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Electrical Manufacturers' Council, "Standard accounting and cost system for the electrical manufacturing industry" (1919). *Publications of Accounting Associations, Societies, and Institutes*. 164.
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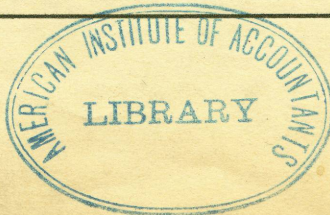
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**STANDARD ACCOUNTING AND COST SYSTEM
FOR THE
ELECTRICAL MANUFACTURING INDUSTRY**

Supplementary Manual

**SUGGESTED METHOD FOR APPLYING
THIS SYSTEM**

Issued supplementary to the Oct. 1, 1919, edition
by the Standing Committee
of the
Electrical Manufacturers' Council



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PREFACE

The reasons for the issue of this "Supplementary manual" are given in Section 2, sheet 2 of the Committee's report. At the urgent request of some of the smaller electrical manufacturing companies, the Committee submits, in the following pages, a suggested method for applying the Standard Accounting and Cost System.

As stated in the Committee's report, it is its feeling that no matter how limited the volume of any manufacturer's business may be, a competent accountant and cost supervisor is essential if the manufacturer would know definitely the results of his operations, thus enabling him to determine selling prices to the maximum advantage to himself and the industry generally.

Nevertheless it is hoped that the brief outline contained in this pamphlet will prove a valuable guide to some of the smaller electrical manufacturing companies.

C. E. PATTERSON,
Chairman of the Standing Committee.

120 Broadway,
New York City.

SUGGESTED METHOD FOR APPLYING STANDARD ACCOUNTING AND COST SYSTEM

The outlines of the suggested system are presented in the following order:

1. The elements of costs.
2. The shop order system.
3. Features of bookkeeping plan which most directly affect accurate costs.
4. Method of designating accounts.
5. Method of recording details in sub-ledgers and upon individual "job cost sheets".

1. THE ELEMENTS OF COST

Definitions of the elements of cost will be found on sheets 3 and 4 of Section 2.

2. THE SHOP ORDER SYSTEM

A. PRODUCTION ORDERS

Production orders are those issued to the factory authorizing the manufacture of material or apparatus to be shipped to customers.

The following is quoted from the bulletin issued by the Federal Trade Commission under date of July 1st, 1916:

"There are, generally speaking, but two distinct methods of manufacture. Each requires a cost system a little different in detail but identical in fundamental principles. The first of these is used in a business where every order is a separate article of manufacture, very often made to order, and the selling price fixed before work is started; and the second is used in a business where the output consists of one or more articles which are being continually produced. For convenience we will designate the cost systems applicable to each as the 'Job cost system' and the 'Continuous production system.' "

1. The job cost system

"The first step is to provide for giving the factory instructions as to what work is to be done, and a form should be provided which must give the following information; job number, date, name and address of customer for whom work is to be done, a description of the work to be done, giving sufficient details, specifications as to what material will be needed, and shipping instructions. This form should also have space for the entry of shipments, so that when the work is done, the order form will be a complete record. A duplicate of this factory order should be kept in the office and when the original is sent to the factory the cost clerk opens a job cost sheet under that number."

2. The continuous production system

“A system for recording the costs of a continuous product is a much simpler one than a system for recording the cost of job work, because in the former costs are figured departmentally or by processes instead of by jobs. The accounts are practically the same, except that there is not the necessity for the same detailed analysis as in the job cost system.

The business must be departmentalized as the first step, and the departmental divisions carefully observed, as otherwise true costs will not be obtained. Departmental divisions are different from the job cost divisions, as these should be by processes, regardless as to whether the work is of similar character or not.”

B. MANUFACTURING PLANT ACCOUNT ORDERS

Instructions or orders to the factory to do work or produce equipment chargeable to “Manufacturing plant” accounts, will be treated exactly the same as production orders, but will be issued in a separate series of numbers.

