MECHANIZATION OF THE MAJOR ACCOUNTING FUNCTIONS OF A DAIRY PLANT

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ABSTRACT

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by Lewie C. Dodge

Office mechanization can greatly improve the cost efficiency of the office. In addition, speed and accuracy in handling accounting data are traits of mechanized systems which concern management in today's competitive industry.

Office accounting equipment was studied to determine the units that are available to the dairy industry, their practical application in dairy plant accounting and the feasibility of each to various size operations.

Costs vary directly with the capability, speed, flexibility and extent of mechanization in the system. Machines are available for rent or purchase. Maintenance is usually included in the rental fee. A limited systems study and initial operator training are included in the purchase price.

Competitive proposals from different manufacturers are suggested as a means for the purchaser to get the best systems analysis and to evaluate the service available. In some cases the service available from the manufacturer has been the only significant difference between brands of equipment.

by Lewie C. Dodge

Some of the office equipment available include accounting machines, add-punch adding machines for paper tape, microfilm equipment, punched card tabulating equipment and electronic computers. Service organizations are available on a fee basis to do accounting work on high speed data processing equipment.

Several factors other than cost efficiency frequently contribute in the decision to purchase or rent mechanized accounting equipment. Some of these factors include speed necessary to get up-to-date operating data, increased number of reports required of the accounting department, increased clerical requirements based on planned expansion and high clerical turnover.

A complete analysis should be made by a qualified individual before any decision is made to change the present accounting system. Accounting jobs which may be mechanized include employee payroll, producer payroll, accounts payable, wholesale accounts receivable, retail route accounting and general ledger accounting.

Accounting machines appear feasible for the dairy with more than 15 routes, the add-punch adding machine with the tape processed by a service organization for over 15 routes, the punched card tabulating system for an excess

of 100 routes and the desk-size computer for an excess of 50 routes. Dairies smaller than 15 routes may consider a manual pegboard system utilizing the write-it-once principle.

Office mechanization is not a substitute for good management. Only management can supply the judgment necessary to make wise decisions.

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INTRODUCTION

The high competitive dairy industry with its historically low profit margin on sales, requires constant alertness to keep costs at a minimum. Recent developments have contributed to more efficient methods in milk processing and distribution. However, the dairy office has had increased costs without the same regard for efficiency. Statistics compiled by a representative of the U. S. Department of Agriculture (26) for the period June, 1955 to June, 1960, indicate that office personnel costs per hundredweight of milk processed increased 20% whereas plant personnel costs were reduced 10%.

While office work and costs have risen in all industries, the dairy industry seems to have lagged behind the others in improving office efficiency. Because the office is a service department for the organization, it may frequently deceive management as to its effects on profit. Yet, lower costs in the office will contribute to profit just as would reduced production costs. One author stated that the office is about one-tenth as mechanized as the factory (17).

In addition to cost efficiency, the speed and accuracy of handling accounting data and the availability of reports are a vital concern to progressive dairy managements. Current business conditions require that dairy management receive accurate and detailed operating data with a minimum delay to serve as the basis for intelligent decisions.

The recent trend of the state and federal governments, which require more detailed reporting from firms to various government agencies, has also contributed to the greater work load in the accounting department.

Modern developments in the office equipment industry include systems with which to mechanize the accounting function with the goal of increased cost efficiency, speed and accuracy.

An analysis of the entire accounting system of a dairy firm will serve as the basis for any decision to adopt new methods and/or equipment with which to increase the efficiency and amount of management information obtained from the accounting function.

A complete study of mechanized accounting has not been reported for the dairy industry. The articles available in the literature on mechanized dairy accounting were quite general and each described only a specific installation.

This study was undertaken to investigate the mechanized accounting methods which could be used in the dairy industry to improve the efficiency of accounting procedures in the office to study the practical applications and to investigate and suggest criteria of size or work load necessary to make each system feasible for any particular dairy firm. The most emphasis of the study was on equipment which would be practical in the small and medium size dairies. The management of large regional and national dairies are more aware of the office situation and generally have an office specialist on the staff. Literature on computers and accounting in other industries were reviewed for basic principles which might have application in the dairy industry.

LITERATURE REVIEW

Planning for Improved Accounting

The planning of the accounting system has been described as the creative phase by Johnson (21). He suggested resourcefulness, imagination and ingenuity, coupled with solid experience as requisities for successful planning of accounting systems.

Canning (8) emphasized that it was the responsibility of top management to assign the proper people to the office mechanization project. He said, "Success (of the new accounting system) depends much more on the people than on the machines. Relative advantages of different makes of equipment are secondary to the methods by which those machines are used.

The methods are directly related to the skill and understanding of the people who lay out those methods."

The following work was suggested by Knox (23) as necessary in the pre-planning step of preparing for office mechanization: "Analyze the existing operation, eliminate non-essential operations standardizing work through combining divergent methods, identify all variations from the rule or norm, streamline procedures by improving methods,

controlling forms and records, and train supervisors to a new level of management efficiency." Knox claimed that management has been frequently amazed with the results of this self analysis and many times the need for mechanization was lessened or became unnecessary.

The type and number of reports desired by management, accuracy, speed, volume of entries, internal control and costs were the major considerations in the design of an accounting system as suggested by Johnson (21) and Hicks and Place (17).

Improved Forms

Writers for The Milk Dealer (3) described spot carbonization as, "The electronic application of hot wax to the backs of form sheets in selected predetermined areas." This method gave copies of selected information with only one writing, and no carbon paper was involved. The author also described the use of these forms with peg holes along the edge. The forms with the holes are placed on a pegboard to match up all common rows of information for easier computation. In this case, each route's load sheet was aligned on the pegboard to compute the total transactions for the day.

Johnson (21) defined write-it-once accounting as the simultaneous or automatic preparation of more than one document or record. He listed speed, accuracy, lower cost and increased internal control as advantages of the spot carbon and pegboard method of accounting.

Jernigan (20) reported the write-it-once payroll system used by his firm. By the previous, "Write it four times before you hand out the checks," method it had taken up to 2 days for a very competent woman to get out the weekly payroll for 55 to 65 payees. In contrast, using the write-it-once system the same employee frequently prepared the weekly paroll in as little as 1/2 day, including placement of the checks into the envelopes. The author concluded that write-it-once systems were very good for small and medium size operations. Machine accounting in many cases would probably be superior, but a write-it-once system may be more economical than a manual method and involves only a minimum cost in forms.

Microfilm

Lutes (25) described a system of microfilm retail billing in which the page in the route book maintained by the driver, was totaled at the end of the month, photographed,

and then mailed to the customer as the statement. The microfilm copy served as the company record. Other uses of the microfilm equipment included photographing checks, patrons' weight and test records, payroll information and sales records.

Several authors (16), (18), (25) cited benefits of microfilm retail billing. Included were savings in time, equipment, labor costs and stationery; greater customer satisfaction due to ease in reading the itemized statement; and the elimination of transcribing errors.

Ives (19) reported the savings which resulted from the use of microfilm billing. The previous policy required keeping the route books of 187 retail routes for 7 years. Microfilm allowed the storage of these route data in a cabinet 4-1/2 x 4-1/2 x 2 feet instead of the two rooms previously required to store the books. Labor savings in billing represented about 700 hours per month using the microfilm method with a rate of approximately seven route books filmed per hour.

