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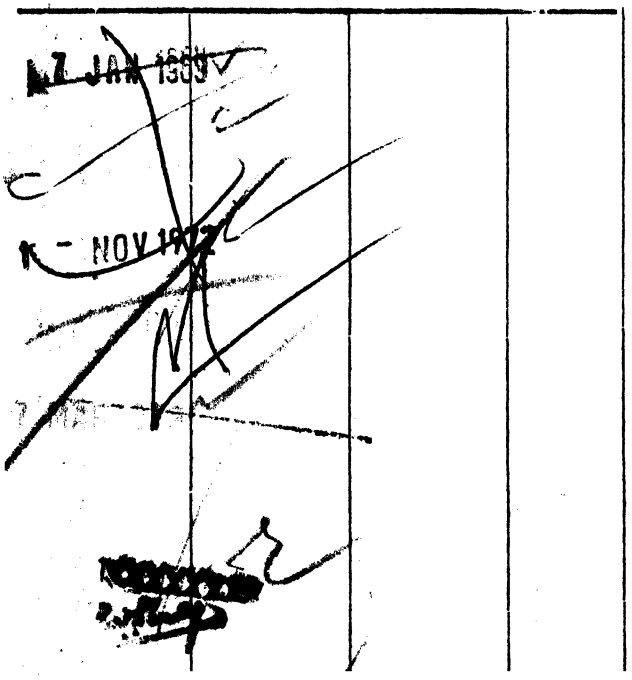
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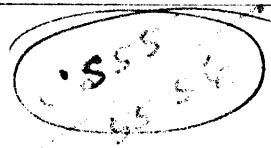
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COST ACCOUNTING

Principles and Methods

1527

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(Fifth Impression)

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To

STUART C. McLEOD

Secretary of the National Association
of Cost Accountants
this book is most gratefully dedicated

PREFACE TO SECOND EDITION

In preparing this revised edition, the principal purpose of the authors has been to show that costing for distribution expense is as essential a part of cost accounting as manufacturing costs. The chapters on distribution costs are new. Methods of determining the unit costs of marketing products in different districts by different systems of distribution to different customers or groups of customers are explained and the control of selling and administrative expenses is discussed at length. The chapters on standard costs for manufacturing operations have been entirely rewritten. A chapter on By-Product and Joint-Product Costs is added in Part III, and an additional chapter on Trade Associations and Uniform Cost Accounting is included at the end of the text.

In order to make space for the new material, the discussion of actual manufacturing costs has been condensed. In spite of this, many points which experience has shown to be inadequately discussed in the first edition are treated more fully and the authors believe that the explanation of no important principle or procedure mentioned in the early edition has been omitted.

C. R.
C. E. J

PREFACE TO FIRST EDITION

Within the last two decades the science of cost accounting has entered upon a new field of usefulness to industry. From an earlier period, when costs were little more than a historical portrayal of the past, we are fast emerging into an era where costs are considered necessary to furnish vital information upon which policies of administration and management rest.

In addition to those sound principles and cost procedures which have come from the past, this text discusses six distinct phases of costing that have been given little, if any, consideration in earlier works on Cost Accounting. The recent developments included are:

First: Definite emphasis is placed upon the use of cost accounting in measuring and evaluating plant performance. In earlier days cost data contributed much as a guide to the setting of prices, and as a means of assuring more scientific bidding. The last twenty years have seen the World War, the rapid shift from manual to machine production, the development of high-speed tools, automatic machines, and standardization. The cost of production has been transferred from men to machines. Intraplant problems have become of major importance and cost accounting must supply the data for the solution of such problems.

Second: Overhead expense is treated as a major item that must be rigidly controlled and kept in definite relation to production. Heretofore the cost man confined his efforts to the distribution of overhead expenses to processes and units of goods produced. The more important aspect, namely, the placing of a budgetary control over overhead expenses that will hold in check this cost element with the same rigidity that direct labor is controlled through measured allowances was neglected.

Third: Standard costs and budgets are included as an integral part of this text. The principles discussed are fundamental and may be applied in a wide variety of industries.

Fourth: Managerial foremanship is stressed as an important development in the use of costs. Foremen in the last analysis are responsible for a large percentage of the expenditures of an enterprise. The placing of a cost emphasis on all of their activities makes their work managerial in a restricted but definite sense. To their accustomed functions of handling men, materials, and machinery is added control of the monetary value of each.

Fifth: Two chapters are given to distribution costs. In costing today the same analytical treatment is applied to the marketing phases of business as to the operating and fabricating aspects.

Sixth: The important subject of the presentation of cost data for management use is treated in detail. The final success of costs depends upon the accountant's capacity to interpret costs to the executive and administrative staff.

Special attention has been given to the teachability of this text. The organization is in numbered topics. Principles are illustrated by specific applications taken from business and industry. The significance of illustrative transactions is made clear by the use of T accounts.

The author's wide experience in cost installations, as cost and budget consultant to a large number of American industries, and in state and federal government service, has made possible the extensive use of practical illustrative material found throughout the text.

For the splendid cooperation given by accountants, executives, foremen, and engineers in hundreds of industries, and for the specific help and advice from his many friends in the National Association of Cost Accountants, in the Government of Pennsylvania, and in the Federal Government, the author owes an unpayable debt. In fact, this book in a large measure is but the expression of the thoughts of a number of industrial and business leaders, who see and understand the value of cost accounting in bringing about a more efficient and a more human industrial day.

C. R.

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PART I

BASIC COST PRINCIPLES

CHAPTER I

SERVICES OF COST ACCOUNTING

1. Cost Accounting a Tool of Management.—The purpose of cost accounting is to serve management. Its value depends upon the assistance it renders in solving the problems of industry by showing what it costs to manufacture and market goods or services and to carry on business. Thus cost accounting should be looked upon as a means to an end and not an end in itself.

With the rapid progress of American industry, particularly since the Great War, business men have come to look upon cost accounting as an indispensable tool, the ultimate purpose of which is to cost and to control all the varied operations and all the units of product which are produced in a manufacturing enterprise. Cost accounting is designed to aid management in shaping and directing activities so that the policies of the enterprise can be worked out successfully. Cost accounting is the means of finding the dollar and cents facts of every phase of manufacturing and marketing, and in accomplishing this it furnishes indispensable information to management.

2. Two Aspects of Cost Accounting.—To gain an adequate picture of cost accounting it must be looked at from two distinct points of view: (1) The bookkeeping side; (2) The control or service side.

The bookkeeping side is made up of a fairly well standardized body of principles and practices. By use of definite rules, the cost man keeps his books and records, and by means of these he is able to analyze and reduce a large variety of transactions into a few accurate and usable statements. This bookkeeping work is primarily, if not solely, the concern of the cost accountant.

In contrast, almost every one in the business is concerned with the conclusions drawn by the cost accountant from his bookkeeping work. The furnishing of these conclusions is the control or service side of cost accounting. This phase of cost accounting is vitally concerned with results. These are matters of especial significance to the owners and managers of the business, to bondholders, creditors, and bankers, to prospective investors, to plant supervisors, sales managers and engineers, and very often to the government and the public in general. Some accountants who are not well qualified have been inclined to neglect the service side of costs, because it seems more intangible and abstruse, and less exact than the bookkeeping side. The intelligent administrator will judge the cost accountant by the control, or service, feature of his work. Here is the cost accountant's

opportunity to make himself invaluable to industry by insight and constructive imagination. In short, his costs must serve the management.

In every application of cost accounting to industry, the accountant must keep both of these aspects of costs in mind. He must be able to distinguish the essential from the unessential, the important from the unimportant, both as to the means he employs, the statements he compiles, and the conclusions he draws. He must know what to do, and how to do it; what to infer and how to present and interpret his conclusions. In general, it may be said that the bookkeeping requirements must be so blended with the service side that the greatest values obtainable through cost accounting are rendered to management with the least expense consistent with adequate and reliable information. What these values are will be discussed in later chapters.

3. Development of Cost Accounting.—The general accountant has been for a long time aware of the insufficiency of a system which for the most part neglects the important internal operations of a manufacturing business,—those by which raw materials are converted into finished products and marketed through many different sales outlets. Consideration of this problem on the part of accountants, engineers, and managers has led to the formulation of methods which attempt to fulfil the following purposes:

1. The elimination of the dependence upon physical inventories.
2. The determination of unit costs, which are necessary both to complete the financial records of the company and to guide its selling policies.
3. The establishment of standards, and the securing of control over all the internal operations of the manufacturing, selling and administrative divisions.

The system which accomplishes these purposes is called a *cost system*. The body of rules and principles in accordance with which such systems are designed and operated is called *cost accounting*. Any system of accounts which does not fully meet the three purposes just mentioned is inadequate and unworthy of being termed a sound cost system.

Cost accounting is a comparatively recent development in the application of scientific principles to the problem of management. The need for efficiency in the conducting of business affairs has become increasingly apparent, and with this need the more proficient executives have sought means for obtaining a more effective regulation of the activities of which they are in charge.

In a small plant the owner or manager can know continuously about the conduct of all of its activities by direct observation. By daily tours through the factory he can judge whether the flow of material is continuous, or whether work is congested at one or more points with consequent disruption of later processes. He can distinguish between the good and the poor workman, the efficient and the inefficient machine, the inexpensive and the costly process. He has an intimate contact with all the productive, selling, and administrative activities of the busi-

ness. As the size of the organization increases, however, this direct relationship and intimate contact are lost. Some other means must be applied to furnish the management with facts and to test results. Cost accounting and statistics supply this means. By the aid of cost reports, management supervises the work of the various department and operating heads, and coordinates the diverse functions of the business.

Several powerful economic forces have cooperated in bringing about an industrial situation in which cost accounting has become an indispensable element in the conduct of business. These changes may be summarized as follows:

1. The increasing power of competition.
2. The larger size of manufacturing plants.
3. The greater complexity and speed of industrial operations and machine processes.
4. Rising costs.

The use of machinery and power in the making of goods is a comparatively recent innovation. The results of this process of mechanization have been to specialize men and machines to a high degree, to require large investments of capital, to increase enormously the size of manufacturing plants and the intricacy of processes and operations within the plants. Also, the manufacturer has been subjected to other powerful forces. Competition of suppliers on the one hand has tended to drive prices of his finished products downward, and on the other hand the demand of labor for higher wages and a better standard of living, larger capital investments and other items have tended to increase the costs of production.

The manufacturer thus has been caught between two millstones. He has found it necessary to spend carefully and intelligently, striving to make the required quantity and quality of goods at the lowest possible cost. It is not sufficient, however, merely to desire low costs. They must be achieved by constant attention and analysis. Cost accounting supplies the means by which expenditures are constantly recorded and watched, regularly compared with standards and actual results, and thereby effectively controlled. This system is based upon the generally accepted philosophy that with knowledge of the facts comes the opportunity and the power to plan and do whatever is necessary for effective guidance and control.

4. Summary of Purposes in a Manufacturing Business.—Cost accounting has become an important instrument of industrial management. Its purposes and uses may be summarized as follows:

1. It records the internal transactions of a manufacturing business so that the information by which perpetual inventories may be kept is furnished. This makes possible the compiling of monthly financial statements.
2. It furnishes the management with the total and detailed costs of its products, and thereby enables the company to formulate intelligent selling policies.

3. It furnishes the management with the detailed costs of all operations and processes, analyzed into the several elements of materials, labor, overhead, selling, delivery and administration, and by means of comparisons with previous costs and with standards enables the responsible executives to exercise an effective control over the efficiency of each division of the business.
4. By use of cost experience, intelligent and effective control of all departments is obtained through the establishment of standards and budgets for all executives and covering all expenditures.

The immediate aim of cost accounting is to ascertain all of the costs that go into making and marketing a product. Merely to know these costs, however, is not the ultimate aim of cost accounting. The other and more important purpose consists in obtaining and maintaining an adequate control over all the operations and activities of an enterprise so as to establish the highest degree of efficiency possible.

5. Scope of Cost Accounting.—The service of cost accounting applies not only to manufacturing enterprises, but to every type and kind of activity wherein there is a monetary value involved. In retail and wholesale businesses, in banks, in transportation companies, in government, in schools and colleges, in hospitals, and in churches, the costs of carrying on must be measured carefully and accurately if these institutions are to be operated efficiently. To believe that cost accounting is confined to manufacturing industries is to be blind to its growth and progress during the last twenty-five years. It is true that the first development of cost accounting was in manufacturing establishments. But as its value became recognized its scope was widened until it has come to be applied in all types and kinds of institutions that go to make up our present civilization.

Not only has the scope of cost accounting been widened to include all types of institutions, but its services within the individual institution have likewise broadened. The first analyses made by cost accounting were limited to the fabricating or manufacturing division of a business. The cost to manufacture this table, that desk, or that automobile was the type of information first supplied by cost accounting. Today, in contrast, cost accountants make analyses not only of manufacturing expenditures but also of those incurred in purchasing, selling, advertising, delivery, and administration. Thus it can be said that cost accounting has forged ahead until today it is applied to every type and kind of institution and to every type and kind of function performed within an institution.

CHAPTER II

COST ACCOUNTING AND MANAGEMENT

6. Cost Accounting in Relation to Policy Formation and Financial Control.—Cost accounting has come to be of outstanding importance to the major executives of a business as an aid in policy formation and in financial control. Principles, methods, and illustrative material covering the presentation of costs for executives are considered in a later chapter. It is essential, however, at the very start of our cost studies, that we become familiar with the general type of service that cost accounting performs for management. The successful cost man must be about fifty per cent. cost accountant and fifty per cent. an executive himself. As an executive he must be acquainted with the complete financial structure of the company, with its organization, with its operating and sales methods, and with its supervisory personnel. Only by being acquainted with these different phases of an enterprise can he adequately interpret and shape his cost data to meet the specific needs of the officers who are to use them.

In many present day establishments the cost man is little more than an accounting clerk, and as such he is satisfied to turn out his cost statements without knowledge or understanding of what use is to be made of them. As a result most of his cost findings are relegated to dead files and waste baskets. Executives in such concerns find no connection between the problems with which they are wrestling and the dull standardized cost statement coming from the cost clerk. Cost data turned out in this unintelligent way are worse than useless because they lead business and industrial leaders to have doubt regarding the value of all cost accounting, both good and bad.

Alert cost accountants, however, are ably meeting the situation, and management is now given the vital information on which financial control and policy formation must rest. By thus meeting the needs of executives, cost accountants have established cost accounting as one of the most important influences in guiding the destinies of industry.

7. Value of Cost Data.—A detailed list of the services that cost data can furnish major executives would be far too extensive to put down here. In a general way, however, the services group into seven types. These are:

First.—Costs bear a direct relation to the wage problem. If satisfactory relations are to exist between management and workers, then proposed wage and salary changes must be interpreted in the light of the cost factors. Also, where bonus or premium plans are being contemplated the need of considering cost figures is apparent.

Second.—Cost data furnish information concerning idle plant and equipment. The cost variations between active and inactive periods are required by enlightened

management. Again, it is important to analyze fully the causes for the "down" hours of a plant if proper policies for remedying this condition are to be developed.

Third.—Cost data bring to the executives the factual basis upon which selling policies should be formulated. Costs by lines, units, territories, and sales divisions enable the executive to set up a sound distribution plan.

Fourth.—Cost data are essential to give a clear picture of the capital structure of a plant. Depreciation and depletion costs are subjects demanding careful study, and any policy formulated regarding these elements must take into consideration the cost factor.

Fifth.—There is a constant demand for special cost studies and special cost reports. Research, engineering, sales, maintenance, and operating departments all bring to the major executives problems the solutions of which require cost figures. A paramount need of business, therefore, is a flexible cost system that can furnish the data for special studies and reports.

Sixth.—Cost data interpret any changes, major or minor, that are contemplated by the enterprise. The introduction of new lines of product, the development of new uses for established lines, new construction, etc. are all changes that have definite relations to and bearings on costs. And no other element is so important in shaping policy regarding such changes as costs: first, the cost of making the changes; and second, the resultant changes in cost of operation and of product.

Seventh.—Cost data give to the executives a basis for comparing their business with competitive concerns and with the general condition of the trade. Many trade associations supply important cost information to their members. In many industries it is now possible to determine that one specific cost item of a concern is out of line with the same item for other members of the association. Furthermore, reasons for the bad condition can also be learned.

The chart between pages 6 and 7 was constructed after a study of over three hundred industrial concerns had been made. In the column at the left ten principles of modern management are shown. In the second column the activities which superior or exceptionally successful firms found essential to the carrying out of each management principle are indicated. A star is placed immediately before each activity that directly requires cost information for its proper functioning. Those services that indirectly require the aid of cost accounting are not starred.

Columns three and four show activities conducted by average companies and relatively unsuccessful businesses, respectively. The outstanding differences between these columns and the column headed The Superior Firm is the absence of those activities that require cost information for their performance. To put this in other words, the success of superior firms is largely due to their managements' utilizing the information that adequate cost accounting can supply.

As costs become more closely related to the needs of the major executives the real importance of cost data becomes manifest. At present it is the exception

rather than the rule to find a cost system adequately organized to serve the needs of the management. Therefore, coupled with the need of building up a sound cost accounting system, goes the need for the cost accountant to sell his major executives on the value and importance of costs to the successful administration of business and industry.

CHAPTER III

COSTS AND MANUFACTURING CONTROL

8. Scope of Manufacturing Cost Analysis.—In the early days of cost accounting its function was the finding of the unit cost of manufacturing different lines of products. These cost data were used as a guide in the determination of proper selling prices and as an aid in making sales quotations. Through the comparison of unit manufacturing costs and selling prices, unprofitable lines were recognized and, if competitive market conditions permitted, discontinued. Sometimes this was not possible because it was necessary to carry a full line of products in order to fill customers' orders satisfactorily. The finding of unit manufacturing costs is still, and will continue to be, an important phase of cost accounting.

As time went on, the supplying of information helpful in the control of manufacturing activities became the outstanding purpose of a good cost system. During the last few decades the nature of American industry has changed. The size of the industrial establishment necessary for economical production has greatly increased and, consequently, also the amount of capital invested. Great amounts of money have been tied up in plant and equipment of all kinds. The costliness of production has in effect been transferred from men to machines, from labor to capital. The increased size of the manufacturing establishment and the greater investment per man employed have made it necessary for executives to rely upon statistics and accounting data for the formulation of policy, the establishment of control, and the guidance of the activities for which they are responsible. The judgment of the executive today rests upon reported facts rather than upon direct knowledge and observation. Efficient costing, therefore, must supply, not only the unit costs of manufacturing products, but also, and more important, the means of measuring performance at every stage of the manufacturing process.

9. Meaning of Control.—There are two distinct meanings attached to the word *control* in cost accounting literature. The original meaning of the word *control* in accounting was in connection with the controlling account. The controlling account is a single account kept in the general ledger and having a balance equal to the sum of a group of individual account balances in a subsidiary ledger or record. The controlling account takes the place of and represents in the general ledger the group of detail accounts in a subsidiary ledger. Because of this relationship, the general ledger is said to "control" the detail accounts appearing elsewhere. Sometimes when this device is extensively used the general ledger is referred to as the control ledger. Controlling accounts are also found in subsidiary ledgers when there are sub-subsidiary ledgers in the accounting system.

The controlling-account device is used in cost accounting even more extensively than in general accounting, because of the necessity of tying in the cost with the financial accounts of the company. Cost systems that are not coordinated with

the financial accounts are unreliable and frequently misleading. Consequently, in a cost system it is usual to find numerous control accounts. The principal ones include Raw Materials Inventory, Goods in Process Inventory, Finished Goods Inventory, Manufacturing Overhead Expense, Sales Expense, and Administrative Expense. This technical, or bookkeeping, use of the word *control* is familiar to the student of accounting, although some of its applications in cost work will require explanation.

The word *control* has come to have a meaning in addition to, and entirely distinct from, its bookkeeping significance. The new meaning may be referred to as its managerial use; or insomuch as it is employed in connection with the guidance and regulation of the internal operations of a business through up-to-date costing, it may be termed the "cost analysis" meaning of the word. In this sense it refers particularly to the *guidance of business activity through the measuring of manufacturing and sales performance.*

10. Manufacturing Performance and Its Measurement.—The phrase manufacturing or plant performance refers to what goes on within the factory, to the results of the activities of the men, machines, tools, and supervision, all of which should be combined and coordinated into a harmonious system without overlapping of authority, duplication of effort, or waste, loss, or inefficiency at any point in the productive process.

The word, performance, means "a thing done, accomplished, or carried through; a feat or achievement." Performance, achievement, accomplishment is always the result of effort. In measuring manufacturing performance, therefore, it is necessary, as a beginning, to ascertain:

1. The extent of the effort—the expenditure of money and material, the time of workmen and machines and auxiliary services—which is made in or for each department. This expenditure of money and effort may be expressed in terms of time, so much per day or week or other appropriate period, or it may be expressed as so much for a given job or order, operation or process. Whenever effort is expressed in terms of money (and it must usually at some point in the analysis be so expressed), this is known as the cost of operating the department for the given period, or the cost applied to a given job, order, operation, or process. It is, however, very often of value to express the effort in terms other than money; for example, it may be expressed in productive man-hours, machine-hours, department-hours, etc.
2. The result—that is, what is accomplished by means of the expenditure that has been made, or the number of units turned out in a given time—expressed in terms appropriate to the operation or process that has been performed.
3. The relationship of the result to the effort. This is arrived at by comparing the one with the other. This relationship

may be expressed in terms either of effort or of result, and may be stated as the effort per unit of result, or the result per unit of effort.

It is apparent, therefore, that the first step in cost accounting, as applied to measuring plant performance, is the exhibiting of what takes place in the factory, through records of the actual expenditure for material, labor, and overhead, subdivided properly by departments, operations, processes, cost centers, or jobs, in accordance with the particular cost plan in use, and the results achieved in return for the outlay.

This modern concept of cost accounting as a means of measuring plant performance is an attempt to make cost accounting an instrument in supervising every expenditure within the factory. Merely to know expenditure, however, is not sufficient. The outlay must always be compared with a carefully measured result, with some amount of output, however expressed.

The goal is not reached, moreover, solely by knowing the expenditure and the output. Some gauge for judging the result is necessary. Consequently an effort is made to find out whether the present result is better or worse than has been achieved in the past, better or worse than some normal expectancy, or better or worse than what was estimated to be the probable result in the present circumstances of business. An end cannot be measured in terms of itself. Measurement takes place usually by means of a comparison of some sort.

If one wishes to reason about his physical well-being from his bodily weight, it is not enough merely to step on the scales and find out that they register a certain figure. It is necessary to know in addition what the normal weight for a healthy individual of a given age, sex, and height is. Tables of normal weights for men and women of varying heights and at different ages have been compiled by the medical profession, insurance companies, and others interested. One may, therefore, determine his own weight and then check with the table, and find out whether he is above or below the normal expectancy of weight for one of his height, age, and sex. In other words, the mere isolated knowledge of one's individual weight is illuminated and vitalized by comparison with a standard. This comparison is not merely amusing; it is informative. It is *indicative* to an important extent, other factors being equal, of physical well-being, inasmuch as it has been determined by experience that those who are either too far above or too far below the standard are apt to suffer, if they are not already suffering, from some form of physical disability.

A like process of reasoning is used in many kinds of scientific investigation. Certain data are collected, certain facts are discovered, summarized, and compared with an appropriate standard of measurement. In the actual cases at hand variances from the standards are noted, causes of the variances are determined, conclusions are drawn regarding their significance, and such action as seems desirable is taken.

11. Comparison of Manufacturing Performance with Standards.—There are two general types of comparisons used by which the efficiency of current plant per-

formance may be judged. One is a comparison of the current performance with past performance; the cost of a job, operation, or department now as compared with that at some earlier date. This type of comparison is of value but is not nearly so worth while as a comparison of the present with some carefully predetermined standard.

A standard of any kind is a measuring stick, an instrument by which something else is rated, judged, evaluated, appraised, or tested. One of the basic principles of the so-called standard cost system is the provision of a standard by which to judge performance. Standard costs are sometimes also called estimated, predetermined, or budgeted costs. They "are scientifically determined in advance, in contrast to historical costs which are accumulated after the event." Standard costs are the amount that the given operation or job to which they apply *should* cost under normal operating conditions. They are not the actual or the average cost, although past experience is necessarily considered in their determination. They rather represent the reasonable expectancy as to operating performance, —what each department of the factory, and therefore all departments, can do when they aim at the attainment of a definite, predetermined goal. The standards, of course, must be scientifically set. Standards so fixed reflect an attainable degree of plant efficiency and become a source of stimulus to the organization. This is particularly the case when they are combined with wage incentive plans. The reduction of cost then becomes, not a remote matter of benefit to the company only, but of vital concern to the individual workman. Standard costs then stand not only as a measure of actual accomplishment but also as an incentive to still greater accomplishment.

12. Variations of Manufacturing Performance from Standards.—In the control of plant performance, the first step logically is the fixing of the standards of performance and the second step is the recording of the actual performance. The third step, and the one to which the others are the necessary preliminaries, is the comparison of the actual with the standard. This concluding step may be subdivided into two distinct processes, both of which are indispensable to the accomplishment of the highest purpose of costing; namely, the securing of complete operating control. The subdivisions of the third step are:

1. Determining the variances of the actual from the standard.
2. Analyzing the causes of each individual variance.

The variations of the actual from the standard will be stated in terms appropriate to the individual business and in accordance with the general cost plan used. In other words, comparison will be made of order costs or of departmental costs, or both, as will be more fully explained later. In any event, the comparison is made of each individual item, either of the departmental or the order costs, as well as of the total.

After the variations of actual from standard costs have been arrived at, they must be explained; their causes must be determined. Some person or condition is responsible for the differences; there are one or more reasons for each individual

variation. The variation of the actual material cost from the standard may be due to price differences, to a change in quality of the material, or to a fluctuation in the quantity of it consumed. The cause and the individual responsibility lying behind each one of these conditions must be determined and explained. Variations of labor costs may be due to differences of actual wage rates from the standard, incompetent help, improper routing, defective equipment, etc. Suffice it to say, that the causes of all differences must be analyzed and traced to their final responsibility.

It is important, also, that these variations and their causes be determined promptly. So far as they concern the individual workman and foreman they are, in an efficient system, analyzed and reported daily. The control, therefore, must be not only analytical, intelligent, and complete; it must be immediate. Promptness is an indispensable element in effective control through costs. The speed with which the story of costs is presented to those responsible for them, determines to a considerable extent the interest aroused and the degree of responsibility to which those in charge may be held, and hence the extent of the control which may be exercised.

13. Degrees of Effectiveness in Cost Control.—Standard costs are a recent development in cost accounting. No other cost method or system is equally effective in guiding and controlling factory operation, in testing and improving production. Standard costs were first developed in connection with factory costs, but are today also used in measuring sales performance, and in regulating the administrative and financial expenses of a business.

The control results achieved by the older, so-called actual, cost systems are not to be compared in directness, promptness or exactness with the results accomplished by standard cost systems. The merits and benefits of the older methods are many. These older methods supply the actual costs which are compared with the standard costs to measure performance. But actual costs without standards, have only a limited usefulness. Some sort of standard or basis of judgment was used in connection with the older systems, inasmuch as such systems were to some extent utilized for controlling expenditures. This was necessarily the case, because the exercise of any degree of control involves the analysis of trends or changes and the making of decisions. Such decisions are the results of reasoning, which is in turn a process of making comparison or of drawing contrasts. The standards unconsciously used in making control-use of the older cost methods were, however, inexact, uncertain, unreliable. They were rules of thumb, based upon general impression or conventional practice, or upon experience unrefined by precise measurement and careful analysis. In contrast, the new standards are scientifically determined. They are deliberately used, and are incorporated in and constitute a vital part of the cost system. They also set a goal; they define what should be rather than what is.

Modern cost accounting has established a system for measuring and controlling plant performance. The system determines what should be done; then it records what is done. Next it calculates the variation between what is done and what

should have been done, discovers the causes of the variation, and fixes the responsibility. Thus it achieves control. This control is the more effective because it is immediate and because it is aimed particularly at those operations which fail to measure up to the expected result. One of the features of well-managed concerns is that they have developed methods of testing their results at all important points with astonishing rapidity and simplicity; a few figures show at a glance whether or not all is well. But this simplicity should not deceive anybody; the methods of testing were probably devised as a result of long and careful studies of all the factors involved.

14. Summary.—The general nature of cost accounting and its relation to the problem of measuring plant performance has been considered. It is desirable now to review a few of the more detailed objectives of management which are associated with the use of cost accounting methods as applied to manufacturing activities. These objectives may be summarized briefly as follows:

1. The problem of plant management is concerned with the controlling of manufacturing operations so as to establish them on as efficient a basis as possible. This is the general field and problem of scientific management, in which cost accounting plays an important part through the furnishing of accurate and pertinent information. Cost accounting attempts no less a feat than the bringing of the activities of the whole plant, no matter how widespread, under the direct review of the management.
2. More particularly, plant management is concerned with:
   a. The skilled purchase, receipt, storage and economical use of raw materials and supplies.
   b. The scientific fixing of wage rates and the handling of labor.
   c. Unceasing improvement in productive methods through the devising of new processes and the development of suitable machines.
   d. The reduction of the idle time of men and machines.
   e. The reduction of defective work.
   f. The elimination so far as possible of all delays, losses and wastes.
   g. The closer adaptation of production to sales requirements.
3. Cost accounting aids management in securing and maintaining an effective control over these intricate industrial processes by:
   a. Analyzing and recording the actual cost of operating each department necessary to the production of each lot or kind of product manufactured; in other words, com-

paring the costs incurred with the results accomplished at each step in the industrial process.

b. Establishing standards that indicate what the cost of operating each department and manufacturing each lot or kind or product should be.

c. Analyzing and interpreting the variations of the actual from the standard costs, and explaining the causes of these variations, thereby locating waste and inefficiency and fixing the responsibility for it.

d. Showing what each worker and supervisor actually does as compared with what each should do.

It is the aim of the executive in charge of manufacturing to satisfy the demand for his company's products with the smallest possible expenditure of money and effort consistent with quality requirements. In attaining this objective, he is limited only by the efficiency of his organization, which is, in turn, dependent largely upon his own intelligence and ability to achieve harmonious and coordinated control. To the extent that cost accounting aids the manufacturing division in measuring and regulating plant performance, it increases plant efficiency and thus helps to widen the gap between costs and selling prices, and consequently increases the profitableness of the business.

CHAPTER IV

COSTS AND SALES CONTROL

15. Functions of Manufacturing and Sales Divisions.—Manufacturing or production is concerned with what goes on within the factory. After goods and services have been purchased they are combined and transformed, by production, from the raw material stage into a salable product. This conversion is at times relatively simple and at other times it is very complicated. It depends upon the nature of the product manufactured and the number of subdivisions of the plant by means of which the conversion is brought about. The manufacturing function is finished with the delivery of the salable product to the warehouse or shipping department. At that point the selling function begins.

Selling or, better, marketing includes the actual selling of the product and the advertising, traveling, supervision and planning which are necessary to the making of sales. The term *marketing* is a broader term than selling. Selling refers to the act of taking an order or in other words to making a sale. The term, marketing, on the other hand, is intended to convey the much broader concept of the entire relationship of a company with its customers,—the matter of making contact with them in the first place, of actually selling them, of keeping them satisfied after the sale, of making such adjustments and allowances as may be necessary and, in general, of following through every transaction so that good-will will be built up for the company. Both the terms marketing and selling, however, are often used interchangeably in this broader meaning.

The creation of units of finished product is merely a means toward the accomplishment of a more fundamental purpose; namely, the filling of a demand from customers, actual or prospective, for the products of the company. The existence of this demand is basic in the calculations of every business. It is the purpose of the sales division of the business to convert as large a share as possible of this potential sales demand into an actual demand for the products of the enterprise. The actual demand means the receipt of sales orders or contracts.

From this point of view, the sales function must be ranked in importance ahead of the manufacturing function. If there are no sales, there is no need to purchase raw materials or services and to transform them into finished products. Sales, in other words, are primary; manufacturing is secondary, taking place only because orders are actually on hand or in prospect. Sales are the electrifying energy which starts the manufacturing departments and keeps them in motion. All activities are regulated in accordance with the volume of sales and all estimates of future requirements depend upon the estimates of future sales. Any accounting device which can contribute toward the formulation of intelligent sales policies is bound to be of great assistance in the management of the business.

16. Sales and Profits.—Sales are not only the energizing force in a manufacturing enterprise, but also they are the direct means by which the outgo of expenditure through costs is replaced and set to work again for the company at the task of earning a profit. Profits are earned only as an excess of selling price over costs.

Whenever the selling price exceeds the cost of making and selling a product, the enterprise is able to realize a profit from its manufacture and sale. This is the condition that the business manager strives to maintain, the one which in fact he must maintain over an extended period of time. It may be, however, that the cost of producing and marketing exceeds the selling price at a particular time, or even for short periods of time. In this event the business is suffering a loss on each unit of product sold. Every business attempts to avoid this situation. It may be, however, that at a given time economic forces that are entirely beyond an individual industry's control force costs upward or the selling prices downward, or both, to the point where the normal excess of selling prices over costs is reversed.

Since the unit profit or loss is the difference between selling price and the cost, it is of the greatest importance to management that the unit cost of manufacturing and selling as well as the unit selling price be known and controlled, so that a profit will be earned.

It must be recalled that under a plan of accounting that does not make use of cost accounting, unit costs cannot be determined. Under such a plan, sales, costs, and gross and net profits are considered only as *totals at the end of the accounting period*, for all products taken together for the entire period. Whether a profit is being made or a loss incurred on specific kinds of products is a matter of rough estimate, guesswork or judgment, all of which are uncertain methods for guiding the sales policy of a business. Under adequate cost accounting, on the other hand, the comparison between unit cost, selling price, and profit, is immediate and direct.

17. Unit Costs and Sales.—One of the aids that cost accounting affords to management is the determination of unit costs of manufacturing. By following a product from the raw-material stage through the various departments and operations of a plant, cost accounting puts on record and summarizes the costs that accumulate in the different manufacturing departments and finally is able to state not only the costs of each operation and process but also the total manufacturing cost per unit of product or per job. Thus costs are recorded in detail by operations and also in totals. The detailed costs are principally of interest to the manufacturing division. The total, or product, costs are the direct concern of the sales division.

A knowledge of the total unit cost of manufacturing products is not sufficient. The sales executives also require selling costs per unit of product. Further, unit selling costs must be known for different sales districts and for different methods of distribution. The costs of selling units of product vary according to the territories in which the products are sold. Markets far from the factory have high transportation costs. Urban centers show selling costs that differ from those in rural areas. The warmer sections of the country often show a cost of selling much lower than that of the colder sections. Even the racial characteristics of

a particular market result in different unit selling costs. Likewise, the type of sales outlet employed affects the selling costs and thus the final profit per unit of product sold. The cost of distributing through retailers and jobbers, by mail order, and by salesmen selling direct to the customer varies greatly.

A knowledge of unit manufacturing costs, together with a knowledge of unit selling costs in different sales districts and by different methods of distribution, enables the sales division to perform its function more effectively because:

1. This makes possible a comparison between the selling price and the cost of each article sold.
2. This comparison calls attention at once to those products or to the particular sizes or types of a product which are profitable as well as to those yielding an insufficient profit or no profit at all.
3. A knowledge of relative profitableness enables the management to formulate intelligent selling policies. It enables the management to discontinue selling in unprofitable districts and by unprofitable methods of distribution, and to eliminate unprofitable lines, or if market conditions make this impossible, to place the major selling emphasis and effort on the profitable lines. Other matters of sales department administration, the arranging and placing of advertising, the fixing of commission rates, the regulation of traveling, the payment of salaries or bonuses based upon profits, etc., may be regulated in accordance with the information afforded by a comparison of unit costs and selling prices.

The importance of this contribution of cost accounting to management cannot be exaggerated. When the proper cost information is lacking, the business must be steered blindly, whereas, with the help of adequate cost methods, the enterprise can be guided wisely, with less risk of loss and with the expectation of greater financial return to the owners.

18. Relationship of Selling Prices and Cost.—The assertion is sometimes made that cost accounting does not enable the management of a company to fix the selling price at a point that will yield a profit, that in spite of the information given as to cost, it is frequently not possible to set a price that will cover cost and include a reasonable profit. The implication is that for this reason cost accounting is valueless.

In the long run, however, it is found that the selling price of a commodity tends to be determined principally by its cost of production, including costs of selling and the profit element. Under competitive conditions the price of a product cannot long remain greatly above or below its cost of production and marketing with a reasonable profit included, because any circumstance which causes a divergence from such price will set in motion economic forces that will operate to bring the selling price back to cost plus a reasonable profit. If, in the long run, buyers

are not willing to pay such price and the cost cannot be reduced, production will cease. Broadly speaking, there will be no supply except at a price that will cover cost to the producers and yield them a fair margin of profit.

In the long run, therefore, it may be asserted that cost substantially fixes selling price. To be able to know and control cost is in effect to be able to regulate selling price, and to determine it, for a given product, on a sound economic basis. This cannot be accomplished, of course, by a single producer, but when the knowledge of scientific cost methods is distributed among a substantial number of the producers within a given industry, this desirable result is largely brought about. Uniform cost accounting attempts, and when intelligently applied accomplishes, this result with attendant benefits to both producers and consumers. It brings about more enlightened competition within the industry, which in turn tends to stabilize the industry and improve wages, conditions of employment, and profits.

It is significant, also, that the larger, better established, and financially strong producers use their knowledge of costs to fix selling prices at a point that will yield a fair profit. If the market becomes disorganized, the curtailment of production, rather than the cutting of prices, is resorted to in an effort to restore the market to normal.

19. Summary of the Contribution of Cost Accounting to Sales Management. The assistance that cost accounting gives to the sales division of an industrial enterprise may be summarized as follows:

1. Cost accounting furnishes the unit cost of making and selling each article, or of each class of similar articles or products. This makes possible a direct comparison of cost with selling price, thereby bringing management immediately into contact with a way of measuring the accomplishment of the primary object of the enterprise, namely, the earning of a profit.
2. The comparison of unit costs and selling prices enables the executives of a company to determine the relative profitableness of different lines or products. This knowledge aids in the establishment, within the limits set by the competitive conditions of the market, of correct selling prices. It sometimes makes possible the elimination of the unprofitable lines or articles. It always makes possible the directing of the selling efforts toward the most profitable products.
3. The comparison of unit costs and selling prices sometimes enables the seller to exert an indirect influence upon selling prices, through the effect that advertising may exert upon demand, and hence upon price.
4. Cost accounting furnishes the management of an enterprise with convincing evidence of the relationship between cost and the volume of business. This is of vital importance in determining prices to be quoted for prospective business.

5. Cost accounting will enable the sales department to quote prices safely and intelligently. Through the records of past performance, the standards established for the present and the budgeting of the future, the manufacturer is enabled substantially to predetermine his costs, to bid more intelligently for prospective business, and when it is obtained, to regulate his costs in accordance therewith.
6. Cost accounting increases the efficiency of salesmen and branches by submitting pertinent analyses of the cost of their activities and their profitableness.
7. Cost accounting, through the assistance it gives in maintaining perpetual inventories and in planning the productive activities of the company, aids the sales department in promising to make and in making satisfactory deliveries of goods to customers. This is of great importance in maintaining the good-will of customers.
8. Uniform methods of cost accounting promote better informed competition within the industry that adopts them. This more intelligent, cooperative competition is to be contrasted with ignorant, cut-throat competition which too often has ended in financial disaster for the weaker members of an industry, and in reduced profits for all. Such uniform cost methods tend to prevent the cutting of selling prices below cost of production, and thus aid in the economic stabilization of the industry.
9. Cost accounting aids in the detailed administration of the sales function, by supplying information pertinent to the fixing of salaries, bonuses, and commissions, and to the control of expenditures for traveling, advertising, etc.
10. Cost accounting by analyzing selling expenses determines the profit realization of the product by different territories, by types of sales outlets, and for different methods of delivery.

The contribution that cost accounting makes to the control and regulation of sales activities alone, without consideration of its benefits in the manufacturing division of the business, often spells the difference between failure and success for the entire enterprise.

CHAPTER V

ELEMENTS OF COSTS

20. Means of Production.—The making of a manufactured product requires effort—labor. Labor alone, however, does not turn out a product. There must be something to start with, which labor changes into the usable thing that is wanted. Nature supplies a great variety of basic raw materials, the natural resources, such as deposits of coal, iron, copper, and groves of standing timber. Men labor to extract these natural resources from the ground or to cut the timber, in the first place, and later to combine them and change their form, size, shape and other characteristics. Useful products are created by the labor of men, working upon these materials supplied by nature.

Man worked, in the beginning, upon the raw materials he found in nature using his hands only, unaided by anything except the force of his own body. Later he devised tools to help his bare hands. Gradually these tools became more and more complicated, as man progressed in his knowledge of how to make things, until today they are the gigantic and intricate machines and mechanisms that are used in modern factories and transportation systems.

Machines are an important class of a larger group of items. This larger group is commonly called fixed capital, and includes machines, land, and buildings, which are required to carry on the manufacturing and selling activities of the company. A characteristic of fixed assets, such as are represented by buildings and machines, is that they are not immediately used up, like labor and materials, in a single productive operation. They are nevertheless consumed gradually, over a period of years. This gradual using up, consumption, *is a cost*, some part of which belongs to each unit of product made with the help of these facilities.

Not only do machines depreciate, they also require power to run them and repairs to maintain them in fit operating condition. Any great number of them makes necessary some system for routing and supervising work. And so the use in industry of machines and other forms of capital gives rise to a new kind of cost, which is called *overhead*. This cost is indirect; that is, it cannot be laid directly to the making of any particular unit of product. It is nevertheless necessary, in fact, unavoidable, in the process of making products in the modern machine way.

21. Main Divisions of Total Cost.—The total costs of conducting a manufacturing company are divided into three main groups, corresponding to the three chief activities of the business. These groups of costs are: (1) Manufacturing; (2) Selling; (3) Administrative.

The typical profit and loss statement for a manufacturing business shows the expenses or costs of running it for a given period, separated into these three sections. For cost purposes, however, there are logically only two divisions of costs, manufacturing and selling. The administrative costs are incurred in order to make

it possible to carry on the producing and sales activities, and so these general overhead expenses should be divided between, or assigned to, the factory and sales divisions on some arbitrary yet fair basis. This point will be discussed more fully later.

Manufacturing costs are sometimes called production costs, or factory costs. They include the cost of materials used, the wages of labor employed, and the other expenses such as power, heat, light, depreciation, repairs, and supervision, which are incurred in the factory to aid in producing goods. A list illustrating the usual kinds of manufacturing costs is as follows:

Raw-material cost
Direct-labor cost
Overhead cost or manufacturing expense, including:
- Power
- Light, heat, and water
- Factory supplies
- Tools
- Patterns
- Inspection
- Factory accounting
- Defective work
- Supervision
- Telephone and telegraph
- Depreciation of factory building
- Depreciation of factory machinery and equipment
- Insurance on factory buildings and equipment
- Taxes on factory buildings and equipment
- Repairs and maintenance of factory buildings
- Repairs and maintenance of factory machinery and equipment.

This list is not intended to be complete as to all items of manufacturing expense. It is merely illustrative of the most common kinds.

The selling expenses include all the items of cost that are incurred to aid in selling and delivering the product. They begin at the point where the factory costs end; namely, at the point where the product has been put into salable condition. The selling costs cover the expenses of making the sales and deliveries and include the following:

Salesmen's salaries
Salesmen's commissions
Salesmen's traveling expense
Sales office salaries
Delivery expense
Advertising expense
Catalog and sample expense
Telephone and telegraph expense

Depreciation on sales buildings and equipment
Taxes on sales buildings and equipment
Insurance on sales buildings and equipment.

This list, like the preceding one, is not intended to be complete. It is merely illustrative of the most common items of selling costs.

The administrative costs include all items that are chargeable to the general administration of the company. Some of the common items in this group are as follows:

Officers' salaries
General-office salaries
General-office expense
General-office stationery and printing
Telephone and telegraph expense
General accounting and auditing expense
Legal expense
Repairs to office building and equipment
Depreciation on office building and equipment
Insurance on office building and equipment
Taxes on office building and equipment.

22. Basic Elements of Manufacturing Cost.—Attention has already been directed to the fact that manufacturing costs arise from the use of materials, men, machines, and other forms of capital in producing goods. These terms designate the means by which production is brought about. The terms regularly used in connection with the three classes of manufacturing costs are: (1) Material; (2) Labor; (3) Other Expense.

In cost accounting, it is necessary to know not only the nature of the item but also the directness of its relationship to the product. Consequently each of the above costs is divided into two parts, one of which represents costs that are direct, and the other, the costs that are indirect. *The direct costs are those which are known to have been incurred because of a particular unit of product or group of units.* They enter into the product and form a part of it. The indirect costs are the remainder. They cannot be charged directly to the product. They do not enter into the product in such a way as to form a definite or specific part of it. They are, rather, the expenses for rent, insurance, operating supplies, depreciation, supervision, taxes, etc.

23. Manufacturing Cost Elements Analyzed into Direct and Indirect Costs.—The elements of manufacturing cost when analyzed into direct and indirect charges are as follows:

(*a*) *Material:*	(*b*) *Labor:*	(*c*) *Other Expense:*
(1) Direct	(1) Direct	(1) Direct
(2) Indirect	(2) Indirect	(2) Indirect

(*a*) *1.—Direct material* is the stuff from which the product is made. It is present in the finished product. The materials as purchased are called raw materials. The manufacturing operations are applied to them and change their form and shape. Their substance is still present, however, in the finished article. Not infrequently several direct materials are combined to form one finished product. The cost of these direct materials is sometimes called the direct material cost. More often it is merely called the material cost.

Illustrations of direct materials are as follows: wheat in the making of flour; leather in the making of shoes; wood in the making of furniture. There are one or more direct materials present in every manufactured article.

(*a*) *2.—Indirect material* is material that is used in such a way that it cannot be charged to any particular unit or group of units of product. Such items are necessary to the processes of manufacture, and yet they either do not get into the product itself or the amounts of them are so small or they are so used that they are not easily measured. For practical purposes, indirect materials are those which are not direct.

Illustrations of indirect material are: lubricating oils applied to machines; waste used in cleaning machines; and all of the many varieties of operating supplies used in a factory. Items of small cost, such as glue used in fastening parts together, when the amount consumed in any given product or group of products cannot be measured, are regarded as indirect material.

(*b*) *1.—Direct labor* is labor that works immediately upon the materials that go into the product. Direct labor brings about, through the aid of tools and machines, the change of shape and form in the direct materials which takes place in the manufacturing operations. The results of this labor appear in the finished article in the same way that the direct materials appear. For example, in the making of a desk, the effort spent in planing, cutting, and shaping the raw lumber into the various parts required, the assembling of these parts into the desk, and the staining and finishing of the desk after assembly are all items of direct labor.

(*b*) *2.—Indirect labor* is all labor that is not direct. Indirect labor is not applied directly to the making of the product. There is no immediate connection between the making of the product and the expenditure for the indirect labor. This labor does not in any way create the product, or bring about the changes that constitute the difference between a raw material and a finished article. Though indirect labor does not bring about these changes, it aids the methods by which they are brought about. Examples of indirect labor are: sweeping and trucking in the factory; the work of foremen and assistant foremen; labor in repairing equipment; factory clerks. Work of this kind does not turn out a single unit of product. Without it, however, finished products could not be turned out efficiently, if at all, for any length of time.

(*c*) *1.—Direct expense* is expense that is assignable to certain units of product. Expenses of this type are very rare in manufacturing operations. They are found more frequently in construction work. When they are present, they are expenditures which pertain to or follow either direct material or direct labor, so as in reality

to be a part of either the one or the other, although because of differences in method of payment they are accounted for separately. Subsistence furnished direct laborers through a company commissary is of this nature.

(*c*) *2.—Indirect expense* is, from the point of view of costing, one of the most difficult items to handle and hence one of the most important. Indirect expenses are not incurred because of any particular product, or because of any given job or order. They arise rather from the necessity of providing a place to work in, power to operate machines, and other requirements of a similar nature. Examples of indirect expenses are: power, heat, light, repairs, depreciation, insurance, taxes, and other items such as are mentioned in Art. 21.

24. Cost Elements Regrouped.—The elements of manufacturing cost are analyzed into direct and indirect items to aid in securing the total cost of a given process or job in as accurate a manner as possible. By this analysis, costs that are chargeable directly to a given process or job are separated from other costs that are not so chargeable. These indirect costs must be assigned to the work carried on during a given period, and the basis on which they are assigned must necessarily be more or less arbitrary. The most suitable basis must be determined by special study in each particular case.

In order to make the most practical use of the advantage of distinguishing between direct and indirect items, manufacturing costs are grouped as follows:

1. Direct-material cost
2. Direct-labor cost
3. Factory overhead cost, made up of:
   - Indirect material cost
   - Indirect labor cost
   - Other indirect costs.

Factory overhead is sometimes called *burden*, or *manufacturing expense*. Whichever term is used includes all the indirect costs; namely, all those factory costs that cannot be charged directly to the making of the product.

Manufacturing costs are always accumulated in terms of these three elements—direct material, direct labor, and overhead. This is true whether the costs are stated for the direct material, direct labor and overhead expense incurred

1. In a particular department or cost center of the factory.
2. For any particular function performed in the factory.
3. For all of the factory operations necessary to complete a given product or job.
4. For all the products made by a business during a period of time, as shown by the profit and loss statement.

The division of manufacturing costs into these three groups is therefore a fundamental principle of costing and must be thoroughly understood. Very often the terms used for these cost elements are abbreviated into *material cost, labor cost,* and *overhead* or *burden.* Whenever the expression "material cost" or "labor

cost" is used, it is to be understood that only direct material and direct labor are indicated. The indirect labor and indirect material are always thought of as a part of the overhead.

25. Two Uses of the Term "Direct."—At this point it is important to note two distinct uses of the word "direct" as applied to manufacturing costs. The first and most frequent use, which has already been described, refers to the relationship existing between the cost and the product. A second use of the word "direct" refers to the relationship between the cost and the department or cost center in which, or for the benefit of which, the cost is incurred. The latter use of "direct" applies solely to the overhead group of costs. In accordance with this use of the word, the overhead items incurred in a given division of the plant are referred to as the direct overhead expenses or costs of that division. Examples of such costs are: the wages of foremen, assistant foremen, and clerks; operating supplies used in the department; repairs to the equipment of the department, etc. These costs are incurred directly by the department in the same sense that direct labor and direct material costs are incurred by the product.

Besides these direct or departmental overhead costs, there are other overhead expenses that are not incurred specifically for any one department, but are nevertheless necessary if the factory is to operate. These overhead costs are termed indirect or general overhead, and include such items as the salary of the major executive in charge of the production division, and insurance, taxes, and depreciation on the factory buildings. Such overhead must be distributed or prorated to the departments.

The distinction between overhead costs that are direct and overhead costs that are prorated is very important from the control point of view. Although they are both costs of manufacturing, different individuals will, in most organizations, be held responsible for the amount of each. The foreman of each department is to be held responsible for the direct departmental costs. Some other person, usually of wider authority, such as a superintendent or manager, is responsible for the prorated charges.

26. General Survey of Methods of Finding Manufacturing Costs.—Before going into any further description of detailed cost procedures, a general survey of methods used to find the cost of products manufactured is desirable. The purpose of this very brief survey is to furnish a general view of the methods used so that as the more detailed steps are explained later the relationship of each step to the whole plan will be clear.

Cost accounting is a process of reasoning about the expenditures made in a factory or other enterprise and the results obtained from these expenditures. It is impossible, however, to reason about them in the aggregate, in one mass. They must be broken down, analyzed, so that they can be intelligently studied. Then they must be recombined to show the total costs of the various products manufactured. In other words, in costing, as in other processes of reasoning and investigation, there are two distinct steps: analysis, separating the elements of cost; and synthesis, putting them together in usable form.

The whole process of cost accounting may, therefore, be summarized as follows:

1. The analysis of costs by
   a. The nature of each item and the directness of its relationship to the product.
   b. The cost center or department in which each cost is incurred.
2. The combination of costs so analyzed into the cost of the product or products manufactured by either or both of the two following methods:
   a. The order method.
   b. The process method.

The analysis of costs in accordance with the nature of each item and the directness of its relationship to the product has already been covered.

27. The Cost Center or Department.—The cost center or department (as it is to be understood in this discussion of costs) is a division of a plant based upon:

1. The performance of a single operation, or a group of similar or related operations, in the process of converting the raw material into the finished product; or,
2. One or more identical or similar machines or work benches; or,
3. The performance of a specialized function for the plant, such as the furnishing of power, purchasing, cost accounting, time study, job standardization, receiving and storing materials, and other types of work of such character that they benefit the entire producing organization.

The *cost center* is the smallest division of the plant or the most minute operation in terms of which costs are analyzed and accumulated. The term "cost center" is used here with the same meaning as was applied to the word "department" in earlier passages. Care must be taken in using the word "department," however, because it is frequently used in manufacturing to designate a larger section of the plant than is meant when this term is used in cost analysis. For example, a company may make three separate products. Each of these, we will say, is made in a large division of the plant which is not infrequently called a department. For cost purposes, however, it is necessary to analyze the distinct operations that are performed in each of the major divisions. Each of the smaller sections of the plant which is indicated by this process of analysis is here called a *cost center* or a *department.* These terms are used interchangeably.

Careful analysis of the manufacturing operations of a company into definitely established cost centers is one of the first steps necessary to intelligent cost accounting. This analysis must be made in accordance with the particular equipment and the specific steps in the productive process employed by each company. No general rules or principles can be laid down to describe exactly how it should be

done. *One of the most important purposes of precise departmentalization, however, is to establish definite responsibility for the expenditures that are made in each cost center.* Responsibility rests directly with the foreman in charge of each cost center, if the direct labor costs of work performed exceed the standard labor cost that has been established, or if the actual direct overhead for the cost center exceeds the budgeted allowance. The careful fixing of responsibility for physical and financial results is ever one of the chief purposes of cost analysis.

Two classes of manufacturing departments or cost centers must be distinguished: (1) The direct, or producing; (2) The service.

Producing departments are devoted to the actual manufacture of the product. They are the departments in which the raw materials are handled and the direct labor is applied. Therefore they actually bring about the conversion of the raw materials into the finished products. In a steel foundry, for example, the following producing departments are usually found: melting, molding, coremaking, cleaning and finishing, and heat-treating.

Service departments perform some special function, not directly connected with the conversion of raw materials, yet necessary in order that the producing departments may operate. They render service of one kind or another, not to a single producing department, but to all. Examples of such services are the furnishing of power, light and heat, purchasing, receiving and storing materials, planning and routing, costing, etc. The cost of such service departments must be prorated to the producing departments on some basis that assigns their cost in proportion to the service rendered.

28. Two Types of Manufacturing Enterprises.—In some industries selling transactions take place before manufacturing, while in others the reverse is true. This condition divides manufacturing enterprises into two major classes: the special-order type of industry; and the stock-order type of industry.

In the *special-order type of industry*, marketing comes before purchasing or producing. The sale is made first, that is, an order is received by the manufacturer from the customer to furnish a specified number of units of a certain product at an agreed upon price. The necessary instructions are then issued to the manufacturing departments for the conversion of the material into the number of units of the finished goods which have been ordered. When these are made, they are shipped. At this point it is customary to record the sale in the accounting records by charging the customer or cash and crediting the appropriate sales account. The accounting for the sale is usually contingent upon shipment. The actual sale, however, in the commercial sense, preceded the manufacture of the goods, and very often also precedes the buying of the raw material. Production in this type of enterprise takes place only *in response to specific sales.*

In the *stock-order type of industry*, the industrial enterprise handles standard products—those which are always in demand, subject of course to fluctuation in the quantity, and also to occasional changes in style. In this type of enterprise it is customary for the manufacturer to anticipate sales; that is, to convert material into the finished product in that quantity which he thinks will be absorbed

by the market, before actual sales are made. As indicated by the title applied to this type of enterprise, the finished product is made for stock; that is, to be held on hand in anticipation of receipt of orders, and to be used to fill such orders as they are received. Production takes place before sales, but always *in anticipation of sales.*

The distinction between these two kinds of enterprises is significant because each type has given rise to a distinct type of cost accounting procedure. The two types of cost accounting are the special-order, or job-order, method, and the process method.

29. Job-Order Method of Costing.—Under the order method of accumulating costs, every part or article manufactured is represented by a production order which serves as the basis for costing. This order constitutes a specific job, distinct from all other jobs. Each order moves through the factory as a separate lot, distinguishable from all other lots. Each order covers a specific quantity of a specific article.

All of the manufacturing costs incurred in producing a given order are charged to that order. Material and labor are charged directly to the order. Overhead cost, having first been accumulated for each department, is charged to each order, either at actual or predetermined rates, on some equitable basis that represents the use made of the facilities of the department. The cost sheet upon which these items are accumulated will then show the direct costs and the overhead by departments for each order, and also the number of units on the order. The unit cost of the article can then be arrived at by dividing the total cost for the order by the total number of units made on the order. The unit cost of the completed article is immediately apparent under this method of cost finding.

The order method of cost finding is particularly suited to special-order enterprises and to other businesses in which each lot manufactured (because of peculiarities of the product or of the methods of manufacture that apply to it) has a cost which can be distinguished easily from the cost of every other order. A clear illustration of a business requiring job-order costs is found in construction work. Each building, bridge or tunnel is distinctly a job by itself. In manufacturing industries, also, equally clear-cut examples can be found where each order represents a separate product—as in the building of special machines. Each repair job in a garage is a special order which must be costed separately from all other orders. Much of the work performed by machine shops is of this nature.

The order cost method requires more detailed work than the process method, and therefore it is more expensive. Hence it should be avoided, except in those industries where it is indispensable.

30. Process Method of Costing.—Process cost methods are applicable in industries where it is either impossible from a physical point of view, or unnecessary from a cost point of view, to distinguish between separate lots or orders. The product is made in bulk. Units are measured in terms of feet, yards, gallons, tons, or pounds; or if, as is sometimes the case, each unit is physically separate

from every other, as for example a separate part, no reason exists for determining a separate cost on each group, lot or order.

The operation of the process cost method requires two kinds of information:

1. The costs of direct material, direct labor, and overhead, incurred for each department within a given period.
2. The quantities produced by each department during the period.

The division of the cost for each department by the number of units produced gives the cost of a unit of product in each department; and the sum of all the departmental unit costs for a given article gives the total cost to make that article. Usually the accumulating costs of producing a given article are transferred from department to department as the physical units themselves progress through the plant.

Companies that manufacture for stock usually use process costs. This is invariably true if the machinery is arranged in a straight line. In this case, the factory is set up to produce the same product on the same line of machines for a long time, and nothing will be gained by attempting to differentiate between the costs of different lots of the same product. Companies that produce for stock frequently have their equipment arranged in such a way that machines of the same type are grouped in one cost center with a different cost center for each type of machine. Here, also, process costs will usually be employed, particularly when the same kinds of products are produced continuously for comparatively long times.

In a stock-order industry when there are a variety of products operated on in each cost center during each period, job-order costs may be used and each order or lot costed separately. However, when there are a great many small lots of products more or less similar operated on in a cost center during a period, the calculation of the costs of each lot may be impossible or involve too great expense. In this case, process costs will be used and the expense of each cost center for the period divided or "averaged" in some way among the various types of products passing through it. The greater the variety of products worked on in the various cost centers, usually the less accurate are the unit costs obtained by the process method.

Examples of industries which may be costed in whole or in part by the process method are as follows: Paint and varnish factories, flour milling operations, coal mining, and certain types of foundries. This list is merely suggestive of the wide number of industries that use the process method of costing.

31. Selling Expense Analyzed.—Typical kinds of selling expense are shown in Art. 21. As in the case of manufacturing costs, selling expenses can be classified as *direct* and *indirect*, that is, into expenses that are incurred directly in selling a particular product, and expenses that are necessary to obtain sales, but which are not incurred specifically to sell any given commodity. Examples of direct selling expenses are salaries of salesmen whose time is devoted to the sale of one product,

and advertising expense that is incurred to sell one type of goods. Examples of indirect selling expense include most of the items of selling expense mentioned in Art. 21.

As explained in Art. 25 the terms *direct* and *indirect* when applied to manufacturing costs have a second meaning, that is, expenses that are incurred solely for a particular factory department and expenses that are necessary to operate the manufacturing division but are not chargeable directly to any specific department. This second meaning of *direct* and *indirect* is of great importance in analyzing selling expenses. As in the case of the factory, the selling division may contain a number of departments, and these departments may again be classified as producing departments or service departments. The producing departments are those departments that actually obtain orders from customers. They include mail sales, and the department or departments that embrace the activities of salesmen. Storage, delivery, advertising, market research, and the sales office are examples of selling service departments. Expenses are incurred directly to operate these departments, and in addition there are certain general expenses such as the salary of the major executive in charge of the sales division, and insurance, taxes, and depreciation on building in which the sales division is housed that are not chargeable to any particular department but which may be distributed or prorated to all the departments in the sales division. Service department costs may be distributed to the productive or direct selling departments.

In certain respects, cost procedures for selling expense are more complicated than for manufacturing expense. Cost analysis relating to the factory chiefly concerns product costs, department costs, and general costs of the manufacturing division. Selling cost analysis may concern not only the expense of selling products, selling department expenses, and general expenses of the sales division, but also the cost of selling in a particular sales district, by different salesmen, by different methods of distribution (for example, through wholesalers, through retailers, and direct to consumers), or to different customers or classes of customers. The terms *direct* and *indirect* as applied to selling expense may, therefore, have a third connotation. For example, expenses that are incurred solely for the benefit of one sales district may be considered to be direct; whereas, sales expenses that are not incurred for any specific territory or branch may be looked upon as indirect. Similarly, expenses that are incurred specifically to sell a particular customer or class of customer are called direct, and expenses that are incurred to sell all classes of customers are called indirect.

32. Administrative Expense Analyzed.—Items of administrative expense are shown in Art. 21. In businesses that manufacture more than one product, it is unusual for administrative expense to be incurred solely in connection with a particular commodity. Occasionally this is the case, as, for example, when a definite part of the time of a general executive is given up to the development of a new product or to promoting the sale of one commodity. The analysis of administrative expense into direct and indirect (in the first meaning of these terms discussed in Art. 31) is rarely of significance.

The administrative division frequently contains several departments, for example, general office, treasurer's department, accounting department, credit and collection department, etc. Administrative expense may, therefore, be analyzed into direct and indirect, meaning expenses that are incurred solely for the benefit of a particular department, and expenses that are incurred for the administrative division as a whole. All administrative departments are service departments; they exist only to facilitate the manufacture and sale of the company's products.

As stated in Art. 21, administrative expense for cost purposes should be apportioned to the manufacturing and sales divisions. The total indirect or general administrative expense is, therefore, not usually prorated to administrative departments. A portion may be so prorated and the remainder divided between general manufacturing and general selling expense. Departmental administrative expenses should also be divided between general manufacturing and general selling expense on some equitable basis.

33. Standard Costs.—The method of cost procedure to which the name *standard costs* has been applied, was referred to in Arts. 10-13. The essential idea of this system is to furnish measurements of what the cost to manufacture and sell an article should be, with which the actual cost of manufacturing and selling can be compared. In other words, what the cost of manufacturing and selling a product ought to be under normal operating conditions is determined in advance,—predetermined. All variances of actual cost from predetermined cost are completely accounted for. Some of the advantages of this method were discussed in Arts. 11-13.

The superiority of the standard cost method lies in the fact that standard costs are scientifically determined for the various manufacturing, selling and administrative departments. They set up a goal of accomplishment toward which every department aims. By analyzing the variances of actual from standard cost and fixing the responsibility for all these variances, a more intelligent and complete control of performance is secured than is possible under any other type of cost system. Since standard costs are established in advance, they are also of great aid to the sales department in deciding upon selling policies, as they indicate normal costs upon which sales policies can be based. Standard costs are discussed in Part IV.

CHAPTER VI

COST ACCOUNTS AND THE GENERAL BOOKS

34. Manufacturing Cost Accounts.—Cost accounts collect the money value of all the manufacturing operations, that is, they show the dollars and cents value of the raw materials used, of the direct labor employed, and of the overhead expense applied to the product made.

When the three elements of manufacturing cost, namely, raw materials, direct labor, and overhead expenses, are totaled, the cost of work in process results. As the various amounts of these three elements of cost are placed into production their money values are placed in a Work in Process Inventory account.

With the completion of the job or process, the units of product made are transferred to the shipping department or to the warehouse. This is known as the *finished goods* stage, and the total cost of the units is transferred from the Work in Process Inventory account to the Finished Goods Inventory account.

The Finished Goods Inventory account carries the cost of the finished units until the goods are shipped to the customer. When the invoice is mailed to the customer, the cost of the finished goods is transferred to the Cost of Sales account at *cost price.*

Another entry is also necessary at this time. The customer is debited with the amount of the credit to the sales account which is, however, at the *invoice,* or *selling,* price.

The following entries in general journal form show the above transactions:

Entry No. 1

Work in Process	$9,000	
Raw Materials		$2,500
Direct Labor		3,500
Overhead Expense		3,000

This entry carries into the Work in Process account the three cost elements.

Entry No. 2

Finished Goods	$9,000	
Work in Process		$9,000

This entry records the placing of the goods manufactured in the warehouse.

Entry No. 3

Cost of Sales	$9,000	
Finished Goods		$9,000

This entry records the sale of goods at cost price.

Entry No. 4

Accounts Receivable	$12,000	
Sales		$12,000

This entry records the sales at selling price and the customer's debt.

The manufacturing cost accounts are usually control accounts supported by subsidiary ledgers or other records. In a large manufacturing business it would be impossible to place all of the detailed cost accounts in the general ledger or even in the factory ledger

The accompanying tabulation shows the control accounts and the records which they control.

GENERAL LEDGER OR FACTORY LEDGER CONTROL ACCOUNTS		SUBSIDIARY RECORDS	
1.	Raw Materials Inventory Factory Supplies Inventory Stationery and Office Supplies Inventory		Stores Ledger or Ledgers
2.	Payroll		Payroll Distribution Sheet
3.	Overhead Expense		Overhead Expense Ledger
4.	Work in Process Inventory	1. Process Cost System	1. Separate Analysis Sheet for each Department.
		2. Job-Order Cost System	2. Individual Cost Cards for each Unfinished Job.
5.	Finished Goods Inventory	1. Process Cost System	1. Finished Goods or Warehouse Ledger.
		2. Job-Order Cost System	2. Individual Cost Cards for each Completed Job not Shipped.
6.	Cost of Sales	1. Process Cost System	1. Invoices Billed.
		2 Job-Order Cost System	2. Individual Cost Cards for each Job Shipped.

The last two accounts, Finished Goods Inventory and Cost of Sales, are sometimes listed as trading accounts. They are, however, closely connected with costs.

Material accounts may be divided into three general groups. The chief material account to be considered is Raw Material. The other two groups are Factory Supplies, and Stationery and Office Supplies. While the latter is not a pure cost account, the office supplies are usually handled by the stores department. The office supplies used in the factory office are considered an overhead expense item.

35. Raw Materials Inventory Account.—The Raw Materials Inventory account, as a cost account, exercises control over the quantity as well as the value of the raw materials. The quantity of raw materials must be controlled, so that a proper supply of all necessary materials will be on hand and available for use at all times. The value of the raw materials must be under control at all times in order to have an inventory figure available for use in preparing the monthly operating and financial statements.

An account for Raw Materials Purchases is unnecessary when a cost system is in operation. The Raw Materials Inventory account is debited with the invoice price of all purchases. The same account is also credited with the cost value of the materials withdrawn from the storeroom for use in production. It is clearly evident, then, that the balance in the control account, when all postings are completed, represents the value, at cost, of the raw materials in the storeroom. The inventory account thus becomes a perpetual-inventory record.

The debit postings to the Raw Materials Inventory account come from the voucher register. Vouchers are prepared for the creditors' invoices after the raw materials have been received, and verified properly as to quantity, quality, and price. The amount of every creditor's invoice for raw materials vouchered is entered in the voucher-register column having the heading Raw Materials Inventory. This is a debit column, the total of which is posted to the debit side of the Raw Materials Inventory control account in the general ledger.

Often other miscellaneous debit postings are made to the Raw Materials Inventory account from the factory journal or from the general journal or from journal vouchers. These miscellaneous postings are for salvaged and scrap materials turned back to the storeroom, for parts manufactured within the plant, and for corrections and adjustments which are certain to arise from time to time.

The credit postings to the Raw Materials Inventory account come, primarily, from the factory journal. In this journal are recorded the requisitions for materials issued from the storeroom and charged to work in process.

Other credit postings to the Raw Materials Inventory account are made from the factory journal or from the general journal or from journal vouchers. These postings are for raw materials that are returned to vendors, or for allowances granted by vendors. Adjustments and various corrections also give rise to additional credit postings occasionally. An example of the Raw Materials Inventory control account is shown in Illustration 1.

RAW MATERIALS INVENTORY

19—						19—					
Jan.	1	Balance		$ 54,790	10	Jan.	15	Raw Materials returned to vendor	*JV30*	$ 961	22
	10	Salvaged Materials returned to Storeroom	*JV12*	1,160	85		31	Raw Materials issued for production	*FJ 7*	65,911	75
	19	Scrap sent to Storeroom from Shop	*JV37*	254	82		31	Balance		50,567	00
	23	Finished Parts manufactured in Shop	*JV51*	3,641	77						
	31	Raw Material Purchases	*VR 8*	57,592	43						
				$117,439	97					$117,439	97
Feb.	1	Balance		$ 50,567	00						

ILLUSTRATION 1

36. Factory Supplies Inventory Account.—Some concerns include factory supplies in the Raw Materials Inventory account. The better method, however, is to account for factory supplies in a separate account. Even though factory supplies are kept in the storeroom with the raw materials, the factory supplies are considered as an overhead expense, rather than as raw material. The nature of the use made of an item in production determines its classification as a raw material or as a factory supply. Raw materials compose the known quantities used in a

unit or units of production, while factory supplies cannot be charged directly to any unit or units of production.

A perpetual inventory of factory supplies should be maintained the same as for raw materials. The operation of a perpetual inventory makes possible the quantity and value control as in the case of raw materials.

The debit postings to the Factory Supplies account are made chiefly from the voucher register, and occasionally from the general journal or from journal vouchers. Vouchers are prepared for the vendors' invoices after the factory supplies have been received, and properly verified as to quantity, quality, and price. The amount of every vendor's invoice for factory supplies is entered in the voucher-register column having the heading Factory Supplies. The factory supplies column is a debit column, and the total of the column, at the end of each month, is posted to the debit side of the Factory Supplies Inventory control account in the general ledger.

Debits to the control account are required occasionally for corrections and adjustments, but rarely are there any debits to this account for scrap or salvaged supplies. Factory supplies are usually of such a nature that little if any scrap or salvage is created during the process of production.

The credit postings to the Factory Supplies Inventory account come from the factory journal and from the general journal or journal vouchers. Requisitions for factory supplies issued are entered in the factory journal as debits to an overhead-expense column and as a credit to the factory supplies inventory column. Credit postings to the Factory Supplies Inventory account, for corrections and adjustments, are made from journal vouchers. Included in these credits are adjustments for returns and allowances of factory supplies. An example of the Factory Supplies Inventory control account is shown in Illustration 2.

FACTORY SUPPLIES INVENTORY

19—						19—					
Jan.	1	Balance		$ 8,471	63	Jan.	5	Allowance on damaged waste received from Union Waste Co.	JV64	$ 65	40
	31	Purchases of factory supplies	VRS	15,676	21		31	Factory supplies issued during month	FJ 7	16,197	72
							31	Balance		7,884	72
				$24,147	84					$24,147	84
Feb.	1	Balance		$ 7,884	72						

ILLUSTRATION 2

37. Stationery and Office Supplies Inventory Account.—The larger business concerns make a practice of stocking their printed forms and office supplies. A certain part of the storeroom is reserved for these items, and they are issued upon requisitions signed by the heads of the various departments. Stationery and

office supplies requisitioned by the manufacturing division heads are classified as overhead expense items, and therefore this account may be classified as a manufacturing cost account. The items requisitioned by the sales and administration executives are charged to their respective departments.

If the stationery and office supplies are under the control of the stores department, a perpetual-inventory record is also maintained. Quantity and value control of stationery and office supplies are as important as in the case of raw materials and factory supplies.

The debit postings to the Stationery and Office Supplies Inventory account are made chiefly from the voucher register. A voucher for each invoice covering the purchase of stationery and office supplies shows that the amount is to be entered in the column in the voucher register bearing this heading. Sundry debit postings from journal vouchers may be made for adjustments or corrections.

Credits to the control account come from the factory journal and from journal vouchers. Requisitions for stationery and supplies to be used in the factory are entered in the factory journal as debits to some overhead expense column and as a credit to the stationery and office supplies inventory column. Credit postings are made from journal vouchers for corrections, adjustments, returned supplies, and for supplies requisitioned by the sales and administration departments. An example of the Stationery and Office Supplies Inventory control account is shown in Illustration 3.

STATIONERY AND OFFICE SUPPLIES INVENTORY

19—						19—					
Jan.	1	Balance		$2,158	70	Jan.	18	Return of ink frozen in transit to Penn Ink Co.	*JV36*	$ 50	65
	31	Purchases of Office Supplies	*VR8*	1,892	16		22	Supplies for Sales Department	*JV50*	320	77
							27	Supplies for Administration Department	*JV71*	294	63
							31	Supplies for Factory	*FJ 7*	410	81
							31	Balance		2,974	00
				$4,050	86					$4,050	86
Feb.	1	Balance		$2,974	00						

ILLUSTRATION 3

38. Factory Payroll Account.—The Factory Payroll account is not, strictly speaking, a cost account. It is so closely tied up with the Work in Process Inventory account, because of the labor that is charged into production, that its function is described along with the real cost accounts. The Factory Payroll account is a clearing account from which the cost of all direct labor is credited at the time it is charged into production. When the payroll for direct laborers is prepared, an entry is made in the Voucher Register debiting the Factory Payroll account with

the amount of the voucher drawn, and a corresponding credit is made to the Accounts Payable account.

All indirect factory labor costs are likewise carried through the Factory Payroll account. The debits representing the indirect labor cost are made to the Overhead Expense account or to the various overhead accounts of the different factory departments while a credit for the total is made to the Factory Payroll account. When the payroll for indirect laborers is prepared, the Factory Payroll account is debited and the Accounts Payable account is credited.

An analysis of the Factory Payroll account is known as the *Payroll Distribution.* The payroll distribution serves as the subsidiary record of the payroll account. Some manufacturing companies set up direct labor accounts in a supporting or subsidiary ledger classified as to department, operation or function performed. To these accounts is posted the detailed labor cost which is controlled by the Factory Payroll account. The most general practice consists, however, of making the payroll analysis upon a payroll distribution sheet, which will be described later.

Sometimes the Factory Payroll account is classified as a current liability account. This is when the account contains a credit balance at the end of the period. There will be no balance in the Factory Payroll account at the end of a period if payrolls are prepared for monthly or half-monthly periods, since in this case the payroll or payrolls for each month will equal the labor cost distributed. However, payrolls are frequently prepared for weekly or bi-weekly periods. Under this circumstance, the labor cost distributed at end of month will not be equal to the payrolls recorded for the month and the Factory Payroll account will show a credit balance which represents wages accrued for the few days that elapse between the last day of the payroll period and the last day of the month. This balance is shown in the current liability section of the balance sheet. A Factory Payroll account is exhibited in Illustration 4.

FACTORY PAYROLL ACCOUNT

19—						19—					
Jan.	16	Payroll for direct and indirect labor for first half of month	*VR8*	$32,497	16	Jan.	31	Indirect labor accrued for first and second half of month	*FJ7*	$ 2,020	00
	31	Payroll for direct and indirect labor for second half of month	*VR8*	35,524	72		31	Direct labor accrued for first and second half of month	*FJ7*	66,001	88
				$68,021	88					$68,021	88

ILLUSTRATION 4

39. Overhead Expense Account.—Several factors determine whether one or several manufacturing overhead-expense control accounts will be found in the accounting system. In a small-sized plant, a single Overhead Expense control

account is usually sufficient. Where the manufacturing processes are complex, involving numerous departments, the overhead expenses are accounted for departmentally, thus calling for a separate Overhead Expense control account for each department.

A single Overhead Expense control account will be described. Cost accounting systems for large concerns requiring more than one account to establish the proper measure of control over the overhead expense are merely an adaptation of the single-account idea.

Manufacturing overhead expense is composed of innumerable items of expense necessary in the manufacturing of goods. Usually, it is very difficult, if not impossible, to determine what proportion of the cost of any overhead expense item applies to any one unit of product manufactured. Therefore, the total cost of all overhead expense items is collected in one account, and divided or prorated over the total number of units produced by one of several methods which will be described later. Many items of overhead expense must be accounted for in any manufacturing concern. To establish a proper measure of control over each individual item, a separate account is set up to record the individual expense of each item. Thus, in the overhead expense subsidiary record would be accounts for such items as indirect labor, factory supplies, office stationery and supplies, power, fuel, water, insurance, taxes, depreciation, etc. The Overhead Expense control account is set up in the general ledger (or in the factory ledger) to establish control over these many individual overhead expense items.

OVERHEAD EXPENSE

19—						19—					
Jan.	31	Overhead expenditures incurred during month	*VR 8*	$36,063	55	Jan.	31	To Work in Process Inventory	*FJ7*	$68,443	91
	31	Factory supplies issued during month	*FJ 7*	16,197	72						
	31	Stationery and Office supplies issued to factory	*FJ 7*	410	81						
	31	Indirect labor	*FJ 7*	2,020	00						
	31	Depreciation applicable to month	*JV73*	12,179	83						
	31	Estimated taxes for month	*JV74*	1,309	62						
	31	Estimated compensation insurance	*JV75*	262	38						
				$68,443	91					$68,443	91

ILLUSTRATION 5

The debits to the Overhead Expense control account arise from two sources: first, from the voucher register; second, from the factory journal or journal vouchers. A voucher is prepared for each item of overhead expense incurred during the period and to be paid for by check. The voucher indicates that the Overhead Expense

account is to be charged. The voucher is the authority for the entry made in the voucher register as a debit in the Overhead Expense column. The total of this column is posted at the end of each month to the control account for Overhead Expense.

The other debit postings, coming from the factory journal or from journal vouchers, are made at the end of each month. These postings are adjustments for supplies used; for indirect labor; for prepaid and accrued manufacturing expense items; for depreciation; and for estimated manufacturing expenses, the exact expense of which is not known until later, such as taxes, compensation insurance, water, etc.

The credit postings to the Overhead Expense account are dependent upon the type of cost system in operation. In an ordinary process cost system, the total overhead expenses accumulated monthly, as reflected in the Overhead Expense control account, are credited out of that account and charged to the Work in Process Inventory account. Under a job-order cost system, the Overhead Expense control account is credited out at the end of the month, with a corresponding debit to another overhead account usually bearing the name, Overhead Absorbed.

The analysis of the Overhead Absorbed account at the close of the period shows on the debit side the actual charges of all overheads for the period. The credit side shows the overhead charges that have been made to production. Thus a debit balance indicates lack of production to absorb the overhead or an insufficient rate to charge the overhead into product. Conversely, a credit balance shows heavy production or too high a rate.

An example of an Overhead Expense control account is given in Illustration 5.

40. Work in Process Inventory Account.—The Work in Process Inventory control account is one of the most important cost accounts. This inventory account is the clearing house for all the cost elements. The cost of the raw materials, the direct labor, and the overhead expense are charged into this inventory account as the various elements enter into production. As the various units of production are finished, or as different jobs are completed, the costs accumulated upon them are transferred out of the Work in Process Inventory account to the Finished Goods Inventory account. It is, therefore, extremely important that extraordinary care be exercised in handling the postings to the Work in Process Inventory account, in order that the units or jobs shall be properly costed. Furthermore the debit balance in the Work in Process Inventory account at the close of any month represents the accumulated cost of uncompleted units or jobs. Since this inventory account is used in the determination of the profit or loss for any given period, it may be easily understood that its accuracy is imperative. This means that an accurate balance in the Work in Process Inventory account is dependent primarily upon four things: First, upon properly priced requisitions for the accurate amount of raw materials placed into production. Second, upon accurately figured time slips covering the exact number of hours of direct labor employed at the proper rates per hour for each employe. Third, upon a correct method of costing the product, either unit or job, with its share of the overhead

expense. Fourth, upon the possession of definite knowledge of the cost of every completed unit or job that is transferred from the Work in Process Inventory account to the Finished Goods Inventory account.

The number of Work in Process Inventory accounts is determined by the nature of the manufacturing plant. A cost system designed for a small plant usually has but one Work in Process Inventory account. On the other hand, a plant manufacturing a complex type of product, involving numerous processes, may have a separate Work in Process Inventory account for each department or process. If more than one Work in Process Inventory account is required, the cost of the units or jobs is transferred successively from the first to the last Work in Process Inventory account as the product is passed from one department to another. It is possible to obtain a detailed analysis of the product cost, as to its raw material, direct labor, and overhead-expense elements, when departmental Work in Process Inventory accounts are used.

A Work in Process Inventory account in a plant having a process cost system serves as a control over the detailed analyses of the cost elements involved in production. These detailed analyses are usually called Departmental Cost Reports.

WORK IN PROCESS INVENTORY

19—						19—					
Jan.	1	Balance		$ 19,742	81	Jan.	10	Salvaged materials returned to storeroom	*JV12*	$ 1,160	85
	31	Elements of cost charged into production as follows:					19	Scrap sent to storeroom	*JV37*	254	82
		Raw Material $65,911.75					23	Finished Parts completed and sent to storeroom	*JV51*	3,641	77
		Direct Labor $66,001.88					31	Finished goods delivered to warehouse	*JV78*	200,500	00
		Overhead Expenses $38,443.91	*FJ7*	$200,357	54		31	Balance		14,542	91
				$220,100	35					$220,100	35
Feb.	1	Balance		$ 14,542	91						

ILLUSTRATION 6

In a plant manufacturing on a job-order basis, the Work in Process Inventory acts as a control over the individual cost cards that are issued for each different job or order. At the end of any month, after all postings are completed, the balance in the Work in Process Inventory account should agree with the total of the balances appearing on the cost cards covering the partially completed jobs.

The debits posted to the Work in Process Inventory account come from the factory journal. The work in process inventory column in that journal accumulates the various cost-element charges. After the raw materials have been requisitioned from the storeroom, the requisitions form the basis for a debit entry to the work in process inventory column, with a corresponding credit to raw materials inventory

column. After the direct labor has been performed, the wage tickets are the source of a debit entry to the work in process inventory column, with a corresponding credit to the payroll column. When the overhead expense for a job or process has been computed, the amount is entered as a debit in the work in process inventory column, with a corresponding credit to the overhead expense or overhead absorbed column.

Credits to the Work in Process Inventory account are made in accordance with the type of cost system in operation. Under a job-order cost system, the cost of each completed job is credited from the Work in Process Inventory account as the finished goods are transferred to the warehouse or shipping department Special columns may be set up in the factory journal to provide for these numerous transfers day by day. If the jobs completed monthly are relatively few, the transfer may be made through a journal voucher. Where a process cost system is in use, the balance to be transferred from Work in Process account, representing the cost of the finished goods, usually is transferred at the end of the month by means of a journal voucher. Other credits may be made to the Work in Process Inventory account for the cost of salvaged or scrap materials that have been reclaimed from production and returned to the storeroom. Finished parts manufactured within the plant are likewise credited to the Work in Process Inventory account when the parts are completed and delivered to the storeroom.

A Work in Process Inventory control account is shown in Illustration 6.

41. Finished Goods Inventory Account.—The Finished Goods Inventory control account is a perpetual-inventory account, the balance of which represents the value of finished goods in the warehouse. The volume of finished goods on hand depends upon the type of manufacturing plant and its cost accounting system. A plant engaged in the production of job orders usually has a very small amount of money tied up in its finished goods inventory. As the goods are produced on specified orders, they are usually shipped as soon as completed. A manufacturing concern engaged in process production, on the other hand, usually produces for stock, and consequently has a rather large inventory of finished goods on hand.

The subsidiary record controlled by the Finished Goods Inventory account, also, depends upon the nature of the plant and its accounting system. In a job-order plant, the cost of the finished goods on hand ready for shipment is reflected not only in the Finished Goods Inventory account, but on the individual job-order cards as well. The aggregate of the total cost of all of the job-order cost cards covering unshipped finished orders should equal the balance in the Finished Goods Inventory control account. In a process-order plant, the number of different items produced for stock varies from one to hundreds or thousands of items. It may be readily understood that it is absolutely necessary to have a system of accounting for the items in detail. As the items are completed and transferred from the Work in Process Inventory account to the Finished Goods Inventory account, the quantity and the cost of the items are entered in detail in the finished-goods ledger. Sometimes the name of warehouse ledger or finished-stock ledger is given to this subsidiary record. The sum of the balances on all the finished-

stock ledger sheets should be equal to the balance in the Finished Goods Inventory account at the end of any month when postings are completed.

In a plant having a job-order cost system, the debits to the Finished Goods Inventory account usually come from the factory journal. In this journal a debit column for finished-goods inventory and a credit column for work in process inventory provide for the many transfers that are made during the month. A plant producing for warehouse stock can take care of its transfers of finished goods to the warehouse by a monthly entry in the factory journal or on a journal voucher. A debit to Finished Goods Inventory account is offset by a corresponding credit to Work in Process Inventory account.

The credits to the Finished Goods Inventory account are usually made from a shipment book in a job-order plant. In this book is recorded from the job-order cards, the cost of orders shipped. The cost of the orders is credited to a column labeled Finished Goods Inventory, with a corresponding debit to the column bearing the title, Cost of Sales. In a process plant, an adding-machine tape is prepared from the duplicate copies of all invoices, on each of which has been placed the cost of the shipment in addition to the selling price as billed to customers. The tape total of the cost price is the amount for which the entry is prepared in the factory journal or on a journal voucher, Cost of Sales being debited and Finished Goods Inventory credited.

A Finished Goods Inventory account is shown in Illustration 7.

FINISHED GOODS INVENTORY

19—						19—					
Jan.	1	Balance		$ 36,500	00	Jan.	31	Cost of shipments during the month	*JV81*	$192,500	00
	31	Cost of production for the month	*JV78*	200,500	00		31	Balance		44,500	00
				$237,000	00					$237,000	00
Feb.	1	Balance		$ 44,500	00						

ILLUSTRATION 7

42. Cost of Sales Account.—The Cost of Sales account, as previously mentioned, is sometimes classified as a trading account, because the cost of sales is deducted from the net sales to determine the gross profit. The cost of production, however, is reflected in the Cost of Sales account; therefore, the account may be also classified as a cost account. The Cost of Sales account may be said to be a transitional account serving as a connection between the production and sales divisions.

The Cost of Sales account can be considered as a control account. The balance in the account may be verified with the total of the costs of all duplicate customers' invoices in a process plant or the total of the costs recorded on job-order cards for shipped goods in a job-order plant.

The source of debits to the Cost of Sales account is explained in Art. 41.

The Cost of Sales account may have posted to it but one credit each fiscal period. This credit posting is made at the end of the fiscal period when the books are closed. From the general journal or a journal voucher, a credit is posted to the Cost of Sales account to correspond to the debit to the Profit and Loss account.

A Cost of Sales account is shown in Illustration 8, a six-month closing period being assumed.

COST OF SALES

19—						19—					
Jan.	31		*JV 81*	$ 192,500	00	June	30	To Profit and Loss	*JV431*	$1,146,000	00
Feb.	28		*JV159*	171,600	00						
Mar.	31		*JV218*	189,450	00						
Apr.	30		*JV299*	189,950	00						
May	31		*JV351*	199,250	00						
June	30		*JV417*	203,250	00						
				$1,146,000	00					$1,146,000	00

ILLUSTRATION 8

In connection with the Cost of Sales account, there is usually required a supplementary account to record the cost value of any shipments returned by customers. Since two entries are required when the finished goods are shipped, likewise, the return of any shipment must be recorded by a dual entry. The following entries in general journal form illustrate the entries required when finished goods are shipped.

Accounts Receivable	$100.00	
Sales		$100.00
To record the sale of 5 units at a selling price of $20.00 each.		
Cost of Sales	$ 50.00	
Finished Goods Inventory		$ 50.00
To record the cost of 5 units sold at a unit cost of $10.00 each.		

If one of the units should be returned by the customer, it would be placed in the finished goods inventory. The entry to accompany this transaction might be made on a journal voucher and would be as follows:

Finished Goods Inventory	$10.00	
Returned Shipments		$10.00
To record the return of one unit, which was placed in the inventory at the cost price of $10.00.		

The entry to adjust the sales account and the customer's account would likewise be a journal voucher entry and would be as follows:

Sales Returns and Allowances	$20.00	
Accounts Receivable		$20.00
To credit the customer with selling price of unit returned.		

The balance of the Returned Shipments account is closed to the Cost of Sales account before the balance of the latter account is transferred to the Profit and Loss account.

43. Factory Ledger.—The cost accounts described in the foregoing pages may be set up in the general ledger or they may be segregated in an auxiliary ledger known as the factory or plant ledger. If the manufacturing plant is a small one, or if the productive processes are simple, and the general office is located at the plant, the general ledger may contain all the cost accounts. Frequently the cost accounts are kept in a factory ledger with a control account termed Factory Ledger in the general ledger. The plant property and equipment accounts and their corresponding reserve accounts may also be included in the factory ledger.

When the factory is located at a distance from the main office, a control account is required in the factory ledger as well as one in the general ledger. The existence of a control account in the factory ledger makes it possible to test the correctness of the postings made during the period in this ledger without referring to the balance in the control account in the general ledger. When the general ledger is at a distance from the factory office the balance of the control account in the general ledger is not available immediately to the factory accounting department. In the general ledger the control account is called *Factory Ledger*. In the factory ledger the control account is given the title of *General Ledger*. *The important thing to remember about these control accounts is that whenever any amount affecting both ledgers is recorded, the same amount must always be reflected in both the accounts.* Any other procedure would prevent the two control accounts from having the same balance at the close of each month.

The use of reciprocal control accounts will now be shown by illustrative entries in general journal form. The accounting conditions are assumed to be as follows:

(*a*) The general office operates the voucher register and the cash-disbursements journal, the sales journal and the cash-receipts book.

(*b*) The general ledger, kept at the general office, contains the accounts for the factory buildings, machinery and other factory equipment, as well as the depreciation reserves for these property accounts.

(*c*) The general ledger has accounts for all liability reserves such as the reserve for taxes, the reserve for compensation insurance, etc.

(*d*) The factory ledger contains all the cost control accounts, except the Cost of Sales account. The factory office comes into possession of the knowledge that the cost accounts are affected by expenditures, through the receipt of carbon copies of the vouchers. Journal voucher transactions originating at the general office, which affect the cost accounts in the factory ledger, are transmitted to the factory office by means of a duplicate copy of each journal voucher.

Information pertaining to shipments of finished merchandise from the factory, which are invoiced by the general office, is sent by the factory office in the form of duplicate shipping orders.

The trial balance of the general ledger on January 1, 19__, when a factory ledger was placed in operation was as shown herewith.

TRIAL BALANCE

January 1, 19__

Cash	$ 15,000.00	
Accounts Receivable	45,000.00	
Raw Materials Inventory	25,000.00	
Work in Process Inventory	5,000.00	
Finished Goods Inventory	30,000.00	
Land	13,000.00	
Factory Buildings	72,000.00	
Machinery and Equipment	150,000.00	
Reserve for Depreciation, Factory Buildings		$ 36,000.00
Reserve for Depreciation, Machinery and Equipment		75,000.00
Accounts Payable		30,000.00
Reserve for Taxes		2,150.00
Reserve for Compensation Insurance		650.00
Capital Stock		200,000.00
Surplus		11,200.00
	$355,000.00	$355,000.00

The following entries were required to establish the reciprocal control accounts:

IN THE BOOKS AT THE GENERAL OFFICE			IN THE BOOKS AT THE FACTORY OFFICE		
Factory Ledger	$60,000		Raw Materials Inventory	$25,000	
Raw Materials Inventory		$25,000	Work in Process Inventory	5,000	
Work in Process Inventory		5,000	Finished Goods Inventory	30,000	
Finished Goods Inventory		30,000	General Ledger		$60,000

The following transactions occurred during the month:

1.	Purchases of raw material	$30,000
2.	Purchases of factory supplies	15,000
3.	Raw materials used in production	35,000
4.	Factory supplies used	13,500
5.	Cost of indirect labor for month	2,000
6.	Cost of direct labor for month	28,000
7.	Wages for indirect and direct labor for month paid	30,000

The following adjustments are necessary at the end of the month:

8.	Depreciation on factory buildings ($300) and equipment ($1,250)	$ 1,550
9.	Estimated taxes on factory buildings	250
10.	Estimated compensation insurance expense	60

The entries required to record the foregoing transactions and adjustments are as follows:

	IN THE BOOKS AT THE GENERAL OFFICE			IN THE BOOKS AT THE FACTORY OFFICE		
1.	Factory Ledger	$30,000		Raw Materials Inventory	$30,000	
	Accounts Payable		$30,000	General Ledger		$30,000
2.	Factory Ledger	15,000		Factory Supplies Inventory	15,000	
	Accounts Payable		15,000	General Ledger		15,000
3.				Work in Process Inventory	35,000	
				Raw Materials Inventory		35,000
4.				Overhead Expense	13,500	
				Factory Supplies Inventory		13,500
5.				Overhead Expense	2,000	
				Payroll		2,000
6.				Work in Process Inventory	28,000	
				Payroll		28,000
				Payroll	30,000	
				General Ledger		30,000
7.	Factory Ledger	30,000				
	Accounts Payable		30,000			
	Accounts Payable	30,000				
	Cash		30,000			
8.	Factory Ledger	1,550		Overhead Expense	1,550	
	Reserve for Depreciation on Factory Buildings		300	General Ledger		1,550
	Reserve for Depreciation on Machinery and Equipment		1,250			
9.	Factory Ledger	250		Overhead Expense	250	
	Reserve for Taxes		250	General Ledger		250
10.	Factory Ledger	60		Overhead Expense	60	
	Reserve for Compensation Insurance		60	General Ledger		60

The following entry is required to transfer the balance of the Overhead Expense account to the Work in Process Inventory account:

IN THE BOOKS AT THE FACTORY OFFICE

Work in Process Inventory		$17,360	
Overhead Expense			$17,360

The following additional facts concerning the operations of the period are given:

1. Goods finished during period . . . . . $ 75,000
2. Cost of Goods sold 85,000
3. Sales (for cash, $115,250; on account, $12,000) 127,250
4. Accounts payable paid 50,000

The entries required to record these transactions are as follows:

	IN THE BOOKS AT THE GENERAL OFFICE			IN THE BOOKS AT THE FACTORY OFFICE		
				1. Finished Goods Inventory	$75,000	
				Work in Process Inventory		$75,000
2.	Cost of Sales	$85,000		General Ledger	85,000	
	Factory Ledger		$85,000	Finished Goods Inventory		85,000
3.	Cash	115,250				
	Accounts Receivable	12,000				
	Sales		127,250			
4.	Accounts Payable	50,000				
	Cash		50,000			

The result of posting the foregoing entries is shown in the following T accounts:

GENERAL LEDGER

Cash	
$ 15,000	$30,000
115,250	50,000

Accounts Receivable	
$ 45,000	
12,000	

Raw Materials Inventory	
$ 25,000	$25,000

Work in Process Inventory	
$ 5,000	$ 5,000

Finished Goods Inventory	
$ 30,000	$30,000

Land	
$ 13,000	

Factory Buildings	
$ 72,000	

Machinery and Equipment	
$150,000	

Reserve for Depreciation Factory Buildings	
	$36,000
	300

Reserve for Depreciation Machinery and Equipment	
	$75,000
	1,250

Accounts Payable	
$30,000	$ 30,000
50,000	30,000
	15,000
	30,000

Reserve for Taxes	
	$ 2,150
	250

Reserve for Compensation Insurance	
	$ 650
	60

Capital Stock	
	$200,000

Surplus	
	$ 11,200

Cost of Sales	
$85,000	

Sales	
	$127,250

Factory Ledger	
$60,000	$85,000
30,000	
15,000	
30,000	
1,550	
250	
60	

FACTORY LEDGER

General Ledger	
$85,000	$60,000
	30,000
	15,000
	30,000
	1,550
	250
	60

Raw Materials Inventory	
$25,000	$35,000
30,000	

Work in Process Inventory	
$ 5,000	$75,000
35,000	
28,000	
17,360	

Finished Goods Inventory	
$30,000	$85,000
75,000	

Factory Supplies Inventory	
$15,000	$13,500

Payroll	
$30,000	$ 2,000
	28,000

Overhead Expense	
$13,500	$17,360
2,000	
1,550	
250	
60	

Trial balances for the general ledger and the factory ledger, prepared from the T accounts, are as follows:

TRIAL BALANCES

GENERAL LEDGER

Cash	$ 50,250	
Accounts Receivable	57,000	
Land	13,000	
Factory Buildings	72,000	
Machinery and Equipment	150,000	
Reserve for Depreciation—Buildings		$ 36,300
Reserve for Depreciation—Machinery and Equipment		76,250
Accounts Payable		25,000
Reserve for Taxes		2,400
Reserve for Compensation Insurance		710
Common Capital Stock		200,000
Surplus		11,200
Cost of Sales	85,000	
Sales		127,250
Factory Ledger	51,860	
	$479,110	$479,110

FACTORY LEDGER

General Ledger		$ 51,860
Raw Materials Inventory	$ 20,000	
Work in Process Inventory	10,360	
Finished Goods Inventory	20,000	
Factory Supplies Inventory	1,500	
	$ 51,860	$ 51,860

Particular attention should be given to the trial balances with respect to the agreement of the reciprocal control accounts. In the general ledger trial balance, the Factory Ledger control account has a *debit* balance of $51,860. The General Ledger control account in the factory ledger has a *credit* balance of the same amount, $51,860. *This agreement of the reciprocal control account balances is proof of the accuracy of the transfers between the general office and the factory office.*

44. Selling Expense Account.—There may be one or several Selling Expense control accounts in the accounting system, depending on the size of the business and the complexity of its operations. When the selling division contains distinct departments there is likely to be a control account for each department; for example, Storage, Delivery, Advertising, Market Research, Mail Sales, etc. A single Selling Expense control account will be described. The use of a number of accounts is an adaptation of the single account idea.

Selling expense consists of many items. To establish proper control over every item, separate accounts are set up in a subsidiary ledger. The Selling Expense control account is placed in the general ledger to establish control over the detail accounts.

The debits to the Selling Expense control account come from two sources, the voucher register and the general journal or journal vouchers. A voucher is prepared for each item of selling expense (including salesmen's and sales office salaries)

incurred during the period for which cash is to be paid. The voucher shows that the Selling Expense account is to be debited. The voucher is the authority for the entry made in the voucher register as a debit in the Selling Expense column. The total of the column is posted at the end of each month to the Selling Expense control account.

The other debit postings, coming from the general journal or from journal vouchers, include stationery and office supplies used, adjustments for prepaid and accrued selling expense items, for depreciation on selling equipment, and for estimated selling expenses, the exact amount of which is not known at the time, such as taxes, lighting, etc.

The Selling Expense control account may have posted to it but one credit each fiscal period. At the end of the fiscal period the Selling Expense control account is closed into the Profit and Loss account. The entry is made in the general journal or on a journal voucher.

SELLING EXPENSE

19—					
Jan.	22	Stationery and office supplies issued to Sales department	*JV*50	320	77
	31	Selling expenses (including salaries) incurred during month	*VR*8	10,500	50
	31	Insurance expense applicable to month	*JV*86	112	20
	31	Depreciation applicable to month	*JV*87	310	25
	31	Estimated taxes for month	*JV*88	200	80

ILLUSTRATION 9

Illustration 9 shows a Selling Expense control account with debit postings for one month. No credit posting is shown because the account will usually not be closed until the end of the year.

