# SHARP

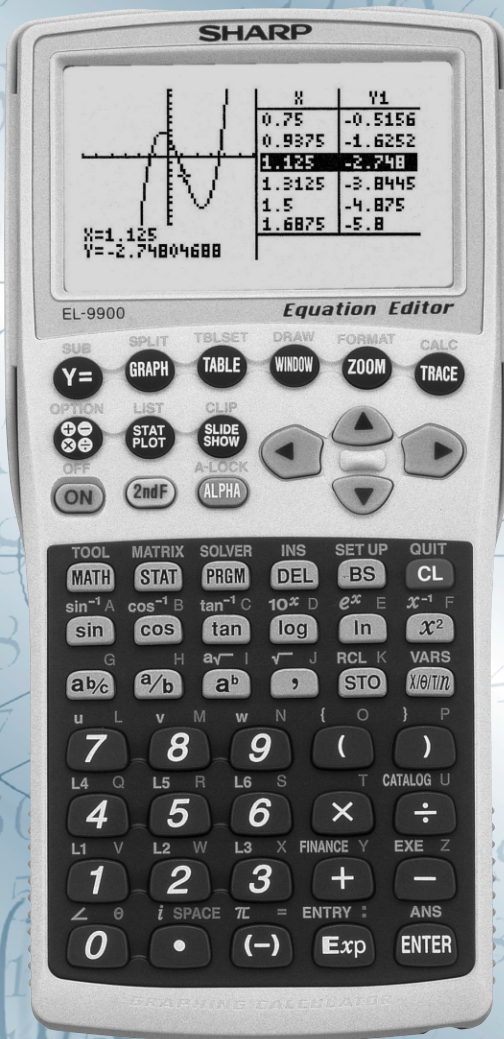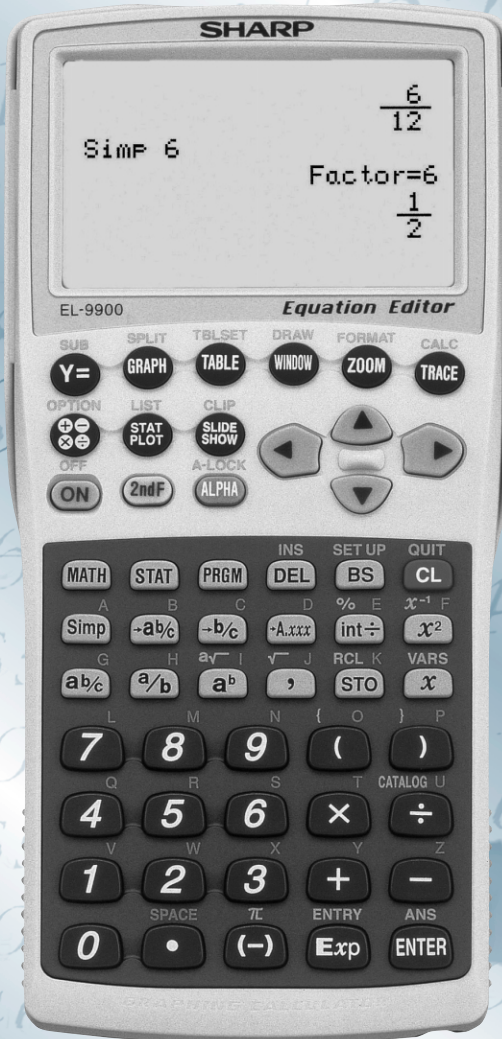## Graphing Calculator
# EL-9900
# OPERATION GUIDE

For Advanced Levels        For Basic Levels

# Introduction

Around the world, there's a growing need for graphing calculators that can be used as educational tools. More and more schools are starting to introduce calculators in the lower grades. Despite this trend, though, current graphing calculators are often designed with too many functions allotted to a limited number of keys. They take too long to get used to operating, and are too complex to be used for their main purpose — as learning support tools.

That's why SHARP developed the EL-9900, with the world's first reversible keyboard. This unique keyboard has functions used in lower grades on one side and those for higher grades on the other, along with different function select menus for both basic and advanced keyboards. The 2-in-1 EL-9900 helps students learn not only basic operations — such as fractions, pie charts and easy statistics — but also high-level functions and complex statistics. It's a simple case of just reversing the keyboard. And, as well as being easy to use, it's economical; there's no need for a student to buy a new calculator when he begins studying more advanced functions.

The EL-9900 features the latest useful functions from our current models. The Equation Editor, for example, displays equations as they would appear in a textbook, while the Slide Show function displays inputted equations, tables, or graphs in a slide-show style.

Our intention with this Operation Guide is to introduce the main features of the EL-9900, using operation examples, so that teachers can use this calculator more easily.

Note)
• The Reversible Keyboard is an original SHARP technology, patent pending.
• For more information on the EL-9900, please visit this web page: http://sharp-world.com/products/calculator/product/graphing/9900.html

## Contents

# Changing the keyboard

Using the reversible keyboard of this calculator changes not only its appearance, but also its internal functions and configurations.

**To change the keyboard:**

1. Press 2nd F | OFF to turn off the calculator's power.

2. Open the battery compartment cover. Hold the calculator as illustrated.

3. Slide the keyboard eject tab (KEYBOARD EJECT) down.

   The keyboard will be ejected.

   Be careful not to drop the keyboard on the floor, as this may damage it.

4. Turn the keyboard over, and place it back in the calculator as illustrated. Secure by gently pressing the keyboard until you hear the notch click.
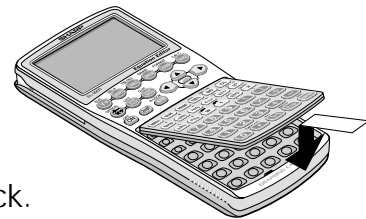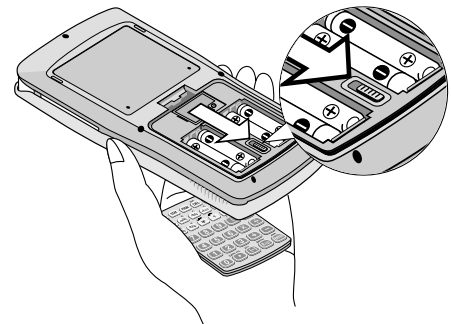
**Note:** Clean the edges and contact points of the keyboard and the keyboard tap before reattaching the keyboard to the main unit. DO NOT touch the pad portion in the keyboard tap.
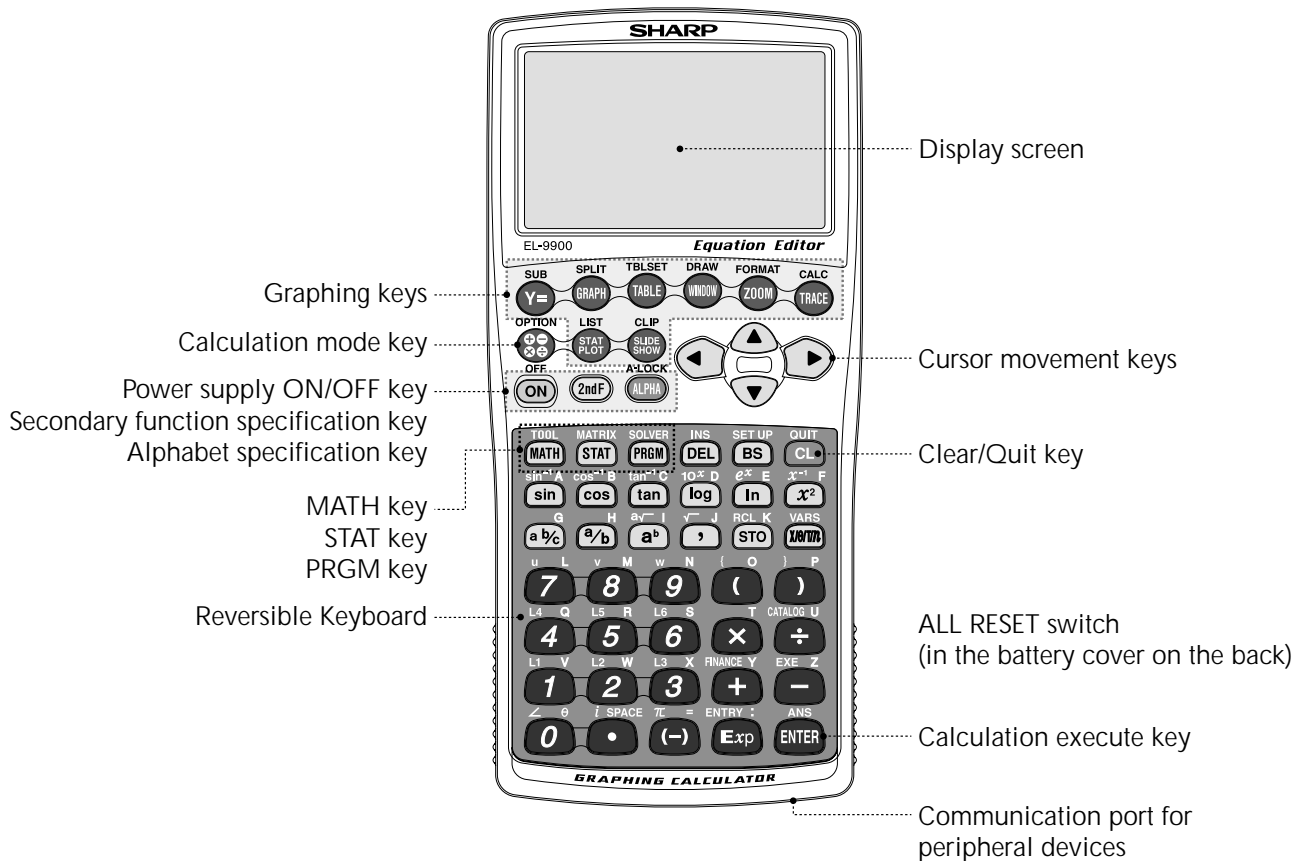
5. Replace the battery compartment cover.