C. EXPENSE ACCOUNT ORDERS

Work to be performed in the shops, which is chargeable to indirect expense, can best be recorded by the issue of so-called standing expense orders, bearing numbers to correspond with those assigned to the accounts to which they are chargeable, prefixed or suffixed by the departmental designation.

D. DEVELOPMENT ORDERS

The work of engineering, drafting and shop departments, which is chargeable to “Development”, should be controlled by special orders in a separate series of numbers.

E. UNIT COST DEPARTMENTS

The manufacturing functions for the following materials are suggested for segregation into “unit cost” departments:

Grey iron, malleable iron, steel and brass castings, wire and cable, porcelain, insulation, screw machine output, sheet steel punchings, varnishes and compounds, etc.

The cost of the output of such “unit cost” departments should be carried to the cost summary sheet as material.

Contributory work by one assembly department for another should be segregated on the cost summary sheet into material, labor and indirect manufacturing expense.

3. FEATURES OF THE BOOKKEEPING PLAN WHICH MOST DIRECTLY AFFECT ACCURATE COSTS

(A) THE GENERAL LEDGER

(B) THE SUB-LEDGERS

When the volume of business is small, a concern may find it practicable to confine its records to the general ledger only. In most instances, however, the business is of sufficient magnitude to warrant the maintenance of "sub-ledgers" containing accounts subsidiary to those carried in the "general ledger"; accounts in the sub-ledger are termed "sub-accounts", while those in the general ledger are termed "controlling accounts". The sub-accounts must always be in balance with the corresponding controlling accounts.

In connection with these sub-accounts further records are necessary to aid in the determination of accurate costs and some of these records are suggested below under the titles of the several sub-accounts:

1. Stores account

This account will be supplemented by a record either in the form of cards or loose leaf, of all materials purchased and charged to "Stores account". The record should, for each class of raw material, provide, in convenient form, for quoting the number of the purchase order, the quantity ordered and received; also the quantities as withdrawn. Whether or not this record should give the purchase cost, in addition to the other information, is a matter of organization, but when this record is to serve the purpose of determining the cost of raw materials entering into the finished product, then the information is essential and the form of record should be so arranged as to permit of the entry of the purchase cost, including transportation, for each lot purchased and for averaging these costs over given periods, unless the practice is adopted of using the cost of each quantity received until issued.

2. Payroll record

The purpose of this record is two-fold: 1, to determine the amount of wages payable to individual employes; 2, to determine the aggregate charge for labor against individual departments, the specific classes of apparatus or individual production orders.

Manufacturers employing a large number of operators will find it necessary to maintain two separate records for these purposes. As an aid to the determination of costs, it is primarily essential that there be a very careful distribution of the aggregate payroll for each period against individual production orders, standing expense orders, plant account orders, etc.

3. Indirect manufacturing expense

It is most important, not only for the determination of proper overhead percentages in application to costs, but also for proper control of the manufacturing expenses, to maintain comprehensive sub-records of all those expenditures which are defined under the above title in Section 3.

The record should be one which will, in convenient form, produce the segregation of the aggregate amount of indirect manufacturing expense under two principal divisions:

1. According to the account numbers as given in Section 3.
2. By departments.

The designation of accounts and departments by numbers and symbols respectively, as suggested in sub-division 4, sheet 7 of this manual, will materially simplify the arrangement of such a record. The listing of account numbers vertically, with columns horizontally across the record, each column representing a department, will give a very satisfactory summary in detail of the expense incurred for the department whose number or symbol is shown at the head of the column, simultaneously giving this total expense by account numbers. It will also give the aggregate expense incurred for each expense account number for the entire establishment, as shown in the last column, at the same time making available for review the amount expended for each department. A suitable grouping of department headings upon this record into:

- (a) Production departments or production centers,
- (b) Non-productive departments (mechanical),
- (c) Non-productive departments (administrative),

will be helpful in arriving at bases for proration of indirect manufacturing expense, as explained in sub-division 5-B, sheet 9.

