF COSTS AS ITEMIZED.

Fluid Power and Welding Classroom/Laboratory (Modifici

The Fluid Power Program requires a full-time instructor coordinator which is certified in Fluid Power. The individual selected must be able to manage all aspects of the program and teach all of the courses except Welding. Instruction in welding and assistance with laboratory/workshop activities will be accomplished with part-time employees. English and Speech courses may be taught by existing TCC personnel. The instructor/coordinator should handle the second year cooperative education program and be paid the usual coop-ed stipend per student.

RECOMMENDATION 3. IT IS RECOMMENDED THAT TACOMA COMMUNITY COLLEGE ESTABLISH A BUDGET FOR THE FLUID POWER TECHNOLOGY PROGRAM FOR 1979-80.

The budget established for the Fluid Power Technology Program should not only provide for the staffing in Recommendation 2, but also the following:

VI. RECOMMENDATIONS - (Cont.)

RECOMMENDATION 3: (Continued)

- 1. Supplies, materials and maintenance costs.
 - 2. Contingencies (\$1,000/year for unexpected costs.)
 - 3. Start-up equipment needed for the first year of the program.
- Renovation of existing space in the Science Building (Building 14) to provide the classroom, laboratory and support space required by the program.

The College expects to acquire some equipment and supplies through donations from industry. The staff requirement should be provided through the use of federal vocational funds. Specialized equipment needs could be provided through the use of line items of instructional equipment funds.

RECOMMENDATION 4: IT IS RECOMMENDED THAT AREAS OF BUILDING 14 BE RENOVATED TO HOUSE THE PROGRAM (GEOLOGY LAB 14-12, OCEANOGRAPHY LAB 14-13 AND ADJACENT AREAS).

The proposed renovation of Building 14 (Northwest end) will require the following alternations:

Modification of Rooms: (See Appendix H - Floor Plan)

- A. <u>Fluid Power and Welding Classroom/Laboratory (Modification of</u> Geology Lab 14-13).
 - 1. Remove experiment Stations.
- 2. Repair Floor Replacement of Tile.
 - 3. Install Two Sinks on South Wall.
 - 4. Install Window into Projected Office Space Adjacent to Interior Door on South Wall.
 - 5. Removal of Pipe Rail at Base of East Wall.
 - 6. Remove Map from East Wall (to be installed in Room 12 on
 - Northwest Wall Section.
 - 7. Install White and Chalk Board on East Wall.
 - B. Office (Modification of Storage Area)
 - Move South Wall of Storage Area Southward to South Edge of Exterior Double Doors.
 - 2. Construct Wall Ten Feet from Southeast Portion of Storage Room.
 - 3. Install Door in Wall and a Window for Supervision of Storage Area.
 - 4. Install Cabinets in Office (Upper and Lower).
- 5. Install Shelving for Books on East Wall of Office.
- 6. Install Phone Service.

- RECOMMENDATIONS (Cont.) ۷.
 - C. Workshop (Modification of Photo Lab/Project Room)
 - Remove Phot Lab Furniture, Cupboards, Equipment and light 1. Screens from Storage Area.
- 2. Remove South Wall of Room 20 (Room West of #12).
 - 3. Install Two Wall Cabinets 4' x 7' with Locable Doors.
 - D. Welding Lab (Modification of Project Areas Adjacent to Room 14-13)
 - 1. Remove interior walls except for East wall of green house.
 - 2. Cover phone terminal block or lower into floor with protective cover.
 - 3. Move the air compressor equipment to South wall or West wall.
 - 4. Move sink to South wall or West wall.
 - 5. Install venting system (adequate for welding operations).
 - 6. Build a concrete base and chain guards for oxygen and acetylene tanks.
 - 7. Install fence and fire block wall for manifold (East end of building.
 - 8. Install twelve (12) work bench units for welding stations on North and East walls (See attachment D).
 - 9. Install power units in greenhouse area.
- 10. Install proper leads (arc) for each booth.
 - Geology Lab 14-12 (Modification for General Use) auth be 2's
- 1. Remove Experiment Stations.
 - 2. Repair Floor.
 - 3. Remove Cabinets on West End of Room.
 - Install Hard Boards, Chalk Boards, and White Boards on the 4. Full Length of the West Wall.
 - Install Two Sinks in the South Wall; Lower Cabinet Tops. 5.
 - Modify the Lab (Experiment) Stations and Install a Four Foot 6.
 - Lower Cabinet on the East Wall in lieu of present lower cabinets.
 - 7. Install the Geology Map of 14-13 on the Northwest Wall Section West of the Exterior Door.
 - 8. Install 16 Tables facing West in 14-12.
 - F. General Storage (Modification of Existing Storage Areas)
 - Install Wall Cabinets on all Walls of the Storage Areas adjacent 1. to 14-18.
 - General Purpose Classroom/Lab (14-8) G.
 - Remove Wall Storage on East Wall of 14-8. 1.
 - 2. Install the Cabinets on West and North Walls.
 - Install Chalk Boards on Full Length of East Wall. 3.
 - Install 3 sinks in the Lower Cabinets installed on the North Wall. 4.

The methods used in renovating Building 14 to house the Fluid Power Technology Program should take into consideration the long range needs of not only this program, but also the Science Program. The Welding area should be developed in such a way as to make it possible for a number of programs to use

V. RECOMMENDATIONS - (Cont.)

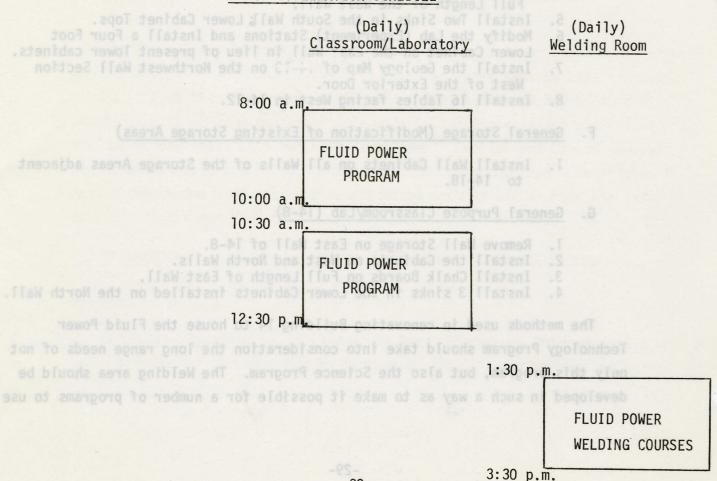
the facility. The College needs to proceed immediately with the design work necessary to proceed with the renovation this summer. The renovation should be accomplished through the use of College personnel and minor capital improvement funds.

RECOMMENDATION 5: IT IS RECOMMENDED THAT THE FOLLOWING OPERATIONAL DESIGN BE ACCEPTED FOR THE FLUID POWER PROGRAM FOR FALL, 1979.

OPERATIONAL DESIGN

The fluid power facility will be open from 7:30 a.m. to approximately 3:30 p.m. daily, Monday through Friday. The facility will be staffed with one full-time instructor/coordinator. The instructor/coordinator will be supported by a shop assistant or work study students. The students enrolled in the program will use the welding facility from approximately 1:00 p.m. to 3:30 p.m. each day. An alternate use of the welding facility could be $2\frac{1}{2}$ hours, two days a week in order to permit a more general use of the facility.

SPACE UTILIZATION SCHEDULE



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V. <u>RECOMMENDATIONS</u> - (Cont.)

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RECOMMENDATION 6: IT IS RECOMMENDED THAT THE FOLLOWING TIME LINE BE UTILIZED IN IMPLEMENTING THE FLUID POWER PROGRAM.

TIME LINE FOR IMPLEMENTATION

a.	Curriculum Committee Review	May 16,	1979
b.	Proposal of Fluid Power Program to SBCCE	May 18,	1979
с.			
		May 24,	1979
d.	Employment of Instructor/Coordinator after	June 1,	1979
e.	Purchase of Equipment (ann. bidding)	July 1,	1979
f.	Purchase of Supplies after	July 1,	1979
g.	Remodeling of Facilities after	June 1,	1979
h.		Septembe	er 26, 1979
i.	Implementation of Welding Course	January	1, 1980

The dates are given as a guide in order to implement the program on September 26, 1979. The instructor/coordinator should be involved as much as possible.

VII. APPENDICES

REPRESENTATIVE ADVISORY COMMITTEE

Committee Title: FLUID POWER

Meeting Dates for Year:

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APPENDIX ..

<u> </u>	Pure pure pure pure pure pure pure pure p	Dr. Art Anderson	Part Owner		1123 Port of Tacoma
X	V 10 0 10 0 0 0	Dr. Art Anderson		Concurate Toch	Tacoma, WA
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		George Laiblim	Mgr, V. Pres	Timco, Inc.	Tacoma, WA
SEFO	BRE RE P				8410 Dallas Ave, E
	ext b t 55	Bill Leverton	Engineer	Spencer Aircraft	Seattle, WA
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Χ	SHU UF UF	Ed Bevis	Owner	Bevis & Assoc.	Tacoma, WA
		401 40 1	P P P P P P P P P P P P P P P P P P P		250 Andover Park, W
<u>X</u>	KEN LA EN	John Boydell	Manager	Dupar Dynamics	Seattle, WA
	AL X S LE A	Al Gavda	Plant Engr	Kaiser	3400 Taylor Tacoma, WA
Party in the second	Λ	Ed Muller and/or	Plan Engr	Kalser	650 Orcas St
44 . 45	X	Stewart Har	Gen Supt	Robbins Co	Seattle, WA
		Bob McCleoud and/or	uch oupo	1000 1113 00	P. O. Box 1837
	X	Scott Ford	Engineer	Port of Tacoma	Tacoma, WA
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210 2 2 2 2	X	Robert Hull	Maint Supt	St. Regis	Tacoma, WA
18- 9 4 A		Turanna MaCaba	Math/Sci Div	тсс	5900 So 12th St Tacoma, WA
	<u>a 4 10 9 9 5 9</u>	Ivonna McCabe	<u>Chairman</u> Assoc Dean		5900 So. 12th St
XXX		Lorraine Stephan		TCC	
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CAREER PLANNING GUIL WASHINGTON STATE COMMUNITY COLLEGE DISTRIC	
5900 South 12th Street Tacoma, WA 98465	RECOMMENDED PREPARATION AND QUALIFICATIONS EDUCATION: HIGH SCHOOL DIPLOMA OR GED CERTIFICATE (For unusual circumstances, refer to catalog, "Admissions Policy"). TESTS
CAMPUS. TCC AVERAGE LENGTH OF TRAINING <u>60-120</u> CREDITS HOURS <u>3-6</u> QUARTERS ENROLLMENT CK FALL SUMMER CONTINUOUS SPECIAL COMPLETION EARNED ASSOCIATE IN TECHNICAL Arts Degree	Tuition (resident - per quarter) \$ 102 for6quarters \$ 612 (non resident - per quarter) \$ 396.00 forquarters \$ Laboratory Fee forquarters \$ Lab fees (per quarter) \$ forquarters \$ Books (per quarter) \$ 55 for2quarters \$ 110 Supplies and equipment (est) TOOLSandmisc 70
CERTIFICATE	FEES SUBJECT TO CHANGE WITHOUT NOTICE

PROGRAM DESCRIPTION AND GOALS:

The fluid power graduate will be prepared to work on hydraulic systems or pneumatic systems that are an integral part of automated machinery or equipment used in industry.

Activities will vary from trouble shooting and repairing existing systems to installing complex electro-hydraulic systems on new or existing machinery. Preparation for this work requires developing analytical procedures and certain mechanical abilities or skills.

PROGRAM GOALS: Students who successfully complete the first year will:

- 1. Be prepared for careers in a wide variety of occupations involving hydraulics, pneumatics and machine control.
- Have a thorough knowledge of individual hydraulic and pneumatic components, the application and proper installation of each, preventative maintenance procedure and potential service problems.
- 3. Be able to read and understand hydraulic and pneumatic schematics.
- 4. Have hands-on experience in layout and piping hydraulic systems, which includes tube bending, tube fitting selection, pipe threading and hydraulic hose selection and hose assembly fabrication.

PROGRAM GOALS: Students who successfully complete the second year will:

- 1. Develop basic shop skills required to operate drill press, lathe, milling machine, power saws and surface grinder as required in the fluid power industry.
- 2. Develop shop skills in repairing hydraulic and pneumatic components.
- 3. Develop drawing skills required to layout manifold and the use and application of cartridge type valves in manifolds.

4. Understand complex automated machines using the electrical, pneumatic and hydraulic schematics: Be able to identify each function relative to schematics during operation

CAREER OPPORTUNITIES:

In view of the increasing impact of technical developments in fluid power, it is essential that trained personnel be available in this field. As a result of a local survey, awareness of the value of highly trained and skilled technicians who can work effectively with professional and management personnel is realized.

Starting monthly salaries are commensurate with those graduates of many traditional engineering technology programs. Because of the unique qualifications of a fluid power program graduate, he may advance in salary and position at a rapid rate. <u>POTENTIAL POSITIONS</u>: Hydraulic Sales Companies: Salesman, inside and outside, Field Serviceman, Power-unit Fabricator. Industrial Equipment Users: Maintenance Mechanic, Hydraulic Trouble Shooter, Circuit Designer, Manufacturing Problem Solver, Maintenance Foreman. Mobile Equipment Dealers: Field Serviceman, Maintenance Supervisor, Technical Services. Industrial Manufacturing Companies: Installation Worker, Component Repairman Design Department, Draftsman of Hydraulic or Pneumatic Systems. Marine Industries N.W. Inc. Bldg. 503 Alexander Road Tacoma, WA 98421

Wm. A. White, President Sea-Tac Alaska Ship building 1112 Alexander Tacoma, WA 98421

James W. Hill, Pres. TAM Engineering Corp. 3033 So. Lawrence Tacoma, WA 98409

George L. Lockermoyer Tool-Garage & Machine Works 4336 S. Adams Tacoma, WA 98421

Leo Krenzler, Pres. American Marine Industries, Inc. 2556 East 11th Tacoma, WA 98421

Adolph M. Cummings, Pres. Cummings Boat Company, Inc. 3017 Ruston Way Tacoma, WA 98402

Leslie P. Jones, Pres. Jones & Goodell Shipbuilding Corp. 1690 Marine View Drive Tacoma, WA 98422

E.E. Roberts, Gen Mgr. Marine Iron Works Inc. 1120 East D. Street Tacoma, WA 98421

Carl Swindohl, Pres. Modritech Plastics 401 Alexander Avenue Tacoma, WA 98421

William J. Gazecki Precision Machine Works, Inc. 2101 Pacific Avenue Jacoma, WA 98402 Strategic Weapons Facility Pacific Silverdale, WA 98383

Wendel Berg Foss Launch & Tug Co. 225 East F. Strett Tacoma, WA 98421

President/Manager Port of Bremerton 8850 S.W. State Hwy 3 Port Orchard, WA 98366

Donald L. Masman, Deputy Ex Director Port of Tacoma 571 Sitcum Waterway Tacoma, WA 98421

George J. Peterson Peterson Boatbuilding Co. 223 E "F" Street Tacoma, WA 98421

Wm W. Buckley, Pred. Air Cushion Boat Company 1748 Narrows Dr. Tacoma, WA 98406

Robert D. Fievez, Pres. Almar Aluminum Marine Const. 120 E 23rd Tacoma, WA 98421

President/Manager CLK Yacht Crafters Inc. 1950 -B Marine View Dr. Tacoma, WA 98422

President/Manager Jet Boat Inc. 10801 - GA Tacoma, WA

President/Manager Jetline Boats 120 E 23rd Tacoma, WA Knapp Boat Building Co. 1950 Marine View Drive Tacoma, WA 98422

President/Manager Manzanita Yachts 3805 Harborview Dr. Gig Harbor, WA 98335

John & Bob Charters, Owner Marine Technical Services 2218 Marine View Dr. Tacoma, WA 98422

Elias C. Peterson, Owner Marine View Boat Bldg. Co. 5420 Marine View Dr. Tacoma, WA 98422

Norman A. Nordlund, Pres. Nordlund Boat Co. 1621 Taylor Way Tacoma, WA 98421

President/Manager Ringer Fiberglass Boat Co. 25802 Pacific Hwy. S. Kent, WA

Steven Sandstrom S & S Boat Works 1950 1/2 Marine View Dr. Tacoma, WA 98422

A. R. Galoway Samson Marine of Tacoma 4106 E 11th Tacoma, WA 98422

President Stanley Plastic Manu**g**. 41128 196th Enumclaw, WA

President/Manager Turbojet Inc. Rt. 1 Box 733 Buckley, WA

Harold W. Stocker, Pres. Windward Marine Inc. 3310 So. Union Tacoma. Wa 98409

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APPENDIX C

Mm. A. White, President See-Tac Alaska Ship building 1112 Alexander Tacoma, WA 98421

> James W. Hill, Pres. TAM Engineering Corp. 3033 So. Lawrence Tacome, WA 98409

George L. Lockermoyer Tool-Garage & Machine Noris 4335 S. Adams Tacoma, WA 98421

Leo Krenzier, Pres. American Marine Industries.

> 2556 East 11th Tecoma, WA 98421

Adolph H. Cummings, Pres. Cummings Boat Company, Inc. 2017 Ruston Way Tacoma, WA 98402

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Carl Suddohl, Pres. Nodritech Plastics 401 Alexander Avenue Tacoma, NA 98421

William J. Gazecki Precision Machine Works, Inc. 2101 Pactric Avenue Tacoma, WA 98402

Strategic Weapons Facility Pacific Silverdale, MA 98383

> Wendel Boyg Foss Lawnch & Twg Go 225 East F. Strett Tacome, WA 98421

President/Manager Port of Bremerton 8850 S.W. State Hwy 3 Port Orchard, WA 98355

Donald L. Masman, Deputy Ex Director Port of Tacoma 571 Sitcum Waterway

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Robert D. Flevez, Pres. Almar Aluminum Marine Const 120 E 23rd Tacoma, NA 98421

> Prosident/Manager CLX Yacht Crafters Inc. 1950 -8 Marine View Dr. Facoma, WA 98422

> > President/Manage Jet Boat Inc. 10801 - GA Tacoma, WA

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Paul H. Schweiss, Owner Clinker Boat Works 8906 1/2 35th West Tacoma, WA 98466

Breck Adams, Owner Eddon Boat Company 3805 Harborview Dr. Gig Harbor, WA 98335

Howard W. Cox Gig Harbor Machine Works 3360 Harborview Dr. Gig Harbor, WA 98335

Claire Edwards Harbor Boat Repair 4224, Marine View Drive Tacoma, WA 98422

Frank Lynott, Pres. Northern Line Mach & Engr. 1840 Marine View Drive Tacoma, WA 98421

Robert Reid Northwest Performance Boats 10201 Lakeview Ave. S.W. Tacoma, WA 98499

> 5 & 5 Boat Works 1950 1/2 Martine View Dr. Tacoma, WA 98422

Bill Rice, Owner Ohema Plastics 5705 8th St. East Tacoma, WA 98424

Steve Foss, Mike Snyder, Co-)Owners Wind And Sea, Inc. 17923 78th Ave. E. Puyallup, Wa 98371

Peter F. Nolan Windjammer Marine 2315 Ruston Way Tacoma, WA 98402 Invington-Moore P.C. Box 23038 Portland, Oregon 97223

Teorland Company 122 South Licile Street Seattle, 1/2 98108

Cosident/Hanager

maident/Manager Chachinery Company 1725 West Valley Highway 10. Box 3562 Aattle, Wa 98124

Chesident/Hanager ca-Tac Ford Truck Sales Inc. (100) Pacific Hwy. South Scattle, Wa 98168

Regis Paper Company Box XX For XII 59923

Frisidant/Manuger F. Latlig Company MC Tourte Avenue South Attice W 93108

ident/Manaper C. Machinery Company M. Hwaukee Day Ma. Wa 98421

Cescarello openie de la company Cescarello company Co2-76th South Min Mai 98031

e Anderson Mail Juik Power Stouth Webster Ste. Wa 98108

11 Newton t Tacoba Newsprint Co. 18328 Fresident/Hanager Fydraulic & Air Equipment 818 South Dakota Seattle, Wa 98108

President/Manager Flow Industries, Inc. 21414-68th Avenue, South Kent, Wa 98031

President/Manager Aerojet General-SES Div. 132 Sitcum Waterway Tacoma, Wa 98421

Leo H. Long, Jr. Atlas Foundry 3012 South Wilkeson Tacoma, Wa 98402

Fresident/Manager Eiles Coleman Lumber Co. Twisp, Wa 98856

Joe Guizzetti Buffelen Woodworking P.O. Box 1383 Tacoma, Wa 98401

John Hurlow Cablecraft Inc. F.O. Box 11372 4401 S. Orchard Tacoma, Wa 98466

G. Ward Hall, Gen. Mgr. Canron, Inc. 326 Alexander Avenue Tacoma, Wa 98421

Merrill Teats, Gen. Supt. ASARCO, Incorporated F.O. Box 1677 Tacoma, Wa 98401

Richard G. Haley, Exec. V.P. Brown & Haley 110 East 26th Street Tacoma, Wa 98402

President/Manager Centralia Plywood Centralia. Wa 13531 -37Mr. Fat Monahan, Plant Mgr. Certain-Teed Products 1718 Thorne Road Tacoma, Wa 98402

President/Manager Cheney Lumber Co., Inc. P.O. Box 1936 Tacoma, Wa 98401

Robert Kusaman, Gen. Mgr. Container Corp. 817 East 27th Street Tacoma, Wa 98402

William Kohten, Plant Supt. Glacier Sand & Gravel P.O. Box 518 Steilacoom, Wa 98388

Martin Brashern, Mgr. Globe Machine Mfg. Co. 701 East D Street Tacoma, Wa 98421

Carl Virgil, Works Mgr. Hooker Chemicals & Plastics P.O. Box 1646 Tacoma, Wa 98401

Don Satter, Supt. Hydrade Food Products P.O. Box 1636 Tacoma, Wa 98401

President/Manager ITT Rayonier P.O. Box 539 Hoguian, Wa 98550

Karl Klason, Plant Mgr. Kaiser Aluminum 3400 Taylor Way Tacoma, Wa 98421

President/Manager Lamb-Grays Harbor Co. Hoquiam, Washington 98350

President/Manager Continental Can Co., Inc. 1202 Fones Road Cticental Grain-Co Shuster Parkway Tours, Na 98402

Pointent/Manager Could z Stud Co. Amedia, Wa 98377

Consident/Manager Conson Lumber Co. 1921 Acst Bay Drive Compile, Wa 98501

connel Bradford Without Chemicals Limited 220 Alexander Avenue acoma. Wa 28402

estar Vanderbool, Gen. Mgr. Seberbrand Paper Prod. Corp. Drx 490 Common. Wal 98390

Manager Gia-Pacific Corp. Intainier Div. - Olympia U. Box 203 Lorda, Wa 98501

esident/Nanager Docta Brevery Comple, Weshington 98501

Consident/Manager Doiffic Fover & Light PS Big Hanaford Road Struija, Wal 98531

Contribunager Lewood Lumber Co. Lekwood, Wa (198361)

Eremer, Jr. spansk doeblaans open: Nills Middle Waterway and molecular orma, Wa 98421

Loarge J Peterson Constrained

Mr. Mossman Port of Tacoma P.O. Box 1837 Tacoma, Wa 98401

Lee Bennett, President Puget Sound Plywood 230 East "F" Street Tacoma, Wa 98402

Jim Manke Manke & Sons, Inc. 1750 Marine View Drive Tacoma, Wa 98422

George Russell, Pres. Mann-Russell Elect. Inc. 1401 Thorne Road Tacoma, Wa 98402

Joseph Martinac, Pres. J.M. Martinac Shipbldg. 401 East 15th Street Tacoma, Wa 98421

Robert Freeman Metal Marine Pilot Inc. 2119 So. Mildred Tacoma, Wa 98466

President/Manager Mt. Adams Veneer Box 865 Randle, Wa 98377

David McDonald, Pres. Nalley's Inc. 3410 So. Lawrence Tacoma, Wa 98402

President/Manager National Fruit Canning Co. P. O. Box 479 Chehalis, Wa 98532

Henry Hewitt, Jr., Mgr. St. Regis Paper Co. Kraft Division P.O. Box 2133 Tacoma, Wa 198401

John Redding, Pres. Wilkins & Associates 601 Alexander Avenue Robert Hull, Maintenance Lumber & Plywood Div. St. Regis P.O. Box 1593 Tacoma, Wa 98401

William White, Pres. Sea-Tac Alaska Shipbldg. 1112 Alexander Tacoma, Wa 98421

President/Manager Shakertown Corp. Winlock, Wa 98596

President/Manager Simpson Timber Co. Shelton, Wa 98584

President/Manager Standard Brands P.O. Box 488 Sumner, Wa 98390

President/Manager Stang Hydronics, Inc. 2339 Lincoln Avenue Tacoma, Wa 98421

Frank Lynott Tacoma Boatbldg. Co. 1840 Marine View Drive Tacoma, Wa 98422

President/Manager Tacoma Industrial Supply 4624 Pacific Hwy. E. Tacoma, Wa 98424

President/Manager Thurston County Engr. 3730 Blvd. Road Olympia, Wa 98503

President/Manager Tubafor Mill, Inc. Morton, Wa 98356

F. P. May U. S. Gypsum Co. 2301 Tavlor Way Timeo Inc. 2305 So. Tacoma Way Tacoma, WA 98409

Spencer Air Craft 8410 Dallas Ave., E. Chattle, WA 98108

-Ed Bevis Bevis, Charles M. & Assoc. 1904 Stewart Tacoma, WA 98421

John Boydell Dupar Dynamics 250 Andover Park W. Seattle, WA 98188

Dr. Art Anderson Concrete Technology 1123 Port of Tacoma Road Tecoma, WA 98421

Coes Anderson Scimaeuser Company Micross Building Cooma, AA 98401

Al Goyca Palser 5410 - Arler Facema, MA - 98420

Ed Muller, Field Serv. Mngr. The Robbins Company 150 S. Orcas Street Seattie, WA 98108

Bob McGlood & Scott Ford Port of Tacoma P.C. Box 1837 Froma, WA 98401

Period Products Inc. A Pacific Highway, E. Somp. MA 98424

President/Manager Wesh. Irrigation & Dev., Co. 1015 Big Wenaford Road Costralia. We APEAN Robert Hull, Maintenance St. Regis 1220 St. Paul Tacoma, WA

President Howard Cooper Corp. 8501 N.E. Killingsworth Portland, OR 97220

President Hydra-Power Systems, Inc. 5700 S.E. Johnson Creek Blvd. Portland, OR 97206

President/Manager Hydraulic Repair & Design 7124 South 196th Kent, WA 98031

President/Manager Hydraulic & Air Equipment Co. 818 South Dakota Seattle, WA 98108

President/ Manager Rucker Products 5973 - 4th South Seattle, WA

President/ Manager Stacey Controls 13105 N.E. 124th Street Kirkland, WA 98033

President/Manager Salem Equipment Inc. 3371 "D" Street N.E. Salem, OR 97301

President/Manager Signode Corp. 6090 Maynard Ave. South Seattle, WA 98108

President/Manager Howard Cooper Corp. 5055 Fourth Avenue South Seattle, WA 98134

President/Manager Buchanan Fluid Systems 655 South Orcas Street Seattle, Wa 93108 President/Manager Hyster Company 9892 - 40th South Seattle, Wa 98118

President/Manager Hydraulics Northwest 305 East 25th Tacoma, Wa

Mr. Bob Lynch, Manager St. Regis Paper Company 801 Canal Street Tacoma, Wa 98421

President/Manager Star Machine 241 South Lander Street P.O. Box 3595 Seattle, Wa 98124

President/Manager Kockums Ind. P.O. Box 19358 Portland, Oregon 97219

President/Manager Stand Hydronics Inc. 2339 Lincoln Avenue Tacoma, Wa 98421

President/Manager Simpson Timber Co. 3330 Overlake Parkway Redmond, Wa 98052

President/Manager Black Clawson Inc. P.O. Box 1028 Everett, Wa 98206

President/Manager Western Machine Works, Inc. 666 East 11th Street Tacoma, Wa 98421

President/Manager Northwest Chain 2200 N.W. Savier Street Portland, Oregon 97210

President/Manager Farwest Equip. & Control 630 Garfield Street Eugene, Oregon 37402

Totals as of 5/3/79

APPENDIX D



PLEASE RETURN TO:

Russell E. Clark Tacoma Community College 5900 South 12th Street Tacoma, WA 98465 (206) 756-5060

Yes 12 No 36

Yes 21 No 26

137

Tacoma Community College is developing a Fluid Power program to train technicians in hydraulic and pneumatic skills. To make this program successful to the students and the industrial community, we need your assistance by answering the following questions:

- 1. Does your company use people with Fluid Power skills? Yes 41 No 6
- Does your company have a source of trained employees with Fluid Power skills?
- 3. Does your company presently provide training for employees need Hydraulic skills?
- 4. Estimate the number of employees your company could use next year trained in Fluid Power
- Please check the skills and level of achievement a person filling such a position in your company would need:

LEVEL 1 - Basic concepts and principles LEVEL 2 - Skills adequate to adjust and operate (trouble-shooting)

SUITABLE SEGMENT FOR CONTINUING EDUCATION PURPOSES FOR YOUR STAFF

LEVEL 1 LEVEL 2 CONTINUING EDUCATIO 1.0 Basic Hydraulic Systems . 2. 14 33 8 ol redail no 203. Basic Pneumatic Systems 18 24 5 Equipment Repair 8 29 5 Equipment Service 4. 9 27 5. Equipment Installing 13 26 6 6. System Trouble Shooting 11 30 10 Design Hydraulic Systems 7. 9 13 6 8. Electrical Systems 14 23 7 9. Electronic Systems 12 12 4 10. Machinist 9 15 3 11. Welding 9 18 6 12. Basic Hand Tools 8 22 5 13. Other 2 3 0

6. Would a Fluid Power Technician in your company have to belong to any union? If so, which union?
Yes 23 No 20

Name, title and address of person completing this survey instrument.

Name	22		- 979	13 75	Coops
Title	-9-	200101	901	194A	00rth
Firm			8134	36	AN .9
Address					

A self-addressed stamped envelope is enclosed for your convenience. -40-

FLUID POWER

Class and Lab Supplies

1. High Budget Equipment Items

Budget

A S

The second

derin Le

A. Open Account

	Campbells open account Amfac open account	\$400/year unbudgeted		
D		year or 10dwsk	\$1,000.00	
в.	Zerox Blueprint paper chemicals Hydraulic Hose and Fittings Source Hydraulic Steel Tubing and Fittin Source Pipe and Pipe Fittings and Coupl	and Pneumatics	\$ 400.00 300.00 200.00 1600.00 700.00 800.00	
c.	Travel Field Trips for Students	Model 36 - Check 10 See 11 61 23 16 1 3 Murcher, Inc. P. 0. 772 St. Cloud, Minn 56301	2850.00 \$6800.00 650.00	
	Instructor Travel: Local Professional Travel Coordinators Travel w/SCC	Shearer Machine (Allen Bradley-Iron Wo Set of Tanks for Gas Oxygen Acetylene	150.00 150.00 <u>300.00</u>	
		Mock Ups (Hydraulic, Control Systems)	.8	

1 1

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F. EQUIPMENT REQUIREMENTS

1. High Budget Equipment Items

 Injection Molding Machine (1/3g) (Newberry) 2 hp.