6. Press ON .

7. Make sure that the message shown on the right appears.

```
PRESS [CL] KEY TO
CLEAR ALL DATA

PRESS [ON] KEY TO
CANCEL
```

8. Press ON .

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# Basic operation

## Names of parts & main keys

Display screen

Graphing keys

Calculation mode key

Power supply ON/OFF key
Secondary function specification key
Alphabet specification key

MATH key
STAT key
PRGM key

Reversible Keyboard

Cursor movement keys

Clear/Quit key

ALL RESET switch
(in the battery cover on the back)

Calculation execute key

Communication port for
peripheral devices

| | | | |
|---|---|---|---|
| ON | Power on | Y= | Equation entry mode |
| 2nd F  OFF | Power off | GRAPH | Draw graph |
| CL | Erase equation and answer | TABLE | View table of function values |
| 2nd F  QUIT | Cancel previous function | WINDOW | Graph size setting mode |
| ⊞⊟⊠⊟ | Enter calculation mode | ZOOM | Adjust viewing mode |
| MATH | Display function menu | TRACE | Trace graph mode |
| STAT | Enter statistics mode | ENTER | Calculation execute key |
| PRGM | Enter programming mode | | |

# Basic operation

## Guide to key use

Press $\boxed{\text{2nd F}}$ to use secondary functions (in yellow).

Press $\boxed{\text{ALPHA}}$ to use the alphabet keys (in violet).

**Example**: $\boxed{x^2}$ (with $x^{-1}$ above, F above-right)

To select "$X^2$": $\boxed{x^2}$

To select "$X^{-1}$": $\boxed{\text{2nd F}}$ $\boxed{x^2}$ $\rightarrow$ $\boxed{\text{2nd F}}$ $\boxed{x^{-1}}$
Displayed as follows:

To select F: $\boxed{\text{ALPHA}}$ $\boxed{x^2}$ $\rightarrow$ $\boxed{\text{ALPHA}}$ $\boxed{\text{F}}$
Displayed as follows:

## SET UP menu

There may be differences in the results of calculations and in displayed content, as this calculator has detailed set up menus involving options such as angle units and display formats.

The set up menu screen will appear upon pressing $\boxed{\text{2nd F}}$ $\boxed{\text{SET UP}}$.

Confirm the current settings or change the settings using the cursor keys.

```
A
B DRG    Rad
C FSE    FloatPt
D TAB    9
E COORD  Rect
F ANSWER Mixed(Real)
G EDITOR Equation
H SIMPLE Auto
```
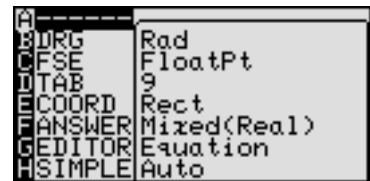
## Adjusting screen contrast

- The contrast adjust screen will appear when pressing $\boxed{\text{2nd F}}$ $\boxed{\text{OPTION}}$ .

```
A CTRST
B MEMCHK   LCD CONTRST
C DEL
D LINK
E RESET
         +  ▒▒▓  −
         DARK←——→LIGHT
```

Press $\boxed{+}$ to darken contrast.

Press $\boxed{-}$ to lighten contrast.

## Reset function

### 1) When trouble occurs

Press $\boxed{\text{2nd F}}$ $\boxed{\text{OPTION}}$ $\boxed{\text{E}}$ to enter the reset mode.

```
A CTRST
B MEMCHK  1 default set
C DEL     2 All memory
D LINK
E RESET
```

- Use this function ( $\boxed{1}$ or $\boxed{2}$ ) to return all settings to the default value or to delete all data.

### 2) All RESET operation

- If trouble still occurs, proceed as follows:
    1. Press $\boxed{\text{2nd F}}$ $\boxed{\text{OFF}}$ to turn the calculator off.
    2. Open the battery cover.
    3. Press the RESET switch in the battery compartment.
    4. Place the battery cover back on.
    5. Press $\boxed{\text{ON}}$ .
    - Returns to the initial display.

**CAUTION**

If you press $\boxed{\text{CL}}$ in step 5, it will delete all data stored in the calculator.

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# Equation editor

The equation editor allows equations to be viewed just as they are written in textbooks.
This aids student comprehension and allows mistakes to be found quickly.

**Example**

### Input the equation and see how it can be easily viewed with the equation editor.

<Advanced calculation mode>    <Basic calculation mode>

❶ $\displaystyle\int_{0}^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}\,dx$    ❷ $1\frac{1}{2} \div \left(-\frac{5}{6}\right)$

---

❶ $\displaystyle\int_{0}^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}\,dx$

| Key Operation | Display | Notes |
|---|---|---|
| **1** [⊞⊟ ⊠⊟] [CL] | — | Clear the display. |
| **2** [MATH] [A] [▶] [▶] [▼] [▼] [ENTER] | ACALC BNUM CPROB DCONV EANGLE FINEQ GLOGIC HCOMPLX — 01 log2 02 2^x 03 fmin( 04 fmax( 05 d/dx( 06 ∫ 07 dx 08 Σ( 09 sec 10 csc 11 cot 12 sec⁻¹ | Select CALC and ∫ (Integral function) |
| **3** [0] [▶] [1] [a/b] [2] [▶] [▶] | $\int_0^{\frac{1}{2}}$ | Enter the range of the integral. |
| **4** [X/θ/T/n] [a/b] [2nd F] [√] [1] [—] [X/θ/T/n] [x²] [▶] [▶] | $\int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}$ | Enter $\frac{x}{\sqrt{1-x^2}}$ |
| **5** [MATH] [▶] [▼] [▼] [▼] [ENTER] | $\int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}\,dx$ | Complete equation input. |
| **6** [ENTER] | $\int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}\,dx$  0.133974596 | Calculate the expression. The mark in the upper right corner will blink for approximately 10 seconds, indicating that the expression is being calculated. |
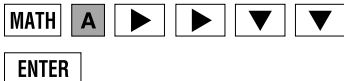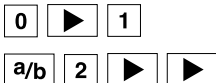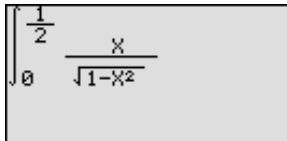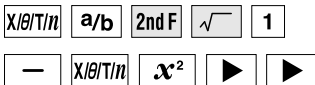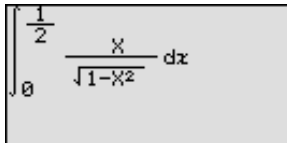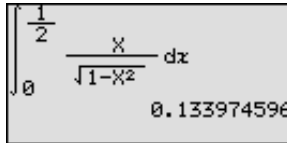
**SHARP**

4

❷ $1\frac{1}{2} \div \left(-\frac{5}{6}\right)$

| **_Key Operation_** | **_Display_** | **_Notes_** |
|---|---|---|

**1** See page 1 and switch the calculator to Basic calculation mode.

**2** 〔⊞⊟／⊠⊞〕 〔CL〕

〔—〕

Clear the display.

**3** 〔1〕〔a^b/c〕〔1〕〔▶〕〔2〕〔▶〕〔÷〕 〔(〕〔(−)〕〔5〕〔a/b〕〔6〕〔▶〕〔)〕

$1\frac{1}{2} \div \left(-\frac{5}{6}\right)$
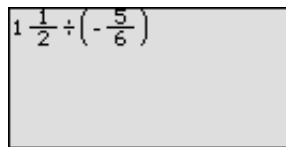
Enter the equation.

**4** 〔ENTER〕

$1\frac{1}{2} \div \left(-\frac{5}{6}\right)$

$-1\frac{4}{5}$

Calculate the expression.

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# Slide show

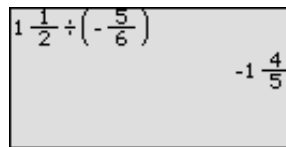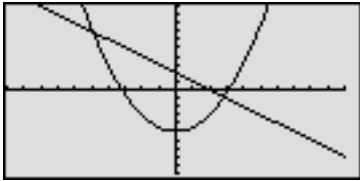Utilizing the calculator's graphing capabilities, the slide show function helps students understand a range of mathematical concepts. With this function, the calculator's screen images can be captured, organized and stored.

