# The HP20b Calculator: A Missed Opportunity?

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This month, Hewlett-Packard formally introduces the HP20b Financial Consultant, a low-cost machine which combines many of the most popular financial and business functions with a powerful array of mathematical and statistical capabilities. A review of the machine by Gene Wright appears elsewhere in this issue. For HP calculator veterans, the provision of both RPN and Algebraic entry methods (along with a double-wide INPUT key in the traditional place) will be welcomed. However, for those who prefer high keyboard efficiency and minimized keystroke counts, the 20b may represent another missed opportunity. In the previous issue[1], we presented suggested keyboard improvements to the HP17bII+ financial calculator and this time around, a similar treatment will be performed with the HP20b.

## Why Only One Shift Key?

Like the HP17bII+, only a single shift key is provided to add a secondary key plane of functions to the keyboard. Going all the way back to 1977 with the desktop HP92 and to 1978 with the handheld HP38E financial machines, Hewlett-Packard offered gold "f" and blue "g" shift keys to effectively triple the number of functions on the keyboard. Whether the decision to avoid that here was due to concern about keyboard clutter intimidating the user or plans to introduce a two-shift model in the future, or "menu madness" isn't known. However as a result, functions which could be otherwise reached with two keyclicks are currently concealed, requiring in some cases as many as five, six, or even more key presses. (An example of this would be the ACOS function in the Math menu requiring ▬ Math INPUT ▼ ▼ INPUT .) By making some firmware and key-layout improvements while leaving the hardware unchanged (just like was suggested for the "17bII++" last time), a significant number of keystrokes may be saved for functions that the everyday user would employ. So, let's get right to it.

The layout of the left-hand column of HP20b keys below INPUT exactly mimics that of the hp17bII+; with ▲ and ▼ keys followed by the single shift key (▬) and lastly the ON/CE key. A conversion to a two-shift-key system by transferring ▼ up a row and switching the ▲ function to the upper-shifted position of the ▼ key allows the second shift to be positioned in place of ▲ as shown in figure 1

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[1] Please see "Optimizing the Calculator User Interface: A Little Clutter Can Go a Long Way" from *Datafile,* V27N2P7.

below. Since the lower-shifted key functions are already marked in blue, it seemed logical to mark the upper-shifted functions in gold, like many earlier HP machines.



*Figure 1. HP20b navigation and shift keys (left) and a proposed "20bII" version with a second shift key along with navigation keys combined onto one key (right).*

## Organizing Some Newly-Surfaced Functions

The 20b primary keyboard contains the menus [Amort], [CshFl], [IRR], [NPV] and [Bond] and the shifted keyboard has [ ][%calc], [ ][Iconv], [ ][Stats], [ ][Math], [ ][BrkEv], [ ][Reset], [ ][Mode], [ ][Depr], [ ][Date], and [ ][Memory]. Of these shifted-keyboard menus, many lead to functions which a user would access frequently, and thus bringing them out to the keyboard would simplify operation. First, it seemed to make sense to surface the [Mode] and [Math] functionality. Thus, the displayed significant digits (FIX nn), angular mode (Deg or Rad), date format (mm.ddyy or dd.mmyy), radix mark (decimal point or comma), control of number delimiters (on or off), entry notation (Chain, Algebraic or RPN), calendar modes and Annual/Semi-annual modes were brought out to the keyboard. For the modes with multiple choices (such as Deg/Rad), these functions were set as toggles so repeated presses would cycle through the choices. Following [↰]FIX by a number would set the number of displayed digits. (The choice of language for displayed messages was left in a "LANG" menu in a lower-shifted position.) The functions in the [Math] menu, originally divided into Trig, Hyperbolic and Probability submenus followed by ABS and LOG, were able to be surfaced in the upper-shifted key positions on the numeric keypad, near to the lower-shifted math functions already present. The only exceptions were the eight Probability functions, which were retained in a "Prob" menu in the same position as the original [Math] menu. Based on my counts, the HP20b [ ][Mode] menu requires a total of 223 keystrokes to select each and every function. Utilizing the alternate method, the new functions (including the ones in the LANG menu) would only require 104 keystrokes. Likewise, the original [Math] menu's 20 functions require 156 keystrokes to reach everything while the new

method requires only 85 keystrokes. Between these two menus, a slightly more than 50% keystroke savings would be achieved.

