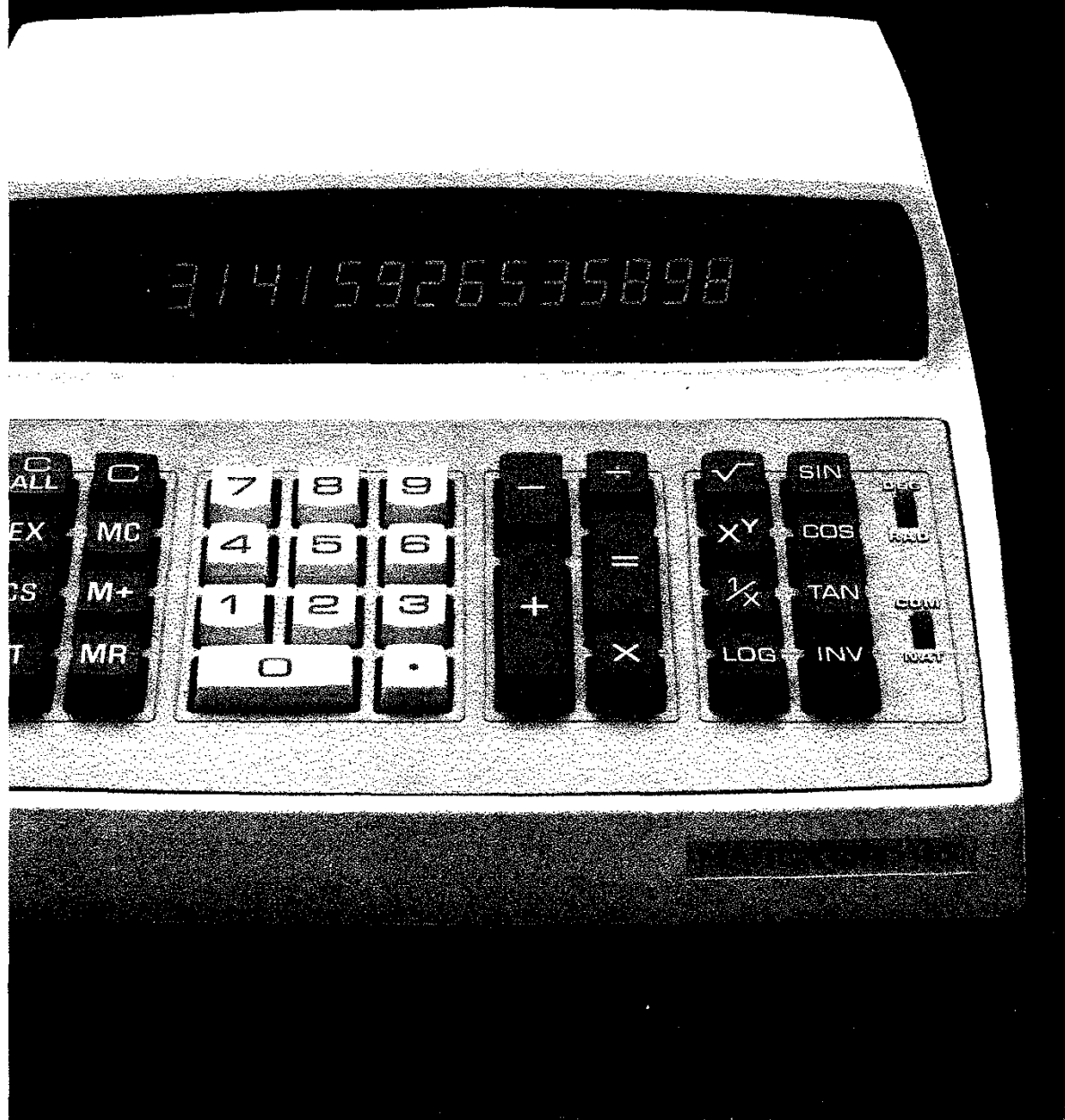# VICTOR
## series 1800
### ELECTRONIC DISPLAY CALCULATOR

general
operating
instructions

**MODEL 18-1721**

### *Welcome to the world of Victor calculator owners*

*Congratulations on your choice of a Victor electronic calculator. Careful design, coupled with the use of quality materials, painstaking American workmanship, and advanced research and production facilities, have given you an instrument which, with proper care, will provide years of trouble-free service. To keep your machine in top operating condition—and to assure its giving you the long service it is designed to provide—be sure to ask your Victor representative about the low cost protection offered by a Victor Full Coverage Maintenance Agreement.*

VICTOR COMPTOMETER CORPORATION

**Contents**

guarantee

The finest materials and workmanship go into the Series 1800 Electronic Calculator assuring you dependable performance over a long period of time.

