

A PROPOSED PLAN FOR THE ORGANIZATION AND
OPERATION OF THE
SCHOOL OF ENGINEERING
OF
MICHIGAN STATE COLLEGE

By
James M. Apple

A THESIS
Submitted to the School of Graduate Studies of Michigan
State College of Agriculture and Applied Science
in partial fulfillment of the requirements
for the degree of
MASTER OF SCIENCE

Department of Mechanical Engineering

1952

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PREFACE

It is the objective of this thesis to present a plan for the organization and operation of the School of Engineering at Michigan State College. The proposed plan is followed by suggestions and recommendations for carrying out the plan.

It should be pointed out that this thesis has been in preparation for about four years, and for that reason, some of the plan is already in operation. Much of the actual writing on the plan is a report on the present organization, as it has been developed during the past four years, as a result of preliminary work on the thesis.

It is felt, however, that much remains to be done to bring the organization and operation up to its most effective level. In order to accomplish this, it would be well if every member of the staff would read this report as background material for work to be done in his own department. Then each organizational unit of the School would be better prepared to attack the problem of more effective operation in its own area of activity.

It is suggested that each organizational unit follow the procedure outlined in Part II in working out its own organizational plan. For example, a Department or Committee should try to establish its own objectives,

in light of what is presented here, develop its own list of activities, define each activity, group related activities, and plan an organization for the overall task.

The details of the organization of the School of Engineering and its Departments, as presented here, are only suggestions. They may be used as guides, but it is hoped that each group will seriously study its own sphere of activity and follow through the procedure herein outlined.

The author wishes to express deep gratitude to Dean Lorin G. Miller for his encouragement, guidance, and many suggestions throughout the period of time this work has been in preparation. He would also like to thank Professor Leonard C. Price, Head of the Mechanical Engineering Department, with whom he has had many conversations on departmental problems. Thanks are also due to other department heads, as well as many faculty members with whom he has had conferences.

East Lansing, Michigan

James M. Apple

August 4, 1952

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Lorne G. Miller

ABSTRACT

This thesis has been written as a guide to the development of an effective organizational plan for the School of Engineering.

In section one, basic concepts of organization and administration are briefly reviewed in order to form a background for the reader. Several principles of organization are quoted as guide posts in organization planning.

Section two deals with the procedure for organization planning, first defining the subject, and then outlining the steps to be followed. Each step is carried out, as it pertains to the School of Engineering. This shows in a brief form, how an organization plan is developed.

In the third section an organization chart for the School is presented. Supplementing the chart in a somewhat condensed version of an organization manual, which describes each area of activity and lists several representative functions of each.

The fourth section is concerned with the organization of individual instruction departments. The same general procedure is indicated for the planning process. An organization chart of the Mechanical Engineering Department is presented as an example. Also included is a brief

organization manual for the department.

In section five, the role of the department head is considered from the point of view of his duties and responsibilities. Some of the major problems of the department head are considered, and several suggestions are made with the aim of making his job easier. The suggestions follow a pattern which has proved successful in business and industry.

Section six concerns itself with recommendations for improved operation of the School and its several departments. Certain specific suggestions are made, while others are indicated which it is thought require further study by the School Administration.

A PROPOSED PLAN FOR THE ORGANIZATION AND
OPERATION OF THE
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I. DISCUSSION OF ACCEPTED PRINCIPLES AND PRACTICES

Before undertaking the task of solving a particular problem, it seems well to review briefly the field with which we will be dealing. This will require a consideration of organization as a science, administration as a means of carrying out organization, and related subjects dealing with responsibility, authority, delegation, obligation, etc.

A. What is Organization

"Organization is a means to more effective concerted endeavor"¹ More broadly defined, it may be said that organization is the state or manner of being arranged or constituted in interdependent parts, each having a special function, act, office, or relation with respect to the whole. As organization is a state, or a condition, so may it also be a process.

¹Brown, Alvin, "Organization of Industry," Prentice-Hall, Inc., New York, 1947, p. 10.

In its application to an enterprise, organization defines that part which each member is to perform, and the interrelationships between members, in such a way that the concerted effort shall serve the purpose of the enterprise.

It should be understood that when we speak of "member" it is not meant to imply that organization deals in terms of persons. Alvin Brown says: "Organization does apply to individual jobs, however, and in that sense to individuals, though they be not identified at the time of organization."²

In practice, organization defines responsibilities of jobs and functions to be performed--not responsibilities or functions of persons.

B. Relationship Between Organization and Administration

If organization is the definition of parts to be performed, administration is the sum of the endeavors of the members of the enterprise to accompany its purpose. Administration denotes performance. "Organization serves administration and administration serves the purpose."³ Administration plans--decides what is to be done; executes--gives orders, instructions, supervises; and controls--sees that work is

²Brown, Alvin, "Organization," Hibbert Printing Co., New York, 1945, p. 10.

³Brown, Alvin, "Organization of Industry," p. 11.

done according to plans. Organization assigns responsibilities. Administration applies organization to endeavor.

C. The Need for Organization

An individual performing a task needs only to best utilize his own effort to accomplish a purpose. That is an administrative problem. He has no need of organization. But let the individual take on a helper, or two, or three, and immediately he must divide his responsibilities. He can no longer live within his own shell. He must define that part of the task each is to perform so that the purpose of endeavor is best served. This is organization. As the number of helpers increases, the original individual will find that an increasing amount of his time will be spent in overseeing the work of others, and at some point he has crossed the line into administration--he plans, he executes, he controls, for the progress of the endeavor.

Whenever several persons are involved in the accomplishment of a purpose, organization is necessary to define responsibilities and interrelationships; administration applies organization to the endeavor.

The Production Handbook states the idea in these words: "Organization, the framework within which

individuals work is an essential in reaching toward a common objective."⁴

D. The Scope of Organization

Organization, in its broadest sense, includes a consideration of:

1. The jobs or functions required to be performed in the operation of an enterprise
2. The respective place each occupies
3. The range of responsibility and authority required by each
4. The framework of interrelationships between individual jobs and functions
5. The mechanisms through which tasks are accomplished and coordinated in attaining the purpose of the enterprise

E. Responsibility and Authority

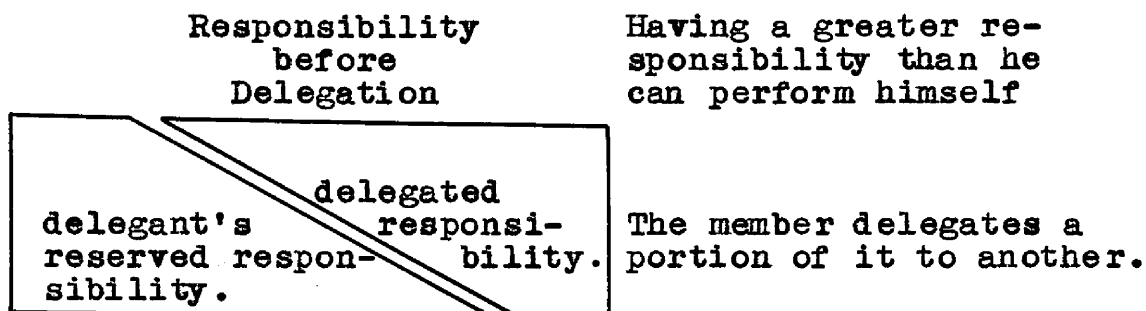
Two important fundamentals that enter into organization are responsibility and authority.

"Responsibility is that part of administration which is assigned to a particular member of an enterprise. Its definition is an act of organization."⁵

⁴Alford, L.P. and Bangs, J.R., "Production Handbook," Ronald Press Co., 1944.

⁵Brown, _____, op. cit., p. 27.

Responsibility is created "...when one member of an enterprise defines a share in his endeavor which he will transfer to another person..."⁶ Brown puts it in graphical form, thus:⁷



To quote further from Brown:

A delegation of responsibility creates an individual part in administration. Before a person is clothed with it, it exists by definition or prescription; it is often called a job specification. After it has been assumed by a person, it becomes a responsibility in a full sense, for then this is a member who is responsible or accountable for the part in administration. At this time, also, it assumes two other aspects. Besides being a prescription of endeavor, it becomes also an obligation for performance and a power of performance. These attributes are not matters of invention or agreement; they are the manifest consequence of the origin of responsibility. The inherent relationships of obligation and authority arise automatically from delegation of responsibility."⁸

It follows from what has been said above that when a responsibility is accepted, it carries with it the necessary authority to perform it.

Authority has been defined as "...that aspect

⁶Brown, _____, op. cit., p. 31.

⁷loc. cit.

⁸op. cit., p. 37.

of responsibility which represents its power of performance..."⁹ It includes all the means which would be considered necessary for the performance of responsibility. It is the power to exact performance.

Authority, then, is inherent in responsibility. The definition of responsibility is an act of organization. Administration is the effort to apply organization to the purpose of enterprise.

F. The Phases of Administration

As indicated previously, administration comprises three phases; planning, execution and control.

1. Planning

Whatever the endeavor to be undertaken, it must be planned. If the purpose of the enterprise is to be attained, each activity necessary to its attainment must be duly considered, its details studied and appraised, and proper procedures planned for its execution.

Planning has its beginning in the collection of the data required to determine objectives and means of accomplishment.

It has been suggested that planning consists of the following successive steps:¹⁰

⁹op. cit., p. 61

¹⁰Comstock, Glaser, "Administrative Procedure," American Council on Public Affairs, Washington, D.C., 1941, p. 68

- a. definition of purpose
- b. formulation of policies, determining the exact limits of projected activity
- c. formulation of program arranging ways and means in a tentative program of action
- d. design of plan, bringing ways and means into exact quantitative, qualitative and functional relationships
- e. differentiation of projects, making each as independent as possible

Harlow S. Person points out that planning is actually made up of three levels or planes:¹¹

- a. directive planning - the making up of a program, its division into major projects, with lump-sum budgets for each and control of broad policies by the administrator.
- b. administrative planning - the assignment of tasks to specific working units, and control by comparing actual accomplishment with the plan
- c. operative planning - carried on within each working unit

Planning starts with ideas. It then becomes the responsibility of the administrator to gather ideas, sort them out, and arrange to put the good ones into practice.

¹¹op. cit., p. 69.

These thoughts are summarized graphically in Figure 1.

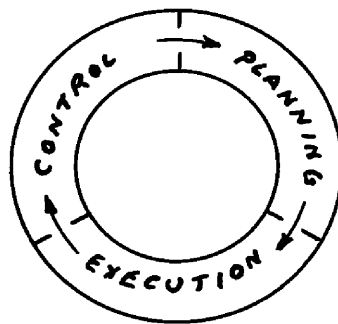
2. Execution

The physical activity involved in following the planned course.

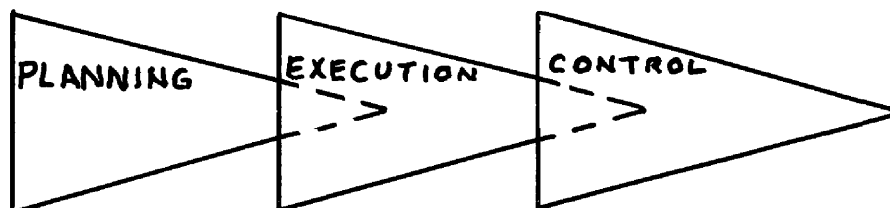
3. Control

The examination of results to insure that endeavor is carried on in accordance with plans; the comparing, discussion, and criticism of operation with the aim to stimulate planning, strengthen organization, and increase efficiency.

All administration exhibits these three phases; and they take place in the order named.



It must not be thought, however, that these three phases can be separated. One phase is not necessarily completed before the next is begun. They generally overlap each other.



Responsibility for Phases

AREAS OF PLANNING¹²

ADMINISTRATIVE (WHAT)		MANAGEMENT (HOW)	
		<u>Directive</u> (Top Level)	
1. Major objectives	} With respect to major functions	1. Frame of organization	
2. Basic scheme of operations		2. Assignment of major fields of activity	
3. General policies and criterial of accomplishment		3. General channels of responsibility and coordination	
		4. Administrative procedures (in broad terms)	
		<u>Administrative</u> (Middle Level)	
1. Breakdown of operations into specific functions and projects		1. Specific assignment of duties to subordinate units of organization	
2. Standards of accomplishment: quantity (including time, money) quality		2. Procedures (more specifically)	
3. Assignment of priorities within organization and major divisions		3. Timing and scheduling operations	
		4. Means of observation and direction	
		<u>Operative</u> (Bottom Level)	
1. Division of functions and projects into tasks		1. Assignment of tasks to individuals	
2. Assignment of priorities within units		2. Operating procedures	
3. Specification of individual and group jobs		3. Flow and timing of tasks	
4. Planning of unit production (work budget)			

Fig. 1

¹²op. cit., p. 70

As has been said previously, responsibility is to be shared by members of an enterprise. This assumes that the administrator of the enterprise has defined areas of responsibility for numerous functions, and delegated that responsibility, and the necessary authority, to suitable persons.

As the administrator extends his capacity in this way, he frees his time for supervision.

It is likely that he will first delegate portions of the execution phase; then when necessary to supplement his capacity further, portions of the planning and controlling phases.

As the enterprise grows larger, the reserved portions of planning and controlling will become smaller. The administrator reserving for himself only the planning of fundamental policies and the control of overall endeavor.

G. Administrator's Span of Control

Span of control, in organization terminology, refers to the number of subordinates an executive can effectively supervise. It is fairly well agreed by students of organization that this number is about six. It may vary however - being less near the top of the organization, and more at lower levels. The primary reasons for this is that human beings have only a limited span of attention, and unless official contacts are kept to an effective minimum, the executive

will find it impossible to comprehend the numerous problems brought to him by an excess number of subordinates.

H. Individuals and Groups

1. Individuals

In general, individuals should handle such tasks as they can properly conceive, plan, and execute in the working time available. It is in trying to overstretch this obvious statement that many individuals find themselves "swamped" with more to do than they can possibly accomplish in the allotted time.

It is this dilemma which has brought about, in industry, the position of staff assistant, or as it is more commonly known, "Assistant to ...". The assistant aids his superior in his work. His responsibility is the same, but none of the responsibilities are delegated to him, as a deputy. Since he cannot delegate, no one owes him any responsibility. He has been sometimes described as an additional "hand" for his superior, whose job is to "worry about the problems which worry the boss." His position is well described by Urwick as follows:¹³

The 'Assistant to' is essentially a man who represents his chief in matters of administrative detail. His functions are limited to study, research, analysis, recommendation and above all, to helping his chief to get things done by handling the publication of instructions, etc.,

¹³Dale, Ernest, "Planning and Developing the Company Organization," American Management Assn., New York, 1952, p. 63.

watching the organization, and foreseeing and forestalling any failure in coordination between the specialists and the 'line.' He has no executive duties.

A survey by the American Management Association has shown that the position of "Assistant to..." is one of the most useful, and yet one of the most misunderstood in the organization structure. This appears to be very true in education too, where executive positions are few, often stacked on top of regular educational duties, and amazingly demanding of breadth in the individual.

The staff assistant, if more widely used in education, could offer the following advantages:

- a. reduce the burden of executives' work
- b. aid in planning and coordination
- c. excellent training for the assistant, in that he acquires an over-all point of view of the entire operation

Some possible activities of a staff assistant, or "Assistant to ..." are:

- a. coordinate work
- b. collect and disseminate information
- c. act as secretary of committees
- d. collect, analyze and write up plans and procedures
- e. screen visitors and requests of the chief
- f. design management control charts

- g. keep organization manual up to date
- h. work out plans for improving performance of office functions
- i. assemble facts
- j. summarize and interpret facts
- k. recommend courses of action
- l. discuss plans with other members of the department and obtain their opinions
- m. explain and interpret orders, procedures, etc.
- n. observe operation of department
- o. promote proper use of established procedures and carrying out of policies
- p. investigate proposals of others
- q. settle minor difficulties

Another method for the executive to use in getting help on specific tasks is by special assignments. This technique is usually used when a rather specific task or area of activity is to be accomplished, but is of such a nature that it is best handled by an individual. Assignment may be made on a permanent basis, or only temporarily, until the job is accomplished. Examples of the special assignment technique are indicated on the charts in this report. They are, for the most part, permanent areas of activity, however, the task may be shifted among the personnel from time to time. This may be done to prevent overloading an

individual, or to broaden members of the organization.