\$ 2,500

13,000

2,767

with the first of

Pr. y

Newberry Industries Newberry, Ohio 44065

2. Blow Molding Machine (Rosode) R35 - Model Number

Rocheleau Tool and Die Co. 650 North Main Street Leominster, Mass. 01453

3. Paper Boiler (May have on TCC campus) Model 36 - Check to see if true

> Murcher, Inc. P. 0. 772 St. Cloud, Minn 56301

4. Shearer Machine (Allen Bradley-Iron Worker)

- 5. Set of Tanks for Gas Oxygen Acetylene
- Test and Flow Bench 12' x 6' (std item) Hydraulic Power System for Devices
- 7. Power Drill Press
- 8. Mock Ups (Hydraulic, Control Systems)
- 9. Rolling Tool Cabinet

n l	ENDIX F										APPE	ENDI	(F
3% , 7		2.	FALL QUARTER (EQUIPMENT N	EEDS)	1								
P	В.	Hydrauli	c Equipment Lists	w bra		(8) (8)	L L					war	
w l				<	Vouble A Surdstrand	Rivett	Continental	Vickers	Racine	0ennisan	arker	Char Lymn	Cost
- 01	lst ytr.	I	tem text set main text text text text text text text tex	Re	no Su	Ri	S	>>	Ra	De	Pa	C	\$
95		1.	Pumps gear vane (fixed) Vickers 3 pieces	9	:31X	Test	biul	1	15.	1	1	献]]@.	1 200 200 100
TAL 00			2 pieces double pump (variable volume) Piston (fixed) Variable volume		Motor e ton F	Alic Van Iris (res	rdra r(1 (2)		.81 1				100 100 200 100 400
N 100	80 each	2.	Hydro Static closed loop Direct & Servo Pressure Control Relief Value	d nigh iston	ir pee) Law) Rad ders	(5 (6 7170 01	0	17.				800 1700
P		3.	Direct Operated Pilot Operated Solenoid Pilot Operat Sequence Counter Balance Pressure Reducing	(Vicl	kers)		etua 01 nsta	1	.81		1 1 1		80 160 80 80 160
50 SO		5.	Directional Control Value Industrial type control va 3-6 gal/min value 8-12 gal/min value 35-50 gal/min value Mobile Manual	lue			ectr I	1	1		1		200 900 300
the second		4.	Single spool w/relief 3 spool stock value (Floor Control Values	Greser	sen) 1)					•			100 300
16-5			Needle Non compensated Pressure Comp Temp & Press. Comp					1			1 1 1		25 75 100 200
5		5.	Fluid Conditioners Heat exchange (Young 1) (water to oil)										120
		6.	Return Line Filter (gresen-1) (schrocher filter ind	icator	- 1)							~	30 100
The second		7. 8. 9. 10. 11.	Tank Heater (Chromalux) Float switch (1) Filter Breather (Renz 1) Sightglass (leng) Clean out Covers Racine										80 80 15 10 30
N.		12. 13.	Hydraulic Fluid Thuis Fluid test kits (guif o Tools (total) (1) set of screw drive										395 150
L.			blades/philips (2) Socket Set 3/8" (E	ng] ish -4	& Me 2-(a)	tric)							

APPENDIX F

(8) Set of nut drivers (3) open end wrenchs set (4) Allen wrench (lex) in box (5) Pair of water pump pliers (channel lock) (6) Soft end hammer (7) 6in. vice grips 14. Vickers Demonstration Cut away set \$ 2,540 (start up Costs-either 1st or 2nd year) Gulf Oil Co. (bexit) ensy 395 15. Fluid Test Kit: P.O. 1519 Houston, TX 77001 16. Hydraulic Motors 1,000 Vickers, Parker (1) Vane (2) Piston Vickers (3) Gear Webster, Buchanon (1) Cessna Spencer Aircraft 5) Law speed high torgue Ross, Charlynn (6) Radial Piston Sundstrand 17. Cylinders Parker, Atlas, T. Johnson 500 0il & Air Cunningham 318 So. Webster St. 18. Actuaters 0il & Air Constant Speed Drives 19. Electric Drive Motors & Couplings 20. \$ 12,105 (2) Socket Set 3/0-242-millsh & Metric

APPENDIX

1,000.00

3. Winter Quarter Equipment Needs

A. Electrical Controls

AN A TON

1.4

- 1. Continuity Tester
- 2. Allen Bradley
- 3. l each Motor Starter Auxillary Co. Relay Relay Timer Push Button (Green) Stop Button 3 Position Switch Selector Pilot Light Transformer 3 Heater elements (over load)

Automatic Timer 305D-011-A-10-PX

- 2. Allen Bradley Illuminated Push Pull Switch Pressure Switch Limit Switch Limit Switch Limit Switch Limit Switch
- 3. #14 Wire (Electrical)
- 4. Terminal Blocks

\$10/ea - 2

70980D 103		
1495F1		
700N800		
700NT400	Filter, Lubricator and Moisture eleminators	
800TB1T	Valves - Directional	
800T68		
800TJ2A		
800TP16R	in live mount	
1497N27		
N34		

- С-Н 816Р14
- ATC 115 V-AC
 - 5. Brass Fittings

Total

- 8COTFxQ 836T-T251J 802T-P 802T-D 802T-B
 - 9. Air Motors

alve tston

(Gardner Denver & Chicago Pheumatic)

FETRA RA X TA M TA M TA M TA

Pneuma	atic IstoT						210	Tota	1 16.5	1.000.0
						ester	lves	tuni	Contr	
				er	asn	Schroder	Auto Valves	Airomatic	s & Mac	
				Parker	Nargasn	Schre	Ross	Airor	Watts	
1.	Filter, Lubricator and R Moisture eleminators	Regulators			-	X	ner	HT N	Rela	
2.	Valves - Directional Poppet			Х	Х	Х	Х	But But	Х	
	Spool in live mount		10	lect	n Se	vite	on S pht ner	siti t Li sfor	3 Poi Pilo Tran	
3.	Quick Exhaust Valves		(bso	Х	(0) a	nent	ele.	iter	3 He	
4.	Air Hose and Brass Fitti Push-lock Fittings	ng H-3 Argara		X X		01	^o ane 14 ^e Pla	nan 1 " x ting	Hoff I Moun	
5.	1/4" Plastic Tubing (E)	ATC 115 V		х	X9-	her 1-10	AT ::	nat1 050-	Auto 3	
6.	Brass Fittings			x			elbe	78.0	ATTe	
7.	Air Logic Machines See if we can get a d	istributor to	loan	1 5	n Pu	Pus i tch	nted e Sw witc	umin ssur it s	Pre	1.000.0
8.	Single and double acting	Air Cylinders				-	wite wite	it 5 1t 5	mi 1 mi 1	
9.	Air Motors				faol		(E)			
	Valve Piston									
	(Gardner Denver & Chicago	Pneumatic)				CKS .	810	1001	i era	
						25				

APPENDIX F

4. SPRING QUARTER EQUIPMENT NEEDS

APPENDIX G

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APPENDIX F

Fit	ting Hose EQUIPMENT AND SUPPLY NEEDS FOR WELDING COURSES	
1.	Cabinets-Weatherhead fitting storage 6 each 50 draw fitting cabinet FH-135 \$150 ea (3)	\$4 50/ea.
2.	Tube Benders (hand powered) 1/4 in. 3/8 " Parker as Imperial Eastmen 1/2 " 5/8 " 3/4 " 1 "	\$350
3.	Set of hand dies for cutting pipe Rigid (any plumbing)	100
4.	Pipe Threader-Rigid #535 w/ 811 universal die head 1/2 to 2 in. pipe stand for it Pipe support	\$1,000 \$250 \$60
5.	Hand Cronked tube bender w/case Parker Model 412 Jack Ogle Co. Seattle	\$200
6.	Parker tube flaring Hydroflare kit w/dies	\$800
7.	Combination flaring Parker Jack Ogle Co. 11 ea. Imperial #400 F \$35 ea (5)	\$35 \$175
8.	Tube Cutters 11ea. 274 F.C. Imperial Eastman \$6 ea (5)	\$ 30
9.	Tube Reamer 11 ea. 208 FF5 Imperial \$15 ea (5)	\$ 75
10.	Hose assembly Machine (Hose Winder) 2 press reusable Compling Imperial Eastman 398 FA (hats-389 FA may not be available)	\$700
11.	Weatherhead (Call-a-crimp press) T-401 w/electric motor & pump) Fittings & Seattle	\$650
12.	Weatherhead Hose cutting & Shivivg machine T-75-3	\$950
13.	8" heavy duty vise	\$200
14.	Heavey duty work bench 3'x6' -46-	\$500

EQUIPMENT AND SUPPLY NEEDS FOR WELDING COURSES

WELDING COURSE NEEDS (NON-CERTIFIED PROGRAM)

		Unit Cost	Quan	To	tal
1.	Equipment for Welding Room :				
	 a) Insulated rack oven (heated w/light bulbs) to keep welding rods dry-warm to touch. b) Shearer-Hacksaw c) Grinders-Polishers d) Oxy-Acetylene Gas Generators Manifold System - w/acetylene in separate compartment w/oxygen " " " 	\$ 391 1800		\$ •	391 500 100 800
2.	Welding-Electric (All Unites are to be complete w/cords and leads)*:				
	 a) Miller (250 Twin) b) Hobart (TR-250) c) Lincoln (Idralara) d) Stools in each Welding Booth e) Valves & regulators w/hoses & torches in each booth 	34	3 3 12 12	5.	800 800 800 378 2400
	JUD IVIAL			\$10	969
3.					
	Welding Tips				
	Helmet w/shaded 10 lense plus clear plastic lense Chipping Hammer Wire Brush Leather Coat or Cape Sleeve and Apron Leather Gloves Rods and Supplies Striker				11 ea 4 " 1 " 36 " 8 1 " 1 "
	Goggles Tip Cleaner Pliers Sledge Hammer Welder Cap 6' Tap	ss reusable Co ial Eastman l			4 " 2 " 2 3 5 3
4.	Types of Welding Rods Used:				<u>10</u> 111
	EGOH EGO10 E7018				
	E7024 #7 Mild Steel Wire - Size 3/32" x 36" Stick				\$500
	25 m Brazing Rod 3/32" x 36" Rod				
	-47- dom				

APPENDIX G

EQUIPMENT AND SUPPLY NEEDS FOR WELDING COURSES - (Cont.)

Staff - 5 hours of part-time/week 5.

One Hour of Lecture Per Week Two 2-hour Labs (close supervision) Instructor Preparation time

*See Appendix G (listing/quote from Oxygen Sales).

	Lincoln-Idealarc 250 AC/DC Power Bupply	
	Lenco M-250 Electrode Holder	
	Despatch WSC-1-25 Electrode Oven	
19.50 Ea		
	Bernard 3605 Curtain Rod & Hooks	

APPENDIX G



OXYGEN SALES and SERVICE, Inc. COMPLETE WELDING SUPPLY SERVICE

2043 SOUTH 35th • TACOMA, WASHINGTON 98409 • (206) GR 4-9434 P.O. BOX 11393 • TACOMA, WASHINGTON 98411

TO:

April 23, 1979 DATE

Russel Clark DATH C/O Tacoma Community College Faculty Office Building 12 5900 South 12th Tacoma, WA

IN RESPONSE TO YOUR INQUIRY, WE ARE PLEASED TO SUBMIT THE FOLLOWING QUOTATION:

ITEM	Quantity	DESCRIPTION	UNIT PRICE	Unit	TOTAL PRICE
	1	Miller-Dialarc 250 AC/DC Power Supply	610.00	Ea	7
	1	Lincoln-Idealarc 250 AC/DC Power Supply	568.00	Ea	
		# 1 Welding Cable	.93	Ft.	
	36	Lenco L-12 Lugs	.60	Ea	-
	12	Lenco M-250 Electrode Holder	9.00	Ea	
	12	Lenco EG-300 Ground Clamp	3.95	Ea	2
	1	Despatch WSC-1-25 Electrode Oven	391.00	Ea	
	12	Bernard 3600 Welding Booth	149.50	Ea	, ,
	12	Bernard 3601 Weld Spatter Shield	19.50	Ea	*
	12	Bernard 3604 Stool	34.50	Ea	
	12	Bernard 3605 Curtain Rod & Hooks	57.50	Ea	
	12	Bernard 3606 Curtain	35.50	Ea	
		PLUS SALES TAX IF APPLICABLE			

DELIVERY: _____ AFTER RECEIPT OF ORDER

ABOVE DELIVERY SUBJECT TO DELAY BY REASON OF ACTS OF GOD, STRIKES, LOCKOUTS, FIRES OR ANY OTHER CONTINGENCY, WHETHER OF LIKE NATURE OR OTHERWISE, BEYOND THE CONTROL OF SELLER.

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TERMS:

F.O.B.

ABOVE PRICE FIRM FOR _____ DAYS

Thank you for this opportunity to quote Very Truly Yours OXYGEN SALES & SERVICE, INC.

BY___

TITLE Bob Underwood, Sales Rep.

APPENDIX G



OXYGEN SALES and SERVICE, Inc. COMPLETE WELDING SUPPLY SERVICE

2043 SOUTH 35th • TACOMA, WASHINGTON 98409 • (206) GR 4-9434 P.O. BOX 11393 • TACOMA, WASHINGTON 98411

TO:

April 23, 1979 DATE

1	Quantity	DESCRIPTION	UNIT PRICE	Unit	TOTAL PRICE
	1	Western Enterprise MD-9-6 Manifold (Oxygen)	787.00	Ea	
	1	Western Enterprise MD-1-4 Manifold (Acetylene)	1,003.83	Ea	
	12	Western Enterprise WSV-1-1 Line Station Valves	15.25	Ea	
Т	12	Western Enterprise WSV-1-2 Line Station Valves	15.25	Ea	
	12	Western Enterprise WSR-1-1 Line Station Regulators	41.00	Ea	
	12	Western Enterprise WSR-1-2 Line Station Regulators	41.00	Ea	
	6	Rexarc (or equal) 2-04-560-G Pipe Station Drops	87.62	Ea	
	6	Rexarc 2-04-560-R Pipe Station Drops	87.62	Ea	
	12	Victor S-250-D Station Regulator	44.50	Ea	
	12	Victor S-260-A Station Regulator	44.50	Ea	
	12	Victor 100 Cutting Attachments	43.50	Ea	
	12	Victor CA-1350 Cutting Attachments	57.50	Ea	
	24	Victor Type 13 Sizes 000 thru 2 Tips	10.80	Ea	
		PLUS SALES TAX IF APPLICABLE			

DELIVERY: _____ AFTER RECEIPT OF ORDER

ORDER

ABOVE DELIVERY SUBJECT TO DELAY BY REASON OF ACTS OF GOD, STRIKES, LOCKOUTS, FIRES OR ANY OTHER CONTINGENCY, WHETHER OF LIKE NATURE OR OTHERWISE, BEYOND THE CONTROL OF SELLER.

ABOVE PRICE FIRM FOR	DAYS
F.O.B	VieV
TERMS:	Thank

Thank you for this opportunity to quote, Very Truly Yours OXYGEN SALES & SERVICE, INC.

BY___

TITLE_

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APPENDIX G



OXYGEN SALES and SERVICE, Inc.

2043 SOUTH 35th • TACOMA, WASHINGTON 98409 • (206) GR 4-9434 P.O. BOX 11393 • TACOMA, WASHINGTON 98411

TO:

April 23, 1979 DATE

A Quantity	DESCRIPTION	UNIT PRICE Unit	TOTAL PRIC
12	Victor 50-R Reverse Flow Check Valves	5.90 Ea	I
12	Victor 60-R Reverse Flow Check Valves	5.90 Ea	I
12	Victor 3/16x12 1/2 Hose	8.91 Ea	12
12	Jackson H-4-A Welding Helmet	18.85 Ea	12
12	Lenco LH-2 Chipping Hammer	3.27 Ea	12.
12	Fibre Metal FM-70 Goggles	4.10 Ea	12
12	Misc. Items Wire Brush	.90 Ea	6
12	Misc. Items Tip Cleaners	2.25 Ea	0
12	Misc. Strikers	.80 Ea	12
12	Misc. Black Sabre Gloves	8.05 Pr	12
12	Misc. Cape Sleeve & Apron	35.64 Ea	12
	Lincoln Fleetweld 5P 1/8" (E6010)	.524 Lt	12
	Lincoln Fleetweld 35 1/8" (E6011) PLUS SALES TAX IF APPLICABLE	.538 L	24

DELIVERY: AFTER RECEIPT OF ORDER ABOVE DELIVERY SUBJECT TO DELAY BY REASON OF ACTS OF GOD, STRIKES, LOCKOUTS, FIRES OR ANY OTHER CONTINGENCY, WHETHER OF LIKE NATURE OR OTHERWISE, BEYOND THE CONTROL OF SELLER.

TERMS:	tinutioggo eid		
F.O.B.			
ABOVE PRIC	E FIRM FOR	2142 14	DAYS

Thank you for this opportunity to quote, Very Truly Yours OXYGEN SALES & SERVICE, INC. BY

TITLE _

-51-

APPENDIX G

April 23, 1979 DATE



OXYGEN SALES and SERVICE, Inc. COMPLETE WELDING SUPPLY SERVICE

2043 SOUTH 35th • TACOMA, WASHINGTON 98409 • (206) GR 4-9434 P.O. BOX 11393 • TACOMA, WASHINGTON 98411

TO:

Lincoln LH-78 1/8" (E7018) Lincoln Jetweld 3 1/8" (E7024) .493 Lb	
PLUS SALES TAX IF APPLICABLE	
DELIVERY: AFTER RECEIPT OF ORDER ABOVE DELIVERY SUBJECT TO DELAY BY REASON OF ACTS OF GOD, STRIKES, LOCKOUTS, FIRES OR ANY OTHER CONTING WHETHER OF LIKE NATURE OR OTHERWISE, BEYOND THE CONTROL OF SELLER.	

APPENDIX G

MARK VIII-2® POLY-WELD SYSTEM EIGHT 200 AMPERE DC WELDERS IN ONE UNIT NWSA: 340 FORM: PS DATE: NOVEMBER, 1974 SUPERSEDES: PS-7 INDEX NO. DC/10.0



EIGHT operators weld from ONE DC power source

The unique MILLER POLY-WELD SYSTEM features individual power-packed modules housed in a common cabinet which can provide remotely controlled welding current to as many as eight stations anywhere in a wide radius from the main unit.

Virtually any combination of welding power from 40 to 800 amperes at 40 volts, 100%

- Bridge Contractors
- **Shipyards**
- Pipe Fabricators
- Foundries

duty cycle, or 40 to 1,000 amperes at 40 volts, 60% duty cycle, is available for a wide variety of applications. Each of the eight modules provide 40 to 350 amperes of d-c (200 amperes at 40 volts, 60% duty cycle). Compact construction means that the MARK

VIII-2 can be lifted with a crane or moved easily with a fork-lift truck.

- USERS:
 - Power Plant Erectors
 - Assembly Lines
 - Weld Shops, Welding Schools
 - Structural Fabricators and Erectors

mil

OPTI	ONAL	VOLTAGES
901	346	208/230/4
901	347	230/380/460
901	348	230/460/57

SPECIFICATIONS

(Subject to change without notice)

LER	RATED WI	ELDING CURREN AT 40 VOLTS	τ ουτρυτ	D-C WELDING CURRENT	ODEN	LOA	INPUT AT F D OUTPUT THREE PHA				WE	IGHT
MODEL	SINGLE	MAIN TRA	NSFORMER	- RANGE SINGLE MODULE	OPEN CIRCUIT VOLTS	230 VOLTS	460 VOLTS	KVA	ĸw	DIMENSIONS	NET	SHIP
MARK VIII-2	200 Amps @ 60% Duty Cycle	800 Amps @ 100% Duty Cycle	1600 Amps @ 25% Duty Cycle	40-350 Amps	80	170 Amps	85 Amps	68	48.6	Height 70 ¹ /4" (178 cm) Width 72" (182 cm) Depth 40" (101 cm)	4160 lbs. (1886 kilos)	4210 lbs. (1909 kilos)

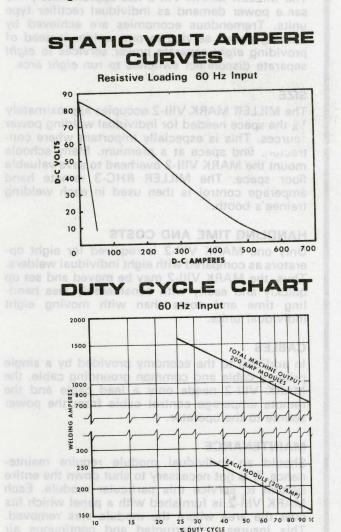
Also suitable for operation on 50 Hz with associated changes in output.

Standard MARK VIII-2 is wired for 230/460 volt operation. Other voltages available at additional cost.

CU

USES

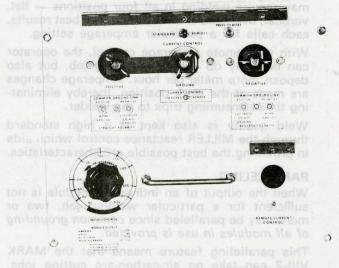
- Shielded Metal-Arc (Stick) Welding
- Gas Tungsten-Arc (TIG) Welding
- Gas Metal-Arc (MIG) Welding .
- Submerged Arc Welding
- Stud Welding .
- Stress Relieving State State of the base .
- Air-Carbon-Arc Cutting and Gouging .
- Magnetic Particle Inspection



Duty cycle holds true for either 50 or 60 Hz

FEATURES

- Remote current control capability
- D c straight or reverse polarity
- Individual units can be paralleled
- Compact and easy to move about
- All weather protected and corrosion resistant
- 115 volt a c receptacle
- Built-in means for providing a common ground
- Designed with operator safety in mind

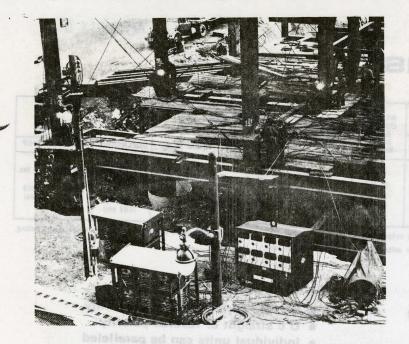


Module close-up illustrated with protective covers removed. Note the standard and remote switch, circuit breaker reset button, positive and negative secondary welding output terminals with choice of ground linkage, weld control rheostat, strain relief bar and remote current control receptacle.



Immediately below No. 8 module, illustrated above, is a protective cover which shields a dual 115 volt, 50/60 Hz ac receptacle with power to operate accessory tools, even while welding. On the left is an on-off button set used to energize the control circuit, fan units and primary contactor. A pilot light further left will indicate when the Mark VIII-2 is energized.

-54-



A MILLER VIII-2 is illustrated in use, along with other MILLER welders, on a multi-story steel structure. As many as eight operators are taking advantage of this model's ability to allow widely scattered welding operations simultaneously.

ECONOMIES AND ADVANTAGES WITH THE MARK VIII-2

WELD QUALITY CONTROL PLUS REDUCED LABOR COSTS

Each of the eight welders can be remotely controlled with an optional RHC-3 Remote Hand Control. Remote current control throughout the full range is preferred by weldors because one job may require welding in all four positions — flat, vertical, overhead and horizontal. For best results, each calls for a particular amperage setting.

With the remote amperage control, the operator can not only do a better welding job, but also deposit more metal per hour. Amperage changes are made at the work position, thereby eliminating time consuming trips to the welder.

Weld quality is also kept at a high standard through the MILLER reactance control which aids in providing the best possible arc characteristics.

PARALLELING

When the output of an individual module is not sufficient for a particular welding job, two or more may be paralleled since *common grounding of all modules in use is provided.*

This paralleling feature means that the MARK VIII-2 can take on air-carbon-arc cutting jobs, submerged arc and other processes requiring high amperages.

POLARITY CONTROL

With the MARK VIII-2, each individual operator can use whichever polarity (straight or reverse) he requires, as each module can be individually controlled.

ALL WEATHER PROTECTION AND CORROSION RESISTANCE

The MILLER MARK VIII-2 has double varnish impregnated and baked cores and coils. The case is designed to provide the maximum all weather protection. Primary terminal board, fuse blocks, and contactor are totally enclosed. These features minimize the costly deterioration caused by rain, salt air, snow, etc. This degree of weather protection and corrosion resistance normally costs extra on individual welders. It is, however, standard on the MARK VIII-2.

POWER INPUT

The MILLER MARK VIII-2 has approximately the sanle power demand as individual rectifier type units. Tremendous economies are achieved by running power service to one welder instead of providing *eight* separate power services to *eight* separate disconnect switches to run *eight* arcs.

SIZE

The MILLER MARK VIII-2 occupies approximately 1/4 the space needed for individual welding power cources. This is especially important where contractors find space at a premium. Many schools mount the MARK VIII-2 overhead to save valuable floor space. The MILLER RHC-3 remote hand amperage control is then used in each welding trainee's booth.

HANDLING TIME AND COSTS

Only one MARK VIII-2 is required for eight operators as compared with eight individual welders. Thus, the MARK VIII-2 may be moved and set up quickly and easily with considerably less handling time and costs than with moving eight individual units.

CABLES

In addition to the economy provided by a single primary cable and common grounding cable, the MARK VIII-2 needs only a lead cable and the remote amperage control cable from the power source to the operator.

MAINTENANCE

Should an individual module require maintenance, it is not necessary to shut down the entire system to service this particular module. Each MARK VIII-2 is furnished with a panel which fits over the area where the module was removed. This insures uninterrupted and continuous air flow.

OPTIONAL ACCESSORIES

AUTOMATIC FAN TIME CONTROL SYSTEM (Stock No. 040 364)

Where the welder is subjected to corrosive environment and severe contamination, the optional automatic fan time control for the welder's dual fans is recommended. This control is designed to turn off both fans during periods when not needed. It is a sealed device which activates both fans when the arc is struck. When the arc is broken, the fans are turned off automatically after a three minute interval. The welder remains energized and generates enough heat to reduce condensation.

The fan motors of this superior cooling system are totally enclosed. Continued efficiency is assured through the use of lifetime lubricated ball bearings.



RHC-3 REMOTE HAND AMPERAGE CONTROL (Stock No. 040 056)

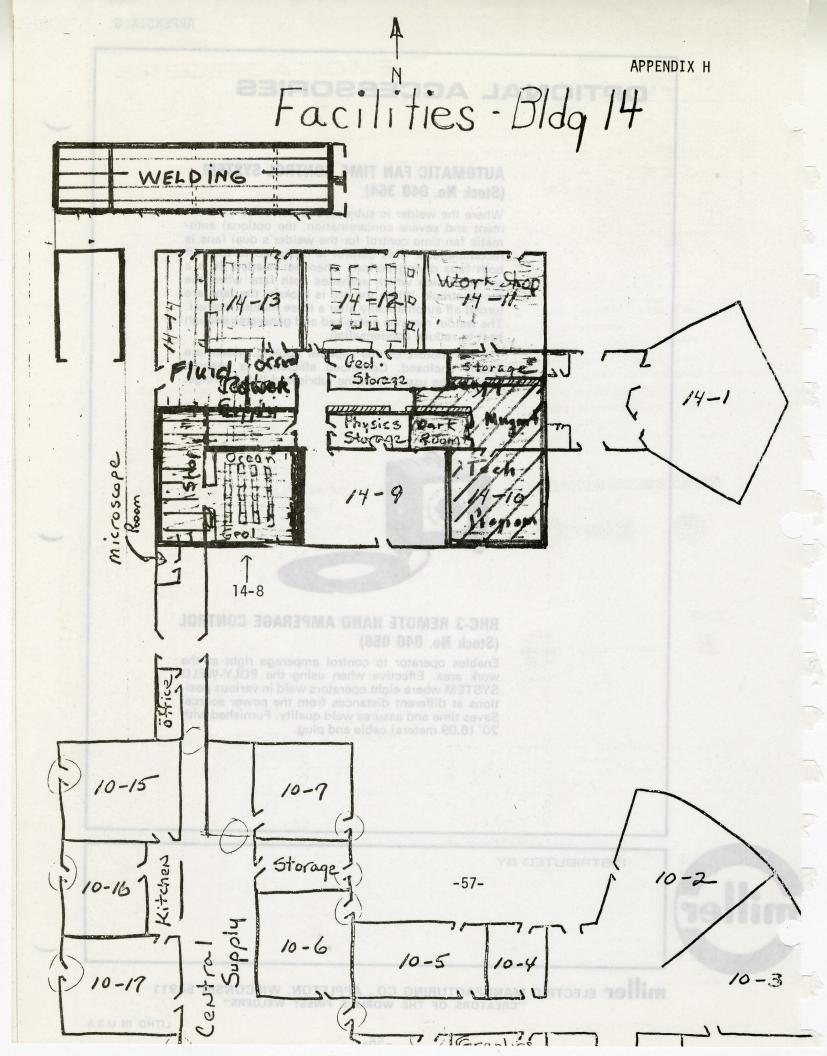
Enables operator to control amperage right at the work area. Effective when using the POLY-WELD SYSTEM where eight operators weld in various positions at different distances from the power source. Saves time and assures weld quality. Furnished with 20' (6.09 meters) cable and plug.



DISTRIBUTED BY

miller ELECTRIC MANUFACTURING CO., APPLETON, WISCONSIN 54911 "CREATORS OF THE WORLD'S FINEST WELDERS"

-56-



FORM 2805

A great way to organize your metal fabricating bench work in one sturdy, convenient, shielded area. The center can be used for stick, MIG and TIG welding, cutting, brazing and other bench work.

Made of durable steel, the table features welded construction. The wide, waist-high table top and grate makes the center ideal for use in the shop, training center or vocational school. The table has a slag tray built-in that helps keep the floor and work area clean. Each table comes ready to assemble with grate, ground lug, slag tray and rod holder. A line of accesories – from curtains to weld spatter shields adapt the Metal Fabricating Center to your application.

NEW Bernard



It costs less to buy than to build!

ELERS allow table to uneven floors, or to own, beneath grate is easy

y to assemble and stable.

Grate Part No. 3632

S SEPARATE

D SPATTER SHIELD auge steel - 12" high ping Weight 16 lbs.

L CABINET pauga steal all waldad thration - completely mbled. 24" deep x 13" x 17" high.

