IBM

537 Card Read Punch

for use with

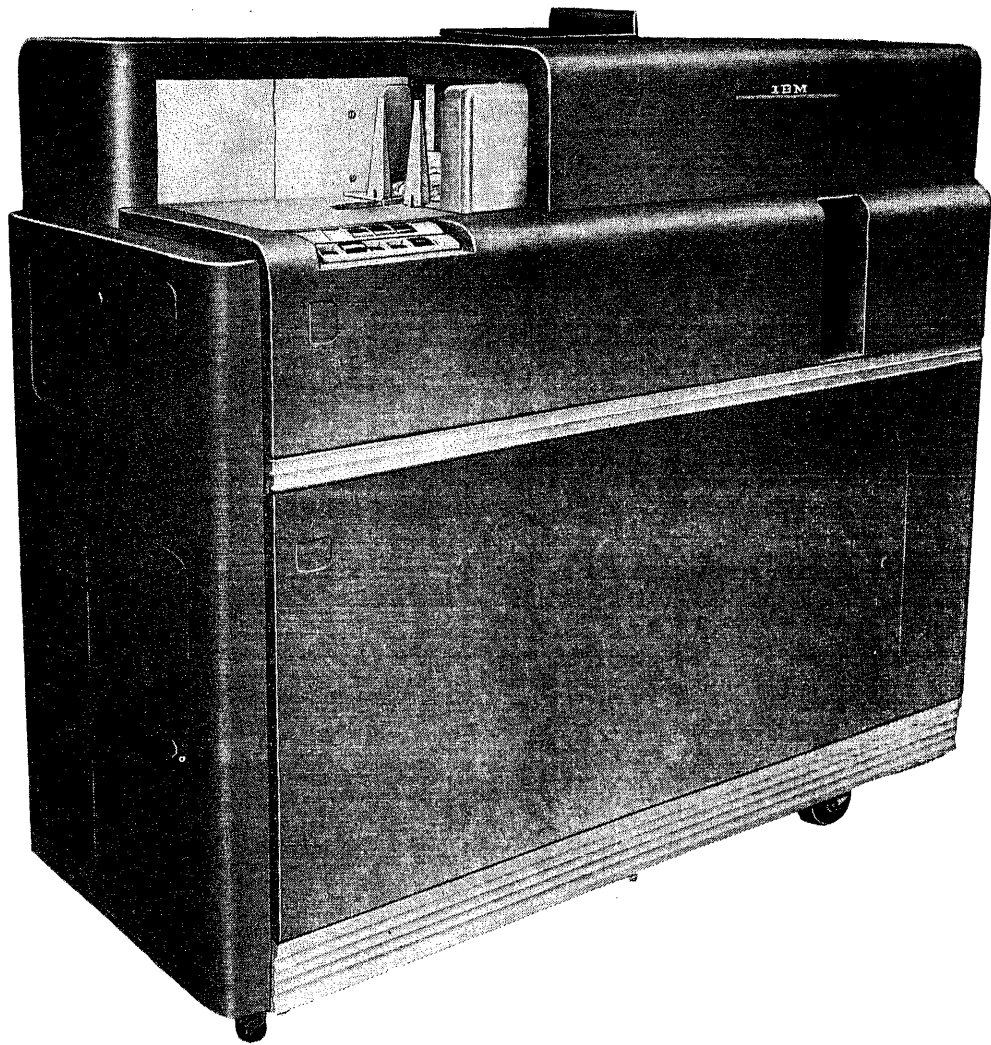**650** Data-Processing System

MANUAL OF OPERATION: PRELIMINARY EDITION

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537 CARD READ PUNCH

THE 537 Card Read Punch is a new component of the 650 Data-Processing System designed to permit punching of calculated results into IBM cards that contain the original source data. For example, in public utility billing applications the calculated results can be punched into the meter cards themselves rather than into newly-created cards as is necessary on the 533 Card Read Punch.

In commodity billing applications, the detail sales billing source cards can be punched with individual extensions calculated by the 650.

In payroll applications, job tickets can be extended individually; in inventory applications, issue cards can be priced and extended individually. The end result is analagous to that normally obtained with the 604, 607, or 608 with their associated read-punch unit components.

The 537 Card Read Punch can operate at a maximum rate of 155 cards per minute — 55 cards per minute faster than the punching speed of the 533. The rate will vary on some applications as a result of extensive 650 processing time, or where input-output units, such as the 407 Printer or the 533 Card Read Punch, are consulted during the course of the problem.

Aside from the increased punching speed, the 537 offers distinct savings in card cost in those applications where newly-created punched cards are not required.

Whether the 537 is used as an independent component of the 650 or in conjunction with the 407, 533, or both, it is obvious that the 537 provides another powerful tool in data-processing techniques.

DESCRIPTION OF THE 537 CARD READ PUNCH

FROM a functional standpoint, the 537 may be compared to the 521 component of the 604, the 529 component of the 607, or the 535 component of the 608. As shown in Figure 1, the machine has one hopper, a first and second reading station, a calculating station, a punch station, a punch reading station, and one stacker. Cards are placed in the hopper face down, 12-edge first. All or any part of the card can be read at first, second, or punch reading stations, and all or any part of the card can be punched at the punch station.
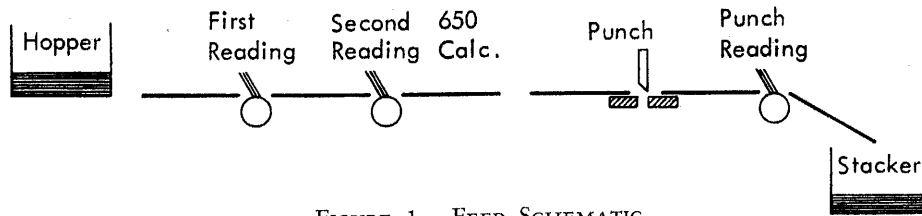
FIGURE 1. FEED SCHEMATIC

The first reading station is used to differentiate between cards on the basis of control punches, and to pick up selectors for subsequent operations. It is also used to read into *Alphabetic First Read Entry* hubs.

