

IBM

DATA-PROCESSING

**machine
functions**

INTERNATIONAL BUSINESS MACHINES

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IBM

DATA PROCESSING

machine functions

THIS BOOKLET shows in simplified form the functions of the many IBM machines used for all types of accounting, statistical, and computational work. IBM machines can perform such functions as :

- reading
- checking
- coding
- duplicating
- filing
- arranging
- sorting
- posting
- copying
- searching
- comparing
- counting
- computing
- listing
- summarizing
- printing
- document writing

For needed uniformity in machine-processing the great variety of sizes, contents, and arrangements of records, information is transcribed into a unit record.

The IBM card is this unit record, and holes punched in the cards represent the information to be processed.

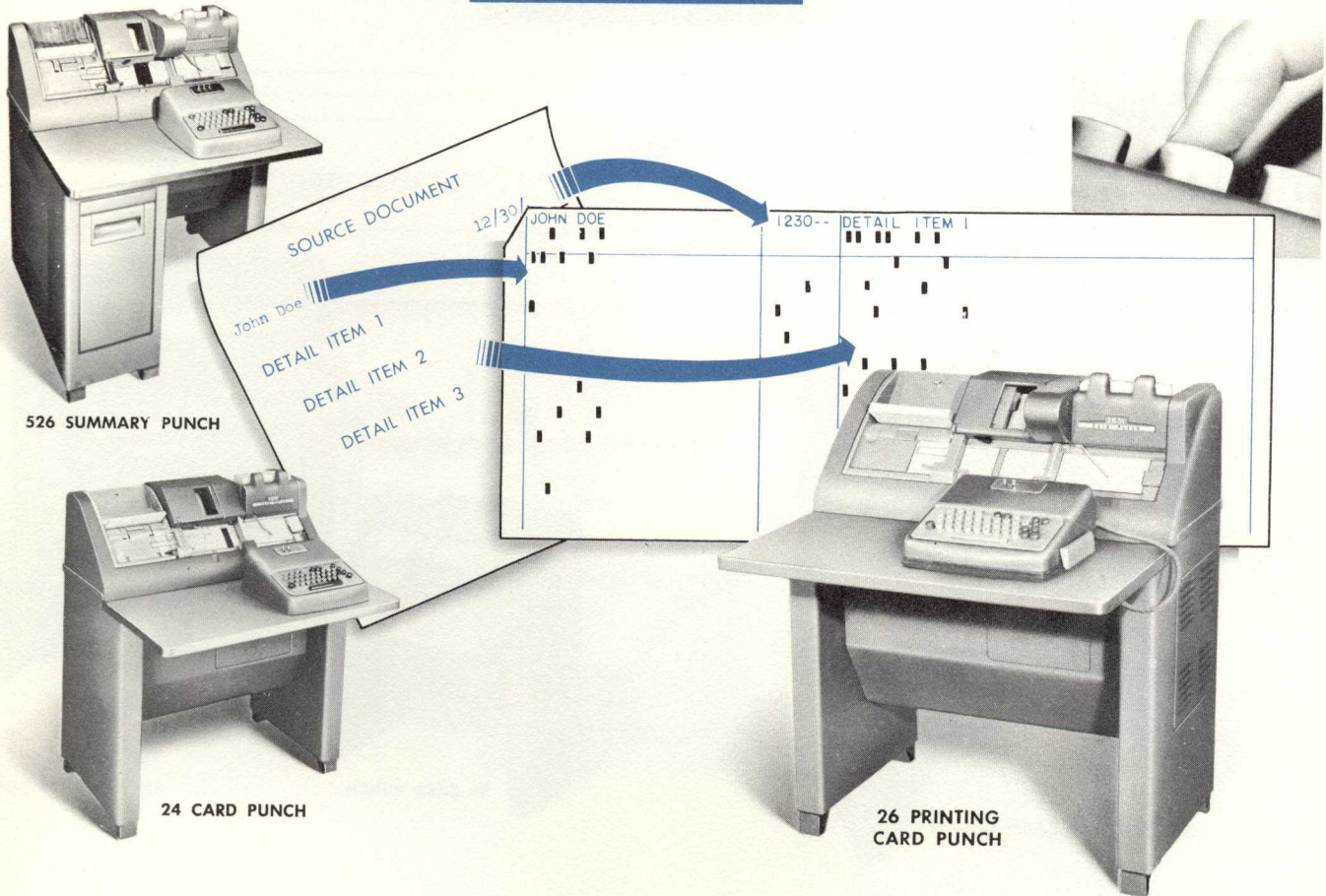
After it is once punched and verified, the unit record can be automatically processed through IBM machines to produce finished reports.

Various methods of punching data into IBM cards, and the functions performed by IBM machines in processing the cards and data, are listed by page number.

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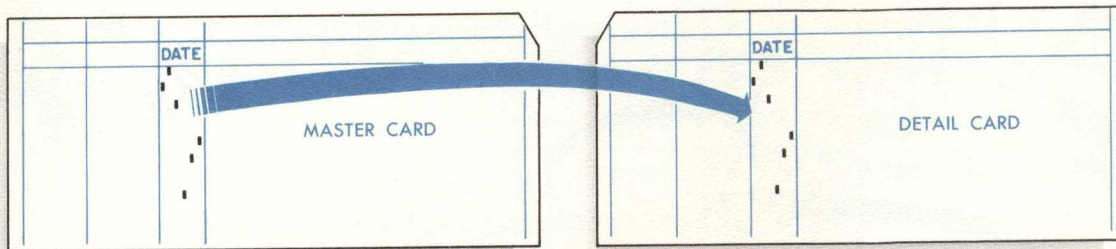
CARD PUNCHING



CARD PUNCHING is the basic method of converting source data into IBM punched cards. The operator reads the source document and, by depressing keys, converts the information into punched holes. The machine feeds, positions, and ejects the card automatically. The operator's primary concern is to depress the proper keys in the correct sequence.

This is basically the same kind of function as typing or other key-driven operations. Card punches equipped with printing mechanisms automatically interpret the punched information at the top of the card directly above the hole being punched.

DUPLICATING



26 PRINTING CARD PUNCH



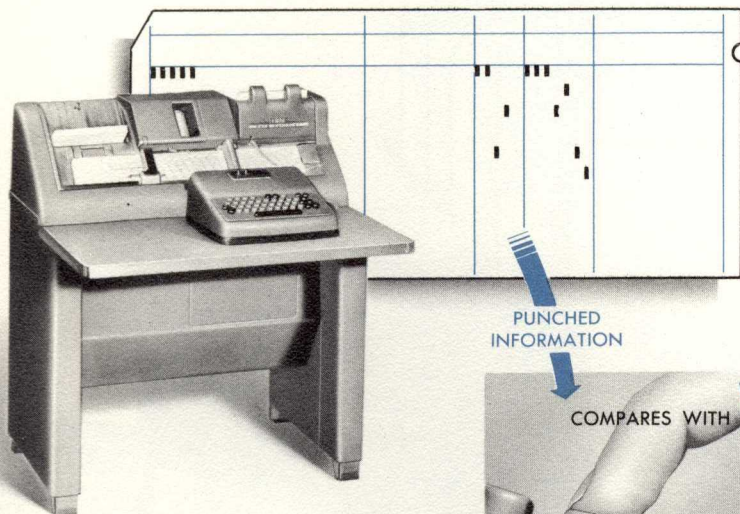
24 CARD PUNCH



526 SUMMARY PUNCH

DUPLICATING is automatic punching of repetitive information from a master card into a group of succeeding detail cards. This is normally performed as part of the card-punching function. Instead of depressing keys repetitively for common information (such as ENTRY DATE, which is to be punched in every card), the operator punches the common information only once in the first card of each group, and it is automatically punched into all remaining cards for the group. This reduces the work per card, insures consistency of common data, and increases productivity of the operator.

CARD VERIFYING

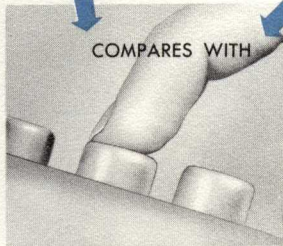


56 CARD VERIFIER

PUNCHED
INFORMATION

INFORMATION
READ

COMPARES WITH



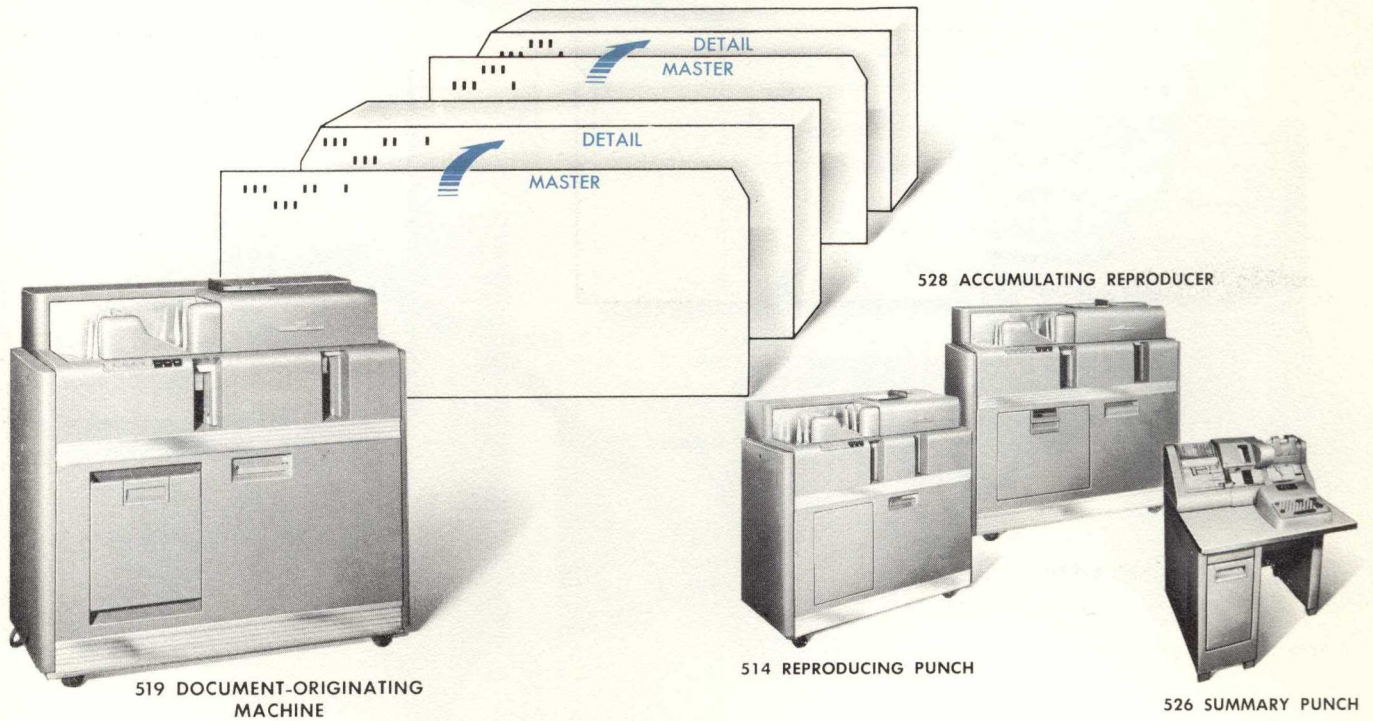
LEE-KLED, Inc. Index, N. Y. INVOICE			
To..		Rankin File Co. Express Ppd.	
Sequence, ohio		2% 10 Days Net 30	
5 gr.	#2 Wood Handles equipped with Brass Ferrules	4.29	21.45
10 doz.	Brass Washers		

CARD VERIFYING is simply a means of checking the accuracy of the original key punching. A second operator verifies the original punching by depressing the keys of a verifier while reading from the same source data. The machine compares the key depressed with the hole already punched in the card. A difference causes the machine to stop, indicating a discrepancy between the two operations.

