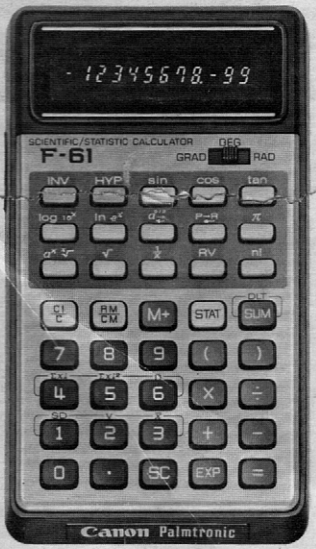
BM MARK FOR HIGH QUALITY & RELIABILITY
Recognized by JAPAN BUSINESS MACHINE MAKERS ASSOCIATION

Canon Palmtronic F-61

INSTRUCTIONS



English Edition

Canon

CANON INC. 11-28, Mita 3-chome, Minato-ku, Tokyo 108, Japan

CANON U.S.A., INC. HEAD OFFICE
10 Nevada Drive, Lake Success, Long Island, N.Y. 11040, U.S.A.

CANON U.S.A., INC. CHICAGO OFFICE
140 Industrial Drive, Elmhurst, Illinois 60126, U.S.A.

CANON U.S.A., INC. LOS ANGELES OFFICE
123 Paularino Avenue East, Costa Mesa, California 92626, U.S.A.

CANON OPTICS & BUSINESS MACHINES CANADA, LTD.
HEAD OFFICE
3245 American Drive, Mississauga, Ontario, L4V 1N4, Canada

CANON AMSTERDAM N.V.
Gebouw 70, Schiphol Oost, Holland

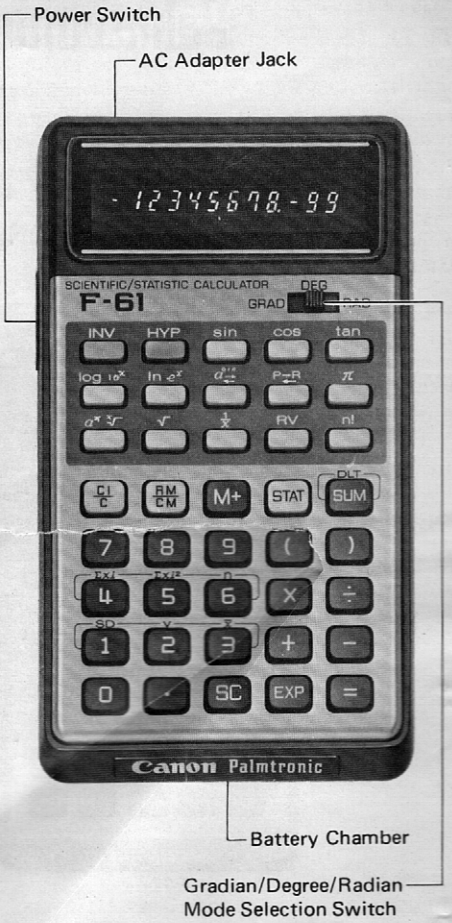
CANON LATIN AMERICA, INC. SALES DEPARTMENT
P.O. Box 7022, Panama 5, Rep. of Panama

CANON LATIN AMERICA, INC. REPAIR SERVICE CENTER
P.O. Box 2019, Colon Free Zone, Rep. of Panama

CANON INC. HONG KONG BRANCH
5th Floor 2-6, Fui Yiu Kok Street, Tsuen Wan, New Territories, Hong Kong

PUB. IE3137 1076N5 PRINTED IN JAPAN

Description



Keys and Switches

Power Switch: Slide the power switch down to on.

Numeral Entry Keys: Used for entering numerals.

Decimal Point Key: Used for entering a decimal point.

Instruction Keys: Depress a corresponding key for addition, subtraction, multiplication or division. Depress the = key for obtaining the result.

Sign Change Key: Used for changing the sign (+ or −) of the displayed numerals of mantissa or exponents.

Exponential Key: Depress for entering the exponent.

Clear Indicator Key/Clear Key: Depress this key for clearing entered numerals and results.
If the C key is depressed once after the numerals are entered, it clears only the numerals that have just been entered. (Clear Indicator)
However, if the C key is depressed after an instruction key (+ − × ÷ =) or if it is depressed twice successively, it clears the contents of the register except memory.

Memory Plus Key: Used for accumulating numerals in the memory.

Recall Memory Key/Clear Memory Key: A double function key. If depressed once, it recalls the memory contents. If depressed twice successively, it clears the memory contents.

Open, Close Parentheses Keys: Up to 2 sets may be used.

Statistics Key: Used to set the calculator in the statistical mode. It is also used for obtaining output of statistical calculation results. If depressed once, it sets the calculator in the statistical calculation mode. Once the key is set to the statistical calculation mode, it instructs the calculator to output the statistical calculation results by combined use of the STAT key and any of 7 ~ 9 keys.

- STAT 7 → **Standard deviation** (SD)
- STAT 8 → **Variance** (V)
- STAT 9 → **Mean** ($\bar{x}$)
- STAT Σ → **Sum of variates** ($\Sigma x\,i$)
- STAT Σ → **Sum of squared variates** ($\Sigma x\,i^2$)
- STAT n → **Number of variates** (n)

Statistical Input (SUM) Key/Statistical Data Delete Key: When inputting statistical data x_1, x_2, x_3.. x_n, operate as x_1 SUM x_2 SUM x_3 SUM ... x_n SUM.
When deleting statistical data, operate as INV CLT SUM.

GRAD DEG RAD

Gradian/Degree/Radian Mode Selection Switch: In performing trigonometric calculations, set the switch to GRAD for gradian units calculations, set it to DEG for degree units and set it to RAD for radian units. The relation to each unit is $200^{GRAD} = 180^{\circ} = \pi^{RAD}$
This switch may be set to any mode for calculations other than trigonometric calculations.

INV **Inverse Key:** Used for performing inverse trigonometric calculations ($\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$) and inverse hyperbolic ($\sinh^{-1}x$, $\cosh^{-1}x$, $\tanh^{-1}x$). It is also used for performing any of the functions (10^x, e^x, $\sqrt{\ }$) or conversions ($a \leftarrow$, P$\leftarrow$R).
This key is also used for deleting statistical calculation data.

HYP **Hyperbolic Key:** Used for performing hyperbolic function calculations.