2. Groups

Groups, more commonly known as committees, are extremely useful in organization work. When an activity or function is of such a nature that it requires consideration by, or deliberation of more than one person, a committee can be appointed to undertake the problem. The committee is of primary value as a consulting technique, and should be used;

- a. to assure the representation of a number of interests
- b. to keep a number of persons informed
- c. to attain a degree of formality in action
- d. to gain various viewpoints in solving a problem
- e. to coordinate activities and points of view, as they pertain to a specific problem
- f. to more easily get complete acceptance of the conclusion reached on a problem
- g. to help train members of the organization in the overall operation of the organization
- h. to provide integrated group judgment
- i. to help secure cooperation in carrying out plans
- j. to act as a clearing house for ideas
- k. to secure a meeting of minds
- l. to make studies of important activities
- m. to provide well considered recommendations as

a basis for action.

- n. to provide pooled judgment in lieu of that of an individual or specific group.

Committees are shown, on the organization charts in this manual, in those areas where it is felt group action is preferable to individual action, or where advice to an executive should represent several points of view.

I. Progressive Organization

Let nothing which has been said thus far lead the reader to believe that organization, once defined, is fixed or stable. It is true that the original organization of an enterprise requires much deliberation on the part of the organizers, and that much of what has been decided should be codified.

Nevertheless, organization is a continuing process. Brown has this to say:¹⁴

Organization is not a suit of clothes, cut in a universal pattern to an exact dimension. Its principles are universal, truly; but the application of those principles to administrative requirements--which, on the whole, are never the same in two cases--is an art. Art is never perfect. The artificer who would persuade himself that his task is perfected is ready to yield it to a fresher workman.

The practice of Industrial Engineering freely admits that no industrial process is so perfect but

¹⁴Brown, _____, "Organization of Industry, p. 340

that, given more study, it can be further improved. This is certainly true of organization.

As an enterprise grows, new problems arise. Mistakes will be uncovered in operation and must be corrected.

Organizers must never close their minds to revision, or trial of new methods in administrative techniques.

J. Summary

The preceding pages have presented, in a brief way, a background of the field of organization and related topics. It is hoped that the reader, having digested this material, will find himself better acclimated to the discussions of specific problems which will follow.

In order to more or less summarize, or codify, what has been set forth in the preceding pages, below are quoted from Alvin Brown selected principles of organization¹⁵ which should be kept in mind not only by organizers, but by members of the organization.

Purpose

1. Organization is a means to more effective concerted endeavor.

¹⁵op. cit., p. 1 - 8.

Scope

2. Organization deals exclusively with individuals and their relations.

Precedence

4. Organization precedes endeavor
6. Organization should determine the selection of personnel rather than personnel determine the nature of organization.

Responsibility

8. Responsibility inheres exclusively in individuals.
9. Responsibility cannot be shared with another.

Delegation of Responsibility

11. Each responsibility is created by delegation from one having that responsibility.
12. Each responsibility is created by delegation from one having a greater responsibility.
14. A member does not, by delegation, divest himself of responsibility.
16. The inherent relationships of obligation and authority arise automatically from delegation of responsibility.

Obligation

17. The acceptance of a responsibility creates an equivalent obligation for its performance.

Authority

- 24. In each responsibility is inherent an equivalent authority.
- 25. Authority includes all means necessary and proper for the performance of responsibility.

Partition of responsibility

- 38. Duties of less import should be delegated and those of greater import reserved.
- 39. Delegation of responsibility must be sufficient in extent and degree so that reserved responsibility will not exceed the capacity of the delegant.

Definition of responsibility

- 45. Responsibilities should be defined by identifying and then grouping the elements of administration.
- 46. Definition of responsibility must be clear and precise.

Groups

- 69. Responsibility is truly exercised by a group only when its decisions are made by preponderance of the opinions of its members.
- 70. A particular responsibility is better performed by one member than by two or more.
- 71. Responsibility should be delegated to a group only upon clear demonstration that individual administration is undesirable.

72. In a group exercising responsibility as such, it is the duty of each member to contribute to the decision as he would if the responsibility were his alone.

Practice

95. Organization must be a continuing concern of administration.
96. Whereas organizational principle is a science, the practice of organization is an art.

II. ORGANIZATION PLANNING

A. The Nature of the Problem

The operation of an enterprise as complex as an engineering school certainly calls for the application of organization principles for effective operation. Think for a moment of the many and varied functions and activities performed by an engineering school. How can they all be properly carried out without some serious thinking and planning for the proper performance of each? Each function and activity must of necessity be analyzed by its administrators in order that it may best be carried out. Included in this study should be an analysis, also, of the relationship between each of the units and those associated with it.

Organization planning has been defined as:¹⁶

The process of defining and grouping the activities of the enterprise so that they may be most logically assigned and effectively executed. It is concerned with the establishment of relationships among the units so as to further the objectives of the enterprise. The following basic characteristics of organization should be kept in mind in any discussion of organization planning:

1. Organization is a planning process. It is concerned with setting up, developing and maintaining a structure or pattern

¹⁶Dale, _____, op. cit., p. 14.

of working relationships of the people within an enterprise. It is carried on continuously as changes in events, personalities and environment require. Thus organization is dynamic. However, the resulting structure is static - i.e., it reflects the organization only as of a given moment of time.

2. Organization is the determination and assignment of duties to people so as to obtain the advantages of fixing responsibility and specialization through subdivision of work.
3. Organization is a plan for integrating or coordinating most effectively the activities of each part of the enterprise so that proper relationships are established and maintained among the different work units and so that the total effort of all people in the enterprise will help accomplish its objectives.
4. Organization is a means to an end. Good organization should be one of the tools of accomplishing the company's objectives, but it should not become an objective in itself.

Some of the more important advantages of organization planning, paraphrased from Dale,¹⁷ are:

1. Defines, discusses, and evaluates objectives
2. Indicates in clear and easily understood terms, where responsibility lies
3. With the aid of the resulting organization chart and manual, an individual can grasp the whole organization structure and his relation to it
4. Chart and manual are aids in orientation and training of new personnel
5. Top executives should be relieved of overloads of responsibility

¹⁷Dale, _____ op. cit., p. 16.

6. They should have more time for long range planning, reviewing, coordination, and innovation
7. Representatives of different areas of activity may be better able to work together when they see their individual places in the organization
8. Executives should have a greater opportunity to realize their own abilities, plan their own activities, develop and train themselves and others.
9. Aids in determining manpower needs
10. Helps to integrate personalities with the objectives of the enterprise.
11. Makes for better cooperation and mutual understanding--removes innumerable artificial obstacles to cooperation
12. May reduce or eliminate duplication of effort
13. Assigns definite responsibilities
14. Improves coordination between different functions
15. Eliminates unnecessary functions

B. General Procedure for Overall Organization

The general procedure for arriving at an organizational plan for the entire School of Engineering was

divided into several steps. The first four of these steps are shown in graphical form in Figure 2. These are indicated and discussed below:

Step 1. Statement of Objectives

The first step to be taken in planning for the organization of any sort of enterprise is the statement of the objectives of the organization. These should be rather broad in scope, but should, as a group, indicate the fields in which the School will operate and its proposed activities in operating in those fields. The following objectives of the School of Engineering were drawn up to fulfill this first step in the organizational procedure.

Objectives

- a. To provide a source of competent engineering graduates, for recruitment by Michigan industry, in the following fields:

Agricultural Engineering

Chemical Engineering

Civil and Sanitary Engineering

Electrical Engineering

Industrial Arts and Education

Mechanical Engineering

Metallurgical Engineering

- b. To develop students in such a way that when faced with a new and unfamiliar problem, they

OBJECTIVES

ACTIVITIES

DEFINITIONS

STEPS IN GATHERING AND CORRELATING INFORMATION TO MAKE AN ORGANIZATION CHART

1. TO PROVIDE A SOURCE OF COMPETENT ENGINEERING GRADUATES FOR RECRUITMENT BY MICHIGAN INDUSTRY, IN THE FOLLOWING FIELDS:
A. AGRICULTURAL ENG.
B. CHEMICAL & METALLURGICAL ENG.
C. CIVIL ENG.
D. ELECTRICAL ENG.
E. MECHANICAL ENG.
F. INDUSTRIAL ARTS AND EDUC.
G. METALLURGICAL ENG.

2. TO SERVE AS A SOURCE OF TECHNICAL ADVICE, AND AS A CENTER FOR THE POOLING AND DISSEMINATION OF TECHNICAL INFORMATION, FOR THE USE OF MICHIGAN INDUSTRY.

3. TO PROVIDE AN OPPORTUNITY FOR THE PERSONAL DEVELOPMENT OF THE MEMBERS OF THE ENGINEERING FACULTY IN THEIR RESPECTIVE FIELDS.

4.

PROMOTE GRADUATE WORK
COUNSEL WITH STUDENTS
ACQUAINT STUDENTS WITH INDUS.

GATHER TECHNICAL INFORMATION
DISSEMINATE TECH. INFOR.
PERFORM CONSULTING WORK

DIRECT GRADUATE STUDIES
KEEP UP IN FIELD

PROMOTE GRADUATE WORK
TO SO PROMOTE THE FIELD OF GRADUATE STUDY THAT THE PROPER STUDENTS WILL BE ATTRACTED.....

COUNSEL WITH STUDENTS
TO AID STUDENTS IN SOLVING THEIR PERSONAL PROBLEMS IN THE ENGINEERING FIELD.....

ACQUAINT STUDENTS WITH INDUSTRY
TO ASSURE THAT THE STUDENT NOT ONLY KNOWS THEORY, BUT IS ACQUAINTED WITH INDUSTRY

GATHER TECHNICAL INFORMATION
TO SERVE AS AN AGENCY FOR THE POOLING OF TECHNICAL INFORMATION.....

DISSEMINATE TECHNICAL INFORMATION
TO SEE THAT NEEDED TECHNICAL INFORMATION IS DIRECTED INTO THE RIGHT CHANNELS

PERFORM CONSULTING WORK
TO SERVE AS A SOURCE OF PERSONAL TECHNICAL ADVICE FOR MICHIGAN INDUSTRY.

DIRECT GRADUATE WORK
TO SEE THAT GRADUATE PROJECTS ARE PROPERLY GUIDED TO SUCCESSFUL COMPLETION.

KEEP UP IN FIELD
TO KEEP ABREAST OF THE LATEST DEVELOPMENTS IN TECHNICAL FIELDS.

FUNCTION

RELATED FUNCTIONS

GRADUATE STUDIES
THE DIRECTION OF THE GRADUATE STUDY PROGRAM IN SUCH A WAY AS TO:
1. ATTRACT GOOD STUDENTS
2. ACQUAINT STUDENTS WITH INDUSTRIAL PROBLEMS
3. MAKE USEFUL INFORMATION AVAILABLE TO INDUSTRY.
4. BE OF PERSONAL SERVICE TO INDUSTRY.
5. KEEP COLLEGE ABREAST OF TECHNICAL FIELDS

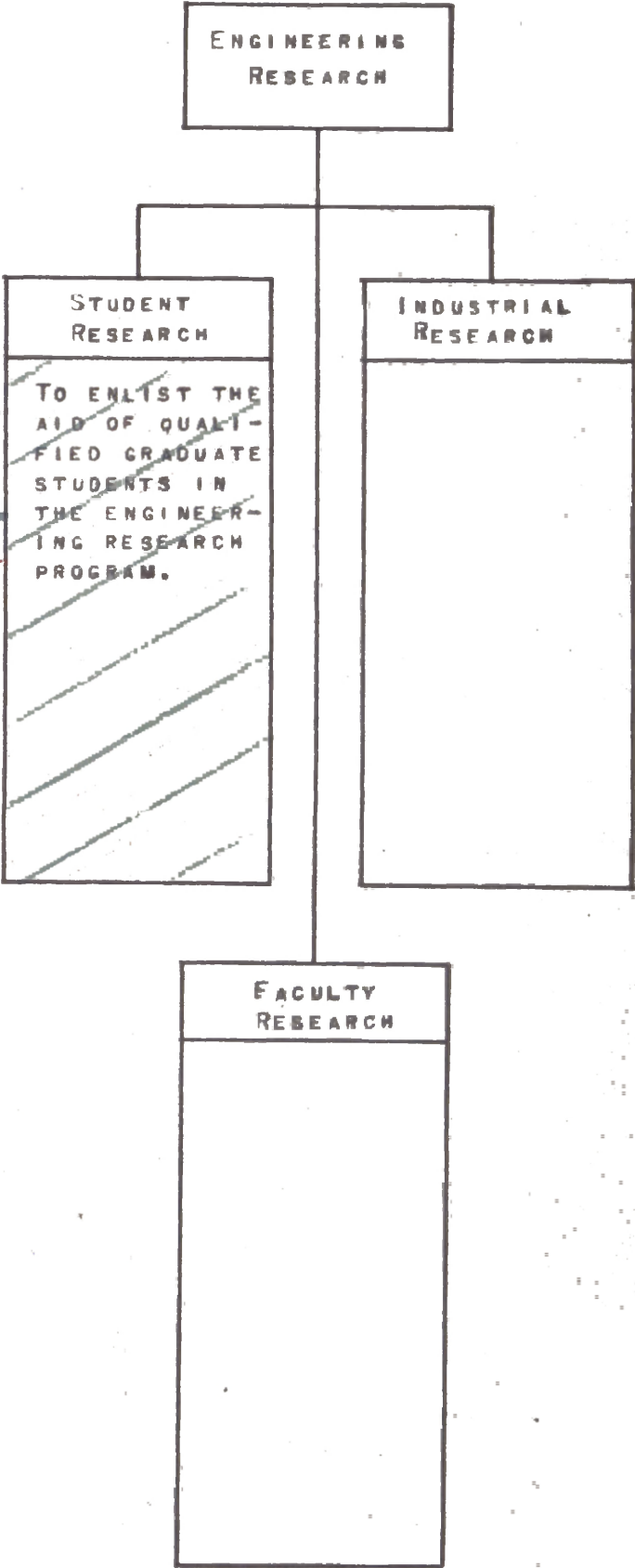


Fig. 2

- will be able to handle it with competence involving skill, initiative, and leadership.
- c. To serve as a source of technical advice, and as a center for the pooling and dissemination of technical information, for the use of Michigan industry and education.
 - d. To provide an opportunity for the personal development of the members of the Engineering faculty, in their respective fields.
 - e. To perform research in such engineering fields as will be of benefit to industry.

Step 2. Listing of Activities

This step involves a consideration of the overall objectives with the idea of making a list of all of the activities performed by the School. These need not be in any particular order, but ideas should be jotted down as rapidly and as often as they come to mind. Anyone concerned with the activities may be invited to participate in compiling the list. Of course it can never be complete, so that need not be a worry. Items may be of any nature, such as:

- a. Things you do
- b. Things other people, associated with you, do
- c. Things a department does
- d. Things the school does
- e. Things which should, or might, be done by a progressive Engineering School

Following is a list of a few activities to give an idea of what is intended in this step:

Partial List of Activities of the
School of Engineering

1. Plan curricula
2. Plan courses
3. Schedule classes
4. Procure staff members
5. Train staff members
6. Appraise staff members
7. Encourage research work
8. Develop staff members
9. Counsel students (curricula, activities, jobs, etc.)
10. Cooperate with other Schools in the College
11. Cooperate with other Colleges and Universities
12. Cooperate with industry
13. Procure equipment for instruction purposes
14. Prepare budgets
15. Hold short courses
16. Provide extension training
17. Purchase equipment
18. Inventory
19. Purchase Operating Supplies
20. Staff Travel
21. Student trips to industry
22. Participate in professional societies

23. Cooperate with government agencies
24. Equipment and funds for research
25. Prepare bulletins
26. Text book preparation
27. Cooperate with placement bureau
28. Public relations
29. Teach classes
30. Keep cost records
31. High school cooperation
32. (See functions of various committees for additional activities)

Step 3. Definition of Each Activity

When a list of activities has been accumulated it becomes necessary to consider each in some detail in order to define what is meant by each or what is included or represented in the few words jotted down. In this way it will be possible to more accurately identify each activity in order that it can be placed in a group of related activities for consideration as a part of a major function.

An example or two will indicate what is meant by this step.

- a. Plan courses - to determine the objective of a desired course, and to so plan the content in terms of lecture, recitation, and student participation, that at the end of the course the objective will have been met.

- b. Appraise staff members - to devise a method whereby the accomplishments and contributions of each staff member to the overall objectives of the School can be determined and evaluated.

Other examples are shown on the diagram in Figure 2.

