

**Basic Applications—System/360 Model 20**

**IBM**

**Data Processing Application**

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## FOREWORD

The purpose of this manual is to describe the IBM System/360, Model 20, and show how it may be used to process six basic applications: billing, accounts receivable, sales analysis, inventory control, accounts payable, and payroll.

Since the Model 20 is available with many different combinations of input and output units, there are many different ways to solve the same problem. This manual illustrates various approaches to applications with various configurations of the Model 20 and shows techniques of using it. In many cases the Model 20 technique is compared with the standard punched card method to

show differences in approach to the same problem.

The final solution of any application depends upon the needs of the individual user. Selection of a particular configuration of the Model 20 depends upon meeting the needs of all applications within a user's installation. Because many of the basic applications illustrated are interrelated, their relationships must be examined in putting together a complete system. For example, the output of the billing application becomes input to sales analysis, accounts receivable and inventory control. In considering one application the others must also be considered.

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## SYSTEM/360, MODEL 20

The System/360, Model 20, Card Processing System offers the advantages of stored programming to the user who is ready to change from a manual or conventional punched card system to a more powerful and flexible solution to his data processing problems. The System/360, Model 20, handles card processing requirements with a new degree of sophistication. As a new member of the IBM System/360 family, it combines new technologies with a variety of input and output devices at lower costs to make a powerful, inexpensive data processing system.

The components of the system are:

- 2020 Processing Unit
- 2560 Multi-Function Card Machine
- 2501 Card Reader, Model A1 or A2
- 2520 Card Punch, Model A2 or A3
- 2520 Card Read Punch, Model A1
- 1442 Card Punch, Model 5
- 2203 Printer, Model A1
- 1403 Printer, Model 2 or 7
- Communications Adapter

### 2020 PROCESSING UNIT

The System/360, Model 20, Card Processing System is controlled by the 2020 Processing Unit, which uses magnetic core storage to store both instructions and data. The processing unit has been designed to permit overlapped or "simultaneous" combinations of functions such as card reading, card punching, line printing, and processing of data. The console contains the necessary switches and indicators to operate and control the system. Additional switches and indicators are located on the various input/output units included in the system.

The processing unit is available in the following models:

- Model B--4,096 core storage positions
- Model C--8,192 core storage positions
- Model D--16,384 core storage positions

### 2560 MULTI-FUNCTION CARD MACHINE

The Multi-Function Card Machine (or MFCM) permits an unprecedented degree of card handling on a single pass through the system. This versatile card-handling input/output unit for the system is equipped with two hoppers and five stackers. An optional printing feature fulfills card printing requirements in a range from simple interpreting to preparation of a six-line card document. The machine has the functional flexibility to read, punch and print cards from either or both hoppers and to direct any card to any of the stackers, thus permitting card collating or separating. The MFCM reads 500 cards per minute, punches 160 columns per second, and prints on cards at the rate of 140 character columns per second.

Cards are fed into the machine on a parallel basis. Each feed has its own path through the reading station, which reads the cards serially, column by column. The card paths merge before a single punching station. Cards are punched column by column, and punching can be terminated at any column and the card ejected from the punch station.

The optional card printing feature may be specified for two, four, or six lines of printing. Printing is accomplished serially, character by character, as the card moves through the print station. The speed of operation is the same regardless of the number of print heads in operation. The print spacing is ten characters per inch and as many as 64 characters in length per line. The print heads can be adjusted by the operator to print on any of 25 lines on the card.

The five stackers of the MFCM are standard. A card, after ejection from the print station, continues its motion and then enters the radial stackers. Any card can be directed to any stacker regardless of the hopper from which it came, thus enabling collating and/or separating.

### 2501 CARD READER

The 2501 Card Reader is a low-cost, compact card-reading unit which operates at a speed of either 600 cards per minute (Model A1) or 1,000 cards per minute (Model A2).

### 2520 CARD PUNCH AND 2520 CARD READ PUNCH

The 2520 satisfies the requirement for high-volume punched output. As a punching unit, it is offered in two speeds: 500 cards per minute (Model A2) and 300 cards per minute (Model A3). If reading and punching in the same card are required, the Model A1 Card Read Punch is available, which operates at a speed of 500 cards per minute for both reading and punching functions.

### 1442 CARD PUNCH, MODEL 5

The 1442, Model 5, provides a low-cost punched output. Cards are fed from the card hopper through a serial punch station to a stacker. Punching speed depends upon the last column punched and ranges from 91 cpm, when all 80 columns are punched to 360 cpm when only the first column is punched.

### 2203 PRINTER, MODEL A1

The 2203 Printer employs a single typebar which moves in a horizontal plane. Typebars may contain

a 13-character set, 39-character set, 52-character set or 63-character set. They may be changed by the operator to meet printing needs. The standard 2203 has a print span of 120 positions with 24 additional positions optional.

Lines-per-minute output varies with the number of characters contained in the typebar:

<u>Character Set</u>	<u>Model A1</u>
13	750 lpm
39	425 lpm
52	350 lpm
63	300 lpm

Forms movement is directed by a paper tape-controlled carriage in conjunction with the program. As an optional feature, a dual-feed carriage is available.

#### 1403 PRINTER, MODEL 2 or 7

The 1403 Printer provides high-speed printing for the System/360, Model 20. The Model 2 has a rated speed of 600 lines per minute with a print span of 132 characters. It utilizes a 48-character set and a dual-speed tape-controlled carriage.

The Model 7 has a rated speed of 600 lines per minute with a print span of 120 characters. It utilizes a 48-character set and a single-speed tape-controlled carriage.

#### COMMUNICATIONS ADAPTER

As an optional feature, a communications adapter can be provided. This allows communications via common-carrier lines with single terminals or systems.

The primary application of this feature is to allow the Model 20 system to be employed as a remote processing terminal in various branches of larger companies. Operation of the communications adapter can be overlapped with other system functions such as printing and card punching. The device is housed within the processing unit.

#### SYSTEM CONFIGURATIONS

A substantial number of case studies reveal that there are two basic System/360, Model 20 configurations with minor variations in each -- Multifunction Operation and Simulated Accounting Machine/Calculator Operation.

#### Multifunction Operation

This configuration consists of the 2020 Processing Unit, the MFCM, and a printer. A 2501 Card Reader can be added. This system can perform the functions and applications of a complete punched card equipment installation, with only keypunches, verifiers and sorters required additionally.

One major advantage of the multifunction system approach relates to the handling of master and balance files. With the two feeds of the MFCM, master files need not be separated to process affected records. The complete master file may be placed in one feed of the MFCM, with transaction cards placed in the other. The master file is passed until an affected master record is located. Data from the master file record is used as desired and then the file is searched for the next affected record. The sequence of the master file is not disturbed. Considerable time is saved as separate collating, merging, gang punching and interpreting steps are eliminated.

With the addition of a 2501 Card Reader, the entire file of balance cards is passed against transaction cards until an affected balance card is located. After updating the record, a new balance card is punched and inserted in the file in sequence by the MFCM. The old balance card is selected into a separate pocket. Thus the file is updated with only one processing. Machine and card handling time are thereby greatly reduced.

The multifunction approach provides a substantial improvement in handling not only present punched card applications but also new applications not feasible with present equipment.

#### Simulated Accounting Machine/Calculator Operation

With the appropriate combinations of the 2501 Card Reader and 2520 Card Read Punch or Card Punch, the Model 20 is used in a manner similar to combined accounting machine and calculator operation. The Model 20 handles high-volume jobs, while peripheral runs such as sorting, collating, and interpreting are performed by additional machines. This type of configuration will also support equipment in installations where larger data processing systems are installed.

#### PROGRAMMING

In order to simplify programming on the Model 20, IBM has developed a method known as the RPG (Report Program Generator). RPG, which is a deck of program cards, automatically converts job specifications into Model 20 programs.

Job specifications include a description of (1) the cards used as input, (2) the calculations to be performed, and (3) the output cards and/or reports. The form which describes the input cards includes such detail as field location and name, card type, sequence of input, control fields, special codes, etc. The form describing the calculations is similar to a 602 or 604 planning chart and includes the factor locations, operations to be performed, and the results. The output format specifications form describes the cards to be punched and the reports to be printed.

The specification forms are completed for each job to be performed by the system. From the completed forms, specification cards are key-punched and entered into the Model 20 with the RPG program deck. The RPG program reads the job specification cards and produces a program in storage that will perform the required processing. The data cards for the job are then entered into the system and the desired processing and results are obtained.

Like a permanently wired control panel, the specification cards become a permanent file and are altered only when the specifications for the job are changed.

#### ADVANTAGES

The System/360 is IBM's new approach to data processing. Major development efforts have been directed to this series of computers.

The Model 20 is designed to bring full-scale data processing capabilities to a level that could heretofore be met only with punched card equipment.

It offers:

- More flexibility by multifunction operations with the MFCM
- Higher reading and punching speed with high-speed card input/output
- Higher printing speed
- Input/output functions and speed tailored to special requirements

• Present expansion capabilities such as dual-feed carriage, variable character set for printing, additional storage, and printing on a card

The main advantages of the System/360, Model 20, over existing punched card equipment are:

- Higher throughput, resulting in faster completion of jobs, free capacity for new applications
- More calculation and logical decision power, resulting in more sophisticated applications with more expressive reports
- More streamlined organization by multifunction approach, resulting in reduced card handling, simplified scheduling of jobs, and reduced manpower requirements
- Upward growth within the Model 20 and into larger models of the System/360







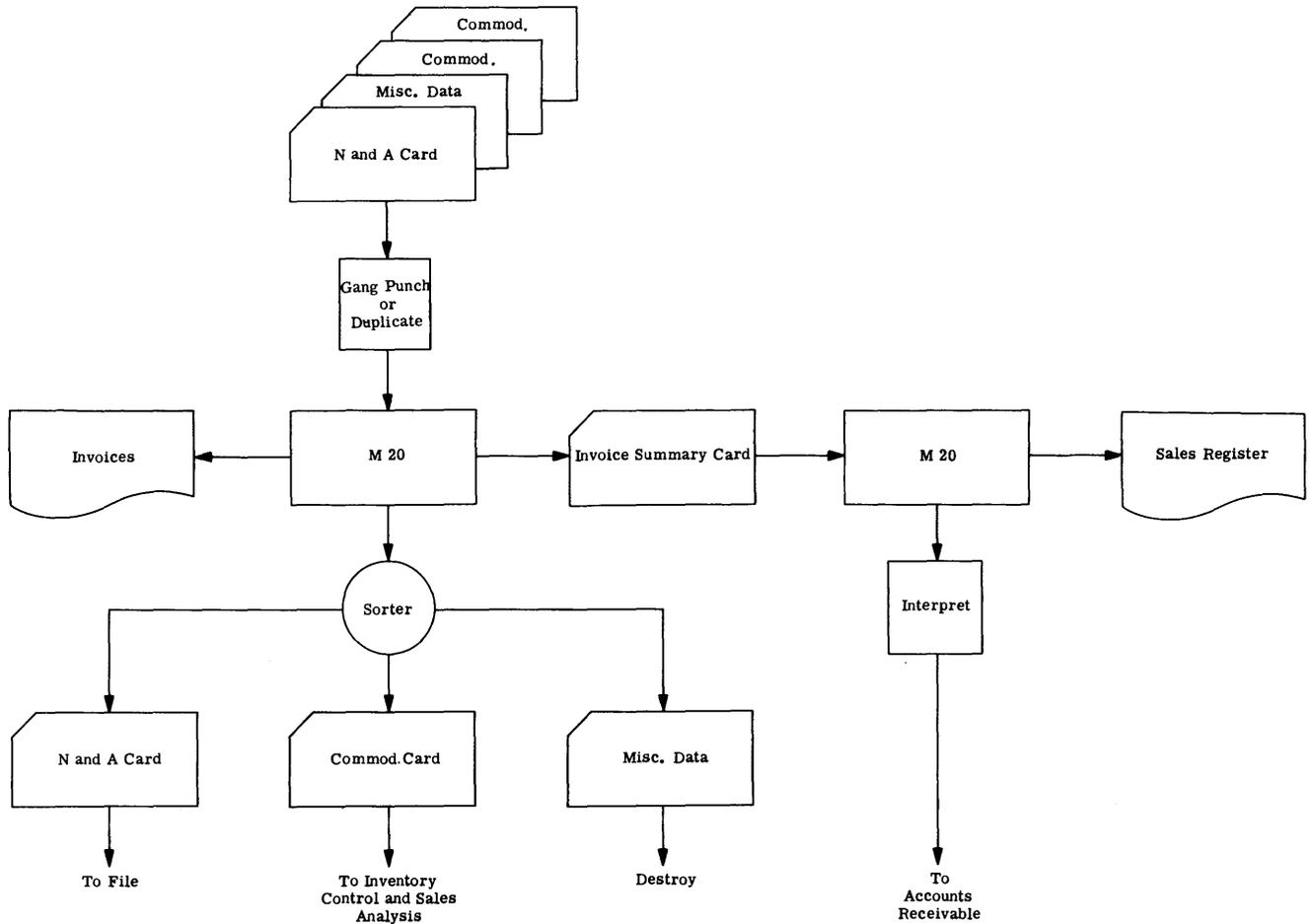


Figure 3. Billing with preassembled cards using the card reader, punch and printer

NATIONAL PRODUCTS INC.				
GREENVILLE, MASS.				
SOLD TO		SEAVIEW HOME SUPPLY CO 14 OCEANSIDE AVE RICHARDS REEF N H		INVOICE NUMBER 1 2 3 4 5
SHIP TO		SEAVIEW HOME SUPPLY CO 14 OCEANSIDE AVE RICHARDS REEF N H		
CUST. NO.	SHIP VIA	SALESMAN	CUST. ORDER NO.	INVOICE DATE
10341	FREIGHT	86	311	4/15
COMMODITY CODE	DESCRIPTION	QUANTITY	UNIT PRICE	AMOUNT
19941	KOLDFLO ELEC FAN 12IN	36	2.95	106.20
19949	KOLDFLO ELEC FAN 8IN	72	2.50	180.00
42641	KORN KING CORN POPPER	3	4.60	13.80
66488	VACU-LOK VACUUM BTS 2PT	36	.88	31.68
12996	LUXURY HEAT PADS	12	3.50	42.00
				373.68

Figure 4. Typical invoice

#### BILLING USING THE MFCM AND PRINTER

In this example, it is assumed that billing cards are created by pulling from tub files. Quantity may or may not have to be punched. A miscellaneous data card and a customer number card must be created. Customer number must be gang-punched or duplicated into the billing cards. Billing cards are sorted into customer-number sequence and placed in the MFCM. The name and address file is placed in the other feed of the MFCM.

The name and address file is passed until an equal comparison is reached between the name and address card and the first billing card. Name and address is printed on the invoice, the miscellaneous data card is printed, and the invoice cards are extended and printed, as shown in Figure 4. (The result of the extension does not have to be punched into each billing card, because the extension can be performed quickly every time the card is used for analysis or reporting functions.) Billing data is accumulated for each invoice and punched, along with indicative information in the customer number card to create an invoice summary card. At the same time summary data may be accumulated for control and reporting purposes.

Invoice summary cards are listed to provide a

sales register, interpreted, and used as entry to the accounts receivable procedure. If the interpreting device on the MFCM is used, invoice summary cards may be interpreted during the billing run. Cards are separated in the MFCM by type. Commodity cards are held aside for inventory control and sales analysis.

The entire name and address file is passed through the MFCM, and only those cards for customers to be billed are printed. The sequence of the file is not disturbed. This eliminates collating steps to select proper name and address cards, or manually pulling and refiling the cards. With the reading speed of the MFCM, manual and/or processing time may be saved. The flow of data for this procedure is shown in Figure 5.

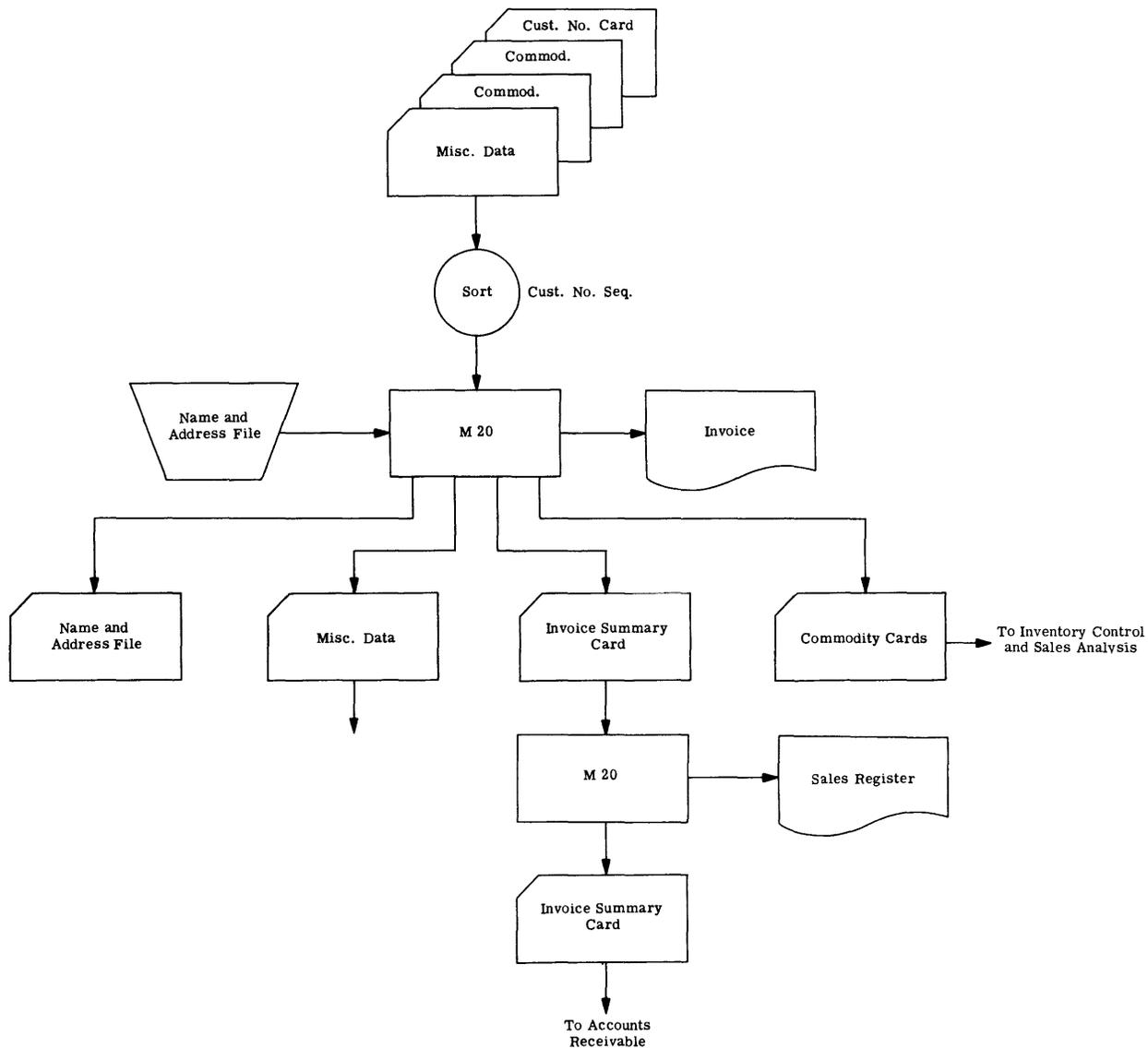


Figure 5. Billing using the MFCM and printer

**BATCH BILLING USING THE CARD READ PUNCH AND PRINTER**

Batch billing offers a method of billing with the minimum amount of manual processing, and, in addition, provides for checking inventory availability before writing invoices. After the miscellaneous data card is punched, commodity cards consisting of customer number (duplicated from the miscellaneous data card), item number and quantity are punched, one for each line item. (They may also be prepared by card-order conversion.) A card is also created with only customer number punched in it; this will become the invoice summary card. The three types of cards are separated.

Commodity cards are sorted by commodity code. Commodity balance cards are merged ahead of each group, and blank cards (to become new balance cards) are merged behind each group (Figure 6).

The following operations take place in the Model 20:

1. Indicative information for the item is gang-punched from the balance card into all others.

2. Quantities ordered are subtracted from the balance totals. The new balance will be punched into the new balance card.

3. If no stock is available, the quantity-shipped field is punched to indicate this.

4. Such extensions as are necessary are performed (quantity times price, quantity times weight, quantity times cost, etc.).

5. Available balance is checked against minimum to see whether order action is necessary.

6. A transaction register is printed.

7. Various summary data is accumulated as desired.

Cards are separated by type. The previously punched miscellaneous data cards are placed ahead of the commodity cards, which are followed by the cards with customer number punched in them. They are then sorted by customer number. Name and address cards are merged ahead of each set of order cards, and all cards are then entered in the card read punch.

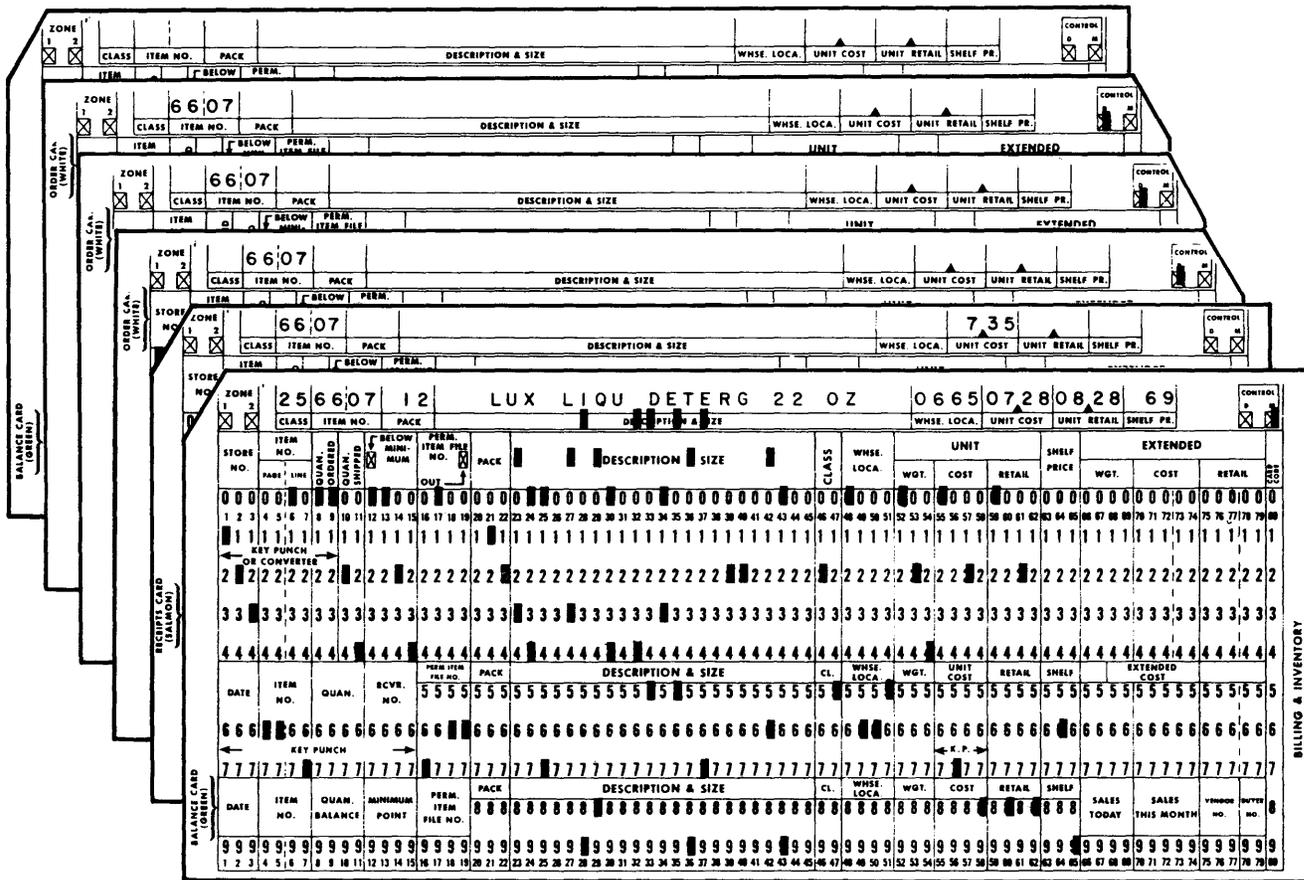


Figure 6. Batch billing cards, balance commodity, and blank cards

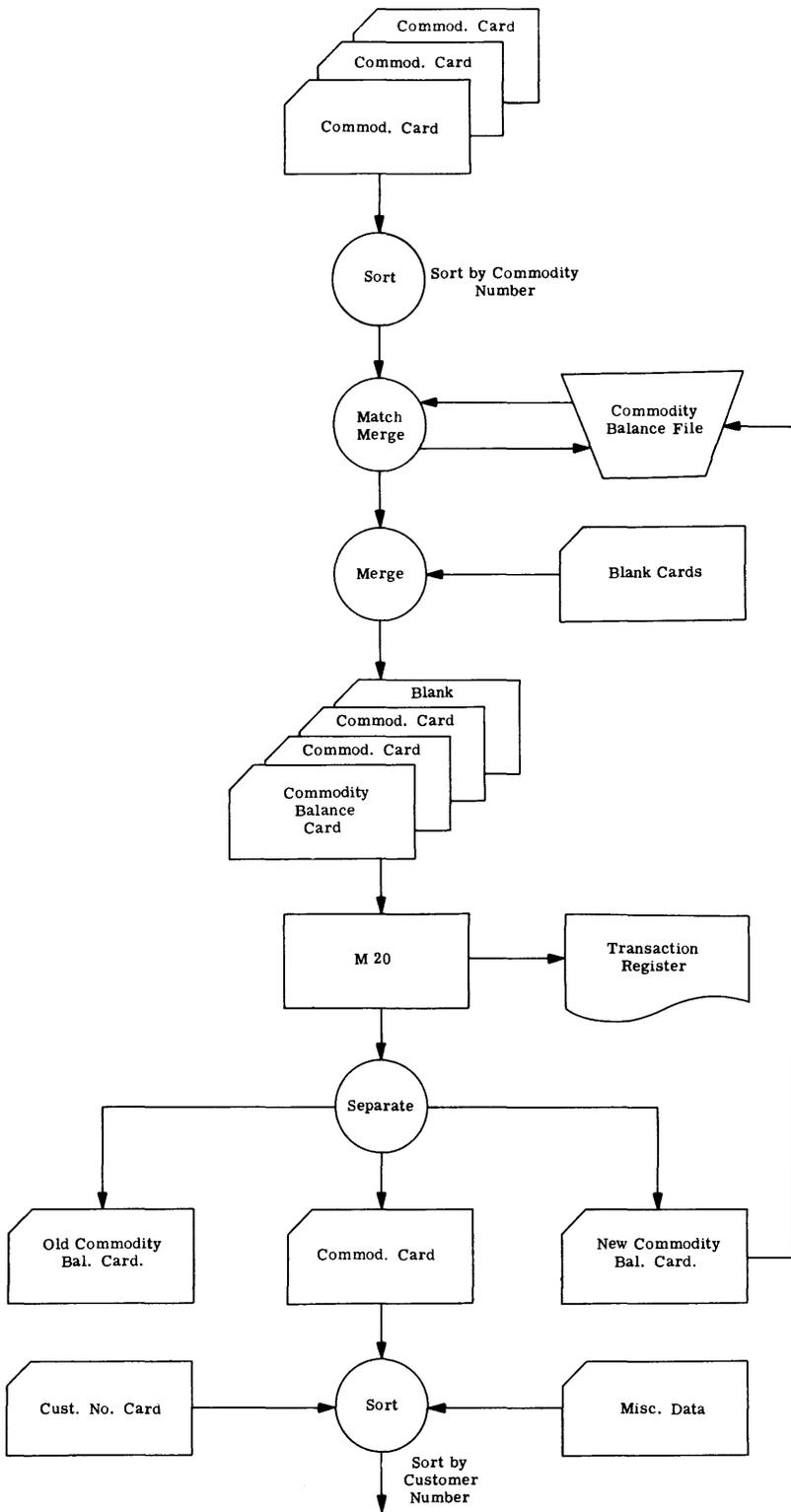


Figure 7. Batch billing with the card reader, punch and printer (1 of 2)

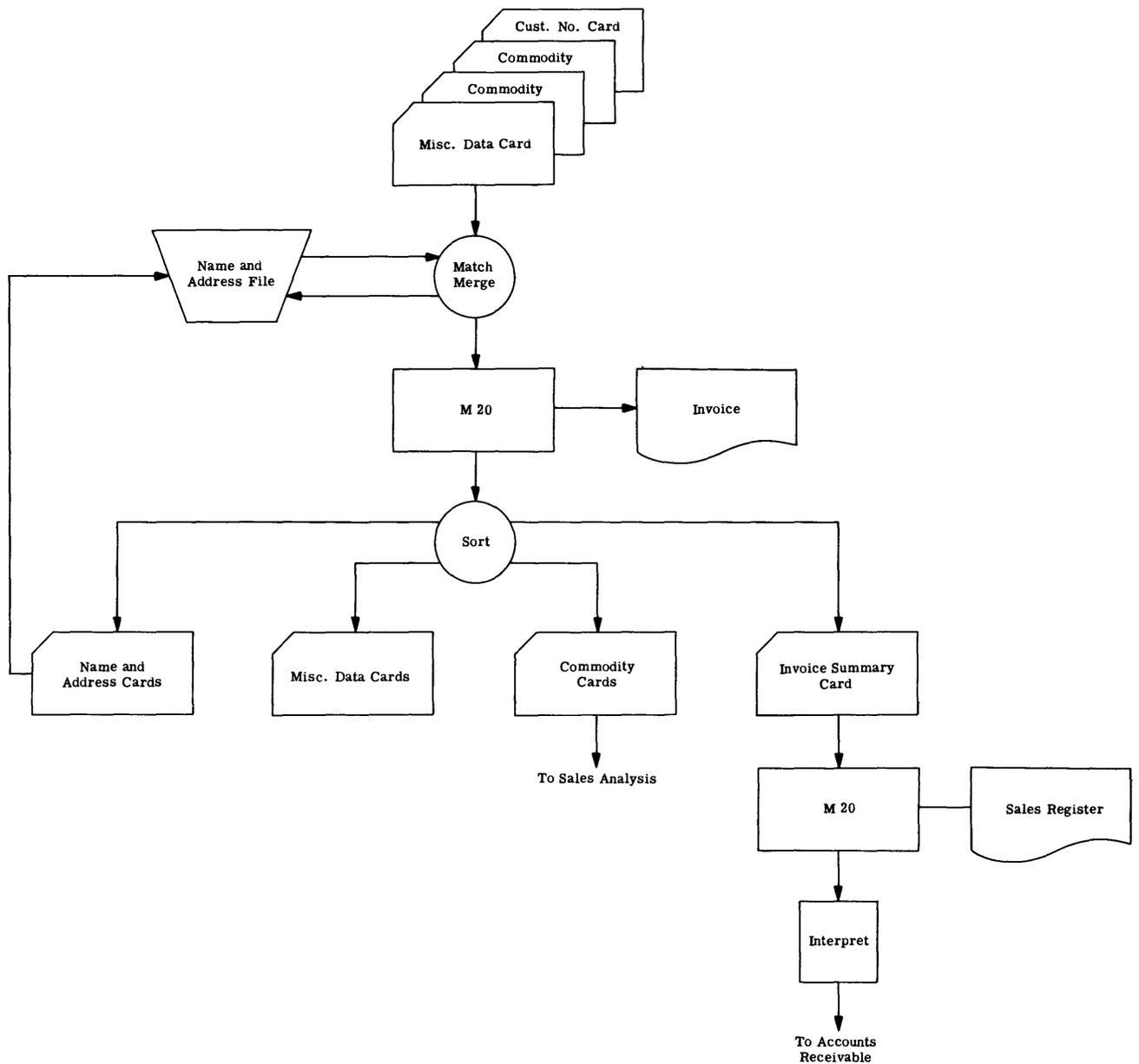


Figure 7. Batch billing with the card reader, punch and printer (2 of 2)

In the billing run, the invoices are prepared. Customer identification data is punched into invoice cards. Summary data and identification data are punched into the customer number card to make it an invoice summary card. Dollar controls from this run are checked against the totals on the transaction register to ensure accuracy.

