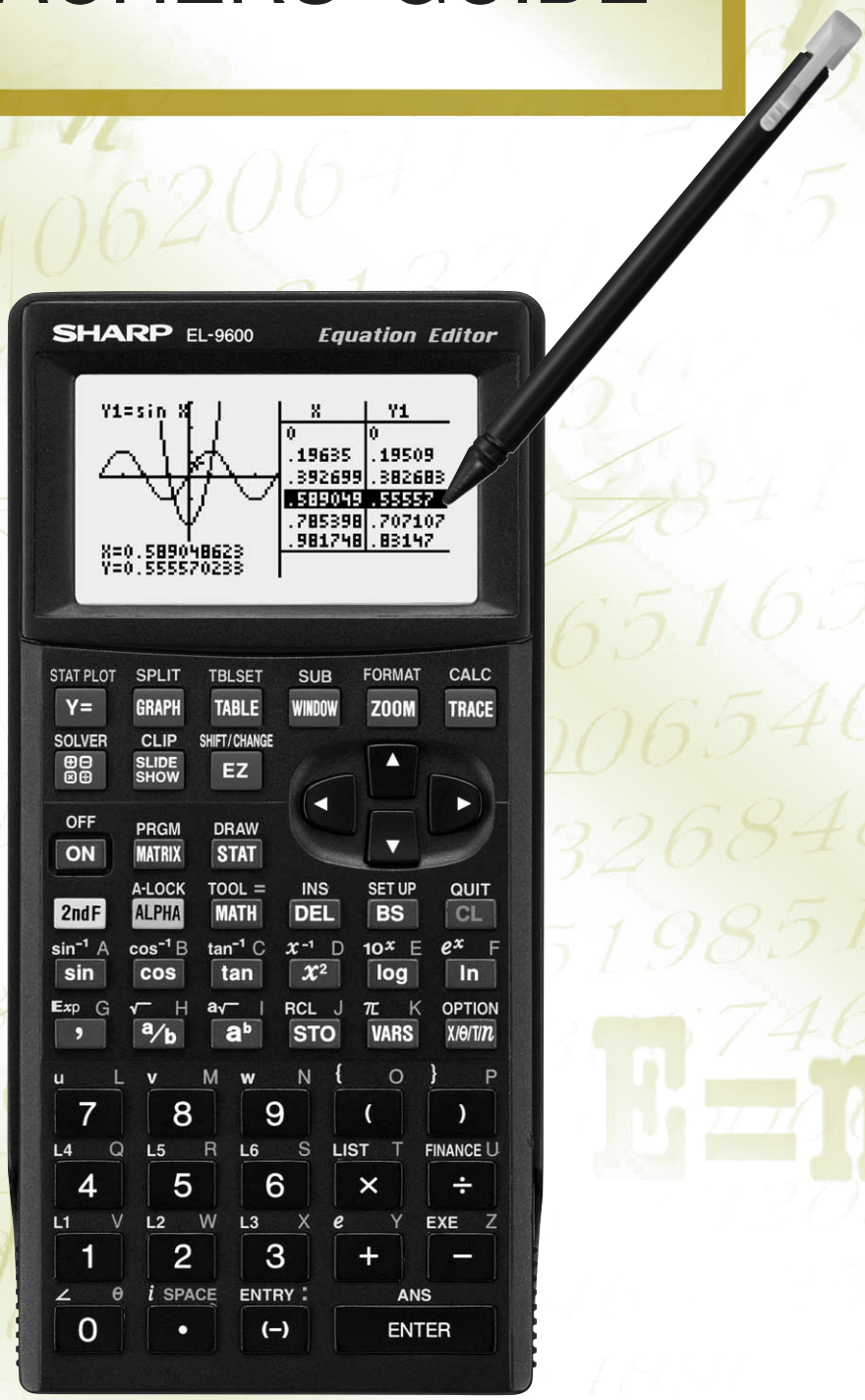
SHARP

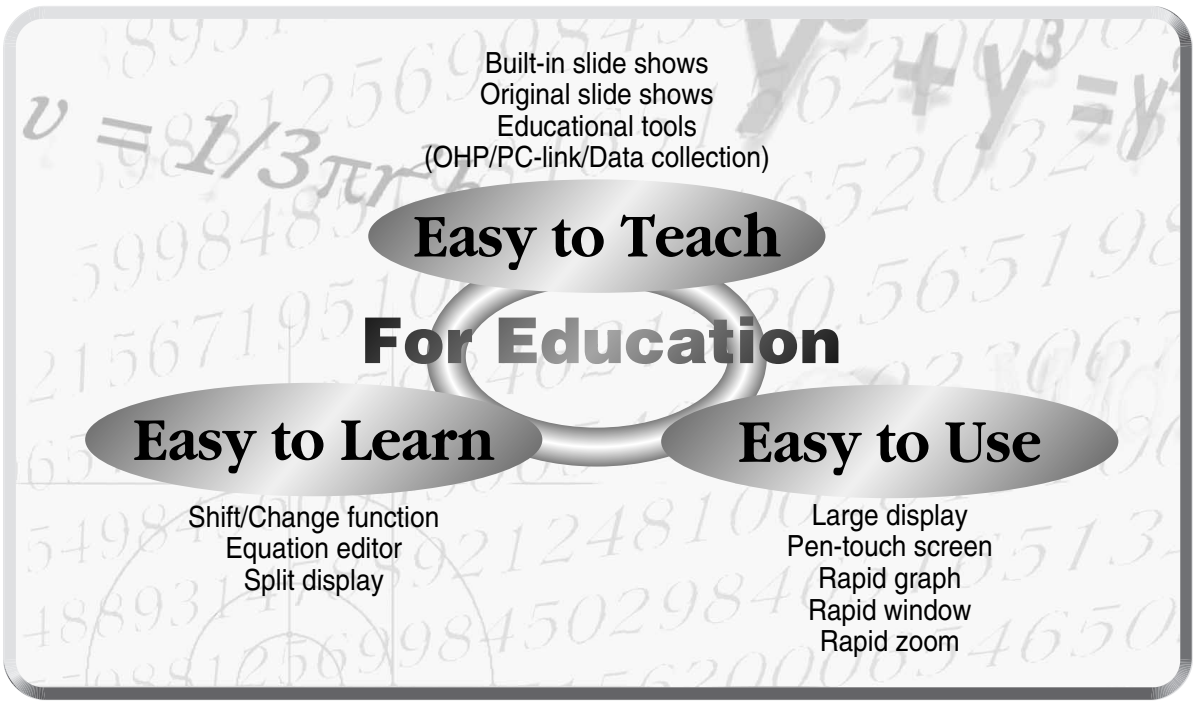
Graphing Calculator
EL-9600
TEACHERS' GUIDE



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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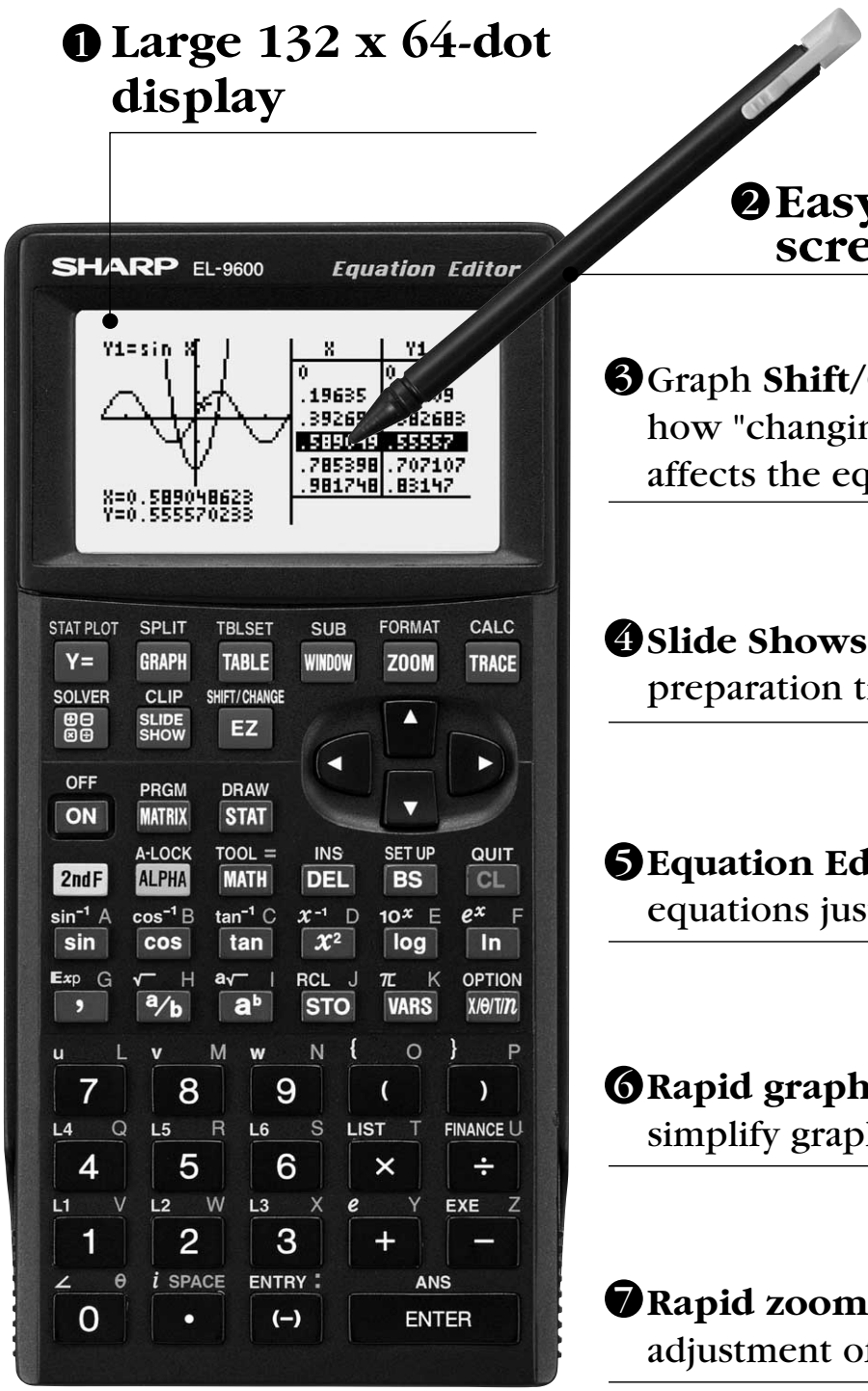
Sales points

