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AN EXAMINATION AND EVALUATION OF THE INTERNAL PRODUCTION CONTROL STRUCTURE AND JOB-ORIENTED COMMUNICATION METHODS USED IN THE PRINTING PLANT AT SOUTH DAKOTA STATE COLLEGE

83

BY

DONALD MURRAY FERGUSON

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree, but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor

Head of the Major Department

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science, Department of Printing
and Journalism, South Dakota State
College of Agriculture and
Mechanic Arts

June, 1963

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AN EXAMINATION AND EVALUATION OF THE INTERNAL PRODUCTION CONTROL STRUCTURE AND JOB-ORIENTED COMMUNICATION METHODS USED IN THE PRINTING PLANT AT SOUTH DAKOTA STATE COLLEGE

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_____

Thesis Adviser

_____

Head of the Major Department

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Additional and much deserving thanks is extended here to the author's parents, Mr. and Mrs. John W. Ferguson, for their encouragement and support.

DMF

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CHAPTER I

INTRODUCTION

Reasons for Undertaking the Study

This study was undertaken for a number of reasons. First of all, some people held the belief that the findings of an exploratory study of the printing plant production operations would reveal areas where efficiency of men and machines could be increased by applying certain control principles. Better quality printing products was another area where improvement could be made.

At the time this problem was conceived for study and since that time, it was assumed that the solution to the problem would not be a custom-made one; but rather, the solution would be the adoption, for the most part, of production control principles used effectively in industrial printing plants today. To some degree the investigator realized there would be problems in transplanting control systems into a printing plant where the resources are used for a dual purpose; namely, production and education. This study was made in order to get a clear picture of the problems and to see what could and what could not be done in the way of solving these problems.

The investigator believes that this study is the only formal study of its kind ever to have been made.

Problems that will arise under a situation like this one can be quickly perceived, to some degree, by the use of reason and logic; but this is probably the first time such a problem has been studied at any great length.

Another reason that attracted the investigator to such a problem was an interest in printing plant production control and the dissemination of managerial communication. This project provided the opportunity for an unbiased observer to study a medium-sized printing plant in operation.

Printing Management thesis research centered about a mail questionnaire survey was not particularly appealing to the investigator, nor did it seem to have the practical and real lasting value found in a project of this nature.

Scope and Objectives of the Study

A college must be a leader in promoting improved ways of doing things for a better tomorrow. In order for theories to become useful and valuable to the public, they must be studied and tested in a practical or "real" situation.

In order to arrive at a workable solution to any research problem, there will be expenditures of time and money. The best possible results must be gained from these investments.

A researcher working to develop a new corn hybrid

will probably take about 10 years of continuous research in order to perfect the hybrid, which will be of great value to agriculture. Printing plant management is another field where careful and rigorous research is needed to keep pace with progress.

The investigator has limited the scope and objectives of this research to a practical degree. This research is the first step in discovering and solving production and management problems that arise in a college printing plant which has instructional facilities.

This report will explain briefly the internal systems and procedures presently used in controlling and managing production in this college printing plant. This information should help produce a clear image of the advantages and usefulness of suggested solutions to problems that naturally arise under the present procedures.

This study will be concerned with increasing the efficiency of job control. These goals can be achieved through better administrative organization and communication.

Production control is the heart of good production management. It may be defined as a series of functions which coordinate the available plant facilities and regulate the orderly movement of goods through a plant's entire manufacturing cycle, from the procurement of materials

to the shipping of finished goods.[1]

The production control department has four basic functions: scheduling, material control, dispatching and follow up. This section is governed by both external and internal factors. Each of these factors must be taken into consideration before schedules can be established.[2]

Scheduling is one of the broadest areas of production control. It is utterly dependent on good communication. In fact, scheduling is nothing but communication and to apply it properly we must know the what, where and when about a job.[3] Two-way communication is an integral part of the latter function. Whenever communications are not as complete and accurate as possible, congestion occurs in the production process.

A well designed production control system must reflect the nature and the needs of a plant's manufacturing activities and organization pattern. The system must be flexible, adaptable, economical and efficient. It must

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[1]Donald M. Ferguson, "Co-ordinating Plant Functions Is Key to Production Control," Inland Printer/American Lithographer, Vol. 149, No. 5, (August, 1962), p. 54.

[2]Charles T. Melvin, "Scheduling as Applied to the Printing Industry," (unpublished term paper, Department of Printing and Journalism, South Dakota State College, March, 1962), p. 1.

[3]M. I. Bassist, "Communication: Key to Production Control," Graphic Arts Monthly, Vol. 31, No. 4, (April, 1959), p. 40.

function on the basis of simplicity and must be able to assure corrective action.[4]

Proposals will be designed to help produce better quality jobs, to produce them on time and to produce them in the proper quantity. Suggestions will be made to help increase the effectiveness of production efforts made by individual part-time and full-time shop employees and their departments in order to coordinate and insure a relatively smooth-running college printing plant operation.

The research task is not completed until the report has been written. The most brilliant hypothesis, the most carefully designed and conducted study and the most striking findings are of little import unless they are communicated to others.[5]

The investigator has attempted to convey the findings of this study in such a manner as to be clearly understood by "students" of printing and those people who have some knowledge of printing along with an interest in the field. The main points will be brought out quickly and as much detail as is considered necessary will be set forth.

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[4]Harold D. Koontz and Cyril O'Donnell, Principles of Management (2d ed.; New York: McGraw-Hill, 1959).

[5]Clair Selltiz and Others, Research Methods in Social Relations (U.S.A.: Holt, Rinehart and Winston, 1962), p. 442.

It is hoped that this research will add to a general store of knowledge in the field of printing management.

Areas where future research could be pursued will be included in Chapter V.

Conditions Limiting the Study

The printing plant at South Dakota State College functions to serve the college's printing production needs as well as to provide a laboratory for printing instruction. It is only when a person understands elementary principles of industrial production control that the problems arising from this dual situation are thoroughly understood.

The investigator has limited the scope of the study in order to concentrate on job-oriented communication and control problems which can be eliminated or "toned down."

A short and accurate way to reveal the nature of the printing plant under investigation would be to list the conditions of operation. The men, materials and equipment are the same as found in other printing plants.

South Dakota State College's printing plant may be considered a medium-sized printing plant because its total work force exceeds 20 employees.[6] This plant has equipment

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[6]Donald E. Hill, "An Investigation of Dissemination of Scientific Management in Selected Areas of the Commercial Printing Industry." (unpublished Master's thesis, Department of Printing and Journalism, South Dakota State College, August, 1962), p. 11.

which, if operated under an efficient industrial situation, would require many more employees.

The plant labor force consists of college student part-time help, full-time classified employees, high school students and instructors who also function as production workers. The four "classified" employees work steadily throughout the day on production work. The others work periodically during the day and week.

Many machines are not used because they must be available for student practice and instruction or because there is a lack of qualified labor and printing jobs.

All jobs come from a college-associated source. This printing plant is a "captive" plant because it was established to serve the college and for no other reason. Obviously, there is no need for a sales force. Another problem is the fact that this plant often deals indirectly with the customer which may result in poor communications.

In a free competitive society, competition is the sole determinant as to who will operate in a market. This places a premium on competency and efficiency rather than on incompetency and diminishes the possibility of substituting regulation for skill.[7]

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[7]Donald E. Hill, "Production Control for Small Shops," Modern Lithography, Vol. 30, No. 8, (August, 1962), p. 41.

The capacity of each machine is the practical amount of production that can be produced in a specified period of time. Whether a printing plant is large or small, the control center must know the practical capacity of the centers of production and the load commitments of the various centers of operations for efficiency and good planning.[8]

Scheduling is necessary for plant efficiency. Without proper scheduling, time is lost all through the plant. The schedule should start in the control office and carry through to shipping. Every department then knows what is coming, when it will arrive and when it should be completed.

Most important of all, proper scheduling will insure the procurement of paper and ink for each job in time for the press to make-ready. It insures ample time for paper inspection, cutting and seasoning, if necessary. It assures the pressroom that all plates will be ready when needed.[9]

Printing probably ranks first in scheduling difficulties in comparison with other jobbing industries. This is true because of the extreme variation from job to job,

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[8]Chester B. Story, "Scheduling to Control Production," Inland Printer, Vol. 141, No. 2, (May, 1958), p. 92.

[9]Charles W. Latham, "How to Reduce Make-ready Time on Four-Color Offset Press," The Inland and American Printer and Lithographer, Vol. 145, No. 3, (June, 1960), p. 66.

the service characteristic of the business and because control of most printing jobs is surrendered once, twice or more when proofs are submitted to a customer.[10]

If detailed plant control is not practiced, the full-schedule will not work. It is impossible to estimate the time that should be alloted to each job in each department. It is impossible to determine the many things that may upset a schedule and cause loss of time. A good method of follow-up must be a part of a well designed system of production control. Without a routine check-up, no system seems to work for very long.[11]

Therefore, custom-made systems of control have to be used in the college printing plant to a greater degree than in industrial printing plants.

Some of the following conditions may help to give insight to the production control problems that arise in this plant.

In order for a printing plant to operate efficiently, its production facilities must be utilized to the utmost practical capacity.

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[10]Donald N. Rollo, "An Investigation of Production Control Systems and Methods Used in Selected Small Commercial Printing Plants," (unpublished Master's thesis, Department of Printing and Journalism, South Dakota State College, August, 1960), p. 22.

[11]Ibid., p. 66.

To operate every machine in the South Dakota State College printing plant eight hours a day, five days a week, is unrealistic. For instance, in the machine composition department there are ten linecasting machines and two full-time operators; one of these operators instructs classes in machine maintenance and operation which requires a few hours a week. Generally, the machines that are not being used for production are specifically available for students' practical experience for a limited number of hours each week. During the remainder of the time some of the machines are idle. There is no need to use all of the machines because in addition to other limits, there is a limit to the amount of "copy" that needs to be composed. The two operators in this department have been able to handle the work that is required of their department.

Under these circumstances, it would be foolish to make an efficiency check on linecasting machines which would involve the determination of the number of "ems" that are produced each hour by each machine. This same trend of thought may be applied to the efficiency of presses by determining the number of impressions made each hour or the amount of time they are in use. This type of "efficiency" check will not prove to be of any practical value to this college printing plant.

Qualified labor is only available for a fraction of the total time each machine is free for production. Many of the machines that receive the most use are not used 40 hours a week.

If there were a qualified labor supply to operate most of the equipment in the plant 40 hours a week, there would not be enough work to keep each worker busy.

Most of the equipment has to be available at various times through the week for instructional purposes. This time is largely "nonproductive."

It is possible to visualize that under present conditions certain machines and equipment cannot, from a practical standpoint, be assigned solely for production purposes because there is not an excess of many types of machines that can be set aside entirely for instructional purposes.

If all or most of the machines were operated at or near full capacity, bottlenecks would develop that would definitely hinder a smooth production flow which would result in a printing manager's "nightmare."

In order to solve such a problem, it would be necessary to purchase more of certain kinds of equipment and machines and additional floor space would be required. Also, the problem of finding competent craftsmen and specialists would be greatly increased.

It is not possible to have a sales program. There are no salesmen to supply the college printing plant with jobs in order to level out the peaks and valleys of production. In other words, keeping the equipment operating at full capacity through the year is not possible even through planning.

The 10 part-time workers are a vital part of the production team. They are students first and production workers second. The number of hours each day that a student worker is available for work varies with each individual. If there is any reason a student worker cannot report for work as scheduled, there is nothing that can be done to stabilize the situation because he is primarily a student. Replacements for part-time help are not readily available to complete production that is scheduled or ready to be produced. Even when part-time workers are on the job, they only produce during a limited number of hours each day. Therefore, when a part-time worker quits, all production on a job may stop until the next day. Another worker may or may not be available to take over where the first worker left off.

No "approved" job is turned away. Each job is normally allowed 10 days for completion but there are a large number of rush and priority jobs that turn up unexpectedly and are expedited through the plant. A centralized system

of scheduling is not practicable or possible.

A decentralized system of scheduling in coordination with other necessary conditions seems to be the answer to a practical and fairly accurate system of production control in the college printing plant.

The combination of education and production must be considered together when determining solutions to increase the efficiency of the college printing plant. This combination must be considered as permanent. Plant control methods under this situation must be altered and improved.

Methodology of the Study

The first step is the formulation of a specific research problem in need of solution which can be investigated by scientific procedures.[12] The selected research problem must be one which yields a task of manageable size.[13] Once the latter is decided upon, the methods of data collection can be determined together with those for analyzing the data.[14]

Various techniques for collecting data were used in this study. A flexible research design provides opportunity for considering many different aspects of the

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[12] Selltiz, op. cit., p. 30.

[13] Ibid., p. 34.

[14] Ibid., p. 31.

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exploratory problem.[15] In research, the major emphasis is on discovery of ideas and insights. Therefore, the research design must be flexible enough to permit the consideration of many different aspects of a phenomenon.[16]

The techniques used to collect the necessary data for this study were observation, interviews and examination of records. This approach provides protection against bias and inaccurate information.[17]

The purpose of the study was to attempt to find answers to some of the job control and management problems as they occur in the operation of the college printing plant.

Observational methods are primarily directed toward describing and understanding behavior as it occurs. They are less effective in giving information about a person's perceptions, beliefs, feelings, motivations, anticipations, future plans or past behavior.[18]

A plan for interviewing (Appendix A) was developed and executed with each printing plant production employee to reduce the limitations incurred as the result of a

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[15] Selltiz, op. cit., p. 78.

[16] Ibid., p. 50.

[17] Ibid., p. 67.