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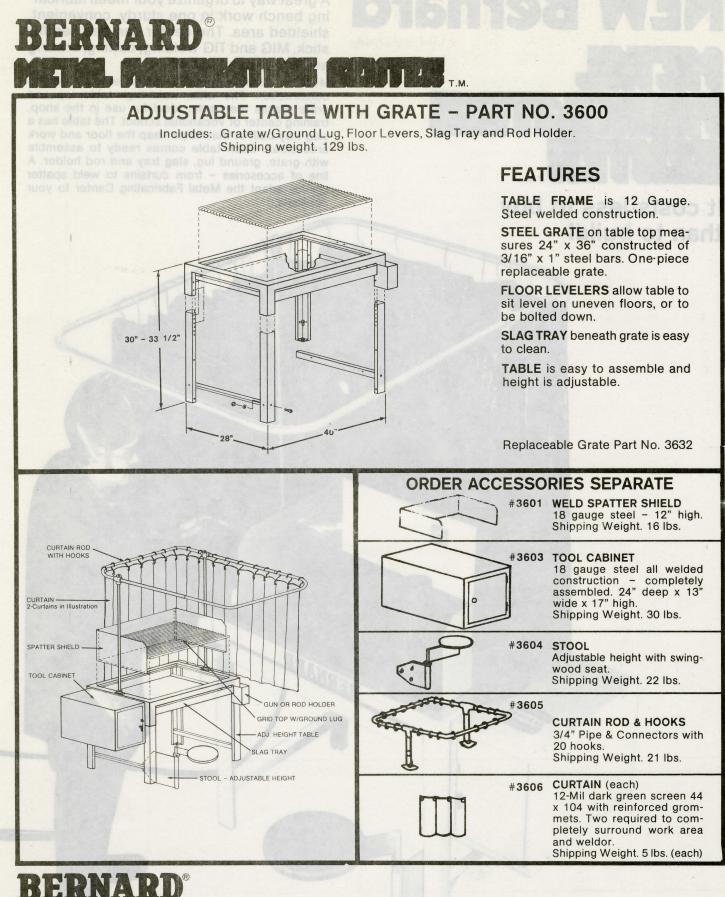
VAPPIN ROD 1 HOOKS VAPPIN & Connectors with 0 hooks bicetor Weight 21 the

CURTAIN (sac) 12-Mil dark green screen 44 x 104 with reinforced grommets. Two required to complately surround work area and waldor.

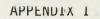
Shipping Waight 5 lbs (each)

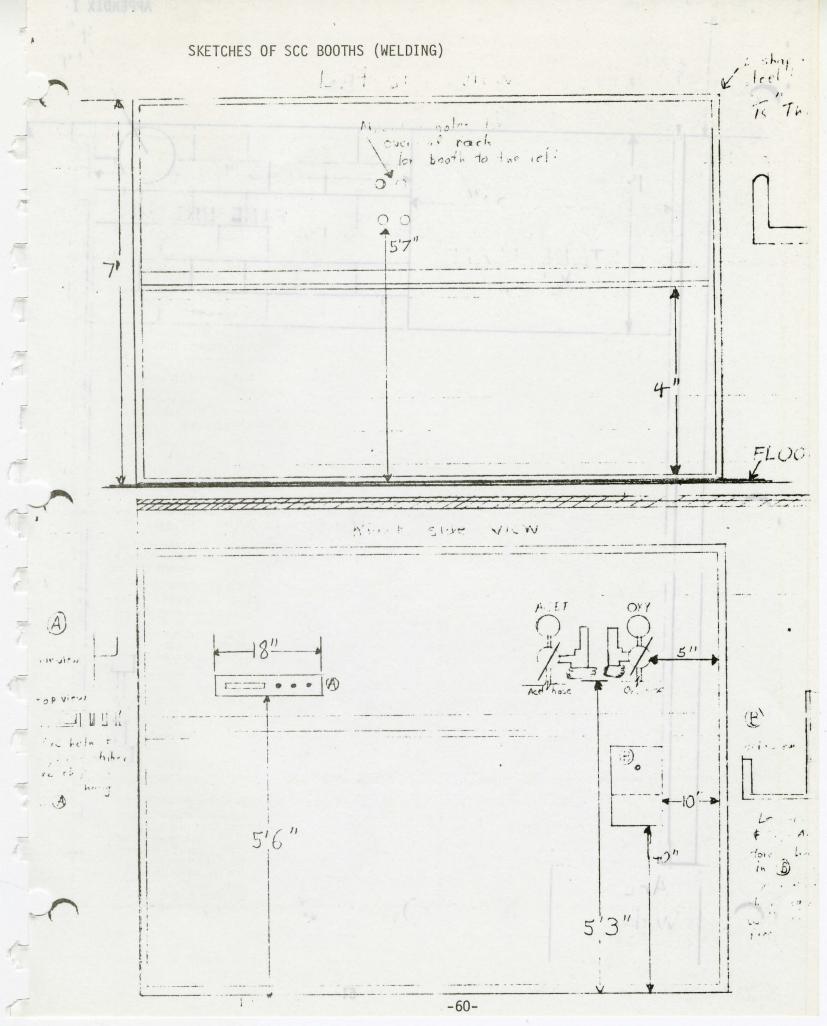
BERNARD

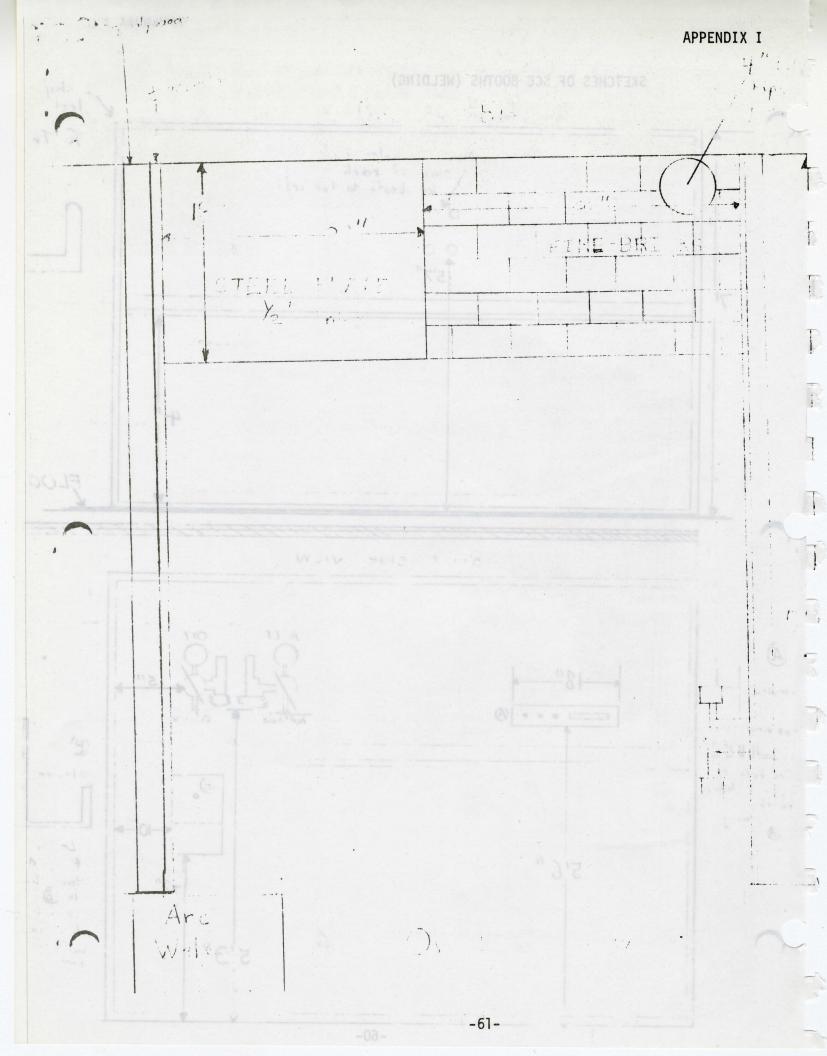
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Box 667, Beecher, Illinois 60401 Phone: (312) 946-2281 DOVER CORPORATION / BERNARD DIVISION







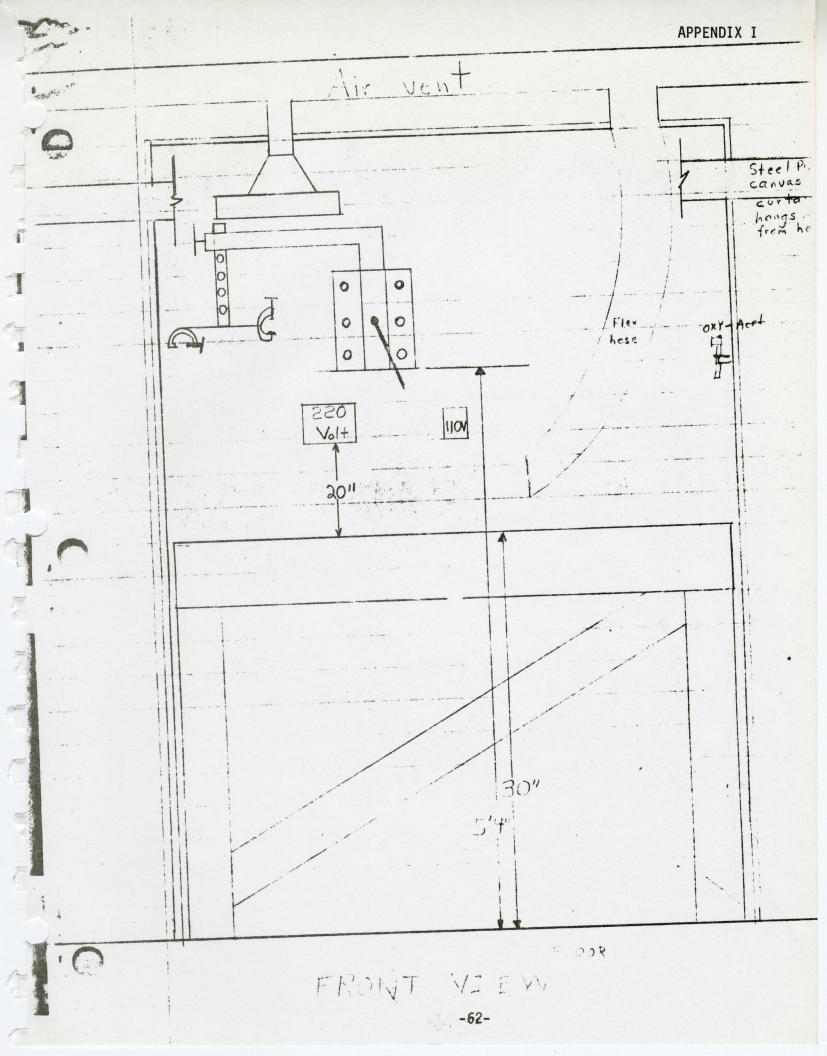
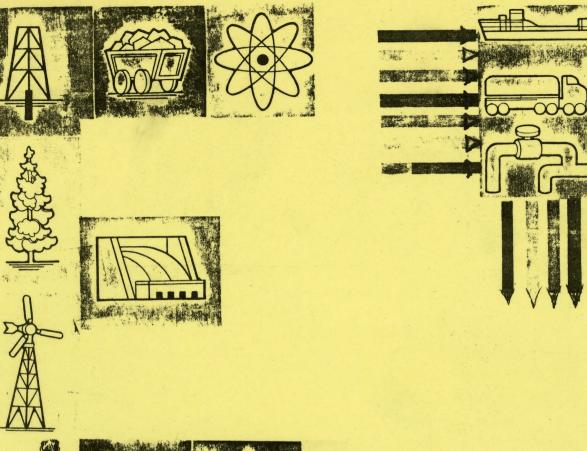
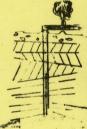
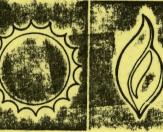




Exhibit B

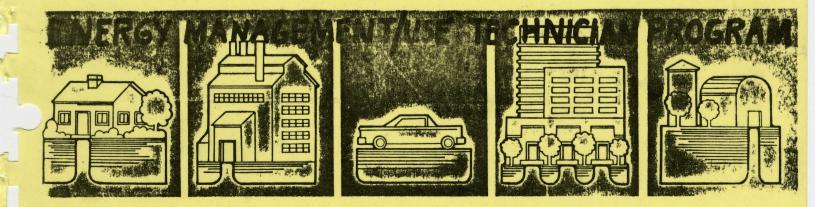






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TACOMA COMMUNITY COLLEGE

LORRAINE STEPHAN Associate Dean For Occupational Education

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The we the

Russel E. Clark Coordinator of Program Development Fluid Power Technology Program

IVONNA MCCABE CHAIRMAN, DIVISION OF MATHEMATICS AND SCIENCE

ENERGY MANAGEMENT/USE

TECHNICIAN PROGRAM

DOCUMENT PREPARATION BY:

Dennis Findley Anne Koenig Pat Loth

EDITED BY: DONALD R. GANGNES

MAY, 1979

PROGRAM PLANNING BY:

LORRAINE STEPHAN ASSOCIATE DEAN FOR OCCUPATIONAL EDUCATION

RUSSEL E. CLARK COORDINATOR OF PROGRAM DEVELOPMENT FLUID POWER TECHNOLOGY PROGRAM

IVONNA MCCABE CHAIRMAN, DIVISION OF MATHEMATICS AND SCIENCE

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I. INTRODUCTION

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INTRODUCTION

Tacoma Community College indicated its first interest in a training program for Energy Technicians in the fall of 1976 when the College filed a program alert for "Energy Efficiency Technician" with the Washington State Board for Community College Education. As stated in that original alert, the goal of the College was to develop the following:

"A two-year program designed to graduate technicians who can work in the field of energy utilization and conservation. They will assist with planning, installing and monitoring existing and new systems of heating, ventilation, air conditioning, and lighting of new and existing structures."

The filing of the alert created considerable interest and concern statewide. This reaction eventually forced the College to make an effort to further develop the definition of an "Energy Efficiency Technician" and to show a need for this type of training program. The resulting alert classified the program as an emerging technology.

To acquire more data about the need for people trained in the new technology, the College contracted with the Northwest Educational Associates, Longview, Washington, to conduct a statewide needs survey. The comprehensive survey was accomplished during the summer of 1977. The results of the study, including recommendations, and a list of the membership of the statewide advisory committee established to guide the study are included as Appendix A. The findings of the study prompted the State Board for Community College Education staff to recommend that Tacoma proceed with the offering of supplemental courses and continue statewide development activities.

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In an effort to carry out this charge, Tacoma Community College, with financial support from the State Board for Community College Education, organized the Northwest Energy Management Consortium in December, 1977. The consortium, composed of representatives from six community colleges (Spokane Community College, Lower Columbia Community College, Seattle Community College, Edmonds Community College, Columbia Basin Community College and Tacoma Community College) met with industrial, commercial, architectural, engineering and institutional representatives to formulate the educational components of the energy curriculum. An end product of the consortium's efforts was the submittal of a proposal to the Office of Education in response to RFP 78-63: a request for bids on the development of a national community college curriculum for energy management/use.

-2-

INTRODUCTION - (Continued)

The Northwest Energy Consortium was an unsuccessful bidder for the curriculum development project. However, the successful bidder, Technical Educational Research Center, Waco, Texas, has accepted Tacoma as a test site for the new curriculum. The Energy Advisory Committee listed in Appendix A recommends that Tacoma implement the Energy Management Technician Program described in this proposal.

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II. DESCRIPTION OF PROGRAM

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II. DESCRIPTION OF PROGRAM

A. Rationale for the Energy Management Technician Program:

Modern equipment used in homes, businesses, institutions and factories has become more complex. It typically consists of systems utilizing combinations of mechanical, electrical, thermal, fluid and/or optical components and, frequently, these systems are controlled by electronic computers and microprocessors. In addition to the technical specialists currently employed, a growing need exists for systems-oriented technicians who possess combinations of skills and abilities, and can apply them in jobs to develop, construct, test, operate, maintain, install or sell modern equipment. Many of these jobs are related, either directly or indirectly, to our country's increasing emphasis on conservation.

The equipment associated with energy production, conservation and utilization is typical of modern complex equipment--it may have electric motors, heaters, lighting, electronic controls, mechanical drives and linkages, thermal systems for heating, cooling, drying, melting or fusing, lubricants, optical rf or microwave systems and communication links, pneumatic and hydraulic drives, controls and cushions and, in some instances, involve nuclear radiation. To work with this type equipment requires understanding of the various technical disciplines and their interrelationships.

A curriculum for preparing an interdisciplinary technician with real comprehension of the interrelationships in energy systems requires a broad technical base. The courses should be practical, but they also should include basic understanding of physical and chemical principles. The technologies associated with production, conservation and utilization of various forms of energy are changing rapidly; thus, the Energy Conservationand-Use Technicians must be prepared for the tasks presently required, and learn new technical phenomena, materials, processes and equipment as these appear on the job. They must be versatile and capable of lateral mobility within employer organizations.

This document describes the design of a technical, interdisciplinary curriculum and presents detailed course and module outlines for all the curriculum listings. Technical Education Research Center - Southwest currently is under contract to the U.S. Office of Education to develop the

-5-

II. DESCRIPTION OF PROGRAM - (Continued)

curriculum and instructional materials, and to evaluate them in at least six postsecondary institutional field-test sites, beginning in the fall of 1979, of which Tacoma Community College will be one.

B. Definition of Energy Conservation-and-Use Technician:

Prior to designing the Energy Conservation-and Use Technician curriculum, it was necessary to define the technician. The first step in this definition was to identify fields in which such a technician might be employed; e.g.:

Energy-related research and development .

Energy production (electric power plants, solar collection, etc.).

Energy use (factories, buildings, equipment, etc.).

Energy conservation (audits, construction techniques, retrofits, etc.).

Similarly, it was necessary to identify functions such a technician might perform; e.g.:

Provide direct support to engineers/scientists.

Operate and/or maintain mechanical, electrical/electronic,

electromechanical or more complex equipment or systems.

Perform building "operating engineer" services (operations and maintenance of building HVAC, electrical and mechanical systems).

Perform systems operational tests and analyses.

Perform energy-use audits.

Perform energy conservation technical services: construction, retrofits, load balancing, etc.

Based on the criteria noted above, a very general definition of an Energy Conservation-and-Use Technician was formulated:

A systems oriented worker who possesses a combination of skills and abilities and can apply this interdisciplinary capability in jobs to develop, construct, test operate, maintain and/or install modern equipment used in homes, businesses, institutions, factories and other installations. Typically, this equipment consists of systems utilizing combinations of mechanical, electrical, thermal, fluid and/or optical components, and frequently these systems are controlled by electronic computers or microprocessors.

-6-

1 32

Detailed job descriptions and a task inventory for Energy Conservationand-Use Technicians are presented in Appendix D of this document.

C. An Emerging Technology:

A new generation of "systems oriented" technicians is needed to develop, install, operate, maintain and repair this type of equipment. Narrowly trained specialists are no longer sufficient or adequate for these tasks; the demand of this changing technology is for interdisciplinary technicians with combinations of technical skills and knowledge. Recent surveys indicate that at least 79,000 of these technicians will be needed in the next decade in a variety of occupations; in research and development labs as support to engineers and technicians; in power plants and factories to develop and maintain production equipment; in service organizations as energy audit technicians; in businesses, institutions, hotels and apartments for responsibilities in maintaining the "plant equipment;" and in sales and installation of new, energy-related equipment such as solar heating or electric conversion systems.

Programs at postsecondary institutions for training Energy Conservationand-Use Technicians will require a technically broadbased curriculum with flexibility of modular instructional materials to allow a school to "tailor" the curriculum to local and/or regional needs. A search of schools, for energy-related programs or supporting curriculum materials of this type, has not produced evidence that either exists.

In October, 1978, Technical Education Research Center - Southwest was awarded a contract (#300780551) from the U.S. Office of Education (USOE), Bureau of Occupational and Adult Education, to begin a project to develop and test curriculum modules, develop a program planning guide and conduct limited dissemination and familiarization activities for two-year postsecondary preparatory programs for Energy Conservation-and-Use Technicians (ECUT).

The curriculum is being designed for a broad technical based, interdisciplinary technician (described previously). Survey data indicate that graduates of such a program will have employment opportunities in a large number of different jobs related to energy and modern industrial equipment. Consequently, the curriculum design is based on tasks and knowledge required from several distinctly different jobs.

-7-

III. ASSESSMENT OF NEED

III. ASSESSMENT OF NEED

When surveying the need for an emerging occupational specialty, the College is first confronted with the basic problem of definition. In order to obtain useful information about potential employment, the surveyor must request feedback on not only the number of potential jobs but also the respondents definition of the specialty being surveyed.

The first needs survey ever performed in the State of Washington for the occupational specialty, Energy Management Technician, was performed during summer, 1977. The state-wide needs assessment, which surveyed 400 employers, was conducted for Tacoma Community College, by Northwest Educational Associates. The item by item summary of the 148 employer responses to this survey follows:

Item]

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- a. Do you currently employ persons who perform any of the above tasks?
 - 103 employers said Yes 35 employers said No 10 employers gave no response
- b. How many perform these tasks as their sole responsibility?
 - 133 employers reported a total of ¹04 persons performing these tasks as their sole responsibilities
- c. How many have other job responsibilities? List other responsibilities:

125 employers reported a total of 739 persons having shared responsibilities. For a list of responsibilities. (Appendix B)

d. What additional training is necessary for persons with shared job responsibilities to adequately coordinate energy usage?

Nearly 50% (70 out of 148) responded to this item. For a list of additional training refer to survey report, page 14-15. (Appendix B)

e. If you do not currently employ persons who perform any of the above tasks, how are the tasks performed?

31	l employers responded to this item as follows:	
	parent company headquarters	3
	employees as requested	12
	consulting personnel (outside contracts)	7
	company engineers	9

III. ASSESSMENT OF NEED - (Continued)

Item 2 a. Is the number you currently employ for this purpose more or less or about the same as five years ago? Three years ago? One year ago? 40 employers reported "more" Five years ago: 6 employers reported "less" 40 employers reported "same" 62 employers gave no response notpel deal to edicite ent 148 responses we vorgue abeen terth ent 33 employers reported "more" Three years ago: 6 employers reported "less" 47 employers reported "same" 62 employers gave no response 148 responses One year ago: 20 employers reported "more" 2 employers reported "less" 60 employers reported "same" 66 employers gave no response 148 responses

Item 3

What has been their turnover rate? (Report of average number of yearly replacements)

38 employers reported a total of 34 average yearly replacements for an estimated 4% yearly turnover rate. 110 employers gave no response.

c. How many have other job responsibilities? List other responsibe mails:

Give the job title of the persons performing these tasks.

92 employers reported job titles and job descriptions. For a list of job titles, refer to survey report, page 16-17. (Appendix B)

nearly out (10 out of 148) responded to this item. For a list of additio

Item 5

What are the training requirements and work experience qualifications for such a position?

115 employers reported training requirements in terms of educational level: 16 employers responded as requiring high school completion 26 employers responded as requiring at least 2 years of college 71 employers responded as requiring at least 4 years of college 2 employers responded as requiring at least graduate level 33 employers gave no response 148 responses (See page 13 of the report) (Appendix B)

III. ASSESSMENT OF NEED - (Continued)

Item 6

Estimate salary for the above position (Beginning and maximum salary spread)

10-15,000 16-20,000 21-25,000	47 positions reported 56 positions reported 18 positions reported	and Atr Conc
26,000 and up	19 positions reported	(<u>See page 13 of the report</u>) (Appendix B)

Item 7

What are your projections, anticipations, and plans for hiring persons who perform these tasks during the next three years? (Report estimated total employment for each year)

A total of 78 employers responded. Of the 78 employers, 45 projected 115 new positions for the period 1978 through 1980. 70 employers gave no response.

The findings and discussion included in the report presented by Northwest Educational Associates are included as Appendix B.

In an effort to expand on the work of Northwest Educational Associates and obtain employment information specific to Pierce County, the program development advisory committee for Tacoma Community College's program structured another survey instrument. This instrument was mailed to 227 employers during March, 1979. Eighty-five employers responded to the mailing. The results outlined below are taken from the tally of the eighty-five responses, which is included as Appendix C.

Survey Results:

Responses:

Two hundred twenty-seven needs assessment forms were mailed during March, 1979, to industries, commercial firms, architects, utilities, governmental units, and public and private institutions. These units were considered as large energy users, suppliers, or designers within Pierce County. Eighty-five (85) energy units returned the surveys for a 37% return.

Analysis of Item Response:

Q. 1. The employers were asked to indicate the skill level required. (Level I-Basic concepts and principles. Level 2-Skills adequate to adjust and operate).

III. ASSESSMENT OF NEED - (Continued)

Q. 1. (Cont.)

The tally shows a trend toward trouble shooting skills (Level 2) in the area of H.V.A.C. (Heating, Ventilation, and Air Conditioning). The responses were about equally distributed between Level 1 and Level 2 on the other items.

Q. 2. Forty-five respondents stated they needed people with skills listed; 32 respondents indicated they did not. This is a fairly significant response for an emerging occupation.

Q. 3. The respondents indicated an average of 36 technicians would be needed over the next five years. Most of the 36 are new hires.

> Q. 4. Forty-one respondents indicated they would send employees to the program for continuing education.

Q. 5. Forty-six respondents indicated that continuing education courses should be offered in the evening.

Q. 6. Most of the responses to this question listed knowledge of control systems, air balancing skills, energy conservation skills, HVAC knowledge and skills, and trouble shooting skills.
Q. 8. See Appendix C, "Tally and Comments," for resonses to Question No. 8.

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IV. DEVELOPMENT OF CURRICULUM

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Tacoma Community College developed a list of modules to be included in the curriculum through consultation with the representatives of the trades, industry, government, and with the State Energy Office. (Appendix E) The energy management advisory group recommended focusing on the modules involved in residential, commercial and industrial building envelopes and building energy management. They developed a job description, (see Appendix D,) an understanding inventory list, and a tentative task inventory for the technician. The survey instrument was constructed in such a way as to give information on the level of skill required by each employer and areas selected for supplemental or continuing education. (See Appendix B)

Tacoma Community College contacted the T.E.R.C. offices in Waco, Texas, after they were awarded the Federal grant to develop the Energy Management Curriculum. Materials were sent to TCC by T.E.R.C. and after study of the list of modules that TCC had developed to date and the list of courses included in the T.E.R.C. proposal, a recommendation was made to join the T.E.R.C. development as one of their test sites.

On October 1, 1979, the Technical Education Research Center - Southwest was funded by the U. S. Office of Education, Bureau of Occupational and Adult Education, to develop and test a curriculum for Energy Conservation-and-Use Technicians. This three-year program involves the following major tasks:

7. 17

- A national assessment of employer needs for Energy Conservation-and-Use Technicians.
- An assessment of existing training programs and curriculum materials for Energy Conservation-and-Use Technicians.
- Design of a model curriculum and specification of course content for preparing Energy Conservation-and-Use Technicians at two-year postsecondary technical institutions and community colleges.
- 4. Development of modular instructional materials for all the technical specialty courses in the model curriculum.
 - 5. Field tests at at least six postsecondary institutions for the purpose of evaluating the effectiveness of the curriculum and making revisions to the developed instructional materials.

IV. DEVELOPMENT OF CURRICULUM (Continued)

The curriculum for the T.E.R.C. Energy Technician Program is given curriculum through consultation with the representatives of the trades, indust:wolod ENERGY CONSERVATION-AND-USE TECHNICIAN RECOMMENDED CURRICULUM ved The Deservation of OUARTER SYSTEM level on the Detected by the Deservation tati viotneval pathastanebau as (.0 xtbneggA esa) .notita Contract 5 Credit eb First Quarter Lec. Lab. Hours Hours Unified Technical Concepts I (Physics) 3 4 7 5 Chemistry for Energy Technicians 5 5 3 2 Fundamentals of Energy 3 3 3 3 3 3 Technology and yoursel and goleveb of theme levebel and bebrave enew year nette Technical Math I 3 3 3 Microcomputer Operations <u>2</u> <u>4</u> <u>6</u> <u>4</u> the PIER.C. prop 421, a recomplication was 1 made to join the T.E.R.C. develop Second Quarter Unified Technical Concepts II (Physics) bes (section of the use 3 months) 4 to set 7 Used to 5 mil Properties and Reactions of Inorganic Materials 3 2 5 4 Energy Economics 3 0 3 3 Technical Math II 3 0 Use Technicians. 3 Fundamentals of Electricity/ Electronics <u> 3 all ba 4 anno 7 and 100</u> 5 Design of the sector of the sector of course content 20 Unified Technical Concepts III (Physics) 3 4 7 7 molecul 5 Properties and Reactions of Organic Materials 3 2 5 4 Energy Production Systems 3 0 3 3 Mechanical Devices and Systems $\frac{3}{4}$ and $\frac{4}{2}$ and $\frac{7}{2}$ and $\frac{7}{2}$ 5 12 17 10 22

IV. DEVELOPMENT	OF CURRICU	LUM (Continu	ed)	
Fourth Quarter	Lec.	Lab.	Contact Hours	Credit Hours
Electromechanical Devices	3	4	7	5
Electronic Devices and Systems	2	4	6	4
Electrical Power and Illumination			18 S	
Systems	4	2	6	5
Schematic and Blueprint Reading		4	5	3
	10	14	24	17
Fifth Quarter				
Fluid Power Systems	3	4	7	5
Microcomputer Hardware	2	4	6	4
Heating, Ventilating and				
Air Conditioning	2	4	6	4
Energy Conservation		2	6	5
	11	14	25	18
Sixth Quarter				
Technical Communications	5	0	5	5
Energy Audits	21	4	5	3
Instrumentation and Controls	3	4	7	5
Codes and Regulations	83	2	5	<u>4</u> u
	12	10	22	17

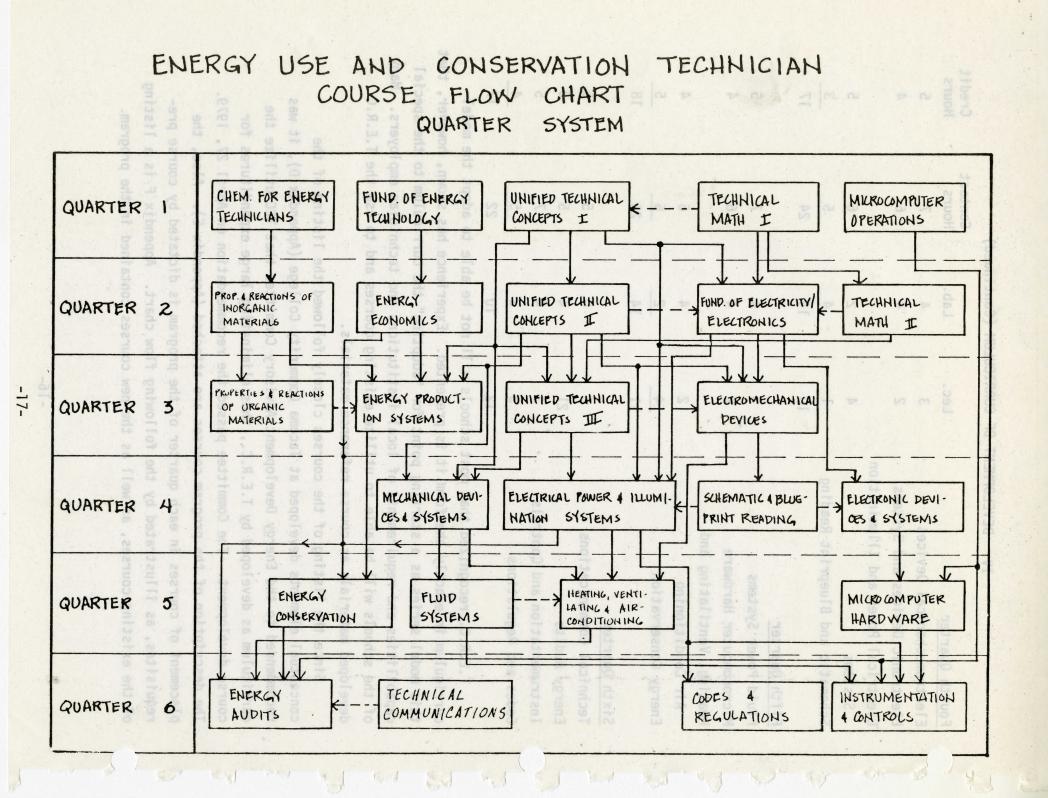
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T.E.R.C. recognized that most schools will not be able to adopt the model curriculum in exactly the form it is presented. Experience has shown, however, that this model series as a starting point for "adopting" the curriculum to the special capabilities and requirements of local institutions and technician employers. Many of the schools will be able to utilize existing courses and to use the T.E.R.C. developed materials as course reference materials.

