

Operating Instructions

The serial number may be found on the back of the battery cover. For your convenience, note these numbers in this book and retain the book to serve as a permanent record of your purchase, to aid in identification in the event of theft, and for future reference.

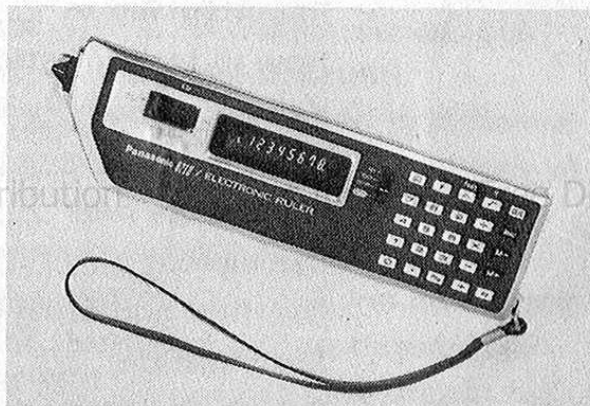
MODEL NO. JE-8210U

SERIAL NO. _____

NAME OF DEALER _____

DATE OF PURCHASE _____

Electronic Calculator
JE-8210U



Panasonic®

Before operating please read these instructions completely

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Important Notes

- **This electronic calculator, with electronic ruler, is designed mainly for personal use. The electronic ruler can be used to determine distance between points on a map or chart for driving, boating and flying. It can also be user to determine dimensions on a scaled drawing or blueprint for carpentry work or other construction.**
- **Accuracy of the ruler measurement is $\pm 1\text{mm}$ at $\pm 1\%$ of measured length or distance. However the accuracy depends on surface condition of the measured object, accuracy of the map or drawing, and how you use the unit.**
- **Accuracy may not be suitable for commercial or laboratory applications.**
- **A roller guide attachment comes with the unit, which may be attached and used along the edge of object to enable following the contours of the object, without wavering.**
- **Do not use or place this calculator near sources of high or low temperature, in high humidity, in direct sunlight or in a dusty place for a long time. It may cause a damage**

to the cabinet or functional failure, of and result in poor performance.

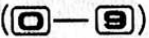


- Do not use thinner, benzine or alcohol to clean the cabinet. Please use a silicon-cloth or a cloth dampened with soap and water.
- If the unit is not going to be used for a long time (a month or more), remove the batteries to prevent possible damage if the batteries should start to leak.

How to replace battery

When the battery power nears exhaustion, the display will gradually darken and finally disappear, and calculation will no longer be possible. Replace the batteries with new ones, according to following procedure:

- 1) Remove the battery cover from the unit.
- 2) Remove the old batteries.
- 3) Insert new batteries. Be sure to point the batteries in the proper direction. If the unit does not work after new batteries have been inserted, chances are that one or both batteries are facing the wrong way.
- 4) Replace the battery cover.

Key and Switch Functions

- Power On/Off & Metric unit selection switch
Slide the switch to mm, cm or m position. The first digit will show a "0." in the display, and the unit is ready for calculating or measuring.
- Number keys ()
Enters the number.
- Decimal point key ()
Enters a decimal point.
- Clear Entry/Clear key ()
When depressed once.
 - a) Clears the displayed number just entered or the length measured.
 - b) Clears overflow condition, except memory contents and roller-scale sign.When depressed twice:
Clears all calculations and/or entries except memory contents and scale-sign.

- Clear Display key (CD)

Clears the displayed number and the overflow sign which appears when measuring speed is too fast.

- Plus key (\oplus)

Performs addition.

- Minus key (\ominus)

Performs subtraction.

- Multiplication key (\otimes)

Performs multiplication.

- Division key (\oplus)

Performs division.

- Equal key (=)

Performs calculation if command of +, −, × or ÷ has been given.

- Percent key ($\%$)

Performs percent calculation.

- Memory Plus key (**M+**)

The displayed number or calculated result can be directly accumulated into the memory.