┌─ *Example* ─────────────────────────────────────────────┐

### Use the slide show function to create an original slide show.

└─────────────────────────────────────────────────────────┘

Before carrying out the following operation, press the reset switch in the battery compartment and press the CL ENTER keys (caution: previously entered equations and memory will be erased).

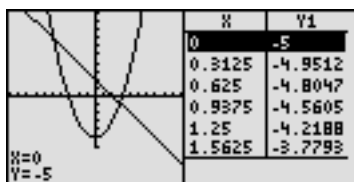| *Key Operation* | *Display* | *Notes* |
|---|---|---|
| **1** SLIDE SHOW C ENTER<br>S A M P L E<br>ENTER | Slide show title<br>[SAMPLE ]<br>[2ndF][CLIP] to save screen. | Enter the slide show creation mode and input a title. |
| **2** ⊞⊟⊠⊟ 2nd F A-LOCK<br>G R A P H I C<br>SPACE S C R E E N<br>**3** 2nd F CLIP | GRAPHIC SCREEN▮ | Create the first screen and press 2nd F CLIP to register it.<br>The message "STORESCREEN 01" will appear momentarily to show that registration is completed. |
| **4** Y= 0 · 5 X/θ/T/n<br>$x^2$ − 5 ENTER<br>(−) X/θ/T/n + 2<br>**5** 2nd F CLIP | Y1■0.5X²−5<br>Y2■-X+2<br>Y3=<br>Y4=<br>Y5=<br>Y6= | Enter the graph equations "0.5X²-5" and "-X+2" at Y1 and Y2 respectively. Registers as the second screen. |
| **6** GRAPH<br>**7** 2nd F CLIP | | Displays the graph.<br>Registers as the third screen. |
| **8** TABLE<br>**9** 2nd F CLIP | X Y1 Y2<br>0 -5 2<br>1 -4.5 1<br>2 -3 0<br>3 -0.5 -1<br>4 3 -2<br>5 7.5 -3<br>X=0 | Shows the table.<br>Registers as the fourth screen. |

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| *Key Operation* | *Display* | *Notes* |
|---|---|---|

**10** `2nd F` `SPLIT`



The graph and table are shown simultaneously.
Registers as the fifth screen.

**11** `2nd F` `CLIP`

**12** `SLIDE SHOW` `B`



```
ACURR
BPLAY    01SAMPLE
CNEW
DSELECT
EEDIT
```

Sets the slide show to the playback mode.

**13** `0` `1`



```
GRAPHIC SCREEN        01
```

Press `ENTER` to recall the first screen.
The symbol **01** is displayed in the top right corner of the screen.

**14** `▼`



```
Y1=0.5X²-5            02
Y2=-X+2
Y3=
Y4=
Y5=
Y6=
```
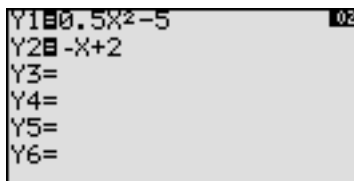
Press the `▼` key to recall the second screen.
The symbol **02** is displayed on the screen.

**15** `▼` `▼` · · ·
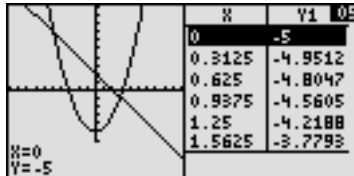


Press the `▼` key repeatedly to view the screens in the order that they were created. The last screen is shown at left. This is the end of the playback.

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# Graphing procedures

With the EL-9900, graphs can be drawn in one of 4 modes: by rectangular coordinates, by polar coordinates, by parameters, or by sequences.
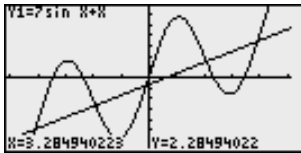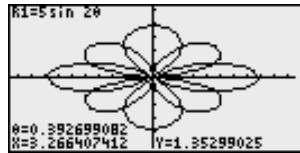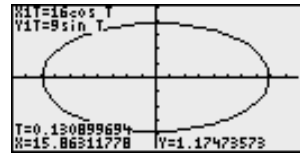(Note: Graphs in polar coordinate, parameter, and sequence modes cannot be drawn using the Basic keyboard.)
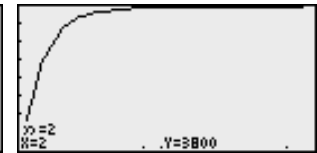
| | | | |
|---|---|---|---|
| Rectangular coordinates | Polar coordinates | Parameters | Sequences |

## Graphing Steps

Example: Draw a rectangular graph.

| Key Operation | Display | Notes |
|---|---|---|
| **1** $\boxed{Y=}$ $\boxed{X/\theta/T/n}$ $\boxed{a^b}$ $\boxed{3}$ $\boxed{\blacktriangleright}$ $\boxed{+}$ $\boxed{X/\theta/T/n}$ $\boxed{x^2}$ $\boxed{-}$ $\boxed{2}$ $\boxed{X/\theta/T/n}$ | Y1■X³+X²−2X<br>Y2=<br>Y3=<br>Y4=<br>Y5=<br>Y6= | Enter the equation. |
| **2** $\boxed{\text{GRAPH}}$ | | Draw the graph. |
| **3** $\boxed{\text{WINDOW}}$ $\boxed{(-)}$ $\boxed{3}$ $\boxed{\cdot}$ $\boxed{5}$ $\boxed{\text{ENTER}}$ $\boxed{2}$ $\boxed{\cdot}$ $\boxed{5}$ $\boxed{\text{ENTER}}$ $\boxed{1}$ $\boxed{\text{ENTER}}$ $\boxed{(-)}$ $\boxed{3}$ $\boxed{\text{ENTER}}$ $\boxed{3}$ $\boxed{\text{ENTER}}$ $\boxed{\cdot}$ $\boxed{5}$ $\boxed{\text{ENTER}}$ (Amend the range size.) | Window (Rect)<br>Xmin=-3.5<br>Xmax=2.5<br>Xscl=1<br>Ymin=-3<br>Ymax=3<br>Yscl=0.5 | Adjust the viewing window. |
| **4** $\boxed{\text{GRAPH}}$ | | |
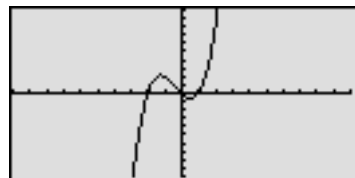
**SHARP**
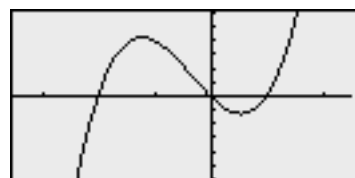
# Extra Options

The EL-9900 has detailed settings, as shown below, so that graphs can be displayed in various formats.

[2nd F] [FORMAT]

```
A--------
BEXPRES OFF
CY'      OFF
DAXIS    ON
EGRID    OFF
FCURSOR RectCoord
```

(Displays in bold outline are the default settings.)

**B EXPRESS**  Choose this setting to display the written form of equations on the graph screen.

EXPRESS ON          EXPRESS OFF

**C Y'**  The numeric derivative (*dx/dy*) can be displayed on the graph screen.
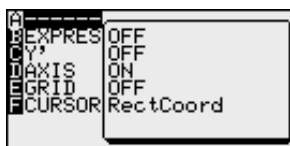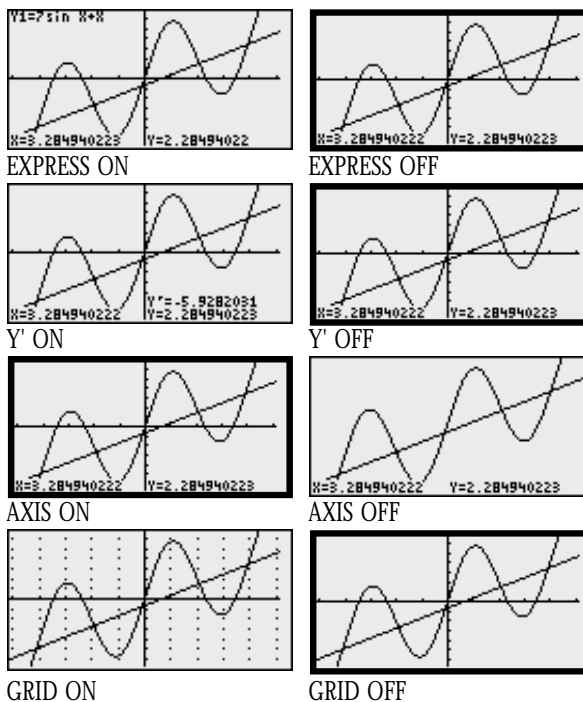
Y' ON               Y' OFF

**D AXIS**  The graph axes can be made invisible with this menu item.

AXIS ON             AXIS OFF

**E GRID**  An X-Y grid can be displayed in the background.

GRID ON             GRID OFF

---

Using the DRAW function, you can also add lines, circles and dots to the graph screen, and change the settings for line appearance and for shading. Below are two examples.

