"Project SOUL" is a summer program in which disadvantaged high school students are given computer training. This section describes the content of the Keypunch and Data Processing Courses conducted in 1970. One or both of these descriptions include course objectives, course outline, teaching guide, and methods of instruction and evaluation. (MK)
UNIVERSITY OF SOUTHERN CALIFORNIA
Technical Report

PROJECT SOUL:
Computer Training Program for High School Students
from Disadvantaged Areas

PART II - The Keypunch and Data Processing Courses

James Woolever

Supported by the National Science Foundation
under Grant No. GJ-0981

ELECTRONIC SCIENCES LABORATORY

Engineering
Technical Report

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PART II - The Keypunch and Data Processing Courses

James Woolever
Department of Data Processing
Cerritos Community College

Supported by the National Science Foundation under Grant No. GJ-0981
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THE KEYPUNCH AND DATA PROCESSING COURSES

1. Introduction

The information contained herein is a report on the Data Processing Program of the 1970 Project Soul, as well as a guide for the development of curricula for similar programs on a national scale. It consists of two sections: 1. Keypunch Operations, 2. Fundamentals of Business Data Processing and COBOL Programming. It contains a detailed description of the courses taught, in addition to teaching methods and techniques used.

A total of fifty high school juniors and seniors with non-scientific backgrounds participated in the Data Processing Program. In general terms, the primary goal was to provide these young persons sound basic training in commercial data processing. The training, practical in its form, was designed to expand the horizons of the students in the educational and occupational frames of reference, and thereby, to motivate their interest in continuing education. Secondary goals were to prepare these young persons for employment in the areas of keypunch operations and data processing, and to establish and maintain a file of competent data processing personnel for recruitment by firms in the Los Angeles area which have indicated an interest in our trained people.

The keypunch course accommodated ten students and lasted four weeks. Two hours per day were devoted to lecture and two to laboratory work.

Forty students in groups of twenty took part in the six-week business data processing course. The first two weeks were spent on the fundamentals of business data processing, and the remaining four were devoted to an intensive course in COBOL programming utilizing the Honeywell H-200 Computer System. Again, two hours were spent in lecture and two in laboratory; at least one of the latter involved hands-on experience on the hardware.
It is a pleasure to acknowledge the following persons for their valuable contributions in the development of this segment of Project Soul: Norman Gale, Jules King, John Kelder, Richard Avery.

2. Section I - Keypunch Operation

a. Course Description and Objectives

This course has been designed to acquaint the student with the various processes of Key Punching in a business environment.

Prerequisite: That student be able to type at a speed of 40 words per minute.

Upon successful completion of this four-week course, the student will be able to:

1. State from memory at least six functions which a punched hole in a card can perform.

2. Describe correctly a unit record card in terms of the number of columns, and the names of the various punch positions.

3. Define a card field and calculate the number of columns required to punch a given field.

4. When questioned, locate and explain the use of:

   - Main Line Switch
   - Card Hopper
   - Punching Station
   - Reading Station
   - Card Stacker
   - Back Space Key
   - Keyboard
   - Chip Box
   - Program Control Unit

5. Set up a program control card, using the automatic functions available with this machine.

6. Correct and manually duplicate error cards.
7. Define the following program codes:

   Automatic Duplication
   Automatic Skip
   Alpha Shift
   Field Definition

8. State the purpose of the following:

   Program Drum
   Column Indicator
   Program Card

9. Remove and replace a program card.

10. Correctly operate the card punch under program control.


024-026 Keypunch.

b. Course Outline

I. Class Opening
II. Principles of Unit Record Accounting
III. The Unit Record Card
IV. Features of the Punched Card
V. Manual Punching Exercises
VI. Program Control Unit
VII. Additional Features of the Card Punch
VIII. Verifying Procedures
IX. Examination
LESSON ANALYSIS SHEET

LESSON TITLE: The Recording of Information.

LESSON OBJECTIVES: Discuss principle of the recording function through the use of the keypunch machine.

REFERENCE: 3M-DATA PROCESSING—Volume 1, 2, and 3.

MATERIALS: Chalk, Blackboard, Overhead foils

MOTIVATIONS: Student will be required to use keypunch machine in future data processing classes and possibly in employment.

APPLICATION AND FEEDBACK

Segment Objectives: Technical operations and control of the keypunch machine.

I. Processing Cycle.

1. Cycle carried out by using the various types of machines.

2. 5 principal processing steps used in a punched card installation.
   A. Recording
   B. Classifying
   C. Calculating
   D. Summarizing
   E. Reporting

II. Recording

1. The recording function is performed by utilizing a machine called a keypunch.

   2. Keypunch
PRESENTATION ITEMS

A. Most widely used method of recording data.

B. Point out similarities to keypunch and typewriter.

3. Components of the keypunch.
   A. Keyboard
      (Pg. 48 awad)

   B. Card hopper
      500 cards

   C. Punching station
      12 Vertical Position Punch
      Dies

   D. Reading station
      12 Brushes

   E. Card stacker
      500 cards

   F. Column indicator
      Next column to be punched.

   G. Program Control establishes
      automatic control of basic
      operation on the Keypunch.
      a. Automatic skip
      b. Auto Duplication
      c. Shifting of punching mode

   H. Four basic punches for
      prog control.
      a. 12 Field def.
      b. 11 Auto skip

APPLICATION AND FEEDBACK

1. What are the similarities and differences between the typewriter and a keypunch?

2. What is the function of the card hopper?

3. What is the difference between a reading station and a punching station?

4. What does the "column indicator" indicate?
PRESENTATION ITEMS

c. 0 Auto Dup.
d. 1 Alpha shift
e. used separately or in combination

Program card
a. Regular card
b. Star wheels

APPLICATION AND FEEDBACK

5. What is a program card?

III. Accuracy in recording.

1. Keypunch slow and costly
2. Of utmost importance that cards are punched correctly

IV. Verifier

1. Looks like Keypunch
2. Operator re-keys from same source document.
3. Machine uses sense pins
4. Error indicated on the error column 3 tries. 
   U Notch
5. Card correct notch at upper right hand corner

6. What is the difference between the keypunch and the verifier?
7. Why is it important to ascertain the accuracy of data processing at the keypunch stage?

EVALUATION

Keypunch program card assignment
3. **Section II - Fundamentals of Business Data Processing and COBOL Programming**

**a. Course Description**

This course will be divided into two parts. The first of which will cover the fundamentals of Business Data Processing. In Part One the student will learn the basic operation of the following unit record machines: IBM keypunch, IBM interpreter, and IBM card sorter. The second part will utilize the most frequently used procedural language for Business Application-COBOL. COBOL is a "Near-English" language which provides for thorough documentation of the program and enables programmers to be able to program on all major manufacturers' equipment with a minimum of adjustment. Business application will be analyzed, flowcharted, coded, and debugged using the computer.

**Prerequisite:** Satisfactory completion of programmer aptitude test.

**b. Course Objectives**

1. Introduce the students to the fundamentals of Data Processing and its application in business today.

2. Discuss principles of the recording function through the use of the keypunch machine.

3. Discuss the principles of sorting in both numeric and alphabetic sequence.

4. To introduce the student to the operation and control panel wiring of the card interpreter.

5. Discuss and use the current methods of computer problem flowcharting.

6. To develop the student's ability to work effectively with any modern third generation computer system.
7. To develop in the student confidence that he can work and communicate in any computer environment by applying the general principles of programming to the specific language that he may encounter.

8. To provide the challenge of applying and extending the student's ability in problem solving situations.

9. To further extend the student's knowledge of current Data Processing Techniques.

c. Course Outline

Part One
1. Class Opening
2. Fundamentals of Data Processing
3. The Unit Record Card
4. The Card Sorter
5. The Interpreter

Part Two
A. Electronic Data Processing and COBOL
   1. Data Characteristics and Organization
   2. What is a Procedure?
   3. What is COBOL?
B. The Procedure Division
   1. The Parts of a COBOL Source Program
   2. Basic Procedure Division Elements
   3. The Move, Add, Subtract, Multiply, and Divide Verbs
   4. The GO TO, PERFORM and Stop Verb
   5. The IF Statement
   6. Input and Output
C. The Data Division
   1. The File Description
   2. Level Structure
   3. Record Description
4. The Picture Clause
5. Condition Name Value Entries
6. The Working Storage Section
7. The Constant Section

D. The Environment Division
E. The Identification Division

d. Methods of Instruction and Evaluation

Text and References:

2. References: International Business Machine:
   - 026-024 Keypunch
   - 029 Keypunch
   - 557 Interpreter
   - 083 Card Sorter

Methods of Instruction:
1. Instructor Explanation and Demonstration of Course Content
2. Use of Overheads and Computer Listings to Provide Actual Models of Language and Techniques Discussed
3. Have Students Write Programs that Utilize All Aspects of Course
4. Class Discussion on Projects and Assignments

Methods of Evaluation:
1. Regular Attendance
2. Laboratory Projects
3. Formal Testing
LESSON ANALYSIS SHEET.

LESSON TITLE: Introduction to the Fundamentals of Data Processing

LESSON OBJECTIVES: To introduce the students to the fundamentals of data processing and its applications in business today.

REFERENCE: 3M DATA PROCESSING -- Volumes 1, 2, and 3.

MATERIALS: Chalk
Blackboard
Overhead Foils

MOTIVATIONS: Indicate to the students that this is a new and growing field with many opportunities.

PRESENTATION ITEMS

APPLICATION AND FEEDBACK

Segment Objectives:
Discuss Data Processing course taught at Cerritos College.

I. Why should data processing be a field of study?

1. Complexity of business organization:
   A. Early barter to corporate form.
   B. Tribe leadership
   G. Gigantic government

2. Physical Factors:
   A. Growth of customer force
   B. Credit as a way of life

3. Cost Factors:
   A. Cost of clerical help
   B. Cost of inefficiency
   C. Cost of not planning

4. Labor factor:
PRESENTATION ITEMS

A. Increase in "white collar"
B. Inefficiency in "added personnel"
C. Job enlargement.

5. Speed factor:
   A. Currency of information
   B. Best information is

II. What are the fields of Data Processing?

1. Manual:
   A. Office Machines
   B. Keysort systems
   C. Microfilm

2. Mechanical (Punched Card)
   A. Standard size record
   B. Automatic manipulation

3. Electronic Data Processing
   A. Computer System
   B. Applications

EVALUATION

None
HIGHLIGHTS OF COMPUTATION HISTORY

Arabic Numbers

Abacus

Logarithms

Slide Rule

Adding Machine 1642 Pascal

Calculator 1670

Punched Card Jacquard 1801

Babbage 1834

Boolean Algebra 1854

Liebnitz, 1694

Thomas, 1829

Baldwin, 1872

Felt, 1887

Burroughs and Monroe, 1914

Mark I 1944

Eniac 1943

Edvac 1943

Von Neuman Stored Program 1946

IBM

CDC

UNIVAC

RCA

HONEYWELL

NCR

80 Column Punched Card 1928

Hollerith

Tab Machine Company 1896

International Time Recording and Dayton Scale

Name Changed to IBM 1924

Punched Card Equipment 1890

Powers

Accounting Tab Machine Company

Remington Rand, 1911

Sperry Rand
LESSON ANALYSIS SHEET.

LESSON TITLE: Hollerith Coding System -- Unit Record Card.

LESSON OBJECTIVES: Understand coding system devised by Dr. Herman Hollerith and its application in modern business data processing.

REFERENCE: 3 M Data Processing -- Volume 1, 2, and 3.

MATERIALS: Chalk
Blackboard
Overhead foils

MOTIVATIONS: Necessity of understanding the Hollerith coding system.

PRESENTATION ITEMS

APPLICATION AND FEEDBACK

Segment Objective:
Coding system, method of recording and unit record concept.

I. Unit Record Card

1. Holds one unit of information
2. Must be standard size (machine)

II. Method of recording data on punched card.

1. Data is transcribed from a source document to the unit record with the keypunch.
2. Unit record becomes permanent storage.
3. Unit card can be duplicated when desired or necessary.

III. Source of cards.

1. Why is it necessary to have a standard punched card?
2. What is the role of the punched card in the recording stage?
3. What is the Hollerith Code?
2. Major company
   IBM (80)
   Remington Rand (90)

IV. 80 Column Card Hollerith Code

1. 80 vertical spaces called columns

2. Columns are numbered from left to right 1--80

3. Each column can only contain "1" character

V. Punching Positions

1. The 80 column unit record card is divided into two punching positions.
   A. ZONE
   B. DIGIT

VI. Zone Position

1. 3 horizontal rows at the top of the card.

2. Two of which are used for zone punching only.

3. One is a combination punch.

VII. Digit Position

1. 10 horizontal rows

2. Represent position 0--9

VIII. Edge and Face of card.
PRESENTATION ITEMS

Sample handout.

1. Nine edge
2. 12-edge
3. Face

APPLICATION AND FEEDBACK

5. What is meant by "face down 9-edge first"?

IX. Numeric recording of information.

1. One hole per column
40875 require 5 columns

X. Alphabetic recording

1. Two holes per column

2. ZONE AND DIGIT SYSTEM
   A - I
   J - R
   S - Z

XI. Card Layout

1. Cards must have predetermined format.

2. Field A column or columns set aside for specific information.

3. Field max. 80, min. 1

4. Numeric Field must fill with zeros.

5. Alpha field

6. Fixed info left

7. Variable info right

XII. Card Design
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<th>APPLICATION AND FEEDBACK</th>
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<td>1. Uniform fields</td>
<td>7. How many different ways can a card be identified?</td>
</tr>
<tr>
<td>2. Identifying mark color stripes</td>
<td>8. What is a control field used for?</td>
</tr>
<tr>
<td>XIII. Control fields</td>
<td>X-row used for control</td>
</tr>
</tbody>
</table>

**EVALUATION**

Review Question
LESSON TITLE: Classifying information

LESSON OBJECTIVE: To discuss the principle of sorting of data in both numeric or alphabetic sequence using the 82 Sorter.

REFERENCE: 3M-DATA-PROCESSING, Volumes 1, 2, and 3.

MATERIAL: Chalk
Blackboard
Overhead foils

MOTIVATION: Emphasize the importance of the classifying process within data processing installations.

PRESENTATION ITEMS

APPLICATION AND FEEDBACK

Segment Objectives:
To introduce student to the fundamentals of classification of data using sorting machines.

Classifying Information

I. Classifying
   1. Process in which like transactions are grouped, or arranged together, in either alphabetic or numeric.

II. Three basic types of classification
   1. Sorting in sequence
   2. Selecting
   3. Grouping

III. Sequence
   1. Both numeric and alphabetic

IV. Selecting
Operation which involves pulling certain cards from a file without disturbing the sequence of the remainder of the file.

1. What is an example of selecting?

V. Grouping
Sorting by common characteristics.
1. By branch
2. Regional office

2. What is an example of Grouping?

VI. The Sorter
1. Fastest machine in punched card data processing installation.
2. 13 pocket
   1. will accept any possible punch & blank
3. Only one brush that is positioned over column being read.

