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The major purpose of this guide is to elicit the information needed for the writing of educational specifications used in the planning of educational facilities for electrical technology programs. It is for use by instructors, supervisors, school plant planners, and local school officials. Part I is a discussion of the recent trends which were utilized in the preparation of the guide. Part II provides data collection instruments covering basic electrical program features, objectives, and the kinds of programs organized to implement the objectives. Part III contains data collection instruments covering the facts relative to the actual desired space. Part IV is an annotated bibliography of 24 related items published between 1959 and 1968. Fifteen data collection instruments are included. A related document is "A Guide to Systematic Planning for Vocational and Technical Schools" (VT 007 825). (EM)

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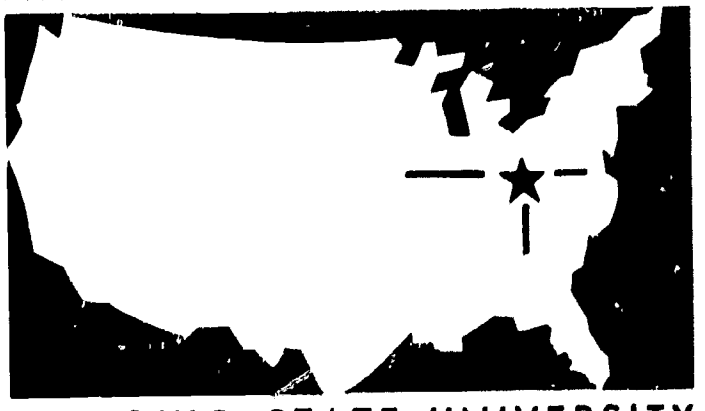

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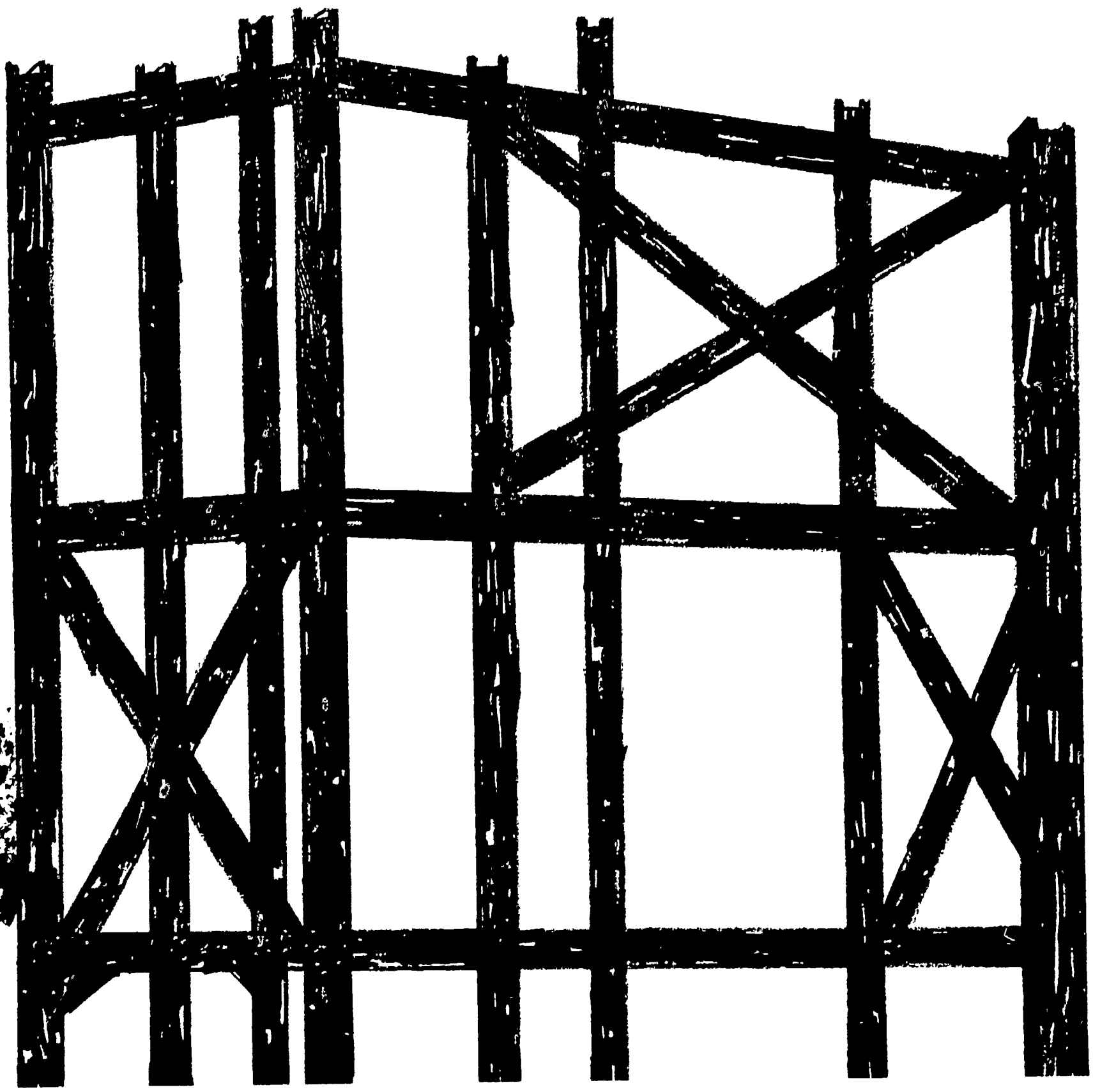

The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Comprehensive and Vocational Education Research, U. S. Office of Education. It serves a catalytic role in establishing consortia to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;

2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;

3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;

4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;

5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and inservice education program;

6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Resources Information Center located in the U. S. Office of Education.

RESEARCH SERIES NO. 30

INTERIM REPORT
GRANT NO. OEG-3-7-000158-2037

A GUIDE FOR PLANNING FACILITIES FOR OCCUPATIONAL PREPARATION PROGRAMS IN ELECTRICAL TECHNOLOGY

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FOREWORD

One of the most fundamental concerns in planning for vocational and technical education facilities is that of assuring that educational requirements dictate the nature of the facilities. Other concerns include planning a sufficiently adaptable and flexible structure to permit needed modifications and programmatic changes over the lifetime of the building. Experiences have shown that adequate manuals and guide materials can provide substantial assistance in planning educational facilities. This document is a guide for planning facilities for occupational preparation programs in electrical technology. The information recorded in the guide is to be used in the preparation of educational specifications.

The guide lists a series of pivotal questions about the educational program to be offered. The answers to these program questions bear directly on the numbers and kinds of instructional areas needed in the contemplated facilities. After program decisions are recorded, the guide provides for the description of instructional areas needed to meet program requirements. Much of the material is presented in a checklist format which allows for consideration of alternatives in facility planning.

The guide was designed for use by any person or groups of persons responsible for planning electrical technology training facilities. It is anticipated that knowledgeable persons such as electrical technology instructors, state supervisors, university school plant planners, and local administrators will find the guide a useful planning tool. The guide can also be used for instructional purposes at universities, colleges, seminars, and institutes.

This guide is the eighth in a series being developed by The Center. Subsequent guides will be published for dental technology and medical technology. The first seven guides developed were in the fields of home economics, machine trades, data processing, business and office occupations, animal science technology, metallurgy technology, and automotive services. All guides follow the general format developed by The Center project staff and M. J. Conrad, head, Administration and Facilities Unit, College of Education, The Ohio State University. Vocational educators should also refer to the basic guide, A Guide to Systematic Planning for Vocational and Technical Education Facilities.

The Center for Vocational and Technical Education, The Ohio State University, worked cooperatively with L. J. Sitterlee, chairman and the staff of the Electrical Technology Department of Broome Technical College, Binghamton, New York, in preparing this planning guide. Center project staff members were Richard F. Meckley, Ivan E. Valentine, and Zane McCoy.

The Center is grateful to the many individuals and groups whose assistance and suggestions led to the successful conclusion of the project. Special appreciation is due William A. McIntosh,

associate professor, North Carolina State University, for thoughtful and helpful review of the initial draft of the guide.

Robert E. Taylor
Director
The Center for Vocational
and Technical Education

CONTENTS

A GUIDE FOR PLANNING FACILITIES FOR OCCUPATIONAL PREPARATION PROGRAMS IN ELECTRICAL TECHNOLOGY

FORMS A B C D E F G H I J K L M N O

PART I

INTRODUCTION

PURPOSE OF GUIDE

The major purpose of this guide is to elicit the necessary information for the writing of educational specifications for facilities to house needed programs in electrical technology. The guide was developed as a facility planning tool for use by such knowledgeable persons as electrical technology instructors, state supervisors, school plant planners, and local school officials.

In addition to providing important and comprehensive information to be incorporated in educational specifications, the guide is also designed to:

- Assist planners in the formation of creative solutions to the housing of desired educational programs.
- Prevent important considerations from being overlooked in the facility planning process.
- Encourage logical and systematic facility planning.

ORGANIZATION OF GUIDE

The facility planning guide is organized under four major headings or parts. Part I (Introduction) is a discussion of the major purpose, the underlying assumptions, the guiding principles, and recent trends which were utilized in the preparation of the guide.

In Part II (The Instructional Program) important information is sought on the electrical technology department basic program features, objectives, and the kinds of programs which will be organized to implement them.

In Part III (Distinct Types of Instructional Areas to be Provided) the actual spaces desired to house the programs are described in detail.

Part IV is an annotated bibliography of reference sources which offer a more detailed treatment of the various phases of facility planning.

UNDERLYING ASSUMPTIONS

Important assumptions were made in the preparation of this guide. They were:

- Major educational program decisions have or are being made. Content of instruction has been determined through educational surveys, advisory committees, school board study, etc. Instructional methods have been determined by qualified electrical technology and other appropriate staff members. To assure adequate educational program planning, the guide will ask important questions which may serve as guidelines to such planning.

- A cooperative and collaborative relationship has been established with knowledgeable local agencies who are aware of economic, political, and social conditions which must be taken into account in short- and long-range educational planning.

- Educational, economic, political, and social planning has revealed the approximate numbers and kinds of students (school-age and adult) to be served by the proposed school. Such information has been provided by enrollment projections, census tract data, student interest studies, etc.

- The information recorded in this document will be used in the preparation of educational specifications for use by an architect(s) in facility design. Sufficient funds are or can be made available to support both the provision of facilities and the operation of the desired occupational preparation programs.

RECENT TRENDS

- Expanded programs to reach not only the average and those who are college bound, but also the unusually gifted, the physically handicapped, the mentally retarded, and the culturally disadvantaged are needed and being provided by occupational preparation programs.

- Cooperation among instructors in developing interdisciplinary units or courses is increasing. Cooperative instruction is encouraged and facilitated by the proximity of instructional and work areas where the teachers can plan together and produce instructional materials.

- Mobile equipment and convenient space for storing it is making the same space available for many purposes and resulting in more effective and efficient use of space.

- Mechanical and electronic teaching aids are being utilized to a greater degree by instructors in occupational preparation programs. To some extent, the effective use of such devices depends upon the accessibility and convenience of storage.

GUIDING PRINCIPLES

In planning facilities to house occupational preparation programs, it is suggested that educational program and facility decisions be consistent with the following guiding principles.

- The educational program is the basis for planning space and facilities.

- Space and facilities should be planned to accommodate changes in the educational program.

- The program should be planned to serve the needs of a variety of groups in the community.

- Space and facilities for the program can be extended through the use of community resources.

- Safe and healthful housing must be provided for all students.

- Space and facilities for occupational preparation programs should be considered in context with the total educational program of the institution and the community.

PART II

THE INSTRUCTIONAL PROGRAM

Part II of the guide records important instructional program decisions with respect to basic program features, objectives, and needed information on occupational preparation programs to be housed.

BASIC PROGRAM FEATURES

Basic features of the educational program are determined greatly by a school or department's educational philosophy. A philosophy of education provides a base from which program objectives and teaching and learning activities designed to meet these objectives can be derived. In the final analysis, it is the kinds of teaching and learning activities to be carried on which should determine facility needs.

In this section, planners have an opportunity to express basic program features which will serve as guidelines for the planned occupational preparation programs in electrical technology.

Indicate below the relative degree of emphasis to be placed on each of the program features stated by circling the appropriate number. The scale provided for this purpose ranges from 1 for major emphasis, 2 for some emphasis, 3 for slight emphasis, to N for no emphasis. This same scale will be used frequently throughout the planning guide.

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. Purpose of Program

   a. The purpose of the program will be the preparation of students for gainful employment. 1 2 3 N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

b. The purpose of the program will be the preparation of students for entry into further training programs. The nature of this further training is _____ _____ _____ _____ 1 2 3 N

c. Other program purposes which should be included are:
1) _____
2) _____
3) _____
4) _____

2. Students

a. Students will be selected for entrance into the program. The basis for selection will be:
1) _____
2) _____
3) _____
4) _____

b. The program will place emphasis on skill acquisition. 1 2 3 N

c. The program will place emphasis on the learning of theory. 1 2 3 N

d. Students will have freedom of movement and access to learning materials. 1 2 3 N

e. Students will be encouraged to act independently. 1 2 3 N

f. Students will be provided with cooperative work experience outside the school. 1 2 3 N

g. Other basic program features in relation to students include:
1) _____
2) _____
3) _____
4) _____

3. Instruction

a. The instructional approach will be single discipline (electrical technology) as opposed to interdisciplinary (electrical technology, science, etc.). If not a single discipline approach, describe the inter-disciplinary approach and the disciplines involved. _____ _____ Yes No

b. Cooperative or team instruction will be used. If this mode of instruction is to be extensively emphasized, describe in general terms. _____

_____

_____

_____ Yes No

c. Community resources will be utilized in instruction. If a high emphasis is to be placed on use of community resources, describe some of these resources. _____

_____

_____

_____ Yes No

d. Instructional flexibility is required. If a high emphasis is to be placed on instructional flexibility, please describe the kinds of flexibility desired. _____

_____

_____

_____ Yes No

4. Other basic program features important to the planned instructional program:

a. _____

_____

b. _____

_____

c. _____

_____

d. _____

_____

EDUCATIONAL OBJECTIVES

Educational objectives are often identified as goals or outcomes of the educational program. An objective should describe a desired educational outcome that is consistent with a school's philosophy.

Objectives are important to both the planner and the architect since they determine the school's program and related activities. They provide important implications which when translated into facilities can both enhance as well as adequately house the desired program. Thus it becomes imperative to clearly establish the program objectives prior to embarking on educational specifications and subsequent building design.

The purpose of this part of the guide is to bring together these elements in a way to provide direction and understanding for both the planner and the architect. Space is provided below to indicate degree of emphasis by circling the appropriate number for each of the objectives, and to list additional objectives. The scale provided for this stated purpose ranges from 1 for major emphasis down to N for no emphasis.

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. To prepare individuals for entry into gainful employment as technicians 1 2 3 N

2. To give the individual enough background so that he may formally or informally continue his education 1 2 3 N

3. To prepare individuals to be useful citizens in their community 1 2 3 N

4. In order that the electrical technician may be well prepared, the following subject area objectives are emphasized:

   a. Mathematics: mathematical principles required for direct application to physics, electrical and electronic problems. 1 2 3 N
   b. Engineering drawing and design: basic drafting and design (with supplemental sketching) applied to the electrical field, such that the graduate may understand electrical and electronic diagrams, equipment construction diagrams, and various graphic descriptions. 1 2 3 N
   c. Technical subject matter: physics, networks, electronics, computer programming, machines, and controls to present the theory and physical concepts of the electrical field. 1 2 3 N
   d. Laboratory experience: to enable students to obtain practical experience in manufacturing processes, electricity, electronics, physics, rotating machinery, controls, and computer programming. Laboratory experience supplements theoretical training by inabling students to use modern equipment similar to that found in industry. 1 2 3 N
   e. General education: English, social studies, and economics so that the student may be articulate and be aware of social and economic trends. Industrial relations, and industrial organization and management enable the student to understand industrial practices and the function of industry in our society. 1 2 3 N
   f. Electives: mathematics, engineering economics, and introduction to system logic provide for additional growth and familiarity with current engineering practices. 1 2 3 N
   g. Electrical construction and maintenance: familiarize the individual with present

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

shop practices so that he may 1) talk intelligently with the skilled craftsman, 2) supervise the construction of a project, or 3) build and test the project in a model shop. 1 2 3 N

5. Other program objectives include:

a. _____

b. _____

c. _____

d. _____

PROGRAM CONTENT AREAS

The educational program in electrical technology should be designed to meet its established objectives. All decisions made with respect to educational programs should be consistent with established philosophy and objectives.

