Introduction

The EL-9600 was developed to meet the needs of an expanding education market and is based on three concepts: easy to teach, easy to learn and easy to use. The EL-9600 has been designed with simplified operations and time-saving features, allowing teachers to concentrate on actual teaching.

This manual was designed to introduce teachers to the unique features of the EL-9600 using detailed operation examples.

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</table>
**Sales points**

1. **Large 132 x 64-dot display**

2. **Easy Pen-touch screen**

3. **Graph Shift/Change** shows how "changing" the graph affects the equation

4. **Slide Shows** reduce class preparation time

5. **Equation Editor** shows equations just as in textbooks

6. **Rapid graph/Rapid window** simplify graphing procedures

7. **Rapid zoom** allows easy adjustment of window size
Basic operation

**Power ON/OFF**
- **ON** (Power on)
- **2ndF OFF** (Power off)
- **CL** (Erase equations and remove error displays)
- **2ndF QUIT** (Cancel of previous function (Escape))

**Function keys**
- **Y=** (Use to enter equations)
- **GRAPH** (Use to draw graphs)
- **TABLE** (Use to view table of function value)
- **WINDOW** (Use to set size of viewing window)
- **ZOOM** (Use to adjust the viewing range)
- **TRACE** (Use to trace graphs)
- **SLIDE SHOW** (Use to enter slide show mode)
- **EZ** (Use to operate Rapid Graph/Rapid Window and Rapid Zoom functions)

**Names of parts**

1. Graphing keys
2. Power supply ON/OFF key
3. Alphabet specification key
4. Secondary function specification key
5. Display screen
6. Cursor movement keys
7. Clear/Quit key
8. Variable enter key
9. Calculation execute key
10. Communication port for peripheral devices
**Basic operation**

### Guide to key use

Press **2nd** to use secondary functions (in yellow).

Press **ALPHA** to use the alphabet keys (in blue).

**Example:**

To select “sin”: **sin**

To select “sin⁻¹”: **2nd** **sin**

To select A: **ALPHA** **sin**

### Adjusting screen contrast

- The contrast adjust screen will appear when pressing **2nd** **OPTION**.

Press **+** to darken contrast.

Press **−** to lighten contrast.

(Change the contrast by touching **+** or **−** using the pen)

- With pen-touch mark **Pen**, all operations can be performed using the pen touch.
- Operation examples for the pen-touch key are given assuming that the operation is started from the default value setting.

### SET UP menu

Press **2nd** **SET UP**.

- Contents displayed on the right side of the screen are the current settings.

**Example:**

There may be differences in the results of calculations and graph plotting depending on the SET UP settings.

### Reset function

1) When trouble occurs

Press **2nd** **OPTION** **E** to enter the reset mode.

- Use this function (1 or 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 the RESET switch on the back.
  2. Press **ON**.

  - Returns to the initial display.

**CAUTION**

Do not press **CL** in step 2. It will delete all data stored in the calculator.
Pen-touch operation

Pen-touch screen offers convenient operations. Use it to select from the menu displays or shift a graph, fast and easy. All operations can also be performed without the pen.

1 Convenient to make changes to graphs

2 Select menu options with a touch of the pen

3 Easy to move between displays

Example: Convert “3.55” to d,m,s (degree, minute, second)

<table>
<thead>
<tr>
<th>Pen touch operation</th>
<th>Key operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) [MATH] 3 5 5</td>
<td>[MATH] 3 5 5</td>
<td></td>
</tr>
<tr>
<td>2) Pen-touch [CONV]</td>
<td>▼▼▼</td>
<td></td>
</tr>
<tr>
<td>3) Pen-touch [2→dms] twice</td>
<td>ENTER ▼ ENTER</td>
<td>3°33′8″</td>
</tr>
<tr>
<td>4) ENTER</td>
<td>ENTER</td>
<td></td>
</tr>
</tbody>
</table>
The equation editor allows equations to be viewed just as they are written in textbooks. This increases 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.

\[
\int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}} dx
\]

