

AN ABSTRACT OF THE THESIS OF

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Title: AN EVALUATION OF THE EFFECT OF WRITTEN VERSUS VERBAL INSTRUCTION  
ON STUDENT ACHIEVEMENT IN OFFICE MACHINES

Abstract approved: George K. Walters

The purpose of this study was to determine the effect of written versus verbal instruction on student achievement in office machines. The written material included learning packets consisting of basic calculations and production jobs frequently used on a personal basis as well as in business. Verbal instruction consisted of the instructor providing the instructions verbally to each individual student for the same basic calculations and production jobs found in the learning packets. Evaluation of effectiveness was by a control group and an experimental group.

Summary

Five publisher's tests were under consideration. For each test, a difference between means test was conducted for the number of errors made and was conducted for the total minutes taken to complete the test for a total of ten difference between means tests. When the experimental group was compared to the control group for the number of errors made, the "t" score calculated for each test was less than the critical "t"

value of 2.056 at the 95 percent level of confidence. When the experimental group was compared to the control group on total minutes taken to complete the test, the "t" score calculated for each test was less than the critical "t" value of 2.056 at the 95 percent level of confidence. The results indicated the use of written material (learning packets) had no significant effect on the achievement of students.

### Conclusions

Based on the results of the data presented in this study, the null hypothesis, that there is no significant difference in achievement (number of errors and completion time) in office machines between students who received written instruction and students who received verbal instruction, is accepted.

### Recommendations

On the basis of the information presented in this study, the following recommendations are offered:

1. Office machines teachers should consider using written material (learning packets) as they allow students to progress at their individual pace.
2. Office machines teachers should consider using textbooks which expose students to basic calculations and production jobs frequently used on a personal basis as well as in business.
3. Textbooks used in office machines course should contain instructions which correspond with the machine being used.
4. Further study should be done to determine the effect of written versus verbal instruction in office machines courses on student achievement.

AN EVALUATION OF THE EFFECT OF WRITTEN  
VERSUS VERBAL INSTRUCTION ON STUDENT  
ACHIEVEMENT IN OFFICE MACHINES

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A Thesis  
Presented to  
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by  
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## Chapter 1

### INTRODUCTION

Students learn in different ways and in different time spans.

"The major dimensions of individual differences are ability and motivational direction."<sup>1</sup> Two major questions that must be considered are (1) "What can he or she do?" and (2) "What does he or she want?"<sup>2</sup> The soundness of our social institutions depends upon how successfully this is taken into account.<sup>3</sup>

"At least two generations of teachers have recognized intellectually that students differ in most aspects of the learning process; but in practice, the majority of teachers instruct groups of children in much the same manner in which they were taught."<sup>4</sup> Educators should not be content with any system of universal education that provides identical treatment for all students. Ways of diversifying education must be developed to make it fit the diverse individuals whose talents should be developed and utilized.<sup>5</sup> This is possible by individualizing instruction.

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<sup>1</sup>Leona E. Tyler, Individual Differences: Abilities and Motivational Devices (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1974), p. 18.

<sup>2</sup>Ibid., p. 219.

<sup>3</sup>Ibid., p. 5.

<sup>4</sup>Frederick R. Brown, "Individualization: Making It Happen," Individualizing Instruction in Educational Administration: A Performance-Based Worktext, ed. Launey F. Roberts (New York: MSS Information Corporation, 1976), p. 34.

<sup>5</sup>Tyler, op. cit., p. 5.

The implementation of individualized instruction in the classroom is enhanced through the use of programmed materials. These materials have been among the resources for teaching and learning in educational programs for many years.<sup>1</sup> They provide assistance in imparting knowledge, of teaching skills, of motivating, or of influencing attitudes.<sup>2</sup> In using the programmed method, educators are able to meet the individual needs of students by allowing them to progress at their particular pace and level. The necessity of teaching more students efficiently and with less teacher time makes programmed instructional materials worthy of consideration.<sup>3</sup>

### The Problem

In the teaching of office machines, individualized instruction enables a student, regardless of learning level, to progress at a rate which will enable comprehension of subject matter and successful development of skill in operating office machines. In an endeavor to assist students enrolled in office machines classes at Washburn Rural High School, Topeka, Kansas, the following research was undertaken.

### Statement of the Problem

The purpose of this study was to determine the effect of written versus verbal instruction on student achievement in office machines. The written material included learning packets consisting of basic

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<sup>1</sup>Jerrold E. Kemp, Planning & Producing Audiovisual Materials (San Francisco: Chandler Publishing Company, 1968), p. 3.

<sup>2</sup>Ibid., p. 10.

<sup>3</sup>Lloyd V. Douglas, James T. Blanford, and Ruth I. Anderson, Teaching Business Subjects (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1973), p. 70.

calculations and production jobs frequently used on a personal basis as well as in business. Verbal instruction consisted of the instructor providing the instructions verbally to each individual student for the same basic calculations and production jobs found in the learning packets. Evaluation of effectiveness was by a control group and an experimental group.

### Null Hypothesis

There is no significant difference in achievement in office machines between students who receive written instruction and students who receive verbal instruction.

### Importance of the Study

A student will succeed in learning a given task to the extent that one spends the amount of time that is needed to learn the task.<sup>1</sup> Because learning takes place individually, a method of instruction should center around the individual student.<sup>2</sup>

By individualizing instruction, teachers not only enable a student to learn at the individual's pace and level but also allows for the discovery of their "human potential"—potential which is useful both to the learner and to society. "Human potential is everything with which the individual is capable of responding to . . . . It is, in brief, total personal responsiveness without preconceptions concerning

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<sup>1</sup> Lee Willerman and Robert G. Turner, eds., Readings About Individual and Group Differences (San Francisco: W. H. Freeman and Company, 1979), p. 108.

<sup>2</sup> William E. Palton, John J. Hunt, and Lyle E. Berg, "Preplanning for Individualized Instruction," Business Education Forum, XXVI (December, 1971), 14.

the limitations of that responsiveness."<sup>1</sup> In addition, West presented the following:

Teachers need to emphasize discovery of potential in learners. They can do this, in part, by providing opportunities for learners to discover their own powers as they participate in the numerous mental, emotional, aesthetic, and social interactions involved in the learning process. The teacher's concern should be not only with the content of learning or with the end product of the learning process, but also with the continuing process of self-discovery which should accompany learning and give the content and the learning process personal relevance.

Development of potential causes its release for useful service to the individual and to society. We see release of human potential as being the major goal of teaching for individualization. Release suggests a reduction of restrictive forces which hold the individual back, but it suggests also an<sub>2</sub> affirmative, dynamic freeing of the individual for action.

#### Delimitations of the Study

This study was delimited to two office machines classes of Washburn Rural High School, Topeka, Kansas. Instructional units were written to correspond with machines and text-workbook currently in use.

#### Limitations

This study was limited by the enrollment procedure of the school system. Scheduling of a first-hour office machines class is a factor on the alertness of students.

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<sup>1</sup>Jeff West and Ronald C. Doll, "The Need and the Setting," Individualizing Instruction, ed. Ronald C. Doll (Washington: National Education Association, 1964), pp. 13-15.

<sup>2</sup>Ibid.

### Definition of Terms

The following technical terms relating to the research project were defined:

#### Individualized Instruction

Individualized instruction is the organization of instructional materials in a manner that will permit each student to progress in accord with one's own abilities and interests, and the provision of instructional guidance and assistance to individual pupils in accord with their needs.<sup>1</sup>

#### Office Machines Course

A course of study in which instruction is given in the operation of machines commonly found in the business office. Machines are the full-keyboard adding-listing, the ten-key adding-listing, electronic calculators (listing and non-listing).<sup>2</sup>

#### Learning Packets

A unit of study developed by the teacher for use by individuals on particular machines available for use in the office machines course. Performance objectives were written for application of the machines to particular business problems contained in the fourth edition of Office Machines Course published by South-Western Publishing Co.

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<sup>1</sup> Carter V. Good, Dictionary of Education (New York: McGraw Hill Book Company, 1973), p. 305.

<sup>2</sup> Ibid., p. 150.

### Difference Between Means Test

By using the difference between means test, two sample means drawn from two sampled groups may be compared. In this case, the difference between two means of samples drawn from sampled groups is involved in a test of the hypothesis. The hypothesis may be stated in one of the two following ways: (1) The two populations have the same means but different variances. (2) The two populations have the same means and the same variances; that is, the two populations are essentially the same.<sup>1</sup>

### Methods of Procedure

Methods of procedure consisted of the development of written materials (learning packets), pilot study, selection of control group and experimental group, implementation of materials in classroom, and the evaluation of student achievement.

### Written Materials

Written materials consisted of learning packets for each machine in the office machines course. Learning packets were written to correspond with the text-workbook currently in use, the fourth edition of Office Machines Course published by the South-Western Publishing Co. Performance objectives were written. Three basic learning packets were developed with revisions made in each packet to correspond with individual machines. Learning packets developed were Learning Packet A/Victor, NCR, Addo-X Machines (Jobs 1-10 and Jobs 31-40);

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<sup>1</sup>Stephen P. Shao, Statistics for Business and Economics (Columbus, Ohio: Charles E. Merrill Publishing Company, 1967), pp. 402-407.

Learning Packet B/Canon P101, Victor Metalist, Olivetti-Logos 250, Olympia CA505 Machines (Jobs 11-20); Learning Packet C/Monroe 525, Monroe 2805, Monroe 2810, Canon MP141 Machines (Jobs 21-30 and Jobs 41-50). Instructional units were designed to allow for step-by-step completion of a particular job in accordance with the machine being utilized. Information was recorded on individual grade sheets as to the length of time to complete a learning packet, grade received on jobs and tests, and total amount of work completed. See Appendix A for Learning Packet C on the Monroe 2810 Electronic Calculator and Appendix B for the individual grade sheet. Learning packets were implemented for use during the second semester of the 1979-1980 school year.

#### Pilot Study

Upon completion of writing and developing the learning packets, a pilot study was conducted to test the effectiveness of construction. A packet was presented to a student to complete within a two-week period. No recommendations for revisions were given.

#### Selection of Control Group and Experimental Group

By random selection, first hour was chosen as the experimental group using learning packets and third hour was chosen as the control group using verbal instructions. Each group consisted of 14 students.

#### Implementation of Materials in Classroom

The control group began working on the text-workbook in the traditional manner, i.e., receiving verbal instructions, observing a machine demonstration from the teacher, completing appropriate jobs, and seeking additional assistance from instructor when needed. They were allowed to progress to different machines at their own pace.

The experimental group would complete the appropriate learning packets by reading the instructions and studying the examples. The experimental group was also allowed to progress to different machines at their own pace.

Instruction time for both groups was a 55-minute period with the experimental group meeting first hour (8:15 to 9:10 a.m.) and the control group meeting third hour (10:30 to 11:25 a.m.). Each group was given the entire semester to complete a learning packet from each set—A, B, and C—for a total of three. In addition, the students completed a portion of Office Machines Practice Set (fourth edition, South-Western Publishing Co.). However, work completed from the practice set was not considered a part of this study.

#### Evaluation of Effectiveness

The achievement was evaluated by using the student's scores (number of errors and total minutes of completion) on the publisher's tests. The publisher's tests were the series from South-Western Publishing Co., which correlated with the text-workbook. Publisher's tests two, four, six, eight, and ten were used in this study. See Appendix C for publisher's test number six used in Learning Packet C. Student's scores on jobs and a practice set were not used in this study. Tests scores were recorded on individual grade sheets (see Appendix B) prepared by the teacher.

