Cost Basis—Accounting’s “Samson’s Tresses”

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A weakening of the usefulness of accounting for financial purposes of both management and external interests—and perhaps for the internal performance appraisal activities of company management—is seen by the present author if, through the intermingling of different types of economic data, it should be shorn of the objectivity, reliability, and communicability of historical cost. The viewpoint taken is not that accounting should be restricted in its services, but that it should meet them as a comprehensible and consistent methodology.

THE USEFULNESS OF ACCOUNTING has developed in two major areas, accounting to management and accounting to the public. In considering accounting growth, managerial accounting and financial accounting must be considered together, since managerial accounting exerts pressures for modifications of accounting methodology which may affect the service of accounting to the public and because counter-pressures are exerted by financial accounting which may affect the service of accounting to management.

The basic function of accounting methodology is to produce dependable communication about the enterprise. Dependability of the data presented is important because of the varied group of parties at interest, parties which can be, and at certain times are, in direct conflict. A broad view of usefulness to all these parties must be taken because, if a narrow view of usefulness is adopted which makes accounting subservient to a particular group exerting pressure or to the requirements of a specialized use of accounting data, the service of accounting for other purposes may be seriously impaired and its total area of service substantially restricted.

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Multiplied Demands Upon Accounting

The outstanding fact with respect to the evolution of accounting is less that the growth has been in response to a need for useful information than that there has been, and continues to be, an ever-expanding group of parties at interest. Both management and the various outside interests believe they see much untapped usefulness in the methods of accounting. Since accounting is admittedly utilitarian, many believe that it should be open to change whenever a new group of potential users see possible adaptations which will make it more serviceable to their needs. Moreover, the present disturbed condition of the world, both politically and economically, increases the search for additional usefulness, since all parties are seeking a more secure basis for economic decisions.

Pressures for the adaptation of the methods of accounting continue because each group is increasingly seeking quantitative data about enterprises and because of the existence of conditions which give the impression that accounting is highly flexible. People at various levels of management, who have derived constant and growing benefit from accounting in providing for the control of operations, for the internal control of the assets of the enterprise and in furnishing some of the data necessary in making various types of policy decisions, feel as a result of their continuous experience that the methods of accounting are highly useful and very adaptable. Many laymen and specialists in other fields, not aware of the problems of measurement and of judgment in accounting and of the need for serving many interests dependably, believe that accounting is a relatively simple procedure which is easily made accurate and which, consequently, should be adaptable to the measurement and classification of all types of economic data.

The pressure for expansion of accounting methodology to embrace more types of economic data has been aggravated by the lack of distinction between the function and capabilities of the accounting and the functions and potentialities for service of the accounting methodology. Since the accountant is currently being utilized in, and proposed for, a more important economic role, many people believe that accounting can readily be modified to be of greater usefulness in making the enterprise understandable to all, thus permitting the interested and responsible parties to participate more effectively in the solution of many problems of management policy, investment, and of government planning, control, and tax administration.

Finally, a rather broad and indefinite conception of what constitutes accounting data prevails among businessmen, laymen and accountants. To many...
it is a concept broad enough to include any quantitative data processed by an accountant, including transaction data, standard costs, pertinent value data, cash and other budgetary forecasts, and even statistical adjustment of costs by means of index numbers. Some businessmen, economists, and accountants think that accounting objectives and techniques must be continuously revised to give effect to changes in economic relationships; they claim that the role of accounting in the corporate system and its potentialities in solving some of our economic problems are just beginning to be realized. Some even believe that eventually accounting can help to settle the whole broad question of bringing about economic balance by helping to change the problem of social rivalries from one of emotion to one of fact.

While high goals are set for the potential growth and service of accounting, the development of the methods of accounting and ways of interpreting accounting data have not kept pace with all these aspirations and new needs. Moreover, there is no consensus among industrial accountants, public accountants or academicians specializing in accountancy as to the extent and manner of adaptation that the accounting methods should undergo in meeting changing economic and social needs. Some have advocated various extensions of the area of service of accounting by means of value modifications of account data and interpretative adjustments of cost figures by index numbers, when necessary to supply significant information. Others contend that some adaptations already made are improper and should be discontinued in order to establish an objective base for building further usefulness.

This poses the problem of the extent and type of adaptation which accounting should undergo in order to attain maximum usefulness. In the beginning, the problems of response were comparatively simple but, with the increase in the complexity of economic life, the problems of dependable communication of information about an enterprise have become correspondingly complex. With a multiplication of uses for accounting data, questions arise as to the limitations or appropriate boundaries of accounting methodology for, obviously, accounting cannot be the one complete and ideal information source for all needs of all interested parties.

The Nature and Importance of the Demands for Usefulness

There are many types of demands on accounting for usefulness. Some of these can be met directly by appropriate presentation and interpretation of invested cost data. Other demands require for their satisfaction other types of quantitative economic data, such as special types of value, current "costs," or
future "costs." These may be used to satisfy certain demands either instead of, or along with, invested cost data. Certainly an attempt should be made to meet all these demands. The question raised is, "To what extent should these other types of economic data be encompassed in accounting methodology and expressed as account data, and to what extent should they be kept separate and distinct?"

This question cannot be answered satisfactorily unless a broad view of usefulness is taken and the nature and significance of each type of usefulness understood. The following classified list of uses indicates some of their characteristics which are important in providing an answer to the foregoing question:

1. Central and continuing uses:
   - Presentation of a dependable record of assets (productive factors), equities and income in financial reports.
   - Measurement of overall enterprise performance and the performance of functional sub-units of the enterprise.
   - Study of cost behavior to assist in cost control.
   - Internal control.

2. Auxiliary repetitive uses:
   - Budgeting.
   - Setting of standards.

3. Auxiliary special uses:
   - Special reports — Realizable value balance sheet for certain financial difficulty situations.
   - Statements showing effect of price level change.
   - Special justifications — Quantitative support for recommendations on price policy, financial policy, labor policy, and tax policy.

Cost Basis Needed for Reliability and Effective Communication

The organization of a business enterprise (or entity) is usually in one of the following legal forms: single proprietorship, partnership, or corporation. They serve the social function of bringing people together so that the efforts of groups may be combined and directed toward common objectives. It is necessary to measure separately the operating results of each entity, its financial posi-
tion and the custodianship of its tangible properties, as a unit separate from individuals or groups who provided the financial resources. This entity is a focal point of the interest of various parties. If the private economic activities of the owners, of credit suppliers, of customers or employees, were part of the accounts of a particular economic unit, this circumstance would certainly produce a blurred picture. What is needed is a distinct picture of the economic unit as such. The accountant refers to the unit for which an accounting is made as an accounting entity.

The accounting entity is an abstraction, but one definitely relating to a significant and concrete segment of the economic system. It is certainly a necessary abstraction when considered from the communications viewpoint. Accounting is part of an information service. It provides an accounting for a specific, definite entity. Without this conceptual device, an accounting for an indefinite segment of economic activity would be the alternative. Such an accounting would be impossible to prepare, undependable, and confusing or useless to the various interested parties—management, creditors, stockholders, investors, and governmental agencies. The scope of the entity concerned is basic to the understanding of any report upon it. A report of operations which was not given a title would be useless because not identifiable with an economic unit. The boundaries of the entity must always be kept clearly in mind in recording and reporting if a dependable accounting communication is to be achieved. The outline of the entity marks the boundaries of the data which should be included in its accounts and gives the principal clue to data which should be excluded. The entity device is an aid to dependability and communication and, at the same time, may serve as the basis for the distinction of data which are external to the enterprise and, therefore, different in nature. Such external data are not thereby labeled insignificant but rather as different from data which have been produced by the transactions and productive actions of the enterprise.

The idea of the entity is fundamental for the starting classification of facts relevant to the enterprise. However, it must be supplemented by other devices and procedures to support the dependability and improve the communication of accounting data. The entity device aids objectivity by establishing in an impersonal way, not subject to arbitrary opinion in each situation, the boundary for data which may qualify as account data for the particular enterprise. The further requirement of actuality, as evidenced by the committed acts of the entity in its business transactions with outsiders, provides protection against the inclusion of supposed effects on the enterprise which would tend to be highly subjective.

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The entity device and the restriction of account data to actual business transactions are facilitating factors in obtaining an adequate and independent review of the operations and conditions of a business. Since the auditor's area of responsibility is defined by the boundaries of the entity, he can develop a thorough and integrated audit program for satisfying himself that the underlying accounting records are objective and complete. The restriction of accounting data to actual, objective business transactions makes a review possible, and capable of being independent. It is impossible to review potentialities, intentions of enterprise management, and the degree of correlation and effect of external current circumstances on the individual business entity. Actuality (actions of the entity) can be reviewed because supporting evidence has been provided by the action itself. The requirement that the facts basic to accounting reports be reviewable and be reviewed, adds materially to the user's belief in their dependability since it insures greater accuracy and a minimization of the effect of nonaccounting motives.

Communication likewise is aided by the utilization of the entity device. It provides the framework for a distinct picture, but it alone is not sufficient and must be supplemented by other factors in achieving a high degree of communication. Money-price representation makes possible orderly recording and summarization and provides a means of comprehension of the extent of ownership of diverse objects and claims. Also, since money representation is in accord with the common and legally sanctioned method of measuring business activity, the nonexpert user of financial statements, along with the more qualified analysts, can derive some useful information from reports presented in familiar terms.

Consistency through time and among various enterprises aids communication by providing greater comparability. Consistent treatments and disclosure of the various classes of elements in all financial statements leads even the occasional user to a better appreciation of the basic financial aspects of business activities and their results. Consistent treatment and disclosure are more likely to occur if they are based on an integrated theory which is directed toward the achievement of the primary function of enterprise accounting—the measurement of the productive factors and the effectiveness of their utilization in accomplishing the enterprise purpose. The development of an integrated body of theory which is internally consistent is not possible if usefulness of information is the only accepted accounting objective.

In order to provide useful quantitative measurement to assist management control and protection of the various equities in all possible situations, accounting would have to encompass the entire field of value. The purposes for deter-
Determining value are so manifold that it is impossible to construct an internally consistent body of accounting theory centered about value in general. If each use of accounting information had its own set of principles and procedures, there would be greater freedom of adaptability and perhaps greater usefulness in a limited area but broader usefulness would be sacrificed. Some function of accounting must be selected as central if accounting is to have broad and continuing usefulness. If the purpose of the accounting is not clear and is subject to change from time to time as different areas of value representation are selected under the pressure of special needs and if the basic data can be recorded under several different systems and theories, it is obviously more difficult to prepare reports which interested parties can understand and interpret intelligently and in which they will have confidence as to reliability. The acceptance of a central and continuing purpose is necessary to the formulation of an integrated and internally consistent body of theory which, in turn, can facilitate the attainment of greater dependability and clearer communication.

For any individual enterprise, invested cost data have substantially different characteristics from other data related to the enterprise. They differ substantially in relevance, timing and reliability. They are more relevant to the enterprise because their relevance has been demonstrated by the committed actions of the enterprise. As to timing, they have probably affected the enterprise and are not "might-have-been," "might-be," or "will-be" effects on the enterprise. Their reliability is supported by the fact that they originated from transactions between independent bargaining units and by validating their completeness and subsequent treatment through competent independent review guided by professional standards.

The Difficulties and Dangers of Accounting for Value

One of the pressures for expansion of accounting toward what some contend will be greater usefulness involves expansion beyond the enterprise entity as the limit of relevant data. In securing a broader base of information for decisions by management or outsiders, economic information of significance can be derived from many sources. Examples are market values and liquidation values of certain assets, changes in general price level and specific price levels bearing a closer relationship to the activities of the enterprise, trends in the specific line of business of which the enterprise is a part, and the trend of business activity in the total economy.

There are constant and intermittent demands that accounting go outside of the boundaries of the entity for information of some significance to the enter-
prise entity. There is a justifiable and continuing demand for information concerning value. The market value of certain assets, such as marketable securities and merchandise inventory, is desired as significant information by banks and suppliers so that they may have better knowledge as to the degree of liquidity of the enterprise and magnitude of its liquid resources. There is an intermittent demand for information as to the value of fixed assets. This is of some importance to financial management in times of rising prices when decisions must be made concerning the retention of earnings to maintain productive resources. It is also of some importance to creditors when the enterprise is seeking additional financing through an issue of long-term bonds, especially mortgage bonds. There are also some legal situations, in which the law is involved in protecting the rights of various equity holders, which require value information of special types—current appraised value and market value to measure the magnitude of the dividend base and realizable or liquidation value under the circumstances of receivership or liquidation. Finally, economists and statisticians, in collecting data for the computation of national income, desire market value information in order to arrive at the net value added by the productive activities of each enterprise.

However, the area of interest in value is very broad and indefinite. There are many different types of value with special meanings denoted by appropriate attached adjectives (such as market, going-concern, assessed, sound, liquidation, and replacement) aiding the understanding of their precise meaning in line with the special purpose for which value is being determined. A consideration of some of the characteristics of value which are common to all its meanings, other than invested cost or exchange-price value, indicates the necessity of distinguishing other types of value data from invested cost data. Value is subjective, variable and involves an appraisal of the future. It is highly subjective because it involves the mental process of inference, which is chiefly dependent upon an individual's opinion as to the similarity of two situations in regard to the specific circumstances of time, place, identity of commodity or property, and the purpose of the valuation. It is variable because it is an expression of individual opinion dependent upon changes in surrounding circumstances and the special purpose of the valuer. It indirectly involves appraisal of the future since it is derived from anticipated demand for a product or property, expected usefulness to a present or prospective owner, or potential profit or earnings to be obtained through use or sale. It is impossible to trace through time the causes of the changes in value information relative to specific assets. Most of those causes lie outside the enterprise and are not under the control of enterprise management.
Since value is impossible to trace within the entity and account for continuously and since many types of value are not continuously significant anyway, it seems that value information can best be treated outside the accounts. To inject value information into the accounts confuses the service which accounting renders in providing information needed to measure performance and to aid in the control of operations, and thus it impairs the present and future usefulness of the account data to management and to most outside parties. Value data have significance for certain interpretative purposes, but the differences in the reliability and relevance of these data indicates that, for the broad general usefulness and long-run usefulness of accounting to management and accounting to the public, some items must be pointed out as external economic data (beyond the entity) and not of the same nature as invested cost data, enterprise accounting facts, or account data.

The Difficulties and Dangers of Accounting for Price Level Changes

Another pressure for expansion of accounting involves expansion beyond invested dollar representations to include index representations. During the inflationary years since World War II, there has been a growing belief among the users of accounting data that the information presented was less significant and less dependable because accounting measurements were in terms of dollars recorded at various past dates and that, therefore, those dollars failed to reflect the change in the purchasing power of the dollar since those times. Many businessmen, economists, and some eminent accountants have contended that the adjustment of accounting to measure the economist's idea of real income would be desirable.

The simplest way to convert a money measure into the economist's "real" measure is through use of an accepted index of the general price level. However, the immediate discovery is made that price indexes are not perfect measuring devices either. Economists admit that no perfectly satisfactory index of the general price level exists, because of poor price reporting and inadequate coverage and, also, because in theory it is impossible to construct a perfect price index no matter how much information one has.

Another difficulty encountered is the recognition that there is not one price level but many. Since any individual business does not expend its liquid resources for all the items embraced in the computation of a general price index, there is a strong argument to adjust for purchasing power in the light of the use to which the purchasing power will normally be put, that is, to use an index bearing a closer relationship to the activities of the enterprise. Thus a...
dilemma is created, since the application of a broad general index to the account data of an individual firm may result in distortion rather than significant interpretation, while the application of a more specific index selected by management makes possible some manipulation and would make comparisons between companies still more difficult than at present. Any interpretative adjustment made by the use of index numbers might be useful to management for certain purposes and helpful to the economist compiling and interpreting industry, regional and national data, but the additional complexity injected into the reporting of income would reduce comprehension of the reported data by most outside parties, since it would be a radical departure from generally understood method. Furthermore, in striving to get consistency of one type within an individual enterprise—the matching in each period of revenue and expense dollars having equivalent purchasing power—it appears that some new problems of attaining consistency among enterprises may be created unless the use of a particular index is mandatory, and that would bring its own troubles.

Most of the proposals to reflect the effect of the changing value of the dollar do not attempt to portray the full impact of inflation on the enterprise. No consideration has been given to the offsetting effect on costs and financial position due to the fact that some of the liabilities will be paid off in dollars which are cheaper than when the liabilities were incurred. Omission of such consideration not only results in failure to attain the initial objective but also in justifiable criticism by labor, tax authorities and others that such omission is the equivalent of manipulation.

It is conceded that management, during inflationary times, is indeed under the press of short-run considerations in the execution of its responsibility to administer income—the drain of taxation, the needs of financing dollar and physical expansion, the maintenance of dividends, and the demands of labor for increased wages. Having focussed their attention on these problems which demand immediate solution and being impatient with the slow processes of changing laws and of public relations, some feel that change in accounting methodology is preferable to a longer and more difficult, yet more basic and stable, solution. The management of an individual enterprise may seek tax justice by the restatement of its cost through the application of index numbers, but the same management would probably not offer to restate the dollars it owes to creditors.

Accounting methods can insure neither a business enterprise, debtors, nor creditors against risk due to monetary fluctuation. If injustice is being done to any of these because of contracts made before monetary fluctuation, it should
be alleviated by tax law change, by encouraging the use of security contracts which provide for repayment in equivalent purchasing power, or by national legislative action for revalorization of assets and debts in terms of coefficients established by relating the value of the monetary unit in various prior years when assets were acquired and debts incurred to the currently established value of the monetary unit. The means of attaining greater financial justice in times of monetary fluctuation are clearly in the field of law. Accounting is neither a short-cut to justice nor is its modification an appropriate substitute for legal modification.

If successive index number interpretations were made directly in the accounts, accounting data would gradually be separated from their basis of dependability—the actual business transactions of the entity. Furthermore, there is no way that the method of computation of an index or its applicability to the entity can be satisfactorily reviewed by the independent public accountant. If there is no reasonable assurance as to the dependability of the interpretations made, they will not be used by outside interests in making their decisions related to the enterprise and the continuing usefulness, for management purposes in measuring performance and cost control, that was in the basic account data will have been sacrificed.

In view of all the difficulties and losses in usefulness involved in price index adjustment, accounting should not sacrifice the advantages of money representation. The monetary unit is not suited for all types of economic measurement but it has much to recommend it. It is the unit in which business transactions are discussed and recorded and thus provides a logical starting point in improving understanding. Not only is a careful accounting in dollar measurements necessary to facilitate understanding and belief in dependability, but it is also mandatory as a base if any price level adjustment is to be made. A complete record of transactions and dates must be available for converting recorded dollars to a common purchasing power denominator. The limitations of money representation caused by changing price levels should be mitigated by interpretation, but any interpretation by means of index numbers should be clearly disclosed as such and kept distinct from the array of recorded accounting facts, the account data.

The Difficulties and Dangers of Accounting for Potential Costs

Another pressure for the expansion of accounting involves an expansion beyond actuality into potentiality. Management's job is guidance toward the future and so it is natural that it seeks some quantitative data as part of the
base for its guidance and as support for its decisions. Business executives feel that this can be found in a more scientific, quantitative approach to economic activities and their control. For the area of financial decisions, accounting has seemed the most readily available and adaptable technique. Hence it has had new demands for extended service and modification.

It has been contended by businessmen, economists and accountants that it is future costs (potential or replacement costs), considered along with expectations of future revenue, that are effective in business policy determination. Businessmen have persisted in their attempts to modify the conventional exchange-price account data in various ways (last-in, first-out inventory method, and depreciation on replacement cost) so that data for pricing policy and various phases of financial policy are automatically made available to them in the accounts and presented to outside parties. Management believes that, if the basic financial problem of maintaining the resources of the enterprise is presented to the various elements of the public by reflecting replacement costs in the published reports, stockholders will make more reasonable dividend demands, labor will make saner wage demands, and income tax policy will be formulated which will permit enterprise maintenance and growth.

Certain difficulties and probable losses of usefulness raise serious objections to the acceptance of potential data, such as replacement costs, into the accounting framework which is used as the basis for accounting to the public and accounting to management. One difficulty encountered is that, in order to obtain future replacement cost data, so many new variables and imponderables (highly subjective estimates as to the timing and type of replacement and the probable prices then effective) must be considered that any estimates made are of doubtful reliability. It is almost impossible to get a solution which will be dependable and be sustained by the subsequent replacement experience.

Measurement and the review of that measurement are indispensable characteristics of usefulness, especially in accounting to the public. When measurement is almost impossible, and if those made cannot be corroborated by independent review (since an examination and validation of intentions is impossible), it seems illogical and misleading to intermingle such data with the actual account data. For comparisons between companies, it is apparent that there would be a loss in usefulness, since another element of inconsistency in accounting practice would be introduced. This would arise from the considerable variety of practice in estimating replacement costs because of the varying degrees of competence, integrity, and thoroughness of study by financial management, accountants, and engineers of different enterprises.

