The HP-41C Quick Reference Guide

Contents

ALPHA Operations	2	Statistics Operations 11
ALPHA Mode Keyboard	2	Flags 11
Data Storage Registers		Programming
and Program Memory	4	Information 12
Function Index	6	Controlled Looping 13
The Catalog	9	Conditionals 14
Function Execution and		Indirect Operations 14
Assignment1	0	The COPY Function 15

The HP-41C Normal Mode Keyboard



Caution: Turn the HP-41C off prior to removing or inserting plug-in extensions! **MEMORY LOST** display indicates that Continuous Memory has been cleared.

The HP-41C ALPHA Mode Keyboard



ALPHA Operations

The ALPHA register is independent from the automatic memory stack. To place an ALPHA string into the display, place the HP-41C into ALPHA mode (press ALPHA) and press the keys associated with the desired ALPHA characters. Refer to the ALPHA keyboard illustration above, on the back of the calculator, in the Owner's Handbook for a complete ALPHA keyboard.

There are eight functions on the ALPHA mode keyboard: APPEND, ASTO, ARCL, BST, SST, CLA, , , , , AVIEW, R/S. Two additional functions, ASHF and

PROMPT, are not on the keyboard. **ARCL** are used to store and recall ALPHA strings into the data storage registers. Press **ARCL** nn in ALPHA mode to store the left-most six characters in the ALPHA register into the indicated register. Press **ARCL** nn in ALPHA mode to recall the contents of the indicated register into the ALPHA register. **ASHF** shifts the contents of the ALPHA register six characters to the left.

CLA clears the contents of the ALPHA register, and **AVIEW** places the contents of the ALPHA register into the display.

Switching out of and into ALPHA mode terminates ALPHA string entry. If you want to add to a string that is in the ALPHA register and ALPHA string entry has been terminated, press **APPEND** and continue keying in the desired ALPHA characters.

In a program, **PROMPT** halts program execution and places the contents of the ALPHA register into the display as a prompt for data, etc.

Data Storage Registers and Program Memory

Primary Data Storage Registers (up to 63 on basic HP-41C).



Extended Data Storage Registers (up to 219 total).



The Automatic Memory Stack Registers



Program Memory

Up to 319 registers of program memory (up to 63 on the basic HP-41C).

Register Allocation

To determine the number of unused registers presently allocated to program memory, simply press GTO • • in PRGM mode. The display will show **00 REG nn**. The indicated number (nn) is the number of unused registers that remain in program memory.

To determine the total number of registers allocated to data storage registers, recall increasingly higher numbered data storage registers. When the next numbered recall operation results in the **NONEXISTENT** display, that numbered register represents the number of registers currently allocated to data storage registers. Example:

Keystrokes Display

0.0000 NONEXISTENT	This register exists but the next numbered register does not. The allocation is 20 registers to data storage registers and the remainder to
	program memory.
	0.0000 NONEXISTENT

To set the number of registers in data storage and program memory, execute **SIZE** and specify a three-digit register size (000 through 318). This specifies the number of data storage registers. The remainder of registers are allocated to program memory.

Register Specification

Any function that requires a data storage register to be specified can accept a two-number data storage register number (00 through 99). When you supply the register number, pressing • followed by X, Y, Z, T, or L (for LAST X) specifies the stack or LAST X registers. Pressing • followed by a two-digit number specifies an indirect address. Valid indirect addresses are 00 through 99. The indirectly addressed register can be numbered 000 through 318. Pressing ■ • followed by X, Y, Z, T, or L specifies an indirect address in the stack or LAST X registers.

Function Index

Functions with one name for keyboard execution, and a second name for assigning and display execution are shown with both names (e.g., \overline{s} on the keyboard and \overline{sort} in the display). The keyboard name is listed first. Refer to the *HP-41C Owner's Handbook and Programming Guide* for complete descriptions of all HP-41C functions. The * indicates functions printed on the normal mode keyboard.