❶ Large 132 x 64-dot display



❷ Easy Pen-touch screen

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

❹ Slide Shows reduce class preparation time

❺ Equation Editor shows equations just as in textbooks

❻ Rapid graph/Rapid window simplify graphing procedures

❼ Rapid zoom allows easy adjustment of window size

SHARP

Basic operation

Power ON/OFF

ON · · · · · · · Power on

OFF
2nd F **ON** · · · Power off

CL · · · · · · Erase equations and remove error displays

QUIT
2nd F **CL** · · · 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

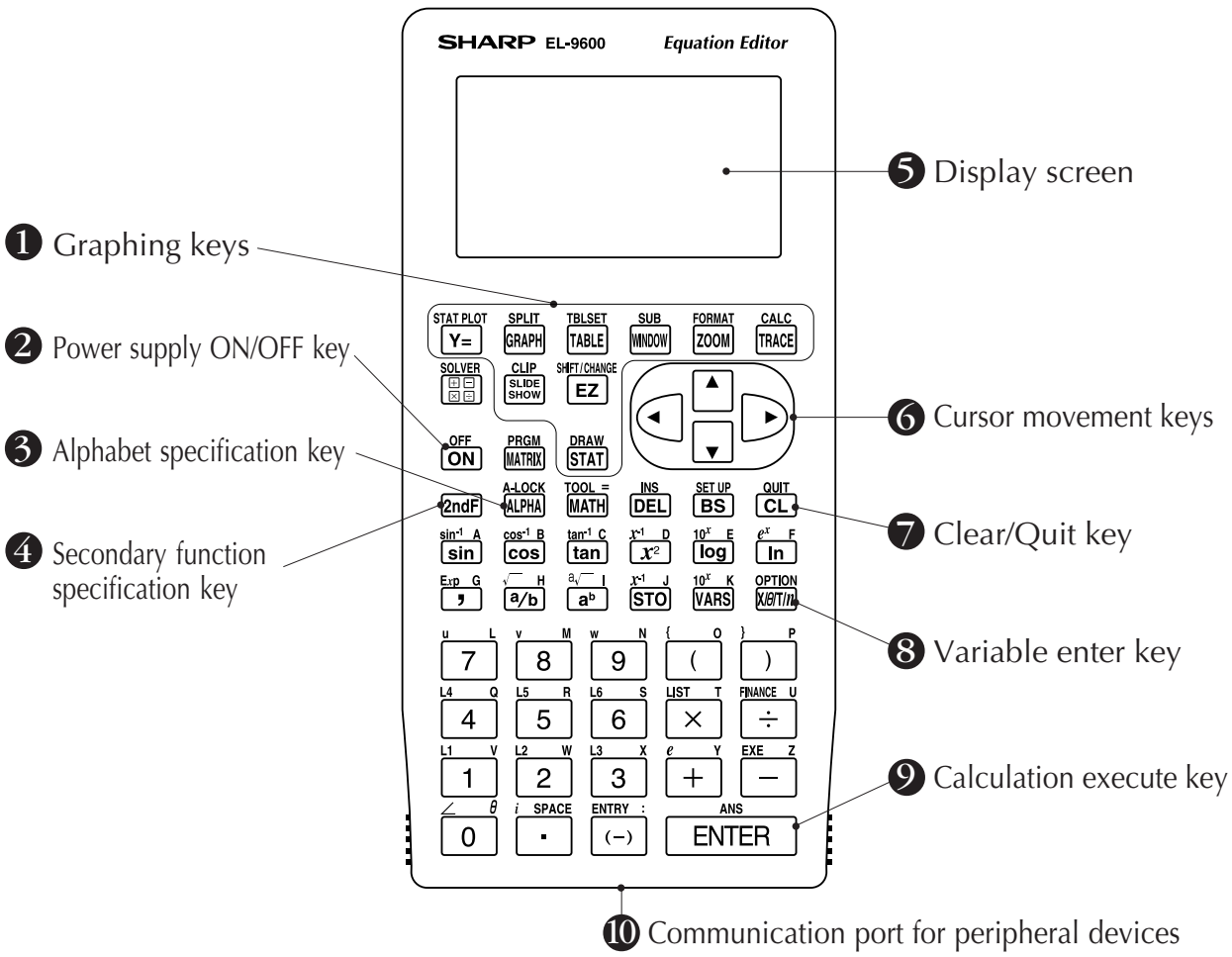
Use to enter calculation mode

SLIDE SHOW Use to enter slide show mode

EZ Use to operate Rapid Graph/Rapid Window and Rapid Zoom functions

A
sin

Names of parts



Basic operation

Guide to key use

Press [2nd F] to use secondary functions (in yellow).

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

Example: [A sin]

To select "sin": [sin]

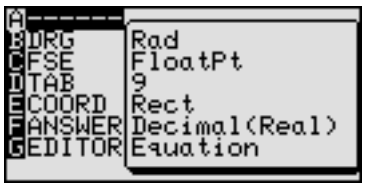
To select "sin^{-1}": [2nd F] [sin^{-1} sin]

To select A: [ALPHA] [A sin]

SET UP menu

Press [2nd F] [SET UP] .

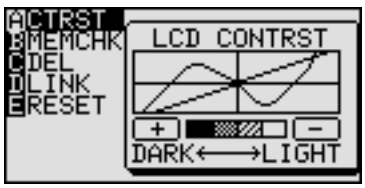
- Contents displayed on the right side of the screen are the current settings.



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

Adjusting screen contrast

- The contrast adjust screen will appear when pressing [2nd F] [OPTION].



Press [+] to darken contrast.

Press [−] to lighten contrast.

Pen Touch (Change the contrast by touching [+] or [−] using the pen)

- With pen-touch mark Pen Touch, 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.

Reset function

1) When trouble occurs

Press [2nd F] [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.

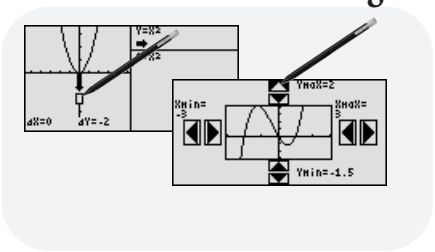
CAUTION

Do not press [CL] in step 2. It will delete all data stored in the calculator.

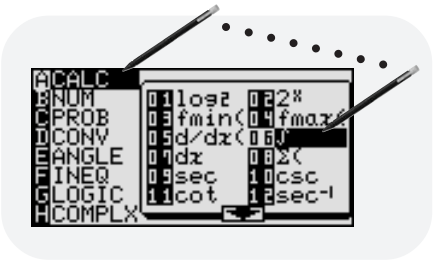
Pen-touch operation

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.

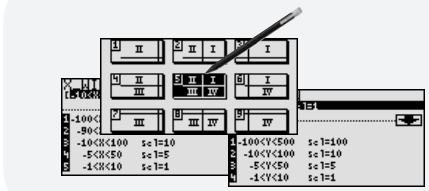
❶ Convenient to make changes to graphs



❸ Easy to move between displays

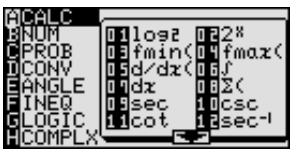
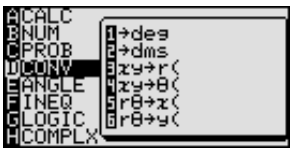
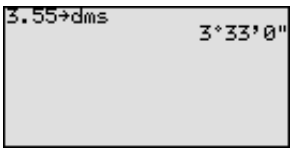


❷ Select menu options with a touch of the pen



See how a simple choice can be made directly from the screen.

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

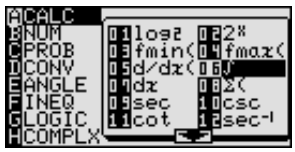
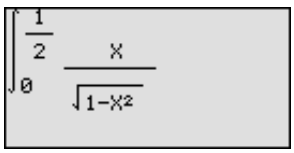
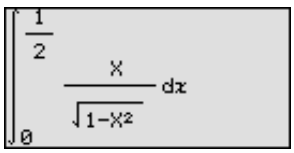
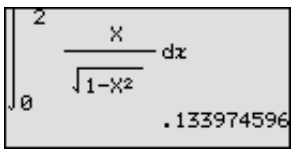
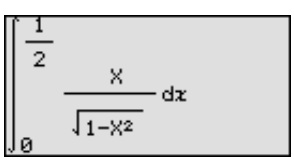
	Pen touch operation	***Key operation***	***Display***
1)	[▦] [CL] [3] [•] [5] [5] [MATH]	[▦] [CL] [3] [•] [5] [5] [MATH]	
2)	Pen-touch [**D** CONV]	[▼] [▼] [▼] (or [D])	
3)	Pen-touch [**2** →dms] twice	[ENTER] [▼] [ENTER] (or [2])	
4)	[ENTER]	[ENTER]	

Equation editor

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. $\int_0^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}dx$

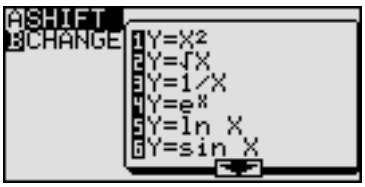
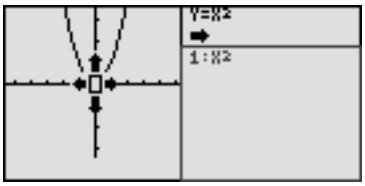
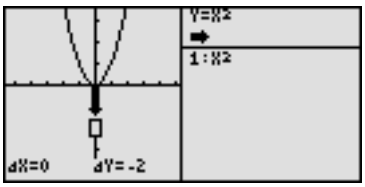
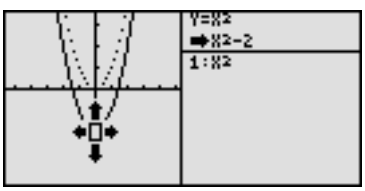
	Key Operation	***Display***	***Notes***
1	[⊞⊟] CL		Clear the display.
2	MATH A ENTER ▶ ▼ ▼ ENTER Pen Touch (or MATH A 0 6)		Select CALC and ∫(Integral function)
3	0 ▶ 1 a/b 2 ▶ ▶		Enter the range of the integral.
4	X/θ/T/n a/b 2nd F √ 1 − X/θ/T/n x^2 ▶ ▶		Enter $\frac{x}{\sqrt{1-x^2}}$
5	MATH ENTER ▼ ▼ ▼ ENTER Pen Touch (or MATH A 0 7)		Complete equation input.
6	ENTER		Calculate the expression. [The mark in the upper right corner will blink for approximately 10 seconds, indicating that the expression is being calculated.]
7	2nd F ENTRY		Review the input equation.

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?

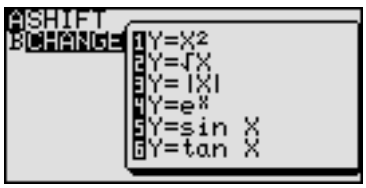
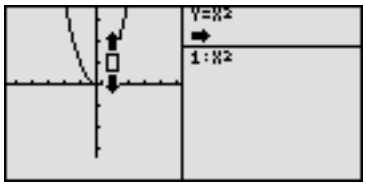
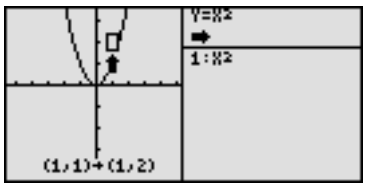
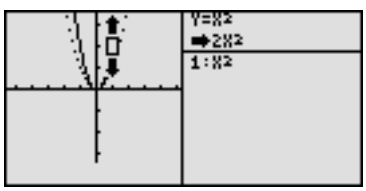
	Key Operation	*Display*	*Notes*
1	2nd F SHIFT/CHANGE		Enter **SHIFT/CHANGE** mode. [If **A**SHIFT is not already highlighted press ▲.]
2	ENTER Pen Touch		Select shift. Cursor moves to the equation menu.
3	ENTER Pen Touch		Select the equation: $y = x^2$ and draw the graph.
4	▼ ▼ Pen Touch		Select the location of the shift: move cursor down twice.
5	ENTER Pen Touch		View the result of the shift. [$y = x^2$ ↓ $y = x^2-2$]

Change (Change the shape of the graphs)

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?

