# MACHINE METHODS OF ACCOUNTING

## THE PREPARATION AND USE OF CODES

NUMERICAL codes have long been recognized as the most concise and accurate method of identifying individual items and groups of related items. Their advantages are especially obvious when observed in connection with the sorting and classifying operations of accounting machine systems.

The proper designing of codes is therefore an inherent part of every installation of International Electric Accounting Machines, and is of paramount importance in determining the most efficient preparation of the required reports and tabulations.

This section has been prepared for the purpose of presenting:

1. The various principles and methods of code preparation with their attendant advantages and disadvantages.
2. Some representative examples of coding in actual use.
3. Methods of automatic coding.
4. Simplified methods of decoding final reports.

Careful review of these factors will facilitate the proper selection and design of codes to meet any specific need.

## Coding Principles

### Sequence Codes

The simplest form of coding that can be utilized is the sequence method. It consists of the simple assignment of numbers, starting with 1, to a list of items arranged in any order. An example follows:

| No. | Salesman | No. | Salesman |
|---|---|---|---|
| 1 | George Adams | 7 | Ernest Eton |
| 2 | John Beldon | 8 | Charles Franklyn |
| 3 | Arthur Brown | 9 | Louis Gordon |
| 4 | John Calahan | 10 | John Hamilton |
| 5 | Thomas Dalton | 11 | Richard Mason |
| 6 | William Elkton | | etc. |

The sequence method does not provide for any classifying of groups and can not be used where such requirements exist. It provides the best and only practical plan for coding lists of not more than twenty or thirty items, or for numbering longer lists where there is absolute assurance that no classification will ever be needed.

A sequence code always requires memorization or decoding, therefore the original list to be numbered should be arranged in some logical order to aid in this process. The code illustrated has been arranged in alphabetic order of last name.

New names or items are assigned to the next higher number, therefore the order of the original list will not be maintained indefinitely unless the list is fixed in character. If it is desired to maintain a definite arrangement, the original list may be assigned to every second, third, or fourth number, and new items inserted in their proper place in the arrangement. Generally speaking, a sequence code would not be employed where arrangement is a vital factor.

The sequence method of coding, due to its simplicity and unlimited expansion, has been mistakenly applied again and again to long lists of items or names, with the result that there can be no quick grouping by any classification, and reference must be made to group lists. This is particularly handicapping to tabulating machine operation. When such a condition is encountered, a new scientifically constructed code must be designed along the lines set forth later in this section of this manual.

The sequence plan of coding has a vital function in connection with most of the more comprehensive methods of coding, inasmuch as subdivisions of larger groups are usually coded in sequence. This principle can be employed to advantage in some machine installations where a combination of article numbers, descriptive codes, and dimensions is used for identifying individual items. In these cases the use of ordinary coding principles results in a great many digits. For example:

| 1839 | —32 | 14″ x 18″—11 |
|---|---|---|
| (Mirror) | (Walnut) | (Size)      (Bevel Edge) |
| 1839 | —32 | 14″ x 20″—12 |
| (Mirror) | (Walnut) | (Size)      (Square Edge) |
| 1839 | —35 | 14″ x 18″—11 |
| (Mirror) | (Mahogany) | (Size)      (Bevel Edge) |
| 1839 | —35 | 14″ x 18″—12 |
| (Mirror) | (Mahogany) | (Size)      (Square Edge) |

Twelve digits are required here because fin-

ishes and edges are coded according to a standard code for all articles, and because sizes have been used directly. The result is beyond the best efficiency of the machines for sorting and automatic controlling. Decoding requires reference to two code lists, one for finish and one for edge.

The same conditions can be met by the following sequence coding of subdivisions:

| | | | |
|---|---|---|---|
| 1839 | Mirror—Item | | 1 |
| 1839 | " | — " | 2 |
| 1839 | " | — " | 3 |
| 1839 | " | — " | 4 |

Thus one digit replaces eight, and decoding can be done at one operation instead of two. The gain in machine time and capacity is considerable, and no attempt need be made to use the code for other than the internal operation of the machine department. The regular code may be used otherwise and may be punched in the cards in addition to the sequence number, if desired.

In this manner sequence coding may be used to avoid the disadvantages of an over-coding situation, and in some cases will provide a quicker identification than a complicated, though scientifically constructed, code.

## Block Codes

This term is applied to codes which utilize groups or blocks of numbers in sequence to represent classifications. These blocks are not arranged according to tens, hundreds, or thousands, but according to any desired number of units. An example follows:

| | | |
|---|---|---|
| 1 | Razor Blades—packed 10 | |
| 2 | "      "   — "   12 | |
| 3 | "      "   — "   50 | 1—5 Blades |
| 4 | | |
| 5 | | |
| 6 | Hoe Type Razor—Gold | |
| 7 | "      "      "   —Silver | |
| 8 | "      "      "   —Nickel | |
| 9 | "      "      "   —Style H | 6—12 Hoe Type |
| 10 | "      "      "   —Style K | |
| 11 | | |
| 12 | | |
| 13 | Straight Razor—Black | |
| 14 | "         "   —Ivory | |
| 15 | | 13—16 Straight |
| 16 | | |
| | etc. | |

Block coding provides a method of coding by

classes where the number of digits must be limited, as it provides more groups with less digits than any other class coding plan. Expansion is also provided in a limited way by the reserving of vacant numbers in each group.

The above principle can be brought out by a simple analysis of the illustrated code. Three groups with their individual items have been covered in the first 16 numbers, therefore eighteen similar groups could be handled in the first two digits, or 99 numbers. In an ordinary group coding of the same items, it would be necessary to allow two digits to indicate the groups, and a third digit would be required for the individual items under the groups. Thus the block code has taken one digit less than the corresponding group code.

Block coding reduces machine sorting, but will not automatically control in the tabulator. Card groups must be separated by hand, and tabulated group totals can be obtained only by separate clearing of the machine. Therefore, block coding should be used only where there is a restriction on the number of digits or where sorting of the cards is a large factor, and then only for short lists.

Block coding as a principle also has a function in combination with other codes for the designating of subdivisions and the signalling of special information. For example, in the following code of operating accounts, the numbers of the subdivisions of each account have been assigned according to the block principle.

### 10 Receiving Labor

| | | |
|---|---|---|
| 1 | Supervision | |
| 2 | Cleaning and Janitor | 1—3 Indirect |
| 3 | Other Labor | |
| 4 | Trucking | |
| 5 | Receiving | |
| 6 | Stacking | 4—9 Direct |
| 7 | Sorting | |
| 8 | Viners | |

### 11 Preparation Labor

| | | |
|---|---|---|
| 1 | Supervision | |
| 2 | Cleaning and Janitor | 1—3 Indirect |
| 3 | Other Labor | |
| 4 | Serving Cutters | |
| 5 | Cutting and Sorting | |
| 6 | Lye Peeler and Blancher | |
| 7 | Sorting Belt Work | 4—9 Direct |
| 8 | Grading | |
| 9 | Slicing | |

This arrangement permits the machine sorting and tabulating of two groups for each major account, the cards being easily separated at the uniform dividing line between "3" and "4". The tabulator will not make this separation automatically, nor will it print any sub-group indication.

## Group Classification Codes

Group classification codes are those codes in which major and minor classifications are represented by the succeeding digits of the numbers, and are the most efficient for ordinary coding problems. An example follows:

```
1000  Materials
  1100  Production Materials
    1110  Brass              1120  Steel
      1111  Strips             1121  Plates
      1112  Sheets             1122  Strips
      1113  Bars               1123  Wire
      1114  Castings           1124  Bars
      1115  Tubing                   etc.
```

In the above code all digits except the last represent a definite classification in such a way that a machine sort on the particular digit representing any desired classification will accomplish a complete separation. The automatic control feature of the tabulator can be used throughout, and sorting is required only as far as the digit which represents the groups or controls needed for any given report.

When constructing a group code, it is well to start each subdivision with the numeral "1" rather than "0", leaving the latter open to indicate the groups. In the sample code, for example, the first detail item is No. 1111 and no use is made of the numbers 1000 to 1110 other than to indicate the groups. If this wasting of 110 numbers in each major group is not desirable from a capacity standpoint, they may be assigned completely or partially as follows:

```
1000 —Materials—Production—Brass
  1001  Strips
  1002  Sheets
  1003  Bars
  1004  Castings
  1005  Tubing

1010 —Materials—Production—Steel
  1011  Plates
  1012  Strips
  1013  Wire
  1014  Bars
        etc.
```

This arrangement does not affect the efficiency of the code or of machine operations.

It only tends to consolidate the names and numerical designations of the groups.

In many cases it will be found that there will be more than nine or ten individual items to a group, thus breaking the ideal arrangement of the code. When this occurs two sets of numbers may be consolidated into one group as follows:

```
10 — Roadside and Grade
     11 — Earth Work and Embank-
          ments
     12 — Earth Shoulders
     13 — Metal Shoulders

20 & 30 — Drainage Structures
     21 — Bridges 100' span or more
     22 — Bridges under 100' span
     23 — Culverts
     24 — Curb and Gutter
     25 — Catch Basins
     26 — Ditches
     27 — Spillways
     28 — Tile Lines
     29 — Baffle Walls and Weirs
     30 — Stream Channels
     31 — Intakes

40 — Grade Separations
     41 — Viaducts over Railroads
     42 — Viaducts over Highways
     43 — Subways under Railroads
     44 — Subways under Highways
```

This arrangement will break control on the tabulator, but a simple manual addition of the two resulting totals will give the desired result, and is usually better than adding a digit to the code to take care of exceptional groups.

Another good example of this type of code is available in booklet form under the heading of "Numerical Code for States, Counties and Cities of the U. S." Here the major divisions represent states, and the subdivisions represent cities arranged in alphabetical order.

Since this code is used primarily in designating the customers of a business concern, a third subdivision is added in practice, namely, customer. Customers are numbered by cities, thus giving a three-division group classification code.

Since group classifications codes are so easily constructed and so popular, they are often applied where there is no use for them. Where automatic tabulation and recognition of definite groups is not a vital factor, a sequence code or block code will usually accomplish the purpose with less digits, less sorting, and fewer card columns.

## Significant Digit Codes

This term has been applied to codes wherein all or some of the digits represent weight, dimension, distance, capacity, or any other factor which has been transferred bodily into the code. In one sense this is not actual coding, as these factors determine the numbers without coding.

The primary object of significant digit codes is to eliminate or reduce the work of decoding by providing a code number that is directly readable. A secondary object is the provision of a means of expansion according to the schedule predetermined by the factor included in the code. An example follows:

| Code Number | R. R. Station Name | |
|---|---|---|
| 010 | Leeds | Mo. |
| 013 | Edgecomb | " |
| 015 | Swope Park | " |
| 017 | Dodson | " |
| 019 | Holmes | " |
| 058 | Abbott | Okla. |
| 116 | Cleveland | Mo. |
| 275 | West Line | " |
| 375 | Acorn | Ark. |

The number representing the name of the station in this case is determined by its distance in miles from a starting point.

The following five-digit code explains how this principle of coding may be applied to various articles. In the examples, the first two columns are for group classification only. The balance of the columns are devoted to unit classification in which the significant digit code is illustrated.

In this first example the code numbers are expressed in inches, and correspond to the length of the files.

10000 — **Files**
   10004 — 4″ files
   10005 — 5″ "
   10006 — 6″ "
   10012 — 12″ "
   10015 — 15″ "
   10018 — 18″ "

In the following instance the code numbers correspond to the size of the bulbs expressed in watts.

13000 — **Bulbs, Electric Light**
   13020 — 20 Watt Bulbs
   13025 — 25 " "
   13040 — 40 " "
   13060 — 60 " "
   13100 — 100 " "
   13200 — 200 " "
   13250 — 250 " "

The hundreds column below is used in indicating the width of the chisels in inches. The tens and units columns indicate less than one inch expressed in sixty-fourths of an inch, which is the common denominator of the fractions.

11000 — **Wood Chisels**
   11008 — $\frac{1}{8}$″ Chisel
   11016 — $\frac{1}{4}$″ "
   11024 — $\frac{3}{8}$″ "
   11032 — $\frac{1}{2}$″ "
   11140 — $1\frac{5}{8}$″ "
   11148 — $1\frac{3}{4}$″ "
   11200 — 2″ "
   11256 — $2\frac{7}{8}$″ "

Here the code numbers for the diameter are placed in the hundreds column expressed in thirty-seconds of an inch, the tens column gives the length of the pins in inches, and the unit column shows the fractional lengths in eighths of an inch.

12000 — **Pins, Cotter**
12310—3/32″diameter by 1″ l'gth pins
12314—3/32″ "  " $1\frac{1}{2}$″ " "
12410—1/8″ "  " 1″ " "
12412—1/8″ "  " $1\frac{1}{4}$″ " "
12414—1/8″ "  " $1\frac{1}{2}$″ " "

The following code gives directly the weight of the contents each kind of sack is designed to hold.

14000 — **Sacks, Cotton**
   14025 — 25 lb. sacks
   14028 — 28 " "
   14035 — 35 " "
   14050 — 50 " "
   14056 — 56 " "
   14070 — 70 " "
   14100 — 100 " "
   14140 — 140 " "

In this case the containers are reduced and expressed in gills as the common denominator.

15000 — **Containers**
   15001 — $\frac{1}{4}$ pint container
   15002 — $\frac{1}{2}$ "  "
   15004 — 1 "  "
   15005 — $1\frac{1}{4}$ "  "
   15006 — $1\frac{1}{2}$ "  "
   15007 — $1\frac{3}{4}$ "  "
   15008 — 1 quart "
   15016 — $\frac{1}{2}$ gal. "
   15032 — 1 "  "

Prunes and other fruits are often classified according to the count or number to the pound.