VII. Numeric Sorting
1. Low order position to high order position

VIII. Alphabetic sorting
1. Low order to high order position
2. Two pass on each column
3. Numeric 1st and Zone 2nd

IX. Compilation of sort time
4. Why is it important to compute sort time?
Volume + Numeric Columns
Speed or Sorter

+ 25% handling
Lesson Title: Introduction to the IBM 548 Interpreter

Lesson Objectives: To introduce the student to the operation and control panel wiring of the 548 interpreter.


Motivation: The student will be introduced to the wiring concept using the 548 in an attempt to eliminate any confusion as to what the control panel accomplishes.

Presentation Items

Application and Feedback

Segment Objectives

To introduce the machine functions of the 548

1. Interpreter will print information on same card
   a) increases value of card
   b) easy to read document

2. Useful for file maintenance
   a) proofreading
   b) prepunched tub file

3. Speed of interpreter is 60 cards per minute (Foil#1)

1. Why do we interpret cards?

2. Why would it be helpful in maintaining a file?

3. How long would it take to interpret 8,000 cards?
Segment Objectives:
To introduce the operating features of the 548.

1. Main-line switch (Foil #2)
2. Start and stop keys.
3. Hopper
   a) cards feed face up, 12 edge first.
   b) feed from back file.
4. Stacker.
5. Path of card through machine. (Foil #3)

Segment Objectives:
Discuss printing characteristics.

1. Two lines of printing possible.
2. Printing position knob. (Foil #2).
3. Sixty type bars. (Foil #4).
4. Control panel functions. (Foil #5)
5. X brushes.
   a) reason for them.
   b) how to set them.

Segment Objectives:
To introduce the control panel and the principles of wiring.

1. Control panel wiring.
1. Is warm-up required?
2. How long must the start key be depressed?
3. How many cards will the hopper hold?
4. What are the problems in feeding cards face up?
5. How many read stations on the 548?
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<th>APPLICATION AND FEEDBACK</th>
</tr>
</thead>
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<tr>
<td>a) reading brushes exit hubs</td>
<td>there on the 548?</td>
</tr>
<tr>
<td>b) typebars entry hubs.</td>
<td></td>
</tr>
<tr>
<td>c) common hubs.</td>
<td>2. Explain the term Common Hubs.</td>
</tr>
<tr>
<td>2. Wiring to print in two places.</td>
<td>3. What is offset wiring?</td>
</tr>
<tr>
<td>3. X eliminators. (Foil # 6)</td>
<td>4. How many X eliminators are standard on the 548?</td>
</tr>
<tr>
<td></td>
<td>5. How does the interpreter differ from most IBM machines?</td>
</tr>
</tbody>
</table>
LESSON ANALYSIS

LESSON TITLE: Block Diagramming

LESSON OBJECTIVE: Discuss and use current methods of Computer Block Diagramming.

REFERENCE: 3M-Data Processing-Volumes 1, 2, 3, and illustrations

MATERIALS: Blackboard, Chalk, Overhead foils, Handout materials.

MOTIVATION: A program is a part of a problem solving cycle which, when done carefully, saves time.

PRESENTATION ITEMS

APPLICATION AND FEEDBACK

Segment Objective: To introduce student to scientific method of problem solving.

I. Electronic Computer is dependent on man.
   2. It is only as useful as the Program that directs its work.

II. Preparation and planning.
   1. Overall understanding of problem.
   2. Proper planning before implemented.

III. Flowchart. Definition: A Flowchart is a chart depicting the flow of data and operations in a D.P. system.

I. What is involved in data organization?

II. Why is the problem-definition stage important in problem solving?
IV. Elements of the flowchart.
   1. Problem-solving process.
      2. 5 parts.
         1. Define the problem.
         2. Organize the required data.
         3. Devising a procedure for a desired solution.
         4. Testing procedure
         5. Carrying out the program

V. Define Problem.
   1. Determine what input-output
      a. Mention form layout.
      b. What info in data cards.
      c. Source documents.
   2. Must be sufficient amount of
      time allowed.
      1. Well organized program
      2. Short and sloppy program
   3. Awareness of the limitations
      of both the equipment and personnel.
      1. Computer size, etc.
      2. Advance-Trainee Programer

VI. Data Organization.
   1. Arrangement of component parts.
   2. Logical arrangement of data from various areas.

VII. Development Stage (Devise Procedure)
   1. Devising procedure - based and data organization.
   2. All necessary steps involved in reporting.

VIII. Block diagram.
1. Visual Aid.
2. # of Block containing instruction.
3. A block diagram is essential in that it makes it possible to write the program in an orderly manner.
4. Example of Block diagram:

   STAND
   UP

   SPEAK
   UP

   SHUT
   UP

   Reference page 220.
   Discuss how to get up in the morning.

IX. Symbols.
1. Symbols vary according to manufacture.
2. Represent different ideas.
3. Direction of flow

4. Input-Output Symbol

   Read       Punch
   Card       Card
   Input      Output
5. Processing Symbol.

Add, Subtract, Move, etc.

6. Reference figure 18.5 page 224 and discuss LOOP.
7. Decision Symbol.

Alternative operation
EQUAL - UNEQUAL
HIGH, LOW

8. Branching
Detour around certain instructions reference fig. 18.7, page 227

X. General Diagraming Hints.
1. Step begin at the top and come down and toward the right.
2. Consistent use of symbols.
3. Minimize and clarify writing.

XI. Coding stage
1. After diagram is debugged
2. Translation of flowchart into the language of the Computer
   1. Assembly, computer; machine language.

XII. Debugging
1. To locate and correct errors in program.
2. To main type of errors
   1. Logic errors - Decision:
2. Cleric errors - Misspell
   Print : PRRNT

XII. (Testing stage & Carrying Out Program)
1. Run test data.
LESSON ANALYSIS SHEET

LESSON TITLE: Data Organization

LESSON OBJECTIVE: To Discuss the Organization of Data

REFERENCE: A Guide to COBOL Programming: Daniel D. McCracken

MOTIVATION: Emphasize the Importance of Data Organization

PRESENTATION

DATA CHARACTERISTICS

1. Data refers to any information that can exist within a computer system.

2. Types of Data
   a. source
   b. master-file
   c. sorted
   d. edited

   What is a master-file?
   What does editing mean?

3. The most elementary unit of data is a character. Which may be a numeric or alphabetic character.

4. Data-Items is composed of one or more characters.

5. Data Name is a symbol by which a data item is referred to.

   What is the difference between a data name and a data item?

6. A record is composed of data items. These items are related.

   Example:
   Inventory File (record)
   Part number
   Quantity on Hand
   Quantity or Order

   Data Items

7. A File consists of records.
   a. Input files
   b. Output files

EVALUATION

Oral Discussion.
LESSON TITLE: What is a Procedure

LESSON OBJECTIVE: To Define a Procedure


MOTIVATION: To show the student the importance of Procedures.

PRESENTATION

SEGEMENT OBJECTIVE

To learn how to integrate the needs of the business, the characteristics of the data, and the powers and limitation of computers.

1. Procedures must be general so they will work correctly with data of like type.

2. Computer cannot exercise judgement unless it has been provided with explicit directions for making a decision.

3. The computer must be told how to know when it is finished.

4. Describe the tasks and consider the general approach to the computer procedure for carrying out the desired processing.

EVALUATION

Oral Discussion.
LESSON TITLE: What is COBOL?

LESSON OBJECTIVE: To Discuss the COBOL Compiler Language.

REFERENCE: A Guide to COBOL Programming: Daniel D. McCracken

MOTIVATION: The student will understand the elements of the COBOL language.

PRESENTATION

Segment Objective
To discuss the COBOL Language which grew out of the requirement for a language that would be compatible with various computer systems.

1. A computer cannot follow a procedure just as it stands; there must be an intermediate translation step first

2. To accomplish this translation the COBOL language is divided into a number of divisions.
   A. Procedure Division
   B. Environment Division
   C. Identification Division
   D. Data Division

3. These divisions combined represent a COBOL program the translation of this program is called a compilation.

APPLICATION AND FEEDBACK

What is a translation step?
4. The output from a COBOL compilation is known as the object program and is in a usable form for the computer.

5. The COBOL program after compilation is then ready to run data for report preparation.

Evaluation

Oral Discussion.
LESSON TITILE: Parts of a COBOL source program

LESSON OBJECTIVE: To discuss and use the various elements of a COBOL program.

REFERENCE: A Guide to COBOL Programming: Daniel D. McCracken

MOTIVATION: To assist student understanding of the COBOL language.

PRESENTATION

1. Identification Division is a new line to identify the program, the author, and data written.

   Identification Division.
   Program-ID. Demo.
   Author. H. White.

2. Environment Division specifies the computer to be used, both for the compilation and for the object program; the two are ordinarily the same.

   Environment Division.
   Configuration Section.
   Source-Computer. H-200-Special
   Object-Computer. H-200, Supervisor,
   No Segmentation.

3. Data Division includes the files, records, and data items that are to be processed or produced as results.

   Data Division
   Work-Storage Section.
   01 Name-Record-File.
   02 Name-In Picture x(20).
   02 Address-In Picture x(20).
   02 City-In Picture x(20).
   02 Zip-In Picture 9(s).
4. Procedure Division specifies the steps the programmer wishes the computer to carry out in processing the data.

   Procedure Division.
   Display CAC.
   Go-File.
   Accept Name-Record-File.
   Display Name-Record-File.

Evaluation

Oral Discussion
APPENDIX A

Organizational Chart
"PROJECT SOUL" 1970

Principal Investigator:
  Richard Bellman

Project Director:
  Carlos Ford-Livene

Technical Administrator:
  M. Virginia Zoitl

Secretary-Placement Aide:
  Betsy Gloster

Data Processing Curriculum Coordinator: James Woolever

Keypunch Operator Course
  Instructors:
    1. John Kelder

Business Data Processing Course
  Instructors:
    1. N. Gale
    2. J. King

  Lab. Assistant:
    1. Richard Avery
APPENDIX B

Schedule of Classes
<table>
<thead>
<tr>
<th>COURSE</th>
<th>DATE</th>
<th>CLASS SIZE</th>
<th>TIME</th>
<th>LOCATION</th>
<th>INSTRUCTOR</th>
<th>KEYPUNCH DISTRIBUTION</th>
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<tbody>
<tr>
<td>Keypunch</td>
<td>June 29-July 24</td>
<td>10</td>
<td>10-12</td>
<td>OHE 134</td>
<td>John Kelder</td>
<td>OHE 132-5kps</td>
</tr>
<tr>
<td>Business Data Processing, Section A</td>
<td>June 29-August 7</td>
<td>20</td>
<td>10-12 Lab.</td>
<td>CSL 113</td>
<td>Norman-Gale</td>
<td>CSL-5kps</td>
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<td></td>
<td></td>
<td></td>
<td>1-3 Lect.</td>
<td>CSL 129</td>
<td>R. Avery (Lab.</td>
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<td>Assistant)</td>
<td></td>
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<tr>
<td>Business Data Processing, Section B</td>
<td>June 29-August 7</td>
<td>20</td>
<td>10-12 Lect.</td>
<td>CSL 129</td>
<td>Jules King</td>
<td>CSL-5kps</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1-3 Lab.</td>
<td>CSL 113</td>
<td>R. Avery (Lab.</td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Assistant)</td>
<td></td>
</tr>
</tbody>
</table>

OHE denotes Olin Hall of Engineering
CSL denotes Computer Science Laboratory
APPENDIX C

Aptitude Test
INSTRUCTIONS FOR PART I

In Part I you will be given some problems like those on this page. The letters in each series follow a certain rule. For each series of letters you are to find the correct rule and complete the series. One of the letters at the right side of the page is the correct answer. Look at the example below.

W. a b a b a b a b | (1) (2) (3) (4) (5)
   a b c d e

For this problem, the series goes: ab ab ab ab
The next letter in the series is a. Choice 1 is the correct answer.

X. a a b b c c d d | (1) (2) (3) (4) (5)
   a b c d e

In Example X above, the series goes like this: aa bb cc dd. The next letter in the series is e. Choice 5 is the correct answer.

Now do Example Y below.

Y. c a d a e a f a | (1) (2) (3) (4) (5)
   d e f g h

In Example Y, the series goes: ca da ea fa. Therefore, the correct answer is g. Choice 4.

Now do Example Z.

Z. a x b y a x b y a x b | (1) (2) (3) (4) (5)
   a b c x y

In Example Z, the series goes like this: axby axby axb. Therefore, the correct answer is y. Choice 5.

In the problems on the following page, you are to select the correct letter on the right-hand side of the page which belongs next in the series. Indicate the correct answer on the answer sheet.
# PART I

1. `c d e x y z f g h x y z`
   | (1) (2) (3) (4) (5)
   | i j k l m
2. `t s r t s r t s`
   | (1) (2) (3) (4) (5)
   | r s t v w
3. `a b c c d e f f g`
   | (1) (2) (3) (4) (5)
   | e f g h i
4. `m n n n k l o p o p k l`
   | (1) (2) (3) (4) (5)
   | k o p q r
5. `a b c i j d e f i j`
   | (1) (2) (3) (4) (5)
   | g h i j k
6. `a i b c i d e f`
   | (1) (2) (3) (4) (5)
   | e f g h i
7. `a g b h c`
   | (1) (2) (3) (4) (5)
   | d f g h i
8. `a e d h g`
   | (1) (2) (3) (4) (5)
   | h i j k l
9. `k s j t i u h`
   | (1) (2) (3) (4) (5)
   | v w x y z
10. `n j f m i e l`
   | (1) (2) (3) (4) (5)
   | d h i j m
INSTRUCTIONS FOR PART II

In Part II you will be given some problems like those on this page. Each row is a problem. Each row consists of four figures on the left-hand side of the page and five figures on the right-hand side of the page. The four figures on the left make a series. You are to find out which one of the figures on the right-hand side would be the next or the fifth one in the series. Now look at Example X.

Example

In Example X there is a clockwise movement of the striped square: upper right, lower right, lower left, upper left. The next or fifth position in this clockwise movement would thus be upper right, and so Choice 42 is the correct answer.

Now look at Example Y.

In the series of figures on the left, there is one more line in each box and these lines increase in length. Now look at the five choices on the right-hand side of the page and determine the correct answer.

You should have selected Choice 5 which has five lines, one more than the last box on the left with the fifth line slightly longer than the last line in Box 4.
INSTRUCTIONS FOR PART III

In Part III you will be given some problems in arithmetical reasoning. After each problem there are five answers, but only one of them is the correct answer. You are to solve each problem and indicate the correct answer on the answer sheet. The following problems have been done correctly. Study them carefully.

Example X: How many apples can you buy for 80 cents at the rate of 3 for 10 cents?

(1) 6  (2) 12  (3) 18  (4) 24  (5) 30

The correct answer to the problem is 24, which is Choice (4).

Example Y: In 4 weeks John has saved $2.80. What have his average weekly savings been?