Cards are then sorted by type. The invoice summary cards are listed to prepare a sales register, interpreted, and used as entry to the accounts receivable application. Commodity cards are held for various types of sales analysis.

The flowchart for this procedure is shown in Figure 7.

**BILLING WITH INVENTORY SCREENING USING THE MFCM AND PRINTER**

In this method of billing, the commodity cards may be either partially punched with customer number and item number or they may be fully punched. The cards are sorted by type, and the commodity cards are then sorted by commodity number.

Commodity cards are placed in one feed of the MFCM, and the commodity master file in the other. Whenever the commodity number in a commodity card matches the commodity number in a commodity master card, the inventory balance is checked to determine whether stock is available. If it is, the quantity to be shipped is punched in the commodity card, and the inventory balance is reduced. If there is insufficient stock, either the remainder amount or zeros are punched in the quantity-shipped field. If the cards are partially punched, descriptive information from the master card is punched into the quantity card. Extensions are calculated and may be punched if desired. At the same time a transaction register is prepared of items active on that day. Calculations may be performed and printed for management action as needed if items go below minimum or order point. Control and summary analysis figures may be accumulated, depending upon storage availability and individual desires.

Since new balance cards are not created at this time, the time necessary to produce the invoices is reduced. With the master file being passed as a unit, its sequence remains the same after processing. Thus collating operations are reduced, and card-handling time is kept to a minimum.

Miscellaneous data cards are placed ahead of the commodity cards, customer number cards after them, and they are sorted by customer number. They are placed in one feed of the MFCM, and the name and address file is placed in the other. Invoices are prepared, with the necessary control and summary totals accumulated. The customer number card is punched with invoice summary data. Cards are separated into different pockets. Commodity cards are subsequently used for the inventory control and sales analysis functions. The invoice summary cards are listed for a sales register (Figure 8) and become the entry to accounts receivable. The name and address file, which remained intact, is returned to its location.

The entire billing and inventory screening operation has been performed with a minimum of machine and manual processing. Only three sorting and three Model 20 operations are necessary to complete the entire billing operation, as shown in the flowchart in Figure 9.

SALES REGISTER														
INVOICE NUMBER	ACCOUNT NUMBER	ACCOUNT NAME	TRANS ABBR	DATING		REFERENCE NUMBER	INVOICE DT			MOSE TERMS	ACCOUNTS RECEIVABLE	PARCEL POST	MERCHANDISE AMOUNT	SLM
				MO	DAY		MO	DAY	YR					
16783	11886	FINES FASHIONS INC	INV			3051	4	18	-	2	86	40	86	16
16784	12093	FINNEGANS INC	INV			3025	4	18	-	2	403	10	403	41
16785	12128	FISHER BROS INC	INV			3046	4	18	-	2	345	05	345	43
16786	12206	FLOR DELIOS INC	INV			3017	4	18	-	2	700	60	700	16
16787	12720	FORDHAM FABRICS CO	INV			3022	4	18	-	2	1,253	40	1,253	18
16788	12803	FRANKELS & SMITH	INV			3029	4	18	-	N	48	52	45	17
16789	12815	FREEMANS & FOSTER	INV			3049	4	18	-	2	107	05	107	23
16790	12900	GADSONS INC	INV			3012	4	18	-	2	345	10	345	41
16791	13260	GIBNEY & SONS	INV			3066	4	18	-	2	165	35	165	22
16792	13265	GLOBAL DISTR INC	INV			3028	4	18	-	2	316	05	316	16
16793	12390	HAYES DROBNEY INC	INV			3011	4	18	-	N	43	60	40	43
16794	14619	HIGH BRIDGE	INV			3053	4	18	-	2	1,129	02	1,129	13

Figure 8. Sales register

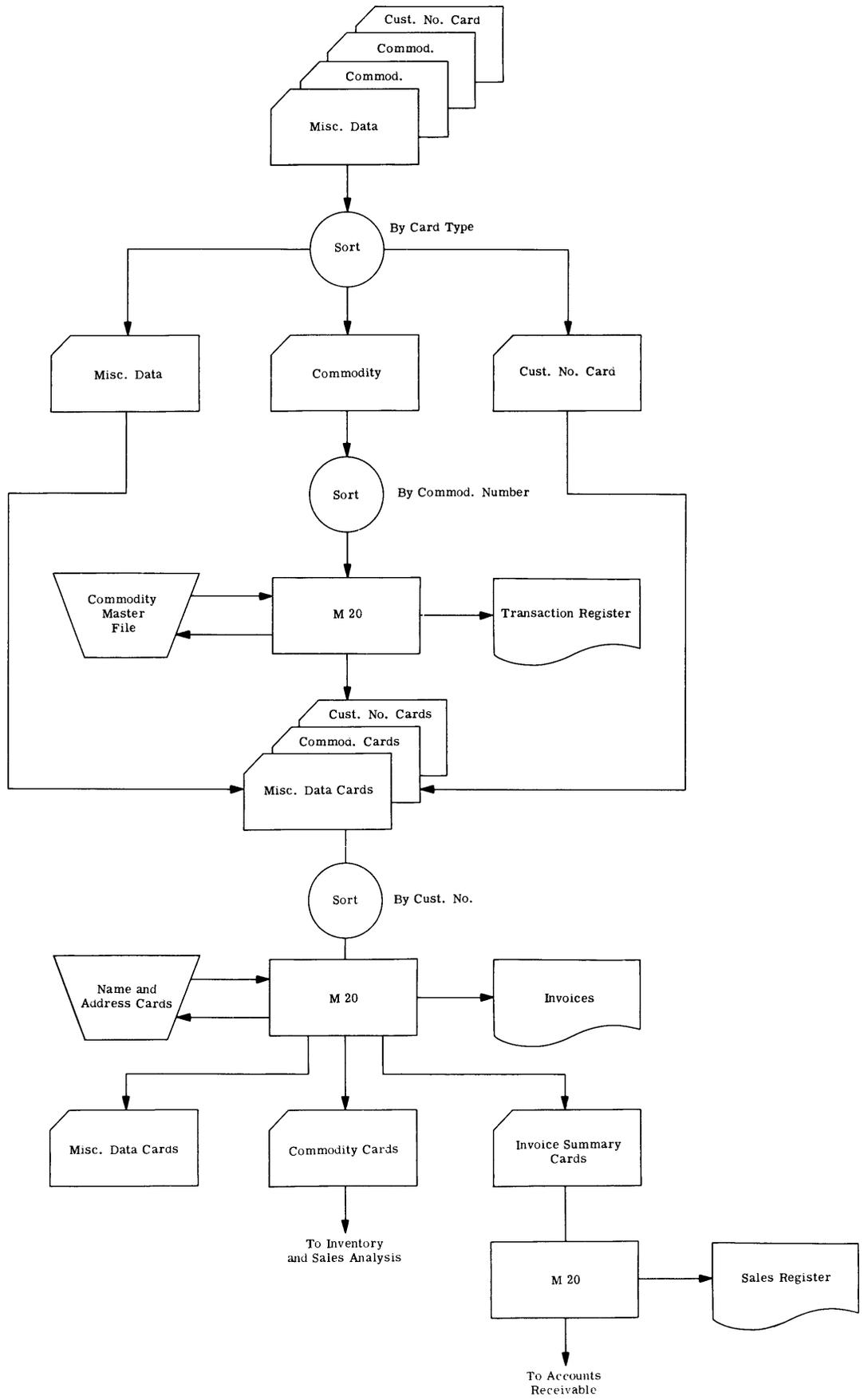


Figure 9. Billing with inventory screening using the MFCM



## ACCOUNTS RECEIVABLE

Accounts receivable is the amount of money owed to a company by its customers for merchandise sold or services rendered on a credit basis. In general, the purpose of accounts receivable procedures, in addition to accounting for all receivable transactions, is to facilitate collecting money owed, to minimize any losses from bad debts, and to maintain customer goodwill through prompt and accurate recordkeeping.

All transactions, including charges for merchandise sold or services rendered, payments, credit and debit memos, and journal entries, must be recorded in chronological sequence and then charged or credited to the proper customer accounts. There are two basic approaches to this function: open-item and balance-forward.

Open-item approach. Under this approach, a separate record of each unpaid invoice is maintained. This record is a punched card. Essentially, open-item procedures work as follows:

An accounts receivable file containing one card for each open item is maintained. For each invoice written a card is inserted in the file. When a payment is made it is applied by removing the cards that represent the invoices paid. These cards are usually completed by punching the amount paid, any discount, and the date paid. They then become the cash credit cards. If the payment does not cover the full amount owed, it is applied to the oldest open item(s), and a credit card is punched for any amount which cannot be applied to a specific item. Thus, under this approach, the accounts receivable ledger file contains only the open items, and continues to contain such items until they have been paid.

Balance-forward approach. Under this approach a record of the customer's total outstanding balance is maintained, and payments are applied against the balance rather than individual invoices. Essentially, balance-forward procedures work as follows:

A balance file is maintained containing balance cards which reflect the status of the accounts at the end of the previous period. For each invoice prepared a card is inserted into the file. Payments are applied by punching a cash credit card for each payment and placing the card in the file as a credit entry. Thus, under this approach the accounts receivable file contains detail cards for all charges and credits for the current period, and a balance-forward card for the total of all transactions prior to the current period.

The choice of the particular method used depends on the requirements of individual companies. In either approach, however, most of the entries are made by automatically inserting machine-prepared receivable cards into punched card receivables files.

The following pages describe typical procedures for punched card conventional approaches and Model 20 approaches to open-item and balance-forward accounts receivable.

### PUNCHED CARD CONVENTIONAL APPROACHES

#### Open-Item

During the billing procedure, when the invoices are printed, an invoice summary card is automatically punched. It contains account name and number, invoice date and number, invoice amount, terms, and entry code. The summary cards, referred to as receivables cards (Figure 10), are interpreted and used to prepare the accounts receivable register (Figure 11). Registers are prepared daily for invoices and credit memorandums, and monthly for journal entries.

After the accounts receivable register is listed and balanced, the accounts receivable totals (which were automatically accumulated and printed for each control group) are posted to the control book. The cards are then collated into the open-item accounts receivable file. The procedure discussed thus far is shown in Figure 12.

The open-item accounts receivable file contains cards for all open accounts receivable entries. The file is the means of maintaining customer balances and is used in the automatic preparation of trial balances and customer statements, and for reference purposes.

Posting to this file is accomplished by merging the accounts receivable cards into the file. The presence of a card in the file is the equivalent of a posting.

#### Applying Payments

Customer remittances are sorted into alphabetic sequence. The amount received is marked either on the tearoff slip of the invoice, on the customer's remittance statement, or on the envelope if no stub or statement was included with the payment. After batch control totals are taken on the checks and the remittance advices, the checks are ready to be deposited.



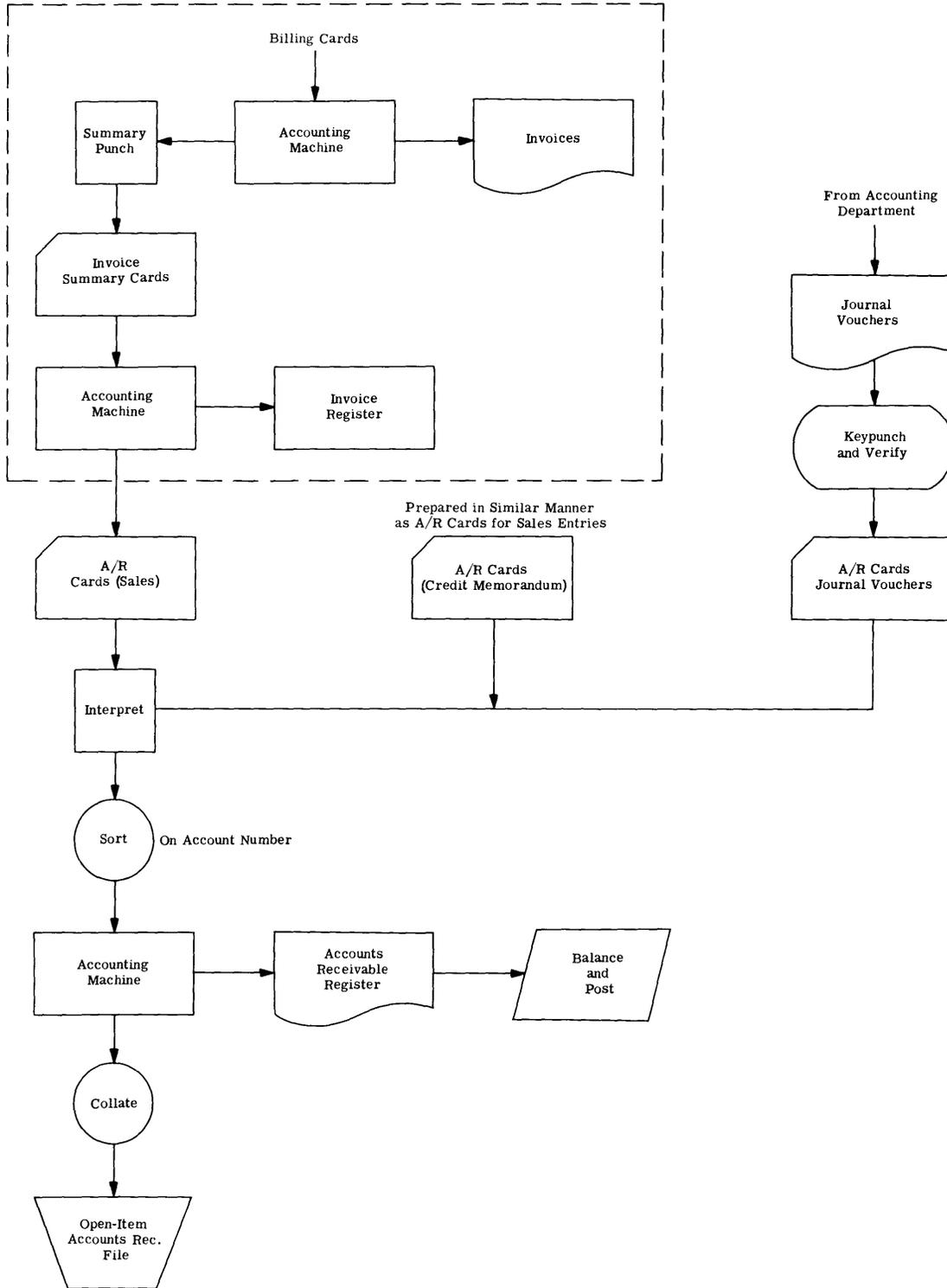


Figure 12. Punched card conventional approach -- open-item (1)

## Cash Receipts Register

The cards representing cash payments are listed in customer-number sequence to prepare the cash receipts register (Figure 13), which serves several purposes. Its immediate function is to prove that the accounts receivable cards are in balance with actual cash receipts. It is also a permanent record of accounts receivable cash entries, and provides a means of ready reference. Furthermore, it is the basis for auditing credit entries to the accounts receivable ledger file and for posting to the control sheet.

After the cash receipts register is listed and balanced, the payment cards are sort-separated. Cards representing credits to the accounts receivable file and partial payments are collated into the open file, and the remainder of the cards are placed in the paid file. Figure 14 is a flowchart of the procedures just described.

## Statement Preparation

At statement time, the name and address card for each open account is automatically inserted in front of the open-item cards for that account (name and address cards for inactive accounts are selected and set aside). The cards are then placed in the accounting machine to prepare customer statements.

As the statements (Figure 15) are being prepared, trial balance summary cards are automatically punched for all accounts. These cards contain the account number, the total amount due, and a breakdown of the open items into current, over 30- and over 60-day categories. Special columns can be provided to show past-due amounts on the customer statements.

The total accounts receivable figure (accumulated in the accounting machine while statements are being prepared) is balanced to the control totals, and the original copies of the statements are mailed to the customers.

CASH RECEIPTS REGISTER												
ACCOUNT NUMBER	ACCOUNT NAME	TRANS ABBR	DATING		REFERENCE NUMBER	INVOICE DT			ACCOUNTS RECEIVABLE	DISCOUNT ALLOWED	DEDUCTIONS ALLOWED	AMOUNT PAID
			MO	DAY		MO	DAY	MO				
11243	DRJ WIRE CO	CSH			2648	4	17	428	1248	25		1223
11886	FINES FASHIONS INC	CSH			3051	4	18	428	8640	173		8467
14910	HASTING WHITE TOOL	CSH			2319	4	11	428	1126			1126
17197	HENRY JOHN & CO	CSH			2649	4	17	428	6330	131		6399
17614	HOUSE OF FORRESTE	CSH			2812	4	18	428	94125	1882		92243
28677	KRAUSZ MFG	CSH			3688	4	23	428	38416	768		37648
30541	NIXON GLASS CO	CSH			2843	4	18	428	282750	5655	2 200 1	275094
30599	NORTHWESTERN SUP CO	CSH			3497	4	23	428	28984	580		28404
30611	NOVASKEIN FASH INC	CSH	4	10	2006	2	21	428	2466			2466
33577	ODIN CHEMICAL CO	CSH			2914	4	18	428	94125	1882		92243
59751	SOUTH LAKE SAND CO	CSH			2117	3	24	428	62222		8 200 2	64210
59751	SOUTH LAKE SAND CO	CSH			2255	3	26	428	2190			2190

Figure 13. Cash receipts register

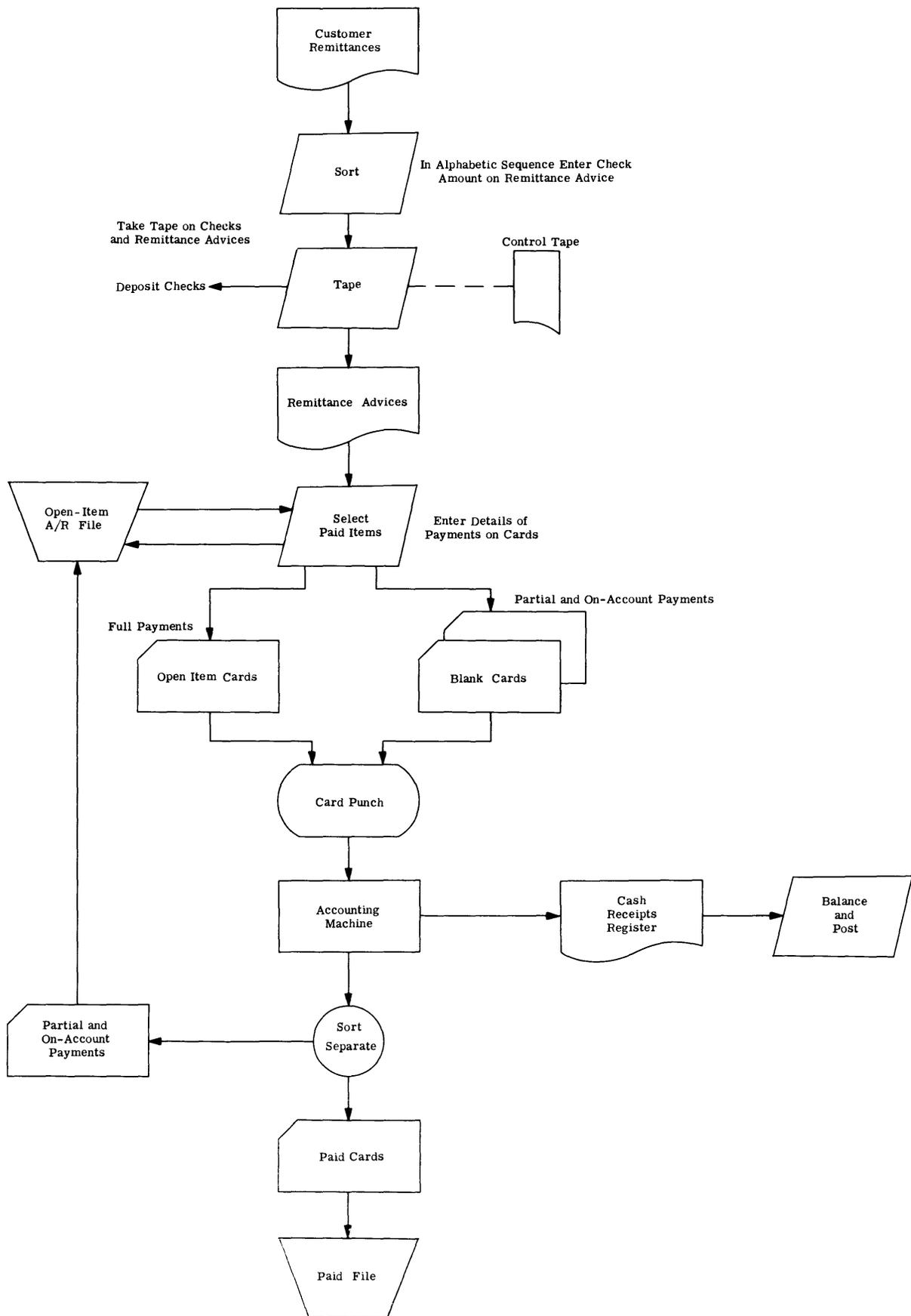


Figure 14. Punched card conventional approach -- open-item (2)

**STATEMENT**  
**Barton and Delaney Inc.**  
BOSTON, MASSACHUSETTS  
HILLVIEW 4-4801

NAME AND ADDRESS: WINSTON HARDWARE  
57 WASHINGTON ROAD  
WORCESTER MASS

1	26	9090	10 31 6-
TYPE SALE	BAL. NO.	CUST. NO.	MONTH ENDED

DATE			DATING			INVOICE OR CREDIT MEMO #	SYM.	CHARGE	CREDIT	BALANCE
MO.	DAY	YEAR	MO.	DAY	YEAR					
7	10	6-				298	IN	2538		2538
8	14	6-				345	IN	3725		3725
9	15	6-				398	IN	6710		6710
10	15	6-				431	IN	556		556
10	25	6-	3	15	6-	452	IN	13720		13720
10	30	6-				463	IN	11580		11580

DATED	CURRENT	ALL INVOICES PAST DUE 60 DAYS SUBJECT TO 6% INTEREST PER ANNUM				TOTAL BALANCE
		30 - 60 DAYS	60 - 90 DAYS	90 - 120 DAYS	OVER 120 DAYS	
13720	12136	6710	3725	2538		38829

ALL OPEN CHARGES AND CREDITS TO YOUR ACCOUNT ARE LISTED ABOVE. PLEASE ADVISE PROMPTLY IF NOT CORRECT.  
EXPLANATION OF SYMBOLS: IN - INVOICE    CS - CASH    CM - CREDIT MEMO    JE - JOURNAL ENTRY

Figure 15. Open-item statement

**Aged Trial Balance**

At this point the trial balance summary cards are merged with the name and address cards (which were first sort-separated out of the open file) and

the aged trial balance (Figure 16) is listed on the accounting machine. The total accounts receivable amount is balanced to the statement amount (accumulated when statements were run). The last of the flowcharts for this approach is shown in Figure 17.