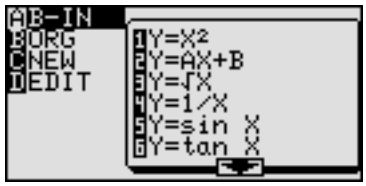
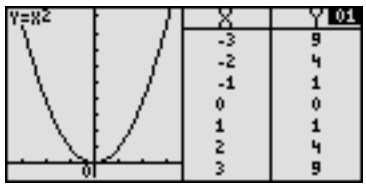
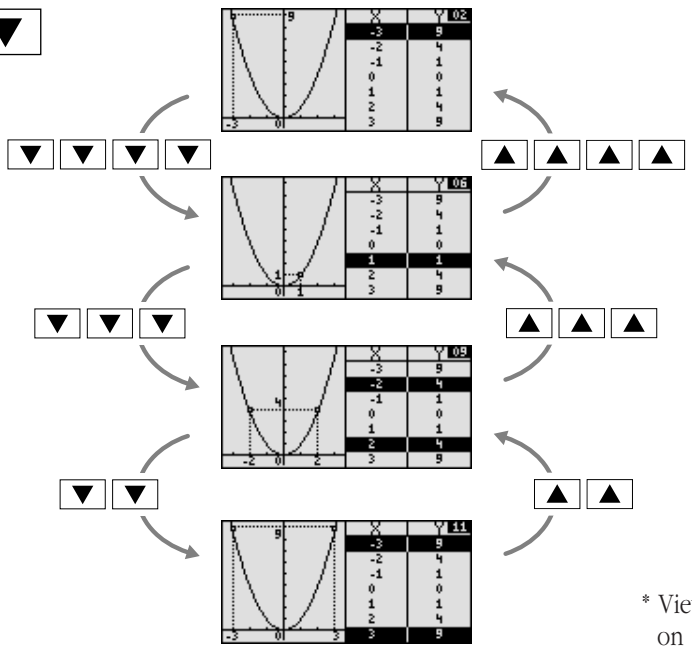
	Key Operation	Display	Notes
1	2nd F SHIFT/CHANGE ▼		Enter **SHIFT/CHANGE** mode and specified (**B CHANGE**).
2 Pen Touch	ENTER		Select change. Cursor will move to the equation menu.
3 Pen Touch	ENTER		Select the equation: $y = x^2$ and draw the graph.
4 Pen Touch	▲		Select the location of the change: increase the value of y-coordinates.
5 Pen Touch	ENTER		View the result of the change. $\begin{bmatrix} y = x^2 \\ \downarrow \\ y = 2x^2 \end{bmatrix}$

Slide show

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

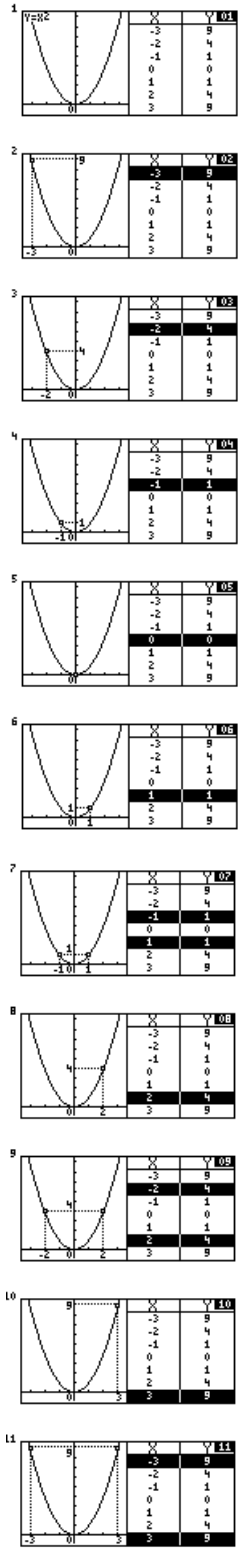
Use the built-in slide show of $y = x^2$ to show how the coordinates change as you move along the graph.

	Key Operation	*Display*	*Notes*
1	SLIDE SHOW		Specified **SLIDE SHOW** mode.
2	ENTER Pen Touch		Select the built-in menu.
3	ENTER Pen Touch		Select $y = x^2$ and the first slide appears.
4	▼		Begin the slide show by pressing the ▼ cursor key. Moving between the values you can follow the changes in the graph's coordinates, making the nature of the graph easier to understand.

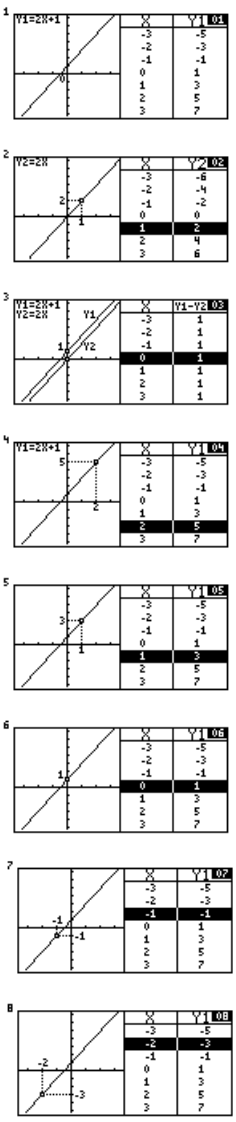
* View the selection of built-in slide shows on the following pages.

Built-in slide show selections

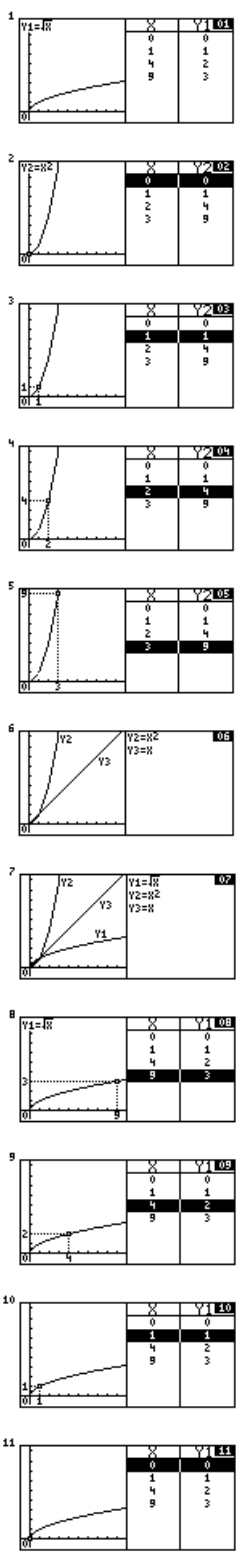
1) $Y=X^2$



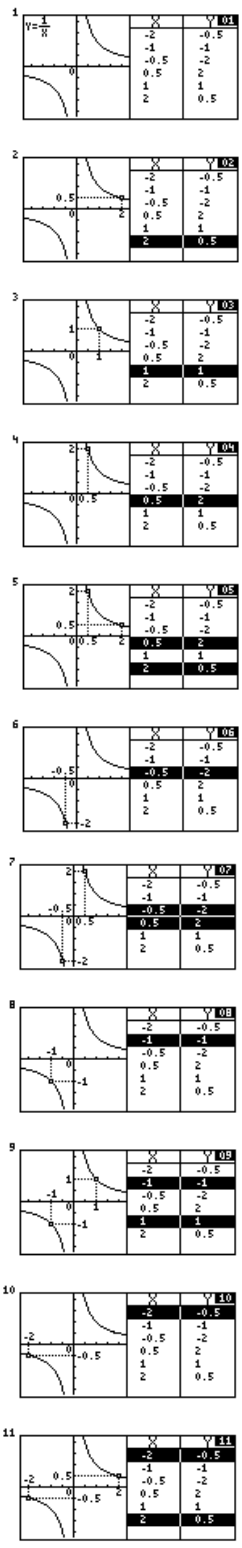
2) $Y=AX+B$



3) $Y=\sqrt{X}$

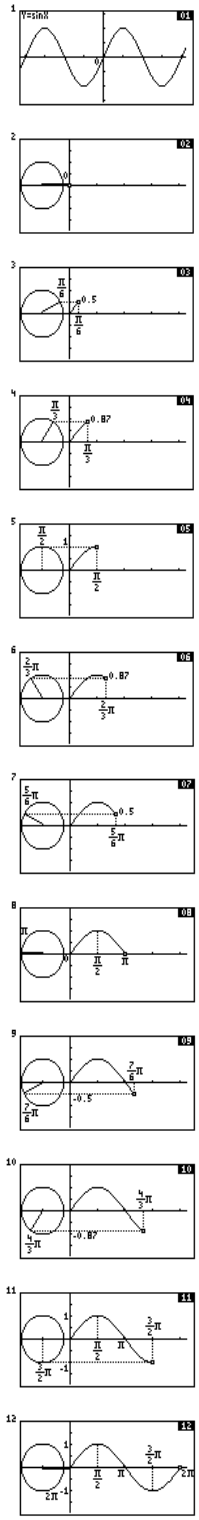


4) $Y=1/X$

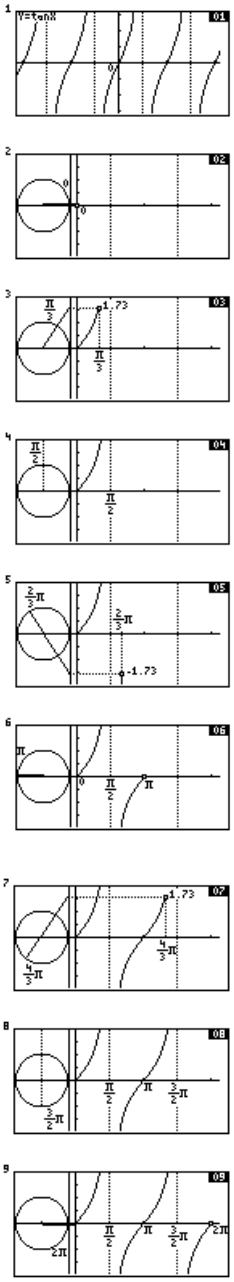


Built-in slide show selections

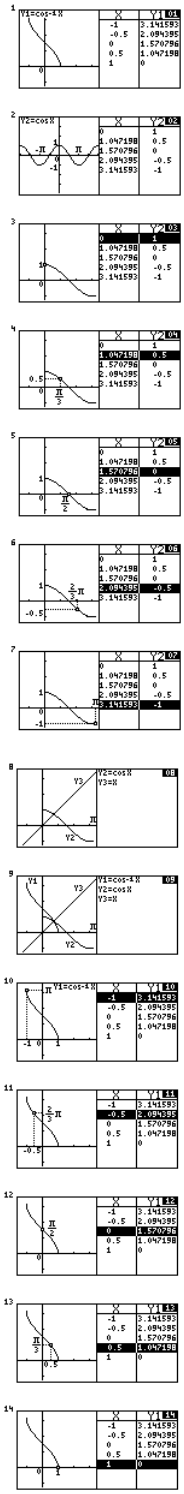
5) Y=sinX



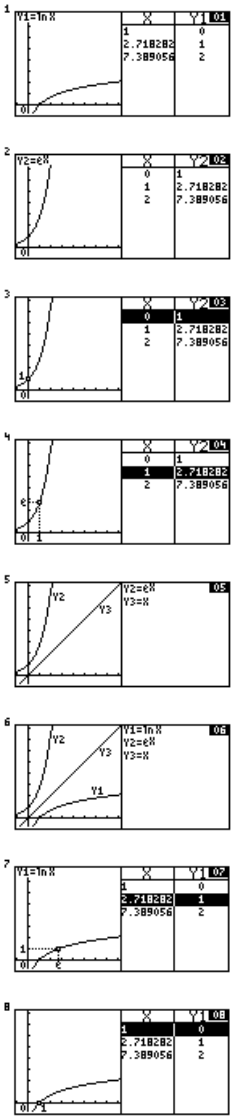
6) Y=tanX



7) Y=cos^{-1}X



8) InX



SHARP

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.

Step 1

Input equation

Manual Input

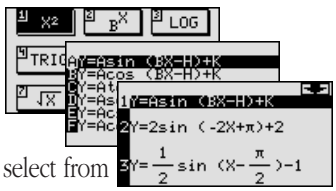
Y=

X/θ/T/n | a^b | 3 | ▶ | + | X/θ/T/n

X² | — | 2 | X/θ/T/n

Rapid Graph

EZ



Simply select from built-in menu to modify desired type of equation.

Step 2

Set X, Y range

Xmin =
Xmax =
Xscl =
Ymin =
Ymax =
Yscl =

Manual Input

WINDOW

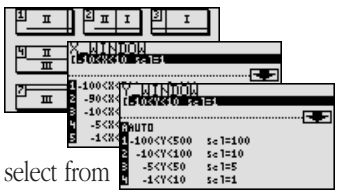
(–) | 3 | ENTER | 3 | ENTER

1 | ENTER | (–) | 1 | • | 5 | ENTER

1 | • | 5 | ENTER | • | 5 | ENTER

Rapid Window

EZ

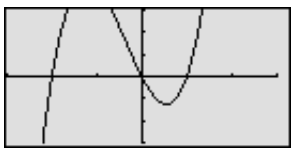


Simply select from built-in menu to set window size.

Step 3

Draw graph

GRAPH



Press Graph button to draw graph.

