	NEXT 2B	QRG / Version 1.0 / 17.03.2013	Sebastian Toelg				
	Function	**Description**	**Inputs**	**Outputs**	**Stack**	**Messages/Errors**	**Author/Source**
		NoV-64 Flash-ROM block					
	NROM	Prompts (function is not programmable) for Flash-ROM block of NoV-64 module: 0: disable Flash-ROM (no Flash-ROM block enabled, enables 32K RAM operation)) 1: enable Flash-ROM block 1 (disables 32K RAM operation) 2: enable Flash-ROM block 2 (disables 32K RAM operation) Only numeric keys 0 - 2 and corresponding keys in upper two rows are accepted.	none	none	-	TURN OFF/ON (message) - power cycle to activate new Flash-ROM block RAM - MCODE is running in NoV-RAM block and user tries to switch off that block. Enter "OK" in ALPHA and redo if you want to switch anyway. Be sure that you know what you are doing!	Sebastian Toelg
	PNROM	Enables Flash-ROM block specified by decimal numbers 0, 1 or 2. 0 disables Flash-ROM. If the message TURN OFF/ON is displayed, any running user program will be stopped.	X: Flash-ROM block	none	-	ALPHA DATA - X contains alpha data DATA ERROR - value in X has wrong format NONEXISTENT - specified block does not exist (value is not 0 - 2) see also above (NROM)	Sebastian Toelg
	NROM?	Returns the active Flash-ROM block specified by decimal number: 0, 1 or 2.	none	X: Flash-ROM block	U	none	Sebastian Toelg
		NoV-64 lower and upper RAM block					
	NRAM	Prompts (function is not programmable) for lower NoV-RAM block in pages #8-#B to be enabled: 0-3: enable lower NoV-RAM block, respectively Only numeric keys 0 - 3 and corresponding keys in upper two rows are accepted.	none	none	-	RAM - MCODE is running in NoV-RAM block and user tries to switch off that block. Enter "OK" in ALPHA and redo if you want to switch anyway. Be sure that you know what you are doing! RAM REVERSED - lower RAM block > upper RAM block RAM USED - specified RAM block is already being used	Sebastian Toelg
	NRAMU	Prompts (function is not programmable) for upper NoV-RAM block in pages #C-#F to be enabled: 0: disable upper NoV-RAM block (enables 16K RAM operation) 1-3: enable upper NoV-RAM block, respectively (enables 32K RAM operation) Only numeric keys 0 - 3 and corresponding keys in upper two rows are accepted.	none	none	-	TURN OFF/ON (message) - power cycle to deactivate Flash-ROM block see also above (NRAM)	Sebastian Toelg

	PNRAM	Enables NoV-ROM block specified by decimal number: a) 0, 1, 2, 3 (positive single-digit) to enable lower NoV-RAM block, respectively b) -1, -2, -3 (negative single-digit) to enable upper NoV-RAM block, respectively (to disable upper NoV-RAM block, a small negative value > -1 may be given, e.g. -0,1) c) UL positive double-digit where U specifies upper NoV-RAM block and L specifies lower NoV-RAM block simultaneously d) LL positive double-digits with identical digit values, e.g. 11, 22 or 33 to enable specified lower NoV-RAM block and to disable upper NoV-RAM block at the same time If the message TURN OFF/ON is displayed, any running user program will be stopped.	X: NoV-RAM block	none	-	ALPHA DATA - X contains alpha data DATA ERROR - value in X has wrong format NONEXISTENT - specified block does not exist (value is not 0 - 3) see also above (NRAMU)	Sebastian Toelg
	NRAM?	Returns the active NoV-RAM block specified by decimal number: a) single-digit for lower NoV-RAM (16K RAM operation) b) double-digit UL where U and L specify upper and lower NoV-RAM block, respectively (32K RAM operation)	none	X: NoV-RAM block	U	none	Sebastian Toelg
		NoV-64 control word					
	NOV?	Displays and prints (in NORM & TRACE mode) current configuration of NoV-64 module. Flash-ROM and upper NoV-RAM block are only shown if they are enabled, i.e. not 0.	none	none	-	message showing ROM block (if active), upper RAM block (if 32K operation), and lower RAM block	Sebastian Toelg
