

IBM

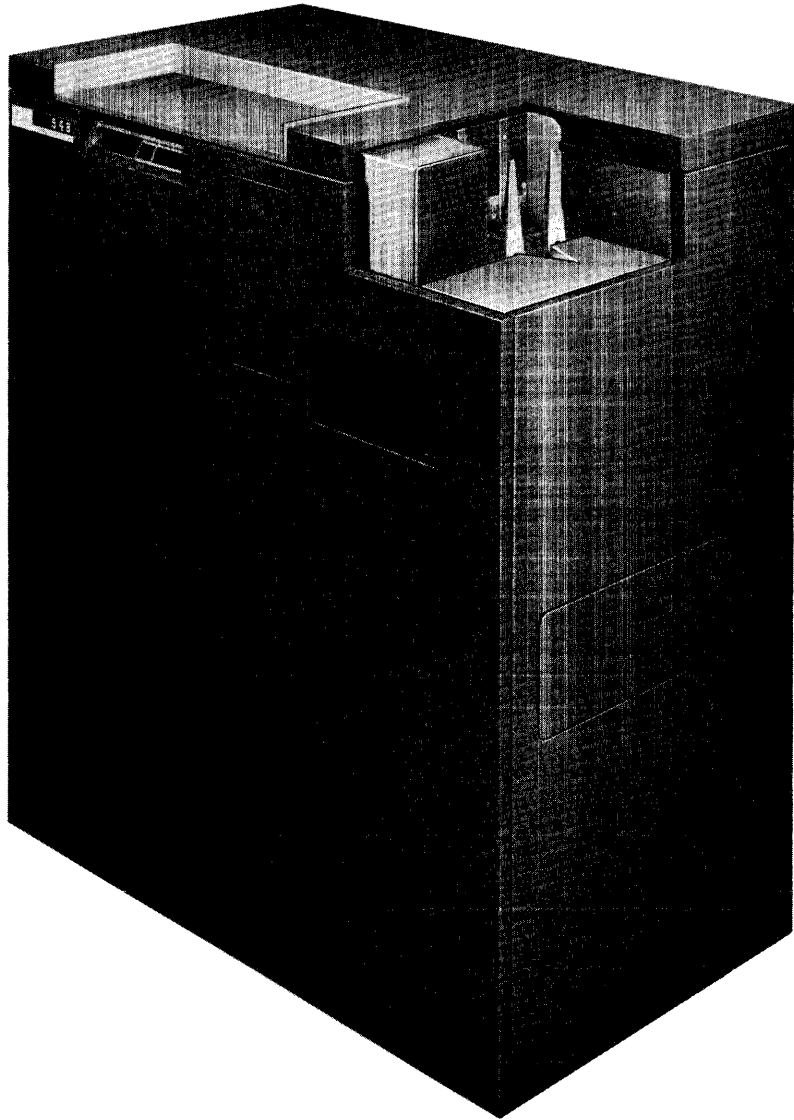
IBM 548,552
Interpreters

Manual of Operation

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IBM 548 INTERPRETER

IBM Interpreters 548, 552

IBM INTERPRETERS have increased the use of the IBM card as a documentary recording medium. Through their use, it is possible to print descriptive words and numerals directly upon a punched-card record, by translating the holes in a card into printed information on the same card. The facility with which unit records, in the form of IBM punched cards, may be made to serve as documentary records associated with accounting systems, has been demonstrated by their use in production planning, payroll, control of materials, billing, and other record-keeping routines.

When interpreted, summary cards originating during a billing operation become an easily-handled entry for accounts receivable. Pre-punched records, when interpreted, increase the efficiency of the IBM method in such applications as billing, payroll, production planning, and cost distribution.

548 Interpreter

THE 548 INTERPRETER is designed to translate numerical and alphabetic data, punched into an IBM card, into printed characters on one of two printing lines on the face of the card. The information can be printed in any sequence because of the flexibility inherent in the control panel. Sixty columns of the card can be interpreted on either printing line.

The machine operates at a speed of 60 cards a minute, or 3,600 cards an hour.

OPERATING FEATURES

Card Feed

The machine is equipped with a horizontal feed that is on the right of the machine as one faces the front of it. It is possible to add cards to the card-feed hopper while the machine is running. This allows continuous operation of the machine. Cards must be placed into the feed hopper *face up*, with the *top edge* (12's) entering the machine first. Note that the front card in a handful of cards is the last one to be interpreted.

Whenever the supply of cards in the feed hopper becomes exhausted, all cards within the machine will

be interpreted and run out into the stacker, and the machine will stop. The capacity of the feed hopper is approximately 700 cards.

Card Stacker

The card stacker is located directly below the feed. Cards may be removed without stopping the continuous operation of the machine. If the stacker becomes full, the machine automatically stops; it can stack about 900 cards before stopping.

Main Line Switch

This switch is located in the front of the machine near the top. It must be on for all machine operations. When the switch is on, a green ready light next to it indicates that the machine is ready for operation.

Start and Stop Keys

The start and stop keys are next to the green ready light. The start key, which is blue and recessed, must be pressed and held for three feed cycles to start the machine running. The machine continues to operate as long as cards are feeding, or until the stacker becomes full. The stop key is also blue, and protrudes slightly. It is used to stop the operation of the machine at any time while cards are feeding.

Printing-Position Knob

Characters can be printed on one of two lines on the face of the card. The first is along the top of the card above the 12 position (Figure 1), and the other is between the 12 and 11 positions (Figure 2). The line is determined by the setting of the printing-

position knob, which is located on the back of the machine behind the feed hopper. An indicator shows which line is set up to be printed. To change the printing line, pull the knob and turn it clockwise for the upper line, or counterclockwise for the lower line. This knob rotates while the machine is running.

