Appendix

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Appendix A Resetting the Calculator

Warning!

The procedure described here clears all memory contents. Never perform this operation unless you want to totally clear the memory of the calculator. If you need the data currently stored in memory, be sure to write it down somewhere before performing the RESET operation.

●To reset the calculator

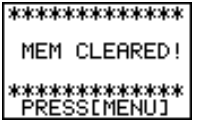
1. Press [MENU] to display the main menu.

2. Highlight the **MEM** icon and press [EXE], or press [9].

3. Use ⊙ to move the highlighting down to “Reset” and then press [EXE].

[F1] [F4]

4. Press [F1] (YES) to reset the calculator or [F4] (NO) to abort the operation without resetting anything.

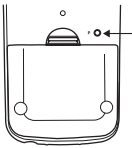


- If the display appears to dark or dim after you reset the calculator, adjust contrast.

Resetting the calculator initializes it to the following settings.

Item	Initial Setting
Icon	RUN
Angle Unit	Rad
Exponent Display Range	Norm 1
Fraction Reduction	Automatic
Mixed Fraction	Display
Graph Type	Rectangular coordinate (Y=)
Statistical Graph	Automatic
Variable Memory	Clear
Answer Memory (Ans)	Clear
Graphic Display/Text Display	Clear
View Window	Clear (initialized)
View Window Memory	Clear
Graph Function	Clear
Enlargement/Reduction Factor	Clear (initialized)
Table & Graph Data	Clear
List Data	Clear
Statistical Calculation/Graph Memory	Clear
Program	Clear
Input Buffer/AC Replay	Clear

- Performing the RESET operation while an internal calculation is being performed will cause all data in memory to be deleted. Make sure that no calculation be being performed before starting a RESET operation.



- If the calculator stops operating correctly for some reason, use a thin, pointed object to press the P button on the back of the calculator. This should make the RESET confirmation screen appear on the display. Perform the procedure to complete the RESET operation.

Appendix B Power Supply

This unit is powered by two AAA-size (LR03 (AM4) or R03 (UM-4)) batteries. In addition, it uses a single CR2032 lithium battery as a back up power supply for the memory.

If the following message appears on the display, immediately stop using the calculator and replace batteries.

If you try to continue using the calculator, it will automatically switch power off, in order to protect memory contents. You will not be able to switch power back on until you replace batteries.

Be sure to replace the main batteries at least once every two years, no matter how much you use the calculator during that time.

Warning!

If you remove both the main power supply and the memory back up batteries at the same time, all memory contents will be erased. If you do remove both batteries, correctly reload them and then perform the reset operation.

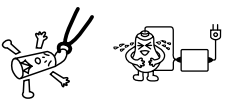
The batteries that come with this unit discharge slightly during shipment and storage. Because of this, they may require replacement sooner than the normal expected battery life.

■ Replacing Batteries

Precautions:

Incorrectly using batteries can cause them to burst or leak, possibly damaging the interior of the unit. Note the following precautions:

- Be sure that the positive (+) and negative (–) poles of each battery are facing in the proper directions.
- Never mix batteries of different types.
- Never mix old batteries and new ones.
- Never leave dead batteries in the battery compartment.
- Remove the batteries if you do not plan to use the unit for long periods.
- Never try to recharge the batteries supplied with the unit.
- Do not expose batteries to direct heat, let them become shorted, or try to take them apart.



(Should a battery leak, clean out the battery compartment of the unit immediately, taking care to avoid letting the battery fluid come into direct contact with your skin.)

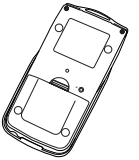
Keep batteries out of the reach of small children. If swallowed, consult with a physician immediately.

●To replace the main power supply batteries

- * Never remove the main power supply and the memory back up batteries from the unit at the same time.
- * Be sure to switch the unit off before replacing batteries. Replacing batteries with power on will cause data in memory to be deleted.
- * Never replace the back cover or switch the calculator on while the main power supply batteries are removed from the calculator or not loaded correctly. Doing so can cause memory data to be deleted and malfunction of the calculator. If mishandling of batteries causes such problems, correctly load batteries and then perform the RESET operation to resume normal operation.
- * Be sure to replace all two batteries with new ones.

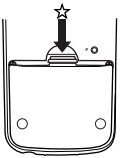
1. Press [SHIFT] [OFF] to turn the calculator off.

2. Making sure that you do not accidently press the [AC/ON] key, attach the case to the calculator and then turn the calculator over.



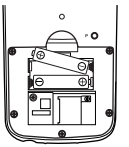
3. Remove the back cover from the unit by pulling with your finger at the point marked ☆.

4. Remove the two old batteries.



5. Load a new set of two batteries, making sure that their positive (+) and negative (–) ends are facing in the proper directions.