[2nd F] [DRAW]

```
ADRAW
BPOINT  AClrDraw
CON/OFF BLine(
DLINE   CH_line
EG_DATA DV_line
FPICT   ET_line(
GSHADE  FDraw
```
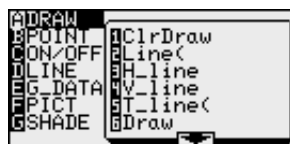
**D LINE**  Sets the line appearance of each graph to solid line, dotted line, bold line, locus or dots.

Normal              Line appearance changed

**G SHADE**  Use this function to illustrate inequalities, intersections and complements of multiple graphs.

Normal              Shaded

**SHARP**
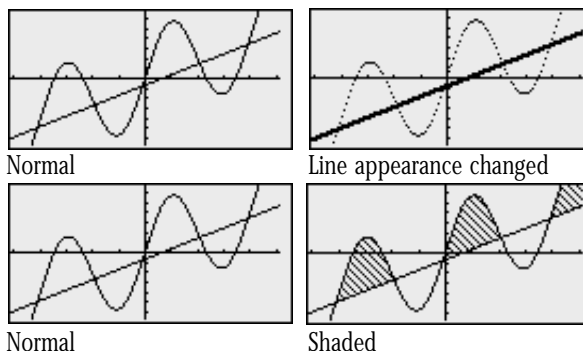
# P C-LINK

Connect the EL-9900 with a PC to expand the possibilities of data exchange using PC-Link Software.

## CE-LK2(PC-link system)

CE-LK2

PC-Link Software

Link Cable

IBM® PC

Main Unit
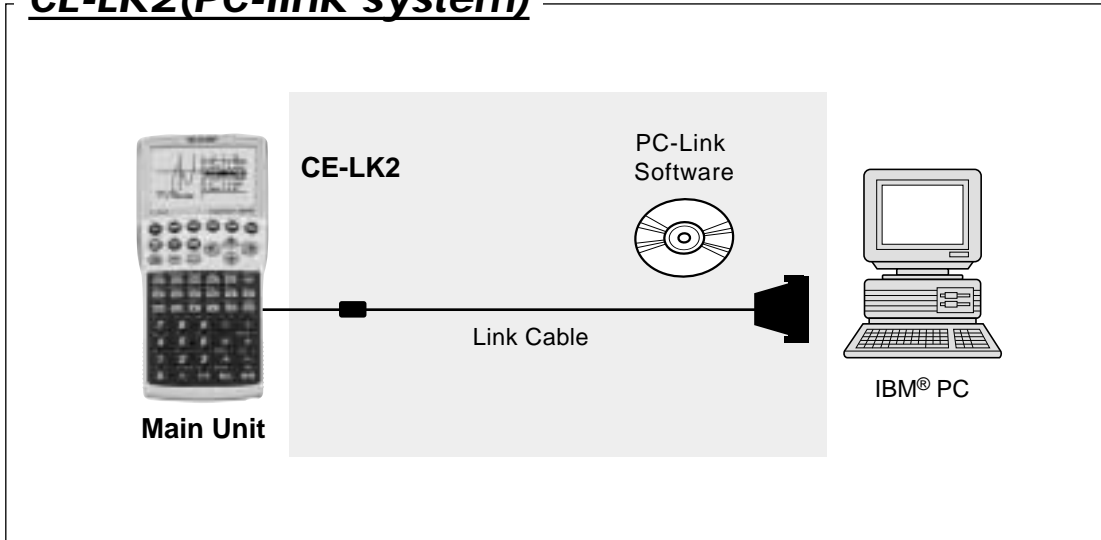
### What is PC LINK?

- Creates and edits EL-9900 programs on a PC.
- Receives and saves programs and various data from EL-9900.
- Makes a backup of all the contents of EL-9900.
- Sends programs and various data to EL-9900.

- Loads image data of EL-9900.
- Converts programs and various data files into a Text File. Converts program text files into a Program File.
- Prints out programs and various data files.

## Procedure

**1** Turn off the EL-9900.

**2** Connect the EL-9900 to the PC by using the PC-Link Cable (see above diagram).

**3** Open PC-Link Software.

**4** Switch on EL-9900.
* It is essential to use the same port for both the PC and the PC-Link Software.

**5** Operate according to the instructions on the screen.

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# Set to set communication

Transfer data between two EL-9900 calculators using the communication cable (CE-451L).

## CE-451L (Communication cable)



**EL-9900**          **CE-451L**
Communication cable          **EL-9900**
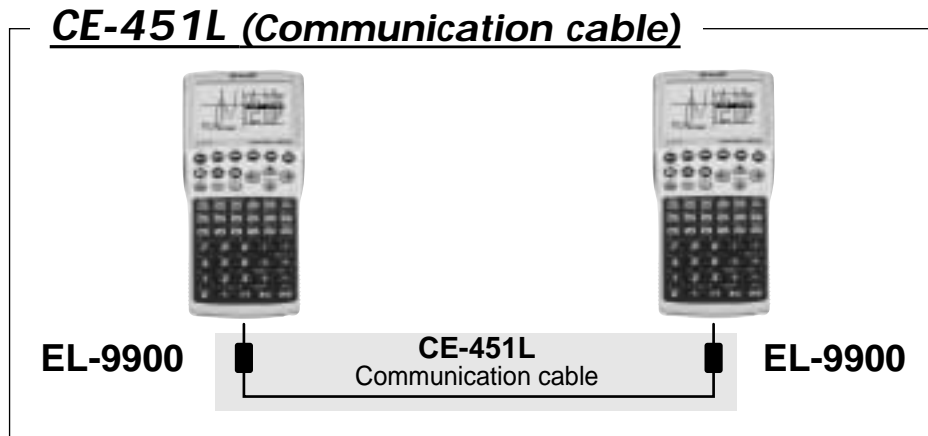
### Communication Procedure

**1** Plug the cable into both calculators.

**2** Turn power on.

**3** **Receiver**
[2nd F] [OPTION]
[▼] [▼] [▼]
( or [D] )
Specified LINK.

**4** [ENTER] [▼]
[ENTER]
( or [2] )

RECEIVING
[ON] to cancel

Select LINK/RECEIVE.

**5** **Sender**
[2nd F] [OPTION]
[▼] [▼] [▼]
( or [D] )
Specified LINK.

**6** [ENTER] [ENTER]
( or [1] )
Select LINK/SEND.

**7** [ENTER] [ENTER]

Select Data
L1          :List
L2          :List
Y1          :Graph
Y2          :Graph
X1T         :Graph
↓ Y1T       :Graph
[2ndF][ENTER] to send

Select SEND/ALL.

[ List of sendable data will appear on screen. ]

Select Data
*L1         :List
L2          :List
*Y1         :Graph
Y2          :Graph
X1T         :Graph
↓ Y1T       :Graph
[2ndF][ENTER] to send

Select 'LI', 'YI'

[ * mark desired data to be sent. ]

**8** [ENTER]
[▼] [▼]
[ENTER]

**9** [2nd F] [ENTER]

SENDING
[ON] to cancel

Execute Sending function.

### List of the SEND menu

A SELECT ...................... Sends files individually as described below.
01 ALL ........................... Selects and displays all files.
02 List ........................... Selects and displays all list files.
03 Matrix ...................... Selects and displays all matrix files.
04 Graph Eqn ................. Selects and displays all graph equations.
05 Solver Eqn ............... Selects and displays all solver equations.
06 Program ................... Selects and displays all program files.
07 G_Data ..................... Selects and displays all graph data files.
08 L_Data ..................... Selects and displays all list data files.
09 Picture ..................... Selects and displays all picture data files.
10 Slide ........................ Selects and displays all self-made slide shows.
11 A~Z, Ø ...................... Selects and displays all fixed memory of A to Z, and Ø
B BACKUP ..................... Menu to send all file data. Use this feature to send the entire content.

## SHARP

# OHP System

Use the EL-9900 OHP system with the overhead projector to make classroom presentations convenient for the whole class to see.