A difference between means test was used in this study to check the hypothesis; a calculation of difference between means test is illustrated in Appendix D.

Students who did not complete the entire length of this study were not included in the final results. The results of the evaluation are presented in Chapter 3.

## Chapter 2

### REVIEW OF RELATED LITERATURE

Although the advancement of educational technology has its threatening aspects, it also has a certain attractiveness to anyone interested in the improvement of education.<sup>1</sup>

The major appeal of technology, particularly among educators resides in its promise of helping to achieve three conditions that seem to be almost universally desired. These are (1) the individualization of instruction; (2) the reduction of humdrum and routine activities connected with teaching; and (3) the exposure of all students to top quality instruction and first-rate materials. These three desirables, either singly or in combination, have figured prominently in the arguments presented for the promotion and adoption of almost all forms of educational technology, from the lowly audio-visual aid to the lordly computer console.<sup>2</sup>

Many teachers, however, do not individualize because they do not know the procedure; they think it is difficult, or they think that preparing for individualization is too time consuming. These teachers are only partly right. A full-scale, overnight individualization of instruction is difficult, complicated, and time-consuming. Teachers who do utilize individualization need new skills. A teacher may "edge" into individualization by trying out teaching strategies and materials in regular classes on a small scale.<sup>3</sup>

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<sup>1</sup>Phillip W. Jackson, "The Teacher and the Machine," Horace Mann Lecture, 1967 (Pittsburgh: University of Pittsburgh Press, 1968), p. 32.

<sup>2</sup>Ibid.

<sup>3</sup>Nancy A. Dittman, "Individualizing the Easy Way," Business Education Forum, XXX (March, 1976), 20.

Because of the importance of individualization in office machines course and the use of programmed materials for attainment of individualization, the review of literature pertained to these areas.

### Individualized Instruction

Traditional instruction and individualized instruction differ in technique and emphasis. Instruction has traditionally been oriented toward a group or class. Assignments are given to all members of the group; and if individual projects are assigned, all students are expected to complete their projects on the same specified dates. Thus, these students' learning experiences are group-oriented, teacher-paced, and scheduled at a time convenient for the teacher and school.

In contrast, individualized instruction is geared toward the individual child. Appropriate learning experiences are assigned each student. In order to determine what is "appropriate" for each learner, some type of diagnostic procedure is used. Once these learning experiences are identified, instruction is self-oriented and self-administered at a time convenient to the learner within a school's broad time constraints.

Reactions to individualized instruction varies. Some school administrators feel individualized instruction is not for all students or all teachers. However, the traditional method does not always work well for some students and some teachers. Little evidence is shown at the present time to indicate which method is better. Schools, however, that have gone from traditional to individualized instruction all agree

that they would not go back to group orientation.<sup>1</sup> On the other hand, some teachers who could not keep up with the pace of individualized instruction went back to the traditional methods. In defense of the teachers' actions, behavior might have been different through better preparation—adequate training, materials, and support. Factors which led to favorable reaction to individualized instruction were:<sup>2</sup> (1) student response was positive, (2) teachers are more satisfied even if they have to work harder, (3) traditional disciplinary problems disappeared and attendance improved, (4) students had a renewed interest in academic activities and school in general, (5) enthusiasm of students being passed on to parents which improved the school image in the community, and (6) some administrators feel individualized instruction may be a partial solution to cutting down the cost by better utilization of teachers and support personnel. While traditional instruction places emphasis on teacher-student ratio, individualized instruction places increased emphasis on student self-direction, instructional technology, and appropriate use of para-professionals.

Individualized instruction should not be considered as a single, uniform procedure. All individualized instruction required, by definition, individual pacing. If instruction is group-paced, it cannot at the same time be individualized. Even though a school may set common learning objectives—it is still considered individualized if students work at their own pace.<sup>3</sup>

Individualized instruction programs need to establish neither common learning objectives nor the means to attain either common or unique learning objectives. However, some programs do. By doing so,

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<sup>1</sup> Jack V. Edling, Individualized Instruction, U. S., Department of Health, Education, and Welfare, No. 16 (Washington: U. S. Government Printing Press, 1972), p. 1.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

four types of individualized instruction becomes apparent:<sup>1</sup> Type A: Behavioral objectives are clearly specified, and defined systems of materials and methods of instruction have been developed to enable learners to reach specified behavior. Speed is determined by the individual. This method of instruction is usually found in required courses, and it is identified with average learners. Type B: This instruction is characterized by well-developed testing programs, clearly stated curriculum goals, and by well equipped and developed learning resource centers or learning laboratories where a wide variety of materials are available. The learner has a great deal of latitude in determining how learning will progress. It is believed the students can develop individuality if allowed to prescribe their activities rather than someone else taking the responsibility. This is usually found in required courses and is identified with above-average learners. Type C: This is called "personalized" because the learner identifies personal learning objectives. Individual student interest is the primary objective, but once selected, the student follows a directed program with specified materials. This is usually found in science, social studies, and elective courses and is identified with average learners. Type D: Another name for this is independent study because the learner independently determines both learning objectives and the means to attain them. This is identified with above-average learners and is usually found in science, social studies, and elective courses. Table 1 illustrates these four types of individualized instruction.

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<sup>1</sup>Ibid.

Table 1  
Types of Individualized Instruction<sup>a</sup>

MEDIA	OBJECTIVES	
	School Determined	Learner-Selected
School-Determined	Type A Individually Diagnosed	Type C Personalized
Learner-Selected	Type B Self-Directed	Type D Independent Study

<sup>a</sup>Jack V. Edling, Individualized Instruction, U. S., Department of Health, Education, and Welfare, No. 16 (Washington: U. S. Government Printing Press, 1972), p. 1.

The following are some key concepts that should be remembered if one utilizes individualization:<sup>1</sup>

1. It is very important not to lose personal touch with students.
2. Establish a relationship in which the student uses the teacher as a resource person and helper.
3. It is imperative that all students be involved in a learning activity at all times.
4. Evaluate each group or individual on the basis of improvement, provided that minimum standards are met.
5. Make sure that all physical facilities are in working order.
6. Learn as much as possible about each student.
7. Communicate with parents as often as possible to let them know how their sons or daughters are progressing.

Selection and use of instructional materials to accomplish individualized instruction is a problem for educators. Instructional materials produced commercially are designed for group instruction with the teacher providing the variations. Teachers have no quarrel with the content; their sole complaint is with the structure. In order to get what they need for individualized instruction, individual teachers and groups will attempt to design and produce educational materials. This involves time and money.

An alternative to this problem is available. This is accomplished by adapting traditional text materials to individualized methodology.

Six steps in this process are:<sup>2</sup> (1) review the chapter or unit,

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<sup>1</sup>Charlotte Nindl Wellins, "Individualization of Shorthand: Closing the Gap Between What We Believe and What We Do," Business Education World, LIX (May-June, 1979), 22-23.

<sup>2</sup>Merle W. Wood, "Adapting Traditional Text Materials to Individualized Methodology," The Balance Sheet, LIX (October, 1977), 52-53.

(2) determine what content to add, subtract, or change as to sequence, (3) prepare written performance objectives for the unit, (4) place marginal marks in a copy of the text material, (5) develop the individualized instruction sheets and, (6) prepare pre- and post-testing material. If a school wants to simply individualize a course or program, steps three and six may be left out: performance objectives and pre- and post-testing. These steps are necessary if the program is to be competency based and individualized. If the program is just to be individualized, these steps may be deleted.

### Office Machines

Six basic types of adding and calculating machines are:<sup>1</sup> ten-key and full-key adding machines, mechanical printing calculator, rotary calculator, key-driven calculator, and visual display or printing electronic calculator. In deciding which of these machines to include in the office machines course, keep in mind which ones are actually being used in the employing community.

Consider the results of a survey of 100 businesses in Arkansas conducted by White in 1974: With a 65 percent return and with a total of 1,337 machines represented, the percentage of each type of machine in use was as follows: ten-key adding machine, 39 percent; full-keyboard adding machine, 17 percent; printing calculator (nonelectronic), 8 percent; electronic calculator (listing and nonlisting), 31 percent; rotary calculator, 4 percent; and key-driven calculator, 1 percent.

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<sup>1</sup>Vera G. Kinney, "Office Machines Equipment Selection," Journal of Business Education, 1 (January, 1974), 145-147.

When reporting replacements of machines, 91 percent plan to replace the rotary with an electronic calculator; 86 percent plan to replace the key-driven calculator with an electronic calculator; 86 percent plan to replace the non-electronic printing calculator with an electronic calculator; 58 percent plan to replace the ten-key adding machine with an electronic calculator; 46 percent plan to replace the full-keyboard adding machine with an electronic calculator and 40 percent plan to purchase another full-keyboard; 96 percent will replace an electronic calculator with tape with one of like model; and 54 percent when replacing an electronic calculator without tape plan to replace it with same model while 46 percent will replace one with tape.<sup>1</sup>

Another aspect when considering machine selection is whether to teach students on as many different makes of equipment or standardize all makes of equipment in the classroom. McMarty in an article "Multi-Make vs. Uni-Make Instruction" proposed that teachers use uni-make models. Instruction is simplified and there is better utilization of time for the teacher and students. It is easier for students to assist each other and they will learn how to transfer learning to other models by teaching on uni-make models. In addition, maintenance is simpler. The emphasis should be on the process not the hardware.<sup>2</sup>

"The ten-key adding machine and machines employing the ten-key keyboard are commonly used in business. Skill acquired on this machine represents a salable skill to the student when he seeks a job."<sup>3</sup>

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<sup>1</sup>Gayle White, "A Study to Determine the Types of Small Computing Machines Used in the Offices of Selected Businesses in Arkansas," Business Education Forum, XXX (October, 1975), 53.

<sup>2</sup>David C. McMarty, "Office Machines: Multi-Make vs. Uni-Make Instruction," Journal of Business Education, II (October, 1974), 23-24.

<sup>3</sup>Herbert S. Madaus and Augusta C. Yrle, "Developing Proficiency in Ten-Key Touch Operation," Business Education Forum, XXX (April, 1976), 11.

What competency level of skill should students have? Marion concluded in his study that the minimum standards for employment of ten-key printing calculator operators are as follows: for addition, 16 DWPM (digital words per minute); for subtraction, 14 DWPM; for multiplication, 14 DWPM, and for division, 15 DWPM.<sup>1</sup> According to Barnett, "Very few employers and secretaries have established or formulated employment standards for machine calculation."<sup>2</sup> Agnew and Cornelia gave the following conclusion from a survey conducted with 200 businesses in the New York City area:

If only 22.6 percent of the secretarial employees are asked occasionally to use adding and calculating machines, then such students should be given only an acquaintanceship level course in business machines. The non-secretarial students, however, should be given at least a highly skilled level course in business machines.

Will jobs be available for office machine operators? The U. S. News & World Report showed the latest employment figure (1976 estimate) for office machine operators was 163,000, and the average annual openings to 1985 for office machine operators will be 7,700.<sup>4</sup>

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<sup>1</sup> Harold Emil Marion, "Minimum Standards for Operators of the Ten-Key Printing Calculator" (PhD dissertation, New York University, 1974), p. 80.