Because management's interest in the modification sought is not only for its...
own guidance but also to develop a more persuasive argument in quantitative form to counter or minimize certain financial pressures, some slight bias and various degrees of manipulation would be inevitable. Accounting cannot be a wishful advocate of management and exert influence for the self-interests of management in the solution of enterprise problems. To be influenced by management or any other party automatically restricts the usefulness of accounting to other parties. Under the contemporary economic circumstances and the existing relationships between management and labor, management and stockholders, and management and the government, accounting modifications cannot be sought on the basis that they will enable one party to convince the others of the reasonability of its decisions. The purpose of accounting is not the advocacy of the position of any of the interested parties. Any hint of advocacy, especially in the methods selected to determine income, only aggravates any existing distrust among the various parties and leads to disbelief of the data presented.

If potential data are merged into the same framework with actual data, some losses of present usefulness occur and some new difficulties are encountered. It is obvious that accounting becomes less useful as a device for accountability. Individuals or groups of individuals with financial responsibility can only be held accountable for their actions, not for what they might have done, for their intentions, or for actions or conditions external to their prescribed area of responsibility. Serious loss would also occur in a type of usefulness of constant importance to management, that is, the determination of cost performance and the responsibility for that performance. The mixing of actual and potential data in the accounts would seriously impair the validity of the data and its interpretation through study of cost behavior as the basis for any control action to be taken in regard to men or materials.

Moreover, modification of accounting methodology to include replacement cost data does not provide a real solution to two aspects of the basic problem of maintaining the resources of the enterprise. One aspect is that of convincing certain distributees that there is a justifiable need for retaining earnings. Under contemporary circumstances, such accounting modification would only aggravate distrust of management and disbelief of the data presented. The second aspect is that of replenishing or increasing the dollar resources of the enterprise. If the resources of the enterprise are to be maintained in the sense that liquid resources will be available for the replacement of existing inventories and productive facilities, there is a problem of proper pricing policy so that revenue assets will provide additional dollar resources, or a problem of financial policy to provide new sources of additional dollars through bond or stock issues. A change in accounting policy will not provide additional dollars. Since the in-
clusion of potential data within the accounting framework cannot provide direct solutions to management pricing and financial problems and such inclusion would cause serious losses of existing usefulness, the distinction between actual enterprise data (account data) and potential enterprise data is appropriate and necessary.

**Satisfying Varied Needs by Distinguishing Types of Economic Data**

After consideration of these various types of expansion of the services of accounting, it becomes increasingly clear that some of the concepts and methods which have been put forward in the name of making accounting more serviceable are capable, if adopted, of impairing the primary services which accounting has been rendering for a long time. There is a real danger that, without a critical examination of suggested modifications, the core of accounting usefulness may be extracted in a blind search for more extensive usefulness. Since accounting cannot meet all the individual needs for information fully, its primary communication function should be to present dependable and basic information about the enterprise, which can be of substantial usefulness to all interested parties.

The reason for existence of enterprise economic units is to serve some productive purpose. Hence, creditors, investors, employees, consumers, and the government have a continuing interest in the manner in which this productive purpose is carried out. If a maximization of usefulness of accounting is sought, it seems that all parties can be directly or indirectly served, without prejudice to the information needs of any, by presenting facts concerning the accomplishment of the enterprise productive purpose—the details of actual expenses, losses and revenues, and the net income result. Inasmuch as some of the parties using income statement information have opposing interests, it is important that the elements of income determination be measured as objectively as the internal factors of dependability, combined with professional competence and judgement, can make them. Dependability cannot be achieved if value modifications, index number interpretations, and potential cost figures are intermingled with the account data which have important differences as to timing, reliability, and relevance.

Critical examination of the modifications advocated not only reveals the possible dangers of such expansion but suggests alternative means to satisfy the fundamental objectives underlying the pressures for expansion. The proper approach to establishing a framework which will provide for the maintenance of present usefulness and will provide the basis for meeting expanded needs.
is to stake out carefully and clearly the boundaries of the area of service of accounting and the information it properly channels and summarizes and to delineate the other types of economic data which are of some significance to an understanding of the enterprise but which have important differences in the characteristics of timing, reliability and relevance. In this connection, most literature uses the term, accounting data, quite broadly. If the data are quantitative, useful and prepared by accountants, they are referred to as accounting data. Thus, the term has gradually embraced economic data of widely varying characteristics. By making all interested parties aware of the different characteristics of these economic data, more effective communication can be accomplished and greater confidence in the dependability of the basic accounting information can gradually be established. Therefore, it is recommended that the different types of accounting data be carefully distinguished. These distinctions, can be broadly summarized into the following three:

1. Account data—those data generated by the transactions and the operating actions of the enterprise.
2. Potential enterprise data—those data which are useful to management and internal to the enterprise but which are generated by prediction, such as standard costs and replacement costs.
3. External economic data—those data which are useful in interpreting account data but which are beyond the scope of actions and responsibility of the enterprise, such as value data and index numbers.

Accounting methodology, especially for accounting to the public, should be delimited to deal only with account data. This will emphasize to all parties that accounting provides primarily account data which has special qualities related to dependability and communication which have been developed out of long experience and cannot be dispensed with without serious loss in usefulness. Accounting should meet the new and expanded demands for service by improving its presentation of the actual enterprise account data and by correlation of these with potential and external information which are deemed to be of significance in interpreting current financial status, financial needs, and results of operations. This correlation can be accomplished either through additional columns inserted in traditional statements or through supplementary interpretative analyses which are tied into and reconciled with the basic accounting statements.

This approach to usefulness is substantially, but not sufficiently, recognized in practice. The fact, that certain departures (the use of cost-or-market valuation, depreciation on replacement cost, the last-in, first-out inventory method and accelerated depreciation regardless of the physical facts of operation) have been practiced rather widely, has brought accounting under severe criticism. Proposed modifications and excursions for some data beyond the entity and
into the external, beyond the immediate past and into the future, and beyond money-price representation to statistical index number representation would further impair belief in dependability and cause serious losses in types of usefulness which accounting has been rendering for a long time.

In order to restore and maintain belief in dependability, the statements presented to the public must clearly rest on a base which is as objective as the factors of dependability and competent professional judgment can make it. That base should be composed only of account data. Once dependability is established, then the expansion of usefulness is possible by teamwork with those working in neighboring fields (economics, statistics, and law) through providing as distinct data those items which will enable them to implement their concepts and methods to attain their special nonaccounting goals.

In essence, it seems that accountants would be wise to enter rapidly upon such modifications of their art as would make it more understandable and dependable without changing its fundamental base or function, and that they could profitably engage in a continuous, well-considered effort of public relations designed to explain the nature, boundaries and service of accounting methodology in accounting to the public and accounting to management. An increased understanding of the characteristics necessary for the primary service of accounting in providing dependable communication about the enterprise, especially in relation to income determination and the measurement and control of performance, and an increased understanding of the resultant necessity for distinguishing between account data, external data, and potential data, will help clarify to all users of accounting data the types of primary service and auxiliary service which can be rendered by accounting.
Faster Depreciation—The Glitter’s Not All Gold
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Under the Internal Revenue Code of 1954 you can have higher depreciation charges in the early years of life of new assets—if you want them. The author of this article particularizes the advantages but also makes it clear that they are both mixed and contingent. A company may or may not, after consideration, wish to try for added working capital that way. If it does, the author suggests, it may wish to tailor its records to avoid arriving at misleading costs for managerial purposes.

Some industrial accounting subjects are like classical symphonies. They are always good, always enjoyable to persons who know something about them, always permit some variation of interpretation by the performer and the listener, and always generate some discussion after the presentation. One of these subjects is depreciation. With the enactment of the Internal Revenue Code of 1954 we have developed variations on the theme and the discussion has reached the highest volume and pitch of all time. The opening movement is in a bright and lively major key—the taxpayer has gotten a break and general business will be stimulated. The theme is so pleasant that few have paused to examine the complete score. Is it possible that the later movements could be pitched in a low and doleful minor key? Let’s try to look ahead and thus avoid surprises.

The changes in the code pertaining to depreciation center first on Section 167(b) the “use of certain methods and rates” and secondly on Section 167(d) “agreement as to useful life on which depreciation rate is based.” It is the former with its related paragraphs c and e which is generating the greater part of the discussion and which presents many problems. The latter, Section 167(d), may involve difficulties and delays in entering “into an agreement in writing specifically dealing with the useful life and rate of depreciation of any property.” But once agreement is reached, the rate cannot be changed retroactively by the Internal Revenue Service. It may, under certain conditions, be changed for a current year and future years by either party to it by serving notice in writing to the other of a proposed change. There appear to be no minor chords in this.

Faster Depreciation Permitted, and Selectively, Too

There seems to be a general assumption in business circles that a rapid depreciation of fixed assets is desirable. Therefore, when the code was enacted con-
### Exhibit 1

Comparative Annual Depreciation Allowance and Remaining Values

<table>
<thead>
<tr>
<th>Asset Costing $10,000 - No Salvage Value</th>
<th>20 Year Life</th>
</tr>
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<tbody>
<tr>
<td>Asset Remaining Value</td>
<td>20 Year Life</td>
</tr>
<tr>
<td>DECR. BAL. AT 10% PERCENT.</td>
<td></td>
</tr>
<tr>
<td>Remaining Value</td>
<td></td>
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<td>Period</td>
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### Example:

<table>
<thead>
<tr>
<th>Year</th>
<th>Dep. Allow.</th>
<th>Remaining Value</th>
<th>Period</th>
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### Effectiveness

The table above demonstrates the effectiveness of the fixed depreciation method. By applying a straight-line method, the asset's value is reduced evenly over its useful life, allowing for a consistent amount of depreciation each year, putting the asset's value at a zero balance after 20 years.

This method is particularly useful for fixed asset groups where the assets are expected to depreciate uniformly. The example provided illustrates how this method works in practice.
attaining specific approval in Section 167(b) of the declining-balance method and of the sum of the years-digits method, in addition to the straight-line method, there was great rejoicing, and it continues. Any other consistent method may also be used if the allowances do not, during the first two-thirds of the useful life of the property, exceed the total of such allowances which would have been used had such allowances been computed under the declining-balance method. Thus, the interest, annuity, sinking-fund and other less generally used methods are not outlawed if they meet the test of limitation of allowances. For all practical purposes, the problem for most companies is the selection of one or more of the three methods which are specifically named.

When individual item property records are maintained, it is not necessary to use the same method for each asset. Some could be on straight-line, others on declining-balance and still others on sum of the years-digits. With group accounts, different methods may be used for different groups. Also, the selection of the method of depreciation can be made each year for the acquisitions of that year. However, the method chosen for items or groups acquired in a year must be continued for those items or groups for their entire life, except that, where the declining-balance method is selected, a change may later be made to straight-line. Once such a change is made, the straight-line method must then be followed for the remainder of the life of the item or group.

Many tables and charts have been published comparing depreciation rates and allowances under the three methods. As a basis for further discussion, Exhibits 1 and 2 to this article show the annual depreciation allowances and remaining values for two assets under the three methods. For simplicity, annual depreciation is calculated in these to the nearest ten dollars.

Effect on Cash — It Depends

The advantage of rapid depreciation is the rapid recovery of cash invested in fixed assets. Obviously the recovery and retention of cash must come through the saving of taxes on income resulting from the higher depreciation charges reducing taxable net income. If losses should be incurred which extend over the allowable carry-back carry-forward period, there would be no advantage in computing depreciation allowances under either the declining-balance or sum of the years-digits methods as against using the straight-line method.

There will be no difference in total cash recovery over the life of an item or group, regardless of the depreciation method used, if tax rates do not change. The only difference will be in time of recovery.

However, if a company is constantly investing in new assets, a switch to a
more rapid method will result in a permanent addition to cash, if it earns a profit over the entire cycle. Exhibit 3 shows the comparative cash saving resulting from using the declining-balance method for ten years and then straight-line for the remaining ten as against using straight-line and also for sum of the years-digits versus straight-line. This illustration is based on acquisitions of $10,000 per year for a twenty-year period, which is also the life of the assets. The differences in depreciation are based on Exhibit 1. There is a build-up in the differences because new assets are acquired each year. For example, under the sum of the years-digits, in the third year there would be depreciation allowances of $950 on the additions of that year, $910 on the additions of the second year and $860 on those of the first year, or a total of $2,720, as compared with $1,500 total under the straight-line method. In the twentieth year, when the cycle is completed, there is no difference in the total allowances under either method.

By using the declining-balance method for the first ten years of each year's acquisition and then switching to the straight-line method for the last ten years of each year's acquisitions, cash is increased permanently by $10,760. By using the sum of the years-digits method, cash is increased permanently by $16,453. In both instances, there is assumed to be no change in the tax rates.

There have been statements that the permissible more rapid depreciation is particularly advantageous to a small business. However, a business which does not get into the higher tax brackets has less tax saving. At a 30 percent tax rate, rather than a 52 percent rate, the permanent savings in cash would be reduced from $10,760 to $6,208 and from $16,453 to $9,492 respectively.

Selection of Method Requires Balancing Considerations

Still assuming that a rapid depreciation of fixed assets is desirable, the first problem is that of choosing between the declining-balance and the sum of the years-digits methods.
years-digits method. The illustrations show that, after the earliest years, greater amounts are allowed under the sum of the years-digits. The number of years during which the declining-balance method will result in the greater allowance will vary with the life of an asset, but is always a small portion of the total years of life. Also, the sum of the years-digits results in a complete write-off of the asset values. In contrast, there is a remaining value at the end of the useful life of the assets under the declining-balance method. This must be written off at that time if the asset is scrapped, resulting in a high charge against operations in that year. Therefore, the weight of evidence is in favor of the sum of the years-digits for rapid write-off of cost.

However, there is one further and important consideration. The law permits a taxpayer using the declining-balance method to change to the straight-line method at any time. If the twenty-year life asset is depreciated on the declining-balance method for ten years and then switched to straight-line, the annual depreciation in the last ten years would be $349 which, for the next three years, would be less than that for the same years under the sum of the years-digits but then would be higher and would completely write off the cost of the asset. A switch to straight-line for a twenty-year life asset after the eleventh year would result in slightly higher annual depreciation than taken in the years immediately preceding the change. This effect will occur in other years for assets having shorter or longer lives. Thus, by changing from declining-balance to straight-line, the disadvantage of not realizing a complete write-off of the asset can be overcome.

The fact remains that the sum of the years-digits provides more rapid recovery than does declining-balance, even when the latter is switched to the straight-line method at or after the middle of the life of the asset. But, when the sum of the years-digits method is selected, it must be used for the life of the asset. If business conditions change for the worse, it may be that a company cannot absorb the higher depreciation charges and still earn a profit. For assets on the declining-balance method, a switch to straight-line could be made so as to reduce the annual depreciation charge. This flexibility has great intangible value and should be given great weight in the selection of the method of depreciation.

The choice must be made on the basis of the relative desirability of flexibility under the declining-balance method and the more rapid recovery of cost under the sum of the years-digits method.

What If Future Holds Higher Tax Rates (or Excess Profits Tax)?

Since future tax rates are absolutely unpredictable, the decision to use rapid depreciation is fraught with danger. Suppose a small business had one machine
<table>
<thead>
<tr>
<th>Acquisitions of $10,000 per Year with Average 20 Year Life Over a Twenty Year Cycle</th>
<th>COMPARATIVE CASH SAVING OVER STRAIGHT LINE DEPRECIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Depreciation Allowances</td>
</tr>
<tr>
<td></td>
<td>Cumulative</td>
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<tr>
<td>End of Year</td>
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<td>20</td>
<td>500</td>
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</tbody>
</table>

The table above shows the comparative cash savings over straight line depreciation for different acquisitions of $10,000 per year with an average 20 year life over a twenty year cycle. The table compares the cumulative depreciation allowances with the tax saving level rate.

It is important to note that taxes on the sale of assets at the end of their useful lives will have a significant impact on the overall cash savings. Proper tax planning and management are crucial in maximizing the benefits of depreciation allowances.
which cost $1,500 (Exhibit 2) and decided to use the sum of the years-digits method. Also suppose the tax rate remained at 30 percent for the first three years and then was increased to 50 percent. In the first three-year period, because its costs were $300 higher than they would have been under straight-line depreciation, the company would have saved $90 in taxes. For the fourth and fifth years, its costs would have been $300 lower and it would have paid $150 more taxes. For the five-year period it lost a tax and cash advantage of $60. Multiply this by many assets and the disadvantage becomes significant.

The probable trend of tax rates is a major factor to be considered in deciding to use any method of depreciation which gives a faster write-off than does straight-line. If rates will be lower in the future, rapid depreciation in the next few years will be very advantageous. If they will be higher, it will be most disadvantageous.

Then too, consider the possibility of another national emergency which would bring the imposition of excess profits taxes. If higher depreciation charges were taken over the immediate future years and these years should be base years for computing the excess profits tax exemption, the result would be a lower exemption. At the same time, the acquisition of new property may be seriously curtailed during an emergency. Thus the business would not have higher depreciation on new assets to offset lower depreciation on older assets. The result, other conditions being equal, would be to show higher profits with a lower exemption and higher tax rates.

It must be recognized that higher tax rates, and particularly excess profits taxes, could soon dissipate the cash saving which resulted from more rapid depreciation. In fact, over a period of years the result could be the payment of substantially greater taxes.

The Reduction in Net Income May Hurt

Although the fact is that cash can be saved through more rapid depreciation if tax rates remain the same or decline, it must be recognized that profits after tax will be reduced. Such reduction is the difference between the excess depreciation over straight-line method and the tax saving. Based on the figures in Exhibit 3, the use of declining balance for ten years and then straight-line would have reduced profits after tax a total of $9,935 over the twenty-year period, an average of $993 per year. Under the sum of the years-digits, they would have been reduced a total of $15,187 or an average of $1,518 per year.

For the small, closely held company a reduction in after-tax profits may be a small price to pay for cash in the bank. For the large publicly-owned company, lower reported profits could have a marked effect upon equity financing and also
EFFECT OF ALTERNATE DEPRECIATION METHODS COMPARISON WITH STRAIGHT LINE

<table>
<thead>
<tr>
<th>Depreciation Method</th>
<th>Cash Increased</th>
<th>Interest Cost Saved</th>
<th>Profit After Tax Would be Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declining balance depreciation for twenty years</td>
<td>$8,300</td>
<td>$2,112</td>
<td>$5,548</td>
</tr>
<tr>
<td>Declining balance depreciation for first ten years and straight line for last ten years</td>
<td>10,760</td>
<td>2,241</td>
<td>7,694</td>
</tr>
<tr>
<td>Sum of the years - digits depreciation for twenty years</td>
<td>16,453</td>
<td>2,995</td>
<td>12,192</td>
</tr>
</tbody>
</table>

(A) Reduction in profit after tax resulting from higher depreciation less saving in interest cost after tax.

EXHIBIT 4

upon the appraisal of management performance. Suppose a large company was spending ten million dollars a year for capital additions, then the average annual reduction of after-tax profits, instead of being $993 or $1,518 per year as noted above, would be either $993,500 or $1,518,700 depending on the depreciation method. For most large companies, this would be a substantial reduction and would give pause for consideration.

It must be remembered that, under a 30 per cent tax rate, for every thirty cents added to cash, seventy cents is being taken from after-tax profits. With a 52 per cent tax rate, every fifty-two cents added to cash means forty-eight cents taken from after tax profits. There is a penalty to the stockholder for more rapid recovery of cash through more rapid depreciation.

The Price Tag on Rapid Depreciation

Although the preceding discussion injects many intangible factors into a consideration of rapid depreciation, it is possible to summarize the tangible factors. The objective of rapid depreciation is rapid recovery of cash. It is stated that this more rapid recovery will stimulate the economy by permitting earlier replacement of equipment with more efficient equipment or, if replacement is not desirable, will provide funds to be invested in other equipment to increase productive and earning capacity. Probably the first statement is questionable. If asset lives have been established with proper consideration of wear and obsolescence, there may be great reluctance to replace a machine which has a relatively low depreciation cost. The second statement is of greater importance in an expanding economy.

Expansion of productive capacity then becomes a choice of securing the needed funds through tax savings resulting from higher depreciation as against borrowing such funds. Exhibit 4 shows the "price tag" on securing the funds...
through rapid depreciation. The illustration is based on capital additions of $10,000 per year for twenty years. It is assumed that the cumulative cash secured through tax savings at a 52 per cent rate is needed and would be borrowed at 3\(\frac{1}{2}\) per cent interest if it were not provided by rapid depreciation. For example, Column 3 in Exhibit 3 shows a tax saving or cash increase of $260. If this had been borrowed at 3\(\frac{1}{2}\) per cent the interest cost would have been nine dollars. The second year $728 is available which, if borrowed, would have cost $25 or a cumulative total interest cost of $34 for the two years. Continuing, in the nineteenth and twentieth years, $10,760 would be borrowed at an interest cost of $377. The twenty-year cumulative interest cost is thus calculated for each depreciation method and reflected in Column 2 of Exhibit 4 as a net amount after 52 per cent tax, since interest costs are deductible for tax purposes.

The question to be answered is "is it worth a reduction in after-tax profit of $5,548 or $7,694 or $12,192 to secure, without borrowing, added cash of $8,300 or $10,760 or $16,453 respectively?" Borrowing capacity is an important consideration. Another is dilution of stockholder interest by debt. Another is the possibility of lower dividend payments because of lower after-tax profits. The accountant can calculate the "price tag" for rapid depreciation. Management must decide whether or not it is too high.