	NOVCW	Prompts (function is not programmable) for control word of NoV-64 module given as 3-digit number with format RUL where: - R is Flash-ROM block - U is upper NoV-RAM block - L is lower NoV-RAM block See NoV-64 User Manual for details about control word and normalization. The 4th digit that can be activated by pressing EEX is ignored, i.e. only the 3 rightmost digits are considered.	none	none	-	none	Sebastian Toelg
	PNOVCW	Sets control word of NoV-64 module given as 3-digit number with format RUL where: - R is Flash-ROM block - U is upper NoV-RAM block - L is lower NoV-RAM block Leading zeros are inserted, i.e. the rightmost integer digit is always L. U and R are 0 if only rightmost integer digit is given. The values are passed trough to the NoV module. See NoV-64 User Manual for details about control word and normalization.	X: control word in format RUL	none	-	ALPHA DATA - X contains alpha data DATA ERROR - value in X has wrong format	Sebastian Toelg
	NOVCW?	Returns control word of NoV-64 module as 3-digit number with format RUL where: - R is active Flash-ROM block - U is active upper NoV-RAM block - L is active lower NoV-RAM block	none	X: control word in format RUL	U	none	Sebastian Toelg
		NoV-64 Flash-ROM page #F of block 2					

	NCLFF	Does clear (erase) page #F of Flash-ROM block 2. If this page does not contain any ROM image, then no action is taken. The clearing process is started by the NoV-64 processor (PIC) when the calculator goes to standby mode. The PIC processor takes about 1 second to clear the Flash-ROM. The message WAIT A SEC will be displayed. You MUST NOT press any key before this time is elapsed. Otherwise, the calculator will be reset and the memory will be lost!!! Any running user program will be stopped. It can be continued by pressing the R/S key after the waiting time is over.	none	none	-	WAIT A SEC (message) - do not press any key for about 1 second !!!	Sebastian Toelg
	NDUMPFF	Dumps page given as R,P (or R.P) into the page #F of Flash-ROM block 2: - integer part R (0 - 3) is the NoV-RAM block - decimal part P is the page within that block (0 - 3) Page #F of Flash-ROM block 2 must to be erased before dumping a NoV-RAM page, e.g. by means of NCLFF function. The dumping process is started by the NoV-64 processor (PIC) when the calculator goes to standby mode. It takes the PIC processor about 3 seconds to complete the dumping routine. (For more details see NoV-64 User Manual.) The message WAIT 3 SECS will be displayed. You MUST NOT press any key before this time is elapsed. Otherwise, the calculator will be reset and the memory will be lost!!! Any running user program will be stopped. It can be continued by pressing the R/S key after the waiting time is over.	X: page to dump in format R,P (or R.P)	none	-	WAIT 3 SECS (message) - do not press any key for about 3 seconds !!! ALPHA DATA - X contains alpha data DATA ERROR - value in X has wrong format FLASH USED - page #F of Flash-ROM block 2 is already being used NONEXISTENT - if R or P are not 0 - 3 RAM - MCODE is running in lower NoV-RAM block and this is not the same NoV-RAM block that contains the image to be dumped or MCODE is running in upper NoV-RAM block	Sebastian Toelg
		HEPAX file system					

	HEPCHN	Configures the chain of NoV-RAM pages in the HEPAX file system as specified by the characters in ALPHA. WARNING: this is a very powerful but also potentially harmful function! Each page in the HEPAX file system chain is specified as a hexadecimal digit (8 - F). The leftmost digit is the 1st link in the chain (start of chain). The rightmost digit is the last link in the chain. A 0 on the left indicates that the pointer to the previous page in the next link to the right (1st link) is set to NIL/NULL. A 0 on the right indicates that the pointer to next page in the previous link to the left (last link) is set to NIL/NULL. EXAMPLES: - "0890" initializes file system with pages #8 and #9 - "8A9" inserts page #A to the above configuration => "08A90" - "9B0" appends page #B to the above configuration => "08A9B0" - "8" resets (marks) page #8 as a link in the HEPAX file system chain, but does not affect the pointers to previous and next page If lower NoV-RAM block has pages #9 and #A in the HEPAX file system ("09A0") and you want to append pages #E and #F in the upper NoV-RAM block, you have to enter ("AEF0") and the chain will be "09AEF0". However, always make sure that you know what you are doing !!!	