Any one of the following codes may therefore be selected to indicate this count directly.

| 38000 — Prunes | | | 3800-Prunes | 38000-Prunes |
|---|---|---|---|---|
| 38020 — 20-30 | count | | 3823 | 38203 |
| 38030 — 30-40 | " | | 3834 | 38304 |
| 38040 — 40-50 | " | (or) 3845 (or) | 38405 |
| 38050 — 50-60 | " | | 3856 | 38506 |
| 38060 — 60-70 | " | | 3867 | 38607 |
| 38070 — 70-80 | " | | 3878 | 38708 |

Codes similar to the examples given might be continued indefinitely. The principle can be applied to any products and items which are indentified by units, measures, or numbers, provided these factors are not too lengthy to convert into practical codes. Although most of the examples given in this section are five-digit codes, it is not essential that five digits be used in a significant digit code. Such a code may be applied to any number of digits. This of course depends entirely on the particular requirements of the problem.

The significant digits need not always be determined by units, measures, or factors of like character, but may be in themselves code numbers. Thus in designing a new code to replace one already in existence, it may be found advantageous to have the new code numbers arranged so that they reproduce or partially indicate the old, thus—

| 4000 — | **Pumps** | |
|---|---|---|
| 4017 — | #17 | Pump |
| 4024 — | #24 | " |
| 4077 — | #77 | " |
| 4812 — | #812 | " |
| 4997 — | #13997 | " |

The old code numbers or identification numbers often have been well memorized, and therefore should be preserved for their significant value. This applies also to the conversion of mnemonic symbols into straight numerical codes, where as much of the original symbol should be retained in the new code as can be accomplished without increasing the number of digits.

In using the significant digit method of coding it will sometimes be found that actual dimensions may be used directly without a code, provided the number of digits is not too great for sorting. Thus tire sizes are often used directly without any code other than for indicating general groups.

### Final Digit Codes

This term is applied to the use of ending or final numbers to designate certain information in regard to the items so coded. It is used only in connection with some other type of code and is not a complete code in itself.

The use of a final digit code is warranted only when the information to be brought out has no relation to the classifications of the main or primary code.

The simplest and most common application of the final digit principle is the assigning of numbers ending in "0" to indicate items of special importance. The telephone companies utilized this principle in assigning phone numbers ending in "0" or "00" to subscribers having large private switchboards, thus signaling their operators to try more than one line.

Another simple device under this method is to assign all of the items of one class to numbers ending in even numerals and all of a second class to those ending in odd numerals. This accommodates two kinds of items and presupposes that they will be about evenly divided. Where there are more classes and where they are unevenly divided, the following may be employed:

**Final Digit**
1 — Manufactured Products
2 — Purchased Products
3 — Assembled Products

(or)

**Final Digit**
1, 2, 3, 4 — Manufactured Products
5, 6 — Purchased Products
7, 8, 9 — Assembled Products

The second arrangement makes more numbers available for each group, and while not suited for automatic controlling on the tabulator does lend itself easily to a manual separation of cards. The first arrangement may be expanded to indicate ten classes by use of all of the ending numerals.

One of the most frequent uses of a final digit code of the first arrangement is the assignment of the ending numeral "9" to indicate "Miscellaneous" at the end of a block of names, accounts, or items.

| 400 **Expense** | 405 Research |
|---|---|
| 401 Rent | 406 Advertising |
| 402 Traveling | 407 |
| 403 Automobile | 408 |
| 404 Office | 409 Miscellaneous |

Where more capacity is desired, with only one numeral or column required for sorting, the second ending digit may be used as the significant numeral instead of the first, as follows:

10 — Class 1
20 — Class 2
30 — Class 3

(or)

10, 20, 30, 40 — Class 1
50, 60        — Class 2
70, 80, 90    — Class 3

The disadvantage of this method is that it may begin to interfere with the main code unless there is a large number of digits. It must be remembered that the use of final digit designations always tends to reduce the capacity of the main code, due to the fact that certain numbers must be reserved for their proper items, and are thus not available for all new items. The second method shown in both cases above is based on the frequency of occurrence of the classes, and therefore reduces the main code capacity to the least extent.

The use of fractions, letters, or symbols at the end of a code number to designate special items must not be confused with final digit coding, as these devices are simply equivalent to the addition of another digit to the main code. A true final digit code adds one or more classifications to the main code without the addition of any digits. It simply governs the way the **regular** code numbers shall be assigned.

Where final digit codes are employed, a tabulation of the items so coded can usually be made directly following the first or initial sort of the cards for the main or primary report. Thus no extra sorting is required.

**Decimal Codes**

The decimal system of coding was developed primarily for the purpose of indexing in library work, and for classifying correspondence according to subject. One of these codes is reproduced in part below:

000 General
100 Philosophy
200 Religion
300 Sociology
400 Philology
500 Natural Science
   510 Mathematics
   520 Astronomy
   530 Physics
     531 Mechanics
       531.1 Machines
         531.11    Lever and Balance
         531.12    Wheel and Axle
         531.13    Cord and Catenary
         531.14    Pulley, simple
         531.141 Pulley, compound
         531.15
            etc.

It will be noted that the coding to the left of the decimal point is the same as the regular group classification method. It is only in the finer subdivisions that the decimal principle comes into play. This type of coding is not so well adapted to the identifying of individual items or articles as it is to the designation of groups, accounts, or subjects.

A decimal code is capable of unlimited expansion, since any number of new subdivisions can be inserted and designated by additional decimal places. This is accomplished, however, at the expense of a greater number of digits. In the illustration, "531.141—Pulley, compound," has been inserted as a subdivision of "531.14—Pulley."

The decimal system of designation has been used by many cities and municipalities for numbering lots on city maps. It is one of the best methods for this purpose, as it allows lots to be subdivided again and again, and a number is still available for each parcel of land.

The advantage of the decimal system, namely its unlimited expansion, is a disadvantage for tabulating machine usage, as card design and other requirements are not adapted to a changing number of digits. In designing a card to be used with a decimal code, one or two additional columns should be reserved to the right of the decimal to provide for any new classifications which may later appear.

In most cases an attempt should be made to convert the decimal code to a fixed digit code which provides expansion by means of vacant numbers. The illustrated code converted to a regular group code would appear as follows:

531000 Mechanics
   531100 Machines
       531101    —
       531102    —
       531103    Lever and Balance
       531104    —
       531105    —
       531106    Wheel and Axle
       531107    —
       531108    —
       531109    Cord and Catenary
       531110    —
       531111    —
       531112    Pulley, simple
       531113    Pulley, compound
       531114    —

In the above example the code has been definitely limited to six digits, with allowance for considerable expansion, whereas there is no assurance that the corresponding six-digit deci-

mal code would not eventually be carried to seven or eight digits. In making such a conversion it is often found that one digit may be immediately dropped from the decimal code, particularly where there are only a few subdivisions utilizing the last decimal place.

## Mnemonic Symbols

This term is used to designate codes which have, as an integral part of their construction, some aid to the memory expressed in letters, numbers, or combinations. For example, the following is a common type of mnemonic symbol.

<div align="center">

H 2 B W 1 2 ½

</div>

This might represent a 2 pound Hammer with Ball peen and 12½ inch Wood handle, the initial letters and dimensions being used to determine the symbol.

It is obvious that this principle can not be employed indefinitely, due to the conflict of names beginning with the same letter. Should it be desired to designate Hack Saw, for instance, in the same code it is likely that "S" would be used, or "HK."

In other cases it is customary to employ letters with similar sounds to accomplish the purpose, and there are no definite rules except that an effort is made to select a symbol which suggests in some manner the item it represents. The letters I, O and Q must not be used, due to their similarity to the numerals 1 and 0.

Symbols which ordinarily do not accomplish this purpose may in some cases be considered mnemonic if the symbol itself has become familiar. Thus "R" may be used to designate supply items because the Supply Department has been known as Department "R."

The sequence and position of the letters and figures constituting a symbol have a significance, and in this respect resemble a decimal system of coding. This sequence should be arranged so that the letters of the alphabet are intermingled with the figures, as such a symbol is more easily remembered than one with all letters together and all numerals together, since the classifications are better accented.

An example of mnemonic coding may be found in the method of assigning automobile license numbers in certain states. Although these numbers are not code numbers in the strict sense, the mnemonic principle is used, inasmuch as the letters of the license are made to correspond to the initial of the county in which they are issued.

The disadvantage of a mnemonic symbol is that it is always growing in length. Whenever there is a split in classification, a new digit or numeral is added. It also has the disadvantage that the more items there are to be coded, the less mnemonic, or memory aiding, the symbols become.

Mnemonic symbols are not well adapted to tabulating machine practice, due to the use of letters and fractions, the length of the symbols, the non-uniformity of digit position, and the variable length of symbols.

Where these symbols are encountered, the simplest, but least efficient method of conversion is to assign numbers to the letters and fractions of the symbols. This makes machine operation possible, but adds more digits and does not overcome any of the other difficulties.

The usual mnemonic code makes use of at least twenty letters of the alphabet. Should one be encountered which uses only ten, it immediately becomes possible to substitute letter type in the tabulator, thus avoiding decoding and the need for additional digits.

In most cases it will be necessary to revise the entire coding system to a numerical basis, and to use the new code as an internal medium for tabulating use until such time as the mnemonic symbols are dropped. In building the new code, an attempt should be made to preserve as many of the symbols as can readily be accommodated. The principles for doing this are outlined under "Significant Digit Codes."

## Letter Type Codes

The term "Letter Type Codes" has been applied to codes requiring the use of letter type in the numerical tabulator to print names and abbreviations instead of numbers. The objective of such codes is to eliminate all decoding, and allow a numerical accounting machine to accomplish some of the results of the alphabetic accounting machine in producing final reports.

The following code was worked out in one case to give certain units and measures directly in their lettered abbreviations:

| Name | Printed Result | Code Number |
|---|---|---|
| Pounds | LB. | 36 |
| Ounces | OZ. | 69 |
| Grams | GM. | 27 |
| Grains | GN. | 28 |
| Pints | PT. | 74 |
| Quarts | QT. | 84 |
| Litres | LT. | 34 |

| Name | Printed Result | Code Number |
|---|---|---|
| Gallons | GL. | 23 |
| Kilograms | KG. | 52 |
| Cubic Cent. | CC. | 11 |
| Sticks | ST. | 94 |
| Pieces | PC. | 71 |
| Tablets | TB. | 46 |
| Cans | CN. | 18 |
| Cartons | CT. | 14 |
| Misc. | M. | 07 |

The arrangement of letter type in the tabulator which was found to give these results is shown below:

| | First Column | Second Column |
|---|---|---|
| 1 — | C | C |
| 2 — | G | G |
| 3 — | L | L |
| 4 — | T | T |
| 5 — | K | A |
| 6 — | O | B |
| 7 — | P | M |
| 8 — | Q | N |
| 9 — | S | Z |

The zero positions on the tabulator are arranged so that they do not print when one of the columns is unpunched. If there is assurance that there will be no unpunched columns, a letter type may be placed in the zero position, thus giving ten letters per column.

In some cases it will be found simpler to supply complete alphabets in three columns each, rather than to attempt to study the frequency of letters. The following shows the type arrangement:

```
      1 2 3    4 5 6
      - - -    - - -
1     A J S    A J S
2     B K T    B K T
3     C L U    C L U
4     D M V    D M V
5     E N W    E N W
6     F O X    F O X
7     G P Y    G P Y
8     H Q Z    H Q Z
9     I R      I R
```

The principal disadvantages under this plan are that the uneven spacing of the printed names, abbreviations, or symbols makes them less legible, and that more card columns are required.

The two-letter code first illustrated brings out the advantage of studying the frequency of letters. Without such a study, this code would apparently require two complete alphabets, or six columns. Instead, it is found that letters can be fitted into two columns, which is no more than would be required to code numerically.

The following is an example of the type arrangement of a special seventeen-digit code requiring one bank and part of another in the accounting machine:

```
     1 2 3 4 5 6 7 8 9 0    1 2 3 4 5 6 7
     - - - - - - - - - -    - - - - - - -
0-   A A A A B A A A A C    A A B A A C C
1-   B E C C C I C D D      B E C C C D E
2-   C H D F E D M E E E    C H E E E E H
3-   F I E I F E N I H I    D I F J H H I
4-   I O F K I H O N K K    F K I N M I M
5-   M P I N J I P P N P    J M N P N P R
6-   O R M O N N R R O R    M O O R R R S
7-   P S N R O O S S R S    P R S S S S T
8-   S T S S P R T T S T    S S T T T T W
9-   W U T T U U U W T Y    W U U W Y W Y
```

This permits the printing of a number of words and abbreviations applicable to a confectionery business. A few examples follow:

```
     1 2 3 4 5 6 7 8 9 0    1 2 3 4 5 6 7
     - - - - - - - - - -    - - - - - - -
     A S S T   H A R D        C A N D Y
     B E T T E R   E A T    M I N T S
     B U T T E R            W A F E R S
     P E C A N              F R E S H
     W H I T E R O C K        C A N D Y
     S T F   F R U I T        F A N C Y
         S T E A M E R      B A S
     S O F T     M I N T    C R E A M S
     A S S T   H A R D      C E N T E R S
     S T F   D A T E S
     P E A   N U T          B R I T
     S P E C   A S S T      C H O C
     B I T T E R     S      C H O C
             F R U I T      D A I N T I E
             N U T          P A T T Y
```

The initial step in constructing codes of this type is to list all the names, abbreviations, or symbols which are needed, and then to arrange them as they should print.