Beyond these two menus, it was realized that based on the number of key positions available, another seven menus' and submenus' functions could be brought to the surface. Those are [Iconv], [BrkEv], [Date], [%calc] Mkup%C, [%calc] Mkup%P, [%calc] Part%Tot, and [%calc] %Change. Among these all, the total number of keystrokes on the original machine is 63 whereby the new keystroke count would be 52. It should also be mentioned that in the new configuration, these functions would be solved using a method more closely resembling that on the 17bII+. Let us use the Date menu as an example. In the original 20b, to compute the days between two dates, one would press [▬][Date] (key in date1) [▼] (key in date2) [▼] [=] which would total 5 keystrokes (not counting the date entries). Under the new system, the sequence would be (key in date1) [⬆]Date1 (key in date2) [⬆]Date2 [⬆] DDays.

In this case, the keystroke count would actually be 6, however for the submenus which were originally buried multiple levels down such as [▬] [%calc] Mkup%P, the keystroke savings would more than offset this case.

Despite this, the current 20b method of solving Date, Bond, Break Even, etc. types of problems has a distinct benefit. The fact that one may use the [▼] and [▲] keys to review (without updating) the current values entered into the problem is very convenient. In fact in the hp17bII+, one must press [RCL] followed by the soft key corresponding to the value to be reviewed (such as pressing [RCL] MAT for the bond maturity date) which not only requires more keystrokes, but also modifies the RPN stack. To level the playing field for our 20bII, once the first data value was entered for a variable in an application, the machine could consider itself to be inside that particular problem-solving mode; whereby pressing the [▼] and [▲] keys at this point could step the calc through the problem variables in the application if the user preferred. So, after solving a Date problem using the new direct-key method above, a user could review the values in the problem with the arrow keys, stopping to update a value if necessary.

## Highlighting The Menu Keys

In many of the Pioneer-series and also in the HP48S and G-Series calculators, key functions which activated menus were identified with a darker background. This feature has always been a favourite of mine, and in order to extend that feature to this fictitious machine, the menu keys which were retained have been highlighted with a rectangular box around the function name.

An image of this fictitious "HP20bII" calculator along side of the real machine is shown in figure 2 below.



*Figure2. The HP20b (left) and a proposed "20bII" (right). Adding a second shift key enables 34 additional functions on the physical keyboard and eliminates roughly ten menus.*

## Going Further: Simplifying the Stats-Menu Labyrinth

In the 20b's "single-function-at-a-time" menuing system, the user will realize quickly that various calculations can be very keystroke busy. By a large measure, the most complex application involves the ⬛ [Stats] menu[2]. I find that navigating

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[2] Gene Wright also shows a layout of the [Stats] menu in his 20b review article elsewhere in this issue.

through this maze of twisty passages can become frustrating and it is easy to choose the wrong path unless a printed menu map from the manual is handy. Even with the map, too often a press of ⌄ is made when INPUT was desired (or vice versa), and recovering to the correct path is not always possible without having to start over at the top. Nevertheless, it is very useful to be able to navigate through to review the values in a problem using the arrow keys. Probably nothing would approach the utility of this immediate data-access capability with the exception possibly of an hp50g-sized INPUT form displaying all the current values simultaneously. Since the goal of our thought exercise is to prohibit changing the hardware, another approach is suggested here.