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[CL]</td>
<td>Clear the display.</td>
</tr>
<tr>
<td>2</td>
<td>MATH A ENTER ▼ ▼ ▼ ENTER</td>
<td>Select CALC and ( \int ) (Integral function)</td>
</tr>
<tr>
<td>3</td>
<td>0 ▼ 1 a/b 2 ▼ ▼ ▼</td>
<td>Enter the range of the integral.</td>
</tr>
<tr>
<td>4</td>
<td>MATH A 2ndF ( - ) 1 ▼ ▼ ▼</td>
<td>Enter ( \sqrt{1-x^2} )</td>
</tr>
<tr>
<td>5</td>
<td>MATH ENTER ▼ ▼ ▼ ENTER</td>
<td>Complete equation input.</td>
</tr>
<tr>
<td>6</td>
<td>ENTER</td>
<td>Calculate the expression.</td>
</tr>
<tr>
<td>7</td>
<td>2ndF ENTRY</td>
<td>Review the input equation.</td>
</tr>
</tbody>
</table>
Shift (Change the location of graphs)

Graph shift function helps students grasp the relationship between an equation and its graph. Shift the graph’s location without changing its shape, and the change is immediately reflected in the equation on the right side of the display.

**Example**

When the graph of \( y = x^2 \) is shifted downward, how does this affect the equation?

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2nd F [ \text{SHIFT/CHANGE} ]</td>
<td>![Display Image]</td>
<td>Enter [ \text{SHIFT/CHANGE} ] mode. If [ \text{SHIFT} ] is not already highlighted press [ \text{A} ].</td>
</tr>
<tr>
<td>2 ENTER</td>
<td>![Display Image]</td>
<td>Select shift. Cursor moves to the equation menu.</td>
</tr>
<tr>
<td>3 ENTER</td>
<td>![Display Image]</td>
<td>Select the equation: ( y = x^2 ) and draw the graph.</td>
</tr>
<tr>
<td>4 [ \text{D} ]</td>
<td>![Display Image]</td>
<td>Select the location of the shift: move cursor down twice.</td>
</tr>
</tbody>
</table>
| 5 ENTER | ![Display Image] | View the result of the shift. \[
\begin{align*}
\quad & y = x^2 \\
\downarrow & y = x^2 - 2
\end{align*}
\] |
Graph change function helps students grasp the relationship between an equation and its graph. Change the shape of the graph, and the change is immediately reflected in the equation on the right side of the display.

### Example

**When the graph of \( y = x^2 \) is changed, how does it affect the equation?**

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2nd F SHIFT/CHANGE ▼</td>
<td>![Display Image]</td>
<td>Enter <strong>SHIFT/CHANGE</strong> mode and specified (<strong>CHANGE</strong>).</td>
</tr>
<tr>
<td>2 ENTER</td>
<td>![Display Image]</td>
<td>Select change. Cursor will move to the equation menu.</td>
</tr>
<tr>
<td>3 ENTER</td>
<td>![Display Image]</td>
<td>Select the equation: ( y = x^2 ) and draw the graph.</td>
</tr>
<tr>
<td>4 ▲</td>
<td>![Display Image]</td>
<td>Select the location of the change: increase the value of ( y )-coordinates.</td>
</tr>
<tr>
<td>5 ENTER</td>
<td>![Display Image]</td>
<td>View the result of the change.</td>
</tr>
</tbody>
</table>

\[
\begin{bmatrix}
  y = x^2 \\
  y = 2x^2
\end{bmatrix}
\]
Slide show assists with teacher preparation. By selecting from the built-in options or creating your own series of slides, you can demonstrate lessons with minimum preparation time.

**Example**

Use the built-in slide show of $y = x^2$ to show how the coordinates change as you move along the graph.

