

AN APPROACH TO THE HUMAN PROBLEM IN
SYSTEMS MECHANIZATION

Thesis for the Degree of M. S.
MICHIGAN STATE UNIVERSITY

Ralph Griese
1959

112518

This is to certify that the

thesis entitled

AN APPROACH TO THE HUMAN PROBLEMS
IN SYSTEMS MECHANIZATION

presented by

Ralph Griesse

has been accepted towards fulfillment
of the requirements for

M. S. degree in M. E.

W. Dale Jones
Major professor

Date September 30, 1960

O-169



AN APPROACH
TO THE HUMAN PROBLEM IN
SYSTEMS MECHANIZATION

by
Ralph Griesse

AN ABSTRACT

Submitted to the College of Engineering Michigan
State University of Agriculture and Applied
Science in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE

Department of Mechanical Engineering

1959

Approved: W. Dale Jones

ABSTRACT

The industrial revolution, over a span of relatively few decades, has provided mankind with innumerable mechanical devices greatly multiplying individual productivity.

Decentralized rural living with small productive groups as family units have combined into our present urban communities and metropolitan production and trading areas.

Transportation, production, and distribution have made more things desired by, and available to more people of our nation. As the less productive nations of this world proceed along an increasing accelerated progress cycle, we as a nation, in order to continue to improve our present standards of living, must produce more productively and efficiently.

Burden factors to the modern administrator are of a fixed and variable nature. Clerical costs accrued to accomplish order handling, processing, distribution, servicing, invoicing, receiving, etc., comprise a large portion of administrative burden. Organizational complexities become accentuated directly with increased output, productive capacity, and range of distribution. As these factors are studied it has become more apparent that disorganized effort is largely responsible for increasing costs. This poorly managed effort has been an outgrowth of improvised procedures that have resulted in non-correlated systems.

People are the theme. Recognition of all employees as working associates, understanding and overcoming their fears, jealousies and distrusts, encouraging their latent abilities and loyalty and molding of cooperative organizational work units are certainly conducive to

ABSTRACT

increased efficiency and better employee morale.

Personal resistance to change is the basic human issue. This resistance will be found evident in members of management, supervisory staff, and operating personnel alike. A progressive approach through steps of employee orientation, planning, study, analysis, interviewing, charting and graphical outlining, and sincere understanding of needs of all employees involved can be the human and engineered approach needed. Many large organizations are finding this approach successful and well worth the cost and effort to implement and maintain. Any method procedure or system must be kept up to date or it will become obsolete and lose its value.

Managements have long realized that obsolete production tools, standards, and facilities soon make their business undesirable and non-competitive. Office systems therefore must rapidly be updated from fully and semi manual methods to maximum utilization of machines and trained employee skills.

Rule of thumb and makeshift decisions do not foster a sound organization. Converting office work to a machine basis for the sake of conversion alone is a mistake that should be avoided. Discrimination must be used in deciding whether or not to mechanize specific office tasks.

The purpose of this thesis is to recommend steps in a systematic and analytical approach to the human aspects of systems analysis for office mechanization. This subject, though very controversial today, is no different basically than other problems successfully resolved by industry that involved changes in thinking and interpretation

ABSTRACT

by organizational personnel.

It is felt the recommended programmed approach by management along with skillful planning and handling by trained personnel, will not only provide benefits in immediate objectives, but will encourage sustained cooperative thinking toward previously unthought of potentialities.

AN APPROACH
TO THE HUMAN PROBLEM IN
SYSTEMS MECHANIZATION

by
Ralph Griesse

A THESIS

Submitted to the College of Engineering Michigan
State University of Agriculture and Applied
Science in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE

Department of Mechanical Engineering

1959

612762
12-21-60

ACKNOWLEDGMENT

The author wishes to express his sincere thanks to Professor Fritz B. Harris, under whose guidance and valuable assistance this study was made. Appreciation is also expressed to Professor W. Dale Jones for his constructive criticism in the final thesis preparation.

He is also indebted to Miss Barbara Brown for assistance in preparing this thesis.

Thanks are also expressed to Mr. Kenneth Burns, Assistant Controller, The Ohio Oil Company, Findlay, Ohio for his cooperation in supplying the Procedure Research Exhibits used in this study.

TABLE OF CONTENTS

CHAPTER	PAGE
I. SURVEY OF PRIOR RESEARCH.	1
II. INTRODUCTION.	3
III. ORIENTATION TO SYSTEMS MECHANIZATION.	10
IV. HUMAN ASPECTS OF THE PLANNED APPROACH	18
V. THE PROCEDURE OR SYSTEM STUDY	24
VI. ANALYZING FACTS OF THE STUDY.	28
VII. GAINING ACCEPTANCE OF NEW PROCEDURES.	43
VIII. DEVELOPMENT OF A NEW SYSTEM	50
IX. ESTIMATING COSTS.	57
X. COMMUNICATION AND PRESENTATION	67
XI. CONVERSION PROBLEMS	72
XII. CONCLUSIONS	76
XIII. BIBLIOGRAPHY.	80

LIST OF CHARTS

CHART	PAGE
I. Operator - Machine Comparison Chart.	31
II. Multiple Operator Usage of Machines.	32
III. Determination of Hourly Rate Clerical Costs and Productive Time	63
IV. An Analysis by Sampling to Determine the Error in Distribution — To Verify Elimination of 100 Per Cent Audit	64
V. Check List for Cost Estimations.	65

LIST OF EXHIBITS

EXHIBITS	PAGE
A. General Flow Chart of Bulk Plant Accounts	
Receivable System	37
B. Detail Flow Chart of Tank Wagon Buyer --	
Portion of General Flow Chart	38
C. Example Work Process Chart on Verifying	
Invoices.	39
D. Payroll System Flow Chart	40
E. Detail Procedure Flow Chart of Proposed	
Marketing Loaned Equipment Records	41
F. Payroll System -- General Block Diagram.	42

CHAPTER I

SURVEY OF PRIOR RESEARCH

Many periodical articles were found and read that detailed comparisons of specific mechanized tasks. No thesis composition was discovered that attempted to present an organized approach to the human problem of office systems mechanization.

Recourse was made to research of this subject carried on by automotive, mining, metals, petroleum, business machine, pharmaceutical, textile and other industries. Conference studies and technical societies have done much to crystallize thinking and planning on the general subject of systems work. Branches of the Federal Government, utilities, railroads, banks and insurance companies have greatly reduced clerical costs through implementing usage of planned mechanized systems.

While it is apparent that larger American corporations are utilizing benefits derived from procedures research and systems analysis by staff or technical groups handling such functions, this study has been designed as an organized approach for those companies of less than several thousand employees. It has been estimated that 70 per cent of such companies have to date failed to make use of systems analysis and mechanization benefits.

It is more often the rule rather than the exception that these smaller company managements fail to realize the potential benefits available to them. Then to, a systematic approach is inherent to

growth, and systems analysis in the office is often neglected until clerical costs of office systems overload the operation.

Self analysis for growth and strength is a primary means of survival. When properly implemented with the will and tools, through proper planning and presentation, systems analysis followed by systems mechanization can mean better, faster, and more thorough information for management.

CHAPTER II

INTRODUCTION

The past three decades have witnessed highly concentrated effort by manufacturing managements in the refinement of costs through production planning, work measurement, production standards, material controls, standardization of engineering design and automated production. The progress in these areas of control has substantially reduced direct labor costs, increased productivity per man hour, has made possible greater output with less effort, provided better products at reduced cost, and has helped create greater demand for more and better products.

By 1959, automation, the technology, has become basic to our American industrial operation. Strong forces are pushing industry toward increased utilization of automation and as emphasized by James E. Trainer, executive vice president of the Firestone Tire & Rubber Co.: "One of the most compelling of these forces is the life-or-death necessity of this country to stay out in front in the international race for technological and scientific supremacy."¹

By 1975 present population of about 175 million will have increased anywhere from 41 to 69 million according to the latest Bureau of Census forecasts. Significantly, however, greatest population growth

¹"Survey Report and Automation Forecast," Automation, A Penton Publication, Cleveland, Ohio, 1959, s-1.

will be in young adults and the aged. The number of Americans in the main working age group, 25 to 44 years old, will remain nearly static during the next ten to fifteen years. The young adult and college group, aged 18 to 24, will reach 25 million by 1970. By 1975 Department of Commerce forecasts indicate that the Gross National Product will almost double to a total of \$358 billion. A 100 per cent increase in output will be demanded from a total working population roughly 30 per cent greater than today's.

A typical job trend in automated plants indicates that production personnel will increase 1.3 per cent, production output will increase 53 per cent, and professional and white collar personnel demands will go up 53 per cent.²

Business problems today are characterized by masses of data, relatively little computation and multitudes of variables. Today white collar or office functions employ as an average nearly half as many people as in the direct manufacturing functions, compared to 1920 when eleven clerical employees per one hundred production workers were employed. Trends indicate that as technical problems of manufacturing increase the demand for routine clerical functions will increase also. Availability of such personnel on the other hand is diminishing based on the following conditions:

1. Progressively earlier retirements will leave fewer trained office workers available with a working knowledge of company procedures, policies and work details.

²Ibid., s-2.

2. The longer educational period of youth makes this group proportionately unavailable. A higher degree of education makes these people unwilling to assume routine tasks.
3. Military training programs further reduce young manpower availability.
4. Population estimates indicate that those available for work will increase 6 per cent while the population will increase 30 per cent.
5. Increased credit and installment sales will increase demands for clerical personnel.
6. Demands of government regulations compliance further increases the record keeping load.
7. Effective short range planning and long range planning, forecasts and controls require additional employees.
8. Increasing availability of product choices to the consumer promotes an increasing load of control data.
9. Effective means of combatting delays in deliveries or services as a competitive survival measure demands added records.

Therefore, the impact of automation on office procedures, or application of data processing systems, with or without electronic devices in the next ten years is certain to be greater than it has been in the production and manufacturing fields. Mechanization of

office tasks and their susceptibility to automatic control is proving particularly effective for several reasons:

1. The benefits from better than approximate controls is realizable.
2. Speed, flexibility, and efficiency of such organization routine procedures makes possible a more rapid expansion in the scope of the business when the opportunity becomes available.
3. The faster and more accurate data summation for forecasting presents material otherwise unavailable for more precise decision making.
4. Reduction of clerical costs results through standardization of reports and elimination of repetition, and backtracking.
5. Machines don't have "employee bad days", are insensitive to emotional conflicts, are always on time, are not hostile or indifferent, and are not benefactors of social legislation.

Utilities, banks, insurance companies and transportation industries have thus far availed themselves of many of the benefits of systematized office mechanization. Large manufacturers are rapidly converting in order to maintain overhead costs at an economical level.

Progress in the area of office systems mechanization can be practically unlimited, and this thesis will attempt to clarify the

questions of why, how, and when an organization should realistically approach this problem.

This being basically a management problem it can be best handled by a scientific management approach.

Frederick W. Taylor, often called the "Father of Scientific Management," defined scientific management as "knowing exactly what you want men to do and seeing that they do it the best and cheapest way." The most important characteristic of scientific management is the attitude of mind that it reflects — the substitution of orderly thinking for guesswork.³ During the period from about 1915 to 1935 W. H. Leffingwell undertook the task of applying scientific management to office activities. He developed an analytical approach, did much to promote the use of office standards of all types, and pointed to the need for specialists in office management.

Associations such as the National Office Management Association, The American Management Association, the Society for Advancement of Management and the Systems and Procedures Association of America have all contributed greatly in promoting scientific office management.

It is intended, in succeeding Chapters III through XII, to develop an outline for an Approach to the Human Problem in Systems Mechanization. This paper has not been written as a complete or total analysis of any specific phase included.

³C. L. Littlefield and R. I. Peterson, Modern Office Management, Prentice Hall, Inc. 1956-59577, p 30.

Orientation to Systems Mechanization, Chapter III, will outline the organization approach, policies to be formulated, systems factors and objectives. A broad base approach is recommended and development must be planned on individual company requirements.

Human Aspects of the Planned Approach, Chapter IV, outlines the need for executive action, objective use of records management, and projection of dynamic policies. Since the processing of paper is production in the office, herein lies the large cost of labor and materials.

A Systems Study, Chapter V, has as pertinent sections; personal factors, interviewing, survey and study details. The present systems employed must be studied detail by detail to best formulate plans for its successor.

By Analyzing Study Facts, Chapter VI, inherent weaknesses can be highlighted. Acceptance or rejection of systems elements can be easily verified through the use of work flow, work process, procedure flow, block diagram, and forms distribution charts. Use of these helpful visual analytical techniques help sell a program much more easily than words.

Gaining Acceptance, Chapter VII, of a system improvement is highly important to its future beneficial functioning. Management, supervisory, and workers attitudes must be considered in the proper perspective and approval gained.

In Developing a New System, Chapter VIII, a specific problem must be recognized, facts must be gathered, a solution agreed upon, the solution applied, and the results followed up and evaluated for comparison.

Estimating Costs, Chapter IX, must be of optimum precision. Reliable data consisting of machine capacities, methods analysis, work measurement, statistical sampling and standards of performance accurately accumulated and rationally applied must be utilized.

