

8891121

\$2.95

# Adding Machines and Calculators

**Ronald Merchant**

For Self-Study or Classroom Use



SELF-  
TEACHING  
GUIDES



TP32  
M554  
(2)

8851121

贈閱

---

---

# ADDING MACHINES AND CALCULATORS

---

---

**RONALD MERCHANT**  
*Spokane Falls Community College*  
*Spokane, Washington*



E8861121



**John Wiley & Sons, Inc.**  
**New York • London • Sydney • Toronto**

---

---

Copyright © 1974, by John Wiley & Sons, Inc.

All rights reserved. Published simultaneously in Canada.

No part of this book may be reproduced by any means, nor transmitted, nor translated into a machine language without the written permission of the publisher.

Library of Congress Cataloging in Publication Data

Merchant, Ronald.

Adding machines and calculators.

(Wiley self-teaching guides)

1. Calculating-machines—handbooks, manuals, etc. 2. Electronic calculating machines—handbooks, manuals, etc. I. Title.

HF5541.C3M47

651'.8'2

73-16107

ISBN 0-471-59444-X

Printed in the United States of America

74 75 10 9 8 7 6 5 4 3 2 1

---

---

---

# Preface

---

---

Adding machines and calculators have long been important tools, and recent innovations are making them even more useful to American business. Although adding machines continue to be popular, electronic calculators are rapidly replacing the slower, larger, and noisier mechanical machines. The new electronic machines not only operate in milliseconds and often cost much less than their older mechanical counterparts, but they are also easier to operate. As new electronic innovations continue to increase the capabilities of these machines and decrease their price, they are being found in more and more business offices and even in many homes.

Students are finding that a skill in machine operation lets them use these new business machines as real learning tools in any class that uses numbers. With this skill the student can solve real-life complex problems without becoming bogged down in time-consuming arithmetic calculations. Not only does this skill give the "slow" student more confidence to tackle difficult problems, but it gives the "advanced" student more time to probe into deeper meanings and relationships. All business students and many others need a touch control on a ten-key keyboard and an awareness of what electronic calculators can do for them. And this need will grow as more and more employers expect this skill and knowledge.

Like the ten-key adding machine, the new electronic machines have a ten-key keyboard. However, many people cannot operate the familiar ten-key keyboard with a touch control, and most do not utilize the capabilities of their machines. This text is designed to solve these problems. The reader should be able to (1) build a touch control on a ten-key keyboard, (2) become familiar with what calculators can do, and (3) review and make practical business application of some mathematical concepts.

Business machines are easy to operate, but most people learn to operate them on the basis of solving a particular problem. In other words, they are more concerned with getting the answer to a specific problem than developing a skill in machine operation. A concentrated effort is required to develop a touch control and fully utilize the capabilities of a machine. This text offers the reader an opportunity to concentrate on using business machines efficiently. A business student may be able to use a calculator or an adding machine without this Self-Teaching Guide or without a touch control, but he won't be able to use it as well.

To the students and colleagues who have helped in the preparation of these materials, I extend my thanks. I wish also to extend a special thanks to Mariner G. Manchester, Jr., who helped prepare some of these materials and without whose encouragement this book would not exist.

---

---

---

# How to Use This Book

---

---

The purpose of this Self-Teaching Guide (a text that may be used in the classroom or for individual study) is to provide two essential skills: (1) a touch control on a ten-key keyboard, and (2) an awareness of what new electronic calculators can do for you. To accomplish these objectives, an integrated approach is employed. This book contains introductions to the principles covered, guidelines for operating business machines, problems to work, basic arithmetic review, and self-tests to check your performance.

Part One and Part Two are self-contained. You can start with either Chapter 1, on ten-key adding machines, or Chapter 3, on electronic calculators, without losing continuity. Each chapter, in turn, begins with a description of the content and an indication of why it is important. Be sure to read these introductory materials. They let you know where you are going and why.

