



## **WANG 300 Series electronic calculators**



**Models to solve every computational need**

**... from basic arithmetic computations to  
complex equations and programmed calculations,  
... wherever speed, simplicity, reliability and  
computational value/dollar are important.**

**BASIC MODEL 300**

Glare-free, 10-digit display with  $\frac{5}{8}$ " high illuminated numerals, distinct, floating decimal point and algebraic sign.

CHANGE SIGN key alters algebraic sign of any number displayed.

ON-OFF SWITCH

PRODUCT ACCUMULATION SWITCH

LEFT ADDER stores intermediate addition and subtraction totals and automatically accumulates sums of products and quotients.

PRODUCT REGISTER keys for multiplication, division and single-stroke reciprocals.

WORK REGISTER. Standard 10-key layout for simplicity and accuracy.

DECIMAL POINT. Can be placed anywhere over the range of  $10^{-10}$  to  $(10^{+10}-1)$

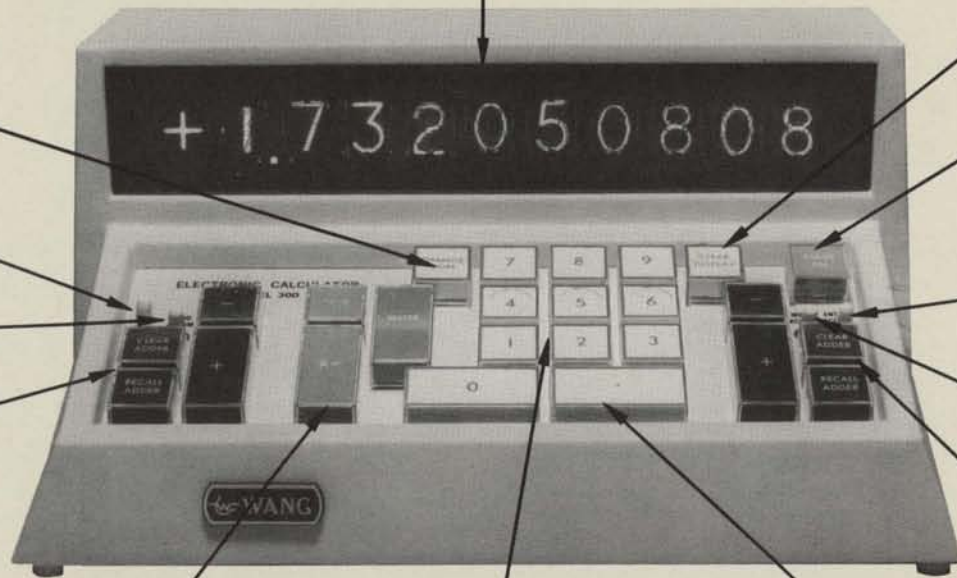
CLEAR DISPLAY key removes any number indexed and shown in display.

CLEAR ALL key primes calculator for operation and removes all previously entered numbers.

ENTRY ACCUMULATION SWITCH

MULTIPLIER ACCUMULATION SWITCH

RIGHT ADDER stores intermediate addition and subtraction totals and automatically accumulates sums of multipliers and/or entries.



## An advanced concept in calculating power

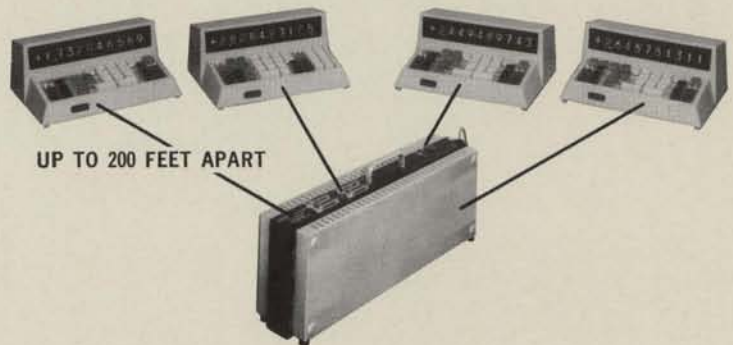
Wang calculators are as convenient and portable as a telephone. There is always space for the compact keyboards wherever greater computational power is needed. They are as simple to learn and operate as a ten-key adding machine, yet they can increase computational speed by as much as 8 to 16 times. Because there are no moving parts, all computations are performed silently, at electronic speed. There are no complicated mechanisms to wear out and break down. In thousands of installations in business, education, industry, science and engineering, Wang 300 Series electronic calculators have proven their reliability in more than two years of dependable operation.