<sup>2</sup> Jahnae H. Barnett, "Recommended Criteria for the End-of-Course Evaluations of Student Performance in Typing, Shorthand, and Machine Calculation Courses in Selected Public Junior Colleges," Journal of Business Education, IL (December, 1973), 128.

<sup>3</sup> Peter L. Agnew and Nicholas J. Cornelia, Business Education-- A Retrospection, Monograph, No. 133 (Dallas, TX: South-Western Publishing Co., 1978), 92.

<sup>4</sup> "Official Look at Where Jobs Will Open Up in Next Few Years," U. S. News & World Report, April, 1978, p. 81.

### Other Studies

Walters concluded students in college office machines who received taped instruction achieved as well as students who received traditional instruction and completed assignments in slightly less time. He further states it may be possible to handle larger enrollments in office machines without additional staff through the use of taped instruction and the maintenance costs and downtime of machines might be substantially reduced. Recommendations by Walters are (1) students in office machines classes should be given more responsibility in meeting the course requirements and more opportunity to use their own initiative; (2) the more capable students in office machines classes should be allowed to move ahead at their own pace; and (3) an instructor should be present to give individual help and encouragement in using taped instruction.<sup>1</sup>

Gary Allen Berg, in his study "A Comparison of the Achievement of Students Taught by the Flowchart Direction Approach and the Traditional, Textbook Direction Approach in Business Machines" made the following conclusions:<sup>2</sup>

(1) Students' performance on the speed and accuracy tests showed no significant difference between the flow-chart and traditional methods of instruction.

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<sup>1</sup>George K. Walters, "The Effect of Taped Instruction on Achievement in College Office Machines" (EdD dissertation, University of Northern Colorado, 1968), pp. 6-8.

<sup>2</sup>Gary Allen Berg, "A Comparison of the Achievement of Students Taught by the Flowchart Direction Approach and the Traditional Textbook Direction Approach in Business Machines" (EdD dissertation, University of Nebraska, 1972), p. 100.

(2) Correlations produced evidence that a good basic background of business mathematics and high accumulated grade point averages of students were significant factors in the success of students in the business machines course.

(3) The students' supplementary practice time outside of class in the business machines laboratory provided little to the overall success in business machines as shown by the correlations in the study.

Findings in a study conducted by Ellzy indicated office machines students achieve at essentially the same level whether instruction is by group means or by individualized means and that this type of instruction appears to have no effect on students' opinions regarding the office machines course. In addition, the utilization of individualized strategies in office machines course may require less time to complete assignments and units of instruction. Ellzy recommended teachers should not hesitate to use individualized strategies in the teaching of office machines class and especially where time is limited.<sup>1</sup>

Zahn, comparing the effectiveness of audio-tutorial, slide/tape instruction versus the flowcharted method, concluded the office machines course was not more effectively taught by the slide/tape instructional presentation as opposed to the flowcharted method. Zahn stated a pretest administered in machine calculation may be a worthwhile device to help determine whether a student should be allowed to pursue the individualized instructional approach or if he should be encouraged to continue in a teacher-centered instructional environment. In addition, the students generally enjoyed the AVT approach for studying

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<sup>1</sup>James A. Ellzy, "A Comparison of Two Methods of Teaching Office Practice and Office Machines at the Collegiate Level" (EdD dissertation, Northern Illinois University, 1974), p. 201.

and a majority would prefer this system to a traditional classroom if given a choice.<sup>1</sup>

Results of a test administered in a study conducted by Hendrix indicated that 30.7 percent of the students made A's, 7.7 percent of the students made B's, 46.1 percent of the students made C's, and 15.4 percent of the students made F's. Most of the students believed they learned faster from the taped instruction. All students preferred the taped instructions and most believed they would like to have taped instruction for other machines in the class.<sup>2</sup>

#### Summary

Individualized instruction allows a teacher to meet the individual needs of the students, affords better utilization of class time, and builds motivation in most students. The office machines teacher should consider using this type of instruction. In addition, a responsible office machines teacher needs to equip the machines room with machines that will be used in offices of the immediate future as well as offices of the distant future and should keep abreast of employment opportunities for office machine operators.

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<sup>1</sup>Donald K. Zahn, "A Study to Evaluate the Effectiveness of Audio-Tutorial, Slide/Tape Instruction Versus the Flowcharted Method of Self-Instruction in Machine Calculation" (EdD dissertation, University of Montana, 1972), p. 111.

<sup>2</sup>Beverly K. Hendrix, "Development and Use of an Instructional Unit for the Monroe Electronic Programmable Printing Calculator" (Master's thesis, Emporia State University, 1973), pp. 61-64.

## Chapter 3

### THE EVALUATION ON THE EFFECT OF WRITTEN VERSUS VERBAL INSTRUCTION ON STUDENT ACHIEVEMENT IN OFFICE MACHINES

It was the purpose of this chapter to present and interpret data in a manner that would clearly show the effects of written versus verbal instruction on student achievement in office machines. It was hoped the material presented in this chapter might help office machines teachers decide on the usefulness of written materials (learning packets) in an office machines course.

A total of 28 students were involved in the study. The control group consisted of 14 students and the experimental group also consisted of 14 students. The control group received instructions verbally from the teacher while the experimental group received instructions from learning packets.

The experimental group completed the appropriate learning packets by reading the instructions and studying the examples. The experimental group was allowed to progress to different machines at their own pace.

The control group began working on the text-workbook in the traditional manner, i.e., receiving verbal instructions, observing a machine demonstration from the teacher, completing appropriate jobs, and seeking additional assistance from the teacher when needed. The control group was allowed to progress to different machines at their own pace.

Publisher's tests from South-Western Publishing Co., which correlated with the text-workbook currently in use, Office Machines Course, fourth edition, were used to evaluate the achievement of the students. Record was kept as to the number of errors made on a test and the total minutes taken to complete the tests. Tests two and eight (Learning Packet A), test four (Learning Packet B), and tests six and ten (Learning Packet C) were used as a part of this study.

#### Difference Between Means Test

For each of the five publisher's tests under consideration, a difference between means test was conducted for the number of errors made and was conducted for the total minutes taken to complete the test-- for a total of ten difference between means tests conducted.

#### The Effect of Written Versus Verbal Instruction

The first test considered by this study was test two from Learning Packet A. This test was completed on either a Victor, NCR, or Addo-X ten-key adding-listing machine. Problems on the test included addition, subtraction, multiplication, division (using reciprocals), and credit balance.

Table 2 shows the results of the difference between means test for test two. When the experimental group was compared to the control group for the number of errors made, a "t" score of .467 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. When the experimental group was compared to the control group on total minutes taken to complete the test, a "t" score

Table 2  
Difference Between Means for Test 2

Experimental Group	Control Group	"t" Score	Critical "t" Value	Percent Level	Significant
Errors	Errors	.467	2.056	95	No
Minutes	Minutes	1.474	2.056	95	No

of 1.474 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. The results indicated the use of written material (learning packets) had no significant effect on the achievement of students.

The second test considered by this study was test eight from Learning Packet A. This test was completed on either a Victor, NCR, or Addo-X ten-key adding-listing machine. Problems on the test included addition, subtraction, multiplication, and credit balance.

Table 3 shows the results of the difference between means test for test eight. When the experimental group was compared to the control group for the number of errors made, a "t" score of .283 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. When the experimental group was compared to the control group on total minutes taken to complete the test, a "t" score of 1.477 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. The results indicated the use of written material (learning packets) had no significant effect on the achievement of students.

The third test considered by this study was test four from Learning Packet B. This test was completed on either a Canon P101, Victor Metalist, Olivetti-Logos 250, or Olympia CA505 electronic calculators. Problems on the test included addition, subtraction, multiplication, division, discounts, gross pay, and percent of markup.

Table 4, page 26, shows the results of the difference between means test for test four. When the experimental group was compared to the control group for the number of errors made, a "t" score of .918 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. When the experimental group was compared to the

Table 3  
 Difference Between Means for Test 8

Experimental Group	Control Group	"t" Score	Critical "t" Value	Percent Level	Significant
Errors	Errors	.283	2.056	95	No
Minutes	Minutes	1.477	2.056	95	No

Table 4  
Difference Between Means for Test 4

Experimental Group	Control Group	"t" Score	Critical "t" Value	Percent Level	Significant
Errors	Errors	.918	2.056	95	No
Minutes	Minutes	1.444	2.056	95	No

control group on total minutes taken to complete the test, a "t" score of 1.444 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. The results indicated the use of written material (learning packets) had no significant effect on the achievement of students.

The fourth test considered by this study was test six from Learning Packet C. This test was completed on either a Monroe 525, Monroe 2805, Monroe 2810, or Canon MP141 electronic calculator. Problems on the test included proration, chain discounts, commission, dividends, markup price, discounts, percent of increase, constant multiplication, and accumulative multiplication.

Table 5 shows the results of the difference between means test for test six. When the experimental group was compared to the control group for the number of errors made, a "t" score of .944 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. When the experimental group was compared to the control group on total minutes taken to complete the test, a "t" score of 1.121 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. The results indicated the use of written material (learning packets) had no significant effect on the achievement of students.

The fifth test considered by this study was test ten from Learning Packet C. This test was completed on either a Monroe 525, Monroe 2805, Monroe 2810, or Canon MP141 electronic calculator. Problems on the test included accumulative multiplication, division, commission, chain discounts, addition, subtraction, percent of increase, and discounts.

Table 5  
Difference Between Means for Test 6

Experimental Group	Control Group	"t" Score	Critical "t" Value	Percent Lével	Significant
Errors	Errors	.944	2.056	95	No
Minutes	Minutes	1.121	2.056	95	No

Table 6 shows the results of the difference between means test for test ten. When the experimental group was compared to the control group for the number of errors made, a "t" score of .365 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. When the experimental group was compared to the control group on total minutes taken to complete the test, a "t" score of .699 was calculated. This was less than the critical "t" value of 2.056 at the 95 percent level of confidence. The results indicated the use of written material (learning packets) had no significant effect as measured by the test scores on the achievement of students.

#### Summary

A total of 28 students were involved in this study; 14 were in the experimental group and 14 were in the control group. Ten difference between means tests were conducted comparing the variances of number of errors made on the test and total minutes taken to complete the test. The results of all ten difference between means tests indicated the use of written material (learning packets) had no significant effect on the achievement of students at the 95 percent level of confidence.

Table 6  
Difference Between Means for Test 10

Experimental Group	Control Group	"t" Score	Critical "t" Value	Percent Level	Significant
Errors	Errors	.365	2.056	95	No
Minutes	Minutes	.699	2.056	95	No

## Chapter 4

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to determine the effect of written versus verbal instruction on student achievement in office machines. The written material included learning packets which were written to correspond with the text-workbook currently in use, the fourth edition of Office Machines Course published by the South-Western Publishing Co. Verbal instruction consisted of the teacher providing the instructions verbally to each individual student for the same basic calculations and production jobs found in the learning packets.

The experimental group completed the appropriate learning packets by reading the instructions and studying the examples. They were allowed to progress to different machines at their own pace. The control group worked on the text-workbook in the traditional manner, i.e., receiving verbal instructions, observing a machine demonstration from the teacher, completing appropriate jobs, and seeking additional assistance from the teacher when needed. They were also allowed to progress to different machines at their own pace.

Publisher's tests from South-Western Publishing Co., which correlated with the text-workbook currently in use, were used to evaluate the achievement of students. Records were kept as to the number of errors made on tests and the total minutes taken to complete the tests. Tests two, four, six, eight, and ten were used as a part of this study.