45. Administrative Expense Account.—As in the case of selling expense, there may be one or several Administrative Expense control accounts. When the administrative division contains distinct departments there usually is a control account for each department. There are many types of administrative expense and, therefore, to insure proper control detail accounts are set up in a subsidiary ledger or in subsidiary ledgers when there is more than one control account. Reference will be made to a single Administrative Expense control account.

The Administrative Expense control account is in the general ledger. Debits to the account come from the voucher register and the general journal or journal

DISTRIBUTION SHEET FOR SELLING EXPENSES

Month of January 19__

*5301		5302		5303		5309		5310		5311		5312		5313		5314		5315		5316		5317	
Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount	Reference	Amount
V1100	$ 650 90	V1100	$ 289 78	V1100	$ 175 00	V1036	$ 66 20	V1028	$ 58 35	V1050	$ 37 50	V1022	$ 45 00	V1048	40 00	V1258	121 11	V1237	103 75	V1234	200 65	JV100	20 00
V1290	560 10	V1290	290 90	V1290	175 00	V1125	110 80	V1111	34 89	V1267	101 82												
						V1201	34 67			V1285	3 25												

*The names of the accounts applicable to the account code numbers are found in Illustration 11.

ILLUSTRATION 10

vouchers. A voucher is made for each item of administrative expense for which cash is to be paid. When the voucher is recorded in the voucher register, a debit entry is made in the Administrative Expense column. The total of this column is posted to the Administrative Expense control account at the end of each month. Debit postings also come from the general journal or journal vouchers, for such items as stationery and office supplies used, adjustments for prepaid and accrued administrative expense items, for depreciation on general office equipment, and for estimated administrative expenses, the exact amount of which is not known at the time, such as taxes, lighting, etc.

Selling Expense **For the Year 19__**

Account		Jan.	Oct.	Nov.	Dec.	Total
Code	Name					
5301	Salaries	$1,211 00				
5302	Shipping Dept. Wages	580 68				
5303	Drivers' Wages	350 00				
5309	Store Supplies	211 67				
5310	Shipping Supplies	93 24				
5311	Office Supplies	142 57				
5312	Delivery Truck Supplies	45 00				
5313	Postage	40 00				
5314	Telephone and Telegraph	121 11				
5315	Power	103 75				
5316	Heat	200 65				
5317	Water	20 00				
5318	Compensation Insurance	18 90				
5319	Delivery Truck Repairs	85 90				
5321	Depreciation, Equipment	125 00				
5322	Depreciation, Building	25 00				
5323	Depreciation, Delivery Truck	75 00				
5331	Repairs and Main., Equipment	34 50				
5332	Repairs and Main., Buildings	54 00				
5341	Insurance, Equipment	23 00				
5342	Insurance, Building	25 00				
5343	Insurance, Delivery Truck	101 50				
5350	Miscellaneous Expense	30 13				
5360	Advertising	1,000 00				
5361	Out Freight and Express	12 88				
5390	General Admin. Expense	300 00				
	Total	$5,030 48				

ILLUSTRATION 11

The Administrative Expense control account may have posted to it but one credit each fiscal period. The balance of this account is closed into the Profit and Loss account at the end of the fiscal period by means of an entry in the general journal or on a journal voucher. No illustration of an Administrative Expense control account is shown as such an illustration would be similar to Illustration 9 which shows a Selling Expense control account.

46. Subsidiary Cost Ledgers.—The account forms used in these ledgers do not usually conform to the equibalanced debit and credit plan shown in Illustrations 1 to 9. The subsidiary accounts may take the form of loose cards kept in a card file, as is usually the case in inventory ledger records or plant equipment records.

A common form of ledger record used in connection with detail manufacturing overhead, selling, and administrative expenses is the expense distribution sheet. An example of a distribution sheet for selling expenses is shown in Illustration 10. A column, with two sub-columns for reference to source of transaction and amount, takes the place of a ledger page and an entire subsidiary ledger is, therefore, shown on one or, at most, a few sheets. This saves not only paper but the bookkeepers' time and makes it possible to speed up the preparation of statements at the end of the month.

Each month a new expense distribution sheet is used and the previous month's sheet is filed away as a permanent record. The balances in the various expense accounts at the end of each month are transferred to a yearly summary record which is shown in Illustration 11.

CHAPTER VII

THE VOUCHER REGISTER AND COSTS

47. Importance of the Voucher Register.—Every cost system includes a voucher register as one of its most important books of original entry. The voucher register is important because it aids in building up certain cost controls. Through the voucher register, charges are set up in the proper columns, and posted to the following cost accounts:

(*a*) The Raw Materials Inventory account, the Factory Supplies Inventory account, and the Stationery and Office Supplies Inventory account, which are charged with the invoice price of the purchases.
(*b*) The Factory Payroll account, which is charged with the cost of direct and indirect factory labor.
(*c*) The Overhead Expense account, which is charged with the invoice price of the factory overhead items.
(*d*) The Selling Expense account, which is charged with the invoice price of all selling expenses.
(*e*) The Administrative Expense account, which is charged with the invoice price of all administrative expenses.

It is thus seen that the three elements of manufacturing cost as well as selling and administrative expense have a portion of their control established through the voucher register.

48. The Voucher System.—The voucher system is a development of the purchase journal. The purchase journal usually records only the cost of merchandise or raw materials. In a voucher system, the chief principle to be followed is the recording of every expenditure as soon as it is known. The nature of the expenditure does not matter. The important thing is to record the liability for the expenditure. The expenditures recorded in the voucher register cover the purchase of raw materials, factory supplies, office supplies, fixed assets, and all manufacturing, selling, and administrative expenses. The amount of the payroll is also set up in the voucher register before payment is made. Petty cash reimbursements, too, are entered in the voucher register. In brief, a check cannot be drawn for one cent unless a voucher is prepared, and a record entered in the voucher register.

The voucher register, as described, performs three services:

(*a*) It analyzes the transactions as they are recorded.
(*b*) It itemizes the charges covering every expenditure.
(*c*) It sets up a portion of the controls for the cost accounts.

The voucher register is but one part of a voucher system. When a cost accounting system is designed, the voucher system usually embodies the following books and forms:

(*a*) Voucher and Voucher Check
(*b*) Voucher Register
(*c*) Subsidiary or Special Ledgers for the detailed items reflected in the cost control accounts
(*d*) Check Register
(*e*) Voucher Index of Creditors

Each of these books and forms will be described in the order mentioned, but first the reader must become acquainted with the conditions in the business that precede vouchering.

49. Steps Preliminary to Voucher Preparation.—In any business concern the preparation of a voucher is preceded by one of the following situations:

(*a*) Raw materials and supplies have been ordered by the purchasing department.
(*b*) Labor, both direct and indirect, has been performed by the employes, and for this payrolls are prepared.
(*c*) Overhead expenses have been incurred in the form of heat, power, water, telephone, etc.
(*d*) Selling expenses have been incurred for salesmen's salaries, salesmen's expenses, advertising, office salaries, etc.
(*e*) Administrative expenses have been incurred for office expense, postage, telephone and telegraph, etc.
(*f*) Equipment for the manufacturing, selling, or administrative divisions has been ordered by the purchasing department.
(*g*) Disbursements from the petty cash fund have been made, and it becomes necessary to reimburse the fund.

The receiving of all raw materials, supplies, and other items is accompanied by the receipt of an invoice. The invoices of the creditors, for materials and supplies, are carefully checked with the purchase order and the receiving record.

Invoices and bills from creditors for expense items such as power, telephone, water, taxes, etc., are verified by the proper authority before a voucher is prepared. Payrolls are checked and rechecked by the payroll department before a voucher is drawn for payment. Before any invoice or bill is passed for payment, which means the preparation of a voucher, its accuracy and the fact that the material or services represented by it are for the use of the company must be conclusive and undeniable.

When an invoice, or bill, has been verified properly, the next step is the preparation of the voucher. The invoice, or bill, is always attached to the voucher.

50. Voucher and Voucher Check.—A voucher is a form, which when filled in, authorizes the payment for an expenditure. Vouchers are by no means uniform. The printed form is prepared in accordance with the nature of the accounting

ACCOUNTS PAYABLE VOUCHER

(Duplicate)

BELFOUR BRASS, INCORPORATED
Pittsburgh, Penna.

Check Number 1

Jan. 12, 19

Voucher Number 1-1

Payable To Omar Held & Company $483.04

Four Hundred Eighty Three and - - - - - - - - - - 04/100 Dollars

Purchase Order Checked by *H. M. S.*

Invoice Prices & Extensions checked by *D. D. K.*

Voucher Distribution made by *R. D. A.*

Voucher Distribution checked by *C. R.*

Entered in Voucher Register by *D. P. S.*

Payment Approved:

Miles H. Jones

Voucher Folio 1

INVOICES PAID

Date	Invoice	Amount	Date	Invoice	Amount
			Jan. 1	A422 1/10-N/30	$487 92
				Total	$487 92
				Cr. Purchase Discount	4 88
				Cr. Accounts Payable	$483 04

VOUCHER DISTRIBUTION

Account Code	Account Name	Factory Ledger	Selling Expense	Administrative Expense	General Ledger
152	Graphite	$ 487 92			
	Total	$ 487 92			

ILLUSTRATION 12

system. When designing a voucher, the designer must keep in mind the form of the voucher register to be used. The procedure in handling vouchers is, first, to prepare the voucher, and next to enter it in the voucher register. It is easy to understand, then, that both forms must have spaces for the same information.

An example of an accounts payable voucher is shown in Illustration 12. This voucher is designed for use with the voucher register shown in Illustration 16.

VOUCHER CHECK
(Original)

BELFOUR BRASS, INCORPORATED
Pittsburgh, Penna.

Check Number 1 Jan. 12, 19

Tri-River National Bank

Pay to the Order of Omar Held & Company $483.04

Four Hundred Eighty Three and - - - - - - - - - - 04/100 Dollars

BELFOUR BRASS, INCORPORATED

G. H. Freisel
Treasurer

C. C. James
Controller

Detach Check Above and Retain This Statement for Your Reference

INVOICES PAID

Date	Invoice	Amount	Date	Invoice	Amount
			Jan. 1	A422 1/10-N/30	$487 92
				Total	$487 92
				Discount Deducted	4 88
				Balance Paid.	$483 04

ILLUSTRATION 13

No uniform system of numbering vouchers is found in use. They may be numbered as a separate series each month, as 1,000 to 1,999 during January; 2,000 to 2,999 during February, etc. A numerical prefix may be used to designate the month, such as *1* for all January vouchers. Under this method, vouchers may be numbered in straight order from January through December. During January, if the number of vouchers prepared were 1,300, each would be given the

prefix *1-*; for example 1-962. A voucher number in February might be 2-1899; in March, 3-2962, etc. Still another system may be used whereby the letters of the alphabet are used as prefixes to represent months. Many additional schemes are found in use.

ACCOUNTS PAYABLE VOUCHER

BELFOUR BRASS, INCORPORATED
Pittsburgh, Penna.

Voucher Number 1-1
Date Paid Jan. 12, 19___
Check Number 1
Date of Jan. 2, 19__
In favor of Omar Held & Company

Voucher Distribution

Code	Account Name	Amount	
	Raw Materials Inventory		
152	Factory Supplies Inventory	$487	92
	Office Supplies Inventory		
	Payroll		
	Overhead Expense		
	Selling Expense		
	Administration Expense.		
	General Ledger		
	Accounts Payable	$487	92

Date		Invoices: Remarks	Amount	
Jan.	1	A422 1/10-N/30	$487	92
		Total	$487	92
		Purchase Discount	4	88
		Cash	$483	04

Purchase Order Checked by *H. M. S.*
Prices and Extensions Checked by *D. D. K.*
Voucher Distribution Made by *R. D. A.*
Voucher Distribution Checked by *C. R.*
Entered in Voucher Register by *D. P. S.*
Payment Approved by *M. H. J.*

ILLUSTRATION 14

Any number of invoices, payable to the same creditor, may be included on the same voucher, provided the invoices are all payable on the same date. Invoices payable to the same creditor, but at different dates on account of discount requirements, must have separate vouchers for each different payment.

The portion of the voucher, down to the division labeled Voucher Distribution, shown in Illustration 12, is prepared at the same time the voucher check is prepared. The voucher check is shown in Illustration 13. While the voucher check (original) and the voucher (duplicate carbon copy) are prepared at the same time, the voucher contains additional information. It is still the practice with some business concerns to prepare the voucher and the check at separate times. The voucher in such a case is prepared after the invoice is properly verified, and the check is made up at the time of payment. This plan is always used when it is not definitely known that the cash discount will be taken. Where the financial position of the company is strong enough to allow all discounts to be taken, the method of voucher preparation differs. The voucher check (Illustration 13) is the original copy, while the voucher (Illustration 12) is the duplicate. With the use of a piece of carbon paper, the two forms are prepared together. This step includes the inserting of the date, name of payee, amount of check, and the dates and amounts of each individual invoice.

Spaces are provided on the voucher for the various notations of approval. This information is not shown on the voucher check, because the creditor has no interest in it. A member of the auditing department checks the invoice with the purchase order, and the verification is considered complete when that employe's initials are placed in the proper space. Another clerk will have the responsibility of verifying the invoice prices and extensions with the purchase-order quotation.

The voucher distribution of the invoice is prepared by some member of the auditing department. This member is one who is thoroughly familiar with the classification of accounts. He must be equally familiar with the names of all raw materials, supplies and other expense items. Familiarity with both the account classification and the items listed on the invoice, permits the proper distribution of the expense to be made.

After the name of the account and the control account affected by the voucher distribution are shown on the voucher, it is rechecked by another employe. Then the voucher is ready for entry in the voucher register. This job is performed by still another employe. As the voucher is entered in the voucher register, this employe places his name or initials in the proper space. He also enters on the voucher the number of the page of the voucher register wherein the entry is made.

The record of the voucher is now complete up to the point of issuing the check in payment. The voucher is filed away in a date payment file. Each day the vouchers due for payment are withdrawn and paid. After the actual payment has been made, a record of the voucher paid is made in the check register.

Another form of voucher, which does not provide for a factory ledger control account, is shown in Illustration 14. This illustration is given in order to have a voucher designed for use with the voucher register shown in Illustration 15. This type of voucher is prepared from the invoices and placed in a date file for payment. Several days prior to the date when payment is due, the voucher is removed from the file. A check is prepared, and the voucher is paid on the proper date.

VOUCHER REGISTER

(Designed for use with cost control accounts where no factory ledger is used)

Date	In Favor of	Voucher Number	Paid Date	Paid Check No.	Accounts Payable	Raw Materials Inventory	Factory Supplies Inventory	Office Supplies Inventory	Factory Payroll	Overhead Expense	Selling Expense	Administrative Expense	General Ledger Amount	General Ledger L.F.	General Ledger Account
19.. Jan	2 Gear Weld & Co	1-1	1-12	1	$487 92		$487 92								
	3 W J Rose & Co	1-2			892 71		892 71								
	5 Schram Supply Co	1-3			165 92			165 92							
	7 Metal Magazine Co.	1-4	1-20	5	150 00						150 00				
	9 Coldwater Copper Co	1-5	1-19	4	8 650 20	8 650 20									
	11 American Telephone Co	1-6			47 92						28 16	19 76			
	14 Marshall Machine Works	1-7			2 862 10								2 862 10	8	Machinery
	15 B R & P R R Co	1-8	1-15	2	171 82								171 82	8	Machinery
	16 Paymaster	1-9	1-16	3	10 487 50				10 487 50						
	18 Ziegler Zinc Co	1-10	1-28	6	6 907 77	6 907 77									
	20 Perry Sand Co	1-11	1-30	7	581 18	581 18									
	30 Northern Power Co	1-12			1 162 75					1 162 75					
	31 Union Equipment Co	1-13			300 00								300 00	9	Office Equipment
					$32 867 79	$16 139 15	$1 380 63	$165 92	$10 487 50	$1 162 75	$178 16	$19 76	$3 333 92		
					(10)	(1)	(2)	(3)	(4)	(5)	(6)	(7)			

ILLUSTRATION 15

51. Voucher Register. The voucher register is a journal of original entry. In it are recorded all expenditures for which vouchers have been prepared. The vouchers are entered in their numerical order. The voucher register thereby becomes a record of all current liabilities, together with an analysis of the expenditures incurred when the liabilities are created.

The forms and rulings of a voucher register are about as numerous as those of vouchers. While standard forms of voucher registers are sold by printing concerns, most companies have their own peculiar forms to fit their individual systems. Some voucher registers have separate money columns for each expense account frequently affected by transactions. The number of money columns in this type of voucher register depends upon the frequency of the occurrence of transactions of a similar nature. The type of voucher register found in most general use today features the use of numerous control-account columns. In the control-account columns are entered the amounts which build up the totals used in establishing the cost accounts previously mentioned. This type of voucher register, used in connection with the voucher shown in Illustration 14, is shown in Illustration 15.

There appear in the voucher register, Illustration 15, nine money columns. The first eight of these money columns, beginning at the left, show the name of a controlling account in the general ledger. In the money column headed Accounts Payable is entered the amount of every voucher. A portion of the Accounts Payable control account is thereby established when the total of this column is posted at the end of the month as a credit. Before any summary postings are made, the balance of the voucher register should be proved. The accounts payable column total should be equalled by the totals of all the debit columns.

The next five money columns to the right of the Accounts Payable column are for accounts dealing with manufacturing cost control. These cost accounts which control their detailed subsidiary ledgers are as follows:

Raw Materials Inventory, Factory Supplies Inventory, Office Supplies Inventory, Payroll, Overhead Expense.

At the time the amount of the voucher is entered in the accounts payable column, the same amount is also entered in one or more debit columns. The invoice price of all raw materials, as shown on the voucher, is entered in the raw materials inventory column. At the end of the month, the total of this column is posted as a debit to the control account, Raw Materials Inventory. Similarly, any vouchers for invoices covering factory supplies and office supplies are entered in their respective inventory columns in the voucher register. The totals of these columns are posted at the end of the month to their controlling accounts in the general ledger.

When the amount of the factory payroll is computed, a voucher is prepared authorizing its payment. The voucher may be drawn in favor of the paymaster, factory payroll cash, etc. The amount of the payroll is then entered in the Factory Payroll column. The summary of this column is posted at the end of the month as a debit to the Factory Payroll account.

All vouchers for overhead expense items are distributed to the column bearing the title of Overhead Expense. At the end of each month, the total of this column is posted as a debit to the Overhead Expense cost account in the general ledger.

The titles of the columns headed Selling Expense and Administrative Expense are names of expense control accounts. A subsidiary ledger for each of these control accounts contains the detailed accounts. The selling expense accounts contain the distribution of expenses incurred in selling. The administrative expense accounts record the expenses of the administrative division of the business.

One of the most important principles to keep in mind, in connection with the operation of a cost accounting system, is to keep all subsidiary records under control. Adhering to this principle makes possible an early and an accurate closing each month. With all cost controls in balance at the end of each month, the preparation of cost summaries and cost statements is speeded up. *The important thing is to reflect every amount entered in the cost control column, likewise in the subsidiary ledger or other record.*

The amount column under the heading of general ledger is a column in which all miscellaneous amounts are entered. All amounts which cannot be placed

properly in some specially titled column must be entered in the general ledger column. The voucher register may be designed to contain both a debit and a credit money column under the general ledger caption. Where but one general ledger column appears in the voucher register as in Illustration 15, any entry of a credit amount must be made in red ink. All amounts entered in the general ledger column must be posted currently to the general ledger account named in the account column. No summary or total posting is made at the end of the month from the general ledger column since each amount is posted currently.

The number of money columns, in a register like that shown in Illustration 15, may be increased or decreased to meet the need of any cost accounting system. While no purchase discount column appears in this illustration of the voucher register, such a column could be included. Its inclusion depends upon the financial policy of the business management. This is discussed in Art. 55.

The postings made from the voucher register shown in Illustration 15 are shown in the following ledger accounts.

GENERAL LEDGER

Raw Materials Inventory			1
VR 1	16,139.15		

Factory Supplies Inventory			2
VR 1	1,380.63		

Office Supplies Inventory			3
VR 1	165.92		

Factory Payroll			4
VR 1	10,487.50		

Overhead Expense			5
VR 1	1,162.75		

Selling Expense			6
VR 1	178.16		

Administrative Expense			7
VR 1	19.76		

Machinery			8
VR 1	2,862.10		
VR 1	171.82		

Office Equipment			9
VR 1	300.00		

Accounts Payable			10
		VR 1	32,867.79

The Accounts Payable account reflects the summary posting from the column bearing that name in the voucher register. The amount of every voucher is entered in the accounts payable column.

After the vouchers have been entered in the voucher register, they are filed away in a date payment file record. The total of all unpaid vouchers represents the amount owed to creditors. The unpaid-vouchers file thus amounts to an

VOUCHER REGISTER 1

(Designed for use with a factory ledger and voucher check)

Date	In Favor of	Voucher No.	Paid Date	Paid Check No.	Accounts Payable	Purchase Discount	Factory Ledger	Selling Expense	Administrative Expense	General Ledger Amount	General Ledger L. F.	General Ledger Account
Jan. 2	Omar Held & Co.	1-1	1-12	1	483 04	4 88	487 92					
3	W. J. Rome & Co.	1-2			892 71		892 71					
5	Schramm Supply Co	1-3			165 92		165 92					
7	Metal Magazine Co.	1-4	1-20	4	150 00			150 00				
9	Coldwater Copper Co.	1-5	1-19	5	8,563 70	86 50	8,650 20					
11	American Telephone Co.	1-6			47 92			28 16	19 76			
14	Marshall Machine Works	1-7			2,862 10		2,862 10					
15	B.R. & P.R.R.Co.	1-8	1-15	8	171 82		171 82					
16	Paymaster	1-9	1-16	9	10,487 50		10,487 50					
18	Ziegler Zinc Co.	1-10	1-28	10	6,838 69	69 08	6,907 77					
20	Perry Sand Co.	1-11	1-30	11	569 56	11 62	581 18					
30	Northern Power Co.	1-12			1,162 75		1,162 75					
31	Union Equipment Co.	1-13			300 00					300 00		Office Equipment
					$32,695 71	$172 08	$32,369 87	$178 16	$19 76	$300 00		
					(16)		(74)					

ILLUSTRATION 16

accounts payable ledger. Since the unpaid vouchers are controlled by the general ledger control account, Accounts Payable, no other detailed record is necessary. In this manner, the use of the voucher register eliminates the use of an accounts payable ledger. The debits to the Accounts Payable account are made chiefly from the check register. When a voucher is paid, it is removed from the unpaid file and a record is made in the check register. Other details in regard to the Accounts Payable account are described in Art. 53.

From the preceding illustrations and description of the voucher register, one may readily see why this book of original entry is considered so important. It is one of the chief journals used to establish cost controls.

52. The Voucher Register and the Factory Ledger. The voucher register shown in Illustration 16 is used when the factory cost accounts are kept in a factory ledger and there are reciprocal control accounts. In this illustration appears a column headed Factory Ledger. This column is the name of a controlling account in the general ledger. The total of this column ($32,369.87) is posted as

a debit to the control account, Factory Ledger, at the end of the month, as follows:

FACTORY LEDGER 74

19—												
Jan.	31			*VR*1	$32,369	87						

The debit total represents the total charges made to the factory during the month of January.

At the factory where the cost records are kept, the factory journal, shown in Illustration 17, is the book of original entry recording the charge of $32,369.87 against the factory.

The postings to the factory ledger accounts are made from the factory journal as follows:

FACTORY LEDGER

Raw Materials Inventory 1

*FJ*1	16,139.15		

Factory Supplies Inventory 2

*FJ*1	1,380.63		

Office Supplies Inventory 3

*FJ*1	165.92		

Payroll Cash 4

*FJ*1	10,487.50		

Overhead Expense 5

*FJ*1	1,162.75		

Machinery 6

*FJ*1	2,862.10		
*FJ*1	171.82		

General Ledger 7

		*FJ*1	32,369.87

Note that the credit balance in the General Ledger control account ($32,369.87) in the factory ledger is in agreement with the debit balance in the Factory Ledger account in the general ledger. This is the agreement between the reciprocal control accounts mentioned in the concluding paragraph of Art. 43.

The debits posted to each of the three inventory accounts and to the Overhead Expense account are also posted in detail to their respective subsidiary ledgers.

Where a factory ledger with reciprocal control accounts is in use, care must be exercised in showing the details of the transfers. For example, in Illustration 17, transfer reference 1–1 refers to a copy of voucher No. 1–1. The reference may be

FACTORY JOURNAL

Date	Explanation	Transfer Reference	General Ledger	Raw Materials Inventory	Factory Supplies Inventory	Office Supplies Inventory	Payroll Cash	Overhead Expense	Factory Ledger Dr.	Factory Ledger Cr.	Factory Ledger L. F.	Factory Ledger Account
19—												
Jan. 2	Graphite	1-1	487 92		487 92							
3	Fire Clay	1-2	892 71		892 71							
5	Printed Forms	1-3	165 92			165 92						
9	Copper Ingots	1-5	8,650 20	8,650 20								
14	Sand Sifting Mach.	1-7	2,862 10						2,862 10		6	Mach'y
15	Freight on Machines	1-8	171 82						171 82		6	Mach'y
16	Payroll Cash	1-9	10,487 50				10,487 50					
18	Refined Zinc Slabs	1-10	6,907 77	6,907 77								
20	Molding Sand	1-11	581 18	581 18								
31	Elec. Furnace Power	1-12	1,162 75					1,162 75				
			$32,369 87	$16,139 15	$1,380 63	$165 92	$10,487 50	$1,162 75	$3,033 92			
			(7)	(1)	(2)	(3)	(4)	(5)				

ILLUSTRATION 17

to some form other than the voucher itself. Regardless of the nature of the reference coming to the factory office, the name of the account affected in the subsidiary record must be clearly shown. Sometimes the voucher reference form shows only the account code number to which the posting must be made in the subsidiary record. *The important thing to remember in connection with the recording of any amount in any of the cost control account columns in the factory journal, is that the same amount must always be reflected in the subsidiary ledger or record.* If this principle is always adhered to, the detailed subsidiary ledger will always be in agreement with its control account.

The debit to the Payroll Cash account represents the receipt of the cash at the factory to be used in paying the workmen.

The debits to the Machinery account reflect the cost of new equipment installed. Since this charge is set up in the factory ledger, it implies that the plant property and equipment is accounted for at the factory. Another plan would be to carry the factory equipment in the general ledger. This latter practice makes it necesary to prepare transfer entries every month, from the general ledger to the factory ledger, for the amount of depreciation charged off.

The Purchase Discount column appearing in the voucher register, Illustration 16, is in its usual position when a voucher check is used. The voucher check is used when all invoices are paid within the discount period. As the check is made

out at the same time the voucher is prepared, the Purchase Discount column must be in the voucher register.

53. Check Register.—The check register is a book of original entry in which the payment of all cash is recorded. The term cash disbursements journal is another common name for the check register. If a voucher check is used in payment to creditors, the paid vouchers are entered in the check register in order of their payment. If a voucher check is not used, entry of the paid voucher in the check register is generally in numerical order of the checks issued.

The general form of a check register is shown in Illustration 18. This form is designed for use in connection with a voucher register like that shown in Illustration 15, which has no purchase discount column, whereas the check register shown in Illustration 19 is intended for use with the voucher register exhibited in Illustration 16.

As the vouchers are paid, and after the checks have been issued, a cross reference is made in the voucher register. This reference shows the date the voucher was paid and also the number of the check used in making the payment.

CHECK REGISTER

Date		In Favor of	Check No.	Voucher No.	Cash		Purchase Discount		Accounts Payable	
Jan.	12	Omar Held & Co.	1	1–1	483	04	4	88	487	92
	15	B.R. & P.R.R.Co.	2	1–8	171	82			171	82
	16	Paymaster	3	1–9	10,487	50			10,487	50
	19	Coldwater Copper Co..	4	1–5	8,563	70	86	50	8,650	20
	20	Metal Magazine. . Co..	5	1–4	150	00			150	00
	28	Ziegler Zinc Co..	6	1–10	6,838	69	69	08	6,907	77
	30	Perry Sand Co. .	7	1–11	569	56	11	62	581	18
					27,264	31	172	08	27,436	39
									(10)	

ILLUSTRATION 18

When voucher checks are used, the voucher check numbers frequently will not be in numerical order when entered in the check register. This condition results from the fact that the voucher checks are made out in advance of their payment. To aid in reconciling the paid checks, another set of numbers is often placed on the checks. The numbers of this second set are known as the treasurer's numbers. These numbers are placed upon the voucher checks at the same time entry is made in the check register.

Some concerns handle their voucher checks in a different manner. During any month, the voucher checks are not made up and entered in the voucher register until payment is actually made. Under this plan there is the same order of entry in the voucher register and in the check register. At the end of the month, all invoices that have not been paid have vouchers prepared for them. These

vouchers are then entered in the voucher register. This procedure is necessary to show the full liability and expense distribution for all expenditures.

CHECK REGISTER 15

Date		In Favor of	Check No.	Voucher No.	Cash		Accounts Payable	
19__								
Jan.	12	Omar Held & Co. . .	1	1-1	483	04	483	04
	15	B.R. & P.R.R.Co. . .	8	1-8	171	82	171	82
	16	Paymaster.	9	1-9	10,487	50	10,487	50
	19	Coldwater Copper Co.	5	1-5	8,563	70	8,563	70
	20	Metals Magazine Co.	4	1-4	150	00	150	00
	28	Ziegler Zinc Co. . .	10	1-10	6,838	69	6,838	69
	30	Perry Sand Co. . . .	11	1-11	569	56	569	56
					27,264	31	27,264	31
							(15)	

ILLUSTRATION 19

At the end of each month, after all postings have been completed, the Accounts Payable control account is ready for verification. The verification of the balance in the control account is made with the unpaid vouchers. For Illustrations 15 and 16 the unpaid voucher file should reveal the following unpaid vouchers:

Voucher Number	In Favor of	Amount
1-2	W. J. Rome & Co.	$ 892.71
1-3	Schramm Supply Co	165.92
1-6	American Telephone Co.	47.92
1-7	Marshall Machine Works	2,862.10
1-12	Northern Power Co.	1,162.75
1-13	Union Equipment Co.	300.00
	Total Unpaid Vouchers . . .	$5,431.40

The total of the unpaid vouchers amounting to $5,431.40 may be verified by two different methods. First, the unpaid vouchers may be checked with the open or unpaid items in the "date paid" column of the voucher register. (See Illustrations 15 and 16.) Second, the control account, Accounts Payable, should reveal the same balance. An illustration of this control account is shown in Illustration 21 The amount owed to creditors is, thereby, readily and accurately verified.

Since the unpaid vouchers reveal the amount owed to creditors so readily, the creditor's ledger is eliminated from use. In the elimination of this ledger, a great amount of time is saved. Numerous postings are eliminated since there are no accounts for individual creditors.

54. Voucher Index of Creditors.—With the elimination of the creditor's ledger, some substitute must be employed to serve as a readily available record of the transactions with the creditors. Paid vouchers with invoices and bills attached

are invariably filed in their numerical order. Necessity for reference to an old invoice of a creditor would mean searching the numerically filed paid invoices. The time required by this method would be prohibitive. Therefore, a record of the creditors must be made which permits of ready reference to their names. The voucher index of creditors provides this record. This index consists of cards, one form of which is shown in Illustration 20.

VOUCHER INDEX OF CREDITORS

Creditor Omar Held & Co.
Address 3620 Terrace Street, Pittsburgh, Pa.

Date Invoice	Voucher No.	Amount	Date Paid	Remarks
Jan. 1	1-1	487.92	Jan. 12	Discount 1/10

ILLUSTRATION 20

From the paid voucher, the information is entered on the voucher index card, and the cards are filed in alphabetical order. By referring to them, but a few seconds are required to locate a paid invoice of any creditor. Each card also shows the amount of purchases that have been made from a particular seller.

55. The Purchase Discount Problem.—The position of the Purchase Discount column depends upon the financial policy of the management. The purchase discount is deducted from the invoice amount on the voucher if all invoices are paid within the discount period. Under this plan the Purchase Discount column is in the voucher register. In Illustration 21 is shown an Accounts Payable account

ACCOUNTS PAYABLE *15*

19—						19—					
Jan.	31	Check Register	*15*	$ 27,264	31	Jan.	31	Voucher Register	*V15*	$ 32,695	71
	31	Balance		5,431	40						
				$ 32,695	71					$ 32,695	71
							Feb.	1	Balance		$ 5,431	40

ILLUSTRATION 21

where the postings are made from the voucher register (Illustration 16) and the check register (Illustration 19). The Purchase Discount column is in the voucher register.

If the financial position of the company is not strong enough to assure the taking of all discounts, the discount deduction is shown in the check register. In Illustration 22 is shown an Accounts Payable account where postings have been made from the voucher register, Illustration 15, and check register, Illustration

18. In this case, the Purchase Discount column is in the check register. Note that the balance is the same as in Illustration 21 although the postings are different.

Where purchase discounts are deducted in advance of the actual payment of the voucher, a condition is created that requires an adjustment periodically. At the end of any month, all vouchers showing the discount deducted will not have

ACCOUNTS PAYABLE 10

19— Jan.	31	Check Register		1	$ 27,436	39	19— Jan.	31	Voucher Register	VR1	$ 32,867	79
	31	Balance			5,431	40						
					$ 32,867	79					$ 32,867	79
							Feb.	1	Balance		$ 5,431	40

ILLUSTRATION 22

been paid. This causes an overstatement of the earnings from purchase discount. It also understates the full amount of the accounts payable liability. To correct this condition, the amount of purchase discount taken on the unpaid vouchers must be determined. An adjusting entry is then made in the general journal debiting the Purchase Discount account and crediting the Accounts Payable account. At the beginning of the following period, the entry is reversed. The reversing entry adjusts the accounts so that the balances are properly stated when the vouchers in question are paid.

Some managers insist that the purchase discounts saved should be credited to the production departments. The payment of an invoice within the discount period means that the raw materials or supplies were purchased at a lower cost. Therefore, the cost of manufacturing should receive the benefit of the savings

VOUCHER REGISTER

Voucher Number	Paid		Accounts Payable (Cr.)		Purchase Discount (Dr.)		Raw Materials Inventory (Dr.)	
	Date	Check						
7-942			400	00	8	00	392	00

ILLUSTRATION 23

rather than the treasurer's department. If this plan is followed, the purchase discount postings are handled in a different manner. Sometimes the plan followed is to deduct the purchase discount from the invoice amount. Then, the net amount is shown as a debit to the inventory or expense account and as a credit to the Accounts Payable account.

A different plan is followed if the purchase discount is reflected in the books of account. For example, in the case of an invoice for raw materials amounting to $400 and subject to a discount of 2 per cent., the entry in the voucher register would be as in Illustration 23.

The payment of the voucher number 7–942, within the discount period would be entered in the check register as in Illustration 24.

CHECK REGISTER

Check No.	Voucher No.	Accounts Payable (Dr.)		Purchase Discount (Cr.)		Cash (Cr.)	
4893	7–942	400	00	8	00	392	00

ILLUSTRATION 24

If for any reason some discount was not actually taken after it had been shown in the voucher register, no credit would appear in the purchase discount column in the check register. The amount of the credit appearing in the cash column then would be $400.00. An adjustment would be necessary, therefore, to adjust the Purchase Discount account as well as the Inventory account. The journal voucher adjustment would be as in Illustration 25.

JOURNAL VOUCHER

		Raw Materials Inventory		8	00		
		Purchase Discount				8	00
		To adjust accounts for discount taken but not earned.					

ILLUSTRATION 25

Some concerns advocate the use of this plan for measuring the amount of the purchase discounts lost. This may be accomplished by omitting the adjusting entry every time a purchase discount is not taken. At the end of the year, an adjustment must be made for unpaid vouchers on which discounts had been deducted; then, after this adjustment is made, any balance still appearing on the debit side of the Purchase Discount account represents discounts lost.

PART II

CONTROL AND COSTING OF MANUFACTURING COST ELEMENTS

CHAPTER VIII

PURCHASING, RECEIVING, AND ISSUING RAW MATERIALS

56. Relationship of Purchasing Department to Costs.—A very important relationship exists between the purchasing department and manufacturing costs. While the relationship is not a direct one, it, nevertheless, has a far-reaching effect upon the completed product and its cost. The efficiency of a purchasing agent may be gauged by his buying policy and his insistence upon the quality of raw materials and supplies. The purchasing agent is the contact man between the production departments and the raw-materials market. The purchasing agent is charged with the responsibility of obtaining materials and supplies at the lowest price. But price is not the only guiding factor. Quality must also be considered. Cheap raw materials not only result in material losses, but often tend to increase the amount of the other two elements of manufacturing cost. A product may be nearly completed before the flaw in the raw material appears. If the nearly-completed unit must be scrapped, this means not only a loss in the material cost but in the labor and the overhead expense costs as well. It likewise means delay in filling customers' orders which causes no end of trouble. Even though flaws in the completed unit are not detected within the plant, the defect may be discovered by the buyer soon after its purchase. This means a dissatisfied customer, and customers of this type may cause the bankruptcy of a business. While the relationship between the purchasing department and costs is indirect, it is, nevertheless, of extreme importance.

The chief functions of the purchasing department are: (*a*) To receive purchase requisitions; (*b*) to seek quotations from dealers; (*c*) to place purchase orders with dealers; (*d*) to verify the invoices of the shippers with their quotation prices and with the quantity ordered; (*e*) to insist upon delivery, inspection, and testing of goods received. These duties of the purchasing agent's department will now be described.

57. Purchase Requisition.—A purchase requisition is a printed form which requests the purchasing agent to order certain items of raw materials or supplies. The purchase requisition usually originates with the storekeeper. With all purchase requisitions originating with the storekeeper, there is established one phase of an adequate control of stores. If every foreman or department head were

permitted to place requisitions with the purchasing agent, no central control over the materials on order would be maintained. Under such a plan, duplication of orders for the same items would frequently take place. This would bring about an overinvestment in inventories, and also contribute to wasteful practices. The scientifically managed plant provides for all purchase requisitions to be cleared through the storekeeper. This enables the storekeeper to prevent overstocking of stores, duplications of purchases, and the requisitioning of improper items. It also enables him to order items so that they will be on hand when they are needed, and to have a uniform record of all materials due on old orders, which are called *back* orders.

Every purchase requisition sent by the storekeeper to the purchasing agent bears a number. The requisition is usually prepared in duplicate. The original is sent to the purchasing agent, and the duplicate is retained by the storekeeper. An example of a purchase requisition is shown in Illustration 26. The two columns

PURCHASE REQUISITION

BELFOUR BRASS, INCORPORATED

Requisition Number 17691

December 20, 19

Purchasing Agent:

Please order the following items for shipment

By Jan. 1, 19 to the following address: Belfour Brass, Incorporated

Ship Via: Truck Pittsburgh, Pa.

Quantity	Description		
4 bbls.	Flake Graphite		

ILLUSTRATION 26

at the right are not given a title. The reason is because the columns are used for different purposes on the original and duplicate. The purchasing agent uses the columns to show the purchase-order number and from whom ordered. The storekeeper uses the columns of the duplicate to show the date received and from whom received. A part of the raw-materials inventory control is also established from the duplicate. A record of each requisition for standard store items is entered in the stock ledger.

58. Purchase-Order Quotation Request.— After the purchase requisition has been received at the office of the purchasing agent, quotations are requested from

the various supply companies. The requests are for prices on the quantities of various items requisitioned. The nature of the items requisitioned determines the number of quotations sent out. If the items on the purchase requisition are a variety of different sizes of the same article, one quotation request to the several supply companies will be sufficient. A purchase requisition for a half-dozen entirely different items may require separate quotation requests for each item.

PURCHASE QUOTATION REQUEST

BELFOUR BRASS, INCORPORATED

Quotation Request No. 53644

Pittsburgh, Pa., December 21, 19____

THIS IS NOT AN ORDER

To Omar Held & Company

Please quote prices on the following items, submitting your quotation opposite the items listed. Quote all prices f.o.b. Pittsburgh, Pa. Quotations must be received by us on or before Dec. 26, 19____. Delivery of the items must be made on or before Jan. 1, 19____.

Arthur B. Curtis
Purchasing Agent

Quantity	Description of Items	List Price	Less Discount	Net Price
4 bbls.	Flake Graphite			

The above items can be furnished at the prices listed opposite the descriptions.

_____ 19____

ILLUSTRATION 27

The method of making the quotation request depends upon the nature of the items wanted on the requisition. The request may be made by telephone conversation if the items wanted are of a standard nature, and the supply company is located in the same city as the purchasing agent. If the items cannot be purchased in the city, requests are mailed. Rush orders may require the use of the long-distance telephone or a telegram to obtain quotations. Quotation requests are not always necessary. Large orders are often placed in advance, the materials to be delivered monthly or when requested.

A copy of a purchase quotation request is shown in Illustration 27. Each supply company to whom a quotation request is sent enters its price or prices upon the quotation request. The request is then returned to the purchasing agent.

59. Purchase Order.—A purchase order is an order placed with a supply company for raw materials and supplies requisitioned by the storekeeper. Two copies of the purchase order are usually prepared in addition to the original. The original is sent to the supply company as its authority for shipment. The duplicate is retained in the files of the purchasing agent. The triplicate is sent to the storekeeper.

The triplicate purchase order sent to the storekeeper aids in keeping his records up to date. If the production department makes inquiry of the storekeeper about materials wanted in a rush, the storekeeper can refer to his copy of the purchase order. If he finds that the materials have been ordered, he advises the purchasing agent of the necessary rush on the particular order number. A record of the purchase-order number is sometimes made on the copy of the purchase requisition, for a complete reference.

An example of a purchase order is shown in Illustration 28.

PURCHASE ORDER

BELFOUR BRASS, INCORPORATED

Purchase Requisition No. 17691 Purchase Order No. 25477

Pittsburgh, Pa., December 26, 19

Omar Held & Company Ship via Truck

101 Market St. Date Wanted January 1, 19

Please ship to the above company the following items at the prices quoted by you on December 24, 19.

All shipments and invoices must show the purchase requisition and the purchase order numbers.

Quantity	Description	Price	Amount
4 bbls.	Flake Graphite, per pound	$0.50	

Arthur B. Curtis

Purchasing Agent.

ILLUSTRATION 28

60. Purchase Invoice.—Upon receipt of the purchase order, the shipper makes out a shipping order. The shipping order is a copy of the purchase-order information on a uniform form of the shipper. After the shipping order has been used to fill the order and to mark the containers for their destination, it is next used to prepare the shipper's invoice, here called the purchase invoice. The invoice is mailed to the purchasing agent. An example of a purchase invoice is shown in Illustration 29.

Clerks in the office of the purchasing agent check the invoice prices with the shipper's quotation prices. If the prices are correct, a notation of the fact is placed on the invoice with a rubber stamp. Price extensions and the total are also checked. After the invoice price is checked, a record is made on the duplicate copy of the purchase order of the shipper's invoice number and date of shipment. The invoice is next sent to the accounting department. It is held there awaiting the receipt of the receiving list from the storekeeper. If the invoice agrees with the receiving list, a voucher is prepared for the purchase invoice.

PURCHASE INVOICE

OMAR HELD & COMPANY
Pittsburgh, Penna.

Your Requisition No. 17691 Our Invoice No. A422

Your Order No. 25477 Jan. 1, 19

Ship Via Truck Terms 1/10-N/30

To Belfour Brass, Incorporated
Pittsburgh, Pa.

Quantity	Description	Price	Amount
4 bbls.	Flake Graphite, 975.84 lb.	$0.50	$487.92

ILLUSTRATION 29

61. Procedure Involved in Receiving Materials.—The person responsible for all materials and supplies received at the storeroom is called the receiving clerk. Accurate receiving records affect the accounting process from the proper check of materials received through to the preparation of the voucher.

The receiving list is a form prepared by the receiving clerk. It enumerates all the information pertaining to the materials and supplies received. An example of a receiving list is shown in Illustration 30.

The first act of the receiving clerk upon receiving a shipment is to list the purchase-order number and purchase-requisition number on the receiving list. The other details are then added. From the container tag, stencil, or sticker, the name of the shipper may be learned. This information helps to identify the shipment with the shipper's invoice. The entry, showing the method of transportation involved in making the shipment, aids in identifying the transportation charges such as freight, express, and cartage. The information pertaining to the number of containers, weight, quantity, catalog number, and description helps to identify

the shipment with the shipper's invoice. The greatest accuracy should be practiced in the preparation of the receiving lists.

The quantity of raw materials or supplies listed on one receiving list should be limited to the items received from one supply company on the same order number. The same supply company may ship several orders at the same time, but the items received may have been purchased at several different times on different order numbers. When this is the case, usually, a separate invoice is issued for each different purchase order. Unless separate receiving lists are made for each different order number, confusion often results in the auditor's office, when the receiving lists are being identified with the supply company's invoices.

RECEIVING LIST

BELFOUR BRASS, INCORPORATED

Purchase Requisition No. 17691 — Receiving List No. 30001

Purchase Order No. 25477 — Jan. 1, 19__

Received from Omar Held & Company

Via: Freight ☐ Express ☐ — Parcel Post ☐ Auto Truck ☒ — Messenger ☐ — Car Initials and Number

Number of Containers	Weight	Quantity No. Units	Catalog Number	Description	Placed in Storeroom: Section	Placed in Storeroom: Bin
4 bbls.	975.84 lb. net			Flake Graphite 1 bbl. 3 bbls. Gross Tare Net 268 20 248 261 21 240 258 20 238 271.84 22 249.84 975.84	H Base-ment	14

Material Weighed and Counted by *Boyd*

Material Placed in Storeroom by *Weston*

Remarks:

ILLUSTRATION 30

Before the materials are placed in their proper location in the storeroom, many items must be inspected and tested. Often, the plant engineer is also the materials inspector. He judges whether or not the materials received are in accordance with the specifications as ordered. Before the receiving list covering items subject to inspection can be passed to the auditing department, the inspector's stamp must show its acceptance. Any materials not passing inspection are withheld until correspondence determines their disposition. Sometimes a credit memorandum for an allowance is received from the supply company to justify the acceptance of

the material. Again, the entire shipment may be returned, requiring a credit memorandum to be issued for the full amount of the invoice.

Finished parts manufactured within the plant are usually placed in the storeroom for later use. Manufacture of the finished parts is usually authorized by a shop order. The shop order is made out by the storekeeper, and is directed to the production manager of the plant. Upon completion of the finished parts, they are delivered to the receiving clerk. The clerk makes out a receiving list in the usual manner. Instead of showing the purchase-requisition and purchase-order numbers, the receiving list shows the shop-order number. In the auditing department, this receiving list is checked against the job-order cost card. The unit cost price of the completed parts is thus determined. The price record on the inventory and stores records is adjusted, then, if the occasion requires it.

Two copies of the receiving list are prepared. The original is sent to the accounting or auditing department. The duplicate is retained by the receiving clerk. The duplicate is for the purpose of future reference in event the original becomes lost in the accounting department. The duplicate also serves as a guide to the section and bin in which the materials are placed. The proper storage of the materials and supplies is an important function of storekeeping. It is important because it is a part of proper stores control, from the storage viewpoint and from the inventory viewpoint. The original copy of the receiving slip becomes the connecting link between the purchase requisition and the shipper's invoice. The record on the receiving slip will be compared with the invoice, by some member of the accounting or auditing department. The receiving list shows the name of the shipper, the purchase-order and requisition number, and the materials received. The shipper's invoice shows similar information. It is the duty of a clerk to verify the receipt of the materials and supplies as shown by the invoice. If no discrepancy is shown by the receiving list, the invoice is approved for vouchering. If a difference in the count or weight is shown to exist between the receiving list and the voucher, the details are taken up by correspondence with the shipper. If the discrepancy is small, the invoice may be passed for payment to take advantage of the discount, and an adjustment made later. If the discrepancy is large, the invoice may not be vouchered immediately, but may be held until an adjustment is made by the shipper.

It must not be forgotten that, in cost accounting, every step in the purchasing and receiving of materials has its final effect upon the cost of the product. From the time the shortage of materials necessitates a purchase order, until the receiving slip identifies the shipment with the invoice, cost procedures are involved. If a mistake is made in some one of the records, it will be reflected in the final materials cost. It is, therefore, extremely necessary to exercise the utmost care in the prepation of all records.

62. Relationship of Stores Department to Costs.—The storekeeper, the head of the stores department, is the contact man between the purchasing agent and the production department. The storekeeper is responsible for keeping down the

stock of raw materials and supplies. However, an adequate stock of raw materials and supplies must always be on hand. It is poor production policy to exhaust the supply of some important raw material. The shortage of raw materials not only slows up production itself, but it seriously disrupts a smooth production policy. Machine operators must be transferred to other operations and jobs. Also overhead expenses continue despite slowed-up production due to the lack of raw materials. The scheduling and planning of all orders is disrupted and such disruptions cannot help but have the effect of increasing the unit cost of the product. It is readily seen, then, that under no consideration should the raw materials stock be allowed to become too low. There is no excuse for allowing different stock items to become exhausted. The storekeeper should be made to understand the importance of an adequate supply as well as the need for as small an inventory investment as possible.

63. Classifying Materials and Supplies.—The numbering of stock items often follows a very elaborate classification of materials and supplies. This is especially true where there is need for carrying a large inventory. The materials classification may be worked out according to a plan used by one business only or it may follow a trade-association standard.

A classification of materials and supplies usually consists of general groups of similar types of items. Certain blocks of numbers may be assigned to each group. For instance, in the example of Raw Materials Classification given on the following page, the numbers 4110 to 4119 represent specific items of the group entitled Sheet Iron; the numbers 4120 to 4129, the group Sheet Steel; the numbers 4130 to 4159, the group Rivets. Other methods of numbering materials and supplies are also used.

The scope of such a classification of raw materials and supplies is limited only by the number of items used within the plant. The specific item number should never be duplicated.

Several uses are made of the raw materials and supplies classification. It is a system of orderly arrangement, which is one of the first principles of good management. The stock ledger follows the classification of materials and supplies. This provides an orderly arrangement of the various stock items in the stock ledger, not only by groups but by a numerical sequence of specific items as well. Another use of the material classification is in numbering the bins in which the materials and supplies are stored. Materials received in the receiving department are recorded on the receiving slips by classification number as well as by name. The receiving clerk is guided by the classification number in storing away the goods in the proper bins. The stores requisitions, also, bear the item number in accordance with the classification system. With the proper reference appearing on the stores requisition, the price can be inserted thereon with accuracy and speed.

The materials and supplies classification is, then, the most important guide to the proper control of stores. Ordering, receiving, storing, issuing, and pricing raw materials are coordinated through the classification. Every employe of the

RAW MA' ERIALS CLASSIFICATION

General Group		Specific Item	
No.	Name	No.	Name
1	Sheet Iron	4110	30 inch × 96 inch, 20 gauge Black Sheet Iron
		4111	30 " × 96 " , 22 " " " "
		4112	30 " × 96 " , 24 " " " "
		4113	36 " ×120 " , 18 " " " "
		4114	36 " ×120 " , 20 " " " "
		4115	30 " × 96 " , 18 " Galvanized Sheet Iron
		4116	30 " × 96 " , 20 " " " "
			etc.
2	Sheet Steel	4120	$\frac{3}{16}$ inch ×60 inch ×120 inch Sheet Steel
		4121	$\frac{3}{16}$ " ×72 " ×144 " " "
		4122	$\frac{1}{4}$ " ×60 " ×120 " " "
			etc.
3	Rivets	4130	$\frac{1}{8}$ inch × $\frac{3}{4}$ inch Round Head Iron Rivets
		4131	$\frac{1}{8}$ " × $\frac{7}{8}$ " " " " "
		4132	$\frac{3}{16}$ " × $\frac{3}{4}$ " " " " "
		4133	$\frac{3}{16}$ " × $\frac{7}{8}$ " " " " "
		4134	$\frac{1}{4}$ " × $\frac{3}{4}$ " " " " "
			etc.
4	Stove Bolts	4160	$\frac{3}{16}$ inch × $\frac{1}{2}$ inch Flat Head Stove Bolts
		4161	$\frac{3}{16}$ " × $\frac{3}{4}$ " " " " "
		4162	$\frac{3}{16}$ " ×1 " " " " "
			etc.
5	Machine Bolts	4180	$\frac{5}{16}$ inch ×1 inch Machine Bolts
		4181	$\frac{5}{16}$ " ×1$\frac{1}{2}$ " " "
		4182	$\frac{5}{16}$ " ×2 " " "
		4183	$\frac{5}{16}$ " ×2$\frac{1}{2}$ " " "
		4184	$\frac{5}{16}$ " ×3 " " "
			etc.
6	Cotter Pins	41150	$\frac{1}{16}$ inch ×1 inch Cotter Pins
		41151	$\frac{1}{16}$ " ×1$\frac{1}{4}$ " " "
		41152	$\frac{1}{16}$ " ×1$\frac{1}{2}$ " " "
			etc.
7	Expansion Bolts	41180	$\frac{1}{4}$ inch ×3 inch Star Expansion Bolts
		41181	$\frac{1}{4}$ " ×4 " " " "
			etc.
8	Lag Screws	41200	$\frac{3}{8}$ inch ×2 inch Lag Screws
		41201	$\frac{3}{8}$ " ×3 " " "
			etc.
9	Cut Washers	41220	$\frac{1}{8}$ inch Cut Washers
		41221	$\frac{1}{4}$ " " "
		41222	$\frac{3}{8}$ " " "
			etc.
10	Square Nuts	41230	$\frac{1}{8}$ inch Square Nuts, U. S. S. Thread
		41231	$\frac{1}{4}$ " " " " " "
			etc.
11	Hexagon Nuts	41250	$\frac{1}{8}$ inch Hexagon Nuts, U. S. S. Thread
		41251	$\frac{1}{4}$ " " " " " "
			etc.
12	Machine Screws	41270	$\frac{1}{2}$ inch No. 10 Flat Head Machine Screws
			etc.
13	Wood Screws	41300	$\frac{1}{2}$ inch No. 24 Round Head Brass Wood Screws
			etc.
14	Pipe Nipples	41400	$\frac{1}{4}$ inch ×1 inch Black Pipe Nipples
			etc.

stores department and plant engaged in any of the activities pertaining to the handling of stores must become acquainted with the classification of the stock items. Printed copies of the raw-materials and supplies classification are placed in the hands of all employes whose duties require that they possess a knowledge of the classification.

A well worked out plan of materials classification also contributes to better accounting control. The ordering, receiving, storing, and issuing of raw materials and supplies are followed by pricing, which is the connecting link between stores control and the accounting records. The proper pricing of items withdrawn for production means accurate charges to the Work in Process Inventory account.

If machine tabulation is used to record stores, then the classification of all items will follow a code set up for these mechanical appliances.

64. Issuing Materials and Supplies.—Materials and supplies are issued to the shop in exchange for stores requisitions. A stores requisition is an order to the storekeeper to furnish certain stock items to the production department, and is signed by a properly authorized person. Foremen and production managers usually have the authority to sign stores requisitions. The counter clerks in the

STORES REQUISITION

Stores Requisition Number 1618

Jan. 3, 19

To the Storekeeper:

Please furnish the following items to be charged to order

K7741

Quantity	Stock Item No.	Description	Unit Price	Amount
50 lbs.	152	Flake Graphite	$0.50	$25.00

Jerry Moore

ILLUSTRATION 31

storeroom, who issue the materials and supplies in exchange for the requisitions, are supplied with a list of signatures of the persons having authority to make requisitions. Since the storekeeper is responsible for the inventory, he should make clear the importance of issuing no materials except upon properly signed requisitions.

An example of a stores requisition is shown in Illustration 31.

Shop men who have the authority to issue stores requisitions should be acquainted with the proper names of the stock items. A well designed cost accounting system will always include a manual which describes the details of the system. A record of all items of raw materials and supplies, together with their reference numbers, should be included as a supplement to the manual. A copy of the stock record is placed in the hands of each shop man authorized to issue stores requisitions. Then, if he does not remember the proper name or number of a stock item, reference to the stock record quickly produces it.

If for any reason the requisition does not clearly show the amount or nature of the item called for, the counter clerk must insert the missing details. A requisition cannot be priced accurately unless the item issued is clearly shown. Any inaccuracy on a requisition means an inaccurate charge to work in process. Any such errors are reflected in the monthly cost reports as well as in the final profit for the year. Hence, accuracy in issuing materials should be emphasized to everyone concerned.

Some manufacturing plants have a different system of requisitioning their materials and supplies. The operation of a production planning department involves the scheduling of production. The amount of material that will be needed in a certain department at a certain time is figured out in advance. The planning department prepares the stores requisitions showing the date and machines at which certain quantities of material are to be on hand. The storeroom, under this system, operates a delivery crew. The crew delivers the goods requisitioned, a day or two in advance of the time they are needed. Under this plan there is less likelihood that production will be held up by a shortage of material. Another advantage is that the material can be delivered more cheaply by the storeroom, than by having shop men call for it.

The stores requisition serves three purposes after it is received in exchange for the materials issued. It is the source of the credits entered in the "issued" column of the stores ledger. It is used also to ascertain the value of the materials issued, so that the proper credit can be made to the inventory account, and it is used to determine the material cost of an order, or the cost of supplies charged to an overhead expense account.

After the requisition has been filled, the counter clerk makes certain that the description, item number, and quantity are accurately stated. Frequently he is required to place his initials on the requisition after it is filled, thus making it possible to call upon him for an explanation in event there is a question pertaining to items issued on certain requisitions. This requirement also keeps the clerks reminded of the importance of the information shown on the stores requisition. The stores ledger, which keeps the detailed record of all items in the storeroom, must have posted to it a record of all items issued. Since this ledger is an important part of the raw-materials inventory control system, the information posted to it must be accurate.

Either before or after the records of the quantities issued are recorded in the stores ledger, the stores requisitions are priced. This is a step in costing, as well as a phase of inventory control. Both steps are described further on. The pricing

of the requisitions is mentioned here in order to emphasize the far-reaching importance of properly made out stores requisitions. After the requisitions are priced and the prices are extended, the accounting procedure is as follows: For raw materials issued, a debit is made to the Work in Process Inventory account, with a corresponding credit to the Raw Materials Inventory account. For supplies issued, a debit is made to the Overhead Expense account and a credit to the Factory Supplies Inventory account.

QUESTIONS

Answers to the following questions are now to be prepared by you after careful study of the foregoing chapter. Any good quality paper on which your work will appear neat and legible may be used.

(1) Construct a table showing the following column headings on a horizontal line across the top: (*a*) Name of form or record; (*b*) prepared in office of; (*c*) sent to; (*d*) contains the following information.

Enter the following forms or records under column (*a*) and fill in the remaining columns for each of them: Purchase requisition; purchase order quotation request; purchase order; purchase invoice; receiving list; purchase credit memorandum.

(2) What are the chief principles underlying the use of a classification code system for items of raw materials and supplies stored in the storeroom?

(3) In connection with the stores requisition, state: by whom it is prepared; to whom it is presented; what information it contains; and what final disposition is made of it.

Retain your answers and continue with the study of the next chapter.

CHAPTER IX

CONTROL OF INVENTORIES

65. Importance of Accurate Inventories.—There are no items to be accounted for which need greater care in handling than the inventories. The net profit or net loss for any period is only as accurate as the inventory values used in arriving at the profit or loss. Of course this statement holds true for any expense or income item used in the preparation of the profit and loss statement. Practically all other items affecting the profit or loss for a period, with the possible exception of depreciation and doubtful accounts, are items the amounts of which are approximately exact. Such items of expense as wages, insurance, taxes, repairs, power, etc., are guarded very closely. Cash outlays for such expense items are very carefully vouchered. Similarly, income items such as sales, interest earned, commisssions earned, etc., are ascertained accurately to the last penny. In contrast to the accuracy with which expense and income items are accounted for, the inventory values are often arrived at with much less accuracy.

The inaccuracy of inventory values is due to the very nature of raw materials. Materials and supplies are usually purchased in large quantities, but are consumed in small amounts. The purchases of raw materials are as carefully vouchered as expense items are vouchered. The preceding chapter has described the care that must be exercised in receiving and inspecting raw materials before a voucher is prepared for the invoice. Thus, debits to the Raw Materials Inventory account are very accurately determined. It is in connection with the issuing of raw materials that the balance in the Raw Materials Inventory account becomes inaccurate. Raw materials and supplies are issued as stores requisitions are received from the shop. Dozens or hundreds, even thousands of these requisitions are filled daily by the storeroom, depending upon the size of the establishment. Even if a stores requisition is obtained for *every item* issued, there is, nevertheless, invariably a need for inventory adjustment. Upon casual thought it would seem that there was no possibility for inaccuracies to come into existence when stores items are issued by individual count, package, weight, linear measurement, etc. Stores attendants, however, are only human, and after they are employed for some period of time they become more or less indifferent to their job. The indifference generally results in carelessness in issuing the materials and supplies. The carelessness in issuing is invariably characterized by giving too good measure. The stores attendant's attitude is that the materials and supplies are not his property, therefore why should he worry about using care in issuing. It is true that an extra pound of nails, half a foot of rubber hose, or an extra machine bolt which the stores requisition does not call for may amount to only a few pennies on one requisition. In the course of a month, however, because of such inaccuracies, many hundred dollars worth of materials and supplies may have been issued for which no stores requisitions have been received.

Foremen not working under rigid budgetary control of materials are likely to requisition more materials than they actually need. If 42 feet of rope is required for a job, 50 feet will be requisitioned. Foremen frequently requisition in units used by the purchasing agent when ordering, rather than in accordance with the needs of the job. Requisitions are often made out for "5," "dozen," "gross," or "box" rather than for the amount required. When foremen are given definite material allowances in terms of specific volumes of production, this evil decreases. This phase of budgetary control is discussed in Chapter XXII.

The possibility that raw materials may be taken from the stores department without any stores requisition whatsoever being given increases the likelihood of a discrepancy in the Raw Materials Inventory account. When night shifts are working and no clerical help is employed in the storeroom, special care must be taken to ensure a true record of materials issued. The discrepancy in the Raw Materials Inventory account balance results chiefly, however, from the fact that the account is not credited for the cost of the "good measure" issued by the stores attendants. This causes the Raw Materials Inventory account to have a balance greater than the value represented by the actual items on hand. Since the inventory value is overstated, the cost of raw materials and supplies used is understated. This results in the understatement of the cost of production and the cost of sales and in an overstatement of profit. In addition to the misstatement of the cost of production, the Work in Process Inventory account and the Finished Goods Inventory account are likewise misstated.

Inaccurate inventory balances in the Raw Materials Inventory account, therefore, have a far-reaching effect upon the costs and net profits of a manufacturing plant. Proper stores control aids materially in reducing the discrepancies in the raw materials inventory. The storekeeper must maintain a constant watchfulness over his store attendants. He must urge them to issue the stock items with the greatest of care. Care must also be exercised in connection with pricing and extending the prices on the stores requisitions. Likewise, caution must be practiced in recording the receipts and issues of stock items in the subsidiary stock ledger.

Too much emphasis cannot be laid on the subject of accuracy in handling the raw-materials inventory transactions. All inaccuracies in such work are far reaching in their effect. Unless the proper safeguards are created in the stores control, inaccuracies are certain to occur. The purposes of a cost system and a general accounting system are defeated if the monthly statements result in a misstatement of fact. The monthly operating and financial statements are only as accurate as the figures used in their preparation.

66. Methods of Offsetting Discrepancies Between Perpetual Inventory Balance and Actual Inventory.—There are two methods employed to offset the existence of large discrepancies between the perpetual inventory balance in the Raw Materials Inventory account and the value of the actual inventory. Cost accountants know that there is inevitably a shortage in the physical inventory of raw materials as compared with the perpetual-inventory account balance at the

end of each month. Past experience is a valuable aid in estimating the shortage between the physical inventory figure and the Raw Materials Inventory account balance figure. On this basis, a monthly adjustment may be made. The adjusting journal entry is as follows:

Overhead Expense (Inventory Shortage) . .	$152.41	
Reserve for Inventory Shortage		$152.41
To charge the cost of production for the estimated shortage of raw materials for the month of January.		

Where there is a tendency to have an overstated inventory, the foregoing entry guards against understated cost of production and overstated profit. The adjustment provides the necessary correction by charging to overhead expense the estimated understatement of the amount of raw materials charged into the Work in Process Inventory. In this manner the equivalent of the amount of raw materials not charged as such, is gotten into the cost of production. The use of this adjusting entry tends to state the production costs and net profit in an accurate manner.

Disposition of the credit to the account, Reserve for Inventory Shortage, is described in Art. 74.

The second method employed to offset the existence of large discrepancies between the perpetual inventory balance in the Raw Materials Inventory account and the value of the actual inventory is frequent stock checking. Stock-checking consists of periodic counts of all stock items. Each day, a stock-checker actually counts the items contained in a certain specified group of bins. His record when completed shows the section and bin number, name of item, stock item number, and quantity on hand when counted. Proper storage of stock items is a great aid in speeding up the work of stock-checking. The results as shown on the sheets of the stock-taker are made use of by a stores-ledger clerk. The clerk compares the stock-checker's count of each separate stock item with the stores-ledger record of the same item. The two records should be in agreement. They rarely are in agreement, however, owing to the reasons just described.

When a discrepancy is found to exist, corrections of the quantity and value are made on the stores-ledger card. A summary of all these corrections furnishes the figure for the adjustment which is made at the end of each month. This adjustment of the stores controlling account is made in order that the balance may agree with the subsidiary record. The adjusting entry is as follows:

Reserve for Inventory Shortage	$130.11	
Raw Materials Inventory		$130.11
To bring the perpetual inventory in agreement with the physical inventory value at this date.		

Sometimes the stock-checking will disclose that the receiving clerk has stored away the items in the wrong bin. Stock-checking will also indicate the accuracy of the clerk whose duty it is to post the "issues" on the stores-ledger sheet.

Stock-checking, likewise, will divulge whether or not stores requisitions are being received for all items issued. Minor differences between the actual count and the stores-ledger record, invariably result from the many weaknesses attending the stock-handling by human beings. Stock-checking is one of the most important methods of maintaining up-to-date inventory control.

67. Financial Aspect of Inventories.—Inventories represent an investment of capital. It does not matter in what form the inventory may be. Raw materials, work in process, finished goods, and supplies of various kinds all represent a value for which cash has been paid or is to be paid. Unless the manufacturing plant is stocking its warehouse heavily with finished goods for a coming season's demand, the raw materials inventory usually represents the largest inventory investment. It is the raw materials inventory that requires the closest supervision from the investment viewpoint. Modern business management devotes no small amount of its time and effort to keeping the investment down to a predetermined minimum.

Overinvestment in raw materials is poor business policy. Quantities of raw materials on hand in excess of 30 to 60 days' requirements, mean that the money invested in the inventory is not working. With modern transportation facilities and a well supplied market for practically every commodity, but a very short time is required to replenish the stores items. If a supply of stores items sufficient for two to six months is kept in the storeroom at all times, the cash paid for the material is prevented from earning a return. Materials and supplies ordered on a basis of satisfying requirements for a period of 30 to 60 days ordinarily are necessary to safeguard production from being held up for the want of stores items. If the supply of raw materials exceeds the quantity needed for production, it has an adverse effect on the business in three ways. First, the amount of cash tied up in the unneeded materials could be earning interest at rates of 2 per cent. or higher per annum. Second, the cash invested in the excessive raw-materials inventory may necessitate the borrowing of funds for meeting the payroll or other expenses. Third, the material may become obsolete. Well planned methods should be worked out in every manufacturing concern to prevent overinvestment in the raw materials inventory.

68. Stores Ledger.—A very necessary part of accurate inventory control is the operation of the stores ledger. The stores ledger is the subsidiary record controlled by the Raw Materials Inventory account. Detailed postings are made to the stores ledger from the vouchered invoices. The stores ledger consists of specially ruled forms, either loose sheets in a binder or loose cards. The stores-ledger sheet or card varies as to form in accordance with the desires of the accountant who designs it at the time of the installation of the cost accounting system. A general outline of a stores-ledger sheet is shown in Illustration 32. Some forms are designed only for quantity control purposes, having no columns for unit price or for inventory value. When "price" and "value" columns are included in the stores-ledger form, the auxiliary record becomes the perpetual inventory of both quantity and value. The quantity figure is the basis for ordering or replenishing

STORES LEDGER

Stock Item Description Flake Graphite — Stock Item Number 152

Stores Location: Yard or Floor 1st floor / Basement — Section H — Bin 14

Minimum Stock 250 lb. (1 bbl.) — Maximum stock 1,000 lb. (4 bbl.)

Average Monthly Consumption 750 lb. (3 bbl.) — Unit Pounds

Ordered			Received					Issued					Balance			
Date	Requisition No.	Quantity	Date	Requisition No.	Quantity (Lb.)	Total Cost	Unit Cost (Lb.)	Date	Reference	Quantity (Lb.)	Unit Price (Lb.)	Value	Date	Quantity (Lb.)	Unit Price (Lb.)	Value
19__								19__					19__			
													11-30	400.00	$0.50	$200.00
								12-10	1340	150	$ .50	$75.00				
12-20	17691	4 bbl.						12-19	1501	150	.50	75.00	12-31	100.00	.50	50.00
19__			19__					19__								
			1-1	17691	975.84	$487.92	$.50	1-3	1618	50	.50	25.00				
								1-10	1800	200	.50	100.00				
								1-19	1892	300	.50	150.00				
1-21	18091	3 bbl.						1-27	1966	250	.50	125.00	1-31	275.84	.50	137.92

ILLUSTRATION 32

the supply when the re-order point is reached. The value, or monetary, figures are used to prove the Raw Materials Inventory control account.

The balance column may be kept so as to reflect the balance after each issue is recorded. Usually, the balance column shows only the amount on hand at the end of the month. When this is the case, it is easier to pick off the monthly balances used in verification with the control account. Also, clerical labor is saved, when only the closing monthly balances are shown. Personal preference of the supervising accountant determines the plan adopted. When the balance column shows the quantity on hand to be approximately the same amount as the reorder or minimum-stock figure, the stores-ledger card is "pulled" or marked for order.

The stores-ledger clerk is entrusted with the responsibility of maintaining an adequate stock of raw materials and supplies. Stores-ledger cards may be pulled out of the file for purchase requisition purposes daily, weekly, or at any arbitrary time designated by the storekeeper. Regular stock-replenishment requisitions frequently are placed once a month. Special purchase requisitions are placed, if necessary, in between the regular order dates, for stores items that are needed in a rush before the regular requisition date has arrived. After the purchase requisition has been sent to the purchasing agent, a copy is given to the stock-ledger clerk. The clerk then makes a notation of the purchase requisition number and quantity ordered, on the stores-ledger card.

The Received column of the stores-ledger card enables the stock-ledger clerk to see at a glance what amounts, if any, are due on back orders. This column, also, furnishes a permanent record of the changes in the cost of the stock item. This is an important factor in keeping the inventory under control. If the unit price changes with each new shipment received, the unit price to be used in costing the materials requisitioned for production must reflect the changed price. The importance of accurate pricing of materials and supplies issued on stores requisitions will be discussed presently. The information recorded in the Received column is copied from the duplicate voucher. Sometimes the duplicate copy of the receiving list furnishes the information as to the date and quantity received, as well as the purchase requisition number upon which the material was ordered.

The Issued column of the stores ledger lists the dates, stores-requisition numbers, quantities issued on each stores requisition, unit price shown on the stores requisition, and the total material cost. All this information is copied from the stores requisitions received for the materials and supplies issued. If the stock items are issued in small quantities at numerous times each day, a recapitulation sheet, prepared from the requisitions, is generally used to determine the total issues for the month and only the total issues for the month are entered in the Issued column. To enter each stores requisition on the stock-ledger record, under such circumstances, would cause the stores-ledger cards to be consumed too rapidly.

Stock-checking, as previously described, is the method used to verify the quantity on hand at any date. For example, refer to the stores-ledger card shown in Illustration 32. Suppose that a stock clerk checked the flake graphite on hand on January 20, and found 523 pounds in stock. When this amount is compared

with the stores-ledger sheet, it is seen that there is a shortage of 2.84 pounds. The stores ledger shows 100 pounds on hand at December 31, plus 975.84 pounds received January 10, less 550 pounds issued during January up to and including the 19th. The stores-ledger balance on January 20 is, therefore, 525.84 pounds. The shortage of 2.84 pounds is evidently due to pilferage or to overweight on the three issues made January 3, 10, and 19. The method of adjustment for the difference is described in Art. 66.

69. The Perpetual Inventory.—A perpetual inventory for raw materials and supplies is an absolute necessity if the cost accounting system is to function properly. The value of the raw materials used, as one of the elements of cost, must be known at the end of each month. The cost of raw materials used is shown in the statement of the cost of production. The balance in the Raw Materials Inventory account at the end of the month is used in the preparation of the balance sheet. If a perpetual-inventory value were not available, a complete physical inventory would have to be taken at the end of each month. This policy, of course, would not be practical.

A perpetual inventory of the raw-material value is established in the general ledger or in the factory ledger. The account, Raw Materials Inventory, has its balance established by the postings described and illustrated in Art. 35. The subsidiary record supporting the Raw Materials Inventory account is not always kept in terms of dollars and cents. It is desirable to do so, however, since it establishes a greater measure of control over the inventory. If the stores-ledger record is not maintained as shown in Illustration 32, value and quantity together, the accounting department may keep a value record of the inventory in detail. The quantity record, then, is kept separately by the stores department purely for stores control purposes. The quantity record prevents the stores items from falling too far below the minimum point before a purchase requisition is placed.

Constant stock-checking keeps the quantity inventory record accurately adjusted from month to month. Without a perpetual checking of the raw materials and supplies, the quantity balance of many items might become misleading. Where the purchase requisitions are prepared from the stores ledger, it is apparent that quantity balances at all times should be accurate. Where stock-checking is not practiced, the quantity balance of each item is verified only when the occasion requires it. All items are counted at least once a year when the physical inventory is taken. The ideal plan, as a part of a thorough inventory control, is periodical stock-checking.

70. Importance of Accurate Pricing.—A very important phase of raw-materials inventory operations is the problem of accurate pricing. In fact, accurate pricing may be said to come second only to accuracy in determining the quantity of raw materials used. More than one factor in the cost-accounting process is affected if the stores requisitions show incorrect unit prices for the materials and supplies issued. Let us follow the stores requisition after the raw materials or supplies have been issued and note the accounts, statements, and records that are affected

by the information shown thereon. The stores requisition listing the items issued is priced by the price clerk. The price is extended to show the total cost of raw materials or supplies issued. If the stores requisition shows a particular production-order number, the cost of the raw materials is transferred to the job-order cost card. A summary of all stores requisitions filled each month forms the basis for an entry made in the factory journal, whereby the Work in Process Inventory account or an Overhead Expense account is debited, while the Raw Materials Inventory account is credited. The cost of raw materials used during the month appears on individual job-order cards in a job-order plant. In a process-order plant, the raw material cost appears as one of the elements of cost on the monthly cost report. The statement of the cost of production includes the raw material cost. The cost of the supplies requisitioned for use in the service departments is reflected in the overhead expense of the job-order cards or the monthly cost report, and in the statement of the cost of production. Raw materials and supplies embodied in partially completed work at the end of the month have their cost reflected in the Work in Process Inventory. Finished products, the cost of which is shown in the Finished Goods Inventory account, reflect the prices used in costing the raw materials and supplies. The prices placed on the stores requisitions for raw materials and supplies affect the net profit on the profit and loss statement, and all the inventories and surplus on the balance sheet.

FIRST-IN FIRST-OUT METHOD OF COMPUTING PRICES FOR INVENTORY ITEMS

Item: 100-lb. Sacks Cement

Date	Received			Issued			Balance		
	Quantity	Price	Value	Quantity	Price	Value	Quantity	Price	Value
19—									
Jan. 1							500	$2.10	$1,050.00
5	1,000	$2.20	$2,200.00						
8				500	$2.10	$1,050.00			
8				100	2.20	220.00			
12	1,000	2.30	2,300.00						
18				800	2.20	1,760.00			
20	1,000	2.10	2,100.00						
25				100	2.20	220.00			
25				1,000	2.30	2,300.00			
25				400	2.10	840.00			
28	1,000	2.25	2,250.00						
31							600	2.10	1,260.00
							1,000	2.25	2,250.00
	4,000		$8,850.00	2,900		$6,390.00	1,600		$3,510.00

At first thought, the pricing of a stores requisition would seem to be simple. This is the case provided the correct price is known. Determining the price that shall be used for issued items is a problem worthy of the attention of every cost accountant. If every item of like kind were purchased at the same price, little difficulty would exist. But the market is not so stable as to permit this condition

to exist. Items purchased once a month may show a different price on each invoice received. Therefore, the problem as to what price shall be used in costing the materials requisitioned for production must be faced. Two different methods are employed in pricing materials and supplies requisitioned, namely, the first-in first-out method, and the moving-average method.

MOVING-AVERAGE METHOD OF COMPUTING PRICES FOR INVENTORY ITEMS

Item: 100-lb. Sacks Cement

Date	Received			Issued			Balance		
	Quantity	Price	Value	Quantity	Price	Value	Quantity	Price	Value
19—									
Jan. 1							500	$2.10	$1,050.00
5	1,000	$2.20	$2,200				1,000	2.20	2,200.00
							1,500	*$2.16666	$3,250.00
8				600	$2.16666	$1,300.00	600	2.16666	1,300.00
							900	$2.16666	$1,950.00
12	1,000	2.30	2,300				1,000	2.30	2,300.00
							1,900	*$2.23684	$4,250.00
18				800	$2.23684	$1,789.47	800	2.23684	1,789.47
							1,100	$2.23684	$2,460.53
20	1.000	2.10	2,100				1,000	2.10	2,100.00
							2,100	*$2.17168	$4,560.53
25				1,500	$2.17168	$3,257.52	1,500	2.17168	3,257.52
							600	$2.17168	$1,303.01
28	1,000	2.25	2,250				1,000	2.25	2,250.00
31	4,000		$8,850	2,900		$6,346.99	1,600	*$2.22063	$3,553.01

*New price determined after each new purchase.

71. First-In First-Out Method of Pricing.—The first-in first-out method is successfully used where the volume of units handled is relatively small, or where the items are of a bulky nature and have a rather high unit price. Such items as automobile tires, cement, lumber, etc., are examples. If the items are of such bulk as to permit of ease in ascertaining when all of the items at one purchase price have been issued, the method is a practical one to use. The first-in first-out method also tends to keep the inventory accurately stated. An illustration of the application of this method is shown on the preceding page.

When the first-in first-out method is used, the issued items are always priced at the oldest price until the number of units purchased at that price have been issued entirely. While this method is practical for stock items like sacks of cement, the method is impractical for small items such as cotter pins, nuts, washers, etc. The latter named items are issued, usually, in small quantities. The clerical cost of figuring out the number of items issued at the exact cost price is often dispensed with in favor of the moving-average method.

72. Moving-Average Method of Pricing.—By the moving-average method, a new average unit price is determined for all stock on hand, after a new purchase has been made at a different price. The new average price is computed by adding the total cost of the old stock on hand, at the price at which it is held on the books, to the total cost of the new purchase, and dividing the sum by the total number of units in the two groups. The average unit price so found is used until another purchase is made at a different price.

The application of the moving-average method, as shown on the preceding page, is illustrated with use of the same figures as employed in the first-in first-out method. A comparison will show the difference in the inventory value under the two methods on the date of January 31. The first-in first-out method shows an inventory value of $3,510.00 for 1,600 sacks of cement. This is the exact cost price. The moving-average method discloses an inventory value of $3,553.01 for the same number of sacks of cement. This is a higher inventory value by $43.01 for exactly the same items. The inventory value at January 31, therefore, would be overstated by $43.01 if the moving-average method was used. Charges to production, during January, would be understated. The charges to production during the following month adjust the undercharge for the preceding month, however, if only the 1,600 sacks are used. The proof is as follows:

	First-In First-Out Method		Moving-Average Method	
On Hand Jan. 1	500 sacks	$1,050.00	500 sacks	$1,050.00
Purchased	4,000 sacks	8,850.00	4,000 sacks	8,850.00
To be Accounted for	4,500 sacks	$9,900.00	4,500 sacks	$9,900.00
Issued	2,900 sacks	$6,390.00	2,900 sacks	$6,346.99
On Hand Jan. 31	1,600 sacks	3,510.00	1,600 sacks	3,553.01
	4,500 sacks	$9,900.00	4,500 sacks	$9,900.00

When a standard cost system is in use, materials are put into stock at a standard cost price and the difference between the standard and actual cost is recorded in a Material Price Variance account. Materials and supplies are issued at standard cost. For inventory valuation purposes, the standard cost is used unless it is greater than the market price, in which case the latter is employed.

Regardless of the pricing method used, a detailed record of the cost price of each item of raw material and factory supplies must be maintained. If there is occasion for more than one person to make use of the price records, as many copies of the price book are prepared as necessary. In small establishments, the price record is usually shown on the stores ledger. The work of computing new prices from the invoices is delegated to some responsible person, in whose accuracy confidence is placed.

73. The Physical Inventory.—When an inventory is taken by actual count, and is priced and extended, it is termed a physical inventory. If a perpetual inventory system is not in operation, a physical inventory is the substitute for ascertaining periodic inventory values. Even though a perpetual inventory is a part

of the cost system, a physical inventory is usually taken once a year. If constant stock-checking is maintained, some controllers and auditors consider a physical inventory unnecessary. The best practice, however, is to take a physical inventory at the close of each fiscal year. By so doing a complete check against the perpetual inventory record is obtained at one time. This plan permits an adjustment to be made for the inventory shortage previously described.

In a plant having a large investment in its raw materials inventory, the supervising accountant, controller or auditor, must plan the physical inventory with great care. Usually, standard instructions are issued by the controller. The instructions provide the general plan in minute detail. The standard instructions are mimeographed, and placed in the hands of each one who has a part in supervising or taking the inventory. Contrary to what one might think at first, the physical inventory is not supervised by the storekeeper, but by the auditor. The reason for this is that the storekeeper is responsible for the materials and supplies entrusted to his care. He is the company's custodian of supplies. It is only logical, then, that at least once a year the investment entrusted to the care of the storekeeper should be verified.

PHYSICAL INVENTORY RECORD

Sheet No. 42

Date Dec. 31, 19

Listed by Wayne McKee

Section No.	Bin No.	Counted By	Description		Amount		Unit Price	Amount
			Item No.	Item Name	Quantity	Unit		
M	1	C.L.V.	9-220	$\frac{1}{8}$" Cut Washers	55	Lb.	$0.10	$5.50
M	2	"	9-221	$\frac{1}{4}$" Cut Washers	70	"	.10	7.00
M	3	"	9-222	$\frac{3}{8}$" Cut Washers	200	"	.11	22.00

ILLUSTRATION 33

A preliminary step to the actual taking of the physical inventory is the writing up of the inventory sheets. The sheets, as shown in Illustration 33, are prepared from the stock ledger. Not a single stock item is omitted when this plan is followed. Prior to taking the inventory, the sheets show the following information: section, bin number, number and name of stock item, and unit price. The columns for the unit count, or quantity, are filled in when the physical count is taken, and the prices are extended later. Preparing the sheets in advance materially reduces the time actually required to take the physical inventory.

The actual counting process in taking the physical inventory is performed usually by the stores clerks and laborers. The necessity for an accurate count should be emphasized. If a thorough and rigid count is wished, in event the store-

keeper is suspected of misappropriating supplies, the physical count may be made by the clerks from the auditing department. If the quantity of materials and supplies on hand is large, the counting may begin several days or a week in advance of the fixed date for the physical inventory. The items in each bin are counted and a slip is placed therein showing the count. The counter's initials should be placed on the slip in event it becomes necessary to review it owing to an inaccurate count. All items issued on stores requisitions, between the date of the count and the physical-inventory date, are listed in the deduction column of the slip by the stores clerk issuing the materials. All materials and supplies received and placed in the bins, between the date of the count and the inventory date, must be added to the original count on the slip by the receiving clerk. On the inventory date, the count is ready to be transcribed to the physical-inventory sheets. One clerk reads the net quantity count from the bin slips, and another clerk writes it upon the inventory sheet. By this process an accurate count is obtained in a short period of time.

After the count has been completed on the inventory sheets, the sheets are given to clerks who prepare the extensions. The unit count times the unit price gives the inventory value of each item. An addition of the totals on each sheet gives the physical-inventory value. It is this inventory value that is compared with the perpetual-inventory value as shown in the Raw Materials Inventory account balance.

RESERVE FOR INVENTORY SHORTAGE

19—					19—					
Dec.	31			$1,899	14	Jan.	31		$ 152	41
						Feb.	28		152	41
						Mar.	31		152	41
						Apr.	30		152	41
						May	31		152	41
						June	30		152	41
						July	31		152	41
						Aug.	31		152	41
						Sept.	30		152	41
						Oct.	31		152	41
						Nov.	30		152	41
						Dec.	31		152	41
									1,828	*92*
							31	Balance to P. & L.	70	22
				$1,899	14				$1,899	14

74. Adjusting the Perpetual-Inventory Value.—No one expects a physical-inventory value to be in agreement with the perpetual-inventory value; but, with the proper principles of storekeeping in operation, and with care exercised in taking the physical inventory, the two inventory values should not vary to any large extent. It is enevitable that certain factors, described in Art. 65, will cause the perpetual inventory to have a value in excess of the physical-inventory value. The monthly adjusting entry to provide for the inventory shortage was described in

Art. 66. When the actual shortage between the perpetual and the physical inventories is ascertained, the difference is absorbed by the account, Reserve for Inventory Shortage. As a result of anticipating an inventory shortage, each month, an estimated amount credited to the reserve account, as here shown, provides a credit balance which absorbs the loss.

Consider the perpetual inventory, as shown in the Raw Materials Inventory account on December 31, 19__, to have a balance of $151,931.20. Also assume that the physical inventory showed a value of $150,032.06 on the same date, thus indicating an inventory shortage of $1,899.14. Then an adjusting entry is made as follows if monthly adjustments have not been made because of frequent stock checking, as shown in Art. 66. If monthly adjustments have been made, the adjustment now required should be less in amount.

19__			
Dec. 31	Reserve for Inventory Shortage	$1,899.14	
	Raw Material Inventory		$1,899.14
	To bring the perpetual inventory in agreement with the physical inventory value at this date.		

The perpetual-inventory account would be as follows after posting the credit in the above entry:

RAW MATERIALS INVENTORY

19__ Dec.	31	Balance	$151,931	20	19__ Dec.	31	Reserve for Inventory Shortage	$ 1,899	14
							Balance	150,032	06
			$151,931	20				$151,931	20
19__ Jan.	1	Balance	$150,032	06					

The stores-ledger records must be adjusted to be in agreement with the count as disclosed by the physical inventory, and the adjusted balance ($150,032.06) as shown in the control account.

After the debit is posted from the adjusting entry to the Reserve for Inventory Shortage account, that account is seen to have a debit balance of $70.22. This means that the loss from inventory shortage was greater than was anticipated. Monthly costs throughout the year have been understated by $70.22, and consequently profits have been overstated.

Since this fact is not known until the end of the year, it is too late to revise the monthly cost figures. Therefore, the balance in the Reserve for Inventory Shortage account may be closed out by an adjustment to the Profit and Loss account and appear in the non-operating section of the profit and loss statement. The entry is as follows:

19—			
Dec. 31	Profit and Loss	$70.22	
	Reserve for Inventory Shortage . . .		$70.22
	To adjust the net profit for the year for the inventory shortage under-estimated during the year.		

An overestimate of the inventory shortage would result in a credit balance remaining in the Reserve for Inventory Shortage account after the adjustment had been made to that account for the actual difference between the perpetual-inventory and the physical-inventory values. In this case, the final adjustment to the account, Reserve for Inventory Shortage, would be made by closing out the balance as a credit to the Profit and Loss account.

Underestimated or overestimated inventory shrinkage affects manufacturing costs and, therefore, at the end of the year instead of being carried to the Profit and Loss account direct, may be transferred to the Cost of Sales account or divided between Cost of Sales, Finished Goods Inventory, and Work in Process Inventory accounts.

It may happen that the *physical-inventory* value *is greater than* the perpetual-inventory value. If so, the difference is usually due to errors in preparing the physical inventory. The errors may be the result of improper count, wrong prices, inaccurate price extensions, or incorrect page totals. Rechecking the physical inventory record will bring to light the last two named errors. Prices can be checked with the price list to disclose any discrepancies. Improper count is the most difficult error against which to check. Sometimes, a comparison of the present year's physical inventory with the preceding year's, item for item, will disclose a seemingly large quantity of certain items shown in the latest inventory. A recount of the items may disclose an error in the original count.

The physical inventory should be reviewed for obsolete items. If by a comparison with the physical-inventory records of preceding years it is found that certain items have not been moved, then it is usually considered sound practice to scrap the items. The production department should be consulted before the scrapping actually takes place. It is possible that the items may be used in future production. If any items are scrapped, care must be taken to adjust the stores-ledger record.

CHAPTER X

COSTING MATERIALS

75. Meaning of the Term Costing.—Raw materials should never be thought of as an expense. As long as the raw materials are unused they are classified as an inventory or an asset. When they are withdrawn by stores requisitions for use in production, the raw materials are said to be "costed" into production. Costing raw materials, then, is the process of transferring the cost of the raw materials from the Raw Materials Inventory account to a production account. The production account is usually known as the Work in Process Inventory account. The cost accounting systems of some manufacturing plants have no Work in Process Inventory account, owing to the nature of the manufacturing process. If a period of only twenty-four hours or less is required to convert the elements of cost into the finished product, it is unnecessary to carry the elements of cost through a Work in Process Inventory account. In this event the raw materials are costed into a Cost of Production account, or into a Finished Goods Inventory account.

The methods of accumulating raw-material costs depend upon the nature of the cost accounting system in operation, and will be described presently.

76. Steps Preliminary to Costing Raw Materials.—The basis for issuing a production order is the receipt or expectation of customers' orders. In a job-order plant, no raw materials are requisitioned until the customer's order has been received. After its receipt a plant production order is executed as the authority for the work to be begun. In a process-order plant, raw materials may be requisitioned on a plant production order without any definite relationship to a customer's order. The commodities when they are produced are placed in the warehouse. As customers' orders are received, they are filled from the finished-goods stock in the warehouse.

An engineering department is an important division of a manufacturing plant specializing in job-order production. In this department, the customers' orders are analyzed. Each customer's order is given a job-order number. The engineers compute a list of the raw materials needed for the order. This list is called a *bill of materials*. It accompanies the job order that is sent to the foreman of the department in which the work is to begin, if no production-planning department exists. The foreman, in this event, prepares the stores requisition for the raw materials needed in his department. Other foremen in other departments likewise order the raw materials needed in their own respective departments. Under the operation of a production-planning department, the bill of materials is analyzed as to its requirements. The scheduling clerk figures out the date and hour the job order will be worked upon in all the departments through which the order will pass and makes it possible for the material order clerk to requisition the raw materials for the various departments.

In a process-order plant, the raw materials are requisitioned in larger quantities than in a job-order plant. The plant production order is usually for several hundred or thousand items of identical type. The raw-material requirements are computed by the engineering department and ordered by either the foremen or the production-planning department.

Under a production-planning department, the raw materials are frequently delivered by a storeroom labor gang. The stores requisitions specify at what machine or bench, and in what department the items are to be delivered. After the raw materials are received in the shop, and production is commenced, a work in process inventory is created. The accounting treatment of the work in process inventory will be described later.

77. Essentials of Proper Raw Material Costing.—The roots of the proper costing for raw materials go as far back in the accounting process as the receipt of the purchased materials. Each invoice accompanying the receipt of raw materials and supplies shows the cost price of the items. After verification of the price, quantity, and quality received, the invoice is approved for vouchering. After the voucher is prepared and entered in the voucher register, the duplicate copy of the voucher together with the invoice comes to the price clerk.

It is the work of the price clerk to transfer the new prices, shown on the invoices, to the stores-ledger record and to the price book. If the moving-average method of pricing is used, the price clerk must compute the new unit price. Accuracy is imperative in computing new unit prices. The proper costing of raw materials depends upon accurate prices as well as upon the accurate quantity issued.

The stores requisitions received by the stores department for raw materials issued also must fulfill all the requirements of accuracy. The plant order number, be it a job order or a process order, must be stated accurately. If a wrong job-order number is placed upon the stores requisition, it results in improper costs for the job orders affected. The improper number causes the material charges on one job order to be overcosted, while another job order will be undercosted.

The quantity of raw materials issued is a costing factor that must be watched very closely. Accuracy in stating the quantity is as essential as accuracy in placing the proper price on the stores requisitions. The proper prices can be applied to the requisitions only when the requisitions bear the proper stock-item descriptions and classification numbers. This is the reason why the counter clerk in the storeroom should be held responsible for the requisitions that are filled by him. It is his duty to see that the proper quantity, stock-item number, and description are shown on each requisition. The initials of the clerk filling the requisition should be placed thereon, as an assurance that all the information is accurately stated.

The stores requisitions received each day are placed in the hands of the pricing clerk after the stores-ledger clerk has made a record of the issues. The price clerk enters on the requisition the unit prices of the raw materials issued. The accuracy of the price entered is assured when the stock-item description and classification

number on the stores requisition agree with the stock-item description and classification number shown in the price record.

The final essentials in the proper costing of the raw materials charged to production are the price extension and total shown on the stores requisition. Accuracy in this step of costing is assured to a greater extent if the computations are made by a comptometer operator. It is a function of the cost department to insure and verify the accuracy of raw-material costing. If all of the essentials of proper material costing are complied with, material costs will be reflected accurately in all of the cost records, accounts, and statements affected thereby. Job-order cost cards and the process-order cost reports will show the cost element of raw material stated properly. The Work in Process Inventory account and the Raw Materials Inventory account will have posted thereto the proper debits and credits respectively. The statement of the cost of production, the profit and loss statement, and the balance sheet will reflect accurate inventory values.

78. Costing Scrap Materials.—Another phase of material costing is that of costing scrap. Scrap materials come into existence as a result of the processes of production. The operations of cutting, shearing, turning, boring, and punching of various kinds of metal bring scrap into existence. In woodworking plants, sawdust, shavings, blocks, and strips are the scrap for which an accounting must be made. A plant manufacturing glass, during the productive processes, creates a scrap item known as cullet. This item, likewise, must be accounted for, in order to state the material costs properly in the cost reports, accounts, and statements.

Scrap reclaimed from production is turned over to the storeroom. Metal scrap is classified in accordance with a standard classification. When metal scrap is received by the stores department, it is sorted in accordance with the standard classification. The scrap is held at the storeroom until an adequate market price indicates that it should be sold, or until a limitation of storage space demands that it be removed. Records of the various classifications of scrap should be kept on stores-ledger cards, and these records should show quantity and value. This procedure is necessary if the value of the scrap is charged to the stores control account.

Some scrap has a usable value in other industries. For example, wood shavings and sawdust may be sold for packing purposes. Sometimes scrap wood is utilized for boiler-heating purposes. Glass cullet is made use of in the same factories producing it, as a raw-material ingredient in the raw-material batch mixture.

Reclaimed scrap offers two major cost problems. In the first place, what price shall be placed upon the scrap? In the second place, if scrap arises in the production of job orders, what quantity and value shall be credited to each job order?

The price placed upon the reclaimed scrap should be in accordance with its market value. The problems met with in this connection are easy to understand, but difficult to solve equitably. The market value of scrap copper or scrap brass may fluctuate monthly. The scrap reclaimed each month is recorded at the

current market price. The scrap may be held for six months or a year or more for a more favorable price. When the scrap is sold, the difference between the selling price and the value accumulated in the scrap account at varying market prices, is certain to result in a loss or a gain. Entries to record the sales of scrap are as follows. Assume that

(*a*) The accumulated value of the No. 1 cut steel scrap on the stores-ledger card is shown to be $788.42.
(*b*) The selling price of the full amount of the No. 1 cut steel scrap was $809.17.

The entries on the journal vouchers are:

Accounts Receivable	$809.17	
Scrap Sales		$809.17
To record sale of No. 1 cut steel scrap.		
Cost of Scrap Sales	$788.42	
Raw Materials Inventory (Scrap)		$788.42
To record cost of the scrap removed from storeroom.		
Scrap Sales	$809.17	
Cost of Scrap Sales		$788.42
Profit on Scrap Sales		20.75
To record profit on scrap sales.		

The loss or gain is related to the costs of preceding months or fiscal years, which means that those costs were not exactly accurate. From a theoretical viewpoint, the affected costs and profits of preceding periods should be adjusted. In practice, however, costs and profits affected by the price applied to the scrap are not adjusted. The clerical cost required to follow through the adjustments would be out of proportion to the benefits derived and therefore the balance of the Profit on Scrap Sales account is shown on the profit and loss statement in the non-operating section or as an addition to (or subtraction from) gross profit on sales. The problem points out quite clearly, however, that the price applied to recovered scrap should be a price arrived at after much thought. Sometimes, an average price is adopted, based on the scrap price quotations over a long period of time.

The second problem pertaining to the costing of scrap material has to do with the individual job-order costs. The value of the scrap resulting from production on a job order should be credited to the cost card accompanying the job. In this manner, the material cost of the job is accurately stated. When many job orders of similar nature are being worked upon at the same time, it is often difficult to ascertain the scrap value to be credited to each job order. A general plan can not be adopted. The nature of the product, the size of the order, the kind of scrap, all must be considered before an equitable plan can be evolved.

The factory journal entry to cover the reclaimed scrap is as follows·

19—			
Jan. 31	Raw Materials Inventory (Scrap)	$147.27	
	Work in Process Inventory		$147.27
	To charge stores department with scrap reclaimed during January.		

79. Accounting for Spoiled Material.—Material which after being placed into production is found to be defective, or which is damaged in some operation so that it cannot be completed as a finished product, is classed as spoiled material. Spoiled material is otherwise known as spoilage and defective work. Defective material itself may be the cause of spoilage. Sand holes in castings are defects that may not be discovered until machining operations are commenced. On the other hand, perfectly sound material may be ruined by an incompetent operator. Regardless of the cause of the spoilage, an accounting treatment is required to prevent the cost of the order from being overstated. The accounting treatment is complicated because it involves the disposition of accumulated labor and overhead costs as well as the material cost.

It frequently happens that some part of the spoiled or defective material can be salvaged. If so, the salvage value is charged to the stores department by debiting the Raw Materials Inventory account. If no salvage can be obtained, then, the scrap value, if any, is debited to the Raw Materials Inventory account.

A different problem exists where several operations have been performed upon the materials in one or more departments. The fact that direct-labor charges and overhead-expense charges have been added to the material cost complicates the problem of accounting for spoilage. Only the elements of cost actually required according to predetermined specifications are the proper amounts to be costed. If raw materials, direct labor, and overhead expenses in excess of the standard quantities are used in the production of an order, the cost of the order and the unit cost would be excessive. Therefore, provision must be made to remove all such excessive costs from the Work in Process Inventory account. Any such excessive costs, likewise, must be removed from the job-order cost cards, and adjusted on the process cost statements. When the Work in Process Inventory account is credited, the offsetting debit is to an Overhead Expense account. The specific overhead account charged is Defective Work, Spoiled Work, or some other account of similar name. The reason defective and spoiled work is considered an overhead-expense charge is because in the process of manufacturing, spoilage is bound to occur. Spoilage is a manufacturing expense which should be prorated over the cost of all orders. A possible exception is in connection with job orders. If a spoilage results on a job order involving the manufacture of a product of an extremely difficult nature, it is considered better policy, generally, not to remove the spoilage cost from the specific job-order card. Owing to the nature of the product and the difficulty involved in its manufacture, the spoilage cost may be considered properly as a part of the job-order cost.

Foremen more than any others can lessen the amount of spoiled work. By insisting upon a clean, orderly, well-lighted plant, by studying and analyzing the

causes of defective work, and by setting standards for quality performance, much can be done to reduce spoiled work to a minimum.