SIN **Sine Key/Arc Sine Key**

COS **Cosine Key/Arc Cosine Key**

TAN **Tangent Key/Arc Tangent Key**

log 10^x **Common Logarithm Key/Common Antilogarithm Key**

ln e^x **Natural Logarithm Key/Natural Antilogarithm Key**

° ' " **Degree/Minutes/Seconds ⇄ Decimal Degrees Conversion Key.**

P R **Polar ⇄ Rectangular Conversion Key**

π **Pi Key**

x^y $\sqrt[y]{\ }$ **Power Key/Multiple Root Key**

$\sqrt{\ }$ **Square Root Key**

$\frac{1}{x}$ **Reciprocal Key**

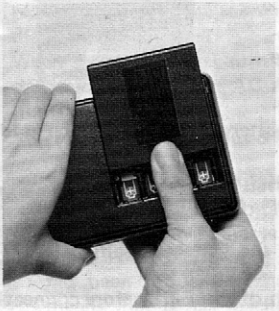
x^{-1} **Reverse Key**

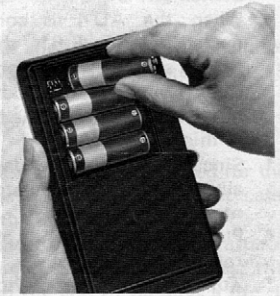
$x!$ **Factorial Key**

How to Load and Replace Batteries

Remove the cover of the battery chamber on the back of the F-61. Insert four new penlight batteries in the chamber. Insert batteries' minus (—) end first following the drawing inside the chamber.
Replace the cover.

* The F-61 will not operate if batteries are loaded in the wrong way.
  Batteries must be replaced when the display becomes dim. A dim display indicates low battery voltage.
  Replace all four batteries at one time.
* Be sure to take the batteries out of the calculator if it is not to be used for more than one month.





AC Adapter (Optional)

The F-61 can be operated either with batteries or with a household power source (AC power) by using Canon's special AC Adapter AD-1.

* Do not connect any other adapter to the F-61.

How to Use the Canon AC Adapter AD-1

1. Plug the AD-1 into an electrical outlet.
2. Insert the output plug of the AD-1 into the AC Adapter jack of the F-61.
3. Then, turn on the Power Switch of the F-61.
   When the AD-1 is connected to the F-61, the power source is automatically switched from batteries to AC power. The battery power will not be used in this case.

* Since the Canon AC Adapter AD-1 is designated especially for Canon's calculators, do not try to use it with other electric machines.
* Plug in the AD-1 only at the voltage specified on the rating and name plate.
* Turn off the Power Switch of the F-61 before connecting to or disconnecting from the AC Adapter.

Canon NiCd Battery Pack-2 (Optional)

The F-61 can be operated by the Canon NiCd Battery Pack-2.

How to Use NiCd Battery Pack-2

Load the NiCd Battery Pack-2 into the Battery Chamber of the F-61.

Be sure to insert the Battery Pack correctly aligning the poles.

Recharging

When the display becomes dim, recharge the Battery Pack with the AC Adapter AD-1.

When recharging, first turn off the power of the calculator and then connect the AC Adapter. It will take about 15 hours for a full charge.

The Pack will yield about 8 hours by full charge.

Note: *When the NiCd Battery Pack-2 is to be used for the first time, the voltage may be low. In that case, immediately recharge the Battery Pack.

* If the Pack only gives a short period of use even after it has been properly recharged a number of times, this means that it has reached the end of its service life. It should, therefore, be replaced.
* Be sure to take the Pack out of the calculator if it is not to be used for a long period of time.
* Do not leave the Pack charging for more than 48 hours.

How to Enter Numerals

1) The F-61 allows you to enter a maximum of eight digits for the mantissa. If more than eight digits are entered, the 9th and the subsequent digits will be displayed as exponents.
2) To enter exponential numbers, enter the mantissa, then depress the EXP key and enter the exponent.
   The F-61 allows the entry of two exponential digits ($-99 \sim 99$). If more than two digits are entered, only the last two digits will be effective.
3) To enter a negative value for the mantissa, depress the SC key after entering numerals.
   To enter negative value in the exponent first depress the EXP key, then the exponent followed by the SC key or then the SC key followed by the exponent.

Input Numerals	Operation	Display
123	1 2 3	123.
123.456	1 2 3 . 4 5 6	123.456
0.789	* . 7 8 9	0.789
1234567800	1 2 3 4 5 6 7 8 0 0	12345678. 02
34.56×10^{25}	3 4 . 5 6 EXP 2 5	34.56 25
-456	4 5 6 SC	−456.
43.2×10^{-21}	4 3 . 2 EXP 2 1 SC	43.2 −21

* It is not necessary to depress the 0 key before the . key in this case.

How to Correct Entered Numerals

1) To correct all the digits of just entered numerals, depress the C key to clear the numerals on display and then enter the correct numerals again.
2) To correct exponent numerals alone, simply re-enter the correct two-digit exponent.
3) To correct the exponential sign alone, just depress the SC key again. However, if the EXP key has been depressed, only the sign of the exponent can be changed.

Numerals to be entered	Operation (Correction)	Display
12345	1 2 3 7 5 ↓ To correct to 4. (C 1 2 3 4 5)	12375. 12345.
34.56×10^{42}	3 4 . 5 6 EXP 4 3 ↓ To correct to 2. (4 2)	34.56 43 34.56 42
42.75×10^{21}	4 2 . 7 5 EXP 2 1 SC ↓ To correct to plus. (SC)	42.75 −21 42.75 21
-44.45×10^{12}	4 4 . 4 5 EXP 1 2 ↓ To correct to minus. (C 4 4 . 4 5 SC EXP 1 2)	44.45 12 −44.45 12

* If you depress an incorrect instruction key (+ − × ÷), depress the correct instruction key immediately to correct the error.

Example:

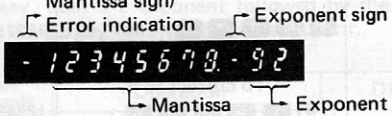
4 x 3 = 12

Operation 4 ÷ × 3 = ... (12)

↓

Incorrect key

How to Read Output



1) Results are displayed in as many as eight significant digits $0.01 \leqq$ result $\leqq 99999999$.

Example:

Result	Display
0.123 ⟶	0.123

2) Results are in exponential display for result <0.01 or result >99999999.

Example:

Result	Display
0.00123 ⟶	1.23 −03
12300000000 ⟶	1.23 10

* 0. is displayed at the top digit of the mantissa part in clear status.