One small dealer (4), with 300 charge customers, used an office photocopying machine to make copies of the record of sales. These were sent out as the monthly statements. The billing time was cut in half by the use of this method.

The statements were itemized by date of delivery. Each copy was prepared in 4 seconds.

Microfilm equipment is useful and economical in dairies with as few as 12 routes, as well as the larger dairies (2). The author listed prices of microfilm equipment in the range of $550 to 2,300.

Microfilm storage occupies about 1% of the space required for filing original documents according to Johnson (21).

Machines

"A change to machine accounting should be made only after a careful study of the present and future needs of the individual company," according to the authors of the MIF-IAICM Accounting System Manual (27). This manual listed four problems in the conversion to machine accounting:

"1. How far should I go with machine accounting and what jobs should be put on machines?
2. What can the savings be?
3. Will these savings pay for the machines in a reasonable time?
4. Can I keep within the scope of good accounting for my industry or will I be

forced to deviate so much that my statements will be too general for my business?"

The manual also listed several common dairy accounting applications of machine methods which included the general ledger, payroll, accounts receivable, inventory records, accounts payable or voucher register, expense and subsidiary ledgers, procurement and producers payroll and budgetary accounting.

Planning for mechanized accounting methods may involve machine posting for the small company, punched card accounting for the medium size company and data processing with an electronic computer for the large company. But, in any case, each should be an intelligently planned step into a more advanced area of office mechanization for the company concerned according to Knox (23).

Accounting Machines. (Also referred to as bookkeeping or posting machines in the literature.) Hicks and Place (17) listed the following description of accounting machines:

I. Ledger cards are inserted into machine, previous balances entered, and the machine computes and lists.

II. Date keys and other descriptive keys identify basic information.

III. Various methods of proof are used to check the accuracy of the posting.

IV. Usually debit items are posted at one time and credit items at another time.

V. The machines are adaptable for various types of bookkeeping forms.

VI. The three basic types are an outgrowth of a cash register, of an adding machine and of a typewriter.

Strickler (33), suggested the use of a National Model 31 accounting machine for payroll only, because complete mechanization was too costly. His cooperative association plant received milk from about 4,000 producers. The machine operator read directly from the route recap sheet the producer's name, milk price and volume figures. The producer's ledger, pay statement, check and check register were printed in one operation. The machine automatically figured and printed the net amount, and automatically accumulated all totals on the check register. These totals were cleared at the end of each route. This machine also handled the plant payroll of 100 to 120 employees with all records produced in one pass. It saved the time of two office employees.

Kotz (24) described his firm's accounting machine installation which handled accounts payable, general ledger

and payroll. He stated the Sensimatic accounting machine by Burroughs will produce 100 pay checks and statements per hour, complete with journal entry. Kotz also said, "A week's accounts payable work is done in a few hours."

Kapp (22) found the bookkeeping machine to be a very versatile machine. It can be used in a lot of ways to save time and labor. Operations handled on this firm's accounting machine included payroll records, producer accounts payable, check writing, posting wholesale accounts and the record of daily producer receipts. This firm has 20 retail and seven wholesale routes.

Similar uses and savings were cited by Finneran (13), Garvin (14), Pettine (31) and writers in The Milk Dealer (1).

Punch Card Accounting. Hicks and Place (17) listed the following description of the punch card system:

I. Data are punched or coded in cards which contain 80 vertical columns and 12 horizontal units.

II. The same card may be used repeatedly in preparing different combinations of data. It activates all other machines.

III. The basic operational principle is simple; the holes in the cards transmit signals to the machine

to perform such operations as add, subtract, multiply, divide, list or print.

IV. This system analyzes, summarizes and prints statistical data of all kinds; also it may be used to prepare payrolls, invoices and statements.

Johnson (21) mentioned the speed of use, reliability after the original punching and verification, and the versatility and reusability of the punched card as its chief advantages in an accounting system. Crowley (11), also mentioned that the multiple use of the punched card was the main advantage of this system.

Paulson (30) described his firm's IBM punch card accounting system. This system included a keypunch, sorter, collater, interpreter, summary-gang punch, calculating punch, and the accounting machine. The following jobs were being performed:

I. The daily route load orders were prepared from mark-sense product cards turned in by the route-men. Provisions were made for exceptions at the time of leading by use of add or credit cards.

II. Inventory control reports were prepared which indicated the volume by product and size of container.

III. Routeman's daily load settlement reports were prepared from the punched cards.

IV. Routeman's daily cash settlement reports were prepared from the punched cards.

V. Daily product sales recaps were prepared from the individual route product cards.

The chief advantages cited by Paulson for this system were:

I. The ease in which reports were obtained on time.

II. The ability to reuse the punched card.

III. The routemen had less paper work.

IV. The reports were more easily read.

V. More comprehensive reports were available at no additional expense.

VI. The cost of forms was reduced.

VII. Flexibility of equipment allowed off peak use to prepare wholesale billing, producer payroll, expense distribution registers and retail collection report, without additional expense.

He concluded that the system has proved to be both economical and efficient in operation.

According to Brill (7), a 2-day job to report by manual methods to the New York Milk Market Administrator was changed

to 2 hours with punch card accounting. This dairy with 111 retail and wholesale routes used an IBM punch card system for producer payroll, milk control board reports, route load orders, plant production report and accounts receivable for wholesale and retail routes. Three men and two girls worked with the machines in an area the size of an ordinary living room. One girl handled the complete accounting for 700 producers.

Greene (15) and Wall (34) described similar uses and savings with punched card systems.

Missimer (28) reported his firm's punched card system on which individual cow and herd milk production records were maintained in addition to sales accounting and butter-fat control.

Doll (12) stated that an important feature of punched card accounting for his firm was the availability of the complete financial report of the previous month by 2:00 p.m. on the first working day of the month.

The 125 retail drivers in Crimmins' (10) firm used the punched cards in place of the route book on the routes. He was not very enthusiastic about the results of using punched cards on the routes because of the tremendous volume of cards to be processed daily and the opportunity for error.

Electronic Computers. Bell (6) in his discussion of management control, related many current operating conditions to the analogy of the pilot whose instruments give conditions as they were 5 minutes ago, rather than the present. Bell visualized that in the future a small simple recording device would be installed in each retail milk truck. The routeman would enter the sales information for each of his customers on a keyboard which would be recorded on a continuous magnetic tape. At the end of the day the tape records from all the milk routes would be sent to a central computer which would summarize the sales for the day and update each customer's account. At the end of the month the computer would automatically prepare individual customer billings and monthly sales statistics.

Service Organizations

Collins (9) described the growing use of computer service organizations by the business community. He pointed out that the sale of computer time and technical assistance at these agencies was expected to reach 40.3 million dollars in 1961, up 20% from 1960 and nearly five times the 8.4 million dollar volume of 1956. Jobs done on the computers ranged from the dullest routine to bizarre

problem solving situations. In September, 1961, a small bond dealer underbid the Bank of America for the winning contract on 100 million dollars of bonds for California school buildings. This was the first bid challenging the Bank of America syndicate on a major state of California school bond issue since 1956. The small bond dealer had engineered the winning bid with the aid of a computer operated by a service agency. Payrolls of many firms were being handled by these service centers according to Collins. He stated that a group of doctors in New Jersey were using a computing service organization to bill their patients and check up on delinquent accounts.