6. Replace the back cover and press [AC/ON] to turn power on. The memory back-up battery provides power to the memory while the main batteries are removed, so memory data is not lost.



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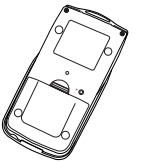
- Power will not switch on if you press [AC/ON] while the back cover is open.
- Do not leave the unit without main power supply batteries loaded for long periods. Doing so can cause deletion of data stored in memory.
- If the figures on the display appear too light and hard to see after you turn on power, adjust the contrast.

●To replace the memory back up battery

* Before replacing the memory back up battery, switch on the unit and check to see if the "Low battery!" message appears on the display. If it does, replace the main power supply batteries before replacing the back up power supply battery.
* Never remove the main power supply and the memory back up batteries from the unit at the same time.
* Be sure to switch the unit off before replacing battery. Replacing battery with power on will cause data in memory to be deleted.
* Be sure to replace the back up power supply battery at least once 2 years, regardless of how much you use the unit during that time. Failure to do so can cause data in memory to be deleted.

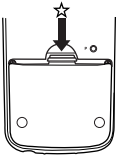
1. Press [SHIFT] [OFF] to turn the calculator off

2. Making sure that you do not accidently press the [AC/ON] key, attach the case to the calculator and then turn the calculator over.

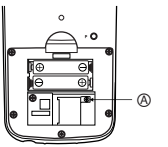


3. Remove the back cover from the unit by pulling with your finger at the point marked ☆.

4. Remove screw Ⓐ on the back of the calculator, and remove the back up battery holder.

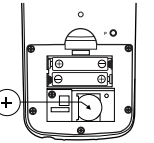


5. Remove the old battery.



6. Wipe off the surfaces of a new battery with a soft, dry cloth. Load it into the calculator so that its positive (+) side is facing up.

7. Pressing down on the battery with the battery holder, replace the screw that secures the holder in place.



8. Replace the back cover and press [AC/ON] to turn power on. The main batteries provide power to the memory while the back-up battery is removed, so memory data is not lost.

■ About the Auto Power Off Function

The calculator switches power off automatically if you do not perform any key operation for about 6 minutes. To restore power, press [AC/ON].

The calculator automatically turns off it is left for about 60 minutes with a calculation stopped by an output command (◢), which is indicated by the "–Disp–" message on the display.

Appendix C Error Message Table

Message	Meaning	Countermeasure
Syn ERROR	① Calculation formula contains an error. ② Formula in a program contains an error.	① Use ◀ or ▶ to display the point where the error was generated and correct it. ② Use ◀ or ▶ to display the point where the error was generated and then correct the program.
Ma ERROR	① Calculation result exceeds calculation range. ② Calculation is outside the input range of a function. ③ Illogical operation (division by zero, etc.) ④ Poor precision in differential calculation results.	①②③ Check the input numeric value and correct it. When using memories, check that the numeric values stored in memories are correct. ④ Try using a smaller value for Δx (x increment/decrement).
Go ERROR	① No corresponding Lbl n for Goto n. ② No program stored in program area Prog "file name". ③ No corresponding "Next" for "For", no corresponding "LpWhile" for "Do", or no corresponding "WhileEnd" for "While".	① Correctly input a Lbl n to correspond to the Goto n , or delete the Goto n if not required. ② Store a program in program area Prog "file name", or delete the Prog "file name" if not required. ③ Correctly match "Next" with "For", "LpWhile" with "Do", or "WhileEnd" with "While".
Ne ERROR	• Nesting of subroutines exceeds 10 levels.	• Ensure that Prog "file name" is not used to return from subroutines to main routine. If used, delete any unnecessary Prog "file name". • Trace the subroutine jump destinations and ensure that no jumps are made back to the original program area. Ensure that returns are made correctly.

Message	Meaning	Countermeasure
Stk ERROR	• Execution of calculations that exceed the capacity of the stack for numeric values or stack for commands.	• Simplify the formulas to keep stacks within 10 levels for the numeric values and 26 levels for the commands. • Divide the formula into two or more parts.
Mem ERROR	① Not enough memory to hold function input in the Graph Mode for graph drawing. ② Not enough memory to hold function input in the TABLE Mode. ③ Not enough memory to store data in list function.	①②③ • Keep the number of variables you use for the operation within the number of variables currently available. • Simplify the data you are trying to store to keep it within the available memory capacity. • Delete no longer needed data to make room for the new data.
Arg ERROR	• Incorrect argument specification for a command that requires an argument.	Correct the argument. • Fix n, Sci n : n = integer from 0 through 9. • Lbl n , Goto n : n = integer from 0 through 9.
Dim ERROR	• Illegal dimension used during list calculations.	• Check list dimension.
Com ERROR	• Problem with cable connection or parameter setting during program data communications.	• Check cable connection.
Transmit ERROR!	• Problem with cable connection or parameter setting during data communications.	• Check cable connection.
Receive ERROR!	• Problem with cable connection or parameter setting during data communications.	• Check cable connection.
Memory Full!	• Memory of receiving unit became full during program data communications.	• Delete some data stored in the receiving unit and try again.

