

KEYPUNCHING

THIRD EDITION

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PEGGY HANSON

Service Computation Center
University of Texas Medical Branch, Galveston

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FOR DEAN

PREFACE

The third edition of Keypunching constitutes a major revision of this work. In a continuing effort to keep abreast of the latest advances in card punch equipment technology, in addition to the machines presented in the first two editions (the IBM 24, 26, 29, 56, and 59), two new sections on the IBM 129 Card Data Recorder and the IBM 5496 Data Recorder have been added. This text is a manual of basic instruction and a workbook for learning the operation of these machines.

It is the intention of the author to prepare students using this book for employment in the field of data processing. In order to qualify students to handle many basic types of work assignments, a carefully designed and diversified range of materials and work problems is presented.

Material from the original text has been refined, revised, and expanded. It has been arranged in a sequence which leads the student from elementary how-to-turn-on-the-machine type of instruction through progressively more complicated tasks. In all cases, the work problems were designed to teach more than simple mechanical proficiency. A prime consideration was to acquaint students not only with correct machine procedures, but also to give practical experience in analyzing and solving problems and in performing tasks with a minimum of supervision. By following the sequence of exercises, a student will develop skill in manual dexterity and accuracy, as well as in learning to make progressively more complex program cards. Special emphasis has been placed on analyzing and creating program cards for both basic and multiple-program punching.

This text is primarily a guide for individual work and study, but should be used in conjunction with classroom lecture and demonstration.

Sufficient material has been provided so that, at the instructor's discretion, the course may be adjusted to cover any desired time span.

Portions of some pages concerning operating features and Figures 8, 9, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 28, and 29 are reprinted by permission of IBM.

I wish to thank the IBM Corporation for the fine training which set my feet

upon this path many years ago. It is my sincere hope that I, in turn, am now doing the same for others.

Peggy Hanson

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INTRODUCTION

The world of tomorrow is here today. It is a world of automation. Every day more and more people are being released from the tedious drudgery of menial routine labor, replaced by tireless machines which can perform as well or better than human workers.

At first glance, the picture presented by the advent of automated technology might seem a dismal one—hundreds of thousands of people idled by automatic systems.

In the field of data processing, more and more machines are being utilized to perform work previously done by accountants, bookkeepers, statisticians, secretaries, clerks, etc. One computer can handle literally in minutes, paper-work otherwise requiring days and the combined effort of several hundred people with paper and pencils, adding machines, calculators, and typewriters. In the span of a year, a single computer can do the work of a half million persons.

However, the prospect is really not dark, because for practically every job being eliminated by automation, a new one is being created. The demand for workers is not being reduced—actually, it is increasing. The problem is that the type of work required of human laborers is radically changing. To meet the challenge, today's workers must develop the special new skills required by an automated society, for machines, with all their superhuman capabilities, have one shortcoming. From the largest, most complex computers to the smallest, simplest data recorders, all depend upon one vital component without which they cannot function: the human operator.

Some machines can read writing, printing, or diagrams, but no machine can think as people can. Most machines understand only digital transmission (numeric coding translated into electrical impulses) of information and instruction, and before any machine can function at all, it must be told what to do by being "programmed" or fed coded performance instructions. Before a machine can process anything, the information to be fed into it must be translated from the source documents into a coded form that the machine can "read" and assimilate.

Transcribing written, printed, or diagrammatic data into digital form is

the function of the keypunch machine. The punched card produced by the keypunch machine is the basic unit of most IBM data processing systems.

There are several models of keypunch machines: two older models, the 24 and 26; and updated version, the 29; and the newer 129 Card Data Recorder and 5496 Data Recorder. One of the most important features of these machines is the program unit, which provides a simple means of setting them up quickly for automatic control of skipping, duplicating, and switching between alphabetic and numeric punching.

This textbook contains detailed descriptions of the operating features of each machine, as well as operating suggestions designed to simplify the operator's task. A series of exercises is provided which has been designed along the lines of jobs which are common in most business-oriented data processing organizations. These exercises are meant to provide the student operator some insight into "real world" applications of the data recording function.

