

HP 35s Scientific Calculator

Quick Start Guide



Edition 1

HP part number: F2215-90201

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1 Getting Started



Welcome to your HP 35s Scientific Calculator



This guide is a supplement to the *HP 35s Scientific Calculator User's Guide*, and it is intended to provide the user with basic operational information about the calculator. For more detailed information about the many capabilities of the HP 35s Scientific Calculator outlined in this guide, refer to the complete user's guide on the enclosed CD.


Manual Conventions

In this guide, images of the keys are used along with the descriptions of the tasks to clarify the steps of operations. Many of these operations involve the use of the yellow and blue shift keys,  and  respectively. When a task requires the use of a shift key, the shift key is not pressed and held while pressing other keys, like the shift key on a computer. To complete an operation, press and release the desired shift key and then press other keys as required, unless directed otherwise. Keys describing complex tasks are displayed in the order in which they are to be pressed to complete operations. Pictures of the calculator display appear in various places throughout the guide to clarify intermediate steps during entry.




Turning the Calculator On and Off

To turn the calculator on, press and release the  key. “ON” is printed on the bottom of the  key in blue.

To turn the calculator off, press  . Since the calculator has Continuous Memory, turning it off does not affect any information you've stored.

To conserve energy, the calculator turns itself off after 10 minutes of inactivity. If you see the low-power indicator () in the display, replace the batteries with two new CR2032 (or equivalent) batteries as soon as possible. See appendix A of the *HP 35s Scientific Calculator User's Guide* for instructions.

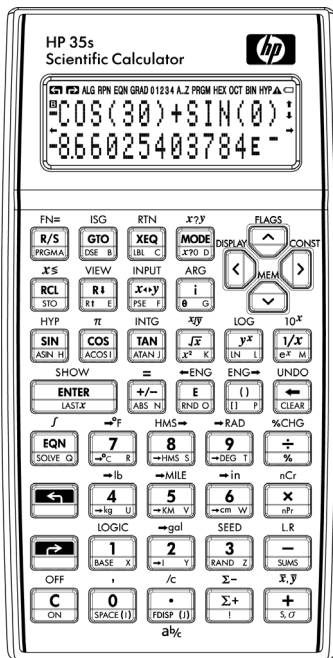
Adjusting Display Contrast

The display contrast depends on lighting, viewing angle, and the contrast setting. To increase or decrease the contrast setting, press and hold the  key while at the same time pressing  or  repeatedly. Each press of these keys very slightly adjusts the contrast, darker or lighter, respectively.

Keyboard

Features of the Keyboard

Figure 1 Calculator Keyboard



Shifted Keys



- Cursor keys have only a yellow shift function.
- Most keys have three functions: one printed in white, a yellow-shifted-function printed above the key, and a blue-shifted function printed on the angled face of the key (See Figure 2).
- Pressing the shift keys activates the corresponding shift key symbol,  or , at the top left of the display.
- The symbol display remains on until another key is pressed. Press the shift key again to cancel a shift key.





Figure 2 Key Diagram



Alpha Keys

Keys with a pink letter displayed on the bottom right corner are alpha keys, used commonly to enter variables or program labels. When you are prompted for a letter entry, the **A..Z** symbol appears in the display, and the alpha keys are active. Pressing a letter key turns alpha mode off.







Cursor Keys

Each of the four cursor direction keys is marked with an arrow. In this text, the cursor keys appear as , ,  and .




Backspacing and Clearing

Table 1 explains how the backspace and clear operations work.

Table 1 Backspace and Clear Operations

Key	Description
	Backspace and Clear. If an expression is in the process of being entered, pressing  erases the character to the left of the entry cursor (_). Otherwise, with a completed expression or the result of a calculation in line 2,  replaces that result with a zero.  also clears error messages and exits menus.
	Clear or Cancel. This key (also the ON key) clears the displayed number to zero or cancels the current context (menu, message, prompt, or Equation– or Program–entry).
 CLEAR	Clear. The Clear menu has options for clearing the number in the X-register, all direct variables, all memory, etc.

Undo key

The operation of the Undo key depends on the calculator context, but it serves mainly to recover from the deletion of an entry, rather than to undo any arbitrary operation. Press  **UNDO** immediately after using  or  to recover:

- an entry you deleted, as a digit in an expression.
- an equation deleted while in equation mode.
- a program line deleted while in program mode.

Undo also recovers the values of a register, or registers, just cleared using the CLEAR menu, if the undo operation immediately follows the cleared operation.

Using Menus

Sixteen of the keys are menu keys, keys which permit access to more functions. These functions are displayed in Table 2.

Table 2 Menu Functions

























Menu Name	Menu Description
L.R.	 L.R. Linear regression and estimation.
\bar{x}, \bar{y}	 \bar{x}, \bar{y} Arithmetic mean of statistical x - and y -values; weighted mean of statistical x -values.
s, σ	 s, σ Sample and population standard deviation.
CONST	 CONST Menu of 41 physics constants.
SUMS	 SUMS Statistical data summations.
BASE	 BASE Base conversions (Base 2, 8, 10 and 16).
INTG	 INTG Sign value, integer division, remainder, greatest integer, fractional part, integer part.
LOGIC	 LOGIC Logical operators for base- n numbers.
FLAGS	 FLAGS Functions to set, clear, and test flags.
$x?y$	 $x?y$ Comparison tests of the X - and Y -registers.





Table 2 Menu Functions

Menu Name	Menu Description
x?0	 X?0 Comparison tests of the X-register and 0.
MEM	 MEM Memory status (bytes of memory available); catalog of variables; catalog of program labels.
MODE	 MODE Angular modes and operation mode.
DISPLAY	 DISPLAY Fixed, scientific, engineering, full floating point display; radix symbol options; complex number display.
R↓ R↑	  R↓ R↑ Allows review of the 4-level stack in ALG mode.
CLEAR	 CLEAR Functions to clear different portions of memory.

To use a menu function:




1. Press a menu key to display a set of menu items.
2. Press , , , or  to move the underline cursor to the item you want to select.
3. Press  while the item is underlined to choose that item.
With numbered menu items, you can also enter the number of the item.