A notch in the upper right edge of the card indicates that it has been key punched and verified correctly. A notch directly above a column signifies that the punching of that column is in error.

This is basically the same type of function as typing or other key-driven operations.

GANG PUNCHING



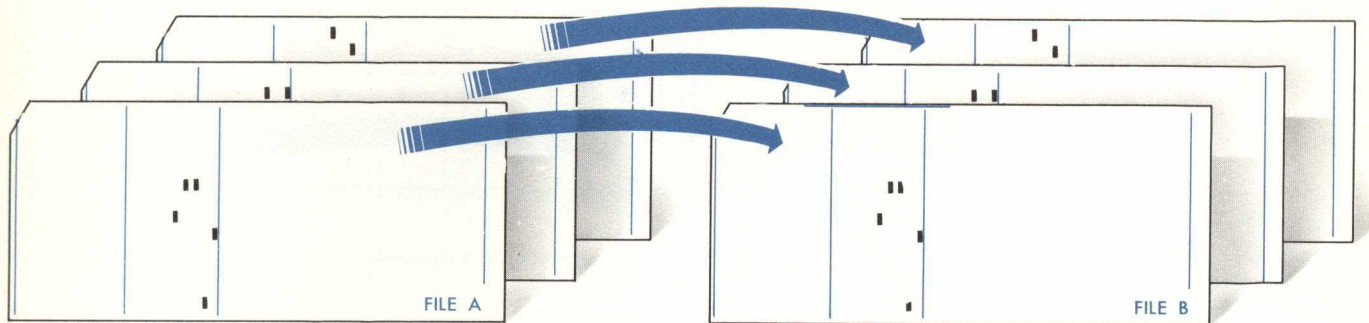
GANG PUNCHING is the automatic copying of punched information from a master card into one or more detail cards that follow it.

In single master-card gang punching, one master card precedes all detail cards to be punched with the same information.

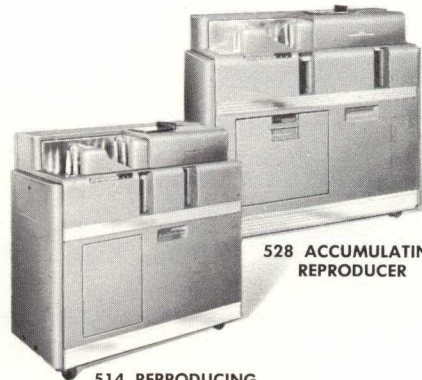
Where information changes from one group of cards to the next, interspersed gang-punching methods may be used. A master card precedes each group of detail cards. Information in the master card is automatically selected for punching into all following detail cards until a new master is read. The punching pattern then changes to conform with the new master.

Gang punching can be performed separately or in combination with reproducing and summary punching for both alphabetical and numerical information.

REPRODUCING



519 DOCUMENT-ORIGINATING
MACHINE



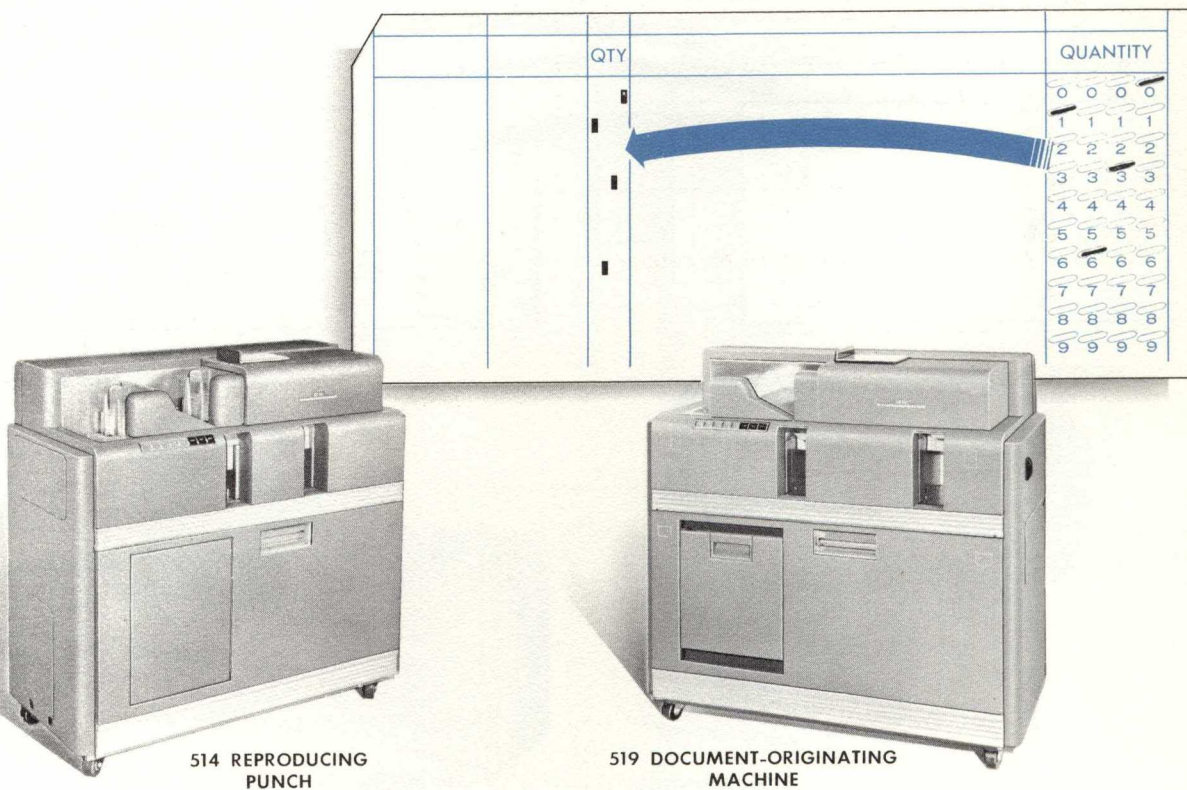
514 REPRODUCING
PUNCH

528 ACCUMULATING
REPRODUCER

REPRODUCING from one card to another is like copying from one record to another. Information from one set of punched source cards is automatically punched into another set of cards. The two sets of cards are fed through the machine synchronously.

The comparing feature proves agreement between originals and reproductions. Differences are automatically indicated.

MARK-SENSED PUNCHING

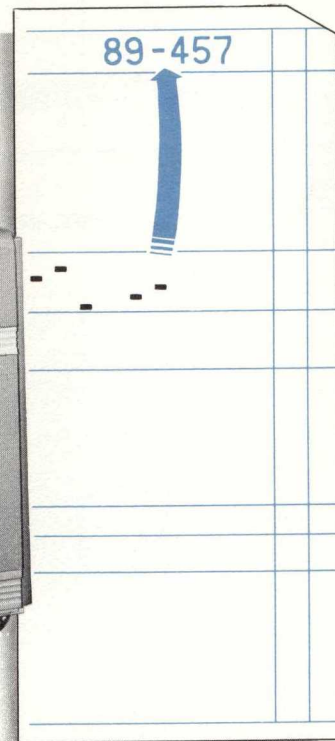


MARK-SENSED PUNCHING is the automatic punching of a card by means of electrically-conductive marks made on the card with a special pencil.

Thus, original facts may be recorded anywhere—in the office, plant or field, by workmen, timekeepers or field workers—and these facts are translated directly into punched-hole form.

END PRINTING

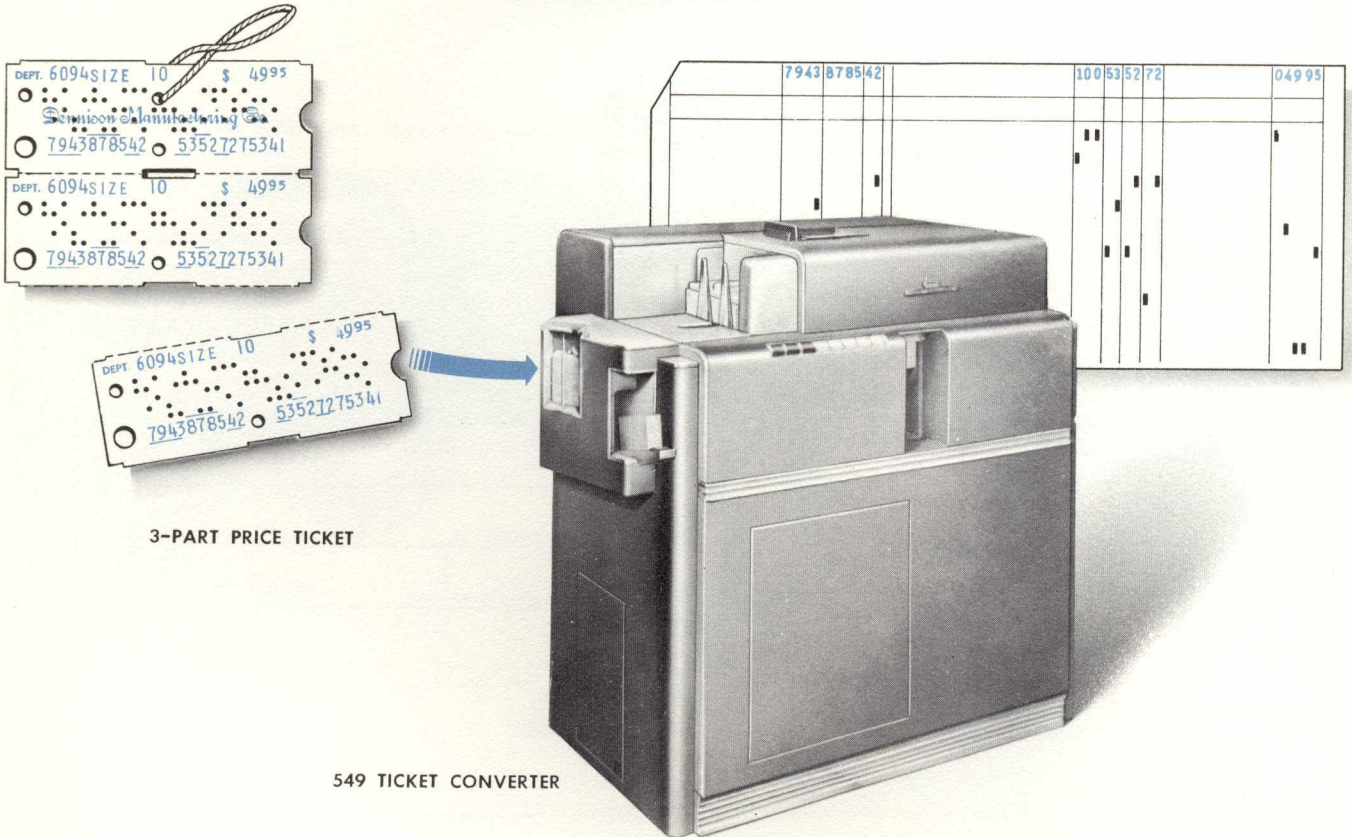
519 DOCUMENT-ORIGINATING
MACHINE



END PRINTING converts punched information into bold printing across the end of the card simultaneously with gang punching, summary punching, reproducing, and mark-sensed punching. This is similar to interpreting, and makes possible quick reference to the card.