Next determine and record on a work sheet the letter frequencies represented in each column, with the first letter of the word or abbreviation assigned to the first column, the second letter to the second column, etc. These data will, in most cases, disclose the fact that there are more letters to be used in some columns than the nine or ten spaces available in a column on a card, and that the same letter is to be used in more than one column. The number of times a letter is used in each column should be carefully analyzed in an effort to consolidate it with the same letter contained in a column on either side, and also to main-

tain the wording or the abbreviation. As these changes are made, the number of times each letter is used in each column should be corrected on the work sheet until the final arrangement has been determined.

The original arrangement of the descriptive matter may be such as to congest the letter requirements to the right of the code, since the arrangement of the wording usually contains the name of an article preceded by a description thereof, such as:

| Blank | Paper | Bitter Sweet Chocolate |
|-------|-------|------------------------|
| Wall | " | Hard Center " |
| Newsprint | " | Cream " |
| Bag | " | Nut Center " |
| Ledger | " | Assorted " |
| Bond | " | |
| Manila | " | |

An inversion or reversal of order for part of the list by placing the name before the description will often relieve the letter congestion. Changes may also be made in abbreviations as the requirements and limitations become more clearly determined.

From this point on, it is a continued readjustment of the original work sheet until only nine or ten letters are needed in each column, and the words, abbreviations, or symbols still remain legible. The zero position should be used only when absolutely necessary. Blank space between letters of a word should be avoided if possible.

Another method for studying letter frequencies for large codes consists of the original recording of the names in normal order and the counting of initial letters as mentioned before. The ten letters with the highest count are then retained, and all names starting with other letters are moved one column to the right. A count is then made of the second letter, determining the ten which are to be retained and moving others again to the right. This is continued until a basic arrangement has been attained. Further adjusting is then made for names which have not been accommodated, and the final code is determined.

When more than one bank of a tabulator is required for the code, care should be taken to see that a word will print within the limits of a bank, and that it is not split between banks. Considerable attention also should be given to the location of the letter type in the machine banks, so that they are not in disuse for other work more than is absolutely necessary.

Simple codes of ten digits may often be arranged with letter type in the machine so that

they print single characters, double characters, or even triple characters, and thus decode themselves when tabulated.

The use of any letter type of coding requires the prepunching of cards when more than two or three columns are devoted to letters. Master cards with the duplicator or gang punch may be used to accomplish this prepunching.

## Cryptic Codes

The use of dual tabulating cards as original records has given rise occasionally to the need of designing or suggesting codes which are more or less secret in nature, but which can be translated by the tabulating machines in a normal manner. This applies more often to the coding of "Cost," "Selling Price," or other money amounts than to the coding of products, names, or accounts.

One of the simplest methods of handling such a condition is to express the factor in letters which really represent numbers, showing these letters on the card field under a heading which is intended to be misleading. For example:

| FACTORY | | | | | COST |
|---------|---|---|---|---|------|
| A | K | 0 | H | R | 000.00 |
| B | L | 1 | 0 | M | 111.11 |
| C | M | 2 | L | N | 222.22 |
| D | N | 3 | D | P | 333.33 |
| E | 0 | 4 | V | L | (Meaning) 444.44 |
| F | P | 5 | T | D | 555.55 |
| G | Q | 6 | U | V | 666.66 |
| H | R | 7 | W | Q | 777.77 |
| I | S | 8 | X | T | 888.88 |
| J | T | 9 | Y | W | 999.99 |

Thus a cost of $132.79 would apparently be "Factory BN2WW," and since no letter type is placed in the tabulator, it would indicate and add in the normal manner.

The dial phone system employs this principle, although not for the purpose of secrecy. Letters appear on the dials and names are apparently dialed, but the equipment utilizes numbers only. The arrangement is given below in the event that some application may be found for the principle:

| A, B or C | — 1 | M, N or 0 | — 5 |
|-----------|-----|-----------|-----|
| D, E or F | — 2 | P, R or S | — 6 |
| G, H or I | — 3 | T, U or V | — 7 |
| J, K or L | — 4 | W, X or Y | — 8 |

The numerals "0" and "9" are not utilized in this code, but the plan might be altered to assign only two letters to one number, including all ten digits.

Another cryptic code which has been encountered is the inversion of digits:

$$\$23.17 = \$32.71 \text{ or } \$27.31$$

In using this code, the plugging of the tabulator is made to restore the amounts to their normal sequence. A variation of the above is to insert digits which have no meaning, the plugging of the tabulator again restoring to normal.

$$\$23.17 = \$230.17 \text{ or } \$302.71$$

Another more complex method is based on multiples of value represented by numbers, starting from some arbitrary point other than zero. The first step under this method is to set the value of each multiple, although amounts varying in one-cent intervals must be expressed by one-cent multiples.

Having selected the money value of each number, an arbitrary zero point is selected, such as 500, 513, 700 or any other number.

Assuming that 513 has been selected and that each additional number represents three cents, the following would be true.

| | | |
|---|---|---|
| 513 | — | $ .00 |
| 514 | — | .03 |
| 515 | — | .06 |
| 793 | — | 8.40 |
| 942 | — | 12.87 |
| | etc. | |

This is not readily decoded, but a series of these prices may be totaled by machine, and the true value determined by a calculation. Take the following items:

| Code Value | True Value |
|---|---|
| 793 | $ 8.40 |
| 942 | 12.87 |
| 1020 | 15.21 |
| 590 | 2.31 |
| 612 | 2.97 |
| 3957 | $41.76 |

The machine total would be 3957, and the card counter is used to indicate that 5 prices are involved. Since zero was set at 513, there are therefore 5 x 513 or 2565 dead numbers in the tabulated total. Subtracting these gives 3957—2565 or 1392 as the true numerical total. Multiplying this by the unit value of $.03 per number gives $41.76, or the true value.

A variation of the above is obtained by setting the starting point at less than zero. When this is done, the above formula applies, except that the dead numbers are added to the tabulated total instead of subtracted.

There are certain short-cuts which may be used in converting tabulated code amounts to true values. These, however, must be worked out individually for specific cases, as all are dependent on the particular way in which the code is used.

## Numerical—Alphabetical Codes

### Partial Sequence—Short Lists

This is the simplest type of numerical-alphabetical code, and appears as follows:

01 — A
| | | |
|---|---|---|
| 01 | 01 | Acme Engineers |
| 01 | 02 | Adam Construction Co. |
| 01 | 03 | Ahloin & Son |
| 01 | 04 | Ajax Construction Co. |
| 01 | 05 | etc. |
| 01 | 99 | |

02 — B
| | | |
|---|---|---|
| 02 | 01 | Baker & Thomas |
| 02 | 02 | Balmat & Sons |
| 02 | 03 | Bannon, Jas. L. |
| 02 | 04 | Baptist, J. R. |
| 02 | 05 | etc. |
| 02 | 99 | |

03 — C
| | | |
|---|---|---|
| 03 | 01 | Caldwell Engineering Co. |
| 03 | 02 | Callahan, W. E. |
| 03 | 03 | Calumet Const. Co. |
| 03 | 04 | Cameron-Joyce & Co. |
| 03 | 05 | etc. |
| 03 | 99 | |

26 — Z
| | | |
|---|---|---|
| 26 | 01 | Zastrow & Lasher |
| 26 | 02 | Zimmerly Bridge Co. |
| 26 | 03 | Zimmerly, Frank |
| 26 | 04 | Zolpher & Sons |
| 26 | 05 | etc. |
| 26 | 99 | |

The first two digits represent the initial letter, and the last two are assigned to individual names. The original list is coded in exact alphabetical sequence, but all new names are simply assigned the next open numbers under the proper initial letters, thus gradually destroying the original sequence and making this a partial sequence code.

This method should not be employed where the list of names is so long that some letter

groups would have more names than can be readily scanned for reference or decoding, nor should the principle be expanded to include the second letter of the alphabet on the same basis, as four digits would be required to express only 26 times 26 or 676 divisions. Four digits normally should give 9999 divisions. In most cases it is advisable to have twenty-seven initial letters, "Mc" being regarded as a separate letter.

This type of coding does not require the use of a numbered coding register book, since new names are assigned the next open numbers, and a card file or ordinary code list may be used for determining these open numbers.

In using a code of this kind, a study should be made to determine whether final digit designations might prove beneficial, since significant information can be obtained by assigning these numbers according to the principles set forth in "Final Digit Codes."

### Condensed Alphabetic Sorting

Along the lines of the simple alphabetical code may be classed the following device for sorting to as many as six initial letters of a name. It is not a code, but performs some of the functions of a code. It can not be indicated, controlled, or printed by the tabulating machine, but is useful for sorting only.

Triple punching is employed in a four-column card field, the columns being divided as follows:

| | | | | | |
|---|---|---|---|---|---|
| Sect. 1 | 12<br>11<br>0<br>1 | 12<br>11<br>0<br>1 | 12<br>11<br>0<br>1 | 12<br>11<br>0<br>1 | Sect. 2 |
| Sect. 3 | 2<br>3<br>4<br>5 | 2<br>3<br>4<br>5 | 2<br>3<br>4<br>5 | 2<br>3<br>4<br>5 | Sect. 4 |
| Sect. 5 | 6<br>7<br>8<br>9 | 6<br>7<br>8<br>9 | 6<br>7<br>8<br>9 | 6<br>7<br>8<br>9 | Sect 6 |

Each separate section represents one letter, and the punching is as shown below:

Sect. 1—First Initial    Sect. 3—Second Letter    Sect. 5—Fourth Letter
Sect. 2—First Letter    Sect. 4—Third Letter    Sect. 6—Fifth Letter

| | Sect. 1 | Sect. 2 | Sect. 3 | Sect. 4 | Sect. 5 | Sect. 6 |
|---|---|---|---|---|---|---|
| A | – | – | – | – | – | – |
| B | – | 12 | – | 2 | – | 6 |
| C | – | 11 | – | 3 | – | 7 |
| D | – | 0 | – | 4 | – | 8 |
| E | – | 1 | – | 5 | – | 9 |
| F | 12 | – | 2 | – | 6 | – |
| G | 12 | 12 | 2 | 2 | 6 | 6 |
| H | 12 | 11 | 2 | 3 | 6 | 7 |
| I | 12 | 0 | 2 | 4 | 6 | 8 |
| J | 12 | 1 | 2 | 5 | 6 | 9 |
| K | 11 | – | 3 | – | 7 | – |
| L | 11 | 12 | 3 | 2 | 7 | 6 |
| M | 11 | 11 | 3 | 3 | 7 | 7 |
| N | 11 | 0 | 3 | 4 | 7 | 8 |
| O | 11 | 1 | 3 | 5 | 7 | 9 |
| P | 0 | – | 4 | – | 8 | – |
| Q | 0 | 12 | 4 | 2 | 8 | 6 |
| R | 0 | 11 | 4 | 3 | 8 | 7 |
| S | 0 | 0 | 4 | 4 | 8 | 8 |
| T | 0 | 1 | 4 | 5 | 8 | 9 |
| U | 1 | – | 5 | – | 9 | – |
| V | 1 | 12 | 5 | 2 | 9 | 6 |
| W | 1 | 11 | 5 | 3 | 9 | 7 |
| XY | 1 | 0 | 5 | 4 | 9 | 8 |
| Z | 1 | 1 | 5 | 5 | 9 | 9 |

By means of this punching, and with selective sorting, it is possible to arrange any cards, so punched, in almost complete alphabetical sequence without devoting more than two columns to each three letters. Under the alphabetical coding method, six columns would be required for each three letters.

## Partial Sequence—Long Lists

This type of code breaks down the alphabetical groups beyond initial letter without the use of extra digits, and appears as follows:

| | | | | | |
|---|---|---|---|---|---|
| A | 1 — | 19 | B | 340 — | 359 |
| Ac | 20 — | 39 | Bae | 360 — | 379 |
| Ad | 40 — | 59 | Bak | 380 — | 399 |
| Ag | 60 — | 79 | Bal | 400 — | 419 |
| Al | 80 — | 99 | Bam | 420 — | 439 |
| Ale | 100 — | 119 | Bar | 440 — | 459 |
| All | 120 — | 139 | Bari | 460 — | 479 |
| Als | 140 — | 159 | Barn | 480 — | 499 |
| Am | 160 — | 179 | | | |
| Ame | 180 — | 199 | Wom | 9840 — | 9859 |
| An | 200 — | 219 | Wood | 9860 — | 9879 |
| And | 220 — | 239 | Wool | 9880 — | 9899 |
| Ap | 240 — | 259 | Wr | 9900 — | 9919 |
| Ar | 260 — | 279 | Wu | 9920 — | 9939 |
| Arm | 280 — | 299 | X-Y | 9940 — | 9959 |
| At | 300 — | 319 | Yo | 9960 — | 9979 |
| Au | 320 — | 339 | Z | 9980 — | 9999 |

The names are assigned to the next open numbers under their respective alphabetical groups, and therefore will not be in complete alphabetical order beyond the original groups, thus making this a partial sequence code.

The construction of such a code is as follows: The number of names to be coded is first ascertained, as well as the amount of expansion required. These determine the number of digits necessary in the final code. Although a four-digit code has been illustrated, the above calculation may indicate that a three-, four-, or five-digit capacity may be required.

No more than ten, twenty, or thirty numbers should be assigned to an alphabetical division. Therefore the total code capacity is next divided by one of these figures to determine the number of divisions. The smaller the number chosen, the finer will be the alphabetical break-down. The code illustrated is based on twenty numbers to a division.

The complete known alphabetical list of names is then counted and marked off into the number of equal parts which has been determined as above. This roughly fixes the alphabetical groups constituting the code, and slight adjustments, where dividing lines occur in the middle of groups, gives the final code as illustrated previously.

In the event that a known list of names is not available or is, for some reason, considered not representative, a city directory, phone book, correspondence file, or other related list may be used to build the code. It will be found more satisfactory in most cases to use an actual list, since the frequencies of certain names vary greatly with different enterprises and localities.

