

# MACHINE METHODS OF ACCOUNTING

## PRINCIPLES OF THE ELECTRIC ACCOUNTING MACHINE METHOD

**T**HE art of accounting has developed along with business. The modern accountant has become expert in the quick and accurate handling of essential facts and figures. He has taken his place in the present-day organization as a major executive, or skilled adviser, because scientific management has become a vital factor in the operation of modern business.

Many mechanical devices have been perfected to aid the accountant in the handling of the mass of detailed information incident to modern business procedure. The majority of these devices are thoroughly understood by anyone familiar with manual methods. None of them, however, has equaled International Electric Bookkeeping and Accounting Machines in flexibility of application to all accounting functions.

Since International Electric Bookkeeping and

Accounting Machines, utilizing punched cards, solve accounting problems in a way quite different from that of the ordinary manual method, a clear understanding of this viewpoint is essential for a realization of their outstanding advantages.

### The Tabulating Card

The basis of the International Electric Bookkeeping and Accounting Machine Method is the tabulating card. All pertinent information, originally written or typed, is transcribed from the source records into tabulating cards in the form of punched holes in predetermined positions of the card.

A complete record of both classification and quantitative data is incorporated in a tabulating card for each unit or item. For example, in



A REPRESENTATIVE TABULATING DEPARTMENT

*International Electric Bookkeeping and Accounting Machines in the office are a counterpart of automatic machines in a manufacturing plant. By their use, record-keeping and the preparation of reports are reduced to speedy and efficient routines.*

Census work, a card would be punched containing the data such as date of birth, sex, color, nativity, marital status, occupation, etc., pertaining to each inhabitant of a country; in Sales Analysis, a card would be punched for each product appearing on an invoice showing salesman, customer, transaction date, invoice number, branch office, quantity, cost involved in the transaction, etc.; and in Accounts Receivable, one card would be punched for each debit or credit transaction affecting a customer's account, showing amount, nature of transaction, ledger account, etc. These punched cards will then serve to actuate the various machines into which they are subsequently placed.

As indicated by the name of the method, the automatic compilation of facts recorded in tabulating cards is performed by electricity. The passage of the perforated cards under brush contacts permits an electrical circuit to be completed through the card at the position of the punched hole. This closing of an electrical circuit at a definite time and from a fixed position on the card is the basis upon which the various electric accounting machines function.

The tabulating card is made of paper stock

eighty columns of digits across the card. Similar cards are furnished in 34- and 45-column capacity. Each column contains twelve punching positions. Of these, ten are indicated by the printed digits 0 to 9, which correspond to the digits of the numerical data to be punched. The 11th and 12th punching positions are at the top of the card and are not indicated by printed numerals. If the 80-column card were completely punched it would contain 960 holes—eighty columns of twelve positions each; but seldom are more than two holes punched in a single column.

The first step in the use of a card for a particular record is the designation of groups of columns as "fields." Each field defines a section of the card in which one particular type of information will always appear.

The following illustration shows a tabulating card drawn up into fields. Each field is assigned a sufficient number of columns to include the largest number of digits which it will be called upon to accommodate.

For instance, since the greatest number of months is twelve (a two-digit number), two

[illegible]

### Tabulating Card

of fine quality, manufactured especially for this use. The material is carefully processed to make it a non-conductor of electricity, to obtain the necessary degree of durability, and to insure an even weight and thickness.

The illustration shown is a reproduction of a tabulating card, reduced size. There are

columns are sufficient for recording this information. Since the greatest number of days in a month is thirty-one, this field also requires only two columns. The illustration shows the date July 21 punched in the card—"7" for the month and "21" for the day.

At this point it is obvious that all informa-

SALES AND COST																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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LICENSED FOR USE UNDER PATENT 1,772,492

Card for Numerical Recording and Tabulation

tion, whether descriptive or numerical, must be registered in the card in the form of punched holes. The registration of all data is a simple matter. The digits of the numbers to be transcribed correspond to the digits printed on the card. Descriptive information, such as the names of persons, companies, or products, may be either coded numerically or punched in the manner shown in columns 51 to 80 on the illustrated alphabetic card, to enable the accounting machine to identify and print alphabetic characters. This dissimilarity in punching ac-

counts for the difference in results between the two types of accounting machines—the straight numerical and the combination alphabetic and numerical. Tabulated reports from the former show all data in numerical form. Tabulated reports from the latter give both descriptive (alphabetic) and numerical data, no decoding being necessary. For convenience, further discussion of the operation of alphabetic equipment, which is essentially the same in principle as that of the numerical machines, will be deferred.

