

Appendix

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Appendix A Resetting the Calculator

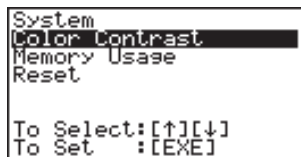


Warning!

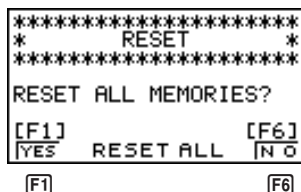
The procedure described here clears all memory contents. Never perform this operation unless you want to totally clear the memory of the calculator. If you need the data currently stored in memory, be sure to write it down somewhere before performing the RESET operation.

•To reset the calculator

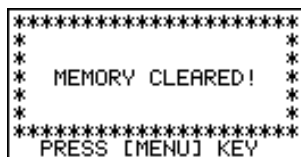
1. Highlight the **SYS** icon on the main menu and then press **[EXE]**, or press **[tan]**^F.



2. Use **[▼]** to move the highlighting down to “Reset” and then press **[EXE]**.



3. Press **[F1]** (YES) to reset the calculator or **[F6]** (NO) to abort the operation without resetting anything.



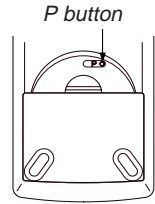
4. Press **[MENU]**.

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





- 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 screen appear on the display. Perform the procedure to complete the RESET operation.

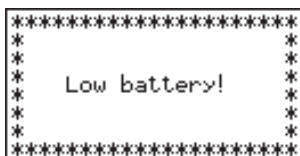


- Pressing the P button while an internal calculation is being performed will cause all data in memory to be deleted.

Appendix B Power Supply

This unit is powered by four 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 turn power off, in order to protect memory contents. You will not be able to turn 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!

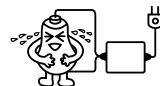
If you remove both the main power supply and the memory back up batteries at the same time, all memory contents will be erased. If you do remove both batteries, correctly reload them and then perform the reset operation.

■ 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.
- * Never turn 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 four batteries with new ones.

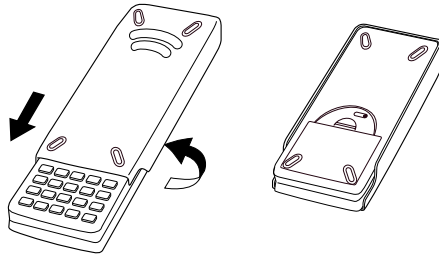
1. Press **SHIFT** **OFF** to turn the calculator off.



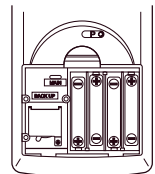
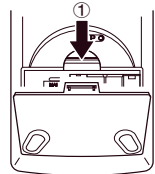
Warning!

- * Be sure to turn the unit off before replacing batteries. Replacing batteries with power on will cause data in memory to be deleted.

2. Making sure that you do not accidentally press the **AC/ON** key, slide the case onto the calculator and then turn the calculator over.



3. Slide the back cover from the unit by pulling with your finger at the point marked ①.
4. Remove the four old batteries.
5. Load a new set of four batteries, making sure that their positive (+) and negative (–) ends are facing in the proper directions.
6. Replace the back cover.
7. Turn the calculator front side up and slide off its case. Next, press **AC/ON** to turn on power.



- Power supplied by memory back up battery while the main power supply batteries are removed for replacement retains memory contents.
- 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 tint.

•To replace the memory back up battery



* Before replacing the memory back up battery, turn 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 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.

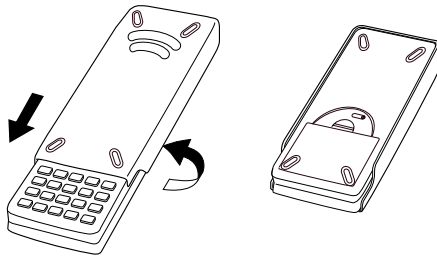
1. Press **SHIFT** **OFF** to turn the calculator off.