Errors

1. **Overflow Errors**

The calculator will overflow in the following instances, and further calculations will not be possible as the calculator will be electronically locked:

1) The calculation result is $>|1\times100^{100}|$.
2) Content of the memory is $>|1\times100^{100}|$.
3) A ÷ 0 (division with 0 as divisor) is performed.
4) Data exceed the range of any function.
5) Calculations of ln 0, log 0 are performed.
6) In calculations of tan$x$, when the value of x is approximately $\pm90°$, $\pm270°$, $\pm450°$ ... $\pm(90° + 180° \times n)$ the calculator will overflow.
7) When the parentheses keys are not used as a pair.
8) In the statistical calculation mode, if SD, V, or $\bar{x}$ is outputted at n=0 (data is not inputted), or SD is outputted at n=1.

The overflow display is E 0.

Clear the overflow error by depressing the [AC] key.

2. **Underflow Errors**

All digits will be cleared in the following cases and 0. will apear on the display:

1) A calculation result is $<|1\times10^{-100}|$
2) At tan$x$ calculations of $\pm180°$, $\pm360°$, $\pm540°$ ... $\pm(90° \times 2n)$ are performed.

Calculation Examples

Expression	Operation (Display)
Addition and Subtraction	
$8+3+5.5=16.5$	8 [+] 3 [+] 5.5 [=] (16.5)
$4-7-3=-6$	4 [−] 7 [−] 3 [=] (−6.)
Repeated Addition and Subtraction	
$4+4+4+4=16$	4 [+] [=] [=] [=] (16.)
$10-2-2-2=4$	10 [−] 2 [=] [=] [=] (4.)
Multiplication and Division	
$3.6\times1.7=6.12$	3.6 [×] 1.7 [=] (6.12)
$592\div4.8=123.33333$	592 [÷] 4.8 [=] (123.33333)
Mixed Calculations	
$(3+5)\times7=56$	3 [+] 5 [×] 7 [=] (56.)
$(6\times9\div3)+2=20$	6 [×] 9 [÷] 3 [+] 2 [=] (20.)

It is not necessary to depress the [AC] key before beginning the next calculation since the preceding calculation result is automatically cleared.

Expression	Operation (Display)
Power Calculation	
$123^2=15129$	123 [×] [=] (15129.)
Exponential Calculations	
$(1.23\times10^{32})\times(4.56\times10^{12})$ $=5.6088\times10^{44}$	1.23 [EXP] 32 [×] 4.56 [EXP] 12 [=] (5.6088 44)
$(321\times10^{-14})\times(65\times10^{28})$ $=2.0865\times10^{18}$	321 [EXP] 14 [±] [×] 65 [EXP] 28 [=] (2.0865 18)
$(78.9\times10^{56})\div(0.34\times10^{15})$ $=2.3205882\times10^{43}$	78.9 [EXP] 56 [÷] .34 [EXP] 15 [=] (2.3205882 43)
Addition by a Constant	
$2+3+\underset{\sim}{6}=11$ $7+\underset{\sim}{6}=13$	2 [+] 3 [+] 6 [=] (11.) 7 [=] (13.)
Subtraction by a Constant	
$4-2-\underset{\sim}{1}=1$ $3-\underset{\sim}{1}=2$	4 [−] 2 [−] 1 [=] (1.) 3 [=] (2.)
Multiplication by a Constant	
$\underset{\sim}{2\times3}\times4=24$ $\underset{\sim}{2\times3}\times5=30$	2 [×] 3 [×] 4 [=] (24.) 5 [=] (30.)
Division by a Constant	
$9\div3\div\underset{\sim}{2}=1.5$ $4\div\underset{\sim}{2}=2$	9 [÷] 3 [÷] 2 [=] (1.5) 4 [=] (2.)

In addition, subtraction and division, the last entered numbers (*i.e.* the last addend, the last subtrahend and the last divisor) automatically become the constants.
In multiplication, the products of all the successive multipliers except the last one become the constant.

Expression	Operation (Display)
Memory Calculations (Sum and difference of products and quotients)	
20×30= 600	20 × 30 = M+ (′600.)
40×50= 2000	40 × 50 = M+ (′2000.)
15×20= 300	15 × 20 = M+ (′300.)
Sub Total 2900	MR (′2900.)
−125×40=−5000	125 SC × 40 = M+ (J5000.)
Total −2100	MR (J2100.)

When the data are stored in the memory, the memory sign (′) appears at the left of the mantissa sign display.

* Clear the preceding memory contents when starting a new memory calculation. (Clear the memory sign by depressing the MR key two times in succession.)
* In the statistical calculation mode, the memory can not be used.

Expression	Operation (Display)
Composition Ratio Calculation	
Composition ratio (%)	
A 125 (25)	125 + 185 + 190 =
B 185 (37)	(500.)
C 190 (38)	÷ 100 ÷ 125 %' = M+
Total (500) (100)	(′25.)
	185 = M+ (′37.)
	190 = M+ (′38.)
	MR (′100.)

$$A=\frac{125}{125+185+190}\times 100 \qquad B=\frac{185}{125+185+190}\times 100$$

$$C=\frac{190}{125+185+190}\times 100 \qquad A+B+C=100\%$$

How to Use the Parentheses ( ) Keys

The parentheses keys are used for calculations involving parentheses. The F-61 can perform calculations using up to 2 sets of parentheses.

Function of Parenthesis Keys

The (key designates the open parenthesis of the calculation, and the) key designates the close parenthesis, as well as performing the calculations within the parentheses.

Expression	Operation (Display)
Parentheses Calculations	
2×(3+4)=14	2 × (3 + 4) = (14.)
((4−3.6+5)×0.8−6) ×4.2=−7.056	CE ((4 − 3.6 + 5) × .8 − 6) × 4.2 = (−7.056)
2×(3+4)÷(7−2) =2.8	2 × (3 + 4) ÷ (7 − 2) = (2.8)

Note: * The (and) keys are always used as a pair. If either key is depressed alone during an operation, the calculation will not be executed.

Example: 7 x (6 + 5) = 77

7 × (6 + 5)) ..... (E0.)

Wrong operation

* The parentheses keys can not be used in the statistical calculation mode.
* Depress the CE key before starting the parentheses calculations.

Conversion of Degrees-minutes-seconds and Decimal Degrees

Enter sexagesimal data (seconds-minutes) respectively after depressing the ▪ key.

Example 123 ▪ 45 57 8

(Degree) Decimal	(Minute) Sexagesimal (2 digits)	(Second) Sexagesimal (2 digits)	Decimal fraction of second

When converting data from decimal degrees to degrees-minutes-seconds perform as shown below.