The second reading station is the station normally used for reading data to be processed by the 650.

The calculating station represents the position of the card while 650 processing for that card is being performed.

The punch station is used to punch information from 650 and also to gangpunch, or emit information into the card.

The punch reading station, immediately following the punch station, is normally used for double-punch and blank-column detection. Similar to the 514, 519, 521, 529, and the 535 in principle, it can also be used as a gangpunch reading station.

As may be seen in Figure 2, five separate and distinct cards can be operated upon during a given card cycle at the same time.

Card 1 is checked for double punches and blank columns as it passes the punch reading station.

Card 2 is punched from output synchronizer as it passes the punch station with results of calculations performed by the 650 on the previous cycle.

Card 3 is processed by the 650 as it passes the calculating station.

Card 4 is read into input synchronizer as it passes the second reading station.

Card 5 is read for control purposes as it passes the first reading station.

SPEED

IN simultaneous read and punch operations, the cards feed continuously at the rate of 155 cards per minute provided calculating time required for each card does not exceed approximately 300 milliseconds. In operations that require calculating and punching without reading, the cards feed at the rate of 155 cards per minute provided calculating time required for each card does not exceed approximately 335 milliseconds.

When calculating time exceeds these limits, an internal interlock interrupts card feeding until programming is completed. In such cases, approximate production speed may be estimated by use of the chart shown in Figure 3.
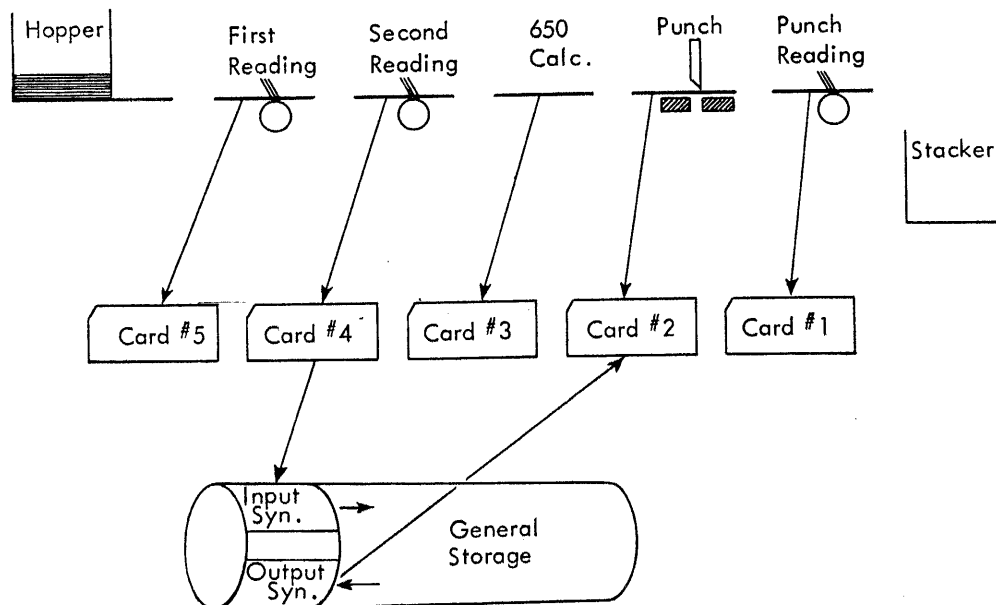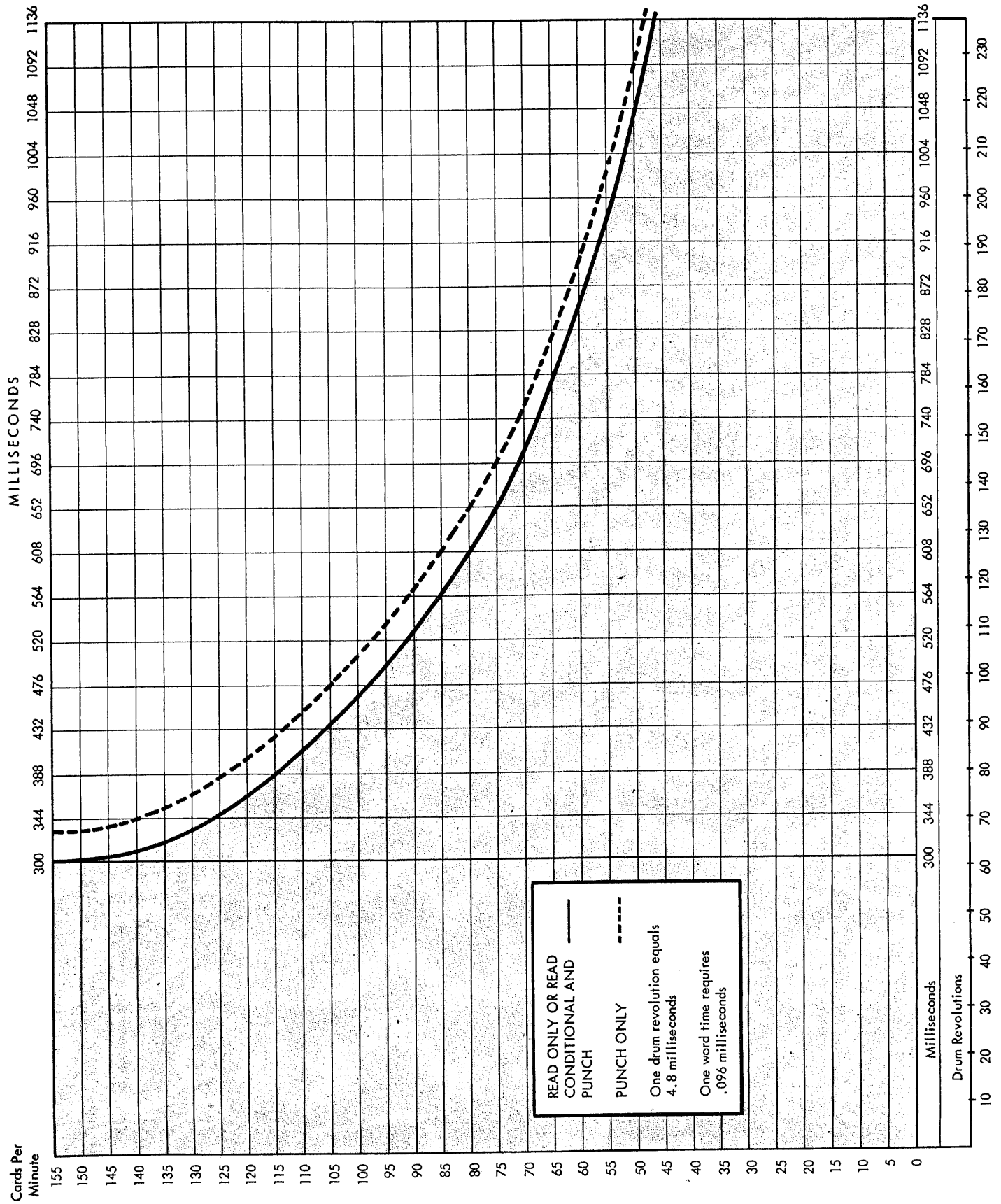