Myrick (29) described the services offered by Service Bureau Corporation (SBC) for dairy route accounting. Under this system the dairy kept the usual records, but SBC did the work of assimilating the material and putting it into meaningful form. The reports prepared included the route sales and gross profit by route and in summary, product sales and gross profit by product and the routeman's account with the dairy showing cash analysis and accounts receivable.

Saal (32) continued the report with more up-to-date information on the SBC service to the dairy industry. Seven dairies in the area of Pittsburgh, Pennsylvania, were using

the service. Management of the largest dairy with 100 routes was enthusiastic about the results. This firm's union contract required a daily settlement report for each driver. Accounting costs were reduced while at the same time getting more information, faster, for management decisions.

An armored carrier picked up the daily load sheets from the dairy after the close of business and delivered them to the SBC office. At SBC the net quantities of each item on each route were punched into IBM cards. The information on the punched cards was fed into the computer which made the necessary value extensions and produced the summary cards. A summary card was made for each route which showed net sales for that route and also a summary card was produced for each product which showed the total sales of that product. Daily summary cards were combined to produce a monthly summary card for each category at the end of the month. The summary cards were placed into the accounting machine which printed the various reports. The daily reports were returned to the dairy by messenger prior to the start of the next business day. "Basically, SBC does the pricing, extension and summary of sales and costs for the dairy," according to Saal.

PROCEDURE

Preparation for this project included an observation of the dairy accounting systems being used in six dairies in the Detroit, Michigan, marketing area. Information sought included procedures, records in use, job time involved in various phases of the accounting and detailed information on machines used in the system.

Representatives of the major office equipment manufacturers were interviewed to obtain data on the machines available which could have possible application in dairy plant accounting. The interview with each representative was conducted as specifically as possible to gather data on the machines available, including machine capability, reliability, cost and the planning necessary before installation. An outline was prepared to serve as a guide in the interview (page 19).

At the conclusion of the project a recommended guide was developed for use in making an analysis of a dairy accounting system. The development of the guide was based upon the results of personal interviews with authorities on office equipment, opinions expressed by authorities in the literature and the personal thoughts of the author.

Outline Used in Accounting Machine Survey

I. Type of machines available
    Nature of the machines
    Accounting jobs handled
    Availability
    Size and appearance

II. Capability of each machine
    Flexibility
    Speed
    Storage or column capacity

III. Reliability
    Errors of the machine
    Human opportunities to introduce errors

IV. Cost
    Purchase price
    Rental
    Preparation of the program
    Installation
    Site preparation
    Forms, cards or tape

V. Necessary pre-planning by the dairy
    Skill required of the operators
    Changes required in the accounts, procedures or training of personnel
    Pre-purchase investigation

Accounting Machines

An accounting machine basically posts ledger cards with the use of carbons (or no-carbon-required paper) to record the data simultaneously on the original and subsidiary ledger while at the same time accumulating columnar totals.

Generally accounting machines are a combination of a typewriter and an adding machine with a similar keyboard and platen. The ability to accumulate columnar totals may be supplemented with various automatic actions and control features which are programmed on the program bar. The program bars control the sequence of operation for each type of job. Some models are available with four-sided program bars which permit changing among the four programs by only rotating the program bar. Other models require changing the program bar when changing the type of job. The program bar activates automatic printing of the date, printing of the balance, zero line proof, automatic opening and closing of the carriage and tabulating to the desired columns. Zero line proof or the printing of the pick-up balance serves as a check on the accuracy of the posting. Each operation that can be programmed to operate automatically reduces the opportunity for human error.

Some higher priced models include limited ability to make computations which are of value when making extensions. Also, models are available with adapters to punch the data into tape or cards as a by-product of the original recording. The accounting machine furnishes the original readable copy and the punched tape or cards may be further processed on high speed equipment to obtain additional summary reports or statistical analyses. This equipment can serve well for firms with branch offices. The original records remain in the branch, with the data sent to the main office accounting department via the punched tape or cards.

Capabilities of accounting machines vary with the number of accumulators for preparing totals. Machines are available with from two to 24 column totals. Costs of these increase with the number of column totals which are to be accumulated. The two-register machine costs about $1,800 and the 24-register machine $8,500. The computing models vary in price from $10,000 to 18,000 according to their capability and control features.

The accounting machines are most frequently used for payroll, accounts receivable and accounts payable; but they may also be used for expense or sales distribution work, government tax reports, billing, general ledgers and budgetary accounting.

Training operators for accounting machines is relatively easy if they have basic typing and accounting knowledge. No other special skills are required. Training is done on the job by the equipment manufacturer. Usually one application is taught at a time.

The following description briefly outlines the general procedure used with accounting machines.

I. The ledger card is inserted into the machine.

II. The previous balance is entered.

III. The date keys and other descriptive keys identify the basic information. With an alphabetic keyboard a description may be typed if needed.

IV. Money data are entered.

V. The machine may be programmed to compute, list, print new balance and/or accumulate column totals.

VI. A method of proof is utilized to check the accuracy of the posting. This may be a "zero line proof" (.00) or a reprinting of the pick-up balance.

VII. Usually similar items are posted at the same time (i.e. all debits at one time, then all credits at a separate time).

Generally the office equipment manufacturer will survey the customer to determine the current system, the records

required and future plans before recommending a machine and system. Thus, some of the pre-purchase planning may be done by the manufacturer as part of the selling function. Competitive bidding will help insure the dairy of the best system analysis. Preparing the program, installing of the machine and the training of the initial operator are done by the equipment manufacturer with the cost included in the purchase price or rental of the machine.

Delivery time from the decision to purchase is usually as soon as dairy management can prepare for the change. This may vary from 1 to 6 months depending on the application and the forms to be used.

Punched Card Tabulating Machines

The punched card is the basic unit in this system. The accounting data are registered in the cards in the form of punched holes. Once the holes are punched and verified as correct, each card is a lasting record which may be processed repeatedly by the machines in preparing different combinations of data.

Since the repeated use of the punched card is a key to the efficiency in this system, applications not involving any repetition in the use of the basic data may be less efficient

than those where the card is used frequently for various records, reports and summaries.

The operating principle of this system is contact brushes which transmit electrical impulses through the holes in the card to cause the machine to perform various functions such as add, subtract, multiply, divide, sort, list or print.

Several machines are used to make up a punched card tabulating system. These machines include a key punch, verifier, interpreter, mark-sense punch, reproducing punch, summary punch, tape-to-card converter, sorter, collator, accounting machine (or tabulator), calculating punch and computers. The following is a brief description of each machine:

I. The key punch is used to enter the source data into the punch cards. The operator reads the source document and by depressing keys, converts the information into punched holes in the card. Card punches are also available with printing mechanisms which automatically print the information at the top of the card directly above the hole being punched. Operating the key punch is basically the same type of function as typing or operating any other key-driven machine.

II. The verifier is a type of key punch used to check the accuracy of the original punching. The mechanics of the two major brands are slightly different. Basically, another operator depresses the keys of the verifier while reading from the original source document. The verifier compares the key depressed with the hole already punched in the card. Any difference is indicated by the machine automatically stopping or automatically inserting a colored card at the position. A card verified as completely correct is notched or a small hole placed on the margin by the verifier.