For the same reason it is better to design a separate code for each application, following the principles set forth herein, than to attempt to utilize one of the many published codes which have been designed for filing systems generally.

The coded names need not be registered in a numbered book, although it is advisable to have a code list or other medium for determining the next open numbers.

Significant names may be designated by assigning them to numbers ending in zero, so that the initial sort may be utilized to separate them without any additional effort.

It is also common practice to have a code of this kind start with 100, 1,000, 10,000, or 100,-000 as the case may be, rather than with 1, so that all names are designated with a like number of digits. In this event the numbers with fewer digits may be assigned to auxiliary, miscellaneous, or special items, the fewer number of digits serving to identify them quickly and in many cases eliminating the need of a second code.

## Complete Sequence—All Lists

This type of code is used where it is necessary to sort and list in complete alphabetical order down to the final letter. It is recorded on register sheets or a numbered book which appears as follows:

### Sheet 39

| | | | |
|---|---|---|---|
| 00 | Heland Co., Inc. | 50 | Hell Gate Packers |
| 01 | | 51 | |
| 02 | | *52 | Hellman Co., Inc. |
| 03 | | 53 | |
| 04 | | 54 | |
| 05 | Helbruin Polish Co. | 55 | Helmrath Bottle Co. |
| 06 | | 56 | |
| 07 | | 57 | |
| *08 | Held Adams & Co. | 58 | |
| 09 | | 59 | |
| 10 | Held Baking Co. | 60 | Heloran & Co. |
| 11 | | 61 | |
| 44 | | 94 | |
| 45 | Helier's Drug Stores | 95 | Helpern Spec. Co. |
| 46 | | 96 | |
| 47 | | 97 | |
| 48 | | 98 | |

The construction of this code is exceedingly simple when undertaken in the right way. The first step is the counting of the names on the list to be coded, and the estimation of proper allowance for expansion. This determines the number of digits and the total code capacity.

The code capacity is then divided by the number of known names on the list. This gives the exact factor of expansion, and should not be adjusted to round numbers except when resulting in a fraction, in which case the next lower whole number must be taken. For example, should the above computation result in the figure 7.341 the factor used would be "7".

Numbered sheets are then prepared, 100 numbers to the sheet or page. As many sheets are prepared as are necessary for the total code capacity.

The names are then entered on the sheet, skipping as many spaces between each name as the factor of expansion indicates. The factor of expansion of the code illustrated was "5", therefore the names of the original list were entered opposite each fifth number. The first name on "Sheet 0" must not be entered opposite "01" as thereby no expansion would be provided before this name. It is advisable to start with "03" or "04". It is also desirable to change the starting point on each sheet so that the ending numerals will be evenly distributed for machine sorting.

Care must be taken in preparing the register to see that all computations have been made correctly, and that names are entered correctly, or the last page will be reached and more names may be left than available spaces. A check-up toward the end will show whether this condition exists, and if so the factor of expansion may be reduced so that the remaining names will fit in.

New names as they occur are entered in the middle of the available vacant numbers so that expansion is still left on both sides for other new names (see * on illustration). This permits of an exact alphabetical sequence and provides a complete sequence code.

It is necessary that obsolete and discontinued names be eliminated at regular intervals so that numbers may be later re-assigned and the complete alphabetical sequence thus preserved indefinitely.

## Complete Sequence—No List

This method of coding can be used where the complete list of names to be coded is not available, but where a master code is necessary as coding instruction or to insure uniformity.

An example of this case might be the coding of customers by branch houses where each branch operates its own code, and numbers are not assigned at the home office. In a case of this kind, the same coding scheme would be in effect at all branches, the branch number being used to differentiate the customers.

If the correct basis is used, this code will keep the names in perpetual order by alphabetical arrangement to the last letter. It must, however, be kept in register form so that new numbers can be assigned intelligently.

The steps of construction are as follows:

(1) Select a list of names, such as a directory or trade list, which it is estimated will compare favorably in name frequencies with the list to be built.

(2) Divide this basic list into as many equal parts as is estimated will not cause more than thirty names to fall in one division.

(3) Adjust these divisions slightly so that they conform with the nearest alphabetical groups.

(4) Number the divisions from "1" up and record the master code as follows:

| A | — 1 | Af | — 9 |
|---|---|---|---|
| Ab | — 2 | Ah | — 10 |
| Abe | — 3 | Ai | — 11 |
| Ac | — 4 | Al | — 12 |
| Ad | — 5 | Ald | — 13 |
| Adams A | — 6 | Ale | — 14 |
| Adams L | — 7 | Alk | — 15 |
| Add | — 8 | All | — 16 |

(5) Prepare numbered register sheets, each sheet with 100 numbers, and record the alphabetical division and number at the top of each sheet.

As names occur, they are inserted on the sheets in the middle of the available vacant numbers. Thus, the first name in any group would be assigned to No. 50, the second to Nos. 25 or 75, and so on. This allows a perpetual alphabetical sequence. The code number of any name consists of a combination of "Sheet No." and "Line No." unless complete numbers have been shown on each line.

Final digit designations may be used with this code to designate key names, although care must be taken that they do not interfere with the alphabetical sequence.

In the event that no list is available, and it does not appear practical to build a code from some related list, the following table of num-

# NAME CODE — 1000 DIVISIONS

### A

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| A | 1 | Alli | 12 | Ap | 23 |
| Abe | 2 | Alm | 13 | Ar | 24 |
| Abr | 3 | Alt | 14 | Are | 25 |
| Ac | 4 | Am | 15 | Arm | 26 |
| Ad | 5 | Amer | 16 | Arn | 27 |
| Adc | 6 | Ames | 17 | Arp | 28 |
| Al | 7 | An | 18 | As | 29 |
| Ale | 10 | Anderson | 19 | At | 30 |
| All | 11 | Andr | 20 | Au | 31 |
|  |  | Ane | 21 | Aus | 32 |
|  |  | Ans | 22 | Av | 33 |

### B

| Name | No. | Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|---|---|
| B | 34 | Bas | 49 | Bens | 64 | Bir | 78 |
| Bac | 35 | Bat | 50 | Bent | 65 | Bis | 79 |
| Bad | 36 | Bau | 51 | Ber | 66 | Bl | 80 |
| Bag | 37 | Baum | 52 | Berg | 67 | Blad | 81 |
| Bai | 38 | Bax | 53 | Berga | 68 | Blan | 82 |
| Bak | 39 | Be | 54 | Bergm | 69 | Ble | 83 |
| Bal | 40 | Bear | 55 | Berk | 70 | Blo | 84 |
| Ball | 41 | Bec | 56 | Bern | 71 | Bloo | 85 |
| Ban | 42 | Becka | 57 | Berr | 72 | Blu | 86 |
| Bar | 43 | Bed | 58 | Bes | 73 | Bo | 87 |
| Barg | 44 | Beg | 59 | Beu | 74 | Boe | 88 |
| Barn | 45 | Bel | 60 | Bi | 75 | Bog | 89 |
| Barr | 46 | Bella | 61 | Big | 76 | Bol | 90 |
| Barri | 47 | Ben | 62 | Bin | 77 | Bon | 91 |
| Bartl | 48 | Benn | 63 |  |  |  |  |

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| Boo | 92 | Bren | 106 | Buck | 120 |
| Bor | 93 | Bret | 107 | Bud | 121 |
| Bos | 94 | Bri | 108 | Buf | 122 |
| Bou | 95 | Bril | 109 | Bul | 123 |
| Bow | 96 | Bris | 110 | Bur | 124 |
| Bowl | 97 | Bro | 111 | Burg | 125 |
| Boy | 98 | Broe | 112 | Burk | 126 |
| Boyl | 99 | Broo | 113 | Burl | 127 |
| Br | 100 | Brop | 114 | Burns | 128 |
| Brads | 101 | Brow | 115 | Burr | 129 |
| Brae | 102 | Bru | 116 | Bus | 130 |
| Bran | 103 | Brun | 117 | But | 131 |
| Bras | 104 | Bry | 118 | Butt | 132 |
| Bre | 105 | Bu | 119 | By | 133 |

### C

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| C | 134 | Cat | 149 | Clen | 164 |
| Cal | 135 | Ce | 150 | Cli | 165 |
| Call | 136 | Ch | 151 | Clo | 166 |
| Cam | 137 | Chan | 152 | Co | 167 |
| Campb | 138 | Chap | 153 | Cod | 168 |
| Can | 139 | Char | 154 | Coh | 169 |
| Car | 140 | Che | 155 | Cohl | 170 |
| Carl | 141 | Chi | 156 | Col | 171 |
| Carm | 142 | Chi | 157 | Cole | 172 |
| Carp | 143 | Chu | 158 | Coll | 173 |
| Carr | 144 | Ci | 159 | Colo | 174 |
| Carro | 145 | Cl | 160 | Con | 175 |
| Cart | 146 | Clark | 161 | Conk | 176 |
| Cas | 147 | Clas | 162 | Conn | 177 |
| Casp | 148 | Cle | 163 | Conne | 178 |

| Name | No. | Name | No. |
|---|---|---|---|
| Conno | 179 | Cran | 194 |
| Cons | 180 | Craw | 195 |
| Cont | 181 | Cre | 196 |
| Cool | 182 | Cri | 197 |
| Coop | 183 | Cro | 198 |
| Cop | 184 | Croo | 199 |
| Cor | 185 | Crow | 200 |
| Cord | 186 | Cru | 201 |
| Corn | 187 | Cu | 202 |
| Corn | 188 | Cun | 203 |
| Cos | 189 | Cur | 204 |
| Cou | 190 | Curr | 205 |
| Cov | 191 | Curt | 206 |
| Cox | 192 | Cus | 207 |
| Cr | 193 |  |  |

### D

| Name | No. | Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|---|---|
| D | 208 | Deg | 221 | Diet | 234 | Dow | 247 |
| Dal | 209 | Del | 222 | Dig | 235 | Doy | 248 |
| Daly | 210 | Dele | 223 | Dim | 236 | Dr | 249 |
| Dan | 211 | Dem | 224 | Dit | 237 | Dre | 250 |
| Daniels | 212 | Den | 225 | Do | 238 | Dri | 251 |
| Dar | 213 | Dep | 226 | Doe | 239 | Dro | 252 |
| Das | 214 | Des | 227 | Dol | 240 | Duf | 253 |
| Dav | 215 | Det | 228 | Don | 241 | Dug | 254 |
| Davis | 216 | Dew | 229 | Donn | 242 | Dun | 255 |
| De | 217 | De | 230 | Dor | 243 | Dunn | 256 |
| Deb | 218 | Di | 231 | Dor | 244 | Dup | 257 |
| Dec | 219 | Dicki | 232 | Dor | 245 | Dut | 258 |
| Ded | 220 | Die | 233 | Dou | 246 | Dy | 259 |

### E

| Name | No. | Name | No. |
|---|---|---|---|
| E | 260 | Eli | 272 |
| Eas | 261 | Ellis | 273 |
| Eb | 262 | Elm | 274 |
| Ec | 263 | En | 275 |
| Ed | 264 | Eng | 276 |
| Edm | 265 | Engl | 277 |
| Edn | 266 | Er | 278 |
| Eh | 267 | Err | 279 |
| Ei | 268 | Es | 280 |
| Eis | 269 | Ev | 281 |
| El | 270 | Eve | 282 |
| Elf | 271 | Ey | 283 |

### F

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| F | 284 | Fis | 299 | Fr | 314 |
| Fai | 285 | Fisha | 300 | Frank | 315 |
| Fal | 286 | Fit | 301 | Frankl | 316 |
| Far | 287 | Fitz | 302 | Fras | 317 |
| Farr | 288 | Fla | 303 | Fre | 318 |
| Fas | 289 | Fle | 304 | Free | 319 |
| Fe | 290 | Fo | 305 | Frei | 320 |
| Fel | 291 | For | 306 | Fres | 321 |
| Fen | 292 | Fore | 307 | Fri | 322 |
| Fer | 293 | Forg | 308 | Frisch | 323 |
| Ferr | 294 | Fors | 309 | Frig | 324 |
| Fi | 295 | Fort | 310 | Fro | 325 |
| Field | 296 | Fos | 311 | Fu | 326 |
| Fin | 297 | Fot | 312 | Fun | 327 |
| Finl | 298 | Fox | 313 |  |  |

### G

| Name | No. | Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|---|---|
| G | 328 | Germ | 342 | Golds | 356 | Grenn | 370 |
| Gal | 329 | Ges | 343 | Gole | 357 | Grenf | 371 |
| Gall | 330 | Gi | 344 | Gol | 358 | Greg | 372 |
| Galle | 331 | Gid | 345 | Goo | 359 | Gri | 373 |
| Gam | 332 | Gie | 346 | Goodr | 360 | Grig | 374 |
| Gar | 333 | Gil | 347 | Gor | 361 | Gro | 375 |
| Gare | 334 | Gilm | 348 | Gos | 362 | Gros | 376 |
| Gas | 335 | Gi | 349 | Gr | 363 | Grot | 377 |
| Gau | 336 | Gl | 350 | Gra | 364 | Gru | 378 |
| Gei | 337 | Gle | 351 | Grab | 365 | Gu | 379 |
| Gel | 338 | Gli | 352 | Grad | 366 | Gul | 380 |
| Gen | 339 | Glo | 353 | Gras | 367 | Gur | 381 |
| Gen | 340 | Go | 354 | Gray | 368 | Gut | 382 |
| Ger | 341 | Golde | 355 | Gre | 369 |  |  |