To obtain the full benefit from this book, as self-instruction or as a text for a course, you should have available the operating manual put out by the manufacturer of the machine you plan to use.

Each section within the chapters contains a series of problems provided with instructions. Follow the instructions carefully before attempting the unanswered problems. When you have worked the problems as directed and have written the answers, you can compare your answers with the ones furnished following each frame of problems. If you have any incorrect responses, you should determine why the answer given is correct (and yours was incorrect) before proceeding to the next section.

For maximum learning efficiency, you should follow these guidelines:

- (a) Use the manufacturer's operating or instruction manual to familiarize yourself with your machine. Do not attempt to go through each example given in the manufacturer's instruction manual at one sitting. Do only the sample problems pertaining to the subject you are studying.
- (b) The sections should be read and the problems worked in sequence. Each answer must be written in the space provided. Writing each answer is part of the proficiency in using the machine.
- (c) After finishing the problems in each section, or when directed, check your work and correct any errors you have made. You may want to cover the answers while you are working the problems, so that you won't be tempted to peek. You should pay careful attention to the hints that are given in enclosed boxes throughout the book. They will help you to become a more efficient machine operator with a better understanding of what you are doing.

- 
- (d) Do not attempt to go too fast even when the material seems easy. Each problem that you work will reinforce your knowledge and increase your proficiency on the machines.
  - (e) If you are unable to reason out why a particular answer is correct, raise a question in class and/or discuss it with someone. Do not spend too much time on any one problem.
  - (f) If you have difficulty with some problems in a section, go through all of the section again. A good general rule is to rework all the problems in any section in which you miss more than 10 percent of the questions.
  - (g) After completing the assigned problems on a machine, you will find it worthwhile to go through any remaining example problems found in the manufacturer's instruction manual. This will give you a better understanding of the special features found on your machine.
  - (h) In Chapters 1 and 3, there are sections on speed and accuracy development, which contain practice groups for improving your skills. After completing these practice groups, you should take a ten-minute timed test to check your touch control. Time yourself on these practice groups to be sure you have sufficient touch control.
  - (i) At the end of the practice groups and following the sections on business applications, you will be directed to turn to the back of the book and take a Self-Test. These Self-Tests are designed to check your ability to use various types of machines. The Self-Tests are longer than the examinations you may be given on each machine, but the problems are similar. If you have difficulty with any Self-Test problem, be certain to return to the appropriate place in your text and/or ask for assistance from your instructor. Be sure you understand each Self-Test question before attempting any examination.

#### General Rules for Rounding to be Used Throughout This Book

- **Rounding:** If the portion to be dropped begins with the figure 5 (which is one-half of the unit of the last figure retained) or above, add 1 to the last figure retained. If the portion to be dropped is less than 5, discard it.
- **Intermediate Calculations:** Don't round off too soon! Carry intermediate answers at least one place more than is needed in the final answer. A good rule of thumb when using an electronic calculator is five decimal digits.
- **Recording Final Answers:** Round money answers to the nearest cent (\$.01). Round percent answers to the nearest tenth of one percent (.1%). Round decimal answers to the nearest thousandth (.001).

**HINT:** Refer back to these instructions several times during your reading.

---

---

# Contents

---

---

PART ONE	1
Chapter 1      OPERATION OF THE TEN-KEY ADDING MACHINE	2
Adding: 4, 5, 6 Keys, 4	
Adding: 7, 8, 9 Keys, 6	
Adding: 1, 2, 3 Keys, 7	
Zero Key, 8	
Subtotal Key, 10	
Subtraction Key, 11	
Credit Balances, 12	
Non-Add Key, 14	
Decimals, 15	
Fractions, 16	
Multiplication, 18	
Shortcut Multiplication, 20	
Speed and Accuracy Development, 22	
Chapter 2      BUSINESS APPLICATION PROBLEMS FOR MECHANICAL MACHINES	31
Percentage, 32	
Cash Discounts, 34	
Trade Discounts, 36	
Merchandising, 39	
Payroll, 47	
Invoice Extension, 51	
PART TWO	53
Chapter 3      DISPLAY AND PRINTING ELECTRONIC CALCULATORS	54
Adding: 4, 5, 6 Keys, 56	
Adding: 7, 8, 9 Keys, 58	
Adding: 1, 2, 3 Keys, 59	
Zero Key, 60	
Decimal Key, 61	
Subtraction Key, 62	
Credit Balances, 64	
Speed and Accuracy Development, 65	
Multiplication of Whole Numbers, 72	
Multiplication of Decimal Numbers, 72	