III. The interpreter translates the punched holes in the card and prints the information on the same card.

IV. The mark-sense punch automatically punches the cards from electrically conductive marks made on the card with a special pencil. This type of card may be used anywhere in the field, office or plant, as the original information is recorded with the special pencil for later punching at the office.

V. The reproducing punch mechanically duplicates the holes in one card onto another blank card. All or any portion of the information on the original card

may be reproduced and a comparing feature proves the agreement between the original and the reproduction.

VI. The summary punch is connected to the accounting machine and automatically punches selected information into cards. Generally summary punching is done to carry balance figures forward to a succeeding account and to reduce card volume and store summary data (i.e. punch monthly summary cards of sales information rather than handle daily cards for extended periods).

VII. The sorter automatically arranges the punched cards into numerical or alphabetical sequence according to the information desired. This machine gives a fast automatic method for the arranging of cards to prepare various reports, all of which may originate from the same cards, but each requiring a different sequence because of the information desired.

VIII. The collator is used to merge two sets of punched cards into one set of given sequence.

IX. The accounting machine, frequently called the tabulator, prints the reports from the data on the

punched cards. The printing may be in detail showing all information on each card or in summary by listing groups of information and printing totals. The totals are accumulated in counters and may be automatically printed on the report at the completion of a group of similar transactions.

X. The calculating punch performs multiplication, division, addition, subtraction, sign control and computation of ratios with the results being punched into the card.

XI. The tape-to-card converter automatically punches all, or any desired part, of the information sensed from perforated tape into cards.

A basic 50-card per minute installation would include a key punch, sorter, collator, reproducing punch and accounting machine. The rental on a minimum installation is about $600 to 800 per month depending upon the extent of control features programmed into the system. The rental includes maintenance. To purchase one of these minimum units the cost would be approximately $40,000. The dairy would have to contract for the maintenance. Also, by purchasing the machines dairy management faces the problem of low trade-in value if machines are changed because of expansion or technological advances.

Larger systems involve faster units (150 cards per minute) of the basic machines previously mentioned, plus a verifier, interpreter, summary punch and calculating punch. These additions plus the use of several source data machines (key punches and verifiers) will increase the monthly rental to $2,500 or more. Purchase price of such a system would exceed $100,000.

Some of the various benefits cited for the punched card system over manual methods include:

I. The increased work efficiency which is obtained from office personnel and the more efficient use of office space.

II. A higher degree of accuracy is claimed for the electronic equipment with its various built-in controls. Once the punched card is verified, there is much less opportunity for transposition or similar copying errors.

III. The increased speed levels peak work periods in the office and makes operating information available to management on a more up-to-date basis.

IV. The attractive appearance and legible printing of the statements and settlements make them preferable to those done by hand methods. The neat appearance

and high degree of accuracy tend to give greater confidence to both the customers and the drivers.

V. In systems which do the extending of load sheets and some other route accounting jobs, the accounting load is lessened for the driver, resulting in more time available to spend on selling.

VI. The flexibility and expandability of the system permits variation and growth to handle company expansion.

A major factor in the successful installation and operation of a punched card system is careful planning and programming. The planning phase by dairy management before a decision to purchase may require from several months to a couple of years depending on the degree of attention given to the project. This phase of planning will include a detailed accounting system analysis either by the competitive firms bidding or by other qualified personnel. Time lapse between the decision to purchase and actual delivery will be approximately 6 months. This is probably as soon as the preparations for the physical site can be made.

The following physical site planning guide is recommended for use 6 to 12 months in advance of the scheduled delivery of the punched card equipment:

I. The installation manual should be studied.

II. The prospective location for the machines should be determined.

III. A preliminary layout of the planned facilities should be drawn. Templates of the machines (drawn to scale) are available from the manufacturers for use in planning. These templates also show recommended space for service clearance around each machine.

IV. The planning and layout requirements should be discussed with the equipment representative. He should be informed of any special regulations or security restrictions which may be required of the installation personnel. Discussion with the manufacturer should include consideration of the following factors:

A. The adequacy of the floor space selected for the equipment should be confirmed. Consideration of the clearances required of entrances and elevators to accommodate the machines during delivery is necessary.

B. The capacity of the floor must be adequate to support the weight of these machines.

C. The electrical requirements, including the number and location of outlets, must be determined.

D. Temperature and relative humidity are important in both the machine and card storage area. Air conditioning will be necessary to maintain conditions within the optimum limits of 30 to 65% relative humidity and 50° to 90° F. temperature for card operation and storage. The equipment manufacturer will provide the information on BTU output per hour for each machine at 100% capacity.

E. Furniture, fixtures and lighting needs must be determined.

F. An engineering service area is needed for parts storage and testing equipment. A large installation may warrant a service room sufficiently large to move a machine into for repairs.

G. An adequate storage area is needed for the cards and other supplies.

H. Several safety factors which need to be given consideration during site preparation are noise level, fire resistant materials, fire prevention equipment and emergency exits.

I. Machine arrangement should be designed to give the most efficient operation of the system.

J. Arrangements for emergency use of other equipment must be made to insure continued operation during a breakdown.

V. All requirements should be checked 1 month before delivery. The physical site should be ready for the equipment by the date of delivery.

The first operating employees at the time of the installation will be trained by the equipment manufacturer as part of the installation. Of course, later employees will have to be trained by the dairy's own personnel. Prospective key punch operators should be able to type and to coordinate eyes and fingers in making precise movements quickly and accurately. The tabulating supervisor should be an individual with a background in accounting who is thoroughly familiar with the accounting needs of the firm. Generally the supervisor should attend special schools sponsored by the equipment company prior to the installation. These schools train the tabulating supervisor in the fundamentals of punched card accounting as well as the mechanics of wiring panels for programs, card design and detecting troubles.

Desk-Size Computers

Development of the desk-size computer has brought electronic data processing within the financial ability of many more firms. This computer occupies no more space than a modern office desk. The desk-size computer can be plugged into a 110 volt electric outlet and requires no special flooring or air conditioning.

The basic computer is a processing unit with a magnetic drum storage system of 9,000 digit capacity. The possible input and output components include an electric typewriter, punched cards, teletypewriter and punched tape. These devices utilize a simple plug-in coupling for quick attachment to the computer.

One manufacturer has developed a program for dairy route accounting on a desk-size computer. The net quantities of units on each load sheet are added horizontally using a comptometer. Next the vertical columns are added using an add-punch adding machine which punches the data into a paper tape. The punched tape is fed into the computer which produces the settlement sheet in a total time of 2 minutes or less for each route. In addition a new tape is produced with the new totals for the month. These data tapes can be used in calculating driver commissions and sales summaries for financial reports.

Payroll checks may also be made on the computer at a rate of 100 to 125 per hour including the necessary extensions and deductions.

Rental on this computer is $700 per month. The purchase price is $24,500. The addition of input and output accessories will increase the cost of a minimum installation to approximately $1,000 per month rental or $30,000 purchase price.

Since operator functions consist mainly of changing tapes, the simple operating procedure can be learned by a clerk-typist.

Add-Punch Adding Machines

Perhaps one of the most promising systems for high speed accounting in small firms is the development of the punched tape adding machine.