Thought conveyance must be tuned to the ear of the listener in Communication and Presentation, Chapter X. Who is involved as the audience for the presentation? What are the recipients interests? Why is the presentation being made? Where will the presentation be given? These are all human aspects of the thought conveyance problem.

Conversion Problems, Chapter XI, have both machine and employee aspects. Both must be adequately evaluated and scheduled for fulfillment of project requirements.

People, not machines, support the Conclusion, Chapter XII, that systems mechanization cannot be successfully achieved without a systematic and communicative handling of human factors involved.

CHAPTER III

ORIENTATION TO SYSTEMS MECHANIZATION

A. Concept of Thinking -- Productivity of Personnel.

A comparison of managerial neglect discloses that in private industry on the whole, \$1,700 is invested in equipping the average employee with tools to perform the production work required. Most recent figures disclose that the average office worker is assisted by only \$260 worth of equipment.⁴ Is it any wonder that office procedure and clerical costs have become an ever increasing burden? Increasing productivity in the office as well as the factory should be of equal importance. In reaching for expanding markets, adequate profit margins, and accomplishment of internal growth through employee skill utilization, management must properly orient itself and focus proper attention upon systems mechanization.

B. Evaluation of Existing Methods.

No new development in office equipment should be considered without first acquiring knowledge of the company's own systems, procedures, clerical costs, and report requirements.⁴ Each management member in an organization will look at automation from a different viewpoint.

⁴ Esther R. Becker and Eugene F. Murphy, The Office in Transition -- Meeting The Problems of Automation, New York, Harper and Brothers, 1957, p 131.

An accountant or auditor considers whether to automate because he is primarily concerned with the thoroughness, the control of accuracy, the perfection of data classification, and the flexibility to changing controls. He has in the past possibly relied chiefly upon general staff control and individual interpretation and classification of specific details.

A systems analyst or methods specialist, in considering automation, oftentimes oversimplifies because his chief concern is simplification, cost comparisons, scheduling, and coding.

A top management executive considers automation principally in the light of the speed of data assembly, rapid availability of data for decision making, capital investment and other cost considerations, equipment utilization, variety of classification, accommodations for new equipment, and impact upon established procedures.

An office manager, when considering an automation program, is concerned primarily with personnel requirements (training and personnel adjustments), deadlines to be met, and volume of transactions to be processed.

A workable decision requires that all management aspects be given consideration and properly evaluated for total organizational benefit.

C. Phases of Office Activities Convertible to Machine Methods.

In introducing office methods automation, it is first necessary to find which phases of the office activities can be performed by machines and which phases need human interpretation and handling.

Basically, in every office routine, work functions fall into

seven (7) basic categories:

1. Preparing source of original documents.
2. Introducing or putting data from these documents into record-keeping system.
3. Manipulating, or working with the data, such as assembly, sorting and classification of data, reference to and extraction of related data previously stored; and computation.
4. Storing data, including temporary filing of intermediate results and other data in process and the maintenance of files of carry-forward data.
5. Withdrawing or taking out results from processing.
6. Summarizing results.
7. Supervisory control.

Sorting, classification, and computation functions, can normally be mechanized.

Preparation of original documents, input operations and supervisory control cannot usually be mechanized with any degree of profitability.

D. Systems Program Policies.

In preparing for office mechanization, a company should have a definite program along the following lines:

1. Show employees that their jobs will be protected.

2. Define the new job openings -- possibly through job descriptions.
3. Have a scientific method of selection of employees.
4. Acquaint employees with the nature of the new jobs, opportunities for learning, and point out potential advancement avenues.
5. Allow employee participation in planning and setting up new equipment additions and work place arrangements.
6. Provide on-the-job training.
7. Follow up the training.
8. Avoid potential employee turnover by improper selection.
9. Encourage employee understanding and individual participation in methods simplification.
10. Emphasize the importance of role through improved job status.
11. Effective means of communication through orientation meetings and informal discussions must be used to give employees realistic facts concerning program objectives in order to promote receptive attitudes.

12. Explain how the new system is planned to provide new and added information faster, and how it can open avenues for handling of otherwise unthought of problems.

E. Factors Affecting Systems.

Efficient systems do not just happen, but they result from recognition of the need for certain facts, knowledge of the means for obtaining these facts, skill and ability in planning, creating and operating with a loosely knit group of people, machines and varying circumstances. The influence of people, machines and particularly circumstances is never static and each play an important part in determining the success or failure of any system.

The people must be cooperative, enthusiastic and capable. The machines must be flexible, fast, accurate and reliable. The circumstances, however, fluctuate constantly due to changes in volume, economy, seasonal variations of sales, governmental regulations, competition, and other outside influences. Proper planning alone can minimize the effects of circumstances on a system.

System analysis is expensive, and if the improvement cannot be sold, it is a considerable waste of time, money, talent and effort. Frequent reviews of a system are required to maintain updating and to avoid progressive loss of efficiency through obsolescence or by continued increased demands.

A systematic survey is the most reasonable assurance that the study undertaken will result in the development and acceptance of a worthwhile new system, procedure or method.

The five steps to be followed in order of sequence are:⁵

1. Determine clearly the problem. Isolate the true problem and work towards a specific goal. Specific goals, agreed upon before action is undertaken, help to avoid arguments and prevent distractions and detours.
2. Break down the job. Understand what is wanted and needed and proceed to tabulate guide posts for planned action.
3. Develop suggested improvements. All systems are the result of ideas molded together in a workable manner which produce results. This concerns improvement of results. All ideas and facts relative to a job must be explored, studied and developed.
4. Establish agreement. As each segment of the new system is being developed steps should be agreed upon by first the project team, then supervisory personnel involved, third the operating personnel and finally approval by management.
5. Install improved system. Selling the system, instruction, installation, conversion and

⁵C. E. Wolford and C. R. Mygrant. "Orientation to Systems Work," Chapter I, Procedures Research Manual, The Ohio Oil Company, Findlay, Ohio, 1958. p 7-13.

follow up all require careful planning to assure success.

F. Objectives of the Systems Study.

In general, purposes to be accomplished by any systems study, are the following:

1. Reduce the clerical work load through elimination of unnecessary reports and records and the installation of minimum controls.
2. Simplify and speed up the processes by applying mechanical processes where economically feasible and practical, utilizing existing equipment as much as possible.
3. Cross departmental lines, if necessary, to improve accounting procedures of the company from a company-wide standpoint.
4. Supply accounting and operating departments with whatever records are necessary to their successful operation.
5. Effect maximum employee utilization through cooperative rejection of existing system faults, omissions and duplications.
6. Fully utilize existing employee talents, and improve workers' enthusiasm, imagination, inquisitiveness, openmindedness, accuracy and job satisfaction.
7. Improve employee confidence by rendering a personal service in recognizing individuals

as individuals.

8. Promote cooperative effort between departments by stressing interdependence and relations of functions one to the other.
9. Provide more correct data, more quickly for better decision making.
10. Correlate objectives of records usage, storage, obsolescence, and eventual destruction.

It is imperative that all organizational personnel become oriented to a plan for systems mechanization. Management must establish and define policies of authority, project scope, general objectives, and range of activities to be studied. Management's attitude must be positive about defining responsibilities and encouragement of active individual participation through effective communication. Constantly emphasize benefits to accrue to employees and the company alike. Announcement of intent for such systems analysis work will assist in removing doubts of ulterior motive, downgrading of work content or employee classifications and will help in preparing workers for potential changes in work procedures.

Therefore, orientation creates a healthful atmosphere for employee indoctrination, anticipation and even participation.

CHAPTER IV

HUMAN ASPECTS OF THE PLANNED APPROACH

A. Simplifying the Problem.

Executives are measured by the accomplishments of the people for whom they are responsible. People can be led against their will but not driven indefinitely. Employees will accept leadership from the executive who earns their respect and confidence and demonstrates a sincere interest in their individual welfare. Leaders must be clear and consistent because few people learn from implication.

For those who would lead, perhaps the greatest challenge today — and the one most overlooked — is the challenge of the individual. Job enlargement can be an answer to both specialization and work boredom. Most individuals will produce best when there exists both a challenge and established goals. This has been proven correct for supervision and workers alike.

Management and supervisory personnel in admitting to a required change are in effect admitting past shortcomings. To change takes time but enthusiasm exhibited through upper levels rapidly filters through the organization. A common error encountered is for management to force premature enthusiasm for a project that has not had policies formulated to the level of practicable promotion.

Within limits, productivity is a function of motivation. To increase motivation each employee must understand the importance of their contribution to the total effort. Few people remember facts and details but make assumptions based on personal reaction to conditions

and supervisory attitudes. Understanding usually precedes acceptance and a desired change must exhibit definite characteristics of employee achievement.

Oversimplification of a new planned approach is less dangerous than a complete and detailed preliminary presentation because it expresses fundamentals of the plan in a general manner. This approach allows employees to gradually assimilate the degree of change necessary without visibly relinquishing accepted levels of past performance. By express simplification of the problem, the usual non-contributing participants will have all possible opportunities to offer constructive work and performance details. Nearly everyone gets a good idea once in a while and those least apt to participate can be encouraged by free and open acknowledgment of ideas. Those individuals performing rudiments of the task involved are usually best able to advise on solutions. If employee and particularly group interest, enthusiasm, and cooperative effort can be generated in the early stages of the project development exceptional results can normally be attained. Becoming a working member of a team signifies acceptance.

The office "grapevine" can be an effective communication medium when management plans changes in policies and programs without consulting subordinates. Information properly directed can frequently stimulate interest of employees in their work, in their company, and in their associates and such properly directed interest usually is healthy. A cognizant management must learn to live with, use to advantage and profit from the ever existent "grapevine."

B. Recognition of need through records management.

Forms control is a study in itself. Any organization not

utilizing a system of records management will often find itself burdened with office forms involving data duplication. Records management should encompass a workable area of effort and can easily yet greatly reduce expense. To guide and regulate clerical operations through systematic application and distribution of information should be the objective of records management.

A finished form, as a picture of a function, must have or perform at least the following:⁶

1. It must create a favorable mental attitude.
2. The sequence of data entry must be easily followed.
3. The arrangement must allow continuous execution.
4. The design must reduce any writing to a minimum.
5. The design must help reduce the tendency of error in listing and using the data.
6. The design must minimize proofreading.
7. The design must make for paper, printing and storage economy.

By simplification, elimination, and combination, fewer forms better edited can be handled in less time with less effort and with fewer motions on the part of clerical workers. In the office the processing of paper is production. Many of the smaller companies in need of systems mechanization do not have forms processing or printing

⁶"Proceedings of the 8th Annual Systems Meeting," Workshop for Management, Forms Control, 1956. p 196.

departments. Such organizations can gain much help from local printers or commercial processing and supply companies in records management.

While no really authoritative figures exist on the subject, it is recognized that the clerical cost of using forms is 8 to 10 times the purchase price or production cost of those same forms.⁷

By checking the six words; why, what, when, where, how and who in relation to any record, and examining each step in the process it is estimated that fifty per cent of clerical work cost can be saved. This clerical cost when added to inventory cost, printing cost, files cost, record storage, and rehandling costs presents possibilities of enticing proportions for cost reduction.

Management again must be realistic in their recognition of what information is necessary and what data can be dropped as superfluous. In many instances erroneous circulation results as a matter of force of habit rather than necessity. Distribution lists must be analyzed to ascertain individual need for information being circulated. Again, if productivity is to be elevated, waste by duplication and avoidable effort must be eliminated.

Many employees, not through lack of procedures, but by honest misunderstanding create wasteful job details. Most individuals can be creative if allowed to exercise directed judgment. Their interest must be trained and judgment guided by a patient and interested supervisor who fully understands the job function.

⁷ Frank M. Knox, Design and Control of Business Forms, McGraw-Hill Book Co., 1952. p 3.

C. Project a dynamic policy for employee participation.

Today management has to embody within its objectives a full consideration of the social effects of their decisions. Included in this is the principle of operating a business that is sound and will be permanent; one that makes a definite contribution to the welfare and the stability of the community; and one that does not bring unnecessary hazard to its owners, its management, or its staff.⁸ A good man can produce good results despite a poor system, and the best system never will be an adequate substitute for a good man. Good workers become such through good supervisors who are interested in them as individuals and recognize them as important members of a team.

Making a living can be much more than economic drudgery -- it is a way of life, an emotional and social experience. Once American management decides that quality in the standard of living is as just and desirable as quantity -- it will be promoting true dignity of the individual quality of skills -- manual, mental and social. Each individual should develop as an articulate person, interested worker and as a responsible citizen.

Finally, neither men nor business stand still. If there is to be progress, there must be motion; and motion comes from decision and action. The penalties for not making a decision at all can be as great as for making the wrong decision. Decisions made by individuals and implemented by employees considered as individuals provide the best

⁸Joseph M. Dodge, "Some Marks of Successful Management," Management Review, January, 1955. p 9.

atmosphere for coordinated action. Unity of purpose and action will result in a smoother operation at greatly reduced costs.

