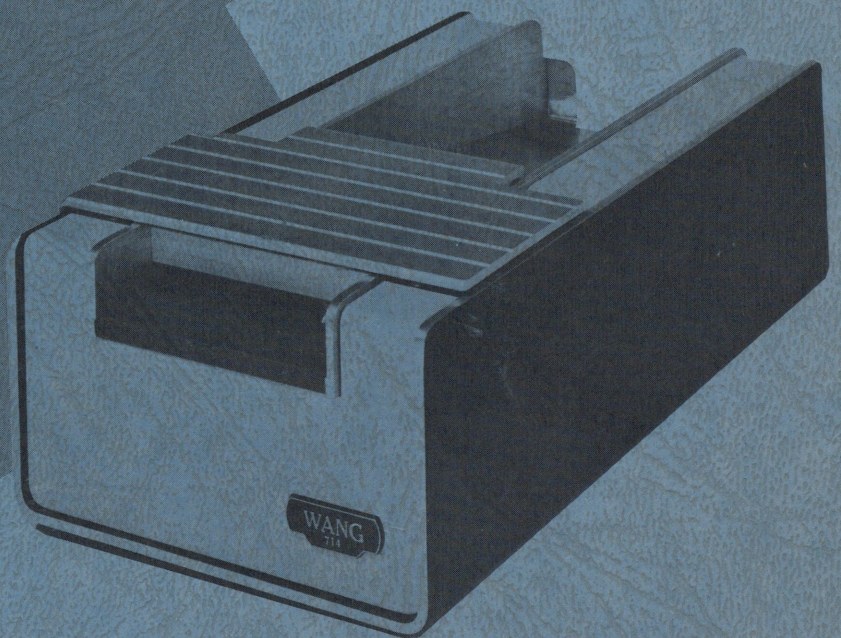


514/614/714

MARK  
SENSE  
CARD  
READER

*M-Labor*

REFERENCE  
MANUAL



WANG







514/614/714

MARK  
SENSE  
CARD  
READER

REFERENCE  
MANUAL

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## PREFACE

Wang Laboratories, America's leading manufacturer of electronic calculating systems, would like to take this opportunity to thank you for your purchase of Wang calculating equipment.

As a company we are committed to a total program of services to meet the needs of our customers. We maintain an extensive library of customer-oriented programs. Our worldwide service organization complemented by trained personnel assures downtime to be at a minimum if at all.

Wang equipment is designed around our renowned modularity concept, which allows a user to expand his system as his requirements expand. Add-on optional items such as a printer, display, extra storage, programming, and special function keys are available that can be installed easily and efficiently. These features and many more are designed especially to meet the needs of any calculating requirements that may arise.

This manual provides operating instructions for the Wang Mark Sense Card Readers (Models 514, 614, 714). Illustrations are typical and show the principal design features of the unit.

For further information, contact your local sales office or Wang Laboratories, Inc. 836 North Street, Tewksbury, Massachusetts 01876.

Remember "We do more so you can."



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## INTRODUCTION

The Mark Sense Card Readers, Models 514, 614, and 714, add a new dimension to the overall calculating flexibility of the 500, 600, and 700 Series calculators.

These easy-to-install card readers are very useful for preparing programs **OFF-LINE** allowing the calculator to be free for other calculating applications.

The card reader utilizes silicon phototransistors mounted on the same plane as the read heads and the lamps. The light, generated by these small lamps, is reflected back to the phototransistors by the card when no data is present on the card. When data (markings in the appropriate blocks) appear, the light ceases to reflect back, engaging the circuits to accept and transfer the data to the calculator. When no card is present in the reader, the phototransistors are off. Since it only reads the black surface under the read heads, no reflection occurs.

The card is designed to handle a maximum of 40 instructions, and read at the rate of 8/10 of a second per card. The only limitation of the number of cards is the programming capacity of the calculator. This manual describes in detail the programming capacity of the entire line of 500, 600, and 700 Series calculators.

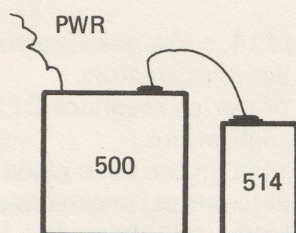
The card reader can be very beneficial to your organization when a number of people are writing and running programs. The calculator is free while the program is being written and the loading of a program takes only seconds. Thus, you get more out of your calculator.

The following pages will describe all the detailed information required for you to achieve maximum benefits from your system.



## 514 INSTALLATION

A simple cable connection between the 514 Card Reader and the rear panel of the 500 calculator is all that is necessary to prepare the 514 for operation. There are no power switches, dials or power on/off procedures for the unit. Power for the 514 Card Reader is supplied by the 500 calculator.



## ADDRESSING THE 500 CALCULATOR

As stated in the 500 Instruction Manual, the calculator has four different modes of operation. When using the 514 Card Reader, we will only concern ourselves with two of these modes. Namely, the RUN mode and the LEARN mode. Some keystroke functions can be executed in the RUN mode.

Primarily, the 514 can be used in two ways, either to enter data into the system or to load a program into memory. To enter data into the system, we use the RUN mode. This procedure is similar to direct keyboard operation. To load a program into memory, we must use the LEARN mode which is again similar to the method used when loading a program into memory by the direct keystroke method.

Simply stated, physically engage the mode desired and load your card or cards into the reader.

## DATA ENTRY

INSERT THIS END IN READER -- THIS SIDE UP

| P.G.M. CODE | SKIP                     | 8                        | 4                        | 2                        | 1                        | 8                        | 4                        | 2                        | 1                        |           |
|-------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------|
| 0001        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - 1       |
| 0002        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - 2       |
| 0003        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - 3       |
| 0011        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - SET EXP |
|             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |           |
|             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |           |
|             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |           |
|             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |           |
|             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |           |
|             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |           |
|             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |           |

USE NO. 2 PENCIL

When entering data, a maximum of eleven digits can be read into the calculator. To prevent an overflow condition from occurring, the SKIP column can be shaded, or a short-cut method, using the SET EXP code may be used.

|      |   |                          |                          |                          |                          |                          |                          |                          |                          |      |
|------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------|
|      | 5 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
|      | 6 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
|      | 7 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
|      | 8 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |      |
| 0803 | 9 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - GO |

# 700-1221  
TITLE/NO:

13M N67829 N67830

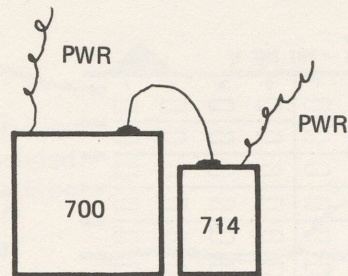
WANG LABORATORIES INC., TEWKSBURY, MASS. U.S.A.

