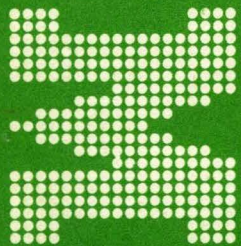
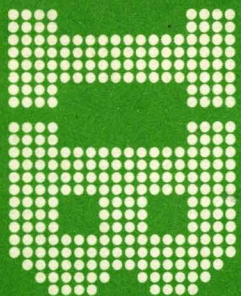
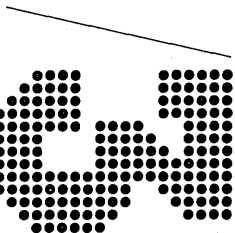
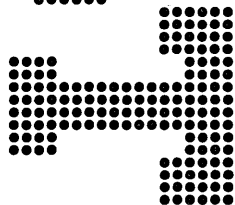
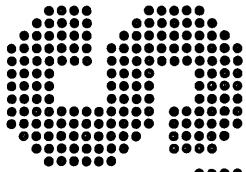
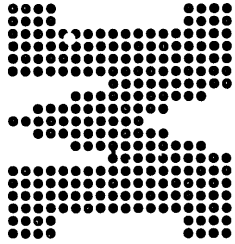
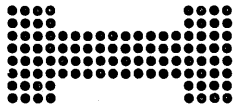


**IBM System/3
Model 6
Introduction**





IBM System/3 Model 6 Introduction

This manual introduces the IBM System/3 Model 6 to those who will program, operate or manage the system.

The manual explains the Model 6 units and the functions they perform, and the programs used in performing various data processing jobs.

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Chapter 1. Introduction

The IBM System/3 Model 6 is designed to bring the advantages of electronic data processing, now enjoyed by larger companies, to companies with small data processing budgets. The system should appeal to small independent firms as well as branch locations of larger companies.

The IBM System/3 Model 6 provides:

- Low cost data processing.
- Optional ledger card processing.
- Editing and error checking capabilities to help operators check their work before it is processed.
- Summary reports.
- Growth paths to larger and faster machines without major reprogramming.
- An easy to use mathematical problem solving capability at a low cost.

The Model 6 permits:

- Processing of data in random sequence
- Random inquiry into data files
- Persons with little data processing experience to operate the system.

Chapter 2. General Data Processing Concepts

Data processing very basically stated, consists of reading data from an input device into computer storage, performing an arithmetic or logical operation with the data, and then transferring the results to an output device for human reading or further processing at a later stage.

INPUT DEVICES

Input devices are used to enter data into the data processing system.

- Punched card and punched paper tape readers accept information in the form of holes punched in cards or paper tape.
- Magnetic disk and tape units accept information in the form of magnetic bits recorded on disks or tapes.
- Keyboards allow the operator to enter information directly into the system.

Each of these methods of entering information into a computer system has its advantages. For instance, punched cards and tapes are less expensive than disks or magnetic tapes but much slower. Disks or tapes can store more information in less physical space than cards. Keyboards provide great flexibility where input data is complex and variable, but speed depends on the operator.

PROCESSING UNIT

The processing unit is the controlling center of the system. It can be divided into three parts:

- Arithmetic/logical
- Storage
- Control

Arithmetic/Logical

The arithmetic/logical section performs addition, subtraction, multiplication, and division. Logical comparisons or tests for various data conditions are also handled.

Storage

Data to be processed, must be placed in main storage located in the processing unit, by an input device. Each numbered position of storage is called an address. Data stored in one of the storage positions can be retrieved by requesting the contents of the storage address.

During internal processing, data may be rearranged in storage by sorting or by combining several different types of data received from several input devices. The processor may also take data from storage, calculate according to a program and place the result back into storage.

The storage capacity of the IBM System/3 Model 6 is either 8,192; 12,288; or 16,384 bytes of storage (1K = 1,024 bytes). One byte can contain either one alphabetic character or symbol, or two numeric digits. The time required to access one byte is 1.56 microseconds (1 microsecond equals one millionth of a second).

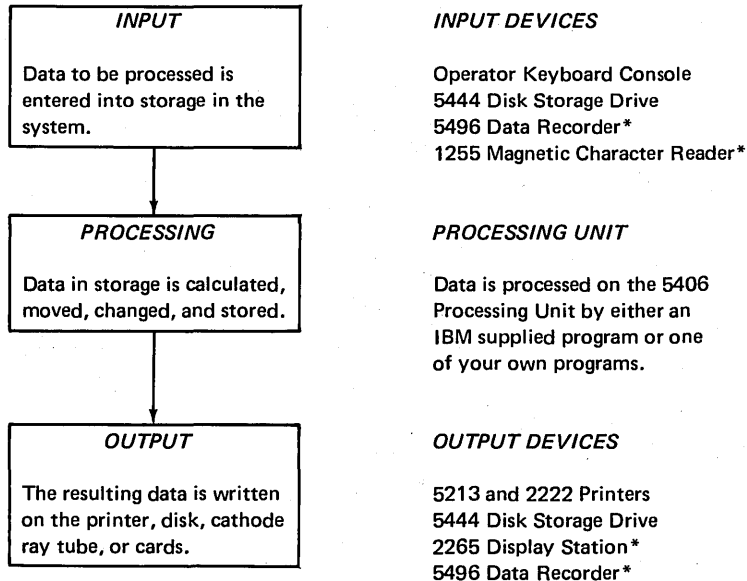
Auxiliary storage is another type of storage area available. This storage area is located in a device other than the processing unit, usually a disk storage drive. Auxiliary storage can hold much more data (up to 9.8 million bytes), but the storage access time is longer (about 1/4 second). Auxiliary storage is used to store such things as master, customer, and inventory records, as well as programs used by the system.

Control

The control section directs and coordinates the operation of the input/output devices, the arithmetic/logical operations of the processing unit, and transferring data to and from storage.

OUTPUT DEVICES

Output devices are used to make the results available for people to read or for further machine processing. Data recorders place data in cards in the form of holes; printers print data on paper; disk and tape units record data in the form of magnetic bits on disk and tape; the cathode ray tube displays data on a screen.



*Optional Devices

Chapter 3. Standard Devices

The IBM System/3 Model 6 is comprised of these devices (Figure 1):

- IBM 5406 Processing Unit
- Operator keyboard console
- IBM 5444 Disk Storage Drive
- IBM 5213 Printer or IBM 2222 Printer

The Model 6 requires only 120 square feet of floor space, including operator and service access areas.