Many companies are standardizing on Wang calculators because the versatility and compatibility of the 300 Series can solve the needs of a variety of operations. As explained on the following pages, there are many options available (more than any other calculator manufacturer) to increase calculating capabilities to suit every need. Add-on compatibility makes it possible to expand into sophisticated desk top calculating systems (Wang 370 Series) that will branch, loop, perform sub-routines, make decisions and manipulate arrays. For unmatched economy, up to four keyboards can share the same electronics, thus costing far less per station than any comparable calculating machine.



UP TO 200 FEET APART

Basic Model 300K keyboard and separate, compact electronics package 300E (shown at left) is the standard configuration for single unit applications.

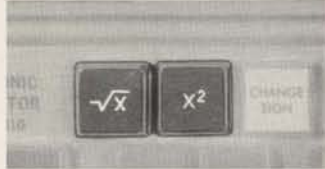


UP TO 200 FEET APART

Up to four 300K keyboards can operate simultaneously from electronics package 300SE (as shown at right) for greater economy in multiple station applications. Line connections are provided in 25 foot increments up to 200 feet.

## Step-by-step Increase in Calculating Capabilities

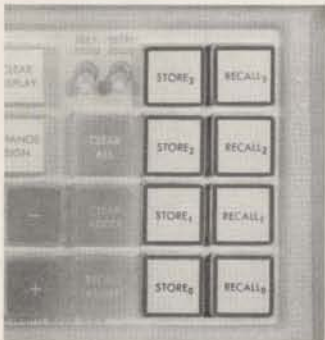
Added keys on Model 310 for statistical computations



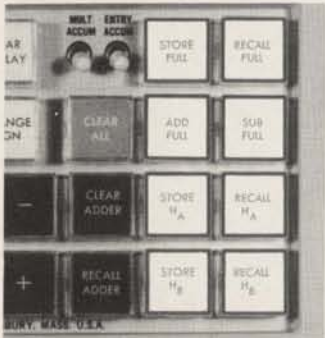
Added keys on Model 320 for scientific calculations



4 extra storage registers on Model 360



12 extra accumulating storage registers on Model 362 (Split to 24—Storage only)



Trigonometric keys on Models 320KT, 320KR, 360 KT and 36OKR



## SUMMARY OF 300 SERIES MODELS

TYPE	FUNCTION	MODELS
Business Calculator	Instant additions, subtractions, multiplications, divisions, reciprocals, percentages, automatic extensions, chain multiplications, weighted averages, etc. Two independent adders and product register, large readout display, floating decimal point.	300E and 300K; or 300SE and four 300K's <b>Physical Measurements</b> E Models: 9" x 15" x 17", 15 lbs. SE Models: 8" x 5" x 24", 25 lbs. Keyboards: 8" x 4 1/2" x 10 1/4", 6 lbs
Statistical Calculator	All of the features and functions of the Model 300 above and instant $\sqrt{x}$ , $x^2$ . Automatic $\Sigma x$ , $\Sigma x^2$ , $\Sigma y$ , $\Sigma y^2$ , $\Sigma(x+y)$ , $\Sigma(x \cdot y)$ , $\Sigma \sqrt{x}$ , $\Sigma \frac{1}{x}$	310E and 310K; or 310SE and four 310K's <b>Physical Measurements</b> (See above)
Item Counter (add to any 300 series keyboard)	Counts the number of +, -, X, ÷, $\sqrt{x}$ , $x^2$ operations or combinations thereof.	IC-1 compatible with 300K, 310K, 320K, and 360K. <b>Physical Measurements</b> 5" x 5 1/2" x 3", 1 3/4 lbs.
Scientific Calculator	All of the features and functions of the Model 310 above and instant $\text{Log}_e X$ and $e^x$ with 14-digit accuracy.	320E and 320K; or 320SE and four 320K's <b>Physical Measurements</b> (See above)
Scientific Calculator with Extra Storage	All of the functions of above plus four extra registers to store 14-digit numbers, decimal point and +- sign.	360E and 360K Single-output electronics only. <b>Physical Measurements</b> (See above)
	12 extra registers to accumulate and/or store 14-digit numbers or 24 half-registers to store 6-digit numbers. All registers show correct decimal point and sign.	362E and 362K Single-output electronics only. <b>Physical Measurements</b> 362E: 7" x 11.8" x 17", 20 lbs. 362K: 8" x 4 1/2" x 10 1/4", 6 lbs
Trigonometric Calculator	All of the functions above and single keystroke generation of sine, cosine, arcsin, and arctan in degrees or radians, by Taylor series.	320KT or 320KR to function with 320E or 320SE. 360KT or 360KR to function with 360E or 362E <b>Physical Measurements</b> 9 1/2" x 5 1/4" x 12", 9 lbs.
Card Reader or Programmer	Stores up to 80 instructions to automate keyboard operations by prescored tab-card; two cards for 160 steps. Programmed in easy keyboard language.	CP-1 compatible with any calculator model listed above including KT's and KR's. <b>Physical Measurements</b> 5 1/2" x 2 1/2" x 9 1/2", 6 1/2 lbs.