Degrees-minutes-seconds → decimal degrees

Example 1:	Key operation (Display)
123°45′57″	123 ▪ 4557 $a^{b'c''}$
→123.76583°	(123.76583)

Example 2:

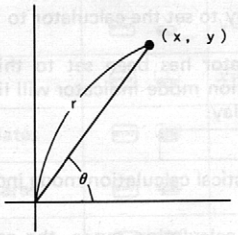
5′3″→0.0841666° ▪ 0503 $a^{b'c''}$ (0.0841666)

Decimal degrees → degrees-minutes-seconds

Example:

2.3456°	2 ▪ 3456 INV $a^{b'c''}$
→2°20′44″16	(2.204416)

Conversion from/to Polar and Rectangular Coordinates



Polar Conversion

	Result
x INV y INV P→R	(r)
RV	(θ)

Rectangular Conversion

r RV θ P→R	(x)
RV	(y)

How to Use the Reverse Key RV

The RV key is used for reversing an operator and operand.

Example:

$$\frac{123}{456+789}=0.0987951$$

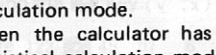
Operation	Display
456 ＋ 789 ÷	(1245.)
123	(123.)
RV	(1245.)
=	(0.0987951)

How to Perform Statistical Calculations

1. Setting to the statistical calculation mode

Depress the [STAT] key to set the calculator to the statistical calculation mode.

When the calculator has been set to this mode, the statistical calculation mode indicator will light up in the mantissa sign display.



* In the statistical calculation mode, the calculator performs ordinary arithmetic and function calculations. But it will not perform memory calculations and calculations involving parentheses.

* To release the statistical calculation mode, first depress the [STAT] key and then depress the [ON/C] key.

2. Entering Statistical Data

Statistical data x_1, x_2, x_3 ... x_n can be entered by inputting each piece of data followed by depressing the [SUM] key after each entry.

* In the statistical calculation mode, it is possible to use the data in the following ways:

1) Entering numerals

Example: 2 [SUM] 3 [SUM] 4 [SUM]

2) Results of arithmetic calculations.

Example: 2 [×] 3 [=] [SUM] 4 [×] 5 [=] [SUM]

3) Results of function calculations

Example: 125 [log] [SUM] 100 [log] [SUM]

3. Output of Statistical Calculation Results

Once data are entered, the calculator processes them automatically.

Results are displayed by combined use of the [STAT] key and any of the [1] ~ [6] keys.

Output	Operation	Equation
Standard deviation of sample	[STAT] [$x_{\sigma n-1}$] (1)	$SD=\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(xi-\bar{x})^2}$
Variance	[STAT] [V] (2)	$V=\frac{1}{n}\sum_{i=1}^{n}(xi-\bar{x})^2$
Mean	[STAT] [$\bar{x}$] (3)	$\bar{x}=\frac{1}{n}\sum_{i=1}^{n}xi$
Sum of variates	[STAT] [Σx] (4)	$\sum_{i=1}^{n}xi$
Sum of squares	[STAT] [Σx^2] (5)	$\sum_{i=1}^{n}xi^2$
Number of variates	[STAT] [n] (6)	n

For calculation examples, see page 35.

* To obtain standard deviation of population $\left\{\sqrt{\frac{1}{n}\sum_{i=1}^{n}(xi-\bar{x})^2}\right\}$, extract the square root of variance of population.

* To obtain the variance of sample $\left\{\frac{1}{n-1}\sum_{i=1}^{x}(xi-\bar{x})^2\right\}$, multiply standard deviation of sample by 2.

4. Correction of Data

1) Entered numerals (numerals before depressing the [SUM] key) can be cleared by depressing the [ON/C] key.

Example: 1 [SUM] 2 [SUM] 4 [ON/C] 3 [SUM]

Clears 4.

2) Data entered after the [SUM] key is depressed can be deleted by depressing the [INV] [DLT] keys successively.

Example 1: 1 [SUM] 2 [SUM] 4 [SUM] [INV] [DLT] 3 [SUM]

Deletes 4

Example 2: 1 [SUM] 2 [SUM] 3 [SUM] 1 [INV] [DLT]

Deletes 1

3) It is possible to delete data and to re-input other data even after obtaining a statistical calculation result.

Example:

[STAT] 2.3 [SUM] 1.8 [SUM] 2.2 [SUM] 5.4 [SUM] [STAT] [$\bar{x}$] (.2.925)

Delete

5.4 [INV] [DLT] [STAT] [$\bar{x}$] (.2.1)

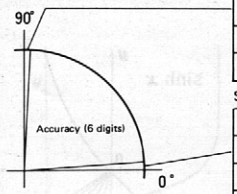
Types of Functions, Key Operations And Input Range

Function	Key Operation	Input Range
$y=\sin x$	x [sin]	$0 \leqq \lvert x \rvert < 10^{100}$
$y=\cos x$	x [cos]	$0 \leqq \lvert x \rvert < 10^{100}$
$y=\tan x$	x [tan]	$0 \leqq \lvert x \rvert < 10^{100}$
$y=\sin^{-1} x$	x [INV] [sin]	$\lvert x \rvert \leqq 1$
$y=\cos^{-1} x$	x [INV] [cos]	$\lvert x \rvert \leqq 1$
$y=\tan^{-1} x$	x [INV] [tan]	$0 \leqq \lvert x \rvert < 10^{100}$
$y=\sinh x$	x [HYP] [sin]	$0 \leqq \lvert x \rvert < 100 \ln 10$
$y=\cosh x$	x [HYP] [cos]	$0 \leqq \lvert x \rvert < 100 \ln 10$
$y=\tanh x$	x [HYP] [tan]	$0 \leqq \lvert x \rvert < 10^{100}$
$y=\sinh^{-1} x$	x [INV] [HYP] [sin]	$0 \leqq \lvert x \rvert < 10^{50}$
$y=\cosh^{-1} x$	x [INV] [HYP] [cos]	$1 \leqq x < 10^{50}$
$y=\tanh^{-1} x$	x [INV] [HYP] [tan]	$0 \leqq \lvert x \rvert < 1$
$y=\log x$	x [log]	$0 < x < 10^{100}$
$y=\ln x$	x [ln]	$0 < x < 10^{100}$
$y=10^x$	x [INV] [10^x]	$-99 \leqq x < 100$
$y=e^x$	x [INV] [e^x]	$-99 \ln 10 \leqq x < 100 \ln 10$
$y=a^x$	a [a^x] x [=]	$0 < a < 10^{100}$, $0 \leqq \lvert x \rvert < 10^{100}$ $-99 \ln 10 \leqq x \ln a < 100 \ln 10$
$y=\sqrt[x]{a}$	a [INV] [$\sqrt[x]{}$] x [=]	$0 < a < 10^{100}$, $0 \leqq \lvert x \rvert < 10^{100}$ $-99 \ln 10 \leqq \frac{\ln a}{x} < 100 \ln 10$
$y=\sqrt{x}$	x [$\sqrt{}$]	$0 \leqq x < 10^{100}$
$y=1/x$	x [x^{-1}]	$0 < \lvert x \rvert < 10^{100}$
$y=n!$	x [n!]	$n \leqq 69$ (n ; Integer of positive)