A difference between means test was used to evaluate student achievement. A difference between means test was conducted for the number of errors

made on a test and also for the total minutes taken to complete a test. A total of ten difference between means tests was conducted.

### Summary

Five publisher's tests were under consideration. For each test, a difference between means test was conducted for the number of errors made and was conducted for the total minutes taken to complete the test for a total of ten difference between means tests. When the experimental group was compared to the control group for the number of errors made, the "t" score calculated for each test was less than the critical "t" value of 2.056 at the 95 percent level of confidence. When the experimental group was compared to the control group on total minutes taken to complete the test, the "t" score calculated for each test was less than the critical "t" value of 2.056 at the 95 percent level of confidence. The results indicated the use of written material (learning packets) had no significant effect on the achievement of students.

### Conclusions

Based on the results of the data presented in this study, the null hypothesis, that there is no significant difference in achievement (number of errors and completion time) in office machines between students who received written instruction and students who received verbal instruction, is accepted.

### Recommendations

On the basis of the information presented in this study, the following recommendations are offered:

1. Office machines teachers should consider using written material

(learning packets) as they allow students to progress at their individual pace.

2. Office machines teachers should consider using textbooks which expose students to basic calculations and production jobs frequently used on a personal basis as well as in business.

3. Textbooks used in office machines course should contain instructions which correspond with the machine being used.

4. Further study should be done to determine the effect of written versus verbal instruction in office machines courses on student achievement.

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**BIBLIOGRAPHY**

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## BIBLIOGRAPHY

## A. BOOKS

- Doll, Ronald C., ed. Individualizing Instruction. Washington: National Education Association, 1964.
- Douglas, Lloyd V., James T. Blanford, and Ruth I. Anderson. Teaching Business Subjects. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1973.
- Good, Carter V. Dictionary of Education. New York: McGraw Hill Book Company, 1973.
- Jackson, Phillip W. Horace Mann Lecture, 1967. Pittsburgh: University of Pittsburgh Press, 1968.
- Kemp, Jerrold E. Planning & Producing Audiovisual Materials. San Francisco: Chandler Publishing Company, 1968.
- Roberts, Launey F., ed. Individualizing Instruction in Educational Administration: A Performance-Based Worktext. New York: MSS Information Corporation, 1976.
- Shao, Stephen P. Statistics for Business and Economics. Columbus, Ohio: Charles E. Merrill Publishing Company, 1967.
- Tyler, Leona E. Individual Differences: Abilities and Motivational Devices. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1974.
- Willerman, Lee, and Robert G. Turner, eds. Readings About Individual and Group Differences. San Francisco: W. H. Freeman and Company, 1979.

## B. PERIODICALS

- Barnett, Jahnae H. "Recommended Criteria for the End-of-Course Evaluations of Student Performance in Typing, Shorthand, and Machine Calculation Courses in Selected Public Junior Colleges." Journal of Business Education, IL (December, 1973), 128.
- Dittman, Nancy A. "Individualizing the Easy Way." Business Education Forum, XXX (March, 1976), 20.
- Kinney, Vera G. "Office Machines Equipment Selection." Journal of Business Education, I (January, 1974), 145-147.

- Madaus, Herbert S., and Augusta C. Yrle. "Developing Proficiency in Ten-Key Touch Operation." Business Education Forum, XXX (April, 1976), 11.
- McMurty, David C. "Office Machines: Multi-Make vs. Uni-Make Instruction." Journal of Business Education, II (October, 1974), 23-24.
- "Official Look at Where Jobs Will Open Up in Next Few Years." U. S. News & World Report, April, 1978, p. 81.
- Palton, William E., John J. Hunt, and Lyle E. Berg. "Preplanning for Individualized Instruction." Business Education Forum, XXVI (December, 1971), 14.
- Wellins, Charlotte Nindl. "Individualization of Shorthand: Closing the Gap Between What We Believe and What We Do." Business Education World, LIX (May-June, 1979), 22-23.
- White, Gayle. "A Study to Determine the Types of Small Computing Machines Used in the Offices of Selected Businesses in Arkansas." Business Education Forum, XXX (October, 1975), 53.
- Wood, Merle W. "Adapting Traditional Text Materials to Individualized Methodology." The Balance Sheet, LIX (October, 1977), 52-53.

### C. UNPUBLISHED MATERIALS

- Berg, Gary Allen. "A Comparison of the Achievement of Students Taught by the Flowchart Direction Approach and the Traditional Textbook Direction Approach in Business Machines." EdD dissertation, University of Nebraska, 1972.
- Ellzy, James A. "A Comparison of Two Methods of Teaching Office Practice and Office Machines at the Collegiate Level." EdD dissertation, Northern Illinois University, 1974.
- Hendrix, Beverly K. "Development and Use of an Instructional Unit for the Monroe Electronic Programmable Printing Calculator." Master's thesis, Emporia State University, 1973.
- Marion, Harold Emil. "Minimum Standards for Operators of the Ten-Key Printing Calculator." PhD dissertation, New York University, 1974.
- Walters, George K. "The Effect of Taped Instruction on Achievement in College Office Machines." EdD dissertation, University of Northern Colorado, 1968.
- Zahn, Donald K. "A Study to Evaluate the Effectiveness of Audio-Tutorial, Slide/Tape Instruction Versus the Flowcharted Method of Self-Instruction in Machine Calculation." EdD dissertation, University of Montana, 1972.

## D. OTHER PUBLICATIONS

Agnew, Peter L. and Nicholas J. Cornelia. Business Education—A Retrospection. Monograph, No. 133. Dallas, TX: South-Western Publishing Co., 1978.

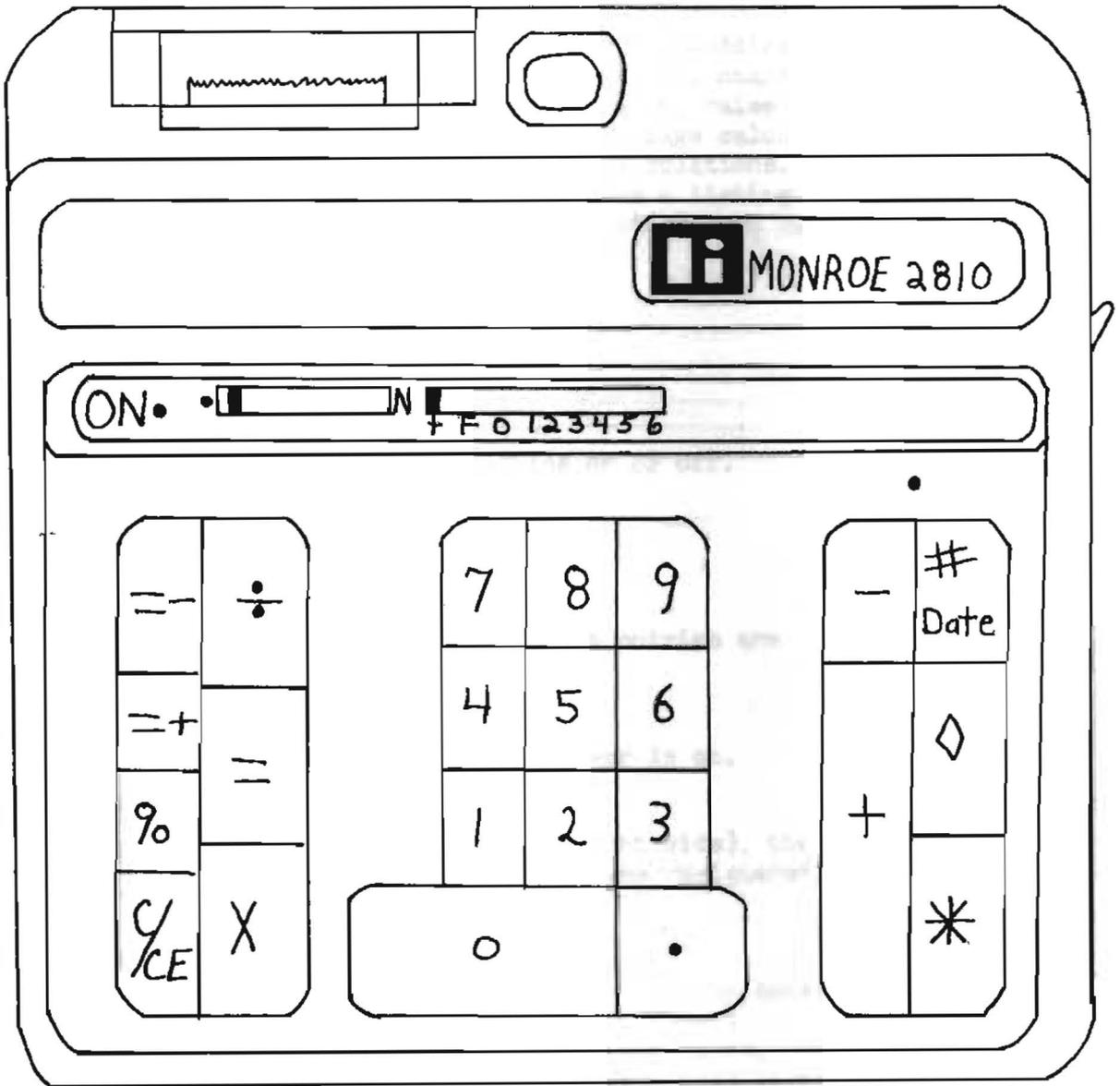
Edling, Jack V. Individualized Instruction, U. S., Department of Health Education, and Welfare, No. 16. Washington: U. S. Government Printing Press, 1972.

## APPENDICES



APPENDIX A



LEARNING PACKET C

MONROE 2810

Office Machines Course  
 Fourth Edition  
 South-Western Publishing Co.

## Monroe 2810

THE MACHINE

1. The Monroe 2810 is an easy machine to operate.
2. The machine can perform a variety of functions—addition, subtraction, multiplication, division, repeat addition and subtraction, chain multiplication and division, automatic constant multiplication and division, raise numbers to powers, sum and difference of products and quotients, percentage calculations, and add-on and discount calculations, and various mixed calculations.
3. The machine uses paper, therefore, is called a listing machine.
4. Operation of the machine is by the touch method—you do not look at your hands.
5. The machine has one memory register.

THE MACHINE PARTS

- A. On/Off Switch  
This switch will turn the machine on or off.
- B. Paper Advance  
This advances the paper tape.
- C. Paper Tape Display  
The paper tape will advance here as entries are registered.
- D. Power Lamp  
The lamp will light up when the power is on.
- E. N Count Switch  
When the switch is set at the N (right side), the machine will count the number of items registered on the paper tape.
- F. Decimal Point Selector Switch  
The decimal point selector switch is used to determine the decimal point position in calculation results. When working with dollars and cents, the decimal point selector switch can be set at the add-mode position (+), eliminating the need to enter the decimal point. Move it off of the add-mode position (+), the decimal point must be entered along with the figures of the numbers. When set a "2", all totals and results will contain two decimal places; when at "0", no decimals will print. Also the machine will round the answers off at settings of 2-6. In the "Floating" (F) position, totals and results are expressed to maximum decimal accuracy.
- G. Accumulator Lamp  
When illuminated, this indicates that an amount is being retained in the accumulator.