### H

| Name | No. | Name | No. | Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|---|---|---|---|
| H | 383 | Harm | 400 | Hein | 417 | Hod | 434 | Horr | 451 |
| Hac | 384 | Harr | 401 | Hel | 418 | Hoe | 435 | Hos | 452 |
| Hag | 385 | Harri | 402 | Helm | 419 | Hof | 436 | Hou | 453 |
| Hah | 386 | Harrisa | 403 | Hen | 420 | Hog | 437 | How | 454 |
| Hal | 387 | Hart | 404 | Hen | 421 | Hol | 438 | Howe | 455 |
| Hall | 388 | Hartm | 405 | Henri | 422 | Holl | 439 | Howl | 456 |
| Halla | 389 | Harv | 406 | Hes | 423 | Holm | 440 | Hu | 457 |
| Halm | 390 | Harw | 407 | Hess | 424 | Holmg | 441 | Hud | 458 |
| Ham | 391 | Hat | 408 | Hey | 425 | Hom | 442 | Hug | 459 |
| Hamilt | 392 | Hau | 409 | Hi | 426 | Hop | 443 | Hul | 460 |
| Hamm | 393 | Hav | 410 | Hig | 427 | Hor | 444 | Hum | 461 |
| Han | 394 | Haw | 411 | Hil | 428 | Hor | 445 | Hun | 462 |
| Hane | 395 | Hay | 412 | Hill | 429 |  |  | Hunta | 463 |
| Hans | 396 | Hayf | 413 | Hin | 430 |  |  | Hur | 464 |
| Har | 397 | Heb | 414 | Hir | 431 |  |  | Hut | 465 |
| Har | 398 | Hed | 415 | Ho | 432 |  |  | Hy | 466 |
| Hare | 399 | Hei | 416 | Hob | 433 |  |  |  |  |

### I

| Name | No. |
|---|---|
| I | 467 |
| In | 468 |
| Int | 469 |
| Ir | 470 |
| Is | 471 |

### J

| Name | No. | Name | No. |
|---|---|---|---|
| J | 472 | Jer | 481 |
| Jaco | 473 | Jo | 482 |
| Jacobsa | 474 | Johnsa | 483 |
| Jae | 475 | Johnst | 484 |
| Jan | 476 | Jon | 485 |
| Jap | 477 | Jor | 486 |
| Je | 478 | Jos | 487 |
| Jen | 479 | Ju | 488 |
| Jens | 480 | Jun | 489 |

### K

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| K | 490 | Ker | 504 | Ko | 518 |
| Kai | 491 | Kes | 505 | Koe | 519 |
| Kam | 492 | Ki | 506 | Koh | 520 |
| Kap | 493 | Kil | 507 | Kol | 521 |
| Kas | 494 | Kin | 508 | Kop | 522 |
| Kau | 495 | Kinga | 509 | Kos | 523 |
| Ke | 496 | Kir | 510 | Kr | 524 |
| Kee | 497 | Kis | 511 | Kran | 525 |
| Kei | 498 | Kit | 512 | Kre | 526 |
| Kel | 499 | Kl | 513 | Kri | 527 |
| Kell | 500 | Kle | 514 | Kro | 528 |
| Kem | 501 | Kli | 515 | Kru | 529 |
| Kenne | 502 | Kn | 516 | Ku | 530 |
| Kenni | 503 | Kno | 517 | Kup | 531 |

### L

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| L | 532 | Law | 544 | Li | 557 |
| Lad | 533 | Laws | 545 | Lie | 558 |
| Lai | 534 | Lay | 546 | Lig | 559 |
| Lam | 535 | Le | 547 | Lind | 560 |
| Lan | 536 | Led | 548 | Line | 561 |
| Lang | 537 | Lee | 549 | Lip | 562 |
| Langf | 538 | Lef | 550 | Lit | 563 |
| Lans | 539 | Leh | 551 | Liv | 564 |
| Lar | 540 | Lei | 552 | Lo | 565 |
| Las | 541 | Lev | 553 | Log | 566 |
| Lau | 542 | Levine | 554 | Loh | 567 |
| Laur | 543 | Lew | 555 | Lon | 568 |
|  |  | Low | 556 | Longa | 569 |
|  |  |  |  | Lor | 570 |
|  |  |  |  | Lov | 571 |
|  |  |  |  | Low | 572 |
|  |  |  |  | Lu | 573 |
|  |  |  |  | Lue | 574 |
|  |  |  |  | Lus | 575 |
|  |  |  |  | Lut | 576 |
|  |  |  |  | Ly | 577 |
|  |  |  |  | Lyo | 578 |
|  |  |  |  | Lz | 579 |

### M

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| M | 580 | Mark | 596 | McCl | 612 |
| Macd | 581 | Marl | 597 | McCo | 613 |
| Mack | 582 | Mars | 598 | McCor | 614 |
| Macl | 583 | Mart | 599 | McCr | 615 |
| Mad | 584 | Marv | 600 | McD | 616 |
| Mag | 585 | Mas | 601 | McDon | 617 |
| Mah | 586 | Mass | 602 | McE | 618 |
| Mai | 587 | Mat | 603 | McG | 619 |
| Mal | 588 | Matl | 604 | McGr | 620 |
| Malb | 589 | Math | 605 | McGu | 621 |
| Man | 590 | Mau | 606 | McH | 622 |
| Mang | 591 | Maur | 607 | McK | 623 |
| Mann | 592 | May | 608 | McKi | 624 |
| Mano | 593 | Mayn | 609 | McL | 625 |
| Mar | 594 | McA | 610 | McM | 626 |
| Marg | 595 | McCar | 611 | McMe | 627 |

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| McN | 628 | Mil | 644 | Mori | 659 |
| McNe | 629 | Miller | 645 | Morris | 660 |
| McP | 630 | Milles | 646 | Morrisa | 661 |
| Me | 631 | Min | 647 | Mort | 662 |
| Mei | 632 | Mir | 648 | Mos | 663 |
| Mel | 633 | Mis | 649 | Mot | 664 |
| Men | 634 | Mit | 650 | Mow | 665 |
| Mer | 635 | Mof | 651 | Mu | 666 |
| Merr | 636 | Mol | 652 | Mui | 667 |
| Mes | 637 | Mon | 653 | Muller | 668 |
| Met | 638 | Monr | 654 | Mun | 669 |
| Mey | 639 | Moo | 655 | Mur | 670 |
| Meyers | 640 | Moor | 656 | Murr | 671 |
| Mi | 641 | Mor | 657 | Mus | 672 |
| Mid | 642 | Morg | 658 | My | 673 |
| Mil | 643 |  |  |  |  |

### N

| Name | No. | Name | No. |
|---|---|---|---|
| N | 674 | Newm | 684 |
| Nal | 675 | Ni | 685 |
| Nat | 676 | Nie | 686 |
| Nau | 677 | Nil | 687 |
| Ne | 678 | No | 688 |
| Nef | 679 | Nor | 689 |
| Nei | 680 | North | 690 |
| Nem | 681 | Nos | 691 |
| Neu | 682 | Nu | 692 |
| New | 683 |  |  |

### O

| Name | No. | Name | No. |
|---|---|---|---|
| O | 693 | Om | 701 |
| O | 694 | On | 702 |
| Oc | 695 | Or | 703 |
| Od | 696 | Or | 704 |
| Og | 697 | Os | 705 |
| Oi | 698 | Osm | 706 |
| Ol | 699 | Ot | 707 |
| Ols | 700 | Ow | 708 |

### P

| Name | No. | Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|---|---|
| P | 709 | Pec | 720 | Phi | 730 | Por | 740 |
| Pag | 710 | Pee | 721 | Pi | 731 | Pos | 741 |
| Pal | 711 | Pen | 722 | Pie | 732 | Pow | 742 |
| Pan | 712 | Per | 723 | Pik | 733 | Pr | 743 |
| Par | 713 | Perr | 724 | Pir | 734 | Pre | 744 |
| Park | 714 | Pet | 725 | Pl | 735 | Pri | 745 |
| Parkh | 715 | Peter | 726 | Ple | 736 | Prim | 746 |
| Pars | 716 | Petr | 727 | Po | 737 | Pro | 747 |
| Pat | 717 | Pf | 728 | Pol | 738 | Pu | 748 |
| Pau | 718 | Ph | 729 | Pom | 739 | Pur | 749 |
| Pe | 719 |  |  |  |  |  |  |

### Q

| Name | No. |
|---|---|
| Q | 750 |
| Quin | 751 |

### R

| Name | No. | Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|---|---|
| R | 752 | Rei | 763 | Ro | 774 | Rosenf | 785 |
| Raf | 753 | Reim | 764 | Robe | 775 | Ross | 786 |
| Ral | 754 | Rel | 765 | Roberts | 776 | Rot | 787 |
| Ran | 755 | Rep | 766 | Robi | 777 | Rou | 788 |
| Rap | 756 | Rey | 767 | Roe | 778 | Row | 789 |
| Rat | 757 | Ri | 768 | Rog | 779 | Ru | 790 |
| Raw | 758 | Richa | 769 | Roh | 780 | Rue | 791 |
| Re | 759 | Richb | 770 | Rom | 781 | Rum | 792 |
| Red | 760 | Rid | 771 | Ros | 782 | Rus | 793 |
| Ree | 761 | Rig | 772 | Ros | 783 | Rut | 794 |
| Reef | 762 | Rip | 773 | Rosen | 784 | Ry | 795 |

### S

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| S | 796 | Schn | 812 | Sh | 828 |
| Sai | 797 | Scho | 813 | Shap | 829 |
| Sal | 798 | Schof | 814 | Shaw | 830 |
| Sam | 799 | Schr | 815 | She | 831 |
| San | 800 | Schu | 816 | Shel | 832 |
| Sanf | 801 | Schul | 817 | Sher | 833 |
| Sar | 802 | Schum | 818 | Shi | 834 |
| Sav | 803 | Schw | 819 | Sho | 835 |
| Sc | 804 | Schwe | 820 | Shr | 836 |
| Sch | 805 | Sco | 821 | Shy | 837 |
| Schag | 806 | Se | 822 | Si | 838 |
| Sche | 807 | See | 823 | Sie | 839 |
| Schen | 808 | Sei | 824 | Sig | 840 |
| Schi | 809 | Sel | 825 | Sim | 841 |
| Schl | 810 | Ser | 826 | Simon | 842 |
| Schm | 811 | Sev | 827 | Sin | 843 |

| Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|
| Sip | 844 | Spr | 860 | Sto | 875 |
| Sk | 845 | St | 861 | Ston | 876 |
| Sl | 846 | Stah | 862 | Stor | 877 |
| Sle | 847 | Stan | 863 | Str | 878 |
| Sm | 848 | Stanf | 864 | Stre | 879 |
| Smith | 849 | Star | 865 | Stro | 880 |
| Smitha | 850 | Ste | 866 | Stu | 881 |
| Sn | 851 | Stee | 867 | Su | 882 |
| So | 852 | Stei | 868 | Sull | 883 |
| Som | 853 | Steina | 869 | Sum | 884 |
| Son | 854 | Stel | 870 | Sup | 885 |
| Sou | 855 | Ster | 871 | Sw | 886 |
| Sp | 856 | Stev | 872 | Swe | 887 |
| Spe | 857 | Stew | 873 | Swi | 888 |
| Spen | 858 | Sti | 874 | Sy | 889 |
| Spi | 859 |  |  |  |  |

### T

| Name | No. | Name | No. |
|---|---|---|---|
| T | 890 | Tim | 903 |
| Tan | 891 | To | 904 |
| Tar | 892 | Tol | 905 |
| Tay | 893 | Top | 906 |
| Te | 894 | Tow | 907 |
| Ten | 895 | Tr | 908 |
| Th | 896 | Tre | 909 |
| Thi | 897 | Tri | 910 |
| Tho | 898 | Tro | 911 |
| Thomp | 899 | Tru | 912 |
| Thor | 900 | Tu | 913 |
| Thr | 901 | Tur | 914 |
| Ti | 902 | Tut | 915 |

### U

| Name | No. |
|---|---|
| U | 916 |
| Un | 917 |
| Unit | 918 |
| Up | 919 |

### V

| Name | No. | Name | No. |
|---|---|---|---|
| V | 920 | Vi | 927 |
| Van | 921 | Vil | 928 |
| Vand | 922 | Vo | 929 |
| Vane | 923 | Voi | 930 |
| Vant | 924 | Von | 931 |
| Ve | 925 | Vor | 932 |
| Ver | 926 |  |  |

### W

| Name | No. | Name | No. | Name | No. | Name | No. | Name | No. |
|---|---|---|---|---|---|---|---|---|---|
| W | 933 | Was | 945 | Wells | 957 | Wi | 969 | Wir | 980 |
| Wag | 934 | Wat | 946 | Wen | 958 | Wie | 970 | Wit | 981 |
| Wah | 935 | Wats | 947 | Wer | 959 | Wil | 971 | Wo | 982 |
| Wal | 936 | Wau | 948 | Wes | 960 | Wild | 972 | Wolf | 983 |
| Walk | 937 | We | 949 | Weste | 961 | Wilk | 973 | Woli | 984 |
| Wall | 938 | Web | 950 | Westf | 962 | Will | 974 | Woo | 985 |
| Wals | 939 | Webs | 951 | Wh | 963 | Willie | 975 | Wood | 986 |
| Walt | 940 | Wee | 952 | Whee | 964 | Wils | 976 | Woods | 987 |
| Walto | 941 | Wei | 953 | Whi | 965 | Win | 977 | Wor | 988 |
| War | 942 | Wein | 954 | White | 966 | Win | 978 | Wr | 989 |
| Warn | 943 | Weis | 955 | Whitea | 967 | Winn | 979 | Wu | 990 |
| Warr | 944 | Wel | 956 | Whitm | 968 |  |  |  |  |

### X

| Name | No. |
|---|---|
| X | 991 |

### Y

| Name | No. |
|---|---|
| Y | 992 |
| Ye | 993 |
| Yo | 994 |
| Young | 995 |

### Z

| Name | No. |
|---|---|
| Z | 996 |
| Ze | 997 |
| Zi | 998 |
| Zim | 999 |

erical-alphabetical divisions is given for general use. This table should not be employed unless absolutely necessary, as it will not be found to apply to certain types of names and certain localities.

