A Survey Of HP Calculator Numeric Keypads
Jake Schwartz

Recently, when the August issue of HPc Magazine first showed drawings of the upcoming Xpander handheld, a wide range of comments were heard and read. The one that stuck with me was by Ron Johnson of the Chicago-area CHIP HP group, who was incensed by the shifting of the bottom row of numeric keys such that the "zero" key is no longer directly below the "one" key. This change is apparently just one in a sequence of breaks with tradition, which have been appearing in Hewlett-Packard calculators recently. With this one, along with the equally radical relocation of the ENTER key in the HP49G, it was felt that an exhaustive look at HP calculator numeric keypads might be an interesting exercise.

As a result, a close examination of all keyboards from the HP35 up to the present day has been performed and two tables of data are presented here as a result. The first merely lists each machine in chronological order of introduction along with associations with the R&D facility of origin and the calculator series to which it belongs. The second enumerates entry logic, programmability and dissects the numeric keypad for various specific features such as (1) order of arithmetic operation keys, (2) identification of the third key on the "zero / decimal point" row and (3) labeling of the change-sign key.

Some trends become immediately apparent. An early change in keypad arrangement that puzzled users is the left-hand or right-hand position of the arithmetic keys. From the start, these keys were on the left side, but starting with the TopCat (HP91/92 etc.) and Voyager (HP10C/11C etc.) series', they were moved to the right and stayed there to the present day. The order of these keys also made a major shift, from "**-+×÷**" to "**÷×-+**" at the exact same time as the position of the column shifted. The replacement of the "**÷**" and "**×**" symbols with "**/**" and "**∗**" occasionally was used (in the HP71B handheld computer and much later on the HP38G high-school calculator) as well. For the "change-sign" key, old-timers were accustomed to the "**CHS**" nomenclature; however starting in mid-1986 with the HP18C business "clamshell" machine, the vast majority adopted the "**+/-**" instead. (Some exceptions include the HP38G with its unique "**-X**" and the recently-introduced HP39G/40G machines which use "**(-)**".) The "enter-exponent" key also has been flip-flopping between "**EEX**" and "**E**", with "**EEX**" dominating keyboards from 1972 through 1983, and then "**E**" being more popular starting with the HP71B in 1984 and running through 1990 in the HP19B-II. The trend apparently reversed back to "**EEX**" again thereafter, from the 1990 HP48GX through 2000 in the HP39G/40G with the exception of the HP30S earlier this year.

The function on the third key in the "zero / decimal point" row is interesting and varies widely. There does seem to be some logic behind this, however. Early in the game, when all machines used RPN entry logic, the programmables dominated with "**R/S**" being the favorite, while for the non-programmables, the "**Σ+**" was mostly used. However, for the algebraic machines between 1986 and 1990, the "**=**" or "**,**" was used (whether the calculator was programmable or not). The later RPL-based machines of 1990 to 2000 all adopted "**SPC**" as their key of choice. An interesting tidbit in this category is that the HP35 from 1972 and the HP30S (from this past Spring) are the only calculators which have "**π**" in this row.

Finally, a discussion like this could not be considered complete unless we mentioned the position and labeling of the "**ENTER**" key. In the "all-RPN" days of 1972 through 1980, all machines used the large horizontal key, which included an upwards-pointing arrow. The sole exception is the HP80 business calculator, which used "**SAVE$\uparrow$**". Then, with the Voyager series, the horizontal key was replaced with a large vertical **ENTER** without the upwards arrow. (The arrow only appeared again on the HP41CX, the final instantiation of the Coconut-series units.) From this point, the arrow was discontinued. The vertically-oriented **ENTER** only appeared again on the HP71B handheld computer (which many consider to be a stretched Voyager machine anyway). With the advent of algebraic HP calculators in the mid-1980s, "**ENTER**" would become "**INPUT**", however all others after 1995 retained **ENTER**, including such algebraic units as the HP38G, 30S. The position and size of this key changed with the introduction of the HP49G RPL/Algebraic machine when it became small and moved to the bottom of the column of arithmetic operation keys. We are told that this was a compromise, to make the keyboard more familiar to algebraic logic-oriented users.