CHAPTER V

THE PROCEDURE OR SYSTEM STUDY

A. Personal Factors.

The systems man must not be fooled by the apparent simplicity of a system. While maintaining a questioning attitude, facts and answers cannot be assumed. Learning to question properly takes much practice, but the results are well worth the effort and dividends repaid. Tact, sincerity, simplicity, and clarity of language used in a positive approach are the best means of developing data for survey work. A sense of humor and a high frustration point are invaluable. The ability not to become discouraged, pessimistic or disorganized, and impatient no matter how trying the circumstances, are important individual attributes. Sometimes it is difficult to determine progress, but by setting goals, a time schedule, and by recording progress the feeling of discouragement can be largely eliminated.

An employee from within the organization generally well liked and respected, with a good working knowledge of interrelated functions, can become the nucleus or organizer of the systems group. Departmental heads can readily be designated as committee members to act as consultants. Many of the following qualifications should be found in a good systems man:⁹

1. Enthusiastic.

⁹C. E. Wolford, "Systems Survey," Chapter IV, Part 1. Procedures Research Manual, The Ohio Oil Company, Findlay, Ohio, 1958, p 4.

2. Even temperament.
3. Inquisitive sense.
4. Imaginative ideas.
5. A good listener.
6. A good speaker.
7. Experienced in accounting and procedures.
8. Friendly.
9. Courageous.
10. Patient.
11. Sincere.

A good systems man must be able to encourage the confidence of operating people by his competent listening attitude and sincere reception of oral communications. Building up a person's self esteem helps generate confidence. Having a sincere desire for the operating people to share in improving the system, encouraging self-interest, and seeing that recognition is gained for contributions made, are all important.

B. Interviewing to Determine Details.

Much time in fact finding will be spent in interviews with many people ranging from top management personnel to clerks doing the actual work. Confidence of all persons to be contacted must be gained and any impressions created will either assist or plague future progress during the installation phase.

Interviews should be arranged by prior appointment and conducted during employees' periods of least activity. This arrangement is appreciated by all. Interviews should be kept as short as possible.

They should have a well defined starting and stopping point and avoid, as much as possible, irrelevant and aimless conversation. Develop the individual's viewpoint on the subject if at all possible, and make a sincere effort to point out any potential advantages, because at some time in the future this person's opinion will probably have to change and knowing the method of approach can be most advantageous. Answer all questions fairly and honestly. Do not cover up or mislead as it will backfire at some later date. Ask questions simply, because oftentimes insufficient information is secured due to the failure of communications. Attempt to keep the employee in a cooperative and communicative frame of mind and avoid criticizing people or situations or the appearance of agreement with personal criticism.

If the interview is carefully and diplomatically closed the employee can be made to feel he has been a contributor to ideas and facts and can be made to feel that he would like to continue the discussion. After all, conversation has centered about him, his attitudes and his work. Considerable survey interest can be so generated.

After each interview notes should be immediately made as to individual interviewed, time, date and place of the interview. Include important facts or conclusions as part of the permanent record because this data can materially direct needed revisions at a future date.

C. Survey of Existing Work Force.

The present work force should be surveyed to determine if it is adequate in size, aptitude and personal characteristics. Do any individuals possess specialized machine training? Will they be able to absorb new or additional functions? Will they be adaptable to new

arrangements? Can they be trained in new methods?

D. Separation of Study Details.

Forms have been devised to classify departmental functions and activities as well as individual workers tasks. Although these will be a source of much information, they should be carefully checked with the collaboration of the departmental supervisor, against the actual work practice because oftentimes there exist unrecorded changes. At the same time approximate time estimates for each task should be recorded. Activities that consume the most time and thus probably cost the most will become apparent. Summaries will indicate duplications, misguided effort, unrelated tasks, overloads, and uneven work distribution.

During collection of information about the system you will secure data about the volume of input, output, handling time, etc. This information will be needed for costing the present system and comparison of cost with the proposed system.

The system study to be usable must be thorough and analytical. It must progress by the scheduled steps of generating confidence toward acceptance, interviewing employees to ascertain attitudes and present system functions and by separation of study details for subsequent analysis. No study made by a remote or subjective observer will be adequate for detailing. Confidence in systems work, by all employees, at this stage should be evident. Open suspicion should be fairly well overcome with a genuine display of curiosity and willingness to contribute shown by participants.

CHAPTER VI

ANALYZING FACTS OF THE STUDY

A. Disclosure of System Weaknesses.

From the compiled data of the procedure or system survey it becomes obvious that there exist evidence of time wasted, duplication of effort and reports prepared requiring extensive clerical effort for which no practical use is in evidence.

Analyze all the facts recording answers to the following questions:

1. Why is the work done as it is?
2. Why are all the reports made?
3. Why does it require the manpower used?
4. Why are so many copies being made?
5. Why is this work duplicated in different departments?
6. Why is this work started, necessary, and where does it conclude?

Open criticism of these conditions must be suppressed. Therefore, the first prerequisite of successful analyzing is "Ask questions with suspended judgment." A waiting game, played with reserved judgment, will prove right in time. Incorrect conclusions are better left unsaid. The appearance of arrogance, infallibility or snap decision making are traits oftentimes used to cloak a feeling of inadequacy, and never are justified.

B. Rejection or Acceptance of Study Elements.

In analyzing each fact or element of the survey, it must be determined whether that element can best improve the whole by elimination, combination, change of sequence, simplification, or justification.

Chart I, page 31, shows an "operator-machine" chart, which indicates that with one operator, extremely good man utilization is obtained -- 96 per cent. However, fairly large areas of machine idle time are evident -- 56 per cent.¹⁰

A similar chart can be drawn for two operators. This will show improved machine utilization to 61 per cent and the number of invoices processed can be increased from 29.4 invoices for one operator per hour to 41.7 invoices for two operators and one machine per hour. However, as shown in the figures below, the two operator approach results in a higher cost per invoice:

One operator and machine cost:

Machine operator cost per hour	\$ 1.75
Machine cost per hour	<u>1.75</u>
Total cost per hour	\$ 3.50
$\$3.50 \div 29.4 \text{ (invoices per hour)} = \$.119 \text{ per inv.}$	

Two operators and machine cost:

Operator cost per hour	\$ 3.50
Machine cost per hour	<u>1.75</u>
Total cost per hour	\$ 5.25
$\$5.25 \div 41.7 \text{ (invoices per hour)} = \$.126 \text{ per inv.}$	

¹⁰ Thomas M. Cox, Jr., "Office Investments - When Are They Justified?" American Management Association, Inc., Office Management Series, No. 143, 1956.

Not all machines lend themselves to sharing. Should each operator have a machine, or should there be a sharing of machines? The problem is to determine the inefficiency resulting from sharing rather than the inefficiency of manual methods. Another source of waste can accrue, namely employee conflict. This potential waste can be minimized by cooperative and understanding coworkers.

Chart II, page 32, illustrates formulas devised to economically justify the adding of additional equipment to reduce waste. Some highly automated office processing machines today can be compared to automatic production equipment. One operator merely supervises the input and output with all internal functions of processing and inspection handled automatically by the machine.



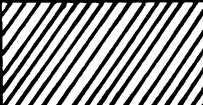
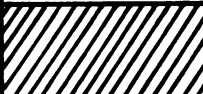









It may do little good to have tremendous speed on the computational phases of an office procedure if other phases are not performed with comparable efficiency. The other phases constitute bottlenecks in such instances, and the use of electronic computers in situations has been compared to the proverbial use of a pile driver on a tack.¹¹

The principle of integration can be applied in tying together and controlling standard types of office machines so that they operate automatically in a planned sequence. This will bring the concept of the "automatic office" much closer to reality for small as well as large firms.¹²

¹¹John S. Coleman, "Electronics—Pile Driver on a Tack?", Office Executive, October 1954.

¹²C. L. Littlefield and R. L. Peterson, Modern Office Management, Prentice-Hall, Inc., 1956-59577, p 225.

CHART I
OPERATOR-MACHINE COMPARISON CHART¹³

OPERATOR		Elapsed Time (Seconds)	MACHINE		
Oper.No.	Time - (Sec.)		Time - (Sec.)	Oper. No.	
1	2.34	10		10.17	-
2	7.83				
3	2.34			6.95	1
4	7.83	20		3.22	-
5	2.41				
6	2.34			6.95	2
7	3.46	30		11.50	-
8	2.41				
9	7.83				
10	2.34	40		7.53	3
11	3.46				
12	1.73			10.24	-
13	7.83	50		10.24	-
14	2.34				
15	3.46			7.53	4
-	1.73	60		10.24	-
16	2.41				
17	7.83			7.53	5
18	2.34	70		10.24	-
19	3.46				
-	1.73			7.53	6
20	2.41	80		10.24	-
21	7.83				
22	2.34			7.53	7
23	3.46	90		10.24	-
24	1.73				
25	2.41			7.53	8
26	7.83	100		10.24	-
27	2.34				
28	7.83			7.53	9
29	2.41	120		2.64	-
Operating 		29.4 Invoices Per Hour		Idle 	
Operating 96%				Operating 44%	
Idle 4%				Idle 56%	
Operator Total 100%				Machine Total 100%	

¹³ AMA Reports, Office Investments--When Are They Justified?
Office Management Series, No. 143, 1956.

CHART II

CONFLICT AND WASTE FROM MULTIPLE MACHINE USAGE

Assumption: All Operators will use the machine(s) the same amount of time.

Let A = Proportion of day demanded by user a.
 Let B = Proportion of day demanded by user b.
 Let C = Proportion of day demanded by user c.
 Let u (Usage of any person) = A = B = C.

Use of machine will be required as follows:

	<u>Require(s) machine</u>	<u>Does not require machine</u>
No Conflict	No one a b c	a,b,c b,c a,c a,b
Conflict	a,b a,c b,c a,b,c	c b a No one

$$\text{Conflict} = 3u^2 - 2u^3$$

$$\text{Waste} = 3u^2 - u^3$$

<u>If you have Users</u>	<u>Machines</u>
2	1
3	1
4	1
5	1
6	1
3	2
4	2
5	2
6	2
4	3
5	3
6	3
5	4
6	4
6	5

Addition of (1) machine will
reduce waste in the amount:

$$\begin{aligned}
 &u^2 \\
 &3u^2 - 2u^3 \\
 &6u^2 - 8u^3 + 3u^4 \\
 &10u^2 - 20u^3 + 15u^4 - 4u^5 \\
 &15u^2 - 40u^3 + 45u^4 - 24u^5 + 5u^6 \\
 &u^3 \\
 &4u^3 - 3u^4 \\
 &10u^3 - 15u^4 + 6u^5 \\
 &20u^3 - 45u^4 + 36u^5 - 10u^6 \\
 &u^4 \\
 &5u^4 - 4u^5 \\
 &15u^4 - 24u^5 + 10u^6 \\
 &u^5 \\
 &6u^5 - 5u^6 \\
 &u^6
 \end{aligned}$$

The following check list is made up of questions that must be answered relative to any work operation to properly satisfy rejection or acceptance of system elements.

1. Does the system permit rapid expansion in volume during busy periods and easy re-trenchment in slack periods?
2. Is the system designed only for busy periods with high fixed clerical costs?
3. Does the system take into consideration the needs of other departments?
4. Can displaced personnel be taken care of without downgrading?
5. Can the personnel within the department be taught new jobs or skills?
6. Will the contemplated new system require additional readily available or little available skilled employees?
7. Have all work activities been investigated?
8. Are all work elements necessary?
9. Would improvements or changes be justified after taking into consideration the time and personnel required in the present system?
10. Is the end result beneficial to the operation of the company?
11. Does the time necessary to obtain the desired end result outweigh its usefulness?

12. Can the work operation be eliminated entirely?
13. Does the end result, or report, appear in another activity in which a minor change, such as slight additional information, be made to supply the end result of both or more activities?
14. Could the operation be changed readily to supply additional needed information?
15. Could the operation be adapted readily to a quicker and simpler mechanical means to obtain the end results?

C. Establish Work Flow, Work Process, Procedure Flow, Block Diagrams and Forms Distribution Charts.

The work flow chart actually depicts the flow of forms through the system and the work relating to each form. It eliminates such recurring questions as: Where does this data originate? How is this data produced? Who originates? To whom does the form go?, etc. The chart therefore graphically and simply portrays a picture of the entire system including existing overlapping and poor work flow. (See Exhibits A and B, pages 37 and 38.)¹⁵

A work process chart is a tool used to record the detail steps of specific jobs within the system. This chart contains a description of the present step-by-step method of completing the work and space for a description of an eventual proposed method. This provides for

¹⁵ Exhibits A - F, incl., Courtesy of Ohio Oil Company, Procedures Research Department, Findlay, Ohio.

close element comparison. A line connected through symbols, representing the type of work effort for each step, again graphically points out processing inefficiencies. Distance travelled, employees engaged at each station, and volume of documents processed per employee completes the visual process record. Even if the study shows that the basic system requires no major change, the detail operations can many times be improved or work load reallocated. (See Exhibit C, page 39.)

The form distribution chart can immediately pinpoint any dead head stop off points in a forms normal routine of requisition, storage, usage, and misappropriation. Many expensive forms become note paper or are misused in place of the proper form, usually filling waste baskets as scrap. Proper printing limits should be established so as to maintain form stocks in proper reserve with due considerations to unit runs and total invested capital.