The method of removing the cost of spoiled material from the Work in Process Inventory account is by the following journal entry:

19—			
Mar. 30	Raw Materials Inventory (Salvage or Scrap)	$10.27	
	Overhead Expense (Defective Work)	61.20	
	Work in Process Inventory		$71.47
	To charge the overhead expense account with the cost of spoiled material in process and to charge stores with reclaimed material for the month of March.		

If there are a number of productive departments, the overhead expense of each department should include the cost of spoiled-work or defective-work due to the department.

An illustration of the cost-element charges which gave rise to the preceding journal entry is as follows:

Raw Materials	$22.42
Direct Labor	16.35
Overhead Expense	32.70
Total charges to Work in Process Inventory	$71.47

As the charges to the Work in Process Inventory account, job-order cost cards, and process cost statements are analyzed by the three elements of cost, the above analysis must be made in order properly to account for spoilage.

80. Costing Materials in a Process Cost System.—In a process cost-accounting system, raw materials are costed into production on a lump basis. A plant production order for manufacturing 10,000 electric desk lamps would be followed by a stores requisition for the necessary raw materials. After the materials have been delivered to the factory, the priced requisition becomes the authority for an entry in the factory journal. The basis for the quantity of raw materials ordered would be the material specifications for one specific electric desk lamp. Consider the raw material specifications for an electric desk lamp, number 77Y, to be as follows:

1—bronze finished cast iron base, B/P 5172.
1—piece 5-inch×6-inch green bottom felt.
1—12-inch length $\frac{3}{8}$-inch flexible loom.
2—$\frac{3}{8}$-inch loom connections.
1—$\frac{3}{8}$-inch key socket.
1—7-inch green metal shade, B/P 3117.
1—10-foot length green lamp cord.
1—Hubbell plug and receptacle.

With the exact specifications known, it is an easy matter to prepare the stores requisition for accurate quantities covering the process order for 10,000 number 77Y desk lamps.

Different methods of costing raw materials are in effect in different types of plants using process cost accounting systems. The procedure in a glass manufacturing plant is shown in Illustration 34.

Glass products are manufactured from a mixture consisting chiefly of sand, soda, glass cullet, lime, niter, and borax. Measured quantities of each ingredient are mixed together and dumped into a melting furnace. The mixture is called a batch. A workman classified as a mixer keeps a record of the number of pounds

RECORD OF BATCHES INTO PRODUCTION

Date	Sand	Soda	Cullet	Lime	Niter	Borax
19__						
Jan. 1	10,000	5,000	30,000	1,500	500	100
2	10,000	5,000	30,000	1,500	500	100
3	9,000	4,500	27,000	1,350	450	90
30	10,000	5,000	30,000	1,500	500	100
31	9,500	4,750	28,500	1,025	342	68
Pounds . . .	300,000	150,000	900,000	45,000	15,000	3,000
Price	$0.005	$0.02	$0.01	$0.015	$0.03	$0.06
Cost.	$1,500.00	$3,000.00	$9,000.00	$675.00	$450.00	$180.00

ILLUSTRATION 34

of each ingredient placed in each batch. Each day this report is sent to the cost department, where it is tabulated on a recapitulation sheet as shown in Illustration 34.

At the end of each month a stores requisition is prepared from the information gathered on the recapitulation sheet. The raw materials are costed into production monthly.

The raw materials used in the production of ice are water, ammonia, and calcium. The water is costed to production on the basis of the amount consumed as shown by meter readings. The ammonia and calcium are costed to production as they are withdrawn from inventory and placed into the manufacturing process. The entry would be as follows:

Cost of Production	$475.38	
Water		$ 75.00
Inventory of Ammonia		100.38
Inventory of Calcium		300.00

The debit is to Cost of Production, not Work in Process, because the finished product is produced in a short time.

Innumerable illustrations might be given of the different methods involved in costing materials in plants engaged in process manufacturing. While the different plants may vary as to the details of costing the materials, the general idea is to charge the Work in Process Inventory account with a bulk cost. Various plans are in use to collect the raw material costs, but the keynote of all plans is to gather the quantities used in an accurate manner. It should be remembered that product costs, as well as profits, are only as accurate as the costs that are placed on the elements when they are debited to the Work in Process Inventory account.

81. Costing Materials in a Job-Order Cost System.—Raw materials are costed into production, in a job-order cost system, in accordance with the requirements for each job order. Either the shop foreman or the production-planning department may order the raw materials. In either case, the stores requisition calls for the materials needed for one job-order number. The stores requisition, when priced, becomes the basis for the raw-material charge on the job-order card for the specific job-order number. The requisition, likewise, becomes the basis for the entry made in the factory journal, debiting Work in Process Inventory, and crediting Raw Materials Inventory.

CHAPTER XI

TIMEKEEPING AND PREPARATION OF PAYROLLS

82. Labor as a Cost Element.—Accounting for labor as an element of manufacturing cost requires particular care for two reasons. In the first place, it requires the same degree of accuracy as is given to the accounting for raw materials, for the sake of accurate costs and profits. In the second place, workmen are selling their services, and accurate records must be prepared to insure proper payment. Direct labor is more important than indirect labor and requires more effort in accounting, because it is identified with the productive operations of the plant; because it is often tied up with some incentive wage scheme; because it must be distributed in accordance with the cost classification of functions, operations, departments, and jobs; and because it usually represents a cost and an outlay of cash many times greater than the cost of indirect labor. Indirect labor, as an item of overhead expense, must be accounted for, but its treatment is different from that of accounting for direct labor.

83. Basis of Accounting for Labor.—Accounting for labor rests upon the operations and services performed by the timekeeping, payroll, and cost departments. The relationship existing between these three departments is not a fixed or rigid one. The three departments may exist as distinct and separate divisions within the plant. Often, however, the timekeeping department is under the supervision of the payroll department. Sometimes, the timekeeping department is a part of the cost department. Again, the payroll department may be a unit of the cost department. The size of the business, usually, is the factor which determines the extent to which there is a separate split-up of the three phases of accounting for labor. Regardless of the arbitrary divisions established, the parties engaged in timekeeping, in preparing the payroll, and in figuring labor costs, all must work for the mutual benefit of the business as a whole. Close cooperation between the heads of the three groups will contribute to the preparation and completion of cost reports in the shortest possible time. For the purpose of describing the activities of the three departments, each will be discussed separately.

84. Functions Performed by the Timekeeping Department.—The timekeeping department oversees two things, in general. First, that the workmen are present on the job in the plant. Second, that the time worked on each job or order is stated properly for every workman. Verifying the presence of the workmen involves a plan of employe numbering, daily checking in and out of employes, and daily location of the employes on the job. Verifying the time worked on each job by the shop employes involves inspection of work performed before the time tickets and wage slips can be approved. The timekeepers and inspectors perform

all of these functions before the payroll department comes into possession of any of the time tickets or wage slips.

85. Identification of Workmen.—One of the first principles of accounting for labor is a method for identifying shop workmen. Identification by workman number is most desirable. It prevents confusion when different individuals have the same or similar names. It saves time to handle certain labor records by the use of a short number rather than a long name. In a plant where the labor turnover is rather high, names of new workmen do not have to be mastered when identification numbers are used. An identification number for a workman carries through the entire process of accounting for labor. The time-clock card, the time ticket or wage slip, the payroll sheet, the pay check or pay envelope all show the workman's number.

TIME-CLOCK CARD

WEEK ENDING JANUARY 7, 19----
I. T. R. Co. Form No. 1212.

No. 1
NAME

JOHN NEELY

	MORNING IN	NOON OUT	NOON IN	NIGHT OUT	EXTRA IN	EXTRA OUT	
M	7 04	12 01	12 48	4 32			8¼
TU	6 54	12 02	12 52	4 35			8½
W	6 45	11 30	12 54	4 36			8
TH	6 57	12 03	12 56	4 31			8½
FR	6 46	12 02	12 49	4 30	5 00	9 05	4½
SA	6 47	12 30					5¾

TOTAL TIME 53 1/4 HRS.
RATE
TOTAL WAGES FOR WEEK $

Courtesy International Time Recording Co.
ILLUSTRATION 35

86. Time-Clock Card.—A time-clock card is a card form used to record the time of day the workman enters and leaves the plant. The time clock automatically prints the workman's time in and out of the plant. The clock is located at the employes' entrance. Its position is usually at the beginning of a narrow aisle so as to prevent the workmen from crowding past it in any manner but single file. A watchman employe of the timekeeping department sees that every workman punches the clock upon arrival and departure. The watchman likewise prevents one workman from punching the time-clock card of another workman.

A great many varieties of the time-clock card are found in use, each one fitting a different variation of accounting for labor. An example of a time-clock card is shown in Illustration 35. A close inspection of this form will disclose several important things. In the first place, the working hours at this plant are from 7 A.M. to 12 noon, and from 1 P.M. to 4:30 P.M. This makes a working day of

8½ hours. The time clock prints the hour of arrival and departure. It is so designed that the timekeeping department clearly sees the late arrivals and early departures printed in red ink. In the illustration, the figures that would appear in red on an actual time card are indicated by heavy black type. For example, the first column to the left headed "Morning In" shows the hour of arrival for Monday at 7:04. This time would be printed in red ink because it is four minutes after the regular time to be on hand for work. Being four minutes late causes the workman to lose fifteen minutes, the penalty for being late from one up to fifteen minutes. On Wednesday, the workman left the shop at 11:30 A.M. This time would also be printed in red ink because it is one-half hour earlier than the regular hour to stop for lunch. The timekeeper at the end of the day, therefore, showed 8 hours as the time worked by No. 1 on Wednesday. On Friday, the workman put in overtime from 5:00 P.M. to 9:05 P.M. as shown in the columns headed "Extra In" and "Extra Out." Four extra hours were worked actually, but since time and one-half was allowed for overtime, the total extra time allowed was 6 hours. The timekeeper, therefore, showed an allowance of 14½ hours, for Friday. The time-clock card is, thus, the watch-dog of the company with respect to the actual hours each workman spends within the plant. It clearly shows lateness and absenteeism, two things modern management is endeavoring to reduce.

87. Time Ticket.—A time ticket is a form designed to record the earnings of a workman classified as a direct laborer. There are about as many different forms as there are plants using them. A time ticket should be designed to fit in with the cost system and any peculiar wage-incentive system that may be in use. A comprehensive time ticket might include spaces for the following information:

1. Date.
2. Workman's number and name.
3. Job-order number.
4. Department number.
5. Starting and finishing time.
6. Operation number.
7. Operation name.
8. Number of pieces to be made.
9. Number of pieces spoiled.
10. Number of good pieces.
11. Inspector's signature.
12. Piece-work rate.
13. Set-up allowance (amount).
14. Daily piece-work earnings (amount).
15. Standard operation time (hours or fraction).
16. Standard allowed time (hours).
17. Actual time worked.
18. Time saved (hours).
19. Premium time earned (hours).
20. Set-up allowance (hours).

21. Overtime allowed (hours).
22. Total time to be paid for (hours).
23. Rate paid (amount).
24. Daily earnings on standard-time basis (amount).
25. Day work (hours).
26. Day work rate.
27. Day work earnings (amount).
28. Timekeeper's signature.

If a plant did not operate on a piece-work basis, naturally the details pertaining to that plan (items 12 to 14 inclusive) would not appear upon the time ticket. On the other hand, if the plant paid its labor exclusively on the piece-rate basis, then, no space would be necessary for the standard rate plan (items 15 to 24 inclusive). Some plants pay their direct laborers on the basis of both piece-work rates and standard time rates which necessitates a rather elaborate time ticket. A time ticket embodying spaces for all of the above information is shown in Illustration 36.

The time ticket provides another column at the extreme left, sometimes, for a job-order number column. This is necessary if one time ticket is to serve each workman each day, and the workman works on more than one job order. A separate column for job-order numbers is not required if a separate time ticket is prepared for each different order number upon which work is performed. If the time ticket is designed for a plant engaged in production on a job-order basis, it sometimes has columns for the burden rate and amount.

If it is necessary to place a workman on day work where piece-work or standard-time rates are in effect, space should be provided on the time ticket telling why the direct laborer was placed on the day rate. The "whys" give the management an insight into the causes of inefficiency or fall-downs in performance. This is one of the many instances illustrating how cost accounting is an aid to management.

A careful survey of the time ticket as shown in Illustration 36 will reveal the information from which labor costs are determined. An analysis of the time ticket shows the following data pertaining to the distribution of labor costs:

Departmental labor cost (F)
Job-order labor cost (B661)
Operation labor cost (742)
Operation labor cost (743)
Operation labor cost (65)
Machine-shop service
Department Overhead expense (M2)
Direct Labor Cost (Computed by Payroll Department).
Indirect Labor Overhead Cost (Computed by Payroll Department).

All of the preceding data, as shown on the individual time tickets, are analyzed by either the payroll department or the cost department. The data supplied by the timekeeping department pertains primarily to the hours and time worked, the operations, and information concerning the units produced.

TIME TICKET

(Completely Filled in and Ready to be Sent from the Timekeeping Department to the Payroll Department)

Workman's Number 1 — Workman's Name John Neely

Job-Order Number B 661 — Department F(Turning, Boring, and Tapping)

Date Jan. 3, 19__

TIME

Started	Finished
7:00	9:00
9:00	10:00
10:00	12:00
1:00	2:30
2:30	4:30

Total Hours 8½

PIECE WORK

Operation No.	Operation Name	Production Ordered	Production Spoiled	Production Accepted	Rate	Piece-Work Wages	Set-Up Allowed	Total Piece-Work Earnings	Total Earnings
742	Boring ½"	100	0	100					
743	" ⅝"	100	0	100					

STANDARD TIME

Operation No.	Operation Name	Hours: Standard Operating Time	Standard Allowed Time	Actual Time Worked	Time Saved	Premium Earned	Set-Up Allowed	Overtime	Total Time	Rate	Total Standard Time Earnings
65	Tapping			3.50							

DAY WORK

Nature of Work	Reasons for Day Work	Hours	Rate	Total
M2 Helping Machinist	Machine Breakdown	2		

Inspector *T. J. Boyd*

Timekeeper *C. Hayes*

Total Amount for Payroll

ILLUSTRATION 36

The clerks in the timekeeping department must be thoroughly familiar with the classification of labor accounts for both the direct and indirect labor. It is highly important that the timekeepers be familiar with the classification, both account names and code numbers. The reason a knowledge of the classification of labor accounts is necessary is because it insures a more accurately filled-in time ticket. The time tickets must show charges to the proper labor accounts if the labor distribution and costs are to be accurate.

The distribution of labor is made by the cost department. It is prepared from the time tickets after the payroll department has completed its records from the time tickets.

The hours shown in the Started and Finished time columns are inserted by the operator, John Neely, or by a clerk. Some plants prefer to have the direct laborers perform the operations assigned to them only. In this case, the starting and finishing times are inserted by the clerk. The total hours ($8\frac{1}{2}$) worked for the day are computed by the *timekeeper*. By referring to the time-clock card of John Neely, Illustration 35, the total time worked is found to be as shown on the time ticket of Tuesday, January 3. This verification is made by a clerk in the payroll department.

The clerk usually writes the number and name of the operations to be performed, as shown in the Operation column. It may be the duty of the clerk, also, to enter the quantity of items to be produced in the production ordered column. On the other hand, this information is, sometimes, inserted by the production-planning department. The timekeeper's name appears on each time ticket as an indication that the time computations are accurate.

The inspector enters the information or quantities shown in the Spoiled and Accepted columns under Production. After the inspector has completed his job and inserted the proper information, he signs his name before the time ticket is sent to the payroll department.

88. Job-Order Time Ticket.—A time ticket designed to show the different job-order numbers worked upon by the same workman on the same date is shown in Illustration 37. This type of time ticket is necessary where a workman performs operations on numerous different job orders each day. Its use eliminates the necessity for preparing more than one time ticket for each workman each day.

This form of job-order time ticket is designed for a plant where an hourly rate is paid for the operations performed. The bonus is computed on the basis of bettering the time allowed for a standard number of completed operations performed in an hour. For example, operation C181 has a standard set for drilling 90 holes, $\frac{1}{4}$ inch in diameter, in one hour. This makes the standard time for drilling one hole, .01111 of an hour (1 hour divided by 90). For drilling 200 holes, 2.22 hours would be allowed ($.01111 \times 200$). Since the 200 holes were drilled in two hours, a saving of .22 of an hour was effected. The bonus allowed, if based upon the Halsey Premium Wage System, would be one-half of the value of the time saved. If the workman received 60 cents an hour at his regular rate, then his bonus would be 50 per cent. of the value of time saved, or $.50(.22 \times \$0.60) = \$0.066$. The worker's

JOB-ORDER TIME TICKET

No. 18881

Department C (Cutting and Trimming) Date Jan. 4, 19__

Name Charles Seidle Number 31

Time			Order Number	Operation		Day Rate	Bonus	Total Earnings	Machine Number	Burden
Start	Finish	Hours		Number	Rate					
7:00	9:00	2	4275	C181					M82	
9:00	12:00	3	4277	C183					M91	
1:00	4:30	3.5	4278	C182					M77	
Total		8.5								

Production Record

Order Number	Operation Number	Ordered	Spoiled	Accepted
4275	C181	200	0	200
4277	C183	300	0	300
4278	C182	350	0	350

T. J. Boyd Inspector

H. McBride Foreman

C. Hayes Timekeeper

ILLUSTRATION 37

earnings for operation C181, then, would be 2 hours @ $0.60 an hour, plus the bonus of $0.066. The payroll department enters the rates, and computes the premiums or bonuses. The application of the bonus system is illustrated at this point to show the need for the production-record columns and the number of hours actually required to produce the units required.

The columns for machine number and burden are used by the cost department. The machine number identifies the machine upon which the operations were performed. Each machine has a certain hourly rate if the machine rate is employed for costing overhead expenses.

Since 2 hours were required to produce the 200 units on M82, the burden costed would be 2 times the hourly machine rate for M82. This information is frequently shown on the job-order ticket, because the ticket provides a very convenient place for collecting this information.

89. Unit Time System.—The unit time system of accounting for labor makes use of an arbitrary time period instead of the minute or the hour for measuring operation performance. At the beginning working hour of the first day of each month, the periods are numbered beginning with 1. The periods from the beginning number continue consecutively in number until the end of the month. The length of the period is some number of minutes which is exactly divisible into one hour or sixty minutes. Usually, six minutes are used as the period unit. Specially designed time clocks scattered throughout the shop automatically print the number of the period when the time ticket is inserted in the clock. If a workman began a job at 8 A.M. on March 1, he would insert the time ticket in the clock, whereupon the clock would print period number 1. If the job was completed at 11 A.M. of the same day, the workman would again insert the card in the clock and the finished period printed would be 31. The difference between 31 and 1 would be 30 periods, 30 periods of six minutes each would be 180 minutes or 3 hours. This method of accounting for labor simplifies the computation of time worked by providing a uniform period of measurement instead of the hour and minute basis.

90. The Wage Slip.—The wage slip is a form which records the hours of labor performed by the indirect laborers. A separate form is used to record the earnings for indirect labor for two reasons. In the first place, this prevents the possibility of confusion with direct-labor charges. In the second place, the form is much simpler and printing costs are saved in having a smaller form. An example of a wage slip is shown in Illustration 38. The wage slip provides space in the heading for the date, and worker's name and number. The number of hours worked and the nature of the work performed are the most important items in the wage slip, in addition to the employe's name. Often the occupation is not numbered or even named. It is better to show this information, however, in order to obtain the proper indirect-labor charge to the various departments. Since indirect labor is an overhead expense item, the labor is an overhead expense charge to some production department or to some service department. A classification of indirect labor as to the various departments is, therefore, needed. Coded accounts may be set up in the overhead expense ledger to record the various indirect labor charges.

The rate paid the indirect laborer is inserted by the payroll department. The earnings are likewise placed on the wage slip by a payroll clerk.

The timekeeping department is responsible for verifying the presence of the workmen classified as indirect laborers. The wage slips are, usually, prepared by the foreman in whose department the indirect laborers are employed. The timekeeper verifies the presence of the workmen, which amounts to an approval of the

WAGE SLIP

Completely filled in and ready to be sent from the timekeeping department to the payroll department

Date Jan. 2, 19

Workman's Name Larry Malenfant Number 22

Time		Occupation		Hours	Rate	Earnings
Started	Finished	Number	Name			
7:00	12:00	514	Loading Scrap	5		
1:00	5:00	512	Delivering Stores	4		
				9		

C. Hayes Timekeeper *D. C. Davis* Foreman

ILLUSTRATION 38

wage slips as prepared by the foreman. Clerks in the timekeeping department, likewise, may check up on the existence of the direct laborers in the plant. This procedure requires a timekeeper to make trips through the plant, morning and afternoon, to see if the workmen are actually engaged in the performance of their jobs.

After the time tickets and wage slips are approved by the timekeeping department, they are forwarded to the payroll department. The payroll department prepares its records chiefly from the time tickets and wage slips.

91. Services Performed by Payroll Department.—The payroll department holds an intermediate position between the timekeeping department and the cost department. The payroll department receives the time tickets and wage slips after they have been approved by the timekeeping department. In the payroll department, the rates are inserted on the time tickets and wage slips. Then, the daily earnings are computed, and entered on the time tickets and wage slips, which form the basis for the amounts entered on the payroll sheet. Time-clock cards are checked against the time tickets and wage slips to verify the total number of hours worked in the pay period by each employe. From the completed payroll sheet, at the end of each pay period, the employes' pay is prepared and paid by the paymaster. The time tickets and wage slips, after they have served their usefulness to the payroll department, are next turned over to the cost department. The cost department then prepares the labor distribution from them. Occasionally, some systems provide for the labor distribution to be prepared by the payroll

department. Each of the services performed by the payroll department will now be described in detail.

92. Computing the Daily Earnings.—The payroll department comes into possession of the time tickets and wage slips after the clerks in the timekeeping department have completed their work on them. In the preceding pages it was explained that the timekeeping department does not release the time tickets and wage slips until the following information is completely shown: For each workman classed as a direct laborer, there must be shown on his time ticket the total number of hours worked during the day, the number of hours spent on each job, and the number of hours spent on each type of operation. Also, the name and number of the operations worked upon must be shown. The time tickets must also show a distribution of the hours worked to piece work, standard time, or day work. Before the time tickets are received in the payroll department, the work inspectors have completed the production-record columns, which show the number of different units ordered, spoiled, and produced. With all of these details shown on the time tickets, the payroll department is in position to insert the remainder of the details necessary for completion.

After the time tickets are received by the payroll department, in the condition just described, the rate clerk is the first one to come into possession of them. The rate clerk inserts the rates for the different operations as the time tickets show them to have been performed by the workmen. If the operations are paid for on the piece-work basis, the number of good pieces produced multiplied by the rates equals the piece-work earnings for the operations. A comptometer operator usually computes the earnings, because the extensions can be made more rapidly and more accurately by machine.

The time tickets showing operations performed at standard time rates are also sent to the desk of the rate clerk. The clerk enters the standard time for each operation, the total allowed time for the job, the time saved, and the rate. If a bonus or premium has been earned, the rate clerk may compute the premium earned, or this may be the work of another clerk. Any allowance for setting up the machine to perform a certain operation is inserted on the time ticket by a clerk in the payroll department.

Rates for each different operation performed within the plant are prepared by the rate department. The rate department is often a division of the time and motion study section of the production-planning department. In a plant having no production-planning department, the rate department frequently is a division of the payroll department.

After all the details pertaining to the hours on the standard-time plan have been entered on the time slip, it is, next, given to the comptometer operator. The values in the total time column multiplied by the rate give the total earnings. In Illustration 39 the total time of 3.75 hours is arrived at in the following manner. To perform one tapping operation, No. 65, requires .04 of an hour. Since operation No. 65 had to be performed 100 times, the standard time is 4 hours ($100 \times .04$ hour). The actual time required, by the workman, to perform the operation was 3

TIME TICKET

(After Completion in the Payroll Department)

Workman's Number 1 — Workman's Name John Neely

Job-Order Number E 661 — Department F(Turning, Boring, and Tapping)

Date January 3. 19

PIECE WORK

TIME Started	TIME Finished	Operation No.	Operation Name	Production Ordered	Production Spoiled	Production Accepted	Rate	Piece-Work Earnings	Set-Up Allowed	Total Piece-Work Earnings	Total Earnings
7:00	9:00	742	Boring 1/4" hole	100	0	100	.01	1.00		1.00	
9:00	10:00	743	" 3/8" hole	100	0	100	.013	1.30		1.30	
										2.30	2.30

STANDARD TIME

TIME Started	TIME Finished	Operation No.	Operation Name	Production Ordered	Production Spoiled	Production Accepted	Hours: Standard Operating Time	Hours: Standard Allowed Time	Hours: Actual Time Worked	Hours: Time Saved	Hours: Premium Earned	Hours: Set-Up Allowance	Hours: Overtime	Hours: Total Time	Rate	Total Standard Time Earnings	Total Earnings
10:00	12:00	65	Tapping	100	0	100	.04	4.00	3.50	.50	.15	.10		3.75	.60	2.25	
1:00	2:30															2.25	2.25

DAY WORK

TIME Started	TIME Finished	Nature of Work	Reasons for Day Work	Hours	Rate	Total Earnings	
2:30	4:30	M2 Helping Machinist	Machine Breakdown	2	.50	1.00	
						1.00	1.00
Total Hours $8\frac{1}{2}$		Inspector *T. J. Boyd*			Total Amount for Payroll		$5.55
		Timekeeper *C. Hayes*					

ILLUSTRATION 39

hours and 30 minutes or 3.50 hours. The time saved, then, amounted to one-half hour, stated as .50 hour. If the workman, according to the incentive wage plan shared 30 per cent. of the time saved, he would be paid for 30 per cent. of the .50 hour saved, or he would be paid for .15 hour (.30×.50=.15 hour). A set-up allowance of .10 hour was allowed for operation 65, as shown in Illustration 39. The total time of 3.75 hours is summarized in the following manner:

Actual time worked	3.50 hours
Premium earned	.15 hour
Set-up allowance	.10 hour
Total time	3.75 hours
Rate paid	$0.60
Total earnings, standard time rate	$2.25

The day rate is also entered on the time ticket by the rate clerk, and extended by the comptometer operator.

The time ticket, as completed by the rate clerk and the comptometer operator, is shown in Illustration 39. The total earnings amount to $5.55, as shown in the illustration. Before the time tickets are sent to the payroll clerk, they are subjected to another check. A clerk verifies each employe's daily time ticket with the employe's time-clock card.

WAGE SLIP

(After completion in the Payroll Department)

Date Jan. 2, 19__

Workman's Name Larry Malenfant Number 22

Time		Occupation		Hours	Rate	Earnings
Started	Finished	Number	Name			
7:00	12:00	514	Loading Scrap	5	.48	2.40
1:00	5:00	512	Delivering Stores	4	.48	1.92
				9		4.32

C. Hayes, Timekeeper *D. C. Davis*, Foreman

ILLUSTRATION 40

After the wage slips for the indirect laborers are made out each day and approved by the timekeeper they are sent to the payroll department. The number of hours worked by each employe classed as an indirect laborer has been entered on the slip by the foreman. The timekeeper approves the wage slips by placing his name in the proper space. In the payroll department the wage slips are first placed in the hands of the rate clerk. After the rates are placed on the wage slips, the slips are given to the comptometer clerk for extension. An example of a wage

PAYROLL SHEET

Payroll Sheet No. 1

Payroll for Period Ended January 15, 19

NO.	NAME	CLASS OF WORK	1 16	2 17	3 18	4 19	5 20	6 21	7 22	8 23	9 24	10 25	11 26	12 27	13 28	14 29	15 30	31	HOURS	RATE	AMOUNT	TOTAL EARNINGS	DEDUCTIONS				NET AMOUNT TO BE PAID
																							Stock Subscriptions	Payroll Advances	Group Insurance	F.O.A.B. Tax	Total Deductions	
		Piece Work			3	8	5	8½	8½		—	—	—	—	14	14			35	—	27.10						
		Std. Time			13	—	4½	—	—		8½	8½	8½	8½	7	7			56	60	33.60						
1	John Neely	Day Work			2	4	—	—	—		—	—	—	—	—	—			24	50	1.25	61.95	1.25		.62	2.37	59.58
		Piece Work																									
		Std. Time																									
2	Jake Borgs	Day Work			8½	8½	8½	8½	8½		8½	8½	8½	8½	8½	—	8½		93½	63	58.91	58.91	1.25	10.00	.53	12.34	46.57
		Piece Work			8½	8½	8½	8½	8½		8½	8½	8½	8½	8½	8½			102		71.05						
		Std. Time																									
18	Geo. Esterly	Day Work																				71.05	1.25		.71	2.46	68.59
		Piece Work																									
		Std. Time			7	8½	8	8½	7		8½	8½	8½	8½	8½	8½			96	60	57.60						
19	Jim Reed	Day Work			1	1			2				2						6	50	3.00	60.60	1.25		.61	2.35	58.24
		Piece Work				3½		8½	8½										34	—	28.01						
		Std. Time									9	10	10	10	10	10			59	55	32.45						
20	Howard Kidd	Day Work																				60.46	1.25		.60	2.35	58.11
		Piece Work			59	53	50	60	66	58		61	61	55	61	67	60		716		501.20						
		Std. Time			96	96	99	97	98	97		99	99	99	99	99	97		1.170		749.76						
	TOTAL	Day Work			5	4	6	2	8	3		4	6	5	4	3	4		54		27.00	1.277.96	35.00	25.00	13.00	12.78	82.78	1.195.18
	TOTAL HOURS																		1.940								

*Data for Nos. 3-17, which appeared in the actual Payroll are here omitted.

ILLUSTRATION 41

slip, completely filled in, is shown in Illustration 40. The total earnings amount to $4.32, as shown in the illustration.

93. Verifying the Number of Hours Worked. The number of hours worked by the shop employes as shown on the time tickets and wage slips are not accepted as final and conclusive by the payroll department. Good management dictates another verification even though the timekeeper has approved the number of hours worked as shown on those forms. Without any check-up other than that of the timekeeper on the number of hours worked by the employes, it would be easy to defraud the company. The timekeeper could turn in fake time tickets and wage slips for hours worked, when the workmen were absent. A previously made agreement between the timekeeper and workmen to practice such fraud would be followed by the guilty parties splitting the fake earnings. Such a practice is fairly well guarded against by the use of the time-clock card.

The time-clock card of each workman, as described in Art. 86, will show the exact number of hours each man spent in the shop each day. The safeguards

established around the punching of the time-clock card fairly insure a correct statement of the hours worked. Therefore, a comparison of the time-clock card of each workman with his time ticket or wage slip, by a responsible employe of the payroll department, should detect any attempted payroll padding. The time checker in the payroll department may use one of two methods in checking the hours worked by each workman. The verification may be made daily, or it may be made for the entire pay period at one time.

94. Preparation of the Payroll.—The payroll sheet is a transcript of the daily time tickets and wage slips. There is an innumerable variety of payroll forms. Every plant has a form to fit its needs as outlined by the head accounting officer, or by the firm designing the cost system. Regardless of the many forms of payroll that are in use, the general nature of the details entered on the payroll sheet is the same.

After the earnings have been computed on the daily time tickets and wage slips the forms are turned over to the payroll clerk. The clerk sorts the time tickets in numerical order in accordance with the workmen's numbers, because they are entered on the payroll in this order. An example of the payroll sheet is shown in Illustration 41. Note the information relative to the number of hours worked on January 3, by John Neely, employe No. 1. The payroll sheet shows that he worked 3 hours piece-work time, $3\frac{3}{4}$ hours standard time, and 2 hours day work. Reference to Illustration 39 shows that these hours worked were so classified on this man's time ticket for January 3. A transcript of Neely's time tickets for the first 15 days of the month, as shown on the payroll, reveals the following information:

Piece work	36 hours
Standard time	56 hours
Day work	$2\frac{1}{2}$ hours
Total, January 1 to January 15 inclusive	$94\frac{1}{2}$ hours

The total hours Neely spent within the plant, as shown by his time-clock cards, plus his set-up allowances and premiums earned (expressed in hours) for the period, must be $94\frac{1}{2}$ hours.

The payroll sheet shown in Illustration 41 is more complicated than are some others found in use. Since the workmen in the plant are paid on three different bases, it is necessary to have a set of three spaces for each workman to record their earnings. Piece work, standard time, and day work are the three bases upon which the workmen's earnings are computed.

Before the payroll is approved, so that the wages can be paid, numerous summary verifications must be made. Checking the time-clock cards with the time tickets has been described already. Other verifications are employed: A recapituation of three daily totals is made at the end of the pay period. The piece-work hours worked each day by all workmen as shown on the daily time tickets are totaled. In the case shown in Illustration 41, the grand total of the daily totals would have to be 716, the total number of piece-work hours shown at the junc-

tion space of Total Piece Work and the Hours columns. Likewise, the total standard time hours of 1,170, and day work hours of 54 would be proved.

The total number of hours worked by the direct laborers, as shown at the bottom of the payroll sheet, amounts to 1,940 hours. The total hours divided as to piece work, standard time, and day work may be used for another purpose beside payroll verifications. One of the methods of distributing the factory overhead expense is on the basis of the direct-labor hours worked. The payroll sheet is a convenient place for collecting the total number of direct-labor hours worked.

The total amount of piece-work earnings for each employe, as shown on the payroll sheet, must be taken directly from the workman's time tickets. Piece-work rates differ in accordance with the operations involved. One workman may perform many different operations. Therefore, no one rate can be entered in the rate column for piece work. The piece-work rates can be shown only on the time tickets. The daily time ticket shows the piece-work earnings for the day. The total piece-work earnings for the payroll period, as taken from the daily time tickets, is placed in the amount column. This figure for John Neely, workman No. 1, was $27.10.

The total piece-work earnings of all workmen, for the pay period ended January 15, was $501.20. This amount is shown in Illustration 41 in the junction space of the Total-Piece-Work line and the Amount column. The daily total of the piece-work earnings of all employes for the payroll period ended January 15 also should be $501.20, to agree with the payroll-sheet total.

Since each workman is paid a fixed rate for each hour of standard time worked, it is a simple multiplication process to ascertain the amount of wages earned on that basis. The same thing holds true for day work. For example, in Illustration 41, workman No. 1 worked 56 hours standard time, and at $0.60 an hour the earnings were $33.60. The total standard-time earnings of $794.76 is verified in the following manner before the payroll is approved for payment. Each day an adding-machine tape of the workmen's time tickets is run, listing the standard-time earnings. A recapitulation of these daily adding-machine tape totals must be the same amount as shown when the standard-time earnings of all workmen are totaled for the payroll period. In like manner, the day-work earnings are verified.

With verifications of piece-work earnings, standard-time earnings, and day-work earnings made as described, the total earnings are easy to compute and verify. The earnings of each workman as shown in the total earnings column ($61.95 for workman No. 1, as shown in Illustration 41) for the payroll period, when added together equal the total earnings of the payroll period ($1,277.96 in the same illustration). The total piece-work earnings ($501.20), the total standard-time earnings ($749.76), and the total day-work earnings ($27.00) when added together, give the same grand total of $1,277.96.

When all of the preceding verifications as to earnings and hours have been made accurately, the paymaster can feel quite certain that the payroll is correct. The payroll sheet is not completed until the deductions are recorded, and the net wages for each workman computed.

It is one of the functions of the payroll department to handle deductions, chargeable against the employes. Deductions include a varied group of items. Capital-stock subscriptions, payroll advances, group insurance, Federal old age benefit tax, rent, company-store purchases, etc. are illustrations of deductions. The information pertaining to the deductions is given to the payroll department by the general accounting department. The information consists of the amounts and nature of the deductions to be made against each employe. The deductions applicable to each employe are classified on the payroll sheet in accordance with their nature, as shown in Illustration 41. The total amount to be deducted from the total earnings of each employe leaves the net amount to be paid. This amount appears in the last column on the right-hand side of the payroll sheet.

The total appearing in the Net Amount To Be Paid column is the amount for which a voucher is drawn for payment of the payroll. All of the totals in the money columns of the payroll sheet are used in making the voucher. When the voucher is entered in the voucher register, the debits and credits therein are equivalent to the following general journal entry:

Payroll (Direct Labor)	$1,277.96	
Stock Subscriptions		$ 35.00
Payroll Advances		25.00
Group Insurance		10.00
Federal O.A.B. Tax		12.78
Accounts Payable		1,195.18

The total direct-labor earnings of $1,277.96 is the figure which is analyzed by the cost department. Direct-labor costs are analyzed by departments, operations, and orders. The details pertaining to the labor distribution are described further on.

All workmen classed as direct laborers are grouped together on the payroll sheets. A separate sheet or sheets contain the hours worked and earnings of the indirect laborers. The same type of entry as the preceding one is used to debit the indirect labor to its ledger account. A distribution of the indirect labor is required as well as of the direct labor.

CHAPTER XII

COSTING LABOR

95. Costing Labor Defined.—Costing labor is the process of transferring the direct labor charges from the payroll account to a production cost account. Where the nature of the product manufactured is such that it is necessary to account for work in process inventory costs, the direct labor costs are charged to a cost of production account. The production cost account is generally termed the Work in Process Inventory account.

Indirect labor must not be confused with direct labor in connection with costing. While it is true that indirect labor must be accounted for, it is costed as a manufacturing overhead expense item, and not under the general name of labor. Indirect labor is costed under the heading of manufacturing overhead expense because of its nature. It is exceedingly difficult, if not impossible, to allocate any indirect labor costs to any one unit of product, or to any one plant production order.

Direct labor costs per unit of product or plant production order can be determined very accurately by the use of properly designed time tickets. Since direct labor costs can be determined with such a degree of accuracy, they are costed into production as a separate element of cost.

Costing labor is one of the functions of the cost department. The payroll department turns over to the cost department the time tickets and wage slips after they have served their usefulness for payroll purposes. The cost department then analyzes the time tickets and wage slips preparatory to costing. Direct labor charges are costed to departmental Work in Process Inventory accounts. Indirect labor charges are costed to service-department expense accounts, which are divisions of overhead expense. The manner in which the service-department costs are handled is described later.

96. Steps Preliminary to the Costing of Labor.—A plant production order should be brought into existence before direct labor is costed. In a plant specializing in the production of standard commodities for warehouse stock, a process order number should be the authority for such production. The issuance of monthly numbered process orders, however, is not always the practice followed. If monthly numbered process orders are not issued, the direct labor cost is charged to the department in which the direct laborers are engaged. In a plant specializing in the production of job orders, separate job orders are the authority for production. The direct labor cost applicable to the various jobs is charged to the respective job-order numbers.

Plant production orders do not necessarily have to be brought into existence, before indirect laborers are put to work. This is because workmen classified as indirect laborers do not have any portion of their time charged directly to any production order. The cost of the services which they perform is charged to some service-department account. Sometimes the indirect-labor cost for the different

service departments is charged to a standing order number for each department. These standing order numbers are generally coded account numbers identifying the indirect-labor cost with certain service departments.

The production planning department when such a department exists plays an important part in the costing of direct labor, especially in a job-order plant. This department analyzes the job orders with respect to the operations that are required to be performed by the direct laborers. The operations are listed on the job-order card. As each operation is completed by the direct laborers, their time is charged on the time tickets and later to job-order cards, specifying the job-order number affected.

The time ticket is the form from which the proper costing of the direct laborers' time is done. When these forms are properly filled in, showing the time worked by the direct laborers, they constitute the source of information from which the labor distribution is prepared. The preparation of a labor-distribution sheet is one of the final steps in costing direct labor in a process manufacturing plant. Collecting the direct-labor costs on the job-order cost card is one of the final steps of direct-labor costing in a job-order manufacturing plant.

The wage slips prepared daily for the indirect laborers show the information which permits the proper charges to be made to the indirect-labor expense accounts. Analyses and summaries of the wage slips are made in order to permit the proper costing of indirect labor as a manufacturing overhead expense item.

97. Essentials of Accurate Labor Costing.—Accurate labor costing depends, primarily, upon accuracy in the preparation of time tickets and wage slips. All of the plant personnel having anything whatsoever to do with the preparation of these two forms must be impressed with the need for accuracy. Correct charges for direct labor in production departments, and correct charges for indirect labor in service departments insure proper labor costing. The need for proper labor costing is quickly understood when it is remembered that it has a direct effect upon unit costs and net profit.

To insure the proper costing for labor, time-clock cards must always set forth the correct number of hours each workman spends within the plant. With this information known to be correct, verification may be made with the time tickets and wage slips. This verification establishes the accuracy of the number of hours worked.

Another essential of accurate labor costing is the insertion of the correct rates on the time tickets and wage slips. The rate clerk must use extreme care in entering the correct rate for the operation performed, for the piece work completed, and for the day work charged. Errors in rates paid, of course, mean errors in unit costs and profits. Making the correct extensions and adding the total earnings on the time tickets and wage slips are as important as the other essentials of accurate labor costing. Accuracy and precision in every particular must accompany the preparation of the time tickets and wage slips. With an assurance of these qualities reflected in every workman's daily record of time worked, the correct distribution of labor charges to the proper accounts is assured. An accurate and rapid distribu-

tion of labor depends upon a good classification of accounts for direct labor and for indirect labor.

98. Classification of Accounts for Labor.—Direct labor is usually classified by departments. Each different operation within a department is numbered so that labor required for different operations may be costed. An illustration of the classification of labor accounts for a foundry is as follows:

DIRECT LABOR

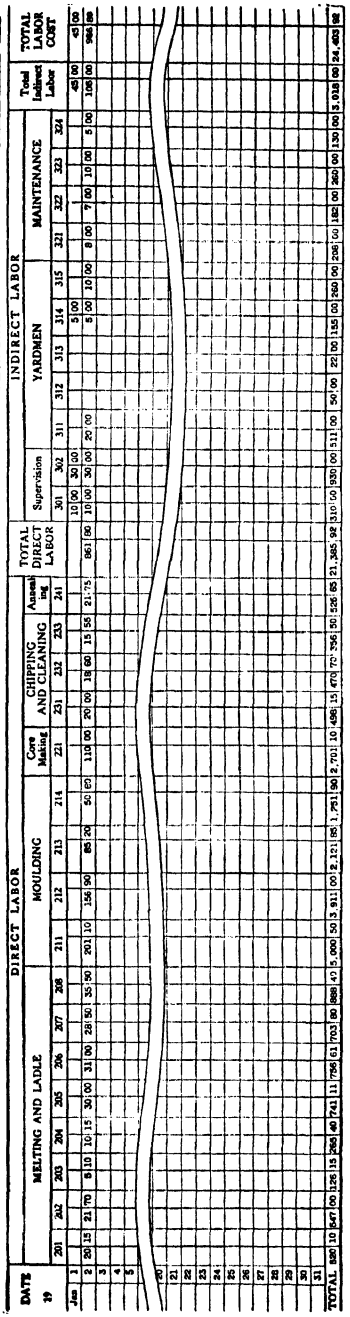
Department		Operation	
Code Number		*Code Number*	
20	Melting and Ladle		
		201	Breaking scrap
		202	Loading scrap
		203	Weighing scrap
		204	Elevator operators
		205	Charging operators
		206	Cupola melters
		207	Slag handlers
		208	Ladle operators
21	Molding		
		211	Molders and helpers
		212	Molding machine operators
		213	Pouring
		214	Shakers
22	Coremaking		
		221	Coremakers
23	Chipping and Cleaning		
		231	Chipping
		232	Cleaning
		233	Sand blasting
24	Annealing		
		241	Annealers and helpers

INDIRECT LABOR

Department		Operation	
Code Number		*Code Number*	
30	Supervision		
		301	Superintendent
		302	Foremen
31	Yardmen		
		311	Material handlers
		312	Cleaning yard
		313	Cleaning windows
		314	Watchmen
		315	Cranemen
32	Maintenance		
		321	Carpenters and helpers
		322	Masons and helpers
		323	Machinists and helpers
		324	Pipe fitters and helpers

If the foundry produced both brass and gray-iron castings, the two different shops could be differentiated by other code numbers. The brass foundry labor could be designated by the numerical prefix 1; the gray-iron foundry labor by the numerical prefix 2. Thus, cupola melters in the brass foundry would charge their time to account 1206. This code number, when analyzed quickly, conveys the following information:

1 Brass foundry.
20 Direct labor in melting and ladle department.
6 Cupola melting as the specific type of direct labor.



LABOR DISTRIBUTION SHEET

LABOR DISTRIBUTION FOR THE MONTH OF January 19__

| DATE 19 | DIRECT LABOR | | |

to record the distribution to the direct-labor accounts. The journal entry, Illustration 43, would be made for the direct-labor distribution shown in Illustration 42. The direct labor as an element of cost is thus costed into production.

It must be understood that the account, Payroll (Direct Labor), is merely a clearing account. For example, during the month of January vouchers were drawn for the payroll, as shown in Illustration 44, and at the end of the month the total of these vouchers, $21,385.92, was debited to Payroll (Direct Labor), as shown in Illustration 45, which exhibits the account after all the debits and credits have been posted to it.

FACTORY JOURNAL 7

19—							
Jan.	31	Work in Process Inventory, Melting and Ladle Department		$ 4,548	57		
		201 $520.10					
		202 547.00					
		203 126.15					
		204 265.40					
		205 741.11					
		206 756.61					
		207 703.80					
		208 888.40					
		Work in Process Inventory, Molding Department		12,285	25		
		211 $5,000.50					
		212 3,911.00					
		213 2,121.85					
		214 1,251.90					
		Work in Process Inventory, Coremaking Department		2,701	10		
		221 $2,701.10					
		Work in Process Inventory, Chipping and Cleaning Department		1,325	35		
		231 $498.15					
		232 470.70					
		233 356.50					
		Work in Process Inventory, Annealing Department		525	65		
		241 $525.65					
		Payroll (Direct Labor)	33			$21,385	92
		To record the distribution of direct labor for January					

ILLUSTRATION 43

The debits to the various direct-labor accounts are made in the subsidiary ledgers. Each departmental Work in Process Inventory account has a summary debit posted thereto. These summaries are totals of the individual postings made to the specific direct-labor accounts in the different subsidiary ledgers.

The totals as shown in the labor distribution sheet, which are posted as debits to the direct-labor accounts, are also used in the preparation of the monthly cost sheet. This is discussed later.

What has been said about the methods of distributing direct labor holds true for indirect labor with few exceptions.

The wage tickets coming from the payroll department form the basis for the preparation of the indirect-labor distribution. The labor distribution is made in accordance with the classification of indirect-labor accounts for the various departments. Care must be taken to insure an exact agreement of the amount for indirect labor as shown in the daily payroll and in the daily labor distribution.

VOUCHER REGISTER 9

Date	In Favor of	Voucher Number	Paid		Accounts Payable		Payroll (Direct Labor)	
			Date	Check				
19—								
Jan. 16	Paymaster	1099	1–18	333	$10,562	40	$10,562	40
Jan. 31	Paymaster	1207	2–3	471	10,823	52	10,823	52
							$21,385	92
							33	

ILLUSTRATION 44

The monthly closing entry for the indirect labor is prepared from the labor-distribution sheet. The various service-department expense controlling accounts are charged with the indirect labor. The closing entry for indirect labor prepared from the labor-distribution sheet shown in Illustration 42 is shown in Illustration 46.

The specific indirect-labor expense accounts are debited in the subsidiary ledgers controlled by their respective service-department control accounts. The credit to the account, Payroll (Indirect Labor), cancels the debit posted to that account from the voucher register.

PAYROLL (Direct Labor) 33

19— Jan.	31		*VR9*	$21,385	92	19— Jan.	31	Distribution	*FJ7*	$21,385	92

ILLUSTRATION 45

The method of costing indirect labor is described later, since this type of labor is classified as a manufacturing overhead expense item.

The analysis of direct-labor and indirect-labor costs as shown in the labor-distribution sheet has another use which has not been mentioned. If the labor distribution is made by operations and occupations as shown by the coded account

numbers, the cost of each operation and occupation is easily known at the end of the month. This information is used as a basis for computing the estimated workmen's compensation insurance cost for each month. The compensation insurance rates vary in accordance with the hazard of the occupation. Since the labor is distributed by occupations, it is an easy matter to estimate the monthly liability for payment to the insurance company writing the policy for the plant. The details of preparing the entry for this overhead expense item are described later.

100. Costing Direct Labor in a Process Cost System.—Direct labor is costed into production as a summary in a process cost-accounting system. The issuance of plant production orders, which are the authority for requisitioning raw materials, likewise brings direct labor into operation. The procedure of accumulating the

FACTORY JOURNAL 8

19—							
Jan.	31	Supervision		$1,240	00		
		301	$310.00				
		302	930.00				
		Yardmen		998	00		
		311	$511.00				
		312	50.00				
		313	22.00				
		314	155.00				
		315	260.00				
		Maintenance		780	00		
		321	$208.00				
		322	182.00				
		323	260.00				
		324	130.00				
		Payroll (Indirect Labor)				$3,018	00
		To record the distribution of indirect labor for January					

ILLUSTRATION 46

direct-labor costs, from the preparation of the time tickets to the labor distribution, has been described fully. The direct labor as analyzed in the labor-distribution sheet forms the basis for costing the direct labor. The direct labor is costed into production in accordance with the nature of the plant and the commodities produced. Some process cost systems have but one Work in Process Inventory account; others have a separate Work in Process Inventory account for each different department. The labor-distribution sheet should be drawn up in accordance with the number of Work in Process Inventory accounts in use in the accounting system. At the end of each month the summaries in the labor-distribution sheet form the basis for costing the direct labor. A factory journal entry debits the Work in Process Inventory account or accounts and credits the Payroll (Direct Labor) account. An example of the entry used in costing the direct labor is given in Illustration 43.

101. Costing Direct Labor in a Job-Order Cost System.—Direct labor is costed into production, in a job-order cost system, by means of the job-order cost cards. Every job order is analyzed by the engineering department or the production-planning department. The necessary operations to be performed by the direct laborers in the different departments are analyzed and recorded on a route sheet. The route sheet follows the job from department to department until the job is finished. As each direct laborer completes his operations, he charges his time to the job order upon which he is working. The time ticket may show numerous small quantities of time charged to a number of different job-order numbers. A separate job-order cost card is prepared for each different job order. It records the direct-labor costs as well as the raw-material and manufacturing overhead expense costs. The job-order cards must be kept posted up to date in order to know the cost of the job when the shipment is invoiced to the customer. After the time tickets have passed through the payroll department, they go to the cost department. A cost clerk then charges the amounts of direct labor to the cost cards as indicated by the job-order time tickets. The individual job-order cards thereby record the cost of the direct labor.

Three different methods of costing direct labor to production may be used so far as the books of account are concerned. One method makes use of the labor-distribution sheet in the manner already discussed. The second method costs the direct labor into the Work in Process Inventory account or accounts daily from the time tickets at the same time the record is made on the job-order cost cards. A third method provides a charge to the Work in Process Inventory account or accounts when the job order is completed. The second method keeps the Work in Process Inventory account or accounts posted up to date. This method also requires a much greater amount of clerical effort to record the entries in the factory journal.

Use of the third method may be made where there is but one Work in Process Inventory account in use. It is a poor method to use if accounts are kept for the Work in Process Inventory in each department. If the entry debiting direct labor is not made in the factory journal until the job is completed, an analysis must be made of all the time tickets pertaining to the job to ascertain the departmental-labor operating charges. The third method is used, therefore, where but one Work in Process Inventory account is in the factory ledger. Under the third method, an analysis of the uncompleted job-order cards must be made at the end of each month. This is necessary in order to ascertain the amount of the direct-labor charges accumulated on the uncompleted jobs. An entry must be made for the direct labor charged to the uncompleted jobs so that the Work in Process Inventory and Payroll (Direct Labor) accounts will be adjusted properly.

CHAPTER XIII

ACCUMULATING OVERHEAD EXPENSES

102. Manufacturing Overhead Expense as a Cost Element. — Manufacturing overhead expense includes all of the expense items entering into the cost of production, except raw materials and direct labor. Manufacturing overhead expense, as a cost element, is found to be vastly different from the other two cost elements. Overhead expense, as a collective title, includes a wide variety of expense items. Many overhead items such as depreciation, taxes, indirect labor, insurance, etc., are common to practically all types of manufacturing concerns. Other overhead expense items are peculiar to certain manufacturing plants by virtue of differently named accounts. For example, a large manufacturing plant usually has separate accounts for numerous classifications of indirect labor. Indirect labor may be subclassified by the following named accounts: foremen, inspectors, rate setters, material handlers, testers, production clerks, etc.

The nature of manufacturing overhead expense accounts is such that they must be handled in a manner very different from the other two elements of cost. Raw-material costs and direct-labor costs can be definitely charged to production and job orders. Raw-material costs, as well as direct-labor costs, can be definitely measured as they apply to operations and job orders. Such definite measurement is not the case with manufacturing overhead expenses. In many instances it is impossible to determine the exact money value of the overhead-expense items used in particular productive operations. Even though it may be possible to ascertain the exact amount of the various overhead-expense items pertaining to a specific operation or to a job order, the clerical cost to determine it would be prohibitive. Therefore, manufacturing overhead expenses must be combined, and the total monthly cost spread equitably over the various units of production.

Spreading the cost of factory overhead expenses equitably over the monthly production is one of the biggest problems in cost accounting. The problem challenges not only the cost accountant, but the industrial engineer and the factory management as well. Study and research are being carried on constantly to evolve better plans and methods of accounting for manufacturing overhead expenses. Trade associations are devoting much of their time to the overhead problem; cost accounting associations are constantly discussing principles involved in the overhead problem. Industrial engineers are joining hands with the cost accountants in an endeavor to solve the overhead problem within individual plants.

103. Importance of Manufacturing Overhead Expense.—While raw materials may be substituted, they never can be displaced by another cost element. The style of a finished product may change yearly, involving the use of more glass and less wood, or vice versa, but substantially the same quantities of raw materials,

as a whole, are required from year to year. The situation with respect to the other two elements of cost, direct labor and overhead expense, is very different.

The relative importance of direct labor and overhead expense began to shift as far back as the middle of the eighteenth century. This date is important because it marks the beginning of the industrial revolution, when the first spinning and weaving machinery was invented. The perfection of newer and more complex machinery has been most pronounced since the beginning of the twentieth century. With the methods of production shifting from the hand basis to machine routine, there has come a shift in the relative importance of the cost elements of direct labor and overhead expense. The trend, in practically every industry, has been toward more machinery and less direct labor. Many machines in use today are entirely automatic. Raw materials are fed into machines, processed, and thrust out in a series of automatic steps without the direct aid of human hands. Direct-labor costs at one time represented the largest of the three cost elements in many industries. Today, overhead costs are often the largest. The causes for the predominance of manufacturing overhead expenses will now be described.

Machinery, tools, and equipment necessitate extensive investments of cash. Complex automatic machines sometimes cost in excess of $100,000. Depreciation charges are therefore quite heavy, and improvements have been made so rapidly that obsolescence has become a vital problem. Machinery that is in perfect operating condition and capable of rendering many more years' useful service is consigned to the junk pile. New equipment, capable of producing more economically a greater output, must be purchased. Failure to purchase the new machines means inability to compete on the same basis with other manufacturers in the same field of production. The problem of charging off the undepreciated cost of the obsolete and replaced equipment is an overhead problem.

Large investments in machinery and equipment, with increased depreciation charges, are accompanied by greater insurance expense. In states where manufacturing establishments are not favored by tax exemption, the taxes on equipment are measured by its value. The greater the investment in the equipment, then, the greater the amount of tax expense. The increased use of machinery also increases other overhead expense items. Repairs and maintenance naturally are greater. The larger the machines, or the more machines there are in use, the greater the power expense. In order to explain methods of accumulating and controlling overhead expenses, it is necessary to describe the classifications under which manufacturing overhead expenses may be grouped.

104. Classifications of Manufacturing Overhead Expense.—Manufacturing overhead expense can be classified under three general headings, as follows:

I. Items	II. Departments	III. Applications
A. Non-variable	A. Production	A. Specific (Direct to department)
B. Semi-variable	B. Service	B. General (Common to several departments)
C. Variable		

The classification of manufacturing overhead expense as to items is a three-fold one. A sharp distinction can be drawn between the three separate groups of non-variable, semi-variable, and variable items.

Non-variable overhead items are those items of manufacturing expense which have a constant existence. They are ever-present expenses, which must be accounted for, whether or not the plant operates full time, part time, or stands idle for a year's time or more. Specific illustrations of non-variable manufacturing overhead expense items are:

> Depreciation of plant and equipment, Insurance on plant and equipment, Taxes on plant and equipment, Rent (if buildings are not owned), Interest on investment (if the theory is accepted that it is a cost item).

In any plant these expense items are ever present, with the possible exception of rent and interest. As long as the plant is operating at normal capacity, the non-variable expenses are being absorbed properly into the cost of production. As soon as production falls below normal, or possibly reaches a standstill, what about the non-variable overhead expense items? Depreciation continues despite a shut-down, and adjustments must be made for it at the end of each month. Insurance on plant and equipment has been paid in advance, and each month a pro-rata share of it must be charged off. Taxes on plant and equipment accrue from month to month and must, therefore, be costed to the product. Costing non-variable overhead expense items presents a real problem where production is at any point below normal. If the full amount of non-variable manufacturing overhead expense items is costed to the product when the plant is operating less than normal, the unit cost of production is increased. The fewer the units produced, the greater becomes the unit cost. If production costs are to fluctuate violently owing to this cause, they are of little use for future reference as bases upon which to determine prices.

There is small wonder that the plant management is constantly endeavoring to keep the plant operating at top speed and capacity. Not to do so means failure to utilize available facilities. In not utilizing the plant facilities to the fullest, an absorption must be made of these non-variable expenses as a pure loss. Plant idleness is fought, therefore, by all the skill and cunning of modern management.

Semi-variable overhead items are those items of manufacturing expense which vary, but which do *not* vary in direct proportion to productive output. These items are sometimes called semi-fixed, or curved, overhead expenses. Semi-variable overhead expense items include indirect labor classified as the supervisory group. Specific illustrations of semi-variable manufacturing overhead-expense items are salaries and expenses for the following employes:

> Superintendent and assistants, Foremen and assistants, Inspectors, Supervisors, Rate setters, Cost clerks, Production-planning department employes, Any other minor plant executive or shop workman paid on salary basis.

Examples of semi-variable overhead expense items, or items that do not vary in direct proportion to productive output, are as follows:

If a plant is completely idle, no factory superintendent is needed, and therefore no overhead-expense outlay is required. As soon as the plant resumes operations, however, a superintendent must be employed. Until the plant operates at 40 or 50 per cent. of its productive capacity, the superintendent may be able to care for all of the details coming under his supervision. Beyond the 40 or 50 per cent. operating point the superintendent may require an assistant. The salary paid to the superintendent and his assistant does not follow a sliding scale proportionate to the relative percentage of manufacturing activity. A plant operating from 1 to 25 per cent. of normal capacity may require three inspectors; from 26 to 50 per cent. of normal, six inspectors; from 51 to 75 per cent. of normal, nine inspectors; from 76 to 100 per cent. of normal, a dozen inspectors. The indirect-labor expense of the inspectors does not, however, run a line parallel to product output. It is easy to see, then, why this class of manufacturing overhead expense items is termed semi-variable.

Some manufacturing concerns consider it necessary to retain their superintendent, their departmental foremen, and other important minor executives even if the plant is idle. The theory is that these men form a nucleus of experienced men that it is necessary to keep intact. To discharge them when a plant shut-down is necessary would mean destroying a smooth working personnel which may have taken years to organize. The expense of assembling and training a similar group of executives would be much more costly than keeping the key men on the payroll when the plant is idle. Under these circumstances, the salaries of the key men are treated as a non-variable expense, or fixed charge, when the plant is absolutely idle.

Variable overhead items are those items of manufacturing expense which fluctuate in direct proportion to the productive activity. Specific illustrations of some variable manufacturing overhead-expense items are: Supplies, or all store items which cannot be classed as raw materials; Indirect labor, such as oilers, sweepers, cleaners, floating labor gang, watchmen, crane operators, elevator operators, firemen, engineers, internal truckers, etc.; Compensation insurance; Electric power; Compressed air; Heat; Water; Defective work; Repairs and maintenance.

There are many other items of variable expense which are peculiar to individual plants. The preceding group enumerates the most common types.

Manufacturing overhead expense may be classified according to the departments to which the expenses apply. Overhead expenses are applicable either to the production departments or to the service departments. Production departments are those departments in which the units of product are worked upon. In the production departments the raw materials are transformed by the direct laborers into finished goods. Service departments are those departments which are secon-

dary to the production departments. Service departments perform services necessary for, common to, and used by the production departments.

The nature of the plant and the type of products manufactured determine the names applied to the different production departments. For example, a brick manufacturing concern may have the following departments: Mining, crushing, mixing, molding, drying, enameling, and firing. A machine shop may be divided into the following departments: Turning, boring, planing, milling, gear cutting, drilling, and grinding.

The number of service departments required by a manufacturing plant usually depends upon the size of the plant. A small foundry may have the following service departments: Engineering, maintenance, and floating labor. A large electrical manufacturing company may have, in addition to the three named service departments, the following: Supervision, personnel and welfare, purchasing and stores, cost accounting, production planning, motion and time study, toolroom, power, and police and fire.

Manufacturing overhead expenses in production and service departments are also classified as to items. Controlling accounts are established for each production department and for each service department. The subsidiary ledger or record of each controlling account for manufacturing overhead expense provides the detailed record of the non-variable, semi-variable, and variable expense items. An illustration of the accounting system for manufacturing overhead expenses for production and service departments is shown in Art. 105 and those following.

The third classification of manufacturing overhead expenses pertains to the applications of the overhead items. Overhead-expense items classified as to their application are either specific or general. A specific item is an overhead-expense item chargeable direct to a certain department. Examples of specific items are supplies, power where measured by meter, defective work, repairs and maintenance, and depreciation.

A general overhead-expense item is one that is common to several or all departments. Examples are heat, water, compensation insurance, and indirect labor. Some plants endeavor to reduce to a minimum the items enumerated as general overhead items. Indirect labor, for example, may be charged directly to certain departments if the wage slips show sufficient detail to make it possible. An effort always should be made to reduce the general overhead expenses to a minimum. The prorating of overhead expense items to different departments not only requires more accounting, but it must be done in an arbitrary manner. Regardless of the refined methods employed to determine the arbitrary method of prorating expenses, inequalities and misstated charges are bound to result.

105. Accumulating Overhead Expenses in the General Ledger.—The sources from which manufacturing overhead expenses are posted are the voucher register, factory journal, and general journal or journal vouchers when the cost accounts are kept in the general ledger. When the cost accounts are kept separately in the factory ledger and the ledger contains a reciprocal control account, the overhead expenses are posted to their accounts from the factory journal.

The accumulating of overhead expenses where the cost accounts are kept in the general ledger is the easier method. This plan may be adopted in a small manufacturing plant, but cannot be used to advantage in a large plant. Accumulating the manufacturing overhead expenses in a single overhead controlling account in the general ledger is first explained. The debits to the Manufacturing Overhead Expense controlling account can be classified into three groups as to their origin in the books of original entry. The voucher register, the factory journal, and the general journal or journal vouchers are the three sources of original entry under which the collecting of specific overhead items is described.

The voucher register has a column bearing the title of the Manufacturing Overhead Expense controlling account. Therein are entered all amounts representing cash expenditures, the entire amount of which is an overhead expense chargeable in full during the month. The chief items in this group are:

Rent.
Repairs (when made by an outside party).
Small Tools (when the accounting policy is to charge off their cost as an expense rather than to capitalize their cost).
Ice (for factory water coolers).
Miscellaneous factory expense (forms such as factory time tickets, wage slips, purchase requisitions and purchase orders, miscellaneous supplies, etc.).

The voucher indicates the specific overhead-expense account to be charged in the manufacturing overhead expense ledger. An illustration of the entries in the voucher register, and the postings to the general and subsidiary ledgers are shown in Illustration 47.

The controlling account in the general ledger accumulates summaries of the manufacturing overhead expenses, not only from the voucher register, but from the factory journal and from the general journal or journal vouchers. The specific accounts in the manufacturing overhead expense ledger collect the details of the summaries. The details are used in the preparation of cost statements, cost reports, and overhead-expense budgets.

The factory journal has a column for entering amounts chargeable to the Manufacturing Overhead Expense controlling account. The amounts entered in that column represent intraplant transactions. The items recorded in the factory journal differ in this respect from the items that are entered in the voucher register.

VOUCHER REGISTER V 39

Date		In Favor of	Voucher No.	Paid		Accounts Payable		Manufacturing Overhead Expense	
				Date	Check				
19__									
July	2	Reliable Realty Co.	7000	1- 2	1000	300	00	300	00
	5	Frank Printing, Inc.	7010	1-15	1010	47	22	47	22
	12	Macon Machine Co.	7027			91	37	91	37
	17	Harvey & Salter	7059			156	41	156	41
	23	Star Supply Store	7072			5	92	5	92
	31	Polar Ice Co.	7163			10	50	10	50
						611	42	611	42
								(77)	

GENERAL LEDGER

Manufacturing Overhead Expense (Control) 77

19__																	
July	31			V39	611	42											

MANUFACTURING OVERHEAD EXPENSE LEDGER

Rent 7701

19__																	
July	2			V39	300	00											

Repairs, Building 7702

19__																	
July	17			V39	156	41											

Small Tools Expense 7703

19__																	
July	12			V39	91	37											

Water Cooler Service 7704

19__																	
July	31			V39	10	50											

Miscellaneous Factory Expense 7705

19__																	
July	5			V39	47	22											
	23			V39	5	92											

ILLUSTRATION 47

FACTORY JOURNAL

FJ 11

Date	Explanation	Reference	Manufacturing Overhead Expense Dr.	Stores Cr.	Sundry Amount	Sundry Folio	Sundry
19__							
July 6	25 Gal. Lubricating Comp.	14740	25 00	25 00			
9	Supplies for repairing machine	14816	9 20	9 20			
15	Defective work on order #8147	D 702	17 85		(Cr) 17 85		Work in Process Inventory
23	Glass to replace broken panes in building	14911	23 16	23 16			
28	Miscellaneous supplies	14993	192 47	192 47			
29	Defective work on order #J 787	D 703	5 30		(Dr) 4 20		Stores
					(Cr) 9 50		Work in Process Inventory
			272 98	249 83	(Cr) 23 15		
			(77)				

GENERAL LEDGER

Manufacturing Overhead Expense (Control) 77

19__					
July	31	V39	611	42	
	31	FJ11	272	98	

MANUFACTURING OVERHEAD EXPENSE LEDGER

Factory Supplies 7706

19__				
July	6	FJ11	25	00
	28	"	192	47

Repairs, Machinery 7707

19__				
July	9	FJ11	9	20

Defective Work 7708

19__				
July	15	FJ11	17	85
	29	"	5	30

Repairs, Building 7702

19__				
July	17	V39	156	41
	23	FJ11	23	16

ILLUSTRATION 48

GENERAL JOURNAL

J 28

	Manufacturing Overhead Expense	July 31, 19___	General Ledger	
	550 00	Supervision		
	78 90	Repairs, Buildings		
	156 40	Repairs, Machinery		
	150 00	Cleaning and Sweeping		
		Payroll	935 30	
		To distribute indirect labor for month of July		
	137 88	Depreciation, Buildings		
	1,542 10	Depreciation, Machinery		
		Reserve for Depreciation	1,679 98	
		To charge off depreciation applicable to July		
	27 18	Fire Insurance, Buildings		
	34 62	Fire Insurance, Machinery		
		Prepaid Insurance	61 80	
		For expense applicable to July		
	36 11	Taxes, Buildings		
	45 10	Taxes, Machinery		
		Reserve for Taxes	81 21	
		To charge estimated taxes and create reserve for payment of same for month of July		
	52 20	Compensation Insurance		
		Reserve for Compensation Insurance	52 20	
		To charge estimated compensation insurance and create reserve for payment of same for month of July.		
	1 00	Heat		
	5 50	Water		
	692 81	Power		
		Reserve for Gas, Water, and Power	699 31	
		To charge expense accounts with the estimated amount of gas, water, and power consumed during July		
	3,509 80		3,509 80	
	(77)			

ILLUSTRATION 49

GENERAL LEDGER

Manufacturing Overhead Expense (Control) 77

19__						
July	31		V39	611 42		
	31		FJ11	272 98		
	31		J28	3,509 80		
				4394 20		

ILLUSTRATION 50 (a)

MANUFACTURING OVERHEAD EXPENSE LEDGER

Supervision 7709

19__																	
July	31		J28	550	00												

Repairs, Buildings 7702

19__																	
July	17		V39	156	41												
	23		FJ11	23	16												
	31		J28	78	90												

Repairs, Machinery 7707

19__																	
July	9		FJ11	9	20												
	31		J28	156	40												

Cleaning and Sweeping 7710

19__																	
July	31		J28	150	00												

Depreciation, Buildings 7711

19__																	
July	31		J28	137	88												

Depreciation, Machinery 7712

19__																	
July	31		J28	1,542	10												

Fire Insurance, Buildings 7713

19__																	
July	31		J28	27	18												

Fire Insurance, Machinery 7714

19__																	
July	31		J28	34	62												

Taxes, Buildings 7715

19__																	
July	31		J28	36	11												

Taxes, Machinery 7716

19__																	
July	31		J28	45	10												

Compensation Insurance 7717

19__																	
July	31		J28	52	20												

Heat 7718

19__																	
July	31		J28		1	00											

Water 7719

19__																	
July	31		J28	5	50												

Power 7720

19__																	
July	31		J28	692	81												

ILLUSTRATION 50 (b)

Overhead-expense items entered in the voucher register are directly related to some outside creditor. The overhead-expense items entered in the factory journal are for transactions which are purely of an internal nature. The main items in this group are:

Factory Supplies (requisitioned from the storeroom)
Repairs (where the repairs are made by shop workmen)
Defective work.

Entries made in the factory journal for supplies used are authorized by the stores requisitions. When supplies are issued by the stores department, the requisition received in exchange shows the name of the overhead-expense account to be charged. Entries for defective work are authorized by defective-work reports.

An illustration of the entries made in the factory journal, and of the postings made to the ledgers is shown in Illustration 48.

The reference number 14740, shown in the factory journal on July 6, is the stores requisition number. The requisition specifies that the account to be debited is Factory Supplies. Reference number 14816 specifies Machinery Repairs as the account to be charged. Reference numbers D702 and D703 refer to defective work reports. These reports are the authority for making the entries in the factory journal, and they also indicate that the Defective Work account is to be charged.

The general journal or journal vouchers provide for the periodical monthly adjusting entries affecting the Manufacturing Overhead Expense account. The principal items in this group are as follows:

Indirect Labor
- Supervision
- Repairs, Buildings
- Repairs, Machinery
- Cleaning and Sweeping

Depreciation
- Buildings
- Machinery

Fire Insurance
- Buildings
- Machinery

Taxes
- Buildings
- Machinery

Compensation Insurance
Heat
Water
Power

The entries made in the general journal, or on journal vouchers affecting the Manufacturing Overhead Expense account, and the postings made therefrom are as shown in Illustrations 49, 50 (*a*), and 50 (*b*).

The general ledger control account for Manufacturing Overhead Expense, account number 77, now shows a debit balance of $4,394.20. The balance is the

total of all of the overhead expense summaries from the voucher register, factory journal, and general journal or journal vouchers for the month of July, 19__. The debit balances of all of the accounts, numbered from 7701 to 7720, in the manufacturing overhead expense ledger must be equal to the control-account balance of $4,394.20. The proof that the individual overhead expense items have been collected properly is shown as follows:

Account Number	Account Name	Amount
7701	Rent	$ 300.00
7702	Repairs, Buildings	258.47
7703	Small Tools Expense	91.37
7704	Water Cooler Service	10.50
7705	Miscellaneous Factory Expense	53.14
7706	Factory Supplies	217.47
7707	Repairs, Machinery	165.60
7708	Defective Work	23.15
7709	Supervision	550.00
7710	Cleaning and Sweeping	150.00
7711	Depreciation, Buildings	137.88
7712	Depreciation, Machinery	1,542.10
7713	Fire Insurance, Buildings	27.18
7714	Fire Insurance, Machinery	34.62
7715	Taxes, Buildings	36.11
7716	Taxes, Machinery	45.10
7717	Compensation Insurance	52.20
7718	Heat	1.00
7719	Water	5.50
7720	Power	692.81
	Total Manufacturing Overhead Expense charges for month of July, 19__	$4,394.20

106. Collecting Overhead Expenses in the Factory Ledger.—Many cost accounting systems provide for the cost accounts to be kept in a separate ledger known as the Factory Ledger or the Plant Ledger. The principles of the operation of the Factory Ledger were described in detail in Art. 43. The Factory Ledger can be operated under two distinct plans. First, it can be maintained at the factory and controlled by a reciprocal account as described in the article just mentioned. Under this plan the general accounting office and the factory accounting office are at separate points. Second, it can be operated as a regular subsidiary ledger without any reciprocal control account, if the factory office and general accounting office are at the same place.

In describing the first plan, the following conditions are assumed:

(*a*) The general office operates the voucher register and the general journal.

(*b*) The general ledger, kept at the general office, maintains the accounts for the factory buildings, machinery, depreciation reserve accounts, and liability reserve accounts.

(*c*) The factory ledger has all of the cost control accounts.

(*d*) The payroll distribution is prepared at the factory, and the payroll cash is sent to the factory from the general office.

The entries in the voucher register and in the factory journal for the corresponding transactions are as in Illustration 51.

VOUCHER REGISTER

(At General Office)

Date		In Favor of	Voucher No.	Paid		Accounts Payable Cr.		Factory Ledger Dr.	
				Date	Check				
19__ July	2	Reliable Realty Co.	7000	1 -2	1000	300 00		300 00	
	5	Frank Printing, Inc.	7010	1-15	1010	47 22		47 22	
	12	Macon Machine Co.	7027			91 37		91 37	
	17	Harvey & Salter	7059			156 41		156 41	
	23	Star Supply Store	7072			5 92		5 92	
	31	Polar Ice Co.	7163			10 50		10 50	
						611	42	611	42

FACTORY JOURNAL

(At Factory Office)

Date		Explanation	Reference	General Ledger Cr.		Manufacturing Overhead Expense Dr.	
19__ July	3	Rent	7000	300	00	300	00
	6	Miscellaneous Factory Expense	7010	47	22	47	22
	13	Small Tools	7027	91	37	91	37
	18	Repairs to Building	7059	156	41	156	41
	24	Misc. Factory Expense	7072	5	92	5	92
	31	Water Cooler Service	7163	10	50	10	50
				611	42	611	42

ILLUSTRATION 51

The Factory Ledger column in the voucher register and the General Ledger column in the factory journal are totalled to show that the columns must be in agreement, since they are reciprocal control accounts. It must be remembered, however, that there are other charges entered in the Factory Ledger column of the voucher register, for raw materials and payroll cash charged against the factory.

The amounts for these two classes of items, likewise are taken up in the General Ledger column in the factory journal. Instead of being debited to the column for Manufacturing Overhead Expense, they are debited to columns for Stores and Payroll. Each amount entered in the Manufacturing Overhead Expense column is posted currently to the proper account in the subsidiary ledger for manufacturing overhead expense. The postings to the subsidiary ledger are not duplicated here, since they are the same as shown in Illustration 47.

The entries in the factory journal for factory supplies requisitioned and for defective work are the same as shown in Illustration 48. Since these transactions are purely of an internal factory nature, they do not affect the reciprocal control account.

The entries in the general journal and in the factory journal for the periodical monthly adjusting entries affecting the Manufacturing Overhead Expense account are as shown in Illustrations 52 and 53.

GENERAL JOURNAL J 28

Factory Ledger		July 31, 19__	General Ledger	
137	88	Depreciation, Buildings		
1,542	10	Depreciation, Machinery		
		Reserve for Depreciation	1,679	98
		To charge depreciation applicable to July		
27	18	Fire Insurance, Buildings		
34	62	Fire Insurance, Machinery		
		Prepaid Insurance	61	80
		For expense applicable to July		
36	11	Taxes, Buildings		
45	10	Taxes, Machinery		
		Reserve for Taxes	81	21
		To charge estimated taxes and create reserve for payment of same for month of July		
52	20	Compensation Insurance		
		Reserve for Compensation Insurance	52	20
		To charge estimated compensation insurance and create reserve for payment of same for month of July		
1	00	Heat		
5	50	Water		
692	81	Power		
		Reserve for Gas, Water, and Power	699	31
		To charge expense accounts with the estimated amount of gas, water, and power consumed during July		
2,574	50			

ILLUSTRATION 52

If the debit total shown in the factory ledger column in Illustration 52 is compared with the debit total of the general journal illustration shown in Illustration 49, it is revealed that there is a difference of $935.30. This is owing to the fact that the entry for the indirect-labor payroll must be handled differently where reciprocal control accounts are used. The factory furnishes the general office with the payroll amounts, and the general office in turn forwards the cash or checks for the payroll to the factory. This procedure requires an entry in the voucher register for the amount of the payroll, as shown in Illustration 53.

VOUCHER REGISTER

(At General Office) V 39

Date		In Favor of	Voucher Number	Paid		Accounts Payable		Factory Ledger	
				Date	Check				
19__									
July	31	Paymaster	7171			935	30	935	30

FACTORY JOURNAL

(At Factory Office)

Date		Explanation	Reference	General Ledger		Manufacturing Overhead Expense	
19__							
July	31	Depreciation, Buildings	J28			137	88
		Depreciation, Machinery	"	1,679	98	1,542	10
		Fire Insurance, Buildings	"			27	18
		Fire Insurance, Machinery	"	61	80	34	62
		Taxes, Buildings	"			36	11
		Taxes, Machinery	"	81	21	45	10
		Compensation Insurance	"	52	20	52	20
		Heat	"			1	00
		Water	"			5	50
		Power	"	699	31	692	81
		Supervision	V39–7171			550	00
		Repairs, Buildings	"			78	90
		Repairs, Machinery	"			156	40
		Cleaning and Sweeping	"	935	30	150	00
				3,509	80	3,509	80

ILLUSTRATION 53

The General Ledger column total of $3,509.80 in the factory journal is equal to the Factory Ledger column totals of $935.30 and $2,574.50, respectively, in the voucher register and general journal. The individual amounts entered in the Manufacturing Overhead Expense column of the factory journal are posted to their respec-

tive accounts in the subsidiary ledger for overhead expenses. In this manner the manufacturing overhead expenses are collected in an accounting system employing the reciprocal control account.

Where a factory ledger is employed to collect the manufacturing overhead expenses without the use of a reciprocal control account, no difficult problems are involved. The Overhead Expense control account is in the factory ledger. The general ledger has a control account controlling the factory ledger. All charges pertaining to raw materials, direct labor, and overhead expenses for production are debited to the Factory Ledger columns in the various books of original entry. The factory ledger in turn has sub-control accounts for the three different elements of cost. Manufacturing overhead expenses are segregated from the other two cost elements, and thereby the overhead expenses are collected in a sub-controlling account. The sub-controlling account for manufacturing overhead expenses controls a subsidiary ledger in which the detailed overhead expense accounts are kept.

An illustration of this plan of collecting manufacturing overhead expenses is shown in the Voucher Register, Illustration 54 (*a*).

In the general ledger, the posting to the Factory Ledger account would be as shown in the General Ledger, Illustration 54 (*a*).

VOUCHER REGISTER V 51

Date		In Favor of	Voucher No.	Paid		Accounts Payable		Factory Ledger					
				Date	Check			Stores		Payroll		Manufacturing Overhead	
19__													
Aug.	2	Lamont & Clung	8-3			456	71	456	71				
	4	Meridian Corp.	8-9			1,652	25	1,652	25				
	7	Brown, Burr & Co.	8-42			92	22					92	22
	12	Coler and Breen	8-201			155	95					155	95
	17	Paymaster	8-119	1-17	8245	7,647	82			7,647	82		
	25	United Supply Co.	8-146			55	04					55	04
	31	Paymaster	8-171			6,959	90			6,959	90		
								2,108	96	14,607	72	303	21
								39		*39*		*39*	

GENERAL LEDGER

Factory Ledger (General Control) 39

19__					
Aug.	31	Stores	V51	2,108	96
		Payroll	"	14,607	72
		Overhead	"	303	21

ILLUSTRATION 54 (*a*)

FACTORY LEDGER

Stores (Sub-Control) 4

19__ Aug.	31		V51	2,108	96							

Payroll (Sub-Control) 5

19__ Aug.	31		V51	14,607	72							

Manufacturing Overhead Expense (Sub-Control) 6

19__ Aug.	31		V51	303	21							

MANUFACTURING OVERHEAD EXPENSE LEDGER

Repairs to Machinery 601

19__ Aug.	7	V51	92	22								

Repairs to Building 602

19__ Aug.	12	V51	155	95								

Misc. Factory Supplies 603

19__ Aug.	25	V51	55	04								

Superintendence 604

19__ Aug.	31	JV75	500	00								

Foremen 605

19__ Aug.	31	JV75	1,000	00								

Labor Gang 606

19__ Aug.	31	JV75	957	62								

ILLUSTRATION 54 (*b*)

The factory ledger would show the postings of the three cost elements, stores, payroll, and manufacturing overhead expense, as in Illustration 54 (*b*).

The Manufacturing Overhead Expense account, as a sub-control account, controls the subsidiary ledger having the same name as the account. The detailed postings to that account are as shown in Illustration 54 (*b*).

At the end of the month when the labor distribution was prepared, a journal voucher, Illustration 55, would be the authority for making the postings there indicated.

JOURNAL VOUCHER

PLANT AUDITOR: No. JV 75

Please enter the following adjustments.

Date August 31, 19__

Code	Account Name		Dr.		Cr.	
7	Direct Labor		12,150	10		
6	Manufacturing Overhead Expense		2,457	62		
5	Payroll				14,607	72
	Distribution of August payroll, with overhead charges as follows:					
604	Superintendence	$ 500.00				
605	Foremen	1,000.00				
606	Labor Gang	957.62				

Authorized *G. R. Esterly*

ILLUSTRATION 55

With the postings made from the journal voucher No. 75, the Factory Ledger accounts affected would appear as in Illustration 56.

FACTORY LEDGER

Payroll 5

19__						19__					
Aug.	31		V51	14,607	72	Aug.	31		JV75	14,607	72

Manufacturing Overhead Expense 6

19__					
Aug.	31		V51	303	21
	31		JV75	2,457	62
				2760	83

Direct Labor 7

19__					
Aug.	31		JV75	12,150	10

ILLUSTRATION 56

The debit balance of $2,760.83 appearing in the Manufacturing Overhead Expense sub-controlling account is verified as follows: A comparison of the sub-controlling account balance is made with the total of the balances in the detailed overhead accounts. The proof is as follows:

MANUFACTURING OVERHEAD EXPENSE LEDGER ACCOUNT BALANCES

Code Number	Account Name	Amount
601	Repairs to Machinery	$ 92.22
602	Repairs to Building	155.95
603	Misc. Factory Supplies	55.04
604	Superintendence	500.00
605	Foremen	1,000.00
606	Labor Gang	957.62
	Debit balance in Manufacturing Overhead Expense Control Account	$2,760.83

107. Departmental Overhead Expense Accounts.—All of the preceding description pertaining to the collecting of manufacturing overhead expenses has been confined to a single overhead-expense control account. The description was confined to the single overhead-expense control account for two reasons. First, it is easier to grasp the principles when described in that fashion. Second, it is found in actual use in the accounting systems of many small manufacturing concerns. Larger concerns, however, do not confine the collecting of their overhead expense items to a single account. Instead of a single account, separate manufacturing overhead-expense control accounts are established for each producing department. Such overhead accounts are called Departmental Overhead Expense accounts.

One of the chief principles of modern management is the principle of departmentalization. Departmentalization is the subdivision of the plant in accordance with the production processes. The departmentalization may follow the line of different operations, such as illustrated in a foundry. The departments of a foundry are named after the processes performed within them, namely, pattern shop, core-making, melting and pouring, molding, and cleaning. In a machine shop, the departmentalization is quite different. Here the departments are usually designated by a group of machines of the same type, or by an area where work of a similar nature is performed. In a plant of this type, the departments are called machine centers, bench centers, production centers, or cost centers. Plants are departmentalized for the purpose of designating responsibility as well as for the purpose of collecting costs more accurately. Foremen of the various departments are not only responsible that the producing processes are properly executed, but for keeping down the overhead expenses. With the responsibility of the plant divided by departments, the result of the foremen's efforts can be measured. They are then rewarded or penalized, depending upon the result of their efforts. More adequate cost analysis by means of departmentalization is the next subject to be taken up.

The accuracy of cost analyses depends upon the degree of accuracy with which the manufacturing overhead expenses are collected. One of the fundamental principles of cost accounting is to have the cost system so designed that unit costs can be accurately ascertained. This means also determination of the accurate cost

of the partly completed unit at the various stages of its production in the different departments. If the cost of production of a portion of a unit in a certain department is to be accurate, the overhead cost for that department must be known definitely. The more one understands the nature of the overhead expenses incurred within the various departments of a plant, the easier it is to comprehend the truth of the preceding statements. Let us illustrate the point. A plant manufacturing metal parts for automobiles has the following divisions: forge, machine, blacksmith, and foundry. Each of the divisions is composed of departments performing a distinctly different type of work. Each department has machinery and equipment representing an investment that may be widely different from the others in amount. The fixed, or non-variable, overhead expenses of the different departments vary in accordance with the value of the investment in their equipment. Some departments require more indirect labor and supplies than other departments. In fact the overhead applicable to each separate department can be determined accurately only by collecting the overhead expense by departments. To charge the product produced in the *foundry* with some arbitrary portion of the total depreciation of the plant equipment would mean that it was being loaded with some depreciation applicable to the *forge-shop* and *machine-shop* products. The same condition would hold true for practically every other type of overhead-expense item. The only accurate method of collecting overhead-expense items is by departments.

The method used to collect overhead expenses by departments is the same method as employed to collect the overhead expenses in a single overhead-expense account, with one exception. Instead of having a single overhead-expense account, there are as many overhead accounts as there are production departments. The journals wherein debits and credits arise, which affect the overhead-expense accounts, must be designed so that the transactions can be easily recorded. The factory journal should have a separate column for each separate overhead-expense control account. If sufficient transactions arise through the voucher register, that journal, too, should have separate overhead-expense control-account columns. If a general journal is used in place of journal vouchers, it is necessary to provide columns for the overhead-expense control accounts.

Where departmental-expense control accounts are used, it becomes necessary to adopt a system of account code numbers to identify and to handle with ease the many charges to the various overhead-expense accounts. A plan of coding overhead-expense accounts is described in Chapter XV.

108. Service Department Overhead-Expense Accounts.—The need for separate overhead-expense control accounts for each service department is as great as for separate overhead control accounts for each production department. Service departments perform some special function not directly connected with the conversion of raw materials and are necessary in order that producing departments may operate. The service departments render service to several, or all, producing departments. The most common service departments are as follows: supervision, personnel, engineering, purchasing and stores, cost, toolroom, maintenance, power, and labor gang. The size of the plant determines the number of

service departments established and operated. For example, a small plant would not operate a power plant. Where the amount of power consumed monthly is relatively small, it is cheaper to buy it rather than to build and maintain a power plant.

Expenses of operating service departments are overhead expenses of an indirect nature. The expenses must be prorated among the producing departments at the end of each month. It is necessary to spread the monthly expense of the service departments among the producing departments, because the commodities produced are not run through the service departments. Since the service department expenses are incurred in order that the producing departments can operate effectively, the product must be costed with the indirect overhead expenses known as service charges.

The method of collecting the indirect overhead expenses of the various service departments is similar to the method of collecting the direct overhead expenses for producing departments. A control account should be set up in the factory ledger or in the general ledger for each service department. Suitable subsidiary ledgers or records should be designed to provide for the accounts to collect the detailed debits and credits pertaining to the service departments. The factory journal should have separate columns for each service-department expense control account. The voucher register and the general journal also may have special columns to collect the service-department expenses. If there are not sufficient transactions coming through the two last named journals to warrant special columns, any transactions which must be entered therein can be placed in the General Ledger column. Where service-department expenses must be handled, a system of account code numbers should be in operation. With their use the collecting of the service-department overhead expenses is greatly simplified. The plan of coding these indirect overhead expense items is described in Chapter XV.

109. Prorating Service-Department Overhead Expenses.—After the service-department expenses have been collected, they must be disposed of at the end of each month. The disposition of this type of indirect expense items is made by a monthly distribution. The balance in each service-department expense control account is prorated among the producing departments, and, in some cases, among several other service departments. A portion of the total monthly expense of one service department may be applicable to several other service departments. For example, the maintenance department may have made repairs to such service departments as the toolroom, power plant, and stores department. If such is the case, the service departments receiving the repairs should be charged with the proper amount of such expenses, and the maintenance department should be credited with like amount. A complex situation arises in event of a cross-distribution between two service departments. For example, if the toolroom also had performed some work for the maintenance department, how should the distribution be made? Would it be better to transfer the expense incurred by the toolroom for the maintenance department to the maintenance-department expense account first, or vice versa? If the total toolroom expense is distributed before the maintenance is

charged to the toolroom, obviously the *total* toolroom expense is, then, not distributed. Such a conflict must be handled arbitrarily. The distribution of the various service department expenses generally should be made as follows:

Distribute the expense of that service department first, which has the most widely used service; that is, the maintenance department serves more service departments than does the toolroom, therefore the maintenance-department expenses should be distributed first. Only in event that the service performed by the toolroom for the maintenance department is of a rather large amount, should it be given special handling. If the service performed is an expensive one, the amount should be transferred from the toolroom expense account to the maintenance account before the maintenance expense is distributed. A trivial charge of similar nature between the two departments should be ignored, because of the cost and difficulty of determining it exactly.

The bases for prorating the various service department expenses depend upon the nature of the service rendered. An equitable method must be worked out for each different type of service rendered. Haphazard methods must be avoided if the different producing departments are to be charged fairly with the service-department expenses. A few examples will illustrate the method generally used in connection with the more common types of service expenses.

(*a*) *Supervision Service.*—The expense involved in connection with the plant superintendent's office is known as supervision. This expense includes the superintendent's salary, the salaries of all assistants and clerks, office expenses, supplies, depreciation on the equipment used in the department, and the proportion of the general non-variable and variable overhead expense items properly applicable to that department.

The general non-variable expense items include depreciation, taxes, rent, and fire-insurance on the building. The general variable overhead-expense items include heat, water, and power unless it is measured by meter.

The basis generally used for prorating supervision service expense is the number of hours worked by all classes of employes within the departments to which the distribution is made.

(*b*) *Personnel Service.*—The expense necessary to care for the records of factory employment such as hiring, dismissing, transferring, promoting, etc., is termed personnel service. This expense includes the salaries of the chief personnel officer and all of his assistants; the expenses and supplies of the office; and a proportion of the general non-variable and variable overhead-expense items.

The expenses of the personnel department are generally prorated among all of the departments affected by this service in accordance with the number of employes within the various departments.

(*c*) *Engineering Service.*—The expenses of planning, routing, and scheduling production; preparing estimates; designing, drafting, and blueprinting, are classed as engineering services. These expenses cover salaries, supplies, and other direct departmental expenses, as well as a proportion of the general non-variable and variable overhead-expense items.

The expenses of the engineering department are prorated among all of the production departments in accordance with the number of hours worked by the employes within those departments. Two exceptions to the preceding statement should be mentioned. First, in event that members of the engineering department are engaged in working on a special job, their time and a certain amount of the overhead expense of the engineering department should be charged to the cost of the job upon which they are working. Second, the expenses incident to carrying on research projects should be segregated. If the research develops into any tangible evidence of value, the cost should be capitalized, generally, to a Patent account. If no value develops from the research efforts, the expense pertaining to it should be charged to the Profit and Loss account at the end of the year, after it has been ascertained that the efforts were unfruitful.

(*d*) *Purchasing and Stores Service.*—The expenses of operating the purchasing and stores departments include the salaries of the department heads and their assistants, store laborers' wages, miscellaneous office and stores expenses and supplies, and a proportion of the general non-variable and variable overhead expenses.

The expenses of these departments may be prorated among the production departments on the basis of the total hours worked by all of the employes within those departments or on basis of value of supplies and materials used, or space required for materials used by different departments.

(*e*) *Cost Service.*—The expenses of the cost department include the salaries of the personnel, all miscellaneous expenses and supplies of the department, and a proportion of the general non-variable and the variable overhead expenses.

The expenses of the cost department are prorated among the production departments in accordance with the total hours worked by all of the employes within those departments.

(*f*) *Toolroom Service.*—The expenses of the toolroom include the wages of the foreman and attendants, miscellaneous expenses and supplies chargeable direct to the department, and a proportion of the general non-variable and variable overhead expenses.

The expenses are prorated among the production departments, in accordance with the number of direct-labor hours worked within the various departments. This basis is used because the tools are used almost exclusively by the workmen classed as direct laborers. There are two exceptions to this basis of distribution. First, the toolroom may handle the tools of the maintenance department. If so, the maintenance department should bear a portion of the toolroom expense. Second, the toolroom may manufacture some of the tools used in the plant. If so, the cost of the finished tools should be charged to the Small Tool account before the expense is prorated among the other departments.

(*g*) *Maintenance Service.*—The expenses of the maintenance department are the wages of the foremen and the various tradesmen, such as carpenters, masons, electricians, machinists, pipe-fitters, etc., the wages of oilers, cleaners, sweepers, etc., miscellaneous expenses and supplies for the department, and also a proportion of the general non-variable and variable overhead expenses.

Since maintenance consists of upkeep and repairs, the bulk of the expenses of the department can be prorated directly to the departments receiving the service. This plan requires that stores requisitions show the name of the department for which the repair materials are to be used. It also requires that the wage slips list the name of the department for which the maintenance labor was performed. The overhead expenses of the maintenance department can be charged to the other departments on the basis of the maintenance labor hours expended for these departments.

(*h*) *Power Service.*—This service includes the wages of the power-house attendants and laborers, water, fuel, miscellaneous expense and supplies. As the power house is operated apart from the factory building, the non-variable overhead expenses can be determined as for a separate unit.

Power service usually provides electric power and steam heat. The cost of the electric power produced is divided by the kilowatt-hours produced. Each machine in a producing department using electric power is driven directly by a motor in a modern plant. A separate meter may measure the kilowatt-hours used by each motor. In this manner the amount of the power used is measured so that the total power expense can be prorated departmentally.

The cost of steam produced may be divided as to the amount used for generating electric power, and the amount used for heating purposes. Meters are used to measure the quantity of steam used for both purposes. The cost of steam used for heating purposes can be prorated on the bases of meters, cubic feet of space, or radiator area within the departments.

(*i*) *Labor Gang.*—Large plants maintain a general labor gang which performs all kinds of odd jobs in all departments. The expenses of the gang consist chiefly of the wages of the foreman and the laborers. The maintenance of small hand trucks and wagons is also a part of the expense of the gang.

By charging the laborers' time worked daily to the department in, or job on, which they worked, their total time can be prorated over the several producing and service departments at the end of each month.

110. Collecting and Prorating General Overhead Expenses.—General overhead expenses are those expenses which are common to several or all departments, such as heat, if purchased, water, janitor service, and a large number of other sundry items of expense which arise in a going concern. Overhead expenses falling under this classification are entered originally in the voucher register, general journal or journal vouchers, or factory journal, depending upon the nature of the transaction. The amounts are entered in a column bearing the name of the control account, General Overhead Expense. The individual amounts are posted to detailed subsidiary accounts which are controlled by the control account. The General Overhead Expense control account is set up in either the general ledger, or in the factory ledger, depending on the nature of the cost system, as described in Arts. 105 and 106.

A portion of the general administrative expenses of the business may also be transferred to the General Overhead Expense control account at the end of each

month. This transfer is made before the balance in the General Overhead Expense account is prorated. The reason for including a portion of the general administrative expenses in the general overhead expense is because a portion of these expenses is incurred in directing the manufacturing activities. Just what percentage of the general administrative departments' expense is attributable to the manufacturing expense must be determined by each individual concern.

General overhead expense is prorated to the producing and service departments in accordance with the nature of the individual expense item; for example:

(*a*) Gas purchased for heating purposes is prorated on the basis of cubic foot, area, or burner measurement.
(*b*) Water expense is prorated on the basis of the number of outlets in each department, or by meter.
(*c*) Janitor service expense is prorated on the basis of floor area.
(*d*) Other miscellaneous items of expense are dealt with in accordance with their respective natures.

111. Code System for Overhead Expenses.—The various types of manufacturing overhead expenses and their control accounts have been described quite fully. To facilitate their collection and distribution, there must be in use a well worked-out system of code numbers for the control and individual detailed expense accounts. Unless a system of coded accounts is used, confusion is likely to result in posting to the many detailed overhead-expense accounts. The principles of code classification are illustrated and discussed in detail in Chapter XV. With a code classification, it is a simple matter to collect the departmental overhead expenses in their respective control accounts. Likewise, the detailed accounts in their respective subsidiary records are readily identified as to department and type of expense by their detailed code numbers. After the overhead expense amounts have been collected for the production department, service department, and general overhead expense accounts at the end of the month, the distribution can be made. The amounts in the general overhead expense control account and in the service-department control accounts are prorated in accordance with the principles previously described.

Monthly and annual statements of the overhead expense amounts for each item in each department furnish a detailed record, ideal in nature, for the purpose of establishing overhead-expense budgets.

CHAPTER XIV

COSTING AND CONTROLLING OVERHEAD EXPENSES

112. Costing Overhead Expenses.—Costing manufacturing overhead expenses is the method of applying the overhead expenses to production cost accounts, to job-order cards, and to cost sheets. The production cost accounts are the Work in Process Inventory accounts or a Manufacturing Cost account. Job orders are costed on individual records showing the detailed cost of the overhead expense, as well as the costs of materials and direct labor. Cost sheets are summaries of the monthly manufacturing costs analyzed by departments, elements, and operations. Often the overhead expenses are distributed on the cost sheets before the formal journal entry costing the overhead to the Work in Process Inventory accounts is made.

Other phrases are used to describe the costing of manufacturing overhead expenses. Some cost accountants use the term "burden application." Another phrase is "absorbing burden." Still another is "burden loading." Each of these phrases carries with it the conception of an *added* cost. That is, to the direct costs of raw materials and labor, there is another cost to be added. The cost of the units produced is not complete until the overhead applicable to them is estimated and applied thereto. Applying the overhead, absorbing the overhead, or costing the overhead, is one of the most intricate problems with which the cost accountant is confronted. The problem is that of applying the overhead in a fair manner. By a fair manner is meant that each department, each job, and each unit receives its share of the overhead expense, *no more or no less.* Thousands of dollars worth of overhead expenses may be incurred monthly, covering a wide variety of items and services. It is not possible in many instances, and certainly not practical in most cases, to apply or cost individual overhead expense items to the units of production. Therefore, the overhead expenses must be arbitrarily costed to departments, orders, and units as a whole. Hence, the importance of this problem.

Costing the overhead expenses when a proper method has been worked out, results in accurate costs for the completed product. Improper methods of costing overhead expenses may be worse than no method, because they lead to erroneous conclusions. Improper overhead costing results in inaccurate product cost, not only in the department in which the overhead expenses were applied but in all subsequent departments through which the product must pass. If the departmental unit costs are warped or inaccurate, the effect is felt through the remaining accounting processes and records; the production costs are misleading, inventories of work in process and finished goods are misstated in value, and the net profit is inaccurate. It is plain that the right method of costing overhead expenses must be worked out and applied in use.

113. Methods of Costing Overhead Expenses.—The prime thing to remember in connection with costing overhead expenses is that the expense must be applied

to the product in the most equitable manner. The existence of varying conditions within different plants makes it necessary to prescribe different methods of costing the overhead expense. There are five methods generally used in costing overhead expenses. They will be taken up in the following order: (*a*) Output Method; (*b*) Direct-Labor Hour Method; (*c*) Direct-Labor Dollar Method; (*d*) Machine-Hour Method; (*e*) Production-Center Method.