4. Work in progress

This is a record kept entirely by production order numbers and it is its purpose to collect for each production order all the elements of cost chargeable against it in accordance with the procedure outlined in sub-division 5, sheet 8.

5. Engineering, or development records

The purpose of this record is to collect all expenditures, for development, as outlined in Section 2, sub-division A, and allocate them to:

- Individual development orders (through job numbers).
- Classes of articles, or apparatus.

The cost of each development order is assembled on a development "cost sheet" or job record.

A summary is suggested that will collect under classes of articles, or apparatus, the aggregate charges to individual development orders. Liquidations, as explained in sub-division D, sheet 11, should be entered on the summary. This record will then show the unliquidated balance for each class of article, or apparatus.

6. Manufacturing plant and depreciation record

The purpose of the manufacturing plant sub-ledger is to collect the aggregate charges from the individual manufacturing plant shop orders. Charges to each manufacturing plant account are shown separately.

If the manufacturing plant orders are preceded by formal appropriations, it may be desirable to collect by plant accounts the expenditures against each appropriation. The essential feature of the appropriation record is to show when the appropriation has been exhausted.

As a basis for the intelligent application of depreciation in costs, a record should be established which will show the first cost, yearly additions and life of each building and of each large machine tool or other equipment, separately or by accounts. Charges to each manufacturing plant account should be arranged by departments.

This record should also show the normal depreciation deducted from the cost of buildings and catalogued equipment, separately or by accounts.

7. General expense record

The purpose of this record is to summarize the expenditures of the sales and general administrative departments, as outlined in Section 2, sub-divisions D and E, and allocate such expenditures, first, to accounts, as defined in Section 3, sheet 21 under the caption "General expense sub-accounts" and, second, to individual sales and administrative departments. (Forms of the same general description as described under "Indirect manufacturing expense records" may be used).

C. INTERMEDIATE FORMS

Each manufacturer can best decide for himself what forms he may require for initiating work, receiving incoming material, withdrawing material and supplies from the point of storage to the point of consumption, recording labor activities, accompanying transfers from one production center to another, authorizing changes, reporting defects and losses, announcing completions and shipments, and crediting returns.

4. METHOD OF DESIGNATING ACCOUNTS

For convenience in recording operations and collecting results, it is desirable to establish a system of numbers, one series for designation of accounts; and, for those concerns which, by reason of the variety of their product, have a departmental organization, another series for designation of departments. Departments may be designated instead by symbols.

However, assuming that preference is given to numbering and that a manufacturer, having four departments, designates them as Nos. 1, 2, 3 and 4, also that he assigns a block of numbers, beginning with 500, for "Manufacturing plant" accounts (see Section 3, sheet 2 on which these accounts are designated by letters) and a block, beginning with 600, for development orders; further that for "Indirect expense" accounts, the numbers as given in this pamphlet (Section 3, sheets 28 to 51) will be used; the following examples will serve to illustrate the procedure for identifying operating charges for individual orders and departments:

- a. A lathe is purchased at a cost of \$1000 for Department No. 2, and, the account in the "Manufacturing plant" sub-ledger for "Machinery and tools" having been assigned No. 503, the distribution of this charge will be to account No. 2-503.
- b. Department No. 4 undertakes development of a certain new device involving time of engineers and work in the shops. It has obtained development order No. 634, therefore, all time, material and expense in connection with this work, will be charged to account or order No. 4-634 in the "Engineering or development" sub-ledger.
- c. Wages of inspectors engaged in Department No. 1 will be charged account No. 1-203 in the "Indirect expense" sub-ledger.

Manufacturers, having a great many departments, will find it convenient to have a key to the designations assigned to departments. This may be combined with a key to the account numbers, by preparing blue prints showing the department numbers vertically and the account numbers horizontally, or vice versa. Copies of these blue prints should be in the hands of every employee who is in any way interested in the distribution of disbursements.