Note: some menus have more than one page. In these menus, the  or  symbols on the display indicate there are more


pages available. Use the  and  cursor keys to move to an item on the current menu page; use the  and  keys to access the next and previous pages in the menu.

Exiting Menus

Whenever you execute a menu function, the menu automatically disappears. If you want to leave a menu *without* executing a function, you have three options:

- Pressing  backs out of a 2-level menu, one level at a time.
- Pressing  or  cancels any other menu.
- Pressing another menu key replaces the old menu with the new one.

Controlling the Display Format

All numbers are stored with 12-digit precision, however, the number of digits used in the display is controlled in the Display menu. Press  **DISPLAY** to access this menu. The first four options (**FIX**, **SCI**, **ENG**, and **ALL**) control the number of digits in the display of numbers. See Figure 3.

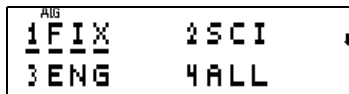


Figure 3

Operating Modes

The HP 35s has two operating modes: Reverse Polish Notation (RPN) and Algebraic mode (ALG). RPN is usually more efficient than Algebraic, requiring fewer key presses to solve most problems. It is also particularly helpful when working through a problem one step at a time, as all intermediate answers are displayed.

Algebraic mode allows an expression to be keyed in the order it is written. No intermediate answers are displayed, as the final result is calculated in one step.

RPN Mode

Press **MODE** **5** to set the calculator to RPN mode. When the calculator is in RPN mode, the **RPN** annunciator is on. In RPN mode, the result of any computation, whether simple or complex, can be used as the input for the next calculation. RPN uses a 4-level stack to hold intermediate or previous results. In RPN mode, values are entered first and then an operation is performed.

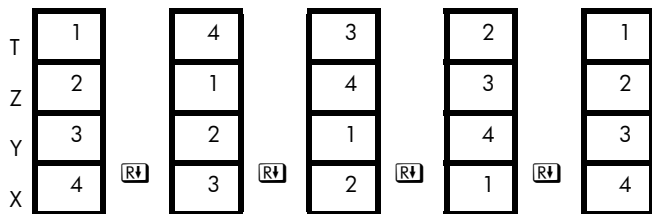
The X and Y-registers are displayed, unless a menu, a message, an equation line, or a program line is displayed. The X-register is the bottom number displayed, and the Y-register is the top number. Several function names include an x or y. These refer to the X- and Y-registers. For example, **10^x** raises ten to the power of the number in the X-register. The other two stack regis-

ters are labeled Z and T.

The **R↓** (*roll down*) key reviews the contents of the stack by "rolling" the contents downward, one register at a time. Suppose the stack is filled with 1, 2, 3, 4




(**1** **ENTER** **2** **ENTER** **3** **ENTER** **4**). Pressing **R↓** four times "rolls" the numbers back into their original order. (See Figure 4). The **R↑** (*roll up*) key works the same as **R↓**, except it "rolls" the stack contents upward.



Figure 4 RPN Stacks




The **x↔y** key (*x exchange y*) switches the contents of the X- and Y-registers without affecting the rest of the stack. Pressing **x↔y** twice restores the original order of the X- and Y-register. The **x↔y** function is used primarily to swap the order of numbers in a calculation. For example, to calculate $9 \div (13 \times 8)$, enter **1** **3** **ENTER** **8** **×** **9** **x↔y** **÷**.

The LAST X register is a companion to the stack; it holds the

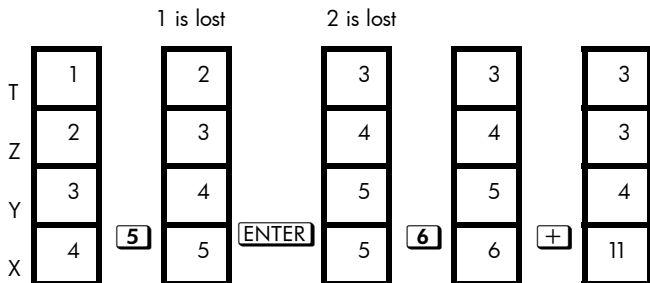
number that was in the X-register before the last numeric function was executed. Pressing  **LASTx** returns this value into the X-register. Retrieving the "last x" has two primary uses, correcting errors and reusing a number in a calculation. For example, suppose you wanted to find the square root of a number, but pressed **TAN** by mistake. You don't have to start over! To find the correct result, press  **LASTx** .

Some numerical operations require a single number for input, such as  **LN**, and **SIN**. In RPN mode, enter the number first and then the operation to be applied. For example, to square 3, press **3**  **x²**.

Some operations require two numbers, such as **+**, **y^x** and  **nCr**. The **ENTER** key is used to separate two numbers keyed in one after the other. For example, suppose the stack is already filled with 1, 2, 3, and 4 and you wish to evaluate 5+6. Press **5** **ENTER** **6** **+**. When **5** is pressed, the contents of the stack are pushed up one level – the previous value of 1 in the T register is lost. Pressing **ENTER** copies the X register to the Y register, pushing up the stack contents again but disabling stack lift. This stack lift disable condition after pressing **ENTER** allows the **6** keyed in next to overwrite the copy of 5 in the X register without pushing the stack up. The **+** adds the X and Y register contents together and drops the other stack values down one level. Therefore, the value of 3 in T is copied down to Z as shown

below. The LAST X register would hold the value of 6 in this example.

Figure 5



The stack allows longer problems to be evaluated easily. For example, to solve $(10 - 5) \div [(17 - 12) \times 4]$, press

1 0 ENTER 5 - 1 7 ENTER 1 2 - 4 × ÷.

Algebraic Mode

In Algebraic mode (ALG), arithmetic operations are preformed using the standard order of operations. Press **MODE 4** to set the calculator to ALG mode. When the calculator is in ALG mode, the **ALG** annunciator is on.

In ALG mode, numerical operations requiring a single number for input, such as **LN** and **SIN**, are evaluated by keying the

operation first, then the number, followed by **ENTER**. To square the number 3, press **\square x^2 3 **ENTER****.

For operations requiring two numbers, such as **\square $+$** , **\square $-$** , **\square \times** , **\square \div** , and **\square y^x** , key the first argument, followed by the operation to be performed, then key the second argument and press **ENTER** to evaluate the operation. For example, to evaluate $3+4$, press **3 $+$ 4 **ENTER****. To compute 3^4 , press **3 y^x 4 **ENTER****.