OPEN

## H. Non-Add/Date Key

This key prints identifiers on the paper tape such as an invoice number, the date (month, day, year), employee number, etc.—WITHOUT adding the numbers.

H.  
Non-Add Key

## I. Numeral Keys

The keys to depress in order to enter numbers for the problem. Home row keys are 4-5-6-0. The entry will not print until a function key is depressed.

## J. Plus Key

The plus key is used to add numbers. To add the same amount more than one time (repeat addition), enter the amount once and depress the plus key as many times as necessary.

## K. Minus Key

The minus key is used to subtract numbers. To subtract the same amount more than one time (repeat subtraction), enter that amount once and depress the minus key as many times as necessary.

## L. Sub-Total Key

Prints a total but does not clear the machine.

## M. Total Key

Prints a total and WILL clear the machine—used with addition and subtraction.

## N. Times Key

The times key is used to multiply.

## O. Divide Key

The divide key is used for division.

OPEN

## P. Equals Key

The equals key prints the totals for multiplication and division calculations.

## Q. Equals/Plus Key

This key is similar to the equals key EXCEPT the answers are automatically put in memory.

## R. Equals/Minus Key

This key is similar to the equals key EXCEPT the answers are automatically subtracted from memory.

## S. Percent Key

This key allows you to perform percent calculations.

## T. Clear/Clear Entry Key

This key is "two keys in one." "C" stands for clear and is used to clear functions on the LEFT SIDE of the machine—it WILL NOT clear functions on the RIGHT SIDE of the machine. "CE" stands for clear entry and allows an entry to be corrected before it has printed on the paper tape.

## U. Decimal Point Key

This key is used to enter a decimal point when calculations demand the point be entered manually rather than the machine automatically placing the decimal point.

The following items should be followed with each job.

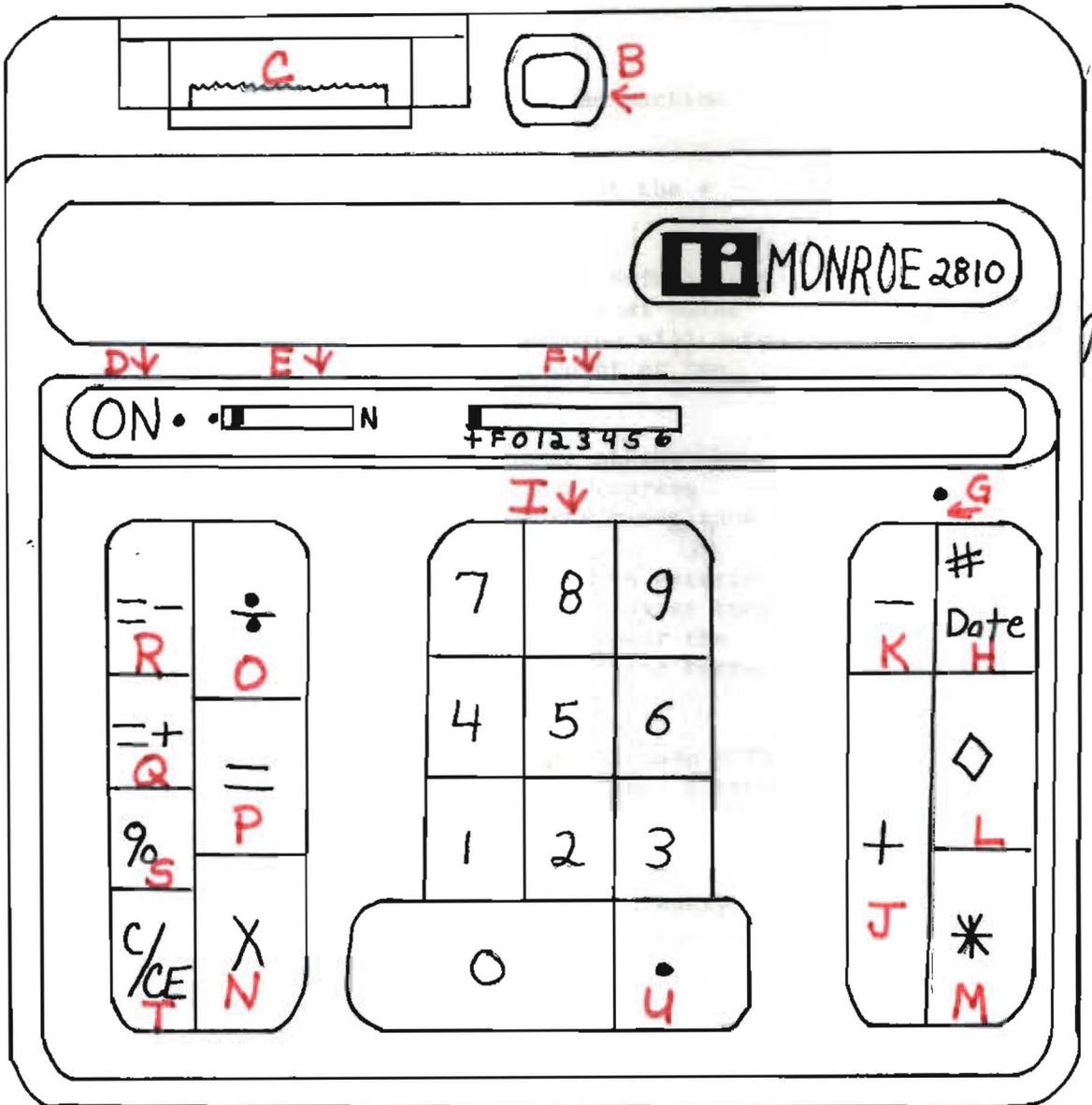
1. Plug in the machine. Make sure the cord is plugged in the machine as well as the electrical outlet.
2. Turn machine on by depressing the on/off switch on the right side.
3. Clear the table of books which do not pertain to the course.
4. Place the machine on the right side of the table, at a slight angle, and the learning packet and job sheet at the left, allowing for ease of operation and reading.
5. Sit erect, relax, and put both feet flat on the floor.
6. Do not hold a pencil or pen in your hand as the machine is operated.
7. Write your name, period, and current date at the top of the page.
8. READ EACH JOB INSTRUCTION THOROUGHLY BEFORE BEGINNING PROBLEMS.

INDEXPart I/Jobs 21-30

- Job 21/Touch Addition
- Job 22/Subtraction and Credit Balances
- Job 23/Multiplication and Repeat Addition
- Job 24/Division
- Job 25/Fractions
- TEST #5
- Job 26/Percentages
- Job 27/Multiplication: Constants and Accumulative Multiplication
- Job 28/Discounts and Net Amounts: Cash Discounts and Chain Discounts
- Job 29/Proration
- Job 30/Review
- TEST #6

Part II/Jobs 41-50

- Job 41/Touch Addition
- Job 42/Touch Addition and Repeat Addition
- Job 43/Subtraction, Credit Balances, and Sub-Totals
- Job 44/Multiplication and Accumulative Multiplication
- Job 45/Division
- TEST #9
- Job 46/Addition, Subtraction, and Constants in Multiplication
- Job 47/Cash, Trade, and Chain Discounts
- Job 48/Percentage: Increase and Decrease
- Job 49/Accumulative Multiplication
- Job 50/Review
- TEST #10



MONROE 2810

Job 21/Touch Addition

The purpose of this job is to develop speed and accuracy in touch addition. Remember, touch addition is operating the machine WITHOUT looking at your hands!

COMPLETE PROBLEMS 1-24 AS FOLLOWS:

1. Depress TOTAL KEY (M) in order to clear the machine. This must be done before each problem.

Job 21 - #1

2. Set the DECIMAL POINT SELECTOR SWITCH (F) at the + (add-mode position).

0.00 \*

NOTE: a. When the Decimal Point Selector Switch is set at +, do not put in the decimal point shown in the number. The machine will automatically print the decimal point at two decimal places.

44.40 \* +

55.50 +

66.60 +

44.50 +

45.40 +

46.40 +

3. Enter all figures for a number in sequence on the KEYBOARD (I) using the touch method, then depress PLUS KEY (J) to register the number on the paper tape.

55.40 +

54.50 +

66.40 +

NOTE: a. MISTAKES: If a mistake is made in entering a number BEFORE it prints on the paper tape, use the CLEAR ENTRY KEY (T) to clear the number and then proceed to enter the correct number.

65.50 +

544.60 \*

0.00 \*

- b. If you realize a mistake has been made AFTER the number prints on the paper tape, subtract the mistake. A plus and minus will clear the number.

65.50 \* +

66.40 +

54.50 +

55.40 +

4. After all numbers have been registered on the paper tape, depress the TOTAL KEY (M) to obtain the first answer. Write this answer on the first line beneath the problem.

46.40 +

45.40 +

44.50 +

6.60 +

5. Do the problem again, but this time read from bottom to top. After all numbers have been registered on the paper tape, depress TOTAL KEY (M) to obtain a second answer. Write this answer on the second line provided.

6.60 -

66.60 +

55.50 +

44.40 +

6. It is assumed the answer is correct if the first and second answers are the same number. If so, proceed to the next problem. If not, complete the problem again reading from top to bottom. If the answers do not agree after the third time, compare the paper tape with the numbers in the problem and locate the mistake and correct according to step 3b above.

544.60 \*

542.93 +

46

LETE PROBLEMS 25-26 AS FOLLOWS:

1. Depress TOTAL KEY (M) in order to clear the machine. This must be done before each problem.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at the + (add-mode position).
3. Add horizontally (across) for Dept. A - Dept. D for each day of the week shown. Record the answer on the "Total" line.
4. Check the answer by completing the problem a second time. Place a checkmark beside the number if it is the same. If not, compare the paper tape with sales report.
5. Add vertically (down) the totals for the individual departments on Monday to Saturday. Record the answer on the first line provided.
6. Check the answer by completing the problem a second time. Place a checkmark beneath the first answer if it is the same. If not, compare the paper tape with sales report.
7. Obtain final total (and at the same time checking the accuracy of individual totals) by (a) add all of the totals for the horizontal additions and write answer on the last line of "Total" column, and (b) add all of the totals for the vertical additions and write beneath the answer obtained in (a).

Job 21 - #25  
Dept. A - Dept. D

0.00 \*

475.85\*+  
586.91 +  
673.46 +  
376.84 +  
2,113.06 \*

0.00 \*

376.84\*+  
673.46 +  
586.91 +  
475.85 +  
2,113.06 \*

Job 21 - #25  
Monday - Saturday

NOTE: a. If all of the totals are correct, the answers for (a) and (b) above should be the same number. If not, compare the paper tape with the sales report to find the error.

0.00 \*

475.85\*+  
986.13 +  
542.93 +  
876.84 +  
656.89 +  
2,786.75 +  
6,325.39 \*

ON COMPLETION OF JOB 21, STAPLE AND SUBMIT TO INSTRUCTOR.  
NEED TO JOB 22.

0.00 \*

2,786.75\*+  
656.89 +  
876.84 +  
542.93 +  
986.13 +  
475.85 +  
6,325.39 \*

The purpose of this job is to learn the use of the minus key and to understand credit balances. Subtraction, like addition, is performed by the touch method--DON'T look at your hands!