[18] Ibid., p. 236.

strictly observational study. Ten full-time production workers and an equal number of part-time student production workers were interviewed individually in the printing and journalism building at various convenient times. The interviews averaged about 22 minutes in length. Secretaries and mailroom employees were not included in the planned interviews.

In addition to the interviews there was a good deal of informal discussion with plant personnel concerning the operation of the printing plant and its production problems.

This study required that data be gathered from what people have said as well as from what they have done as employees. Because of limited observational time and the fact that the people working in the plant have been exposed to the plant's production problems and systems much longer than the investigator, the exchange of thoughts with the printing plant personnel proved beneficial as part of the study.

The first question the observer must face is: What should be observed? "Everything" is an unachievable goal because not even the best observer or the best team of observers can be expected to provide a complete record of even seemingly simple events.[19]

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[19]Selltiz, op. cit., p. 207.

As formerly implied, the investigator limited the scope of the study after evaluation, then recorded the plant's functions as they were observed.

A good portion of the investigator's observation was unstructured because certain aspects could not be determined in advance. While making observations the investigator participated as one of the plant production employees; moving frequently from one department to another in order to discover the plant's communication problems.

In certain instances employees were contacted to act as participant observers in order to record certain facts or sequence of events that could not be done by the investigator because of other daily obligations.

There was no trouble in establishing rapport with the employees. The investigator became acquainted with all of them during the study. It was obvious that the information acquired from the employees was accurate in their opinion. The employees were not worried about losing their jobs as a result of the study. They were whole-heartedly in favor of improvement.

It has been emphasized that the results of this study might improve, to some degree, the efficiency of various production control functions in the college printing plant. The investigator believes that the study has been objective and that the hypotheses are accurate.

CHAPTER II

PRESENT OPERATION PROCEDURE

Introduction

The printing plant under investigation has no need for a sales force and, therefore, cannot use sales forecasting procedure to a very practical extent.

There are some specific jobs that can be expected at certain times. As a result of previous production experience, the period of time and the operations needed to complete these jobs has been determined. These jobs include, among others, the Collegian, Dakotan, Alumnus, General College Catalog, High School Editor, Economic Newsletter and Rural Press and Print Shop.

These printing jobs are among many priority jobs that must be considered in production planning along with other production orders to successfully meet the delivery commitments determined by someone in the college or by the plant supervisor.

All jobs going to the college printing plant originate at a college-associated source. The customer seldom comes in direct contact with the printing plant as he works through editors or deans. Three main sources of jobs are the extension division, the experiment station and the college editor. No "approved" job can be turned away.

When copy comes into the printing plant it is assumed that the secretary who typed the copy was accurate, that the editor has properly edited it and that the author has also approved it. The job is then made up and proofed. This proof is sent to the author or customer who may or may not agree with the proof in whole or part. There is so little direct contact with the customer, that the author frequently has alterations. If the printing plant personnel have to do a job over because the customer was at fault, extra charges are made. This costs the college extra money, not the printing plant, although it is an inconvenience for the printing plant.

The plant supervisor, unfortunately, functions not only as the plant supervisor, but as the personnel man, estimator, production man, purchaser, time and motion man, expediter, professor and production control supervisor.

A small printing shop demands that a manager function as an all-around man because it is the most efficient way of operating; but as printing plants become larger and more complex, it becomes increasingly necessary to divide the responsibility between two or more men.

The Estimating Function

Estimating the price of a printing job is one of the first steps in gathering all the necessary job information, in order to estimate accurately, plan the production of the

job and communicate clearly to plant personnel how the job should be produced.

In order to estimate accurately the price for a printing job, many facts must be known, such as kind of work, paper cost per unit, quantity, kind of paper (ream size and substance), number of halftones, number of colors, and equipment needed.

"About 10% of the jobs received by the college printing plant are given an estimate in advance. These jobs are usually the more complicated and expensive jobs."[20]

The customer requests an estimate in order to determine if the cost of the work he would like to have done will fit into his department or divisional budget. The quantity or some other aspect of the job may have to be "cut back" in order to meet the budget and get the job produced. The customer is not going to take his work elsewhere because an estimate seems high. The estimate given by the college printing plant will not be in competition with other estimates, which is a condition found in an industrial situation.

The estimating function must be and is more flexible in the college printing plant. More adjustment of estimates will be found necessary in this plant.

The plant superintendent functions as estimator. He seems to be fair and accurate in determining prices before

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[20]Expressed by the printing plant superintendent in a personal interview. January 1963.

and after completion of the job. A rigid system for making and verifying estimates is not needed. The estimating function in this printing plant is not part of a selling operation.

Figure 1 is a sample job price sheet used by the plant supervisor. This is the only form used as part of the estimating function.

The sole purpose of using the Franklin Printing Catalog is to quickly determine job prices. Prices for jobs in this printing plant situation do not have to be as accurate as in an industrial situation. In addition, the plant supervisor is too busy to make detailed price calculations. The price sheet is used for each job and is filed in the job ticket when the job is completed. If a job is reordered or a customer calls up concerning a particular job's price, the price sheet is immediately available for reference.

The space made available on the form for the "Franklin Section and Date," is used to indicate what table of figures was used to determine the price of the job. Catalog sections are revised from time to time. Therefore, when jobs are reordered, price adjustments must be made on jobs or portions of jobs having costs incurred under the changed sections.

Each factor or group of factors priced to determine the total price of the job are listed separately in the

Extension_____ Franklin Sec. Date____OF____LP_____
Experiment Station____
Charge to_____ Date_____Job No._____

For_____ STOCK

Quantity_____Pp._____ ___Reams_____Ss____x____-_____

Description_____

___Reams_____Ss___x____-_____

Sec.____Pp.____Class____Grade____

Table_____Sub._____

NO. of Engravings____We furnish___ Furnished_____ Binding_____

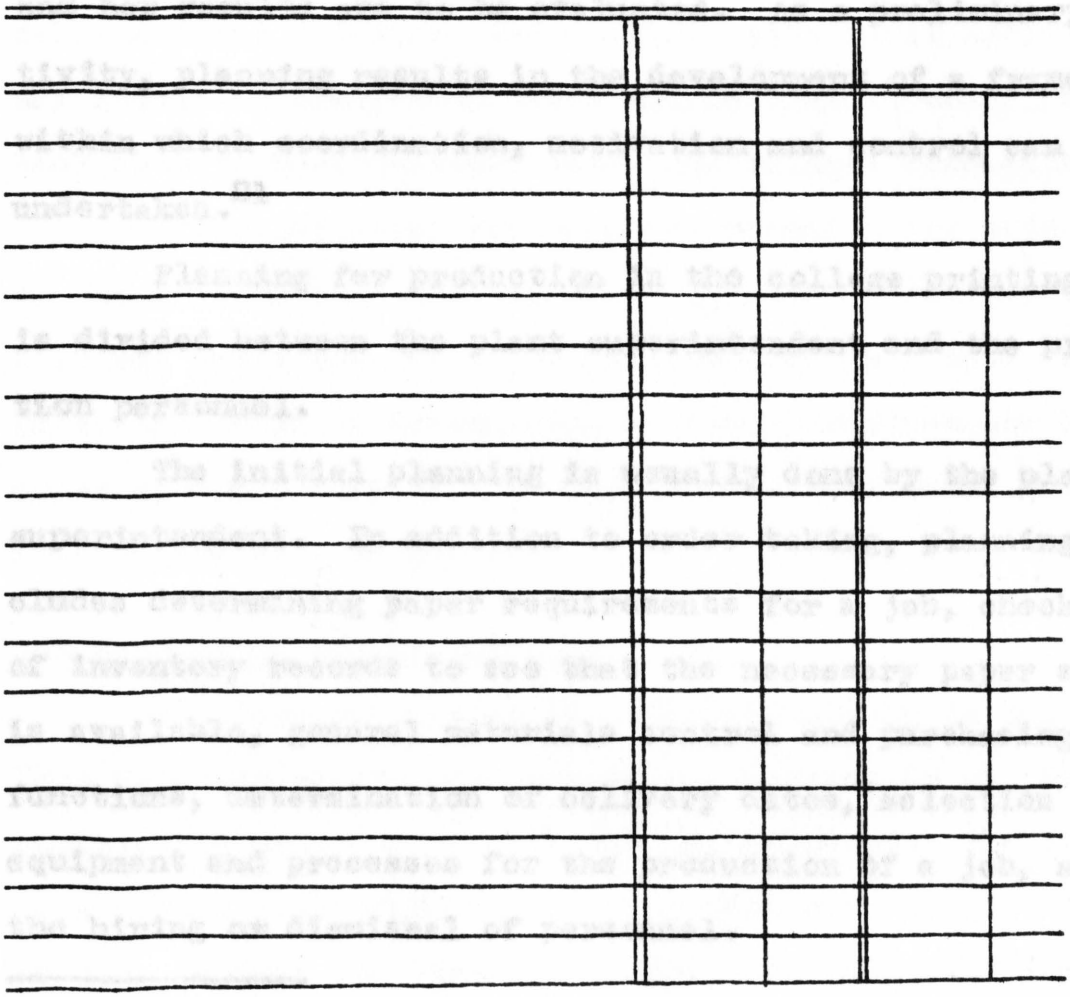

Figure 1. Estimate and job price sheet used by the college printing plant superintendent

tabular section of the price form.

This same sheet or form is sent to the customer who has requested an estimate. Most of the space above the tabular section is not filled out in this case.

Job Planning

Planning involves the formulation of what is to be done; how, when and where it is to be done; who is to do it, and how results are to be evaluated. As a preliminary activity, planning results in the development of a framework within which coordination, motivation and control can be undertaken.[21]

Planning for production in the college printing plant is divided between the plant superintendent and the production personnel.

The initial planning is usually done by the plant superintendent. In addition to order taking, planning includes determining paper requirements for a job, checking of inventory records to see that the necessary paper stock is available, general materials control and purchasing functions, determination of delivery dates, selection of equipment and processes for the production of a job, and the hiring or dismissal of personnel.

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[21] James L. Lundy, Effective Industrial Management (New York: The Macmillan Company, 1957), p. 4.

Key men in the back shop often function as planners because job instructions are inadequate or are not clearly stated. The number of pages in a press run and the method of working the sheet such as "work and turn," "work and twist," are determined in the back shop. The process and press which will be utilized to produce a job are indicated on the job ticket. Due to the lack of an accurate and current picture of the shop load, the availability of personnel and other important information, this final decision may result in changes of press and process in order for the back shop to meet delivery dates and balance production.

The paper stock spoilage requirements are determined by the individual doing the paper cutting. Pressmen usually cut the stock for a job as they need it. This results in several ways of determining spoilage requirements because each man must be the judge of how many extra press size sheets will be needed.

Job Scheduling and Dispatching

The "memory" system is used extensively in the college printing plant. The scheduling devices in use do not portray the progress of each job in the plant. The stoneroom is the only production center that can show the status of jobs in that department or which have been sent from it to a press area. The production picture is not complete and frequently is not current in the composition areas in

spite of the aid of the forementioned control board. The stoneroom foreman uses his scheduling device solely for his own benefit. Figure 2 is an example of the control card he uses. Figure 3 is an improved control card, designed by the investigator and now adopted, for a more meaningful production picture in the stoneroom.

The plant superintendent utilizes a small rol-a-chart schedule board in his office. This board is used to indicate the proof status of "large" printing jobs only. His control board operates on the principle of visualizing time through a continuous, transparent, movable mylar sleeve. All entries are made with a grease pencil and removed with the wipe of a soft cloth. The sleeve is moved across a gridded background with a fixed index on the left side. Job number and description entries are made on the laminated index with a grease pencil. The dates and types of proofs that have gone out and/or returned are marked on the mylar sleeve.

A job ticket box in this office contains job tickets for all jobs that have a proof out. When the proof is returned to the printing plant it is examined and sent to the appropriate department.