Another useful tool for designing the new system is the procedure flow chart. (See Exhibit D, Payroll Systems Flow Chart, page 40.) This type of chart is used principally where simplification and condensation is necessary to provide a general understanding of the new system. Exhibit E, page 41, is used as a detail procedure flow chart to explain the system to the personnel familiar with the problem being studied. Each important operation is shown separately on the chart and its relation to other operations. Don't forget, "One picture is worth a thousand words."

Block diagrams are a tool needed only in systems that incorporate the use of a computer. The general diagram presents the over-all computer system in a condensed one-page form. (See Exhibit F, Payroll System -- General Block Diagram, page 42.) The block diagram is used

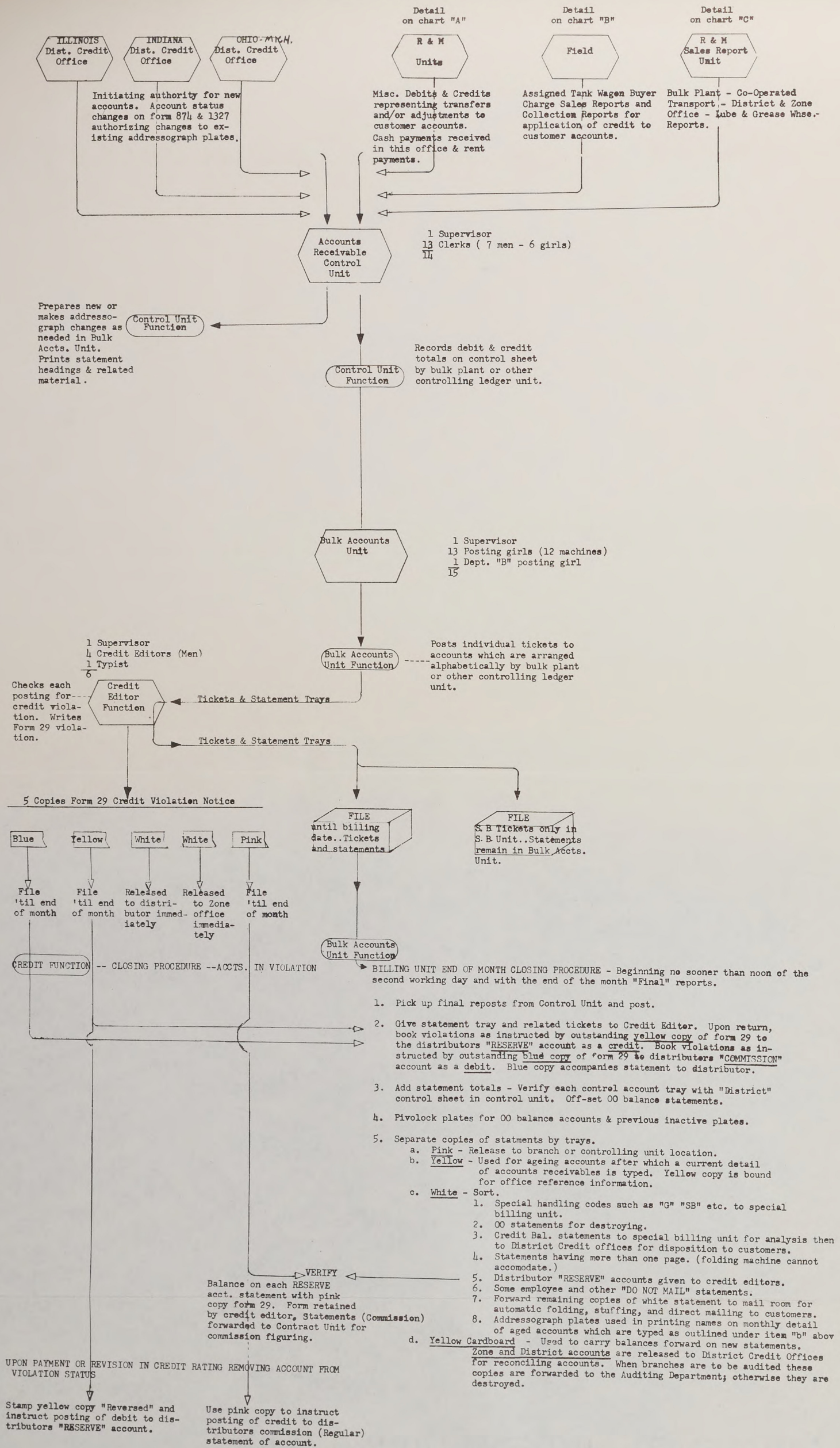
for constructing the original computer instructions and is used extensively in testing and correcting these instructions.

The accurate analysis of facts of the systems study is the key to the achievement of the fruits of labor. Use of all possible tools to verify, compare and pinpoint weaknesses and eliminate conjecture are desirable for correct analysis. Constant employment of a polite questioning attitude will usually provide answers and information needed. To, "Ask questions with suspended judgment," accomplishes much good. Conclusions made from inadequate source material can prove embarrassing, and can be interpreted by the employees involved as an indication of study inadequacy and misplaced confidence.

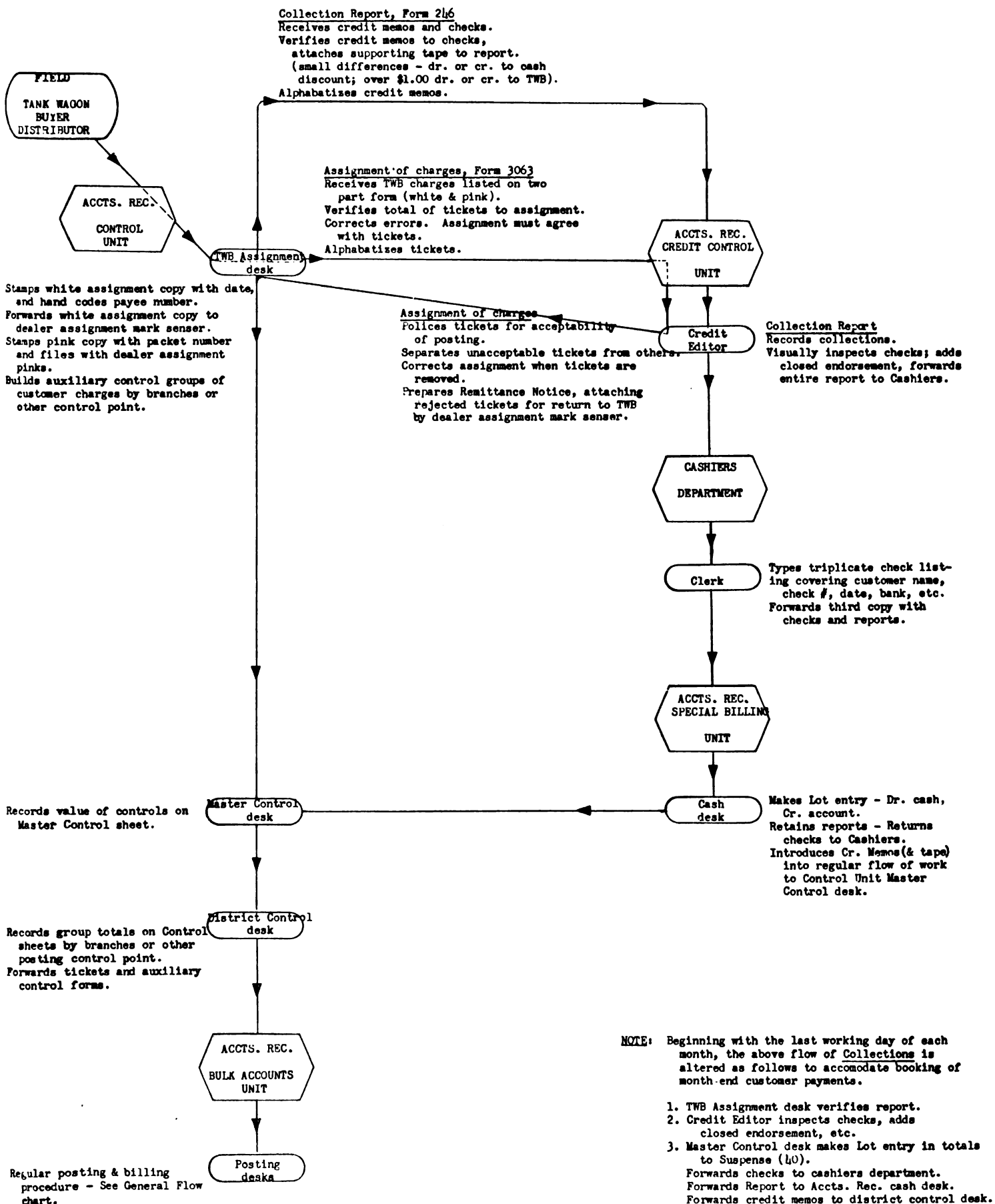
Analysis of facts encountered must be handled objectively. People are often generally familiar with their part in the total plan. Visual aids in the form of charts and diagrams simplify yet pinpoint work flow. A new system, to be acceptable, must be an improvement over the existing system, be relatively simple to operate, understandable to all concerned and reduce costs.

5/22/57

WORD PICTURE -- GENERAL FLOW CHART OF ACCOUNTS RECEIVABLE DEBITS & CREDITS THROUGH BULK ACCOUNTS UNIT FOR POSTING AND BILLING



WORD PICTURE -- DETAIL CHART "B" -- ASSIGNED TANK WAGON BUYER CUSTOMER CHARGES & COLLECTIONS TO BULK ACCOUNTS UNIT FOR POSTING AND BILLING



WORK PROCESS CHART

Date 3/7/58

Summary

Description	Present	Proposed	Savings
No. of Operations	16	12	4
No. of Transportations	12	—	12
No. of Storages	3	3	—
No. of Inspections	4	4	—
Distance Traveled	720	—	720

Position VERIFIER - ACCTS. REC.
Work Charted VERIFYING INVOICES.No. of Employees on This Work 6
Daily Time per Employee 6 1/2 HRS
Daily Volume per Employee 80
Forms Used 1290-SHIPPING RPT 1910-INVOICE
Charted By John Scott

Present Method					Proposed Method							
Dist. in Feet	Operation	Transp.	Storage	Inspect.	Description of Work	Step No.	Dist. in Feet	Operation	Transp.	Storage	Inspect.	Description of Work
					REMOVE SHIPPING REPORT FROM BOX	1						REMOVE SHIPPING REPORT FROM BOX
					REMOVE FROM ENVELOPE	2						INSPECT FOR COMPLETE DATA
					INSPECT FOR COMPLETE DATA	3						PLACE IN DESK FILE
10					GO TO NUMERICAL FILE	4						REMOVE INVOICE FROM BOX
					PLACE IN FILE	5						INSPECT FOR COMPLETE DATA
10					RETURN TO DESK	6						REMOVE FOLDER FROM FILE
					REMOVE INVOICE FROM BOX	7						MATCH 1 + 4 ABOVE
					REMOVE FROM ENVELOPE	8						INSPECT FOR QUANTITY + DESCR.
					INSPECT FOR COMPLETE DATA	9						LOCATE MEM IN ROTARY DESK FILE
10					GO TO NUMERICAL FILE	10						CHECK PRICE
					PLACE IN FILE	11						RETURN FOLDER TO FILE
10					RETURN TO DESK	12						CHECK EXTENSIONS
150					GO TO SALES DEPT.	13						CHECK ADDITIONS
					CHECK WITH CLERK	14						INITIAL
150					RETURN TO OWN DEPT.	15						STAPLE
10					GO TO FILE	16						PLACE IN BOX
					REMOVE FOLDER	17						FILL IN CHECK LIST FOR OTHER DEPTS.
10					RETURN TO DESK	18						STAPLE TO 1 OR 4 ABOVE
					MATCH 1 + 7 ABOVE	19						PLACE IN BOX
					INSPECT FOR QUANTITY + DESCR.	20						
					REMOVE PRICE BOOK FROM DRAWER	21						
					LOCATE ITEM	22						
					CHECK PRICE	23						
					RETURN PRICE BOOK TO DRAWER	24						
10					RETURN FOLDER TO FILE	25						
10					RETURN TO DESK	26						
					CHECK PRICE EXTENSIONS	27						
					CHECK ADDITION	28						
					STAMP	29						
					INITIAL	30						
					STAPLE 1 + 7 ABOVE	31						
					PLACE IN OUTGOING BOX	32						
200					GO TO SHIPPING DEPT.	33						
					CHECK WITH CLERK	34						
200					RETURN TO OWN DEPT.	35						
						36						
						37						
						38						
						39						
						40						
						41						
						42						
720	16	12	3	4	Totals		—	—	—	—	—	Totals