114. Output Method of Costing Overhead Expenses.—The output method of costing overhead expenses to the product is the simplest, but it has its limitations. It can be used only where a single uniform type of product is made. There are few industries today that concentrate upon only one product. Illustrations of such industries are pig iron, cement, brick of a uniform size and type, etc. The units of the single-product type of industry are measured by tons, thousands, or other standard quantity measurement. This method can be applied only to industries engaged in process production. If the plant in an industry of this type is departmentalized, the overhead expenses can be collected by departments. The overhead expenses are, then, costed to the product by departments. This scheme permits each department to show its unit cost complete before the cost is transferred to the next department. Where the overhead expense is costed in this manner, it is measured in terms of the cost of whatever the unit may be, as for example tons, thousands, etc.

Where a single overhead-expense account has been used to collect all such expenses, the entry used in costing the overhead depends upon the nature of the plant. If there are several departments each producing the completed product among which the overhead is to be distributed, the total expense may be divided on the basis of the unit of measurement used, namely, tonnage, thousands etc., For example, in a certain plant, the total overhead expenses collected for the month amounted to $25,600.00. The tonnage of the four departments and the division of the overhead expenses are as follows:

DISTRIBUTION OF OVERHEAD EXPENSES—OUTPUT METHOD

Department	Tonnage Produced	Percentage of Department Tonnage to Total	Distribution of Total Overhead Expense
A	20,000	25.00	$ 6,400.00
B	22,000	27.50	7,040.00
C	19,000	23.75	6,080.00
D	19,000	23.75	6,080.00
	80,000	100.00	$25,600.00

The entry to cost the product, if each department has a Work in Process Inventory account, would be as follows:

Work in Process Inventory, Department A	$6,400	
Work in Process Inventory, Department B	7,040	
Work in Process Inventory, Department C	6,080	
Work in Process Inventory, Department D	6,080	
Manufacturing Overhead Expenses		$25,600
To distribute the overhead expenses for month of _____, 19__.		

The overhead cost in Department A for each ton produced is $0.32 ($6,400.00 ÷ 20,000 tons). This overhead expense cost per unit is valuable in making monthly comparisons for cost-control purposes. Where a separate overhead-expense account is maintained for each department, the costing is a direct process at the end of the month. The overhead expense collected in the account for Department A, is transferred to the Work in Process Inventory, Dept. A, account.

115. Direct-Labor Hour Method of Costing Overhead Expenses.—The direct-labor hour method is a very fair method to employ if the bulk of the operations are performed by manual labor. It is not a method to use if the bulk of the operations are performed by machinery. If hand labor is predominant, this method is an ideal one to use as a basis for costing the overhead expenses. If overhead expenses are not accumulated by departments, the apportionment of the overhead expenses is made to a department in the ratio of the number of direct-labor hours worked in that department to the total direct-labor hours worked. This method has the disadvantage of requiring a record to be kept of the total number of hours worked each day by each direct laborer. If the plant is engaged in producing job orders, the number of hours worked on each job by each man must be recorded daily.

Where a single overhead-expense account is used to collect the amount of overhead expenses incurred, an entry is prepared in accordance with the number of departments to which the expense is applicable. The number of hours worked in each department must be known. With this factor and the overhead expense known, the distribution is determined by the following method:

DISTRIBUTION OF OVERHEAD EXPENSES—DIRECT-LABOR HOUR METHOD

Department	Direct-Labor Hours Worked	Percentage of Departmental Hours to Total	Distribution of Total Overhead Expense
A	5,000	27.778	$7,111.17
B	4,000	22.222	5,688.83
C	6,000	33.333	8,533.25
D	3,000	16.667	4,266.75
	18,000	100.000	$25,600.00

The entry to cost the product would be as follows:

Work in Process Inventory, Department A	$7,111.17	
Work in Process Inventory, Department B	5,688.83	
Work in Process Inventory, Department C	8,533.25	
Work in Process Inventory, Department D	4,266.75	
Manufacturing Overhead Expense		$25,600.00
To distribute the overhead expenses for the month of _____, 19____.		

If separate overhead-expense accounts are kept for each department, the overhead expense is costed directly to the departmental Work in Process Inventory account from the departmental Overhead Expense account. The value of using the direct-labor hours under this condition lies in being able to cost operations and job orders. Direct-labor hour rates may be found for each department by dividing the department overhead expense by the number of direct-labor hours worked in the department.

116. Direct-Labor Dollar Method of Costing Overhead Expenses.—The direct-labor dollar method can be used with accuracy only where the wage rates paid to direct laborers are quite uniform, and also where direct labor by hand dominates over the use of machinery. This method leads to an erroneous costing of overhead expenses if the wage rates vary considerably. If Department A laborers receive a higher rate than is paid to laborers in Department B, Department A will be costed with a greater amount of overhead expense, provided both departments have the same number of direct laborers. This might be directly contrary to the existing conditions of the departments, especially if the departments are almost identical as to size, nature, and expense-incurring requirements. The method has in its favor the ease of collecting the basis for making the overhead distribution. The direct-labor dollars, or cost, can be taken from a summary of the monthly payrolls.

With a single Overhead Expense account used to collect these items of expense, overhead expense is apportioned to a department in the ratio that the payroll for direct labor in the department bears to the total payroll for direct labor. An illustration of this method follows:

DISTRIBUTION OF OVERHEAD EXPENSES—DIRECT-LABOR DOLLAR METHOD

Department	Direct Labor	Percentage of Departmental Direct-Labor Payroll to Total	Distribution of Total Overhead Expenses
A	$4,000	28.571	$7,314.18
B	3,000	21.429	5,485.82
C	5,000	35.714	9,142.78
D	2,000	14.286	3,657.22
	$14,000	100.000	$25,600.00

The entry to cost the product would be as follows:

Work in Process Inventory, Department A	$7,314.18	
Work in Process Inventory, Department B	5,485.82	
Work in Process Inventory, Department C	9,142.78	
Work in Process Inventory, Department D	3,657.22	
Manufacturing Overhead Expenses		$25,600.00
To distribute the overhead expenses for the month of _____, 19____.		

Separate departmental overhead expense accounts may be in use. If so, the balance of the Overhead-Expense account of each department is transferred to the Work in Process Inventory account of the respective department. Individual jobs or separate operations may be costed within the department by applying the departmental overhead to the job or operation in the proportion that the direct-labor cost of the job or operation bears to the total departmental direct-labor cost.

117. Machine-Hour Method of Costing Overhead Expenses.—The machine-hour method is considered a suitable method of costing overhead expenses where there exists a heavy investment in plant equipment. Where a plant has a large amount of machinery in use there are certain overhead expenses brought into existence that are not found where the bulk of production is by hand. These additional overhead-expense items are taxes, depreciation, fire insurance, power, and repairs,

pertaining to the machines. Since the majority of plants are dominated by the use of machinery today, the machine-hour method has a widespread and general use. Under this condition the machine-hour method is deemed a more equitable method of costing the overhead expenses than the direct-labor hour or the direct-labor dollar method. The reason is that the method assigns to each machine the overhead expenses applicable to it. In turn the units produced are costed with overhead expenses which have been apportioned to each machine. This method will now be described in detail.

Each machine within the plant must be charged, or burdened, with two different groups of overhead expenses. The first group consists of the items of expense applicable direct to the machine. The second group of expense items are those of a general nature which must be prorated to all machines. The direct overhead expenses for an individual machine include the following:

Taxes (proportion of total taxes on equipment based upon the valuation of the machine).

Depreciation (based upon the cost value of the machine).

Fire Insurance (proportion of total fire insurance covering machinery based upon the valuation of the machine).

Power consumed by the machine (based upon meter readings).

Repairs (based upon record of repair expense kept for each machine).

The indirect or general overhead expenses applicable to an individual machine are apportioned on a ratio basis. The total amount of the indirect expenses is apportioned to the individual machines in proportion to the area required for one machine as compared with the total factory area (or total area of department when departmental overhead expense accounts are used) or in proportion to machine valuation. The indirect overhead expense items so apportioned include the following:

Depreciation on Buildings.
Taxes on Buildings.
Fire Insurance on Buildings.
Maintenance of Buildings.
} Or Rent of Buildings if they are not owned.
Heat of Buildings.
Supervision.
Indirect Labor.
Indirect Supplies.
Compensation Insurance.
Water.
Service Department Expenses.
General Administrative Expenses (proportion assigned to plant).
All other overhead expense items of a general nature not applicable direct to a machine.

In a process-order plant, the summary of indirect or general overhead expense is made at the end of the month after the actual expenses are ascertained. In a job-order plant, the summary is prepared as a budget in advance of the actual operations performed during the month. The reason for the advance preparation in a job-order plant is that each job is costed as it is completed. Therefore, the job order card must be costed with the *estimated* cost of the overhead. This procedure is impossible if the estimated burden rate is not computed in advance.

In a job-order cost system, where jobs are costed with the overhead expense immediately upon completion, there is invariably a need for adjustment at the end of the month. Two things can happen which will result in an inaccurately estimated hourly rate. First, the actual overhead expenses always vary some from the estimated amounts set up in advance. Second, the actual number of hours that the machine operates during the month will always vary from the standard or normal hours set up in advance. The method of making the required adjustment is described in Art. 120.

When only a single overhead expense control account is used, the amount of overhead costed to each departmental Work in Process account is found by multiplying the machine-hour rate of each machine by the number of hours each machine in the particular department was operated. When there are departmental overhead expense accounts, machine hour rates are used to cost job orders and operations.

The disadvantage of the machine-hour rate method lies in the inadequate manner whereby indirect overhead expenses applicable to the machines are costed. All indirect expenses applicable to the machines are apportioned to the machines on the basis of machine valuation or on the area required by the machine. Certain of the indirect overhead-expense items are more equitably prorated on the area basis, such as the building overhead expenses of depreciation, taxes, fire insurance, heat, light, and maintenance. Other indirect overhead items such as supervision, indirect labor, supplies, service-department expenses, etc., are more equitably prorated on a labor-hour basis. A method of costing overhead which permits of these two applications of indirect overhead proration in addition to enjoying the advantages of the machine hour rate is known as the production-center rate method of costing overhead.

118. Production-Center Rate Method of Costing Overhead Expenses.—In the production-center rate method, the overhead expenses are collected by production centers. The plant must be departmentalized on the basis of the nature of the production. Like or similar machines of any number in one department may be classified as one production center. Where different machines within the same department require varying amounts of overhead expenses it becomes necessary to have more than one production center within the department. One machine may be a production center. Several benches likewise may be another production center.

The overhead expenses, under the production-center method of costing, are gathered in three separate groups. First, the direct overhead-expense items pertaining to the machines are collected in much the same manner as in the machine-hour rate method. Second, the overhead expenses pertaining to the buildings are collected. Third, the overhead expenses of a general nature, such as supervision, other indirect labor, supplies, service-department expenses, etc., are collected as a separate group.

The overhead expenses pertaining to the machines are direct charges to the production centers. The building overhead expenses are usually prorated among

the production centers on the basis of their areas. The other general overhead expenses, including service department expenses, are usually prorated among the production centers on the basis of the labor hours worked within the centers. The total amount of these three groups of overhead expenses as applied to each production center becomes the total overhead expense applicable to each center. The standard or normal number of working hours set up for each center is divided into the overhead expense of the center to arrive at the hourly costing rate.

119. Costing Manufacturing Overhead Expenses in a Process-Order Cost System.—The particular method or methods used in costing overhead expense into production in a plant engaged in process production depends upon the nature of the plant and the commodities produced. The overhead expense may have been collected in one overhead expense account or in several departmental overhead expense accounts. If the overhead has been collected in one account, it may be apportioned to departments by methods discussed in foregoing pages and an entry run through the factory journal debiting the departmental Work in Process Inventory accounts and crediting the Manufacturing Overhead Expense account. The monthly cost sheets also show the distribution and application of the overhead expense, by departments, processes, and detailed analysis of overhead items.

120. Costing Manufacturing Overhead Expenses in a Job-Order Cost System. An estimated costing rate for overhead expense is used in a job-order plant. The estimated rate is necessary in order to determine the overhead-expense cost of the job when it is completed. It is important to know the cost of the job before it is billed. This is especially true in the case of cost-plus contracts with the customer. In other types of contracts, the manufacturer is interested to know whether or not the finished job resulted in a profit or a loss.

The nature of an estimated machine-hour costing rate was discussed in Art. 117. An estimated production-center rate is prepared in much the same manner. An estimated labor-hour rate may be found by dividing the estimated number of hours the plant or department will work in the coming period into the estimated amount of overhead. Similarly, an estimated labor-dollar rate may be obtained by dividing the estimated payroll for direct labor for the next period into the estimated overhead expense.

Overhead expenses are collected and distributed in a job-order plant the same as they are in a process-order plant. The overhead expenses, likewise, are costed by either of the rate methods, or by either of the labor methods. The only point of difference lies in the fact that the overhead expenses are estimated for the month and the estimated amount is costed in a job-order system. In a process cost system the overhead expenses are distributed and costed after the actual amount becomes known.

Where the overhead expenses are costed at an estimated rate, it is readily seen that the amount costed into production will never agree with the actual amount found at the end of the month. Therefore, adjustments must be made for the

difference when it becomes known at the end of the month. The plan operates in the following manner. Consider the following conditions to hold true:

(*a*) Overhead expenses are costed into production by the production-center rate method.

(*b*) The estimated production-center overhead costing rate is $6.50 per hour.

(*c*) The following orders were worked on in the production center and required the specified time and resulted in overhead cost as follows:

Order No.	Hours in Production Center	Overhead Expenses Costed to Production
1091	200	$1,300
1092	600	3,900
1093	700	4,550
1094	500	3,250

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			Job Order No.	Work in Process Dept. C		Overhead Absorbed	
19__ Jan.	10		1091	1,300	00	1,300	00
	16		1092	3,900	00	3,900	00
	24		1093	4,550	00	4,550	00
	31		1094	3,250	00	3,250	00
						13,000	00
						(31)	

From the factory journal, the following posting would be made for the overhead costing of the jobs to the Overhead Absorbed account.

FACTORY LEDGER

Overhead Absorbed 31

| | | | | | |

FACTORY LEDGER

Manufacturing Overhead Expense 60

19—												
Jan.	31		V17	1,475	20							
	31		JV90	5,962	12							
	31		F54	6,096	68							
				13 534	00							

adjustment must be made to the Cost of Sales account. If some of the orders are still in the unfinished stage or in the finished goods inventory, then, those two accounts must be adjusted with their proportion of the correction. If the jobs have been billed, the entry will be as follows:

JOURNAL VOUCHER

No. 1-191

January 31, 19—

Cost of Sales	534	00		
Overhead Absorbed			534	00
To adjust estimated overhead absorbed during January				

Approved *H. Collman*

121. Control of Manufacturing Overhead Expenses.—Manufacturing overhead expenses should be controlled as carefully as the other two cost elements, raw materials and direct labor, are controlled. Until recently, scientific methods of controlling overhead were not in use. Elaborate plans have long been in operation for adequate control of raw materials and direct labor. Perpetual inventories and stores-control plans have saved manufacturers millions of dollars. The use of the time-clock card in connection with an internal check on the payroll has saved employers from paying enormous sums to fraudulent parties. The application of incentive wage systems has proved to be immeasurably important in connection with the workmen's production. While the improvements in the control of materials and labor were being perfected to the highest notch, the control of overhead expenses was shunted aside. The chief emphasis placed upon manufacturing overhead expenses, until recently, was the devising of ways to distribute and apply this element of cost. The importance of the proper methods of overhead distribution and application cannot be minimized. They are of tremendous importance, as they relate to unit cost and profit. Overhead distribution and application, or costing overhead to the product is, however, only one half of the overhead problem. The other half, equally as important, is the control over and reduction of the manufacturing overhead expenses.

Semi-variable and variable expenses are the groups of manufacturing overhead items upon which the emphasis of control is placed. Budgets for the production departments may be prepared at different levels of productive output. The estimated amount of expense for every specific overhead item falling under the classification of these two groups of expenses appears in the budgets. Each month the actual overhead expenses incurred are compared with the budgeted amounts. If the actual expenditures are less than the budgeted amounts, the key men (foremen and other minor executives) influential in effecting the saving, may be rewarded with a bonus. If the actual expenditures are greater than the budgeted amounts, the key men are called upon for an explanation. Budgets for the general overhead expenses may also be prepared at varying degrees of productive output. The actual overhead expenses are compared monthly with the budgeted figures. When the actual expenses are less than the budgeted expenses, the key men influential in effecting the savings also may be rewarded with a bonus. With the bonus as an incentive, the foremen, supervisors, and other minor executives have a real interest in "beating the budget." This method of establishing a control over semi-variable and variable overhead expenses has proved to be very effective. It is discussed at length in Chapter XXIII.

Non-variable overhead expenses cannot be reduced in amount but economies can be affected by the reduction of plant idleness to a minimum. Any means by which the cost of idle capacity is shown clearly will assist in this.

122. Measuring the Idle Capacity of a Plant.—Non-variable expenses come into existence irrespective of the degree of plant production activity, and must therefore be accounted for from month to month. If a plant is working below normal, then the full amount of non-variable overhead expenses is not a production cost. To treat the non-variable expenses as production costs in full, when the plant is producing below normal, serves to increase the unit cost of products above the unit cost found when the plant is working normal time. If unit costs are to serve a useful purpose, they should not fluctuate as a result of output variance due to the plant operating at a point below normal.

To establish a method of accounting for idle plant capacity the management must set an arbitrary standard known as a normal operating point for each department or production center. Several factors enter into the determination of the normal. Among these are the following: past average of the percentage of facilities used in production; future growth and business-cycle outlook; and creation of new products requiring greater use of facilities. If from these factors it is determined that the department or production center will ordinarily operate at approximately 80 per cent. of its possible capacity, then the unit cost of products at that capacity is said to represent a normal cost. Should production go below 80 per cent., unit costs will tend to increase, because fewer units are produced and the non-variable overhead expenses remain stationary. If production exceeds the 80-per cent. normal, unit costs will tend to decrease, because more units are produced with no appreciable change in the non-variable overhead expenses. To prevent fluctua-

tion of unit costs, the 80-per-cent. normal is used as a standard of measurement in costing the non-variable overhead expenses.

An illustration will show the procedure: The normal operating activity of Department A is set at 80 per cent. of its estimated maximum production. At 80-per cent. productive activity, the department will operate 8,000 hours at the following overhead cost:

Non-Variable Overhead Expenses	$ 4,000
Semi-Variable Overhead Expenses	4,800*
Variable Overhead Expenses	20,000
Total Cost	$28,800

$28,800 ÷ 8,000 = $3.60, overhead cost per hour of operation.

*This amount is added to the non-variable overhead expenses for normal burden application.

The overhead expenses are itemized as follows:

MONTHLY OVERHEAD EXPENSES, OPERATING AT 80-PER-CENT. CAPACITY

	Non-Variable	Semi-Variable	Variable
Depreciation, Machinery	$1,500	(Added to Non-Variable for Normal Burden Application)	
Taxes, Machinery	50		
Fire Insurance, Machinery	150		
Power, Machinery			$ 600
Repairs, Machinery			2,000
Supervision	4,000		
Depreciation, Buildings	800		
Taxes, Buildings	200		
Fire Insurance, Buildings	100		
Power and Light, Buildings			200
Repairs, Buildings			500
Heat			800
Indirect Labor	800		4,400
Indirect Supplies			4,000
Compensation Insurance			600
Water			100
Service Department Expenses	700		4,000
General Administrative Expenses	500		2,800
	$8,800		$20,000

At 40-per cent. capacity or at one-half of normal the department will operate 4,000 hours and the overhead cost is as follows:

Non-Variable Overhead Expenses	$ 4,000
Semi-Variable Overhead Expenses	3,000*
Variable Overhead Expenses	10,000
Total Cost	$17,000

$17,000 ÷ 4,000 = $4.25, overhead cost per hour of operation.

*This amount is added to the non-variable overhead expenses for normal burden application.

The increase of the overhead cost per hour of operation by $0.65 in comparison with the overhead cost per hour of operation at 80-per-cent. capacity, or at normal

is due chiefly to the non-variable overhead expenses being identical at 80 per cent. and at 40 per cent. The semi-variable overhead expenses, likewise tend to increase the unit cost at 40-per cent. capacity, because they have not been reduced in the same proportion as have the variable overhead expenses.

The overhead expenses at 40-per-cent. capacity are itemized as follows:

MONTHLY OVERHEAD EXPENSES, OPERATING AT 40-PER-CENT. CAPACITY

	Non-Variable	Semi-Variable	Variable
Depreciation, Machinery	$1,500	(Added to Non-Variable for Normal Burden Application)	
Taxes, Machinery	50		
Fire Insurance, Machinery	150		
Power, Machinery			$ 300
Repairs, Machinery			1,000
Supervision	3,000		
Depreciation, Buildings	800		
Taxes, Buildings	200		
Fire Insurance, Buildings	100		
Power and Light, Buildings			100
Repairs, Buildings			250
Heat			400
Indirect Labor			2,400
Indirect Supplies			1,800
Compensation Insurance			300
Water			50
Service Department Expenses	700		2,000
General Administrative Expenses	500		1,400
	$7,000		$10,000

The computation of the idle capacity charge and the overhead to be costed into production is as follows:

(a) Plant Capacity Per Cent	(b) Hours Operated	(c) Non-Variable Overhead Expenses	(d) Normal Non-Variable Overhead Expense Rate per Hour Operated $c \div b$	(e) Overhead Non-Variable Expense to Be Costed to Production $b \times d$	(f) Idle Capacity Charge to Profit and Loss $c - e$
(Normal) 80 per cent.	8,000	$8,800	$1.10		
40 per cent.	4,000	7,000		$4,400.00	$2,600.00

Actual Total Overhead Expenses at 40-per-cent. plant capacity	$17,000.00
Idle Capacity Charge at 40 per cent.	2,600.00
Overhead Expense costed to Production	$14,400.00

If the overhead cost at 40-per-cent. plant capacity is computed with the use of a normal non-variable costing rate, the overhead cost per hour of operation will be the same as the overhead cost at 80-per-cent. plant capacity. The computation is as follows:

Overhead Expense Costed	$14,400.00

$14,400.00 ÷ 4,000 = $3.60, overhead cost per hour operation.

The journal entries to record costing the production of Department A with the overhead expenses at 40-per-cent. plant capacity, using a normal overhead rate, would be as follows:

Work in Process Inventory (or Overhead Expense Absorbed) Department A	$14,400.00	
Idle Capacity (Profit and Loss)	2,600.00	
Manufacturing Overhead Expenses		$17,000.00
To close monthly overhead expenses into production at 40-per-cent. plant capacity, and to charge Profit and Loss with cost of idle capacity.		

The advantages of applying normal costing rates to non-variable overhead expenses are several in number as follows:

(*a*) Gives a measure of plant idleness due to lack of customers' orders or other reasons.

(*b*) Provides a uniform unit cost of production for comparative purposes.

(*c*) Prevents overstatement in the closing work in process inventory, finished goods inventory, and net profits.

In event that the productive activity exceeds the normal of 80 per cent., at which point the normal burden rate was established in the foregoing illustration, an overapplication or overabsorption of burden results. This overapplication can be handled in one of two ways. First, it can be credited to the Profit and Loss account as overapplied burden. Second, it can be credited to an account, Reserve for Overapplied Burden. Against such a credit balance can be charged any underapplied burden resulting from operating below the 80-per-cent. normal.

CHAPTER XV

COST SUMMARIES

123. Meaning of Cost Summaries and Their Importance.—A cost summary is a collection and compilation of cost data. Monthly summaries are required for each of the manufacturing cost elements. All stores requisitions received by the stores department for raw materials and supplies are collected by the auditing or accounting department each month and priced, extended, totaled, and sorted. The sorting is necessary to allow summaries to be computed that enable the charges to be made to the various Work in Process Inventory accounts, to producing departments, to job orders, to Overhead Expense accounts, and to service departments. The total credit to the Stores account must also be determined.

Other cost summaries are required for labor. The daily time tickets and wage slips eventually reach the cost department. There the daily wages earned are broken down by departmental direct and indirect labor costs, by job orders, by overhead-expense accounts, by service departments, and by direct labor operations. After the wage information has been analyzed, the detail is used to compile cost summaries.

Overhead-expense items are summarized in auxiliary records and accounts controlled by factory-ledger or in some cases by general-ledger accounts. At the end of each month, these expenses are analyzed and summaries prepared to show producing-department cost, service-department cost, and total commodity, line, and unit cost.

Summaries of work in process are likewise prepared monthly. It is often important and necessary to have an analysis of the component elements of the different departmental work-in-process inventories. Records must be taken from the cost-element sources to compile the analyses of the make-up of the work-in-process inventory accounts as to raw materials, direct labor, and overhead expenses.

Summaries are prepared of goods completed during the period and of finished-goods inventory. The latter shows the quantity of completed items on hand at the end of the month. The number of units of each different line and product is compiled to establish control over the warehouse ledger.

Summaries of the cost of sales are also prepared for the purpose of making the monthly closing entry whereby the Cost of Sales account is debited and the Finished Goods Inventory account is credited, with the cost value of all goods shipped.

Cost summaries are important because they form the bridge between the original data and the entries made in the factory journal. The original data, such as stores requisitions and time tickets, when summarized, form the basis for making the journal entries costing the elements of manufacturing cost into production. At the same time another important phase of this process must not be forgotten.

The original data are also used to make the records in subsidiary ledgers or records. Stores-ledger cards must be credited with issues. Payrolls must be prepared. Direct-labor operation costs are collected either in auxiliary-ledger accounts or on work sheets. Overhead-expense items are posted to subsidiary records. The entries or postings pertaining to the cost elements made to the auxiliary or subsidiary records must agree in total with the summaries used to prepare the journal entries, which, when posted, provide new balances in the cost-control accounts. If this is not done, the auxiliary records will be out of control with the control accounts.

It is necessary to describe an important essential pertaining to the collecting of the figures for cost summaries before the summaries themselves are described in detail. Figures used in the preparation of the cost summaries are most easily gathered where there is some systematic method employed to gather them. A system of coding the operating and inventory accounts is most valuable in keeping a record of the detailed debits and credits to the cost accounts.

124. Coding Cost Accounts.—An accounting code system is a plan whereby each account is given a number which identifies it with the name and classification of the account. The code number may also identify the account with a particular department, or with a certain costing center. The code number may, again, refer to a certain labor operation, or to a certain item of raw material. A code system, properly devised, should be so flexible that it can be expanded to cover any new account, which may come into existence, without destroying the already existing plan or structure of the code classification. The requisites of a good code system are simplicity, flexibility, and clarity.

The cost-control accounts often are given a number composed of only one digit. The control-account number is used in conjunction with the specific account number to identify clearly the nature of the specific account. For example, if the code for Stores control account is 4, the individual store item, 00 Sandpaper, may be coded as 4-191 or 4191. The code number 4-191 or 4191 is used to designate 00 sandpaper in the stores ledger, in preparing purchase requisitions, in making out receiving slips when that grade of sandpaper is received in the storeroom, in writing stores requisitions, and in the price record. Another example is the use of the digit, 5, for the labor accounts. The code 5-153 may represent a lathe turning operation by an employe classed as a direct laborer.

The manufacturing overhead-expense control account could bear the code 0. The code 0701 could represent the account, Depreciation on Buildings. An outline for a classification code for cost accounts is shown in Illustration 57.

Often it is necessary to expand the code classification in order to identify cost accounts with certain departments in preparing cost summaries. Numbers representing producing departments and service departments can be used in conjunction with the specific account code to identify the charge with a certain department. A scheme might be used as shown in the Classification Code for Departments shown in the lower part of Illustration 57.

CLASSIFICATION CODE FOR COST ACCOUNTS

General Identification of the Cost Control Account		Sub-Classification of the Cost Control Account		Specific Classification of the Cost Control Account	
Name	Code	Name	Code	Name	Code
Stores	4	Raw Materials (Direct)	4–0 to 4–999	½" Round Soft Steel	4111
	04	Factory Supplies (Indirect)	04–0 to 04–99	Colored Cotton Waste	0412
Labor	5	Direct Labor	5–0 to 5–999	Slotting 1¼"×12" Machine Bolt	5164
	05	Indirect Labor	05–0 to 05–99	Cleaning windows in machine shop	0550
Manufacturing Overhead Expense	0	Variable Overhead Expenses	01–00 to 04–99	Machine Oil	0401
		Semi-Variable Overhead Expenses	05–00 to 05–99	Time Setters wages	0557
		Non-Variable Overhead Expenses	06–00 to 07–99	Depreciation on Buildings	0701
Work in Process Inventory	6				
Finished Goods Inventory	7				
Cost of Sales	8				
Payroll	9				

CLASSIFICATION CODE FOR DEPARTMENTS

General Identification of the Departments		Sub-Classification of the Departments	
Name	Code	Name	Code
Producing	1	Forge Shop Machine Shop Blacksmith Shop Foundry	11 12 13 14
Service	2	Maintenance Engineering Toolroom Purchases and Stores Cost	21 22 23 24 25
General Overhead Expense	03		

ILLUSTRATION 57

The code system in which departmental codes and cost-account codes are combined to identify accounts will now be illustrated. These codes are convenient to use where tabulating machines are employed for handling cost data. The following numbers are illustrative of control-account codes:

Control Account Code	Representing the Account With:
12–6	Machine Shop Work in Process Inventory
14–05	Foundry Indirect Labor
11–0	Forge Shop Overhead Expense
21–0	Maintenance Overhead Expense
13–5	Blacksmith Shop Direct Labor
12–4	Machine Shop Raw Materials

The following numbers are illustrative of specific account numbers in a subsidiary ledger or other record:

Specific Account Code	Representing the Account With:
14–0550	Foundry Window Cleaning Wages
23–0550	Toolroom Window Cleaning Wages
11–0701	Forge Shop Depreciation on Buildings
11–0702	Forge Shop Depreciation on Machinery
12–0104	Machine Shop Building Repairs
13–5005	Blacksmith Shop Wages

The code number for a specific account should not contain more than six digits. It is important to keep down the number of digits in an account code so that machine tabulation may conveniently be used.

125. Summaries for Stores.—It is an easy matter to account for the various items of raw materials when the scheme as described here is in effect. Cost summaries for raw materials are prepared from the records just mentioned. Codes facilitate the collection of the cost summaries for raw materials. Guesswork as to the nature of the item received, issued, ordered, and priced is removed if each item carries a number, and the number is used in handling the cost records.

The stores ledger cards described in Chapter IX summarize information pertaining to each different stock item of raw material. From the purchase requisition showing the stock, or code, number of the item ordered, the quantity ordered is recorded in the Ordered column. From the receiving list showing the stock item code number, the quantity received is entered in the Received column. From the stores requisition also bearing the code number of the issued item, the quantity issued is shown in the Issued column. The stores-ledger cards for each stock item form the subsidiary records which are controlled by the Stores controlling account. *The balance in the Stores account is proved by summarizing the value columns under the heading of "balance" in the stores ledger.* Supplies as an overhead-expense item are likewise summarized. Thus, value control of Stores as a cost account is established by summaries.

After the stores requisitions have been priced, and the quantity reflected in the Issued column of the stores ledger, the stores requisitions are summarized for another purpose. The total cost of the raw materials issued, as shown on an adding-machine tape at the end of each month, serves as a basis for a monthly journal entry in a process cost system. The entry made in the factory journal or on a factory journal voucher is as follows:

Code	Name of Controlling Account		
11–6	Work in Process Inventory, Forge Shop. . .	$9,274.81	
4	Stores		$9,274.81
	To cost raw materials into forge shop production for the month of January, 19____.		
11–0	Manufacturing Overhead Expense, Forge Shop.	$ 279.73	
4	Stores		$ 279.73
	To cost factory supplies into forge-shop production for the month of January, 19____.		

In a job-order cost system, the entries for the raw materials used are often made from day to day in the factory journal rather than as a monthly summary.

Each stores requisition shows the nature of the charge. The charge will be either to an order number, or to an overhead expense account. If the stores-requisition charge is for a process or a job order, the summary of such requisitions is a debit to a Work in Process Inventory account. All stores requisitions summarized under the heading of betterment orders are debited to asset or equipment accounts. Stores requisitions showing charges to repair orders are summarized and debited to maintenance or repairs as an overhead expense. The stores requisitions, thus, summarize the charges to several cost accounts, as well as a credit to the Stores account. In a job-order cost system, the stores requisitions also form the basis for setting up the raw-material charges on the individual job-order cost cards.

126. Summaries for Labor.—Codes are very useful in accounting for labor. As shown in Illustration 57, the figure 5 is associated with labor. The figure 5 is identified with direct labor, and the number 05 is related to indirect labor. When additional digits are added to 5, it is possible to form any number of codes to be used to represent various direct-labor operations. The different operations requiring direct labor vary in number in accordance with the size of the plant and the nature of the operations within it. Direct-labor operations are coded for the purpose of facilitating the handling of the production records. Instruction cards based on time and motion studies, as well as instructions on the route and schedule cards as to the operations to be performed are listed in terms of a code. Usually, individual direct-labor accounts are not set up in a subsidiary ledger for each different operation. Direct-labor accounts may be set up for each producing department. The departmental direct labor may be analyzed and summarized for certain operations. If so, the summarization is shown in analytical form on a work sheet, coded numbers being used for the different operations.

The summary of importance for costing is the labor-distribution record. This record is prepared from the time tickets and wage slips after they have been used in preparing the payroll sheet. The first step in the preparation of the labor-distribution summary is sorting the daily wage tickets by departments, it being assumed that departmental labor accounts are kept. The code number on the wage ticket identifies it with the department. The second step is to sort the wage

tickets as to the operation performed within the department. The code used in identifying the operation also makes possible the preparation of such a summary. The third step is sorting the tickets in order to summarize the order costs. The order number on each wage ticket makes possible this summary.

The amounts from the labor distribution summary are used to prepare an entry at the end of the month to cost labor. The entry is made in the factory journal or on a factory journal voucher. The entry may cost the direct labor to Work in Process accounts directly as follows:

Code			
12–6	Work in Process Inventory, Machine Shop	$7,548.62	
9	Payroll		$7,548.62

The direct-labor cost data are transferred as monthly totals for each operation to subsidiary ledger accounts or to labor cost summary sheets.

The above entry does not provide for departmental direct-labor accounts that show department summaries of debit postings to the subsidiary records which exhibit direct labor cost by operations. If departmental direct-labor accounts are desired, the entry to cost direct labor would be

Code			
12–5	Direct Labor, Machine Shop	$7,548.62	
9	Payroll		$7,548.62

After all of the direct labor has been distributed to the departmental labor accounts, another entry will be required which may be illustrated as follows:

Code			
12–6	Work in Process Inventory, Machine Shop	$7,548.62	
12–5	Direct Labor, Machine Shop		$7,548.62

Direct-labor costs in a job-order cost system are usually recorded on the job-order cost record card daily. If quite a number of direct laborers are working on one job, the direct-labor cost must be summarized on a work sheet in order to reduce it to daily totals; from this sheet it is transferred to the job-order cost card.

What has been said pertaining to summarizing direct-labor costs applies equally as well to indirect labor. Indirect labor costs are divided and coded as to occupations performed by the group of workmen. The costs of the various occupations are collected and summarized under the various producing and service departments. The cost-control accounts affected by indirect labor operations may be illustrated by the following entry:

Code			
14–0	Manufacturing Overhead Expense, Foundry	$361.10	
21–0	Maintenance Overhead Expense	679.80	
9	Payroll		$1,040.90

The indirect-labor details as to occupations are transferred from the monthly totals to subsidiary overhead-expense ledger records in the same manner as are the direct-labor costs.

127. Summaries for Manufacturing Overhead Expenses.—Summaries for overhead expenses are prepared differently from the summaries for stores and labor.

The different technique is due to the nature of overhead expense items. Raw materials used by a plant in its production may include several thousand items, yet they are of a common nature so far as being handled together in the same summaries for costing purposes. Direct labor, likewise, can be summarized with ease. Overhead expense, as a cost element, includes so many different types of expense items that the values for each must be collected in separate expense accounts.

It has already been described how the expenditures for overhead expenses are analyzed at the time they are incurred. The expenditures are recorded in the voucher register, and the detailed expense amounts are posted to specific expense accounts in auxiliary records. Journal vouchers or general journal entries are used to collect monthly adjustments pertaining to overhead-expense items of a widely varying nature. Control accounts for overhead expenses are required for each different producing and service department. Separate expense accounts under each overhead control account are required to collect the detailed expense. Therefore, it is easy to see that overhead-expense items cannot be collected for summary purposes as are raw materials on stores requisitions, and as direct labor is collected on time tickets.

Overhead expenses are most conveniently summarized when a code system is in operation. In Illustration 57 manufacturing overhead expense is designated by the general symbol 0. The sub-grouping is shown in that table to follow the overhead classification of variable, semi-variable, and non-variable items. The overhead expense code is so designed that it identifies indirect materials with the stores symbol by using the numbers 0400 to 0499 for factory supplies. The symbol 0 signifies overhead; 4 signifies stores; and the following digits 00 to 99 provide for individual items. Account numbers from 0100 to 0399 provide for 400 different items of overhead expense of a variable nature in addition to factory supplies. The series from 0500 to 0599 provides for indirect labor, combining the overhead symbol 0 with the labor symbol 5. The series from 0600 to 0799 furnishes more than enough combinations to provide separate codes for the non-variable overhead expense items.

The general idea to be kept in mind in setting up a code system for overhead expenses is to have a common symbol for like overhead items regardless of the number of departments in which they represent an expense. For example, factory supplies are used by every producing and service department. If the figure 0401 is used to represent factory supplies, each overhead expense account in every department will bear that number. The departmental identification number preceding the factory supply symbol specifies in what department the factory supplies are used. For example, 11-0401, is the factory supplies account in the forge department.

It is a simple matter to summarize the departmental overhead expenses once a code system has been perfected to provide for all items. A code scheme of this nature is presented in Illustration 58. After all of the postings have been made to the overhead control and to the detailed expense accounts at the end of each month, summarizing them for costing purposes is the next problem to consider.

CODE CLASSIFICATION FOR MANUFACTURING OVERHEAD EXPENSES

Departments	Producing				Service					General
	Forge	Machine	Blacksmith	Foundry	Maintenance	Engineering	Toolroom	Purchases and Stores	Cost	
Control Accounts	11–0	12–0	13–0	14–0	21–0	22–0	23–0	24–0	25–0	03
Specific Accounts										
Small Tools	11–0100	12–0100	13–0100	14–0100	21–0100	———	23–0100	24–0100	———	———
Power	11–0101	12–0101	13–0101	14–0101	21–0101	22–0101	23–0101	24–0101	25–0101	03–0101
Spoilage	11–0102	12–0102	13–0102	14–0102	———	———	23–0102	———	———	———
Compensation Insurance	11–0103	12–0103	13–0103	14–0103	21–0103	22–0103	23–0103	24–0103	25–0103	———
Maintenance	11–0104	12–0104	13–0104	14–0104	———	———	23–0104	24–0104	———	03–0104
Heat	11–0105	12–0105	13–0105	14–0105	21–0105	22–0105	23–0105	24–0105	25–0105	03–0105
Water	11–0106	12–0106	13–0106	14–0106	21–0106	22–0106	23–0106	24–0106	25–0106	03–0106
Cleaning	11–0107	12–0107	13–0107	14–0107	21–0107	22–0107	23–0107	24–0107	25–0107	03–0107
Engineering	11–0250	12–0250	13–0250	14–0250	21–0250	———	23–0250	24–0250	25–0250	03–0250
Toolroom	11–0251	12–0251	13–0251	14–0251	21–0251	22–0251	———	24–0251	25–0251	03–0251
Purchases and Stores	11–0252	12–0252	13–0252	14–0252	21–0252	22–0252	23–0252	———	25–0252	03–0252
Cost	11–0253	12–0253	13–0253	14–0253	21–0253	22–0253	23–0253	24–0253	———	03–0253
General Overhead Expense	11–0300	12–0300	13–0300	14–0300	21–0300	22–0300	23–0300	24–0300	25–0300	———
General Administrative Expense	11–0301	12–0301	13–0301	14–0301	21–0301	22–0301	23–0301	24–0301	25–0301	03–0301
Supplies	11–0400	12–0400	13–0400	14–0400	21–0400	22–0400	23–0400	24–0400	25–0400	03–0400
Foremen and Supervisors	11–0502	12–0502	13–0502	14–0502	21–0502	22–0502	23–0502	24–0502	25–0502	03–0502
Inspectors	11–0503	12–0503	13–0503	14–0503	21–0503	———	23–0503	———	———	———
Other Indirect Labor	11–0504	12–0504	13–0504	14–0504	21–0504	22–0504	23–0504	24–0504	25–0504	03–0504
Rent	11–0600	12–0600	13–0600	14–0600	21–0600	22–0600	23–0600	24–0600	25–0600	03–0600
Depreciation, Buildings	11–0701	12–0701	13–0701	14–0701	21–0701	22–0701	23–0701	24–0701	25–0701	03–0701
Depreciation, Equipment	11–0702	12–0702	13–0702	14–0702	21–0702	22–0702	23–0702	24–0702	25–0702	03–0702
Fire Insurance, Buildings	11–0801	12–0801	13–0801	14–0801	21–0801	22–0801	23–0801	24–0801	25–0801	03–0801
Fire Insurance, Equipment	11–0802	12–0802	13–0802	14–0802	21–0802	22–0802	23–0802	24–0802	25–0802	03–0802
Taxes, Buildings	11–0901	12–0901	13–0901	14–0901	21–0901	22–0901	23–0901	24–0901	25–0901	03–0901
Taxes, Equipment	11–0902	12–0902	13–0902	14–0902	21–0902	22–0902	23–0902	24–0902	25–0902	03–0902

ILLUSTRATION 58

The methods of prorating and distributing the service department expenses, the general overhead expenses, and the general administrative expenses have been described in Chapter XIII. It is necessary to prorate and distribute the indirect overhead expenses before a summary of the overhead expenses can be prepared for costing purposes. For example, the Maintenance control account (21-0) in the factory ledger shows a debit balance of $1,511.55. It is supported by the debit balances of the following accounts in the subsidiary overhead expense ledger:

Code	Name of Account	Amount
21-0100	Small Tools	$ 261.19
21-0101	Power	42.10
21-0103	Compensation Insurance	21.20
21-0250	Engineering	37.50
21-0251	Toolroom Expense	152.19
21-0252	Purchases and Stores	21.00
21-0253	Cost	32.00
21-0300	General Overhead Expense	175.00
21-0301	General Administrative Expense	206.16
21-0400	Supplies	155.19
21-0502	Foremen	200.00
21-0701	Depreciation, Buildings	75.14
21-0702	Depreciation, Machinery	110.22
21-0801	Fire Insurance, Buildings	6.02
21-0802	Fire Insurance, Machinery	8.91
21-0901	Taxes, Buildings	4.16
21-0902	Taxes, Machinery	3.57
		$1,511.55

On the basis of the amount of work done for the other departments during the month, the following entry is made to distribute the $1,511.55 maintenance expense:

Code			Name of Account		Amount
Control	*Detail*		*Control*	*Detail*	
11-0	11-0104	(Dr.)	Forge Shop Overhead Expense	Maintenance and Repairs	$ 178.11
12-0	12-0104	(Dr.)	Machine Shop Overhead Expense	Maintenance and Repairs	265.76
13-0	13-0104	(Dr.)	Blacksmith Shop Overhead Expense	Maintenance and Repairs	289.43
14-0	14-0104	(Dr.)	Foundry Overhead Expense	Maintenance and Repairs	310.77
23-0	23-0104	(Dr.)	Toolroom Overhead Expense	Maintenance and Repairs	416.70
24-0	24-0104	(Dr.)	Purchases and Stores Overhead Expense	Maintenance and Repairs	50.78
21-0	(Sundry)	(Cr.)	Maintenance Overhead Expense	(Sundry accounts)	$1,511.55

If the detailed overhead expense accounts are kept in a subsidiary ledger, the balances in that ledger are ruled off when the debit balance in the control is transferred to other producing or service-department overhead-expense accounts. If the detailed overhead expense accounts are summarized on a specially ruled sheet, which serves as a subsidiary ledger, the sheets are filed away each month in a permanent record binder. The detailed overhead expense accounts are collected only for the purpose of expense analyses. The analyses are used in the preparation of budgets for overhead expense control.

By similar entries, all of the indirect overhead expenses are distributed to the overhead-expense accounts of the producing departments. With the producing department overhead-expense accounts reflecting all of the plant overhead expenses, summaries of the overhead expenses may be prepared. The overhead-expense summaries are prepared for the purpose of costing the overhead expense into production.

In a process-order cost system, the total departmental overhead expense is set up on a cost sheet as one of the elements of cost. The entry made in the factory journal or on a journal voucher is as follows:

Code	Name of Account		
11-6	Work in Process Inventory, Forge Shop .	$9,017.52	
11-0	Manufacturing Overhead Expense, Forge Shop.		$9,017.52
	To cost overhead expenses into forge shop production for month of January, 19____.		

The summary of manufacturing overhead expenses in a job-order cost system is made use of in a different manner. When the producing departmental overhead expense is shown as a summary at the end of the month it is used as a comparison. The use of estimated overhead-expense rates for costing job orders has been previously described. The total estimated amount of overhead expenses credited to the Overhead Absorbed account during the month is compared with the summary of the actual overhead expenses. The difference between the absorbed overhead expense and the actual overhead expense is corrected by an adjusting entry as described in Art. 120.

128. Summaries for the Work in Process Inventory.—A full description has been given already as to how the three elements of costs are combined to create a stage of production known as Work in Process. Debits to the Work in Process Inventory control account or accounts come into existence as a result of recording the three cost summaries described in the three preceding Articles. The Work in Process Inventory account is debited when the Stores account is credited with the summary of raw materials used, as collected from stores requisitions. The Work in Process Inventory account is also debited when the Direct Labor account is credited at the end of the month after the labor distribution has been completed. The Work in Process Inventory account is likewise debited when the Manufacturing Overhead Expense account is credited at the end of the month after the overhead application has been computed.

All transactions pertaining to the costing of raw materials, direct labor, and overhead expenses should be analyzed properly on cost summaries, within the various departments. The Work in Process Inventory account balance at the end of any month can be analyzed, then, as to its cost element composition. This very important analysis is made possible by preparing a summary of costs by departments. These data are more easily collected in a job-order system than in a process cost system. In a job-order cost system, the cost elements are charged

to each job-order card as the order progresses from one department to another. The charges for raw materials, direct labor, and estimated overhead expense appearing on job-order cost cards for uncompleted orders give the detailed analysis of the cost elements in the Work in Process Inventory account. In a process cost system, the cost-element values in a Work in Process Inventory account must be approximated. The value of each of the three cost elements entering into a completed unit must be worked out in each department. When the values for the three cost elements in the Work in Process Inventory account are known at the beginning of the month, the closing inventory analysis can be determined as follows:

SUMMARY OF WORK IN PROCESS INVENTORY

	Total	Raw Materials	Direct Labor	Overhead Expenses
Inventory Work in Process at beginning of the month	$100,000	$ 25,000	$ 25,000	$ 50,000
Charges to Work in Process during the month	400,000	100,000	100,000	200,000
	$500,000	$125,000	$125,000	$250,000
Completed Units transferred to Finished Goods during the month	$450,000	$112,500	$112,500	$225,000
Inventory Work in Process at end of month	$ 50,000	$12,500	$ 12,500	$ 25,000

The Work in Process Inventory account balance at the end of the month should be in agreement with the summary total of $50,000 as shown in the table above. The summary as reflected in that table is the auxiliary record of the Work in Process Inventory Control account.

129. Summaries for the Finished Goods Inventory.—The control account for Finished Goods Inventory is debited with the cost of completed goods transferred from the Work in Process Inventory account. In a job-order cost system, the cost of the finished units is easily ascertained from the job-order cost cards. In a process cost system a record of the number of units of each product completed is kept and the total cost of the finished units is ascertained by multiplying the number of units by the unit cost as found by the cost department. The credits to the Finished Goods Inventory come from the summary made for the Cost of Sales account.

In a process cost system, a warehouse ledger or a finished-goods inventory record gives a summary of finished units on hand. The summary is often in the form of a stores ledger record. It records the receipts of finished units from the factory, shows the issues when units are shipped, and gives the balance on hand which should be in agreement with the control-account balance when all postings for the period have been made.

In a job-order cost system, the cost of the completed orders not shipped represents the Finished Goods Inventory value at the end of any accounting period. The finished job-order cost cards represent the cost summary in this case.

130. Summaries for Cost of Sales.—The Cost of Sales account is debited when the finished units are transferred from the warehouse to the shipping department. The corresponding credit is to the Finished Goods Inventory account. The cost summary for the Cost of Sales is prepared from duplicate copies of the customers' invoices. The cost is placed on the duplicate copies from the job-order cost card, or from unit cost prices as shown in the finished-goods cost record.

The methods of preparing cost summaries having thus been described, a description of the method of utilizing the summaries will be given next. The factory journal is used as the book of original entry wherein the cost summaries are entered and from which they are posted to the cost accounts.

CHAPTER XVI

THE FACTORY JOURNAL

131. Purpose and Use of the Factory Journal.—The purpose of the factory journal is to provide a book of original entry in which the cost summaries and cost adjustments can be entered and from which they can be posted to the general ledger or factory ledger. The factory journal has been mentioned many times in the preceding pages. The references have been to the various entries required in costing the cost elements of material, labor, and overhead expenses. Now, the purpose and use of the factory journal will be further described. A better understanding of the manner in which the journal is used can be obtained from its description as a complete unit.

The manner in which the factory journal is used to record cost transactions depends upon the cost-accounting system in use. Two different methods of using the factory journal will be described. The first method considers the factory journal to be an integral part of the general accounting system in which the cost transactions are segregated. Under this plan the cost control accounts are kept in the general ledger, with the detailed cost accounts kept in subsidiary ledgers. The second method treats the factory journal as a journal apart from the general accounting system. Under this plan the cost control accounts are kept in a *factory ledger*, with the detailed accounts kept in auxiliary ledgers or other records. Under the second plan, the factory ledger is controlled by the use of a reciprocal control account, termed General Ledger. The general ledger uses a reciprocal control account called the Factory Ledger.

FACTORY JOURNAL AS INTEGRAL PART OF GENERAL ACCOUNTING SYSTEM

132. Description of Factory Journal.—The factory journal as a book of original entry incorporated in the general accounting system to record the cost transactions is first described. It is a simple form of a journal, having columns for the cost-control accounts. An example of this type is shown in Illustration 59. This form of the factory journal is used in conjunction with the voucher register shown in Illustration 15.

The factory journal shown in Illustration 59 provides for but one account for Work in Process Inventory, and one account for Overhead Expense. The factory journal may provide for as many accounts for Work in Process Inventory as there are departments, if the cost system is so designed. The same holds true for overhead-expense accounts. The illustration limits the Work in Process and Overhead Expense accounts to one each, owing to space limitations and for the purpose of simplicity in explanation. The method used in the single account explanation is the same when it is adapted to any number of similar columns.

FACTORY JOURNAL

Date	Account	Explanation	Folio	Work in Process Dr.	Overhead Expense Dr.	Cost of Sales Dr.	Finished Goods Dr.	Stores Cr.	Direct Labor Cr.	Overhead Expense Cr.	Work in Process Cr.	Finished Goods Cr.	General Ledger Dr.	General Ledger Cr.	General Ledger Folio	General Ledger Account

ILLUSTRATION 59

The Account column on the left side of Illustration 59, is for the names of the detailed accounts, the amounts of which are entered in the cost-control columns. The entries made in all of the cost-control account columns except in the Overhead Expense column are made from the cost summaries already described. The cost-control account for Overhead Expense is generally the only cost account which has a subsidiary ledger to which postings are made to detailed accounts from the factory journal. In connection with the other cost-control accounts, the detailed postings are made to the subsidiary records in a different manner. The debits to the stores ledger are made from the vouchered invoices; the credits, from the stores requisitions. The debits to the direct-labor accounts, if these accounts are kept, come from the labor-distribution sheet; the debit balances are ruled off when the cost of direct labor is transferred to Work in Process Inventory.

The Explanation column lists the reasons for, and references to, the transactions entered in the factory journal. The name and reference to the various cost summaries are placed in the Explanation column. In this column are also placed references to charges for job orders.

Each general type of entry set up in the factory journal will now be described. It must be remembered that these entries are made where the factory journal is operated as an integral part of the general accounting system. The journal entries are illustrations, chiefly of the entries made from the summaries previously described in Chapter XV.

133. Journalizing Stores Transactions in the Factory Journal.—The summary of raw materials and supplies issued from the storeroom is prepared from the stores requisitions. If the summary shows that raw materials amounting to $40,695.72 were requisitioned and charged to production orders during the month,

and that $8,654.92 worth of factory supplies had been used, then an entry would be made in the factory journal as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	Work in Process Dr.	Overhead Expense Dr.	Stores Cr.
19— Jan. 31		Summary of raw materials and factory supplies used during January		40,695 72	8,654 92	49,350 64

134. Journalizing Labor Transactions in the Factory Journal.—Expenses for direct labor and for indirect labor are first journalized in the voucher register from the payroll summary. If the total payroll for the month amounted to $58,925.01, the voucher register would record the transaction by debiting the Payroll account and crediting the Accounts Payable account with that amount.

During the month, the labor distribution has been cumulatively collected from day to day. At the end of the month the labor distribution shows the direct-labor charges to be $52,165.19, which are to be costed into production. The labor distribution summary also shows the indirect-labor charges to be $6,759.82, which are to be charged to the manufacturing overhead-expense account. The entry to clear the payroll account is as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	Work in Process Dr.	Overhead Expense Dr.	General Ledger Credit	General Ledger Account
19— Jan. 31		Direct labor wages costed to production, and indirect labor charged to overhead expense to clear Payroll Account in accordance with the labor distribution summary		52,165 19	6,759 82	58,925 01	Payroll

135. Journalizing Manufacturing Overhead Expense Transactions in the Factory Journal.—Certain charges to the Manufacturing Overhead Expense account are entered in the voucher register. Such charges are for the purchase of overhead-expense items which require a cash outlay, such as small tools, power purchased, etc. Many charges to the Overhead Expense account other than factory supplies and indirect labor come through the factory journal. The over-

head expense items entered in the factory journal are chiefly adjustments, as follows:

1. Reclaimed scrap.
2. Defective work.
3. Inventory shortage estimates.
4. Depreciation on factory buildings and equipment.
5. Estimated taxes on factory buildings and equipment.
6. Fire insurance applicable to factory buildings and equipment.
7. Compensation insurance applicable to factory labor.

The above adjustments would appear in the factory journal as in Illustration 60.

FACTORY JOURNAL

			Overhead Expense Dr.		Work in Process Cr.		General Ledger Debit		Credit		Folio	Account
19— Jan.	15	Spoilage	Order M992	15	62	15	62					
	31	Spoilage	Reclaimed scrap on order M857	36	47	47	83	11	36			Stores (#20-sheet iron)
	31	Inventory shortage	Estimated monthly shortage	163	17					163	17	Reserve for Inventory Shortage
	31	Depreciation on buildings	Monthly charge	8,492	12					8,492	12	Reserve for Depreciation on buildings
	31	Depreciation on equipment	Monthly charge	12,183	59					12,183	59	Reserve for Depreciation on equipment
	31	Taxes	Estimated taxes for month	416	67					416	67	Reserve for Taxes
	31	Fire Insurance	Monthly charge	1,560	44					1,560	44	Prepaid Insurance
	31	Compensation Insurance	Estimated monthly expense	865	90					865	90	Reserve for Compensation Insurance

ILLUSTRATION 60

After the overhead expense has been determined in the full amount for the month, it is then costed into production through the factory journal as follows:

FACTORY JOURNAL

		Account	Explanation	Folio	Work in Process Dr.		Overhead Expense Cr.	
19— Jan.	31		Costing overhead expense for the month		42,651	07	42,651	07

136. Journalizing the Completed Cost of Manufactured Goods in the Factory Journal.—At the end of the month the cost of completed goods is ascertained by summaries. The next step is to credit the Work in Process account with the cost of the goods completed during the month. The entry in the factory journal to adjust the cost-control accounts is a debit to the Finished Goods account and a

credit in the Work in Process Inventory account. This entry appears in the Factory Journal as follows:

FACTORY JOURNAL

		Account	Explanation	Folio	Finished Goods Dr.		Work in Process Cr.	
19— Jan.	31		To transfer the cost of production for month to finished goods inventory		109,782	21	109,782	21

137. Journalizing the Cost of Sales in the Factory Journal.—The entry to set up the cost of sales in the ledger account is not always accomplished through the Factory Journal. It can be done, however, where the Factory Journal is an integral part of the general accounting system. The argument for keeping the cost of sales transactions out of the factory journal is that cost of sales is a trading account, and not a cost account. Since the cost of sales is the "tie-in" account between the manufacturing division and the trading division of the plant, there can be no harm in showing how it relates to the Finished Goods Inventory account. From the summary of duplicate invoices representing shipments to customers, the cost of the sales is determined. The entry in the Factory Journal to show the cost of sales is as follows:

FACTORY JOURNAL

Date		Account	Explanation	Folio	Cost of Sales Dr.		Finished Goods Cr.	
19— Jan.	31		To transfer cost of finished goods sold from Finished Goods Inventory account		108,692	43	108,692	43

The entries shown in Arts. 133-137 are next collected in one form as in Illustration 61 to show the Factory Journal as a complete unit. No amounts appear in the *Direct Labor* credit column unless a job-order cost system is in operation. Under such a plan the direct-labor costs may be accumulated daily. Work in Process is debited and Direct Labor is credited for the daily accrued direct labor. When a voucher for the payroll is prepared Direct Labor is debited and accounts payable credited.

Current postings are made from the Factory Journal for all items appearing in the Overhead Expense column as debits to the subsidiary ledger accounts the

FACTORY JOURNAL

P 3

Date	Account	Explanation	Folio	Work in Process Dr.	Overhead Expense Dr.	Cost of Sales Dr.	Finished Goods Dr.	Stores Cr.	Direct Labor Cr.	Overhead Expense Cr.	Work in Process Cr.	Finished Goods Cr.	General Ledger Dr.	General Ledger Cr.	General Ledger Folio	General Ledger Account
19— Jan 15	Spoilage	Order M992			15 62						15 62					
31	Supplies	Stores used summary		40,695 72	8,654 92			49,350 64								
31	Indirect Labor	Labor distribution summary		52,166 19	6,759 82									58,925 01		Payroll
31	Inventory Shortage	Estimated shortage for January			163 17									163 17		Reserve for Inventory Shortage
31	Depreciation on Buildings	Monthly charge			8,492 12									8,492 12		Reserve for Depreciation, buildings
31	Depreciation on Equipment	Monthly charge			12,183 59									12,183 59		Reserve for Depreciation, equipment
31	Taxes	Estimated taxes for month			416 67									416 67		Reserve for Taxes
31	Fire Insurance	Monthly charge			1,560 44									1,560 44		Prepaid Insurance
31	Compensation Insurance	Estimated expense for month			865 90									865 90		Reserve for Compensation Insurance
31	Spoilage	Reclaimed scrap on order M857			36 47						47 83		11 36			Stores (#20-sheet iron)
31		Overhead costed into production		42,651 07						42,651 07						
31		Cost of finished goods transferred from Work in Process					109,782 21				109,782 21					
31		To transfer cost of finished goods sold from Finished Goods Inventory account				108,692 43						108,692 43				
				135,511 98 (6)	39,148 72 (9)	108,692 43 (10)	109,782 21 (7)	49,350 64 (5)		42,651 07 (9)	109,845 66 (6)	108,692 43 (7)	11 36	82,606 90		

ILLUSTRATION 61

FACTORY JOURNAL

Date	Account	Explanation	Folio	General Ledger Dr.	General Ledger Cr.	Stores Dr.	Work in Process Dr.	Overhead Expense Dr.	Finished Goods Dr.	Direct Labor Cr.	Stores Cr.	Overhead Expense Cr.	Work in Process Cr.	Finished Goods Cr.	Factory Ledger Dr.	Factory Ledger Cr.	Factory Ledger Folio	Factory Ledger Account

ILLUSTRATION 62

names of which appear in the Account column. Current postings are likewise made from the General Ledger column to the respectively named accounts appearing in the Account sub-column. Totals of the cost-control account columns are posted at the end of the month. The total of the Overhead Expense Credit column is greater than the total of the corresponding Debit column because the proportion of Administrative Expense applicable to factory ($3,502.35) is debited to the Overhead Expense account from the general journal.

FACTORY JOURNAL UNDER A RECIPROCAL CONTROL PLAN

138. Use of Factory Journal.—Some cost systems have the factory ledger entirely apart from the general ledger. The general ledger controls the factory ledger through a reciprocal account by the name of Factory Ledger. The corresponding reciprocal control account in the factory ledger is the General Ledger account. The factory journal used in a system of this type differs slightly from the style shown in Illustration 61. In Illustration 62 there are three additional columns. Two of the additional columns, one a debit column and one a credit column, are for the reciprocal control account, General Ledger. The other additional column is a debit one for collecting the debit postings to the Stores account. The Sundry columns are given the heading of Factory Ledger instead of General Ledger. A column for the Cost of Sales does not appear in the Factory Journal, Illustration 62. The factory journal shown in Illustration 62, is used in conjunction with the voucher register shown in Illustration 16.

Illustration 62 is designed for use with but a single Work in Process Inventory control account. Columns for additional control accounts may be added. The same holds true for overhead-expense accounts, if necessity requires the use of more than one such account.

Where a reciprocal control account is used in the general ledger to control the factory ledger, all of the expenditures to be paid in cash for items of factory expense are first entered in the voucher register. In the voucher register the debit for such items is to the Factory Ledger control account in the general ledger. The information pertaining to the transactions is, then, transmitted to the factory, where the same items are taken up on the factory ledger through the factory journal. Some debit and credit items affecting the factory ledger accounts are transferred to the factory after being recorded in the general journal or on journal vouchers. Such items are generally for adjustments; and cost of sales transfers. A better understanding of this method of using the factory journal may be obtained through illustrations which follow. The transactions will be shown first in the voucher register or general journal at the general office, and then as taken up in the factory journal.

139. Journalizing Stores Transactions in the Voucher Register and Factory Journal.—The voucher register at the general office records the liability for the expenditure chargeable to the factory. For invoices covering raw materials and supplies purchased, the entry in the voucher register is as follows:

VOUCHER REGISTER

Date		In Favor of	Voucher No.	Paid		Accounts Payable	Purchase Discount	Factory Ledger Dr.
				Date	Check			
Jan.	16	Sun Supply Co.	1109			11,746 82	118 66	11,865 48

A copy of the voucher number 1109 is sent to the factory where it is taken up on the factory journal. The Stores column is debited, and the General Ledger column is credited. The entry is as follows:

FACTORY JOURNAL

Date		Account	Explanation	Folio	General Ledger		Stores Dr.
					Dr.	Cr.	
19—Jan.	16	Sun Supply Co.	Voucher 1109			11,865 48	11,865 48

140. Journalizing the Payroll and Labor Transactions in the Voucher Register and Factory Ledger.—Where the liabilities for all expenditures are recorded in the voucher register at the general office, the information pertaining to the payroll amount is sent to the general office. A copy of the payroll to be paid is the authority for drawing the voucher, which is entered in the voucher register as follows:

VOUCHER REGISTER

Date		In Favor of	Voucher No.	Paid		Accounts Payable	Purchase Discount	Factory Ledger
				Date	Check			
19—Jan.	31	Paymaster	1216	Jan. 31	1216	58,925 01		58,925 01

An entry is made in the factory journal to record the costing of direct and indirect labor. The direct labor is costed into Work in Process, and the indirect labor is charged to the Overhead Expense control account. The amounts charged to Work in Process and to Overhead Expense are obtained from the labor distribution sheet. The entries made in the Factory Journal are as follows for:

1. Costing production with the direct labor and charging overhead expense with the indirect labor.
2. Receiving the cash from the general office for paying the payroll.
3. Paying the employes.

FACTORY JOURNAL

Date	Account	Explanation	Folio	General Ledger Cr.	Work in Process Dr.	Overhead Expense Dr	Factory Ledger Dr.	Factory Ledger Cr.	Factory Ledger Folio	Factory Ledger Account
19— Jan 31		Labor Distribution			52,165 19	6,759 82		58,925 01		Payroll
31		Vo 1216		58,925 01			58,925 01			Payroll Cash
31		Payment of payroll					58,925 01			Payroll
								58,925 01		Payroll Cash

141. Journalizing Manufacturing Overhead Expense Transactions in the Voucher Register, General Journal, and Factory Journal.—All manufacturing overhead expense items for which cash is paid are entered in the voucher register as invoices are received covering them. The entry in the voucher register is a debit to the factory ledger and a credit to accounts payable. The entries in the voucher register for expenses chargeable to the Overhead Expense account are as follows:

VOUCHER REGISTER

Date	In Favor of	Voucher No.	Paid Date	Paid Check	Accounts Payable	Purchase Discount	Factory Ledger
19— Jan. 16	Moerlein Machine Co.	1162			5,231 07		5,231 07
31	Penn Power Co.	1220			5,031 10		5,031 10

The entries to take up the overhead expense charges in the factory journal are made from duplicate copies of the vouchers as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	General Ledger Dr.	General Ledger Cr.	Overhead Expense
19— Jan. 16	Small Tools	Vo. 1162			5,231 07	5,231 07
31	Power	Vo. 1220			5,031 10	5,031 10

If the general ledger contains the asset and depreciation reserve accounts for the factory buildings and equipment, then, at the end of each month copies of the adjusting entries must be forwarded to the plant. Adjustments are also prepared by the general accounting office for fire insurance expense and estimated tax expense when the Prepaid Insurance account and the Reserve for Taxes account are kept in the general ledger. The adjusting entries are prepared at the general office and entered in the general journal or on journal vouchers. These items are illustrated in the general journal at the general office as follows:

GENERAL JOURNAL

	Factory Ledger		Jan. 31, 19__	General Ledger		
	8,492	12	Depreciation on Buildings			
	12 183	59	Depreciation on Equipment			
			Reserve for Depreciation Buildings	8,492	12	
			Reserve for Depreciation Equipment	12,183	59	
			Monthly depreciation charge			
	416	67	Taxes			
			Reserve for Taxes	416	67	
			Estimated monthly expense			
	1,560	44	Fire Insurance			
			Prepaid Insurance	1,560	44	
			Monthly charge to expense			
	3,502	35	Administrative Expenses			
			Administrative Expense	3,502	35	
			Proportion applicable to factory			

The entries made on the factory journal to take up the adjustments originating at the general office, pertaining to the factory overhead expense, are as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	General Ledger Dr.	General Ledger Cr.	Overhead Expense Dr.
19__						
Jan. 31	Depreciation on Buildings	Monthly adjustment from general office			8,492 12	8,492 12
	Depreciation on Equipment	Ditto			12,183 59	12,183 59
	Taxes	Ditto			416 67	416 67
	Fire Insurance	Ditto			1,560 44	1,560 44
	Administrative expenses	Ditto			3,502 35	3,502 35

Another type of entry is required in connection with certain overhead expense items. Items of manufacturing expense which must be estimated at the factory

and the liability for payment which is carried in the general ledger, require the type of entries next shown. Such items as compensation insurance for factory employes, water, gas, etc., are illustrations. Items of this nature can be estimated quite accurately. Compensation insurance for factory employes is estimated at the end of the month after the payroll distribution has been prepared. Water and gas expenses can be determined by making readings of the meters. In this manner the expense for each month can be costed into production through the Overhead Expense account, without waiting for the public utility company's monthly statements. The monthly statement of expense might not be received until the 10th or 15th of the following month, which would retard unduly the monthly closing. A single illustration for compensation insurance is shown in the following entry in the factory journal:

FACTORY JOURNAL

Date	Account	Explanation	Folio	General Ledger Dr.	General Ledger Cr.	Overhead Expense Dr.
19— Jan. 31	Compensation Insurance	Liability transferred to the general office			865 90	865 90

At the general office the liability is taken up in the general journal in the following manner:

GENERAL JOURNAL

Factory Ledger		Jan. 31, 19—	General Ledger	
865	90	Compensation Insurance		
		Reserve for Compensation Insurance	865	90
		To set up liability for compensation insurance for January		

Other overhead expense items are entered in the factory journal which do not affect the general ledger reciprocal control account. These items are for reclaimed scrap, spoilage, estimated inventory shortage, supplies, etc., in addition to indirect labor already illustrated in Art. 140. The entries in the factory journal for this group of items are shown in Illustration 60.

The entry for costing the overhead expense into production in the factory journal under the reciprocal control account plan is the same as the entry shown in Art. 135, except as to the amount.

142. Journalizing the Completed Cost of Manufactured Goods in the Factory Journal.—The entry required to transfer the value of the finished goods from the

Work in Process account to the Finished Goods account, when a reciprocal control account is used, is identical with the Illustration in Art. 136, except as to amount.

143. Journalizing the Cost of Sales in the Factory Journal and in the General Journal.—In a cost system where reciprocal control accounts are used to connect the general and factory ledgers, the cost of sales is transferred from the factory books to the general office books. This transfer is necessary because the monthly profit and loss statement of the concern is prepared at the general accounting office. Therefore, it is necessary to have the cost of sales to compare with the total sales which are recorded in the general ledger, to arrive at the gross profit. The entry made in the factory journal for the transfer is as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	General Ledger Dr.	General Ledger Cr.	Finished Goods Cr.
19__ Jan. 31	Cost of Sales	To transfer cost of finished goods sold to general office		104,692 43		104,692 43

At the general office, the cost of sales is entered in the general journal as follows:

GENERAL JOURNAL

General Ledger	Factory Ledger	Folio	Jan. 31, 19__	General Ledger	Factory Ledger
104,692 43			Cost of Sales To record cost of finished goods shipped by factory		104,692 43

The entries which have been made in the preceding paragraphs are next summarized as in Illustration 63 to show the Factory Journal as a complete unit. The credit to the Factory Ledger reciprocal control account in the general ledger represents the value of the finished goods comprising the elements of cost previously reflected in the charges to the Factory Ledger account. The general office can be thought of as a source which provides the funds to pay for the raw materials, direct labor, and overhead expenses. The factory is charged with these costs on the general ledger, and naturally should receive credit for them after they have been converted into finished goods and shipped to customers.

FACTORY JOURNAL

F 11

Date	Account	Explanation	Folio	General Ledger Dr.		General Ledger Cr.		Stores Dr.		Work in Process Dr.		Overhead Expense Dr.		Finished Goods Dr.		Direct Labor Cr.		Stores Cr.		Overhead Expense Cr.		Work in Process Cr.		Finished Goods Cr.		Factory Ledger Dr.		Factory Ledger Cr.		Folio	Account
19—																															
Jan. 15	Spoilage (O.H.)	Order M 992										15	62									15	62								
16	Sun Supply Co.	Vo. 1109				11,865	48	11,865	48																						
16	Small Tools	Vo 1162				5,231	07					5,231	07																		
31	Supplies (O.H.)	Stores Used Summary								40,695	72	8,654	92					49,350	64												
31	Indirect Labor (O.H.)	Labor Distribution								52,165	19	6,759	82															58,925	01	156	Payroll
31	Inventory Shortage (O.H.)	Estimated amount for month										163	17															163	17	157	Reserve for Inventory Shortage
31	Power (O.H.)	Vo 1220				5,031	10					5,031	10																		
31	Depreciation on Buildings (O.H.)	J 31				8,492	12					8,492	12																		
31	Depreciation on Equipment (O.H.)	J 31				12,183	59					12,183	59																		
31	Taxes (O.H.)	J 31				416	67					416	67																		
31	Fire Insurance (O.H.)	J 31				1,560	44					1,560	44																		
31	Administrative expenses (O.H.)	J 31				3,502	35					3,502	35																		
31	Compensation Insurance (O.H.)	Estimated expense for month				865	90					865	90																		
31	Spoilage (O.H.)	Reclaimed scrap on order M857										36	47									47	83			11	36			152	Stores (#20 sheet iron)
31		Overhead costed into production								52,913	24									52,913	24										
31		Value of finished goods completed												125 894	24							125,894	24								
31		Cost of goods sold		104,692	43																			104,692	43						
31		Vo. 1216 Payroll Cash Received				58,925	01																			58,925	01			158	Payroll Cash
																										58,925	01	156	Payroll
																												158	Payroll Cash
				104,692	43	108,073	73	11,865	48	145,774	15	52,913	24	125,894	24			49,350	64	52,913	24	125,957	69	104,692	43	117,861	38	118,013	19		
				(151)		(151)		(158)		(165)		(154)		(155)				(158)		(154)		(153)		(155)							

ILLUSTRATION 63

The postings made from the factory journal to the factory ledger are as follows:

FACTORY LEDGER

General Ledger (Control) 151

19__							19__						
Jan.	31	Balance	F11	104,692	43		Jan.	31		F11	108,073	73	
				3,381	30								
				108,073	73						108,073	73	
							Feb.	1	Balance		3,381	30	

Stores (Control) 152

19__							19__					
Jan.	31		F11	11,865	48		Jan.	31		F11	49,350	64
	31		F11	11	36							

Work in Process (Control) 153

19__							19__					
Jan.	31		F11	145,774	15		Jan.	31		F11	125,957	69

Overhead Expense (Control) 154

19__							19__					
Jan.	31		F11	52,913	24		Jan.	31		F11	52,913	24

Finished Goods (Control) 155

19__							19__					
Jan.	31		F11	125,894	24		Jan.	31		F11	104,692	43

Payroll 156

19__							19__						
Jan.	31		F11	58,925	01		Jan.	31		F11	58,925	01	

Reserve for Inventory Shortage 157

							19__						
							Jan.	31		F11	163	17	

Payroll Cash 158

19__							19__						
Jan.	31		F11	58,925	01		Jan.	31		F11	58,925	01	

The credit balance of $3,381.30 in the General Ledger account (151) must be the same figure shown in the general ledger account, Factory Ledger. The latter named account will have a debit balance.

Current postings are made from the Overhead Expense debit column of the factory journal to the Overhead Expense subsidiary ledger. The accounts as named in the account column are posted with the respective amounts as shown in the overhead expense column.

The stores ledger also has current postings made to its stock items. The stores ledger items, or ledger cards, are debited and credited with the stores items received and requisitioned, the values of which appear in the Stores debit and credit columns.

Current postings are made also to the factory ledger accounts for all items entered in the factory ledger sundry debit and credit columns appearing at the extreme right-hand side of Illustration 63.

Summary records collect the detail pertaining to Work in Process Inventory control account. These records reflect the analysis of the cost elements costed into production. They also show an analysis of the cost element values in the balance of the account at the end of each month. If a job order cost system is in use, the job order cost cards form the subsidiary record controlled by the Work in Process Inventory account.

Current postings are debited to the finished goods ledger from copies of the completed production orders or a record of finished products in a process order cost system. These orders show the quantity of each different unit produced and placed into warehouse stock. Copies of the shipping orders are used to prepare the summary of finished goods shipped and recorded as a debit to the cost of sales in the general ledger debit column, and as a credit to the finished goods column. The current credit postings to the finished goods ledger are also made from the copies of the shipping orders showing the quantity of the various stock items shipped.

FACTORY JOURNAL VOUCHERS

144. Some cost systems make use of a general factory journal or factory journal vouchers where the factory ledger is controlled by a general ledger reciprocal control account. Under such a plan the number of columns in the factory journal can be reduced. If a process cost system is in use, the debit and credit columns for work in process can be eliminated in the factory journal. The finished goods columns and the credit columns for direct labor and overhead expense can be dispensed with easily. The closing entries at the end of each month for costing raw materials, direct labor, and overhead expense into work in process can be handled by a factory journal voucher or entered in a general factory journal. The value of finished goods transferred from work in process, and the value of finished goods shipped can also be entered on factory journal vouchers or in a general factory journal.

The nature of the cost system and the commodities produced aid in determining whether a single factory journal is better than using an additional general factory journal or factory journal vouchers.

PART III

PROCESS AND JOB-ORDER COST SYSTEMS

CHAPTER XVII

PROCESS COSTS

145. Accuracy of Process Costs.—Process costs are found in widely varying types of manufacturing industries that produce for stock rather than to fill special orders. There may be a single commodity produced, or there may be several like commodities of different sizes manufactured. In other cases, the entire commodity production may be similar as to general classification, but the individual commodities may be radically different in design. For example, a plant manufacturing electrical apparatus may produce a varied line, such as waffle irons, toasters, fans, stoves, motors, dynamos, transformers, turbines, etc. There may be two or more different sizes or models of each of the commodities mentioned.

The difficulty of arriving at accurate unit costs in a process cost system is usually in inverse ratio to the number of different commodities produced. If a single commodity is produced, the unit cost can be determined with accuracy. If many commodities are produced and as a result many products are operated on in the same department, the unit cost cannot be so accurately computed unless the cost elements are charged to specific production order numbers. One reason for this is that there is difficulty in accurately allocating the overhead expense to the many commodities passing through the same departments or cost centers. Averaging the overhead cost over the different commodities must be resorted to as an expedient. Another reason is that each operator in a department may work on several types of commodities; this involves the problem of averaging the labor cost among the types of commodities produced. Still another reason, is that the materials issued to a department may be used in different kinds of commodities; this also involves the problem of averaging the material cost among the different commodities on which operations are performed. Where it is necessary to resort to the use of averages, exact unit costs cannot be determined.

More accurate process costs can be computed if the plant is laid out so that radically different types of commodities are manufactured in separate divisions of the plant. For example, in an electrical manufacturing plant, there could be separate divisions for the production of waffle irons, toasters, fans, motors, dynamos, transformers, turbines, etc. The elements of cost, then, can be segregated and summarized by divisions manufacturing similar lines of products, thus contributing to greater accuracy in unit costs.

Certain types of plants cannot have their producing operations so easily separated into divisions as in the illustration of the electrical manufacturing plant. A plant producing many varieties of toys manufactured from tin illustrates the

problems involved where segregated divisions cannot be established. In this type of plant, departments only can be established. The departments would be as follows: Trimming and cutting; Stamping and printing (designs and colors); Pressing and shaping; Finishing and baking; Assembly and packing. In a plant of this type all parts for every style of toy manufactured pass through the same departments. It would be impracticable to have separate divisions established for each different classification of toy manufactured. Therefore, the problem of averaging the cost elements of each department among the types of toys passing through it is difficult.

146. Principles of Process Cost Systems.—Certain well-defined principles should be followed in the operation of a process cost system. Adherence to these principles will result in the most accurate determination of unit costs possible. This is one of the most important aims of any cost system. The principles involved pertain to process production orders, to departmentalization and to divisionalization, to material, labor, and overhead costing, to cost element summaries, and to cost statements and unit costs. Each of these topics will now be described in detail.

147. Process Production Orders.—There must be some authority or provision for bringing any type of production into existence in a manufacturing plant. Back of all production orders, of course, lies the customers' orders. Without the sales orders which are received daily, there could be no continuous production. In a going concern, the preparation of a sales budget gives the planning and producing department a basis for estimating production requirements. The manufacture of the various commodities is scheduled as to quantity to be made, date production is to commence, and date production is to be completed.

The production order comes into existence as a result of the production schedule. If the schedule provides for the manufacture of 300 dozen $\frac{3}{4}$-inch **S** wrenches for the month, the planning department prepares a shop order for them. A copy of the shop order, bearing a number, goes to the foreman of each department in which any work is required to be done in the production of the **S** wrenches. The shop order specifies the quantity wanted and the description of the item or items. The date when the order is to be completed in the various departments through which it passes is likewise given. Briefly, the process production order is the authority for proceeding with the production of certain commodities in an orderly and routine fashion. A copy of a process production order is shown in Illustration 64.

The production order may also provide a specific order number to which is charged the materials used and direct labor incurred in connection with the manufacture of the item indicated on the order. If a production order number is so used, then a certain amount of overhead expense is added to material and labor costs and the total cost of producing the item learned. The unit cost can then be determined when the number of good pieces finished is reported by the inspector. This method of obtaining unit costs is essentially the same as that described under

job-order costs in the next chapter except that actual instead of estimated overhead costing rates may be used. Sometimes a specific order number is used to accumulate the costs, not of one type of product, but of several; for example, all the small sizes of a certain commodity. In this case the costs charged to the order number are averaged among the various lines or sizes before unit costs are calculated.

PROCESS PRODUCTION ORDER

To the Foremen of the
Following Departments:

Order Number K561
March 16, 19

The following items are scheduled for production in your departments on the dates shown. Charge all materials and labor to the above order number.

By order of Production Engineer Jas. Hanson

Quantity Wanted	Description
300 dozen	¾-inch S Wrenches, Blueprint No. 4712

Department	Production to Begin	Quantity to be Finished				Total Order Finished
		No.	Date	No.	Date	
Forging	March 20	150 doz.	Mar. 23	150 doz.	Mar. 27	
Finishing	March 23	150 "	Mar. 25	150 "	Mar. 29	
Inspection	-----	150 "	Mar. 26	150 "	Mar. 30	

ILLUSTRATION 64

Most process plants do not bother about issuing production orders for the purpose of accumulating costs. If production consists of an extremely large number of different commodities of various sizes, shapes, and styles, the unit costs usually are determined by the averaging plan. Though the averaging plan is not entirely accurate, it is less costly than the separate accumulation of costs for each production order.

148. Departmentalization Versus Divisionalization.—The cost system must be designed to fit the needs of the individual plant. Manufacturing plants, making a product for which a process cost system is advisable, may be divided into three general groups. First, those plants in which the product is of a single type, such as ice plants, blast-furnace plants, electric power plants, steam heating plants, etc. Plants within this group are not departmentalized nor divisionalized. There is no necessity for a Work in Process Inventory account, as a general rule, in plants classified under this group. Usually there is no necessity for issuing process production orders. Plants of this nature are either in operation or at a standstill. Production, when the plant is in operation, is a steady, continuous process. The

total operating expenses for the month are charged to a Cost of Production account. Plants that turn out a single uniform product require the simplest type of a process cost system. The cost of raw materials, direct labor, and overhead expenses are closed monthly to the Cost of Production account. The monthly cost divided by the number of units produced gives, as a result, the unit cost of production. There is no problem of interdepartment transfers of the cost of partly finished units.

The second group of process-order plants consists of those which require departmentalization. The product may be of a single type, yet require several different processes to complete it. To control the cost of each process, the cost elements are segregated by departments. The manner in which the raw material, direct labor, and overhead expenses are costed into production, under this plan, is described in Arts. 149-151. Such a plan involves a more complex process cost system. Examples of this type of plant are tanneries, pipe and tube mills, and factories making concrete products, ceramic products, etc. Cost systems designed for plants of this type provide for Work in Process Inventory accounts, because of the lapse of time between the date the first cost elements are combined and the completion of the commodities. If several days are required to complete a unit, an account must be available to reflect the cost of the partly finished goods at the end of any month.

The third group of plants making use of process cost systems includes those which must be divisionalized to permit the costs to be gathered accurately. Examples of plants of this nature are: Electrical manufacturing plants, where a wide variety of apparatus is produced; Automobile plants where many different parts are produced by the same company; Glass manufacturing plants where the products are extremely diversified.

In a plant producing a widely varying line of commodities, the nature of the operations for each commodity produced often varies widely. It would be impracticable to have such a plant laid out on a purely departmental plan. The processes required and the departments in which the manufacture of an electric fan takes place have no connection with the different processes required in the construction of an electric transformer. The solution, therefore, lies in arranging the plant in divisions in which the production of widely different commodities is segregated. Within each division there may be departments or cost centers where like classes of work are performed. Divisionalization permits of gathering more accurate costs. In reality, each division is a small factory in itself.

149. Costing Raw Materials in a Process Cost System.—The particular manner in which raw materials are costed into production in a process cost system, depends upon the nature of the commodities produced within the given establishment. The variety of raw materials used is quite small, as a general rule, in a plant engaged in the production of a single commodity. The different raw materials may be so few in number that a separate ledger account may be set up for each. An illustration is in the ice industry where the raw materials are ammonia, calcium, and water. At a blast furnace plant the raw materials are iron ore, coke,

limestone, and scrap iron. Separate ledger accounts are kept for each of these items of raw materials. In plants of this nature, the raw materials are costed into production from summary records. As the various ingredients are placed into production, a record of their count, weight, or measure is maintained daily. At the end of the month the summary is used as a basis for the charge to the Raw Materials Used account and a credit to the various accounts to which the cost of the raw materials has been debited during the month. The balance of the Raw Materials Used account is then carried to the Cost of Production account.

A plant in which it is necessary to establish departments, usually produces a variety of products. Raw materials are, therefore, handled through a Stores control account, supported by a subsidiary stores ledger. Raw materials are requisitioned by the foremen of the various departments, if no planning department exists within the plant. If there is a planning department, the requisitions are issued by employes of this department. Regardless of the manner in which the stores are requisitioned, the requisition must show the department to which the material is to be charged. Different raw materials are charged to the Work in Process Inventory accounts of the different departments as they are needed in the successive stages of production. The entries made in the factory journal are debits to the different departmental Work in Process Inventory accounts and credits to Stores. The raw-material charges are made usually from a monthly summary. Certain types of production may necessitate the prorating of the total raw material cost to different departments on a tonnage or other arbitrary basis. This method is to be avoided if at all possible, because it leads to inaccuracies as to departmental costs and unit costs.

In a plant characterized by divisionalization, the variety of raw materials used in production is usually greater than in any other type of process production plant. Raw materials are withdrawn from the storeroom and charged to the departments or cost centers within a division. Monthly summaries of the raw materials used in the different divisions form the basis for the entries made in the factory journal.

The most important principle to remember in connection with costing raw materials in a process cost system, where there is departmentalization or divisionalization, is that there should be a record of the raw materials charged to each department. In addition to the raw materials, the other elements of direct labor and overhead expense also are charged to the departmental Work in Process account. When the work that is to be done on the product in a department has been finished, the product is credited to the Work in Process account of that department and debited to a like account of the department to which it is transferred. To have an analysis of the raw-material cost, then, a record must be kept of the value of the raw materials charged to each department. Illustrations 68 to 71, inclusive, show a form of this analysis. Unless material costs are charged to specific production order numbers as well as to departments, the material costs pertaining to a department are averaged among the different products passing through the department and the departmental material cost per unit is found by dividing the number of units of one product operated on into the material cost assigned to the particular product.

In some process cost systems, even though departmentalization or divisionalization exists, material costs are not charged into departmental Work in Process Inventory accounts. This is usually the case where the time required to complete the unit produced is 24 hours or less. The total material cost is prorated over all different commodities produced, upon a basis of unit count, weight, gallons, etc. Material cost per unit is determined by dividing the number of units of one commodity produced into the material cost prorated to that particular commodity. The commodities produced under this type of cost system must be somewhat uniform to permit of the total material costs being averaged or prorated satisfactorily to products. The following example will illustrate the method.

COMMODITY RAW-MATERIAL DISTRIBUTION

	Total	Item 101	Item 102	Item 103
Average Weight Each Item		100 lb.	350 lb.	125 lb.
Total Items produced		80,000	20,000	40,000
Total Tonnage	10,000 tons	4,000 tons	3,500 tons	2,500 tons
Cost of Raw Materials included in Cost of Production	$18,249.50	$7,299.80	$6,387.32	$4,562.38
Raw Material Cost per unit		$.0912475	$.319366	$.1140595

Scrap materials and defective work have an effect upon the material cost in the various departments. Scrap and salvaged materials are charged back to the Stores control account with a corresponding credit to the Work in Process Inventory account of the department where the scrap or salvaged material came into existence, or to Raw Materials Used, if material costs are not charged into departmental Work in Process Inventory accounts. If the cost elements are accumulated by production order numbers, the production order record must also receive a credit for the same value as entered in the Work in Process Inventory account.

150. Costing Direct Labor in a Process Cost System.—The method used to cost direct labor depends upon the type of process cost system in use. Where a single commodity is produced and the plant is not departmentalized, the direct labor is charged to a Cost of Production account. There is no problem of labor distribution. The payroll furnishes the information for making an entry whereby the Cost of Production account is debited and the Payroll account credited.

It is necessary to use a labor-distribution sheet in order to be able to cost the labor in a process plant that is departmentalized. Time tickets are prepared which show the daily wages of each direct laborer, the operation cost, and the department in which the operations are performed. The time tickets are the sources from which the labor distribution is prepared. The labor-distribution sheet furnishes the information from which is prepared the entry whereby the labor is costed into production. The departmental Work in Process Inventory accounts are debited and the Payroll account is credited. The same information

is necessary for the preparation of a departmental cost-element analysis sheet. Illustrations 68-71 show a form of this analysis.

In a divisionalized plant, the direct labor must be costed into the Work in Process Inventory accounts in accordance with the amount of direct labor chargeable to each department in each division. The labor-distribution sheet furnishes this detail at the end of each month. The entries made to cost the direct labor into production in this type of a plant are the same as described in the preceding paragraph.

151. Costing Manufacturing Overhead Expenses in a Process Cost System. The manner in which manufacturing overhead expenses are costed into production, where a process cost system is in use, also depends upon the nature of the production. Where a plant is engaged in the production of a single commodity and there is only one department, the overhead expenses are costed directly into the Cost of Production account. The corresponding credit is to the Overhead Expense control account.

A plant composed of two or more departments in each of which numerous different commodities are operated on furnishes a more involved problem of overhead expense costing. In the first place, the plan of accumulating overhead costs in departmental Overhead Expense accounts must be worked out in accordance with principles discussed in Chapter XIII, Accumulating Overhead Expense. At the end of the month the amounts collected in the departmental Overhead Expense accounts are transferred to the respective departmental Work in Process Inventory accounts. Sometimes a single Overhead Expense account is used even though the plant is departmentalized. In this case, the total overhead expense of the month may be distributed to departments in accordance with the costing methods discussed in Chapter XIV, Costing and Controlling Overhead Expense. An analysis of the overhead expenses charged to each department is set up on a departmental cost element analysis sheet. Illustrations 68-71 show a form of this analysis. Unless overhead costs are costed to specific production order numbers as well as to departments, the overhead expense of each department is averaged among the products passing through the department and the departmental overhead cost per unit learned by dividing the number of units of one product operated on into the overhead cost assigned to the particular product.

COMMODITY OVERHEAD EXPENSE DISTRIBUTION

	Total	Item 101	Item 102	Item 103
Average Weight each item		100 lb.	350 lb.	125 lb.
Total items produced		80,000	20,000	40,000
Total Tonnage	10,000 tons	4,000 tons	3,500 tons	2,500 tons
Overhead Cost included in Cost of Production	$13,104.58	$5,241.83	$4,586.60	$3,276.15
Overhead Cost per unit		$.065523	$.229330	$.081904

Sometimes when a single Overhead Expense account is used in a process cost system where the plant is departmentalized, the total overhead expense is allocated to various lines of product upon a basis of tonnage, gallons, or unit count, and then to arrive at unit commodity cost the amount so allocated to each line is divided by the number of units produced. An illustration of this method is shown on page 199.

In a divisional process cost system there must be at least one Overhead Expense account for each division. Usually there will be an Overhead Expense account for each department or cost center within a division. Procedure for costing overhead expense in a divisionalized business is essentially the same as that in a business that is merely departmentalized.

152. Cost Element Summaries Under a Single-Commodity Process Cost System.—The necessity for, and the methods of, collecting summaries for raw material, direct labor, and overhead expense costs were described in Chapter XV. The general method of recording these summaries in the factory journal was described in Chapter XVI. A description will now be given of the different methods of recording the entries in the factory journal under the different process cost plans. The different plans described are for the single-product business with only one department, the departmental business, and the divisional business.

The process cost system for the single-product type of business provides for the collection of the various elements of cost as described in Arts. 149, 150, and 151. Briefly, the procedure is as follows:

The cost of raw-material ingredients used in the production of the commodity can be recorded in separate accounts, such as Calcium, Ammonia, and Water accounts in an ice plant. At the end of each month the summary entry required to cost the raw materials would be made in the factory journal as follows:

FACTORY JOURNAL

Date	Account	Explanation		Factory Ledger Dr.	Factory Ledger Cr.	Folio	Factory Ledger Account
19—							
Jan. 31				900 00			Raw Materials Used
		Raw materials used during month			250 00		Calcium
					350 00		Ammonia
					300 00		Water
Jan. 31		Costing raw materials used into production		900 00			Cost of Production
					900 00		Raw Materials Used

If the single commodity produced requires numerous different items of raw materials in its production, the original purchases should be charged to a Stores or

Raw Material Inventory account. At the end of each month, after the summary of raw materials used had been prepared, entries are made in the factory journal as follows:

FACTORY JOURNAL

Date		Account	Explanation	Factory Ledger							
				Dr.			Cr.			Folio	Account
19— Jan.	31		Raw materials used as shown by monthly summary	16,941	11		16,941	11			Raw Materials Used Stores
Jan.	31		To cost raw materials used into production	16,941	11		16,941	11			Cost of Production Raw Materials Used

The direct-labor expense and the overhead expenses having been collected in controlling accounts, previously described, the entry is used as follows to cost the two elements:

FACTORY JOURNAL

Date		Account	Explanation	Factory Ledger							
				Dr.			Cr.			Folio	Account
19— Jan.	31		To cost direct labor and overhead expenses into production	11,151	12						Cost of Production
							1,500	00			Direct Labor
							9,651	12			Overhead Expense

153. Cost Element Summaries Under a Departmental Process Cost System. When production is specialized by separate departments, the process cost system must provide for collection of the values of the cost elements by departments. Summaries of raw materials used can be prepared departmentally from stores requisitions which show the department name or number into which the materials were ordered. Summaries of direct labor employed can be gathered from the labor-distribution sheet that shows the amount of this cost element chargeable to each department. Overhead expense accounts for each department collect the total indirect manufacturing expenses applicable to each department or the total overhead expense is prorated to departments according to methods explained in Chapter XIV.

When the three elements of cost are summarized by departments, a cost-element analysis statement must be prepared in order to show the cumulative cost of

the cost elements in each department. This summary provides the information from which transfer entries are made, whereby the cost of the product is transferred from the first departmental Work in Process account successively through other departmental Work in Process accounts to the Finished Goods account. This procedure is also necessary in order to provide for the proper analysis of the Work in Process inventories at the end of each month. An example of this type of analysis summary is shown in Illustration 65.

From the Cost Element Analysis Statement shown in Illustration 65, it is possible to determine the cost of the completed work in each department for the month. The manner in which the cost elements are costed into the departmental Work in Process Inventory accounts already has been described. The importance of this analysis statement is not that it shows the analysis of the cost elements by departments, but that it shows the cumulative cost of the Work in Process Inventory as it passes from department to department on through to the finished-goods stage. At the end of the month, entries similar to the following would be made in the factory journal to show the commodity cost at successive stages of completion:

FACTORY JOURNAL

Date		Account		Factory Ledger Dr.		Factory Ledger Cr.		Folio	Factory Ledger Account
19—									
Jan.	31			22,877	88				Work in Process Inventory, Dept. B
						22,877	88		Work in Process Inventory, Dept. A
	31			37,698	99				Work in Process Inventory, Dept. C
						37,698	99		Work in Process Inventory, Dept. B
	31			45,863	99				Work in Process Inventory, Dept. D
						45,863	99		Work in Process Inventory, Dept. C
	31			56,362	83				Finished Goods Inventory
						56,362	83		Work in Process Inventory, Dept. D

At the end of the month, after the preceding illustrative entries have been posted to the ledger accounts, the balance left in each departmental Work in Process Inventory account represents the value of partly finished commodities in the respective departments. The composition, or make-up of the Work in Process Inventory account balances also can be seen in the analysis sheet. The values attached to the work in process inventories and to the partly completed commodities transferred from department to department are usually estimates. It is extremely difficult, if not impossible, to arrive at exact values in this connection, especially if the commodities are of numerous varieties and pass through many departments before completion. It is easy to understand why this is the case. Production orders are begun at various dates during each month. The orders are for different

COST ELEMENT ANALYSIS STATEMENT

Charges to Departmental Work in Process Inventory Accounts Originating During the Month.

Departments	Total	Raw Materials	Direct Labor	Overhead Expense
A	$28,597.35	$10,000.00	$12,500.00	$ 6,097.35
B	21,473.87	6,000.00	10,000.00	5,473.87
C	13,261.00	5,000.00	4,750.00	3,511.00
D	13,465.31	4,000.00	6,750.00	2,715.31
	$76,797.53	$25,000.00	$34,000.00	$17,797.53
Department A:				
Work in Process Inventory at Beginning of Month	——	——	——	——
Charges to Work in Process During Month	28,597.35	10,000.00	12,500.00	6,097.35
Total charges to Work in Process	$28,597.35	$10,000.00	$12,500.00	$ 6,097.35
Work in Process Inventory at end of Month	5,719.47	2,000.00	2,500.00	1,219.47
Department B:				
Cost of Work Transferred from Dept. A	$22,877.88	$ 8,000.00	$10,000.00	$ 4,877.88
Work in Process Inventory at Beginning of Month	——	——	——	——
Charges to Work in Process During Month	21,473.87	6,000.00	10,000.00	5,473.87
Total Charges to Work in Process	$44,351.75	$14,000.00	$20,000.00	$10,351.75
Work in Process Inventory at End of Month	6,652.76	2,100.00	3,000.00	1,552.76
Department C:				
Cost of Work Transferred from Dept. B	$37,698.99	$11,900.00	$17,000.00	$ 8,798.99
Work in Process Inventory at Beginning of Month	——	——	——	——
Charges to Work in Process During Month	13,261.00	5,000.00	4,750.00	3,511.00
Total Charges to Work in Process	$50,959.99	$16,900.00	$21,750.00	$12,309.99
Work in Process Inventory at End of Month	5,096.00	1,690.00	2,175.00	1,231.00
Department D:				
Cost of Work Transferred from Dept. C	$45,863.99	$15,210.00	$19,575.00	$11,078.99
Work in Process Inventory at Beginning of Month	——	——	——	——
Charges to Work in Process During Month	13,465.31	4,000.00	6,750.00	2,715.31
Total Charges to Work in Process	$59,329.30	$19,210.00	$26,325.00	$13,794.30
Work in Process Inventory at end of Month	2,966.47	960.50	1,316.25	689.72
Finished Goods:				
Cost of Goods Manufactured During Month	$56,362.83	$18,249.50	$25,008.75	$13,104.58

commodities and for varying quantities. Various orders will be at various stages of completion at the end of the month. Unless a record is kept for each production order, showing the quantity and value of each cost element charged to the order, the cost accountant must resort to estimates and averages. The estimates and averages are used in order to arrive arbitrarily at the values representing the cost of the goods transferred from department to department and the values remaining in the Work in Process inventory accounts. If it is impractical to record cost-element charges on separate forms for each production order, and it usually is, then a most careful basis must be provided to ascertain the component element cost for each different type of unit manufactured. As a careful record is kept of the number of partly finished and finished units in each department, it requires only a mathematical computation (units completed in each department times estimated total cost of elements used in each unit) to estimate the cost of the units finished in each department during the month. The value computed in this fashion is transferred as a cost to the Work in Process inventory of another department. The same value deducted, also, from the total charges to the department during the month, gives a balance which represents the Work in Process Inventory account balance at the end of the month. The Departmental Work in Process Inventory account balance should be supported by a statement of the component cost elements as shown in Illustration 65.

The averaging method, just described, which is used to compute the cost of the partly finished products in different departments, as well as the value of the Work in Process inventory at the end of the month, is one of the inherent weaknesses of the process cost system. If the method of averaging is faulty, the effect is far-reaching. The cost of the units partly finished in one department is estimated. If the estimate is inaccurate, the cost transferred to the next department is inaccurate. Such an inaccuracy is carried through all of the Work in Process Inventory accounts to the Finished Goods and Cost of Sales accounts. The inaccuracy ultimately is reflected in the net profit. Faulty averaging methods are reflected, also, in the Work in Process Inventory account balances, which represent the value of the partly finished units at various stages of completion. These balances, if erroneously valued, likewise carry a misstated cost value into the following month's costs.

