PROPER CALCULATOR KEYBOARDS AND ATTACHABLE OVERLAYS

Jake Schwartz



Figure 1. The HP35, where it all started. RPN, large ENTER key, HP handhelds are off and running.





From a human-engineering standpoint, the keyboard was the most critical area of the design. The problem was to place thirty-five keys in an area approximately 21/2 inches by 41/2 inches and retain the ability to operate the keys without striking more than one at a time. It became apparent that the industry standard of 3/4-inch centerto-center key spacing could not be maintained. A successful compromise was to use 11/16-inch center-to-center spacing for the numeric keys, and 1/2-inch spacing for all others. This was

space between the keys.

The keys are divided into groups according to functions. The groups are sepa-

made possible by reducing the size of each key, thereby increasing the

rated by size, value contrast, color, and placement of nomenclature. The numeric keys, which are most frequently used, are larger and have the strongest value contrast. They have their nomenclature directly on the keys. The next group of keys accord-

ing to frequency of use are identified by their blue color. The ENTER↑ key and arithmetic keys are separated within this group by placement of nomenclature on the keys. The less frequently used keys have the least value contrast, and the nomenclature is placed on the panel just above the key.

The keys have an over-center or snap feel when they are pressed. This comes from special spring contact developed by HP. The electrical and mechanical parts of the keyboard are less than ½ inch high.

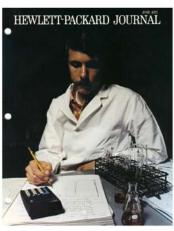


Figure 2. HP35 keyboard description from Hewlett-Packard Journal.

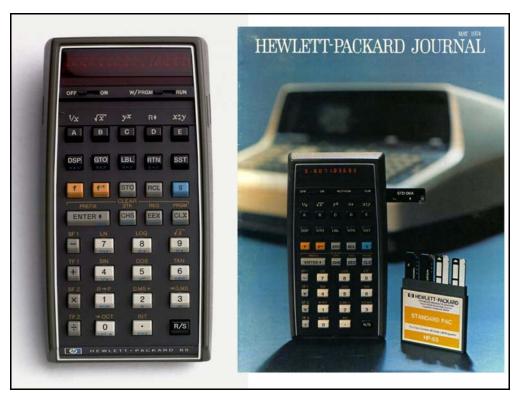


Figure 3. The HP65 with magnetic cards which define the top-row keys.





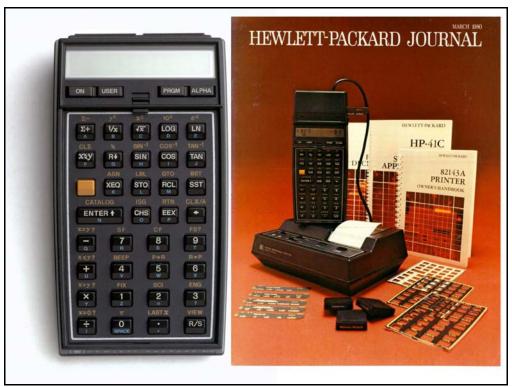


Figure 4. The HP41 with key assignments, full keyboard overlays and I/O ports.

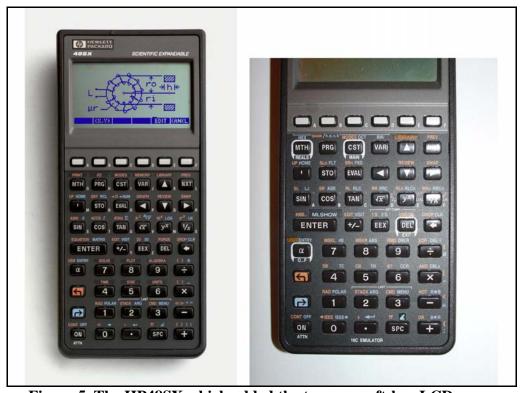


Figure 5. The HP48SX which added the top-row soft-key LCD menu







Figure 6. The HP49G and HP49G+.

Where did the overlays go?