Absolute value. Accumulation correction. Accumulations. Addition operator. Advance paper. ALPHA mode key. ALPHA mode off. ALPHA mode on. ALPHA recall. ALPHA shift left. ALPHA shift left. ALPHA store. ALPHA view. Antilogarithm (common). Antilogarithm (natural). Antilogarithm (for small arguments). Append display. Arc cosine. Arc sine. Arc tangent. Assign.	ABS • E- • E+ ADV • ALPHA AOFF AON ARCL ASHF ASHF ASTO AVIEW • [0] or 10+X • COS ⁻¹ or ACOS • SIN ⁻¹ or ASIN • TAN ⁻¹ or ATAN
Beeper.	* BEEP
Back step.	* BST
Catalog list.	* CATALOG OF CAT
Change sign.	* CHS
Clear all data storage registers.	CLRG
Clear ALPHA register.	* CLA

Clear display. Clear program. Clear program flag. Clear automatic memory stack. Clear statistics registers. Clear X-register. Copy (download or copy). Correction key. Cosine. Decimal to octal conversion. Decrement and skip if equal. Degrees mode. Degrees to radians conversion. Delete program memory lines. Division operator. End of program. Engineering notation display. Enter exponent. Enter number in X into Y. Exchange X- and Y-registers. Exchange X- and any register. Execute. Exponential. Exponential. Factorial. Fixed point display. "Flag clear" test. "Flag clear" test and clear. "Flag set" test. "Flag set" test and clear. Fractional portion of number. Go to. Go to line or ALPHA label. Go to end of program memory. Grads mode. Hrs. (decimal) to hr., min., s. Hr., min., s. addition. Hr., min., s. subtraction. Hr., min., s. to decimal hrs.



Increment and skip if greater.	* ISG
Integer portion of number.	INT
Label .	* LBL
Logarithm (common).	* LOG
Logarithm (natural).	* LN
Logarithm (arguments close to one).	LN1+X
LAST X register recall.	* LASTX OF LASTX
Mean	MEAN
Modulo (remainder).	MOD
Multiplication operator.	* ×
Octal to decimal conversion	DEC
Pack program memory. Pause. Percent. Percent of change. Pi. Polar to rectangular conversion. Power off. Power on (continuous) function. Program mode key. Prompt.	PACK PSE * π %CH * π orf * Orf * OR ON * FRGM PROMPT
Radians mode. Radians to degrees conversion. Recall. Reciprocal. Rectangular to polar conversion. Return. Roll down. Roll up. Round. Run/stop.	RAD R-D * [RCL] * [T/x] or [1/x] * [R+P] * [R+] * [R+] Rep * [R+] Rep * [R+] Rep * [R+] Rep * [R+] * [R+] * [R+] * [R+]
Set flag.	* SF
Scientific notation display.	* SCI
Shift key.	* SIGN
Sign, unary of x.	* SIN
Sine.	\$ISN
Size of register configuration.	\$IZE



The Catalog

Press CATALOG 1 to review all of the program names that you have stored into program memory.

Press **CATALOG** 2 to review all of the functions associated with currently plugged-in extensions.

Press CATALOC 3 to review all of the standard HP-41C functions.

You can stop the catalog listing by pressing \mathbb{R}/\mathbb{S} . You can then use \mathbb{SST} and \mathbb{BST} to step through the catalogs

manually. Press \bigcirc again to restart the listing. Stop the listing and press \bigcirc to get out of a catalog listing operation.

As the listing of catalog 1 progresses the HP-41C is automatically set to the location in program memory of the currently displayed program name.

Function Execution and Assignment

To execute a normal mode function, simply press the corresponding key in normal mode. To execute any valid function, press XEO [ALPHA] name [ALPHA] and supply the proper function name (refer to the function index).

Most standard HP-41C functions can be assigned to a key location for execution in USER mode (refer to the Function Index in the back of the owner's handbook). All key locations except **ON**, **USER**, **(PRGM**, **(ALPHA**), and **W** will accept function assignments.

All ALPHA program labels that you have written and stored into program memory can be assigned to a key location.

To assign a function or a program to a key location, press **ALPHA** name **ALPHA** and supply the function or program name. Then press the key or **a** and the key to which you wish the function or program to be assigned. The key location is identified in the assignment function execution by a row-column keycode (shifted locations are indicated by a minus sign before the keycode).

To return to the normal mode function for any key, press

To execute any reassigned function or program, simply place the HP-41C into USER mode (press USER) and press the reassigned key. The name of the function will appear in the display if you hold the key down momentarily. If you hold the key down for more than about a half

second, the function is nullified (NULL) and is not executed when you release the key.