**Will Higher Early-Year Depreciation Give Costs for Pricing?**

Another pertinent question with respect to rapid depreciation is whether the higher depreciation charges should be included in costs used for setting sales prices. Obviously, after-tax profits will not be affected adversely if the higher depreciation can be recovered through higher sales prices. However, when competition is keen, it is questionable if this can be done.

Suppose two companies begin operations in 1954. The first elects to use declining-balance depreciation and the second to use the straight-line method. Each has identical costs other than depreciation, has the same equipment, and uses a markup on cost of 20 per cent to cover selling and administrative expenses and profit. In the first year, the first has a unit depreciation cost of $8 and the second of $4. Other factory costs are $96. The first arrives at a total cost of $104 and a selling price of $124. The second has total costs of $100 and a selling price of $120. Who will get the business in a competitive market?

Now, suppose instead of two companies these were two plants of the same company, one which began operations prior to 1954 and the other in 1954. Which cost should be used as a basis for pricing? If the plants are selling in different territories, possibly one could have a higher sales price than the other.
If it did, and since each was taking the same markup on cost, the one with the higher cost would have the higher dollars of profit. Would that mean that it is the better plant from a management appraisal view-point? In the second year, the difference will be less and, in time, the costs of the first plant will be lower than those of the second. Should its sales prices be reduced as depreciation costs decrease?

The above questions do not have a ready answer, even though the preceding suppositions are over-simplified in that two separate plants were used. The problems become more acute when facilities are added to existing operations. Thus, in one production center, there can be equipment acquired prior to 1954 which is being depreciated on the straight-line method and other equipment acquired in or after 1954 being depreciated on one of the more rapid methods permitted under the 1954 code. Thus depreciation calculated under two or more methods becomes intermingled and inseparable in the cost picture.

The problem of which method of depreciation to reflect in product cost cannot be ignored on the basis of immateriality. A survey of the published reports of a number of corporations showed that depreciation ranged from about two per cent to about eight per cent of total factory cost. For those in the lower ranges the increase in cost, resulting from more rapid depreciation of new acquisitions, when averaged with the substantial amount of fixed assets, acquired prior to 1954, may be insignificant. For those in the higher ranges, it would be noticeable and would have an effect on costs used for pricing. But in both instances corporate averages are being considered. In actual practice the impact would be on specific production units and specific product lines, and most likely in new and growing lines. In these it would be material.

It does seem that the adoption of more rapid depreciation methods by any company, large or small, will call for two sets of depreciation records to provide the solution to cost-price problems. One would be based on straight-line depreciation and would be used for cost determination. The other based on a more rapid method would be used in tax determination and corporate financial statements. This would entail extra clerical cost and this cost should be estimated and become a factor in arriving at a decision as to the depreciation methods to be used.

**Will Higher Early-Year Depreciation Give Costs for Management?**

The final major problem is that of the effect of more rapid depreciation on internal reports used to appraise management effectiveness by product lines, plants, divisions or other units of a company. At the corporate level, a company may be spending a relatively constant sum per year for capital additions. Within

*N.A.C.A. BULLETIN*
units of the company expenditures are usually anything but constant. A major addition will be made in one unit one year and in another the next. A product with a level sales trend will have few major capital requirements. One with a rapid growth trend will have frequent major additions.

Then, too, profitability by product lines varies considerably, as does the relative significance of depreciation as a component of total cost. A narrow-profit product produced on a highly mechanized line could well be changed to a losing product if a major addition to or replacement of equipment were made in the production line and depreciated more rapidly than under the straight-line method. In contrast, for a wide-margin product with little mechanization, the change would barely be noticeable in costs and profit.

The impact of rapid depreciation is felt not only in the cost of a product but also in the book value of assets used to produce it. With the increasing acceptance of the return on investment as a measure of performance, with book value of assets assigned to a product or plant used as investment, the measurement problem is compounded by rapid depreciation. Costs and investment are both relatively high in the early years following capital additions and relatively low in the latter years. Thus, fluctuations in return on capital investment are created by accounting methods.

Exhibit 5 shows the effect of a major replacement on cost, profit and return on investment. In the last year before replacement, a major machine has a remaining value of $5,000 and annual depreciation of $1,334. It is replaced with a new machine costing $100,000 and having a useful life of twenty years. All other cost and investment items are assumed to be unchanged. Depreciation and property, plant and equipment are changed to reflect the elimination of the old machine and its replacement by the new one. For the latter, depreciation and remaining value are taken from Exhibit 1 multiplied by 10 to make them relative to a $100,000 asset. At the end of the first year after replacement, the return on investment is seven-tenths of a percentage point lower if the sum of the years-digits is used rather than straight-line for the new machine. At the end of the tenth year, it is eight-tenths of a percentage point higher under sum of the years-digits depreciation because of lower depreciation and remaining value at the end of that year.

Experience has shown that a tenth of a per cent change in return on investment is considered important, particularly when it changes the position of a product or other company unit in relation to the return of others. Thus, the manager of the unit in the illustration would be reluctant to agree to sum of APRIL, 1955 1037
COMPARATIVE EFFECT OF DEPRECIATION METHOD ON RETURN ON INVESTMENT

Major Machine Replaced in Production Line at Cost of $100,000 with Life of Twenty Years

<table>
<thead>
<tr>
<th>Before Replacement</th>
<th>END OF FIRST YEAR AFTER REPLACEMENT</th>
<th>END OF TENTH YEAR AFTER REPLACEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacement of Straight Line Years - digits</td>
<td>Replacement of Straight Line Years - digits</td>
<td>Replacement of Straight Line Years - digits</td>
</tr>
</tbody>
</table>

| Annual Sales | $400,000 | $400,000 | $400,000 | $400,000 | $400,000 |
| Costs other than depreciation | $344,000 | $344,000 | $344,000 | $344,000 | $344,000 |
| Depreciation | $66,000 | $66,000 | $66,000 | $66,000 | $66,000 |
| Total Cost | $410,000 | $410,000 | $410,000 | $410,000 | $410,000 |
| Profit before Tax | $90,000 | $90,000 | $90,000 | $90,000 | $90,000 |
| Profit after Tax @ 52% | $46,500 | $46,500 | $46,500 | $46,500 | $46,500 |
| Investment | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 |
| Cash, Receivables & Inventory | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 |
| Property, Plant & Equipment | $100,000 | $100,000 | $100,000 | $100,000 | $100,000 |
| Total | $200,000 | $200,000 | $200,000 | $200,000 | $200,000 |
| % Profit on Sales | 4.5% | 4.5% | 4.5% | 4.5% | 4.5% |
| Return on Investment | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% |

*Includes $1,334 annual depreciation on old machine having remaining value of $5,000 and to be replaced.

EXHIBIT 5

the years-digits for depreciation because it would affect his return on investment adversely in the earlier years after replacement. It could be pointed out that he will have a better return in later years. But he may not be manager of the unit when changes in tax rates may cancel out the later advantage, or other events may occur to change the picture. Greater weight, rightly or wrongly, is given to the immediate future than to a long span of years. If company policy is to use rapid depreciation, it can deter replacement and expansion. A manager may prefer to retain old equipment or hold his production capacity level rather than have the rapid depreciation of new equipment reflected in his results.

With replacements and additions occurring at different times in various units of a company, it will be a long time before all assets of all units are on the same method of depreciation. Then, too, for policy reasons at the corporate level, it may be decided to use straight-line depreciation for all acquisitions of certain years. These factors will combine to distort comparisons of the performance of company units.

It would seem that, for internal reporting as for cost determination for pricing, two sets of records are desirable. Then costs and remaining values of assets could be reflected on the straight-line depreciation method for all units at all times. The sum of profits and investments of the units would not equal the company total. At the company level, there would be more or less profit and less investment. Just how much confusion would be created in reporting to top management with the whole not being equal to the sum of its parts will depend upon circumstances in each company.

N.A.C.A. BULLETIN

April 1950
Two Depreciation Records — and a Reserve for Future Taxes

Fortunately, it is possible to have your cake and eat it too. The answer lies in two sets of records and special accounting treatment. The foregoing problems all arose from the fact that the difference between straight-line and more rapid depreciation would be reflected in the accounts. That is, the cost accounts would be charged with depreciation on the more rapid methods and the provision for depreciation would be credited. However, with two sets of property records—and it appears that these are needed regardless of final accounting treatment—there is an alternate and very desirable accounting procedure.

Under the alternate treatment, depreciation charges would be reflected in costs and at the corporate level on the straight-line method. The property, plant and equipment asset would be reflected on the balance sheet at cost less provision for depreciation on the straight-line method.

A separate computation of depreciation on the more rapid methods would then be made and this would be taken as depreciation on the tax return. Of course, this deduction must be supported by adequate property records. On the profit and loss statement, the provision for taxes on income would be shown as what it would be if depreciation on the straight-line method were used for computing the tax liability. On the balance sheet, the taxes actually payable would be reflected as an accrued liability. The difference between this liability and the provision for taxes shown on the profit and loss statement would be credited to a "reserve for future taxes," which would be shown on the balance sheet between the liability and equity sections. In years in which depreciation on the more rapid methods exceeded that on the straight-line method, this reserve would be credited. When it is less than straight-line depreciation, the difference would be debited to the reserve for future taxes. Thus, if a single acquisition were involved, the reserve for future taxes would build in the earlier years of the life of the asset, would be reduced in the latter years and would disappear when the life of the asset was exhausted—all assuming no changes in tax rates. With a constant level of acquisitions in future years, as assumed in the illustrations, the reserve for future taxes would build until an average life cycle were covered and then would hold as a constant sum for future years, again assuming no change in tax rates.

This provision of a reserve for future taxes is consistent with Accounting Research Bulletin 42 of the Committee on Accounting Procedure of the American Institute of Accountants. This treatment provides the benefit of more rapid cash recovery without affecting adversely reported profits before and after provision for taxes and without disturbing cost-price relationships or internal reporting. It

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does not remove the hazard of the adverse effects of possible future increases in tax rates.

**Recapitulation**

The Internal Revenue Code of 1954 permits the use of depreciation methods which provide a more rapid write-off of depreciable assets than does the straight-line depreciation method. There are intangible advantages of this more rapid write-off but the only tangible advantage is the more rapid recovery of cash. If this is not essential, rapid write-off is of questionable value. The recovery of cash depends on tax rates and can be dissipated. In any event, unless two sets of depreciation records are maintained, after-tax profits are reduced by more rapid depreciation until a capital additions cycle is completed, and problems are created in cost determination for pricing and in internal reporting. As we look at the permission for more rapid depreciation we can only conclude that it glitters, but it's not all gold.
The Tax Status of the Direct Costing Method

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It is pointed out in this paper that direct costing, as a method of valuing inventories, has two hurdles to clear — acceptance by the accounting profession and by the Internal Revenue Service. What the income tax law, regulations, and court decisions to date indicate with respect to the validity of the method for tax purposes, is reviewed and summarized.

One of the important aspects of the tremendous development of cost accounting during and after World War II has been the greatly increased interest in the principles of direct costing. Current accounting literature and meetings include frequent discussions of the subject. Two papers on direct costing were presented at the 1953 annual meeting of the American Institute of Accountants. The National Association of Cost Accountants considered interest in the subject to be of sufficiently widespread importance to warrant an extensive study. The results of this study were published in the April 1953, N.A.C.A. Bulletin as Research Series No. 23.

Many companies have indicated an interest in direct costing for internal usage and, to a lesser extent, for use in financial statements. It appears that many more companies would adopt this costing procedure if it were not for the major problem found in its relationship to the Federal income tax. Research Series No. 23 states that "income tax problems which arise at the time of changing from absorption costing to direct costing seem to be the most serious obstacle to wider use of direct costing."

Although there are differences among accountants concerning the application of direct costing to various items of cost, certain general principles have been established. The definition of direct costing contained in the N.A.C.A. Bulletin sets forth these principles and will be adopted for purposes of this discussion. This definition is as follows:

"Direct costing should be defined as segregation of manufacturing costs between those which are fixed and those which vary directly with volume. Only the prime costs plus variable factory costs are used to value inventory and cost of sales. The remaining factory expenses are charged off currently to profit and loss. . . ." It is within the area of these general principles that the problems involving the income tax arise.

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What Implications Can be Drawn from Code and Regulations?

Section 471 of the Internal Revenue Code of 1954 provides that "Whenever in the opinion of the Secretary or his delegate the use of inventories is necessary in order clearly to determine the income of any taxpayer, inventories shall be taken by such taxpayer on such basis as the Secretary or his delegate may prescribe as conforming as nearly as may be to the best accounting practice in the trade or business and as most clearly reflecting the income." Both the House and Senate Committee Reports state that Section 471 corresponds to section 22(c) of the Internal Revenue Code of 1939 and that no changes of substance have been made. Therefore, any determination of the applicability of direct costing under the Internal Revenue Code is to be made under rules already existing, and the new code should not affect any conclusions reached.

As stated in Regulations 118, Section 39.22(c)—2, "Section 22(c) provides two tests to which each inventory must conform: (1) It must conform as nearly as may be to the best accounting practice in the trade or business, and (2) it must clearly reflect income." The regulation wisely recognizes that inventory rules cannot be uniform but must give effect to the best accounting practice and, further, that an inventory which can be used under the best accounting practice in the taxpayer's financial statements can be regarded generally as clearly reflecting income. However, and here is where difficulty may arise, the regulation also provides that "the inventory practice of a taxpayer should be consistent from year to year, and greater weight is to be given to consistency than to any particular method of inventorizing or basis of valuation."

The position of the Internal Revenue Service appears to be that the principle of direct costing is not allowable. The regulations define inventory cost in the case of merchandise produced by the taxpayer to be "(1) the cost of raw materials and supplies entering into or consumed in connection with the product, (2) expenditures for direct labor, (3) indirect expenses incident to and necessary for the production of the particular article, including in such indirect expenses a reasonable proportion of management expenses." (Italics supplied.) This definition has been included in almost identical form as a part of the regulations since those issued under the Revenue Act of 1918.

Adverse Indications of Litigation to Date

A fairly recent decision of the Tax Court (Frank G. Wikstrom & Sons, Inc., 20 T.C. No. 45, May 15, 1953) is also unfavorable to the cause of direct costing for tax purposes. Although the term "direct costs" is not used specifically in the opinion, the inventory method used by the taxpayer is described as "the use of
inventories taken at cost but including only direct labor and material charges attributable to specific contracts as costs of production. All other expenses were treated as general expenses in the year incurred, deductible as operation expenses of that year." This method had consistently been used by the taxpayer for all years since incorporation. Pursuant to the regulations, the Commissioner recomputed inventories, allocating to them a portion of overhead. The overhead items so allocated consisted of officers' salaries, rent, taxes, depreciation, repairs, light, heat and power, insurance, employees' welfare, factory stores, indirect factory labor, vacation, holiday and bonus pay, freight inward, and miscellaneous. Certainly a number of these items would be excluded from inventory cost under any application of direct costing.

The Court upheld the action of the Commissioner as entirely appropriate, even for a manufacturer of merchandise on special order, stating that "It does not distort the income of the petitioner. Indeed, it is superior, since allocating overhead to cost of goods sold offsets that overhead against the sales of each year . . . and thus gives a better correlation between income and expense than the method used by the petitioner." Further, the record failed to show that the Commissioner's method did not "conform as nearly as may be to the best accounting practices in the trade or business."

In the Wikstrom case, the Court did not cite any prior cases to support its decision and the issue does not seem to have been directly litigated in the past. In one previous decision (Garden City Feeder Co., 35 B.T.A. 770, 1937), the Board of Tax Appeals was faced with a situation in which the taxpayer had charged to expense and omitted from the valuation of inventories such items as labor, freight, and manufacturing expenses from the date of taking inventories to the end of the year. The Commissioner included a portion of these items in inventory, which action the taxpayer did not contest. Therefore, the Board did not have to decide the issue. However, in discussing the taxpayer's procedures, the Board referred to the omitted items and stated that they "are essential to a determination of inventory valuation." This dictum seems consistent with the later opinion of the Tax Court in the Wikstrom decision.

In a case involving various state and Federal taxes (Montreal Mining Co., 2 T.C. 688, affirmed on this issue, C.C.A. 6, 1944, 33 A.F.T.R. 1660), the Tax Court held that they were not indirect expenses incident to and necessary for the production of ore by a mining company and, therefore, were not includable in cost for valuing inventory. The taxpayer claimed that they were properly includable because inclusion was in accordance with the practice of a large part of the industry and because they were necessary indirect expenses. The Court refused to agree with either contention, stating that "the type of indirect ex-
penses contemplated by the regulations as includable in cost of inventory are such as are incident to operating charges. In this case, operating charges are expenses attributable to taking ore from the mine.” Although seemingly offering some support for the position of direct costing, this decision probably should not be relied on heavily. It should be noted that, in this instance, it was to the Commissioner’s advantage to exclude the expenses from inventory because the exclusion resulted in lower “net income from the property” for purposes of the depletion limitation. The Commissioner may not take the same position in other cases, and, in fact, did not in Wikstrom, where taxes were added to inventory cost.

The Internal Revenue Service previously took the position, in Section 29.22(a)-5 of Regulations 111, that deductions should not be made for depreciation or depletion, based on cost, in determining cost of goods sold. However, these regulations were amended in 1953 to permit such deductions. Revenue Ruling 141, 1953 C.B. 101, states that the regulations now conform to accepted principles of cost accounting and are consistent with the regulations quoted above with respect to inventory valuation.

On the basis of the regulations and the few cases on the subject, it seems to be a fair appraisal of the situation to state that direct costing has not yet become generally acceptable for tax purposes, although there are some instances in which it has been used without being questioned (See, for example, discussion by Oswald Nielson, “Direct Costing Internally and Externally,” The Journal of Accountancy, August, 1953, p. 204). However, these instances are probably limited in most cases to businesses which have employed direct costing at all times. Our main concern here is with businesses considering a change to direct costing.

How Can Direct Costing Achieve Acceptance for Tax Purposes?

The question which logically presents itself, in view of this unfavorable situation is: Is it possible that direct costing will become acceptable for tax purposes and, if so, what will have to be done to gain this acceptance?

As the first, and perhaps the most important step, it will be necessary for direct costing to achieve the status of a generally accepted accounting method. At present it does not appear that such acceptance has been achieved. The Committee on Accounting Procedure of the American Institute of Accountants, in Accounting Research Bulletin No. 43, states that “As applied to inventories, cost means in principle the sum of the applicable expenditures and charges directly or indirectly incurred in bringing an article to its existing condition and location.” Although the statement does not specifically discuss direct costing, the
use of the terms "indirectly incurred" would seem to include items which are not within the scope of the definition of direct costing quoted above. One of the papers presented at the 1953 meeting of the American Institute of Accountants, after discussing the arguments for and against direct costing, concludes with the statement, "The conventional basis, properly developed and adequately reported, seems definitely superior for general use." (Roger Wellington, Direct Costing and its Implications in Financial Reporting, Papers presented at the 66th Annual Meeting, American Institute of Accountants, 1954.)

Unless and until direct costing gains acceptance for general financial statement purposes, the Internal Revenue Service will have a strong argument to support its resistance to the adoption of direct costing for tax purposes, particularly in view of the current agitation for adoption of accepted accounting practice in the tax laws. If direct costing becomes a generally accepted accounting procedure, a major portion of the battle will be won. It can then be argued that the definition of cost included in the regulations is not in accordance with the best current accounting practice and should be revised.

Nevertheless, in the final analysis, acceptance of direct costing may depend on the Commissioner's willingness to pay the price, i.e., the loss of revenue in the year of change to direct costing. In that year, deductible cost will include fixed expenses included in the beginning inventory and also fixed expenses which would normally be included in the closing inventory. This is the "serious obstacle at the time of change" referred to in N.A.C.A. Research Series No. 23. In the past, the Commissioner has apparently resisted this loss and there seems to be no doubt that he can continue to do so. Section 446(e) of the Internal Revenue Code of 1954 provides that "a taxpayer who changes the method of accounting on the basis of which he regularly computes his income in keeping his books shall, before computing his taxable income under the new method, secure the consent of the Secretary or his delegate." The Senate committee report, in discussing the nature of a change requiring this consent, states that "It also includes a change in the treatment of a material item such as a change in the method of valuing inventory."

Under the 1939 Code, this consent presumably could have been secured if the taxpayer were willing to restate beginning inventories and thus forego a deduction for fixed costs included therein. This, of course, was a highly unsatisfactory solution. The 1954 Code lays down specific rules covering changes in accounting method. Section 481 requires that, in computing taxable income for the year of change, "... there shall be taken into account those adjustments which are determined to be necessary solely by reason of the change in order to prevent amounts from being duplicated or omitted, except there shall not be taken into
account any adjustment in respect of any taxable year to which this section does not apply."

Under the 1939 Code, if a change of accounting method was made voluntarily and with the approval of the Commissioner, adjustments were required in order to insure that all amounts of income and deductions were taken into account and that none were omitted. If the Commissioner forced a change in method, various court decisions have denied him the right to make the necessary adjustments. The Senate Committee Report points out that Section 481 requires that adjustments be made whether the change is made voluntarily or involuntarily, except that "no part of the transitional adjustments will be based on items that were, or should have been, under the proper method of accounting, taken into account as an income producing factor" for taxable years to which the section does not apply.