PRELIMINARY INSTRUCTIONS

1. Read each page and study the illustrations carefully.
2. Complete each exercise (keypunch and verify) before going on to the next one. Be sure you thoroughly understand the principles of the operation involved in performing each exercise. If you do not, go over the written material again with your instructor and then rework the exercise.
3. From the beginning, get into the habit of pulling all "garbage" (bad cards) out of the deck (of punched cards) as you are working. This is most easily done by catching the bad card as it is being flipped from the reading station into the stacker. Also, when verifying, acquire the habit of marking the cards for correction as they pass through the reading station of the verifier. It is a very bad and extremely time-consuming procedure to attempt to go back into the deck after all the cards are verified and try to determine what is wrong with a card and how to correct it. See the section on the verifier for complete details.
4. A problem solved by personal effort is a lesson learned and remembered. Whenever an operational (machine function) problem occurs as you are punching an exercise, refer first to the OPERATING SUGGESTIONS section in this manual. If possible, determine for yourself what the problem is and how to solve it. If you cannot, then ask your instructor for assistance.
5. An operator on the job must be able to make all program cards required. You will be asked to prepare a layout card and a program card for each exercise in this manual except EXERCISE 1-A. A correct example of each can be found on pages
BEFORE YOU LOOK AT THE EXAMPLE, try to make the cards yourself. Compare the program card to the layout card and only after you feel you have made your program card correctly, check it against the sample in the book. If you have made an error in your programming, analyze the mistakes. Determine why you were wrong and be sure that you understand why the correct coding (as indicated by the example) will make the program card function properly. Only by determining unassisted the proper programming for your cards will you learn this most important part of the keypunch operation.
6. CONCENTRATE. THINK about what you are doing.
7. SPEED + ACCURACY = A GOOD OPERATOR. Speed is important, but it is of little value if precious time is lost correcting a multitude of errors.

SOME KEYPUNCH TERMS YOU SHOULD KNOW

A	Alpha. Program card should be coded for alphabetic punching.
A/N	Alpha/Numeric. An alpha-numeric field may be punched with either alphabetic or numeric characters. The program card should be coded for alphabetic punching and the numeric shift key depressed to punch numeric characters.
N	Numeric. Program card should be coded for numeric punching.
O	Alphabetic 'Oh'
Ø	Zero.
X-PUNCH	The 11th punching position on a card. Also called the 11-X and the Credit-X. Created by depressing the skip/dash key at the upper right corner of the keyboard.
DNP	<u>Do Not Punch.</u>
DUP	Duplicate.
DECK	The group of cards with which you are working. Before the cards are punched, it is a <u>blank deck</u> ; after punching, it is a <u>punched deck</u> .
FWZ	<u>Fill With Zeros.</u> In a field carrying this instruction, all blank spaces must be punched with numeric zeros.
LAYOUT CARD	A blank punch card which is graphically divided into sections (fields) to illustrate the design or plan for punching a particular job. There are as many punching formats as there are jobs to be done. Each is different, and the layout card may be used by the operator as a visual aid to indicate the size and location of each field punched into a card.
FIELD	Any specified number of card columns as designated by the work format to hold specific information. In the card shown in Fig. 1, there are four fields - a field for the Customer Name (card columns 1-25), a field for the Customer Number (card columns 26-31), a field which is to be left blank and will therefore be skipped (columns 32-79), and a field for the Division Number (column 80). As you can see, the Customer Name field occupies 25 columns while the Division Number field uses only 1 column.
GARBAGE	Any punched cards which are worthless (punched incorrectly, torn, dirty, wrinkled, etc.) and must be thrown away.

THE PUNCH CARD

THE 80-COLUMN CARD

The standard IBM Punch Card has 80 columns across, which may be punched.

The top edge of the card is called the "12-edge."

The bottom edge of the card is called the "9-edge."

The right end of the card is called the "80-column end."

The left end of the card is called the "Column-1 end."

Each column of the card has twelve punching positions: one for each of the digits 1 to 9, and three zone punches — 0, 11, and 12.

The zero punch can also serve as a digit when it is punched in a series with other digits, such as 105, 00110, etc.

The 11-zone is usually referred to as the "X-punch."

The 12-zone may also be referred to as the "high-punch" or the "and-punch."

Each of the digit and zone punches is made by punching a single hole into the desired column.

A letter of the alphabet is a combination of one zone punch and one digit punch in the same column (a double punch).

For example: In Fig. 2, column 1 is an A, formed by a 12-zone punch and a digit 1. Column 22 is a K, an 11-zone punch and a digit 2. Column 48 is an X, a zero-zone punch and a digit 7.