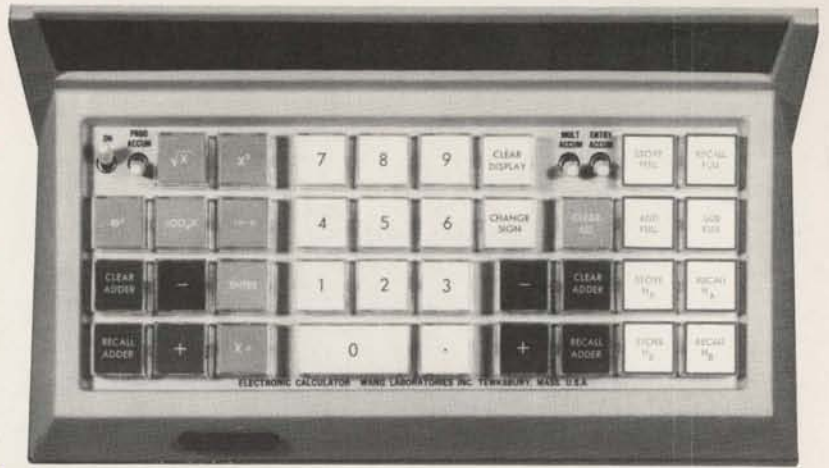
## Sample Problems/Solutions

- To Key in  $-3.1416$   
3 . 1 4 1 6 **[Change Sign]**
- To find  $2 + 5.7$  in left Adder  
**[Clear Adder]** 2 **[+ A<sub>L</sub>]** 5 . 7  
**[+ A<sub>L</sub>]** ans.: +7.7
- To find  $9 + 4.5 - 14$  in A<sub>R</sub>  
**[Clear Adder]** 9 **[+ A<sub>R</sub>]** 4 . 5  
**[+ A<sub>R</sub>]** 1 4 **[- A<sub>R</sub>]** ans.: -5
- To recall left Adder  
**[Recall A<sub>L</sub>]** ans.: +7.7
- To recall left Adder and divide its contents by right Adder contents  
**[Recall A<sub>L</sub>]** **[Enter]** **[Recall A<sub>R</sub>]** **[÷ =]** ans.: -15.4
- To find  $2 \times 3 = 6$   
2 **[Enter]** 3 **[X =]**
- To find  $2 \times 3 \times 4 \times 5 = 120$   
2 **[Enter]** 3 **[Enter]** 4 **[Enter]** 5 **[X =]**
- To find  $\frac{2 \times 3 \times 4}{5} = 4.8$   
2 **[Enter]** 3 **[Enter]** 4 **[Enter]** 5 **[÷ =]**
- To total a series of extensions
 

Quantity	Price	Amount
156	\$1.75	\$ 273.00
200	3.89	778.00
445	1.29	574.05
<u>801</u>		<u>\$1,625.05</u>