FIGURE 2

FIGURE 3. CHART FOR ESTIMATING PRODUCTION SPEED

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INPUT-OUTPUT SYNCHRONIZERS

THREE unaddressable areas of the drum are reserved as input-output synchronizers as described in the *650 Manual of Additional Features*, Form 22-6265-1. Synchronizer 1 is standard; synchronizers 2 and 3 are optional.

Because there is no permanent connection between a 650 drum input-output synchronizer and an input-output unit, each input-output unit is equipped with a cable which can be connected by the operator to any one of the three synchronizers. Thus, it is possible, for example, to connect a 537 to synchronizer 1, a 533 to synchronizer 2, and a 407 Printer to synchronizer 3.

Each synchronizer is divided into two sections: one section provides for 10-word input; the other provides a 10-word output. Three operation codes are assigned to each synchronizer to provide a flexible means of controlling each of the input-output units connected to that synchronizer. The operation codes are as follows:

OP CODES	ABBREV.	DESCRIPTION	
70	RD1	Read	
71	WR1	Write (Punch or Print)	Input-Output Synchronizer 1
72	RC1	Read Conditional	
73	RD2	Read	
74	WR2	Write (Punch or Print)	Input-Output Synchronizer 2
75	RC2	Read Conditional	
76	RD3	Read	
77	WR3	Write (Punch or Print)	Input-Output Synchronizer 3
78	RC3	Read Conditional	

The Read and Write operation codes are self-explanatory. When a 537 is connected to a synchronizer in a simultaneous read and punch operation, a Read Conditional Code (72, 75, or 78) must precede a Write operation code (71, 74, or 77). Maximum operating speed is obtained, however, when the Read Conditional operation is immediately followed by a Write operation.

The Read Conditional codes do not by themselves cause a card feed or card read operation, but merely transfer the 10 words in input synchronizer to the general storage band specified by the D-address of the instruction. The actual card feeding is caused by a subsequent Write operation code during which time one card is punched from output synchronizer while another is read into input synchronizer that has previously been conditioned (erased) by a Read Conditional code.

Read Conditional codes are not used in programs calling for reading and calculating without punching, or calculating and punching without reading. In the former, card feeding is controlled by operation codes 70, 73, or 76; in the latter, card feeding is controlled by operation codes 71, 74, or 77.

OPERATING KEYS AND SIGNAL LIGHTS
(Figure 4)

Start Key

Depression of this key will start card feeding. When used to run out the last two cards in the feed, no calculating will take place.

Stop Key

This key is depressed to stop card feeding.

End-of-File Key

This key is depressed to run out the last two cards in the machine if those cards are to be calculated. The start key is used if the last two cards are not to be calculated.

Reset Key

When the double-punch blank-column detection light goes on, the reset key must be depressed before the machine can be restarted.

Fuse Light

This light turns on whenever a fuse blows.

Ready Light

This light when on indicates that the machine is ready for operation. It turns on if cards are not feeding, no fuses are blown, the die is in place, no covers are off, and the input power supply is available.

End-of-File Light

This light turns on whenever the end-of-file key is depressed.

DPBC Detect Light

This light turns on whenever a double punch or a blank column is detected by control panel wiring. The light turns off when the reset key is depressed.