- Memory Minus key (**M-**)

The displayed number or calculated result can be directly subtracted from the memory.

- Memory Recall/Clear key (**MRC**)

Recalls memory contents to the display when this key is pressed once. Clears the memory contents when this key is pressed twice in succession.

- Inch/Feet conversion key (**in** / **feet**)

Converts the displayed number to inches. (1 inch \doteq 25.4 mm)

After the F key is pressed, converts the displayed number to feet. (1 foot \doteq 304.8 mm)

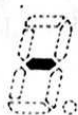
- Square root/Pi key ($\sqrt{\quad}$ / π)
Performs square root calculation.
After the F key is pressed, performs entry of pi. ($\pi \doteq 3.1415926$)
- Scale key (SCL)
Sets or resets roller-scale mode and scale sign.

Display

The various signs appear on the extreme left of the display to indicate the following.



Memory
occupied



Minus



Overflow

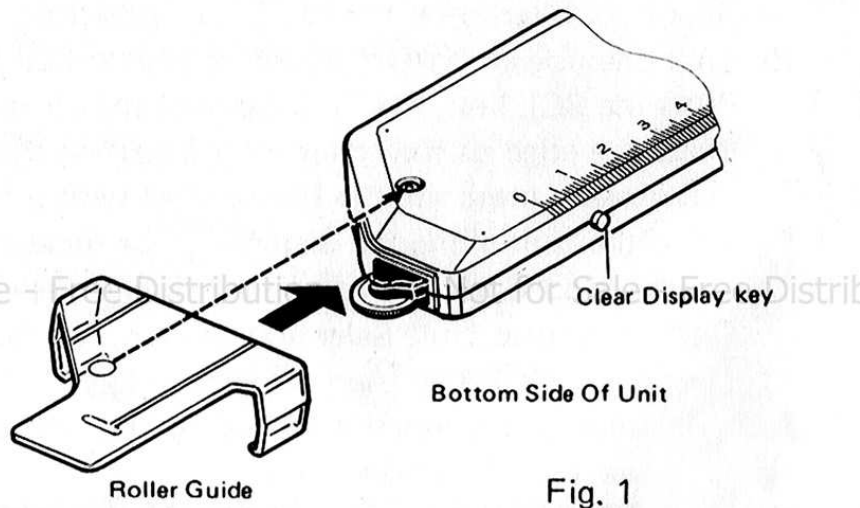
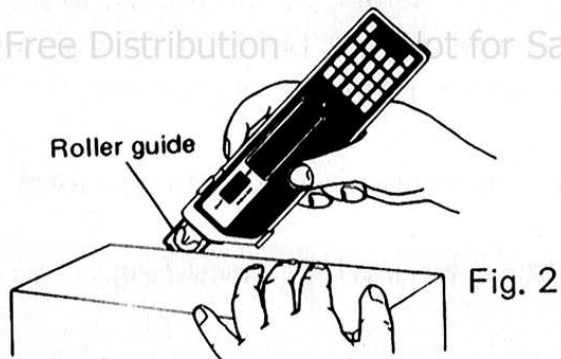


Scale

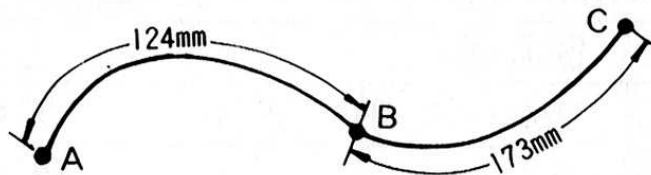
How to use ruler

- 1) Slide the roller-knob to the "OUT" position.
 - 2) Slide the power On/Off switch to the desired metric unit position (mm, cm, m).
 - 3) Press the SCL key; the "L" sign will appear on the display.
 - 4) Place the edge of the roller on the starting point of the object or line to be measured. If necessary press the CD key to start with a zero reading.
 - 5) Move the unit along the distance to be measured. Millimeters, centimeters and meters can be read directly from the display, depending upon the position of the power On/Off, Metric Unit Selection Switch. To read inches, press the feet/in key. To read feet, press the F key then the feet/in key.
- The roller guide, when attached to the unit enables measuring along the perimeter of any object, without wavering.
 - Do not touch the CD key or any of the calculation keys while measuring.