The red marks in Figure 4 indicate the location of job ticket boxes which contain work orders that are waiting to be acted upon by the respective production areas. When

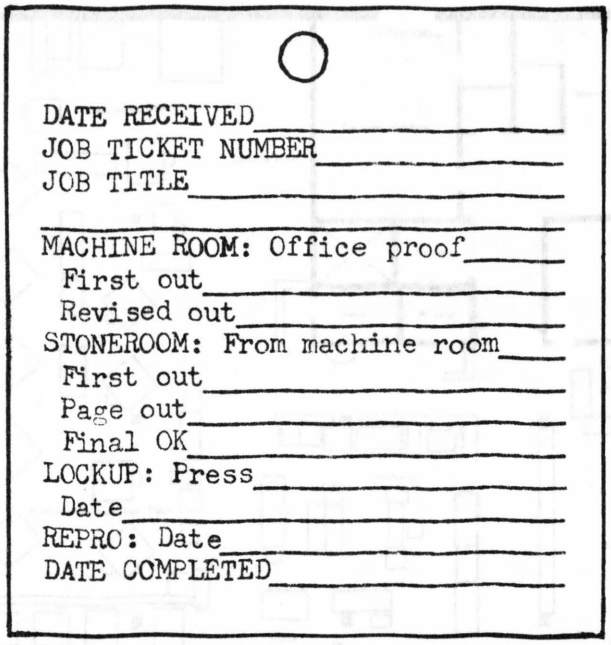

Figure 2. Stoneroom control card presently being used for letterpress jobs

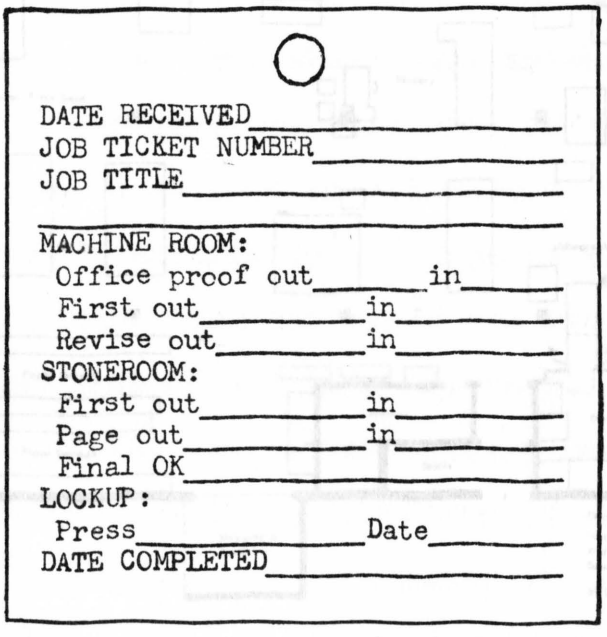

Figure 3. An improved control card to be used in the stoneroom for letterpress jobs

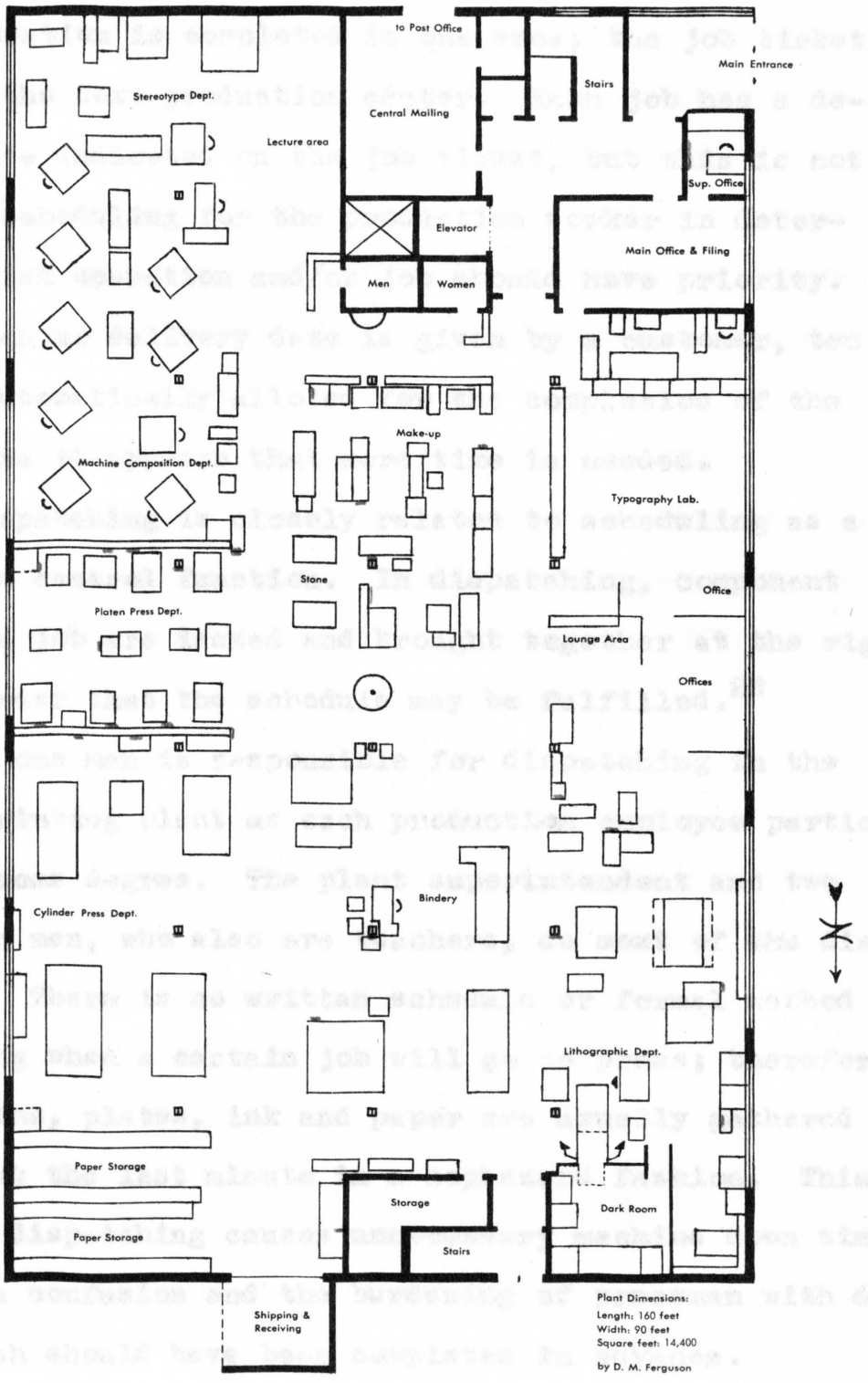

Figure 4. College printing plant layout with red marks indicating the location of job ticket boxes and green marks indicating control boards

a job operation is completed in one area, the job ticket moves to the next production center. Each job has a delivery date indicated on the job ticket, but this is not adequate scheduling for the production worker in determining which operation and/or job should have priority.

When no delivery date is given by a customer, ten days is automatically alloted for the completion of the job, unless it appears that more time is needed.

Dispatching is closely related to scheduling as a production control function. In dispatching, component parts of a job are issued and brought together at the right time in order that the schedule may be fulfilled.[22]

No one man is responsible for dispatching in the college printing plant as each production employee participates to some degree. The plant superintendent and two production men, who also are teachers, do most of the dispatching. There is no written schedule or formal method of determining when a certain job will go to press; therefore, instructions, plates, ink and paper are usually gathered together at the last minute in a haphazard fashion. This method of dispatching causes unnecessary machine down time, production confusion and the burdening of pressmen with details which should have been completed in advance.

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[22]Robert H. Roy, Management of Printing Production (Washington, D.C.: The Lakeside Press, 1958), p. 97.

Records of Production Time

Part-time production personnel report their production time by the use of a time card and time clock. They "punch in" when they begin work in the plant and "punch out" when leaving the plant. This record is used for determining the pay of production workers not working under a contract.

There is no individual job record or daily machine record showing chargeable and non-chargeable time, nor is there any other production information recorded with the exception of that on the job ticket, which is filed.

CHAPTER III

ADMINISTRATIVE REORGANIZATION

Introduction

A program to appraise and improve management must be carefully planned and judiciously executed. It should be established on a continuing basis and tailored to meet the particular requirements of the organization.[23]

There is no one production control system that can be recommended for all plants, but there is a need for standardized production control principles. In the details of operations, however, each organization must modify these principles to fit particular conditions.[24]

It is not sufficient for the production control system simply to detect and repair such troubles as material shortages and machine down time. A properly organized and managed production control program will include means for anticipating production bottlenecks so that action may be taken to avoid or minimize the adverse effects of emergency situations.[25]

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[23] Catheryn Seckler-Hudson, ed., Processes of Organization and Management (Washington, D.C.: Public Affairs Press, 1952), p. 239.

[24] James A. Parton, Jr. and Chris P. Steres, Production Control Manual (Philadelphia: Chilton Company, 1955), p. 15.

[25] Ibid., pp. 13-14.

The investigator observed that little effort is made to forsee production problems or make sure constructive steps are taken to assure the smooth operation of the plant. The present administrative organization is not properly designed to cope with large production problems nor is there any formal system of scheduling or production control, centralized or decentralized.

There is no question that when the work to be done is at all complicated, a good organization with poor plant facilities will give better results than the best plant facilities with a poor organization.[26]

The investigator realized that building up of an efficient organization is necessarily slow and sometimes very expensive, but steps must be continually taken in the direction of improvement.

The remaining pages of this chapter set forth a comparison of the present administrative organization and a proposed organization to satisfy the requirements of the college printing plant.

Present Organization

The investigator determined through observation that Figure 5 represents the present printing plant administrative organization.

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[26]Frederick W. Taylor, Scientific Management (New York: Harper and Brothers Publishers, 1947), p. 62.

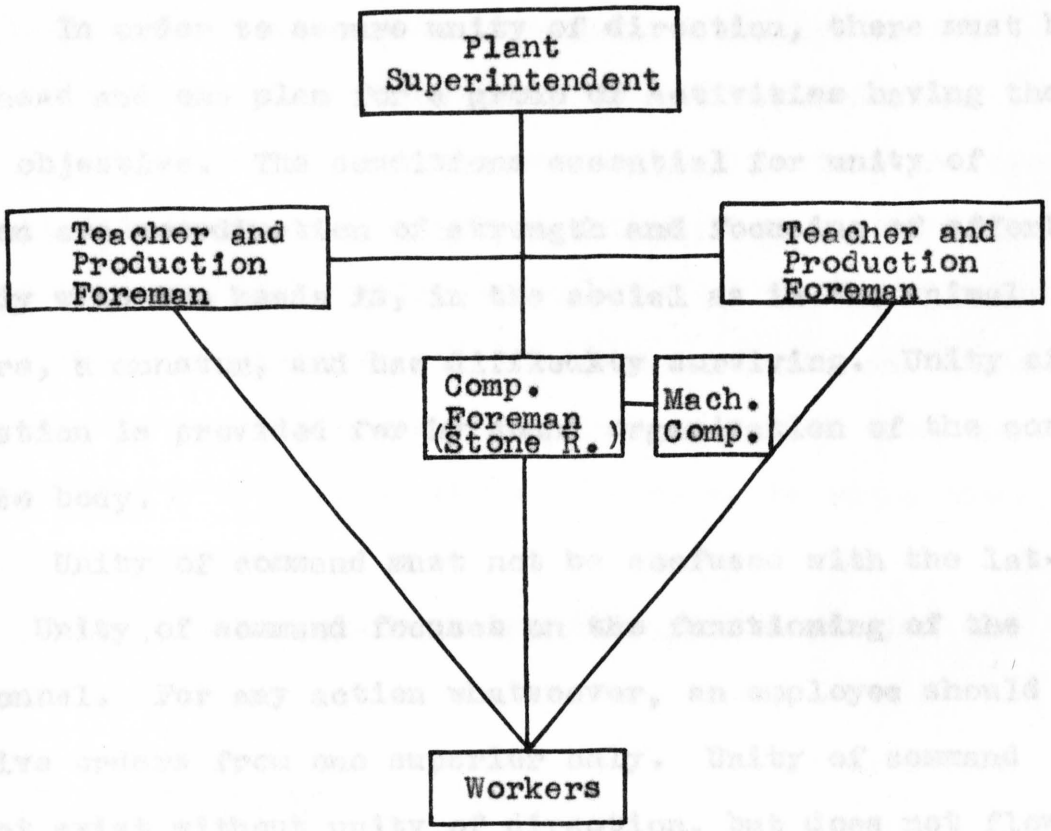

Figure 5. Present college printing plant administrative organization

Two employees who are teachers also function as production foremen. These men have approximately the same functions in production. Even if their functions were not the same, there is still the need for a production coordinator to relieve the plant superintendent of expediting and coordination duties in order that he may function more efficiently.

The teacher-production combined role must be eliminated for better efficiency and control. Separate duties must be assigned to the two production foremen.

In order to secure unity of direction, there must be one head and one plan for a group of activities having the same objective. The conditions essential for unity of action are coordination of strength and focusing of effort. A body with two heads is, in the social as in the animal sphere, a monster, and has difficulty surviving. Unity of direction is provided for by sound organization of the corporate body.

Unity of command must not be confused with the latter. Unity of command focuses on the functioning of the personnel. For any action whatsoever, an employee should receive orders from one superior only. Unity of command cannot exist without unity of direction, but does not flow from it.[27]

Key production personnel must be in the plant eight hours a day. Constant supervision is an absolute requirement of good management.[28]

As part of the present organization, the two key personnel immediately responsible to the plant superintendent are available for production when they are not scheduled to conduct a class. This procedure can cause a lack of vital communication and can freeze production of certain jobs.

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[27]Henri Fayol, General and Industrial Management (London: Sir Isaac Pitman and Sons, Ltd., 1949), pp. 24-26.

[28]Ibid., p. 26.

The latter, in turn, causes overtime, increased costs, failure to meet delivery commitments and rescheduling.

Authority and the responsibility that is a corollary of that authority must be better established in the college printing plant. Many times the foremen as well as production workers are confused as to who should give an OK for a certain job. At times no one in the plant will take the responsibility to give an OK, thus passing it on to the plant superintendent.

These facts were revealed through observation and interviews.

Proposed Organization

The proposed organization, if properly established, would eliminate evading of responsibility, production confusion and inefficiency. Every employee would have specific duties to perform commensurate with his position and abilities.

No employee, whether manager or operative, should have any doubts as to his place and purpose in the organization and his responsibility for achieving that purpose.[29]

A company must build its organization around tasks, not people. As valuable as a man may be, the organization should be constructed so as to be strong in its own right

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[29]Lundy, op. cit., p. 130.

