

Some Notes about HP 48SX and 50g Graphing and Scientific Calculators

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Abstract

This document is the result of a certain study of [1] and [2] with the addition of some simple functions and programs developed.



Contents

1	Common solutions	1
1.1	Evidences	1
1.2	Evaluation of polynomials	2
1.3	The function \rightarrow ROW	2
2	HP 48SX	3
2.1	Errors in [1]	3
3	HP 50g	4
3.1	Evidences	4
3.2	Graphics	5
3.3	Doubts	5
3.4	Errors in [2]	6
	References	8

1 Common solutions

1.1 Evidences

- Remember for both calculators that TICKS provides system time as binary integer in units of clock ticks with 1 tick = 1/8192 sec.

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- CLVAR is useful for both, to purge all the variables from an index. In 48SX it's possible to have it prepared with $\boxed{\uparrow}$ PURGE. Unfortunately there is no shortcut in 50g.

1.2 Evaluation of polynomials

To solve a polynomial with the 50g there is a bit too hidden function PEVAL which considers the coefficients a_i of the polynomial:

$$a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x^1 + a_0 x^0$$

exactly in this order and put into a vector $[a_n \dots a_0]$. With the 48SX it's easy to program the function using a reversed vector $[a_0 \dots a_n]$ as in the following function PEv1:

```

<< → x
<< OBJ→ OBJ→ SWAP 1 -
  START
  x * +
  NEXT
>>

```

A function that behaves as the 50's PEVAL, having the same order of the coefficients, may be Pev:

```

<< → x
<< OBJ→ OBJ→ 0 ROT 1 + ROT 1 +
  FOR j
  x * j ROLL +
  -1 STEP
>>

```

which is more complex than Pev1, but has the advantage of using exactly the same vector than PEVAL. Note as well in fig. 1, that PEv, as PEVAL, works even with one-element vector (*i.e.*: a constant), where PEv1 can work with 2-elements at the minimum (*i.e.*: linear).

1.3 The function →ROW

The function →ROW of the 50g is quite useful, but missing on the 48SX. Here is a substitute which works exactly in the same way, as shown in fig. 2 as well:

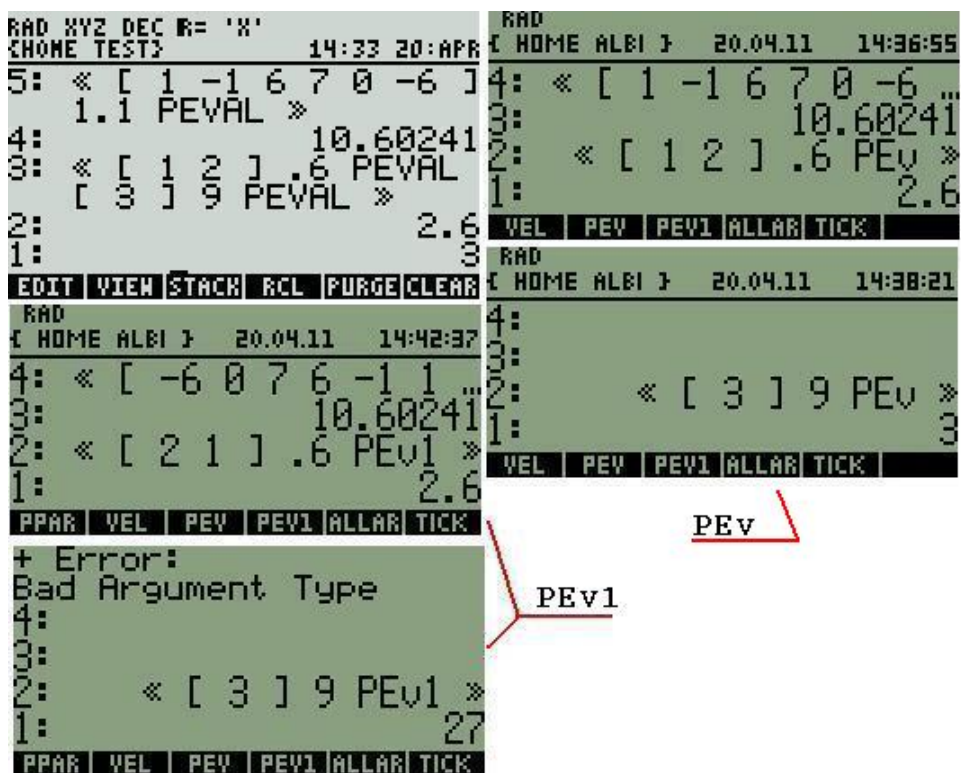


Fig. 1: Check of polynomials functions in HP 50g (light grey screen) and in HP 48SX (darker and sort of greenish screen).

```

<< OBJ → OBJ → DROP → R C
  << R C * → p
  << 1 R START
    1 C START
      p ROLL
      NEXT
  C →ARRY p C - 1 + 'p' STO
    NEXT
  >> R >>>
    
```

2 HP 48SX

2.1 Errors in [1]

- p. 155: RDZ is a function to set the seed and not to produce a random number with the seed in level 1.



