

OWNER'S MANUAL

**6518206**

Please read before using

**BIG Display 12 - Digit  
Scientific Calculator**

**with  
Fractional and Statistical  
Functions**

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## FEATURES

**Large 10 + 2 Digit Display**

**Calculates Mixed and Improper Fractions**

**Up to 15 levels of Parenthesis**

**Binary / Octal / Decimal / Hexadecimal Calculation Modes**

**Common and Natural Logarithms**

**Advanced Statistical Functions**

**Boolean Logic calculations**

**Auto Power off saves batteries**

**Battery powered**

**Protective Case**

**Folding stand for best viewing angle**

## Keys

**ON:** Turns the power ON and resets the calculator. The power turns off automatically after a few minutes if no key is pressed. The memory is not reset when ON is pressed.

**OFF:** Press to turn OFF the calculator.

**C/CE:** Press to delete a number in the display, Press twice to clear the current calculation.

**EXP:** Exponent key. Press to enter exponents  
Ex.  $40 \times 10^{22}$  Press 4 0 EXP 22 ( $40^{22}$ ) is displayed

**+/-** Changes the sign of the displayed mantissa and exponents

**>** Backspace Key : Clears the last digit from the display and shifts the other digits to the right.

## Mode Select Keys

**INV:** Press to perform the function above the keys.

**MODE:** Press to select the calculation mode.  
Then press 1 – 5 to select the Mode:

<u>Press</u>	<u>Mode</u>	<u>Displayed</u>
1	Decimal	DEG
2	Binary	BIN
3	Octal	OCT
4	Hexadecimal	HEX
5	Statistical	SD DEG

## **Display Mode Keys**

## Display Mode Keys

**FLO – SCI – ENG** Press to select the display mode.

FLOATING: Floating Point	Ex. 123456
SCI: Scientific Exponential	Ex. 1.2345606
ENG: Engineering Exponential	Ex. 123.45604

## Display Range

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Floating Point :	$10^{-9} \rightarrow 10^{10}$
Scientific:	$10^{-99} \rightarrow 10^{100}$
Engineering	Exponential $10^{-99} \rightarrow 10^{100}$
Mantissa:	Less than 100

## Decimal Point

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Press **MODE**, then press **DRG** to set in **DEG** mode.

Press **INV** and press **FIX** then a number from 0 to 9 to set the number of numbers to the right of the decimal point.

Press **INV** and press **FIX** then **.** (decimal point) to reset the Decimal point location.

**DRG**: Degree/Radian/Gradient Mode Key.

Press to change the angle units.

**DRG>** : Angle Conversion key.

Used with INV key to convert angle values to different units.

$$200^{\text{GRAD}} = 180 \text{ degrees} = \text{Pi}^{\text{RAD}}$$

## Basic Functions

**+**, **-**, **x**, **÷** keys

Press keys as written for basic functions.

**%** key

Press for percentage calculations, Add-on and discounts.

**(...)** **Open/Close parenthesis keys**

Press for up to 6 levels of parenthesis when performing complex calculations.

Up to 15 consecutive open parenthesis may be used at one time.

Notes: Open and close parenthesis must be used together, If only one is used, the calculation will be incorrect.

## Fractions

Accepts fractions and calculates with both mixed and improper fractions. Answers are given in mixed fractions.

**ab/c Fraction key**: Press to enter fractions as shown:

**Improper fractions A/B**:

Numerator **ab/c** Denominator

Ex.  $6 \text{ ab/c } 7 = 6/7$  <<6\_| 7>> is displayed

Up to 6 digits may be used for the numerator, 3 digits for the denominator.

## Mixed Fractions

Enter: Integer **ab/c** Numerator **ab/c** Denominator

Ex. 4 **ab/c** 6 **ab/c** 7 = 4 6/7

4\_6\_|7 is displayed

Up to 3 digits may be used for the Integer, numerator or denominator up to a total of 8 digits.

Press **ab/c** to change the displayed number from a fraction to a decimal number.