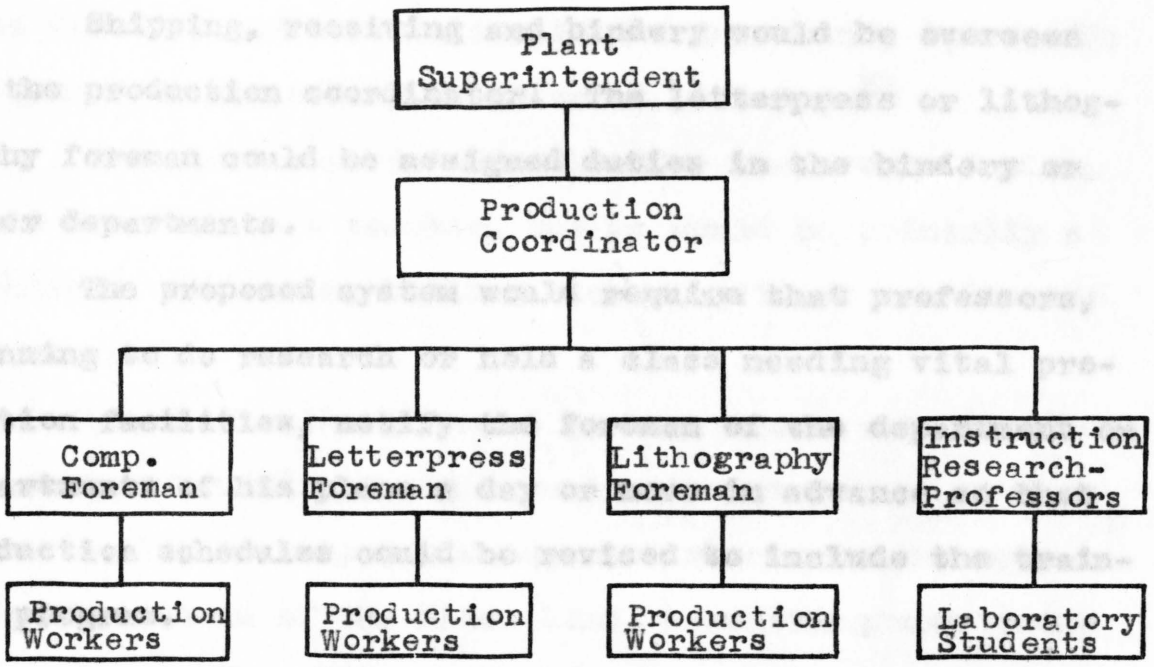

Figure 6. Proposed college printing plant administrative organization

and not dependent on that man, for one never knows when the organization will have to function without him.[30]

Figure 6 indicates a rigid line organization on the surface, but this rigidity is misleading without further explanation.

The production coordinator, letterpress foreman, and lithography foreman, under the proposed plan, would be interchangeable positions in case an absence occurs. None of these positions can go unmanned for an extended period of time. Another person would have to be hired if a vacancy occurs.

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[30]Lundy, op. cit., p. 131.

Shipping, receiving and bindery would be overseen by the production coordinator. The letterpress or lithography foreman could be assigned duties in the bindery or other departments.

The proposed system would require that professors, planning to do research or hold a class needing vital production facilities, notify the foreman of the department or departments of his plans a day or more in advance so that production schedules could be revised to include the training program.

Among other things, the plant coordinator would determine when there is a need for more or less personnel and when personnel should be shifted from one department to another. Shifting of personnel may be caused by lack of work in one department. A high priority job may require more personnel to expedite it through the shop as fast as possible. The production coordinator would also see that all jobs are moved through the plant on schedule and that bottlenecks are eliminated.

An organization must maintain short spans of control. A span of control indicates the number of people reporting directly to a given position. Care must be taken to avoid overloading supervisors or top management personnel with too many subordinates and duties. Under such circumstances problems requiring immediate attention prevent a manager

from devoting sufficient time to the important, but easily postponed or neglected, function of planning.[31]

The plant superintendent, under the proposed plan, could function as a teacher, but he would be primarily a purchaser, estimator, billing clerk, business coordinator and manager.

Lines of authority must be kept short. By avoiding excessive pyramiding in an organization structure, the analyst is able to keep top management closer to the operational problems of the first line, permitting more intimate relationships than would be achieved in a multi-level structure.[32]

The potential efficiency of the proposed organization structure could eliminate poor coordination and instigate better production control even with the inherent handicaps under which the college printing plant operates.

Better guidance, improved direction, rapid communication and positive action are the characteristics of the proposed type of organization.

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[31] Lundy, op. cit., p. 132.

[32] Ibid., pp. 132-133.

CHAPTER IV

A SYSTEM OF IDEAS FOR BETTER PRODUCTION CONTROL

Controlled Scheduling

In order to test the effectiveness of a production control system under the present organization and procedures, a Job Progress and Control Card was developed by the investigator for his use. This card is illustrated in Figure 7.

Because no employee participates in an organized scheduling or control operation, the investigator experimentally took complete responsibility for determining daily job progress. This function was presupposed as a method to determine production bottlenecks and to provide the plant superintendent with production information.

Before beginning this project, information on each job in progress toward completion was recorded on a Job Progress and Control Card. Each new job that came into the plant was recorded. The experiment began October 1, 1962 and ended October 31, 1962. Every day during the experimental period, the progress of each job was recorded. As a job progressed from one production area to another, the progress card was filed to indicate its location.

The experiment revealed that each man in the college printing plant must cooperate and take part in production

JOB PROGRESS AND CONTROL CARD

Job Title_____ Job Number_____
Ordered By_____ Date in Progress_____
Date Promised_____

Description and Quantity

Estimated Clearing Dates	Mater.	Comp.	Stone	Letter.	Litho.	Bind.
Actual Clearing Dates						

PROGRESS OF MATERIALS REQUIRED
Engraving Copy In_____ Ordered_____
Received_____
Paper Stock
Misc.

COMPOSITION Letterpress ☐ Lithograph ☐
Copy In_____ All ☐ Part ☐
Copy In_____ All ☐ Part ☐
Type Set_____ All ☐ Part ☐
Type Set_____ All ☐ Part ☐
Rerun ☐ File No._____ Changes ☐
Corrections- Office Proof Out_____ In_____
First Proof Out_____ In_____
Second Proof Out_____ In_____
Page Proof Out_____ In_____
Revised Proof Out_____ In_____
Pages_____ OKed_____
Pages_____ OKed_____
Stone Proof Repro. Proof

IMPOSITION AND LOCKUP Date In_____ Out_____
Form Being Locked Up_____ Date_____
Press_____
Form Being Locked Up_____ Date_____
Press_____

CAMERA Date In_____ Date Out_____
No. of Halftones_____ No. Shot_____
No. of Line Negs_____ No. Shot_____
No. of Color Trans._____ No. Shot_____
No. of Duo Tones_____ No. Shot_____

STRIPPING Date In_____ Date Out_____
No. Flats Required_____ No. Completed_____
Saved ☐ Disposed of ☐ Date_____
Brown Print ☐

PLATEMAKING Date In_____ Date Out_____
Press Size_____ No. of Plates_____
Press Size_____ No. of Plates_____
Plates Saved ☐ Plates Disposed ☐ Date_____

PRESSROOM Date In_____ Date Out_____
Press Name_____
Number of Section Imp. Completed_____
Section Being Run_____ Date_____
Number of Section Imp. Completed_____
Section Being Run_____ Date_____
Sections Completed_____
First Color_____ Second Color_____

BINDERY Date In_____ Date Out_____
Operation 1._____ 2._____ 3._____
No. Comp._____ _____ _____

SHIPPING Date In_____ Date Out_____
Operation Progress ☐ Deliver To_____

Figure 7. An experimental printing production progress card

control. An efficient system of scheduling is necessary; a dynamic organization is needed. An organization, in a dynamic sense, is a process of welding together a framework of positions which can be used as a management tool for the most effective pursuit of the goals of an enterprise.[33]

The job of production control is too time consuming and costly for one man to handle in the college printing plant. A one-man control system cannot give a minute-by-minute account of the production status, and scheduling would be too complex. Control information must be simple and not detailed. It must be available quickly and transmitted in the same manner. The facts that are recorded must be important ones.

In order to improve the present control system, more paper work is necessary. The combination of planning and paper work that is required should be done simply, but it must also be highly effective in accomplishing its goals.

The experiment also revealed the percentage of "on time" deliveries for the month of October. It should be pointed out that many of the month's deliveries were made on time because of overtime and Saturday work. Table I on the following page illustrates delivery dates met and missed for the period of one month.

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[33]Lundy, op. cit., p. 119.

Table I. Production dates met and missed for October 1962

	Delivery date met on or before schedule	One day late	Two days late	Three or more days late
Completed Jobs	68	3	2	19

On time deliveries	68
Late deliveries	24
Total jobs completed	92
Per cent - On time deliveries	78.1%

Some reasons for late deliveries are: priority jobs breaking up a schedule, inadequate scheduling for control, lack of available personnel for specific periods of time, no control over whether a proof will be returned in a reasonable amount of time, supplies not available at the proper time or inability to hire personnel when there is a need for additional hands.

As a result of observation and the experiment with the Job Progress and Control Card, indications are that a centralized master schedule would not be practical. The production control in regard to scheduling and dispatching must be done in the shop by production personnel. Scheduling job operations must be the duty of production centers with a plant coordinator to assist foremen.

Continual check of all centers of production would be made to see that daily printing plant production requirements are met. In addition, the plant coordinator must continually check to see that poor quality work is not done in the plant.

Every plant works on some kind of schedule. It is up to management to see that it is a time-saving and informative one.[34] The production schedule is an integral part of any systematic approach to the operation of an organization. The basic notion of a system is simply that it is a set of interrelated and interdependent parts.[35]

As an organization grows in size and complexity, it becomes increasingly necessary for management to divide its load, delegate its responsibilities, decentralize its burdens and provide adequate concentration and specialization of supervisory attention at focal points throughout the plant.[36]

Scheduling to control production and meet customer requirements is one of the important aims of all successful

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[34]Charles W. Latham, "Schedule Board Saves Time in Plant," Inland and American Printer and Lithographer, Vol. 143, No. 1, (April, 1959), p. 64.

[35]Seymour Tilles, "The Manager's Job - A Systems Approach," Harvard Business Review, Vol. 41, No. 1, (January/February, 1963), p. 74.

[36]Seckler-Hudson, op. cit., p. 93.

manufacturing.[37]

The investigator proposes that simple control boards be set up for each major production area. These boards could be kept current and accurate on production being done anywhere in the plant. Each production worker would be required to do his small part in keeping the control board current. The production worker's function of making entries on a control card before and after working with a job would be easily and quickly performed and should help achieve the intended purpose of the control board. Examples of the proposed control board and control card are illustrated in Figures 8 and 9 respectively. The control board was designed for the letterpress section. The control card for each control board would be printed on different colored bristol for quick identification.

The control card, Figure 9, would be filled out for each job on arrival in the letterpress department. The card would then be placed on an individual hook in the proper press section of the board. The job work order would then go back to the department job ticket box. Then at the time a production worker began work on a job, the card would be taken off the hook, the beginning date and the operator's name entered and finally returned to a hook in the same section. The worker would then take the job ticket to his

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[37]Story, op. cit., p. 91.

LETTERPRESS PRESS SECTION		
10 x 15 Platen • • • • • • • •	Heidelberg Cyl. • • • • • • • •	Miehle Vert. • • • • • • • •
12 x 18 Platen • • • • • • • •	Kelley Cyl. • • • • • • • •	Heidelberg • • • • • • • •
Kluge Platen • • • • • • • •	Miller Cyl. • • • • • • • •	Job Completed •

Figure 8. Control board for the letterpress section

○ PRESS ROOM
Job No. Job Title Date Began Date Finished Operators   Percent of Job Completed 1 2 3 4 5 6 7 8 9 out

Figure 9. Letterpress control card

production station. On completion of the job, the control card would be marked accordingly and placed on the "job completed" hook. If the production worker could not complete the job, he would circle the percentage representing the work done so the next production worker would know where to start. This would give the foreman an accurate picture when filling out the production schedule.

A daily schedule to complement each control board would be made out by the foreman or production coordinator in charge of a particular department. It would be made out in triplicate. The original would be placed on a clip board and hung next to the control board. The second copy would go to the production coordinator and the third copy sent to the plant superintendent.

Control boards designed similar to that shown in Figure 8 are proposed for the lithographic press section, bindery, stone and makeup section, machine composition and letterpress section. A board combining camera, plate making, and stripping operations would also be made. Proposed locations for these boards are indicated by orange lines on Figure 10.

A visual control board at each dispatch station would show the amount of work each department has to produce, the work "in process" and the jobs waiting to be processed.