BILLING															DESCRIPTION														
DATE		CUSTOMER		BR.	SALES- MAN	CITY	ST.	QUAN.	SALES AMOUNT	COST AMOUNT	UNIT PRICE		12121212 12 12 121212 12 12 121212 12 12 12 121212 12 12 12 121212 12																
MO.	DAY	CL.	NO.								SALES	COST	X X																

LICENSED FOR USE UNDER PATENT 1,772,492

Card for Numerical and Alphabetic Recording and Tabulation

SALES					
SALESMAN	CLASS OF GOODS	QUANTITY	SALES AMOUNT	COST	TRANSPORTATION
1	101	1025	62580	58421	1252
		621	12684	9612	254
			53245	39984	1065
				1418	226

PAYROLL						
NAME	CLOCK NO.	CLOCK NO.	HOURS	GROSS PAY	DEDUCTIONS	NET PAY
Burke, E. J.	100	100				
Jackson, Frank	101	101	480	2400		
Miller, A. H.	102	102	370	2220	150	
Johnson, G. L.	103	103	448	1792	120	2250
Collins, A. M.	104	104	450	2250		
Keith, A. D.	105	105	360			
Day, R. C.						

SALES EXPENSE BUDGET						
BRANCH	ACTUAL SALES	SALES BUDGET	SALES EXPENSE BUDGET	ACTUAL EXPENSE	BUDGET	
					OVER	UNDER
1	1345065	1200000	100000	98215		1785
	905625	1000000	100000	71285		28715
		2000000	150000	161019	11019	
			150000	198512	48512	21475
				78525	1162	978

CONTROL OF STOCK						
MAXIMUM REQUIRED	MINIMUM REQUIRED	COMMODITY NO.	BEGIN BALANCE	RECEIVED	DISBURSED	NEW BALANCE
350	300	24972				
2000	1500	24973	200			
900	600	24974	500	260		
1200	1000	24975	750	1800	75	
950	700	24976	1100	1445	1000	385
975	900	24977	800	800	375	
700	600					
300						

EXPENSE COMPARISON						
DEPARTMENT NO.	ACCOUNT	BUDGET	ACTUAL TO DATE	ACTUAL THIS PERIOD	VARIANCE TO DATE	
					OVER	UNDER
101	10102	50000	62067	4792	12067	
101	10103	15000	17434	2815	2434	
101			25042	3857	42	

AGED TRIAL BALANCE								
BRANCH	DATE	REFERENCE NUMBER	KIND OF ENTRY	90 DAYS	60 DAYS	30 DAYS	CURRENT	BALANCE
3	1 13	26	2	550				
3	2 14	26	2		600			
3	3 07	26	4			550		
3	4 02	26	1				3400	5100*
3	2 17	119	1		6975			
3	3 11	119	1			1600		
3	4 03	119	1				6375	14950*
9	1 19	4321	1	2500				
9	2 21	4321	2		5125		1250	8875*
9	4 11	4321	4					
9	2 25	4562	1		3750		2600	6350*
9	4 12	4562	1				14250	14250*
12	4 26	5430	1					

Reports Prepared on Numerical Machines



CONTROL OF MATERIAL					
SEPTEMBER 12 1935					
STOCK SYMBOL	STOCK ITEM	QUANTITY ON HAND	QUANTITY ISSUED	QUANTITY RECEIVED	OLD BALANCE
784	ENDICOTT PLANT				
1968	OIL PUMP BRACKET SCREW	600		600	
2300	BRUSH HOLDER BLOCK INSULATION	1100	250	150	1200
4085	CARD MAGAZINE SIDE PLATE SCREW	3720	9060	2000	10780
10438	BRUSH HOLDER BLOCK WASHER	269	186	55	400
10439	THROAT BLOCK	49			62
11118	THROAT KNIFE				50
13119	CARD LEVER CONTACT BLOCK				333
17804	FEED ROLL				066

INSURANCE POLICIES ISSUED OR REVIVED											
NAME OF INSURED	POLICY NUMBER	AGE OF ENTRY	AMOUNT OF INSURANCE	ISSUED			WEEKLY PREMIUM	REVIVED			PLAN OF INSURANCE
				DATE OF POLICY	MONTH	DAY		DATE OF LAST PAYMENT	MONTH	DAY	
EDMONDS ROSELLE	3127439	27	68	6	27	31	14				30
HOWLETT FLOYD L	3127445	21	206	6	29	31	31	6	20	32	60
HOWLETT EDNA B	3127446	18	206	6	29	31	28				60
WORSHAM SARAH C	3127451	30	250	6	30	31	17	3	9	32	61
JERKINS MOSES	3127456	34	500	7	2	31	48				81
MASSAY HARVEY	3127458	28	62	7	3	31	25				26
VAUGHAN JOHN M	3127462	43	95	7	4	31	10	9	5	31	12
MOSBY HELEN	3127465			7	4	31	13				61
KLEIN JOHN P	3127469										60
BROWN FRANK P	312747										42
KLEIN SAMUEL	312748										
MURPHY FRANK B	31274										
BRIDE JOHN	3127										
FLOYD F	3127										