+: Press + Key  
A<sub>L</sub>: Left Adder  
A<sub>R</sub>: Right Adder

Turn on Prod Accum and Entry Accum switches.  
**[Clear All]**  
156 **[Enter]** 1.75 **[X =]** Record \$273.00  
200 **[Enter]** 3.89 **[X =]** Record \$778.00  
445 **[Enter]** 1.29 **[X =]** Record \$574.05  
**[Recall A<sub>R</sub>]** Record 801  
**[Recall A<sub>L</sub>]** Record \$1,625.05  
Turn off duplex switches if no more add-ons (taxes) or discounts are involved.
- To find weighted average from exercise 9  
**[Recall A<sub>L</sub>]** **[Enter]** **[Recall A<sub>R</sub>]** **[÷ =]**  
ans.: +2.028776529
- To find  $\frac{7}{8} + \frac{1}{8} = +.2678571429$   
Turn on Prod Accum **[Clear A<sub>L</sub>]**  
7 **[÷ =]** 8 **[÷ =]** **[Recall A<sub>L</sub>]**
- To find  $\sqrt{2}$   
2 **[√X]** ans.: 1.41421
- To find  $3\sqrt{2}$   
3 **[Enter]** 2 **[√X]** ans.: +4.2426
- To find  $(7.5)^2$   
7.5 **[X<sup>2</sup>]** ans.: +56.25
- To find  $2 \times (7.5)^2$   
2 **[Enter]** 7.5 **[X<sup>2</sup>]** ans.: +112.5
- To find  $\log_e 7.5$   
7.5 **[Log<sub>e</sub>X]** ans.: +02.01490302
- To find  $\log_e (2 \times 7.5)$   
2 **[Enter]** 7.5 **[Log<sub>e</sub>X]** ans.: +02.70805020
- To find  $\log_{10} 7.5 = \frac{\log_e 7.5}{\log_e 10}$   
10 **[Log<sub>e</sub>X]** **[Clear A<sub>L</sub>]** **[+ A<sub>R</sub>]**  
7.5 **[Log<sub>e</sub>X]** **[Enter]** **[Recall A<sub>R</sub>]** **[÷ =]**  
ans.: +.8750612634
- To find e  
1 **[e<sup>x</sup>]** ans.: +2.718281828
- To find  $e^{-.25}$   
.25 **[e<sup>x</sup>]** ans.: +1.284025416
- To find  $(7.5)^7$   
7.5 **[Log<sub>e</sub>X]** **[Enter]** 7 **[X =]** **[e<sup>x</sup>]**  
ans.: +1334838.862
- To find  $\sqrt[7]{7.5} = (7.5)^{1/7}$   
7.5 **[Log<sub>e</sub>X]** **[Enter]** 7 **[÷ =]** **[e<sup>x</sup>]**  
ans.: +1.333548305
- To find  $e^{-1.5}$   
1.5 **[Change Sign]** **[e<sup>x</sup>]**  
ans.: +.2231301601
- To store 4.4, 5.5, 6.6, 7.7  
in Reg<sub>0</sub>, Reg<sub>1</sub>, Reg<sub>2</sub>, Reg<sub>3</sub> respectively  
4.4 **[Store Reg<sub>0</sub>]**  
5.5 **[Store Reg<sub>1</sub>]**  
6.6 **[Store Reg<sub>2</sub>]**  
7.7 **[Store Reg<sub>3</sub>]**
- To recall contents of Reg<sub>0</sub>  
**[Recall Reg<sub>0</sub>]**
- To change its content to 8.8  
8.8 **[Store Reg<sub>0</sub>]**
- To find  $\sin 30.5^\circ$  in 360KT  
30.5 **[Sin]** ans.: +.5075383631
- To find  $\sin^{-1}.50754$   
.50754 **[sin<sup>-1</sup>]** ans.: 30.5°
- $\frac{a}{\sin A} = \frac{b}{\sin B}$  on 360KT  
A = 40.5° B = 70.85° b = 250 feet  
 $a = \frac{\sin 40.5^\circ}{\sin 70.85^\circ} \times 250$   
= 153.38 feet  
**[Clear All]** 70.85 **[sin]** **[Store Reg<sub>0</sub>]**  
40.5 **[sin]** **[Enter]** 250 **[Enter]**  
**[Recall Reg<sub>0</sub>]** **[÷ =]**



## Model 362 Desktop Calculator/Computer with Twelve Storage Registers

Model 362, with twelve storage registers, two independent adders, and the instant Log Register, is highly efficient for calculations in science, engineering, statistics, and finance. By combining the 362 with a CP-1 Card Programmer, the executive or professional user can command an extremely neat and versatile package of computing power at his own desk.