### **d/c Mixed/improper fraction key**

Press to convert mixed fractions to improper fractions:

<u>Press</u>	<u>Displayed</u>
10 <b>ab/c</b> 3	10_ 3
INV <b>d/c</b> =	3_ 1_ 3
INV <b>d/c</b> 10_ 3	

**X<->Y** key. Press to reverse the operand and the operator for multiplication and division.

123 x 456 ÷ 789 INV **X<->Y** =  
(0.01406718)

## Memory Keys

**M+** Press to add the displayed number to the independent memory

**Min** Press to store the displayed number in the independent memory

**MR** Press to recall the number in memory.

**X->M** Display/Independent Memory Exchange key. Press to exchange the displayed number with the contents of the independent memory and vice versa.

### **Binary/Octal/Hexadecimal keys**

Enter numbers with the following keys:

Binary Keys	0 – 1
Octal keys	0 – 7
Hexadecimal keys	0–9,A,B,C,D,E,F

Remember to first press:

MODE 2 for Binary, MODE 3 for Octal,  
MODE 4 for Hexadecimal.

**NEG** key: Press to change to the complement in Binary/Octal or Hexadecimal modes. Press again to change the complement back to the original value.

**BINARY – MODE 2**

Press 101010 **NEG** 1111010110. is displayed

**Octal – MODE 3**

Press 123456 **NEG** 7777654322. is displayed

**Hexadecimal – MODE 4**

Press 789 A B C **NEG** FFFF876544. is displayed

## Function Keys

ARCHYP – ArcHyperbolic key

HYP – Hyperbolic key

sin - Sine key

cos - Cosine key

tan - Tangent key

In - Natural Logarithm key

$e^x$  - Exponential function key

$x^2$  - Square key

$\sin^{-1}$  - Arc Sine key

$\cos^{-1}$  - Arc Cosine key

$\tan^{-1}$  - Arc Tangent key

log - Common Logarithm key

10x - Common exponential key

- Square Root key

1/x - Reciprocal key

DMS – DEG

Sexadecimal -> Decimal conversion key

R->P, P->R

Rectangular->Polar Coordinate key

$x^y$  - Raise to power key

- Pi key

$\sqrt[3]{\phantom{x}}$  - Cubic Root key

$x^{1/y}$  - Multiple root key

n! - Factorial key

## Statistical keys

**Variable Entry (DATA)**

**Variable Correction (DEL) key**

$\Sigma x$  key

**n** key

$\sigma^n$  key

$\sigma^{n-1}$  key

$\Sigma x^2$  key

$\bar{x}$  key

## Logical calculation keys

Used for Logical calculations in Binary, Octal and Hexadecimal modes

**AND OR**

**XOR XNOR NOT**

## Display Indicators

The following indicators will appear when the respective function is selected

<u>Display</u>	<u>Mode</u>
INV	Inv
HYP	Hyperbolic
BIN	Binary Mode
OCT	Octal Mode
HEX	Hexadecimal mode

<u>Display</u>	<u>Mode</u>
SD	Statistical mode
DEG	Degree Mode
RAD	Radian mode
GRAD	Gradient mode
( )	Calculation in Parenthesis

<u>Mode</u>	<u>Hexadecimal</u>	<u>Statistical</u>
+, -, x, ÷	6 levels	3 levels
( )	y	y
Constant	y	y
Percentage	n	y
Fractions	n	n
Memory	y	y
Function		
1 variable function	n	y
2 variable function	n	y
Raise to Power	n	n
Statistical	n	y
Logical	y	n
Complement (NEG)	y	n
+/-	n	y
Display		
(FLO, SCI, ENG)	n	y
Decimal (Fix)	n	y
Angle	n	y
Reverse	y	y

### Calculations modes

<u>Mode</u>	<u>Decimal</u>	<u>Binary</u>	<u>Octal</u>
+, -, x, ÷	6 levels	6 levels	6 levels
( )	15 levels	15 levels	15 levels
Constant	y	y	y
Percentage	y	n	n
Fractions	y	n	n
Memory	y	n	n
Functions			
1 variable	y	n	n
2 variable	y	n	n
Raise to Power	y	n	n
Statistical	y	y	y
Logical	y	n	n
Complement (NEG)	n	y	y
+/-	y	n	n
Display			
(FLO, SCI, ENG)	y	n	n
Decimal (Fix)	y	n	n
Angle	y	n	n
Reverse	y	y	y

## Calculation priority

Calculation priority is automatically determined by the calculator. Algebraic expressions are entered as they would be written.