Ninety day guarantee. This Victor 1800 Electronic Calculator is guaranteed for ninety days for parts and labor.

Any guarantee, statutory or otherwise, does not include replacement or repair of parts when damage or defect is a result of accident, abuse, or the elements.

# VICTOR ELECTRONIC DISPLAY CALCULATOR MODEL 18-1721

... an electronic scratch pad

for scientists and engineers

| | |
|---|---|
| **Arithmetic:** | Add, subtract, multiply, divide and square root. |
| **Trigonometric:** | Sin x, cos x, tan x, arcsin x, arccos x, and arctan x. Angles can be expressed in terms of degrees or radians. |
| **Logarithmic:** | $Log_e$ x, $log_{10}$ x, $e^x$ and $10^x$ |
| **Special:** | $x^y$, $1/x$, $\pi$, change sign, exchange (reverse) operation and accumulating memory. |
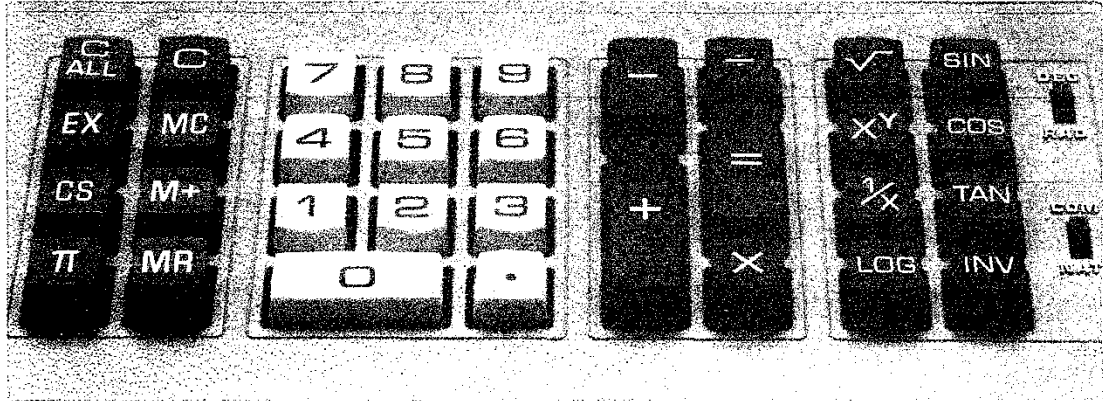
**ON/OFF SWITCH:** Located beneath the right front. Left position is "ON"—right position is "OFF".

**CLEAR-ALL KEY:** Clears amounts in the entire machine. Sets initial state.

**CLEAR KEY:** Clears display. Also clears overflow condition, without clearing keyboard.

**ADD KEY:** Adds keyboard entries and causes running sum to be displayed. Also, when depressed repeatedly, performs constant addition.

**MINUS KEY:** Subtracts keyboard entries and causes running sum to be displayed. Also, when depressed repeatedly, performs repeat subtraction.

**MULTIPLY KEY:** Enters displayed value as multiplicand. Also completes a sequential calculation and sets that result up for subsequent multiplication.

**DIVIDE KEY:** Enters the displayed value as dividend. Also completes a sequential calculation and sets that result up for subsequent division.

**MEMORY PLUS KEY:** Adds entries or results to the value in memory.

**MEMORY RECALL KEY:** Displays value from the memory for use as any factor or for reference.

**MEMORY CLEAR KEY:** Sets memory to zero *without* clearing display.

**EQUALS KEY:** Calculates results in multiplication, division, and power raising computations. Retains multiplicand or divisor for further computations.

**SQUARE ROOT KEY:** Calculates the square root of any positive displayed value.

**CHANGE SIGN KEY:** Changes the algebraic sign of the displayed value.

**PI KEY:** Enters the constant $\pi$ into the display register.

**EXCHANGE KEY:** Exchanges the displayed value with the value in the calculating register.

**RECIPROCAL KEY:** Calculates the reciprocal of displayed value.

**POWER RAISING KEY:** Raises X to the whole number or fractional y power.

**LOG BASE SELECTOR SWITCH:** COM position (switch up) conditions the calculator to compute common logs ($\log_{10}$) or antilogs ($10^X$). NAT position (switch down) conditions the calculator to compute natural logs ($\log_e$) or antilogs ($e^X$).