For other operations requiring two arguments, such as **\square \sqrt{y}** , **\square **%CHG****, and **\square **nCr****, key the operation first. The operation is prompted with open and close parentheses with a comma separating the arguments. The cursor is positioned just inside the open parenthesis. Key the first argument, press **\square** to move across the supplied comma, and then key the second argument followed by **ENTER**. For example, to compute the number of combinations of 69 items taken 2 at a time, press **\square **nCr** 6 9 \square 2 **ENTER****.

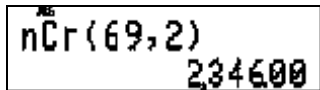


Figure 6

Once an expression has been evaluated, by pressing **\square**

and placing the cursor at the end of that expression, the expression can be changed and reevaluated. For example, if after computing the number of combinations of 69 items taken 2 at a time, you then decide to determine the number of combinations of 69 items taken 3 at a time, rather than entering the expression all over again, press $\boxed{\leftarrow} \boxed{\leftarrow} \boxed{\leftarrow} \boxed{3} \boxed{\text{ENTER}}$. For longer, more complicated expressions, this is often much easier than entering an entire expression again.

In ALG mode, operations are carried out in order of algebraic precedence, where certain functions are evaluated before others. For example, $\boxed{1} \boxed{+} \boxed{2} \boxed{\times} \boxed{3} \boxed{\text{ENTER}}$ would evaluate to 7, since multiplication is done before the addition. To change this, use parentheses to alter the expression: $\boxed{(} \boxed{1} \boxed{+} \boxed{2} \boxed{)} \boxed{\times} \boxed{3} \boxed{\text{ENTER}}$. In this instance, the parentheses are evaluated first, resulting in a value of 9 rather than 7.

Memory and Variables

The HP 35s has 30KB of memory for storing numbers, equations and programs. Numbers are stored in locations called variables or registers. Variables are named with a letter from A to Z, giving 26 directly addressable memory registers. There are also six registers that contain information for statistical calcula-

tions. These variables are always available for use. For example, in ALG mode, to save the currently displayed value into register Q, press **[R] [STO] [Q] [ENTER]**. To recall the value to use it again, press **[RCL] [Q] [ENTER]**. The stack registers X, Y, Z, and T are not the same as the memory registers with the same letter. For example, **[R] [STO] [T]** stores a number into *variable* T, not *stack register* T. The **[X↔Y]** function does not swap the values of the *data* registers X and Y but swaps *stack registers* X and Y. Memory is allocated to registers indirectly addressed. Reference these indirect registers by storing the numeric address desired into variable I or J and use the special functions **[R] [STO] [I]** or **[R] [STO] [J]** to store a value indirectly. For example, in ALG mode, to store a future result into indirect register 3 using register J, first store 3 into J by pressing **[3] [R] [STO] [J] [ENTER]**, compute the value to store and press **[R] [STO] [I] [ENTER]**. If J still holds 3, pressing **[RCL] [I] [ENTER]** recalls the value later for use.

Built-in Functions

Some of the many built-in functions are listed in Table 3.

Table 3 Built-in Functions









































Keys	Functions
 	Numeric integration of an equation
 SOLVE	Numeric evaluation and roots of an expression
 LN  LOG    10 ^x	Natural and common logarithm, e^x and 10^x
   1/x   x ²	y^x , $\sqrt[x]{y}$, reciprocal, \sqrt{x} , and x^2
 %  %CHG	Percent and percentage change
SIN COS TAN	Sine, cosine, tangent, and inverses
 HYP SIN COS TAN	Hyperbolic trigonometric functions and inverses
 BASE (Menu)	Conversion of numbers in bases 2, 8, 10 and 16
 LOGIC (Menu)	AND, XOR, OR, NOT, NAND and NOR operations

Table 3 Built-in Functions

Keys	Functions
 INTG (Menu)	Quotient and remainder, integer division
 →KM  →MILE  →kg  →lb  →l  →gal  →cm  →in  →°C  →°F	Miles to kilometers, pounds to kilograms, gallons to liters, inches to centimeters, Fahrenheit to Celsius, and inverses
 5  →HMS	Hours, minutes, seconds to decimal hours and inverse
 →RAD  →DEG	Degrees to radians and radians to degrees
 !  nPr  nCr  RAND  SEED	Factorial (gamma), permutation, combination, random number, random number seed
 \bar{x}, \bar{y} (Menu)	Mean, sample and population standard deviations
 L.R. (Menu)	Slope, intercept, estimation, correlation, weighted average

Physics Constants











Press  **CONST** to view and use any of the 41 built-in physics constants. The values of these constants that have units are in SI units (International Standard).

Table 4 Physics Constants

Physics Constants	
Speed of light in vacuum	Standard acceleration of gravity
Newtonian constant of gravitation	Nuclear magneton
Molar volume of ideal gas	Proton magnetic moment
Avogadro constant	Electron magnetic moment
Rydberg constant	Neutron magnetic moment
Elementary charge	Muon magnetic moment
Electron mass	Classical electron radius
Proton mass	Characteristic impedance of vacuum
Neutron mass	Compton wavelength
Muon mass	Neutron Compton wavelength
Boltzmann constant	Proton Compton wavelength
Planck constant	Fine structure constant
Planck constant over 2π	Stefan-Boltzmann constant

Table 4 Physics Constants

Physics Constants	
Magnetic flux quantum	Celsius temperature of melting point of water ice in degrees Kelvin
Vacuum dielectric constant	Standard atmosphere
Molar gas constant	Proton gyromagnetic ratio
Faraday constant	First radiation constant
Atomic mass constant	Second radiation constant
Magnetic permeability of vacuum	Conductance quantum
Bohr magneton	The value e (base for natural logs)
Bohr radius	

To use a constant, position your cursor where you want the constant inserted, press   to display the physics constants menu. Press     or   to access the next menu page to scroll until the desired constant is underlined, and then press  to insert the constant.