AGED TRIAL BALANCE								
SALES MAN	CUSTOMER NUMBER	CUSTOMER NAME	DATED	CURRENT	30-60 DAYS	60-90 DAYS	90+OVER	TOTAL
11	1001	A C BIDDLE CO	1003	10 20	26			1023 36
66	1002	BIGEMANN HARDWARE		181	34			181 34
39	1004	BIDEREUX CO		443	10			443 10
72	1007	BIGNAY FLOOR COVERS			153 26	114 14CR	1 12	40 24
34	1010	BILL & BOB HARDWARE		367	94	101 74		469 68
20	1018	BILL & RALPH SPORTS					71	71
23	1028	BIRDS HARDWARE CO	24	12 122	81			146 93
66	1035	BLACKMOOR MFG		26	30	26 30CR		
42	1040	BLACKSTONE STORE			49	42		49 42
41	1052	BLAKELY SPORT SHOP	31	29 192	52			223 81
66	1053	BLANCHARD VARIETIES				8CR		8CR
11	1061	E W BLISSIL CO		217	82			217 82
36	1067	BLODGETT HOME SUP		106	95			106 95
18	1070	BLONDIN RADIO			869	40		869 40
15	1078	BLUE HILL STORES		196	35			196 35
55	1088	BOBS TEXACO		21	93	1 94		23 87
66	1095	CHARLES B BOGLE		1	10 476	33	174 96CR	394 46
70	1096	MRS M BOHUN		35	87	35 95		8

Figure 16. Aged trial balance

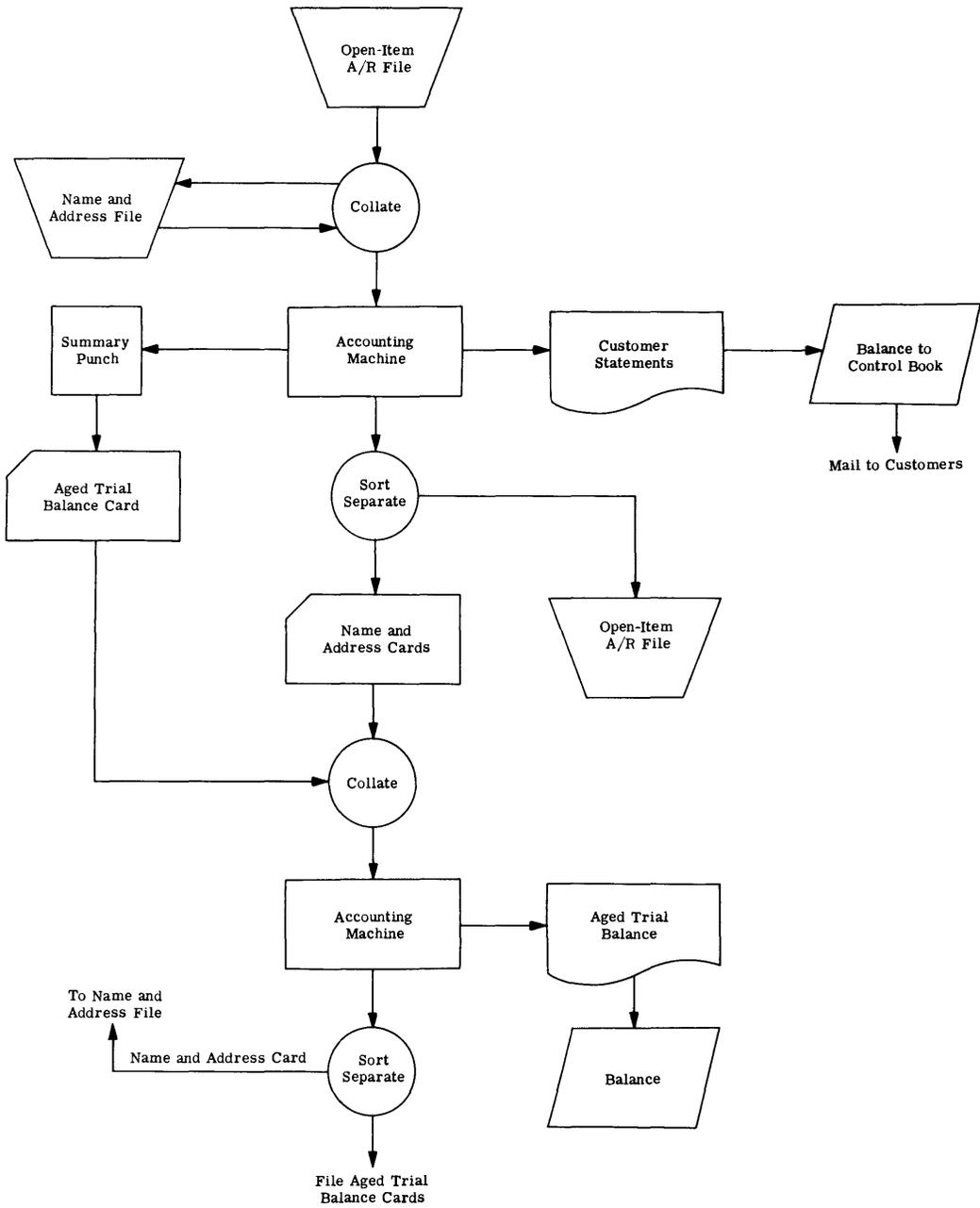


Figure 17. Punched card conventional approach -- open-item (3)



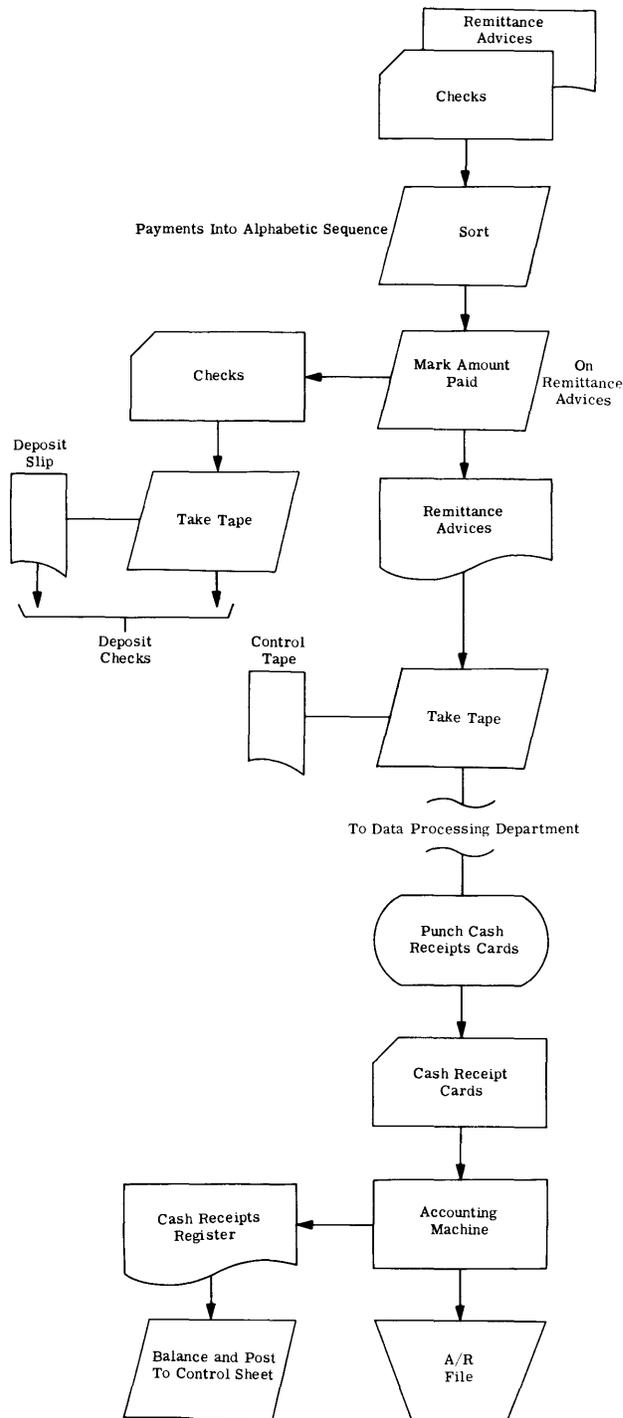


Figure 19. Punched card conventional approach -- balance-forward

## Statement Preparation

The receivables file, old balance and transaction cards, balanced to control, are merged with name and address cards. (Name and address cards for inactive accounts are selected and set aside.) The cards are then placed into the accounting machine to prepare statements (Figure 20).

At the same time that the statements are being prepared, new balance-forward summary cards are automatically punched. These cards contain the account number, the total balance forward, and a breakdown of the overdue amounts for the past month. This aging is automatically performed by the accounting machine, which applies payments to the oldest amounts due.

**STATEMENT**  
**Arthur Bolton Co.**  
INCORPORATED

PLEASE MAIL CHECK TO  
P.O. BOX 1234  
MIAMI FLORIDA

TO: SMITH FLOWER GARDEN  
523 NW HOBART ST  
MIDDLEBURG FLORIDA

STATEMENT DATE	ACCOUNT NUMBER
4 30 6	3975

ACCOUNTS DUE 10TH OF MONTH FOLLOWING DATE OF PURCHASE

DATE	INVOICE NUMBER	CHARGES	CREDITS	PREVIOUS BALANCE
3 31 6				10985
4 16	27235	6.75		
4 26	27514	20.00		
4 36	27642	17.25		
4 36			25.00	
4 8 6	5279	8.65		
4 14 6	5599	51.25		
4 16 6	27160	13.10		
4 16 6			18.00	
4 19 6	5728	12.75		

NO UNAUTHORIZED DEDUCTIONS ALLOWED - SEE TERMS ON INVOICES  
CHARGES AND CREDITS AFTER THE 26TH OF THE MONTH  
APPEAR ON THE NEXT MONTHS STATEMENT.

PAST DUE AMOUNTS			CURRENT AMOUNT	TOTAL AMOUNT DUE
OVER 90 DAYS	OVER 60 DAYS	OVER 30 DAYS		
1250	2235	3200	6575	13260

PAY THIS AMOUNT

Figure 20. Balance-forward statement

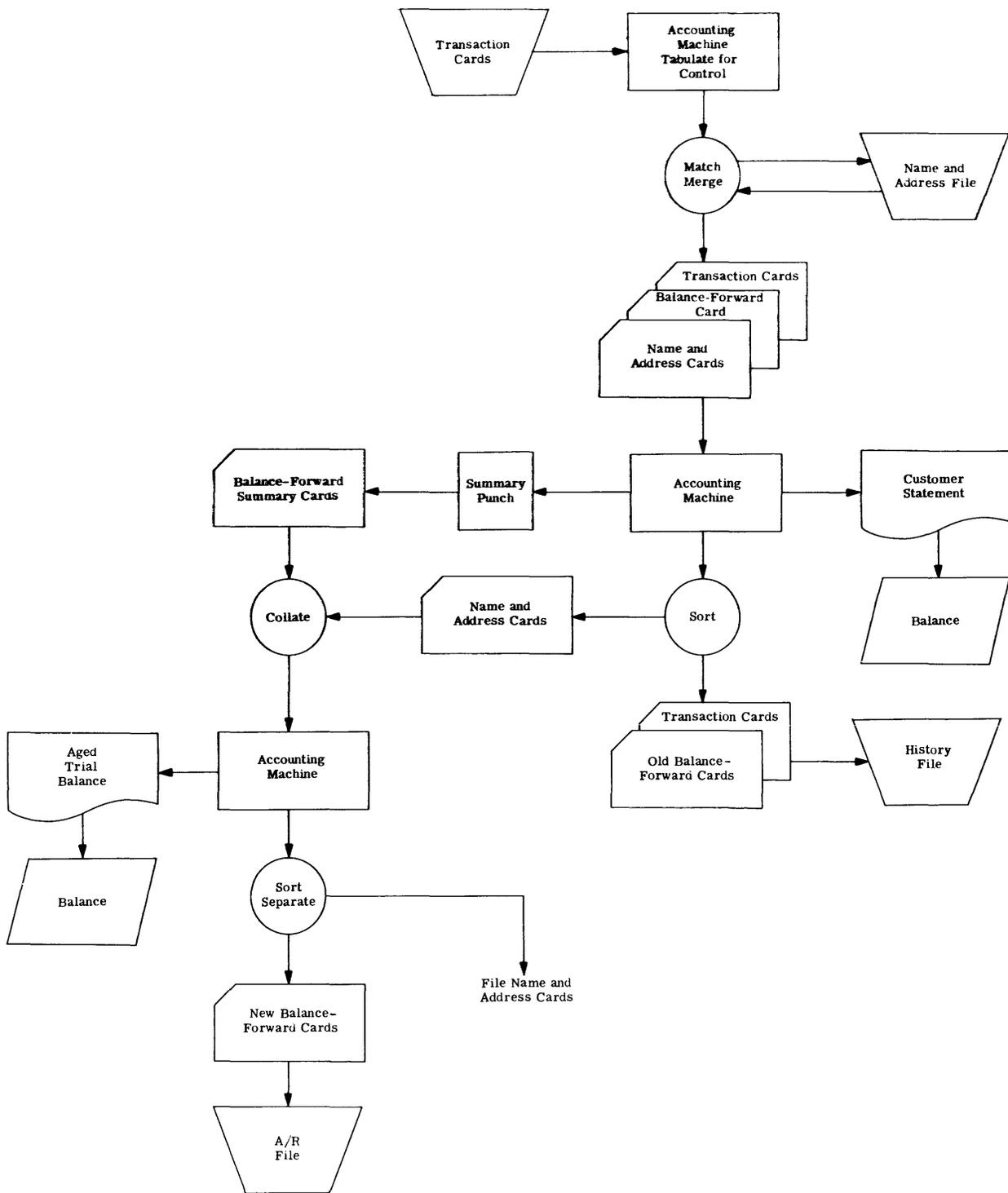


Figure 21. Punched card conventional approach -- balance-forward

### Aged Trial Balance

The name and address cards are sort-separated from the transaction cards and the old balance cards, and are merged with the new balance-forward summary cards. The aged trial balance is then prepared on the accounting machine.

The period's transaction cards and the old balance cards are filed in the history file, the name and address cards are collated back into the name and address file, and the new balance-forward cards are placed in the receivables file. Figure 21 is a flowchart of a common procedure used for statement and trial balance preparation.

## PUNCHED CARD SYSTEMS APPROACHES

On the previous pages, the basic advantages and methods of accounts receivable processed by the IBM punched card conventional approach have been discussed. Input documents and desired results remain the same during the following discussion of the System/360, Model 20, approaches. The basic differences are in the method of processing, the relative speeds of operation, and the combination of several steps into one using the Model 20.

In effect the 360, Model 20, represents a new, faster, and more efficient approach to the problem of maintaining a current, accurate record of customer accounts. The configuration desired will depend on the normal considerations of any business — number of customers, method of payment, etc.

Flowcharts accompanying the following discussion depict the punched card systems approach to the preparation of the cash receipts register, statements, and the aged trial balance.

With the System/360, Model 20, invoice summary cards are created as a by-product of invoicing, much the same as in the conventional punched card approach. Using the multi-function card machine blank cards in the secondary hopper are punched containing the complete accounts receivable information — account name and number, invoice date and number, invoice amount, terms, and entry code. After the cards are punched, they are interpreted at the print station within the MFCM.

Credit memorandums and journal vouchers are prepared in the same manner as in the conventional punched card approach. A card is punched and verified for each entry and forwarded to the data processing department. However, with the MFCM, the cards can be interpreted as they are processed.

All receivable cards are sorted into account-number sequence and processed through the MFCM to prepare the accounts receivable register. If it is desirable to reproduce the receivable cards for sales analysis reporting, blank cards may be in-

serted in the secondary hopper of the MFCM. As the accounts receivable register is prepared, the blank cards are punched with the sales analysis information.

The register is balanced and posted as in the punched card approach.

### Open-Item

#### Applying Payments

The open-item method of applying payments is identical to that used in the punched card approach shown in Figure 14. Use of the Model 20 card reader and printer, however, results in faster preparation of the cash receipts register.

When the full- and partial-payment cards are processed through the MFCM to prepare the cash receipts register, they are automatically selected out into separate pockets, eliminating the sort/select step shown in Figure 14.

#### Statements and Aged Trial Balance

Statements are prepared for all customers with open balances at the end of the month. The computing capability of the System/360, Model 20, makes it possible to prepare the aged trial balance before the customer statements.

The open-item cards are removed from the file and placed in the card reader. Since the cards contain the account number, account name, salesman number, invoice date and amount, the Model 20 can prepare the trial balance and age each account. The total accounts receivable amount is printed and will be balanced to the customer statements.

After preparation of the trial balance, when a reader, punch and printer are used with the Model 20, customer name and address cards are collated with the open-item cards for each account. They are then processed through the card reader to prepare customer statements. The cards are then

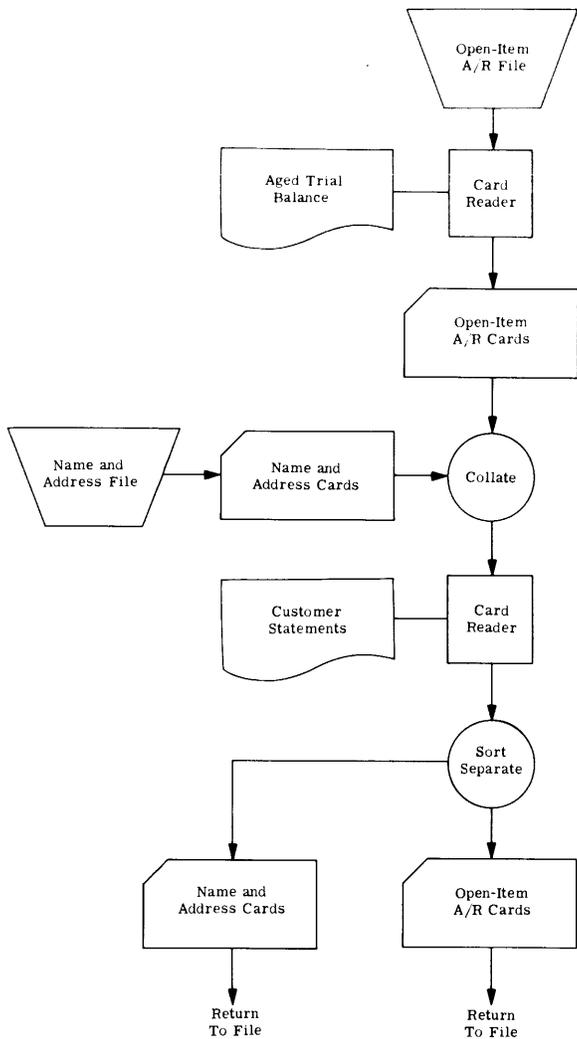


Figure 22. Statement and trial balance preparation using a card reader, card punch and printer with Model 20

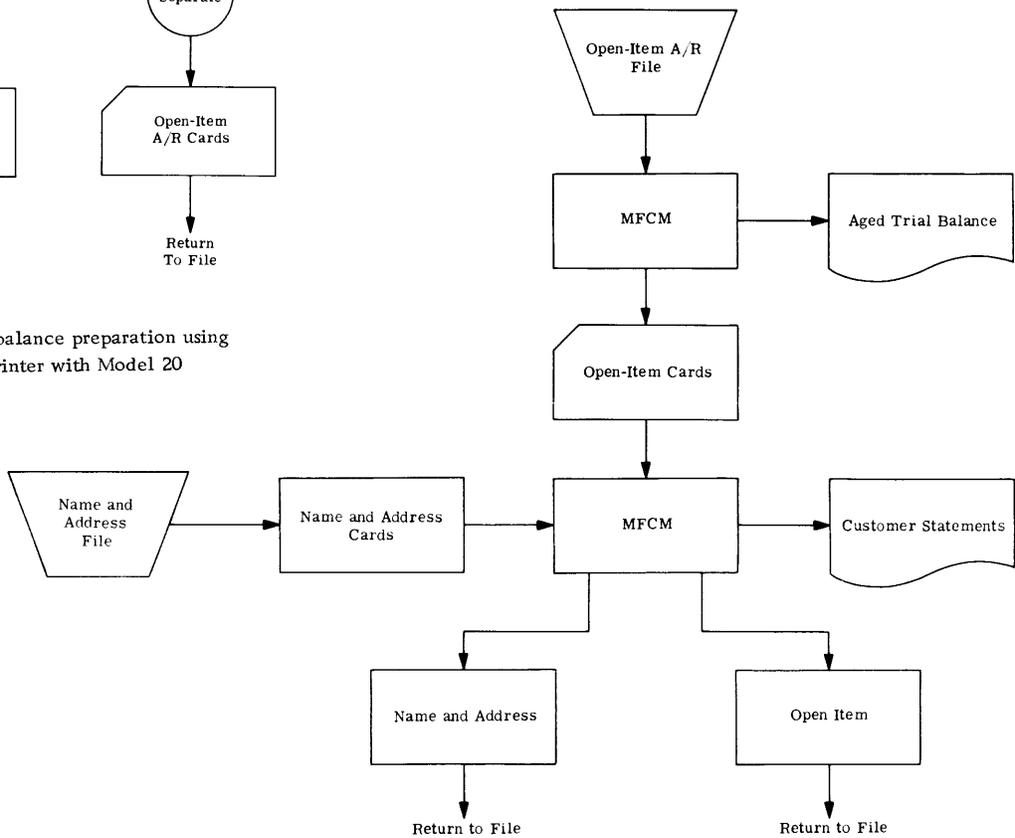


Figure 23. Statements and aged trial balance preparation using the Model 20 with the MFCM -- open-item

sort-separated and returned to their respective files. This procedure is shown in Figure 22.

When the MFCM is used with the Model 20, the open-item cards are removed from the file and placed in the hopper of the MFCM. Since the cards contain the account number, account name, salesman number, invoice date and amount, the Model 20 can prepare the trial balance and age each account. The total accounts receivable amount is printed and balanced to the customer statements.

After preparation of the trial balance, customer name and address cards are placed in the primary hopper of the MFCM and the open-item cards are placed in the secondary hopper. The cards are processed to prepare a statement for each customer. The customer's name and address are printed at the top of the statement. Each open item is listed and the total accumulated and printed. Name and address cards and open-item cards are selected into different pockets of the MFCM and returned to their respective files, as shown in Figure 23.

## Balance-Forward

### Applying Payments

The procedure for applying payments is identical to that used in the conventional punched card approach. However, by using the Model 20 card reader and printer for preparation of the cash receipts register, the advantage of increased speed is realized.

Again, the procedure for applying payments using the Model 20 and the MFCM is identical to the punched card approach. Speed is the basic advantage realized since the cash receipts cards are processed through the MFCM to prepare the cash receipts register.

### Statements and Aged Trial Balance

In the balance-forward method of preparing statements and trial balances using printer, reader and punch, the old balance and transaction cards are placed in the card reader. Because these cards contain the information needed for the aged trial balance — customer name and number, previous balance, transactions and overdue amounts — it is possible to prepare the aged trial balance before writing customer statements.

Blank cards are placed in the card punch. As the cards are processed, the aged trial is prepared and new balance cards are punched.

Following this run, customer name and address cards are merged with the old balance and transaction cards for each account. The cards are processed to prepare customer statements. The old balance and transaction cards are placed in a

history file and the customer name and address cards are returned to the file. This procedure is shown in Figure 24.

When preparing statements and aged trial balance on the Model 20 with the MFCM, the old balance cards and transaction cards, in account-number sequence, are placed in the primary hopper of the MFCM. Because these cards contain the information necessary for the aged trial balance (customer name and number, previous balance, transactions and overdue amounts), it is possible to prepare the aged trial balance before writing customer statements.

Blank cards, placed in the secondary hopper of the MFCM, are automatically punched with updated information for each account and become new balance cards. The amount of the new balance for each customer is also printed on the aged trial balance.

Following this run, the old balance and transaction cards are placed in the secondary hopper of the MFCM. All customer name and address cards, in account-number sequence, are placed in the primary hopper of the MFCM. The cards are processed to prepare customer statements. The name and address cards for each active account processed write the address portion of the bill. They are followed by the old balance and transaction cards, to calculate and print the body of the statement.

After each statement is prepared, the name and address cards are selected into pocket 1 and returned to the name and address file. Old balance and transaction cards are selected into pocket 2 and placed in a history file. This procedure is shown in Figure 25.

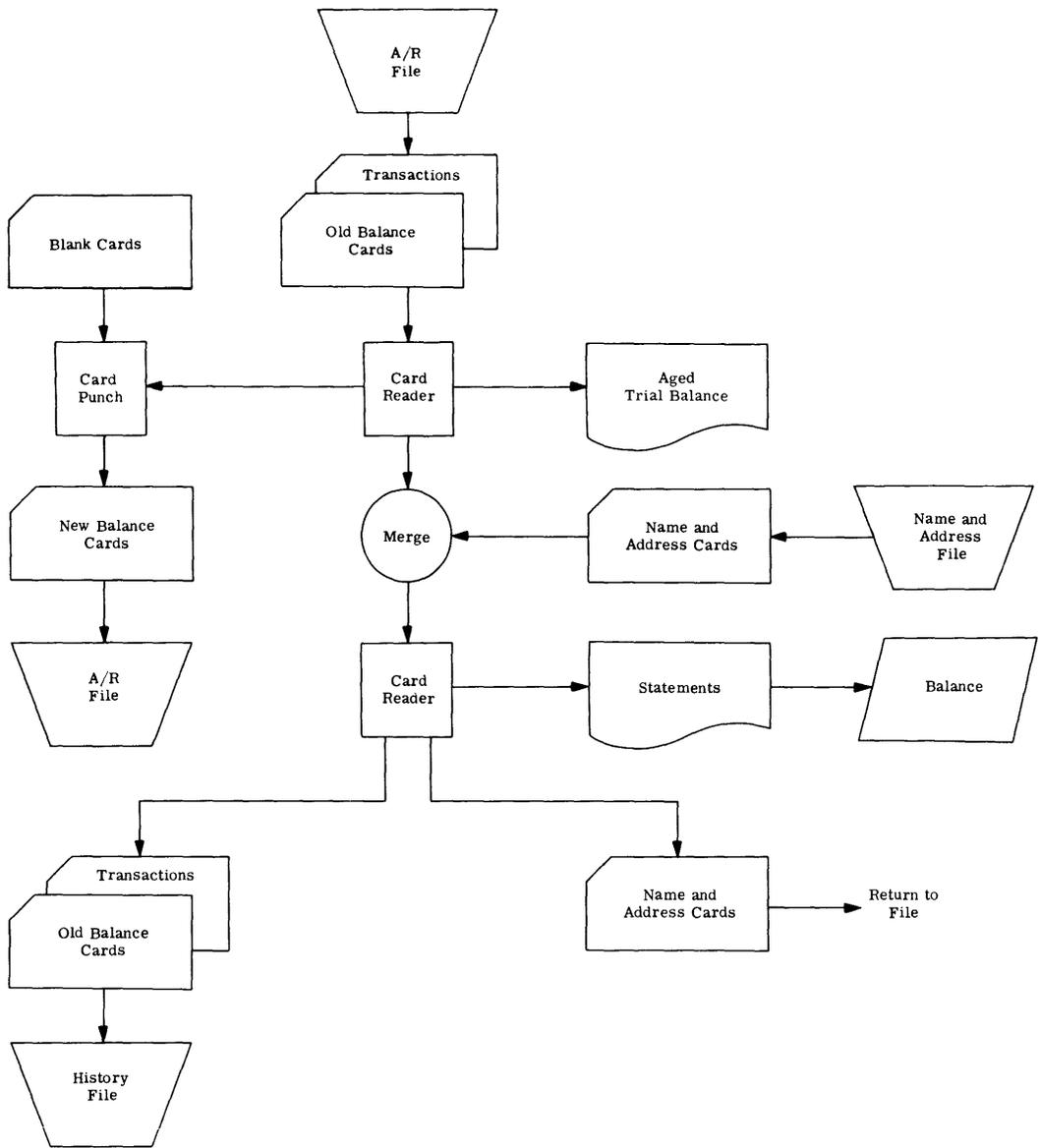


Figure 24. Statements and aged trial balance preparation using Model 20 with card reader, card punch and printer

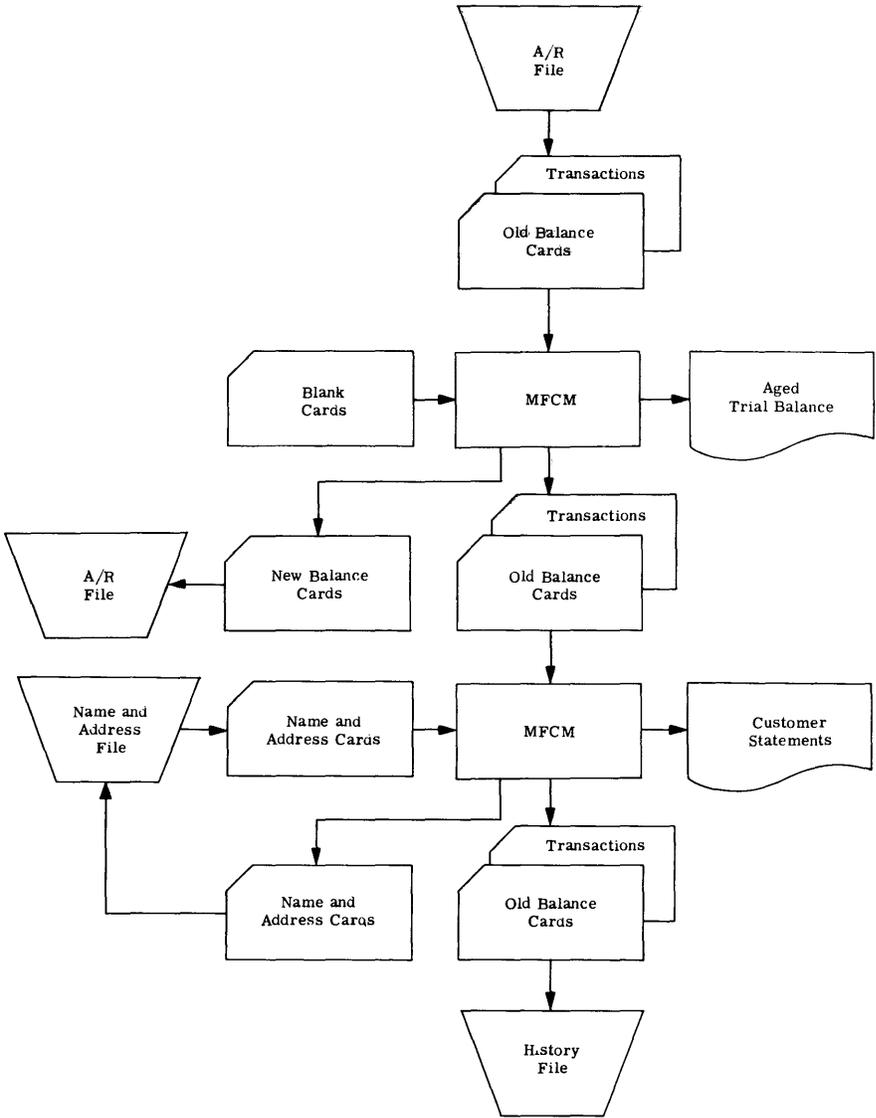


Figure 25. Statements and aged trial balance preparation using the Model 20 with the MFCM balance-forward



## SALES ANALYSIS

### MFCM AND PUNCH

Commodity cards from billing are sorted into the desired sequence for sales analysis. They are placed in the primary feed, and the year-to-date file in the secondary feed of the MFCM. During processing, the sales analysis is prepared on the printer. The previous year-to-date cards are selected into pocket 2 and the commodity cards are selected into pocket 1. Also during processing, the entire new year-to-date file is created on the punch. A variation of this is to punch only active year-to-date cards and select the updated old year-to-date cards into a separate pocket. The new year-to-date cards could then be merged on a collator with the inactive year-to-date cards to produce the new year-to-date file.

### READER AND PUNCH

Commodity cards are sorted into the desired sequence for sales analysis and merged on a collator with year-to-date cards (year-to-date cards can be

merged during the sort step). This file is then passed through the reader and the sales analysis is produced. During this processing the previous year-to-date cards are selected into pocket 1, the commodity cards are selected into pocket 2, and the new year-to-date file is created on the punch.

### MFCM

Commodity cards are sorted into the desired sequence for sales analysis. They are then merged on the MFCM with blank cards to insert a blank behind each commodity group. A control list for balancing is produced. The merged commodity and blank cards are then placed in the primary feed, and the year-to-date cards in the secondary feed of the MFCM. The sales analysis report is produced and the new year-to-date cards punched for active items. The commodity cards are selected in pocket 1, the new year-to-date cards in pocket 2, and the active old year-to-date cards in pocket 3.

