CANON CANOLA F-11
ABRIDGED USER GUIDE

(based on a 4-page brochure [German], plus using an actual F-11, pictured below)

NOTE: some icons in this document are quite small, but will be perfectly readable if you zoom in.

Contents

Features

1. Simple algebraic arithmetic logic

Numbers and operations are keyed in as they are read. Brackets allow expressions to be nested 3-deep and mixed fractions can be entered without memory allocation or re-keying of intermediate calculated values.

2. 10 memories

The Canola F-11 has 10 memories for storage, accumulation calculation, retrieval and summation of values, items and results.

3. Floating point, fixed point and scientific display

Floating point applies for input, fixed point for output (from 0 to 6 decimal places), floating point (F) or scientific notation (SN). Numbers greater than 10^{10} and less than 10^{-10}, are always displayed in scientific form. The dynamic range is 10^{99} to 10^{-99}.

4. Trigonometric functions

Angular functions sine, cosine, tangent and their Inverse functions are performed in degrees, grads and radians.

5. Hyperbolic functions

Hyperbolic functions sinh, cosh, tanh and their inverse functions.

6. Logarithmic functions

Base 10 and natural logarithms and their inverse functions are calculated to 10 decimal digits.

7. Functions of x.

Square, square root, reciprocal and

exponentiation.

8. Constant

The constant π is available on a key. The K switch allows constant multipliers or divisors to be used.

9. Statistical functions

Statistics can be computed for 1-sample or 2-sample data. These include Mean value, Standard deviation, Sum of values and their squares and Correlation coefficient.

For 2-sample data, linear regression coefficients a (slope) and b (y intercept) can be calculated . The button 

is used to solve factorials, permutations, combinations and probability calculations.

10. Conversions

Degrees, minutes, seconds ↔ decimal degrees; polar coordinates ↔ rectangular coordinates . Temperature conversions (°F ↔ °C), measurements (ft ↔ m, in ↔ cm), weight conversions (lb ↔ kg) and volume Conversions (gal ↔ litres).

11. Fractional calculations

With the fraction button  mixed fractions can be entered directly. Note that fractions are not preserved but converted on the fly.

e.g. To enter the mixed fraction 2 ⅙, press

NOTE: any “leading zeros” in the fractional part of the entry will be ignored. e.g. 2.001 will be treated as if 2.1 was entered.

12. Functional keyboard

The keys are well dimensioned and logically placed. Their tactile feel and feedback makes for easy use.

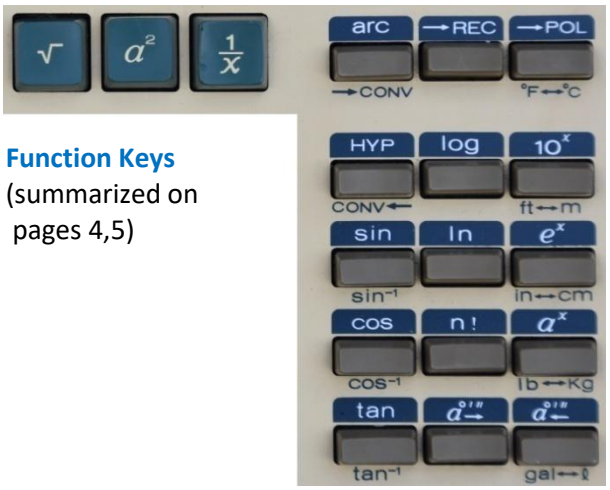
NOTE: Where multiple keys are required for a particular function or action, keys are pressed sequentially. There are NO instances where more than one key is pressed at any one time.

Canola F-11 Display

Canola F-11 Keyboard

Memory and Clear Keys

OUT: Return stats
M+n: Add to memory ***n***
RMn: Recall memory ***n***
SMn: Save to memory ***n***
CMn: Clear memory ***n***
(***n*** is 0...9)
DEL: Delete
CI: Clear last
C: Clear display



Function Keys

(summarized on pages 4,5)

Numeric Entry Keys

0-9, decimal point and sign change.