Thus, where a change to direct costing is made in the first year subject to the 1954 Code, Section 481 would seem to require the loss of a deduction for fixed costs in beginning inventories, although it is not clear that this is the intent in cases where the previous method of accounting was a proper one. If a change is made in subsequent years, the section will protect the taxpayer from losing a deduction but, at the same time, will require the Commissioner to agree to a loss in revenue which he has not been willing to sustain.

How the Matter Stands

If the problems of direct costing in relation to income taxes are to be solved, efforts must be directed toward both the accounting profession to secure its general acceptance and the Internal Revenue Service to consent to a change in accounting method which will result in a temporary loss of revenue. The philosophy underlying many of the changes in the law made by the Internal Revenue Code of 1954 is to bring tax accounting into line with generally accepted accounting principles. Therefore, success with the accounting profession should promote success with the Internal Revenue Service. As the situation stands at present, however, it will be necessary to fight each case with the Commissioner, who appears to have all the guns on his side.
Ramifications of the Concept of Seasonal Costs

by OSWALD NIELSEN

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Costs may be seasonal because production is or, in different categories, because sale activity is or because there is convenience in doing particular types of work at particular times of the year or costs may fall irregularly because of the varying length of work months or vacations may leave fixed costs "floating" without a direct activity base. Costing policy in such situations is discussed provocatively in the accompanying paper which interestingly points out some of the implications of the cost problems of companies producing for more than one season during the year.

The industrial accountant cannot help but recognize the existence of such a factor as variation in the magnitude of costs from one season to another. Along with this appears the matter of variation inactivities from one time of the year to another. The industrial accountant desires to reflect operation and product costs as nearly accurately as possible for the various portions of the year in the face of difficulties posed by these variations. Accounting literature has given only limited attention to the integration of costs and operations as they vary from one season to another. For the purpose of this study, handling of these fluctuations in costs and magnitude of operations is thought of as seasonal costing. Accounting treatment may take two major forms, i.e., either reflecting or obscuring differences resulting from these variations.

Activity Fluctuations and Short-Term Statements Pose Problems

The problem of seasonal costs assumes its greatest significance when the activity of the business varies considerably in degree from one time of the year to another. Seasonal fluctuations in volume of business stem from various causes such as the influence of weather conditions upon certain outside construction, the effect of growing crops upon both the movement of goods into the market and the related processing of them, the fluctuation in consumer demands for products, and inability of a business to achieve a product mix which will permit uninterrupted flow of production at all times of the year, despite varying seasonal demands for the different elements in the entire product mix. The more extreme a seasonal fluctuation is likely to be, the more significant is the problem of doing some seasonal cost finding. Conversely, the less extreme the variations,
the less important becomes the problem of seasonal accounting for costs. If there is no variation in business activity from one portion of the year to another, the problem of seasonal costing disappears.

The length of period of time for which costs are under review also plays an important role in seasonal costing. The longer the period of time involved, the less serious the problem of seasonal costing tends to become. Assume, for example, two pronounced operating seasons in a year. In the annual income statement seasonal variations appearing in individual semi-annual statements tend to offset each other. Now assume four operating seasons in a year. Here there tends to be an offset of seasonal differences in the semi-annual statements but not on quarterly statements. In brief, if our entire concern is with the longer period, seasonal variations tend to become unimportant. When we deal with the shorter period, seasonal variations become more important. As a result, in long-term statements, errors in expressing seasonal factors tend to be negligible because seasonal differences have eliminated themselves. The shorter the period the less likelihood is there of seasonal differences cancelling each other and, therefore, the matter of giving expression to them assumes importance.

It is also true with respect to the length of the period as far as seasonal variations are concerned, that, if less than one year's figures are prepared as averages of annual figures, true seasonal variations tend to be obscured. The shorter the period the greater can be the error from this source. An accounting which has as its objective the normalizing of the expenses from one period to another fails to disclose differences resulting from seasonal variations in activity. Assume further the usual procedure of rendering an accounting for a short period of time, say a month, with a certain degree of seasonal variation existing for each such period. In such a case, the year-to-date figures tend to assume greater consistency than the figures for the shorter periods, in that the former give the net result of several periods of variation and, therefore, tend to obscure errors in reflecting seasonal variations.

When Should We Cost in Working Days Instead of Equal Months?

An important factor with respect to seasonal costs is the number of operating days in each calendar month because much of American accounting is, of course, done on a monthly basis. It is sobering for the accountant to realize that ordinary months of operation, instead of being uniform segments of time, vary all the way from sixteen or seventeen days to as many as twenty-three working days. It is easy to have a variation of somewhere from thirty to twenty-five per cent in the number of working days per month. Despite this fact, many costs are
pro-rated uniformly over monthly periods of time. This is true of insurance costs. Instead of pro-rating premiums by days of insured coverage, which may vary from twenty-eight to thirty-one days per month, insurance costs are usually pro-rated on a calendar month basis. In doing so, the same cost is attributed to months such as February, in which there might be a minimum as low as fifteen working days, depending on the number of holidays, to another month such as August with no holidays, in which there might be as many as twenty-three working days. Some degree of refinement results from the simple procedure of allocating insurance costs to the accounting period on a dollars per insured day basis rather than on the simple calendar month basis. The same thing might apply in cases where one has depreciation of items with time as a major factor in cost.

However, this recognition of differences in the number of working days does not apply to such a factor as the salaries of superintendents or foremen. They are paid uniformly on a calendar month basis. There is a considerable variation in daily operation costs for these items and, since salaries are on a calendar month basis, the variations they contribute to product cost can very properly be disclosed in the accounts.

**Application of Fixed Costs When Production Is Seasonal**

Seasonal variation in production has stimulated most interest in the whole matter of seasonal costs and has also stimulated related questions. The first of these is, shall we assume that the seasonal variations in production are also accompanied by differences in the cost of production? These seasonal variations have their prime effect on the allocation of the fixed cost to the product. The more significant the fixed cost, the more important is the problem of seasonal costing. Another question is, shall we assume that the fixed costs are to be spread uniformly over production obtained within the entire fiscal period so as to normalize product costs from one season to another?

In answering the first question in the affirmative, we assume that variations in production from one part of the year to another are accompanied by significant differences in the costliness of production. Such variations in cost of production should, accordingly, be reflected in the industrial accountant's reports. There is an advantage in this viewpoint in that we seek to reflect differences in cost of production with varying seasons and thereby impose on the accountant the responsibility of indicating how much more production is necessary in order to make operations economical under existing total cost conditions.

If it is believed that seasonal costs should be spread over the entire period,
then it is assumed that all of the costs are incurred for whatever production can be obtained in all portions of the year. Here the reasoning is that variations in production are absolutely necessary if one is to remain in business at all and that, sometimes, the company will be able to operate at a full capacity, whereas at other times, it definitely must force itself to operate at less than capacity because of the existing seasonal situations.

This is a common experience with respect to the cost of using agricultural machinery, much of which operates only for a short time every year. A specific instance is machinery used for handling hay crops during the short-lived hay season. There might be times when the same equipment can be used for a less important job. However, the cost of ownership of this machinery is assumed to be part of the cost of putting in the hay crop. The seasonal differences are not important, regardless of how much production varies from one time of the year to another. Under this assumption, the overhead costs are assumed to be more period costs than they are individual unit product costs.

The opposite applies in the situation where it is assumed that differences in product cost exist. In this respect, overhead costs are viewed primarily as product costs and secondarily as period and operation costs. They assume significance where it is important to maintain a scale of production necessary to justify the incurrence of overhead charges at their magnitudes.

**When the Gaps Are Wholly or Partly Filled by other Production**

In certain businesses, facilities are available to handle production at seasonal peaks of short duration. This is true of facilities used for canning vegetables in the mid-western agricultural areas, as well as for many other products. Here expensive facilities are available to run only for short seasons of the year. Plants are owned for these particular uses and are maintained and put into use simply for short-run periods. The matter of seasonal costing for the definite seasonal operations almost disappears by itself in these circumstances, because the total cost becomes the cost of doing the canning.

Assume a corn canning factory in a mid-western agricultural area. This factory has been established entirely for the purpose of canning corn. If that is all that can be canned in this area, then the cost of maintaining this plant is a cost of putting up the corn pack in a particular year. Since all of the production is highly seasonal production, the problem of seasonal costing of overhead in such a case disappears in that the plant has only one target for allocation during the year.

Suppose the company realizes the significance of having an expensive plant
available for the processing of only one crop and looks about for other possibilities of further utilization. It finally decides to go into the canning of peas and negotiates with additional farmers in the area to produce crops of peas which may be canned during a different period of time. There is now superimposed a second seasonal production on top of the corn canning, so that there will be canning of peas a few weeks before the corn crop is ready. In this case, the opportunity to spread the entire overhead cost over additional products means that the seasonal cost does have significance in production and is to be spread over two products instead of a single one. In this case, it is the possibility of chaining together a series of seasons that makes seasonal cost important.

Let us go further with the superimposing of seasonal activities and assume that it would be possible for the cannery to continue processing of one crop after another until production would continue uniformly throughout the year, such as might be possible in a subtropical climate. The result of this complete other extreme of continuous production is also the elimination of the seasonal quality of costs.

To summarize, if production is possible only in one season, the problem of seasonal cost has automatically eliminated itself in that costs for the entire year are focused upon the production for one season. If we go to the other extreme, where different seasonal productions have been staggered through the year so that we have a continuous flow of production, we find that all of the fixed costs for the year have tended to apply themselves to the entire year and, again, the seasonal problem has been eliminated, this time by the spreading of costs. Between these two extremes seasonal costs become important in helping arrive at decisions of the extent to which it is necessary or desirable to spread cost over more and more extended periods of production.

**Standby Facilities — for Production Peaks or Equipment Failures?**

In certain industrial production situations, standby facilities are kept for emergencies. These emergencies might be the handling of sudden influxes of highly desirable rush orders. When this is the case, the cost of having standby facilities for that influx of orders which occurs at only certain times of the year becomes a problem of emphasizing the difference in cost of handling these rush orders.

Under these circumstances, any general concept of cost accounting, as the determination of an average cost of production over an entire period of time or by averaging all overhead over all production, is erroneous. It would be more meaningful for the industrial accountant to figure one set of costs for regular production and an extra set of costs for the extra production by means of
standby facilities. This overhead allocation for standby facilities does not answer questions about general overhead allocation as they apply in cases of seasonal variations in production, which have already been discussed above.

Another purpose for maintaining standby facilities is to enable the flow of normal continuous production, regardless of failures and breakdown of machinery. Such standby facilities are entirely for the purpose of stabilizing production and have nothing to do with seasonal variations. Their cost becomes an annual cost, the same as general maintenance costs, and only enters into the problem of seasonal costs when there is a seasonal variation in production.

### Changes in Variable Costs from One Season to Another

It is recognized that the matter of seasonal cost is primarily one of dealing with fixed overhead. There are, however, certain characteristics of variable costs which require attention here. First, variable costs impose a problem in that they rise when production is up and decline as production goes down. The importance of clear cut accounting for them emerges with respect to budgetary control, especially in its financial aspects. It is, therefore, true that the problem of variable costs is just as important in seasonal costing when one extends our concept of industrial accounting to the whole range of accounting control, including the matter of budgetary control.

Textbooks generally look upon variable costs as constant per unit of product, so that there actually is no quantity variance. The seasonal variance is a variance only in so far as seasonal differences in the cash budget are concerned. The problem becomes one simply of leads and lags of ordinary purchasing, processing and payment.

In addition to these variations in variable costs from one season to another, a still different type of variation also needing consideration is the price variation which occurs from one season to another. With these price variations, just what is the standard cost under seasonal costing? Assume that the expected cost at the time of the flow to the market of materials which need to be processed will be the standard cost for the year. Any other differences in prices, say, for subsidiary flows of materials or for supplies obtained from warehouses for processing, will be favorable or unfavorable depending upon whether or not the price is up as the supply becomes shorter or whether the price goes down because people believe that the supply is not moving fast enough to unload the stock before another seasonal influx occurs. Price variances then accompany the seasonal flows to the market. Sometimes these seasonal variations are eliminated by hedging.
Plant Vacation Time as a Seasonal Cost Factor

It has been mentioned elsewhere that the number of working days in a month varies greatly when one considers only the difference in the number of days and the number of holidays which fall into the various months. Another cause for the variation in the number of working days in the calendar month is the present practice of scheduling plant vacation time in conformity with union agreement. Many organizations find it economical to close down the entire plant while their employees take vacations rather than to operate with employees taking vacations on some staggered basis which forces make-shift production schedules over an extended period of time. With this plan of operation in effect, the question naturally arises as to how the vacation payroll, definitely a seasonal cost, and also the usual loss which results during the operations for the vacation months, should be handled.

Frequently, accountants spread vacation payroll over the entire year by accruing it uniformly month to month. This system of uniform proration of vacation time is favored in that its cost is allocated over the months during which the employee becomes entitled to receive his vacation pay. Vacation pay is considered to be an expense which accrues regularly as the employee works. A few minor refinements might be added, such as answers to questions as to the number of years required before an employee earns his vacation. It is also true that with such requirements as, say, five years for a two weeks vacation and ten years or fifteen years for a three weeks vacation, it is the service over many years which builds up the occasion for giving more vacation time as length of service increases. The making of such refined allocations is ordinarily considered impractical. That is why vacation costs are applied within the year in which the vacation is taken.

Then comes the matter of other general overhead which continues during the vacation period of time. Such overhead should be allocated over all the months when we assume that the vacation time is simply one of the general considerations in the operation of the business. Under this reasoning, the vacation period actually is not a seasonal factor except in occurrence. Cost-wise, the vacation should be spread over the entire year of which it is a part and we do not consider the low ebb of business operations in the vacation months to be a seasonal factor.

Let us look at it a little differently. Management wants to know which is the best month in which to schedule a vacation. It might be that in some businesses, June would be better than July or July less desirable than August. If one month is more desirable than another it would mean that the operating loss from vacation would be minimized by taking it in the most preferred month. A preferred
month might be one which will enable the most sales. It might be the month which will enable the fastest production recovery afterward. If the best month in which to grant vacation and close down the plant is to be selected, industrial cost accounting ought to reflect an operating loss in vacation months, if such a loss occurs. Overhead should be allocated to the vacation month to reflect this situation. By so doing, emphasis is on the desirability or undesirability of the particular month as a vacation month. This is an important consideration and is often overlooked by management when it complains about the accounting which would show a loss in the vacation month, as though this were entirely without meaning.

Costing of Work Done for Convenience in Slack Periods

Some costs are incurred to benefit extended periods of time but are incurred on a seasonal basis. An illustration of such a cost would be the painting of a building during favorable weather conditions. No one would contest the distribution of this cost over longer periods of time. In other words, this illustrates a seasonal cost from the point of incurrence but not from the standpoint of distribution.

Bringing Up the Subject of Cyclical Costs

In the production of crops, cyclical as well as seasonal variations occur. The volume varies greatly from one year to another. This is typified in the canning industry. These circumstances suggest the possibility of a cyclical allocation of overhead cost, which has not yet been adopted in industrial accounting practice. Such a cyclical allocation of cost would be an innovation in thinking which is strongly at variance with present ideas which tend toward direct costing. These seek to keep overhead within periods by means of an accrual basis which rarely, if ever, recognizes cyclical variations.
A Ship Builder's Surplus Stock Control Procedure

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Comptroller, Bath Iron Works Corporation, Bath, Maine

How a cost control unit, already functioning well in the area of departmental costs was assigned and is discharging the task of controlling inventories in several surplus categories, under the broad specifications of a procedure also described, is set forth in this paper. Also depicted are some of the characteristic problems which face a shipbuilding company.

The study involves a company engaged in building commercial and naval vessels, ranging from small fishing craft up to cargo vessels and destroyers. The work is characterized by a relatively small number of contracts of large individual value and by periods of performance running from two to five years. Since World War II, developments in design have advanced rapidly and contracts have been limited to a few vessels of each new design. All of the material required for the construction of a vessel is listed on bills of material prepared from construction plans. Most of this material is procured for each contract in the quantities specifically required and is carried in an inventory which is segregated for that contract. Such an inventory for one contract includes approximately 7,000 different items. Material which is usable on any vessel construction, such as bolts, nuts, washers, screws and other common hardware, is procured on a normal stock basis as general stores material and is carried in an inventory so designated. The general stores inventory includes approximately 4,000 items and is used for all contracts. Material required for plant construction and maintenance purposes, including tools and repair parts, is carried in a separate inventory. The maintenance inventory includes approximately 5,000 different items and inventory does not include material carried in the general stores inventory.

There is still another materials classification. The company is also engaged in the manufacture of machines for crushing coal, limestone, various kinds of ore, and other materials. These machines range in weight from 700 pounds to 180,000 pounds and include approximately 150 different types and sizes. Except for the smallest machines, which are manufactured for stock, they are produced to meet the requirements of each individual order. Hence, a stock of steel plates and shapes and other materials required for the manufacture of these machines is carried as a separate crusher inventory. Castings and forgings for the non-
wearing parts of these machines are purchased as required. Parts which wear and are required for replacement, such as cast and forged hammers, jaw plates and screens, are purchased on a normal-stock basis. The inventory of material purchased for crushers includes approximately 3,500 items. Common items, such as bolts, and nuts, are taken from the general stores material inventory.

All material which is determined to be in excess of the requirements of a particular contract or the needs of general stores, maintenance or crushers is transferred to a surplus material inventory. This inventory varies greatly in number of items but has averaged approximately 10,000. It should be noted that material transferred to surplus is priced at its estimated value at the time of transfer, after giving consideration to likelihood of future use.

**Experience with Operating Department Control**

On the face of it, as to specific job material, it would seem that material purchased in accordance with the bill of material requirements for a ship construction contract would meet the particular requirements of that contract and that there would be no problem as to slow-moving and obsolete material. This was largely true during World War II when the type of vessel constructed and the techniques of production had become highly standardized in the interests of achieving a large volume of output. However, subsequent to World War II, the focus of attention was changed from quantity of production to improvements in design. A great amount of effort has been spent in improving the performance of machinery, electronic and ordnance components of vessels. Due to the continual progress made, contracts for construction have been limited to a few vessels of the latest design and each new contract has represented a substantial change from the preceding contract. Furthermore, certain improvements in design which have been developed subsequent to the latest contract awards have been considered sufficiently important to incorporate in the partly completed vessels and the contracts have been modified accordingly.

As a result of the foregoing conditions, it was soon found that slow-moving and obsolete material had become a very real problem even on material purchases for a specific contract. The procedure then in existence, intended to meet this problem, was as follows:

1. A perpetual record of surplus material on hand was maintained in the drafting department where bills of material are prepared. While this record was a duplicate of that maintained by the stores department, it was found desirable to keep, due to the physical separation of the two departments and the necessity of having the record used by technical personnel rather than stores personnel.

2. As material was determined to be surplus due to changes in plans or for other reasons, it was transferred from the active inventory of material intended for a particular contract to a surplus material inventory.
surplus inventory. The stores document effecting this transfer was prepared in the drafting department where changes in bills of material were made. At the completion of construction under each contract, all material not previously transferred to the surplus inventory was then transferred.

3. Bills of material for additional work were screened against the surplus inventory record before being released for purchasing.

4. Where requirements could be filled from surplus material on hand, the material list was marked accordingly and a stores document initiated by the drafting department transferring the material from the surplus inventory to the active inventory of the contract involved.

This procedure, which was to be supplemented rather than superseded, was critically reviewed by auditing the surplus material of an early postwar contract, and the results disclosed a major deficiency. No provision had been made for investigating significant surplus items to determine why they had become surplus. The most obvious reason for material becoming surplus, that of changes in plans, was found to be applicable in only a portion of the cases. Accumulations were also found to be due to differences between theoretical and actual material requirements, changes in production practices, processing of special orders without screening against surplus, etc.

As a result of these findings, the procedure was revised to provide that an investigation be made by the surplus material section of the drafting department of each significant item of surplus material as to the reason for its becoming surplus. Such investigation was to be made at the time the item was determined to be surplus and findings reported to the chief engineer for appropriate action, to avoid a repetition of the occurrence wherever possible. This revision in procedure represented a substantial improvement but was likewise found by later experience to involve a basic weakness in its functional setup, i.e., involvement of the reviewing authority in the creation of the situation reviewed.

In the case of general stores material, which is purchased for common use on all types of work on a normal-stock basis, the problem of slow-moving and obsolete material is one that requires continuing watchfulness. Unlike material purchased for a specific contract, there is never a time when all work is completed and the entire material remaining on hand automatically becomes surplus.

The existing procedure, again not superseded but strengthened by the procedure to be described, for controlling slow-moving and obsolete general stores material was for the stores department to review the perpetual inventory cards periodically and investigate items which had not turned over at least once during the previous year. This procedure was normally supplemented by a review made in conjunction with the annual audit of accounts. In preparing a listing showing the quantity of each item on hand, the usage during the past year was also shown. Items of significant value which had not turned over at least once during the past year were reviewed by the internal auditors with the stores department.
The procedure was followed with respect to the crusher and maintenance inventories also. Once more, the "self-review" by operating departments of situations of their own creation was discerned to be a weakness.