Step 4. Grouping of Related Activities into Major Functions

After having defined each activity it becomes necessary to determine which ones are related to each other and should logically become a part of a major function or group of activities. This is done by studying each description in order to find the characteristics of each activity so that it may be compared with others. Those activities having common characteristics or leading toward a common objective, may then be placed in one group.

It should be stated here that many of these relationships will be obvious without the descriptions made in step 3. Step 3 merely helps to crystallize thoughts regarding a specific activity and, in the case of doubt, to determine the others with which it may be associated.

A few related activities, from the list in step 2, are:

- a. prepare budgets
- b. purchase equipment
- c. inventory
- d. purchase operating supplies
- e. keep cost records

It will be seen that a common characteristic of all of these is cost, or money. Therefore, in planning the organization of the School these activities, and others of a similar nature, are grouped into a function whose overall responsibility is money or costs as they pertain to the operation of the School.

Similar groupings are made of other related activities, until all activities have been allocated and there remains a relatively small group of functions or major areas of activity. This step is also shown in Figure 2.

Step 5. Planning Interrelationship of Functions

In most organizational plans there are two general types of functions: Operating and advisory. The operating functions are those which actually perform the activities of the organization. The advisory functions, on the other hand are, as their name implies, of an advisory nature. Ordinarily such groups concern themselves with planning for, and advising the operating groups.

In planning the organization chart or structure it is common practice to place these two distinct types of activity in separate spots on the chart.

Charting conventions will not be explained here, since it is felt that the examples shown will suffice in this case. Advisory functions are charted as a group, even separating them into sub-groups on the charts; advisory committees, and special assignments. Operating groups are likewise charted separately, and often into related sub-groups such as laboratory areas, options, graduate work, etc.

III. THE ORGANIZATION OF THE SCHOOL OF ENGINEERING

It will be the objective of this section to present a suggested plan for the organization of the School of Engineering. Principles set forth in Part One have been adhered to. The procedure described in Part Two has been followed in setting up the organization plan.

Over a period of several years, the operation of the School of Engineering has been observed, and many conferences have been held with Department Heads, and other staff members. Several trial plans were worked out and discussed with the Dean and others. Each was studied and in some cases partially tried out. The plan herein set forth is a result of this process of study, discussion, and experiment. Obviously it is not perfect. There is no "one best answer." Only time will tell how this plan will work. It is hoped that the framework is sound, and that changes found necessary will be made as required to keep the organization operating effectively.

The proposed organization is presented here in two forms: 1) an organization chart, and, 2) an abbreviated organization manual, to supplement and describe the chart. (Figure 3). The chart and manual follow.

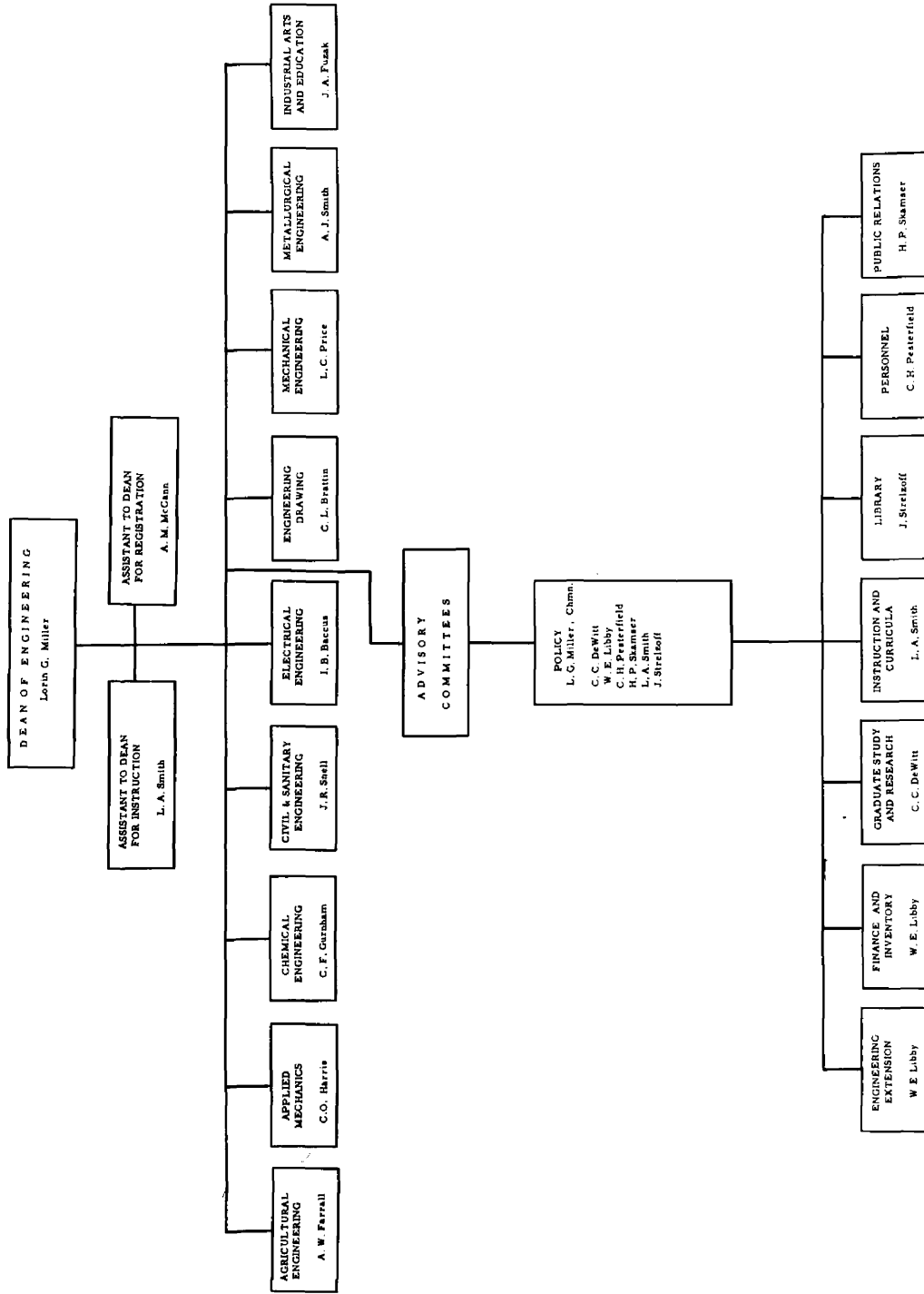
A. General Comments

After having followed the steps outlined under the section on Organization Planning, the work of the School of Engineering was divided into six major functions. Each of these is represented by an advisory committee. They are as follows:

1. Engineering Extension
2. Finance and Inventory
3. Graduate Studies and Research
4. Instruction
5. Personnel
6. Public Relations

The arrangement and interrelationship of these functions is shown on the chart, Figure 3.

The Policy Committee, shown near the top of the chart, is the guiding group of the School of Engineering. It is logically comprised of the person in charge of each of the six major functions. It must be recalled, from section one, that this is an advisory group to the Dean. It has no authority, and no power to act. It can only discuss a matter, each member representing his function, and advise the Dean on a course of action. It is up to the Dean to make the decision, and act. It should also be pointed out that this committee, if it lacks proper information or background on a specific problem, can send its members



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Fig. 3

back to their individual committees for consultation.

The individual advisory committees are indicated under their proper titles, and are made up of one representative from each instruction department. Each member of a committee represents the people in his department, and should express their feelings to the group of which he is a member. It is then up to the committee to form an opinion on a specific point, or problem, and submit it, through the chairman, to the Policy Committee.

B. Description of the Organization Chart

(Abbreviated Organization Manual)

1.0000 Administration

1.1000 Dean of Engineering

The Dean is the administrative head of the School of Engineering and is responsible to the President of the college for all phases of the operation of the School of Engineering.

1.2000 Assistant to Dean - Instruction

This individual shall assist the Dean in all matters pertaining to undergraduate instruction. He shall be the chairman of the Instruction and Curricula Committee, the duties of which are listed under said committee.

1.3000 Assistant to Dean - Registration

This individual shall assist the Dean in all matters pertaining to the registration of undergraduate students. Among the duties of this function are:

- a. counsel students
- b. help plan student programs
- c. register students
- d. maintain student records

2.0000 Instruction Departments

- 2.1000 Agricultural Engineering
- 2.2000 Applied Mechanics
- 2.3000 Chemical Engineering
- 2.4000 Civil and Sanitary Engineering
- 2.5000 Engineering Drawing
- 2.6000 Electrical Engineering
- 2.7000 Industrial Arts and Education
- 2.8000 Mechanical Engineering
- 2.9000 Metallurgical Engineering

3.0000 Advisory Committees

3.1000 Policy Committee

- a. objective - To serve as the top advisory group to the Dean on all matters of operation of the School of Engineering.

b. representative functions

1. survey operation of the School
2. study other Schools of
Engineering
3. make overall plans for clarification of objectives and improved operation
4. study and draw up general policies
5. maintain a sound and effective organization, with functions, responsibilities, and authority clearly defined and properly allocated
6. maintain effective systems of control
7. establish general policies
8. general coordination of major operating plans
9. appraisal of performance and results
10. to develop opinion and viewpoint of major function heads in regard to contemplated plans and policies, to guide the Dean

11. to consider need for and make recommendations on changes in policy, control, and other general problems
 12. to provide each member of the committee with an appreciation of the problems and operations of other functions
 13. question and test the soundness and adequacy of every phase of School operation, from an objective point of view
- c. Membership - Chairmen of all Advisory committees, with the Dean as chairman

3.2000 Engineering Extension Committee

- a. objective - to plan, promote, and advise in the carrying out of an effective extension program
- b. representative functions
 1. survey need for extension programs of all kinds
 2. plan proper extension program to insure meeting all needs
 3. arrange for conducting extension classes

4. arrange for conducting correspondence courses
 5. arrange for conducting short courses
 6. cooperate in presentation of conferences
 7. plan for industrial cooperation in extension activities
 8. serve as official contact with Continuing Education Service
 9. disseminate technical information
 10. prepare publicity material for extension work of all kinds
- c. Membership - one person from each instruction department; chairman appointed by the Dean

3.3000 Finance and Inventory Committee

- a. objective - to plan policies and procedures for the proper handling of all matters concerning finance and inventory
- b. representative functions
 1. plan purchasing procedures and records
 2. plan inventory procedures and records

3. study and report on costs of instruction
 4. study and report on other operating costs
 5. determine laboratory fees
 6. coordinate travel requests, authorizations, and reimbursements
 7. plan financial policies and procedures relating to:
 - a. procurement
 - b. disposal
 - c. maintenance
 - d. repair
 - e. depreciation
 - f. student labor
 - g. loans from industry
 8. advise on budget preparation
 9. submit final budget to Dean's office
 10. devise and set up departmental budgetary control system
- c. membership - one person from each instruction department; chairman appointed by the Dean

3.4000 Graduate Study and Research Committee

- a. objective - to plan, promote and advise in carrying out all activities concerned with graduate studies and research
- b. representative functions
 - 1. study facilities for graduate study and research
 - 2. study programs of other schools and colleges
 - 3. coordinate graduate program
 - 4. plan graduate curricula
 - 5. advise graduate students
 - 6. plan for setting up records on all graduate students
 - 7. serve as liaison between School of Engineering and School of Graduate Studies
 - 8. plan for the carrying out of a research program for the benefit of industry
 - 9. arrange for the reporting of findings to interested persons
 - 10. promote cooperation of industry in research
 - 11. procure research problems
 - 12. advise on research problems
 - 13. coordinate research program

- 14. encourage faculty research
- 15. advise on research budget
- 16. plan program to solicit graduate students

c. membership - one person from each instructional department; chairman appointed by the Dean

3.5000 Instruction and Curricula Committee

- a. objective - to assure that the School of Engineering has the best possible curricula, and that it is implemented by effective instruction
- b. representative functions
 - 1. scheduling of courses
 - 2. setting up student records
 - 3. teaching methods
 - 4. teaching loads
 - 5. exchange ideas with other schools and colleges
 - 6. coordinate courses
 - 7. course numbering system
 - 8. book order control
 - 9. study curricula in light of needs and objectives of engineering education
 - 10. coordinate curricula
 - 11. integrate and coordinate courses

12. suggest new courses
13. study new ideas in education
14. catalog revision
15. improvement of instruction

c. Membership - one person from each instruction department; chairman appointed by the Dean

3.6000 Personnel Committee

- a. objective - to plan whatever policies, procedures, and activities are necessary to assure the best possible faculty for the School of Engineering
- b. representative functions
 1. personnel policies and procedures
 2. advise on faculty appointments
 3. plan for and promote faculty development
 4. faculty appraisal
 5. promote faculty activities
 6. advise on promotions
 7. policy on consulting work
 8. program of leaves of absence
 9. staff travel policy
 10. advise on salaries
 11. plan for exchange professorships

12. write specifications for each
staff responsibility for the
School

c. membership - one member from each
instruction department; chairman
appointed by the Dean

3.7000 Public Relations

a. objective - to plan for the
carrying out of whatever activities
will promote the welfare of the
School of Engineering

b. representative functions

1. recruitment of students

2. coordinate activities for place-
ment of graduates

3. industry liaison

4. furnish speakers

5. prepare news releases

6. student organization coordina-
tion

7. promote cooperation between the
college and industry

8. counsel students on placement

9. alumni contacts and relations

10. high school cooperation

c. membership - one member from each
instruction department; chairman
appointed by the Dean

3.8000 Library Committee

- a. objective - to make whatever plans
are necessary to assure an adequate
Engineering section in the college
library
- b. representative functions
 - 1. examine existing facilities
 - 2. determine needs
 - 3. make recommendations for addi-
tions to library
 - 4. coordinate department require-
ments
 - 5. cooperate with college library
 - 6. study and promote use of visual
aids

IV. THE ORGANIZATION OF INSTRUCTIONAL AREAS

A. Review of Procedure

The Mechanical Engineering Department has been chosen as an example to show the organization of a typical instructional area and its relationship to the organizational plan for the School of Engineering.

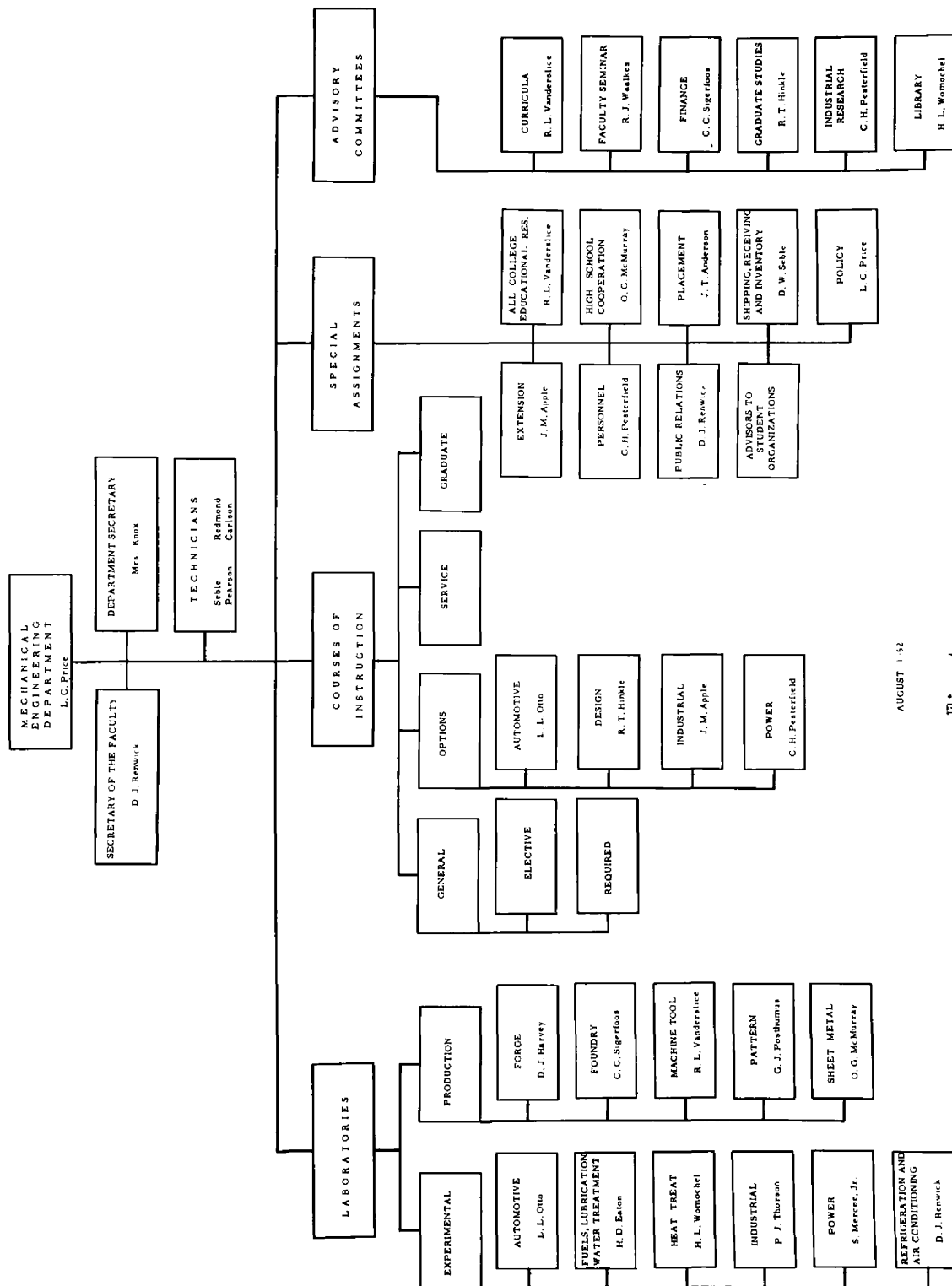
In general, the same pattern should be followed in developing an organizational plan for an instructional area as for the School as a whole. As a reminder, these steps were:

1. Statement of Objectives
2. Listing of Activities
3. Definition of Activities
4. Grouping of Related Activities into Major Functions
5. Planning Interrelationships of Related Functions

As the procedure is about the same as was followed in the development of the organizational plan for the School, details will not be discussed here. Rather the interrelationships and coordination problems will be discussed.

