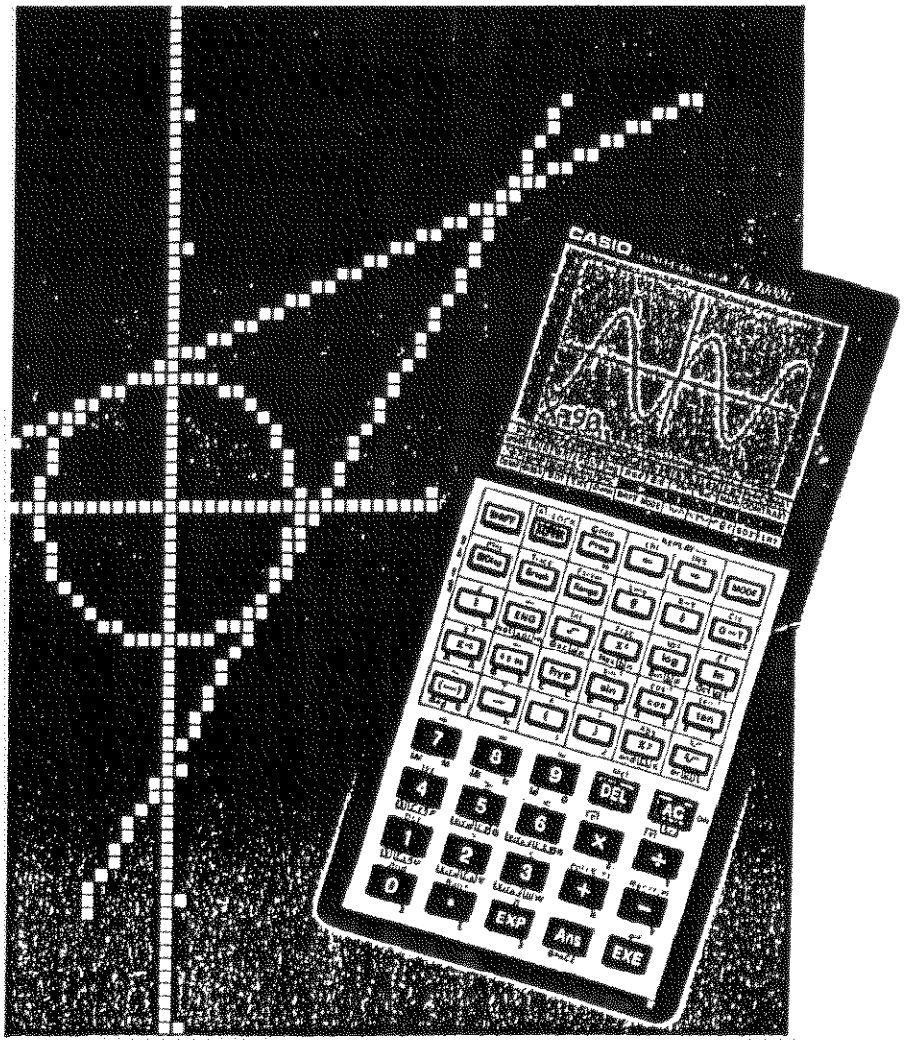
fx-7000G

OWNER'S MANUAL



CASIO

- The information contained herein is subject to change without notice.
- Reproduction of this manual either in part or its entirety is forbidden.
- Note that the manufacturer assumes no responsibility for any injury or loss incurred while using this manual.
- Due to limitations imposed by printing processes, the displays shown in this manual are only approximations and may differ somewhat from actual displays.

FOREWORD

Thank you for your purchase of the CASIO fx-7000G.
This unit is a totally new type of advanced programmable computer. B
sides 82 scientific functions, graph functions also make it possible to pr
duce a wide variety of useful graphs.
Manual computations can be easily performed following written formul
(true algebraic logic). A replay function is provided that allows confirm
tion or correction when key operation errors occur. Programs can also
input by following true algebraic logic, so repeat and/or complex co
putations are simplified.

This manual is composed of four sections:

1. Configuration and Operation
2. Manual Computations
3. Graphs
4. Program Computations

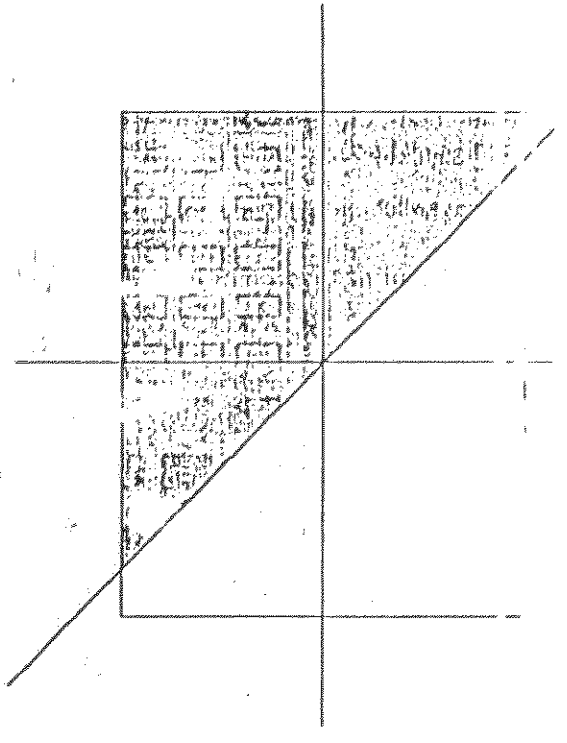
Section 1 should be read first to become familiar with the nomencla-
ture, handling and cautions concerning this unit. Sections 2, 3 and 4
can then be read in order to master each type of functions through
samples and explanations.

