

IBM
ELECTRIC PUNCHED CARD
ACCOUNTING MACHINES

CUSTOMER ENGINEERING MANUAL OF INSTRUCTION

ELECTRONIC MULTIPLIER

TYPE 603

INTERNATIONAL BUSINESS MACHINES CORPORATION
NEW YORK, NEW YORK

Published by
Department of Education
International Business Machines Corporation
Endicott, N. Y.

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International Business Machines Corporation
590 Madison Avenue, New York 22, N. Y.
Printed in U. S. A.
Form 22-3838-0

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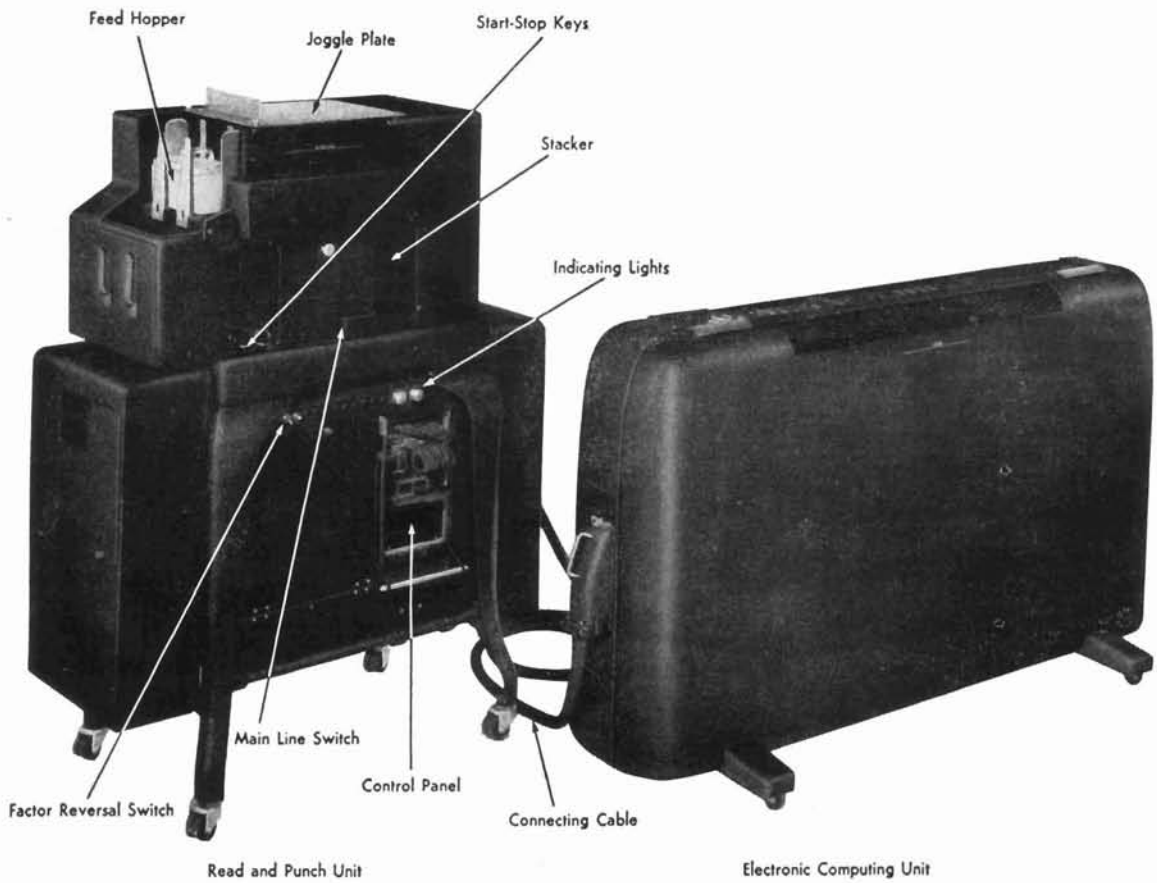
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PURPOSE OF TUBES IN THE COMPUTING SECTION



ELECTRONIC MULTIPLIER
Type 603

IBM ELECTRONIC MULTIPLIER

TYPE 603

INTRODUCTION

THE CONVENTIONAL multiplying machine using mechanical counters for the computation of products is considerably limited in its speed of operation because of the inertia of moving parts. By the use of electrical computation circuits, calculating speeds can be increased considerably. The Electronic Multiplier makes use of recently-developed electronic circuits which perform calculations at extremely high speeds. Thus the burdensome and usually slow-speed process of computing products is reduced to an automatic high-speed process in keeping with the other high-speed functions of the IBM Accounting Machine Method. Calculations involving earnings, material costs, discounts, inventories, and many other computations can be effected automatically to speed up the accounting routines which normally require much time and effort.