In occupational preparation programs, the courses or units of instruction emphasize the student's acquisition of knowledge and the development of understanding, attitudes, and skills relevant to occupational preparation and the utilization of specialized skills of electrical technology. Learning activities and experiences are organized to enable students to develop competencies essential for entry into their chosen occupations, to further training, or to acquire new or additional competencies for upgrading their occupational profession.

Instruction in occupational preparation electrical technology is usually given in overlapping subject areas or courses. Subject matter is coordinated with appropriate field, laboratory, and work experience.

Programs in electrical technology can be classified under the broad headings or content areas of 1) Electrical Machines and Power; 2) Manufacturing Processes, Electrical Construction, and Maintenance; 3) Circuits and Physics; 4) Electronics; 5) Engineering Drawing; 6) Computer Programming; and 7) Computer and Control Systems. These seven content areas relate directly to the field of electrical technology and can be used to categorize most occupational preparation programs in the field. However, students in various electrical technology programs often elect or are required to take courses in subjects such as English, mathematics, and physical education which are available to all

students. For example, a first-year community college student might take the following courses or units:

Courses	Content Areas
English	Academic
Mathematics I	Academic
Manufacturing Processes	Manufacturing Processes, Electrical Construction, and Maintenance
Industrial Safety	Academic
Physics	Circuits and Physics
Engineering Drawing	Engineering Drawing

The concept of content areas is used in this planning guide because different instructional content areas usually call for different kinds of instructional facilities and equipment. The following content areas which usually call for specialized instructional areas are used in this guide.

- Electrical Machines and Power
- Manufacturing Processes, Electrical Construction, and Maintenance
- Circuits and Physics
- Electronics
- Engineering Drawing
- Computer Programming
- Computer and Control Systems
- Academic
- Science (other than circuits and physics)
- Music
- Physical Education
- Other (This category is used in the event that a course or unit to be offered will not fit into any of the above content areas.)

PLANNING INSTRUCTIONAL AREAS BY MODES OF LEARNING

The planning of instructional areas for occupational preparation facilities can be substantially aided through utilization of the concept of modes of learning. Learning can be divided into three distinct modes--reaction learning, interaction learning, and action learning.

Reaction learning, which usually occurs in an instructional area designed for lecture and demonstration, is characterized by activities which tend to be largely teacher-centered with the central focus on instruction. Student activities include listening, observing, and the taking of notes. Group size may vary from one to a very large number as the number of students has little effect on the learning experience if proper technological aids such as television, microphones, projectors and the like are used. Because student activities are relatively passive in reaction learning, a short optimum time span is normally employed.

Lecture/demonstration areas can be used commonly for reaction learning in all subject areas. For example, in planning facilities for two diverse occupational preparation programs in electrical technology such as electrical machines and automatic controls, the planner should bear in mind that reaction learning for students in both programs can occur in the same kind of instructional area. This means that facility planning should be done in terms of the total program rather than its fractional parts. In many instances, lecture/demonstration areas can be shared not only by occupational preparation programs within vocational service areas, but also shared by distinct and dissimilar service areas such as electrical circuits and physics. Where a great deal of facility sharing is planned, the planner should consider the optimal location within the total building and the advisability of clustering various instructional areas.

Interaction learning, which usually occurs in a seminar instructional area, is characterized by both teacher and learner activity participating as both listener and speaker. This mode of learning, of course, most occur in groups; however, sociological research suggests these groups should not exceed 15 persons for optimal effectiveness. Active interaction of all students generally requires a longer time span than reaction learning.

Seminar areas, like lecture/demonstration areas, are usually designed for common use by all students regardless of programs in which they are enrolled. The same considerations which were outlined for lecture/demonstration areas also apply to seminar areas.

Action learning, which usually occurs in a laboratory instructional area, allows the individual student to learn by doing. Students learn on an individual basis, but may, nevertheless, function in a group setting. Often in more flexible educational programs, students are scheduled for laboratory work on an individual basis. Since action learning involves overt action by individual students, the teacher's role is largely that of a consultant to the learner.

Laboratory areas, of necessity, are more specialized than lecture/demonstration areas used for reaction learning and seminar areas used for interaction learning. Since laboratory areas are designed to facilitate the learning of specific skills, there is less likelihood of sharing such areas by students in various vocational training programs. However, wherever common elements of skill instruction are found among vocational training programs, the possibility of sharing and clustering laboratory facilities can be both expedient and economical.

SPECIALIZED AND MULTI-USE OF INSTRUCTIONAL AREAS

The relative amounts of time to be spent by students in a given vocational program in reaction, interaction, and action learning has definite implications for the number and kind of spaces to be provided. These time considerations combined with

decisions on the degree of specialization versus multi-use help determine the nature of facilities required. Since most vocational programs have concentrated on action learning experiences, facilities designed for a particular vocational program have seldom provided adequate reaction and interaction facilities because of the limited utilization of such spaces. However, if the learning activities in any vocational program are broken down into the modes of learning, it will be noted that reaction and interaction spaces are the same regardless of the vocational area. Therefore, by providing common reaction and interaction spaces for all vocational programs, the most modern technological aids can be justified which, in most cases, will permit lectures, demonstrations and other group reaction learning experiences for groups larger than typically used in vocational education programs. Not only will group reaction learning be improved but more time will become available for the professional staff to work with individuals and small groups in interaction and action learning activities.

Scheduling group reaction and interaction learning experiences into specialized facilities permits complete flexibility in the use of action learning laboratories on an open individualized basis since students would no longer need to be scheduled into the action learning laboratories on a specific class basis. This will permit 100 percent room utilization of the action learning laboratories and also permit the introduction of differentiated staff assignments into vocational education.

The open laboratory concept also permits the planned sharing of certain specialized equipment which may be required by two or more vocational programs.

NOTE: THE FOLLOWING SECTIONS OF THE GUIDE (PAGES 16-36) WILL ASSIST THE PLANNER IN MAKING MATHEMATICAL DETERMINATION OF THE NUMBER OF INSTRUCTIONAL AREAS NEEDED TO HOUSE THE DESIRED PROGRAM. IF THE NUMBER OF INSTRUCTIONAL AREAS REQUIRED ARE ALREADY KNOWN, PLANNERS MAY NOW PROCEED TO FORM E, PAGE 37. IF, HOWEVER, MATHEMATICAL DETERMINATIONS ARE TO BE MADE, ALL FORMS SHOULD BE COMPLETED AS ACCURATELY AS POSSIBLE.

OCCUPATIONAL PREPARATION PROGRAMS TO BE OFFERED

Information on each electrical technology occupational preparation program to be offered is entered on a separate Form A which follows. Directions for completing Form A(s) appear on pages 16 and 17. To assist planners, a sample of a completed Form A is given on page 19. Data entered in the sample of Form A are for an electrical technology training program. The data were assumed for purpose of illustration.

Form A for each occupational preparation program should be filled out as completely as possible. However, it is realized, for example, that an electrical technology instructor completing

Form A may be unaware of time allotments and methods of instruction in other subject areas. If such is the case, the instructor can only supply information on courses within the content areas of electrical technology.

INSTRUCTIONS FOR COMPLETING FORM A
BASIC PROGRAM INFORMATION

Item 1
Occupational Preparation Program--Enter the name of the occupational program to be offered, e.g., electrical technology, electronics technology, etc.

Item 2
Yearly Enrollment--Enter the projected maximum number of students to be enrolled yearly in the program.

Item 3
Nature of Students--Underline all categories which apply to the students to be enrolled in the program.

Item 4
Weeks of Instruction per Year--Enter the number of weeks per year the school will be open for instruction, e.g., 36 weeks, 52 weeks.

Item 5
Total Weekly Periods or Modules--Enter the total number of periods or modules (if modular scheduling is to be used) per week available for instructional purposes for each student. Do not count periods or modules scheduled for lunch and other non-instructional purposes.

Column 6
Courses of Instruction--List the courses or units of instruction to be offered either on a required or elective basis for the occupational preparation program.

Column 7
Content Area--Opposite each course of instruction, enter the appropriate content area as presented on page 11.

Column 8
Total Course Enrollment--Opposite each course of instruction, enter the projected maximum student enrollment.

Column 9
Maximum Group Size for Reaction Learning--Opposite each course or unit of instruction, enter the maximum group size in number of students for reaction (lecture/demonstration) type learning.

Column 10
Estimated Weekly Periods or Modules of Reaction Level Learning--Opposite each course or unit of instruction, enter the estimated number of periods or modules per week to be devoted to reaction learning per student.

Column 11
Weekly Group-Periods or Modules (Lecture/Demonstration)--To compute weekly group-periods or modules, divide the entry in Column 8 by the entry in Column 9 and round up to the nearest whole number. Then multiply the whole number by the entry in Column 10.

Column 12
Maximum Group Size for Interaction Learning--Opposite each course or unit of instruction, enter the maximum group size in number of students for interaction (seminar) type learning.

Column 13
Estimated Weekly Periods or Modules of Interaction Level Learning--Opposite each course or unit of instruction, enter the estimated number of periods or modules per week to be devoted to interaction learning per student.

Column 14
Weekly Group-Periods or Modules (Seminar)--To compute weekly group-periods or modules, divide the entry in Column 8 by the entry in Column 12 and round up to the nearest whole number. Then multiply the whole number by the entry in Column 13.

Column 15
Maximum Group Size for Action Learning--Opposite each course or unit of instruction, enter the maximum group size in number of students for action (laboratory) type learning.

Column 16
Estimated Weekly Periods or Modules of Action Level Learning--Opposite each course or unit of instruction, enter the estimated number of periods or modules per week to be devoted to action learning per student.

Column 17
Weekly Group-Periods or Modules (Laboratory)--To compute weekly group-periods or modules, divide the entry in Column 8 by the entry in Column 15 and round up to the nearest whole number. Then multiply the whole number by the entry in Column 16.

SAMPLE FORM A

BASIC PROGRAM INFORMATION

1. Occupational Preparation Program *Electrical Technology (first year)*
2. Yearly Enrollment *120*
3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) *post high school*
4. Weeks of Instruction per Year *33*
5. Total Weekly Periods or Modules *40*

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
			Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
English	*Acad.*	*120*	*30*	*3*	*12*						
Math	*Acad.*	*50*	*30*	*4*	*8*						
Manufact. Processes	*Mfg.Proc El.Con.Mt*	*120*	*30*	*1*	*4*				*15*	*3*	*24*
Industrial Safety	*Acad.*	*120*	*150*	*1*	*1*	*15*	*1*	*8*			
Physics	*Physics, Circuits*	*50*	*30*	*4*	*8*				*15*	*3*	*12*
Engineering	*Eng.*										
Drawing	*Drawing*	*120*							*30*	*3*	*12*

[1]If both day and night schools are to be offered, fill out separate forms for each.
*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

FORM A

BASIC PROGRAM INFORMATION

1. Occupational Preparation Program _____

2. Yearly Enrollment _____

3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) _____

4. Weeks of Instruction per Year _____

5. Total Weekly Periods or Modules _____

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
			Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)

[1]If both day and night schools are to be offered, fill out separate forms for each.

*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

FORM A

BASIC PROGRAM INFORMATION

1. Occupational Preparation Program _____

2. Yearly Enrollment _____

3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) _____

4. Weeks of Instruction per Year _____

5. Total Weekly Periods or Modules _____

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
			Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)

[1]If both day and night schools are to be offered, fill out separate forms for each.

*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

FORM A

BASIC PROGRAM INFORMATION

1. Occupational Preparation Program _____

2. Yearly Enrollment _____

3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) _____

4. Weeks of Instruction per Year _____

5. Total Weekly Periods or Modules _____

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
			Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)

FORM A

[1]If both day and night schools are to be offered, fill out separate forms for each.

*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

FORM A

BASIC PROGRAM INFORMATION

1. Occupational Preparation Program _____

2. Yearly Enrollment _____

3. Nature of Students (underline appropriate categories): a. day school[1]; b. night school[1]; c. school age; d. adults; e. males; f. females; other (specify) _____

4. Weeks of Instruction per Year _____

5. Total Weekly Periods or Modules _____

Courses of Instruction	Content Areas	Total Course Enrollment	Maximum Group Sizes, Estimated Weekly Periods or Modules and Calculated Group-Modules or Period-Modules by Levels of Learning								
			REACTION*			INTERACTION**			ACTION***		
			Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules	Maximum Group Size	Weekly Periods or Modules	Weekly Group-Periods or Modules
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)

[1]If both day and night schools are to be offered, fill out separate forms for each.

*(LECTURE/DEMONSTRATION); **(SEMINAR); ***(LABORATORY)

PART III

DISTINCT TYPES OF INSTRUCTIONAL AREAS TO BE PROVIDED

QUANTITATIVE FACILITY NEEDS

The number of instructional areas to house the programs described in Part II (The Instructional Program) are recorded in this section of the guide.

As indicated in Part II, there are three principal types of instructional areas used to accommodate educational programs. They are:

Lecture/demonstration areas--used principally for group reaction learning;

Seminar areas--used principally for group interaction learning; and

Laboratory areas--used principally for group or individual action learning.

In addition to these instructional areas, there are, of course, other school-wide auxiliary areas such as instructional materials centers, language laboratories, gymnasiums, and auditoriums which are part of the overall school plan. Requirements for such facilities are calculated as a part of total school planning and are not made in this guide.

It is recommended that facility needs, including those for occupational preparation programs in electrical technology be made on a school-wide basis in order to provide planners with a balanced picture of the building to be constructed and to promote economy and convenience through the sharing and clustering of various kinds of facilities and equipment.

Forms B, C and D can be used to compute the number of lecture/demonstration, seminar, and laboratory areas required, respectively, for the planned programs in electrical technology occupational preparation. The use of these forms requires some mathematical ability. Personnel responsible for completing the guide may want to utilize the services of individuals with this special competence.

Results of the computations on Forms B, C and D are entered on Form E which is a summary of total instructional area requirements for electrical technology.

In the event that instructional area requirements are already determined (e.g., it has been decided that one combination laboratory and lecture/demonstration area will be provided) the information can be recorded directly on Form E without making the computations on Forms B, C and D.

It is strongly recommended that appropriate personnel be utilized to ensure that the number of instructional areas meets program requirements. After the number of each type of instructional area is determined and recorded on Form E, information can then be recorded in the following sections of the guide concerning the nature of these instructional areas.

INSTRUCTIONS FOR COMPLETING FORM B
LECTURE/DEMONSTRATION AREA REQUIREMENTS BY CONTENT AREAS

Column 1
Content Area--Content areas are listed in Column 1.

Column 2
Total Enrollment--To obtain total enrollment for content areas, find the total enrollment for each content area as indicated in Columns 7 and 8 of Form A(s) for all occupational preparation programs.

Column 3
Maximum Group Size--Opposite each content area, enter the maximum group size desired for a lecture/demonstration area to serve the content area (Form A, Column 9).

Column 4
Total Weekly Periods or Modules--Opposite each content area, enter the total periods or modules per week the school will be open for day school instruction. This entry will be identical for all content areas and identical to the number recorded for Item 5, Form A.

Column 5
Total Weekly Reaction Group Periods or Modules--Opposite each content area, enter the total group periods or modules per week to be devoted to reaction learning as indicated in Column 11 of Form A(s) for all occupational preparation programs.

Column 6
Lecture/Demonstration Areas Required--Opposite each content area, enter the quotient of Item 5 divided by Item 4. Round up to the nearest hundredth.

Column 7.
Adjusted Lecture/Demonstration Areas Required--To adjust for scheduling difficulties which result in areas being less than 100 percent utilized, multiply the entry in Column 6 by 1.3 and enter the result, rounded up to the nearest hundredth, in Column 7 for each content area.

Column 8
Totals--Since lecture/demonstration areas, unlike laboratory areas, can be utilized by nearly all content areas, the entries in Column 7 can be added for all lecture/demonstration areas with identical maximum group sizes as entered in Column 3. For example, 8a might read 2 lecture/demonstration areas with a student capacity of 50 each.