The GO code is used to continue the program at the next step following its last stopping point.



## 714 INSTALLATION (614 installation is the same)

The same connection is made to the 700 as that made to the 500. If other peripheral devices are being used on the 700, a T-connector may be required. Also, a power cord from the 714 must be plugged into a convenient socket before the card reader is ready for operation.



## ADDRESSING THE 700 CALCULATOR

The 700 calculating system is a very sophisticated and flexible unit. As a result, many configurations can be designed for ultimate results. Because of its flexibility, instructions must be given to the calculator preceding the operation of the peripheral device. These instructions condition the 700 to accept data from the device in question. For the 714 Mark Sense Card Reader, a two-step instruction is required.

As illustrated in the reference manual, the 700 has four modes of operation. When engaging the use of the 714 Card Reader, we are only concerned with two of these modes, namely, the RUN and LEARN modes.

To condition the 700 or 600 calculator to accept data or perform certain keystroke functions in the RUN mode, a two-step instruction must be given:

|     |                       |     |                       |
|-----|-----------------------|-----|-----------------------|
| 700 | GROUP 1               | 600 | GROUP 1               |
|     | <del>MARK</del> 04 08 |     | <del>MARK</del> 04 08 |

Once the two keystrokes have been completed, the 700 is ready to accept data or perform keystroke functions in the RUN mode.

The data will be loaded into the X-Register of the calculator, or a specific function will be performed, where it will remain until some direct keyboard operation is engaged.

A similar type of two-step instruction is required to condition the calculator to load a program into the 700 or 600 memory (LEARN mode).

|     |                       |     |                       |
|-----|-----------------------|-----|-----------------------|
| 700 | GROUP 2               | 600 | GROUP 2               |
|     | <del>MARK</del> 04 08 |     | <del>MARK</del> 04 08 |

Once the two keys have been depressed, the display will appear in exactly the same manner as when the LEARN mode switch is physically depressed, showing the step number and the code number. The SKIP command will not advance the Program Counter.

The calculator is now ready to load a program into memory.

### NOTE:

- (1) Once the GROUP 1 ~~MARK~~ 04 08 instruction or the GROUP 2 ~~MARK~~ 04 08 instruction is given, the keyboard is non-operational until the PRIME key is depressed.
- (2) These two-step instructions will not function unless the card reader is installed.



## CARD FORMAT

The cards used for this system are similar to most data processing cards, containing up to 40 instructions which indicate where on the card the data should be placed.

Each card has 9 channels or columns consisting of 8 program code columns and one skip column in which to indicate the data to be processed. The illustration below shows the positioning of the columns and the blocks that should be blacked out.

The diagram shows a standard 80-column punch card used for data entry. The card is divided into several sections by vertical lines. Annotations with arrows point to specific areas:

- SKIP BLOCK:** Points to the first column, labeled 'P G M CODE'.
- DATE ENTRY BLOCKS:** Points to columns 2 through 5, which are labeled 'DATE'.
- DATE:** Points to the 'DATE' label in the header.
- STEP NUMBER:** Points to columns 6 through 9, which are labeled 'STEP'.
- PROGRAM CODE:** Points to columns 10 through 13, which are labeled 'PROGRAM CODE'.
- PROGRAM TITLE:** Points to columns 14 through 79, which are labeled 'PROGRAM TITLE'.
- TIMING MARK:** Points to the right edge of the card, which has a series of rectangular marks.

The card has a header section at the top with the text 'INSERT THIS END IN READER -- THIS SIDE UP'. The card is numbered '700-1221' and 'TITL/NO:'. The bottom of the card has the text 'WANG LABORATORIES INC, TEWKSBURY, MASS, U.S.A.'.



The blocks with the numbers on them, reading 8 4 2 1 | 8 4 2 1, are the blocks used for indicating the data to be read and transferred to the calculator.

All codes for the 500, 600, and 700 Series calculators are four-digit codes. The first two digits are the high-order code, the second two digits are the low-order code.

The numeric code for the  $x^2$  function on the 500 is 0812, 08 being the high-order code, 12 being the low-order code. This instruction will appear on the card as follows:

A felt tip is not recommended when marking cards.

To generate the code for  $X^2$  on the 500, simply shade in 08 12

To generate code 05 09

To generate code 15 15

The calculator will not read the 0714 code because the skip column has been shaded.

The left most block is the skip block. If this column is blacked out, it will instruct the calculator to skip the entire row of data.

INSERT THIS END IN READER -- THIS SIDE UP

| P'G'M CODE | SKIP                     | 8                        | 4                        | 2                        | 1                        | 8                        | 4                        | 2                        | 1                        |
|------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 0          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 0          | SKIP                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 0          | SKIP                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 0          | SKIP                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

# 700-122  
TITLE/NO:

18M N87829 N87830

WANG LABORATORIES INC; TEWKSBURY, MASS. U.S.A.



## SPECIFICATIONS

|                           |                                                                           |
|---------------------------|---------------------------------------------------------------------------|
| <b>Line Width:</b>        | Minimum 020-inch pencil mark required for reliable sensing.               |
| <b>Reading Rate:</b>      | 8/10 second for a complete card.                                          |
| <b>Weight:</b>            | 6 lbs.                                                                    |
| <b>Power Dissipation:</b> | 5.5 watts                                                                 |
| <b>Power (514):</b>       | Power is obtained directly from the 500 calculator.                       |
| <b>(614 &amp; 714):</b>   | Power is obtained by means of a separate power cord connected to the 714. |
| <b>Temperature Range:</b> | 25°C ± 10°C 59°F to 95°F                                                  |
| <b>Humidity:</b>          | 20 to 80% relative humidity                                               |
| <b>Dimensions:</b>        | 3.25" high - 5.33" wide - 11.25" deep                                     |
| <b>Cards:</b>             | 100 program cards are supplied with the unit.                             |

## PROGRAM CAPACITY

The cards can be introduced into the card reader one after the other in a continuous and uninterrupted fashion. They are stacked in the 514, 614, or 714 Card Receiver after being read.