Fig. 2: An example of the function \rightarrow ROW.

- p. 363: Probably that [3 4 5] should be [4 5 6]!
- pp. 428–430: the example of solution of the equation:

$$\frac{3}{2x-1} + 4 = \frac{6x}{2x-1}$$

which gives $x = 0.5$ in the text, is absolutely wrong, because the equation is always false and with no solutions: in fact should be $x \neq \frac{1}{2}$.

- pp. 430–432: the “right” solution of equation:

$$\frac{n-5}{6n-6} = \frac{1}{9} - \frac{n-3}{4n-4}$$

should be $n = \frac{53}{11}$ and not $n = 4.8$ (better would be $n = 4.\overline{81}$); moreover no hint is done that should be $n \neq 1$, as evident from the equation itself and from many passages.

- p. 451: the (*wrong* and not “inaccurate”) result for $Y = 2$ isn’t 5.53.but $7.\overline{86}$.
- p. 511: the Italian word “**espressoine**” should be “**espresso**”.
- pp. 547–548: the picture at p. 548 isn’t the result of the program at p. 547: an automatic translation from Italian to English has occurred!

3 HP 50g

3.1 Evidences

- The function DROITE to find the equation of the straight line in the plane that connects two complex numbers taken as two points in the plane.

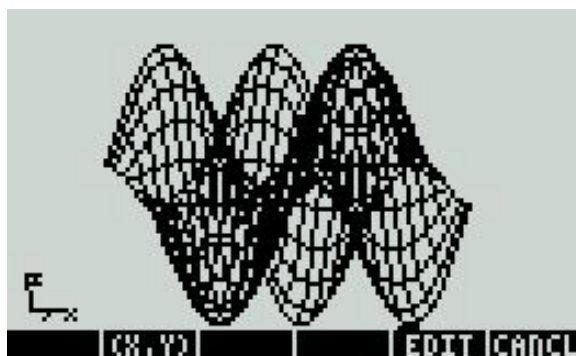


Fig. 3: A HP 50g fast graphics.

- The function MENU, like *e.g.*: 117.02 MENU to find strange units like dB.
- The function PEVAL, cited in 1.2, to evaluate polynomials.

3.2 Graphics

In fig. 3 a simple example of a 3D graphic which can give an idea of the power of the calculator.

3.3 Doubts

- There is quite a confusion about SD formatting: [2] says FAT32 produced by a calculator FORMAT, and FAT[16] is considered as just supported, while on the HP site FAT[16] is reported as the only supported and working possibility.
- There is no instruction in [2] about the correct compatible SD: no warning is present about the incompatibility of SHDCs. And note that SDMCs are quite rare nowadays!
- There is no apparent reason to force ‘Radians’ for many operations. For example in the expression:

$$\pi \rightarrow \text{NUM} \rightarrow \text{Q}$$

- It’s very undesirable that so many functions (like DARCY and many other) don’t have a correspondent HELP function. What are they for, if there is no quotation in the manual? And should a user go around with a printed manual or a PC? Without speaking about MES, MINITM, MITM, MSOLVR, and so on.

- Many approaches are quite cumbersome and not always easy to remember: for instance the way to go to the soft numerical solver is *holding down* $\boxed{\uparrow}$ then $\boxed{7}$. And the logic? Is it always so? Absolutely not.
- Sometimes equations are in form of list, sometimes in form of vector. Very confusing.
- It's incredible that functions are dispersed in this way. Example: **SIZE** of a list inside **PRG**, where \sum **LIST** inside **MTH**!
- It's annoying that in many solvers, like that in [2, p. 11–20] it's impossible to get a value from the stack in RPN, even if it's possible to choose a variable or to enter it with **EDIT**.

3.4 Errors in [2]

- p. 1–12: “*ALPHA-Right-Shift function, to enter the symbol **P***” enters instead the symbol Π (note, *not* π).
- p. 1–28: “*Auto **intend** cursor when entering a carriage return*” is **indent** instead.
- p. 2–21: “*The editing of algebraic **equations** follows the same rules as the editing of algebraic equations.*”. Nice sentence! Should be ‘**expression**’ I think...
- p. 2–31: the **minus** in equation:

$$\frac{d}{dt}(\alpha \cdot t^2 - \beta \cdot t + \delta) = 2\alpha \cdot t + \beta$$

is obviously a **plus**.