Since the listing of the courses closely followed the listing of the conceptual elements developed at Tacoma Community College (Appendix D), it was recommended to the Energy Development Advisory Committee that TCC utilize the curriculum as developed by T.E.R.C., thus eliminating large expenditures for course development. The Committee passed the recommendation on April 27, 1979. The description of the program courses are attached (Appendix E). Also, the placement of courses in each quarter of the program is dictated by course pre-requisites, as illustrated by the following flow chart. Appendix F is a listing of the existing courses, as well as the new courses contained in the program.



ENERGY MANAGEMENT TECHNICIAN PROGRAM CATALOG DESCRIPTION

UNIFIED TECH CONCEPTS I, II, III

1 11 16

1

The Part

The the A

101 Physics	5 Credits
102 Physics	5 Credits
103 Physics	5 Credits

Unified Technical Concepts I, II, III, are designed to teach the basic principles of Physics as they apply to mechanical, fluid, electrical and thermal systems. Practical applications and hands-on laboratory work are stressed throughout the course. Prerequisite: None

> MICRO COMPUTER OPERATIONS 101 101 Micro Computer Operations

4 Credits

This course covers the operation and programming of microcomputers used by energy conservation technicians. The first part of the course (Modules MO-1, MO-2 and MO-3) concentrates on general concepts such as computer codes, binary arithmetic and major parts of most computers. Then small microcomputer systems are studied and applied to typical energy related data-gathering and control problems. In the third part of the course, a larger, disk-based system is used. Its operation and the kinds of software it uses are first studied and applied to energy conservation problems. Finally, students learn athe elements of BASIC Prerequisites: Permission of Instructor/Coordinator

Properties and Reactions of Organic Materials is a practical chemistry course on the fuels, lubricants and plastics that an Energy Conservation-and-Use Technician will encounter. The course will include an evaluation of the materials properties and a bries introduction to spectroscopy and nuclear chemistry. programming

101 Energy Economics

3 Credits

Energy Economics develops the techniques necessary to evaluate the economic impact current levels of energy production and use. The conceptual format enables the student to apply appropriate tools to a diversity of energy-related decisions in the construction redesign maintenance of buildings and related systems. The course concludes with financial analysis of alternate energy applications. Prerequisite: None

electrical and thermal systems. Practical applications and manus-on

104 Chem for Energy Technicians 4 Credits

Chemistry for Energy Technicians is an introduction to basic chemistry concepts including a consideration of atomic structure and the "language" of chemistry. Laboratory techniques are included with an emphasis upon safety.

Prerequisite: None

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105 Prep. and Reactions for Inorganic Materials 4 Credits

This course includes a discussion of the chemistry of gases, metals and solutions. Materials properties and energy applications will be emphasized.

Prerequisite: Chem 104

106 Prop. and Reactions of Organic Materials

4 Credits

Properties and Reactions of Organic Materials is a practical chemistry course on the fuels, lubricants and plastics that an Energy Conservation-and-Use Technician will encounter. The course will include an evaluation of the materials properties and a brief introduction to spectroscopy and nuclear chemistry. Prerequisite: Chem 105

Energy Production Systems 111

3 Credits

Energy Production Systems is an in-depth technical study of processes and equipment used to convert energy resources (such as geothermal and the sun) and fuels (such as coal and natural gas) into useful energy forms, such as electricity, heat and motion or light. This course will enable the Energy Conservation and Use Technician to select optimum energy sources and equipment for maximum economy, availability, efficiency and/or environmental quality.

In addition to its inclusion as a technical course in the two year curriculum this course will also be used by postsecondary institutions and employers as a retraining course in adult education. Prerequisite: Permission of Instructor/Coordinator

Fundamentals of Electricity and Electronics 5 Credits 101

Fundamentals of Electricity and Electronics is designed to provide the student with basic knowledge and skills in DC and AC electrical circuits to include circuit analysis, recognition and use of electrical components and electrical measurement instruments. Topics presented include voltage, resistance, current, power. Ohm's Law, inductors, capacitors, series and parallel circuits, phase resonance and circuit transients.

Prerequisite: Permission of Instructor/Coordinator

Electro Mechanical Devices 5 Credits 121

11. 1

Electromechanical Devices is designed to provide the student with a working knowledge of control elements in electrical circuits, transformers, motors and generators. Topics presented include switches, circuit breakers, relays, fuses, transformers, DC and AC motors and generators. Prerequisite: Permission Instructor/Coordinator

121 Electro Mechanical Devices

5 Credits

Electro Mechanical Devices is designed to provide the student with a working knowledge of control elements in electrical circuits, transformers, motors and generators. Topics presented include switches, circuit breakers, relays, fuses, transformers D.C. and A.C. motors and generators. Prerequisite: Permission of Instructor/Coordinator

104 Schematic and Blueprint Reading 3 Credits

Schematic and Blueprint Reading is designed to familiarize the student with the standard symbols and techniques used in schematics of electrical, mechanical, hydraulic and pneumatic systems and structural blueprints. Devices and systems discussed in other courses in the Energy Conservation and Use Technician curriculum are used as examples. The laboratory stresses the identification of parts and the relationships of the schematic or blueprint to the system it describes. Prerequisite: Permission of Instructor/Coordinator

ints and electrical measurement instruments. lopics present

112 Mechanical Devices and Systems 5 Credits

Mechanical Devices and Systems is an in-depth study of the principles, concepts and applications of various mechanisms that may be encountered in industrial applications of energy use and conservation. The mechanical components and systems are divided into eight modules of instruction, covering operational principles, uses, maintenance, troubleshooting, and repair and replacement procedures. The procedure or application portion of the modules will emphasize practical maintenance and installation of equipment and selection and specification of proper replacement components from manufacturers catalogs.

Prerequisite: Permission Instructor-/Coordinator

122 Electronic Devices and Systems

4 Credits

5 Credits

Electronic Devices and Systems is designed to provide the student with a working knowledge of modern electronic devices and the circuits in which they are employed. Electronic troubleshooting techniques are stressed throughout the course. Topics presented include rectifiers, transistors, SCR's and triacs, vacuum and gaseous tubes, filters, amplifier circuits, operational amplifiers, noise reduction, digital circuits and display devices. Prerequisite: Permission of Instructor/Coordinator

123 Elec. Power and Illumination Systems

Electrical Power and Illumination Systems is designed to provide the student with practical knowledge of electrical distribution systems and contains a section with specific emphasis on illumination systems. Topics presented include three-phase electrical systems, generating stations, highvoltage transmission and distribution systems, industrial and residential power distribution, wiring and electrical codes, illumination measurements, and indoor and outdoor lighting systems.

Prerequisite: Permission of Instructor/Coordinator

rocomputers used in energy conservat

132 Heating, Ventilating and Air Conditioning 4 Credits

This course is designed to give the student an overview of heating, ventilating and air conditioning systems and a working knowledge of each component and sub-system. Emphasis is placed on proper operation and maintenance to achieve maximum system performance. Prerequisite: Permission of Instructor/Coordinator

> icrocomputers are surveyed. Applications of these techniques a actual control problems are illustrated. Finally, data communication ideas and microcomputer troubleshooting techniqu

> > -22-

131 Fluid Power Systems

Fluid Power Systems is designed to give the student an overview of fluid power technology and a working knowledge of each of the components used in fluid power circuits. Hydraulic and pneumatic systems will be discussed with emphasis placed on troubleshooting and maintenance procedures involved in each. Topics presented will include fundamentals of fluid dynamics, conventional fluid circuits and fluid power components. Prerequisite: Permission Instructor/Coordinator

133 Energy Conservation

Energy conservation is designed to give the student technical knowledge and specific skills and required to perform conservation measures relative to the most common energy uses. The student will learn and utilize the basic principles of energy conservation and efficiency. Prerequisite: Permission Instructor/Coordinator

111 Microcomputer Hardware (C.S.)

This course provides an introduction to hardware associated with microcomputers used in energy conservation applications. It concentrates on interfacing and on input/ output electronics. Design of microcomputers is covered only to the point of enabling student to pinpoint problems and specify systems appropriate for various applications.

This course begins with an introduction to integrated circuit logic and a discussion of common electrical and logical digital interfacing techniques. Specific techniques for getting both digital and analog data into and out of microcomputers are surveyed. Applications of these techniques to actual control problems are illustrated. Finally, data communication ideas and microcomputer troubleshooting techniques are covered.

-23-

Prerequisite: Permission Instructor/Coordinator

4 Credits

5 Credits

5 Credits

141 Instrumentation and Controls

Instrumentation and Controls is designed to provide the student with practical knowledge and skills in the specification, use and calibration of measuring devices and the principles and applications of automatic control processes. The course stresses the integration of knowledge gained in previous courses through the detailed examination of control systems for electrical power production,, heating, air conditioning and manufacturing.

Prerequisite: Permission Instructor/Coordinator

140 Energy Audits

This course provides an overview of the purpose, objectives and mechanics of the energy audit process. Full background and procedural instructions precede case studies and laboratory practice in auditing. Finally, audit analyses are undertaken, with student recommending remedial actions based on analyses of his or her practice audits. Prerequisite: Permission Instructor/Coordinator

143 Codes and Regulations

This course is designed to provide the technician with a b asic understanding of the labyrinth of codes and regulations imposed upon each area of responsibility The subject matter will not only familiarize the student with many national codes, but also will instruct the student in how state and local codes can be found and used. Prerequisite: Permission Instructor/Coordinator

4 Credits

3 Credits

-24-

5 Credits

V. IDENTIFICATION OF RESOURCE

1

REQUIREMENTS

V. IDENTIFICATION OF RESOURCE REQUIREMENTS (continued)

The sites in Building 14 that seem to have the capacity to provide sufficient space for these thrusts is 14-10, 14-11, and the storage areas between the two rooms. See Appendix G for the building layout. There are certain courses in the program that will be taught at other sites in Building 14 and in Building 19, such as Computer Science Courses, Energy Economics, Chemistry, Physics, Electricity-Electronics, and the Mathematics courses. Courses are listed below that require specific sites or rooms.

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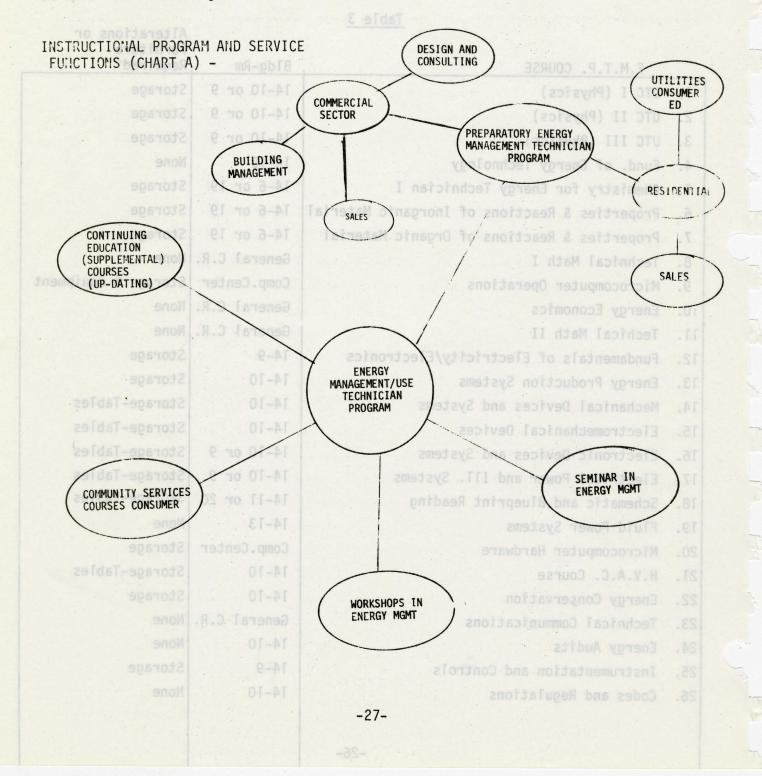
	Table 5				
	nury v in success		Alterations or Furniture		
1	E.M.T.P. COURSE	Bldg-Rm	Required		
1.	UTC I (Physics)	14-10 or 9	Storage		
2.	UTC II (Physics)	14-10 or 9	Storage		
3.	UTC III (Physics)	14-10 or 9	Storage		
4.	Fund. of Energy Technology	14-10	None		
5.	Chemistry for Energy Technician I	14-6 or 19	Storage		
6.	Properties & Reactions of Inorganic Material	14-6 or 19	Storage		
7.	Properties & Reactions of Organic Material	14-6 or 19	Storage		
8.	Technical Math I	General C.R.	None		
9.	Microcomputer Operations	Comp.Center	Storage & Equipment		
10.	Energy Economics	General C.R.	None		
11.	Techical Math II	General C.R.	None		
12.	Fundamentals of Electricity/Electronics	14-9	Storage		
13.	Energy Production Systems	14-10	Storage		
14.	Mechanical Devices and Systems	14-10	Storage-Tables		
15.	Electromechanical Devices	14-10	Storage-Tables		
16.	Electronic Devices and Systems	14-10 or 9	Storage-Tables		
17.	Electrical Power and Ill. Systems	14-10 or 9	Storage-Tables		
18.	Schematic and Blueprint Reading	14-11 or 20	Storage-Tables		
19.	Fluid Power Systems	14-13	None		
20.	Microcomputer Hardware	Comp.Center	Storage		
21.	H.V.A.C. Course	14-10	Storage-Tables		
22.	Energy Conservation	14-10	Storage		
23.	Technical Communications	General C.R.	None		
24.	Energy Audits	14-10	None		
25.	Instrumentation and Controls	14-9	Storage		
26.	Codes and Regulations	14-10	None		
	-27-				

Table 3

V. IDENTIFICATION OF RESOURCE REQUIREMENTS

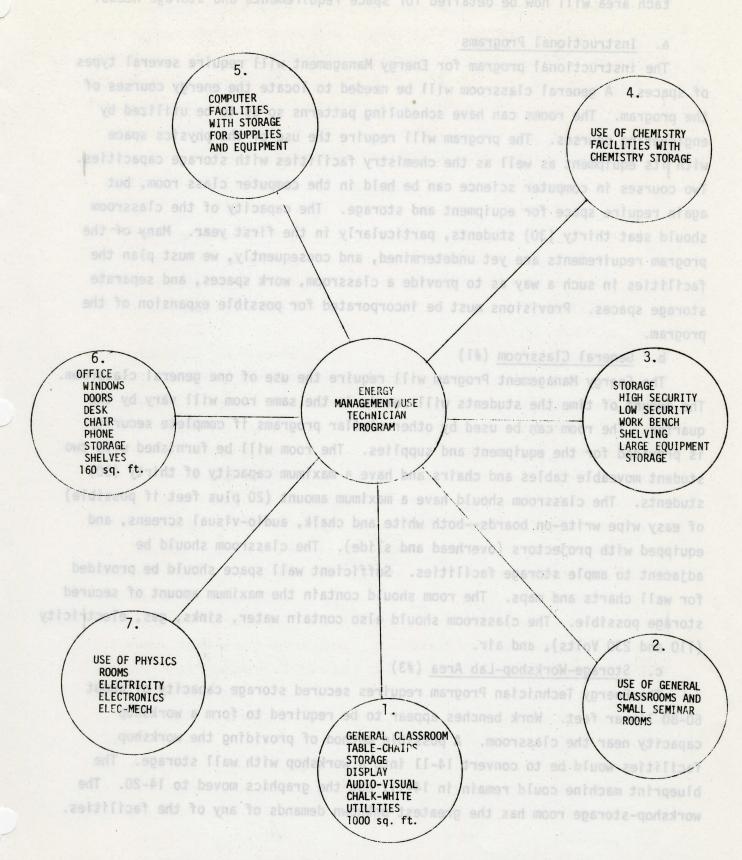
A. Facility Requirements

Tacoma Community College has the capacity to assimilate the Energy Management Technician Program into the Building 14 facilities. Requirements needed to implement the program will be discussed, proceeding from the facilities to equipment and supplies. The program will provide the College with several thrusts which need to be considered in choosing the location. The various thrusts that are being considered are depicted below: (Chart A)



SPACE REQUIREMENTS AND SPECIFICATIONS - (CHART B)

The specific facility requirements are depicted below. The areas 4, 5, and 7 require additional storage capacity assigned only to the program.



An office (#6.) is recommended for the program in the vicinity of the general classroom and shop area. The program requires a block of time for the students in Building 14, and the equipment requires monitoring at all times.

V. IDENTIFICATION OF RESOURCE REQUIREMENTS (continued)

Each area will now be detailed for space requirements and storage needs.

a. Instructional Programs

The instructional program for Energy Management will require several types of spaces. A general classroom will be needed to locate the energy courses of the program. The rooms can have scheduling patterns so as to be utilized by engineering courses. The program will require the use of the physics space with its equipment as well as the chemistry facilities with storage capacities. Two courses in computer science can be held in the computer class room, but again require space for equipment and storage. The capacity of the classroom should seat thirty (30) students, particularly in the first year. Many of the program requirements are yet undetermined, and consequently, we must plan the facilities in such a way as to provide a classroom, work spaces, and separate storage spaces. Provisions must be incorporated for possible expansion of the program.

b. General Classroom (#1)

The Energy Management Program will require the use of one general classroom. The amount of time the students will remain in the same room will vary by the quarter. The room can be used by other similar programs if complete security is provided for the equipment and supplies. The room will be furnished with two student moveable tables and chairs and have a maximum capacity of thirty (30) students. The classroom should have a maximum amount (20 plus feet if possible) of easy wipe write-on boards--both white and chalk, audio-visual screens, and equipped with projectors (overhead and slide). The classroom should be adjacent to ample storage facilities. Sufficient wall space should be provided for wall charts and maps. The room should contain the maximum amount of secured storage possible. The classroom should also contain water, sinks, gas, electricity (110 and 230 Volts), and air.

c. Storage-Workshop-Lab Area (#3)

The Energy Technician Program requires secured storage capacity of about 60-80 linear feet. Work benches appear to be required to form a workshop capacity near the classroom. A possible method of providing the workshop facilities would be to convert 14-11 into a workshop with wall storage. The blueprint machine could remain in 14-11, but the graphics moved to 14-20. The workshop-storage room has the greatest unknown demands of any of the facilities.

An office (#6.) is recommended for the program in the vicinity of the general classroom and shop area. The process requires a block of time for the students in Building 14, and the equipment requires monitoring at all times.

V. IDENTIFICATION OF RESOURCE REQUIREMENTS (continued)

Many of the second year courses, largely laboratory in nature, could be taught in the workshop/storage room. The storage-workshop-lab area should contain both 110 and 230 Volt power capacities, as well as gas, water, and air.

d. Office Area (#6)

An office of about 120 square feet should be provided with desk, chair, phone, shelving for reference materials, and locked storage. The room should be able to hold small conferences and group meetings. A table with chairs would be necessary.

Windows should be placed so as to give visibility into both storage-workshoplab area, as well as the classroom. Doors should be arranged in such a way so as to provide rapid entrance into each area. The storage area interior to 14-11 could be considered for this requirement.

e. Other Classrooms (2, 4, 5, and 7)

The Energy Technician Program will utilize other classrooms such as economics, mathematics, chemistry, physics, as well as computer.

B. Operation Design and Space Utilization

The program has the possibility of being either a day or evening program. If, in evening, it becomes available for supplemental education students, the program will cover a period of about six hours per day. Coordination with departments will be essential.

The operational design for the Energy Management Technician Program will require a full-time coordinator/instructor able to teach the technology courses such as H.V.A.C. The program will necessarily be offered in such a way so as to guarantee its success. Students without technological training will be encouraged to register as well as the tradesman with years of experience. Provisions must also be made to offer workshops and seminars in Energy Conservation for community services.

The schedule for the Energy Management Technician Program has two distinct service functions that require a decision. The feasibility study pointed out the demand for the program to be structured in such a way so as to serve both preparatory training and continuing education. Thirty-nine (39) new hires and forty-six (46) continuing education employees have expressed interest in taking the program. The program would serve both markets — if the continuing education types of courses were placed in the evening hours or Saturdays and the preparatory types of courses in the day. An assumption needs to be made that persons in the continuing education mode have already taken the courses labeled preparatory.

-30-

V. IDENTIFICATION OF RESOURCE REQUIREMENTS (continued)

The Energy Technician Program is divided into the preparatory and continuing education classifications in <u>Table 1</u>. Each course is then identified as to when it will be offered (day, night, or Saturday), as well as the quarter.

C. Supply and Equipment Needs

Approximations for the supply and equipment needs have been submitted by T.E.R.C. for certain courses of the program. Tacoma Community College will be able to use some of the physics, chemistry, and computer equipment. The estimations are given in the table below. Appendix H contains T.E.R.C.'s figures for the physics courses (101, 102, 103), "Unified Technical Concepts."

ould be considered for this requirement.

. Other Classrooms (2, 4, 5, and /)

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) 1.	UTC I (Physics	Staff PT	Supplies	Equipment_
2.	UTC II (Physics)	РТ		
3.	UTC III (Physics)	РТ		
	Sub Totals		1200	\$10,000*
4.	Fund. of Energy Technology		1200	2,000
5.	Chem for Energy Technician I	РТ		,
6.	Properties & Reactions of Inorganic Material	PT		
7.	Properties & Reactions of Organic Material	PT		
8.	Sub Totals Technicial Math I		3457	7540
9.	Microcomputer Operations	Zimmerman	300	5000
10.	Energy Economics	Sigmen		
11.	Technical Math II			
12.	Fundamentals of Electricity/Electronics	PT		
13.	Energy Production Systems			
14.	Mechanical Devices and Systems			
15.	Electromechanical Devices			10,000
16.	Electronic Devices and System			10,000
17.	Electrical Power and Ill. Systems			4,000
18.	Schematic and Bluepring Reading			
19.	Fluid Power Systems			
20.	Microcomputer Hardware	Zimmerman	200	20,000
21.	H.V.A.C. Course			20,000
22.	Energy Conservation			8,000
23.	Technical Communications			
24.	Energy Audits			
25.	Instrumentation and Controls			10,000
26.	Codes and Regulations			
*Se	e Appendix H			

VI. RECOMMENDATIONS

<u>RECOMMENDATION 1</u>: IT IS RECOMMENDED THAT TACOMA COMMUNITY COLLEGE IMPLEMENT THE ENERGY MANGEMENT TECHNICIAN PROGRAM AND THAT THE PROGRAM COMMENCE FALL QUARTER, 1979.

Tacoma Community College stated its interest in Energy Management Education as early as the spring of 1976, and since that time, it has devoted considerable resources to research, planning and development activities. Some of the efforts initiated by Tacoma Community College involved conducting studies (needs assessment), forming an Energy Management Consortium (NEMEC - Spring of 1978), developing an Energy Management Proposal for the USDE (Summer of 1978), sponsoring an Energy Management Workshop for the Community Colleges of Washington State (December 1, 1978), and developing program modules with the assistance of an advisory committee.

Tacoma Community College has completed all of the preliminary work necessary for the development of a two-year Energy Management (Use, Efficiency, or Conservation--the term is optional) Technician Program.

The needs assessment survey (1979) revealed a job market requiring 39 technicians in 1980, 36 technicians in 1983, and 34 technicians in 1985. The need is twice the number of graduates the program could turn out per year. Also, 41 firms surveyed indicated that individuals already in their employ would be enrolled in the program for continuing education.

The following conclusions are based on the responses for the survey and support the recommendations.

- 1. The Pierce County area does have employment opportunities for graduates of an Energy Management Technician Program.
- The survey results indicate that both the preparatory program and a supplemental program are necessary.
 - 3. The program should have two sections: a day time preparatory program and an evening supplementary training program.

RECOMMENDATION 2. IT IS RECOMMENDED THAT TACOMA COMMUNITY COLLEGE ADOPT THE "ENERGY CONSERVATION AND USE TECHNICIAN" CURRICULUM AS DEVELOPED BY TECHNICAL EDUCATION RESEARCH CENTER, WACO, TEXAS, AS THE CURRICULUM FOR ITS ENERGY MANAGEMENT TECHNICIAN PROGRAM.

The curriculum developed by Technical Education Research Center contains the same components as recommended by our Northwest Energy Management Education (NEMEC - Spring, 1978). The curriculum by T.E.R.C. has the distinction of being the developed curriculum for community college energy management programs in the United States. The curriculum was developed for the U.S.O.E.

A large number of the program courses will serve as core courses for other programs. The computer courses will provide additional training options for our present program. This program could provide a number of "spin-off" training options.

<u>RECOMMENDATION 3.</u> IT IS RECOMMENDED THAT TACOMA COMMUNITY COLLEGE HIRE A FULL-TIME INSTRUCTOR/COORDINATOR FOR THE ENERGY MANAGEMENT PROGRAM AS SOON AS POSSIBLE, AND THAT THE COLLEGE BUDGET ADDITIONAL DOLLARS FOR PART-TIME FACULTY AND OTHER STAFF COSTS AS SUMMARIZED.

Occupational programs require that instructor/coordinators have years of experience in their fields. The individual coordinating the program must assist in making the plans and decisions involved in the implementation of the program. The instructor/coordinator must be involved in the procurement of supplies and equipment, the alternations of classroom space, the development of class schedules and the identification of qualified staff. All of the planning will have to be accomplished by early summer so that instructors will be able to partcipate in in-service training with T.E.R.C. during the summer months.

RECOMMENDATION 4. IT IS RECOMMENDED THAT TACOMA COMMUNITY COLLEGE ESTABLISH A BUDGET FOR THE ENERGY MANAGEMENT TECHNICIAN PROGRAM FOR 1979-80.

The budget established should provide for not only the employment of a full-time instructor/coordinator and part-time staffing, but also the following:

VI RECOMMENDATIONS - (Continued)

RECOMMENDATION 4. - (Cont.)

- 1. Supplies, materials and maintenance costs.
- 2. Contingencies (\$1,000 for unexpected costs).
- 3. Start-up equipment needed for the program.
- 4. Renovation of existing space in the Science Building (Building 14) to provide classroom, laboratory, and storage space required by the program.

The College should continue to explore funding possibilities from the Materials Center in Olympia; the Washington State Energy Office, Olympia; The D.O.E., Region X, Seattle; and private corporations.

The "start-up" costs for the program are high, but they can be spread over a two year period. The budget for the second year will be somewhat larger than that for the first year.

<u>RECOMMENDATION 5</u>: IT IS RECOMMENDED THAT AREAS OF BUILDING 14 BE RENOVATED TO HOUSE THE PROGRAM (14-10, 14-11, AND STORAGE AREAS BETWEEN THE TWO ROOMS).

The proposed renovation of Building 14 (East End) will require the following alterations:

A. Classroom (14-10):

tor area to

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- Remove chairs and install tables and chairs for 30 students. (Possibly add to the number of tables removed from 14-20.)
- 2. Remove the cabinets on the east wall.
- 3. Repair floor and wall.
- 4. Install white, chalk, and bulletin board on the east wall.
- Install cabinets on entire west wall (lower and upper).
- 6. Install lower cabinets with two sinks on North wall.
- 7. Install sliding windows in North wall above cabinets for materials and visibility.
- 8. Provide gas, electricity (both 110 and 230), and air services.
 - B. Workshop-Lab-Storage Area (14-11):
 - 1. Move Engineering Graphic equipment, tables, cabinets and supplies to 14-20.
 - Install large lockable storage cabinets on East and South walls where possible.

3. Install workshop lab tables for 30 students.

VI RECOMMENDATIONS - (Continued)

- B. Workshop-Lab-Storage Area (14-11) (Cont.)
 - 4. Install donated blue printing machine in 14-11.
 - 5. Install a sliding window between 14-11 and storage room.
 - Provide water and sinks, 110 and 230 volt electricity, gas, and air services in room.

C. Office Facility for Program:

- 1. Possible Locations
 - a. Dark room
- Adjacent area East of dark room in storage area exterior 14-10.
 c. Storage room between corridor and 14-11.
 - 2. Office requires desk, chair, filing cabinets, shelves for books, lockable storage cabinets, and phone service.
 - 3. Install windows on North and South walls of office. (Visibility of all rooms by use of windows is highly desirable.)

D. Corridor Storage:

- 1. Install tall, lockable storage cabinets on the periphery of the corridor storage areas.
 - 2. Change the double door system to high security status.
 - 3. Install a door just East of the South hall door to separate the storage areas and to give security to the program equipment and supplies.
 - Provide interior light switches for the lights.
 - E. Physics Storage in Corridor Area:
 - 1. Install as much of the removed cabinetry in the corridor area west of newly installed door. Convert the corridor area to corridor storage.
 - 2. Provide switches for the physics storage area lights.

The actions taken in renovating Building 14 to house the EMTP should take into consideration the long range needs of not only this program, but future technical programs as well. The changes recommended have only increased storage areas and enhanced the teaching capabilities of the classroom (14-11) for other subject areas such as art.

The College needs to proceed immediately with the planning, renovating, and installation. The renovation should be accomplished through the use of College personnel and minor capital improvement funds.

VI RECOMMENDATIONS - (Continued)

RECOMMENDATION 6: IT IS RECOMMENDED THAT THE FOLLOWING OPERATIONAL DESIGN BE ACCEPTED FOR THE E.M.T.P. FOR FALL, 1979.

Operational Design:

The E.M.T.P. should be designed in such a way so as to provide classes for both preparatory students and supplementary students. The preparatory students will take the Physics 101/114 class at 9:30 a.m. daily and a 12:30 lab on Tuesday and Thursday.

The Chemistry 104, 105 and 106 classes should be offered on Monday and Wednesday evenings from 7:00 to 10:00 p.m. The Energy Technology course should be offered on Tuesday night from 7:00 to 10:00 p.m. and the Schematic and Blueprint reading course should be offered on Saturday from 8:00 a.m. to 1:00 p.m.

<u>RECOMMENDATION 7</u>: IT IS RECOMMENDED THAT THE FOLLOWING TIME LINE BE UTILIZED IN IMPLEMENTING THE ENERGY MANAGEMENT TECHNICIAN PROGRAM.