CONTENTS

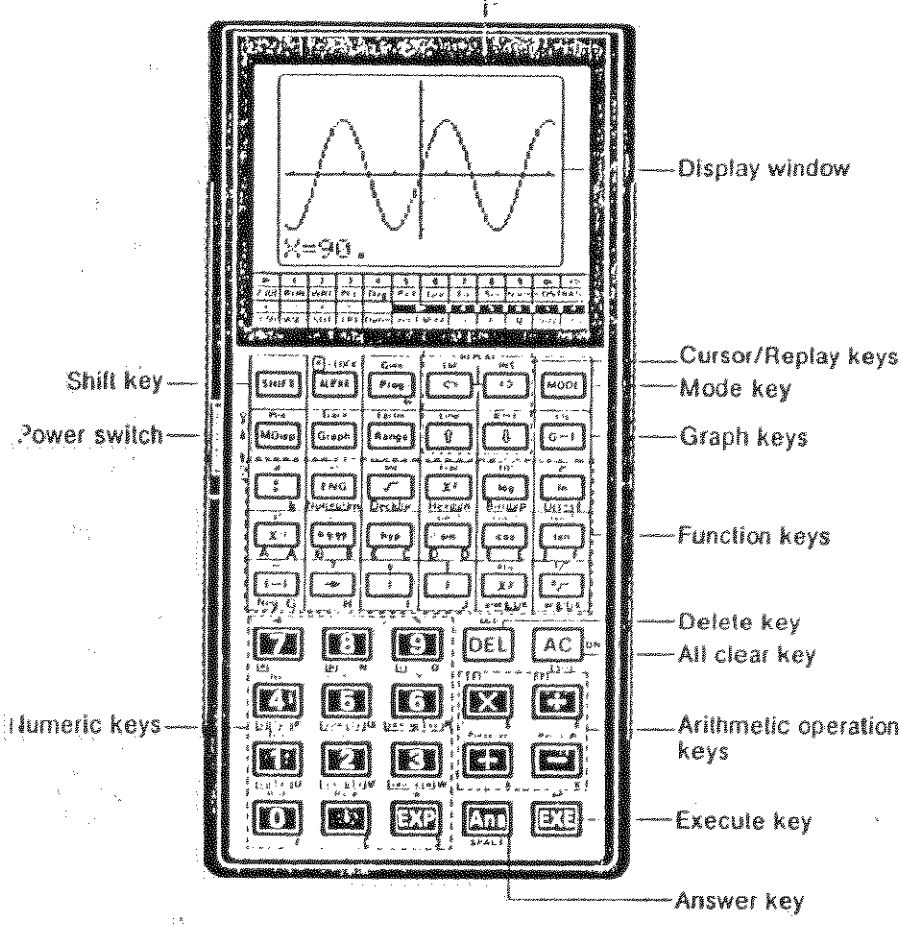
HANDLING PRECAUTIONS

- This unit is composed of precision electronic components and should never be disassembled. Do not drop it or otherwise subject it to sudden impacts or sudden temperature changes. Be especially careful to avoid storing the unit or leaving it in areas exposed to high temperature, humidity or large amounts of dust. When exposed to low temperatures, the unit will require more time to display answers and may even fail to operate. The display will return to normal once normal temperature is attained.
- Batteries should be replaced every 2 years even if the unit is not used for extended periods. Never leave dead batteries in the battery compartment. They can leak and cause damage to the unit.
- Avoid using volatile liquids such as thinner or benzine to clean the unit. Wipe the unit with a soft, dry cloth or a cloth that has been dipped in a neutral detergent solution and wrung out.
- If malfunction of the unit should occur, either bring or send the unit to your retailer or the nearest CASIO dealer.
  Be sure to clearly explain the problem in detail.
- Before assuming malfunction of the unit, be sure to carefully reread this manual and ensure that the problem is not due to insufficient battery power, programming or operational errors.

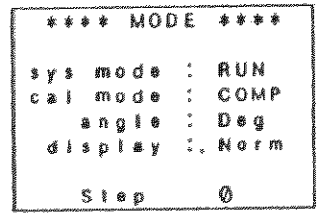
1.
CONFIGURATION AND OPERATION

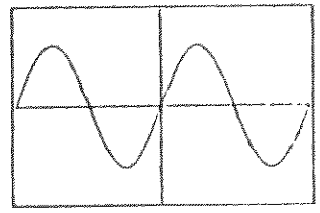


1-1 NOMENCLATURE AND FUNCTIONS



■ Display window





The display window is capable of displaying 16-character by 8-line text and symbols. Graphs are produced on a 95 by 63-dot matrix. A system display as shown on the left indicates the following: the system mode (sys mode), calculation mode (cal mode), angle unit (angle), number of decimal places or number of significant digits (display), and key input buffer status (Step).
The display on the right shows a sine graph as a representative example of the graphs.
The letter "O" is distinguished from zero by adding a slash for the zero (Ø).

■ Power switch

Power is turned ON by sliding the power switch up. Sliding the power switch down turns power OFF.

■ Special operation keys

[SHIFT] Shift key

Press when using the function commands and functions marked in brown on the key panel. An [S] will blink on the display to indicate that [SHIFT] has been pressed. Pressing [SHIFT] again will cause the [S] to disappear from the display and the unit to return to the status it was in before [SHIFT] was originally pressed.

[MODE] Mode Key

Press when setting the status of the unit or the unit of angular measurement.