WORK SHEET

Date 3/10/58

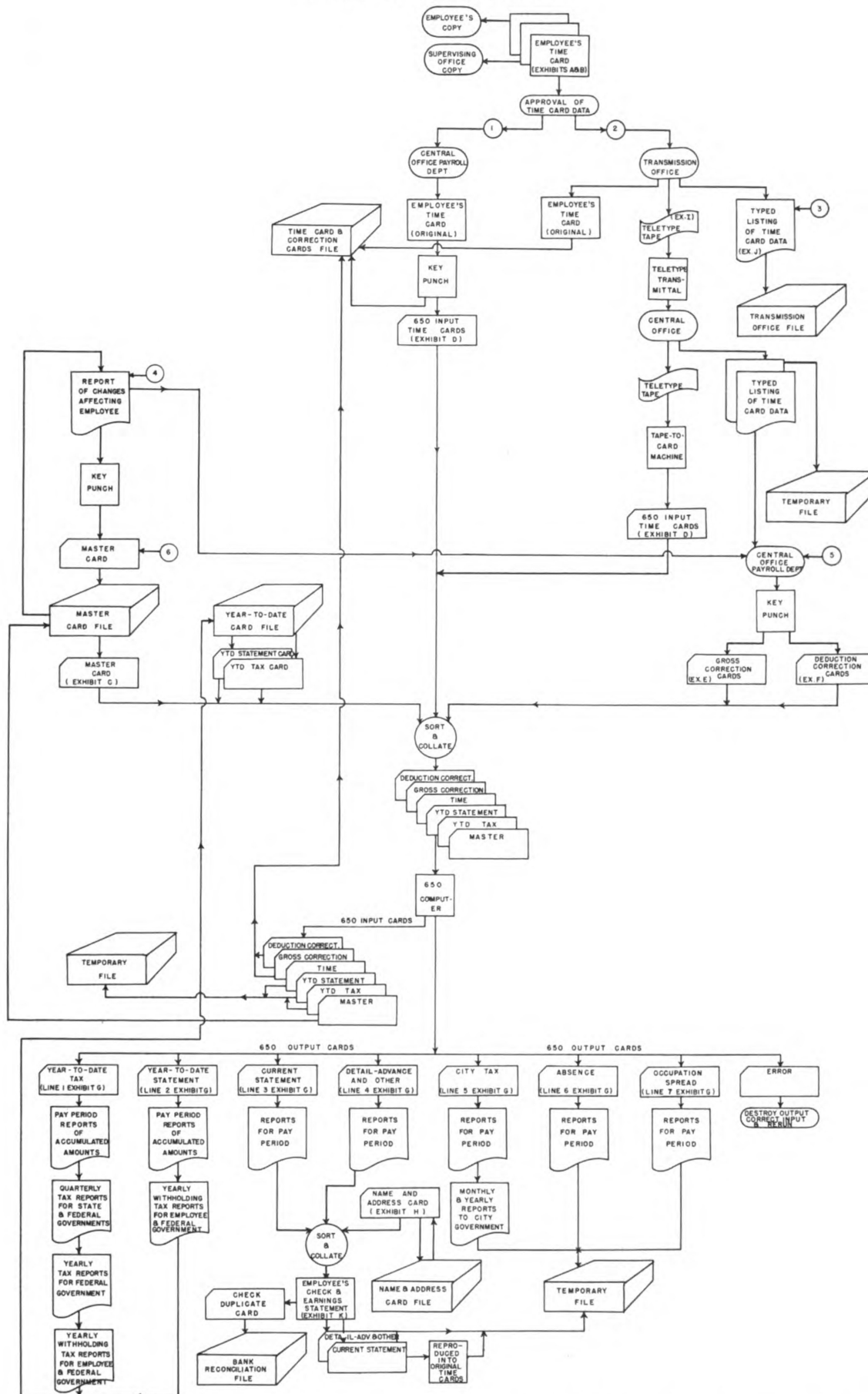
Subject ACCOUNTS REC.-VERIFYING

Analyzed By FRED BROOKS

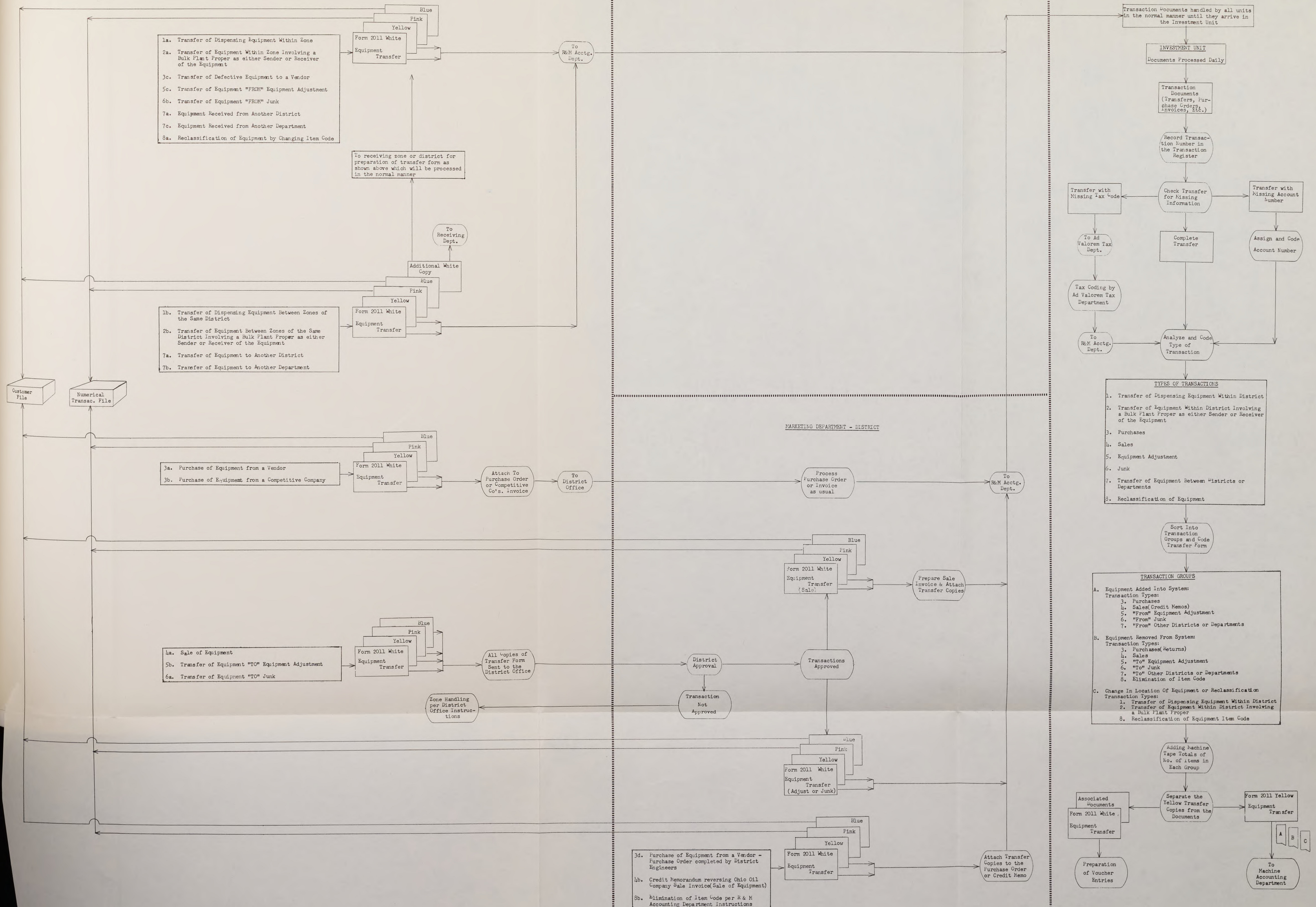
Chart Line Number	Eliminate	Combine	Change Sequence	Simplify
2	SEND IN FLAT FOLDER. NO ENVELOPE NEEDED			
4	ARRANGE FILE IN DESK DRAWER			
6	SEE 4			
8	SEE 2			
10	SEE 4			
11			MATCH FIRST. FILE ONLY IF NECESSARY.	
12	SEE 4			
13	MAKE CHECK LIST			
14	FOR QUESTIONING			
15	OTHER DEPTS.			
16			SEE 11	
17				
18				
21				ROTARY FILE. SPEED UP CHECK
24				SEE 21
25	SEE 4			
26				
29	STAMP NOT NEEDED. PRINT BOX ON FORM FOR INITIALS			
33	SEE 13, 14 + 15			
34				
35				

THE OHIO OIL COMPANY PAYROLL SYSTEM FLOW CHART

EXHIBIT D



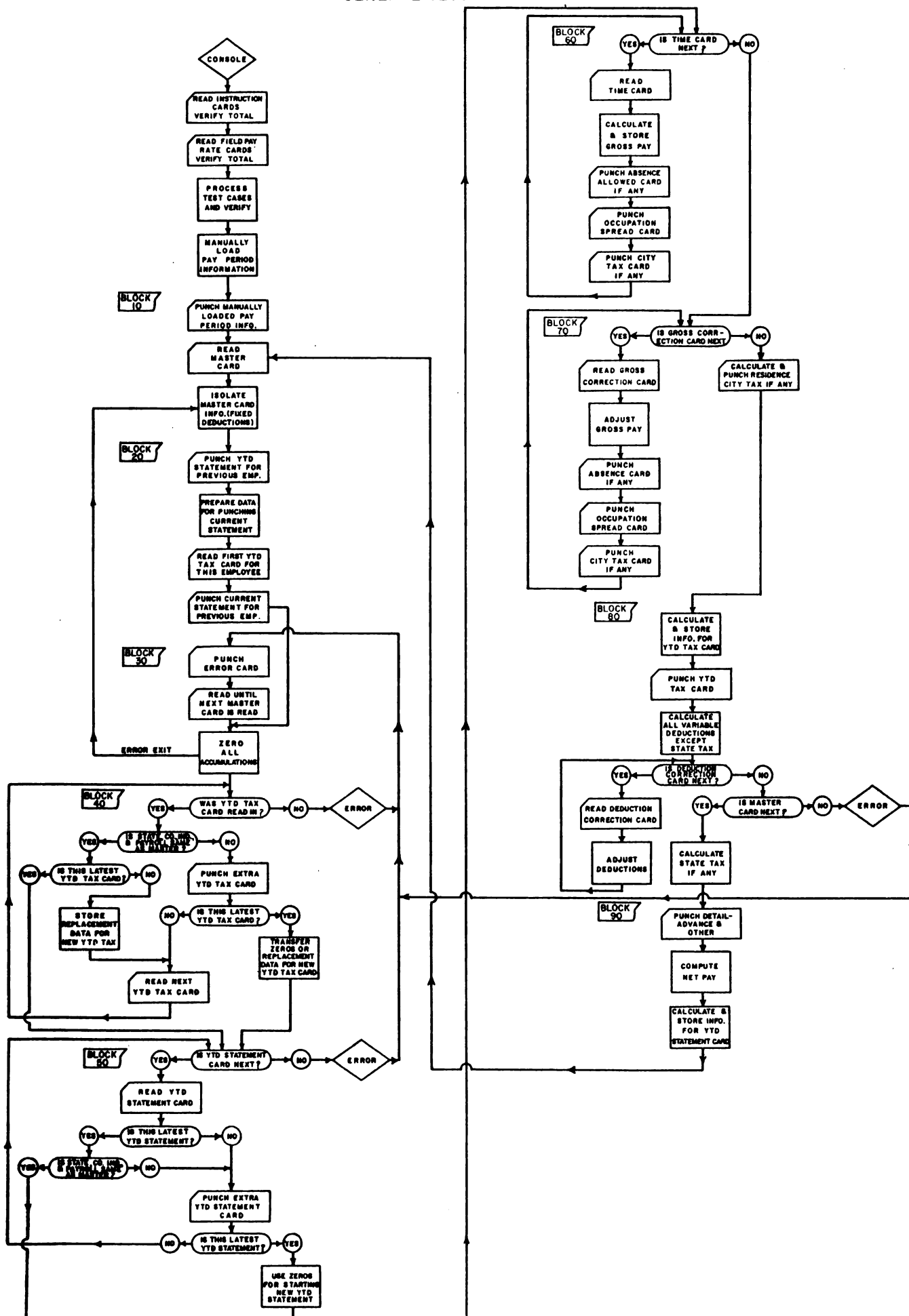
1. TIME CARDS FOR EMPLOYEES WORKING IN OHIO ARE MAILED TO THE PAYROLL DEPARTMENT, SINCE THE DISTANCE DOES NOT WARRANT TELETYPE TRANSMISSION. THE PAYROLL PERSONNEL RECORDS THE PREMIUM HOURS, SUCH AS OVERTIME, AND THE FIELD PAYROLL OCCUPATION CODES. THE OCCUPATION CODES DIRECT THE COMPUTER TO THE RATES OF PAY.
2. ALL OTHER TIME CARDS ARE FORWARDED TO ONE OF THE NINE TRANSMISSION OFFICES. THE SAME CLERICAL WORK IS PERFORMED IN THESE OFFICES AS IN 1 ABOVE.
3. THE TYPED LISTING OF TIME CARD DATA IS MANUALLY VERIFIED WITH THE TIME CARDS AND CORRECTIONS MADE BEFORE THE TELETYPE TAPE IS TRANSMITTED.
4. THESE REPORTS OF CHANGES ARE THE BASIC PERSONNEL RECORDS CONTAINING SUCH DATA AS RATE OF PAY, ADDRESS, ETC. THEY ARE ORIGINATED AND APPROVED THROUGH THE SUPERVISORY CHANNELS.
5. THE REPORT OF CHANGES SOMETIMES REQUIRES RETROACTIVE ADJUSTMENTS. THE LISTING OF TIME CARD DATA ALSO CONTAINS SUCH INFORMATION AS TERMINATIONS, SPECIAL DEDUCTIONS, ETC. THESE ITEMS OFTEN REQUIRE CORRECTION CARDS.
6. THE CHANGES ARE RECORDED ON THE OLD MASTER CARD AND IT IS DUPLICATED EXCEPT FOR THE NEW DATA.