ALPHA: characters as described	none	-	DATA ERROR - character in ALPHA is not 8, 9, A - F NULL - 0 occurs in the middle (not leftmost or rightmost character)	Sebastian Toelg
	HEPCHN?	Returns the configuration of NoV-RAM pages in the chain of the HEPAX file system as characters in ALPHA. If executed interactively (not from running program), the returned configuration in ALPHA is also displayed and printed. Each page in the HEPAX file system chain is specified as a hexadecimal digit (8 - F). The leftmost digit is the 1st link in the chain (start of chain). The rightmost digit is the last link in the chain. A 0 on the left indicates that the pointer to the previous page in the next link to the right (1st link) is set to NIL/NULL. A 0 on the right indicates that the pointer to next page in the previous link to the left (last link) is set to NIL/NULL. The 0 on the left and on the right should always be present for an intact chain of HEPAX file system.	none	ALPHA: characters as described	-	CHAIN BROKEN - last page in ALPHA has wrong pointer to previous link, i.e. backward pointer does not match NO START - start (1st link) of HEPAX file system chain not found NOT IN CHAIN - last page in ALPHA is not marked as a link in the HEPAX file system chain OUT OF RANGE - last page in ALPHA does not have valid pointer to previous or next page	Sebastian Toelg
	RLSRAM	Does release specified page from HEPAX file system chain to use it for other purposes. The page to be released does not need to be the last one in the chain since the gap will be closed automatically. EXAMPLE: If the HEPAX file system is "089A0" and 9 RLSRAM is executed, this will result in "08A0".	X: page number (8 - 15)	none	-	ALPHA DATA - X contains alpha data DATA ERROR - page number is not valid (not 8 - 15)	Sebastian Toelg
		ROM, XROM-ID and page					

	CHKRIDS	Checks ROM-IDs for multiple (double or more) occurrence. ROM-IDs that have been assigned to pages within the HEPAX file system and that have still an empty FAT (no entries in the Function Address Table) are also taken into account. Multiple ROM-IDs will cause a ROM-IDS BAD error. Flag 25 is handled correctly and will be cleared if it was set before. If executed interactively (not within running program), the messages are displayed and printed in NORM & TRACE mode.	none	none	-	DUP RID id (message) - shows ROM-ID that is been used multiple times ROM-IDS OK (message) - all installed ROMs have different IDs ROM-IDS BAD - at least one ROM-ID is used multiple times	Sebastian Toelg (motivated by Angel Martin's CHKCFG)
	CHKSPG	Calculates checksum of a specified ROM page or zeroes checksum if page number has negative sign (i.e. < 0). If the checksum is wrong, then it will be reset to the correct value automatically. In this case a message "CHKSUM RESET" will be displayed and printed. While the checksum is being calculated, the ROM label (L) and version (V) will be displayed as LL-VV. If checksum is set to zero, then "CHKSUM ZERO" will be displayed and printed. These messages can be suppressed by setting flag 25. It will be cleared and the checksum will be reset or set to zero anyway.	X: page number (8 - 15)	none	-	CHKSUM RESET (message) - checksum of ROM page was wrong and has been reset to correct value CHKSUM ZERO (message) - checksum of ROM page has been set to zero ALPHA DATA - X contains alpha data DATA ERROR - page number is not valid (not 8 - 15)	Sebastian Toelg (motivated by PGSUM in RAMBOX, W&W)