SAMPLE FORM B

LECTURE/DEMONSTRATION AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Reaction Group-Periods or Modules (5)	Lecture/Demonstration Areas Required (5) ÷ (4) (6)	Adjusted Lecture/Demonstration Areas Required (6) X 1.3 (7)
Electrical Mach. and Power	--	--	--	--	--	--
Manuf. Processes, Elec. Const. and Maintenance	*120*	*30*	*40*	*4*	*0.10*	*0.13*
Circuits and Physics	*50*	*30*	*40*	*8*	*0.20*	*0.26*
Electronics	--	--	--	--	--	--
Engineering Drawing	*120*	--	--	--	--	--
Computer Programing	--	--	--	--	--	--
Computer and Control Systems	--	--	--	--	--	--
Academic	*170* *120*	*30* *150*	*40* *40*	*20* *1*	*0.50* *0.03*	*0.65* *0.04*
Science	--	--	--	--	--	--
Physical Education	--	--	--	--	--	--

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3.) Round off total to next higher whole number.

a. *2* lecture/demonstration areas with a student capacity of *30*, each.
b. *1* lecture/demonstration areas with a student capacity of *150*, each.
c. _____ lecture/demonstration areas with a student capacity of _____, each.
d. _____ lecture/demonstration areas with a student capacity of _____, each.

SAMPLE FORM B

FORM B

LECTURE/DEMONSTRATION AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Reaction Group-Periods or Modules (5)	Lecture/Demonstration Areas Required (5) ÷ (4) (6)	Adjusted Lecture/Demonstration Areas Required (6) X 1.3 (7)
Electrical Mach. and Power						
Manuf. Processes, Elec. Const. and Maintenance						
Circuits and Physics						
Electronics						
Engineering Drawing						
Computer Programing						
Computer and Control Systems						
Academic						
Science						
Physical Education						

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3.) Round off total to next higher whole number.

a. _____ lecture/demonstration areas with a student capacity of _____, each.
b. _____ lecture/demonstration areas with a student capacity of _____, each.
c. _____ lecture/demonstration areas with a student capacity of _____, each.
d. _____ lecture/demonstration areas with a student capacity of _____, each.

INSTRUCTIONS FOR COMPLETING FORM C
SEMINAR AREA REQUIREMENTS BY CONTENT AREAS

Column 1
Content Area--Content areas are listed in Column 1.

Column 2
Total Enrollment--To obtain total enrollment for content areas, find the total enrollment for each content area indicated in Column 7 and 8 of Form A for all occupational preparation programs.

Column 3
Maximum Group Size--Opposite each content area, enter the maximum group size desired for a seminar area to serve the content area (Form A, Column 12).

Column 4
Total Weekly Periods or Modules--Opposite each content area, enter the total periods or modules per week the school will be open for day school instruction. This entry will be identical for all content areas and identical to the number recorded for Item 5, Form A.

Column 5
Total Weekly Interaction Group Periods or Modules--Opposite each content area, enter the total group periods or modules per week to be devoted to interaction learning as indicated in Column 14 of Form A(s) for all occupational preparation programs.

Column 6
Seminar Areas Required--Opposite each content area, enter the quotient of Item 5 divided by Item 4. Round up to the nearest hundredth.

Column 7
Adjusted Seminar Areas Required--To adjust for scheduling difficulties which result in areas being less than 100 percent utilized, multiply the entry in Column 6 by 1.3 and enter the result, rounded up to the nearest hundredth, in Column 7 for each content area.

Column 8
Totals--Since seminar areas, unlike laboratory areas, can be commonly utilized by nearly all content areas, the entries in Column 8 can be added for all seminar areas with identical maximum group sizes or entered in Column 3. For example, 8a might read 2 seminar areas with a student capacity of 20, each.

SAMPLE FORM C

SEMINAR AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Interaction Group-Periods or Modules (5)	Seminar Areas Required (5) ÷ (4) (6)	Adjusted Seminar Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Const. and Maintenance						
Circuits and Physics						
Electronics						
Engineering Drawing						
Computer Programing						
Computer and Control Systems						
Academic	*120*	*15*	*40*	*8*	*0.20*	*0.26*
Science						
Physical Education						

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3). Round up total to next higher whole number.

a. *1* seminar areas with a minimum student capacity of *15*, each.
b. _____ seminar areas with a minimum student capacity of _____, each.
c. _____ seminar areas with a minimum student capacity of _____, each.
d. _____ seminar areas with a minimum student capacity of _____, each.

SAMPLE FORM C

FORM C

SEMINAR AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Interaction Group-Periods or Modules (5)	Seminar Areas Required (5) ÷ (4) (6)	Adjusted Seminar Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Const. and Maintenance						
Circuits and Physics						
Electronics						
Engineering Drawing						
Computer Programing						
Computer and Control Systems						
Academic						
Science						
Physical Education						

(8) Totals (Figures in Column 7 can be added together for areas with same student capacity as entered in Column 3). Round up total to next higher whole number.

a. _____ seminar areas with a minimum student capacity of _____, each.
b. _____ seminar areas with a minimum student capacity of _____, each.
c. _____ seminar areas with a minimum student capacity of _____, each.
d. _____ seminar areas with a minimum student capacity of _____, each.

INSTRUCTIONS FOR COMPLETING FORM D
LABORATORY AREA REQUIREMENTS BY CONTENT AREAS

Column 1
Content Area--Content areas are listed in Column 1.

Column 2
Total Enrollment--To obtain total enrollment for content areas, find the total enrollment for each area as indicated in Columns 7 and 8 of Form A for all occupational preparation programs.

Column 3
Maximum Group Size--Opposite each content area, enter the maximum group size desired for a laboratory area to serve the content area (Form A, Column 15).

Column 4
Total Weekly Periods or Modules--Opposite each content area, enter the total periods or modules per week the school will be open for day school instruction. This entry will be identical for all content areas and identical to the number recorded for Item 5, Form A.

Column 5
Total Weekly Action Group Periods or Modules--Opposite each content area, enter the total group periods or modules per week to be devoted to action learning as indicated in Column 17 of Form A(s) for all occupational preparation programs.

Column 6
Laboratory Areas Required--Opposite each content area, enter the quotient of Item 5 divided by Item 4. Round up to the nearest hundredth.

Column 7
Adjusted Laboratory Areas Required--To adjust for scheduling difficulties which result in areas being less than 100 percent utilized, multiply the entry in Column 6 by 1.3 and enter the result, rounded up to the nearest hundredth, in Column 7 for each content area.

SAMPLE FORM D

LABORATORY AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Action Group-Periods or Modules (5)	Laboratory Areas Required (5) ÷ (4) (6)	Laboratory Adjusted Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Construction and Maintenance	*120*	*15*	*40*	*24*	*0.60*	*0.78*
Circuits and Physics	*50*	*15*	*40*	*12*	*0.30*	*0.39*
Electronic						
Engineering Drawing	*120*	*30*	*40*	*12*	*0.30*	*0.39*
Computer Programing						
Computer and Controls Systems						
Academic						
Science						
Physical Education						

SAMPLE FORM D

FORM D

LABORATORY AREA REQUIREMENTS BY CONTENT AREAS

Content Area (1)	Total Enrollment (2)	Maximum Group Size (3)	Total Weekly Periods or Modules (4)	Total Weekly Action Group-Periods or Modules (5)	Laboratory Areas Required (5) ÷ (4) (6)	Laboratory Adjusted Areas Required (6) X 1.3 (7)
Electrical Machines and Power						
Manufacturing Processes, Elect. Construction and Maintenance						
Circuits and Physics						
Electronic						
Engineering Drawing						
Computer Programing						
Computer and Controls Systems						
Academic						
Science						
Physical Education						

SAMPLE FORM E

SUMMARY OF FACILITY REQUIREMENTS FOR ELECTRICAL TECHNOLOGY PROGRAMS

Instructional Areas	Number Required*		Required Student Capacity
	Calculated Forms B, C, D Column 7	Next Higher Whole Number	
Lecture/Demonstration	*1.04*	*2.00*	*30*
Lecture/Demonstration			
1 Lecture/Demonstration			
Lecture/Demonstration			
Seminar	*0.26*	*1.00*	*15*
Seminar			
2 Seminar			
Seminar			
Circuits & Physics Laboratory Area(s)	*0.39*	*1.00*	*15*
Electrical Machines and Power Laboratory Area(s)			
Manufacturing Processes, Electrical Constr. & Maintenance Lab. Area(s)			
Circuits & Physics Laboratory Area(s)			
3 Electronics Laboratory Area(s)			
Engineering Drawing Lab. Area(s)			
Computer Programing Lab. Area(s)			
Computer and Control Lab. Area(s)			

4 Multi-purpose areas

If any of the specialized areas entered above are to be combined as multi-purpose areas, indicate the combinations desired.

a. *Circuits and Physics Lab. Area, Electronics Lab. Area & Seminar Area*

b. _____

c. _____

d. _____

5 Summary of facility requirements for electrical technology training program requirements. Based on the above entries, summarize the total quantitative facility requirements for the planned program._____

_____

_____

_____

*Enter the number of instructional areas needed for each student capacity required. In the event that the numbers required indicate that an area will be used only sparingly, consideration should be given to sharing lecture/demonstration and seminar areas with other training programs or the construction of high student capacity areas which are capable of being subdivided for instructional purposes.

FORM E

SUMMARY OF FACILITY REQUIREMENTS FOR ELECTRICAL TECHNOLOGY PROGRAMS

Instructional Areas	Number Required*		Required Student Capacity
	Calculated Forms B, C, D Column 7	Next Higher Whole Number	
Lecture/Demonstration			
Lecture/Demonstration			
1 Lecture/Demonstration			
Lecture/Demonstration			
Seminar			
Seminar			
2 Seminar			
Seminar			
Circuits & Physics Laboratory Area(s)			
Electrical Machines and Power Laboratory Area(s)			
Manufacturing Processes, Electrical Constr. & Maintenance Lab. Area(s)			
Circuits & Physics Laboratory Area(s)			
3 Electronics Laboratory Area(s)			
Engineering Drawing Lab. Area(s)			
Computer Programing Lab. Area(s)			
Computer and Control Lab. Area(s)			

4 Multi-purpose areas
If any of the specialized areas entered above are to be combined as multi-purpose areas, indicate the combinations desired.

a. _____
b. _____
c. _____
d. _____

5 Summary of facility requirements for electrical technology training program requirements. Based on the above entries, summarize the total quantitative facility requirements for the planned program._____

_____

_____

_____

*Enter the number of instructional areas needed for each student capacity required. In the event that the numbers required indicate that an area will be used only sparingly, consideration should be given to sharing lecture/demonstration and seminar areas with other training programs or the construction of high student capacity areas which are capable of being subdivided for instructional purposes.

QUALITATIVE FACILITY NEEDS

In this section, detailed information on the kind of instructional areas required is recorded. Special forms are provided for describing the nature of lecture/demonstration areas, laboratory areas, and auxiliary areas to be provided. For each general type of instructional area required information is sought in the following categories.

1. The relationship of the area to other instructional areas (specialized vs. multi-purpose utilization of space).

2. The number of these kinds of areas needed (see previous section or calculations booklet: Special Facility Requirements and Space Needs).

3. The activities of students and teachers in the instructional area.

4. The spatial relationships within the area and the area's spatial relationships to other instructional areas and the building as a whole.

5. The furniture and equipment required for the area.

6. The environmental factors required for the area.

7. The special utility services required for the area.

8. The minimum space requirements required for the area.

FORM F

DESCRIPTION OF LECTURE/DEMONSTRATION AREA(S)
TO BE USED PRINCIPALLY FOR GROUP REACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The lecture/demonstration area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with _____ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. As an area within a single multi-use space	Yes	No

2. Number of lecture/demonstration areas required for the desired program reagrdless of capacity (see Form E) _____

3. Student and instructor activities in this space. Indicate the extent to which each of the activities listed below will occur.

a. Listening to lectures	1	2	3	N
b. Observing demonstrations	1	2	3	N
c. Taking notes	1	2	3	N
d. Viewing films, slides, overhead projections, etc.	1	2	3	N
e. _____	1	2	3	N
f. _____	1	2	3	N

4. Spatial relationships. Indicate the extent to which the lecture/demonstration area(s) should be accessible to the:

a. Instructional materials center	1	2	3	N
b. Building entrance	1	2	3	N
c. Delivery area	1	2	3	N
d. Other instructional areas				
1) _____	1	2	3	N
2) _____	1	2	3	N
3) _____	1	2	3	N
e. Other building areas				
1) _____	1	2	3	N
2) _____	1	2	3	N
3) _____	1	2	3	N

5. Furniture and equipment

a. Student seating

1) Individual desks and chairs		P A NA*
a) Number of desks and chairs required		
b) Provision for storage		Yes No
2) Permanent-type desk		P A NA
a) Number required		
b) Provision for storage		Yes No
3) Desk and chair combination		P A NA
a) Number required		
b) Provision for storage		Yes No
4) Tables and chairs		P A NA
a) Number of tables required		
b) Number of chairs required		
c) Provision for storage		Yes No
5) Auditorium-type seating		P A NA
Number of seats required		
b. Stage		Yes No
1) Permanent type		P A NA
2) Portable type		P A NA
The approximate area in square feet desired		
c. Sound amplifying system		P A NA
d. Controls for regulating light intensity		P A NA
e. Lectern		
1) Permanent type		P A NA
2) Portable type		P A NA
3) Provision for storage		Yes No
f. Projection screen		
1) Built-in type		P A NA
2) Portable type		P A NA
3) Approximate dimensions		
4) Provision for storage		Yes No

g. Other equipment required for lecture/demonstration area(s) are:

1) _____
2) _____
3) _____
4) _____

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the lecture/demonstration area(s).

_____
_____
_____
_____

*Code: P = Preferred; A = Acceptable; NA = Not Acceptable. This scale is used frequently on the following pages.

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the lecture/demonstration area(s).

_____

_____

_____

_____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the lecture/demonstration area(s).

_____

_____

_____

_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound systems. Indicate any special consideration important to the planning of the lecture/demonstration area(s).

_____

_____

_____

_____

e. Safety. In planning a school building, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the lecture/demonstration area(s).

_____

_____

_____

_____

7. Vertical instructional surfaces

a. Chalkboard	Yes	No
1) Wall-mounted	P A	NA
Number of lineal feet	_____	
2) Portable	P A	NA
Provision for storage	Yes	No
b. Tack board	Yes	No
Number of lineal feet	_____	
c. Pegboard	Yes	No
Number of lineal feet	_____	

8. Special utility services required

a. Electricity		
1) Projection equipment	Yes	No
2) Sound amplifying equipment	Yes	No

3) Electrical needs for other equipment (specify)
   a) _____
   b) _____
   c) _____
   d) _____

b. Other utility needs for the lecture/demonstration area
   1) _____
   2) _____
   3) _____
   4) _____

9. The minimum space requirement in square feet for each lecture/demonstration area (optional) _____. (The planner should be aware of any state or local regulation or recommendations concerning floor space requirements.)

10. Other important factors to be considered in the planning of the lecture/demonstration area(s) are:

_____

_____

_____

_____

_____

_____

FORM G

DESCRIPTION OF SEMINAR AREA(S) TO BE USED PRINCIPALLY FOR GROUP INTERACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The seminar area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with _____ laboratory area(s)	Yes	No
c. In combination with lecture/demonstration area(s)	Yes	No
d. As an area within a single multi-use space	Yes	No

2. The number of seminar area(s) required for the desired program regardless of capacity (see Form E) _____

3. Student and instructor activities in this space. Indicate the extent to which each of the activities listed below will occur.

a. Small group discussing	1	2	3	N
b. Viewing films, slides, overhead projections, etc.	1	2	3	N
c. Demonstrating	1	2	3	N
d. Reporting	1	2	3	N
e. Working on projects	1	2	3	N
f. _____	1	2	3	N
g. _____	1	2	3	N

4. Spatial relationships. Indicate the extent to which the seminar area(s) should be accessible to the:

a. Instructional materials center	1	2	3	N
b. Building entrance	1	2	3	N
c. Delivery area	1	2	3	N
d. Other instructional areas				
1) _____	1	2	3	N
2) _____	1	2	3	N
3) _____	1	2	3	N
e. Other building areas				
1) _____	1	2	3	N
2) _____	1	2	3	N
3) _____	1	2	3	N

5. Furniture and equipment

a. Seminar table	Yes	No
1) Number required	_____	

2) Seating for how many persons
3) Permanent type — P A NA
4) Portable type — P A NA
5) Provision for storage — Yes No

b. Chairs
1) Number required
2) Straight-back type — P A NA
3) Folding type — P A NA
4) Provision for storage — Yes No

c. Other equipment required for seminar area(s):
1) _____
2) _____
3) _____

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of seminar areas.