## INVENTORY CONTROL

The basic purpose of inventory control is to maintain inventory at the proper level to meet customer requirements with a minimum of investment. To achieve this goal, it is necessary to maintain records of what quantities of what item or items are on hand at any particular time. This involves keeping records in the office which reflect the status of the warehouse or plant. Thus, every movement of an item in or out of the warehouse must be reflected by an entry to the inventory record in the office.

The basic record is a balance card which contains item status as of a given point in time. As items flow in and out of the warehouse, a card is punched to reflect each transaction, whether it is a receipt, a return, an issue or an adjustment. Periodically, the transaction cards are processed with the balance card for each item, and a new balance card is punched, reflecting the new inventory position. This may be daily, semiweekly, or weekly, depending upon individual needs. During this processing, the stock status report may be printed reflecting the current inventory position. This is illustrated in Figure 26.

Data added to this basic process can be helpful to management. By answering the following

questions, the system provides management with more close control over the inventory maintained, and the dollar amount invested in it.

What stock is on order? It is necessary to know how much stock is on order for each item in inventory. This information is important, since any decision to obtain additional inventory must consider open orders. Figure 27 shows an inventory report in which opening balances have been updated by

Stock No.	Description	Opening Balance	+ Receipts	- Issue	= On Hand	On Order
11398	TRANSFORMER	210			210	300
11402	MOTOR ASM 50	1205	500		1705	1500
11610	CAM	10341		1423	8918	
11682	LEVER	433	3500	1255	2678	500

Figure 27. Inventory report of items on hand plus on order

receipts and issues to produce current on-hand balances. The amount on order is also summarized for each item in inventory. The amount on order must be reduced when shipments arrive, as well as being increased when purchase orders are written.

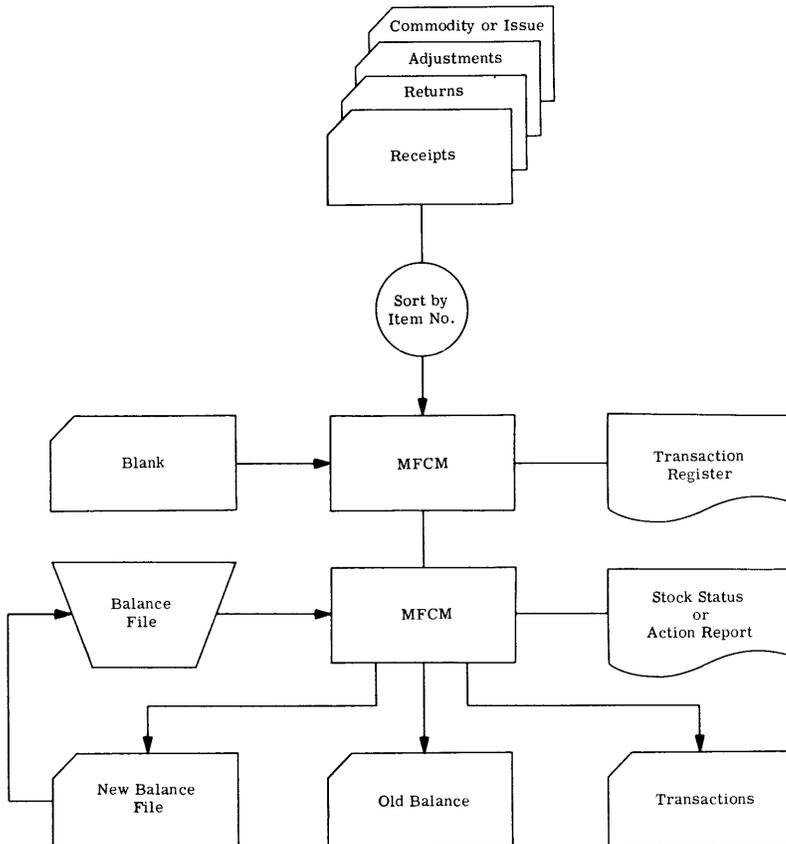


Figure 26. Balance-forward method of inventory control

When to reorder stock? One of the most critical decisions in the entire inventory control application is the question of when (or at what stock level) an order should be placed for an item. The decision to reorder is usually triggered when the on-hand stock plus the on-order stock falls below a designated amount -- the order point. Order points are usually based on estimates of future demand and are established in terms of the following basic factors:

1. Order processing time -- the time required to prepare the purchase or manufacturing order.
2. Lead time -- the time required to obtain delivery of or to manufacture the ordered quantity once the order has been placed.
3. Safety stock -- the absolute lower limit of stock on hand, below which stock should not be allowed to fall.

Order point is the sum of the estimated issues over the order processing time and lead time plus the safety stock, or:

$$\text{Order point} = \text{demand during order processing and lead time} + \text{safety stock}$$

The inventory report in Figure 28 shows what is "available" to fill orders with a minimum delay (on hand plus on order) and how the available status compares with the order point and safety stock. If the on-hand stock (or available stock if delivery time is short) exceeds the order point, no action needs to be taken. If the on-hand or available stock

falls below the order point, it provides the basis for placing a new order. If the on-hand stock (not available) falls below the safety stock, outstanding orders should be expedited. This last condition can occur with or without an order having to be placed.

How much stock to reorder? Once it has been established that an inventory item is to be re-ordered, the question remaining is, "How much should be reordered?" The reorder amount becomes a compromise between two opposing factors -- the cost of acquiring inventory and the cost of possessing inventory in relation to demand.

What is required? Manufactured products of any complexity contain many assemblies, subassemblies and component parts. The purpose of requirements planning is to determine the type and quantity of parts and assemblies which will be needed at future points in the production calendar to produce the required number of finished products. Once gross requirements (that is, requirements not considering material on hand or on order) are determined, it is necessary to compare them with the actual and planned inventory position and to take action, if needed, to assure that the components will be on hand when they are required. Figure 29 shows the combined on-hand and on-order balance of each item reduced by the planned requirements for that item. An excess of planned inventory over requirements is indicated by a plus balance in planned availability; a negative balance calls attention to the need for inventory replenishment.

Stock No.	Description	Opening Balance	+ Receipts	- Issue + (Returns)	= On Hand	PLANNING			Safety Stock	ACTION	
						+ On Order	= Available	Order Point		OP	EXP
11398	TRANSFORMER	110			110	300	410	600	125	*	*
11402	MOTOR ASM 50	1205	500		1705	1500	3205	2000	500		*
11610	CAM	10341		1423	8918		8918	10000	2500	*	*
11682	LEVER	433	3500	1255	2678	500	3178	2750	600		

Figure 28. On-hand plus on-order, versus minimum order point and safety stock

Stock No.	Description	Opening Balance	+ Receipts	± Adjustments	- Issues	= On Hand	PLANNING		
							- Require	+ On Order	= Available
11398	TRANSFORMER	210		30		240	50	300	490
11402	MOTOR ASM 50	1205	500			1705	1855	500	350
11610	CAM	10341			1423	8918	2133		6785
11682	LEVER	433	3500	20-	1255	2658	920	500	2238

Figure 29. Manufacturing requirements weighted against on-hand and on-order

## INPUT AND OUTPUT FOR CONTROL OF PURCHASED GOODS FOR RESALE

In establishing a punched card inventory control application, a basic step is to record stock on hand. The most desirable approach is a physical count of stock, balanced against whatever records already exist. In the event of a variation between actual inventory and recorded inventory, all adjustments and corrections should take place before punching the initial inventory balance cards. A complete agreement between physical inventory and the punched card records at this point is essential to the accuracy and usefulness of any future inventory reports. Once the inventory balance file has been keypunched, transaction cards can be keypunched and processed against the balance cards to produce the desired output reports for the inventory control application.

### Balance Card

The on-hand quantities developed above are punched into the balance card (Figure 30), along with the item identification (unit of measure, commodity class, price, warehouse location, description, card code and item number). The safety stock and order point are established for each item and punched into the balance card.

The balance card is an up-to-date record. Daily, or perhaps semiweekly or weekly, when the transactions affecting any given item are processed, an updated balance card is punched. When the new balance card is punched in the MFCM, it is merged into the inventory balance file and the old balance card removed to produce an automatically updated inventory balance file in one machine pass.

### Commodity Card

Each customer order results in the issue of stock from inventory, and a consequent reduction in inventory. Most transaction cards are issue cards (commodity cards). Miscellaneous data and commodity cards are illustrated in Figure 30.

### On-Order Card

As the available supply of any given stock item approaches or falls below the order point, three

things must happen: (1) the need for recorder must be recognized, (2) a purchase order must be written and sent to the vendor, and (3) the inventory records must show that (a) the item has been ordered and (b) the on-hand supply must be increased upon receipt of the order.

As the purchase orders are written, on-order cards (Figure 30) are created for each item ordered.

### Receipt Card

As ordered items are received, on-order cards are pulled from the on-order file and the quantities received are keypunched into them. If the quantity received is not the quantity ordered, the difference code, indicating the reason for the incomplete order (short shipment, damaged or incorrect goods) is keypunched. The card code is changed from a 1 for the on-order card to a 2 for the receipt card.

If an on-order file is not used, the receipt cards are keypunched from the shipping notice. The receipt card is shown in Figure 30.

### Adjustment Card

Any unusual transaction that results in a discrepancy between the inventory record and the physical inventory calls for immediate action. An adjustment card is punched and processed with the other transaction cards for that day. Transactions of this kind take place when book inventory does not match actual, when an order is cancelled, when stock deteriorates or is condemned, and when stock is destroyed by fire or damage, etc.

The adjustment card (Figure 30) contains an adjustment code that indicates to the Model 20 what type of an adjustment is to be made. Any change in unit cost or price is punched in the adjustment card.

### Return Card

When an item is ordered, reduced from inventory, billed, delivered, and then returned, several adjustments must be made. Return cards are prepared, used to write credit memos, increase inventory by the amount returned, reduce accounts receivable, and reduce sales analysis figures. The return card (Figure 30) has all information needed to credit the necessary accounts.



## Controls

Control figures are printed on each report. They are designed to check calculations on the reports (by crossfooting) and to assure that no extra, missing or incorrect cards exist in the deck being processed. A standard notation for the types of control figures has been adopted for all the inventory control applications illustrated. A list of the control figure notations is as follows:

<u>Notation</u>	<u>Type of Control Figure</u>
AA	Production requirements
BB	Beginning commodities or issues
BB'	Ending commodities (after back orders)
CC	Receipts
DD	New on-order
EE	Adjustments
FF	Ending on-hand
FF'	Beginning on-hand
GG	New back orders
GG'	New partial back orders
HH	Unfilled back orders
II	Filled back orders
JJ	Returns
KK	Ending available
KK'	Beginning available
MM	Billing revenue
NN	Accounts receivable
PP	Sales analysis
XX	Ending total back orders
XX'	Beginning total back orders
YY	Ending total on-order
YY'	Beginning total on-order

The controls shown in the applications flowcharts are designed to provide complete control over an inventory control application containing all optional procedures (for example, back order, an on-order file, billing from commodity cards, etc.). In tailoring procedures to his own requirements, the user must also suit the controls to his own application.

## Control Listing

This listing (Figure 31) provides a method of checking the accuracy of the transaction cards, once they have been keypunched from source documents. Fillable back-order cards are shown beside their respective receipt cards. Totals of listed transactions are balanced to supporting adding machine tapes.

## Transaction Register

This register (Figure 32) provides a listing, by item number, of the daily activity against inventory. The receipts, returns and positive adjustments are increases to inventory; issues and negative adjustments are decreases to inventory. The reference code on this report allows the transactions to be tied back to their source documents. Totals of transactions are balanced to control figures.

## Action Report

This report (Figure 33) summarizes information for only those items whose amount on hand is below their order point. For items printed, the beginning on-hand balance, a summarization of current transactions, the new on-hand balance, and the "action" information are listed. The action section of this report provides useful information to management about the nature and severity of the action required. An asterisk is printed in the OP column if the balance on hand is below the order point. An additional asterisk is printed in the EXP column if the inventory on hand has fallen below the safety stock level. OP action requires that the on-order status be checked and the item reordered if no order large enough to take the item out of the danger status is outstanding. EXP action results only when the inventory on hand has fallen below the danger point marked by the safety stock level. In this case, any outstanding orders should be expedited, and if no order is outstanding, an order should be quickly placed and expedited. Totals of all transaction and planning figures are balanced to control figures. In some cases the action report is combined with the transaction register.

## Stock Status Summary

This report (Figure 34) lists the opening and updated on-hand balances of each item in inventory. Dollar values can be included to show capital invested in inventory and changes in capital investment between opening and closing balances. Also, comparative past balances can be included to show changes in inventory levels over periods of time. The "service position" area of the report is printed only if the on-hand stock falls below the order point. In this case, the order point and the amount short of the order point are printed. Safety stock and the amount short of the safety stock are printed if the on-hand balance is below the safety stock. Totals of on-hand stock are balanced to control figures. This report is printed monthly, quarterly, or as needed.

INVENTORY CONTROL LISTING												
DATE XX XX XX												
ITEM NO	P.O.NO	RECEIPTS		U M	ORDERED	RECEIVED	SHORTAGE	QAN	QAL	FILLED BACK ORDERS		
		VENDOR	COST							CUST NO	ORDER NO	FILLED
XXXXXX XXXXXX	XXXXXX XXXXXX	XXXXXX XXXXXX	XX.XXX XX.XXX	AAA AAA	XXXXX XXXXX	XXXXX XXXXX	XXXXX XXXXX	*	*	XXXXXX	XXXXXX	XXXXX
TOTALS					XXXXXXXX *	XXXXXXXX * (CC)	XXXXXXXX*			UNFILLED FILLED		XXXXXXXX* (HH) XXXXXXXX* (II)
ITEM NO	ORDER NO	RETURNS CUST NO	PRICE	U M	QUANTITY							
XXXXXX XXXXXX	XXXXXX XXXXXX	XXXXXX XXXXXX	XX.XX XX.XX	XXX XXX	XXXXXX XXXXXX							
TOTAL					XXXXXXXX *	(JJ)						
ITEM NO	MEMO NO	ADJUSTMENTS NEW COST			QUANTITY							
XXXXXX XXXXXX	XXXXXX XXXXXX	XX.XXX XX.XXX			XXXXXX- XXXXXX-							
TOTAL					XXXXXXXX-*	(EE)						
ITEM NO	ORDER NO	COMMODITY CUST NO	PRICE		QUANTITY							
XXXXXX XXXXXX	XXXXXX XXXXXX	XXXXXX XXXXXX	XX.XX XX.XX		XXXXXX XXXXXX							
TOTAL					XXXXXXXX *	(BB)						

Figure 31. Control listing

TRANSACTION REGISTER										
DATE XX XX XX										
ITEM NO	COMMOD CLASS	UNIT MEAS	REFER CODE	DATE	ACTUAL TRANSACTIONS					
					RECEIPT	RETURNS	ADJUST	ISSUE		
XXXXXX XXXXXX XXXXXX XXXXXX XXXXXX	XXX AAA XXX AAA XXX	AAA AAA AAA AAA AAA	XXXXXX XXXXXX XXXXXX XXXXXX XXXXXX	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX	XXXXX		XXXXX		XXXXX XXXXX	
TOTALS					XXXXXXXX (CC)	XXXXXXXX (EE)	XXXXXXX	XXXXXXX	XXXXXXX (JJ)	
					FILLED B/O (II)		XXXXXX			
					BEGIN COMMOD (BB)		XXXXXX			

Figure 32. Transaction register

INVENTORY ACTION REPORT														
DATE XX XX XX														
COMMOD CLASS	ITEM NO	DESCRIPTION	UNIT MEAS	OPEN BAL	ACTUAL TRANSACTIONS					ACTION				
					RECPT	RETURN	ADJUST	ISSUES	NEW ON HAND	ORDER POINT	SAFT STK	OP	EXP	
XXX	XXXXXX XXXXXX	AAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAA	AAA AAA	XXXXXX XXXXXX	XXXXX XXXXX	XXXXX XXXXX	XXXXX XXXXX	XXXXX XXXXX	XXXXX XXXXX	XXXXX XXXXX	XXXXX XXXXX	XXXXX XXXXX	*	*
TOTALS				XXXXXXXXX (FF')	XXXXXX (CC)	XXXXXX (JJ)	XXXXXX (EE)	XXXXXX	XXXXXX (II) (BB)	XXXXXX (FF)				
					FILLED B/O END ISSUES		XXXXXX							

PARTIAL B/O XXXXX (GG)  
 NEW B/O XXXXX (GG)  
 TOTAL B/O XXXXX (XX)

Figure 33. Action report

**Back-Order Register**

This register (Figure 35) is printed each day to show the current status of back-ordered items. The register is in item-number sequence and shows all pertinent information related to the customer order being delayed. Also, the number of days elapsed since the customer order was placed is listed, as well as the quantity back-ordered and the gross profit (cost less sales) related to each back order. Total delayed gross profit is printed and represents the gross profit delayed by out-of-stock conditions. Total back-order quantity is divided into unfilled and new back orders. These back-order totals are then balanced to control figures.

**On-Order Register**

This register (Figure 36) is printed each time purchase orders are written. It lists all outstanding orders for stock in item-number sequence and contains descriptive information about each purchase order, plus a summary of the activity for each purchase order. The "activity summary" section indicates the quantity originally ordered, quantity still on order (assuming partial shipments or damaged goods may be received), and "difference code". A total of new orders and a total on-order quantity are printed and balanced to control figures.

DATE XX XX XX		STOCK STATUS SUMMARY											
COMMOD CLASS	ITEM NO	DESCRIPTION	UNIT MEAS	UNIT COST	CURRENT ACTIVITY					SERVICE POSITION			
					OPEN BAL	OPENING VALUE	NEW BAL	NEW VALUE	NET VAL CHANGE	ORDER POINT	ORD PT DIFFER	SAFT STK	SF ST DIFF
XXX	XXXXXX XXXXXX	AAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAA	AAA AAA	XXXXX XXXXX	XXXXX XXXXX	XXXXXX XXXXXX	XXXXX XXXXX	XXXXXX XXXXXX	XXXXXX- XXXXXX-	XXXXX XXXXX	XXXXX- XXXXX-	XXXX XXXX	XXXX- XXXX-
TOTALS					XXXXXX (FF')	XXXXXXXX (FF')	XXXXXX (FF)	XXXXXXXX (FF)	XXXXXXXX-	← PRINT IF NEGATIVE →			

Figure 34. Stock status summary

DATE XX XX XX		BACK ORDER REGISTER - FOR RESALE								
COMMOD CLASS	ITEM NO	DESCRIPTION	UNIT MEAS	CUST NO	CUST ORDER NO	ORDER DATE	ELAPSED DAYS	QUANTY BACK-ORDERED	DELAYED GROSS PROFIT	
XXX	XXXXXX XXXXXX	AAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAA	AAA AAA	XXXXXX XXXXXX	XXXXXX XXXXXX	XX XX XX XX XX XX	XXX XXX	XXXXX XXXXX	XXXXX XXXXX	
TOTALS								UNFILLED B/O NEW B/O	XXXXX (HH) XXXXX (GG) XXXXXX (XX)	XXXXXX

Figure 35. Back-order register

DATE XX XX XX		ON ORDER REGISTER								
COMMOD CLASS	ITEM NO	DESCRIPTION	UNIT MEAS	TRANSACTION DESCRIPTION				ORDER ACTIVITY		
				VENDOR NO	PURCH ORD NO	ORDER DATE	VENDOR STOCK NO	QUAN ORDERED	STILL ON ORD	DIFF CD
XXX	XXXXXX XXXXXX	AAAAAAAAAAAAAAAAAAAA AAAAAAAAAAAAAAAAAAAA	AAA AAA	XXXXXX XXXXXX	XXXXXX XXXXXX	XX XX XX XX XX XX	XXXXXX XXXXXX	XXXXX XXXXXX	XXXXX XXXXX	X X
NEW ON ORDER								XXXXX XXXXXX (YY)	(DD)	

Figure 36. On-order register

## BATCH BILLING INVENTORY CONTROL

Batch billing inventory control ties the inventory control procedure in with the billing procedure. Since billing provides the entries to accounts receivable and sales analysis, the batch billing method provides a clear way of tying the inventory, billing, accounts receivable and sales analysis applications into a unified system. With batch billing, all items ordered are punched into partially punched commodity cards rather than being pulled from a tub file. Receipt cards are punched for items received from vendors. Return cards are punched for items returned by customers. Adjustment cards are punched for adjustments to items in inventory. These four types of cards, as a group, are considered transaction cards.

When a batch of transaction cards has been keypunched, proved, sorted into item-number sequence, they are listed to produce the transaction register, a listing of daily transactions against each stock item, providing an audit trail of daily inventory activity. The transaction cards are then matched against the balance cards; indicative data is gang-punched from the balance cards into the transaction cards and updated balance cards are punched. An action report is produced from the transaction and balance cards and lists only those items for which reorder activity or other attention is necessary.

Transaction cards are separated from the balance cards. The commodity cards enter the billing application, where invoices are produced and accounts receivable cards are punched. The accounts receivable cards enter the accounts receivable application, and items-ordered cards (commodity cards) enter the sales analysis application. A listing of the status of all items in inventory may be periodically produced. Such a stock status report can contain comparative figures as well as current unit and dollar figures per item.

Batch billing inventory control, like all other inventory control applications, should be carefully controlled for accuracy. The controls should include checking all transaction cards, all files used, and revenue involved. The revenue figures, representing gross sales billed from commodity cards, should be balanced with the subsequent accounts receivable and sales analysis applications.

The batch billing inventory control application may contain a back-order procedure and an on-order file. The application can be handled by the Model 20 using a separate reader and punch, or by

the multi-function card machine, or by a combination of the MFCM and separate reader or punch. The batch billing flowcharts and explanations show how the application can be performed with the MFCM, the MFCM and punch, or the reader and punch. The flowcharts also show the control totals that appear on each report and the organization of the control sheets. While no control procedure is shown in the flowcharts of batch billing with an MFCM and punch, it would be the same as that in the flowcharts of batch billing with only the MFCM.

The batch billing procedures are shown in detail to illustrate a completely planned and integrated approach to an application using the Model 20.

### Batch Billing of Finished Goods with Back Orders — MFCM (Figure 37)

#### Step 1

Four initial entries are made to the inventory control and batch billing procedure. A receipt card is keypunched from the packing slip or other receiving document. Adjustments to inventory are keypunched. Skeleton commodity cards, a miscellaneous data card, and a card with customer number, order number and card code are keypunched for each customer order. The miscellaneous data and customer number cards are held for billing. Receipt, adjustment, and commodity cards are sorted separately by item number.

#### Step 2

The receipts, followed by adjustment cards and commodity cards, are placed in the primary feed, and the back-order file is placed in the secondary feed of the MFCM. During run 1, the cards are listed and totaled. Also at this time, the receipt cards are matched against the back-order file to select those back-order cards that can be completely filled. Totals of unfilled back orders (HH) and filled back orders (II) are posted to the inventory control summary sheet. Totals of receipts (CC), adjustments (EE) and commodities (BB) are balanced to the tapes and posted to the inventory control summary sheet. Unfilled back orders can be selected out or left in the deck to reduce back-order file processing by one run (as shown). Filled back-order cards are punched to identify them as such.

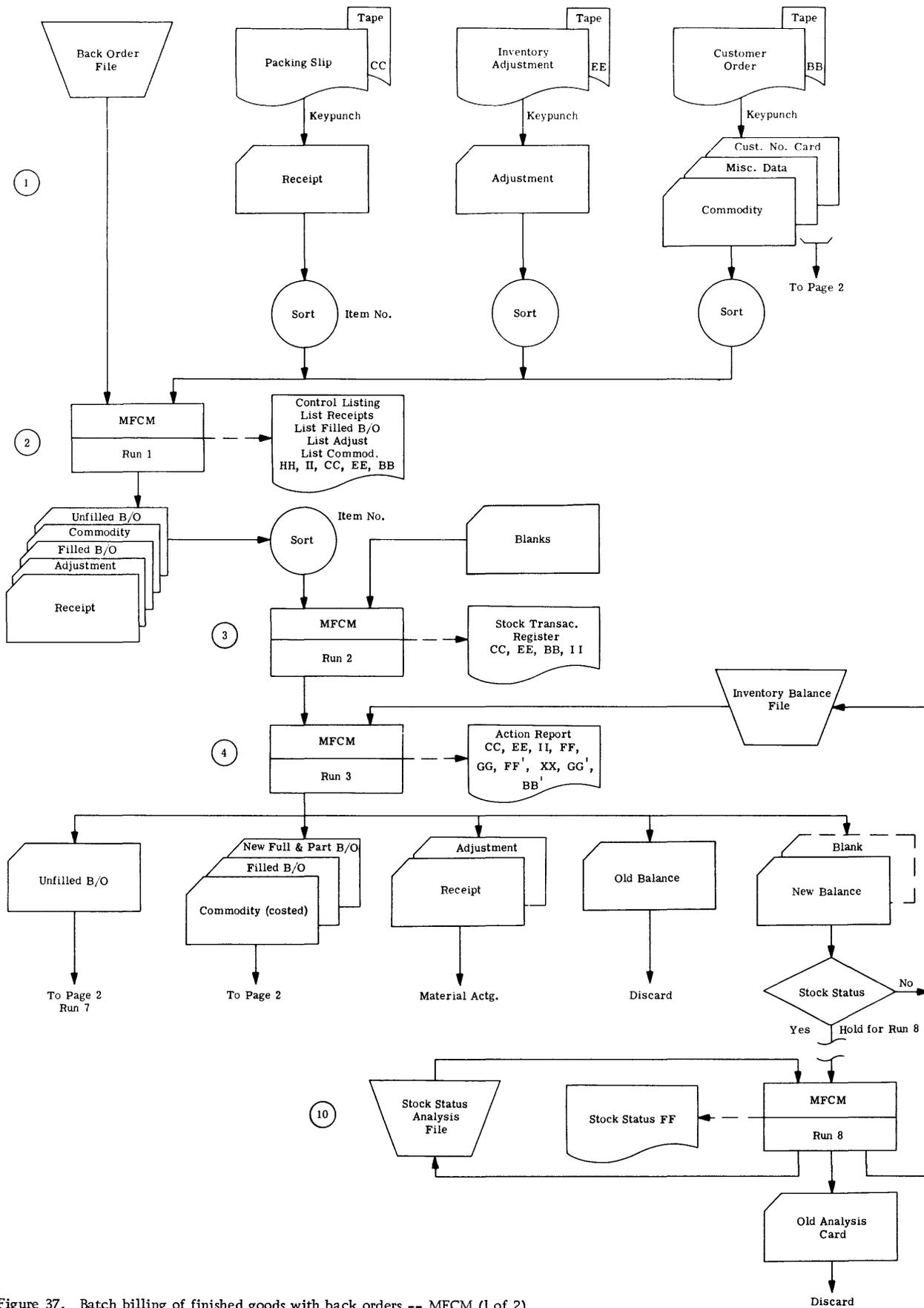
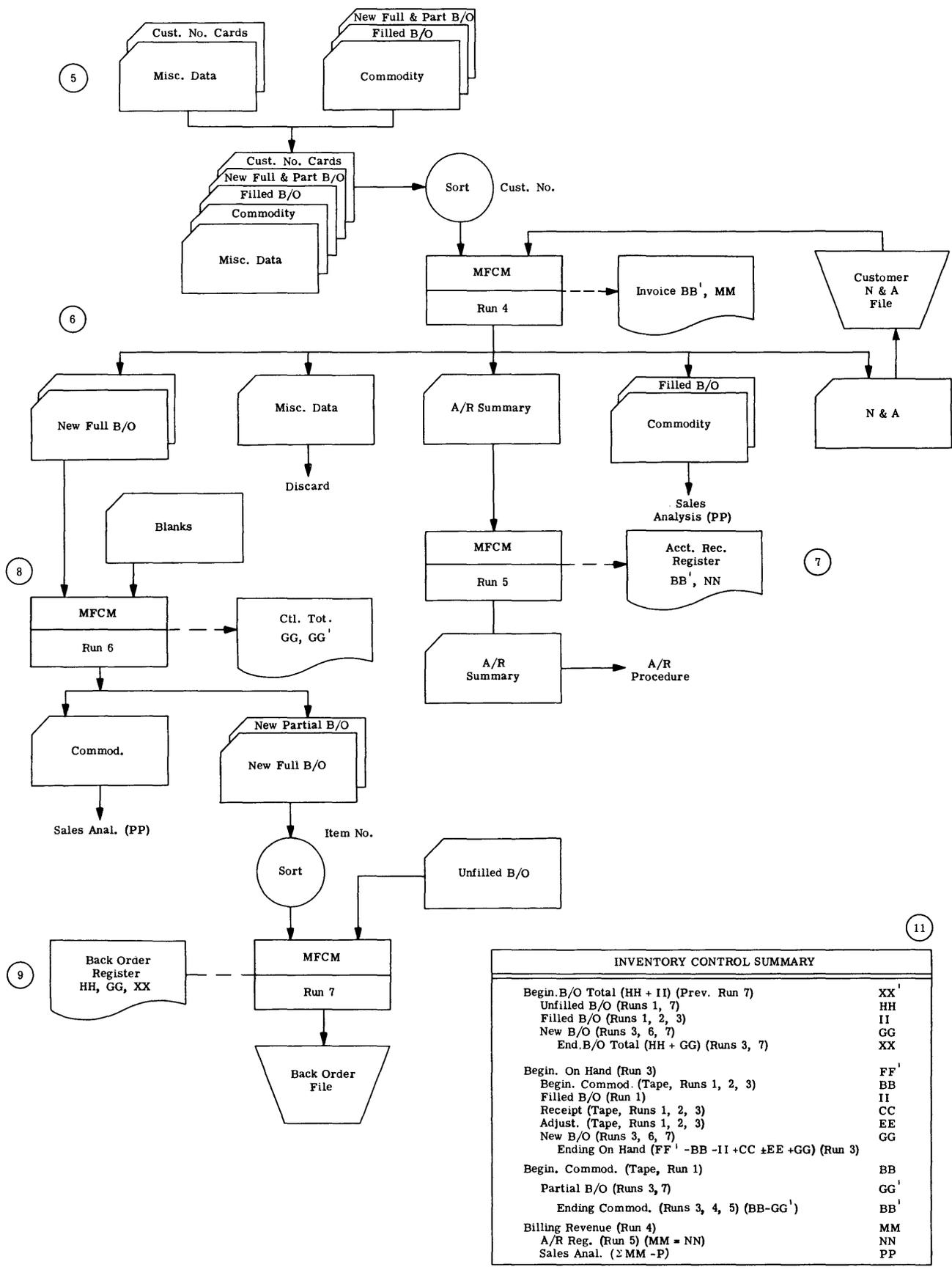


Figure 37. Batch billing of finished goods with back orders -- MFCM (1 of 2)



INVENTORY CONTROL SUMMARY	
Begin. B/O Total (HH + II) (Prev. Run 7)	XX <sup>1</sup>
Unfilled B/O (Runs 1, 7)	HH
Filled B/O (Runs 1, 2, 3)	II
New B/O (Runs 3, 6, 7)	GG
End. B/O Total (HH + GG) (Runs 3, 7)	XX
Begin. On Hand (Run 3)	FF <sup>1</sup>
Begin. Comod. (Tape, Runs 1, 2, 3)	BB
Filled B/O (Run 1)	II
Receipt (Tape, Runs 1, 2, 3)	CC
Adjust. (Tape, Runs 1, 2, 3)	EE
New B/O (Runs 3, 6, 7)	GG
Ending On Hand (FF <sup>1</sup> - BB - II + CC ± EE + GG) (Run 3)	
Begin. Comod. (Tape, Run 1)	BB
Partial B/O (Runs 3, 7)	GG <sup>1</sup>
Ending Comod. (Runs 3, 4, 5) (BB - GG <sup>1</sup> )	BB <sup>1</sup>
Billing Revenue (Run 4)	MM
A/R Reg. (Run 5) (MM = NN)	NN
Sales Anal. (Σ MM - P)	PP

Figure 37. Batch billing of finished goods with back orders -- MFCM (2 of 2)

### Step 3

All transaction cards are sorted by item number and listed by the Model 20 during run 2 to produce the inventory transaction register. Also, during run 2 a blank card is merged behind each item-number group. Totals of receipts (CC), adjustments (EE), beginning commodities (BB) and filled back orders (II) are balanced to the inventory control summary sheet.