Step 4

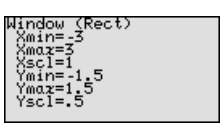
Adjust viewing window

Manual Input

WINDOW

Amending range size

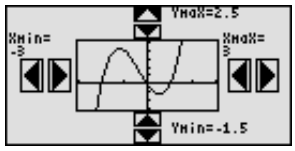
GRAPH



Go back to Step 2 to readjust window size.

Rapid Zoom

EZ



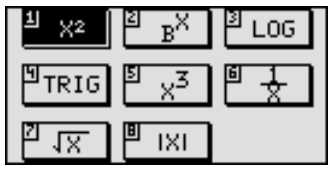
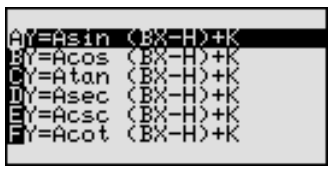
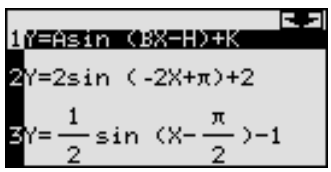
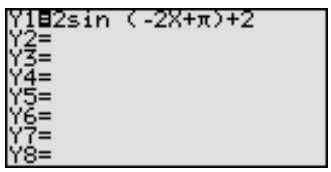
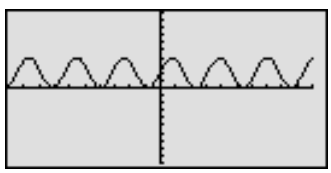
Use arrows to adjust window size while viewing graph.

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.

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

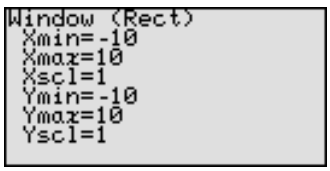
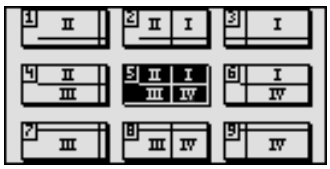
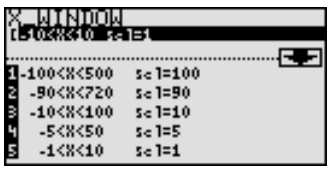
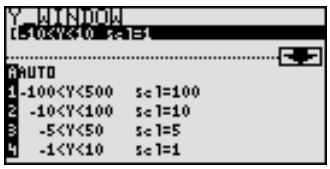
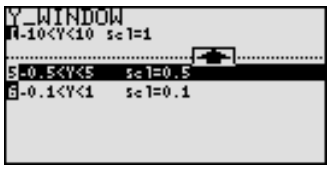
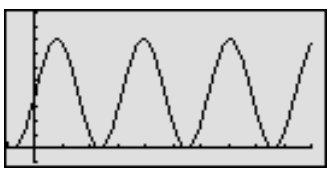
SHARP

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 = 2sin (-2x+π) + 2 (refer p. 12), set the viewing window using the rapid window function.

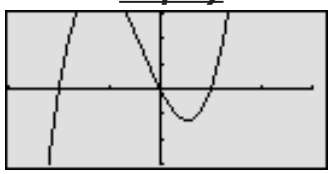
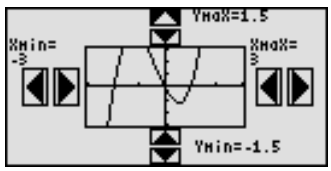
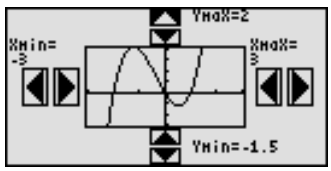
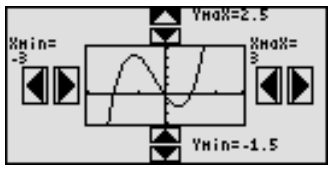
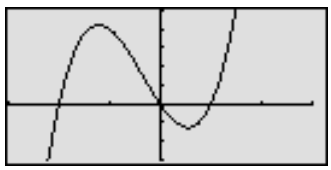
	Key Operation	*Display*	*Notes*
1	WINDOW		Enter viewing window setup mode.
2	EZ		Enter Rapid Window mode.
3	▲ ▶ ENTER Pen Touch (or 3 ENTER)		Select the No. 3 style and view the X-range menu.
4	▼ ENTER (Five times) Pen Touch (or 5 ENTER)		Select X-range No. 4: (-1 < X < 10 scl=1), and view the Y-range menu.
5	ALPHA ▼ Pen Touch (or 5)		Move the cursor to No. 5: (-0.5 < Y < 5 scl=0.5)
7	ENTER		Select the Y-range and draw the graph.

Rapid zoom

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

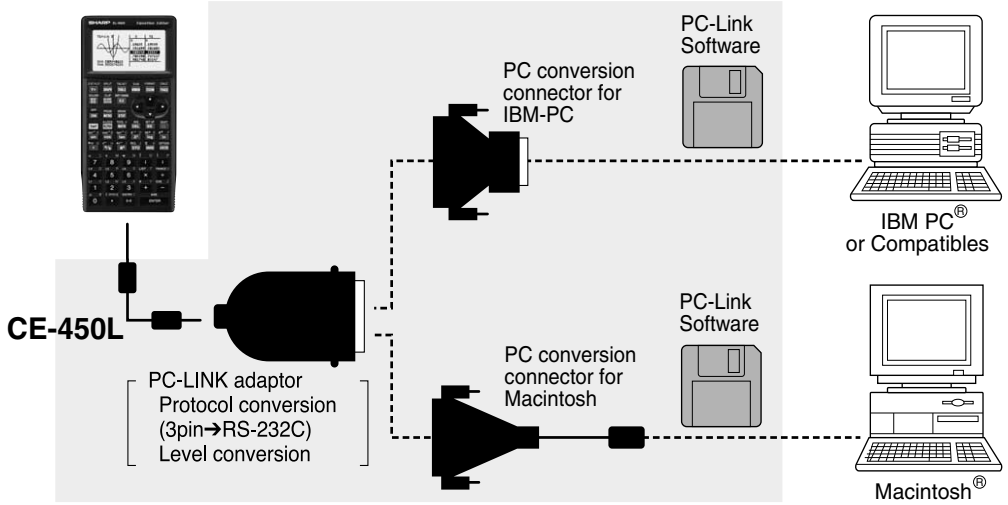
Adjust the viewing window for $y = x^3 + x^2 - 2x$ to show the entire graph.

	Key Operation	***Display***	***Notes***
1	Y= X/θ/T/n a^b 3 ▶ + X/θ/T/n x^2 − 2 X/θ/T/n WINDOW (−) 3 ENTER 3 ENTER 1 ENTER (−) 1 • 5 ENTER 1 • 5 ENTER • 5 ENTER GRAPH		Create the graph $y = x^3 + x^2 - 2x$ using the following conditions: X-range: xmin = -3 xmax = 3 xscl = 1 Y-range: ymin = -1.5 ymax = 1.5 yscl = 0.5
2	EZ		Enter Rapid Zoom mode.
3	ENTER Pen Touch		Change Y-range from Ymax = 1.5 to Ymax=2. Draw the graph.
4	ENTER Pen Touch		Repeat: Change Y-range from Ymax = 2 to Ymax=2.5. Draw the graph
5	GRAPH		View display (adjusted).

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)



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).

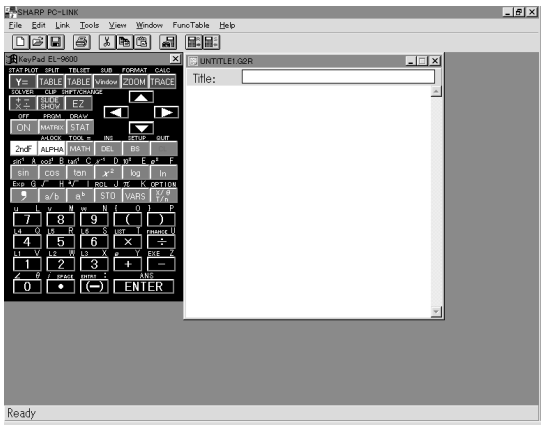
3 Make sure that the RS-232C (serial port) is connected to the PC. Use of the connector is determined by the shape of the PC serial port (see below chart).

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.



Shape of PC serial port	Connecting procedure
25 pin (male)	Connect the other side (25-pin side) of PC LINK adaptor to the serial port for the PC.
9 pin (male)	Connect the other side (25-pin side) of PC LINK adaptor to the 25-pin terminal of a converting adaptor. Also connect the other side (9-pin side) of the converting adaptor to the serial port for the PC.
8 pin (female)	For Macintosh

Set to set communication

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

CE-450L (Communication cable)

Communication Procedure

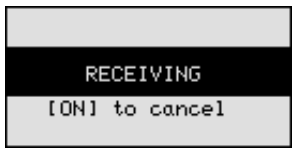
1 Plug the cable into both calculators.

2 Turn power on.

3 **Receiver**
2nd F OPTION
Pen Touch ▼ ▼ ▼
(or D)

Specified LINK.

4 ENTER ▼
Pen Touch ENTER
(or 2)



Select LINK/RECEIVE.

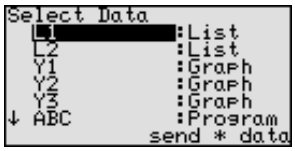
5 **Sender**
2nd F OPTION
Pen Touch ▼ ▼ ▼
(or D)

Specified LINK.

6 ENTER ENTER
Pen Touch (or 1)

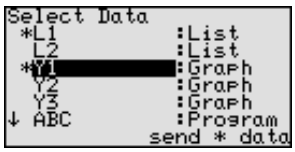
Select LINK/SEND.

7 ENTER ENTER
Pen Touch



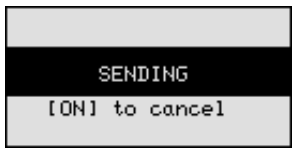
Select SEND/ALL.
[List of sendable data will appear on screen.]

8 ENTER
Pen Touch ▼ ▼ ENTER



Select 'LI', 'YI'
[* mark desired data to be sent.]

9 2nd F EXE



Execute Sending function.

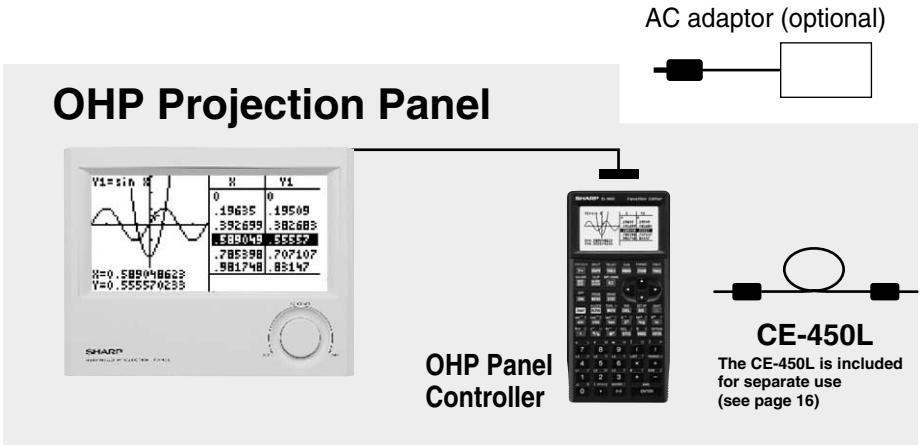
List of the SEND menu

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 eqations.
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 show.
11 A~Z, Ø	Selects and displays all 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.

OHP System

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

EL 96T (OHP system)



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.)