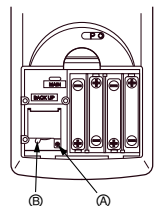
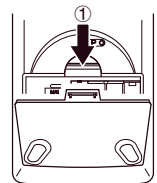
Warning!


* Be sure to turn the unit off before replacing batteries. Replacing batteries with power on will cause data in memory to be deleted.

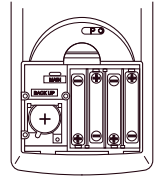
2. Making sure that you do not accidentally press the **AC/ON** key, slide the case onto the calculator and then turn the calculator over.




3. Slide the back cover from the unit by pulling with your finger at the point marked ①.
4. Remove screw **A** on the back of the calculator, and remove the back up battery compartment cover.
5. Insert a thin, pointed non-metal object (such as a tooth pick) into the hole marked **B** and 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. Install the memory protection battery cover onto the calculator and secure it in place with the screw. Next, replace the back cover.
8. Turn the calculator front side up and slide off its case. Next, press  to turn on power.



■ About the Auto Power Off Function

The calculator turns power off automatically if you do not perform any key operation for about 6 minutes. To restore power, press .

Appendix C Error Message Table

Message	Meaning	Countermeasure
Syn ERROR	<ol style="list-style-type: none"> ① Calculation formula contains an error. ② Formula in a program contains an error. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 Σ calculation results. ⑤ Poor precision in differential calculation results. ⑥ Poor precision in integration calculation results. ⑦ Cannot find results of equation calculations. ⑧ Attempt to use approx with an expression that generates an error unique to the ALGBR Mode. 	<ol style="list-style-type: none"> ①②③④ Check the input numeric value and correct it. When using memories, check that the numeric values stored in memories are correct. ⑤ Try using a smaller value for Δx (x increment/decrement). ⑥ Try changing the tolerance "tol" when using Gauss-Kronrod Rule or the number of divisions "n" when using Simpson's Rule to another value. ⑦ Check the coefficients of the equation. ⑧ Change the input expression.
Go ERROR	<ol style="list-style-type: none"> ① No corresponding Lbl n for Goto n. ② No program stored in program area Prog "file name". 	<ol style="list-style-type: none"> 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.
Ne ERROR	<ul style="list-style-type: none"> • Nesting of subroutines by Prog "file name" exceeds 10 levels. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Execution of calculations that exceed the capacity of the stack for numeric values or stack for commands. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Not enough memory to input a function into function memory. • Not enough memory to create a matrix using the specified dimension. • Not enough memory to hold matrix calculation result. • Not enough memory to store data in list function. • Not enough memory to input coefficient for equation. • Not enough memory to hold equation calculation result. • Not enough memory to hold function input in the Graph Mode for graph drawing. • Not enough memory to hold function input in the DYNA Mode for graph drawing. • Not enough memory to hold function or recursion input. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Incorrect argument specification for a command that requires an argument. 	<ul style="list-style-type: none"> • Correct the argument. • Lbl n , Goto n : $n =$ integer from 0 through 9.
Dim ERROR	<ul style="list-style-type: none"> • Illegal dimension or list used during matrix calculations. 	<ul style="list-style-type: none"> • Check matrix or list dimension.
Com ERROR	<ul style="list-style-type: none"> • Problem with cable connection or parameter setting during program data communications. 	<ul style="list-style-type: none"> • Check cable connection.
Transmit ERROR!	<ul style="list-style-type: none"> • Problem with cable connection or parameter setting during data communications. 	<ul style="list-style-type: none"> • Check cable connection.
Receive ERROR!	<ul style="list-style-type: none"> • Problem with cable connection or parameter setting during data communications. 	<ul style="list-style-type: none"> • Check cable connection.
Memory Full!	<ul style="list-style-type: none"> • Memory of receiving unit became full during program data communications. 	<ul style="list-style-type: none"> • Delete some data stored in the receiving unit and try again.