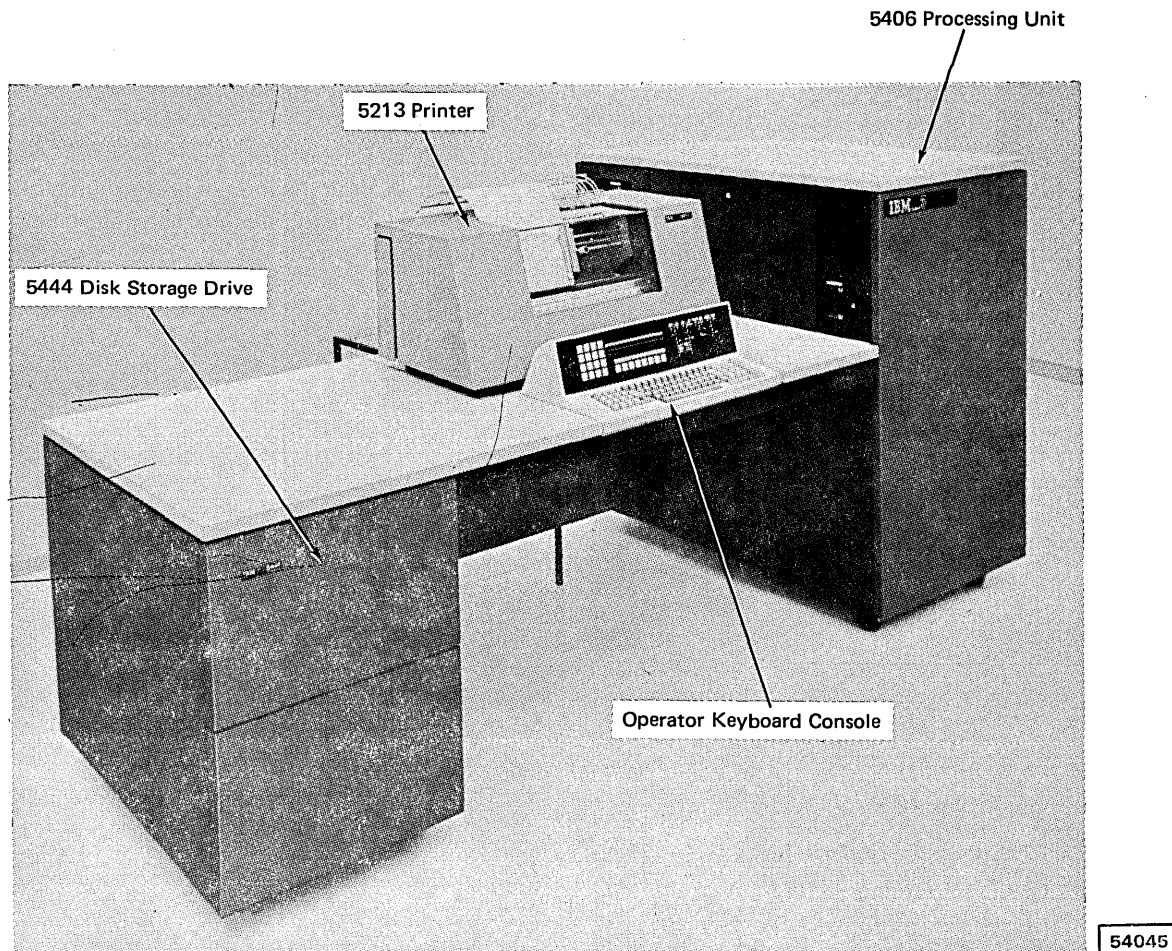


Figure 1. IBM System/3 Model 6

IBM 5406 PROCESSING UNIT

The 5406 Processing Unit (Figure 2) is available in three different models, depending on the storage capacity desired. Model B2 provides 8K bytes of storage, Model B3 provides 12K bytes, and Model B4 provides 16K bytes.

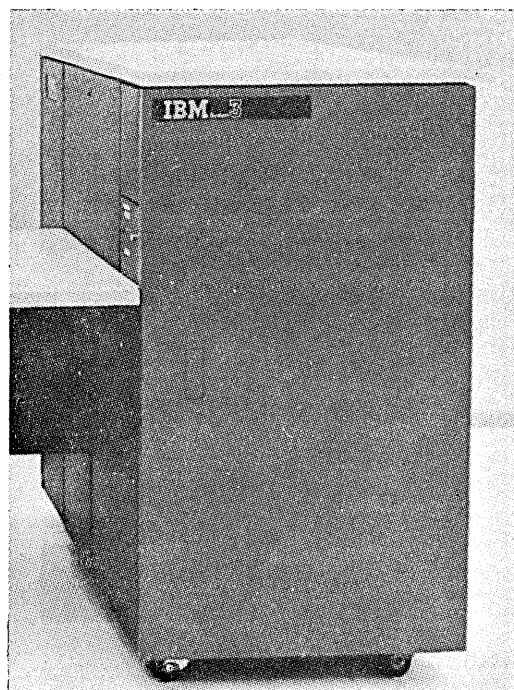
The processing unit uses monolithic systems technology (MST) for high reliability and speed. It also uses a technique called cycle stealing that allows input, processing, and output operations to be done at the same time; this overlapping of functions reduces the time required to complete a job.

The 5406 Processing Unit uses the same architecture as the processing unit for the System/3 Model 10. This provides growth to larger and faster computer systems without major reprogramming or data file reorganization.

The Binary Synchronous Communications Adapter (BSCA) is an optional feature that can be installed on the 5406. This feature allows you to send and receive data over switched, leased, or private telephone lines. The 5406 with the BSCA feature can communicate with the following systems (if they have the BSCA feature):

- System/3
- System/360
- System/370

The BSCA feature allows transmission rates of 200, 600, 1200, 2400, 4800, 19,200, 40,800, and 50,000 bits of data per second.



54044

Figure 2. IBM 5406 Processing Unit

OPERATOR KEYBOARD CONSOLE

The operator keyboard console (Figure 3) allows the operator to perform these functions:

1. Enter data into storage by means of the alphameric keyboard and the 10-key numeric keyboard.
2. Control system functions by means of the system control switches.
3. Control certain program operations and printer operations by means of command keys.

Command Key Lights

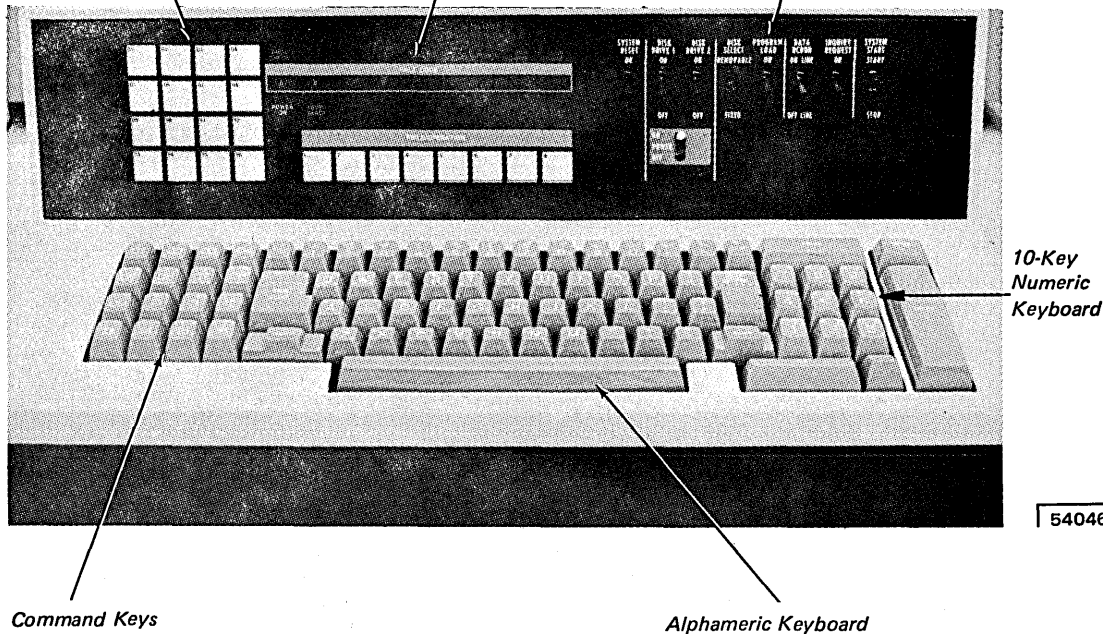
These lights tell the operator which command keys have been turned on.

System Status Lights

I/O attention lights indicate those devices that need operator attention. The halt code and field/operation lights show system status.

System Control Switches

These switches start and control the system.



10-Key
Numeric
Keyboard

54046

Command Keys

Command keys permit the operator to change the program's execution to allow for exceptions (for example, special prices or discounts).

Alphameric Keyboard

The keyboard is used to enter data into storage in the processing unit.

Figure 3. Operator Keyboard Console

IBM 5444 Disk Storage Drive

IBM 5444 Disk Storage Drives (Figure 4) offers the following storage capacities: 2,457,600; 4,915,200; 7,372,800; 9,830,400 bytes. These storage capacities indicate the number of bytes available for access at any given time. However, each disk storage drive has a removable disk. This disk can be replaced with other disks. Since you can have as many removable disks as you need, you virtually have unlimited storage capacity.