- Measuring on slippery surface will not be accurate if the roller slips.
- Reset the "L" sign by depressing the SCL key to conserve battery power when the electronic ruler function is not in use.



● Distance Calculation

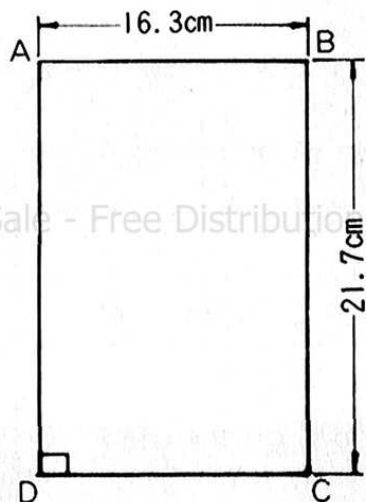


| Switch | Operation | Display | Remarks |
|--------|----------------------|-------------|--------------------------|
| mm | SCL CD | L 0. | |
| | Roller (A→B) | L 124. | Distance between A and B |
| | Roller (B→C) | L 297. | Distance between A and C |
| | CD | L 0. | |
| | Roller (B→C) | L 173. | Distance between B and C |

● Interchangeable Scales

| | | | | |
|----|---------------------------------|---|-----------|-------------------------------|
| mm | SCL CD | L | 0. | |
| | Roller (A→B) | L | 124. | Distance between A and B (mm) |
| cm | | L | 12.4 | // // (cm) |
| m | | L | 0.124 | // // (m) |
| | Roller (B→C) | L | 0.297 | Distance between A and C (m) |
| cm | | L | 29.7 | // // (cm) |
| mm | | L | 297. | // // (mm) |
| | in | L | 11.692913 | // // (inch) |
| mm | Roller (A→C) | L | 297. | // // (mm) |
| | F feet SCL | | 0.9744094 | // // (feet) |

• Area Calculation (Rectangle)



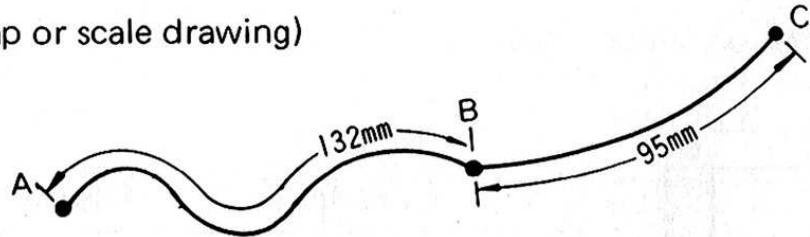
Switch: cm

| Operation | Display | Remaks |
|---|-----------|-------------------------|
| <input type="checkbox"/> SCL <input type="checkbox"/> CD | L 0. | |
| Roller (A → B) | L 16.3 | (cm) |
| <input checked="" type="checkbox"/> <input type="checkbox"/> CD | L 0. | |
| Roller (B → C) | L 21.7 | (cm) |
| <input type="checkbox"/> SCL | 353.71 | (cm ²) Area |
| <input type="checkbox"/> in <input type="checkbox"/> in | 54.825157 | (square inch) Area |

● Distance Calculation (map or scale drawing)