SALES TO CUSTOMERS BY PRODUCT			
CUSTOMER	PRODUCT	QUANTITY	AMOUNT
ABBOTT SUPPLY STORES	BITS	80	640
	BRACES	48	3360
	DRIP PANS	200	5200
	PADLOCKS	268	4800
			14000*
ARMSTRONG AND HARE	DOOR MATS	24	1440
	JIGS NO 3	4	2240
	KEY FORMS	800	2400
			6080*
HARDWARE	LATHES	8	14600
	KNIVES	336	1960
	MITRES	96	4960
	OIL CANS	48	3480
	PADLOCKS	72	1640
	STRIPPING	576	9200
	WEDGES	120	1800
			37640*
SMITH CO	DISH PANS	24	720
	DRAINERS	24	480
	FUNNELS	43	860
	GUN CASES	1	1570
	WRENCHES	60	3820
	SINKERS	144	1440
			8890*
WARE INC	AX BLADES	40	2400
	BRACES	200	14000
	DOOR MATS	96	7360
	KETTLES	8	1920
	OIL CANS	80	5840
			31520*
	DRAW BITS	72	760
	DRIP PANS	36	840
	PADLOCKS	40	920
	SICKLES	144	6600
			9120*
			107250*

THE NATIONAL MANUFACTURING CO.		
702 BROADWAY NEW YORK, N. Y.		
SOLD TO GEORGE L HENDERSON CO 50 FRONT ST TORONTO ONT		
CUSTOMER'S ORDER NO. & DATE 2105 4-21 REQUISITION NO. CONTRACT NO.		
QUANTITY	DESCRIPTION	PRICE
40	NATIONAL NO 17 TIRE GAUGES	72
100	REPLACEMENT HUB CAPS	35
20	ALUMINUM PISTONS NO 58	200
5	SPECIAL ROLLER BEARINGS	75
30	PARKING SPARK PLUGS	100
50	STOP LIGHT HEAD ASSEMBLIES	150
100	WINDSHIELD WIPERS	200
9	NO 61 IGNITION WIRE SETS	180
15	R O K BUMPERETTES	125
		300
		Express
		2880
		3500
		4000
		375
		5000
		4500
		10000
		18000
		1125
		4500
		53880*

Reports Prepared on Alphabetic Machines

### The Key Punch

The transcription of original numerical data to tabulating cards in the form of punched holes may be accomplished by means of an electric punching machine. This machine has a keyboard of twelve recording keys, one for each punching position of a column. As a key is depressed a hole is cut and the card advances automatically to the next column to be punched. The automatic features of the machine and the simplicity of the keyboard make the transcription of written data into punched hole form easy, rapid, and efficient.

### The Sorting Machine

When the punching has been completed, the cards are usually in miscellaneous order. The next step is to arrange them in sequence by some desired classification—that is, to group them according to some information which is punched in them. The Electric Card-Operated Sorting Machine is used for this purpose.

The operation of the Electric Card-Operated Sorting Machine is based on the position of the punched hole in a vertical column of the card. As the cards pass through the machine a brush contact is made through the hole, causing an electrical circuit to be closed. This momentary circuit causes the card to be directed to a receiving pocket which corresponds to the position of the punched hole. For example, a card punched "9" in the column under consideration is directed to the 9 pocket; a card punched "6" in the same column is directed to the 6 pocket, etc.

The automatic sort is made on one column at a time. It is apparent, therefore, that to arrange a group of cards in numerical sequence according to the data punched in a three-column field, the group is passed through the sorting machine three times. The sort is made first on

the units column, then on the tens column and finally on the hundreds column. The Electric Card-Operated Sorting Machine is entirely automatic and operates at a speed of 400 cards a minute.

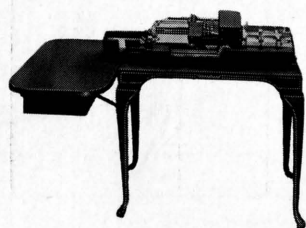
### The Accounting Machine

The automatic compilation of the punched data into printed reports is accomplished by the Electric Accounting Machine which is a combined adding, subtracting, and printing machine. Punched cards passing through this machine actuate the various adding counters and printing mechanisms—again by means of electrical contacts. Each Electric Accounting Machine is so designed that it provides complete flexibility in the arrangement of the compiled and printed data on the report form. The machine is entirely automatic, and operates at the speed of 150 cards a minute. It is so designed that total or balance-forward cards can be punched simultaneously with the printing of reports. Its various features are best demonstrated by the results produced.