- The HP41 first adopted them
- The HP48 had them
- The HP49 removed them
 - What could it have cost to leave the slots in place?
- Still missing on the HP49G+
 - How does one identify key assignments for software packages?
 - Doesn't that discourage third-party applications?
- Shouldn't user-customizability be increasing?







Figure 7. The HP49 Data Collector software and environmental case w/built-in overlay.

Can We Attach Overlays to the HP49G+ Anyway?

- Plastic device which "grips" around the sides and contains the slots to which an overlay may attach
- Post-it note paper cut to cover the keyboard and stick to the calc surface







emu48/49





HP Calculator User Customizability Scorecard

| | Top-Row | | Full-Keyboard | | | |
|--------|-----------------------|------------------------------|-----------------|-------------|------------|-------|
| | Key Assignments | Keyboard Overlays | Key Assignments | Ports | I/O | Score |
| | | | | | | |
| | | Mag Card sits over top row | | | | |
| HP65A | LBL A thru LBL E | keys | | Card Reader | | 3 |
| | • | | | • | • | |
| | | | | | | |
| | | Mag Card sits over top row | | | | |
| HP41C | Local labels A-J | keys, plus full-key overlays | Yes | 4 modules | HPIL | 8 |
| | | | | | | |
| | Yes, plus soft keys & | | | | | |
| HP48SX | LCD soft-key menus | Full-key overlays | Yes | 2 cards | IR, Serial | 8 |
| | | | | | | |
| | Yes, plus soft keys & | | | | | |
| HP49G | LCD soft-key menus | | Yes | | Serial | 4 |
| | <u> </u> | | | • | | |
| | Yes, plus soft keys & | | | | | |
| HP49G+ | LCD soft-key menus | | Yes | 1 SD card | IR, USB | 6 |



Figure 8. The HP32S-II and HP33S. Keystroke sequences have become more complex.





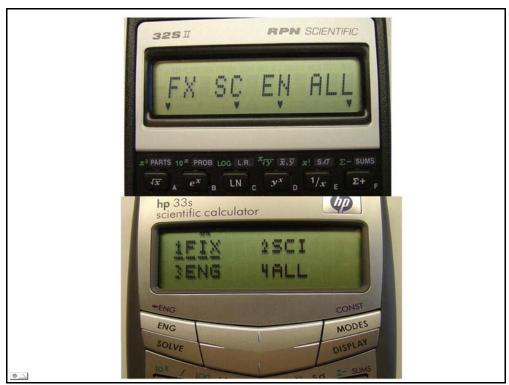


Figure 9. The DISP menu on the 32S-II and 33S. Why search for number keys?

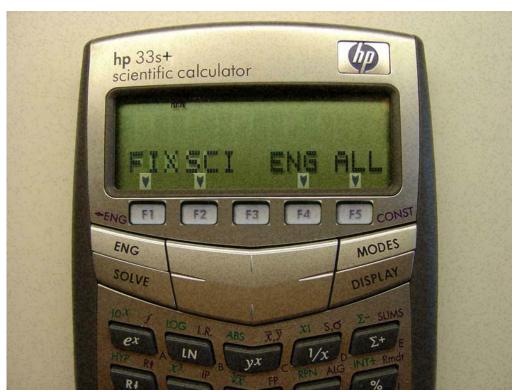


Figure 10. A mythical "33S+" with 32S-II-type menus an a new top row of keys.



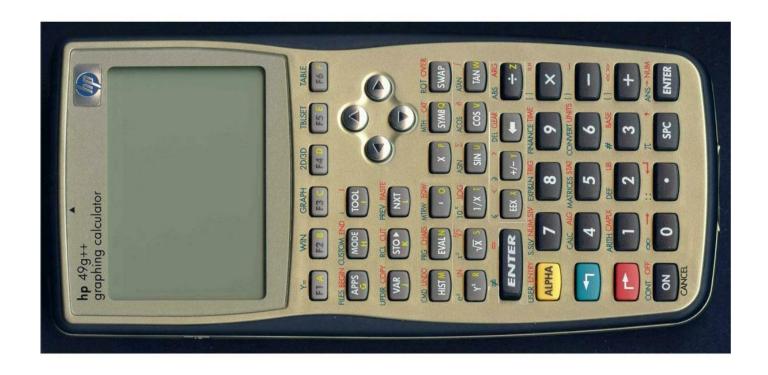


What About The ENTER key? (Compromises for ALG users)