In theory, the existing procedures established to control slow-moving and obsolete material, of whatever type, appeared adequate to accomplish the purposes for which they were intended. They aimed to disclose what material was slow-moving and obsolete and they facilitated the use and disposal of a great deal of such material. However, the total amount of slow-moving and obsolete material continued to increase each year. As a result, a study was made to determine why the existing procedures failed to achieve the desired results. This study disclosed a number of basic conditions to be responsible, the principal ones being the following:

1. Slow-moving and obsolete material results from the activities of nearly every phase of a business. The engineering department may overestimate requirements or initiate changes in design which call for new materials and eliminate others. The stores department may incorrectly determine re-ordering quantities of items kept on a normal-stock basis. The purchasing department may find it necessary to purchase vendors' minimum quantities in excess of requirements. The operating departments may develop changes in production practices which result in less material being used.

In view of this, it appears undesirable to charge any one of the departments involved in transactions dealing with material with the responsibility for investigating the causes of slow-moving and obsolete items and recommending changes in procedures or practices to eliminate a recurrence.

2. Human nature tends toward optimism. Expectations for using slow-moving and obsolete material reflect this optimism. This state of mind is found particularly in persons who are in departments which participate in transactions involving material.

3. Among the forces in a business which exert varying pressures toward "getting things done," the forces affecting the investigation and disposition of slow-moving and obsolete material are at the bottom of the scale. This is particularly true where a company has ample working capital, for the one force likely to bear heavily on reducing inventories is a shortage of working capital. The primary effort of the engineering department is to meet design deadlines and of the stores department to meet demands made in handling active material.

The Cost Control Approach — and a Six-step Procedure

As a result of the findings of the foregoing study of the inadequacies of normal procedures to control slow-moving and obsolete material, it was decided to approach the problem in the same manner as cost control and for much the same reason. In our company, control over costs is exercised through a cost controller assisted by a small staff. The responsibility of the cost controller is to review cost reports, investigate significant variations from standard or budgeted costs and recommend appropriate action. The work does not include the preparation of cost reports, since all such work is done by tabulating machines. It does include, however, an investigation of problems in the operating and service departments which are reflected in cost reports. As such, the work...
has a technical side and its extension to include slow-moving and obsolete material is a logical and natural application of cost control in its broadest sense.

Following the decision to approach the control over slow-moving and obsolete material in the same manner as cost control of operations, the responsibility for reviewing material records, investigating significant slow-moving items and recommending appropriate action was assigned to the cost controller and his staff. This provided the desired approach of having the responsibility discharged objectively and as of high importance by someone not in a department involved in the transactions. It also permitted maximum use of existing records and procedures. The procedure adopted (and still in force) by the cost controller with regard to slow-moving and obsolete material is as follows:

1. Review perpetual inventory records and prepare listing of slow-moving items. This review, over a period of time, includes all inventories except materials purchased for specific vessel construction contracts, which are treated separately.
2. Investigate significant items as to a. Reason for becoming obsolete or slow-moving.
   b. Possible use.
3. Make necessary implementing arrangements with the departments involved, in cases of possible usage.
4. Refer to purchasing department, for possible return to vendors or for sale, material for which no use can be found.
5. Recommend appropriate action in cases in which procedural weaknesses are discovered, especially those resulting in accumulation of stock.
6. Follow up accomplishments in the use or disposal of slow-moving and obsolete material.

The listing of slow-moving and obsolete items prepared under the first step includes all those for which the usage during the past twelve months is less than the quantity on hand. In preparing the listing, the following information is shown: description of material, quantity on hand, quantity used during past three years, date of last usage, unit price, and total price of quantity on hand.

The investigation of the material, prescribed in the second step, is limited, for reasons of practicality, to items with a book value in excess of $100. In seeking the reason why items of material have become obsolete or slow-moving, particular care is taken to get at underlying causes. This requires an investigator who is familiar with shipyard procedures and practices, both engineering and operating. Experience has shown that an inexperienced investigator will frequently be misled by an apparently good reason for the inactivity of an item, which later proves to be based on superficial findings. The difficulty here lies in the fact that the individuals involved in the situations questioned tend to avoid personal responsibility and are sometimes quite ingenious in developing plausible explanations which shift responsibility elsewhere.

The phase of investigation of slow-moving and obsolete material which relates to possible use is generally made at the same time as the investigation as to the reason for excess since, largely, the same individuals are involved. In
SLOW MOVING ITEMS ANALYSIS
Progress Report as of January 10, 1955
Summary of All Inventories

<table>
<thead>
<tr>
<th>Activity</th>
<th>THIS MONTH</th>
<th>9-30-54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance at beginning of period</td>
<td>$180,815</td>
<td>$279,646</td>
</tr>
<tr>
<td>Additions</td>
<td>2,400</td>
<td>2,400</td>
</tr>
<tr>
<td></td>
<td>$183,215</td>
<td>$282,046</td>
</tr>
<tr>
<td>Deductions:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used</td>
<td>$11,858</td>
<td>$76,521</td>
</tr>
<tr>
<td>Sold</td>
<td>9,813</td>
<td>33,190</td>
</tr>
<tr>
<td>Scrapped</td>
<td>819</td>
<td>11,610</td>
</tr>
<tr>
<td></td>
<td>$22,490</td>
<td>$121,321</td>
</tr>
<tr>
<td>Balance at end of period.</td>
<td>$160,725</td>
<td>$160,725</td>
</tr>
</tbody>
</table>

Status of current balance

- No action (pending investigation) $2,400
- Hold for possible use 155,073
- No use (method of disposal to be determined) -0-
- Sell 3,252
- Scrap -0-

(Prepared by Cost Control. Date: Jan. 17, 1955)

EXHIBIT 1

determining possible use for material, the major emphasis is placed upon its potential as a substitute for some other material, for it is generally found that adequate effort has been made to utilize the material for the exact purpose for which it was bought. For example, there proved to be an excess stock of heat-treated nuts and bolts costing approximately ten per cent more than standard items. In the normal inventory procedure, all effort had been exhausted to use these wherever called for. However, at the suggestion of the cost controller, these nuts and bolts were used in place of standard nuts and bolts until the supply was exhausted. In spite of the higher cost of the heat-treated stock, it was more economical to use them up in this way than to dispose of them in any other manner. This example is but one of scores of instances, each of which has its own peculiarities. All have involved the same general method of approach.
When possible use for an item is found, it is up to the cost controller to make arrangements with the departments involved to accomplish the usage, as noted in the third step of the procedure. This is generally done by referring the matter to the stores department for action. However, in some cases it is necessary for the cost controller to arrange with the engineering department to issue written instructions for the use of substitute material.

Where no use for an item can be found, the cost controller, following the fifth step, refers it to the purchasing department for investigation of the possibilities of return to the vendor or of sale. This means of disposal is limited to cases in which the quantity involved is sufficient to provide an attractive proposition to the vendor or a possible buyer. Generally, similar items are treated as a package offer. In instances in which the quantity involved is not sufficient for this, the cost controller refers the material to the stores department for scrapping.

The cost controller, throughout his investigations, is constantly alert for weaknesses in procedure which require strengthening, specified in the sixth step as an integral part of the procedure. Some excess material is normal in any type of work and may be regarded as safeguarding uninterrupted production. Some excess is the result of errors in judgment or a human failing somewhere in the course of processing. However, where a pattern of error develops with a marked regularity or frequency, it is evident that a weakness in procedure or, in some cases, personnel, exists. Such weaknesses are referred to the comptroller and to the technical or operating supervisor involved, together with recommendations for appropriate action.

**Summary Report of How Matters Stand**

The control over slow-moving and obsolete material, which has been described, requires adequate follow-up to achieve full effectiveness. The use of punched card tabulating procedures has been found well suited for this purpose. The listing of slow-moving items prepared under the first step of the procedure is later coded as to the status of each item as follows:

1. No action (pending investigation).
2. Hold for possible use.
3. No use (method of disposal to be determined).
4. No use—sell.
5. No use—scrap.

The coded listing is submitted to the tabulating department, where a punched card is made for each item and a simple report prepared showing the description, quantity on hand, unit cost and total cost of the items in each status. Each month, by follow-up with stores department records, items used, sold or scrapped are so marked and the report returned to the tabulating department, together
with listings of any additional material. A new report is then prepared. From the tabulated report a condensed summary report is prepared for the comptroller, stores manager and certain others, as shown in Exhibit 1. This report serves as a useful guide as to the progress being made.

With regard to slow-moving and obsolete material purchased for particular vessel contracts, the cost controller investigates the underlying reasons for all significant items at the completion of each contract. The processing of these items for possible use in new shipbuilding work is done in accordance with the normal procedure for screening bills of material before purchasing. However, the cost controller occasionally reviews this material for items inactive for an unusual period and, in such cases, processes the items along with other slow-moving and obsolete material.

Reducing and Realizing Upon Slow Stock

During the first two years of operation of the new procedure for controlling slow moving and obsolete material through the cost controller, the total amount of such material in the general stores, maintenance and crusher inventories was reduced by more than $250,000 or by approximately 75 per cent of the original balance. (It will be recalled that this classification does not include material purchased for specific vessel construction contracts.) The major portion of this reduction was achieved through finding uses for the material. However, the reduction achieved through returning material to vendors or selling it through various outlets was substantial. The proceeds realized on the disposal represented a surprisingly large percentage of the original cost, taken in the aggregate. Although many items were sold at twenty cents on the dollar, or less, others were sold at a much higher recovery and some at more than original cost. Fortunately, the last-mentioned group included several items of large value.

Along with these measurable results, there have been several changes in procedure intended to prevent the accumulation of slow-moving and obsolete material. At the same time the focusing of attention on this objective has developed greater alertness throughout the organization, to the problems involved.

The procedure has required the part-time services of the cost controller and the full-time work of a clerical assistant. Although it may be possible in the future to reduce the amount of clerical time spent, it is likely that the work will require a full-time clerk as long as the present ever-changing conditions continue. The results achieved amply justify the time and effort spent.
Time And Dollar Costs In Consumer Financing

by GILBERT W. URBAN

Member of the Comptroller's Staff, First National Bank, Minneapolis, Minn.

A service industry in which operating costs are comprised of interviews, evaluation, clerical, and other desk operations (rather than bench or machine attendance operations as in manufacturing) is here subjected to cost analysis for control purposes. There is also developed information looking to determination of a minimum economic size of service, i.e., size of loan in terms of dollars which it is profitable to process. The procedures availed of appear open to application to administrative and clerical cost control generally.

Effective cost analysis is a relatively new management tool in the consumer credit operation. As presented here, it encompasses three management aids—work measurement, unit or item costs, and break-even points. For the first of these, work measurement, the basic assumption is that for all clerical and administrative operations of a repetitive nature, the best available measure of productive effort is time.

Efficiency Disclosures on the Bases of Standard Times

The procedure for and results of such work measurement in our company will serve here for example. Work measurement study of the consumer credit operation was based on a complete analysis of the procedures involved in the following operations for each class of loan:

1. New loans
2. Loan payments
3. Monthly maintenance, consisting of:
4. Loan liquidation
   a. Delinquency efforts
   b. Administration

The steps for each of the operations by class of loan were then listed on observation sheets for time-study purposes. Each step was timed with a stop watch, but no attempt was made to obtain split-second accuracy. The usual safeguards were taken to ensure understanding of objectives and purposes on the part of operating personnel. There may be a highly capable employee who is antagonistic to the study. Usually this attitude is caused by a lack of understanding and results from a careless approach on the part of the analyst. If the purpose of the time study is clearly and fully explained, there is usually little difficulty in obtaining complete cooperation.

A portion of the Observation Sheet (Exhibit 1) for acquisition of appliance loans is illustrative of the detail in which the work units were time-studied. Time
studies were taken over a sufficient period to obtain representative figures. No attempt was made to identify the personnel involved in the timing of any operation. This was another way of insuring complete cooperation of employees. The time study figures for the various types of loans were summarized in a table as follows:

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>UNIT MINUTES</th>
<th>UNITS MINUTES</th>
<th>UNITS MINUTES</th>
<th>UNITS MINUTES</th>
<th>Average Time per Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>5</td>
<td>117.3</td>
<td>3</td>
<td>70.5</td>
<td>282.4</td>
</tr>
<tr>
<td>Investigate</td>
<td>3</td>
<td>37.2</td>
<td>2</td>
<td>24.2</td>
<td>61.4</td>
</tr>
<tr>
<td>Authorize Credit</td>
<td>2</td>
<td>6.1</td>
<td>4</td>
<td>8.5</td>
<td>18.6</td>
</tr>
<tr>
<td>Prepare Work Sheet</td>
<td>4</td>
<td>21.2</td>
<td>5</td>
<td>22.6</td>
<td>101.3</td>
</tr>
<tr>
<td>Check for Proceeds</td>
<td>6</td>
<td>25.8</td>
<td>7</td>
<td>30.9</td>
<td>189.1</td>
</tr>
<tr>
<td>Drawn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ledger Cards Prepared and Filed</td>
<td>3</td>
<td>14.2</td>
<td>3</td>
<td>13.8</td>
<td>45.9</td>
</tr>
<tr>
<td>Bookkeeping Operation</td>
<td>5</td>
<td>19.2</td>
<td>2</td>
<td>9.1</td>
<td>53.9</td>
</tr>
<tr>
<td>Total</td>
<td>60.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue Allowance - 15%</td>
<td>9.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervision Allocation</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Unit Time</td>
<td>75.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Applying these unit times to activity statistics yielded the total number of productive minutes accounted for by the activity of the period. These productive minutes were converted to hours and compared with the time-sheet hours recorded by the department during the period. The result was as follows:

Total time sheet hours 12,505
Total hours accounted for 10,630
Percentage of hours accounted for 85%

Past experience with work unit analysis suggested that time accounted for should be at least 80 per cent of time-sheet hours. Less than 80 per cent usually indicates errors in analysis or overstaffing of the work. Although the overall percentage thus “looked good” further analysis of hours accounted for showed real variation in work load and relative staffing among divisions.
This analysis disclosed the existing difference in work performance, i.e., a spread of 27 per cent between automobile and appliance units. Likewise, a difference of 22 per cent between two of the control functions sections, accounting and billing, was discovered. Transferring personnel in accordance with this analysis yielded greater overall efficiency. Throughout the work measurement study, careful consideration was also given to procedure improvement.

**Differential Cost Figures Which Were Developed**

The allowed times were used as the basis for computing unit or item costs for the various operations and organizational divisions of the consumer credit function. The calculation proceeded in orderly fashion. For each class of loan, activity statistics were obtained for number of new loans, number of loans liquidated, number of loan payments processed, and average number of loans outstanding. Activity statistics by class of loan were multiplied by the respective work units to arrive at productive minutes for the department during the period. Total productive minutes were divided into the total departmental expenses (direct and indirect) to arrive at a cost per productive minute. Cost per productive minute was multiplied by the number of productive minutes determined to be representative for the basic operations, i.e., new loans, loan payments, loan liquidated, and monthly maintenance for each class of loan.

This procedure yielded the following item costs:

<table>
<thead>
<tr>
<th></th>
<th>Acquisition</th>
<th>Liquidation</th>
<th>Payments</th>
<th>Monthly Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliance</td>
<td>$3.75</td>
<td>$.38</td>
<td>$.30</td>
<td>$.30</td>
</tr>
<tr>
<td>Automobile</td>
<td>6.25</td>
<td>.38</td>
<td>.30</td>
<td>.60</td>
</tr>
<tr>
<td>F.H.A.</td>
<td>4.50</td>
<td>.38</td>
<td>.30</td>
<td>.35</td>
</tr>
<tr>
<td>Heavy Equipment</td>
<td>4.50</td>
<td>.38</td>
<td>.30</td>
<td>.50</td>
</tr>
<tr>
<td>Personal</td>
<td>4.25</td>
<td>.38</td>
<td>.30</td>
<td>.25</td>
</tr>
</tbody>
</table>

A small portion of the difference in item costs among loan classes arose out of the difference in the workload between the major divisions, but this difference did not appear to be significant after making the personnel changes suggested by standard vs. actual time analysis shown earlier. In general, the differ-
BREAK-EVEN POINTS FOR VARIOUS LOAN TYPES AND MATURITIES

<table>
<thead>
<tr>
<th>MATURITY OF LOAN</th>
<th>New</th>
<th>Late Model</th>
<th>Used</th>
<th>Appliance</th>
<th>F.H.A.</th>
<th>Equipment</th>
<th>Personal</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>$895.</td>
<td>$660.</td>
<td>$473.</td>
<td>$316.</td>
<td>$598.</td>
<td>$720.</td>
<td>$538.</td>
</tr>
<tr>
<td>9 months</td>
<td>714.</td>
<td>524.</td>
<td>381.</td>
<td>257.</td>
<td>477.</td>
<td>566.</td>
<td>265.</td>
</tr>
<tr>
<td>12 months</td>
<td>627.</td>
<td>461.</td>
<td>306.</td>
<td>216.</td>
<td>416.</td>
<td>521.</td>
<td>235.</td>
</tr>
<tr>
<td>18 months</td>
<td>541.</td>
<td>399.</td>
<td>292.</td>
<td>199.</td>
<td>361.</td>
<td>457.</td>
<td>201.</td>
</tr>
<tr>
<td>21 months</td>
<td>517.</td>
<td>382.</td>
<td>279.</td>
<td>196.</td>
<td>345.</td>
<td>439.</td>
<td>192.</td>
</tr>
<tr>
<td>24 months</td>
<td>499.</td>
<td>369.</td>
<td>260.</td>
<td>184.</td>
<td>333.</td>
<td>426.</td>
<td>185.</td>
</tr>
<tr>
<td>30 months</td>
<td>474.</td>
<td>351.</td>
<td>245.</td>
<td>176.</td>
<td>316.</td>
<td>407.</td>
<td>175.</td>
</tr>
</tbody>
</table>

EXHIBIT 2

ence in acquisition costs between appliance and automobile loans represented the additional time spent reviewing and investigating the latter type of loan.

Monthly maintenance costs of loans include two factors, delinquency and administration. Delinquency cost represents the efforts necessary for review, follow-up and collection of the various classes of loans. It includes the preparation and distribution of past due notices, the follow-up work of the unit men, the outside collectors' direct efforts, and expenses directly attributable to delinquencies and repossessions. The administrative cost represents the allocation of departmental administration to this function. The breakdown of cost shown above for this function into two parts, resulted in the following figures:

<table>
<thead>
<tr>
<th>MONTHLY MAINTENANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delinquency</td>
</tr>
<tr>
<td>Appliance</td>
</tr>
<tr>
<td>Automobile</td>
</tr>
<tr>
<td>F.H.A.</td>
</tr>
<tr>
<td>Heavy equipment</td>
</tr>
<tr>
<td>Personal</td>
</tr>
</tbody>
</table>

The delinquency costs were further analyzed and converted to a "per past due notice" basis. The spread in cost per notice reflected two things:

1. Variance in monthly delinquency cost by type of loan.
2. Number of notices mailed per past due account by type of loan.

The result of this analysis follows:

<table>
<thead>
<tr>
<th>PAST DUE NOTICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliance</td>
</tr>
<tr>
<td>Automobile</td>
</tr>
<tr>
<td>F.H.A.</td>
</tr>
<tr>
<td>Heavy equipment</td>
</tr>
<tr>
<td>Personal</td>
</tr>
</tbody>
</table>

1066 N.A.C.A. BULLETIN
Calculating Break-Even Points for Different Types of Loans

The final step taken in our cost analysis was the calculation of an operating break-even point by loan categories to determine amounts at which profitability ceases (or starts). What is the break-even point on a loan? It is the point at which the net discount earned on a loan for a given period of time covers all of the operating expenses of acquisition, liquidation, payment and maintenance, plus the per dollar cost of funds used. The latter costs include the cost of obtaining money by the lending institution, life insurance on borrowers’ lives, and an adequate reserve for losses. Assuming for purposes of illustration that the per dollar costs on all loans are 2.25 per cent per year, the formula for the calculation of break-even points is stated and illustrated below for a 12-month loan for a new automobile with a discount rate of 4 per cent and a per dollar cost of 2.25 per cent. The relevant item costs for an automobile loan, already illustrated, are used. It appears that the face amount of a 12-month loan for a new automobile must be $627 to cover all expenses, on the assumptions used:

The product of length of loan in months (12) monthly discount rate (.0033), and face amount of loan (the unknown to be solved for) =

\[
12 \times .0033 \times X = 6.25 + .38 + .12 (.30 + .60) + .001875 (12 + 1 \times 1/2X)
\]

or

\[
.04 X = 6.63 - 10.80 + .0121875 X
\]

\[
.0278125 X = 17.43
\]

\[
X = 627.00
\]

Break-even points for the different classes of loans handled as well as for the most common maturities within each class, are summarized in Exhibit 2. This table facilitates continuous control over loan purchases in any degree of detail desired. For example, the table shows that the face amount of an appliance loan for 24 months must be $184 before all expenses will be covered, while an F.H.A. loan for a similar period of time would have to be over $333 in order to realize a profit.