### Step 4

Cards from run 2 and the inventory balance file are processed during run 3 to produce the action report and an updated inventory balance file. Average unit cost is calculated and punched in commodity and balance cards (if average costing is done). Description and other data is punched in commodity cards from balance cards. Quantity shipped is punched in commodity cards if different from quantity ordered (if the same, a control punch may be punched instead). The unfilled back-order cards are held for run 7. The filled commodity, filled back-order, and back-ordered commodity cards are held for billing. Adjustment and receipt cards are held for material accounting. The old balance cards are discarded. The total receipts (CC), adjustments (EE), and filled back orders (II) are balanced to the inventory control summary sheet. Total beginning on-hand (FF'), ending on-hand (FF), newly back-ordered commodities (GG), total back orders (XX), partial back orders (GG') and ending commodities (BB') are posted to the inventory control summary sheet.

### Step 5

Miscellaneous data and customer number cards are assembled with commodity, filled back-order and new back-order cards in the grouping shown. They are then sorted by customer number to prepare them for billing.

### Step 6

The cards from step 5 are merged against the customer name and address file in the MFCM on run 4 as invoices are printed. Accounts receivable summary cards are punched (in the customer number cards) and held for run 5. The customer name and address file is selected into a pocket undisturbed. Commodity and filled back-order cards are selected out for sales analysis. Miscellaneous data cards are selected and discarded. New back-order cards are held for run 6. Ending commodity total (BB') is balanced to inventory control summary.

Billed revenue (MM) is posted to inventory control summary.

### Step 7

The accounts receivable summary cards are read by the MFCM on run 5 to produce the accounts receivable register. Accounts receivable summary cards then become input to the accounts receivable procedure. Ending commodity total (BB') is balanced to the inventory control summary. Total receivables (NN) is posted to inventory control summary.

### Step 8

The new back-order cards are listed on run 6 and duplicates of the partial back orders are punched from blanks in the MFCM. The back-order amount becomes quantity ordered, and the quantity-shipped field is blank. New back-order cards are sent to sales analysis to account for the filled portion of the partially filled commodity cards. The duplicate cards are kept with new full back-order cards to account for the unfilled portion of the partially filled commodity cards. Totals of new back orders (GG) and partial back orders (GG') are balanced to the inventory control summary.

### Step 9

All new back-order cards are merged with unfilled back-order cards in the MFCM during run 7. The merged deck becomes the new back-order file. The back-order register is printed and totals of unfilled back orders (HH) and new back orders (GG), and the ending back-order file (XX) are balanced to the inventory control summary.

### Step 10

The new inventory balance cards can be used to produce the stock status report during run 8, when desired. If two blanks are merged on run 2, a comparative stock status report can be obtained with the use of an analysis file, which is updated on run 8. The ending on-hand (FF) figure is balanced to the inventory control summary sheet.

### Step 11

The inventory control summary sheet allows the inventory control procedure to be completely checked for errors. The type of control is determined by the type of starting control figures on the tapes in step 1. The inventory control summary

sheet is composed of four sections: back orders, on-hand, commodities, and revenue.

Back orders. This section provides control over the back-order file. The beginning balance of the back-order file (XX') is balanced to the total of unfilled (HH) and filled back orders (II). If (HH + II) does not balance to the beginning back-order figure (XX'), some of the back-order file is missing and a back-order register should be run on step 1 and checked against the back-order register produced the last time the back-order file was updated. The ending back-order file (XX) is checked by balancing it to the unfilled back orders (HH) plus new back orders (GG).

On-hand. This section provides control over the inventory balance file and current transaction cards. The beginning on-hand (FF') figure is actually the ending on-hand (FF) figure from the last inventory control procedure. The new ending on-hand (FF) is checked by calculating it with the following expression:

$$\begin{aligned} \text{Ending on-hand} = & \text{beginning on-hand} - \\ & \text{beginning commodity} - \text{filled} \\ & \text{back orders} + \text{receipt} \pm \\ & \text{adjustments} + \text{new back} \\ & \text{orders} \end{aligned}$$

All factors of the above expression except ending on-hand are obtained from the inventory control summary. If the calculated ending on-hand does not balance to the ending on-hand figure printed on the inventory action report, the transactions should be separated, listed, totaled and checked against

the control tapes. This should locate the out-of-balance type of transactions. A comparison, item by item, of the listing for the transaction in error with the control listing of run 1 should locate the extra, incorrect, or missing cards.

Commodities. This section is needed when partial back orders are processed. In this case, ending commodity cards (separate from fully back-ordered commodity cards) contain possible partial back-order amounts. The beginning commodity figure (BB) must therefore be reduced by the partial back-order total (GG') to arrive at the ending commodity figure (BB'). The ending commodity figure is determined by the following expression:

$$\begin{aligned} \text{Ending commodities} = & \text{beginning commodities} - \\ & \text{partial back orders} \end{aligned}$$

The calculated ending commodity figure is balanced to the ending commodity figure printed during runs 3, 4, and 5. When an out-of-balance condition exists, all commodity cards should be listed to check for missing, incorrect, or extra cards.

Revenue. This section provides control over the billing, accounts receivable, and sales analysis procedures, which are closely connected with the inventory control procedure. The billing revenue (MM) is balanced to the total receivables (NN) entering the accounts receivable procedure. Since sales analysis is obtained periodically, the sales analysis total (PP) is balanced to the sum of the billing revenue totals ( $\Sigma$  MM) accumulated since the last analysis procedure.

Batch Billing of Finished Goods without Back Orders — MFCM, Punch (Figure 38)

Step 1

The commodity cards, receipt cards, and adjustment cards are keypunched from customer orders, receiving slips, and adjustment memos respectively. They are placed in the primary feed of the MFCM. During run 1, the transaction cards are listed and totaled on the inventory control listing.

Step 2

The commodity, receipt, and adjustment cards are sorted by item number and placed in the primary feed, and the inventory balance file in the secondary feed of the MFCM. Blank cards are placed in the punch. During run 2, the transaction register and action report is printed, new balance cards are created in the punch, and the files in the MFCM are separated in the stackers.

Step 3

The commodity cards are sorted by customer number and placed in the primary feed of the MFCM. The customer name and address file is placed in the secondary feed of the MFCM. Blank cards are placed in the punch. During run 3 the printer prepares the invoices and the punch creates the accounts receivable summary cards. The commodity cards are selected in pocket 1 of the MFCM to be used for sales analysis and allied reports, the name and address file is selected in pocket 2 undisturbed, and the unmatched transaction cards are selected for investigation.

Step 4

The new balance cards, created in step 2, are placed in the primary feed, and the unmatched balance cards, from step 2, are placed in the secondary feed of the MFCM. During run 4 the stock status report is prepared and the balance cards are merged. The stock status report need only be prepared when a complete inventory status is desired.

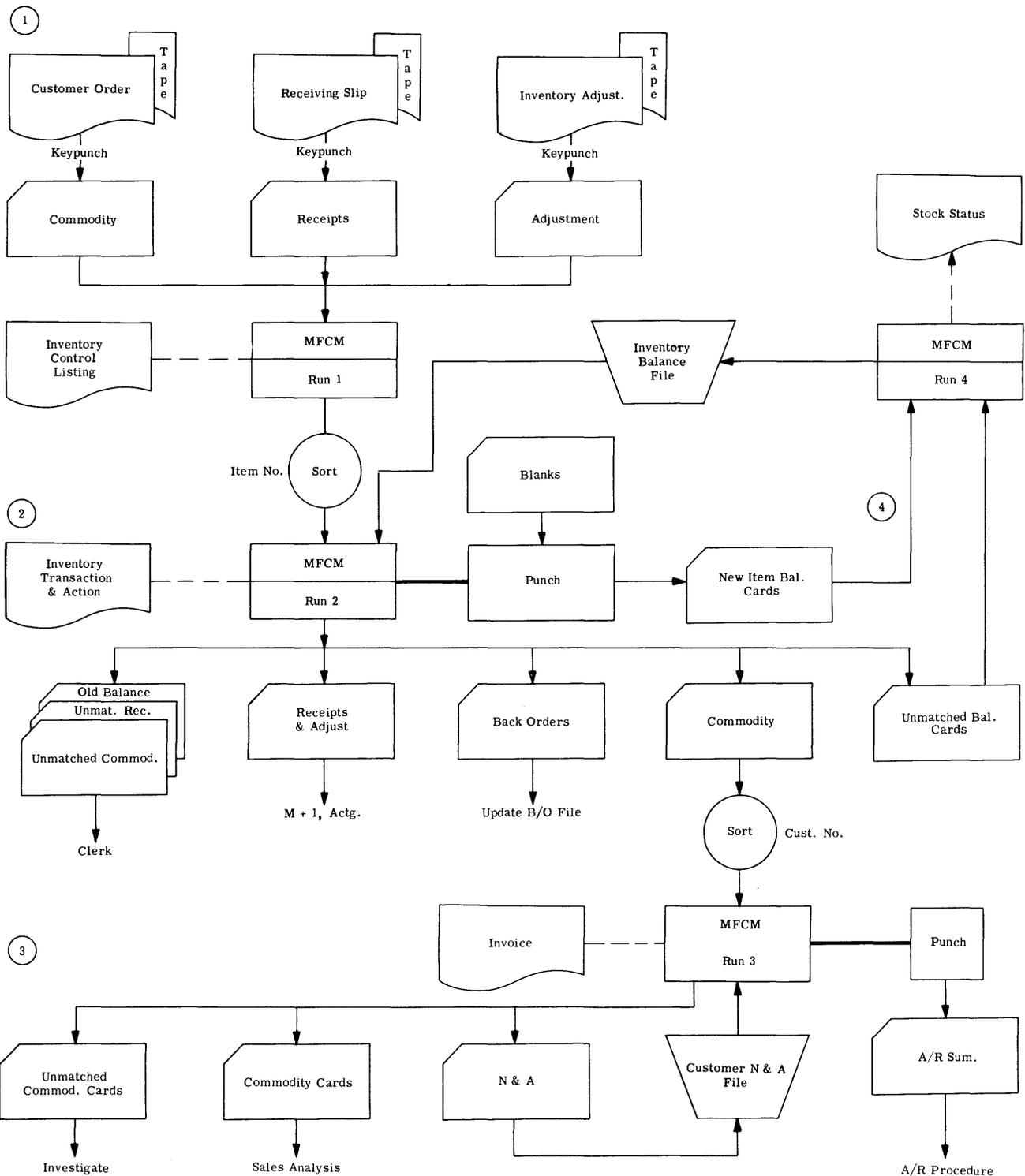


Figure 38. Batch billing of finished goods without back orders -- MFCM, Punch

Batch Billing of Finished Goods with Back Orders — Reader, Punch (Figure 39)

Step 1

Four initial entries are made to the inventory control and batch billing procedure. A receipt card is keypunched from the packing slip. Adjustments to inventory are keypunched. Commodity cards and a miscellaneous data card are punched for each customer order. Miscellaneous data cards are held for billing.

Step 2

The receipt cards are sorted by item number and commodity class and match-merged against the back-order file. Matched back-order cards are presumed to be fillable and are selected to enter the inventory control procedure.

Step 3

Receipt (CC), adjustment (EE), filled back-order (II), and commodity cards (BB) are listed and totaled on run 1, balanced back to the control tapes and posted to the inventory control summary sheet.

Step 4

The transaction cards from run 1 are sorted by item number and match-merged with the inventory balance file. Unmatched transaction cards are investigated for incorrect item number or missing inventory balance cards. The active inventory balance cards, followed by their transaction cards, produce the transaction register and action report during run 2. New balance cards are punched for active inventory items, and a back-order flag is punched for commodity cards that must be back-ordered (no partial back orders filled). The old balance cards are discarded, receipt and adjustment cards held for material accounting, and commodity and filled back-order cards held for step 6. The totals of beginning commodity (BB), receipts (CC), and adjustments (EE) are balanced to the inventory control summary sheet. The totals of beginning on-hand (FF'), ending on-hand (FF) and new back orders (GG) are posted to the inventory control summary sheet.

Step 5

The back-order flags are used to select the commodity cards that must be back-ordered, using a collator. The back-order flags are then discarded. Unselected commodity and filled back-order cards are then used for billing. The selected new back-order cards are held for run 5.

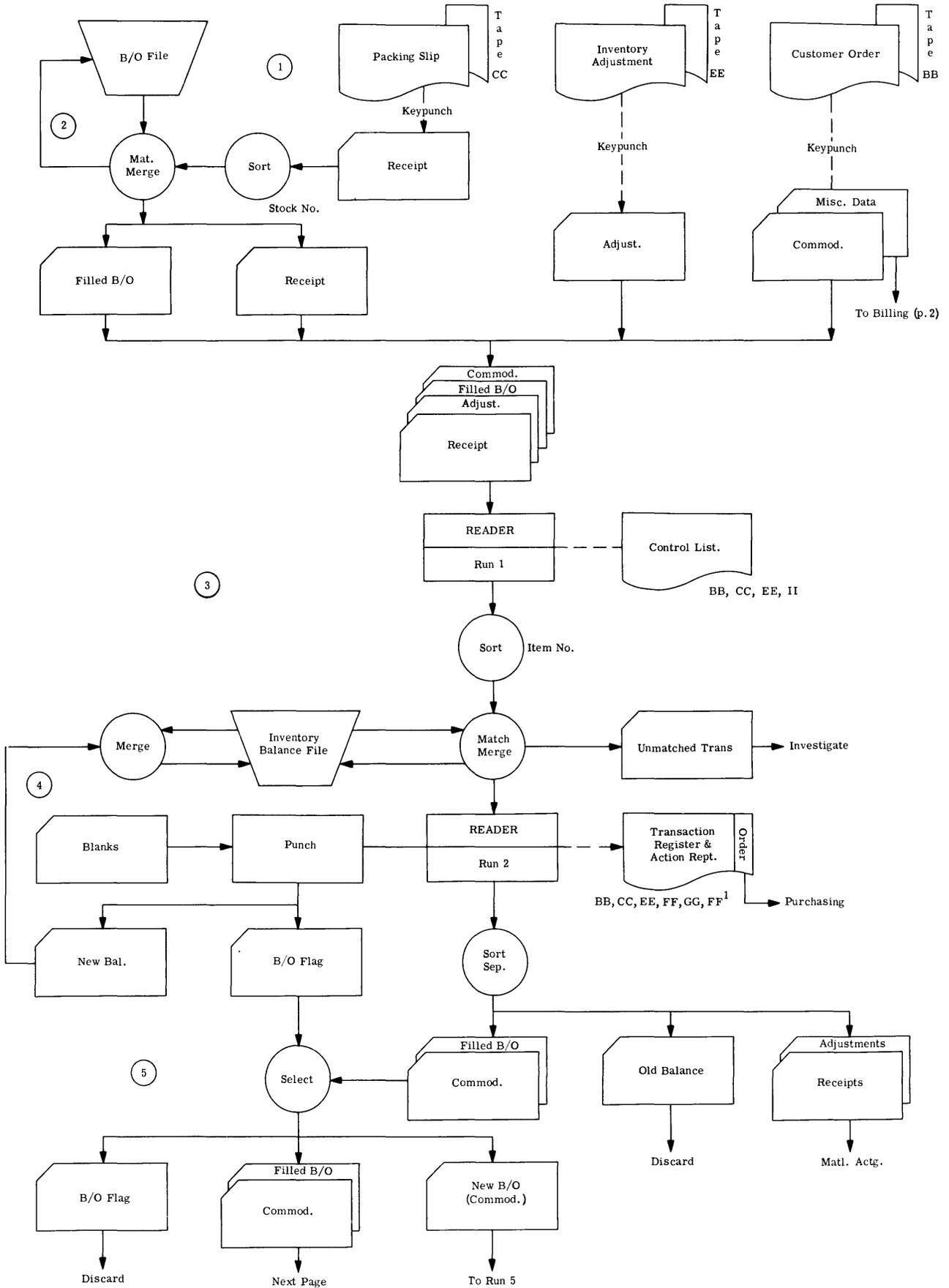


Figure 39. Batch billing of finished goods with back orders--reader and punch (1 of 3)

## Step 6

Commodity and filled back-order cards are merged with miscellaneous data cards by sorting on order number (if desired) and then customer number. These cards are match-merged with the customer name and address file. This merged deck is used to produce invoices during run 3. Accounts receivable summary cards are punched for each invoice. The billing cards are separated, name and address cards refiled, miscellaneous data cards discarded, and commodity cards held for sales analysis. The total billing revenue (MM) for the invoices is posted to the inventory control summary sheet.

## Step 7

The accounts receivable summary cards are used to produce the accounts receivable register during run 4. Invoice summary cards may be punched at this time and held for sales analysis. The total receivables (NN) on the accounts receivable register is posted to the inventory control summary sheet.

## Step 8

Selected new back-order cards from step 5 are merged with unfilled back-order cards to produce the new back-order file; the new back-order file is listed to produce the back-order register on run 5. An identifying punch is then gang-punched into the back-order cards. Total ending back-order amount (XX) is posted, and the new back-order amount (GG) is balanced to the inventory control summary sheet.

## Step 9

The inventory control summary sheet allows the inventory control procedure to be completely checked for error. The type of control is determined by the type of starting control figures on tapes in step 1. The inventory control summary sheet contains three sections: back orders, on-hand, and revenue.

Back orders. This section provides a control over the back-order file. The ending back-order file total (XX) from the back-order register is

balanced to the calculated ending back-order total derived as follows:

$$\text{Ending back orders} = \text{beginning back orders} - \text{filled back orders} + \text{new back orders}$$

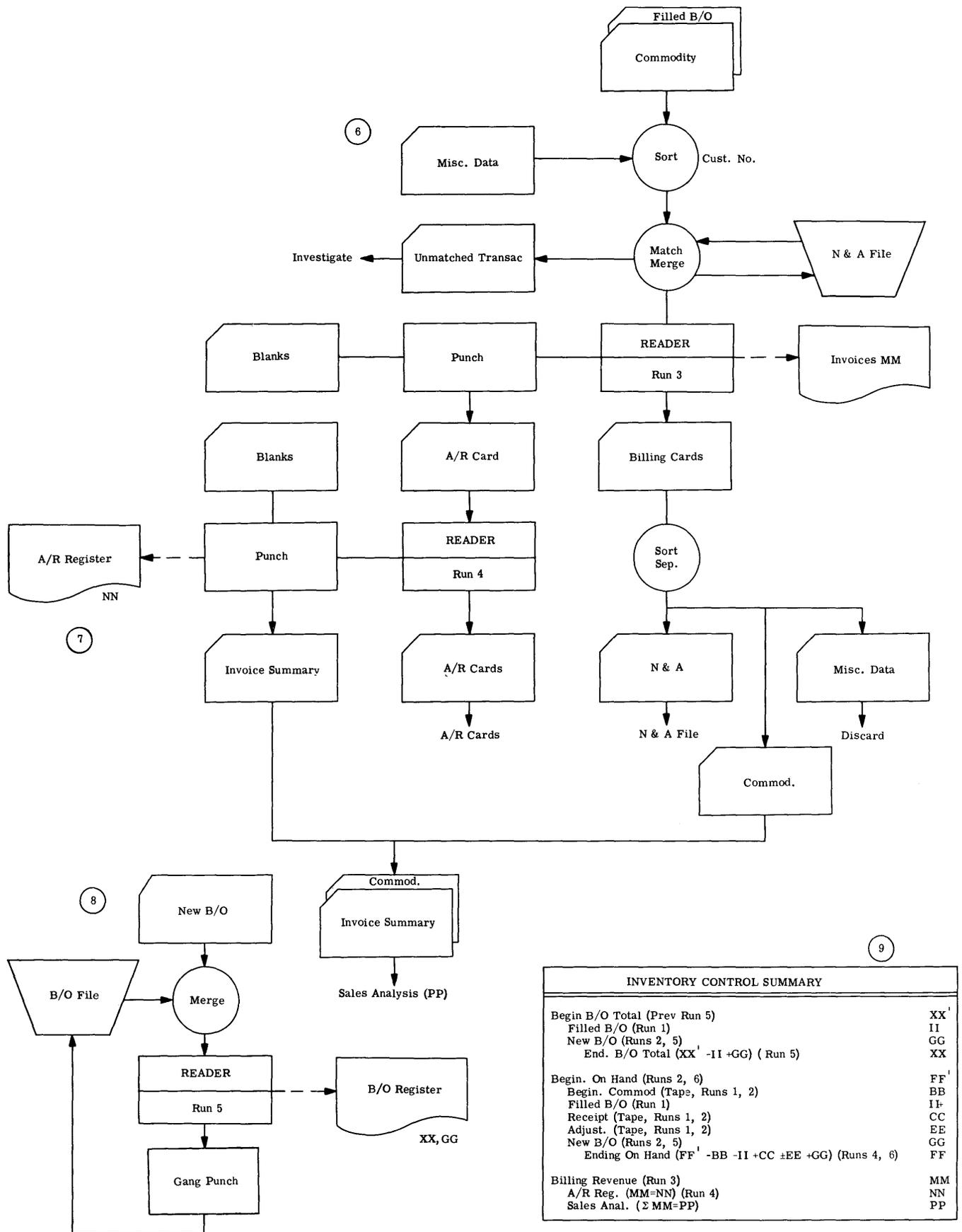
Beginning back orders (XX') is the ending back-order total from the previous inventory control procedure. All figures except ending back orders and beginning back orders are obtained from the inventory control summary. An out-of-balance condition requires that the filled back orders (II) and new back orders (GG) be listed. These lists, plus the previous back-order register (showing beginning back orders) and current back-order register, are needed to locate missing, incorrect or extra cards.

On-hand. This section provides a control over the inventory balance file and the current transaction cards. The new ending on-hand (FF) is checked by determining it as follows:

$$\text{Ending on-hand} = \text{beginning on-hand} - \text{beginning commodity} - \text{filled back orders} + \text{receipt} \pm \text{adjustments} + \text{new back orders}$$

All figures except ending on-hand are obtained from the inventory control summary. If the calculated ending on-hand figure does not balance to the on-hand figure printed on the inventory action report, the transactions should be separated, listed, totaled, and checked against the control tapes. This should locate the out-of-balance type of transaction. A comparison of the listed transactions in error with the control listing of run 1 should locate the extra, incorrect, or missing cards. The unit on-hand figure should be verified periodically by a physical inventory. The dollar on-hand figure represents the capital invested in inventory.

Revenue. This section provides control over the billing, accounts receivable, and sales analysis procedures, which are closely connected with the inventory control procedure. The billing revenue (MM) is balanced to the total receivables (NN) entering the accounts receivable procedure. Since sales analysis is obtained periodically, the sales analysis total (PP) is balanced to the sum of the billing revenue totals ( $\Sigma$  MM) accumulated since the last sales analysis procedure.



9

INVENTORY CONTROL SUMMARY	
Begin B/O Total (Prev Run 5)	XX <sup>1</sup>
Filled B/O (Run 1)	II
New B/O (Runs 2, 5)	GG
End. B/O Total (XX <sup>1</sup> -II +GG) (Run 5)	XX
Begin. On Hand (Runs 2, 6)	FF <sup>1</sup>
Begin. Commod (Tape, Runs 1, 2)	BB
Filled B/O (Run 1)	II <sup>1</sup>
Receipt (Tape, Runs 1, 2)	CC
Adjust. (Tape, Runs 1, 2)	EE
New B/O (Runs 2, 5)	GG
Ending On Hand (FF <sup>1</sup> -BB -II +CC ±EE +GG) (Runs 4, 6)	FF
Billing Revenue (Run 3)	MM
A/R Reg. (MM=NN) (Run 4)	NN
Sales Anal. (Σ MM=PP)	PP

Figure 39. Batch billing of finished goods with back orders--reader and punch (2 of 3)

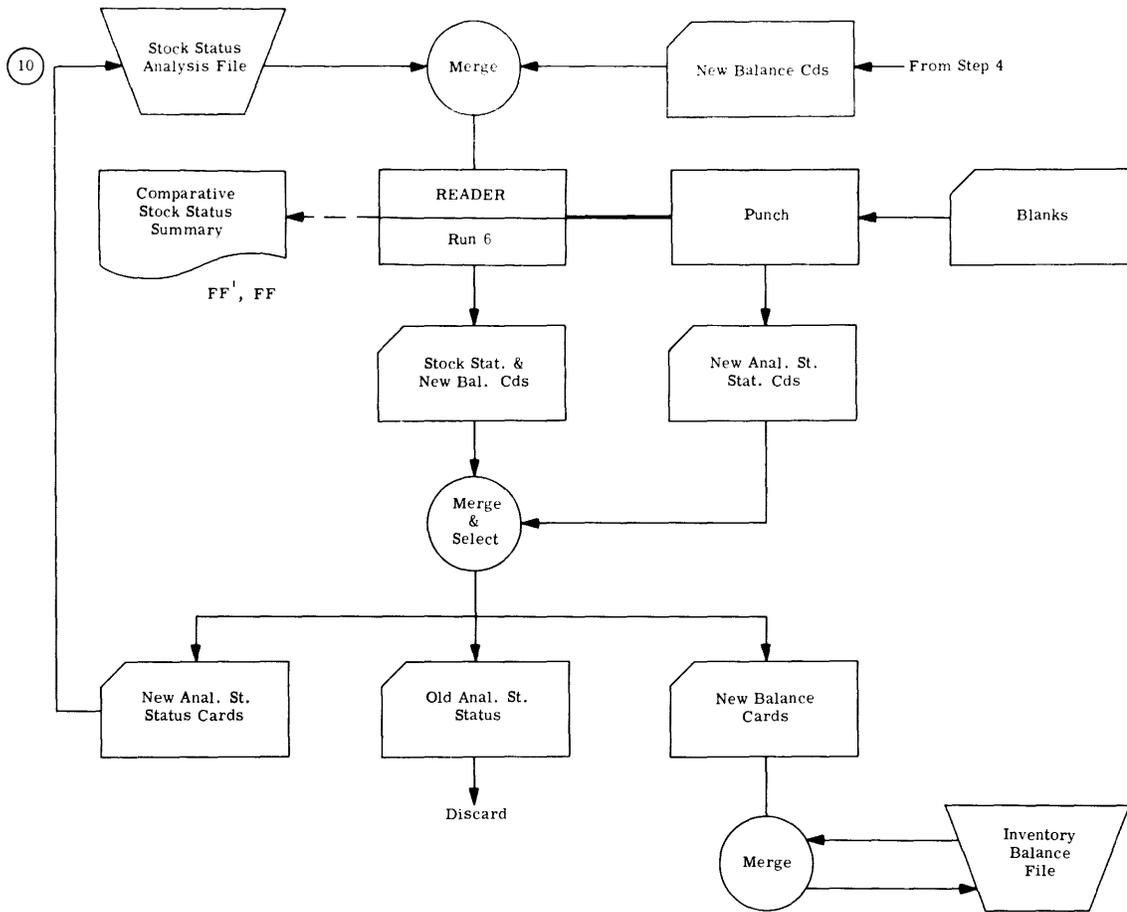


Figure 39. Batch billing of finished goods with back orders--reader and punch (3 of 3)

### Step 10

If a stock status summary is desired, the new balance cards are merged with the comparative stock status file (if comparative data is desired), and these cards are processed on the Model 20 to produce the comparative stock status summary and updated stock status analysis cards. The beginning (FF') and ending (FF) on-hand figures are balanced to the inventory control summary. The deck from run 6 and the new stock status analysis cards are

processed on the collator to produce the updated stock status analysis file, select out the stock status analysis cards that were updated, and select out the balance cards. The new balance cards are then merged into the inventory balance file. If no comparative data is required in the stock status summary, step 10 consists of merging the new balance cards into the inventory balance file and running the entire inventory balance file on run 6 to produce the stock status summary and control totals.