5. METHOD OF RECORDING DETAILS IN SUB-LEDGERS AND UPON INDIVIDUAL "JOB COST SHEETS"

A. SOURCES OF ENTRY

Charges against the several classes or orders, described in connection with the shop order system including charges account of "production orders" which will be recorded upon the individual "Job cost sheets" supporting the "Work in progress" sub-ledger, will originate, as follows:

1. Material

When a general stores system is maintained, as materials and supplies are received into the storeroom, the cost of them, including transportation, will be charged in the sub-ledger to "Factory raw materials and supplies" account and, as they are required by shop departments, they will be withdrawn from the storeroom by means of "material requisitions". These requisitions must show the quantity, description and value of the material withdrawn and the number of the order for which it is to be used. Charges to the orders will be entered direct from "material requisitions".

When it is the practice to order materials for the exclusive use of a specific department or upon a specific order, it is not necessary to pass the transaction through the store-room records therefore a "material requisition" is not necessary. The source of entry for such material will be the vendor's invoice, which should indicate the order number for which the material was purchased.

2. Labor

All charges against orders for labor performed in the shops will originate with the time ticket (or labor ticket), which must show the number of the order chargeable; also check number of operator, description of operation, number of hours and rate of wages and the total amount of the charge.

3. Other sources of entry

Although charges against "production orders", "manufacturing plant orders" and "expense orders" will originate exclusively from "material requisitions", vendors' invoices and "labor tickets", charges to "development orders", in addition to those originating from these sources, will originate from the following:

- (a) Time cards of engineers and draftsmen for time traceable to individual development orders.
- (b) Journal entries for pro-rata liquidation of purchase price of patents.
- (c) Invoices covering royalties under license agreements.

B. INDIRECT EXPENSE

Having recorded all details in the sub-ledgers, there should be entered upon the "job cost sheets" the assessments against the corresponding "production orders" for "indirect expense" including "depreciation", thus obtaining the "shop cost" of these orders.

"DEPARTMENTALIZATION NECESSARY FOR PROPER
DISTRIBUTION OF FACTORY OVERHEAD"

"The first step in a fair and equable distribution of factory overhead is a departmentalization of the business. Every business can be departmentalized to some extent, some more than others, but the sub-division into departments varies so much in the different lines that it is almost impossible to give any definite idea as to what divisions should be made. Generally speaking, it is best to subdivide into departments according to operations of manufacture, although at times, for simplicity, a subdivision which places similar work in the same department regardless of operation is used and has proven satisfactory in a number of cases. By similar work is meant hand workers who use practically the same amount of supplies, machines of similar type, etc. Departmentalizing by operations is a little more complicated, as it results in a greater number of departments, because the same or a similar kind of hand work may be done in several departments, and the same holds true of the machine departments."*

Nearly every manufacturing establishment can be divided into two general classes of departments.

- (a) "Production departments" or "production centers", i.e., those which make goods for sale, such as contributing or process departments and assembling or completing departments.
- (b) "Non-productive departments", i.e., mechanical and administrative departments, which do not make goods for sale.

Furthermore, the overhead expenses of most manufacturing concerns can be divided into two classes:

- (a) Expense which is incurred exclusively for account of one department and is, therefore, chargeable directly to that department.
- (b) Expense incurred jointly account of several departments, which must be assessed against those departments upon a pro-rata basis.

After ascertaining the amount of expense chargeable to each non-productive department, direct and upon pro-rata bases, this amount should be apportioned, upon predetermined bases, to the productive departments interested.

In arriving at bases for pro-rating expenses incurred jointly for account of several departments, and for apportioning expenses of non-productive departments, the character of the service rendered and its relation to the departments served must be considered; "not all overhead expense bears down with equal pressure on all productive centers".

*Quoted from bulletin issued by the Federal Trade Commission.

The following examples, extracted from the Federal Trade Commission's bulletin, will serve to illustrate the points to be considered in arriving at proper bases for apportioning expenses.