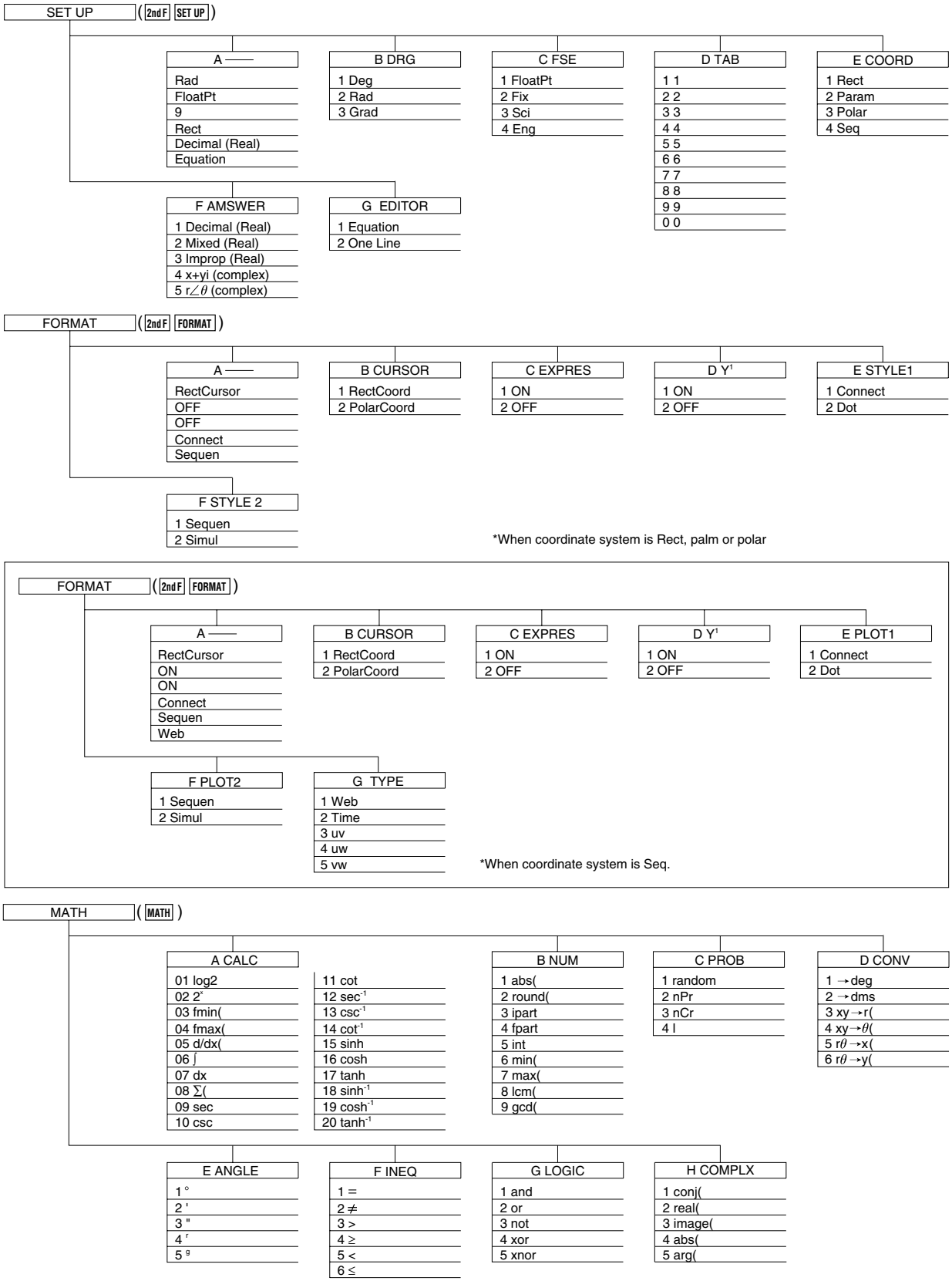
3 Switch on the OHP Panel Controller.

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 1



SHARP

Menu tree 2

When coordinate system is Rect

CALC (2nd F CALC)

CALC
1 Value
2 Intsct
3 Minimum
4 Maximum
5 X_Incpt
6 Y_Incpt
7 Inflec

When coordinate system is Polar,Param or Seq

CALC (2nd F CALC)

CALC
1 Value

MATH menu on the NBASE calculation

N-MATH (2nd F TOOL MATH)

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

LIST (2nd F LIST)

A OPE
1 sortA(
2 sortD(
3 dim(
4 fill(
5 seq(
6 cumul
7 df_list
8 augument(
9 list→mat(
0 mat→list(

B MATH
1 min(
2 max(
3 mean(
4 median(
5 sum(
6 prod(
7 stdDv(
8 varian(

C L_DATA
1 stoLD
2 RclLD

STAT (STAT)

A EDIT
edit list
Press ENTER

B OPE
1 sortA(
2 sortD(
3 SetList
4 ClrList

C CALC
1 1_Stats
2 2_Stats
3 ANOVA(

D LINE	
01 Med_Med	08 Rg_log
02 Rg_ax+b	09 Rg_ab^x
03 Rg_a+bx	10 Rg_ae^{bx}
04 Rg_x^2	11 Rg_x^{-1}
05 Rg_x^3	12 Rg_ax^b
06 Rg_x^4	13 x'
07 Rg_ln	14 y'

E TEST	
01 x^2test	
02 Ftest2samp	10 Ztest1prop
03 Ttest1samp	11 Ztest2prop
04 Ttest2samp	12 Zint1samp
05 TtestLinreg	13 Zint2samp
06 Tint1samp	14 Zint1prop
07 Tint2samp	15 Zint2prop
08 Ztest1samp	16 InputList
09 Ztest2samp	17 Input Stats

F DISTRI	
01 pdfnorm(	
02 cdfnorm(	08 cdfF(
03 InvNorm(	09 pdfbin(
04 pdfT(	10 cdfbin(
05 pdf x^2(	11 pdfpoi(
06 cdf x^2(	12 cdfpoi(
07 pdfF(	13 pdfgeo(

DRAW (2nd F DRAW)

A DRAW
1 ClrDraw
2 Line(
3 H_Line
4 V_Line
5 T_Line(
6 Draw
7 Shade(
8 DrawInv
9 Circle(
0 Text(