[MODE] [1] ... For manual computations and program execution.
[MODE] [2] ... For writing or checking programs.
[MODE] [3] ... For clearing programs.
[MODE] [4] ... Deg displayed. If [EXE] is pressed, unit of angular measurement is specified as degress.
[MODE] [5] ... Rad displayed. If [EXE] is pressed, unit of angular measurement is specified as radians.
[MODE] [6] ... Gra displayed. If [EXE] is pressed, unit of angular measurement is specified as grads.
[MODE] [7] ... Fix displayed. Entering a value from 0 to 9 followed by [EXE] will specify the number of decimal places according to the value entered.
Ex. [MODE] [7] [3] [EXE] → Three decimal places
[MODE] [8] ... Sci displayed. Entering a value from 0 to 9 followed by [EXE] will specify the number of significant digits from 1 to 10.
Ex. [MODE] [8] [5] [EXE] → 5 significant digits
[MODE] [9] ... Norm displayed. Pressing [EXE] will cancel the specified number of decimal places or the specified number of significant digits.
[MODE] [·] ... Defm displayed. Entering a value followed by [EXE] will specify the number of memories available.
Ex. [MODE] [·] [1] [0] [EXE] → Number of memories available increased by 10.
If [EXE] is pressed without entering a value, the current number of memories available and remaining steps will be displayed. (See page 24.)
Ex. [MODE] [·] [EXE]

```
**Defm**
Program : 56
 Memory : 36
286 Bytes Free
```

[MODE] [+] ... Specifies COMP mode for arithmetic computation or function computation (program execution possible).
[MODE] [−] ... For binary, octal or hexadecimal computations/conversions.

[MODE] [×] ... For standard deviation computations (SD1 mode).
[MODE] [÷] ... For regression computations (LR1 mode).
[SHIFT] [MODE] [×] ... For production of a bar graph, line graph or normal distribution curve according to single variable statistical data (SD2 mode).
[SHIFT] [MODE] [÷] ... For production of a regression line according to paired variable statistical data (LR2 mode).
[SHIFT] [MODE] [4] ... Pressed after a numeric value representing degrees is input.
[SHIFT] [MODE] [5] ... Pressed after a numeric value representing radians is input.
[SHIFT] [MODE] [6] ... Pressed after a numeric value representing grads is input.

[ALPHA] Alphabet key

Press to input alphabetic characters or special characters. Pressing [ALPHA] displays ▣ and allows the input of only one character. After that the unit returns to the status it was in before the [ALPHA] key was originally pressed. Pressing [SHIFT] followed by [ALPHA] will lock the unit in this mode and allow consecutive input of alphabetic characters until [ALPHA] is pressed again.

[ ]

[k]	[m]	[μ]	[n]	[p]	[ ]
[A]	[B]	[C]	[D]	[E]	[F]
[G]	[H]	[I]	[J]	[K]	[L]
[M]	[N]	[O]	[ ]	[ ]	
[P]	[Q]	[R]	[S]	[T]	
[U]	[V]	[W]	[X]	[Y]	
[Z]	[ ]	[ ]	[SPACE]	[ ]	

Goto [Prog] Program/Goto key

Press [Prog], enter a value from 0 to 9 and then press [EXE] to execute a program.
Ex. [Prog] [1] [EXE] → Execution of Program 1 begins.
Pressing [SHIFT] followed by [Goto] (Goto [Prog] key) will cause Goto to appear on the display. This is a jump command used in programs.

Cursor/Replay keys

Press to move the cursor (blinking "_") left, right, up, and down on the display. The ◁ key moves the cursor to the left, ▷ moves the cursor to the right, △ moves the cursor up, and ▽ moves the cursor down. Holding any of the keys down will cause the cursor to continuously move in the respective direction.

Once a formula or numeric value is input and EXE is pressed, the ◁ key and ▷ key become "replay" keys. In this case, pressing ◁ displays the formula or numeric value from the beginning, while pressing ▷ displays it from the end. This allows the formula to be executed again by changing the values.

Pressing the cursor key following SHIFT changes their functions to those marked above the keys.

LBL (SHIFT ◁) is used to input labels within programs.

INS (SHIFT ▷) inserts a space at the current position of the cursor. Line (SHIFT △) makes it possible to produce line graphs or regression lines. The X⇔Y (SHIFT ▽) key makes it possible to switch the X and Y coordinate display during graph trace operations.

◁ and ▷ following the MODE key are used for contrast adjustments. (See page 12.)

DEL Delete key

Press to delete the character at the current position of the cursor. When the character is deleted, everything to the right of the cursor position will shift one space to the left.

Pressing SHIFT DEL EXE will clear the memory contents.

AC All clear key

Press to completely clear the displayed formulas, numeric values or texts, and to clear all of the input buffer contents. Also used to release errors indicated by error message displays, and to restore power after reactivation of the auto power off function. (See page 27.)

EXE Execute key

Press to obtain the result of a computation or to draw a graph. Pressed after data input for a programmed computation or to advance to the next execution after a computation result is obtained.

Ans Answer key

Pressing Ans followed by EXE will recall the last computation result. It can be recalled by Ans EXE even after it has been cleared using the AC key or by switching the power of the unit OFF. When used during program execution, the last result computed is recalled.

■ 0 ~ 9, ·, EXP Numeric/Decimal point/Exponent input keys

When entering numeric values, enter the number in order. Press the · key to enter the decimal point in the desired position.

To input 1.23×10^{6}, press 1 · 23 EXP (−) 6.

SHIFT key combinations for the various modes are as follows:

COMP mode (MODE +)

⇒	=	≠
Isz	≥	≤
Dsz	>	<
Rnd	Ran#	π

Base-n mode (MODE −)

⇒	=	≠
Isz	≥	≤
Dsz	>	<

Pol(, Rec(, Rnd, Ran# and π cannot be used in this mode.

SD mode (MODE ×)

⇒	=	≠
Isz	≥	≤
$\bar{x}$	$x\sigma_n$	$x\sigma_{n-1}$
Rnd	Ran#	π

Standard deviation functions can be used.

