Thank you for purchasing the SHARP Scientific Calculator Model EL-506TS.

After reading this manual, keep it in a convenient location for future reference.

Note:
- On the sheet with calculation examples is used English notation (with a decimal point).
- This product uses a period as a decimal point.

### OPERATION MANUAL

#### DISPLAY

**Display Equation →** 3

- **On a large display**, a calculation can be viewed from a far off angle.
- **Certain inactive symbols may appear visible when viewed from a far off angle.**
- **XNOR**
- **XOR**
- **AND**
- **OR**
- **NOT**

#### HARD CASE

- **Display**
- **Reset switch**
- **ON/OFF switch**
- **Solar-powered**
- **Keymap**
- **S-Base switch**
- **Display**

#### CALCULATIONS

- **Scientific Calculations**
- **Graphing Calculations**
- **Matrix Calculations**
- **Statistics**
- **Linear Regression**
- **Logarithmic Functions**
- **Hyperbolic Functions**
- **Degree of Numbers**
- **Complex Numbers**
- **Random Numbers**
- **Binomial Distribution**
- **Poisson Distribution**
- **Hypergeometric Distribution**
- **Factorial**
- **Permutation**
- **Combination**
- **Random Dice**
- **Angular Unit Conversions**
- **Memory Calculations**
- **MEM/RESET**

#### MEMORY

- **Names and Variables**
- **Independent Memory (M)**
- **Equation Memory**
- **Multi-line Memory**
- **STAT-VAR**

#### CONSTANTS

- **Scientific Notation**
- **Number of Significant Digits**
- **Floating Point Numbers System**
- **Accuracy of Calculations**

#### OTHER FEATURES

- **Factorial**
- **Permutation**
- **Combination**
- **Random Numbers**
- **Random Dice**
- **Angular Unit Conversions**

### SCIENTIFIC NOTATION

- **Polar/Rectangular Conversions**
- **Trigonometric Functions**
- **Logarithmic Functions**
- **Hyperbolic Functions**
- **Degree of Numbers**
- **Complex Numbers**
- **Random Numbers**
- **Binomial Distribution**
- **Poisson Distribution**
- **Hypergeometric Distribution**

#### GRAPHING CALCULATIONS

- **Graphing Calculations**
- **Graphing Operations**
- **Graphing Setting**
- **Graphing Memory**
- **Graphing Function**
- **Graphing Trace**
- **Graphing Zoom**

#### MATRIX CALCULATIONS

- **Matrix Operations**
- **Matrix Memory**
- **Matrix Functions**
- **Determinant**
- **Inverse**
- **Transpose**

#### STATISTICS

- **Statistical Calculations**
- **Statistical Mode**
- **Statistical Functions**
- **Statistical Memory**
- **Statistical Display**

#### MEMORY

- **Memory Calculations**
- **MEM/RESET**
- **Independent Memory (M)**
- **Equation Memory**
- **Multi-line Memory**
- **STAT-VAR**

### OPERATIONS

- **Scientific Calculations**
- **Graphing Calculations**
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- **Angular Unit Conversions**

#### PRGM

- **Programming**
- **Program Memory**
- **Program Operations**
- **Program Display**
- **Program Debugging**
- **Program Execution**
- **Program Editing**

### SET Up

- **Setting the Floating Point Numbers System in Scientific Notation**
- **Arithmetic Operations**
- **Constant Calculations**

### FUNCTIONS

- **Scientific Calculations**
- **Graphing Calculations**
- **Matrix Calculations**
- **Statistics**
- **Linear Regression**
- **Logarithmic Functions**
- **Hyperbolic Functions**
- **Degree of Numbers**
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#### PROGRAM

- **Programming**
- **Program Memory**
- **Program Operations**
- **Program Display**
- **Program Debugging**
- **Program Execution**
- **Program Editing**
Last answer memory (ANS)
The calculation result obtained by pressing \( \boxed{\text{1st}} \) or any other calculation ending naturally in the last answer memory. A Matrix/List format result is not stored.

Formula memories (F1 – F4)
Formula up to 256 characters in total can be stored in F1 – F4. Functions such as sin, etc., will be counted as one letter. Storing a new equation in each memory will automatically replace the existing equation.

\[ \text{Coefficients of regression equation} \]
\[ \text{Coefficient} = \text{Degree Fahrenheit} \]

\[ \text{Use of} \quad (\boxed{\text{S}}) = \text{0.017} \text{Giga} \]

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Binary, Pental, Octal, and Hexadecimal Operations (N-Base)
Conversion can be performed between N-Base numbers. The four basic arithmetic operations, calculations with parentheses and memory calculations can also be performed, along with the logical operations AND, OR, NOT, XOR and XNOR on binary, pental, octal and hexadecimal numbers.