The two adders and twelve storage registers on the Model 362 all can handle ten to fourteen digit numbers plus decimal points and the + or - sign. The twelve storage registers are also accumulators; each can be used to store, recall, add or subtract numbers. Thus, the 362K keyboard with only one

set of numerical keys, has the power of fourteen adding machines!

Each of the twelve storage registers can be split into half registers to store two numbers of six digits, along with their respective decimals and + or - signs. Hence, with the 362 it is practical to operate the keyboard to generate numbers, and then store away twenty-four (24) of these at a time.

This kind of computing power will suit the needs of most executives and professionals, in the key areas of management information, and technical analysis. Combined with the CP-1 Programmer (described on following page), the Model 362 spells the end of delays for those who must make important decisions based on figure facts and analytics!

### 362 Application Illustration

Prorate \$75,000 according to direct labor hours without re-keying the DL hours:

DEPARTMENT	HOURS	PRORATED AMOUNT
1	3,950	\$17,193.85
2	2,945	12,819.21
3	2,865	12,470.98
4	1,890	8,226.93
5	2,175	9,467.50
6	3,405	14,821.53
	<u>17,230</u>	<u>\$75,000.00</u>

362K KEY OPERATION	PROGRAM CODE	362K KEY OPERATION	PROGRAM CODE
Clear All		Recall Full 1	17, 61
3950		Enter	41
Store Full 1	13, 61	Recall A <sub>R</sub>	51
+ A <sub>L</sub>	56	X =	46
2945		(Record \$17,193.85)	
Store Full 2	13, 62	Recall Full 2	17, 62
+ A <sub>L</sub>	56	Enter	41
2865		Recall A <sub>R</sub>	51
Store Full 3	13, 63	X =	46
+ A <sub>L</sub>	56	(Record \$12,819.21)	
1890		Recall Full 3	17, 63
Store Full 4	13, 64	Enter	41
+ A <sub>L</sub>	56	Recall A <sub>R</sub>	51
2175		X =	46
Store Full 5	13, 65	(Record \$12470.98)	
+ A <sub>L</sub>	56	Recall Full 4	17, 64
3405		Enter	41
Store Full 6	13, 66	Recall A <sub>R</sub>	51
+ A <sub>L</sub>	56	X =	46
(Record 17230)		(Record \$8226.93)	
75000		Recall Full 5	17, 65
Enter	41	Enter	41
Recall A <sub>L</sub>	55	Recall A <sub>R</sub>	51
÷ =	47	X =	46
+ Right	52	(Record \$9467.50)	
Clear A <sub>L</sub>	50	Recall Full 6	17, 65
Turn on Prod Accum		Enter	41
		Recall A <sub>R</sub>	51
		X =	46
		(Record \$14821.53)	
		Recall A <sub>L</sub>	55
		(Read = \$75,000 check)	

Note: A<sub>L</sub> = Left adder  
A<sub>R</sub> = Right Adder

## Stored Program Operations



Wang CP-1 Card Programmer

Operations of the Wang keyboard are in essence a series of arithmetic commands, interspersed with numerical variables and constants. Each calculation has its logical sequence of the key-touching commands. So, if we were to preserve the steps taken to execute a calculation, the result is a stored and reusable program.

The stored-program system on the Wang calculators consists of a computer tab-card(s) and a card reading CP-1 Programmer. The latter is a device that can be attached between any 300 Series electronics and the appropriate keyboard unit. There is a 50-foot limitation to the extension cable reaching the CP-1 in order not to exceed the design margins for power requirements.