Card Advance Light

This light turns on whenever a card fails to feed.

READY		END OF FILE	DPBC DETECT	CARD ADVANCE	

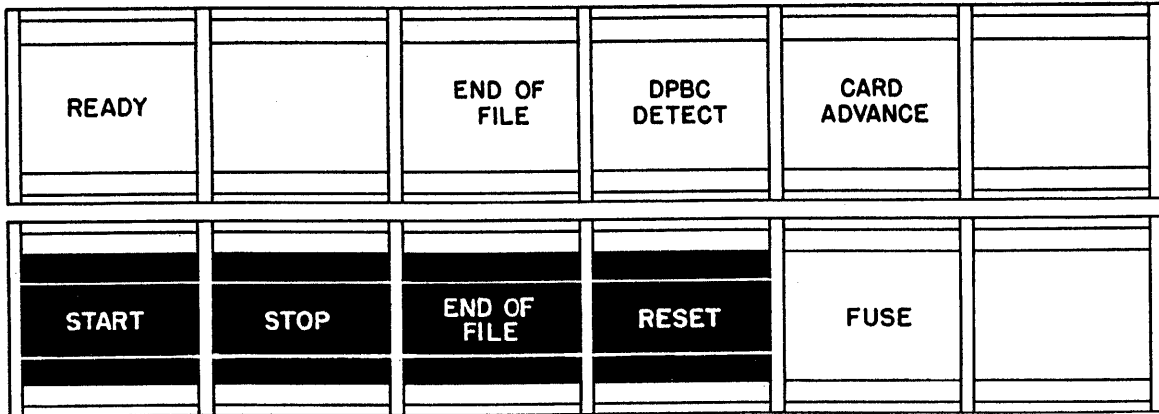| START	STOP	END OF FILE	RESET	FUSE	

FIGURE 4. OPERATING KEYS AND SIGNAL LIGHTS

537 CONTROL PANEL (Figure 5)

THE 537 control panel is the same as the 533 control panel with no change in layout or terminology. For 537 "punch only" operation, an additional control panel switch (A, 21-22) is provided to advance the first card from the hopper to the punch station on the run-in. This switch makes Read and Read Conditional codes inoperative.

Wiring principles are the same for either machine with the following exceptions:

On the 537, PILOT and CO-SELECTOR HOLDS are inactive.

Hubs labelled READ CARD A, READ CARD B, and READ CARD C on the 533 control panel represent the second reading station on the 537.

Hubs labelled PUNCH CARD A, PUNCH CARD B, and PUNCH CARD C on the 533 control panel represent the punch station on the 537.

READ and PUNCH COLUMN SPLITS, READ and PUNCH DIGIT SELECTORS, and 12, X, 0, 8, and 9 READ IMPULSES may be used interchangeably on the 537.

The four sets of PUNCH DELAY IN and OUT hubs on the 533 may be used on the 537 as follows: PUNCH DELAY 1 and 2 for two-cycle delay; PUNCH DELAY 3 and 4 for three-cycle delay. They may also be used to delay signals entered from read functions.

PUNCH A, PUNCH B (C-D, 43-44) may be impulsed from FIRST or SECOND READING stations through delay hubs, as well as from CONTROL INFORMATION hubs for selection of punching.

PUNCH CODE SELECTORS may be picked up from FIRST or SECOND READING stations through delay hubs, as well as from CONTROL INFORMATION hubs for selection of punching.