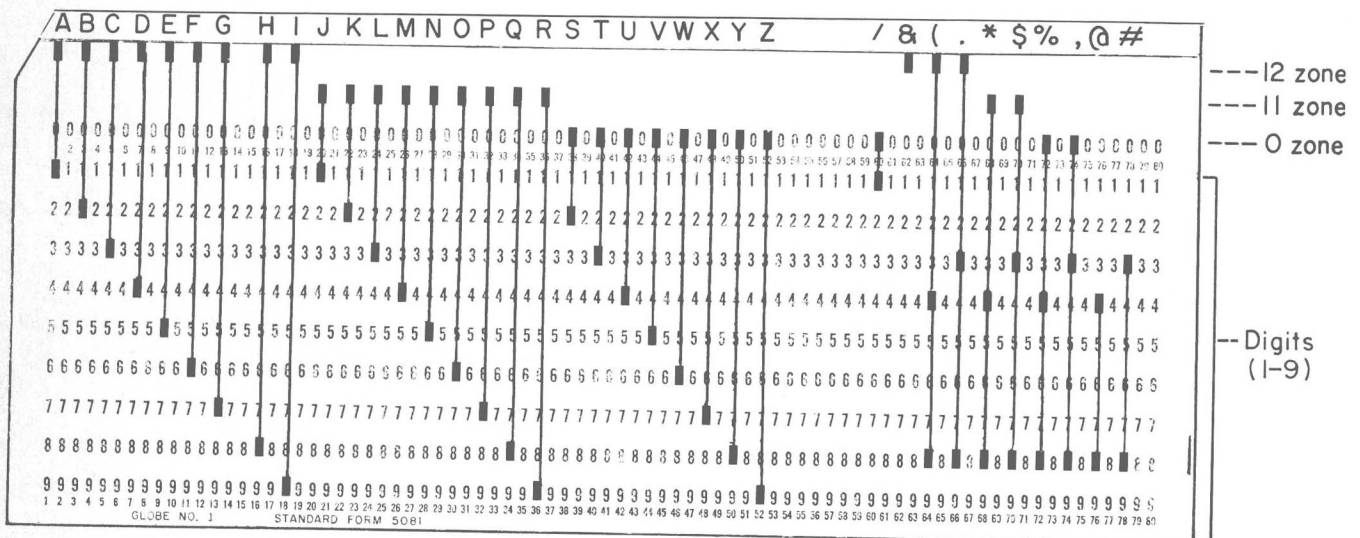


Figure 2. Punch card containing letters of the alphabet and some of the special characters available

REMEMBER: Numeric punching consists of a single punch in each column and alphabetic punching consists of a double punch in each column.

Special characters (& . - \$ * / , % # @) are formed by one, two, or three holes in a single column. The punching of the holes is automatic when the proper key is depressed.

THE 96-COLUMN CARD

The punch card used in the IBM 5496 Data Recorder is quite different from that used in the other IBM card punch machines. It is smaller and it contains 96 card columns which may be punched.

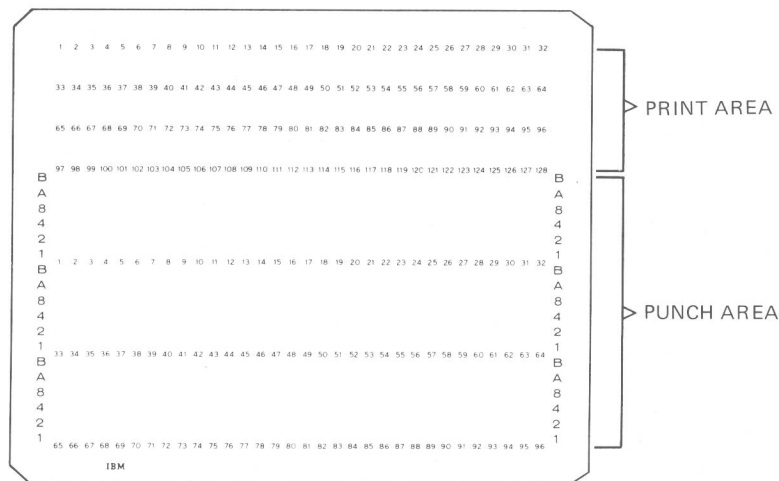


Figure 3. 96-column punch card

As you can see, the card is divided into two sections: the print area and the punch area.

Each section is further separated into "tiers" or levels: 4 print levels, and 3 punch tiers.

The 5496 can produce 64 punch combinations. These include the numbers 9-0, 26 alphabetic letters, the blank or space, and 27 special characters, such as the period, comma, asterisk, etc.

Characters punched into card columns 1-32 will be punched into Tier 1 of the card, and the corresponding interpretation of the punches may be printed in columns 1-32 of Print Line 1.

Characters punched into card columns 33-64 will be punched into Tier 2 and the printing interpreting columns 33-64 may appear on Print Line 2.