In appearance the punched tape adding machine is a regular 10-key or full keyboard adding machine with a tape mechanism incorporated which produces a punched paper tape in addition to the regular printed adding machine tape. The punched tape can be processed on high speed data processing equipment either within the firm or at accounting service organization facilities. The latter choice being for smaller

and medium size firms who could not otherwise afford a computer and its auxiliary high speed equipment. For a small firm the tape processing would generally involve only a matter of minutes of machine time on the computer.

The costs of using punched tape are lower than when manual punching of cards is necessary at the service organization. A tape-to-card converter (if the cards are needed) operates about 10 times as fast as manual key punching. However, in many examples the tape may be fed directly into the computer thus eliminating the punching and verification of the punched cards.

Because of the simple operation of the add-punch a skilled operator is not needed. The add-punch is operated like a normal adding machine with the exception of the additional code keys. Removable program panels allow the use of the same machine for various types of jobs by simply changing program panels.

The add-punch adding machine produces the normal printed tape in addition to the punched tape. The printed tape is an important control feature which proves the accuracy of the punching without further verification.

The cost of these machines is $2,000 to 2,500 per unit. The lease is $50 to 140 per month depending on the length

of term and who takes ownership at the end of the contract.

Microfilm Equipment

One of the best methods at present for retail billing appears to be the use of single copy pages in the route book, which are microfilmed before release to the customers as their statement. This method provides an itemized statement for the customer.

After posting balances to the route book for the next period, a control tape is taken and balanced to the route settlement control to insure that balances are carried forward accurately. The microfilm copy of the route book pages serves as the dairy's ledger control.

Microfilming may also be used in other office functions to reduce the volume of stored records and reports. For example, some possible uses include photographing checks, patron's milk weight and quality records, payroll information, plant production records and sales records.

Prices of microfilm equipment vary from $600 to 3,200 according to the size, speed and ability of each model. Approximately 3,500 6-inch wide statements can be filmed on a 100-foot roll of film. This results in a cost of approximately $0.0015 per statement for film and processing.

ACCOUNTING JOBS WHICH MAY BE MECHANIZED

A majority of the accounting jobs which occur in the dairy plant office may be mechanized. The extent of mechanization feasible is largely dependent upon the size of the firm.

Employee Payroll

The job of employee payroll is one which is readily adapted to mechanization. Generally on most accounting machines all payroll records, including the payroll journal, individual earning record, pay statement, check and check register, may be prepared simultaneously. The checks can also be numbered consecutively, dated and protected automatically. Total registers on the accounting machine will accumulate the year-to-date gross pay, net pay, income taxes withheld, social security withheld, insurance premiums and any other employee deductions. This information is then immediately available for posting to the general ledger, departmental expense accounts or the preparation of quarterly and annual reports of employee earnings and taxes withheld for the federal and state governments.

With a punched card system, the basic payroll data are handled on the punched card and year-to-date figures are

retained in summary cards. In many instances the check itself may take the form of a punched card which mechanizes its movement through banking channels and also the sorting and reconciliation of canceled checks by the firm.

Producer Payroll

The milk weights may be posted by an accounting machine with totals accumulated for each producer and the grand total of all producers for the month. The actual payroll writing is mechanized in the same manner as the employee payroll described previously with all records prepared simultaneously.

The punched card system retains each producer's milk weight, fat percentage and all deductions on the punched cards. The reuse of the punched card contributes to ease in making the producer payroll reports required by federal and/or state agencies in addition to actually calculating the producer payroll and hauler fee.

Accounts Payable

The accounts payable may also be mechanized on the accounting machine with all records processed in one pass. The simultaneous recording may include the remittance voucher and register, check, check register and expense distribution

ledger card. With the punched card system the check, check register and distribution to expense accounts are prepared from the data retained in the punched cards.

Wholesale Accounts Receivable

Mechanization of this function gives the wholesale customer an accurate, legible statement listing the charges and credits for the billing period. The customer's ledger card and the sales journal with distribution to product groups may also be performed simultaneously with the posting of the statement. Sales totals are accumulated and automatically printed at the completion of posting. Monthly accumulation totals are posted on the ledger control card.

With a punched card system a similar printed statement is made for the customer. In addition, the punched cards containing the sales information may be further processed for various sales analyses as may be desired by management.

Retail Route Accounting

Attempts have been made to mechanize the retail billing function of the accounting system. However, the majority of the retail billing work involves the original recording by the driver. Use of the mark-sense cards or punched product cards on the routes is possible, but has appeared

too cumbersome and results in an excessive number of cards to be processed each day.

The most efficient method at present for retail billing appears to be the use of a single copy sheet in the route book, which is microfilmed before being released to the customer as the statement. This gives the customer an itemized statement and the microfilm serves as the dairy's ledger control.

The portion of retail route accounting which involves route control can be mechanized with ledger route control cards established for each route. With this system of route control; the route ledger, control ledger and cash receipts journal may be posted at the same time.

Although retail customer billing is not feasible with the punched card system, this system does present a high degree of mechanization for route control. The daily transaction cards of each route may be used to produce:

I. A daily production report listing each item ordered by the routes and the total quantity needed for each. This report is sent to the plant and is used as a guide for production (with allowances for adds and cuts).

II. A daily cash report is prepared from route trans-

action cards. Cash totals serve as controls for comparison with actual cash or other related reports.

III. A daily load report which is sent to the cooler and is used as the order to load out the trucks. The report contains the list of items and quantities needed for each route number.

IV. A daily route settlement is prepared which lists the items ordered by the route, adds and deducts at time of loading, cash receipts and returns. This report, which summarizes his account with the dairy, is available on the following day for each driver.

V. The daily summary cards contain the totals of the transactions for the day. These may be used later in making monthly sales analyses, cost reports and the monthly Federal Milk Market Administrator's Report.

General Ledger Accounting

The mechanization of the general ledger is associated with the subsidiary accounting methods (accounts receivable, accounts payable, payroll, expense distribution, etc.) which have previously been mentioned. Generally, each subsidiary function is connected with the general ledger by simultaneous

posting or by furnishing a subsidiary control total which may be posted to the control account in the general ledger.

With an accounting machine the orderly, legible ledger cards contribute to ease in making the financial statements.

In a punched card system the data for the financial statements may be printed directly from summary cards which have been organized into the sequence desired.

SERVICE ORGANIZATIONS

Accounting service organizations are becoming available which perform accounting work on their high speed data processing equipment for a fee. The equipment available at these service agencies includes punched card and punched tape equipment and electronic computers. These agencies keep their machines busy by renting time to, or performing services for, a growing number of small and large business firms. Some of the smaller jobs may require a few minutes of computer time. But, these service centers make available fully mechanized data processing equipment to the small firm which could not otherwise afford the necessary investment and planning involved to establish such a system.

The jobs presently being handled range from routine payrolls and check writing to complicated problem solving situations such as calculating product formulations or sales predictions. Jobs which are performed infrequently, such as monthly or annually, may be economically placed with a service center since no organization can justify a computer for such infrequent use.

One national organization offers services specifically for dairy route accounting. The dairy keeps the usual

records for this system, but the service organization does the work of assimilating the material and putting it into meaningful form.

The standard load sheet may serve as the source document under this system. The dairy only needs to determine the net quantity sold. The documents are picked up by an armored carrier after the close of business, processed by the SBC center and the reports returned prior to 8:00 a.m. of the next business day. Reports prepared include route sales and gross profit for each route and in summary for all routes, product sales and gross profit for each product and the routemen's settlement statements, daily and monthly summary, including calculation of commission.