Operator Keys

[ ]	nesting
π	pi (constant)
×	multiply
EXP	exponent entry
÷	divide
SUM	stats data entry
+	Addition
/	fraction
–	subtraction
=	display result

Settings

1 2 3 4 5

1. Display: decimal places (0,1,2,3,4,9); floating point (F); scientific notation (SN)
2. Stats: Off, 1-variable (X), 2-variable (XY) and linear regression (LR)
3. Angle measure: Radians; degrees; grads
4. Constant operator (K)
5. Round off (5/4) or round down (↴)

FUNCTIONS (Math)

1. Summary of keys

Trigonometric functions

sin – sine

cos – cosine

tan – tangent

arc sin – Arc Sin

arc cos – Arc cosine

arc tan – Arc Tangent

Hyperbolic functions

HYP sin –Hyperbolic sine

HYP cos – Hyperbolic cosine

HYP tan – Hyperbolic tangent

arc HYP sin – Arcsin h

arc HYP cos – Arccos h

arc HYP tan – Arctan

Logarithmic functions

log – Decimal logarithm

10^x – Exponent x to base 10

ln – Natural logarithm

e^x – Exponent x to base e

Functions of x.

a^2 – square of x

$\sqrt{\ }$ – square root of x

$\frac{1}{x}$ –reciprocal of x

a^x –a to the power x

Angular conversions

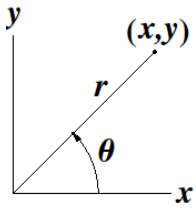
$a^{\circ\prime\prime}\rightarrow$ – conversion of degrees, minutes, seconds to decimal degree

$a^{\circ\prime\prime}\leftarrow$ – Conversion of decimal degrees into degrees, minutes, seconds

Coordinate conversions

→REC – polar form r and θ are converted to cartesian form to x and y.

→POL – rectangular form x and y are converted to polar form r and θ.



Statistical functions

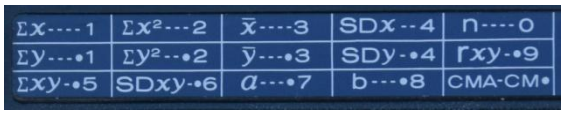
n! – N factorial for integers x for range $0 \leq x \leq 69$

SUM + –Enter data (1-sample or 2-sample)

DEL SUM + –Clear data (1-sample or 2-sample)

CM n . – Clear all memories

1-sample and 2-sample statistics can be performed using the OUT key as per the legend provided above the keyboard.



Linear regression

The linear regression for any two-dimensional variable (x_i, y_i) stats can be determined by entering the x value and pressing OUT = to obtain the estimate

Metric conversions

→CONV °F↔°C – fahrenheit to celsius

→CONV ft↔m – feet to meters

→CONV in↔cm – inches to centimetres

→CONV lb↔Kg – pounds to kilograms

→CONV gal↔ℓ – gallons to litres

CONV← instead of →CONV : perform conversion in the opposite direction.

FUNCTIONS (Math)

2. Usage

Function keys operate on 1 or 2 variables as indicated in the table below. The calculation accuracy is always based on 10 digits

NOTE: Set angle switch to desired setting before using functions ***sin***, ***cos***, ***tan*** and their inverses. Likewise for ***→REC*** *and* ***→POL***.

Input variables	Kinds of functions	Key operation and display (result)						
		1	2	3	4	5	6	7
1 variable	$\sqrt{}$, a^2, $1/x$, sin, cos, tan, log, 10^x, ln, e^x, n!, $a^{\circ\prime\prime}_{\rightarrow}$, $a^{\circ\prime\prime}_{\leftarrow}$	variable	various function keys	result				
	arc (sin, cos, tan)	variable	arc	sin (cos tan)	result			
	hyp (sin, cos, tan)	variable	HYP	sin (cos tan)	result			
	arc hyp (sin, cos, tan)	variable	arc	HYP	sin (cos tan)	result		
2 variables	a^x	variable (a)	a^x	Variable (x)	a^x	result		
	→ POL	Variable (x)	→POL	variable (y)	→POL	result (r)	→POL	result (Θ)
	→ REC	variable (r)	→REC	variable (Θ)	→REC	result (x)	→REC	result (y)

NOTE: When an operator does not appear before an opening bracket, [( ], multiplication is implied.

Examples of using Functions.

Equation	Setting	Key sequence	Answer
$5e^{\frac{3}{2}\{(1.7-0.8)sin30+0.7cos60\}} + tan\ 15^{\circ}25'30''$ =16.875		5 [3 ÷ 2 [[1.7 − .8] × sin + .7 × 60]] e^x + 15.253 $a^{\circ\prime\prime}_{\rightarrow}$ tan =	16.8765
$2\ sinh\ 2.5 + 3\cos(\frac{1}{4}\ sinh^{-1}\ \frac{1}{\sqrt{3.5^2-1}})$ = 15.1085		2 × 2.5 HYP sin + 3 [4 $\frac{1}{x}$ 3.5 [a^2 − 1] √ $\frac{1}{x}$ arc HYP sin] HYP cos =	15.1085

FUNCTIONS (Statistical)

Set the statistics switch to **X** for 1-variable stats, to **XY** for 2-variable stats or **L.R.** for linear regression.