B POINT
1 PntON(
2 PntOFF(
3 PntCHG(
4 PxlON(
5 PxlOFF(
6 PxlCHG(
7 PxlTST(

C ON/OFF
1 DrawON
2 DrawOFF

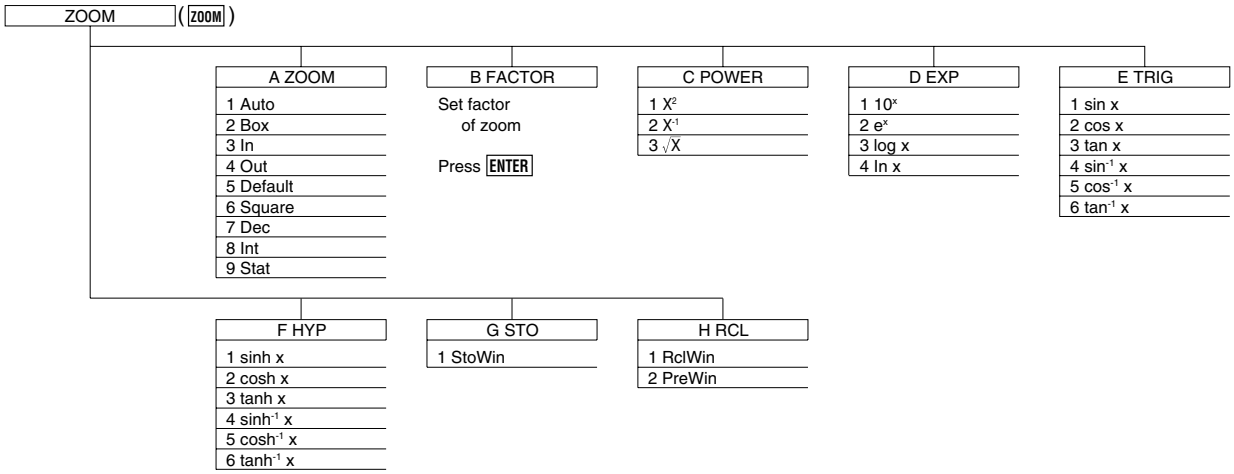
D LINE
select line type
Press ENTER

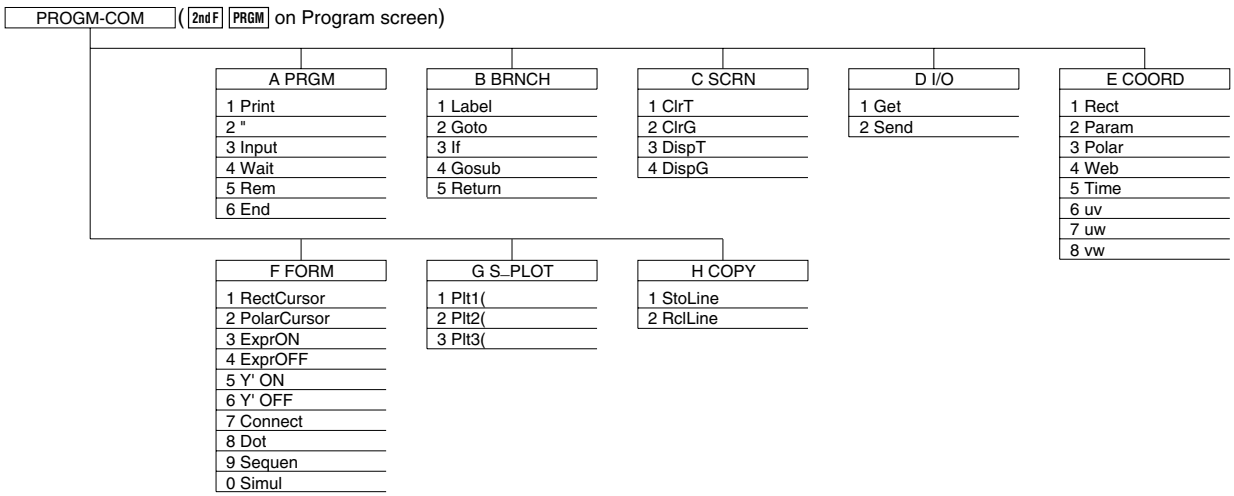
E G_DATA
1 StoGD
2 RclGD

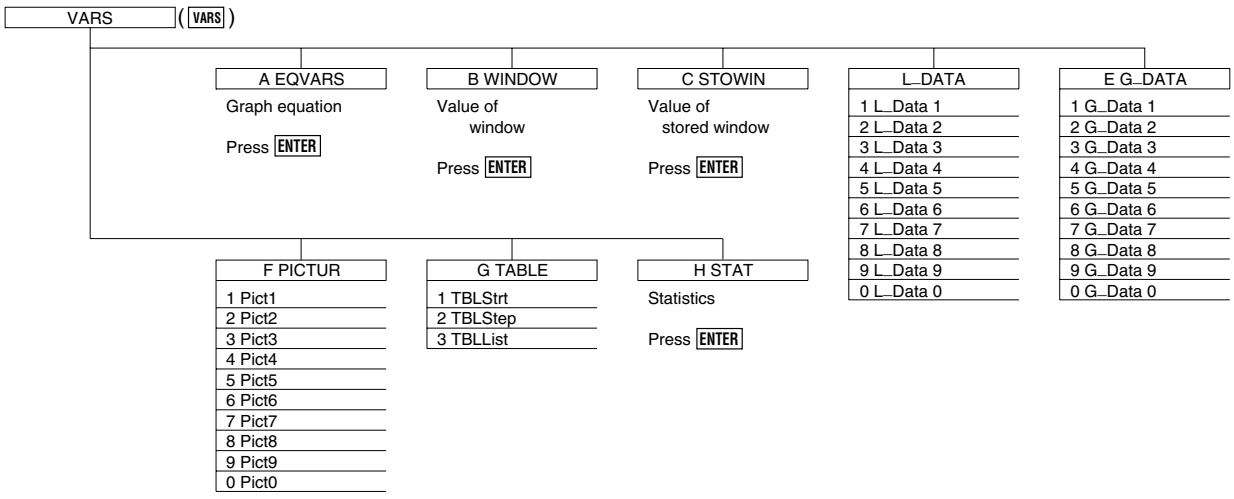
F PICT
1 StoPict
2 RclPict

G SHADE
1 SET
2 INITIAL

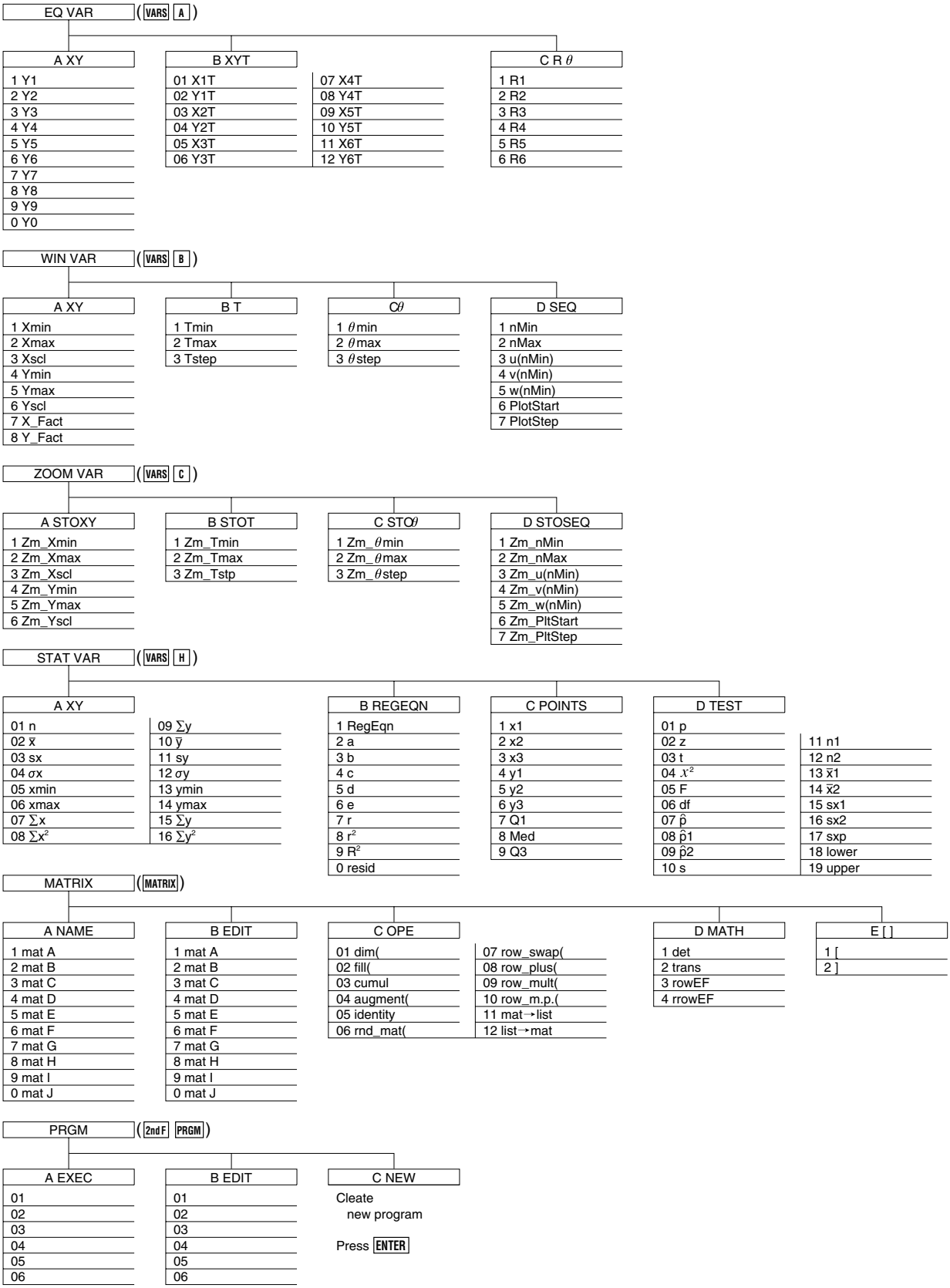
Menu tree 3


ZOOM (ZOOM)
A ZOOM
1 Auto
2 Box
3 In
4 Out
5 Default
6 Square
7 Dec
8 Int
9 Stat
B FACTOR
Set factor of zoom
Press ENTER
C POWER
1 X²
2 X⁻¹
3 √X
D EXP
1 10ˣ
2 eˣ
3 log x
4 ln x
E TRIG
1 sin x
2 cos x
3 tan x
4 sin⁻¹ x
5 cos⁻¹ x
6 tan⁻¹ x
F HYP
1 sinh x
2 cosh x
3 tanh x
4 sinh⁻¹ x
5 cosh⁻¹ x
6 tanh⁻¹ x
G STO
1 StoWin
H RCL
1 RclWin
2 PreWin

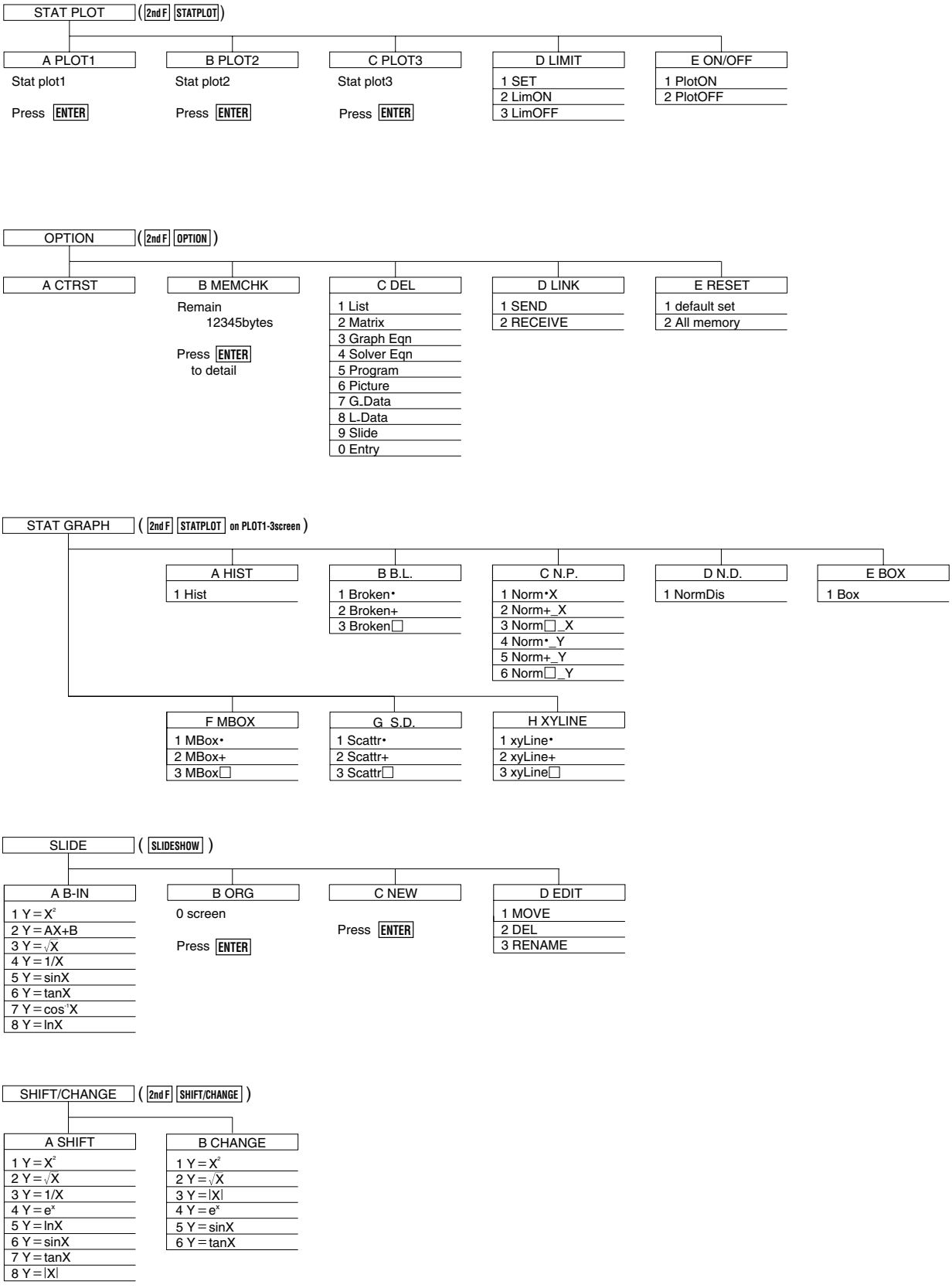

PROGM-COM (2nd F PRGM on Program screen)
A PRGM
1 Print
2 "
3 Input
4 Wait
5 Rem
6 End
B BRNCH
1 Label
2 Goto
3 If
4 Gosub
5 Return
C SCRN
1 ClrT
2 ClrG
3 DispT
4 DispG
D I/O
1 Get
2 Send
E COORD
1 Rect
2 Param
3 Polar
4 Web
5 Time
6 uv
7 uw
8 vw
F FORM
1 RectCursor
2 PolarCursor
3 ExprON
4 ExprOFF
5 Y' ON
6 Y' OFF
7 Connect
8 Dot
9 Sequen
0 Simul
G S_PLOT
1 Plt1(
2 Plt2(
3 Plt3(
H COPY
1 StoLine
2 RclLine


VARS (VARS)
A EQVARS
Graph equation
Press ENTER
B WINDOW
Value of window
Press ENTER
C STOWIN
Value of stored window
Press ENTER
L_DATA
1 L_Data 1
2 L_Data 2
3 L_Data 3
4 L_Data 4
5 L_Data 5
6 L_Data 6
7 L_Data 7
8 L_Data 8
9 L_Data 9
0 L_Data 0
E G_DATA
1 G_Data 1
2 G_Data 2
3 G_Data 3
4 G_Data 4
5 G_Data 5
6 G_Data 6
7 G_Data 7
8 G_Data 8
9 G_Data 9
0 G_Data 0
F PICTUR
1 Pict1
2 Pict2
3 Pict3
4 Pict4
5 Pict5
6 Pict6
7 Pict7
8 Pict8
9 Pict9
0 Pict0
G TABLE
1 TBLStrt
2 TBLStep
3 TBLList
H STAT
Statistics
Press ENTER