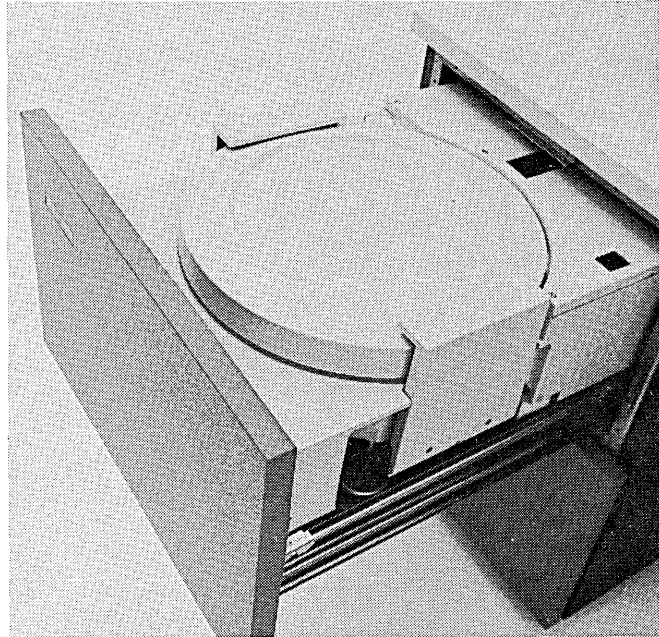


Figure 4. IBM 5444 Disk Storage Drive

A disk storage drive (Figure 5) has four disk surfaces (top and bottom of the fixed and removable disks). Each surface is divided into tracks; Model 1 has 100 tracks per surface and Model 2 has 200 tracks per surface. Each track is divided into 24 sectors. Each sector contains 256 bytes of data.

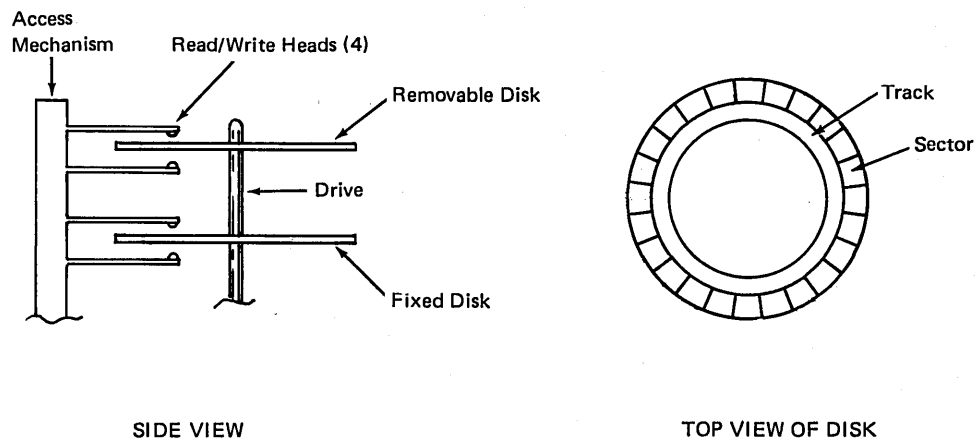


Figure 5. Disk Storage Drive

The access mechanism contains four read/write heads, one for each surface of the two disks. This mechanism moves back and forth across the disk surfaces to position the heads to read or write data. When the access mechanism is in any one position, all four heads are positioned in the same relative location on the four disk surfaces. Thus, the four corresponding tracks can be read without repositioning the access mechanism. The storage area (four disk surfaces) accessible with the access mechanism in one position is called a cylinder.

The total time required for the access mechanism to move in or out to the proper cylinder, for the disk to rotate so that the sector to be read is aligned with the read/write heads, and for the system to read or record the data in that sector is called "access time." This chart shows the minimum, average and maximum access time in milliseconds (ms) for the 5444 Model 1 and the 5444 Model 2.

	<u>Minimum</u>	<u>Average</u>	<u>Maximum</u>
Model 1	39 ms	153 ms	395 ms
Model 2	39 ms	269 ms	750 ms

A 5444 Model 2 has about twice as much storage capacity as a Model 1. However, since the Model 2 has twice as many cylinders as the Model 1, the access mechanism must travel further on the average to find a particular record, and the average access time is not quite as fast as on a Model 1.

Each data record stored on disk has a physical address consisting of track, sector, and position within that sector (like city, street, and street number). However, when using RPG II, the user need never be concerned with physical addresses. Indices can be maintained for him on the disk, which allow the user to seek records on the basis of logical addresses which have meaning to him; for example, customer number, account number, or part number.

IBM 5213 AND 2222 PRINTERS

The IBM System/3 Model 6 can use either a 5213 Printer or a 2222 Printer. The 5213 Printer can print 132 print positions; the 2222 Printer can print 220 print positions. Both printers have a 64 character set and can print up to 85 characters per second.

5213 Printer

The 5213 Printer (Figure 6) comes in three models. Model 1 uses a pin-feed platen to move forms through the printer; that is, forms with holes along the outside edges are attached to pins on both ends of the platen. Printing is done from left to right. Model 1 will be used primarily in scientific applications when printing on single part forms.

Model 2 also prints from left to right. It uses a pair of forms tractors to move forms through the printer. The form is attached to the pins on both forms tractors. This model is recommended for printing multiple part forms and for use in business applications.

Model 3 differs from Model 2 only in that Model 3 allows printing in both directions across the form. This feature increases print speed about 50 percent.

The speed of the 5213 Printer varies with the length of the line printed. This chart shows the average number of lines per minute (lpm) that can be printed:

<i>Line Length</i>	<i>5213 Model 1</i>	<i>5213 Model 2</i>	<i>5213 Model 3</i>
40	60 lpm	66 lpm	100 lpm
60	42 lpm	44 lpm	69 lpm
70	36 lpm	38 lpm	60 lpm
80	32 lpm	33 lpm	53 lpm
100	26 lpm	27 lpm	43 lpm
120	22 lpm	22 lpm	36 lpm

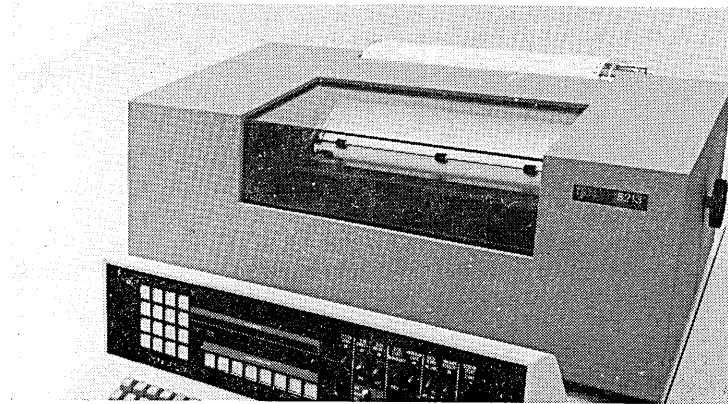
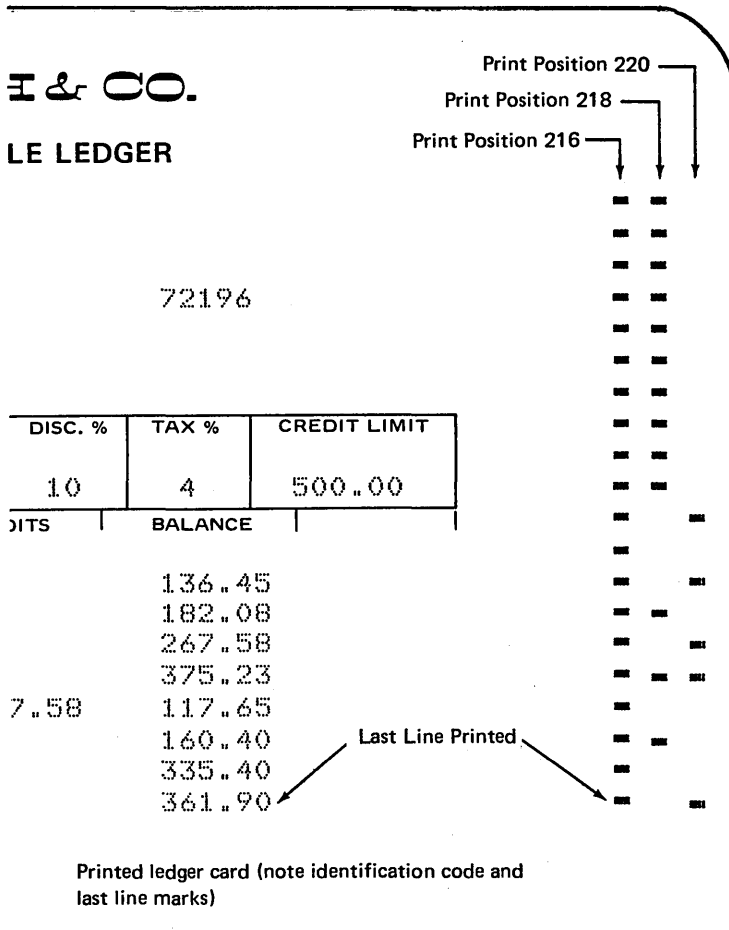


Figure 6. IBM 5213 Printer

2222 Printer

The 2222 Printer (Figure 7) comes in two models. Both models have dual forms tractors. The dual forms tractors allow two forms to space independently of each other. For example, an invoice form and journal form can both be printed, but they can be spaced independently.