To supplement this table, a series of income and expense statements are prepared for each class of loan handled, for the most common maturity dates. Exhibit 3 shows the income and expenses for new automobile loans ranging in APRIL, 1955 1067
amount from $400 to $600 and from 6 months to 36 months in duration. As a supplement to Exhibit 2, it provides the answer to two vital questions:

1. Is this loan profitable?

2. What will be the net income or net loss on any particular loan or loans? Suppose that the average income and expense on a new automobile loan of $500 for 30 months is sought. The $500 column intersects the 30 months maturity line at income of $50 and expenses of $48. Thus, there would be a net profit of $2 (a little less). The table also shows that on the average, no automobile loan of less than $500 will prove profitable for any of the maturity periods shown. The amounts bracketed for the various face amounts from $500 to $600 indicate the earliest possible maturity period at which the loan will break even. For instance, looking in the $500 column, break-even occurs at a 24 month maturity, while for a $600 loan, 15 months is sufficient.

**An Achievement of Control in Cost and Profit**

We feel that we have a sound and informative cost analysis for our consumer credit operation. Our work measurement study offers continuous personnel complement control. The unit cost and break-even point analyses provide a means of appraising the value of the various types of loans and, on a comparative basis, serve as a cost control mechanism.
Approaching Mechanical Applications Wisely

by GEORGE H. WADSWORTH
Assistant Comptroller, Scovill Mfg. Co., Waterbury, Connecticut

The worthwhile nature of advance exploratory and specific study of the possibilities of employing mechanical or other advanced equipment economically and serviceably is emphasized in this paper, based on one company's deliberations, which resulted in applying tabulating equipment to the billing function. The programming of an installation is also stressed so that organization, personnel and equipment readiness will be arrived at simultaneously.

The use of more and less advanced equipment is a live topic today. Magazines, trade journals, meetings and conferences are full of the "new look" in the office. One might say the atmosphere is electronic. In our company, we have been interested in these developments and have been anxious to make the best possible use of them. This paper does not discuss the use we are making, but rather the hurdles to be crossed before such use can be made. Moreover, our experience is only that of one company. However, we are convinced that mechanization carefully applied to office procedures will be better for our company, our employees, and our customers, although we have only begun to move in this direction. We have started in the direction of billing and sales analysis and the experience discussed is largely in connection with the mechanization of these functions.

The Scovill Manufacturing Company is one of the oldest in the brass business. It has a brass mill as well as a wide variety of fabricating divisions. At our main plant, in addition to brass and aluminum mill products, we make proprietary lines of slide fasteners, garden hose equipment, grippers and buttons, and a wide variety of contract items including cosmetic containers, screw machine products, forgings and stampings. Each of these categories of business is entirely separate in its distribution channels, in many of the manufacturing problems, and in the conditions affecting the operation of the business. This has produced a tremendous variety of detailed practices in our office which have grown with the individual trade requirements and which make a very complex picture. It is into this picture that we want to introduce any benefits to be derived from mechanization. We feel, however, that mechanization must be considered primarily on the basis of economies it yields. The additional values to be derived from better information, faster information, or more effective use of information are products which must come along at no extra cost.

APRIL, 1955
A Survey Resulting in an Initial Project

How does one know how to get started? The first step is some sort of preliminary survey. In our case, the survey has been of a continuous type. We have attended meetings, read literature, written to suppliers. We have listened to people talk about equipment which is several years ahead of our present state of development. We have done a good deal of figuring on the cost of alternative methods of operation. Doing this work has permitted the development of a "feel" for possible methods. Out of this "feel" has come the sense of direction, the ideas as to what might be fruitful areas for direct attack. The individual active in forwarding this work might, in different companies, be a methods man, an accountant, the comptroller, or even in some cases, the president. There might be several people who compare notes from time to time about developments and about company problems.

To us, this exchange of ideas seemed to offer the best approach and is the one we are using. Out of all this talk, pencil-pushing and playing with alternatives will come some idea of the area to be studied, the type of equipment which will probably be effective, the possible economies, etc. In considering types of equipment, we have explored punched cards, punched tape, and some of the other new developments in the purely electronic field. In considering the area to be studied, we have had to give serious thought to the amount of housekeeping which would be involved, i.e., the amount of standardization and procedure revision which would be necessary.

In short, the preliminary survey requires thinking far ahead of the immediate projects. It means that the person or persons doing this sort of work must be several years ahead of the actual accomplishments in the office. In this way, then, it is possible to keep specific projects for direct study in front of the methods and systems people who are going to have to do the work. Our survey resulted in a decision to start out with a project to use punched card equipment in a billing and sales analysis application. The reasons were unique for us at that time. Some of them were:

1. Possibility of economies in the operations affected.
2. Previous experience with this application within the organization.
3. Recently added statistical reporting requirements which fitted readily into the machine picture.
4. Ready availability of a supplier who already had some experience with our operations.
5. Punched cards a logical starting point because of wealth of background information available from other businesses and because we can expand applications gradually.

Handling the Required Changes in Underlying Detail

The next step is a detailed study. It is necessary to ask what we have to do to get the operation going. In our case we had to tackle the following areas:

N.A.C.A. BULLETIN

APR.
Conduct of study
Housekeeping
Development of organization
Development of detailed procedures

The question then arises who will do it—a systems man or a supervisor? In our case, we feel that the supervisors are sufficiently burdened with day-to-day administrative problems so that they are not available to put in the long hours of intensive thought required for this type of work. Therefore, we have made use of men who can be freed for this purpose alone. The individuals who have been selected for this kind of work have been trained at courses run by the suppliers of equipment and have been selected for their special background in company problems and operations. They are not necessarily systems men by training. Results indicate that a knowledge of company practice is more important than machine "know-how" at this stage.

At this point there should be mentioned one of the major problems which we have run into in connection with mechanization. This is the matter of housekeeping. Housekeeping consists of standardizing procedures and also, in many cases, policies, so that data can be handled fast and repetitively within the mechanized system. Any company which has grown over a long period of time, especially one which sells to a wide variety of industries, will have a host of exceptional situations for particular customers, particular products, or particular executives. In order to insure reasonably satisfactory machine operation and to get a maximum of advantage from the fact of mechanizing, it is important that these exceptions be reduced to an absolute minimum. It is also important that people throughout the organization realize the effect of these practices on an integrated system. We were considerably helped by having a frame of mind in the organization favorable to mechanization at all levels. Without this frame of mind, we could not have proceeded to overcome the obstacles which were ahead of us.

At the same time, there has been a very large job of educating other departments and people within the accounting area who were not familiar with machine problems, to the need for standardization and the effects of nonstandardization. Some of the hindrances to good housekeeping which we ran into were nonstandard pricing, product numbers which did not completely identify the article, the use of numbers for the same article varying with departments, different requirements for statistical information for various types of business within the company, and, in many cases, documents flowing into the mechanical operations which were different in form and content and had been handled by widely differing procedures.

It is estimated that as much as one-third of the entire survey time was spent talking out these details and getting enough standardization so that the
mechanical processing would be efficient and, therefore, economical. Even with the most wholehearted participation, it was found that the burden of changing was very heavy on some of the departments involved in our billing and sales analysis application. In some cases, product identification numbers had to be changed, with a great effect on the entire organization. In other cases, we had to get agreement from customers in the matter of pricing. A frequent experience is illustrated by one case in which we went from a price per great gross to the system of billing and pricing per thousand used on other items. (The customers, it turned out, preferred the revised method.) The requirement in this phase of operation for a person of tact, judgment and salesmanship needs no further emphasis. It is basic.

**Changes Affecting Staff and Departmentalization**

When all of the housekeeping details and probably all of the programming (to be described in the next section of the paper) are done, it is then possible to visualize the resulting jobs which will be needed after the transaction is completed. There will be jobs in the machine area and jobs remaining in the areas which have been studied. We found that the existing personnel could be readily fitted into both situations. Also, we have felt that they were better qualified through a knowledge of company operations than if we had tried to get outside help, trained in machine procedures. We use a job evaluation system for all office jobs. It is particularly useful in a problem of this kind where the job specifications are laid out in advance. In this way, we have been able to make the best possible assignments with the assurance of preserving the status of individuals in the organization.

For administrative purposes, the machine accounting organization was set up as a separate function as shown on...
Exhibit 1. The responsibility for the accounting knowledge of billing and sales analysis remains in the billing office. The machine accounting function operates as a service department, in a manner similar to transcribing and duplicating services. The lines of communication are very heavy between the machine accounting group and the areas they serve. However, the administrative problems are quite different and the separation leaves each supervisor free to concentrate on his special problems. This has the further advantage of bringing a team of supervisors to the solution of problems which arise affecting more than one department.

Programming Procedures and Developing Forms

The process of developing detailed procedures we have referred to as programming, which seems to be the currently fashionable term. Programming, as we refer to it, means the development of all card forms or other systematic means of putting information in mechanical form. It includes the detailed development of all reports which will be required and the establishment of all the day-to-day operating routines connected with the machine operation. A manual of procedure for the billing and sales analysis project is given to the operators of the punched card equipment. We have found that the detail reported in these write-ups has helped to minimize errors.

We have leaned heavily on our suppliers in programming our mechanical operations. Because we are in the early phases of mechanization, we do not have the knowledge which we expect to acquire at a later date. The main thing which we have been able to contribute to the study is a knowledge of company operations and requirements. Out of the preliminary detailed study, we have developed card forms and report forms which will contain the necessary information. In addition, we have prepared detailed flow charts and outlines of the various operations to be formed. Here we have been somewhat more independent and operated on our own. This job requires time, care, and thought, but, in cases in which we did not lay out these detailed instructions, we regretted it after we started the operation. Therefore, we are convinced that time spent in anticipating details in advance of the actual operations is time well spent and that no operations should go into effect without this planning. The detail procedures and flow charts are useful in the subsequent training of the individuals who will run the operations and can serve as a daily guide during the starting up phase.

Preparing Personnel and Workplace

Getting ready to operate the programmed application consists of two main problems. One is training personnel and the other is the preparation of the site to be occupied by the equip-
ment. The training phase of the operation may begin part-way through the detailed study. It became obvious to us that particular individuals would be selected for various kinds of jobs and their training could begin immediately. In this case, we made use of the supplier's training schools and also used the setting-up of files of information as a training exercise.

In the preparation of the site, consideration has to be given to future expansion. If the first application has merit and works out as originally expected, there are, undoubtedly, additional activities which should be brought into the picture. These will require space enough for machines to be accessible for maintenance and room for reasonable traffic between the machines in day-to-day operations. Also, do not forget the requisite filing arrangements. Punched cards accumulate rapidly and space must be found to keep them in inactive storage where this is required. The inactive storage space will undoubtedly not be in the operating area, for this would be a waste of best office space. However, it must be accessible and convenient. Another problem—with some equipment—is either air conditioning or air circulation to permit reasonable working temperatures in the machine area and to insure proper machine operation. The supplier can produce specifications in this regard.

The chief point about both training and site preparation is the need for scheduling them so that, at the time the installation is ready to start operation, there will be no delay for these reasons. The cost of the equipment is such that few companies can afford to have it sitting around idle while the preliminaries are being completed. Our experience has been that it is easy to underestimate the time required for training and that, if anything, there is a natural tendency to start operations before the day-to-day details have been thoroughly drilled into the operating personnel.

Getting Started — and Keeping Going

Getting started brings in a whole new group of problems. They form pertinent questions. How will you start? Are you keeping the organization posted? How are you doing? Have you provided for the unexpected? This section of the article will give brief answers, based on our experience, to all of these.

How will you start? Will you ease in, step-by-step or plunge in on a complete overall operation? Will you operate a parallel program with the old method or not? Our decision was to ease in, step-by-step, in order to train our organization as we went along and to minimize the errors and confusion connected with the transition. Easing in step-by-step, in our case, meant adding one new product category at a time to the application. Any problem in coordinating the old and the new was ascertained and rectified at the earliest possible point. We had an obvious change of direction as far as the equipment was concerned, but the overall program was not altered. We have found that this has been the best way to keep the organization posted and to avoid confusion and error.

Another problem is the provision of adequate cooling for the equipment. This, of course, is a problem only as far as the equipment is concerned, and an extra cooling tower provided with the installation. The equipment is portable and, therefore, it is possible to change the location in the future if necessary. How long the changeover will take is another problem which becomes evident as the system becomes more and more complex.
and the new system was not as great as the confusion which would have resulted from trying to do everything at once. In some cases, we have paralleled our old method in order to check statistical reliability and to cover us until the new operations are successfully proved. On other items, such as billing itself, it is obviously wasteful to run a parallel operation and we have substituted the new method for the old. In general, we have tried to avoid paralleling and the extra load of personnel it requires.

Are you keeping the organization posted? Relations with other departments become particularly important at this time because of the number of changes being affected in all areas. The best way to meet this situation is to keep other departments posted on the progress and expected performance so far as it can be anticipated. Who should operating details be cleared with? There will be several people handling different phases of a new application and it is frequently important that an outside department be able to go to the right person for particular answers. Much time and friction can be avoided by having a coordinator in general charge clear all questions of an interdepartmental nature.

How are you doing? As soon as the operation starts, it immediately becomes important to learn how performance stacks up against what was originally expected on the basis of preliminary and detailed studies. How much can a person be expected to do under the pressure of day-to-day operations? This will obviously not be a fixed amount until the operation is completely "shaken down" and a permanent staff is accustomed to the routines. However, it is of the utmost importance to know what progress is being made, which individuals need extra coaching, and whether the end results which were promised are going to be attainable.

To this end we have used two methods of keeping track of operations. One is a time check of activity at all work stations, machines or otherwise, and the other is a batch ticket. This is a Punched Card Processing Time Ticket, (Exhibit 2) and follows the work through the processes and shows the length of processing time for a particular bit of information. The information on these tickets can then be tabulated to show either the machine utilization or the cost of processing particular types of information. Both of these summaries are essential to appraise performance. Obtaining the cost of the operation permits such an appraisal of performance in comparison with estimates in terms of business activities. The machine loading study provides the tools for most economical use of machines available.

In the absence of this detailed information, the operation as a whole cannot be visualized and it is very hard to determine whether adequate prog-
<table>
<thead>
<tr>
<th>PUNCHED CARD PROCESSING TIME TICKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch No.</td>
</tr>
<tr>
<td>No. of Shipping Tickets.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Batched</th>
<th>Mark Sense, Check, Separate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Initials</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name &amp; Address Cards Pulled</th>
<th>Mark Sense Punched -514-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Initials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terms and Routing Cards Key Punched</th>
<th>Process Through Calc. -604-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Initials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item Cards Pulled</th>
<th>Write Invoices -403-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Initials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tax, Freight, Misc. Cards Pulled</th>
<th>Released to Invoice Checker (Billing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Initials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Add'L Info. Pulled in Item Cards</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Initials</td>
</tr>
</tbody>
</table>

**EXHIBIT 2**

The process is being made or where additional bolstering is required. If you have had to increase clerical personnel during the transition phase, it is also very important to know the approximate period of the transition so that plans can be made to absorb these personnel with a minimum of inconvenience to the employee or the organization.

Have you provided for the unexpected? A final note of warning is to allow for contingencies. There will be a last minute revisions of procedure. There will be unexpected requirements from other departments for information which they had not formerly anticipated. In all these cases, it is necessary to have a key individual in charge of the mechanical operation available to give time and thought to these problems as they arise. It may well be necessary to have additional clerical time available also. The more complex the operation being undertaken, the more contingencies will arise.

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In conclusion, we find that there are several steps to the business of mechanizing, whether it be a partial or broader application of mechanical, mechanical-electronics, or electronic equipment. The steps are:

1. A preliminary survey is best carried out if it is a continuing review of the company organization and the types of mechanical equipment available to do various jobs. The preliminary survey is a way of giving direction to the entire program and is the point at which the basic thinking is performed. It is frequently called "blue sky" thinking.

2. Detailed study follows the first decision. The matter is turned over to qualified people within the organization to be explored in detail. All the procedures must be spelled out sufficiently so that the results can be used for job instruction as the operation progresses. All forms and daily routines must be developed in final form.

3. Getting ready involves the training of people who have been selected to operate the application and the preparation of the site first. The time required for training is easy to underestimate. What seems like exhaustive detail in the training of the operators will pay off later in a smooth operation.

4. Getting started is the culmination of all the previous activities. Careful attention must be given to planning the way in which the operation will start, coordination with other departments, and review from the first day of operation of the results being achieved. In this way, the transfer to the new method will be as fast and orderly as possible.

All of the foregoing sounds like a review of the fundamentals of administration. In fact it is. It may serve to dispel some of the mystery which seems to surround problems of mechanization, and to give some advance warning of problems which will be presented. Machines of themselves create very few problems. It is the resulting administrative matters which take time and attention.

Automatic Processing of Orders and Invoices

by FRANK D. HIRSCHMAN

Member of Systems and Procedures Staff, Morris Paper Mills, Morris, Ill.

A solution to prompt and economical preparation of sales invoices from order data processed through the use of punched paper tape is narrated here and adds one more to the growing number of instances in which advanced principles of communication have been applied to accounting routines.

Our organization had a problem in handling sales orders. With the sales office in Chicago and three plants at varying distances up to 200 miles, the use of the mail to transmit a six-part sales order called for improvement within our own organization and for our customers. The old order system, stated simply, was:

1. A ten-part order was typed on continuous snap-out forms on an electric typewriter in the Chicago sales office.
2. Orders were audited for accuracy before mailing to branches.
3. Many "rush" orders were teletyped to the branches. (Thus, in addition to
typing the teletype order, a confirming order had to be typed. This was a duplication of typing and checking.)

4. Our sales orders were (and still are) in two basic classes:
   a. Those calling for goods to be shipped from stock.
   b. Those calling for some processing.
   (In some cases, the six-part sales order form had too many copies, in others too few. This meant additional typing at the plant or throwing away some copies, in either case an expense.)

5. Invoicing was done from the shipping copy of the sales order on electric typewriters with a six-part fanfold set—two invoices and four internal copies.

There were some obvious deficiencies in this system. They will not all be commented on here. However, one example of unnecessary delays in filling orders will help make the situation concrete. A large customer sent about 60 per cent of his orders to the wrong office. The order came to the plant, was mailed back to the sales office, typed at the sales office and returned to the plant in the mail. This process required two days. Perhaps a form letter to the customer at the many outlets where these orders originated would have improved this situation to some extent. It was felt, however, that such a move did not go far enough. It will become apparent that, under the new order system, all orders are shipped from one to two days earlier.

Objective: Order-Writing Which Would Set Up the Invoice

The old sales order form was the basis for the design of the new order form. The former was conventional in appearance and the upper two-thirds could, with a few changes, be developed into an invoice form. This was a helpful clue. With an idea of the goal in mind, that is, to write an order in such arrangement that the static information on the order would fall into position to form an invoice, the search began for a machine to do the job.

The possibility of typing a 16-part order-invoice set was ruled impractical, although some will argue it can be done. Such a form would not speed the forms to the plant, would provide no extra copies, would be bulky, and would be difficult to correct—just to mention a few disadvantages. All methods of duplicating were explored, but none were found which would speed the order from the sales office to the plant. Thus, the real problem seemed to be how to get the sales order from the sales office to the plant.

One answer was teletype. Some companies have been doing it for a number of years. We had been using teletype for messages for several years. But typing on a teletype keyboard is slower than a standard typewriter. It is conceded that the average speed is approximately 45 words per minute. In our case, this meant the leasing of another wire and teletype if two girls were to manually send orders via teletype to our plants. In addition, we would entertain the problem of typographical errors. The question then was—would the mistakes be caught in
time or not until the order was "broken" and various copies dispersed over the plant?

Review of Practicability of Punched Tape Transmission of Orders

It was about at this point in developing our new order system that tape-punching typewriters came into the picture. To explain briefly, this is an electric typewriter which punches code holes in a paper tape as a document is being typed. The information can then be "played back" on the same typewriter to reproduce what is punched in the tape. The tape can also be used to activate a teletype-writer. An automatic typewriter will also stop typing when the proper code has been entered in the tape. This feature enables a master tape to be used for typing repeat orders. Variable data can be entered at certain pre-designated points on the order.

After a little further study and research, it became apparent that an automatic typewriter, used with the teletype, opened several new approaches to our order handling problem.

In the first place, all orders could be typed in the sales office, audited for accuracy, then transmitted to the plant via teletype using the punched tape. All confirming orders were thus eliminated. It was apparent, too, that more efficient use of the teletype through the use of punch-tape would result in transmission one-quarter faster than manual use of keyboard, or 60 words per minute. (120 word per minute teletypes are expected to be available in 1955.)

