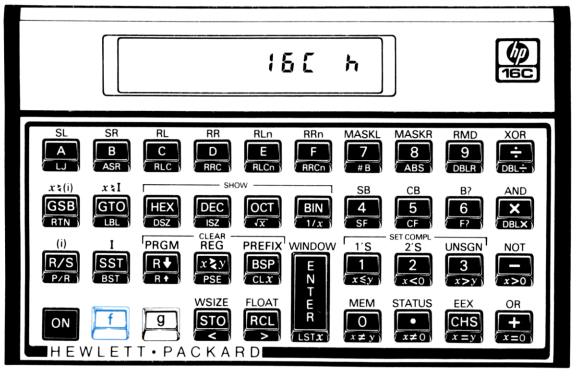

42: Fourth Row, Second Column

Example

The following program utilizes the "double" functions (explained on pages 52-55) to multiply large numbers *of any base* and obtain an exact *decimal* answer up to 39 digits long (that is, up to and not including $10^{19} \times 2^{64}$). The double-sized result is placed into registers X (the most significant digits) and Y (the 19 least significant digits).

Since the "double" functions operate internally in *binary*, it is necessary to perform the extra manipulations below (dividing by 10^{19}, the largest exponent of 10 that can be held in one register) to obtain a meaningful *decimal* answer.

Keystrokes	Display	
f CLEAR PRGM		Sets program memory to line 000 but does *not* clear it. (This function only clears in Program mode.)
g P/R	**000–**	Program mode (**PRGM** annunciator displayed).
g LBL 1	**001–43,22, 1**	

Keystrokes	Display		
f SET COMPL UNSGN	002–	42 3	Allows a larger possible answer since there is no sign bit.
g DBL×	003–	43 20	Double-multiplies the contents of the X- and Y-registers.
STO 1	004–	44 1	Stores the most significant digits of the result into R_1.
x≷y	005–	34	
STO 2	006–	44 2	Stores the least significant digits of the result into R_2.
x≷y	007–	34	
RCL 0	008–	45 0	Recalls (for the divisor) the largest possible power of 10.
g DBLR	009–	43 9	
RCL 2	010–	45 2	Ninteen least significant digits of product.
RCL 1	011–	45 1	Most significant digits.
RCL 0	012–	45 0	Divisor.
g DBL÷	013–	43 10	
DEC	014–	24	Ensures that the result is expressed in base 10.
g RTN	015–	43 21	

To run the program, set the word size to 64 and store 10^{19} (the largest possible power of 10 in Unsigned mode) into R_0. Then enter the numbers 12345678987654 and 987654321234567 into the X- and Y-registers.

Keystrokes	Display	
[g] [P/R]		Returns to Run mode (no **PRGM** annunciator). Display shows last result.
0 [f] [WSIZE] [DEC]		Sets word size 64, the largest possible word size.
[f] SET COMPL [UNSGN]		
10000000 00000000	**00000000** .d	
0000 [STO] 0	**00000000** .d	Stores 10^{19} in R_0.
12345678987654		
[ENTER]	**78987654** .d	Enters the two numbers to be multiplied.
987654321234567	**21234567** .d	
[GSB] 1	**19326320** .d	Executes program
[f] [WINDOW] 1	**12** d.	labeled "1"; resulting product is in X- and Y-registers. Most significant word is 1,219,326,320.
[x⇄y]	**31035818** .d	Least significant word
[f] [WINDOW] 1	**12676360** .d.	(19 digits) 0,731,267,
[f] [WINDOW] 2	**73** d.	636,031,035,818. Exact answer is 12,193,263,
	Leading zero suppressed.	200,731,267,636,031, $035,818_{10}$.

To repeat the program with different values for the multiplicands, just place those numbers in the X- and Y-registers and press [GSB] 1. (Flag 4 is set during execution of this program because the [DBL÷] operation leaves a remainder not equal to zero. However, this is of no significance because the program calculates the remainder in line 009.)

Further Information

Program Labels

Labels in a program (or subroutine) are markers telling the calculator where to begin execution. There are 16 possible labels