For example, since the speed of light, c , in meters per second is the first constant on the first page of the constants menu, to subtract one meter per second from it in ALG mode, press

$\left[\text{CONST} \right] \left[\text{ENTER} \right] \left[- \right] \left[1 \right] \left[\text{ENTER} \right]$.

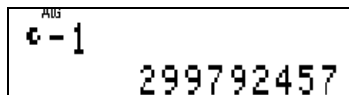


Figure 7

Note: constants are referred to by their symbols rather than their numeric values when used in expressions, equations, and programs.

Fractions

Numbers may be entered as fractions of the form “a b/c,” results viewed as fractions, and display of fractions controlled. The symbol “a b/c” is written below the decimal point key on the keyboard as a reminder that this key is used for most operations with fractions. For example, to enter the fraction $1 \frac{3}{4}$, press $\left[1 \right] \left[\cdot \right] \left[3 \right] \left[\cdot \right] \left[4 \right]$. Pressing the decimal point a second time interprets the value being entered as a fraction. For example, to add $1 \frac{3}{4}$ to $\frac{5}{8}$ in ALG mode, press

$\left[1 \right] \left[\cdot \right] \left[3 \right] \left[\cdot \right] \left[4 \right] \left[+ \right] \left[\cdot \right] \left[5 \right] \left[\cdot \right] \left[8 \right] \left[\text{ENTER} \right]$. In RPN mode, press $\left[1 \right] \left[\cdot \right] \left[3 \right] \left[\cdot \right] \left[4 \right] \left[\text{ENTER} \right] \left[0 \right] \left[\cdot \right] \left[5 \right] \left[\cdot \right] \left[8 \right] \left[+ \right]$.

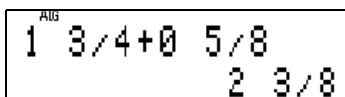



Figure 8

To display values entered as fractions use the Fraction Display  **FDISP**.

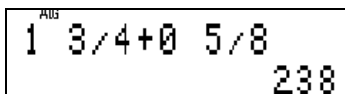








Figure 9



If values are displayed as decimal values, pressing  **FDISP** changes the display view to show fractions. Pressing it again changes the display back to decimal values. More exact control of the fraction display is possible using the   function.

Complex Numbers

To distinguish complex numbers from real numbers, the keys  and  facilitate entry of a complex number in one of three forms: xiy , $r\theta a$, and $x+yi$. The form in which a complex number is displayed is controlled by choosing  **DISPLAY**, menu options 9, 10 or 11. Option 9 is the xiy form. Option 10 is the $r\theta a$ form. Option 11 is the $x+yi$ form and is only available in

ALG mode. A complex number can be entered in a format other than the current display format – it will be converted to the display format after entry. In RPN mode, the 4-level stack can hold 4 complex numbers at one time. In ALG mode, an expression can contain as many complex numbers as needed.

The HP 35s processes complex arithmetic (+, −, ×, ÷), complex trigonometry (sin, cos, tan), and the mathematics functions −z,

$1/z$, $z_1^{z_2}$, $\ln z$, and e^z . (where z_1 and z_2 are complex numbers). It also computes the magnitude of a vector represented by the parts of a complex number. To separate the magnitude and angle of a complex number in rθa form, use the  **ABS** and  **ARG** functions.

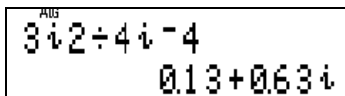


Figure 10

In ALG mode to find $3+2i \div 4-4i$ press

3 **i** **2** **÷** **4** **i** **+/-** **4** **ENTER**.

In RPN mode, press **3** **i** **2** **ENTER** **4** **i** **+/-** **4** **÷**.

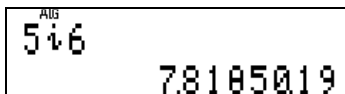


Figure 11

To find the magnitude of the vector represented by the complex number $5+6i$, in either RPN or ALG mode, press **5** **i** **6** to enter the vector, then press **↵** **DISPLAY** **◊** **0** to place the HP 35s into the complex number r0a display mode. The magnitude is displayed as the 7.81 portion of the complex number as shown in the display graphic above.

Vectors

Vectors are treated as objects separate from real and complex numbers. Enter vectors using the **→** **□** keys. This entry opens an empty set of brackets to hold the values within the two or

three dimensional vector. Elements of a vector are separated with a comma, entered by pressing $\boxed{\leftarrow}$ $\boxed{,}$. The elements stored in a vector cannot be complex numbers or vectors themselves. Vectors can also be used in equations and programs. Vectors may be subtracted, multiplied, divided, and multiplied by a constant. The $\boxed{\leftarrow}$ $\boxed{\text{ABS}}$ function computes the magnitude of a vector.

To determine the dot product of $[1,3]$ and $[3,1]$ in ALG mode, press:

$\boxed{\leftarrow}$ $\boxed{[]}$ $\boxed{1}$ $\boxed{\leftarrow}$ $\boxed{,}$ $\boxed{3}$ $\boxed{\rightarrow}$ $\boxed{\times}$ $\boxed{\leftarrow}$ $\boxed{[]}$ $\boxed{3}$ $\boxed{\leftarrow}$ $\boxed{,}$ $\boxed{1}$ $\boxed{\text{ENTER}}$.

In RPN mode, press:

$\boxed{\leftarrow}$ $\boxed{[]}$ $\boxed{1}$ $\boxed{\leftarrow}$ $\boxed{,}$ $\boxed{3}$ $\boxed{\text{ENTER}}$ $\boxed{\leftarrow}$ $\boxed{[]}$ $\boxed{3}$ $\boxed{\leftarrow}$ $\boxed{,}$ $\boxed{1}$ $\boxed{\times}$. The dot product is equal to 6.

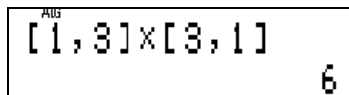


Figure 12

Statistics

The HP 35s can analyze a set of one or two variable statistical data made up of real numbers. The functions provided include the mean of X and Y values, the average of X weighted by Y, as

well as the sample and population standard deviations. Statistical data are entered using the $\Sigma+$ key. If you make a mistake entering a value or values, key them in again and press \leftarrow $\Sigma-$ to remove them.