Accuracy of Functions

1. General accuracy of functions is 6 digits. However, note that accuracy of the following functions is less than 6: Please refer to the accompanying charts.
   - For angles approaching and including 90° and 0° in trigonometric functions.
   - For angles approaching 0° or 1° in inverse trigonometric functions; For numbers approaching 1 in logarithmic functions.
   - For numbers approaching 0 in hyperbolic functions.
   - For numbers approaching 0 or 1 in inverse hyperbolic functions.

$\sin x$, $\cos x$



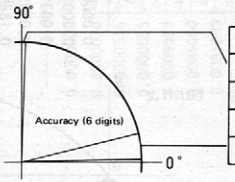
$\cos x$

Accuracy (digits)	Angle (degrees) *
4	$90 > \lvert x \rvert \geqq 85.409998$
5	$85.409997 \geqq \lvert x \rvert \geqq 85.407802$
6	$85.407801 \geqq \lvert x \rvert > 0$

$\sin x$

Accuracy (digits)	Angle (degrees) *
6	$5.7299974 \leqq \lvert x \rvert < 90$
5	$4.5800013 \leqq \lvert x \rvert \leqq 5.7299973$
4	$0 < \lvert x \rvert \leqq 4.5800012$

$\tan x$

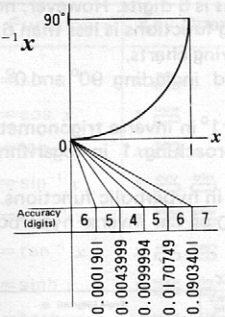


Accuracy (digits)	Angle (degrees) *
4	$89.999999 \leqq \lvert x \rvert \leqq 89.139991$
6	$89.139990 \leqq \lvert x \rvert \leqq 10.077112$
5	$10.077111 \leqq \lvert x \rvert \leqq 1.1004021$
4	$1.1004020 \leqq \lvert x \rvert < 0$

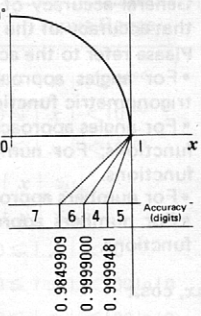
* If $\lvert x \rvert > 360°$, the accuracy of numbers displayed will be less than those shown in the charts.

* The accuracy of radians and gradians will be exactly the same as the accuracy of their corresponding degree values.

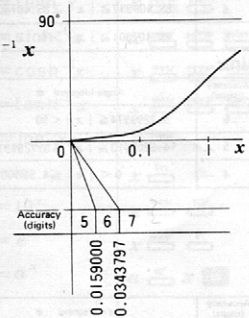
$\sin^{-1}x$



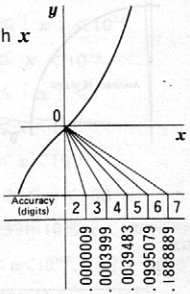
$\cos^{-1}x$



$\tan^{-1}x$



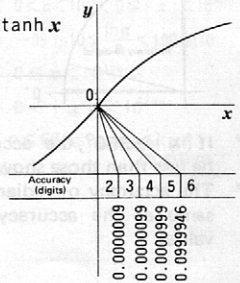
$\sinh x$



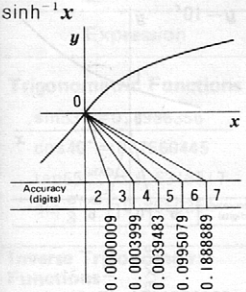
$\cosh x$

The general accuracy is 6 digits for all calculations of hyperbolic cosine.

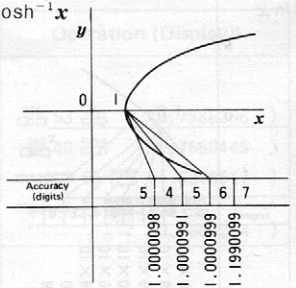
$\tanh x$



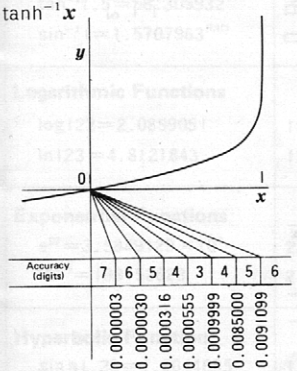
$\sinh^{-1}x$



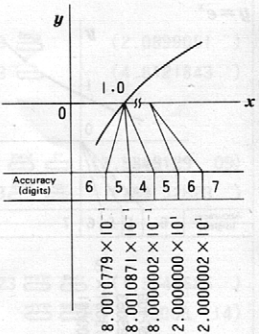
$\cosh^{-1}x$

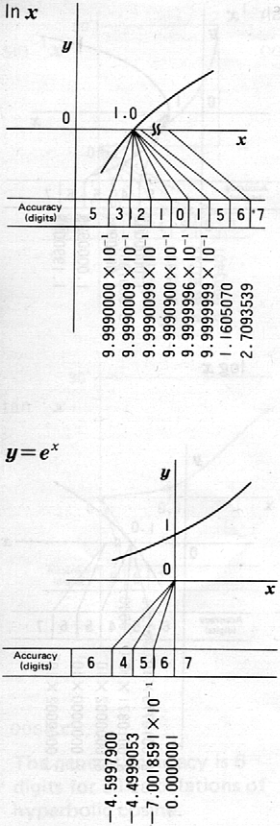


$\tanh^{-1}x$



$\log x$





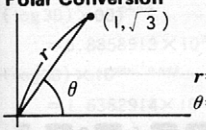
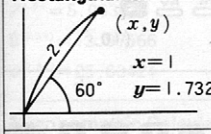
The general accuracy is 6 digits for calculations of $y = a^x$. However, the greater the value of x the less accurate the result will be.