Menu tree 4

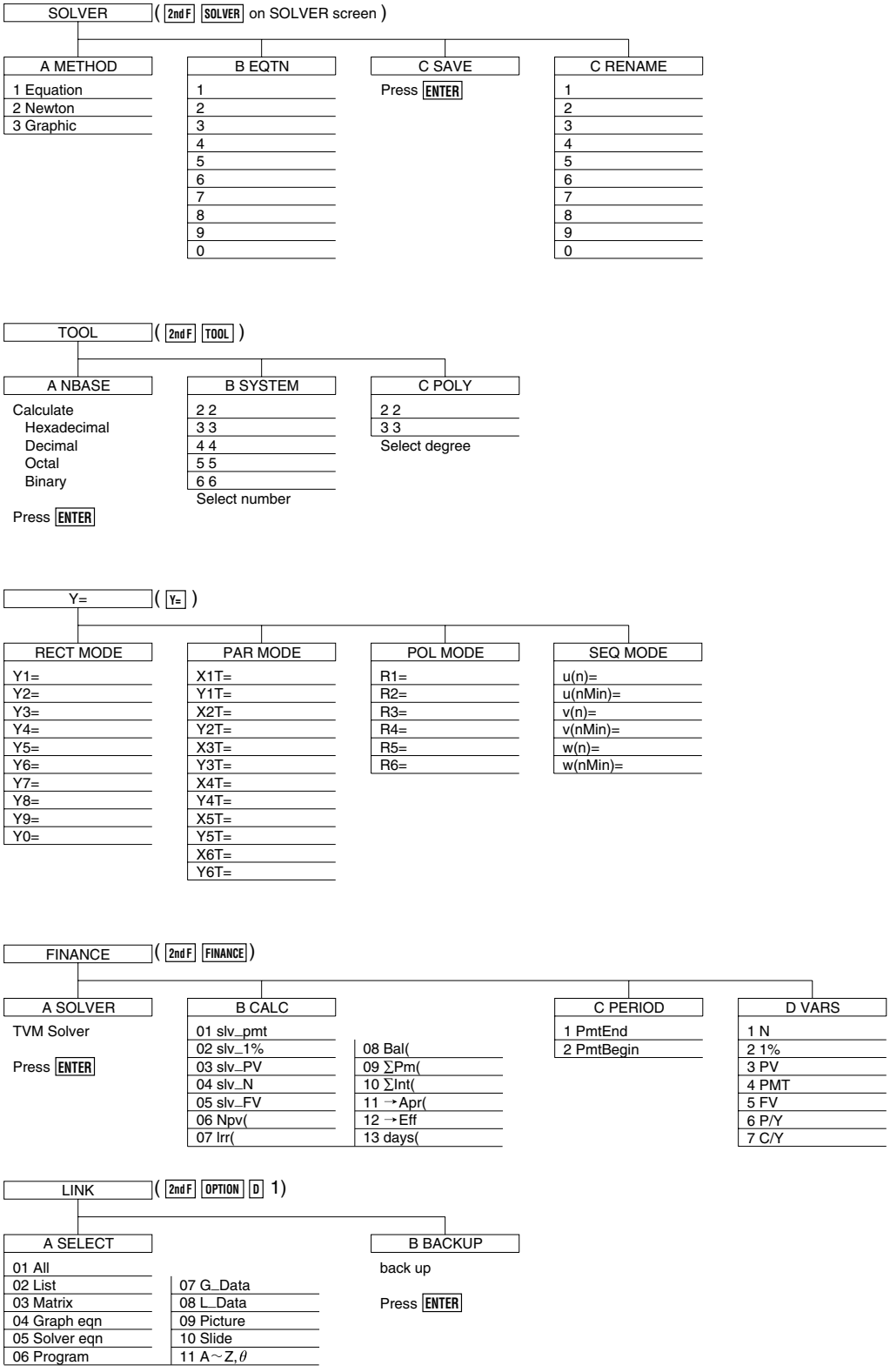

EQ VAR (VARS A)
A XY
1 Y1
2 Y2
3 Y3
4 Y4
5 Y5
6 Y6
7 Y7
8 Y8
9 Y9
0 Y0
B XYT
01 X1T
02 Y1T
03 X2T
04 Y2T
05 X3T
06 Y3T
07 X4T
08 Y4T
09 X5T
10 Y5T
11 X6T
12 Y6T
C R θ
1 R1
2 R2
3 R3
4 R4
5 R5
6 R6
WIN VAR (VARS B)
A XY
1 Xmin
2 Xmax
3 Xscl
4 Ymin
5 Ymax
6 Yscl
7 X_Fact
8 Y_Fact
B T
1 Tmin
2 Tmax
3 Tstep
Cθ
1 θmin
2 θmax
3 θstep
D SEQ
1 nMin
2 nMax
3 u(nMin)
4 v(nMin)
5 w(nMin)
6 PlotStart
7 PlotStep
ZOOM VAR (VARS C)
A STOXY
1 Zm_Xmin
2 Zm_Xmax
3 Zm_Xscl
4 Zm_Ymin
5 Zm_Ymax
6 Zm_Yscl
B STOT
1 Zm_Tmin
2 Zm_Tmax
3 Zm_Tstp
C STOθ
1 Zm_θmin
2 Zm_θmax
3 Zm_θstep
D STOSEQ
1 Zm_nMin
2 Zm_nMax
3 Zm_u(nMin)
4 Zm_v(nMin)
5 Zm_w(nMin)
6 Zm_PltStart
7 Zm_PltStep
STAT VAR (VARS H)
A XY
01 n
02 x̄
03 sx
04 σx
05 xmin
06 xmax
07 Σx
08 Σx²
09 Σy
10 ȳ
11 sy
12 σy
13 ymin
14 ymax
15 Σy
16 Σy²
B REGEQN
1 RegEqn
2 a
3 b
4 c
5 d
6 e
7 r
8 r²
9 R²
0 resid
C POINTS
1 x1
2 x2
3 x3
4 y1
5 y2
6 y3
7 Q1
8 Med
9 Q3
D TEST
01 p
02 z
03 t
04 x²
05 F
06 df
07 p̂
08 p̂1
09 p̂2
10 s
11 n1
12 n2
13 x̄1
14 x̄2
15 sx1
16 sx2
17 sxp
18 lower
19 upper
MATRIX (MATRIX)
A NAME
1 mat A
2 mat B
3 mat C
4 mat D
5 mat E
6 mat F
7 mat G
8 mat H
9 mat I
0 mat J
B EDIT
1 mat A
2 mat B
3 mat C
4 mat D
5 mat E
6 mat F
7 mat G
8 mat H
9 mat I
0 mat J
C OPE
01 dim(
02 fill(
03 cumul
04 augment(
05 identity
06 rnd_mat(
07 row_swap(
08 row_plus(
09 row_mult(
10 row_m.p.(
11 mat→list
12 list→mat
D MATH
1 det
2 trans
3 rowEF
4 rrowEF
E [ ]
1 [
2]
PRGM (2nd F PRGM)
A EXEC
01
02
03
04
05
06
B EDIT
01
02
03
04
05
06
C NEW
Cleate
new program
Press ENTER

Menu tree 5



SHARP

Menu tree 6


SOLVER (2nd F SOLVER on SOLVER screen)
A METHOD
1 Equation
2 Newton
3 Graphic
B EQTN
1 2 3 4 5 6 7 8 9 0
C SAVE
Press ENTER
C RENAME
1 2 3 4 5 6 7 8 9 0
TOOL (2nd F TOOL)
A NBASE
Calculate
Hexadecimal
Decimal
Octal
Binary
Press ENTER
B SYSTEM
2 2
3 3
4 4
5 5
6 6
Select number
C POLY
2 2
3 3
Select degree
Y= (Y=)
RECT MODE
Y1= Y2= Y3= Y4= Y5= Y6= Y7= Y8= Y9= Y0=
PAR MODE
X1T= Y1T= X2T= Y2T= X3T= Y3T= X4T= Y4T= X5T= Y5T= X6T= Y6T=
POL MODE
R1= R2= R3= R4= R5= R6=
SEQ MODE
u(n= u(nMin)= v(n)= v(nMin)= w(n)= w(nMin)=
FINANCE (2nd F FINANCE)
A SOLVER
TVM Solver
Press ENTER
B CALC
01 slv_pmt
02 slv_1%
03 slv_PV
04 slv_N
05 slv_FV
06 Npv(
07 Irr(
08 Bal(
09 ∑Pm(
10 ∑Int(
11 →Apr(
12 →Eff
13 days(
C PERIOD
1 PmtEnd
2 PmtBegin
D VARS
1 N
2 1%
3 PV
4 PMT
5 FV
6 P/Y
7 C/Y
LINK (2nd F OPTION D 1)
A SELECT
01 All
02 List
03 Matrix
04 Graph eqn
05 Solver eqn
06 Program
07 G_Data
08 L_Data
09 Picture
10 Slide
11 A~Z, θ
B BACKUP
back up
Press ENTER

Specifications

Dimensions W x D x H (mm)			183 x 86 x 19.5 (without hardcase)
Power			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		32 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	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	
Features unique to Sharp	Pen-touch screen, Equation editor, Shift/Change, Slide show (Built-in/Original), Rapid graph, Rapid window, Rapid zoom, List grouping, Σcalculation, Simultaneous equation		
Peripheral	CE-450L		Unit-to-unit communications cable
	CE-LK1		PC-Link (Print screen/Data storage)
	EL-96T		OHP system (includes controller)

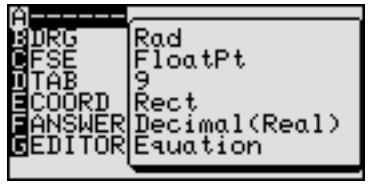
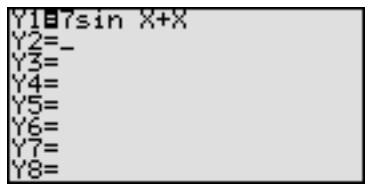
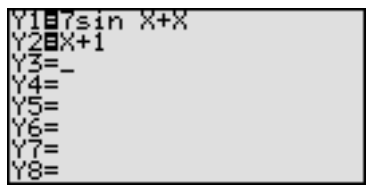
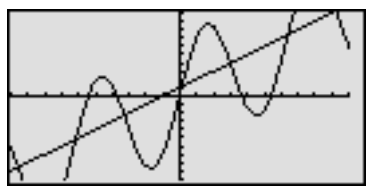
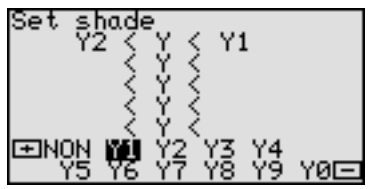
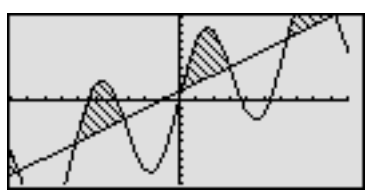
* Design and specifications are subject to change without notice.
* Some products may not be available in some countries.

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 [CL] [ENTER] 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 **E COORD** . The example shows the initial settings of the EL-9600.]
2	[Y=] [7] [sin] [X/θ/T/n] [+] [X/θ/T/n] [ENTER]		Enter graph equation "7sinX+X" at Y1.
3	[X/θ/T/n] [+] [1] [ENTER]		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.

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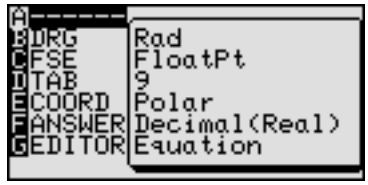
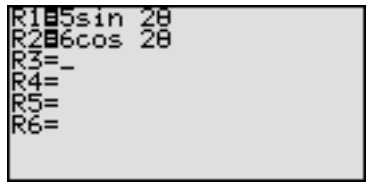
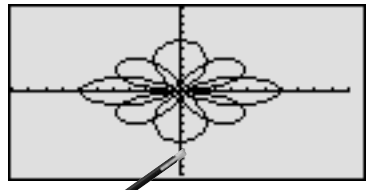
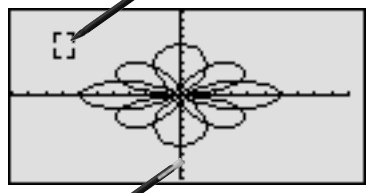
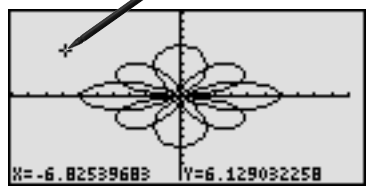
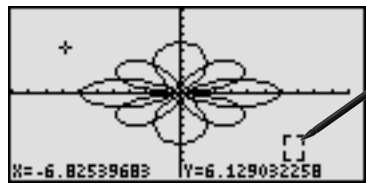
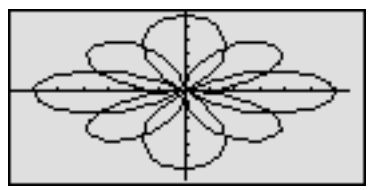
Polar coordinate graphs

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 [CL] [ENTER] keys (caution: previously entered equations and memory will be erased).