Single variable functions and calculations in parenthesis have a higher priority than basic functions like +, -, x, ÷.

During calculations lower priority calculations are stored in the stack memory and processed in turn. Six levels of calculations may be stored in stack memory.

## Calculation range

A maximum of 9 digits in the mantissa or 10 digits plus 2 digits for exponent may be entered. If a result is too large to display, an Error indicator appears. This applies for Decimal/Octal/Hexadecimal modes.

## Statistical calculations

Press **MODE 5** to enter Statistical Mode. This clears all function commands and all registers except the memory.

The results of statistical calculations are stopped in the statistical calculation memory. As a result, you can perform statistical calculations again by exiting to another mode and then resetting the calculator for statistical calculation mode.

## Entering Statistical data

Ex. 1: 2 DATA            3 DATA            4 DATA  
Ex. 2: 125 LOG DATA            100 LOG DATA  
Ex. 3: (123 M+ MR DATA)

## Making corrections

**C/CE** clears the last digit pressed.  
**INV DEL** deletes the last DATA entered.

## Output of Statistical Calculation Results

<u>Output</u>	<u>Operation</u>
Arithmetic mean	INV $\bar{X}$
Standard Deviation of sample	INV $\sigma^{n-1}$
Standard Deviation population parameter	INV $\sigma^n$
Variance of Sample	INV $\sigma^{n-1} X^2$
Variance of Population	INV $\sigma^n X^2$
Sum of data	INV $\sum X$
Sum of Squares of data	INV $\sum X^2$



## Performing Logical Calculations

Logical Calculations are performed with Boolean Algebra. Variables in logical calculations have only two values, True and False. Truth is represented by a “1” and False is represented by a “0”.

For Octal or Hexadecimal calculations, the values are converted to Octal or Hexadecimal.

### Type of logical calculations and truth tables

**AND:** Product of propositions  
Produces 1 when all input values are 1.

**OR** Sum of propositions  
Produces 1 when one or more input values are 1.

**XOR** Exclusive Sum of propositions  
Produces 0 when all input values are either 1 or 0. (Other cases acts as an OR)

**XNOR** Exclusive sum of propositions  
Combination of XOR and NOT

**NOT** Negation  
Produces the opposite value of the Input.

#### **Examples:**

1100 **AND** 1010 = (1000.)  
1100 **OR** 1010 = (1110.)  
1100 **XOR** 1010 = (110)

## **Truth Tables**

<b>AND</b>	<b>INPUT</b>		<b>OUTPUT</b>
	<u>A</u>	<u>B</u>	<u>X</u>
	1	1	1
	1	0	0
	0	1	0
	0	0	0

<b>OR</b>	<b>INPUT</b>		<b>OUTPUT</b>
	<u>A</u>	<u>B</u>	<u>X</u>
	1	1	1
	1	0	1
	0	1	1
	0	0	0

<b>XOR, XNOR</b>	<b>INPUT</b>		<b>OUTPUT</b>	
	<u>A</u>	<u>B</u>	<u>X OR</u>	<u>X NOR</u>
	1	1	0	1
	1	0	1	0
	0	1	1	0
	0	0	0	1

<b>NOT</b>	<b>INPUT</b>	<b>OUTPUT</b>
	<u>A</u>	<u>X</u>
	1	0
	0	1

## Errors

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The calculator will overflow if::

- Calculation or contents of the memory are outside the range of  $1 \times 10^{-99}$  to  $9.999999999 \times 10^{-99}$
- When dividing by 0.
- When data exceeds the range of any function or statistical data
- In Statistical calculation mode, if  $\sigma^{n-1}$  is calculated with only one data
- When finding  $x, \sigma^n$  and  $\sigma^{n-1}$  when  $v=0$ .
- When the number of calculation nesting levels exceeds 3 in statistical mode
- When more than 15 open parenthesis are used at one time.

In these cases the calculator stops and displays **E**. Press C/CE to resume.