THE OHIO OIL COMPANY

650 COMPUTER PAYROLL SYSTEM

GENERAL BLOCK DIAGRAM



CHAPTER VII

GAINING ACCEPTANCE OF NEW PROCEDURES

In answering the question, "Why is acceptance of new, improved procedures important?", we must consider as of primary importance the human aspects.

Acceptance means, "generally believed in and favorably approved." Acceptance is born of a positive state of mind, is essential to progress, is necessary to understanding and should be affected by willing or at least cooperative compliance. Humans naturally resist change because it is an infringement on a personal and established pattern. Three basically different attitudes toward change are usually encountered:

1. Objective attitude.
2. Dependent attitude.
3. Hostile attitude.

Objective and dependent attitudes cause no problem for concern, but hostility poses a problem usually overcome in one of two ways:

- a. Helping the hostile group "find out for themselves" is usually painfully slow, frustrating and is often accompanied by feet dragging indifference, a "you show me" attitude, constant refutation of procedure details, or open antagonism.
- b. By application of discipline to the situation a line executive clearly defines goals to be achieved, fixes responsibilities and gives assurance to key

personnel with respect to their positions. This approval usually overcomes individual defensive attitudes, displayed by a hostile nature, and secures more immediate participation by operating personnel.

Elimination of waste of human resources in business represents one of the most fertile areas for increasing the financial returns of business, and in turn, the ultimate reduction of price to consumers. It is conservatively estimated that employees at all levels turn out only from 60 to 70 per cent of what they are capable of producing without undue fatigue. Groups of workers set arbitrary limits on what they will produce in the course of an hour or a day — consciously or unconsciously, union or non-union. Absenteeism, alcoholism, tardiness, carelessness, indifference and accident proneness are additional and pervasive symptoms of work disturbance among employees. Loss of employee productivity can be prevented, and causal factors behind such waste are many. Intelligent consideration to human relationships can increase productivity and individual effectiveness in every phase of business operations. Inability of employees to get along with one another, spending useless time arguing, undermining one another, or sitting at work while their minds wander in jealousy, anger, worry, or anxiety, are all primary causes of wasted effort. Acceptance by employees of job responsibilities and personal satisfaction gained through an efficient contribution to organizational effort soon leaves no room for personal animosities.

Cooperative and enthusiastic employees enlarge their individual capabilities, promote group effort, and provide best potential for the

procedure's success.

Failure of individuals or a group to accept a procedure improvement is costly. All survey, tabulation, compilation, and investigating data costs are lost by non-acceptance. Suspicion is aroused concerning justification of the change and natural personal conflicts are aroused. Opposition to future suggested changes will be better organized with more opposition support evident.

By including operating personnel as real partners in every study undertaken greater confidence is displayed by the individuals participating. Often hidden talents become apparent, new ideas are offered for group consideration, and approaches are tried that may not have been previously considered feasible.

Employees actually take pride in being associated with something spectacular, something unique, or being part of an efficient processing staff or group that distinguishes them from routine file, sorting or office handling functions.

Less effort, less fatigue, and less rush are resulting benefits of office mechanization methods.

An employee's skill is transferable to other jobs. Dr. Lillian Gilbrieth has defined skill as dexterity, plus knowledge, which can adapt itself to changing situations, and is capable of improvement.

Personal barriers such as fear of work status change, job insecurity, inherent personal jealousies, disbelief of change need, overcaution and distorted personal interest, must all be recognized as negative forces contributing to human inertia that require overcoming or circumventing in gaining new procedures acceptance. More often than not these personal barriers are created or brought about by personal

goals versus organizational goals.

In trying to understand why people set up barriers, of which we are all possessed, we must examine, explore and find logical answers to some of many questions we may ask ourselves when faced with a proposed change in the work we do.¹⁶

1. Will I work for another supervisor?
2. Will my skill be needed after the
change has been introduced?
3. Have I been doing poor or unsatisfactory work?
4. Will the prestige I now enjoy be reduced or
enlarged?
5. Will I be displaced or lose my job?
6. Will I be able to enjoy my new work without
expending unreasonable time, effort, etc., in
learning new ways?
7. Am I capable of doing a technical job?
8. Do my supervisors accept this proposed change?
9. Will I have less freedom of communication with
fellow workers?
10. Will my work become more tedious and less
interesting?

Usually it is possible to provide an honest and satisfying answer from the workers' viewpoint, and failure to do so spells out trouble ahead. Employees usually adopt the attitude of their supervisors

¹⁶J. W. Buttermore. "Gaining Acceptance", Chapter II. Procedures Research Manual, The Ohio Oil Company, Findlay, Ohio 1958, p 16.

as an acceptable evaluation of company policy. Therefore, managerial and supervisory acceptance is imperative before outright selling to employees is approached.

The receptive attitude of managements' acceptance of need for systems improvements is an achievement in itself. Management is functionally the processes of planning, organizing, coordinating, controlling and directing. Recognition of the need for improvement is obviously an apology for past or present practices along with acceptance of self criticism. To enlarge management prestige it is first necessary to gain program acceptance by supervisory personnel.

Line supervision, being more directly responsible for maintenance of existing systems, handling of involved personnel, and critical of any possible encroachment on personal territory, will oftentimes be defensive in their attitudes and even outright hostile. To these people a projected change can mean loss of prestige or status, a possible decrease in responsibilities, fear of staff systems personnel taking over, or the need to face up to new and more exacting supervisory effort. Doing things in the traditional company manner, following examples of others whose methods seem acceptable, working by hunch or intuition often supported by meager evidence, are all methods that have some merit and are much employed. Not one can be completely satisfactory by itself.

The full potentialities of the office as an efficient and accurate information source need to be understood both by the supervisors in charge of departments served by office activities and by the specialists who render the services. Office services are quite often considered nuisance tasks, unnecessary red tape, non-productive,

and at best a necessary evil. As a consequence of such disrespectful status, office department heads become lacking in initiative, interest, knowledge, and time to accomplish planned revitalization within their area of influence. Greater recognition of the need of these employees means encouraging each to think, to question existing policies, procedures or systems, and to exercise initiative. Information must be allowed to pass freely from bottom to top as well as from top to bottom.

Office supervisors have wonderful potential opportunities to be successful and participating managers. Their interest, enthusiasm, and active participation must be encouraged and obtained otherwise the systems study cannot be successful. Fears of interference or domination must be overcome by a sincere display of recognition of their knowledge of their job. Policies or rules should leave elbow room for growth and development by establishing general objectives. Specific objectives, if formulated by supervisory personnel, provide a springboard for active enlargement.

As long as individuals are different and management is willing to recognize that their needs, fears, and wants are different, it should not be too difficult to understand different individual interpretations of the same mass of information. It is difficult to over-emphasize the human factor relating to problems of individual and eventually group acceptance of procedure changes. Therefore acceptance, though not a signal of salutary success, can become a solid cornerstone for building new and improved procedure structures. Every ally gained is one less opposition problem.

The attitude toward the meaning of work and its proper incentives are among the most important questions Americans have to face. The old

incentives to labor, the economic whip and the increased gains, have disappeared.¹⁷ The problem of human incentive is threefold: How to get people 1) to work hard and strive well, 2) to be happy and contented in their work, and 3) to do these things for as low a money cost to the organization as possible. Through encouragement, acceptance of the group and by the group, recognition of achievement, quality standards attainment, and accomplishment of organized effort, individual and group incentive take on a personal meaning.

¹⁷C. Wright Mill, "A Look at the White Collar," American Management Association, Inc., Office Management Series No. 131, 1952.

CHAPTER VIII

DEVELOPMENT OF A NEW SYSTEM

Fundamental to nearly all office activities are the systems or channels through which activities are coordinated. The need for accumulation of specific and systematically gathered facts for more rapid and more exact decision making data has been an important factor in increasing office costs. Executives today cannot rely on past experience, vague memories or scattered impressions to support decisions needed in today's economy.

When you stop to think about developing a new system, you will find that a logical approach, as in any other problem-solving situation, can be handled in a five step sequence:¹⁸

1. Recognize the problem.
2. Gather all the available facts about the problem.
3. Agree on the best possible solution for your needs.
4. Apply the solution.
5. Evaluate results and follow-up.

1. Recognition of the Problem.

It is important to remember that, regardless how the study is initiated, a systems study must have management support and recognition.

¹⁸L. C. Gainsley, "Development of a New System," Chapter 7, Procedures Research Manual, The Ohio Oil Company, Findlay, Ohio, 1958, p 2.

A study is usually begun as a means of establishing means of resolving a problem and a memorandum issued to areas affected announces the study's start, aims, general objectives, and serves to introduce the people who will be working on the problem.

The need for a new system, or the study of potential possibilities at least, may have been brought about for a number of reasons such as:

1. Excessive paperwork costs.
2. Inefficiency of work performance.
3. Proper information is not available.
4. Lack of uniformity in handling various
paper has high-lighted an existing
inadequacy.
5. Processing bottlenecks have occurred
as a result of increased office activity.
6. Added personnel have been requested that
do not seem justified.

Once the problem has been defined a preliminary conference or a meeting with departmental personnel can direct thinking toward common goals and defining limitations of the study.

2. Gather all the Available Facts About the Problem.

Conversation with operating personnel and a sincere interest coupled with a good listening attitude, will do much to gain acceptance for the study and insure cooperation during future steps of the program. A systems man must be able to appreciate the relative value of all work, and cannot at the risk of jeopardizing the entire study, present an

attitude of tolerance or merely condescend to listen.

The idea of a possible radical change must be deemphasized. Above all, forget that any new system is going to eliminate people or consolidate functions. Job displacement possibility is a fear not easily overcome if it becomes at all well entrenched in the minds of otherwise receptive and cooperative individuals.

Tact and skillful planning are needed to gain sufficient facts from the working employees to provide the systems man with all possible information. There is no limit to the amount of work that can be accomplished if personal glory can be completely subjugated. Never fail to include recognition and appreciation for suggestions received from all personnel, but also guard against giving credit where it is not due.

A work flow chart will diagram the system in a simple graphic presentation. It shows what is happening from the point of origin to the point of completion. A proposed system flow chart will tend to fall in alongside the chart of the present system and helps to organize systematic thinking about facts collected.

Watch for new ideas in the systems field and be selective in material read. It is possible that companies within a single corporation have also already handled such a problem. Other local companies with which there is frequent business or personal contact can be very helpful. No plausible or thought provoking leads should be overlooked, because a correct positive approach pays off in better dividends than frequent rerouted detours. Never expect or attempt to fit a system tailored to one company's needs to suit the problem being studied. Look

for worthwhile ideas and make full use of them.

3. Agree on the Best Possible Solution for Your Needs.

With facts collected and material organized it is now necessary to sift, sort, eliminate, consolidate and to basically think out alternate solutions to the problem. The problem must be thought through objectively and impartially so as to present a solution best fitted to specific needs and utilizing people and machines best available within cost limits.

The systems man must be fair and cannot favor one department over another. Neither can he expect unanimous agreement on all suggestions made. He must work effectively with all people involved, by displaying patience, and must make every effort to understand and take into consideration all human factors involved.

Difficulties can be minimized by attempting to arrive at immediate solution of differences as they arise rather than postponing a difficult decision until later. Good exists in all systems and a "hard nosed" attitude in demanding compliance on a minor point is often-times unjustified. It is important to remember that a department, a group, or an individual can more easily and better absorb few changes more frequently than many changes at once. Habits and attitudes resist complete upheaval and the best rule can be expressed as "Make Haste-Slowly."

Care and time should be taken to double check by analyzing and evaluating all data to make certain of its completeness. The present system must be understood completely and no details overlooked. As the analysis brings out areas of improvement needs, start the formula-

tion of recommendations along with their practical application.

Possible better utilization of equipment already installed should be given every possible consideration. Employees and supervisors are well acquainted with present equipment quirks, handling of controls, and generally feel an assurance of skill of handling. New equipment can be rented, leased, or purchased outright, but make certain that the present system and equipment usage is understood completely and is being efficiently utilized.

4. Apply the Solution.

If all parties concerned generally agree that the problem, facts of the problem, and solution to the problem have been resolved, the dual testing of the proposed system along with the present system is in order.

This "dry run" will serve to point out possible overlooked weaknesses. It will also serve to test the manpower and machine requirements recommended for job completion. Bugs or faults can be expected to appear but necessary adjustments can be handled at this time.

If the new system run shows the promise anticipated, concentrate on the distribution of necessary communications to assist the departmental personnel to properly perform the necessary work process.

Final acceptance by operating personnel in many cases hinges on the smoothness of changeover. Faults that appear and are not corrected or adjusted quickly can take on monstrous proportions leading to confusion, neglect and the system breakdown.

5. Evaluate Results and Follow Up.

Objectives established for the new system must be accomplished or bettered by the change. It is not necessary to invite problems or

to question adequacy if the system is not perfect but adequate.