READ CODE SELECTORS may be impulsed from PUNCH READING station in the same manner as done from first or second reading stations if RSO switch is wired on.
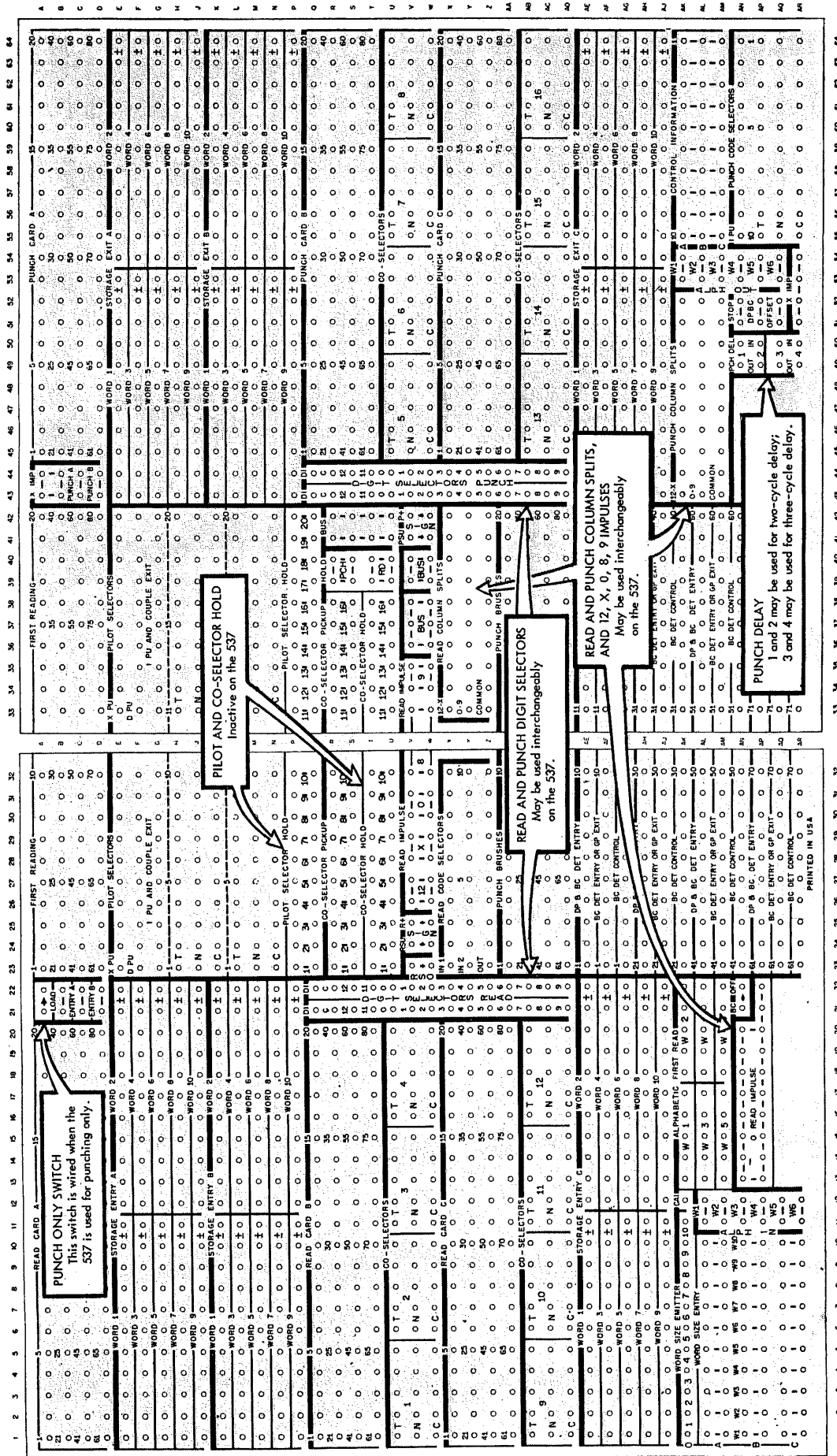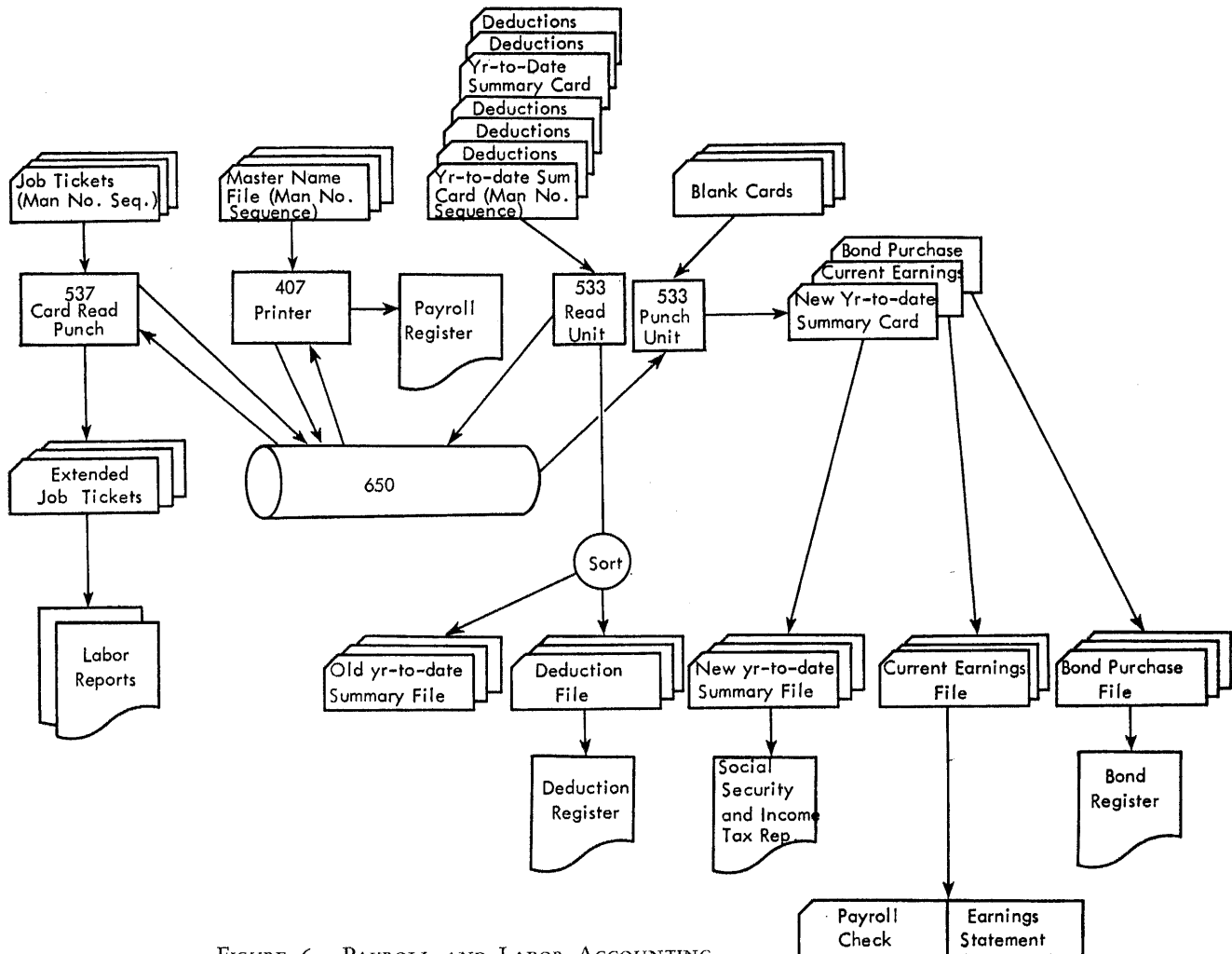
FIGURE 5. CONTROL PANEL

FIGURE 6. PAYROLL AND LABOR ACCOUNTING

APPLICATIONS

THIS section suggests in flow chart form five possible applications of the 537 in conjunction with the 533 Card Read Punch and the 407 Printer.