	Key Operation	Display	Notes
1	[2nd F] [SET UP] [E] [3]		Specify Polar mode on the screen. [As shown, Polar corresponds to **E COORD** . The example shows when only coordinate is changed.]
2	[Y=] [5] [sin] [2] [X/θ/T/n] [ENTER] [6] [cos] [2] [X/θ/T/n] [ENTER]		Enter the graph equations "5sin2 θ and "6cos2θ " respectively at **R1** and **R2** . (This completes the graph equation).
3	[GRAPH]		Display the graph. An eight-petaled flower is drawn.
4	Press [ZOOM] [A] [2] and use the attached pen to touch the screen directly.		Use the attached pen to touch the top left corner of the area to be enlarged. ([ ] will appear).
5	Touch the inside of the [ ] once more. [The operations in **4** and **5** above can also be carried out using keys. Press [ZOOM] [A] [2] , move cursor and press [ENTER] .]		Touch the inside of the [ ] once more and + cursor will appear. (The + cursor corresponds to the top left corner of the area to be enlarged).
6	Use the attached pen to touch the screen directly.		Use the attached pen to touch the bottom right corner of the area to be enlarged. ([ ] will appear as before).
7	Touch the inside of the [ ] once more. [This operation can also be carried out using [ENTER] key.]		Touch the inside of the [ ] once more and the screen will be enlarged up to the cursor positions.

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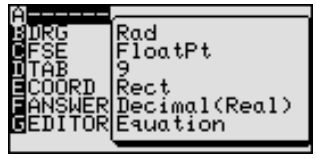
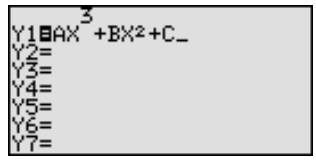
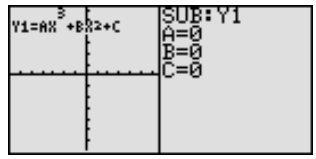
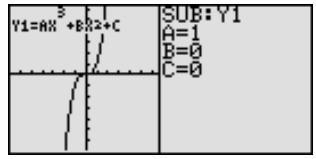
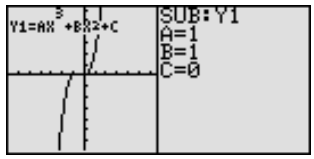
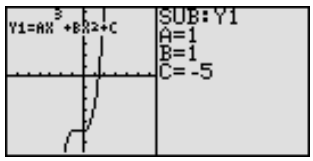
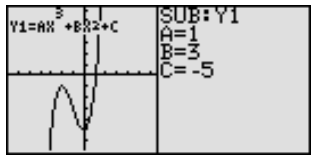
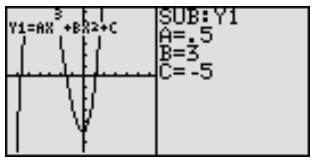
Substitute graph Function

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 [CL] [ENTER] keys (caution: previously entered equations and memory will be erased).

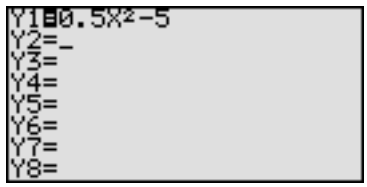
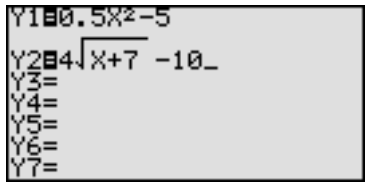
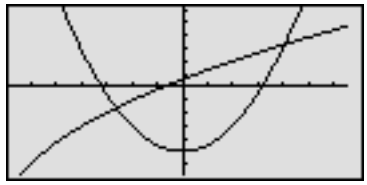
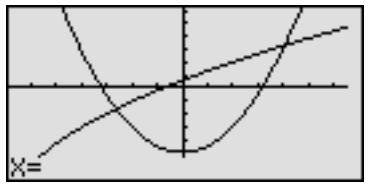
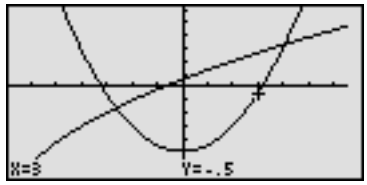
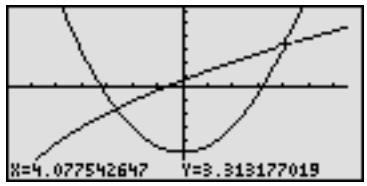
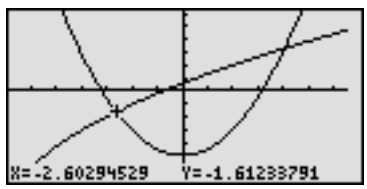
	Key Operation	***Display***	***Notes***
1	[2nd F] [SET UP] [E] [1]		Specify Rect mode on the screen. [As shown, Rect corresponds to **E COORD**. The example shows the initial settings of the EL-9600.]
2	[Y=] [ALPHA] [A] [X/θ/T/n] [a^b] [3] [▶] [+] [ALPHA] [B] [X/θ/T/n] [x^2] [+] [ALPHA] [C]		Enter the graph equation "AX^3+BX^2+C" at Y1.
3	[2nd F] [SUB]		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]		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]		Substitute1 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]		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]		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]		Similarly, alter the numbers for variable A from 1 to 0.5 and view the changes in the graph. (The graph equation is $Y=0.5X^3+3X^2-5$).

CALC function

Example

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 [CL] [ENTER] keys (caution: previously entered equations and memory will be erased).

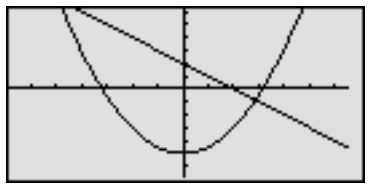
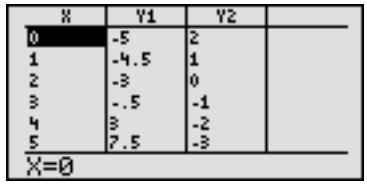
	Key Operation	Display	Notes
1	[Y=] [0] [·] [5] [X/θ/T/n] [x^2] [−] [5] [ENTER]		Enter the graph equation "$0.5X^2-5$" at Y1.
2	[4] [2nd F] [√‾] [X/θ/T/n] [+] [7] [▶] [−] [1] [0]		Enter the graph equation "$4\sqrt{X+7}-10$ " at Y2.
3	[GRAPH]		Display the graph.
4	[2nd F] [CALC] [1]		Specify the value of X to find the value of Y, by specifying the value of CALC.
5	[3] [ENTER]		Enter "3" as the value of X and the value of Y is calculated. [The values X and Y appear at the bottom of the screen and the cursor appears at the corresponding point on the graph.]
6	[2nd F] [CALC] [2]		Specify "Intsct" function to calculate the intersection point of the two graphs. [After completion of the calculation, the values of the X,Y intersection will appear at the bottom of the screen, and the cursor will appear at the corresponding point on the graph, as before.]
7	[2nd F] [CALC] [2]		The graph is intersected at two points. Carry out the same operation as in **6** to find the second intersection. [After completion of the calculation, the values of the X,Y intersection will appear at the bottom of the screen, and the cursor will appear at the corresponding point on the graph, as before.]

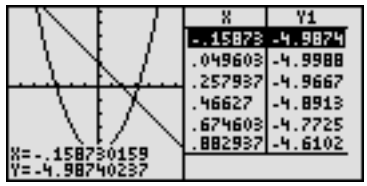
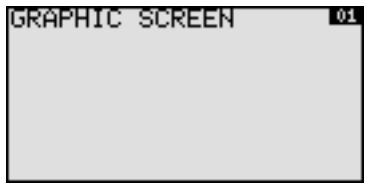
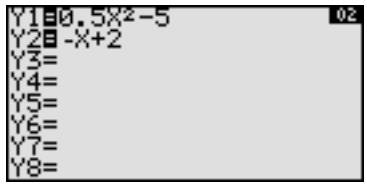
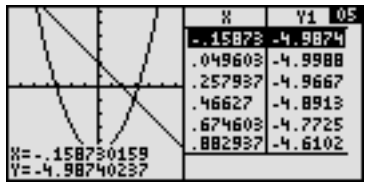
Original slide show

Example

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 [CL] [ENTER] keys (caution: previously entered equations and memory will be erased).

	Key Operation	*Display*	*Notes*
1	[SLIDE SHOW] [C] [ENTER] [S] [A] [M] [P] [L] [E] [ENTER]	TITLE:SAMPLE	Enter slide show creation mode and input a title.
2	[▦] [2nd F] [A-LOCK] [G] [R] [A] [P] [H] [I] [C] [SPACE] [S] [C] [R] [E] [E] [N]	GRAPHIC SCREEN	Create the first screen and press [2nd F] [CLIP] to register it. The message "STORESCREEN 01" will appear momentarily to show that registration is completed.
3	[2nd F] [CLIP]		
4	[Y=] [0] [·] [5] [X/θ/T/n] [x^2] [−] [5] [ENTER] [(−)] [X/θ/T/n] [+] [2]	Y1=0.5X²−5 Y2=-X+2_ Y3= Y4= Y5= Y6= Y7= Y8=	Enter the graph equations "$0.5X^2-5$" and "-X+2" respectively at Y1 and Y2. Registers as the second screen.
5	[2nd F] [CLIP]		
6	[GRAPH]		Displays the graph. Registers as the third screen.
7	[2nd F] [CLIP]		
8	[TABLE]		Shows the table. Registers as the fourth screen.
9	[2nd F] [CLIP]		

Key Operation	Display	Notes
10 2nd F SPLIT **11** 2nd F CLIP		The graph and table are shown simultaneously. Registers as the fifth screen.
12 SLIDE SHOW B		Sets the slideshow to the playback mode.
13 ENTER		Press ENTER to recall the first screen. The symbol **01** is displayed in the top right corner of the screen.
14 ▼		Press the ▼ key to recall the second screen. The symbol **01** is displayed on the screen.
15 ▼ ▼ • • •		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.

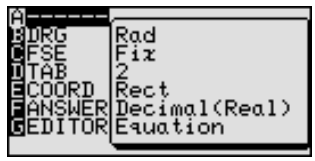
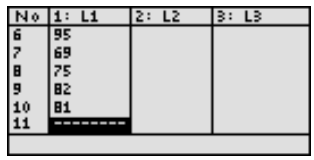
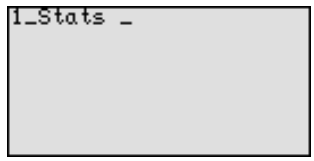
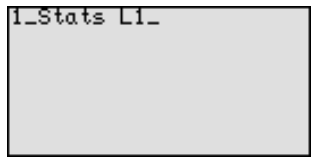
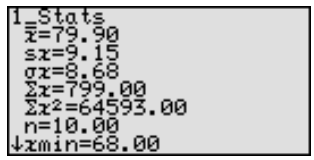
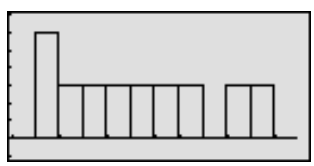
Statistics calculations

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 [CL] [ENTER] keys (caution: previously entered equations and memory will be erased).

	Key Operation	***Display***	***Notes***
1	[2nd F] [SET UP] [D] [2] [C] [2]		Specify two figures after the decimal point on the set up screen.
2	[⊞⊟⊠÷] [STAT] [A] [ENTER] [6] [8] [ENTER] [7] [3] [ENTER] [9] [2] [ENTER] [8] [6] [ENTER] [7] [8] [ENTER] [9] [5] [ENTER] [6] [9] [ENTER] [7] [5] [ENTER] [8] [2] [ENTER] [8] [1] [ENTER]		Enter all the exam results into the list L1.
3	[⊞⊟⊠÷] [STAT] [C] [1]		Select the variable quantity of the statistics from the statistics mode.
4	[2nd F] [L1]		Specify the list L1 containing the exam data.
5	[ENTER]		Calculates the quantity of the statistics such as average, standard deviation, total and bottom score.
6	[2nd F] [STAT PLOT] [A] [ENTER]		Set the screen for the various specified values in order to draw the statistical graph with PLOT1.
7	[ENTER] [▼] [ENTER] [▼] [2nd F] [L1] [▼] [▼]		Input of the specified values for drawing a histogram from the list L1 of the statistical quantity has been completed. [on/off: set whether to graph or not DATA: select variable 1(X) or variable 2 (XY). List X: set the list of the corresponding graph. Freq: set frequency GRAPH: set graph format]
8	[ZOOM] [A] [9]		Draw the graph by setting the most suitable screen for the statistical graph.

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