The general accuracy is 6 digits for calculations of $y = \sqrt[x]{a}$

Basic Function Calculations

Expression	Operation (Display)
Trigonometric Functions	
$\sin 53^\circ = 0.7986356$	DEG 53 sin (0.7986356)
$\cos 40^\circ = 0.7660445$	DEG 40 cos (0.7660445)
$\tan 65^{GRAD} = 1.6318517$	GRAD 65 tan (1.6318517)
$\sin \frac{\pi^{RAD}}{3} = 0.8660254$	RAD π ÷ 3 = sin (0.8660254)
Inverse Trigonometric Functions	
$\sin^{-1} 0.3 = 17.457603^\circ$	DEG .3 INV sin (17.457603)
$\cos^{-1} 0.8 = 36.869898^\circ$	DEG .8 INV cos (36.869898)
$\tan^{-1} 1.5 = 56.309932^\circ$	DEG 1.5 INV tan (56.309932)
$\sin^{-1} 1 = 1.5707963^{RAD}$	RAD 1 INV sin (1.5707963)
Logarithmic Functions	
$\log 123 = 2.0899051$	123 log (2.0899051)
$\ln 123 = 4.8121843$	123 ln (4.8121843)
Exponential Functions	
$e^{22} = 3.5849129 \times 10^9$	22 INV e^x (3.5849129 09)
$10^{2.3} = 199.52623$	2.3 INV 10^x (199.52623)
Hyperbolic Functions	
$\sinh 1.23 = 1.5644685$	1.23 HYP sin (1.5644685)
$\cosh 34 = 2.9173088 \times 10^{14}$	34 HYP cos (2.9173088 14)
$\tanh 1.23 = 0.8425793$	1.23 HYP tan (0.8425793)

Expression	Operation (Display)
Inverse Hyperbolic Functions	
$\sinh^{-1}1.5\times10^{25}$	1.5 EXP 25 INV HYP sin
$=58.663239$	(58.663239)
$\cosh^{-1}1.5=0.9624236$	1.5 INV HYP cos (0.9624236)
$\tanh^{-1}0.4=0.4236489$	.4 INV HYP tan (0.4236489)
Power Calculations	
$5.43^3=160.103$	5.43 $a^{\square}$ 3 = (160.103)
$2^{3.4}=10.55606$	2 $a^{\square}$ 3.4 = (10.55606)
Multiple Root	
$\sqrt[12]{123}=1.49334$	123 INV $\sqrt[x]{\ }$ 12 =
	(1.49334)
Extraction of Square Roots	
$\sqrt{3}=1.7320508$	3 $\sqrt{\ }$ (1.7320508)
$\sqrt{(5+6)\times7}=8.7749643$	5 + 6 × 7 = $\sqrt{\ }$
	(8.7749643)
Reciprocal Calculations	
$\frac{1}{123}=8.1300813\times10^{-3}$	123 $\frac{1}{x}$ (8.1300813−03)
$\frac{1}{2\times3+4}=0.1$	2 × 3 + 4 = $\frac{1}{x}$ (0.1)

Expression	Operation (Display)
Degrees-minutes-seconds → Decimal degrees Conversion	
360° 12′ 38″ →	DEG 360.1238 $d^{\circ\prime\prime\prime}$
360.21055°	(360.21055)
Decimal degrees → Degree-minute-second Conversion	
360.21055° →	DEG 360.21055 INV $d^{\circ\prime\prime\prime}$
360° 12′ 37″ 9	(360.12379)
Polar Conversion	
	DEG 1 RV 3 $\sqrt{\ }$ INV P→R
	(2.)
$r=2$	RV (60.)
$\theta=60°$	
Rectangular Conversion	
	DEG 2 RV 60 P→R
	(1.)
$x=1$	RV (1.7320508)
$y=1.7320508$	
Factorial Calculations	
$25!=1.5511209\times10^{25}$	25 n! (1.5511209 25)
$(4\times2-3)!=120$	(4 × 2 − 3) n!
	(120.)

Expression	Operation (Display)
Probability Find the probability of obtaining three heads in a single trial of tossing four coins.	3 [n!] [×] [(] 4 [−] 3 [)] [n!] [÷] 4 [n!] [nv] [=] [×] [(] 2 [1/x] [a^x] 4 [)] [=] (0.25)
Permutations $_nP_r=\frac{n!}{(n-r)!}$ $_5P_3=\frac{5!}{(5-3)!}=60$	5 [n!] [÷] [(] 5 [−] 3 [)] [n!] [=] (60.)
Combinations $_nC_r=\frac{n!}{r!(n-r)!}$ $_5C_3=\frac{5!}{3!\times(5-3)!}=10$	3 [n!] [×] [(] 5 [−] 3 [)] [n!] [÷] 5 [n!] [nv] [=] (10.)
Continuous Calculations $3\sin^2 65^\circ=2.4641814$	[DEG] 65 [sin] [=] [×] 3 [=] (2.4641814)
$\sin\frac{\pi^{RAD}}{4}\times\cos\sqrt{123}+\tan 60^\circ$ $=1.799098$	[RAD] [π] [÷] 4 [=] [sin] [×] 123 [√] [cos] [+] [DEG] 60 [tan] [=] (1.799098)
$3+\sqrt{3}=4.7320508$	3 [+] [√] [=] (4.7320508)

* Continuous calculations including a^x and $x\sqrt{a}$ should be performed after obtaining the result of a^x and $\sqrt[x]{a}$.
Example:

$3^{4.5}+678=818.2961$

3 [a^x] 4.5 [=] [+] 678 [=] (818.2961)

Expression	Operation (Display)
Constant Calculations $\cos 60^\circ+e^{\ln 20}=20.5$	[DEG] 60 [cos] [+] 20 [ln] [INV] [e^x] [=] (20.5)
$e^{\sqrt{100}}+(e^{\ln 20})=$ 22046.465	100 [√] [INV] [e^x] [=] (22046.465)
$\log 30\times 10^{\log 20}$ $=29.542426$	30 [log] [×] 20 [log] [INV] [10^x] [=] (29.542426)
$(\log 30)\times 10^{\sqrt{560.2}}$ $=6.8858913\times 10^{23}$	560.2 [√] [INV] [10^x] [=] (6.8858913 23)
$(\log 30)\times 10^{\sin^{-1}0.875}$ $=1.6382914\times 10^{61}$	.875 [INV] [sin] [INV] [10^x] [=] (1.6382914 61)
$2^{2.34}=5.063026$	2 [a^x] 2.34 [=] (5.063026)
$3^{(2.34)}=13.07566$	3 [=] (13.07566)
$4^{(2.34)}=25.63424$	4 [=] (25.63424)
Trigonometric Calculations $\operatorname{cosec} x=\frac{1}{\sin x}$	[DEG]
$\operatorname{cosec} 45^\circ=1.4142135$	45 [sin] [1/x] (1.4142135)
$\sec x=\frac{1}{\cos x}$	
$\sec 30^\circ=1.1547005$	30 [cos] [1/x] (1.1547005)
$\cot x=\frac{1}{\tan x}$	
$\cot 30^\circ=1.7320507$	30 [tan] [1/x] (1.7320507)