In some cases, generally where a larger ticket is desirable, a three-part IBM card (Figure 42) is used rather than a print/punch ticket or a conventional price tag. The IBM card price ticket is usually prepared as follows: When merchandise is received, a master card is punched for each lot of merchandise that differs in style, color or other sales characteristics. From these master cards a three-part ticket for each garment is reproduced in the MFCM and interpreted for greater readability by store personnel.

After the tickets are prepared they are attached to the garments with a string or tamper-proof seal. When the merchandise is sold, the sales portion of the tag is removed and returned to the accounting department. Sales statistics and inventory reports are then prepared the same way as for the print/punch ticket, except that the stub ticket is either read by an IBM reproducer with a stub card device, or used to hand-select the corresponding card from an inventory file.

Four basic reports are produced during the merchandise control application: the sales report, the inventory transaction register, the sales and inventory report, and the class price line report. In addition to these reports, others can easily be developed by sorting and summarizing the sales cards in different manners. Thus, reports showing sales by item within color, or by item within size, or by item within material, etc., can be produced according to the needs of the user.

The sales report in Figure 43 shows the sales of a dress department broken down into size within color, within style, within manufacturer, within merchandise classification. The entire sales report is in department-number order and lists this information for all items sold in all departments. This report is prepared either daily, several times a week, or weekly, depending upon the volumes and requirements of the individual store or department.

The inventory transaction register for merchandise control application is a listing of all transaction cards used to update the inventory balance file.

The sales and inventory report (Figure 44) relates the sales to remaining inventory levels. This report is less detailed than the sales report, since the information is broken down only by style level. The sales and inventory report is a type of inventory velocity report, since it shows the changes in sales over the past four time periods.

The gross profit information, combined with the velocity figures, can make the sales and inventory report more valuable.

The class price line report (Figure 45) shows sales broken down by price line within merchandise classification. This report provides one of the most common types of classification control, in that sales and inventory figures in units and dollars are maintained for a similar class and price-group of items in a department. The report provides a broad

Figure 42. Three-part IBM card sales ticket



## Merchandise Control - MFCM (Figure 46)

### Step 1: Receipts

Items on order are represented by cards in the on-order file. When orders are received, the cards representing the orders are pulled from the on-order file and the quantity received is punched in cards. For damaged goods or a partial shipment, an on-order card representing the balance of the order still to be received is punched and filed in the on-order file. Receipt cards are then held for step 5.

### Step 2: Sales

After merchandise is received, it is ticketed and forwarded to the selling floor as it is needed. When a sale is made, the print/punch price ticket is removed and held until the end of the day. The tickets are then forwarded to the data processing department, where they are separated into groups of mutilated tickets, regular tickets, and tickets of marked-down merchandise. The mutilated tickets are converted to punched cards by a keypunch operator. The regular tickets are processed through an IBM 549 Ticket Converter. All information stored in the price ticket, plus additional information of a

fixed nature, such as store number, type of transaction, and date, is punched into IBM cards. Markdowns are also processed by the converter and all fields are punched with the exception of sales price, which is manually punched after the ticket-converting operation.

The sales cards are sorted by department, class and style. Sales cards are then merged with blanks in the MFCM during run 1. The sales report is produced and sales summary cards are punched during run 1. The sales cards are held for sales analysis. The sales summary cards, one for each line on the sales report, are held for step 5.

### Step 3: Miscellaneous Transactions

Miscellaneous changes to inventory resulting from orders, customer returns, returns to manufacturers, and adjustments are keypunched into miscellaneous transaction cards. These cards are held for step 5.

### Step 4: Transfers

Interstore transfers, or transfers between departments, are punched into transfer cards as increases (transfers-in) or decreases (transfers-out) to inventory. These cards are held for step 5.

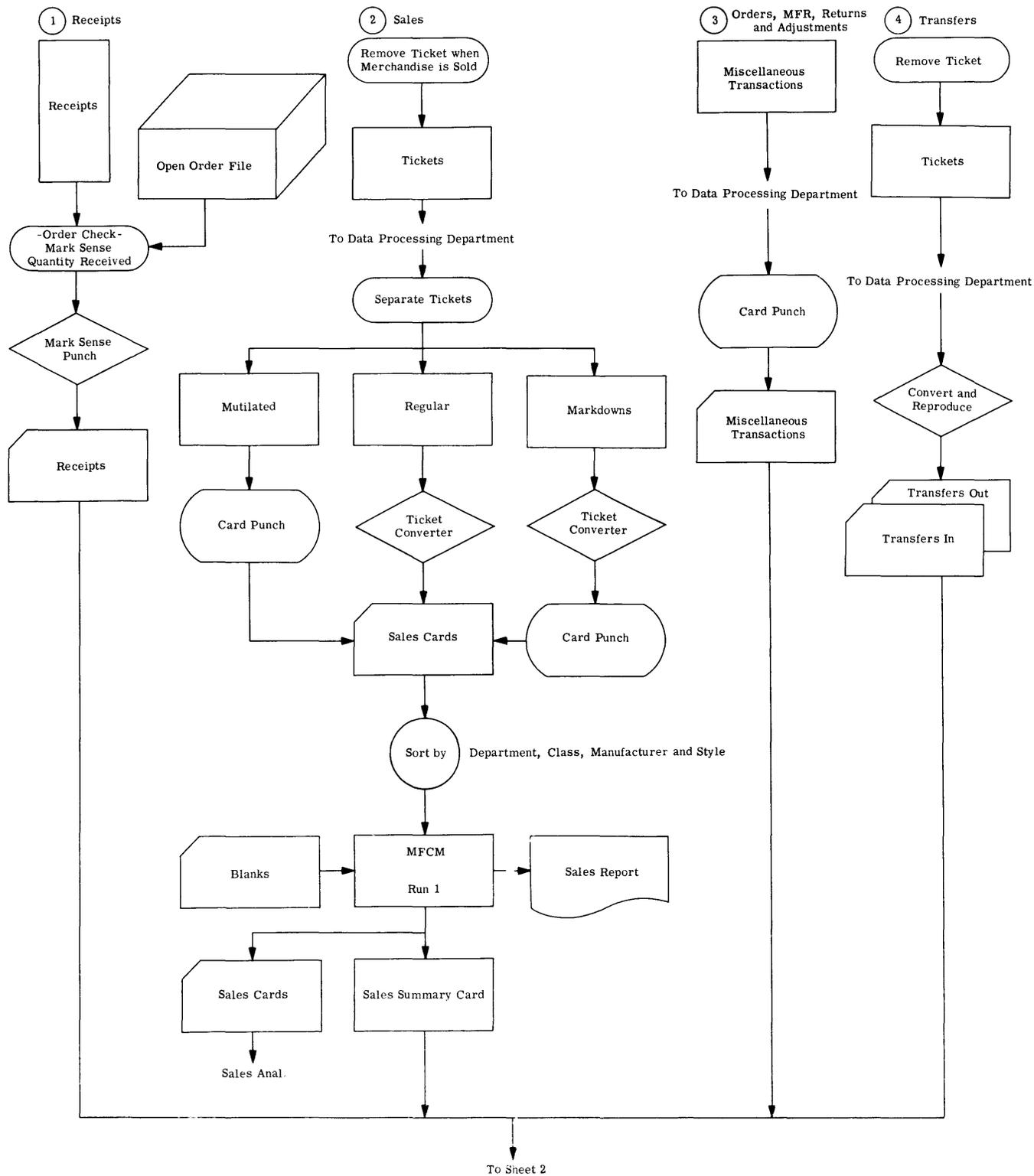


Figure 46. Merchandise control--MFCM (1 of 2)

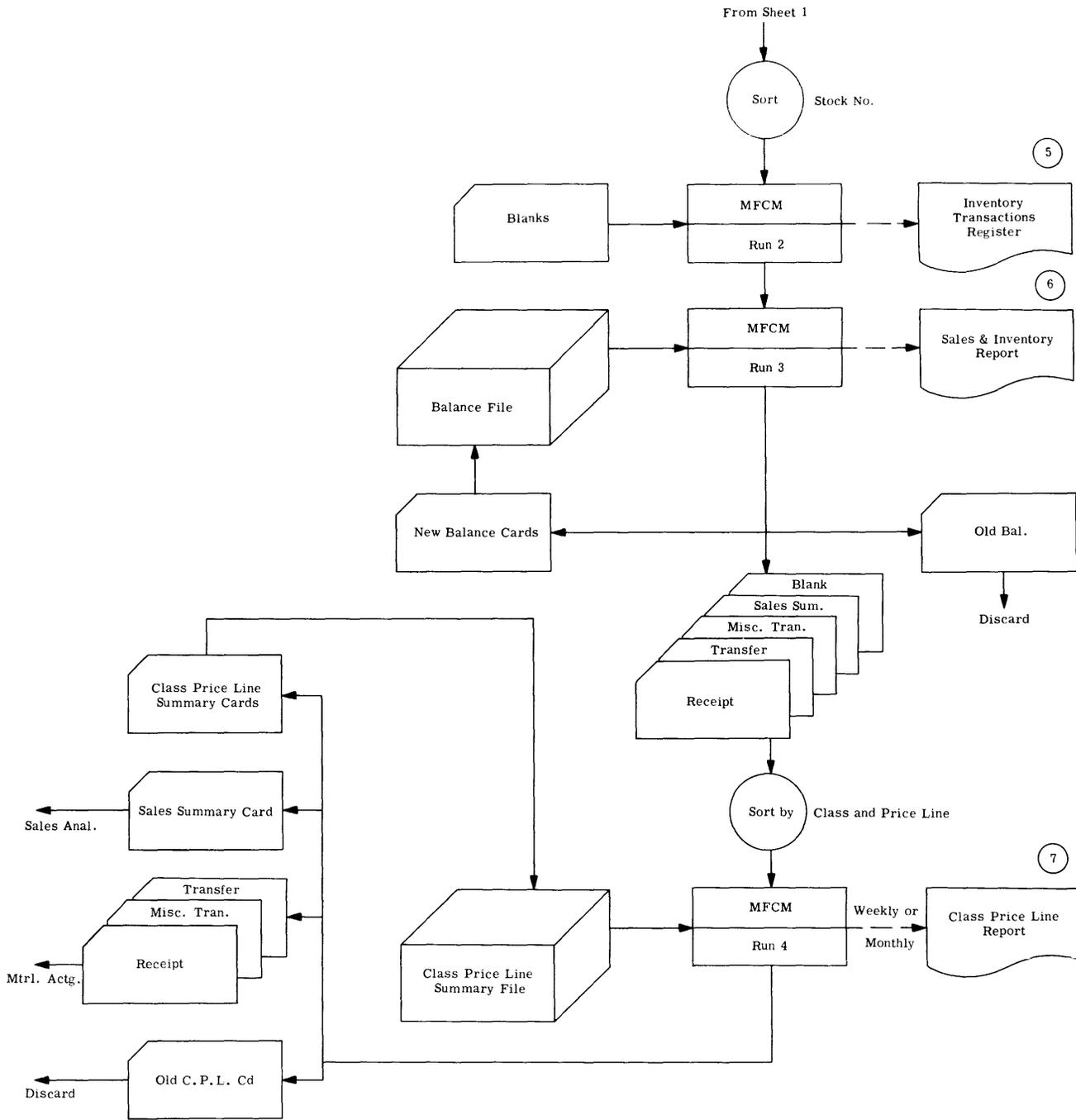


Figure 46. Merchandise control--MFCM (2 of 2)

#### Step 5

The receipts, followed by transfers, miscellaneous transactions, and sales summary cards, are sorted by stock number. The sorted cards are merged with blanks in the MFCM during run 2, and the inventory transaction register is produced. During run 2, two blank cards are merged behind each stock-number group.

#### Step 6

All transaction cards from run 2, with the two blank cards behind each stock-number group, are placed in the primary feed, and the inventory balance file in the secondary feed of the MFCM. During run 3, the sales and inventory report is produced. At the same time, the changes to the inventory balance file are punched, merged with the inactive inventory balance cards, and selected into pocket 1. The old

balance cards, selected into pocket 2, are discarded. The transaction cards, with one blank card behind each stock-number group, are selected into pocket 3 and held for step 7.

#### Step 7

The transaction and blank cards are placed in the primary feed and the class price line summary file in the secondary feed of the MFCM. During run 4, the class price line report is produced. Also during this run, the new class price line file is produced and selected into pocket 1. The sales summary cards are selected into pocket 2, to be used for sales analysis. Receipt, miscellaneous transaction, and transfer cards are selected into pocket 3, to be used for material accounting and/or other analysis reports. The updated old class price line summary cards are selected into pocket 4 and discarded.

ACCOUNTS PAYABLE

GENERAL

The two major functions of accounts payable are (1) the payment of bills (disbursements) and (2) the assignment of charges to the proper departments or accounts (distributions). Both functions are important because they deal with the use of company money.

Bills must be paid promptly in order to take advantage of available discounts within the prescribed time limit, and to maintain a good credit rating. Discounts earned can amount to large sums over a period of time; the loss of discounts directly reduces total profit. Loss of discounts implies late payments, which in turn may reflect on a company's credit status.

In addition, management must know how much was spent, to whom it was paid, and for what it was spent. Accurate and timely data for analysis is vital to this function.

Accounts payable cards (Figure 47) for disbursements and distribution are punched from the validated vendor's invoice. Because a disbursement is concerned with paying the total liability and establishing the discount amount, only one card is needed for this function.

For distribution, one card is usually punched for each line item on the vendor's invoice and contains the data for each item purchased and the distribution charge code. If a single item

cost is distributed to more than one account, one card is punched for each account number charged.

After punching, the cards are listed to prepare an invoice register (Figure 48). The invoice register is a permanent record of items of indebtedness which makes it possible to review any transactions without reference to the original documents. At the same time, the distribution cards for an invoice are balanced to the disbursement card to ensure correct punching. The sum of the distribution cards must equal the invoice amount punched in the disbursement card.

Totals accumulated during preparation of the register are balanced to previously established controls and posted to the accounts payable control sheet.

Most businesses schedule dates for writing and remitting checks. Before checks can be written, however, money must be available to cover their total dollar amount. Therefore, it is important that cash be made available to meet all obligations and that checks be written and remitted within the allowable period.

The cash requirements report (Figure 49) permits the company treasurer to adjust the cash balance in the accounts payable account to the minimum requirements for that payment date or to select items for payment; it also assures taking all possible discounts. When the necessary transfer of

The image shows two punched cards from a company's accounts payable system. The top card is a disbursement card for Vendor NIXON GL, Invoice No. 0240270064301123, dated 02/22/68, for an amount of 48420.47. The bottom card is a distribution card for the same vendor and invoice, dated 02/27/68, for an amount of 169.92. Both cards contain fields for vendor info, invoice details, and a grid of distribution codes.

Figure 47. Distribution and disbursement card forms



CHECK NO. 1645

**C & D DYEING AND FINISHING CO.** 1291 W. 33rd STREET STATEMENT OF REMITTANCE

DATE	NUMBER	YOUR VOUCHER NUMBER	AMOUNT	DEDUCTIONS	DISCOUNT	BALANCE
1/26/6-	33156	6430	\$ 367.17		7.34	\$ 359.83
1/27/6-	33887	6516	\$ 199.45	18.64	3.62	\$ 177.19
						\$ 537.02*

DETACH BEFORE DEPOSITING

**C & D DYEING AND FINISHING CO.**  
CHESTER, VERMONT

CHECK NO. 1645 DATE 2/04/6- EXACTLY \*\*537 DOLLARS 02 CENTS \$ \*\*\*537.02

			\$ 14.25	\$ .71	\$ 13.54*
--	--	--	----------	--------	-----------

**KRAUSZ MANUFACTURING COMPANY**  
SYRACUSE, NEW YORK STATEMENT OF REMITTANCE NEW YORK, NEW YORK

CHECK NUMBER	VENDOR	INVOICE DATE	VENDOR'S INVOICE NO.	INVOICE	DISCOUNT	AMOUNT PAID
12400410	AUSTERHOLZ INC	2/08/-	A 45920	\$ 624.77	12.50	\$ 612.27
	AUSTERHOLZ INC	2/09/-	A 45974	1,833.19	36.66	1,796.53

*Luoch L.A. Reynolds*  
PRES TREAS

**KRAUSZ MANUFACTURING COMPANY**  
SYRACUSE, NEW YORK

50-1003  
213

CHECK NUMBER	VENDOR	MO.	DAY	YR.
1240	04	16	6-	

PAY TO THE ORDER OF AUSTERHOLZ INC.

DOLLARS 2,408 CENTS 80

ACCOUNTS PAYABLE

**COMPANY**

**ODIN CHEMICAL CO.**  
BROCKTON, PA. STATEMENT OF REMITTANCE

	CHECK NUMBER	INVOICE DATE	VENDORS INVOICE NO.	CODE	INVOICE AMOUNT	DISCOUNT	NET AMOUNT
1. YOUR INVOICE	1242	1/23/6-	AB 2576	1	\$ 98.13	\$ 1.96	\$ 96.17
2. YOUR CR. MEMO.		1/28/6-	AB 2588	1	158.78	3.18	155.60
3. OUR DE. MEMO.		1/28/6-	CM 0085	2	25.00-	.50-	24.50-
4. OUR CR. MEMO.					\$ 231.91*	\$ 4.64*	\$ 227.27*

001242 **ODIN CHEMICAL COMPANY** 1-222  
BROCKTON, PA. 210

CHECK NUMBER	VENDOR NUMBER	MONTH	DAY	YEAR
	1179	2	02	6-

TO THE ORDER OF:  
NIXON GLASS  
NIXON, VIRGINIA

PAY → \$ 227 27

ACCOUNTS PAYABLE  
*C.H. Simmons*  
AUTHORIZED SIGNATURE

**BROCKTON BANK & TRUST COMPANY**  
BROCKTON, PA.

Figure 50. Remittance statements and checks

cash has been made, checks and remittance statements can be prepared.

A remittance statement accompanying a check is an explanation to the vendor of what obligations are covered by the payment, and the method used to arrive at the check amount. The actual types of remittance statements (Figure 50) are as varied as the businesses that use them, but their basic purpose is the same. When a continuous form is used, the remittance statement generally precedes the check.

The cash disbursements register (Figure 51) is a concise record of all payments made. It shows the vendor's name and number, items paid, check number, date, debit amount, discount amount and

credit amount of all checks issued for easy reference.

The factor that gives the truest basis for accounting records is actual cost. Expense records are based on experience, and all money paid out should be allocated to the phase of business operation that made the expense necessary.

At the end of each accounting period, the payables distribution cards that were accumulated from daily or periodic processing of payables are used to produce the accounts payable distribution report (Figure 52).

KRAUSZ MANUFACTURING CO.					
ACCOUNTS PAYABLE					
CASH DISBURSEMENTS REGISTER					
ROUTE TO <i>Mr. J. P. Patrick</i>					DATE APR 16 196-
					SHEET 1 OF 2
VENDOR	CHECK NO. VENDOR NUMBER	✓	ACCOUNTS PAYABLE		CREDIT
			DEBIT	DISCOUNT	CASH
SOLVAY GEN SUP	10160416		\$ 773.30	\$ 15.47	\$ 757.83
ROCHESTER PR CO	10210416		1,620.18	32.40	1,587.78
CALABRIA CONT	10490416		143.65	2.87	140.78
ONONDAGA STL CO	10770416		5,982.82	119.66	5,863.16
BLACK & NICHOLS	11030416		14.25	.71	13.54
AUSTERHOLZ INC	12400416		2,457.96	49.16	2,408.80
CHRISTIE & CO	13660416		745.54		745.54
WILSON & WILSON	22310416		2,936.12	58.72	2,877.40
CLAR. HIGGINS	25900416		1,000.00		1,000.00
HONOUR BROS	31010416		97.36	1.95	95.41
BASTIANI & SON	31120416		3,580.85	71.62	3,509.23
DRJ WIRE CO	31640416		256.90	5.14	251.76
HASTING-WHITE	32580416		1,144.42	22.89	1,121.53
DARONO ART MET	34270416		256.87	5.14	251.73

Figure 51. Cash disbursement register

HENRY JOHN & CO.													
ACCOUNTS PAYABLE DISTRIBUTION SUMMARY													
DATE MAR 30 196-													SHEET 3 OF 4
ENTRY CODE	INVOICE DATE	VENDOR ABBREVIATION	INVOICE NUMBER	VENDOR NUMBER	OUR VOUCHER NUMBER	ENT. CODE	ACCT. NO. GEN. SUB.	DEPT. CHG.	ITEM NUMBER	DUE DATE	QUANTITY	INVOICE AMOUNT	GENERAL LEDGER
		MACHINERY					364-080						
3/05	3/03	KESTON CASTINGS	41065	7604	41750	19	364-080	132	30236	3/13	6	\$ 347.85	
3/12	3/09	HASTING-WHITE	11333	8420	42916	19	364-080	031	1689	3/19	144	262.19	
3/13	3/12	KESTON CASTINGS	41988	7604	43008	19	364-080	132	51706	3/22	6	333.60	
3/15	3/13	KRAUSZ MFG CO	24092	3466	43262	19	364-080	100	104008	3/23	1	2,897.45	
3/15	3/13	KRAUSZ MFG CO.	24092	3466	43262	19	364-080	100	20343	3/23	1	1,390.11	
3/19	3/15	KESTON CASTINGS	42397	7604	46481	19	364-080	132	865	3/25	100	28.60	
3/19	3/15	KESTON CASTINGS	42397	7604	46481	19	364-080	132	518	3/25	72	97.21	
3/29	3/26	MIDWEST CAST CO	13738	8092	46826	19	364-080	132	1162	4/09	12	165.95	
3/29	3/26	KRAUSZ MFG CO	25164	3466	46829	19	364-080	100	187661	4/09	1	944.40	
		RAW STORES					364-126						
3/12	3/07	DRJ WIRE CO	44492	2910	41801	19	364-126	408	33927	3/17	1000	180.45	
3/12	3/09	SOUTH LAKE SAND	A1925	4647	42888	19	364-126	100	630	3/19	20000	600.00	
3/12	3/09	CALHOUN & COLLS	17831	7755	42891	19	364-126	100	12882	3/19	72	163.39	
3/12	3/09	BRIEN & HAYNES	55630	9132	42895	19	364-126	408	6491	3/19	100	491.00	
3/19	3/16	AMER REF PROD	12088	7620	46523	19	364-126	031	1242	3/26	50	675.95	
3/19	3/16	AMER REF PROD	12088	7620	46523	19	364-126	031	1633	3/26	50	195.15	
3/19	3/16	AMER REF PROD	12088	7620	46523	19	364-126	031	1040	3/26	10	310.52	
3/19	3/14	SUTLER MFG	55592	7731	46402	19	364-126	408	39117	3/24	144	53.05	
3/19	3/13	BRIEN & HAINES	55898	9132	43275	19	364-126	408	7459	3/23	15	49.56	
3/21	3/18	OLONSON SUPPLY	9247	7622	46124	19	364-126	100		3/28	144	12.00	
3/21	3/18	SOUTH LAKE SAND	A1994	4647	46136	19	364-126	100	630	3/28	20000	600.00	
3/21	3/18	CALHOUN & COLLS	18926	7755	46139	19	364-126	391	10320	3/28	12	51.24	
3/21	3/15	DRJ WIRE CO	45318	2910	45733	19	364-126	408	38618	3/25	5000	764.25	
3/21	3/15	AMER REF PROD	19637	7620	45687	19	364-126	031	1242	3/25	50		
													\$ 6,467.36*

Figure 52. Accounts payable distribution report

**SUMMARY OF PURCHASES**

DATE 3/31/6-

ACCOUNT NAME	ACCOUNT		SUB-ACCOUNT TOTAL	GENL. ACCOUNT TOTAL
	GENL.	SUB.		
RAW MATERIALS				
BRASS	123	301	\$ 14,971.50	
CASTINGS	123	305	24,607.53	
BLANKED PARTS	123	320	180.75	
GEARS	123	325	134.45	
GLASSWARE	123	330	300.78	
INSULATING MATERIAL	123	340	2,338.45	
LUMBER	123			
PAINTS	123			
PARTS	123			
STEEL	123			
VARNISHES	123			
VENEERED PANELS	123			

**PURCHASE ANALYSIS BY VENDOR**

VENDOR'S NO.	VENDOR'S NAME	AMOUNT THIS MONTH	RETURNS YEAR TO DATE	NET AMOUNT YEAR TO DATE	NET AMOUNT LAST YEAR TO DATE	INCREASE OR DECREASE
27	ABBOT MACHINE CO	1286.44		3194.26	3010.42	183.84
53	ACE TOOL CO			1975.15	1859.76	115.39
66	ACME ABRASIVE CO	342.86		1505.93	1482.50	23.43
324	ALLAN ALLOYS CO		95.10	4675.22	4410.15	265.07
367	AMERICAN TOOL CO			986.74	1293.84	307.10 CR
425	ANGUS METAL WORKS			842.89	795.22	47.67
475	APEX CORPORATION	2316.84	245.73	10476.79	9473.65	1003.14
502	ARCO STATIONERY CO			319.42	445.93	126.51 CR
					1902.64	43.19
					801.42	10.03
					1694.74	97.44
					562.18	31.23
					4273.56	198.38
					931.50	12.23

**EXPENSE BUDGET ANALYSIS**

COMPARATIVE

DATE 3/31/6-

DEPT.	ACCOUNT		EXPENSE THIS MONTH	EXPENSE BUDGET THIS MONTH	EXPENSE YEAR-TO-DATE	EXPENSE BUDGET YEAR-TO-DATE
	GENL.	SUB.				
3	913	660	\$ 2,378.55	\$ 2,500.00	\$ 7,289.50	\$ 7,500.00
3	913	700	675.95	725.00	3,000.00	2,655.32

**SAXON AND JOYE INC.**

**EXPENSE DISTRIBUTION BY DEPARTMENT OR BRANCH**

SHEET 5 OF 18

DATE MAR 31 196-

DEPT. OR BR.	ACCOUNT NUMBER GENL-SUB.	VOUCHER NUMBER	DATE	AMOUNT	ACCOUNT TOTAL	DEPARTMENT OR BRANCH TOTAL
40	873 -430	33921	3/03	687.50		
40	873 -430	34763	3/12	732.04		
40	873 -430	39810	3/23	16.67		
				\$ 1,436.21*	\$ 8,741.81*	\$26,109.40*
		26618	3/01	175.95		
		27003	3/02	47.60		
		39824	3/25	483.52		
				\$ 707.07*		

**BRANCH EXPENSE STATEMENT**

DATE 3/31/6-

ACCOUNT NAME	BRANCH	ACCOUNT NUMBER	AMOUNT
COLLECTION EXPENSE	10	570	\$ 10.00
	22	570	25.00
			\$ 35.00 *
DONATIONS	1	610	\$ 20.00
	4	610	50.00
	7	610	30.00
	10	610	25.00
	16	610	5.00
	22	610	60.00
	31	610	10.00
	34	610	45.00
			\$ 245.00 *
DUES	13	620	\$ 25.00
	19	620	15.00

**BRANCH EXPENSE STATEMENT**

DATE 3/31/6-

ACCOUNT NAME	BRANCH	ACCOUNT NUMBER	AMOUNT
OPERATORS SALARIES	1	113	\$ 2145.00
CLERICAL SALARIES	1	114	4080.00
JANITOR WAGES	1	141	285.00
BANK CHARGES	1	540	2.50
DONATIONS	1	610	20.00

Figure 53. Analysis reports

The disbursement cards in the paid accounts payable file and the distribution cards in the payables distribution file constitute a completely detailed history of the payables transactions of an organization. The IBM method of data processing makes it possible to present all this information in the form of readable reports in order to provide management with a basis on which to make future purchasing decisions. Examples of these reports are shown in Figure 53.

Control of accounts payable starts in the accounting department when the invoices are checked for accuracy, approved and vouchered. When the invoices and related documents are validated and the posting process begins, they are accompanied by an adding machine control tape.

The totals on the invoice register must compare with the totals on the control tape, thus ensuring overall accuracy of the quantitative data for that day. Invoices omitted or posted twice by mistake are quickly caught.