(1) 35¢  (2) 40¢  (3) 50¢  (4) 70¢  (5) 80¢

The correct answer to the above problem is 70¢, Choice (4).
PART III

21. A clerk multiplied a number by ten when it should have been divided by ten. The answer he got was 100. What should the answer have been?

(a) 1  (b) 10  (c) 100
(d) 1000  (e) 10,000

22. The average salary of three programmers is $95 per week. If one programmer earns $115, a second earns $65, how much is the salary of the third programmer?

(a) $95  (b) $105  (c) $115
(d) $160  (e) $180

23. If a card punch operator can process 80 cards in half an hour, how many cards can she process in a seven and one-half hour day?

(a) 560  (b) 600  (c) 800
(d) 1120  (e) 1200

24. In a programming team of 12 persons, 1/3 are women and 2/3 are men. To obtain a team with 20% women, how many men should be hired?

(a) 4  (b) 6  (c) 8
(d) 12  (e) 20

25. It cost a college 70 cents a copy to produce the program for the homecoming football game. If $15,000 was received for advertisements in the program, how many copies at 50 cents a copy must be sold to make a profit of $8000?

(a) 14,000  (b) 35,000  (c) 46,000
(d) 75,000  (e) 115,000
APPENDIX D

Instructional Supplements - Keypunch Course
IBM KEYPUNCH - GENERAL INFORMATION

All IBM cards have 80 columns; they are read from left to right.

In each column there are 12 possible punching positions:

\[
\begin{align*}
12 \\
11 \text{ (or X)} \\
0
\end{align*}
\]

zone punches + 1 through 9 digit punches = 12 positions.

The combination of 1 zone punch and 1 digit punch makes an alphabetic character.

- 12 zone punch + 1-9 digit punch = letters A-I
- 11 zone punch + 1-9 digit punch = letters J-R
- 0 zone punch + 2-9 digit punch = letters S-Z

The following chart is convenient for interpreting alphabetic information punched in an IBM card:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
</tr>
<tr>
<td>11</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
<td>O</td>
<td>P</td>
<td>Q</td>
</tr>
<tr>
<td>0</td>
<td>S</td>
<td>T</td>
<td>U</td>
<td>V</td>
<td>W</td>
<td>X</td>
<td>Y</td>
<td>Z</td>
</tr>
</tbody>
</table>

A field is a column or a group of columns, set aside by vertical lines, for one type of information which corresponds to the source document.

A dotted line in a field indicates the punctuation; such as the position of the decimal in a money or percentage field.

Corner cuts in cards enable the operator to see that all the cards are facing the correct way.

Only the left hand lower corner cut will not feed through the machine.

Fan and joggle the cards before placing them in the hopper.

Cards are placed in the hopper face forward, 9-edge down.

Cards which have no fields are called General Purpose cards, or 5081.

Cards which have fields are called Detail cards.

The card which is placed around the drum is called a program card.

When mounting a program card on the drum, first fasten the column 80 edge of the card under the smooth edge of the clamping strip.

When the Star Wheels are UP the machine is in alphabetic shift; when the Star Wheels are Down on a program card, the machine is in program control. (The program Unit controls, skipping, duplicating, alphabetic and numeric punching.)
Cards are placed in the hopper, face forward, 9-edge down.

The machine fuses are located behind the chip box.

The card column indicator points to the next column to be punched.

The card gauge should be used to check the punching registration, daily and after card jams.

Depression of the feed key does not cause feeding when a card has been registered for punching.

With automatic feed ON, when column 80 of a card passes the punching station, that card moves to the reading station, a card at the right in the card bed is positioned for punching, and another card is fed from the hopper.

The pressure roll release lever is depressed to permit the removal of a card caught at the punching or reading station.

A card can be manually inserted, at the right of either the punching or reading station.

When mounting a program card on a drum, first fasten the column 80 edge of the card under the smooth edge of the clamping strip.

When alphabetic information does not fill the entire field, the unpunched portion is normally skipped, by the use of the skip key, in conjunction with program card coding.

Cards in the punching and reading station, and the program card moves backward when the backspace key is depressed.

With program control ON, depression of the dash skip or dash key, always punches an X (11 punch), but causes skipping over numerical fields only.

Automatic skipping can be accomplished, when the program card is properly punched, and the automatic skip switch is ON.

Duplication by use of the duplicate key is faster with program control than without.

Depression of the duplicate key locks the machine if the column of the card at the reading station is unpunched and the keyboard is in numerical shift.

When numbers are to be occasionally punched in an otherwise alphabetic field, (such as street address), the program card is normally coded for alphabetic punching and the numerical shift key is depressed when necessary.
When date is automatically duplicated, to change the date, the automatic duplicate switch must be turned OFF, and the new information punched in the first detail card of the new date group.

The backspace key backspaces the cards continuously, as long as it is held depressed.

When a card is released due to a punching error, the information in a field programmed for automatic duplication is automatically duplicated regardless of its location.

When correcting an error during punching under program control, the operator may duplicate all of the correctly punched fields, and must rekey only the field containing the error column.

In order to punch alphabetic information with program control ON, either the program card must be coded 1 or the alphabetic shift key must be depressed.
IBM 024 CARD PUNCH

With Star Wheels UP this machine punches alphabetic information. In order to punch numeric information with the Star Wheels UP (program control off) the numeric key (NUM) must be held down.

THE PARTS OF THE MACHINE ARE AS FOLLOWS:

Main Line Switch (off and on)

Card Hopper

Pressure Plate (holds cards in hopper)

Card Beds (three) - punching station, reading station, and card stacker

Card Weight

Key Board (movable)

Jog Plates

Control Switches

Reading Board

Chip Box (empty daily or when necessary)

Fuses (two small ones may be replaced by operator)

Back Space Key

Program Control Lever (Star Wheels) - never put the Star Wheels down unless there is a card on the program drum

Pressure Roll Release Lever (press down the release cards caught in punching or reading station)

Card Column Indicator (sits on next column to be punched)

Keys - gray keys are punching keys, blue keys are functional keys, and keys with shadow in back of them are numeric keys

Use first finger for 7, 4, 1, and DUP
Use middle finger for 8, 5, 2 and X SKIP (the X SKIP or DASH SKIP key always punches an X (11 zone punch) and skips over numeric fields only)
Use ring finger for 9, 6, 3 and 0.

Program Drum - 80-edge of card goes under smooth edge of clamping strip
IBM 024 KEY PUNCH

MAIN LINE SWITCH: This switch turns the machine ON and OFF.

CARD HOPPER AND PRESSURE PLATE: Inside the card hopper there is a pressure plate which holds the cards in position.

PUNCHING STATION: Punching is performed at the first right-hand station.

READING STATION: Cards are read for duplicating at the left-hand station.

CARD STACKER and CARD WEIGHT: Inside the card stacker is a card weight which holds the cards in position.

CARD BEDS: These are located to the right of the punching and reading stations and below the card stacker.

BACK SPACE KEY: This key is located below the card bed between the reading and punching stations.

KEYBOARD and READING BOARD: The keyboard is movable and sits on the reading board.

CONTROL SWITCHES: These switches are on top of the keyboard and they control automatic feeding of the cards and automatic skipping and duplicating. (The 026 Key Punch machine has a switch which controls printing also.)

JOG PLATES: These are located on both sides of the keyboard.

CHIP BOX and FUSES: The chip box is located under the reading board and is emptied daily. The machine fuses are located behind the chip box. (The two small ones may be replaced by the operator.)

PROGRAM CONTROL LEVER: This lever is located below the program unit and is used to raise and lower the Star Wheels. (Never lower the Star Wheels if there is no card on the program drum, nor pull the drum off when the Star Wheels are down.)

PROGRAM DRUM: The program drum is located inside the program unit.

COLUMN INDICATOR: This indicator, located at the base of the program drum holder, indicates to the operator the NEXT column to be punched.
PRESSURE-ROLL RELEASE LEVER: This silver lever, located above the column indicator and to the right of the program drum, is depressed to permit the removal of cards caught at the punching and reading stations.

KEYS: The gray keys are punching keys, the blue keys are functional keys, and the shadowed gray keys are the numeric keys. For touch system use:

- Index finger for digits 7, 4, 1, and DUP
- Middle finger for digits 8, 5, 2, and -SKIP-. (The DASH SKIP or X SKIP key always punches an X (11 zone punch) and skips over numeric fields only.)
- Ring finger for 9, 6, 3, and 0.
HOW TO START KEY PUNCHING (FINGER EXERCISES)

1. Turn on the Main Line Switch.

2. Get a handful of general purpose cards (those having no fields) from the shelf.

3. Fan and joggle these cards then place them in the hopper of the machine face forward, 9-edge down.

4. Put the program card on the program drum, 80-edge under the smooth edge of the clamping strip.

5. Place the program drum on the spindle so that it rests firmly on the card column indicator, then put the Star Wheels down (program control lever on).

6. Press the Release Key (marked REL). If the program drum turns around, the machine is warm and you may continue to the next step. If the drum does not turn, wait until it does turn before continuing.

7. Press key marked FEED twice and then turn the Auto Feed and Auto Skip and Dup switches to the "on" position.

8. You may now punch the finger exercises. Be sure you are using the correct fingers as shown on your chart. The numbers are grouped in units of four for easier reading but there are no spaces between these groups; the numbers are punched consecutively.

9. If you make a mistake and want to start over, press the key marked REL (Release Key) and the error card will move to the read station, the card in the punch station will be registered for punching, and another card will be fed from the hopper. When this new card is completed, the error card will be in the stacker and must be removed. (Only correct cards are supposed to remain in the stacker.)

10. If you are leaving your machine for a period of time (coffee break), clear your machine by turning off the Auto Feed and Auto Skip and Dup switches and by pressing first the Release Key (REL) and then the Register Key (REG) alternately until the cards from the card beds are in the stacker. Then turn off the main line switch.

11. If you are going home, after you have cleared your machine put the punched cards in the salvage box on the teacher's desk (or wherever the teacher says) and the un punched cards back in the box they came from. Please do not mix them together. Leave the card hopper in the open position.
12. Be sure the Star Wheels are UP, then remove the program drum from the spindle and remove the program card from the drum. (Turn handle half way, then remove card from under teeth edge of the clamping strip; turn the handle toward the smooth edge of the clamping strip and finish removing the card from the drum.) Save the program card for the next class session. Return the program drum to the spindle loosely. Do not try to fasten the peg in the hole.

13. Empty Chip Box (if necessary) and replace in machine.

14. Replace books and rulers (if borrowed) back where they came from.
<table>
<thead>
<tr>
<th>First Finger</th>
<th>Second Finger</th>
<th>Third Finger</th>
<th>Fourth Finger</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUP</td>
<td>11 SKIP</td>
<td>0</td>
<td>REL</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>ALT PROG</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
<td>FEED</td>
</tr>
<tr>
<td>MULT PCH</td>
<td>7</td>
<td>8</td>
<td>SKIP RÈG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>AUX DUP</td>
</tr>
</tbody>
</table>
NORMAL PROGRAM CODES

12 - FIELD DEFINITION
11 - SKIPS
0 - DUPLICATES
1 - ALPHABETIC
Space - NUMERIC

The 12 zone punch is made by punching the letter "P" with the numeric key held down.

The 11 zone punch is made by punching the SKIP X or DASH SKIP key in either the numeric or alphabetic shift.

The 0 (zero) zone punch is made by punching the 0 (zero) key with the numeric key held down.

12 is the FIELD DEFINITION which continues and defines fields.

RULES:

1. There must be 12's punched in every column of the field except the first position, in the first position there must be the command.

2. Alphabetic must have 1's in every column of the field plus Rule #1.

3. SKIP: SKIP X (11 zone punch) followed by 12's.

4. DUPLICATION: (Numeric) 0 (zero) followed by 12's.

5. DUPLICATION: (Alphabetic) 0-1 (zero and 1 in the same column) followed by the letter "A".

6. ALPHABETIC: 1 followed by "A's".

7. NUMERIC: Space followed by 12's.

ALL ALPHABETIC CODING MUST BE FOLLOWED BY A's.

ALL NUMERIC CODING MUST BE FOLLOWED BY 12's.

**The letter "A" is just a faster way of punching a 12 zone punch plus a 1 for an alphabetic field definition. (The letter "A" being made of the zone 12 and the digit 1.)
APPENDIX E

Laboratory Exercises - Keypunch Course
### EXERCISE 1

**Specification: Card Column**

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6</td>
<td>Student number (last column will be alpha)</td>
</tr>
<tr>
<td>7-31</td>
<td>Course title (alpha)</td>
</tr>
<tr>
<td>32-35</td>
<td>Course number</td>
</tr>
<tr>
<td>36-40</td>
<td>Class number</td>
</tr>
<tr>
<td>41-44</td>
<td>Department number (dup)</td>
</tr>
<tr>
<td>45</td>
<td>Hours</td>
</tr>
<tr>
<td>46-69</td>
<td>Student name (alpha)</td>
</tr>
<tr>
<td>78-79</td>
<td>Grade number</td>
</tr>
<tr>
<td>80</td>
<td>Student code (alpha)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>7-31</th>
<th>32-35</th>
<th>36-40</th>
<th>41-44</th>
<th>45</th>
<th>46-69</th>
<th>78-79</th>
<th>80</th>
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<tbody>
<tr>
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<td>DATA PROCESS.</td>
<td>7634</td>
<td>97531</td>
<td>1088</td>
<td>7</td>
<td>JOHNSON, WILLIAM</td>
<td>81</td>
<td>J</td>
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<tr>
<td>76689B</td>
<td>BOOKKEEPING</td>
<td>5704</td>
<td>78654</td>
<td>3542</td>
<td>7</td>
<td>SMITH, MARYANN</td>
<td>64</td>
<td>S</td>
</tr>
<tr>
<td>83824H</td>
<td>BUSINESS</td>
<td>9874</td>
<td>34867</td>
<td>2033</td>
<td>8</td>
<td>ARNOLD, PAUL</td>
<td>40</td>
<td>A</td>
</tr>
<tr>
<td>70890N</td>
<td>KEY PUNCH</td>
<td>8756</td>
<td>12308</td>
<td>4286</td>
<td>9</td>
<td>BRIGHT, BETTY</td>
<td>76</td>
<td>B</td>
</tr>
<tr>
<td>68570C</td>
<td>HISTORY</td>
<td>8049</td>
<td>67491</td>
<td>0798</td>
<td>7</td>
<td>CARLTON, THOMAS</td>
<td>56</td>
<td>C</td>
</tr>
<tr>
<td>12367X</td>
<td>ENGLISH</td>
<td>7878</td>
<td>34786</td>
<td>0012</td>
<td>9</td>
<td>CONNER, FRED</td>
<td>87</td>
<td>C</td>
</tr>
<tr>
<td>70865K</td>
<td>SPEECH</td>
<td>6757</td>
<td>23498</td>
<td>7070</td>
<td>9</td>
<td>ISAAC, JACK</td>
<td>13</td>
<td>I</td>
</tr>
<tr>
<td>08876T</td>
<td>BUSINESS MATH</td>
<td>7856</td>
<td>45385</td>
<td>4563</td>
<td>8</td>
<td>IRWIN, STANLEY</td>
<td>45</td>
<td>I</td>
</tr>
<tr>
<td>75634R</td>
<td>MACHINES.</td>
<td>9850</td>
<td>36759</td>
<td>6875</td>
<td>9</td>
<td>KRAVITSKY, JULIUS</td>
<td>68</td>
<td>K</td>
</tr>
<tr>
<td>45891W</td>
<td>DRAWING II</td>
<td>8762</td>
<td>54540</td>
<td>2309</td>
<td>7</td>
<td>ROONEY, HARRY</td>
<td>91</td>
<td>R</td>
</tr>
</tbody>
</table>