	PCOPY	Programmable version of mainframe function COPY. Program name must be given in ALPHA. If ALPHA is empty, then current ROM program is copied. This function is useful to automatically copy (several) programs from ROM page (e.g. from ROM modules, Flash-ROM or HEPAX memory) to main memory RAM.	ALPHA: program name	none	-	NONEXISTENT - no program with that name found RAM - program is in RAM	Sebastian Toelg
	ROMID	Returns ROM-ID (XROM number, 1 - 31) for a given page number. A 0 indicates that there is no ROM at that page.	X: page number (3 - 15)	X: ROM-ID	L	ALPHA DATA - X contains alpha data DATA ERROR - page number is not valid (not 3 - 15)	Sebastian Toelg
	ROMPG	Returns page number (3 - 15) of a given ROM-ID (XROM number). A 0 indicates that there is no ROM with that ID found in the calculator.	X: ROM-ID (1 - 31)	X: page number	L	ALPHA DATA - X contains alpha data DATA ERROR - ROM-ID is not valid (not 1 - 31)	Sebastian Toelg
		main memory & partitioning					
	CLMM	Clears main memory. As a safeguard "OK" is required in ALPHA.	ALPHA: OK	none	-	MM CLEARED (message) - displayed after execution DATA ERROR - "OK" is missing in ALPHA	Sebastian Toelg (extended from CLXM in Zengrange Ltd., ZENROM 3B)

	MMROOM	Returns number of free registers in main memory (same as shown in PRGM mode).	none	X: free registers	U	none	Sebastian Toelg (adopted from MCODE for Beginners p. 71)
	GTOEND	Positions the user program counter to the permanent .END. and stops there if executed within a user program. This is a convenient alternative to using CAT 1 to get to the end of the user program memory.	none	none	-	none	MCODE for Beginners p. 42
	END?	Returns absolute address of .END. as decimal number (192 - 511).	none	X: absolute address	U	none	Sebastian Toelg
	R0?	Returns absolute address of first user data register (0) as decimal number (192 - 511).	none	X: absolute address	U	none	Sebastian Toelg
	ΣR?	Returns absolute address of first statistics register as decimal number (192 - 511).	none	X: absolute address	U	none	Sebastian Toelg
	TPRV	Toggles private status (function is not programmable) of user program in main memory (RAM) or ROM page. Prompts for program name. If nothing is entered (i.e. 2x ALPHA-key), then private status of current user program in RAM or ROM is toggled. WARNING: checksum of ROM page will turn wrong! Use CHKSPG to reset.	none	none	-	NONEXISTENT - no user program with that name found	Sebastian Toelg
	PTPRV	Programmable version of TPRV. Program name must be given in ALPHA. If ALPHA is empty, then private status of current user program in RAM or ROM is toggled.	ALPHA: program name	none	-	see above (TPRV)	Sebastian Toelg
		extended memory * should work with all ROM-versions 1A, 1B, 1C & 2D (CX)					
	CLEM	Clears extended memory. As a safeguard "OK" is required in ALPHA.	ALPHA: OK	none	-	EM CLEARED (message) - displayed only after execution from keyboard (not from running program) DATA ERROR - "OK" is missing in ALPHA	Sebastian Toelg (extended from CLXM in Zengrange Ltd., ZENROM 3B)
	CHKSEMP*	Calculates checksum of program file in extended memory. If the checksum is wrong, then it will be reset to the correct value automatically. In this case a message "CHKSUM RESET" will be displayed and printed. This message can be suppressed by setting flag 25. It will be cleared and the checksum will be reset anyway. The named file becomes the working file.	ALPHA: file name	none	-	CHKSUM RESET (message) - checksum of program file was wrong and has been reset to correct value FL NOT FOUND - no file with that name found FL TYPE ERR - file is not a program file NAME ERR - ALPHA is empty NO XF/M - no extended function/memory installed	Sebastian Toelg (motivated by RSTCHK from RAMPAGE and PPCJ V13 N2 p14)