LR mode (MODE ÷)

A	B	r
$\bar{y}$	$y\sigma_n$	$y\sigma_{n-1}$
$\bar{x}$	$x\sigma_n$	$x\sigma_{n-1}$
Rnd	Ran#	π

Paired variable statistic functions can be used.

■ Computation keys

+, −, ×, ÷ Arithmetic operation keys

For addition, subtraction, multiplication and division, enter the computation as it reads. SHIFT key combinations for the various modes are as follows:

COMP mode or SD mode

Pol(Rec((Pol(x, y) + and Rec(r, θ) − keys) ... Coordinate transformation

LR mode

x̂ ŷ (x̂ + and ŷ − keys) ... Estimated value computation of x and y

Pol(Rec(... Coordinate transformation

■ Graph keys

Used to produce a variety of graphs (see page 57 for details). These keys cannot be used in the Base-n mode.

[Plot / Mode] Mode display/Plot key

- Used to confirm the status of the system mode, calculation mode, angle unit and rounding. Setting status is displayed only while this key is pressed.
- Pressed following [SHIFT] to plot a point on the graph screen.

[Trace / Graph] Graph/Trace key

- Pressed before entering a formula to be used for a graph ("Graph Y=" appears on the display).
- Pressed following [SHIFT] to trace over an existing graph and display the x or y coordinate value.

[Factor / Range] Range/Factor key

- Used to confirm or set the range and size of graphs.
- Pressed following [SHIFT] to magnify or reduce the upper and lower ranges of graphs.

[Cls / G↔T] Graph-text/Clear screen key

- Switches between the graph display and text display (see page 20).
- [SHIFT] [Cls] [EXE] clears the graph display. The text display cannot be cleared using this operation.

■ Function keys

Press for functional computation. Various uses are available in combination with the [SHIFT] key, and/or depending on the mode being used.

[Multistatement / Display] Multistatement/Display key

- Press to separate formulas or commands in programmed computations or consecutive computations. The result of such combinations is known as a multistatement. (See page 38.)
- When pressed following the [SHIFT] key, the results of each section of the programmed computations or consecutive computations are sequentially displayed with each press of [EXE].

[ENG / Negation] Engineering/Negation key

- Press to convert a computaion result to an exponential display whose exponent is a multiple of three.

(10^{3}=kilo K, 10^{6}=mega M, 10^{9}=giga G, 10^{-3}=milli m, 10^{-6}=micro μ, 10^{-9}=nano n, 10^{-12}=pico p)

- When obtaining logical negation for a value in the Base-n mode, press prior to entering the value.
- Press following the [SHIFT] key in the Base-n mode to obtain the exclusive logical sum.

[√ / Integer] Root/Integer key

- Press prior to entering a numeric value to obtain the square root of that value.
- When pressed following the [SHIFT] key, the integer portion of a value can be obtained.
- Press followed by [EXE] in the Base-n mode to specify the decimal computation mode.
- When pressed following the [SHIFT] key in the Base-n mode, the subsequently entered value is specified as a decimal value.

[x^2 / Fraction] Square/Fraction key

- Press after a numeric value is entered to obtain the square of that value.
- When pressed following the [SHIFT] key, the decimal portion of a value can be obtained.
- Press followed by [EXE] in the Base-n mode to specify the hexadecimal computation mode.
- When pressed following the [SHIFT] key in the Base-n mode, the subsequently entered value is specified as a hexadecimal value.

[log / 10^x] Common logarithm/Antilogarithm key

- Press prior to entering a value to obtain the common logarithm of that value.
- When pressed following the [SHIFT] key, the subsequently entered value becomes an exponent of 10.
- Press followed by [EXE] in the Base-n mode to specify the binary computation mode.
- When pressed following the [SHIFT] key in the Base-n mode, the subsequently entered value is specified as a binary value.

[ln / Octal] Natural logarithm/Anti-natural logarithm key

- Press prior to entering a value to obtain the natural logarithm of that value.
- When pressed following the [SHIFT] key, the subsequently entered value becomes an exponent of e.
- Press followed by [EXE] in the Base-n mode to specify the octal computation mode.
- When pressed following the [SHIFT] key in the Base-n mode, the subsequently entered value is specified as an octal value.

[x⁻¹] Reciprocal/Factorial key

- Press after entering a value to obtain the reciprocal of that value.
- When pressed following the [SHIFT] key, the factorial of a previously entered value can be obtained.
- Press in the Base-n mode to enter A (10_{10}) of a hexadecimal value.

[°'"] Degree/minute/second key (decimal⟷sexagesimal key)

- Press to enter sexagesimal value. (degree/minute/second or hour/minute/second)
  Ex. 78°45'12"→78 [°'"] 45 [°'"] 12 [°'"]
- When pressed following the [SHIFT] key, a decimal based value can be displayed in degrees/minutes/seconds (hours/minutes/seconds).
- Press in the Base-n mode to enter B (11_{10}) of a hexadecimal value.

[hyp] Hyperbolic key

- Pressing [hyp], and then [sin], [cos], or [tan] prior to entering a value produces the respective hyperbolic function (sinh, cosh, tanh) for the value.
- Pressing [SHIFT], then [hyp] and then [sin], [cos], or [tan] prior to entering a value produces the respective inverse hyperbolic function ($\sinh^{-1}$, $\cosh^{-1}$, $\tanh^{-1}$) for the value.
- Press in the Base-n mode to enter C (12_{10}) of a hexadecimal value.

[sin] [cos] [tan] Trigonometric function/Inverse trigonometric function keys

- Press one of these keys prior to entering a value to obtain the respective trigonometric function for the value.
- Press [SHIFT] and then one of these keys prior to entering a value to obtain the respective inverse trigonometric function for the value.
- Press in the Base-n mode to enter D, E, F (13_{10}, 14_{10}, 15_{10}) of a hexadecimal value.