More could be said about the changes to HP calculator keypads through the years, but perhaps it would be better to leave some of the discoveries to other interested explorers. Finally, we are faced with the impending release of Xpander some time in the near future. At first glance, one would surmise that this keypad was designed by individuals who have no prior knowledge of HP calculators (even those machines most recently produced by the ACO). Whether this represents a hindrance or merely a short-term annoyance remains to be seen. Let's hope that this unit uses an industry-standard CPU and memory card, thus permitting emulation in the touch-sensitive screen of any or perhaps all of our favorite HP calculators past and present.

Table 1. HP Calculators by Introduction Date and by Series

Intro Date	Factory	Classic	Wood-stock	TopCat	Sting	Spice	Coconut	Voyager	Titan	Clam-shell	Pioneer 2-line	Pioneer 1-line	Charle-magne	Elsie	Vger	ACO
72-2-1	APD	HP35														
73-2-1	APD	HP80														
73-5-1	APD	HP45														
74-1-19	APD	HP65														
74-8-1	APD	HP70														
75-1-1	APD	HP55														
75-2-1	APD		HP21													
75-8-1	APD		HP25													
75-9-1	APD		HP22													
76-3-1	APD			HP91												
76-5-1	APD		HP27													
76-7-1	APD		HP25C													
76-7-1	APD	HP67														
76-7-1	APD			HP97												
76-7 ??	APD			HP95C												
77-7-1	CVD				HP10											
77-7-1	CVD		HP29C													
77-7-1	CVD			HP92												
77-9-1	CVD				HP19C											
78-5-1	CVD					HP31E										
78-5-1	CVD					HP33E										
78-5-1	CVD					HP38E										
78-7-1	CVD					HP32E										
79-7-1	CVD					HP33C										
79-7-1	CVD					HP34C										
79-7-1	CVD					HP37E										
79-7-1	CVD					HP38C										
79-7-1	CVD						HP41C									
80-12-15	CVD						HP41CV									
81-9-1	CVD							HP11C								
81-9-1	CVD							HP12C								
82-7-1	CVD							HP15C								
82-7-1	CVD							HP16C								
82-9-2	CVD							HP10C								
83-10-1	CVD						HP41CX									
84-2-1	CVD								HP71B							
86-6-1	CVD									HP18C						
87-1-5	CVD									HP28C						
88-1-4	CVD										HP17B					
88-1-4	CVD									HP19B						
88-1-4	CVD										HP27S					
88-1-4	CVD									HP28S						
88-6-1	CVD											HP22S				
88-6-1	CVD											HP32S				
88-10-31	CVD											HP14B				
88-10-31	CVD										HP42S					
89-1-3	CVD											HP10B				
89-1-3	CVD											HP20S				
89-1-3	CVD											HP21S				
90-1	CVD										HP17B-II					
90-1	CVD									HP19B-II						
90-3-6	CVD												HP48SX			
91-3-1	CVD										HP32S-II					
91-4-2	CVD												HP48S			
93-6-1	CVD												HP48GX			
93-6-1	CVD												HP48G			
95-4-6	CVD/Singapore													HP38G		
98-4	ACO												HP48G+			
99-4	ACO															HP6S/Solar
99-8	ACO														HP49G	
00-5																HP30S
00-7	ACO														HP39G	
00-7	ACO														HP40G	
00-9?	ACO															HP10B-II
00-?	ACO															Xpander