_____
_____
_____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the seminar area(s).

_____
_____
_____
_____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the seminar area(s).

_____
_____
_____
_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the seminar area(s).

_____
_____
_____
_____

e. Safety. In planning a school building, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the seminar area(s).

_____
_____
_____
_____

7. Vertical instructional surfaces

a. Chalkboard	Yes	No
1) Wall-mounted	P A	NA
Number of lineal feet	_____	
2) Portable	P A	NA
a) Number of lineal feet	_____	
b) Provision for storage	Yes	No
b. Tack board	Yes	No
Number of lineal feet	_____	
c. Pegboard	Yes	No
Number of lineal feet	_____	

8. Special utility services required

a. Electricity		
1) Projection equipment	Yes	No
2) Sound amplifying equipment	Yes	No
3) Instructional TV outlets	Yes	No
4) Electrical needs for other equipment (specify)		

_____
_____
_____

b. Other utility needs for the seminar area(s)
1) _____
2) _____
3) _____
4) _____

9. Minimum space requirement in square feet for each area (optional) _____. (The planner should be aware of any state or local regulations or recommendations concerning floor space requirements.)

10. Other important factors to be considered in the planning of the seminar area(s) are:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

FORM H

DESCRIPTION OF ELECTRICAL MACHINES AND POWER LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The electrical machines and power laboratory area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with _____ (specify) laboratory area(s)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space divisions within the electrical machines and power laboratory area(s). Indicate the extent to which each activity will occur.

a. Lecture/demonstration space				
1) Discussing laboratory procedure	1	2	3	N
2) Use of visual instructional aids	1	2	3	N
3) Computation and report writing	1	2	3	N
4) _____	1	2	3	N
b. Power distribution panel space				
1) Providing power required for experiments	1	2	3	N
2) Providing interconnections to other lab stations	1	2	3	N
3) Providing special power requirements to other laboratories	1	2	3	N
4) _____	1	2	3	N
c. Motor-generator and test bench area				
1) Conducting electrical machines experiments	1	2	3	N
2) Conducting motor control experiments	1	2	3	N
3) Conducting solid-state energy conversion experiments	1	2	3	N
4) _____	1	2	3	N
d. Control equipment space				
1) Conducting magnetic control experiments	1	2	3	N
2) Conducting electronic control experiments	1	2	3	N
3) Conducting fluidic control experiments	1	2	3	N
4) _____	1	2	3	N
e. Demonstration equipment storage space				
1) Specialized equipment for demonstration	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

	2) _____	1	2	3	N
f.	Instrument storage space				
	1) Small portable instrument storage	1	2	3	N
	2) Cart or caster mounted instrument storage	1	2	3	N
	3) _____	1	2	3	N
g.	Apparatus storage space				
	1) Small portable apparatus storage	1	2	3	N
	2) Cart or caster mounted apparatus storage	1	2	3	N
	3) _____	1	2	3	N
h.	Reference material space				
	1) Instructional material storage	1	2	3	N
	2) Manufacturers' diagrams storage	1	2	3	N
	3) Equipment manuals storage	1	2	3	N
	4) Periodical storage	1	2	3	N
	5) Reading table space	1	2	3	N
	6) _____	1	2	3	N
i.	Office space				
	1) Directing laboratory activities	1	2	3	N
	2) Consultation	1	2	3	N
	3) _____	1	2	3	N
j.	Other space(s) (specify) _____				
	_____	1	2	3	N
	1) _____	1	2	3	N
	2) _____	1	2	3	N
	3) _____	1	2	3	N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

a.	Within the electrical machines and power laboratory area(s)				
	1) Lecture/demonstration space to:				
	a) Power distribution panel space	1	2	3	N
	b) Motor-generator and test bench space	1	2	3	N
	c) Control equipment space	1	2	3	N
	d) Demonstration equipment storage space	1	2	3	N
	e) Instrument storage space	1	2	3	N
	f) Apparatus storage space	1	2	3	N
	g) Reference material space	1	2	3	N
	h) Office space	1	2	3	N
	i) Other	1	2	3	N
	2) Power distribution panel space to:				
	a) Motor-generator and test bench space	1	2	3	N
	b) Control equipment space	1	2	3	N
	c) Demonstration equipment storage space	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

d)	Instrument storage space	1	2	3	N
e)	Apparatus storage space	1	2	3	N
f)	Reference material space	1	2	3	N
g)	Office space	1	2	3	N
h)	Other	1	2	3	N
3)	Motor-generator and test bench space to:				
a)	Control equipment space	1	2	3	N
b)	Demonstration equipment storage space	1	2	3	N
c)	Instrument storage space	1	2	3	N
d)	Apparatus storage space	1	2	3	N
e)	Reference material space	1	2	3	N
f)	Office space	1	2	3	N
g)	Other	1	2	3	N
4)	Control equipment space to:				
a)	Demonstration equipment storage space	1	2	3	N
b)	Instrument storage space	1	2	3	N
c)	Apparatus storage space	1	2	3	N
d)	Reference material space	1	2	3	N
e)	Office space	1	2	3	N
f)	Other	1	2	3	N
5)	Demonstration equipment storage space to:				
a)	Instrument storage space	1	2	3	N
b)	Apparatus storage space	1	2	3	N
c)	Reference material space	1	2	3	N
d)	Office space	1	2	3	N
e)	Other	1	2	3	N
6)	Instrument storage space to:				
a)	Apparatus storage space	1	2	3	N
b)	Reference material space	1	2	3	N
c)	Office space	1	2	3	N
d)	Other	1	2	3	N
7)	Apparatus storage space to:				
a)	Reference material space	1	2	3	N
b)	Office space	1	2	3	N
c)	Other	1	2	3	N
8)	Reference material space to:				
a)	Office space	1	2	3	N
b)	Other	1	2	3	N
9)	Office space to:				
	Other	1	2	3	N
b.	Electrical machines and power laboratory area(s) to:				
1)	Instructional materials center	1	2	3	N
2)	Offices	1	2	3	N
3)	Building entrance	1	2	3	N
4)	Other instructional areas				

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

5) Other building areas (specify)
   a) _____ 1 2 3 N
   b) _____ 1 2 3 N

5. Furniture and equipment

a. Power distribution panel — Yes No
   1) Three phase AC subpanel(s) — Yes No
      a) Number required _____
      b) Input feeder required — Yes No
   2) Single phase AC subpanel(s) — Yes No
      a) Number required _____
      b) Input feeder required — Yes No
   3) Direct-current subpanel(s) — Yes No
      Number required _____
   4) Jacks for interconnection of lab stations — Yes No
      Number required _____
   5) Connections to other laboratories — Yes No
      Number required _____
   6) Others (specify) _____ — Yes No
b. High current DC source — Yes No
   1) Motor-generator set — Yes No
      a) Number required _____
      b) Rating _____
   2) Solid state rectifiers — Yes No
      a) Number required _____
      b) Rating _____
   3) Others (specify) _____ — Yes No
c. Transformers — Yes No
   1) Three phase transformers — Yes No
      a) Number required _____
      b) Rating _____
   2) Single phase transformers — Yes No
      a) Number required _____
      b) Rating _____
   3) Inverter transformers — Yes No
      a) Number required _____
      b) Rating _____
   4) Others (specify) _____ — Yes No
d. Motor-generator sets — Yes No
   1) DC-DC — Yes No
      a) Number required _____
      b) Rating _____
   2) AC-DC — Yes No
      a) Number required _____
      b) Rating _____
   3) DC-AC — Yes No
      a) Number required _____

b) Rating		
4) Universal	Yes	No
a) Number required		
b) Rating	Yes	No
5) Others (specify) _____	Yes	No
e. Motor-generator test stands		
1) Number required		
2) Size		
3) Type of construction		
4) Portable or stationary	Yes	No
5) Others (specify) _____	Yes	No
f. Rectifiers for experiments	Yes	No
1) Mounted silicon power diodes		
a) Number required		
b) Rating	Yes	No
2) Mounted power thyristors		
a) Number required		
b) Rating	Yes	No
3) Others (specify) _____	Yes	No
g. Magnetic controllers	Yes	No
1) Small portable units		
a) Number required		
b) Rating	Yes	No
2) Cart or caster mounted units		
a) Number required		
b) Rating	Yes	No
3) Others (specify) _____	Yes	No
h. Electronic controllers	Yes	No
1) Small portable units		
a) Number required		
b) Rating	Yes	No
2) Cart or caster mounted units		
a) Number required		
b) Rating	Yes	No
3) Others (specify) _____ _____	Yes	No
i. Fluidic controllers	Yes	No
1) Small portable units		
a) Number required		
b) Rating	Yes	No
2) Cart or caster mounted units		
a) Number required		
b) Rating	Yes	No
3) Others (specify) _____	Yes	No
j. Special demonstration units	Yes	No
1) Number required		
2) Specify type _____	Yes	No
k. Components for experiments	Yes	No
1) Loadbanks or similar device		
a) Number required		
b) Rating	Yes	No
2) Inductors		
a) Number required		
b) Rating	Yes	No
3) Capacitors		

a) Number required _____
b) Rating _____

4) Rheostats or potentiometers Yes No
a) Number required _____
b) Rating _____

5) Autotransformers Yes No
a) Number required _____
b) Rating _____

6) Switches Yes No
a) Number required _____
b) Rating _____

7) Relays Yes No
a) Number required _____
b) Rating _____

8) Timers Yes No
a) Number required _____
b) Rating _____

9) Synchros Yes No
a) Number required _____
b) Rating _____

10) Interconnection leads Yes No
a) Number required _____
b) Rating _____

11) Others (specify) _____

1. Instruments Yes No

1) Oscilloscope(s) Yes No
a) Number required _____
b) Specifications _____

2) Electronic counter(s) Yes No
a) Number required _____
b) Specifications _____

3) Tachometer(s) Yes No
a) Number required _____
b) Specifications _____

4) Wattmeter(s) Yes No
a) Number required _____
b) Rating _____

5) Voltmeter(s) Yes No
a) Number required _____
b) Rating _____

6) Ammeter(s) Yes No
a) Number required _____
b) Rating _____

7) Power factor meter(s) Yes No
a) Number required _____
b) Rating _____

8) Phase sequence indicator(s) Yes No
a) Number required _____
b) Specifications _____

9) Instrument transformer(s) Yes No
a) Number required _____
b) Specifications _____

10) Bridge(s) Yes No
a) Number required _____
b) Specifications _____

	Yes	No
11) Volt-Ohm-Meter(s)		
a) Number required		
b) Rating		
12) Thyristor checker(s)	Yes	No
a) Number required		
b) Specifications		
13) Others (specify)_____	Yes	No

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the electrical machines and power laboratory area(s).

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity and ventilation. Indicate any special considerations important to the planning of the electrical machines and power laboratory area(s).

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the electrical machines and power laboratory area(s).

d. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any safety considerations which have implications of the electrical machines and power laboratory area(s).

7. Vertical instructional surfaces

	Yes		No
a. Chalkboard	P	A	NA
1) Wall-mounted			
Number of lineal feet	P	A	NA
2) Portable			
a) Number of lineal feet			
b) Provision for storage	Yes		No

b. Tack board — Yes No
Number of lineal feet _____
c. Pegboard — Yes No
Number of lineal feet _____
d. Projection screen — Yes No
Size _____

8. Special utility services required

a. Electricity
1) Power distribution panel — Yes No
a) 208/120 volt ac — Yes No
b) 240/120 volt ac — Yes No
2) Special lighting requirements (specify)
a) _____
b) _____
c) _____
d) _____
3) Electrical needs for other equipment (specify)
a) _____
b) _____
c) _____
d) _____
4) Special wiring requirements
a) Instructional TV — Yes No
b) Intercom — Yes No
c) Other (specify) _____ — Yes No
_____

b. Water
1) Drinking fountain(s) — Yes No
2) Sinks — Yes No
3) Toilets — Yes No
4) Other (specify) _____ — Yes No
_____

9. Minimum space requirements in square feet

a. Floor area in square feet for entire electrical machines and power laboratory area _____
b. If distinct space divisions are desired according to function, give minimal floor area requirements in square feet for each of the following areas if included in the desired program:
1) Lecture/demonstration area _____
2) Power distribution area _____
3) Motor-generator and test bench _____
4) Control equipment _____
5) Special demonstration equipment _____
6) Instrument storage _____
7) Apparatus storage _____
8) Reference material _____

9) Office _____
10) Other (specify) _____ _____

10. Other important factors to be considered in the planning of the electrical machines and power laboratory area(s) are:

FORM I

DESCRIPTION OF MANUFACTURING PROCESSES AND ELECTRICAL CONSTRUCTION AND MAINTENANCE AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The manufacturing processes and electrical construction and maintenance area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with _____ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use area(s)	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space division within the manufacturing processes and electrical construction and maintenance area(s) indicate the extent to which each activity will occur.

a. Lecture/demonstration area				
1) Lecture purposes	1	2	3	N
2) Demonstration purposes	1	2	3	N
3) Others (specify) _____	1	2	3	N
b. Reference area				
1) Student referencing	1	2	3	N
2) Storage of reference materials	1	2	3	N
3) Planning table	1	2	3	N
4) Study space	1	2	3	N
5) Others (specify)	1	2	3	N
c. Display area				
1) Project display	1	2	3	N
2) Product display	1	2	3	N
3) Bulletin board display	1	2	3	N
4) Storage of display materials	1	2	3	N
5) Others (specify) _____	1	2	3	N
d. Clean-up area				
1) Student washing	1	2	3	N
2) Parts cleaning	1	2	3	N
3) Others (specify) _____	1	2	3	N
e. Storage area				
1) Raw material storage	1	2	3	N
2) Parts and supply storage	1	2	3	N
3) Student project storage	1	2	3	N

FORM I

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

	4) Others (specify) _____	1	2	3	N
f.	Tool board area				
	1) Storage of tools	1	2	3	N
	2) Others (specify) _____	1	2	3	N
g.	Welding area				
	1) Student work station practicing	1	2	3	N
	2) Instructor demonstration	1	2	3	N
	3) Project and material storage	1	2	3	N
	4) Others (specify) _____	1	2	3	N
h.	Practice wiring area				
	1) Student practice	1	2	3	N
	2) Instructor demonstration	1	2	3	N
	3) Cable dispensing	1	2	3	N
	4) Scrap cable storage	1	2	3	N
	5) Others (specify) _____	1	2	3	N
i.	Bench and assembly area				
	1) Student operations	1	2	3	N
	2) Instructor operations	1	2	3	N
	3) Others (specify) _____	1	2	3	N
j.	Machining area(s)				
	1) Turning	1	2	3	N
	2) Knurling	1	2	3	N
	3) Threading	1	2	3	N
	4) Boring	1	2	3	N
	5) Grinding	1	2	3	N
	6) Drilling	1	2	3	N
	7) Reaming	1	2	3	N
	8) Taper turning	1	2	3	N
	9) Counter sinking	1	2	3	N
	10) Counter boring	1	2	3	N
	11) End milling	1	2	3	N
	12) Band sawing	1	2	3	N
	13) Hack sawing	1	2	3	N
	14) Pipe threading	1	2	3	N
	15) Fly cutting	1	2	3	N
	16) Buffing	1	2	3	N
	17) Polishing	1	2	3	N
	18) Others (specify) _____	1	2	3	N
k.	Measurement area				
	1) Verniers	1	2	3	N
	2) Optical	1	2	3	N
	3) Others (specify) _____	1	2	3	N
l.	Special operations area				
	1) Printed circuit	1	2	3	N
	2) Micro-electronics	1	2	3	N
	3) Others (specify) _____	1	2	3	N
m.	Support area(s)				
	1) Air	1	2	3	N
	2) Water	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

3)	Sewer	1	2	3	N
4)	Exhaust	1	2	3	N
5)	Others (specify) _____	1	2	3	N

4. Spatial relationships indicate the extent to which spaces should be accessible to each other.

Within the manufacturing processes and electrical construction and maintenance area(s)