The programming or card capacity is dictated only by the programming capability of the calculator. There are a number of different 500, 600, and 700 Series calculators. Their programming capacities are listed below:

| 500 Series |                       | 600 Series |                       | 700 Series |                       |
|------------|-----------------------|------------|-----------------------|------------|-----------------------|
| Models     | Program Step Capacity | Models     | Program Step Capacity | Models     | Program Step Capacity |
| 500-0      | 64                    | 600-2      | 312                   | 700C       | 960                   |
| 500-1      | 192                   | 600-6      | 824                   | 720C       | 1984                  |
| 500-2      | 320                   | 600-14     | 1848                  | 720B       | 1984                  |
| 520-2      | 312                   |            |                       |            |                       |
| 520-6      | 824                   |            |                       |            |                       |
| 520-14     | 1848                  |            |                       |            |                       |

## PROGRAM WORKSHEETS (50 worksheets per pad)

Program worksheets should be used to develop and record programs. The worksheet contains 80 steps corresponding to two marked sense cards. Each step has space for the command, code, and comment. Additional space is provided for the program description and special instructions. The worksheets come in pad form (8½ by 11), 3-hole punched. They may be kept neatly in a three-ring binder for quick reference. See next page for an illustration of a program worksheet.



MODEL

PROGRAM

TITLE:

NO.

(THIS SPACE FOR INSTRUCTIONS  
AND NOTES)

# SAMPLE PROGRAM WORKSHEET

| No. | Cmd | Code   | Comment | No. | Cmd | Code   | Comment |
|-----|-----|--------|---------|-----|-----|--------|---------|
| 00  |     |        |         | 40  |     |        |         |
| 01  |     |        |         | 41  |     |        |         |
| 02  |     |        |         | 42  |     |        |         |
| 03  |     |        |         | 43  |     |        |         |
| 04  |     |        |         | 44  |     |        |         |
| 05  |     |        |         | 45  |     |        |         |
| 06  |     |        |         | 46  |     |        |         |
| 07  |     |        |         | 47  |     |        |         |
| 08  |     |        |         | 48  |     |        |         |
| 09  |     |        |         | 49  |     |        |         |
| 10  |     |        |         | 50  |     |        |         |
| 11  |     |        |         | 51  |     |        |         |
| 12  |     |        |         | 52  |     |        |         |
| 13  |     |        |         | 53  |     |        |         |
| 14  |     |        |         | 54  |     |        |         |
| 15  |     |        |         | 55  |     |        |         |
| 16  |     |        |         | 56  |     |        |         |
| 17  |     |        |         | 57  |     |        |         |
| 18  |     | CARD 1 |         | 58  |     | CARD 2 |         |
| 19  |     |        |         | 59  |     |        |         |
| 20  |     |        |         | 60  |     |        |         |
| 21  |     |        |         | 61  |     |        |         |
| 22  |     |        |         | 62  |     |        |         |
| 23  |     |        |         | 63  |     |        |         |
| 24  |     |        |         | 64  |     |        |         |
| 25  |     |        |         | 65  |     |        |         |
| 26  |     |        |         | 66  |     |        |         |
| 27  |     |        |         | 67  |     |        |         |
| 28  |     |        |         | 68  |     |        |         |
| 29  |     |        |         | 69  |     |        |         |
| 30  |     |        |         | 70  |     |        |         |
| 31  |     |        |         | 71  |     |        |         |
| 32  |     |        |         | 72  |     |        |         |
| 33  |     |        |         | 73  |     |        |         |
| 34  |     |        |         | 74  |     |        |         |
| 35  |     |        |         | 75  |     |        |         |
| 36  |     |        |         | 76  |     |        |         |
| 37  |     |        |         | 77  |     |        |         |
| 38  |     |        |         | 78  |     |        |         |
| 39  |     |        |         | 79  |     |        |         |



## WRITING AND RUNNING PROGRAMS

**Writing the Program:** Using the worksheets, list the program in the sequential order that the program will be run. The normal sequence will be in an order that the calculator can understand, read, and interpret for accurate results. Once the program has been determined, use the worksheets to list the step number, key description, code, and any comments necessary for a generally accepted complete program.

When the worksheet has been completed, the next step is to complete the markings on the mark sense card. Shade in the proper blocks on the card that correspond numerically to the key code desired. Make your markings clear, concise and accurate.

A number 2 lead pencil is recommended for the best results. As indicated before, a card will contain a maximum of 40 instructions. Therefore, if you have a 170-step program, 5 cards will be needed. The card has space for the program title, card number, and date. This information should be written on the card immediately to eliminate any errors in card manipulation.

The program has been written, the cards have been marked, we are now ready to run the program.

**Running the Program:** As indicated previously, the 500, 600, and 700 Series calculators are addressed in different ways. The 500 can be addressed physically by depressing either the RUN or LEARN mode switch. In this case, we would want to engage the LEARN mode switch to load a program into memory. The 600 Series requires a two-step instruction. This will condition the calculator to accept data in the RUN or LEARN mode depending on the instruction given. The 700 Series is similar to the 600 Series in that it requires a two-step command for addressing purposes.

Upon completion of loading the program into memory, check to see if it has been loaded in accurately and completely by depressing the PRIME and VERIFY PROGRAM keys. This operation will give you the verify number. Stepping through the entire program will also assist you in checking the accuracy.

If the verify number is correct, the next step would be to follow the normal operating procedures required for program execution.



## EXAMPLE

### 500 Calculator and 514 Mark Sense Card Reader

The following program illustrates the procedures required to "learn" a program into memory, and then run the program to calculate and print the Mean, Variance and Standard Deviation of the data entered into the system.