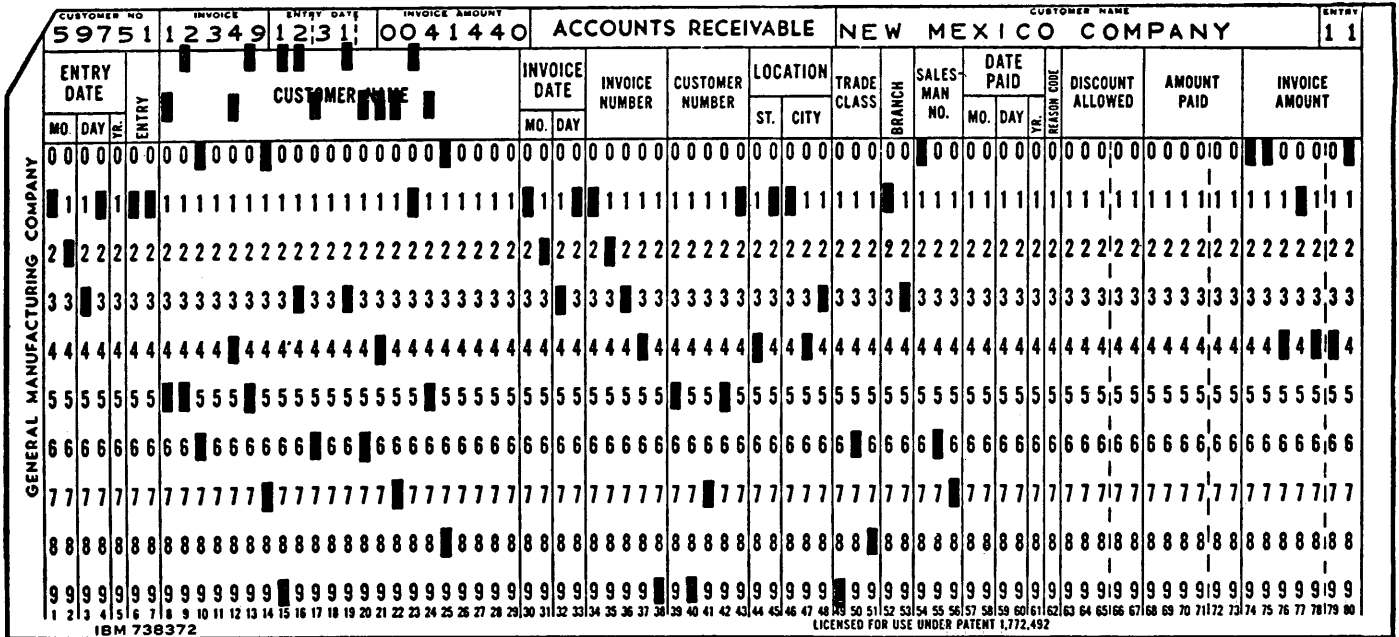


Figure 1. Upper-line Printing

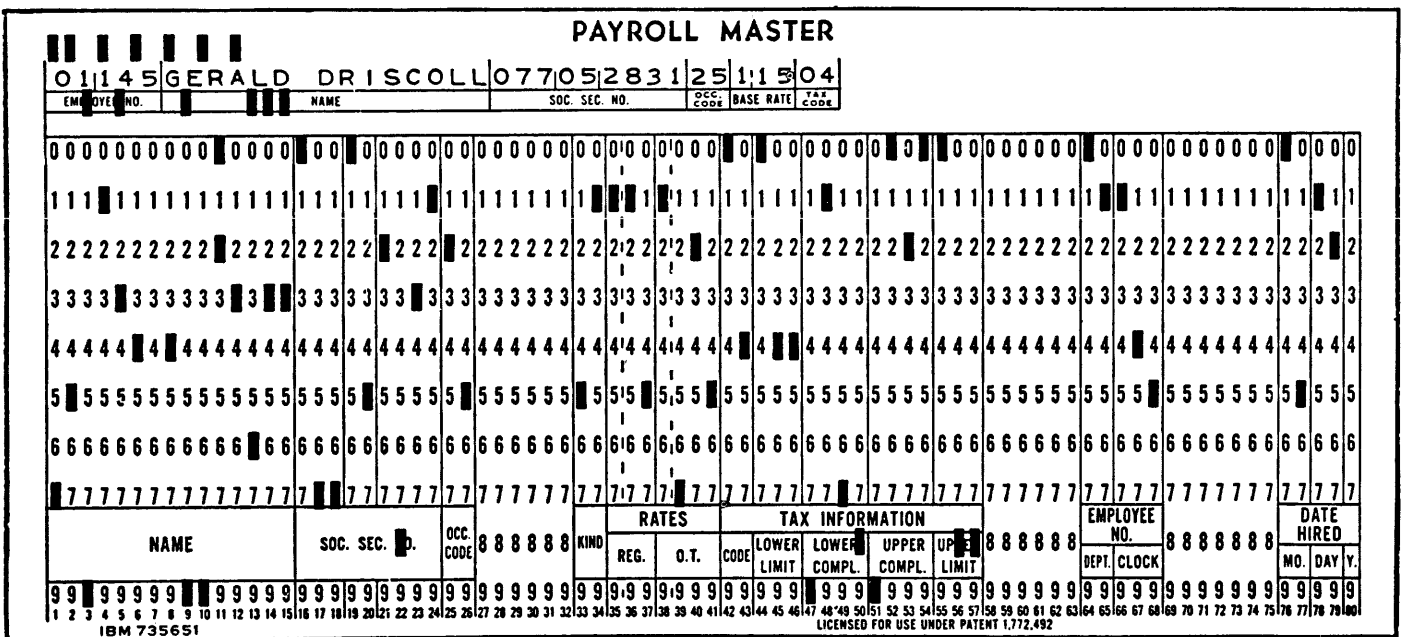


Figure 2. Lower-line Printing

Because a card can be interpreted on only one line at a time, a complete file of cards is usually interpreted on one line, and then run again through the machine to be printed on the other line. A good "rule of thumb" is that the printing-position knob should never be turned unless the control panel is changed or re-wired.

Operation

To operate this machine: wire the control panel; turn the main line switch on; set the printing-position knob; place the cards into the feed hopper *face up, 12-edge first*; and depress the start key. The machine will then automatically interpret the cards at a rate of 3,600 an hour.

Reading Brushes

A card is read by a set of 80 reading brushes, one for each card column. The card passes between these brushes and a metal roller. A hole in a card column enables the brush to make contact with the roller, and an electrical impulse travels from the roller through the brush and through control-panel wiring to the typebar (Figure 3).

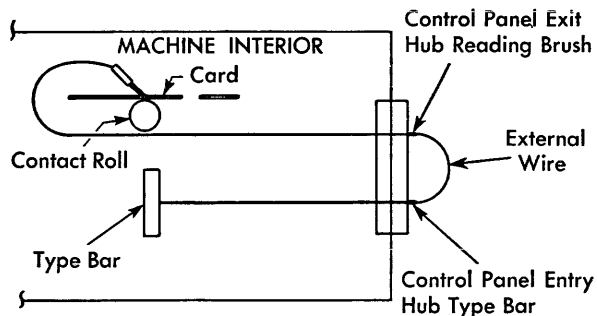


Figure 3. Internal and External Wiring Schematic

The brush assembly is located just under the hinged top cover to the left of the feed. Access to it is possible by raising the front part of the cover. To remove a card from under the brushes, lift the handle on the brush-unit assembly and pull up the whole brush assembly. This allows ample space to remove cards. Replace by reversing the procedure. Make certain that the handle is down to the left before cards are fed into the machine.