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SLIDE SHOW</td>
<td>![Display Image]</td>
<td>Specified SLIDE SHOW mode.</td>
</tr>
<tr>
<td>2 ENTER</td>
<td>![Display Image]</td>
<td>Select the built-in menu.</td>
</tr>
<tr>
<td>3 ENTER</td>
<td>![Display Image]</td>
<td>Select $y = x^2$ and the first slide appears.</td>
</tr>
<tr>
<td>4 ▼</td>
<td>![Display Image]</td>
<td>Begin the slide show by pressing the ▼ cursor key.</td>
</tr>
</tbody>
</table>

Moving between the values you can follow the changes in the graph's coordinates, making the nature of the graph easier to understand.

* View the selection of built-in slide shows on the following pages.
Built-in slide show selections

1) $Y=X^2$
2) $Y=AX+B$
3) $Y=\sqrt{X}$
4) $Y=\frac{1}{X}$
Built-in slide show selections

5) $Y = \sin X$

6) $Y = \tan X$

7) $Y = \cos^{-1} X$

8) $Y = \ln X$
Graphing Procedures

The EL-9600 has three unique functions that simplify graphing procedures: Rapid Graph, Rapid Window and Rapid Zoom. Of course, the EL-9600 supports conventional graphing procedures as well.

### Graphing Procedure

Following outlines graphing procedures and indicates the steps where Sharp's unique functions can be used to simplify operations. These functions are introduced on the following pages.

<table>
<thead>
<tr>
<th><strong>Step 1</strong></th>
<th><strong>Manual Input</strong></th>
<th><strong>Rapid Graph</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Input equation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y=</td>
<td>EZ</td>
<td>Simply select from built-in menu to modify desired type of equation.</td>
</tr>
<tr>
<td>XBT/T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XBT/T</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Step 2</strong></th>
<th><strong>Manual Input</strong></th>
<th><strong>Rapid Window</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Set X, Y range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xmin =</td>
<td>EZ</td>
<td>Simply select from built-in menu to set window size.</td>
</tr>
<tr>
<td>Xmax =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xscl =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ymin =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ymax =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yscl =</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Step 3</strong></th>
<th><strong>Manual Input</strong></th>
<th><strong>Rapid Zoom</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Draw graph</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GRAPH</td>
<td>Use arrows to adjust window size while viewing graph.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Step 4</strong></th>
<th><strong>Manual Input</strong></th>
<th><strong>Rapid Zoom</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjust viewing window</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amending range size</td>
<td>Go back to Step 2 to readjust window size.</td>
</tr>
<tr>
<td></td>
<td>GRAPH</td>
<td></td>
</tr>
</tbody>
</table>
Rapid graph

Graphing has never been easier. With its full range of preset equations, rapid graph simplifies equation input. Use in conjunction with the rapid window function or with any graph created.

**Example**

**Draw the graph for \( y = 2\sin(-2x + \pi) + 2 \) using the rapid graph function.**

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Y=</td>
<td></td>
<td>Enter the equation entry mode.</td>
</tr>
<tr>
<td>2 EZ</td>
<td></td>
<td>Enter Rapid Graph mode and view the equation-type menu.</td>
</tr>
<tr>
<td>3 ▼ ENTER</td>
<td></td>
<td>Select the type of equation: Trigonometric, and view the equation format menu.</td>
</tr>
<tr>
<td>Pen/Touch</td>
<td></td>
<td>Select the sin equation format and view the sin equation style.</td>
</tr>
<tr>
<td>4 ENTER</td>
<td></td>
<td>Select the second equation style and input. If necessary, make changes to the coefficients.</td>
</tr>
<tr>
<td>Pen/Touch</td>
<td></td>
<td>Draw the graph. (Note: Previous range values may affect the viewing window. To reset range values, use Rapid Window.)</td>
</tr>
</tbody>
</table>
Rapid window

Rapid window simplifies setting window size with a range of preset values. Use in conjunction with the rapid graph function or with any graph created.

Example

After using Rapid Graph to draw the graph of \( y = 2\sin (-2x+\pi) + 2 \) (refer p. 12), set the viewing window using the rapid window function.