Cards are printed in this manner for use in prepunched files where cards are stored on end, or in attendance-card racks for convenient reference and selection.

TICKET CONVERTING



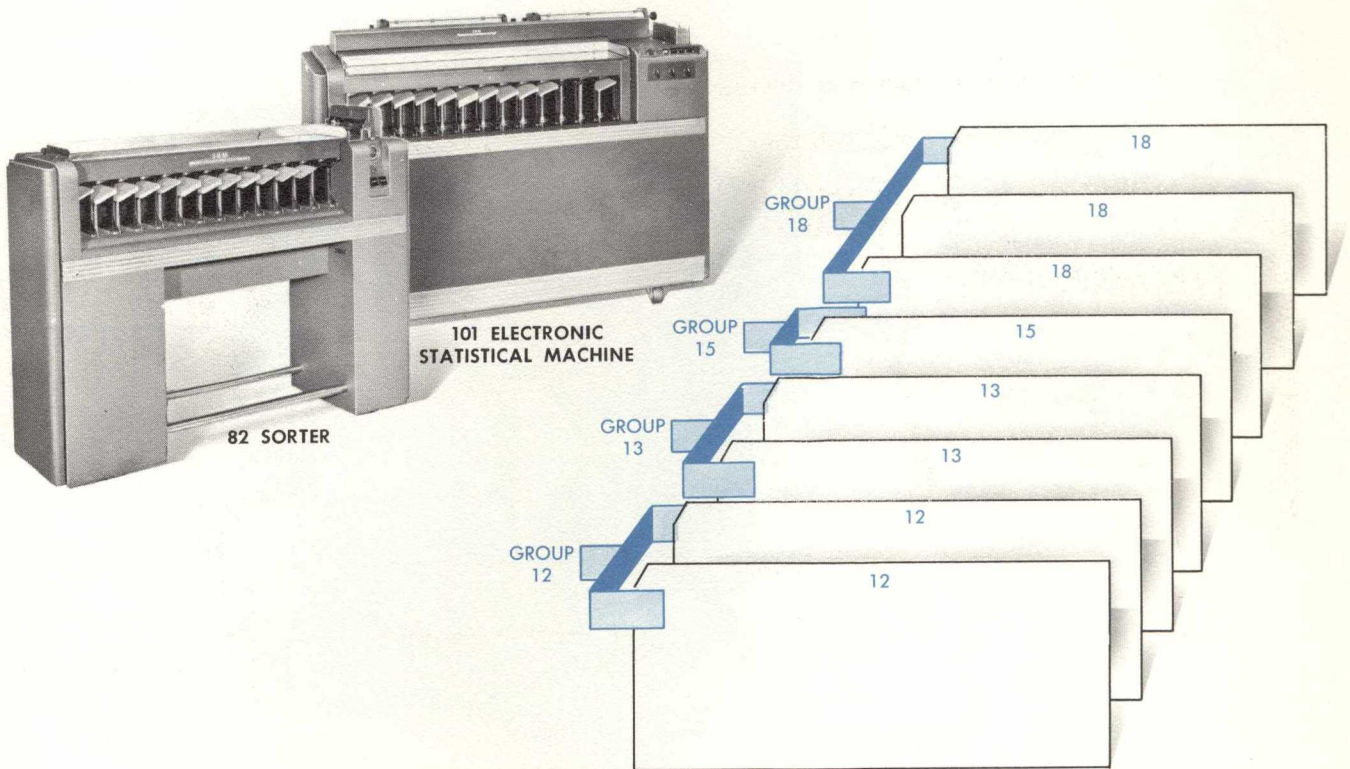
3-PART PRICE TICKET

549 TICKET CONVERTER

TICKET CONVERTING is the process of changing prepunched ticket stubs (2.7" wide by 1" deep) into IBM cards. The ticket is made up of a basic section and one or more stubs that are numerically prepunched and printed with identical information.

When a transaction occurs, a stub is detached from the ticket and put into a receiver; the receiver is then placed directly in the ticket converter. The ticket stubs are fed from the receiver, and IBM cards are punched with the corresponding information. A typical application of the ticket converter is in merchandising where price tickets often represent the greatest volume of transactions.

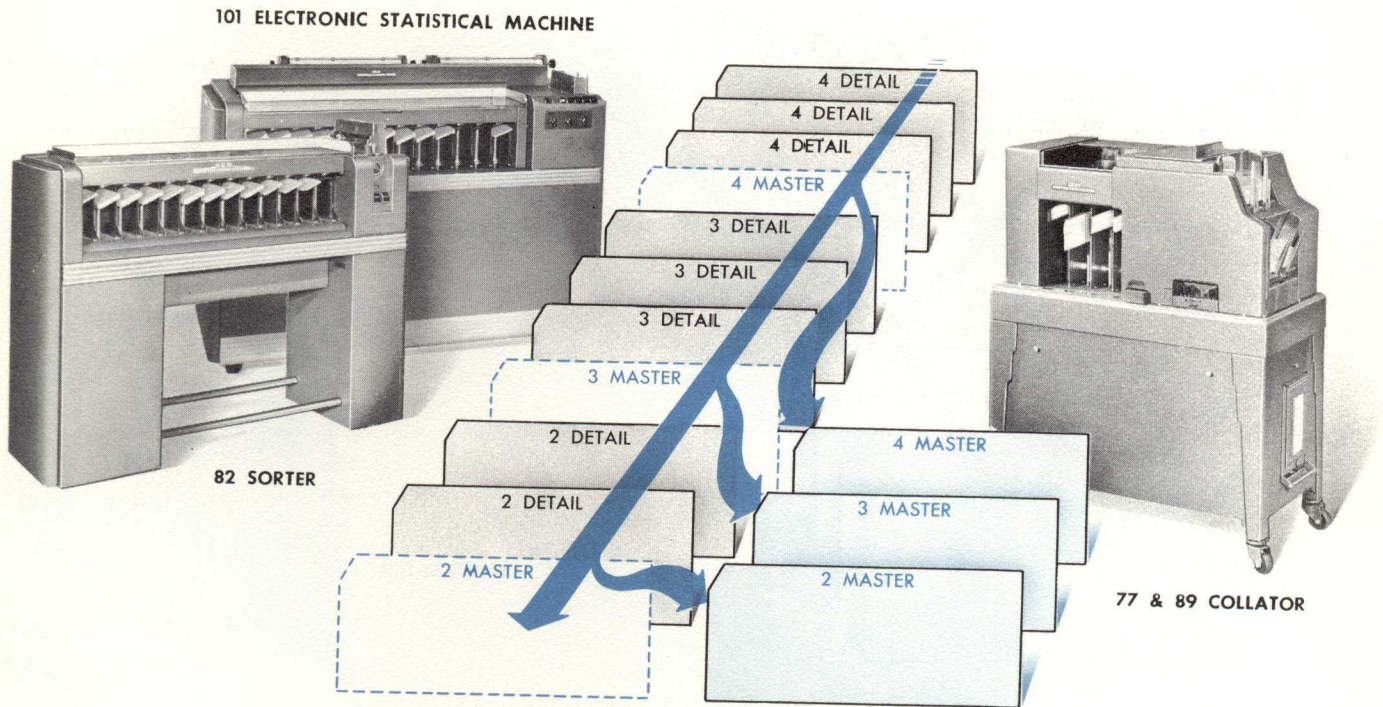
SORTING



SORTING is the process of grouping cards in numerical or alphabetical sequence according to any classification punched in them. To group cards by account, for instance, they are sorted into account sequence. This makes possible summarizing the cards by account.

A fast, automatic machine process thus is provided for arranging cards for the preparation of various reports—all originating from the same cards, but each requiring a different sequence or grouping of information.

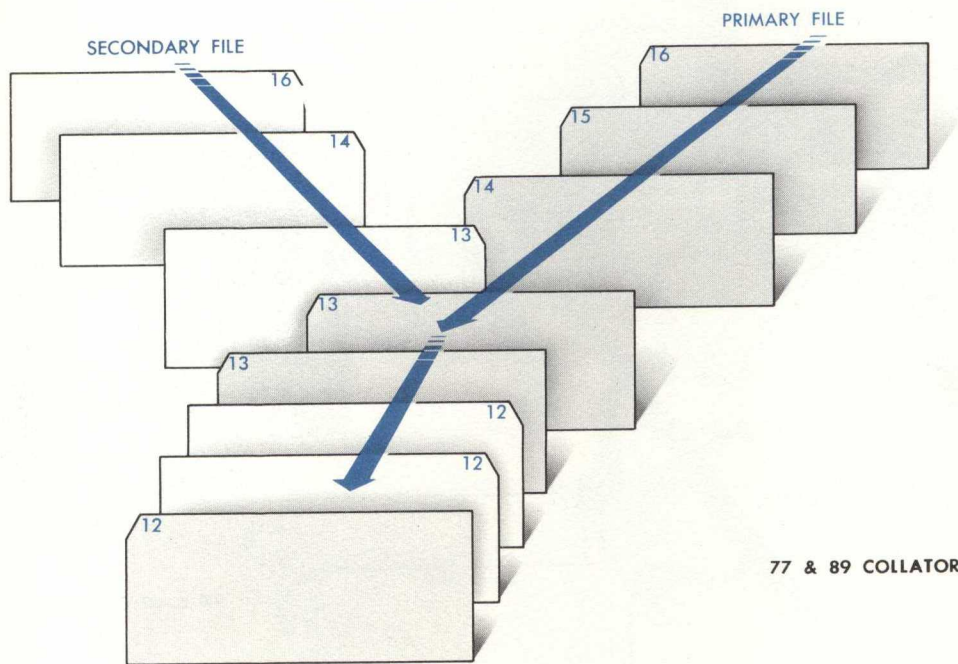
SELECTING



SELECTING is the function of pulling from a mass of data, certain items that require special attention. Selection of individual cards is accomplished automatically by either the sorter or collator, according to the type of selection. Typical selections are:

- Cards punched with specific digits
- Certain type of cards for a specific date
- All cards containing a specific number
- All cards higher than a specific number
- All cards lower than a specific number
- Cards between two specific numbers
- First card of each group
- Last card of each group
- Unmatched cards
- Cards out of sequence

MERGING



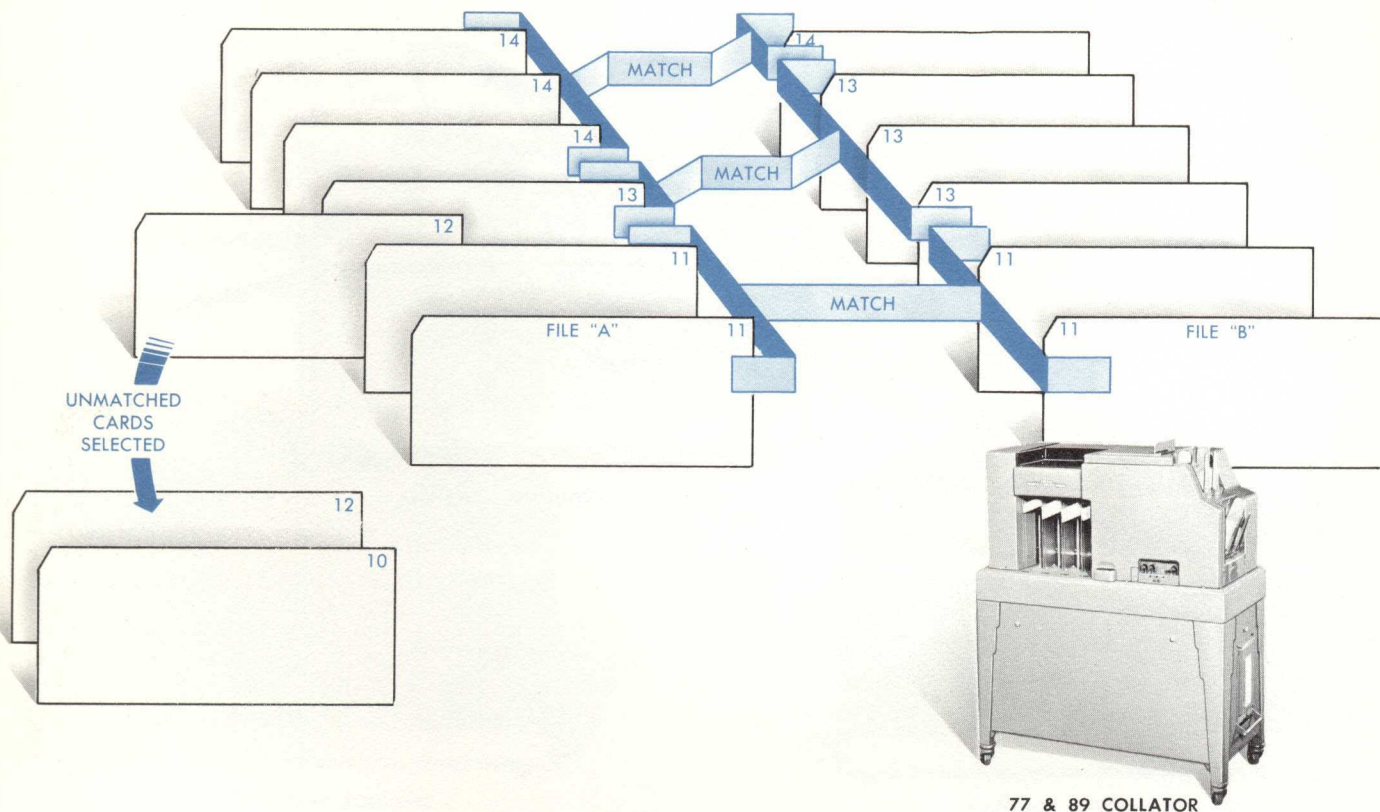
77 & 89 COLLATOR



MERGING is the combining of two sets of punched cards into one set of given sequence. Both files of cards must be in the same sequence before they are merged.

This function makes possible automatic filing of new cards into an existing file of cards. It is a faster method than sorting to use in placing related cards together.

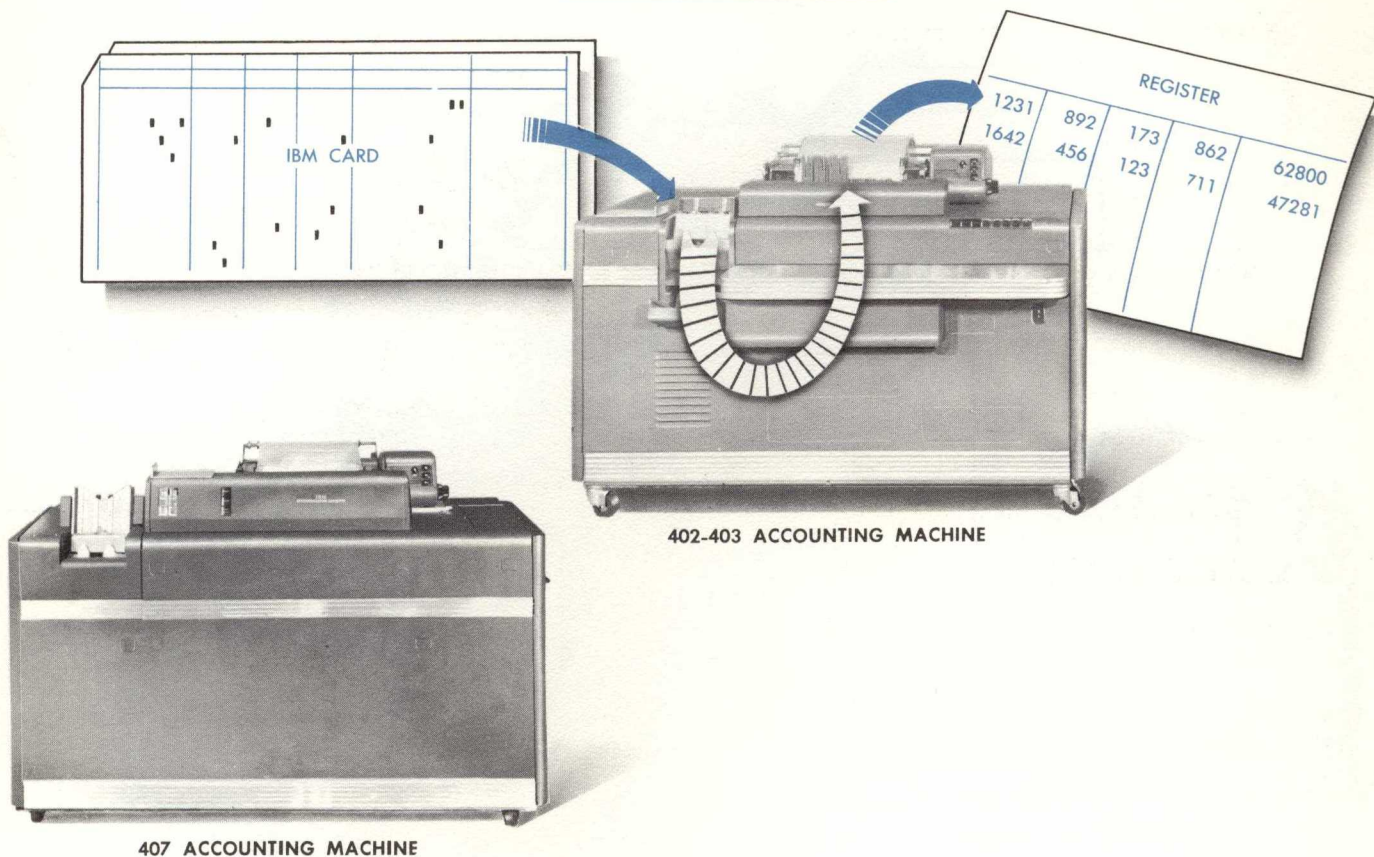
MATCHING



MATCHING is a checking function used to check the agreement between two sets of cards. Groups of cards in one file are compared with similar groups in a second file. Unmatched cards or groups of cards in either file may be selected or separated from the files.

This function is frequently performed in conjunction with merging.

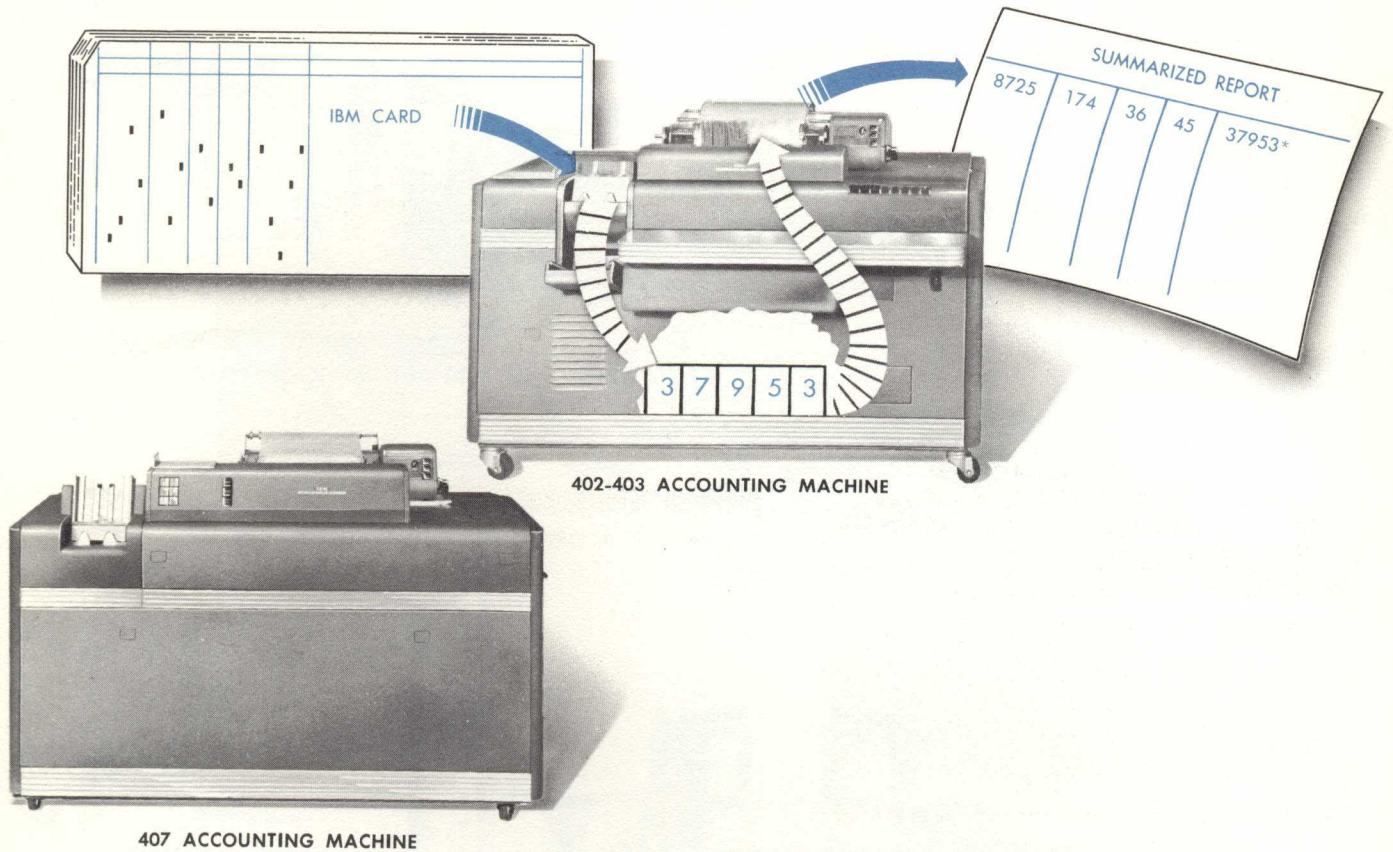
DETAIL PRINTING



DETAIL PRINTING is the printing of information from each card as the card passes through the machine. The function is used to prepare reports that show complete detail about each transaction.