B. General Comments

In following the procedure indicated above, the plan shown in Figure 4 was developed. It will be



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Fig. 4

noticed that there are four major functions or areas of activity. These major functions were arrived at by the process outlined above. The various activities thought necessary to carry out the objectives of the department were classified into the four following groups:

1. Laboratories
2. Courses of Instruction
3. Advisory Committees
4. Special Assignments

The advisory committees and special assignments parallel the organization of the School of Engineering. They are not, however, identical, since department problems are not all of school-wide interest, nor are all functions of such scope as to require committee study or action. For that reason, in the Mechanical Engineering Department, the following interrelationships exist between the School and the Department.

School Committee	Department Committee	Department Special Assignment
Policy	Policy	-----
Engineering Extension	-----	Extension
Finance and inventory	Finance	Shipping, Receiving and Inventory
Graduate Study and Research	Graduate <u>Studies</u> Research	-----
Instruction and Curricula	Curricula	All College Educational Research
Personnel		Personnel
Public Relations		<u>High school coop.</u> <u>Placement</u> <u>Public Relations</u>
Library	Library	

A few words of explanation are in order here, regarding these interrelationships. Committees have been set up in the Mechanical Engineering Department to handle those areas of activity in which it is felt committee deliberation will be of value. It will be seen that two department committees have been set up to handle Graduate Studies and Research. This was done because it was felt that on the instructional level, it was desirable to separate the two functions.

On the administration or policy level, they are best coordinated by one group, at the present time.

And the exact opposite has been done with the School function of Public Relations. Three special assignments have been indicated for the handling of the phases of public relations of most importance in an instruction department: High School Cooperation, Placement, and Public Relations (in the publicity sense). Each of these is assigned to one person. He may of course seek advice, counsel, and aid from other department members, as necessary.

In the Finance and Inventory area, there have been set up at the department level, both an advisory committee, and a special assignment, for ease of operation.

One further note is in order here. It is a well known fact, that in a small business or industry, functions are combined under one person, because the scope of the functions is limited in the small organization. In a larger organization, the functions are split into smaller units, and set up as separate functions, because of the relatively large scope of certain narrow fields of activity. For example, in a small plant, one man might be charged with the entire responsibility of a function known as Engineering and Production. While in a larger plant, there would

probably be separate Engineering and Production functions, with conceivably a sizeable staff devoting its entire time to such a specialized problem as materials handling.

Therefore in a larger instruction department, many of the functions shown on the chart would merit consideration of individual committees, or persons. In a smaller department, several functions would most likely be combined to be handled by one person.

C. An Example

The following several pages are a brief organization manual for the Mechanical Engineering Department. An attempt has been made to define and describe each function on the chart and to outline the scope of activity of each. For obvious reasons, most of the duties of the advisory committees are the same as, or similar to those given previously for the School of Engineering. In some cases, the duties are slanted more towards the operation of the department.

Outline of Mechanical Engineering

Department Organization

- A. Administration
 - 1. Department Head
 - 2. Secretary of the Department
 - 3. Stenographer
- B. Staff Technicians
- C. Laboratory Areas
 - 1. Experimental
 - a. Automotive
 - b. Fuels, Lubrication, and Water Treatment
 - c. Heat Treat
 - d. Industrial Engineering
 - e. Power
 - f. Refrigeration and Air Conditioning
 - 2. Production
 - a. Forge
 - b. Foundry
 - c. Machine Tool
 - d. Sheet Metal
 - e. Pattern
- D. Courses of Instruction
 - 1. General
 - a. Required
 - b. Elective
 - 2. Options
 - a. Automotive
 - b. Design
 - c. Industrial
 - d. Power
 - 3. Service
 - 4. Graduate
- E. Advisory Committee
 - 1. Curricula
 - 2. Graduate Study
 - 3. Faculty Seminar
 - 4. Finance
 - 5. Library
 - 6. Policy
 - 7. Research
- F. Special Assignments
 - 1. All College Educational Research Committee
 - 2. Extension
 - 3. High School Cooperation
 - 4. Engineering Personnel Committee
 - 5. Placement
 - 6. Public Relations
 - 7. Shipping, Receiving, Inventory

Fig. 5

Explanation of Organizational Units

2.8000 Administration

I. Administrator

A. Description:

The administrator of the department is the department head. He reports directly to the Dean of Engineering and is responsible to him for the proper operation of the department.

B. Typical Duties:

1. General administration
2. Assignment of teaching load
3. Budget preparation
4. Long range planning
 - a. Equipment
 - b. Curricula
 - c. New courses
 - d. Course changes
 - e. Space requirements
 - f. Personnel
5. Public relations (official outside department contact)
6. Department meetings
7. Educational trends
8. Industrial needs

9. Encourage growth of staff members
10. Counsel staff members
11. (See part V - B of this report for additional functions) *p. 79*

II. Department Stenographer

A. Description:

The stenographer shall carry out the normal functions of secretary and stenographer for the entire department

B. Typical Duties:

1. Receptionist
2. Telephone
3. Mail
4. Correspondence
5. General Typing
6. Purchase requests
7. Miscellaneous forms
 - a. Travel authorizations, etc.
8. Book lists
9. Staff schedules
10. Etc.

III. Secretary of the Mechanical Engineering Department

A. Description:

The secretary of the department shall be a member of the teaching staff, appointed by the department head.

B. Typical Duties:

1. Record minutes of each department meeting
2. Duplicate minutes and distribute to department
3. Etc.

IV. Technicians

A. Description:

Technicians shall perform those duties necessary to the proper operation of the laboratory areas to which they are assigned, and as prescribed by the persons in charge. Duties will consist primarily of maintenance, repair, set-up and tear-down of equipment, construction of apparatus, and such other duties as may be deemed necessary.

2.810 Laboratories

Laboratory facilities of the department are, in general, of two distinct types: experimental and production processes.

2.811 Experimental

2.8111 Automotive Laboratory

2.8112 Fuels and Lubrication Laboratory

2.8113 Heat Treat Laboratory

2.8114 Industrial Engineering Laboratory

2.8115 Power Laboratory

2.8116 Refrigeration and Air Conditioning
Laboratory

2.812 Production Processes

2.8121 Forge

2.8122 Foundry

2.8123 Machine Tool

2.8124 Sheet Metal

2.8125 Pattern

2.8111 Automotive Laboratory

Location: In Woodshop Building, between Machine
Shop and Pattern Shop

Objective: To provide an opportunity for the
student to complement his classroom work by actual
contact with studied items, and by actual opera-
tion and performance testing of typical engines,
vehicles and special test equipment

Work Done:

1. Dissassembly and study of a typical automo-
tive engine and its components
2. Assembly and performance testing of a typical
automotive engine
3. Study of typical carburetion, ignition, and
fuel-injection systems and the experimental
determination of mixture-ratio and spark-
advance requirements of an engine

4. Study of fuel-testing equipment and procedures and performance of octane-rating tests
5. Study of automotive transmissions and test-operation of an automatic transmission
6. Design check of steering layouts, spring suspension systems, sliding-gear transmissions, driveshafts, final-drive systems
7. Study and design of braking systems, braking abilities, and braking limitations
8. Performance calculations for automotive vehicles

2.8112 Fuels, Lubricants and Water Treatment Laboratory

Location: Room 14, Olds Hall

Objective: To permit each student to operate standard testing equipment in order to actually analyze properties of fuels and lubricants as well as impurities of water used for steam generation

Work Done:

1. Steam generation plant study
2. Heating value of gas
3. Heating value of oil or coal
4. Viscosity of oils
5. Flash, fire and sediment in oils
6. Distillation and gravity of oils
7. Gas analysis

8. Coal analysis (proximate)
9. Water analysis for solids
10. Water analysis for dissolved gases and pH

2.8113 Heat Treat Laboratory

Location: Metallurgy Laboratory Building

Objectives:

1. To acquaint the students with the use of heat treating and testing equipment
2. To illustrate a number of the important principles of physical metallurgy with laboratory experiments.
3. To carry on discussions of the lecture material with small groups of students

Work Done: Heat treatment, physical testing, and metallographic examination of plain carbon and alloy steels, cast iron, and non-ferrous alloys

2.8114 Industrial Engineering Laboratory

Location: Rooms 217, 218, 219, 220 Woodshop Building

Objective: To provide an opportunity for actual practice in the use of selected Industrial Engineering techniques as discussed in the classroom.

Work Done:

1. Motion study projects to illustrate techniques for recording, analyzing, and improving work methods

2. Time study practice to show how to establish a fair day's work, by stop watch and synthetic methods
3. Use of motion picture equipment in time and motion study
4. Problems in the selection and application of proper materials handling equipment
5. Projects to show the relationship between motion study, time study and materials handling in planning an effective layout for the physical facilities necessary to produce a product
6. Production control problems to illustrate the need for proper planning, routing, scheduling, dispatch, and follow-up in the smooth operation of an industrial enterprise
7. Process engineering work to give practice and show importance of the proper selection of production processes and equipment and the need for a well planned sequence of operations
8. Economic analysis of operating problems in a manufacturing plant
9. Other related types of work

2.8115 Power Laboratory

Location: Room 8, Olds Hall

Objective: To impart by observation and use a

knowledge of the construction and applications of instruments commonly used in testing mechanical equipment; and to provide experience in planning, performing, and reporting mechanical equipment tests

Work Done:

1. Observe and use the following instruments:

Manometers, Bourdon tube gages, barometers, thermometers, thermocouples, pitot tubes, velometers, anemometers, orifice meters, wiers, planimeters, engine indicators, prony brakes, dynamometers, flue gas analyzers, and steam calorimeters

2. Test the following mechanical equipment:

Blower, centrifugal pump, single and double stage air compressors, Corliss steam engine, turbine-generator, single cylinder diesel engine, multicylinder diesel engine, multicylinder gasoline engine, domestic oil burning steam boiler, and heat exchangers

2.8116 Refrigeration and Air Conditioning Laboratory

Location: Room 11, Olds Hall

Objective: To provide space and equipment to demonstrate and test typical refrigeration and air conditioning equipment, from the standpoint of equipment operation and performance testing

procedure. Also to provide space and facilities to perform some research projects in this field, involving especially the necessary instrumentation and control for such studies

Work Done:

1. Models and charts to demonstrate operation function of equipment
2. Standard tests for performance and operation of equipment
3. Research projects involving controlled atmospheric conditions of temperature and humidity
4. Studies of temperature and humidity instrumentation and control methods
5. Miscellaneous projects in refrigeration, air conditioning, and air handling

2.8121 Forge and Welding Laboratory

Location: West end of Forge Foundry Building

Objective:

1. To acquaint the student with the use of equipment
2. To give the student an appreciation of the practical aspect of welding, forging and heat treat
3. To demonstrate principals that are much less difficult to comprehend when seen or actually verified by the student himself

4. To learn certain skills involved in the use of specialized measurement and testing equipment

Work Done:

1. Welding
 - a. Arc welding
 - b. Oxy-acetylene welding
 - c. Inert gas welding
 - d. Atomic hydrogen welding
 - e. Oxy-acetylene cutting
 - f. Weld testing, inspection and control
2. Hand forging
3. Heat treatment
4. Lectures and demonstration covering manufacturing methods

2.8122 Foundry

Location: East end of Foundry and Forge Building

Objective: To teach students the various recognized best metal casting procedures and to be able to apply these procedures to new casting designs in such a manner as to produce:

- a. The desired number of castings at a suitable rate
- b. Castings within the desired physical and chemical specifications
- c. Castings (within specifications a and b above) at a minimum cost per unit

Work Done:

1. Metal castings made in the following types of molds:
 - a. Green Sand
 - b. Dry Sand
 - c. Shell (coring process)
 - d. Permanent (iron)
2. Castings made in the following types of metals:
 - a. Gray Iron
 - b. Malleable Iron
 - c. Steel
 - d. Aluminum
 - e. Brass
 - f. Bronze

(The bulk of castings are used on the M.S.C. air compressor project and a few are used by the M.S.C. Buildings and Utilities Department)

2.8123 Machine Tool

Location: First floor, rear of Woodshop Building
(south side)

Objective:

1. To provide an opportunity for practice in machine tool operation
2. To provide facilities for the making of special equipment for M.E. laboratories

Work Done:

1. Machining of air compressor parts
2. Assembly of parts into complete air compressor
3. Making of tool, jigs, fixtures, metal patterns, etc. for use in manufacturing of air compresor
4. General machine work for M.E. Department
5. Special equipment built for other M.E. laboratories
6. Occasionally build special equipment for other departments or schools

2.8124 Sheet Metal Processing

Location: First floor, front of Woodshop Building

Objective: Standard tools, dies and machines are used to acquaint the student with the fabrication of sheet metal. He sees the plastic flow of sheet metal, the need for bend allowances, methods of reenforcing, and types of construction that lend to ease in fabrication

Work Done:

1. Study die construction
 - a. Methods of feeding work into a die
 - b. Methods of extracting work and scrap
 - c. Types of dies
2. Use dies, punchpresses, press brakes, spot welding, and other standard machines

3. Types of layout
4. Learn the need for sequence of operations
5. Sheet metal safety

2.8125 Pattern

Location: First floor, front of Woodshop Building

Objective: To present the basic and fundamental information regarding tools, machines, techniques and general practices of wood working in Cabinet Work, Carpenter Work, Pattern Work, and Pattern Design where a limited number of castings are wanted

Work Done:

1. Handwork
2. Layout work
3. Lathe - spindle and face plate
4. Sharpening of tools and adjusting
5. Fundamental pattern making
6. Advanced pattern making
7. Pattern design
8. Joint work
9. Machine set up
10. Machine adjusting

2.820 Courses of Instruction (listed on following page)
Courses taught in Mechanical Engineering Department may be divided into four groups: general, option, service, graduate

General courses are those taken by all Mechanical Engineering students, regardless of senior option. This group also contains several courses which are not required by any specific program, but which can be elected by students as desired.

Option courses are those of a specialized nature required by students selecting a particular senior option. They may sometimes be taken by students not in the option, as electives.

Service courses are those offered to meet requirements of other departments, and not usually taken by Mechanical Engineering students.

Graduate courses* are those open only to students enrolled in the Graduate School. They are usually of a more specialized nature, and require more individual work.

2.8200 Courses of Instruction (See College Catalog for
descriptions)

2.8211 General (required)

101 Elements of Engineering

244 Forging, Welding & Heat Treatment
of Metals

254 Pattern Making & Foundry

264 Machine Shop

*Some 300 and 400 courses are acceptable for graduate credit, but are also taken by undergraduate students.