**LOG KEY:** Calculates the common log ($\log_{10}$) or the natural log ($\log_e$).

**INVERSE KEY:** Conditions the calculator to compute the following:

(a) Antilogs $10^X$ or $e^X$.

(b) Inverse trig functions $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$.

*Note:* The INV key and then the LOG key are touched for calculating antilogs, and INV is touched prior to touching the SIN, COS or TAN keys for calculating inverse trig functions.

**DEGREE/RADIAN SELECTOR SWITCH:** DEG position (switch up) conditions the calculator to compute the trigonometric functions (sin, cos or tan) of an angle expressed in degrees *or* the inverse trigonometric functions ($\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$) in degrees.

RAD position (switch down) conditions the calculator to compute the sin, cos or tan of an angle expressed in radians or the inverse trigonometric functions ($\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$) in radians.

**TRIG FUNCTION KEYS:** Calculates the sin, cos or tan of an angle expressed in degrees or radians. The secant, cosecant, and cotangent functions can be obtained by performing cosine, sine and tangent functions first and touching 1/X key i.e., secant $\theta = \dfrac{1}{\cos\theta}$

Calculates the $\sin^{-1}$, $\cos^{-1}$, or $\tan^{-1}$, expressing the angles in degrees or radians *when used in sequence with* the INV key. To find $\sec^{-1}$, $\csc^{-1}$, $\cot^{-1}$, first invert secant, cosecant or cotangent and then find $\cos^{-1}$, $\sin^{-1}$, or $\tan^{-1}$, respectively, i.e.,

$$\text{secant}^{-1} = \text{cosine}^{-1}\left(\frac{1}{\text{secant }\theta}\right)$$

**OVERFLOW:** F is displayed for the following operations—where results are $>$ 14 digits to left of the decimal point and entries are $>$ 14 digits.

Other functions have been defined to display F:

- Division by zero, including $1/x$ where $X = O$
- Square Root of a negative number
- Arc sine or arc cosine of a number $> 1$
- Log X, In X, and $X^y$ of zero or a negative number
- Computing tangent $90° \pm n\,180$ where n is an integer

**ACCURACY:** All arithmetic functions, $+$, $-$, $\div$, X, $1/x$ and $\sqrt{\ }$ yield 14 place accuracy truncated to the least significant digit where the value of X is $\geq 10^{-14}$ or $\leq 10^{+14} - 1$.

All exponential and trigonometric functions yield 12 place accuracy rounded to the least significant digit within the following range of arguments:

| | |
|---|---|
| $\log_{10} X$ and $\log_e X$ | X is $\geq 10^{-14}$ or $\leq 10^{+13}$ |
| Inverse $\log_{10} X$ | X is $\geq -12.3$ or $< +14$ |
| Inverse $\log_e X$ | X is $\geq -28.4$ or $< +32.2$ |
| $X^y$ | X is $\geq 10^{-14}$ or $\leq 10^{+13}$ |

*Note:* For $X^y$ the limits of y are dependent on the value of X.

| | |
|---|---|
| Sin X, cos X, tan X | X is $\geq -360°$ or $\leq +360$ |
| $\sin^{-1} X$, $\cos^{-1} X$ | X is $\geq -1$ or $\leq +1$ |
| $\tan^{-1} X$ | X is $> -10^{13}$ or $< +10^{13}$ |

12 place accuracy is assured if arguments are within .01 of a degree $\pm$ 90° for sine and cosine; or 10 place accuracy if arguments are within one degree (1°) $\pm$ 90° for tangent.

To assure 12 place accuracy when computing functions of angles $>$ 360° first convert to an angle between $\pm$ 360°, for example convert 3600030° to 30°.