For example, suppose you wish to find the average X and Y values of the following set of data points: (1,2), (4,5), and (9,4). First, clear the statistical data registers by pressing \leftarrow CLEAR \leftarrow 4 \leftarrow . Then in either ALG or RPN mode, enter the first data point by pressing 1 ENTER 2 $\Sigma+$. The display shows a value of 1 to indicate that one data point has been entered.



Figure 13

Enter the remaining data values the same way:

4 ENTER 5 $\Sigma+$ 9 ENTER 4 $\Sigma+$.

To display the averages, press \leftarrow $\overline{x}, \overline{y}$ to view the averages menu. The average X value is 3.67.

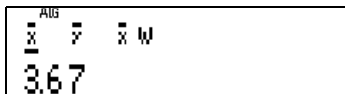


Figure 14

pressing **1** **ENTER** **2** **$\Sigma+$** **4** **ENTER** **5** **$\Sigma+$** **9** **ENTER** **4** **$\Sigma+$** .

To view the results of the linear regression, press **\leftarrow** **L.R.** to view the linear regression menu.

The first menu entries are used to estimate an X value given a value of Y, and a Y value given a value of X.

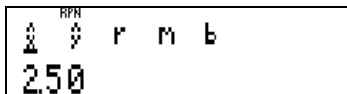


Figure 16

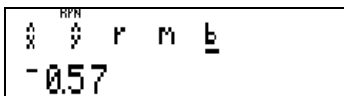


Figure 17

The third entry on the menu displays the correlation coefficient, r . The next two entries on the menu display the slope and Y-intercept of the line that best fits the data points. To view the slope, press **\rightarrow** **\rightarrow** **\rightarrow** to move the cursor under the m symbol in the menu. The slope is 1.43. Press **\rightarrow** to view the Y-intercept, which is -0.57 .

To estimate X and Y values using the linear regression equation, enter the known value, then enter the linear regression menu to view the estimated value. In this example, to estimate a Y value

when $X=6$, press \boxed{C} $\boxed{6}$ $\boxed{\rightarrow}$ $\boxed{L.R.}$ $\boxed{\rightarrow}$. The estimated Y value is 8.

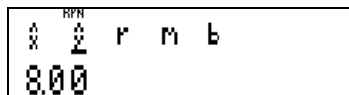


Figure 18

Equations and HP Solve

HP Solve is a powerful feature, a feature unique to HP calculators that solves for unknown variables in equations or expressions. In addition, you can evaluate and integrate expressions entered into the equation catalog. The HP Solve and integration features can be extended to work with programs as well as expressions. Pressing the \boxed{EQN} key displays the HP 35s equation catalog.



Figure 19

If there are no user-entered equations, the display appears as shown at right. The \uparrow and \downarrow annunciators on the upper right of the display indicate that the catalog contains more entries than are presently shown on the screen. The $\boxed{\wedge}$ and $\boxed{\vee}$ keys scroll through the entries in this catalog. There are two permanent

equations in the catalog, 2 by 2 and 3 by 3 linear equation solvers. Equations and expressions may be used in several ways. You can specify that an equation evaluates, solves for unknown values (find roots), and is used for numeric integration.

Evaluating Expressions

The HP 35s evaluates expressions entered into the equation list. For example, if you wish to evaluate X^2-4 for various values of X , press **[EQN]** and then press **[RCL] [X] [y^x] [2] [-] [4] [ENTER]**. The **[RCL]** key allows you to press a key showing a letter on the front to enter a variable into an equation.

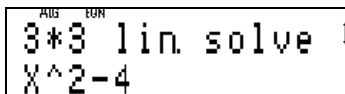


Figure 20

To evaluate this expression at a value of $X=3$, press **[ENTER]** when the equation is displayed. At the “?” prompt, enter a value for X .



Figure 21

Press **[3]** and then the **[R/S]** key at the top left of the keyboard.

The display shows the value of the expression when $X=3$, which is 5.



Figure 22

To evaluate the expression at another value of X , press the **[EQN]** key, then **[ENTER]**, and key the next value of X and **[R/S]**. This operation can be repeated as often as you may need to evaluate the expression at different values of a variable.

The process is the same for an expression containing more than one variable. For example, to evaluate $3X+Y^2$ for values of X and Y , press **[EQN]** then press

[3] [X] [RCL] [X] [+] [RCL] [Y] [y^x] [2] [ENTER].

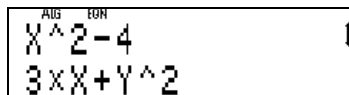


Figure 23

To evaluate this expression at $X=1$ and $Y=3$, press

ENTER **1** **R/S** **3** **R/S**.



Figure 24

Finding Roots of Equations

The HP 35s can find roots of equations entered into the equation list. For example, suppose you wish to find the roots of the polynomial, $X^2 - 3X + 2 = 0$. First, enter the equation into the equation catalog. Press:

EQN **RCL** **X** **y^x** **2** **-** **3** **x** **RCL** **X** **+** **2** **↵** **=** **0** **ENTER**.

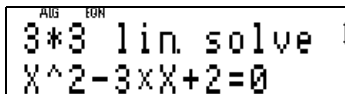


Figure 25

Then press the **EQN** key again to leave the equation catalog. HP Solve uses the value currently stored in the variable as an initial guess for a root. Therefore, store an initial guess of zero for the root into the variable X in the equation by pressing

0 **↵** **STO** **X** **ENTER** in ALG mode. **Note:** there is no need to

press **ENTER** in RPN mode.

To solve for a value of X that makes the left side of the equation equal zero, press **EQN** **▢** **SOLVE** **X**. The root of $X=1$ is found.

The image shows a rectangular calculator display. In the top left corner, the word "ALG" is displayed. The main display area shows "X=" on the left and "1.00" on the right.

Figure 26

To check for additional roots, change the initial guess to a different value and try again. Press **5** **▢** **STO** **X** **ENTER** in ALG mode. Then press **EQN** **▢** **SOLVE** **X**. The root of $X=2$ is found.

The image shows a rectangular calculator display. In the top left corner, the word "ALG" is displayed. The main display area shows "X=" on the left and "2.00" on the right.

Figure 27

As with expressions in the previous section, roots for equations with more than one variable can be found as well.