Table 2. HP Calculator & Numeric Keypad Attributes

Intro Date	Model	Series	Sci (S) / Bus (B) / Stat (T) / Prog (P)	RPN/Alg/ RPL	Prog/No n/Solver	Arith Keys	+× or /*	0 . ?	Arith Keys: L or R?	Change Sign	Expo- nent of Ten	ENTER Key
72-2-1	HP35	Classic	S	RPN	Non	- + × ÷	+×	π	L	CHS	EEX	ENTER↑
73-2-1	HP80	Classic	B	RPN	Non	- + × ÷	+×	Σ+	L	CHS	none	SAVE↑
73-5-1	HP45	Classic	S	RPN	Non	- + × ÷	+×	Σ+	L	CHS	EEX	ENTER↑
74-1-19	HP65	Classic	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
74-8-1	HP70	Classic	B	RPN	Non	- + × ÷	+×	CLX	L	CHS	none	ENTER↑
75-1-1	HP55	Classic	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
75-2-1	HP21	Woodstock	S	RPN	Non	- + × ÷	+×	DSP	L	CHS	EEX	ENTER↑
75-8-1	HP25	Woodstock	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
75-9-1	HP22	Woodstock	B	RPN	Non	- + × ÷	+×	Σ+	L	CHS	none	ENTER↑
76-3-1	HP91	TopCat	S	RPN	Non	+×-÷	+×	FIX	R	CHS	EEX	ENTER↑
76-5-1	HP27	Woodstock	S/B	RPN	Non	- + × ÷	+×	Σ+	L	CHS	EEX	ENTER↑
76-7-1	HP25C	Woodstock	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
76-7-1	HP67	Classic	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
76-7-1	HP97	TopCat	S	RPN	Prog	+×-÷	+×	DSP	R	CHS	EEX	ENTER↑
76-7 ??	HP95C	TopCat	S	RPN	Prog	+×-÷	+×	Σ+	R	CHS	EEX	ENTER↑
77-7-1	HP10	Sting	B	Alg	Non	+× − +	+×	+/=	R	none	none	none
77-7-1	HP29C	Woodstock	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
77-7-1	HP92	TopCat	B	RPN	Non	+×-÷	+×	Σ+	R	CHS	EEX	ENTER↑
77-9-1	HP19C	Sting	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
78-5-1	HP31E	Spice/Spike	S	RPN	Non	- + × ÷	+×	%	L	CHS	EEX	ENTER↑
78-5-1	HP33E	Spice/Spike	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
78-5-1	HP38E	Spice/Spike	B	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
78-7-1	HP32E	Spice/Spike	S	RPN	Non	- + × ÷	+×	%	L	CHS	EEX	ENTER↑
79-7-1	HP33C	Spice/Spike	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
79-7-1	HP34C	Spice/Spike	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
79-7-1	HP37E	Spice/Spike	B	RPN	Non	- + × ÷	+×	Σ+	L	CHS	none	ENTER↑
79-7-1	HP38C	Spice/Spike	B	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
79-7-1	HP41C	Coconut	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
80-12-15	HP41CV	Coconut	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