154. Cost Element Summaries Under a Divisional Process Cost System.—Where process production is characterized by commodity manufacture within well defined divisions, costs can be collected or summarized, usually, with a great degree of accuracy. This is because dissimilar lines of products are segregated in different divisions. Each division becomes, in reality, a small plant in itself. The preparation and recording of cost element summaries under a divisional process system is essentially the same as that described in the preceding article.

155. Cost Statements Under a Process Cost System.—There are about as many varieties and forms of cost statements as there are plants having process cost systems in use. The chief accounting officer in charge of the cost division

usually designs the cost statements in keeping with his own desires. Any cost statement, however, should set forth the following information:

(*a*) Total Raw Material Cost
(*b*) Total Direct-Labor Cost
(*c*) Total Overhead-Expense Cost
(*d*) Total Commodity Cost
(*e*) Commodity Cost by Groups or Lines
(*f*) Commodity Unit Cost

The cost statement may show also the commodity cost of groups or lines and of commodity unit costs by cost elements.

THE SNOWBANK ICE COMPANY
Statement of Manufacturing Cost
January 1, 19__ to January 31, 19__

Raw Materials:		
Ammonia	$ 350.00	
Calcium	250.00	
Water	300.00	
Total Raw Materials Cost		$ 900.00
Direct Labor:		1,500.00
Overhead Expenses:		
Fuel	$ 968.71	
Power	1,647.85	
Lubricants and Waste	95.47	
Factory Supplies	618.60	
Repairs	1,591.10	
Taxes	482.66	
Insurance	394.71	
Depreciation	3,852.02	
Total Overhead Expenses		9,651.12
Total Cost of Production, January 1, 19__ to January 31, 19__		$12,051.12
Ice produced during January, 3,012 tons		
Cost per ton, $4.001		

ILLUSTRATION 66

Separate cost sheets may be used to show commodity costs broken down by departments, and by cost elements within the departments. Other cost statements may show the cost-element composition in the Work in Process inventories. Another group of cost statements can be made to show the composition of the cost elements in the cost of production analyzed as to departments and commodities.

The principal purpose of a cost statement is to show the cost of production for the month, the volume of output expressed in the terms of units produced, and the resultant unit cost. The other cost statements enumerated in the preceding paragraph supplement the main cost statement.

In a plant with only one department and producing a single commodity, the cost statement is simple. The raw materials, if few in number, are enumerated

under the heading, Raw Materials. The direct-labor cost follows the raw-material cost. Next appears the overhead expenses, usually itemized, and then the total cost of production. The production cost divided by the total units produced, results in the unit cost of production for the month. Illustration 66 shows a cost statement prepared for an ice manufacturing concern, and is representative of the type of statement prepared for a plant producing a single commodity.

156. Cost Statements Under a Departmental Process Cost System.—The cost statements shown in Illustrations 67 to 72 inclusive, show the minute analyses required in a departmental process cost system. The principal cost statement showing element costs distributed by commodities, together with unit costs, is shown in Illustration 67.

NATIONAL IRON PRODUCTS COMPANY
Cost Statement
January 1, 19__ to January 31, 19__

	Total Cost	Commodities: Item 101	Item 102	Item 103
Raw Materials	$18,249.50	$ 7,299.80	$ 6,387.32	$ 4,562.38
Direct Labor	25,008.75	10,250.00	9,050.00	5,708.75
Overhead Expense	13,104.58	5,425.00	4,275.50	3,404.08
	$56,362.83	$22,974.80	$19,712.82	$13,675.21
Total Tonnage Produced	10,000 tons	4,000 tons	3,500 tons	2,500 tons
Total Items Produced		80,000	20,000	40,000
Average Weight		100 lb.	350 lb.	125 lb.
Raw Material Tonnage Cost		$1.82495	$1.82495	$1.82495
Direct Labor Tonnage Cost		2.56250	2.58571	2.28350
Overhead Expense Tonnage Cost		1.35625	1.22157	1.36163
Total Tonnage Cost		$5.74370	$5.63223	$5.47008
Raw Material Unit Cost		$0.0912475	$0.319366	$0.1140595
Direct Labor Unit Cost		.1281250	.452500	.1427187
Overhead Expense Unit Cost		.0678125	.213775	.0851020
Total Unit Cost		$0.2871850	$0.985641	$0.3418802

ILLUSTRATION 67

The four cost statements, Illustrations 68-71, could be placed in one statement and probably would be in actual practice. For the purpose of presentation in a clear manner, however, the statements are presented separately. The four departmental cost statements, Illustrations 68-71, analyze the departmental manufacturing cost by cost elements distributed as to the commodities, as to the Work in Process inventory, and as to the balance transferred to the next department. The analyses in these statements show more detail than is shown in Illustration 67.

An analysis of the cost elements by departments, commodities, work in process inventories, and cost of production can be set up as in the cost statement shown in Illustration 72.

157. Cost Statements Under a Divisional Process Cost System.—Cost statements prepared for a plant, which is divisionalized and where a process cost system is used, do not differ materially from the cost statements mentioned in the preceding article.

DEPARTMENT A

Analysis of Cost Elements by Commodities, Closing Inventory, and Cost of Units Transferred to Department B

		Commodities		
	Total Cost	Item 101	Item 102	Item 103
Charges to Work in Process, Department A, during January:				
Raw Materials	$10,000.00	$ 4,000.00	$ 3,500.00	$ 2,500.00
Direct Labor	12,500.00	5,000.00	4,500.00	3,000.00
Overhead Expense	6,097.35	2,500.00	2,000.00	1,597.35
Total Charges	$28,597.35	$11,500.00	$10,000.00	$ 7,097.35
Work in Process Inventory at Jan. 31, 19___	5,719.47	2,250.00	1,950.00	1,519.47
	$22,877.88	$ 9,250.00	$ 8,050.00	$ 5,577.88
Analysis of Work in Process Inventory at Jan. 31 19__				
Raw Materials	$ 2,000.00	$ 800.00	$ 700.00	$ 500.00
Direct Labor	2,500.00	950.00	850.00	700.00
Overhead Expense	1,219.47	500.00	400.00	319.47
Total:	$ 5,719.47	$ 2,250.00	$ 1,950.00	$ 1,519.47
Analysis of Cost of Units Transferred to Department B, during Jan., 19__				
Raw Materials	$ 8,000.00	$ 3,200.00	$ 2,800.00	$ 2,000.00
Direct Labor	10,000.00	4,050.00	3,650.00	2,300.00
Overhead Expense	4,877.88	2,000.00	1,600.00	1,277.88
Total:	$22,877.88	$ 9,250.00	$ 8,050.00	$ 5,577.88

ILLUSTRATION 68

A general cost statement can be prepared which lists the total cost and unit costs of all commodities. Supplements to the general cost statement, however, will be in the form of cost statements prepared for each division. The divisional cost statements will show the analyses of cost elements, commodities, work in process inventories, and finished unit costs.

DEPARTMENT B

Analysis of Cost Elements by Commodities, Closing Inventory, and Cost of Units Transferred to Department C

	Cost of Units Transferred from Dept. A	Charges to Work in Process, Dept. B	Total Charges to Dept. B	Commodities		
				Item 101	Item 102	Item 103
Raw Materials	$ 8,000.00	$ 6,000.00	$ 8,000.00	$3,200.00	$2,800.00	$2,000.00
			6,000.00	2,400.00	2,100.00	1,500.00
			$14,000.00	$ 5,600.00	$ 4,900.00	$ 3,500.00
Direct Labor	10,000.00	10,000.00	$10,000.00	$4,050.00	$3,650.00	$2,300.00
			10,000.00	4,000.00	3,500.00	2,500.00
			$20,000.00	$ 8,050.00	$ 7,150.00	$ 4,800.00
Overhead Expense	4,877.88	5,473.87	$ 4,877.88	$2,000.00	$1,600.00	$1,277.88
			5,473.87	2,200.00	1,800.00	1,473.87
			$10 351.75	$ 4,200.00	$ 3,400.00	$ 2,751.75
Total Charges to Dept. B	$22,877.88	$21,473.87	$44,351 75	$17,850.00	$15,450.00	$11,051.75
Analysis of Work in Process Inventory at January 31, 19__						
Raw Materials			$ 2,100.00	$ 840.00	$ 735.00	$ 525.00
Direct Labor			3,000.00	1,200.00	1,000.00	800.00
Overhead Expense			1,552.76	600.00	500.00	452.76
			$ 6,652.76	$2,640.00	$ 2,235.00	$ 1,777.76
Analysis of Cost of Units Transferred to Dept. C during Jan., 19__						
Raw Materials			$11,900.00	$4,760.00	$4,165.00	$2,975.00
Direct Labor			17,000.00	6,850.00	6,150.00	4,000.00
Overhead Expense			8,798.99	3,600.00	2,900.00	2,298.99
			$37,698.99	$15,210.00	$13,215.00	$ 9,273.99

ILLUSTRATION 69

DEPARTMENT C

Analysis of Cost Elements by Commodities, Closing Inventory, and Cost of Units Transferred to Department D

	Cost of Units Transferred from Dept. B	Charges to Work in Process, Dept. C	Total Charges to Dept. C	Commodities					
				Item 101		Item 102		Item 103	
Raw Materials	$11,900.00		$11,900.00	$4,760.00		$4,165.00		$2,975.00	
		$ 5,000.00	5,000.00	2,000.00		1,750.00		1,250.00	
			$16,900.00		$ 6,760.00		$ 5,915.00		$ 4,225.00
Direct Labor	17,000.00		$17,000.00	$6,850.00		$6,150.00		$4,000.00	
		4,750.00	4,750.00	1,900.00		1,700.00		1,150.00	
			$21,750.00		8,750.00		7,850.00		5,150.00
Overhead Expense	8,798.99		$ 8,798.99	$3,600.00		$2,900.00		$2,298.99	
		3,511.00	3,511.00	1,500.00		1,100.00		911.00	
			$12,309.99		5,100.00		4,000.00		3,209.99
Total Charges to Dept. C	$37,698.99	$13,261.00	$50.959.99		$20,610.00		$17,765.00		$12,584.99
Analysis of Work in Process Inventory at January 31, 19__									
Raw Materials			$ 1,690.00	$ 676.00		$ 591.50		$ 422.50	
Direct Labor			2,175.00	800.00		750.00		625.00	
Overhead Expense			1,231.00	500.00		400.00		331.00	
			$ 5,096.00		1,976.00		1,741.50		1,378.50
Analysis of Cost of Units Transferred to Dept. D, during Jan., 19__									
Raw Materials			$15,210.00	$6,084.00		$5,323.50		$3,802.50	
Direct Labor			19,575.00	7,950.00		7,100.00		4,525.00	
Overhead Expense			11,078.99	4,600.00		3,600.00		2,878.99	
			$45,863.99		$18,634.00		$16,023.50		$11,206.49

ILLUSTRATION 70

DEPARTMENT D

Analysis of Cost Elements by Commodities, Closing Inventory, and Cost of Units Transferred to Finished Goods Inventory

	Cost of Units Transferred from Dept. C	Charges to Work in Process, Dept. D	Total Charges to Dept. D	Commodities					
				Item 101		Item 102		Item 103	
Raw Materials	$15,210.00		$15,210.00	$6,084.00		$5,323.50		$3,802.50	
		$ 4,000.00	4,000.00	1,600.00		1,400.00		1,000.00	
			$19,210.00		$ 7,684.00		$ 6,723.50		$ 4,802.50
Direct Labor	19,575.00		$19,575.00	$7,950.00		$7,100.00		$4,525.00	
		6,750.00	6,750.00	2,800.00		2,400.00		1,550.00	
			$26,325.00		10,750.00		9,500.00		6,075.00
Overhead Expense	11,078.99		$11,078.99	$4,600.00		$3,600.00		$2,878.99	
		2,715.31	2,715.31	1,100.00		900.50		714.81	
			$13,794.30		5,700.00		4,500.50		3,593.80
Total Charges to Dept. D	$45,863.99	$13,465.31	$59,329.30		$24,134.00		$20,724.00		$14,471.30
Analysis of Work in Process Inventory at January 31, 19__									
Raw Materials			$ 960.50	$ 384.20		$ 336.18		$ 240.12	
Direct Labor			1,316.25	500.00		450.00		366.25	
Overhead Expense			689.72	275.00		225.00		189.72	
			$ 2,966.47		1,159.20		1,011.18		796.09
Analysis of Cost of Units Transferred to Finished Goods During Jan., 19__									
Raw Materials			$18,249.50	$7,299.80		$6,387.32		$4,562.38	
Direct Labor			25,008.75	10,250.00		9,050.00		5,708.75	
Overhead Expense			13,104.58	5,425.00		4,275.50		3,404.08	
			$56,362.83		$22,974.80		$19,712.82		$13,675.21

ILLUSTRATION 71

158. Advantages and Inadequacies of Process Costs.—Process costs are primarily costs obtained from monthly summaries. Unless the cost elements are accumulated by production order numbers, departmental material, labor, and overhead costs for the month are averaged among the commodities passing through each department during the month. Departmental unit costs are found by dividing the number of units of each commodity operated on into the departmental costs assigned to the particular commodity less that portion of these costs

ANALYSIS OF COSTS

By Departments, Commodities, Work in Process Inventories, and Cost of Production

	Total Charges During Month	Item 101	Item 102	Item 103
Raw Material Cost:				
Department A	$10,000.00	$ 4,000.00	$ 3,500.00	$2,500.00
Department B	6,000.00	2,400.00	2,100.00	1,500.00
Department C	5,000.00	2,000.00	1,750.00	1,250.00
Department D	4,000.00	1,600.00	1,400.00	1,000.00
	$25,000.00	$10,000.00	$ 8,750.00	$6,250.00
Raw Materials in Work in Process Inventory at Jan. 31, 19__:				
Department A	$ 2,000.00	$ 800.00	$ 700.00	$ 500.00
Department B	2,100.00	840.00	735.00	525.00
Department C	1,690.00	676.00	591.50	422.50
Department D	960.50	384.20	336.18	240.12
	$ 6,750.50	$ 2,700.20	$ 2,362.68	$1,687.62
Cost of Raw Materials in Finished Units Transferred to Finished Goods during January, 19__	$18,249.50	$ 7,299.30	$ 6,387.32	$4,562.38
Direct Labor Cost:				
Department A	$12,500.00	$ 5,000.00	$ 4,500.00	$3,000.00
Department B	10,000.00	4,000.00	3,500.00	2,500.00
Department C	4,750.00	1,900.00	1,700.00	1,150.00
Department D	6,750.00	2,800.00	2,400.00	1,550.00
	$34,000.00	$13,700.00	$12,100.00	$8,200.00
Direct Labor in Work in Process Inventory at January 31, 19__:				
Department A	$ 2,500.00	$ 950.00	$ 850.00	$ 700.00
Department B	3,000.00	1,200.00	1,000.00	800.00
Department C	2,175.00	800.00	750.00	625.00
Department D	1,316.25	500.00	450.00	366.25
	$ 8,991.25	$ 3,450.00	$ 3,050.00	$2,491.25
Cost of Direct Labor in Finished Units transferred to finished goods during January, 19__:	$25,008.75	$10,250.00	$ 9,050.00	$5,708.75

ANALYSIS OF COSTS—(Continued)

	Total Charges During Month	Item 101	Item 102	Item 103
Overhead Expense Cost:				
Department A	$ 6,097.35	$ 2,500.00	$ 2,000.00	$1,597.35
Department B	5,473.87	2,200.00	1,800.00	1,473.87
Department C	3,511.00	1,500.00	1,100.00	911.00
Department D	2,715.31	1,100.00	900.50	714.81
	$17,797.53	$ 7,300.00	$ 5,800.50	$4,697.03
Overhead Expense in Work in Process Inventory at January 31, 19__:				
Department A	$ 1,219.47	$ 500.00	$ 400.00	$ 319.47
Department B	1,552.76	600.00	500.00	452.76
Department C	1,231.00	500.00	400.00	331.00
Department D	689.72	275.00	225.00	189.72
	$ 4,692.95	$ 1,875.00	$ 1,525.00	$1,292.95
Cost of Overhead Expense in Finished Units Transferred to Finished Goods During January, 19__	$13,104.58	$ 5,425.00	$ 4,275.50	$3,404.08

ILLUSTRATION 72

applicable to work in process still in the department. Product unit costs are obtained by adding together the departmental unit costs applying to the commodity.

Much less clerical effort is required in accounting for process costs than for job or special order costs. A process cost system is simple and is quite effective if the products are similar in nature. One of the chief inadequacies of the process cost system lies in the fact that averages are used in obtaining unit costs. If the commodities produced vary widely in their nature it is often a difficult matter to obtain averages of the different cost elements which will yield accurate unit costs. Inaccurate averages and estimates will cause unit costs, work in process, finished goods inventories, and profits to be misstated.

CHAPTER XVIII

JOB-ORDER COSTS

159. Meaning of Job-Order Costs.—A job-order cost system is designed to collect the elements of cost separately for each specific job. The number of special orders worked upon during the month does not matter; it may be five, fifty, five hundred or more. Regardless of the number of orders, the raw material, direct labor, and manufacturing overhead-expense costs must be charged to the special orders to which they apply. The cost of any two orders will not be the same, since each job is of a different nature, size, or quantity. Manufacturing plants in which job-order cost systems are used, generally fill special orders and therefore produce commodities of such an extensive variety that it is impossible to apply the process cost plan. A foundry is a good illustration of an industry in which a job-order cost system is used. Of course some foundries employ a process cost system when the products are standard and uniform, such as freight-car brake shoes, fire hydrants, etc.

Job-order costs serve two purposes. A job order comes into existence after the receipt and analysis of the customer's order. A price is generally quoted to the customer. Segregation of the costs applicable to an order makes possible a comparison between the selling price and the cost. From the comparison, it can be ascertained whether or not the price quoted the customer was too low, and whether or not the cost-element expenses were too high. Again, a record of each completed job order is filed away with a description of the commodity produced. This record will be of assistance in quoting prices to prospective customers on like or similar orders in the future. Prices on future customers' orders can be quoted more intelligently when there is a record showing the cost of like or similar orders previously manufactured.

160. Job Order Analysis.—Usually either an engineering department or a production planning and scheduling department exists in a manufacturing plant engaged in the production of job orders. The function of one of these service departments is to analyze the customer's order for a special job and to estimate the cost.

The file record of completed jobs will be resorted to in an endeavor to learn whether or not a similar type of order ever has been produced. If so, the record will give valuable information respecting the cost of the item. If no similar type of order has ever been produced, a drawing or blueprint must be prepared unless the request from the prospective customer for a bid price was accompanied by a blueprint. From the blueprint and the specifications prepared, the total cost can be estimated.

If the price submitted to the customer is acceptable, a purchase order will be received from him. From the customer's order there is prepared a plant job order which will bear a special number. The engineering department or the production planning department then prepares the following:

1. A bill of materials, which gives the description and quantity of the raw materials needed for the job in each department.
2. A schedule of the direct-labor operations, which enumerates the name and number of each operation required in the production of the job order.
3. A schedule showing the date the work is to be begun and completed within each department, and the machines that will perform the work.
4. A route card, which is a copy of the schedule of operations and accompanies the job through the factory.

The bill of materials is sent to the storeroom from the engineering or planning department. At the storeroom it is checked with the stores ledger cards for the items wanted. When a sufficient quantity is on hand, the quantity required for the job is entered in the "issued" column in a special manner to show that that quantity is unavailable for any future orders. For such cases, some stores ledger cards have a special column, which may be headed "Reserved." If the stores ledger shows that the items wanted for the job order are not on hand, a special rush purchase requisition is sent to the purchasing agent for the items needed. If the stores department delivers all raw materials to the factory, the bill of materials will show also the date on which the raw materials are wanted, and in what department, and at what machine.

161. Principles of Job-Order Cost Systems.—A job-order cost system should be designed to obtain the complete cost of each individual job worked upon in the most rapid manner without sacrificing accuracy. The principles pertaining to job-order production costs involve job-order instruction cards, departmentalization, material, labor, and overhead costing, cost-element summaries, cost statements, and unit costs. Each of these will now be discussed in detail.

One of the important principles of a job-order cost system is to have a different order number designated for each different job. The order number is used in connection with every phase of the job-order production. Specifications, blueprints, instruction cards, stores requisitions, time tickets of direct laborers, job-order cost cards, all carry the distinguishing order number of the job to which they apply.

162. Job-Order Instruction Card.—The job-order instruction card is prepared by the engineering or the production-planning department and is otherwise known as the route card. It is prepared from the information contained in the job-order specifications and blueprints. Each operation to be performed in each department is listed on the instruction or route card. The operations may be listed as piece-work operations or they may be shown together with the standard

allowed time for each. The instruction or route card bears the job-order number and follows the job through each department. The purpose of the instruction or route card, in addition to showing the operations required, is to enable the direct laborers to charge their time to the proper job-order number.

163. Departmentalization in a Job-Order Cost Plant.—Departmentalization may require the segregation of the producing operations into groups known as departments. In a plant of this type the commodities produced on individual job orders are transferred from department to department as the production is completed within each department.

Another type of departmentalization occurs where the product requires several stages of assemblies before the completed commodity is produced. The assemblies may be made within a department where a certain operation or operations have been completed after the semifinished product has been transferred from some other department, or the assemblies may be made in separate departments established only for that purpose. Sometimes the parts of the product are manufactured in different departments and all the finished parts are transferred from the several departments to the final assembly department.

Whatever methods of production are followed, the principal cost idea is to collect the costs departmentally as well as by job-order numbers. Departmental costs are for the purpose of measuring the efficiency of the departments. The costs collected by job-order numbers enable the management to ascertain the cost of the jobs when they are completed.

164. Costing Raw Materials in a Job-Order Cost System.—Raw materials may be delivered by stores attendants to the producing departments on requisitions prepared by the departmental foremen or the production planning department. Raw materials also may be issued over the counter from the stores department on a stores requisition presented by a shop employe. In either event, the stores requisitions are the evidence which enables proper accounting to be made for the materials used on different jobs. It is here again reiterated that to insure accurate costing of raw materials, the stores requisition must be prepared with the utmost care. The proper costing for raw materials requires that the stores requisition show: the actual quantity issued, the correct description and code number of the items issued, the proper job-order number for which the raw materials are to be used, the accurate price of the stores items, and the accurate total material cost. The stores requisitions should show, in addition to the job-order number, the department for which the raw materials are ordered. The information on the completely filled-in stores requisition is transferred to three different records in a job-order cost system, as follows: (1) The stores ledger; (2) the factory journal; (3) the job-order cost card.

The method of recording the issues in the stores ledger is described in detail in previous pages. The issues must be credited in the subsidiary record in order that that record may be in agreement with the balance in the Stores or Raw Material controlling account.

The method of recording the stores issued on stores requisitions differs in different job-order cost systems. The stores requisition shows which departmental Work in Process Inventory is to be charged, in addition to the job-order number that is to be charged with the same cost. The requisitions can be sorted as to departments daily, and an entry made in the factory journal for the total of each day's issues. If daily entries are not made for the stores issues, a summary entry is made at the close of each month. The effect upon the departmental Work in Process Inventory accounts and the Stores account is the same whether the summary of stores issued is entered in the factory journal daily or monthly. The entry in the factory journal would be as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	Work in Process Dept. A Dr.	Work in Process Dept. B Dr.	Stores Cr.
19— Jan. 31		Monthly Summary of stores issued		9,652 81	6,496 61	16,149 42

The job-order cost card is the third record which must reflect the cost of the raw materials issued. A job-order cost card is prepared for each separate job order worked upon in the plant. An example of the cost card on which is listed the raw-material cost is shown in Illustration 73.

The stores requisitions, received daily by the cost department, are sorted by order numbers. All requisitions for raw materials issued to the same job-order number are then sorted by departments. The total material cost by departments is entered on the job-order cost card. The total material cost is known as soon as the job is completed. In event a certain job is only partly completed at the end of the month, the job-order cost card represents a subsidiary analytical record of the Work in Process Inventory record.

The value placed on any reclaimed scrap materials resulting from the production of a job order must be credited on the job order cost card. This is accomplished by entering the value of the scrap in red ink in the departmental and total material-value columns. The entry in the factory journal corresponding to the credit placed on the cost card is a debit to the Stores account and a credit to the departmental Work in Process Inventory account wherein the scrap came into existence.

The value of any spoilage that comes into existence within any department must also be credited to the proper columns on the job-order cost card. (See Art. 79.) The entry in the factory journal as reflected on the job-order cost card is a debit to Stores for the value of the reclaimed materials, a debit to Manufac-

turing Overhead Expense for the loss of value, and a credit to the departmental Work in Process Inventory accounts affected.

165. Costing Direct Labor in a Job-Order Cost System.—The original record involved in the costing of direct labor is the job-order time ticket in a job-order cost system. The job-order time ticket is described in Chapter XI. The time ticket must be designed so as to collect the time worked upon each job. The time ticket is sometimes an elaborate form, especially when it must also provide for a record of the operation name and number, the department in which the operations

JOB-ORDER COST CARD

Job Order No. 7170

	Dept. A	Dept. B	Dept. C	Dept. D	Total
Raw Materials	$152 10 101 72	$ 49 52	$ 73 80 11 10	$ 19 77	$295 19 112 82
	$253 82	$ 49 52	$ 84 90	$ 19 77	$408 01
Direct Labor					
Overhead Expense					
Total Cost					
Total Pieces Produced		Estimated Total Cost			
Unit Production Cost		Under or Over Estimate			

ILLUSTRATION 73

are performed, the rate paid for performing the operation, and the total earnings. The timekeeping department and the payroll department are responsible for verifying the information entered on the time ticket. Their verifications are of great importance in insuring proper costing for direct labor. The schedule of direct-labor operations or the route card specifies the operations that are to be performed in connection with specific job-order numbers. The direct-labor operators are instructed by their foremen how to fill out their daily job-order time tickets. The instructions should emphasize accuracy in regard to showing the

time of starting and finishing each job, and placing the proper job-order number on the time ticket.

The information on the job-order time ticket is transferred to four different records in a job-order cost system as follows: (1) The payroll sheet; (2) The labor distribution sheet; (3) The factory journal; (4) The job-order cost card.

The procedure involved in recording the daily earnings of each direct laborer on the payroll sheet has been described in detail in previous pages, and will not be treated further at this point. The distributing of labor has also been described. The labor distribution sheet provides an analysis of direct labor by departments and by operations. From this record the figures are obtained to prepare the monthly summary of direct labor entered in the factory journal. Some job-order systems provide for costing the direct labor each day or when each job order is completed. The most common method is to make a monthly summary entry. The entry in the factory journal to record the direct-labor costing would be as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	Work in Process Dept. A Dr.	Work in Process Dept. B Dr.	Payroll Cr.
19— Jan. 31				8,355 70	9,483 10	17,838 80

If the entries for the direct labor were made daily or when job orders are completed, the costing would appear in the factory journal as follows:

FACTORY JOURNAL

Date	Account	Explanation	Folio	Work in Process Dept. A Dr.	Work in Process Dept. B Dr.	Direct Labor Cr.
19— Jan. 1				376 40	395 17	771 57

If entries for costing the direct labor are made during the month, the necessity for the labor distribution as far as departmental costing is concerned is eliminated. At the end of the pay period, the total accumulated in the Direct Labor credit column equals the amount of the payroll. If the amount was $8,862.01 for the first 15 days of January, a voucher would be drawn and entered in the voucher register. The entry under this plan would be a debit to the Direct Labor account and a credit to the Accounts Payable account.

The job-order cost card is the fourth record which must reflect the cost of the direct labor employed. The direct-labor earnings as shown on the time tickets, pertaining to specific job-order numbers, are transferred to the respectively numbered job order cost cards as shown in Illustration 74.

JOB-ORDER COST CARD

Job Order No. 7170

	Dept. A	Dept. B	Dept. C	Dept. D	Total
Raw Materials					
Direct Labor	$ 36 80 42 91 48 82	$ 52 90 116 72 11 20	$ 26 41 19 82 31 75	$ 42 00 17 88 9 75	$158 11 197 33 101 52
	$128 53	$180 82	$ 77 98	$ 69 63	$456 96
Overhead Expense					
Total Cost					

Total Pieces Produced		Estimated Total Cost	
Unit Production Cost		Under or Over Estimate	

ILLUSTRATION 74

The total direct-labor cost of a specific job is known as soon as the job is completed and the earnings on all the job-order time tickets applicable to the specific job-order number have been entered on the job-order cost card. At the end of any month, if a certain job is uncompleted, the direct-labor charges already recorded constitute a portion of the value of the Work in Process Inventory account at that time.

166. Costing Manufacturing Overhead Expense in a Job-Order Cost System. Costing manufacturing overhead expense in a job-order cost system usually differs radically from the costing of the same cost element in a process cost system. The reason for the radical difference lies in the fact that the cost of a job order must be known at once. If a job is finished on the eighth of the month, the cost should be

known at least two days thereafter. The cost of the job order could not be determined immediately if the overhead expense was not applied until the actual expense was known at the end of the month. A method of estimating the overhead expense applicable to the job order must be worked out and the estimated overhead expense added to the known material and labor costs. The total cost of the job order then can be determined before the customer is billed for the selling price.

The overhead expenses are accumulated in a job-order cost system in the same manner as in a process cost system. The overhead expenses are costed on one or more of the following bases: the direct-labor dollar method, the direct-labor hour method, the machine-hour rate method, or the production-center rate method. The important principle pertaining to the costing, however, is that estimated dollar or hour rates are used in costing job orders. The overhead expense is costed to the job order as the work progresses from department to department, or from operation to operation. Since the total actual overhead expense is not known until the end of the month, an estimated costing figure or rate must be set and applied to the job order as the work progresses upon it.

The estimated costing rate for the overhead expense may be determined from past experience. A review of the cost records for the past year or years will reveal the total actual overhead expenses incurred. If the volume of production for the present year is expected to be approximately the same as in the past year or years, it may perhaps be assumed that the total overhead expenses for the present year will be approximately the same as the total for the preceding year or years. The estimated rate used in the present year may then be the actual rate worked out from the records of the past year or years.

The estimated overhead costing rate may be ascertained in the following manner when the direct-labor dollar method of applying the overhead expense is in use. Let it be assumed, for example, that the actual overhead expense last year was $145,650; and that the direct-labor cost last year was $97,100. The overhead rate for last year was, therefore, 150 per cent. of the direct-labor dollar. If this rate is used for the present year, then, the estimated overhead expense on a job order on which the actual direct labor was $79.50, would be $1.50 \times \$79.50 = \$119.25$.

By the direct-labor hour method of applying the overhead expense, the estimated costing rate for the same conditions would be worked out as follows: The actual overhead expense last year was $145,650. There were 130,045 direct-labor hours worked last year. The actual overhead rate for that year was, therefore, $\$145,650 \div 130,045 = \$1.12$ per hour. Then, for every hour of direct labor employed in the present year on a job order, an estimated overhead expense charge of $1.12 should be made. If 80 hours' direct labor were charged to a certain job order, the same job would be charged with an overhead expense amount of $89.60.

Where the machine-hour rate is used, the overhead expense is costed as follows: Every job order requiring operations to be performed by a machine having an estimated rate set for it, would be costed at that rate times the number of hours the specific job occupied the use of the machine. If the rate was $13.63 an hour, and the machine was used $7\frac{1}{2}$ hours, the job order would be costed with overhead expense amounting to $102.23.

When overhead expenses are collected in departmental Overhead Expense accounts or costed to departments at end of month, estimated costing rates are prepared for each department. The preparation and use of estimated departmental costing rates are essentially the same as described in the last few paragraphs where figures for an entire plant are employed. The estimated overhead expense determined for each job order is shown on the following records: (1) The job order cost card, (2) The factory journal, (3) The Overhead Absorbed account.

JOB-ORDER COST CARD

Job Order No. 7170

	Dept. A	Dept. B	Dept. C	Dept. D	Total
Raw Materials					
Direct Labor	$ 36 80 42 91 48 82	$ 52 90 116 72 11 20	$ 26 41 19 82 31 75	$ 42 00 17 88 9 75	$158 11 197 33 101 52
	$128 53	$180 82	$ 77 98	$ 69 63	$456 96
Overhead Expense Dept. A rate $1.25 " B " 1.33 " C " .98 " D " 1.40					
	$160 66	$240 49	$ 76 42	$ 97 48	$575 05
Total Cost					

Total Pieces Produced		Estimated Total Cost	
Unit Production Cost		Under or Over Estimate	

ILLUSTRATION 75

The estimated overhead expense is placed on the job-order cost card in accordance with the manner in which the overhead expense is costed. If the direct-labor dollar method is used, the overhead can be costed, after the direct labor charges have been entered on the job-order cost card. In case the direct-labor hour method is used, the overhead expense can not be entered on the job-order cost card until the total number of hours worked is listed thereon. Where the machine-hour rate or the cost-center rate is used, the estimated overhead expense is placed on the job-order cost card in accordance with the number of hours the card shows that the job occupied the use of the machine, or was in the cost center. The job-order cost

card would appear as shown in Illustration 75, if the direct-labor dollar method was used in costing the overhead expense.

The estimated overhead rates in the different departments are as follows: Department A, $1.25; Department B, $1.33; Department C, $.98; Department D, $1.40.

The form of the job-order cost card must vary from the preceding form if the overhead expense is costed by the machine-hour rate or the cost-center rate. Space would have to be provided for the machine numbers or the cost center designations. A column for the rate and a column for the number of hours which the job occupied the use of the machine or was in the cost center, then, would enable the overhead expenses to be collected. In some cases the job-order time ticket provides a column for the overhead applied to the job order. The overhead expense is entered on the job-order time ticket each day after the direct labor information has been entered thereon.

The factory journal records the entries pertaining to the estimated overhead expense charged daily to the job-order cost cards. When the total estimated overhead expense applicable to the job order becomes known, the following entry is made in the factory journal:

FACTORY JOURNAL 3

Date	Account	Explanation	Folio	Work in Process Dept. A Dr.	Work in Process Dept. B Dr.	Overhead Absorbed Cr.
19— Jan. 1		110% Direct Labor Cost, Dept. A 120% Direct Labor Cost, Dept. B		414 04	474 20	888 24

At the end of the month the total of the Overhead Absorbed column is posted as a credit to the ledger account bearing the same name. The Overhead Absorbed account would appear as follows after the total estimated overhead expense applied to the different job orders had been posted at the end of January.

OVERHEAD ABSORBED

								19— Jan.	31			FJ3		20,570	99

Shortly after January 31st the total amount of the actual overhead expenses will be definitely known. If the total actual overhead expense for January was $20,310.52, then the following entry would be made on a journal voucher:

JOURNAL VOUCHER

No. 1-196 January 31, 19

	Overhead Absorbed	$20,570	99		
	Manufacturing Overhead Expense			$20,310	52
	Cost of Sales			260	47
	To adjust the estimated overhead expense applied with the actual overhead incurred for the month of January 19__				

Approved *H. Zeigler*

This entry closes both of the overhead accounts and adjusts the Cost of Sales account for the difference between the amounts of the two account balances. If any of the January production has not been invoiced but is still in the Finished Goods Inventory account, or if some of the January production charges are still in the Work in Process Inventory account, then these two inventory accounts should be credited for a proportion of the $260.47 difference shown in the adjusting entry.

An illustration of the method used in calculating the adjustment required for unabsorbed overhead expense, when part of the production is still in the Finished Goods Inventory account and part is still in the Work in Process Inventory account, is given in the following chapter, which is entitled an Illustrative Job-Order Cost System.

167. Cost-Element Summaries in a Job-Order Cost System.—Summaries for raw materials, direct labor, and manufacturing overhead expense are discussed in Arts. 164, 165, and 166. The raw-material cost as shown on the stores requisitions must be reflected in the factory journal and on the job-order cost cards. The individual stores requisitions, after the cost of the materials issued has been shown thereon, are first used to make a record on the job-order cost card. The job-order number is shown on each stores requisition. The cost of the stores issued is placed on the job-order cost card, as shown in Illustration 76. After the stores requisitions have served this purpose, they are collected for the second costing step. The requisitions are sorted as to departments in which the material was placed into use. A summary entry can be made at the end of the month in the factory journal, which affects the departmental Work in Process Inventory accounts and the Stores account.

The direct-labor cost as accumulated on the time tickets must be reflected likewise in the factory journal and on the job-order cost cards. The individual time tickets, after the wages have been computed thereon, are first used to make a record on the job-order cost card. The job-order number is shown on each time ticket. On the cost card there is placed the amount of wages applicable to the job order, as in Illustration 76. The time tickets are then sorted as to departments in which the labor was performed. A summary of the wages earned in each department is then made on a labor-distribution sheet and costed monthly. The

entry is made in the factory journal, and when posted, affects the Work in Process Inventory accounts and the Payroll account.

The estimated manufacturing overhead expense cost is sometimes accumulated on the job-order time tickets before being placed on the job-order cost cards. This depends upon the plan in operation. The estimated overhead expense must be shown on the individual job-order cost cards and also be entered as a summary in the factory journal. The summary entry made in the factory journal affects the Work in Process Inventory accounts as well as the Overhead Absorbed account.

An illustration of a job-order cost card showing a summary of all of the cost elements is shown in Illustration 76.

JOB-ORDER COST CARD

Job Order No. 7170

	Dept. A	Dept. B	Dept. C	Dept. D	Total
Raw Materials	$152 10 101 72	$ 49 52	$ 73 80 11 10	$ 19 77	$295 19 112 82
	$253 82	$ 49 52	$ 84 90	$ 19 77	$408 01
Direct Labor	$ 36 80 42 91 48 82	$ 52 90 116 72 11 20	$ 26 41 19 82 31 75	$ 42 00 17 88 9 75	$158 11 197 33 101 52
	$128 53	$180 82	$ 77 98	$ 69 63	$456 96
Overhead Expense Dept. A rate $1.25 " B " 1.33 " C " .98 " D " 1.40					
	$160 66	$240 49	$ 76 42	$ 97 48	$575 05
Total Cost	$543 01	$470 83	$239 30	$186 88	$1,440 02

Total Pieces Produced	25	Estimated Total Cost	$1,460 00
Unit Production Cost	$57.60	Under or Over Estimate	$ 19 98

ILLUSTRATION 76

The entries made in the factory journal to record the cost of the partly finished product transferred from department to department are of the same nature as the entries shown in Art. 153. A cost element analysis statement, as illustrated in the same article, can be used as a subsidiary record supporting the balances in the departmental Work in Process Inventory controlling accounts. The total accumulated charges on the job-order cost cards covering uncompleted jobs at the end of

the month can be used as a verification of the departmental Work in Process Inventory control accounts.

The Finished Goods Inventory controlling account balance can be proved, in a job-order cost system, by the job-order cost cards covering completed jobs not yet invoiced to the customers. A summary of the total costs on the job-order cost cards covering the completed jobs not yet billed should be equal to the balance in the Finished Goods Inventory controlling account.

COST STATEMENT FOR JOB-ORDER COST SYSTEM

Month: February, 19___

Departments	Total Cost							
	Material		Labor		Overhead		Total	
Melting								
Total	$2,470	80	$ 856	91	$1,071	14	$ 4,398	85
Moulding								
Total	$1,541	10	$2,657	82	$3,543	76	$ 7,742	68
Coremaking								
Total	$ 675	14	$1,196	22	$1,315	84	$ 3,187	20
Cleaning								
Total	$ 165	55	$ 397	14	$ 476	57	$ 1,039	26
Total	$4,852	59	$5,108	09	$6,407	31	$16,367	99

ILLUSTRATION 77

168. Cost Statements and Unit Costs in a Job-Order Cost System.—The job-order cost cards covering completed jobs are individual cost statements. If the job-order calls for several units the unit cost is obtained by dividing the number of units into the total cost accumulated for the order, and the unit cost is also entered on the card. Note Illustration 76.

For the use of executives, it is desirable to have composite cost statements prepared which combine the information and figures shown on the many cost cards. A composite cost statement is shown in Illustration 77. Many forms of such cost statements are found in actual use.

It will be noted that the Statement of Manufacturing Cost, Illustration 78, and the Cost Statement, Illustration 77, show slightly different amounts for overhead charges. This is due to the estimated overhead costing rates being incorrect. If all job-order cards were adjusted for overhead not applied, the same amount of overhead charges would be shown on each statement. Each statement serves a different purpose. The Statement of Manufacturing Cost shows a set up of the manufacturing cost elements combined for all departments, as well as the Raw Material and Work in Process inventory values. The Cost Statement analyzes the charges to production by cost elements and departmental costs.

THE LONE STAR COMPANY

Statement of Manufacturing Cost for Month Ending February 28, 19__

Raw Material Cost		
Stores Inventory, Feb. 1, 19__	$ 4,857.19	
Purchases	7,411.11	
Cost of raw materials available for use:	$12,268.30	
Stores Inventory, Feb. 28, 19__	7,415.71	
Cost of raw materials used		$ 4,852.59
Direct Labor Cost		5,108.09
Overhead Expenses		
Indirect Labor	$ 964.70	
Supplies	419.82	
Repairs to Equipment	1,582.10	
Fuel	1,714.08	
Depreciation on equipment	1,726.30	
Rent	400.00	
Total Overhead Expenses:		6,807.00
Charges originating during February		$16,767.68
Work in Process Inventory, Feb. 1, 19__		3,892.12
Total Manufacturing Charges		$20,659.80
Work in Process Inventory, Feb. 28, 19__		3,292.12
Total Manufacturing Cost		$17,367.68

ILLUSTRATION 78

Job-order costs are valuable for the purpose of providing detailed information pertaining to the cost of different kinds, sizes, and shapes of items produced. The historical data collected on the job-order cost cards can be of value in estimating the cost of prospective orders. Differences in material, labor, and overhead-expense costs must be taken into consideration if a present price is being estimated from information shown on a job-order cost card dated back three or four years in the past.

The disadvantages of job-order costs are, chiefly, two in number. First, the expense involved in keeping a separate cost of each job amounts to a substantial sum each year. Second, job-order costs may be inaccurate because of difficulty in arriving at an accurate method of applying overhead expense to products.

CHAPTER XIX

AN ILLUSTRATIVE JOB-ORDER COST SYSTEM

169. A simple job-order cost system will now be set up, and the principles described in the foregoing pages will be illustrated by the working out of a practical problem. The system shown is one designed for a plant manufacturing various types of valves as the orders are received, the valves being of such a nature that it is not practical to produce and store them in a warehouse in advance of customers' orders.

DATA FOR ILLUSTRATIVE JOB-ORDER COST SYSTEM

The Pennsylvania Valve Company manufactures special types of valves. A job-order cost system is in use in connection with the general books. The following books and records are used. The column headings of each book or record are indicated immediately after each title.

General Journal: Journal Vouchers are used. Summary of Journal Vouchers is shown. The columns are: Date, J.V. No., Account and Explanation, Folio, Dr., Cr.

Cash Receipts Journal: Date, Account, Explanation, Folio, Cash, Sales Discount, Accounts Receivable, General Ledger. Though this book is part of the accounting system it is not used in this problem.

Check Register: Date, Paid to, Voucher No., Check No., Cash, Purchases Discount, Accounts Payable.

Petty Cash Book: Receipts, subdivided into Date and Amount columns; Date; Explanation of Payment; Petty Cash; Factory Expense; Postage; Automobile Expense.

Voucher Register: Date; Voucher No.; Payable to; Check, subdivided into Date and No. columns; Accounts Payable; Stores; Direct Labor; Manufacturing Overhead; Distribution Expense; Administration Expense; Sundry, subdivided into Dr., Cr., Folio, and Account columns.

Factory Journal: Date; Item and Explanation; Job Order No.; Work in Process Inventory, Dr.; Manufacturing Overhead Expense, Dr.; Stores, Dr.; Finished Goods Inventory, Dr.; Work in Process Inventory, Cr.; Stores, Cr.; Direct Labor Accrued, Cr.; Absorbed Overhead Expense, Cr.; Sundry, subdivided into Dr., Cr., Folio, and Account columns.

Sales Journal: Date; Account; Folio; Accounts Receivable; Sales, No. 1 Valves; Sales, No. 2 Valves; Sales, No. 3 Valves; Sales, No. 4 Valves; Sales, No. 5 Valves.

Ledgers and Forms:

a. With regular ruling:

1. General Ledger.
2. Customers' Ledger.

b. With special ruling:

1. Stores Ledger: Item No.; Date; Received; Issued; Balance.
2. Job-Order Cost Cards: Job No.
   Charges: Date, Folio, Material, Labor, Overhead, Total.
   Billing: Customer, Billing Price.
3. Operating Ledger: Account, January, February, March.
   (For Manufacturing Overhead Expense, Distribution Expense, and Administration Expense control accounts).

4. Voucher Summary:
   a. Manufacturing Overhead Expense
      Indirect Labor
      Factory Expense
      Lubricants
      Automobile Expense
      Repairs, Machinery
      Superintendence
      Fuel
      Power House Wages
      Depreciation, Buildings
      Depreciation, Machinery
      Depreciation, Tools
   b. Distribution Expense
      Salaries, Salesmen
      Traveling Expense
      Automobile Expense
      Advertising
      Depreciation, Buildings
   c. Administration Expense
      Office Supplies
      Office Salaries
      Postage
      Depreciation, Buildings
      Depreciation, Furniture and Fixtures

Ledger Accounts.—The general ledger accounts (some of which show balances at January 1, 19__) are as follows:

Cash	$25,510.00	Common Capital Stock	$150,000.00
Petty Cash		Surplus	17,710.00
Accounts Receivable		Profit and Loss	
Stores	1,000.00	Sales, No. 1 Valves	
Work in Process Inventory		Sales, No. 2 Valves	
Finished Goods Inventory		Sales, No. 3 Valves	
Inventory Office Supplies		Sales, No. 4 Valves	
Land	40,000.00	Sales, No. 5 Valves	
Buildings	30,000.00	Cost of Sales	
Machinery	30,000.00	Direct Labor	
Automobiles	3,200.00	Direct Labor Accrued	
Tools	6,000.00	Manufacturing Overhead Expense	
Furniture and Fixtures	2,000.00	Absorbed Overhead Expense	
Goodwill	50,000.00	Distribution Expense	
Accounts Payable		Administration Expense	
Reserves for Depreciation	20,000.00		

The plant has been closed for a year and is just resuming operations. This accounts for the absence of balances in many of the accounts.

The Stores Ledger shows the following items:

Raw Material		Stores Item	No. 1	Raw Material		Stores Item	No. 9
"	"	"	No. 2	"	"	"	No. 10
"	"	"	No. 3	"	"	"	No. 11
"	"	"	No. 4	"	"	"	No. 12
"	"	"	No. 5	Scrap		"	No. 13
"	"	"	No. 6	Packing Supplies		"	No. 14
"	"	"	No. 7	Factory Supplies		"	No. 15
"	"	"	No. 8	Fuel		"	No. 16

Transactions.—The following transactions are to be recorded in the general books and in the cost records as the occasion requires. All of the summaries of the cost records are posted to the General Ledger at the end of the month.

Jan. 1. Machinery purchased from the Mesta Machine Company, amount $12,000.00.
Jan. 2. Received 90 tons coal at $6.00 a ton from the Penn Coal Company, for which a check was sent in payment.
Jan. 3. Received factory supplies on account from the King Supply Company, amount $475.00.
Jan. 4. A Petty Cash fund of $150.00 was created.

Jan. 6. Received the following stores items from the Kokomo Supply Company, on account:

Item No. 1	$500.00
Item No. 2	500.00
Item No. 3	500.00
Item No. 4	500.00
Item No. 5	500.00
	$2,500.00

Jan. 8. Received 400 packing boxes at $.30 each on account, from the Baker Box Company.

Jan. 8. Received 300 gallons lubricating oil on account, from Waverly Oil Company, $240.00.

Jan. 9. Received from Malker & Company on account, Stores item No. 10, $360.00.

Jan. 10. Order received from L. M. Oakes for 50 No. 1 Valves on which he had been quoted a price of $8.00 each. The shop order covering this job is No. 1.

Order received from Best Valve Company for 200 No. 2 Valves on which a price of $6.00 each had been quoted. The shop order for this job is No. 2.

Jan. 11. Paid $18.00 from Petty Cash for miscellaneous factory expenses.

Jan. 15. Paid wages to foremen and indirect laborers for the first half of the month, $160.00.

Received an invoice amounting to $150.00 from McClane & Co. for stationery, which had been received.

Received raw materials from H. M. Wallers Company as follows:

Stores Item No. 6	$450.00
Stores Item No. 7	450.00

Received 50 tons coal from the Penn Coal Company @ $6.00 a ton.

Jan. 16. Paid invoice of January 1 to the Mesta Machine Company.

Stores requisition filled for item No. 10, $174.00, charged to Job No. 1.

Time tickets show direct labor worked on Job No. 1, $90.00.

The actual overhead expenses are not known until the end of the month; therefore, an estimated rate must be used to cost the job orders. The direct labor dollar basis is used in costing the overhead expense to the job orders. A 60 per-cent. rate is used as the estimated amount. Each time the direct-labor cost is entered in the factory journal and on the job-order cards, 60 per cent. of the labor cost will be entered in the same records to represent the estimated overhead cost.

Stores requisition filled for the following items, and charged to Job No. 2:

Item No. 6	$92.80
Item No. 3	24.40

Jan. 16. Stores requisition filled for factory supplies chargeable to factory expense, $10.00.

Paid W. Cohec, salesman, $300.00 for salary, and $150.00 for traveling expenses.

Jan. 17. The shop delivered scrap to the storeroom from Job No. 1, $10.50.

Stores requisition filled for lubricating oil, $240.00.

Received miscellaneous factory supplies costing $20.00, and postage stamps costing $9.00, which were paid for from Petty Cash.

Received boxes from the Baker Box Company on account, $150.00.

An order was received from the Milkwaukee Valve Company for the following Valves:

100 No. 1	quoted price	$ 8.00	each	$	800.00
200 No. 2	" "	12.00	"		2,400.00
150 No. 3	" "	6.00	"		900.00
100 No. 4	" "	10.00	"		1,000.00
100 No. 5	" "	9.00	"		900.00
					$6,000.00

This order is given Job order No. 3.

Jan. 20. Store requisition filled for the following items, charged to Job order No. 2:

Item No. 6	$92.80
Item No. 3	24.40

Store requisition filled for packing boxes, charged to Job No. 1, $15.00.

Direct labor for packing Job No. 1, $5.00.

Store requisition for raw materials used on Job No. 3 is filled as follows:

Item No. 1	$244.00

Jan. 20. Job No. 1 is completed and transferred to the Finished Goods Inventory account.
Paid invoice of January 6 to Kokomo Supply Co.
Paid $14.00 from Petty Cash for miscellaneous factory expenses.
Received coal from Penn Coal Company, amount $1,200.00.

Jan. 22. Job No. 1 is shipped to L. M. Oakes, and he is invoiced for an amount of $400.00.
Received on account from Maxwell & Co. the following raw materials:

Item No. 11	$1,300.00
Item No. 12	1,300.00

Jan. 23. The shop sent scrap to the storeroom from Job No. 2, amount $16.72.
The time tickets for direct labor on Job No. 2 amounted to $700.00.

Jan. 24. Stores requisition for boxes used in packing Job No. 2 amounted to $30.00.
Direct labor for packing Job No. 2 amounts to $10.00.
Stores requisition is filled for Job No. 3, Item No. 2, $244.00.
Received bill from Lakeside Garage for $190.00 for truck repairs and supplies. (Manufacturing and Distribution to be charged an equal amount.)

Jan. 25 Job No. 2 is finished and transferred to Finished Goods Inventory account.
Received from the Nolan Iron Company, on account, the following stores items:

Item No. 8	$350.00
Item No. 9	350.00

Received from M. Kendell a bill for repairs to machinery, $140.00.
Paid $44.00 from Petty Cash for gasoline and truck repairs. (Divide expense equally between Manufacturing and Distribution.)

Jan. 27. Shipped Job No. 2 to Best Valve Company and mailed invoice for $1,200.00.

Jan. 28. Received an order from Blair, Wilson & Company for 50 No. 5 Valves, upon which a price of $9.00 each had been quoted. The order for this Job is No. 4.
Stores requisition is filled for raw material item No. 3, $244.00, chargeable to Job No. 3.
Received an order from Melwood & Claypool for the following valves:

100 No. 4 quoted at $10.00	$1,000.00	
60 No. 5 quoted at 10.00	600.00	
		$1,600.00

The order for this Job is No. 5.

Jan. 30. Stores requisition is filled for the following items, charged to Job No. 4:

Item No. 7	$107.00
Item No. 14	15.00

The direct labor on Job No. 4 is $215.00.
Paid Lakeside Garage invoice of January 24.

Jan. 31. Stores requisition is filled for raw material Item No. 4, $244.00 and charged to Job. No. 3.
Direct labor time tickets total $1,820.00 covering charges to Job No. 3.
Paid payroll for the last two weeks, which shows the following labor distribution:

Direct labor	$805.00	
Superintendent	250.00	
Office salaries	300.00	
Truck drivers and helpers	360.00	(Divide equally between Manufacturing and Distribution)
Power house wages	200.00	
		$1,915.00

Scrap amounting to $2.76, arising from Job No. 4, was sent from the shop to the storeroom.
Stores requisition was filled for Job No. 5, covering the following items:

Item No. 8	$168.00
Item No. 9	168.00

Time tickets for direct labor on Job No. 5 total $190.00.
Job No. 4 is completed and transferred to Finished Goods Inventory account.
The Petty Cash fund is reimbursed and a distribution made of the expenses paid during January.
Received a bill for $115.00 from the National News for advertising in the January issue.

SUPPLEMENTARY INFORMATION

Coal used during January totalled $720.00.
Depreciation rates per annum on the property accounts are as follows:
Buildings 2½ per cent. (Distribute to Manufacturing, 75 per cent.; Distribution, 20 per cent.; Administration, 5 per cent.)
Machinery 10 per cent.
Tools 15 per cent.
Furniture and Fixtures 12½ per cent.
Automobiles 25 per cent. (Distribute equally to Manufacturing and Distribution.)
Stationery used during January totaled $55.00.

ILLUSTRATIVE COST SYSTEM BASED ON THE FOREGOING DATA

In the following pages is shown a cost system based upon the foregoing data. The transactions and supplementary information are recorded and the following are exhibited:

1. Job order cost cards.
2. Adjustment of the balance in the Absorbed Overhead Expense account with the amount of actual overhead expense as shown in the Manufacturing Overhead Expense account. The computation of the actual overhead expense rate for January is shown, also the adjusting entry to correct for the difference in the amount of estimated overhead expense costed into production and the amount of the actual overhead expense.
3. Trial Balance.
4. Proof of all the balances in the control accounts.
5. Statement of Manufacturing Cost.
6. Statement of Profit and Loss.
7. Balance Sheet.
8. Closing entries. These entries are shown in the Summary of Journal Vouchers.

SUMMARY OF JOURNAL VOUCHERS

Date	J.V. No.	Account and Explanation	Folio	Dr.	Cr.
19__					
Jan. 22	1	Cost of Sales	25	$ 330 50	
		Finished Goods Inventory	6		$ 330 50
		For cost of Job No. 1			
Jan. 27	2	Cost of Sales	25	1,383 68	
		Finished Goods Inventory	6		1,383 68
		For cost of Job No. 2			
Jan. 31	3	Direct Labor Accrued	27	805 00	
		Direct Labor	26		805 00
		To close amount of direct labor paid into the direct labor accrued to show the wages due at January 31st.			

SUMMARY OF JOURNAL VOUCHERS—(Continued)

Date	J.V. No.	Account and Explanation	Folio	Dr.	Cr.
Jan. 31	4	Manufacturing Overhead Expense	28	505 20	
		Depreciation, Buildings $46.88			
		" Machinery 350.00			
		" Tools 75.00			
		" Automobiles 33.32			
		Distribution Expense	30	45 84	
		Depreciation, Buildings 12.50			
		" Automobiles 33.34			
		Administration Expense	31	23 96	
		Depreciation, Buildings 3.12			
		" Furniture and Fixtures 20.84			
		Reserve for Depreciation	16		575 00
		To charge January operations with depreciation expense.			
Jan. 31	5	Administration Expense(Office Supplies)	31	55 00	
		Inventory Office Supplies	7		55 00
		To charge expense with cost of supplies used.			
Jan. 31	6	Absorbed Overhead Expense	29	1,818 00	
		Manufacturing Overhead Expense	28		1,818 00
		To close overhead expense already costed into production into the actual overhead account.			
Jan. 31	7	Cost of Sales	25	200 90	
		Finished Goods Inventory	6	53 66	
		Work in Process Inventory	5	501 64	
		Manufacturing Overhead Expense	28		756 20
		To adjust the above accounts for amount of undercosted overhead expense			
		CLOSING ENTRIES			
Jan. 31	8	Sales, No. 1 Valves	20	400 00	
		Sales, No. 2 Valves	21	1,200 00	
		Profit and Loss	19		1,600 00
		To close incomes to profit and loss			
		Profit and Loss	19	3,210 88	
		Cost of Sales	25		1,915 08
		Distribution Expense	30		907 84
		Administrative Expense	31		387 96
		To close costs and expenses to Profit and Loss.			
		Surplus	18	1,610 88	
		Profit and Loss	19		1,610 88
		To close net loss to surplus			

CHECK REGISTER

D3

Date	Paid to	Voucher No.	Check No.	Cash	Purchases Discount	Accounts Payable
19__						
Jan. 2	Penn Coal Co.	2	1	$ 540 00		$ 540 00
4	Petty Cash Fund	4	2	150 00		150 00
15	Payroll	9	3	160 00		160 00
16	Mesta Machine Co.	1	4	12,000 00		12,000 00
16	W. Cohee	13	5	450 00		450 00
20	Kokomo Supply Co.	5	6	2,500 00		2,500 00
30	Lakeside Garage	17	7	190 00		190 00
31	Payroll	20	8	1,915 00		1,915 00
31	Petty Cash	21	9	105 00		105 00
				$18,010 00		$18,010 00
				(1)		(15)

PETTY CASH BOOK

Receipts Date	Receipts Amount	Date	Explanation of Payment	Petty Cash	Factory Expense	Postage	Automobile Expense
Jan. 4	$150 00	Jan. 11	Factory Expenses	$ 18 00	$18 00		
		17	Misc. Factory Supplies	20 00	20 00		
		17	Postage	9 00		$ 9 00	
		20	Factory Expenses	14 00	14 00		
		25	Gas, Oil and Repairs	44 00			$44 00
			50% Manufacturing				
			50% Distribution				
				$105 00	$52 00	$ 9 00	$44 00

SALES JOURNAL

1

Date	Account	Fol.	Accounts Receivable	Sales No. 1 Valves	Sales No. 2 Valves	Sales No. 3 Valves	Sales No. 4 Valves	Sales No. 5 Valves
19__								
Jan. 22	L. M. Oakes		400 00	400 00				
27	Best Valve Co.		1,200 00		1,200 00			
			1,600 00	400 00	1,200 00			
			(5)	(20)	(21)			

VOUCHER REGISTER 1

Date	Vo. No.	Payable to	Check Date	Check No.	Accounts Payable	Stores	Direct Labor	Manufacturing Overhead	Distribution Expense	Administration Expense	Sundry Dr.	Sundry Cr.	Folio	Account
Jan. 1	1	Mesta Machine Co.	Jan. 16	4	12,000 00						12,000 00		10	Machinery
2	2	Penn Coal Co.	Jan. 2	1	540 00	540 00								
3	3	King Supply Co.			475 00	475 00								
4	4	Petty Cash Fund	Jan. 4	2	150 00						150 00		2	Petty Cash
6	5	Kokomo Supply Co.	Jan. 20	6	2,500 00	2,500 00								
8	6	Baker Box Co.			120 00	120 00								
8	7	Waverly Oil Co.			240 00	240 00								
9	8	Malker & Co.			360 00	360 00								
15	9	Payroll	Jan. 15	3	160 00			160 00						
15	10	McClane & Co.			150 00						150 00		7	Inv. Off. Sup.
15	11	H. M. Wallers Co.			900 00	900 00								
15	12	Penn Coal Co.			300 00	300 00								
16	13	W. Cohee	Jan. 16	5	450 00				450 00					
17	14	Baker Box Co.			150 00	150 00								
20	15	Penn Coal Co.			1,200 00	1,200 00								
22	16	Maxwell & Co.			2,600 00	2,600 00								
24	17	Lakeside Garage	Jan. 30	7	190 00			95 00	95 00					
25	18	Nolan Iron Co.			700 00	700 00								
25	19	M. Kendell			140 00			140 00						
31	20	Payroll	Jan. 31	8	1.915 00		805 00	630 00	180 00	300 00				
31	21	Petty Cash	Jan. 31	9	105 00			74 00	22 00	9 00				
31	22	National News			115 00				115 00					
					25,460 00	10,085 00	805 00	1,099 00	862 00	309 00	12,300 00			
					(15)	(4)	(26)	(28)	(30)	(31)				

Date	Item and Explanation	Job Order No.	Work in Process Inventory Dr.	Mfg. Overhead Expense Dr.	Stores Dr.	Finished Goods Inventory Dr.	Work in Process Inventory Cr.	Stores Cr.	Direct Labor Accrued Cr.	Absorbed Overhead Expense Cr.	Sundry Dr.	Sundry Cr.	Sundry Folio	Sundry Account
Jan. 16	Stores Item No 10	1	174 00					174 00						
16	Direct Labor	1	90 00						90 00					
16	Overhead Expense (60% of Direct Labor)	1	54 00							54 00				
16	Stores Item No. 6	2	92 80					92 80						
16	" " No. 3	2	24 40					24 40						
16	Factory Expense (Item No. 15)			10 00				10 00						
17	Scrap (Item No. 13)	1			10 50		10 50							
17	Lubricating Oil (Item No 15)			240 00				240 00						
20	Stores Item No. 6	2	92 80					92 80						
20	" " No 3	2	24 40					24 40						
20	" " No 14	1	15 00					15 00						
20	Direct Labor	1	5 00						5 00					
20	Overhead Expense (60% Direct Labor)	1	3 00							3 00				
20	Stores Item No. 1	3	244 00					244 00						
20	Cost Job No. 1 transferred to Finished Goods					330 50	330 50							
23	Scrap (Item No. 13)	2			16 72		16 72							
23	Labor	2	700 00						700 00					
23	Overhead (60% of direct labor)	2	420 00							420 00				
24	Packing boxes	2	30 00					30 00						
24	Labor	2	10 00						10 00					
24	Overhead (60% of direct labor)	2	6 00							6 00				
24	Store Item No 2	3	244 00					244 00						
25	Cost of Job No 2 transferred to Finished Goods					1,383 68	1,383 68							
28	Store Item No 3	3	244 00					244 00						
30	Store Item No 7	4	107 00					107 00						
30	Store Item No 14	4	15 00					15 00						
30	Labor	4	215 00						215 00					
30	Overhead Expense (60% of direct labor)	4	129 00							129 00				
31	Store Item No 4	3	244 00					244 00						
31	Direct Labor	3	1,820 00						1,820 00					
31	Overhead Expense (60% of direct labor)	3	1,092 00							1,092 00				
31	Scrap (Item No 13)	4			2 76		2 76							
31	Store Item No. 8	5	168 00					168 00						
31	Store Item No. 9	5	168 00					168 00						
31	Labor	5	190 00						190 00					
31	Overhead Expense (60% of direct labor)	5	114 00							114 00				
31	Cost of Job No 4 transferred to Finished Goods					463 24	463 24							
31	Fuel (Item No. 16)			720 00				720 00						
			6,735 40	970 00	29 98	2,177 42	2,207 40	2,857 40	3,030 00	1,818 00				
			(5)	(28)	(4)	(6)	(5)	(4)	(27)	(29)				

GENERAL LEDGER

Cash — 1

19__						19__					
Jan.	1			25,510	00	Jan.	31		D3	18,010	00
							31	Balance		7,500	00
				25,510	00					25,510	00
Feb.	1	Balance		7,500	00						

Petty Cash — 2

19__											
Jan.	4		V1	150	00						

Accounts Receivable — 3

19__											
Jan.	31		S6	1,600	00						

Stores — 4

19__						19__					
Jan.	1		V1	1,000	00	Jan.	31		FJ1	2,857	40
	31		FJ1	10,085	00		31	Balance		8,257	58
	31			29	98						
				11,114	98					11,114	98
Feb.	1	Balance		8,257	58						

Work in Process Inventory — 5

19__						19__					
Jan.	31		FJ1	6,735	40	Jan.	31		FJ1	2,207	40
	31		JV7	501	64		31	Balance		5,029	64
				7,237	04					7,237	04
Feb.	1	Balance		5,029	64						

Finished Goods Inventory — 6

19__						19__					
Jan.	31		FJ1	2,177	42	Jan.	22		JV1	330	50
	31		JV7	53	66		27		JV2	1,383	68
							31	Balance		516	90
				2,231	08					2,231	08
Feb.	1	Balance		516	90						

GENERAL LEDGER—(Continued)

Inventory Office Supplies 7

19__						19__				
Jan.	15		V1	150 00		Jan.	31		JV5	55 00
							31	Balance		95 00
				150 00						150 00
Feb.	1	Balance		95 00						

Land 8

19__										
Jan.	1			40,000 00						

Buildings 9

19__										
Jan.	1			30,000 00						

Machinery 10

19__										
Jan.	1			30,000 00						
	1		V1	12,000 00						

Automobiles 11

19__										
Jan.	1			3,200 00						

Tools 12

19__										
Jan.	1			6,000 00						

Furniture and Fixtures 13

19__										
Jan.	1			2,000 00						

GENERAL LEDGER—(Continued)

Goodwill — 14

19—											
Jan.	1				50,000	00					

Accounts Payable — 15

19—						19—					
Jan.	31			18,010	00	Jan.	31		V1	25,460	00
	31	Balance	D3	7,450	00						
				25,460	00					25,460	00
						Feb.	1	Balance		7,450	00

Reserves for Depreciation — 16

19—											
Jan.	1								JV4	20,000	00
	31									575	00

Common Capital Stock — 17

19—											
Jan.	1									150,000	00

Surplus — 18

19—						19—					
Jan.	31	Net Loss	JV8	1,610	88	Jan.	1			17,710	00
	31	Balance		16,099	12						
				17,710	00					17,710	00
						Feb.	1	Balance		16,099	12

Profit and Loss — 19

19—						19—					
Jan.	31		JV8	3,210	88	Jan.	31	Sales	JV8	1,600	00
							31	To Surplus	JV8	1,610	88
				3,210	88					3,210	88

GENERAL LEDGER—(Continued)

Sales No. 1 Valves 20

19__						19__					
Jan.	31	To Profit and Loss	JV8	400	00	Jan.	31		S6	400	00

Sales No. 2 Valves 21

19__						19__					
Jan.	31	To Profit and Loss	JV8	1,200	00	Jan.	31		S6	1,200	00

Sales No. 3 Valves 22

Sales No. 4 Valves 23

Sales No. 5 Valves 24

Cost of Sales 25

19__					19__				
Jan.	22	JV1	330	50	Jan.	31	To Profit and Loss	JV8	1,915	08
	27	JV2	1,383	68						
	31	JV7	200	90						
			1,915	08					1,915	08

Direct Labor 26

19__					19__				
Jan.	31	V1	805	00	Jan.	31		JV3	805	00

GENERAL LEDGER—(Continued)

Direct Labor Accrued — 27

19__						19__					
Jan.	31		JV3	805 00		Jan.	31		FJ1	3,030 00	
	31	Balance		2,225 00							
				3,030 00						3,030 00	
								Feb.	1	Balance	2,225 00

Manufacturing Overhead Expense — 28

19__						19__					
Jan.	31		JV4	505 20		Jan.	31		JV6	1,818 00	
	31		V1	1,099 00			31		JV7	756 20	
	31		FJ1	970 00							
				2,574 20						2,574 20	

Absorbed Overhead Expense — 29

19__						19__					
Jan.	31		JV6	1,818 00		Jan.	31		FJ1	1,818 00	

Distribution Expense — 30

19__						19__					
Jan.	31		JV4	45 84		Jan.	31	To Profit	JV8	907 84	
	31		V1	862 00				and Loss			
				907 84						907 84	

Administration Expense — 31

19__						19__					
Jan.	31		JV4	23 96		Jan.	31	To Profit	JV8	387 96	
	31		JV5	55 00				and Loss			
	31		V1	309 00							
				387 96						387 96	

CUSTOMERS' LEDGER

L. M. Oakes

19__																			
Jan.	22			S1		400	00												

Best Valve Company

19__																			
Jan.	27			S1		1,200	00												

STORES LEDGER

Item No. 1

Date		Received				Issued				Balance			
Jan.	6			500	00								
	20						244	00					
	31									256	00		

Item No. 2

Jan.	6			500	00								
	24						244	00					
	31									256	00		

Item No. 3

Jan.	6			500	00								
	16						24	40					
	20						24	40					
	28						244	00					
	31									207	20		

Item No. 4

Jan.	6			500	00								
	31						244	00					
	31									256	00		

STORES LEDGER—(Continued)

Item No. 5

Date	Received		Issued		Balance	
Jan. 6	500	00				
31					500	00

Item No. 6

Jan. 15	450	00				
16			92	80		
20			92	80		
31					264	40

Item No. 7

Jan. 15	450	00				
30			107	00		
31					343	00

Item No. 8

Jan. 25	350	00				
31			168	00		
31					182	00

Item No. 9

Jan. 25	350	00				
31			168	00		
31					182	00

Item No. 10

Jan. 9	360	00				
16			174	00		
31					186	00

STORES LEDGER—(Continued)

Item No. 11

Date	Received		Issued		Balance	
Jan. 22	1,300	00				
31					1,300	00

Item No. 12

Jan. 22	1,300	00				
31					1,300	00

Item No. 13, Scrap

Jan. 17	10	50				
23	16	72				
31	2	76				
31					29	98

Item No. 14, Packing Supplies

Jan. 8	400 @ $0.30	120	00			
17	500 " .30	150	00			
20				15	00	
24				30	00	
30				15	00	
31					210	00

Item No. 15, Factory Supplies

Jan. 1					1,000	00
3	475	00				
8	240	00				
16			10	00		
17			240	00		
31					1,465	00

Item No. 16, Fuel

Jan. 2	90 Tons @ $6.00	540	00			
15	50 " @ "	300	00			
20	200 " @ "	1,200	00			
31				720	00	
31					1,320	00

JOB-ORDER COST CARDS

Job No. 1 (50 No. 1 Valves)

Date	Folio	Material	Labor	Overhead	Total	Customer	Billing Price
Jan. 16	FJ1	174 00			174 00	L. M. Oakes	400 00
16	"		90 00		90 00		
16	"			54 00	54 00		
17	"	Cr. 10 50			Cr. 10 50		
20	"	15 00			15 00		
20	"		5 00		5 00		
20	"			3 00	3 00		
		178 50	95 00	57 00	330 50		

Job No. 2 (200 No. 2 Valves)

Date	Folio	Material	Labor	Overhead	Total	Customer	Billing Price
Jan. 16	FJ1	92 80			92 80	Best Valve Co.	1,200 00
	"	24 40			24 40		
20	"	92 80			92 80		
20	"	24 40			24 40		
23	"	Cr. 16 72			Cr. 16 72		
23	"		700 00		700 00		
23	"			420 00	420 00		
24		30 00			30 00		
24			10 00		10 00		
24				6 00	6 00		
		247 68	710 00	426 00	1,383 68		

Job No. 3 (100 No. 1; 200 No. 2; 150 No. 3; 100 No. 4; 100 No. 5 Valves)

Date	Folio	Material	Labor	Overhead	Total	Customer	Billing Price
Jan. 20	FJ1	244 00			244 00	Milwaukee Valve Co.	6,000 00
24	"	244 00			244 00		
28	"	244 00			244 00		
31	"	244 00			244 00		
31			1,820 00		1,820 00		
31				1,092 00	1,092 00		
31	JV7			454 22	454 22		
		976 00	1,820 00	1,546 22	4,342 22		

Job No. 4 (50 No. 5 Valves)

Date	Folio	Material	Labor	Overhead	Total	Customer	Billing Price
Jan. 30	FJ1	107 00			107 00	Blair, Wilson & Co.	450 00
30	"	15 00			15 00		
30	"		215 00		215 00		
30	"			129 00	129 00		
31	"	Cr. 2 76			Cr. 2 76		
		119 24	215 00	129 00	463 24		

JOB-ORDER COST CARDS—(Continued)

Job No. 5 (100 No. 4; 60 No. 5 Valves)

Date	Folio	Material	Labor	Overhead	Total	Customer	Billing Price
Jan. 31	FJ1	168 00			168 00	Melwood & Claypool	1,600 00
31	"	168 00			168 00		
31	"		190 00		190 00		
31	"			114 00	114 00		
	JV7			47 42	47 42		
		336 00	190 00	161 42	687 42		

OPERATING LEDGER

Account	January	February	March
Manufacturing Overhead Expense			
Indirect Labor	$ 160 00		
Factory Expense	62 00		
Lubricants	240 00		
Automobile Expense	330 32		
Repairs, Machinery	140 00		
Superintendence	250 00		
Fuel	720 00		
Powerhouse Wages	200 00		
Depreciation, Buildings	46 88		
Depreciation, Machinery	350 00		
Depreciation, Tools	75 00		
	$2,574 20		
Distribution Expense			
Salaries, Salesmen	$ 300 00		
Traveling Expense	150 00		
Automobile Expense	330 34		
Advertising	115 00		
Depreciation, Buildings	12 50		
	$ 907 84		
Administration Expense			
Office Supplies	$ 55 00		
Office Salaries	300 00		
Postage	9 00		
Depreciation, Buildings	3 12		
Depreciation, Furn. & Fixt.	20 84		
	$ 387 96		

VOUCHER SUMMARY

MANUFACTURING OVERHEAD EXPENSE

Indirect Labor			Factory Expense			Lubricants			Automobile Expense		
V 9	160	00	FJ1	10	00	FJ1	240	00	V17	95	00
			V21	52	00				V20	180	00
									V21	22	00
									JV4	33	32
	160	00		62	00		240	00		330	32

Repairs, Machinery			Superintendence			Fuel			Power House Wages		
V19	140	00	V20	250	00	FJ1	720	00	V20	200	00
	140	00		250	00		720	00		200	00

Depreciation, Buildings			Depreciation, Machinery			Depreciation, Tools		
JV4	46	88	JV4	350	00	JV4	75	00
	46	88		350	00		75	00

DISTRIBUTION EXPENSE

Salaries, Salesmen			Traveling Expense			Automobile Expense			Advertising			Depreciation, Buildings		
V13	300	00	V13	150	00	V17	95	00	V22	115	00	JV4	12	50
						V20	180	00						
						V21	22	00						
						JV4	33	34						
	300	00		150	00		330	34		115	00		12	50

VOUCHER SUMMARY—(Continued)

ADMINISTRATION EXPENSE

Office Supplies		Office Salaries		Postage		Depreciation, Buildings		Depreciation Furniture and Fixtures	
JV5	55 00	V20	300 00	V21	9 00	JV4	3 12	JV4	20 84
	55 00		300 00		9 00		3 12		20 84

ADJUSTMENT OF UNABSORBED OVERHEAD EXPENSES

Total actual overhead expenses	$2,574.20
Total estimated overhead expenses absorbed or charged into production	1,818.00
Actual overhead expenses not costed to production	$ 756.20

(This means that the estimated overhead costing rate of 60 per cent. of the direct labor cost was too low. Based upon the actual overhead expenses incurred during January, the overhead costing rate should have been 84.9571 per cent. ($2,574.20÷$3,030.00).

Since the job orders were undercosted, the effect is as follows:

(a) Cost of Sales account is understated on jobs billed (Nos. 1 and 2)

(b) Finished Goods Inventory account is understated on job finished, but not shipped or billed (No. 4)

(c) Work in Process Inventory account is understated on jobs Nos. 3 and 5.

The adjusting entry amounts are determined in the following manner:

Job Order No.	Direct Labor Charges	Actual Overhead Expense Rate Applied (84.9571%)	Estimated Overhead Expense Applied (60%)	Overhead Expense Undercosted	Increase Cost of Sales	Increase Finished Goods Inventory	Increase Work in Process Inventory
1	$ 95 00	$ 80 70	$ 57 00	$ 23 70	$ 23 70		
2	710 00	603 20	426 00	177 20	177 20		
3	1,820 00	1,546 22	1,092 00	454 22			454 22
4	215 00	182 66	129 00	53 66		53 66	
5	190 00	161 42	114 00	47 42			47 42
Totals	$3,030 00	$2,574 20	$1,818 00	$ 756 20	$ 200 90	$ 53 66	$ 501 64

TRIAL BALANCE

January 31, 19__

Cash	$ 7,500	00		
Petty Cash	150	00		
Accounts Receivable	1,600	00		
Stores	8,257	58		
Work in Process Inventory	5,029	64		
Finished Goods Inventory	516	90		
Inventory Office Supplies	95	00		
Land	40,000	00		
Buildings	30,000	00		
Machinery	42,000	00		
Automobiles	3,200	00		
Tools	6,000	00		
Furniture and Fixtures	2,000	00		
Goodwill	50,000	00		
Accounts Payable			$ 7,450	00
Reserves for Depreciation			20,575	00
Common Capital Stock			150,000	00
Surplus			17,710	00
Sales, No. 1 Valves			400	00
Sales, No. 2 Valves			1,200	00
Cost of Sales	1,915	08		
Direct Labor Accrued			2,225	00
Distribution Expense	907	84		
Administration Expense	387	96		
	$199,560	00	$199,560	00

PROOF OF CONTROL ACCOUNTS

Accounts Receivable				
L. M. Oakes	$ 400	00		
Best Valve Company	1,200	00		
			$1,600	00
Stores				
Item No. 1 Raw Materials	$ 256	00		
" No. 2 " "	256	00		
" No. 3 " "	207	20		
" No. 4 " "	256	00		
" No. 5 " "	500	00		
" No. 6 " "	264	40		
" No. 7 " "	343	00		
" No. 8 " "	182	00		
" No. 9 " "	182	00		
" No. 10 " "	186	00		
" No. 11 " "	1,300	00		
" No. 12 " "	1,300	00		
" No. 13 (Scrap)	29	98		
" No. 14 (Packing Supplies)	210	00		
" No. 15 (Factory Supplies)	1,465	00		
" No. 16 (Fuel)	1,320	00		
			$8,257	58
Work in Process Inventory				
Job Order No. 3	$4,342	22		
" " No. 5	687	42		
			$5,029	64
Finished Goods Inventory				
Job Order No. 4 (ready for shipment)			$ 516	90
(Estimated cost, $463.24 + adjusted overhead, $53.66)				
Accounts Payable				
Voucher No. Payable to				
3 King Supply Co.	$ 475	00		
6 Baker Box Co.	120	00		
7 Waverly Oil Co.	240	00		
8 Malker & Co.	360	00		
10 McClane & Co.	150	00		
11 H. M. Wallers Co.	900	00		
12 Penn Coal Co.	300	00		
14 Baker Box Co.	150	00		
15 Penn Coal Co.	1,200	00		
16 Maxwell & Co.	2,600	00		
18 Nolan Iron Co.	700	00		
19 M. Kendell	140	00		
22 National News	115	00		
			$7,450	00
Cost of Sales				

	Estimated Cost	Adjusted Overhead	Total Actual Cost
Job No. 1	$ 330.50	$ 23.70	$ 354.20
Job No. 2	1,383.68	177.20	1,560.88

			$1,915	08
Manufacturing Overhead Expense) See the				
Distribution Expense)Operating				
Administration Expense) Ledgers				

PENNSYLVANIA VALVE COMPANY

Statement of Manufacturing Cost, January 1, 19__ to January 31, 19__

Raw Materials				
Inventory Stores, Jan. 1, 19__			$ 1,000	00
Stores Purchased during January	$10,085	00		
Scrap Reclaimed during January	29	98		
			10,114	98
Stores Available for Use			$11,114	98
Inventory Stores, January 31, 19__			8,257	58
Stores Used during January			$ 2,857	40
Supplies Charged to Manufacturing Overhead Expense			970	00
Raw Materials Charged to Manufacturing			$ 1,887	40
Scrap, Credited to Manufacturing			29	98
Raw Materials Used in Manufacturing			$ 1,857	42
Direct Labor			3,030	00
Manufacturing Overhead Expenses				
Indirect Labor	$ 160	00		
Factory Expense	62	00		
Lubricants	240	00		
Automobile Expense	330	32		
Repairs to Machinery	140	00		
Superintendence	250	00		
Fuel	720	00		
Powerhouse Wages	200	00		
Depreciation on Buildings	46	88		
Depreciation on Machinery	350	00		
Depreciation on Tools	75	00		
Total Manufacturing Overhead Expenses			$ 2,574	20
Total Charges to Manufacturing during January			$ 7,461	62
Inventory, Work in Process, January 31, 19__			5,029	64
Cost of Valves Manufactured			$ 2,431	98

PENNSYLVANIA VALVE COMPANY

Statement of Profit and Loss, January 1, 19__ to January 31, 19__

Sales			$1,600	00
Cost of Valves Manufactured, January 1, 19__ to January 31, 19__	$2,431	98		
Inventory of Finished Goods, January 31, 19__	516	90		
Cost of Sales			1,915	08
Loss Before Operating Expense			$ 315	08
Distribution Expenses				
Salesmen's Salaries	$ 300	00		
Traveling Expenses	150	00		
Automobile Expense	330	34		
Advertising	115	00		
Depreciation on Buildings	12	50		
			907	84
			$1,222	92
Administration Expenses				
Office Supplies	$ 55	00		
Office Salaries	300	00		
Postage	9	00		
Depreciation on Buildings	3	12		
Depreciation on Furniture	20	84		
			387	96
Net Loss to Surplus			$1,610	88

PENNSYLVANIA VALVE COMPANY
Balance Sheet, January 31, 19__

ASSETS

Current:			
Cash		$ 7,500.00	
Petty Cash		150.00	
Accounts Receivable		1,600.00	
Stores Inventory		8,257.58	
Work in Process Inventory		5,029.64	
Finished Goods Inventory		516.90	
Total Current Assets			$ 23,054.12
Deferred Charges to Operation:			
Inventory, Office Supplies			95.00
Fixed:			
Land		$40,000.00	
Buildings	$30,000.00		
Machinery	42,000.00		
Automobiles	3,200.00		
Tools	6,000.00		
Furniture and Fixtures	2,000.00		
	$83,200.00		
Less Reserves for Depreciation	20,575.00		
		62,625.00	
Total Fixed Assets			102,625.00
INTANGIBLE:			
Goodwill			50,000.00
			$175,774.12

LIABILITIES AND CAPITAL

Current Liabilities:			
Accounts Payable		$ 7,450.00	
Direct Labor Accrued		2,225.00	
			$ 9,675.00
Capital Stock Outstanding		$150,000.00	
Surplus		16,099.12	
Total Net Worth			166,099.12
			$175,774.12

CHAPTER XX

BY-PRODUCT AND JOINT-PRODUCT COSTS

170. Multiple Production.—In Chapters XVII and XVIII an explanation of how unit manufacturing costs are found under process and job-order cost systems is given. The methods discussed, however, are not sufficient to obtain unit costs under all manufacturing conditions. There is one condition, that of multiple production, which necessitates the employment of further accounting techniques if unit costs are to be learned. By multiple production is meant the production of two or more products by the same operation or set of operations. A characteristic of multiple production is that the increased production of one product results in an increase in the output of the others. This condition is not uncommon in industry. In fact, it has been estimated that 50 per cent of commodities produced are manufactured under the condition of multiple production. Industries in which multiple production is found include the following: Lumber, minerals, petroleum, coke, meat packing, milling, dairying, canning, sugar refining, glass, and the chemical industries.

There are two major classes of multiple products, by-products and joint-products. The distinction between these is important since the obtaining of the unit costs of by-products and joint-products requires different accounting methods; therefore, each will be discussed separately. The reader must first understand, however, that by-product and joint-product costs are not cost systems replacing process and job-order costs. Where by-products and joint-products exist the cost principles and methods discussed in earlier chapters are employed and either process costs or job-order costs may be used to obtain the total costs of the products manufactured by the same set of operations. An additional accounting technique, however, is necessary to divide the total costs of the multiple products among the individual products.

171. By - Product Costs.—By-products are minor products that are produced by the same set of operations as a principal or major product. For example, mill feed is produced at the same time as flour; coal tar, ammonium sulphate, and benzol, when coke is manufactured; gases useful in power generation, when steel is produced; and hides, bristles, hoofs, etc., when pigs are slaughtered to produce meat. Frequently by-products require further processing after separation from the principal product.

Since by-products are minor products and, therefore, much less valuable than the principal product, the accounting problem is not so much to obtain the correct unit costs of the by-products as reasonably accurate unit costs for the principal product. In some instances, when the by-products are of trifling value they are considered as having no cost and all costs are charged to the principal product.

Such income as is obtained from the sale of the by-products is regarded as incidental and shown in the other income section of the profit and loss statement. If the accounting system is set up so as to record the expenses involved in further processing and disposing of the by-products separate from other expenses, this amount is debited to the income account containing the selling price of the by-products. In a small lumber mill the slabs and lumber trimmings sold as firewood to the workers might be so treated.

Usually, however, by-products are regarded as having some cost. Frequently, this cost is considered to be the selling price or estimated selling price of the by-products. If the cost accounting system records the cost of further processing and disposal separately, these costs are deducted from the values assigned the by-products. The remainder is then subtracted from the total costs charged to the multiple products up to the point of separation, and any additional cost incurred in processing the principal product beyond the point of separation is added. The result is considered the cost of the principal product. This method of costing the principal product is sometimes referred to as the addition and subtraction method.

A simple example will make the method clear. Suppose a flour mill has a process cost system, that the production of the principal product, flour, for the period is 100,000 barrels, and that the total cost of material, labor, and overhead is $400,000. Let us further suppose that by-products, various kinds of mill feed, for the period have an estimated selling price of $21,000, and that expenses incurred in placing the mill feed in bags and in disposing of it are expected to be $1,000. A part of the expense included in the latter amount will have been incurred already and a part will be estimated, since some of the mill feed will be on hand at the end of the period. We will also assume that the cost of barreling and handling the principal product, flour, after the separation point is recorded separately and is $2,000. The total cost of the flour will be $400,000 − ($21,000 − $1,000) + $2,000, or $382,000. The cost per barrel or per unit is $\frac{\$382,000}{100,000}$ or $3.82.

A difficulty with the cost method illustrated in the last paragraph is that a number of the figures that enter into the value of the by-products are estimates. If the selling price or the costs of further processing and disposing of the by-products change greatly, the value assigned the by-products and, therefore, the cost found for the principal product is incorrect. Estimated selling prices and costs of further processing and disposal should, therefore, be made with care, and be based on past experience modified by intelligent forecasts of the future. In some instances, an additional amount is included in the estimated expenses for further processing and disposal of the by-products, as a factor of safety.

Where estimated figures are used, there will be some loss or gain on the sale of the by-products, since the estimated and actual figures will not be the same. When a standard cost system is used, standard costs are prepared for the by-products and when the by-products are sold there will be some variance between the amounts received and the standard costs.

It often happens that by-products are used by the company manufacturing them. In this case, the by-products may be valued at the price of similar materials

purchased in the open market, or, as in the case of waste heat or gases diverted to useful purposes, at the estimated cost of generating the same amount of heat or gases.

172. Joint-Product Costs.—When, as a result of the same set of operations, two or more commodities of substantially equal importance are produced and, therefore, no one product can be regarded as the principal or major product, the multiple products are known as joint-products. For example, in the glass industry many kinds of glassware may be molded or blown from the same molten mixture of raw materials. In the petroleum industry, gasoline, fuel oil, lubricating oil, kerosene, parafin, and asphalt are produced from the same crude oil. In the meat-packing industry many varieties of meat products are produced from the same animal. In some industries, for example, the canning industry, different grades of a product are produced by the same operations. Frequently joint products require further processing after separation from each other.

When products are produced jointly, it is not possible to determine the costs of each with absolute accuracy. The method used to distribute the joint costs, if wisely selected, however, will yield approximately correct results. In some instances, the output of products produced jointly can be measured according to volume or weight, and the joint costs can be satisfactorily distributed between the joint products according to the proportion that the volume or weight of each product bears to the total volume or weight of all the products. To obtain the costs of each joint product the costs of further processing of the product are added to the amount of the joint costs distributed to it. The costs of joint-products in the petroleum industry are sometimes found by this method.

The most common method of distributing joint costs is to divide them according to the proportion that the total market price of each of the joint products bears to the total market price of all the joint products. If there are costs incurred for processing beyond the separation point, these costs are usually subtracted from the total market price of each joint product before the calculations are made. The cost of each joint product is then considered to be the portion of joint costs allocated to it, plus the costs of its further processing.

In the case of some products, the high quality and therefore most valuable grades require the least processing, the low quality and, therefore, least valuable grades being the result of further processing the material remaining after the high grades are drawn off. In such circumstances it is useless to include the entire cost of further processing in the cost of the lower grades. Instead the total cost of processing all grades may be allocated among the grades according to their market values. The cost system, however, should accumulate the costs of further processing the low grades separately, in order that it may be known whether the net amount received for these grades is sufficient to cover the costs of further processing and something additional.

To obtain the total market price of each joint-product, the market price per unit may be multiplied by the number of units produced. Frequently, however, the number of units produced is not definitely known and cannot be learned with-

out excessive expense and trouble. In this circumstance, test runs can be made from which are learned the amounts of the various kinds of joint products produced from a given quantity of raw material. Standard ratios can then be developed, which when applied to the total raw materials processed during a period, will give, with reasonable accuracy, the number of units of each joint-product produced.

The use of market prices in distributing joint-costs sometimes produces unsatisfactory results. If prices of some of the joint products fluctuate sharply over short periods of time, the costs found for all the joint products will likewise fluctuate without good reason, and be of little utility as indicators of manufacturing efficiency or for price setting. To offset this disadvantage, average market prices over a period of time, or normal market prices, are often used instead of actual market prices.

Occasionally, where there is much processing of joint-products after the point of separation, and the profit margins are small and there is a rapid turnover of finished products, joint costs are not allocated to the joint products but the materials in process at each stage of the manufacturing process are valued at net market values, that is, at market values less cost of selling, delivery, etc. This can be done satisfactorily only when the materials in process at each stage of manufacturing are marketable and their market values, therefore, ascertainable. Examples of industries where this condition holds are meat-packing and the oil industry. Should this method result in a substantial amount of unrealized profit being included in the closing inventories, a reserve should be set up to take care of the overvaluation.

PART IV

STANDARD COSTS AND BUDGETS

CHAPTER XXI

STANDARD UNIT MANUFACTURING COSTS

173. Nature and Value of Standard Cost Systems.—In previous chapters costing under process and job-order cost systems is fully explained. Process and job-order cost systems are frequently termed actual cost systems, since they are concerned with the expenses actually incurred by the manufacturing division. An adequate process or job-order cost system makes known the actual material, labor, and overhead (in detail) expense of each productive department, the actual cost of conducting each service department in detail, and the general overhead expense (in detail) incurred to operate the factory, but not for any specific department. Such systems provide for the distribution of service-department expense and general overhead to the productive departments and for the periodic preparation of cost statements and reports that are of real assistance to executives in conducting operations.

Process and job-order cost systems also supply unit manufacturing costs for all commodities produced. Since these unit costs are obtained from the figures recorded for actual material, labor, and overhead expense, they are termed actual unit costs.

During the last two decades the most outstanding advance in cost accounting has been the development of standard-cost systems. Standard costs and budgets, unlike process and job-order costs, are today applied in the analysis of sales and administrative expense, as well as that of the manufacturing division. Standard costs, however, were first introduced in connection with factory activities and, therefore, will first be considered in connection with manufacturing operations.

Standard-cost systems differ from actual cost systems in that a standard-cost system not only makes known the actual expense of operating each productive and service department and the actual amount of general overhead expense incurred each period, but determines in advance what these expenses should be. Actual and predetermined expenses are compared, the variances noted and analyzed, and the causes of differences are thus revealed. This information makes it possible for departmental and general factory executives to take immediate steps to improve conditions if the variances are unfavorable; that is, if actual experience is worse than the standards set. A standard-cost system also saves the time of executives because it brings to their attention all variances from standard or normal and thus makes it unnecessary for them constantly to study operating conditions in order to learn those conditions that require attention. It is obvious, therefore, that

standard costs are of more value than process or job-order costs in the control of manufacturing operations.

A standard-cost system also provides predetermined or standard unit manufacturing costs for the different commodities produced. In a standard-cost system, the expense of running each department or production center is predetermined and applied to all units operated on in the center. The costs of each production center are studied and all expenses that are likely to be incurred when the factory runs at *normal capacity* are carefully estimated. Standard cost rates based on these estimates are then established.

Material costs are also predetermined. Thus, under a system of standard costs, there is one unit cost for manufacturing a given product no matter when the product is produced, and no matter whether the factory is running part time or overtime. Unit costs are established for *normal capacity* and are used whether the factory actually operates at normal capacity or not. This provides a uniform basis for price setting. That this condition does not exist when an actual cost system is used is shown by the following two examples:

(*a*) Suppose that there is a fluctuating demand for a company's goods. Assume that its production records show these figures:

January, 804 units produced	April, 1,086 units produced
February, 602 units produced	May, 1,206 units produced
March, 1,112 units produced	June, 992 units produced

It will be seen that in May slightly more than twice as many units were produced as in February; and yet it has been shown in preceding chapters that overhead expenses could not have been only one-half in February what they were in May. Salaries of officers, taxes, depreciation, and the like were practically the same in the two months; and yet these expenses were spread over only 602 units in February, and over as many as 1,206 units in May. It is apparent that there must be a wide difference between the unit costs of production for each of these months. Moreover, while there would not be such great differences among the other months, it is plain that the unit costs would fluctuate in accordance with the increase or decrease in production. This illustration applies to any business whose output varies throughout the year.

(*b*) Suppose, for a second example, that in one of the departments of the factory, there are six men doing the same type of work. The wages of these men vary, both because they differ as to the amount of skill they possess and because some have been with the company longer than others. Suppose that the lowest hourly rate paid is 50 cents, the highest 65 cents, and that the other four fall at various intervals between these two points. Further, suppose that expenses are charged against production orders as the orders move through the factory and as the expenses actually occur. Thus when the man with the 50-cent rate works on a production order, that order will have a different direct-labor cost than will another on which the man with the 65-cent rate works; and the result will be that the unit cost of producing one order will differ from the unit cost of producing another.

When it is considered that in the immense manufacturing enterprises of today a thousand or more similar influences affect costs, and that in modern industry a production center may be made up of, not six men, but hundreds of men, it is readily seen that a system of actual costs does not provide a sound procedure by which to determine the unit cost of producing goods. There are so many variations in the expense items that no one, whether an expert cost accountant or not, can settle upon a figure that will represent the normal cost of producing a unit of product.

It was because of the inefficient nature of actual unit costs and the need for a system in which a definite, reliable unit cost of operation can be applied to production at all times, that standard costs were first developed. In a system of standard costs, manufacturing expenses are broken down, as they are in actual cost systems, into material, labor, and overhead costs. Standards are set for each of these and until the standards are changed, all units produced are charged with the standard rates.

The chief foundations upon which standard costs are built are (1) the cost center, and (2) normal capacity. A cost center is a section of the plant in which a particular kind of work is done, so that every unit entering the cost center receives the same type of treatment as every other unit. The time spent upon one kind of product in a given cost center may be longer or shorter than the time spent upon another kind, but the nature of the work done on the two products will be identical. The following table illustrates how one factory divides its work among cost centers:

PRODUCTION DEPARTMENT

LIST OF COST CENTERS

No. 1 Cutting	No. 5 Ring Bending
No. 2 Tapping	No. 6 Painting
No. 3 Threading	No. 7 Assembly
No. 4 Bulldozing*	No. 8 Packing

Every article entering Cost Center No. 6, therefore, will be painted, although of course smaller articles will not spend so much time there as larger articles.

The second important foundation of standard costs is "normal capacity." This means that standard unit costs are based on a volume of production that is a reasonable average output for a typical year.

The development of standard unit manufacturing costs will now be discussed. In connection with this, the method of preparing material, direct labor, and overhead cost standards must be explained. Later the major purpose of standard costs, namely, the controlling of material, direct labor, and overhead expense by means of cost standards and flexible budgets will be considered at length.

174. Material Cost Standards.—The most obvious factor to be used in arriving at the cost of producing a unit of output is the material cost, the cost of the raw

**Bulldozing* is a term applied to the process of pounding metals into shape by the use of force. Pipe, rods, etc., are fashioned into desired shapes by this pounding process.

stuffs of which the finished article is made. The effect of materials on cost of production is exerted in two ways: (1) through price, and (2) through quantity. In a system of actual costs, production is charged with the amount actually paid for the raw materials. Since prices of raw materials are constantly fluctuating, so that, for example, a pound of copper that costs 12 cents today may cost only 10 cents a month from now, it is sometimes a question as to which figure should be used when there are more than one to choose from. This problem has been disposed of, in systems of actual costs, by various plans, such as the "first-in-first-out" and "moving-average" methods. In a system of standard costs, however, there is only one material price—a price that is predetermined and that is used throughout a period covering at least six months or, better, a year of production. This does not mean that prices on the market will not fluctuate as before, but in a system of standard costs these fluctuations *are not reflected in the unit cost of materials used.* In other words, the material price that seems to be the nearest to the normal price—the price at which the greater portion of the raw materials will be bought—is the one selected, and every unit produced is charged with this standard predetermined cost.

In regard to the influence of the quantity element, it is found that in a system of actual costs production is charged with the amount of materials actually used. Here again there is a vast opportunity for unit costs to vary, because as soon as there is more spoilage in one month than another or in producing one order than in producing another, the unit material costs will differ. Take the situation where the purchasing department, in order to obtain raw materials at a cheaper price, buys a quantity of goods that are of inferior quality. When these goods are used in production, it is found that the amount of spoilage greatly increases; and this state of affairs results in dissimilar unit material costs for each period and each production order.

A standard cost system wherein the quantity of materials to be charged to each unit is determined before a single unit is manufactured is simpler and more effective. As in the case of material prices, it is possible to come to a conclusion as to what is the average amount of materials needed to produce an article, and to set that average amount as a standard which will govern production over a given period of time. In this way, every unit produced is charged with a definite amount of materials used, and even though there may be an unusual amount of spoilage at one time or another because of the purchase of inferior material or other reasons, this condition (which, after all, is only a temporary out-of-line situation) is not permitted to affect the unit cost of production.

Since, in a standard cost system, both the amount of material and the cost of material that will enter each unit is predetermined, it is possible to know definitely the material cost of each article that is to be produced. If the standard quantity of material entering into a given item is, say, three pounds, and if the standard price is 12 cents a pound, it is obvious that each unit manufactured will have a material cost of 36 cents, *which will not vary.* In the non-standard systems of cost accounting, where both price changes and quantity requirements are permitted

to affect the costs of production, there can be no definite figure such as this, and unit material costs will vary continually.

175. Direct-Labor Cost Standards.—Of all the types of costs entering into the production of goods, material costs are undoubtedly the easiest to handle, because they represent something that is tangible, something that can be seen with the eye and that can be measured and weighed. But other manufacturing expenses are not so readily handled. In setting standards for direct labor, one meets a vast array of vexing problems. Labor, being a human product, is as variable as human nature itself. Everything, from the condition of the weather to the grudges a man may bear toward his boss, affects both the quality and the speed with which work is done. Rates of pay, factory conditions, cooperation between supervisors and workers, personal health and ability, and many other questions must be considered in arriving at the average direct-labor cost of producing goods.

However, just as it is necessary, in setting standards for materials, to fix upon a unit cost that may be used in all cases, regardless of fluctuations both in prices and in the amount of materials used, it is necessary, in setting direct-labor standards, likewise to determine a unit labor cost which will remain fixed in spite of different rates of pay and different periods of time taken to do a task. Scientific methods are used to determine the amount of time needed to perform each operation. This clearly shows why a production division must be divided into cost centers in each of which only one kind of work is done. As long as only one kind of work is done in each cost center, as painting, boring, or threading, it is possible to measure the amount of time required to process a unit of any commodity passing through the center. If, on the other hand, several operations were carried on in a cost center, it would be difficult, if not impossible, to determine the time needed for each operation.