Analytical sales studies are an important by-product of this route accounting system. The daily summary cards retained at the dairy may be tabulated to evaluate the products which are being handled. With these data available to management on a current basis, better decisions may be made on sales problems. Product deletions, greater promotion of products with rising demand and budget planning are some of the possibilities.

If the dairy management does not have a cost accounting program, the use of this accounting system adds incentive

to management to determine product costs because the service organization will then be able to report gross profit by product and by route on sales reports.

Some office inefficiencies which are corrected by the service organization system include:

I. Frequent time-consuming conferences between the office and routemen are avoided by the use of the complete printed route settlement statement.

II. Errors are largely overcome through the high degree of accuracy with machine accounting.

III. Tracing errors in accounts receivable becomes easier since the accounts receivable difference reported by the routes daily automatically establishes a ledger control for each route.

At least one national service agency has a dairy specialist who studies the dairy's complete accounting system and correlates it with management's goals. The system has operated smoothly within a matter of days after installation, thus avoiding cost of running duplicate systems. With experience the service agency has resulted in savings which made each dairy's use of this method pay for itself; several users reduced their accounting costs by 25 to 40%. The service costs are based on the unit costs of the various

components of the job performed. Therefore, the rates vary with the frequency of summaries, uniformity of the dairy's product prices, number of branch summaries, etc. A minimum program with monthly summaries would cost about $20 to 30 per route per month.

For this service the dairy must be located within an area which can receive overnight service from the agency. At present this is about a 150-mile radius, depending upon automobile service.

One service organization has been described here in more detail only because it was the first service agency to develop a specific program for dairy route accounting.

Other service agencies are available in every major city that can do many standard accounting jobs for a dairy. These jobs could include employee and producer payroll, government tax reports, and accounts payable. A precaution to the dairy contacting a service agency is to find out what standard accounting jobs they have already programmed. If the agency must make a new or special program for the dairy the costs may be higher than if the program is already established.

Any dairy can probably work out a satisfactory arrangement with a local service agency. Special consideration

should be given to the use of the add-punch adding machines, previously described as an efficient means of sending the data to the service agency computer. Costs of the agency will vary with the machine time used and magnitude of the job to be done. However, the cost of computer time even at $75 to 175 per hour, usually is less expensive when considering the short work time involved on a computer that can handle 5,000 characters per second. A few minutes or an hour per month may be all of the time involved to do the necessary work. Rental may be cheaper than the purchase or lease of high speed equipment and have it stand idle much of the time.

GUIDELINES FOR SYSTEMS PLANNING

The study of the accounting records may be done by a member of the firm, if one is qualified, or by a qualified individual from outside of the firm, such as a consultant. In either case the following qualifications should be considered when selecting the individual to perform the study:

I. He should have knowledge of accepted accounting practices and procedures.

II. He should have knowledge and experience in modern management methods (i.e. management oriented).

III. He should have information on, or access to data on the latest forms, office equipment and office supplies available with which to increase office efficiency. The qualified man employed from outside of the firm will generally be better informed on various methods in use in other firms and/or other industries.

IV. He should have ability to look at the accounting system in an objective manner for the good of the whole firm, not just for the benefit of one department or segment of the organization.

V. He should have experience and knowledge of office

work simplification procedures in order to evaluate the efficiency of the present methods.

The following individuals may be sources to consider for studying, or consulting, when considering office mechanization:

I. Experts associated with the manufacture of office machines of the type being considered are usually a good possibility. Equipment salesmen usually have a limited ability in this area. Their main knowledge is about the equipment, rather than methods. Specialists on the staff of the equipment manufacturers will generally do a limited study and make recommendations as part of the selling function. Competitive bidding will serve to stimulate the best systems analysis. This becomes more important as the size of the system increases.

II. Consultants connected with the designers and manufacturers of business forms will assist in performing a study. This is the logical choice in the case of the smallest firms which may not mechanize, but rather will utilize improved forms and manual procedures.

III. Office management consulting firms can give expert advice on various problems, especially consultants

specializing in systems design.

IV. Accountants can frequently give suggestions which will increase the ease of audit and effectiveness of internal control. Dairy management considering changes should make a special effort to get the opinion of the accountants familiar with firm's audit.

The analysis and subsequent improvement of any part of the accounting system may be of some benefit, but generally the whole system should be examined with the methods given special study. If a study is made of the feasibility of one machine for a segment of the whole system, then that machine may be overemphasized with too little attention given to the remainder of the system. The speeding up of a portion of the accounting system does little good if some other segment then becomes a bottleneck. The purchase of new equipment should not be looked upon as only a way to speed up old processes. Instead, the new equipment should be coupled with new, more efficient methods that may change present personnel duties and responsibilities.

The overall study of the accounting system should include three main areas:

I. Survey of the existing system.

II. Planning phase for any recommended changes.

III. Installation of adopted forms, equipment and procedures.

Management should lay the ground rules before the study is started. The direction and scope of the study must be enumerated by stating the objectives in writing and also establishing the policies to be used. A failure to do this at the start can create problems in communications and liaison between various levels of management and the study groups (or individual). Employees may become uncertain, fearful and then noncooperative when they lack an understanding of the situation.

Survey of the Existing System

During the study of the present system every procedure and document used should be examined and analyzed.

I. The analyst must first secure copies of the financial and operating statements of the company along with information on any other reports desired by management. These basic statements should include:

balance sheet,

profit and loss statement,

production report (yields and product losses),

unit costs report,

government reports (taxes, market administrator),

and other statistical reports (sales, yields,

age of accounts receivable, ratios, etc.).

These forms and statements are examined and analyzed. Consult with top management in regard to the adequacy of the present reports and the desirability of others which may have been overlooked or thought not necessary in the past. Reports should not be established merely to pass more information on to management, but rather must answer a need of management.

II. A complete chart of accounts including detailed information on subsidiary ledgers should be obtained. The method and frequency of posting should be observed.

III. A list of the books of original entry and copies of all blank forms should be prepared. Note any inefficiencies in the recording of original information, such as repeated copying of the same data. Also, note the effectiveness of the original documents in collecting data needed for the management reports. Is too much or not enough information obtained? This study is analogous to the architect designing a

building, the top determines the amount of foundation required.

IV. The procedures manual should be studied if available. If one is not available, the procedures in use should be thoroughly observed. In any case, the procedures should be observed to check that they are being performed the same as described in the manual.

V. An organizational chart of the firm should be obtained to determine present lines of responsibility and authority. More detailed statistical information, such as aging of accounts receivable, sales analysis breakdowns, etc., will go to the lower levels of management and the summary financial statements to top management.

VI. A procedures chart should outline the lines of information flow within the firm.

VII. At this point the analyst may make a preliminary report to the management.

A. The present system appears to be satisfactory and efficient.

B. Certain areas (or the whole system) need further detailed study.

Based upon the preliminary report, the analyst and management will determine the future course of action. Unless the system is satisfactory, more detailed study of the system may be necessary to enter the planning phase. The remainder of the planning and installation should be carried out by the same persons who made the survey, since the survey was made to acquaint the analyst with the problems, and the remainder is solving the problems.