1. Building expense

"The first requisite of a business is a place in which to work; consequently, the first item of overhead is building expense or rent. If the building is owned by the manufacturer, the building expenses consist of insurance, taxes, depreciation, and repairs, together with such other expenses which are general in their nature but yet are necessary to render the building useful, such as heat, light, elevator, janitor, and water. If the building is rented, the items of insurance, taxes, depreciation, and repairs are paid by the owner and in lieu of these is rent. Rent includes a return on the investment in addition to the items named, so when it is desired to make comparisons between plants where the building is owned and where it is rented the return on the investment must be taken into consideration.

"The basis of distribution for all rent charges is the productive or used square feet. The total used square feet divided into the total rent charges gives the charge per used square foot. This result multiplied by the used area of the departments gives that department's proportion of the total rent expenses. By used floor space is meant that which is actually in use, exclusive of stairways, passages, elevator space, and idle or unused space."

2. Power

"The second requisite is power, and this must be obtained either from outside sources or generated in one's own plant. The distribution of power is a little more difficult than that of building expense and sometimes an arbitrary division based on the opinion of the engineer and superintendent is used, but this method is not recommended. One difficulty in distributing power charges is that very often the same boiler supplies steam for heating and steam for power generating and it is difficult to say how much for each."

"For distributing power charges the factor generally used is found by multiplying the horse power required by each machine or department by the average hours run by each and dividing the sum into the total power charge. Power distribution is a problem in itself, and it varies so much in different plants that it is impossible to lay down any rules for its solution. Each plant must be treated in an individual manner according to the existing conditions."

3. Insurance and taxes

"Insurance and taxes should be distributed on the basis of the actual net value of the equipment in each department. This refers to fire insurance and taxes on the plant only, as boiler insurance is a charge to power, accident insurance is a charge to general factory expense, and the charge for other forms of insurance is determined by the nature of the insurance. Taxes on real estate and plant* only are chargeable against manufacturing operations, as taxes on finished goods in stock and franchise taxes are chargeable to general expense, while income tax is a direct charge to surplus."

*This is intended to embrace all personal property at manufacturing plants.

C. DEPRECIATION

1. Methods of determining depreciation

“One method of handling depreciation, which is unqualifiedly condemned although extensively used, is to wait until the end of the year and then if the profit and loss statement shows that a good profit has been earned to charge a part of this profit to depreciation. If, on the other hand, the profit and loss shows little or no profit, nothing is charged to depreciation. It is difficult to understand how any practical man can take the view that his plant and equipment have not worn out because he has not made a profit, and at the same time have worn out when he has made a profit.”

“The first step necessary to provide for proper depreciation is to departmentalize the plant values. The next step is to take each kind of equipment or machine and figure its proper depreciation.”

The Committee recommends the adoption of the rates as shown in Appendix A, Section 2, sheet 9:

2. Method of including depreciation in costs

The total amount of normal depreciation to be absorbed in shop cost during the year is determined at the beginning of the year. Each month an entry should be made for the monthly proportion, crediting account No. 22 and charging accounts Nos. 324 and 384.

There must now be added to the “shop cost” of the production orders, “development cost” and “installation and construction” costs, thereby obtaining the “manufacturing cost” of these orders.

D. LIQUIDATION OF DEVELOPMENT

The liquidation of cost of development into manufacturing cost should be as follows:

1. Expenditures incurred in the development of special product designed for specific customers' orders, should be included, as a separate item, in the manufacturing cost of such product.
2. Expenditures incurred in the development of standard types of product, should be included in the manufacturing cost of all material of such types produced, special as well as standard, on pro-rata bases to be determined according to the estimated value or volume of output during a reasonable period of time.
3. Expenditures incurred in the development of entirely new classes, lines or types of product, the manufacture of which has been abandoned, should not enter into manufacturing costs, but should be charged to account No. 24-c, Reserve for failure to liquidate development, if such product is not special as defined in paragraph (1).

E. INSTALLATION AND CONSTRUCTION

Those concerns which make it a practice to enter into contracts for the sale of apparatus, which include its installation upon the customer's premises, should so arrange their "job cost sheets", that the cost of the installation work may be recorded thereon, as expenditures are incurred.