A well designed, planned, and initiated system over a period of time will become less important or even obsolete due to changing work of the company, replacement of personnel, the changing business atmosphere, or even due to revisions in management policies. Periodic checking is necessary to attempt to keep a system up to date with internal organizational changes. Weaknesses originally non-existent will appear and will require corrective action.

Frequent review or follow up checking offers opportunities to discover means of speeding up processing, reducing overtime, or reducing peak loads. Such follow-up often produces better results and cash savings than were originally anticipated. The follow-up is also a safeguard against unintentional tampering that may result due to a misinterpreted procedure.

Again, communication through operating personnel pays dividends. The employee having become established in a new routine can be better made to feel a part of the success story. Each employee that may have helped in some degree to develop it, will feel more enthusiastic to make it work. As the new system smooths out into an efficient operation, operating employees, having taken part in its formulation, will be sold on it and will look for merits and improvements rather than faults.

The follow-up, therefore, serves as a means to assure success, to correct errors, to teach, to enlarge, and to remove objections. It is accomplished by personal contact with operating personnel and group supervisors, and should be continued as long as a legitimate need seems to exist.

Development of new systems can successfully be accomplished in the manner outlined. Recognition of the problem indicates a willingness to attempt to alter existing system deficiencies. A systematic gathering of facts shows that the study will be all inclusive. Agreement among persons involved on the best possible of several solutions gives all participants a share in the proposed system. Applying the agreed upon solution, according to a predetermined time schedule, establishes individual and cooperative time limits. Final evaluation and follow-up indicates to all working and supervisory personnel involved that this change is getting attention and results evaluated.

CHAPTER IX

ESTIMATING COSTS

The management of any company will want to know how much it will cost to develop new procedures and whether the savings produced by them will justify the expense of converting to the new procedure recommended.

As familiarity with an existing procedure is being accomplished questions of cost are certainly pertinent. The following questions are obvious and begin the process of cost accumulation and comparison:¹⁹

1. How many people are working in this area under study?
2. What per cent of their time is spent doing the work under study?
3. What equipment do they use?
4. What is the cost of this equipment?
5. What space is occupied by the people and equipment in this area?
6. How many preprinted forms are used?
7. Are multiple shifts applicable to this work?

Two most vulnerable elements of cost are hourly rates for non-administrative personnel and hourly rates for machines.

¹⁹C. C. Smith, "Estimating Project Costs," Chapter 8. Procedures Research Manual, The Ohio Oil Company, Findlay, Ohio. 1958, p 1.

Basically, the formula for the hourly labor cost is Labor Costs plus Overhead Costs divided by the Productive Time. Labor costs include salaries and payroll burden. The overhead costs are items which cannot be charged directly to productive work such as expense accounts, travel expense, and office space costs (such as depreciation, heat, light, and maintenance). Productive time can be determined by deducting from total available hours per year those average recorded off the job allowances such as holidays, vacation, sick time, personal leaves and special absences, coffee breaks, rest periods, training, etc., that are considered normal. Average productive hours per month will usually result in a determination with the range of 110 - 130 hours. (See Chart III, page 63.)

The only costs that enter into the machine rates are rentals, in the case of leased equipment; or depreciation, repairs and maintenance in the case of company owned equipment. Rental is on a monthly basis and should include rental, sales tax and excise tax, if applicable.

Machine output capacities vary with manufacturers and are usually based on full machine utilization by experienced operators.

Reasonable cost estimates should include both normal or obvious costs and those easily overlooked costs.

The obvious costs generally are:

1. The direct expense of the project team working on the procedure change.
 - a. Familiarity time on existing procedure.
 - b. Any travel expenses required for investigation.

- c. Time required to develop a
new procedure.
- 2. Time required for dual running costs
and testing.
- 3. Cost of new forms over existing forms.
- 4. Cost of new machines needed.
- 5. Training costs for supervisors and
employees.
- 6. Cost of maintaining procedures and follow-
up.

Less obvious costs more easily overlooked are as follows:

- 1. Additional space requirements.
- 2. Rearrangement of facilities.
- 3. Conversion costs.
 - a. Cost of master files.
 - b. Destruction and obsolescence
of present forms.
 - c. Cost of added personnel during
conversion.
- 4. Costs of maintaining up-to-date files.
- 5. Obtaining source media.
- 6. Cost of distributing prepared reports.
- 7. New procedures usually increase responsi-
bilities. Therefore, upgrading of the
rate range increases cost.
- 8. Men may be required to replace women
in some areas.

Good working conditions have proved to be one of the most vital elements in office morale, efficiency, and productivity. Poor conditions mean higher than normal costs.

Methods analysis, work simplification, work measurement, statistical sampling, and quality control along with establishing standards of performance are all practical approaches borrowed from factory applications. These methods, if evaluated properly, establish norms for output schedules and limits of acceptability.

Chart IV, page 64, illustrates an analysis by sampling of invoices to determine the error distribution. As shown in the chart, the errors were small and tended to cancel out. The auditing procedure, needless to say, was reviewed. As a result, the 100 per cent audit was discontinued on invoices of less than \$250 value. Thus, two people were made available for other work.

A new procedure may provide intangible benefits on which it is practically impossible to assign dollar values. Better information faster, more accurate information, reduction of errors, and better employee attitudes are such intangible benefits. They should be mentioned to lend weight to new procedure consideration.

Cost adjustments must be kept on a current basis or they lose their value. A realistic attitude must be maintained and optimum output must not be considered as normal. Reasonable performance can be attained and usually improved.

In calculating time required to handle a job give consideration to factors such as the following:

1. Make ready time.
2. Interruptions.

3. Handling delays.

4. Clean up time.

Chart V, pages 65 and 66, is a comprehensive check list for estimating costs that can be used as a base of operations.

As a summary it can be said that successful cost estimates are a result of thorough planning and will contain the following elemental procedure:

1. Start at the beginning.
2. Cost the old system.
3. Cost the new procedure.
4. Analyze and compare.
5. Follow up cost estimates.
6. Maintain realistic and reasonable attitudes.

Each project, it is soon learned, has costs somewhat peculiar to that project alone. A reasonable yet thorough approach will bear fruit by accomplishing best results and create the least antagonism.

Employee apprehension, concerning costs, can be substantially reduced by including in the cost estimates presented, morale boosting factors contemplated such as improved lighting or ventilation, improved work place layout and improved work flow. Workers actually resent conditions that permit periods when output must be accelerated to meet emergencies while other times they have no work available.

Application of work sampling, work measurement, synthetic standards or performance standards must be handled differently in different companies. Area labor availability, union or non-union clerical personnel, employee loyalty to the company and workers and supervisory attitudes must be factors explored before any of these

techniques can be prematurely released upon unsuspecting personnel. Many well written books are available that quite completely explain means and methods of using each of these various measuring techniques. These authors, in many instances, are authorities who have been instrumental in applying these management tools in a scientific approach to just such problems.

CHART III

PRODUCTIVE TIME²⁰

(Company Wide Averages)

	<u>Male</u>	<u>Female</u>
Available (hours per year)	2080	2080
Less: Non-Productive Hours		
<u>Off the job:</u>	Hours	Hours
Holidays	64	64
Vacation	120	88
Sick Time	16	24
*Other	10	10
** <u>On the job</u>	<u>470</u>	<u>560</u>
Avg. Prod. Hrs./Yr.	<u>1400</u>	<u>1334</u>
Avg. Prod. Hrs./Mo.	<u>117</u>	<u>111</u>
Avg. Prod. Hrs./Day	<u>5.3</u>	<u>5.0</u>

*Other

Illness in family
 Death in family
 Personal Business
 Special Absences

**On the Job

Lack of work
 Disorganized effort
 Coffee breaks
 Conferences
 Personal time
 Civic duties

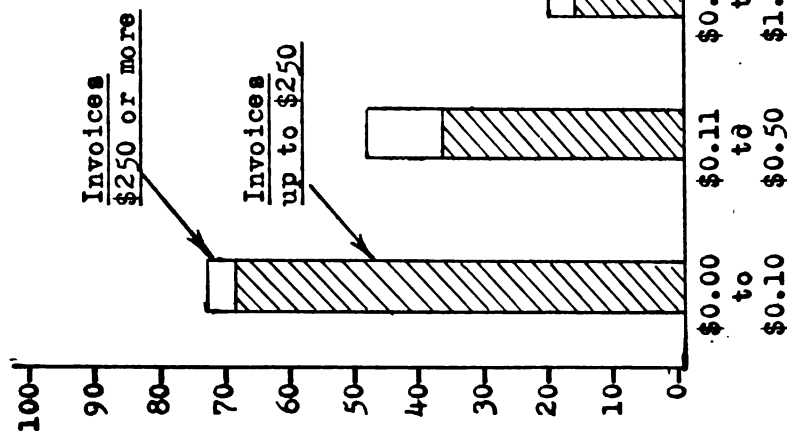
CLERICAL COST-HOURLY

	Labor (Salary plus Payroll Burden)
+	<u>Overhead</u> (Ad.Salaries plus Payroll Burden plus Bus. Exp. plus Off. Space Cost)
÷	<u>Productive Time</u> (Available - Non-Productive)
=	Net Clerical Hourly Rate

²⁰C. C. Smith, "Estimating Costs," Chapter 8, Procedures Research Manual, The Ohio Oil Company, Findlay, Ohio, 1958, Exhibit 1.

CHART IV

DISTRIBUTION OF ERRORS DETECTED IN 100% AUDIT OF DISCOUNT COMPUTATIONS



Monthly Total Invoices Handled	\$ 50,000,000
Monthly Total Discounts Recalculated	\$ 110,000
Errors Detected	176
Wage Cost to Detect Errors	\$ 1,100
Net Value of Errors	+ 13.00

AMOUNT OF ERROR

CHART V

CHECK LIST FOR COST ESTIMATIONS

Time required to become familiar with present procedure.

Travel expenses incurred while studying case histories.

Time required to develop new procedures.

Time required to write and de-bug computer programs if there is a computer application.

Dual running costs of old and new procedures during test period.

Cost of construction of Master Card files and/or Addressograph Plate files.

Cost of obsolete forms destroyed.

Use of additional personnel during the conversion period.

Charges for personnel relieved by the procedure but retained to aid with conversion.

Time required by Project Team personnel to aid with conversion and installation.

Costs of developing new equipment to satisfy system requirements.

Costs of training personnel in the use of new equipment.

Costs of designing new tabulating cards and preprinted forms.

Postage charges for obtaining source media and distributing prepared reports.

Cost of leased wires, teletype, and associated equipment.

Costs of training new personnel.

Electric accounting machines required.

Costs of control panels and wires used in these panels.

Space requirements for new machinery.

CHART V (Continued)

Space requirements for new desks, typewriter stands, etc.

Reduced space requirements for less machinery and equipment.

State Sales Tax and Federal Excise Taxes on purchase or rental of machines.

Personnel required to operate machines.

Personnel required in the operating departments.

Cost of preprinted forms and continuous tabulating paper for preparation of runs.

Cost of IBM cards required each month to complete the job.

Computer time required if it is a computer application.

Costs of maintaining computer programs.

Cost of maintaining up-to-date Master Card files and/or Addressograph Plate files.

Cost of space for card file cabinets in the Machine Accounting Department.

Cost of space required in Record Storage.

Costs of microfilming and remote area storage.

Machine costs outside of Machine Accounting which are allocated to departments.

Non-allocated machine costs such as typewriters, adding machines, calculators, etc.

Furniture and Fixture costs.

Costs of up-grading rate ranges because of increased responsibilities.

Costs of replacing women with men in a job area.

Costs of moving household goods of displaced personnel.

CHAPTER X

COMMUNICATION AND PRESENTATION

A. Communication.

The four major areas of communication; writing, speaking, reading, and listening, are all involved in communicating ideas, plans, policies and procedures upward, downward and across all parts of an organization.

Thought conveyance, whether written or spoken, should be clear and concise, and must be tuned to the ear of the listener. From the moment management realizes an organizational need for any system study communication plays the dominant role of hero or villain.

Listening is one of the most important links in a company's communications and is also one of the weakest. Most people do not know how to listen and this art of faculty of communication has been practically forgotten. Listening concentration is more difficult than any other form of concentration. Most people are capable, on the average, of speaking 125 words per minute, but think at the rate of 500 words per minute. A good listener uses spare thinking time well and trains himself in four useful mental activities:

1. The listener must think ahead of the talker, trying to anticipate what thought he is being led up to and what conclusions can be drawn from the words spoken.

2. The listener must weigh the evidence used by the talker to support points made:
 - a. Is this valid?
 - b. Is it the complete story?
 - c. Is evidence assumed or imagined?
 - d. Is evidence colored to camouflage?
 - e. Does the talker believe what he is saying?
3. The listener periodically reviews and mentally summarizes points of the talk.
4. Throughout the talk, the listener "listens between the lines" for meanings implied but not necessarily put into words. In other words, "Is the talker avoiding certain unfamiliar aspects, arbitrarily disregarding facts, or attempting to short change the subject?" "If so, why so?"

All listeners to some extent mentally block that which they do not want to hear and have an open ear or receptive acceptance to that which they want to hear and believe. Incidents created by poor listening frequently are the cause of management insistence that more and more communication be put into writing. Paper work piles higher and higher and causes the tangle often called "red tape." Much less writing and more careful speaking would be advisable if trained listening were the order of the day.