### Example of a Stored Program

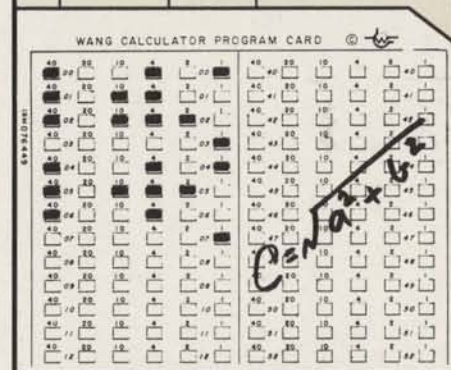
The Pythagorean Law states that  $c^2 = a^2 + b^2$ , or  $c = \sqrt{a^2 + b^2}$ . The key-touch sequence for this on a Wang calculator are: Clear Adder left, input value of a,  $x^2 +$  left, input value of b,  $x^2 +$  left, and  $\sqrt{x}$ .

To store this program of key-touching sequence on the Wang program card, we list the operations and add an appropriate "stop" command for entering new inputs or for the end of the program. Then, we code each command in accordance with a predetermined listing. The written program is complete.

Next, the program card is prepared by punching through the correct codes for each step on the prescored card. A "41" code for the Enter operation requires that holes be opened for 40 and 1. A "66" code for the numeral 6 requires that holes be opened for 40, 20, 4, and 2. A stylus and a portapunch are available for the preparation of program cards. The Pythagorean program now looks as shown in the program work sheet above right.

## Calculator Program

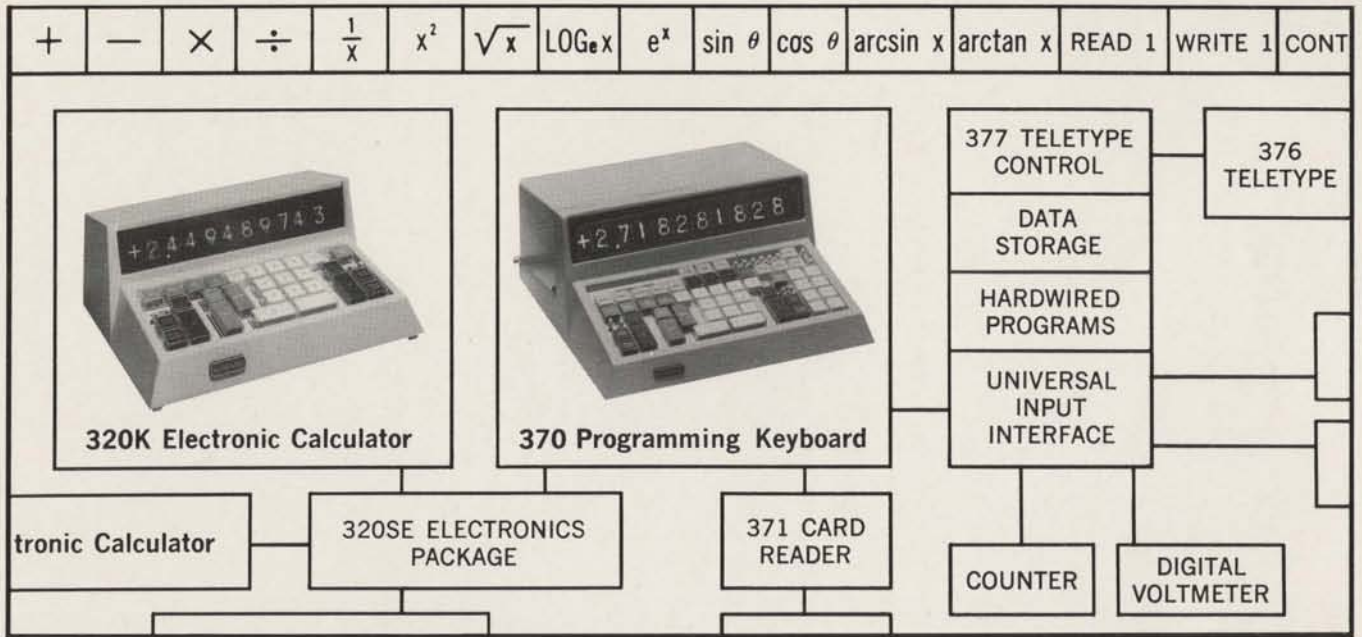
No	Cmd	Code	Comment
00	$X^2$	45	
01	CLA <sub>L</sub>	54	
02	+A <sub>L</sub>	56	
03	Stop	01	Index b
04	$X^2$	45	
05	+A <sub>L</sub>	56	
06	$\sqrt{x}$	44	
07	Stop	01	Display c