Integrating Expressions

The HP 35s numerically integrates expressions in the equation catalog or program routines that define the function to be integrated. **Note:** the display mode is used to specify the desired

accuracy of a result, which also affects the time taken to get a result. FIX 2 returns a result much faster than SCI 9, but it is also less precise.

For example, to integrate $1/X$ from 1 to 4, press

[EQN] **[1/X]** **[RCL]** **[X]** **[ENTER]** to enter expression in the equation catalog. The expression appears in the catalog as shown in the display. INV(X) is how the solver shows the **[1/X]** function.

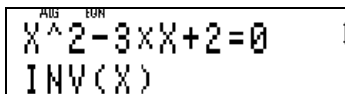


Figure 28

Press **[EQN]** to leave the equation catalog.

To integrate the expression, in either mode, the lower and upper limits of integration must be specified. First press **[1]** **[ENTER]** **[4]** and then **[EQN]** **[∫]** **[/]**. At this point, the display appears as shown below.

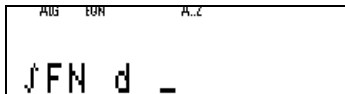


Figure 29

Specify the variable of integration, in this case, the variable X,

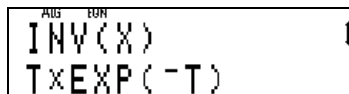
by pressing the letter key \boxed{X} . The message “INTEGRATING” briefly displays before the result of 1.39 appears.



The calculator display shows the integral symbol followed by an equals sign and the result 1.39. Above the integral symbol, the word "ANS" is visible.

Figure 30

For another example, to integrate Te^{-T} from 0 to 10, first enter the expression into the equation catalog by pressing $\boxed{\text{EQN}} \boxed{\text{RCL}} \boxed{T} \boxed{X} \boxed{\rightarrow} \boxed{e^x} \boxed{+/-} \boxed{\text{RCL}} \boxed{T} \boxed{\text{ENTER}}$. The display appears as shown below.





The calculator display shows the expression INV(X) at the top and T * EXP(-T) below it. Above INV(X), the words "ANS" and "EQN" are visible.

Figure 31

Press $\boxed{\text{EQN}}$ to leave the equation catalog. Input the limits of the integration by pressing $\boxed{0} \boxed{\text{ENTER}} \boxed{1} \boxed{0}$. Press $\boxed{\text{EQN}}$ and then integrate the expression by pressing $\boxed{\text{EQN}} \boxed{\text{ENTER}} \boxed{T}$. After a few moments, the result of 1.00 is displayed.

Linear Solver

There are two permanent entries in the equation catalog that solve problems involving 2 by 2 and 3 by 3 systems of linear equations. These entries can be found just below the EQN LIST

TOP prompt in the equation catalog. Use the  and  keys to move through the catalog until “**2*2** and **3*3 lin solve**” is displayed.

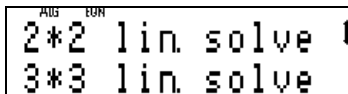




Figure 32

An example of a 2 by 2 linear system might be $3X + Y = 10$ and $X - 2Y = 8$, which has the solution set $\{X = 4, Y = -2\}$. This example contains six coefficients, 3, 1, and 10 for the first equation in the system, and 1, -2, and 8 for the second equation. A 3 by 3 system contains a total of twelve coefficients.

Not every system of linear equations has a solution. Some systems have an infinite number of solutions. The linear solver equations built into the HP 35s detects situations where no solution exists, or where an infinite number of solutions exist.

To solve the 2 by 2 linear system presented above, make sure the “2*2 lin. solve” entry in the equation catalog is on the bottom line of the display, using the  and  keys, if necessary.

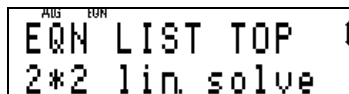


Figure 33

Begin the solution by pressing **[2] [SOLVE]**. The HP 35s prompts for the entry of the six coefficients, which are stored in lettered variables A through F. The value stored in variable A is displayed, which you may use by pressing **[R/S]**, or replace by keying in another value and pressing **[R/S]**. Enter the first coefficient **[3] [R/S]**.



Figure 34

A prompt for each successive coefficient appears. Press **[1] [R/S] [1] [0] [R/S] [1] [R/S] [2] [+/-] [R/S] [8] [R/S]** to enter these remaining values. The message "SOLVING" briefly displays, followed by the value found for X.



Figure 35

The \uparrow and \downarrow annunciators at the right of the display indicate that more information exists. Press $\square \vee$ to display the value found for Y.



Figure 36










The solution to this 2 by 2 system is $\{X = 4, Y = -2\}$. Solving 3 by 3 linear systems is done in the same manner.

Programming

Entering simple calculations once is easy, however, entering the same calculation multiple times, or doing a complicated calculation, can be time-consuming. It is preferable to store all the steps needed for the calculation in a program. A program is simply a stored sequence of instructions. Once it is written, it can be tested to see if it works correctly, then used many times without the need to press every key of the calculation each time. Some of the many operations commands permit programs to perform include:

- performing tests upon a number in the X register and transferring execution to a different part of the program, depending on the result of the test.
- looping through a section until a certain condition is met.

Now, enter the program by typing:

  A       . Each line of the program begins with the letter of the label and then has a three-digit line number. (See displays below).

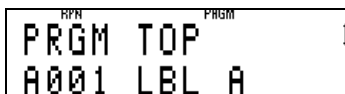


Figure 38

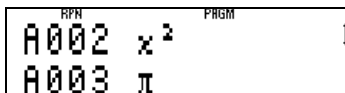


Figure 39

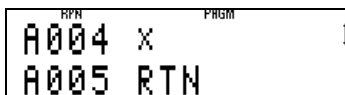











Figure 40

The rest of the program line is a function or program instruction. The program instructions here are the   and   instructions, while the functions are     .

To use this program, press **[F4] [PRGM] [F4] [RTN]** to move out of program mode and return to the top of the program.

To calculate the area of a circle with a radius of 5, make sure RPN mode is set (**[MODE] [5]**) and press **[5] [R/S]**. The area of 78.54 inches is displayed. These steps may be repeated to determine the area of as many circles as you wish. To compute the area of a circle with a radius of 10 inches, press **[1] [0] [R/S]**. The answer of 314.16 inches is displayed below 78.54.