### EXERCISE 2

**Specification: Card Column**

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-8</td>
<td>Tag number (last column will be alpha)</td>
</tr>
<tr>
<td>9-13</td>
<td>Account number</td>
</tr>
<tr>
<td>18-22</td>
<td>Quantity</td>
</tr>
<tr>
<td>23-30</td>
<td>Amount</td>
</tr>
<tr>
<td>45-50</td>
<td>Date (dup)</td>
</tr>
<tr>
<td>51-59</td>
<td>Purchase order</td>
</tr>
<tr>
<td>60-76</td>
<td>Vendor's name</td>
</tr>
<tr>
<td>77-80</td>
<td>Current date (month and day)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>9-13</th>
<th>18-22</th>
<th>23-30</th>
<th>45-50</th>
<th>51-59</th>
<th>60-76</th>
<th>77-80</th>
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<tr>
<td>7650943A</td>
<td>757927</td>
<td>00024</td>
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<td>091070</td>
<td>976511578</td>
<td>WILFRED, GODFREY</td>
<td>0912</td>
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<td>9865002T</td>
<td>873070</td>
<td>00300</td>
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<td>976110054</td>
<td>ANDREW, JOHN</td>
<td>0905</td>
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<td>7594608R</td>
<td>52119</td>
<td>00019</td>
<td>000067.00</td>
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<td>111453379</td>
<td>MONSEN, ARVID</td>
<td>0906</td>
</tr>
<tr>
<td>7945009K</td>
<td>67511</td>
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<td>001345.50</td>
<td>091070</td>
<td>989966001</td>
<td>SMITH, ROBERT</td>
<td>1109</td>
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<tr>
<td>567438BP</td>
<td>55231</td>
<td>00056</td>
<td>000014.00</td>
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<td>768490012</td>
<td>INGRAHAM, FRANK</td>
<td>1110</td>
</tr>
<tr>
<td>7645898S</td>
<td>89998</td>
<td>00105</td>
<td>002000.00</td>
<td>091070</td>
<td>67488021</td>
<td>COWAN, KENNETH</td>
<td>0711</td>
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<tr>
<td>2347895D</td>
<td>54761</td>
<td>00078</td>
<td>000175.85</td>
<td>091070</td>
<td>987067893</td>
<td>CLONEY, WILLIAM</td>
<td>1115</td>
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<tr>
<td>5670996J</td>
<td>11223</td>
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<td>000414.00</td>
<td>091070</td>
<td>000657411</td>
<td>JOHNSON, FRANKLIN</td>
<td>1205</td>
</tr>
<tr>
<td>0987890Z</td>
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<td>SEYBOLT, GEORGE</td>
<td>1207</td>
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<tr>
<td>7654562L</td>
<td>87613</td>
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<td>007423579</td>
<td>WILLIAMS, PETER</td>
<td>1230</td>
</tr>
</tbody>
</table>
# Exercise 3

**Specification:** Card Column

- **1-6** Check number—left zero's print
- **7-26** Name
- **27-37** City
- **38-42** State (duplicate)
- **50-55** Date (duplicate month and year only)
- **65-69** Amount

<table>
<thead>
<tr>
<th>Check Number</th>
<th>Name</th>
<th>City</th>
<th>State</th>
<th>Date</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>7589</td>
<td>FREDERICK, ROBERT</td>
<td>LAKewood</td>
<td>CALIF</td>
<td>041067</td>
<td>56.00</td>
</tr>
<tr>
<td>864</td>
<td>MEES, BOB</td>
<td>LONG BEACH</td>
<td>CALIF</td>
<td>041467</td>
<td>145.00</td>
</tr>
<tr>
<td>1000</td>
<td>MYERS, FLOYD</td>
<td>BELLFLOWER</td>
<td>CALIF</td>
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<td>70.00</td>
</tr>
<tr>
<td>45</td>
<td>HODGE, PAUL</td>
<td>PARAMOUNT</td>
<td>CALIF</td>
<td>042067</td>
<td>35.00</td>
</tr>
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<td>490</td>
<td>GOFF, DARRELL</td>
<td>DOWNEY</td>
<td>CALIF</td>
<td>042167</td>
<td>285.00</td>
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<tr>
<td>24</td>
<td>GUIDA, DANNY</td>
<td>LAKewood</td>
<td>CALIF</td>
<td>042567</td>
<td>9.98</td>
</tr>
<tr>
<td>18</td>
<td>BARTLEY, EDWARD</td>
<td>NORWALK</td>
<td>CALIF</td>
<td>042867</td>
<td>80.80</td>
</tr>
<tr>
<td>6765</td>
<td>DEMPSEY, HERBERT</td>
<td>LONG BEACH</td>
<td>CALIF</td>
<td>042967</td>
<td>75.25</td>
</tr>
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<td>98401</td>
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<td>ORANGE</td>
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<td>123.89</td>
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<tr>
<td>690</td>
<td>HALLIDAY, LINDA</td>
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<td>CALIF</td>
<td>043067</td>
<td>300.78</td>
</tr>
</tbody>
</table>

---

# Exercise 4

**Specification:** Card Column

- **1-6** Check date (duplicate year only)
- **12-15** Check number
- **16-40** Name of payee
- **46-50** Amount
- **55-70** Bank name
- **75-80** Current date (duplicate year only)

<table>
<thead>
<tr>
<th>Check Date</th>
<th>Check Number</th>
<th>Name of Payee</th>
<th>Amount</th>
<th>Bank Name</th>
<th>Current Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>030067</td>
<td>2356</td>
<td>HANSON, SUSAN</td>
<td>087.90</td>
<td>FIRST NATIONAL</td>
<td>061068</td>
</tr>
<tr>
<td>031167</td>
<td>7645</td>
<td>SCOTT, SYLVIA</td>
<td>050.00</td>
<td>FEDERAL SAVINGS</td>
<td>061868</td>
</tr>
<tr>
<td>042167</td>
<td>9856</td>
<td>GARRISON, KENNETH</td>
<td>145.40</td>
<td>FIRST WESTERN</td>
<td>092568</td>
</tr>
<tr>
<td>050767</td>
<td>4522</td>
<td>ROONES, BOB</td>
<td>175.00</td>
<td>FIRST NATIONAL</td>
<td>092868</td>
</tr>
<tr>
<td>060967</td>
<td>6745</td>
<td>POTTER, TOM</td>
<td>230.50</td>
<td>FIRST WESTERN</td>
<td>100268</td>
</tr>
<tr>
<td>072307</td>
<td>3007</td>
<td>HUGHES, MARTIN</td>
<td>16.00</td>
<td>FEDERAL SAVINGS</td>
<td>100668</td>
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<tr>
<td>072467</td>
<td>8009</td>
<td>ANDERSON, EDWIN</td>
<td>43.87</td>
<td>HOME SAVINGS</td>
<td>102468</td>
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<tr>
<td>100967</td>
<td>6731</td>
<td>HARTLEY, DEREK</td>
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<td>FIDELITY</td>
<td>111969</td>
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<tr>
<td>102167</td>
<td>1816</td>
<td>HIGGINS, HENRY</td>
<td>303.00</td>
<td>BANK AMERICA</td>
<td>112068</td>
</tr>
<tr>
<td>113067</td>
<td>8011</td>
<td>MCCORMICK, JOSEPH</td>
<td>212.20</td>
<td>SAN FRANCISCO</td>
<td>122968</td>
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### EXERCISE 5

**Specification: Card Column**

<table>
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<tr>
<th>1-3</th>
<th>10-25</th>
<th>27-35</th>
<th>38-45</th>
<th>55-61</th>
<th>65-69</th>
<th>73-75</th>
<th>77-79</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Number</td>
<td>Location</td>
<td>Serial Number</td>
<td>Date</td>
<td>Phone Number</td>
<td>Invoice Number</td>
<td>Item Code X</td>
<td></td>
</tr>
<tr>
<td>789</td>
<td>DE MILLE</td>
<td>41546120</td>
<td>06-15-65</td>
<td>9276096</td>
<td>36241</td>
<td>104</td>
<td>ABC</td>
</tr>
<tr>
<td>586</td>
<td>LINDBERGH</td>
<td>786540978</td>
<td>06-23-65</td>
<td>8679775</td>
<td>83820</td>
<td>26</td>
<td>BCF</td>
</tr>
<tr>
<td>411</td>
<td>MILLIKAN</td>
<td>456119876</td>
<td>06-25-65</td>
<td>4214580</td>
<td>43689</td>
<td>3</td>
<td>GAB</td>
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<td>871</td>
<td>LAKEWOOD</td>
<td>456681189</td>
<td>07-04-66</td>
<td>4267589</td>
<td>16231</td>
<td>264</td>
<td>LAC</td>
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<td>830</td>
<td>AVALON</td>
<td>564789125</td>
<td>07-19-66</td>
<td>8697460</td>
<td>98743</td>
<td>59</td>
<td>DEF</td>
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<td>764</td>
<td>BANCROFT</td>
<td>761190956</td>
<td>10-20-66</td>
<td>8675980</td>
<td>28623</td>
<td>300</td>
<td>BGD</td>
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<tr>
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<td>LONGFELLOW</td>
<td>546781190</td>
<td>11-25-66</td>
<td>4386549</td>
<td>48609</td>
<td>150</td>
<td>LBR</td>
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<tr>
<td>543</td>
<td>JORDON</td>
<td>567489076</td>
<td>08-08-67</td>
<td>8769458</td>
<td>67540</td>
<td>766</td>
<td>KLH</td>
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<tr>
<td>964</td>
<td>WILSON</td>
<td>765234801</td>
<td>08-11-67</td>
<td>8675409</td>
<td>52110</td>
<td>98</td>
<td>IJK</td>
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<tr>
<td>974</td>
<td>POLY</td>
<td>768906437</td>
<td>09-28-67</td>
<td>4257890</td>
<td>87615</td>
<td>9</td>
<td>THR</td>
</tr>
</tbody>
</table>

### EXERCISE 6

**Specification: Card Column**

1-8 Number

Column 8 alpha

Columns 1-7 left zero print

14-18 Account number

23-27 Quantity

33-38 Amount (print suppress amount)

46-51 Current date (dup)

52-70 Name

78-80 Your initials (first, middle, last)

<table>
<thead>
<tr>
<th>Number</th>
<th>Account Number</th>
<th>Quantity</th>
<th>Amount</th>
<th>Current Date</th>
<th>Name</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>98745K</td>
<td>76543</td>
<td>00342</td>
<td>98.00</td>
<td>081567</td>
<td>COTTLE, JAMES</td>
<td>JMC</td>
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<tr>
<td>4580D</td>
<td>98561</td>
<td>00076</td>
<td>180.90</td>
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<td>RDH</td>
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<tr>
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<td>67450</td>
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<td>79.00</td>
<td>081567</td>
<td>WHITF, BILL</td>
<td>BIL</td>
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<td>0089674J</td>
<td>65231</td>
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<td>240.00</td>
<td>081567</td>
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<td>JAP</td>
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<td>5118GF</td>
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<td>00460</td>
<td>90.00</td>
<td>081567</td>
<td>JAMES, RICHARD</td>
<td>RAJ</td>
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<tr>
<td>78112C</td>
<td>06814</td>
<td>00009</td>
<td>376.98</td>
<td>081567</td>
<td>ZIMMERDAHL, STEVE</td>
<td>SPZ</td>
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<tr>
<td>89T</td>
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<td>211.00</td>
<td>081567</td>
<td>WIT, DIANE</td>
<td>DMW</td>
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<td>6173M</td>
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<td>00250</td>
<td>65.50</td>
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<td>MCMAHAY, CHUCK</td>
<td>CRM</td>
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<tr>
<td>7171000F</td>
<td>56997</td>
<td>00780</td>
<td>44.00</td>
<td>081567</td>
<td>COOPER, SHARON</td>
<td>SFC</td>
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<tr>
<td>6591P</td>
<td>11994</td>
<td>00065</td>
<td>300.00</td>
<td>081567</td>
<td>VALLES, DALE</td>
<td>DTV</td>
</tr>
</tbody>
</table>
THE JOB INSTRUCTION SHEET: EXERCISE 1

The following exercise is designed to familiarize the student with the job instruction sheet. Program cards are to be coded and punched from the information contained on the instruction sheet. The prepared program cards are then to be utilized in the punching of the exercise.

The numeric portions of the exercise may be used as an additional numeric drill on the Selectric typewriter.

General Instructions: 24, 26, and 29 Keypunches
1. Using a blank card and a pencil, design a program card to punch the data specifications contained on the job instruction sheet.
2. From the planning card prepared from step 1, punch the program card.
3. Keypunch each page of the exercise without stopping. Time yourself on each page so that you may check your speed.
4. Visually verify the accuracy of your cards, or verify them on a 56 or 59 verifier.
5. Rekeypunch the cards containing errors and turn in all cards to the instructor.
6. Record your time and speed from the accompanying chart in your notebook and also on a separate card to be turned in to your instructor.

Selectric Typewriter Instructions
1. Set margin stops at 1 and 80.
2. Place a blank sheet of paper in the typewriter and be sure the 1428 typing element is in place.
3. Set the tab stops to tabulate over alphabetic fields or fields designed to be skipped.
4. Type the exercise. Upon completion of each line visually verify and make any necessary corrections by retyping the entire line.
5. Time yourself and retyping the assignment going straight through and not stopping after each line to verify.
6. Use the accompanying chart to find your punching speed measured in keystrokes per hour. Record the figures in your notebook and also at the bottom of the assignment to be turned in to your instructor.
7. Visually verify the exercises and retype any line containing an error.