- 313a Mechanical Equipment Laboratory
- 313b Mechanical Equipment Laboratory
- 313c Material Testing Laboratory
- 345 Metals and Alloys
- 384 Kinematics
- 385 Mechanics of Machinery
- 390 Thermodynamics
- 391 Internal Combustion Engines
- 392 Steam Power
- 405a Industrial Management
- 413d Mechanical Equipment Laboratory
- 473a Seminar
- 473b Seminar
- 473c Seminar
- 486 Machine Design
- 2.8212 General (elective)
 - 229a Industrial Accident Prevention
 - 229b Safety Organization & Management
 - 265 Sheet Metal Processing
 - 334 Pattern Making, Advanced
 - 355 Foundry Technology
 - 363 Advanced Machine Shop
 - 387 Manufacturing Process
 - 413f Test Planning & Reporting
 - 451a Foundry Engineering
 - 451b Foundry Engineering
 - 451c Foundry Engineering

2.8220 Options

2.8221 Automotive Option

- A. Objective: To study the coordination and the application of basic engineering principles to the treatment of typical engineering problems encountered in the design, development, testing, and performance of internal combustion engines and self-propelled automotive vehicles
- B. Technical courses required:
 - 417d Automotive Engineering
 - 417e Automotive Engineering
 - 446a Plain Carbon & Alloy Steel
 - 446b Non-Ferrous Metals & Alloys
 - 446c Cast Ferrous Metals

2.8222 Design Option

- A. Objective: To correlate and amplify basic theory which has been learned previously, so as to provide an intelligent and practical approach to theoretical design
- B. Technical courses required:
 - 446a Plain Carbon & Alloy Steel
 - 446b Non-Ferrous Metals & Alloys
 - 446c Cast Ferrous Metals

- 484 Mechanical Vibrations
- 485 Experimental Stress Analysis
- 488 Lubrication
- 489a Advanced Machine Design
- 489b Advanced Machine Design
or
- 405c Industrial Engineering
- 495 Heat Transfer and Fluid Flow

2.8225 Industrial Engineering Option

- A. Objective: To add to a basic engineering training, a background in the theory and application of techniques and procedures used in the effective operation of the production phase of an industrial enterprise
- B. Technical Courses required:
 - 401 Materials Handling & Plant Layout
 - 402 Motion and Time Study
 - 403 Production Control
 - 404 Job Evaluation & Wage Incentives
 - 405b Industrial Personnel Practices
 - 405d Manufacturing Problems
- Plus 3 credits of Economics and 3 credits of General Business
- G.B. 317 Principles of Organization
- Econ. 209a General Economics

2.8224 Power Option

- A. Objective: To provide an opportunity for specialization in that branch of Mechanical Engineering which is devoted to the production of electric power as supplied by power utility, industrial, and institutional plants
- B. Technical courses required
 - 407c Power Plant Engineering
 - 407d Power Plant Engineering
 - 409e Refrigeration
 - 409f Refrigeration
 - 413c Advanced Materials Testing
or
413e Fuels, Combustion and Evaporation
 - 418a Heating & Ventilation
 - 418b Industrial Heating & Ventilating

2.823 Service Courses

- 205a Industrial Management
- 205c Industrial Engineering
- 209 Refrigeration
- 218 Piping Systems
- 233 Wood Working
- 261 Machine Shop
- 320 Mechanical Equipment of Hotels
- 321 Mechanical Equipment of Hotels
- 393 Thermodynamics
- 394 Heat Power Engineering

2.824 Graduate Courses

- 501 Automotive Engineering Research
- 502 Automotive Engineering
- 511 Thermodynamics Research
- 512 Thermodynamics
- 513 Heat Transfer and Fluid Flow
- 521 Machine Design Research
- 522 Machine Design
- 531 Heating, Air Conditioning,
Refrigeration Research
- 532 Refrigeration
- 533 Heating and Air Conditioning
- 541 Industrial Engineering Research
- 542 Industrial Engineering Problems
- 543 Industrial Engineering Seminar
- 551 Power Plant Research
- 561 Metals & Alloys Research
- 571 Foundry Research
- 572 Foundry Engineering Problems
- 591 Engineering Analysis Research
- 592 Engineering Analysis

2.830 Advisory Committees

2.831 Curricula

- A. Objective: To maintain the best
possible Curricula for the department

B. Functions:

1. Study other college curricula
2. Determine industry needs
3. Study need for new courses
4. Review existing courses for:
 - a. need
 - b. adequacy
5. Maintain course number plan and assign new course numbers
6. Supervise catalog revisions
7. Check with other departments for:
 - a. needs in service courses
 - b. areas of duplication

2.832 Graduate Study

A. Objective: To plan and develop the best possible graduate program for the department

B. Functions:

1. Examine level of instruction in graduate courses
2. See that courses are brought up to proper level
3. Pass on acceptance of graduate students
4. Counsel graduate students
5. Cooperate with Graduate School

6. Cooperate with Engineering School
Coordinator of Graduate Studies
7. (See list under Curricula Committee for other suggested functions)

2.833 Faculty Seminar

- A. Objective: To plan and carry out periodic seminars for department staff, including items of general interest to all department members
- B. Functions:
 1. Canvass members for ideas and suggestions
 2. Arrange programs on suitable subjects
 3. Set up schedule of seminars

2.834 Finance

- A. Objective: To plan the financial program of the department (except salaries) and see that it is carried out
- B. Functions:
 1. Determine financial needs of the department
 2. Receive and review individual budget estimates
 3. Suggest revisions

4. Plan general financial policies
5. Submit budget to Department Head for approval
6. Establish department cost data
7. Set up budgetary controls to assure proper operation of budget
8. Recommend action where necessary
9. Study department operation to find areas for cost reduction
10. Aid in making decisions on purchases of major importance and high cost

2.835 Library

- A. Objective: To maintain an adequate collection of books in the College Library to permit proper teaching and research
- B. Functions:
 1. Review adequacy of existing collection
 2. Plan for continuous additions as required

2.836 Policy

- A. Objective: To serve as an advisory group to the department head in all matters of department operation

B. Functions:

1. Meet on request of department head
2. Consider problems and suggest solutions
3. Seek advice of appropriate committees when necessary, for study and report

2.837 Research

A. Objective: To plan and maintain an adequate research program

B. Functions

1. Survey present research program
2. Study possibilities for future research projects
3. Cooperate with Engineering Experiment Station
4. Encourage research work by staff members
5. Set up plan for a progressive research program

2.840 Special Assignments

Certain phases of department activity do not usually require the attention of a committee. They are, therefore, assigned to individuals who act as coordinators and representatives to

the department, of the specified areas of activity. These phases are as follows:

2.841 All College Education Research Committee

Representative

Seek counsel from department members as necessary, in his work with the All College Committee

2.842 Extension

Be responsible for necessary relationships between Engineering Extension and the Continuing Education Service in all matters concerning non-degree training

2.843 High School Cooperation

Be responsible for the encouragement and coordination of all matters related to cooperation with high schools

2.844 Engineering Personnel Committee Representative

Represent the department in all matters concerning the evaluation of personnel and recommendation for changes in salary and rank

2.845 Placement

Serve as official representative of the department in all matters concerning the placement of graduates; become as well

acquainted as possible with all seniors,
and with representatives of concerns
seeking graduates

2.846 Public Relations

Make known the work of the department and
its members; encourage and coordinate
dissemination of information of newsworthy
value through such media as newspapers,
magazines, radio, and television

2.847 Shipping, Receiving and Inventory

Handle the receiving of all materials
(Except mail delivered by the Post Office
Department to the department office)
coming to the department, and see that
such materials are properly delivered to
persons concerned; also handle the shipment
of all materials sent out from the depart-
ment; and coordinate the taking of the
annual physical inventory

2.848 Faculty Advisors to Student Organizations

Provide a faculty contact and advisor to
each student organization in the department,
such as:

1. Pi Tau Sigma
2. American Society of Mechanical Engineers
3. Society of Automotive Engineers

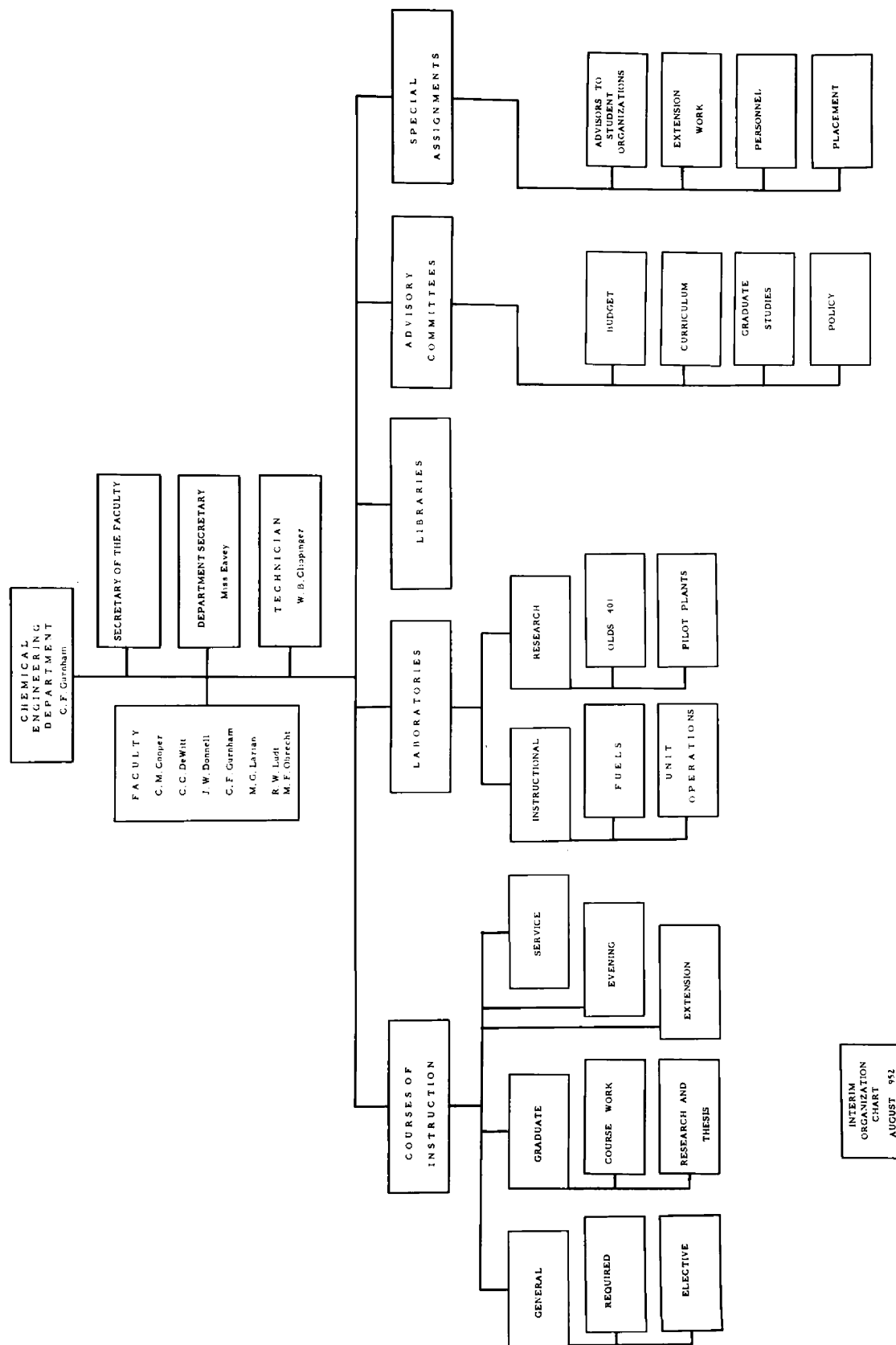
4. American Society of Heating and Ventilating Engineers
5. American Foundry Society
6. American Society of Refrigeration Engineers
7. Etc.

D. Suggestions on the Organization and Operation of Instructional Areas

1. Individuals and Functions

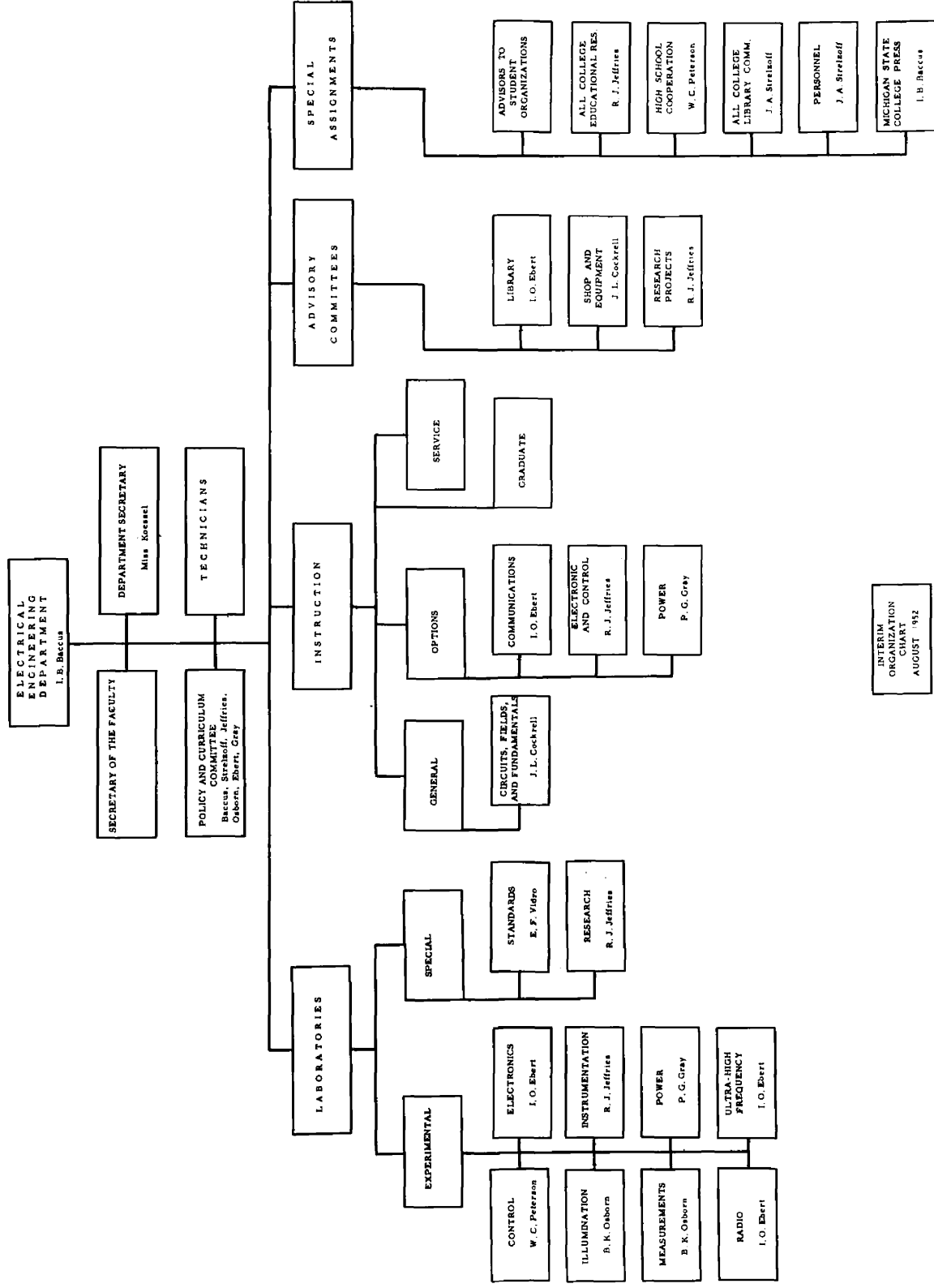
Generally speaking, individuals should not be considered in arriving at an organizational plan. The plan should be based purely on activities and functions to be performed. After a workable plan has been developed, individuals should be selected to head up or perform activities or duties on the basis of their qualifications for the established task.