## Specifications:

# Addition/subtraction

## Addition/subtraction—automatic repeat
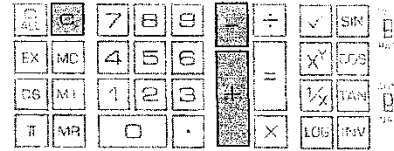
| Example: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| | | C | |
| 123 | 123 | + | 123 |
| 123 | | + | 246 |
| -456 | 456 | - | 2 10- |
| 789.2561 | 789.2561 | + | 579.2561 |
| .0039 | .0039 | + | 579.26 |
| 579.26 | | | |

## Individual totals and summary totals
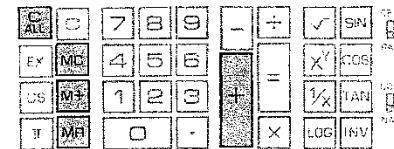
| Example: | ENTER | TOUCH | DISPLAY | ACCUMULATE MEMORY |
|---|---|---|---|---|
| | | C ALL | | |
| 3.2    5.7 | 3.2 | + | 3.2 | |
| 5.5    9.8 | 5.5 | +  M+ | 8.7 | 8.7 |
| 8.7 + 15.5 = 24.2 | 5.7 | + | 5.7 | |
| | 9.8 | +  M+ | 15.5 | |
| | | MR  MC | 24.2 | |

**Summary of examples:** Simple multiplication
Chain multiplication
Multiplication with constant
multiplicand
Memory accumulation
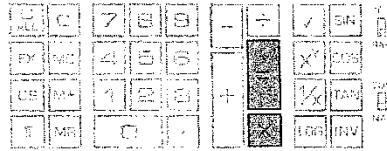
## Simple multiplication
and chain multiplication

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *12 x 13 = 156* | 12 | X | *12* |
| | 13 | = | *156* |
| *12.1234 x 5.67 = 68.739678* | 12.1234 | X | *12.1234* |
| | 5.67 | = | *68.739678* |
| *2 x 3 x 4 = 24* | 2 | X | *2* |
| | 3 | X | *6* |
| | 4 | = | *24* |
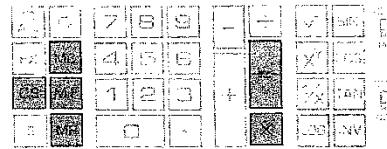
## Memory accumulation and
constant multiplicand

| Example: | ENTER | TOUCH | DISPLAY | ACCUMULATE MEMORY |
|---|---|---|---|---|
| *12 x 13 = 156* | 12 | X | *12* | |
| | 13 | = M+ | *156* | |
| *12 x 14 = 168* | 14 | = M+ | *168* | |
| *-(12 x 15) = -180* | 15 | = CS M+ | *180-* | |
| | | MR MC | *144* | ACCUMULATED TOTAL |

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# Division

**Summary of examples:** Simple division

Chain division

Division with constant divisor

Memory accumulation
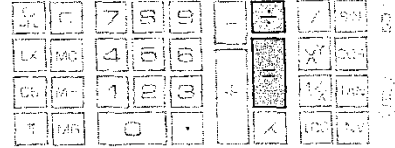
## Simple division and chain division

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *15 ÷ 6 = 2.5* | 15 | ÷ | *15* |
| | 6 | = | *2.5* |
| *24 ÷ 4 ÷ 3 = 2* | 24 | ÷ | *24* |
| | 4 | ÷ | *6* |
| | 3 | = | *2* |
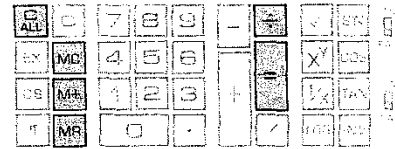
## Memory accumulation with constant divisor

| Example: | ENTER | TOUCH | DISPLAY | ACCUMULATE MEMORY |
|---|---|---|---|---|
| | | C ALL ÷ | | |
| *180 ÷ 20 = 9* | 180 | | *180* | |
| | 20 | = M+ | *9* | |
| *240 ÷ 20 = 12* | 240 | = M+ | *12* | |
| *360 ÷ 20 = 18* | 360 | = M+ | *18* | |
| | | MR MC | *39* | ACCUMULATED TOTAL |

**PRIME USES OF MEMORY**

   I Accumulate keyboard entries or results

   II Store keyboard entries or results
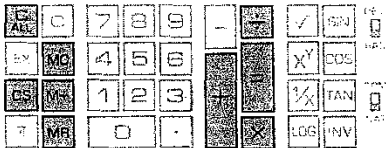
## Accumulation and storage