Two sets of cards are used in preparing the invoice register: distribution cards provide the detail; disbursement cards, the total and discounts. The accumulated totals of the distribution cards must equal the totals of the disbursement cards. Accuracy in the invoice register is assured by a crossfoot check of accounts payable against net payables plus discounts.

A new control sheet (Figure 54) is started at the beginning of each accounting period by entering the balance of accounts payable shown on the last trial balance. During the accounting period, whenever an invoice register is produced, the total shown on it is entered as a credit to accounts payable.

The cash disbursements register lists payments made, net amount, and discount taken. The total of payments made reduces accounts payable and is posted as a debit. The net payables amount appears on the control sheet as a credit to cash, and the total discount is posted as a credit to discounts.

The control sheet shows opening balance and totals of daily transactions for the current period. All distributions and reports of these transactions must balance to this control. The balance in the control account corresponds to the net amount of unpaid accounts payable cards, representing open invoices or credit memorandums. The control sheet is the medium by which the trial balance will be proved.

The trial balance (Figure 55) is the total amount of accounts payable as of a given date. By listing the accounts payable file by vendor number and due date, a list of all obligations remaining unpaid at the closing of the accounting period is obtained. This is the trial balance and, if correct, it will agree with the totals on the daily control sheet.

ACCOUNTS PAYABLE CONTROL SHEET																					
MONTH <i>March</i>																					
Entry Date	Opening Balance (Trial Bal.)			+	INVOICES			-	Payments			=	New Balance			Cash Paid		+	Discount Taken		Initial
3/1	84	326	52										84	326	52						
3/5	84	326	52		4	244	56						88	571	08						
3/6	88	571	08			648	51		11	645	77		77	573	82	11	443	81		201	96
3/8	77	573	82																		

Figure 54. Control sheet

NATIONAL PRODUCTS INC.							
TRIAL BALANCE							
OPEN ITEMS—ACCOUNTS PAYABLE							
CLOSING DATE <i>MAR 30 196-</i>				SHEET <i>18</i> OF <i>18</i>			
VENDOR	VENDOR NUMBER	INVOICE DATE	DUE DATE	ACCOUNTS PAYABLE	DISCOUNTS	NET PAYABLES *	
WALTERS INS	1181	3/24	4/24	382.40		382.40	
WALTERS INS	1181	3/27	4/27	1,647.85		1,647.85	
				\$ 2,030.25*		*\$ 2,030.25*	
GREENWICK FUEL	1196	3/22	4/02	126.20	2.52	123.68	
GREENWICK FUEL	1196	3/26	4/05	119.73	2.39	117.34	
GREENWICK FUEL	1196	3/28	4/07	121.45	2.44	119.01	
				\$ 367.38*	\$ 7.35*	\$ 360.03*	

Figure 55. Trial balance report

## DATA PROCESSING METHODS

Two of the data processing methods which may be used to process the accounts payable procedures outlined above are the punched card conventional method and the punched card systems method using the IBM System/360, Model 20, with printer and the IBM MFCM.

Because of the variations in the method of preparing the disbursement and distribution cards for accounts payable applications, this area will not be described. In the conventional method, however, it is assumed that invoices are manually checked for accuracy and that discount amount and amount to pay are either manually calculated or calculated and punched by machine. In the systems method, invoices can be manually checked for accuracy, but the discount percentage is keypunched into the disbursement cards and the discount amount and amount to pay are computed and punched into the cards in the first pass through the system.

### Punched Card Conventional Method

Figure 56 illustrates the flow of data in posting liabilities, writing checks and statements, and recording payments in the punched card conventional method of processing.

1. The disbursement and distribution cards for each invoice are combined and used to prepare the invoice register on an accounting machine to balance to controls.

2. The cards are separated on the sorter, and the distribution cards are filed for monthly distribution procedures. The disbursement cards are sorted by vendor number within due date sequence.

3. Daily, the disbursement cards are merged with the disbursement due file. In some installations this step may be performed manually.

4. The disbursement cards for those accounts to be paid are sorted into vendor sequence.

5. On the scheduled date for writing checks and statements, the cards for the proper due-date period are removed from the file and processed in

the accounting machine to prepare the cash requirements statement. When the necessary transfer of cash has been made to the accounts payable account, checks and remittance statements can be prepared. Those selected cards for which payments will not be made are returned to the open accounts file.

6. The disbursement cards that are to be paid are match-merged with the vendor name and address file to select cards for the respective vendors.

7. The file is processed on the accounting machine to prepare the checks and statements. At the same time, a paid summary card is automatically punched for each check written.

8. After the checks and statements are printed, the paid summary cards are processed on the accounting machine to prepare the disbursements register.

9. The vendor name and address cards are separated from the disbursement cards.

10. The name and address file is combined and filed for next payment day.

11. Date paid is gang-punched into the payables cards.

Figure 57 shows the flow of data to create the monthly trial balance, distribution reports and the various analysis reports.

1. The disbursement due file is sorted to vendor sequence and processed on the accounting machine to prepare the monthly trial balance. The file is then resorted into due date sequence.

2. The distribution cards for the month are sorted into desired sequence with the last month's summary cards and processed on the accounting machine to produce any of the desired distribution reports.

3. The paid disbursement cards for the month are sorted into desired sequences with last month's summary cards and processed on the accounting machine to produce any of the desired disbursement analyses.

Note: In items 2 and 3, two sorting operations are required for each additional report--one to separate summary cards and another to sort in desired sequence with other summary cards.

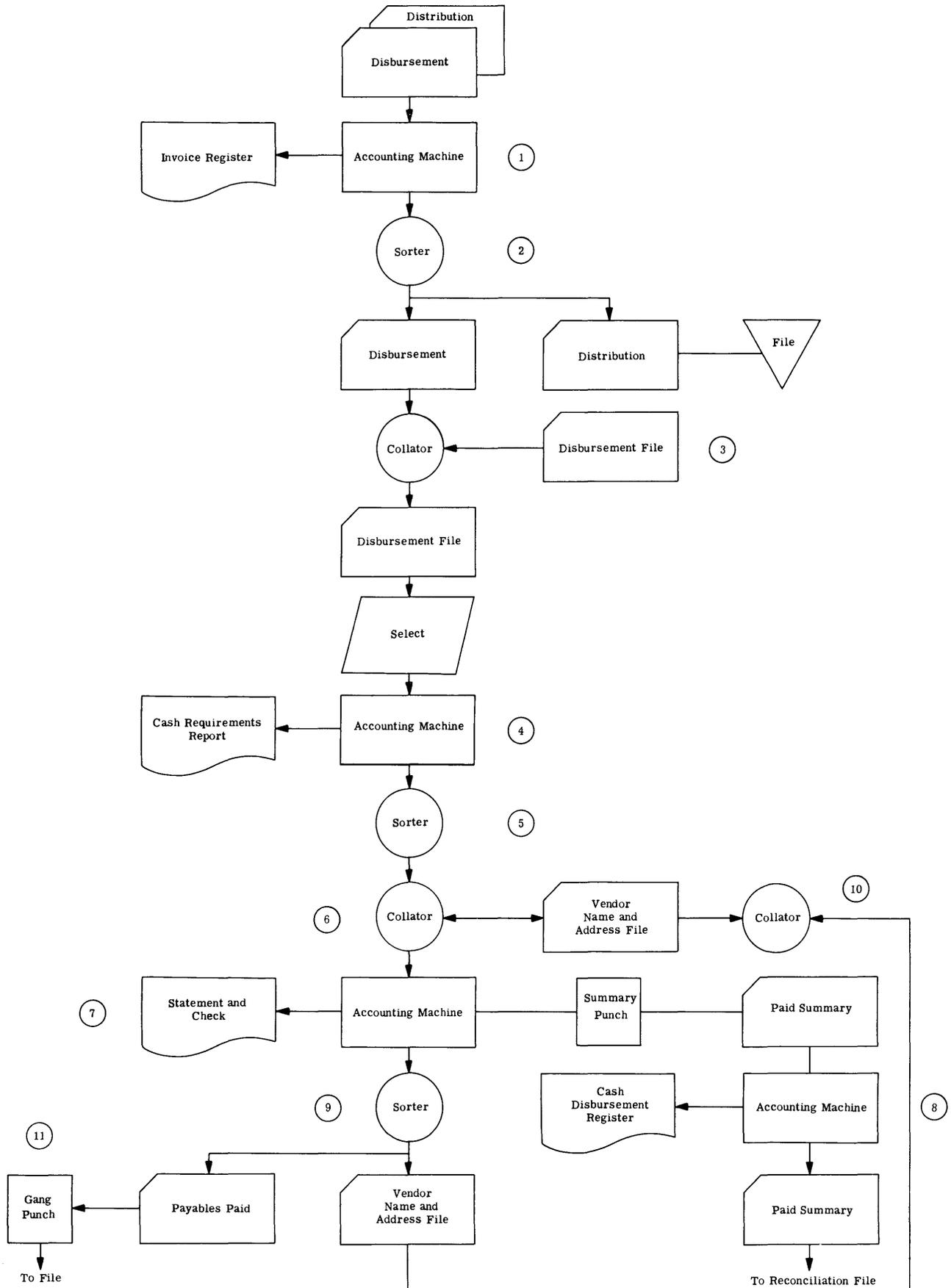


Figure 56. Data flow for conventional punched card method

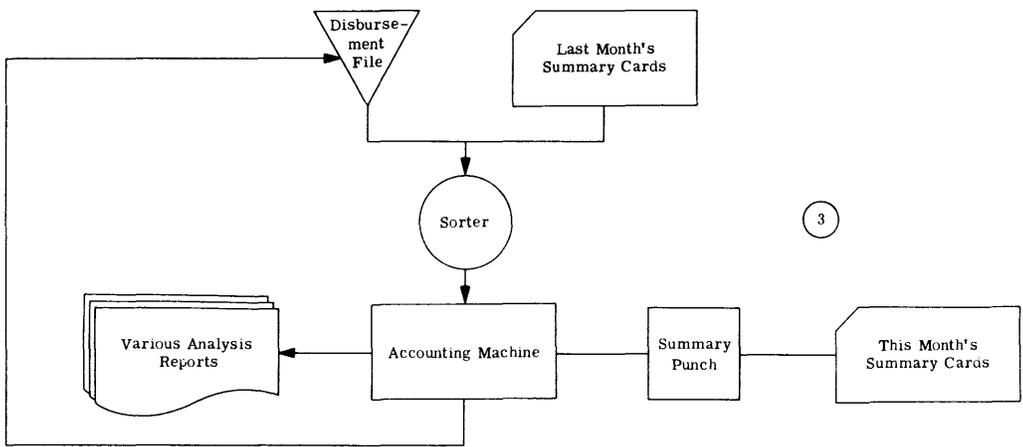
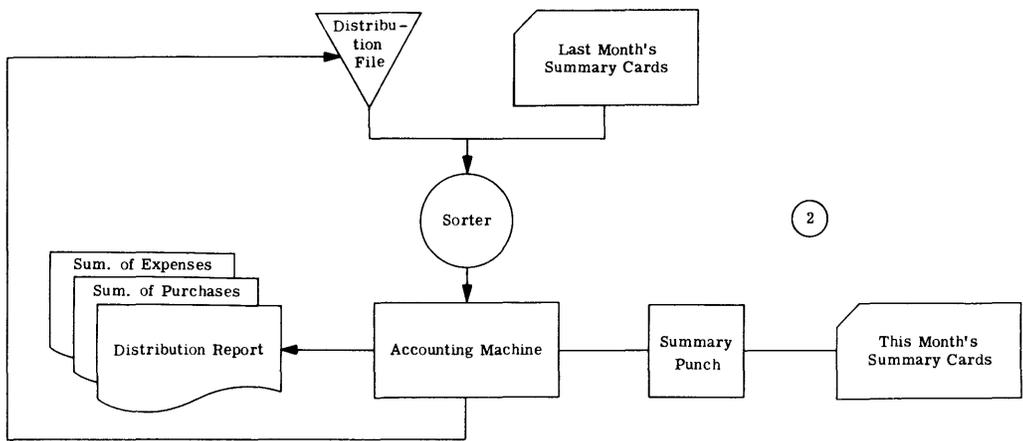
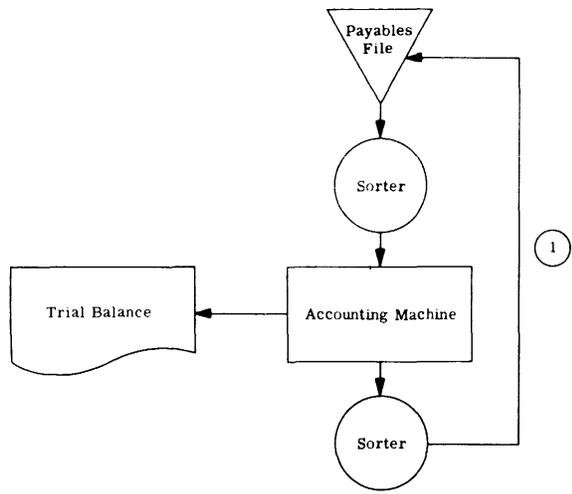


Figure 57. Data flow for conventional punched card method (continued)

## Punched Card Systems Method

Figure 58 illustrates the flow of data on the Model 20 to accomplish the same results.

1. The distribution and disbursement cards are processed on the system to produce the invoice register. In the same run, the discount amount and amount to pay are calculated and punched in each disbursement card. The disbursement and distribution cards for each invoice are automatically audited, zero-balanced, and stacked into separate stackers.

The main difference between the distribution and disbursement card forms used in a System/360, Model 20, as compared with a card form used in a conventional method, is that those fields to be punched by the MFCM should appear in the low-order positions of the cards.

2. The distribution cards, separated during the invoice register preparation, are filed for the monthly distribution procedures. The disbursement cards are sorted by due date within vendor sequence. The advantages of this are shown in step 3 and in the preparation of the monthly trial balance.

3. The disbursement cards are merged with the open accounts payable file on the system on the scheduled dates before writing checks. In addition to the merge operation, the system (a) selects those items from the open accounts payable file that are due to be paid, (b) prepares the cash requirements report, and (c) accumulates balance, total invoices, and cash requirements totals to post to the accounts payable control sheet. This balancing feature performed each time the new disbursements are merged and the cash requirements report is prepared assures that the file is always in balance. The open accounts payable file is not disturbed, and all the cards in the open accounts file are checked for due date.

When the necessary approval of payment has been obtained and the transfer of cash has been made to the accounts payable account, checks and remittance statements can be prepared. Those

selected cards for which payments will not be made are returned to the open accounts file.

4. The separate step of merging and selecting the vendor name and address cards with the disbursement cards to be paid is combined with the preparation of the statements and checks. In this manner, the sequence of the name and address file is not disturbed. This combination run not only eliminates the merge step in the conventional method, but also eliminates selecting and refileing the name and address cards after the statements and checks are printed. In addition, the disbursement cards are punched at the same time with check number and date paid.

5. The cash disbursements register is prepared from the disbursement cards used to prepare the statements and checks. During the processing, blank cards are also fed into the system to create the paid summary cards for reconciliation. The paid disbursement cards are filed for month-end analysis.

Figure 59 shows the flow of data to create the monthly trial balance, distribution reports and the various analysis reports on the Model 20.

1. The monthly trial balance is created by passing the open accounts payable file through the system. Because the file is in vendor sequence, no sorting is required.

2. The distribution cards and last month summary cards are sorted into the desired sequences and processed on the system to produce any of the desired distribution reports. Blank cards fed into the system create new summary cards, which do not require a sort to be separated. During these analysis runs, percentages can be calculated and printed.

3. The paid disbursement cards and last month summary cards are sorted into the desired sequences and processed on the system to produce any of the desired distribution reports. Blank cards fed into the system create new summary cards. During these analysis runs, percentages can be calculated and printed.

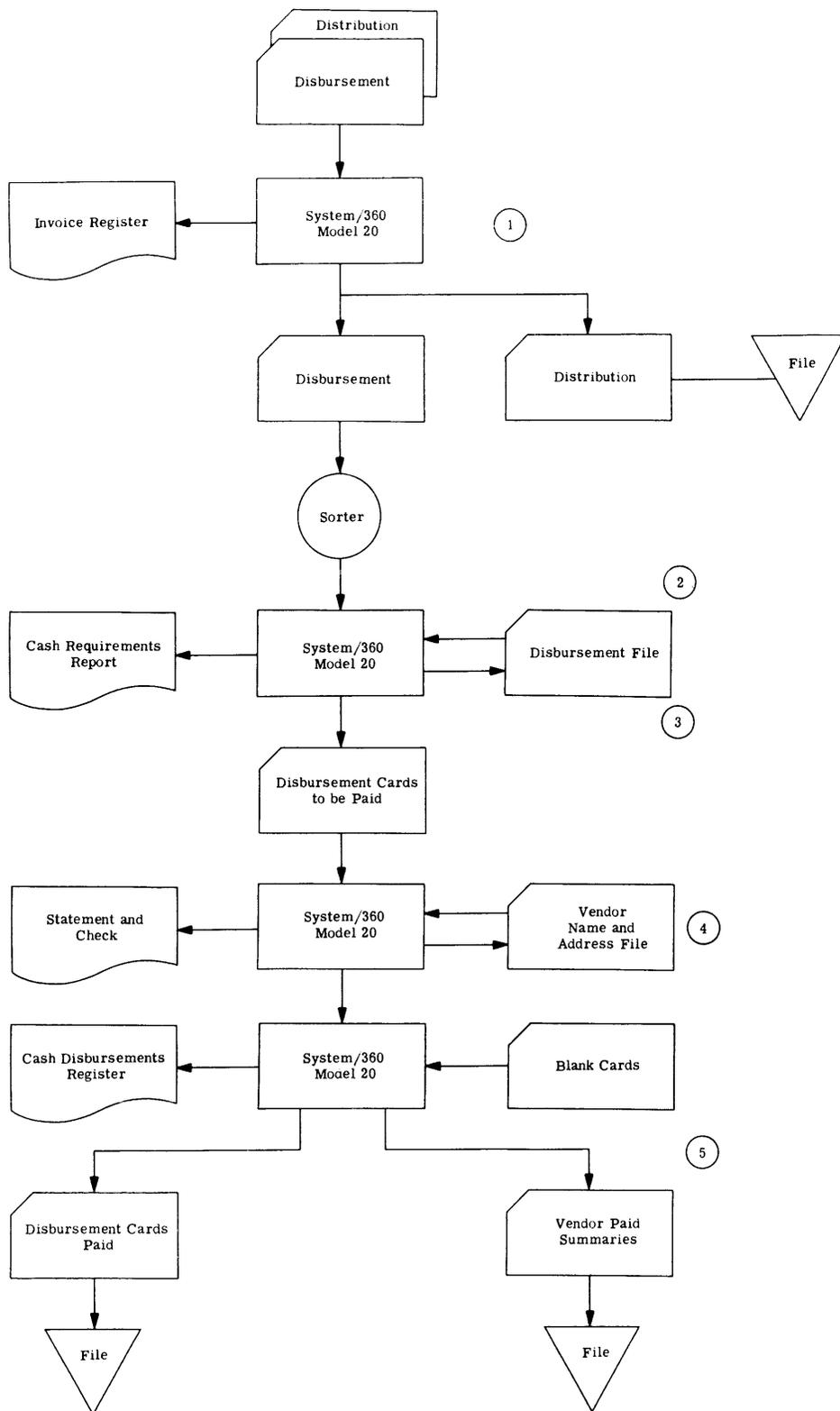


Figure 58. Data flow for systems method

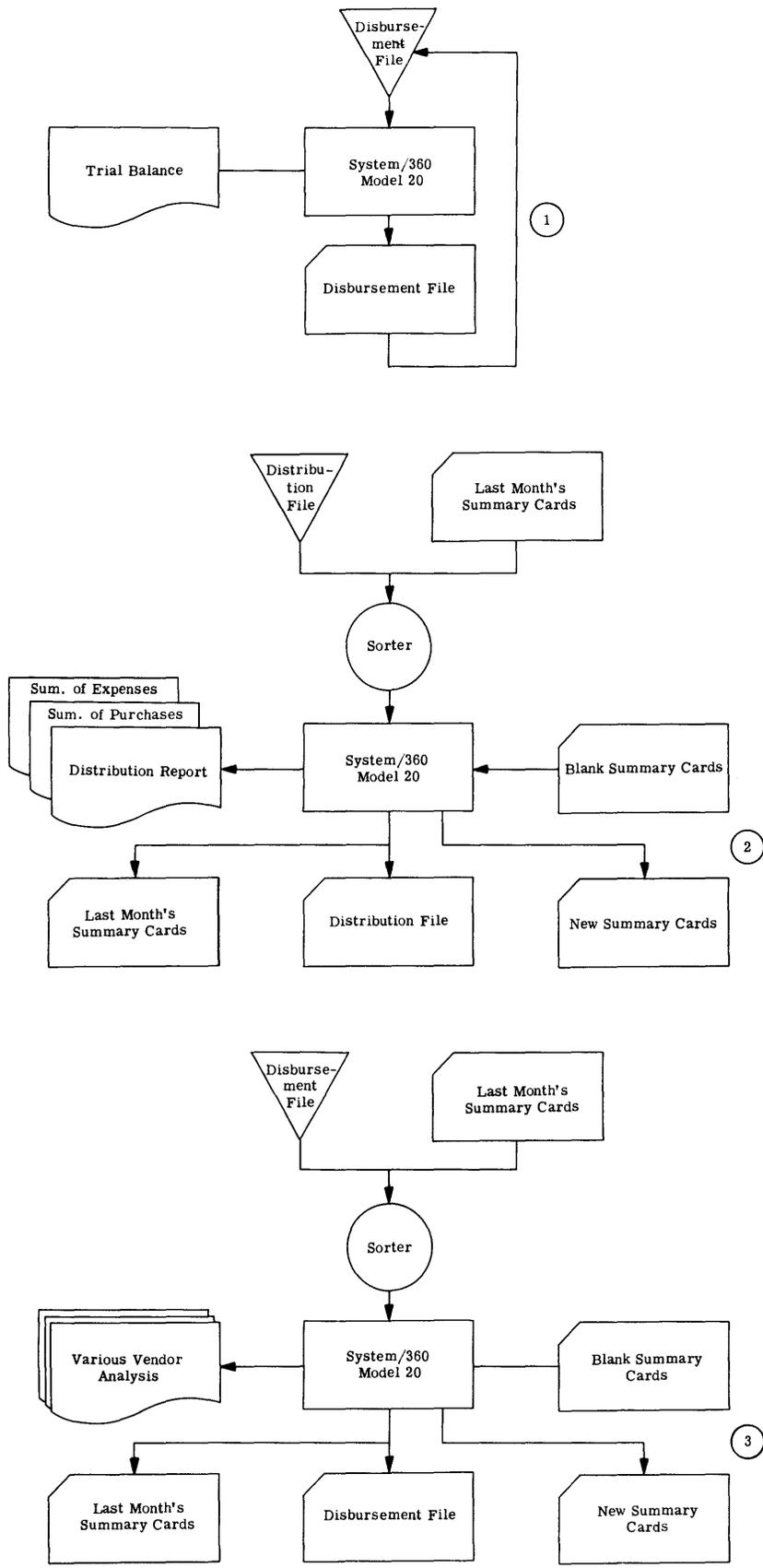


Figure 59. Data flow for systems method (continued)

## PAYROLL AND LABOR ACCOUNTING

The primary objective of payroll and labor accounting is the prompt and accurate reporting to the employee, the employer and governmental organizations of the amount of money paid for the services rendered the employer by the employee.

Businesses must transmit to the employee an accurate record of his earnings and should attempt to measure performance intelligently. In addition to the prompt and accurate payment of employees, the accounting and analysis records of the organization play a vital role in managing the business.

Since labor is the most perishable of all commodities or services purchased by a business organization, it must not be misdirected or wasted. Labor accounting, which studies rates, costs, and operating efficiencies, is necessary to evaluate the financial and operating status of a business. Labor is an elusive element and only the most careful analysis by management can detect it waste. Conversely, more judicious use of the labor dollar can increase efficiency and improve profits. Intimate knowledge of labor cost and usage can be a positive factor in attaining management goals.

Payroll techniques vary with the size and type of company. However, no matter what payroll procedure is used, such basic elements as source records, controls, regular gross earnings, taxes, etc., are required. Within these elements, some of which are controlled by law, there are many variations to be considered.

### SOURCE RECORDS

Source records usually required for a complete payroll procedure are:

Basic payroll and employee records. These records should include the employee's name, number, Social Security number, tax class, occupation, department or location, and wage rate. It may also include job classification, regular hours, shift, and other pre-established information. (Personnel records are even more complete in that they include such information as birth date, date of employment, sex, education, etc., in addition to the basic payroll data.)

Deduction authorizations. Deductions from an employee's gross earnings to determine net earnings may be classified in two ways--statutory and voluntary. Statutory types required by either the federal, state or local government include withholding taxes

(FIT), federal insurance contribution (FICA), state income taxes, city or county income taxes, state unemployment compensation insurance, pensions, and retirement contributions. Voluntary types may include insurance, contributions, union dues, tools, uniforms, U. S. Savings Bonds, and stock purchases.

Deduction authorizations are used not only to calculate employee earnings but also to compile the payroll and deduction registers, write the payroll checks, and maintain current balances for voluntary deductions such as bond purchases.

Time and attendance records. The attendance time record is the basis of payroll recording under all systems of day work or hourly work. The conditions imposed by the federal Fair Labor Standards Act necessitate the maintenance of such records. Attendance records of some form are thus indispensable in establishing proof of compliance with the law.

Permanent time records further assist in furnishing employees and governmental agencies with the many various records and reports that have become necessary as the result of such social legislation as excludable sick pay, FICA and state unemployment insurance.

Production time records. Production or job time is the recorded time which the employee spends on a particular job, operation, or process. It is essential that both productive time and nonproductive time be accounted for to enable management to exercise effective control over both direct and indirect costs of production. Cost records accurately maintained and properly presented permit management to (1) determine costs exactly so that sales prices may be profitably established or adhered to, (2) approve payroll expenditures with assurance that every cent of payroll has been accounted for, and (3) determine effective cost reduction policies through the analysis of actual costs and their comparison with standards or budgeted amounts.

Samples of these source records are shown in Figure 60.

### OUTPUT REPORTS

As a result of payroll processing, there are many different types of output reports. Some of these are required by law, others are helpful to management for analysis purposes. The following are required by the Federal Government:

1. Form 941A, a quarterly return which must be filed with the District Director of Internal Revenue to report the full amount of taxes due for the previous quarter--that is, both income tax withheld from wages and employee and employer FICA taxes paid.



2. W-2 Form, a report which each employee must receive on or before each January 31 or at the termination of employment. This report shows the total wages subject to income tax withholding, the amount of income tax withheld, the amount of FICA employee tax withheld, and the amount of wages subject to this tax.

3. Form 941 (reverse side), an annual reconciliation of income tax withheld. It must be filed on or before January 31 of each year. In addition, the employer must submit a copy of all W-2 forms furnished employees for the preceding calendar year.

4. Form 940, the annual return which must be filed for Federal Unemployment Tax (Federal U-C).

In addition to the above, the employer must file reports and pay unemployment taxes and withholding taxes to the various state and local authorities.

Other reports that are a necessary part of the payroll procedure include payroll and deduction registers, checks and earnings statements, and labor cost reports. Payroll and deduction registers (Figure 61) are the permanent records of the earnings and deductions of all employees. They provide the entry amounts to the general ledger of payroll expense, tax and deduction liabilities, and total funds required for deposit to proper bank accounts. In some cases they take the place of employee history records.

The form of the payroll register to be produced varies with individual payroll requirements. As far as possible, all the information related to an employee's wages should be shown on one line of the payroll register. If the number of deductions is large, it may be advisable to group certain deductions, or even total deductions, into one column of the report and to supplement this total with the individual deduction registers. Form capacity of the payroll register may be increased, when necessary, by designing the register with two lines of printing for each employee.

Where checks are used as the means of payment, it may be desirable to show the check number on the payroll register so that one record serves as both a check register and payroll register.

Payment of wages by check eliminates the problem of handling large amounts of cash and also satisfies the need for an employee pay receipt. The ease with which checks can be distributed is particularly important where the wages must be mailed or distributed to employees remote from the payroll department. IBM card checks serve a twofold purpose: they are an authentic medium of payment, and they furnish an automatic means of bank reconciliation.

A provision of the Social Security law requires that the employer render the employee a statement

of earnings and taxes deducted from wages at the time of each payment. When checks are used, this statement can be a stub of the check. Where there are many voluntary deductions (such as insurance, union dues, rent, food, clothing and others), the deductions are usually itemized on the check stub.

IBM card checks may be designed with attached earnings statement stubs, in either continuous or cut-card (separate) form (Figure 62). They also furnish a means of automatic bank reconciliation. The card checks, upon return from bank clearing operations, are sorted to check-number sequence and automatically matched with the duplicate check cards. Unmatched duplicates are listed for outstanding check totals.

One of management's tasks is to control labor costs so that business operations will be more profitable. A unique contribution of the IBM method is its ability to extract the vital management data hidden in the maze of details.