	FLHD*	Returns absolute address of register containing the file header, i.e. 2nd register of file after the register containing the file name. The named file becomes the working file. If ALPHA is empty, then the current working file will be used.	ALPHA: file name	X: address of file header	U	FL NOT FOUND - no file with that name found NO XF/M - no extended function/memory installed	Sebastian Toelg (motivated by RAMPAGE)

	FLTP*	Returns code for file type. The named file becomes the working file. If ALPHA is empty, then the current working file will be used.	ALPHA: file name	X: file type	U	FL NOT FOUND - no file with that name found NO XF/M - no extended function/memory installed	Sebastian Toelg (motivated by RAMPAGE)
	RETPFL*	Retype file, i.e. change file type to specified code. The named file becomes the working file.	ALPHA: file name X: new file type code	none	-	DATA ERROR - code for new file type is not valid (not 0 - 15) FL NOT FOUND - no file with that name found NAME ERR - ALPHA is empty NO XF/M - no extended function/memory installed	Sebastian Toelg (motivated by RAMPAGE)
	RENMFL*	Rename file. The old file name and the new file name are separated by a comma. The file with the new name becomes the working file. If no new file name is given (no comma), then the file with the old name becomes the working file.	ALPHA: old name, new name	none	-	DUP FL - a file with the same (new) name already exists FL NOT FOUND - no file with that name found NAME ERR - ALPHA is empty NO XF/M - no extended function/memory installed	Sebastian Toelg (motivated by RAMPAGE)
	WORKFL*	Appends the name of the working file to ALPHA.	none	ALPHA: with filename appended	-	FL NOT FOUND - no working file defined NO XF/M - no extended function/memory installed	Sebastian Toelg
	READEM	Reads the complete extended memory from mass storage file.	ALPHA: file name on mass storage	none	-	NO XFM - no extended function/memory installed see HP-IL Module	READXM from Extended IL ROM
	WRTEM	Writes the complete extended memory to mass storage file.	ALPHA: file name on mass storage	none	-	DIR EMPTY - no files in extended memory NO XFM - no extended function/memory installed see HP-IL Module	WRTXM from Extended IL ROM
		hardware configuration					
	41MM	Returns number (1 - 5) of installed memory modules. For 41C with QUAD MEMORY module, CV or CX the number of 5 will be returned always.	none	X: number of memory modules	U	none	Sebastian Toelg
	41EM	Returns number (0 - 2) of installed extended memory modules (X MEMORY).	none	X: number of extended memory modules	U	NO XF/M - no extended function/memory installed	Sebastian Toelg

	41NUT	Returns code: 1 for fullnut (like ver. 1 or 1/1) or 2 for halfnut (like ver. 2 or 1/2)	none	X: code	U	none	Sebastian Toelg
	41REV	Displays and prints (in NORM & TRACE mode) revision code of operating system ROMs (0, 1, 2).	none	none	-	ROM pages and their revision codes (message)	Sebastian Toelg
		display					
	DSP	Sets display to number of specified decimal digits.	X: number of decimal digits (0 - 9)	none	-	ALPHA DATA - X contains alpha data DATA ERROR - number in X is not 0 - 9	Sebastian Toelg
	DSP?	Returns number (0 - 9) of decimal digits being displayed.	none	X: number of decimal digits	U	none	Sebastian Toelg
	DSPTST	Perform display test - displays all commas and subsequently all segments.	none	none	-	all display segments on	MCODE for Beginners p. 112
	VMANT	View (display and print in NORM & TRACE mode) mantissa with all 10 digits.	X: numeric value	none	-	all 10 digits of mantissa (message)	Sebastian Toelg (extended from MCODE for Beginners p. 93)
		key assignments					
	KAPACK	Packs key assignments.	none	none	-	none	PPC Journal V12N4 p. 24
	KASIZE	Returns number of registers used for key assignments.	none	X: number of registers	U	none	W&W GmbH, RAMBOX
	LKAOFF	Switch off local key assignments, i.e. key assignment of A-J and of a-e in upper two rows are deactivated.	none	none	-	none	Sebastian Toelg (inspired by PPC Journal V10N5 p. 9)