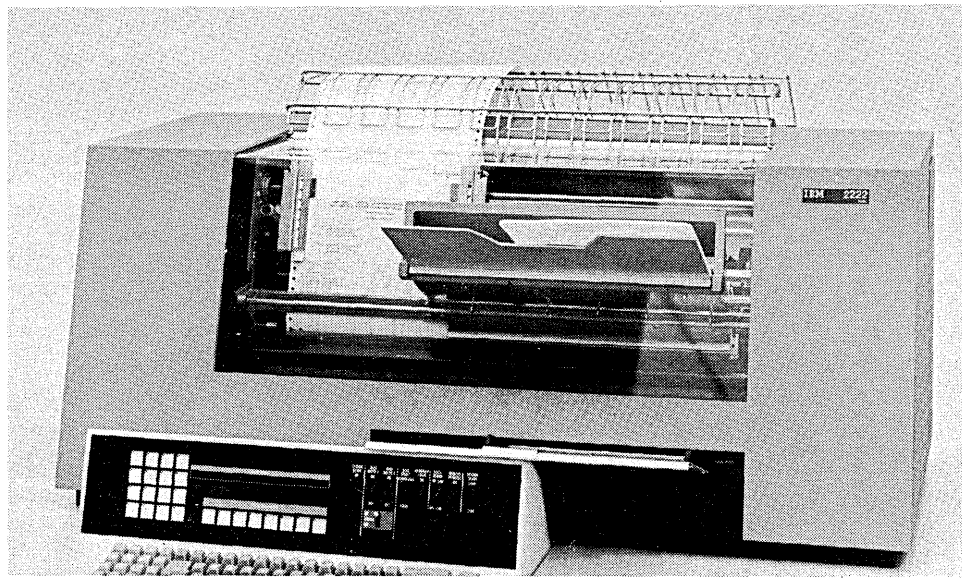
Both models of the 2222 Printer can also print on ledger cards. The ledger card device reads the ledger identification number and the last line printed, and transfers the information to storage. In about three seconds, the ledger card is automatically positioned on the proper line, and the card is printed and ejected. Ledger cards do not require special magnetic strips. Both sides of the card can be used. The cards can be 6 to 14 inches wide and 8 to 11 inches long.



Model 2 differs from Model 1 only in that Model 2 allows printing in both directions across the form. Model 1 only prints from left to right.

The speed of the 2222 Printer varies with the length of the line printed. This chart shows the average number of lines per minute (lpm) that can be printed:

<i>Line Length</i>	<i>2222 Model 1</i>	<i>2222 Model 2</i>
40	66 lpm	100 lpm
60	44 lpm	69 lpm
70	38 lpm	60 lpm
80	33 lpm	53 lpm
100	27 lpm	43 lpm
120	22 lpm	36 lpm



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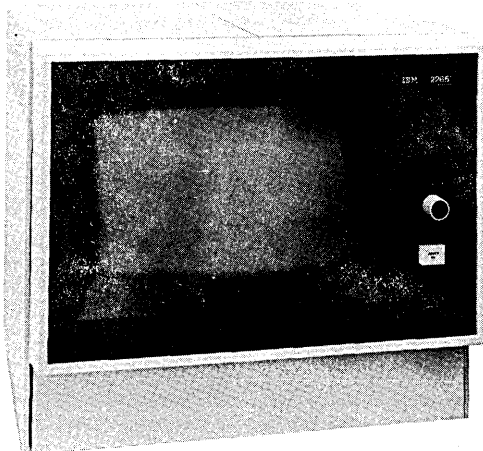
Figure 7. IBM 2222 Printer

Chapter 4. Optional Devices

IBM 2265 DISPLAY STATION (CATHODE RAY TUBE)

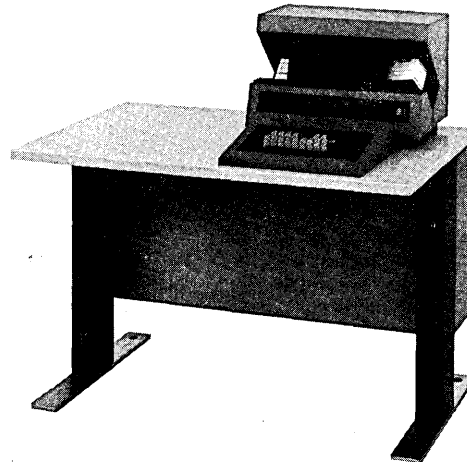
The 2265 Display Station (Figure 8) has a cathode ray tube that displays up to 960 characters (15 lines of 64 characters each). All 64 characters in the Model 6 character set can be displayed.

The 2265 may be specified as an output device for both RPG II and BASIC programs. It can be used for inquiry and for operator messages. In problem solving applications using the BASIC language, the 2265 can also be used for program listings and for fast interaction with the system.



54047

Figure 8. IBM 2265 Display Station



51802

Figure 9. IBM 5496 Data Recorder

IBM 5496 DATA RECORDER

The 5496 Data Recorder (Figure 9), when attached to the Model 6, serves as either a 96-column card reader or card punch. The 5496 can read or punch programs and data at a rate of 22 cards per minute. It can also serve offline (not attached to the system) as a regular data recorder. The data recorder increases system processing speed because an operator can punch data on the 5496 while the Model 6 is doing other processing.

IBM 1255 MAGNETIC CHARACTER READER

The 1255 Magnetic Character Reader (Figure 10) is attached to the IBM System/3 Model 6 by the Serial Input/Output Channel. The 1255 reads MICR characters printed on checks and documents, accumulates data, and sorts documents. The number of documents the 1255 can process per minute is 500 or 750 depending on the model.

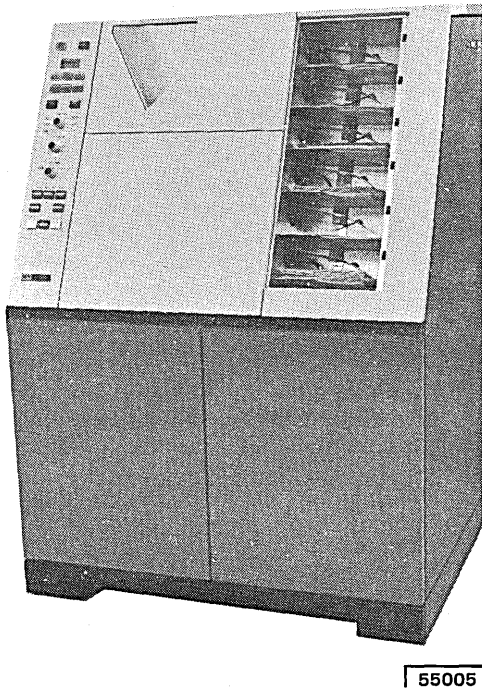


Figure 10. IBM 1255 Magnetic Character Reader

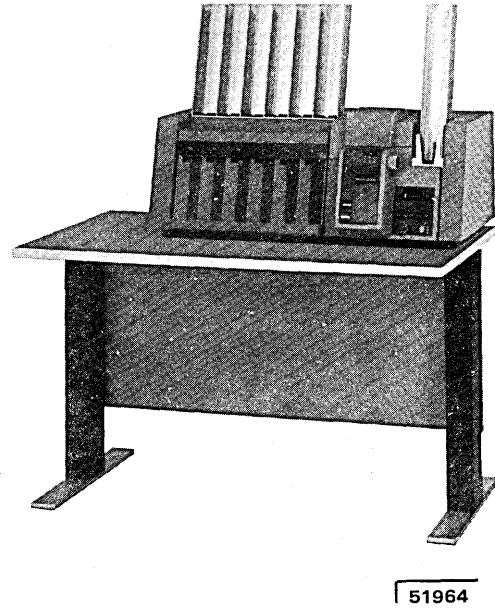


Figure 11. IBM 5486 Card Sorter

IBM 5486 CARD SORTER

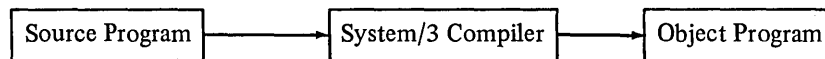
The 5486 Card Sorter (Figure 11) is used offline to sort 96-column cards. Two models are available. One model sorts 1000 cards per minute; the other model sorts 1500 cards per minute.