Conversion to each system appearing with the following keys:
\[ \boxed{\text{S}} \quad \text{Converts to the binary system.} \]
\[ \boxed{\text{S}} \quad \text{Converts to the octal system.} \]
\[ \boxed{\text{S}} \quad \text{Converts to the pental system.} \]
\[ \boxed{\text{S}} \quad \text{Converts to the hexadecimal system.} \]

Conversion is performed on the displayed value when these keys are pressed. Note: The hexadecimal numbers A – F are entered by pressing \[ \boxed{\text{S}}, \boxed{\text{S}}, \boxed{\text{S}}, \boxed{\text{S}}, \boxed{\text{S}}, \boxed{\text{S}}, \boxed{\text{S}} \]. In the binary, pental, octal, and hexadecimal systems, fractional parts cannot be entered, and if a fractional part is converted to a binary, pental, octal, or hexadecimal number, the fractional part will be truncated. Likewise, when the result of a binary, pental, octal, or hexadecimal calculation includes a fractional part, a fractional part is dropped. In the binary, pental, octal, and hexadecimal systems, negative numbers are displayed as a complement. Time, Decimal and Sexagesimal Calculations
Conversion between decimal and sexagesimal numbers can be performed, and when using sexagesimal numbers, conversion to seconds and minutes notation. The four basic arithmetic operations and memory calculations can be performed using the sexagesimal system. Notation is sexagesimal as follows:
\[
12:34:56.78 \quad \text{second}
\]

Coordinate Conversions
- Before performing a calculation, select the angular unit.
- \[ \boxed{\text{S}} \] \text{Selects rectangular coordinate.} \]
- \[ \boxed{\text{S}} \] \text{Selects polar coordinate.} \]
- \[ \boxed{\text{S}} \] \text{Converts automatically stored in memory \( x \) and \( y \). Value of \( r \) or \( x \), \( y \) Memory Value of \( r \) or \( x \), \( y \) Memory} \]

Calculations Using Physical Constants
A constant is recalled by pressing \[ \boxed{\text{S}} \]. The calculation result is automatically stored in memories X and Y.

- Before performing a calculation, select the angular unit.
- \[ \boxed{\text{S}} \] \text{Selects rectangular coordinate.} \]
- \[ \boxed{\text{S}} \] \text{Selects polar coordinate.} \]
- \[ \boxed{\text{S}} \] \text{Converts automatically stored in memory \( x \) and \( y \). Value of \( r \) or \( x \), \( y \) Memory Value of \( r \) or \( x \), \( y \) Memory} \]

Linear regression calculation
Statistics of \( x \) and \( y \), in addition, estimate of \( y \) for a given \( x \) (estimate \( y \)) and estimate of \( x \) for a given \( y \) (estimate \( x \)). (For quadratic regression calculations before actual calculation takes place, it obtains all statistics, except coefficients and \( x \), from the stored data file under the "SHOT""). Quadratic regression calculation
Statistics of \( x \) and \( y \) and coefficients \( a \), \( b \), \( c \) in the quadratic regression formula \( y = ax^2 + bx + c \). (For quadratic regression calculations, no correlation coefficient \( r \) can be obtained.) When there are two values, press \[ \boxed{\text{S}} \]. When performing calculations using \( a \), \( b \), and \( c \), only one numeric value can be held.
Returns a random matrix with specified values

Returns a new list using the difference between,

Returns the absolute value of the list (vector).

Returns the cumulative matrix.

Sorts list in descending order.

Creates lists with elements from each column

Fig. 2

Mantissas of up to 14 digits

Returns the matrix with the columns transposed

Battery × 1 (installed), operation manual and hard case

Returns the inner product of 2 lists (vectors).

• Before performing calculations, press

This function enables the saving of up to 4 matrices (4 rows x 4 columns) for calculations. Press

• On selecting another mode, the imaginary part of any complex number stored in the independent memory (M) will be cleared.

• Within the ranges specified, this calculator is accurate to ±1 of the least significant digit of the mantissa. However; a calculation error is possible in continuous calculations due to accumulation of each calculation error. (This is the same for y^x, √, etc., in the Matrix/List calculations, etc., where continuous calculations are performed internally.) Additionally, a calculation error will accumulate and become larger in the vicinity of inflection points and singular points of functions.

Calculation Ranges

Example: 2 \( \bar{\bar{G}} \)

Error Codes and Error Types

Syntax error (Error 1):

• Do not throw batteries into a fire as they may explode.

• Explosion risk may be caused by incorrect handling.

Notes on Battery Replacement

When the battery is replaced, the memory contents are erased. Erase data can also occur if the calculator is defective or if it is repaired. Make a note of all important memory contents in case accidental memory erase occurs.

Replacement Procedure

1. Turn the power off by pressing \( \text{OFF} \).\n
2. Remove the screws. (Fig. 2)

3. Lift the battery cover to remove.

4. Remove the used battery by prying it out with a ball-point pen or similar pointed device. (Fig. 2)

5. Install one new battery. Make sure the “+” side is facing up.

6. Replace the cover and screws.

7. Press the RESET switch with the tip of a ball-point pen or similar object.

• Make sure that the display appears as shown below. If the display does not appear as shown, remove the battery, reinstall it, and check the display again.

Automatic Power Off Function

This calculator will turn itself off to save battery power if no key is pressed for approximately 10 minutes.

SPECIFICATIONS

Calculators: Scientific calculations, complex number calculations, equation solvers, statistical calculations, etc.