The first procedure, then, is to divide the production division into cost centers in which all work performed is of an identical nature. After this has been done, job studies must be made to discover how much direct labor is required on each product from the time it enters a cost center until it leaves. If 800 units of a given product are completed each day in Cost Center No. 1, the cutting section, supposing ten men to be working in this cost center seven hours each, then it is likely that the standard labor time for each unit will be approximately 5.25 minutes (4,200 minutes divided by 800 units). And if the average rate of wages for the ten men is 45 cents per hour, the standard labor cost for each unit will be somewhere near $(5.25 \div 60) \times 45$ cents, or 3.9375 cents. But even though past experience has shown that 800 units is the normal capacity for this cost center, it is not to be thought that 5.25 minutes is set blindly as standard labor time and 3.9375 cents per unit as standard labor cost. A system of standard costs is a scientific structure, and operating conditions should be perfect before rates are set. In Cost Center No. 1, for instance, there may be "off" conditions which, if overcome, would make it possible to produce 850 units in the same seven-hour day with the same number of workers. Perhaps some of the workers are inefficient; perhaps time is lost because the materials are not supplied fast enough; perhaps the machines

are not operated at the correct speed—there are a number of conditions that should be examined before a standard rate is set. It may even be found that an average wage of 45 cents is too small, and that if a higher wage were paid, more efficient workers could be secured.

It must be remembered that standard labor rates and standard labor time, like material standards, remain fixed and are used in arriving at the manufacturing cost of an article, no matter whether more or less than the standard time was spent on it, and no matter whether more or less than the standard wage was paid.

Overhead as well as labor and material costs must be charged to the products that are operated on in each cost center. In order to make it simple to charge overhead to products operated on, standard direct labor costs are usually stated not as so much per unit of product, but as so much per standard productive hour. The reason for this will be made clear in the next Article.

176. Overhead Expense Standards.—After standards have been set for material costs and for direct-labor costs, the accountant must turn his attention to the setting of rates to absorb the overhead costs. And as overhead expenses are made up of so many widely different elements, it is to be expected that the problem of apportioning them should be the most difficult. It would be absurd to try to apportion the overhead in the same manner as the other costs, and apply a rate for each type of overhead as production is carried on in the factory. How, for instance, could one determine how much depreciation should be charged against each unit? Or how much of the wages of the indirect laborers? Or how much of the salary of the factory manager? If all of these elements were to be studied separately in relation to each unit of product, the accounting system would be so cluttered up as to be useless. The material cost can be directly determined because the amount of materials is measurable. The labor cost can be directly determined because the amount of time needed to finish an article can likewise be measured. But overhead costs require a different treatment: *they must be calculated in total, and then spread over production in the form of an overhead rate per unit or per standard productive hour.*

In the treatment of overhead expenses, the first thing to be remembered is that direct overhead and general overhead must be sharply differentiated. Because of this, two overhead rates must be determined, one for each of the two types of overhead. The reasons for this distinction are not hard to understand. The direct overhead expenses are those which are incurred directly and entirely in the costing center to which they pertain. The salaries of the foreman and his assistants, the wages of the indirect laborers, the amount of defective work, the factory supplies used, all may be set apart as belonging absolutely to a particular costing center; and it is essential, in order to hold the supervisors of that center responsible for the costs incurred, that this direct expense be separated from the prorated or general expense items, for which the supervisors are not responsible. The schedule of direct overhead expenses must, therefore, be drawn up for each individual department or cost center—if there are ten cost centers, there must be ten schedules—because the nature of the costs in each will vary. Schedules are prepared for

some definite period of time, usually a month. The schedule of general overhead expenses, however, is drawn up for the factory at large, since it consists of those expenses which cannot be definitely allocated to productive cost centers—such expenses as insurance, taxes, salaries of general factory executives and depreciation on buildings.

If the plant is sufficiently large to have service departments, estimates are made of the various expenses incurred in operating each service department and the total figure for each is included as one item in the schedule of general overhead expenses.

When the general overhead schedule or budget has been completed, the next step is to settle upon some basis by which these expenses will be allotted to the cost centers—not, of course, that the foremen will be held responsible for all of them, but in order that they may be charged against the goods being manufactured. Light, heat, and power, for example, are prorated overhead expenses, but they are elements in the cost of producing goods in Cost Center No. 1 just as truly as the item supplies is an element. Depreciation is another example of expense which must be considered in arriving at the cost of producing goods, although it is difficult to say how much depreciation should be charged to one cost center or another. Thus it is seen that prorated expenses are as truly costs of manufacturing as are the direct expenses, the only difference being that the exact location of the prorated expenses is not known. It is because of this that a basis must be found on which to charge each cost center with its share of the general expenses. As it would be unscientific to make the allotment arbitrarily, each item should be taken separately and definite reasons should be found why the item is to be divided in one way or another. A very orderly and reasonable basis for distributing general expenses is presented in Illustration 79. It may be well to select an item or two from this illustration and analyze them in order that our understanding of the table may be clear. The salaries of the general manager and his assistants, which may be estimated as $1,030 at normal capacity, are to be apportioned according to the number of employes in each cost center. Thus, if there are 400 employes in the plant and Cost Center No. 1 has 20 of them, this cost center will be charged with $\frac{1}{20}$ of $1,030, or $51.50. Miscellaneous supplies, amounting to $1,400, are to be apportioned according to floor space. Therefore, Cost Center No. 1, which occupies, say, one-eighth of the total plant area, will be charged with $\frac{1}{8}$ of $1,400, or $175.

When schedules or budgets of departmental and general overhead expenses are drawn up, they are based on production at normal capacity. Normal capacity may be stated in terms of units produced or in terms of standard productive hours. When normal capacity is stated in terms of units produced, an analysis must be made of the overhead expenses, both direct and general, that are incurred when the volume of production is normal; and the budgets must be set in accordance with the estimates as to what the same expenses will be in a normal period in the future. If in May, the expenses for indirect labor were $4,320 when the volume of production was 3,000 units, and in June, the expenses for indirect labor were $5,030 with a volume of 4,000 units, what budget figure for indirect labor

PRORATION OF GENERAL OVERHEAD EXPENSE

Expense Item		Basis of Distribution to Cost Centers of General Overhead Expense
Account	Code	
General Manager and Assistants	51	Number of Employes in Cost Centers
Superintendents and Assistants	52	Number of Employes in Cost Centers
General Foremen	53	Time Analysis Report of General Foremen
Rate Setters	54	Number of Direct Labor Employes in each Cost Center
Chief Inspectors	55	Number of Inspectors in each Cost Center
Schedulers	56	Number of Direct Labor Employes in each Cost Center
Route Clerks	57	Number of Direct Labor Employes in each Cost Center
Crane Operators	58	Number of Direct Labor Employes in each Cost Center
Oilers and Cleaners	59	Time Study Analysis
Fuel	60	Burner Hours Used
Power	61	Engineering Estimates if no Meters Installed
Light	62	Engineering Estimates if no Meters Installed
Water	63	Engineering Estimates if no Meters Installed
Police	64	One-half on Floor Space; one-half on Number of Employes
General Factory Labor	65	Number of Direct Labor Employes
Telephone and Telegraph	66	Number of Employes
Store Room	67	Number of Requisitions of Each Cost Center (not the Amount Requisitioned)
Receiving Department	68	Number of Requisitions of each Cost Center
Purchasing Department	69	Number of Direct Labor Employes
Shipping Department	70	Number of Direct Labor Employes
Works Accounting	71	Judgment of Comptroller
Engineering	72	Judgment of Chief Engineer
Industrial Relations	73	Number of Employes
Accident Compensation	74	Number of Employes
Learners	75	Number of Direct Labor Employes
Miscellaneous Wages	76	Number of Direct Labor Employes
Miscellaneous Supplies	77	Floor Space (mostly Janitor Supplies)
Fire Insurance and Taxes	78	Floor Space with Certain Adjustments for Difference in Type of Building
Depreciation, Machinery	81	Engineers' Estimate and Appraisal
Depreciation, Tools	82	Engineers' Estimate and Appraisal
Depreciation, Buildings	83	Engineers' Estimate and Appraisal
Depreciation, Furniture and Fixtures	84	Engineers' Estimate and Appraisal

ILLUSTRATION 79—SCHEDULE SHOWING BASIS UPON WHICH GENERAL OVERHEAD EXPENSE IS ALLOCATED TO THE COST CENTERS

should be set for future production when it is estimated that normal volume of production will be 3,400 units? Because of the uncertain nature of overhead expenses, it is not sufficient to say that the indirect-labor expenses to be incurred in producing 3,400 units will be at a point four-tenths of the way between $4,320 and $5,030. An examination must be made of the elements entering into the situation, and the budget figure that results must have a scientific basis. Similarly, with each of the many other items of overhead cost, there must be a survey of

what expenses have occurred at various volumes of production in the past; there must be an expert study made to determine what is the normal production volume; and in this way, the expense items that are to appear in the budgets for the future must be adjusted to the predetermined normal production volume. The overhead budgets are therefore built up item by item and step by step.

After the budget has been completed, it is a simple matter to determine what the standard overhead cost per unit should be. If the total direct overhead budget for Cost Center No. 1 is $3,200 for a normal capacity set to meet a production volume of 4,000 units, each unit as it passes through Cost Center No. 1 must be charged with 80 cents ($3,200 ÷ 4,000) of overhead expenses. In a similar manner, when the general budget has been drawn up on the basis of a production volume of 4,000 units, and has been apportioned to each cost center, the unit rate for prorated overhead can be easily found for each unit as it passes through the cost center. Each article produced, therefore, is seen to be charged with four standard rates: that for material cost, that for direct labor cost, that for direct overhead expense, and that for general overhead expense.

Budgets based on production volume are efficient when the company using them has but one type of product. In this case, each unit requires the same kind of treatment, and the standard time allowed for the completion of each does not vary. In the painting section, Cost Center No. 6, for example, if every unit is identical, the standard time required to paint a unit today will be exactly the same as the time required a week from today. Because of this, if 4,000 units are produced in a month, very properly the overhead expense can be divided evenly among the 4,000. But most industries turn out a variety of products, and while each article receives its coat of paint in the paint department, one requires a different amount of time from another. Suppose that during a certain month 2,000 articles are produced, requiring 10 minutes each to paint, 1,000 requiring 20 minutes each, and 500 requiring 40 minutes each. There have been manufactured 3,500 articles, yet certainly it is not proper to apportion the overhead expenses of the painting section arbitrarily by charging each unit with $\frac{1}{3,500}$ of the total expenses.

A sensible answer to the problem suggests itself immediately. In the illustration just given, the painting section devotes 1,000 hours monthly to its function of painting three different types of product. What, then, is the overhead expense of running the cost center for each productive hour? It is merely a matter of simple arithmetic to discover the answer. The total budget for the month which has been set for normal capacity, say $3,200, is divided by the 1,000 productive hours to find the hourly rate of $3.20. And after the hourly expense has been determined, it is just as simple to charge each article with that portion of an hour which is spent in working upon it; if 10 minutes, one-sixth of $3.20 or 53⅓ cents; if 20 minutes, one-third of $3.20 or $1.06⅔; if 40 minutes, two-thirds of $3.20 or $2.13⅓. Because of the fact that most industries today produce not one type of article, but a vast number, budgets based on standard productive hours are commonly employed.

177. Building of Standard Productive Hour Rates.—It is necessary to repeat at this point the never-changing principle of standard costs that, no matter at what range above or below normal capacity the plant is operating, *production is charged at the standard rates which have been set for normal capacity.* Thus even though at the middle of a month the officers might think production to be far beyond the 100-per cent. mark, the 100-per-cent. rates would be used nevertheless for costing purposes. *To understand this fundamental principle is to understand the essential nature of the standard cost structure.* There is one expense rate for each cost center—one rate and only one, and this rate covers all expenses except material costs. This statement may seem contradictory to what has been said about standard rates, and the apparent contradiction will now be explained.

In the preceding consideration of standard cost rates, the rates have been split into four divisions: material rates, direct-labor rates, direct-overhead rates, and general-overhead rates. While material rates are always treated independently, the other three rates, in the operation of a cost system, are combined *in one standard cost rate.* Accordingly, while there are four different elements entering into the cost of producing an article, only two cost rates are applied, the one for materials, the other for direct labor, direct overhead, and general overhead combined.

When separate hourly rates have already been determined for direct labor and for the two divisions of overhead expenses, it is a simple matter to build the standard hourly rate covering all three. The three individual rates have been determined on the basis of the standard productive hour, and the single combined rate will likewise be stated as *the manufacturing expense of running a cost center for one productive hour.* Suppose that when the budget was drawn up for Cost Center No. 1 for direct overhead, the normal capacity is set at 3,500 productive hours, and the estimated expenses determined to be $4,200. Therefore, the direct overhead cost per hour is $4,200 ÷ 3,500 = $1.20. In order to develop the illustration, suppose that the general overhead applicable to Cost Center No. 1 is settled upon as $7,000 for normal capacity. The hourly rate for general overhead, then, will be $7,000 ÷ 3,500 hours = $2. And if the standard direct-labor rate should be set at, say, 60 cents per hour, *the standard rate for running Cost Center No. 1 each productive hour* would be $1.20 + $2.00 + $.60 = $3.80. Then every item to be produced in Cost Center No. 1 must be charged on the basis of this $3.80, and the rate remains at $3.80, no matter how violently production may fluctuate, and no matter what expenses may actually occur.

It is a simple matter to apply a standard cost rate set up in this manner. If Cost Center No. 1 works on three different sizes of product, the standard allowed time for one being 1½ hours, of the second, 40 minutes, of the third, 10 minutes, the standard expense of turning out these three types of goods in Cost Center No. 1 will be respectively $5.70, $2.53⅓, and $0.63⅓.

It should be noted here that while standard cost rates are unvarying as far as day-to-day production is concerned, they may be changed completely as often as conditions warrant the change. Such changes are usually effected at the beginning of a year, and not in the midst of the period. A shift in the industry by which sales, and therefore production, are permanently increased or decreased; obsoles-

cence of the old rates because of increased economies in production, because of enlargements of the plant, or because of other reasons; a firm conviction on the part of the executives that the rates were ill-planned in the beginning—any of these causes may serve as a reason for changing the standard rates. Ordinarily, it should not be necessary to effect changes oftener than once a year.

178. Standard Unit Manufacturing Costs When Normal Capacity is Stated in Terms of Volume of Production.—When normal capacity is stated in terms of volume of production, that is, in terms of number of units produced, standard unit manufacturing costs are easily calculated. The standard unit costs of direct labor, direct overhead, and general overhead for each department are found as explained in Arts. 175 and 176. These three costs are added together to get the total standard unit operating or manufacturing cost of each department. The standard unit material cost is learned as discussed in Art. 174. The total standard unit cost is the standard unit material cost plus the standard unit operating costs of each department in which the product is processed.

As stated in Art. 176, however, normal capacity is commonly stated in terms of standard productive hours. The calculation of standard unit costs under this condition will now be considered.

179. Standard Unit Manufacturing Costs When Normal Capacity Stated Is in Terms of Standard Productive Hours.—The matter of finding the unit cost of each of a number of commodities manufactured is greatly simplified by the use of a non-changing standard hourly rate in each cost center. In Art. 173, eight cost centers in a certain factory were listed. The method of finding the unit cost in such a plant is illustrated in the accompanying tabulation. Here arbitrary values have been used for standard hourly rates and for allowed times, and the cost incurred per unit in each cost center has been calculated. The sum of all these costs is the standard manufacturing expense per unit.

Cost Center	Standard Hourly Rate	Allowed Time Per Unit	Expense Per Unit
1. Cutting	$3.80	10 minutes	$ .633333
2. Tapping	2.40	3 minutes	.12
3. Threading	3.20	5 minutes	.266667
4. Bulldozing	2.80	4 minutes	.186667
5. Ring Bending	3.00	8 minutes	.40
6. Painting	2.20	5 minutes	.183333
7. Assembly	3.50	10 minutes	.583333
8. Packing	1.80	5 minutes	.15
Total Standard Manufacturing Expense in all cost centers			$2.523333

By adding this total standard expense to the standard material cost, which may be assumed to be 53 cents, the standard cost of producing each unit of output is found to be $3.05½. If there are a number of articles of different shapes and sizes to be produced in these cost centers, the standard cost for each type may be found in exactly the same manner. The first two columns will remain the same since the standard rate is unchanging, the third column will list the allowed time

for each size of article, and the fourth column, of course, will vary in accordance with the amount of time allowed.

If material is issued to cost centers other than Cost Center No. 1 the standard unit cost of each cost center is the expense per unit of that cost center plus the unit cost of the material issued to the cost center. When work in process is transferred from one cost center to another, the unit cost at which the transfer is made is the sum of the standard unit costs of all centers previous to the cost center to which the transfer is made. Completed products are debited to the Finished Goods Inventory account at total standard unit costs, and goods shipped are credited to Finished Goods Inventory and debited to Cost of Sales at the same rates.

In the preceding discussion it is assumed that the commodities, whose standard unit costs are to be found, do not require machines to be specially set up for their manufacture, or that the cost of setting up the machines when spread over the total number of units manufactured is so small that it can be ignored, or that the wages of the set-up men are considered overhead expense in the same way as the wages of foremen, inspectors, repairmen, etc. Frequently, set-up cost is a direct-labor charge and should be included with direct-labor cost in standard unit costs. In order to learn the standard direct-labor cost of setting up a machine, studies are made to find what is the fair or standard time required to make the setup and this time is multiplied by the standard wage of the class of men who do the work. Investigations are also made to discover the average-size lot produced; that is, the number of operations which on the average will be performed before the machine is set up again to manufacture another product. The standard unit cost per operation is then found by dividing the figure obtained into the standard set-up cost. For example, if $10 has been decided upon as the standard cost of setting up a machine required in the manufacture of product A and investigation shows that on the average 10,000 units of product A are operated on at a time, the standard set-up cost per operation will be .1 cent.

On page 269 is shown a form on which standard manufacturing expense per unit of product may be compiled when set-up costs in connection with certain of the operations performed on the product should be included in the standard unit cost.

180. Effect of Alterations in Standard Unit Costs.—Since standard unit costs are based on the standard rates established for materials, direct labor, direct overhead, and general overhead, standard unit costs change. If standard rates for materials, direct labor, direct overhead, or general overhead are altered, new standard unit costs must be calculated. Changes in standard unit costs usually are made only at the beginning of the year. Such changes affect the Work in Process Inventory accounts (if any of the commodities whose unit costs are altered are in process) and the Finished Goods Inventory account, also the Raw Materials Inventory account if the changes in unit costs are due to alterations in material standard prices and some of the particular materials are on hand. When the new inventory values have been calculated the old inventory accounts are closed by

Part Name _____

Part No. _____

Drawing _____

Standard
Set Up Quantity _____

OPERATION NUMBER	OPERATION NAME	DEPARTMENT	SET UP		DIRECT LABOR	TOTAL SET UP AND DIRECT LABOR	OVERHEAD EXPENSE	TOTAL
			TOTAL COST	PER UNIT				
A-1	Rough Turn and Bore	40	1.16	.0116	.0180	.0296	.0569	.0865
B-2	Drill	41	—	--	.0060	.0060	.0113	.0173
Total			2.082	.0208	.2847	.3055	.5841	.8896

being credited for their balances and new inventory accounts are opened which are debited with the new inventory values. The difference between the new and old inventory values is debited or credited direct to Profit and Loss account or to a special reserve account. A reserve account is used when it is expected that part of the inventory contents will still be on hand at the end of the first period of the new year.

The use of a special reserve account necessitates an adjustment at the end of each month of the new year crediting or debiting the special reserve account, and debiting or crediting Profit and Loss account for a portion of the amount originally posted to the special reserve account. When all the inventory on hand at the beginning of the year has disappeared the reserve account should be in balance and no further adjusting entries will be required. If a balance sheet is prepared while the reserve account has a balance, this balance is shown as a deferred asset or deferred liability. Since material, work in process, and finished goods are credited out at the new standard rates, the apparent gain or loss due to altering the inventory values at the beginning of the year is offset when the product is sold. For example, if at the beginning of the year the material inventory is written up because of increases in standard rates for materials, the cost of materials issued during the year and, therefore, the cost of goods manufactured and sold during the year will correspondingly increase. The increase in cost of goods sold will offset the apparent profit due to the write-up of the raw material inventory at the beginning of the year.

181. Advantages and Disadvantages of Standard Unit Manufacturing Costs. As shown in Art. 173, unit costs in actual cost systems constantly change. In a standard cost system, unit costs do not alter because of temporary changes in manufacturing conditions. The advantage of uniform unit costs in the setting of prices and in the determination of sales policies is obvious and constitutes one of the superiorities of standard unit costs over actual unit costs.

A second important advantage of standard unit costs is as follows: Suppose the engineers of a plant make a new design for manufacture, a type of article that has never before been produced. Under a non-standard cost accounting system, if it were desired to estimate what would be the unit cost to produce the new design, an extensive study would have to be made of all the elements entering into its cost. It would likely be necessary to compare the new design with a large number of old ones in order to arrive at an approximate idea of what the new design would cost—and the resulting estimate would by no means be exact. In a standard cost system, all that would be necessary would be a schedule such as the one in Art. 179, based on studies made in each cost center as to the amount of time to be allowed for each operation. With the items in the last column calculated according to the estimates of allowed time, the total of this column would give a scientific, sensible unit cost.

Once standard unit costs are found, new unit costs are usually calculated only once a year, and then only if changes in standard material and standard hourly rates have been made. A third advantage of standard unit manufacturing costs,

therefore, is that accounting expense is less than when unit costs are obtained by the methods employed in process and job-order systems.

Since standard unit costs do not alter during the year, these unit costs possess a fourth advantage, namely that the preparation of monthly summaries of work in process transferred from one department to another, of finished goods transferred from work in process, of departmental work in process inventories, and finished goods inventory, are expedited.

The chief disadvantage of standard unit costs is the possibility that such costs may be incorrect and, therefore, prices and sales policies based on them unsound. Standard unit costs will be wrong if the work of setting standard rates and calculating the standard unit costs from these standard rates is done inaccurately. In standard cost systems, as in all cost systems, accuracy is essential. Standard unit costs may also be incorrect because they have not been altered although fundamental changes in manufacturing conditions have occurred. This danger can easily be avoided if the cost accountant is alert and promptly reports such conditions to the sales division.

CHAPTER XXII

CONTROL OF MATERIALS AND DIRECT LABOR THROUGH STANDARD COSTS

182. Recording the Receipt of Materials in a Standard Cost System.—As indicated in previous chapters, a standard cost system establishes a greater measure of control over all items of manufacturing expense than that set up by actual cost systems. In this chapter the methods by which control over material and direct labor costs are set up in standard cost systems will be discussed. Fundamentally, this control is established by means of variance accounts.

When materials are received by a company possessing a standard cost system, the procedure to begin with is essentially the same as that described in Chapter VIII. The information contained in the shipper's invoice is carefully verified. In addition, however, the materials itemized on the invoice must be priced at standard prices and their value at standard prices entered on the invoice. The method by which standard material prices are established is explained in Article 174.

Entries to record the receipt of materials in a standard cost system differ substantially from those in actual cost systems. When materials are received and a standard cost system is in use, they are recorded both in the Raw Materials Inventory account and in the stores ledger at standard, not actual, costs. The difference between actual and standard costs is entered in an account entitled Material Price Variance, as a debit if actual prices are the greater, and as a credit if actual prices are the smaller.

Suppose materials having an actual cost of $500.00 but a value of only $490.00 at standard prices, are received. The entry in general journal form to record this transaction will be as follows:

Raw Material Inventory	$490.00	
Material Price Variance	10.00	
Accounts Payable		$500.00

If the same materials at standard prices have a value of $510.00 the entry in general journal form would be:

Raw Materials Inventory	$510.00	
Material Price Variance		$ 10.00
Accounts Payable		500.00

Obviously, if all purchases of materials have been recorded, the balance of the Material Price Variance account shows the amount by which the actual cost of materials purchased exceeds or is less than the expected or standard cost.

183. Recording the Issue of Materials in a Standard Cost System.—Entries to record the issue of materials in a standard cost system differ from similar entries in actual cost systems in two ways, the issued materials are priced at standard prices and the Work in Process Inventory account or accounts are only charged with standard quantities; that is, with the amounts which, as explained in Art. 174, have been scientifically determined to be needed to produce the required number of units of product.

If, because of an unusual amount of spoilage, more than the standard amount of materials is required, the excess is debited to an account termed Material Quantity Variance or Material Yield Variance. If, because of unusual care, less than the standard amount of materials is used, the difference is returned to stores and the Material Quantity Variance account credited. Occasionally other conditions may necessitate entries in the Material Quantity Variance account. For example, a material may be out of stock and a more expensive one substituted. The increase in cost due to this will be debited to Material Quantity Variance account. Again, a foreman may be able to use a material cheaper than the standard material. In this case, the decrease in cost will be credited to Material Quantity Variance. Even though a Work in Process account is kept for each department, there is usually only one Material Quantity Variance account in the general or factory ledger. Departmental material quantity variances are recorded on a supplementary work sheet.

Let us suppose that the standard amount of material required by Department A to produce an order of goods is 1,000 units and that the standard price of this amount of material is $500.00. The standard amount will be issued to Department A and an entry made which, expressed in general journal form, is as follows.

Work in Process Inventory, Dept. A	$500.00	
Raw Materials Inventory		$500.00

Now let us further suppose that because of unusual spoilage ten additional units of material are furnished to Department A before the order is completed. An entry will be required which, when expressed in general journal form, is as follows:

Material Quantity Variance	$5.00	
Raw Materials Inventory		$5.00

If because of unusual care only 990 units of material were required to produce the order and ten units were returned to stores, an entry the reverse of the above would be needed.

The balance of the Material Quantity Variance account shows how much the value of materials issued exceeded the standard or allowed value. Conceivably, the balance may be a credit and indicate that less than the standard value of materials has been used.

184. Analysis of Material Variances.—The balance of the Material Price Variance account shows the difference between the actual and the expected or

standard price of the materials purchased during a period. Supporting this account are filed invoices which show the difference between the actual and expected price of individual items of material. An intelligent study of these invoices will reveal the causes of the divergencies between actual and standard prices, and the persons responsible. With this information available, effective control over the purchase of materials can be established easily. The reader should note that it is not necessary to wait until the end of a period in order to analyze material price variances. Invoices may be studied daily or weekly and steps taken immediately to remedy unfortunate situations.

The responsibility for material price variances usually rests with the purchasing department. If the variance is unfavorable, it may be found that large quantities of raw material should be bought when prices are at or below the standard, instead of small quantities at frequent intervals when advantage may not be taken of price differences. It may be thought wise to buy the raw materials from firms other than those dealt with in the past, or to substitute a different grade of materials. And there is always the possibility of a need to alter the material price standards to meet a permanent change in market prices.

The Material Quantity Variance account shows the difference between the actual and standard amount of materials issued to production during the month. Supplementary work sheets indicate the exact departments in which excess materials were used during the month. If materials are requisitioned by production order numbers, it is even possible to know for what products operated on in a department the excess materials were required. It is thus easy to learn the cause and to place responsibility for excess use of materials.

In some standard cost systems excess materials issued to a cost center because of spoiled work are debited to the Overhead control account of the cost center and to a subsidiary overhead account entitled Spoilage. When this is done, control over materials spoiled in process is obtained in the same way as control over any item of overhead. Control over overhead expenses in a standard cost system is discussed in Chapter XXIII. Even when a Spoilage account is used there is still need for a Material Quantity Variance account, since many material quantity variances are due to causes other than spoiled work in process. Usually when amounts are debited to Overhead because of spoiled work, the amounts represent only the value of direct labor and overhead charged to the work in process that has been spoiled, the loss resulting from spoiled materials being shown in the Material Quantity Variance account.

The reader will realize that as in the case of material price variances it is not necessary to wait until the end of a period to analyze material quantity variances. If requisitions for excess materials are analyzed, the amount of excess materials used can be learned daily or whenever advisable and responsibility fixed immediately. The responsibility for material quantity variances rests either on the purchasing department or on the production division. If, in the event of an unfavorable variance, the below-standard condition was due to the fact that the right materials were not in stock or if they were of an inferior quality or not adaptable to the needs of the production division, the blame should rest on the purchasing

department. If the variance was the result of poor workmanship, the production department is responsible. If the variance was favorable this was probably due to care taken in the production division or possibly to the substitution of less expensive materials.

185. Inventories in a Standard Cost System.—It will now be clear to the reader that when a standard cost system is used entries to inventory accounts are made at standard cost figures. The reader is familiar with the accounting principle that for balance sheet purposes inventories should be valued at cost (in this case standard cost) or market price whichever is lower. The company's auditor may insist that market conditions require that inventories be written down from standard cost figures before the annual balance sheet is prepared. This will cause no accounting difficulty. The subsidiary ledger or record supporting each inventory control account is first proved against the balance of the control account at standard figures. Then an additional credit entry is made in the inventory account recording the amount of the reduction in value necessary to lower the inventory to market price. The corresponding debit is to Profit and Loss account and the total write-down of all inventories is shown in the non-operating or other expense section of the profit and loss statement.

At the beginning of the next year standard unit costs are revised and new inventory control accounts opened with balances that correspond to the revised standard unit costs. The entries required are fully explained in Article 180. At the same time, the subsidiary inventory records are altered because of the changes in standard unit costs, and are then proved against the opening balances in the new inventory control accounts.

186. Recording Direct-Labor Cost in a Standard Cost System.—The fundamental purpose of a standard cost system so far as it concerns direct-labor cost is to establish control over this item of expense. Payrolls are prepared and recorded as in actual-cost systems. Direct labor, however, is costed to production in a different manner. The reason for this is that in a standard cost system production is charged with standard, not actual, labor cost.

A distribution sheet is prepared for actual direct-labor cost as explained in Chapter XII, but actual labor cost is not debited to the Work in Process account or accounts; only standard labor cost is so debited. Actual labor cost is almost sure to exceed standard labor cost, that is, to contain a labor variance. If the amount of the variance is known immediately, it will be possible to record the actual labor cost shown by the distribution sheet as follows, provided there is only one Work in Process account.

Work in Process	$ x x x x	
Direct-Labor Variance	x x x x	
Payroll		$ x x x x

However, the amount of labor variance cannot be known before the standard labor cost is calculated. Therefore, it is usual tentatively to consider all actual direct-labor cost as a variance and record it as follows:

Direct-Labor Variance	$ x x x x	
Payroll		$ x x x x

Standard labor cost to be charged to Work in Process account or accounts may be calculated in the following way: The number of units operated on in each cost center is multiplied by the standard time allowed per unit (usually expressed as a part of an hour) and the result multiplied by the standard hour wage rate for the cost center. The final result is the standard labor cost for the center. The preparation of standard labor time and wage rates is explained in Art. 175

In Art. 179 mention is made of set-up cost as an element in standard unit costs. When setting up machines is an operation distinct from the regular operations of the cost center and the time spent on setting up is considered as a direct labor cost of the center, the direct labor charge to the Work in Process account must include set-up cost at standard rates. The standard cost of setting up the machines in a center is the standard time allowed for the number of set-ups during the period, multiplied by the standard wage rate established for this type of work.

The following entry, when only one Work in Process account is used, is required to cost production with standard labor cost and to leave the Direct-Labor Variance account with the correct balance:

Work in Process	$ x x x x	
Direct-Labor Variance		$ x x x x
To charge work in process with standard labor cost.		

The balance of the Direct-Labor Variance account shows the difference between actual direct-labor cost and expected or standard direct-labor cost for the period. Usually this balance is unfavorable, that is, actual direct-labor cost is greater than standard. In many companies workers who complete operations in less than the standard times allowed are paid a bonus equal to the saving made in labor costs.

187. Analysis of Direct-Labor Variances.—The reader may expect to find not one but two Direct-Labor Variance accounts, Direct-Labor Time Variance and Direct-Labor Rate Variance. The use of two labor variance accounts is feasible. However, a complete analysis of labor variance will show more than the amounts of variance in each department due to time and wage rate conditions. For example, unfavorable time conditions may be due to the workers taking excessive time to perform operations (technically called falldowns) or to conditions for which the management is responsible which prevent the workers completing jobs in the standard times and for which extra allowances of time must be granted. An analysis of labor variance should show the amount of variance due to falldowns and allowances respectively. In the illustrative problem given in Chapter XXIV, a method of analyzing the labor variance of each department is shown and when such a method is employed nothing is gained by having separate accounts for time and rate variances.

The responsibility for direct-labor variance rests almost entirely with the production division. If an analysis of the variance shows excessive time to have

been taken by workers, a study should demonstrate whether the excess was due to the breakdown of machinery, to delay in the arrival of goods from other cost centers, to tardiness in bringing materials from the storeroom, to faulty materials or to the inefficiency of the workmen themselves.

As explained in Chapter XII, a labor distribution sheet for actual labor cost is not prepared all at one time at the end of the period, but daily throughout the month. Similarly the standard labor costs are calculated daily for each department and if advisable for each operation or worker in the department. Variances are noted, the person responsible for unfavorable conditions is immediately learned, and steps are taken to remedy them. A great merit of standard cost systems is the speed with which persons responsible for bad conditions are indicated.

188. Effect of Material and Direct Labor Variances on Financial Statements. The usual practice is to close Material and Direct-Labor Variance accounts into the Profit and Loss account at the end of the period, and to show the balances of these accounts as additions to or subtractions from the cost of goods sold (at standard rates) on the profit and loss statement. This method is illustrated in Art. 199. It yields results that are substantially accurate, but these results are not acceptable for income tax purposes. The reason for this is that the balances of variance accounts represent the difference between the actual and standard manufacturing cost of the period, and these differences are reflected in the value of work in process and finished goods inventories on hand as well as in the cost of goods sold during the period. A portion of material price variance is even reflected in the value of raw material inventory on hand. If the total of variance account balances is treated as an addition to or subtraction from cost of sales, the final profit or loss of the year is over or understated to some degree. A method for apportioning the total of variance account balances between inventories and cost of sales, and thus for obtaining a final profit or loss figure acceptable to the income tax authorities, is given in Article 199.

CHAPTER XXIII

CONTROL OF OVERHEAD EXPENSES THROUGH FLEXIBLE BUDGETS

189. Meaning of Flexible Budgets.—One of the outstanding characteristics of standard costs as applied to manufacturing is the control achieved over overhead expenses. In Chapter XXI it is explained that in order to obtain standard unit costs of products, schedules or budgets giving estimates of each item of departmental and general overhead expense for a period when production is normal are prepared. In any given period, no department will operate at exactly normal capacity. Frequently production will be far below or above normal. Overhead budgets constructed for normal capacity, by themselves, therefore, can be of only minor value in controlling overhead expenses. In a standard cost system schedules for departmental and general overhead are constructed not only for normal capacity but for volumes of production both below and above normal. Such schedules are termed flexible budgets since when they exist there is an estimate of overhead items or budget available for any volume of production at which a department or plant is likely to operate.

190. Normal Capacity.—In Chapter XXII it is shown that when a standard cost system is used production is not charged with actual material and direct labor expense, but with the standard cost of these items. Similarly, production must be charged with standard overhead expense. In Art. 176 the preparation of costing rates both for departmental and general overhead is explained. Such rates are sometimes expressed as so much per unit of production, but usually as so much per standard productive hour. When overhead rates are stated in terms of units of production, standard departmental and general overhead costs of the period are obtained by multiplying the standard number of units, or number of units that should have been produced in the time devoted to production, by the standard overhead rate per unit. When overhead rates are stated in terms of standard productive hours, the standard departmental and general overhead costs are calculated by multiplying the standard hours, or number of hours that should have been taken to turn out the actual production, by the standard hour rates. Standard overhead rates are always calculated on the assumption that the plant is operating at normal capacity.

Since normal capacity not only plays a great part in the setting of standard overhead rates, but also in controlling overhead expenses through the analysis of overhead variances, its meaning must be discussed at some length. Normal capacity has been defined as the utilization of physical plant that is necessary to meet the average commercial demands over a period of time long enough to level out the peaks which come with seasonal or cyclical variation. In other words,

when a plant is equipped to produce more than ordinarily can be sold, normal capacity is determined by average sales expectancy. To measure normal capacity, reference must be made to a period of time. For example, we may speak of the normal capacity of a plant or department as its normal use per year, per month, per week, per day, per hour, or even per minute.

In a company that produces more than one type of product, it is usually difficult to measure volume of production or capacity in terms of physical units and, therefore, the capacity of a plant or department is commonly stated in terms of productive hours. If each cost center has a normal capacity stated in terms of productive hours, the sum total of these separate items will represent the normal capacity of the plant. Normal capacity may, therefore, be defined as the number of standard productive hours per period necessary to produce the average output over a long time sweep.

How standard productive hours are used to measure normal capacity when a number of commodities is produced, will be shown by a simple example. Suppose that a certain cost center has as its normal capacity 2,000 standard hours per period. Suppose it produces only one type of goods, each unit requiring 10 minutes. Then there will be produced 12,000 units. Now suppose that in the time it takes to produce those 12,000 units—the cost center running at the same capacity—the following goods are produced: 6,000 units of one type requiring 5 minutes each; 3,000 units of a second type requiring 2 minutes each; 72,000 units of a third type requiring 1 minute each; and 24,000 units of a fourth type requiring $\frac{1}{2}$ minute each. The sum total of the hours required to produce these 105,000 units of four different kinds of goods is exactly the same as the number of hours required to produce the 12,000 identical units requiring 10 minutes each. In other words, normal capacity is not affected in the slightest degree by the number or kinds of goods produced but by the time required to produce them.

191. Constructing Flexible Budgets.—Before flexible overhead budgets are prepared, it is necessary for the plant to be divided into appropriate cost centers, each with its specific type of work, and for the responsibility of the foremen, superintendents, and the general manager to be definitely determined. The matter of setting standards has already been discussed. Material standards, it was explained, are set at a level that represents the value of the normal quantity of material required to produce a unit, the value being figured at the price that usually prevails. Labor standards are set at the figure which represents the normal amount of time required for a given operation multiplied by the average rate of wages paid for that particular type of work. Overhead standards are fixed to take care of the expenses that are likely to occur when the plant is operating at normal capacity. The nature of material and labor standards is easily understood but the problem of overhead expenses is intricate.

The first problem in connection with overhead expenses is the setting of flexible budgets for each cost center, to take care of those overhead expenses that can be definitely allocated to one center as belonging there and nowhere else. The follow-

DIRECT OVERHEAD BUDGETS

Cost Center No. 1—Pipe-Cutting — Foreman Samuel Rider

Normal Capacity 3,500 Standard Hours

Expense Item		Direct Overhead Expense at Various Volumes of Production										
Account	Code	40%	50%	60%	70%	80%	90%	100%	110%	120%	130%	140%
Foreman	21	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Assistant Foreman	22	—	—	90	90	175	175	175	175	175	225	225
Miscellaneous Wages	23	200	200	200	200	250	250	250	250	250	300	300
Inspectors	24	100	100	150	150	200	200	200	200	250	250	275
Clerks	25	150	225	225	225	300	300	300	300	300	350	350
Helpers	26	300	340	390	450	500	525	550	570	590	610	625
Repairs	27	300	370	440	560	580	600	620	650	660	670	680
Defective Work	28	30	50	100	125	150	200	250	325	400	475	550
Material Handling	29	530	590	650	720	795	845	900	980	1,080	1,190	1,300
Supplies	30	135	160	185	225	255	280	305	335	375	415	450
Overtime Bonus	31	140	175	210	245	280	315	350	385	420	455	490
Totals		$2,185	$2,510	$2,940	$3,290	$3,785	$3,990	$4,200	$4,470	$4,800	$5,240	$5,545

ILLUSTRATION 80—SCHEDULE FOR DIRECT OVERHEAD EXPENSE AT VARIOUS VOLUMES OF PRODUCTION

ing is a typical list of such direct overhead expenses:

Salary of foreman
Salary of assistant foreman
Wages of inspectors
Wages of clerks
Wages of helpers
Repairs
Defective work
Supplies
Material handling
Overtime bonus

There is nothing puzzling about any of these items. It can easily be seen that each of them is definitely incurred in a given cost center. Since the foreman, assistant foreman, inspectors, clerks, and helpers spend all of their time working in a particular cost center, there is no way by which any of their salaries and wages could be charged to a different cost center or to general overhead. The extent of repairs required, the amount of spoilage, the amount of supplies used, the cost of transporting materials and partly completed products, the overtime bonus paid—all of these items distinctly belong to the cost center in which they are incurred.

After the expenses that are to be included as the direct overhead costs have been determined, the next step is to estimate what these costs will be for some definite period of time, usually a month, if the cost center operates at normal capacity during this

period. This procedure is termed drawing up the budget for the cost center. Suppose that in Cost Center No. 1 the normal monthly capacity is estimated to be 3,500 standard productive hours. On this basis, the following budget is drawn up for each month: Salary of foreman, $300; Salary of assistant foreman, $175; Miscellaneous wages, $250; Wages of inspector, $200; Wages of clerks, $300; Wages of helpers, $550; Repairs, $620; Defective work, $250; Material handling, $900; Supplies, $305; Overtime bonus, $350; Total direct expense, $4,200. When, in any month, Cost Center No. 1 operates at normal capacity, the expenses that it is permitted to incur are limited to the $4,200. This sum is the standard direct overhead allowance for production at normal capacity. If Cost Center No. 1 were to operate for 3,500 standard productive hours, and have in that time actual expenses of $4,310, it would be off-standard to the amount of $110 ($4,310 − $4,200); or, on the other hand, if the expenses amounted to only $4,010 when the center was operating at normal capacity, it would beat the standard by $190.

The question that next presents itself is, What happens when production is considerably above or below normal capacity? Is the budget for normal capacity still used, or is there a different budget set to take care of this condition? It is obvious that if Cost Center No. 1 had a volume of 4,200 standard productive hours instead of 3,500 hours, the amount of its direct expenses would rise. With production increased 20 per cent., nothing could keep the overhead costs from increasing also. For example, if $305 worth of supplies were used during 3,500 hours, then surely a considerably larger quantity would be used in 4,200 hours. The foreman is held responsible for the expenses that occur in his cost center, yet, certainly, when the business is so fortunate as to have a production 120 per cent. of normal, the foreman cannot be expected to be held to a budget set for a 100 per cent. capacity.

The problem is solved by setting up a budget to take care of production at 120-per-cent. capacity. As overhead expenses do not increase in proportion to volume of production, the expense budget at 120 per cent. will not be one-fifth more than the budget at normal volume. At a volume of production of 120 per cent., for instance, there will be no increase in the foreman's salary, there will not be another assistant foreman added, and the number of clerks will probably remain the same. In building the 120-per-cent. budget, therefore, a survey must be made as to what expenses will increase and to what extent they will increase.

Even two budgets, one at 100 per cent., and one at 120 per cent., are not sufficient. As budgets are predetermined expenses set before any production takes place, it is not known whether the volume of production will be at normal, at 120 per cent., or at only 70 per cent. If the plant actually operates at 70 per cent. and thus has a volume of only 2,450 productive hours, it would be as foolish to permit the foreman to spend the entire $4,200 allowed for normal capacity as it would be to limit him to that amount when production is above standard. *It is necessary, therefore, to draw up budgets for all the various ranges of production above and below 100 per cent. that have a possibility of occurring.* Such a schedule, showing budgeted expenses at eleven different ranges, is shown in Illustration 80.

The general overhead budget demands a similar treatment. Since the general expenses are not directly applicable to the productive cost centers, only one general

budget need be drawn up, and that for the plant as a whole. It, of course, must contain estimates for expenses at various ranges of production in order that it may be used side by side with the budgets for direct overhead expense. As stated in Art. 176, when service departments exist, the estimated expenses of each service department are included as one item of general overhead expense. The general budget, like the direct budgets, must be based on the principle of normal capacity, for the plant has a normal volume of standard productive hours—just as each cost center has. The first step, then, is to estimate what expenses will take place at normal capacity. After this has been done, the same procedure that was used in setting the direct budgets must be followed; that is, other budgets must be prepared that will set the estimated expenses at the different possible levels of production, such as for percentages of 50, 90, 110, 130, etc. Illustration 81 shows a budget summary of this kind.

At this point, the following question suggests itself: What determines the number of budgets that will be prepared for each direct-overhead budget schedule and for the single general-overhead budget schedule? In practically every case the upper and lower limits in the range of the budgets will be based upon the experience of the company in the past. If the company has been operating steadily between an 80-per cent. capacity and a 120-per cent. capacity for the past 10 years, it is evident that there is no need, in planning budgets for future production, to provide for ranges below, say, 70 per cent. nor above 130 per cent., as there is almost no likelihood that budgets above or below these points will ever be used. As to the number of budgets to be prepared within the limits chosen, the usual procedure is to prepare budgets at either 5-per-cent. or 10-per-cent. intervals. Budgets at 5-per-cent intervals naturally call for more exacting figures, but ultimately the use of one type of interval is scarcely more accurate than the use of the other; since budgets, whether they be drawn at one interval or another, are, after all, estimates.

Although the foreman of a cost center is held responsible only for items of direct overhead and not for those of general overhead, there are sometimes cases wherein a measure of responsibility will be placed upon the foreman even for general overhead items. In some plants, for example, expense for light and power is placed in the direct-overhead budgets; otherwise, the foreman might permit lights to burn when not needed, and motors to run when nothing is being produced.

192. Overhead Variances.—Before explaining how overhead expenses are costed to production in a standard cost system, overhead variances must be discussed. The reason for this is that the difference between actual and standard overhead expense is posted to overhead variance accounts. Material and direct-labor variances have already been considered and the reader is aware that a variance is any off-standard condition and that it may be either favorable or unfavorable. Overhead variances may be classified as follows:

(*a*) Direct Overhead Variances
  (1) Volume Variance
  (2) Controllable Variance

(*b*) General Overhead Variances
- (1) Volume Variance
- (2) Controllable Variance

Direct Overhead Variances. Direct overhead variances are of two kinds: (1) Volume, or capacity, variance; and (2) controllable, or efficiency, variance. Volume variance is that which arises on account of fluctuations above and below normal capacity in the amount of production. All factory conditions may be in perfect

VOLUME VARIANCE SHEET

Month August, 19— Cost Center No. 1—Pipe-Cutting

Foreman Samuel Rider

Normal Capacity 3,500 Standard Hours (100%)

Actual Performance 2,800 Standard Hours (80%)

Expense Item / Account	Code	*a* Budget at Normal Capacity	*b* Costed into Production	*c* Budget at Actual Volume (80%)	*c*–*b* Volume Variance
Foreman	21	$ 300		$ 300	
Assistant Foreman	22	175		175	
Miscellaneous Wages	23	250		250	
Inspectors	24	200		200	
Clerks	25	300		300	
Helpers	26	550		500	
Repairs	27	620		580	
Defective Work	28	250		150	
Material Handling	29	900		795	
Supplies	30	305		255	
Overtime Bonus	31	350		280	
Totals		$4,200	$3,360	$3,785	–$425

ILLUSTRATION 82—STATEMENT PRESENTING THE VOLUME VARIANCE

order, and yet the fact that only enough orders have been received to keep the factory running at a 60-per-cent. capacity will cause volume, or capacity, variance. On the other hand, the factory may be poorly managed as far as internal operations are concerned, yet if there is a volume above 100 per cent. there will be a favorable volume variance. Volume variance, then, arises only because actual production is either above or below 100 per cent. Obviously, it may be either favorable or unfavorable, because production above normal capacity will be a favorable condition, and below normal capacity, an unfavorable one.

The problem of volume variance, will be better understood by noting how the figures actually work out for a center like Cost Center No. 1 previously referred to. Suppose that instead of there being 3,500 productive hours in a certain month, as stated in Art. 191, there are only 2,800. This means that the cost center is operating 20 per cent. below normal capacity; therefore, there will be an unfavorable volume variance. *The amount of volume variance is the difference between the budgeted*

expenses and the expenses costed into production at the standard cost rate. In the case of Cost Center No. 1, the budgeted expense for 80 per cent. capacity, according to Illustration 82, is $3,785. What was actually costed into production? The standard direct overhead rate was fixed at $1.20 per hour. There were 2,800 productive hours, so that the total amount costed into production must have been 2,800×$1.20 or $3,360. Hence, the difference between the budget of $3,785 and the standard expense of $3,360 represents an unfavorable volume variance of $425. A table showing the analysis of this volume variance is given in Illustration 82.

There is, however, another side to the question of volume variance. Suppose that instead of there being only 2,800 productive hours there were 4,900 hours. Production was then 40 per cent. above normal. There was costed into production 4,900×$1.20, or $5,880, while the budget at 140 per cent. calls for only $5,545. In this instance, there was a favorable volume variance of $335.

CONTROLLABLE OVERHEAD VARIANCE SHEET

Month August, 19__ Cost Center No. 1—Pipe-Cutting

Foreman Samuel Rider

Normal Capacity 3,500 Standard Hours (100%)

Actual Performance 2,800 Standard Hours (80%)

Expense Item / Account	Code	*a* Budget at Normal Capacity	*b* Budget at Actual Volume (80%)	*c* Actual Expenses	*b–c* Controllable Overhead Variance
Foreman	21	$ 300	$ 300	$ 300	$ ——
Assistant Foreman	22	175	175	175	——
Miscellaneous Wages	23	250	250	230	20
Inspectors	24	200	200	180	20
Clerks	25	300	300	260	40
Helpers	26	550	500	520	–20
Repairs	27	620	580	620	–40
Defective Work	28	250	150	80	70
Material Handling	29	900	795	770	25
Supplies	30	305	255	240	15
Overtime Bonus	31	350	280	270	10
Totals		$4,200	$3,785	$3,645	+$140

ILLUSTRATION 83—STATEMENT PRESENTING THE CONTROLLABLE OVERHEAD VARIANCE

Controllable or efficiency variance is that which arises when manufacturing conditions are either better or worse than the standards allow. The very fact that this type of variance is called controllable indicates that those in charge of each cost center are responsible, and it is on account of their efficiency or inefficiency that a controllable variance occurs.

It is entirely possible to have a large volume variance either above or below standard, and yet have little controllable or efficiency variance. It is to be remembered at all times that there is no direct relationship between volume and controllable variances; there may be an unfavorable volume variance linked with a favor-

able controllable variance, or a favorable volume variance in the face of an unfavorable controllable variance.

The amount of controllable variance is the difference between the budgeted expenses and the actual expenses. If, in Cost Center No. 1, there were only 2,800 productive hours in August, this represents a volume of 80 per cent. of capacity. At this volume of production, the predetermined budgets permit an expenditure of $3,785. Suppose, however, that on account of the excellent management of the foreman, actual expense for August amounted to only $3,645. Cost Center No. 1, then, even though it has an unfavorable volume variance, is nevertheless able to show a favorable controllable variance of $140 ($3,785−$3,645). Illustration 83 summarizes the calculation of this controllable variance.

Before leaving the subject of direct overhead volume and controllable variances, let us see what would happen if in Cost Center No. 1 for August there were 2,835 standard productive hours. This means that production was carried forward at a capacity of 81 per cent., a capacity for which no budget was drawn up. If we wish to find the budget allowance for August, therefore, it is necessary to calculate a new total. This is done by taking the 80-per-cent. budget allowance, $3,785, and adding to it one-tenth of the difference between the 80-per-cent. and 90-per-cent. budgets, since the difference between 80 and 81 per cent. represents one-tenth of the difference between the 80 per cent. and the 90 per cent. capacities. Thus the budget allowance for August is $3,785 plus $20.50 ($\frac{1}{10}$ of the quantity $3,990−$3,785), or $3,805.50. After this figure has been found, the method of finding the volume and controllable variances is the same as that followed in the previous examples. Some plants show each flexible budget in the form of a curve, from which the budget at any percentage of capacity can easily be determined.

General Overhead Variances. It is necessary to say only a word or two about general overhead variances. As in the case of the direct overhead, variances from general overhead are made up of volume variances and controllable variances. The only point of difference to be remembered is that the volume and controllable variances for most of the items of general overhead are analyzed only for the plant as a whole; and only those items that are definitely prorated to the productive cost centers are broken down into figures for each center.

193. Recording Overhead Expenses in a Standard Cost System.—In a standard cost system overhead expenses directly attributable to particular departments are accumulated in the same manner as in actual cost systems. Production, however, is not charged with actual direct overhead expense, but with standard direct overhead expense. The standard direct overhead expense of a cost center is calculated by multiplying the standard productive hours of the center, or number of hours that should have been taken at standard times to complete the operations performed in the center, by the standard direct overhead rate of the center. The method by which the direct overhead rate of a cost center is found is explained in Art. 176. How direct overhead is costed to production will be explained by means of the figures shown in Art. 192.

According to these figures the actual overhead expense of Cost Center No. 1 for August was $3,645.00; the standard overhead expense or amount costed to production, $3,360.00; the volume variance, an unfavorable one of $425.00; and the controllable variance, a favorable one of $140.00. The entry to record the costing of direct overhead for Cost Center No. 1 to production will be as follows:

Work in Process, Cost Center No. 1	$3,360.00	
Direct Overhead Volume Variance	425.00	
Overhead Expense, Cost Center No. 1 . . .		$3,645.00
Direct Overhead Controllable Variance . . .		140.00

Before general overhead expense can be costed to production, the actual general overhead must be prorated to cost centers, and in this sense the actual general overhead expense of each center learned. Production, however, is charged with the standard general overhead expense of each center, not actual general overhead expense. The standard general overhead expense of the center is learned by multiplying the standard productive hours of the center by its general overhead rate. The method by which the general overhead expense rate of a center is found is explained in Art. 176. The difference between the actual and standard general overhead expense of a cost center is broken up into volume and controllable variances as explained in Art. 192. The entry to record the costing of general overhead expense when both general overhead expense variances are unfavorable is as follows:

Work in Process, Cost Center No. 1	$ x x x x	
General Overhead Volume Variances	x x x x	
General Overhead Controllable Variance	x x x x	
General Overhead Expense, Cost Center No. 1		$ x x x x

The entries recording the costing of general overhead expense to the various cost centers may be, of course, combined into a single compound entry.

194. Overhead Controllable Variances and Supervisory Responsibility.—As long as a manager, a superintendent, or a foreman meets the standards set for the section of the plant that is under his control, there can be neither fault-finding nor inordinate praise for his work. He is merely doing what he is expected to do. But when his department or section shows controllable variances, either favorable or unfavorable, then it is time that he be either rewarded or punished. It is for this reason that overhead budgets are set up in such a way that specific persons may be held directly responsible. The direct overhead of a cost center is completely under the control of the foreman of that center. He and only he should receive the praise or blame, whichever it may be, for the status of the expenses in his section. For the overhead items that cannot be alloted directly to a given cost center, the manager in charge of the larger divisions of the plant is responsible.

Not only must controllable variances be set forth for each cost center, but they must be broken down into such detail that each foreman may know exactly why his department has had a favorable or unfavorable record. It is not enough to say that Cost Center No. 1 had a favorable overhead controllable variance of $140.

This total sum must be analyzed into its various parts in order to discover what elements entered into it. It may be that for some items of expense there were unfavorable variances, but that favorable variances were sufficiently large to absorb this adverse condition. Illustration 84 shows a variance sheet in which both overhead volume and controllable variances are set forth, and in which the controllable variance is broken down into its various elements. In spite of the fact that there was a large aggregate favorable variance, it will be seen that there were two items that showed unfavorable variances—wages of helpers, and repairs.

COMBINED OVERHEAD VARIANCE SHEET

Month August, 19__ Cost Center No. 1—Pipe-Cutting

Foreman Samuel Rider

Normal Capacity 3,500 Standard Hours (100%)

Actual Performance 2,800 Standard Hours (80%)

Expense Item		a	b	c	d	Variances		
Account	Code	Budget at Normal Capacity	Costed into Production	Budget at Actual Volume (80%)	Actual Expenses	Net b–d	Volume b–c	Controllable c–d
Foreman	21			$ 300	$ 300			—
Assistant Foreman	22			175	175			—
Miscellaneous Wages	23			250	230			+$ 20
Inspectors	24			200	180			+ 20
Clerks	25			300	260			+ 40
Helpers	26			500	520			− 20
Repairs	27			580	620			− 40
Defective Work	28			150	80			+ 70
Material Handling	29			795	770			+ 25
Supplies	30			255	240			+ 15
Overtime Bonus	31			280	270			+ 10
Totals		$4,200	$3,360	$3,785	$3,645	−$285	−$425	+$140

ILLUSTRATION 84—STATEMENT PRESENTING BOTH OVERHEAD VOLUME AND CONTROLLABLE VARIANCES

If the $140 total had not been analyzed, the foreman would have been congratulated for his showing, but he would not have been reminded of the better record he could have made had he prevented the unfavorable variances.

Illustration 84 shows an analysis of the controllable variance of Cost Center No. 1 for a monthly period. It is not enough to give a foreman a monthly report showing that he has had unfavorable results of such and such amounts for such and such items. It is necessary to call his attention again and again to his responsibility for removing unfavorable conditions. One of the devices used to do this is the follow-up sheet, an example of which is presented in Illustration 85.

The names of persons responsible for off-standard conditions are listed on the follow-up sheet. The specific causes of the conditions and suggested remedies are also put down. The listing of the names of those who caused the off-standard conditions will not only aid the foreman in locating the sources of trouble, but will

FOLLOW-UP SHEET—UNFAVORABLE VARIANCES

Cost Center No. 6—Painting Foreman John Stephens

Week Ending March 11, 19—

Fall-Down Accounts			Name of Responsible Person	Cause of Unfavorable Variance	Remedy to be Employed	Report of Progress		
Name	Code	Amount				March 12	March 14	March 16
Inspectors	24	$18	Fred Stone	Slow checking	More efficient scheduling to prevent delays	New schedule drawn up	New schedule operating	O. K.
Supplies	30	$32	Pete Wells	Supplies of poor quality	Fault of purchasing department	....	....	....
Overtime Bonus	31	$24	Tom Fry	Necessary to complete specific job	Better scheduling of rush orders	Check all rush orders	O. K.	O. K.

ILLUSTRATION 85—STATEMENT USED TO KEEP CHECK ON UNFAVORABLE VARIANCES

demonstrate to the persons named that they, as individuals, are accountable for the variances. Columns are left in which to enter information respecting the progress made in removing the difficulties. The Report of Progress columns insure that a senior executive will "keep after" the foreman until the bad conditions indicated are removed. The follow-up sheet usually provides for a check on unfavorable material and direct-labor conditions for which the foreman is responsible, as well as for unfavorable overhead controllable variances.

Follow-up sheets are usually prepared weekly or more often. Original records such as time tickets, wage slips, requisitions for materials and supplies, spoilage reports, etc., that supply the information to record the actual overhead of a cost center, may also be used to prepare weekly or even daily reports of off-standard conditions. Many items of overhead are not entered on the follow-up sheet and no report respecting them is made to the foreman other than the monthly report shown in Illustration 84. A good foreman will himself compare the overhead expenses of his department as they accumulate during the month with the total amounts allowed by the flexible budget for the month and will take steps to reduce any item that appears to be getting out of line with the budgeted amount.

General overhead controllable variance should be analyzed in

the same manner as direct overhead controllable variance. Such a detailed analysis for general overhead controllable variance will indicate items of general overhead expense that need attention. Among these items may be service departments that are operating at a cost greater than allowed by the general overhead budget.

As there are only two kinds of overhead expense considered, direct overhead applying specifically to each cost center, and general overhead applying to the factory at large, and as the individual foreman is responsible for the direct overhead and the general manager for the factory-wide general overhead, there are no overhead budgets directly under the control of superintendents. But because the superintendents have authority over a group of cost centers, naturally their responsibilities extend to the operation of the overhead budgets in those cost centers. The responsibility of superintendents, therefore, while not first-hand, is nevertheless great; so much so that off-standard conditions in the cost centers reflect directly upon them. In addition, since the scope of superintendents' authority extends over a group of cost centers and is not limited to a single section, their responsibilities in regard to general overhead may be considerable. For such expenses as light, heat, and power, miscellaneous factory wages, and factory supplies, they may often be considered almost directly responsible.

195. Key Man Bonus.—Many companies have found that excellent control over overhead expense is obtained when some incentive is given the foremen, assistant foremen, and possibly other factory executives to "beat the budget"; that is, to keep the actual overhead expense below that allowed by the budget set for the capacity at which the department is operated. The incentive usually takes the form of a bonus which is a percentage of the saving made; that is, of the favorable controllable variance of the department for the period. A bonus is a reward that is readily appreciated by everyone; moreover, it is something that may be graded in proportion to the value of the record made. If the foreman of a cost center is promised a 25 per cent. bonus on the amount of the favorable overhead controllable variance for a month, he knows full well that the sum he will receive will be large or small according as the favorable variance is large or small. Therefore, he will have every incentive to operate his department with care and to cooperate with his workers in order that the favorable variance may be as large as possible. The bonus earned by a foreman may be based on favorable material quantity and direct-labor variances, as well as favorable direct-overhead controllable variance.

Since a supervisor may have unfavorable variances in some periods during a year, a part only of the bonus earned in one period may be paid him at the next pay day following the period and the remainder set aside in a fund to offset unfavorable variances. If there is a credit balance in the fund at the end of the year, it is paid the supervisor. When there is an assistant foreman in a cost center a portion of the bonus is usually paid him as well as the foreman. For example, the assistant foreman may receive one-third and the foreman two-thirds of the bonus.

Bonuses are also paid the executives responsible for general overhead expense. The plan is the same as for foremen and assistant foremen. Some firms believe that the senior factory executives assist in making the cost centers operate efficiently and, therefore, should receive a share of the bonus earned in each cost center. A certain percentage of the saving in each cost center may, therefore, be set aside for the senior factory executives and added to the bonus earned because of the saving in general overhead expense.

The bonus plan is often extended to include a percentage of any saving that results from a suggestion made by an employe and in this case is paid to workers as well as to minor and senior executives. The suggestion may concern any phase of the company's activities. A corporation whose product must be protected from the dust while awaiting shipment to customers decided to build a large warehouse in which to store its product. A worker pointed out a simple means of protecting with paper the only part of the product affected by dust and the warehouse was not required. 25 per cent. of the large annual saving that resulted was paid the worker for one year. When a broad bonus plan of this nature is adopted, the reduction in costs that follows is often very large.

196. Managerial Foremanship.—In the past, foremen were scarcely concerned with the costs of operating their departments. Their function was to insure that the required amount and quality of production was turned out at the proper time. With the wide-spread introduction of standard cost systems and flexible budgets, a new conception of foremanship has arisen. The modern foreman is a manager. Standard rates and flexible budgets establish monetary limitations within which he must operate. His function no longer merely concerns production, he is responsible for turning out production at a certain cost. The foreman of a section is similar to a proprietor of a small business. Like a proprietor, he is not only trying to do business, but to do business at a profit. His profit is measured by the amount of the favorable variances of his department.

197. Analysis of Overhead Volume Variance.—Overhead volume variance as well as overhead controllable variance must be analyzed and its causes learned. Volume variance may be due in part at least to seasonal causes. Many businesses have peak periods, that is, months in which orders received are greater than in others, and unless the goods manufactured are of the kind that can be stocked over lengthy periods, production must fluctuate from month to month. When this is the case, the first step in the analysis of volume variance is the removal of what may be termed seasonal variance; that is, that part of volume variance which is due to seasonal causes. This is not difficult. Before flexible budgets are prepared the normal capacity for an average month is discovered. Similarly, in the case of businesses subject to seasonal fluctuation in production, the normal capacity at which the plant should operate during each calendar month is found. Volume variance without any element of seasonal variance can then be determined easily. An example will make the procedure clear.

Suppose a business has a normal capacity of 100,000 standard productive hours per average month, that the monthly overhead budget for this capacity is

$100,000, and the overhead hourly costing rate, therefore, $1.00. Further suppose that because of seasonal conditions the plant in January is expected to operate 90,000 standard productive hours only, and that the overhead budget for this capacity is $93,000. Let us now assume that in January the plant did operate 80,000 standard productive hours and that the overhead budget at this capacity is $87,000. The total unfavorable volume variance is $87,000 − $80,000 or $7000, the amount of the volume variance due to seasonal causes is $93,000 − $90,000 or $3,000, and the remainder of volume variance due to other reasons $7,000 − $3,000 or $4,000.

A part of volume variance may be the result of calendar variance, that is, of the fact that the month under consideration has less or more working days than the average month for which normal capacity has been found. Calendar variance can be determined by the same method as seasonal variance.

Suppose again that a business has a normal capacity of 100,000 standard hours per month, that the monthly overhead budget for normal capacity is $100,000, and the overhead hourly costing rate, therefore, $1.00. Also suppose that the month in question has 5 per cent. less working hours than the average month for which the budget was prepared. In a very real sense, therefore, the normal capacity for the month is 95 per cent. Let us assume that the overhead budget at 95 per cent of capacity is $97,500, that the plant during the month did operate at 90 per cent of capacity, and that the overhead budget at this capacity is $93,000. The total unfavorable volume variance is $93,000 − $90,000, or $3,000. The amount of calendar variance is $97,500 − $95,000, or $2,500, and the remainder of volume variance due to other reasons $3,000 − $2,500, or $500.

When a business is subject to seasonal fluctuations, seasonal and calendar variances are frequently not distinguished, that is, the amount termed seasonal variance also includes calendar variance. In determining the normal capacity at which the plant should operate during each calendar month, the number of working days in the month is taken into account as well as the capacity at which the plant is likely to operate each day. For example, if it is determined that in February a plant should operate at only 80 per cent. of the normal capacity of the average month, this low percentage is partly due to the fact that demand and therefore production normally falls off during the winter, and partly due to the fact that February has less working days than other months.

After seasonal and calendar variances have been removed, the volume variance remaining must be further analyzed. If the remaining volume variance of a period was favorable, was it merely because a period of general business prosperity increased sales and therefore made possible the speeding of production? Or was it because the selling force made a special effort to increase the volume of sales? Or, again, was it because the plant manager was able to speed the work beyond the normal output—the surplus, perhaps, going into stock until it should be required. If the volume variance was unfavorable, similar questions should be asked. Did a period of national depression cause the falling off in volume? Did the sales force fall down on its job? Did the management decide to reduce the stock on hand? Or was the fault within the plant itself; was there perhaps a sufficient list

of orders, but a failure, nevertheless, to speed production to turn out the normal production of goods? When these questions have been answered and the answers criticized, the officers of the company will be in a position to proceed definitely to adopt policies that will preserve the favorable features while abolishing the unfavorable ones. Perhaps they may conclude, so unfavorable was the volume variance, that the sales manager should be dismissed and a new one hired in his place; perhaps, on the contrary, a substantial increase in salary may be considered a reward for his efforts in bringing about a favorable variance.

The volume variance of each department as well as the plant as a whole should be studied to learn whether the cause was in the department itself or elsewhere, and to discover remedies for unfavorable conditions. Possibly the lack of volume was due to poor supervision or to the absence of key workers in the department. Possibly equipment in the department was out of use for an unusually long time because of the need for repairs. Possibly the department did not receive the materials necessary to enable it to operate continuously. This may have been due to delays in other departments or to lack of efficiency in the stores or purchasing departments, or even to labor trouble in plants from which materials are purchased. Occasionally such a condition as the following may be found: The volume variance of a department may be due to insufficient orders for a particular kind of goods although sales as a whole are satisfactory. In such a circumstance, the remedy may be to increase sales effort on the particular line or, perhaps, to reduce the size of the cost center or to turn it to the production of another type of goods.

198. Revision of Standards.—The essential function of a standard cost system is the controlling of operations through the discovery and analysis of variances. Standards are not of importance in themselves. Usually they are established at the beginning of the year and automatically applied during the year.

All standard rates, however, should be reviewed at the end of every year and changes made at the beginning of the next, at which time necessary adjustments will also be made in standard unit costs and new inventory values set up on the books as explained in Art. 180. Occasionally conditions will change so radically that certain rates must be revised during the year. Such revisions particularly when a key man bonus system is in operation should only be made for important reasons. Otherwise, the foremen and others affected may feel that the revision is an attempt to deprive them of the bonuses promised. The entries required when standards are revised during the year will be explained by considering two circumstances which may necessitate the altering of standard rates during the year.

Suppose the key man bonus in operation provides for the payment to foremen of a percentage of any favorable direct labor variances that occur in their departments. Further suppose that as a result of a general wage increase the average hourly wage paid in each cost center is increased. This is a condition which is not under the control of the foremen and should not be allowed to affect their bonuses. The difference in labor costs due to the general wage increase should be segregated in a special account which may be termed Revision of Direct Labor Standards.

If in Cost Center A the standard direct labor cost for a certain month is $1,000 but the actual direct labor cost only $950, the following entries would be made. Review Article 186.

Direct Labor Variance	$ 950.00	
Direct Labor Cost, C. C. A		$ 950.00
Work in Process, C. C. A	1,000.00	
Direct Labor Variance		1,000.00

Now assume that wage rates were increased 50 per cent at the beginning of the month considered. In this case, the actual wages paid were $1,425 and the average hourly wage rate of the department was increased 50 per cent. The following entries provide for the situation:

Direct Labor Variance	$1,425.00	
Direct Labor Cost, C. C. A		$1,425.00
Work in Process, C. C. A	1,000.00	
Revision of Direct Labor Standards	500.00	
Direct Labor Variance		1,500.00

The balance of the Direct Labor Variance account is now $75.00 and the foreman's bonus will be based on this account. This is correct, since the saving in direct labor cost during the month attributable to the foreman is $75.00, provided wage rates were increased 50 per cent. at the beginning as stated.

The following is an instance when the standard rate should be changed during the year in fairness to the company; that is, to prevent a foreman receiving a bonus to which he is not entitled. Let us suppose that Cost Center B has a normal capacity of 10,000 productive hours a month, that its direct overhead budget at normal capacity is $10,000, and, therefore, its direct overhead costing rate is $1.00 an hour; also that when the cost center operates at 200 per cent of normal capacity its overhead budget is $15,000. If the cost center operates at normal capacity and the actual overhead cost is $10,500, the entry recording the costing of overhead would be:

Work in Process, C. C. B	$10,000	
Direct Overhead Controllable Variance	500	
Direct Overhead Expense, C. C. B		$10,500

Suppose at the beginning of the month under consideration the center was equipped with new machinery which made it possible to double the output with no additional overhead expense and that the output was doubled during the month. If no change was made in the direct overhead costing rate, the following entry would be made and the foreman paid a bonus to which he is not entitled since he is not responsible for the amount shown as a credit to the Direct Overhead Controllable Variance account.

Work in Process, C. C. B	$20,000	
Direct Overhead Expense, C. C. B		$10,500
Direct Overhead Volume Variance		5,000
Direct Overhead Controllable Variance		4,500

The direct overhead hourly costing rate of Cost Center B should be changed from $1.00 to 50 cents, and the difference between the charge to work in process at the old rate and what would be the charge at the new rate should be segregated in a special account which may be termed Revision of Direct Overhead Standards. The entry to record the facts would then be:

Work in Process, C. C. B	$20,000	
Direct Overhead Controllable Variance	500	
Direct Overhead Expense, C. C. B		$10,500
Revision of Direct Overhead Standards		10,000

It will be noted that this entry shows no direct overhead volume variance and that the direct overhead controllable variance is an unfavorable one of $500.00. This is correct, since when the new machinery was installed the normal capacity of the cost center (assuming orders are available) was doubled and the actual direct overhead expense for the month was greater by $500 than what it should have been, since the new machinery doubled the output without increasing overhead cost.

The Revision of Standards accounts are true variance accounts, for their balances represent a part of the variance between the charges made to production and the actual expense of the period.

199. Effect of Manufacturing Variances on Financial Statements and Taxable Income.—At the end of the period overhead variance accounts are treated similarly to Material and Direct-Labor Variance accounts. All manufacturing variance accounts are usually closed to the Profit and Loss account and the balances of these accounts shown as additions to or subtractions from the cost of goods sold (at standard rates) on the profit and loss statement. The following illustration of a portion of a profit and loss statement will make the points involved in this treatment clear:

Net Sales		$100,000
Adjusted Cost of Goods Sold:		
Cost of Goods Sold at Standard Rates	$50,000	
Material Price Variance	500	
Material Quantity Variance	700	
Direct Labor Variance	2,000	
Direct Overhead Controllable Variance	350*	
Direct Overhead Volume Variance	1,800	
General Overhead Controllable Variance	250*	
General Overhead Volume Variance	800	
Revision of Standards (total)	200*	55,000
Gross profit (actual)		$ 45,000

*Negative amount.

However, as explained in Article 188, this method of closing manufacturing variance accounts produces a final profit that is not acceptable to the Federal income tax authorities as taxable income. Manufacturing variances are reflected in the value of closing inventories as well as in the cost of goods sold during the year and the method ignores this and, therefore, misstates the final profit (or loss) figure.

The following method of apportioning the total manufacturing variances between cost of goods sold during the year and the closing inventories is acceptable to the Department of Internal Revenue.

First obtain the ratio of the total value of all closing inventories, at standard rates, to the total manufacturing cost of the year at standard rates. The manufacturing cost at standard rates is the cost of goods sold during the year at standard rates, less the beginning inventory at standard rates, plus the closing inventory at standard rates. If the total of the manufacturing variances is positive, that is, if the actual costs of the period are less than the standard costs apply the ratio obtained to the total of the manufacturing variances and subtract the result from the value of the closing inventories at standard rates to obtain the actual value of closing inventories. Of course, if the total of the manufacturing variances is negative, that is, if the actual costs of the period exceed the standard costs an addition must be made to the standard value of the closing inventories to find the actual value. The total of manufacturing variances less the portion applied to the closing inventories is then added to or subtracted from the standard cost of goods sold to obtain the actual cost of goods sold.

The effect on the taxable income of the year of using this method of apportioning manufacturing variances between closing inventories and cost of goods sold, will be clear if we consider that in the case for which a partial profit and loss statement is shown above the ratio of closing inventories at standard rates to the manufacturing cost of the year at standard rates is $\frac{\$10,500}{\$52,500}$ or $\frac{1}{5}$ and prepare an adjusted section of the profit and loss statement. The adjusted section would be:

Net Sales			$100,000
Adjusted Cost of Goods Sold:			
Cost of goods sold at standard rates		$50,000	
Add—Excess of actual manufacturing cost for year over standard cost as shown by variance accounts	$5,000		
Less ⅕ applicable to inventories on hand	1,000	4,000	54,000
Gross Profit (actual)			$ 46,000

200. Standard Costs in Job-Order Plants.—It may be asked whether standard costs are as applicable in a job-order plant as in a process plant. The answer to this is an emphatic affirmative. The standard costs for a job-order are assembled by means of a route sheet, on which is listed the operations that must be performed on the order as it passes through the factory. When an order is received, its course through the plant must be mapped out. The cost centers that will act upon it are determined, as well as the amount of time that will be required in each of these centers. When this information has been collected, the route sheet is prepared, and the standard expense rates of each cost center are applied to the order, according to the time required in each center. The standard amount of materials for a product which has not been produced before, is learned by careful analysis of the information accompanying the order, and the standard cost of materials is obtained by multiplying the estimated number of units of material

needed by the standard price. By adding the standard cost of materials to the aggregate of the standard expense totals in the cost centers, the standard cost of producing the specific order is determined.

Each particular order in a job-order plant, therefore, can be charged with the standard costs of the materials, direct labor, and overhead required to produce the product in much the same way that the actual cost of these items is charged to a particular order when an actual cost system is employed. Similarly, each Work in Process account can be charged with the standard cost of materials, labor, and overhead, and credited with the standard cost of work in process and completed products transferred to another department and to finished goods inventory. A standard cost system, therefore, can be used, although the plant is engaged solely in the production of special orders.

CHAPTER XXIV

AN ILLUSTRATIVE STANDARD COST SYSTEM AS APPLIED TO MANUFACTURING

201. Explanation.—The best way to master the operation of a standard cost system as applied to manufacturing is to study the activities of a typical plant for such a period of time that practically all entries that are peculiar to standard costs will be encountered at least once. For this reason this chapter is devoted to the detailed presentation of an illustrative problem which it is hoped will give a clear understanding of the handling of standard costs on a company's books.

The plant considered is at a distance from the head office and the cost records are kept at the factory office. The factory ledger, therefore, will contain a reciprocal control account termed General Ledger, and all the entries that are posted to the factory ledger will first be entered in the factory journal. Information respecting transactions affecting the factory ledger accounts that are recorded in the general books, such as the purchase of materials, are transferred to the factory office so that such transactions can be recorded in the factory journal. To contribute to the simplicity of the problem, only those entries which are recorded in the factory journal will be considered. The complete standard cost transactions may be grasped without introducing transactions of a general nature which do not affect the factory and which are recorded in the general books. It will be assumed, moreover, that the company under consideration has only three cost centers (called Departments A, B, and C), although, ordinarily, a company operating under a standard cost system would have many more than three.

202. Illustrative Problem.—The White Manufacturing Company, which employs a system of standard costs, had the following accounts and balances in its factory ledger at the beginning of April, 19—:

WHITE MANUFACTURING COMPANY
Factory Ledger Trial Balance, March 31, 19—

General Ledger (Control)		$56,481.12
Finished Goods Inventory	$21,185.01	
Work in Process—Department A	3,670.41	
Work in Process—Department B	4,950.01	
Work in Process—Department C	14,469.71	
Stores Inventory	18,322.20	
Small Tools Inventory	440.00	
Factory Office Supplies	220.00	
Factory Payroll		6,776.22
	$63,257.34	$63,257.34

Dept. A—Direct Overhead Expense Budget

Normal Capacity 3,000 Hours

Expense Items	85%	90%	95%	100%	105%	110%	115%
Foreman	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Inspectors	200	250	250	250	250	275	275
Material Handlers	225	250	250	275	275	300	300
Miscellaneous							
Indirect Labor	165	175	200	200	200	220	220
Shop Supplies	600	625	660	680	705	725	740
Depreciation, Machinery	200	200	200	200	200	200	200
Repairs	320	340	360	380	400	420	430
Compensation Insurance	35	38	43	45	50	53	57
Totals	$2,045	$2,178	$2,263	$2,330	$2,380	$2,493	$2,522

ILLUSTRATION 86

Dept. B—Direct Overhead Expense Budget

Normal Capacity 2,400 Hours

Expense Items	85%	90%	95%	100%	105%	110%	115%
Foreman	$ 275	$ 275	$ 275	$ 275	$ 275	$ 275	$ 275
Inspectors	180	210	210	210	210	225	225
Material Handlers	220	230	250	250	250	260	275
Miscellaneous							
Indirect Labor	140	150	170	170	170	190	190
Shop Supplies	500	530	545	570	590	610	625
Depreciation, Machinery	220	220	220	220	220	220	220
Repairs	350	370	390	410	430	450	470
Compensation Insurance	30	33	36	39	42	45	49
Totals	$1,915	$2,018	$2,096	$2,144	$2,187	$2,275	$2,329

ILLUSTRATION 87

Dept. C—Direct Overhead Expense Budget

Normal Capacity 4,000 Hours

Expense Items	85%	90%	95%	100%	105%	110%	115%
Foreman	$ 350	$ 350	$ 350	$ 350	$ 350	$ 350	$ 350
Inspectors	220	230	240	240	240	250	250
Material Handlers	280	280	300	300	300	320	320
Miscellaneous							
Indirect Labor	225	240	250	260	275	285	300
Shop Supplies	740	775	800	820	840	865	885
Depreciation, Machinery	320	320	320	320	320	320	320
Repairs	400	410	425	435	445	460	475
Compensation Insurance	53	57	61	65	69	73	77
Totals	$2,588	$2,662	$2,746	$2,790	$2,839	$2,923	$2,977

ILLUSTRATION 88

The standard budgets under which the three cost centers operate are presented as Illustrations 86, 87, 88, and 89. The first three are those for direct overhead expense in each of the cost centers, and they set forth the standard expense allowances at various ranges of capacity from 85 per cent to 115 per cent. The 100-per-cent figures, of course, are those for normal capacity, and they are used in

GENERAL FACTORY OVERHEAD EXPENSE BUDGET

Expense Items	85%	90%	95%	100%	105%	110%	115%
General Superintendent	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Miscellaneous Labor	3,080	3,250	3,450	3,620	3,780	3,950	4,120
Light, Heat, and Power	275	290	305	320	335	350	365
Depreciation, Building	420	420	420	420	420	420	420
Depreciation, Furniture	60	60	60	60	60	60	60
Miscellaneous Supplies	240	250	260	270	280	290	300
Fire Insurance	320	320	320	320	320	320	320
Taxes	80	80	80	80	80	80	80
Small Tools Expense	210	230	245	260	275	290	305
Factory Office Expense	82	86	90	96	101	105	109
Totals	$5,267	$5,486	$5,730	$5,946	$6,151	$6,365	$6,579

ILLUSTRATION 89

calculating the standard cost rate with which production will be charged during the month. Illustration 89, gives the general overhead expense at the same ranges of capacity, and here again, the 100-per-cent figures are used in calculating the standard cost rates. As a standard cost rate, including within itself the elements of direct-labor cost and direct and general overhead expense, must be set up for each department, it is necessary to prorate the 100-per-cent column of Illustration 89 to the three departments, so that the share of each in the general

APPORTIONMENT OF GENERAL OVERHEAD EXPENSE AT NORMAL CAPACITY

Expense Items	Amount	Apportionment Rates in Per Cent.			Amount Prorated to Each Department		
	100%	A	B	C	Dept. A	Dept. B	Dept. C
General Superintendent	$ 500	25	25	50	$ 125	$ 125	$ 250
Miscellaneous Labor	3,620	35	25	40	1,267	905	1,448
Light, Heat, and Power	320	35	25	40	112	80	128
Depreciation, Building	420	30	30	40	126	126	168
Depreciation, Furniture	60	33 1/3	33 1/3	33 1/3	20	20	20
Miscellaneous Supplies	270	30	20	50	81	54	135
Fire Insurance	320	30	30	40	96	96	128
Taxes	80	30	30	40	24	24	32
Small Tools Expense	260	30	20	50	78	52	130
Factory Office Expense	96	33 1/3	33 1/3	33 1/3	32	32	32
Totals	$5,946				$1,961	$1,514	$2,471

ILLUSTRATION 90

STANDARD LABOR RATES AND STANDARD LABOR COST

Department	Standard Hours Normal Capacity	Standard Labor Rates	Standard Labor Cost
A	3,000	80c	$2,400.00
B	2,400	65c	1,560.00
C	4,000	75c	3,000.00

ILLUSTRATION 91

overhead may be determined. This has been done in Illustration 90. Here the proration rates for each of the items of general expense are listed, the share of each cost center is extended, and the total apportioned general expense for each is calculated.

In Illustration 91, the standard hourly direct-labor rates are presented. Now, for each department, there have been found the *monthly* total direct overhead cost at normal capacity, the *monthly* total general overhead (apportioned) cost, and the *hourly* direct labor rates. The next task is to determine *the standard hourly rate* for each of the three departments. This has been done in Illustration 92 which offers no complicated problem. It is a simple matter, when total monthly costs and the number of standard hours per month at normal capacity are known, to determine the rate per hour. This is done first for the direct overhead, and

STANDARD HOURLY EXPENSE RATES

	Department A	Department B	Department C
Direct Overhead Expense:			
Total at Normal Capacity	$2,330	$2,144	$2,790
Standard Hours at Normal Capacity	3,000 Hours	2,400 Hours	4,000 Hours
Rate per Hour	$0.77666 2/3	$0.89333 1/3	$0.6975
General Overhead Expense:			
Apportioned at Normal Capacity	$1,961	$1,514	$2,471
Standard Hours (same as above)	3,000 hours	2,400 hours	4,000 hours
Rate per Hour	$0.65366 2/3	$0.63083 1/3	$0.61775
Total Standard Expense per Hour:			
Standard Labor Rates	$0.80	$0.65	$0.75
Standard Direct Overhead Rates	.77666 2/3	.89333 1/3	.6975
Standard General Overhead Rates	.65366 2/3	.63083 1/3	.61775
Net Standard Expense Rate	$2.23033	$2.17417	$2.06525

ILLUSTRATION 92

STANDARD UNIT COST RATES

Department	Standard Time for Each Unit (Hours)	Standard Rate	Standard Expense Per Unit	Material Price	Total Unit Cost
A	0.1	$2.23033	$0.223033	$0.45	$0.673033
B	0.08	2.17417	0.173934	0.23	0.403934
C	0.1333 1/3	2.06525	0.275367	0.06	0.335367
Totals			$0.672334	$0.74	
Standard Cost to Complete One Unit in All Departments					$1.412334

ILLUSTRATION 93

then for the general overhead. The sum of these two rates plus that for direct labor gives the net standard expense rate.

The purpose of Illustration 93 is to set forth the unit costs that will be employed in charging production during the month. First of all, the time allowed in each department to produce a single unit is shown; next, the standard hourly rate from which the amount of standard expense per unit of product is calculated is given; then, the standard material price is listed; finally, the total cost per unit of product in each department and total cost per unit of product in all departments are shown.

Keeping in mind the standard unit costs shown in Illustration 93, turn back to the factory ledger trial balance for a moment to discover whether or not the inventories listed there were calculated in terms of standard costs. The calculations that follow will readily show that standard costs were used in determining the value of these inventories. It is to be noted that, in this factory, all units in the process of production move from Department A to Department B to Department

Finished Goods Inventory		
15,000 units@$1.412334 (Total Standard Unit Cost)		$21,185.01
Work in Process—Department A		
7,000 units, one-third completed:		
7,000 units@$0.45 (Material Cost—Dept. A)	$3,150.00	
⅓ of (7,000 units×$0.223033, Standard Expense Rate—Dept. A)	520.41	
		$ 3,670.41
Work in Process—Department B		
5,000 units, one-half completed:		
5,000 units@$0.45 (Material Cost—Dept. A)	$2,250.00	
5,000 units@$0.23 (Material Cost—Dept. B)	1,150.00	
5,000 units@$0.223033 (Standard Expense Rate—Dept. A)	1,115.17	
½ of (5,000 units×$0.173934, Standard Expense Rate—Dept. B)	434.84	
		$ 4,950.01
Work in Process—Department C		
12,000 units, one-fourth completed:		
12,000 units@$0.45 (Material Cost—Dept. A)	$5,400.00	
12,000 units@$0.23 (Material Cost—Dept. B)	2,760.00	
12,000 units@$0.06 (Material Cost—Dept. C)	720.00	
12,000 units@$0.223033 (Standard Expense Rate—Dept. A)	2,676.40	
12,000 units@$0.173934 (Standard Expense Rate—Dept. B)	2,087.21	
¼ of (12,000 units×$0.275367, Standard Expense Rate—Dept. C)	826.10	
		$14,469.71

NOTE.—Frequently the decimals are not carried out, instead the nearest cent figure is used.

C, so that the units that, for example, are still in process in Department C have already been charged with the complete rates for Departments A and B. The calculations are shown on page 301.

203. Transactions for April.—During the month of April, the White Manufacturing Company had the transactions given in the List of Transactions, which follows. Each transaction in the list has a number that corresponds to the number of the entry in the Factory Journal, Illustration 94, and the number of the explanation of the entry, which is given in Art. 204.

LIST OF TRANSACTIONS

April 1:

1. A shipment of raw materials, amounting to $2,765.80, was received. The standard material price for this order is $2,960.
2. The freight cost on the foregoing shipment was $152.
3. Shop supplies were issued from the storeroom as follows: Department A, $200; Department B, $110; Department C, $240.

April 2:

4. Cash to the amount of $6,776.22 was received from the general office to meet the payroll for the second half of March.
5. Five thousand units were completed in Department A and transferred to Department B.

April 3:

6. Production materials were issued from the storeroom as follows: Department A, $4,500; Department B, $1,150.
7. Miscellaneous factory supplies amounting to $120 were issued.
8. The March payroll was paid.
9. Six thousand units were completed in Department B and transferred to Department C.

April 4:

10. Production Materials were issued to Department C: $360.
11. A shipment of raw materials was received. Amount: $12,750. Standard price: $13,340.
12. Freight on the foregoing shipment was $620.
13. An extra allowance of $23 of raw materials was made to Department B.

April 5:

14. Repairs to machinery were made as follows: Department A, $120; Department C, $150. This $270 charge was made up of $235 of supplies and $35 of indirect labor.
15. Small tools expense of $40 was incurred. This means small tools to the value of $40 were issued.
16. Twelve thousand units were sold today.

April 6:

17. Ten thousand units were completed in Department C and transferred to the warehouse.

April 8:

18. Five thousand units were completed in Department A and transferred to Department B.
19. Production materials were issued to Department B: $1,150.
20. Miscellaneous factory supplies amounting to $80 were issued.

April 9:

21. Five dollars of indirect labor was used in cleaning the factory office.
22. Shop supplies were issued from the storeroom as follows: Department A, $120; Department B, $70; Department C, $240.

April 10:

23. An extra allowance of $225 of raw materials was made to Department A.
24. Repairs to machinery were made as follows: Department B, $210; Department C, $140. This charge of $350 was made up of $310 of supplies and $40 of indirect labor.

April 11:

25. Seven thousand units were completed in Department B and transferred to Department C.
26. Production materials were issued to Department C: $420.
27. Nine thousand units were sold today.

April 12:
28. A shipment of raw materials was received. Amount: $4,728. Standard price: $4,990.
29. Freight on the foregoing shipment was $225.
30. Repairs amounting to $150 were made in Department A. This $150 charge was made up of $145 of supplies and $5 of indirect labor.

April 13:
31. Small tools expense of $70 was incurred.
32. Five thousand units were completed in Department A and transferred to Department B.
33. Production materials were issued to Department B: $1,150.

April 15:
34. Ten thousand units were completed in Department C and transferred to the warehouse.
35. Production materials were issued to Department A: $4,500.
36. Shop supplies were issued from the storeroom as follows: Department A, $260; Department B, $210; Department C, $300.

April 16:
37. The payroll for the first half of April was as follows:

Direct Labor:

Department A	$1,240.28	
Department B	662.20	
Department C	1,736.20	$3,638.68

Direct Overhead Wages:

	Department A	Department B	Department C
Foremen	$150.00	$137.50	$175.00
Inspectors	125.00	105.00	125.00
Material Handlers	135.00	127.50	160.00
Miscellaneous Indirect Labor	120.00	90.00	130.00
Totals	$530.00	$460.00	$590.00

General Overhead Wages:

Superintendent	$ 250.00	
Miscellaneous Labor	1,950.00	$2,200.00

April 17:
38. Repairs to machinery were made as follows:

Department B	$70.00
Department C	70.00

This $140 charge was made up of $130 of supplies and $10 of indirect labor.
39. Small tools expense of $90 was incurred.
40. Cash to the amount of $7,418.68 for the April 1–15 payroll was received, and the payroll was immediately paid.

April 18:
41. Five thousand units were completed in Department A and transferred to Department B.
42. Production materials were issued to Department B: $1,150.

April 19:
43. Seven thousand units were completed in Department B and transferred to Department C.
44. Production materials were issued to Department C: $420.
45. Repairs to machinery amounting to $110 were made in Department A. This $110 charge was made up of $100 of supplies and $10 of indirect labor.

April 20:
46. Small tools expense of $75 was incurred.
47. An extra allowance of $6 of raw materials was made to Department C

April 22:
48. Miscellaneous factory supplies amounting to $45 were issued.

April 23:
49. Six thousand units were completed in Department A and transferred to Department B.
50. Production materials were issued to Department B: $1,380.
51. Shop supplies were issued from the storeroom as follows: Department A, $140; Department B, $160; Department C, $70.

April 24:
52. Production materials were issued to Department A: $4,387.50.

April 25:

53. Repairs to machinery were made as follows: Department B, $90; Department C, $120. This $210 charge was made up of $195 of supplies and $15 of indirect labor
54. Ten thousand units were sold today.

April 26:

55. Seven thousand units were completed in Department C and transferred to the warehouse.

April 27:

56. Five thousand units were completed in Department B and transferred to Department C.
57. Production materials were issued to Department C: $300.

April 30:

58. Two thousand units were completed in Department A and transferred to Department B.
59. Production materials were issued to Department B: $460.
60. The payroll for the second half of April was as follows:

Direct Labor:

Department A	$1,323.75	
Department B	756.72	
Department C	1,582.37	$3,662.84

Direct Overhead Wages:

	Department A	Department B	Department C
Foreman	$150.00	$137.50	$175.00
Inspectors	130.00	107.50	120.00
Material Handlers	123.00	125.00	155.00
Miscellaneous Indirect Labor	118.00	100.00	135.00
Totals	$521.00	$470.00	$585.00

General Overhead Wages:

Superintendent	$ 250.00	
Miscellaneous Labor	1,925.00	$2,175.00

61. Office supplies to the amount of $97 were used during April.

Reserves were set up on the general books for the following direct overhead expenses:

		Department A	Department B	Department C
62.	Depreciation, Machinery	$200.00	$220.00	$320.00
63.	Compensation Insurance	50.00	37.00	63.00

Reserves were set up on the general books for the following general overhead expenses:

64.	Light, Heat, and Power	$330.00
65.	Depreciation, Buildings	420.00
66.	Depreciation, Furniture	60.00
67.	Fire Insurance	320.00
68.	Taxes	80.00

69. The cleared-in Labor Costs for the month were charged to the three Work in Process accounts. The term *cleared in* applies to those costs which, under a standard system, are allowed; that is, justified.
70. The cleared-in direct Overhead Expense was charged to the three Work in Process accounts.
71. The cleared-in General Overhead Expense was charged to the three Work in Process accounts.

204. Explanations of Entries in Factory Journal.—The student should read each transaction in the preceding article, and consider carefully what entry he would make in the light of the principles he has been studying in the past chapters; then, he should look at the factory journal, Illustration 94, to see the manner in which the author has treated the transaction; finally, he should read the explanations of the entries which follow. All those entries that may not be readily understood at first sight are explained herewith:

1 and 2.—In a system of standard costs, all inventories must be debited and credited at standard prices. The freight, of course, is to be considered as part of the cost of the materials. The total actual cost, $2,917.80 ($2,765.80 +$152.00), is $42.20 less than the standard price. The Stores Inventory account is charged at the standard price, and the $42.20 balance is credited to Material Price Variance.

3. Shop supplies, being items of direct overhead, are charged in the Direct Overhead columns, as they would be in a non-standard system using such columns.

4. No explanation necessary.

5. Department A Work in Process must be credited and Department B Work in Process must be charged with the standard costs of these 5,000 units. According to Illustration 93, the standard unit cost in Department A is $0.673033. The total figure is, therefore, 5,000×$0.673033, or $3,365.17.

6. Since raw materials are issued in standard quantities at standard prices, they are charged directly to the Work in Process accounts.

7. No explanation necessary.

8. No explanation necessary.

9. The same principles which applied to Entry 5 apply here also. The credit to Department B Work in Process and the debit to Department C Work in Process of $4,461.80 is made up of the following elements:

6,000×$0.673033 (Standard Unit Cost—Dept. A)	$4,038.20
6,000×$0.403934 (Standard Unit Cost—Dept. B)	2,423.60
	$6,461.80

10. See Entry 6.

11 and 12. Same principles as Entries 1 and 2. In this case the actual cost exceeds the standard price, and the balance is a debit item.

13. Since Work in Process in Department B has already been charged with the total amount of standard materials at the standard price, this allowance of $23 is an extraneous expense and must be debited to Material Quantity Variance.

14. Repairs are direct overhead expenses and must be charged as such. The credit of $35 must be made to General Overhead Expense because the labor expended is part of the repair expense and must be removed from the category of indirect expenses. At the end of the month, General Overhead Expense will be charged with the total payroll for miscellaneous indirect labor, and the $35, which has become direct expense in Departments A and C, will be automatically deducted therefrom by the credit entry made today.

15. No explanation necessary.

16. The sales transactions are taken care of on the general books, and there must be some means of transferring the units sold from the Finished Goods

Inventory account in the factory books to the general books. This is done by debiting General Ledger (Control) account and by crediting Finished Goods Inventory. The reciprocal entry in the general journal will be:

Cost of Goods Sold	$16,948.01	
Factory Ledger (Control)		$16,948.01

The figure, $16,948.01, is obtained by multiplying the total unit cost $1.412334 (from Illustration 93) by 12,000 units.

17. See Entries 5 and 9.
18. See Entries 5 and 9.
19. See Entry 6.
20. No explanation necessary.
21. This is a debit to the General Overhead (Control) account (Factory Office Expense in the subsidiary ledger), and a credit to the same control account (with Miscellaneous Labor in the subsidiary ledger receiving the credit).
22. See Entry 3.
23. See Entry 13.
24. See Entry 14.
25. See Entries 5 and 9.
26. See Entry 6.
27. See Entry 16.

28 and 29. See Entries 1 and 2.

30. See Entry 14.
31. No explanation necessary.
32. See Entries 5 and 9.
33. See Entry 6.
34. See Entries 5 and 9.
35. See Entry 6.
36. See Entry 3.
37. Factory Payroll is credited for the total amount of the payroll no matter whether it pertains to direct labor, direct overhead, or general overhead. The debits to the direct overhead and general overhead accounts need no explanation. The debit for the direct-labor cost $(3,638.68) to the Direct Labor Variance account may be explained as follows: It is not known at this time how much of the direct-labor cost is the standard allowed cost and how much of it is variance. There is no calculation made at the middle of the month as to the number of units produced or as to the number of standard hours worked. This calculation will be made at the end of the month, but in the meantime it is impossible to charge the Work in Process accounts with the labor cost, the standard amount of which has not been determined. At this time and at the end of the month, therefore,

the Direct Labor Variance account will be charged with the total direct-labor payroll; and then, when the standard labor cost is determined, this standard labor cost will be credited out of the Direct Labor Variance account and charged to the Work in Process accounts. Then whatever remains in the Direct Labor Variance account will be the net variance for the month.

38. See Entry 14.
39. No explanation necessary.
40. No explanation necessary.
41. See Entries 5 and 9.
42. See Entry 6.
43. See Entries 5 and 9.
44. See Entry 6.
45. See Entry 14.
46. No explanation necessary.
47. See Entry 13.
48. No explanation necessary.
49. See Entries 5 and 9.
50. See Entry 6.
51. See Entry 3.
52. See Entry 6.
53. See Entry 14.
54. See Entry 16.
55. See Entries 5 and 9.
56. See Entries 5 and 9.
57. See Entry 6.
58. See Entries 5 and 9.
59. See Entry 6.
60. See Entry 37 for an explanation of the debit of the direct labor payroll to Direct Labor Variance.
61. No explanation necessary.

62 and 63. These are the expense items that must be allowed for at the end of the accounting period by every firm, whether it employs a standard system or not. The entry in the general journal for these two items would be as follows:

Factory Ledger (Control)	$890.00	
Reserve for Depreciation, Machinery		$740.00
Reserve for Compensation Insurance		150.00

The entries in the factory journal would debit the departmental Direct Overhead Expense accounts and credit the General Ledger account.

CALCULATION OF DIRECT LABOR VARIANCE FOR APRIL

	Department A		Department B		Department C	
Number of Units Produced		31,500		28,500		33,000
Allowed Time for Each Unit		0.1 hour		0.08 hour		0.1 1/3 hour
Standard Hours Allowed for April Production		3,150		2,280		4,400
Standard Labor Rates		$0.80		$0.65		$0.75
Cleared-In Labor Cost		$2,520.00		$1,482.00		$3,300.00
Actual Payroll:						
1-15	$1,240.28		$662.20		$1,736.20	
16-30	1,323.75	2,564.03	756.72	1,418.92	1,582.37	3,318.57
Direct Labor Variance for April		-$44.03		+$63.08		-$18.57

Total Factory-wide Labor Variance:

Department A	-$44.03
" B	+ 63.08
" C	- 18.57
	+$0.48

ILLUSTRATION 95

64 to 68. Same principles as apply to Entries 62 and 63, except that the entries in the factory journal debit the General Overhead Expense account.