Appendix D Input Ranges

Function	Input ranges	Internal digits	Precision	Notes
$\sin x$ $\cos x$ $\tan x$	(DEG) $\|x\| < 9 \times 10^{9}$° (RAD) $\|x\| < 5 \times 10^{7}\pi$rad (GRA) $\|x\| < 1 \times 10^{10}$grad	15 digits	As a rule, precision is ±1 at the 10th digit.*	However, for $\tan x$: $\|x\| \neq 90(2n+1)$:DEG $\|x\| \neq \pi/2(2n+1)$:RAD $\|x\| \neq 100(2n+1)$:GRA
$\sin^{-1}x$ $\cos^{-1}x$	$\|x\| \leqq 1$	"	"	
$\tan^{-1}x$	$\|x\| < 1 \times 10^{100}$			
$\log x$ $\ln x$	$1 \times 10^{-99} \leqq x < 1 \times 10^{100}$	"	"	
10^{x}	$-1 \times 10^{100} < x < 100$	"	"	
e^{x}	$-1 \times 10^{100} < x \leqq 230.2585092$			
$\sqrt{x}$	$0 \leqq x < 1 \times 10^{100}$	"	"	
x^{2}	$\|x\| < 1 \times 10^{50}$			
$1/x$	$\|x\| < 1 \times 10^{100}$, $x \neq 0$	"	"	
$\sqrt[3]{x}$	$\|x\| < 1 \times 10^{100}$			
$x!$	$0 \leqq x \leqq 69$ (x is an integer)	"	"	
nPr nCr	Result $< 1 \times 10^{100}$ n, r (n and r are integers) $0 \leqq r \leqq n$, $n < 1 \times 10^{10}$	"	"	
Pol (x, y)	$\sqrt{x^2 + y^2} < 1 \times 10^{100}$	"	"	
Rec (r, θ)	$\|r\| < 1 \times 10^{100}$ (DEG) $\|\theta\| < 9 \times 10^{9}$° (RAD) $\|\theta\| < 5 \times 10^{7}\pi$ rad (GRA) $\|\theta\| < 1 \times 10^{10}$grad	"	"	However, for $\tan\theta$: $\|\theta\| \neq 90(2n+1)$:DEG $\|\theta\| \neq \pi/2(2n+1)$:RAD $\|\theta\| \neq 100(2n+1)$:GRA

Function	Input ranges	Internal digits	Precision	Notes
$\circ\,'\,''$	$\lvert a\rvert, b, c < 1 \times 10^{100}$ $0 \leqq b, c$	15 digits	As a rule, precision is ±1 at the 10th digit.*	
$\overleftarrow{\circ\,'\,''}$	$\lvert x\rvert < 1 \times 10^{100}$ Sexagesimal display: $\lvert x\rvert < 1 \times 10^{7}$			
$\wedge(x^y)$	$x > 0$: $-1 \times 10^{100} < y\log x < 100$ $x = 0 : y > 0$ $x < 0$: $y = n, \frac{1}{2n+1}$ (n is an integer) However; $-1 \times 10^{100} < y\log \lvert x\rvert < 100$	"	"	
$\sqrt[x]{y}$	$y > 0 : x \neq 0$ $-1 \times 10^{100} < \frac{1}{x}\log y < 100$ $y = 0 : x > 0$ $y < 0 : x = 2n+1, \frac{1}{n}$ ($n \neq 0$, n is an integer) However; $-1 \times 10^{100} < \frac{1}{x}\log \lvert y\rvert < 100$	"	"	
$a^b/_c$	Total of integer, numerator and denominator must be within 10 digits (includes division marks).	"	"	
STAT	$\lvert x\rvert < 1 \times 10^{50}$ $\lvert y\rvert < 1 \times 10^{50}$ $\lvert n\rvert < 1 \times 10^{100}$ $x\sigma_n, y\sigma_n, \overline{x}, \overline{y}, a, b, c, r$: $n \neq 0$ $x\sigma_{n-1}, y\sigma_{n-1}$: $n \neq 0, 1$	"	"	

* For a single calculation, calculation error is ±1 at the 10th digit. (In the case of exponential display, calculation error is ±1 at the last significant digit.) Errors are cumulative in the case of consecutive calculations, which can also cause them to become large. (This is also true of internal consecutive calculations that are performed in the case of $\wedge(x^y)$, $\sqrt[x]{y}$, $x!$, $\sqrt[3]{\ }$, $n\mathrm{P}r$, $n\mathrm{C}r$, etc.)
In the vicinity of a function's singular point and point of inflection, errors are cumulative and may become large.