#### Operating Procedures:

1. 500 calculator in LEARN mode.
2. PRIME or SET P.C.
3. Load card number 1 into 514 Card Reader (Program is now in the calculator.)
4. Switch to RUN mode.
5. Key f(00)

CARD NO. 1

$$\text{MEAN } \bar{X} = \frac{\sum x}{N}$$

$$\text{VARIANCE } \sigma^2 = \frac{\sum x^2 - N(\sum x/N)^2}{N - 1}$$

$$\text{STANDARD DEVIATION } \sigma = \sqrt{\frac{\sum x^2 - N(\sum x/N)^2}{N - 1}}$$

| Step No. | Code  | Step No. | Code  |
|----------|-------|----------|-------|
| 000      | 09 00 | 020      | 08 02 |
| 001      | 10 00 | 021      | 15 15 |
| 002      | 00 14 | 022      | 08 02 |
| 003      | 09 00 | 023      | 11 10 |
| 004      | 15 15 | 024      | 05 01 |
| 006      | 09 03 | 025      | 08 02 |
| 006      | 08 02 | 026      | 15 10 |
| 007      | 00 10 | 027      | 04 01 |
| 008      | 06 14 | 028      | 07 02 |
| 009      | 08 12 | 029      | 04 01 |
| 010      | 02 00 | 030      | 03 00 |
| 011      | 07 14 | 031      | 00 01 |
| 012      | 02 01 | 032      | 03 02 |
| 013      | 00 01 | 033      | 05 00 |
| 014      | 02 02 | 034      | 08 02 |
| 015      | 08 00 | 035      | 01 10 |
| 016      | 15 15 | 036      | 08 13 |
| 017      | 09 00 | 037      | 08 02 |
| 018      | 10 01 | 038      | 02 10 |
| 019      | 07 02 | 039      | 09 15 |

Executing a program in the RUN mode may require the use of the SKIP column to compensate for the delays caused by mathematical functions.

6. Load data cards 2, 3, 4, and 5 into 514 Card Reader. (Repeat Step 5 for all data cards.)
7. Key f(01).

INSERT THIS END IN READER -- THIS SIDE UP

| P.G.M. CODE | SKIP | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 |
|-------------|------|---|---|---|---|---|---|---|---|
| 09 00       | 0    |   |   |   |   |   |   |   |   |
| 10 00       | 1    |   |   |   |   |   |   |   |   |
| 00 14       | 2    |   |   |   |   |   |   |   |   |
| 09 00       | 3    |   |   |   |   |   |   |   |   |
| 15 15       | 4    |   |   |   |   |   |   |   |   |
| 09 03       | 5    |   |   |   |   |   |   |   |   |
| 08 02       | 6    |   |   |   |   |   |   |   |   |
| 00 10       | 7    |   |   |   |   |   |   |   |   |
| 06 14       | 8    |   |   |   |   |   |   |   |   |
| 08 12       | 9    |   |   |   |   |   |   |   |   |
| 02 00       | 0    |   |   |   |   |   |   |   |   |
| 07 14       | 1    |   |   |   |   |   |   |   |   |
| 02 01       | 2    |   |   |   |   |   |   |   |   |
| 00 01       | 3    |   |   |   |   |   |   |   |   |
| 02 02       | 4    |   |   |   |   |   |   |   |   |
| 08 00       | 5    |   |   |   |   |   |   |   |   |
| 15 15       | 6    |   |   |   |   |   |   |   |   |
| 09 00       | 7    |   |   |   |   |   |   |   |   |
| 10 01       | 8    |   |   |   |   |   |   |   |   |
| 07 02       | 9    |   |   |   |   |   |   |   |   |
| 08 02       | 0    |   |   |   |   |   |   |   |   |
| 15 15       | 1    |   |   |   |   |   |   |   |   |
| 08 02       | 2    |   |   |   |   |   |   |   |   |
| 11 10       | 3    |   |   |   |   |   |   |   |   |
| 05 01       | 4    |   |   |   |   |   |   |   |   |
| 08 02       | 5    |   |   |   |   |   |   |   |   |
| 15 10       | 6    |   |   |   |   |   |   |   |   |
| 04 01       | 7    |   |   |   |   |   |   |   |   |
| 07 02       | 8    |   |   |   |   |   |   |   |   |
| 04 01       | 9    |   |   |   |   |   |   |   |   |
| 03 00       | 0    |   |   |   |   |   |   |   |   |
| 00 01       | 1    |   |   |   |   |   |   |   |   |
| 03 02       | 2    |   |   |   |   |   |   |   |   |
| 05 00       | 3    |   |   |   |   |   |   |   |   |
| 08 02       | 4    |   |   |   |   |   |   |   |   |
| 01 10       | 5    |   |   |   |   |   |   |   |   |
| 08 13       | 6    |   |   |   |   |   |   |   |   |
| 08 02       | 7    |   |   |   |   |   |   |   |   |
| 02 10       | 8    |   |   |   |   |   |   |   |   |
| 09 15       | 9    |   |   |   |   |   |   |   |   |

# 700-1221  
TITLE/NO.

10M N8782L N87830

WANG LABORATORIES INC., TEWKSBURY, MASS. U.S.A.



# 700 PROGRAM DESCRIPTION

|                                                                                                                                                                                                        |              |                                                                                                                                                                                                                        |           |                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROGRAM TITLE<br>ROUND-OFF FOR 12-DIGIT NUMBER                                                                                                                                                         |              |                                                                                                                                                                                                                        |           | NUMBER<br>1000A/UT1                                                                                                                                                                                                                         |
| ROGRAM ABSTRACT<br>See Below                                                                                                                                                                           |              |                                                                                                                                                                                                                        |           | PROGRAMMED BY<br>JACK HUNG                                                                                                                                                                                                                  |
| BLOCKS                                                                                                                                                                                                 |              |                                                                                                                                                                                                                        |           | DATE<br>DECEMBER 23, 1969                                                                                                                                                                                                                   |
| NO.                                                                                                                                                                                                    | NO. OF STEPS | DATA REGISTERS                                                                                                                                                                                                         | MARK USED | NO. OF STEPS<br>24                                                                                                                                                                                                                          |
|                                                                                                                                                                                                        | 24           | 003                                                                                                                                                                                                                    | 0100      | VERIFY NUMBER<br>229                                                                                                                                                                                                                        |
|                                                                                                                                                                                                        |              |                                                                                                                                                                                                                        |           | SET P.C.<br>000                                                                                                                                                                                                                             |
| <u>TO "LEARN" PROGRAM</u><br>(keyboard to core)<br>1. Set <u>LEARN</u> mode.<br>2. <u>SET PC</u> to desired step.<br>3. Index keys in program.<br>4. Index <u>END PROGRAM</u> as last step in program. |              | <u>TO RECORD PROGRAM</u><br>(core to tape)<br>1. Insert tape cartridge.<br><u>REWIND</u> if necessary.<br>2. Set <u>TAPE READY</u> .<br>3. <u>SET PC</u> to first step of program.<br>4. Index <u>RECORD PROGRAM</u> . |           | <u>TO LOAD PROGRAM</u><br>(tape to core)<br>1. Set <u>RUN</u> mode.<br>2. Insert tape cartridge.<br><u>REWIND</u> if necessary.<br>3. Set <u>TAPE READY</u> .<br>4. <u>SET PC</u> to desired step number.<br>5. Index <u>LOAD PROGRAM</u> . |

## OPERATING PROCEDURE:

1. PRIME ; VERIFY PROGRAM Read (229)  
Put the number to be rounded off in the X-register
2. Set the Toggle Switches to 10 ; Key 00
3. Index the number of digits after the decimal pt. which are to be reserved after rounding off. Key GO
4. Read the result from Y-register

## EXAMPLE:

1. PRIME ; VERIFY PROGRAM Read (229)  
Key . 0 0 6 7 5 2 4
2. Set the Toggle Switches to 10 ; Key 00
3. Key 4 ; GO
4. Read from Y-register  $.68 \times 10^{-2}$

## NOTE:

In Operation 3, if the place to be rounded off is before the decimal pt. , Key CH SIGN before GO is keyed.