- p. 6–21: the evaluation of the combined equation with **EVAL(EQ)**, asks for approximate mode (two times) and only if one answer is ‘Yes’ there is a result, obviously different from that of the text. This happens if **PIPES** is a subdirectory of the previous one, where many variables are already defined. If it's a complete independent subdirectory, or if the variables of the upper directories are purged, it works as described.
- p. 7–5: “*The final solution is $X = 1.8238$, $Y = -0.9681$.*” should be $Y = -0.9682$.
- p. 7–10: “*In order to solve any triangle, you need to know at least three of the following six variables: $a, b, c, \alpha, \beta, \gamma$.*” which is absolutely false; if you know the last three you know a redundant variable, but not the sides. The right sentence should be “In order to solve any triangle, you need to know at least three of the following five variables: a, b, c , plus two variables chosen among α, β, γ .”

```

RAD XYZ DEC R= 'X'
{HOME TEST TTT} 15 11 05:MAY
1:
6: (1 5 3 1 2 1 3 4 2 1)
5: 1.6348773842
4: 10√720
3: 1.93078203669
2: 720√10
1: 1.00320315402
◀LIST ▶ELIST ▶MLIST SORT REVL1 ADD

```

Fig. 4: What looks to be a bad error.

- p. 7–11: “Here is the sequence of keystrokes to use to prepare and store this list.” but the sequence is missing, even if there is no need of a sequence at this point.
- p. 8–3: “Addition of a single number to a list produces a list augmented by the number, and not an addition of the single number to each element in the list”. Here is the place to add that if you want an addition of a single number to each element is simple: just subtract the negation. By the way the operator ADD for + is almost useless. If an operator should be added, better an operator for concatenation like CONC, even if personally, I would have used an operator like “,” (comma) as in APL or “||” as in PL/i. This looks to have another bad effect as well, like what’s stated in [2, p. 8-13] where ADD should be used instead of + for programs working with a list. Really bad.
- p. 8–17: about the geometric mean, it should be $\sqrt[10]{720}$ and not $\sqrt[720]{10}$, in my opinion, as shown in fig. 4.
- p. 9–1: “Physical vectors have two or three components...”. Well, physical vectors may have much more than three components, and viceversa also non physical vectors may have 2 or 3 components.
- p. 9–1: “...we will choose the notation $A = [Ax, Ay, Az]$ or $A = [Ax, Ay, Az]$, to refer to...”. Repetition.
- p. 9–22: step 4 can be substituted with a simpler DROP.
- p. 10–6: “In RPN mode, this exercise is performed by entering `A` `ENTER` `3` `ENTER` `GET`...”.

This is absolutely wrong. If you follow it you’ll get 2 and not 2.8, *i.e.* the second element of A. You should enter 6, or better {2 3} to get 2.8.

- p. 10–6: “In RPN mode you can use:
 $\boxed{\text{VAR}} \{3, 1\} \boxed{\text{ENTER}} \boxed{\uparrow} \pi \leftarrow \text{PUT.}$ ”
 Perhaps a single quotation mark (') before the π is needed.
- p. 12–5: “You will get the result: ROOT: -
 1.6635...”. Perhaps the minus should be attached to the number.
- p. 12–10:¹ “Press $\boxed{\text{ADD}}$ and type $\boxed{\uparrow} e^x \leftarrow \boxed{\text{ALPHA}} \boxed{\text{X}} \boxed{\text{ENTER}} \dots$
 There is no need of the $\boxed{\text{ALPHA}}$ button before $\boxed{\text{X}}$.
- p. 21–10: all the page is wrong because it’s always used the key $\boxed{\uparrow}$,
 where also $\boxed{\uparrow}$ should be used.
- p. 21–15: “..calculator instructions enclosed between the program contains ? and \gg .”. Instead of ‘ \ll ’ a strange character is present.

References

- [1] HEWLETT PACKARD (1990). *HP 48SX Calcolatore scientifico interfacciabile — Manuale operativo (vol. I & II)*. Edizione 1, gennaio 1990, HP part number 00048-90019, 00048-90040, Hewlett-Packard Company 16399 West Bernardo Drive MS 8-600 San Diego, CA 92127-1899 USA.
- [2] HP INVENT (2006). *HP 50g Graphing Calculator — User’s Guide*. Edition 1, April 2006, HP part number F2229AA-90006, Hewlett-Packard Company 16399 West Bernardo Drive MS 8-600 San Diego, CA 92127-1899 USA.
- [3] HP INVENT (2009). *HP 50g / 49g+ / 48gII Graphing Calculator Advanced User’s Reference Manual*. Edition 2, 14.7.2009, HP part number F2228-90010, Hewlett-Packard Company 16399 West Bernardo Drive MS 8-600 San Diego, CA 92127-1899 USA.

¹ And in many other places