About half of our orders call for releases from finished goods. Thus a master tape serves very well to carry all the pertinent data on an order. This includes customer's name, address, shipping point, special billing information, number of copies of the invoice, specifications of the item, price of unit, routing, salesman, special accounting codes, etc. To make the order complete, there is also needed sales order number, customer's order number, date of order and the quantity or quantities involved. The importance of a master tape for releases of stock from finished goods cannot be over-emphasized. Once this master tape has been typed and audited, only the second group of items need be checked for each new order. The time formerly spent by the traffic and shipping departments to verify and check routings is eliminated completely when the order is on a master tape. Specifications on the order will be correct if the proper master tape is selected from the file. This is important, not only from the standpoint of filling the order but also for the accounting and statistical use of the data at such points as production scheduling, inventory control and, later, sales analysis. The teletype located at the plant could be supplied with a tape-reperforator which punches a tape identical to the one being transmitted by the sales of-
So that this second tape may be identified by eye, it has the letters and figures typed along its margin.

An analysis and time study of message demands on our twenty-four hour leased wire teletype service revealed that two-fifths of the messages (and teletyped orders) were transmitted in a one and one-half hour period just before noon. Total elapsed hours transmitting messages and orders under existing methods was two and one-half hours to send and receive. Thus there remained, with proper scheduling of teletype time, six and one-half hours of free time to transmit orders (using a staggered lunch hour to obtain a nine-hour day). Incidentally, changing from message to order forms requires one-half minute or less. It seemed clear that sufficient time existed to transmit the bulk of our orders via teletype.

A special situation was presented by certain orders for manufacture having estimates, specification sheets, samples, etc., attached to them. It was provided that these should be mailed as well as transmittal to the plant, the punched tape to be mailed with them and the necessary copies reproduced on the automatic typewriter there.

New Procedure at the Sales Office

At the sales office, sales orders are typed on an automatic typewriter punching a paper (five-channel, suitable for teletype) tape at the same time the order is being typed. The form, as revised from the old order, appears in the top portion of Exhibit 1. The blank lines just below "printed for" are not used at the time the order is being typed. These two lines are reserved for routing, car number, number of packages, and total weight. This is billing information, and is to be added later. The location of these two lines on the form also enables a bill of lading to be duplicated as well as an invoice. A pre-punched master tape is used to type information on orders relating to stock items. Since the automatic typewriter is capable of simultaneously punching a new tape as it is "reading" from a master tape, only items such as quantities, customer's order numbers, shipping dates, etc., need be typed on the new order. The master tape is filed in a window envelope with a copy of the order.

It should be understood that a master tape is used only for orders shipped from stock. We have not yet advanced into the use of master tapes for orders of any type received from the same customer. This requires analysis to determine the frequency of repeat orders, changes in specifications if they occur, and the consistency of ordering several items of the same or different sales classification. If a customer is in the habit of ordering eight or nine different items and then occasionally one or two items, the use of master tapes becomes questionable. Before starting the new system, we set up 1600 master...
tapes for one large customer to handle shipments from stock. These are proving well worth the time spent typing these master tapes.

A four-part form is typed as the first part of the order writing operation. These parts are the office copy, customer’s acknowledgement, salesman’s copy, and statistical copy. The four forms and the tape (the tapes are torn off as each order is typed) are clipped together and sent to an order checker, along with the original order from the customer.

If an error has occurred and is serious enough to demand re-writing the order, the tape and all copies are returned to the proper typist. The tape can be re-run up to the point of the error and the error corrected manually at that point.

After checking, the tape with one copy of the order is sent to the teletype operator. At the time of tape transmission of an order, there is a single customer acknowledgment copy in the teletypewriter at the sales office. This fifth copy assures proper registration on the order form at the point of transmission to the plant. In certain cases this copy is mailed to the customer, used within our organization, or thrown away.

The question might be raised at this point, why use the automatic typewriters, why not type directly to the plant on the teletype? There are three basic reasons that led to the decision on that score:

1. Theoretically, at least, all errors are caught before sending orders to the plant.
2. Tape transmission on teletype is 25 percent faster than manual typing at the keyboard on a teletype. In our case this meant no increased expense for an additional teletype wire, as our equipment was not used to near capacity.
3. Orders with estimates, special samples, cuts, etc. are more easily mailed together. As already stated, a tape goes with this type of order to produce the plant copies.

New Procedure at the Plant

At the time of transmission from the sales office, the plant teletype creates a three-part order and a second punched tape. This second tape can be used to produce copies of an order, but its primary function is for the future when back ordering items will be under experiment. The plant sales order, the characteristics of which are indicated in the lower portion of Exhibit 1, consists of a billing copy, (a duplicating master) shipping copy, and production copy.

When an order is shipped from stock, the three copies are sufficient to fill and bill the order. It will be noted that the form carries a quantity shipped column. This column was missing on the older order form and thus rendered the shipping copy inadequate upon occasions. The new shipping copy is written by the shipping clerks as the orders are filled and weighed. When this shipping copy comes to the billing department, the only data missing in order to complete the dollar value of the invoice is the price per

united states air force

are not complete. When tapes are sent off the plant, the tapes are sent after the shipment is complete. This is done so that the shipping department has these records of the shipment. This is done to meet the requirements of the War Department, and therefore the tapes are sent to the War Department.

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unit, which does not show on the shipping copy of the plant order set. Complete extension of the bill is made after matching billing copy and shipping copy. Calculators are used for this operation. In might be interesting to note that, although this step of extending is done on a calculator, the use of a combination calculator and automatic typewriter is under consideration. The results would then be printed directly on the billing master after having set up the quantity and price in the calculator.

At the present time, however, we are typing from the shipping copy to the billing copy duplicating master, with an automatic typewriter creating a punched tape for analysis purposes. The data typed are such items as date of invoice, car number, number of packages, total weight, routing (when not already typed on the master), number of individual packages and weight when there is more than one item on the order, dollar values, freight charges, if any, etc. The duplicating master is then ready to run off pre-collated sets of invoices and bills of lading. Although not yet in use, the design of a freight bill for use by one of our subsidiaries, a truck line, will make this job of duplicating really worthwhile. At present these freight bills are all typed manually.

When the three-part order is taken from the teletype and more copies are needed, the duplicating master (billing copy) is available for the necessary copies. In some cases, where an eight inch by eleven inch envelope becomes part of the order, we can print directly on the envelope. Under the old system, this operation consisted of gluing a copy of the order to the envelope. Since this type of order is for manufacture, we can hold the billing copy while the duplicating is completed, without disturbing the flow of the orders. When duplicating is completed, the master billing copy passes to the billing department. Billing is then the same as described above.

An Innovation Calling for General Adaptation

Although this use of automatic typewriters as an integral part of systems work is fairly new, many companies today have advanced into programs of systems improvement using paper punched tapes. The subject of this article is in a field of methods and procedures currently of great interest to industrial accountants, especially in order handling and service to customers. The order-invoice procedure as outlined above may not fit the needs of another organization, but a little imagination, coupled with the knowledge of what some of the newer pieces of office equipment can accomplish, may result in a substantial reduction of overhead in many order and/or billing departments, through a variant of it.
Preparation and Use of Process and Flow Charts

by W. GERALD COLE
Administrative Assistant, Accounting Staff, Bethlehem Steel Co., Bethlehem, Pennsylvania

With opening recognition that, although charting is a technique, it is not an obscure one, the author of this article comments that charts may be of substantial use to accountants in their growing concern with data processing. He then offers summary illustrated description of five kinds of charts.

There is a strong tendency for individuals engaged in making an analysis of a clerical or operational system or procedure to avoid completely the use of all charts, because of their seeming complexity. Accountants, in general, believe that the preparation and analysis of charts is quite essential, but they, too, seem to feel that charts must be drawn by a trained engineer or draftsman. It is our purpose here to show that, by standardizing, simplifying and carefully designing the basic types of process and flow charts for the particular need, the accountant can prepare and utilize such charts in a survey, with ease and confidence.

It is the opinion of many persons that it is impracticable, generally, to analyze properly any system or any specific procedure without utilizing process charts or flow charts to some degree. The more complicated the operation to be analyzed or the more diversified the units which are to be compared, the more important it is that those who are to make the ultimate decision should have such charts to help them in making the quick but accurate comparison necessary in arriving at a correct decision. But, even before the survey has reached the stage for final review and recommendations, persons making the detailed analysis of the system at various locations will find that the work of preparing such charts will bring to their attention variations in procedure and discrepancies which, by themselves, may point the way to important savings which would otherwise be undisclosed.

For any such analytical work, it is well for a company to standardize its charting practices, that is, to provide a uniform system for the preparation and presentation of such charts. The procedures and charting practices set forth in this article have been adopted by one company for the use of its systems and procedures group, which is engaged in project studies of clerical work simplification. Certain of the standards adopted conform closely to those adopted in 1947 by the American Society of Mechanical Engineers. Others are generally accepted methods of charting which have been in use by
many companies for some time. It is not intended, in any way, to imply that everything included is an innovation on the part of the particular company. In the aggregate, the standards form one method of providing uniformity. With this in mind, there is set forth in the following paragraphs procedures for charting purposes which will explain the purpose, the possible use and the general method of preparing certain types of charts which are especially useful in the study of work simplification.

Data Amenable to Charting: Uses of Charts

Fact-gathering and the planning of simplified clerical procedures are greatly facilitated if prepared in chart form to provide a condensed “picture” of the “object” under study. The facts needed in most such studies include the following information, which can be gathered and charted after the main objectives have been determined:

1. The major functions and phases (groups of operations) of work division to produce the objectives.
2. The units of organization and the personnel performing the functions.
3. The movement of work within the organization units and the interunit relationship.
4. The specific actions performed, their sequence, the forms and methods used.
5. The volume of work involved.
6. The physical layout of the work areas and location of equipment in such work areas.

Charted data may be applied to a number of uses. The first analysis is, i.e., to provide a working paper for the analysis of a system, procedure or method. The second is comparison, making it easy to match present and proposed procedures or to compare similar procedures. The third is training, for which a chart tells the entire procedure story on a specific job, therefore making it easy to get an overall understanding of what is to be accomplished. Besides these generalized classes of uses, there are also a practically unlimited array of more particular ones.

For example, charts may be used as a sales tool for company procedures. In this role, they are aids in selling management on prospective changes for improvement and demonstrate new procedures in outline form, thereby in many instances avoiding experimentation and trial runs in order to secure approval. Layout charts facilitate arrangement of office furniture and equipment for best operating results. Charts assist scheduling and the development of a smooth flow of work. They may also be used in forms and reports control to help determine whether a form or report is or is not being used beyond its intended functions when present and proposed charts are compared. Finally, charts serve to facilitate narrative writing. They may be used to arrange all pertinent data to simplify the preparation of a narrative description for project reports, procedures manuals or instructions in respect to installation of a new procedure.
**PROCESS CHART SYMBOLS AND DEFINITIONS**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Classification</th>
<th>Basic Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>✄</td>
<td>Operation</td>
<td>Produces or accomplishes</td>
</tr>
<tr>
<td>✄</td>
<td>Transportation</td>
<td>Movement</td>
</tr>
<tr>
<td>✄</td>
<td>Inspection</td>
<td>Verifies</td>
</tr>
<tr>
<td>✄</td>
<td>Temporary storage</td>
<td>Keeps for a short period of time.</td>
</tr>
<tr>
<td>✄</td>
<td>Permanent storage</td>
<td>Keeps for a relatively long period of time.</td>
</tr>
<tr>
<td>✄</td>
<td>Uncharted action</td>
<td>Actions outside the control of the procedures charted.</td>
</tr>
<tr>
<td>✄</td>
<td>Combined action</td>
<td>Produces and verifies at the same time.</td>
</tr>
<tr>
<td>✄</td>
<td>Input or Output</td>
<td>Data or forms entering or leaving the process flow.</td>
</tr>
<tr>
<td>✄</td>
<td>Flow</td>
<td>Direction of flow of input and output data.</td>
</tr>
<tr>
<td>✄</td>
<td>Flow</td>
<td>Direction of procedure flow.</td>
</tr>
<tr>
<td>✄</td>
<td>Destroy</td>
<td>Destruction of records (includes rough drafts).</td>
</tr>
<tr>
<td>✄</td>
<td>End</td>
<td>End of all action (appears after a &quot;permanent storage&quot;).</td>
</tr>
</tbody>
</table>

**EXHIBIT 1**

**Kinds of Charts and Some Charting Techniques**

In succeeding sections of this article, differing types of charts are discussed in sufficient detail to make clear the general principles involved in them and to give instructions for their preparation and use. The operation and flow charts which have been adopted and are in use by one company—and all of which will be illustrated—are:

1. Process charts
   a. Single column
   b. Multi-column
2. Work flow charts
3. Record flow charts
4. Layout flow charts
5. Special purpose flow charts

Attempting to portray too much information or trying to present a combination of charting methods on a single sheet of paper has caused some aversion to the use of process and flow charts. Any tendency to overly complicated presentation should be guarded against. A good rule is to use the proper chart for the intended purpose and to keep all charts as simple as possible. Process and flow charts need not be works of art but they should be accurate and reasonably neat. Certain process and flow charts may not be readily adapted to specially printed forms. Usually the data should be drawn on blank paper or on cross-section or columnar paper having pale
### EXHIBIT 2

Blue guide lines which will not reproduce if the chart is photographed for copies. Often it is advisable to draw charts oversized and then have them oversized and then have them...
## MULTI-COLUMN PROCESS CHART (CHARTED PORTION ONLY)

<table>
<thead>
<tr>
<th>DEPARTMENTAL FUNCTION - STEERING COMM. MEMBERS</th>
<th>SYSTEMS AND PROCEDURES</th>
<th>COMPTROLLER</th>
<th>BILLING DIVISION DUPLICATING SECTION</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-1Originate Request</td>
<td>0-2 Catalogs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-3 Reviews</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[10] Reviews and gives recommendation</td>
<td></td>
<td></td>
<td>Assign investigation number in sequence</td>
</tr>
<tr>
<td></td>
<td>O-4 Gives action decision</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF APPROVED</td>
<td>O-5 Makes ready for duplication</td>
<td>0-6 Duplicates</td>
<td></td>
<td>Decision may be - approval, hold or rejection</td>
</tr>
<tr>
<td></td>
<td>O-7 Circularizes to interested members</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O-9 Gives recommendation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O-10 Records replies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[10] Reviews and gives action decision</td>
<td></td>
<td></td>
<td>If not approved, see procedure Code SPC-III for hold decision, or code SPC-IV for rejection decision</td>
</tr>
<tr>
<td>IF APPROVED</td>
<td>O-11 Formalizes into project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O-12 Files</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EXHIBIT 3

**NOTE:** This chart is a representation of a process flowchart for the NACA Bulletin. The chart outlines the steps involved in the process, from the initiation of a request to the final filing of documents. Each step includes specific actions and decision points, with notes on the implications of these decisions. The chart is intended to provide a clear and structured understanding of the process flow, facilitating better management and execution of tasks.
reduced by photography to the desired size for duplicating. This process tends to minimize slight drawing irregularities.

In every case each chart should include the following information since proper identification is imperative:

1. Survey subject — a concise description of the project.
2. Surveyor’s signature.
3. Reviewer’s signature, which indicates approval.
4. Charting code.
5. Charting and review dates.
6. Present or proposed plan.
7. Page number.
8. Other information, when necessary, to properly identify the chart.

**Process Charts**

Process charts are classified as single-column and multi-column. The respective objectives of each are:

*Single-column*—Used to portray a graphic and written description of the detailed steps in a relatively simple procedure, such as one within a single department or division thereof.

*Multi-column*—Used to describe graphically the detailed steps in a complex procedure or procedure which involves more than one department, division, etc.

The graphical portion of both process charts utilizes a series of symbols to aid in detecting and eliminating inefficiencies. Each of the symbols represents a distinct classification of the clerical procedures. The main classes are termed (1) operations, (2) transportations, (3) inspections and (4) storages. The symbols used, in general, are those which have been accepted through common usage. Templates are available from several office supply companies to aid in the preparation of process charts. The standard symbols and class of procedure or action which each denotes are shown in Exhibit 1.

The single-column process chart generally consists of a graphic and written description of a procedure or a phase of an overall procedure. It is used to describe action within a single operating unit or action performed on a particular job. Simplicity in charting can often be achieved by splitting a procedure into the component functions and charting each phase on a separate chart. Each of the phases can be brought together on a summary chart which is properly coded to the detail sheets. Supplemental information, such as distance traveled, time, form numbers, source of input data, alternate or combined procedures, cross references, etc., if pertinent to the study, should also be shown. A concise written description of each of the procedure actions should appear opposite the respective action symbol.

All actions should be numbered serially for identification and reference purposes. Each class of action should be numbered in a series of its own, such as 0-1, 0-2, 0-3: INS-1, INS-2: TS-1, TS-2: T-1: etc. The total of each class of action should be shown at the bottom of the last sheet of the data charted. Lines are provided to show totals of such items as distance traveled, elapsed time, etc.

A standard process chart blank
should be made available to personnel for charting purposes. One form is shown in Exhibit 2 (actual form size of exhibit is 8½" x 14"). It serves as an example of the suggested charting technique and shows how the form can be utilized for a detailed analysis. Some single-column process charts may vary widely in format because of differences in the processes which they portray. Such charts should be drawn on plain paper of sufficient size to accommodate the chart.

EXHIBIT 4

The multi-column process chart is more adaptable for a complex procedure or a procedure which involves interunit operations. Exhibit 3 shows this type chart with only the actions charted. Identifying data, etc., have been omitted. It may be detailed or in summary form, whichever better serves the purpose of the analysis. The charting technique is similar to that used for a single-column process chart but the action description is often condensed and, in certain cases, it may be detailed or in summary form, whichever better serves the purpose of the analysis. The charting technique is similar to that used for a single-column process chart but the action description is often condensed and, in certain cases, it may
be dispensed with entirely. The action symbols may be shown but they are not a requirement.

The chart should be designed to indicate the departmental, divisional and/or sectional units in which action takes place. Personnel classifications also may be shown if conditions to be analyzed so warrant. Actions should be numbered as in the single-column process charts. Pertinent reference data should be shown also.

The conditions which affect the procedures being charted will govern the form of the chart. Generally, blank paper should be used. Columnar statistical paper often can be used to good advantage for this type of chart.

**Work Flow Charts**

When it is desired to study the main actions and interunit flow in the sequence of operations of clerical procedures, the work flow chart should be used. Exhibit 4 shows this type of chart, with only the actions and the description charted. Identifying data, etc., have been omitted. It should show all of the units involved in the procedure. This type of chart may be used as a summary chart for related detailed charted procedures.
Usually the names of the units performing the operations should be listed at the top of a series of vertical columns. A general description of the more important operations should be shown in another vertical column on horizontal lines, so that the division of work can be described. Small circles or a heavy dot may be used to indicate where the operations are performed. Such indications should be connected by straight lines to show the flow of the work from unit to unit.

The conditions which affect the procedures being charted will govern the form size. Generally, blank paper should be used. Columnar statistical paper sometimes can be used to good advantage for this type of chart.

Record Flow Charts

The purpose of a record flow chart is to study the distribution of copies of a multi-copy form. Exhibit 5 shows this type of chart with only the record flow charted. Identifying data, etc., have been omitted. In some instances, a short description of the main action performed on each copy by each receiving unit also is shown to record the cause for the copy being sent to or routed through the unit. The chart should consist of a series of vertical columns headed with the names of the

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units performing the actions. The origination and flow of each copy of the record should be diagrammed, using record symbols indicating each piece of paper. A solid line or arrow should be used to indicate the direction of flow from unit to unit. Where two or more copies of a form move together, a bracket should be used to indicate this fact. Alternative procedures or actions should be shown by using dashed (—) or dotted (…) lines and symbols.

The symbols used should be rectangular blocks, as shown for input or output records under the process charts section of this article. Numbers should be shown within the symbols to indicate the copy number. The figure (O) should always represent the original (prime copy) in carbon typing, or the master in hectograph, stencil or lithography typing, etc. In cases in which two masters are prepared at one typing or a master is produced by xerography from an original record, the figure should be shown as 1/0, indicating the first master or original and 2/0, indicating the second master. In such cases, the first duplicated copy from each master should be shown as 1/1 and 2/1, respectively. When it is necessary to cross flow lines, the vertical line should be straight and the horizontal should be “half-circled” to indicate that no juncture occurs. A notation of how the work is duplicated always should be shown immediately under the originating symbols. Such note will generally consist of one of the following:

<table>
<thead>
<tr>
<th>Method</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pencil carbon</td>
<td>Xerox</td>
</tr>
<tr>
<td>Ink carbon</td>
<td>Xerox litho</td>
</tr>
<tr>
<td>Typed carbon</td>
<td>Contact print</td>
</tr>
<tr>
<td>Typed hectograph</td>
<td>Diazo master</td>
</tr>
<tr>
<td>Typed litho (meaning “multilith” or lithograph)</td>
<td></td>
</tr>
</tbody>
</table>

A very general comment on each of the main operations performed may be shown under the respective record symbols within the proper action unit. The chart size should be governed by the data to be charted. However, by using the paper lengthwise, when necessary, it is usually possible to keep within the standard paper sizes. It is especially helpful to produce a record flow chart oversized and to reduce it by photography before duplicating.

**Layout Flow Chart: Other Special Purpose Charts**

The layout flow chart is commonly used to analyze the flow of paperwork within an office or group of offices to aid in developing the best furniture and equipment layout, so that unnecessary steps can be eliminated. This type of chart or diagram should be drawn to scale size, usually one-fourth inch to equal one foot. The scale should be indicated. The drawing should show symbols indicating office furniture. Templates or cutouts, obtainable from office supply companies, greatly simplify the preparation of these charts.