## Examples

Constant Calculations

EX.  $4 + 5 =$     $5 + 5 =$     $6 + 5 =$   
Press  $4 + 5 =$          $5 =$          $6 =$

Binary

MODE 2  
 $10101011 + 1100 + 1110 = 11000101$

Octal

MODE 3  
 $654 + 321 = 1175$   
 $741 - 357 = 362$

Hexadecimal

MODE 4  
 $AAA + bb + C = b71$   
 $dEF - EFE = FFFFFFFEF1$   
 $FEDC \times A9 = A83F3C$

Binary/Octal/Hexadecimal mode calculations may be mixed.

## Trigonometric Functions

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	<u>Press</u>	<u>Displayed</u>
Sin53°	[Mode][DRG]►DEG	53 sin (0.79863551)
Tan 65grad	[Mode][DRG]►GRAD	65 tan (1.631851687)
Cos22	[Mode][DRG]►RAD	22 cos (-0.999960826)

### Inverse Trigonometric Functions

Sin <sup>-1</sup> 0.3	[DEG] . 3 INV sin-1	(17.45760312°)
Cos <sup>-1</sup> 0.8	[DEG] . 8 INV cos-1	(36.86989765°)

### Logarithmic Functions

Log 123=	1 2 3 log	(2.089905111)
In 123=	1 2 3 In	(4.812184355)

### Exponential calculations

e <sup>2.2</sup> =	2 2 INV e <sup>x</sup>	(3584912846)
10 <sup>2.3</sup> =	2 . 3 INV 10 <sup>X</sup>	(199.5262315)

### Reciprocal Calculations

$$\frac{1}{2 \times 3 + 4} = 0.1 \quad 2 \times 3 + 4 = 1/x \quad (0.1)$$

### Factorial Calculation

$$(4 \times 2 - 3)! = 120 \quad 4 \times 2 - 3 = \text{INV } n! \quad (120)$$

### Trigonometric Calculations

$$\text{Cosec } x = \frac{1}{\sin x}$$

[DEG] 4 5 sin 1/x (1.414213562)

## Hyperbolic Calculations

Cosh34 = 3 4 HYP cos (2.917308713 x 10<sup>14</sup>)

## Inverse Hyperbolic Calculations

Sinh<sup>-1</sup> 1.5 x 10<sup>25</sup> = 58.66323961  
 1 . 5 EXP 2 5 INV HYP sin (58.66323961)

## Statistical Calculations

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DATA	Enters statistical data
$\Sigma x$	Displays Sum of the data
$n$	Displays the number of data
$\sigma^{n-1}$	Displays the Standard deviation sample
$\Sigma x^2$	Displays the Square sum of the data
$\bar{x}$	Displays the Mean value of the data
$\sigma^2$	Displays the Standard deviation population parameter

**Note:** In scientific mode the results may be displayed in the form of exponent

## APPLICATIONS AND EXAMPLES

### BUSINESS

Calculate the future value of a \$1000 investment compounded annually at a rate of 6% for 7 years.

$$\begin{aligned} \text{FV} &= p(1+i)^n \\ &= 1000(1+0.06)^7 \\ &= 1503.63 \end{aligned}$$

Press	Display
1 [+] 0.06 [=] [x <sup>y</sup> ] 7[=]	1.503630259
[x] 1000 [=]	1503.630259

### PHYSICS

If a ball is thrown upward with a velocity of 75 feet per second, what is its velocity at the end of 1.6 seconds ( $g=32.2 \text{ ft/sec}^2$ )?

$$\begin{aligned} \text{Velocity: } V &= V_0 - gt \\ &= 75 - (32.2 \times 1.6) \\ &= 23.48 \text{ ft/sec.} \end{aligned}$$

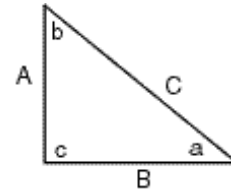
$$\begin{aligned} \text{Height: } S &= V_0t - \frac{1}{2}gt^2 \\ &= (75 \times 1.6) - \left(\frac{1}{2} \times 32.2 \times (1.6)^2\right) \\ &= 78.784 \text{ ft.} \end{aligned}$$

Press	Display
75 [-] 32.2 [x] 1.6 [=]	23.48
75 [x] 1.6 [-] 2[1/x] [x]	0.5
32.2 [x] 1.6 [x <sup>2</sup> ] [=]	78.784

## CIVIL ENGINEERING

In this right triangle,  $A = 5.7$  feet and  $a = 30$  degrees. Determine the value of  $C$ .