81-9-1	HP11C	Voyager	S	RPN	Prog	+×-÷	+×	Σ+	R	CHS	EEX	ENTER
81-9-1	HP12C	Voyager	B	RPN	Prog	+×-÷	+×	Σ+	R	CHS	EEX	ENTER
82-7-1	HP15C	Voyager	S	RPN	Prog	+×-÷	+×	Σ+	R	CHS	EEX	ENTER
82-7-1	HP16C	Voyager	P	RPN	Prog	+×-÷	+×	CHS	R	CHS	EEX	ENTER
82-9-2	HP10C	Voyager	S	RPN	Prog	+×-÷	+×	Σ+	R	CHS	EEX	ENTER
83-10-1	HP41CX	Coconut	S	RPN	Prog	- + × ÷	+×	R/S	L	CHS	EEX	ENTER↑
84-2-1	HP71B	Titan	S	Alg	Prog	/ * − +	/ *	,	R	none	E	ENDLINE
86-6-1	HP18C	Clamshell	B	Alg	Solver	+×-÷	+×	=	R	+/-	E	INPUT
87-1-5	HP28C	Clamshell	S	RPL	Prog	+×-÷	+×	,	R	CHS	EEX	ENTER
88-1-4	HP17B	Pioneer2-line	B	Alg	Solver	+×-÷	+×	=	R	+/-	E	INPUT
88-1-4	HP19B	Clamshell	B	Alg	Solver	+×-÷	+×	=	R	+/-	E	INPUT
88-1-4	HP27S	Pioneer2-line	S/B	Alg	Solver	+×-÷	+×	=	R	+/-	E	INPUT
88-1-4	HP28S	Clamshell	S	RPL	Prog	+×-÷	+×	,	R	CHS	EEX	ENTER
88-6-1	HP22S	Pioneer1-line	S	Alg	Solver	+×-÷	+×	=	R	+/-	E	INPUT
88-6-1	HP32S	Pioneer1-line	S	RPN	Prog	+×-÷	+×	R/S	R	+/-	E	ENTER
88-10-31	HP14B	Pioneer1-line	B	Alg	Non	+×-÷	+×	=	R	+/-	E	INPUT
88-10-31	HP42S	Pioneer2-line	Stat	RPN	Prog	+×-÷	+×	R/S	R	+/-	E	ENTER
89-1-3	HP10B	Pioneer1-line	B	Alg	Non	+×-÷	+×	=	R	+/-	E	INPUT
89-1-3	HP20S	Pioneer1-line	S	Alg	Prog	+×-÷	+×	=	R	+/-	E	INPUT
89-1-3	HP21S	Pioneer1-line	T	Alg	Prog	+×-÷	+×	=	R	+/-	E	INPUT
90-1	HP17B-II	Pioneer2-line	B	RPN/Alg	Solver	+×-÷	+×	=	R	+/-	E	INPUT
90-1	HP19B-II	Clamshell	B	RPN/Alg	Solver	+×-÷	+×	=	R	+/-	E	INPUT
90-3-6	HP48SX	Charlemagne	S	RPL	Prog	+×-÷	+×	SPC	R	+/-	EEX	ENTER
91-3-1	HP32S-II	Pioneer1-line	S	RPN	Prog	+×-÷	+×	R/S	R	+/-	E	ENTER
91-4-2	HP48S	Charlemagne	S	RPL	Prog	+×-÷	+×	SPC	R	+/-	EEX	ENTER
93-6-1	HP48GX	Charlemagne	S	RPL	Prog	+×-÷	+×	SPC	R	+/-	EEX	ENTER
93-6-1	HP48G	Charlemagne	S	RPL	Prog	+×-÷	+×	SPC	R	+/-	EEX	ENTER
95-4-6	HP38G	Elsie	S	Alg	Prog	/ * − +	/ *	,	R	−X	EEX	ENTER
98-4	HP48G+	Charlemagne	S	RPL	Prog	+×-÷	+×	SPC	R	+/-	EEX	ENTER
99-4	HP6S/Solar	ACO	S	Alg	Non	×+ + −	+×	+/-	R	+/-	Exp	none
99-8	HP49G	Vger	S	RPL/Alg	Prog	+×-÷	+×	SPC	R	+/-	EEX	ENTER
00-5	HP30S	ACO	S	Alg	Non	+×-÷	+×	π	R	+/-	E	ENTER
00-7	HP39G	Vger	S	Alg	Prog	+×-÷	+×	(-)	R	(-)	EEX	ENTER
00-7	HP40G	Vger	S	Alg	Prog	+×-÷	+×	(-)	R	(-)	EEX	ENTER
00-9?	HP10B-II	ACO	B	Alg	Non	+×-÷	+×	=	R	+/-	E	INPUT
00-?	Xpander	ACO	?	?	?	/ ×−+	/ ×	ON/OFF	R	none	none	ENTER