X-Brushes

A set of five X-brushes is located above the cards in such a way that they read a card just before it passes under the reading brushes. They are timed to read only X-punches in the card. Any of the five

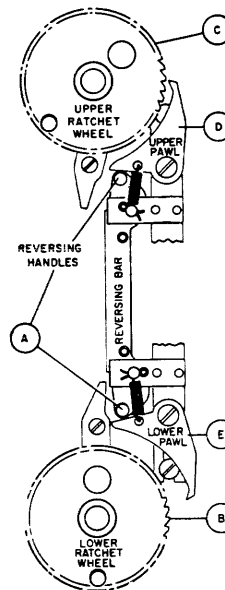
X-brushes may be positioned to read any card column. Two columns must separate adjacent brushes. If there is an X-punch in the card column being read by one of these brushes, an impulse will be available from the two common X-brush hubs on the control panel that corresponds to that particular X-brush (1, 2, 3, 4, or 5).

Each of the five X-brushes is distinguished by means of a jack-type control-panel wire that connects the brush to the X-brush terminal block, a small five-hub "control panel" located near the X-brush station. The hubs are numbered 1-5, and each of these is internally connected to the corresponding pair of common hubs on the control panel. For example, card-column 71 may be read by X-brush 2 by placing one of the X-brushes on column 71 and wiring it to hub 2 on the terminal block.

The control-panel X-brush hubs are normally wired to pick up selectors.

Ribbon

The ribbon is a little wider than the 7 ³/₈ inch width of a card, and moves vertically as each card is interpreted. It reverses its direction of movement automatically, and does not require operator attention until the printing on the cards becomes too light and a new ribbon is required. Figure 4 is a side-view schematic diagram of the ribbon mechanism, and outlines the procedure for changing a ribbon. It indicates what the operator will see when he opens the front door below the brush assembly (step 2 in the procedure).



548 RIBBON CHANGING PROCEDURE

1. UNLATCH AND RAISE BRUSH ASSEMBLY
2. OPEN FRONT DOOR EXPOSING RIBBON FEED MECHANISM.
3. PUSH EITHER REVERSING HANDLE "A" DOWN TO DISENGAGE LOWER PAWL "E". IF IMPOSSIBLE TO DISENGAGE LOWER PAWL "E" TURN LOWER RATCHET WHEEL "B" COUNTER-CLOCKWISE.
4. TURN UPPER RATCHET WHEEL "C" COUNTER-CLOCKWISE UNTIL RIBBON LEADER IS WOUND AROUND RIBBON.
5. PUSH EITHER REVERSING HANDLE "A" UP TO DISENGAGE UPPER PAWL "D".
6. TURN UPPER RATCHET WHEEL "C" COUNTER-CLOCKWISE UNTIL LEADER CLIP IS IN VIEW.
7. DISCONNECT LEADER CLIP.
8. REMOVE RIBBON BY PUSHING SPOOL TOWARDS REAR OF THE MACHINE.
9. INSTALL NEW RIBBON WITH NOTCHED END OF SPOOL TOWARD FRONT OF MACHINE WITH CONNECTING LOOP ON TOP.
10. ATTACH RIBBON LEADER CLIP TO RIBBON LOOP.
11. TURN BOTTOM RATCHET WHEEL "B" COUNTER-CLOCKWISE APPROXIMATELY TEN TURNS.
12. LOWER AND LATCH BRUSH ASSEMBLY. CLOSE COVERS.

Figure 4. Ribbon-changing Instructions

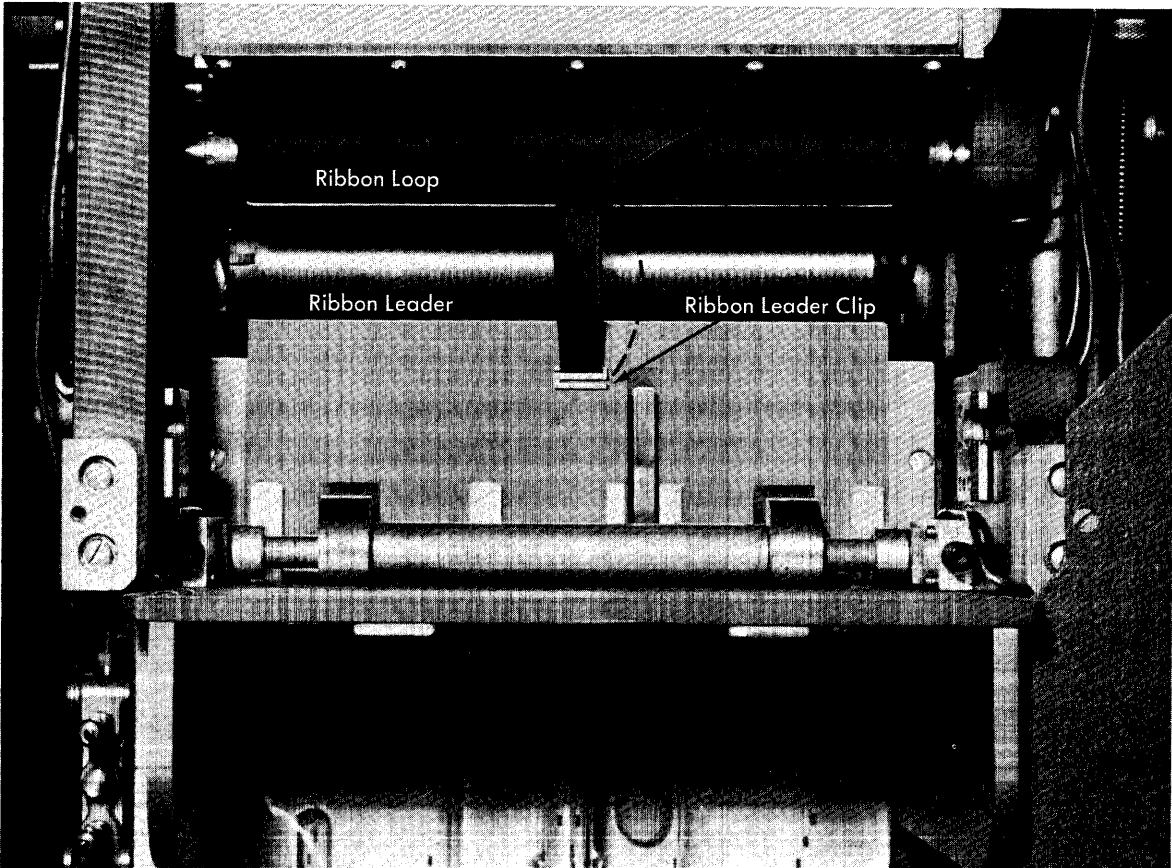


Figure 5. Ribbon Inserted

Figure 5 is a top view of the machine just after the new ribbon has been inserted (step 9). The ribbon leader is permanently attached to the lower ratchet wheel. Thus, step 11 will cause the ribbon loop to be drawn down to the lower ratchet wheel, and the ribbon is ready for use.