In Payroll and Labor Accounting (Figure 6), the 537 is used to punch earnings in individual job tickets.

In Labor Distribution (Figure 7), the 537 is used as a punch only, to create new updated labor distribution summary cards.

In Billing and Accounts Receivable (Figure 8), the 537 is used to punch cost and sales amounts in individual commodity billing cards.

In Inventory Control and Material Accounting (Figure 9), the 537 is used to punch new unit cost and total cost in each issue card.

In Customer Billing for Public Utilities (Figure 10), the 537 is used to punch gross and net billing amounts and total arrears in each meter reading card.

The flow charts are self-explanatory and in each case the functions performed by the 650 Data-Processing System are briefly described.

Payroll and Labor Accounting (Figure 6)

The functions of the 650 Data-Processing System are:

1. Multiply hours by rate and punch earnings into individual job tickets.

2. For each employee, calculate current earnings, FICA, withholding tax, and new year-to-date figures; determine defense bond purchases; crossfoot gross to net.

3. For each employee, print payroll information on payroll register. (Name for payroll register held in 407 storage.)

4. For each employee, punch new year-to-date summary card, current earnings card, and bond purchase card.
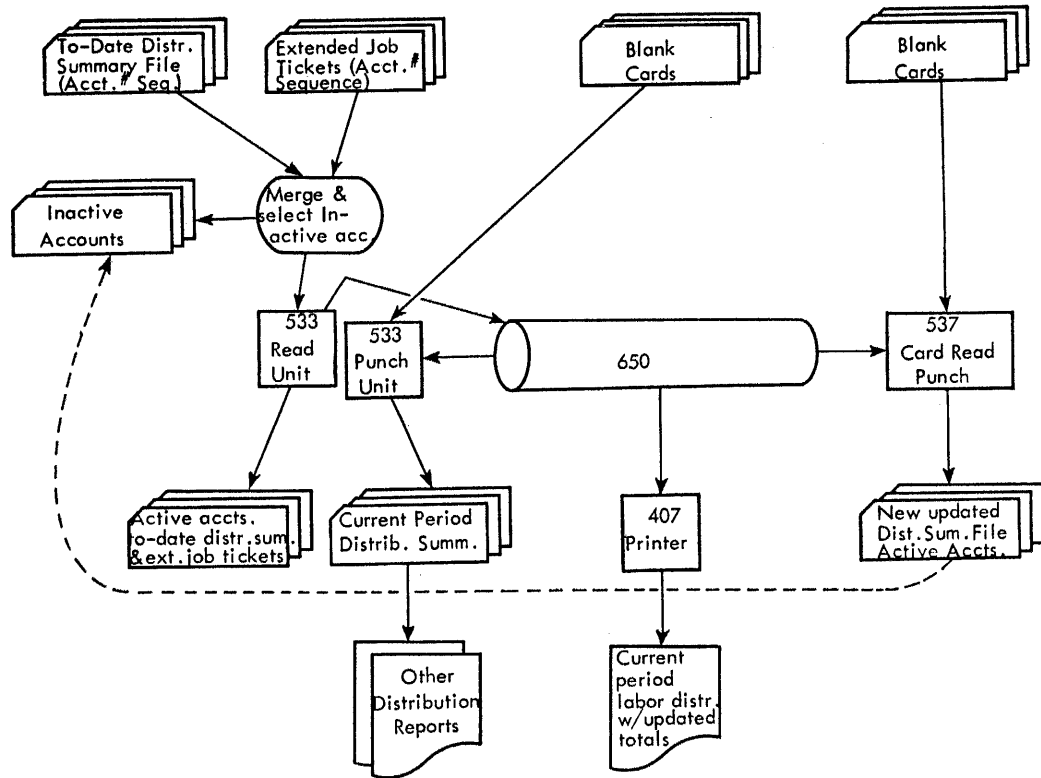
FIGURE 7. LABOR DISTRIBUTION

Labor Distribution (Figure 7)

The functions of the 650 Data-Processing System are:

1. Summarize job tickets by account number and punch current period distribution summary card for each account number.

2. For each account number, add current period distribution summary to previous to-date distribution summary.

3. For each account number, punch new updated distribution summary card.

4. Print a current labor distribution report by account number with new updated totals.
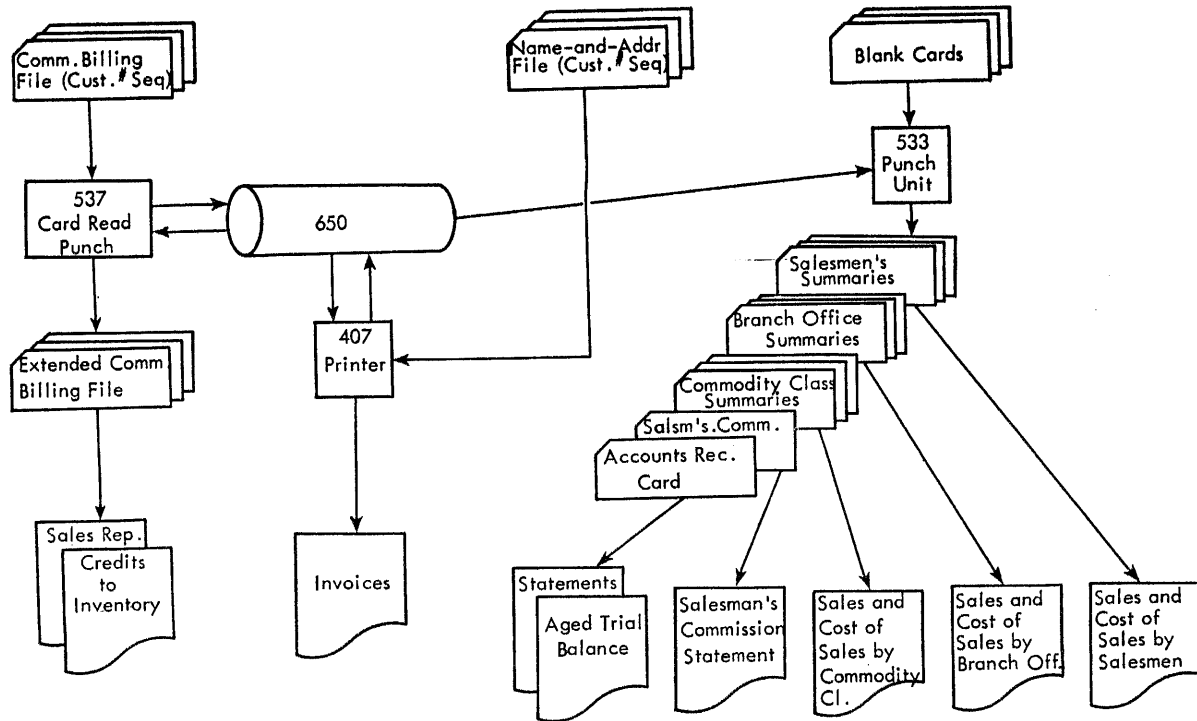
FIGURE 8. BILLING AND ACCOUNTS RECEIVABLE

Billing and Accounts Receivable (Figure 8)

The functions of the 650 Data-Processing System are:

1. Multiply quantity by unit price and unit cost and punch sales amount and cost amount in each commodity billing card.

2. Accumulate invoice and control totals; calculate freight, discount and net invoice amount.

3. Print invoices.

4. For each invoice, punch accounts receivable card and salesman's commission card.

5. Distribute sales amount and cost amount by commodity class, branch office, and salesmen; load results on drum.

6. At the end of the billing operation, punch out one summary card for each commodity class, one for each branch office, and one for each salesman.
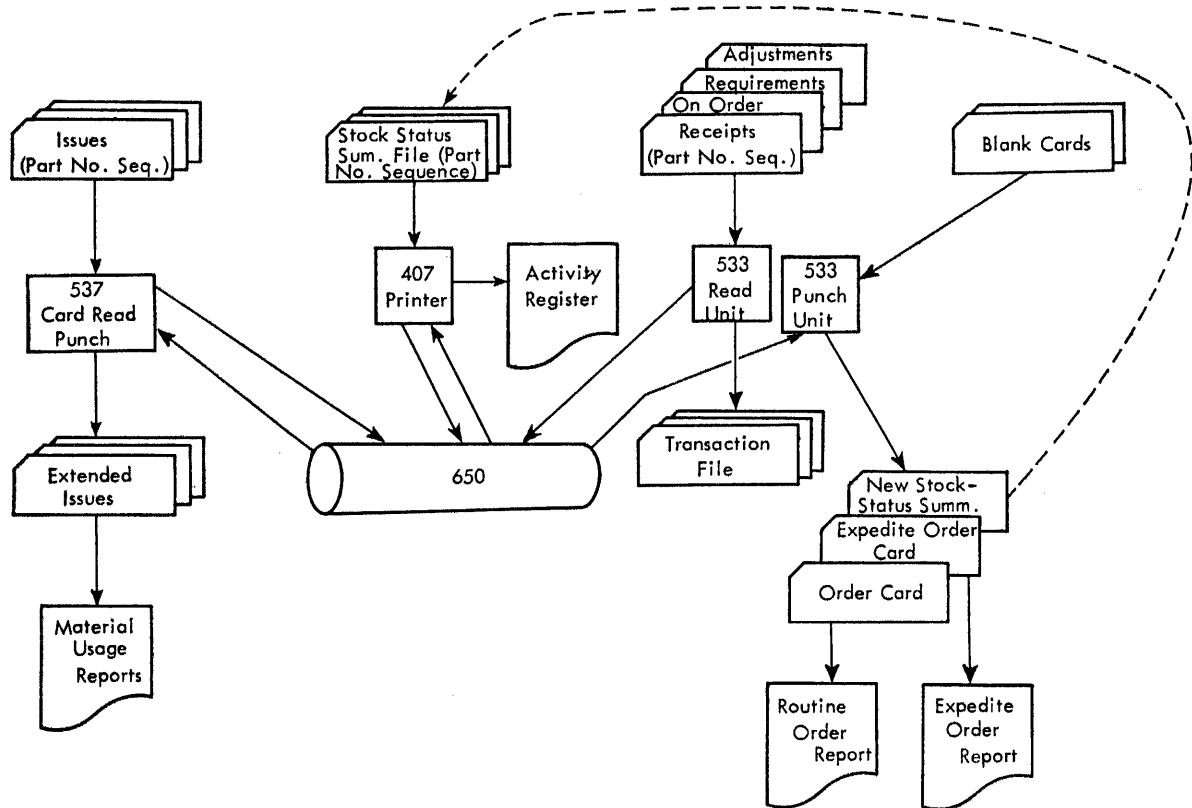
FIGURE 9.   INVENTORY CONTROL AND MATERIAL ACCOUNTING