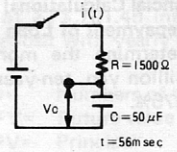
Expression	Operation (Display)
Degree → Radian Conversion $60^\circ = 1.0471975^{RAD}$	DEG 60 sin RAD INV sin (1.0471975)
Radian → Degree Conversion $1.0471975^{RAD} \rightarrow 60^\circ$	RAD 1.0471975 sin DEG INV sin (60.)
Degree → Gradian Conversion $60^\circ = 66.666666^{GRAD}$	DEG 60 sin GRAD INV sin (66.666666)
Gradian → Radian Conversion $66.666666^{GRAD} = 1.0471975^{RAD}$	GRAD 66.666666 sin RAD INV sin (1.0471975)
Logarithmic Mean $\overline{L} = \frac{4-8}{\ln 4 - \ln 8} = 5.7707808$	(RM CM) 4 ln M+ 8 ln SC M+ 4 − 8 ÷ RM CM = (5.7707808)
Geometric Mean $\overline{G} = \sqrt[4]{1.23 \times 1.48 \times 1.96 \times 2.2} = 1.67383$	1.23 × 1.48 × 1.96 × 2.2 = INV $\sqrt{}$ 4 = (1.67383)

Applied Calculations

[Electricity]

(1) Electric Circuit Problem

Obtain the voltage Vc at the both terminals of the condensor at t=56m/sec.



Formula:

$$Vc = Vi(1 - e^{-\frac{1}{RC}})$$

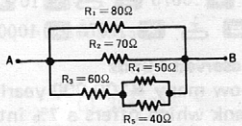
$$= 100 \times (1 - e^{-\frac{56 \times 10^{-3}}{1500 \times 50 \times 10^{-6}}}) = 52.60562$$

Operation:

1500 × 50 EXP 6 SC ÷ 56 EXP 3 SC INV e^x = SC INV $\ln$ SC + 1 × 100 =
(52.60562)

(2) Calculation of Combined Resistance

Using the given circuit:



Formula:

$$R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3 + \frac{1}{\frac{1}{R_4} + \frac{1}{R_5}}}}$$

$$= \frac{1}{\frac{1}{80} + \frac{1}{70} + \frac{1}{60 + \frac{1}{\frac{1}{50} + \frac{1}{40}}}} = 25.675391$$

Operation:

50 $\frac{1}{x}$ + 40 $\frac{1}{x}$ = $\frac{1}{x}$ + 60 = $\frac{1}{x}$ + 70 $\frac{1}{x}$ + 80 $\frac{1}{x}$ = $\frac{1}{x}$
(25.675391)

[Financial Calculations]

(1) Repayment of Loan

Determine the monthly payment amount on a one million yen, ten-year term loan at a monthly interest of 0.75%.

PMT= Amount of repayment
PV= Amount of loan
i= Monthly interest
n= Number of years

Formula:

$$PMT=PV\frac{i}{1-\frac{1}{(1+i)^n}}=1000000\times\frac{0.0075}{1-\frac{1}{(1+0.0075)^{10\times12}}}$$

$$=¥12667.577$$

Operation:

1 [+] .0075 [=] [a^x] [(] 10 [×] 12 [)] [=] [$\frac{1}{x}$] [SC] [+] 1
[=] [$\frac{1}{x}$] [×] .0075 [×] 1000000 [=] (12667.577)

(2) Reserved Funds

How many ¥100,000 yearly deposits must be made in a bank which offers a 7% interest rate to result in a combined principal and interest sum of ¥1,380,000?

n= Number of yearly deposits
FV= Future value (sum of principal and interest)
PMT= Payment (amount of yearly deposits)
i= Yearly interest rate

Formula:

$$n=\frac{\ln\left\{\frac{FV\times i}{PMT}+1\right\}}{\ln(1+i)}=\frac{\ln\left\{\frac{1380000\times0.07}{1000}+1\right\}}{\ln(1+0.07)}$$

$$=9.9913536 \text{ (approx. 10 years)}$$

1 [+] .07 [=] [ln] [M+] 1380000 [×] .07 [÷] 100000 [+]
1 [=] [ln] [÷] [RM] [=] (' 9.9913536)

(3) Compounded Interest

Determine the interest rate on a principal amount of ¥50,000 which yields a total of ¥71,781.45 interest plus principal after five years' deposit with yearly compounded interest.

n= Numbers of years
FV= Future value
PV= Principal

Formula:

$$i=\sqrt[n]{\frac{FV}{PV}}-1=\sqrt[5]{\frac{71781.45}{50000}}-1=0.075$$

Operation:

71781.45 [÷] 50000 [=] [INV] [$\sqrt[x]{}$] 5 [=] [−] 1 [=]
(0.075)

[Chemistry]

Hydrogenous Ion of Solution

Obtain Ph in a solution having a density of 4.2×10^{-4} mol/l.

Formula:

$$pH=\log\frac{1}{H^+}=\log\frac{1}{4.3\times10^{-4}}=3.3665315$$

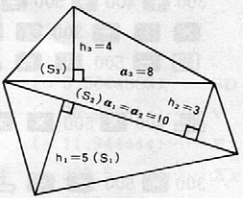
Operation:

4.3 [EXP] 4 [SC] [$\frac{1}{x}$] [log] (3.3665315)

[Surveying]

Areas of Triangles

Obtain the area of these three triangles when the heights and lengths are given as shown.



Formula:

$$S=S_1+S_2+S_3$$

$$=\frac{a_1h_1+a_2h_2+a_3h_3}{2}$$

$$=\frac{(10\times5)+(10\times3)+(8\times4)}{2}$$

$$=56$$

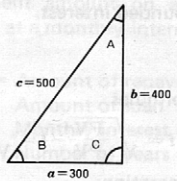
Operation:

([RM] [RM]) 10 [×] 5 [=] [M+] 3 [=] [M+] 8 [×] 4 [=] [M+] [RM]
[÷] 2 [=] (' 56.)