---

Multifactor Multiplication, 73	
Division, 74	
Accumulative Multiplication and Division, 76	
Fractions, 77	
Use of Constants, 80	
Raising a Number to a Power, 84	
Combined Arithmetic, 86	
Chapter 4    BUSINESS APPLICATION PROBLEMS FOR ELECTRONIC CALCULATORS	88
Percentage, 89	
Invoices and Business Forms, 94	
Merchandising, 97	
Payroll, 100	
Simple Interest, 104	
Consumer Credit, 108	
Compound Interest, 110	
Prorating Expenses, 114	
Depreciation, 116	
 PART THREE	 123
Appendix I    ROUNDING NUMBERS	124
Appendix II    ESTIMATING THE DECIMAL	127
Appendix III    PERCENTAGE	131
Appendix IV    THE USE OF RECIPROCAL Table of Reciprocals, 142	137
Appendix V    DECIMAL EQUIVALENTS OF COMMON FRACTIONS	145
Appendix VI    INCOME TAX WITHHOLDING TABLE	146
Appendix VII    MEASURES AND WEIGHTS	147
 SELF-TESTS	 151
Answers to Self-Tests, 173	
 GLOSSARY OF COMMON BUSINESS TERMS	 176
 INDEX	 181

---



---

---

# Part One

---

---

---

---

## CHAPTER ONE

# Operation of the Ten-Key Adding Machine

---

---

The ten-key adding machine can be found in every kind of business and professional office, used in conjunction with other machines or by itself. The machine is easy and quick to operate, and it produces a tape to record every calculation. The mathematical processes of addition and subtraction are performed most efficiently by this simple machine, and with a special technique of repeated addition the machine will also multiply or by using reciprocals (as explained in Appendix IV) provide answers for division.

The ability to operate a ten-key adding machine with speed and accuracy is a marketable skill with increasing importance, because it can be transferred to printing calculators, electronic calculators, and many integrated data processing systems.

The ten-key adding machine is so named because it uses a standardized location of the digits one through nine, plus zero, thus filling the need for a fast adding machine that can be operated by the touch method and that allows the operator to keep his eyes on the source material. Fundamentally, the operation of all ten-key adding machines is similar, although there are differences between models and manufacturers. The differences occur in the location of function keys, the type of zero key or keys, key and tape symbols, special features, and credit balance indicators. Because of this, it may be worthwhile to review the operating manual for your particular machine or, if you are in a class, have your instructor acquaint you with the operation of the machine you will be using.

### INSTRUCTIONAL OBJECTIVES

The reader should gain proficiency in the following areas on the ten-key adding machine.

- Touch control
- Addition, including subtotals
- Subtraction, credit balances, non-add
- Decimals and fractions

- Multiplication, repeating
- Speed and accuracy

After completion of Chapter 1, the reader will have developed a touch control, giving adequate speed and accuracy to pass two 10-minute timed Self-Tests, one on addition and subtraction only, and one containing multiplication. The reader will be able to complete at least 35 out of 50 problems on each test, with 90 percent accuracy. The reader will also be ready to apply this new skill to the typical business problems found in Chapter 2 of this Self-Teaching Guide.

HINT: For best results, be certain you have read "How to Use This Book" at the beginning of the book.