## EXAMPLE:

1. Key 1 2 3 4 . 5
2. Set the Toggle Switches to 10 ; Key 00
3. Key 1 ; CH SIGN ; GO
4. Read from Y-register 1230.



| Step | Key                                | Code | Comment |
|------|------------------------------------|------|---------|
| 0    | MARK                               | 0408 |         |
| 1    | 0100                               | 0100 |         |
| 2    | $\uparrow$                         | 0604 |         |
| 3    | SET EXP                            | 0710 |         |
| 4    | $\div$                             | 0603 |         |
| 5    | ST DIR                             | 0404 |         |
| 6    | 003                                | 0003 |         |
| 7    | STOP                               | 0515 |         |
| 8    | $10^x$                             | 0613 |         |
| 9    | x                                  | 0602 |         |
| 0    | $\downarrow \uparrow$              | 0606 |         |
| 1    | X DIR                              | 0402 |         |
| 2    | 003                                | 0003 |         |
| 3    |                                    | 0712 |         |
| 4    | 5                                  | 0705 |         |
| 5    | + DIR                              | 0400 |         |
| 6    | 003                                | 0003 |         |
| 7    | RE DIR                             | 0405 |         |
| 8    | 003                                | 0003 |         |
| 9    | INT X                              | 0608 |         |
| 0    | $\downarrow \uparrow$              | 0606 |         |
| 1    | $\div$                             | 0603 |         |
| 2    | RETURN                             | 0511 |         |
| 3    | END PROG                           | 0512 |         |
| 4    |                                    |      |         |
| 5    |                                    |      |         |
| 6    |                                    |      |         |
| 7    |                                    |      |         |
| 8    |                                    |      |         |
| 9    |                                    |      |         |
| 0    |                                    |      |         |
| 1    |                                    |      |         |
| 2    | 1. Address the 700 calculator      |      |         |
| 3    | GROUP 2                            |      |         |
| 4    | MARK                               |      |         |
| 5    | 2. Load cards                      |      |         |
| 6    | 3. Follow instructions on Page 10. |      |         |
| 7    |                                    |      |         |
| 8    |                                    |      |         |
| 9    |                                    |      |         |

| Step | Key | Code | Comment |
|------|-----|------|---------|
| 0    |     |      |         |
| 1    |     |      |         |
| 2    |     |      |         |
| 3    |     |      |         |
| 4    |     |      |         |
| 5    |     |      |         |
| 6    |     |      |         |
| 7    |     |      |         |
| 8    |     |      |         |
| 9    |     |      |         |

INSERT THIS END IN READER -- THIS SIDE UP

| P.G.M CODE | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 0          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 0          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 0          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 7          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 8          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 9          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

USE NO. 2 PENCIL

OF

CARD

# 700-1221  
TITLE/NO:

DESIGN 62878N MS1

WANG LABORATORIES INC; TEWKSBURY, MASS. U.S.A.

|   |  |  |  |
|---|--|--|--|
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |



# 700 PROGRAM DESCRIPTION

|                                                                                                                                                     |              |                                                                                                                                                                          |                  |                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROGRAM TITLE                                                                                                                                       |              |                                                                                                                                                                          |                  | NUMBER                                                                                                                                                                                          |
| "t" TEST FOR SIGNIFICANCE OF DIFFERENCE<br>BETWEEN PAIRED SAMPLES                                                                                   |              |                                                                                                                                                                          |                  | 1025A/ST2                                                                                                                                                                                       |
|                                                                                                                                                     |              |                                                                                                                                                                          |                  | PROGRAMMED BY<br>C. M. TANG                                                                                                                                                                     |
| PROGRAM ABSTRACT                                                                                                                                    |              |                                                                                                                                                                          |                  | DATE                                                                                                                                                                                            |
| See Below                                                                                                                                           |              |                                                                                                                                                                          |                  | SEPTEMBER 1, 1969                                                                                                                                                                               |
| BLOCKS                                                                                                                                              |              |                                                                                                                                                                          |                  | NO. OF STEPS                                                                                                                                                                                    |
| NO.                                                                                                                                                 | NO. OF STEPS | DATA REGISTERS                                                                                                                                                           | MARK USED        | 54                                                                                                                                                                                              |
|                                                                                                                                                     | 54           | 000, 001, 002                                                                                                                                                            | 0700, 0701, 0702 | VERIFY NUMBER<br>453                                                                                                                                                                            |
|                                                                                                                                                     |              |                                                                                                                                                                          |                  | SET P.C.<br>000                                                                                                                                                                                 |
| TO "LEARN" PROGRAM<br>(keyboard to core)                                                                                                            |              | TO RECORD PROGRAM<br>(core to tape)                                                                                                                                      |                  | TO LOAD PROGRAM<br>(tape to core)                                                                                                                                                               |
| 1. Set <u>LEARN</u> mode.<br>2. <u>SET PC</u> to desired step.<br>3. Index keys in program.<br>4. Index <u>END PROGRAM</u> as last step in program. |              | 1. Insert tape cartridge.<br><u>REWIND</u> if necessary.<br>2. Set <u>TAPE READY</u> .<br>3. <u>SET PC</u> to first step of program.<br>4. Index <u>RECORD PROGRAM</u> . |                  | 1. Set <u>RUN</u> mode.<br>2. Insert tape cartridge.<br><u>REWIND</u> if necessary.<br>3. Set <u>TAPE READY</u> .<br>4. <u>SET PC</u> to desired step number.<br>5. Index <u>LOAD PROGRAM</u> . |