Applying the IBM method to payroll and labor cost routines gives management at all levels the data needed for reviewing critically and constructively the activities of the organization. Original documents used to fulfill the recordkeeping requirements (timecards, payroll records, etc.) are used to produce this data. The records are completely flexible and lend themselves to easy and rapid classification, reclassification and summarization to provide management the answers to such questions as:

- What is the average number of hours worked by our employees?
- How many employees, by age group, do we have?
- What is our labor turnover? Number hired? Number separated?
- In what departments is our labor turnover excessive?
- What is our average hourly earnings rate by occupation?
- How many man-hours do we have available by department?
- How much idle time have we by department?
- Is our absenteeism excessive? Where? Why?
- What are our average hourly earnings by employee, sex, age, marital status, etc.?
- What are our average incentive and overtime earnings?
- Do our actual expenses for indirect labor conform to the anticipated or budgeted amounts?
- What is our daily employee and departmental efficiency as compared with standards?
- For what were our payroll dollars spent?
- What are our machine and manpower requirements for the planned production schedule?

PAYROLL REGISTER											DATE _____													
YEAR-TO-DATE		EMPLOYEE		NAME OF EMPLOYEE	HOURS WORKED	BASE RATE	EARNINGS				DEDUCTIONS			NET PAY										
EARNINGS	WITH. TAX	DEPT.	NUMBER				REGULAR	OT PREM.	OTHER	TOTAL	FICA	WITH. TAX	MISC.											
3002	38	267	68	01	206	W V ASTOR	44	0	2	250	99	00	4	50	103	50	3	74	10	85	8	75	80	15
2684	30	361	44	01	342	A F DUFFY	50	10	2	250	112	50	1	25	123	75	4	49	11	87	3	25	104	14
2432	71	255	24	01	518	B H ENGLISH	40	10	2	150	86	00			86	00	3	12	6	58	4	50	71	80
1807	50	266	22	01	615	F L FARELY	42	10	1	500	63	00	1	60	4	00	68	60	2	49	7	78	3	50
2175	64	269	82	01	703	J E GENDER	42	10	1	350	77	170	1	99	6	100	85	169	3	10	8	36	2	50
2231	27	342	54	01	893	F A HARRIS	44	10	1	900	83	160	4	06	5	75	93	141	3	39	11	26	3	75
1945	178																							
1870	32																							
2461	11																							
875	82																							
2521	12																							
2434	161																							
2220	102																							

DEDUCTION REGISTER											DATE _____			
EMPLOYEE		NAME OF EMPLOYEE	SOC. SEC. NO.	FICA CODE	WEEKS MADE	TOTAL DEDUCTIONS	SAVINGS BOND	HOSPITAL INSUR- ANCE	GROUP LIFE INS.	CREDIT UNION	RETIRE ANNUITY			
DEPT.	NUMBER													
01	206	W V ASTOR	4	3	4	8	75				8	75		
01	342	A F DUFFY	2	3	4	1	25		1	25				
01	342	A F DUFFY	4	3	4	2	00				2	00		
01	518	B H ENGLISH	1	3	6	2	00	2	00					
01	518	B H ENGLISH	5	3	4	2	50					2	50	
01	615	F L FARELY	2	3	4	1	50		1	50				
01	615	F L FARELY	3	3	4	2	00			2	00			
01	703	J E GENDER				2	50							

Figure 61. Payroll register and deduction register

NUMBER 077994		THE GENERAL CORPORATION		1-222 210	
TO THE ORDER OF:					
E V MCDONALD		APRIL 30 19-		AMOUNT	
		PAY →		53.92	
STANDARD BANK & TRUST COMPANY					
SPECIMEN					

STATEMENT OF EARNINGS						
NOT NEGOTIABLE						
THIS IS A STATEMENT OF YOUR EARNINGS AND DEDUCTIONS						
DETACH AND RETAIN FOR YOUR PERSONAL RECORDS						
EMPLOYEE NO.	SOC SEC NO.	PERIOD ENDING	TOT FICA	YR TO DATE EARN	YR TO DATE WT	
229	111240087	03/25/-	16.50	824.72	118.04	
#	BOND BAL	GROSS	WITH-TAX	MISC DED.	S.U.I	F.I.C.A
		63.44	7.06		.16	2.30
						53.92

\* INDICATES BOND TO BE PURCHASED THIS PAY PERIOD.

THE GENERAL CORPORATION

Figure 62. Payroll checks and earnings statements

## PAYROLL PROCEDURES

There are basically three types of payroll procedures: salary, hourly, and incentive. The basic difference among the three procedures is the manner in which gross pay is determined; beyond that point the procedures may follow similar patterns. There will, however, be variations because of company policies, type of industry, location, etc., as well as the type of equipment used.

### Salary Payroll

In regard to salary payrolls, the following generalizations can be made:

1. The employee is paid a fixed amount for a specific pay period.

2. The employee is not penalized for normal absences or latenesses.

3. The employee may or may not be paid for overtime. In general, employees working in supervisory capacities or earning over a specified amount are exempt from payment for overtime.

4. The principal exception from the fixed pay- ment results from overtime earnings.

5. Vacation time is given with pay.

6. The time of each employee is generally charged to only one expense or clearing account.

In a salary payroll a high percentage of earnings, tax withholdings, voluntary deductions and other factors remain constant from one pay period to the next. In some cases, however, there are variations

which should be considered. As an example, salary payrolls may in some companies include a pension plan (as a payroll deduction and/or a company contribution), a stock purchase plan, a personal savings plan, or bonus plan based on gross salary. It may also be necessary to accumulate absences (for example, in civil service) or to account for the number of vacation days taken. Furthermore, in a sales organization, commissions may be paid in addition to the base salary.

The IBM System/360, Model 20, is not only capable of handling the routine payroll procedure with a minimum of effort, but can also simplify the handling of exceptions and additional data which might be required. For example, the five pockets on the MFCM eliminate sort/separate runs necessary on conventional equipment. The MFCM's two feeds allow merge operations to take place with calculating, thus make separate collating and calculating operations unnecessary. Internal speeds and storage capabilities allow calculations that require several passes with the punched card conventional method to be done in one pass, and control can be established in any possible combination of input and output files required for the given operation.

Two approaches to salary payroll follow--one using the MFCM and one using a card reader and a card punch.

#### MFCM Approach

The flow of data in the MFCM approach is shown in Figure 63.

1. Master payroll, deduction, and previous year-to-date cards are pulled from the file and placed in the primary feed of the MFCM. Overtime and adjustment cards are placed in the secondary feed and the two card decks are merged. During this run, the system computes the overtime amounts and establishes department controls for standard gross pay, overtime gross pay, total pay, overtime hours, total deductions, total FIT, total FICA, total SUI (where applicable), net earnings, as well as previous and new year-to-date totals.

There are various methods of reporting and recording overtime hours and computing overtime payments. In some cases, the total hours worked and the overtime hours are recorded; then gross earnings = (total regular and overtime hours worked x hourly pay) + 1/2 (overtime hours x hourly pay).

Another method used is called premium hours. Under this approach the person responsible for reporting time halves the actual overtime hours worked and reports this as premium hours. Gross earnings then = (total of all hours worked x hourly pay) + (premium hours x hourly pay).

When it is necessary to report overtime payment separately, it is obtained by multiplying the overtime hours worked by 1 1/2 times the hourly pay.

In the conventional punched card method, it is necessary to compute overtime in a calculator run and establish controls in a separate accounting machine run.

2. The merged deck from step 1 is placed in the primary feed and blank year-to-date, current earnings and check reconciliation cards (dual-card format) are placed in the secondary feed. During this run, the system (1) prepares the payroll register, (2) punches a current earnings card, a new year-to-date card and a check reconciliation card, and (3) selects overtime and previous year-to-date cards and merges the current earnings, new year-to-date, and reconciliation cards into the file.

Punching the check reconciliation card on this run eliminates a reproducing step necessary in the punched card conventional approach.

3. In this run, the check and earnings statement are prepared using the merged deck from the previous step in the primary feed and collated blank checks and earnings statements in the secondary feed. With the optional interpreting device on the MFCM, the checks and statements are printed on the same run, saving a separate run for interpreting. The checks and earnings statements have identifying codes punched into them to assure punching and printing data on the proper cards. Since the check number was punched into the reconciliation card it is used to control the proper punching of the card check.

A check register is also written on this run. The totals developed are used to balance against the controls established in run 1.

Master, deduction, current earnings, new year-to-date, and reconciliation cards are selected into separate pockets for further analysis or for filing, thus saving a separate sort. At the same time, it is also possible to separate bond issue cards, stock issue cards, or any other special deduction cards for further analysis or processing.

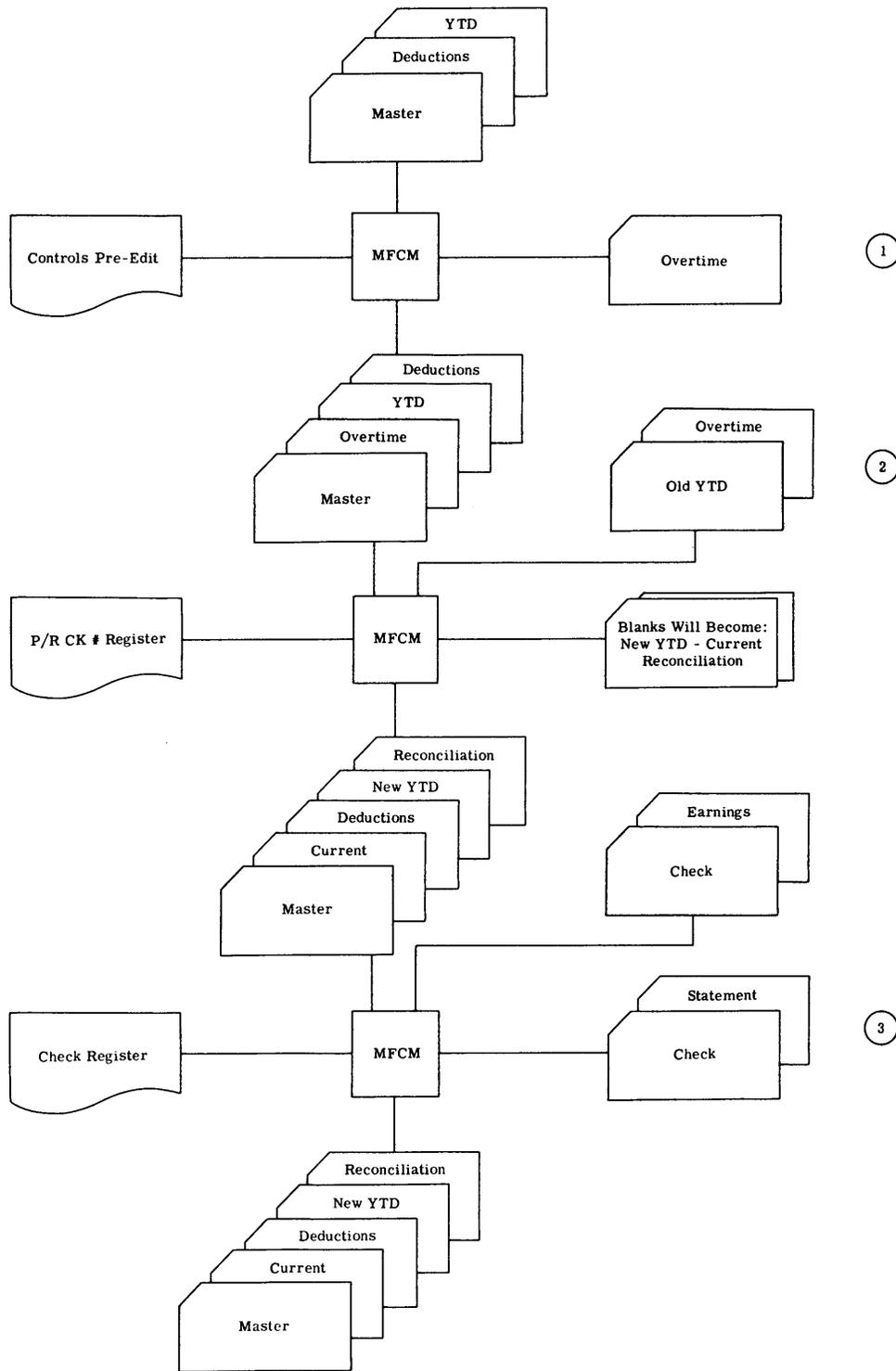


Figure 63. MFCM approach -- salary payroll

## Card Reader/Card Punch Approach

The flow of data for a salary payroll in this approach is shown in Figure 64. In the first run, the merged master, deduction and year-to-date cards are proof-listed. In the second run, the overtime cards are extended and the controls for overtime printed.

1. After the controls are established, the overtime cards are merged with the master, deduction and previous year-to-date cards. This file is placed in the card reader, and blank year-to-date and current earnings cards (dual-card format) are placed in the card punch. During this run, the gross-to-net calculations are performed, the payroll register is printed, and the current earnings and new year-to-date cards are punched. The check number is printed on the payroll register and punched into the current earnings card.

2. The master and deduction cards are separated from the year-to-date earnings and sorted with the current earnings and new year-to-date cards.

3. The file is placed in the card reader and blank check reconciliation cards are placed in the card punch. In this run, the checks and statements are prepared and a check reconciliation card is punched. After the run, the master, current earnings, deduction, and new year-to-date cards are separated and filed.

4. The check reconciliation cards are processed to create the check register. This run can be eliminated, since the check number is printed on the payroll register. If the check number is punched into the current earnings card, a separate reconciliation card is unnecessary.

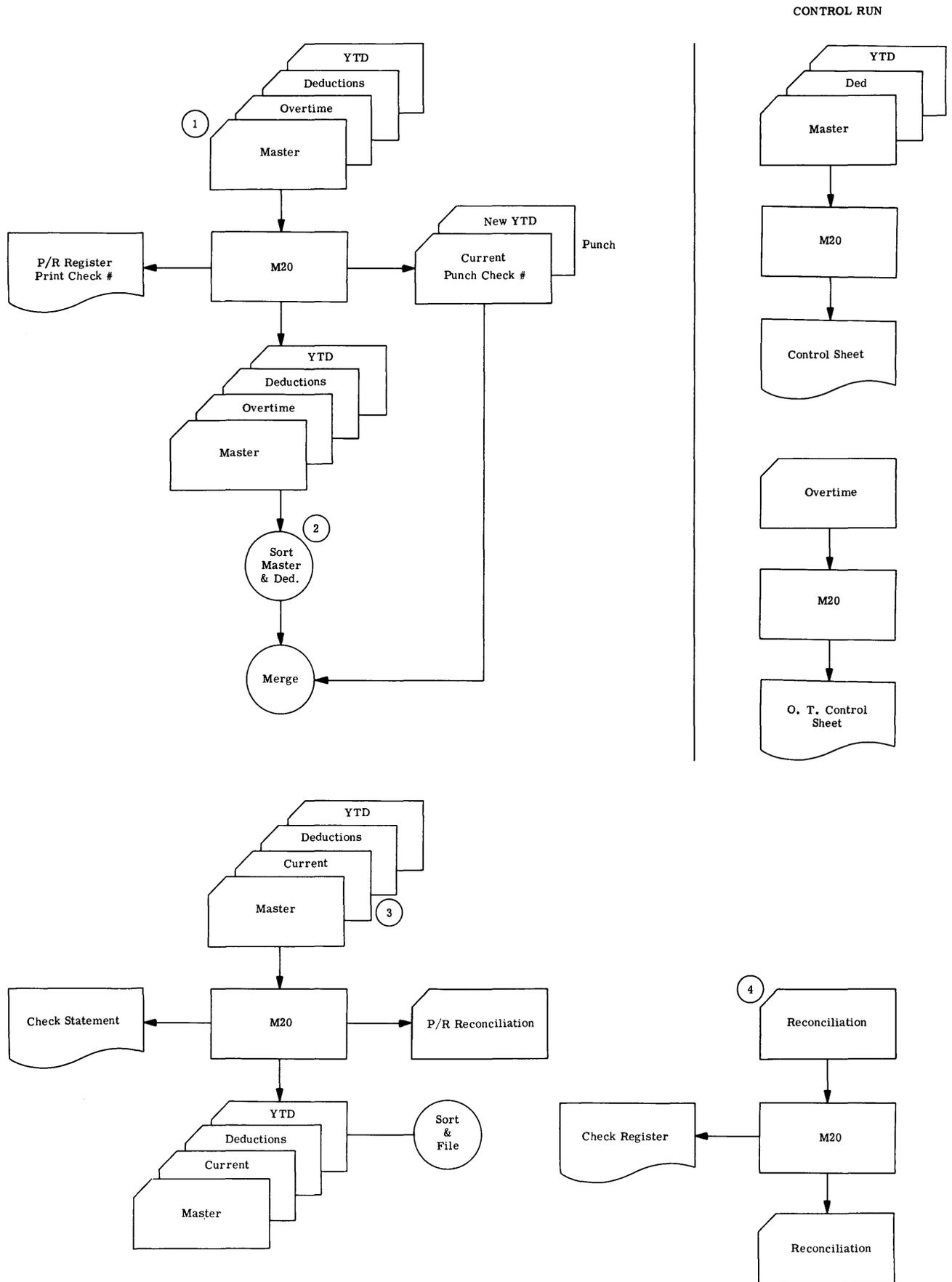


Figure 64. Card reader and card punch approach -- salary payroll

## Job-Rated Payroll

In a job-rated payroll, the employee is paid for the particular job he performs on the basis of an hourly rate. There are two general methods of deciding hourly rates--by occupation and by individual.

Under the occupation-rated method, no matter who works at a specific job, the hourly rate is the same. Under the employee-rated method, the hourly rate is set for the individual, no matter what job he performs. Because, in either case, gross pay equals hourly rate times hours worked, the typical procedures which follow work for both methods.

There are many procedures used to record hours worked and hourly rate in punched card form. They range from manual recording methods to automatic teleprocessing methods. For example, in some companies, employees' daily work records are filled in by the foreman for each job performed. These records are audited by the payroll department and batched for card punching. Job cards are punched and verified, and a proof list is run to balance against the proof tape.

In other companies, teleprocessing equipment is used to report job times. In this case, job cards are punched, verified, and attached to shop orders before they are released to the first manufacturing department. At the start of each job, the employer transmits to the data processing department the start time using these job cards. In the data processing department, the information that is transmitted is recorded in punched card form and includes all the data from the job card as well as employee identification and start time. At the end of the shift, or daily, the job cards are sorted by man number within department and zero-balanced to the total hours of the shift. Any discrepancies in time are indicated for investigation.

The processing methods that follow assume that job cards are punched with man number, hours worked, rate, job number, etc.

### MFCM Approach

The processing of these job cards using the MFCM approach is shown in Figure 65.

1. Weekly, the daily job cards are sorted by man number within department and placed in the primary feed of the MFCM. Deductions and

previous year-to-date cards are placed in the secondary feed. In this run, the two decks are merged, and a proof control sheet is created for further balancing. If rates are not included in the job cards, the job cards are sorted by rate code and merged with rate cards. A separate processing run is then required to punch rate amount. ( This step is not shown on the flowchart.)

2. After all balancing has been done, the newly merged deck is placed in the primary feed of the MFCM, and blank year-to-date cards and current earnings cards are placed in the secondary feed. During this run, the payroll is calculated from source (gross) to net and earnings are punched into the current earnings cards along with check number. This enables the current earnings card to be used as a reconciliation card at a later date. A payroll register is printed at this time which also includes the check number, and the new year-to-date card is punched and selected into a pocket along with the master, weekly time, current earnings, and deduction cards. The previous year-to-date and job cards may be selected into separate pockets for further analysis or filing.

3. The check and earnings statements can be produced in one of two forms. They may be printed checks produced on the printer or punched card checks produced by putting blank card checks and statements into the secondary feed of the MFCM. If the latter method is chosen, the card checks and statements may also be interpreted using the interpreter device on the MFCM. At the same time the master, time, deduction and year-to-date cards may be selected into separate pockets for further analysis or filing. It is possible to create a separate check register if a card check is punched. This separate register, however, can be eliminated, since the check number appears on the payroll register. If checks are printed and a separate check register is desired, it can easily be prepared by using the MFCM for a separate run.

As in the salary payroll, special deductions are easily handled by punching a code into the card, selecting these cards immediately for special processing, or using the codes to handle special processing at a later date.

Because of the speed of calculating, the extension of rate times hours does not have to be punched into the job cards. The calculations are remade whenever necessary for labor distribution.

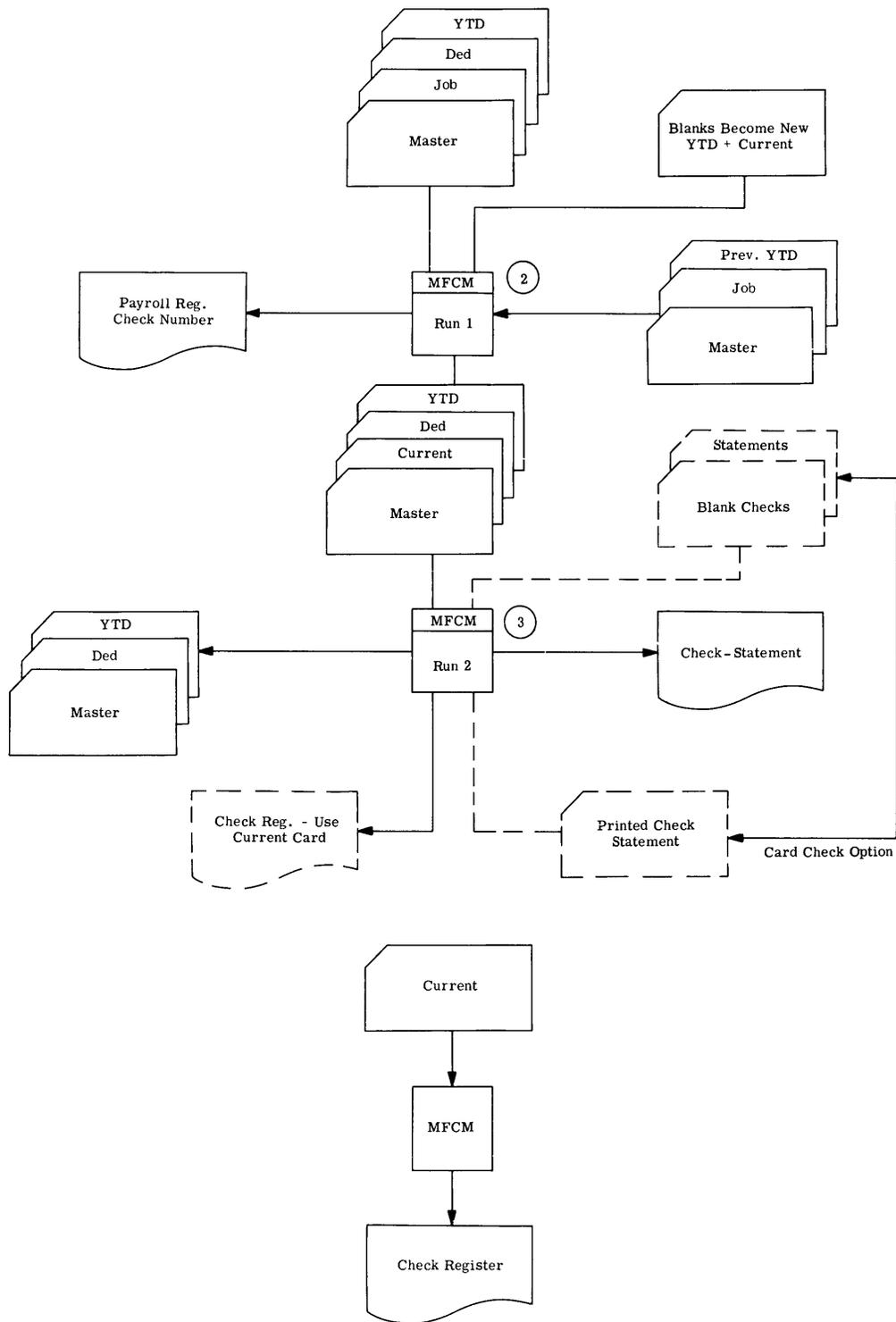


Figure 65. MFCM approach -- job-rated payroll

## Card Reader/Card Punch Approach

Another approach that can be taken is to use a configuration that includes a separate reader and a separate punch rather than the MFCM. The flow of data for this approach is shown in Figure 66.

1. Each week, the job cards are sorted by man number and merged with a deck containing master, deduction and previous year-to-date cards. The deck containing the master, deduction, and previous year-to-date cards would have been run through the Model 20 for a proof control listing before merging with the job cards.

2. The merged deck of cards is placed in the card reader. Current earnings and year-to-date blank cards are placed in the card punch. During this processing run, the gross-to-net calculations are made, the payroll register is printed including check number, and the new current earnings and new year-to-date cards are punched.

3. The master and deduction cards are selected on a sorter and merged with the new current earnings and year-to-date cards for check-writing purposes. These cards are placed in the card

reader and blank check reconciliation cards in the card punch. In this run the checks and statements are written and check reconciliation cards are punched. (The current earnings card can be used as the reconciliation card by punching check number into it when it is created.) The master, current earnings, deductions, and year-to-date card are sorted for filing or further analysis.

4. The check reconciliation cards are processed through the Model 20 to create the check register. This may be eliminated because the payroll register contains the check numbers.

## SUMMARY

In comparing any of the payroll procedures on the System/360, Model 20, with punched card conventional methods, it can be seen that many of the steps involved in the conventional method are combined in the System/360, Model 20, method. The separate machine processing steps include (1) calculating, punching and checking, (2) printing, and (3) collating. All of these are combined in one run on the System/360, Model 20, method.

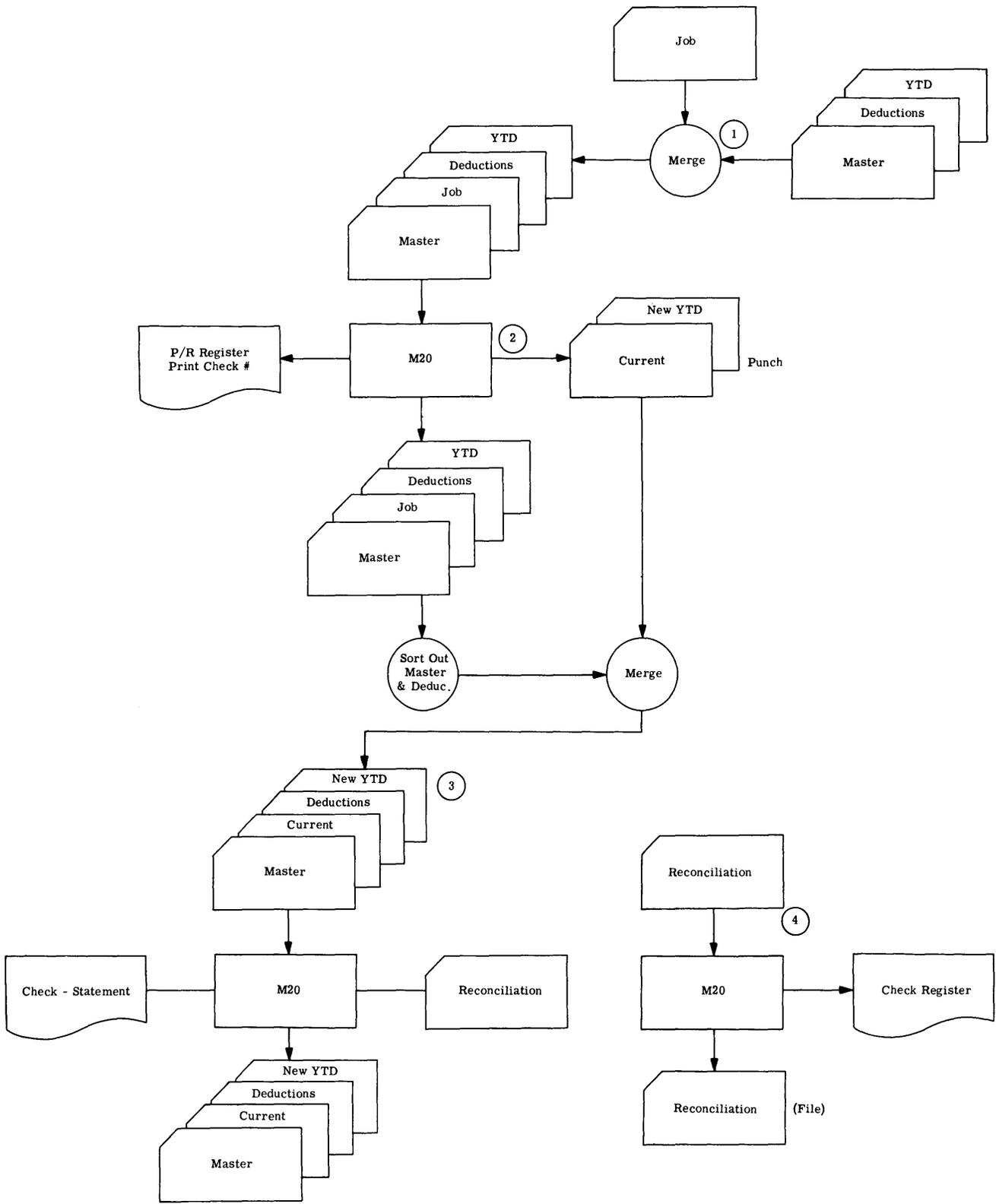


Figure 66. Card reader/card punch approach -- job-rated payroll



**International Business Machines Corporation**  
**Data Processing Division**  
**112 East Post Road, White Plains, N. Y. 10601**