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 WINDOW</td>
<td>![Display 1]</td>
<td>Enter viewing window setup mode.</td>
</tr>
<tr>
<td>2 EZ</td>
<td>![Display 2]</td>
<td>Enter Rapid Window mode.</td>
</tr>
<tr>
<td>3 ▲ ▶ ENTER</td>
<td>![Display 3]</td>
<td>Select the No. 3 style and view the X-range menu.</td>
</tr>
<tr>
<td>(or 3 ENTER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 ▼ ENTER</td>
<td>![Display 4]</td>
<td>Select X-range No. 4: ((-1 &lt; X &lt; 10 \quad \text{scl}=1)), and view the Y-range menu.</td>
</tr>
<tr>
<td>(Five times)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(or 5 ENTER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 ALPHA ▼</td>
<td>![Display 5]</td>
<td>Move the cursor to No. 5: ((-0.5 &lt; Y &lt; 5 \quad \text{scl}=0.5))</td>
</tr>
<tr>
<td>(or 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 ENTER</td>
<td>![Display 6]</td>
<td>Select the Y-range and draw the graph.</td>
</tr>
</tbody>
</table>
Rapid zoom offers one-touch adjustment of window size while viewing the graph. No more guessing or wasting class time to find optimal values for window size.

**Example**

Adjust the viewing window for \( y = x^3 + x^2 - 2x \) to show the entire graph.

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td><img src="image1.png" alt="Graph Display" /></td>
<td>Create the graph ( y = x^3 + x^2 - 2x ) using the following conditions: X-range: ( \text{xmin} = -3 ) ( \text{xmax} = 3 ) ( \text{xscl} = 1 ) Y-range: ( \text{ymin} = -1.5 ) ( \text{ymax} = 1.5 ) ( \text{yscl} = 0.5 )</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td><img src="image2.png" alt="Graph Display" /></td>
<td>Enter Rapid Zoom mode.</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><img src="image3.png" alt="Graph Display" /></td>
<td>Change Y-range from ( \text{Ymax} = 1.5 ) to ( \text{Ymax} = 2 ). Draw the graph.</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td><img src="image4.png" alt="Graph Display" /></td>
<td>Repeat: Change Y-range from ( \text{Ymax} = 2 ) to ( \text{Ymax} = 2.5 ). Draw the graph.</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td><img src="image5.png" alt="Graph Display" /></td>
<td>View display (adjusted).</td>
</tr>
</tbody>
</table>
PC-LINK

Connect the EL-9600 with a PC or Macintosh computer to expand the possibilities of data exchange using PC Link software.

### CE-LK1 (PC-link system)

<table>
<thead>
<tr>
<th>PC conversion connector for IBM-PC</th>
<th>IBM PC® or Compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC conversion connector for Macintosh</td>
<td>Macintosh®</td>
</tr>
</tbody>
</table>

#### What is PC LINK?
- Creates and edits EL-9600 programs on a PC.
- Receives and saves programs and various data from EL-9600.
- Makes a backup of all the contents of EL-9600.
- Sends programs and various data to EL-9600.
- Loads image data of EL-9600.
- 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-9600.

2. Connect the EL-9600 to the PC by using the CE-450L, PC-Link adaptor and PC connector (see above diagram).

3. Make sure that the RS-232C (serial port) is connected to the PC. Use of the connector is determined by the shape of the PC serial port (see below chart).

4. Open PC Link-Software.

5. Switch on EL-9600.
   - It is essential to use the same port for both the PC and the PC Link-Software.

6. Operate according to the instructions on the screen.
Set to set communication

Transfer data between two EL-9600 calculators using the communication cable (CE-450L).

**CE-450L (Communication cable)**

![Diagram of EL-9600 calculators connected with CE-450L communication cable]

**Communication Procedure**

1. Plug the cable into both calculators.
2. Turn power on.

### Receiver

- **2nd F** + SELECT
- **SEND** + LINK/SEND

Specified LINK.

3. ENTER

4. ENTER

### Sender

- **2nd F** + SELECT
- **SEND** + LINK/SEND

Specified LINK.