The full 10,000 divisions of the table may be used or a smaller code may be constructed by taking every second or third division.

## Representative Codes

Any of the basic principles of coding just described may be adapted to simplify various phases of accounting routines. Although the types of coding are limited, the range of applications is extremely wide, and seldom do two problems have exactly the same code as a solution. Careful planning and ingenuity can be used in the construction of a code to make it instrumental in simplifying the handling of special peculiarities that are distinctive of each individual business. Several types of commonly used codes are illustrated to show their general construction and their application to specific types of work.

### FACTORY EXPENSES (Major Acct. 90)

Combine Major Account with Intermediate and Minor Accounts. For example: Production Department Salaries would be coded 90-010-015.

| Intermediate | Minor | Factory Expenses |
|---|---|---|
| -010 | xxx | General Factory Salaries |
| | -011 | Executive Office |
| | -012 | Accounting Dept. |
| | -013 | Purchasing Dept. |
| | -014 | Rate Setting Dept. |
| | -015 | Production Dept. |
| | -016 | Factory Service Dept. |
| | -017 | Planning and Routing Dept. |
| | -018 | Stock Chasing Dept. |
| -020 | xxx | Departmental Supervision |
| | -021 | Foremen and Assistants |
| | -022 | Set-up Labor |
| | -023 | Shop Clerks |
| -030 | xxx | Inspection of Product |
| | -031 | Work in Process |
| | -032 | Completed Equipment |
| | -033 | Tool Equipment |
| | -034 | Finished Parts |
| | -035 | Parts for Export |
| -040 | xxx | Handling and Storing Product |
| | -041 | Unloading Purchased Material |
| | -042 | Storekeeping |
| | -043 | Inter-Department Trucking |
| | -044 | Outside Trucking Service |
| | -045 | General Freight and Express |
| | -046 | Cleaning, Weighing & Counting Parts |
| | -047 | Motor Truck Operation |
| -050 | xxx | Labor Adjustments |
| | -052 | Hourly Rate Guarantee |
| | -053 | Time Unaccounted for |
| | -055 | Waiting Time |

| Intermediate | Minor | Factory Expenses |
|---|---|---|
| -060 | xxx | Supplies and Lubricants |
| | -061 | Cutting Oils and Compounds |
| | -062 | Abrasives |
| | -063 | Finishing Materials |
| | -064 | Machine Lubricants |
| | -065 | Fuel Oil and Gas |
| | -069 | General Supplies |
| -070 | xxx | Light-Heat-Power |
| | -071 | Power Plant Labor |
| | -072 | Fuel Used |
| | -073 | Supplies and Lubricants |
| | -074 | Equipment Maintenance |
| | -075 | Water Purchased |
| | -079 | Electric Current Purchased |
| -080 | xxx | Defective and Damaged Product |
| | -081 | Parts Scrapped |
| | -082 | Reworking Parts and Equipment |
| | -083 | Loss on Returned Defective Equipment |
| | -085 | Allowances on Orders Improperly Filled |
| | -089 | Field Repairs to Defective Equipment |
| -090 | xxx | Office Expenses |
| | -091 | Stationery and Supplies |
| | -092 | Tabulating Service |
| | -093 | Postage |
| | -094 | Telephone |
| | -095 | Telegraph |

## FACTORY EXPENSES (Major Acct. 90)—*Continued*

| Inter-mediate | Minor | Factory Expenses |
|---|---|---|
| -100 | xxx | Factory Engineering |
| | -111 | Factory Changes in Standard Equipment |
| | -112 | Laboratory Production Engineering |
| | -120 | Specification Clerks |
| | -130 | Special Tracings and Wiring Diagrams |
| | -140 | Reworking Parts due to Engr. Changes |
| | -150 | Blueprinting |
| | -161 | Electrical Laboratory |
| | -162 | Mechanical Laboratory |
| | -163 | Chemical Laboratory |
| | -164 | Metallurgical Laboratory |
| | -169 | Other Laboratory Expense |
| | -170 | Tool Designing and Ordering |
| | -180 | Reworking Tools due to Engr. Changes |
| | -190 | Other Factory Engineering |
| -200 | xxx | Welfare |
| | -201 | Band |
| | -203 | Club Activities |
| | -204 | Safety Protection |
| | -205 | Educational and Training Expense |
| | -208 | Medical and First Aid |
| | -209 | General Welfare |
| | xxx | Country Club Expense |
| | -211 | Salaries and Wages |
| | -214 | House Supplies and Expenses |
| | -215 | Maint. of Bldgs., Equip't and Grounds |
| | -216 | Rental Property Maintenance |
| | -217 | Insurance and Taxes |
| | -218 | Light, Heat, Power, Water and Telephone |
| | -219 | Depreciation of Bldg. and Equip't. |
| | xxx | Country Club Revenue |
| | -222 | Revenue from Rooms |
| | -226 | Rental Property Revenue |
| -300 | xxx | Other Unclassified Expenses |
| | -301 | Factory Traveling |
| | -302 | Departmental Rearrangement |
| | -303 | Adapting Stock Equip't to Orders |
| | -304 | Supper Allowance |
| | -305 | Suggestion Contests |
| | -306 | Federal Check Tax |
| | -307 | Production and Cost Control |
| | -309 | Unclassified (Itemize and describe) |

| Inter-mediate | Minor | Factory Expenses |
|---|---|---|
| -400 | xxx | Building Maintenance and Service |
| | -401 | Maintenance of Buildings |
| | -402 | Janitor Service |
| | -403 | Elevator Service |
| | -404 | Watchman Service |
| | -405 | Fire Protection |
| | -406 | Water Purchased (General use) |
| | -409 | Ground Upkeep |
| -500 | xxx | Equipment Maintenance |
| | -501 | General Machinery |
| | -502 | Dies, Jigs, Fixtures, Etc. |
| | -503 | Small Tools and Cutters |
| | -504 | Electrotype and Type |
| | -505 | Power Transmission |
| | -506 | Motors |
| | -507 | Furniture and Fixtures |
| | -508 | Unclassified Equipment |
| | -509 | Supervision |
| | -510 | Cleaning and Oiling Machinery |
| -600 | xxx | Factory Expense Recovered |
| | -611 | Scrap Sold |
| | -612 | Handling and Loading |
| | -620 | Foremen's Productive Time |
| -700 | xxx | Depreciation of Assets |
| | -701 | Buildings |
| | -709 | Building Equipment |
| | -711 | Power Plant |
| | -712 | Transmission Lines |
| | -721 | General Machinery |
| | -722 | Dies, Jigs, Fixtures, Etc. |
| | -723 | Small Tools and Cutters |
| | -724 | Drawings and Patterns |
| | -725 | Furniture and Fixtures |
| | -726 | Tool Equipment with Vendors |
| | -729 | Unclassified Equipment |
| -800 | xxx | Accrued and Deferred Charges |
| | -801 | Inventory Obsolescence and Contingencies |
| | -802 | Annual Inventory Expense |
| | -811 | Employees Compensation Insurance |
| | -812 | Fire Insurance Premiums |
| | -820 | Factory Property Taxes |
| -900 | xxx | Inter-divisional Expense Adjustment |
| | -901 | Rental |
| | -902 | Power |

## GEOGRAPHIC CODES

To assist the users of International Electric Accounting Machines, a book has been prepared by International Business Machines Corporation covering symbol or code classifications of States, Counties, and all Cities of the United States of 2,500 minimum population. All the practical geographic analyses required by the users of IBM products have been considered in the preparation of this code and it is for their use and service that the book has been compiled.

### State, County, and City Codes

The book shows, in figures, the population of every state, and the population of every county. It contains a code number for every state and county, and of every city of a population of 2500 or more, as well as a code number for the population group into which the city falls. Two digits have been assigned to state, three digits to county, and three digits to city.

### Population Code

All cities in the United States have been classed according to their population (1930 census). The Code numbers under the caption "Pop. Group" indicate the population groups.

Following is a list of these groupings with their corresponding code:

|  |  | Population Code |
|---|---|---|
| Cities having 1,000,000 or more |  | 1 |
| " " | 500,000 to 1,000,000 | 2 |
| " " | 250,000 to 500,000 | 3 |
| " " | 100,000 to 250,000 | 4 |
| " " | 50,000 to 100,000 | 5 |
| " " | 25,000 to 50,000 | 6 |
| " " | 10,000 to 25,000 | 7 |
| " " | 5,000 to 10,000 | 8 |
| " " | 2,500 to 5,000 | 9 |
| " " | less than 2,500 | 0 |

When the population indication is not desired the code for population can be disregarded with the resultant saving of one column of the tabulating card.

### Cities Located in More Than One County

Where a city extends into more than one county, both county code numbers are shown opposite the city. The county in which the greater part of the city's population is located is the first listed. For example:

| State | County | City | City | Pop. Group |
|---|---|---|---|---|
| 01 | 113 | 077 | Phenix City | 7 |
| 01 | 081 | 077 | Second Co. | 7 |

## STATE CODES

| State Code | STATE | State Code | STATE | State Code | STATE | State Code | STATE |
|---|---|---|---|---|---|---|---|
| 01 | Alabama | 14 | Kansas | 26 | Nevada | 38 | South Carolina |
| 02 | Arizona | 15 | Kentucky | 27 | New Hampshire | 39 | South Dakota |
| 03 | Arkansas | 16 | Louisiana | 28 | New Jersey | 40 | Tennessee |
| 04 | California | 17 | Maine | 29 | New Mexico | 41 | Texas |
| 05 | Colorado | 18 | Maryland | 30 | New York | 42 | Utah |
| 06 | Connecticut | 19 | Massachusetts | 31 | North Carolina | 43 | Vermont |
| 07 | Delaware | 20 | Michigan | 32 | North Dakota | 44 | Virginia |
| 08 | Florida | 21 | Minnesota | 33 | Ohio | 45 | Washington |
| 09 | Georgia | 22 | Mississippi | 34 | Oklahoma | 46 | West Virginia |
| 10 | Idaho | 23 | Missouri | 35 | Oregon | 47 | Wisconsin |
| 11 | Illinois | 24 | Montana | 36 | Pennsylvania | 48 | Wyoming |
| 12 | Indiana | 25 | Nebraska | 37 | Rhode Island | 49 | Dist. of Columbia |
| 13 | Iowa |  |  |  |  |  |  |

## VERMONT—Code 43

Population $\left\{ \begin{array}{l} \text{380,000 Estimated, July, 1936} \\ \text{359,511 Official, 1930} \end{array} \right.$

### COUNTIES

| State | County | COUNTY | Population | State | County | COUNTY | Population | State | County | COUNTY | Population |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 43 | 001 | Addison | 17952 | 43 | 011 | Franklin | 29975 | 43 | 021 | Rutland | 48453 |
| 43 | 003 | Bennington | 21655 | 43 | 013 | Grand Isle | 3944 | 43 | 023 | Washington | 41733 |
| 43 | 005 | Caledonia | 27253 | 43 | 015 | Lamoille | 10947 | | | | |
| 43 | 007 | Chittenden | 47471 | 43 | 017 | Orange | 16694 | 43 | 025 | Windham | 26015 |
| 43 | 009 | Essex | 7067 | 43 | 019 | Orleans | 23036 | 43 | 027 | Windsor | 37416 |

### CITIES

| State | County | City | CITY | Pop. Group | State | County | City | CITY | Pop. Group |
|---|---|---|---|---|---|---|---|---|---|
| 43 | 005 | T 001 | Barnet | 9 | 43 | 019 | C 023 | Newport | 8 |
| 43 | 023 | C 003 | Barre | 7 | 43 | 021 | V 025 | Proctor | 9 |
| 43 | 023 | T 005 | Barre | 9 | 43 | 025 | T 027 | Rockingham | 8 |
| 43 | 025 | V 007 | Bellows Falls | 9 | 43 | 021 | C 029 | Rutland | 7 |
| 43 | 003 | V 009 | Bennington | 8 | 43 | 011 | C 031 | St. Albans | 8 |
| 43 | 021 | T 011 | Brandon | 9 | 43 | 005 | V 033 | St. Johnsbury | 8 |
| 43 | 025 | V 013 | Brattleboro | 8 | 43 | 027 | V 035 | Springfield | 9 |
| 43 | 007 | C 015 | Burlington | 6 | 43 | 021 | T 037 | West Rutland | 9 |
| 43 | 007 | T 017 | Colchester | 9 | 43 | 027 | V 039 | Windsor | 9 |
| 43 | 027 | T 019 | Hartford | 9 | 43 | 007 | C 041 | Winooski | 8 |
| 43 | 023 | C 021 | Montpelier | 8 | | | | | |

"C", "T", and "V" preceding city code designates whether City, Township or Village.

## PURCHASED MATERIAL CLASSIFICATIONS

010 ABRASIVES
    010 Miscellaneous
    011 Grinding Wheels
    012 Emery Paper, etc.
    013 Sandblast and Tumbling Materials
    014
    015 Polish Materials

020 ACIDS, CHEMICALS AND LUBRICANTS—
PLATING SUPPLIES
    020 Miscellaneous
    021 Acids
    022 Miscellaneous Chemicals
    023
    024 Lubricants
    025 Cutting Oils
    026
    027 Plating Suplies, Anodes, etc.