Time Line for Implementation:

a.	E.M.T.P. Developmental Advisory Committee approval of program and curriculumApril 27, 1979
b.	Curriculum Committee approvalMay 16, 1979
c.	Board Study SessionMay 22, 1979
d.	Board ApprovalMay 24, 1979
e.	Employment of Instructor/Coordinator AfterJune 1, 1979
f.	Purchase of Equipment and Storage CabinetsJuly 1, 1979
g.	Purchase of Supplies AfterJuly 1, 1979
h.	Remodeling of FacilitiesJune 11, 1979
i.	Implementation of E.M.T.PSeptember 26, 1979
j.	Advertising and Recruitment of StudentsMay 25, 1979

The dates are given as a guide in order to implement the program on September 26, 1979. The instructor/coordinator should be involved as much as possible.

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REPRESENTATIVE ADVISORY COMMITTEE

CollegeTACOMA	er er er er	Date Submitted	9			
Committee Title ENERGY MANAGEMENT TECHNICIAN		Programs Served:				
Meeting Dates for Previous Ye		O. E. Code	Title			
January 31, 1979 February 7, 1979 February 14, 1979	February 21, 1979 April 27, 1979	Multi III	d nu vite a nu vite nu vite a nu vite a nu vite a nu vite a nu vite a nu vite a nu vit			

CHECK APPROPRIATE COLUMN(S)				COMMITTEE MEMBERS	INFORMATION	E g
Employer Rep.	Employee Rep.	J.A.T.C. Rep.	Name	Job Title	Employer	City of Residence
X X X X X X X X X X X X	X X X X	nabude to insultances bas	Dale Kent Norbert Mathven Casey Cox <u>Bill Daniels</u> Ted Cross Jon Thorpe Wn B. Dearborn Carol Costello Lee Johnson Don Seifert Philip Swain Jim Reety	Consumer Representative Energy/Consv. Mgmt Mgr Deputy Facilities Engr Director Owner Executive Sec V. Pres Coordinator Asst Director Owner Dir of Ed Relation Trng Retired/Consumer	Weyerhaeuser Co. Hdq 9th Inf Div CVED Gordon & Cross Engrs Nat Elec Contr Assn Wash Nat Gas Wash State Energy Offic DOE Region X Seifert & Farber Archi Boeing Co. Self	Tacoma Tacoma Tacoma Olympia Tacoma Tacoma e Olympia Seattle Tacoma Seattle Tacoma Seattle Tacoma
	The dates are September 26, 19.×	sinsmelopni .t. j. Advertisin	Bill Crostick	Pres of Bldg Trades	Pierce Cty Bldg Trades	Des long

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APPENDIX A

iacoma Community College

MEMORANDUM

Date: January 12, 1979

To: Lorraine Stephan, Ivonna McCabe

From: Russell Clark

Subject: Energy Management Technician Program Development Advisory Member List

The following persons have been contacted about serving on the development advisory committee and each have accepted the position.

Dale Kent P.O. Box 11007 Tacoma, WA 98411

Norbert Mathven C.H. 3-18 Weyerhaeuser Company Tacoma, WA 98401

Casey Cox of 967-3191 3513 Wilderness Drive Olympia, WA 98501 Home 456 - 3930 Ted Cross 260 South 5th

Tacoma, WA 98403

▶ Bill Daniels Cur. Ctr. Bldg. 17 Air Industrial Park Olympia, WA 98504

V Jon Thorpe 534-4095 Nat. Electric Contr. Assn. c/o Jan 8815 So. Tacoma Way Rm. 215 Tacoma, WA 98499

V William B. Dearborn, Vice President Engy Winneger Southern Division Washington Natural Gas P.O. Box 11066 Tacoma, WA 98411 (Pun Robinson - 475-6700

Carol Costello Washington State Energy Office 400 East Union Olympia WA 98504

Lee Johnson DOF Region X Rm 1992 Federal Office Bldg. 915 2nd Avenue Seattle, WA 98174

Don Seifert and and teenishe of teervolous Seifert & Ferbes Arch-Planning & Engineering 925 Tacoma Avenue South Tacoma, WA 98402

Philip Swain Boeing 655-8658 Director of Ed. Relations, Training and Development, Boeing Company Mail Stop 10-12 Seattle,WA 98124

Jim Reetz 111 2nd Avenue S.E. Pacific, WA 98047

Bill Crostick, Bus Manager (475-1190) Local 76, I.B. E.W. (President at Pierce Cty Blody Trades) 3049 50 3614 Tacoma, 78409

building management and related sudit

Also, I stated to them that they would receive a follow up letter The potential members seem to prefer an spelling out the particulars. afternoon meeting (day time).

or Fress Peters Ex Directon Press et Bldg Tredes



STATE-WIDE FEASIBILITY STUDY - N.W. Ed. ASSOCIATES - 1977 APPENDIX B

Findings and Discussion

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n ec

Sample Size and Respondents. As has been pointed out earlier in this report, the number of potential employers of energy-management personnel was so great as to suggest a random sample. This procedure was followed, and a total of 400 employers were contacted. The rate of response from engineering firms and utility agencies was considerably higher than the rate of response from manufacturers. Consequently, the results of the survey indicate a proportionately larger total number of employees in engineering and utility firms than in manufacturing firms. The manufacturers who did respond, however, indicated that there are large numbers of energy-management personnel in their ranks, with implications for technical training.

and Development, Boeing Compan

A total of 148 employers responded. Of these, 105 reported that they employ energy management personnel. Most reported that these personnel perform other tasks along with energy-related tasks. The chart which follows divides employer responses into three broad categories: engineers and related technicians; building management and related auditing personnel; and utilities and related services and sales. The chart also summarizes total employed by category, salary range, projected growth, and educational attainment.

- 21 - 41-00

(Les Robenson - M73-6700

DATA CHANF ... worksheet

may - -

	Employees per Employer	Yearly Sal (in thous 10-15 16-20	ands)	Education Leve 1-2 His. Col. BA	I Employers Anticipating Grad Growth	Summary Remarks
Engineers and Related Technicians (Design)	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x	X X X X X X X X	X XXX X XXX X XXX X XXX X XXX X XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX	x x x x x x x x x x x x x x x x x x x	Salary range from D10,000 to 326,000+. Nearly all required engineering degree a few used techni- cians. Most also required experience.
Puilding Management and Related Auditing Personnel (Monitor & operate)	6 1 8 3 2 20 4 5 4 1 1 3 1 5 1 1 1 30 8 2 1 1 4 1 1	X X	True sug obs. and the substant	XX X X XX X X X X X X X X	allysis atructural des	Level of education depended upon amount of responsibility & complexity of job. Often h.s. plus continuing education sufficient. Salary ranged from \$10,000 to \$20,000, and some higher.
Utilities and Related Services and Sales (Produce, sell, service, & control energy supply)	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX X X	x x x x x x	x xx xxx x xx xxx x xx xxx x xx xxx x xx x	sported waing tec	Level of education generally required engineering degree, except with service people who had lots of company experience Salaries 310,000 to 320,000 and a few higher.

in the

Engineers and related technicians. Forty respondents reported 281 employees engaged in some form of energy management. These employees were almost exclusively engineers with the various engineering degrees; most employers also required several years experience. A small number of employers (5) reported using technicians. These technicians were reported as having a multi-purpose function with a heavy emphasis upon drafting and graphics. Salaries ranged from \$10,000 to \$25,000 and up. Employers who indicated interest in additional staff training suggested the following:

> System analysis Materials and structural design Conducting and interpreting infra-red surveys Computer technology Economics and cost effectiveness Equipment and product design Building codes and energy requirements Graphics

Building management and related auditing personnel; to monitor and operate. Twenty-five respondents reported 115 employees engaged in monitoring and operating energy systems in building complexes and manufacturing facilities. Most of these employees were reported as having other supervisory, maintenance, or custodial duties as well as energy management. The level of education ranged from high school to baccalaureate degrees, depending upon the complexity and responsibility of the job. Therefore, salaries ranged from \$10,000 to \$20,000 and up. Most employers indicated interest in additional staff training. Their suggestions are listed below:

> Control systems Construction materials and techniques Blueprint reading, sketching, and drafting Economics and cost effectiveness Manufacturing processes HVAC systems Refrigeration Thermal balancing Property management; operation of buildings and complexes Building codes and energy requirements 'Public relations Mechanical Intuition--An approach to problem solving

> > -43-

Utilities and related services and sales. (To produce, sell, service, and control energy supply.) Twenty-eight respondents reported 418 employees with energy management duties. The level of education and training required varied with the task assigned. Many required engineering degrees. These employees also commanded the highest salaries, generally \$18,000 and up. Most employees were found to have completed high school and a number had completed community college. These were generally long-time employees who had worked their way up the ranks. Their salaries were commensurately less than that for engineers. Employers who responded indicated that additional staff training was being required, especially in areas of personnel re-assignment.

> Public speaking Human Relations Heat transfer U factors R factors Heat factors Economics and cost effectiveness Energy accounting and information systems Energy supplies: peak loads, resources, deficits Funding Building codes and energy requirements

<u>Historical trends and projected demands</u>. Since the energy conservation and management field is so broadly based and rapidly expanding, employers were unable to give precise responses concerning past employment and turnover rates. The vast majority of employees that were reported as having energy conservation and management functions were either re-assigned from other areas of responsibility or have shared job responsibilities.

Approximately seven employers anticipated a growth in the numbers of energy management personnel; at first glance not very impressive nor encouraging. However, most employers qualified that response by indicating that employment in the energy conservation and management field depends upon three

-44-

energy availability, energy costs, and governmental controls. Given stricter regulations, increased energy costs, and energy shortages or curtailments; the demand for energymanagement personnel will increase in direct proportion. assigned. Many required engineering degrees.

Job Specifications. Job titles, descriptions, and specifications were found to vary according to the three broad categories of respondents. Sample descriptions and specifications are located in Appendix D. Of interest was the variety of job titles designated by respondents. These responses illustrate in part how current needs are being met through personnel shifts, job re-assignments, and shared responsibilities.

Engineers and related technicians	
Engineering technician	
Dower engineer	
Mechanical engineer	
Flootrical engineer	Brotost feet
Inductinal engineer	
Energy management engineer	
Project engineer	
al inclanginger	man 2 Property
Control systems engineer	
chief engineer	
Desteman	victorical trands and pr
Mechanical technician	
Consulting engineer	conservation and managem
	rapidly expanding, emplo
Energy management coordinator	The foundation front do 1
Process engineer	responses concerning pas
II OCCODE CONSECUENCES EL SUD 23	uditing personnel
and related a	uditing personner

Building management and rela energy conservation and mana Instrument repairman from other areas of responsibility or Building inspector Thermal balance technician Plant engineer Utilities maintenance supervisor Director of physical plant Facilities manager Power superintendent Building engineer Plant manager Custodian energy conservation and -24-agement field depends upon three

Building, cont. Maintenance supervisor Operation manager Energy coordinator Utilities monitoring inspector Security officer Conservation officer

<u>Utilities and related services and sales</u> Electric service representative Energy conservation coordinator Residential consultant Area energy coordinator Consumer relations and engineering aide Energy and field service representative Consumer service representative Planning and systems analyst Consumer information officer Electric service engineer Commercial representative Conservation/customer service representative

and governmental agencies have provided seminars and work shops to help supplement training of existing personnel. The result has often been costly and somewhat incomplete. It is recommended that an immediate emphasis be placed upon designing and implementing supplementary training and continuing education on a regular basis for persons

2. New Emerging Occupations. In addition to personn shifts and job reassignments, new occupations in energy management are emerging and will continue to emerge through 1985. Examples include energy consultants, energy coordinators,

Recommendations

Based upon the survey findings, a very real need exists for energy management personnel. The demand for well qualified persons will continue to increase at a dramatic rate through 1985. Implications for training are summarized below.

1. Personnel Shifts and Job Reassignments. The rapid increase in demand for well qualified energy management personnel has required shifts in existing staff, shared job responsibilities, and reassignments. Therefore, a number of businesses, utilities, and governmental agencies have provided seminars and workshops to help supplement training of existing personnel. The result has often been costly and somewhat incomplete. It is recommended that an immediate emphasis be placed upon designing and implementing supplementary training and continuing education on a regular basis for persons who have been assigned energy management functions.

2. New Emerging Occupations. In addition to personnel shifts and job reassignments, new occupations in energy management are emerging and will continue to emerge through 1985. Examples include energy consultants, energy coordinators, and energy management technicians.

-47-

and any affective suditing and record system was able

These emerging occupations will, in large part, depend upon three factors: energy availability, energy costs, and governmental controls. Given stricter regulations, increased energy costs, and energy shortages; the demand for energy management personnel will increase in direct proportion. Based upon such reports as the "Long Range Projection of Power Loads and Resources. .." and the "Proposed Regional Curtailment Plan," employment demands are inevitable. Therefore, it is recommended that preparatory training programs in energy conservation and management be designed and developed in time to meet the anticipated personnel shortages.

Implications for Other Occupations. Approximately 100 30 personel interviews were conducted during the survey. Numbers of employees were recorded, their training requirements were reviewed, and a variety of employer responses were analyzed. AS a result of these interviews, implications for other occupations began to surface. For example, it was of interest to note that one Seattle business was having difficulty understanding why their natural gas bill and electricity bill kept increasing in direct proportion to one another; especially when one provided heat, and the other provided air conditioning. Auditing and records finally concluded that the one system was in conflict with the other. Employees were comfortable at a perfect 70 degrees with their feet only slightly warm.

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In this case, an effective auditing and record system was able to identify the problem. Energy conservation and management is such a broad field that it has implications for a large number of occupations: construction, manufacturing, engineering, sales, clerical, etc. It is recommended that every consideration be given to this encompassing concept when designing and implementing preparatory and supplementary training programs to insure comprehensiveness.

employment demands are inevitable. Therefore, it is recommended that preparatory training programs in energy conservation and management be designed and developed in time to meet the anticipated poreconnel shortages.

3. Implications for Other Occupations. Approximately 100 personal interviews were conducted during the survey. Numbers of employees were recorded, their training requirements were reviewed, and a variaty of employer responses were analysed. As a result of these interviews, implications for other occupations began to surface. For example, it was of interest to note that hatural gas bill and electricity bill kept increasing in direct and the other provided sir conditioning. Auditing and records heat, inally when one provided heat, other, aspecially when one provided heat, in one system was in conflict with the task of the set increasing in direct increasing in direct increase was having difficulty when one provided heat, increasing in direct increasing in direct increase in a other provided sir conditioning. Auditing and records other, exployees at a perfect 70 degrees with the increase with the other is approxible at a perfect 70 degrees with the increase interview increase in a other increase with the increase interview in the other, when one system was in conflict with the increase interview increase with the other, exployees at a perfect 70 degrees with the increase interview increase i

Advisory Committee

Ray Anderson Washington State Energy Office 1000 South Cherry Olympia, Washington 98504

Terry M. Dolan Federal Energy Administration 1910 Federal Building 915 2nd Avenue Seattle, Washington 98174

Fred Hahn Assistant Director Department of Ecology State of Washington Olympia, Washington 98504

Larry Kenny Research Director Washington State Labor Council 105 West Union Olympia, Washington 98504

Ben J. Milton U.S. Office of ERDA 1944 Federal Building Seattle, Washington 98174

Roger Van Gohren Association of Washington Businesses 1414 South Cherry Olympia, Washington 98504

If "YES", how many technicians of this program would you anticipate hiring in 1980 39 1983 3C 1985 2H

Would you send persons already in your employ to take any or all o program for continuing education? YES 41 NO 25

Question #1, above. 11 40 be addred

What would be the best time for your employees to attend that a have 2 Freeding (5-10 p.m.) 4 (Saturday 13

What is your greatest need in the area of energy management?

8. Comments?

RETURN TO:



Mr. Russell Clark Tacoma Community College 5900 South 12th Street Tacoma, Wa 98465 Telephone: (206) 756-5060

PROPOSED ENERGY MANAGEMENT TECHNICIAN PROGRAM

Your help is requested in <u>assessing the need</u> for training persons engaged in <u>energy management and conservation</u> with responsibility for assessing ventilation, heating, lighting, and air-conditioning systems and/or industrial processes to insure efficient energy consumption. These persons may also provide technical support in energy conservation planning for new and existing buildings and in monitoring and auditing energy consumption in residential, commercial and industrial complexes. The proposed program would be called: <u>Energy Management Technician</u> (a 2-year program leading to an associate degree).

1. Please check the skills and level of achievement a person filling such a position in your company would need:

LEVEL 1 - Basic concepts and principles LEVEL 2 - Skills adequate to adjust and operate (trouble-shooting) SUITABLE SEGMENT FOR CONTINUING EDUCATION PURPOSES FOR YOUR STAFF

	JUTADLE SEGNERT FOR CONTINOTING EDUCA		107 Jeni	U jastalasA
	Heat, vent & air-conditioning:	LEVEL 1	LEVEL 2	CONTINUING EDUCATION
	1. Principles of HVAC systems	23	35	27
	2. Principles of duct design	23	20	12
	3. Principles of wiring design	24	27	Mrry Kenny
	4. Principles of piping design	26	Todat 2.4 sta	
	Thermal calculations for buildings	26	2200	NU them 219
	Energy economics (rates & life-cycle costin	g)22	23	an
	Electrical power systems (voltages, phases, power factor)	20	31	22
	Instrumentation & balancing	17	37	stobel 4/2/
	Control systems for heat, vent & A. C.	14	41	su (ellise ² .0
	Building codes & regulations	29	1'e doi	
	Commercial lighting	2_7	23.	to it aloo a 14
	Computer applications & demand controllers	8594	antreton 9	W alony 21
	(permissive load control)	2	<u></u>	13
OTHER:				
			VES US	NO 32
2.			1d you anticir	
3.	If "YES", how many technicians of this pro in 1980 <u>39</u> 1983 <u>36</u>	1985 3-1		
4.	Would you send persons already in your emp program for continuing education? YES	11	NO 23	
5.	If "YES", please insert the approximate nu Question #1, above. $11 \rightarrow 6$ addres	1		
6.	What would be the best time for your emplo	oyees to	attend classes	5?
	Day \mathcal{L} Evening (6-10 p.m.) $\frac{1}{6}$	Satu	Irday_13_	Other
7.	What is your greatest need in the area of	energy m	nanagement?	
8.				(Continued)
5.	- 51-			(concinuea)

(Continued)

If the results of this feasibility study support the implementation of an Energy Management Technician program, would you want to be kept informed? YES 49 NO / D If you know of additional firms who would be interested in notification, please list on the lack of this questionnaire. Name and title of person completing this form: 227 mailed out Lal While we have to have bas of 78 ledge 25 any of the above intervery of the sector states and the sector states technical and we retain special consultants for these skills. They are *** PLEASE RETURN THIS QUESTIONNAIRE BY MARCH 15, IN THE ENCLOSED SELF-ADDRESSED ENVELOPLANA - 52Proposed Energy Management Technician Program - Comments From Survey

This program is what we have been looking for. Will work well with our proposed program of Honeywells Computer - oriented maintenance management program for H.V.A.C. Systems and Equipment. Would your college also be able to put together a custodial training program based on the textbook "Comprehensive Custodial Training Manual - Wm R. Griffin?

I think this area is well overdue for education in above areas, and I support it 100%.

While we have to have basic knowledge of any of the above, they are very technical and we retain special consultants for these skills. They are such people as Electrical and Mechanical Engineers and they are specialists in all phases of energy analysis and management. You should contact these people direct for answers to the above questions.

Need in the commercial/industrial area is great for this type of trained personnel.

At this facility we need an individual who has the background knowledge in all of the above fields listed. I don't think there would be one area more important than any other The ideal candidate should be well rounded in all the areas, also the potential hirees are only needed as vacancies exist.

We need to be able to assimilate nuances in State Energy Codes in order to analize economic, Engineering, and Marketing aspects of our impact on the housing industry with respect to the trend toward more stringent regulations

Need in the commercial/industrial area is great for this type of trained personnell.

Much of the work at this facility related to energy conservation will be in the realm of retrofitting.

These positions must be filled from within the USPS where possible. Persons wishing to aquire these skills on their own may do so, however USPS will not send them.

Ft. Lewis is primarily interested in the training of conservation technicians and managers.

We are not large enough to employ this type of specialized - we will contract for our needs.

We are not large enough to need a person with just these skills. This would be a collateral job. Energy usage is a very small part of our total problem. Energy costs in this area are cheap compared to other areas and at present dont institute a problem.

Personnel who find problem solving an interesting challenge.

In General All Areas of Energy Management

Possible development and installator of Electrical Load Sheding and Power Factor Improvement.

B DESCRIPTION: ENERGY MANAGEMENT TECHNICIAN

Comments from Survey - 2

Energy management is the responsibility of the Directorate of Facilities Engineering and all such services are provided by them. I additional information is needed, please contact them at Fort Lewis, WA 98433.

Employees attend classes as the need arises - currently some employees have attended classes at Bates VTI - We have one very skilled employee who is teaching others. The proposed program has merit and there should be a demand for these skills.

Management would have to be convinced of value of such a person's efforts working in conjunction with present programs

We have made many energy saving changes in the past and will continue upgrading as funding permits.

Probably better in-service for our employees.

We contract for these services at the present time. Because of our 44 banking being so spread out it would not be fiesable to have our own people perform this function.

We're considering in-house remodling of existing buildings.

Our total regularly employed staff is one bookkeeper.

We would rely on outside consultants for this - possibly would take advantage of Continuing Ed. programs.

Many areas of energy conservation depend on funds to accomplish, this is our problem.

We have 1 person responsible for this area of plant management. Usually he comes from a commercial job experience in maintenance. With an established background in this field. I doubt if our present person would be interested, or need, this program.

Not applicable to Container Corp. at America

Our firm uses very little more than average lig Rome in energy - no need for above skills

We do not see the need for someone to do this type work on a full-time basis. We have various individuals handling some of the functions mentioned but only as part of their responsibility. Much of it is sub-contracted also.

I don't feel that our business need anyone or a full time basis for Energy Conservation - we need only a person to maintain Existing Systems.

At the present time we have no need for such a person or position.

JOB DESCRIPTION: ENERGY MANAGEMENT TECHNICIAN

Energy Sector:

DEFINITION:*

Under general supervision of the appropriate official, manager, or officer, to perform skilled and semi-skilled tasks relating to the conservation of energy (electricity, gas, oil, and water.)

EXAMPLES OF DUTIES:*

- 1. Establish and maintain ongoing conservation program on compus.
- Review architectural plans and specifications for new structures and for modifications of existing structures, to assure compliance with local, state, and federal conservation standards.
- 3. Assist in the adjustment, maintenance, and repair of heating, ventilation, and air conditioning equipment for most effective operation. Recommend and supervise related contracted services.
- Assist in the maintenance and repair of plumbing fixtures and piping when operation of such fixtures relates to conservation program. Recommend and supervise related contracted services.
- 5. Assist in the adjustment, maintenance, and repair of space heating and cooling controls and control clocks. Recommend and supervise related contracted services.
- 6. Assist in the adjustment, maintenance, and repair of electrical, pneumatic and lighting equipment relating to conservation. Recommend and supervise related contracted services.
- 7. Take light meter readings; adjust lighting levels as necessary.
- 8. Prepare written recommendations, including cost/benefit analyses and life-cycle analyses, for plant modifications relating to conservation.
- 9. Direct the posting of conservation literature.
- 10. Measure boiler efficiency; supervise maintenance of boilers.
- 11. Recommend planting of vegetation for maximum energy conservation effect.
- 12. Maintain and improve knowledge of job through regular attendance at appropriate workshops and conventions, and by reading periodicals, reports, regulations, and other appropriate literature.
- 13. Prepare purchase requisitions relating to conservation.

Der	asis. We have various individuals handing some of the functions mention
.021	ut only as part of their responsibility. Much of it is sub-contracted an
1	don't feel that our business need anyone or a full time basis for Emergy
	Conservation - we need only a person to maintain Existing Systems.
	At the present time we have no need for such a person or position.
	in the second

* Please delete, add, modify, or leave unchanged the duties and the definition to bring the job description within the needs (employment) of your energy sector.

ENERGY MANAGEMENT TECHNICIAN

2. Understanding Inventory List

The following list is an inventory of the concepts that each Energy Management Technician should possess to be employable in your energy use or supply sector.

CONCEPTS: (modify if needed to make more pertinent)

Check Involved Concepts

Ability to communicate (speech and writte	Perform cust effectiveness studies.
Principles of sketching	Evaluace equipment performance.
Principles of graphics (Drafting)	Read and record temperatures.
Principles of economics Cost affectiveness Life Cycle Casting	Make up simple payback plans. Relate environmental and meteorological fo
Laws of Physics and Chemistry related to (work, heat, radiation) motion of ener its transformations.	Perform thermodynamic calculations bns, vg
Principles of building construction (stru	ctural design)
Principles of H.V.A.C. Design	Calibrate instruments.
Computer operation and use	Analyze air and water samples.
Building and safety codes	Troubleshoot heating and air-conditioning
Technical Accounting and Budgeting	Collect data for efficiency studies.
Knowledge of rate structures	Monitor instruments/controls.
Principles of electricity	Draft building/equipment schematics.
Principles of electronics	Design layouts of various systems.
Knowledge of control systems	Draw piping diagrams.
Principles of pumps, compressors	Develop component prototypes.
Refrigeration and heat exchange systems	Make breadboards of test setups.
Principles of Lighting	Maintain equipment.
General knowledge of:	
Arithmetic	
Trigonometry Algebra	Operate equipment/tools.
Calculus	. Jost Jison 100000
	Interpret building codes and ordinances.
	interpret safety codes and regulations.
	Interpret ASHRAE standards.

Check Involved Concepts

ENERGY MANAGEMENT TECHNICIAN

3. Tentative Task Inventory

This tentative list consists of tasks to be performed by the Energy Management Technician. Please delete, change or add items essential to employment needs in your sector.

toponol bevioval doo Task

Perform cost-effectiveness studies. Evaluate equipment performance. es of graphics (Grafting) Read and record temperatures. Make up simple payback plans. Relate environmental and meteorological forecasts to equipment/ system efficiency. Perform thermodynamic calculations. Interface microprocessors. Calibrate instruments. Analyze air and water samples. Troubleshoot heating and air-conditioning systems. Collect data for efficiency studies. Monitor instruments/controls. Draft building/equipment schematics. Design layouts of various systems. Draw piping diagrams. Develop component prototypes. Make breadboards of test setups. Maintain equipment. Repair equipment. Read blueprints. Operate equipment/tools. Recover waste heat. Interpret building codes and ordinances. Interpret safety codes and regulations. Interpret ASHRAE standards.

ENERGY CURRICULUM CONCEPTS

APPENDIX E

ENERGY MANAGEMENT CURI

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NUCLEAR

INDUSTR1AL

Therma Applications (A-Flow) HVAC System Analysis Manufacturing Processes Monitoring & Inspecting Energy Systems Computer Applications Therma Balancing Procedures Equipment & Product Design Eelectrical Applications

CORE CURRICULUM

Trade Terminology Math-Basic Physics-Chemistry Graphics-Blueprints Economics Public Realtions Public Speaking (Commun.) Practical Thermo Course Energy Concepts-Forms-Fuels-Generation-Conservation Energy Accounting Computer Course Control Systems Practical Elec. Course Structures & Materials Energy Reg. & Codes Design Heat Loss/Gain

SOLAR

Basic Solar Concepts (Passive/Active) Installation & Maint. Separate Technician Program at Vocational Basic Courses Air Conditioning A.C. Principles (4) Refrigeration Principles (4) Hydronics (3) Applical Drawing & Piping(4) Solar Energy Residential Appl. (3) Industrial Appl. (3) Solar Photoelectric Conversion(2) Water Heat Transfer

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Nuclear Industry 6 Qtrs. Ind. Math Blueprinting Radiation Properties Commun. & Tech Writing A.C.-D.C. Elec Industrial Physics Gen. Chem (2 Qtrs) Radio-Active Materials Reactor Physics Introd. to Solid State Ele Nuclear Chemistry Nuclear Ind. & Envir. Atrod. to Computer

TRANSPORTATION

Intro. to Transp. Forms of Urban Area Trans Personal Driving Practice Car Pool-Van Pool Public Energy Awareness (Transportation) Principle of Energy/Fuel Conservation Commercial Management Practices (Economics) Time Schedules for Movement Regulations & Loop holes Central Delivery System Dispatch Management Economics of Transportatio Uses & Carrier Systems

COMMERCIAL

APPENDIX E

Heating Systems Economics (Com) Heating & Ventilation Construction Principles Energy Instrumentation (Mea.) Commercial Lighting Computer Applications Accoustic-Sound Control Control Systems (HVAC) Building Codes & Regulations Thermal Calculations Demand Controllers Neat & Vent. Design

es a breadth of

RESIDENTIAL

^ientation
Building Codes & Regulations
Residential Rates

Heating & Ventilation Systems Lighting

Energy Auditing-Calculations Accoustics (Sound Control) Loads, Rates, Power Factors Funding

Humidity-Vapor Barrier

ENERGY MANAGEMENT CURRICULUM

Introduction: The practice of Energy Management requires a breadth of specialized knowledge that encompasses several engineering technologies as well as business economics and management. However, the subject matter involved does not vary greatly from one physical facility to another, whether the facility is industrial, governmental, or institutional. To be specific, the practice of Energy Management at a professional level in its full range of duties requires the engineer to have an understanding of, and proficience in, the following subject areas:

REQUIRED

OPTIONAL

GENERAL:

Communication - (Verbal & Written) skills Graphics Economics - Cost effectiveness Customer Relations (Public) Energy Concepts, Forms, and Changes Power - Power factors Heat Transfer factors Nuclear Power - Thermal Plants (Coal & Nuclear) Conservation

Materials - Characteristics CIVIL & STRUCTURAL: Structural Design Building & Safety Codes

ECONOMICS:

Technical Accounting Equipment Selection/Evaluation Design Heat Loss/Gain Estimating Budgeting Metering & Billing Practices Rate Structure Property Management

ELECTRICAL:

Circuits In-Plant Power Distribution Illumination Instrumentation & Controls (Control & Instrument) Codes & Standards Elec., Mag, Gen., Transformer, Power factors Monitoring & Inspection Techniques Computer Aspects Pumping Designs

- 59-

MAINTENANCE:

Prep & Interpretation of Drawings & Specs (Graphics) Solar Photoelectric Convers Programs Thermal Balancing

Sales Analysis - Salesmanship

Architectural Practice Site Location

Life Cycle Costing Computer Operation (Putting in and pulling out programs)

Protective Devices Communication & Alarms

ENERGY MANAGEMENT CURRICULUM

MECHANICAL:

HVAC - Fundamentals Pumps/Compressors Piping & Plumbing Instrumentation & Controls Codes & Standards Refrigeration Equipment & Products

Fire Protection Heat Exchangors

APPENDIX E

Page 2

Unified Technical Concepts I

Inorganic Materials Energy Economics Technical Math II Fundamentals of Electricity/

(Physics) Properties and Reactions of

-60-

001 .