## EL-99T (OHP system)

AC Adapter (optional)
for Display Panel

**See-Through
Display Panel**
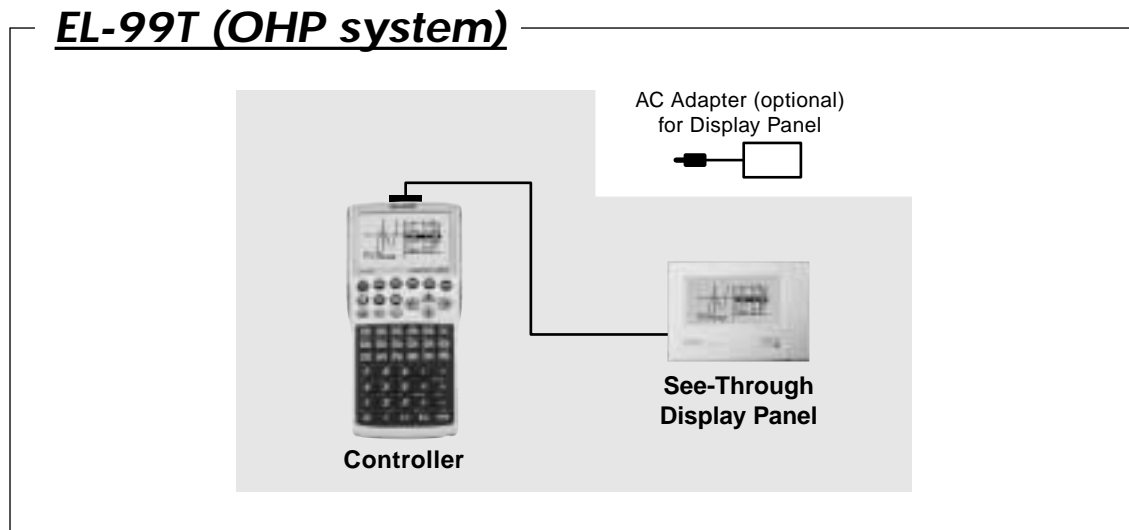
**Controller**

## Procedure

**1** Switch off the Controller.

**2** Plug the cable connector of the See-Through Display Panel straight into the connection terminal of the Controller.

(The optional AC adaptor is recommended for extended use of the See-Through Display Panel.)

**3** Switch on the Controller.

**4** Operating the Controller.

The displays of the See-Through Display Panel and the Controller are synchronized. Place the See-Through Display Panel on top of the overhead projector to project images onto the screen.

**5** Turn on the power to the overhead projector.

**SHARP**

# List of Menu/Sub-menu Items

CATALOG function lets you access almost all the functions and commands.
Square brackets indicate that the value or variable is optional.

## 1. MATH menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Basic mode |
|---|---|---|---|
| MATH CALC | | | |
| $\log_2$ | $\log_2$ *value* | A 0 1 | |
| $2^X$ | $2$ *value* | A 0 2 | |
| fmin( | fmin(*equation, lower limit of x, upper limit of x*) | A 0 3 | |
| fmax( | fmax(*equation, lower limit of x, upper limit of x*) | A 0 4 | |
| d/dx( | d/dx(*equation, value of x [, tolerance]*) | A 0 5 | |
| $\int$ | $\int$ *equation, lower limit, upper limit [, tolerance]* dx | A 0 6 | |
| dx | $\int$ *equation, lower limit, upper limit [, tolerance]* dx | A 0 7 | |
| $\Sigma($ | $\Sigma$ (*expression, initial value, end value [, increment]*) | A 0 8 | |
| sec | sec *value* | A 0 9 | |
| csc | csc *value* | A 1 0 | |
| cot | cot *value* | A 1 1 | |
| $\sec^{-1}$ | $\sec^{-1}$ *value* | A 1 2 | |
| $\csc^{-1}$ | $\csc^{-1}$ *value* | A 1 3 | |
| $\cot^{-1}$ | $\cot^{-1}$ *value* | A 1 4 | |
| sinh | sinh *value* | A 1 5 | |
| cosh | cosh *value* | A 1 6 | |
| tanh | tanh *value* | A 1 7 | |
| $\sinh^{-1}$ | $\sinh^{-1}$ *value* | A 1 8 | |
| $\cosh^{-1}$ | $\cosh^{-1}$ *value* | A 1 9 | |
| $\tanh^{-1}$ | $\tanh^{-1}$ *value* | A 2 0 | |
| sin | sin *value* | | A 1 |
| cos | cos *value* | | A 2 |
| tan | tan *value* | | A 3 |
| log | log *value* | | A 4 |
| $10^X$ | $10$ *value* | | A 5 |

**SHARP**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| **MATH NUM** | | | |
| abs( | abs(*value*) | B 1 | B 1 |
| round( | round(*value [, digit number of decimals]*) | B 2 | B 2 |
| ipart | ipart *value* | B 3 | B 3 |
| fpart | fpart *value* | B 4 | B 4 |
| int | int *value* | B 5 | B 5 |
| min( | min(*value A, value B*) or min(*list*) | B 6 | B 6 |
| max( | max(*value A, value B*) or max(*list*) | B 7 | B 7 |
| lcm( | lcm(*natural number, natural number*) | B 8 | B 8 |
| gcd( | gcd(*natural number, natural number*) | B 9 | B 9 |
| remain | *natural number* remain *natural number* | | B 0 |
| **MATH PROB** | | | |
| random | random *[(number of trial)]* | C 1 | C 1 |
| rndInt( | rndInt(*minimum value, maximum value [, number of trial]*) | C 2 | C 2 |
| rndCoin | rndCoin *[(number of trial)]* | | C 3 |
| rndDice | rndDice *[(number of trial)]* | | C 4 |
| nPr | *value A* nPr *value B* | C 3 | C 5 |
| nCr | *value A* nCr *value B* | C 4 | C 6 |
| ! | *value* ! | C 5 | C 7 |
| **MATH CONV** | | | |
| →deg | *value* →deg | D 1 | D 1 |
| →dms | *value* →dms | D 2 | D 2 |
| xy→r( | xy→r(*x-coordinate, y-coordinate*) | D 3 | |
| xy→θ( | xy→θ(*x-coordinate, y-coordinate*) | D 4 | |
| rθ→x( | rθ→x(*r-coordinate, θ-coordinate*) | D 5 | |
| rθ→y( | rθ→y(*r-coordinate, θ-coordinate*) | D 6 | |
| **MATH ANGLE** | | | |
| ° | *value* ° [*value* ' *value* "] | E 1 | E 1 |
| ' | *value* ° *value* ' [*value* "] | E 2 | E 2 |
| " | *value* ° *value* ' *value* " <br> Print "*character strings*["] | E 3 | E 3 |
| r | *value* r | E 4 | E 4 |

**SHARP**

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| Functions Commands | Syntax | Keystrokes Advanced mode | Basic mode |
|---|---|---|---|
| g | *value* g | E 5 | |
| **MATH INEQ** | | | |
| = | *value A* = *value B* | F 1 | |
| ≠ | *value A* ≠ *value B* | F 2 | |
| > | *value A* > *value B* | F 3 | |
| ≥ | *value A* ≥ *value B* | F 4 | |
| < | *value A* < *value B* | F 5 | |
| ≤ | *value A* ≤ *value B* | F 6 | |
| **MATH LOGIC** | | | |
| and | *value A* and *value B* | G 1 | |
| or | *value A* or *value B* | G 2 | |
| not | not *value* | G 3 | |
| xor | *value A* xor *value B* | G 4 | |
| xnor | *value A* xnor *value B* | G 5 | |
| **MATH COMPLEX** | | | |
| conj( | conj(*complex number*) | H 1 | |
| real( | real(*complex number*) | H 2 | |
| image( | image(*complex number*) | H 3 | |
| abs( | abs(*complex number*) | H 4 | |
| arg( | arg(*complex number*) | H 5 | |
| **MATH (in the N-base calculation mode) LOGIC** | | | |
| and | *value A* and *value B* | A 1 | |
| or | *value A* or *value B* | A 2 | |
| not | not *value* | A 3 | |
| neg | neg *value* | A 4 | |
| xor | *value A* xor *value B* | A 5 | |
| xnor | *value A* xnor *value B* | A 6 | |

## 2. LIST menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Basic mode |
|---|---|---|---|
| **2ndF LIST OPE/NAME** | | | |
| L1 | No arguments | | A 1 |

**SHARP**

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| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| L2 | No arguments | | [A] [2] |
| L3 | No arguments | | [A] [3] |
| L4 | No arguments | | [A] [4] |
| L5 | No arguments | | [A] [5] |
| L6 | No arguments | | [A] [6] |
| sortA( | sortA(*list name [, subordinate list name1, ... , subordinate list name n]*) | [A] [1] | [B] [1] |
| sortD( | sortD(*list name [, subordinate list name1, ... , subordinate list name n]*) | [A] [2] | [B] [2] |
| dim( | dim(*list*) | [A] [3] | [B] [3] |
| fill( | fill(*value, list*) | [A] [4] | [B] [4] |
| seq( | seq(*equation, start value, end value [, increment]*) | [A] [5] | [B] [5] |
| cumul | cumul *list* | [A] [6] | |
| df_list | df_list *list* | [A] [7] | [B] [6] |
| augment( | augment(*list 1, list 2*) | [A] [8] | [B] [7] |
| list→mat( | list→mat(*list 1, ... , list n, matrix name*) | [A] [9] | |
| mat→list( | mat→list(*matrix name, list name1, ... , list name n*)<br>mat→list(*matrix name, column number, list name*) | [A] [0] | |

[2ndF] [LIST] **MATH**

| Functions Commands | Syntax | Advanced mode | Basic mode |
|---|---|---|---|
| min( | min(*value A, value B*) or<br>min(*list*) | [B] [1] | [C] [1] |
| max( | max(*value A, value B*) or<br>max(*list*) | [B] [2] | [C] [2] |
| mean( | mean(*list [, frequency list]*) | [B] [3] | [C] [3] |
| median( | median(*list [, frequency list]*) | [B] [4] | [C] [4] |
| sum( | sum(*list [, start number, end number]*) | [B] [5] | [C] [5] |
| prod( | prod(*list [, start number, end number]*) | [B] [6] | |
| stdDv( | stdDv(*list [, frequency list]*) | [B] [7] | [C] [6] |
| varian( | varian(*list [, frequency list]*) | [B] [8] | [C] [7] |

[2ndF] [LIST] **L_DATA**

| Functions Commands | Syntax | Advanced mode | Basic mode |
|---|---|---|---|
| StoLD | StoLD *natural number* | [C] [1] | [D] [1] |
| RclLD | RclLD *natural number* | [C] [2] | [D] [2] |

* "list" in the above table means a list or a list name.