1)	Lecture/demonstration space to:				
a)	Reference space	1	2	3	N
b)	Display space	1	2	3	N
c)	Clean-up space	1	2	3	N
d)	Storage space	1	2	3	N
e)	Tool board space	1	2	3	N
f)	Welding space	1	2	3	N
g)	Practice wiring space	1	2	3	N
h)	Bench and assembly space	1	2	3	N
i)	Machining space	1	2	3	N
j)	Measurement space	1	2	3	N
k)	Special operations space	1	2	3	N
l)	Support space	1	2	3	N
2)	Reference space to:				
a)	Display space	1	2	3	N
b)	Clean-up space	1	2	3	N
c)	Storage space	1	2	3	N
d)	Tool board space	1	2	3	N
e)	Welding space	1	2	3	N
f)	Practice wiring space	1	2	3	N
g)	Bench and assembly space	1	2	3	N
h)	Machining space	1	2	3	N
i)	Measurement space	1	2	3	N
j)	Special operation space	1	2	3	N
k)	Support space	1	2	3	N
3)	Display space to:				
a)	Clean-up space	1	2	3	N
b)	Storage space	1	2	3	N
c)	Tool board space	1	2	3	N
d)	Welding space	1	2	3	N
e)	Practice wiring space	1	2	3	N
f)	Bench and assembly space	1	2	3	N
g)	Machining space	1	2	3	N
h)	Measurement space	1	2	3	N
i)	Special operations space	1	2	3	N
j)	Support space	1	2	3	N
4)	Clean-up space to:				
a)	Storage space	1	2	3	N
b)	Tool board space	1	2	3	N

FORM I

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

c)	Welding space	1	2	3	N
d)	Practice wiring space	1	2	3	N
e)	Bench and assembly space	1	2	3	N
f)	Machining space	1	2	3	N
g)	Measurement space	1	2	3	N
h)	Special operations space	1	2	3	N
i)	Support space	1	2	3	N
5)	Storage space to:				
a)	Tool board space	1	2	3	N
b)	Welding space	1	2	3	N
c)	Practice wiring space	1	2	3	N
d)	Bench and assembly space	1	2	3	N
e)	Machining space	1	2	3	N
f)	Measurement space	1	2	3	N
g)	Special operations space	1	2	3	N
h)	Support space	1	2	3	N
6)	Tool board space to:				
a)	Welding space	1	2	3	N
b)	Practice wiring space	1	2	3	N
c)	Bench and assembly space	1	2	3	N
d)	Machining space	1	2	3	N
e)	Measurement space	1	2	3	N
f)	Special operations space	1	2	3	N
g)	Support space	1	2	3	N
7)	Welding space to:				
a)	Practice wiring space	1	2	3	N
b)	Bench and assembly space	1	2	3	N
c)	Machining space	1	2	3	N
d)	Measurement space	1	2	3	N
e)	Special operations space	1	2	3	N
f)	Support space	1	2	3	N
8)	Practice wiring space to:				
a)	Bench and assembly space	1	2	3	N
b)	Machining space	1	2	3	N
c)	Measurement space	1	2	3	N
d)	Special operations space	1	2	3	N
e)	Support space	1	2	3	N
9)	Bench and assembly space to:				
a)	Machining space	1	2	3	N
b)	Measurement space	1	2	3	N
c)	Special operations space	1	2	3	N
d)	Support space	1	2	3	N
10)	Machining space to:				
a)	Measurement space	1	2	3	N
b)	Special operations space	1	2	3	N
c)	Support space	1	2	3	N
11)	Measurement space to:				
a)	Special operations space	1	2	3	N
b)	Support space	1	2	3	N
12)	Special operations space to:				
	Support space	1	2	3	N

5. Equipment

a.	Lathe	Yes No
	1) Number required	
	2) Description	
b.	Vertical end mill	Yes No
	1) Number required	
	2) Description	
c.	Phantograph engraving machine	Yes No
	1) Number required	
	2) Description	
d.	Drill press	Yes No
	1) Number required	
	2) Description	
e.	Metal cutting band saw	Yes No
	1) Number required	
	2) Description	
f.	Pedestal grinder	Yes No
	1) Number required	
	2) Description	
g.	AC welder	Yes No
	1) Number required	
	2) Description	
h.	DC welder	Yes No
	1) Number required	
	2) Description	
i.	Oxy-acetylene equipment	Yes No
	1) Number required	
	2) Description	
j.	Wet-dry sander	Yes No
	1) Number required	
	2) Description	
k.	Power hack saw	Yes No
	1) Number required	
	2) Description	
l.	Arbor press	Yes No
	1) Number required	
	2) Description	
m.	Degreasing parts tank	Yes No
	1) Number required	
	2) Description	
n.	Benches	Yes No
	1) Number required	
	2) Description	
o.	Vices	Yes No
	1) Number required	
	2) Description	
p.	Lecture table	Yes No
	1) Number required	
	2) Description	
q.	Chairs	Yes No
	1) Number required	
	2) Description	
r.	Sink	Yes No
	1) Number required	

	2) Description	
s.	Reference material cabinet	Yes No
	1) Number required	
	2) Description	
t.	Tool board	Yes No
	1) Number required	
	2) Description	
u.	Storage cabinets	Yes No
	1) Number required	
	2) Description	
v.	Screw-bolt-nut cabinet	Yes No
	1) Number required	
	2) Description	
w.	Raw material storage rack	Yes No
	1) Number required	
	2) Description	
x.	Air compressor	Yes No
	1) Number required	
	2) Description	
y.	Instructor's desk	Yes No
	1) Number required	
	2) Description	
z.	Measurement cabinet	Yes No
	1) Number required	
	2) Description	
aa.	Special operations equipment	Yes No
	1) Number required	
	2) Description	
bb.	Test equipment	Yes No
	1) Number required	
	2) Description	

6. Environmental factors

a. Aesthetic. Factors to be considered in the asethetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the electrical construction and maintenance and manufacturing processes area(s).

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the electrical construction and maintenance and manufacturing processes area(s).

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such

things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which sould be taken into account in planning the visual environment of the electrical construction and maintenance and manufacturing processes area(s).

_____

_____

_____

_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the electrical construction and maintenance and manufacturing processes laboratory.

_____

_____

_____

_____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special considerations which have implications for design of the electrical construction and maintenance and manufacturing processes area(s).

_____

_____

_____

_____

7. Vertical instructional surfaces

a. Chalkboard	Yes	No
1) Wall-mounted	P A	NA
Number of lineal feet	_____	
2) Portable	P A	NA
a) Number of lineal feet	_____	
b) Provision for storage	Yes	No
b. Tack board	Yes	No
Number of lineal feet	_____	
c. Pegboard	Yes	No
Number of lineal feet	_____	

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire electrical construction and maintenance and manufacturing processes area	_____
b. If distinct space divisions are desired according to function give minimum floor area requirements in square feet for each of the following areas if included in the desired program	
1) Storage space	
a) Raw material storage space	_____
b) Screw-bolt-nut storage space	_____

c) Reference material storage space _____
d) Project storage space _____
e) Display storage space _____
2) Lecture and demonstration space _____
3) Clean-up space _____
4) Tool board space _____
5) Welding space _____
6) Practice wiring space _____
7) Bench and assembly space _____
8) Machining space _____
9) Measurement space _____
10) Practice wiring space _____
11) Special operations space _____
12) Support space _____
13 13) Other (specify) _____

9. Other important factors to be considered in the planning of the electrical construction and maintenance and manufacturing processes are:

FORM J

DESCRIPTION OF CIRCUITS AND PHYSICS LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The circuits and physics laboratory area(s) should be planned:

a.	As independent unit	Yes	No
b.	In comibnation with _____ (specify) laboratory area(s)	Yes	No
c.	In combination with seminar area(s)	Yes	No
d.	In combination with lecture/demonstration area(s)	Yes	No
e.	As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space divisions within the circuits and physics area(s). Indicate the extent to which each activity will occur.

a.	Experimental station space				
	1) Study of basic instrumentation and measuring techniques	1	2	3	N
	2) Performance of experiments involving fundamental DC circuits	1	2	3	N
	3) Performance of experiments involving fundamental AC circuits	1	2	3	N
	4) Performing of experiments using three-phase power	1	2	3	N
	5) Other (specify) _____				
b.	Power control space				
	1) Distributing and controlling DC power to individual experimental stations	1	2	3	N
	2) Distributing and controlling AC power to individual experimental stations	1	2	3	N
	3) Distributing and controlling three-phase power to individual experimental stations	1	2	3	N
	4) Other (specify) _____				
c.	Instrument storage sapce				
	1) Testing and calibrating equipment	1	2	3	N
	2) Repairing equipment	1	2	3	N
	3) Preparing (building or dismantling) demonstration equipment	1	2	3	N
	4) Checking equipment in and out	1	2	3	N
	5) Other (specify) _____				
d.	Lecture/demonstration space				
	1) Discussing experimental projects	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

2) Discussing report writing techniques 1 2 3 N
3) Demonstrating with specialized equipment 1 2 3 N
4) Other (specify) _____

e. Classroom space
1) Preparing diagrams, data sheets and procedures prior to experimentation 1 2 3 N
2) Computing and graphing data and/or results 1 2 3 N
3) Compiling reports 1 2 3 N
4) Using research materials (books, periodicals, slides, etc.) 1 2 3 N
5) Other (specify) _____

f. Other activities in the circuits and physics laboratory area(s) or related areas
1) _____ 1 2 3 N
2) _____ 1 2 3 N
3) _____ 1 2 3 N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

Within the experimental station space
1) Experimental station space to:
a) Power control space 1 2 3 N
b) Equipment storage space 1 2 3 N
c) Lecture/demonstration space 1 2 3 N
d) Classroom space 1 2 3 N
e) Other (specify) _____ 1 2 3 N
2) Power control space to:
a) Equipment storage space 1 2 3 N
b) Lecture/demonstration space 1 2 3 N
c) Classroom space 1 2 3 N
d) Other (specify) _____ 1 2 3 N
3) Equipment storage space to:
a) Lecture/demonstration space 1 2 3 N
b) Classroom space 1 2 3 N
c) Other (specify) _____ 1 2 3 N
4) Lecture/demonstration space to:
a) Classroom space 1 2 3 N
b) Other (specify) _____ 1 2 3 N
5) Classroom space to:
Other (specify) _____ 1 2 3 N

5. Furniture and equipment

a. Experimental benches
1) Number required Yes No
2) Provision for storage required Yes No
3) Power outlets Yes No
a) Voltages available _____

b) Number of outlets _____
c) Type of outlets _____
4) Circuit breakers Yes No
a) Type (range) _____
b) Number required _____

b. Main power panel Yes No
1) Direct current Yes No
a) Range _____
b) Variable Yes No
2) Alternating current Yes No
a) Range (amplitude) _____
b) Variable (amplitude) Yes No
c) Range (frequency) _____
d) Variable (frequency) Yes No
3) Three-phase Yes No
Specify variables _____
4) Special demonstration equipment
(specify) _____ Yes No
_____
5) Other (specify) _____ Yes No
_____

c. Portable DC power supplies Yes No
1) Number required _____
2) Specifications _____

d. Portable AC power supplies Yes No
1) Number required _____
2) Specifications _____

e. Oscilloscopes Yes No
1) Number required _____
2) Specifications _____

f. Pulse generators Yes No
1) Number required _____
2) Specifications _____

g. Instructor's desk(s) Yes No
1) Number required _____
2) Provision for storage required Yes No
3) Further description _____
_____

h. File cabinets Yes No
1) Number of file drawers required _____
2) Legal size P A NA
3) Letter size P A NA
4) Further description _____
_____

i. Student chairs Yes No
1) Number required _____
2) Folding-type P A NA
3) Provision for storage Yes No
4) Further description _____
_____

j. Student tables Yes No
1) Number required _____
2) Folding-type P A NA
3) Provision for storage Yes No

4) Further description _____

_____

k. Portable measuring equipment — Yes No

1) DC voltmeters — Yes No
   a) Number required _____
   b) Type _____
2) DC ammeters — Yes No
   a) Number required _____
   b) Type _____
3) AC voltmeters — Yes No
   a) Number required _____
   b) Type _____
4) AC ammeters — Yes No
   a) Number required _____
   b) Type _____
5) Multi-purpose meters — Yes No
   a) Number required _____
   b) Type _____
6) Wattmeters — Yes No
   a) Number required _____
   b) Type _____
7) Timing devices — Yes No
   a) Number required _____
   b) Type _____
8) Other (specify) _____ — Yes No

_____

l. Circuit components — Yes No

1) Resistors (fixed) — Yes No
   a) Number required _____
   b) Type _____
2) Resistors (variable) — Yes No
   a) Number required _____
   b) Type _____
3) Capacitors — Yes No
   a) Number required _____
   b) Type _____
4) Inductors — Yes No
   a) Number required _____
   b) Type _____
5) Other (specify) _____ _____

_____

_____

_____

m. Other major equipment needs for the circuits and physics laboratory area(s)

_____

_____

_____

_____

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are color, light, style of architecture, design

and the like. Indicate any special aesthetic considerations important to the planning of the circuits and physics laboratory area(s).

_____

_____

_____

_____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the circuits and physics laboratory area(s).

_____

_____

_____

_____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the physics and circuits laboratory area(s).

_____

_____

_____

_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the circuits and physics laboratory area(s).

_____

_____

_____

_____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the circuits and physics laboratory area(s).

_____

_____

_____

_____

7. Vertical instructional surfaces

a. Chalkboard	Yes	No
1) Wall-mounted	P A	NA
Number of lineal feet	_____	
2) Portable	P A	NA
a) Number of lineal feet	_____	
b) Provision for storage	Yes	No
b. Tack board	Yes	No
Number of lineal feet	_____	
c. Pegboard	Yes	No
Number of lineal feet	_____	

8. Minimum floor areas required in square feet

   a. Floor area in square feet for the entire circuits and physics laboratory area(s) _____
   b. If distinct space divisions are desired according to function, give minimum floor area requirement in square feet for each of the following areas, if included in the desired program.
      1) Experimental station space _____
      2) Power control space _____
      3) Instrument storage space _____
      4) Lecture/demonstration space _____
      5) Classroom space _____
      6) Other (specify) _____ _____

9. Other important factors to be considered in the planning of the circuits and physics laboratory area(s) are:

FORM K

DESCRIPTION OF ELECTRONICS LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The electronics laboratory area(s) should be planned:

a.	As independent unit(s)	Yes	No
b.	In combination with _____ laboratory area(s) (specify)	Yes	No
c.	In combination with lecture/demonstration areas	Yes	No
d.	In combination with seminar area(s)	Yes	No
e.	As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space(s) within the electronics laboratory area(s). Indicate the extent to which each activity will occur.

a.	Lecture/demonstration space				
	1) Discussing laboratory procedure	1	2	3	N
	2) Use of visual instructional aids	1	2	3	N
	3) Computation and report writing	1	2	3	N
	4) Instrumentation indoctrination	1	2	3	N
	5) Other (specify) _____	1	2	3	N
b.	General test bench area(s)				
	1) Conducting electronics experiments	1	2	3	N
	2) Conducting calibration exercises	1	2	3	N
	3) Equipment familiarization work	1	2	3	N
	4) Breadboarding new circuits	1	2	3	N
	5) Troubleshooting exercises	1	2	3	N
	6) Other (specify) _____	1	2	3	N
c.	Printed circuit area(s)				
	1) Drafting printed circuits	1	2	3	N
	2) Transfer to printed circuit board	1	2	3	N
	3) Etching printed circuits	1	2	3	N
	4) Soldering printed circuit boards	1	2	3	N
	5) Testing printed circuit boards	1	2	3	N
	6) Other (specify) _____	1	2	3	N
d.	Demonstration equipment storage space				
	1) General purpose equipment	1	2	3	N
	2) Special demonstration equipment	1	2	3	N
	3) Closed circuit TV equipment	1	2	3	N
	4) Projection equipment	1	2	3	N
	5) Sound (record, tape) equipment	1	2	3	N
	6) Other (specify) _____	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

e.	Instrument storage space				
	1) Small portable instruments	1	2	3	N
	2) Cart-mounted instruments	1	2	3	N
	3) Permanently mounted instrument	1	2	3	N
	4) Other (specify) _____	1	2	3	N
f.	Apparatus storage space				
	1) Small portable apparatus	1	2	3	N
	2) Cart-mounted apparatus	1	2	3	N
	3) Permanently mounted apparatus	1	2	3	N
	4) Other (specify) _____	1	2	3	N
g.	Reference material space				
	1) Instructional material storage	1	2	3	N
	2) Manufacturers' diagrams (instruction manuals) storage	1	2	3	N
	3) Other pertinent diagrams	1	2	3	N
	4) Periodical storage	1	2	3	N
	5) Books or texts	1	2	3	N
	6) Reading table space	1	2	3	N
	7) Other (specify) _____	1	2	3	N
h.	Office space				
	1) Lesson preparation	1	2	3	N
	2) Grading student work	1	2	3	N
	3) General study	1	2	3	N
	4) Directing laboratory activities	1	2	3	N
	5) Consultation with students	1	2	3	N
	6) Consultation with other faculty	1	2	3	N
	7) Other (specify) _____	1	2	3	N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