Scale: 1/2000

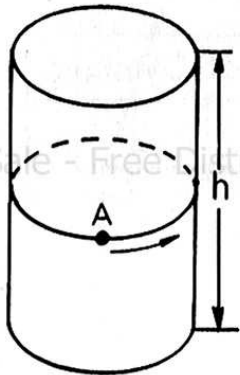
Switch: m



| Operation | Display | Remarks |
|---|---------|---|
| <input type="checkbox"/> SCL 2000 <input checked="" type="checkbox"/> | L 2000. | Set magnification |
| Roller (A→B) | L 0.132 | (m) Distance between A and B on the map |
| <input type="checkbox"/> | L 264. | (m) Actual distance (A-B) |
| Roller (B→C) | L 0.095 | (m) Distance between B and C on the map |
| <input type="checkbox"/> SCL | L 190. | (m) Actual distance (B-C) |

• Diameter, Cross Sectional Area, and Area Of Cylinder

Switch : cm



| Operation | Display | Remarks |
|--|-----------|---|
| SCL CD | L 0. | |
| Roller (one turn from A to A) | L 245.7 | Circumference |
| SCL ÷ F π | 3.1415926 | (cm) The ratio of the circumference (π) |
| = | 78.20874 | (cm) Diameter |
| ÷ 2 × = | 1529.1517 | (Radius) ² |
| × F π = × | 4803.9716 | (cm ²) Area of cross section |

| Operation | Display | Remarks |
|---|-------------|-------------------------------------|
| [SCL] | L 4803.9716 | |
| Roller (h) | L 95 | (cm) Height |
| [=] [SCL] | 456377.3 | (cm ³) Area of Cylinder |
| [F] [feet] [F] [feet] [F] [feet] | 16.116811 | (cft) |

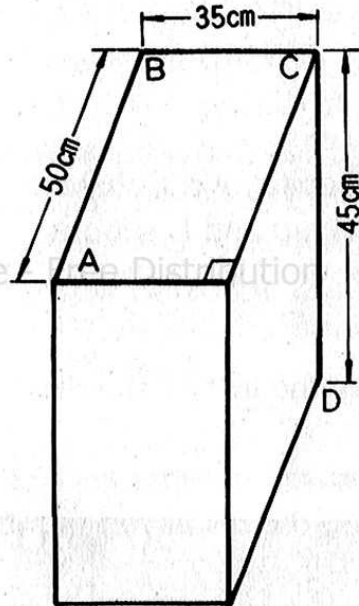
$$\text{Diameter} = \frac{C}{\pi}$$

$$\text{Radius} = \frac{C}{2\pi}$$

$$\text{Area of Cross Section} = \pi R^2$$

$$\text{Area of Cylinder} = H (\pi R^2)$$

● Volume Calculation (Rectangular Prism)



Switch : cm (AB x BC x CD)

| Operation | Display | Remarks |
|---|-----------|--------------------|
| <input type="checkbox"/> SCL <input type="checkbox"/> CD | L 0. | |
| Roller (A→B) | L 50.0 | |
| <input checked="" type="checkbox"/> <input type="checkbox"/> CD | L 0. | |
| Roller (B→C) | L 35.0 | |
| <input checked="" type="checkbox"/> <input type="checkbox"/> CD | L 0. | |
| Roller (C→D) | L 45.0 | |
| <input type="checkbox"/> SCL | 78750. | (cm ³) |
| <input type="checkbox"/> feet <input type="checkbox"/> feet <input type="checkbox"/> feet | 2.7810299 | (cft) |

Calculator

The calculator can perform any of the following functions:

- Addition
- Subtraction
- Multiplication
- Division
- Square root
- Automatic Repeat and Constant
- Memory calculation
- Pi calculation
- Percent, Mark up and Discount

Overflow and Error condition

An overflow or error condition shows up as a “E” sign at the extreme left of the display. Press the CE/C key to reset;

- 1) When the integral number of the calculated results or the measured number exceeds 8 digits, the approximate number can be obtained by multiplying the displayed number by 10^8 .

- 2) When the integral number of the memory content exceeds 8 digits, the memory will go into an overflow condition. However, the contents of the memory that have been registered prior to the overflow are retained and can be recalled to the display if the CE/C key and MRC key are pressed.
- 3) When the number is divided by zero. ($X \div 0$)
- 4) When the square root calculation of a negative number is performed. ($X < 0$)
- 5) When the measuring speed exceeds 40 cm/second which is the maximum limit of the roller detecting capability.