5. ENTER

6. ENTER

### 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 self-made slide show.
- **11 A~Z, Ø** Selects and displays fixed memory of A to Z, and Ø
- **B BACKUP** Menu to send all data of files. Use this feature to send the entire content.

7. ENTER

8. ENTER

9. 2nd F + EXE

List of sendable data will appear on screen.

- Select ‘LI’, ‘YT’ *mark desired data to be sent.

Select **LINK/RECEIVE**.

Selecting **LINK/SEND**.

Execute Sending function.

Select **LINK/RECEIVE**.

Select **LINK/SEND**.

List of sendable data will appear on screen.

*mark desired data to be sent.

Use this feature to send the entire content.
OHP System

Use the EL-9600 OHP system with the overhead projector to make classroom presentations convenient for the whole class to see.

**Procedure**

1. Switch off the OHP Panel Controller.

2. Plug in the cable connector of the OHP Projection Panel straight into the connection terminal of the OHP Panel Controller.
   
   (The optional AC adaptor is recommended for extended use of the OHP Projection Panel.)

3. Switch on the OHP Panel Controller.

4. Operating the OHP Panel Controller.
   
   The OHP Projection Panel display is synchronized with the display of the OHP Panel Controller. Place the OHP Projection Panel on top of the overhead projector to project images onto the screen.

5. Turn on the power of the overhead projector.
Menu tree 2

When coordinate system is Rect

CALC

- Value
- Intsect
- Minimum
- Maximum
- X_intersect
- Y_intersect

MATH menu on the NBASE calculation

N-MATH

- 1 and
- 2 or
- 3 not
- 4 neg
- 5 xor
- 6 xnor

When coordinate system is Polar, Param or Seq

CALC

- Value

LIST

- 1 sortA
- 2 sortD
- 3 dim
- 4 list
- 5 seq
- 6 cumul
- 7 df_list
- 8 augment
- 9 list→mat
- 0 mat→list

STAT

- EDIT
- OPE
- CALC
- TOOL
- MATH

- EDIT
- OPE
- CALC
- TOOL
- MATH

- EDIT
- OPE
- CALC
- TOOL
- MATH

F DISTRIBUT

- 01 pdnorm
- 02 cdfnorm
- 03 invNorm
- 04 pdf
- 05 cdf
- 06 cdfIn
- 07 cdfOut
- 08 cdfGeo

DRAW

- A DRAW
- B POINT
- C ON/OFF
- D LINE
- E G DATA

- A DRAW
- B POINT
- C ON/OFF
- D LINE
- E G DATA

- A DRAW
- B POINT
- C ON/OFF
- D LINE
- E G DATA

- A DRAW
- B POINT
- C ON/OFF
- D LINE
- E G DATA

- A DRAW
- B POINT
- C ON/OFF
- D LINE
- E G DATA

- A DRAW
- B POINT
- C ON/OFF
- D LINE
- E G DATA

- A DRAW
- B POINT
- C ON/OFF
- D LINE
- E G DATA
Menu tree 5

**STAT PLOT**
- Stat plot1
  - Press ENTER

**OPTION**
- A CTRST
  - Remain 123456 bytes
    - Press ENTER to detail

**STAT GRAPH**
- A HIST
  - 1 Hist
  - 2 Broken+
  - 3 Broken

**SLIDE**
- A B-IN
  - 0 screen
    - Press ENTER

**SHIFT/CHANGE**
- A SHIFT
  - 1 Y = X
  - 2 Y = X
  - 3 Y = 1/X
  - 4 Y = sinX
  - 5 Y = tanX
  - 6 Y = cos X
  - 7 Y = sin X
  - 8 Y = tan X