Appendix C Error Message Table

Message	Meaning	Countermeasure
Undefined	<ul style="list-style-type: none">No solution exists for the operation being performed in the ALGBR Mode.	<ul style="list-style-type: none">Change the input expression.
Overflow ERROR	<ul style="list-style-type: none">The result of the operation being performed in the ALGBR Mode exceeds the range of the calculator.	<ul style="list-style-type: none">Change the input expression.
Domain ERROR	<ul style="list-style-type: none">An input value in the ALGBR Mode is outside the domain of the operation being performed.	<ul style="list-style-type: none">Change the input expression.
Non-Real ERROR	<ul style="list-style-type: none">In the ALGBR Mode, only real numbers have been input and the result is a complex number while the set up screen's Answer Type item is specified as "Real".	<ol style="list-style-type: none">Change the setting of Answer Type to "Cplx".Change the input expression.
No Solution	<ul style="list-style-type: none">No solution can be obtained in the ALGBR Mode using the Solve function.	<ol style="list-style-type: none">Change the setting of Answer Type to "Cplx".Change the input expression.

Appendix D Input Ranges

Function	Input ranges	Internal digits	Accuracy	Notes
$\sin x$ $\cos x$ $\tan x$	(DEG) $ x < 9 \times (10^9)^\circ$ (RAD) $ x < 5 \times 10^7 \pi \text{rad}$ (GRA) $ x < 1 \times 10^{10} \text{grad}$	15 digits	As a rule, accuracy is ± 1 at the 10th digit.	However, for $\tan x$: $ x \napprox 90(2n+1)$:DEG $ x \napprox \pi/2 \cdot (2n+1)$:RAD $ x \napprox 100(2n+1)$:GRA
$\sin^{-1}x$ $\cos^{-1}x$	$ x \leq 1$	"	"	
$\tan^{-1}x$	$ x < 1 \times 10^{100}$	"	"	
$\sinh x$ $\cosh x$	$ x \leq 230.2585092$	"	"	For \sinh and \tanh , when $x = 0$, errors are cumulative and accuracy is affected at a certain point.
$\tanh x$	$ x < 1 \times 10^{100}$	"	"	
$\sinh^{-1}x$ $\cosh^{-1}x$ $\tanh^{-1}x$	$ x < 5 \times 10^{99}$ $1 \leq x < 5 \times 10^{99}$ $ x < 1$	"	"	
$\log x$ $\ln x$	$1 \times 10^{-99} \leq x < 1 \times 10^{100}$	"	"	
10^x e^x	$-1 \times 10^{100} < x < 100$ $-1 \times 10^{100} < x \leq 230.2585092$	"	"	
\sqrt{x} x^2	$0 \leq x < 1 \times 10^{100}$ $ x < 1 \times 10^{50}$	"	"	
$1/x$ $\sqrt[3]{x}$	$ x < 1 \times 10^{100}, x \neq 0$ $ x < 1 \times 10^{100}$	"	"	
$x!$	$0 \leq x \leq 69$ (x is an integer)	"	"	
nPr nCr	Result $< 1 \times 10^{100}$ n, r (n and r are integers) $0 \leq r \leq n$, $n < 1 \times 10^{10}$	"	"	
Pol (x, y)	$\sqrt{x^2 + y^2} < 1 \times 10^{100}$	"	"	