## PROGRAM DESCRIPTION:

$$t = \frac{\frac{|\Sigma d|}{n} \sqrt{n-1}}{\sqrt{\frac{\Sigma d^2}{n} - \left(\frac{\Sigma d}{n}\right)^2}}$$

where

d = difference between each pair

n = total number of pairs

## EXAMPLE:

|   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| X | 3.4 | 3.0 | 3.0 | 3.4 | 3.7 | 4.0 | 2.9 | 2.9 | 3.1 | 2.8 | 2.8 | 2.4 |
| Y | 4.9 | 2.3 | 3.1 | 2.1 | 2.6 | 3.8 | 5.8 | 7.9 | 3.6 | 4.1 | 3.8 | 3.3 |

$$t = 1.60948...$$

## OPERATING PROCEDURE:

1. PRIME ; VERIFY PROGRAM Read 453
2. SEARCH 0
3. Index x ; GO
4. Index y ; GO  
Repeat Steps 3 and 4 for all points
5. SEARCH 1
6. Read "t"

## EXAMPLE:

1. PRIME ; VERIFY PROGRAM Read 453
2. SEARCH 0
3. 3 . 4 ; GO
4. 4 . 9 ; GO ,  
etc.
5. SEARCH 1
6. "t" = 1.60948...



# PROGRAM WORKSHEET

## CARD 1

700 PROGRAM TITLE: "t" TEST

| Step | Key            | Code | Comment |
|------|----------------|------|---------|
| 0    | MARK           | 0408 |         |
| 1    | 0              | 0700 |         |
| 2    | 0              | 0700 |         |
| 3    | ST DIR         | 0404 |         |
| 4    | REG 00         | 0000 |         |
| 5    | ST DIR         | 0404 |         |
| 6    | REG 01         | 0001 |         |
| 7    | ST DIR         | 0404 |         |
| 8    | REG 02         | 0002 |         |
| 9    | MARK           | 0408 |         |
| 0    | 2              | 0702 |         |
| 1    | STOP           | 0515 |         |
| 2    | ↑              | 0604 |         |
| 3    | STOP           | 0515 |         |
| 4    | -              | 0601 |         |
| 5    | ↓              | 0605 |         |
| 6    | + DIR          | 0400 |         |
| 7    | REG 00         | 0000 |         |
| 8    | x <sup>2</sup> | 0713 |         |
| 9    | + DIR          | 0400 |         |
| 0    | REG 01         | 0001 |         |
| 1    | 1              | 0701 |         |
| 2    | + DIR          | 0400 |         |
| 3    | REG 02         | 0002 |         |
| 4    | SEARCH         | 0407 |         |
| 5    | 2              | 0702 |         |
| 6    | MARK           | 0408 |         |
| 7    | 1              | 0701 |         |
| 8    | RE DIR         | 0405 |         |
| 9    | REG 00         | 0000 |         |
| 0    | x              | 0607 |         |
| 1    | ↑              | 0604 |         |
| 2    | RE DIR         | 0405 |         |
| 3    | REG 02         | 0002 |         |
| 4    | ÷              | 0603 |         |
| 5    | ÷ DIR          | 0403 |         |
| 6    | REG 01         | 0001 |         |
| 7    | ↓              | 0605 |         |
| 8    | x <sup>2</sup> | 0713 |         |
| 9    | - DIR          | 0401 |         |

## CARD 2

NO. 1025A/ST2 Page 1 of 1

| Step | Key      | Code | Comment |
|------|----------|------|---------|
| 0    | REG 01   | 0001 |         |
| 1    | RE DIR   | 0405 |         |
| 2    | REG 01   | 0001 |         |
| 3    | √x       | 0612 |         |
| 4    | ÷        | 0603 |         |
| 5    | 1        | 0701 |         |
| 6    | - DIR    | 0401 |         |
| 7    | REG 02   | 0002 |         |
| 8    | RE DIR   | 0405 |         |
| 9    | REG 02   | 0002 |         |
| 0    | √x       | 0612 |         |
| 1    | 'x       | 0602 |         |
| 2    | CLEAR X  | 0715 |         |
| 3    | STOP     | 0515 |         |
| 4    | END PROG | 0512 |         |
| 5    |          |      |         |
| 6    |          |      |         |
| 7    |          |      |         |
| 8    |          |      |         |
| 9    |          |      |         |
| 0    |          |      |         |
| 1    |          |      |         |
| 2    |          |      |         |
| 3    |          |      |         |
| 4    |          |      |         |
| 5    |          |      |         |
| 6    |          |      |         |
| 7    |          |      |         |
| 8    |          |      |         |
| 9    |          |      |         |

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1. Address the 700 calculator.  
GROUP 2  
~~MARK~~ 0408
2. Load cards
3. Follow instructions on Page 12.

INSERT THIS END IN READER -- THIS SIDE UP

USE NO. 2 PENCIL

700-1221  
TITLE/NO.

WANG LABORATORIES INC., TEWKSBURY, MASS. U.S.A.

## CARD 1

INSERT THIS END IN READER -- THIS SIDE UP

USE NO. 2 PENCIL

700-1221  
TITLE/NO.

WANG LABORATORIES INC., TEWKSBURY, MASS. U.S.A.

## CARD 2



# 700 PROGRAM DESCRIPTION

|                                                                                 |              |                |           |                             |
|---------------------------------------------------------------------------------|--------------|----------------|-----------|-----------------------------|
| PROGRAM TITLE<br>RATE OF RADIOACTIVE PARTICLES FROM GAS DISCHARGES UP THE STACK |              |                |           | NUMBER<br>1046A/GS2         |
| PROGRAM ABSTRACT                                                                |              |                |           | PROGRAMMED BY<br>Phil Gaber |
|                                                                                 |              |                |           | DATE<br>2/2/70              |
| BLOCKS                                                                          |              |                |           | NO. OF STEPS<br>49          |
| NO.                                                                             | NO. OF STEPS | DATA REGISTERS | MARK USED | VERIFY NUMBER<br>488        |
|                                                                                 | 49           | 001 - 005      | 0000      | SET P.C.<br>000             |

## TO "LEARN" PROGRAM (keyboard to core)

1. Set LEARN mode.
2. SET PC to desired step.
3. Index keys in program.
4. Index END PROGRAM as last step in program.

## TO RECORD PROGRAM (core to tape)

1. Insert tape cartridge.  
REWIND if necessary.
2. Set TAPE READY.
3. SET PC to first step of program.
4. Index RECORD PROGRAM.