COMPLETE PROBLEMS 1-21 AS FOLLOWS:

- |    |   |             |                    |
|----|---|-------------|--------------------|
| 1. | Depress TOTAL KEY (M) in order to clear the machine. This must be done before each problem.           | Job 22 - #1 |                    |
| 2. | Set the DECIMAL POINT SELECTOR SWITCH (F) at the + (add-mode position).                               |             | 0.00 *             |
| 3. | Using problem #1 as an example, do the following:   |             | 33.76*+            |
|    | _____ a. Enter the first number (minuend), 33.76, and depress the PLUS KEY ((J).                      |             | 12.19 -<br>21.57 * |
|    | _____ b. Enter the second number (subtrahend), 12.19, and depress the MINUS KEY (K).                  |             | 21.57*+            |
|    | _____ c. Depress the TOTAL KEY (M) to obtain the answer. Write the answer on the first line provided. |             | 12.19 +<br>33.76 * |

NOTE: a. When a red minus sign prints on the left side of the paper tape and the answer also prints in red, this means it is a credit balance. When this happens, write "CR" (stands for credit balance) beside the answer. Failure to write "CR" when it appears will make the answer incorrect.

Job 22 - #3a

- |    |   |  |         |
|----|---|--|---------|
| b. | A credit balance happens when you have subtracted more than you have added. |  | 5.00*+  |
|    |   |  | 25.00 - |
|    |   |  | 20.00 * |

4. To check whether the answer is correct, add the answer, 21.57, to the subtrahend, 12.19. The total should be the same as the minuend, 33.76. Place a checkmark on the second line provided if the answer is correct. If not, repeat the problem.

COMPLETE TIMED DRILL AS FOLLOWS:

NOTE: The purpose of a timed drill is to help build speed and accuracy. The grade on the timed drill is not recorded in your folder. However, if the timed drill cannot be completed successfully, you will have trouble on the timed test which are taken for a grade.

1. Look at the clock and write the time on the line "Started at \_\_\_\_\_ o'clock."

2. Complete problems--doing each problem only once.

NOTE: a. Try to work as fast but as accurately as possible.

- b. If the answer agrees with the one provided, place a checkmark next to the answer. If not, place an X.

3. After all problems have been completed, look at the clock and write the time on the line "Finished at \_\_\_\_\_ o'clock."
4. Count the number of problems you missed and determine the number of minutes it took to complete the timed drill.
5. Using the appropriate grading scale on page 187 (for this timed drill use grading scale #4), determine the grade and record this on the Achievement Chart on page 188.

NOTE: a. Not all timed drills will use the same grading scale. Be sure to use the one you are instructed to use.

- b. If the timed drill is completed in less time than required, add a "plus" to the grade.
- c. If you are not pleased with the results of the timed drill, do it again and record the best grade on the Achievement Chart.

ON COMPLETION OF JOB 22, SUBMIT TO INSTRUCTOR. PROCEED TO JOB 23.

The purpose of this job is to learn how to complete multiplication problems and learn the procedure for repeat addition.

COMPLETE PROBLEMS 1-10 AS FOLLOWS:

1. Depress CLEAR KEY (T) in order to clear the machine. This must be done before each problem.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".

Job 23 - #1

NOTE: a. When the decimal point selector switch is at "2", you must enter the decimal point using the DECIMAL POINT KEY (U). In addition, the answer will round off to two decimal places.

$$\begin{array}{r}
 245.758 \times \\
 28.45 = \\
 \hline
 6,991.82 *
 \end{array}$$

C

3. Using problem #1 as an example, do the following:
  - a. Enter the first number (multiplicand), 245.758, on the KEYBOARD (I) and depress TIMES KEY (N).
  - b. Enter the second number (multiplier), 28.45, and depress the EQUALS KEY (P). Write the answer on the line provided.

Job 23 - #11

$$0.00 *$$

4. Check the accuracy of the answer by completing the problem a second time.

$$\begin{array}{r}
 124.17 * + \\
 124.17 + \\
 124.17 + \\
 124.17 +
 \end{array}$$

COMPLETE PROBLEMS 11-18 AS FOLLOWS:

1. Depress TOTAL KEY (M) in order to clear the machine. This must be done before each problem.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at +.
3. Using problem #11 as an example, do the following:
  - a. Enter 124.17 on the KEYBOARD (I).
  - b. Depress the PLUS KEY (J) four times which is the number of times 124.17 repeats.
  - c. Enter the next number and depress the PLUS KEY (J) the number of times it repeats. Continue this procedure until all numbers have been registered on the paper tape.
  - d. Depress the TOTAL KEY (M) to obtain the first answer.

$$\begin{array}{r}
 951.87 + \\
 951.87 + \\
 951.87 + \\
 469.50 + \\
 469.50 + \\
 469.50 + \\
 \hline
 4,760.79 *
 \end{array}$$

- \_\_\_\_\_ e. Check the answer by completing the problem a second time.

COMPLETE TIMED DRILL AS FOLLOWS:

1. Use grading scale #4, page 187. Follow usual procedures.

COMPLETION OF JOB 23, SUBMIT TO INSTRUCTOR. PROCEED TO JOB 24.

The purpose of this job is to learn the procedure for dividing.

COMPLETE PROBLEMS 1-15 AS FOLLOWS:

1. Depress CLEAR KEY (T) in order to clear the machine.  
This must be done before each problem.

2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".

Job 24 - #1

NOTE: a. Remember, when the decimal point selector switch is at "2", you must enter the decimal point using the DECIMAL POINT KEY (U). In addition, the answer will round off to two decimal places.

C

$$\begin{array}{r} 478.956 \div \\ 26.875 = \\ \hline 17.82 * \end{array}$$

3. Using problem #1 as an example, do the following:

- a. Enter the first number (dividend), 478.956, on the KEYBOARD (I) and depress the DIVIDE KEY (O).
- b. Enter the second number (divisor), 26.875, on the KEYBOARD (I) and depress EQUALS KEY (P). Write the answer on the line provided.

4. Check the accuracy of the answer by completing the problem a second time.

COMPLETE TIMED DRILL AS FOLLOWS:

1. Use grading scale #1, page 187. Follow usual procedures.

ON COMPLETION OF JOB 24, SUBMIT TO INSTRUCTOR. PROCEED TO  
JOB 25.

Job 25/Fractions

The purpose of this job is to learn the procedures used in adding, subtraction, multiplying, and dividing numbers containing fractions.

COMPLETE PROBLEMS 1-21 AS FOLLOWS:

1. Depress TOTAL KEY (M) or CLEAR KEY (T) for the appropriate calculations in order to clear the machine. This must be done before each problem.

Job 25 - #1

2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".

C

3. Add, subtract, multiply, or divide as usual AFTER converting the fractions to their decimal equivalents using the following chart:

0.00 \*

1/2	.50	3/8	.375	3/16	.1875
1/3	.3333	5/8	.625	5/16	.3125
2/3	.6667	7/8	.875	6/16	.375
1/4	.25	1/12	.0833	7/16	.4375
3/4	.75	5/12	.4167	9/16	.5625
1/6	.1667	7/12	.5833	11/16	.6875
5/6	.8333	11/12	.9167	13/16	.8125
1/8	.125	1/16	.0625	15/16	.9375

749.50\*+

856.25 +

110.75 +

681.125 +

436.50 +

2,834.13 \*

4. Record the answer in the space provided.

COMPLETE TIMED DRILL AS FOLLOWS:

1. Use grading scale #4, page 187. Follow usual procedures.

ON COMPLETION OF JOB 25, SUBMIT TO INSTRUCTOR. PROCEED TO NEXT PAGE.

TEST TIME/Test #5

You are now ready to take the first timed test. You may want to review Jobs 21-25. Ask the instructor for TEST #5 when you have finished reviewing. Speed and accuracy are taken into consideration when computing the test grade.

UPON COMPLETION OF TEST #5, PROCEED TO JOB 26.

Job 26/Percentages

The purpose of this job is to learn the procedure for calculating markup price, markdown price, commission, percent of sales, and percent of increase. Markup price is the cost of the item plus the amount of markup the retailer adds on to the cost to cover his cost of doing business plus a reasonable profit. Markdown price is a percentage of the selling price and is used to attract customers and increase sales. Commission is the amount a salesman receives; he is paid only a percent of his total sales. Percent of sales is to determine what percent of sales is needed to cover a specific item. Percent of increase is finding how much an item increased in price in terms of percent.

COMPLETE PROBLEMS 1-3 AS FOLLOWS:

1. Depress CLEAR KEY (T) in order to clear the machine.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".
3. Using problem #1 as an example, do the following:

Job 26 - #1

C

- a. Add the markup percent, 25% to 100% to get the markup price percent, 125%.
- b. Multiply the cost, \$45.75, by the markup price percent, 125%, by entering 125 and depressing the PERCENT KEY (S).
- c. Write the answer, 57.19, in the space provided.

$$\begin{array}{r}
 100.00 * + \\
 25.00 + \\
 \hline
 125.00 * \\
 \\
 45.75 \times \\
 125.00\% \\
 \hline
 57.19 *
 \end{array}$$

COMPLETE PROBLEMS 4-6 AS FOLLOWS:

1. Depress CLEAR KEY (T) in order to clear the machine.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".
3. Using problem #4 as an example, do the following:

Job 26 - #4

C

- a. Subtract the markdown percent, 15%, from 100% to get the markdown price percent, 85%.
- b. Multiply the selling price, 65.98, by the markdown price percent, 85%, by entering 85 and depressing the PERCENT KEY (S).
- c. Write the answer, 56.08, in the space provided.

$$\begin{array}{r}
 100.00 * + \\
 15.00 - \\
 \hline
 85.00 * \\
 \\
 65.98 \times \\
 85.00\% \\
 \hline
 56.08 *
 \end{array}$$

COMPLETE PROBLEMS 7-10 AS FOLLOWS:

1. Depress CLEAR KEY (T) in order to clear the machine.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2",

3. Using problem #7 as an example, do the following:

\_\_\_\_\_ a. Multiply the amount of sales, 1,244.75, by the percent of commission, 4.25%.

Job 26 - #7

NOTE: a. Remember, you must first change the fraction, 1/4, to its decimal equivalent, .25, before multiplying.

$$\begin{array}{r}
 1,244.75 \times \\
 4.25\% \\
 \hline
 52.90 *
 \end{array}$$

\_\_\_\_\_ b. Write the answer, 52.90, in the space provided.

COMPLETE PROBLEM 11 AS FOLLOWS:

Job 26 - #11

1. Depress CLEAR KEY (T) in order to clear the machine.

2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "4".

3. Using Atlantic City as an example, do the following:

\_\_\_\_\_ a. Divide total salaries, 14,897, by total sales, 231,084. Change the answer, .0645, to a percent by moving the decimal point two places to the right. Record 6.45% in the space provided.

$$\begin{array}{r}
 14,897.0000 \div \\
 231,084.0000 = \\
 6.45\% \quad 0.0645 *
 \end{array}$$

\_\_\_\_\_ b. To determine the percent of sales for rent, simply enter the rent amount, 3,113, and depress the EQUAL KEY (P).

$$\begin{array}{r}
 3,113.0000 = \\
 1.35\% \quad 0.0135 *
 \end{array}$$

NOTE: a. In step b you are dividing rent by total sales. HOWEVER, it was not necessary to enter the total sales amount for step b because the machine remembered it from being entered for step a. (The constant factor of the machine.)

\_\_\_\_\_ c. Add the columns headed "Total Sales," "Total Salaries," and "Rent." Write the answer on the total line beneath the columns. Use these totals in the same manner mentioned in steps a and b above to determine the answer for total of percent of sales for salaries and total of percent of sales for rent.