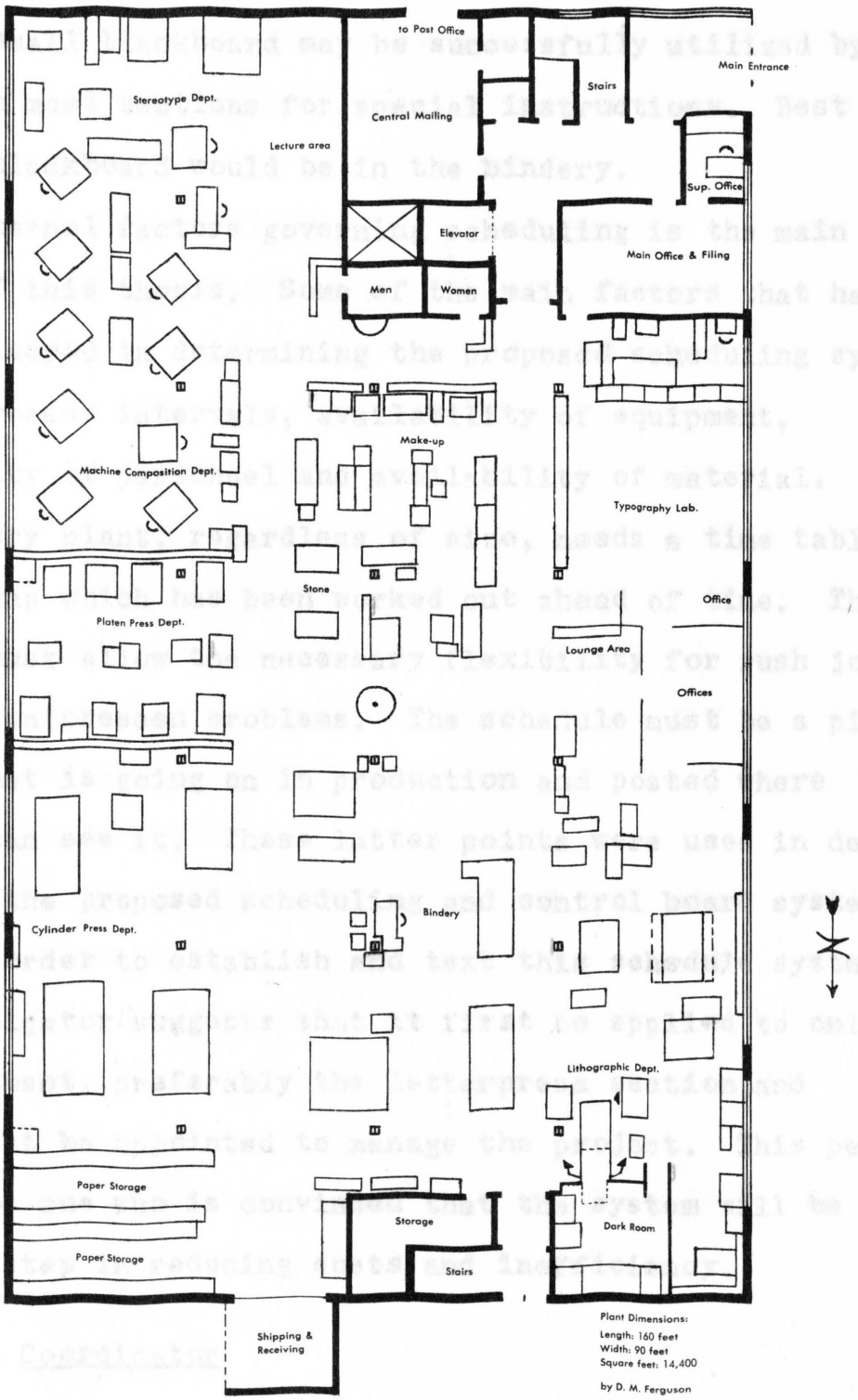

Figure 10. Proposed control board locations indicated by orange line

A small blackboard may be successfully utilized by foremen in most sections for special instructions. Best use of a blackboard would be in the bindery.

Internal factors governing scheduling is the main concern of this thesis. Some of the main factors that have been considered in determining the proposed scheduling system are process intervals, availability of equipment, availability of personnel and availability of material.

Every plant, regardless of size, needs a time table or route map which has been worked out ahead of time. The schedule must allow the necessary flexibility for rush jobs and other unforeseen problems. The schedule must be a picture of what is going on in production and posted where everyone can see it. These latter points were used in determining the proposed scheduling and control board system.

In order to establish and text this schedule system, the investigator suggests that it first be applied to only one department, preferably the letterpress section and someone must be appointed to manage the project. This person must be one who is convinced that the system will be an important step in reducing costs and inefficiency.

Production Coordinator

The production coordinator serves a very important function in the proposed control system. He would act as liaison man between the front office and back shop.

The production coordinator and the plant superintendent must be in close touch concerning such things as estimates, progress of production, order writing, available equipment and other important data that must be communicated for a minimum of problems and peak efficiency.

In addition to the ready availability of the production coordinator, the plant superintendent would have a file of production schedules, completed jobs, and a duplicate copy of the job ticket for each job in the process of production. This visual file of job ticket sheets would always be kept up to date, conveying a record of "live" jobs "in process." The duplicate copy of the job ticket is not just an index to jobs in process, but provides other pertinent job information.

One of the production coordinators as well as the plant foreman is to be conscious of the quality of printing production. High quality must be stressed and random checks must be made to see that the quality is up to a predetermined minimum standard.

Periodic checks throughout the plant would be made by the production coordinator in order to keep track of production, materials and deliveries. This would be a trouble shooting activity. When trouble looms, the proper steps would be taken to iron out problems. He would be continually in contact with production foremen, giving them

advice and instructions.

Under the proposed system for better production control, the production coordinator, rather than the plant superintendent, would release production orders to the plant. One of his main functions would be follow-up. He would be responsible for checking the status of work orders after they were released to the shop and taking any necessary action to insure the smooth flow of work in compliance with the manufacturing schedule. Follow-up would be, therefore, the guiding hand which endeavors to see that factory operations are actually carried out as planned.[38]

Communications Refinement

Intercommunication System. Production control needs to move fast; so it usually has its own intercommunication system. These systems are almost "a must" for every plant.[39] An "intercom" system would speed communication from the plant superintendent to the plant coordinator and production centers. Its effectiveness and value were discussed during interviews with production workers. Some facts figures and discussion on this subject follows.

Table II on the following page tabulates answers given to interview question 24, "Do you think a two-way

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[38]Parton, op. cit., p. 28.

[39]Franklin G. Moore, Production Control (New York: McGraw-Hill, 1959), p. 644.

'intercom' system, if installed in the plant, would be a good method to speed solutions to job instruction problems and to quickly obtain help in process difficulties?" Additional material, pro and con, on this subject was given orally to the interviewee in order that he would have a more complete understanding of its application and to supplement his job experience before answering this question.

Table II. Value judgment totals for interview question 24

	Full-time production workers	Part-time production workers
Strongly Agree	2	-
Agree	3	1
Undecided	2	3
Disagree	2	6
Strongly Disagree	1	-

The answers to this question were given in terms of personal advantage in using a two-way "intercom" system. Three of four full-time workers who spend the majority of their production time in the lithography department agreed or strongly agreed. The plant superintendent strongly agreed that a two-way "intercom" system would be of value. Answers, "as a whole," of "undecided," "disagree" and "strongly disagree" came from personnel working in machine composition, stoneroom and shipping department.

The part-time workers did not feel they would need an "intercom" that was connected to the office. They would find the foreman in the back shop to answer instructional problems. Three of the six part-time workers who disagreed, as shown on the chart, indicated in the comment section that they would agree that the "intercom" system would have a great deal of value for a person in charge of the lithographic department.

As a result of the interviews and observation the investigator believes that an "intercom" from the front office to the lithographic department would be an important step towards increasing the efficiency of the printing plant. The investigator believes, however, that the installation of an "intercom" system must be done simultaneously with administrative reorganization in order to achieve a maximum amount of efficiency.

Data shown in Table III were gathered by an observer for six typical work days. They were gathered to help emphasize the need for changes in administrative organization and an internal "intercom" system between the plant superintendent and key positions in the printing plant.

A count was made each time the plant superintendent went into the back shop and when a production worker came into the front office to speak to the plant superintendent about job specifications and other production business.

The observer, being familiar with all personnel, was given instructions to disqualify from the count any person traveling through the office who was not doing production work and did not appear to be in need of job instruction or production information. Workers bringing proofs to the office were not counted. Workers going through the office for a coffee break, on their way home, or to a class were not counted.

Table III. Tabulation of personal contacts between plant superintendent and production employees relative to job-oriented communication before installation of an "intercom" system

Observation dates 1962	Persons taking the initiative: Plant Superintendent	Full-time production workers	Part-time production workers	Three category count Totals
December 7	11	14	4	29
" 10	15	10	1	26
" 11	11	6	3	20
" 12	8	4	2	14
" 13	13	10	6	29
" 14	9	6	4	19
Single category Totals	67	50	20	137
Daily Average	11.1	8.3	3.3	22.7

The investigator believes that the total number of personal contacts between the plant superintendent and production personnel is extremely high.

These data confirm the need for an "intercom" system between the front office and the foremen in the back shop. Also these data indicate that job instructions are not complete; that a link in the administrative organization is missing; that there is a lack of sufficient authority being delegated to the plant foreman; and that the foreman may not be readily available, for various reasons, to answer his subordinates' production questions. Part-time production workers (students hired for production work) should seldom have to seek out the plant superintendent in order to get answers to production questions.

When the plant superintendent leaves his office for the printing shop, his activity develops into an expediting or production function as well as transmitting oral and written job-oriented communication. His travel usually involves a walk around the entire plant stopping here and there inspecting and checking.

Figure 11 is a layout of the entire printing plant drawn to scale. Blue flow lines have been drawn on the floor plan to indicate two routes often traveled by the plant superintendent. The average one-way uninterrupted time between points has been inserted beside the blue flow lines. The realistic flow lines are not this rigid nor absolute, but are more complex and in greater length. The superintendent's travel involves a number of stops as well.

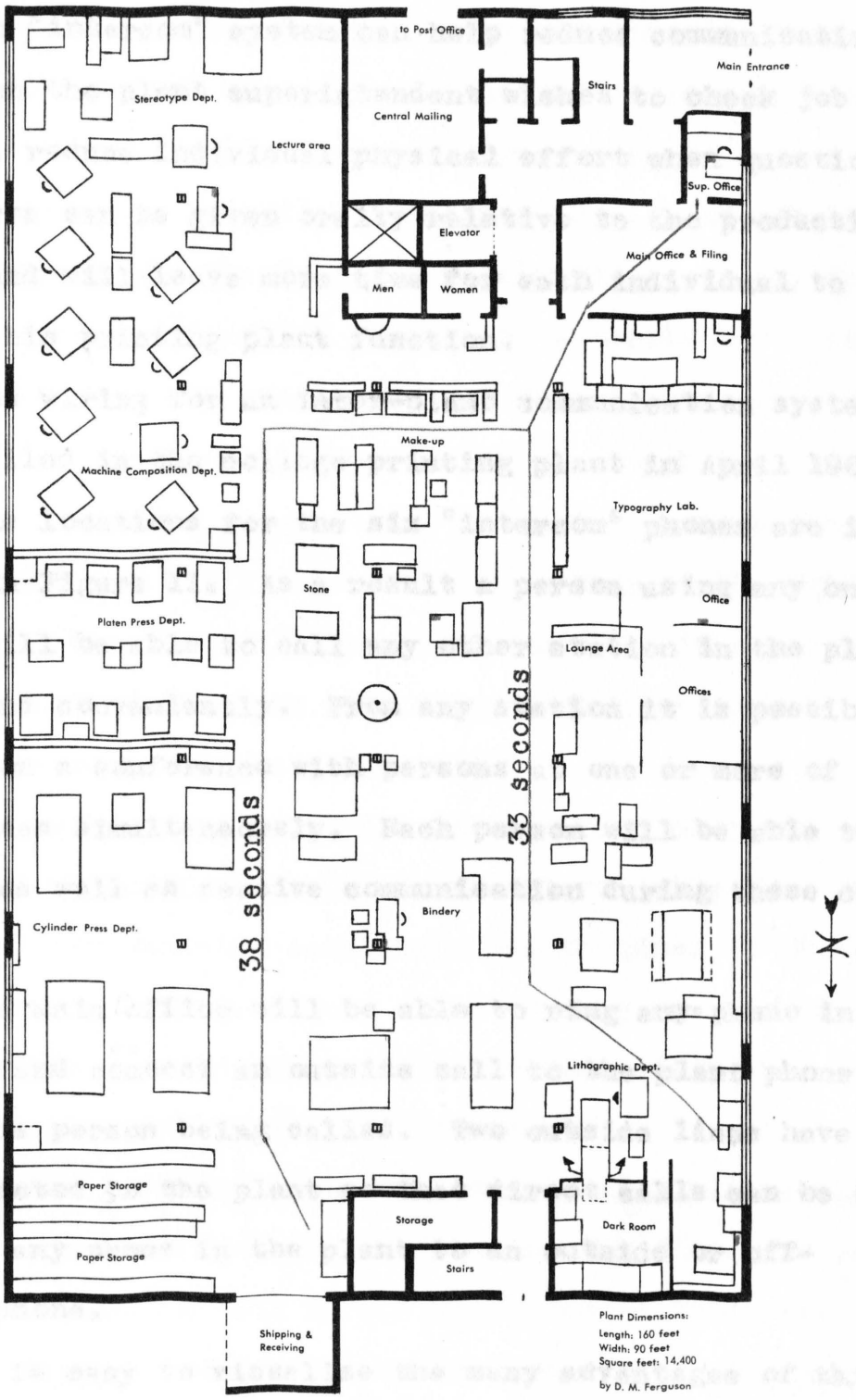

Figure 11. Distance and time one way from the office to selected points in the shop. Red marks show six locations for proposed "intercom" telephones

An "intercom" system can help reduce communication costs when the plant superintendent wishes to check job progress, reduce individual physical effort when questions and answers can be given orally relative to the production of jobs and will leave more time for each individual to spend in his printing plant function.

The wiring for an inter-plant communication system was installed in the college printing plant in April 1963.

The locations for the six "intercom" phones are indicated in Figure 11. As a result a person using any one of them will be able to call any other station in the plant quickly and conveniently. From any station it is possible to carry on a conference with persons at one or more of the other phones simultaneously. Each person will be able to transmit as well as receive communication during these conferences.

The main office will be able to ring any phone in the plant and connect an outside call to the plant phone nearest the person being called. Two outside lines have been connected to the plant so that direct calls can be made from any phone in the plant to an outside or off-premises phone.

It is easy to visualize the many advantages of this system of communication.

Answers obtained during interviews revealed weaknesses which support the idea administrative reorganization is necessary. Table IV on the following page is a tabulation of replies to interview questions 10, 11, 12 and 13.

According to the logic of scientific approach, OK's should be obtained from the foreman of a particular department and not from any other source. This foreman should always be available for advice and OK's. Under the present conditions "foremen" are teachers as well as production men and therefore are not available at all times in the printing plant. "The foreman" that gives the OK's in a particular department should also give the job instructions to the production workers in that department.

The majority of workers indicated that they did not know of any definite channels or system available for the purpose of communicating complaints and or ideas to improve the efficiency of production. Those workers who agreed there were channels of communication commented that they went directly to the plant superintendent.

If this printing plant were functioning with a high degree of efficiency, almost everyone in the interview would have answered yes to each of the questions in Table IV.