Chapter 5. Programming

Basically there are two types of programs: programs that IBM supplies and programs that the user supplies. IBM-supplied programs include any of the following:

- System control programs
- Programming language programs (for example, RPG II and BASIC)
- Conversational utility programs
- Sort program

User-supplied programs are written by the user using a programming language. The user's program is called a source program. The source program is then translated into machine language using an IBM-supplied programming language program (such as RPG II). The translated program is called an object program. The object program tells the system how to process the data.



SYSTEM CONTROL PROGRAMS

Disk System Management

This program is the nucleus of the System/3 Model 6. It provides the user with automatic job-to-job transition, the ability to inquire into disk files during program execution, and the ability to execute programs from previously cataloged procedures.

Library Maintenance

This program allows the user to create and maintain source program and object program libraries on the disk storage drive.

Disk Utilities

These programs allow the user to prepare, copy, and maintain the disk files.

PROGRAMMING LANGUAGE PROGRAMS

The user writes a program using a programming language. The user's program describes the job to be done. Two languages are available: RPG II and BASIC.

RPG II

RPG II is used for commercial data processing applications such as billing, inventory control, and accounts receivable. The language is easy to learn and easy to use.

The user describes his job on four specification sheets. The File Description sheet describes the input and output files used during the job. The Input sheet describes the data records to be processed. The Calculation sheet describes the calculations to be done. The Output-Format sheet describes the format of the resulting output.

The instructions described on these sheets are compiled by the RPG II Compiler and checked for errors. Error messages are printed so that these errors can be corrected. The compiler then generates an object program.

BASIC

BASIC is primarily used by engineers, financial analysts, and business planners for generalized problem solving applications. This language is also easy to learn and easy to use. BASIC checks each statement for correctness and indicates when the BASIC rules have been violated.

CONVERSATIONAL UTILITY PROGRAMS

Keyboard Source Entry (KSE)

This program allows the user to enter, add, delete, and change source program statements in the source library.

Keyboard Data Entry (KDE)

This program allows the user to enter, add, delete, and change data entries in the data files. The program can also provide control totals of the data entered.

Data Interchange Utility (DIU)

This program converts data files generated by one programming system to the format used by the other programming system (RPG II to BASIC or BASIC to RPG II).

SORT PROGRAM

This program allows the user to sort the data stored on disk files into different sequences. When this program is run on a 5406 Processing Unit, Model B3 (12K bytes of storage), 10,000 disk records of 100 characters each can be sorted in less than 10 minutes; 5000 disk records of 200 characters each can be sorted in 6.5 minutes.

Chapter 6. BASIC Language

The IBM System/3 BASIC language is a powerful, but easy to use, language for mathematical problem solving applications. These business areas will find the language useful:

- Market research
- Management science and operations research
- Market analysis
- Financial analysis
- Statistical analysis
- Pricing
- Accounting
- Scheduling
- Engineering
- Planning
- Estimating
- Forecasting
- Budgeting
- Quality control

The BASIC language closely follows simple mathematical notation. These symbols are used:

- Plus (+) indicates addition.
- Minus (-) indicates subtraction.
- Asterisk (*) indicates multiplication.
- Slash (/) indicates division.

For example, a BASIC instruction to calculate 6% interest on \$10,000 for one month would look like this:

$$I = 10000 * .06/12$$

(Interest = \$10,000 multiplied by 6% divided by 12 months)

The following BASIC program shows a mortgage computation. It calculates the monthly interest, deducts that amount from the total payment, applies the remainder to the principal, and prints the new principal amount.

Program

```

0100 REM P = PRINCIPAL
0110 P = 30000
0120 REM N = NUMBER OF MONTHS 300 = 25 YEARS
0130 N = 300
0140 REM I = INTEREST RATE .005 = 6% PER YEAR
0150 I = .005
0160 R = P*((I/((1+I)N-1))+I)
0170 PRINT '          PAYMENT          APPLY TO          NEW'
0180 PRINT '          NO. AMOUNT      INTEREST    PRINCIPAL    AMOUNT'
0190 Y = 0
0200 PRINT
0210 REM *****CALCULATE MONTHLY INTEREST, CREDITS, PAYMENTS AND PRINT RESULTS
0220 FOR X = 1 TO N
0230 M = P*I
0240 Z = R-M
0250 P = P-Z
0260 PRINT USING 270,X,R,M,Z,P
0270 :      ### #####.## #####.## #####.## #####.##
0280 NEXT X
0290 END

```

Note: REM statements (100, 120, 140, 210) are optional remarks used by the programmer to document clearly what he is doing. They are not required for execution of his program.

READY

Printout

	PAYMENT NO. AMOUNT	APPLY INTEREST	TO PRINCIPAL	NEW AMOUNT
1	193.27	150.00	43.27	29956.74
2	193.27	149.78	43.48	29913.26
3	193.27	149.57	43.70	29869.56
4	193.27	149.35	43.92	29825.65
5	193.27	149.13	44.14	29781.52
6	193.27	148.91	44.36	29737.17
7	193.27	148.69	44.58	29692.59
8	193.27	148.46	44.80	29647.79
9	193.27	148.24	45.03	29602.77
10	193.27	148.01	45.25	29557.52
11	193.27	147.79	45.48	29512.05
12	193.27	147.56	45.71	29466.35
13	193.27	147.33	45.93	29420.42
14	193.27	147.10	46.16	29374.26
15	193.27	146.87	46.40	29327.87
16	193.27	146.64	46.63	29281.25
17	193.27	146.41	46.86	29234.39
18	193.27	146.17	47.09	29187.30
19	193.27	145.94	47.33	29140.00
20	193.27	145.70	47.56	29092.45
21	193.27	145.47	47.79	29044.66
22	193.27	145.23	48.02	28996.64
23	193.27	145.00	48.25	28948.39
24	193.27	144.76	48.48	28900.00
25	193.27	144.53	48.71	28851.48
26	193.27	144.29	48.94	28802.74
27	193.27	144.06	49.17	28753.88
28	193.27	143.82	49.40	28704.88
29	193.27	143.59	49.63	28655.75
30	193.27	143.35	49.86	28606.49
31	193.27	143.12	50.09	28557.10
32	193.27	142.88	50.32	28507.70
33	193.27	142.65	50.55	28458.15
34	193.27	142.41	50.78	28408.46
35	193.27	142.18	51.01	28358.65
36	193.27	141.94	51.24	28308.71
37	193.27	141.71	51.47	28258.65
38	193.27	141.47	51.70	28208.46
39	193.27	141.24	51.93	28158.15
40	193.27	141.00	52.16	28107.71
41	193.27	140.77	52.39	28057.15
42	193.27	140.53	52.62	28006.46
43	193.27	140.30	52.85	27955.65
44	193.27	140.06	53.08	27904.71
45	193.27	139.83	53.31	27853.65
46	193.27	139.59	53.54	27802.46
47	193.27	139.36	53.77	27751.15
48	193.27	139.12	54.00	27700.00
49	193.27	138.89	54.23	27648.65
50	193.27	138.65	54.46	27597.15
51	193.27	138.42	54.69	27545.65
52	193.27	138.18	54.92	27494.00
53	193.27	137.95	55.15	27442.25
54	193.27	137.71	55.38	27390.45
55	193.27	137.48	55.61	27338.55
56	193.27	137.24	55.84	27286.55
57	193.27	137.01	56.07	27234.45
58	193.27	136.77	56.30	27182.25
59	193.27	136.54	56.53	27130.00
60	193.27	136.30	56.76	27077.75
61	193.27	136.07	56.99	27025.45
62	193.27	135.83	57.22	26973.15
63	193.27	135.60	57.45	26920.85
64	193.27	135.36	57.68	26868.55
65	193.27	135.13	57.91	26816.25
66	193.27	134.89	58.14	26763.95
67	193.27	134.66	58.37	26711.65
68	193.27	134.42	58.60	26659.35
69	193.27	134.19	58.83	26607.05
70	193.27	133.95	59.06	26554.75
71	193.27	133.72	59.29	26502.45
72	193.27	133.48	59.52	26450.15
73	193.27	133.25	59.75	26397.85
74	193.27	133.01	59.98	26345.55
75	193.27	132.78	60.21	26293.25
76	193.27	132.54	60.44	26240.95
77	193.27	132.31	60.67	26188.65
78	193.27	132.07	60.90	26136.35
79	193.27	131.84	61.13	26084.05
80	193.27	131.60	61.36	26031.75
81	193.27	131.37	61.59	25979.45
82	193.27	131.13	61.82	25927.15
83	193.27	130.90	62.05	25874.85
84	193.27	130.66	62.28	25822.55
85	193.27	130.43	62.51	25770.25
86	193.27	130.19	62.74	25717.95
87	193.27	129.96	62.97	25665.65
88	193.27	129.72	63.20	25613.35
89	193.27	129.49	63.43	25561.05
90	193.27	129.25	63.66	25508.75
91	193.27	129.02	63.89	25456.45
92	193.27	128.78	64.12	25404.15
93	193.27	128.55	64.35	25351.85
94	193.27	128.31	64.58	25299.55
95	193.27	128.08	64.81	25247.25
96	193.27	127.84	65.04	25194.95
97	193.27	127.61	65.27	25142.65
98	193.27	127.37	65.50	25090.35
99	193.27	127.14	65.73	25038.05
100	193.27	126.90	65.96	24985.75