[(−)] Minus key

- Press prior to entering a numeric value to make that value negative.
  Ex. −123→ [(−)] [1] [2] [3]
- When pressed following the [SHIFT] key, the same numeric value can be assigned to multiple memories.
  Ex. To assign the value 456 to memories A through F: [4] [5] [6] [→] [ALPHA] [A] [SHIFT] [~] [ALPHA] [F] [EXE]
- Press in the Base-n mode prior to entering a value to obtain the negative of that value. The negative number is the two's complement of the value entered.

[→] Assignment key

- Press prior to entering a memory to assign the result of a computation to that memory.
  Ex. To assign the result of 12+45 to memory A: [1] [2] [+] [4] [5] [→] [ALPHA] [A] [EXE]
- During execution of program computations or consecutive computations, press following the [SHIFT] key to enter a numeric value.

[(] [)] Parenthesis keys

- Press the open parenthesis key and the closed parenthesis key at the position required in a formula.
- When pressed following the [SHIFT] key, a comma or semicolon can be inserted to separate the arguments in coordinate transformation or consecutive computations.

[x^y] Power/Absolute value key

- Enter x (any number), press this key and then enter y (any number) to compute x to the power of y.
  In the SD or LR mode, this function is only available after pressing the [SHIFT] key.
- Press following the [SHIFT] key to obtain the absolute value of a subsequently entered numeric value.
- Press in the Base-n mode to obtain a logical product ("and").
- Press in the SD or LR mode to delete input data.

[√] Root/Cube root key

- Enter x, press this key and then enter y to compute the xth root of y. In the SD or LR mode, this function is only available after pressing the [SHIFT] key.
- Press following the [SHIFT] key to obtain the cube root of a subsequently entered numeric value.
- Press in the Base-n mode to obtain a logical sum ("or").
- Used as a data input key in the SD or LR mode.

■ Contrast adjustment

Pressing the [◁] or [▷] key following the [MODE] key adjusts the contrast of the display. Pressing [◁] makes the screen lighter, while [▷] makes it darker. Holding either key down will cause the display to successively become respectively lighter or darker.

Pressing any other key besides [MODE], [◁], or [▷] (as well as [△], [▽]) cancels contrast adjustment.

* *Light display contrast even at the darkest setting indicates that battery power is too low. In this case, replace batteries as soon as possible.*
* *Contrast adjustment is impossible during range display using the [Range] key. (See page 61.)*

1-2 POWER AND BATTERY REPLACEMENT

Power is supplied to this unit by three lithium batteries (CR2032C). If the power of the batteries should diminish, the display will weaken and become difficult to read. A weak display even after contrast adjustment (see page 12) may indicate power is too low, so the batteries should be replaced. When making replacements, be sure to replace all three batteries.

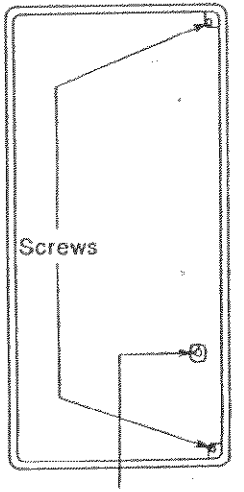
* *If batteries are used for longer than two years, there is the danger of leakage. Be sure to replace batteries at least once every two years even if the unit is not used during that period.*
* *Stored programs or data are erased when batteries are replaced. Therefore, it is recommended that programs and data required for later use be recorded on a coding sheet before replacing batteries.*
* *Be sure to use batteries specified by Casio.*

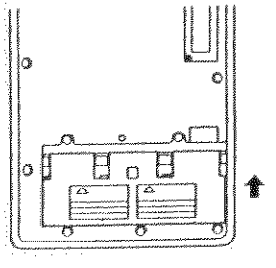
■ Procedure

① Slide the power switch to the OFF position, remove the two screws on the back of the unit with a screwdriver, and remove the back cover.

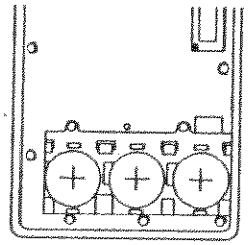
② Slide the battery pressure plate in the direction indicated by the arrows and remove it.

③ Remove the three old batteries from the unit.
(This can be done easily by turning the unit so the battery compartment is facing downwards, and then lightly tapping the unit.)





④ Wipe the surfaces of three new batteries with a soft, dry cloth and load them into the unit ensuring that the positive ⊕ sides are facing upwards.
⑤ Fasten the battery pressure plate in place, and replace the back cover.



** IMPORTANT: Never dispose of old batteries in such a way that they will be incinerated. Batteries may explode if exposed to fire.*

CAUTIONS:
If the batteries being replaced are not totally without power, it is possible to replace batteries so quickly that previously stored programs and memory contents are not erased or altered. In this case, however, all programs and memory contents should be carefully checked after battery replacement.
If battery power should be allowed to decrease or if batteries are removed from the unit for extended periods, programs and memory contents may be erased or altered. In this case, the RESET button located on the back of the unit should be pressed using a pointed object with the power ON after batteries are replaced.
All memory contents and programs will be erased.
** If the display does not light up or the unit does not work normally even after pressing the RESET button, remove the batteries and leave them out for a few minutes. Then install them again and press the RESET button.*

Keep batteries out of the reach of small children. If a battery should inadvertently be swallowed, contact a doctor immediately.

1-3 BEFORE BEGINNING COMPUTATIONS...