Typebars

The machine contains 60 typebars, each bar containing 39 positions: 10 numerical (0-9), 26 alphabetic (A-Z), and 3 special-character positions. The printing capacity is 60 characters in one line on a card. Each typebar has a corresponding print-entry hub on the control panel.

If 60 positions of interpreted information are sufficient, the printing may be accomplished in one run. If it is necessary to interpret more than 60 columns, the cards must be run through the machine a second time, using different control-panel wiring.

For printing in specific locations, exact typebar positions must be determined before wiring the control panel. The ratio that each column bears to each typebar is 60/80 or 3/4, because 60 typebar positions print horizontally in an area covered by 80 columns. Thus, typebar 3 prints over column 4; typebar 6 prints over column 8; typebar 45 prints over column 60, etc. (Figure 6).

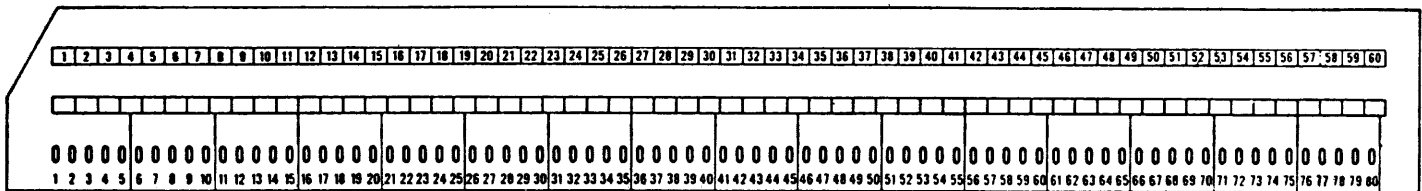


Figure 6. Interpreter Printing Positions

CONTROL-PANEL WIRING

THE ARRANGEMENT of printing on the card is determined by the wiring on the control panel. For example, if card column 5 is to be printed in print position 51, a wire would connect reading-brush hub 5 with print-entry hub 51. If columns 21 to 25 are to print in positions 1 to 5, reading-brush hub 21 would be wired to print-entry hub 1, reading-brush hub 22 would be wired to print-entry hub 2, etc.

The fields interpreted in Figure 1 and the positions in which they are to print are as follows:

<u>Field</u>	<u>Card Columns</u>	<u>Typebars</u>
Customer No.	39-43	1-5
Invoice No.	34-38	6-10
Entry date	1-4	11-14
Invoice amount	74-80	16-22
Customer name	8-29	37-58
Entry	6-7	59-60

Figure 7 shows the wiring to accomplish this interpretation. (Shaded areas represent optional features.)

Typebar Operation

Because cards are fed 12-edge first, zone punching (12, 11, 0) is read before digit punches (1-9). Each typebar will be positioned in one of four places, determined by whether there is a 12-, 11-, or 0-punch, or no zone, in the column wired to it on the control panel. As the card continues to move under the brushes to read the numerical punching, the typebar moves slowly downward until a punch is read in the card column. When this happens, the typebar stops moving; it is now positioned at the desired alpha-numerical character. After the card has been read, a horizontal pressure bar strikes at the rear of the typebars, driving the print heads forward to print the positioned characters. It is the vertical position of each typebar that has determined which character will print.

If a C (12 and 3) is punched in a column wired for interpretation, the 12 reads first and positions

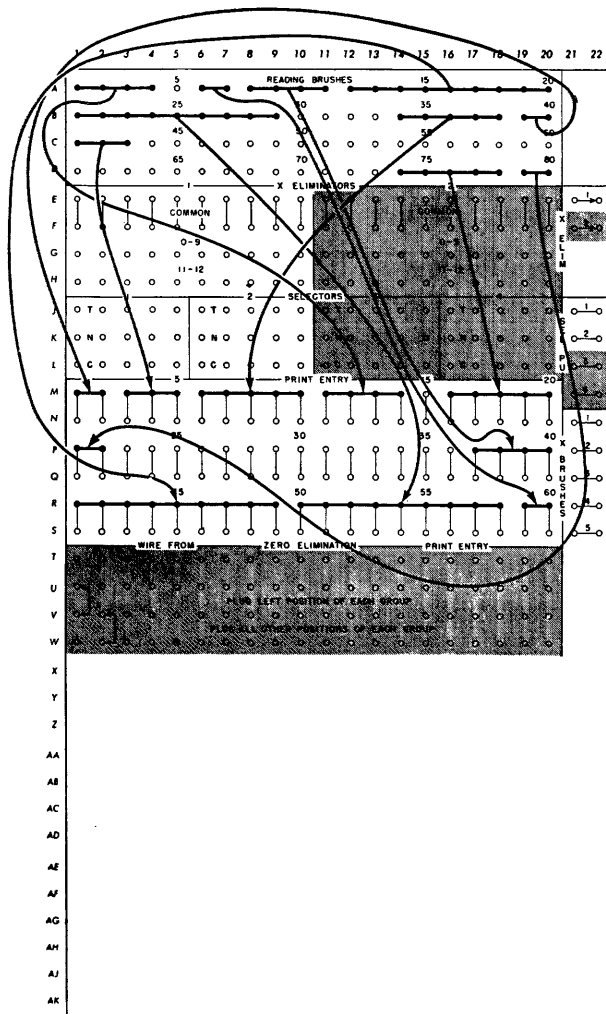


Figure 7. Normal Printing

the typebar to read the 12-zone characters A-I. As the card continues under the reading brushes, the typebar moves down through the 12-zone group until the brush reads the 3 from the card. This causes the typebar to stop with the character C in printing position.