Appendix E Specifications

Variables: 26

Calculation range:

$\pm 1 \times 10^{-99}$ to $\pm 9.999999999 \times 10^{99}$ and 0. Internal operations use 15-digit mantissa.

Exponential display range: Norm 1: $10^{-2} > |x|, |x| \geqq 10^{10}$

Norm 2: $10^{-9} > |x|, |x| \geqq 10^{10}$

Program capacity:

20,000 bytes (max.)

Power supply:

Main: Two AAA-size batteries (LR03 (AM4) or R03 (UM-4))

Back-up: One CR2032 lithium battery

Power consumption: 0.05W

Battery life

Main:

LR03 (AM4): Approximately 1,500 hours (continuous display of main menu)
Approximately 700 hours (continuous operation)

R03 (UM-4): Approximately 900 hours (continuous display of main menu)
Approximately 400 hours (continuous operation)

Back-up: Approximately 2 years (when main batteries are not supplying power)

Auto power off:

Power is automatically turned off approximately six minutes after last operation.

The calculator automatically turns off if it is left for about 60 minutes with a calculation stopped by an output command (◢), which is indicated by the "–Disp–" message on the display.

Ambient temperature range: 0°C to 40°C

Dimensions: 23 mm (H) × 85.5 mm (W) × 169 mm (D)

$^{15}/_{16}$" (H) × 3 $^{7}/_{16}$" (W) × 6 $^{3}/_{4}$" (D)

Weight: 185g (including batteries)

Data Communications

Functions:

Program contents and file names; function memory data; list data; variable data; Table & Graph data; graph functions

Method: Start-stop (asynchronous), half-duplex

Transmission speed (BPS): 9600 bits/second

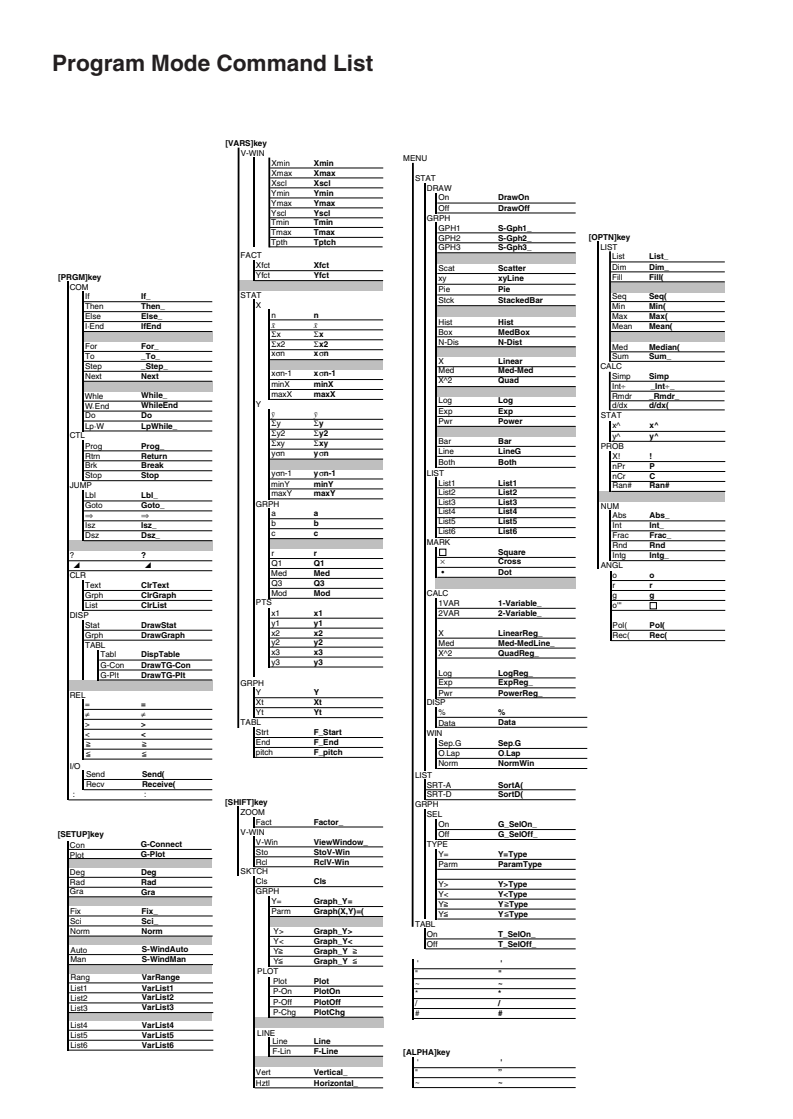
Parity: none

Bit length: 8 bits

Stop bit:

Send: 2 bits
Receive: 1 bit

Program Mode Command List



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SA0212-A Printed in China