ALG Programming Example

In ALG mode, the program looks very similar, but the calculation keys are typed in algebraic order. Programs may not have the same labels, so the algebraic mode program below is given the label "B".

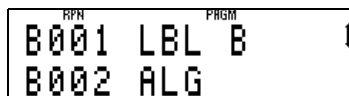


Figure 41

Go to the beginning of program memory by typing **[GTO] [0] [0]**. To set the program mode, press **[F4] [PRGM]**. Type the algebraic mode program:

[F4] [LBL] [B] [MODE] [4] [F4] [x²] [R↓] [←] [ENTER] [→] [×] [F4] [π] [ENTER] [F4] [RTN].

Here is a step-by-step explanation of this program:

Program line B002 is an instruction to set ALG mode, to make sure program B is not accidentally used in RPN mode. If you always work in ALG mode, or if you always remember to switch to the proper mode before using this program, then this program line is not needed – but it is always safer to use it. A similar line, setting RPN mode, could have been used in program A for the same reason.

Line B003 squares the value in the X-register and multiplies it by π .



Figure 42

Enter the REGX instruction by using the **[R↓]** key and moving the cursor to the left before pressing **[ENTER]**. REGX refers to the value in the display – the X register. Since this program line is wider than the screen, an ellipsis is displayed as shown in the second screen image at right. To view the entire program line when it is on the lower line of the screen, press **[◀]** and the entire line is displayed.

The **[G] [RTN]** instruction at line B004 stops program execution

and returns to line B001 at the top of program B.

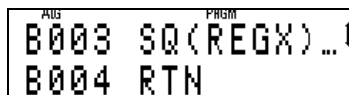


Figure 43

This program works just like the RPN version. To use it, first move out of program mode and go to the beginning of the program. Press **▶** **PRGM** **◀** **RTN**. Type a radius and run the program. To calculate the area of a circle with a radius of 5 inches, press **5** **R/S**. The area of 78.54 inches is displayed.



Figure 44

To determine the area of additional circles, key the radius and press **R/S** for each circle. To compute the area of a circle with a radius of 10 inches, press **1** **0** **R/S**. The answer of 314.16 inches is displayed.


Additional Resources

There are additional resources designed to help you get the most out of your HP 35s calculator. In addition to this quick start guide, a printed copy of the user's guide can be obtained free

of charge by calling HP Customer Care at 800-HP-INVENT. HP also provides a detailed series of training aids and learning modules specifically tailored to the capabilities of your HP 35s calculator. Refer to the HP website for the various learning products available for the HP 35s.

Warranty and Contact Information

Replacing the Batteries

The calculator uses two, 3 Volt CR2032 Lithium batteries. The low battery symbol () appears when battery power is nearly exhausted. Use only fresh batteries when replacing the battery. Do not use rechargeable batteries. To install a new battery:

1. Turn off the calculator. Changing the batteries with the calculator on may erase the contents of the Continuous Memory.
2. Remove only one battery at a time. Gently pry open the back cover. Remove one of the old batteries and replace it with a new battery with the positive polarity symbol facing outward.
3. Remove the other old battery and replace it with a new battery with the positive polarity symbol facing outward.
4. Replace the back cover.

Warning! There is danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Do not mutilate, puncture, or dispose of batteries in fire. The batteries can burst or explode, releasing hazardous chemicals.

HP Limited Hardware Warranty and Customer Care

This HP Limited Warranty gives you, the end-user customer, express limited warranty rights from HP, the manufacturer. Please refer to HP's Web site for an extensive description of your limited warranty entitlements. In addition, you may also have other legal rights under applicable local law or special written agreement

with HP.

Limited Hardware Warranty Period

Duration: 12 months total (may vary by region, please visit www.hp.com/support for latest information).

General Terms

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TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE YOUR SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL HP OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE. Some countries, States or provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE, RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

Notwithstanding the above disclaimers, HP expressly warrants to you, the end-user customer, that HP hardware, accessories and supplies will be free from defects in materials and workmanship after the date of purchase, for the period specified above. If HP receives notice of such defects during the warranty period, HP will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.

HP also expressly warrants to you that HP software will not fail to execute its programming instructions after the date of purchase, for the period specified above, due to defects in material and workmanship when properly installed and used. If HP receives notice of such defects during the warranty period, HP will replace software media which does not execute its programming instructions due to such defects.

Exclusions

HP does not warrant that the operation of HP products will be uninterrupted or error free. If HP is unable, within a reasonable time, to repair or replace any product to a condition as warranted, you will be entitled to a refund of the purchase price upon prompt return of the product with proof of purchase.

HP products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.

Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by HP, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.

Customer Care

In addition to the one year hardware warranty your HP calculator also comes with one year of technical support. If you need assistance, HP customer care can be reached by either email or telephone. Before calling please locate the call center

nearest you from the list below. Have your proof of purchase and calculator serial number ready when you call.

Telephone numbers are subject to change, and local and national telephone rates may apply. For more support information, please visit the web at: **www.hp.com/support**.

Table 1-1 Customer Care

Country	Hotline Phone	Country	Hotline Phone
Algeria	www.hp.com/support	Anguila	1-800-711-2884
Antigua	1-800-711-2884	Argentina	0-800-555-5000
Aruba	800-8000 ; 800-711-2884	Australia	1300-551-664 or 03-9841-5211
Austria	01 360 277 1203	Bahamas	1-800-711-2884
Barbados	1-800-711-2884	Belgium	02 620 00 86
Belgium	02 620 00 85	Bermuda	1-800-711-2884
Bolivia	800-100-193	Botswana	www.hp.com/support
Brazil	0-800-709-7751	British Virgin Islands	1-800-711-2884
Bulgaria	www.hp.com/support	Canada	800-HP-INVENT
Cayman Island	1-800-711-2884	Chile	800-360-999