030 BRASS, BRONZE, AND ALUMINUM
    030 Miscellaneous
    031 Bar Stock—rounds, hexagons
    032 Flat Stock—squares
    033 Sheets
    034 Tubing
    035 Extruded and Pinion
    036 Beryllium—all forms
    037 Aluminum—all forms

040 CASTINGS—ALUMINUM, ZINC, ETC.
    041 Sand Castings
    042 Die Castings

050 CASTINGS—BRASS AND BRONZE

060 IRON AND STEEL CASTINGS—FORGINGS
    061 Sand Castings
    062 Steel Forgings

100 GLASS

110 HARDWARE AND SCREWS
    110 Miscellaneous
    111 Locks
    112 Machine Screws and Cap Screws
    113 Wood and Miscellaneous Screws
    114 Bolts
    115 Nails
    116 Cotter Pins, Washers and Nuts, Taper Pins

130 INSULATING MATERIALS
    130 Miscellaneous
    131 Bakelite—sheet stock
    132 Tubing and Rod
    133 Fabricated Parts—bakelite
    134 Yarn

## PURCHASED MATERIAL CLASSIFICATIONS—*Continued*

150 LUMBER
    150 Lumber—all other
    151 Oak
    152 Pine
    153 Veneer Panels

170 PACKING SUPPLIES
    170 Miscellaneous
    171 Shook Boxes
    172 Paper Containers
    173 Wrapping Materials, Strapping

180 PAINTS AND VARNISHES (FINISHING MATERIALS)
    180 Misc. Finishing Materials
    181 Undercoats
    182 Baking Finishes
    183 Lacquers
    184 Insulated Varnishes
    185
    186
    187 Wood Finishing Materials
    188
    189 Paints—maintenance, etc.

200 RESALE MATERIAL
    200 All Other
    201 Radio Material
    202 Employees' Material

210 STEEL AND IRON
    210 H.R. Steel—flat, round and square
    211 Bar Stock—rounds, hexagons C.D.
    212 Flat Stock—squares
    213 Strip and Sheets
    214 Tubing
    215 Drawn or Extruded Shapes
    216 Norway Iron—all forms
    217 Tool Steels
    218 Music Wire—spring steels
    219 Alloy Steels

220 WIRE—FIXTURE AND CABLE, MAGNET
    220 Miscellaneous
    221 Rubber Insulated Fixture Wire
    222 Flame Proof Fixture Wire
    223 Cables
    224 Magnet Wire
    225 Resistance Wire

230 PURCHASED PARTS
    230 Miscellaneous
    231 Partially Machined Parts
    232 Completely Machined Parts
    233 Sheet Metal Parts
    234 Stampings
    235 Spun Parts
    236 Gears
    237 Bearings—ball and roller
    238 Standard Purchased Parts
    239

240 Motors
241 Synchronous Motors
242 Resistors and Condensers
243 Contacts
244 Transformers and Rectifiers
245 Bells, Buzzers, Horns, etc.
246 Telephone Apparatus
247
248 Dials
249
250 Springs
251 Ribbons
252
253 Type
254
255 Plugwire Assemblies
256 Attachment Cords
257
258 Molded Parts

400 FUEL (POWER AND LIGHT)
    400 Miscellaneous
    401 Coal
    402 Gas
    403 Electricity

410 MISCELLANEOUS (GENERAL SUPPLIES)
    410 General Supplies
    411 Electrical Supplies
    412 Belting
    413
    414 Lamps
    415 Machine Parts
    416
    417
    418 Repairs—bldgs. and equip.

420 STATIONERY AND SUPPLIES

430 SMALL TOOLS
    430 Miscellaneous
    431 Drills and Counterbores
    432 Taps and Dies
    433 Reamers
    434 Mills
    435 Files
    436
    437 Inspection Gauges
    438 Inspection Gauges—maintenance
    439 Field Maintenance Tools

440 PAPER—ALL OTHER

500 CONSTRUCTION

610 TOOLS AND DIES

640 MACHINERY

650 MACHINERY PARTS

660 FURNITURE AND EQUIPMENT

680 MISCELLANEOUS

## Automatic Coding

Numerical codes for the identification of products, geographic areas, individuals, balance sheet accounts, and other items have been advantageously employed in the use of International Electric Accounting Machines. The transcription of alphabetic nomenclature into simple, concise numerical classifications, such as those described in the part on Codes, is the first operation in the accounting routine.

### Code Cards

Any detail transaction to be recorded on a tabulating card may carry one or more fields of identifying or classification data. When the number of such fields is limited, it is a simple matter to make manual notations on the original document of the code from an established code book, or to train the punch operator to memorize the necessary numerical codes. When this information appears in several fields of the tabulating card and is permanently fixed, regardless of the time at which the transaction occurs, and is an item which recurs frequently, it is advantageous to set up, on a single card, the complete code of all of such detail items. A record of this type eliminates the necessity of referring to more than one book of codes.

The development of the Duplicating Key Punch opened new fields for the simplification of the coding operation by combining the coding and punching operations through the use of a punched master code card. The punched holes of the master card are sensed by means of brush contacts. This completes an electrical circuit that results in the operation of the punching keys corresponding to the holes of the master card.

In this way, common information is automatically transcribed to the detail tabulating cards. For example, a bill of goods was sold to the Excelsior Mfg. Co., containing four different items. Four cards would be punched— one for each product item for the purpose of preparing detail sales analysis. As the analysis of these sales items would be made according to salesman, branch, customer, state, class of trade, etc.,—these classification data would have to be punched in each of the detail cards. To accomplish this a punched master code card would be selected from a file by reference to the name of the company—Excelsior Mfg. Co. This card, carrying the coded information, would automatically transfer the coded data to the first detail card. The operator would then manually punch the remaining data pertaining to the first product appearing on the body of the invoice. As the second card appears in the machine, the coded data would again be automatically transcribed and the subsequent specific detail of the second item could then be manually punched. The third and fourth cards would likewise be punched by a combination of automatic machine duplication and manual punching.

This use of a code card with the Duplicating Key Punch has four distinct advantages:

1. It eliminates the necessity for manually posting codes from a code book to the detail record.
2. It eliminates the necessity for verification of the accuracy with which the clerk transcribed the coding information from the master code book.
3. It eliminates the necessity for manually punching the coded information in the detail cards.
4. The automatic accuracy obtained by the duplicating mechanism eliminates the necessity for verification of the punching operation.

| TERRITORY NO. | NAME | |
|---|---|---|
| 13 | Excelsior Mfg. Co. | |
| STATE NO. | ADDRESS | |
| 06 | | |
| CITY NO. | CITY | STATE |
| 002 | Bridgeport | Conn. |
| CUSTOMER NO. | TERRITORY | |
| 57 | | |
| COMPANY | COMPANY | |
| 1 | | |
| | REMARKS | |
| | | |
| | | |

*Customer Code Card*

*Punched Master Code Card*

## Customer Code Cards

One of the most common applications of the code card is in the preparation of detail sales analysis cards as briefly described in the example just given. Sales to customers are repetitive. In some cases, re-orders may be made quite frequently. The recurrence of these invoices permits the creation of master code cards for each individual customer which are selected from a file and serve as an automatic coding and punching medium in the preparation of detail cards. Two main classes of master code cards, entailing two distinct tabulating procedures, are widely accepted in conjunction with the preparation of detail sales cards.

The first one involves the setting up of a master file of a single customer code card for each customer, in which the common descriptive information is both written and punched. When copies of sales invoices are delivered to the tabulating department, the code card corresponding to the customer name appearing on the invoice is "pulled." The invoice and card are clipped together and delivered to a punch operator who checks the name on the code card with the name on the invoice, and then places the master code card in the duplicating rack of the punch. After the detail cards are prepared for each of the items appearing on the invoice, the master code card is put to one side and returned to the customer code

*Coded Sales Analysis Card*

card file. The same card is used whenever an invoice for that customer is received. When more than one invoice per customer is received in the course of a day, it is advisable to have two or three code cards in the file to avoid delay.

The second method is designed to eliminate the refiling operation and also the replacement of master code cards due to wear and tear in handling. Under this procedure, a group of cards, varying from six to several dozen (depending upon the frequency with which sales to a given customer recur) are preaddressed with the customer's name and code information, and gang-punched before they are placed in a file. When a copy of a sales invoice is received, the proper card is selected from the file. It is clipped to the invoice and forwarded to the key punch operator who punches the detail appearing for the first item of the invoice in the card. If more than one item appears on the invoice the card is placed in the duplicating rack so that the common information may be duplicated on the second detail card. The detail regarding the subsequent items is then punched in the succeeding cards. Thus the master card becomes the first detail sales analysis card and proceeds through the general sales accounting tabulating procedure. When subsequent customer invoices are received, one of the remaining gang-punched master code cards is selected. When the last master code card is withdrawn from the file, a new group of code cards must be prepared. This method is especially well adapted to those routines where the average number of items per invoice is one or two and there is a considerable amount of coded information.

As each of these methods has its special advantages, the one selected is entirely dependent upon the conditions met in each individual circumstance. There are many other accounting applications besides that of sales analysis in which considerable common coded information appears on original records. It is necessary only to determine where such cards can be advantageously used.

**Prepunched Cards**

The growing use of prepunched cards for various accounting applications affords another use for the master card. As an illustration, in the chain store and wholesale grocery accounting and billing routine, detail cards are prepared automatically from master cards at a high rate of speed, carrying the alphabetic description of each product, the code number, the unit price, and other descriptive information. The number of detail cards gang-punched is equal to the number of cases of goods received at the warehouse. These cards are set up in files from which they are selected as the given commodity is ordered by the stores.

Those cards selected from the file are used to prepare shipping notices and invoices. The rest of the prepunched cards remaining in the file represent the physical inventory on hand in the warehouse.

The need for a standard alphabetic description, as well as the requirements for accuracy of other information, are best met by the use of the master card retained in a separate master card file to serve as the basis of the gang-punching.



*Master Card for Prepunched Files*

## GROUP-SORTING CODE CARD

*(Card image with punch-hole grid and field labels including: FINAL DISTRIBUTION — CON, CLASS, SUB ACCT., TYPE; ORDER NO.; DEP'T. NO.; MAN NO.; NAME; ORDER OR ACC'T. NO.; OPER. NO.; OPERATION NAME; START STOP; HOURS; GOOD PIECES; RATE; AMOUNT; IND. 1; DIR. 2; REMARKS; INDIVIDUAL JOB TICKET with DATE (MO., DAY), DEPT., MAN NO., ORDER OR ACC'T., OPER. NO., HRS., PIECES, AMT., CODE. Left margin: I.B.M. 129266 — LICENSED FOR USE UNDER PATENT 1,772,492.)*

*Group-Sorting Code Card*

## Group-Sorting Code Cards

In many plants where job order or budget appropriation numbers are set up, the major accounting distribution of all detail items charged to the order number would be the same. To eliminate the necessity of indicating the major accounting codes on each individual item, a group-sorting device has been developed. For example, the device may be used to eliminate certain coding, punching, and verifying of detail cards in cost accounting work. A master card can be punched with the job number, department, and account, while only the job number is punched in the detail cards. At the end of the accounting period, both master and detail cards can be sorted to job number in the regular way. Then the group-sorting device may be used to bring the charges together by department and accounts for cost tabulation. This single card, in effect, corresponds to a master duplicating card, but the sorting device eliminates the necessity for actually transcribing this information from the master card to detail cards.

## Automatic Coding of Total Cards

Whenever analyses are to be made from summary cards, some of the coding may be eliminated from the detail records by the use of indicating cards in the summary punching tabulation.

If the cards illustrated in the example of group-sorting were simultaneously tabulated it would be possible to prepare a total card containing all of the accounting classification data. The group-sorting code card would serve as an indicating card.

## Coding by Checking Preprinted Lists

Recourse to other ingenious short-cuts may be taken when the data to be coded do not permit the use of one of the master coding cards just described. The most common method

**ORDER COST SUMMARY CARD**

| | FINAL DISTRIBUTION | | | | | ORDER NO. | TOTAL HOURS | TOTAL AMOUNT | |
|---|---|---|---|---|---|---|---|---|---|
| | CONT | CLASS | SUB ACCT. | TYPE | | | | | |

```
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 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 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 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 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 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 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 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 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 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 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 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
```

I.B.M. 5080                                         LICENSED FOR USE UNDER PATENT 1,772,492

*Coded Summary Card*

is checking off the item on a preprinted list with some standard mark (✔ or X). This is frequently used to limit the responses to be analyzed on a questionnaire and also to simplify recording on original documents.

### Addressing Plates

Whenever addressing plates are used to imprint original documents, provision may be made to incorporate one or more lines of pertinent codes. This is usually done in connection with customer invoices, employee time cards, and check-writing.

### Blueprinting

Production explosion, the ordering and scheduling of parts for assembly operations, is usually based upon data that are typed on tracing paper so that blueprints can be readily prepared. The inclusion of part number and other numerical codes can be used to reduce subsequent manual coding and insure accuracy.

### Other Methods

The routines outlined above are suggestive of the short-cuts that can be utilized. Among the others are:

1. Use of catalog or item number on order forms.
2. Rubber stamps for name and number of individuals, departments, branches, etc.
3. Use of block codes for major groupings of detail classifications.
4. Prefixes of preprinted serial numbers.
5. Use of significant digit codes.

## Decoding

Finished numerical reports from the electric bookkeeping and accounting machines must be decoded to be generally acceptable. Provision, therefore, should be made to simplify the routine for recording or indicating the necessary descriptive data at a convenient position on the report. One or more of the following decoding procedures may be adapted to meet specific conditions.