- B CHANGE
  - 1 Y = X
  - 2 Y = X
  - 3 Y = 1/X
  - 4 Y = sinX
  - 5 Y = tanX
  - 6 Y = sin X
  - 7 Y = sin X
  - 8 Y = tan X
## Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions W x D x H (mm)</td>
<td>183 x 86 x 19.5 (without hardcase)</td>
</tr>
<tr>
<td>Power</td>
<td>AAA x 4</td>
</tr>
<tr>
<td>Backup Battery</td>
<td>CR2032 x 1</td>
</tr>
<tr>
<td>Display Size (dot)</td>
<td>132 x 64</td>
</tr>
<tr>
<td>Line x Characters</td>
<td>8 x 22</td>
</tr>
<tr>
<td>Character Size (dot)</td>
<td>5 x 7</td>
</tr>
<tr>
<td>Digits (mantissa + exponent)</td>
<td>10 + 2</td>
</tr>
<tr>
<td>Memory Total Memory Size</td>
<td>32 KB</td>
</tr>
<tr>
<td>Memory Constant Memory</td>
<td>27 + last answer memory</td>
</tr>
<tr>
<td>Accessory Protective hard case</td>
<td></td>
</tr>
</tbody>
</table>

### 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: 12
- Scatter Plots and Histograms
- Box-and-Whisker Diagrams
- Inferential statistics
- Probability Distributions

#### 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

### Unique to Sharp
- Pen-touch screen, Equation editor, Shift/Change
- Slide show (Built-in/Original), Rapid graph, Rapid window
- Rapid zoom, List grouping, S calculation, Simultaneous equation

### Peripheral
- CE-450L: Unit-to-unit communications cable
- CE-LK1: PC-Link (Print screen/Data storage)
- EL-96T: OHP system (includes controller)

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

Example

Use rectangular coordinate to enter two graph equations and shade the area surrounded by the graphs

Before carrying out the following operation, press the reset switch located on the back of the unit and press keys (caution: previously entered equations and memory will be erased).

Key Operation | Display | Notes
--- | --- | ---
1. | 2nd F SET UP E 1 | Specify Rect mode on the screen.

As shown, Rect corresponds to ECOORD. The example shows the initial settings of the EL-9600.

2. | Y= 7 sin X+1/2 | Enter graph equation “7sinX+X” at Y1.

3. | X+1/2 + 1 | Enter graph equation “X+1” at Y2.

4. | GRAPH | Display the graph.

5. | 2nd F DRAW G 1 | Specify the area surrounded by the two graph equations to be shaded. (Y2<Y<Y1 on screen shows area to be shaded as larger than Y2 and smaller than Y1).

6. | GRAPH | Return to the graph display and the specified area will be shaded.
## Polar coordinate graphs

### Example

Use polar coordinate mode to draw a picture of a flower and enlarge it on the screen.

Before carrying out the following operation, press the reset switch located on the back of the unit and press `2nd F SETUP` keys (caution: previously entered equations and memory will be erased).

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>2nd F SETUP E 3</td>
<td><strong>Display</strong> Specify Polar mode on the screen. As shown, Polar corresponds to [ E \text{COORD} ]. The example shows when only coordinate is changed.</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Y = 5 sin 2 [ \times \text{Bksp} ] ENTER 6 [ \cos \times \text{Bksp} ] ENTER 2 [ \times \text{Bksp} ] ENTER</td>
<td>Use the attached pen to touch the top left corner of the area to be enlarged. ([ ] [ ] will appear).</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>GRAPH</td>
<td>Display the graph. An eight-petaled flower is drawn.</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Press ZOOM A 2 and use the attached pen to touch the screen directly.</td>
<td>Use the attached pen to touch the top right corner of the area to be enlarged. ([ ] [ ] will appear as before).</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Touch the inside of the [ ] once more. The operations in <strong>1</strong> and <strong>2</strong> above can also be carried out using keys. Press ZOOM A 2 move cursor and press [ \text{ENTER} ]</td>
<td>Touch the inside of the [ ] once more and [ \text{cursor} ] will appear. (The [ \text{cursor} ] corresponds to the top left corner of the area to be enlarged).</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Use the attached pen to touch the screen directly.</td>
<td>Use the attached pen to touch the bottom right corner of the area to be enlarged. ([ ] [ ] will appear as before).</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Touch the inside of the [ ] once more. This operation can also be carried out using [ \text{ENTER} ] key.</td>
<td>Touch the inside of the [ ] once more and the screen will be enlarged up to the cursor positions.</td>
</tr>
</tbody>
</table>
## Substitute graph Function

### Example

Use substitute graph function to see how the shape of the graph changes when different numbers are substituted for the variable.