For example, because John Jones is a cracker-jack along certain lines, an activity should not be set up to handle those things in which he excels. Instead, after an activity has been established to handle certain tasks or duties, the person should be selected to take charge of the activity who is best fitted to do so. The person may be selected from among those already employed, or it may be necessary



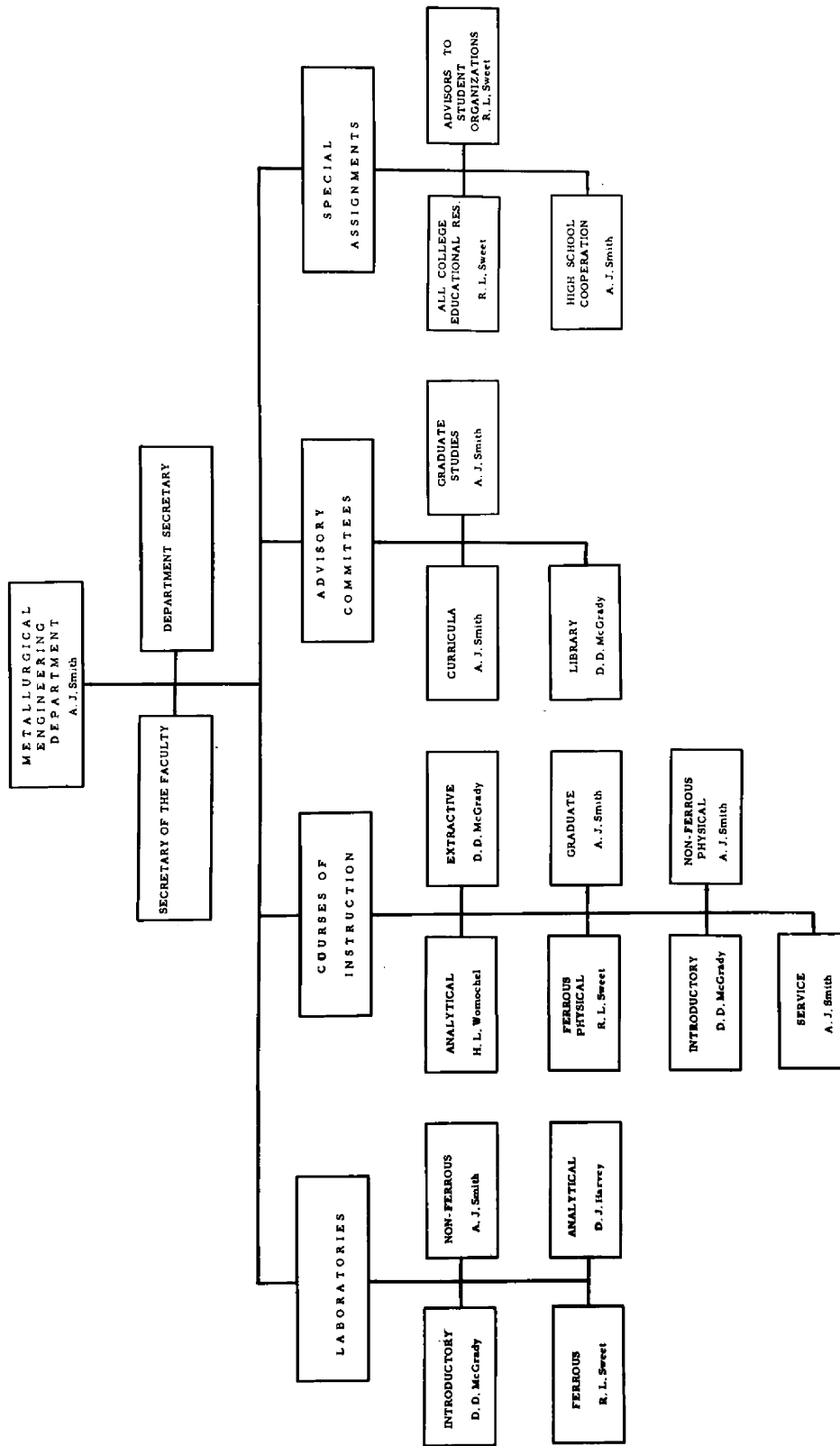
INTERIM
ORGANIZATION
CHART
AUGUST 1952

Fig.6



INTERIM
ORGANIZATION
CHART
AUGUST 1952

Fig.7



INTERIM
ORGANIZATION
CHART
AUGUST 1952

Fig. 8

to employ another person in order to get a properly qualified supervisor.

There is another caution along the same line. After a major function has been established and its activities defined, do not assign that group an unrelated duty to perform on the basis that John Jones has had some experience along that line. This calls to mind the situation at an industrial plant where the Plant Protection function was assigned to the Controller on the basis that during his rise to his present position, he had at one time been in charge of the Plant Protection Service.

2. Assigning Persons to Positions

After the functions, activities, duties and tasks have been defined, there arises the problem of assigning them to individuals. Obviously the person best suited for the assignment should be placed in charge. Generally speaking, this should be regardless of age, seniority, personalities, etc. except in such functions as demand a certain academic rank.

If several persons seem well fitted, it is often wise to call them in, separately or together, to discuss the matter. Often they can aid the executive in making the decision by their words, actions, suggestions, etc. It should be remembered also, that one individual should not be given too many assignments,

for at least two reasons:

- a. He cannot do too much, well
- b. Others are deprived of opportunities

It is usually wise to use as many persons as possible in the assignment of tasks. This will minimize the possibility of too much control or power being concentrated in a small group of people. Even more important, if assignments are spread around, more persons are "in on the know" and the workings of things, and more persons are being developed for higher positions.

Another thing to watch in assigning personnel is to be sure that there is always someone "in on" or learning each job, so that there will be a person ready to move up when the need arises.

3. Operation of Functions

Each of the major functions set up in the Engineering School was established because it was needed. This should also be true in setting up departmental organization plans.

Once a function is established as an operating or advisory group, the personnel should be assigned to it by the Dean or Department Head. The person or persons should then feel free to perform whatever activities are deemed necessary to fulfil the objectives set forth. Suggestions may be solicited from

all sources, and plans discussed with proper persons. Where authority has been delegated to the group, it may act as it sees fit to accomplish its work. If authority, or more authority than has been given, is needed, it should be sought. If the group is advisory in nature, the results of its work should be reported to the proper person.

Often, advisory or operating groups, or committees fail to achieve the aims established for them through lack of action. This generally does not mean that the established function or activity is unnecessary. It may mean that the objectives must be more clearly stated, that outside advice is necessary, that the personnel of the group is not qualified, or that there is a lack of interest on the part of group members. It may only be that time is not conveniently available. Each of these difficulties must be dealt with in a different way, but the person to whom this activity is responsible should seek to determine the causes and see that they are remedied.

If it should be found, after due deliberation, that an activity is not necessary it should be dissolved. Likewise, if it should be found that an activity outgrows its group, or expands into other areas, personnel should be added or new activities established, whichever seems best.

Frequent meetings of coordinating bodies should be held in order to check on progress being made by individual groups or functions or to give advice to activity leaders. Coordinating bodies will usually be made up of group, area, activity or department chairmen, depending on the required level, or the need. For example, the coordinating committee for the School would be the persons in charge of the major functions shown on the chart. The coordinating committee for undergraduate instruction would be Department Heads. The coordinating committee of the Mechanical Engineering Department would be made up of the persons in charge of the options, and others as may be appointed by the Department Head.

The reader should refer to later sections of this report which deal with more specific suggestions on operation (IV-D and VI-A).

V. THE ROLE OF THE DEPARTMENT HEAD

Because it is felt that the department head is the key individual in the operation of the School of Engineering, this section will take up in some detail, his job, and suggestions for carrying out his role more effectively.

A. The Job

No organization can function effectively without proper leadership. In an instruction department, this leadership must be provided by the head of the department. The department head is the administrator of the activities of his department. He is responsible for seeing to it that the work of the department is carried out in such a manner that established objectives are met. In carrying out his role, the department head has many and varied duties to perform--in fact many more than he thinks, if he were to attempt to write them down.

B. Functions and Duties

In most cases, a department head is (in terms of industry functions), a president, sales manager, personnel director, purchasing agent, comptroller, and

production manager.

Some of the functions he performs, or is expected to perform are:

1. Plan overall department program
2. Surround himself with a qualified group of instructors
3. Initiate department policies and procedures
4. Assign duties and responsibilities
5. Appoint committees
6. Make special assignments
7. Plan faculty development program
8. Interpret School and College policies to department staff
9. Inspire faculty to do a good job of teaching and research
10. Carry departmental problems up for administrative advice, decision, or action
11. Meet the public as department representative
12. Resolve or arbitrate department problems
13. Keep a "watchdog eye" on financial matters
14. Review curricula, to assure their adequacy
15. Listen to personal problems of students and faculty
16. Advise students
17. Provide guidance for faculty
18. Check progress of projects and problems

19. Keep up with his own field
20. Be reasonably aware of the fields of the various specialists in his department
21. Teach a course or two, in his field of specialty
22. Keep up with industry as it relates to the fields of activity of his department
23. Encourage suggestions from faculty
24. Make reports to staff and superiors
25. Work toward his own advancement
26. Handle scheduling problems
27. Appraise faculty members
28. Work toward adequate physical facilities
29. Preside over department meetings
30. Recommend appointments, promotions, and dismissals
31. Recommend courses to be offered
32. Pass on acceptance of transfer students
33. Approve and submit department budget to Finance Office
34. Check catalog revisions
35. Promote faculty contacts and contributions to the community
36. Promote faculty social program
37. Represent department before college faculty
38. Promote welfare of department

Such a list of activities is imposing, to say the least. A department head who does everything indicated, and does it well, is certainly a "superman." It is

obvious that no man can perform all the details of the various functions indicated above. The department head can only concern himself with overall guidance of the department program.

C. Problems of the Department Head

Unfortunately, most department heads have not been trained for their jobs. In industry, a new company executive has usually had some experience in administrative work--he has most likely been an assistant in many fields of company operation. Very likely, however, the only training a department head has received is what he has picked up by observation of his predecessor. There are no college courses entitled, "How to be a Department Head."

Immediately upon promotion, he has thrust upon him, a host of duties and problems he never thought existed. He truly faces a challenge. He probably finds himself in an administrative position for the first time. He is not acquainted with the problems, principles, and practices of management. And to top it all off, it is likely that the department head is a scholar, not an administrator.

Men who are drawn into the teaching profession are usually interested in study, research, writing and other types of scholarly work. They are likely to be subjective individuals, possibly even introverts.

Since the department head is faced with such a broad group of responsibilities and problems as were previously listed, and he may not be properly prepared to handle such an array of tasks--what is he to do?

D. Suggestions for Department Heads

Frank C. Hockema, in discussing "What Industry and Business Can Do For Engineering Education," has said that "The leading industrial and business institutions have developed a system of operation that works smoothly and efficiently."¹⁸ He then goes on to list the means by which this is accomplished:

1. Sound Policies
2. Development and use of standard practice instructions
3. Understanding of the system through thorough training of those concerned
4. Adequate records--visual control if possible, instead of remote control through records
5. Adequate reports, planned so that they will be useful to everyone concerned
6. Proper administrative control
7. Proper supervision

It would seem as though this list of techniques could be applied directly to the job of the department head. Let us, then, examine each in detail, and suggest some ways in which they may be effectively applied to his job.

¹⁸Hockema, Frank C., "A Study of Higher Education for Engineers," Studies in Higher Education LIX, Purdue University, Lafayette, Indiana, 1947, p. 87.

1. "SOUND POLICIES"

First, let us define what is meant by a policy. A policy is a code, general rule, or directive principle used as a guide for action. It should define a true interest of the organization, an ideal to be striven for, or a general procedure to be followed in carrying out the objectives of the organization. An example or two will illustrate the definition.

- a. "It is the policy of General Motors that when an opening occurs it be filled by the promotion or transfer of an employee, provided he is capable of doing the work required."
- b. The U.S. Rubber Company states: "We recognize that we are responsible...to our employees... and we will give the pertinent facts about our business to each of the groups to which we are responsible, in terms of their own interests."
- c. General Foods says: "In accordance with long-established policy, General Foods intends to pay wages in its plants and offices as good as or better than prevail for similar work under similar conditions in communities in which it operates."

It can be seen that these are guides for action in carrying out the work of the organization. It is suggested that each department seriously study its overall field of activity and develop a set of policies on various phases of operation, to serve as guides in the work of the department. Such guides will serve to make it easier to establish operating procedures, set up rules and regulations, and perform routine tasks.

Alford states:¹⁹

Successful operation can only be based on accurate information and wise decisions. Policies make effective such information and decisions. No matter how experienced or skilled an executive may be, he needs to be guided by established policies.

Policies should of course be clearly expressed in writing. Holden, Fish and Smith give the following reasons:²⁰

- a. All members of the organization will have the same interpretation of them.
- b. They can be reviewed from time to time and changed to meet current conditions.
- c. They can be checked for compliance and proper understanding within the organization.
- d. They will not become obscure through the passage of time.

It is a well recognized fact that properly formulated policies aid in realizing desired results and

¹⁹Alford, L.P., & Bangs, J.R., op. cit., p. 84

²⁰Holden, P.E., Fish, L.S., Smith, H.L., "Top Management Organization and Control," Stanford University Press, 1941, p. 79

serve as a foundation for operation with a minimum of friction. They assist in the task of reducing to a routine the decisions concerning the day-to-day problems of the business enterprise. Holden, Fish, and Smith have stated:²¹

From the standpoint of management, policies constitute one of the primary instruments of co-ordination and control. They provide consistency of action, without which current operation is not effective and desired ultimate objectives are not likely to be reached.

The distinguishing features of policies seem to be that they constitute the basis for governing future actions; accordingly they must be made known to those who are responsible for handling such actions. Under this interpretation, policies become the laws of conduct for the business, and as such they are a device for permitting authority to be delegated within the organization. Their primary purpose is to sanction in advance the action to be taken in repetitive situations. This makes it unnecessary to refer each case as it occurs to higher authority for decision: it can be handled at the point of occurrence without delay.

Policies can be grouped into these general types:

Basic Policies which establish long-range objectives.

Example--A predetermined percentage of the value of the physical equipment shall be invested in new equipment each year.

General Policies, of short range, or everyday operating significance.

Example--Transfer students from other departments will not be permitted to enroll in this department until

²¹loc. cit.

they have a passing grade point average.

Departmental Policies, of interest to a single department, for conduct of business in the immediate field of activity.

Example--Each committee chairman shall submit a report on the activities of his committee, to the department head, before the end of each term.

Policies for department guidance should be formulated by a policy committee. The committee should pay heed to such principles as these formulated by Paul E. Holden, as quoted in the Production Handbook:²²

- a. The statement of any policy should be definite, positive, clear, and understandable to everyone in the organization.
- b. Policies should be translatable into practices, terms, and peculiarities of every department or division of the enterprise.
- c. Policies, regardless of how fundamental, should not be inflexible: they should, however, possess a high degree of permanency.
- d. Stability of policies is essential and constantly changing policies are fatal to business success.
- e. There should be as many policies as necessary to cover conditions that can be anticipated but not too many policies to become confusing or meaningless.
- f. Policies should be predicated on fact and sound judgement and should not constitute merely personal reflections.
- g. Policies should not prescribe detailed procedure except in rare instances.
- h. Policies should recognize economic principles, be in conformity with federal and other laws, and be compatible with the public interest.

²²Alford, L.P., and Bangs, J.R., op. cit., p.1383

Once departmental policies have been formulated, they should be written down, and explained to department personnel. The department head must see to it that they are properly carried out. If such policies are established, properly promulgated, and effectively carried out, the role of the department head will be much simplified.

2. "DEVELOPMENT AND USE OF STANDARD PRACTICE INSTRUCTIONS"

A standard practice instruction is a codified write-up of a detailed operating procedure. Most large business and industrial organizations maintain manuals of standard practice instructions to enable them to operate effectively. Such write-ups usually deal with details of operation. In an instructional department, might deal with such items as:

- a. purchasing
- b. travel requests
- c. grade changes
- d. class load determination
- e. budget preparation
- f. faculty appraisal
- g. course numbering system
- h. etc.

The reducing of such matters to brief and concise written statements can do much to implement the

policies of the department and make for smoother operation. An example is shown in figures 9 and 10.

As a brief guide in the preparation of standard operating procedures, the following suggestions are offered by Davis:²³

- a. Relate the performance of functions in each phase of a project to its final objectives, to the end that this will be a proper cumulation of values.
- b. Facilitate coordination by specifying the order of performance of phases, and if possible the quantitative time requirements of each phase.
- c. Specify the kind, extent, and degree in which physical factors of environment should be present for maximum economy and effectiveness.
- d. Specify the correct complimentary relationships between functions, faculties, and physical factors, for each phase of the project.
- e. Make possible the proper allocation of responsibility and determination of accountability for each phase.
- f. Provide performance standards for each phase, state where they may be obtained, or show the manner of their determination.
- g. Have flexibility, stability and balance.
- h. Provide for proper initiation and closure of action on each phase of the project, as well as for the project as a whole.
- i. Be as simple and economical as is consistent with effectiveness.