## OPERATION

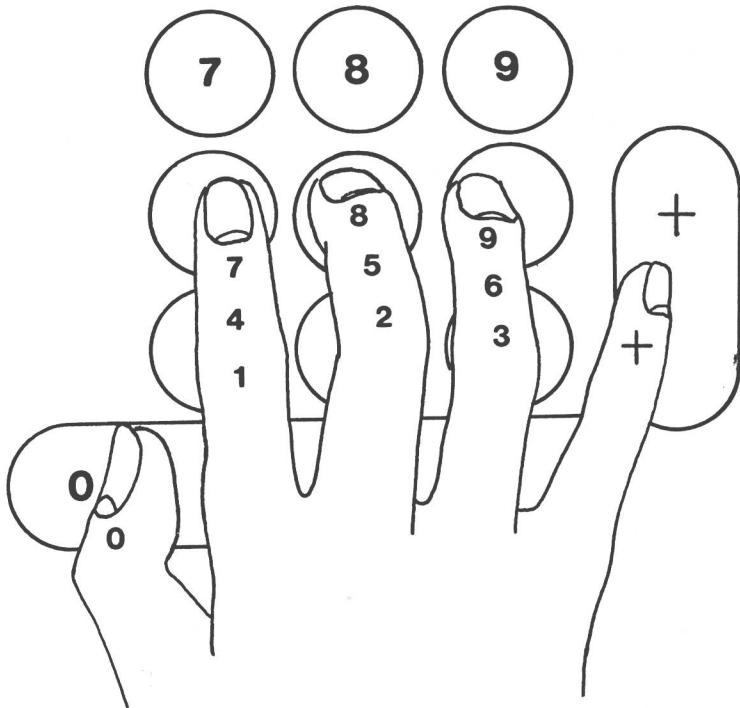
To achieve the operating proficiency of an office employee, you will need to learn to operate the machine without looking at it while concentrating on the material being added or computed.

As in typing, your posture is important. Sit erect but be relaxed. The machine should be placed to the right of center on your desk or work table so that it is in line with your forearm when you reach for it. The machine should be close enough that you don't have to stretch and yet not crowd. This position leaves the space in front of you and to your left free for the work you are doing. Your right hand can now run the machine while your left follows the list of numbers or turns pages. The left-handed person has a real advantage because he can also write with his left hand as he operates the machine with his right hand.

You should not at this point strive for speed, but direct your attention to learning the correct finger operation even though it may seem slow. Speed comes later.

The keys are arranged so that the 4, 5, 6 become home keys. An illustration of this is shown on the next page. You will find that on most ten-key keyboards the 4, 5, 6 keys are given a different surface from the others so that you know when you are on the home keys. After you have practiced, your fingers will not really rest on the 4, 5, 6 keys but will be over them and returning to them when you have reached for another key. The finger operation is that each finger on a home key reaches up for the key above it or down for the one directly below. The thumb operates the zero and the little finger operates the add or subtract bar.

When entering numbers (indexing), you may push a wrong key. Your machine will have a clear key which cancels that number only. (Check your machine manual for the location, operation, and functions of the clear key.)



Keyboard arrangement and hand position  
for the ten-key adding machine

ADDING: 4, 5, 6 KEYS

1. Some exercises for learning the basic operation of the home keys are listed below. When you complete these exercises, you will be ready to work the problems in frame 2.
    - (1) Find the machine diagram in the machine manual and locate these keys:
      - 1 through 9
      - zero or zeros
      - clear key
      - add/motor bar
      - total bar
    - (2) Position your fingers on the 4, 5, 6 keys.
    - (3) Clear the machine by depressing the total key, with your little finger.
-

- (4) Using the 4, 5, 6 keys as home keys, index the following numbers, depressing the add bar after each number so that the machine prints the number on the tape. Be sure that the proper finger is used according to the finger position illustration. Operate the keys without looking.

456  
455  
654

HINT: On most machines a decimal point is printed with the numbers appearing at what is usually dollars and cents. If you do not need the point, ignore it.