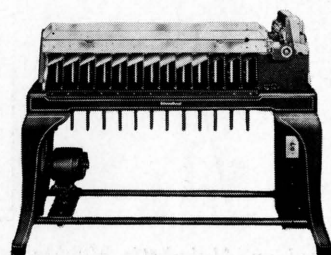
### Auxiliary Machines and Special Devices

For the sake of brevity and clearness no reference has been made here to the auxiliary machines, attachments, and devices which are an important part of the full line of International Electric Bookkeeping and Accounting Machines. All follow in general the same operating principles which have been described. Their purpose is to accomplish automatically the supplementary tasks which are related to the classifying, compiling, and printing of business facts; for example, summarization of to-date or balance-forward data, multiplication, printing on the tabulating card the information punched therein, etc. The entire line is well adapted to perform automatically most of the routine work of accounting.

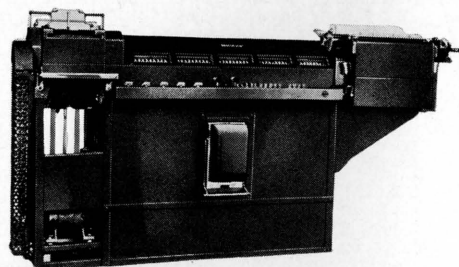
## Basic Machines of the International Electric Accounting Method.



*Duplicating Key Punch*



*Electric Card-Operated Sorting Machine*



*Electric Accounting Machine*

## The Development of Machine Accounting

### Basic Principles of Accounting

To appreciate fully the value of the machines just described, one should be familiar with the steps in the development of accounting records as well as the development of the mechanical devices to facilitate their preparation. Two fundamental conditions have become established as the basic requirements of a good record-keeping system:

1. It is necessary that the record be so explicit that at any subsequent time the exact nature of the transaction may be readily perceived without the aid of memory.

2. It is necessary that the transactions be so classified that at any time the combined effect of like transactions may be readily ascertained.

These principles have been generally accepted by accountants; but in most cases emphasis has been placed on one or the other of the principles resulting in the modification of the accounting system to obtain the desired end. For a long period of time the emphasis was placed upon the maintenance of complete detailed historical records while much of the phase of classifying to prepare up-to-the-minute summaries of like transactions was ignored. Since the beginning of the present century, however, the condition has been reversed. Today, because of the tremendous number of transactions which compose the daily business of a medium-sized or large company, emphasis is placed upon the summarizations of like transactions.

### Early Steps in Development

The development of the typewriter was probably the most important forward step in modern

accounting. It obviously simplified the problem of preparing a journal which would serve as an historical record of the business transactions, by the preparation of a carbon copy of the original document describing the transaction. Take the Sales Journal as a practical example: A carbon copy of an invoice constitutes as complete an historical record as can possibly be prepared of any sales transaction, and consequently a file of copies of sales invoices in numerical sequence could be made to serve as a Sales Journal.

Under such a routine it is simple to understand why the preparation of complete historical records was in the majority of cases relegated to a position of secondary importance. The change, however, was a gradual one; for it took business organizations a long time to give up the idea that accounting records had to be maintained in files of bound books. The outstanding advantages of the typewriter eventually effected a change of older accounting restrictions concerning bound journals and established loose-leaf records as an acceptable form of accounting record.

The subsequent use of writing machines led to the development of loose-leaf *ledgers*, and paved the way for an open-minded approach to accounting problems and the logical advantages that could be made to accrue from the intelligent application of automatic machinery to accounting routines.

### Growth of Responsibilities

The simplification of the preparation of Journals and Registers was accompanied by an increased amount of investigation into the ways

SALES JOURNAL					PAGE 1					
January 192-										
DATE	NAME	ACCOUNT DEBITED	ADDRESS	TERMS	SALE NO.	AMOUNT				
4	H. Young		1351 Broadway City	15 days	82	1	1	2	5	0
4	G.A. Walker		Medford	15 days	84	8	0			
4	R.A. Stein		116 Smith St. City		85	1	7	5	0	
5	H.B. Cole		321 May St. City	30 days	86	1	2	1	5	0
5	H. Young				87	6	0			
5	G.A. Walker			15 days	88	7	2	5	0	
5	G.A. Walker			15 days	89	1	3	2	5	0
5	L.J. March		R.D.#1, Newton	10 days	90	1	6	7	5	0
5	R.A. Stein				91	4	5			
6	John E.				92	6	4	8	7	5