In comparing the menuing system of the HP35s to its HP32SII predecessor back in V27N1P9, an attempt was made to show that soft keys were more user friendly than a numbered menu list requiring the use of the numeric keys to make a selection. However, even the method in the 35s could reduce the keystroke counts in the 20b Stats menu to some extent. In the top row of the display is a dot matrix which permits short alphanumeric prompting messages to be shown. When the message is too long for the display, the text slowly scrolls to reveal the remainder of the characters. (Why this display was designed/selected with roughly the rightmost third of the top row dedicated to annunciators rather than permitting a full row of alphanumerics by placing the annunciators directly *above* the top row is a question for HP.) In cases where three or fewer menu choices are presented to the user, this dot matrix might suffice in order to display a brief numbered menu with those choices. In the case of the Stats menu, there are two of these situations – the first being for the data options "2 Vars" / "1 Var" / "1 Weight" and the second immediately after for analysis options "Descriptive" / Predictions" / "Sums".
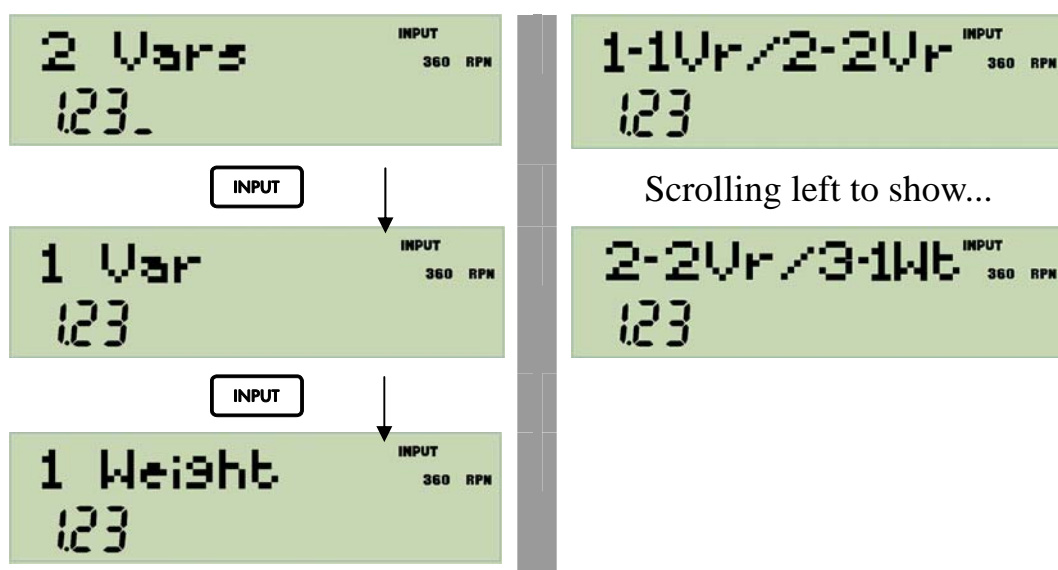


*Figure 3. The HP20b Stats menu data choices (left) and a proposed "20bII"numeric menu in the top display row (right). Pressing a digit would make the choice and move onward. The order of the choices was swapped just so "1Var" and "2Var" didn't map to "2" and "1".*

Upon entering the Stats menu, the user would see the three data options in the top row of the screen and select "1", "2" or "3" from the keypad to make a choice. (See figure 3 for the data-options example.) This would be followed by a second numeric menu, presenting the analysis options in the same manner. As an example, navigating through with "2 Vars" and "Descriptive" in the original machine requires ⏷ INPUT , whereby in the 20bII the keystroke sequence would be 2 1 . However, selecting "1 Weight" and "Sums" in the 20b would require INPUT INPUT ⏷ ⏷ versus only 3 3 in the 20bII. In other words, to reach the data-analysis choices on the 20bII, only two keystrokes would be required in the Stats menu under any circumstances.

For a brand-new HP non-programmable financial calculator which is both function-plentiful and relatively low-cost, the HP20b is probably a winner. Let's hope that its success in the marketplace creates enough enthusiasm in the development group to endeavour further and make future machines both more powerful and more keystroke efficient.