- (5) You now have listed three numbers. With the little finger, depress the total bar to print the sum. If it is 1,565, you have followed the procedure and should go to exercise (6). If not, go back to exercise (1) and rework this problem.
- (6) Do these sample problems to try what you have learned. Compare your answers.

$$\begin{array}{r} \text{(a)} \quad 4 \\ \quad 5 \\ \hline \quad 6 \\ \hline \quad 15 \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 45 \\ \quad 54 \\ \hline \quad 56 \\ \hline \quad 155 \end{array}$$

$$\begin{array}{r} \text{(c)} \quad 456 \\ \quad 654 \\ \hline \quad 546 \\ \hline \quad 1656 \end{array}$$

Now proceed to the problems in frame 2.

2. Do the following problems on the 4, 5, 6 keys. Write your answers as you go. When you have completed all the problems, compare your answers with the ones which follow this frame.

(1)	4	(2)	5	(3)	6	(4)	45	(5)	54
	5		4		5		56		65
	6		6		4		46		64
	4		6		4		56		65
	<u>6</u>		<u>5</u>		<u>5</u>		<u>45</u>		<u>54</u>

(6)	64	(7)	54	(8)	56	(9)	456	(10)	444
	56		64		46		664		555
	45		46		54		555		666
	54		56		45		455		654
	<u>46</u>		<u>65</u>		<u>64</u>		<u>444</u>		<u>546</u>

6 ADDING MACHINES AND CALCULATORS

---

(11) 656	(12) 666	(13) 456	(14) 456	(15) 644
454	666	654	666	464
464	555	456	564	646
565	444	654	555	545
545	555	456	645	546
465	444	654	444	655
654	666	456	645	565
<u>456</u>	<u>444</u>	<u>654</u>	<u>654</u>	<u>645</u>

-----

(1) 25; (2) 26; (3) 24; (4) 248; (5) 302; (6) 265; (7) 285;  
 (8) 265; (9) 2,574; (10) 2,865; (11) 4,259; (12) 4,440; (13)  
 4,440; (14) 4,629; (15) 4,710

ADDING: 7, 8, 9 KEYS

Be sure to reach from a home key directly above for the higher number. For example, reach for the 7 with the same finger which was "at home" on the 4 key.

1. Do these problems without watching the keys. Write your answers. After you have worked all the problems, compare your answers with the ones following this frame.

(1)	7	(2)	8	(3)	9	(4)	74
	4		5		6		47
	7		8		9		74
	4		5		6		47
	7		8		9		74
	<u>4</u>		<u>5</u>		<u>6</u>		<u>47</u>

(5)	85	(6)	96	(7)	89	(8)	75
	58		69		45		94
	85		96		78		57
	58		69		79		84
	85		96		89		75
	<u>58</u>		<u>69</u>		<u>59</u>		<u>67</u>

---

(9) 474	(10) 474	(11) 4,747	(12) 7,485
477	477	4,585	8,596
744	585	4,696	9,674
547	585	5,869	6,958
458	696	4,568	4,785
<u>698</u>	<u>478</u>	<u>5,965</u>	<u>7,894</u>

(13) 7,659	(14) 9,876	(15) 6,965
8,758	5,847	4,784
4,597	6,994	5,876
7,984	8,567	4,695
6,459	6,459	9,877
<u>8,844</u>	<u>8,977</u>	<u>8,866</u>

-----

(1) 33; (2) 39; (3) 45; (4) 363; (5) 429; (6) 495; (7) 439;  
 (8) 452; (9) 3,398; (10) 3,295; (11) 30,430; (12) 45,392; (13)  
 44,301; (14) 46,720; (15) 41,063

ADDING: 1, 2, 3 KEYS

1. Using the touch system, do the following problems. Write your answers and compare them with the ones following this frame.