### I. Accumulating:

| | ENTER | TOUCH | DISPLAY | ACCUMULATE MEMORY |
|---|---|---|---|---|
| $(2+3)-(3x5)+(12\div4)+10=3$ | | C ALL | | |
| | 2 | + | 2 | |
| | 3 | + M+ | 5 | 5 |
| | 3 | X | 3 | |
| | 5 | = CS M+ | 15 | |
| | 12 | ÷ | 12 | |
| | 4 | = M+ | 3 | |
| | 10 | M+ | 10 | |
| | | MR MC | 3 | |

### II. Storage:

| | ENTER | TOUCH | DISPLAY | ACCUMULATE MEMORY |
|---|---|---|---|---|
| $\dfrac{1.265 \times (1.265 + 1)}{5}$ | | C ALL | | |
| | 1.265 | M+ ÷ | 1.265 | |
| | 5 | X | 0.253 | 1.265 |
| | | MR + | 1.265 | |
| | 1 | + | 2.265 | |
| | | = MC | 0.573045 | |

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# Special functions



**Power raising key** (x to the y power)
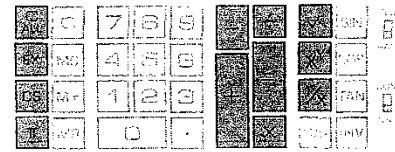
| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| $2^5$ | 2 | | $2$ |
| | 5 | | $32$ |
| $12.5^{1.3}$ | 12.5 | | $12.5$ |
| | 1.3 | | $26.6675437903$ |
| $12.5^{-1.3}$ | 12.5 | | $12.5$ |
| | 1.3 | CS | $1.3-$ |
| | | | $0.0374987665805$ |

**Reciprocal key** Calculates reciprocal of displayed value.

| Example: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *Obtain reciprocal of 8* | 8 | | $0.125$ |
| *Calculate: $2^{1/4}$* | 2 | | $2$ |
| | 4 | | $0.25$ |
| | | | $1.189207115$ |

**Square root key** Calculates the square root of any positive value.

| Example: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *Compute $\sqrt{156.25}$* | 156.25 | | $12.5$ |

**Pi key** Enters the value, π in the display.

| Example: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *Compute area of a* | 5 | ×  × | 25 |
| *circle where: r = 5* | | π | 3.14159265358.98 |
| *(πr²)* | | = | 78.53981633974.5 |

**Change sign key** Changes the algebraic sign of the displayed value.

| Example: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *−1.265 × 15* | 1.265 | CS  × | 1.265− |
| | 15 | = | 18.975− |
| *Calculate 4.75⁻¹ᐟ⁴* | 4.75 | xʸ | 4.75 |
| | 4 | CS  1/x | 0.25− |
| | | = | 0.677370997121 |

**Exchange key** Exchanges the displayed value with the value that is in the calculating register. This exchange either reduces key depressions or the use of the memory in certain sequential calculations.

| Example: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| $\dfrac{4+3}{(6\times2)+7-5} = .5$ | | C ALL | |
| | 6 | × | 6 |
| | 2 | =  + | 12 |
| | 7 | + | 19 |
| | 5 | −  ÷ | 14 |
| | 4 | + | 4 |
| | 3 | + | 7 |
| | | EX | 14 |
| | | = | 0.5 |

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# Logarithmic group

**Computes:** Logarithms $\log_{10}$ and $\log_e$ (ln)

Antilogs $10^x$ and $e^x$

COM

Set log base

NAT
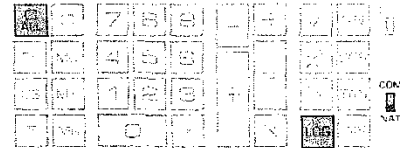
## Computing common logarithms $\log_{10}$

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *Evaluate:* | | C ALL | |
| *The $\log_{10}$ 100* | 100 | LOG | 2 |
| *The $\log_{10}$ 101* | 101 | LOG | 2.00432137378 |
| *The $\log_{10}$ .001* | .001 | LOG | 3- |

## Computing antilogarithms $10^x$

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| *Evaluate:* | | C ALL | |
| *The antilog of 3* | 3 | INV LOG | 1000 |
| *The antilog of −3* | 3 | CS INV LOG | 0.001 |
| *The antilog of 5.5* | 5.5 | INV LOG | 316227.66017 |