## TO LOAD PROGRAM (tape to core)

1. Set RUN mode.
2. Insert tape cartridge.  
REWIND if necessary.
3. Set TAPE READY.
4. SET PC to desired step number.
5. Index LOAD PROGRAM.

F - Flow rate (Cmf)  
T - Collection time (minutes)  
GRC - Gross countrate (also in cpm's)  
E - Counter efficiency  
FS - Stack flow rate (cc/sec)  
NCR - Net countrate (also in cpm's)  
Radioactive concentration of particles ( $\mu$  curies/cc)

## FORMULA

$$CP = \frac{(NCR) (10^{-10})}{(6.29) (F) (T) (E)}$$

$$NCR = GCR - BCR$$

$$RR = (CP) (FS)$$

## INSTRUCTIONS

1. PRIME ; SEARCH
2. Key F GO
3. Key T GO
4. Key GCR GO
5. Key E GO
6. Key FS GO
7. Key BCR GO
8. Read NCR GO
9. Read CP GO
10. Read RR

## SPECIAL FUNCTION KEY 0000

T = 1250  
GCR = 3856419  
E = .9  
FS = 7200000  
BCR = 123  
NCR = 3,856,296  
CP = .136240805511 - 07  
RR = .980933799679 - 01

## EXAMPLE

$$F = 4$$



# PROGRAM WORKSHEET

## CARD 1

700 PROGRAM TITLE: PARTICLE RELEASE

| Step | Key         | Code | Comment  |
|------|-------------|------|----------|
| 0    | MARK        | 0408 | Key G    |
| 1    | Reg 000     | 0000 | Key T    |
| 2    | STOP        | 0515 | Key GCR  |
| 3    | ST IND      | 0504 | Key E    |
| 4    | 1           | 0701 | Key FS   |
| 5    | +           | 0600 | Key BCR  |
| 6    | 5           | 0705 |          |
| 7    | SKIP IF X=Y | 0509 |          |
| 8    | SEARCH      | 0407 |          |
| 9    | Reg 000     | 0000 |          |
| 10   | STOP        | 0515 |          |
| 1    | - DIR       | 0401 |          |
| 2    | Reg 002     | 0002 |          |
| 3    | RE DIR      | 0405 |          |
| 4    | Reg 002     | 0002 |          |
| 5    | ↑           | 0604 |          |
| 6    | CLEAR X     | 0715 |          |
| 7    | STOP        | 0515 | Read NCR |
| 8    | ↓           | 0605 |          |
| 9    | WR ALPHA    | 0412 |          |
| 20   | + DIR       | 0400 |          |
| 1    | ST DIR      | 0404 |          |
| 2    | Reg 005     | 0005 |          |
| 3    | 6           | 0706 |          |
| 4    | .           | 0712 |          |
| 5    | 2           | 0702 |          |
| 6    | 9           | 0709 |          |
| 7    | ↑           | 0604 |          |
| 8    | RE DIR      | 0405 |          |
| 9    | Reg 000     | 0000 |          |
| 30   | X           | 0602 |          |
| 1    | RE DIR      | 0405 |          |
| 2    | Reg 001     | 0001 |          |
| 3    | X           | 0602 |          |
| 4    | RE DIR      | 0405 |          |
| 5    | Reg 003     | 0003 |          |
| 6    | X           | 0602 |          |
| 7    | RE DIR      | 0405 |          |
| 8    | Reg 005     | 0005 |          |
| 9    | 5           | 0606 |          |

## CARD 2

NO. 1046A/GS2 Page 1 of 1

| Step | Key      | Code | Comment |
|------|----------|------|---------|
| 40   | +        | 0603 |         |
| 1    | CLEAR X  | 0715 |         |
| 2    | STOP     | 0515 | Read C  |
| 3    | RE DIR   | 0405 |         |
| 4    | Reg 004  | 0004 |         |
| 5    | X        | 0602 |         |
| 6    | CLEAR X  | 0715 |         |
| 7    | STOP     | 0515 | Read RR |
| 48   | END PROG | 0512 |         |
| 9    |          |      |         |
| 0    |          |      |         |
| 1    |          |      |         |
| 2    |          |      |         |
| 3    |          |      |         |
| 4    |          |      |         |
| 5    |          |      |         |
| 6    |          |      |         |
| 7    |          |      |         |
| 8    |          |      |         |
| 9    |          |      |         |
| 0    |          |      |         |
| 1    |          |      |         |
| 2    |          |      |         |
| 3    |          |      |         |
| 4    |          |      |         |
| 5    |          |      |         |
| 6    |          |      |         |
| 7    |          |      |         |
| 8    |          |      |         |
| 9    |          |      |         |

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- Address the 700 calculator.  
GROUP 2  
~~MARK~~ 0408
- Load cards
- Follow instructions on Page 14.

INSERT THIS END IN READER -- THIS SIDE UP

USE NO. 2 PENCIL

1 / 7

OF

CARD

# 700-1221  
TITLE/NO.

ORIGIN GREENHILL

WANG LABORATORIES INC., NEWTON, MASS. U.S.A.

## CARD 1

INSERT THIS END IN READER -- THIS SIDE UP

USE NO. 2 PENCIL

1 / 7

OF

CARD

# 700-1221  
TITLE/NO.

ORIGIN GREENHILL

WANG LABORATORIES INC., NEWTON, MASS. U.S.A.

## CARD 2



## MODEL 500 PROGRAM DESCRIPTION

|                                                                                                        |              |           |                                   |
|--------------------------------------------------------------------------------------------------------|--------------|-----------|-----------------------------------|
| PROGRAM TITLE                                                                                          |              |           | No. 037-0-BF1                     |
| SALVAGE VALUE (Book)                                                                                   |              |           | Programmed By<br>James J. Gibson  |
| PROGRAM ABSTRACT                                                                                       |              |           | Date<br>March 18, 1971            |
| This program finds book of salvage value, L, at declining depreciation rate, f, at the end of N years. |              |           | No. of Steps 32                   |
|                                                                                                        |              |           | Verify No. With Printer<br>421    |
|                                                                                                        |              |           | Verify No. Without Printer<br>428 |
| BLOCKS                                                                                                 |              |           |                                   |
| NO.                                                                                                    | NO. OF STEPS | DATA REG. | MARKS                             |
|                                                                                                        | 32           | 15        | 1000                              |

## PROGRAM DESCRIPTION

$$L = P(1-f)^N$$

where

L = book of salvage value at the end of N years  
P = price of first cost  
f = declining balance depreciation rate  
N = age of item in years

1. Address the 500 calculator
2. Engage LEARN mode
3. Load Cards
4. Follow instructions on Page 17.

**NOTE:**

This program illustrates the printer and display versions. See Volume 1 of your 500 Program Library.