Chapter 7. Systems Design For RPG II

The sequence for processing data on the Model 6 is about the same as the sequence for hand processing. However, the Model 6 is faster and more accurate.

Before you can begin to use a computer system, you must first do some planning. These six steps should be done in the order listed:

1. Study and document your present method.
2. Correct any deficiencies in your present procedure and plan for future needs.
3. Design or redesign reports.
4. Establish master files.
5. Plan a system flowchart.
6. Code your programs.

STUDY AND DOCUMENT PRESENT METHOD

To study your present methods, trace each source document through the present processing steps. Find out the details of the present job. What is done? Who does it? When is it done? Why is it done? Gather samples of all documents being used. Determine the size of various files, such as the number of customer records, the number of inventory records, and so on. A thorough knowledge of your present method becomes the base for the new design.

In reviewing present procedures, a few data processing terms can be used to describe information. A *source document* is the medium for recording the original transaction, identifying what was done, and further indicating who, where, when, and how. This is true of any source data whether it is an employee report of a day's work, a customer cash payment, or one of the varieties of inventory transactions.

Each item of information on a source document is a *field*. On a customer order, for instance, the fields include the date, customer name, product number, and quantity ordered. A field can contain any number of characters. When all the fields are put together, they become a single *record* of what took place.

A *file* is a group of related records. Each record in the file has some type of record identification which identifies that record from all other records. An employee number could be the record identification for the records in an employee file.

Files that contain relatively permanent data (such as an employee payroll file) are called *master files*; the records in the master file are called *master records*. Data that is not constant (such as orders for products) is recorded on *transaction records* and saved in a *transaction file*.

CORRECT DEFICIENCIES AND PLAN NEEDS

Determine which of your present procedures are deficient so that these procedures can be corrected. Also, evaluate your future needs; if growth requirements are considered in your design plan, future changes can be made more easily.

DESIGN OR REDESIGN REPORTS

The most common form of output from the system is reports. Reports are created by processing input records. By knowing what reports you need and the format of the reports, you can then set up the necessary processing steps needed to produce the reports.

ESTABLISH MASTER FILES

Create your master files. The organization of the files must be designed as well as the format of the individual records. If you now use ledger cards, the fields required include the fields now on the card plus any additional fields needed for planning changes or future requirements. You will want to store the records in the master file on a disk.

PLAN A SYSTEM FLOWCHART

Plan a system flowchart to show the path that your data should take through the system when the data is processed. Show the data needed to do the job, where this data comes from, how it gets into the system, and how the system should produce the results.

CODE YOUR PROGRAMS

Now that you have determined your procedures and needs, you can begin to code your RPG II programs.

Chapter 8. RPG II Language

Each computer has its own way of representing instructions in internal code. This is referred to as machine language. Since you do not know machine language, your instructions to the computer must be interpreted by a *compiler*. The compiler is a program that acts as a translator. It translates the programming language used for writing program instructions into a language the computer uses. The programming language used with Model 6 for most commercial applications is called RPG II.

The RPG II language uses English letters, words, and characters and follows rules just like any language. The compiler understands these characters and rules of RPG II and, at the same time, understands machine language. It, therefore, can take job specifications written in the RPG II programming language and translate them into machine coded instructions.

CODING RPG II SPECIFICATIONS

To describe your job for System/3 Model 6, you use RPG II language specification sheets. These formatted sheets show where specific information is to be coded or programmed.

Output-Format Specifications Sheet

This coding form is used to describe the records and fields in your program that are contained in the output files and to specify the arrangement of the data. In this case, a print line is considered an output record which is written on the printer.

Some of the major entries are:

1. **Filename**—Identifies the file on which the record will be written.
2. **Type**—Identifies the type of output line.
3. **Field Name**—Identifies the name of a field used in the program such as a field from an input record or a result field of calculations.
4. **End Position**—Specifies the location of this field in the output record.

IBM		International Business Machines Corporation		Form X21-9090 Printed in U.S.A.													
		RPG OUTPUT - FORMAT SPECIFICATIONS															
Date _____			Page 1 2		75 76 77 78 79 80												
Program _____			<table border="1" style="border-collapse: collapse;"> <tr> <td>Punching Instruction</td> <td>Graphic</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Punch</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		Punching Instruction	Graphic						Punch					Program Identification
Punching Instruction	Graphic																
	Punch																
Programmer _____																	

Line	Form Type	Filename	Type (H/D/T/E)	Space				Output Indicators			Field Name	Edit Code	End Position in Output Record	Constant or Edit Word	Sterling Sign Position
				Stacker Select/Flash Overflow (F)	Before	Alter	Before	After	Not	And					
01	O	ACCOUNT	T												
02	O														
03	O														
04	O														
05	O														
06	O														
07	O														
08	O														
09	O														
10	O														
11	O														
12	O														
13	O														
14	O														
15	O														
	O														
	O														
	O														
	O														
	O														
	O														

The fields named CUSTNO, NAME, and TOTAL are printed on the file ACCOUNT. In this illustration, the file ACCOUNT would have been defined on the File Description Sheet as an output file on the printer. The fields end in positions 6, 35, and 50, respectively, of the print line.

The resulting output is a printed list of each customer's number, name, and total order amount.

PROCESSING RPG II SPECIFICATIONS

After the program specifications have been coded on the appropriate forms, coding is entered into the system through the operator keyboard using the Keyboard Source Entry (KSE) program. The program, called a source program, is recorded on the disk file. The RPG II Compiler then translates the source program into machine language. The machine language program, called an object program, is written on the disk file. The object program can be called by the user to execute a desired job.

If the System/3 Model 6 has an IBM 5496 Data Recorder attached, then the source statements can be recorded on 96-column cards. The compiler reads the source statements through the card reader.

Chapter 9. Sample Systems Design for a Model 6 Application

The flowcharts in this chapter show a method for installing a billing and inventory control application in your business. The advantages of this method are:

- Capability of adding card input/output to the system at a later date with minor programming changes.
- Upward compatibility with the IBM System/3 Model 10.
- Pre-editing of operator input.
- Simplified operator training.
- Standardized error correction.