3. "UNDERSTANDING OF THE SYSTEM THROUGH THOROUGH TRAINING OF THOSE CONCERNED"

Obviously it is essential to the effective operation of any organization, that its members understand

²³Davis, Ralph C., Industrial Organization and Management, Harper & Bros., New York, 1940, p. 122

Original Dated 10/15/48	MICHIGAN STATE COLLEGE SCHOOL OF ENGINEERING Operating Procedure Manual	Procedure No. 2.5A
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Subject: Purchasing Equipment, Services, Supplies,
etc.

Objectives: 1. to facilitate financial transactions
2. to centralize records and activity
3. to aid in determining operating costs

- EXPLANATION -

1. In any instance, where money is to be spent by an individual for the college a Request for Requisition Covering Purchase or Service (Form No. 2.5A1) must be filled out in duplicate by the individual. This will cover such cases as:
 - a. purchase of equipment and supplies
 - b. rental of films, equipment, etc.
 - c. magazine subscriptions
 - d. services (repair, plumbing, electrical, etc.)
2. Approval must be by persons designated within each Department by the Dean for each course or group of courses.
3. A triplicate copy may be kept by the individual for his records.
4. The original and first copy should be sent to the Finance Office, Room 112, Olds Hall.
5. The Finance Officer will issue a requisition to the Purchasing Department and return the first copy.
6. All contacts and questions regarding the item requested should be made to the Finance Office.
7. Materials may be procured from Stores Department as in the past.
8. Any questions will be answered by the Finance Office.

Fig. 9

REQUEST FOR REQUISITION COVERING PURCHASE OR SERVICE

[illegible]

Form No: 2.5A1 rev. - 2M-4-49
(6825)

Fig. 10

the system and procedures by which it is operated. In industry, this understanding of the system, is provided by executive or management training programs.

Although such a plan is probably not feasible in the average instructional department, because of its small size, other means are available. Among the most desirable techniques for the education of the department members are committee work and special assignments. These are discussed elsewhere in this report. It should be re-emphasized here that the proper and careful appointment of department members to such positions is an excellent method of providing training of prospective educational executives. By revolving committees and special assignments on a predetermined, periodical basis, many individuals can be given varied opportunities to learn about department operation and train for future promotions.

4. "ADEQUATE RECORDS--VISUAL CONTROL IF POSSIBLE, INSTEAD OF REMOTE CONTROL THROUGH RECORDS"

Again, industry and business are head and shoulders above education in the use of records to facilitate proper operation of the organization.

A record has been defined by Davis as:²⁴ "...A device for the accumulation, classification, and preservation of information in a manner that will

²⁴Davis, Ralph C., op. cit., p. 130

facilitate the performance of the particular business functions concerned."

Davis lists the principal functions of records, as follows:²⁵

- a. The accumulation of information for use in planning and control
- b. The preservation of this information
- c. The maintenance of a body of facts that will reduce the effects of forgetfulness, prejudice, emotional bias, etc., in the making of decisions
- d. The maintenance of an account of the conditions and progress of the business

As indicated in the principle above, a visual record is preferred, since it is easier to perceive than a written record. Both are extremely useful, and each should be used in its proper place. Records of use in departmental administration are: charts, graphs, tables, mechanical, written.

Records can be of use in many ways. Some suggested uses are: budgets, costs, student records, class loads, personnel.

It is suggested that department heads and committees give serious consideration to the use of the most effective types of records to show the results of their plans, and work. Many phases of department operation can be much simplified and expedited by proper use of records. Records are the instruments of control, and a part of the system under which the

²⁵op. cit., p. 131

routine business of the department is handled.

Records will point out exceptions to normal and serve as danger signals indicating need for action. Records of the present situation, when compared with records of past performance, act as a means of showing status, or progress in a certain field of activity.

It should be pointed out, of course, that only necessary records should be made and kept. Unnecessary records, or too much detail can spoil the entire effect, and cause more work than if there were no records.

5. "ADEQUATE REPORTS, PLANNED SO THAT THEY WILL BE
USEFUL TO EVERYONE CONCERNED"

Ralph C. Davis has defined a report as:²⁶

.....a statement of fact or opinion, or both, rendered to a responsible authority, and giving an account of certain factors, conditions and activities. Its purpose in business is to provide the responsible authority with whatever information may be required for carrying on managerial functions.

Reports are of value to the management of an organization in:

- a. giving facts useful to operation
- b. measuring the progress of operations by
showing a comparison between past and
present

²⁶Davis, Ralph C., op. cit., p. 129

- c. pointing out causes and effects
- d. keeping executives up to date by providing
brief surveys of various fields of activity
in the organization

Reports may be used for many different purposes in the effective operation of any organization. Davis classifies them as follows:

- a. reports for purposes of creative planning
 - 1. research reports
 - 2. reports of proposed plans
- b. Reports for control purposes
 - 1. operative reports
 - 2. executive reports
 - a. reports for operative control
 - b. reports for administrative control

Many of these kinds of reports can make the work of the department head easier, if he requests them from committee chairmen and special assignment personnel. Especially useful in operation should be reports on plans made by committees, surveys, results achieved, and progress to date. Only through adequate reports can a department head, keep up on the many activities of his department. Frequent, and brief reports should be called for from those in charge of all functions.

6. "PROPER ADMINISTRATIVE CONTROL"

Control may be defined as assuring that performance conforms to plans. It has been indicated previously that planning the work of an organization is essential to its success. But the plans can result in success only if controls are set up to assure that the plans are carried out.

An adequate plan for control should be composed of the following elements:

- a. standards of performance
- b. checking and reporting on performance
- c. taking action for correction

The standards should, of course, be of such a nature that they will measure the effectiveness of carrying out the objectives of the project. This requires that the objectives will have been previously set forth, and that the department head will have selected certain aspects of performance on which to check. These points should give him an idea of the status of the project at the time, and the trend of future work.

Checking can be done personally by the department head by talking with individuals involved, or it may be done by asking for a report from the person in charge.

Corrective action must be taken when a project

seems to have gone astray, or bogged down. Newman has stated:²⁷

Comparison of actual results with the established objectives and standards will almost always reveal some places where the results have not come up to expectations. As soon as this is discovered it is the duty of the administrator to take steps either to correct the past action or, more likely, to bring similar action in the future closer to the desired goal. Broadly speaking, this corrective action will be brought about by some combination of the following steps:

- a. adjust physical and external situations,
- b. review the direction, training, and selection of subordinates,
- c. modify plans where necessary,
- d. improve motivations

In regards to control over specific areas of activity Holden, Fish, and Smith state the following:²⁸

Control over Policies:

To be fully effective, policies must be clearly stated in writing, properly distributed to those affected, and periodically checked as to compliance. This is best accomplished through means of a well-designed policy manual, compiled and maintained by a high-caliber staff agency.

Control over Organization:

Best practice provides for comprehensive, long range organization planning, rationalization of the structure as a whole, proper design and clarification of each part, competent review of proposed changes and the periodic check of actual organization practice. This is the logical province of a competent staff department specializing in organization problems, working through the medium of a well-designed organization manual.

²⁷Newman, William H., "Administrative Action," Prentice-Hall, Inc., New York, 1952, p. 425

²⁸Holden, P.E., et al, op. cit., p. 9-10

Control over Methods and Manpower:

The most effective control is achieved through current comparison of actual against standard costs based on optimum efficiency in handling all operations and activities. This is often supplemented by a sound plan of budgetary control. Properly qualified and co-ordinated central and divisional staff agencies make the basic analyses and determine the standards, while the comptroller's organization presents the current comparisons.

Control may also be had through the proper use of committees, records, reports, and other techniques mentioned elsewhere in this paper.

7. "PROPER SUPERVISION"

This is probably one of the most difficult areas of operation for the department head. It is extremely difficult for one person to properly supervise the numerous activities of persons who work in relatively specialized fields. On the other hand, academic personnel should require a minimum of supervision. Each was hired because he was supposedly proficient in his particular field. Only the relatively young staff members, new in the teaching profession, should require much supervision--and this presumeably by more experienced persons in their field of interest.

It is necessary, however, for the department head to maintain supervision, of a general nature over the work of his department. If it is a small department, this is relatively easy, by frequent personal contact. If it is a large department, and one spread out over

much physical area supervision becomes more of a problem.

Probably one of the best ways to supervise work of an academic nature is by frequent contact with staff members, in their areas of activity. The department head would do well to set aside certain periods during the week when he would plan to visit or make the rounds of the department physical plant. This need not take much time, since he is doing the visiting, and can leave when he is ready, after a brief look at activity in a particular area, or chat with a staff member.

It should be re-emphasized here that reports are an excellent means of finding out what is going on, and that is one way of supervising the activities of the department.

This section has attempted to indicate briefly, some general methods by which the department head can improve the effectiveness of his work, and at the same time, make it easier. Additional suggestions will be found in the next section, under specific areas of activity.

VI. RECOMMENDATIONS

In this section, an attempt will be made to give some suggestions for improved effectiveness in educational administration. Recommendations will be made of two kinds: (1) for improved operation in specific areas of activity, and (2) for further study by the administrative personnel of the School of Engineering. It is suggested that the latter recommendations be parcelled out to existing or special committees for study, and that reports be submitted as to their findings in the areas.

It should be mentioned that it was difficult to separate the suggestions into two distinct groups. Many items listed under "A" should probably be studied in detail, but were placed under "A" because it was felt they pertained to specific areas of activity.

A. For Improved Operation in Specific Areas

In accumulating material and ideas for improving operation of the School of Engineering, it was found that the specific suggestions could be grouped into certain areas of activity or operation. Each area is indicated below, and suggestions pertaining to it are given.

1. Administration

- a. Each administrator (Dean and Department heads) should do some serious thinking on the subject of overall planning for the activity over which he has jurisdiction. The overall function should be studied and broad, overall objectives should be developed and written out. Policies should then be formulated to serve as guides for attaining these objectives. This material could then be incorporated into an organization or operating manual for the guidance of all concerned.
- b. More use should be made of staff personnel.

This does not mean "staff," in the academic sense of the word, but as defined previously, in section I, H, 1. Administrators should plan to delegate some of their work to persons who would become specialists in various phases of educational administration. For instance, there is already an Assistant to the Dean for Instruction, and an Assistant to the Dean for Registration. There might conceivably be other areas of activity to which the "assistant to..." title could be applied, and another related group of responsibilities assigned to an individual. In the case of

the larger instruction departments, there might well be an Assistant to the Department Head. It should be emphasized though, that proper recognition for such service be given, and that such a position not be considered as merely an "office boy" function. Newman offers the following comment and suggestions on the use of staff:²⁹

The use of staff is a relatively complex arrangement in administrative organization and special care is required if it is to be fully effective. In addition to being sure that the concept itself is understood and that the proper people are selected for staff positions, there are a number of points that deserve special consideration. Among these requisites for successful staff work are the following:

1. Provide the staff man ready access to necessary information through:
 - a. Intimate and frequent contact with "the boss."
 - b. Easy communication with operating executives and other staff men.
2. Consult the staff man before taking any action in the area of his responsibility.
3. Expect staff man to take initiative in promoting needed action.
4. Insist that the staff man rely primarily on "selling" his ideas, rather than resorting to commands.

- c. Much work can be accomplished by effective committee operation as was pointed out in Section I, H, 2.

Many projects and problems of the School of Engineering could well afford deliberation by a properly selected committee. Newman gives the

²⁹Newman, op. cit., p. 186-7

following suggestions on effective operation of committees:³⁰

1. Define the duties and authority of the committee clearly.
2. Select members in view of the duties of the committee.
3. Support the committee with necessary staff assistance.
4. Design procedures to obtain prompt and effective action.
5. Appoint the right chairman.

The appointment of Engineering faculty members to all-college committees should be urged. This would serve as a means not only of assuring that the Engineering viewpoint is made known, but also of broadening the viewpoint of Engineering faculty members. Hockema has stated:³¹

Optimum performance by the staff is possible only if each individual is encouraged to have a university rather than an individual or a departmental point of view, and this can be developed only through participation in activities other than those restricted to a single department.

- d. Good communication can mean much to the proper operation of any organization.

A democratic government plan for the School of Engineering, such as was suggested by a recent committee study should aid in this area. Frequent staff meetings and/or a staff bulletin could be used to keep staff acquainted with the latest developments in School operation.

³⁰op. cit., p. 231

³¹Hockema, op. cit., p. 94

- e. Proper use of control techniques as discussed in section V, D, 6 would make for better operation. The administrator could better keep abreast of operations through the use of records and reports submitted by key personnel.

2. Staff Relationships

Under this heading will be mentioned a few of the problems deserving of consideration, and further study. Some of these items properly belong under (B) of this section, but all have been kept here since they pertain to one area of interest.

- a. General duties and responsibilities of faculty members should be written down--not with any idea of limiting their activities, or of dictating duties, but more from an information point of view, so that a staff member could know more about what is expected of the position he holds.
- b. Consulting privileges should be explained, encouraged, and made possible.
- c. Leaves of absence should be encouraged, with guidance as to the most effective use of the time so spent. Fellowships, research grants, or loans without interest should be made available.

Haggerty has discussed this subject to some length. Here are quoted selected thoughts:³²

The life of the college teacher is cast in routine. Every year from early autumn until late spring he lives according to schedule. For forty hours every week, if we may believe our figures of instructional load, he is occupied with the immediate tasks of teaching adolescent youth. The mental life of these young people is immature, and his own processes of thinking must be adapted to it. By and large, it is easy for him to dispose of such intellectual challenge as is offered by students.

Because the scope of a given department is limited and the institution of which it is a part is itself sharply circumscribed from the stream of practical affairs, and because of the specialized character of modern knowledge, which encourages the growth of barriers and cleavages within the world of ideas, the college teacher is faced with an almost irresistible temptation to permit the pattern of his ideas to become fixed and to grow dogmatic in his teaching. In a comparatively small intellectual field he is better informed than most of his fellows, and his thinking is rarely disturbed by original ideas from his colleagues in his own institution.

The sabbatical leave of absence should be neither a bonus nor a pension but an opportunity for the teacher to prepare himself for improving service to an institution. It is a joint investment by the individual and the institution, intended to provide better service to students in the future.

It follows, then that a leave of absence is not intended to relieve a teacher from his obligations to a college, to give him uncharted freedom to do as he likes for a time. It is a contract between the individual teacher and the institution, in which each party accepts certain obligations. The institution undertakes to take care of an instructor's duties during his absence, to pay him until his return. The teacher undertakes to improve himself for future service

³²Haggerty, M. E., "The Evaluation of Higher Institutions, vol. 2, The Faculty, University of Chicago Press, Chicago, 1937, p. 164f

to the institution and to return to the institution for a period of time so that he may render that service.

In planning what his activities shall be during a period of leave, an instructor should be given the greatest possible liberty. The one condition should be that he engage in genuinely educational activities, such as study, research, writing, or travel. Leave to teach in another institution or to accept employment in business or in public service, where the motive is primarily to supplement the instructor's income, is in general not regarded as in accordance with the purpose of sabbatical leave, which involves pay from the institution.

Clearly the possibilities for faculty improvement offered by a well-established plan for sabbatical leave remain to be realized. Need for a well-conceived, definitely formulated, and adequately supported plan, incorporated in administrative policy, still exists in many institutions. Even where an acceptable plan exists, some means appear to be required to render its operation effective.

- d. Faculty members, as individuals trained in the application of the engineering approach to problems, should be encouraged to participate in community affairs. The engineer with his analytical method of thinking, is needed in many places in the community, such as school boards, Parent-Teachers Association, Boy Scouts, church groups, civic organization, municipal advisory groups, and yes--even in politics.
- e. Faculty members should likewise be encouraged to become active members and leaders in the professional societies in their field.

It is a necessary part of the teacher's training that he keep abreast of his field by attending such meetings. Many excellent contacts are to be made with Engineers active in his field. The teacher must be overly careful of not becoming too theoretical, through too much concentration on books and too little contact with men in practice.

- f. A definite plan should be worked out for the staffing of the School of Engineering. Teaching loads should be accurately worked out, and for some period in advance. This would preclude the necessity of last minute hiring of personnel, or even worse, the releasing of personnel.

The President's Commission on Higher Education makes the following positive recommendations:³³

Recruitment of needed faculty should be as well organized and carefully conducted as the procurement effort of competing employers.

Promising students who desire to prepare themselves for college employment should be urged to apply for fellowships.

The faculty of each institution should stimulate the interest of all students in professional educational activities.

An agency, national in scope, should be charged with the responsibility for promoting and coordinating recruitment efforts.