UNEXCELLED PRODUCTS Co. INC.			
813 PROVISION STREET NEW YORK CITY			
CUSTOMER'S ORDER NO. AND DATE 10304 2/28/36		INVOICE NO. 31234	
ORDERED BY A.M. Adams		INVOICE DATE 3/2/36	
PRODUCTION NO.			
SOLD TO A. GENERAL JOBBP			
1492 Columbus Avenue			
EXPLOIT, N.Y.			
SHIPPED TO ABOVE			
DATE SHIPPED 3/2/36		FROM Explorer TERMS Net 60 days	
HOW SHIPPED AND ROUTE Truck		FROM NY	
QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
20 cases	10-6 Tomato Soup	\$ 1.20	\$ 24.00
10	10-6 Oxtail Soup	1.25	12.50
10	10-6 Vegetable Soup	1.25	12.50
30	10-6 Spaghetti	1.50	45.00
30	10-6 Boston Baked Beans	1.40	42.00
10	10-6 Golden Glow Apples	1.30	13.00
12	10-6 Bartlett Peaches	2.10	25.20
15	10-6 Sateum Plums	2.10	31.50
20	10-6 Sale's Orchard Peaches	2.20	44.00
12	10-6 Stringless Wax Beans	1.50	18.00
			\$297.40

Sales Journals

and means of meeting the growing problem of analysis of accounting records to furnish essential figure-facts upon which Management would be able to base its scientific planning and organization for more profitable operation.

A representative example may be taken from the sales records to which reference has already been made. Formerly the only bookkeeping involved was the preparation of the Sales Journal and the posting of the amounts to Accounts Receivable Ledgers. Management of today is concerned with more operating data in the form of timely and accurate reports. It must know how much each salesman is selling, how much gross profit he is producing, what classes of customers are most profitable, what products are moving quickly, which sections of the country are yielding the forecast amount of revenue, and numerous similar analyses.

The job of classifying and accumulating these vital management statistics was assigned to the accounting and record-keeping departments. When the accountant was confronted with these newer and larger problems, it was only as a matter of course that he turned to investigate the possibilities of machinery to simplify the work in the same manner as a writing machine had previously helped in simplifying the historical record-keeping.

### The Development of Accounting Short-Cuts

It will be observed that three major phases—recording, classifying, and accumulating—are characteristic of accounting work. In addition, planning and supervision—which are common to all types of work—play their parts. The former three, however, have been subject to improvement by the use of ingenious devices and mechanical equipment.

As time went on, numerous manual and machine short-cuts were developed. The most notable steps in the evolution of modern accounting methods are listed below in the approximate sequence of their development and use.

1. The development of multiple-column journals and subsidiary ledgers.
2. The application of *unit records* to simplify analysis.
3. The improvement of card-record and loose-leaf systems.
4. The perfection of multiple-counter adding and printing machines.
5. *The adaptation of punched unit card records and automatic sorting and tabulating machines to accounting routines.*

Regardless of the detailed routine which may be applied, the original data and ultimate objectives are essentially the same. Only the means to the end are subject to variation. Each machine or group of machines possesses inherent advantages, which, in the final analysis, will be the determining factor in the decision concerning the method that will be most practical for a particular job.

The use of typewriters and manually operated posting machines was a logical step in the development of accounting methods. Similarly the adoption of punched unit card records and automatic sorting and tabulating machines may be considered a further step forward in a machine age.

### The Use of Unit Records

The use of unit records in analyzing a group of transactions is one method of approaching the problem of classification and summarization of data.

It is obvious that if two items, say debits and credits, were to be summarized to obtain two totals, the operation of classifying could be accomplished simultaneously with that of accumulating if a duplex (2-counter) adding machine were used. Where additional counters were available, as in the case of multiple-register posting and distributing machines, it was possible to attain twenty or more independent group totals by selection of the proper counter for each amount to be accumulated.

Since the number of accumulating counters that can be practically incorporated in one machine is limited, an alternative method had to be developed which could be adapted to those accounting jobs where the number of classifications of data exceeded the practical limits of multiple-counter adding machines.

The method developed was based upon the creation of a unit record. This may be described as a document which bears all of the pertinent information regarding a single transaction or condition that is to serve as the unit of analysis. Thus, a unit record concerning sales usually carries all the information regarding the sale of *one* product to *one* customer at *one* time.