DATA ENTRY

Before you can do any billing or inventory control processing, you must first enter your transaction data (such as order information or inventory activity) into the system. Figure 12 is a flowchart of the two methods that can be used (the letters on the figure relate to the text discussion):

1. Enter the data on a disk through the keyboard, using the Keyboard Data Entry (KDE) program (A).
2. Enter the data on a disk from cards, using a user-supplied RPG II program (B).

After the data has been stored on disk, an Edit program (C) checks the data against the master files for invalid customer numbers, nonexistent item numbers, and so on. The edited data is then ready for additional processing.

The advantages of entering data by one of the methods discussed are:

- All input is edited before it is used for processing.
- Operator efficiency is greater since similar input items are entered at one time.
- Data entry is standardized.
- Error correction is simplified.

When all the operator's input has been entered and edited, the Model 6 can do the rest of the processing without time lost waiting for operator reactions and decisions.

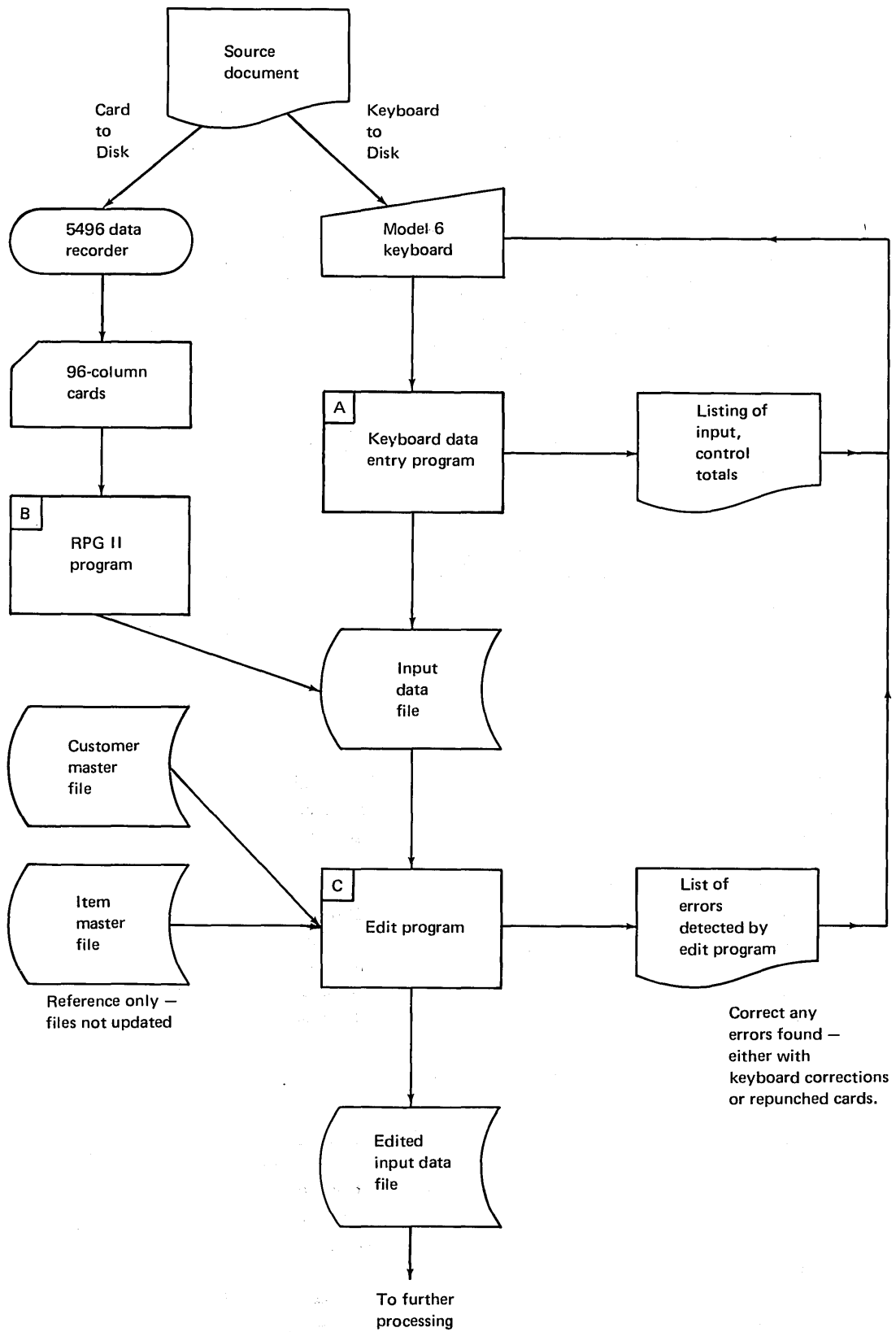


Figure 12. Data Entry

BILLING

The billing process can be done using three small programs: Billing Calculations, Invoice Print, and Invoice Register Print. Small programs are used because they are easier to code, easier to correct, and require less storage. Figure 13 is a flowchart of the billing process (the letters on the figure relate to the text discussion).

The Billing Calculations program (D) uses the data from the input data file, customer master file, and item master file to produce an exception list and an invoice file. The exception list specifies unusual situations which require attention before the final invoice is printed. Such exceptions might include items which are out of stock and invoices that exceed the total credit amount allowed an individual customer. The invoice file produced is only a temporary file. It contains all the information necessary to produce the final invoice. The file is stored on disk until the printer is available to print the invoices and the necessary invoice forms have been loaded into the printer.

The Invoice Print program (E) is used to print the invoices. The temporary invoice file is used as input to this program. As the invoices are being printed, an invoice summary file is created. The invoice summary file contains summary information such as the invoice number, date, and invoice amount.

The Invoice Register Print program (F) uses the invoice summary file and the customer master file to create and print an invoice register.