Specification

Calculator

Display:

Multi-digit fluorescent display tube; 8 digits and signs

Capacity:

8 digits, 7-decimal digit

Decimal Point: Fully floating decimal point system
Memory: 1
Calculating Speed: 0.6 second (max.)

Ruler

Measuring Range: 1 to 99999999 mm
Accuracy: ± 1 mm at $\pm 1\%$ of measured number
Measuring Speed: 40 cm/second (max.)

Logic Element: MOS-LSI

Power Input: DC 3V (2-“AA” size dry battery)

Power Consumption: 0.25W (max.)

Operating Temperature: 0° to 40° C (32° to 104° F)

Dimension: W: 205mm (8-1/16”), D: 57mm (2-1/4”)
H: 19.6mm (25/32”)

Weight: 142g (5 oz.) without batteries

Sample Calculations

| Calculation | Sequence of Numeral & Function Entry | Displayed Answer |
|-------------|--------------------------------------|------------------|
|-------------|--------------------------------------|------------------|

● Addition and Subtraction

| | | |
|----------------------|--------------------|----------|
| 4.23 + 4 = ? | 4.23 ⊕ 4 = | 8.23 |
| 6 - 1.854 = ? | 6 ⊖ 1.854 = | 4.146 |
| 1.23 + 456 - 789 = ? | 1.23 ⊕ 456 ⊖ 789 = | - 331.77 |

● Multiplication and Division

| | | |
|-----------------------------|-----------------------------------|-----------|
| $27.2 \times 18 = ?$ | $27.2 \otimes 18 \ominus$ | 489.6 |
| $12 \div 5.2 = ?$ | $12 \oplus 5.2 \ominus$ | 2.3076923 |
| $0.82 \times 12 \div 9 = ?$ | $.82 \otimes 12 \oplus 9 \ominus$ | 1.0933333 |

● Mark Up and Discount

| | | |
|--|------------------------------|-------|
| (21% up of 1300) $1300 \times (1 + \frac{21}{100}) = ?$ | $1300 \otimes 21 \% \oplus$ | 1573. |
| (1500 less 12%) $1500 \times (1 - \frac{12}{100}) = ?$ | $1500 \otimes 12 \% \ominus$ | 1320. |

● Constant Calculation

| | | |
|------------------------|-----------------------------|-----------|
| $12.3 + 45.6 = ?$ | $12.3 \oplus 45.6 \ominus$ | 57.9 |
| $98.7 + 45.6 = ?$ | $98.7 \ominus$ | 144.3 |
| $12.3 - 45.6 = ?$ | $12.3 \ominus 45.6 \ominus$ | — 33.3 |
| $98.7 - 45.6 = ?$ | $98.7 \ominus$ | 53.1 |
| $45.6 \times 12.3 = ?$ | $45.6 \otimes 12.3 \ominus$ | 560.88 |
| $45.6 \times 98.7 = ?$ | $98.7 \ominus$ | 4500.72 |
| $12.3 \div 45.6 = ?$ | $12.3 \oslash 45.6 \ominus$ | 0.2697368 |
| $98.7 \div 45.6 = ?$ | $98.7 \ominus$ | 2.1644736 |

| | | |
|------------------------|---------------------|------|
| $3 \% \times 1500 = ?$ | $3 \otimes 1500 \%$ | 45. |
| $3 \% \times 4500 = ?$ | 4500% | 135. |