Job Ticket. The basic control form in a printing plant is the work order. It is frequently referred to as a job ticket, production order, job jacket and by various

Table IV. Questions concerning printing plant production communications answered by full-time and part-time production personnel

No.	Question	Responses						
		Full-time worker				Part-time worker		
		Yes	No	Undecided	No Comment	Yes	No	Undecided
10	Are OK's for register, make-ready and to run a job usually obtained from the same person?	4	2	1	3	7	3	-
11	Is the person in charge of approving jobs for running always immediately available for discussion and OK's?	2	4	1	3	5	4	1
12	Are you aware of any definite channels or system available for the purpose of communicating complaints and/or ideas to improve the efficiency of production?	2	4	3	1	4	6	-
13	Do your job instructions on a particular job within a particular department come from the same person?	6	2	1	1	6	4	-

other terminology.[40]

The job ticket is a "road map" which is relied upon by production workers throughout the printing plant in order to produce a printing job. The job ticket must accurately, quickly and completely impart every piece of information which will be required to produce the job efficiently.[41]

The most important tool for the automatic relay of information is the job ticket. The automatic relay of information is the goal of production control.

The interviews with part-time and full-time production workers revealed that most agreed the job ticket is not filled in completely enough to do the job. As a result, other sources of job instructions had to be consulted.

In addition to the investigator's observations and ideas concerning the efficiency of the job ticket, answers to question 15 of the interview provided many pointers for improvement. Some of these ideas have been incorporated into a new job ticket which is illustrated in Figure 12. The old job ticket illustrated in Figure 13 will continue to be used until the present supply is exhausted. The new job tickets have been printed exactly as illustrated in Figure 12.

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[40] Hill, op. cit., p. 105.

[41] M. I. Bassist, "Communication - Key to Production Control," Graphic Arts Monthly, Vol. 31, No. 4, (April, 1959), p. 36.

JOB TICKET Nº 60981

For ..... Offset ☐ Part .....

Ordered by ..... Taken by ..... Letterpress ☐ Date Received .....

Delivery Date .....

QUANTITY and DESCRIPTION

Storage .....
Offset number to be carded

Proof to .....

OFFSET

Changes ☐ No changes ☐ Reprint ☐ Line ☐ HT's ☐

Repro. (O) ..... Copy Shot .....

Repro. (L) ..... Plate Made .....

OK to Run ..... Storage .....

Engraving Copy in ..... Ordered .....

Received ..... Amount $ .....

Special Instructions .....

LETTERPRESS

Office ..... Ret. .....

1st Out ..... Ret. .....

2nd Out ..... Ret. .....

Rev. Out ..... Ret. .....

Rev. Out ..... Ret. .....

Page Out ..... Ret. .....

Rev. Out ..... Ret. .....

Final OK ..... Locked up .....

Forms ..... Locked up for .....

Name of person running job .....

PAPER STOCK

..... Reams ..... + ... Sheets ..... X ..... Wt. .....

..... Cut to ..... X ..... No. Out ..... Finish Size ..... X .....

..... Reams ..... + ... Sheets ..... X ..... Wt. .....

..... Cut to ..... X ..... No. Out ..... Finish Size ..... X .....

..... Reams ..... + ... Sheets ..... X ..... Wt. .....

..... Cut to ..... X ..... No. Out ..... Finish Size ..... X .....

..... Reams ..... + ... Sheets ..... X ..... Wt. .....

..... Cut to ..... X ..... No. Out ..... Finish Size ..... X .....

..... Reams ..... + ... Sheets ..... X ..... Wt. .....

..... Cut to ..... X ..... No. Out ..... Finish Size ..... X .....

PRESSROOM AND BINDERY

Press ..... Start with No. ..... Score ..... Perforate ..... Drill ..... Finish Size .....

Color Ink ..... Pad ..... To be Delivered To .....

..... Fold ..... Central Mailing ..... Ext. (Bul. Rm.) .....

Special Instructions .....

Date Completed .....

Delivered .....

Delivered .....

(Use back side of ticket if needed)

Delivered .....

Estimate .....

SELLING PRICE

Figure 12. New college printing plant job ticket

JOB TICKET Nº 11043

Part _____

FOR _____ OFFSET ☐ Date Received _____

Ordered by _____ Taken by _____ Letterpress ☐ Delivery Date _____

QUANTITY and DESCRIPTION

TYPE STYLE _____ PROOF TO _____

Offset number to be carded

OFFSET		LETTERPRESS	
Part Copy In	Copy Shot	Office	Ret.
ALL Copy In	Plate Made	1st Out	Ret.
Reprint	Plate, Neg. Saved	2nd Out	Ret.
Comp. Set	Combination	Page Out	Ret.
Repro. Proof	HT's Line	Rev. Out	Ret.
We Layout	OK to Run	Final O.K.	Locked up
		Locked up for	Press

Engraving Copy in _____ Ordered _____ Received _____

SPECIAL INSTRUCTIONS _____ Name of person running job _____

PAPER STOCK

____ Reams	____ Sheets	____ X ____	____ Wt.		
	Cut to	____ X ____		No. Out ____	Finish Size ____ X ____
____ Reams	____ Sheets	____ X ____	____ Wt.		
	Cut to	____ X ____		No. Out ____	Finish Size ____ X ____
____ Reams	____ Sheets	____ X ____	____ Wt.		
	Cut to	____ X ____		No. Out ____	Finish Size ____ X ____
____ Reams	____ Sheets	____ X ____	____ Wt.		
	Cut to	____ X ____		No. Out ____	Finish Size ____ X ____
____ Reams	____ Sheets	____ X ____	____ Wt.		
	Cut to	____ X ____		No. Out ____	Finish Size ____ X ____

PRESSROOM and BINDERY

Press _____	Start with No. _____	Score _____	Drill _____
Color Ink _____	Pad _____	Perforate _____	_____
_____	Fold _____	To Be Delivered To _____	

SPECIAL INSTRUCTIONS _____

DELIVERED _____ DELIVERED _____

DELIVERED _____ ESTIMATE _____ SELLING PRICE

DATE COMPLETED _____

(Use back side of ticket if needed)

Figure 13. Old college printing plant job ticket

The important changes in the job ticket will be reviewed reading from top to bottom.

The line "Type Style" is a misleading term. There is no need to have the type style indicated anywhere except on the copy. This term has been changed to "Storage." When a job is reordered, the estimator will enter the galley or plate storage number in this space. If the job is new and is to be reordered, shop personnel will enter the storage location, then the estimator will be able to properly indicate storage on the succeeding job tickets whenever the order is repeated.

Several lines in the offset section have been removed because they were never used nor did they have any practical use when entries were made. These lines include "Part Copy In," "All Copy In," "Composition Set," "We Layout," "Plate, Negative Saved" (changed to "Storage"), and "Combination."

Instead of having one line "Repro. Proof" which has caused confusion for the stone foreman, two lines are now shown: "Repro. (O)" (Office) and "Repro. (L)" (Lithography). The estimator indicates specifically where the proof will go.

A check mark is sufficient to indicate reprint, line and halftone work, so a box was entered instead of a line. In addition, the boxes "Changes" and "No Changes"

are used to indicate whether a job will be printed as the copy or will have changes.

"Amount $" was added for the engraving costs and more writing space was given to "Special Instructions."

Under the letterpress section two additional lines were added for "Revised Out" and "Returned" proof dates. Many jobs require these extra lines. These lines were inserted following "2nd Out." A line "Forms" was entered for the indication of how to work a job (work and turn, tumble etc.). The press on which a job is locked to be run is shown on the "Locked Up For" line.

In the paper stock section a plus sign (+) was added between "Reams" and "Sheets." This plus sign will separate the actual number of sheets needed for a job from the additional sheets needed to allow for waste. This will aid inventory control and prevent excess waste. At present the estimator figures the exact number of sheets needed, then the person cutting the paper for a job refigures it and determines the necessary stock for waste according to his "standards." The estimator has made a detailed study of the job to plan the best method for its production and benefit of his efforts is lost if communication of his findings does not take place.[42]

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[42] Bassist, op. cit., p. 38.

The pressroom and bindery section was rearranged with three additions. "Finish Size" was added. This size will be smaller than the "Finish Size" in the paper stock section. Also, since much of the work done in the printing plant is delivered to Central Mailing and the Extension Service, lines were entered for both places. The number delivered can be entered on these lines.

In the bottom section "Date Completed" was moved from the bottom to the top of the left-hand column because this is the proper order of entry.

"Special Instruction" lines should be used more thoroughly for minor or special production notes.

Each job ticket must be used for one job unless it is absolutely necessary to enter two or more. This simple idea can eliminate communications problems. In addition, the job ticket must not be stuffed full of extra samples, miscellaneous proofs, art work and extraneous materials that have little communicative meaning for production or for the records.

When paper needs to be cut for a job in the college printing plant, the pressman does it when he is ready to run the job. This is a poor production practice that should be discontinued.

The investigator proposes that the foremen of the press departments predetermine, according to their schedule,

when paper for a job must be cut, so at the time the pressman arrives he can go to work immediately at his production station. This will move production along faster and utilize the paper cutter more efficiently. Everyone will not need to use the cutter at the same time.

One person should be assigned to the paper cutter for all cutting. He should receive a stock cutting ticket for each job to be cut. Figure 14 is a proposed stock cutting ticket designed for the college printing plant. This ticket would be filled out in the front office and placed in the job ticket. The cutting ticket can be taken to the shop in advance of press time and sent to the cutter. This frees the job ticket to be used in the current production center and does not break up communication. Stock just brought up from the basement, cut a few hours in advance, will adjust to the pressroom atmospheric conditions before going to press.

The cutting sheet will show the exact amount of stock used and it will be returned with the cut paper stock to the proper department and to the job ticket soon after the cutting. Paper ready for production can be identified with the cutting ticket and any guesswork about the amount of stock used will be eliminated.

The investigator was assigned a paper cutting job which involved trimming 7000 booklets on three sides. The

Nº 60981

STOCK CUTTING TICKET

Cut for:
Lithography ___ Letterpress ___ Stock ___ Customer ___

Cut before _____A.M. P.M.

Grain direction ____ Save deckle ___ Save waste ___

Special instructions:_____

_____

Reams _____ + Sheets _____ X _____ Wt. _____
Cut to _____ X _____ No. Out _____ Finish Size _____ X _____

Reams _____ + Sheets _____ X _____ Wt. _____
Cut to _____ X _____ No. Out _____ Finish Size _____ X _____

Reams _____ + Sheets _____ X _____ Wt. _____
Cut to _____ X _____ No. Out _____ Finish Size _____ X _____

Reams _____ + Sheets _____ X _____ Wt. _____
Cut to _____ X _____ No. Out _____ Finish Size _____ X _____

Reams _____ + Sheets _____ X _____ Wt. _____
Cut to _____ X _____ No. Out _____ Finish Size _____ X _____

Cut by _____

Figure 14. Proposed stock cutting ticket to supplement the printing plant job ticket

cutter was set for the three-sided trim about two o'clock in the afternoon. In the course of the next three hours, five rush cutting jobs involving four different people interrupted the booklet trimming and caused change-overs. At five o'clock only 1500 booklets were trimmed because there was no planning for balanced production control.

Each time a change-over in setting occurred it cost time and money. The interruptions could have been avoided by scheduling the paper cutting for the five rush jobs early in the day when the paper cutter was idle.

Every time the cutter was reset, there was the possibility of error and one person always stood idle while the other cut the paper. The pressman should be getting as many impressions as possible from his press and should not be using his time cutting paper.

All of these observed facts continue to emphasize the lack of production control in the present plant and the need for a scientific approach to organization of printing production.

Proof Methods. All proofs that are made for corrective purposes are taken on light brown newsprint 7" x 24". This paper is completely blank with no lines for job number, galley column number, slot number, or other identification as to the type of proof etc. This method of proofing causes a certain amount of inefficiency and grief.

Proofing in this manner has been well established and the problems that result are accepted as the normal and "right" proofing procedures. New personnel and teachers that work part-time are particularly confused by this method.

There are many jobs that require more than one proof per galley. The first proof is called the "office proof." It stays in the plant and is proofread by the secretaries or plant superintendent. After the corrections are made from the office proof, the "first proof out" is taken and sent to the editor or customer. After this proof is corrected, "revised" and "final" proofs are sent out. When a proof is free of errors, an OK to produce the job is given by the editor or customer.

In order to eliminate the confusion that exists for plant and customer under the present proofing system, the investigator suggests the following system.

Three conservative colors of newsprint should be used for the main types of proofs. For example, a light brown newsprint could be used for the office proof, a light blue newsprint for the first proof and for the final or revised proofs a light green newsprint is suggested. The color gives quick proof identification. In addition, at the head of each proof in relation to the color, large bold letters should be used for printing the names of the respective type of proofs which will give proof confirmation. Below

the heading, a line should be printed for each of the following: job number, galley column and slot number; the latter for immediate storage identification. The job and storage numbers should be written or stamped in the preprinted space provided shortly after the proof is taken and before it is sent out of the shop.

Proofs are often held by a printing customer for unreasonably long periods of time and when the proof is returned the predetermined delivery date is expected to be met. The customer does not realize the problems this causes in the production operation of the printing plant. Because the college printing plant is a "captive plant," perhaps a bright sticker could be attached to each proof that goes out to a customer informing him briefly why and when the proof is expected to be returned in order to meet the delivery date.

Some brief research was done by the investigator with regard to the causes of poor quality reproduction proofs in the college printing plant. The following material is the result of this brief study.