### Alphabetic Decoding Card

When the alphabetic tabulator is available, it is possible to secure completely decoded reports through the use of the alphabetic decoding card. A single card with alphabetic description is punched for each code number appearing in the chart of accounts, payroll lists, or other accounting codes. The numerical code field in each of the detail cards is aligned with the master card field so that the decoding card may be automatically sorted in front of each detail group. By this means the decoded description will be indicated from the first card

## ACCOUNT No. 384—TRANSPORTATION EQUIPMENT

| CO. SERIAL NO. | STATISTICAL "A" | | STATISTICAL "C" | | UNIT OF PROPERTY | CITY, TOWN, VILLAGE |
|---|---|---|---|---|---|---|
| | 1 | AUTO WASHERS | 1 | PASSENGER CARS | | |
| | 2 | BATTERIES, ELEC. VEHICLE | 2 | PORTABLE POWER TOOLS | | |
| CARD NO. | 3 | BATTERY CHARGING EQUIPT. | 3 | PUMPS | | |
| | 4 | BENCHES | 4 | STORAGE FACILITIES | DESCRIPTION OF UNIT OF PROPERTY | |
| | 5 | BRAKE EQUIPMENT | 5 | TESTING EQUIPMENT | | |
| | 6 | CHASSIS | 6 | TIRE EQUIPMENT | | |
| | 7 | COMPRESSED AIR SYSTEM | 7 | TRACTORS | | |
| DATE OF INSTALLATION MO. YR. | 8 | CONVEYING EQUIPMENT | 8 | TRAILERS | | |
| | 9 | GASOLINE DISPENSING SYS. | 9 | TRUCK BODIES, SPARES | | |
| | STATISTICAL "B" | | STATISTICAL "D" | | REFERENCE | |
| | 1 | HOISTING EQUIPMENT | 1 | TRUCKS | | |
| WORK ORDER NO. | 2 | MACH. TOOLS, POWER DRIVEN | 2 | VALVE EQUIPMENT | LOCATION | |
| | 3 | MARINE EQUIPMENT | 3 | WELDING EQUIPMENT | | |
| | 4 | MISCELLANEOUS GENERAL | 4 | FIRE EXTINGUISHER EQUIPT. | | |
| | 5 | MISCELLANEOUS MACHINES | 5 | | | |
| TOTAL COST | 6 | MISCELLANEOUS TOOLS | 6 | | DATE RETIRED MO. YR. | DRAWER NO. / FROM CARD NO. |
| | 7 | MOTORCYCLES & SIDECARS | 7 | | | |
| | 8 | MOTORS | INDIVIDUAL UNIT CODE NO. | | R. O. NO. / FOLIO / SERIAL | TO CARD NO. |
| | 9 | PARTITIONING, ENCLO'S ETC. | | | | |

| CO. SERIAL NO. | CARD NO. | DATE INSTALL. MO. YR. | W. O. NO. | TOTAL COST | STAT. A | STAT. B | STAT. C | STAT. D | INDIVIDUAL UNIT CODE NO. | DATE RETIRED MO. YR. | R. O. NO. | DRAW NO. | FOLIO | SER. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

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 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

I.B.M.—131125—FRONT

LICENSED FOR USE UNDER PATENT 1,772,492

CONTINUING PROPERTY RECORD — FORM NO. 37

0 1 2 3 4 5 6 7 8

*Precoded Lists*

---

CUSTOMER'S ORDER NO. AND DATE 16324 2/28/36
SIGNED BY A. M. Adams
REQUISITION NO.

REFER TO INVOICE NO. 31234
INVOICE DATE 3/2/36

SOLD TO

Endicott Johnson Corporation,
Payroll Department,
North Street,
Endicott, N. Y.

2481-04-37-04-193-21-148-1918-01

---

## 87072

33          WILSON E. DIMMICK     236

*Coded Addressing Plates*

---

FORM 406

### SPECIFICATION & BILL OF MATERIAL

NAME GEAR SHIFT LOCK ASSEMBLY (MEDIUM FEED)

WHERE USED Final Assembly 142000

DWG. SIZE A

No. 142085

NO. OF SHEETS 1 SHEET 1

ORDER NO. ___ QUANTITY ___ DATE ___

No. 142085

| LOCATION OF STOCK | QUAN. REQ. | QUAN. ISSUED | PART NO. | DWG. | NO. PER UNIT | DESCRIPTION |
|---|---|---|---|---|---|---|
| | | | 39841 | A | 2 | Stop pin |
| | | | 109199 | A | 2 | Rivet |
| | | | 112936 | A | 2 | Rivet |
| | | | 141603 | A | 1 | Gear shift lock (Medium Feed) |
| | | | 141399 | A | 1 | Gear shift lock knob |
| | | | 141406 | A | 1 | Spacer ... operating cam |

ENG. CHANGE NOS. R-1053

MADE BY ABC   APPD. DEF   DATE TYPED 4-24-36

*Coded Bill of Material*

ALPHABETIC DECODING CARD

SALES ANALYSIS

LICENSED FOR USE UNDER PATENT 1,732,492

### SALES BY PRODUCT

| PRODUCT | | PRODUCT NAME | QUANTITY | GROSS BILLING | DISCOUNTS | NET BILLING | COST |
|---|---|---|---|---|---|---|---|
| CLASS | ITEM | | | | | | |
| 01 | 014 | ACETIC ACID | 779 | 92590 | 16520 | 76070 | 59290 |
| 01 | 017 | HYDROCHLORIC ACID | 1550 | 765055 | 151040 | 614015 | 318575 |
| 01 | 019 | NITRIC ACID | 2120 | 65928 | 3870 | 62058 | 59590 |
| 01 | 021 | SULPHURIC ACID | 65250 | 187508 | 183200 | 169308 | 125962 |

*Alphabetic Decoding Card*

and the tabulated totals will be printed on the same line.

### Preprinted Forms

The use of preprinted descriptions on forms is to be recommended whenever the reports are frequently prepared and contain identical descriptive information for each periodic tabulation. Proper positioning of the amounts to coincide with their corresponding preprinted descriptions may be obtained by the use of space cards.

### Overlapping Descriptions

Whenever the data which have been printed on tabulated reports follow the alignment of reports for succeeding periods, or related records of the same period, overlapping sheets

carrying the descriptive data may be more economical than preprinted forms.

### Visible Files

When reports which contain variable items are prepared occasionally, the simplest method is to type the descriptive data. The decoding may be facilitated by the use of visible files. These are made in various forms as shown by the illustrations of a few of the devices.

### Decoding Legend

When the number of classifications is limited, a decoding legend may be preprinted on the report forms. This method is entirely satisfactory on internal accounting documents and is also widely used on customer invoices and statements.

## BRANCH MONTHLY EXPENSE STATEMENT

BRANCH __Philadelphia__                                              MONTH OF __May__

| | ACCT. NO. | BRANCH | CURRENT MONTH | | | | | YEAR TO DATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | BUDGET | EXPENSE | % of NET SALES | OVER BUDGET | UNDER BUDGET | BUDGET | EXPENSE | % or NET SALES | OVER BUDGET | UNDER BUDGET |
| **DIRECT EXPENSE** | | | | | | | | | | | | |
| Advertising | 301 3 0 1 | 4 | 563 | 414 | | | 149 | 6756 | 13585 | | 6829 | |
| Commissions | 303 3 0 3 | 4 | 30 | 796 | | 766 | | 360 | 1118 | | 758 | |
| Management Salaries | 305 3 0 5 | 4 | 450 | 450 | | | | 5400 | 5400 | | | |
| Management Traveling | 307 3 0 7 | 4 | 250 | 331 | | 81 | | 3000 | 4136 | | 1136 | |
| Salesmen's Salaries | 309 3 0 9 | 4 | 1800 | 1561 | | | 239 | 21600 | 23853 | | 2253 | |
| Salesmen's Traveling | 311 3 1 1 | 4 | | | | | | | | | | |
| TOTAL DIRECT | 312 3 1 2 | 4 | 3093 | 3552 | | 459 | | 37116 | 48092 | | 10976 | |
| **INDIRECT EXPENSE** | 313 3 1 3 | 4 | | | | | | | | | | |
| Auto Expense | 314 3 1 4 | 4 | | | | | | | | | | |
| Cartage | 315 3 1 5 | 4 | 125 | 125 | | | | 1500 | 1525 | | 25 | |

*Preprinted Form*

---



*Visible Files*

---

**CODE**
0—Monthly Men
1—Contract
2—Day Work

## LABOR
## DAILY REPORT OF EXPENSES

POINT _____                                    Month of __Dec.__

| ACCOUNT | DATE | POINT | CODE | AMOUNT | TOTAL | SHOP EXPENSE |
|---|---|---|---|---|---|---|
| 1. M. of E. Steam Locos. | 12 | 34 | 10 / 11 / 12 | 13 35 / 12 13 | 142 48 | 55.57 |
| 2. M. of E. Expenses | | | 20 / 21 / 22 | 18 14 / 241 36 | 2593 50 | 1011.47 |
| 3. M. of E. Pass. Ca | | | 30 / 31 / 32 | 71 46 / 222 86 / 453 59 | 747 91 | 291.68 |
| 4. M. of E. Fr | | | 40 / 41 / 42 | 132 17 / 409 85 / 484 72 | 1026 74 | 400 43 |
| Transport 6. Expense Acc | | | 60 | 30 66 | | |

*Overlapping Form*

---



---

R-1603
5M-1-32. A. S. B. Co. **Source of Entry (All Copies Attached)**

★
11 Equipment Orders
12 Supply Orders
13 Rental Orders
31 Collections—Suspense Accounts
22 Other Cash Receipts
41 Cash
42 Rent
50 G Journals
60 G Journals
70 Credit Memoranda
81 Supplies Purchased
90 Voucher Register

## AGENTS COMMISSION STATEMENT

Mr. _____  _____ Agency

Page Number _____
Date _____ 193__

| AGENT | SOURCE OF ENTRY | ORDER NO | REFERENCE | AMOUNT CHARGED | AMOUNT CREDITED | BALANCE | |
|---|---|---|---|---|---|---|---|
| | | | | | | DEBIT | CREDIT |

*Decoding Legend*

## List of Stockholders or Dividend Payees

of the___ NATIONAL MANUFACTURING COMPANY ___ COMMON ___ Stock

According to the Records of

### Bank and Trust Company

at close of business___ 3/31/32 ___      Payable___ 4/10/32 ___

Dividend No.___ 35 ___

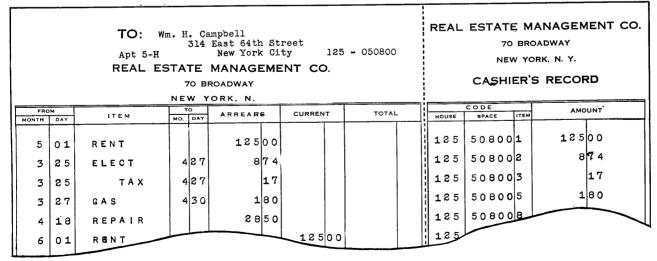| NAME AND ADDRESS | STOCK-HOLDER NO. | SHARES | DIVIDEND AMOUNT | CHECK NO. | REMARKS |
|---|---|---|---|---|---|
| TOTALS BROUGHT FORWARD: | | 7238 | 1085700 | | |
| Anderson & Fox, 43 Broad St., New York, N. Y. | 699-0134 1017 | 1017 1017 | 699 104850 | 1221 | |
| Charles M. Anderson, Chamber of Commerce, Memphis, Tenn. | 100-0128 1023 | 1023 1023 | 100 15000 | 1222 | |

*Plate Stencil Decoding*

## Plate Stencils

If addressing equipment and plates are available, they may be advantageously used for decoding. This method is commonly used in the decoding of payrolls. The plates which are used ordinarily for preparing time cards and checks are utilized to print the employee name and number on the margin of the tabulated Payroll Register. Man number printed from the addressing plate may be visually checked for correspondence with that listed by the accounting machine directly from the payroll cards.

## Use of Dual Cards

Oil companies sometimes use a unique method of reducing the work of decoding in connection with customer billing. Purchasers possessing credit cards sign a copy of a dual tabulating card at the time of purchase, which carries the detail concerning the transaction. When these cards have been brought together at the central accounting office, they are sorted according to customer number and listed on the tabulator to prepare the customer's statement. The signed cards are attached to a copy of the statement and forwarded to the customer. This not only furnishes a quick method of decoding but also gives the complete detail of each transaction in event that any item might be questioned.

## Letter Type for Printing Tabulators

Special letter type may be inserted on the printing unit of the numerical accounting machine to prepare decoded reports. This method is generally used only for one-column codes; but it may also be adapted to printing complete names of articles or items that would ordinarily have to be decoded.

TO:   Wm. H. Campbell
         314 East 64th Street
Apt 5-H      New York City      125 - 050800
REAL ESTATE MANAGEMENT CO.
70 BROADWAY
NEW YORK, N.

REAL ESTATE MANAGEMENT CO.
70 BROADWAY
NEW YORK, N. Y.

CASHIER'S RECORD

| FROM | | ITEM | TO | | ARREARS | CURRENT | TOTAL | CODE | | | AMOUNT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | | MO. | DAY | | | | HOUSE | SPACE | ITEM | |
| 5 | 01 | RENT | | | 12500 | | | 125 | 50800 | 1 | 12500 |
| 3 | 25 | ELECT | 4 | 27 | 874 | | | 125 | 50800 | 2 | 874 |
| 3 | 25 | TAX | 4 | 27 | 17 | | | 125 | 50800 | 3 | 17 |
| 3 | 27 | GAS | 4 | 30 | 180 | | | 125 | 50800 | 5 | 180 |
| 4 | 18 | REPAIR | | | 2850 | | | 125 | 50800 | 8 | |
| 6 | 01 | RENT | | | | 12500 | | 125 | | | |

*Letter Type Decoding*