The Type 603 Electronic Multiplier consists essentially of a unit for reading and punching and an electronic computing unit connected by a cable as shown by the general view of the machine on the frontispiece. The factors punched in an IBM Card are read by the reading unit, computations are automatically made by the electronic computing unit, and the result is then punched in the same card by the punching unit. No time is lost waiting for the completion of the computing operations; all computations are performed between the time a card leaves the reading brushes and the time it reaches the punching position. The machine is equipped with a control panel which makes it entirely flexible as to the reading and punching of information.

The IBM Electronic Multiplier, Type 603, represents the first commercial use of electronics for multiplication. The use of electronic circuits for computing permits operation of this multiplier at maximum punching speed of 6000 cards per hour. The multiplication itself is performed in .027 sec-

ond, between the reading and punching of each card.

OPERATING FEATURES

THE operating controls and features of this machine, which can be seen in Figure 1, are all located on the punch unit.

Main Line Switch

This switch must be ON for the machine to be operative. It must not be turned OFF while cards are feeding through the machine.

Power Indicating Light (Green)

When this light is ON, the machine is ready for operation. It will not turn on until sufficient time has been allowed for the electronic tubes to warm up.

Start Key

This key is depressed to start the feeding of cards at the beginning of a run. It must be held down through three machine cycles, when first starting, before automatic operation begins.

Stop Key

This key is depressed for manual control of stopping the feeding of cards while the machine is through running.

Error Indicating Light (Red)

This light glows when an error is detected by the Double Punch and Blank Column Detection Device, or when a product exceeds the card field capacity as indicated by the Product Overflow feature.

Error Reset Push Button

This button is depressed to extinguish the error light and restore the machine to normal operation, after the machine has stopped because of an error.

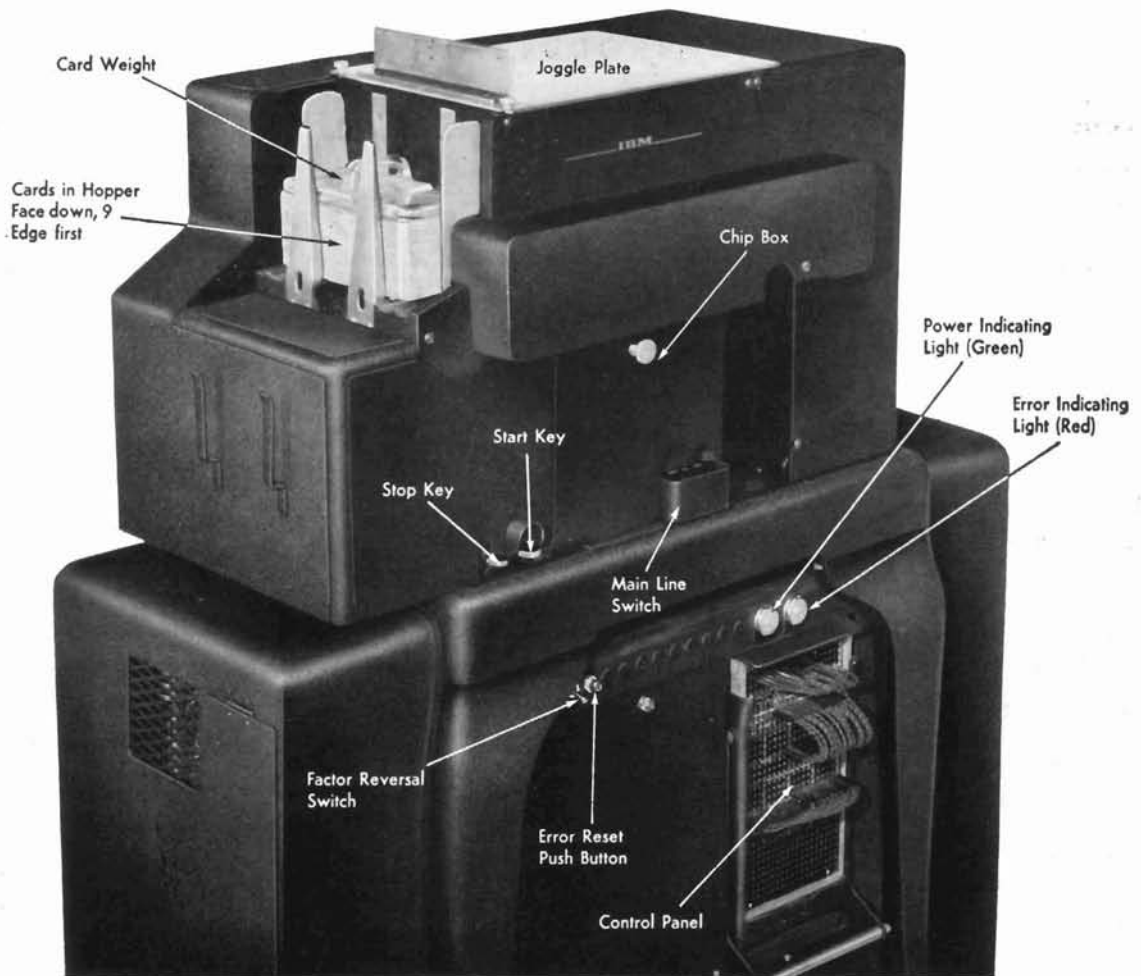


Figure 1. Operating Features

Factor Reversal Switch

When set ON, this switch automatically reverses the multiplier and multiplicand entry hubs. It is used in checking operations.