During this listing operation the machine adds, subtracts, cross-adds or cross-subtracts and prints many combinations of totals.

GROUP PRINTING

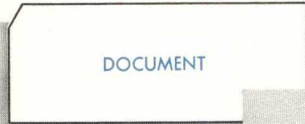


GROUP PRINTING is the accounting-machine function that summarizes groups of cards and prints the totals on a report. Totals may involve adding, subtracting or crossfooting.

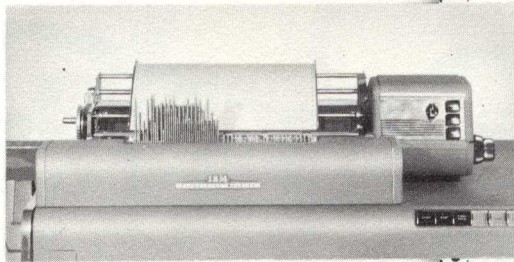
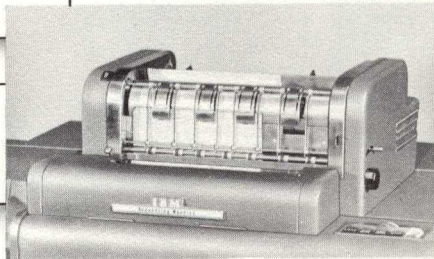
Information read from punched cards is entered into counter units; at the end of each group of cards, the totals are read out of the counters and printed on the report.

This function is used in preparing all types of reports requiring summarized totals. Complete descriptive information identifies all totals.

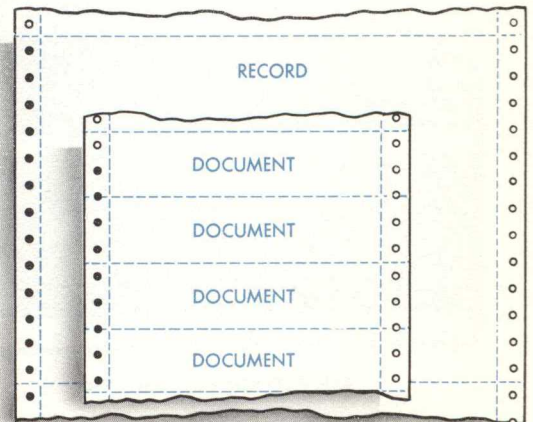
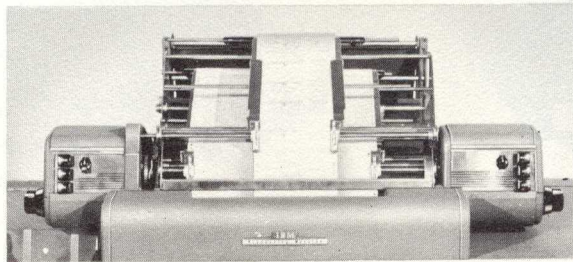
FORM FEEDING



920 BILL FEED



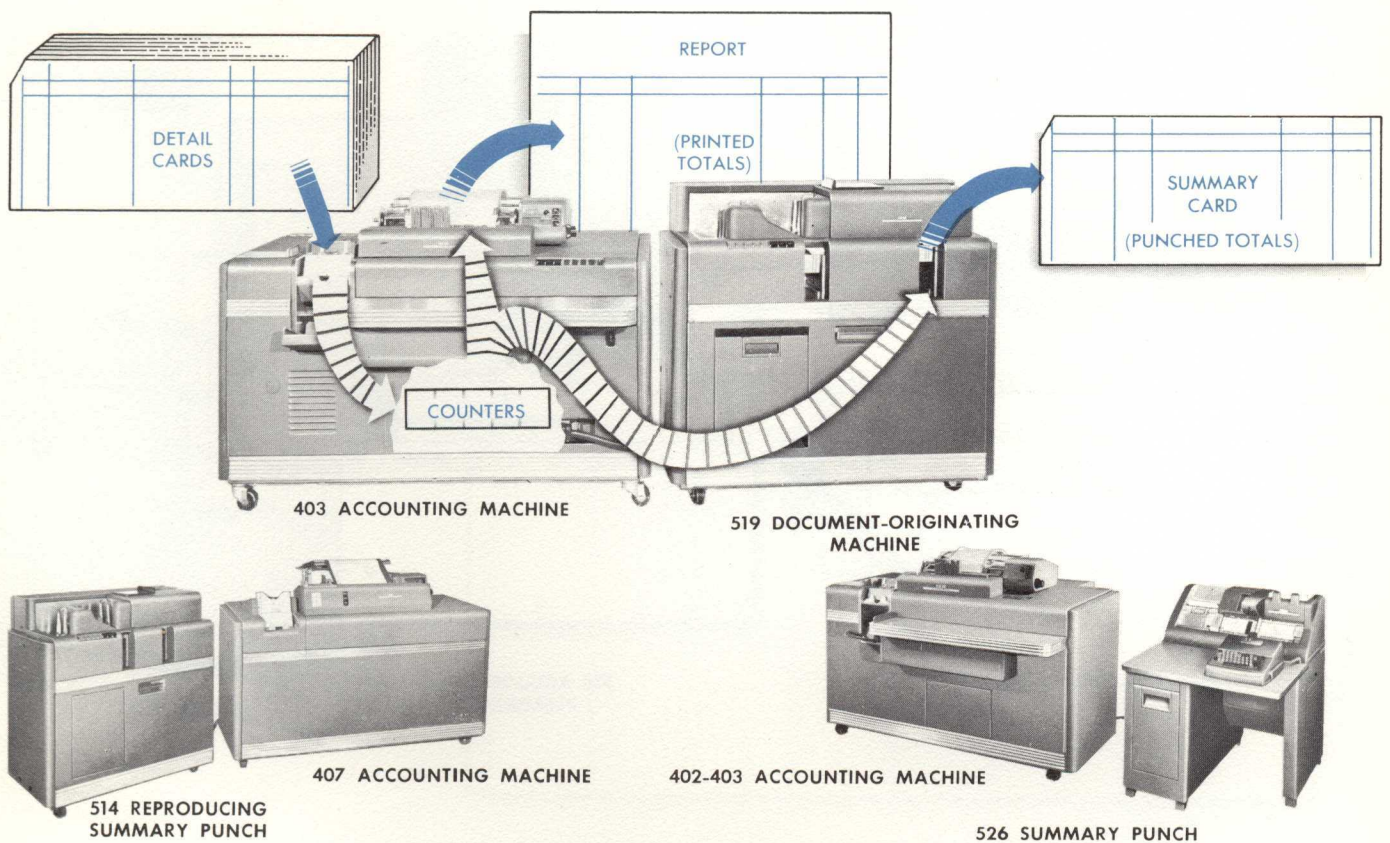
923 AUTOMATIC CARRIAGE



924 DUAL FEED CARRIAGE

FORM FEEDING is the rapid, accurate positioning of reports and documents on which accounting-machine results are printed. The tape-controlled automatic carriage feeds continuous paper forms—single or multiple copies—such as registers, reports, and paper checks. The bill feed positions single forms, such as ledger sheets, envelopes, or IBM cards. The dual-feed carriage feeds two different forms simultaneously, for printing some or all of the same accounting-machine results from the same type bars but with different spacing. All of the devices control feeding within each form, as well as form-to-form ejection.

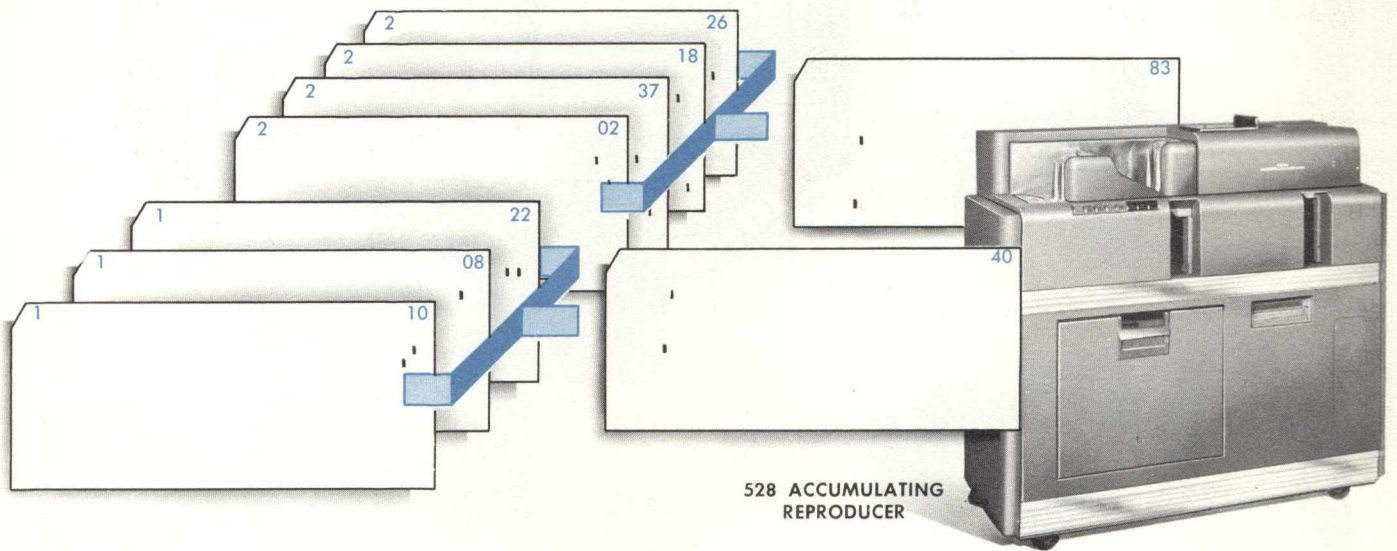
SUMMARY PUNCHING



SUMMARY PUNCHING is the automatic conversion into punched-hole form of information developed by the accounting machine. Summary punching is used for two purposes:

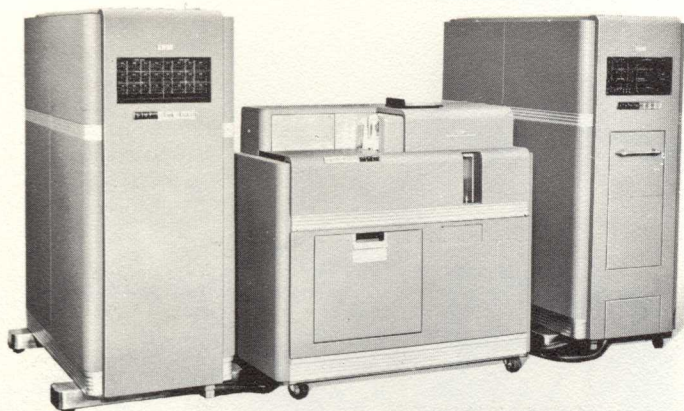
1. To carry balance figures forward. To do this, it is only necessary to include the previous total-to-date card with the current card or cards, and, while a current report is being run, summary punch new balance-to-date cards. These are saved for the next balance-to-date operation when the process is repeated.
2. To reduce card volume and carry summary data. Summary cards reduce peak-load periods due to accumulated card volume, and can be used as entries to general ledger accounting.

ACCUMULATED TOTAL PUNCHING

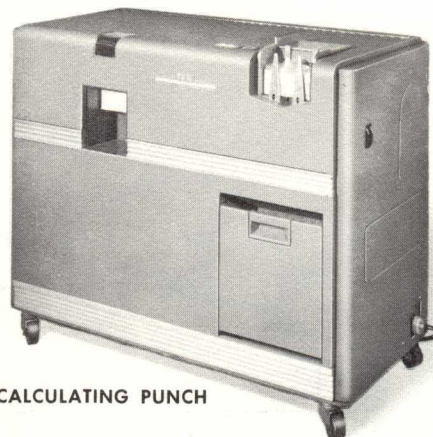


ACCUMULATED TOTAL PUNCHING is the summarizing of detail card information and the punching of a card for the accumulated totals. This is accomplished on the accumulating reproducer through the use of net-balance counters. Classified cards are read and accumulated at the rate of 200 cards per minute, and a summary card is punched for the accumulated totals at the rate of 100 cards per minute. Availability of counters enables the accumulating reproducer to be used as an independent summary punch, without the accounting machine, whenever printed reports are not required. The accumulating reproducer can also be used in conjunction with the accounting machine as a summary punch, thereby increasing total accumulating capacity.

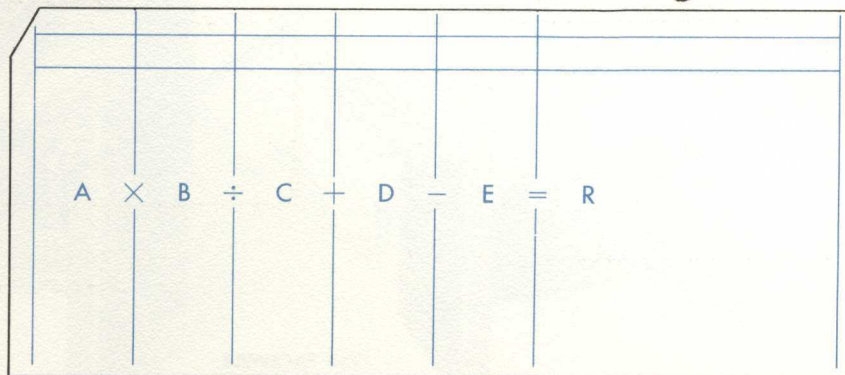
CALCULATING



607 ELECTRONIC CALCULATING PUNCH
(604 IS SIMILAR)



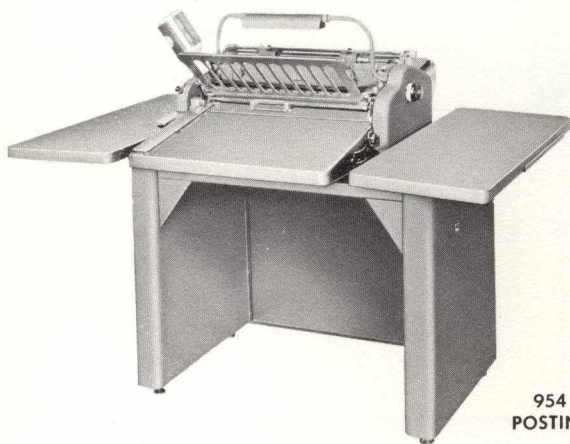
602A CALCULATING PUNCH



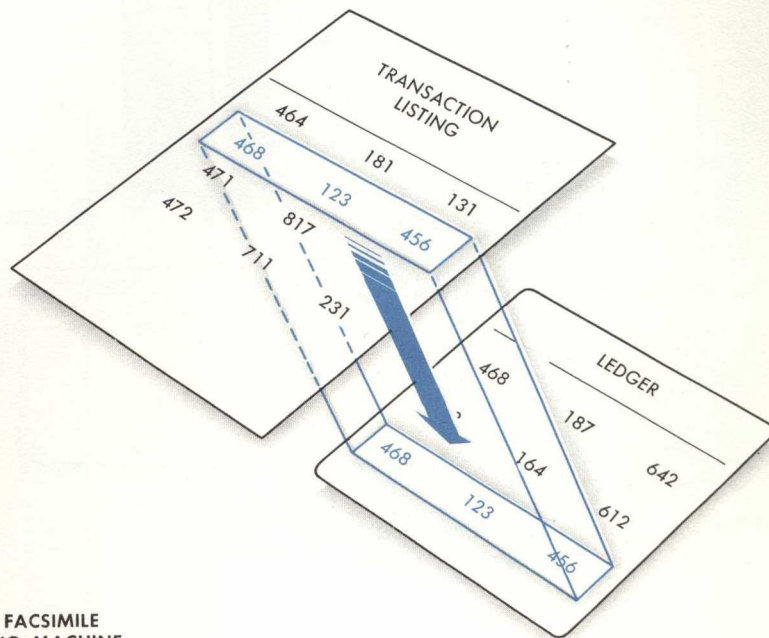
CALCULATING is the computing of a result by multiplication, division, addition, or subtraction. Any combination of these calculations can be performed—often in one run. Factors to be calculated may be read from each card, or series of cards, emitted by a device within the machine, or be developed by the accumulation of a series of calculations. One or several results are punched in each card or in a trailer card which follows a group of cards carrying the factors.

Many routines allow automatic checking to prove accuracy of calculations. For example, to check the punched result, an $A \times B$ calculation can be cross-proofed against a $B \times A$ calculation during the same run.

FACSIMILE POSTING



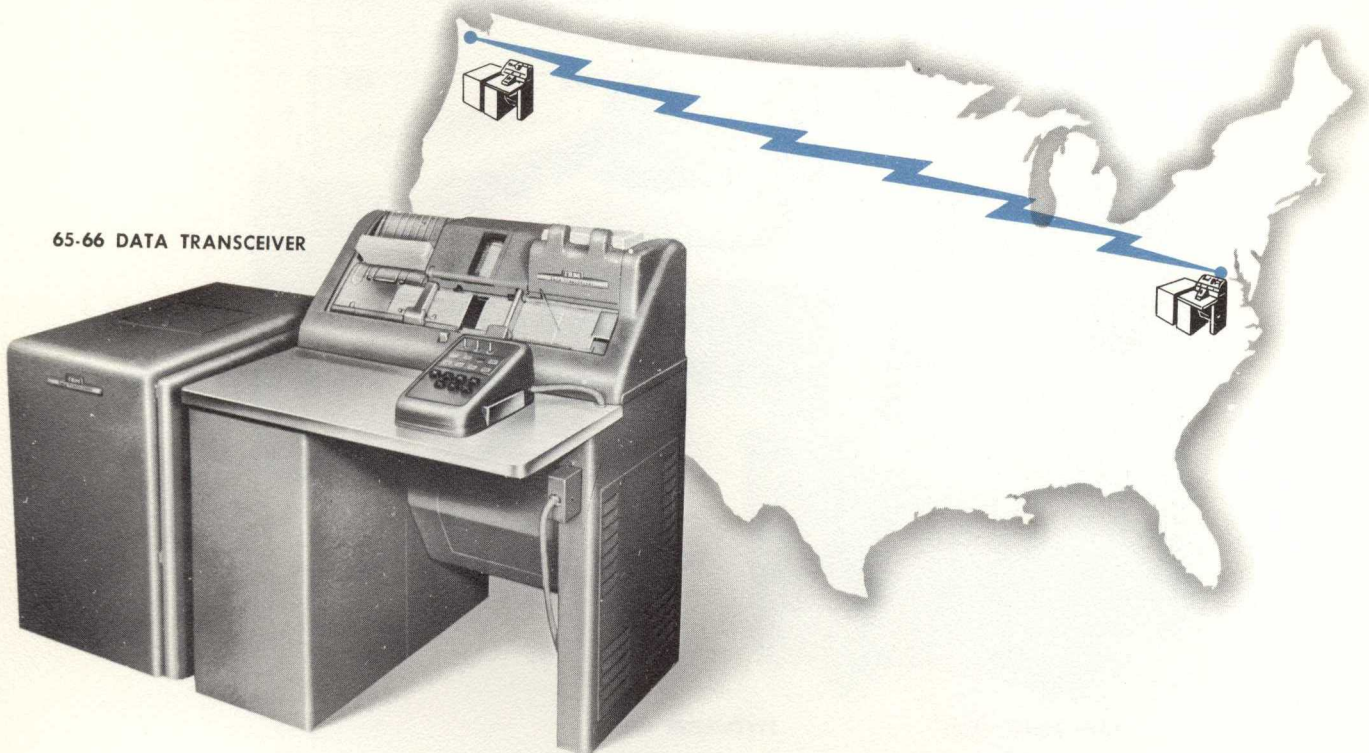
954 FACSIMILE
POSTING MACHINE



FACSIMILE POSTING is the process of transferring by a duplicating process a printed line on a report to a ledger or other record sheet. These may be posted from a transaction listing previously prepared on the accounting machine.

Typical uses of this function are the posting of customer ledgers, employees' earning records, and stock ledger cards.