The college printing plant has a good reproduction proof press with rollers that are equally as good. There are many obvious and frequent causes of poor reproduction proofs which naturally result in an inferior lithographic printing product. Some of the causes of poor reproduction

proofs are: improper kind of ink, causing poor ink transfer and drying; bent and worn linecasting machine matrixes which cause hair lines; improper type height; worn serifs, and pocked faces. When metal is of the improper casting temperature, "cold face" results causing an impure printing surface. Also, when metal chips are not completely cleared from the surface of the type before proofing, a poor reproduction proof will obviously result. The use of any kind of cloth for the cleaning of type surfaces, particularly cloth with weak short fibers, should be prohibited from the time the type is received from the machine or composing stick through preliminary proofs to the final reproduction proof. When rubbing with a cloth instead of a stiff bristled brush, tiny particles of cloth are detached from the rag by the type surface. These particles are left lying between lines on type face "shoulders" and "counters" ready to be picked up by the proof press rollers and later transferred with the ink to the type and in turn transferred and welded to the reproduction proof. As the reproduction proof is examined with a magnifying glass, a person quickly discovers that the letters have very small black strands extending into white areas connecting letters, making some of them illegible. The degree to which this fiber particle transfer occurs depends on how often the rollers are cleaned. This problem, however, cannot be completely eliminated

by cleaning rollers frequently, which incidentally is time consuming, costly and an unpleasant operation. The investigator proposes a very simple and practical solution that is 100% effective in regard to solving the rag fiber problem. The solution is the use of a relatively stiff bristled brush whenever cleaning type to be used for a reproduction proof. Also, a rather powerful and quick evaporative cleaning solution should be used. A brush does a better job of removing foreign particles under any situation and does not get "dirty" as a rag would.

Lithography Plate and Flat Filing. Printing profits are derived from repeat orders. In letterpress the form stored on galleys is common in every plant, yet few plants doing lithographic production make proper provisions to store systematically the flats and plates that can be utilized for reruns.[43]

Flats and plates are costly to make, therefore the best possible protection must be provided for the prevention of damage.

Basically, all flat filing systems depend on having drawers in cabinets large enough to lay the material flat. The proper drawer size is important from a space-saving

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[43] I. J. Borowsky, "Efficient Storage, Filing System Will Reduce Costs," The Inland Printer, Vol. 141, No. 6, (September, 1958), p. 66.

viewpoint and to eliminate folding and bending.[44]

The storage location of each flat and plate that is saved for a rerun must be indicated on the job ticket as well as the flat or plate. When a job repeats, the job ticket is taken out of the file for sample of stock, color, pricing information and for the location of the form, a plate or flat. The new job ticket can be made out quickly and completely when all of these facts are known. When there is no clue as to where a plate or flat may be found or whether it has been saved or not, someone in the plant will have to spend extra time trying to find it.

At present, three sturdy steel filing frames on wheels are used for storing rerun lithographic plates for the two large lithographic presses. A sticker containing the job ticket number, number of plates in the run and flat storage, is attached to each large plate and hung on the steel frame for the next time the job is ordered. If one of these plates is disposed of, the date is entered on the sticker which is torn off and sent to the plant superintendent.

In the college printing plant small plates are piled up in a bin type of storage, disregarding the type of job or whether or not disposal should take place. However, some of these plates are placed in numbered Kraft envelopes

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[44]Borowsky, op. cit., p. 66.

along with the flat.

Two flat filing cabinets are used in the college printing plant. An additional cabinet is needed to store the large number of flats saved. Many flats are damaged due to the lack of storage facilities.

The office where the work orders are prepared does not have a complete up-to-date card file or list of stored plates and flats nor their exact location in the back shop. This situation is caused by the lack of a sound, integrated filing system.

An organized and consistent effort must be made to properly file or dispose of plates, flats and type forms daily. The job ticket must be marked in advance for each job indicating whether the plate, flat or form should be saved or discarded.

The job number and fact sheet number are marked on some flats and not on others. These markings are not put in any specific spot on the flat but are found on different edges of the flat. A sticker should be placed in a specific corner of each flat that is saved indicating job number, fact sheet or publication number, date of filing and file drawer number. Flats and plates should be filed as soon as possible by production workers. In addition, filing and disposal information must be taken down and relayed to the front office at the end of each day.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The primary objective of a modern printing plant is the production of economic goods of the proper quality and quantity, utilizing the least expensive methods and meeting a necessary time schedule for completion. In order to achieve these ends, the plant must have a medium for coordinating its activities into a single organized effort.[45]

The investigator believes that if all proposals made in this thesis are accepted, defective printing plant production organization procedures could be eliminated. The proposals that have been made for the control of scheduling, better administrative organization and communications refinement are the foundation of improvement, but many details must be integrated into the proposed system as it operates day by day.

A system is never better than the people who operate it. The first thing that should be recognized is the importance of a production coordinator and the workers who play a part in planning and scheduling. A system is necessary, but it is worthless without competent and well

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[45] Parton, op. cit., p. 13.

informed people to operate it.[46]

At present a complex version of the functional foremanship form of management organization is in operation. In order to eliminate the problems that occur as part of this type of operation, a line organization geared to the nature of the college printing plant function is suggested. It is proposed that management be stabilized to eliminate the employees' confusion as to whom they are directly responsible and to achieve better control of printing production. As the first step in reorganization, a new key position, that of production coordinator, would be formed.

Working from the foundation of an improved administrative organization, other proposals have been made to obtain better production control. A system of control boards to be used in conjunction with a control card was proposed in order to keep track of each printing job as it moves from one department to another. To realize the maximum benefits of this system, scheduling and dispatching procedure were also studied.

A "before" study was made to determine the potential use of an inter-plant communications system. An "after" study can be made when the system is fully installed and put into operation. The data collected at that time could

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[46]Marshall L. Russell, "Estimating and Production Control," The Lithographer's Manual, Vol. 1. ed. Victor Strauss (New York: Waltwin Publishing Co., 1958), p. 3:9.

determine the most efficient use of the inter-communications system and its effectiveness in reducing the need for a production coordinator and other proposals described in this thesis.

The two principal control forms comprising an important part of this study were the job ticket, or production order form, and stock-cutting ticket. Improvements were made on the existing job ticket and the investigator designed a stock-cutting ticket which will coordinate paper stock cutting with (1) time that the paper cutter is available, (2) personnel to do the work and (3) the job schedule for each press in order to eliminate bottlenecks and inefficient use of production time.

Better methods of identifying and taking proofs were recommended. In addition, care and storage of lithographic plates and flats were discussed in detail to improve production control and increase the job quality.

The proper functioning of the proposed scheduling system will give an up-to-date picture of all jobs in the plant no matter what personnel problems develop and regardless of the number of priority jobs that must be expedited through the plant. "Laboratory" classes cannot affect the system adversely if the program, as a whole, functions as intended.

From an educational standpoint, the part-time production workers are not learning the proper production control techniques they can expect to find in a practical, progressive and successful printing plant. Every student involved in classes or production work in the college printing plant would benefit from and learn the meaning of a scientific approach to production management as a direct result of the installation of the proposed program.

The proposed system has been developed to centralize production control as much as possible. Order taking, estimating, filling out the job ticket, billing, inventory control and purchasing are all functions of the front office.

There would be many tools which the plant superintendent could use to keep abreast of production activity. He could always use his "intercom" system to contact production centers in order to find out quickly the progress of any particular job. At the end of each day he would be supplied with a copy of the daily production schedule and, at all times he would have a carbon copy of the face of every job ticket "in process." Job tickets would be returned to the front office after delivery providing information concerning delivery, inventory and material for billing. The carbon copy of the order for each job would be pulled from the "in process" job tickets when the job ticket was returned after delivery. Whenever a proof would be sent out,

the plant superintendent would have the job ticket at hand and his control board would indicate the type of proof released, dates sent and returned. In addition, the plant coordinator would always be immediately available for conference concerning production, progress and planning.

Scheduling and job control must be done in the back shop because of the many variables that must be accepted as part of the printing plant's day-to-day function.

Instructions have to be carried out all over the printing plant. All operations are not completed at the same time. New sets of instructions must be prepared every day.[47]

The printing plant directions are, in their final application, decentralized whether production control is centralized or decentralized. In production control work, "decentralization" means giving the foreman authority to make certain decisions.[48]

All details cannot be effectively controlled from a central office. You have to let some decisions be made at the "firing line." In the operation of the college printing plant this fact is particularly important. The foreman knows of all the little things that make one decision

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[47]Franklin G. Moore, Production Control (2d ed.; New York: McGraw-Hill Book Co., 1959), p. 88.

[48]Ibid., p. 88.

better than another. He can choose the man, the machine and the exact time better than the front office. If you let him do this work, you say production control has been decentralized.[49]

Factories doing job-lot work often decentralize the control of shop operations. After orders are prepared they are turned over to the production coordinator or foreman who controls the operations of a department.[50]

Production control is itself really an objective, because perfect control of production is nonexistent.

Generally, the more thorough the control procedures the more effective they are, but more costly is the control. This being true, the choice is: to aim for fairly thorough control hoping that the value of fewer slip-ups will more than offset the cost of additional paper work; or to spend less on control, knowing that things will go wrong more often.[51]

The investigator believes that the proposed system for controlling production is quite simple and very inexpensive. An occasional slip-up as a result of this system would be far less costly than would elaborate controls. It is obvious, however, that the present system is inadequate

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[49] Moore, op. cit., p. 88.

[50] Ibid., p. 88.

[51] Ibid., p. 6.

and costly.

The system of printing plant production control should maximize the percentage of promises to customers being kept, maximize the quality of products shipped and minimize the idle time of men and machines. No one objective is more important than the others.

The proposed organization and system for the efficient flow and immediate availability of job-oriented communication must be tested in part and as a whole. In addition, the investigator believes that further study concentrated on material handling and storing of paper stock could greatly benefit the college printing plant. Along with the latter, a study should be made for the purpose of improving the present layout and to determine the necessity of plant expansion at the present time or in the future.

Almost continually, the bindery area and press areas are overloaded with "in process" printing and paper stored for use at a future time. The better coordination possible through the proposed system would alleviate some of this problem; it, however, will not completely solve the "in process" storage problem. The investigator suggests that the large cylinder press, as indicated by the violet rectangle in Figure 15, be removed as soon as possible from the college printing plant to gain the much needed "in process" storage space. This press is never used for

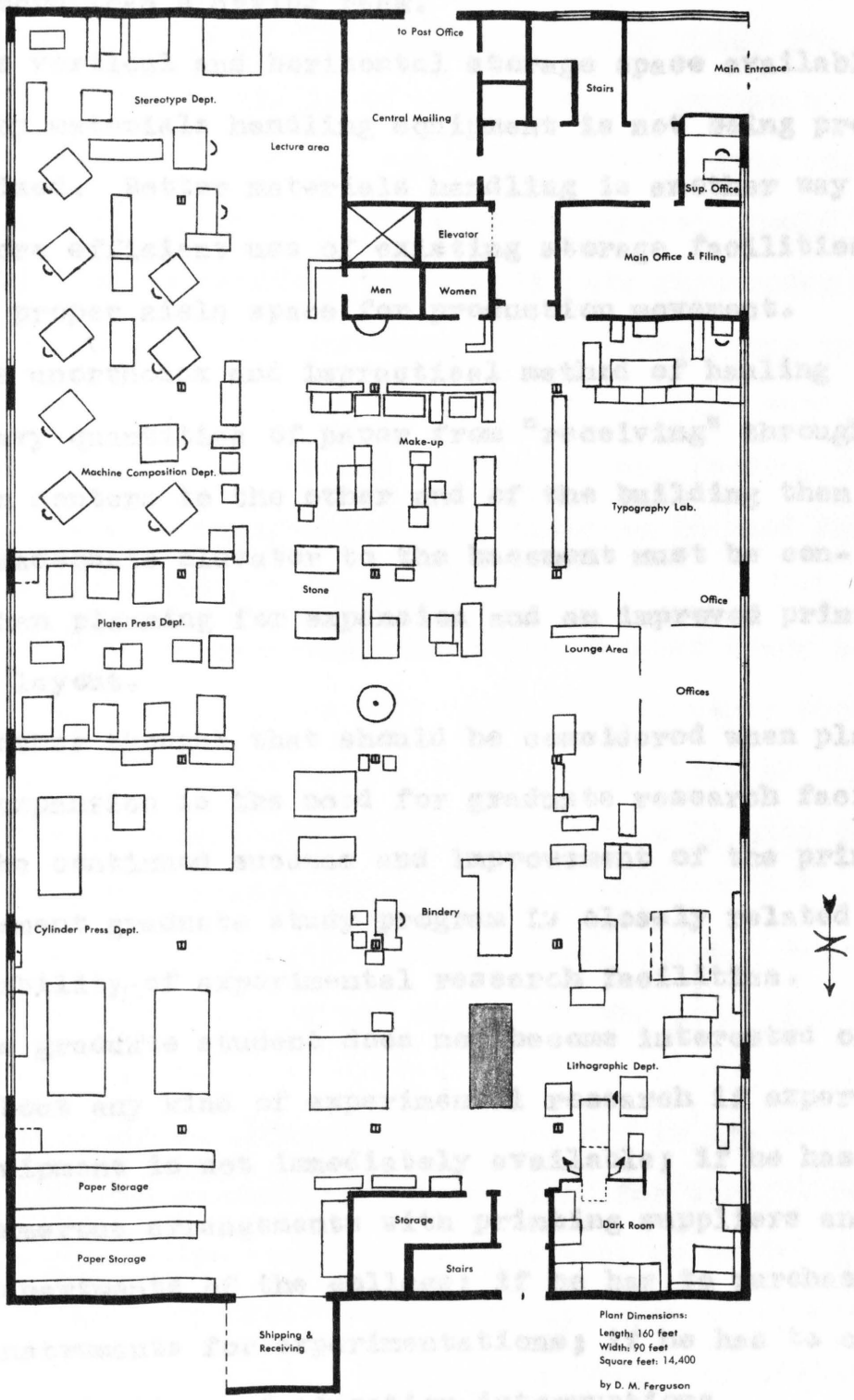

Figure 15. Printing plant layout with violet color indicating the size and position of cylinder press recommended for removal

anything more than a drying rack.