### Code Listing for Program Control

PROGRAM CODE	300-360 OPERATION	362 OPERATION
01	Stop	Stop
10	Store Reg 0	Store Half B
11	Store Reg 1	Store Half A
12	Store Reg 2	Add Full
13	Store Reg 3	Store Full
14	Recall Reg 0	Recall Half B
15	Recall Reg 1	Recall Half A
16	Recall Reg 2	Subtract Full
17	Recall Reg 3	Recall Full
41	Enter	Enter
42	Log <sub>e</sub> X	Log <sub>e</sub> X
43	$e^x$	$e^x$
44	$\sqrt{x}$	$\sqrt{x}$
45	$X^2$	$X^2$
46	X =	X =
47	÷ =	÷ =
50	Clear Right Adder	Clear Right Adder
51	Recall Right Adder	Recall Right Adder
52	+ Right Adder	+ Right Adder
53	- Right Adder	- Right Adder
54	Clear Left Adder	Clear Left Adder
55	Recall Left Adder	Recall Left Adder
56	+ Left Adder	+ Left Adder
57	- Left Adder	- Left Adder
60	Numeral 0	0 and Reg 0
61	Numeral 1	1 and Reg 1
62	Numeral 2	2 and Reg 2
63	Numeral 3	3 and Reg 3
64	Numeral 4	4 and Reg 4
65	Numeral 5	5 and Reg 5
66	Numeral 6	6 and Reg 6
67	Numeral 7	7 and Reg 7
70	Numeral 8	8 and Reg 8
71	Numeral 9	9 and Reg 9
75	Decimal .	Decimal .
76	Clear Display	Cl. D. and Reg 10
77	Change Sign	Ch. S. and Reg 11

# From Electronic Calculators to Versatile Computing Systems



Wang's fully-compatible 300/370/380 series calculating/computing systems offer versatility, efficiency and performance not equaled below \$10,000. True building-block modules enable anyone to begin as simply as budget and requirements dictate. The system can grow as budget and requirements grow — without interface problems or redesign and without expensive replacement.

Wang 370/380 Series Programmable Calculator/Computer extends the capabilities of the 300 series to the exact amount of computing power and versatility needed. The system will branch, loop, do sub-routines, make decisions and manipulate arrays. Storage capacity is increased from 4 to 16 to 64 registers with random access from the keyboard or through program control. Programming capabilities can be raised in increments of 80 steps to as many as 480 steps on prescored tab cards or 640 steps on magnetic tape. A teletypewriter with

full format control provides automatic printout of data, plus automatic input of data or unlimited program, also optional output writer using teletype as basic mechanism. **For On-line Applications**, the 379 series of interface modules enable the 370 system to command the read-in of data from instruments, process the data by an automatic program and present the results in display or tabular form or as BCD output signals. The results can be ready for immediate use in data analysis, process control or further transmission.

**The 300/370 System is immediately-accessible.** The user has direct command and control and receives immediate answers. He is able to proceed directly to the next and most important step — that of analyzing, interpreting and applying the information generated. All elements of the system are readily-available and can be **purchased** at less cost than **renting** a larger, less approachable system for one year.



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## Gentlemen:

- I would like a demonstration of.....  
Please have a sales representative call for an appointment.  
Please send the following:
- 300-362 Series operating manual.     370-380 Series operating manual.
- On-line calculating /computing system literature.
- Program Library Book.     Wang monthly magazine, "The Programmer".
- I am a current user of Wang calculators.

NAME..... TITLE.....

ORGANIZATION.....

ADDRESS.....

..... ZIP.....

## Specifications: 300 Series Electronic Calculators

**Circuitry:** All solid-state, digital circuits in replaceable modules.

**AC Input:** 115 volts AC  $\pm 10\%$ , 60  $\pm 2$  cps, single phase, 3-wire, grounded. 115/220 V/50 cps operation available on request at no extra charge. Power consumption 35 to 45 watts.

**Output:** 250 volts DC at 15 milli-amps from electronic package to keyboard consoles for driving readout tubes and  $+9V \pm 3V$  at a few milli-amps for keyboard logic. 60 milli-amps for simultaneous electronic package.