CARD-TO-CARD TRANSCEIVING

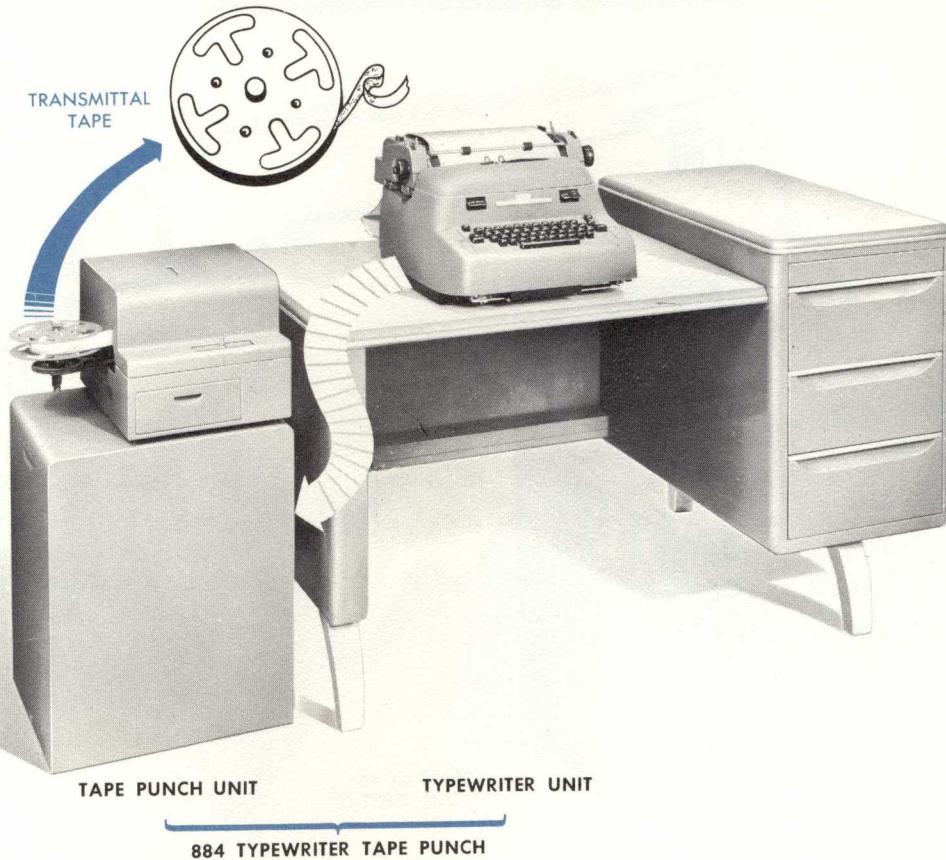


65-66 DATA TRANSCEIVER

CARD-TO-CARD TRANSCEIVING makes possible instantaneous and accurate duplication of punched cards over telephone and telegraph networks between locations separated by either just a few miles or thousands of miles. A switch on the machine halts card transmission at any time to permit direct voice communication over the same telephone circuits connecting the sending and receiving units.

The machines at either end of a circuit are identical and can be used interchangeably for transmitting or receiving.

TYPEWRITER TAPE PUNCHING

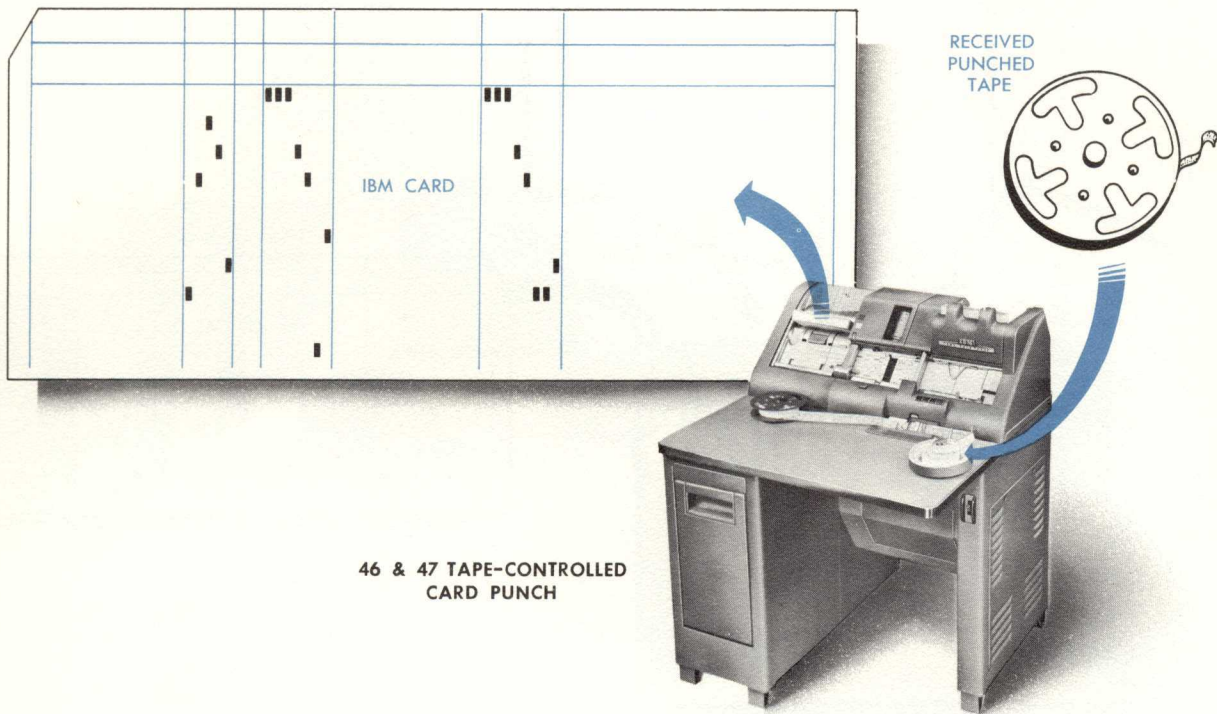


TYPEWRITER TAPE PUNCHING is a means of recording information in code onto a tape by use of a special IBM typewriter. As a document is being created on the typewriter, any or all of the typed information can be recorded on the 8-channel tape. The tape can be easily transported to other locations and processed through a tape-to-card punch to transfer the information into punched holes in IBM cards.

In general, the typewriter tape punch can be used to prepare any document now created on a typewriter and later used as a source document for key punching and key verifying cards; this eliminates the need for the latter two functions.

Typical applications of this machine are for billing, order writing, personnel changes, address changes, insurance policies, railroad accounting, journal vouchers, purchase orders, receiving reports, directories, inventory control, check reconciliation, and many more.

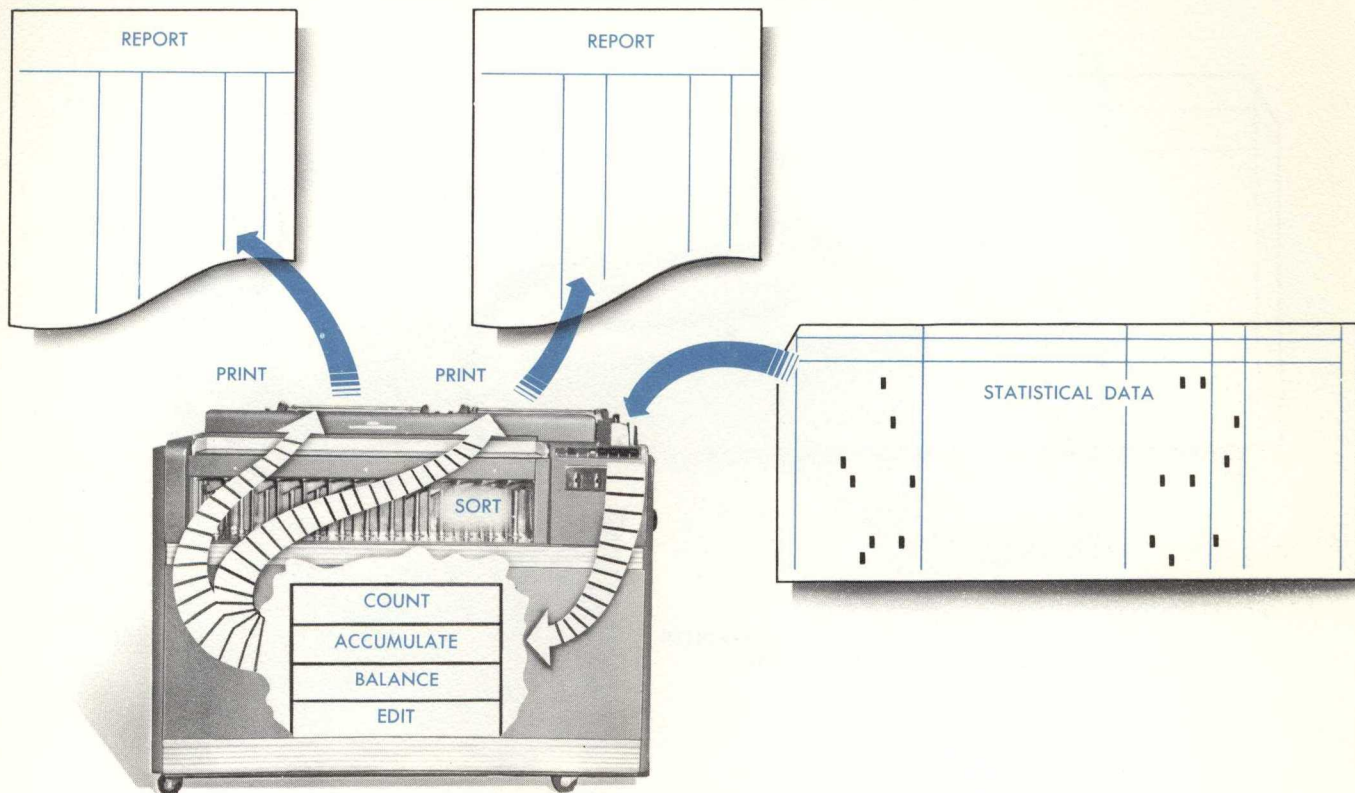
TAPE READING



46 & 47 TAPE-CONTROLLED
CARD PUNCH

TAPE READING is a process of feeding coded tapes through a tape-to-card punch to convert the coded information into IBM punched cards. Tapes can be prepared on the typewriter tape punch or on the card-controlled tape punch; the latter is capable of punching tape that can be transmitted by telegraph.