Internal calculations: Mantissas of up to 14 digits

Pendulum operations: 24 calculations, 10 numeric values in the normal mode (5 numeric values in other modes) and 1 numeric value for Matrix/List data

Power source: Built-in solar cells

1.5V (DC) Alkaline batteries (LR44 or equivalent) × 1

Operating time: Approx. 5,000 hours when continuously displaying 5555S at 20°C (68°F)

Operating temperature: 0°C – 40°C (32°F – 104°F)

Dimensions: 80mm × 161mm × 15mm

Weight: Approx. 110g (with batteries)

Battery 1 \( \text{[6]} \), operation manual and hard case

FOR MORE INFORMATION ABOUT SHARP CALCULATORS VISIT:

http://www.sharp-calculators.com
CALCULATION EXAMPLES

1) \( \begin{array}{c}
\sin(30^\circ) = 0.5 \\
\cos(30^\circ) = \sqrt{3}/2 \\
\tan(30^\circ) = 1/\sqrt{3} \\
\end{array} \)

2) \( \begin{array}{c}
1000000 = \frac{1000000}{10} = 100000 \\
1000 = \frac{1000}{10} = 100 \\
100 = \frac{100}{10} = 10 \\
\end{array} \)

3) \( \begin{array}{c}
45^\circ = 45^\circ : 90^\circ = 45/90 = 1/2 \\
30^\circ = 30^\circ : 60^\circ = 30/60 = 1/2 \\
15^\circ = 15^\circ : 90^\circ = 15/90 = 1/6 \\
\end{array} \)

4) \( \begin{array}{c}
34^\circ = 34^\circ \times 100 = 3400 \\
45^\circ = 45^\circ \times 100 = 4500 \\
68^\circ = 68^\circ \times 100 = 6800 \\
\end{array} \)

5) \( \begin{array}{c}
\sin(30^\circ) = 0.5 \\
\cos(30^\circ) = \sqrt{3}/2 \\
\tan(30^\circ) = 1/\sqrt{3} \\
\end{array} \)

6) \( \begin{array}{c}
\sin(x) = x \times 0.0001 \\
\cos(x) = 1 - x^2/2 \\
\tan(x) = x \\
\end{array} \)

7) \( \begin{array}{c}
90^\circ - y = 90^\circ - y \\
\tan(y) = \\
\sin(y) = \\
\end{array} \)

8) \( \begin{array}{c}
\sin(30^\circ) = 0.5 \\
\cos(30^\circ) = \sqrt{3}/2 \\
\tan(30^\circ) = 1/\sqrt{3} \\
\end{array} \)

9) \( \begin{array}{c}
\sin(x) = x \times 0.0001 \\
\cos(x) = 1 - x^2/2 \\
\tan(x) = x \\
\end{array} \)

10) \( \begin{array}{c}
\sin(x) = x \times 0.0001 \\
\cos(x) = 1 - x^2/2 \\
\tan(x) = x \\
\end{array} \)

11) \( \begin{array}{c}
\sin(x) = x \times 0.0001 \\
\cos(x) = 1 - x^2/2 \\
\tan(x) = x \\
\end{array} \)

The range of the results of inverse trigonometric functions:

- \( \sin^{-1}(x) \): \(-\pi/2 \leq \sin^{-1}(x) \leq \pi/2 \)
- \( \cos^{-1}(x) \): \(0 \leq \cos^{-1}(x) \leq \pi \)
- \( \tan^{-1}(x) \): \(-\pi/2 < \tan^{-1}(x) < \pi/2 \)
Attention: Your product is marked with this symbol. It means that used electrical and electronic products should not be mixed with general household waste. There is a separate collection system for these products.

Information on the Disposal of this Equipment and its Batteries

1. In the European Union

Attention: If you want to dispose of this equipment, please do not use the ordinary dust bin! Used electrical and electronic equipment must be treated separately and in accordance with legislation that requires proper treatment, recovery and recycling of used electrical and electronic equipment. Following the implementation by member states, private households within the EU states may return their used electrical and electronic equipment to designated collection facilities free of charge. In some countries your local retailer may also take back your old product free of charge if you purchase a similar new one.

*) Please contact your local authority for further details.

If your used electrical or electronic equipment has batteries or accumulators, please dispose of these separately according to local requirements.

By disposing of this product correctly you will help ensure that the waste undergoes the necessary treatment, recovery and recycling and thus prevent potential negative effects on the environment and human health which could otherwise arise due to inappropriate waste handling.

2. In other Countries outside the EU

If you wish to discard this product, please contact your local authorities and ask for the correct method of disposal.

Manufactured by:
SHARP CORPORATION
1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan

For EU only:

Imported into Europe by:
MORAVIA Consulting spol. s r.o.
Olomoucká 83, 627 00 Brno, Czech Republic

For UK only:

Imported into UK by:
MORAVIA Europe Ltd.
Belmont House, Station Way, Crawley, West Sussex RH10 1UA, Great Britain

Physical constants and metric conversions are shown in the tables:

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<th>PHYSICAL CONSTANTS</th>
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METRIC CONVERSIONS

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* m, n, r: Integer