To enter data, press 

To clear all statistics registers, press 

To delete data, press 

To return the results of statistical calculations use the 

key as per the table below.

Keys	Operation	
	n	Number of values or pairs of values
	$\sum x$	Sum of the entered x values
	$\sum x^2$	Sum of the squared x values
	$\bar{x}$	Mean of x
	S.D. x	Standard deviation of x
	$\sum y$	Sum of the entered y values
	$\sum y^2$	Sum of squared y values
	$\bar{y}$	Mean of y
	S.D. y	Standard deviation of y
	$\sum xy$	Sum of the products of x and y
	S.D. xy	Standard deviation of x y
	a	The constant a of the regression line $y = a + bx$
	b	The constant b of the regression line $r = a + bx$
	r_{xy}	Correlation coefficient of x and y

NOTE: The stat functions use 5 memories (5 through 9) as scratchpad; previous contents are lost.

Statistical calculation example

The following table shows the size (y) and the weight (x) of a certain group of people. We are looking for the correlation coefficient (r) and parameters a and b of the regression straight line ($y = ax + b$). Then the body sizes of two people with 40 kg or 75 kg weight are estimated.

	A	B	C	D	E
Weight in kg(x)	55	60	50	65	68
Height in cm (y)	162	175	160	172	177

Setting: 


(2-variable stats selected. Clear all memories)

Data entry: (note that entries are X and Y are entered alternately)

55 SUM+ 162 SUM+ 60 SUM+ 175 SUM+ 50 SUM+ 160 SUM+ 65 SUM+ 172 SUM+ 68 SUM+ 177 SUM+

OUT . 7 ..... 112.0600375 (a)

OUT . 8 ..... 0.958724202 (b)

OUT . 9 ..... 0.90587887 (r_{xy})

Setting: 


40 OUT = ... 150

75 OUT = ... 184

One can assume:
A person weighing 40 kg is 150 cm tall.
A person weighing 75 kg is 184 cm tall.

Technical Specifications

Type: Electronic Calculator

Keyboard: 10-key system.

Display: 7-segment planar display.
11 digit mantissa (10 digits and sign) and
3-digit exponent (2 digits and sign).

Registers: 9 for arithmetic operations, 8 for statistical calculations, 1 for fractional calculation, 10 for storage (5 for statistical calculation).

Parentheses level: 13 for operands and 9 for values.

Computing capacity:
Input: $+9.999999999 \times 10^{99} \sim +1.000000000 \times 10^{-99}$
Output: $+9.999999999 \times 10^{99} \sim +1.000000000 \times 10^{-99}$

Command system:
Input: As per keyboard input
Final results: fixed point, adjustable to 0, 1, 2, 3, 4, 6 or Floating point (F). Scientific notation (SN)

Negative values: display with a minus symbol

Calculation method: Algebraic logic with brackets (brackets can be 3 levels deep).

Calculations:

Basic calculations:
addition, subtraction, multiplication and division, parentheses, fractions, mixed calculations.

Functions:
trigonometric, inverse trigonometric, exponential, logarithmic, hyperbolic and inverse hyperbolical, n factorial, squaring, reciprocal, exponentiation, square root.

Conversions:
Temperature (°F ↔ °C)
Dimensions (ft ↔ m, inch ↔ cm)
Weights (lb ↔ kg)
Volume (gal ↔ litres)

Degrees: Minutes: Seconds ↔ Decimal Degrees
Polar Coordinates ↔ Rectilinear Coordinates

Statistical calculations:
Summation of individual values and Pairs of values, Mean, Standard Deviation, Correlation Coefficient, Linear Regression.

Other functions:
a) Security devices
1. Overflow lock
2. Input lock for double keying
3. Automatic register deletion

b) Automatic calculation functions
1. Automatic rounding up and down
2. K-switch for carrying constant values
3. Angle switch for calculations in radians, in degrees and grads
4. Statistics switch for individual values, value pairs and linear regression

c) Display functions
1. minus symbol
2. Error lamp
3. Lamp for statistical calculations

Electronics: MOS-LSI

Power supply: AC 100/115/220/240 V (-15% to + 10%), 50 W.

Temperature: 0 ° C to 40 ° C

Dimensions: 260 mm wide, 290 mm deep, 97 mm high.

Weight: 2.7 kg.

Subject to change