**SHARP**

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| Functions Commands | Syntax | Keystrokes Advanced mode | Basic mode |
|---|---|---|---|
| 2ndF LIST { } | | | |
| { | No arguments | | E 1 |
| } | No arguments | | E 2 |

# 3. STAT menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Basic mode |
|---|---|---|---|
| STAT EDIT/OPE | | | |
| EDIT | No arguments | A ENTER | A ENTER |
| sortA( | sortA(*list [, subordinate list 1, ... , subordinate list n]*) | B 1 | B 1 |
| sortD( | sortD(*list [, subordinate list 1, ... , subordinate list n]*) | B 2 | B 2 |
| SetList | SetList *[list name 1, list name 2, list name 3, ... ]* | B 3 | B 3 |
| ClrList | ClrList *list name1 [, list name 2, ... ]* | B 4 | B 4 |
| STAT CALC | | | |
| 1_Stats | 1_Stats *[x list name [, frequency list]]* | C 1 | C 1 |
| 2_Stats | 2_Stats *[x list name, y list name [, frequency list]]* | C 2 | C 2 |
| ANOVA( | ANOVA(*list name 1, list name 2 [, ... ]*) | C 3 | |
| STAT REG | | | |
| Med_Med | Med_Med (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 1 | D 1 |
| Rg_ax+b | Rg_ax+b (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 2 | D 2 |
| Rg_a+bx | Rg_a+bx (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 3 | |
| Rg_$x^2$ | Rg_$x^2$ (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 4 | D 3 |
| Rg_$x^3$ | Rg_$x^3$ (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 5 | |
| Rg_$x^4$ | Rg_$x^4$ (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 6 | |
| Rg_ln | Rg_ln (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 7 | |
| Rg_log | Rg_log (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 8 | |

* "list" in the above table means a list or a list name.

**SHARP**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | **Advanced mode** | **Basic mode** |
| Rg_ab$^x$ | Rg_ab$^x$ (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 0 9 | D 4 |
| Rg_ae$^{bx}$ | Rg_ae$^{bx}$ (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 1 0 | |
| Rg_x$^{-1}$ | Rg_x$^{-1}$ (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 1 1 | D 5 |
| Rg_ax$^b$ | Rg_ax$^b$ (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 1 2 | |
| Rg_logistic | Rg_logistic (*list name for x, list name for y [, frequency list] [, equation name to store]*) | D 1 3 | |
| Rg_sin | Rg_sin (*[iterations,] list name for x, list name for y [, frequency list] [, period] [, equation name to store]*) | D 1 4 | |
| x' | *value or list* x' | D 1 5 | D 6 |
| y' | *value or list* y' | D 1 6 | D 7 |

## STAT TEST

| Functions Commands | Syntax | Advanced mode | Basic mode |
|---|---|---|---|
| $\chi^2$ test | No arguments | E 0 1 | |
| Ftest2samp | No arguments | E 0 2 | |
| Ttest1samp | No arguments | E 0 3 | |
| Ttest2samp | No arguments | E 0 4 | |
| TtestLinreg | No arguments | E 0 5 | |
| Tint1samp | No arguments | E 0 6 | |
| Tint2samp | No arguments | E 0 7 | |
| Ztest1samp | No arguments | E 0 8 | |
| Ztest2samp | No arguments | E 0 9 | |
| Ztest1prop | No arguments | E 1 0 | |
| Ztest2prop | No arguments | E 1 1 | |
| Zint1samp | No arguments | E 1 2 | |
| Zint2samp | No arguments | E 1 3 | |
| Zint1prop | No arguments | E 1 4 | |
| Zint2prop | No arguments | E 1 5 | |
| InputList | No arguments | E 1 6 | |
| InputStats | No arguments | E 1 7 | |

## STAT DISTRI

| Functions Commands | Syntax | Advanced mode | Basic mode |
|---|---|---|---|
| pdfnorm( | pdfnorm(*value [, mean, standard deviation]*) | F 0 1 | |

**SHARP**

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| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| cdfnorm( | cdfnorm(*lower limit, upper limit [,mean, standard deviation]*) | F 0 2 | |
| InvNorm( | InvNorm(*probability [, mean, standard deviation]*) | F 0 3 | |
| pdfT( | pdfT(*value, degree of freedom*) | F 0 4 | |
| cdfT( | cdfT(*lower limit, upper limit, degree of freedom*) | F 0 5 | |
| pdf$\chi^2$( | pdf$\chi^2$(*value, degree of freedom*) | F 0 6 | |
| cdf$\chi^2$( | cdf$\chi^2$(*lower limit, upper limit, degree of freedom*) | F 0 7 | |
| pdfF( | pdfF(*value, degree of freedom of numerator, degree of freedom of denominator*) | F 0 8 | |
| cdfF( | cdfF(*lower limit, upper limit, degree of freedom of numerator, degree of freedom of denominator*) | F 0 9 | |
| pdfbin( | pdfbin(*number of trial, success probability [, success numbers]*) | F 1 0 | |
| cdfbin( | cdfbin(*number of trial, success probability [, success numbers]*) | F 1 1 | |
| pdfpoi( | pdfpoi(*mean, value*) | F 1 2 | |
| cdfpoi( | cdfpoi(*mean, value*) | F 1 3 | |
| pdfgeo( | pdfgeo(*success probability, value*) | F 1 4 | |
| cdfgeo( | cdfgeo(*success probability, value*) | F 1 5 | |

# 4. STAT PLOT menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| **[STAT PLOT] PLOT1/PLOT2/PLOT3/LIMIT/ON/OFF** | | | |
| PLOT1 | No arguments | A ENTER | A ENTER |
| PLOT2 | No arguments | B ENTER | B ENTER |
| PLOT3 | No arguments | C ENTER | C ENTER |
| SET | No arguments | D 1 | D 1 |
| LimON | No arguments | D 2 | D 2 |
| LimOFF | No arguments | D 3 | D 3 |
| PlotON | PlotON [number] | E 1 | E 1 |
| PlotOFF | PlotOFF [number] | E 2 | E 2 |
| **[STAT PLOT] (in STAT PLOT mode) HIST/B.L./N.P./N.D./BOX/PIE/S.D./XYLINE** | | | |
| Hist | No arguments | A 1 | A 1 |
| Broken • | No arguments | B 1 | B 1 |

**SHARP**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| Broken + | No arguments | B 2 | B 2 |
| Broken □ | No arguments | B 3 | B 3 |
| Norm •_X | No arguments | C 1 | C 1 |
| Norm+_X | No arguments | C 2 | C 2 |
| Norm □_X | No arguments | C 3 | C 3 |
| Norm •_Y | No arguments | C 4 | C 4 |
| Norm+_Y | No arguments | C 5 | C 5 |
| Norm □_Y | No arguments | C 6 | C 6 |
| NormDis | No arguments | D 1 | D 1 |
| Box | No arguments | E 1 | E 1 |
| MBox • | No arguments | E 2 | E 2 |
| MBox+ | No arguments | E 3 | E 3 |
| MBox □ | No arguments | E 4 | E 4 |
| Pie | No arguments | F 1 | F 1 |
| Pie% | No arguments | F 2 | F 2 |
| Scattr • | No arguments | G 1 | G 1 |
| Scattr+ | No arguments | G 2 | G 2 |
| Scattr □ | No arguments | G 3 | G 3 |
| xyLine• | No arguments | H 1 | H 1 |
| xyLine+ | No arguments | H 2 | H 2 |
| xyLine □ | No arguments | H 3 | H 3 |

# 5. DRAW menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| 2ndF DRAW **DRAW** | | | |
| ClrDraw | No arguments | A 1 | A 1 |
| Line( | Line(*x-coordinate of start point, y-coordinate of start point, x-coordinate of end point, y-coordinate of end point [,0]*) | A 2 | A 2 |
| H_line | H_line *y-value* | A 3 | A 3 |
| V_line | V_line *x-value* | A 4 | A 4 |
| T_line( | T_line(*equation, x-value*) | A 5 | A 5 |