If a numerical character, 5 for example, is punched, the bar does not position to the 12-, 11-, or 0-zone groups. It is therefore positioned to read through the numerical zone as the 1-9 punching positions of the card pass the brushes. As the 5-punch is read, the typebar is stopped with the 5 character in printing position.

Figure 8 illustrates the operation of the typebar. Three special characters may be printed; by the X-only, 12-only, and the 0-1 combination of punches.

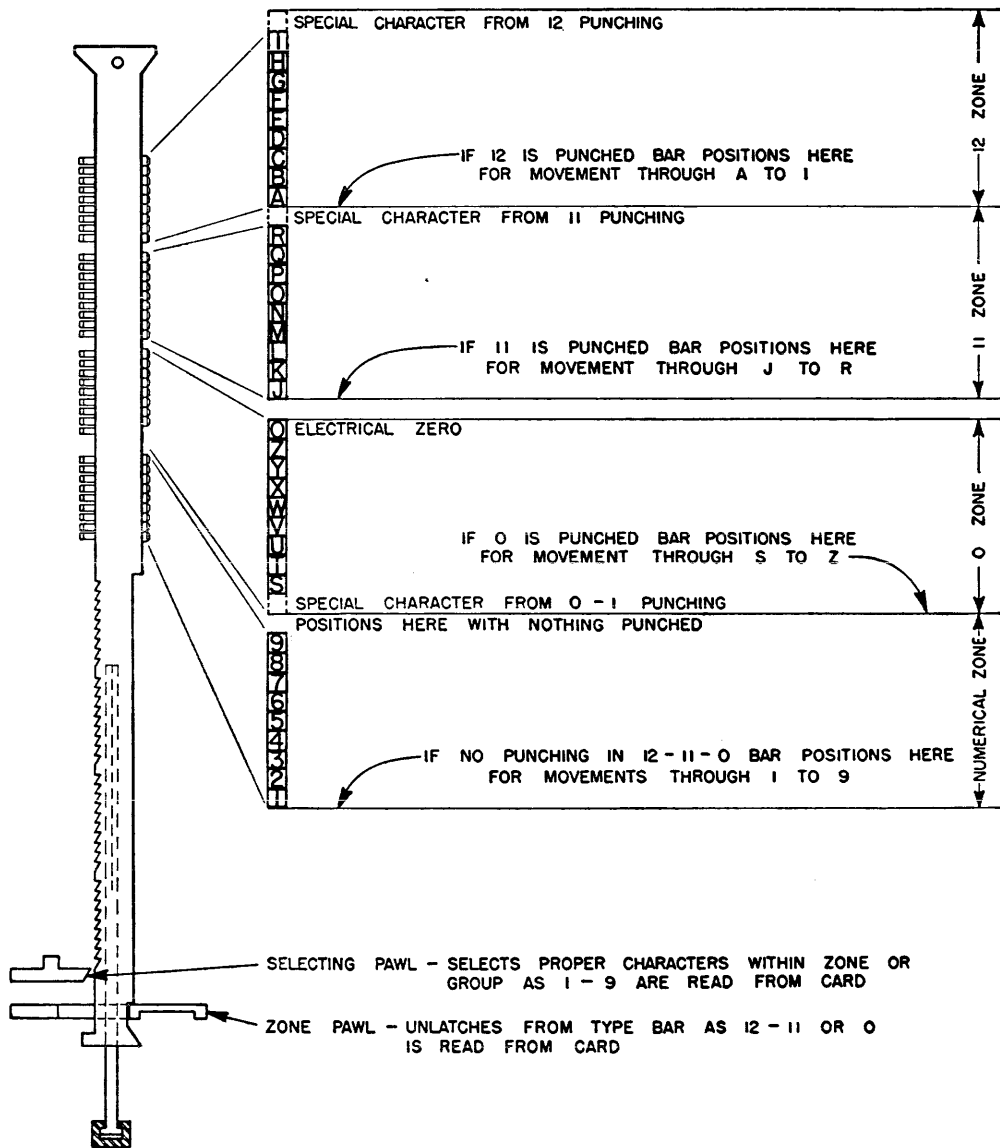


Figure 8. Typebar Schematic

X-Elimination

Some numerical fields may contain an X-punch over one of the positions (usually the units position) to indicate a negative amount. If wired directly to print entry, this X-punch will combine with the numerical punch to print an alphabetic character. The X-punch can be prevented from reaching the print-entry hub by wiring from the reading-brush hub to the common of the X-eliminator and out of the 0-9 hub to the typebar (Figure 9). This allows only the numerical impulse to actuate the typebar and prints a numerical character. The control-panel switch for the X-eliminator must be plugged on for this operation; if not, no impulse will reach the print-entry hub.

The X-eliminators split the card columns between 0 and 11 time. There is a hub for the 11-12 impulses, as well as for 0-9. This device is called a column-split

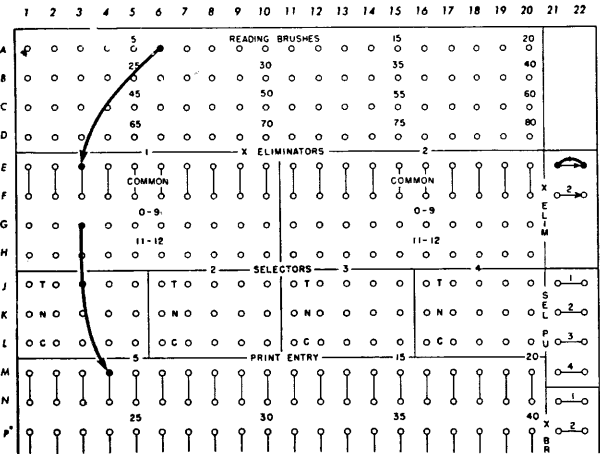


Figure 9. X-Eliminator Wiring

on other IBM machines (Figure 10). One group of ten X-eliminators is standard, and one group of ten is optional. Each group has its own control-panel switch.