Estimating Your Keypunching Speed

<table>
<thead>
<tr>
<th>Number of Keystrokes Per Page of Exercise</th>
<th>Time Required to Keypunch One Page of Exercise in Minutes</th>
<th>Keystroke Speed in Keystrokes Per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,040</td>
<td>21</td>
<td>3,000</td>
</tr>
<tr>
<td>15½</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>12½</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td>10½</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>7½</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12,000</td>
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</tr>
</tbody>
</table>
### Job PER-1

**Plant and Equipment Record**

<table>
<thead>
<tr>
<th>Location</th>
<th>Asset</th>
<th>Description</th>
<th>Acquisition Date</th>
<th>Expiration Date</th>
<th>Total Installed Cost</th>
<th>Periodic Depreciation</th>
<th>Factor Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1 1 5</td>
<td>4725</td>
<td>AUTO SCREW MACHINE</td>
<td>06/51</td>
<td>06/67</td>
<td>3,473.60</td>
<td>201.24</td>
<td>3,775.46</td>
</tr>
<tr>
<td>1 1 1 5</td>
<td>4462</td>
<td>DRILL PRESS MODEL 2</td>
<td>04/50</td>
<td>04/66</td>
<td>3,600.00</td>
<td>313.00</td>
<td>3,671.00</td>
</tr>
<tr>
<td>1 1 1 5</td>
<td>4462A</td>
<td>SAFETY DEVICE</td>
<td>04/50</td>
<td>04/68</td>
<td>96.00</td>
<td>6.00</td>
<td>98.00</td>
</tr>
<tr>
<td>1 1 1 5</td>
<td>4639</td>
<td>ARBOR PRESS</td>
<td>10/70</td>
<td>10/70</td>
<td>595.05</td>
<td>29.40</td>
<td>619.55</td>
</tr>
<tr>
<td>1 1 1 5</td>
<td>4706</td>
<td>DIPULGRAPH PRESS</td>
<td>04/51</td>
<td>04/67</td>
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<td>145.20</td>
<td>2,568.75</td>
</tr>
<tr>
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<td>ROTARY SURFACE GRINDER</td>
<td>12/50</td>
<td>12/65</td>
<td>4,600.25</td>
<td>370.44</td>
<td>4,970.69</td>
</tr>
<tr>
<td>1 1 1 5</td>
<td>4680</td>
<td>RADIAL GRINDER</td>
<td>01/51</td>
<td>01/68</td>
<td>1,015.26</td>
<td>66.24</td>
<td>1,081.42</td>
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<tr>
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<td>4632</td>
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<td>10/50</td>
<td>10/65</td>
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<td>168.48</td>
<td>2,858.84</td>
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<tr>
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<td>02/67</td>
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<td>3,056.49</td>
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<tr>
<td>1 1 1 5</td>
<td>4695</td>
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<td>02/67</td>
<td>3,387.38</td>
<td>207.60</td>
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<tr>
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<td>02/67</td>
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<td>150.00</td>
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<tr>
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<td>4589</td>
<td>GEAR CUTTING MACHINE</td>
<td>08/50</td>
<td>08/65</td>
<td>3,851.59</td>
<td>204.00</td>
<td>3,937.59</td>
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<tr>
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<td>4501</td>
<td>PRECISION GAUGE</td>
<td>06/50</td>
<td>06/60</td>
<td>822.35</td>
<td>48.24</td>
<td>514.51</td>
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<tr>
<td>1 1 1 5</td>
<td>4601</td>
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<td>08/50</td>
<td>08/60</td>
<td>822.35</td>
<td>48.24</td>
<td>514.51</td>
</tr>
<tr>
<td>1 1 1 5</td>
<td>4801</td>
<td>LATHE BENCH</td>
<td>08/51</td>
<td>08/67</td>
<td>1,318.50</td>
<td>75.00</td>
<td>1,443.50</td>
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<tr>
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<td>4509</td>
<td>TOOL RACK</td>
<td>06/50</td>
<td>06/70</td>
<td>124.80</td>
<td>6.24</td>
<td>127.92</td>
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</table>

### Job PER-2

**Plant and Equipment Record**

<table>
<thead>
<tr>
<th>Location</th>
<th>Asset</th>
<th>Description</th>
<th>Acquisition Date</th>
<th>Expiration Date</th>
<th>Total Installed Cost</th>
<th>Periodic Depreciation</th>
<th>Factor Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 1 7 4</td>
<td>5646</td>
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<td>03/67</td>
<td>03/77</td>
<td>7,090.00</td>
<td>430.00</td>
<td>7,100.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>7773</td>
<td>BENCH MILL</td>
<td>05/67</td>
<td>05/77</td>
<td>8,800.00</td>
<td>650.00</td>
<td>10,050.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>7659</td>
<td>TAPS &amp; DIES</td>
<td>05/67</td>
<td>05/78</td>
<td>1,500.00</td>
<td>125.00</td>
<td>700.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>4563D</td>
<td>END-MILLS</td>
<td>02/67</td>
<td>02/78</td>
<td>8,000.00</td>
<td>550.00</td>
<td>8,250.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>6550</td>
<td>MILL-CUTTER</td>
<td>02/67</td>
<td>02/77</td>
<td>8,650.00</td>
<td>400.00</td>
<td>7,000.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>1174</td>
<td>REOMERS</td>
<td>07/67</td>
<td>07/77</td>
<td>900.00</td>
<td>220.00</td>
<td>1,100.45</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>3468</td>
<td>CARBIDE</td>
<td>08/67</td>
<td>08/78</td>
<td>1,500.00</td>
<td>333.54</td>
<td>1,870.50</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>5587</td>
<td>KELLOG SPRAY</td>
<td>08/68</td>
<td>08/78</td>
<td>475.00</td>
<td>98.00</td>
<td>550.89</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>5171</td>
<td>HARDING HEL. CHUCKER</td>
<td>08/67</td>
<td>08/77</td>
<td>8,050.50</td>
<td>600.00</td>
<td>9,100.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>4411A</td>
<td>AIR COMPRESSOR</td>
<td>10/67</td>
<td>10/77</td>
<td>500.00</td>
<td>100.00</td>
<td>650.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>7639</td>
<td>LINCOLN WELDER</td>
<td>10/66</td>
<td>10/77</td>
<td>2,000.00</td>
<td>350.98</td>
<td>2,500.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>8743</td>
<td>SOCKET SET</td>
<td>10/67</td>
<td>10/77</td>
<td>150.00</td>
<td>25.00</td>
<td>175.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>8653</td>
<td>GEAR HOBBING MACH.</td>
<td>09/68</td>
<td>09/78</td>
<td>3,337.38</td>
<td>388.00</td>
<td>4,000.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>6753K</td>
<td>RADIAL GRINDER</td>
<td>11/67</td>
<td>11/76</td>
<td>1,090.45</td>
<td>325.68</td>
<td>2,329.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>6754</td>
<td>ARBOR PRESS</td>
<td>11/67</td>
<td>11/76</td>
<td>636.00</td>
<td>186.00</td>
<td>760.00</td>
</tr>
<tr>
<td>7 1 7 4</td>
<td>9899</td>
<td>BELT SANDER</td>
<td>12/67</td>
<td>12/77</td>
<td>400.00</td>
<td>94.56</td>
<td>575.00</td>
</tr>
</tbody>
</table>
APPENDIX F

Preliminary Exercises - Business Data Processing Course
IF: FULL-TIME MOVE NAME TO REGISTER, IF MARRIED MOVE @M@ TO STATUS, ELSE MOVE @U@ TO STATUS.

-NESTED- IF

NEXT SENTENCE

- NOT NESTED -
SECTION A

ROUTINE TO FIND LARGEST OF THREE NUMBERS USING NESTED IF'S:

IF A > B, IF A > C MOVE A TO GREATEST; ELSE MOVE C TO GREATEST.

IF B > C MOVE B TO GREATEST; ELSE MOVE C TO GREATEST.

FLOW CHART

CODING:

IF A > B GO TO PAR-1.
IF B > C MOVE B TO GREATEST; ELSE MOVE C TO GREATEST.
GO TO PAR-2.

PAR-1.
IF A > C MOVE A TO GREATEST; ELSE MOVE C TO GREATEST.

PAR-2.
NEXT SENTENCE ...
8. WRITE THE STATEMENTS TO DO THE FOLLOWING:

A. DETERMINE WHETHER HOURS-WORKED IS GREATER THAN 37.5 AND, IF SO, TRANSFER CONTROL TO ANOTHER PARAGRAPH (WHICH YOU DO NOT WRITE) NAMED OVERTIME-Routine.

IF HOURS-WORKED IS GREATER THAN 37.5 GO TO OVERTIME-Routine.

B. TRANSFER CONTROL TO BAD-CODE IF CODE CONTAINS ANYTHING BUT DIGITS.

IF CODE IS NOT NUMERIC GO TO BAD-CODE.

<table>
<thead>
<tr>
<th>SOURCE AREA</th>
<th>PICTURE</th>
<th>SAMPLE DATA</th>
<th>RECEIVING AREA</th>
<th>PICTURE</th>
<th>EDITED RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. 9(6)</td>
<td>000123</td>
<td></td>
<td>ZZZ,999</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>10. 999999</td>
<td>000008</td>
<td></td>
<td>ZZZ,999</td>
<td>008</td>
<td></td>
</tr>
<tr>
<td>11. 9999V99</td>
<td>001234</td>
<td></td>
<td>$$, $$9.99</td>
<td>$12.34</td>
<td></td>
</tr>
<tr>
<td>12. X(6)</td>
<td>123456</td>
<td></td>
<td>XXXBBBXXXX</td>
<td>123000456</td>
<td></td>
</tr>
</tbody>
</table>

WRITE THE FIRST THREE LINES OF OUTPUT, GIVEN: IDENTIFICATION DIVISION.

WORKING-STOREAGE SECTION.

77 TAX-RATE PICTURE V999 VALUE .045.
77 MID-VAL PICTURE 9V999.
77 TAX-AMOUNT PICTURE V99.
77 TAX-CTR PICTURE V99.
77 XXX PICTURE 9V999.
01 LINE-IMAGE
  02 LOW-1 PICTURE Z,99.
  02 FILLER PICTURE X(4) VALUE SPACES.
  02 HIGH-1 PICTURE Z,99.
  02 FILLER PICTURE X(4).
  02 TAX PICTURE .99.

PROCEDURE DIVISION.

P-1.

DISPLAY @ AMOUNT. TAX@.
DIVIDE TAX-RATE INTO 0.0047 GIVING MID-VAL, ROUNDED.
MULTIPLY MID-VAL BY 2.0 GIVING XXX.
MOVE ZERO TO LOW-1.
MOVE MID-VAL TO HIGH-1.

P-2.

DISPLAY LINE-IMAGE.
IF MID-VAL IS GREATER THAN 2 STOP @JOB@.
ADD .01 TO MID-VAL.
MOVE MID-VAL TO LOW-1.
ADD XXX TO MID-VAL MOVE MID-VAL TO HIGH-1.
ADD .01 TO TAX-CTR MOVE TAX-CTR TO TAX.
GO TO P-2.

<table>
<thead>
<tr>
<th>AMOUNT</th>
<th>TAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>00</td>
</tr>
<tr>
<td>0.31</td>
<td>01</td>
</tr>
<tr>
<td>0.52</td>
<td>02</td>
</tr>
</tbody>
</table>

(OUTPUT)
COBOL Word

Of the total COBOL character set, only the alphabetic, numeric, and one special character (the hyphen) are used in the formation of COBOL words. A COBOL word is ended by either a space, or another punctuation symbol.

Data-Names

A data-name is a COBOL word which the programmer invents to represent the data involved in his problem. A data-name may have from one to thirty characters, but neither the first nor the last character may be a hyphen, and at least one of the characters must be alphabetic.

ADD, SUBTRACT, MULTIPLY, DIVIDE, MOVE STATEMENTS

ADD A B C D E F GIVING X.
SUBTRACT A B K L J R FROM TOTAL GIVING LEFT.
MULTIPLY A BY B GIVING C.
DIVIDE A INTO B GIVING C.
MOVE B TO C

Explain Reserve Words
SECTION B
Method to Use When Writing Programs

- Determine The Problem
- List The Input Names
- List The Output Names
- Draw A Temporary Flow Chart

Que: Does The Program Read Cards?

- Yes: Design Card Set Up and Fields on Cards
- No: Design Printed Page Fields

Que: Does The Program Write On The PRINTER?

- Yes: Continue
- No: Draw Final Flow Chart

Continue
DATA DIVISION.

WORKING-STORAGE SECTION.

PROCEDURE DIVISION.

ST.

MOVE @ ROBIN@ TO EMPL-NAM1.
MOVE @ RUTH@ GARCIA@ TO EMPL-NAM2.
MOVE @ WILLIAM@ TO EMPL-NAM5.
MOVE @ IRMA@ TO EMPL-NAM3.
MOVE @ IRENA@ CHAVEZ@ TO EMPL-NAM4.
MOVE @ LEILANI@ MORRIS@ TO EMPL-NAM6.
DISPLAY EMPL-NAM1.
DISPLAY EMPL-NAM2.
DISPLAY EMPL-NAM3.
DISPLAY EMPL-NAM6.
DISPLAY EMPL-NAM5.
DISPLAY EMPL-NAM4.
STOP RUN.

1). After execution of the program, describe the following memory locations:

<table>
<thead>
<tr>
<th>EMPL-NAM1</th>
<th>EMPL-NAM2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>EMPL-NAM3</td>
<td>EMPL-NAM4</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>EMPL-NAM5</td>
<td>EMPL-NAM6</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2). What has been printed on the printer?

3). What would have occurred if all of the pictures in the Data Section were x(14)?
DATA DIVISION

WORKING-STORAGE SECTION.

01 COUNT PICTURE 99999999.
02 INT PICTURE 9(5).
01 CTT PICTURE 9v99.
01 OWP PICTURE 99v999.
01 IOU PICTURE 99.
01 TZE PICTURE 9999999999.
01 POK PICTURE 99v999.
01 STU PICTURE 999.
01 AD1 PICTURE x(6).

PROCEDURE DIVISION.

SA. MOVE 213.578 TO COUNT.
MOVE 213.578 TO CTT.
MOVE 213.578 TO INT.
MOVE 213.578 TO OWP.
MOVE 213.578 TO IOU.
MOVE 213.578 TO TZE.
MOVE 213.578 TO PQR.
MOVE 213.578 TO STU.
MOVE @ ABCDEFG@ TO AD1.
DISPLAY INT.
DISPLAY TZE.
DISPLAY STU.
STOP RUN.

1). After execution of the program describe the following memory locations:

COUNT ___ INT ___ CTT ___
OWD ___ IOU ___ TZE ___ STU ___
PQR ___ AD1 ___

2). What has been printed in the printer?

3). What would have occurred if all pictures were 9999999999?
**SECTION B**

**#1**

If A is greater than B, move 5 to C, move 3 to D, move 8 to E, move 7 to X.

<table>
<thead>
<tr>
<th>BEFORE</th>
<th>CASE I</th>
<th>CASE II</th>
<th>CASE III</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 7  B 9  C 14</td>
<td>A 4  B 11  C 14</td>
<td>A 2  B 2  C 14</td>
<td></td>
</tr>
<tr>
<td>D 4  E 5  X 11</td>
<td>D 4  E 5  X 11</td>
<td>D 4  E 5  X 11</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A ___ B ___ C ___</td>
</tr>
<tr>
<td>D ___ E ___ X ___</td>
</tr>
</tbody>
</table>

**#2**

If A is greater than B, move 5 to C, move 3 to D, move 8 to E, move 7 to X.