F. SALES OFFICE AND GENERAL ADMINISTRATION EXPENSES

If the cost sheets are to show the *full* "cost" of the products, there must be added to "manufacturing cost", upon a predetermined basis or bases, "sales office expenses" and "general administration expenses".

In accordance with subdivision B-7 (sheet 6) the sales and administration expense will be recorded by individual sales and administrative departments. The aggregate of these expenses may be pro-rated over "manufacturing costs" upon a "percentage on *shop* cost" basis, or special consideration may be given to the relation which certain classes of expenses bear to the various classes of product, for example:

1. Taxes on income may be pro-rated with regard to the profits accruing from each class of product.
2. Patent litigation expense, to the costs of the products to which it relates.
3. Pension and retirement payments, to the products in connection with which the individuals had been employed, or, more properly, pro-rata against all products upon basis of total labor.
4. Losses on customers' accounts may be pro-rated by adding a percentage to "manufacturing cost", representing the average relation of the aggregate losses for a period of several years to the aggregate manufacturing costs for corresponding period.
5. Losses on warehouse stocks may be pro-rated in a similar manner, or a separate percentage may be determined for each class of product.

PROPER ACCOUNTING FOR DISPOSITION OF PLANT SCRAPPED OR SOLD

As all rates of depreciation are average rates, and apply to the classes of plant items as a whole, it is probable that they do not exactly apply to any particular item in that class. Therefore, it follows that in case an item is sold at a higher or lower value than the difference between the initial cost value, and the depreciation reserve obtained by applying an average rate for the class, the profit or loss should be credited or charged to the depreciation reserve and not to surplus.

The accounting would be as follows:

For example: Take the case of a machine costing \$5000 replaced by a machine costing \$6000.

Depreciation reserve of 7½% per year for six years	\$2250
Making the net value	\$2750
The old machine after six years' use is sold for	\$2000
And the loss	\$750

Entries

1. Dr. Machinery \$6000

Cr. Accounts payable \$6000

Cost of replacing machinery
2. Dr. Accounts receivable \$2000

Cr. Machinery \$2000

Sales value of the old machine
3. Dr. Depreciation reserve \$750

Cr. Machinery \$750

Loss on sale of machine
4. Dr. Depreciation reserve \$2250

Cr. Machinery \$2250

Cancelling the depreciation reserve applying against machine sold.

EXAMPLE FOR SETTING UP DEPRECIATION ON SEMI-DURABLE TOOLS

1908 Expenditures (25%)	\$10,000		
1909 " (50%)	16,000		
1910 " (75%)	15,000		
1911 " (100%)	30,000		
Book value January 1, 1912	\$71,000		
1912 Expenditures (100%)	25,000	1912 Depreciation	\$30,500
1913 " "	40,000	1913 "	26,750
1914 " "	28,000	1914 "	28,750
1915 " "	60,000	1915 "	30,750
1916 " "	72,000	1916 "	38,250
1917 " "	80,000	1917 "	50,000
	<u>\$376,000</u>		<u>\$205,000</u>

NOTE.—First four years' expenditures represent that portion of years' expenditures to be depreciated, assuming balance to have been written off.

Amount for depreciation made up as follows:

	1912	1913	1914	1915	1916	1917
(25%) 1908 Expenditures	\$10,000					
" 1909 "	8,000	\$8,000				
" 1910 "	5,000	5,000	\$5,000			
" 1911 "	7,500	7,500	7,500	\$7,500		
" 1912 "		6,250	6,250	6,250	\$6,250	
" 1913 "			10,000	10,000	10,000	\$10,000
" 1914 "				7,000	7,000	7,000
" 1915 "					15,000	15,000
" 1916 "						18,000
	<u>\$30,500</u>	<u>\$26,750</u>	<u>\$28,750</u>	<u>\$30,750</u>	<u>\$38,250</u>	<u>\$50,000</u>