Arrows indicating work flow or steps required should be drawn from one work space to the next work space.
Distances moved may be shown by inserting the actual distance figures near the center of the distance arrow. Personnel classifications should be shown within the workspace symbol. Windows, doors, partitions and structural columns should be indicated, because office layout often is governed by building layout. Room and other dimensions may be shown if necessary.

Layout flow charts should be drawn on scaled cross-section paper or on plain drawing or tracing paper. Duplicating requirements sometimes dictate which type should be used. In instances in which the drawing is to be reduced in size, it is recommended that the reduction be one-half. This should be shown under the title of the reduced-size drawing, enabling anyone to apply a scale of one-eighth inch to a foot if he wishes to attempt rearrangement or to work with the reduced-size diagram. Exhibit 6 shows this type chart with only the layout diagram. Identifying data, etc., have been omitted.

There are certain other types of flow charts in common use which are designed to analyze clerical and/or mechanical procedures. An example is the special charting generally employed for punched card mechanical procedures. This type usually employs special symbols indicative of the mechanical equipment. Templates for such symbols are available. However, the symbols are not standardized among the various manufacturers of punched card equipment. Such charting may prove confusing to anyone who is not familiar with punched card equipment and procedures.

Special purpose charts may be used, but care should be exercised to consider the ultimate end use of the chart. Such charts should not be used if they are to be presented to persons not completely familiar with that charting technique.

But the Pictures Must be in Good Form

It has always been recognized that people learn more quickly from pictures than they do from reading detailed explanations, provided the pictorial presentation really tells the story. Process charts are one type of picture which can be used to advantage in business. Properly prepared, they present to the busy executive a simplified outline which can be absorbed quickly without the necessity of long and detailed study. We believe that the various types of process charts exhibited and explained above would prove of value to many companies who have not heretofore made use of them.
SEPARATING UNEARNED BURDEN AND VARIANCES FOR MORE ACCURATE COST OF SALES

Editor, N.A.C.A. Bulletin:

ACCOUNTING PROBLEMS can become so confused by the way they are presented that their basic simplicity is obscured. Because the terms, unearned burden and burden variance, are usually associated, it does not necessarily follow that they should be considered synonyms. The association arises from the mechanics of burden costing. It is necessary to estimate the running hours or production of each department as well as the fixed charges and expenses entering into the operations of each center in order to establish a burden rate. Having established it, the operating accounts in the cost ledger are credited with the burden earned as it is charged into cost as goods are produced. At the end of the period, any balance in the operating accounts is debited or credited to unearned burden and burden variances.

These balances in the operating accounts are unearned in so far as the amounts charged into work-in-process has not been sufficient to carry all the overhead and might be called the value of the time a department or center is not in operation. They are variances to the extent that the actual expenses for labor, supplies, etc., differ from those estimated in developing the burden rate.

As the balance thus designated as unearned burden and variances is, to a considerable degree, an actual measure of unused capacity, statements should be prepared from the cost ledger accounts showing the details of the amounts charged and such statements should be further supplemented by detailed record of machine performance. They will be useful in appraising performance.

The separation of the two elements becomes necessary for statement purposes. It is sometimes contended that a separation of the charges as between unearned burden and burden variances cannot be carried into the accounts to any advantage and that the variances as well as the unearned burden must be carried directly to loss and gain. This is certainly subject to argument on any variance due to a low burden rate caused by underestimating the overhead amount used in computing the overhead distribution rate or if the estimated direct labor hours, or other base used, may have been overestimated, resulting in a low distribution rate.

In such an event, an adjustment should be made which will affect the work-in-process inventory, the finished goods inventory and the cost of goods sold. The adjustment of subsidiary records may be too complicated to be practical but each of these three accounts on the general ledger can be charged with their estimated share of the total. In this way, cost of sales will be charged against the sales of the period, the remainder of the variances being divided between variance in work-in-process and variance in finished stock. The last named two variance accounts should remain open until the goods remaining in process and finished stock have been sold, at which time they should be closed into the cost of goods sold for that period.

WILLIAM E. LUNAY

THE IMPORTANCE OF ACCURATE UNIT LABOR COSTS

Editor, N.A.C.A. Bulletin:

I invite your perusal of the following helpful hints on lowering unit costs. These
observations are based on factory work and study of cost accounting, (both at General Electric Company). This combination has enabled me to visualize cost procedures from the factory to the office instead of the usual office to factory route.

Most of us agree that one of the fundamental principles of cost accounting still is to have the cost system so designed that unit costs can be accurately ascertained. Manufacturers incur considerable expense to achieve this goal with such scientific procedures as standard costs, time studies, planning, etc. So much emphasis is placed on these modern, glamorous cost procedures, that sometimes the simple "performance check" method is overlooked. Some of the older manufacturing concerns will find hidden profits eager to be exposed by this down-to-earth practical method of lowering unit costs in direct labor.

A general check of all direct labor operations should be made. Each operation should be compared with the work voucher and checked with the drawing, right on the factory floor, while the operator is performing the operation. This will result in such revelations as:

1. Jobs being planned for discontinued and nonexistent operations.
2. Planned scales not being adhered to.
3. Revisions planned incorrectly.

Some companies inadvertently inflate their unit cost simply by rewording the description of the operation to be performed. This creates confusion resulting in a price discrepancy on like operations. For example, the description might be:

1. Lay out drill and counterbore $2.00
2. Lay out, drill and spot face 2.50

These figures have an obvious inaccuracy. Counterbore and spot-face are two different operations but many times spot-face, a simple operation, is confused with counterboring, which is a more complex and more expensive operation. The result is that both operations are paid alike or, if a differential is made, it may be applied to the wrong operation as in the above example. By being consistent in the descriptive wording of an operation, lower unit costs may be obtained because it would help to eliminate price variations on like jobs with different drawing numbers.

Another method which will help end price variations on similar operations with different drawing numbers would be to add a letter or code to each drawing number so that like operations can be identified and price adjusted accordingly.

For example:

4344148 — ZEO 1
5210380 — ZEO 7142615 — ZED 1
9121177 — XER 4943694 — ZED 2
4521730 — XES

The "ZE" series (for example) includes items which are similar except for size. The third letter shows different sizes. When the first three letters are alike, it means that the items on the drawings are alike except for a revision, (the digit at the end of the code). This coded identification system should end such fallacies as:

1. Price variations for similar work.
2. Small jobs paying more than identical larger jobs.
3. Incorrect pricing of jobs returned for additional work, revisions, or made into a different part number.
4. Price variations when like jobs are done in separate departments.
5. Set ups being paid over and over again for identical jobs with different drawing numbers.
6. Same prices paid for operations on steel, cast iron, bronze, aluminum, etc.

The significance of accurate unit costs can not be over-emphasized. This seemingly small item has the power to make or break a corporation. It has the power of neat magic which has startling effects on many phases of a business. In the figures for the
Inflated unit costs for the two operations cited earlier in this letter, unit costs were inflated because of overpayment to direct labor. Just think how adversely this would affect the costing of overhead expenses into production:

1. Under the direct labor dollar method, costing is inaccurate because more dollars were paid than earned.
2. In the direct labor hour method, costing is inaccurate because more hours were paid for than worked.
3. With the machine hour method, costing is inaccurate because the machine worked less hours than paid for.
4. By the production center method, costing is inaccurate because the overhead expenses pertaining to the machines are charged to the production centers.

Inflated unit costs in this instance will cause improper distribution of overhead expenses with the result that one department will be overcharged and another undercharged. At the beginning of a budget period, one department may be handed a wholly inadequate budget while another may be given a fat budget which it is not entitled to.

The effects of inaccurate unit costs go further. Investment in machines is another example. Inflated labor costs has caused the machine operator to hold back. This machine is not working full time. The company is not getting its full benefit from capital invested and also not getting its full use of depreciation from the machine. Other items affected by unit costs are work-in-process and finished good inventories, as well as net profit.

The books of some manufacturing companies may show incorrectly that the plant is operating at normal capacity. Since inflated unit costs affect idle plant capacity, the plant may actually be operating below normal capacity without its being realized. Therefore, the nonvariable expenses would overcharge unit costs. This is a second charge to unit costs. It is a penalty which must be paid automatically because of the inflated unit costs in direct labor. Since the plant is really working under normal capacity, a drive for more business could be instituted if the fact were known.

The writer feels that, if the various steps outlined here are given conscientious consideration, unit costs can be lowered, production increased, and more savings effected through proper distribution of fixed factory service cost when spread over a greater output. Only then will the manufacturer be in a good position to meet competition.

STANLEY THOMAS

APRIL, 1955
Notes On Current Reading

Books

The Management Team

The attractive title of this compact book covers a contents list no less attractive, "based on the proceedings of the Twenty-fourth National Business Conference, sponsored by the Harvard Business School Association, June 12, 1954." One section, written by four authors bears the title "Effective Delegation and Control by the Controller." A scattering of familiar names will greet industrial accountants in scanning the authorship of other sections also.

Productivity Accounting
Hiram Davis, University of Pennsylvania, Philadelphia, Pa., $5.00.

A section on "the use of productivity accounting in business" (the topic is further subdivided into "measurement of company efficiency," "analytical audit," "budget control," and "common-price accounting") is central to this volume. Opening chapters include definitions and orientation material. There are many tables and much footnoted discussion of concepts of productivity. The article by William Langenberg in the N.A.C.A. Bulletin for January, 1952 is given considered attention.

Centralization vs. Decentralization in Organizing the Controller's Department
Controllership Foundation, August, 1954, 106 pp., $4.50 to members of the Foundation, $6.00 to nonmembers.

Although the background of this study related to the alternatives (or degrees) of centralization and decentralization, there is much direct material on the relationship between accountants and other—especially line and general—management personnel. There is material also on organizing accounting for selling and plant units and on the development of accounting personnel.

New Rapid Tax Depreciation—How to Use it Profitably

On the side of advocacy of adoption of faster early-year depreciation (although objections are considered and there is a chapter "When is Rapid Depreciation Inadvisable?") this concise presentation details the conditions of elections of depreciation method, its financial implications, computations involved in method chosen, and accounting treatment of depreciation taken.

Taxation of Oil and Gas Income

Authored by two partners (at offices in Texas and Alberta, respectively) of a public accounting firm, this book deals with an accounting specialty within a specialized industry. In its field the work is comprehensive and relates mostly to United States tax considerations, with a chapter devoted to Canadian income taxes.

Handbook of Business Forms
Prentice-Hall Editorial Staff, Prentice-Hall, Inc., 70 Fifth Avenue, New York, N. Y., 1933, 393 pp., $5.95.

A reference manual, this work exemplifies 429 "forms" under 31 classifications from "sales contracts" to "miscellaneous" by way of "forms relating to purchasing and inventory control," "reports to management," "insurance records forms," "forms relating to employee benefit plans," "tax forms," and many other classifications. Significant clauses for insertion in contracts are included as forms.
SELECTED ARTICLES FROM ACCOUNTING PERIODICALS

ACCOUNTANT'S JOURNAL, December 1954 (304 Burke Building, Manila, Philippines, single copy $1.00)

The Role of Accountants in Our Changing Economic Life. Jaime Hernandez
The Future of the Philippines' No. 1 Industry—Coconut. Paul R. Parrette
Accounting Problems in a Coconut Oil Factory. Primitivo A. Javier
The Role of Accountants in Modern Business. Oscar Ledesma
Special Features in Accounting for a Sugar Central. Cecilio A. de Guzman
Some Accounting and Auditing Problems Affecting Retailers in the Philippines. Washington Sycip

CANADIAN CHARTERED ACCOUNTANT, February 1955 (10 Adelaide Street, E., Toronto, Ontario, Canada, single copy $.50)

Problems of Compilation of Selling and Distribution Costs. W. L. Spalding

THE CONTROLLER, February 1955 (1 East 42nd Street, New York 17, N. Y., single copy $.50)

*Measuring Sales, Gross Assets and Invested Capital and Comparing Them to Profits. E. Stewart Freeman
A Modern Simplified Pay Role Procedure. Gordon G. Fogg
The A-B-C's of Oil Payments. Harold Harlan Hammer
Conclusions Drawn for Case Study on Management Planning and Control at General Electric.

FEDERAL ACCOUNTANT, December 1954 (P. O. Box 53, Washington 4, D. C.)

The Role of Accounting in Cost Budgeting. Karney A. Brasfield

THE JOURNAL OF ACCOUNTANCY, February 1955 (270 Madison Avenue, New York 16, N. Y., single copy $.75)

Operational Accounting and Operations Research. C. West Churchman & Russell L. Ackoff
Percentage Depletion Controversy. R. K. Macleod
*What is an Accountant? Marquis Eaton
Accelerated Amortization on Defence Facilities in Annual Reports. John H. Myers
More on Declining-balance Depreciation and Estimated Expenses. Carman G. Blough, Editor

THE NEW YORK CERTIFIED PUBLIC ACCOUNTANT, February 1955 (677 Fifth Avenue, New York 22, N. Y., single copy $.50)

An Accounting System for a Community Trust. Louis Englander
Accounting and Auditing Problems of Used-Car Dealers. Arno Herzberg

* Further mentioned in accompanying notes on particular articles.
SELECTED ARTICLES FROM BUSINESS PERIODICALS

ADVANCE MANAGEMENT, February 1955 (74 Fifth Avenue, New York 11, N. Y., single copy to members $.75, nonmembers $1.00)
The Administration of Operations Research. J. W. Pocock
A Program for Motivating Salesmen. William W. Bryan

AMERICAN BUSINESS, February 1955 (4660 Ravenwood Avenue, Chicago 40, Ill., single copy $.35)
Are Office Production Standards the Answer? Harry L. Wylie

FACTORY MANAGEMENT AND MAINTENANCE, February 1955 (330 West 42nd Street, New York 36, N. Y., single copy $.50)
Eight Companies Testify that Incentives Work Fine in Maintenance.

MANAGEMENT METHODS, February 1955 (141 East 44th Street, New York 17, N. Y., single copy $.50)
How to Estimate the Costs of Fringe Benefits, Moritz E. Pape

OFFICE EXECUTIVE, February 1955 (132 West Chelton Avenue, Philadelphia 44, Pa., single copy $.50)
The How of Order Processing. Theodore Nowak
How Our Order-Billing System was Improved. F. Willard Heintzelman
Why Bookless Bookkeeping? Lawrence Liebman

What is an Accountant?
Self-identified as a "word picture," this article proceeds on the thought that "accounting is a science of which accountancy is the art." As a whole, the presentation draws attention to the need of the economy—and of society—for the viewpoint of the accountant and to the present rather hesitant realization of this need on the part of most accountants. Unsolved problems in this growth are described.

Measuring Sales, Gross Assets and Invested Capital and Comparing them to Profits
Developed in this paper, which is devoted to means of measurements of various bases to which profits are related as "return on" and is concerned with the fluctuating value of the dollar in connection with the validity of such bases, is a proposed conven-

Articles

Price-Level Adjustments: Fetish in Accounting
This more-than-twenty-page article reviews the literature of proposals to make accounting more serviceable in periods of fluctuating value of the dollar. It casts a somewhat doubtful eye on the accomplishments (practical or theoretical) which have been achieved and suggests that a shortcut has been attempted to greater usefulness, by focusing on financial statement adjustment, when the need is for "a closer integration of economics and accounting than has ever been accomplished before."
DEPRECIATION POLICY FOR NEW ACQUISITIONS

WHAT MANUFACTURING COMPANIES are doing or planning to do about the new depreciation options provided by the Revenue Act of 1954 (and discussed by I. Wayne Keller in his article “Faster Depreciation—The Glitter’s Not All Gold” on pages 1127 to 1140 of this issue of the N.A.C.A. Bulletin) has been sampled by the National Industrial Conference Board (247 Park Avenue, New York 17, N. Y.), in a survey of 167 companies reported on in the Board’s “Business Record,” February, 1955, under the title of “Depreciation Policies Under the 1954 Code.”

The report was summarized in a release by the N.I.C.B., dated February 17, 1955, as follows “almost half (45%) of 167 manufacturing companies recently surveyed by the National Industrial Conference Board are changing their depreciation methods as now permitted under the 1954 tax code. Thirty-five per cent of the cooperating firms have definitely decided against a change from their present policy, although many point out that they can always exercise the option later if changing conditions warrant. The remaining companies have deferred decision pending completion of studies that are under way.

Although accelerated depreciation was written into the new tax code to stimulate expansion and modernization of plant and equipment, N.I.C.B. found that two-thirds of the 75 companies which have changed their depreciation policy report that the change will have no influence on their capital spending. Factors such as demand for products, advantages of technological improvements, and the availability of cash are expected to remain the dominant considerations.

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to gamble on tax rates, and satisfaction with the straight-line method.

"Twenty-five per cent of the companies which are planning to change their depreciation methods foresee some change in their practice of differentiating between depreciation accounting for tax and book purposes. On the one hand, some companies which favor a "conservative" practice for internal purposes, take the accelerated depreciation solely for tax purposes. On the other hand, some companies which have previously been writing off assets at a faster rate for internal purposes than for tax purposes foresee eventual reconciliation in the two accounts."

ELECTRONICS AT WORK

The quotation below reproduces with permission a passage from a seven-page article entitled "How Electronic Machines Handle Clerical Work" by Arthur A. Brown and Leslie G. Peck which appeared in the January 1955 issue of *The Journal of Accountancy* (270 Madison Avenue, New York 16, N. Y., single copy 75¢). It must be emphasized (as will also appear from the text of the quotation) that the excerpt is fragmentary, needing the entire article for its proper impact. However, the paragraphs below do conjure up with a worthwhile degree of concreteness the essential (not physical) picture of electronic machines at work on a payroll application:

"In payroll operations, the primary source of information is the time card, containing data on hours worked on various job classes and on overtime hours. The time card carries information as to employee name and probably an employee number. The second input is a permanent (or semipermanent) file listing pay rates for the various job classes and for overtime. The third is a similar file listing tax rates, and the fourth is an employee pay history file showing for the individual employee what deductions are to be made, total deductions to date, and other information needed for computing taxes and deductions.

"In an electronic system, numbers are 'written' in the form of magnetized spots on a metallic or metalized tape, or on a drum made of magnetic metal. The writing is done by a current of electricity passing through a coil past which the tape moves, leaving a residue of magnetism on the tape. When the tape is moved past a similar 'reading' coil, the magnetization causes a current to flow in the coil; this current is amplified by vacuum tubes and can actuate a number of circuits, depending on the construction of the machine and the condition of the circuits at the moment.

"Thus, to read the data that have been transcribed from a time card to a tape, the machine passes under the reading coil a magnetic tape containing employee number and number representing the hours worked. If there are many job classifications, each will be assigned a code number which will precede the time information on the tape and govern the disposition the machine makes of it.

"Posting means simply writing the number in a storage medium. The work sheet in the above example is replaced by a special storage medium (usually core, electrostatic, or delay-line storage, though there are other types) in which numbers are kept for quick reference. The usual name for such storage is the 'quick-access memory.'

"Instead of a designated place on a work sheet, the machine uses designated locations in the quick-access memory. The designation is usually called the 'address'; it is therefore customary to speak of read-
Additions and multiplications, subtractions and divisions, are performed in a set of circuits sometimes called the 'arithmetic unit.' The elements are known by the familiar name of 'registers.' A typical operation consists of taking a number from a specified address, adding it to a register, adding to it another number from another specified address, and putting the total in a third address. The machine can erase numbers if desired, can clear registers or leave totals to accumulate, and in general do the same things a hand calculator does.

'It has, however, an additional ability which in a sense justifies the name 'electronic brains.' It can compare two numbers to determine which is the larger, and act in either of two ways depending on the outcome of the comparison. It can, therefore, carry out step (13) of the series listed above,* (i.e., compare total FOAB withholdings with the standard amount), and then proceed to either (14a) or (14b) as directed. Without this ability, the high speed of the arithmetic unit would be needed too often to allow the full speed to be realized. The great flexibility permitted by even this limited amount of 'intelligence' can scarcely be accepted without closer acquaintance with electronic machines. The example* given a little later will help to demonstrate this flexibility, though it cannot convey an adequate impression.

* The operation of an electronic machine is controlled by a set of instructions similar to those which were given out as steps (1) to (17) above* for the payroll clerk, but converted to the form of instructions (a) through (g) of the preceding paragraph.

ACCOUNTING CONFERENCE OF THE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

The dates of April 18 and 19, 1955 have been set for the Eighth Annual Accounting Conference to be held at College Station, Texas, in the Memorial Student Center of the Agricultural and Mechanical College of Texas. Robert P. Wood is General Chairman and Thomas W. Leland, Program Chairman.

The two days of the conference are divided into three sessions—the morning and afternoon of the first day and the morning of the second day. There will also be a banquet on the evening of the first day. Among the topics to be presented in addresses will be "Organization within the Accounting Department," "Managerial and Budgetary Controls," "How to Cut Your Paperwork Red Tape," "Broadened Responsibilities of the Accountant" and financial and accounting problems of small business.

* Reference is to portion of article not reproduced here.