Table 1-1 Customer Care

Country	Hotline Phone	Country	Hotline Phone
China	010-58301327	Columbia	01-8000-51-4746-8368 (01-8000-51- HP INVENT)
Costa Rica	0-800-011-0524	Croatia	www.hp.com/support
Curacao	001-800-872-2881 + 800-711-2884	Czech Republic	296 335 612
Denmark	82 33 28 44	Dominica	1-800-711-2884
Dominican Republic	1-800-711-2884	Equador	1-999-119 ; 800-711-2884 (Andinatel) 1-800-225-528; 800-711-2884 (Pacifitel)
Egypt	www.hp.com/support	El Salvador	800-6160
Estonia	www.hp.com/support	Finland	09 8171 0281
France	01 4993 9006	French Antilles	0-800-990-011; 800-711-2884
French Guiana	0-800-990-011; 800-711-2884	Germany	069 9530 7103

Table 1-1 Customer Care

Country	Hotline Phone	Country	Hotline Phone
Ghana	www.hp.com/ support	Greece	210 969 6421
Grenada	1-800-711-2884	Guadelupe	0-800-990-011; 800-711-2884
Guatemala	1-800-999-5105	Guyana	159 ; 800-711- 2884
Haiti	183 ; 800-711- 2884	Honduras	800-0-123 ; 800-711-2884
Hong Kong	852 2833-1111	Hungary	www.hp.com/ support
Indonesia	+65 6100 6682	Ireland	01 605 0356
Italy	02 754 19 782	Jamaica	1-800-711-2884
Japan	81-3-6666-9925	Kazakhstan	www.hp.com/ support
Latvia	www.hp.com/ support	Lebanon	www.hp.com/ support
Lithuania	www.hp.com/ support	Luxembourg	2730 2146
Malaysia	+65 6100 6682	Martinica	0-800-990-011; 877-219-8671

Table 1-1 Customer Care

Country	Hotline Phone	Country	Hotline Phone
Mauritius	www.hp.com/ support	Mexico	01-800-474- 68368 (800 HP INVENT)
Montenegro	www.hp.com/ support	Montserrat	1-800-711-2884
Morocco	www.hp.com/ support	Namibia	www.hp.com/ support
Netherland Antilles	001-800-872- 2881 ; 800-711- 2884	Netherlands	020 654 5301
New Zealand	0800-551-664	Nicaragua	1-800-0164; 800-711-2884
Norway	23500027	Panama	001-800-711- 2884
Paraguay	(009) 800-541- 0006	Peru	0-800-10111
Philippines	+65 6100 6682	Poland	www.hp.com/ support
Portugal	021 318 0093	Puerto Rico	1-877 232 0589
Romania	www.hp.com/ support	Russia	495 228 3050

Table 1-1 Customer Care

Country	Hotline Phone	Country	Hotline Phone
Saudi Arabia	www.hp.com/ support	Serbia	www.hp.com/ support
Singapore	+65 6100 6682	Slovakia	www.hp.com/ support
South Africa	0800980410	South Korea	2-561-2700
Spain	913753382	St Vincent	01-800-711-2884
St Kitts & Nevis	1-800-711-2884	St Lucia	1-800-478-4602
St Marteen	1-800-711-2884	Suriname	156 ; 800-711- 2884
Swaziland	www.hp.com/ support	Sweden	08 5199 2065
Switzerland	022 827 8780	Switzerland	01 439 5358
Switzerland	022 567 5308	Taiwan	+852 2805- 2563
Thailand	+65 6100 6682	Trinidad & Tobago	1-800-711-2884
Tunisia	www.hp.com/ support	Turks & Caicos	01-800-711-2884
UAE	www.hp.com/ support	United Kingdom	0207 458 0161
Uruguay	0004-054-177	US Virgin Islands	1-800-711-2884

Table 1-1 Customer Care

Country	Hotline Phone	Country	Hotline Phone
USA	800-HP INVENT	Venezuela	0-800-474-68368 (0-800 HP INVENT)
Vietnam	+65 6100 6682	Zambia	www.hp.com/support

Product Regulatory & Environment Information

Federal Communications Commission Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may

void the user's authority to operate the equipment.

Declaration of Conformity for products Marked with FCC Logo, United States Only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. If you have questions about the product that are not related to this declaration, write to:

Hewlett-Packard Company
P.O. Box 692000, Mail Stop 530113
Houston, TX 77269-2000

For questions regarding this FCC declaration, write to:

Hewlett-Packard Company
P.O. Box 692000, Mail Stop 510101
Houston, TX 77269-2000
or call HP at 281-514-3333

To identify your product, refer to the part, series, or model number located on the product.

Canadian Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Avis Canadien

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

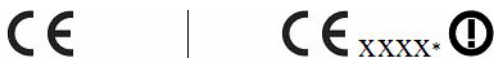
European Union Regulatory Notice

This product complies with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

- Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) which are listed on the EU Declaration of Conformity issued by Hewlett-Packard for this product or product family.

This compliance is indicated by the following conformity marking placed on the product:



This marking is valid for non-Telecom products and EU harmonized Telecom products (e.g. Bluetooth).

This marking is valid for EU non-harmonized Telecom products.
*Notified body number (used only if applicable-refer to the product label).

Hewlett-Packard GmbH, HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, Germany

Japanese Notice

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス B 情報技術装置です。この装置は、家庭環境で使用することを目的としています。この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

Disposal of Waste Equipment by Users in Private Household in the European Union



This symbol on the product or on its packaging indicates that this product just not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Chemical Substances

HP is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (*Regulation EC No 1907/2006 of the European Parliament and the Council*). A chemical information report for this product can be found at:

<http://www.hp.com/go/reach>

Perchlorate Material - special handling may apply

This calculator's Memory Backup battery may contain perchlorate and may require special handling when recycled or disposed in California.

<p>产品中有毒有害物质或元素的名称及含量</p> <p>根据中国《电子信息产品污染控制管理办法》</p>						
部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCA	X	O	O	O	O	O
外觀殼 /字鍵	O	O	O	O	O	O

O：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006标准规定的限量要求以下。

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006标准规定的限量要求。

表中标有“X”的所有部件都符合欧盟RoHS法规

“欧洲议会和欧盟理事会2003年1月27日关于电子电器设备中限制使用某些有害物质的2002/95/EC号指令”

注：环保使用期限的参考标识取决于产品正常工作的温度和湿度等条件