Such documents can be sorted according to any desired classifications as branch, salesman, product, etc., previous to the time of accumulation of totals for each branch, each salesman, or each product, respectively. A single adding counter may be used for the addition of amounts pertaining to one group of items. When all of that group has been accumulated, the total may be transcribed. A second, third,



<i>Cleveland</i>	<i>Kennedy</i>	<i>Ohio</i>	<i>Dow &amp; Co.</i>	<i>#15972</i>	<i>12</i>	<i>117.35</i>
BRANCH OFFICE	SALESMAN	STATE	CUSTOMER	PRODUCT	QUANTITY	SALES AMOUNT

*Manually Prepared Unit Record*

fourth, etc., group may then be similarly totaled in order.

### The Accumulation of Totals From Unit Records

The various methods of creating unit records need not be discussed here. Regardless of how the original unit records were prepared, even a superficial analysis would reveal that four basic methods of accumulating totals from them exist.

1. Mental calculation and manual posting of totals.
2. Mechanical addition in a counter which is actuated by manual key depressions and transcription of totals by hand.
3. Mechanical addition in a counter, as above, and automatic printing of detail information and totals.
4. *Automatically actuated counters (involving no key depression at the time of accumulation) with automatically printed detail and totals.*

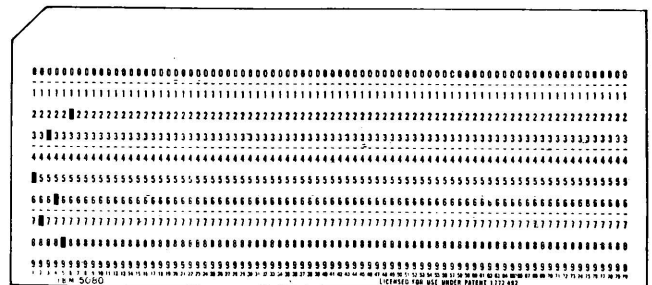
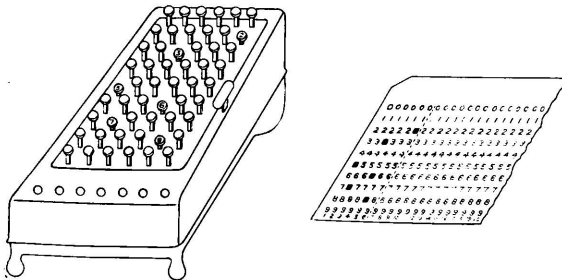
The first three are well-known. The last, which is the International Electric Bookkeeping and Accounting Machine Method, is something of a mystery to those people who have not had the opportunity to operate it or observe its performance. Although the mechanism itself may seem intricate, the principle is simple. Look at the keyboard of any desk adding machine. If the 6-key is depressed, "6" will be added into the counter or accumulating register. If it is necessary to list the amount, a print-

ing mechanism may be attached to the device which will record on a tape the amounts introduced into the counter. This type of keyboard is purely manual. There is nothing automatic in setting it up. Therein lies the chief point of difference between automatically actuated counters and all other adding and computing devices.

Observe how the keyboard of the common adding machine would look if set up to record a six-digit number, and then look at the same number recorded on the sectional and full view of a tabulating card. In reality, the punched tabulating card is a unit record designed to function as an integral part of the International Electric Bookkeeping and Accounting Machine System which will automatically set up an 80-digit adding machine.

The Electric Accounting Machine is so constructed that as a punched tabulating card passes through it, each punched hole actuates one or more counters of the machine in just the same manner as an operator's finger actuates the counter of a manual machine by the depression of a key.

The Electric Accounting Machine may be visualized as a battery of simultaneously operated adding, subtracting, and printing machines. Three or more such units with a capacity of 999,999,999 each may be incorporated in a single tabulator to permit the simultaneous accumulation, in a single operation, of subtotals and major totals of various quantities such as number of units produced, labor cost, material cost, and overhead for each classification. Since

*Comparison of Keyboard and Tabulating Card*

all of the counters operate simultaneously, a five-counter machine reading 150 cards a minute is capable of summarizing 45,000 items an hour and automatically posting desired totals.

### Automatic Accounting

The sorting of cards and the accumulation of amounts are not the only automatic features of the International Electric Bookkeeping and Accounting Machine Method. Provision is also made for:

1. Sensing the change of groups to permit the automatic printing of totals and clearing of counters.
2. The automatic feeding and spacing of printed report forms.
3. The automatic punching of total cards for supplementary records by means of an electrically connected and controlled punch.

Such automatic accounting machinery in an office corresponds in function and use to the automatic machines in a factory. Whenever a *repetitive* operation must be performed a machine can be designed and built to perform the task. In accounting, the classification and reclassification of data necessitate the repetition of the addition of each amount into the various classes of totals to which the item may be allocated. As a particular item may be accumulated into from two to twenty or more records, the value of automatic accounting machinery may readily be appreciated.