(1) 1	(2) 2	(3) 3	(4) 36
4	5	6	39
1	2	3	63
7	8	9	93
1	2	3	63
<u>4</u>	<u>5</u>	<u>6</u>	<u>36</u>

(5) 25	(6) 14	(7) 17	(8) 19
28	17	28	73
52	41	39	82
82	71	71	91
52	41	82	37
<u>28</u>	<u>17</u>	<u>93</u>	<u>28</u>

(9)	141	(10)	171	(11)	1,144	(12)	1,234
	171		144		2,255		5,678
	252		411		3,366		9,363
	282		541		3,693		8,252
	368		251		2,582		7,141
	<u>393</u>		<u>258</u>		<u>1,471</u>		<u>8,321</u>

(13)	9,336	(14)	7,381	(15)	6,254
	8,225		8,343		7,839
	7,114		7,673		4,338
	9,581		9,185		2,143
	8,473		6,783		7,845
	<u>6,193</u>		<u>9,156</u>		<u>2,267</u>

- 
- (1) 18; (2) 24; (3) 30; (4) 330; (5) 267; (6) 201; (7) 330;  
 (8) 330; (9) 1,607; (10) 1,776; (11) 14,511; (12) 39,989; (13)  
 48,922; (14) 48,521; (15) 30,686

Remember, the reason for doing this self-teaching program is to develop a skill as a machine operator. Concentrate on this skill development, not just on getting the right answers to specific problems.

### ZERO KEY

The problems below use the nine numbered keys and the zero key. Some machines will have more than one zero key, that is, keys for entering one, two, or three zeros at once. Use only the key which enters one zero for your calculations in this frame. Your aim should be to learn a touch method which you can use on any ten-key adding-listing machine and you will find all will fit the one zero key operation.

- Do these problems without watching the keys.

HINT: Don't try for speed. Try for the correct finger and thumb position.

(1)	10	(2)	40	(3)	400	(4)	800
	40		70		300		700
	50		50		500		100
	20		80		700		200
	30		90		900		400
	<u>60</u>		<u>60</u>		<u>200</u>		<u>700</u>

---



(5)	30	(6)	502	(7)	902	(8)	404
	700		25		611		400
	50		30		250		450
	60		630		506		460
	900		808		300		406
	<u>200</u>		<u>720</u>		<u>259</u>		<u>405</u>
(9)	470	(10)	4,170	(11)	4,010	(12)	6,096
	580		5,280		5,080		7,085
	690		6,930		3,060		2,550
	609		5,802		2,003		7,065
	508		7,401		4,201		5,208
	<u>407</u>		<u>1,030</u>		<u>1,006</u>		<u>8,096</u>
(13)	3,075	(14)	9,265	(15)	3,346	(16)	3,530
	9,230		9,527		2,480		686
	8,003		6,789		2,320		9,055
	4,410		9,734		3,831		3,580
	1,255		7,320		2,210		2,210
	<u>6,360</u>		<u>1,881</u>		<u>3,669</u>		<u>5,027</u>
(17)	3,929	(18)	234	(19)	3,708	(20)	918
	82		1,862		42		9,004
	3,508		4,021		5		7,576
	443		9,628		2,200		5,401
	1,217		944		2,780		835
	<u>1,119</u>		<u>543</u>		<u>72</u>		<u>2,830</u>
(21)	10	(22)	2	(23)	44	(24)	1,838
	9		17		63		5,207
	73		64		57		1,880
	25		97		82		3,043
	33		85		19		1,025
	<u>76</u>		<u>44</u>		<u>98</u>		<u>4,806</u>

-----

(1) 210; (2) 390; (3) 3,000; (4) 2,900; (5) 1,940; (6) 2,715;  
(7) 2,828; (8) 2,525; (9) 3,264; (10) 30,613; (11) 19,360;  
(12) 36,100; (13) 32,333; (14) 44,516; (15) 17,856; (16) 24,088;  
(17) 10,298; (18) 17,232; (19) 8,807; (20) 26,564; (21) 226;  
(22) 309; (23) 363; (24) 17,799