	LKAON	Switch on local key assignments, i.e. key assignment of A-J and of a-e in upper two rows are reactivated.	none	none	-	none	Sebastian Toelg (inspired by PPC Journal V10N5 p. 9)
		buffers					
	BHD	Returns absolute address of buffer head for a given buffer ID. 1 - 14 are valid buffer IDs. If input is 0, then the address of the 1st buffer (regardless of its ID) will be returned. If input is 15, then the absolute address of the last key assignment register will be returned. A retuned 0 indicates that specified buffer does not exist or that there are no key assignment registers, respectively.	X: buffer ID	X: buffer head address	L	ALPHA DATA - X contains alpha data DATA ERROR - input is not valid (not 0 - 15)	Sebastian Toelg
	BSIZE	Returns buffer size (number of registers) for a given buffer ID. 1 - 14 are valid buffer IDs. If input is 0 then, the cumulated size of all buffers (without key assignment registers) will be returned. If input is 15, then the number of registers used for key assignments will be returned. A retuned 0 indicates that specified buffer does not exist or that there are no key assignment registers, respectively.	X: buffer ID	X: buffer size	L	ALPHA DATA - X contains alpha data DATA ERROR - input is not valid (not 0 - 15)	Sebastian Toelg
		user flags					

	FLAGX	Sets or clears specified user flag. Flag number may be 0 - 55. If value is positive, then flag will be set. If value is negative, then flag will be cleared (flag 0 can also be cleared using a small negative value > -1, e.g. -0,1) .	X: flag number with sign	none	-	ALPHA DATA - X contains alpha data NONEXISTENT - flag does not exist (|X| > 55)	Sebastian Toelg
		non-normalized recall					
	NRCLX	Recall specified user data register without normalization (works with any number of memory modules, i.e. also with 41C).	X: user data register	X: non-normalized value stored in user data register	L	ALPHA DATA - X contains alpha data NONEXISTENT - user register does not exist (exceeding current SIZE setting)	Sebastian Toelg (motivated by Zengrange Ltd., ZENROM 3B and MCODE for Beginners p. 84)
		ALPHA and STACK with statistics registers					
	ASTOΣ	Stores ALPHA register (registers M, N, O, P) into statistics registers. Location of statistics registers must be set before.	ALPHA	none	-	NONEXISTENT - some or all required statistics registers do not exist (exceeding current SIZE setting)	Sebastian Toelg
	ARCLΣ	Recalls ALPHA register (registers M, N, O, P) from statistics registers.	none	recalled ALPHA	-	see above	Sebastian Toelg
	A<>Σ	Exchanges ALPHA register (registers M, N, O, P) and statistics registers.	ALPHA	recalled ALPHA	-	see above	Sebastian Toelg
	STSTOΣ	Stores stack registers (T, Z, Y, X & LastX) into statistics registers. Location of statistics registers must be set before.	X, Y, Z, T, LastX values	none	-	see above	Sebastian Toelg
	STRCLΣ	Recalls stack registers (T, Z, Y, X, LastX) from statistics registers.	none	recalled X, Y, Z, T, LastX values	NA	see above	Sebastian Toelg
	ST<>Σ	Exchanges stack registers (T, Z, Y, X, LastX) and statistics registers.	X, Y, Z, T, LastX values	recalled X, Y, Z, T, LastX values	NA	see above	Sebastian Toelg
		CCD module					
	TLC	Toggles lower case mode of CCD module.	none	none	-	none	Sebastian Toelg
	WSIZE?	Returns code for word size and sign mode (i.e. UNS, 1CMP or 2CMP) of CCD module. Valid word size can be 1 - 32. A returned value of 0 indicates, that no buffer exists, and the default word size of 8 will be used. If 1CMP mode is active, then 64 is added to the word size. If 2CMP mode is active, then 128 is added to the word size. If unsigned mode (UNS) is active, then nothing is added.	none	X: word size code	U	none	Sebastian Toelg
					-	stack is not changed	
					U	stack is moved up, returned value is in X	
					L	old X value is stored in LastX register, returned value is in X	
					NA	not applicable	