Within the electronics laboratory area(s)

1)	Lecture/demonstration space to:				
	a) General test bench area(s)	1	2	3	N
	b) Printed circuit area(s)	1	2	3	N
	c) Demonstration equipment storage space	1	2	3	N
	d) Instrument storage space	1	2	3	N
	e) Apparatus storage space	1	2	3	N
	f) Reference material space	1	2	3	N
	g) Office space	1	2	3	N
	h) Other (specify) _____	1	2	3	N
2)	General test bench area(s) to:				
	a) Printed circuit area(s)	1	2	3	N
	b) Demonstration equipment storage area	1	2	3	N
	c) Instrument storage space	1	2	3	N
	d) Apparatus storage space	1	2	3	N
	e) Reference material space	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

f)	Office space	1	2	3	N
g)	Other (specify) _____	1	2	3	N
3)	Printed circuit area(s) to:				
a)	Demonstration equipment storage area	1	2	3	N
b)	Instrument storage space	1	2	3	N
c)	Apparatus storage space	1	2	3	N
d)	Reference material space	1	2	3	N
e)	Office space	1	2	3	N
f)	Other (specify) _____	1	2	3	N
4)	Demonstration equipment storage space to:				
a)	Instrument storage space	1	2	3	N
b)	Apparatus storage space	1	2	3	N
c)	Reference material space	1	2	3	N
d)	Office space	1	2	3	N
e)	Other (specify) _____	1	2	3	N
5)	Instrument storage space to:				
a)	Apparatus storage space	1	2	3	N
b)	Reference material space	1	2	3	N
c)	Office space	1	2	3	N
d)	Other (specify) _____	1	2	3	N
6)	Apparatus storage space to:				
a)	Reference material space	1	2	3	N
b)	Office space	1	2	3	N
c)	Other (specify) _____	1	2	3	N
7)	Reference material space to:				
a)	Office space	1	2	3	N
b)	Other (specify) _____	1	2	3	N
8)	Office space to:				
	Other (specify) _____	1	2	3	N
9)	Electronics laboratory to:				
a)	Instructional materials center	1	2	3	N
b)	Offices	1	2	3	N
c)	Building entrance	1	2	3	N
d)	Other instructional areas	1	2	3	N
e)	Other building areas (specify)				
	_____	1	2	3	N
	_____	1	2	3	N

5. Furniture and equipment

a.	Power distribution panel				
1)	Single phase 115 volt ac	1	2	3	N
2)	Direct current (variable voltage)	1	2	3	N
3)	Waveform voltages	1	2	3	N
4)	Interconnection facilities	1	2	3	N
b.	Test benches				
1)	Isolated units	1	2	3	N
2)	Interconnected units	1	2	3	N
3)	Island type	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

4) Drawer(s) under	1 2 3 N	
5) Chairs or stools	1 2 3 N	
c. Office furniture		
1) Desk	1 2 3 N	
2) Chair	1 2 3 N	
3) Book case	1 2 3 N	
4) Conference table	1 2 3 N	
5) Chalkboard	1 2 3 N	
6) Other (specify) _____	1 2 3 N	
d. Components for experiments		
1) Discrete resistances	1 2 3 N	
2) Resistance boxes (decade or substitution)	1 2 3 N	
3) Discrete capacitors	1 2 3 N	
4) Capacitance boxes	1 2 3 N	
5) Discrete inductances	1 2 3 N	
6) Inductance boxes	1 2 3 N	
7) Test leads	1 2 3 N	
8) Printed circuit boards	1 2 3 N	
9) Breadboarded circuits	1 2 3 N	
10) Integrated circuits	1 2 3 N	
11) Interconnection boards	1 2 3 N	
12) Vacuum and gas tubes	1 2 3 N	
13) Solid state devices	1 2 3 N	
14) Magnetic devices	1 2 3 N	
15) Transformers	1 2 3 N	
16) Other (specify) _____	1 2 3 N	
e. Instrumentation		
1) Oscilloscopes	1 2 3 N	
a) Number required	_____	
b) Specifications	_____	
c) Rating	1 2 3 N	
2) Scope cameras		
a) Number required	_____	
b) Specifications	_____	
c) Rating	1 2 3 N	
3) Electronic counters		
a) Number required	_____	
b) Specifications	_____	
c) Rating	1 2 3 N	
4) Multimeters		
a) Number required	_____	
b) Specifications	_____	
c) Rating	1 2 3 N	
5) VTVM (electronic voltmeters)		
a) Number required	_____	
b) Specifications	_____	
c) Rating	_____	
6) Panel instruments (angle stand)		
a) Milliammeters	1 2 3 N	

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

	(1) Number required	_____
	(2) Specifications	_____
	(3) Rating	_____
b)	Voltmeters	1 2 3 N
	(1) Number required	_____
	(2) Specifications	_____
	(3) Rating	_____
7)	Bridges	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
8)	Calibration equipment	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
9)	Function generators	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
10)	Wave analyzers	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
11)	Curve tracers	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
12)	Analog computer trainers	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
13)	Digital computer trainers	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
14)	Microwave demonstration equipment	1 2 3 N
a)	Number required	_____
b)	Specifications	_____
c)	Rating	_____
15)	Other (specify)	
	_____	1 2 3 N
	_____	1 2 3 N

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic

considerations important to the planning of the electronics laboratory area(s).

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the electronics laboratory area(s).

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the electronics laboratory area(s).

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the electronics laboratory area(s).

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the electronics laboratory area(s).

7. Vertical instructional surfaces

	Yes P	A	No NA
a. Chalkboard			
1) Wall-mounted			
Number of lineal feet	P	A	NA
2) Portable			
a) Number of lineal feet			
b) Provision for storage	Yes		No
b. Tack board	Yes		No
Number of lineal feet			
c. Pegboard	Yes		No
Number of lineal feet			

8. Minimum floor areas required in square feet

   a. Floor area in square feet for the entire electronics laboratory area _____

   b. If distinct space divisions are desired according to function give minimum floor area requirements in square feet for each of the following areas if included in the desired program

      1) Lecture/demonstration space _____
      2) General test bench area(s) _____
      3) Printed circuit area(s) _____
      4) Demonstration equipment storage area _____
      5) Instrument storage space _____
      6) Apparatus storage space _____
      7) Reference material space _____
      8) Office space _____
      9) Other (specify) _____ _____

9. Other important factors to be considered in the planning of the electronics laboratory area(s) are:

FORM L

DESCRIPTION OF ENGINEERING DRAWING LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The engineering drawing laboratory area(s) should be planned:

a. As independent unit(s)	Yes	No
b. In combination with _____ (specify) laboratory area(s)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use area(s)	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space divisions within the engineering drafting and electrical design area(s). Indicate the extent to which each activity will occur.

a. Lecture-drawing space				
1) Lecture purposes	1	2	3	N
2) Student drafting	1	2	3	N
3) _____	1	2	3	N
b. Reference space				
1) Student referencing purposes	1	2	3	N
2) Storage of reference material	1	2	3	N
3) Storage of drafting materials	1	2	3	N
4) _____	1	2	3	N
c. Reproduction area				
1) Making copies of prints	1	2	3	N
2) Storage of prints	1	2	3	N
3) _____	1	2	3	N
d. Clean-up space				
1) Student washing	1	2	3	N
2) Instrument cleaning	1	2	3	N
3) _____	1	2	3	N

4. Spatial relationships. Indicate the extent to which spaces should be accessible to each other.

Within the engineering drafting and electrical design area(s)				
1) Lecture-drawing space to:				
a) Reproduction space	1	2	3	N
b) Reference space	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

c) Clean-up space 1 2 3 N

2) Reference space to:
a) Reproduction space 1 2 3 N
b) Clean-up space to 1 2 3 N

3) Reproduction space to:
Clean-up space 1 2 3 N

5. Equipment

a. Drafting machines Yes No
1) Number required _____
2) Description _____

b. Instructors' table Yes No
1) Number required _____
2) Description _____

c. Drafting tables Yes No
1) Number required _____
2) Description _____

d. Stools Yes No
1) Number required _____
2) Description _____

e. Print copy device Yes No
1) Number required _____
2) Description _____

f. Print storage cabinet Yes No
1) Number required _____
2) Description _____

g. Reference material cabinet Yes No
1) Number required _____
2) Description _____

h. Mechanical lettering aids Yes No
1) Number required _____
2) Description _____

i. Sink Yes No
1) Number required _____
2) Description _____

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the planning of the electrical drafting and design area(s).

_____
_____
_____
_____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the planning of the electrical drafting and design area(s).

_____

_____

_____

_____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks, and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the electrical drafting and design area(s).

_____

_____

_____

_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the electrical drafting and design area(s).

_____

_____

_____

_____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special considerations which have implications for design of the electrical drafting and design area(s).

_____

_____

_____

_____

7. Vertical instructional surfaces

a. Chalkboard	Yes	No
1) Wall-mounted	P A	NA
Number of lineal feet	_____	
2) Portable	P A	NA
a) Number of lineal feet	_____	
b) Provision for storage	Yes	No
b. Tack board	Yes	No
Number of lineal feet	_____	
c. Pegboard	Yes	No
Number of lineal feet	_____	

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire drafting room area _____

b. If distinct space divisions are desired according to function give minimum floor area requirements in square feet for each of the following areas if included in the desired program.

1) Storage space
   a) Copy machine storage space _____
   b) Print storage space _____
   c) Reference material storage space _____
2) Lecture and drawing space _____
3) Reference space _____
4) Reproduction space _____
5) Clean-up space _____

9. Other important factors to be considered in the planning of the electrical drafting and design area(s) are:

FORM M

DESCRIPTION OF COMPUTER PROGRAMMING LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The computer programming laboratory area(s) should be planned:

a. As an independent unit(s)	Yes	No
b. In combination with _____ laboratory area(s) (specify)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space divisions with the computer programming laboratory area(s). Indicate the extent to which each activity will occur.

a. On-line equipment space				
1) Acquiring techniques of machine operation	1	2	3	N
2) Acquiring diagnostic interpretation skills	1	2	3	N
3) Acquiring techniques of other on-line equipment (specify)				
a) _____	1	2	3	N
b) _____	1	2	3	N
c) _____	1	2	3	N
b. Off-line equipment space				
1) Acquiring techniques of keypunch operation	1	2	3	N
2) Acquiring techniques of printer operation	1	2	3	N
3) Acquiring techniques of other off-line equipment operation (specify)				
a) _____	1	2	3	N
b) _____	1	2	3	N
c) _____	1	2	3	N
c. Reference material space				
1) Instructional material storage	1	2	3	N
2) Equipment manual storage	1	2	3	N
3) Reference material storage	1	2	3	N
4) Reading table space	1	2	3	N
d. Work table space				

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

Writing and debugging programs	1	2	3	N
e. Office space				
1) Directing laboratory activities	1	2	3	N
2) Consultation	1	2	3	N
f. Program storage space				
1) Card storage	1	2	3	N
2) Disk storage	1	2	3	N
3) Paper storage	1	2	3	N
4) Drum storage	1	2	3	N
g. Other activities in computer programming laboratory area(s)				
1) _____	1	2	3	N
2) _____	1	2	3	N
3) _____	1	2	3	N
4) _____	1	2	3	N

4. Spatial relationships. Indicate the extent to which the spaces should be accessible to each other.

a. On-line equipment space to:				
1) Off-line equipment space	1	2	3	N
2) Reference material space	1	2	3	N
3) Work table space	1	2	3	N
4) Office space	1	2	3	N
5) Program storage space	1	2	3	N
6) Other activity space	1	2	3	N
b. Off-line equipment space to:				
1) Reference material space	1	2	3	N
2) Work table space	1	2	3	N
3) Office space	1	2	3	N
4) Program storage sapce	1	2	3	N
5) Other activity space	1	2	3	N
c. Reference material space to:				
1) Work table space	1	2	3	N
2) Office space	1	2	3	N
3) Program storage space	1	2	3	N
4) Other activity space	1	2	3	N
d. Work table space to:				
1) Office space	1	2	3	N
2) Program storage space	1	2	3	N
3) Other activity space	1	2	3	N
e. Office space to:				
1) Program storage space	1	2	3	N
2) Other activity space	1	2	3	N
f. Program storage space to:				
Other activity space	1	2	3	N
g. Computer programming laboratory area(s) to:				
1) Instructional material center	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

2)	Building entrance	1	2	3	N
3)	Delivery area	1	2	3	N
4)	Other instructional areas (specify)				
	a) _____	1	2	3	N
	b) _____	1	2	3	N
	c) _____	1	2	3	N
5)	Other building areas (specify)				
	a) _____	1	2	3	N
	b) _____	1	2	3	N
	c) _____	1	2	3	N

5. Furniture and equipment

a.	Central processing unit		
	1) Time share	Yes	No
	2) Core capacity		
	3) Extra on-line storage		
	a) Disk		
	b) Core		
	c) Magnetic tape		
	d) Paper tape		
	e) Drum		
	f) Other (specify) _____		
b.	Card reader	Yes	No
	1) Type		
	2) Combined with card punch	Yes	No
c.	On-line printer	Yes	No
	Type		
d.	On-line plotter	Yes	No
	Type		
e.	Card punch	Yes	No
	1) Type		
	2) Combined with card reader	Yes	No
f.	Magnetic tape unit	Yes	No
	Type		
g.	Key punch equipment	Yes	No
	1) Type		
	2) Number required		
h.	Paper tape reader	Yes	No
	Type		
i.	Paper tape punch	Yes	No
	Type		
j.	Time share terminals	Yes	No
	Type		
k.	Disk storage cabinets	Yes	No
	1) Number required		
	2) Type		
l.	Card storage cabinet	Yes	No
	1) Number required		

2) Type

m. Magnetic tape storage cabinet — Yes / No
   1) Number required
   2) Type

n. Paper tape storage cabinet — Yes / No
   1) Number required
   2) Type

o. Desk for laboratory assistant(s) — Yes / No
   1) Number required
   2) Type

p. Chair for laboratory assistant(s) — Yes / No
   1) Number required
   2) Type

q. Student work table — Yes / No
   Size

r. Student chairs — Yes / No
   1) Number required
   2) Folding — P / A / NA
   3) Provision for storage required — Yes / No
   4) Type

s. Office desk — Yes / No
   Size

t. Office chair — Yes / No
   1) Number required
   2) Type

u. Book case — Yes / No
   Type

v. Filing cabinet — Yes / No
   Number of drawers

w. Air conditioner for maintenance of temperature of central processing unit — Yes / No
   Input feeder size

x. Desk calculator — Yes / No
   1) Stored program type — Yes / No
   2) Type

y. Other equipment required for the computer programming laboratory area(s). Give description in quantities:

_____
_____
_____

6. Environmental factors.

   a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the computer programming laboratory area(s).

_____
_____
_____
_____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the computer programming laboratory area(s).

_____

_____

_____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the computer programming laboratory area(s).

_____

_____

_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the computer programming laboratory area(s).

_____

_____

_____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the computer programming laboratory area(s).

_____

_____

_____

_____

7. Vertical instructional surfaces

	Yes		No
	P	A	NA
a. Chalkboard			
1) Wall-mounted			
Number of lineal feet	P	A	NA
2) Portable			
a) Number of lineal feet			
b) Provision for storage	Yes		No
b. Tack board	Yes		No
Number of lineal feet			
c. Pegboard	Yes		No
Number of lineal feet			

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire computer programming laboratory area(s) _____

b. If distinct space divisions are desired according to function, give minimum floor

area requirements in square feet for each of the following areas if included in the desired program.