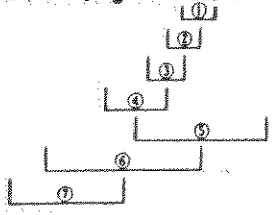
■ Computation priority sequence

This unit employs true algebraic logic to compute the parts of a formula in the following order:

1. Coordinate transformation Pol (x, y), Rec (r, θ)
2. Type A functions* x^2, x^{-1}, $x!$, °, ʳ, ᵍ, °′″
3. Power/root x^y, $\sqrt[x]{\ }$
4. Abbreviated multiplication format in front of π or memory
   2π, 4R, etc.
5. Type B functions* $\sqrt{\ }$, $\sqrt[3]{\ }$, log, 10^x, ln, e^x, sin, cos, tan, $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$, sinh, cosh, tanh, $\sinh^{-1}$, $\cosh^{-1}$, $\tanh^{-1}$, (−), Abs, Int, Frac, h, d, b, o, Neg, Not
6. Abbreviated multiplication format in front of Type B functions or parenthesis 3sin5, $6\sqrt{7}$, 2sin30cos60, etc.
7. ×, ÷
8. +, −
9. and
10. or, xor
11. Relational operators $<$, $>$, $=$, $\neq$, $\leq$, $\geq$

* Functions are divided into two types.
Type A functions are entered after the argument, while Type B functions are entered before the argument.
** When functions with the same priority are used in series, execution is performed from right to left: e.g., $e^{\ln\sqrt{120}} \rightarrow e^{(\ln\sqrt{120})}$.*
Otherwise, execution is from left to right.
** Compound functions are executed from right to left:*
e.g., $\sin\cos^{-1}0.6 \rightarrow \sin(\cos^{-1}0.6)$.
** Everything contained within parentheses receives highest priority.*

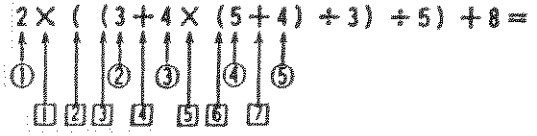
Ex. $2+3\times(\log\sin 2\pi^{r}_{rad}+6.8)=22.07101691$



Number of stacks

This unit features a memory known as a stack for the temporary storage of low priority numeric values and commands (functions, etc). The numeric value stack has eight levels, while the command stack has twenty. If a complex formula is employed that exceeds the stack space available, a stack error (Stk ERROR) message will appear on the display.

Ex. Stack counting method



Numeric value stack	
①	2
②	3
③	4
④	5
⑤	4
⋮	

Command stack	
1	×
2	(
3	(
4	+
5	×
6	(
7	+
⋮	

** Computations are performed in the order of the highest computation priority first. Once a computation is executed, it is cleared from the stack.*

Computation modes

This unit features modes for manual computations, storing programs, and modes for general as well as statistical computations. The proper mode to suit computational requirements should be employed.

● Operation modes

There are a total of three operation modes.

1. RUN mode
   Graph production as well as manual computations and program executions.
2. WRT mode
   Program storage and editing. (See Section 4.)
3. PCL mode
   Deletion of stored programs. (See Section 4.)

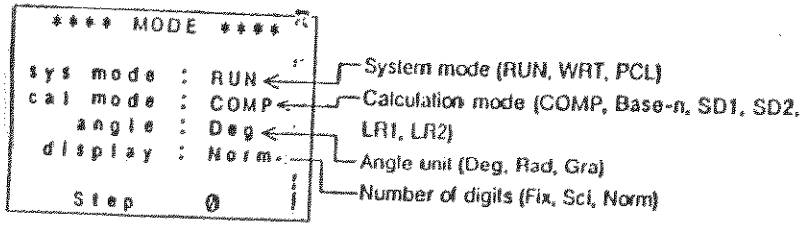
● Computation modes

There are a total of six computation modes which are employed according to the type of computation.

1. COMP mode
   General computations, including functional computations.
2. Base-n mode
   Binary, octal, decimal, hexadecimal conversion and computations, as well as logical operations. (See page 46.) Function computations and graph drawing cannot be performed.
3. SD1 mode
   Standard deviation computation (single variable statistics). (See page 50.)
4. SD2 mode
   For production of bar graph, line graph or normal distribution curve according to single variable statistical data. (See page 83.)
5. LR1 mode
   Regression computation (paired variable statistics). (See page 52.)
6. LR2 mode
   For production of regression line graph according to paired variable statistical data. (See page 87.)

With so many modes available, computation should always be performed after confirming which mode is active.

** IMPORTANT: When the power of the unit is switched OFF (including auto power off), the current system mode is cancelled, and the unit will be set to the RUN mode when switched ON again. However, the calculation mode, number of decimal place setting ([MODE] [7] n), number of significant digits ([MODE] [8] n), and angle unit (Deg, Rad, Gra) will be retained in memory. The mode setting is displayed when the power of the unit is switched ON. Confirm whether the desired mode is set before performing calculations.*



■ Number of input/output digits and computation digits

● The allowable input/output range (number of digits) of this unit is 10 digits for a mantissa and 2 digits for an exponent. Computations, however, are internally performed with a range of 13 digits for a mantissa and 2 digits for an exponent.

Ex. $3\times10^5\div7=$

3 [EXP] 5 [+] 7 [EXE]
3 [EXP] 5 [+] 7 [−] 42857 [EXE]

42857.14286
0.14285714

* *Computation results greater than 10^{10} (10 billion) or less than 10^{-2} (0.01) are automatically displayed in exponential form.*

Ex. $123456789\times9638=$

123456789 [×] 9638 [EXE]

1.189876532E+12

Mantissa Exponent

Once a computation is completed, the mantissa is rounded off to 10 digits and displayed. And the displayed mantissa can be used for the next computation.