<table>
<thead>
<tr>
<th>BEFORE</th>
<th>CASE I</th>
<th>CASE II</th>
<th>CASE III</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 7  B 9  C 14</td>
<td>A 4  B 11  C 14</td>
<td>A 2  B 2  C 14</td>
<td></td>
</tr>
<tr>
<td>D 4  E 5  X 11</td>
<td>D 4  E 5  X 11</td>
<td>D 4  E 5  X 11</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A ___ B ___ C ___</td>
</tr>
<tr>
<td>D ___ E ___ X ___</td>
</tr>
</tbody>
</table>

**#3**

If A is greater than B, move 5 to C, move 3 to D, move 8 to E, move 7 to X.

<table>
<thead>
<tr>
<th>BEFORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A ___ B ___ C ___</td>
</tr>
<tr>
<td>D ___ E ___ X ___</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A ___ B ___ C ___</td>
</tr>
<tr>
<td>D ___ E ___ X ___</td>
</tr>
</tbody>
</table>

---

F-8
APPENDIX G

Examinations - Business Data Processing Course
SECTION A

1. Hollerith code is described as a/an Code.
   (a) digital
   (b) numeric
   (c) alphanumeric
   (d) alphabetical

2. The code used on "IBM" punched cards is called:
   (a) IBM code
   (b) Hollerith code
   (c) Morse code
   (d) None of the above

3. There are (?) columns in the "IBM" punched cards.
   (a) 60 columns
   (b) 9 columns
   (c) 12 columns
   (d) 80 columns

4. If the GROSS-AMOUNT field of an "IBM" punched card is in columns 36 to 41, inclusive, how many columns does this field contain?
   (a) 6
   (b) 5
   (c) 1
   (d) None of the above

5. A 12 zone punch and a 5 punch in the same column represents the letter:
   (a) D
   (b) N
   (c) E
   (d) W

6. (?) holes are necessary to represent special symbols:
   (a) four
   (b) three, two, or one
   (c) two
   (d) None of the above

7. Card columns assigned to specific items of data are called:
   (a) unit records
   (b) fields
   (c) holezie kard
   (d) None of the above
8. (? ) multiple punches can be punched in one column of a card:
   (a) 12
   (b) 9
   (c) 3
   (d) None of the above
SECTION A

1. The code used on "IBM" punched cards is called the _______ code.

2. The program card is locked around the program _________.

3. The column indicator below the program control unit shows _________.

4. Alphabetic information is recorded in punched cards by combining punches known as the ________ and the ________ punches.

5. An 11 punched in a predetermined card column for control purposes is sometimes referred to as a ________ punch.

6. A column or a group of columns set aside to receive specific information is referred to as a _________.

7. Cards prepared from source documents on an IBM Key Punch are checked on a machine known as the _________.

8. The printed side of an IBM card is generally referred to as the ________ of the card.

9. There are ________ actual punching rows on a card.

10. Special characters (such as the dash, comma, ampersand) are usually made of from 1 to ______ punches in a column.

11. The ________ are raised and lowered by the program-control lever on a key punch machine.

12. Cards are placed in the hopper, _________.

11 999999 77777777 000000
11 99999999 77777777 00000000
11 999 999 777 000 000
11 9999999 777 00 00
11 999 77 00 00
11 999 77 000 000
11 999 77 00000000
11 999 77 000000

80
COBOL PROGRAMMING
SECTION A

Write the following arithmetic and standard algebraic notation in COBOL notation:

ARITH-ALGEBRA NOTATION | COBOL NOTATION
--- | ---
1. \(a + b\) | 1. \(A + B\)
2. \(c - d\) | 2. \(J\)
3. \(xy\) | 3. 
4. \(x^2\) | 4. 
5. \((z + x - y)\) | 5. 
6. \(\frac{c}{d}\) | 6. 
7. \(b^2 - 4ac\) | 7. 
8. \(2(a + b)\) | 8. 
9. \(\frac{a + b}{2}\) | 9. 
10. \(p + prt\) | 10. 

NUMBERING SYSTEMS

11. ADD: 10101 01010
    12. 1101 1110
    13. 1111

14. SUBT: 10101 00101
    15. 101011 011101
    16. 1101011 1011110

Convert the following binary numbers to octal numbers and the resultant octal numbers to their decimal equivalent:

<table>
<thead>
<tr>
<th>BINARY NUMBER</th>
<th>OCTAL NUMBER</th>
<th>DECIMAL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>101110</td>
<td>56</td>
</tr>
<tr>
<td>17. 1001101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. 1111111111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. 1010000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. 001111000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EOJRTN.
TRUE OR FALSE

If a statement is ALWAYS TRUE, write (+); if a statement is NOT ALWAYS TRUE, write (0).

1. A COBOL data name is composed of no more than 30 COBOL characters.
2. A COBOL statement may contain one and only one sentence.
3. A COBOL statement must always be followed by a statement separator.
4. A sentence must always be followed by a period and a space.
5. Every paragraph must have a name.
6. The following characters are in the COBOL character set: + , % $ # O R 5
7. The following are DATA NAMES:
   - NET-PAY
   - QUANTITY ON HAND
   - ASTERISK***
   - DATA-DIVISION
   - RATE/3
8. IS is a reserved word.
9. The following is a legitimate paragraph format:
   - MOVE QUANTITY TO ORDER-QUANTITY.
   - MOVE CUSTOMER-NAME TO REPORT-LINE.
10. The PROCEDURE DIVISION must precede the DATA DIVISION.

Fill in the "after" line in each of the following statements:

11. MOVE A TO B.
    Before:  A  B
            165  274
    After:   ____  ____
12. ADD A B C GIVING D.
Before: A  B  C  D
          1  2  3  4
After:   

13. SUBTRACT A B C GIVING D.
Before: A  B  C  D
          2  5  3  8
After:   

14. MULTIPLY A BY B GIVING C.
Before: A  B  C
          2  3  4
After:   

15. DIVIDE A INTO B GIVING C.
Before: A  B  C
          3  15 100
After:   

16. DIVIDE A B GIVING C ROUNDED.
Before: A  B  C
          3  11  5
After:   

17. Before: A  B  C
          6  346 562
After:   

18. SUBTRACT A FROM B.
Before: A  B
          8  2
After:   

19. MULTIPLY X BY Y.
Before: A  B
          8  009
After:   

20. MULTIPLY UNITS BY PRICE GIVING COST.
Before: UNITS  PRICE  COST
          23  147  444444
SECTION A

1. WHICH OF THESE ARE NOT ACCEPTABLE SEQUENCES OF
VERBS, WHEN EACH IS ASSUMED TO APPLY TO ONE FILE?
   A. READ, READ.
   B. OPEN, READ, CLOSE.
   C. OPEN, ACCEPT, CLOSE.
   D. OPEN, DISPLAY, CLOSE.

2. IN A STATEMENT SUCH AS DISPLAY FINAL-TOTAL UPON
PRINTER, WHAT IS THE WORD PRINTER CALLED? HOW
IS THIS MADE TO CORRESPOND TO A PHYSICAL DEVICE?

3. CAN A SINGLE DISPLAY BE USED TO OUTPUT BOTH A DATA
ITEM AND A LITERAL?

4. CONSIDER THE FOLLOWING SENTENCE:
   A. DISPLAY @JOB FINISHED.@. HOW MANY PERIODS
      WOULD BE PRINTED?
   B. DISPLAY @THIS IS A@, QUOTE, @HORSE@, QUOTE, @.@
      EXACTLY WHAT WOULD BE PRINTED?

5. MUST EVERY FILE HAVE A LABEL?

6. TRUE OR FALSE?
   A. AN OPEN MUST ALWAYS PRECEDE THE FIRST READ
      OR WRITE FOR A FILE.
   B. IF THERE IS ONLY ONE READ FOR A FILE, THE AT END
      "OPTION" MUST BE WRITTEN.

7. WRITE COBOL STATEMENTS TO DO THE FOLLOWING:
   A. THERE ARE DATA ITEMS IN STORAGE NAMED TRAN-
      ACTION-QUANTITY AND QUANTITY-ON-HAND. WRITE
      A STATEMENT THAT WILL MAKE THE VALUE OF
      QUANTITY-ON-HAND THE SAME AS THE VALUE OF
      TRANSACTION-QUANTITY; LEAVING THE LATTER
      UNCHANGED.

   B. THERE IS A DATA ITEM NAMED COUNTER: MAKE ITS
      NUMERICAL VALUE EQUAL TO 1.
C. THERE IS A DATA ITEM NAMED HEADING: MOVE THE CHARACTERS PAGE NUMBER TO IT.

D. MAKE THE NUMERICAL VALUE OF THE ITEM NAMED HOW-MANY ZERO.

E. DIVIDE THE VALUE OF THE ITEM NAMED TOTAL BY THE VALUE OF THE ITEM NAMED NUMBER, WITH THE QUOTIENT BECOMING THE NEW VALUE OF THE ITEM NAMED AVERAGE.
SECTION A

Design a flow chart (block diagram) that represents the reading of 10 cards from the card reader and do the following:

Print the 10 cards in the order read.

Only print cards 9 and 10.

Print cards in the reverse order read.
SECTION B

Read an unknown number of cards from the card reader and write them on the printer. It is known that the last card contains all zeros in the reading field and is not to be printed.

READ CARD

DIAGRAM CONTAIN ALL ZEROS?

WRITE ON PRINTER

YES

STOP
SECTION B

Given the following information:

ITEM-NAME Long Eared Lop Nosed Nut
Quantity: 526420
Value-per-unit: 50
Total-value:

ITEM: 14K Plated Lock Washer
Quantity: 25
Value per unit: 5350
Total value: ?

Calculate the total value of the "Long Eared Lop Nosed Nut" and the 14K Plated Lock Washer.

\[
\text{Total value}_{L,E,L,N,N} = \text{Quantity} \times \frac{\text{value}}{\text{unit}} = 626420 \times 50
\]
\[
= 526420 \times 50
\]
\[
= 26321000
\]

\[
\text{Total value}_{14K,P,L,W} = \text{Quantity} \times \frac{\text{value}}{\text{unit}} = 25 \times 5350
\]
\[
= 133750
\]

Draw a flow chart (block diagram) for a computer program to do the calculations of Part A. (See next page.)

Study the COBOL program on page 127 of Spitzbarth that does these calculations.

Show how the printed results of this program look on the printer (see next page).
B. Flow chart of program on page 127.
D. Output on the printer has the following format:

<table>
<thead>
<tr>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Line 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>123456789101112131415161718192021222324</td>
<td>26321000</td>
<td>14K PLATED LOCK WASHER</td>
</tr>
<tr>
<td>LONG EARED LOP NOSED NUT</td>
<td></td>
<td></td>
<td>00133750</td>
</tr>
</tbody>
</table>
Compose a flow chart that is designed to calculate the pay of all employees. The employee number and the pay received for the number of hours worked are to be printed on the printer. The employee number and the number of hours worked are read from the card reader in the following order:

Card 1 15293  ← Employee No. is 15293
Card 2 40 ← No. of hours worked
Card 3 15896 ← Employee No. 15896
Card 4 48  ← No. of hours worked
Card 5 12345  ""
Card 6 26  ""
Card N 0000  ""

The number of employees is unknown; but we do know the last card contains all zeros. Also the rate of pay for all employees is $2 per hour.

---

### Flow Chart

- **Start**
  - Accept Employee-No
  - Is number equal to 0?
    - Yes: Stop Run
    - No: Accept Hours
  - Multiply Hours by $2
  - Giving Pay

- **Display Employee-No**
  - Display Pay
SECTION B

Design a block diagram (flow chart) to do the following:

Read an unspecified number of cards from the card reader where the odd numbered cards represent an employee number and the even numbered cards represent hours worked. That is, each card containing an employee's employee number is followed by a card containing the number of hours that the corresponding employee worked. The number of cards is unknown, but we have placed a card containing all zeros as the last card.

Display on the printer employee number followed by the number of hours that the employee worked. If an employee worked less than 10 hours, then he has been loafing on the job. Therefore, we also want three cards punched out. The first will contain his employee number. The second will contain the number of hours worked. The third will be a statement telling him to "earn more money!"
SECTION B

Design a card setup and flow chart to do the following:

Print the employee number, employee name, address and salary based upon the number of hours worked for each employee. You can read the employee's number, employee name, address and number of hours worked from the card reader. You know how many employees there are. You know the first 50 employees receive $2 per hour and all the others receive $2.50 per hour.

If you knew how many employees there were each day but the number changes from day to day, then how would you design the card setup and flow chart.
APPENDIX H

COBOL Programming Assignments - Data Processing Course
The purpose of this case study is to write a simple payroll program. For the sake of simplicity we will assume we have a master card and a detail card for each employee and that the master card for each employee immediately precedes his detail card. Assume there is no master card without a corresponding detail card and vice versa.

The format for the master card is as follows:

<table>
<thead>
<tr>
<th>COL.</th>
<th>DESCRIPTION</th>
<th>FORMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>EMPLOYEE NO.</td>
<td>9999</td>
</tr>
<tr>
<td></td>
<td>EMPLOYEE NAME</td>
<td></td>
</tr>
<tr>
<td>5-14</td>
<td>LAST</td>
<td>A(10)</td>
</tr>
<tr>
<td>15-17</td>
<td>INITIAL</td>
<td>4(3)</td>
</tr>
<tr>
<td>18-24</td>
<td>SPACES</td>
<td></td>
</tr>
<tr>
<td>25-26</td>
<td>DEPARTMENT CODE</td>
<td>99</td>
</tr>
<tr>
<td>27-28</td>
<td>TAX CLASS</td>
<td>99</td>
</tr>
<tr>
<td>29-35</td>
<td>YTD GROSS</td>
<td>999999V99</td>
</tr>
<tr>
<td>36-40</td>
<td>YTD FICA</td>
<td>999V99</td>
</tr>
<tr>
<td>41-46</td>
<td>YTD WITHHOLDING</td>
<td>9999V99</td>
</tr>
<tr>
<td>47-50</td>
<td>HOURLY RATE</td>
<td>99V99</td>
</tr>
<tr>
<td>51-52</td>
<td>WEEK</td>
<td>99</td>
</tr>
<tr>
<td>53-61</td>
<td>SOCIAL SEC. NO.</td>
<td>9(9)</td>
</tr>
</tbody>
</table>

The format for the detail card is as follows:

<table>
<thead>
<tr>
<th>COL.</th>
<th>DESCRIPTION</th>
<th>FORMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>EMPLOYEE NO.</td>
<td>9999</td>
</tr>
<tr>
<td>10-11</td>
<td>HOURS WORKED</td>
<td>99</td>
</tr>
<tr>
<td>20-21</td>
<td>WEEK</td>
<td>99</td>
</tr>
</tbody>
</table>

To produce a payroll register, the required calculations are as follows:

1. **BASE PAY = BASE-REGULAR HOURS X HOURLY RATE.**

2. **OVERTIME PAY = OVERTIME HOURS X HOURLY RATE X 1.5**

   WHERE OVERTIME IS ANYTHING OVER 40 HOURS.
3. GROSS PAY = BASE PAY + OVERTIME PAY.