FORM PA-6 (1 Oct 1977

	PROGRAM	LES TH REPOR	L 	APPENDIX	F
	Currently Coded Courses Course Name	Course Abbrev, Div/Dept	Course Number	Community Colle	ege Name:
F	Fundamentals of Energy Technology	Energy	120 MU3401 RAU	Tocoma Co Program Name:	
	ATC is consortento they 114-115-116 and is we will Teach three as an instructural hode of 114-115-116	Plysics	114-115-116	Energy Mo Report Date:	ano ge mere
	chem 100 u also comparable to 1102em for Energy Tackmen	Chim	Controlo	May 10, 19	79
	Required College Course Prerequisites		ucts.	quipment & Proc	1
	Requirements for TA degree (plate and of colology				
			44		
	New Courses (Not yet coded)			Clock Hours	Credits
	Unified Technical Concepts I (Physics)	Physics	114	70	5
	Chemistry for Energy Technicians Fundamentals of Energy		111 120	50 0	4
	Technology Technical Math I	Energy Math	100	30	3
	Microcomputer Operations	Computer Sei		60	.4
w	Unified Technical Concepts II (Physics) ²	Physics	115	70	5
	Properties and Reactions of Inorganic Materials	Chem	112	50	43
	Energy Economics Technical Math II Fundamentals of Electricity/ Electronics	Cronomics Math Elec	102 111	30 30 70	3 5
ŕ	Unified Technical Concepts III(Physics)	Physics	116	70	5
	Properties and Reactions of Organic Materials	Chem	113	50	4
	Energy Production Systems Electromechanical Devices Mechanical Devices & Systems	Energy Energy	112 113.	30 70	35
	FORM PA-6 -00	-61-	TOTALS:		I

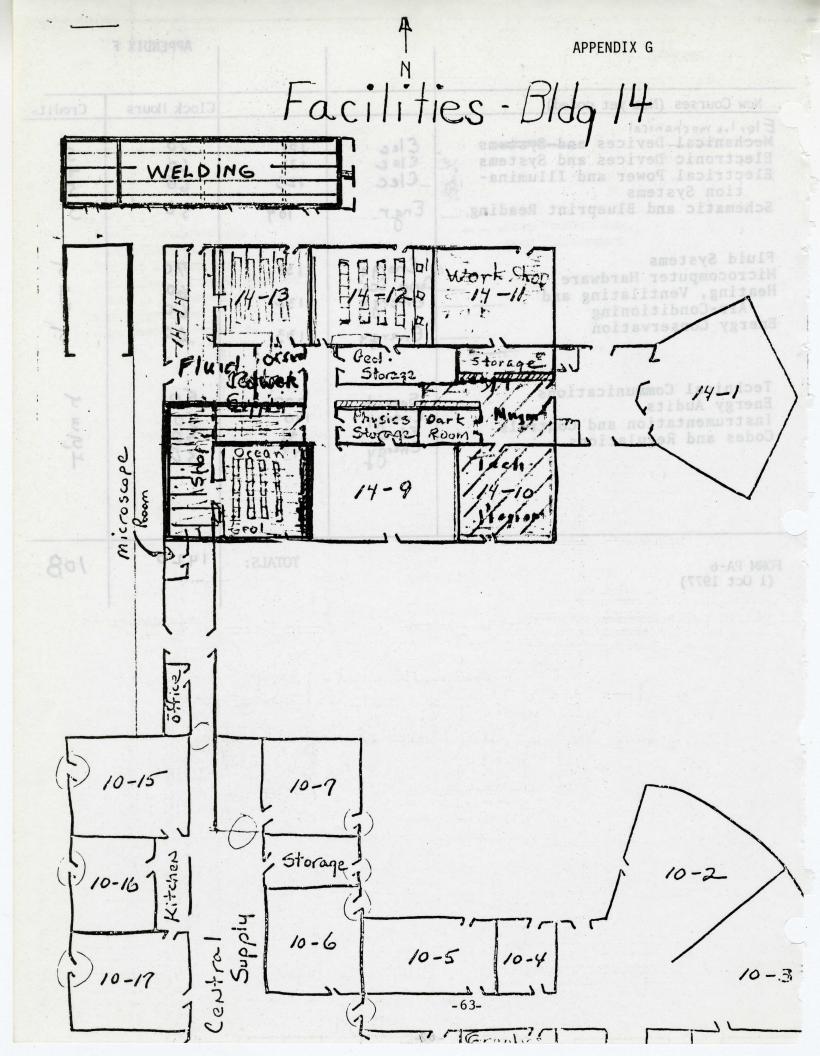
(1 Oct 1977)

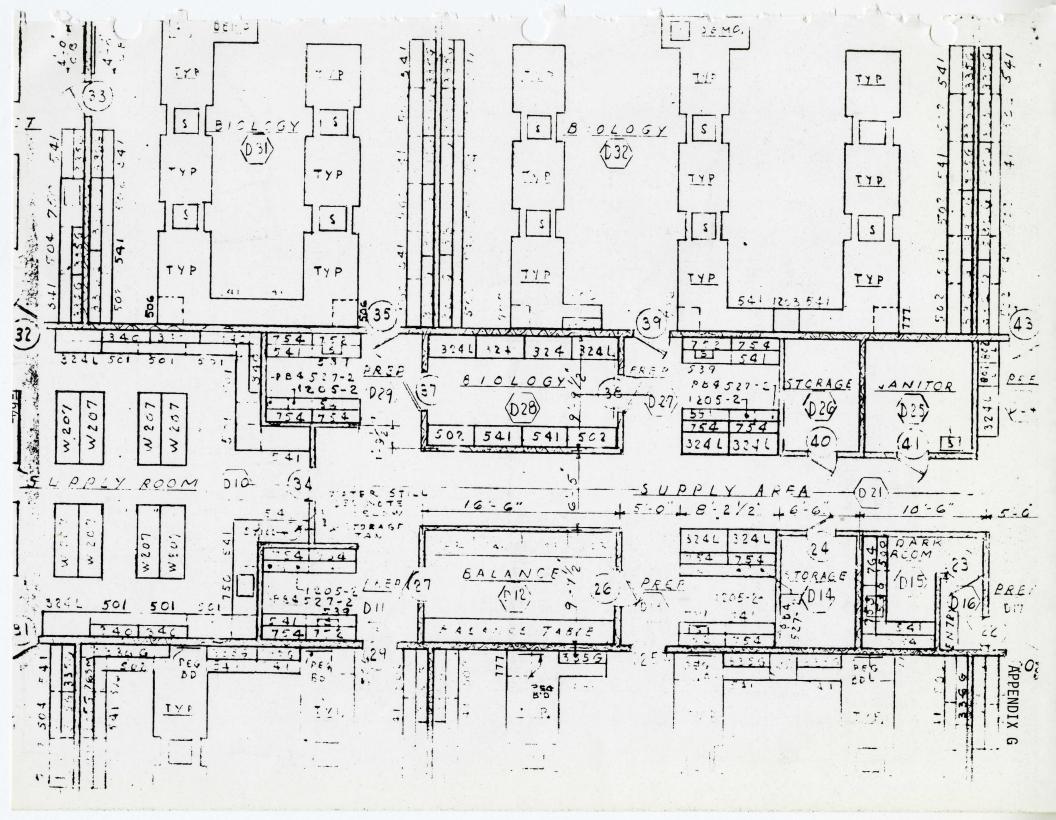
-61-

0 1 2 1 0	and the second se		
IT III D	N-1	Clock Hours	Credit
Elec Elec Elec Engr	121 122 123 104	70 60 60 5.0	5 4 5 3
Energy Comp Sci Energy Energy	131 132 133	70 60 60 60	5775
Speech Enorgy Elec Energy	200 140 141 143	50 50 50	5 354
	TOTALS:	1420	108
		Terms	
	P-01	31-01	G
17	S-04 Do-6		
	Elec Engr Energy Comp Sci Energy Energy Elec Energy Of	Elec 122 Elec 123 Engr 104 Energy 131 Comp Sci 132 Energy 132 Energy 133 Speech 200 Enorgy 140 Elec 141 Energy 143 TOTALS:	Elec 121 78 Elec 122 60 Engr 107 50 Energy 131 70 Comp Sci 60 Energy 132 60 Energy 133 60 Energy 133 60 Energy 133 60 Speech 200 50 Energy 140 50 Elec 141 70 Energy 143 50 Totals: 1420

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TERC-SW ECUT/413 JJ/pt 4/25/79

APPENDIX H

APPENDIX H

INTRODUCTION

Unified Technical Concepts is a flexible instructional package from which physics courses may be constructed to meet the needs of individual technologies. The following modules are recommended for use in the ECUT curriculum:
12 Concept Modules.
58 Application Modules that are strongly recommended as containing "essential" physics for energy technicians.
39 Application Modules that contain physics

COST ESTIMATES FOR UNIFIED TECHNICAL CONCEPTS FOR ENERGY CONSERVATION-AND-USE TECHNICIANS

lect to use some of these.

The cost estimates presented here are based on the use of all recommended materials. These estimates were prepared based on manufacturers' costs of major equipment items and the "best estimate" by the TERC staff on the cost of minor items and supplies. The actual cost of implementing UTC will vary greatly from school to school, depending on the application modules chosen and existing equipment inventories.

INTRODUCTION

Unified Technical Concepts is a flexible instructional package from which physics courses may be constructed to meet the needs of individual technologies. The following modules are recommended for use in the ECUT curriculum:

- 12 Concept Modules.
- 58 Application Modules that are strongly recommended as containing "essential" physics for energy technicians.
- 39 Application Modules that contain physics applications of interest to energy technicians but are designated as "optional."

Because of the high flexibility of UTC and because of the individual needs and resources of schools implementing the ECUT curriculum, no two schools will have identical physics courses. Most schools will use all of the 12 recommended concept modules, most of the 58 "essential" application modules, and a few of the 39 "optional" modules. Over 100 additional modules are also available, and some schools may elect to use some of these.

The cost estimates presented here are based on the use of all recommended materials. These estimates were prepared based on manufacturers' costs of major equipment items and the "best estimate" by the TERC staff on the cost of minor items and supplies. The actual cost of implementing UTC will vary greatly from school to school, depending on the application modules chosen and existing equipment inventories.

COST PER LABORATORY STATION

The following are estimated costs per laboratory station for all recommended UTC application modules except those optional modules addressed separately in item 6.

sired dtsod available to allow no more than four students per Equipment Category Lab Station Oscilloscipes, Voltmeters, ammeters, a.c. wattmeters, signal generators, and a solution of the busic power supplies. Electronics Supplies 100 2. Resistors, capacitors, inductors, transistors, switches, wire, light bulbs, relays. 3. Force tables, spring scales, weights, 008 balance, supports, specialty equipment. 4. Miscellaneous Equipment and Supplies. . . 400 Motors, fans, pumps, generator, hot plate, hose, radiator, hardware, etc. Optical Equipment 1,500 5. Lasers, power meters, optical benches, optical components. Optional, High-Cost Application Modules 6. 200 400 9F5, Vacuum Pumps 500 9T2, Thermoelectric Generators. . . 200 400 10F5, Vacuum Gages. 500 (Note: All module numbers are in revised numbering system.)

COST PER 24-STUDENT LABORATORY

TERC recommends that the first four experiment categories be available in sufficient quantities to allow two students per lab station. Category 5 "Optical Equipment" ideally should be available to allow no more than four students per lab station. One set of category 6 "Optional High-Cost Application Modules" is recommended for demonstrations and group use. The projected costs of all equipment for a 24student laboratory are:

Electronics Equipment (12 sets)....\$ 21,600Electronics Supplies (12 sets)....1,200Standard Physics Lab Equipment (12 sets)...6,000Miscellaneous Equipment and Supplies (12 sets)Optical Equipment (6 sets)....9,000Optional High-Cost Application Modules (1 set)2,200Total Cost - Minimum44,800

balance, supports, specialty equipment.

400

COST REDUCTION

A number of alternatives are available to schools that must reduce the cost of UTC laboratory equipment. Some of these are:

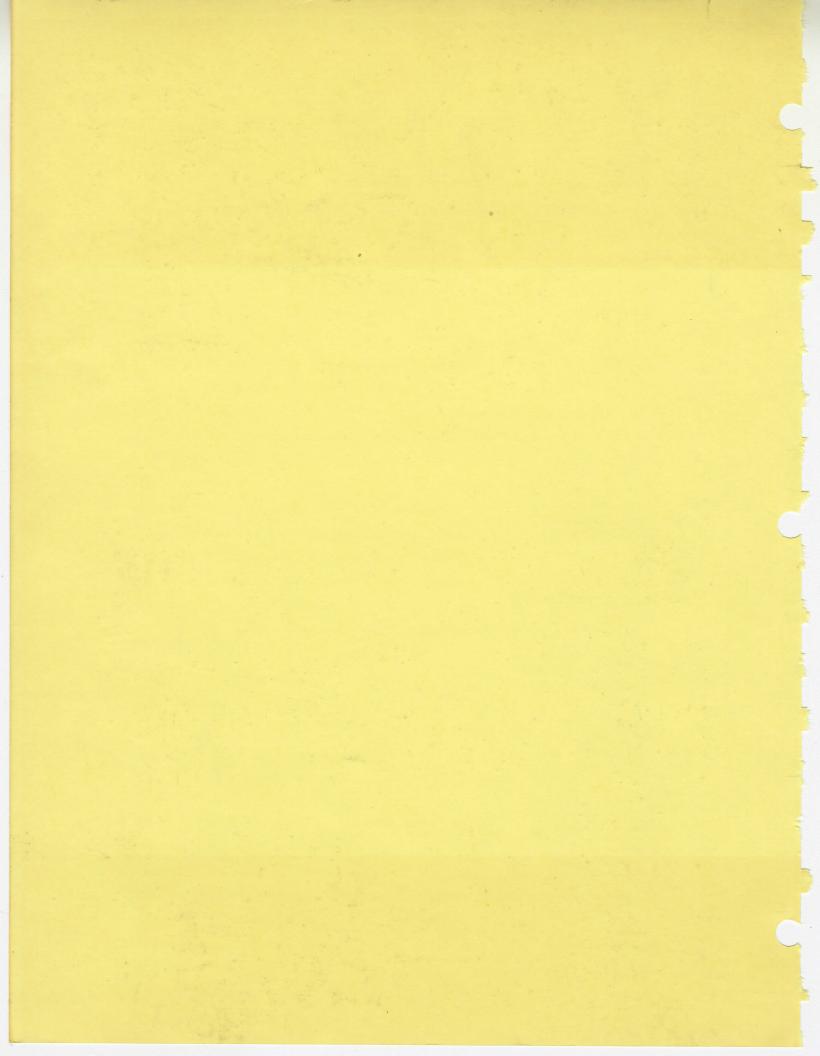
- Exclusion of High-Cost Modules. An estimated savings of \$10,000 can be achieved by the exclusion of optional application modules requiring specialized expensive equipment. These modules include those listed in category 6 above, several optical application modules and a few others.
- 2. Maximum Use of Existing Equipment. Most equipment items in categories 1, 2, and 3 will be available in the

Physics and Electronics departments of many schools. Some specialized items could also be secured "on loan" from other departments.

- 3. Economic Equipment Substitution. Considerable savings can be achieved by substituting less desirable but adequate items for the sophisticaed equipment called for in some modules. Example: A \$50 multimeter and a \$5 solar cell can replace a \$500 optical power meter.
- 4. Sharing of High-Cost Measuring Equipment. Some high-cost instrumentation such as wattmeters, optical power meters, and contact thermometers can be shared by two laboratory stations with little reduction in effectiveness.
- 5. Maximum Use of UTC Flexibility. Students in a single lab section can be divided into two to four groups that perform laboratory exercises in rotation. Thus, while one group does a mechanical experiment, another does a thermal, and another an electrical. Such a scheduling scheme can reduce both equipment cost and set-up time by one third.

Additional information on UTC implementation and cost will be available at the UTC Teacher Training Workshop on June 28-29, 1979.

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COMMUNITY COLLEGE DISTRICT 22

Tab I, Item C

TACOMA COMMUNITY COLLEGE

5900 South 12th Street • Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

X	O: BOARD OF TRUSTEES	DATE May 24, 1979
* F	ROM: President	CATEGORY .
SI	WBJECT: Minutes of April 24 and 26,	1979 Meetings ITEM & FILE NO. I,C ENCLOSURE (S)
RI	EASON FOR BOARD CONSIDERATION:	APPROVAL Minutes of April 24 and 26 Meetings

The minutes of the April 24 and 26 meetings are submitted to the Board of Trustees for approval.

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ADMINISTRATOR INITIATING ITEM: L. P. Stevens	FINAL DISPOSITION
BOARD ACTION DATE	ł
EFFECTIVE DATE	

1

COMMUNITY COLLEGE DISTRICT 22

Tab II, Item B. 1

TACOMA COMMUNITY COLLEGE

5900 South 12th Street • Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

то:	BOARD OF TRUSTEES	DATE May 24, 1979
FROM:	President	CATEGORY S.S.
SUBJECT	Ratification of the Associated Students	ITEM & FILE NO. II, B.1 ENCLOSURE (S)
REASON	FOR BOARD CONSIDERATION: APPROVAL	Resolution 79-6

Background:

Eighteen months ago, a joint task force of students, faculty and administration began a search for a more effective and responsive model of student government for the college and the students it will be serving during the 1980's. Six months later, in the culmination of that search, the Board of Trustees was presented with a draft constitution and with a request that student government, working cooperatively with the administration of Student Services, be guided by this new constitution during the 1978-79 college year. The new model of student government would thus have nearly a full year to be tested and evaluated prior to its submission to the general student body and to the Trustees of the college for ratification and final adoption.

That period of testing and evaluation has now been completed and the constitution ratified by a favorable majority of the student body in a general referendum held on April 25, 1979. The following day the Constitution, as ratified by the students, was lodged with the Board of Trustees at its regular April meeting.

Status:

The student-ratified Constitution has now been in the hands of the Board of Trustees for one month to permit additional comment, evaluation or suggestion from the college community.

Recommendation:

The President recommends that the Board of Trustees formally approve and ratify the new Constitution of the Associated Students of Tacoma Community College as set forth on the attached Resolution.

ADMINISTRATOR INITIATING ITEM:	FINAL DISPOSITION
R. L. Batdorf	
EFFECTIVE DATE	
EFFECTIVE DATE	

RESOLUTION NO. 79-6

WHEREAS, student leaders in the fall of 1977 recognized the need for an improved system of student government at Tacoma Community College; and

WHEREAS, an extensive search was begun to identify such an improved model of student government under the leadership of a joint task force of students, faculty and administration, appointed by the President of the College; and

WHEREAS, this special task force identified and articulated such a model of student government; and

WHEREAS, the new model of student government has been operational on a trial basis during the 1978-79 college year; and

WHEREAS, the campus community has had an ample period of time in which to evaluate and critique the new model of government; and

WHEREAS, the Constitution for this new model of student government has been ratified in a referendum submitted to the student body of the College; and

WHEREAS, this new model of student government has attracted the interest and enthusiasm of community colleges across the United States; therefore,

BE IT RESOLVED, that the Board of Trustees of Community College District 22 do hereby approve and ratify this Constitution of the Associated Students of Tacoma Community College; and

BE IT FURTHER RESOLVED, that the Board of Trustees recognizes and commends the productive and exciting labors of all those members of the campus community, particularly students, who have produced this outstanding model of student government for Tacoma Community College.

DATED this 244 day of May, 1979.

CHAIRMAN, Board of Trustees Community College District 22

Tab II, Item C

COMMUNITY COLLEGE DISTRICT 22

TACOMA COMMUNITY COLLEGE

5900 South 12th Street • Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

То	: E	BOARD OF TRUSTEES		DATE May 24, 1979
FR	om: F	President		CATEGORY A.S.
SUE	BJECT:	Affirmative Action Program, 1	Revised	ITEM & FILE NO. II,C
				ENCLOSURE (S)
RE	ASON F	OR BOARD CONSIDERATION:		
			APPROVAL	*

Background

Copes of the first draft of the College's revised Affirmative Action Program were lodged with the members of the Board of Trustees for study at the January 23, 1979 meeting. After being lodged with the Board, the document was reviewed by the Operational Council and other campus components, and additional revisions were submitted.

Status

The second revised Affirmative Action Program has been lodged with the Board, along with a sheet which reflects the section and content of the revisions and additions.

Recommendation

The President recommends that the Board of Trustees adopt the College's Affirmative Action Program as revised.

ADMINISTRATOR INITIATING ITEM Carl	R.	Brown	FINAL DISPOSITION
BOARD ACTION DATE	;		
EFFECTIVE DATE			

Tab III, Item A

COMMUNITY COLLEGE DISTRICT 22

TACOMA COMMUNITY COLLEGE

5900 South 12th Street • Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

4	TO: BOARD OF TRUSTEE	S	DATE May 24, 1979
	FROM: President		CATEGORY I.S.
		l Development Request, 1979-80 ar, Edward Zimmerman	ITEM & FILE NO. III,A ENCLOSURE (S)
	REASON FOR BOARD CONSIDER.	ATION: APPROVAL	Ne
3			

Background: From time to time faculty receive an opportunity to participate in an activity which will expand their appearance and expertise in areas to benefit the college. Such an opportunity has been extended to Mr. Edward Zimmerman, Chairman of the Mathematics Department and Computer instructor. He has been extended an offer to work as an Assistant Computer Scientist for Community College Consulting at Washington State University. Acceptance of this offer will require Ed Zimmerman's moving to Pullman for the 1979-80 academic year and supplementing the salary paid by Washington State University to equal the salary which would have been carried at the College.

Recommendation: Since Mr. Zimmerman's request is in keeping with the philosophy of the Board in relationship to extending experience and enhancing education, the President recommends that Mr. Zimmerman be granted leave to accept the position at Washington State University for 1979-80 and that the College compensate for the difference in earned income through a professional development grant to Mr. Zimmerman.

ADMINISTRATOR INITIATING ITEM:	R.	R.	Rhule	FINAL DISPOSITION
BOARD ACTION DATE				
EFFECTIVE DATE				

TACOMA COMMUNITY COLLEGE

5900 South 12th Street Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

TO: BOARD OF	TRUSTEES		DATE May 24, 1979
FROM: PRESID	ENT		CATEGORY B.S.P.
SUBJECT:	1979-80 Budget	for Bookstore and Food	ITEM & FILE NO. III, D.1
	Services		ENCLOSURE (S)
REASON FOR BOA	ARD CONSIDERATION:	ACCEPTANCE	

BACKGROUND:

The managers of the two College auxilliary enterprises, Bookstore and Food Services, prepare operating budgets annually for presentation to the Board of Trustees.

STATUS:

The budgets for 1979-80 are being developed now and will be presented to the Board of Trustees at the regular May meeting.

RECOMMENDATION:

The President recommends that the Board of Trustees accept the presented 1979-80 budgets for the Bookstore and Food Services for study.

ADMINISTRATOR INITIA	Donald R. Gangnes	FINAL DISPOSITION
BOARD ACTION DATE		
EFFECTIVE DATE		

TACOMA COMMUNITY COLLEGE

TACOMA, WASHINGTON 98465

<u>1979-80 BUDGETS</u>

FOR

<u>AUXILIARY</u> SERVICES

BOARD OF TRUSTEES:

1

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4

5 × 5 × 5

MS. MILDRED JEYNES MS. ELLEN PINTO MS. SALLY STARKE MR. ALAN VANDEVERT DR. BARBARA WESLEY

PRESIDENT:

DR. LARRY P. STEVENS

BUDGET OFFICER:

MR. DONALD R. GANGNES

OPERATIONAL COUNCIL:

DR. RICHARD L. BATDORF MR. CARL R. BROWN DR. ROBERT R. RHULE

MAY, 1979

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ITEM

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13.84

PAGES

BOOKSTORE BUDGET:

1979-80	Projected	Revenue	1
1979-80	Projected	Budget	2
Positio	n List		3

FOOD SERVICES BUDGET:

1979-80	Projected	Revenue	4
1979-80	Projected	Budget	5
Positio	n List	••••••	6

31331531535

Mary Kennedy, Manager

1979-80 PROJECTED REVENUE

REVENUE CODE	<u>TITLE</u>	AMOUNT
261-1811	New Books	\$358,000
261-1812	Used Books	35,000
261-1813	School Supplies	60,000
261-1814	Misc. Sundries	20,000
261-1815	Paperbacks	9,500
TOTAL PROJECTED REVENUE		\$482,500

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1979-80 PROJECTED BUDGET

EXPENDITURES

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524-99-261-1BK1-BD-0000 524-99-261-1BK1-EA-0010 524-99-261-1BK1-EA-0011 524-99-261-1BK1-EB-0020 524-99-261-1BK1-EB-0020 524-99-261-1BK1-ED-0020 524-99-261-1BK1-ED-0020 524-99-261-1BK1-ED-0020 524-99-261-1BK1-ED-0020 524-99-261-1BK1-ED-0020 524-99-261-1BK1-ED-0020 524-99-261-1BK1-ED-0010 524-99-261-1BK1-ED-0010 524-99-261-1BK1-ED-0010 524-99-261-1BK1-EZ-0010 524-99-261-1BK1-EZ-0010 524-99-261-1BK1-EZ-0052 524-99-261-1BK1-EZ-0052 524-99-261-1BK1-EZ-0050 524-99-261-1BK1-EZ-0060 524-99-261-1BK1-EZ-0080 524-99-261-1BK1-EZ-0080 524-99-261-1BK1-EZ-0080 524-99-261-1BK1-EZ-0000 524-99-261-1BK1-EZ-0000 524-99-261-1BK1-LD-0000 524-99-261-1BK1-LD-0000 524-99-261-1BK1-LD-0000 524-99-261-1BK1-LD-0000 524-99-261-1BK1-LD-0000 524-99-261-1BK1-LD-0000 524-99-261-1BK1-LD-0000 524-99-261-1BK1-LD-0000	Exempt-Temporary Part-time Classified-Permanent Full-time Office Supp-General Office Supp-Xerox Postage Telephone-Local Telephone-Extended Building-General Equipment-General Equipment On Campus Repro-General Dues & Memberships Periodicals/Magazines Misc Contractual Srv Vehicle Maint & Op Cst Advertising and Promotions Use Tax Depreciation Collection Expense In-State Sub Lodging In-St-Priv Auto Mile Equipment OASI Retirement Med Aid & Indus Ins Hith Life & Disabil Unemployment Comp	$\begin{array}{c} 13,252\\ 58,884\\ 1,000\\ 100\\ 300\\ 810\\ 400\\ 4,200\\ 378\\ 450\\ 50\\ 300\\ 200\\ 450\\ 100\\ 200\\ 450\\ 100\\ 200\\ 1,500\\ 825\\ 75\\ 150\\ 1,000\\ 4,523\\ 4,182\\ 850\\ 4,350\\ 500\\ \hline \\ \end{array}$
524-99-261-18K0-EZ-0020	Freight-In	\$ 9,000
524-99-261-18K0-EZ-0021	Freight-Out	1,800
524-99-261-18K0-EZ-0040	Bookstore-Books-New	290,000
524-99-261-18K0-EZ-0041	Bookstore-Books-Used	20,000
524-99-261-18K0-EZ-0043	Bookstore-School Supplies	40,000
524-99-261-18K0-EZ-0045	Bookstore-Novelt/Sundrie	12,000
524-99-261-18K0-EZ-0046	Bookstore-General Merchandise	5,000

TOTAL MERCHANDISE

\$377,800

TOTAL 1979-80 PROJECTED BOOSTORE BUDGET

\$476,849

POSITION LIST

FULL-TIME POSITIONS

Bookstore Manager C		\$	18,939*
Accounting Assistant II			12,097*
Office Assistant II - Typing	1		9,964*
Retail Clerk II			8,316*
Stockroom Attenant I		_	9,568*
	SUB-TOTAL	\$	58,884

PART-TIME POSITIONS

Checkstand Operators		\$ 13,252
	TOTAL	\$ 72,136

* These salary figures include a possible 7% increase.

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Jesus Villahermosa, Manager

1979-80 PROJECTED REVENUE

REVENUE CODE	TITLE	AMOUNT
262-1F21	Food Sales	\$ 152,250
262-1F22	Beverage Vending	9,000
262-1F25	Banquets & Special Events	2,000
262-1F26	Work Study	4,648
TOTAL PROJECTED REVENUE		\$ 167,898

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1979-80 PROJECTED BUDGET

EXPENDITURES

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573-99-262-1FS1-BD-0000 573-99-262-1FS1-BK-0000 573-99-262-1FS1-BK-000T 573-99-262-1FS1-BL-00PT 573-99-262-1FS1-BP-0050 573-99-262-1FS1-EB-0010 573-99-262-1FS1-EB-0020 573-99-262-1FS1-EB-0020 573-99-262-1FS1-ED-0010 573-99-262-1FS1-ED-0020 573-99-262-1FS1-ED-0020 573-99-262-1FS1-ED-0020 573-99-262-1FS1-ED-0020 573-99-262-1FS1-ED-0020 573-99-262-1FS1-ED-0020 573-99-262-1FS1-LD-0000 573-99-262-1FS1-LD-0000 573-99-262-1FS1-LD-0000	Exempt-Temporary Part-time Classified-Permanent Classified-Overtime Classified-Permanent Part-time Student-Work Study Laundry Supplies Postage Telephone - Local Telephone - Extended Building-General Equipment-General Equipment Depreciation OASI Retirement Med Aid & Indus Ins Hlth Life & Disabil Unemployment Comp	\$ $\begin{array}{r} 4,757\\ 48,818\\ 600\\ 6,876\\ 5,810\\ 400\\ 7\\ 300\\ 25\\ 3,000\\ 500\\ 1,000\\ 2,100\\ 4,080\\ 3,995\\ 788\\ 5,220\\ 3,000\\ \end{array}$
TOTAL EXPENDITURES		\$ 91,276

MERCHANDISE

5/3-99-262-1FSO-EZ-0097 Food - Staples <u>30,00</u>	573-99-262-1FS0-EZ-0090 573-99-262-1FS0-EZ-0091 573-99-262-1FS0-EZ-0092 573-99-262-1FS0-EZ-0093 573-99-262-1FS0-EZ-0094 573-99-262-1FS0-EZ-0095 573-99-262-1FS0-EZ-0096	Food Services-Paper Goods Food - Meats Food - Produce Food - Eggs Food - Pastries Food - Breads Food - Dairy Products	\$ 8,400 6,000 3,000 2,500 9,300 3,300 6,000	
	573-99-262-1FS0-EZ-0097	Food - Staples	 6,000 30,000	

TOTAL MERCHANDISE

\$ 68,500

TOTAL 1979-80 PROJECTED FOOD SERVICES BUDGET

\$ 159,776

POSITION LIST

FULL-TIME POSITIONS

Food Services Manager A	\$ 14,321*
Cook I	9,395*
Food Service Worker II	10,477*
Food Service Worker II	7,875*
Food Service Porter	6,750*

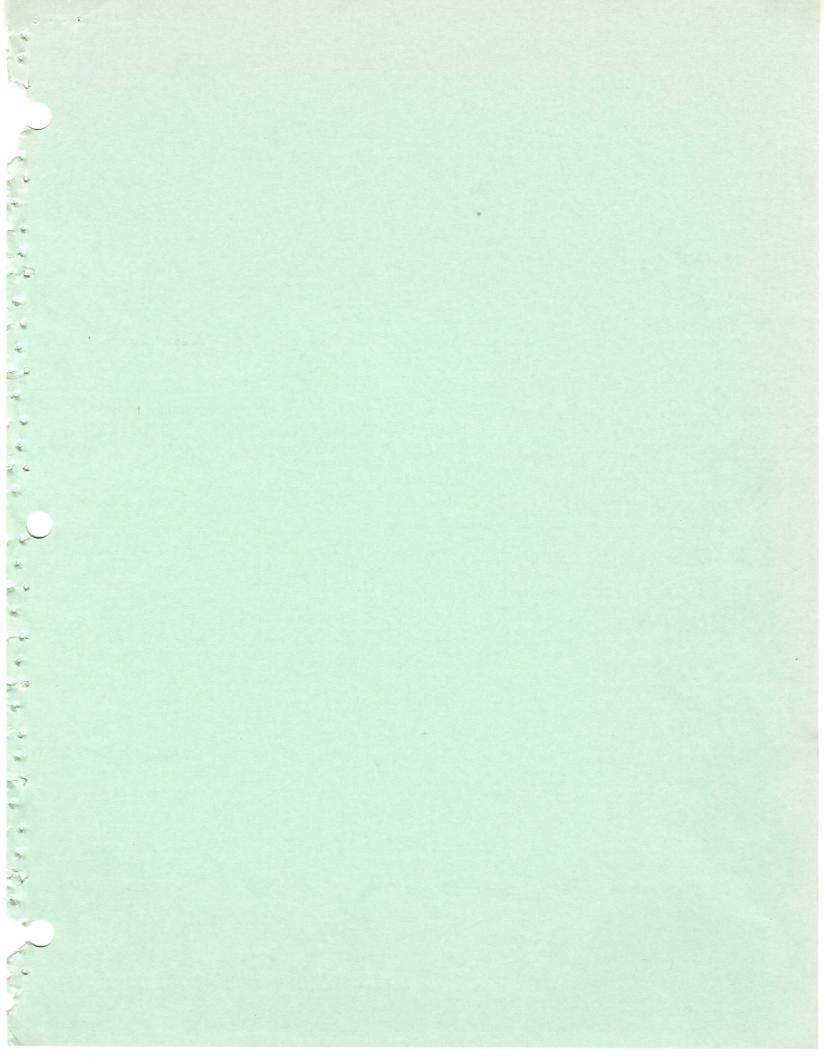
PART-TIME POSITIONS

Cook I	\$ 6,576*
Shift Differential	300*
Exempt - Temporary Part-time	4,757*

STUDENT HELP

Work Study (Federal)		\$ 5,810
	TOTAL	\$ 66,261

* These salary figures include a possible 7% increase.