**SHARP**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| Draw | Draw *equation* | A 6 | A 6 |
| Shade( | Shade(*equation 1, equation 2 [, begin, end]*) | A 7 | A 7 |
| DrawInv | DrawInv *equation* | A 8 | A 8 |
| Circle( | Circle(*x-coordinate of center, y-coordinate of center, radius*) | A 9 | A 9 |
| Text( | Text(*column, row, "character strings"*) | A 0 | A 0 |

2ndF DRAW **POINT**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| PntON( | PntON(*x-coordinate, y-coordinate*) | B 1 | B 1 |
| PntOFF( | PntOFF(*x-coordinate, y-coordinate*) | B 2 | B 2 |
| PntCHG( | PntCHG(*x-coordinate, y-coordinate*) | B 3 | B 3 |
| PxlON( | PxlON(*column, row*) | B 4 | B 4 |
| PxlOFF( | PxlOFF(*column, row*) | B 5 | B 5 |
| PxlCHG( | PxlCHG(*column, row*) | B 6 | B 6 |
| PxlTST( | PxlTST(*column, row*) | B 7 | B 7 |

2ndF DRAW **ON/OFF/LINE/G_DATA/PICT/SHADE**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| DrawON | DrawON [*equation number 1, equation number 2, ...*] | C 1 | C 1 |
| DrawOFF | DrawOFF [*equation number 1, equation number 2, ...*] | C 2 | C 2 |
| LINE | No arguments | D ENTER | D ENTER |
| StoGD | StoGD *number* | E 1 | E 1 |
| RclGD | RclGD *number* | E 2 | E 2 |
| StoPict | StoPict *number* | F 1 | F 1 |
| RclPict | RclPict *number* | F 2 | F 2 |
| SET | No arguments | G 1 | G 1 |
| INITIAL | No arguments | G 2 | G 2 |

# 6. ZOOM menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| ZOOM **ZOOM** | | | |
| Auto Zm_Auto | No arguments | A 1 | A 1 |
| Box Zm_Box | No arguments | A 2 | A 2 |

**SHARP**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| In Zm_In | No arguments | A 3 | A 3 |
| Out Zm_Out | No arguments | A 4 | A 4 |
| Default Zm_Default | No arguments | A 5 | A 5 |
| Square Zm_Square | No arguments | A 6 | A 6 |
| Dec Zm_Dec | No arguments | A 7 | A 7 |
| Int Zm_Int | No arguments | A 8 | A 8 |
| Stat Zm_Stat | No arguments | A 9 | A 9 |
| ZOOM FACTOR/POWER | | | |
| FACTOR | No arguments | B ENTER | B ENTER |
| $x^2$ Zm_$x^2$ | No arguments | C 1 | C 1 |
| $x^{-1}$ Zm_$x^{-1}$ | No arguments | C 2 | C 2 |
| $\sqrt{x}$ Zm_$\sqrt{}$ | No arguments | C 3 | C 3 |
| ZOOM EXP | | | |
| $10^x$ Zm_$10^x$ | No arguments | D 1 | D 1 |
| $e^x$ Zm_$e^x$ | No arguments | D 2 | |
| log x Zm_log | No arguments | D 3 | D 2 |
| ln x Zm_ln | No arguments | D 4 | |
| ZOOM TRIG | | | |
| sin x Zm_sin | No arguments | E 1 | E 1 |
| cos x Zm_cos | No arguments | E 2 | E 2 |
| tan x Zm_tan | No arguments | E 3 | E 3 |

**SHARP**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| $\sin^{-1} x$ <br> Zm_$\sin^{-1}$ | No arguments | [E] [4] | |
| $\cos^{-1} x$ <br> Zm_$\cos^{-1}$ | No arguments | [E] [5] | |
| $\tan^{-1} x$ <br> Zm_$\tan^{-1}$ | No arguments | [E] [6] | |
| [ZOOM] **HYP/STO/RCL** | | | |
| $\sinh x$ <br> Zm_sinh | No arguments | [F] [1] | |
| $\cosh x$ <br> Zm_cosh | No arguments | [F] [2] | |
| $\tanh x$ <br> Zm_tanh | No arguments | [F] [3] | |
| $\sinh^{-1} x$ <br> Zm_$\sinh^{-1}$ | No arguments | [F] [4] | |
| $\cosh^{-1} x$ <br> Zm_$\cosh^{-1}$ | No arguments | [F] [5] | |
| $\tanh^{-1} x$ <br> Zm_$\tanh^{-1}$ | No arguments | [F] [6] | |
| StoWin | No arguments | [G] [1] | [F] [1] |
| RclWin | No arguments | [H] [1] | [G] [1] |
| PreWin | No arguments | [H] [2] | [G] [2] |

# 7. CALC menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| [2ndF] [CALC] **CALC** | | | |
| Value | Value $x$ | [A] [1] | [A] [1] |
| Intsct | No arguments | [A] [2] | [A] [2] |
| Minimum | No arguments | [A] [3] | [A] [3] |
| Maximum | No arguments | [A] [4] | [A] [4] |
| X_Incpt | No arguments | [A] [5] | [A] [5] |
| Y_Incpt | No arguments | [A] [6] | [A] [6] |
| Inflec | No arguments | [A] [7] | |

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# 8. SLIDE SHOW menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| **SLIDE SHOW** **CURR/PLAY/NEW/SELECT/EDIT** | | | |
| CURR | No arguments | [A] [ENTER] | [A] [ENTER] |
| PLAY | No arguments | [B] | [B] |
| NEW | No arguments | [C] [ENTER] | [C] [ENTER] |
| SELECT | No arguments | [D] | [D] |
| MOVE | No arguments | [E] [1] | [E] [1] |
| DEL | No arguments | [E] [2] | [E] [2] |
| RENAME | No arguments | [E] [3] | [E] [3] |

# 9. PRGM menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| **[PRGM]** | | | |
| EXEC | No arguments | [A] | [A] |
| EDIT | No arguments | [B] | |
| NEW | No arguments | [C] [ENTER] | |
| **[PRGM] (in the Prgramming mode) PRGM** | | | |
| Print | Print *variable*<br>Print "*character strings* ["] | [A] [1] | |
| " | "*characters* ["] | [A] [2] | |
| Input | Input *["prompt strings", ] variable* | [A] [3] | |
| Wait | Wait [*natural number*] | [A] [4] | |
| Rem | Rem *comments* | [A] [5] | |
| End | No arguments | [A] [6] | |
| Key | Key *variable* | [A] [7] | |
| **[PRGM] (in the Prgramming mode) BRNCH** | | | |
| Label | Label *label name* | [B] [0] [1] | |
| Goto | Goto *label name* | [B] [0] [2] | |
| If | If *conditional statements* | [B] [0] [3] | |
| Then | Then<br>*commands* | [B] [0] [4] | |
| Else | [Else<br>*commands*] | [B] [0] [5] | |
| Endlf | Endlf | [B] [0] [6] | |

**SHARP**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| For | For *variable, start value, end value [, increment]* | B 0 7 | |
| Next | *commands*<br>Next | B 0 8 | |
| While | While *conditional statements* | B 0 9 | |
| WEnd | *commands*<br>WEnd | B 1 0 | |
| Gosub | Gosub *label name* | B 1 1 | |
| Return | No arguments | B 1 2 | |

**PRGM (in the Prgramming mode) SCRN**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| ClrT | No arguments | C 1 | |
| ClrG | No arguments | C 2 | |
| DispT | No arguments | C 3 | |
| DispG | No arguments | C 4 | |

**PRGM (in the Prgramming mode) I/O**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| Get | Get *variable* | D 1 | |
| Send | Send *variable* | D 2 | |

**PRGM (in the Prgramming mode) SETUP**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| Rect | No arguments | E 0 1 | |
| Param | No arguments | E 0 2 | |
| Polar | No arguments | E 0 3 | |
| Web | No arguments | E 0 4 | |
| Time | No arguments | E 0 5 | |
| uv | No arguments | E 0 6 | |
| uw | No arguments | E 0 7 | |
| vw | No arguments | E 0 8 | |
| Deg | No arguments | E 0 9 | |
| Rad | No arguments | E 1 0 | |
| Grad | No arguments | E 1 1 | |
| FloatPt | No arguments | E 1 2 | |
| Fix | No arguments | E 1 3 | |
| Sci | No arguments | E 1 4 | |
| Eng | No arguments | E 1 5 | |
| Tab | Tab *integer* | E 1 6 | |

**SHARP**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| Decimal | No arguments | E 1 7 | |
| Mixed | No arguments | E 1 8 | |
| Improp | No arguments | E 1 9 | |
| x ± yi | No arguments | E 2 0 | |
| r ∠ θ | No arguments | E 2 1 | |