Card Hopper

Cards are placed in the card hopper face down, 9 edge first. The capacity of the hopper is approximately 800 cards.

Card Stacker

After leaving the last set of brushes, cards enter the stacker which has a capacity of approximately 1000 cards. If the stacker fills to capacity, the machine will be stopped automatically by the stacker stop switch.

Speed

The operating speed of this machine is 100 cards per minute regardless of the number of columns punched and the size of the multiplier or multiplicand fields.

Current

This machine is supplied to operate only on 115 volts or 230 volts A.C., 50 or 60 cycle current.

Control Panel

The automatic control panel provides a means for flexible setup of the machine for all operations. Figure 2 shows a control panel with the function of each hub described.

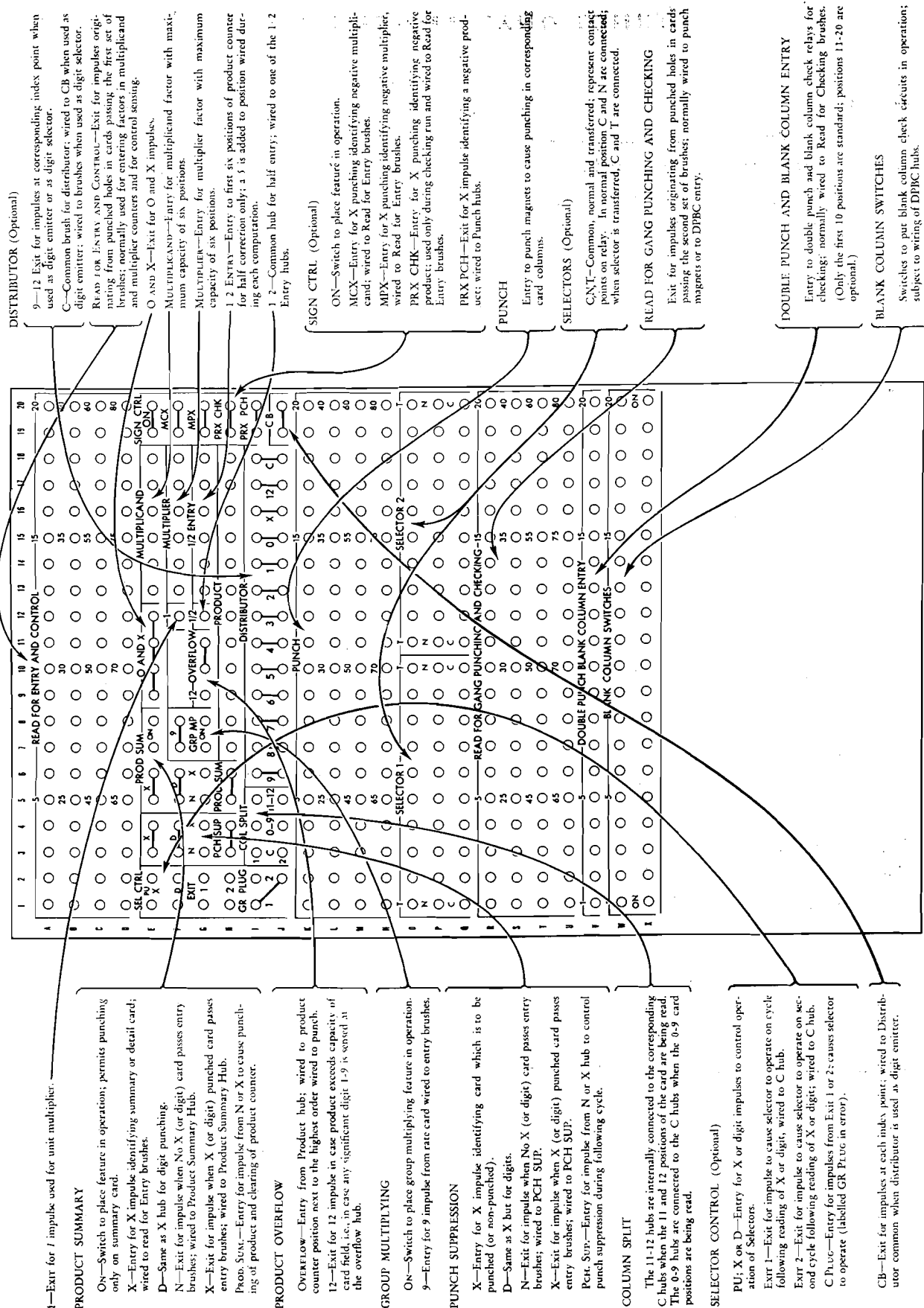


Figure 2. Control Panel—Explanation of Hubs

1—Exit for 1 impulse used for unit multiplier.