It has generally been conceded that the outstanding advantage of the International Electric Bookkeeping and Accounting Machine Method is the speed and facility with which a basic unit record in the form of a punched tabulating card may be classified and reclassified, tabulated and retabulated according to various groupings by means of automatic machines. Each of the three operations of recording, classifying, and accumulating is reduced to a simple routine which is readily adaptable to the machines and eliminates the tedious manual posting of numerous intermediate records and analyses. The routine work is further simplified by the fact that totals may be obtained in any sequence which will facilitate their subsequent use.

The development of auxiliary machines, which are also actuated by punched cards, has added to the value of the machine for analysis and has also increased the number of uses of the International Electric Accounting Method. Today there are many applications of these machines in which the punched cards are used

for only a single tabulation to prepare original accounting documents. This wide range of application can be attained because the tabulating card constitutes a unique record which contains recorded data in such form that the card can automatically add, subtract, multiply, divide, reproduce, and post any or all of the factors contained on it.

### Document Preparation

Originally, machines were widely used for the analysis of business activities to obtain summary data to facilitate the formulation of policies. These uses have since been extended to attain greater accounting economies by the use of the same punched cards in the preparation of many original documents and accounting records. The development of various printing, calculating, and automatic punching mechanisms which are actuated by punched tabulating cards increased the number of purposes which the machines were called to serve. A practical illustration of the reason for these developments can be taken from the steps which led to the application of International Electric Bookkeeping and Accounting Machines to billing routines.

For many years the data appearing on invoices were transcribed to tabulating cards solely for the purpose of obtaining periodic statistical summarizations of sales. This method is the most effective for making analyses:— by product, for the determination of Profit or Loss and for summary postings to Finished Stock Records; by salesmen, to determine the productiveness of salesmen in relation to quota or other performance records; by state and other geographic divisions, to determine the relationship of actual sales to statistical potentials; and by various customer classifications, to determine the large profit-producing merchandising channels. These summary analyses contributed much to the efficient management of the sales and distribution activities of a business.

Constructive thinking became directed toward the development of further uses of the cards to effect even greater economies. Ways and means of utilizing the high-speed printing mechanism of the accounting machine for the preparation of both shipping orders and invoices were studied. These investigations resulted in the development of a billing routine which is almost fully automatic.

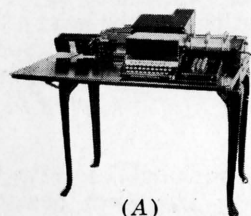
A billing card similar to that shown at the bottom of page 3 indicates the form of the basic record in the routine of preparing shipping notices, invoices, and analyses. The steps

in the procedure are briefly described and illustrated in the following chart.

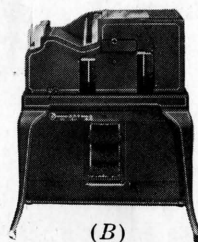
The listing feature of the accounting machine, in addition to facilitating the economical preparation of original documents, furnishes a rapid method of preparing journals, registers, and abstracts for purposes of ready reference. Factual information contained in the punched detail cards may readily be com-

piled in any sequence and in a minimum amount of time to furnish specific records for periodic internal audits, regulatory bodies, and trade associations.

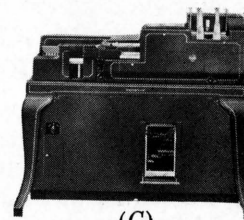
The punched card method of accounting is the only really automatic accounting method. It is to manually operated accounting systems what automatic machines in a factory are to old-fashioned lathes, drills, and punch presses.



(A)



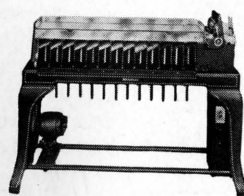
(B)



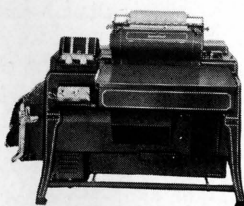
(C)

[illegible]

(D)

[illegible]

(E)


$$(F)$$

BILLING & SALES ANALYSIS											
PRODUCT NAME		GROSS BILLING		DISCOUNT		NET BILLING					
STOCK REPORT											
STORE NO. <u>14</u>				DATE <u>July 20</u>							
CLASS	DESCRIPTION	UNIT	ITEM NO.	OLD BALANCE	RECEIPTS	ISSUES	NEW BALANCE	PER. BALANCE	PER. SALES	PER. DISC.	PER. NET
INVENTORY REPORT											
COMMODITY		UNIT COST	QUANTITY	TOTAL COST							
CLASS	ITEM										
RADIO	ACME	2350	26	61100							
	ETHER	2845	120	341400							
	TONONE		65								
	WESTERN	3420	31	106020							
IRON	HOTTEX	136	125	17000							
	LIBERTY		214								
	QUEEN	279	94	26226							
WAXER	DUPLEX		23								
	ROTARY	1525	17	25925							
	WESTERN	2143	12	25716							