The vertical and horizontal storage space available for bindery materials handling equipment is not being properly utilized. Better materials handling is another way to make more efficient use of existing storage facilities and clear proper aisle space for production movement.

The unorthodox and impractical method of hauling large, heavy quantities of paper from "receiving" through production centers to the other end of the building then down an inadequate elevator to the basement must be considered when planning for expansion and an improved printing plant layout.

Another thought that should be considered when planning for expansion is the need for graduate research facilities. The continued success and improvement of the printing management graduate study program is closely related to the availability of experimental research facilities.

The graduate student does not become interested or excited about any kind of experimental research if experimental equipment is not immediately available; if he has to make numerous arrangements with printing suppliers and various departments of the college; if he has to purchase his own instruments for experimentations; if he has to contend with production and education interruptions.

The facilities of the college printing plant are used for teaching the skills of operation. A research center with modern scientific equipment must be made available for graduate students. The research center should be a self-sufficient laboratory for experiments concerning light and color analysis, photographic science, press systems, paper and ink. The equipment should include various scientific instruments, special light sources, testing devices, machine shop equipment and supplies to be used in tooling special parts for experiments.

The following recommendations for further study to increase printing quality as well as alleviate other production problems have not been covered in the body of this thesis, but have been included in this chapter because they are related to this study.

In the investigator's opinion, advanced research has not been done to confine offset sprays to the area of each press' delivery system.

Present offset sprays pollute the air in the printing plant, causing an unhealthy atmosphere for workers and undesirable production conditions. The mist or powder in the air is inhaled by those working in the area and settles on everything in the plant. This causes damage to stored paper stock and stock that is "in process." The worker becomes less efficient when working in such an atmosphere.

Additional cleaning of machines and building interiors also becomes necessary. Proper offset spray adjustment would solve many of the spray problems in this plant.

The solution to the problem would be a spray that evaporates rapidly. That portion of the spray not immediately covering the printed sheet to prevent offset, would evaporate immediately in the vicinity of the press delivery.

An investigation could be made to determine guidelines for deciding whether a printing job would be done by the letterpress or lithographic printing processes.

Proper packing and platen adjustment procedures must be followed when using hand-fed platen presses. The student must learn to follow these procedures in order to reduce physical effort and produce high quality printing.

In the college printing plant pressboard is not used as part of the packing for platen presses and platens are generally adjusted too high. Therefore at the time the type on the bed of the press and the platen become parallel to each other, the distance between them is insufficient for making a good overlay during make-ready. As a result quality is adversely affected. It may be a good practice to specify a certain hand-fed platen press for posters and "full chase" work. This work requires that the platen be higher than normal. In this way adjustments

and readjustments of all other platens could be eliminated.

Open shelf paper storage should be built to the ceiling of the printing plant to keep paper from being exposed to elements such as dust, light and offset spray.

Too much or too little oil seems to be the oiling practice of the college printing plant employees. Proper oiling procedures must be stressed.

A scheduling desk with storage drawers or shelves should be provided the lithographic section. The storage facilities of this desk are needed to store all materials not required for the production of a specific job as it progresses from the camera through the bindery.

In addition to the job ticket, many jobs that go through the lithographic process have a folder which contains page layouts, reproduction proofs, all preliminary proofs, job copy, art work, "OK" sheets and other miscellaneous materials. All of this material follows the job wherever it goes. Obviously, this is quite a bulky stack of papers to move and store at each operation. As the job progresses from the camera to the bindery, less of the previously mentioned materials are needed. All the bindery needs is the job ticket and a sample of the fold which can be placed inside of the job ticket; the other papers just cause confusion and inconvenience.

Although few printing plants operate on precise clockwork, it is sometimes worthwhile to withhold work authorization until all copy and materials are ready for production rather than to let a partly finished job lie around with the danger of becoming damaged.[52] Scheduling also becomes difficult when all of the copy is not sent in at one time.

It is common practice at this college printing plant to send into the shop any copy received even though it may not be the complete copy for the job. Although there are unusual pressures for production in the "captive plant," better management could reduce this problem.

The investigator also recommends that a printing plant policy booklet be compiled so that workers can learn in advance what is expected of them. More frequent conferences between printing plant management and employees may prove beneficial. A definite system for communicating grievances and ideas is necessary.

To avoid ruining plates due to poor arc light coordination, the undesirable layout relationship between the camera arc lights and the plate-burning frame makes the construction of a partition between them mandatory unless this problem is solved by proper scheduling.

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[52] E. H. MacNiece, Production Forecasting, Planning and Control (New York: John Wiley and Sons, Inc., 1961), p. 192.

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APPENDIX A

JOB COMMUNICATIONS QUESTIONNAIRE

1. Indicate the percentage of your time spent on production in the following departments:

_____Office	_____Lithography
_____Bindery	_____Cylinder Press
_____Shipping	_____Machine Composition
_____Stone Room	_____Hand Composition and Makeup
_____Platen Press	_____Casting & Preparation of Stereo's

2. Are you employed full-time_____or part-time_____?
3. Part-time employees--How many quarters have you worked in the college printing plant_____?
4. If you are a part-time employee, please indicate your pay category.

   _____Below $1.00 an hour

   _____$1,00-$1.49 an hour

   _____$1.50-$1.99 an hour

   _____$2.00 an hour and over
5. Do you understand how your hourly wage was determined? If so, what would you say determines your hourly wage rate?
6. Do you know approximately when to expect a wage raise? Yes_____No_____.

7. What factors do you think should be used to determine the student production worker's hourly wage?

8. Do you believe that your present printing skills are being utilized best in the work you have been assigned to perform?

9. Do you think that you are often overly rushed to complete your job operations?

   Yes____No____Undecided____

10. Are OK's for register, make-ready and to run a job, usually obtained from the same person?

    Yes____No____Undecided____

11. Is the person in charge of approving jobs for running always immediately available for discussion and OK's?

    Yes____No____Undecided____

12. Are you aware of any definite channels or system available for the purpose of communicating complaints and/or ideas to improve the efficiency of production?

    Yes____No____Undecided____

13. Do your job instructions on a particular job within a particular department come from the same person?

    Yes____No____Undecided____

14. Do you usually have to supplement the information on the job ticket with information from another source?

15. What improvements or changes would you propose for the shop job ticket?

16. Where do you think some improvements in job communications and coordination procedures should be made concerning the department you work in?

17. Do you have any comments or suggestions that may be used to improve the management of printing production?

18. In general, would you say that too much time is spent on acquiring OK's to run a job?

_____Far too much time

_____Too much time

_____About right

_____Too little time

_____Far too little time

19. The over-all written and oral job instructions reach the proper place at the proper time?

_____Strongly agree

_____Agree

_____Undecided

_____Disagree

_____Strongly disagree

20. Check direct source or sources of job instructions.

_____Mr. Abel

_____Job Ticket

_____Mr. Buckbee

_____Mr. Evenson

_____Mr. Loken

_____Mr. Turner

_____Mr. Bechtold

_____Mr. Miller

_____Mrs. Biron

_____Other

21. The over-all written and oral job instructions I receive are easy to understand, for the most part.

_____Very easy to understand

_____Easy to understand

_____Understandable

_____Hard to understand

_____Very hard to understand

22. Do you think the scheduling of jobs gives a coordinated and smooth flow of production to and from the department(s) you work in?

_____Strongly agree

_____Agree

_____Undecided

_____Disagree

_____Strongly disagree

23. The over-all written and oral job instructions I receive are complete, for the most part.

_____Very complete

_____Complete

_____Undecided

_____Incomplete

_____Very incomplete

24. Do you think a two-way "intercom" system, if installed in the plant, would be a good method to speed solutions to job instruction problems and to quickly obtain help in process difficulties?

_____Strongly Agree

_____Agree

_____Undecided

_____Disagree

_____Strongly Disagree

Please include any constructive comments that you may have concerning the previous questions.

APPENDIX B

PRINTING PLANT CONTROL FORMS

Additional forms used in the operation of the college printing plant.

Figure 16.

Figure 17.

Figure 18.

Figure 19.

Figure 20.

Figure 21.

Figure 19 is printed on a card and is used for proof of delivery. After it is filled out it goes into the proper job ticket. Many times a job will be delivered and the purchasing party will call the print laboratory to ask for it. If the job was misplaced after delivery this card is proof that it was delivered and who accepted it.

The proof of delivery for a "will call" is the signature on the job ticket of the person accepting the job.

The space between lines on this form can be reduced and another much needed line for description can be added.

PRINTING ORDER FORM № 160

Fund or Department to be charged _____

Description of item _____ Ticket No. _____
To be filled in at Print Lab

_____ Please attach sample if possible.

Number of copies _____ Delivery date desired _____ Kind of paper _____ Color of paper _____

Size _____ Color of ink _____ Number of engravings _____

Engravings furnished ☐ yes ☐ no. Do you wish to read proof? ☐ yes ☐ no. Send proof to _____

Special instructions to the printer _____

Date _____ _____
Signature of person placing order

No orders to be accepted without this completed form. This form should be accompanied by an authorization from the Business Office.

Figure 16. Official printing order form

Incoming Stock

Date _____

From _____

Paper _____

Size _____

Substance _____

Color _____

Amount _____

Figure 17. Paper stock receiving form

Stock Used

Date _____

Ticket No _____

Paper _____

Color _____

Size _____

Weight _____

Quantity _____

Figure 18. Paper stock used form

Received from Printing Laboratory Job No.....

Quantity..... No. of Packages.....

Description.....

.....

Department or Office.....

Date.....

By.....

Figure 19. The external printing product delivery card

Received from the Printing Laboratory Job No.....

Publication.....

Layout..... Copy.....

Photos.....

Dept. or Office.....

Date Returned.....

By.....

Figure 20. Printing laboratory receiving form

LETTERPRESS

FRANKLIN PRICE LIST

Sec._____ Class_____

Page_____ Sub_____

Grade_____ Table_____

List_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

Selling Price___ $_____

OFFSET

FRANKLIN PRICE LIST

Sec._____ Class_____

Page_____ Sub_____

Grade_____ Table_____

List_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

Selling Price___ $_____

Figure 21. Franklin pricing form printed on the back of the job ticket

APPENDIX C

ORGANIZATION GUIDELINES

Here are several principles which can be used as a guide in considering the organizational needs of a company:

1. Establish definite lines of authority and responsibility. The duties of everyone, from the top of the organization to the bottom, must be well defined.

2. Provide for the work of every person in the organization to be confined to the performance of a single function wherever possible.

3. Establish efficient channels of contact between all personnel.

4. Provide for a clear understanding of the mechanisms of organization, that is, a clear understanding of the coordination of all operations by the managerial personnel within the company.

5. Make certain that due consideration is given to the specialized skill, training and abilities of available personnel. Provide for maximum use to be made of these personnel.

6. Provide for proper grouping of work of a specialized nature, and for the appropriate division of labor in relation to the peculiarities of the particular product being manufactured.[52]

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[52]Parton, op. cit., p. 38-39.

APPENDIX D

THESIS INTERVIEWERS

Part-time	Full-time
1. Bruce Buckbee	1. Bert Buckbee
2. Ronald Seeley	2. Bill Smith
3. Brian Edwards	3. Virgil Turner
4. John Griffith	4. A. D. Evenson
5. Gary DuBois	5. Charles Bechtold
6. Jan Peterson	6. Clyde Miller
7. Jerry Christensen	7. Jim Sime
8. Dwaine Voas	8. Oscar Abel
9. Dick Evans	9. Dick Loken
10. Gary Bill	10. Arnold Smith

APPENDIX E

INTERVIEW ANSWERS FOR QUESTIONS 14, 20, 21, 22.

Question 14 states: Do you usually have to supplement the information on the job ticket with information from another source?

Eight part-time workers answered "yes" and two answered "no." Eight full-time workers answered "yes," one answered "no" and one had no comment. Some of the reasons given why other sources were sought are:

1. Specific kind or kinds of ink not indicated.
2. The press form position such as "work and turn," "work and back," not indicated.
3. No sample or dummy, thus a register check must be made.
4. It is difficult to find plates that have been "filed" for rerun.
5. Uncertainty as to what job should be plated and when to plate it.
6. Job ticket could be filled out more fully.
7. Inadequate bindery scheduling and job instructions.

Question 20 asked for an indication of all direct sources of job instructions.

Results shown on Table V.

Table V. Number of direct sources of job instructions

	Number of sources contacted						
	1	2	3	4	5	6	7
Answers by full-time workers	1	3	2	-	1	1	-
Answers by part-time workers	-	2	4	2	2	-	-

The job ticket and one superior (i.e. two sources) should be the maximum number of sources used by any worker under an efficient production control system.

Question 21 stated: The over-all written and oral job instructions I receive are easy to understand, for the most part. (not necessarily complete)

Table VI. Value judgment totals on clarity of job instructions

	Part-time Workers	Full-time Workers
Very easy to understand	4	2
Easy to understand	4	2
Understandable	2	5
Hard to understand	-	-
Very hard to understand	-	-

Question 22 stated: Do you think the scheduling of jobs gives a coordinated and smooth flow of production to and from the department(s) you work in?

Results shown on Table VII.

Table VII. Value judgment totals concerning the effectiveness of production scheduling

	Part-time Workers	Full-time Workers
Strongly agree	1	-
Agree	3	4
Undecided	2	4
Disagree	3	1
Strongly disagree	1	1