4. WITHHOLDING TAX = (GROSS PAY = (TAX CLASS X $13.00) X 18%.

5. FICA = 4% OF GROSS PAY IF YTD GROSS IS LESS THAN $4800.

6. NET PAY = GROSS PAY - FICA - WITHHOLDING.

7. NEW YTD GROSS = OLD YTD GROSS + GROSS.

8. NEW YTD FICA = OLD YTD FICA + FICA.

9. NEW YTD WITHHOLDING = OLD YTD WITHHOLDING + WITHHOLDING.

10. THE CALCULATIONS FOR DEPARTMENTAL TOTALS ARE ROUTINE AND WILL NOT BE SPelled OUT.
SECTION A

OUTPUT:

<table>
<thead>
<tr>
<th>SOC SEC NO</th>
<th>TC</th>
<th>YTDGROSS</th>
<th>DEPT</th>
<th>INDO</th>
<th>NAME</th>
<th>RATE</th>
<th>REG</th>
<th>OT</th>
<th>GROSS</th>
<th>FICA</th>
<th>WITH</th>
<th>NET</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXX XX XXXX</td>
<td>X</td>
<td>XXX.XX</td>
<td>XX</td>
<td>XXXX</td>
<td>X XXXXXXXX X.XX XX XX XXX.XX X.XX XX XX.XX X.XX XX XX.XX XXX.XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XXX XX XXXX</td>
<td>X</td>
<td>XXX.XX</td>
<td>XX</td>
<td>XXXX</td>
<td>X XXXX</td>
<td>X.XX XX XX XX.XX X.XX XX XX.XX XXX.XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XXX XX XXXX</td>
<td>X</td>
<td>XXX.XX</td>
<td>XX</td>
<td>XXXX</td>
<td>X XXXXXXXX X.XX XX XX XXX.XX X.XX XX XX.XX XXX.XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEPT TOTALS</td>
<td>XX</td>
<td>$XXXXXX.XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>XXX XX</td>
<td>$XXXX.XX</td>
<td>$X.XX</td>
<td>$XX.XX</td>
<td>$XXXX.XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each dollar and cents figures are to be edited by inserting a decimal point and suppressing leading zeros in the department totals.

Start each department's payroll register on a new sheet with the appropriate headings. Due to the amount of space required for the headings, it will be necessary to prepare a careful printers spacing chart.
### EDITING:

<table>
<thead>
<tr>
<th>SOURCE AREA</th>
<th>RECEIVING AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICTURE</td>
<td>PICTURE</td>
</tr>
<tr>
<td>SAMPLE DATA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>SOURCE AREA</th>
<th>RECEIVING AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>999999</td>
<td>$ZZZ,ZZZ.99</td>
</tr>
<tr>
<td>2</td>
<td>9999Y99</td>
<td>$bb1,234.56</td>
</tr>
<tr>
<td>3</td>
<td>'9(4)Y99</td>
<td>$ZZZ,ZZZ.99</td>
</tr>
<tr>
<td>4</td>
<td>9999Y99</td>
<td>$9999.9999</td>
</tr>
<tr>
<td>5</td>
<td>999999</td>
<td>$999999</td>
</tr>
<tr>
<td>6</td>
<td>9(6)</td>
<td>$80,80</td>
</tr>
<tr>
<td>7</td>
<td>99999V9</td>
<td>$999999</td>
</tr>
<tr>
<td>8</td>
<td>S9999V99</td>
<td>$<em>,</em>**.99DE</td>
</tr>
<tr>
<td>9</td>
<td>S9(6)</td>
<td>-999999</td>
</tr>
<tr>
<td>10</td>
<td>999999</td>
<td>9B(4)9(5)</td>
</tr>
</tbody>
</table>

### REVIEW:

11. Subtract A B C from D giving X.

Before: 2 5 3 8 4

After:___

12. Divide A into B giving C rounded.

Before: 4 .19 4

After:___

13. The nature of CODASYL would be best described by one of the following statements. Select the one.

a) The group which made the attempt to generate the COBOL language.

b) The meeting at which the initial specifications for a common business oriented language was devised.

c) The organization which created COBOL.
14. Match the phrases in Column Y with the related symbols in Column X.

<table>
<thead>
<tr>
<th>COLUMN X</th>
<th>COLUMN Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) data-name-1</td>
<td>A. Key reserved word</td>
</tr>
<tr>
<td>b) OBJECT-COMPUTER</td>
<td>B. Optional reserved word</td>
</tr>
<tr>
<td>c) MEMORY SIZE H-206</td>
<td>C. Non-reserved words</td>
</tr>
<tr>
<td>d) HONEYWELL-200</td>
<td>D. Optional COBOL statement</td>
</tr>
<tr>
<td>e) NO SEGMENTATION</td>
<td>E. Choice must be made</td>
</tr>
</tbody>
</table>

15. Check the following literals as either NON for non-numeric and N for numeric.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) @12345@</td>
<td>A. Key reserved word</td>
</tr>
<tr>
<td>b) 12345</td>
<td>B. Optional reserved word</td>
</tr>
<tr>
<td>c) @12345ABC@</td>
<td>C. Non-reserved words</td>
</tr>
<tr>
<td>d) @THIS IS A NUMERIC LITERAL@</td>
<td>D. Optional COBOL statement</td>
</tr>
<tr>
<td>e) +157.567</td>
<td>E. Choice must be made</td>
</tr>
<tr>
<td>f) @03-30-70@</td>
<td></td>
</tr>
</tbody>
</table>

16. Choose the entry in Column Y which properly describes an item in Column X.

<table>
<thead>
<tr>
<th>COLUMN X</th>
<th>COLUMN Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) DATA DIVISION</td>
<td>A. Provides documentation, program name, etc.</td>
</tr>
<tr>
<td>b) ENVIRONMENT DIVISION</td>
<td>B. Provides equipment configuration and assignments.</td>
</tr>
<tr>
<td>c) PROCEDURE DIVISION</td>
<td>C. Identifies all of the I/O areas.</td>
</tr>
<tr>
<td>d) IDENTIFICATION DIVISION</td>
<td>D. Includes all of the instructions necessary to solve a given problem.</td>
</tr>
</tbody>
</table>
SECTION A

PART I

CASE STUDY # 1- PROBLEM 1  PENCIL PROBLEM
CASE STUDY # 2- PROBLEM 2  COST PROBLEM
CASE STUDY # 3- PROBLEM 5  CONVERSION TABLE
CASE STUDY # 4- PROBLEM 6  SIMPLE INTEREST
CASE STUDY # 5  DITTO  NELLA, ILMO, JAY

PART II

CASE STUDIES TO BE ASSIGNED AT A LATER DATE.
Study Chapter Nine. FILE USAGE  Page 185.

PROGRAMMING INFORMATION FOR H-200.

IDENTIFICATION DIVISION.
PROGRAM-ID. PROB-NO.
AUTHOR. NAME.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. H-200-SPECIAL.
OBJECT-COMPUTER. H-200, SUPERVISOR, NO SEGMENTATION,
SPECIAL-NAMES.
PAGE IS TO-NEXT-PAGE.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
SELECT PUNCHED-CARD-FILE ASSIGN TO CARD-READER E.
SELECT REPORT-FILE ASSIGN TO PRINTER B.
I-O-CONTROL.
APPLY H-200-SPECIAL ON PUNCHED-CARD-FILE.
DATA DIVISION.
FILE SECTION.
FD PUNCHED-CARD-FILE,
LABEL RECORDS ARE STANDARD,
VALUE OF IDENTIFICATION IS @ @,
DATA RECORDS IS IN-PUT.

FD REPORT-FILE LABEL RECORDS ARE OMITTED,
DATA RECORD IS PRINT-LINE.

PROCEDURE DIVISION.
OPEN INPUT PUNCHED-CARD-FILE, OUTPUT REPORT-FILE
The following program is extra credit.

Required - FLOW CHART
CODING SHEET
PRINTING CHART

Write a program to read a deck of cards and print the information on the printer. Skip to the top of a new page before beginning and also if a form overflow occurs.

The format of the cards is as follows:

<table>
<thead>
<tr>
<th>COL:</th>
<th>INFORMATION</th>
<th>FORMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>IDNO</td>
<td>99999</td>
</tr>
<tr>
<td></td>
<td>NAME</td>
<td></td>
</tr>
<tr>
<td>6-20</td>
<td>LAST</td>
<td>A(15)</td>
</tr>
<tr>
<td>21-29</td>
<td>FIRST</td>
<td>A(9)</td>
</tr>
<tr>
<td>30</td>
<td>MIDDLE-INITIAL</td>
<td>A(1)</td>
</tr>
<tr>
<td>31-39</td>
<td>SOC-SECURITY-NO</td>
<td>9(9)</td>
</tr>
<tr>
<td>40-41</td>
<td>OCCUPATION-CODE</td>
<td>99</td>
</tr>
<tr>
<td>50-54</td>
<td>PAY-RATE</td>
<td>99999</td>
</tr>
<tr>
<td>59-60</td>
<td>DEPARTMENT</td>
<td>99</td>
</tr>
</tbody>
</table>

The format of the printout for each card is as follows:

LINE 1:

| 10-14 | IDNO        | 99999  |
| 18-28 | SOC-SECURITY-NO | 999-99-9999 |
| 35-62 | NAME        |        |
|       | FIRST       | A(9)   |
|       | MIDDLE-INITIAL | bA'.b |
|       | LAST        | A(15)  |

LINE 2:

| 11-12 | OCCUPATION-CODE | 99 |
| 16-17 | DEPARTMENT      | 99 |
| 20-25 | PAY-RATE        | 99,999 |

Double space between every two line combination; single space within the two line combination. Suppress any leading zeros in pay rate.
Rewrite WRITE IBM-360 program for H-200.

IDENTIFICATION DIVISION.
PROGRAM-ID. 'EXTRA CREDIT'
AUTHOR. TEAM C.
ENVIRONMENT-DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. IBM-360 E25.
OBJECT-COMPUTER. IBM-360 E25.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
SELECT IN-FILE ASSIGN TO 'SYS009' UNIT-RECORD 2540R.
SELECT OUT-FILE ASSIGN TO 'SYS001' UNIT-RECORD 1403.
I-O-CONTROL.
APPLY BOTTOM-OF-PAGE TO FORM-OVERFLOW ON OUT-FILE.
DATA DIVISION.
FILE SECTION.
FD RECORDING MODE IS F.
01 EMP-REC.
   02 IDNO
   02 INNAME.
      03 INLAST
      03 INFIRST
      03 INMI
   02 INSSNO.
      03 ONE
      03 TWO
      03 THREE
   02 INOCODE
   02 FILLER
   02 INPARATE
   02 FILLER
   02 INDEPT
   02 FILLER
FD OUT-FILE DATA RECORD IS OUT-REC LABEL RECORDS ARE OMITTED
RECORDING MODE IS F.
01 OUT-REC
WORKING-STORAGE SECTION.
01 PRINT-LINE-1.
   02 FILLER
   02 ID-OUT
   02 FILLER
   02 SSOUT.
      03 SSONE
      03 HYP-1
      03 SSTWO
      03 HYP-2
      03 SSTHREE
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
   02 FILLER
CASE STUDY
SECTION A

Write a program to read a deck of cards and print the information on the printer. Skip to the top of a new page before beginning and also if a form overflow occurs.

The format of the cards is as follows:

<table>
<thead>
<tr>
<th>COL.</th>
<th>INFORMATION</th>
<th>FORMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>IDNO</td>
<td>99999</td>
</tr>
<tr>
<td></td>
<td>NAME</td>
<td></td>
</tr>
<tr>
<td>6-20</td>
<td>LAST</td>
<td>A(15)</td>
</tr>
<tr>
<td>21-29</td>
<td>FIRST</td>
<td>A(9)</td>
</tr>
<tr>
<td>30</td>
<td>MIDDLE-INITIAL</td>
<td>A(1)</td>
</tr>
<tr>
<td>31-39</td>
<td>SOC-SECURITY-NO</td>
<td>9(9)</td>
</tr>
<tr>
<td>40-41</td>
<td>OCCUPATION-CODE</td>
<td>99</td>
</tr>
<tr>
<td>50-54</td>
<td>PAY-RATE</td>
<td>99V999</td>
</tr>
<tr>
<td>59-60</td>
<td>DEPARTMENT</td>
<td>99</td>
</tr>
</tbody>
</table>

The format of the printout for each card is as follows:

**LINE 1:**

| 10-14 | IDNO | 99999 |
| 18-28 | SOC-SECURITY-NO | 999-99-9999 |
| 35-62 | NAME |
|       | FIRST | A(9) |
|       | MIDDLE-INITIAL | bA.b |
|       | LAST   | A(15) |

**LINE 2:**

| 11-12 | OCCUPATION-CODE | 99 |
| 16-17 | DEPARTMENT     | 99 |
| 20-25 | PAY-RATE       | 99.999 |

Double space between every two line combination; single space within the two line combination. Suppress any leading zeros in pay rate.
COBOL PROGRAMMING

SECTION A

GIVEN: Input data cards as described in Case Study 5.

REQUIRED: Considering 120 position for a print area, prepare the following report:

COBOL CASE STUDY 7

NELLO. ILMOL JAY

xxx xxx xxx
xxx xxx xxx
xxx xxx xxx
xxx xxx xxx

TOTAL xxx xxx xxx

AVERAGE xxx xxx xxx

(CURRENT DATE)
(FORMAT MMM DD YY)

INSTRUCTIONS TO CONSIDER FOR THIS PROBLEM:

READ
WRITE
COMPUTE
SECTION B

A. Draw a flow chart for each problem.

B. Develop a table of all data-names and show the contents of each data-name after the execution of each instruction.

C. Some problems have additional questions; answer them.

8 12
START1.

MOVE 156 TO INT.

1) DIVIDE 12 INTO INT GIVING DOZEN-INT.
   ADD 4 DOZEN-INT GIVING DOZEN-INT.
   STOP RUN.

8 12
BEGIN-HERE-AND-NOW.

MOVE 43 TO HOURS.
ADD 7 HOURS GIVING BONUS-HOURS.

2) MOVE 3.50 TO RATE.
   MULTIPLY HOURS BY RATE GIVING ORDINARY-PAY,
   MULTIPLY BONUS-HOURS BY RATE GIVING BONUS-PAY.
   STOP RUN.

8 12
BEGIN.

MOVE 5 TO LENGTH1.
MOVE 13 TO WIDTH1.
MOVE 20 TO LENGTH2.
MOVE 14 TO WIDTH2.