INSERT THIS END IN READER -- THIS SIDE UP

| P G M CODE | SKIP                     |                          |                          |                          | SKIP                     |                          |                          |                          |
|------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|            | 8                        | 4                        | 2                        | 1                        | 8                        | 4                        | 2                        | 1                        |
| 0          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 0          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
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| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 0          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 0          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 0          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7          | <input type="checkbox"/> | <input type="checkbox"/> |                          |                          |                          |                          |                          |                          |

WANG LABORATORIES INC; TEWKSBURY, MASS. U.S.A.



OPERATING PROCEDUREPRINTER

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 421
2. Depress f(x), PRINTER ON;
3. Key f, 00;  
f labeled by "F"
4. Key N, GO;  
N labeled by "Y"
5. Key P, GO;  
P labeled by "C"
6. READ: L labeled by "L"

DISPLAY

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 428
2. Depress f(x);
3. Key f, 00;
4. Key N, GO
5. Key P, GO
6. READ: L

EXAMPLE: What is the salvage value of a nine-year old \$25,000 computer if the declining balance depreciation rate is 15.497%?

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 421
2. Depress f(x), PRINTER ON;
3. Key 1 5 . 4 9 7, 00;
4. Key 9, GO;
5. Key 2 5 0 0 0, GO;
6. READ:

15.4970  
9.00  
25000.00

F  
Y  
C  
  
L

5492.74

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 428
2. Depress f(x);
3. Key 1 5 . 4 9 7, 00;
4. Key 9, GO;
5. Key 2 5 0 0 0, GO;
6. READ: 5492.746432



# MODEL 500 PROGRAM DESCRIPTION

|                                                                                                                                                                  |              |           |                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|-----------------------------------|
| PROGRAM TITLE                                                                                                                                                    |              |           | No. 035-0-BF1                     |
| DECLINING BALANCE DEPRECIATION RATE                                                                                                                              |              |           | Programmed By<br>James J. Gibson  |
| PROGRAM ABSTRACT                                                                                                                                                 |              |           | Date<br>March 18, 1971            |
| This program finds declining balance depreciation rate such that the book (listed) value of an item equals estimated salvage value at the end of an N year life. |              |           | No. of Steps<br>31                |
|                                                                                                                                                                  |              |           | Verify No. With Printer<br>442    |
|                                                                                                                                                                  |              |           | Verify No. Without Printer<br>434 |
| BLOCKS                                                                                                                                                           |              |           |                                   |
| NO.                                                                                                                                                              | NO. OF STEPS | DATA REG. | MARKS                             |
|                                                                                                                                                                  | 31           | 01, 15    | 1000                              |

## PROGRAM DESCRIPTION

$$f = 1 - \sqrt[N]{\frac{L}{P}}$$

where

- f = declining balance depreciation rate  
N = life of study period in years  
L = prospective net salvage value at end of N years  
P = price or first cost

1. Address the 500 calculator.
2. Engage LEARN mode
3. Load Cards
4. Follow instructions on Page 19.

### NOTE:

This program illustrates the printer and display versions. See Volume 1 of your 500 Program Library.

| P G M CODE       |   | INSERT THIS END IN READER -- THIS SIDE UP |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|------------------|---|-------------------------------------------|---|---|---|---|---|---|---|---|--|--|--|--|--|--|--|
|                  |   | SKIP                                      | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 |  |  |  |  |  |  |  |
| USE NO. 2 PENCIL | 0 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 1 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 2 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 3 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 4 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 5 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 6 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 7 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 8 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 9 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
| CARD             | 0 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 1 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 2 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 3 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 4 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 5 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 6 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 7 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 8 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 9 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
| TITLE/NO:        | 0 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 1 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 2 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 3 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 4 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 5 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 6 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 7 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 8 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |
|                  | 9 |                                           |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |

WANG LABORATORIES INC. TEWKSBURY, MASS. U.S.A.

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OPERATING PROCEDUREPRINTER

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 442
2. Depress f(x), PRINTER ON;
3. Key P, GO;  
P labeled by "C"
4. Key L, GO;  
L labeled by "L"
5. Key N, GO;  
N labeled by "M"
6. READ: f labeled by "F"

DISPLAY

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 434
2. Depress f(x);
3. Key P, GO
4. Key L, GO;
5. Key N, GO;
6. READ: f

EXAMPLE: What declining balance depreciation rate would make the book value of a \$25,000 computer exactly equal the prospective salvage value (\$2000) at the end of a 15 year life?

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 442
2. Depress f(x), PRINTER ON;
3. Key 2 5 0 0 0, 00
4. Key 2 0 0 0, GO
5. Key 1 5, GO
6. READ:

25000.00  
2000.00  
15.00

15.49689

C  
L  
M  
F

1. Key PRIME, LOAD PROGRAM, VERIFY PROGRAM: Display should read 434
2. Depress f(x);
3. Key 2 5 0 0 0, 00
4. Key 2 0 0 0, GO
5. Key 1 5, GO
6. READ: 15.49689524



| <p>DATE</p> <p>TIME</p> <p>LOCATION</p> | <p>DESCRIPTION</p>                           |
|-----------------------------------------|----------------------------------------------|
| <p>1945</p> <p>10:00</p> <p>1000</p>    | <p>1. 1000</p> <p>2. 1000</p> <p>3. 1000</p> |
| <p>1945</p> <p>10:00</p> <p>1000</p>    | <p>1. 1000</p> <p>2. 1000</p> <p>3. 1000</p> |
| <p>1945</p> <p>10:00</p> <p>1000</p>    | <p>1. 1000</p> <p>2. 1000</p> <p>3. 1000</p> |
| <p>1945</p> <p>10:00</p> <p>1000</p>    | <p>1. 1000</p> <p>2. 1000</p> <p>3. 1000</p> |
| <p>1945</p> <p>10:00</p> <p>1000</p>    | <p>1. 1000</p> <p>2. 1000</p> <p>3. 1000</p> |
| <p>1945</p> <p>10:00</p> <p>1000</p>    | <p>1. 1000</p> <p>2. 1000</p> <p>3. 1000</p> |
| <p>1945</p> <p>10:00</p> <p>1000</p>    | <p>1. 1000</p> <p>2. 1000</p> <p>3. 1000</p> |







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