PRODUCT SUMMARY

- ON—Switch to place feature in operation; permits punching only on summary card.
- X—Entry for X impulse identifying summary or detail card; wired to read for Entry brushes.
- D—Same as X hub for digit punching.
- N—Exit for impulse when No X (or digit) card passes entry brushes; wired to Product Summary Hub.
- X—Exit for impulse when X (or digit) punched card passes entry brushes; wired to Product Summary Hub.
- Prod. Sum.—Entry for impulse from N or X to cause punching of product and clearing of product counter.

PRODUCT OVERFLOW

- OVERFLOW—Entry from Product hub; wired to product counter position next to the highest order to punch.
- 12—Exit for 12 impulse in case product exceeds capacity of card field, i.e., in case any significant digit 1-9 is stored in the overflow hub.

GROUP MULTIPLYING

- ON—Switch to place group multiplying feature in operation.
- 9—Entry for 9 impulse from rate card wired to entry brushes.

PUNCH SUPPRESSION

- X—Entry for X impulse identifying card which is to be punched (or non-punched).
- D—Same as X but for digits.
- N—Exit for impulse when No X (or digit) card passes entry brushes; wired to PCH SUP.
- X—Exit for impulse when X (or digit) punched card passes entry brushes; wired to PCH SUP.
- Pch. Sup.—Entry for impulse from N or X hub to control punch suppression during following cycle.

COLUMN SPLIT

- The 11-12 hubs are internally connected to the corresponding C hubs when the 11 and 12 positions of the card are being read. The 0-9 hubs are connected to the C hubs when the 0-9 card positions are being read.

SELECTOR CONTROL (Optional)

- PU; X or D—Entry for X or digit impulses to control operation of Selectors.
- EXIT 1—Exit for impulse to cause selector to operate on cycle following reading of X or digit, wired to C hub.
- EXIT 2—Exit for impulse to cause selector to operate on second cycle following reading of X or digit; wired to C hub.
- C PLUG—Entry for impulses from Exit 1 or 2; causes selector to operate (labelled GR PLUG in error).

- CB—Exit for impulses at each index point; wired to Distributor common when distributor is used as digit emitter.

DISTRIBUTOR (Optional)

- 9-12—Exit for impulses at corresponding index point when used as digit emitter or as digit selector.
- C—Common brush for distributor; wired to CB when used as digit emitter; wired to brushes when used as digit selector.

READ FOR ENTRY AND CONTROL—Exit for impulses originating from punched holes in cards passing the first set of brushes; normally used for entering factors in multiplicand and multiplier counters and for control setting.

O AND X—Exit for O and X impulses.

MULTIPLICAND—Entry for multiplicand factor with maximum capacity of six positions.

MULTIPLIER—Entry for multiplier factor with maximum capacity of six positions.

1 2 ENTRY—Entry to first six positions of product counter for half correction only; a 5 is added to position wired during each computation.

1 2—Common hub for half entry; wired to one of the 1-2 Entry hubs.

SIGN CTRL. (Optional)

- ON—Switch to place feature in operation.
- MCX—Entry for X punching identifying negative multiplicand; wired to Read for Entry brushes.
- MPX—Entry for X punching identifying negative multiplier, wired to Read for Entry brushes.
- PRX CHK—Entry for X punching identifying negative product; used only during checking run and wired to Read for Entry brushes.
- PRX PCH—Exit for X impulse identifying a negative product; wired to Punch hubs.

PUNCH

Entry to punch magnets to cause punching in corresponding card columns.

SELECTORS (Optional)

CANT—Common, normal and transferred; represent contact points on relay. In normal position C and N are connected; when selector is transferred, C and T are connected.

READ FOR GANG PUNCHING AND CHECKING

Exit for impulses originating from punched holes in cards passing the second set of brushes; normally wired to punch magnets or to DPBC entry.

DOUBLE PUNCH AND BLANK COLUMN ENTRY

Entry to double punch and blank column check relays for checking; normally wired to Read for Checking brushes. (Only the first 10 positions are standard; positions 11-20 are optional.)

BLANK COLUMN SWITCHES

Switches to put blank column check circuits in operation; subject to wiring of DPBC hubs.