## OUTLINE OF ROUTINE FOR PREPARING SHIPPING NOTICES AND OTHER DOCUMENTS

A set of cards is punched originally on the Alphabetic Punch (A) for each "Commodity." These cards serve as master cards for the reproducing operation performed by the machine illustrated (B). The cards which have been prepared at a speed of 100 cards a minute on the Reproducing Punch are then filed in readily accessible cabinets. When orders are received cards containing the description of each commodity ordered are selected from that file. Punching of classification information is completed by the use of the Duplicating Punch and extensions of prices are automatically computed and punched at a high rate of speed by the Automatic Multiplying Punch (C). These operations result in the creation of a Complete Unit Document (D) that may be used for the automatic preparation of shipping notices, invoices, and sales analysis reports by the use of the Electric Card-Operated Sorting Machine (E) and the Alphabetic Accounting Machine (F).

## THE PURPOSE AND FIELD FOR INTERNATIONAL ELECTRIC BOOKKEEPING AND ACCOUNTING MACHINES

The Industrial Revolution which took place in the 19th century established the machine as the logical means of speeding up manufacturing and reducing the cost of goods to meet the demands of consumption. The progress in factory methods of the past two centuries has been duplicated by the office in the last two decades. The machine has taken its place in the accounting system and contributes in a large measure to the increased economy and efficiency in the conduct of a business enterprise.

This trend toward the business machine has been the logical outcome of the tendency of business. A century ago industries were small, production was limited, and the business was usually owned and operated by the same man or family for years. He knew the plant, the business, the field, and all the facts concerning each. His requirements of additional facts were small and his knowledge of the science of business was meager. With the development of business came the need for compiling figure-facts which would insure profits and eliminate the wastes that usually accompany rapid growth.

The factory can easily enough produce the goods but the office must have the materials on hand with which the factory works; the office must tell the factory what will be consumed; the office must collect the money for the goods and direct the forces in the effective distribution of these goods; the office must reimburse the men for producing the goods and the vendor for the raw material; the office must tell the executives what this endless chain is accomplishing so that this astounding maze of detail can be brought into an array of accurate, timely, condensed reports to shape the policies of the company.

### Purpose

International Electric Bookkeeping and Accounting Machines permit the use of science in business. They make possible an analytical review of operating factors from various angles, whether the business be of a manufacturing, distributing, or service nature. Wrong tendencies can be localized and rectified before they have an opportunity to progress to a point which will result in an unknown but continuous loss to the business.

The repeated use of the same set of figures analyzed from different angles assures complete and detailed knowledge. If deficient tendencies or conditions exist, and only general data are secured, these tendencies would not be detected.

The use of net results based on limited details is dangerous since with the increase in the operations of a business, the deficiencies, which may grow slowly over a period of years, will result in a steady but certain loss. This will not be known or realized until the volume becomes so large that it will offset or materially decrease the factors which have created additional profits. It will be more difficult to adjust and rectify the wrong conditions that have existed over a period of years, but were not apparent, due to the limited amount of information available with which to study the progress of the business.

The use of International Electric Bookkeeping and Accounting Machines assists in preventing conditions of this nature. Tabulating cards store information for current use or for future study and permit arriving at intelligent decisions based on known factors. The cards containing the records of transactions for preceding periods can readily be sorted and analyzed to reflect the results which would have been obtained during past periods had proposed changes in policy been in effect at that time.

### Field

Effective reports are the compass of Industry. They indicate the trend of activities. To collect and analyze figure-facts is therefore one of Industry's most important tasks. As the usefulness of reports is dependent upon their accuracy and timeliness, it is essential that the contributing data be correct and capable of speedy tabulation.

An economical process for analyzing every phase of accounting work, such as disbursements, labor, material, and other accounting or statistical factors, is an important factor in the conduct of a business organization. If the same figures can at any time be reanalyzed from different points of view, the value of the process is greatly increased.

The International Electric Bookkeeping and Accounting Machine Method provides the medium through which this maximum use of figures can be obtained quickly and economically, without necessitating a change in the routine of existing accounting methods.

The International Electric Bookkeeping and Accounting Machine Method is recognized by all industries as the quickest and most dependable means of analyzing such facts as develop in the everyday operation of a manufacturing, mercantile, insurance, transportation, governmental, or other business enterprise.