TACOMA COMMUNITY COLLEGE

Tab III, Item D.2

5900 South 12th Street Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

TO: BOARD OF TRUSTEES		DATE May 24, 1979
FROM: PRESIDENT		CATEGORY B. S. & P.
SUBJECT: 1979-80 Associated Student	Services and	ITEM & FILE NO. III, D.2
Activities Fee Budget		ENCLOSURE (S)
REASON FOR BOARD CONSIDERATION:	ACCEPTANCE	

BACKGROUND:

The Associated Students Services and Activities Fee Budget is prepared annually for presentation to the Board of Trustees.

STATUS:

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The budget for 1979-80 is being developed and will be presented to the Board of Trustees at the regular May meeting.

RECOMMENDATION:

The President recommends that the Board of Trustees accept the presented 1979-80 budget for the Associated Students for study.

ADMINISTRATOR INIT	TATING ITEM:	FINAL DISPOSITION
	Donald R. Gangnes	
BOARD ACTION DATE		
EFFECTIVE DATE		



ASSOCIATED STUDENTS

SERVICES AND ACTIVITIES FEE

BUDGET

FOR

1979 - 80

Associated Students Services and Activities Budget

> For 1979 - 80

> > HELLAWEL Y LIN

BOARD OF TRUSTEES:

Mildred Jeynes Ellen Pinto Sally Starke Alan Vandevert Dr. Barbara Wesley

PRESIDENT:

DR. LARRY P. STEVENS

C.

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BUDGET OFFICER:

DONALD R. GANGNES

DEAN OF STUDENT SERVICES:

DR. RICHARD L. BATDORF

COORDINATOR OF STUDENT PROGRAMS:

PRISCILLA BELL

ASTCC PRESIDENT: SUSAN TALBERT

ASTCC BUDGET COMMITTEE:

Marc Simon, Chairman Elizabeth Harnett Terri Krasnoff Holly Lewallen George McMullin Bud Trafton Priscilla Bell, Advisor

ASTCC BUDGET ADVISORY COMMITTEE:

LOYD PERCY, CHAIRMAN

STUDENTS: VENETTA HILL JAMES LEONARD JOHN SCHOLAR TAMARA SCOTT ROBERT LEIGH

Faculty: Suzanne Butchun Virginia Liebergesell

AMINISTRATION: STEVE HOWARD RONALD MAGDEN RICHARD L. BATDORF, SECRETARY EX OFFICIO

BUDGET BOOKLET PREPARATION:

DENNIS FINDLEY CONSFULLA WESLEY ANNE KOENIG

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BUDGETING GUIDELINES.	1
BUDGET SUMMARY AND REVENUE ESTIMATE	2
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GUIDELINES

for BUDGETING of the STUDENT SERVICES and ACTIVITIES FEE at

TACOMA COMMUNITY COLLEGE

The annual budget for the Services and Activities fee is, with the exception of certain grants and revenue producing activities, buile entirely on funds generated by fees paid directly to the college by students. For that reason, students have the primary role in the development of this budget.

Procedure

Student involvement in preparing the budget occurs in two ways in the budget development process. First, six students, three faculty and two administrators constitute the ASTCC Advisory Board. The Board has three principal responsibilities in the budget development process:

- 1. to review and evaluate expenditures of the current year's budget;
- 2. to identify areas of need or service which can or should be supported by the Services & Activities fee; and
- to determine program priorities and develop recommendations which serve as guidelines for the ASTCC Budget Committee, including Services & Activities fee revenue projections.

The second type of student involvement is the Budget Committee itself. The committee is chaired by a student and draws its membership from the ASTCC Senate. The Budget Committee has three major responsibilities:

- 1. to solicit budget requests from currently funded areas, together with requests for new funding;
- to weigh requests for funding against the recommendations and guidelines of the ASTCC Advisory Board; and
- 3. to develop a balanced budget.

Expenditure Areas

Four broad areas are funded on a percentage basis of total anticipated revenue on the following basis:

- 1. <u>Programs</u> are attached primarily to credit-bearing learning activities and receive approximately 40 percent of budgeted revenue;
- Services which students desire to initiate and maintain, and which are not supported by college operating funds, receive approximately 40 percent of budgeted revenue;
- 3. <u>Activities</u> are primarily social, cultural, and recreational events which play an integral part in the educational and social process and receive approximately 15 percent of budgeted revenue; and
- 4. <u>Contingency/reserve</u> is intended to meet either unforseen needs or to off-set any revenue loss and is budgeted at approximately five percent of anticipated revenue.

SUMMARY TOTALS

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C. IN I

	Approved 78-79	Proposed 79-80	Recommended 79-80	Recommended 79-80 Percentage
PROGRAM SUBTOTAL	\$ 86,000	\$114,109	\$ 80,274	(41.53%)
SERVICES SUBTOTAL	94,546	102,523	80,036	(41.41%)
ACTIVITIES SUBTOTAL	32,200	35,555	24,886	(12.87%)
CONTINGENCY/RESERVE	16,004	9,665	8,104	(4.19%)
BUDGET TOTALS	\$228,750	\$261,852	\$193,300	(100.0%)

REVENUE ESTIMATE

for

1979-1980

Cash Carryover from 1978-79 Budget	\$ 5,000
Fees from 3,100 Annualized FTE's @ \$17.00 x 3	\$158,100
Miscellaneous Revenue (<u>See</u> Appendix A)	30,200
TOTAL ESTIMATED REVENUE AVAILABLE	\$193,300

Account Number	Account Title	Approved 78-79	Proposed 79-80	Recommended 79-80
	PROGRAMS	5		
1900	Program Management	\$18,400	\$17,545	\$14,160
1901	Collegiate Challenge	12,500	17,095	14,160
1902	Drama	5,000	4,925	3,233
1903	Music	5,000	4,905	3,493
1904 ^a	Summer Arts Workshop		3,730	1,761
1905-1909	Unassigned Accounts			
1910	Director of Athletics	27,676	40,009	25,937
1911	Women's Athletics-Basketball	1,330	1,590	1,450
1912	Women's Athletics-Softball	1,160	1,320	1,100
1913	Women's Athletics-Tennis	780	1,200	750
1914	Women's Athletics-Volleyball	1,350	1,390	1,250
1915	Men's Athletics-Baseball	2,900	5,675	3,150
1916	Men's Athletics-Basketball	4,330	4,100	3,250
1917	Men's Athletics-Golf	1,334	1,700	1,400
1918	Men's Athletics-Tennis	780	1,200	750
1919	Men's Athletics-Track/Cross Country	1,450	3,730	1,500
1920	Coed Athletics-Intra/ Extramurals	650	830	400
1921	Men's Athletics-Soccer	1,360	1,665	1,350
1922 ^a	Outdoor Recreation		1,500	1,180
1923-1925	Unassigned Accounts			
	SUB TOTAL: PROGRAMS	\$ 86,000	\$114,109	\$ 80,274

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^aIndicates change of account from Activities to Program area.

Account Number	Account Title	Approved 78-79	Proposed 79-80	Recommended 79-80	
SERVICES					
1930	Child Care Center	\$37,965	\$35,176	\$33,206	
1931	McNeil Island	6,500	9,800	3,658	
1932	Student Help Fund (MAO)	6,000	10,000	5,664	
1933	Work/Study (Matching Grant)	16,981	14,993	14,993	
1934	Student Health Service	4,000	4,500	3,635	
1935	Tutorial Services	10,000	12,000	9,440	
1936 ^a	Women's Programming	1,100	875	-0-	
1937	Equipment and Facilities	12,000	15,179	9,440	
	Sub-Total: SERVICES	\$94,546	\$102,523	\$80,036	

^a Indicates elimination of account

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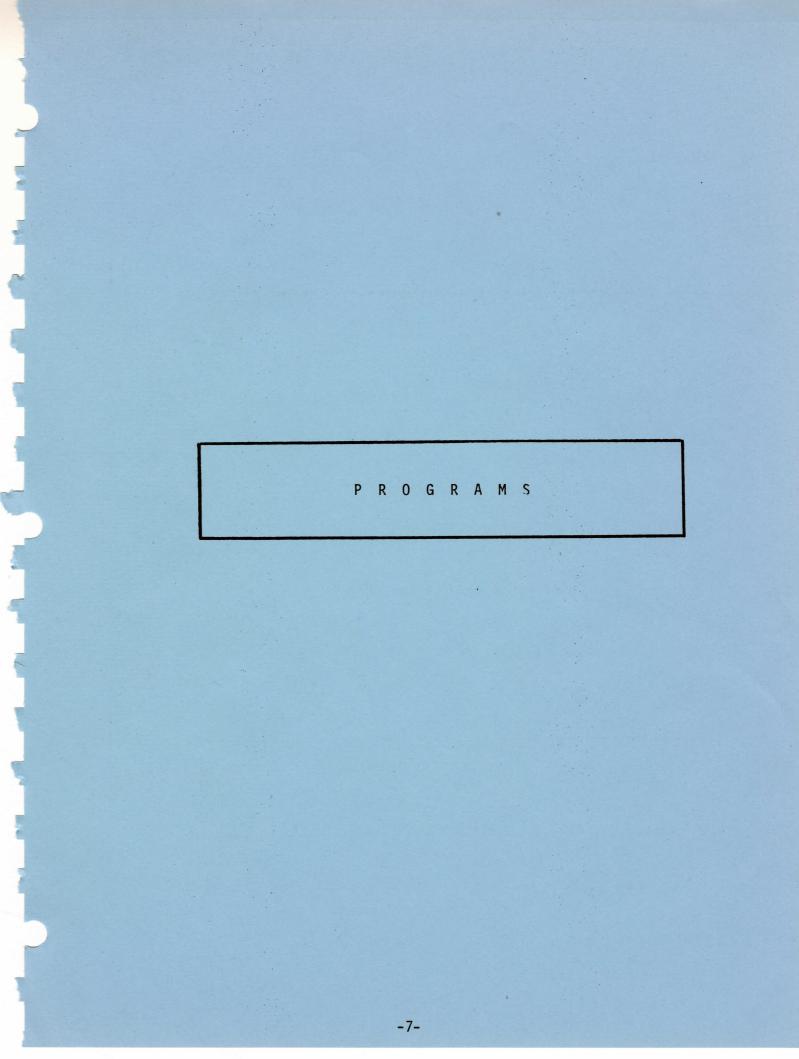
Account Number	Account Title	Approved 78-79	Proposed 79-80	Recommended 79-80
	ACTIVIT	IES		
1950	Activities Programming	\$10,000	\$18,625	14,278
1951	Program Publicity	5,500	4,800	3,965
1952	Conferences	2,400	1,675	1,109
1953 ^a	Innovative Projects	1,000	1,000	0
1954 ^b	Outdoor Recreation	1,300		
1955	Summer Programming	2,000	2,405	1,050
1956-1959	Unassigned Accounts			
1960	Student Clubs and Organizations	2,000	1,600	1,510
1961-1974	Unassigned Accounts			
1975	Trillium	1,000	1,300	944
1976	Spring Festival	3,000	2,650	2,030
1977 ^C	Summer Arts Workshop	4,000		
1978 ^d	Tacoma Zoological Society	-0-	1,500	-0-
	Sub-Total ACTIVITIES	\$32,200	\$35,555	\$24,886

^aIndicates elimination of account

^bAccount transfered from Activities area to Program area. Refer to account #1922. ^CAccount transfered from Activities area to Program area. Refer to account #1904. ^d\$1500 from Contingency/Reserve was budgeted for this account in 1978-79.

Account Number	Account Title	Approved 78-79	Proposed 79-80	Recommended 79-80
CONTINGENCY/RESERVE				
1990	Contingency/Reserve	\$ 16,004	\$ 9,665	\$8,104
	Sub-Total: CONTINGENCY/ RESERVE	\$ 16,004	\$ 9,665	\$8,104

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#1900: PROGRAM MANAGEMENT AN	D OPERATIONS
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			Approved 78-79	Proposed 79-80	Recommended 79-80
BN-89	Student Institutional		\$ 8,000	\$ 7,300	\$ 5,950
EA-10	Office Supp-General		500	225	50
EA-51	Media Supplies		5,500	5,000	4,000
EB-10	Postage		100	200	200
EB-20	Tele-Local		1,800	1,980	1,900
EB-21	Tele-Extended		500	550	525
EF-10	Repro-On Campus-Gen		50	450	300
EF-40	Print On-Campus-Gen		750	400	150
EH-10	Dues & Memberships		-0-	15	-0-
EH-20	Convention/Mtg Fees		-0-	100	50
ER-20	Misc Contractual Srv		233	225	50
GA-00	In-State Sub & Lodging		200	50	50
GC-00	In-St-Priv Auto Mile		150	-0-	-0-
GF-00	Out-St Sub & Lodging		-0-	150	75
LA-00	OASI		490	600	570
LC-00	Med Aid & Indus Ins	1	227	300	290
		TOTAL:	\$18,400	\$17,545	\$14,160

#1901: COLLEGIATE CHALLENGE

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		Approved 78-79	Proposed 79-80	Recommended 79-80
BN-00	Student Institutional	\$ 1,650	\$ 2,000	\$ 2,000
CK-00	Research Srvys & Appr	200	1,500	500
EA-10	Office-Supp-General	150	200	200
EA-11	Office-Supp Xerox	20	20	20
EA-51	Media Supplies	1,100	1,500	1,305
EB-10	Postage	200	100	200
EB-20	Tele-Local	750	300	500
EB-21	Tele-Extended	320	250	350
EF-00	Printing & Reproduction	8,000	10,000	8,160
EF-10	Repro On Campus-Gen	-0-	25	25
EF-40	Print On Campus-Gen	-0-	25	25
EH-20	Convention/Mtg Fees	10	-0-	-0-
GC-00	In-St-Priv Auto Mile	100	200	200
JA-20	Office Equipment	-0-	600	325
JG-10	Photographic Equip	-0-	125	-0-
LA-00	OASI	-0-	150	200
LC-00	Med Aid & Indus Ins	-0-	100	150
	TOTAL:	\$12,500	\$17,095	\$14,160

-9-

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President President

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		Approved 78-79	Proposed 79-80	Recommended 79-80
CK-00	Research Srvys & Appr	\$ 50	\$ -0-	\$ -0-
EA-20	Instruc Supp-Gen	135	135	75
EA-42	Maintenance Supplies	-0-	1,200	800
EA-89	Misc Supplies	2,075	675	475
EB-10	Postage	30	75	25
ED-89	Misc Rentals & Leases	925	925	530
EF-10	Repro On Campus-Gen	-0-	10	10
EF-40	Print On Campus-Gen	125	125	60
EF-60	Outsd Under Pr-Gnr1	125	-0-	-0-
ER-10	Guest Speakers/Lect	50	-0-	-0-
ER-20	Misc Contractual Srv	-0-	150	150
EZ-10	Advertising & Promotions	-0-	1,000	708
EZ-50	Fees/Licenses	-0-	625	400
	TOTAL:	\$ 5,000	\$ 4,925	\$ 3,233

#1903 MUSIC

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			Approved 78-79	Proposed 79-80	Recommended 79-80
EA-89	Misc Supplies		\$ 2,105	\$ 1,600	1,200
EB-10	Postage		-0-	75	75
EF-10	Repro On Campus-Gen		-0-	25	18
EF-40	Print On Campus-Gen		20	100	100
EG-10	Staff Development		400	500	500
ER-10	Guest Speakers/Lect		755	750	750
ER-20	Misc Contractual Srv		50	250	250
EZ-10	Advertising & Promotions		75	250	250
GA-00	In-State Sub & Lodging		-0-	600	-0-
GC-00	In-St-Priv Auto Mile		100	155	150
GD-30	I-S Rental Cars		-0-	600	200
JJ-00	Educational Equipment		1,495	-0-	-0-
		TOTAL:	\$ 5,000	\$ 4,905	\$ 3,493

#1	904	SUMMER	ARTS	WORKSHOP

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1		Approved 78-79	Proposed 79-80	Recommended 79-80
CK-00	Research Srvys & Appr	\$ 275	\$ -0-	\$ -0-
EA-20	Instruc Supp-Gen	500	-0-	-0-
EA-89	Misc Supplies	1,495	1,495	630
EB-10	Postage	25	50	50
ED-89	Misc Rentals & Leases	250	250	50
EF-10	Repro On Campus-Gen	10	5	5
EF-40	Print On Campus-Gen	20	30	30
ER-20	Misc Contractual Srv	-0-	275	171
EZ-10	Advertising & Promotions	800	1,000	200
EZ-50	Fees/Licenses	625	625	625
	TOTAL:	\$ 4,000	\$ 3,730	\$ 1,761

-12-

#1910 DIRECTOR OF ATHLETICS

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		Approved 78-79	Proposed 79-80	Recommended 79-80
BN-00	Student Institutional	\$ 6,426	\$ 8,000	\$ 5,300
EA-44	Laundry Supplies	• 400	400	200
EA-70	Athl & Rec Supplies	7.00	800	600
EB-10	Postage	-0-	300	200
ED-10	Rental Bldg	-0-	150	150
EE-20	Repair-Equipment	50	50	-0-
EF-00	Printing & Reproduction	250	250	200
EF-10	Repro On Campus-Gen	75	100	75
EH-10	Dues & Memberships	2,000	2,200	2,000
EH-20	Convention/Mtg Fees	50	50	-0-
EH-87	Tournament Fund	3,000	3,000	3,000
EJ-10	Periodicals/Magazines	25	25	-0-
EP-00	Insurance	-0-	2,500	2,400
EZ-50	Fees/Licenses	-0-	50	50
GA-00	In-State Sub & Lodging	250	250	150
GB-00	In-State Air Transpr	200	200	150
GC-00	In-St-Priv Auto Mile	250	250	150
JZ-00	Other Equipment	10,726	18,134	9,012
LA-00	OASI	392	-0-	-0-
LC-00	Med Aid & Indus Ins	182	-0-	-0-
NF-10	Scholarships TO	 TAL: \$ 27,676	<u>3,300</u> \$ 40,009	<u>2.300</u> \$ 25,937

-13-

			Approved 78-79	Proposed 79-80	Recommended 79-80
CK-93	Personal Ser-Officials		\$ 300	\$ 600	\$ 600
EP-00	Insurance		180	-0-	-0-
EZ-10	Advertising & Promotions		100	100	100
GA-00	In-State Sub & Lodging		400	400	350
GC-00	In-St-Priv Auto Mile		350	490	400
		TOTAL:	\$ 1,330	\$ 1,590	\$ 1,450

#1911 WOMEN'S ATHLETICS-BASKETBALL

Martin Carlo

#1912	WOMEN'S	ATHL	ETICS-	-SOFTBALL

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		Approved 78-79	Proposed <u>79-8</u> 0	Recommended 79-80
CK-93	Personal-Ser-Officials	\$ 200	\$ 300	\$ 300
EP-00	Insurance	160	-0-	-0-
EZ-10	Advertising & Promotions	100	100	100
GA-00	In-State Sub & Lodging	400	500	350
GC-00	In-St-Priv Auto Mile	300	420	350
		TOTAL: \$ 1,160	\$ 1,320	\$ 1,100

#1913 WOMEN'S ATHLETICS-TENNIS

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			Approved 78-79		Proposed 79-80		Recommended 79-80	
ED-10	Rental Bldg		\$ -0-	\$	360	\$	-0-	
EP-00	Insurance		80		-0-		-0-	
EZ-10	Advertising & Promotions		100		100		100	
GA-00	In-State Sub & Lodging		350		400		350	
GC-00	In-St-Priv Auto Mile		 250		340		300	
		TOTAL:	\$ 780	\$	1,200	\$	750	

		Approved 78-79		
CK-93	Personal Ser-Officials	\$ 350	\$ 400	\$ 400
EP-00	Insurance	200	-0-	-0-
EZ-10	Advertising & Promotions	100	100	100
GA-00	In-State Sub & Lodging	350	400	350
GC-00	In-St-Priv Auto Mile	350	490	400
	TOTAL:	\$ 1,350	\$ 1,390	\$ 1,250

#1914 WOMEN'S ATHLETICS-VOLLEYBALL

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#1915 MEN'S ATHLETICS-BASEBALL

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		Approved 78-79	Proposed 79-80	Recommended 79-80
СК-93	Personal Ser-Officials	¢ 1.000		
CK- 33	reisonal ser-officials	\$ 1,000	\$ 1,500	\$ 1,100
EA-44	Laundry Supplies	-0-	50	-0-
EP-00	Insurance	300	-0-	-0-
EZ-10	Advertising & Promotions	300	600	300
GA-00	In-State Sub & Lodging	1,000	2,875	1,000
GC-00	In-St-Priv Auto Mile	300	600	750
		TOTAL: \$ 2,900	\$ 5,675	\$ 3,150

#1916 MEN'S ATHLETICS-BASKETBALL

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		Approved 78-79	Proposed 79-80	Recommended 79-80
CK-93	Personal Ser-Officials	\$ 1,980	\$ 2,200	\$ 1,800
EA-44	Laundry Supplies	100	100	100
EF-10	Repro On Campus-Gen	50	-0-	-0-
EP-00	Insurance	300	-0-	-0-
EZ-10	Advertising & Promotions	300	600	300
		and the second		
GA-00	In-State Sub & Lodging	1,200	600	500
GC-00	In-St-Priv Auto Mile	400	600	450
	TOTAL :	\$ 4,330	\$ 4,100	\$ 3,250

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#1917 MEN'S ATHLETICS-GOLF

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			roved 78-79	Proposed 79-80	Recommended
EA-70	Athl & Rec Supplies		\$ 450	\$ 450	\$ 450
EP-10	Insurance		75	-0-	-0-
EZ-10	Advertising & Promotions		-0-	100	100
GA-00	In-State Sub & Lodging		609	800	500
GC-00	In-St-Priv Auto Mile		200	350	350
		TOTAL:	\$ 1,334	\$ 1,700	\$ 1,400

#1918 MEN'S ATHLETICS-TENNIS

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			ApprovedProposed78-7979-80			Recommended 79-80		
ED-10	Rental Bldg		\$	-0-	\$	360	\$	-0-
EP-00	Insurance			80		-0-		-0-
EZ-10	Advertising & Promotions			100		100		100
GA-00	In-State Sub & Lodging			350		400		350
GC-00	In-St-Priv Auto Mile			250		340		300
		TOTAL:	\$	780	\$	1,200	\$	750

#1919	MEN'S	ATHLETICS-TRACK/CROSS	COUNTRY

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			Approved 78-79	Proposed 79-80	Recommended 79-80
СК-93	Personal Ser-Officials		\$ 150	\$ 150	\$ 100
EA-70	Athl & Rec Supplies		-0-	300	-0-
EA-99	Reserve		-0-	150	-0-
EP-00	Insurance		300	500	-0-
EZ-10	Advertising & Promotions		100	150	150
GA-00	In-State Sub & Lodging		600	1,480	750
GC-00	In-St-Priv Auto Mile		300	1,000	500
		TOTAL:	\$ 1,450	\$ 3,730	\$ 1,500

#1920 COED ATHLETICS-INTRA/EXTRAMURALS

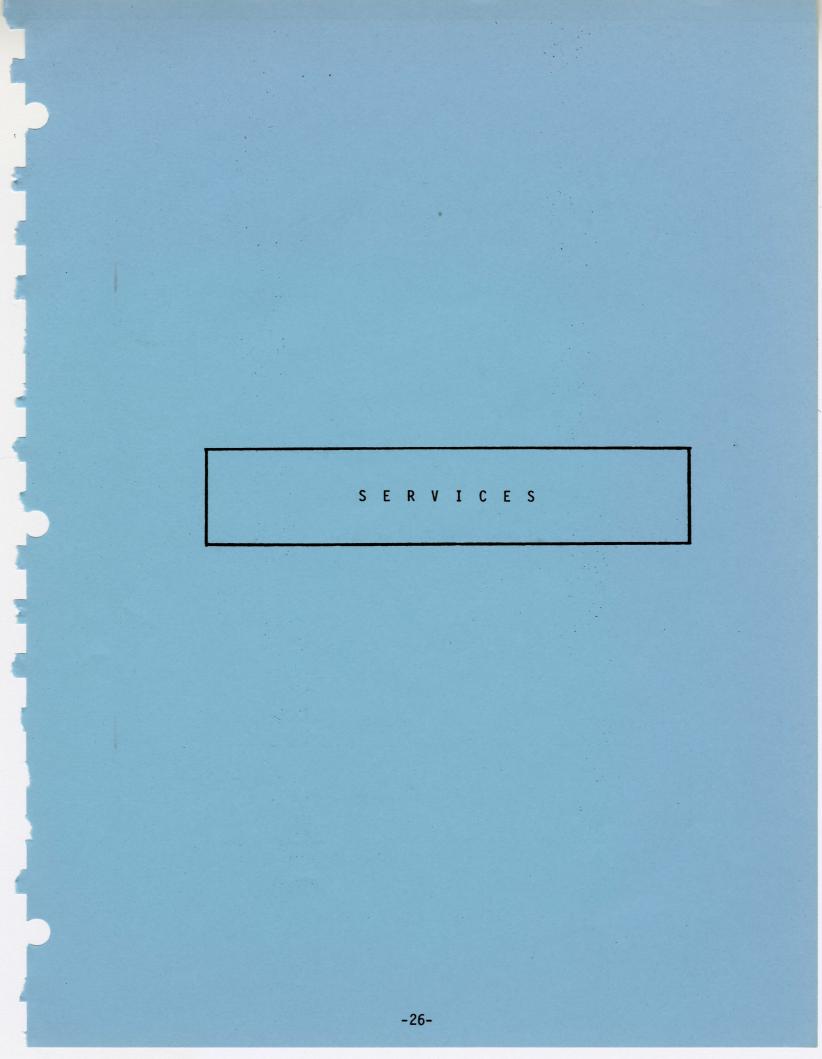
			roved 8-79	oosed 9-80	ommended 79-80
EH-10	Dues & Memberships		\$ 150	\$ 150	\$ -0-
EZ-10	Advertising & Promotions		-0-	100	-0-
GA-00	In-State Sub & Lodging		300	300	200
GC-00	IN-St-Priv Auto Mile		200	 280	200
		TOTAL:	\$ 650	\$ 830	\$ 400

#1921 MEN'S ATHLETICS-SOCCER

			Approved 78-79	Proposed 79-80	Recommended 79-80
CK-93	Personal Ser-Officials		\$ 550	\$ 550	\$ 550
ED-30	Rental Films		-0-	25	-0-
EP-00	Insurance		160	-0-	-0-
EZ-10	Advertising & Promotions		100	100	100
GA-00	In-State Sub & Lodging		350	590	400
GC-00	In-St-Priv Auto Mile		200	400	300
		TOTAL:	\$ 1,360	\$ 1,665	\$ 1,350

#1922 OUTDOOR RECREATION

			Approved 78-79	Proposed 79-80	Recommended 79-80
EA-70	Athl & Rec Supplies		\$ -0-	\$ 100	\$ 100
EH-10	Dues & Memberships		-0-	100	100
GC-00	In-St-Priv Auto Mile		1,300	1,300	980
		TOTAL:	\$ 1,300	\$ 1,500	\$ 1,180



#1930 CHILD CARE CENTER

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		Approved 78-79	Proposed 79-80	Recommended 79-80
BD-00	Exempt Temp Part-time	\$ 24,466	\$ 20,631	\$ 19,875
BN-00	Student Institutional	2,565	2,871	2,871
EA-10	Office Supp-General	30	30	25
EA-20	Instruc Supp-Gen	200	50	50
EA-42	Maintenance Supplies	300	200	200
EA-44	Laundry Supplies	-0-	50	50
EA-89	Misc Supplies	150	300	225
EA-99	Reserve	25	25	25
EB-10	Postage	15	35	35
EB-20	Tele-Local	350	225	225
EB-21	Tele-Extended	-0-	25	25
EC-60	Utilities-Off Campus	3,000	4,000	4,000
EF-10	Repro On Campus-Gen	50	50	50
EF-40	Print On Campus-Gen	50	50	50
EH-10	Dues & Memberships	20	-0-	-0-
EZ-10	Advertising & Promotions	75	25	25
EZ-30	Food-Child Care Center-Only	900	1,155	1,155
GD-40	I-S Field Trips	-0-	20	20
JZ-00	Other Equipment	200	300	300
LA-00	OASI	1,633	1,264	800
LB-00	Retirement	908	-0-	-0-
LC-00	Med Aid & Indus Ins	416	220	200
LD-00	Med Ins	2,612	3,650	3,000
	TOTAL:	\$ 37,965	\$ 35,176	\$ 33,206

#	1931	MCNEIL	ISLAND

		Approved 78-79	Proposed 79-80	Recommended 79-80
BN-00	Student Institutional	\$ 2,362	\$ 2,700	\$ -0-
EA-99	Reserve	-0-	-0-	3,658
ED-30	Rental Films	560	1,000	-0-
EJ-10	Periodicals/Magazines	-0-	1,000	-0-
ER-00	Purchased Services	487	-0-	-0-
ER-10	Guest Speakers/Lect	-0-	200	-0-
ER-20	Misc Contractual Srv	-0-	800	-0-
GC-00	In-St-Priv Auto Mile	-0-	400	-0-
JH-21	A-V Material-Films	500	1,500	-0-
JJ-00	Educational Equip	900	-0-	-0-
JZ-00	Other Equipment	1,500	2,200	-0-
LA-00	OASI	144	-0-	-0-
LC-00	Med Aid & Indus Ins	47	-0	
	TOTAL:	\$ 6,500	\$ 9,800	\$ 3,658

#1932 STUDENT HELP FUND (MAO)

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	Approved 78-79	Proposed 79-80	Recommended 79-80
NF-10 Scholarships	\$_6,000	\$_10,000	\$_5,664_
	TOTAL: \$ 6,000	\$ 10,000	\$ 5,664

#1933 WORK/STUDY (MATCHING GRANT)

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		Approved 78-79	Proposed 79-80	Recommended 79-80
BM-50 Student-Work Study		\$_16,981	\$ 14,993	\$ <u>14,993</u>
	TOTAL:	\$ 16,981	\$ 14,993	\$ 14,993

#1934 STUDENT HEALTH SERVICE

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			Approved 78-79	Proposed 79-80	Recommended 79-80
CJ-00	Med & Hlth Services		\$ 4,000	\$ 4,000	\$ 3,635
EA-89	Misc Supplies		-0-	500	-0-
		TOTAL:	\$ 4,000	\$ 4,500	\$ 3,635

#1935	TUTORIAL	PROGRAM

na kan			Approved 78-79	Proposed 79-80	Recommended 79-80
BN-00	Student Institutional		\$ 9,180	\$ 10,864	\$ 8,576
LA-00	OASI		560	736	579
LC-00	Med Aid & Indus Ins		260	400	285
		TOTAL:	\$ 10,000	\$ 12,000	\$ 9,440

#1937 EQUIPMENT & FACILITIES

		Approved 78-79	Proposed 79-80	Recommended 79-80
ED-10	Rental Bldg	\$ 6,864	\$ 6,864	\$ 6,864
EE-20	Repair-Equipment	-0-	150	150
EF-10	Repro On Campus-Gen	1,038	-0-	-0-
EP-00	Insurance	-0-	400	-0-
ES-00	Vehicle Maint & Op Cst	4,098	5,000	500
GC-00	In-St-Priv Auto Mile	-0-	1,765	1,126
GD-30	I-S Rental Cars	-0-	1,000	800
	TOTAL:	\$ 12,000	\$ 15,179	\$ 9,440

ACTIVITIES

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1950 ACTIVITIES PROGRAMMING

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			Approved 78-79	Proposed 79-80	Recommended 79-80
ED-30	Rental Films		\$ -0-	\$ 800	\$ 550
EF-10	Repro On Campus-Gen		-0-	50	-0-
EF-40	Print On Campus-Gen		-0-	175	-0-
EH-10	Dues & Memberships		-0-	200	-0-
ER-10	Guest Speakers/Lect		6,000	10,800	8,925
ER-20	Misc Contractual Srv		4,000	6,600	4,803
		TOTAL:	\$ 10,000	\$ 18,625	\$ 14,278

#1	951	PROG	RAM	PI	UB	LIC	CITY

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STAT.