$$\begin{aligned} \sin a &= A / C \\ \sin 30 \text{ degrees} &= 5.7 / C \\ C &= 5.7 / \sin 30 \text{ degrees} \\ C &= 5.7 / .5 \\ C &= 11.4 \end{aligned}$$



Mode	Press	Display
DEG	5.7 [÷]	5.7
	30 [sin]	.5
	[=]	11.4

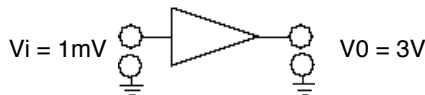
In this right triangle,  $A = 6$  feet and  $C = 15$  feet. Determine the values of  $a$ ,  $b$  and  $B$ .

$$\begin{aligned} \sin a &= A / C \\ \sin a &= 6 / 15 = 0.4 \\ \sin^{-1} .4 &= 23.58 \\ \mathbf{a} &= \mathbf{23.58 \text{ degrees}} \\ \mathbf{b} &= \mathbf{90 - 23.58 = 66.42 \text{ degrees}} \\ \cos a &= B / C \\ \cos 23.58 &= B / 15 \\ B &= \cos 23.58 \times 15 \\ \mathbf{B} &= \mathbf{.9165 \times 15 = 13.7475 \text{ feet}} \end{aligned}$$

Mode	Press	Display
DEG	0 [INV][x<->m]	0
	6 [ ]	6
	15 [=]	0.4
	[INV] [sin <sup>-1</sup> ]	23.57817848
	[Min]	M 23.57817848
	90 [-] [MR] [=]	M 66.42182152
	0 [INV][x<->m]	23.57817848
	23.58 [cos]	0.916502421
	[□] 15 [=]	13.74753633

## ELECTRONICS

### AMPLIFIER GAIN



Calculate the value of  $A_v$

$$\text{Voltage gain } A_v = 20 \log V_o/V_i$$

$$= 20 \log \frac{3}{1 \times 10^{-3}}$$

$$= 69.54242509 \text{ dB}$$

Press	Display
3 [ ] [EXP] 3 [+/-]	1. -03
[=] [log] [□]	3.477121255
20 [=]	69.54242509

## REPLACING THE BATTERY

If the calculator slows down when using the battery, the battery is weak and should be replaced.

1. Remove the 6 screws on the bottom panel and remove the panel.
2. Remove the old batteries.
3. Insert the new batteries (Radio Shack type RS-389 Cat. No. 23-101) following the polarity of the old battery.

4. Replace the bottom panel and replace the screws.

### Replacement Batteries

Radio Shack	Eveready	Maxell
389A	189	LR1130

## CARE AND MAINTENANCE

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This scientific calculator is a carefully designed and crafted electronic device. With the proper care, you can enjoy it for years.

- Keep the calculator dry and away from liquids. If it gets wet, dry it immediately with a soft cloth. If water enters the calculator, wait for the water to evaporate before using the calculator.
- Store the calculator in moderate temperatures. Excessive heat or cold can damage the calculator.
- Do not drop or strike the calculator. A hard knock can damage circuit boards or the display.
- Keep the unit in its protective case when not in use. Clean the calculator case only with a soft damp cloth. Do not use harsh chemicals, cleaning solvents or detergents.

Attempting to modify or tamper with the calculator's internal components can cause a malfunction and invalidate the warranty. If the calculator is not functioning properly, return it to Datexx for assistance.

## ORBYX ELECTRONICS WARRANTY

ORBYX Electronics warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of purchase. Within this period, simply take the product and your proof of purchase to any ORBYX Electronics store or dealer and the product will be repaired without charge for parts and labour. ORBYX Electronics reserves the right to charge for transportation. Any product which has been subject to misuse or accidental damage is excluded from this warranty.

This warranty is only applicable to a product purchased through ORBYX Electronics' company owned stores and dealers and to a product that is presented for repair in a country where ORBYX Electronics offers the product for sale. While this warranty does not confer any legal rights other than those set out above, you may have additional statutory rights which will vary under the laws of the various countries, states, provinces and other governmental entities in which ORBYX Electronics operates. This warranty is subject to all statutory rights you may have in the country of purchase.

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