COMPLETE PROBLEMS 12-24 (WEEKLY SALES ANALYSIS) AS FOLLOWS:

1. Depress the TOTAL KEY (M) and CLEAR KEY (T) in order to clear the machine.

2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "4".

3. Using Problem #12 as an example, do the following:

- \_\_\_\_\_ a. Enter the amount for "This Year", 10,054, and depress the PLUS KEY (J).
- \_\_\_\_\_ b. Enter the amount for "Last Year", 8,996, and depress the MINUS KEY (K).
- \_\_\_\_\_ c. Depress the TOTAL KEY (M) to find "Amount of Increase."
- \_\_\_\_\_ d. Depress the DIVIDE KEY (O) to register the amount of increase back on the paper tape.
- \_\_\_\_\_ e. Enter the amount for "Last Year", 8,996, and depress the EQUAL KEY (P). The result, .1176, will print on the paper tape. Change this decimal to a percent by moving the decimal two places to the right. Record the answer, 11.76% on the space provided.
- \_\_\_\_\_ f. Add the columns headed "This Year," "Last Year," and "Amount of Increase." Write the answers beneath the columns.
- \_\_\_\_\_ g. Find the percent of increase for problem 24 using the totals obtained in step f in the same manner above.

Job 26 - #12

0.0000 \*

C

10,054.0000 \* +

8,996.0000 -

1,058.0000 \*

1,058.0000 ÷

8,996.0000 =

11.76% 0.1176 \*

COMPLETE TIMED DRILL AS FOLLOWS:

- 1. Use grading scale #3, page 187. Follow usual procedures.

ON COMPLETION OF JOB 26, STAPLE AND SUBMIT TO INSTRUCTOR.  
CEED TO JOB 27.

Job 27/Multiplication: Constants and Accumulative

The purpose of this job is to learn the procedure for multiplying by a constant multiplier and learn the procedure for accumulative multiplication. A constant is a number which repeats itself in a series of problems and allows you to save time in operating the machine. Accumulative multiplication is adding the answers (products) you multiply. This is used effectively to check the accuracy of computations on previous answers received by a firm. It is also a time-saver in preparing bills sent out to customers.

COMPLETE PROBLEMS 1-35 AS FOLLOWS:

1. Depress CLEAR KEY (T) in order to clear the machine.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".
3. Using "Series One" as an example, do the following:

Job 27 - #1 to #5

C

- \_\_\_\_\_ a. Enter the constant multiplier, 5.84, and depress TIMES KEY (N).

Note: a. By entering the constant multiplier in the machine first, it will be remembered; it will not be necessary to re-enter the constant for each calculation with which it appears in sequence.

- b. The machine is not capable of remembering constants in addition and subtraction problems--only in multiplication and division problems.

- \_\_\_\_\_ b. Enter the first multiplicand, 37, (in problem #1) and depress EQUAL KEY (P). Record the answer on the space provided.
- \_\_\_\_\_ c. Enter the second multiplicand, 39, (in problem #2) and depress EQUAL KEY (P). Record the answer on the space provided.
- \_\_\_\_\_ d. Enter the third multiplicand, 40, (in problem #3) and depress EQUAL KEY (P). Record the answer on the space provided.
- \_\_\_\_\_ e. Enter the fourth multiplicand, 36, (in problem #4) and depress EQUAL KEY (P). Record the answer on the space provided.
- \_\_\_\_\_ f. Enter the fifth multiplicand, 40, (in problem #5) and depress EQUAL KEY (P). Record the answer on the space provided.

$$\begin{array}{r} 5.84 \times \\ 37.00 = \\ \hline 216.08 * \end{array}$$

$$\begin{array}{r} 39.00 = \\ \hline 227.76 * \end{array}$$

$$\begin{array}{r} 40.00 = \\ \hline 233.60 * \end{array}$$

$$\begin{array}{r} 36.00 = \\ \hline 210.24 * \end{array}$$

$$\begin{array}{r} 40.00 = \\ \hline 233.60 * \end{array}$$

4. Complete remaining problems in above manner. Don't forget to change the constant when a new one appears.

NOTE: a. The following sign-- @ --in problems means to multiply.

COMPLETE PROBLEMS 36-39 AS FOLLOWS:

Job 27 - #36

1. Depress TOTAL KEY (M) and CLEAR KEY (T) in order to clear the machine.

0.00 \*

2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".

C

3. Using problem #36 as an example, do the following:

\_\_\_\_\_ a. Enter the multiplicand, 147.345 (decimal also), and depress TIMES KEY (N).

147.345 X

35.105 = +

5,172.55 \*

\_\_\_\_\_ b. Enter the multiplier, 35.105 (decimal also), and depress EQUALS/PLUS KEY (Q).

87.025 X

68.67 = +

5,976.01 \*

NOTE: a. The equals/plus key will give the answer (product) to a multiplication problem and at the same time add it to the memory register.

892.1752 X

49.555 = +

44,211.74 \*

\_\_\_\_\_ c. Repeat steps a and b above for remaining items in problem 36.

69.5631 X

86.125 = +

5,991.12 \*

\_\_\_\_\_ d. To get the accumulated total, depress the TOTAL KEY (M).

543.8103 X

75.875 = +

41,261.61 \*

COMPLETE TIMED DRILL AS FOLLOWS:

1. Use grading scale #4, page 187. Follow usual procedures.

102,613.03 \*

ON COMPLETION OF JOB 27, STAPLE AND SUBMIT TO INSTRUCTOR.  
CEED TO JOB 28.

Job 28/Discounts and Net Amounts

The purpose of this job is to learn how to calculate discounts and net amounts. Discount is a deduction from an invoice to induce payment within a specified time. Net amount is the amount left to pay after the discount has been subtracted from gross amount.

COMPLETE PROBLEMS 1-7 AS FOLLOWS:

1. Depress CLEAR KEY (Q) in order to clear the machine.
2. Set the DECIMAL POINT SELECTOR SWITCH AT "2".
3. Using problem #1 as an example, do the following:

Job 28 - #1

C

- a. Enter the gross amount, 495.02, and depress TIMES KEY (N).
- b. Enter percent of discount, 15, and depress PERCENT KEY (S).
- c. Record the discount amount on the blank provided.
- d. Depress MINUS KEY (K) to determine the net amount. Write the answer on the blank provided.

$$495.02 \times$$

$$15.00\%$$

$$\underline{74.25}^*$$

$$\underline{420.77}^*$$

- NOTE:
- a. Gross amount  $\times$  discount percent = discount dollar amount.
  - b. Gross amount - discount dollar amount = net amount.
  - c. You do not have to re-enter the numbers for the gross amount and discount dollar amount when determining the net amount because the machine has kept these numbers in its memory register. This is why you only have to depress the minus key.

4. Check the accuracy of the answer by adding the net amount and discount dollar amount--the sum should be the same number as the gross amount. If not, complete the problem again.

COMPLETE PROBLEMS 8-15 AS FOLLOWS:

1. Depress the CLEAR KEY (Q) in order to clear the machine.
2. Set the DECIMAL POINT SELECTOR SWITCH (F) at "2".

(b 28 instructions continue on next page)

3. Using problem #8 as an example, do the following:

- \_\_\_\_\_ a. Enter the gross amount, 567.49, and depress the TIMES KEY (N).
- \_\_\_\_\_ b. Enter 90 (100% - 10%) and depress the PERCENT KEY (S).
- \_\_\_\_\_ c. Depress TIMES KEY (N) to register previous answer (b) on paper tape.
- \_\_\_\_\_ d. Enter 95 (100% - 5%) and depress PERCENT KEY (S).
- \_\_\_\_\_ e. Depress TIMES KEY (N) to register previous answer (d) on paper tape.
- \_\_\_\_\_ f. Enter 98 (100% - 2%) and depress the PERCENT KEY (S). Record this number as the answer on the space provided.

Job 28 - #8

C

567.49 X	
90.00%	
510.74 *	
510.74 X	
95.00%	
485.20 *	
485.20 X	
98.00%	
<u>475.50</u> *	

4. Check the accuracy of your work by completing the problem a second time.

NOTE: a. Problems 8-15 used chain discounts to find net amount. A chain discount is a series of deductions from listed price. It is used to encourage quantity buying, correct catalogue prices, and to meet competition.

LETE TIMED DRILL AS FOLLOWS:

- 1. Use grading scale #4, page 187. Follow usual procedures.

COMPLETION OF JOB 28, SUBMIT TO INSTRUCTOR. PROCEED TO 29.

The purpose of this job is to learn how to prorate expenses and to "force" the computations to balance by increasing or decreasing the largest allocation. Prorate means to distribute expenses. This means, how to find what part of an expense should be charged to each of several departments.

COMPLETE SECTIONS I, II, AND III AS FOLLOWS:

Job 29 - I

1. Depress the TOTAL KEY (M) and CLEAR KEY (T) in order to clear the machine.

0. \*

2. Using Section I as an example, do the following:

C

a. Set the DECIMAL POINT SELECTOR SWITCH (F) at "F".

57,942. ÷  
178,606. =

b. Enter amount to be prorated, 57,942.00, and depress DIVISION KEY (O).

0.324412393761 \*

c. Enter total amount of sales, 178,606, and DEPRESS EQUAL KEY (P), then depress TIMES KEY (N) to register this amount as a constant.

0.324412393761 X  
44,150.00 = +  
14,322.81 \*\*

d. Change DECIMAL POINT SELECTOR SWITCH (F) to "2".

12,386.00 = +  
4,018.17 \*

e. Enter Dept. A's sales amount, 44,150, and depress the EQUALS/PLUS KEY (Q). Record this amount on the space provided.

11,987.00 = +  
3,888.73 \*

f. Repeat step (e) for the remaining departments.

g. Prove the accuracy of the allocations by depress the TOTAL KEY (M).

72,583.00 = +  
+ 14 23,546.823 \*

h. If the total obtained in step (g) does not agree with the amount to be prorated, 57,942.00, adjust the total by adding or subtracting from the largest amount distributed to each department in order to "force" the total to equal the amount of 57,942.00.

10,705.00 = +  
3,472.83 \*

i. Clear the machine, including the memory unit.

6,574.00 = +  
2,132.69 \*

12,162.00 = +  
3,945.50 \*

COMPLETE TIMED DRILL AS FOLLOWS:

1. Use grading scale #2, page 187. Follow usual procedure.

8,059.00 = +  
2,614.44 \*

ON COMPLETION OF JOB 29, SUBMIT TO INSTRUCTOR. PROCEED TO 30.

57,941.99 \*  
*short 1¢*

57,941.99 \* +  
0.01 +

57,942.00 \*

TEST TIME/Test #6

You are now ready to take the second timed test. You may want to review previous jobs, especially Job 30. When ready, ask the instructor for TEST #6. Speed and accuracy are taken into consideration when computing the test grade.

UPON COMPLETION OF TEST #6, PROCEED TO NEXT PAGE TO COMPLETE PART II OF LEARNING PACKET C.

Jobs 41-50

The purpose of completing these jobs is to develop speed and accuracy. Complete jobs 41-50 applying the principles learned in previous jobs. You are to take TEST #9 after Job 45 and TEST #10 after Job 50. (Note: Disregard the fact these jobs were designed for the Rotary Calculator).