**Keyboard 300K:** Size  $4\frac{1}{2}'' \times 8'' \times 10\frac{1}{4}''$ , weight 6 lbs. Standard 0 to 9 and decimal keys. Independent dual accumulators with random access/recall. Duplex accumulation switches for sums of products, multipliers and/or entries. Independent product register with single-keystroke reciprocal. Simplified chain multiplication. Glare-free display with  $\frac{5}{8}''$  high numerals. Readout of 10-digit accuracy with floating decimal point.

**Keyboard Console 310K:** All features above plus instant  $\sqrt{X}$  and  $X^2$  operations with 11th digit round-off. Automatic and simultaneous accumulation of  $\Sigma X$  and  $\Sigma X^2$  for statistical computations.

**Keyboard Console 320K:** All features above. Also instant  $\text{Log}_e X$  and  $e^X$  operations for exponential computations with 12-digit accuracy.

**Electronics Packages 300E, 310E, 320E:** Size  $5'' \times 9'' \times 17''$ , weight 15 lbs. Provide calculations as described for 300K, 310K, and 320K keyboards respectively. Support maximum of four interlinked keyboards, working one at a time.

**Electronics Packages 300SE, 310SE, 320SE:** Size  $5'' \times 8'' \times 24''$ , weight 25 lbs. Provide calculation for keyboards 300K, 310K, and 320K respectively. Four output channels each serving one keyboard operation at a time. Four keyboards may be operated simultaneously.

**Keyboard Console 360K, 362K:** Same in size, weight and function as 320K. Four additional storage registers on 360K; twelve full registers or 24 half registers on 362K. All registers directly addressable from keyboard, storing or recalling numbers at random. Twelve full registers of 362K can also add and subtract.

**Electronics Packages 360E, 362E:** Provide calculations for keyboards 360K and 362K respectively. 360E same in size and weight as 320E. 362E is  $7'' \times 11.8'' \times 17''$  and 20 lbs.

**Trigonometric Keyboards 320KT and 360KT:** Same as 320K and 360K in function but have touch-a-key programs for  $\sin\theta$ ,  $\cos\theta$ ,  $\sin^{-1}x$ ,  $\tan^{-1}x$  for angles  $0^\circ$  to  $90^\circ$ . Accuracy of .00000001 for  $\sin\theta$  and  $\cos\theta$ , .00001 degree for  $\sin^{-1}x$  and  $\tan^{-1}x$ . Operate on 320E/320SE and 360E/362E respectively. 50' maximum length of extension cable to electronics. KT Keyboards can be used jointly with CP-1 programmer. Order 320KR or 360KR if input is in radians.

**CP-1 Card Programmer:** Size  $5.5'' \times 2.5'' \times 9.5''$ . Weight 6.5 lbs. Automates keyboard operation by stored program of 80 instructions per tab card. Works in conjunction with any keyboard in 300 Series. Maximum length of extension cable limited to 50'.

**Item Counter IC-1:** Keyboard accessory measuring  $5'' \times 5\frac{1}{2}'' \times 3''$  and weighing  $1\frac{3}{4}$  lbs. Factory attached or field retrofitted to any 300 Series keyboard. Special cable and input-output connectors required. Switch settings control automatic counting of  $+$ ,  $-$ ,  $\times$ ,  $\div$ ,  $\sqrt{X}$  and  $X^2$  operations or of any combinations of these operations. Counts sequentially from 0000 to 9999.

**Extension Cables and Mounting Plates:** 30-conductor No. 26 wire extension cable to keyboards, .300 O.D., 80°C PVC. Standard lengths at 25', 50', 75', 100', 125', 150', 175', and 200', assembled with input and output connectors. Male connector may be left unassembled for convenience of on-site installation when pulling cables through conduits. Connector assembly diagram No. 5315 for soldering instructions. Special wall-mount cover plate in stainless steel available on special request.

**T-Connector:** Single input, twin output, with branching and lock on circuit module housed in plastic enclosure. One foot cable included. Limited to two-tier, 3-connector, and 4-outlet maximum with "K" series keyboards. Limited to 2-connector, 3-outlet maximum when KT keyboard or CP-1 Programmer is connected to first tier output.

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