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COM

Set log base ↓ ▮

NAT

## Computing natural logarithms  $\log_e$ (ln)

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| Evaluate: | | C ALL | |
| The $log_e$ 1 | 1 | LOG | 0 |
| The $log_e$ 100 | 100 | LOG | 4.605 170 18599 |
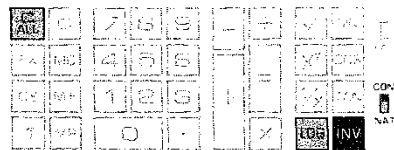
## Computing antilogarithms  $e^x$

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| Evaluate: | | C ALL | |
| The antilog_e of 1 | 1 | INV LOG | 2.718 28 182846 |
| The antilog_e of 4 | 4 | INV LOG | 54598 150033 1 |
| The antilog_e of 12 | 12 | INV LOG | 162 754,79 14.19 |

# Trigonometric group

**Computes:** Trigonometric functions   sine (SIN) cosine (COS) tangent (TAN)
Inverse trigonometric functions   arcsine ($SIN^{-1}$) arccosine ($COS^{-1}$)
arctangent ($TAN^{-1}$)

## Degrees

DEG

Set degree mode

RAD
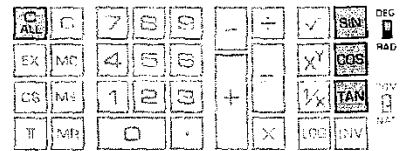
## Computing trigonometric functions

Angles expressed in degrees

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| | | C ALL | |
| The sin of 30° | 30 | SIN | 0.5 |
| The cos of 45° | 45 | COS | 0.7071067811 87 |
| The tan of 135° | 135 | TAN | ⌐ |
| The sin of 395° | 395 | SIN | 0.5735764363 51 |

*Note:* The signs of the trig functions
are correct and depend on the
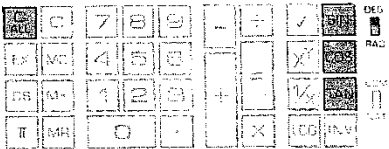quadrant of the argument.

## Computing inverse trigonometric functions

Results expressed in degrees

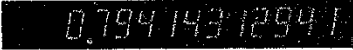| Examples: | ENTER | TOUCH | | DISPLAY |
|---|---|---|---|---|
| | | | C ALL | |
| The arcsin .511 | .511 | INV | SIN | 30.7304622212 |
| The arccos .9763 | .9763 | INV | COS | 12.4989429629 |
| The arctan 1.0427 | 1.0427 | INV | TAN | 46.1975197187 |

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## Radians

DEG

Set radian mode ↓█

RAD

## Computing the trigonometric functions

Angles expressed in radians

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| | | C ALL | |
| The sine of .5 radian | .5 | SIN | 0.479425538604 |
| The cosine of .6532 radians | .6532 | COS | 0.794143129411 |
| The tangent of .875 radians | .875 | TAN | 1.19742162923 |

## Computing inverse trigonometric functions

Results expressed in radians

| Examples: | ENTER | TOUCH | DISPLAY |
|---|---|---|---|
| | | C ALL | |
| The arcsin 1 | 1 | INV SIN | 1.5707963267 9 |
| The arccos .9876 | .9876 | INV COS | 0.157643342675 |
| The arctan 1.1254 | 1.1254 | INV TAN | 0.844390502775 |

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# Victor products and services
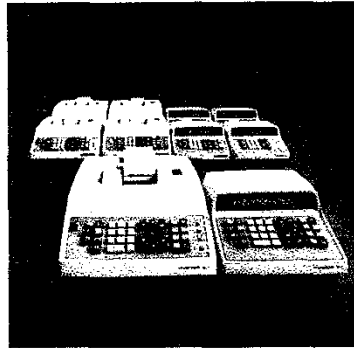
The Series 1800 is only one of a vast family
of products made by Victor, America's foremost
producer of desk-top figuring machines.
Included in its array of related products is a
complete range of electronic and mechanical
display and printing calculators and adding
machines.

Other business products include electronic and
mechanical retail point-of-sale systems,
Electrowriter and facsimile transmission systems
for business, institutional, and industrial
communications. Victor Temporaries, a national
network of company-owned temporary help
offices, make a variety of administrative, clerical
and marketing skills available to the business
and industrial user.

Victor is also diversified in its manufacture and
marketing of leisure time products. Among these
are PGA and Burke golf clubs and accessories,
Daisy-Heddon sport shooting and fishing
equipment; Bear Archery equipment, Valley Pool
Tables, Ertl toys, and Nissen trampolines and
gymnastic equipment.