Ex. $3\times10^5\div7=$

3 [EXP] 5 [+] 7 [EXE]
[−] 42857 [EXE]

42857.14286
0.14286

* *Values are stored in memory with 13 digits for the mantissa and 2 digits for the exponent.*

■ Overflow and errors

If the computational range of the unit is exceeded, or incorrect inputs are made, an error message will appear on the display window and subsequent operation will be impossible. This is the error check function. The following operations will result in errors:

(1) The answer, whether intermediate or final, or any value in memory exceeds the value of $\pm9.999999999\times10^{99}$.
(2) An attempt is made to perform functional computations that exceed the input range. (See page 201.)
(3) Improper operation during statistical computations.
(Ex. Attempting to obtain $\bar{x}$ or $x\sigma_n$ without data input.)
(4) The capacity of the numeric value stack or the command stack is exceeded.
(Ex. Entering nineteen successive [(] 's followed by [2] [+] [3] [×] [)])
(5) Even though memory has not been expanded, a memory name such as Z [2] is used. (See page 24 for details on memory.)
(6) Input errors are made.
(Ex. [5] [+] [+] [3] [EXE])
(7) When improper arguments are used in commands or functions that require arguments. (i.e. Input of an argument outside of the range of 0~9 for Sci or Fix.)

The following error messages will be displayed for the operations noted above:

(1)~(3) Ma ERROR
(4) Stk ERROR
(5) Mem ERROR
(6) Syn ERROR
(7) Arg ERROR

Besides these, there are an "Ne ERROR" (nesting error) and a "Go ERROR". These errors mainly occur when using programs. See page 103 or the Error Message Table on page 199.

■ Number of input characters

This unit features a 127-step area for computation execution.
One function comprises one step. Each press of numeric or [+], [−], [×] and [÷] keys comprise one step. Though such operations as [SHIFT] [x!] ([x!] key) require two key operations, they actually comprise only one function and, therefore, only one step.
These steps can be confirmed using the cursor. With each press of the [◁] or [▷] key the cursor is moved one step.
Input characters are limited to 127-steps. Usually the cursor is represented by a blinking "_", but once the 122nd step is reached the cursor changes to a blinking "■". If the "■" appears during a computation, the computation should be divided at some point and performed in two parts.

* *When numeric values or computation commands are input, they appear on the display window from the left. Computational results, however, are displayed from the right.*

■ Graphic and text displays

This unit has a graph display for production of graphs, as well as a text display for production of formulas and commands. These two types of display contents are stored independently of each other.
Switching between graph and text displays is performed using the [G↔T] key. Each press of [G↔T] switches from the current type of display to the other.
Operations to clear the display depend upon the type of display being shown:

Graphs: [SHIFT] [Cls] [EXE]
Text: [AC]

Pressing the [AC] key causes a cleared text display to appear if pressed during a graph display.

■ Display registers

This unit has separate registers for storing text and graph displays. Both of these two registers are unaffected by key operations except for those related to their functions (calculations or [AC] key operation during text display; graph drawing, switching to text display by [G↔T] after clearing graph display by [SHIFT] [Cls] [EXE]).
Since the register stores the previous calculation results, they can be recalled. This is especially useful in the text mode for binary, octal, decimal, and hexadecimal conversions, as well as decimal and significant digit settings.
The following commands will produce previous calculation results:

- Lbl ○
- Dsz ○
- Isz ○
- Mcl
- Hex
- Dec
- Bin
- Oct
- Deg
- Rad
- Gra
- Fix ○
- Sci ○
- Norm
- Rnd
- Sci
- Prog ○

Ex. Perform the calculation 123×456, and then clear the graph display.

* *The [SHIFT] [Cls] [EXE] operation during graph display does not affect the calculation, so the previous calculation result appears on the display.*

[AC] 123 [×] 456 [EXE]

```
123×456
                56088.
```

[SHIFT] [Cls] [EXE]

```
123×456
                56088.
Cls
                56088.
```

A calculation result displayed as shown here is cleared to 0 by pressing [AC], or if the power of the unit is switched OFF (including auto power off).

■ Corrections

● To make corrections in a formula that is being input, use the [◁] and [▷] keys to move to the position of the error and press the correct keys.

Ex. To change an input of 122 to 123:

[1][2][2]
[◁]
[3]

Ex. To change an input of cos60 to sin60:

[cos][6][0]
[◁][◁][◁]
[sin]

* *If, after making corrections, input of the formula is complete, the answer can be obtained by pressing [EXE]. If, however, more is to be added to the formula, advance the cursor using the [▷] key to the end of the formula for input.*

● If an unnecessary character has been included in a formula, use the [◁] and [▷] keys to move to the position of the error and press the [DEL] key. Each press of [DEL] will delete one command (one step).

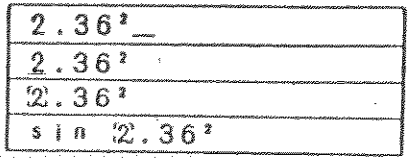
Ex. To correct an input of 369××2 to 369×2:

[3][6][9][×][×][2]
[◁][◁][DEL]

● If a character has been omitted from a formula, use the [◁] and [▷] keys to move to the position where the character should have been input, and press [SHIFT] followed by the [INS] key. Press [SHIFT] [INS] and insertions can be subsequently performed as desired.

Ex. To correct an input of 2.36² to sin2.36²:

[2][.][3][6][x²]
[◁][◁][◁][◁][◁]
[SHIFT][INS]
[sin]



* *When [SHIFT] [INS] are pressed, the letter at the insertion position is surrounded by "[ ]" and blinks. As many letters and/or commands as desired can be inserted at this position until [◁], [▷], [↑], [↓], or [AC] is pressed. This blinking [ ] is indicated by "␣" in the alphabet mode ([ALPHA] key), while it is indicated by "[ ]" in the shift mode ([SHIFT]).*

■ Memory

This unit contains 26 standard memories. Memory names are composed of the 26 letters of the alphabet. Numeric values with 13 digits for a mantissa and 2 digits for an exponent can be stored.