NOTE: a. JOB 43: A new principle not presented in previous jobs is learning the use of the SUB-TOTAL KEY (L). On problems 31-34, depress the SUB-TOTAL KEY (L) after subtracting the credit amount--EXCEPT for the last entry in which the TOTAL KEY (M) will be depressed in order to clear the machine.

b. JOB 47: On problems 31-40, find the net amount by multiplying the gross amount by the decimal equivalent of the chain discount. Use the chart on page 143 to find the decimal equivalent of the chain discount. Using 15-10-5 as an example, do the following:

- \_\_\_\_\_ 1. Find 15 column across the top of the chart.
- \_\_\_\_\_ 2. Find the rest of the equivalent, 10-5, down the left side.
- \_\_\_\_\_ 3. Locate the number which joins the top and left side, .72675. This is the decimal equivalent of the chain discount of 15-10-5.

c. JOB 48: Problems 31-45 (amount of decrease) is determined in the same manner as amount of increase. You find the amount of decrease and divide this number by "last year's" amount. Change the decimal to a percent to get the answer.

ON COMPLETION OF PART II, PROCEED TO NEXT PAGE.

YOU HAVE JUST FINISHED LEARNING PACKET C

ASK THE INSTRUCTOR FOR A NEW LEARNING PACKET AND NEW MACHINE ASSIGNMENT

APPENDIX B

Individual Grade Sheet

Name \_\_\_\_\_

Hour \_\_\_\_\_

<u>Unit</u>	<u>Score</u> <u>Errors/Minutes</u>	<u>Letter</u> <u>Grade</u>	<u>Unit</u> <u>Grade</u>
<b>A. <u>Victor, NCR, Addo-X</u></b>			
Jobs 1-10 . . . . .	_____		
Test #1 . . . . .	_____		
Test #2 . . . . .	_____		
Jobs 31-40 . . . . .	_____		
Test #7 . . . . .	_____		
Test #8 . . . . .	_____		<u>(A)</u>
<b>B. <u>Canon P101, Victor Metalist, Olivetti-Logos 250, Olympia CA505</u></b>			
Jobs 11-20 . . . . .	_____		
Test #3 . . . . .	_____		
Test #4 . . . . .	_____		<u>(B)</u>
<b>C. <u>Monroe 525, Monroe 2805, Monroe 2810 Canon MP141</u></b>			
Jobs 21-30 . . . . .	_____		
Test #5 . . . . .	_____		
Test #6 . . . . .	_____		
Jobs 41-50 . . . . .	_____		
Test #9 . . . . .	_____		
Test #10 . . . . .	_____		<u>(C)</u>
<b>D. Practice Set</b>			<u>(PS)</u>

Grade 1st nine weeks \_\_\_\_\_

Grade 2nd nine weeks \_\_\_\_\_

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APPENDIX C

## TEST NO. 6 TEN-KEY ELECTRONIC CALCULATOR

Name \_\_\_\_\_ Time Completed \_\_\_\_\_ Errors \_\_\_\_\_  
 Time Started \_\_\_\_\_  
 Period \_\_\_\_\_ Date \_\_\_\_\_ Time Required \_\_\_\_\_ Rating \_\_\_\_\_

This test requires the application of all the operating principles presented in Jobs 21-30. Be sure to fill in the blanks above with the required information.

**1 Prorate Rent Expense** of \$75,000 on the basis of area occupied. **ANSWERS**

Dept. No.	Title	Square Feet Occupied	Prorated Rent Expense	1 _____
101	Budget Shop	850	_____	_____
102	Furniture	1,285	_____	2 _____
103	Major Appliances	2,350	_____	3 _____
104	Household Articles	1,965	_____	4 _____
	Total	6,450	\$75,000.00	5 _____
				6 _____
	Commission on:		Dividend on:	7 _____

**2** 6,543.25 @ 5% \_\_\_\_\_ **4** 5,803.59 @ 4 1/4% \_\_\_\_\_

**3** 4,589.75 @ 4% \_\_\_\_\_ **5** 6,783.22 @ 7 1/2% \_\_\_\_\_

**Find the Net Amount** of the following bills:

**6** 3,713.55 less 10%-15%-5% \_\_\_\_\_

**7** 4,133.75 less 5%-10%-7% \_\_\_\_\_

APPENDIX D

Calculation of Difference Between Means Test  
for Test 6 Errors

Student Number	Experimental Group		Student Number	Control Group	
	Total Errors	Total <sup>2</sup> Errors		Total Errors	Total <sup>2</sup> Errors
1	11	121	1	15	225
2	4	16	2	8	64
3	4	16	3	4	16
4	12	144	4	3	9
5	0	0	5	1	1
6	3	9	6	0	0
7	21	441	7	10	100
8	3	9	8	2	4
9	4	16	9	0	0
10	8	64	10	1	1
11	9	81	11	4	16
12	9	81	12	1	1
13	6	36	13	17	289
14	3	9	14	4	16
	97	1,043		70	742

Experimental Group

Total Students ( $N_A$ )	= 14
Total Errors (Sum of $X_A$ )	= 97
Total Errors <sup>2</sup> (Sum of $X_A$ ) <sup>2</sup>	= 1,043
Average Total Errors ( $\bar{X}_A$ )	= 6.928

Control Group

Total Students ( $N_B$ )	= 14
Total Errors (Sum of $X_B$ )	= 70
Total Errors <sup>2</sup> (Sum of $X_B$ ) <sup>2</sup>	= 742
Average Total Errors ( $\bar{X}_B$ )	= 5.00

$$S_A^2 = \frac{(\text{Sum of } X_A)^2 - (\bar{X}_A)(\text{Sum of } X_A)}{N_A - 1}$$

$$= \frac{1.043 - (6.928)(97)}{14 - 1}$$

$$= \frac{1.043 - 672.016}{13}$$

$$= 28.537$$

$$S_B^2 = \frac{(\text{Sum of } X_B)^2 - (\bar{X}_B)(\text{Sum of } X_B)}{N_B - 1}$$

$$= \frac{742 - (5.00)(70)}{14 - 1}$$

$$= \frac{742 - 350}{13}$$

$$= 30.153$$

Are variances homogenous? Yes.

$$F = \frac{\text{larger variance}}{\text{smaller variance}} = \frac{30.153}{28.537} = 1.056$$

$$df = \frac{12}{13} = .05 \text{ critical} = 2.6$$

Since variances are homogenous: 1.056 less than 2.6, use the following formula

$$(\text{Equal Numbers}) \quad S_{\bar{X}_A - \bar{X}_B} = \sqrt{\left( \frac{\text{Sum of } X_A^2 + \text{Sum of } X_B^2}{N_A \text{ or } N_B - 2} \right) \left( \frac{2}{N_A \text{ or } N_B} \right)}$$

(Equal Numbers)

$$S_{\bar{X}_A} - \bar{X}_B = \sqrt{\left( \frac{\text{Sum of } X_A^2 + \text{Sum of } X_B^2}{N_A \text{ or } N_B - 2} \right) \left( \frac{2}{N_A \text{ or } N_B} \right)}$$

$$\text{Sum of } X_A^2 = \text{Sum of } X^2 - \frac{(\text{Sum of } X)^2}{N} \quad \text{Sum of } X_B^2 = \text{Sum of } X^2 - \frac{(\text{Sum of } X)^2}{N}$$

$$= 1.043 - \frac{(97)^2}{14}$$

$$= 1.043 - 672.071$$

$$= 370.929$$

$$= 742 - \frac{(70)^2}{14}$$

$$= 742 - 350$$

$$= 392$$

$$= \sqrt{\left( \frac{370.929 + 392}{14 + 14 - 2} \right) \left( \frac{2}{14} \right)}$$

$$= \sqrt{\left( \frac{762.929}{26} \right) (.142)}$$

$$= \sqrt{(29.343) (.142)}$$

$$= \sqrt{4.166}$$

$$S_{\bar{X}_A} - \bar{X}_B = 2.041$$

$$t = \frac{\bar{X}_A - \bar{X}_B}{S_{\bar{X}_A} - \bar{X}_B} = \frac{6.928 - 5.00}{2.041} = .944$$

$$df = N_A + N_B - 2 = 14 + 14 - 2 = 26 = 2.056 \text{ "t" table}$$

Consult "t" Table

A "t" table was consulted for a two-tailed test at a critical value of 2.056 at the 95 percent level of significance.

Conclusion

As the calculated "t" value of .944 is less than the "t" table value of 2.056, there is no significant difference between means at the .05 level of significance. Therefore, the null hypothesis is accepted.

APPENDIX E

A. Machines

Throughout this semester course, you will work on three machines.

B. Work Required

The work to be completed is as follows: 50 jobs, 10 timed tests, a portion of a practice set, and a semester exam.

C. Grading Procedures

1. Jobs

You can earn up to 10 points for each job. Points are earned as follows:

5 points for completion of each job  
+ bonus of 1 to 5 points for accuracy\*

= Your grade for that particular job

\* accuracy bonus points are determined as follows:

perfect paper - 5 bonus points  
1 mistake - 4 bonus points  
2 mistakes - 3 bonus points  
3 mistakes - 2 bonus points  
4 mistakes - 1 bonus points  
5 or more - 0 bonus points

After all jobs are completed for a particular unit, the total points are added and this is changed into a letter grade using the following scale according to total points possible.

100%	A+
95% - 99%	A
90% - 94%	B+
87% - 89%	B
85% - 86%	C+
80% - 84%	C
78% - 79%	D+
75% - 77%	D
Below	F

2. Timed Tests

Timed tests are given after the fifth and tenth jobs of each unit. They are evaluated according to the following scale:

<u>Time Available</u>	<u>Errors</u>								
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3-4</u>	<u>5-6</u>	<u>7-8</u>	<u>9</u>	<u>10</u>	<u>11 or more</u>
35 minutes	A+	A	B+	B	C+	C	D+	D	F

(Your test grade is lowered one letter grade if you take longer than 35 minutes.)

The grades for jobs and timed tests earned on each machine are averaged together to give the grade for that particular unit. Nine weeks grade is based on the average of the machines completed. Semester grade is based on the grades received for the nine weeks and the grade earned on the semester final.

D. Class Requirements

1. Textbooks are to remain in the classroom at all times!!!
2. Because you will not have any homework, you will be required to work during all of the class time.
3. Check your progress by examining your work folder daily.
4. Take absolute care of the machines. Do not tamper with those machines you have not had.
5. At the end of class time, unplug your machine, throw away any paper, and make sure your chair is under the desk when you leave. (If I must do this for you, I will deduct 5 points for each time.)
6. Attendance is very important!! Assignments are not allowed to be made up at home. Therefore, time must be spent before school, after school, break, lunches, or club period to complete make-up assignments. You may make up your work ahead of time if you know in advance you are going to miss class.

APPENDIX F



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APPENDIX G



WASHBURN RURAL HIGH SCHOOL  
Topeka, Kansas

Machines for Office Machines Course

<u>Type</u>	<u>Number Available</u>
<u>Ten-Key Adding-Listing</u>	
Victor . . . . .	3
NCR . . . . .	1
Addo-X . . . . .	1
<u>Electronic Calculators</u>	
Canon MP141 . . . . .	3
Canon P101 . . . . .	2
Victor Metalist . . . . .	1
Olivetti-Logos 250 . . . . .	1
Olympia CA505 . . . . .	2
Monroe 525 . . . . .	1
Monroe 2805 . . . . .	1
Monroe 2810 . . . . .	<u>1</u>
TOTAL	17