			Approved 78-79		Proposed 79-80		Recommended 79-80	
EB-10	Postage		\$	-0-	\$	300	\$	400
EF-10	Repro On Campus-Gen			-0-		200		150
EF-40	Print On Campus-Gen			-0-		300		250
EF-60	Outsd Under PR-Gnr1		\$	3,000		1,000		700
EZ-10	Advertising & Promotions		_	2,500		3,000		2,465
		TOTAL:	\$	5,500	\$	4,800	\$	3,965

			Approved 78-79	Proposed 79-80	Recommended 79-80
CK-00	Research Srvys & Appr		\$ 275	\$ -0-	\$ -0-
EG-10	Staff Development		250	300	164
EH-10	Dues & Memberships		475	475	475
GA-00	In-State Sub & Lodging		900	900	470
GC-00	In-St-Priv Auto Mile		500	-0-	-0-
		TOTAL:	\$ 2,400	\$ 1,675	\$ 1,109

#1952 CONFERENCES

		Approved 78-79		Proposed 79-80	Recommended 79-80	
EA-89	Misc Supplies		\$ -0-	\$ 50	\$ -0-	
ER-10	Guest Speakers/Lect	Charles A.	-0-	500	-0-	
ER-20	Misc Contractual Srv		-0-	200	-0-	
ES-00	Vehicle Maint & Op Cst		1,000	-0-	-0-	
GC-00	In-St-Priv Auto Mile		-0-	155	-0-	
GD-40	I-S Field Trips		400	400	-0-	
GF-00	Out-St Sub & Lodging		-0-	300	315	
GH-00	Out-St Priv Auto Mile		-0-	300	130	
GJ-40	0-S Field Trips		600	500	605	
		TOTAL:	\$ 2,000	\$ 2,405	\$ 1,050	

#1955 SUMMER PROGRAMMING

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M PL W W K IN M M

#1960 CLUBS & ORGANIZATIONS

THE THE

			Approved 78-79	Proposed 79-80	Recommended 79-80
EA-99	Reserve		\$2,000	\$_1,600	\$_1,510
	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	TOTAL:	\$ 2,000	\$ 1,600	\$ 1,510

#1975 TRILLIUM

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		Approved 78-79	Proposed 79-80	Recommended
EA-89	Misc Supplies	\$ 100	\$ 100	\$ 25
EF-50	Print-St Printer	900	1,200	909
EZ-50	Fees/ Licenses	-0-	-0-	10
	TOTAL:	\$ 1,000	\$ 1,300	\$ 944

#1	97	6	SP	RING	FEST	IVAL

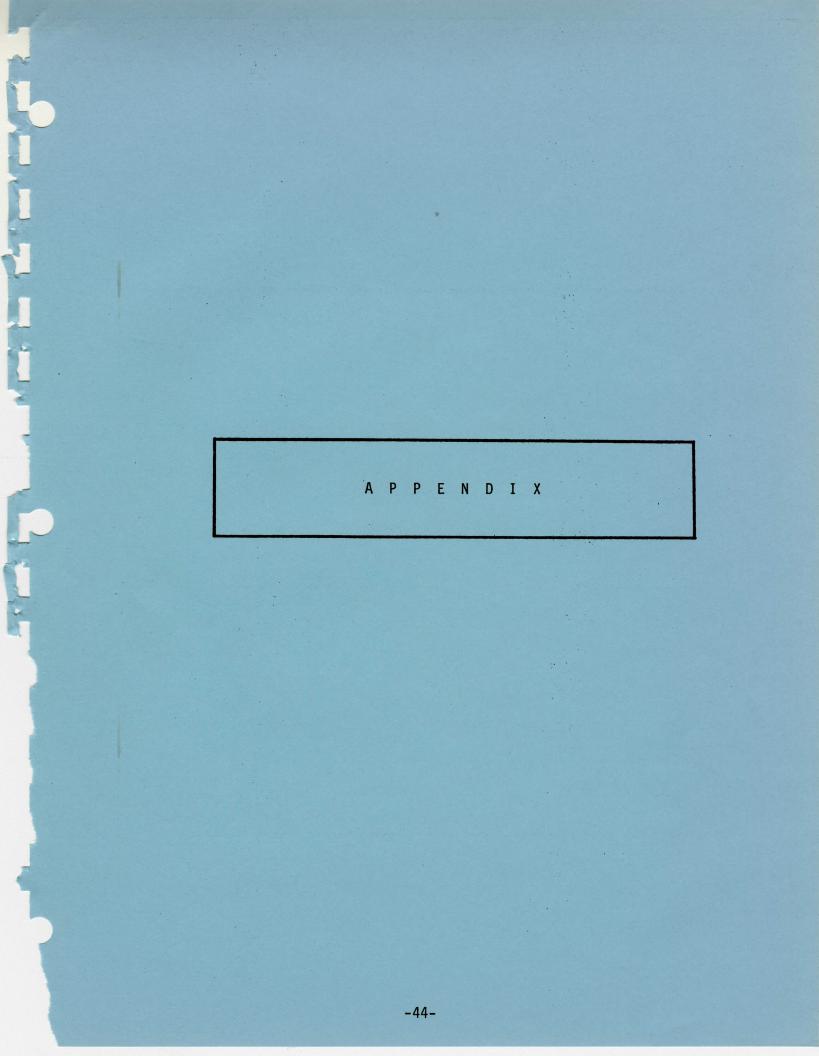
			Approved 78-79	Proposed 79-80	Recommended 79-80
EA-10	Office Supp-Gen		\$ 50	\$ -0-	\$ -0-
EA-11	Office Supp-Xerox	111	25	-0-	-0-
EA-89	Misc Supplies		50	50	-0-
EB-10	Postage		350	400	400
EF-10	Repro On Campus-Gen		50	50	25
EF-40	Print On Campus-Gen		50	50	25
EF-60	Outsd Under PR-Gnrl		500	500	500
ER-20	Misc Contractual Srv		1,525	1,200	680
EZ-10	Advertising & Promotions		400	400	400
		TOTAL:	\$ 3,000	\$ 2,650	\$ 2,030

CONTINGEN CY/RESERVE

#1990 CONTINGENCY/RESERVE

NY N. T

	2.45		Approved 78-79	Proposed 79-80	Recommended 79-80
EA-99	Reserve		\$ 16,004	\$_9,665	\$_8,104
			\$ 16,004	\$ 9,665	\$ 8,104



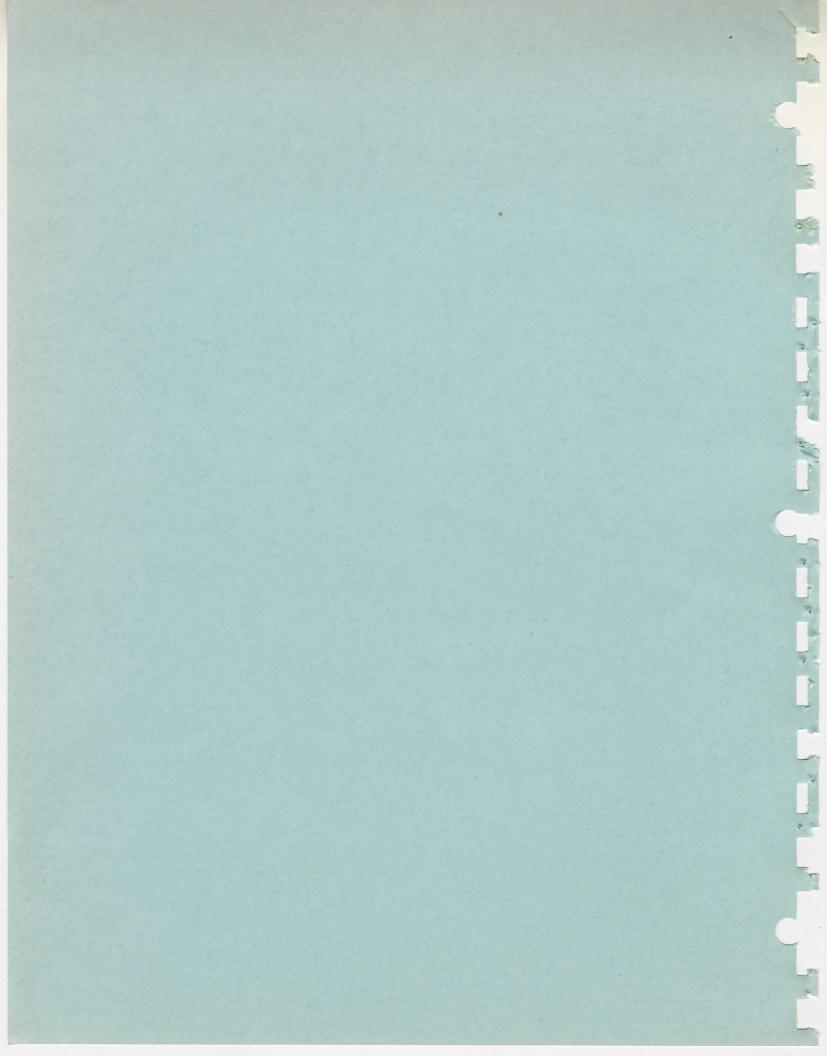
APPENDIX A

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Miscellaneous Revenue Derived from Student Programs, Services & Activities

Account	Account Title	Projected Revenue
	•	
PROGRAMS:		
#1901	Collegiate Challenge	\$ 2,000
#1902	Drama	150
#1916	Men's Athletics-Basketball	300
	Sub Total:	\$ 2,450
SERVICES:		
#1930	Child Care Center	
	Parent Fees USDA Food Subsidy DSHS Service Contract	\$ 8,500 1,500
	Sub Total	\$13,000
ACTIVITIES:		
#1950	Activities Programming	\$11,500
#1955	Summer Programming	1,050
#1960	Clubs and Organizations	200
	Sub Total:	\$12,750
INTEREST:	Sub Total:	\$ 2,000
TOTAL MISCELLANEOUS REVENU	E:	\$30,200



COMMUNITY COLLEGE DISTRICT 22

Tab IV, Item D

TACOMA COMMUNITY COLLEGE

5900 South 12th Street • Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

TO: BOARD OF TRUSTEES	DATE May 24, 1979
FROM: President	CATEGORY I.S.
SUBJECT: Instructional Services; May Report of Activities	ITEM & FILE NO. IV, D ENCLOSURE (S)
REASON FOR BOARD CONSIDERATION:	

Management Leadership Styles Workshop

The Dept. of Continuing Education and Community Services sponsored a "Management Leadership Workshop" for City of Tacoma employees on Thursday, April 12, 1979 from 8 a.m. to 5 p.m. The workshop was conducted by Skip Marshall, Coordinator for Small Business Management Education.

Hilltop Project to Start

40 A 4

The Tacoma Community College/Community Organization Project is scheduled to begin in May. The project is co-sponsored by Tacoma Community Organization and is funded by a Title IA grant from the state Department of Planning and Community Aid.

The project is designed to provide a wide base of community involvement in an effort to aid Hilltop residents solve problems of housing, tax inequity and city-citizen relations.

Workshops on a variety of issues along with television forums and newspaper coverage will be used to prepare area residents for a neighborhood convention aimed at resolving their problems.

CETA project Underway

Through a request from the Metropolitan Development Council, Tacoma Community College has been selected by CETA to provide the instruction for a new training project. The project will provide one training program for outreach workers and another for managerial aides. The project is scheduled to terminate Winter Quarter 1980.

ADMINISTRATOR INITIATING ITEM. Robert R. Rhule	FINAL DISPOSITION
BOARD ACTION DATE	
EFFECTIVE DATE	

A review has been done of the following trades programs at McNeil Island Penitentiary; welding, electronics, small engine repair and barbering.

Lorraine Stephan will be working with the Degree Committee and the Curriculm Committee to propose approval of credits for each of the programs.

A letter has been received from the Technical Education Research Center of Waco, Texas, formally inviting Tacoma Community College to participate in the Energy Conservation and Use Technician Program as a field test site beginning in Fall, 1979.

Final program approval packages for Fluid Power Technician and Energy Management Technician have been submitted to the State Board for Community College Education. Advisory committees for both programs have formally recommended approval of both the curricula and program implementation.

NEW COURSES

After approval by the respective Departments, Divisions, and the College Curriculm Committee, the following new courses, as shown on Attachment "A", were approved by the President.

"Attachment A"

ALLIED HEALTH DIVISION

Nursing 219	State Board Examination Review:	/ 2 / 20 / 0 /
	Psychiatry	Cr. Lec. Lab
Review of basic State Board exa	psychiatric nursing course in prepara mination.	tion for the
Nursing 220	State Board Examination Review:	/ 2 / 20 / 0 /
	Maternity Nursing	Cr. Lec. Lab
Review of basic State Board exa	maternity nursing course in preparati mination.	on for the
Nursing 221	Intensive Care Nursing I	/ 3 / 3 / 0 /
		Cr. Lec. Lab

A course designed for the practitioner interested in, or involved in, the critical care setting to augment the understanding of anatomy and physiology of the core body systems. The course will integrate knowledge of pathophysiology and nursing assessment as they relate to disease processes in critical care. Technical devices for monitoring and life support will be discussed as they relate to the treatment of the critically ill. One of the primary objectives of the course will be to recognize symptoms of shock, pulmonary, and renal pathology and know correct nursing response to that situation. This course is a continuing education course for registered nurses, and is recommended by the Critical Care Interest Group of Pierce County.

Nursing 222 Intensive Care Nursing II / 3 / 3 / 0 /

A course designed for the practitioner interested in, or involved in, the critical care setting to augment the understanding of anatomy and physiology of the core body systems. The course will integrate knowledge of pathophysiology and nursing assessment as they relate to disease processes in critical care. Technical devices for monitoring and life support will be discussed as they relate to the treatment of the critically ill. One of the primary objectives of the course will be to recognize the symptoms and understand the pathology associated with disseminated intravascular clotting, neurological and metabolic problems and know the correct nursing response. This course is a continuing education course for registered nurses, and is recommended by the Critical Care Interest Group of Pierce County.

Nursing 225	Clinical Preceptorship	/ 8 /	40 / 200 /
		Cr. L	ec. Lab

A continuing education for nurses designed to develop both clinical and leadership skills in order to assist the new graduate in the transition from student to staff nurse.

ARTS AND HUMANITIES DIVISION

Drama 135	Summer Arts Workshop	/ 4 / 2 / 4 /
Diama 155		Cr Loc Lab

A laboratory approach to stagecraft instruction primarily for high school juniors and graduating seniors. Set design and construction, properties, wardrobe, lighting, makeup, and house management will be included. The class will serve as the stage crew for the Summer Arts Workshop music theater production.

Music 135	Summer Arts Workshop	/ 4 / 2 / 4 /
		Cr. Lec. Lab

A laboratory approach to vocal instruction in music theater primarily for high school juniors and graduating seniors. Emphasis on rehearsal and performance of leading roles and chorus parts in a Broadway musical. The class will serve as the cast for the Summer Arts Workshop music theater production.

BUSINESS AND OFFICE EDUCATION DIVISION

Banking & Finance 224 Analyzing Financial Statements I / 3 / 3 / 0 / Cr. Lec. Lab

A course which offers the student tools and techniques necessary for the evaluation of financial conditions and operating performance of a modern business enterprise. (Recommended by American Institute of Banking and the Washington AIB State Board Office.)

Banking & Finance 225 Analyzing Financial Statements II / 3 / 3 / 0 / Cr. Lec. Lab

A continuation of Banking and Finance 224. Emphasis is on the tools of financial statement analysis and the techniques of financial statement analysis. (Requested by American Institute of Banking and the Banking and Finance Advisory Council.)

Banking & Finance 240 Introduction to Commerical Lending / 3 / 3 / 0 / Cr. Lec. Lab

A course which provides an overview of the commercial lending function. It is targeted to management trainees and junior management. The four areas of concentration are: commercial lending overview; the lending process; portfolio management; and regulation and business development. (Recommended by Banking and Finance Advisory Committee.)

Banking	2	Finance	246	Branch	Management	1	3	/ 3 /	0/
Dunking		<u>1 1110100</u>				Cı	r.	Lec.	Lab

This is a new modular program designed to present a comprehensive overview of the branch function and the manager's role in its operation. (Requested by the American Institute of Banking and the banking industry.)

Insurance 145	Commercial Lines Rating	/ 3 / 3 / 0 /
		Cr. Lec. Lab

This course in commercial casual coverages is designed to acquaint students with coverages and rating on commercial packages and commercial casualty. Emphasis will be on use of the new commercial lines manual that establishes common general rules and a single classification table for all lines. (Requested by the Pierce County insurance industry.)

CONTINUING EDUCATION AND COMMUNITY SERVICES

Business 198	Consumer Economics & Persona	l Finance	/ 3 / 3 / 0 /
			Cr. Lec. Lab

The course will provide students with general consumer education and personal finance aid and informational education; i.e., how to buy and sell insurance, home, goods and services, knowledge of personal income tax, and how to make the most of your money. The course will be offered in the Peninsula area.

Continuing Education 19	8 Traffic Control an	d Safety	/ 3 / 3 / 0 /
	for the Construction		Cr. Lec. Lab

A course designed for persons engaged in road and facilities construction that disrupts traffic. Topics include: legal and environmental problems, operational aspects, planning, equipment, installation and design. Problem situations and case histories will be presented.

DEVELOPMENTAL EDUCATION

 GED 90-94
 GED Preparation
 / 1-5 / /X /

 Cr. Lec. Lab

A course designed for the student who wishes to take the High School Equivalency (GED) test. Students should be functioning at or above the 8th grade level in basic skills. Emphasis will be on the five subject and skill areas of the GED test which include: Test I--writing skills (GED 90); Test II--social studies (GED 91); Test III-science (GED 92); Test IV--reading skills (GED 93); Test V--mathematics (GED 94).

HEALTH, PHYSICAL EDUCATION AND RECREATION DIVISION

Physical Education 198 Certification for First Aid / 2 / 2 / 0 / Instructors

An American Red Cross First Aid Instructor's course to provide training for individuals to qualify for, and become, Red Cross First Aid instructors. (Requested by the American Red Cross.)

Page 4

SOCIAL AND BEHAVIORAL SCIENCES DIVISION

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Cr.	Lec. Lab
Training and experience in the arts of organization, motivation, leadership. Practical study of leadership and military skills.	and
	3/3/0/
Cr.	Lec. Lab

Application of organization, motivational, leadership skills, and preparation for advanced camp.

COMMUNITY COLLEGE DISTRICT 22

Tab IV, Item E

TACOMA COMMUNITY COLLEGE

5900 South 12th Street • Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

TO: BOARD OF TRUSTEES	DATE May 24, 1979
FROM: President	CATEGORY S.S.
SUBJECT:	ITEM & FILE NO. IV, E
Student Services; May Report of Activities	ENCLOSURE (S)
REASON FOR BOARD CONSIDERATION:	

STUDENT DEVELOPMENT

The most critical event during the month of April was the serious financial problem encountered by the college's Iranian students, many of whom have been unable to receive funds to support their education as a result of the political turmoil in their country. As Spring Quarter began, aid and assistance from various sources throughout the community and the region permitted all but thirteen (13) of these students to pay their non-resident tuition and fees for Spring Quarter. As the final legal deadline for the deposit of tuition and fees approached, it appeared that there would be no way of providing sufficient funds to permit these students to continue their education. Last minute help from the community reduced the number of students still without funds for their tuition to six (6). With authorization from the Office of the Dean of Student Services, these last six students were able to pay their tuition and operating fees through loans from the Emergency Tuition Loan Fund established out of the Service and Activity Fee by the Board of Trustees during Winter Quarter 1979. Thanks to the prompt and impressive repayment record of the numerous other students who have benefited from this new loan fund, there were sufficient funds to meet the non-resident tuition costs of these last remaining Iranian students.

Special credit for the happy conclusion to this most serious problem is due to the unflagging efforts of Mary Palo of our Counseling faculty and Donna Long of our Admissions staff working closely and cooperatively with the Office of the Dean of Business Services and Planning and the Office of Student Financial Services. Their care and tenacity in achieving a solution to the problem is to be commended.

ADMINISTRATOR INITIATING ITEM: R. L.	Batdorf	FINAL DISPOSITION
BOARD ACTION DATE		
EFFECTIVE DATE		

STUDENT PROGRAMS AND ACTIVITIES

The month of April and the early weeks of May saw the annual process of developing a Service and Activity Fee budget unfold. Once again, a highly cooperative and effective relationship existed between the ASTCC Advisory Board (formerly the Budget Advisory Committee) and the ASTCC Senate which is charged with the drafting of the Service and Activity Fee budget.

For the second year in a row the task of developing this budget became an extraordinarily demanding and difficult task in light of a continuing decline in Service and Activity Fee revenue resulting from enrollment declines throughout the college. The Advisory Board, the Senate, and the Coordinator of Student Programs and her staff are to be commended for their exemplary performance under an extraordinarily difficult set of circumstances.

CHILD CARE CENTER

The college's Child Care Center continues to be an increasingly important part of college life. At the beginning of Spring Quarter, the Child Care Center was operating at its licensed capacity of 49 children and had a waiting list of nearly 20 prospective students.

The Director of the Child Care Center recently undertook a survey of participating parents in the program to determine the average credit load of the students who have children in the Center and to determine to what degree the Child Care Center makes their attendance at Tacoma Community College possible. The Board will find the results of this survey most illuminating.

The average credit load during Spring Quarter of students with children in the Center is 15.5 credits and 87 per cent of these students indicate that they would be unable to attend college were it not for the availability of a child care center.

The exceptionally high quality of the staff in the Child Care Center and the outstanding educational program which they offer to the children can be a source of great pride and satisfaction for the entire campus community. COMMUNITY COLLEGE DISTRICT 22

Tab V, Items A-E

TACOMA COMMUNITY COLLEGE

5900 South 12th Street • Tacoma, Washington 98465

AGENDA ITEM BACKGROUND

TO: BOARD OF TRUSTEES		DATE May 24, 1979
FROM: President		CATEGORY .
SUBJECT:		ITEM & FILE NO. V. A-E
Correspondence		ENCLOSURE (S)
REASON FOR BOARD CONSIDERATION:	INFORMATION	Letters

The enclosed correspondence is forwarded to the Board of Trustees for its review.

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ADMINISTRATOR INITIATING ITEM:	L.	Ρ.	Stevens	FINAL DISPOSITION
BOARD ACTION DATE				
EFFECTIVE DATE				

Tab V, Item A

APINON

AFZH-EO

25 April 1979

SUBJECT: Letter of Appreciation

Mr. Joe Kosai Counselling Center Tacoma Community Center 5900 South 12th Street Tacoma, Washington 98465

Dear Mr. Kosai:

The 9th Infantry Division and Fort Lewis Equal Opportunity Staff extends their sincere appreciation for the splendid support you provided as a Guest Speaker for the Fort Lewis Unit Equal Opportunity Seminar and Management Course presented from 9-20 April 1979.

Your presentation on 17 April 1979, on the Japanese American Community in the Tacoma area contributed to the overall Fort Lewis Equal Opportunity objectives by fostering understanding and promoting racial harmony. Your experiise and professionalism was well received by all in attendance and considered to be an essential element in gaining knowledge, awareness, and enhancing the students understanding of contemporary issues in our society.

Your enthusiasm and genuine concern is an outstanding example of how individual contributions can make the Army's Equal Opportunity Program a success.

Again, we extend our deepest appreciation for a job well done.

Sincerely yours,

RICHARD D. PAPINEAU Major, General Staff Equal Opportunity Staff Office

Copy Furnished: Dr. Larry Stevens President, TCC

Tab V, Item B

ANTHONY FELDHAUSEN Superintendent

Willapa Valley Schools

District' No. 160 Menlo, Washington 98561 ROBERT FLUETSCH Secondary Principal

CHARLES WERLEY Elementary Coordinator

MAY 0 3 1979

May 1,1979

Dear Administrator,

Last week one of your educators, Joe Kosai , attended the U.S. Air Force Academy Educator Airlift briefing in Colorado.

The visit was outstanding in every aspect. Collectively and individually we gained a healthy respect and appreciation for the caliber of young people at the Academy.

Let me thank you for permitting your co-worker to attend this excellent conference. I realize the probable inconvenience this may have caused.

Thanking you for your consideration, 1 am

Cordially yours,

RLFluetsch, principal (Captain, USAFR - project officer)



CTHILE OF 15: APR 2.6 1973

Tab V, Item C

April 25, 1979

Mr. Richard Spangler Tahoma Vista Village 1512 S. Mildred Tacoma, WA 98465

Dear Mr. Spangler:

This is to express my appreciation for our meeting of today. It was most valuable and I am looking forward to providing services for Vista Village residents.

Enclosed please find a Spring Quarter 1979 UPDATE, and a copy of the last survey which was distributed to participants of the Life Long Learning Institute Program which you may wish to present to your council meeting for suggestions.

Again, thank you. I will enjoy working with you.

Sincerely,

James a Brunk

Tanya A. Brunke Associate Dean for Continuing Education and Community Services

TAB:ldc

cc: Dr. Rhule Dr. Stevens



STATE OF WASHINGTON

STATE BOARD FOR COMMUNITY COLLEGE EDUCATION 319 Seventh Avenue, FF-11, Olympia, Washington 98504

319 Seventh Avenue, FF-11, Olympia, Wash

Dixy Lee Ray Governor

April 26, 1979

Dr. Ron Magden Tacoma Community College 5900 S. 12th Tacoma, Washington 98465 APR 30 1975

Dear Ron:

I just wanted to write a note of appreciation to you for hosting the AACJC television project earlier this week. In talking to Penny Richardson, she was very pleased with the informal but very adequate arrangements at Tacoma and the obvious friendliness with which the whole project took place.

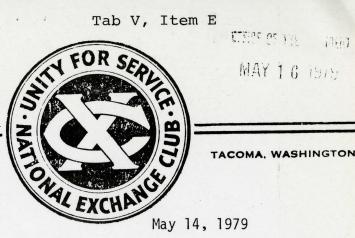
I sincerely appreciate your extra effort in having coffee and juice there for us at the meeting and for seeing that we were accommodated with telephone use when the necessity arose. I believe that we accommodated Penny with everything that she desired and hopefully the report that she will write will be very useful to us.

Thanks again for your kindness.

Sincerely,

É. Frank Price Associate Director

EFP:sw cc: Dr. Larry Stevens



Mr. Donald Gangnes Dean of Business Services Tacoma Community College 5900 South 12th Street Tacoma, WA 98465

THE EXCHANGE CLUB OF TACOMA

Dear Mr. Gangnes:

In keeping with our continuing effort to serve the youth of our community, we, the members of The Exchange Club of Tacoma, wish to donate a section of bleacher seats for use at the Sam Minnitti Playfield baseball diamond.

We have purchased a 36 foot 250 seat capacity steel grandstand from the Sturdisteel Company of Waco, Texas. The order was placed May 9, and shipment is expected in approximately 10 days. We asked that it be delivered to the Playfield in care of Tacoma Community College, and that they contact Mr. Bob Blankenship for unloading instructions. All costs associated with purchase and delivery have been paid by The Exchange Club of Tacoma.

It is our intent that this grandstand be placed behind home plate as the center section of bleachers and that it remain there for use by all college, public school, and community organizations using the Playfield. Although the grandstand is being placed entirely in the custodial care of the College, The Exchange Club members would like to make two requests: (1) we would appreciate an opportunity to be present and help with its assembly; and, (2) we wish to have made and placed on the grandstand an appropriate sign indicating that it was donated by The Exchange Club of Tacoma.

If you have any questions or concerns, please contact me or Mr. Charles Summers who has been the liaison for this project with our assistance committee.

Sincerely,

zyle

J. T. Hayes President Designate The Exchange Club of Tacoma

JTH:mh cc: Dr. Stevens ✓ Phyllis Templin Bob Blankenship