[Heron's Formula]

The Area of a Triangle and Angles

Obtain the area of the triangle (S) and angles (A, B, C) from sides a, b, c,



Formula:

$$S=\sqrt{s(s-a)(s-b)(s-c)}$$

Where: $s=\frac{a+b+c}{2}=\frac{300+400+500}{2}=600$

$$S=\sqrt{600(600-300)(600-400)(600-500)}=60000$$

$$A=\sin^{-1}\sqrt{\frac{4s(s-a)(s-b)(s-c)}{(bc)^2}}=36.869898^\circ$$

$$B=\sin^{-1}\sqrt{\frac{4s(s-a)(s-b)(s-c)}{(ac)^2}}=53.1300092^\circ$$

$$C=180-(A+B)=90.00002^\circ$$

Operation:

300 + 400 + 500 ÷ 2 = M+ (' 600.)·····s

× (− 300) × (RM − 400) × (RM − 500) = RV RM RV M+ √

(' 60000.)·····S

DEG 400 × 500 × = $\frac{1}{x}$ × 4 × RM = √ INV sin

(' 36.869898)

300 × 500 × = $\frac{1}{x}$ × 4 × RM = √ INV sin

(' 53.130092)

SC + 180 − 36.869898 = (' 90.00002)

[Statistics]

(1) Obtain the standard deviation (SD), variance (V), mean ($\bar{x}$), sum of variates (Σxi), sum of squared variates (Σxi^2) and numbers of variates (n) from the data shown.

n	xi
1	2.00
2	3.50
3	3.21
4	3.61
5	2.98

Operation:

STAT 2 SUM 3.5 SUM 3.21 SUM 3.61 SUM 2.98 SUM

STAT 1 (• 0.641989)····· SD

STAT 2 (• 0.32972)····· V

STAT 3 (• 3.06)····· $\bar{x}$

STAT 4 (• 15.3)····· Σxi

STAT 5 (• 48.4666)····· Σxi^2

STAT 6 (• 5.)····· n

(2) Obtain SD, V, $\bar{x}$, Σxi, Σxi^2 and n from the data shown.

	xi	fi
1	2.5	3
2	7.5	7
3	12.5	9
4	17.5	6
5	22.5	2

Operation:

(STAT DT) STAT 2.5 SUM SUM SUM

7.5 SUM SUM SUM SUM SUM SUM SUM

12.5 SUM SUM SUM SUM SUM SUM SUM SUM SUM

17.5 SUM SUM SUM SUM SUM SUM

22.5 SUM SUM

STAT 1 (• 5.6044853)····· SD

STAT 2 (• 30.246914)····· V

STAT 3 (• 11.944444)····· $\bar{x}$

STAT 4 (• 322.5)····· Σxi

STAT 5 (• 4668.75)····· Σxi^2

STAT 6 (• 27.)····· n

[Algebra]

The Root of Quadratic Equation

(Only for a problem having a real root.)

Formula:

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-9\pm\sqrt{9^2-4\times4\times2}}{2\times4} \qquad x=\begin{cases}-0.25\\-2\end{cases}$$

Operation:

(▦ ▦)9 ✕ = M+ 4 SC ✕ 4 ✕ 2 = M+ ▦ (′ 49.) *

9 SC + ▦ ∫ ÷ 2 ÷ 4 = (⌟ 0.25)

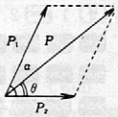
9 SC − ▦ ∫ ÷ 2 ÷ 4 = (⌟ 2)

* When 0 is displayed it is a multiple root.
When displayed numerals are negative, they are imaginary roots.

[Physics]

Synthesis of Two Vectors

Obtain θ at $P_1=30$, $P_2=15$, $a=60°$.



Formula:

$$P=\sqrt{P_1^2+P_2^2+2P_1P_2\cos a}$$

$$=\sqrt{30^2+15^2+2\times30\times15\times\cos60°}$$

$$=39.686269$$

$$\theta=\tan^{-1}\left(\frac{P_1\sin a}{P_1\cos a+P_2}\right)=\tan^{-1}\left(\frac{30\sin60°}{30\cos60°+15}\right)$$

$$=40.893395$$

Operation: DEG

(▦ ▦)30 ✕ = M+ 15 ✕ = M+ 2 ✕ 30 ✕ 15 ✕ 60 $\sin$ = M+ ▦ ∫ (′ 39.686269)

▦ ▦ 30 ✕ 60 $\sin$ + 15 = M+ 30 ✕ 60 $\sin$ ÷ ▦ = INV $\sin$ (′ 40.893395)

Specifications

Type: Palmtronic F-61 electronic calculator with function keys.

Display: Fluorescent tube display
8 digits (mantissa) + 1 digit (mantissa sign)
2 digits (exponent) + 1 digit (exponent sign)

Register: Five registers for calculation, one for memory.

Calculation Capacity: Calculation range:
For decimals
$x \geqq |1.0000000 \times 10^{-99}|$
For integers
$x \leqq |9.9999999 \times 10^{99}|$
Effective accuracy: 8 digits max.

Types of Calculations: Addition, subtraction, multiplication and division. Chain multiplication and division. Addition, subtraction, multiplication and division by a constant. Various mixed calculations.
Function calculations: trigonometric, inverse trigonometric, exponential, logarithmic, hyperbolic, inverse hyperbolic, powers, multiple roots, extraction of square roots, reciprocals, factoricals, constant pi, conversion of degrees-minutes-seconds and decimal degrees, polar and rectangular conversion.
Statistical calculations: standard deviations, variances, means, sum of variates, sum of squared variates, numbers of variates.

Negative Numbers: True value indication with minus sign.

Decimal Point System: Floating system and exponential display.

Indication Functions: Error indication, minus sign, memory indication, statistical indication.

Elements: MOS-LSI

Power Sources:
1. 4 penlight batteries (DC6V 0.5W).
   High performance managanese batteries yield 15 hours of use.
   Alkaline batteries for approx. 25 hours.
2. AC with Canon AC Adapter-1 (Optional)
3. NiCd Battery Pack-2 (Optional) (8 hours)

Usable Temperature: 0°C ~ 40°C (32°F ~ 104°F)

Size: 84mm wide x 150mm long x 26mm high (3-3/8" x 5-15/16" x 15/16")

Weight: 250g (8.81 oz.) with batteries.

Subject to change without notice.