³⁴President's Commission on Higher Education, "Higher Education for American Democracy," vol. IV, Staffing Higher Education, U.S. Government Printing Office, Washington, D. C., 1947, p. 30-31

3. Improvement of Teaching

In this section are presented several ideas for improving teaching. Some of these ideas, besides being listed here as specific suggestions, could also bear further study.

- a. Due to the great influx of students resulting from the G. I. Bill, many class sections have been larger than is desirable for best results. Class size should be reduced to about 20 in recitation-type courses to permit:
 1. greater participation by students
 2. development of student ideas
 3. development of confidence in students, through participation
 4. closer relationship between student and teacher
 5. more accurate evaluation of students
- b. There should be established a training program for Engineering teachers. Such a program would be invaluable to men who are new to the teaching profession, as well as to those who have learned a little - the hard way.

The President's Commission on Higher Education has stated the problem well:³⁴

³⁴President's Commission on Higher Education, op. cit., p. 16, 17.

College teaching is the only major learned profession for which there does not exist a well-defined program of preparation directed toward developing the skills which it is essential for the practitioner to possess. The objectives which higher education seeks to achieve cannot be reached unless there is realism in the programs for preparing college teachers.

One would be understandably concerned about submitting his person to the ministrations of a surgeon who had had no opportunity to apply his theory in actual practice. One should be concerned equally at the preparation in the content of his field and practice in the presentation of subject matter. The long-term results are perhaps less visible, but nonetheless as damaging.

Such a training program should include instruction on:

1. Course planning
2. Homework
3. Classroom techniques
4. Speaking
5. Test preparation
6. Test scoring
7. Visual aids
8. Laboratory methods
9. Library work

In connection with this course there should be an internship program. Quoting again from the report of the President's Commission on Higher Education:³⁵

A carefully arranged period of supervised internship should become the very keystone of an effective preparatory program for college

³⁵ President's Commission on Higher Education, op. cit., p. 20-21

teacher.

What is contemplated here is something far more comprehensive and more expertly aimed at developing teaching competence than the typical graduate assistantships, although based upon the same principle. In most cases, these assistantships receive little or no supervision in their teaching. The intern would not be one who performs only the simple and repetitive tasks connected with teaching, nor would he do one segment of the teaching job without helping to plan the whole. Internship would be on-the-job training in the finest sense of the term.

This commission recommends that each graduate school engaged in the preparation of individuals for careers in higher education take steps immediately to expand the supervision of their instructional and research fellowships into a program of real internship.

Internship might well contemplate some full-time employment in fields other than teaching. The college teacher needs a rich background of experience in other than academic pursuits.

- c. Appointment of a greater number of research and graduate assistants would permit higher staff to have more time free for planning, coordination, and advanced work.
- d. More concrete suggestions on the improvement of teaching are offered by the Association of American Colleges, quoted here from Lubbers.³⁶

Procedures for Improving Instruction

Recommended by Association of American Colleges

- 1. faculty adviser for each new instructor
- 2. periodic reports by new instructors
- 3. classroom visitation

³⁶Lubbers, Irwin J., "College Organization and Administration," Northwestern University, School of Education, Series No. 7, Evanston, Illinois, 1932, p. 88

4. cooperative courses conducted by adviser and instructor
5. visitation of advanced classes by new instructors
6. occasional lectures in advanced classes by instructors
7. occasional staff conferences on instructional problems
8. coordination by one individual of work in several sections
9. annual report on new instructors by heads of departments
10. standing committee on the improvement of teaching

Similar recommendations, but pertaining to faculty growth are suggested by Haggerty as follows:³⁷

Aids to Faculty Growth Arranged in Order of
Frequency of Report

1. Personal conferences with superior officers
2. Special library facilities in field of instruction and research
3. Provision of books relating to college education
4. Institutional study of college educational problems
5. Opportunity to visit classes of other instructors
6. Traveling expenses to meetings of learned societies
7. Observation of instruction by other teachers
8. Investigation of collegiate educational problems
9. Institutional effort to improve examination procedure
10. Counsel of specialists in college teaching
11. Special laboratory facilities in teaching field
12. Sabbatical or other leave
13. Collection of student opinion about institutional practice
14. Reduction of teaching load to provide special opportunity for improvement
15. Collection of alumni opinion about institutional practices

³⁷Haggerty, M. E., op. cit., p. 163, Table XXVI

4. Industry - College Relationships

In Engineering especially, there should be much, and close cooperation with industry. Since a majority of graduates will find their work in industry, it is extremely important that the School and its individual faculty members be in close contact with industry. Several means toward this end are suggested here.

- a. More contract research projects should be sought and be made a major part of the work of the School of Engineering.

Care should be exercised, however, to see that such projects are really research, and not merely routine testing.

- b. The new cooperative program should be more widely publicized and encouraged. Other industrial contacts should be made.

A definite cooperative program should be planned, the plan written down, and explained to the staff. A staff member should be placed in charge of the cooperative program, to serve as a liaison between the college and industry. A planned work schedule should be arranged for each student, and a written report made by him at the end of each work period. Such a report should aid in coordinating his college and industrial work.

- c. Additional grants and fellowships should be sought, for both students and faculty.

They should not, however, be merely a source of funds, but should be provided by the donor in return for some services from the recipient. Whether a student or faculty member, a project of value to the donor should be carried out and reported on periodically. These projects might be surveys, research work, or special studies along lines of interest to the donor.

- d. As indicated elsewhere in this report, summer and sabbatical leaves should be encouraged, in cooperation with industry.

In some cases, "swaps" might be arranged--that is, trading men for a period of time. This would be highly feasible locally, and would serve the dual purpose of acquainting each with the other's work. Above all, it would assure that staff members are in close contact with industry, and getting the practical point of view on the subjects of their specialties.

In an article in the "Journal of Engineering Education", Dean David L. Arm has listed the following objectives and benefits to be derived from a similar plan which he calls a "Year-in-Industry."³⁸

- 1) Objectives

1. To acquaint faculty representatives with the sponsoring organization by giving them

³⁸Arm, David L., "A Year-In-Industry for Educators," Journal of Engineering Education, vol. 42, No. 10, p. 490

a broad view of its organizational structure, its activities and its operating problems.

2. To acquaint the participants with the company's philosophies and practices with respect to customers, stockholders, employees and to the community.
3. To make available information about the American business system and how it operates.
4. To make known the educational requirements of the company for potential employees.
5. To give participants an opportunity to learn about careers for graduates with the company or with the particular industry represented by the company.
6. Through discussions, to enable the company to benefit from ideas and observations of the educators.

2) Benefits

1. Through an interchange of information, both industry and engineering colleges better understand each other's problems.
2. It should make for educational programs better suited to the needs of industry.
3. It should result in better counseling of students.
4. It enables the individual who participates to observe at first hand engineering in action.

e. Greater use should be made of lecturers from industry.

In many cases the subject matter of a course could be made considerably more interesting if men from the field could frequently be used to present certain topics. It is always worthwhile for the student to hear from an outsider that what he is learning is being used or done in the field. And it helps both student and teacher for the outsider to re-emphasize certain things the teacher has been pounding away at.

- f. Additional extension work within industry should be encouraged.

There are many subjects in the college curricula which would be of great value to selected groups from a plant, or group of plants. Such areas of subject matter should be sought out, and publicity given to their availability from the college.

6. Physical Facilities

The general problem indicated here has been well phrased by the President's Commission on Higher Education as follows:³⁹

The most effective policies regarding salaries and personal and professional security will fail their purpose unless the institution improves the work conditions of its faculty. Often the college or university may, by a supplementary and relatively minor investment enhance the effectiveness of its entire educational program.

Even the obvious need for individual desks and office space for the faculty is too often disregarded. Adequate laboratory apparatus and supplies are as essential as reference books, yet requisitions for both are frequently given niggardly consideration.

Specific suggestions are given in the following paragraphs:

- a. To do an effective job, a teacher needs a proper work place.

This means a minimum of an adequate desk, a comfortable chair, and in a reasonable location. File

³⁹ President's Commission on Higher Education, op. cit., p. 58-9.

cabinets, bookcases, etc. should be provided as necessary. Too often an appropriation of several thousand dollars has been made for a piece of mechanical equipment to be used a few hours a term, and little consideration has been given to the minor needs of office equipment used by faculty members approximately 1000 hours per year. What piece of laboratory equipment is used by the teacher for more hours than he would use a good desk or chair, if he had one? This is a problem for serious study, besides being a specific recommendation as indicated here.

- b. A definite policy should be drawn up regarding the depreciation, obsolescence and replacement of all types of equipment used in laboratories, shops, and offices.

A plan must be worked out whereby equipment can be replaced on a sound, businesslike basis. The value of all equipment in the School should be accurately determined, and a plan worked out for the orderly replacement of a specified amount each year. Such a plan should be worked out for several years in advance, since it can be approximated what equipment should be replaced, and when.

7. Conserving Time

Time is worth money. To be specific, a typical faculty member, on a nine month appointment, works:

9 months x 4-1/3 weeks/month x 40 hrs/week, or
1560 hours per year

If this is rounded off to 1500 hours, a simple calculation will reveal that:

- if his salary is \$4500, his time is worth \$3.00/hour
- if his salary is \$6000, his time is worth \$4.00/hour
- if his salary is \$7500, his time is worth \$5.00/hour
- if his salary is \$9000, his time is worth \$6.00/hour

Hence, his time is too valuable to be wasted performing unnecessary, or routine duties. Following are some specific suggestions for saving time, so that it can be spent on more desirable projects.

a. For administrative personnel

1. Procure the services of a good secretary, not only in the stenographic area, but one who can tactfully handle such other items as:
 - reception of callers
 - screening of callers, and sending them to appropriate staff members for specific answers to questions

- answering questions, herself
 - answering routine mail from pencilled memos
 - keeping the boss posted on appointments, meetings, work to be attended to, etc.
 - opening and preliminary sorting of mail
2. Delegate responsibility and authority to other staff members.

The old maxim of: "If you want a thing done right, do it yourself" is old fashioned in a modern business or industrial concern. A better one, and one that is followed by successful executives is: "Don't do anything yourself that someone else can do for you, even reasonably well." This topic has been discussed in an earlier part of this report (I E, I H).

As an indication of the possibilities of delegation, the executive should keep a list for a day or two of everything he does, and then review it to see how many of the activities could have, or should have been delegated to another person. He should always be sure to channel problems to the proper committee or staff person.

3. Be brief in answering letters, and on the phone.
4. Dictate letters. Only write or re-write after dictating--those requiring very careful wording.

5. Instead of asking people to the office, call on them, in their office. In this way, business can be transacted and leave taken courteously, when desired. Calling on others has the additional benefits of providing an opportunity to get a little exercise, as well as seeing first hand, what is going on in the various areas.
6. Likewise, transact business with those who call, don't visit unnecessarily.
7. Parcel out general plans, policies, and assignments. Set others to work on detailed planning, and execution of the task.
8. Request written reports on assignments. It takes less time to read a brief report than to listen to an oral one. If report is not clear or satisfactory, then request oral simplification.

b. General

1. Make up some sort of a "Tickler" file. A tickler file is a file of cards, sheets or folders, identified by dates in the month. Things to be done on certain dates are filed in their proper places. Then, on a specific date, it is possible to pull

out the folder, or cards and tackle each problem. A large monthly calendar can serve the same purpose, to a limited extent. Tasks or appointments can be entered in the squares. The single sheet has the advantage of giving an overall view of a month at a glance.

2. Use dittoed or mimeographed forms for routine memos, such as for attachment to material to be sent to someone else, or circulated.
3. Make maximum use of clerical help and mechanical devices to simplify work. For example, dictaphones are available and if properly used can save much of a secretary's time.
4. If busy when students, or other faculty members drop in, suggest a time when they may return.
5. And last, but not least--go to work early, before the rush begins. A lot can be accomplished in the hour before everyone else arrives and things begin to "hum." Then go home early while everyone else is rushing to get caught up before quitting time.

B. For Further Study by Administrative Personnel

As was indicated in the introduction to Part A of this Section, some of the recommendations could not be made as specific suggestions. They require further study and deliberation by the administration or by committees. Some could be parcelled out as special assignments. It should also be reemphasized here that many of the suggestions in Section A merit further study. They were included above because it was felt they pertained to specific areas of operation.

Below are briefly listed some problems or projects which it is felt require further study.

1. Study, amplify, and rework the objectives of the School of Engineering as stated in section II B of this report. It is essential to the best operation of the School that the objectives be carefully established, as a basis for policies, curricula, procedures, etc. The same should be done for each department.
2. Work out general policies, based on the objectives, as guiding principles for the operation of the School, and its departments.
3. Make up a complete, organization manual for the School and for each department.
4. Draw up operating procedures for all major details of operation of the School and departments.

(Several areas in which procedures are necessary are indicated in this list, and in part A of this section).

5. Work out a plan for making up the annual budget of the School and departments.
6. Draw up a procedure whereby it is possible for the Finance office to make a monthly report to each department, on the standing of each of its accounts.
7. Outline the general duties, functions, and responsibilities of the instructional staff. As a beginning, there are quoted here, functions of a teacher as reported by the President's Commission on Higher Education:⁴⁰

1. Teach effectively all those who are admitted and wish to be taught.
2. Teach not only the youth but also those adults who are seeking further knowledge or skills.
3. Guide and counsel students in their adjustment to adulthood and careers. Instill some of the insight, broad learning, desirable social attitudes, intellectual curiosity, and other personal qualities with which the faculty member himself should be endowed.
4. Conduct the research that is basic to an understanding and mastery of the forces operative in this physical, social, and spiritual world.
5. Aid the student in comprehending the relation between research and action.
6. Administer the system of higher education so that it serves as a model of good management and evidences that the academician himself can synthesize research and action.
7. Develop and provide the instructional tools

⁴⁰President's Commission on Higher Education, op. cit., p. 3.

with which to further these ends.

8. Plan constantly to meet the demands that society increasingly places on the higher education system.
 9. Lead the community in social and cultural enterprises.
8. Consider the establishment of a program for the training of career officers in educational administration at the college level.
 9. Make a detailed study of the problem of work loads for teachers to arrive at a formula by which an equitable load can be established.
Due consideration should be given to work involved in guiding graduate students on theses, research work, advanced study, writing, committee work, special assignments, etc.
 10. Study the salary schedule in terms of what a faculty member would earn if employed in industry. The educational field cannot count exclusively on finding persons who "want to teach." While it is true that there are many intangible advantages to the teaching profession, salary should be commensurate with service expected. The School of Engineering should be able to draw top notch practicing engineers into the profession--not be satisfied with lesser persons because of the salary scale. Some of the recommendations of the President's Commission on Higher Education

are quoted as guides:⁴¹

- a. The beginning salary should be sufficiently high to meet competition and to attract outstanding talent.
 - b. There should be early increases in salary sufficient to hold excellent teachers and research specialists.
 - c. The salary schedule should provide for reasonable increases in salary, based upon satisfactory performance, within each category of rank.
 - d. The typical salary should provide for the maintenance of reasonable living standards and should reflect recognition of the individual's worth to society.
 - e. Salary policies in individual institutions should be determined with the participation of faculty representatives.
11. Continue with the development of the excellent merit rating plan already in use. Check its adequacy, accuracy, and applicability. This plan is in accord with the recommendations of the President's Commission on Higher Education. The report does, however, emphasize the importance of promotion in rank as well as in salary, as public recognition of advancement, since salaries are relatively confidential.
12. Study the need for and advisability of additional full time staff personnel to aid in the administration of the School of Engineering. The President's Commission on Higher Education suggests that one administrator is needed for each fifteen teachers, researchers, and counselors. It further

⁴¹ op. cit., p. 53, 54

states that a proportion should exist as follows:⁴²

Teachers, researchers, and counselors	85%
Administrators	9%
Special Service Personnel	6%

13. Make a study of the necessary qualifications for an administrator in the School of Engineering. List characteristics desired and evaluate each as a basis for selection in the future. Take full cognizance of the fact that an administrator should be an executive, and not exclusively a student, scholar, or scientist.
14. Conduct a critical study of the value of the Doctor of Philosophy degree in the applied sciences. Weigh carefully the value to the students, department, and to the person himself, of advanced academic work versus down-to-earth, practical experience in his field of specialization.

Obviously there are many more areas deserving of study and research, which pertain to the effective operation of a School of Engineering. Those presented here are only the few which have come to mind over a relatively short period of time. The further study of these areas will, no doubt, suggest many more.

⁴²op. cit., p. 9

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