• Repeat and Exponent

| | | |
|-------------------------------|---|-----------|
| $3 + 4 + 4 + 4 = ?$ | $3 \oplus 4 \equiv \equiv \equiv$ | 15. |
| $3 - 4 - 4 = ?$ | $3 \ominus 4 \equiv \equiv$ | — 5. |
| $5 \times 5 = ?$ | $5 \otimes \equiv$ | 25 |
| $12 \div 4 \div 4 \div 4 = ?$ | $12 \oplus 4 \equiv \equiv \equiv$ | 0.1875 |
| $12^5 = ?$ | $12 \otimes \equiv \equiv \equiv \equiv$ | 248832. |
| | (Depress \equiv Key (n-1) times) | |
| | $9 \oplus \equiv \equiv \equiv \equiv \equiv$ | |
| $9^{-4} = ?$ | (Dpress \equiv Key (n+1) times) | 0.0001524 |

• Reciprocal Calculation

| | | |
|-----------------------|---------------|-----|
| $\frac{1}{(2+3)} = ?$ | 2 ⊕ 3 ÷ = = | 0.2 |
| $\frac{4}{(5+3)} = ?$ | 5 ⊕ 3 ÷ = 4 = | 0.5 |

• Square Root

| | | |
|---|-----------------------|-----------|
| $\sqrt{3} = ?$ | 3 √ | 1.7320508 |
| $\sqrt{2} + \sqrt{3} = ?$ | 2 √ ⊕ 3 √ = | 3.1462643 |
| $3 \times \sqrt{2} = ?$ | 3 ⊗ 2 √ = | 4.2426405 |
| $\sqrt{(3+4)} \times 2$ $+ \sqrt{5} = ?$ | 3 ⊕ 4 ⊗ 2 = √ ⊕ 5 √ = | 5.9777249 |

● m, cm, mm To Inch Conversion

| | switch | Operation | Displayed Answer |
|--------------|--------|------------------|------------------|
| 123mm=?inch | mm | 123 (in) | 4.8425196 |
| 45.6cm=?inch | cm | 45.6 (in) | 17.952755 |
| 789 m=? inch | m | 789 (in) | 31062.992 |

● m, cm, mm To Feet conversion

| | | | |
|----------------|----|--------------------------------|-----------|
| 705mm=? feet | mm | 705 (F) (feet) | 2.3129921 |
| 52.36cm=? feet | cm | 52.36 (F) (feet) | 1.7178477 |
| 250m=? feet | m | 250 (F) (feet) | 820.20997 |

● Memory

| | | |
|--------------------------------------|---|--------|
| $(12 \times 3) + (45 \times 6) = ?$ | MRC MRC 12 \times 3 MH 45 \times 6 MH MRC (MRC MRC 12 \times 3 = MH 45 \times 6 = MH MRC) | 306. |
| $-(12 - 3) \times (45 - 6)$ $= ?$ | MRC MRC 12 $-$ 3 M- 45 $-$ 6 \times MRC = | - 351. |
| $12^2 + 3^2 = ?$ | MRC MRC 12 \times MH 3 \times MH MRC | . 153. |
| $5^2 - 4^2 = ?$ | MRC MRC 5 \times MH 4 \times M- MRC | . 9. |
| $5^3 + 6^2 = ?$ | MRC MRC 5 \times = = MH 6 \times MH MRC | . 161. |
| $\sqrt{3^2 + 4^2} = ?$ | MRC MRC 3 \times MH 4 \times MH MRC $\sqrt{\quad}$ | . 5. |

| | | | |
|--------------------|--|---|-------|
| $120 \times 3 = ?$ | $\boxed{\text{MRC}} \boxed{\text{MRC}} 120 \times 3 \boxed{\text{MH}}$ | . | 360. |
| $230 \times 5 = ?$ | $230 \times 5 \boxed{\text{MH}}$ | . | 1150. |
| $340 \times 8 = ?$ | $340 \times 8 \boxed{\text{MH}}$ | . | 2720. |
| <hr/> | | | |
| total ? | $\boxed{\text{MRC}} \boxed{\text{MRC}}$ | | 4230. |

● Approximation

| | | |
|---------------------------|---------------------------------|---|
| $12345678 \times 999 = ?$ | $12345678 \times 999 \boxed{=}$ | $\boxed{\square} 123.33332$ |
| | | (means 123.3333×10^8 or 12,333,332,000) |

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