Planning Phase

Continued conferences with management will be necessary to be sure the needs and desires of management are developed into the new system. At this point, if the analyst is from outside of the firm, he may suggest to management what reports are really needed. Also, since he has just completed a detailed study of the present procedures he is probably in a better position to know the actual circumstances than management. During the planning phase the following factors must be considered in the development of a new system:

I. The write-it-once principle which is the simultaneous preparation of more than one document or record should be considered. By this method the

data is written by human effort only once (at the point of entry into the system), verified once at that point, and thereafter passes through the accounting cycle without costly and repeated verification.

II. The need of each record, report and procedure must be evaluated to eliminate all duplicate, excessively elaborate and unnecessary forms. Each form retained or newly designed should handle only the needed data. Recording more data than are needed is inefficient, and too little data will not accomplish fully the purposes of the system. Each subsidiary or supporting record has supplemental purposes in addition to its primary purpose of contributing data to a management report. For example, the sales invoices contribute information to sales records and ultimately the computation of net profit, but in addition, the invoices serve the purpose of notifying the customer of the amount he is being charged.

III. The forms, records, reports and procedures must provide accurate information or the system does not satisfy its purpose. The designer of the

system should watch for areas where errors are liable to occur and provide a means within the systems for their detection. Most errors are made by people, for example illegible writing, incorrect arithmetic, incorrect copying, lapse of memory, etc. Any procedures which can be adopted to reduce the human element, such as the write-it-once principle, will contribute to more accurate record keeping.

IV. Speed and promptness are important considerations in today's accounting systems. Competitive conditions require that management receive up-to-date operating data for use in making intelligent management decisions. This is true whether the firm is large or small. The business is literally "flying blind" if unit costs, profits, yields, losses and other vital information are out-of-date when received by management. Daily and monthly progress should be known immediately and in a form to be of value to management in making current decisions.

V. One of the functions of management is responsibility for internal control to safeguard the assets

of the owners. The American Institute of Certified Public Accountants defines internal control as, "the plan of organization and all of the coordinate methods and measures adopted within a business to safeguard its assets, check the accuracy and reliability of its accounting data, promote operational efficiency and encourage adherence to prescribed management policies." The following are some features of good internal control:

A. The separation of the record keeping function from the production operations and the cusdodianship of funds, products, supplies and equipment is a basic requirement.

B. Each transaction must pass through an ordered sequence of individual processes with control maintained by each process to check accuracy and authenticity of prior handling.

C. Establishment of individual responsibilities for specific items such as petty cash. The custodian of the document or funds is responsible and accountable for the items concerned.

D. The maintenance of orderly document control which utilizes procedures to prevent the loss of documents, such as sequence numbering.

E. The utilization of balancing methods of accounting control. Balancing methods require that quantities or amounts in the records must balance with those in other records or computed by separate means. Examples are:

comparison of the balance of subsidiary records with the balance of a control account,

comparison of calculated inventory with actual physical inventory taken by the production department,

comparison of sales units as calculated by the sales department with the units shown as produced by the production department, and

comparison of funds deposited to the bank account for a given period with funds collected for the same period.

F. The establishment and maintenance of a written procedures manual which describes in detail all of the procedures used in the system. It should be kept up-to-date with the methods in use.

G. One member of the organization is assigned internal control responsibilities. The large firm will have one or more full time internal auditors. The small firm will include this responsibility in the responsibilities of the management.

H. The services of an independent auditor should be hired annually.

VI. Cost of the proposed system will be the limiting factor in its adoption. During the planning phase a balance must be established between the cost of the proposed system and the preceding factors of reports desired, accuracy, speed and internal control. The cost factor can be examined from the immediate and indirect points of view.

VII. What is the capital outlay for the new system? Will it increase our accounting costs or will the efficiencies result in savings?

VIII. Will the new system increase profits by providing more information to management on a more current basis?

Both of the above opinions are expressed by individuals in business today. Systems are in use which created savings for the particular firm because of the increased efficiencies. There are also systems in use which resulted in higher accounting costs, but the additional and more prompt information has helped the management to make more intelligent decisions resulting in increased profits.

Before the decision is made to initiate a new system, the management must make a comparative cost analysis between the present system and the proposed system. The following illustration (21) is an example of the annual cost comparison of a business man contemplating the purchase of an accounting machine to replace manual methods in his accounts receivable department.

Old Procedure:

Salaries, 3 girls at $3,000	$9,000
Stationery and supplies	
10,000 accounts receivable ledger forms @ 1¢	100
84,000 monthly statements @ 1/2¢	420
Sundry supplies	50
Total	$9,570

Proposed Procedure:

Salaries, 1-1/2 girls at $3,200	$4,800
Depreciation on machine ($4,800 x 1/8)	600
Machine maintenance contract	100
Stationery and supplies	
84,000 combination ledger-statement forms @ 1-1/4¢	1,050
Sundry supplies	50
Total	$6,600

Calculate Period of Working Capital Recovery:

Annual savings in cost with the new system $9,570-6,600	$2,970
Add back depreciation on machine requiring no cash outlay	600
Annual increase in working capital through investment	$3,570

The period of working capital recovery is calculated by dividing the cost of the investment ($4,800) by the annual increase in working capital ($3,570).

$$\frac{\$4,800}{\$3,570} \quad 1\text{-}1/3 \text{ years}$$

A rule of thumb used by systems men is that proposed equipment should pay for itself in 1 or 2 years, or at the most 3 years, according to Johnson (21).

Cost factors which do not appear to be included in this illustration by Johnson are insurance on the machine, electricity to operate the machine, difference in floor space occupied by the two systems and difference in employee

benefit costs. These items would be small in this simple illustration, but could be large when considering a larger system. Other considerations in regard to accounting costs may also influence a firm's decision on whether to install a new accounting system:

I. Possibly a system will not quite pay for itself today, but will in the near future because of expanded production on the machine while maintaining the present office personnel.

II. Due to the increased reports needed by management and the government a mechanized system may be justifiable to avoid overtime peaks and rush work. Rushed work is more susceptable to errors.

III. Turnover among the female employees may be high enough to warrant the change to machines, thus avoiding the high cost of replacement and training.

After considering the various factors and evaluating the proposed system, management must make the decision of whether or not to purchase or rent. Assuming the decision is to purchase the new equipment, management and the systems men then enter the installation phase of the program.

Installation of the New System

The work involved in the installation phase will vary greatly according to the type of system being installed (i.e. - accounting machine, punched card tabulating system or adoption of service organization facilities). However, the basic steps involved remain the same with the different systems. The following steps are not necessarily in order of sequence since several would be taking place simultaneously.

I. The personnel must be trained in the new systems methods. Also, a continuation of management informing the personnel about the system must take place. By nature the personnel will sense a threat to their livelihood with the advent of mechanized procedures. Excellent results in sustaining employee morale have been made in organizations which have guaranteed the workers their livelihood even though their jobs may have been changed. As the system is installed the education will progress until the change-over is made.

II. The programs and procedures must be prepared and tested.

III. The physical site must be prepared for the equipment. Smaller equipment such as the punch tape, add-punch and accounting machines will require little or no site preparation. Other equipment such as punch card systems will require elaborate preparations as previously described.

IV. The necessary stationery supplies must be ordered. The systems designer should oversee the ordering of the necessary forms, cards, tape and other stationery supplies for the new system. In this connection he should see that the forms ordered have the required format, spacing and gather the required information.

V. The systems designer should write or supervise the writing of the new systems manual. All procedures must be described in complete detail.