Appendix D Input Ranges

Function	Input ranges	Internal digits	Accuracy	Notes
Rec (r, θ)	$ r < 1 \times 10^{100}$ (DEG) $ \theta < 9 \times (10^9)^\circ$ (RAD) $ \theta < 5 \times 10^7 \pi$ rad (GRA) $ \theta < 1 \times 10^{10}$ grad	15 digits	As a rule, accuracy is ± 1 at the 10th digit.	However, for $\tan \theta$: $ \theta \neq 90(2n+1)$:DEG $ \theta \neq \pi/2 \cdot (2n+1)$:RAD $ \theta \neq 100(2n+1)$:GRA
\circ, \dots \leftarrow \circ, \dots	$ a , b, c < 1 \times 10^{100}$ $0 \leq b, c$	"	"	
$\wedge(x^y)$	$x > 0$: $-1 \times 10^{100} < y \log x < 100$ $x = 0 : y > 0$ $x < 0$: $y = n, \frac{1}{2n+1}$ (n is an integer or a fraction) However; $-1 \times 10^{100} < \frac{1}{y} \log x < 100$	"	"	
$^x\sqrt{y}$	$y > 0 : x \neq 0$ $-1 \times 10^{100} < \frac{1}{x} \log y < 100$ $y = 0 : x > 0$ $y < 0 : x = 2n + 1, \frac{1}{n}$ ($n \neq 0, n$ is an integer or a fraction) However; $-1 \times 10^{100} < \frac{1}{x} \log y < 100$	"	"	
$a^{b/c}$	Total of integer, numerator and denominator must be within 10 digits (includes division marks).	"	"	
STAT	$ x < 1 \times 10^{50}$ $ y < 1 \times 10^{50}$ $ n < 1 \times 10^{100}$ $x\sigma_n, y\sigma_n, \bar{x}, \bar{y}, a, b, c, d, e, r$: $n \neq 0$ $x\sigma_{n-1}, y\sigma_{n-1}: n \neq 0, 1$	"	"	

* The ALGBR Mode uses natural display notation, so the above input ranges do not apply.

Function	Input ranges
Binary, octal, decimal, hexadecimal calculation	Values fall within following ranges after conversion: DEC: $-2147483648 \leq x \leq 2147483647$ BIN: $1000000000000000 \leq x$ ≤ 1111111111111111 (negative) $0 \leq x \leq 0111111111111111$ (0, positive) OCT: $20000000000 \leq x \leq 37777777777$ (negative) $0 \leq x \leq 17777777777$ (0, positive) HEX: $80000000 \leq x \leq FFFFFFFF$ (negative) $0 \leq x \leq 7FFFFFFF$ (0, positive)

* Errors may be cumulative with internal continuous calculations such as x^y , $x\sqrt{y}$, $x!$, $\sqrt[3]{x}$, sometimes affecting accuracy.

Appendix E Specifications

Model: CFX-9970G

Variables: 28

Calculation range:

$\pm 1 \times 10^{-99}$ to $\pm 9.999999999 \times 10^{99}$ and 0. Internal operations use 15-digit mantissa (except in ALGBR Mode).

Exponential display range: Norm 1: $10^{-2} > |x|$, $|x| \geq 10^{10}$
(except in ALGBR Mode) Norm 2: $10^{-9} > |x|$, $|x| \geq 10^{10}$

Program capacity:

60 kbytes (max.)

Power supply:

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

Back-up: One CR2032 lithium battery

Power consumption: 0.2W

Battery life

Main:

LR03 (AM4): Approximately 230 hours (continuous display of main menu)
Approximately 2 years (power off)

R03 (UM-4): Approximately 140 hours (continuous display of main menu)
Approximately 2 years (power off)

The ALGBR Mode requires more electrical power than other modes, so extensive use of the ALGBR Mode shortens battery life.

Back-up: Approximately 2 years

Auto power off:

Power is automatically turned off approximately six minutes after last operation except when drawing dynamic graphs.

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

Ambient temperature range: 0°C to 40°C

Dimensions: 27.1 mm (H) \times 85 mm (W) \times 181.5 mm (D)

$1 \frac{1}{8}$ " (H) \times $3 \frac{3}{8}$ " (W) \times $7 \frac{1}{8}$ " (D)

Weight: 230g (including batteries)

Data Communications**Functions:**

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

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

Transmission speed (BPS): 9600 bits/second

Parity: none

Bit length: 8 bits

Stop bit:

Send: 3 bits

Receive: 2 bits

X ON/X OFF Control: None