Ex. To store 123.45 in memory A:

123.45[→][ALPHA][A]
[EXE]

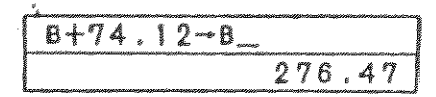
Values are assigned to a memory using the [→] key followed by the memory name.

Ex. To store the sum of memory A+78.9 in memory B:

[ALPHA][A][+]78.9[→][ALPHA][B]
[EXE]

Ex. To add 74.12 to memory B:

[ALPHA][B][+]74.12[→][ALPHA][B]
[EXE]



● To check the contents of a memory, press the name of the memory to be checked followed by [EXE].

[ALPHA][A][EXE]

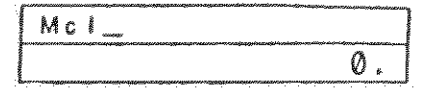
● To clear the contents of a memory (make them 0), proceed as follows:

Ex. To clear the contents of memory A only:

0[→][ALPHA][A][EXE]

Ex. To clear the contents of all the memories:

[SHIFT][Mcl]
[EXE]



● To store the same numeric value to multiple memories, press [SHIFT] followed by [~] ([(−)] key).

Ex. To store a value of 10 in memories A through J:

10 [→] [ALPHA] [A] [SHIFT] [~] [ALPHA] [J]

[EXE]

```
10→A~J_
                10.
```

■ Memory expansion

Though there are 26 standard memories, they can be expanded by changing program storage steps to memory. Memory expansion is performed by converting 8 steps to one memory.

* *See page 106 for information on the number of program steps.*

Number of memories	26	27	28	...	36	...	76	...	78
Number of steps	422	414	406	...	342	...	22	...	6

Memory is expanded in units of one. A maximum of 52 memories can be added for a maximum total of 78 (26 + 52). Expansion is performed by pressing [MODE], followed by [□], a value representing the size of the expansion, and then [EXE].

Ex. To expand the number of memories by 30 to bring the total to 56:

[MODE] [□] 30

```
Defm 30_
```

[EXE]

```
**Defm**
 Program : 0
  Memory : 56
 182 Bytes Free
```

Number of program steps used

Number of memories

Current number of remaining program steps

The number of steps used, number of memories and number of remaining steps are displayed. The number of remaining steps indicates the current unused area, and will differ according to the size of the program stored. To check the current number of memories, press [MODE], followed by [□] and then [EXE].

[MODE] [□] [EXE]

```
**Defm**
 Program : 0
  Memory : 56
 182 Bytes Free
```

To initialize the number of memories (to return the number to 26), enter a zero for the value in the memory expansion sequence outlined above.

[MODE] [□] 0 [EXE]

```
**Defm**
 Program : 0
  Memory : 26
 422 Bytes Free
```

* *Though a maximum of 52 memories can be added, if a program has already been stored and the number of remaining steps is less than the desired expansion, an error will be generated. The size of the memory expansion must be equal to or less than the number of steps remaining.*
* *The expansion procedure ([MODE] [□] expansion value) can also be stored as a program.*

● Using expanded memories

Expanded memories are used in the same manner as standard memories, and are referred to as Z [1], Z [2], etc. The letter Z followed by a value in brackets indicating the sequential position of the memory is used as the memory name. (Brackets are formed by [ALPHA] [□] for " [" and [ALPHA] [EXP] for "] ".)

After the number of memories has been expanded by 5, memories Z [1] through Z [5] are available.

The use of these memories is similar to that of a standard computer array, with a subscript being appended to the name. For more information concerning an array, see page 124.

■ Answer (Ans) function

This unit has an answer function that stores the result of the most recent computation. Once a numeric value or numeric formula is entered and [EXE] is pressed, the result (the answer in the case of the numeric formula) is stored by this function. To recall the stored value, press the [Ans] key.
When [Ans] is pressed, "Ans" will appear on the display, and can be used in this form in subsequent calculations.
* *Hereinafter, Ans will be referred to as the Ans memory.*

Ex. 123+456=579
789−579=210

[1][2][3][+][4][5][6][EXE]

[7][8][9][−][Ans][EXE]

123+456
579.
789−Ans
210.

Numeric values with 13 digits for a mantissa and 2 digits for an exponent can be stored in the Ans memory. The Ans memory is not erased even if the power of the unit is switched OFF. Each time [EXE] is pressed, the value in the Ans memory is replaced with the new value produced by the computation executed.
When a value is stored to another memory using the [EXE] key, that value is not stored in the Ans memory.

Ex. Perform computation 78+56=134, then store the value 123 to memory A:

[7][8][+][5][6][EXE]

[Ans][EXE] ... Checking the content of Ans memory

[1][2][3][→][ALPHA][A][EXE]

[Ans][EXE]

78+56
134.
Ans
134.
123→A
123.
Ans
134.

The Ans memory can be used in the same manner as the other memories, thus making it possible to use it in computation formulas. In multiplication operations, the [×] immediately before [Ans] can be omitted.

Ex. 15×3=45
78×45−23=3487

[1][5][×][3][EXE]

[7][8][Ans][−][2][3][EXE]

15×3
45.
78Ans−23
3487.

■ Auto power off function

The power of the unit is automatically switched off approximately 6 minutes after the last key operation (except during program computations). Once this occurs, power can be restored either by switching the power of the unit OFF and then ON again, or by pressing the [AC] key. (Numeric values in the memories, programs or computation modes are unaffected when power is switched off.)