- The HP49G moved the ENTER key to the bottom right
- The HP49G+ left it in the same place
- Why make this fundamental move solely for the users who prefer Algebraic logic?
- Why not have an ENTER key in BOTH places?
- And what happened to program keys for DUP, SWAP & DROP?







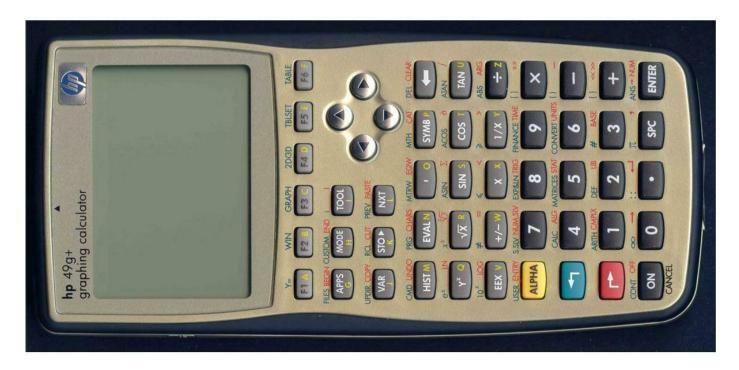


Figure 11. The HP49G+ and a mythical "49G++" with some key adjustments.







Figure 12. A concept drawing and breadboard photo of Hydrix' upcoming Qonos device.

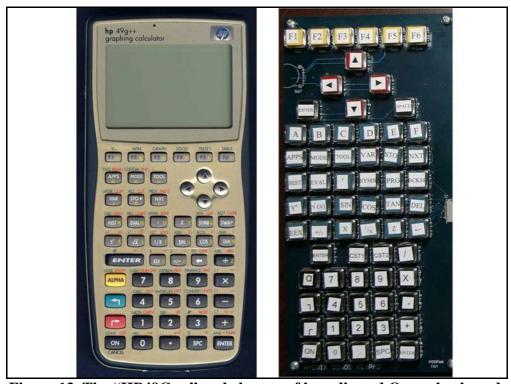


Figure 13. The "HP49G++" and closeup of breadboard Qonos keyboard.





User Customizability Scorecard w/Qonos

| | Top-Row Key Assignments | Keyboard Overlays | Full-Keyboard Key Assignments | Ports | I/O | Score |
|--------|----------------------------|------------------------------|----------------------------------|-------------|------------|-------|
| | | | | | | |
| | - | | | | | |
| | | Mag Card sits over top row | | | | |
| HP65A | LBL A thru LBL E | keys | | Card Reader | | 3 |
| | | | | | | |
| | | Mag Card sits over top row | | | | |
| HP41C | Local labels A-J | keys, plus full-key overlays | Yes | 4 modules | HPIL | 8 |
| | | | | | | |
| | Yes, plus soft keys & | | | | | |
| HP48SX | LCD soft-key menus | Full-key overlays | Yes | 2 cards | IR, Serial | 8 |
| | | | | | | |
| | Yes, plus soft keys & | | | | | |
| HP49G | LCD soft-key menus | | Yes | | Serial | 4 |
| | | | • | | | |
| | Yes, plus soft keys & | | | | | |
| HP49G+ | LCD soft-key menus | | Yes | 1 SD card | IR, USB | 6 |
| | • | | | | | |
| | Yes, plus soft keys & | | | | | |
| | LCD soft-key menus | | | | IR, USB, | |
| | (HP49 emulator | | | | docking | |
| Qonos | mode) | | Yes, plus touchscreen LCD | SD, CF | sled | 8+ |