VI. The actual installation and period of parallel procedures occurs. This period of parallel procedures can be an expensive one if carried out too long. When the new procedures are functioning smoothly, the old system should be dropped.

VII. The final report is given management, The formal systems report is not always a requirement.

However, it appears to be best that the system designer leave a final report which reviews the work accomplished, lists the chart of accounts, journals, statements and other reports and contains a copy of the procedures manual for use by management.

Office Equipment Manufacturers

Management may wish to know where more specific information on mechanized equipment may be obtained. The author has attempted to be impartial toward each brand of equipment in this study. A list of office equipment manufacturers is presented (5).*

I. Accounting (Bookkeeping) Machines:

Addo-X, Inc., 300 Park Avenue, New York 22, New York

Addressograph-Multigraph Corporation, 1200 Babbitt Road, Cleveland, Ohio

Allen, R. C., Business Machines, Inc., 678 Front Avenue, N.W., Grand Rapids 4, Michigan

Burroughs Corporation, 6071 Second Avenue Detroit 32, Michigan

Facit-Odhner, Inc., 235 E. 42nd Street, New York 17, New York

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*Address is listed only with the first entry of each firm.

Monroe Calculating Machine Co., 555 Mitchell Street, Orange, New Jersey

National Cash Register Co., Dayton 9, Ohio

SCM Corporation, 410 Park Avenue, New York 22, New York

Standard-Voss Corporation, 334 E. Weber Avenue, Stockton, California

Underwood Corporation, 1 Park Avenue, New York 16, New York

II. Accounting Machines (Punched Tape):

Burroughs Corporation

Clary Corporation, San Gabriel, California

Friden, Inc., 2350 Washington Avenue, San Leandro, California

International Business Machines Corporation, 590 Madison Avenue, New York 22, New York

Monroe Calculating Machine Co.

National Cash Register Co.

SCM Corporation

Stromberg Division, General Time Corporation, Thomaston, Connecticut

Univac Division, Sperry Rand Corporation, 315 Park Avenue South, New York 10, New York

Victor Business Machines Co., Division/Victor Comptometer Corporation, 3900 N. Rockwell Street, Chicago 18, Illinois

III. Punched Card Equipment:

International Business Machines Corporation

Monroe Calculating Machine Co., Inc

Royal McBee Corporation, 850 3rd Avenue, New York 1, New York

Univac Division, Sperry Rand Corporation

IV. Microfilm Cameras and Accessories:

Dietzgen, Eugene, Co., 2425 N. Sheffield Avenue, Chicago 14, Illinois

Eastman Kodak Co., 343 State Street, Rochester 4, New York

Griscombe Products Corporation, 133 W. 21st Street, New York 11, New York

Kalvar Corporation, 909 S. Broad Street, New Orleans 25, Louisiana

Micro Record Corporation, 487-21 South Avenue, Beacon, New York

Minnesota Mining and Manufacturing Co., 2501 Hudson Road, St. Paul 19, Minnesota

Ozalid Division, General Aniline and Film Corporation, Johnson City, New York

Photostat Corporation, 1001 Jefferson Road, Rochester 3, New York

Regiscope Corporation of America, 150 5th Avenue, New York 11, New York

Remington Rand Office Systems Division, Sperry Rand Corporation, 122 E. 42nd Street, New York 17, New York

V. Electronic Computers:

Bendix Computer Division, Bendix Aviation Corporation, 5630 Arbor Vitae Street, Los Angeles 45, California

Burroughs Corporation

Clary Corporation

General Electric Co., 570 Lexington Avenue, New York, New York

International Business Machines Corporation

Minneapolis-Honeywell Regulator Co., Electronic Data Processing Division, 151 Needham Street, Newton Highlands 61, Massachusetts

Monroe Calculating Machine Co.

National Cash Register Co.

Philco Corporation, 4700 Wissahickon Avnue, Philadelphia 44, Pennsylvania

Radio Corporation of America, Camden, New Jersey

Stromberg-Carlson Co., A Division of General Dynamics Corporation, 1400 N. Goodman Street, Rochester 3, New York

Univac Division, Sperry Rand Corporation

SUMMARY AND CONCLUSIONS

The preceding description of the systems survey illustrates the many variables to be considered in making a decision in regard to the increased efficiency of a new accounting system. Each individual firm must reach its own decision based upon the results of a study of its own situation. For some firms this will mean only an improvement in the present procedures and forms and for others it will be the installation of new equipment, forms and procedures.

The variety of factors which may influence the decision to mechanize the accounting system make it necessary to state the criteria of feasibility for the various systems in very general terms. Authorities recommend that a machine should pay for itself in at least 2 to 3 years.

Accounting machines appear feasible for the dairy with 15 to 20 routes or more. To install an accounting machine in this size dairy will require that all of the accounting functions (producer and employee payrolls, acounts payable, check writing, route controls and wholesale route accounts) be placed on the machine for it to be efficient. This system will need to save the labor of at least one office employee to be feasible.

The punch tape adding machine with the tape processed by a service organization also seems feasible in the dairy of 15 to 20 routes. This system utilizes the higher speed equipment (computers) at a service organization thus making available in a minimum of time, much more detailed reports and analysis than the simple accounting machines can accomplish.

Service organizations may also be hired by dairies without the punch tape adding machine. When the tape is not made by the dairy, the service organization will manually punch cards to initiate the data into the system. The punch tape adding machine used by the dairy is recommended as a more efficient means of getting the data into the service organization's computer:

I. The punch tape is automatically made as a by-product of adding machine work which is usually necessary anyway.

II. If punched cards are needed at the service organization they can be automatically punched on a tape-to-card converter at speeds 10 times as fast as the average manual key punch operator.

III. In much of the work, the punched tape can be fed directly into the computer without the necessity of making punched cards.

Savings resulting from the rise of service organization methods may be nonexistent in the small companies. However, the time saved may be sufficient to avoid hiring another clerk to cover peak periods or the increase in work resulting from expanding sales. In most instances the sales analysis information made available by this system can aid the smaller firm to make the best decisions to remain competitive. Some dairies now using a route accounting system of a national service organization have improve labor relations with the routemen due to the increased accuracy of the daily settlement sheet and the confidence resulting from a neutral party doing the accounting job. These benefits have resulted in the willingness of some unions to reach new labor agreements to the mutual benefit of the routemen and management.

The punched card tabulating system does not appear feasible except for the 100-route and larger dairy. With this system the whole accounting function should be programmed for maximum efficiency. The flexibility available in this type of system and the requirements of the firm will require an extensive accounting system analysis. Probably a labor saving of $900 per month will be necessary to pay for a minimum installation.

The desk-size computer appears feasible only for the dairy with a minimum of 50 to 100 routes. The 50-route dairy will need to program as much of the accounting function as possible to make the system practical. This system will require a saving of $1,000 in salaries to actually pay for a minimum installation.

The dairy smaller than the 15- to 20-route size will probably be ahead financially to use a manual pegboard system utilizing the write-it-once principle. Summary information can be easily and rapidly scanned from the overlapping sheets on the pegboard and totaled with a comptometer.

In conclusion, office equipment is available which may increase the efficiency of the accounting department. Benefits derived from the use of this equipment may include increased efficiency, more up-to-date financial data due to the increased speed and a higher degree of accuracy.

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