69. The Cleared-In Labor Costs for April are calculated in Illustration 95. The term "cleared-in" applies to those costs which, under a standard system, are allowed; that is, are justified. In the case of Department A, for example, 31,500 units were produced, each requiring one-tenth of an hour to finish, so that the total number of *allowed* hours was 3,150. The standard labor rate of $0.80 multiplied by the allowed hours gives the labor costs that are actually charged to the Work in Process—Department A account.

The first line of Illustration 95—The Number of Units Produced—was determined according to the data set forth in Illustration 96.

NUMBER OF UNITS COMPLETED IN APRIL

	Department A	Department B	Department C
Work in Process, April 1:			
Department A			
7,000 units (2/3 completed in April)	4,667		
Department B			
5,000 units (1/2 completed in April)		2,500	
Department C			
12,000 units (3/4 completed in April)			9,000
Number of Units Entering Production and Completely Finished in April	21,000	20,000	15,000
Number of Units Entering Production but not Finished in April (Work in Process Inventories, April 30):			
Department A			
8,750 units (2/3 completed in April)	5,833		
Department B			
8,000 units (3/4 completed in April)		6,000	
Department C			
10,000 units (9/10 completed in April)			9,000
Number of Units Complete in April	31,500	28,500	33,000

ILLUSTRATION 96

At this time, in addition to discovering the amount of the direct labor variance, an analysis should be made of its component elements in order to determine to what extent the variance is due to off-standard rate conditions and to what extent to off-standard time conditions. Such an analysis is presented in Illustration 97. Most of the figures for this schedule may be found in Illustration 95, but a few had to be assumed in order to make the analysis complete. The assumed figures are as follows: (1) Extra time allowances—Department A, 10 hours; Department B, none; department C, 8 hours; and (2) Actual hours taken for the entire month—Department A, 3,165 hours; Department B, 2,284; and Department C, 4,416.

DIRECT LABOR VARIANCE

Department	Analysis of Productive Hours			d	Standard Costs			h	Analysis of Direct Labor Variance				
	a	b	c		e	f	g		i	Time		Rate	
	Net Allowed Hours	Gross Allowed Hours	Actual Hours Taken	Standard Hourly Rates	Cleared-In Labor Cost $a \times d$	Gross Allowed Labor Cost $b \times d$	Standard Cost at Actual Time $c \times d$	Actual Payroll	Total Variance $e-h$	j Allowances $f-e$	k Fall-Downs $g-f$	l Make-Outs $g-h$	m Fall-Downs $h-g$
A	3,150	3,160	3,165	$.80	$2,520.00	$2,528.00	$2,532.00	$2,564.03	−$44.03	$ 8.00	$ 4.00		$32.03
B	2,280	2,280	2,284	.65	1,482.00	1,482.00	1,484.60	1,418.92	+ 63.08		2.60	$65.68	
C	4,400	4,408	4,416	.75	3,300.00	3,306.00	3,312.00	3,318.57	− 18.57	6.00	6.00		6.57
Total	9,830	9,848	9,865		$7,302.00	$7,316.00	$7,328.60	$7,301.52	+$ 0.48	$14.00	$12.60	$65.68	$38.60

ILLUSTRATION 97—ANALYSIS OF DIRECT LABOR VARIANCE

Two columns in Illustration 97 may require a word of explanation: The column headed Gross Allowed Hours represents Net Allowed Hours plus the extra time allowance. Rate Make-Outs represent favorable rate variances, such as occur when the actual rates paid are less than the standard rates.

70. The Cleared-In Direct Overhead Expense is determined as in Illustration 98. The standard allowed hours, of course, are the same as in the case of the Direct Labor Cleared-In Costs (Entry 69), and the rates applied to these hours are those which were set up at the beginning of the month in Illustration 92. The *standard budget allowances* used in calculating Controllable and Volume Variance are determined as follows:

Department A:

Since Department A operated for 3,150 standard hours, when its normal capacity is 3,000 hours, it obviously had a 105-per-cent capacity. The budget allowance appearing in Illustration 86 in the 105% column is the amount to be used in calculating the variances.

Department B:

Since Department B operated for 2,280 standard hours, when its normal capacity is 2,400 hours, its operations were actually at a 95-per-cent capacity. The budget allowance appearing in Illustration 87 in the 95% column is the amount to be used in calculating the variances.

Department C:

Since Department C operated for 4,400 standard hours, when its normal capacity is 4,000 hours, its operations

were actually at a 110-per-cent capacity. The budget allowance appearing in Illustration 88 in the 110% column is the amount to be used in calculating the variances.

71. The Cleared-In General Overhead Expense is found by the calculation in Illustration 99. Here again the rates which were set up in Illustration 92 at the beginning of the month are used. The proration of the actual general overhead expense is shown in Illustration 100. The proration rates that were set up in Illustration 90 were those used to apportion the actual expense. The *standard budget allowances* used in calculating Volume and Controllable Variance for general overhead expense are determined according to the tables in Illustration 101. For Department A, with its oper-

CALCULATION OF DIRECT OVERHEAD VARIANCE FOR APRIL

	Department A	Department B	Department C
Standard Hours Allowed for April Production	3,150	2,280	4,400
Direct Overhead Rates	$0.7766 2/3	$0.8933 1/3	$0.6975
Cleared-in Direct Overhead	$2,446.50	$2,036.80	$3,069.00
Actual Overhead	2,401.00	2,107.00	2,888.00
Total Variance	+$45.50	-$70.20	+$181.00
Calculation of Volume Variance:			
Cleared-In Costs	$2,446.50	$2,036.80	$3,069.00
Standard Budget Allowance	2,380.00	2,096.00	2,923.00
Volume Variance	+$66.50	-$59.20	+$146.00
Calculation of Controllable Variance:			
Standard Budget Allowance	$2,380.00	$2,096.00	$2,923.00
Actual Overhead	2,401.00	2,107.00	2,888.00
Controllable Variance	-$21.00	-$11.00	+$35.00

Total Direct Overhead Variance:	Volume	Controllable
Department A	+$66.50	-$21.00
" B	- 59.20	- 11.00
" C	+146.00	+ 35.00
	$153.30	+ $3.00

ILLUSTRATION 98

ations at 105-per-cent capacity, the 105% column in Illustration 89 was taken, and the proration rates applicable to Department A (shown in Illustration 90, were used to determine its share in the standard general overhead budget. For Department B, the 95% column was taken, and its proration rates were applied to this column. The proration rates for

CALCULATION OF GENERAL OVERHEAD VARIANCE FOR APRIL

	Department A	Department B	Department C
Standard Hours Allowed for April Production	3,150	2,280	4,400
General Overhead Rates	$0.6536 2/3	$0.6308 1/3	$0.61775
Cleared-In General Overhead	$2,059.05	$1,438.30	$2,718.10
Actual Overhead	2,010.75	1,550.25	2,526.00
Total Variance	+$48.30	-$111.95	+$192.10
Calculation of Volume Variance:			
Cleared-In Costs	$2,059.05	$1,438.30	$2,718.10
Standard Budget Allowance	2,031.42	1,460.75	2,643.00
Volume Variance	+$27.63	-$22.45	+$75.10
Calculation of Controllable Variance:			
Standard Budget Allowance	$2,031.42	$1,460.75	$2,643.00
Actual Overhead	2,010.75	1,550.25	2,526.00
Controllable Variance	+$20.67	-$89.50	+$117.00

Total General Overhead Variance:	Volume	Controllable
Department A	+$27.63	+$20.67
" B	- 22.45	- 89.50
" C	+ 75.10	+117.00
	+$80.28	+$48.17

ILLUSTRATION 99

APPORTIONMENT OF THE ACTUAL GENERAL OVERHEAD EXPENSE FOR APRIL

Expense Items	Total	Amounts Apportioned to the Cost Centers		
		Department A	Department B	Department C
General Superintendent	$ 500	$ 125.00	$ 125.00	$ 250.00
Miscellaneous Labor	3,755	1,314.25	938.75	1,502.00
Light, Heat, and Power	330	115.50	82.50	132.00
Depreciation, Building	420	126.00	126.00	168.00
Depreciation, Furniture	60	20.00	20.00	20.00
Miscellaneous Supplies	245	73.50	49.00	122.50
Fire Insurance	320	96.00	96.00	128.00
Taxes	80	24.00	24.00	32.00
Small Tools Expense	275	82.50	55.00	137.50
Factory Office Expense	102	34.00	34.00	34.00
Totals	$6,087	$2,010.75	$1,550.25	$2,526.00

ILLUSTRATION 100

STANDARD BUDGET ALLOWANCE FOR GENERAL OVERHEAD EXPENSE IN EACH DEPARTMENT FOR APRIL

Expense Items	Department A			Department B			Department C		
	Budget at 105%	Rate	Amount	Budget at 95%	Rate	Amount	Budget at 110%	Rate	Amount
General Superintendent	$ 500	25%	$ 125.00	$ 500	25%	$ 125.00	$ 500	50%	$ 250.00
Miscellaneous Labor	3,780	35%	1,323.00	3,450	25%	862.50	3,950	40%	1,580.00
Light, Heat, and Power	335	35%	117.25	305	25%	76.25	350	40%	140.00
Depreciation, Building	420	30%	126.00	420	30%	126.00	420	40%	168.00
Depreciation, Furniture	60	33 1/3%	20.00	60	33 1/3%	20.00	60	33 1/3%	20.00
Miscellaneous Supplies	280	30%	84.00	260	20%	52.00	290	50%	145.00
Fire Insurance	320	30%	96.00	320	30%	96.00	320	40%	128.00
Taxes	80	30%	24.00	80	30%	24.00	80	40%	32.00
Small Tools Expense	275	30%	82.50	245	20%	49.00	290	50%	145.00
Factory Office Expense	101	33 1/3%	33.67	90	33 1/3%	30.00	105	33 1/3%	35.00
Totals	$6,151		$2,031.42	$5,730		$1,460.75	$6,365		$2,643.00

ILLUSTRATION 101

Department C were applied against the expense items in the 110% column of the general overhead expense budget.

205. Factory Ledger.—When all of the transactions in the factory journal have been posted, the accounts in the factory ledger should appear as follows. As, in order to avoid confusion, codes were not set up for the factory ledger accounts, they appear neither in the headings of the accounts here given nor in the folio column of the factory journal.

FACTORY LEDGER

General Ledger (Control)

19__						19__					
Apr.	5		FJ 1	16,948	01	Apr.	1	Balance	√	56,481	12
	5		FJ 1	12,711	01		30		FJ 1	37,535	70
	11		FJ 1	14,123	34						
	25										
	30	Balance	√	50,234	46						
				94,016	82					94.016	82
						May	1	Balance	√	50,234	46

Finished Goods Inventory

19__						19__					
Apr.	1	Balance	√	21,185	01	Apr.	5		FJ 1	16,948	01
	6		FJ 1	14,123	34		11		FJ 1	12,711	01
	15		FJ 1	14,123	34		25		FJ 1	14,123	34
	26		FJ 1	9,886	34		30	Balance	√	15,535	67
				59,318	03					59,318	03
May	1	Balance	√	15,535	67						

Work in Process—Department A

19__						19__					
Apr.	1	Balance	√	3,670	41	Apr.	2		FJ 1	3,365	17
	30		FJ 1	20,413	05		8		FJ 1	3,365	17
							13		FJ 1	3,365	17
							18		FJ 1	3,365	17
							23		FJ 1	4,038	20
							30		FJ 1	1,346	07
							30	Balance	√	5,238	51
				24,083	46					24,083	46
May	1	Balance	√	5,238	51						

Work in Process—Department B

19__						19__					
Apr.	1	Balance	√	4,950	01	Apr.	3		FJ 1	6,461	80
	30		FJ 1	30,242	05		11		FJ 1	7,538	77
							19		FJ 1	7,538	77
							27		FJ 1	5,384	84
							30	Balance	√	8,267	88
				35,192	06					35,192	06
May	1	Balance	√	8,267	88						

Work in Process—Department C

19__						19__					
Apr.	1	Balance	√	14,469	71	Apr.	6		FJ 1	14,123	34
	30		FJ 1	37,511	28		15		FJ 1	14,123	34
							26		FJ 1	9,886	34
							30	Balance	√	13,847	97
				51,980	99					51,980	99
May	1	Balance	√	13,847	97						

Stores Inventory

19__						19__					
Apr.	1	Balance	√	18,322	20	Apr.	30		FJ 1	25,061	50
	30		FJ 1	21,290	00		30	Balance	√	14,550	70
				39,612	20					39,612	20
May	1	Balance	√	14,550	70						

Small Tools Inventory

19__						19__					
Apr.	1	Balance	√	440	00	Apr.	5		FJ 1	40	00
							13		FJ 1	70	00
							17		FJ 1	90	00
							20		FJ 1	75	00
							30	Balance	√	165	00
				440	00					440	00
May	1	Balance	√	165	00						

Factory Office Supplies

19__						19__					
Apr.	1	Balance	√	220	00	Apr.	30	Balance	FJ 1	97	00
							30		√	123	00
				220	00					220	00
May	1	Balance	√	123	00						

Factory Payroll

19__						19__					
Apr.	3		FJ 1	6,776	22	Apr.	1	Balance	√	6,776	22
	17		FJ 1	7,418	68		16		FJ 1	7,418	68
							30		FJ 1	7,413	84

Payroll Cash

19__						19__					
Apr.	2		FJ 1	6,776	22	Apr.	3		FJ 1	6,776	22
	17		FJ 1	7,418	68		17		FJ 1	7,418	68

Direct Overhead Expense—Department A

19__						19__					
Apr.	30		FJ 1	2,401	00	Apr.	30		FJ 1	2,401	00

Direct Overhead Expense—Department B

19__						19__					
Apr.	30		FJ 1	2,107	00	Apr.	30		FJ 1	2,107	00

Direct Overhead Expense—Department C

19__						19__					
Apr.	30		FJ 1	2,888	00	Apr.	30		FJ 1	2,888	00

General Overhead Expense

19__						19__					
Apr.	30		FJ 1	6,207	00	Apr.	5		FJ 1	35	00
							9		FJ 1	5	00
							10		FJ 1	40	00
							12		FJ 1	5	00
							17		FJ 1	10	00
							19		FJ 1	10	00
							25		FJ 1	15	00
							30		FJ 1	6,087	00
				6,207	00					6,207	00

Material Price Variance

19__						19__					
Apr.	30		FJ 1	30	00	Apr.	30		FJ 1	79	20
	30	Balance	√	49	20						
				79	20					79	20
						May	1	Balance	√	49	20

Material Quantity Variance

19__					
Apr.	4		FJ 1	23	00
	10		FJ 1	225	00
	20		FJ 1	6	00
				254	00

Direct Labor Variance

19__						19__					
Apr.	16		FJ 1	3,638	68	Apr.	30		FJ 1	7,302	00
	30		FJ 1	3,662	84						
	30	Balance	√		48						
				7,302	00					7,302	00
						May	1	Balance	√	0	48

Direct Overhead Controllable Variance

19__						19__					
						Apr.	30		FJ 1	3	00

Direct Overhead Volume Variance

						19__ Apr.	30		FJ 1	153	30

General Overhead Controllable Variance

						19__ Apr.	30		FJ 1	48	17

General Overhead Volume Variance

						19__ Apr.	30		FJ 1	80	28

206. Trial Balance.—The trial balance of the factory ledger at the end of April, after all postings, should appear as follows:

WHITE MANUFACTURING COMPANY

Factory Ledger Trial Balance, April 30, 19__

General Ledger (Control)		$50,234.46
Finished Goods Inventory	$15,535.67	
Work in Process—Department A	5,238.51	
Work in Process—Department B	8,267.88	
Work in Process—Department C	13,847.97	
Stores Inventory	14,550.70	
Small Tools Inventory	165.00	
Factory Office Supplies	123.00	
Factory Payroll		7,413.84
Material Price Variance		49.20
Material Quantity Variance	254.00	
Direct Labor Variance		.48
Direct Overhead Controllable Variance		3.00
Direct Overhead Volume Variance		153.30
General Overhead Controllable Variance		48.17
General Overhead Volume Variance		80.28
	$57,982.73	$57,982.73

207. Subsidiary Overhead Expense Ledgers.—Supporting the three direct Overhead Expense accounts and the single General Overhead Expense account in the factory ledger are the following subsidiary ledgers. In the direct overhead subsidiary ledger, columns are provided for the entry of the standard expense allowance and for the extension of the controllable variance. The controllable variance cannot be extended in the general overhead subsidiary ledger since the amounts here are total figures, and the controllable variance is not calculated until the amounts are apportioned to the departments.

DIRECT OVERHEAD SUBSIDIARY LEDGER
Department A

Foreman

Date	Explanation	Amount	Date	Explanation	Amount	Standard Allowance at 105%	Controllable Variance
19__ Apr. 16		$150 00	19__ Apr. 30	Balance	$300 00	$300 00	---- —
30		150 00					
		300 00					

Inspectors

Date	Explanation	Amount	Date	Explanation	Amount	Standard Allowance at 105%	Controllable Variance
19__ Apr. 16		125 00	19__ Apr. 30	Balance	255 00	250 00	-5 00
30		130 00					
		255 00					

Material Handlers

Date	Explanation	Amount	Date	Explanation	Amount	Standard Allowance at 105%	Controllable Variance
19__ Apr. 16		135 00	19__ Apr. 30	Balance	258 00	275 00	+17 00
30		123 00					
		258 00					

Miscellaneous Indirect Labor

Date	Explanation	Amount	Date	Explanation	Amount	Standard Allowance at 105%	Controllable Variance
19__ Apr. 16		120 00	19__ Apr. 30	Balance	238 00	200 00	-38 00
30		118 00					
		238 00					

Shop Supplies

Date	Explanation	Amount	Date	Explanation	Amount	Standard Allowance at 105%	Controllable Variance
19__ Apr. 1		200 00	19__ Apr. 30	Balance	720 00	705 00	-15 00
9		120 00					
15		260 00					
23		140 00					
		720 00					

Depreciation, Machinery

19__ Apr.	30		200	00	19__ Apr.	30	Balance	200	00	200	00	---	—

Repairs

19__ Apr.	5		120	00	19__ Apr.	30	Balance	380	00	400	00	+20	00
	12		150	00									
	19		110	00									
			380	00									

Compensation Insurance

19__ Apr.	30		50	00	19__ Apr.	30	Balance	50	00	50	00	—	—

Department B

Foreman

Date		Explanation	Amount		Date		Explanation	Amount		Standard Allowance at 95%		Controllable Variance	
19__ Apr.	16		137	50	19__ Apr.	30	Balance	275	00	275	00	—	—
	30		137	50									
			275	00									

Inspectors

19__ Apr.	16		105	00	19__ Apr.	30	Balance	212	50	210	00	-2	50
	30		107	50									
			212	50									

Material Handlers

19__ Apr.	16		127	50	19__ Apr.	30	Balance	252	50	250	00	-2	50
	30		125	00									
			252	50									

Miscellaneous Indirect Labor

Date	Explanation	Amount	Date	Explanation	Amount		Standard Allowance at 110%		Controllable Variance	
19__ Apr. 16		90 00	19__ Apr. 30	Balance	190 00		170 00		-20 00	
30		100 00								
		190 00								

Shop Supplies

Date	Explanation	Amount	Date	Explanation	Amount		Standard Allowance at 110%		Controllable Variance	
19__ Apr. 1		110 00	19__ Apr. 30	Balance	550 00		545 00		-5 00	
9		70 00								
15		210 00								
23		160 00								
		550 00								

Depreciation, Machinery

Date	Explanation	Amount	Date	Explanation	Amount		Standard Allowance at 110%		Controllable Variance	
19__ Apr. 30		220 00	19__ Apr. 30	Balance	220 00		220 00		--	--

Repairs

Date	Explanation	Amount	Date	Explanation	Amount		Standard Allowance at 110%		Controllable Variance	
19__ Apr. 10		210 00	19__ Apr. 30	Balance	370 00		390 00		+20 00	
17		70 00								
25		90 00								
		370 00								

Compensation Insurance

Date	Explanation	Amount	Date	Explanation	Amount		Standard Allowance at 110%		Controllable Variance	
19__ Apr. 30		37 00	19__ Apr. 30	Balance	37 00		36 00		-1 00	

Department C

Foreman

Date	Explanation	Amount	Date	Explanation	Amount		Standard Allowance at 110%		Controllable Variance	
19__ Apr. 16		175 00	19__ Apr. 30	Balance	350 00		350 00		--	--
30		175 00								
		350 00								

Inspectors

19__					19__								
Apr.	16		125	00	Apr.	30	Balance	245	00	250	00	+5	00
	30		120	00									
			245	00									

Material Handlers

19__					19__								
Apr.	16		160	00	Apr.	30	Balance	315	00	320	00	+5	00
	30		155	00									
			315	00									

Miscellaneous Indirect Labor

19__					19__								
Apr.	16		130	00	Apr.	30	Balance	265	00	285	00	+20	00
	30		135	00									
			265	00									

Shop Supplies

19__					19__								
Apr.	1		240	00	Apr.	30	Balance	850	00	865	00	+15	00
	9		240	00									
	15		300	00									
	23		70	00									
			850	00									

Depreciation, Machinery

19__					19__								
Apr.	30		320	00	Apr.	30	Balance	320	00	320	00	--	--

Repairs

19__					19__								
Apr.	5		150	00	Apr.	30	Balance	480	00	460	00	-20	00
	10		140	00									
	17		70	00									
	25		120	00									
			480	00									

Compensation Insurance

19__					19__								
Apr.	30		63	00	Apr.	30	Balance	63	00	73	00	+10	00

GENERAL OVERHEAD SUBSIDIARY LEDGER

General Superintendent

19__						19__					
Apr.	16			$250	00	Apr.	30	Balance		$500	00
	30			250	00						
				500	00					500	00

Miscellaneous Labor

19__						19__					
Apr.	16			$1,950	00	Apr.	5			$ 35	00
	30			1,925	00		9			5	00
							10			40	00
							12			5	00
							17			10	00
							19			10	00
							25			15	00
							30	Balance		3,755	00
				$3,875	00					$3,875	00

Light, Heat, and Power

19__						19__					
Apr.	30			$330	00	Apr.	30	Balance		$330	00

Depreciation, Building

19__						19__					
Apr.	30			$420	00	Apr.	30	Balance		$420	00

Depreciation, Furniture

19__						19__					
Apr.	30			$60	00	Apr.	30	Balance		$60	00

Miscellaneous Supplies

19__						19__					
Apr.	3			$120	00	Apr.	30	Balance		$245	00
	8			80	00						
	22			45	00						
				$245	00					$245	00

Fire Insurance

19__						19__					
Apr.	30			$320	00	Apr.	30	Balance		$320	00

Taxes

19__						19__					
Apr.	30			$80	00	Apr.	30	Balance		$80	00

Small Tools Expense

19__						19__					
Apr.	5			$ 40	00	Apr.	30	Balance		$275	00
	13			70	00						
	17			90	00						
	20			75	00						
				$275	00					$275	00

Factory Office Expense

19__						19__					
Apr.	9			$ 5	00	Apr.	30	Balance		$102	00
	30			97	00						
				$102	00					$102	00

208. Closing Variance Accounts.—If the books are to be closed, all of the variance accounts must be closed out. This may be done by the following two entries, the one in the factory journal, the other in the general journal:

In the factory journal:

Direct Labor Variance	$ .48	
Direct Overhead Controllable Variance	3.00	
Direct Overhead Volume Variance	153.30	
General Overhead Controllable Variance	48.17	
General Overhead Volume Variance	80.28	
Material Price Variance	49.20	
Material Quantity Variance		$254.00
General Ledger (control)		80.43

In the general journal:

Factory Ledger (control)	$ 80.43	
Profit and Loss		$ 80.43

209. Financial Statements.—Illustration 102 shows a cost of goods manufactured and sold statement at standard rates based on the trial balance in Article 206 and the information contained in the company's books. To show the effect of the variance accounts on the profit and loss statement, we will assume that net sales for the month were $70,000. The first sections of the profit and loss statement would appear as follows:

Net Sales		$70,000.00
Adjusted Cost of Goods Sold:		
Cost of Goods Sold at standard rates	$43,782.36	
Material Price Variance	49.20*	
Material Quantity Variance	254.00	
Direct Labor Variance	.48*	
Direct Overhead Controllable Variance	3.00*	
Direct Overhead Volume Variance	153.30*	
General Overhead Controllable Variance	48.17*	
General Overhead Volume Variance	80.28*	43,701.93
Gross Profit (actual)		$26,298.07

*Negative Amount

WHITE MANUFACTURING COMPANY

STATEMENT OF COST OF GOODS MANUFACTURED AND SOLD
APRIL 1, 19__ TO APRIL 30, 19__

(All figures at standard rates)

Raw Materials:		
Stores Inventory, April 1, 19__	$18,322.20	
Purchases during month	21,290.00	
Stores Available	$39,612.20	
Stores Inventory, April 30, 19__	14,550.70	
Stores Requisitioned	$25,061.50	
Stores Requisitioned and charged to Overhead and Material Quantity Variance	3,734.00	
Cost of Raw Materials Used		$21,327.50
Direct Labor		7,302.00
Overhead Expenses:		
Direct Overhead	$7,552.30	
General Overhead	6,215.45	13,767.75
Manufacturing Expense of Period		$42,397.25
Work in Process Inventory, April 1, 19__		23,090.13
Total Manufacturing Charges		$65,487.38
Work in Process Inventory, April 30, 19__		27,354.36
Cost of Goods Manufactured during month		$38,133.02
Finished Goods Inventory, April 1, 19__		21,185.01
Cost of Goods Available		$59,318.03
Finished Goods Inventory, April 30, 19__		15,535.67
Cost of Goods Sold		$43,782.36

ILLUSTRATION 102

CHAPTER XXV

BUDGETS AND DISTRIBUTION COSTS

210. Recent Development of Selling and Administrative Costs.—Parts II and III of this work are devoted solely to the discussion of cost accounting for manufacturing operations. The preceding chapters on Standard Costs and Budgets also are concerned with the manufacturing division alone. In Art. 173, however, it is stated that standard costs are applicable to selling and administrative expenses as well as to manufacturing costs. In the remaining chapters of this Part costing for selling and administrative expenses will be discussed and an attempt made to show how unit distribution costs can be found and how efficient control can be established over the costs of the selling and administrative divisions.

The thorough study of selling and administrative expenses is a recent development, and the study, unlike cost accounting for manufacturing operations, in many respects is still in its infancy. It is in the field of distribution costs that the greatest opportunity for the cost accountant lies today. In the early days of cost accounting its major purpose was the determination of unit manufacturing costs. Later, the control of manufacturing costs became an even more important function. Cost accountants gave little attention to discovering what it costs to sell and deliver a unit of product or to the control of selling and administrative expenses.

After going to great trouble to obtain accurate unit manufacturing costs, accountants adopted the unscientific procedure of determining total unit costs by adding a percentage to unit manufacturing costs in order to include selling and administrative expense. This percentage was determined by dividing the total selling and administrative expenses of the period by the total manufacturing expense. Occasionally a part of the administrative expense was prorated to the manufacturing division and thus included in unit manufacturing costs. The remainder of administrative expense was then considered as a selling expense.

Obviously the determination of total unit costs by such a method is unsound. If a concern produces a number of commodities, there is no reason to suppose that it costs ten times as much to sell a product whose unit manufacturing cost is $100 as one whose unit manufacturing cost is $10, or even that every commodity that costs $10 a unit to produce costs the same amount to sell. Some products are relatively easy to sell; others are only sold after much sales effort and expenditure on advertising. Again, the actual manufacturing cost of a unit depends on the number of units produced in a given time. Similarly, the cost of selling a unit of product varies with the number of units in a customer's order. It costs less per unit to sell to a wholesaler or large retailer who purchases in quantity than to a small retailer who orders a small amount at a time. The cost of selling in different areas varies greatly. Delivery expense fluctuates between zones. In some districts little or no advertising expense is incurred while in others advertising is

a large item of expenditure. Salesmen's expense is greater in relation to sales in some territories than in others. Even the cost of selling to different purchasers of the same type and in the same sales district varies. Some buyers require little service while others require much.

The result of adding a fixed percentage to include selling and administrative expense in unit costs is that lines with low marketing costs bear the burden of lines with excessive marketing costs, and the management is not aware which commodities are profitable and which are not. Similarly, buyers and territories requiring little selling expense bear the load of those requiring much.

Under the Robinson-Patman Act of 1936 price differences between customers purchasing the same item can be justified only by differences in the costs of handling their orders. If a business can show that varying manufacturing, selling, and delivery expenses are the result of different methods of selling or delivering goods or of varying sizes of orders, then different prices for the same item are justified, provided such differences in price do not promote monopoly or substantially lessen competition. It is obvious that finding unit costs by adding a fixed percentage to cover selling and administrative expense will not provide the justification for price differences required by the Robinson-Patman Act and that more accurate methods of accounting for selling and administrative expense and of finding total unit costs are essential. Some of these methods will be considered in this and the following chapter.

Until recent years little was done by accountants to control selling and administrative expense. It is true that most accounting systems provided not only for the collection of the total amount of selling and administrative expense, but also for obtaining the amount of each type of expenditure. The accounting device used was one with which the reader is familiar; namely, the control account and subsidiary ledger. The need for proper control of sales and administrative expense will be apparent when it is remembered that in almost every business selling and administrative expenses constitute a substantial part of total expense, and in many businesses are greater than manufacturing costs. While cost accountants were neglecting selling cost, sales managers developed a number of means for controlling selling expense. Among these were the training of salesmen, preparation of prospect lists, routing of salesmen, requiring of salesmen's reports, establishing of sales quotas, and adoption of incentive wage systems.

211. Early Systems of Budgetary Control.—Apart from supplying detailed information respecting the amounts actually spent by the sales and administrative divisions, the first great contribution of accounting to the control of selling and administrative expenses came with the establishment of systems of budgetary control. A system of budgetary control may be defined as a coordinated series of "fixed" budgets covering all the important activities of a business. A budget is a forecast or estimate of what is expected to take place in some definite period in the future. A budget may be termed "fixed" when only one estimate is prepared respecting a certain activity. As explained in Chapter XXIII, budgets are termed "flexible" when several estimates are prepared respecting one activity, each esti-

mate being for a different amount of production or capacity. From the early budgetary systems there have been developed methods of finding unit distribution costs and of obtaining a high measure of control over selling and administrative expense. For this reason budgetary control as originally practiced, and as still practiced in many businesses, will be briefly explained.

The sales estimate is in many respects the most important budget in a budgetary system. A sales budget may be defined as a systematic schedule of the quantities of goods that are expected to be sold within a definite future period, together with estimates of unit selling prices and of the total revenue to be derived from sales. One method by which a sales budget is prepared is to budget each district in a company's sales area with the number of the various articles expected to be sold in that section within a given period of time and to learn the total quantities of each product expected to be sold by adding together the figures shown in the district budgets. Another method is to budget each of the company's salesmen with the volume of the various products he is expected to sell in a specified time. No matter how a sales budget is prepared, each district sales manager and each salesman should be supplied with an estimate of the sales he is expected to obtain during the budget period. A sales budget by itself is of little importance unless accompanied by other budgets. Selling expense, production, and administrative expense budgets are essential. Most budget systems also include budgets for non-operating income and expenses and for cash receipts and payments.

A selling expense budget is an estimate of the expenses that will be incurred in obtaining the anticipated amount of sales. Like the sales budget, the selling expense budget first may be prepared for each sales territory or even for each salesman. No matter how a selling expense budget is prepared, each sales executive should be supplied with an individual budget setting limits to the expenses which may be incurred in his district. Similarly each salesman should be provided with a budget limiting his expenditures.

A production budget is a systematic schedule of the quantities of goods that must be produced within a definite future period to meet anticipated sales, together with estimates of unit production costs and of total production costs. A production budget must be carefully tied in with the sales budget. Thus, if a producer of men's suits finds that his busiest seasons are the fall and spring, with a falling off of orders in the winter and summer, he must budget his production so that he will not find it necessary to discharge most of his workers in the dull seasons, and then be unable to fill his orders during the rush seasons.

An administrative expense budget is an estimate of the administrative expense that will be incurred in producing and selling the anticipated quantities of products. While the preparation of the selling expense, production, and administrative expense budgets depends on the sales budgets, in the sense that they cannot be prepared until an estimate of the amount of goods to be sold is made, yet it should also be remembered that a sales estimate should not be so large that the amount cannot be produced by the facilities available, or sold without an excessive amount of selling expense being incurred.

Budgets are usually prepared for a relatively long period, such as a year, and the aggregate figures are then broken down into estimates for shorter intervals, such as a month, or even a week. The purpose of the breakdown is to give detailed as well as summary information to those concerned and to enable comparisons to be made frequently between actual and budgeted figures. If there are serious differences, explanations must be obtained and steps taken to bring the items into line. If this is impossible it will be necessary to alter the various budgets.

The function of the accounting department in relation to a budgetary system is always important. In many businesses the controller or chief accountant is responsible for budgetary procedure, for the complete budget being available in the proper form at the right time, for explanations of divergencies between actual and budgeted figures being obtained, and for steps being taken to remedy the out-of-line conditions which these explanations indicate, or, if the conditions cannot be removed, for revisions of the budgets. Even when the budgetary system is under the supervision of some executive other than the chief accounting officer or a committee of executives and directors, the accounting department supplies much of the information on which estimates of future conditions are based. Reports showing comparisons between actual and budgeted figures also are prepared periodically by the accounting department.

212. Budgets as Targets.—It was said in the preceding article that a budget is a schedule of expected transactions. Besides being that, it is a target for controlling accomplishment. Just as it is absurd for a hunter to shoot his rifle without aiming, so it is foolish to run any type of organization without having a predetermined goal in sight. If, for example, the sales manager of X. Y. Z. Company merely tells his salesmen to go out and sell, his command will probably meet with some success. But if he says, "Each of you fellows should sell 200 articles within a month," he has placed a target at which each one of them may aim. Moreover, he has set up a standard by which he may measure the value of his employes. If John Smith sells only 140 articles, his worth and work are questionable; but if Smith sells 220 articles, he is likely to be considered a superior salesman.

In a similar manner, if the office manager of the X. Y. Z. Company is told to economize in his expenditures for supplies, it may be that for a time he will endeavor to hold expenses down. But if he is told, "You must not spend more than $50 a month for office supplies," he is limited as if by a barbed-wire fence. He must economize. If he spends more than the $50, he realizes that he is labelled in the eyes of his superiors as inefficient. But, on the other hand, he knows also that if he keeps well under the budget figure, he shows himself to be a valuable member of the organization.

A budget, when thus likened to a target, is seen to be something more than a mere accounting device. It exerts a power of its own; it is a driving force. It may be said to be made up of elements which are partly accounting and partly psychological. In its accounting sense, it is a statement; it is an instrument of accounts and figures. It differs from other accounting statements, however, in

that it has to do with future activity, while they have as their subject what has happened in the past. If you were to hand a layman a statement of profit and loss and a statement of budget estimates, one would be about as uninteresting to him as the other. Neither would arouse his enthusiasm. But if you hand the same two statements to a factory superintendent, you will find a different result. While he will be somewhat interested in the profit and loss statement since it is a record of past achievement or failure, his chief interest will lie in the budget statement—because that represents what has yet to be done.

It is here that the psychological element of budgets enters the picture. There is undoubtedly a tendency in human nature to forget the past, to let yesterday remain in the graveyard where it belongs; and there is another tendency, no matter what one may be doing, to look ahead, to wonder what tomorrow will bring. This is why a budget has great power: it paints the scene that is yet to take place. It sets a standard by which activity will be measured. The profit and loss statement may be carelessly brushed aside, even though it may be a record of woeful inefficiency—such inefficiency only represents the mistakes of yesterday. But the budget statement may not be discarded so lightly, for it is the yardstick by which future success or failure will be determined. All executives know that their jobs depend to a large extent on their ability to handle the business in conformity with the budgets.

The fact that budgets may be used as targets to guide the aim of a company's employes, and that they serve as a strong force in directing future activity, is one of the fundamental advantages of the budget system. But it must be remembered at all times that a budget is by no means a slipshod "hitch-your-wagon-to-a-star" method by which employes are expected to work their heads off without ever accomplishing what they are working for. If the sales manager, previously mentioned, told his salesmen that each should sell 200 articles in a month, while the company's records showed that a sales volume of 150 articles a month was a normal volume, he most certainly was not budgeting his sales. He was merely discouraging those working under him—and such a foolish policy cannot be called a budget system.

213. Budgets as Scientific Statements.—A budget is a scientific statement, and not a record of what the directors of a company would like to see take place but which they expect never will. A budget, to be a common-sense budget, is prepared after a careful study of all conditions affecting the business. All the past records of the company are searched thoroughly to determine what the trends in that particular business may be. If a record of twenty years, say, shows that sales volume has been constantly falling, then the sales budget for the coming year must reflect this condition so that the sales department will not be expected to work a miracle by suddenly overcoming this adverse condition. All outside forces affecting the business must be likewise examined. If prices are generally high, the budget figures must reflect this fact. If industry at large is suffering from depression, this fact must be taken into account in preparing the budget. In other words, a budget, instead of being a rough guess of what things may be, is a thor-

ough and careful estimate, with all forces both inside and outside the business examined, of what is *likely to take place*—not merely what is *hoped* will take place.

214. Failure of Early Budget Systems Properly to Control Selling and Administrative Expenses.—A budgetary system of the type described in the foregoing articles is of the utmost importance in stabilizing production and employment, in keeping inventories at a minimum, and in coordinating the activities of a business. Comparison of actual expenditures with budgeted amounts also affords a considerable measure of control over expenses. This is particularly true of selling and administrative expenses if each district sales manager and salesman and each executive in charge of a selling or administrative department is supplied with a budget showing the expenses for which he is definitely responsible, and each is held rigorously accountable for exceeding his budget without permission and for reducing expenses below the budgeted amount when ordered to do so. Some accountants advocate that when an executive of any rank is supplied with an expense budget it should include not only the items for which he is responsible, but also all items affecting his department or sales district even though these items be fixed in amount or under the control of senior executives. The theory underlying this recommendation appears to be that the inclusion of the latter items gives an executive a more complete picture of the operations under his supervision, may lead him to make valuable suggestions respecting the reduction of expenses not under his control, and when decreases in expenditures are ordered will enable him to realize why the variable expenses under his control must be cut out of proportion to the reduction in sales. The inclusion of items in an executive's budget for which he is not responsible, however, frequently results in useless disputes respecting the fairness of the figures and when substantial in amount may lead the executive to feel that any saving he can make in the total amount budgeted to his department is too small to be worth while. It will also make more difficult the establishment of key-man bonus plans based on the payment to executives of a percentage of the savings they make in budgeted figures.

The control established over selling and administrative expenses by means of the budget system previously explained is far from complete. For example, if both sales and selling expense in a given sales district exceed budgeted figures, there is no way of telling whether the increase in selling expense is justified by the increased sales or whether it is in part due to inefficient operation. Similarly, if both sales and selling expense are less than budgeted, there is no way of learning whether selling expense has been reduced as much as should be expected considering the decrease in sales or whether it is still too great.

In previous chapters, it has been shown how control over the expenses of the manufacturing division is obtained through the use of a standard cost system. When there are available flexible budgets which show the factory overhead expenses that are justified at various levels of production, it is possible to know immediately what items of direct or general overhead are excessive and, by analyzing variances,

to learn the reasons for these bad conditions. We must now consider the recent developments in budgeting which have resulted in the establishment of more efficient control over selling and administrative expense and the discovery of unit distribution costs. Before doing this, however, the nature of unit distribution costs and distribution expense will be clarified by comparison with unit manufacturing costs and manufacturing expense.

215. Comparison of Unit Distribution Costs and Unit Manufacturing Costs. In preceding chapters, methods of discovering actual and standard unit manufacturing costs have been described and the nature of these costs has been explained. One of the purposes of modern budgeting, as related to the selling and administrative divisions, is the estimating of unit distribution costs in advance. Since such costs are based on scientifically prepared estimates of amounts to be sold during a period, ordinarily a year, and the selling and administrative expenses to be incurred during the same period, they may be termed standard unit distribution costs.

In one respect, unit distribution costs are more complicated than unit manufacturing costs. At a given time, there is only one actual or standard unit manufacturing cost for a product. There are, however, many unit distribution costs for the same commodity. The cost of selling a unit of product varies in every sales district. Furthermore, a company may sell its products through different systems of distribution in each sales area. For example, sales may be made to wholesalers, to retailers, to agents who have exclusive rights in their particular localities, to commission houses, and even directly to ultimate consumers. The cost of selling differs with the type of distribution used. Therefore, in one selling district there are as many unit distribution costs for each product sold as there are systems of distribution employed.

Even this is not the full story. The cost of selling to different buyers of the same class in the same territory differs. For instance, a concern may sell to a number of wholesalers in a certain sales district. Some of these wholesalers may place few orders for a large amount of goods while the remainder purchase relatively little, yet order frequently. Some of the buyers may demand more service than others. The number of salesmen's calls in a period and the expense involved in making a call vary with each purchaser. Theoretically at least, there are as many different unit distribution costs for each product as there are buyers of the product. In practice, it will usually be found that discovering unit distribution costs for each purchaser of a product is not worth while. It may be advantageous, however, to find unit distribution costs for all large purchasers in a district and to group all small purchasers in one or possibly a few classifications and to obtain unit distribution costs for the average member of the classification.

The determination of unit distribution costs, therefore, involves the discovery of the unit cost of marketing each commodity sold through each system of distribution used in each sales district. It may even include the finding of the unit cost for selling each product to each individual customer or group of customers in each sales area.

216. Comparison of Manufacturing and Distribution Expense.—Administrative expense is incurred in order that the manufacturing and sales divisions of a business may operate effectively. In a very real sense, therefore, administrative expense, after a portion has been prorated to the manufacturing division, is a selling expense. For this reason in the discussion that follows, administrative expense will be considered as a part of distribution expense, and administrative departments as sections of the sales division.

A typical manufacturing division contains producing and service departments or cost centers. From one standpoint, manufacturing expense may be classified into expenses specifically incurred for producing departments, expenses specifically incurred for service departments, and general overhead. We have learned that in order to find unit manufacturing costs and to control manufacturing expenses, general overhead and service department expenses must be allocated to productive departments. A typical sales division also contains producing departments; that is, sales districts, each under the supervision of a district sales manager, and service departments that are necessary to facilitate the making of sales and the collection of accounts. Examples of such service departments are delivery, advertising, market research, sales office, credit and collections, billing, customers' accounting, general accounting, etc. In connection with the sales division, there are certain general expenses that are not incurred specifically for any sales district or service department. In order to discover unit distribution costs and properly to control distribution expenses, general distribution expense and that incurred for service departments must be apportioned to the various sales districts or selling departments.

While control of manufacturing expense necessitates the collection or apportioning of manufacturing expenses to products and cost centers or departments, control over distribution expense requires at least a four-fold apportionment of distribution expenses—to products or lines of products, to sales districts, to systems of distribution, and to individual customers or groups of customers. To control distribution expense properly, it is necessary to know whether the expense incurred in selling through a particular system of distribution or to individual customers is worth while. Other distributions of selling expense may be necessary depending on the needs of the particular business and the extent of control desired.

To make easy the collection and control of manufacturing expense, it is classified into materials, direct labor, and overhead. There is no corresponding classification of distribution expense. In a concern of some size, distribution expense is divided into a number of classes, but the classifications vary with the nature and size of each business. In many companies certain items of distribution expense are incurred specifically for a given product or vary directly with the dollar sales value of commodities. Among these items are advertising expense incurred for a particular commodity, remuneration and traveling expenses of salesmen selling one line only, research and development expenses incurred for one type of product, state sales taxes, certain excise taxes, commissions paid salesmen based on the dollar value of goods sold, and bad debts estimated as a percentage of sales and discounts. In no two businesses, however, will the same items be directly charge-

able to products. In general, distribution expense is of the nature of overhead and one of the principle problems of costing for distribution expense is the allocating of selling and administrative expense to products, districts, systems of distribution, and customers or groups of customers.

217. Master Sales Budget.—In Article 211 the general nature of sales, selling expense, and administrative expense budgets is explained. Because of the importance of these budgets in the determination of unit distribution costs and the control of unit distribution expense, their nature and method of preparation will now be considered at greater length. The details of budget preparation differ in every business. The explanation that follows is not intended to outline a procedure that can be applied in any particular business without modification.

The preparation of budgets and the determination of unit distribution costs for the coming year are ordinarily completed before the close of the present year. The first step is usually the collecting of information on which to base a sales estimate or master sales budget. About November 1 forms are sent to the different district sales managers on which they are required to enter the number of units of each product they expect will be sold to each large customer and to small buyers as a group during the next year, and for each month of the year. Before the forms are forwarded to the district managers, figures for the preceding year's sales are entered. Each district manager knows the sales of his territory for the present year to date and has a knowledge of business conditions in his area. He is, therefore, in a position to estimate the sales of the next year with considerable accuracy.

When the forms are returned to head office, they are examined by the sales manager, who may feel that certain of the figures should be altered. A sales budget for each district is then prepared. Note Illustration 103. On this form the number of units of each product sold during the last three years is first recorded. Next, the estimates for the coming year of the district sales manager and the sales manager are entered in separate columns. The sales budget is then considered by a committee of executives usually consisting of the president, controller, sales manager, and possibly other executives or directors, and final figures are determined and entered on the form. Before this is done, the long time trend of the business and the condition of the industry and of business in general are fully considered and certain executives, such as the production manager and purchasing agent, are consulted to make sure that the amount of production budgeted can be economically manufactured.

Illustration 103 shows a district sales budget for the entire year. In practice this budget must show monthly as well as yearly figures. Each district sales manager is supplied with a detailed sales budget which becomes his sales quota for the coming year. Examine Illustration 104 carefully. Here, again, the form shown provides for yearly figures only but the actual budget is broken down by months. Note that this form provides an estimate for each sales territory of the number of units of each product expected to be sold to each large customer and to small customers as a group. Also, note that the location and number of miles each customer is distant from head office is shown. In the case of small customers

DISTRICT MASTER SALES BUDGET

District

District Manager

19__

TYPE OF PRODUCT	SALES 19__	SALES 19__	SALES 19__	DISTRICT MANAGER'S ESTIMATE	SALES MANAGER'S ESTIMATE	FINAL ESTIMATE
PRODUCT A						
PRODUCT B						
PRODUCT C						
TOTAL						

ILLUSTRATION 103

FINAL DISTRICT SALES BUDGET (By Products and Customers)

19__

District

District Manager

Customer	Location	Miles	PRODUCT A	PRODUCT B	PRODUCT C	PRODUCT D	PRODUCT E	PRODUCT F	PRODUCT G	PRODUCT H	PRODUCT I	PRODUCT J	PRODUCT K
A Company	Perryville, Pa.	80											
B Company	Stockton, Pa.	205											
C Company	Amsterdam, Pa.	99											
Jones, Inc	Allentown, Pa	73											
Small Customers		174*											
TOTAL													

* Average Figure

ILLUSTRATION 104

a weighted average distance is entered. This information is needed in preparing the budget for delivery expense.

After each sales manager receives his budget or quota of sales, he prepares a budget or quota for each salesman which informs him of the quantities of products he is expected to sell in each month of the coming year. As we will later learn, the furnishing of salesmen with individual budgets is of considerable importance in the control of distribution expense.

When the master sales budget is complete, one-half the information needed to determine unit distribution costs is available. Before unit costs can be determined, the number of units to be sold must be known. The district sales budget shows the number of units of each product that is expected to be sold during the coming year in total and to each large customer and to small customers as a group. The reader will recall that when more than one system of distribution is used there is more than one unit cost for a product in each territory and he may wonder how the number of units expected to be sold through each system of distribution is determined. This presents no difficulty. Suppose that in a certain sales district three methods of distribution are employed. In this case, the district is considered as three districts and three different sets of sales budgets are made up.

Some companies sell so great a variety of products that it is not feasible to prepare sales budgets in terms of units. In this case, sales estimates may be stated in sales dollars, or in units for the principal products and in sales dollars for the remainder. Some companies do not prepare sales estimates for each product but only for entire lines of products. Such budgets are of assistance in determining the profitability of each line but they can only be used to determine unit distribution costs if averaging methods somewhat similar to those used in process cost systems to obtain unit manufacturing costs can be developed.

218. Distribution-Expense Budgets.—After the master sales budget is completed, expense budgets must be prepared. We are here interested in distribution expense budgets only. A distribution expense budget is prepared for each major classification of distribution expense. The number of these budgets, therefore, varies from company to company, depending to a considerable extent on the organization plan for conducting marketing activities in each business. The following, however, is a fairly typical list of distribution expense budgets: delivery expense, advertising expense, market research expense, selling expense, and administrative expense. Each of these expense budgets will now be considered.

219. Delivery-Expense Budget.—Many concerns have no delivery expense and, therefore, need not prepare a delivery-expense budget. Goods are sold f. o. b. point of shipment. Today products are usually packed for shipment in the factory before being placed in the finished goods storeroom, and the packing department is, therefore, merely the last of a line of factory productive cost centers. The department responsible for the storing of the finished goods inventory at the home plant is looked upon as a factory service department and storage expense is prorated to productive cost centers in the same way as the expense of other service

departments. In other companies, however, delivery expense is an important item, either the cost of transportation is paid on all goods sold or else this is necessary in certain localities in order to meet the competition of plants more favorably located in respect to these areas. Because of the Robinson-Patman Act, the careful accounting treatment of delivery expense is now advisable. The existence of delivery expense is one reason why the total unit cost of goods sold to different customers varies and is, therefore, a justification for price differences.

Goods are delivered to customers by various methods. Most commodities are still shipped by railroad freight, but delivery by truck is becoming increasingly important, and we will consider how a budget for these two types of delivery expense may be prepared. The reader must keep in mind that an up-to-date delivery expense budget is much more than an estimate of the total delivery expense to be incurred in the coming year and in each month of the year. To enable unit distribution costs to be determined and delivery expense to be properly controlled, a delivery expense budget must show estimates of delivery expense for each sales district, for each product sold in each sales district, and for each customer or group of customers as well. When more than one system of distribution is used in a sales district, the district is considered to consist of as many districts as there are systems of distribution employed. Illustration 105 shows a form of delivery expense budget for a sales district.

It is not difficult to prepare a budget for railroad freight expense. Freight rates from one point to another are fixed and can easily be learned. The weight of a unit of each product shipped by railroad freight can be established. Sales budgets showing the estimated number of units of each product to be sold to each customer or group of customers in each district have already been prepared and those customers to whom shipments are made by railroad freight are usually known. The preparation of a budget for railroad freight expense is, therefore, merely a matter of arithmetical calculation. In practice this calculation is complicated by the fact that various kinds of goods are sometimes included in one shipment and because rates for carload lots and for less than carload shipments are different. When commodities having varying freight rates are shipped together, the freight rate charged is that of the commodity in the shipment having the highest freight rate. The problem of carload and less than carload lots usually occasions little difficulty since the customers that purchase in carload lots and those that order less than carload lots are known.

When trucking companies are used to deliver goods to customers, trucking expense can be estimated in much the same way as railroad freight expense. When companies use their own trucks, the problem is more difficult. Concerns who have used this method of delivery over a period of some years usually have established a standard cost per mile for a normal truck load. In most cases, a normal truck load is stated in terms of volume, not weight. The cubic contents of a unit of each product delivered by the company's trucks can be determined. Often it is stated in terms of a base product whose unit volume is considered as unity, or 1. The unit volumes of all other products are then expressed as 1.5, 2, 5, etc., meaning 1.5, 2, 5, etc., times the unit volume of the product used as a base. The num-

DISTRICT DELIVERY EXPENSE BUDGET

19__

District

District Manager

CUSTOMER	LOCATION	MILES	PRODUCT A	PRODUCT B	PRODUCT C	PRODUCT D	PRODUCT E	PRODUCT F	PRODUCT G	PRODUCT H	PRODUCT I	PRODUCT J	PRODUCT K	TOTAL
A Company	Perryville, Pa.	80	$	$	$	$	$	$	$	$	$	$	$	$
B Company	Stockton, Pa.	205												
C Company	Amsterdam, Pa.	99												
Jones Inc.	Allentown, Pa.	73												
Small Customers		174*												
TOTAL			$	$	$	$	$	$	$	$	$	$	$	$

* Average Figure

ILLUSTRATION 105

ber of miles each customer is distant from the company's plant is stated in the district sales budget. Refer to Illustration 104. Again it is merely a matter of arithmetical calculation to estimate the delivery expense to be incurred in selling each product, each customer or group of customers, and for each sales district as a whole.

When a standard rate per truck load is established, all expenses connected with delivery must be taken into account. These include wages of truck drivers and assistants, gas and oil, truck repairs and maintenance, depreciation and insurance on trucks, garage expense, salary of the delivery superintendent and his assistants, etc.

Some companies have found that an incentive wage plan for truck drivers and helpers is of considerable assistance in controlling delivery expense. Standard times are established for each delivery. Drivers and helpers are paid by the hour and if they complete a delivery in less than the standard time they are paid for the standard number of hours and allowed to start on a new delivery immediately. The result is that drivers usually beat the allowed times. This reduces the overhead cost per unit delivered although the direct labor cost per unit is not decreased.

220. Advertising-Expense Budget.—The preparation of a budget for advertising expense differs greatly from that for delivery expense. In most companies the management or the committee on finance, after a study of the company's financial position, appropriates a definite amount to be expended in advertising during the coming year. Before this is done, the amount of sales expected to be obtained during the next year and the long-time sales objective of the company must be carefully considered, and the company's advertising agency, if one is employed, its advertising manager, and its sales manager must be consulted. A careful scrutiny of the results produced by various types of advertising in the past may indicate that some kinds of advertising are not worth while and that the appropriation for the coming year may be less than that for the present year, or such an investigation may suggest that some forms of advertising effort should be increased and an amount greater than in the past set aside for advertising.

Since the amount to be expended for advertising during the coming year is definitely fixed, the preparation of an advertising budget which will assist in determining unit distribution costs and in controlling distribution expense consists in learning how much of the appropriation should be apportioned to each sales district, to each product sold in each district, and probably to each customer or group of customers. The reader should keep in mind that if there is more than one system of distribution employed in a district, this district, for budget purposes, is considered as consisting of as many districts as there are systems of distribution used.

Ordinarily the major part of an advertising appropriation is expended through an advertising agency; a minor portion is assigned to the advertising department. The first step in preparing an advertising budget, therefore, is to consult the advertising agency and the advertising manager. When this has been done, it will be found that the agency and the advertising manager have both formulated definite

ADVERTISING EXPENSE BUDGET (By Districts)

19__

DISTRICTS	RADIO	MAGAZ'S	TRADE PAPERS	NEWS-PAPERS	BILL BOARDS	STREET CARS	ELECTRIC SIGNS	DEALERS' SUPPLIES	SAMPLES	ADV. DEPT.	TOTAL
New England	$	$	$	$	$	$	$	$	$	$	$
New York											
Pennsylvania											
TOTAL	$	$	$	$	$	$	$	$	$	$	$

ILLUSTRATION 106

plans for the expenditure of their shares of the appropriation. The advertising agency may have decided that definite amounts will be expended each month on advertising over the radio, in magazines of national circulation, in trade journals, in newspapers, on bill boards, in street cars, and by means of electric signs. The advertising manager will have set aside a portion of his appropriation to cover the monthly expenses of his department and may have alloted the remainder for advertising through the mail, for dealer displays and small electric signs for dealers, and possibly for samples of products.

Once the plans of the advertising agency and sales manager are known, the apportionment of advertising expense to sales districts is not difficult. Expense incurred in advertising through local radio stations, on bill boards, in street cars, by means of electric signs, by dealer displays, and by distribution of samples can be charged directly to sales districts. Expense due to advertising over national radio chains and in magazines and trade journals and to maintaining the advertising department must be allocated to sales districts. Usually it is reasonable to assume that advertising expense not directly chargeable to districts is incurred in proportion to sales obtained and the amount is, therefore, divided among the districts in the proportion that the estimated dollar sales of each district bear to the estimated dollar sales of all districts.

When the district advertising-expense budgets being prepared are not for geographic districts but for systems of distribution employed in a geographic district, most of the advertising expense of the geographic district must be allocated to the system of distribution districts. A part of the advertising expense, for example, advertising in trade papers, may have been incurred to influence sales through a particular system of distribution and should be charged direct to this system of distribution; the remainder must be prorated. Most advertising is expected to influence ultimate consumers and through them retailers, jobbers, and wholesalers, and it will usually be fair, therefore, to allocate the advertising expense of a geographic district to the system of distribution districts in the proportion that the estimated dollar sales of each system of distribution bear to the estimated dollar sales of the geographic district.

Some of the advertising expense apportioned to a district is incurred specifically for particular products and, therefore, can be charged directly to these products. Much advertising expense, however, is institutional in nature and must be prorated to products. The usual method of doing this is to divide among the products that part of advertising expense apportioned to a district that cannot be charged directly to the products sold in the district, in the proportion that the estimated dollar sales of each product bear to the estimated dollar sales of the district.

When it is desired to apportion advertising expense among customers or groups of customers, it will be found that some items such as dealer displays and electric signs for dealers and samples of products may be charged directly, and the remainder of the advertising expense apportioned to a district may be allocated to customers in the ratio that the estimated dollar sales to each customer bear to the estimated dollar sales of the district.

DISTRICT ADVERTISING EXPENSE BUDGET (By Products)

19__

District

District Manager

TYPE OF PRODUCT	RADIO	MAGAZ'S	TRADE PAPERS	NEWS-PAPERS	BILL BOARDS	STREET CARS	ELECTRIC SIGNS	DEALERS' DISPLAYS	SAMPLES	ADV. DEPT.	TOTAL
Product A	$	$	$	$	$	$	$	$	$	$	$
Product B											
Product C											
TOTAL	$	$	$	$	$	$	$	$	$	$	$

ILLUSTRATION 107

DISTRICT ADVERTISING EXPENSE BUDGET (By Customers)

19__

District

District Manager

CUSTOMER	RADIO	MAGAZ'S	TRADE PAPERS	NEWS-PAPERS	BILL BOARDS	STREET CARS	ELECTRIC SIGNS	DEALERS' DISPLAYS	SAMPLES	ADV. DEPT.	TOTAL
A Company	$	$	$	$	$	$	$	$	$	$	$
B Company											
C Company											
Jones Inc.											
Small Customers											
TOTAL	$	$	$	$	$	$	$	$	$	$	$

ILLUSTRATION 108

Illustration 106 shows a budget form on which the total budget appropriation is apportioned to sales districts. The form illustrated is for yearly figures and should be supported by similar statements for months. Illustrations 107 and 108 respectively, show how the advertising expense apportioned to districts may be further apportioned to products and customers.

221. Market Research Expense Budget.—Market research embraces a variety of activities; among these are the development of new products and the improvement of existing products, the discovery of new uses of products and of new points to be stressed in advertising and by salesmen when talking to customers, the study of customers to learn their needs and preferences, and the investigating of markets to find new areas where the company's goods can be profitably sold or existing sales districts where greater sales effort can be profitably expended. Expense on marketing research is similar to advertising expense in one respect; namely, that the management usually appropriates a definite amount for this type of expenditure. Before the amount is decided upon, the objectives to be obtained should be carefully considered and the various executives in charge of the different research activities consulted.

The major problem connected with the preparation of a budget for market research expense is how the sum appropriated shall be allocated among districts, products, and customers or groups of customers. Little market research expense is incurred specifically for a particular district or product or because of a particular customer or group of customers. Even if a portion of market research is incurred for a particular district or product, the sales of the district or product during the year in which the expense is incurred are unlikely to be affected. Expense on market research is of the nature of insurance, a sum expended now to ensure the success of the business in the future. Market research expense, therefore, is not chargeable directly but is usually apportioned to sales districts in the proportion that the estimated dollar sales of each district bear to the estimated dollar sales of all districts.

The amount allocated to each district is then distributed to products and customers in the proportion that the estimated dollar sales of each product and customer bear to the total estimated dollar sales of the district. Illustration 109 shows a form for distributing to products and customers the market research expense already allocated to a district. This form is for yearly figures and should be supported by monthly statements.

Some corporations appropriate large sums of money yearly for a type of research that is essentially different from market research, and which for lack of a better name may be termed pure scientific research. It is research into problems connected with the various physical sciences. The companies that maintain divisions for this type of research believe that in the long run sufficient discoveries that have a commercial application will be made to render the conducting of pure scientific research profitable. Many research projects, however, are undertaken without expectation that the results will repay the company for the amounts expended in the particular investigations. From the standpoint of budgeting,

DISTRICT MARKET RESEARCH EXPENSE BUDGET

19—

District

District Manager

CUSTOMER	LOCATION	PRODUCT A	PRODUCT B	PRODUCT C	PRODUCT D	PRODUCT E	PRODUCT F	PRODUCT G	PRODUCT H	PRODUCT I	PRODUCT J	PRODUCT K	TOTAL
A Company	Perryville, Pa.	$	$	$	$	$	$	$	$	$	$	$	$
B Company	Stockton, Pa.												
C Company	Amsterdam, Pa.												
Jones Inc.	Allentown, Pa.												
Small Customers													
TOTAL		$	$	$	$	$	$	$	$	$	$	$	$

ILLUSTRATION 109

expenditures for pure scientific research may be treated similar to expenditures on market research.

222. Selling Expense Budget.—Selling expense is that portion of distribution expense which is incurred directly in obtaining orders and in supervising and stimulating the sales force. The greater part of selling expense is usually incurred in sales districts, and includes salesmen's remuneration, salesmen's traveling and customer entertainment expense, the cost of holding district salesmen's conventions, remuneration of the district sales manager, traveling and entertainment expense of the district sales manager, and the expense of operating the district sales office. The remuneration of and the expense incurred by the general sales manager and his chief assistants, the cost of sales conventions held at head office, and the upkeep of the sales office at headquarters are also selling expenses. Customers' bad debts frequently are regarded as a selling expense. Sometimes, however, this item is included among administrative expenses.

The preparation of a selling expense budget in many respects resembles that for sales. In November or early December each district sales manager submits a detailed estimate of the selling expense which he expects will be incurred in his district during the coming year. The making of such an estimate usually is not difficult. If salesmen are on a pure salary basis their remuneration can be estimated easily and accurately. If salesmen are paid in whole, or in part, by commissions, past experience, plus a study of the sales expected to be made by each salesman, gives a good basis for estimating their commissions. Past experience, combined with a study of the routes over which salesmen travel, makes it possible to estimate salesmen's expense. The expense incurred on salesmen's conventions held in previous periods provides a basis for estimating the amount that will be expended on this item in the next year. The district sales manager's remuneration is fixed or, if in part variable, can be estimated after an estimate of the sales for his district has been made. Past experience will indicate the approximate amount of traveling and customer entertainment expense which will be incurred by the district manager. Several items of sales office expense, such as rent and the salaries of clerks, are definitely known, and past experience affords a basis from which to estimate the other items.

After the estimates of the district sales managers are received at the head office, they are studied in much the same way that district sales estimates are scrutinized. Usually some of the figures will be altered before the final budget for the selling expense of each district is made up. The items of selling expense incurred at the head office or by head office officials also must be estimated and allocated to the different sales areas before the final budget is prepared.

An easy method of allocating head office selling expense is to divide the total amount among sales districts in the proportion that the estimated dollar sales of each district bear to the estimated dollar sales of all districts. In many instances, this method will produce results that are neither reasonably accurate nor fair. In such cases, methods of allocation must be worked out that will be suitable to the conditions of the business concerned. A thorough knowledge of the methods of

distributing manufacturing overhead will assist the accountant in devising ways of apportioning selling expense. In some companies the salaries of the sales manager and his chief assistants are divided among sales districts according to the amount of time each executive estimates he will give to the problems of each sales area. When the sales office at headquarters contains a number of minor divisions, the work of these divisions may be studied over a period, and the proportion of time that each minor division gives to servicing each sales district may be established and used as a basis for allocating the expense of the division.

After the selling expense of each sales district has been estimated, it must be apportioned among the products sold in the district and possibly among customers or groups of customers. Some selling expense may be charged directly to products; for example, the remuneration and expense of salesmen selling one product only, commissions paid salesmen based on dollar value of sales, and bad debts, estimated as a percentage of sales, if bad debts are considered as a selling expense. Ordinarily, the greater part of selling expense must be prorated to products. An easy, but not always accurate, method of proration is to divide selling expense among products in the proportion that the estimated dollar sales of each product bear to the estimated dollar sales of the district. In a few companies, selling expense can be apportioned to products according to the estimated amount of time salesmen spend in selling these products or even according to the estimated number of buyers purchasing each commodity. In others, selling expense is allocated in the proportion that the estimated number of orders to be received for each product bear to the estimated number of orders to be received for all products. Another method which has been suggested is to allocate selling expense to products by two or more methods and then take an average of the different sets of figures. Some accountants have attempted to obtain accurate results by using different methods of allocation for different items of selling expense. Illustration 110 shows a form for apportioning selling expense to products; it is particularly useful if different items of selling expense are prorated to products by different methods. Even if all selling expense not directly chargeable to products is allocated by one method, it is sometimes worth while to know the amount of each item prorated to products in order that the percentage each item constitutes in unit costs may be known. If this information is not necessary, a form similar to that in Illustration 111 may be used.

Selling expense can be apportioned to customers or groups of customers by methods similar to those used to prorate selling expense to products. Occasionally, some portion of selling expense, such as the remuneration and expense of demonstrator salesmen, may be charged directly to customers. The easiest and perhaps most often used method of allocating selling expense to customers is in the proportion that the estimated dollar sales to each customer bear to the estimated dollar sales of the district. When a company has only a few large customers, selling expense may be allocated to these customers according to the amount of time salesmen are expected to spend on each. Again, selling expense may be allocated to customers in the proportion that the estimated number of orders to be received from each customer or group of customers bears to the estimated

DISTRICT SELLING EXPENSE BUDGET (By Products)

19—

District

District Manager

EXPENSE ITEM	TOTAL	PRODUCT A			PRODUCT B				
		CHG'D. DIRECT	PRO-RATED	TOTAL	CHG'D. DIRECT	PRO-RATED	TOTAL		
Salesmen's Remuneration	$	$	$	$	$	$	$		
Salesmen's Expense									
District Sales Mgr's. Salary									
District Sales Mgr's. Expense									
District Sales Office									
District Sales Conventions									
District Total	$	$	$	$	$	$	$		
H. O. Sales Executives' Salaries									
H. O. Sales Executives' Expense									
H. O. Sales Office									
H. O. Sales Conventions									
Bad Debts									
TOTAL	$	$	$	$	$	$	$		

ILLUSTRATION 110

DISTRICT SELLING EXPENSE BUDGET (By Products)

19__

District

District Manager

TYPE OF PRODUCT	DIRECT CHARGES					PRORATED	TOTAL
	EXPENSE ITEM	EXPENSE ITEM	EXPENSE ITEM	EXPENSE ITEM	EXPENSE ITEM		
PRODUCT A	$	$	$	$	$	$	$
PRODUCT B							
PRODUCT C							
TOTAL	$	$	$	$	$	$	$

ILLUSTRATION 111

number of orders to be received from all customers. Estimated number of salesmen's calls is sometimes used instead of estimated number of orders. One company distributes salesmen's salaries and expense among customers, first according to estimated sales, next according to estimated number of calls, and then takes the average of both sets of figures. The same company apportions the expense incurred in supervising and stimulating salesmen in the ratio that this item bears to the total of salesmen's salaries and expense. For example, if the ratio of supervision expense to salesmen's salaries and expense is 1 : 5, and $50 has been prorated to a customer as his share of salesmen's salaries and expense, then $10 additional will be assigned to this customer as his portion of the expense of supervising salesmen.

Early in this article it was indicated that a great part of selling expense is chargeable directly to geographic districts. When the district selling expense budgets being prepared are for systems of distribution used in a geographic area, much of the selling expense incurred directly for the geographic area must be allocated to the system of distribution-district budgets. Methods similar to those mentioned above for allocating selling expense to geographic districts, products, and customers may be employed or special methods may be worked out to meet the need of the particular business. Some selling expense may be incurred for a specific system of distribution, for example, the remuneration and expense of salesmen selling to a particular type of customer only, and this should be charged directly to the system of distribution.

After the selling-expense budget for a district has been completed, a partial copy must be supplied the district manager. This copy will show by items the estimated expenses to be incurred in the district and possibly the estimated head office selling expense allocated to the district, for the coming year and for each month of the year. It is not necessary to supply the district manager with a copy of the district selling expense budget showing estimated selling expense apportioned to products, since the purpose of this budget is to assist in the discovery of unit distribution costs.

Nor is it necessary to supply him with a copy of the district selling-expense budget showing selling expense apportioned to customers, since selling expense is only one item of distribution expense and the sales manager can learn little respecting the profitability of a given customer or group of customers by considering selling expense alone.

After a copy of the district selling-expense budget is received by the district sales manager, an expense budget is prepared for each salesman, and this sets a limit to the amount of expense he may incur monthly. Efficient control over sales and selling expense is only obtained when frequent comparisons are made between the actual and the budgeted sales and expense of each salesman, and each man is required to produce his quota of sales and to keep within his expense allowance.

223. Administrative Expense Budget.—The nature of administrative expense is well known to the reader. It includes all items of operating expense not directly charged to the manufacturing or selling division. Among these are fees and

expense of directors, salaries of general executives, such as the president, assistant to the president, treasurer, and secretary; general executives' traveling expense; legal expense; fees paid to auditors; and the expense of operating a number of administrative departments, including credit and collections, accounting and statistics, and general office. In many businesses the functions of the general office are performed by a number of departments.

Before a summary administrative expense budget is prepared, it is necessary to make up departmental budgets for the various administrative departments. Such budgets usually are prepared on the basis of past experience. Today some companies which have large administrative divisions are able to specialize the work of a great part of the office employees and, so to speak, set up costing centers within the administrative departments. A unit of measurement for the work performed in each cost center is established and a standard cost per unit of work calculated. Department budgets are then sometimes prepared by estimating the number of units of work that will be completed in each costing center or sub-department and multiplying the estimated figures by the standard unit costs. The purpose of establishing units of measurement for various types of office work, however, is not primarily to assist in preparing budgets but to control office expense by establishing standards of output. The payment of a bonus to office workers who beat the standard outputs frequently will increase the degree of control obtained. Units of measurement for office activities and incentive salary systems for office employees may be established for sales offices as well as for administrative departments.

Examples of units of measurement for office activities are: Number of letters written or lines transcribed in stenographic departments, number of pages or lines copied in typing departments, number of entries recorded by bookkeeping machines in certain accounting departments, number of cards punched in departments using punch-card machines, number of invoices prepared in invoice departments, and number of vouchers, sales tickets, etc., checked in auditing departments.

Estimates of general expense items not departmental in nature, such as salaries and traveling expense of general executives, legal expense, etc., as well as estimates of expense for each administrative department must be prepared. After a total for the administrative division as a whole has been arrived at, the amount must be allocated to sales districts, products, and customers or groups of customers. A simple, but not always accurate, method is to divide administrative expense among districts in the proportion that the estimated dollar sales of each district bear to the dollar sales of all districts, and then to prorate the administrative expense allocated to each district among products and customers in the proportion that dollar sales of each product and each customer bear to dollar sales of the district.

Many accountants today are attempting to improve the methods of allocating administrative and selling expense by subjecting each item of expense to functional analysis. The purpose of functional analysis, in connection with selling and administrative expense items, is to analyze each item minutely for the purpose of spreading costs in the most equitable manner among districts, products, and customers. If the functional analysis of individual expense items is sufficiently

ADMINISTRATIVE EXPENSE BUDGET (By Districts)

19—

EXPENSE ITEM	TOTAL	NEW ENGLAND	NEW YORK	PENNSYL-VANIA			PACIFIC
Directors' Fees and Expense	$	$	$	$	$		$
Executive Salaries							
Executive Expense							
Legal Expense							
Auditors' Fees							
Credit and Collection Dept.*							
Accounting and Statistical Dept.*							
General Office*							
TOTAL	$	$	$	$	$		$

* Detailed figures may be shown for departmental expense.

ILLUSTRATION 112

DISTRICT ADMINISTRATIVE EXPENSE BUDGET (By Products)

19__

District

District Manager

Expense Item	Total	PRODUCT A	PRODUCT B	PRODUCT C	PRODUCT D	PRODUCT E	PRODUCT F	PRODUCT G	PRODUCT H	PRODUCT I	PRODUCT J	PRODUCT K
Directors' Fees and Expense	$	$	$	$	$	$	$	$	$	$	$	$
Executive Salaries												
Executive Expense												
Legal Expense												
Auditors' Fees												
Audit and Collection Dept.*												
Accounting and Statistical*												
General Office*												
TOTAL	$	$	$	$	$	$	$	$	$	$	$	$

* Detailed figures may be shown for departmental expense.

ILLUSTRATION 113

minute, satisfactory methods of allocating the expense incurred for each function will usually suggest themselves. Herewith is given an example of functional analysis applied to the Sales Office Salaries account. In the particular company, the granting of credit and collecting of accounts is a sales, not an administrative, division activity.

FUNCTIONAL ANALYSIS APPLIED TO SALES OFFICE SALARIES ACCOUNT

8105	Sales Office Salaries
8105- 1	Sales Recording
8105- 2	Order and Billing
8105- 3	Adjustment
8105- 4	Transcribing
8105- 5	Filing
8105- 6	Mailing
8105- 7	Statistical
8105- 8	Customer Accounting
8105- 9	Miscellaneous
8105-10	Granting Credit
8105-11	Collecting Accounts

The trouble and expense involved in analyzing a great many individual expense items by functions and in allocating the expense incurred for each function by different methods is great, and simple methods of allocation that can be applied to totals rather than individual expense items are preferred by accountants. When extreme accuracy is essential, functional analysis of individual expense items before allocation may be necessary.

Illustration 112 shows a form for use when administrative expense is prorated to districts by individual expense items. Illustration 113 is a somewhat similar form for use when administrative expense already apportioned to districts is allocated to products by individual expense items. The same type of form might be used to distribute administrative expense to customers if the names of customers, instead of the names of products, were inserted as column headings.

224. Unit Distribution Costs.—Once the sales and various distribution expense budgets have been prepared, the calculation of unit distribution costs for each product sold in each sales district presents no difficulty. Each district delivery, advertising, market research, selling, and administrative expense budget shows the estimated delivery, advertising, market research, selling, and administrative expense to be incurred directly for or allocated to each type of product expected to be sold in a district during the coming year. The total estimated distribution costs to be incurred in each district in connection with each product is found by adding the figures shown on the five distribution expense budgets. Each district sales budget shows the estimated number of units of each product to be sold in the district during the next year. The finding of the unit distribution cost of each product sold in a district is, therefore, a matter of simple division. Frequently unit costs for each classification of distribution expense as well as total unit distribution costs, are determined. When different systems of distribution are employed in a sales district, each system of distribution is regarded as a district and, therefore, the unit distribution costs of products sold through different systems

of distribution are obtained at the same time as district unit distribution costs. As stated in Article 215, estimated unit distribution costs found in this way are frequently termed standard costs, since they are based on scientifically prepared estimates.

Estimated or standard unit distribution costs may later be compared with actual unit distribution costs. After the year for which estimated unit distribution costs are prepared is ended, the actual number of units of each product sold in each district can be learned and the actual distribution expense incurred during the year apportioned to districts and products in the same manner as estimated distribution expense was apportioned except that actual, not estimated, figures are used in making the apportionment. Actual unit costs are then obtained by simple division. A comparison of actual and estimated unit costs will not only test the accuracy of the earlier estimated costs but will supply information that will assist in improving the technique of budgeting.

It is stated in Article 217 that in some companies sales budgets are prepared in terms of sales dollars, not units of products. When this is the case, unit distribution costs must be stated in terms of a sales dollar not in terms of a physical unit of product.

In Article 215 it is indicated that it may be advantageous to discover the unit distribution costs of products sold to each large customer and to small customers as a group. The Robinson-Patman Act apparently will make this type of costing of greater importance in the future. The budgets which have already been discussed supply most of the information required. Each district sales budget shows the estimated number of units of each product to be sold to each large customer and to small customers as a group. Each district delivery expense budget gives the estimated expense of delivering each variety of product to each large customer and to small customers as a group. Since market research expense is prorated to districts, and customers, on a sales dollar basis, each district market research budget may be prepared so as to show this kind of expense prorated to each kind of product sold to each large customer and to small customers as a group. Note Illustration 109. The advertising, selling, and administrative expense budgets show the estimated advertising, selling, and administrative expense of a district apportioned to large customers and to small customers as a group, but do not show the expense apportioned to customers divided among the products sold to each customer. Once this division is made, all the information needed to calculate unit distribution costs of products sold to large customers and small customers as a group is available.

The equitable division of distribution expense already apportioned to customers among the products sold to each customer is frequently difficult. A substantial part of distribution expense is likely to be incurred for specific products but not for specific customers. Other items of distribution expense may be allocated to products sold in a given district on one basis and to customers on another.

At the present time probably the most common method of allocating expense apportioned to customers to the products sold to each customer is to divide the total expense in the proportion that the estimated dollar sales of each product

bear to the estimated dollar sales to the customer. It may be well to repeat at this point that the study of distribution costs is of recent origin and that, therefore, methods of allocating estimated or actual distribution expense are still in the process of development, and new and more accurate methods may be discovered at any time.

225. Effect of Distribution Expense Budgets on Accounting Records.—Unit manufacturing costs are used in the valuation of inventories and, therefore, when estimated costing rates are employed, as in the case of standard cost systems, the difference between the expense costed to production and the actual expense of the period must be accounted for on the books. This difference affects the profit and loss statement. Refer to Articles 199 and 209. Unit distribution costs do not affect inventory values and, therefore, actual distribution expense only is recorded on the double entry books and shown on the regular profit and loss statement. A special operating and profit and loss statement which shows the differences between actual and budgeted distribution expense may be prepared for the use of executives only. Refer to Illustration 137 in Chapter XXVII.

After the various sales and distribution expense budgets are completed, copies must be neatly and accurately prepared and filed in binders as a permanent record. These budgets, however, are not a part of the double entry system and analyses made as a result of their existence do not necessitate entries in the accounting records. In this respect costing for distribution expense is more simple than costing for manufacturing expense.

CHAPTER XXVI

BUDGETS AND DISTRIBUTION COSTS (Continued)

226. Estimated Profit and Loss Statements.—In well developed budget systems today the preparation of estimates of sales and expense for the coming year is accompanied by the preparation of estimated profit and loss statements. These statements are made up for the year as a whole and for each month of the year, for the business as a whole and for each sales district, and probably for each large customer and small customers as a group. They are sometimes prepared for each principal product manufactured or for lines of products.

The fundamental purpose of preparing estimated profit and loss statements is to test whether the plans of the management for the next year as expressed in sales and expense budgets will yield a reasonable profit or in some circumstances, such as in a period of depression, as small a loss as possible. In order to control operations, it is not enough to know that the business as a whole will be profitable. In normal years each district and each customer or group of customers should yield a profit, or if being carried at a loss because of future possibilities of profit, the amount of the loss should be known in advance in order that an intelligent judgment may be made as to whether future prospects justify the immediate loss.

After estimated profit and loss statements are prepared, it will usually be found that sales and expense budgets must be revamped. The estimated profit and loss statements will show unexpected results. Certain districts or customers that were supposed to be profitable will be shown to be unprofitable, if actual figures for next year correspond to budget figures. Examination of these cases will often show that expenses are estimated too high, or sales too low, or that if expenses are increased, sales can be increased more than proportionately. The budgets must be adjusted accordingly. The reader may have obtained the impression that sales estimates are first prepared, then expense budgets, and finally profit and loss statements. In a sense this is true, but in another sense all three processes are concurrent. Figures for all processes must be acceptable before figures for any one process can be taken as final.

Illustration 114 shows an estimated profit and loss statement for a district by months as well as for the year as a whole. Illustration 115 exhibits a monthly statement for a large customer, broken down by products. Such a breakdown indicates the products that yield the greatest profit when sold to this customer. Note that the final line of the statement gives for each product the percentage of estimated net profit per dollar of net sales. With these percentages available, estimated net profits per unit of product can be determined. Since such unit net profits are based on scientifically prepared estimates, they are often termed standard unit net profits. In many cases, the cost of breakdowns by products such as shown in Illustration 115 would be excessive and, therefore, the breakdowns are not made.

DISTRICT ESTIMATED PROFIT AND LOSS STATEMENT

19__

District

District Manager

ITEMS AT ESTIMATED OR STANDARD FIGURES	JAN.	FEB.	MAR.			NOV.	DEC.	TOTAL
Gross Sales								
Less:								
Returns and Allowances								
Federal Excise Taxes								
State Sales Taxes								
Total Deductions								
Net Sales								
Cost of Sales								
Gross Margin								
Delivery Expense								
Advertising Expense								
Market Research Expense								
Selling Expense								
Administrative Expense								
Total Distribution Expense								
Net Operating Profit								

ILLUSTRATION 114

ESTIMATED STATEMENT FOR CUSTOMER

JANUARY, 19__

Customer Address

ITEMS AT ESTIMATED OR STANDARD FIGURES	PRODUCT A	PRODUCT B	PRODUCT C		PRODUCT J	PRODUCT K	TOTAL
Gross Sales							
Less:							
Returns and Allowances							
Federal Excise Taxes							
State Sales Taxes							
Total Deductions							
Net Sales							
Cost of Sales							
Gross Margin							
Delivery Expense							
Advertising Expense							
Market Research Expense							
Selling Expense							
Administrative Expense							
Total Distribution Expense							
Expected Net Profit							
Percent to Net Sales							

ILLUSTRATION 115

The figures to prepare estimated profit and loss statements are easily obtainable. The sales budgets show the number of units of each product expected to be sold during the coming year. Towards the end of the present year the company's price list is carefully studied, adjustments in list prices and trade discounts made, and a new price list prepared. Estimated gross sales are then found by multiplying the number of units shown in the sales budgets by the prices (less trade discounts) in the price list. Returns and allowances are estimated on the basis of past experience. Excise taxes are usually a definite amount per unit of product and sales discounts a definite percentage of sales. Cost of sales is found by multiplying the number of units shown in the sales budgets by the standard unit manufacturing cost of each product. Review Chapter XXI. The distribution expense budgets supply the information respecting delivery, advertising, market research, selling, and administrative expense.

When a form similar to Illustration 115 is used, another form, Illustration 116, presents a useful picture of the company's experience with each large customer and with small customers as a group. This form shows the estimated and actual number of units of each product sold to a customer by months over a period of years, and the monthly standard net profit on the actual sales of each product and in total during the same period. If a copy of this form is supplied each district sales manager, it will assist him greatly in making sales estimates and in supervising the activities of his salesmen. At the head office the form furnishes a useful check on estimates supplied by district managers, and assists in supervising the operations of each district.

Estimated profit and loss statements play an important part in the planning of future operations and in the preparation of budgets. They also are of great assistance in the control of actual operations. Actual profit and loss statements are prepared monthly during the coming year and compared with the estimated statements. Divergencies are noted and analyzed and steps taken to remedy bad conditions. Before discussing this method of controlling distribution costs and net profits, some account must be given of how actual sales and distribution expense data are collected.

227. Accumulation of Sales Data.—When the proper mechanical equipment is used, sales both in units and dollars can be learned easily for districts (and systems of distribution), for products or lines of products, and for customers or groups of customers. Information respecting each order filled for a customer is punched on a card. Refer to Illustration 117. These cards can be sorted mechanically in any way desired and the figures punched on the cards tabulated and recorded. For example, the punched cards recording customers' orders shipped in any period may first be sorted by districts, then by individual customers, and then by products. These cards will be run through a tabulating machine which will add and print the total sales in units and dollars for each product, for each customer, and for each district. The cards may be sorted by districts, salesmen, and products, or in any way desired, and similar tabulations made.

CUSTOMER'S SALES AND PROFIT

Customer Address

MONTH	YR.	PRODUCT A		PRODUCT B		PRODUCT C		PRODUCT D		STANDARD NET PROFIT				
		EST.	ACT.	EST.	ACT.	EST.	ACT.	EST.	ACT.	PRODUCT A	PRODUCT B	PRODUCT C	PRODUCT D	TOTAL
January	37 38 39 40 41													
February	37 38 39 40 41													
November	37 38 39 40 41													
December	37 38 39 40 41													

ILLUSTRATION 116

DAY		11 MO.	DISTRICT		SALESMAN	INVOICE	ACCT. NO.	PROD. X CLASS	NO. OF UNITS	X SALES AMOUNT	X DISTRICT COST	X FACTORY COST
0	0	10	0 0	0 0	0 0 0	0 0 0	0 0 0	0 0	0 0	0 0 0 | 0 0 0 | 0 0	0 0 0 | 0 0 0 | 0 0	0 0 0 | 0 0 0 | 0 0
1	1	1	1 1	1 1	1 1 1	1 1 1	1 1 1	1 1	1 1	1 1 1 | 1 1 1 | 1 1	1 1 1 | 1 1 1 | 1 1	1 1 1 | 1 1 1 | 1 1
2	2	2	2 2	2 2	2 2 2	2 2 2	2 2 2	2 2	2 2	2 2 2 | 2 2 2 | 2 2	2 2 2 | 2 2 2 | 2 2	2 2 2 | 2 2 2 | 2 2
3	3	3	3 3	3 3	3 3 3	3 3 3	3 3 3	3 3	3 3	3 3 3 | 3 3 3 | 3 3	3 3 3 | 3 3 3 | 3 3	3 3 3 | 3 3 3 | 3 3
4	4	4	4 4	4 4	4 4 4	4 4 4	4 4 4	4 4	4 4	4 4 4 | 4 4 4 | 4 4	4 4 4 | 4 4 4 | 4 4	4 4 4 | 4 4 4 | 4 4
5	5	5	5 5	5 5	5 5 5	5 5 5	5 5 5	5 5	5 5	5 5 5 | 5 5 5 | 5 5	5 5 5 | 5 5 5 | 5 5	5 5 5 | 5 5 5 | 5 5
6	6	6	6 6	6 6	6 6 6	6 6 6	6 6 6	6 6	6 6	6 6 6 | 6 6 6 | 6 6	6 6 6 | 6 6 6 | 6 6	6 6 6 | 6 6 6 | 6 6
7	7	7	7 7	7 7	7 7 7	7 7 7	7 7 7	7 7	7 7	7 7 7 | 7 7 7 | 7 7	7 7 7 | 7 7 7 | 7 7	7 7 7 | 7 7 7 | 7 7
8	8	8	8 8	8 8	8 8 8	8 8 8	8 8 8	8 8	8 8	8 8 8 | 8 8 8 | 8 8	8 8 8 | 8 8 8 | 8 8	8 8 8 | 8 8 8 | 8 8
9	9	9	9 9	9 9	9 9 9	9 9 9	9 9 9	9 9	9 9	9 9 9 | 9 9 9 | 9 9	9 9 9 | 9 9 9 | 9 9	9 9 9 | 9 9 9 | 9 9
1	2	3	4 5	6 7	8 9 10	11 12 13	14 15 16	17 18	19 20	21 22 23 | 24 25 26 | 27 28	29 30 31 | 32 33 34 | 35 36	37 38 39 | 40 41 42 | 43 44

ILLUSTRATION 117 *Courtesy of International Business Machine Corporation*

The reader should note that not only may sales data be accumulated through punched cards but also standard factory and standard district cost data as well. Standard district cost includes standard distribution as well as standard manufacturing cost.

228. Accumulation of Distribution Expense Data.—The first step toward the collecting of distribution expense is the preparation of a chart of accounts showing the sales and administrative expense accounts required and their code numbers. The chart will contain titles of control accounts, each followed by a list of subsidiary ledger accounts, since the detailed information respecting distribution expense is collected in subsidiary ledgers. Some of the subsidiary ledger accounts may be control accounts controlling secondary subsidiary ledgers. For example, salesmen's salaries may control a secondary subsidiary ledger containing accounts showing salesmen's salaries by sales districts. The chart may include only two control accounts, Sales Expense and Administrative Expense, but usually will contain several, each corresponding to a broad classification of sales or administrative expense. Accompanying is a chart of accounts for distribution expense. The list, however, is not intended to be typical of any particular type of business. The reader should bear in mind that, since the actual distribution expense collected in ledger accounts is to be compared with budgeted expense, there must be a close correspondence between the chart of accounts and the classification of expense items found in the budgets.

CHART OF ACCOUNTS FOR DISTRIBUTION EXPENSE

8000 Delivery Expense (Control)
- 8001 Delivery Supervision
- 8002 Wages of Drivers and Helpers
- 8003 Gas and Oil
- 8004 Truck Repairs and Maintenance
- 8005 Depreciation on Trucks
- 8006 Insurance on Trucks
- 8007 Garage Expense
- 8008 Freight Out

8100 Advertising Expense (Control)
- 8101 Radio
- 8102 Magazines
- 8103 Trade Papers
- 8104 Newspapers
- 8105 Billboards
- 8106 Street Cars
- 8107 Electric Signs
- 8108 Dealer Supplies
- 8109 Samples
- 8110 Advertising Department Salaries
- 8111 Advertising Department Supplies
- 8112 Advertising Department Office Rental
- 8113 Advertising Department Furniture and Fixtures Expense
- 8114 Miscellaneous Advertising Department Expense

8200 Market Research Expense (Control)
- 8201 Salaries of Research Directors
- 8202 Salaries of Research Assistants
- 8203 Traveling Expense
- 8204 Research Supplies

8205 Research Department Rental
8206 Research Department Furniture and Fixtures Expense
8207 Research Department Miscellaneous Expense

8300 Selling Expense (Control)

8301 Salesmen's Salaries and Commissions
8302 Salesmen's Traveling and Entertainment Expense
8303 Demonstrators' Salaries
8304 Demonstrators' Traveling Expense
8305 Missionary Salesmen's Salaries
8306 Missionary Salesmen's Traveling and Entertainment Expense
8307 District Sales Managers' Salaries
8308 District Sales Managers' Traveling and Entertainment Expense
8309 Branch Office Salaries
8310 Branch Office Supplies
8311 Branch Office Rental
8312 Branch Office Furniture and Fixtures Expense
8313 Branch Office Miscellaneous Expense
8314 District Sales Conventions
8315 General Sales Executives' Salaries
8316 General Sales Executives' Traveling and Entertainment Expense
8317 Head Office Sales Department Salaries
8318 Head Office Sales Department Supplies
8319 Head Office Sales Department Rental
8320 Head Office Sales Department Furniture and Fixtures Expense
8321 Head Office Sales Department Miscellaneous Expense
8322 Head Office Sales Conventions
8323 Customers' Bad Debts

8500 Administrative Expense (Control)

8501 Directors' Fees and Expense
8502 General Executives' Salaries
8503 General Executives' Traveling Expense
8504 Legal Expense
8505 Auditors' Fees
8506 Credit and Collection Department Salaries
8507 Credit and Collection Department Supplies
8508 Credit and Collection Department Rental
8509 Credit and Collection Department Furniture and Fixtures Expense
8510 Credit and Collection Department Miscellaneous Expense
8511 Accounting and Statistical Department Salaries
8512 Accounting and Statistical Department Supplies
8513 Accounting and Statistical Department Rental
8514 Accounting and Statistical Department Furniture and Fixtures Expense
8515 Accounting and Statistical Department Miscellaneous Expense
8516 General Office Salaries
8517 General Office Supplies
8518 General Office Rental
8519 General Office Furniture and Fixtures Expense
8520 General Office Miscellaneous Expense

By an Office Rental account is meant an account that contains a portion of such items as depreciation, insurance, taxes, repairs and maintenance, and janitor service for the building in which the office is located. Similarly an Office Furniture and Fixture Expense account contains such items as depreciation, insurance, taxes and repairs on the furniture and fixtures in the particular office.

When selling and administrative expenses are incurred, the transactions are recorded on vouchers. The control and subsidiary accounts affected by each transaction are indicated. Entries are made from the vouchers to the voucher register of all amounts that affect general ledger control accounts. At the end of the period postings are made in totals to the general ledger control accounts from

the voucher register. Postings are made currently from the vouchers to the subsidiary accounts. The nature of the voucher system is fully explained in Chapter VII. Certain distribution expenses are first recorded in the general journal or on journal vouchers and posted to the proper accounts from these records. Such transactions usually represent adjustments that are required at the end of the period, for example, depreciation, insurance and taxes on furniture and fixtures and buildings, and accrued salaries. Occasionally, entries correcting entries previously made are also recorded in the general journal or on journal vouchers. The reader is familiar with the technique by which expenses are collected in control and subsidiary ledger accounts and no further discussion of this point is needed here.

After distribution expense is collected in ledger accounts it must be apportioned to districts, products, and customers. When a budget system is in use, the methods of apportionment used must be the same as those employed in preparing the various distribution expense budgets. Even though a business does not have a budget system, its management may wish to know actual unit distribution costs and to exercise some measure of control over distribution expense by comparing the actual sales of districts or products or individual customers with the total manufacturing and distribution costs incurred in making the sales. In order to make this possible, distribution expense must be apportioned to districts, products, and customers. Methods similar to those discussed in the last chapter may be used or methods more appropriate to the particular business developed.

229. Analysis of Sales Variances.—When an estimated and an actual monthly profit and loss statement for a business as a whole, for a sales district, or for a customer, are compared, the actual net profit will be found to be greater or less than expected. An analysis should be made to learn the causes of the difference and to detect immediately unfavorable conditions for which remedies should be found. Variances between actual and estimated sales is a frequent cause of variations between actual and estimated net profits.

Sales variances may be favorable or unfavorable. When a variance is unfavorable, that is, when actual sales are less than estimated, the result may be due to prices charged customers being less than those used in calculating the gross sales shown on the estimated profit and loss statement, to quantities sold being smaller than expected, or to the actual "mixture" being less favorable than the standard "mixture." By the last statement is meant that more low-priced and less high-priced goods were sold than estimated.

The effect of price changes on sales can be easily determined. Assume that estimated monthly sales for a district, customer, or product, are $20,000; actual sales (that is, actual number of units multiplied by actual prices), $16,200; actual number of units multiplied by standard prices, $18,000; and standard number of units multiplied by actual prices, also $18,000. Net price reductions account for $18,000−$16,200, or $1,800 of the decrease in expected sales. Conceivably, a better picture of the result of price reductions is to consider the effect, not on the actual quantity sold, but on planned sales. If budgeted quantities had been sold

at actual prices, total sales would have been \$20,000 − \$18,000, or \$2,000 less than expected. A similar analysis may be made if actual prices are greater than estimated prices.

When actual prices are less than estimated or standard prices, the cause may be that the management reduced prices on all or on certain commodities. The purpose may have been to meet competition or to increase sales, and the decision may have been wise or unwise. Frequently, the cause for actual prices being less than estimated prices is that salesmen fall into the habit of allowing excessive discounts. This condition is one that should be detected as soon as it arises and remedied at once.

When the number of units sold as a whole has fallen below that anticipated, the remedy may not be easy to find. Improved supervision and re-routing of salesmen or the adoption of an incentive payment plan for salesmen may assist. Possibly the advertising appropriation should be increased or expended more intelligently. Possibly prices should be reduced. Conceivably, higher prices, although accompanied by some reduction in quantities sold, would produce better results. If more low-priced and less high-priced goods are being sold than expected and this is affecting the profit of the company adversely, the situation often may be remedied by calling it to the attention of district managers and salesmen or by offering an increased commission or bonus on the sale of goods whose sales the management wishes to increase.

230. Analysis of Delivery Expense Variances.—When delivery expense is a significant part of distribution expense, variances between actual and standard or estimated delivery expense should be carefully studied. Actual railroad freight expense for districts, customers, and even products can be learned by merely sorting freight bills and compiling the data shown in these statements. Railroad freight rates seldom change and, therefore, differences between actual and estimated railroad freight expense are unlikely to be due to this cause. If this expense item is greater than expected, the reason may be that more goods were shipped than estimated, that the proportion of goods sold having high freight rates was greater than anticipated, or that different commodities were combined carelessly in the same shipments so that commodities bearing low freight rates were charged the rates of commodities having high rates. Sometimes a company falls behind in its shipments and in order to make deliveries on time uses methods of transportation more rapid and, therefore, more expensive than railroad freight; for example, railroad express, air freight, or even automobile or truck transportation.

When the railroad freight expense variance is favorable, the cause may be that the quantities of goods shipped were less than expected, that the proportion of goods sold having low freight rates was greater than estimated, or that the shipping department was unusually careful in packing goods shipped and in combining different products in shipments and thus secured unexpectedly low rates. Possibly a number of customers were induced to combine their orders and to purchase in carload lots.

When a company has its own trucking system, the analysis of delivery expense variances may be somewhat complicated. The actual number of miles traveled by the trucks during the period should be learned and divided into the total actual trucking expense to obtain an actual truck-mile rate. The actual delivery expense for products, customers, and districts is then found in the same way as the estimated delivery expense discussed in Article 219, except that actual not estimated figures are used. The variances between actual and standard delivery expense for a district, customer, or product may then be analyzed as in the following simple example:

Estimated Delivery Expense for Period (1,000,000 estimated cubic feet miles at standard rate of $.01 per cubic foot mile.)	$10,000.00
Actual Delivery Expense for Period (900,000 actual cubic feet miles at actual rate of $.009 per cubic foot mile.)	8,100.00
Total Variance	$ 1,900.00
Actual number of cubic feet miles at standard rate per cubic foot mile, 900,000×$.01	$ 9,000.00

Favorable Efficiency Variance, $9,000 – $8,100 or $900

Remainder of Variance due to quantities delivered being less than estimated, $10,000 – $9,000 or $1,000

Ordinarily the delivery department is in no way responsible for the volume of goods shipped being below that anticipated. It is responsible, however, for what is termed efficiency variance in the above example. When the efficiency variance is unfavorable the figures should be submitted to more detailed analysis. Possibly the cost of truck repairs and maintenance is excessive or truck drivers may not be operating trucks efficiently. It may be that the routing of trucks should be improved. Possibly, the company is incurring depreciation, insurance, taxes, and garage expense on trucks that are no longer needed. Conceivably, the standard truck-mile rate was based on incorrect estimates and should be revised. Favorable efficiency variances should also be analyzed in order that unusually good conditions be detected and if possible made permanent.

231. Control of Advertising and Market Research Expense.—In Articles 220 and 221 it is stated that definite appropriations are usually made for advertising and market research expense. Control over these items of expenditure is ordinarily obtained by comparing each month's actual expense with the planned expense of the advertising agency, advertising manager, and directors of research. It is to be expected that those responsible for these types of expenditures will change their plans somewhat as the year progresses, but explanations should be obtained for large variances between actual and planned monthly expenditures and for large differences in actual and expected expenditures on specific kinds of advertising and on specific research projects. Under no condition should the total advertising or market research expense appropriation for the year be exceeded without the express permission of the management.

As a rule, any marked decrease in actual as compared with planned advertising or market research expense should be regarded with suspicion rather than immediately considered as favorable. Advertising and market research expense is necessary if a company is to maintain its position in the industry and a decrease in these expense items may mean that the business will be in a weak position in future years.

232. Analysis of Selling Expense Variances.—In most companies selling expense is a great part of total distribution expense, and control of this expenditure is, therefore, of the utmost importance. After actual selling expense has been collected and apportioned to districts, customers, and products, it should be compared with budgeted selling expense and the variances noted. The first step in analyzing selling expense variances is to determine the standard selling expense for the actual number of units sold. The standard unit selling expense for each kind of product sold may be discovered by the method explained in Article 224. The standard selling expense for the actual number of units of all types of products sold is found by simple multiplication and addition.