**PRGM (in the Prgramming mode) FORMAT**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| RectCursor | No arguments | F 0 1 | |
| PolarCursor | No arguments | F 0 2 | |
| ExprON | No arguments | F 0 3 | |
| ExprOFF | No arguments | F 0 4 | |
| Y'ON | No arguments | F 0 5 | |
| Y'OFF | No arguments | F 0 6 | |
| AxisON | No arguments | F 0 7 | |
| AxisOFF | No arguments | F 0 8 | |
| GridON | No arguments | F 0 9 | |
| GridOFF | No arguments | F 1 0 | |
| Connect | No arguments | F 1 1 | |
| Dot | No arguments | F 1 2 | |
| Sequen | No arguments | F 1 3 | |
| Simul | No arguments | F 1 4 | |

**PRGM (in the Prgramming mode) S_PLOT**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| Plt1( | Plt1(*graph type, X list name [, Y list name, frequency list]*) | G 1 | |
| Plt2( | Plt2(*graph type, X list name [, Y list name, frequency list]*) | G 2 | |
| Plt3( | Plt3(*graph type, X list name [, Y list name, frequency list]*) | G 3 | |
| PlotON | PlotON [*number*] | G 4 | |
| PlotOFF | PlotOFF [*number*] | G 5 | |
| LimON | No arguments | G 6 | |
| LimOFF | No arguments | G 7 | |

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| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| **PRGM (in the Prgramming mode) COPY** | | | |
| StoLine | No arguments | H   1 | |
| RclLine | No arguments | H   2 | |

# 10. MATRIX menus

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| **2ndF MATRIX NAME** | | | |
| mat A | No arguments | A   1 | |
| mat B | No arguments | A   2 | |
| mat C | No arguments | A   3 | |
| mat D | No arguments | A   4 | |
| mat E | No arguments | A   5 | |
| mat F | No arguments | A   6 | |
| mat G | No arguments | A   7 | |
| mat H | No arguments | A   8 | |
| mat I | No arguments | A   9 | |
| mat J | No arguments | A   0 | |
| **2ndF MATRIX EDIT** | | | |
| mat A | No arguments | B   1 | |
| mat B | No arguments | B   2 | |
| mat C | No arguments | B   3 | |
| mat D | No arguments | B   4 | |
| mat E | No arguments | B   5 | |
| mat F | No arguments | B   6 | |
| mat G | No arguments | B   7 | |
| mat H | No arguments | B   8 | |
| mat I | No arguments | B   9 | |
| mat J | No arguments | B   0 | |
| **2ndF MATRIX OPE** | | | |
| dim( | dim(*matrix name*) | C   0   1 | |
| fill( | fill(*value, matrix name*) | C   0   2 | |
| cumul | cumul *matrix name* | C   0   3 | |

**SHARP**

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| augment( | augment(*matrix name A, matrix name B*) | C 0 4 | |
| identity | identity *dimension value* | C 0 5 | |
| rnd_mat( | rnd_mat(*number of row, number of column*) | C 0 6 | |
| row_swap( | row_swap(*matrix name, row number, row number*) | C 0 7 | |
| row_plus( | row_plus(*matrix name, row number, row number*) | C 0 8 | |
| row_mult( | row_mult(*multiplied number, matrix name, row number*) | C 0 9 | |
| row_m.p.( | row_m.p.(*multiplied number, matrix name, row number, row number*) | C 1 0 | |
| mat→list( | mat→list(*matrix name, list name 1, …, list name n*) mat→list(*matrix name, column number, list name*) | C 1 1 | |
| list→mat( | list→mat(*list 1, …, list n, matrix name*) | C 1 2 | |
| 2ndF MATRIX **MATH/[ ]** | | | |
| det | det *matrix name* | D 1 | |
| trans | trans *matrix name* | D 2 | |
| rowEF | rowEF *matrix name* | D 3 | |
| rrowEF | rrowEF *matrix name* | D 4 | |
| [ | No arguments | E 1 | |
| ] | No arguments | E 2 | |

# 11. FINANCE menus

| Functions Commands | Syntax | Keystrokes | |
|---|---|---|---|
| | | Advanced mode | Basic mode |
| 2ndF FINANCE **SOLVER/CALC** | | | |
| SOLVER | (TVM SOLVER screen appears) | A ENTER | |
| slv_pmt | slv_pmt *[(N, I%, PV, FV, P/Y, C/Y)]* | B 0 1 | |
| slv_I% | slv_I% *[(N, PV, PMT, FV, P/Y, C/Y)]* | B 0 2 | |
| slv_PV | slv_PV *[(N, I%, PMT, FV, P/Y, C/Y)]* | B 0 3 | |
| slv_N | slv_N *[(I%, PV, PMT, FV, P/Y, C/Y)]* | B 0 4 | |
| slv_FV | slv_FV *[(N, I%, PV, PMT, P/Y, C/Y)]* | B 0 5 | |
| Npv( | Npv(*interest rate, initial investment, list of following collected investment [, frequency list]*) | B 0 6 | |

**SHARP**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| Irr( | Irr(*initial investment, list of following collected investment [, frequency list] [, assumed revenue rate]*) | B 0 7 | |
| Bal( | Bal(*number of payments [, decimal place to round]*) | B 0 8 | |
| ∑Prn( | ∑Prn(*initial number of payments, end number of payments [, decimal place to round]*) | B 0 9 | |
| ∑Int( | ∑Int(*initial number of payments, end number of payments [, decimal place to round]*) | B 1 0 | |
| →Apr( | →Apr(*effective interest rate, number of settlements*) | B 1 1 | |
| →Eff( | →Eff(*nominal interest rate, number of settlements*) | B 1 2 | |
| days( | days(*start month. day year, end month. day year*) days(*day month. year, day month. year*) | B 1 3 | |

**2ndF FINANCE PERIOD**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| PmtEnd | No arguments | C 1 | |
| PmtBegin | No arguments | C 2 | |

**2ndF FINANCE VARS**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| N | No arguments | D 1 | |
| I% | No arguments | D 2 | |
| PV | No arguments | D 3 | |
| PMT | No arguments | D 4 | |
| FV | No arguments | D 5 | |
| P/Y | No arguments | D 6 | |
| C/Y | No arguments | D 7 | |

# 12. TOOL menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| **2ndF TOOL N BASE/SYSTEM/POLY** | | | |
| NBASE | No arguments | A ENTER | |
| 2 | No arguments | B 2 | |
| 3 | No arguments | B 3 | |
| 4 | No arguments | B 4 | |
| 5 | No arguments | B 5 | |

**SHARP**

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| 6 | No arguments | B 6 | |
| 2 | No arguments | C 2 | |
| 3 | No arguments | C 3 | |

# 13. SOLVER menus

| Functions Commands | Syntax | Keystrokes Advanced mode | Keystrokes Basic mode |
|---|---|---|---|
| **2ndF SOLVER (in the Solver mode) METHOD/EQTN/SAVE/RENAME** | | | |
| Equation | No arguments | A 1 | |
| Newton | No arguments | A 2 | |
| Graphic | No arguments | A 3 | |
| EQTN | No arguments | B | |
| SAVE | No arguments | C ENTER | |
| RENAME | No arguments | D | |

**SHARP**

# Specifications

| Dimensions W x D x H (mm) | | 86 x 183 x 23 (without hardcase) | |
|---|---|---|---|
| Power | | R03 (AAA) x 4 | |
| Backup Battery | | CR2032 x 1 | |
| Display | Size (dot) | 132 x 64 | |
| | Line x Characters | 8 x 22 | |
| | Character Size (dot) | 5 x 7 | |
| | Digits (mantissa + exponent) | 10 + 2 | |
| Memory | Total Memory Size | 64 KB | |
| | Constant Memory | 27 + last answer memory | |
| Accessory | Protective hard case | | |
| Standard Features | Graphing | Function graphing | Up to 10 |
| | | Parametric graphing | Up to 6 |
| | | Polar graphing | Up to 6 |
| | | Sequence graphing | Up to 3 |
| | | Split screen | Graph-table/graph-equation |
| | | Graph style | |
| | | Zoom, Trace | |
| | | Table of function values | |
| | Statistics | Regression models | 14 |
| | | Histogram, Broken line plot, Normal probability plot, Normal distribution plot, Box plot, Modified box plot, Pie chart, Scatter diagram, XY line | |
| | Other | Matrix | Up to 10 (Maximum size : 99 x 99) |
| | | List | Up to 6 (Maximum length : 999) |
| | | Programming | |
| | | Trigonometry functions (including sec, csc, cot) | |
| | | Solver | |
| | | Complex numbers | |
| | | Financial calculation | |
| | | Fraction/Decimal conversions | |
| | | Last entry recall (up to 160 steps) | |
| | | Last answer recall | |
| Features unique to Sharp | Reversible keyboard, Equation editor, Slide show function, List grouping, $\Sigma$calculation, Simultaneous equation, Fraction-learning function | | |
| Peripheral | CE-451L | Unit-to-unit communications cable | |
| | CE-LK2 | PC-Link (Print screen/Data storage) | |
| | EL-99T | OHP system (includes controller) | |

\* Design and specifications are subject to change without notice.
\* Some peripheral products may not be available in some countries.

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