1) On-line equipment space _____
2) Off-line equipment space _____
3) Reference material space _____
4) Work table space _____
5) Office space _____
6) Other activity space (specify)
   _____ _____
   _____ _____
   _____ _____

9. Special utility services required

Electricity

1) Service for computer system _____
2) Service for air conditioner _____
3) Number of outlets _____
4) Special lighting requirements (specify)
   _____ _____
   _____ _____
   _____ _____
5) Special wiring requirements
   a) Instructional TV _____
   b) Intercom _____
   c) Share-time system connections _____
   d) Other _____

10. Other important factors to be considered in the planning of the computer programming laboratory are as follows:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

FORM N

DESCRIPTION OF COMPUTER AND CONTROL SYSTEMS LABORATORY AREA(S) TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The computer and control systems laboratory area(s) should be planned:

a. As an independent unit(s)	Yes	No
b. In combination with _____ (specify) laboratory area(s)	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space divisions within the computer and control systems laboratory area(s). Indicate the extent to which each activity will occur.

a. Lecture/demonstration space				
1) Discussing laboratory procedure	1	2	3	N
2) Using visual instructional aids	1	2	3	N
3) Calculating laboratory results	1	2	3	N
4) Other (specify) _____	1	2	3	N
b. Analog computer systems space				
1) Operating the analog computer	1	2	3	N
2) Using on-line plotter	1	2	3	N
3) Using oscilloscope	1	2	3	N
4) Using other equipment (specify) _____	1	2	3	N
c. Student patch-panel space				
1) Putting problems onto patch panels	1	2	3	N
2) Other (specify) _____	1	2	3	N
d. Analog computer system storage space				
1) Available patch-panel storage	1	2	3	N
2) Student patch-panel storage	1	2	3	N
3) Faculty patch-panel storage	1	2	3	N
4) Oscilloscope storage	1	2	3	N
5) Lead storage	1	2	3	N
e. Digital computer trainer space				
1) Operating the digital computer trainer	1	2	3	N
2) Other (specify) _____	1	2	3	N
f. Digital computer trainer storage space				
1) "Hardware" storage	1	2	3	N
2) Lead storage	1	2	3	N
3) Other (specify) _____	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

g. DC servomechanism space
   Performing demonstrations and experiments 1 2 3 N
h. AC servomechanism space
   Performing demonstrations and experiments 1 2 3 N
i. Hydraulic servomechanism space
   Performing demonstrations and experiments 1 2 3 N
j. Fluidics (pneumatic) control system space
   Performing demonstrations and experiments 1 2 3 N
k. Stepping motor control systems space
   Performing demonstrations and experiments 1 2 3 N
l. Reference material space
   1) Instructional material storage 1 2 3 N
   2) Equipment manuals storage 1 2 3 N
   3) Reference material storage 1 2 3 N
   4) Reading table space 1 2 3 N
m. Office space
   1) Directing laboratory activities 1 2 3 N
   2) Consultation 1 2 3 N
   3) Other (specify) _____ 1 2 3 N
n. Other activities in computer and control systems laboratory area(s)
   _____ 1 2 3 N
   _____ 1 2 3 N
   _____ 1 2 3 N
   _____ 1 2 3 N
   _____ 1 2 3 N

4. Spatial relationships. Indicate the extent to which the spaces should be accessible to each other.

a. Lecture/demonstration space to:
   1) Analog computer systems space 1 2 3 N
   2) Student patch-panel space 1 2 3 N
   3) Analog computer system storage space 1 2 3 N
   4) Digital computer trainer space 1 2 3 N
   5) Digital computer trainer storage space 1 2 3 N
   6) DC servomechanism space 1 2 3 N
   7) AC servomechanism space 1 2 3 N
   8) Hydraulic servomechanism space 1 2 3 N
   9) Fluidics (pneumatic) control system space 1 2 3 N
   10) Stepping motor control system space 1 2 3 N
   11) Reference material space 1 2 3 N
   12) Office space 1 2 3 N
   13) Other activity space 1 2 3 N
b. Analog computer system space to:
   1) Student patch-panel space 1 2 3 N
   2) Analog computer system storage space 1 2 3 N
   3) Digital computer trainer space 1 2 3 N
   4) Digital computer trainer storage space 1 2 3 N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

5)	DC servomechanism space	1	2	3	N
6)	AC servomechanism space	1	2	3	N
7)	Hydraulic servomechanism space	1	2	3	N
8)	Fluidic (pneumatic) control system space	1	2	3	N
9)	Stepping motor control system space	1	2	3	N
10)	Reference material space	1	2	3	N
11)	Office space	1	2	3	N
12)	Other activity space	1	2	3	N
c.	Student patch-panel space to:				
1)	Analog computer system storage space	1	2	3	N
2)	Digital computer trainer space	1	2	3	N
3)	Digital computer trainer storage space	1	2	3	N
4)	DC servomechanism space	1	2	3	N
5)	AC servomechanism space	1	2	3	N
6)	Hydraulic servomechanism space	1	2	3	N
7)	Fluidics (pneumatic) control system space	1	2	3	N
8)	Stepping motor control system space	1	2	3	N
9)	Reference material space	1	2	3	N
10)	Office space	1	2	3	N
11)	Other activity space	1	2	3	N
d.	Analog computer system storage space to:				
1)	Digital computer trainer space	1	2	3	N
2)	Digital computer trainer storage space	1	2	3	N
3)	DC servomechanism space	1	2	3	N
4)	AC servomechanism space	1	2	3	N
5)	Hydraulic servomechanism space	1	2	3	N
6)	Fluidic (pneumatic) control system space	1	2	3	N
7)	Stepping motor control system space	1	2	3	N
8)	Reference material space	1	2	3	N
9)	Office space	1	2	3	N
10)	Other activity space	1	2	3	N
e.	Digital computer trainer space to:				
1)	Digital computer trainer storage space	1	2	3	N
2)	DC servomechanism space	1	2	3	N
3)	AC servomechanism space	1	2	3	N
4)	Hydraulic servomechanism space	1	2	3	N
5)	Fluidic (pneumatic) control system space	1	2	3	N
6)	Stepping motor control system space	1	2	3	N
7)	Reference material space	1	2	3	N
8)	Office space	1	2	3	N
9)	Other activity space	1	2	3	N
f.	Digital computer trainer storage space to:				
1)	DC servomechanism space	1	2	3	N
2)	AC servomechanism space	1	2	3	N
3)	Hydraulic servomechanism space	1	2	3	N
4)	Fluidic (pneumatic) control system space	1	2	3	N
5)	Stepping motor control system space	1	2	3	N
6)	Reference material space	1	2	3	N
7)	Office space	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

8)	Other activity space	1	2	3	N
g.	DC servomechanism space to:				
1)	AC servomechanism space	1	2	3	N
2)	Hydraulic servomechanism space	1	2	3	N
3)	Fluidic (pneumatic) control system space	1	2	3	N
4)	Stepping motor control system space	1	2	3	N
5)	Reference material space	1	2	3	N
6)	Office space	1	2	3	N
7)	Other activity space	1	2	3	N
h.	AC servomechanism space to:				
1)	Hydraulic servomechanism space	1	2	3	N
2)	Fluidic (pneumatic) control system space	1	2	3	N
3)	Stepping motor control systems space	1	2	3	N
4)	Reference material space	1	2	3	N
5)	Office space	1	2	3	N
6)	Other activity space	1	2	3	N
i.	Hydraulic servomechanism space to:				
1)	Fluidic (pneumatic) control system space	1	2	3	N
2)	Stepping motor control system space	1	2	3	N
3)	Reference material space	1	2	3	N
4)	Office space	1	2	3	N
5)	Other activity space	1	2	3	N
j.	Fluidic (pneumatic) control system space to:				
1)	Stepping motor control system space	1	2	3	N
2)	Reference material space	1	2	3	N
3)	Office space	1	2	3	N
4)	Other activity space	1	2	3	N
k.	Stepping motor control system space to:				
1)	Reference material space	1	2	3	N
2)	Office space	1	2	3	N
3)	Other activity space	1	2	3	N
l.	Reference material space to:				
1)	Office space	1	2	3	N
2)	Other activity space	1	2	3	N
m.	Office space to:				
	Other activity space	1	2	3	N
n.	Other spaces in computer and control systems laboratory area(s)				
1)	Instructional materials center	1	2	3	N
2)	Offices	1	2	3	N
3)	Building entrance	1	2	3	N
4)	Other instructional areas	1	2	3	N
5)	Other building areas (specify)				
	_____	1	2	3	N
	_____	1	2	3	N
	_____	1	2	3	N
	_____	1	2	3	N

5. Furniture and equipment

FORM N

a. Analog computer	Yes	No
Number required		
b. Computer patch-panels	Yes	No
Number required		
c. X-Y plotter	Yes	No
Number required		
d. Oscilloscope	Yes	No
Number required		
e. Computer table and storage cabinet	Yes	No
Number required		
f. Patch-panel work table	Yes	No
Number required		
g. Digital computer trainer	Yes	No
Number required		
h. Digital computer equipment storage cabinet	Yes	No
Number required		
i. DC servomechanism training apparatus	Yes	No
Number required		
j. AC servomechanism training apparatus	Yes	No
Number required		
k. Hydraulic servomechanism training apparatus	Yes	No
Number required		
l. Fluidic (pneumatic) control system apparatus	Yes	No
Number required		
m. Stepping motor control system apparatus	Yes	No
Number required		
n. Instrument storage	Yes	No
1) Small instrument storage cabinets	Yes	No
Number required		
2) Cart or caster mounted instrument storage	Yes	No
Number required		
o. Work tables	Yes	No
1) Number required		
2) Size		
p. Student chairs	Yes	No
1) Number required		
2) Type		
q. Patch-panel storage cabinet	Yes	No
Capacity		
r. Hardware storage cabinets	Yes	No
1) Number required		
2) Size		
s. Office desk	Yes	No
1) Number required		
2) Size		
t. Office chair	Yes	No
1) Number required		
2) Type		
u. Book case	Yes	No
1) Number required		
2) Type		
v. Filing cabinet	Yes	No
Number of drawers		

w. Other equipment required for the computer and control systems laboratory area(s). Give description and quantities:

_____
_____

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the computer and control systems laboratory area(s).

_____
_____
_____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the computer and control systems laboratory area(s).

_____
_____
_____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the computer and control systems laboratory area(s).

_____
_____
_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the computer and control systems laboratory area(s).

_____
_____
_____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special safety considerations which have implications for design of the computer and control systems laboratory area(s).

_____
_____
_____

7. Vertical instructional surfaces

a. Chalkboard	Yes No
1) Wall-mounted	P A NA
Number of lineal feet	_____
2) Portable	P A NA
a) Number of lineal feet	_____
b) Provision for storage	Yes No
b. Tack board	Yes No
Number of lineal feet	_____
c. Pegboard	Yes No
Number of lineal feet	_____

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire computer and control systems laboratory area(s)	_____
b. If distinct space divisions are desired according to function, give minimum floor area requirements in square feet for each of the following areas if included in the desired rpogram.	
1) Teaching space	_____
2) Analog computer equipment space	_____
3) Digital computer equipment space	_____
4) Servomechanism equipment space	_____
5) Fluidic equipment space	_____
6) Stepping motor equipment space	_____
7) Storage space	_____
8) Office space	_____
9) Other (specify) _____	_____

9. Special utility services required

a. Electricity	
1) Service size	_____
2) Number of outlets	_____
b. Special lighting requirements (specify)	
_____	
_____	
_____	
c. Special wiring requirements	
1) Instructional TV	_____
2) Intercom	_____
3) Other (specify) _____	_____
d. Hydraulic (specify)	
_____	
_____	
_____	
e. Pneumatic (specify)	
_____	
_____	
_____	

10. Other important factors to be considered in the planning of the computer and control systems laboratory are:

FORM O

DESCRIPTION OF STUDENT SELF-STUDY LABORATORY AREAS TO BE USED PRINCIPALLY FOR ACTION LEARNING

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

1. The student self-study laboratory area(s) should be planned:

a. As an independent unit(s)	Yes	No
b. In combination with _____ (specify) laboratory area(s).	Yes	No
c. In combination with seminar area(s)	Yes	No
d. In combination with lecture/demonstration area(s)	Yes	No
e. As an area within a single multi-use space	Yes	No

2. Student capacity required for scheduled activities (see Form E) _____

3. Student and instructor activities in various space divisions within the student self-study laboratory area(s). Indicate the extent to which each activity will occur.

a. Closed loop projector space Viewing 8 mm closed loop films	1	2	3	N
b. Audio tape recorder space Listening to prepared tapes	1	2	3	N
c. Video tape monitor Viewing prepared tapes	1	2	3	N
d. 35 mm film strip projector and record player Viewing and hearing film strips	1	2	3	N
f. Desk top computer Problem solving	1	2	3	N
g. Microfilm reader and copier Viewing microfilm	1	2	3	N
h. Coin slot copier Making copies of reference material	1	2	3	N
i. Reference space				
1) Instructional material storage	1	2	3	N
a) Audio tapes	1	2	3	N
b) Video tapes	1	2	3	N
c) 35 mm film strips and records	1	2	3	N
d) Computer programs	1	2	3	N
e) 8 mm closed loop films	1	2	3	N
f) Copier supplies	1	2	3	N
g) Microfilms	1	2	3	N
h) Microfiche				

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

2)	Manufacturers' equipment manuals storage	1	2	3	N
3)	Supplementary reading materials storage	1	2	3	N
4)	Periodical display and storage	1	2	3	N
5)	Reading table space	1	2	3	N
j. Office space					
	Supervising lab activities	1	2	3	N
k. Other activities in student self-study laboratory area					
	_____	1	2	3	N
	_____	1	2	3	N
	_____	1	2	3	N

4. Spatial relationships. Indicate the extent to which the spaces should be accessible to each other.

a. Closed loop projector space to:					
1)	Audio tape recorder space	1	2	3	N
2)	Video tape monitor space	1	2	3	N
3)	35 mm film strip projector space	1	2	3	N
4)	Microfiche reader space	1	2	3	N
5)	Desk top computer space	1	2	3	N
6)	Microfilm reader and copier space	1	2	3	N
7)	Coin slot copier space	1	2	3	N
8)	Reference space	1	2	3	N
9)	Office space	1	2	3	N
10)	Other activity space	1	2	3	N
b. Audio tape recorder space to:					
1)	Video tape monitor space	1	2	3	N
2)	35 mm film strip projector space	1	2	3	N
3)	Microfiche reader space	1	2	3	N
4)	Desk top computer space	1	2	3	N
5)	Microfilm reader and copier space	1	2	3	N
6)	Coin slot copier space	1	2	3	N
7)	Reference space	1	2	3	N
8)	Office space	1	2	3	N
9)	Other activity space	1	2	3	N
c. Video tape monitor space to:					
1)	35 mm film strip projector space	1	2	3	N
2)	Microfiche reader space	1	2	3	N
3)	Desk top computer space	1	2	3	N
4)	Microfilm reader and copier space	1	2	3	N
5)	Coin slot copier space	1	2	3	N
6)	Reference space	1	2	3	N
7)	Office space	1	2	3	N
8)	Other activity space	1	2	3	N
d. 35 mm film strip projector space to:					
1)	Microfiche reader space	1	2	3	N
2)	Desk top computer space	1	2	3	N

1 major emphasis
2 some emphasis
3 slight emphasis
N no emphasis

3)	Microfilm reader and copier space	1 2 3 N
4)	Coin slot copier space	1 2 3 N
5)	Reference space	1 2 3 N
6)	Office space	1 2 3 N
7)	Other activity space	1 2 3 N
e.	Microfiche reader space to:	
1)	Desk top computer space	1 2 3 N
2)	Microfilm reader and copier space	1 2 3 N
3)	Coin slot copier space	1 2 3 N
4)	Reference space	1 2 3 N
5)	Office space	1 2 3 N
6)	Other activity space	1 2 3 N
f.	Desk top computer space to:	
1)	Microfilm reader and copier space	1 2 3 N
2)	Coin slot copier space	1 2 3 N
3)	Reference space	1 2 3 N
4)	Office space	1 2 3 N
5)	Other activity space	1 2 3 N
g.	Microfilm reader and copier space to:	
1)	Coin slot copier space	1 2 3 N
2)	Reference space	1 2 3 N
3)	Office space	1 2 3 N
4)	Other activity space	1 2 3 N
h.	Coin slot copier space to:	
1)	Reference space	1 2 3 N
2)	Office space	1 2 3 N
3)	Other activity space	1 2 3 N
i.	Reference space to:	
1)	Office space	1 2 3 N
2)	Other activity space	1 2 3 N
j.	Office space to:	
	Other activity space	1 2 3 N
k.	Student-self study laboratory area(s) to:	
1)	Instructional material center	1 2 3 N
2)	Building entrance	1 2 3 N
3)	Delivery area	1 2 3 N
4)	Other instructional areas (specify)	
	_____	1 2 3 N
	_____	1 2 3 N
	_____	1 2 3 N
5)	Other building areas (specify)	
	_____	1 2 3 N
	_____	1 2 3 N
	_____	1 2 3 N

5. Furniture and equipment

a.	8 mm closed loop projectors and small screens	Yes No

	1) Number required sound	_____
	2) Number required silent	_____
b.	Audio tape recorders	Yes No
	1) Number required cartridge	_____
	2) Number required reel	_____
c.	Multiple listening equipment (4 per set)	Yes No
	Number sets	_____
d.	Video playback machine	Yes No
	Number required	_____
e.	Video monitors	Yes No
	1) Number required--color	_____
	2) Number required--black and white	_____
f.	35 mm film strip projectors and record player	Yes No
	1) Number with built-in screen	_____
	2) Number without built-in screen	_____
g.	Microfiche reader	Yes No
	Number required	_____
h.	Desk top computer	Yes No
	1) Number self-contained	_____
	2) Number shared time	_____
i.	Microfilm reader	Yes No
	1) Number with copier attachment	_____
	2) Number without copier	_____
j.	Coin operated copiers	Yes No
	1) Number required	_____
	2) Type	_____
k.	Study carrels	Yes No
	1) Number required	_____
	2) Type or size	_____
l.	Student chairs	Yes No
	1) Number required	_____
	2) Type	_____
m.	8 mm loop storage cabinet	Yes No
	Capacity	_____
n.	Audio tape storage	Yes No
	Capacity	_____
o.	Video tape storage cabinet	Yes No
	Capacity	_____
p.	Microfilm storage cabinet	Yes No
	Capacity	_____
q.	Microfiche storage cabinet	Yes No
	Capacity	_____
r.	Program storage cabinet	Yes No
	1) Capacity	_____
	2) Type	_____
s.	Copier supply cabinet	Yes No
	Type	_____
t.	Periodical display cabinet	Yes No
	Type	_____
u.	Instructional material storage cabinet	Yes No
	Type	_____
v.	Office desk	Yes No
	Size	_____

		Yes	No
w.	Office chair		
	1) Number required		
	2) Type		
x.	Book case	Yes	No
	Type		
y.	Filing cabinet	Yes	No
	Number of drawers		
z.	Other equipment required for the student self-study laboratory area(s). Give description and quantities.		
	_____	_____	
	_____	_____	
	_____	_____	
	_____	_____	

6. Environmental factors

a. Aesthetic. Factors to be considered in the aesthetic domain are colors, light, style of architecture, design and the like. Indicate any special aesthetic considerations important to the student self-study laboratory area(s).