In systems work always remember that it is easiest to stop listening and start arguing when disagreement results. Listen hardest when disagreement or conflict of ideas results. Hunt for negative evidence and always search every possibility to prove the other fellow right instead of wrong.

It must be remembered that in systems work listening will consume as much as 80 per cent of the analyst's time. Therefore, listening becomes the most important link in successful mutual understanding for effective communication.

B. Presentation.

The presentation, as a means of communication, is the relaying to gain acceptance of what has been done, what is being done, or what can be done. The four major things to consider in the preparation of any presentation to management members or departmental employees are:

1. To WHOM is the presentation being given?
2. WHAT are their interests?
3. WHY is the presentation being given?
4. WHERE will the presentation be given?

After the WHO, WHAT, WHY, and WHERE of the presentation have been determined it is possible to determine the TEXT, TIME and TOOLS.

If the presentation is to be given to members of management, they are more interested in results and how obtaining the results will affect personnel, costs, possible expansion and internal problems of conversion. Plan details are unimportant but a general description of how the plan is to be accomplished is all that is desired.

For supervisors, it is desirable to give more detail as to how results will be obtained and the effect of changes on other related departments. This can include cost, personnel and functional changes.

Operating personnel will need all data details as to how the work is to be done, how each employee fits into the new system, and why the particular method was chosen.

Advantages of a new system should be enumerated as well as potential disadvantages. All remarks should be to the point, considerations made, conclusions determined, and the action taken on the conclusions.

In no instance should more time be taken for any presentation than is necessary to make the necessary points clearly evident. Visual tools are very helpful but should vary with each group for which their use is intended.

The presentation well formulated can do much to evoke employee enthusiasm and acceptance. Sincerity of purpose and appreciation of the listeners' role in the total scheme can improve listener reception.

Since the art of listening seems to have become the lost art of communication it is well that this medium be stressed. People like to be heard, and understood. Systems improvement progress will be found to be largely dependent upon the listening aptitude of the systems man. People like to think their ideas are right even though wrong. They cannot be told they are wrong but must be led into the belief that the changed concept is merely a slight alteration from their belief. Toe trampling must be avoided, because wounded pride and loss of status can upset many well laid plans. Employees must be partially self sold before

the final selling strategy can become effective. Wanting to be sold on an idea offers a receptive employee an opportunity to accept the change. Having to be sold places this same employee in the uncomfortable position of surrendering to a change. Victory can be sweet but defeat is always bitter.

CHAPTER XI

CONVERSION PROBLEMS

Several assumptions, regarding what has already been done, must be made before the conversion period is entered. If the following conditions are not true, any conversion problems will be compounded:

1. A sound and practical system has been developed and has been tentatively accepted by management and supervisory personnel.
2. Those working with the former procedure and those involved in the new procedure have been fully informed of progress of the study and their place in the study.
3. Flow charts have been developed.
4. Preliminary system outlines have been prepared.
5. New forms have been designed and ordered.
6. Mechanical equipment contemplated has been tested and passes the test of adaptability and adequacy.

With the above preliminary steps assured and agreed upon it is necessary to understand, evaluate, anticipate and be ready to cope with many "Conversion Problems" as they arise and occur.

A. Administrative and Human Relation Problems.

Oftentimes employee memory skills particularly, acquired over a period of years, become useless. It is important that these employees

are assured by management of complete consideration as long as they are capable and willing to learn new work. Peak performance cannot be immediately expected from employees who are performing different duties in a new procedure. The impact of change may have been anticipated but individuals will oftentimes delay their reactions until new work schedules are to be instituted.

One of the greatest conversion problems can be the growth of one department at the expense of another. Departments may be reduced, eliminated, created or combined and create a loss of prestige to some supervisors and employees alike. Immediate rather than delayed conclusion is necessary.

B. Communications.

When a procedure involves new or revised reports, it is advisable to prepare actual exhibits and, prior to installation, to secure approval from all parties and departments concerned. Familiarity with new reports prior to use will highlight possible revisions and secure more cooperative handling.

The value of personal contact in the form of meetings with people to be affected cannot be overemphasized. Such people are interested in how their work will be changed and should be recognized for their contributions to the study. Such meetings should be kept informal to create the proper atmosphere for questions and comments. Visual aids should be used so that participants may receive and retain a maximum of information and be able to more comprehensively comment and suggest.

C. Time Schedules.

Estimates of the length of the conversion, the time to be taken for the dual operation if any, the installation date along with training schedules if required, should be tabulated and available to interested participants.

Jobs should be checked off as they are completed and the schedule continually reviewed and revised if necessary. Make schedules realistic and do not extend area times because the schedule then loses much of its planning strength and creates an atmosphere of indifference and delayed action.

D. Training Personnel for New or Changed Duties.

On-the-job training is always desirable so that employees can learn by trial and error. It is less costly to experience difficulties and errors before rather than during installation and gives employees an important preview of things to come. The proper training of personnel not only makes their future work easier and their cooperative acceptance more willing, but also helps guarantee the successful conversion and installation of the new system.

It is always advantageous to operate a new and an old system in parallel and compare results. The time to complete the conversion cycle of course will depend almost entirely upon complexity of the system and thoroughness of preparation.

During the dual operation stringent control checks should be maintained to reveal any possible flaws or desired improvements. Written records of progress should be kept and comparisons recorded to serve as proof to management that the system has been adequately tested.

With conversion completed master files must be constantly kept up to date. Review and analysis should continue to insure reliability and continuing possibilities of improvements.

During the early cycles of operation complaints and problems will be evident. Be prepared to make system revisions if absolutely necessary. Remember that supervisors and operating personnel must run the system for the company to gain full benefits.

In the early stages the system costs will be higher due to operators' inexperience and unfamiliarity with the work. Don't become too anxious to establish actual costs for a new system. If expectations look realizable don't rush to tear the trimmings from an obviously well wrapped package.

Conversion problems will be a minimum if careful sequence detail planning has been properly policed. Conversion costs can be controlled provided all personnel involved have accepted and have performed responsibility obligations. Personnel again must know, through adequate communication, details of the proposed operation and methods needed to best knit a new system to other existing systems yet to be converted. People, equipment and time are the control media. Each has its place in the timetable and each must be ready without doubts, questions or many revisions necessary to carry through.

CHAPTER XII

CONCLUSIONS

As the context of this thesis has progressed through the various recommended stages of organizational activities several factors should be reemphasized.

No program of office systems reorganization toward mechanization can become a reality without company management being fully cognizant of its obligations in return for benefits available.

Top management must be thoroughly sold on the need of a program. They must exhibit a willingness to make decisions on tough problems dredged up and placed squarely on their desks, and possess the fortitude required to see such a program through for the necessary extended period required. The more conservative and placid an organization appears, the more likely it is that it can substantially profit from such a program.

No program should be attempted without properly announcing and circulating intentions, objectives, principals involved, along with complete management support and assistance.

Organization planning means considering people who perform the functions and therefore harnessing people and functions to obtain effort at least cost in the right direction. Planning is meant to correct conditions that cause people to pull at the wrong time, or too hard or too little.

Office employees must be conditioned in many instances to accept possible projected changes. Their views, ideas and contribu-

tions must become a working reality and an integral projected part of the change.

"Activity analysis" by trained, conscientious and skilled personnel can keep internal friction to a minimum. Empire builders, jealous individuals, and opportunists exist in every organization. They must be shown the way to cooperative effort and be influenced through tact, diplomacy and management directive if necessary.

Systematic recording of all pertinent data should be maintained, facts analyzed and conclusions developed by many rather than a few. Exclusion breeds contempt, non-acceptance, disregard, and erection of hazardous road blocks.

Thoroughness leaves a minimum to chance. Learn then apply the yardsticks needed for any particularly tailored system. Be practical in the approach made and make use of all possible sources of information.

Judgmental sampling based on "feel" or "experience" must be avoided. Use of a probability survey or control sampling are both acceptable and valid sampling methods that may very well offer satisfactory solutions to problems at a minimum of cost. The statistical performance chart establishes performance norms, provides a continuing base for evaluating performance and tells where and when to look for causes of error. Statistical controls eliminate gamblers' risks and verify limits of the calculated risk.

Records, though necessary, are wasteful. Materials and labor for preparation, equipment for processing, handling labor, storage, and final disposition are all elements of expense. By establishing only

the necessary forms, their efficient processing, and centralized form storage can successfully save much in paper losses.

Costs must be factual and complete. No management wishes to be lulled by a siren song of much gain for little cost, only to realize too late that they have been duped. Many systems improvement programs have been scrapped due to this type of chain of events.

Communications are the heart of the problem of office systems as much as people are the soul. One cannot live without the other. Effective understanding and presentation of mechanization problems of conversion must be made through channels of communication. If operating personnel are not made partners in the how, why, and when of the problem little progress will result.

Conversion of a system will hold no terrors provided adequate preparations to convert have been made. Targets must be understood by all and be realistic. Efficiency of a new system should develop progressively. Don't expect the impossible immediately -- it will take time.

This has been written with the express intent of fulfilling a need for a practical approach to the problem of office systems mechanization. Hazards abound, but the accomplishments both measurable and contributory are well worth the effort.

As expressed by George W. Troost in his keynote address to the International Systems Meeting in October 1956,²¹ "In a complex society

²¹ George W. Troost, "Proceedings of the Eighth Annual Systems Meeting," Workshop for Management, Keynote Address, October 1956, p 25.

like ours, which is growing steadily bigger and more complex, there is no end to the demand for men who can see the simple pattern in a mass of detail, who can use the possibility of order in apparent chaos, and who know how to make modern machines and methods serve the needs of modern man."

It is believed that a careful and planned application of the foregoing phases of systems mechanization will result in better application of methods, improved employee morale and reduced cost of operation.

This outline is meant as an approach to the problem and does not include all possible ramifications necessary for various types of organizations. If more emphasis is given to the understanding of human problems inherent to office procedures and routines more rapid progress in systems management is inevitable.

As expressed by John K. Galbraith in *The Affluent Society*, "Human development, in other words, is what economists have long termed an external economy. Its benefits accrue to all firms; it is not sufficiently specific to any one to be bought and paid for by it."

"If the modern corporation must manufacture not only goods but the desire for the goods it manufactures, the efficiency of the first part of this activity ceases to be decisive. One could indeed argue that human happiness would be as effectively advanced by inefficiency in want creation as efficiency in production. Under these circumstances, the relation of the modern corporation to the people who comprise it -- their chance for dignity, individuality, and full development of personality -- may be at least as important as its efficiency."

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

- Becker, Esther R. and Eugene F. Murphy. The Office In Transition -- Meeting the Problems of Automation. New York: Harper and Brothers, 1957.
- Chapin, Ned. An Introduction to Automatic Computers. New York: D. Van Nostrand Co., Inc., 1957.
- Knox, Frank M. Design and Control of Business Forms. National Office Management Association Series in Office Management. New York: McGraw-Hill Book Company, Inc., 1952.
- Littlefield, C. L. and R. L. Peterson. Modern Office Management. New Jersey: Prentice Hall, Inc., 1956.
- Proceedings of the 8th Annual Systems Meeting, Workshop for Management. Systems and Procedures Association of America, 1956. Management Publishing Corp., Greenwich, Conn.

Periodicals

- Alexander, W. Marks. "Good Order Will Cut Office Cost and Increase Effectiveness." NACA Bulletin No. 38, April 1957, p 1052.
- American Management Association, Office Management Series, New York:
No. 131 "Electronics in the Office: Problem & Prospects," 1952.
No. 135 "Streamlining Office Equipment & Services," 1953.
No. 136 "The Impact of Computers on Office Management," 1954.
No. 140 "Controlling Office Production," 1955.
No. 143 "Engineering for Paperwork Control," 1956.
- Diebold, J. "False Starts in Office Automation and How to Avoid Them." Management Review, Vol. 45, November 1956, p 941.
- Dodge, J. M. "Some Marks of Successful Management." Management Review, January 1955, p 9.
- Eustis, W. "Preparing for Office Automation; Some Tips for Smaller Companies." Management Review, Vol. 46, May 1957, p 17.
- Knox, R. L. "Operation Clean-Up; Preparing for Office Automation." Management Review, Vol. 46, August 1957, p 49.

BIBLIOGRAPHY

- Neuschel, Richard F. "Was Your Report Structure Built or Did it Happen?" NACA Bulletin, November 1956, p 384.
- Seaman, Wm. H. and H. John Ross. "Computers Call for Common Sense in Office Automation." Dun's Review and Modern Industry, Vol. 68, October 1956, p 98.
- Shelton, Jr. "Laying the Groundwork for Office Cost Control," Management Review, Vol. 45, November 1956, p 941.
- Shiff, A. "You Needn't Drown in Paper; Paperwork Control to Reduce Costs and Improve Operation Efficiencies." Dun's Review and Modern Industry, Vol. 70, October 1957, p 112.
- Strong, L. "Cutting the Costs of Paperwork; A Survey of Company Practice." Management Review, Vol. 45, December 1956, p 1061.
- Zwicky, Dr. Fritz. "How to Make Up Your Mind; Total Think; Technique for Solving Problems." Product Engineering, Vol. 28, September 23, 1957, p 35.