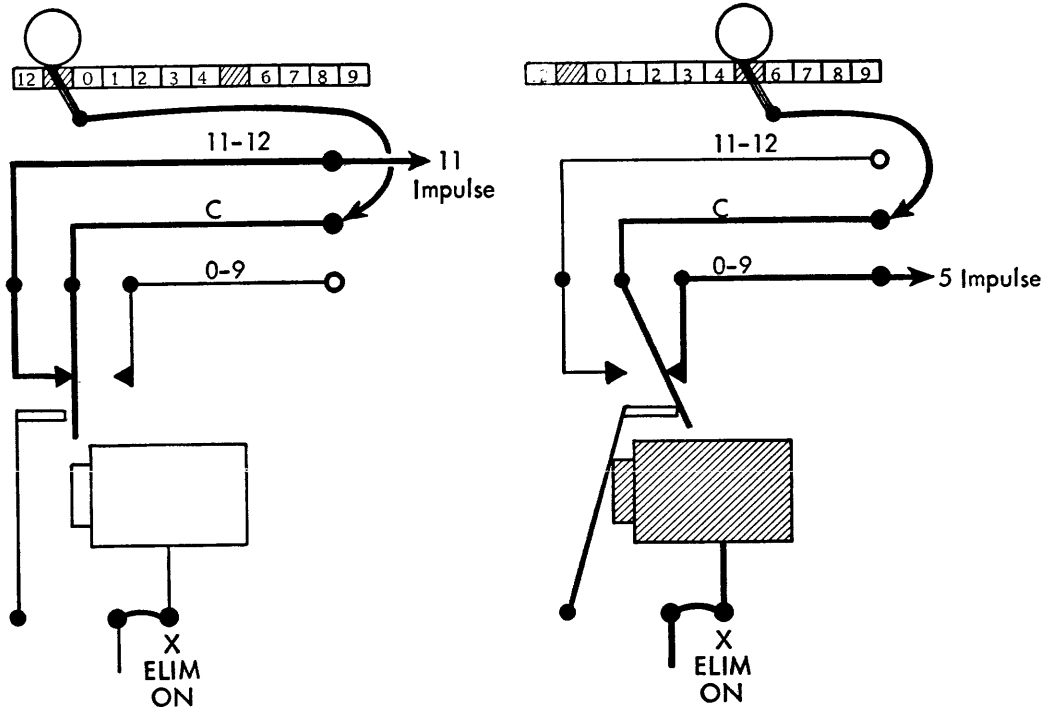


Figure 10. X-Eliminator Schematic

Selection

There are two kinds of selection, class selection and field selection. Each is accomplished by use of the control-panel selectors. Each selector has a set of five common hubs, five normal hubs, and five transferred hubs; and two common pickup hubs. Normally, there is an internal connection between each common hub and the normal hub directly above it. The pickup hubs are usually wired from the X-brush hubs. If an impulse is emitted by an X-brush hub, that is, if there is an X-punch in that column of the card, the internal connection will be broken. There will then be an internal connection between each common hub and the transferred hub directly above it (Figure 11). This connection will last for the duration of the card that contained the X-punch.

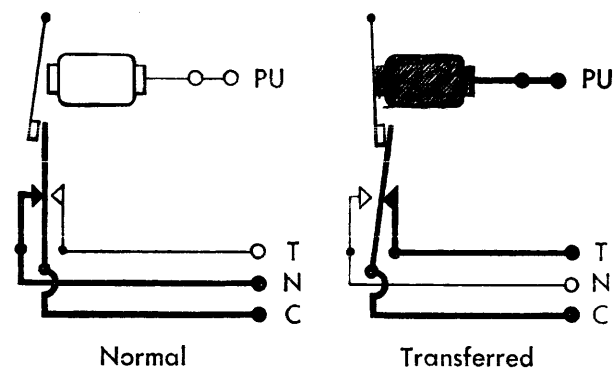


Figure 11. Selector Schematic

Two of the selectors are standard, and two are optional.

Class selection means that a field in a card may be printed in one of two places, determined by whether there is an X-punch in the card. An example of this is shown in Figure 12. Field A is read from the card and printed in position B when no X-21 cards are read, and in position C when X-21 cards are read. (Assume X-brush 2 to be on column 21.)

Field selection means that one or the other of two fields in a card will be printed, determined by whether or not there is an X-punch in the card. An example of this is shown in Figure 13. Field A is read and printed in position C if the card contains an X in

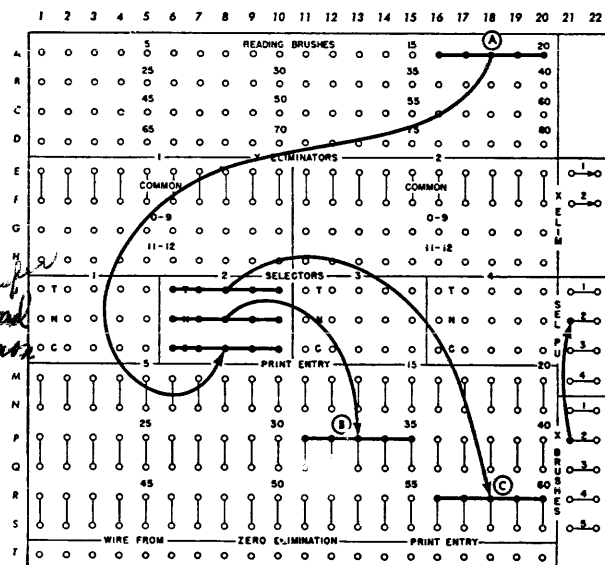


Figure 12. Class Selection

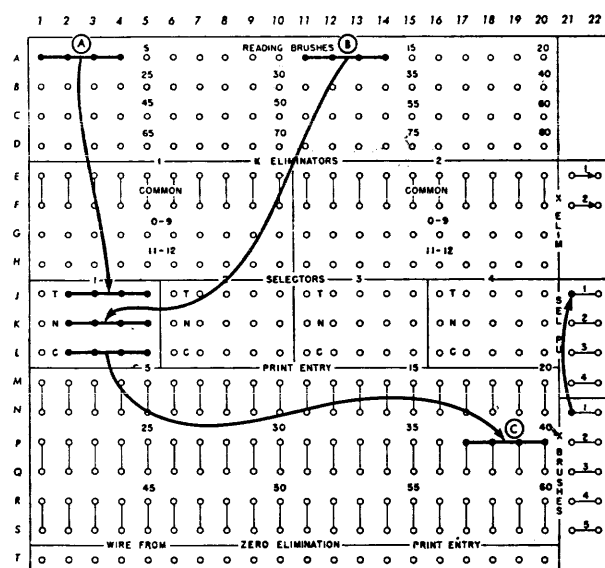


Figure 13. Field Selection

column 33. Field B is read and printed in position C for those cards that do not contain an X in column 33. (Assume X-brush 1 to be on column 33.)