Inventory Control and Material Accounting (Figure 9)

The functions of the 650 Data-Processing System are:

1. For each active stock item, update inventory values by receipts and determine new unit cost.

2. Multiply quantities on each issue card by unit cost and punch extensions in issue cards; update stock status.

3. Determine order and expedite conditions and punch signal card.

4. For each active stock item, punch new stock status summary.

5. Print register for active items only showing opening balance, receipts, issues, adjustments, on hand, requirements, and available balances.
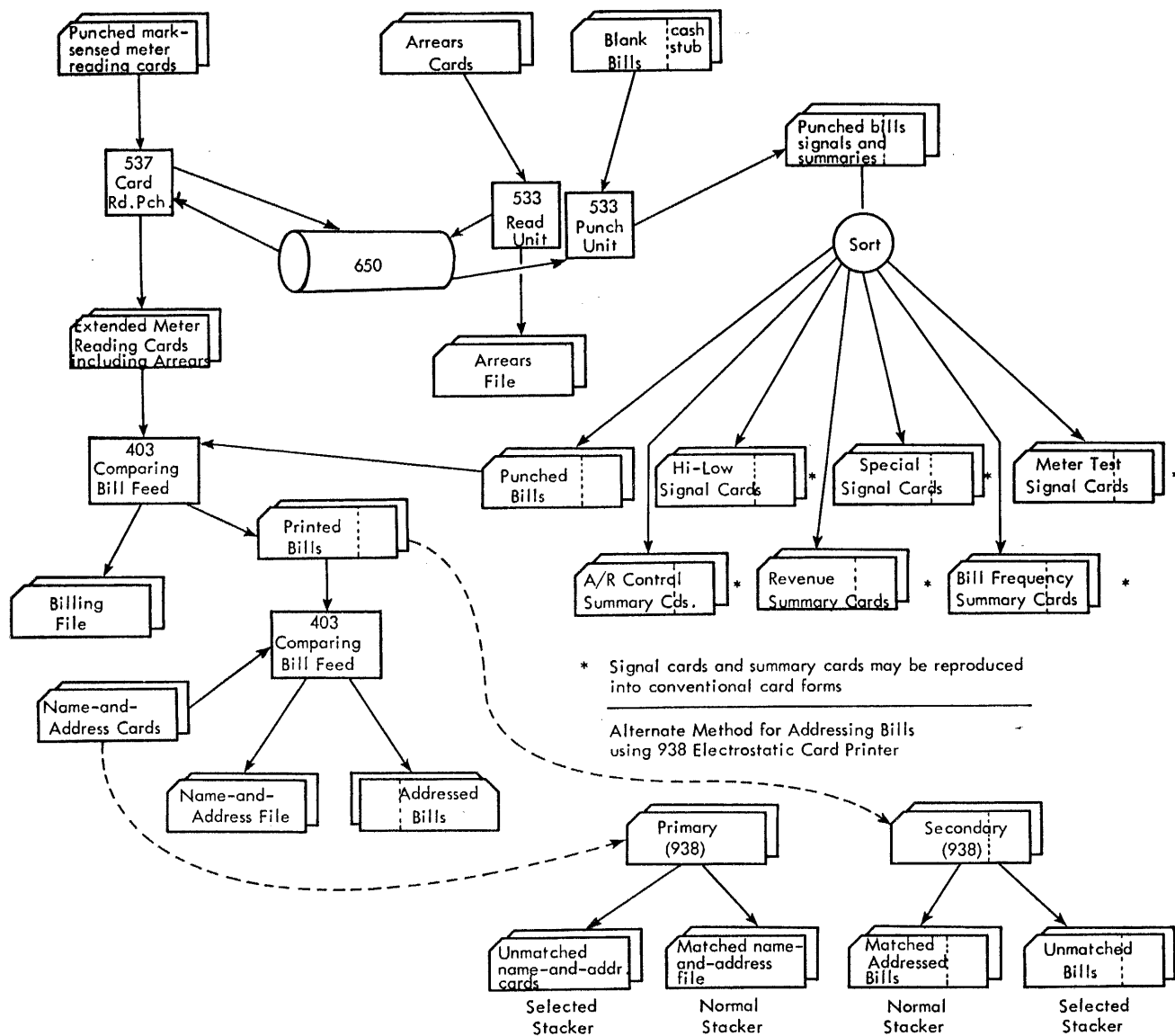
FIGURE 10. CUSTOMER BILLING FOR PUBLIC UTILITIES

Customer Billing for Public Utilities (Figure 10)

The functions of the 650 Data-Processing System are:

1. Subtract previous from present reading and multiply units used by rate to calculate gross and net billing amounts.

2. Summarize arrears for each account number and punch gross, net and arrears in meter reading cards.

3. Punch account number, gross and net amounts in cash stub portion of IBM card bill.

4. Punch signal cards for High-Low Usage, Special, and Meter Test Conditions.

5. Summarize billing amounts for accounts receivable control, revenue statistics, and bill frequency analysis and punch summary cards at the end of the operation.

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