In the analysis of selling expense variances, the importance of finding the standard selling expense for the actual quantity of commodities sold will be made clear by an example. We will consider the case of a company which sells only one product or whose varied products can be expressed in terms of one unit of measurement, such as a pound, yard, barrel, etc. Let us assume that the estimated output of this company for a year is 1,200,000 units and the estimated selling expense $120,000. The standard unit selling expense is, therefore, 10 cents. Let us further suppose that in February budgeted sales are 85,000 units, estimated selling expense $8,700, actual sales 80,000 units, and actual selling expense $8,100. The standard selling expense for the actual number of units sold in February is, of course, $8,000 (80,000 units × 10 cents a unit). The total selling expense variance is $8,700−$8,100 or $600. This variance is due to two causes, sales are less than expected and there is an unfavorable efficiency variance. Selling expense should be $8,700−$8,000, or $700 below the estimated amount, because the expected volume of sales was not realized. Because of the existence of an unfavorable efficiency variance of $8,100−$8,000, or $100, selling expense was reduced by $600 only.

Whenever unit costs are determined from yearly estimates and monthly figures are analyzed, the volume variance found is likely to be due in part to seasonal and calendar conditions. The extent to which these conditions affect the volume variance can be easily discovered. In the foregoing example the volume variance is $700. Had the estimated number of units (85,000) been sold in February, the standard selling expense would have been $8,500 and the volume variance $8,700−$8,500, or $200. Of the $700 volume variance in February, $200 is, therefore, due to seasonal and calendar conditions, that is, to the fact that sales are below normal in the business considered at this time of the year, and also to the fact that February has less working days than the average month.

At this point the reader may find some difficulty. He may reason that since many items of selling expense do not vary directly with sales, flexible budgets for

selling expense as well as for manufacturing overhead should be constructed. Theoretically, this is true but in practice today flexible budgets for selling expense are seldom prepared. The standard selling expense for different volumes of sales is found by multiplying the actual number of units sold by the standard unit selling expenses. This results in some degree of error, but the advantage of having more nearly correct figures may not be sufficient to justify the trouble and expense involved in preparing flexible budgets and in using them in analyzing selling expense.

Selling expense consists of many items, and some accountants believe that proper control cannot be established over this class of distribution expense unless the efficiency variance, when discovered, is further analyzed by items. The actual amount of each item of selling expense is known and the total standard selling expense for the actual number of units sold can be discovered as explained in the first paragraph of this article. If the latter amount can be broken down by individual items, the efficiency variance for each item of selling expense can be learned by subtraction. The following method has been suggested to discover the standard amount of each item of selling expense when the total standard selling expense for the actual quantities sold has already been calculated. Find the per cent. which each item of the year's estimated selling expense apportioned to a product bears to the total estimated selling expense apportioned to the product. Then apply the percentages so found to the total standard selling expense for the actual number of units sold. To obtain district figures add together the amounts found for each product sold in a district.

An examination of Illustration 118 will make clear how efficiency variances may be broken down by individual selling expense items. For simplicity of illustration, it is assumed that the company considered sells only one product or that its different products can be expressed by one unit of measurement. The percentages shown in column (*b*) are the percentages which the individual items in column (*a*) bear to the total of that column. The reader should keep in mind that the total of column (*d*), $4,300, is first determined as explained in this article, and the individual amounts shown in the column are found by applying the percentages shown in column (*b*) to the $4,300. The total efficiency variance, which in this illustration is unfavorable, is found by subtracting the total of column (*e*) from the total of column (*d*). The efficiency variance for each item of selling expense is discovered by subtracting the individual figures in column (*e*) from those in column (*d*).

When there are many products sold in a number of sales districts, an analysis of this kind for each district requires considerable work and the results obtained may not be worth the cost. Theoretically, at least, such an analysis can be applied not only to the selling expense of a district but to that of a customer or group of customers or even of a product or line of products.

In Art. 217, it is stated that some companies prepare sales budgets in terms of sales dollars, not of units of products, and in Art. 224 it is indicated that when this is the case, unit distribution costs are expressed in terms of a sales dollar, not of a physical unit of product. The type of analysis described in this article can be used when sales are expressed in dollars as well as when sales are stated in units.

ANALYSIS OF DISTRICT SELLING EXPENSE

MARCH, 19__

District

District Manager

ITEMS	(a) BUDGETED EXPENSE FOR YEAR	(b) %	(c) BUDGETED EXPENSE FOR MONTH	(d) STANDARD EXPENSE FOR ACTUAL SALES	(e) ACTUAL EXPENSE	(f) EFFICIENCY (d)−(e)	(g) VOLUME VARIANCE (c)−(d)
Salesmen's Salaries	$30,000	60	$2,500	$2,580	$2,500	+80	
Salesmen's Expense	10,000	20	950	860	900	−40	
District Managers' Salary	4,000	8	333	344	400	−56	
District Managers' Expense	1,000	2	100	86	90	− 4	
District Office Expense	2,000	4	167	172	210	−38	
General Sales Executive Salary	1,000	2	83	86	100	−14	
General Sales Executive Expense	1,000	2	100	86	80	+ 6	
H. O. Sales Office Expense	1,000	2	85	86	90	− 4	
	$50,000	100	$4,318	$4,300	$4,370	$−70	$18

ILLUSTRATION 118

In the former case, the standard selling expense of commodities actually sold is found by multiplying the actual number of sales dollars of each product by the standard unit selling expense of the product (expressed in terms of a dollar) and adding the figures obtained.

233. Control of Administrative Expense.—Control over administrative expense today is ordinarily secured through the careful preparation of budgets for the various items of this classification of expense and the frequent comparison of actual and budgeted figures. Comparisons are also often made with expenditures at the corresponding date of the preceding year or years. When units of measurement for the work performed in administrative departments or sub-departments are established, analysis of the expense variances of these departments or sub-departments can be made.

Let us assume that the stenographic department of a company has a budgeted expense for the year of $20,000, that the unit of measurement established for the department is a letter, and that it was estimated that 20,000 letters would be typed. The standard cost per letter is, therefore, $1.00. We will suppose that the budgeted expense for January is $1,800, actual expense $1,900, and actual number of letters typed 1,875. The expense variance for the department is apparently an unfavorable one of $100. Is this variance due to inefficient operation during the period or to more work being performed than expected, or is it due to both causes? The standard expense for the actual number of letters written is $1,875 (1,875 letters × $1.00 a letter). Since actual expense is $1,900 there is an unfavorable efficiency variance of $1,900 − $1,875 or $25. Again, since budgeted expense is $1,800 and standard expense for the number of letters actually written is $1,875, there is a variance of $75 due to the volume of work being greater than anticipated. The fact that more letters were typed than estimated should not in itself be accepted as an explanation of an unfavorable variance. It may be that unnecessary letters were written and that steps should be taken to stop this practice. Similarly, if fewer letters are typed than expected, a study should be made to learn whether any service is being neglected.

234. Comments on Control of Distribution Expense.—It is advisable to repeat again that distribution costs are still in an early stage of development, and that not only have procedures and techniques still to be perfected but that the extent to which distribution expense analyses shall be carried in a given company has, in most cases, yet to be finally determined. Accountants are becoming aware of the importance of distribution costs in guiding the activities of a business and, therefore, of the need for comprehensive and accurate figures respecting distributing expense, but these figures must be provided at a reasonable cost.

It is much more difficult and expensive to make a detailed analysis of distribution expense for a business that sells a great variety of products in many sales districts to a large number of customers than for a company that sells only one or a few products to a small number of large customers. The former concern may have to be content with a partial analysis of distribution expense or with methods

of analysis that are very general in their application; for example, the allocation of a great part of distribution expense to customers and products, and even to districts, on a sales dollar basis, and the use of the sales dollar instead of physical units to measure actual and estimated sales.

Some companies today make no attempt to control distribution expense by means of budgets, but collect distribution expense by lines of products and compare the figures with the gross profit margin of each line. This should, of course, be done by sales districts as well as for the business as a whole. Some companies prepare estimates or budgets in advance and collect distribution expense for lines of products, but do not attempt to determine standard or actual unit distribution costs. Comparisons are made between actual and budgeted expense by lines of products. Many concerns that do determine unit distribution costs do so for sales districts but not for customers or groups of customers. Businesses that prepare estimated and actual profit and loss statements and determine variances may do this for districts but not for customers or products. The variances that are found may be analyzed in detail or merely shown as totals. Some accountants today feel that an elaborate analysis of distribution expense variances is unnecessary and that too much attention should not be given to monthly variances since, over a period of months, favorable and unfavorable variances frequently tend to offset each other.

In this and the foregoing chapter, frequent reference has been made to the analysis of distribution expense by customers. The Robinson-Patman Act may result in the determination of customer unit costs becoming an important phase of cost accounting. Up to the present, however, the purpose of customer expense analysis has usually been to learn whether the sales effort expended on each customer is justified, by determining whether his account is profitable or not. Occasionally the purpose has been to enable the management to answer such questions as, what is the maximum discount that should be allowed each customer?

In the present state of the development of distribution costing, great care should be taken in interpreting the results of any cost analysis by customers. Errors of some magnitude may occur in the apportionment of distribution expense. Accounts that are unprofitable today may be profitable in the future. Further, the elimination of a number of supposedly unprofitable accounts may affect unit production and distribution costs adversely because of a decrease in the volume of sales. It is frequently sound policy to handle accounts that are found to be unprofitable or which yield little profit, through a special mail order department and to concentrate salesmen's efforts on the more profitable customers.

235. Control of Sales and Selling Expense by Means of Sales Compensation Plan.—The sales compensation plan employed can be of great importance in the control of sales and selling expense. Basically, it would seem that a sales compensation plan should have two major objectives. It should increase the sales of the most profitable of a company's products, not merely total sales; and it should assist in keeping salesmen's expense at as low a figure as is compatible with the desired amount of sales being obtained. A compensation plan that is designed

to aid in the control of sales and selling expense should be applicable not only to salesmen, but also to district sales managers, who are responsible for the training, supervision, and stimulation of the sales force.

The first step in creating an adequate compensation plan is the preparation of a table or schedule showing standard or estimated ratio profit values. Since a schedule of standard ratio profit values is of importance apart from its use in connection with a compensation plan, its method of preparation will be briefly explained. Illustration 119 shows such a schedule for a flour milling company that sells eight

X. Y. FLOUR MILLS, INC.
STANDARD RATIO PROFIT VALUES PER BARREL

DISTRICT	GRADE A	GRADE B	GRADE C	GRADE D	GRADE E	GRADE F	GRADE G	GRADE H
No. 1	1.46	1.50	1.30	1.40	1.20	.90	Unity 1.00	1.10
No. 2	1.40	1.45	1.30	1.35	1.25	.85	.95	1.05
No. 20	1.30	1.35	1.20	1.30	1.15	.80	.90	1.00

ILLUSTRATION 119

grades of flour in twenty sales districts. To prepare this table the profit per barrel on each grade of flour sold in each district was learned. If the business had an adequate cost system for both manufacturing and distribution expense, there was no difficulty in this. The profit per barrel on one grade of flour sold in a certain district was chosen as a base profit, that is, it was denoted by 1 or unity. The profits per barrel on all the other grades of flour sold in each district were then stated as ratios to the base profit. The product whose profit is chosen as the base is usually one which sells in considerable quantity but whose profit per unit is relatively small.

If a company sells a great variety of products, it is scarcely possible for a compensation plan to take into account each individual product. In this circumstance,

before the schedule of standard ratio profit values is prepared, the products are grouped together in a few classifications, the profits per unit of all products included in a classification being approximately the same. Many companies cannot find a single physical unit such as a barrel in which all the products sold can be expressed. When this is the case, a sales dollar may be used as the unit of measurement.

A schedule such as shown in Illustration 119 can be of great assistance in the instruction and supervising of salesmen. It can also be used by the advertising manager and the advertising agency to select the products to be stressed in advertising.

When sales and selling expense budgets for each salesman as referred to in Arts. 217 and 222, and a schedule of standard ratio profit values are available, a compensation plan that will assist in the control of sales and selling expense can be devised easily. A plan for the X. Y. Flour Mills, Inc., will be described. The reader must keep in mind, however, that the compensation system discussed is merely illustrative.

Each salesman of the X. Y. Flour Mills, Inc., receives a fixed monthly salary which is paid regardless of the amount of sales made. He also has the opportunity of earning two bonuses, which will be referred to as Bonus A and Bonus B, respectively. Bonus A is calculated as follows: The sales budget of each sales-

SALESMEN'S PERFORMANCE REPORT, JANUARY 19____
JOHN JONES, DISTRICT 1

Grade of Flour	Actual Sales Net Barrels	Weight Factor	Weighted Sales Barrels	Allowed Expense
A	100	1.46	146	
B	104	1.50	156	
C	90	1.30	117	
D	95	1.40	133	
E	80	1.20	96	
F	50	.90	45	
G	78	1.00	78	
H	90	1.10	99	
Total	687		870 at $.20	$174.00

Bonus A
Sales, Weighted Barrels 870
Quota, Weighted Barrels 710

Above Quota 160 at .25 = $40.00

Bonus B
Allowed Expense $174.00
Actual Expense 134.00

Saving $40.00 at 30% = $12.00

Total Bonus $52.00

Bonus Paid in Cash—50% $26.00
Reserve—50% $26.00

ILLUSTRATION 120

man shows the number of barrels of each grade of flour which he is expected to sell in each month of the year. The budget amounts are converted into weighted barrels by multiplying them by the figures given in the schedule of standard ratio profit values, Illustration 119. The actual number of barrels sold by the salesman during the month is also converted into weighted barrels. If the actual weighted barrels are greater than the salesman's quota, he is granted a bonus of, let us say, 25 cents a weighted barrel on the excess. If desired, the bonus may begin when the salesman reaches a certain percentage of his quota.

Bonus B is related to the expense budget of each salesman. If the actual expense of the salesman is less than his allowed expense he is paid a certain percentage (possibly 30%) of the difference as a bonus. Allowed expense and budgeted expense are not identical. If this were the case, it would be possible for the salesman to earn a bonus by neglecting to visit customers. The allowed expense is based on the actual number of weighted barrels sold. A schedule showing the allowed expense per weighted barrel for different volumes of sales is prepared. The allowed expense for the month is found by multiplying the actual number of weighted barrels sold by the appropriate figure in the schedule.

Illustration 120 shows a form on which the total bonus of John Jones, a salesman in District 1, for the month of January is calculated. Note that the salesman

DISTRICT MANAGER'S PERFORMANCE REPORT, JANUARY 19____

WILLIAM SMITH, DISTRICT 1

Salesman	Actual Barrels	Weighted Barrels		Expense	
		Quota	Actual	Allowed	Actual
Jones	687	710	870	$ 174	
McLean	650	680	835	204	
Robinson	710	765	910	156	
Finn	730	805	940	183	
Flanagan	685	705	877	190	
Peters	693	715	899	199	
Hunter	701	800	904	201	
Total		5180	6235	$1307	$1005

Bonus A

Actual Weighted Barrels	6235	
Quota Weighted Barrels	5180	
Above Quota	1055 at .15 =	$158.25

Bonus B

Allowed Expense	$1307	
Actual Expense	1005	
Saving	$302 at 20% =	60.40
Total Bonus		$218.65
Bonus Paid in Cash—50%		$109.33
Reserve—50%		$109.32

ILLUSTRATION 120A

is paid half the bonus immediately and that the remainder is set aside in a reserve to offset months in which the salary paid him is not earned. If there is a credit balance in the reserve at the end of the year, the balance is paid the salesman. Monthly salesmen's performance reports such as exhibited in Illustration 120 are of great assistance to district managers in supervising the activities of their sales forces.

The sales compensation plan of the X. Y. Flour Mills, Inc., also provides a financial incentive for district sales managers to exercise proper supervision over their salesmen. Each district manager in addition to a fixed monthly salary is paid a bonus (Bonus A) when the actual number of weighted barrels sold in his district exceeds the district quota. The bonus is stated as a certain amount per weighted barrel, perhaps 15 cents. In addition, each district manager receives a bonus (Bonus B), if the actual expense of his salesmen is less than the allowed expense. The bonus is a certain percentage of the saving, possibly 20 per cent. Illustration 120A is a monthly district sales manager's performance report, which shows how the total bonus of William Smith, Manager of District 1, is calculated. Such reports assist the general sales manager in reviewing the accomplishment of his district managers.

PART V

EXECUTIVE USE OF COSTS

CHAPTER XXVII

COST REPORTS FOR EXECUTIVES

236. Accounting Reports for the Executives.—For the successful operation of any cost accounting system, it is necessary that there be a series of checks constantly in force, so that the officers in charge may know at all times whether favorable or unfavorable conditions are developing. This principle applies to standard cost systems even more than it does to non-standard systems, because the necessity of rigidly maintaining standards requires that the executives be informed respecting off-standard conditions as soon as they arise. It is therefore the duty of the accountants to prepare reports to be submitted to the various executives. How frequently the reports are prepared depends on circumstances. If, for instance, there have been continual below-standard conditions for the past several months, it is obvious that the check must be extremely frequent. On the other hand, if operations have been normal for a considerable period of time, the degree of watchfulness need not be so great.

The preparation of reports for submission to executives demands care and initiative on the part of the accounting department. Many executives have little knowledge of the science of accounting, and it is important, therefore, that they be not embarrassed or angered by being asked to examine a statement the nature of which puzzles them. Many executives, moreover, do not appreciate the value of a cost accounting system, and they will think even less of its worth if all that it produces is a mass of unintelligible figures. The cost accountant must show that he can secure beneficial results by his activities; for this reason, he must, in preparing his reports, remember the fact that the simpler and more straightforward the statements are, the more they will be appreciated.

One of the chief principles that the accountant should keep in mind when making up statements is that different kinds of reports are required by different executives. A general manager does not want to be bothered with details about why this or that worker in Cost Center No. 1 did not meet the standards. The work of the general manager covers so wide a field that he has absolutely no interest in such detailed items. The foreman of Cost Center No. 1, on the contrary, has his attention centered upon the achievements or the fall-downs of those working under him; but his interest does not extend far beyond his own cost center—it is

NOTE.—In the following pages, some of the material relating to cost reports is taken from the author's book, Cost Presentations for Executives, which was awarded first prize by the National Association of Cost Accountants, and is published by that association. It is with the permission of the Association that the material used is included in the following pages.

likely that he is only mildly interested in what is taking place in production departments in other sections of the plant. Hence the accountant must analyze the individual needs of the executives, and the reports that he prepares must contain those items, *and only those items*, in which they are interested—items that will aid them in guiding the particular portions of the plant under their control.

The first step, then, in laying a foundation for the preparation of cost reports, is to classify the executives according to their authority and according to the portion of the company's records in which they are interested. It should be asked at the start, "Who are the executives?" The answer to this question is not difficult: the executives are those responsible for carrying out the plans and policies of the firm. Study of this definition shows that the number of executives in the average concern is extensive. All employes who have any share in the guiding of activities, who control a section of the business, or who have a number of men working under them are clearly included within the definition. A foreman of a cost center, then, is just as truly an executive as the general manager, because specific responsibility has been given him to carry out the policy of the board of directors in a particular section of the plant. The president, the vice-president, the general manager, the sales manager, the purchasing agent, the chief chemist, the chief clerk, the foremen, the gang bosses—all are executives, all have responsibilities, and all have a right to receive reports from the accounting department.

In order that a basis may be available to guide the accounting department in drawing up statements, the executives must be classified. Roughly speaking, the executives of any plant may be divided into three groups: (1) the minor executives, (2) the departmental executives, and (3) the general executives. The minor executives are those who hold a position immediately over the general run of workers; this group includes the foremen and gang bosses, the master mechanics, the chief storekeeper, the branch sales managers, the cashier, and the like. The departmental executives are those entrusted with the control of a large division of the enterprise, in which is carried on a group of closely related activities; among these executives are the superintendents, the district sales managers, the purchasing agent, the auditor, the chief chemist, the employment manager, and the office manager. Seldom do the departmental executives have direct contacts with the workers; they exercise their authority, instead, through the minor executives. The topmost class of executives contains the general executives, among these being the board of directors, the president, the vice-president, the general manager, the secretary, the treasurer, and the sales manager. It is the general executives who originate the policies which the company is to follow. The carrying out of these policies is the work of the departmental executives.

237. Principles of Presentation.—Since there is a large number of executives with different degrees of authority and each with his interest centered on a different aspect of the firm's operations, it is necessary for the accounting department to be guided by general principles in preparing reports. The following four principles will aid in determining the nature of the various statements to be made up:

(1). *Reports should be shaped to meet the specific needs of a particular executive.* There is nothing difficult to understand in this statement. The accountant must remember that executives are not made for accounting reports, but that accounting reports are made to serve the requirements of the executives. The reports should be simple; they should be to the point; they should contain nothing uninteresting; they should avoid technical language as far as possible; and they should be convincing.

(2). *The period of time covered by a cost report should vary according to the degree of executive responsibility.* Some of the executives are interested in day-by-day details; others need only to examine the summaries for the operations of a month, a quarter, or even a year. The minor executives, who are in control of the detailed daily activities of the company, require reports on the detailed daily activities. They cannot establish adequate control if they do not receive until two or three weeks afterward an account of what is happening in the cost centers today. It is essential that the minor executives be informed immediately of developments, so that all conditions that bring about below-standard results may be quickly remedied, and that immediate advantage may be taken of all above-standard conditions. *Live* cost reports to the minor executives can do much to ensure favorable accomplishment, because the daily decisions of the minor executives guide production and sales.

While the minor executives are especially interested in details, the interest of the general executives is in summaries—in reports of long-range activities of the production and sales departments. Since the decisions that the general executives make on the basis of the reports of the accounting department will affect production and selling over an extended period of time, the reports submitted to them should summarize production and sales data for extended periods. This being so, reports cannot be drawn up very frequently.

(3). *Cost presentations shift from measuring individuals and individual items under minor executives to measuring departmental summaries, trends, and general movements for the higher executives.* Minor executives are interested in the individual operations of the workers under them, whether these workers be salesmen, mechanics, or clerks. The duty of the minor executive in an enterprise is to see that specific individuals and specific machines function properly. As cost reports must help the minor executive to reach a more efficient level of production, they must measure the efforts of each salesman and mechanic and the results of each machine. In contrast to this, the reports that go to the higher executives cover the total activities of each department over a considerable period of time, or show general trends for the enterprise as a whole.

(4). *The higher the rank of the executive, the greater should be the care given to the form and content of the cost reports.* Cost reports that go to departmental and general executives should be neatly prepared, clear and simple in arrangement, and, if possible, limited to one topic. The material contained in them should be accurate, and should be presented in such terms that there can be no misunderstanding of the facts set forth. That this principle is an important one will be readily realized

when it is remembered that important policies may be decided on the data contained in a cost report.

238. Cost Reports for Minor Supervisors.—The minor executives hold positions immediately above the rank and file of workers, and they direct the detailed daily activities of the enterprise. It is the minor executives who, day by day, keep a check on each mechanic, salesman, and clerk. They are constantly engaged in telling how the work is to be done. They suggest the best ways for handling material, for getting good results from the machines, for increasing sales of specific lines, and so on. The minor executives have as their function the carrying of the spirit and policy of the business to the individual workers. They are the morale builders. Cost reports to the minor executives, checking the daily accomplishment of the men working under them, can contribute considerably to the building of a healthy spirit of cooperation between the workers and their superiors. By such cost reports, the accountant is able to show why the worker is failing to earn the highest wages possible and why he fails to gain the bonuses offered for good work; at the same time, he is indicating to the minor executive how the performance of his men may be improved. Thus there is every reason for the accountant, the minor executive, and the worker to join in an alliance that will contribute to the welfare of all.

The accountant must never feel, because the minor executives are at the bottom of the ladder of supervisors, that the cost statements to be submitted to them are of little importance. Each minor executive has a considerable share in contributing to the success or failure of an enterprise, and cost reports to guide him will produce many benefits. If, through cost presentations, a salesman learns whether or not he is reaching his quota, or whether one line of merchandise is more profitable than another, or if a worker discovers how better to make his bonus, then such presentations are of worth and should be encouraged and developed just as wholeheartedly as reports that go to the higher authorities.

Hundreds of statements are being used in industry, and hundreds of others could be devised, to acquaint the minor executives with the cost information needed to enable them to guide their workers intelligently. But the types of reports that are most beneficial for this purpose, the facts that they usually contain, and the general spirit that runs through all of them can be readily understood by an examination of the accompanying sample reports. These samples are of four classes: (1) performance reports for foremen; (2) material reports for storekeepers; (3) reports for minor sales executives; and (4) presentations for minor office executives.

(1). *Performance Reports for Foremen.*—The major interest of every efficient foreman is the performance of his workers. Since the foreman is likely to be untrained in the principles of accounting, he will be much more interested in having a record of good performance than in having a low unit cost of production. Of course, if there are low unit costs, there must be good performance; and, likewise, good performance should result in low unit costs. But the point to be remembered is that the goal of the foreman is the securing of the efficient efforts of his workers rather than the achievement of a certain unit cost. This being so, it is important

that all reports submitted to him reflect on the individual workers, whether favorably or unfavorably.

In Illustration 121, is presented an effective type of cost report, which is intended to supply the foreman daily with information relative to the extent of and reasons for off-standard conditions in his cost center. On July 12,

SECTIONAL COST REPORT

Date July 12, 19__ Cost Center A-12

Actual Costs $225.30 Standard Cost $219.85 Foreman Louis Gordon

Off-Standard Workers	Actual Labor Cost	Standard Labor Cost	Reasons for Off-Standard Costs
T. Smith	$ 6.20	$ 5.25	Inefficiency of operator
B. Jones	9.70	8.40	Special overtime allowance
J. Fry	10.20	9.90	Extra operations
W. McLean	6.50	4.30	Machine breakdown
P. Mahler	4.90	4.20	Faulty tools
	$ 37.50	$ 32.05	
Remainder of Cost Center	187.80	187.80	
Totals	$225.30	$219.85	

ILLUSTRATION 121—DAILY DIRECT-LABOR COST REPORT FOR THE FOREMAN

according to the illustration, $219.85 was the standard amount allowed for direct labor, but the actual cost was determined to have been $225.30 The operators that failed to attain the standard and the reasons why they failed are also shown, and as the report is furnished daily the foreman is expected to take immediate steps to avoid excess costs in the future.

Another statement analyzing the performance of individual workers is shown in Illustration 122. In this report, the amount of spoiled work, the work that failed to pass the inspectors, is set forth and the responsibility of each operator is determined. In the enterprise that used this report, each worker was charged with 25 per cent. of the cost of spoilage, but this rule need not necessarily be adopted by all companies using a similar statement.

Still a third form that may be used in reporting to the foreman is displayed in Illustration 123. The purpose of this statement is to analyze the efficiency of each worker by setting forth the level, above or below standard, at which he operates during the course of a week. In the event that a below-standard level was the result of conditions for which the worker was not responsible, these conditions must be clearly included in the report in order that the worker may be absolved from blame.

(2). *Material Reports for Storekeepers.*—Statements to be submitted to the storekeepers are important because the inventories of materials usually represent such large sums of money that a good system of control should be employed. If adequate checks on the stores department are not maintained, there is grave danger

WEEKLY COST REPORT ON SPOILAGE

Week Ending April 20, 19__ Cost Center Winding Section

Foreman Alex Robertson

Operator	Total Units Produced	Passed Inspection	Spoilage	Percentage of Spoilage	Cost Per Unit Spoiled	Cost of Spoilage	Deducted from Wages 25%
1	324	302	22	6.79	13.2c	$ 2.90	$ .72
2	357	314	43	12.04	13.2c	5.68	1.42
3	284	268	16	5.63	13.2c	2.11	.53
4	302	274	28	9.27	13.2c	3.70	.92
5	290	278	12	4.14	13.2c	1.58	.40
6	327	312	15	4.59	13.2c	1.98	.50
7	348	318	30	8.62	13.2c	3.96	.99
8	313	296	17	5.43	13.2c	2.24	.56
9	287	271	16	5.57	13.2c	2.11	.53
10	299	278	21	7.02	13.2c	2.77	.69
11	312	301	11	3.53	13.2c	1.45	.36
12	318	287	31	9.75	13.2c	4.09	1.02
13	302	281	21	6.95	13.2c	2.77	.69
14	292	279	13	4.45	13.2c	1.72	.43
Total	4,355	4,059	296	6.80		$39.06	$9.76

ILLUSTRATION 122—SPOILAGE REPORT FOR THE FOREMAN

of wasteful use of materials and supplies, a situation similar to that which would exist if a cashier or treasurer were permitted to handle the funds of the company carelessly.

Probably the chief interest that the accountant has in the stores department is the keeping of the actual inventory in line with the book inventory. To accomplish this, it is desirable to have a *daily* check on the actual inventory. This does

WEEKLY PERCENTAGES OF STANDARD

Week of April 5, 19__ Section Heavy Machine

Foreman Earl A. Smith

Worker's		Percentages of Efficiency			Remarks
No.	Name	Present Week	Previous Week	Previous Month	
87	Steve Blake	96	92	90	O. K.
102	David Clark	108	98	97	No holdups. Excellent working conditions prevailed
191	Dick Myer	82	89	90	Machine needs repairs. Should not be penalized
208	Ralph Harrison	98	99	99	O. K.
212	John Sabota	78	83	85	Inefficient workman. Should be moved to another section or discharged

ILLUSTRATION 123—WORKMAN EFFICIENCY REPORT FOR THE FOREMAN

not mean that there should be a complete inventory taken daily, but that a portion of the stores should be checked each day, so that by the end of a given period, say a month, the total inventory will have been checked completely. A form to be used in this daily inventory check is shown as Illustration 124.

DAILY REPORT OF STORES BINS CHECKED

Date_____ No._____

Bin Records			Stores Ledger Quantity	Adjustment of Stores				
Bin No.	Description	Quantity		Quantity	Price	Amount Over	Amount Under	Reason

Checked by:_____ Over_____

Bins Scheduled:_____ Under_____

_____ Chief Storekeeper

ILLUSTRATION 124—REPORT CHECKING ACTUAL INVENTORY WITH THE BOOK INVENTORY

The cost of handling stores is also of major interest to the cost accountant. Illustration 125 was devised to record the expense of stores handling, this expense being compared with the value of the materials handled. This or a similar statement should be made up weekly, and a chart should be used in connection with it, showing how the ratio of the handling costs to the value of the materials handled

COST OF STORES HANDLING

From_____ To_____ Storekeeper_____

Value of Stores Handled	Store Room Wages	Receiving and Testing Costs	Other Overhead	Total Cost of Stores Handled	Ratio of Costs to Value of Materials Handled

ILLUSTRATION 125—ANALYSIS OF STORES HANDLING EXPENSE FOR THE STOREKEEPER

for the current week compares with the ratios of the past several weeks. The value of the stores handled represents the total of shipments received and placed in the storeroom since the time of the preceding report plus the total of the requi-

sitions that were presented to the storekeeper for the issuance of materials to the production centers.

(3). *Reports for Minor Sales Executives*—As foremen represent the first step up from the rank and file of workers, the minor sales executives represent the first step up from the regular salesmen. These executives must keep a frequent check—daily, if possible—on each individual salesman to see that he is selling satisfactorily. It is not enough to know that a salesman is selling a certain quantity of goods; the essential point is to know *what* he is selling. Perhaps he is overlooking the most profitable lines, and is selling a type of goods in which the company is not keenly interested. The minor sales executives, therefore, should be informed regarding which lines are profitable and which are not—and the records of the salesmen should be analyzed to discover whether they are selling the more profitable lines.

WEEKLY SALES SUMMARY

Week Ending February 20, 19__ District Pittsburgh Branch Oakland

Branch Sales Manager Philip Snow

Name of Salesmen	Sales Volume		Analysis of Lines of Goods Sold								
	Last Week	This Week	A1724	A1726	A1728	A1730	A1732	A1734	A1736	A1738	A1740
Harry Cleveland	1,845	1,720	225		50	315	418	623			89
Kenneth Gould	1,180	1,415			110	35	782	488			
Howard Blatz	1,970	1,930	47	84	203	119	540	673	121	47	96
Emil Kidd	535	510	8		44	390	40	28			
Robert Wade	1,700	960				645		315			
Frank Ayars	810	1,115				219	38	746	50	55	7
Clarence Marshall	675	700	470	15		215					
Charley Van Sickle	905	1,010			300	260	232	118	100		
Henry Hall	340	665				150		295	200	20	

Remarks:
Stress: A1726, A1728, and A1732
Drop: A1738, A1740
Standard: A1730, A1734

ILLUSTRATION 126—SALES ANALYSIS REPORT FOR THE MINOR SALES EXECUTIVE

Illustration 126 shows such an analysis. This report not only shows the sales volume of each salesman but also indicates under the heading "Remarks" the lines upon which particular effort should be expended.

Every sales department should set quotas for its salesmen; this matter was discussed in an earlier chapter when it was said that each worker should have a target at which to shoot—something by which to measure his accomplishment. Not only should a quota be set for the volume of sales, but there should be a quota for expense. Much of the advantage of a large volume of sales may be lost if the expenses of the salesmen are exorbitant. In Illustration 127 is shown a form to be used in comparing actual sales with the sales quotas, and actual expenses with expense quotas.

(4). *Presentations for the Minor Office Executives.*—The usual routine of office procedure leaves little in the way of cost reports for the chief clerk, the bureau chief, or the overseer of the typical office force. The most important device that may be used to improve the control of office expenses is an expense budget. In addition a graph or chart on which are plotted the expenses of the preceding year should be kept in a prominent place, and on it should be plotted the expenses of the current year weekly or monthly. In this way, there is maintained a constant comparison of the records for the two years.

REPORT OF SALESMEN

Week Ending_____ District_____

Branch_____

Branch Sales Manager _____

Salesmen		Quotas		Actual Sales	Percentage of Working Quota	Actual Expenses	Budget Allowance for Expenses	Over* or Under Budget	Remarks
No.	Name	Ideal	Working						

ILLUSTRATION 127—FORM TO BE USED IN ANALYZING SALES AND EXPENSE QUOTAS FOR THE MINOR SALES EXECUTIVE

239. Cost Reports for Departmental Superintendents and Managers. Departmental executives differ from minor executives in that, instead of supervising the work of the rank-and-file employes, they supervise other executives—the foremen of the cost centers, the master mechanics, the branch sales managers, etc. They differ from the general executives in that their range of influence does not cover every branch of the enterprise, but is limited to a particular production department, to a specific sales district, or to some other highly specialized field. The departmental executives have two chief functions: (1) to supervise the work of the minor executives under their authority; and (2) to coordinate the work of these minor executives and of the workers under them into a unified whole. They are responsible for all the conditions existing in a department which are beyond the jurisdiction of any of the minor executives. In a production department, for instance, the superintendent must regulate the flow of materials to the cost centers; he must see that there is as little machinery idle as possible; he must direct special and rush orders; he must carefully supervise and measure new work; he must keep a constant check on overhead expenses; and he must prevent friction, both among the foremen and between the workers and their foremen.

The interests of the departmental executives lie in the records of the branches of their departments as units, and not in the individuals who make up those

DEPARTMENTAL LABOR COST REPORT

Month September, 19__ Department Large Industrial Motors

Direct Labor Cost for the Month $29,104.60 Should Have Cost $25,242.20

Section No.	Section Name	Actual Cost	Standard Cost	Percentage of Excess Cost	Remarks
T1	Bearing	$ 1,792.00	$ 1,600.00	12%	
T2	Assembly	2,622.00	2,300.00	14%	
T3	Winding	3,322.80	2,840.00	17%	
T4	Brush Holder	2,912.00	2,600.00	12%	
T5	Commutator	3,463.40	3,038.00	14%	
T6	Core Building	1,694.80	1,436.20	18%	
T7	Shaft	1,822.20	1,584.60	15%	
S2	Assembly	2,045.80	1,818.40	13%	
S3	Paint and Shipping	2,227.20	1,920.00	16%	
S4	Frames	2,765.20	2,230.00	24%	
S5	Brackets	1,789.40	1,612.00	11%	
W8	Coils	2,647.80	2,263.00	17%	
	Totals	$29,104.60	$25,242.20	15%	

ILLUSTRATION 128—DIRECT LABOR STATEMENT FOR THE DEPARTMENTAL EXECUTIVE

branches. Reports to them, therefore, should be *summaries* of what is taking place, and all details as to the success or failure of individual workers should be omitted. In Illustration 121, there is an analysis of daily labor costs compared with standard labor costs to guide the foreman in the control of his cost center. The departmental executive is also interested in direct labor costs, but he is inter-

MONTHLY REPORT OF SALES QUOTAS

Month_____ District_____

District Manager_____

Branch No.	Head of Branch	Sales Quota for Month	Sales Made	Over or Under* Quota	Expense Allowance	Actual Expense	Over* or Under Expense Budget	Remarks

ILLUSTRATION 129—ANALYSIS OF SALES AND EXPENSE QUOTAS FOR THE DISTRICT SALES MANAGER

ested in them as summaries. Illustration 128, which is an analysis of actual direct-labor costs as compared with the standard costs, is a report suitable for the use of the departmental executive. Instead of supplying information for a single day, this statement summarizes data for a month. Instead of listing the off-

standard operations within each cost center, it merely gives a total figure for each center, and every cost center in the department is shown.

The district sales manager, a departmental executive, is likewise interested in summaries rather than in details regarding individuals. In contrast, therefore, to Illustration 127, which is used to report to the branch sales manager (a minor executive), is Illustration 129, which is a form of report that goes to the district sales manager. Here again it is seen that data regarding individuals are omitted, for what is wanted is a simple statement of the records of all the sales branches within the district, set forth without confusing details.

MONTHLY EXPENSE REPORT

Month December, 19__ Department D

Direct Labor Hours 30,000

Expenses		Expense per Direct Labor Hour	Budget Allowance per Direct Labor Hour	Over* or Under Budget	Remarks
Items	Amount				
Fixed Charges (Est.)	$1,600.00	5.3c	5.3c	———	
Fuel Oil	1,500.00	5.0c	4.5c	.5c*	
Stores	6,768.00	22.6c	23.0c	.4c	
Repairs	5,601.20	18.7c	15.0c	3.7c*	
Compensation Insurance	2,200.00	7.3c	7.0c	.3c*	
Coal	18,380.00	61.3c	55.0c	6.3c*	
Inspection	9,402.40	31.3c	30.0c	1.3c*	
Miscellaneous Expenses	3,825.60	12.8c	16.0c	3.2c	
Indirect Payroll	31,600.00	105.3c	110.0c	4.7c	
Totals	80,877.20	269.6c	265.8c	3.8c*	

ILLUSTRATION 130—EXPENSE SUMMARY FOR THE DEPARTMENTAL EXECUTIVE

Probably the element that holds the greatest interest for every departmental executive is the item of expense. Hence the cost accountant, in outlining the type of reports to be submitted to these executives, must always be certain to include an analysis of departmental expenses. A sound report of this kind for a factory executive is given in Illustration 130. Here the overhead expenses of the department are carefully examined—the total expenses are listed, the actual costs per direct labor hour are compared with the standard costs. The items listed in the Over-and-Under-Budget column are to be used as a basis for controlling these expenses in the future.

One of the factors that contribute to excessive factory expense is idle capacity. If, when there are enough orders on hand to keep the factory running at full capacity, there are, nevertheless, periods when some of the machines are idle, such idle capacity is entirely the result of factory conditions—and the superintendent should be held responsible. He is at fault if materials do not flow smoothly through the cost centers, if supplies do not arrive from the storeroom on time, or if, for any other reason, the workers must stop their activities until some conditions, whatever they may be, are adjusted. Because of his responsibility, the accounting depart-

DEPARTMENTAL IDLE-MACHINE REPORT

Month March, 19__ Department Small Machines

Section	Full Capacity Hours	Actual Hours	Idle Hours	Percentage of Full Capacity	Cost of Idle Capacity	Remarks
1	1,000	912	88	91.2	$ 52.80	
2	1,600	1,427	173	89.2	121.50	
3	2,200	1,690	510	76.8	682.75	
4	800	705	95	88.1	74.00	
5	1,200	1,018	182	84.8	108.30	
6	1,200	1,045	155	87.1	132.65	
7	1,800	1,210	590	67.2	487.50	
8	400	240	160	60.0	110.00	
Totals	10,200	8,247	1,953	80.9	$1,769.50	

Full Productive Capacity (25 Days) 10,200 Hours Section Showing Most Idleness No. 8

Actually Worked 8,247 Hours

Percentage of Full Capacity Worked 80.9 Section Showing Least Idleness No. 1

Remarks

All section chiefs under 80% capacity to give detailed report at foremen's committee meeting next week.

ILLUSTRATION 131—STATEMENT OF IDLE CAPACITY FOR THE DEPARTMENTAL EXECUTIVE

MONTHLY PRODUCTION COST REPORT

Month June, 19__ Department K

Superintendent George K. Soisson

Cost Item	Total Cost	Unit Cost	Unit Cost Last Month	Unit Cost Last Year	Remarks
Direct Labor	$10,900.00	$2.1165	$2.1176	$3.0974	
Variable Burden:					
Indirect Labor	2,900.00	.5631	.5820	.6012	
Repairs	885.00	.1718	.2331	.2360	
Experimental	230.00	.0447	.0280	.0521	
Heat and Light	210.00	.0408	.0397	.0429	
Insurance	322.58	.0626	.0548	.0542	
Power	2,700.00	.5243	.6114	.6011	
Elevator Expense	201.73	.0392	.0352	.0333	
Sundry	395.00	.0767	.0559	.0499	
Totals	$18,744.31	$3.6397	$3.7577	$4.7681	

Production:

Number of Brakes Made This Month 5,150

Number of Brakes Made Last Month 5,305

ILLUSTRATION 132—CALCULATION OF UNIT COSTS FOR THE DEPARTMENTAL EXECUTIVES

MONTHLY DEPARTMENTAL COST ANALYSIS

Department	% Actual to Normal	DIRECT LABOR			OVERHEAD EXPENSE			Variance Due to		DIRECT MATERIALS			GRAND TOTAL		
		Standard	Actual	Better or Worse Than Standard	Standard	Actual	Better or Worse Than Standard	Controllable	Volume	Standard	Actual	Better or Worse Than Standard	Standard	Actual	Better or Worse Than Standard
Service															
Machine Shop	98				$ 1,530 57	$ 1,411 89	$ 118 68	$ 125 10	$ 6 42*				$ 1,530 57	$ 1,411 89	$ 118 68
Pipe Shop	96				325 10	321 45	3 65	4 60	.95*				325 10	321 45	3 65
Electrical Dept	92				362 82	321 58	41 24	45 62	4 38*				362 82	321 58	41 24
Direct															
Rod Mill	104	$ 4,909 88	$ 4,563 07	$ 346 81	$ 24,755 96	$ 22,647 57	$1,908 39	$1 054 00	$ 854 39	$ 98,410 42	$ 97,588 48	$ 821 94	$128,076 26	$124,999 12	$ 3,077 14
Wire	123	12,259 28	11,991 28	268 00	27,223 92	19,869 16	7,354 76	2,386 01	4,968 75	213 007 33	210,101 06	2,906 27	252,490 53	241,961 50	10,529 03
Cleaning	88	4 385 56	4,147 77	237 79	10,346 03	11 066 53	720 50*	109 74	830 24*				14,731 59	15,214 30	482 71*
Annealing	84	251 68	167 80	83 88	1,414 64	1,742 84	328 20*	90 12	418 32*				1,666 32	1,910 64	244 32*
Total		$40,996 76	$38,920 53	$2,076 24	$126,597 80	$118,948 50	$7,649 30	$4,289 62	$3,359 68	$396,626 18	$393,751 06	$4,875 12	$566,220 74	$551,620 06	$14,600 66

ILLUSTRATION 133

ment should supply to the superintendent reports summarizing the idle capacity for a specific period in order that he may be guided in eliminating the conditions that cause the idleness. Such a report appears in Illustration 131.

Finally, it may be the duty of the cost accountant to calculate for the departmental executive the unit costs of producing or selling goods. It has been said that the minor executive is more interested in the performance of his men than in unit costs; the departmental executive, on the other hand, gives his attention to unit costs, since he is not sufficiently acquainted with individual workers to measure their performance. Illustration 132 shows how a report on unit manufacturing costs may be prepared. Not only is the total unit cost shown, but also the portion of each kind of expense incurred in producing a unit.

240. Cost Presentations for Major Executives.—The chief characteristic that distinguishes the general executives from the departmental supervisors is the fact that the interests and authority of the general executives are not limited to a single department. The entire enterprise is the field of their activities, and departments and cost centers are considered only as they relate to the business as a whole. Even those general executives who are in charge of the major divisions of an enterprise, such as the vice-president in charge of sales or the controller, do not limit their interests to a single division, but instead they control their divisions in close relation with the movements of the whole enterprise. In fact, not only do the general

executives have the complete business under their eyes, but also they serve as links between the company and the outside world. The general executives, thus, besides being interested in production accomplishments and sales records, are also vitally concerned with world markets, price levels, the business cycle, labor conditions, and the like.

Major executives have the following four functions to fulfill: (1) they must see that every division of the enterprise is operated efficiently; (2) they must keep in mind that the goal of their endeavors is an adequate return on investment; therefore they must be certain both that the investment is safe and that it yields a fair

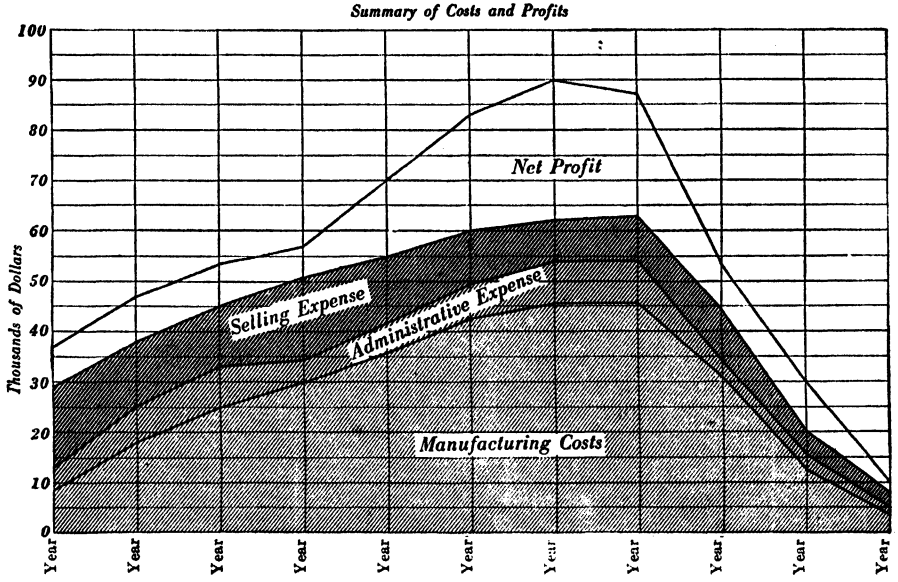


ILLUSTRATION 134.—GRAPH SHOWING TREND IN COSTS AND PROFITS, FOR INFORMATION OF MAJOR EXECUTIVES

return; (3) they must keep a proper working balance between the different departments of the enterprise; and (4) they must compare the accomplishment of their firm with the progress that is being made by other firms in the same field, in order to assure themselves that it is either improving or at any rate maintaining its position.

The accountant, in considering the nature of the reports to be presented to the major executives, must fashion his statements so as to enable the executives to fulfill the functions just mentioned. In a word, the cost statements should serve as tools with which the executives shape the destiny of the enterprise. The type of reports that should be used will now be considered, but it must be remembered that the illustrations given here are only samples, there being scores of statements of one kind or another that may be used effectively.

MONTHLY SALES BY GEOGRAPHIC DISTRICTS

Month_____

Sales District	Current Month	Previous Month	Total Jan. 1 to Date		Sales Quota This Month	Percentage of Sales Quota Reached	Sales Expense This Month		Actual Expense Over* or Under Budget
			This Year	Previous Year			Budget	Actual	
Atlanta									
Boston									
Chicago									
Cincinnati									
Denver									
Detroit									
Los Angeles									
New York									
Philadelphia									
Pittsburgh									
St. Louis									
San Francisco									
Seattle									
Washington									
Totals									

ILLUSTRATION 135—COMPLETE SALES SUMMARY FORM FOR THE MAJOR EXECUTIVES

The first function of the general executives, as already mentioned, is to see that efficient operations are maintained in every department. It follows, therefore, that they must receive reports covering the progress made by the departments. These reports for the production division should show, *in summary*, material costs, overhead costs, direct-labor expenses, variances, and other information. All departments should be considered in total, the unnecessary details being strictly eliminated. Illustration 133 shows a form of such a statement.

MONTHLY SALES BY LINES

Month_____

Lines of Merchandise	Current Month	Previous Month	Total Jan. 1 to Date		Sales Quota This Month	Percentage of Quota Reached
			This Year	Previous Year		
Auto Equipment						
Industrial						
Marine						
Merchandising						
Power						
Radio						
Railway						
Stoker						
Supply						
Castings						
Totals						

ILLUSTRATION 136—FORM TO BE USED FOR SUPPLEMENTARY ANALYSIS OF SALES VOLUME FOR THE MAJOR EXECUTIVES

OPERATING AND PROFIT AND LOSS STATEMENT

Month of Amount	%	Items	%	Twelve Months Amount
		Gross Sales		
		Federal Excise Taxes		
		State Sales Taxes		
		Returns and Allowances		
		Total Deductions		
		Net Sales		
		Adjusted Cost of Sales (A)		
		Gross Margin		
		Distribution Expense (B)		
		Net Operating Profit		
		Other Income and Expense (C)		
		Earnings Before Income Tax		
		Reserve for Income Tax		
		Earnings Before Dividends		
		COST OF SALES AND VARIANCES—A		
		Standard Cost of Sales		
		Manufacturing Variances:		
		Material Price		
		Material Quantity		
		Direct Labor		
		Direct Overhead Controllable		
		Direct Overhead Volume		
		General Overhead Controllable		
		General Overhead Volume		
		Revision of Standards		
		Total Manufacturing Variances		
		Adjusted Cost of Sales A		
		DISTRIBUTION EXPENSE AND VARIANCES—B		
		Standard Distribution Expense		
		Distribution Variances:		
		Delivery		
		Advertising		
		Market Research		
		Selling		
		Administrative		
		Total Distribution Variances		
		Total Distribution Expense B		
		OTHER INCOME AND EXPENSE—C		
		Dividends Received		
		Rent Received		
		Discounts Received		
		Profit or Loss on Assets Sold		
		Discounts Granted		
		Bond Interest		
		Donations		
		Total Other Income and Expense C		

ILLUSTRATION 137

Another function of the major executives, and doubtless their chief function, is to insure the safety of the capital invested and the earning of a reasonable profit on the investment. The graph shown in Illustration 134 was prepared by an accountant to aid the executives in performing this function. An understanding of the *trend* over a period of years in the three major divisions of costs and in net profits will assist the executives to determine whether present costs are excessive and whether net profits are adequate.

The purpose of the report outlined in Illustration 135 is to assist the executives in keeping a proper balance between the different districts of the enterprise. On the form shown in this illustration, the sales records of all of the company's sales

COMPARISON OF THE COSTS OF THE GOODWILL ICE COMPANY WITH AVERAGE COSTS OF THE ICE PRODUCERS ASSOCIATION, 19__

Expense Item	Average Cost of the Association Per Ton	Goodwill Ice Company Cost Per Ton	Remarks
Ammonia	.0653	.0748	
Calcium	.0239	.0236	
Water	.1089	.1205	
Materials (Total)	.1981	.2189	
Operating Wages	.4387	.4495	
Power and Light	.6932	.6729	
Coal	.0398	.0358	
Oil	.0280	.0241	
Waste	.0020	.0021	
Packing	.0150	.0111	
Shop Supplies	.0610	.0675	
Petty Factory Expense	.0010	.0007	
Taxes	.0810	.0749	
Insurance	.0578	.0569	
Depreciation	.6608	.7536	
Repairs to Buildings	.0010	.0002	
Repairs to Compressors	.0810	.1195	
Repairs to Pipe Lines	.0120	.0289	
Repairs to Motors	.0080	.0152	
Repairs to Brine Tanks	.0320	.0703	
Repairs to Condensers	.0410	.0579	
Miscellaneous Repairs	.1940	.2327	
Manufacturing Expense (Total)	2.0086	2.2243	
Cost of Manufacture (Total)	2.6454	2.8927	
Wages	1.1940	1.1734	
Wagon Delivery Expense	.1970	.1732	
Truck Delivery Expense	.1060	.1290	
Telephone Service	.0010	.0012	
Storage House Expense	.0410	.0316	
Scoring Machine Expense	.0030	.0022	
Collecting and Soliciting	.0691	.0678	
Advertising	.0340	.0216	
Insurance	.1000	.0938	
Taxes	.1000	.1045	
Bad Debts	.0910	.0762	
Depreciation	.4000	.3873	
Distribution Expenses (Total)	2.3361	2.2618	

ILLUSTRATION 138—COMPARISON OF AVERAGE INDUSTRIAL COSTS WITH THE COST OF AN INDIVIDUAL COMPANY, FOR USE OF THE MAJOR EXECUTIVES

districts are listed and analyzed, and it is a simple matter to discover which of the districts are making the best records and which the poorest. Knowing these facts, the executives can direct the sales division in such a manner that a proper balance may be kept among the different districts; for it is not a healthy state of affairs to have excessive sales in one district and very few in another. A supplementary analysis of sales volume, giving the record in terms of lines of product, is presented in the form shown in Illustration 136.

Illustration 137 shows an operating and profit and loss statement which some accountants present to senior executives. Note that manufacturing and distribution expense variances are included. More important, however, is the fact that all figures exhibited are shown both for a month and for a twelve month period. For example, if the statement is prepared as of March 31, figures are shown for the month of March and for the twelve months beginning April 1 of the preceding year. Similarly if the statement is dated April 30, it exhibits figures for the month of April and for the twelve months beginning May 1 of the preceding year. Accountants who prepare this form of statement believe that figures for twelve months are more representative of a business than figures for one or a few months, since over a period of twelve months the effects of seasonal and other temporary conditions largely offset each other.

The fourth function of the major executives is to compare the accomplishment of their own enterprise with the progress made by other companies in the same industry. To assist the executives in fulfilling this function, many large companies belong to trade associations representing the majority of concerns in a given industry. The work of these associations, in many cases includes the development of uniform accounting systems, the gathering of figures from members, and the preparation of composite reports for the industry as a whole. Some trade associations issue to their members a statement showing the average amount of each item of expense, per unit of output, for all the members of the association. The general executives, having these cost averages of the group and also knowing their own costs, can readily determine, by a simple comparison, what items of their costs are excessive. A cost report showing a comparison of this kind appears as Illustration 138. Additional cost reports of this kind are illustrated in the following chapter where uniform cost accounting as developed by trade associations in recent years is discussed.

CHAPTER XXVIII

TRADE ASSOCIATIONS AND UNIFORM COST ACCOUNTING

241. Influence of Trade Associations on Cost Accounting.—Trade associations have influenced cost accounting in two major respects. First, they have encouraged their members to adopt uniform accounting procedures, and in this connection have established uniform definitions for the various cost elements and set up standard classifications of accounts. Second, they have made use of the accounting figures that are supplied by their members to set up standards characteristic of the industry or typical of the best practices in the industry, and thus been able to furnish their members with useful tools for controlling operations.

Cost accounting became a fashionable activity in trade associations about twenty-five years ago. The objective was control of prices, and the restraint of destructive price cutting. The benefits which might result in the way of increased efficiency, lower costs, and lower prices to the public were not fully foreseen although they were there. The reasoning which at that time induced manufacturers to finance extensive programs of uniform cost accounting has been stated as follows:

"Most of our members have no knowledge of the cost of the products they manufacture. They take business at competitive prices, often below cost, on the assumption that there must be a profit in such prices or competitors would not quote them. Therefore, if each competitor in the industry will install a cost system and find out what his costs are, he will not sell below cost."

The trouble with this reasoning is the fact that no live concern selling in a buyer's market will refrain from selling below his own costs if he feels it necessary to do so in order to secure the orders that ordinarily come to him or to protect his position in the trade.

During the formulation of the now defunct N.R.A. codes, the theory of cost protection as the basis of price control enjoyed a brief revival; and a large percentage of all the codes approved, contained the so-called cost protection clause. As a means of control these proved practically useless. In the first place, N.R.A. officials failed to take action on a majority of cost accounting formulas submitted to them for approval. In the second place, approval and enforcement of these cost protection clauses could hardly have done more than establish as the industry price level, prices somewhat below the actual whole cost of the lowest cost producer. Few experienced persons advocate cost accounting programs today as a cure for destructive competition.

The fact nevertheless remains that trade associations can still justify the expenditure of money and effort on the promotion of uniform costing and accounting practices, and on the setting up of industry standards for their members' guidance. The American system of individual capitalistic enterprises is on trial. Its failure to provide work and a comfortable livelihood for a large part of the

population is attacked by the advocates of Fascism, Socialism, and Communism. Its alleged failure to bring the cost of goods and services down within the reach of every income group is attacked by economists who complain about "administered prices". It is claimed that industrial enterprises tend to protect their present investments and their present earnings by restricted output at high and controlled prices, and as a result the benefits arising out of improved technology and improved management are withheld from the public at large.

Industrial trade associations have an opportunity and a mission to guide their industries along a course which will conserve the long-pull best interests alike of stockholders, employes, and the consuming public. After a reasonable return is earned on capital invested, commensurate, of course, with the risks in a particular industry, after normal wages and salaries for employes have been adequately provided, lower costs due to improvements in equipment, processes and management, should be passed on to the public to increase the general purchasing power of every class. Uniform cost accounting contributes to this.

One example of such a contribution comes to mind. Uniform methods of cost accounting were installed by some thirty manufacturers in one industry. Thereafter each reported monthly to the association office certain figures developed in his cost records covering current operations. These figures covered all manufacturing operations, and selling and administrative costs. Figures for the most important operations in the manufacture of the product included standard and current machine hour costs, standard and current percentage of machine activity, standard and current production in units per machine hour, and standard and current costs per thousand units. The association office compiled a monthly comparative report in which the figures of all the reporting members were set down without identification of the source. This comparative report went to each reporting company. Each could compare his cost rates as well as his rates of production with the highest, lowest and the average rates of similar concerns manufacturing the same product.

A surprising result followed! The machinery used for the important manufacturing operations was standard throughout the industry and had been in continuous use in the industry for many years. Presumably operators, mechanics and managements were thoroughly familiar with the potential productiveness of these machines. *Yet the first series of monthly reports showed a variation of 100 per cent in the output per machine hour as between different companies.* One year after the reports were started the average hourly production of these machines for all of the companies reporting, increased 20 per cent. *When competing members of an industry can be inspired as a group to increase productive efficiency and to reduce costs in this manner, we can expect the benefits to spread themselves over profits, payrolls, and lower prices to the consumer of the product.*

242. Composite Financial and Operating Statements and Ratios.—Intelligent study of the balance sheet and operating statement of a business involves what is known as ratio analysis. This means that every item on the balance sheet is reduced to a percentage or ratio to the total assets. Every item on the operating

and profit and loss statement is reduced to a percentage or ratio to sales. Other ratios express the relation between different items or groups of items on the balance sheet. Some of the items on the operating and profit and loss statement are expressed in the form of special ratios to items or groups of items on the balance sheet. Most executives are familiar with ratio analysis. Unfortunately there is seldom available any standard or yardstick by which a senior executive can determine whether the relationships set forth on his balance sheet and on his operating statement are normal and typical for the kind of business as a whole in which he is engaged, or whether the ratio of the various elements entering into his costs—material, labor, and the several expenses—are in proper proportion to the market value of the product.

While the balance sheets and operating statements of a certain number of large corporations, including those listed on the security exchanges, are generally published, there are thousands of smaller business enterprises operating in industries for which few or no published financial statements are available. There is simply no published information with respect to many of our diversified industries from which a standard or typical set of balance sheet and operating ratios can be derived.

Any group of manufacturers who are members of a trade association and who employ through that association a trustworthy, confidential agent, has the opportunity cooperatively to establish standards for each individual company to use in measuring and testing its own performance, as disclosed by its own financial and operating statements. These measures and tests can be had covering every vital factor, including credit risk, soundness of financial structure, adequacy of turnover, over or under capacity, profit return, and the cost and expense factors that directly affect profit return.

Composite statements, prepared by bringing together the figures of a group of independent companies, can either represent the broad average for the group as a whole or may, if desired, be broken down into subcomposites. These subcomposites may furnish the individual company even better standards or yardsticks for comparison with its own situation. For example, subcomposites can be set up, in each of which figures are combined for companies of approximately the same size. An appropriate grouping for a particular industry might be one composite for small companies, one for medium sized companies, and one for large companies.

If all of the operating profit and loss statements submitted are arranged in the order of percentage of profit earned from lowest to highest, and two groups are then selected, one representing that half of the total number reporting the highest percentage of earnings, and the other representing that half of the companies reporting the lowest earnings, a separate composite can be set up for the group having the high ratios of profit. Taking the percentage of profit earned as the broad measure of successful management, it is reasonable to assume that all of the balance sheet and operating ratios of this high profit group will be such as to reflect excellent management. From this standpoint this particular subcomposite covering only the higher profit group of companies will provide the best standards for individual managements to use in testing their own position.

The foregoing discussion outlines a few of the ways in which the assembled figures of a number of companies can be put together, without disclosure of any individual data whatever, to furnish a variety of significant yardsticks,—all of them bound to be intensely interesting, because all of them are derived directly from the same industry in which every member of the association is engaged.

From time to time individual companies may find it necessary to justify to outside persons certain situations which appear in their financial statements. A bank or supplier may seek to impose arbitrary standards in measuring credit risk,—standards unnecessarily rigid because of ignorance of conditions generally prevailing in the particular industry. If the composite financial statement for the industry at large is such as to support the figures of the individual company, it might well happen that the credit man would read the company statement in a different light. Then again, individual companies may have difficulties with the Internal Revenue Bureau on such questions as percentage of annual depreciation, propriety of the amount deducted as officers' salaries, or of other deductions. Whenever industry composite statements can be used by the individual member to support his own return, the Income Tax Unit is likely to accept such evidence.

243. How Composite Statements and Ratios are Prepared.—The forms and tables in this chapter show the methods which were used to compile composite balance sheet, composite operating statement, and significant ratios for a manufacturing industry producing a paper product. A majority of the manufacturers in this industry are small enterprises. A minority are medium sized businesses, and one concern can properly be described as a large industrial enterprise. The average annual sales per company are about $250,000. No company in the field has its stock listed on the security exchanges, and no complete published statement of any manufacturer in the industry is available covering assets and liabilities, sales, and profit and loss.

Members used the reporting form which is designated **A** in the accompanying exhibits. A key number was assigned to each member of the association and was stamped on the three copies of the form sent to each member. The three copies were marked respectively, Work Sheet, Copy for your File, and Original. It was unnecessary for the reporting member to enter the name and address of his company on the original report sent in to the association office. In order further to protect the identity of the figures, key numbers only were used on the working papers while compiling the composite statements.

Form **A** provides for a report of the balance sheet, of a condensed operating and profit and loss statement, and two supplementary supporting statements. Because figures were to be secured from as many companies as possible, and the records and classification of accounts of these companies would not be uniform, the reporting forms for the balance sheet and for the operating statement were designed to make it possible for any company having a sound double entry bookkeeping system to fill them out without excessive trouble. The chief difficulty in compiling the reports was the tendency of members to combine items which necessarily had to be brought into the composite as separate amounts. All reports

had to be carefully edited, omitted information secured, and apparent discrepancies checked with the member reporting.

The exhibits designated as Tables I, II, III, IV, and V show how the composite statements for the industry were set up at the end of the fourth consecutive year in which this study was carried out.

Referring now to Table I, Composite Balance Sheets, it will be seen that the arrangement of items among the assets and liabilities follows the order in which they appear on the reporting form **A**. Four separate composites are set up in this table,—first, the general composite for the whole number of companies reporting; then three subcomposites representing three classes of firms according to volume of sales, that is, the *small*, the *medium*, and the *large* company groups. In the columns headed Amounts, the actual composite total in dollars of each asset item and of each liability item are to be shown, so that the statement is a consolidated balance sheet for the number of establishments shown at the top of the column. In the columns headed Ratios are to be shown the percentage of each asset item and of each liability item to the amount representing total assets or total liabilities. These ratios may be thought of as ratios, as percentages, or as "common size" amounts in terms of dollars per hundred dollars of total assets. In the section headed "Four Year Comparative" the four columns show the balance sheet ratios of the current reports compared with those developed in each of three previous annual composites. This comparison is intended to bring out significant trends in the financial condition of the industry.

The four annual composite balance sheets from which these comparative ratios are to be taken do not represent throughout either the same number or the same identity of companies reporting. To this extent the comparisons and study of the trend are subject to some qualification. To correct this deficiency separate composites would be prepared for each year, each limited to the same number of identical companies. These are not shown in the accompanying exhibits.

The last column headed Individual Company Ratios provides space for entering on the special copy of the report given to each participating member the ratios derived from the balance sheet of his own company. He can then compare directly his company's ratios with the general composite ratios, and with the ratios for the group of companies most nearly corresponding to his own in volume of sales.

In Table II, Composite Operating Statement, the order of items in the side heads corresponds to that in the Operating Statement section of reporting form **A**. The top heads and the data appearing in the several columns conform exactly to the arrangement in Table I, Composite Balance Sheets.

It was necessary to exercise careful judgment in determining the amount and kind of detail to be included in this operating and profit and loss statement. Considerable variation could be assumed in the classification of manufacturing expense accounts of the participating companies. Some would carry much detail, others very little. It could not be expected that all would have departmentalized expense totals. So in the composite operating statement most of the variable manufacturing expenses are lumped together in item (12) Other Current Manufacturing

Expense. Experience with this form indicated the necessity of revising it and amplifying some of the detail, and this was done in laying out reporting form **B**.

On form **B**, a peculiar treatment is given to the fourth item, Sales of Waste Paper. The reason for this illustrates how a peculiar condition characteristic of a particular industry may require special consideration. When the values salvaged by the sale of waste and minor by-products are trivial, the treatment of this item in the operating statement may be unimportant. It may appear in the schedule of financial and other income items, or it may be deducted from the total of some general expense, or deducted from the cost of materials used, or included in gross sales. In this particular industry, on the other hand, the item of waste paper sales represents spoilage only to a small degree. Most of such revenue comes from the sale of clean paper clippings obtained when products of irregular contour are cut out of large sheets or rolls. Such clippings may represent from 10 to 20 per cent or more of the original area used. Over the last twenty years the average salvage value has represented from $1\frac{1}{2}$ to $3\frac{1}{2}$ per cent of merchandise sales. It constitutes an item of operating, not non-operating, income, of considerable importance in its proportion to the net profits of the industry. Offhand it would seem that the most logical treatment of this item would be to deduct the amount accruing from sales of waste paper from the net cost of raw materials. On the general operating, profit and loss statement this would simply reduce the indicated ratio of cost of raw materials to sales value. As it happens, such treatment would not correspond to the manner in which the manufacturers in this industry set up their cost sheets on an item or an order, or the manner in which they make an estimate of cost. It has been the universal practice to charge to an item or against an order the full cost of the gross area of uncut paper required. Since the variety of sizes and styles of product is almost unlimited, the exact recovery in the form of clippings cannot easily be determined for a particular item. So the potential recovery from sales of waste paper is disregarded in costing and estimating, or taken into account only as a factor of safety. This seemed sufficient reason to express item (4), Total Materials Used, on the composite operating statement in terms of gross cost without deduction of salvage so that its percentage relationship to sales would be the same as in a cost sheet or estimate. Similar reasoning made it undesirable to include sales of waste paper along with sales of merchandise, and thereby inflate the base figure taken as 100 per cent in the operating ratios. In this composite the net sales of merchandise only is taken as 100 per cent, the sales of waste paper are then added, giving the Total Operating Revenue which appears in the ratio columns as a figure somewhat greater than 100 per cent.

Some companies in this industry own the land and buildings where they operate, and carry these as assets on the balance sheet of the operating company. In a larger number of cases the operating space is leased. Precaution has been taken to provide that the item Rent and Building Expense in the operating statement shall represent as nearly as possible the equivalent of rent where a company owns its own building. The Supporting Statement—Rent and Building Expense, provides for setting up the expense of building ownership, including depreciation,

insurance, taxes, interest on indebtedness, repair and maintenance, together with any rent paid. The total of these items is then carried into the general operating statement as the rent equivalent.

At the bottom of Table II in the columns headed Amounts, the number of executive officers in the reporting companies is given, and the average amount of salary per officer. These data were included at the expresss request of members of the industry. Their interest may have been partly curiosity but mainly reflected the desire of each to test his own salary policy against the general practice of the industry.

Table III sets forth the details of inventories and provides an analysis of the amount which appears as a single item, (12) Total Inventory, in the Composite Balance Sheet, Table I. Some of the reporting companies were unable to furnish this detail. In Table III the first column shows the amounts of each subdivision of the total inventory, and at the bottom of the column the item, Total Assets, from the balance sheets of only those particular companies who did supply this inventory detail. The second column shows the percentage to total inventory of the four subdivisions, Raw Materials, Supplies, Work in Process, and Finished Goods. The third column shows the percentage of each subdivision of the inventory to Total Assets. Either set of percentages can be applied to item (12) Total Inventory, in the general balance sheet, Table I, to arrive at a substantially correct breakdown of that item.

Table IV sets forth the Details of Materials Used, providing an analysis of item (4) in the Composite Operating Statements, Table II. Here again this detail was not obtainable from all of the reporting establishments. The amounts in the first column include at the bottom the net sales of merchandise of only those particular companies whose figures enter into this supplemental statement. Two sets of percentages are worked out. First, the percentage of each item to total materials used, and second, the percentage of each item to the total net sales of merchandise. These percentages can be used for an approximate breakdown of item (4) Total Materials Used, as it appears in the general composite, Table II.

Table V is entitled Selected Management Ratios. These are grouped under three subheads, Credit Ratios, Income Ratios, and Selected Operating Ratios. Following the top headings, under General Composite is given the sequence of ratios for each of four successive years, as developed from the general composite of all the companies whose reports were received in each of those years. Next are ratios based on composites of 17 identical establishments for each of the four successive years.

On the lower half of Table V the same ratios are worked out again for each of the company groups classified by volume of sales. Four successive annual ratios are given for the small companies, the same number for the medium sized companies, and the same for the large companies.

The first six ratios shown in this exhibit under the subhead Credit Ratios are the ratios to which most importance is attached by credit men in determining the desirability of a particular risk. Needless to say these ratios, based on a composite

for a considerable group of typical establishments in the same industry, would assist the judgment of a lender studying the financial condition of a company in this particular industry.

The six ratios subheaded Income Ratios express the relation of net profit to sales and of net profit to net worth, with special attention also to the relation which officers' salaries bear to sales and to net worth. As might be expected in this industry of small enterprises, most of the businesses are closed corporations. The chief owners are also the officers of the company and the active managing heads as well. It is commonly true that the executive officers are themselves in a position to determine the amount of the salaries which they shall draw. In doing so they really determine what proportion of the net earnings of their company they prefer to receive in the form of salaried compensation rather than in the form of dividends or of increased net worth resulting from undistributed net earnings.

There is considerable variation in the practice of executives of the different companies in establishing the amount of their own salaries, for reasons which are largely personal rather than a matter of business policy. In some cases the executive owner may prefer to draw only a nominal salary, less perhaps than would be necessary to pay an equally competent manager. In other cases the executive owner may decide to load the salary account so heavily as to cut deeply into the net profits of the business. Accordingly it seemed necessary to take into consideration the amount of salaries paid to executive officers when studying the net income of the average establishment. This was particularly true of comparisons between the general composite income ratios and the corresponding ratios for an individual company. Failure to have insisted on separate reports of salaries paid to executive officers would have tended to vitiate the whole analysis of the industry's income account.

Since the ratios given include net profit separately, officers' salaries separately, and the total of the two, each individual company is in a position to compare intelligently its own net income performance with the norm of the industry regardless of its own particular salary policy.

The ratios subheaded Selected Operating Ratios mainly reflect various kinds of turnover. The first ratio, Receivables to One Day's Sales, is not a ratio exactly but the quotient obtained by dividing the average daily sales for a 365-day year into the amount of receivables as shown on the closing balance sheet, that is, days' sales uncollected. Naturally this reflects the condition of the receivables account only as of the end of the year.

The potential usefulness of all these ratios derived from the Composite Balance Sheets and Composite Operating Statements will depend on two factors. First, the extent to which the individual company management can and will apply the methods of ratio analysis in the study of its own financial position and operating results. Second, the fact that where such study is carried out the composite ratios supply the normal or typical yardstick so commonly unavailable in industries made up of small and medium sized enterprises.

It is a fair question whether the average conditions in an industry at large can always be depended upon as a yardstick of excellent performance. Probably not.

For this reason the studies made in this particular industry included still another series of subcomposites which are not illustrated in the exhibits shown. The operating profit and loss statements of all the reporting companies were assorted and ranked in the order from lowest to highest percentage of net profit to sales. A figure was then selected representing about the average percentage of profit to sales. A special composite was prepared including the figures of only those companies whose profit had equalled or exceeded this mean figure. Both composite balance sheets and composite operating statements were set up. It was assumed that all of the ratios developed from this high profit composite would establish a superior standard of excellence in management. This proved true by the standards usually applied in ratio analysis, and the resulting ratios provided the soundest available measures of superior financial strength and superior operating efficiency in this particular line of business.

Experience in collecting and compiling these figures suggested possibilities for revision and improvement. Some of these changes are illustrated in reporting form **B**. Reference to the balance sheet section of that form shows how assets were regrouped to list first, quick assets, then inventories, then the total of both as total current assets. Items were added which had frequently been reported, such as non-operating real estate or leaseholds, amounts due from officers and employes or subsidiary companies, as well as items owed to officers or to subsidiary companies.

An important change was made in the form of the operating statement to list and group under manufacturing expenses the items representing delivery and out-transportation. Some confusion had been occasioned by variations in practice as to out-bound freight, express, and parcel post. This had been reported sometimes in manufacturing expenses and sometimes in selling expenses. The Supporting Statement—Materials Used, was amplified. The item of in-bound freight was added since it was found that some companies were in the habit of carrying such an account separately, without ever bringing it into the accounts representing purchases of the several raw materials.

If the potential value of industry composites and industry ratios such as these is evident, why have so few industries adopted this procedure? Where all degrees of managing ability exist the chances are good that sound composite ratios would disclose a few weak spots in the financial structure or operating conditions of even the best managed companies. Each is in a position to secure valuable guidance without disclosing any of its own business figures. The only real obstacle is the instinctive and traditional reluctance to place in the hands of any outsider the most intimate facts of a private business. Willingness to do so requires complete confidence in the trustworthiness, personal integrity, and discretion of the agent employed to handle the figures. The feeling must exist that the agent's interest in and attention to the figures themselves will be strictly professional. Any competent trade association secretary should have these qualifications. Members of well-manned trade associations should not hesitate to furnish their companies' financial statements for the preparation, under proper safeguards, of industry composites. They would seemingly have much to gain by doing so.

There is one further justification for authorizing association managers to prepare industry composite financial statements at regular intervals. In no other way can the true facts as to the financial and operating conditions in the industry be brought to light for intelligent study. These facts are needed for measuring the effectiveness of the association activities; they are needed to show the direction in which the industry is heading; they tend to reconcile conflicting assertions by individual members; they may give reassurance when conditions are alleged to be unsatisfactory; they will sound a warning when prevailing practices in the industry are tearing down the structure. If counsel and leadership is expected from the association manager, he should have this tool to equip him properly for his job.

A

Balance Sheet and Operating Statement

DO NOT OMIT any figure called for on this form, providing the item exists in your business. Any such omission prevents consolidating your statements with those for other companies reporting.

DO NOT COMBINE into one figure, items listed separately on this form. Estimate if necessary the proper subdivision of amounts not already separated in your own private records.

(ORIGINAL FORM 11" × 17" FOLDED)

Key No..... For Year Ending.....19....

Name and address of your Company may be omitted if this sheet shows a Key No. above.

Firm Name.....

Address.....

This exhibit is submitted for statistical purposes only and with the understanding that its separate contents shall be held strictly confidential.

BALANCE SHEET

ASSETS	%	Col. 1	Col. 2
Line No.			
CURRENT ASSETS			
(1) Cash (Bank and Petty).....Enter Col. 2			$
(2) Notes Receivable.....			
(3) Notes Receivable Discounted—			
Subtract from Line 2.....Enter Col. 1			
(4) Accounts Receivable.....Enter Col. 1			
(5) Total Lines 3 and 4.....Enter Col. 1			
(6) Allowance for Bad Debts.....Enter Col. 1			
(7) Net Receivables—Subtract Line 6 from Total Line 5..Enter Col. 2			
INVENTORIES			
(8) Raw Materials on Hand.....Enter Col. 1			
(9) Supplies on Hand.....Enter Col. 1			
(10) Work in Process.....Enter Col. 1			
(11) Finished Goods.....Enter Col. 1			
(12) Total Inventory—Add Lines 8-11.....Enter Total Col. 2			
OTHER QUICK ASSETS			
(a)(13) _____.....Enter Col. 1			
(14) _____.....Enter Col. 1			
(15) Add Lines 13-14.....Enter Total Col. 2			
(16) **Total Quick Assets**—Add Col. 2 to This Point.....			
INVESTMENTS			
(17) Marketable Securities.....Enter Col. 2			
(18) **Total Current Assets**—Add Lines 16-17.....Enter Total Col. 2			
FIXED ASSETS			
(19) Real Estate (Land and Buildings).....Enter Col. 1			
(20) Machinery, Furniture and Fixtures.....Enter Col. 1			
(21) Add Lines 19-20.....Enter Col. 1			
(22) Allowance for Depreciation on Buildings_____			
(23) Allowance for Depreciation on Mchry., Furn. and Fixt.....____			
(24) Total Depreciation—Total of Lines 22-23.....Enter Col. 1			
(25) Net Real Estate (Land and Bldg.) Machinery, Furniture and Fixtures..... Subtract Total Line 24 from Total Line 21.....Enter Col. 1			
OTHER FIXED ASSETS			
(26) Stock Owned in Subsidiary Companies.....Enter Col. 1			
(27) _____.....Enter Col. 1			
(28) **Total Fixed Assets**—Add Lines 25-27.....Enter Total Col. 2			
DEFERRED CHARGES			
(29) Prepaid Expenses (Insurance, Interest, Taxes, etc.). Enter Col. 2			
OTHER NON-CURRENT ASSETS			
(30) _____.....Enter Col. 1			
(31) _____.....Enter Col. 1			
(32) **Total Other Non-Current Assets**—Add Lines 30-31.....Enter Total Col. 2			
Total Assets.....	100%		$

A

» Leave this column blank

(a) Enter cash value of life insurance on line (13).

LIABILITIES	%	Col. 3	Col. 4
Line No.			
CURRENT LIABILITIES			
(33) Notes Payable for Materials Purchased .....Enter Col. 3		$	
(34) Notes Payable for Money Borrowed.....Enter Col. 3			
(35) Notes Payable for Machinery and Equipment Maturing Within One Year .....Enter Col. 3			
(36) Accounts Payable.....Enter Col. 3			
(37) Accrued Liabilities (Wages, Interest, Taxes, etc.) ....Enter Col. 3			
(38) Bonds or Mortgages Maturing Within One Year.....Enter Col. 3			
(39) _____.....Enter Col. 3			
(40) **Total Current Liabilities**—Add Lines 33-39...Enter Total Col. 4			
FIXED LIABILITIES			
(41) Notes Payable for Machinery and Equipment maturing Beyond One Year.....Enter Col. 3			
(42) Mortgages Maturing Beyond One Year.....Enter Col. 3			
(43) Bonds Maturing Beyond One Year.....Enter Col. 3			
(44) _____.....Enter Col. 3			
(45) **Total Fixed Liabilities**—Add Lines 41-44.....Enter Total Col. 4			
(46) **Total Debt**—Add Col. 4 to This Point.....			
RESERVES NOT ALREADY DEDUCTED			
(47) _____.....Enter Col. 4			
(48) _____.....Enter Col. 4			
NET WORTH (EXCESS OF ASSETS)			
(49) Corporation Capital Stock (Issued and Outstanding) .Enter Col. 3			
Proprietary Capital (Individual or Partnership).....Enter Col. 3			
(50) Surplus and Undivided Profits.....Enter Col. 3			
(51) **Net Worth**—Add Lines 49-50.....Enter Total Col. 4			
Total Liabilities, Reserves, and Net Worth.....	100%		$

Leave this column blank

SUPPORTING STATEMENT—MATERIALS USED

Carry forward Total from line 8, column E, to line 4 of Operating Statement, next page.

	A Inventory Beginning of Year	B Purchases During Year	C Total Col. A Plus Col. B	D Inventory End of Year	E Materials Used—Col. C Less Col. D
1 Paper.....					
2 Gum.....					
3 Ink.....					
4 Other Materials.....					
5 _____					
6 _____					
7 Resale Merchandise.....					
8 **Total Material**.....					

SUPPORTING STATEMENT—RENT AND BUILDING EXPENSE

Carry forward Total from line 8, to line 6 of Operating Statement, next page.

1 Rent Paid.....		
2 Depreciation on Buildings Owned		
3 Insurance on Buildings Owned.....		
4 Real Estate Taxes.....		
5 Interest on Real Estate Indebtedness.....		
6 Repair and Maintenance of Buildings.....		
7 Total Expense on Land and Buildings Owned		
8 **Total Rent and Building Expense**.....		

OPERATING STATEMENT

Line No.	(A)	(B)	%	(C)
1	**GROSS SALES** (Envelopes & Mdse. $_____	Waste Paper $ _____)	.....	$_____
2	Less Returns and Sales Allowances		.....	_____
3	**NET SALES**		100%	_____
4	**MATERIALS USED** (See Supporting Statement)	_____	.....	
5	**MANUFACTURING EXPENSES**			
6	Rent and Building Expense (See Supporting Statement)	_____	.....	
7	Depreciation on Equipment	_____	.....	
8	Insurance on Equipment and Inventory	_____	.....	
9	_____	_____	.....	
10	**Total Manufacturing Fixed Expenses**	_____	.....	
11	Wages and Salaries (Including Supervision, Handling, Shipping, Delivery)	_____		
12	Other Manufacturing Expense	_____		
13	_____	_____		
14	**Total Manufacturing Current Expenses**	_____		
15	**COST TO MANUFACTURE** (Total of lines 4, 10, and 14)	_____		
16	Add: Work in Process and Finished Goods, first of year	_____		
17	**Total**	_____		
18	Less: Work in Process and Finished Goods, end of year	_____		
19	**MANUFACTURING COST OF GOODS SOLD**			_____
20	**GROSS PROFIT ON SALES** (Line 19 subtracted from line 3)		.....	_____
21	**ADMINISTRATIVE AND GENERAL EXPENSES**			
22	Salaries of Executive Officers	_____ (D)	.....	
23	Office and Clerical Salaries	_____	.....	
24	Office Expense	_____	.....	
25	Taxes (Except Real Estate and Income)	_____	.....	
26	Bad Debts	_____	.....	
27	Other Administrative or General Expenses	_____	.....	
28	_____	_____	.....	
29	**Total Administrative and General Expenses**	_____	.....	
30	**SELLING EXPENSES**			
31	Salaries, Commissions and Bonuses	_____	.....	
32	Advertising	_____	.....	
33	Traveling and Other Selling Expenses	_____	.....	
34	_____	_____	.....	
35	**Total Selling Expenses**	_____	.....	
36	**TOTAL ADMINISTRATIVE AND GENERAL AND SELLING EXPENSES**		.....	_____
37	**NET PROFIT ON SALES** (Line 36 subtracted from line 20)		.....	_____
38	**FINANCIAL INCOME AND EXPENSES**			
39	Interest Earned	_____	.....	
40	Discounts Earned	_____	.....	
41	Other Income	_____	.....	
42	**Total Additions to Income**	_____	.....	
43	Less Interest Expense	_____	.....	
44	Less Discounts Allowed	_____	.....	
45	Other Deductions from Income	_____	.....	
46	**Total Deductions from Income**	_____	.....	_____
47	**NET PROFIT FOR PERIOD** (Line 46 added to—or subtracted from—line 37)		.....	$_____

Leave this column blank

(A) and (B) Be sure to enter these items. (C) equals (A) plus (B).

(D) Enter here.....number of salaried executive officers to whom this amount is paid.

Year_____

Key No._____

B

Balance Sheet and Operating Statement

DO NOT OMIT any figures called for on this form, providing the item exists in your business. Such omissions may prevent consolidating your statements with those for other companies reporting.

DO NOT COMBINE into one figure, items listed separately on this form. Estimate if necessary the proper subdivision of amounts not already separated in your own private records.

(ORIGINAL FORM 13½" × 18" FOLDED)

Key No..... For Year Ending..... .....19....

Name and address of your Company may be omitted if this sheet shows a Key No. above.

Firm Name.....

Address.....

This exhibit is submitted for statistical purposes only and with the understanding that its separate contents shall be held strictly confidential.

BALANCE SHEET

Line No.	ASSETS	Col. 1	Col. 2	Col. 3
	QUICK ASSETS:			
1	Cash (Bank and Petty)			
2	Notes Receivable			
3	Less: Notes Receivable Discounted			
4	Net Notes Receivable			
5	Accounts Receivable			
6	Total Lines 4 and 5			
7	Less: Allowance for Bad Debts			
8	Net Receivables (Subtract Line 7 from Line 6)			
9	Marketable Securities			
	Other Quick Assets:			
10	Cash Value of Insurance			
11	_____			
12	**Total Quick Assets**			
	INVENTORIES:			
13	Raw Materials on Hand			
14	Supplies on Hand			
15	Work in Process			
16	Finished Goods—Unprinted Stock			
17	Finished Goods—Unbilled Orders Held for Customers			
18	**Total Inventories** (Add Lines 13-17)			
19	**Total Current Assets** (Add lines 12-18)			
	FIXED ASSETS:			
20	Real Estate (Land and Buildings)			
21	Less: Allowance for Depreciation on Buildings			
22	**Net Real Estate (Land and Buildings)** (Subtract Line 21 from Line 20)			
23	Machinery, Furniture and Fixtures, Motor Vehicles			
24	Less: Allowance for Depreciation on Machinery, Furniture & Fixtures, Motor Vehicles			
25	**Net Machinery, Furniture and Fixtures, Motor Vehicles** (Subtract Line 24 from Line 23)			
	Other Fixed Assets:			
26	Stock Owned in Subsidiary Companies			
27	Non-operating Real Estate or Leaseholds			
28	_____			
29	**Total Fixed Assets** (Add lines 22, 25, 26, 27 and 28)			
	DEFERRED CHARGES:			
30	Prepaid Expenses (Insurance, Interest, Taxes, etc.)			
	OTHER NON-CURRENT ASSETS:			
31	Good Will, Patents, Trade Marks, Organization Expenses			
32	Amounts Due from Officers and Employes or from Subsidiary Companies			
33	_____			
34	**Total Other Non-Current Assets** (Add Lines 31-33)			
35	**TOTAL ASSETS**			

B

Line No.	LIABILITIES	Col. 1	Col. 2	Col. 3
	CURRENT LIABILITIES:			
36	Notes Payable for Materials Purchased			
37	Notes Payable for Money Borrowed			
38	Notes Payable for Machinery and Equipment Maturing within One Year			
39	Accounts Payable			
40	Accrued Liabilities (Wages, Interest, Taxes, Royalties, etc.)			
41	Bonds or Mortgages Maturing within One Year			
42	_____			
43	**Total Current Liabilities** (Add Lines 36-42)			
	FIXED LIABILITIES:			
44	Notes Payable for Machinery and Equipment Maturing Beyond One Year			
45	Mortgages Maturing Beyond One Year			
46	Bonds Maturing Beyond One Year			
47	Items Owed to Officers or to Subsidiary Companies			
48	_____			
49	**Total Fixed Liabilities** (Add Lines 44-48)			
50	**Total Debt** (Add Lines 43 and 49)			
	RESERVES NOT ALREADY DEDUCTED:			
51	_____			
52	_____			
	NET WORTH (EXCESS OF ASSETS):			
53	Corporation Capital Stock (Issued and Outstanding)			
54	Proprietary Capital (Individual or Partnership)			
55	Surplus and Undivided Profits			
56	**Net Worth** (Add Lines 53-55)			
57	**TOTAL LIABILITIES, RESERVES, AND NET WORTH** (Add Lines 50, 51, 52 and 56)			

SUPPORTING STATEMENT—MATERIALS USED

Carry forward Total from line 12, column E, to line 6 of Operating Statement, next page.

		A Inventory Beginning of Year	B Purchases During Year	C Total Col. A Plus Col. B	D Inventory End of Year	E Materials Used—Col. C Less Col. D
1	Paper					
2	Gum					
3	Ink					
4	Electros and Engravings					
5	Fastener Materials					
6	Boxes, Cartons and Cases					
7	Outside Work Purchased					
8	Other Materials					
9	Resale Merchandise					
10	Freight In-bound (if not included above)					
11	_____					
12	**Total Material**					

SUPPORTING STATEMENT—RENT AND BUILDING EXPENSE

Carry forward Total from line 8, to line 7 of Operating Statement, next page.

1	Rent Paid		
2	Depreciation on Buildings Owned		
3	Insurance on Buildings Owned		
4	Real Estate Taxes		
5	Interest on Real Estate Indebtedness		
6	Repair and Maintenance of Buildings		
7	Total Expense on Land and Buildings Owned		
8	**Total Rent and Building Expense**		

OPERATING STATEMENT

Line No.		Col. 1	Col. 2	Col. 3
1	GROSS SALES OF MERCHANDISE (Do not include Sales of Waste Paper here; enter same on Line 4)			
2	Less Returns and Sales Allowances			
3	NET SALES OF MERCHANDISE			
4	Sales of Waste Paper			
5	TOTAL OPERATING REVENUE (Total of Lines 3 and 4)			
6	MATERIALS USED (From Supporting Statement, Page 3)			
	MANUFACTURING EXPENSES:			
	Fixed:			
7	Rent and Building Expense (From Supporting Statement, Page 3)			
8	Depreciation on Equipment			
9	Insurance on Equipment and Inventory			
10	_____			
11	**Total Manufacturing Fixed Expenses**			
	Current:			
12	Mfg. Wages and Salaries (Direct, Indirect and Supervision)			
13	Other Current Mfg. Expenses (Power, Repairs, Supplies, Compensation Insurance, etc.)			
14	_____			
15	**Total Manufacturing Current Expenses**			
	Delivery and Out-Transportation:			
16	Wages—Truck Drivers and Helpers			
17	Truck Depreciation			
18	Truck Operating Expenses (Gas, Oil, Repairs, Tires, Insurance, etc.)			
19	Truck Hire, Outbound			
20	Freight, Express and Parcel Post, outbound			
21	_____			
22	**Total Delivery and Out-Transportation**			
23	TOTAL MANUFACTURING EXPENSES (Total of Lines 11, 15 and 22)			
24	COST TO MANUFACTURE (Total of Lines 6 and 23)			
25	Add: Work in Process and Finished Goods, first of year			
26	**Total**			
27	Deduct: Work in Process and Finished Goods, end of year			
28	MANUFACTURING COST OF GOODS SOLD			
29	GROSS PROFIT (Line 28 subtracted from Line 5)			
	ADMINISTRATIVE AND GENERAL EXPENSES:			
30	Salaries of Executive Officers (Number to whom paid____)			
31	Office and Clerical Salaries			
32	Office Expense			
33	Taxes (Except on Real Estate and Income)			
34	Bad Debts			
35	Other Administrative and General Expenses			
36	_____			
37	**Total Administrative and General Expenses**			
	SELLING EXPENSES:			
38	Salaries, Commissions and Bonuses			
39	Advertising			
40	Traveling and Other Selling Expenses			
41	_____			
42	**Total Selling Expenses**			
43	TOTAL ADMINISTRATIVE AND SELLING EXPENSES (Total of Lines 37 and 42)			
44	NET PROFIT ON OPERATIONS (Line 43 subtracted from Line 29)			
	FINANCIAL INCOME AND EXPENSE:			
45	Interest Earned			
46	Discounts Earned			
47	Other Non-operating Income			
48	**Total Additions to Income**			
49	Interest Expense			
50	Discounts Allowed			
51	Other Non-operating Deductions and Expense			
52	**Total Deductions from Income**			
53	ADD OR DEDUCT NET FINANCIAL INCOME OR EXPENSE			
54	NET PROFIT FOR PERIOD (Line 53 added to or subtracted from Line 44)			

TABLE I

COMPOSITE BALANCE SHEETS—DECEMBER 31st, 19__
TOTAL DOLLARS AND RATIOS TO TOTAL ASSETS

	General Composite		Classes by Volume of Sales						4-Year Comparative				Individual Comp'ny Ratios
	All Classes Combined		Sales Less than $250,000		Sales from $250,000 to $500,000		Sales Over $500,000		General Composite Ratios				
Number of Establishments	30		13		10		7		25	27	30	30	No.
ASSETS	Amounts	Ratios	Amounts	Ratios	Amounts	Ratios	Amounts	Ratios	19__	19__	19__	19__	19__
Current Assets:													
(1) Cash (Bank and Petty)													
(3) Notes Receivable (net, undiscounted)													
(4) Accounts Receivable													
(5) Total Receivables													
(6) Allowance for Bad Debts													
(7) Net Receivables													
Inventories:													
(12) Total Inventory													
Other Quick Assets:													
(15) Other Quick Assets													
(16) Total Quick Assets													
Investments:													
(17) Marketable Securities													
(18) Total Current Assets													
Fixed Assets:													
(19) Real Estate (Land and Buildings)													
(20) Machinery, Furniture and Fixtures													
(21) Total Real Estate, Machinery, Furniture and Fixtures													
(22) Allowance for Depreciation on Buildings													
(23) Allowance for Depreciation on Machinery, Furniture and Fixtures													
(24) Total Depreciation													
(25) Net Real Estate, Machinery, Furniture and Fixtures													

Other Fixed Assets:													
(26) Stock in Subsidiary Companies													
(27) Other Fixed Assets													
(28) Total Fixed Assets													
Deferred Charges:													
(29) Prepaid Expenses (Insurance, Interest, Taxes, etc.)													
Other Non-Current Assets:													
(32) Other Non-Current Assets													
Total Assets		100.00		100.00		100.00		100.00	100.00	100.00	100.00	100.00	
LIABILITIES													
Current Liabilities:													
(33) Notes Payable for Materials Purchased													
(34) Notes Payable for Money Borrowed													
(35) Notes Payable for Machinery, Due within One Year													
(36) Accounts Payable													
(37) Accrued Liabilities (Wages, Interest, Taxes, etc.)													
(38) Bonds or Mortgages Maturing within One Year													
(39) Other Current Liabilities													
(40) Total Current Liabilities													
Fixed Liabilities:													
(41) Notes Payable for Machinery, Maturing beyond One Year													
(42) Mortgages Maturing beyond One Year													
(43) Bonds Maturing beyond One Year													
(44) Other Fixed Liabilities													
(45) Total Fixed Liabilities													
(46) Total Debt													
Reserves not Already Deducted:													
(47) Reserves not Already Deducted													
Net Worth:													
(49) Capital Stock (Issued and Outstanding) or Proprietary Capital													
(50) Surplus and Undivided Profits													
(51) Net Worth													
Total Liabilities, Reserves and Net Worth		100.00		100.00		100.00		100.00	100.00	100.00	100.00	100.00	

TABLE II

COMPOSITE OPERATING STATEMENTS—YEAR 19__
TOTAL DOLLARS AND RATIOS TO SALES

	General Composite		Classes by Volume of Sales						4-Year Comparative				Individual Company Ratios
	All Classes Combined		Sales Less than $250,000		Sales from $250,000 to $500,000		Sales Over $500,000		General Composite Ratios				
Number of Establishments	30		13		10		7		25	27	30	30	No.
	Amounts	Ratios	Amounts	Ratios	Amounts	Ratios	Amounts	Ratios	19__	19__	19__	19__	19__
Sales:													
(1) Sales of Merchandise													
(2) Less: Returns and Sales Allowances													
(3) Net Sales of Merchandise		100.00		100.00		100.00		100.00	100.00	100.00	100.00	100.00	
Sales of Waste Paper													
Total Operating Revenue													
Materials Used:													
(4) Total Materials Used													
Manufacturing Expenses:													
(6) Rent and Building Expense													
(7) Depreciation on Equipment													
(8) Insurance on Equipment and Inventory													
(9) Other Fixed Expense													
(10) Total Manufacturing Fixed Expense													
(11) Manufacturing Wages and Salaries													
(12) Other Current Manufacturing Expense													
(14) Total Manufacturing Current Expense													
(15) Cost to Manufacture													
(16) Work in Process and Finished Goods, First of Year													
(17) Total													
(18) Less: Work in Process and Finished Goods End of Year													
(19) Manufacturing Cost of Goods Sold													
(20) Gross Profit													

| | | |

TABLE III

DETAILS OF INVENTORIES

SUPPLEMENT TO TABLE I—COMPOSITE BALANCE SHEETS, 19_

	Amounts	% to Total Inventory	% to Total Assets
Inventories—December 31, 19_			
28 Establishments			
(8) Raw Materials on Hand			
(9) Supplies on Hand			
(10) Work in Process			
(11) Finished Goods			
(12) Total Inventory		**100.00**	
Total Assets			**100.00**

TABLE IV

DETAILS OF MATERIALS USED

SUPPLEMENT TO TABLE II—COMPOSITE OPERATING STATEMENTS, 19_

	Amounts	% to Total Materials	% to Sales
Materials Used—19_			
23 Establishments			
(1) Paper			
(2) Gum			
(3) Ink			
(4) Other Materials			
(7) Resale Merchandise			
(8) Total Materials Used		**100.00**	
Net Sales of Merchandise			**100.00**

TABLE V

SELECTED MANAGEMENT RATIOS BASED ON COMPOSITE BALANCE SHEETS AND COMPOSITE OPERATING STATEMENTS

	General Composite — All Classes Combined				Composite of 17 Identical Establishments Included in Every General Composite to Date				Individual Company Ratios
	19__	19__	19__	19__	19__	19__	19__	19__	19__
Number of Establishments	25	27	30	30	17	17	17	17	No.
Credit Ratios:									
Current Assets to Current Liabilities									
Net Worth to Total Debt									
Net Worth to Fixed Assets									
Sales to Net Worth									
Sales to Fixed Assets									
Sales to Receivables									
Income Ratios:									
Net Profit to Sales									
Officers' Salaries to Sales									
Net Profit plus Officers' Salaries to Sales									
Net Profit to Net Worth									
Officers' Salaries to Net Worth									
Net Profit plus Officers' Salaries to Net Worth									
Selected Operating Ratios:									
Receivables to One Days' Sales									
Sales to Total Plant Investment— (Depreciation not deducted)									
Sales to Machinery, Furniture and Fixtures— (Depreciation not deducted)									
Sales to Total Inventory									
Materials Used to Total Inventory									

	Classes by Volume of Sales											
	Small Sales Less Than				Medium Sales Range Between				Large Sales More Than			
	$250,000	$250,000	$250,000	$250,000	$250,000 and $500,000	$250,000 and $500,000	$250,000 and $500,000	$250,000 and $500,000	$500,000	$500,000	$500,000	$500,000
	19__	19__	19__	19__	19__	19__	19__	19__	19__	19__	19__	19__
Number of Establishments	10	14	17	13	10	5	6	10	5	8	7	7
Credit Ratios:												
Current Assets to Current Liabilities												
Net Worth to Total Debt												
Net Worth to Fixed Assets												
Sales to Net Worth												
Sales to Fixed Assets												
Sales to Receivables												
Income Ratios:												
Net Profit to Sales												
Officers' Salaries to Sales												
Net Profit plus Officers' Salaries to Sales												
Net Profit to Net Worth												
Officers' Salaries to Net Worth												
Net Profit plus Officers' Salaries to Net Worth												
Selected Operating Ratios:												
Receivables to One Days' Sales												
Sales to Total Plant Investment—(Depreciation not deducted)												
Sales to Machinery, Furniture and Fixtures—(Depreciation not deducted)												
Sales to Total Inventory												
Materials Used to Total Inventory												

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