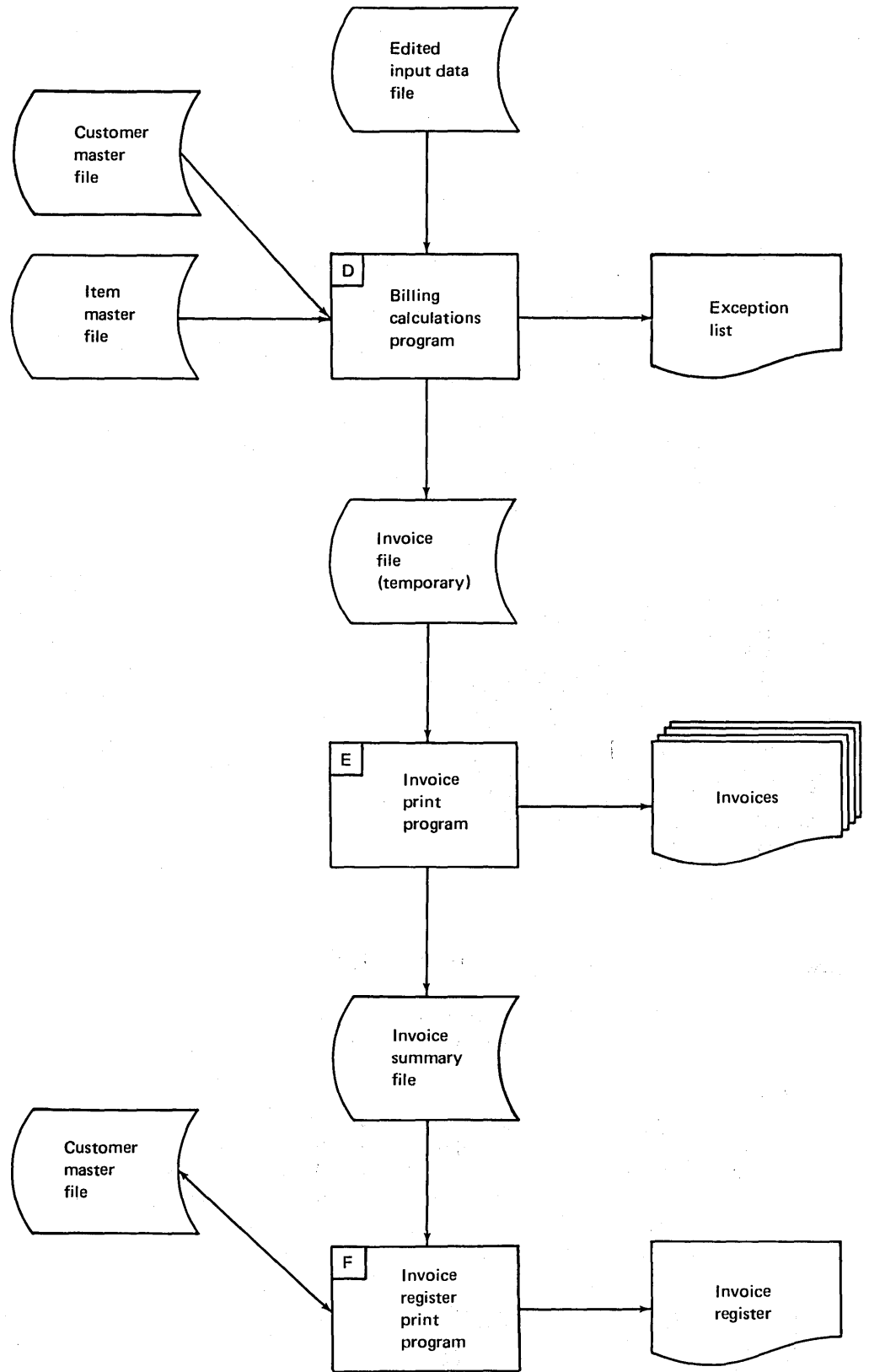


Figure 13. Billing Process

INVENTORY CONTROL

The inventory control process is also done using three small programs: Disk Sort, Inventory Processing, and Stock Status Report. Figure 14 is a flowchart of the inventory control process (the letters on the figure relate to the text discussion).

The edited inventory transactions (such as receipts, issues, adjustments, and sales) are used as input to the Disk Sort program (G). This program sorts the inventory transactions by item number and transaction code.

The Inventory Processing program (H) uses the sorted inventory transactions with the inventory information from the item master file to produce an updated item master file and a stock transaction register. The stock transaction register shows all stock transactions that have taken place.

The Stock Status Report program (I) needs to be run only if a stock status report is needed. This program uses the item master file to create a stock status report on particular business information. This information could be a list of all items, all active items, or just exception items.

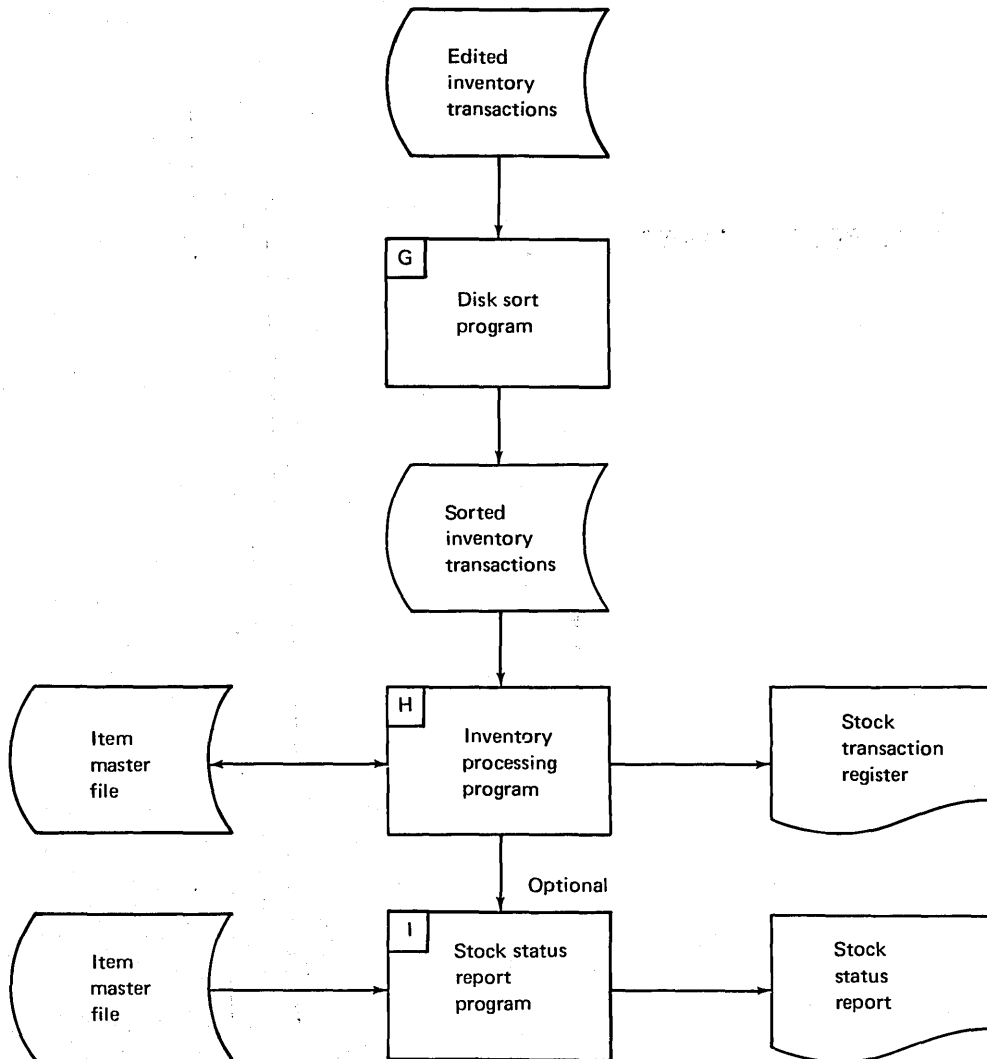


Figure 14. Inventory Control Process

Chapter 10. Installation and Conversion Aids

To help you prepare for installation of your IBM System/3 Model 6, IBM offers:

- Customer Education
- Customer Engineering Services
- System Engineering Services
- Model 6 Simulator
- Test Time

CUSTOMER EDUCATION

Included in the System/3 Model 6 rental price are introductory courses for management and supervisory personnel. Available at extra charge, are courses in systems design, programming and machine operation.

CUSTOMER ENGINEERING SERVICE

Included in the System/3 rental price is machine maintenance. The IBM Customer Engineer has one job to do—help keep your System/3 running smoothly. His service begins even before your machine arrives, as he assists in the physical planning of your installation.

SYSTEMS ENGINEERING SERVICES

IBM Systems Engineers experienced in meeting the systems requirements of the smaller business are available to help you get ready to install your Model 6. You may contract for Systems Engineering Services to assist with the details of installation planning, systems design, and programming.

MODEL 6 SIMULATOR

Testing in operator mode can be very time consuming because of the nature of operator-oriented systems. For this reason the Model 6 Simulator allows Model 6 RPG II programs to be compiled and tested at IBM locations on an IBM System/3 Model 10. This approach reduces test time, makes reruns easier, and is more economical.

You run test cases by simulating keyboard entry with cards rather than using the Model 6 keyboard. Each card represents an item or line that the operator would normally enter at the keyboard, such as data, RPG II statements, command key settings, or OCL commands. The simulator reads the cards from the IBM 5424 Multi-Function Card Unit on the Model 10 and simulates the operation of the Model 6. The IBM 5203 Printer on the Model 10 prints the simulated output of the printer on the Model 6. Ledger cards are simulated on the disk and displayed after a simulated ledger card run. Final testing can be done on a Model 6.

When you create files on disk, it is more efficient to punch the data into cards and use the higher reading speed on the Model 10 (250 or 500 cards per minute). After the disks are loaded, make a backup copy of them for security measures.

TEST TIME

Each Model 6 customer receives a test-time allowance. This time can be used on either a Model 6 or a Model 10 at an IBM location prior to installation of the customer's own system. Additional machine time may be purchased as required. IBM's Systems Engineering Services are available to assist with installation planning, design, and programming.

READER'S COMMENT FORM

IBM System/3
Model 6
Introduction

GA21-9122-1

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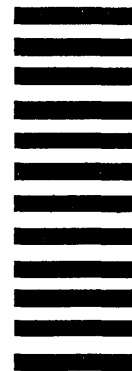
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