Note that in class selection the impulses travel to the common hubs, and from the normal or transferred hubs to the typebars. In field selection, the impulses travel to the normal or transferred hubs, and from the common hubs to the typebars. In the 548 Interpreter, selector wiring for alphabetic data is the same as for numerical data.

Zero Printing

The 548 Interpreter prints zeros only when there are punches in the cards and the columns are properly wired to typebars. Zeros punched to the left of a significant number will print when they are wired to print-entry. Unpunched card columns are not interpreted.

Zero Elimination

Note that the invoice-amount field in Figure 1 has printed two unnecessary zeros in the high-order positions. If it could be printed as 41440 instead of 0041440, it would be easier to read. Printing of high-order insignificant zeros can be prevented by the use of the zero-elimination hubs, an optional feature, on the control panel.

The top row of this group is wired to the print-entry hubs of the field. High order to low order must be from left to right, just as it appears in print. Any group of these zero-elimination hubs may be used, but all of those used for one field must be adjacent. The other three rows are jack-plugged as follows: Below the hub wired to the high-order print-entry position, jack-plug the two upper hubs. Below the hubs wired to all other positions of the field in print entry, jack-plug the two lower hubs.

Zero suppression prevents the printing of zeros by emitting a 1 impulse to the print-entry hub if a 0

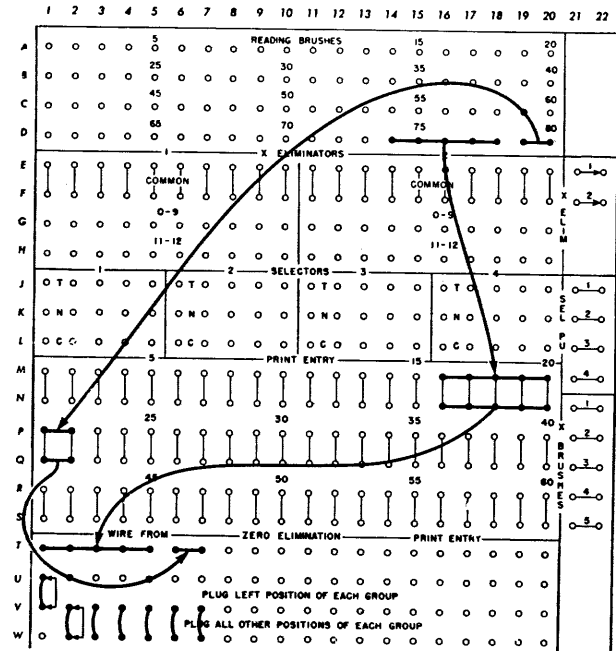


Figure 14. Zero Elimination

impulse has been received from the reading brushes by that hub. Therefore, the 0-1 positions of any typebars that may be zero-suppressed must be blank; they cannot contain special characters.

Figure 14 shows the zero-elimination wiring for the invoice-amount field in Figure 1.

552 Interpreter

THE IBM 552 is an earlier-model interpreter. It is different in appearance (Figure 15) and lacks some of the features of the 548, but its operation is much the same.

The control-panel functions of the two machines are the same. However, the 552 does not have X-brush hubs.

The lack of X-brushes in the 552 requires a different method of selecting alphabetic data. Because the control X is read from the reading brushes, it is too late to control the 12 and 11 zones of alphabetic characters, and those zones must be wired directly to print. For this reason, alphabetic field selection is not possible in the 552.

CONTROL-PANEL COMPARISON

	<i>Location of Hubs</i>	
	548	552
Reading brushes	A-D, 1-20	A-D, 1-20
X-eliminators	E-H, 1-20	E-H, 1-20
X-elimination switches	E-F, 21-22	U, 9-11
Selectors	J-L, 1-20	Q-S, 1-20
Selector pick-up	J-M, 21-22	T; 1-2, 19-20
Print entry/typebars	M-S, 1-20	J-P, 1-20
X-brush hubs	N-S, 21-22	-----
Zero elimination	T-W, 1-20	V-Y, 1-20

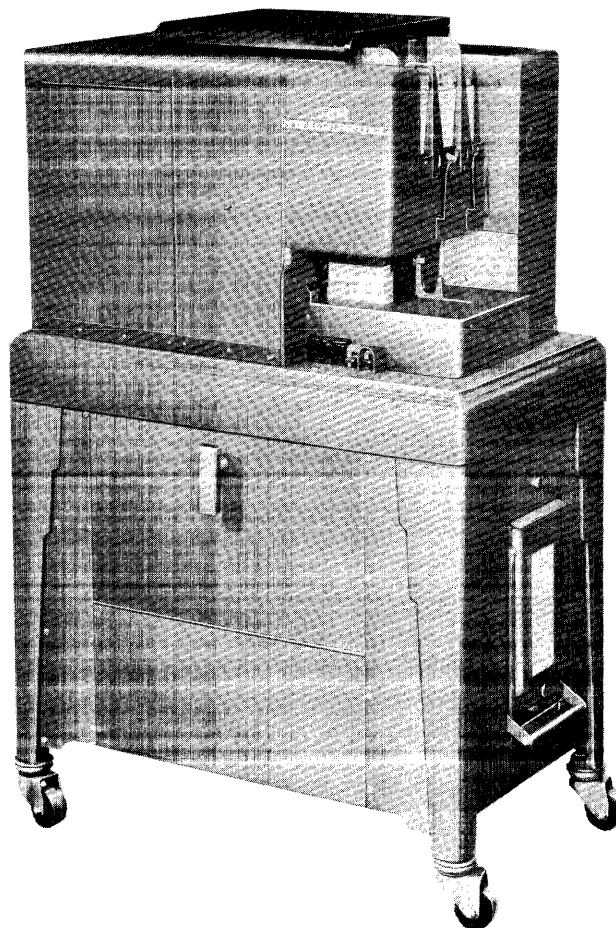


Figure 15. 552 Interpreter

Alphabetic class selection in the 552 Interpreter is performed through the use of a selector and the X-eliminator (Figure 16). (Shaded areas represent optional features.) When a No-X 80 card is interpreted, both the zone and numerical impulses pass through the normal side of the selector to the proper typebars. In the case of an X-80 card, the class selector is not actuated until after the 12 and 11 zone impulses have passed through the X-eliminator to the selected typebars. The 0-9 impulses of the X-80 card pass through the controlled (transferred) side of the selector to the selected typebars. The X-eliminator is wired on for this operation. If there are special characters actuated by a single 12 or 11 punch on typebars used to print the X card, they will be printed from these bars when the 12's or 11's are read from the No-X cards.