_____
_____
_____

b. Aerial. Factors to be considered in this category include air temperature, radiant temperature, relative humidity, and ventilation. Indicate any special considerations important to the student self-study laboratory area(s).

_____
_____
_____

c. Visual. A properly controlled and balanced visual environment is important. The visual environment affects such things as accuracy in perception, attention to tasks and speed of performance. Indicate any special factors which should be taken into account in planning the visual environment of the student self-study laboratory area(s).

_____
_____
_____

d. Sonic. Factors to be considered in this category include such things as acoustical requirements and sound system. Indicate any special considerations important to the planning of the student self-study laboratory area(s).

_____
_____
_____

e. Safety. In planning school buildings, safety for students and instructors is of prime concern. Indicate any special

safety considerations which have implications for design of the student self-study laboratory area(s).

_____

_____

_____

_____

7. Vertical instructional surfaces

a. Chalkboard	Yes	No
1) Wall-mounted	P A	NA
Number of lineal feet		
2) Portable	P A	NA
a) Number of lineal feet		
b) Provision for storage	Yes	No
b. Tack board	Yes	No
Number of lineal feet		
c. Pegboard		
Number of lineal feet		

8. Minimum floor areas required in square feet

a. Floor area in square feet for the entire student self-study laboratory	
b. If distinct space divisions are desired according to function, give minimum floor area requirements in square feet for each of the following areas if included in the desired program.	
1) Closed loop projector use space	
2) Audio tape recorder use space	
3) Video tape recorder use space	
4) 35 mm film strip projector use space	
5) Microfiche reader use space	
6) Desk top computer use space	
7) Coin slot copier space	
8) Carrel space	
9) Office space	
10) Storage space	
11) Other (specify) _____	

9. Special utility services required

Electricity	
1) Service size	
2) Number of outlets	
3) Other (specify) _____	
4) Special lighting requirements (specify)	
_____	
_____	
_____	
_____	
_____	
_____	

5) Special wiring requirements
   a) Instructional TV _____
   b) Intercom _____
   c) Shared time computer wiring _____
   d) Other _____

10. Other important factors to be considered in the planning of the student self-study laboratory are:

PART IV

ANNOTATED BIBLIOGRAPHY

GENERAL FACILITY PLANNING

American Association of School Administrators. Planning America's School Buildings. Washington, D. C.: The Association, 1960.

Contributors to this publication were teachers, supervisors, administrators, architects, engineers, school board members, and school plant planning specialists. In addition to background material on school house construction, the book deals with specific topics including school surveys, analysis and computation of space and facility needs, enrollment projections, building designs, site selection, finance, and building maintenance and operation. Many pictures and illustrations are found, along with sample forms and outlines, which can be used in the facility planning process. No special consideration is given to unique problems faced in the planning for vocational and technical education facilities.

Boles, H. W. Step by Step to Better School Facilities. New York: Holt, Rinehart, and Winston, 1965.

A textbook on overall planning procedures for new and improved school facilities. The typical topics (school surveys, building planning, site selection and acquisition, architectural planning, contracting for construction, and the equipping and furnishing of buildings) are covered. The only mention of vocational schools is on page 270 where the author quotes from another source:

> Vocational training should be de-emphasized in the schools since this training often becomes obsolete before it can be used; also, special "trade" and "vocational" schools should be discontinued, unless the vocational curriculum is liberal in approach and broad in character. Such schools are often used as dumping grounds for students who are not wanted elsewhere and often more than custodial care is provided for them. When more is provided, the skills taught are frequently too partial in nature.

Conrad, M. J. Four Steps to New Schools. Columbus, Ohio: Educational Administration and Facilities Division of the Bureau of Educational Research and Service. The Ohio State University.

A book prepared for the inexperienced school planner. The author emphasizes that a school building is an educational tool and should be designed to do the job they are intended to do. The four steps discussed are: 1) district-wide building survey; 2) educational planning; 3) architectural planning and construction; and 4) moving in and settling down. A glossary of important terms used in plant planning is located in the back of the book.

Conrad, M. J.; Wohlers, E. E.; and Griggs, Norman. School Plant Planning: An Annotated Bibliography. Columbus, Ohio: The Administration and Facilities Unit, School of Education, The Ohio State University, 1968.

A compilation of references in the following categories: general references; periodicals; overview of school plant field, district wide building survey; educational planning; the architect and his work; moving in and settling down; and related topics.

Finchum, R. N. Extended Use of School Facilities. Washington, D. C.: U. S. Department of Health, Education, and Welfare, 1967.

This manual is intended to assist officials of school districts who are planning programs for maximum use of school properties and who must develop policies and regulations for efficient management of such programs. Various schedules of facility use are illustrated for nine different school systems.

Green, A. C. Educational Facilities With New Media. Washington, D. C.: Department of Audiovisual Instruction, National Education Association, 1966.

This work is designed to meet the needs of three distinct groups interested in providing educational facilities. Report A: "A Guide for Policy Makers" is directed to boards, administrators, planning committees, and institutional planners. Report B: "A Guide for the Design of Professions" is designed for architects, planners, and design specialists and planning committees; and Report C: "A Technical Guide" is intended for design-architects, engineers, equipment and furniture suppliers, and media specialists.

National Council on School House Construction. NCSC Guide for Planning Plants. East Lansing, Michigan: The Council, 1964.

A basic reference on school plant planning and construction for use by superintendents, school board members, school plant planners, state department of education personnel, local school system officials, collegiate institutions, architects, lay advisory groups, and graduate students. Major topics

covered are: planning and programming educational plants; spaces and equipment for learning; non-instructional systems; space organizacion and economy and resources. Much attention is given to plant planning through a description of a survey technique used to determine and satisfy school plant needs for a community. Site selection, kinds of instructional spaces, sonic, termal, and visual environments, and best use of natural and plant resources are also treated.

North Carolina. Department of Public Instruction. A Digest of Educational Planning. Raleigh, North Carolina: The Department.

The contents of this book include a description of what educational planning is, when it is done, who does it, and how it is done. The three steps of planning are identified as 1) identification and analysis of educational and facility needs, 2) adapting and implementing plant improvement programs, and 3) completing and evaluating a process of the educational planning.

North Carolina. Department of Public Instruction. The Division of School Planning. School Design. Raleigh.

Basic principles of school design is the thrust of this publication. It focuses on the interrelationship of patterns of school activities, organization of activities on the site, design potentials for various sites, and the building design data necessary for communicating the school's needs to the architect.

School Planning Laboratory. Spectrum of Electronic Teaching Aids in Education. Stanford, California: Stanford University, 1965.

This publication seeks to suggest which learning functions can be served electronically to symbolize the nature and progressive complexity of each electronic system, and finally to estimate budgets which will provide for adequate systems in relation to engineering and warranty costs.

Strevell, W. H., and Burke, A. J. Administration of the School Building Program. New York: McGraw-Hill Book Company, Inc., 1959.

A comprehensive textbook on the administration of the school plant program. The book is organized into three major parts. Part I - "Policy Decisions" deals with school building needs studies and long-range planning. Part 2 - "Program Recommendations" deals with local study of plant needs, evaluation of existing plant, determination of additional plant needs, site selection and development, and the preparation of educational specifications. Part 3 - "Project Administration" is concerned with the financial aspects of a building program and with public relations. There is a brief mention of the objectives of vocational education as contrasted with the objectives of general education on page 12.

The Cost of a Schoolhouse. New York: Educational Facilities Laboratories, 1960.

This book deals with the cost of a schoolhouse and the process of planning and financing it. It provides median costs for various building elements, designates individual responsibilities in process of building, and discusses arrangement of space and environmental factors.

VOCATIONAL-TECHNICAL FACILITY PLANNING

American Vocational Association. Developing Educational Specifications for Vocational and Practical Arts Facilities. Washington, D. C.: The Association.

The purpose of this publication is to reduce the broad principles and processes of school plant planning to those most applicable to vocational and practical arts education. Effective techniques for developing educational specifications are suggested. The committee provides a sequential treatment of program and administrative considerations, desired space and educational program, special site arrangement features, special physical aspects of building, and the financial requirements for the project.

Calder, C. R. Modern Media for Vocational-Technical Education. Connecticut: State Department of Education, 1967.

A study of related literature on programmed instruction, instructional films, instructional television, and learning from various instructional media. It analyzes new instructional media approaches used at North Carolina's Fundamental Learning Laboratories System, and the integrated experience approach at Oakland Community College.

Chase, W. W.; Browne, J. W.; and Russo, M. Basic Planning Guide for Vocational and Technical Education Facilities. Washington, D. C.: Department of Health, Education, and Welfare, U. S. Government Printing Office, 1965.

A general guide that describes important steps to be followed in the planning for and construction of vocational and technical education facilities. Important topics covered are: the impact of the Vocational Education Act of 1963; surveys of area educational needs; use of consultant services; basic planning considerations; educational specifications; general planning; and school construction cost and outlay. Sample floor plans and picture illustrations of vocational schools are included.

McKee, R. L., and Ripley, K. J. The Documentation of Steps to Establish a Technical College and the Evaluation of PERT as a Planning Tool for Educators. Bailey's Crossroads, Virginia: Unpublished report, 1966.

An account of the procedures followed in the establishment of a technical college within a period of less than 90 days. The entire planning process and implementation is described along with the PERT technique which was applied. The author concluded the PERT (Program Evaluation and Review Technique) was effective in assisting the planners in reaching their objectives within a short period of time.

Stanford University. Trends in Facility Design-Vocational-Technical Continuing Information Program. Stanford, California: School of Education, 1966.

The pamphlet emphasizes the need for a total flexibility concept in school building. Consideration is given to the use of building components to provide flexibility in space, lighting, air-conditioning, sewage system, and the like.

U. S. Department of Health, Education, and Welfare. New Ideas and Construction for Vocational Education. Washington, D. C.: Unpublished, 1967.

A report on new trends in the construction of vocational education facilities. Among topics covered are occupational clusters, teaching techniques such as micro-teaching and educational television, facilities for handicapped children, educational parks, and unique problems faced by large city school systems. Special consideration is given to maximum utilization of vocational education facilities on an around-the-clock basis.

Valentine, I. E., and Conrad, M. J. Progress Report: Vocational-Technical Facilities Project. Columbus, Ohio: The Center for Vocational and Technical Education, The Ohio State University, 1967.

A report which relates the thinking of six outstanding consultants on various topics relating current trends in vocational-technical education and facility planning. Reviews the work of a local consortium consisting of three Center vocational specialists, three school plant planners, three representatives from the State Department of Education, three local school officials, and three practicing architects in defining problems, clarifying issues, suggesting approaches to organizing planning guides, and establishing guidelines for a series of facility planning guides in selected vocational and technical subject areas.

Wohlers, A. E. A Manual for Planning a Secondary School Building (Vocational Education). Columbus, Ohio: The Administration and Facilities Unit, School of Education, The Ohio State University, Pamphlet C-14.

A general facility planning guide for programs of vocational education. Principal topics covered include: 1) number of teaching stations; 2) types of teaching stations; 3) equipment needs; and 4) floor areas required. The planning manual also deals with spatial relationships of teaching facilities

and the utilization of auxiliary areas such as libraries, cafeterias, and administrative suites. Planners using the guide are directed to complete checklists and fill-in blanks with the necessary information pertinent to vocational facility planning.

ELECTRICAL TECHNOLOGY FACILITY PLANNING

U. S. Department of Health, Education and Welfare, Office of Education. Electrical Technology, A Suggested Two-Year Post-High School Curriculum. OE-80006, U.S.G.P.O., 1960.

U. S. Department of Health, Education and Welfare, Office of Education. Electronics Technology. OE-80006, U.S.G.P.O., 1960.

Illinois Board of Vocational Education and the University of Illinois, Electronic Technology, A Suggested Two-Year Post-High School Program. Engineering Technology Series No. 2. University of Illinois: 1964.

Illinois Board of Vocational Education and the University of Illinois. Electronic Technology, A Suggested Two-Year Post-High School Program. Engineering Technology Series No. 3. University of Illinois: 1967.

All four of these publications are surveys in depth, designed to give the reader the information necessary to plan curriculum, housing, equipment and facilities for a two-year technical curriculum. The recent University of Illinois studies are particularly valuable.

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THE CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION

RESEARCH SERIES

no.	name of publication	cost
1	A National Survey of Vocational Education Programs for Students with Special Needs. April 1967. 89+ c14, p. ED011041	$2.00
2	The Demand for and Selected Sources of Teachers in Vocational and Technical Education, State Directory. January 1967. 31+c5b p. ED012331	o
3	Research and Development Priorities in Technical Education. May 1967. 34 p. ED013888	o
4	Review and Synthesis of Research in Agricultural Education. August 1966. 140 p. ED011562	1.50
5	Review and Synthesis of Research in Business and Office Occupations Education. August 1966. 128 p. ED011566	o
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11	The Emerging Role of State Education Departments with Specific Implications for Divisions of Vocational-Technical Education. 1967. ED016870	4.50
12	A Taxonomy of Office Activities for Business and Office Education. July 1968. 163 p. VT005935 RIE	2.75
13	Enlisted Men Separating from the Military Service as a Potential Source of Teachers for Vocational and Technical Schools. October 1967. 53 p. ED016131	*
14	Boost: Business and Office Education Student Training; Preliminary Report. 1967. 251 p. VT005131 RIE	3.00
18	Research Priorities in Technical Teacher Education: A Planning Model. October 1967. 48 p. ED016815	o
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4	National Vocational-Technical Education Seminar on the Development and Coordination of Research by State Research Coordinating Units. 1966. 72 p. ED011042	o
5	A Report of the Business and Office Education Research Planning Conference. 1966. 116 p. ED013304	o
6	Program Development for Occupational Education. A Report of a National Seminar for Leaders in Home Economics Education, March 28-31, 1966. 118 p. ED011040	o
7	Report of a National Invitational Research Planning Conference on Trade and Industrial Teacher Education, May 23-27, 1966. 1966. 197 p. ED011043	2.00

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11	Systems Under Development for Vocational Guidance. 1966. 60 p. ED011039	o
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