3) MULTIPLY LENGTH1 BY WIDTH1 GIVING AREA1.
   MULTIPLY LENGTH2 BY WIDTH2 GIVING AREA2.
   SUBTRACT AREA1 FROM AREA2 GIVING SHADED-AREA.
   ADD LENGTH1 LENGTH2 WIDTH1 WIDTH2 GIVING PERIMETER1.
   MULTIPLY LENGTH2 BY 2 GIVING 2TIMES-LENGTH2.
   MULTIPLY WIDTH2 BY 2 GIVING 2TIMES-WIDTH2.
   ADD 2TIMES-LENGTH2 2TIMES-WIDTH2 GIVING PERIMETER2.
   STOP RUN.
H-12

8 12
OK11.
MOVE 6 TO NUMBER-OF-CANDIES.
OK12.
MOVE .05 TO PRICE-OF-EACH.
MULTIPLY NUMBER-OF-CANDIES
BY PRICE-OF-EACH GIVING
TOTAL-COST-OF-CANDY.
(4) IF TOTAL-COST-OF-CANDY IS GREATER THAN .25 MOVE 4.
TO NUMBER-OF-CANDIES
GO TO OK12.
SUBTRACT .20 FROM TOTAL-COST-OF-CANDY.
STOP RUN.

8 12
OK11.
MOVE 6 TO NUMBER-OF-CANDIES.
OK12.
MOVE .05 TO PRICE-OF-EACH.
MULTIPLY NUMBER-OF-CANDIES BY
PRICE-OF-EACH GIVING TOTAL-COST-OF-CANDY.
(3) IF TOTAL-COST-OF-CANDY IS GREATER THAN .25 MOVE 4.
TO NUMBER-OF-CANDIES.
GO TO OK12.
SUBTRACT .20 FROM TOTAL-COST-OF-CANDY.
STOP RUN.

8 12
TITLE-ROUTINE.
(6) MOVE 'EMPLOYEEMANUMBERAPPAYA' TO TITLE.
DISPLAY TITLE.
STOP RUN.

8 12
TITLE-ROUTINE.
(7) DISPLAY 'EMPLOYEEMANUMBERAPPAYA'.
STOP RUN.

8 12
BEGIN.
MOVE 5 TO A.
MOVE 4 TO B.
ADD A B GIVING C.
STOP RUN.

197
Find the error(s) in the following programs. (Also do A, B, C)

8   12
TITLE-ROUTINE.
   DISPLAY 'EMPLOYEE NUMBER'.
   GO TO XENTLY.
9
   MOVE 15 TO X.
   MULTIPLY X BY X GIVING X.
   XENTRY.
   STOP RUN.

8   12
HEAD.
   STOP RUN.
(10)
   MOVE 5 TO X.
   MULTIPLY X BY 2 GIVING X.
   GO TO HEAD.

8   12
XYENTER.
   GO TO X-START.
   XYZSTART.
   MOVE 5 TO Y.
   (11) MULTIPLY Y BY W GIVING Y.
   STOP RUN.
   X-START.
   MOVE 2 TO W.
   GO TO XYZSTART.

8   12
XYENTER.
   GO TO X-START.
   XYZSTART.
   MOVE 5 TO Y.
   (12) 12 MULTIPLY Y BY W GIVING Y.
   STOP RUN.
   X-START.
   MOVE 2 TO W.
   GO TO XYZSTART.

8   12
BEGIN.
   ADD A B GIVING C.
   (13) MOVE 5 TO A.
   MOVE 4 TO B.
   STOP RUN.
DATA DIVISION.
WORKING-STORAGE SECTION.
  01 INT PICTURE 99999999.
  01 DOZEN-INT PICTURE 9(8).
PROCEDURE DIVISION.
(16) START1.
  ACCEPT INT.
  DIVIDE 12 INTO INT GIVING DOZEN-INT.
  ADD 4 DOZEN-INT GIVING DOZEN-INT.
  DISPLAY DOZEN-INT.
  STOP RUN.

PROCEDURE DIVISION.
(17) BEGIN-HERE-AND-NOW.
  MOVE 43 TO HOURS.
  ADD 7 HOURS GIVING BONUS-HOURS.
  MOVE 3.50 TO RATE.
  MULTIPLY HOURS BY RATE GIVING ORDINARY-PAY.
  MULTIPLY BONUS-HOURS BY RATE GIVING BONUS-PAY.
  DISPLAY ORDINARY-PAY.
  DISPLAY BONUS-PAY.
  STOP RUN.
8 12
DATA DIVISION.
WORKING-STORAGE SECTION.
01 NO1 PICTURE 99
01 NO2 PICTURE 99
01 PIN PICTURE 999,
PROCEDURE DIVISION.
START.
MOVE 5 TO NO2.
MOVE 1 TO NO1.
OUTPGM.
(18) IF NO1 IS LESS THAN 25 ADD 5 NO1
     GIVING NO1
     ADD 5 NO2 GIVING NO2
     MULTIPLY NO1 BY NO2 GIVING PIN.
     IF PIN IS LESS THAN 200
     GO TO OUTPGM.
     DISPLAY NO1.
     DISPLAY NO2.
     DISPLAY PIN.
STOP RUN.

Also what numbers are printed on the printer and in what order?

What number(s) is(are) printed on the printer. (Also do A, B, C)

8 12
DATA DIVISION.
WORKING-STORAGE SECTION.
01 THE-CARD-IN PICTURE 9(5)
PROCEDURE DIVISION.
START.
ACCEPT THE-CARD-IN.
LOOP-OUTPT.
IF THE-CARD-IN IS GREATER THAN 25 SUBTRACT 9
FROM THE-CARD-IN GIVING THE-CARD-IN
DIVIDE 10 INTO THE-CARD-IN
DISPLAY THE-CARD-IN
GO TO FINISH.
ADD 5 TO THE-CARD-IN.
GO TO LOOP-OUTPT.
FINISH.
STOP RUN.

cc1 00004 THE-CARD-IN
APPENDIX I

Samples of Student Work - Data Processing Course
H-200 COBOL F COMPILATION RECORD

EXTERNAL IDENTIFICATION= AVERYE  RUN NO.: RUN DATE: 07/29/70
OBJECT PROGRAM VISIBILITY: VISIBLE TO ALL.
COMPILED VERSION: 01.0  VISIBILITY: L
SOURCE PROG. AND LIBR. TAPE NAME: UNUSED

THERE ARE 1 WARNING DIAGNOSTICS.
OBJECT TIME MEMORY REQUIREMENT IS 012537 (005471 DECIMAL) CHARACTERS.

PROJECT SOUL
Completed 7/28/70
INSTRUCTOR: NORM GALE
IDENTIFICATION DIVISION.
PROGRAM-ID. TWO.
AUTHOR. ELIA.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. M-200 SPECIAL.
OBJECT-COMPUTER. M-200. SUPERVISOR.
NO SEGMENTATION.
DATA DIVISION.
WORKING-STORAGE SECTION.
77 TOT-COST PICTURE 99999999.
01 INPUT-DATA-CARD.
   02 POUNDS PICTURE 999.
   02 COST-PER-POUND PICTURE 99999.
01 OUT-PUT-DC.
   02 FILLER PICTURE X(131) VALUE SPACES.
   02 POUNDS PICTURE Z99.
   02 UNIT-COST PICTURE $99.99.
   02 FILLER PICTURE X(127) VALUE SPACES.
   02 TOTAL-COST PICTURE $99999999.
01 HEADING-I.
   02 FILLER PICTURE X(130) VALUE SPACES.
   02 HEAD-COL-1 PICTURE X(6) VALUE SPACES.
   02 FILLER PICTURE X(120) VALUE SPACES.
   02 HEAD-COL-2 PICTURE X(9) VALUE UNIT COST.
   02 FILLER PICTURE X(120) VALUE SPACES.
   02 HEAD-COL-3 PICTURE X(10) VALUE TOTAL COST.
PROCEDURE DIVISION.
/BEGIN/PROG SECTION 0.
PAR-1.
   DISPLAY HEADING-I.
PAR-2.
   ACCEPT INPUT-DATA-CARD.
IF POUNDS IS EQUAL TO 0 STOP HEADING-I.
MULTIPLY POUNDS BY COST-PER-POUND GIVING TOT-COST.
   MOV POUNDS TO POUNDS.
   MOVE COST-PER-POUND TO UNIT-COST.
   MOVE TOT-COST TO TOTAL-COST.
   DISPLAY OUT-PUT-DC.
   GO TO PAR-2.
/END/PROG/AT /BEGIN/PROG
END COBOL
ADDRESSES OF SUBROUTINES INCLUDED IN OBJECT PROGRAM.

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RUN DATE: 07/29/70

7/28/70

W. E. Gay
1. OBSERVE: THIS FILE-NAME IS REPRESENTED IN OBJECT TIME PRINTOUTS AS "FILE 1".

2. OBSERVE: THIS FILE-NAME IS REPRESENTED IN OBJECT TIME PRINTOUTS AS "FILE 2".

IDENTIFICATION DIVISION.

PROGRAM-ID. NELLA-ILMO-JAY.

AUTHOR. JENKINS-MASON-TIMS.

ENVIRONMENT DIVISION.

CONFIGURATION SECTION.

SOURCE-COMPUTER. H-200-SPECIAL.

OBJECT-COMPUTER. H-200. SUPERVISOR. NO SEGMENTATION.

INPUT-OUTPUT SECTION.

FILE-CONTROL.

SELECT IN-FILE ASSIGN TO CARD-READER E.

SELECT OUT-FILE ASSIGN TO PRINTER P.

DATA DIVISION.

FILE SECTION.

FD IN-FILE.

LABEL RECORDS ARE OMITTED.

VALUE OF IDENTIFICATION IS.: 1.

DATA RECORD IS IN-DATA-RECORD.

01 IN-DATA-RECORD.

02 FILLER PICTURE X(20).

02 NELLA-NO-IN PICTURE 9(3).

02 FILLER PICTURE X(17).

02 ILMO-NO-IN PICTURE 9(4).

02 FILLER PICTURE X(16).

02 JAY-NO-IN PICTURE 9(4).

02 FILLER PICTURE X(26).

FD OUT-FILE.

LABEL RECORDS ARE OMITTED.

DATA RECORD IS OUT-DATA-RECORD.

01 OUT-DATA-RECORD.

02 FILLER PICTURE X(28).

02 NELLA-NO-OUT PICTURE 9(3).

02 FILLER PICTURE X(33).

02 ILMO-NO-OUT PICTURE 9(4).

02 FILLER PICTURE X(26).

02 FILLER PICTURE 9(4).

02 FILLER PICTURE X(22).

WORKING-STORAGE SECTION.

01 HEADINGS.

02 FILLER PICTURE X(211) VALUE SPACES.

02 FILLER PICTURE X(18) VALUE JENKINS=MASON-TIMS.

02 FILLER PICTURE X(211) VALUE SPACES.

02 FILLER PICTURE X(12) VALUE CASE STUDY 5.

02 FILLER PICTURE X(211) VALUE SPACES.

02 FILLER PICTURE X(15) VALUE COBOL.

02 FILLER PICTURE X(22) VALUE SPACES.
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|         | PICTURE X(27) VALUE SPACES.                                        |
| 00406   | 02 COL-HEADING-1
|         | PICTURE X(5) VALUE NELLA.                                          |
| 00412   | 02 COL-HEADING-2
|         | PICTURE X(32) VALUE SPACES.                                        |
| 00444   | 02 COL-HEADING-3
|         | PICTURE X(26) VALUE JAY.                                           |
| 00447   | 02 FILLER
|         | PICTURE X(3) VALUE JAY.                                            |
| 00476   | PROCEDURE DIVISION.
|         | /BEGIN/PROG SECTION 0.
|         | START, OPEN INPUT IN-FILE, OUTPUT OUT-FILE.
|         | DISPLAY HEADINGS.
|         | DISPLAY COL-HEADINGS.
|         | READ IN-FILE AT END GO TO EQN.
|         | MOVE SPACES TO OUT-DATA-RECORD.
|         | MOVE NELLA-NO-IN TO NELLA-N3-OUT.
|         | MOVE ILMO-NO-IN TO ILMO-NO-OUT.
|         | WRITE OUT-DATA-RECORD.
|         | GO TO RE-AD.
|         | CLOSE IN-FILE, OUT-FILE.
|         | STOP /JOB.              
### Addresses of Subroutines Included in Object Program

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**GENERAL INFORMATION ON OBJECT FILES**

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**JENKINS-MASON-TIMS**  
**CASE STUDY 5**  
**COBOL**

---

**NELLA**

| 203 | 3042 | 5794 |
| 053 | 3720 | 2468 |
| 570 | 9436 | 7634 |
| 802 | 8026 | 6601 |
| 779 | 0328 | 9820 |
| 012 | 3456 | 5678 |
| 112 | 5533 | 4400 |
| 899 | 4452 | 2011 |
| 852 | 4561 | 7502 |
| 752 | 8542 | 3568 |
| 746 | 8236 | 5069 |

---

**ILMO**

| 779 |
| 852 |
| 570 |
| 802 |

---

**JAY**

| 5794 |

---

**122**  

---

**123**
EXTERNAL IDENTIFICATION: BARAJA  RUN NO:  RUN DATF: 07/30/70
OBJECT PROGRAM VISIBILITY: VISIBLE TO ALL.
COMPILER VERSION: 01.0  VISIBILITY: L  SOURCE PROG. AND LIBR. TAPE NAME: UNUSED
OBJECT TIME MEMORY REQUIREMENT IS 026640 (011680 DECIMAL) CHARACTERS.

PROJECT SOUL
EXTRA CREDIT
COBOL CASE STUDY

124
IDENTIFICATION DIVISION.

PROGRAM-ID. EX-CREDIT.

AUTHOR. TEAM-VICTOR-BARAJAS.

ENVIRONMENT DIVISION.

CONFIGURATION SECTION.

SOURCE-COMPUTER. H-200-SPECIAL.

OBJECT-COMPUTER. H-200. SUPERVISOR. NO SEGMENTATION.

SPECIAL-NAMES.

PAGE IS NEXT-PAGE.

INPUT-OUTPUT SECTION.

FILE-CONTROL.

SELECT IN...FILE ASSIGN TO, CARD-READER E.

FILE-NAMF IS REPRESENTED IN OBJECT TIME PRINTOUTS AS "FILE 1".

I-O-CONTROL.

APPLY H-200-SPECIAL ON IN-FILE.

DATA DIVISION.

FILE SECTION.

FD IN-FILF

LABEL RECORDS ARE STANDARD

VALUE OF IDENTIFICATION IS:

DATA RECORDS IS EMP-REC.

01 EMP-REC.

02 IDNO.

02 INAME.

03 INLAST.

03 INFIRST.

03 INMT.

02 INSSNO.

03 ONE.

03 TWO.

03 THREE

02 INCODE.

02 FILLER.

02 INPARATE.

02 INPARATE.

02 FILLER.

02 INDEPT.

02 FILLER.

FD OUT-FILF

LABEL RECORDS ARE STANDARD

VALUE OF IDENTIFICATION IS:

DATA RECORDS IS OUT-REC.

01 OUT-REC

WORKING-STORAGE SECTION.

77 COUNTER.

01 PRINT-LINE-1.

02 FILLER.

02 ID-OUT.

02 FILLER.
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