STATISTICAL WORK

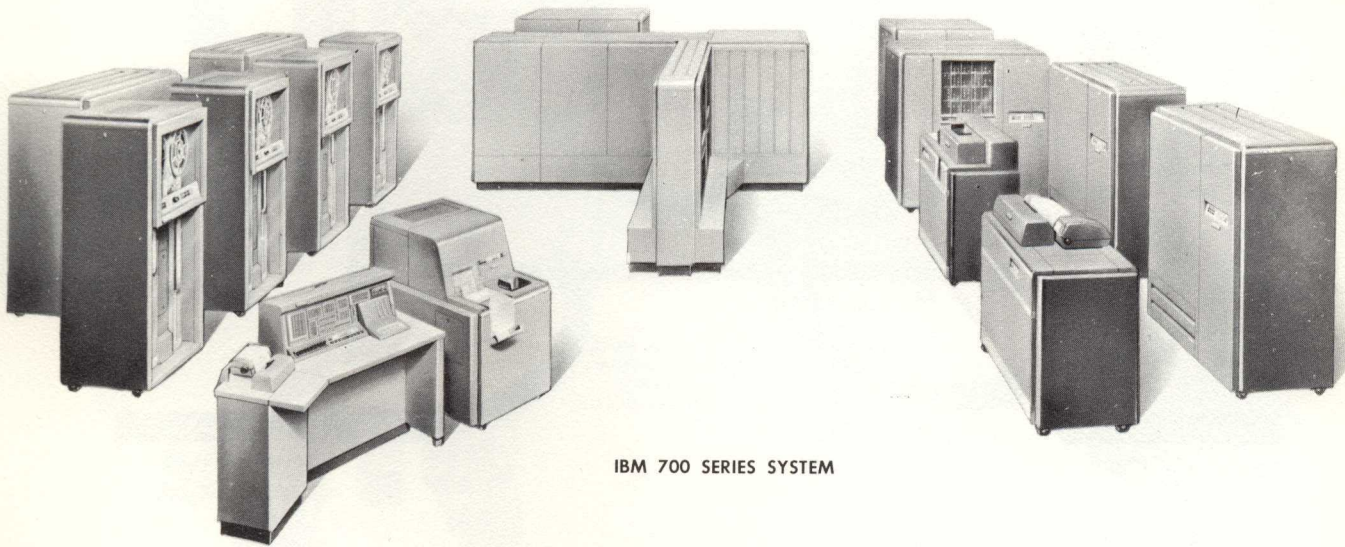


101 ELECTRONIC STATISTICAL MACHINE

STATISTICAL WORK is essentially a problem of counting units in many different classifications. At the same time it is frequently desirable to accumulate certain quantities or amounts, check or edit for consistency or reasonableness, and balance counts to the control totals to check the accuracy of the summaries.

All of these functions are performed by the Electronic Statistical Machine to produce printed summaries. This machine also performs sorting and card-arranging operations.

DATA PROCESSING



IBM 700 SERIES SYSTEM

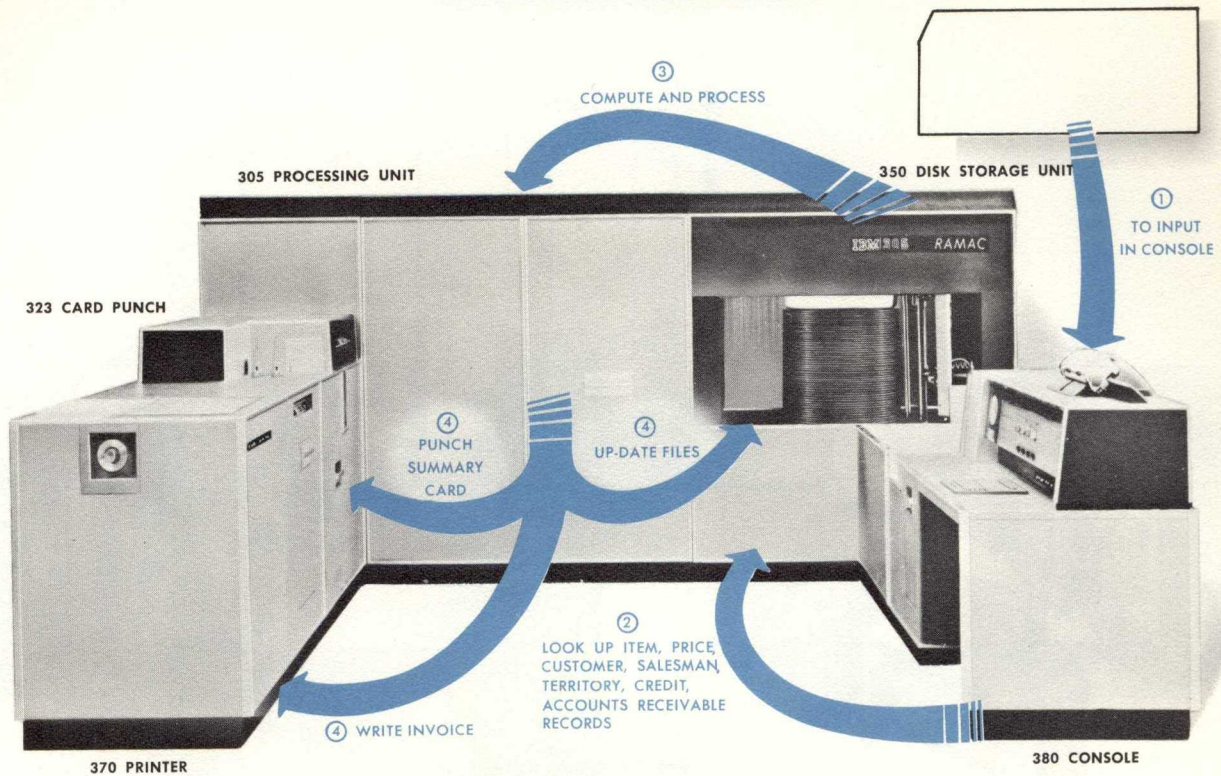
DATA PROCESSING, from a machine standpoint, entails entering a complete set of instructions as well as initial source data into the machine to enable it to arrive at the completed final results or reports in one operation.

This type of data processing requires the programming of each step in the procedure—including the solution to all exceptions—before source data are to be processed. Through the use of cards, magnetic tapes, magnetic drums, electrostatic storage, and printing units, the machines are capable of high-speed input-output and internal logical ability.

Such features permit accurate processing of large procedures and complex problems at high speed.

Stored Programming is the function of entering or “loading” of all instructions into the machine in the proper sequence to perform the steps necessary to complete a given application or problem from data “loaded” in a similar manner.

IN-LINE PROCESSING



IBM 305 RAMAC

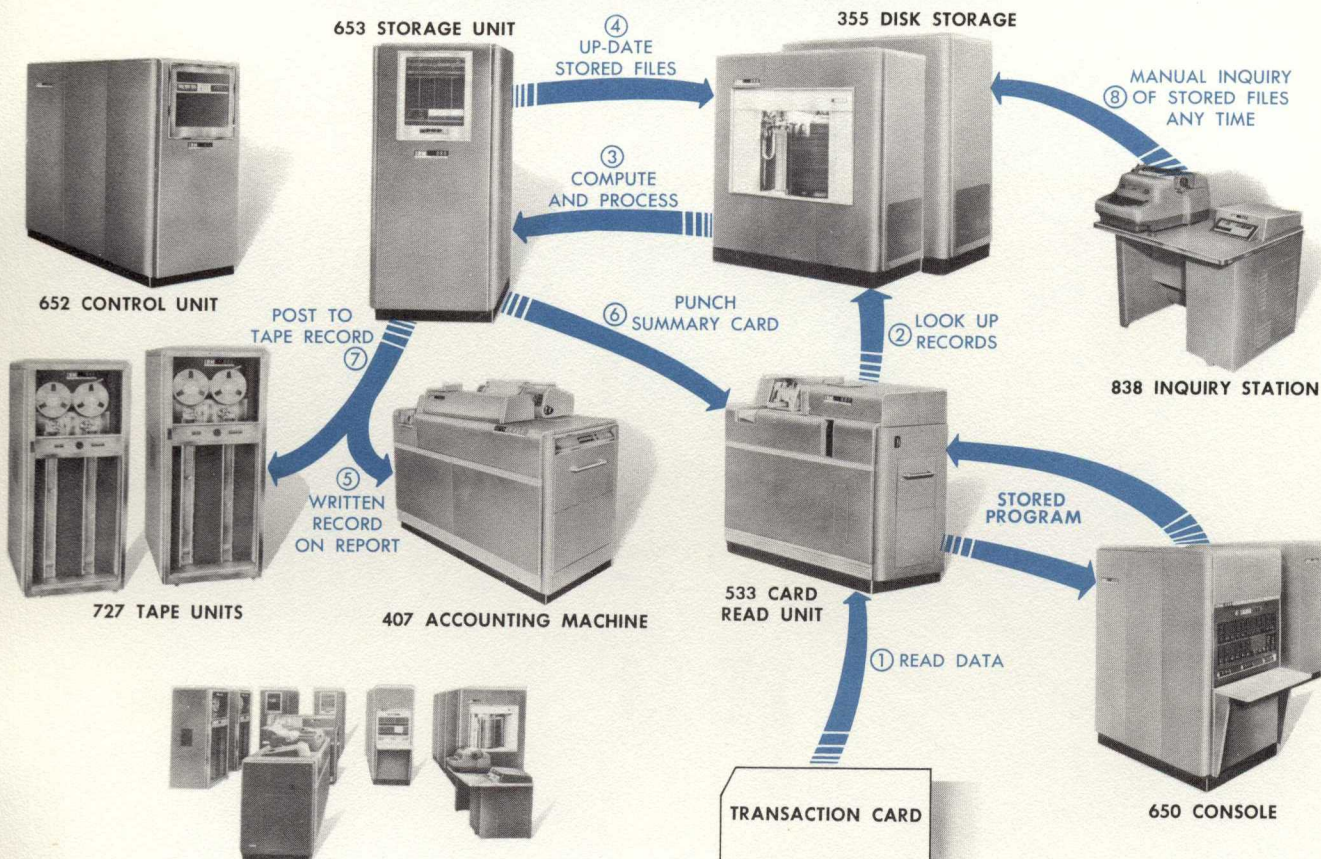
IN-LINE PROCESSING means posting transactions to all ledger accounts affected as they occur. For example, processing a customer order changes the inventory status of all items ordered, and alters accounts-receivable and sales records, too. All these accounts can be updated at one time. Thus, they represent today's status, not yesterday's, last week's, or last month's.

A machine needs high-capacity storage so that all types of accounts can be included. In addition, each record of each account must be readily obtainable.

RANDOM ACCESS METHOD OF ACCOUNTING AND CONTROL describes the functions of the 305 RAMAC®. A disk-storage unit has a capacity of 5,000,000 alphanumerical characters in 100-character groups, each such record available in less than one second.

The RAMAC uses stored programming, on a magnetic drum. The machine has printed, punched, and typed output, and allows interrogation of any of the stored records.

ACCESSIBILITY AND INTERROGATION



IBM 650 RAMAC

ACCESSIBILITY AND INTERROGATION provide ease in handling problems requiring large-capacity random-access storage. This system not only allows the records in disk storage to be updated as the transactions occur, but also makes it possible to inquire about the status of any record, in less than two seconds.

The advantages of stored programming and in-line data processing are combined to handle problems ranging from payroll processing, through elaborate inventory and manufacturing controls, to complex scientific applications.

Data can be entered into the system from magnetic tapes, punched cards, manual inquiry stations, or information previously stored in the magnetic disks. Output results can be in any of these forms: printed, punched, or typed.

IBM[®]