Before carrying out the following operation, press the reset switch located on the back of the unit and press \( \text{CL ENTER} \) keys (caution: previously entered equations and memory will be erased).

#### Key Operation  |  Display  |  Notes
---|---|---
1. 2nd F. SET UP E 1  |  ![Display 1](image1.png)  | Specify Rect mode on the screen.  
As shown, Rect corresponds to \( \text{E COORD} \). The example shows the initial settings of the EL-9600.

2. Y = ALPHA A X^2 + ALPHA B X + ALPHA C  |  ![Display 2](image2.png)  | Enter the graph equation \( AX^3+BX^2+C \) at Y1.

3. 2nd F. SUB  |  ![Display 3](image3.png)  | Specify substitute graph mode.
As shown, the left of the screen shows the graph coordinate and the right of the screen shows that input of the variable used in the equation is being awaited.

4. 1 ENTER  |  ![Display 4](image4.png)  | Substitute 1 for variable A.  
(On left of screen the graph \( Y=1X^3 \) is displayed. B and C are presumed to be “0” as numbers have not been entered.)

5. 1 ENTER  |  ![Display 5](image5.png)  | Substitute 1 for variable B.  
(On left of screen the graph \( Y=1X^3+1X^2 \) is displayed. C is presumed to be “0” as numbers have not been entered.)

6. \((-)\) 5 ENTER  |  ![Display 6](image6.png)  | Substitute -5 for variable C.  
(On left of screen the graph \( Y=1X^3+1X^2-5 \) is displayed. Thus all variables are substituted with numbers.)

7. ▲ 3 ENTER  |  ![Display 7](image7.png)  | Alter the numbers for variable B from 1 to 3 and view the changes in the graph.  
(The graph equation is \( Y=1X^3+3X^2-5 \).)

8. ▲ ▲ 0 ✶ 5 ENTER  |  ![Display 8](image8.png)  | Similarly, alter the numbers for variable A from 1 to 0.5 and view the changes in the graph.  
(The graph equation is \( Y=0.5X^3+3X^2-5 \).)
Use the CALC function to solve graph equations with rectangular coordinate system.

Before carrying out the following operation, press the reset switch located on the back of the unit and press \( \text{CL} \) \( \text{ENTER} \) keys (caution: previously entered equations and memory will be erased).

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Y= 0 ( \cdot ) 5 ( {\text{X}}^{0.5} ) ( \text{X}^2 ) ( \cdot ) 5 ( \text{ENTER} )</td>
<td>Enter the graph equation “0.5X^2-5” at Y1.</td>
<td></td>
</tr>
<tr>
<td>2 4 2nd F ( \sqrt{} ) ( {\text{X}}^{0.5} ) + 7 ( \text{ENTER} )</td>
<td>Enter the graph equation “4(\sqrt{X+7}-10)” at Y2.</td>
<td></td>
</tr>
<tr>
<td>3 GRAPH</td>
<td>Display the graph.</td>
<td></td>
</tr>
<tr>
<td>4 2nd F CALC 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 3 ( \text{ENTER} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 2nd F CALC 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 2nd F CALC 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Use the slideshow function to create an original slide show.

Before carrying out the following operation, press the reset switch located on the back of the unit and press 
\[ \text{CL ENTER} \] keys (caution: previously entered equations and memory will be erased).