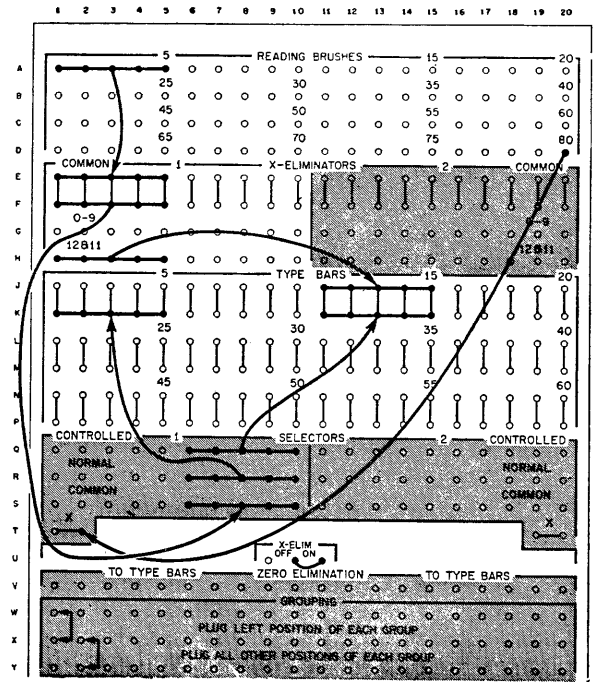


Figure 16. 552 Alphabetic Class Selection

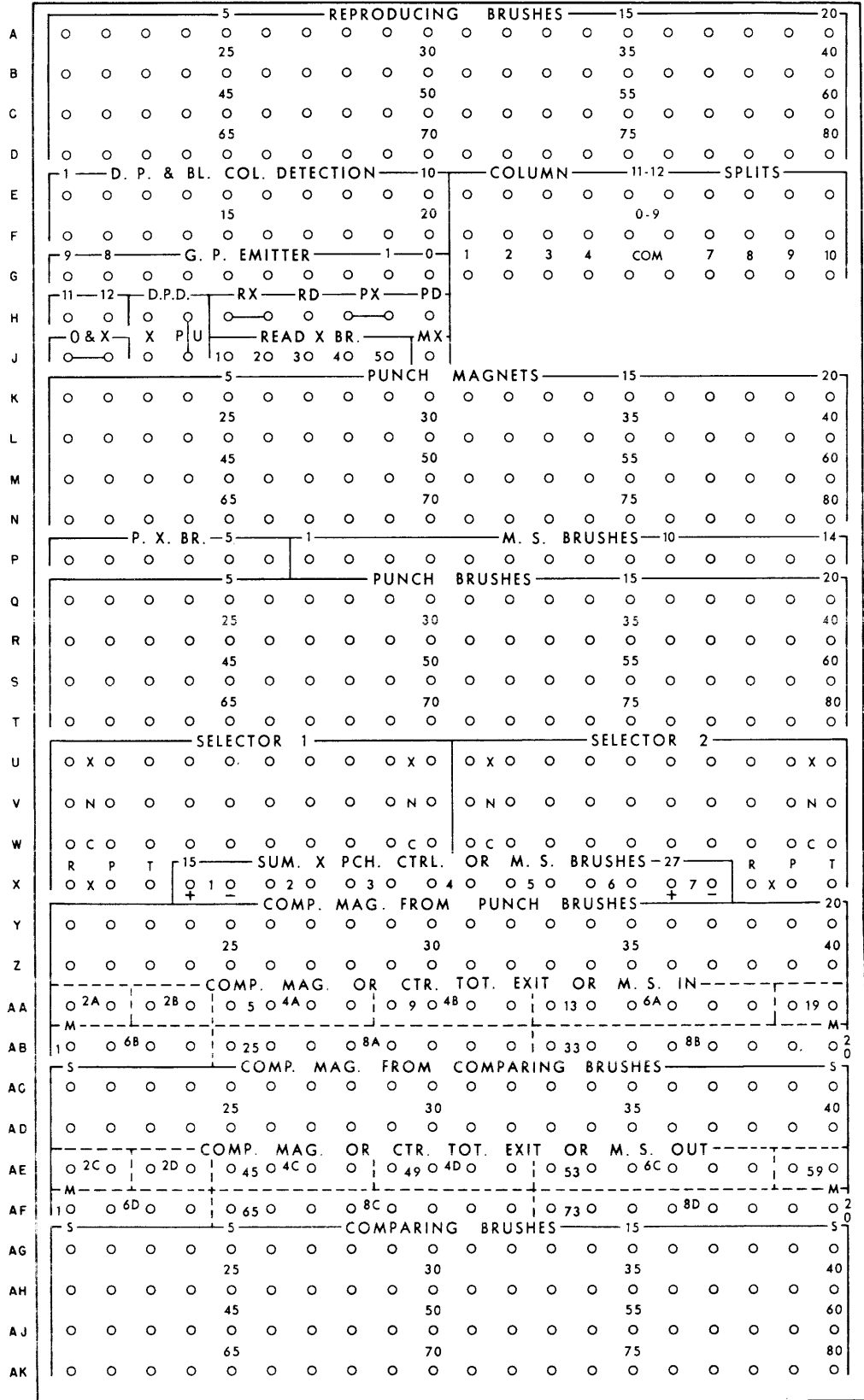
COMPARISON OF FEATURES

Features	548	552
Speed	60 cards per minute	Same
Capacity	Two 60-position lines	Same
Printing-Position knob	Located on back of machine. Turn right for upper, left for lower.	Same
Card feed	Face up, 12-edge first	Same
Control panel	22 hubs wide, 34 hubs long	20 hubs wide, 34 hubs long
	Direct-Contact wires	Jack-type wires
Selectors	Two 5-position selectors standard	None standard
	Two 5-position selectors optional	Two 10-position selectors optional
	Picked up from X-brushes	Picked up from reading brushes
X-eliminators	10 standard, 10 optional	Same
Zero elimination	20 positions optional	Same
Special characters	One for 11-punch, one for 12-punch, one for 0-1 combination. All are optional	Same

IBM 514 REPRODUCING PUNCH
CONTROL PANEL DIAGRAM

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

ELECTRO NO.	CARD NAME OR FUNCTION									
	X OR DIGIT									
	NOTES									
	BLANK COLUMN CHECK SWITCHES									
	REPRODUCE									
	SEL REPD AND GP COMP									
	CARD X PUNCHED									
	MARK SENSING									
	MASTER CARD PUNCHING									
	SWITCHES									



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