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>\text{SLIDE SHOW} \text{C ENTER}</td>
<td>\text{SAMPLE}\text{A}\text{TITLE}</td>
</tr>
<tr>
<td>2</td>
<td>\text{GRAPHIC SCREEN}</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>\text{2nd F CLIP}</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>\text{Y= } 0 \cdot 5 \text{X\text{INT/N}} \text{X}^2 \text{ - 5 ENTER} \text{(-) } \text{X\text{INT/N}} + 2</td>
<td>\text{Y1=0.5X^2-5 Y2=-X+2}</td>
</tr>
<tr>
<td>5</td>
<td>\text{2nd F CLIP}</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>\text{GRAPH}</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>\text{2nd F CLIP}</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>\text{TABLE}</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>\text{2nd F CLIP}</td>
<td></td>
</tr>
<tr>
<td>Key Operation</td>
<td>Display</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>10</strong> 2nd F SPLIT</td>
<td><img src="" alt="Graph and Table Display" /></td>
<td>The graph and table are shown simultaneously. Registers as the fifth screen.</td>
</tr>
<tr>
<td><strong>11</strong> 2nd F CLIP</td>
<td><img src="" alt="Slide Show Display" /></td>
<td>Sets the slideshow to the playback mode.</td>
</tr>
<tr>
<td><strong>12</strong> SLIDE SHOW B</td>
<td><img src="" alt="Slide Show Display" /></td>
<td>Press ENTER to recall the first screen. The symbol 01 is displayed in the top right corner of the screen.</td>
</tr>
<tr>
<td><strong>13</strong> ENTER</td>
<td><img src="" alt="Slide Show Display" /></td>
<td>Press the ▼ key to recall the second screen. The symbol 02 is displayed on the screen.</td>
</tr>
<tr>
<td><strong>14</strong> ▼</td>
<td><img src="" alt="Slide Show Display" /></td>
<td>Press the ▼ key continually 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.</td>
</tr>
<tr>
<td><strong>15</strong> ▼ ▼ • • •</td>
<td><img src="" alt="Slide Show Display" /></td>
<td></td>
</tr>
</tbody>
</table>
Statistics calculations

Example

10 students achieved the following results in a mathematics examination. Draw a graph to classify these results into top, bottom and average score.

Exam results: 68, 73, 92, 86, 78, 95, 69, 75, 82, 81

Before carrying out the following operation, press the reset switch located on the back of the unit and press \text{CL ENTER} keys (caution: previously entered equations and memory will be erased).

<table>
<thead>
<tr>
<th>Key Operation</th>
<th>Display</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2nd F SET UP</td>
<td></td>
<td>Specify two figures after the decimal point on the set up screen.</td>
</tr>
<tr>
<td>D 2 C 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 STAT A ENTER</td>
<td></td>
<td>Enter all the exam results into the list L1.</td>
</tr>
<tr>
<td>6 ENTER</td>
<td></td>
<td>Select the variable quantity of the statistics from the statistics mode.</td>
</tr>
<tr>
<td>3 STAT C 1</td>
<td></td>
<td>Specify the list L1 containing the exam data.</td>
</tr>
<tr>
<td>4 2nd F L1</td>
<td></td>
<td>Calculates the quantity of the statistics such as average, standard deviation, total and bottom score.</td>
</tr>
<tr>
<td>5 ENTER</td>
<td></td>
<td>Set the screen for the various specified values in order to draw the statistical graph with PLOT1.</td>
</tr>
<tr>
<td>6 2nd F STAT PLOT A ENTER</td>
<td></td>
<td>Input of the specified values for drawing a histogram from the list L1 of the statistical quantity has been completed.</td>
</tr>
<tr>
<td>7 ENTER ▼ ENTER</td>
<td></td>
<td>Data: select variable 1(X) or variable 2 (XY).</td>
</tr>
<tr>
<td>▼ 2nd F L1</td>
<td></td>
<td>List X: set the list of the corresponding graph.</td>
</tr>
<tr>
<td>▼ ▼</td>
<td></td>
<td>Freq: set frequency.</td>
</tr>
<tr>
<td>8 ZOOM A 9</td>
<td></td>
<td>GRAPH: set graph format.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Draw the graph by setting the most suitable screen for the statistical graph.</td>
</tr>
</tbody>
</table>

SHARP