Statistics Operations

There are six statistical registers used for accumulations and by the statistical functions. The location of these six registers is controlled by the $\boxed{\Sigma REG}$ function. When you execute $\boxed{\Sigma REG}$ and supply a two-digit register address, that address specifies the beginning of the six-register statistical register block. Initially the statistical registers are R₁₁ through R₁₆. Pressing $\boxed{\Sigma +}$ accumulates and pressing $\boxed{\Sigma -}$ deletes accumulations from the registers:

First Register:	Σ_X	Fourth Register:	Σy^2
Second Register:	Σx^2	Fifth Register:	Σxy
Third Register:	Σy	Sixth Register:	n

Flags

The HP-41C has 30 user flags and 26 system flags. The user flags can be set, tested and cleared. System flags can be tested only. The keyboard flag functions are \overline{sr} (*set flag*), \overline{CF} (*clear flag*), and $\overline{Fs7}$ (*'flag set'' test*). The non-keyboard flag functions are $\overline{Fc7}$) (*'flag clear'' test*), $\overline{Fs7C}$ (*'flag set'' test and clear*), and $\overline{Fc7C}$ (*'flag clear'' test and clear*). If the answer to a flag ''test' is yes, program execution continues with the next line. If no, the next line in the program is skipped before execution continues. Manually from the keyboard, test function answers are displayed as **YES** and **NO**, and no program lines are executed or skipped. Display annunciators**0** through **4** turn on when flags 00 through 04 are set.



User Flags (00 through 29)		System Flags (30 through 55)	
	Flag		Flag
	Number	Flag Name	Number
General Purpose		Catalog Flag	30
User Flags (11)		Peripheral Flags	
	through	(5)	. 31
	10		through
Special Purpose			35
User Flags (10)	11	Number of Digits	
	through	Flags (4)	36
.	20		through
Automatic			39
Execution Flag		Display Format	
(Special Purpose	9	Flags	ENG 41
Flag 11)	11	Radians Mode	40
Printer Enable		Flag Crada Mada Flag	42
Flag	21	Grads Mode Flag	43
	00	Elog	44
Flag	22	Flag	44
ALPHA Input Flag	j 23	Data Entry Flag	45
Hange Error			46
Ignore Flag	24	Shift Set Elan	40
Audio Enchlo Elor	25	AL PHA Mode Flag	- 48
AUGIO Ellable Flag	J 20	Low Battery Flag	10
Decimal Point	21	Message Flag	50
Elag	28	SST Flag	51
Flay Digit Grouping	20	DBGM Mode Elac	, 52
Flag	20	I/O Flag	53
ilay	23	Pause Elan	54
		Printer Existence	<u> </u>
		Flan	55
		ilay	

Programming Information

To begin a new program, press **GTO** • • . This sets the calculator to the end of program memory and tells you the number of unused registers left in program memory (**00 REG nn**).

To key in a program, place the HP-41C into program

mode (press **PRCM**) and press the keys associated with the desired functions. Functions not on the keyboard are keyed in just as you would execute them from the keyboard (press **XEO ALPHA** name **ALPHA**). In USER mode, reassigned functions are loaded into program memory as you press the associated keys. When you are finished keying in a program, press **GTO** • • to place an **END** instruction at the end of the program (also sets the HP-41C to the end of program memory).

Programs must be named with up to seven ALPHA characters. To execute the program, press **XEO ALPHA** name **ALPHA**, supplying the program name. The program is executed when you have keyed in the name and pressed **ALPHA**. Programs can also be executed by assigning the name to a key (press **ASN ALPHA** name **ALPHA**), and then pressing that key in USER mode.

Controlled Looping

ISG (*increment and skip if greater*) and **DSE** (*decrement and skip if equal*) use a number that is interpreted in a special way to control program loops. The number is stored into any data storage register. The format of the number is: **iiiii.fffcc** where:

iiiii is the current counter value, fff is the counter test value, and cc is the increment value.

The **iiiii** portion of the number tells the HP-41C that you wish to count the number of passes through the loop beginning with that number. When the **iiiii** portion exceeds five digits, the decimal portion of the number (**.fffcc**) is truncated on the right for each excess **iiiii** character.

The **fff** portion of the number tells the HP-41C that you wish to stop the counting at that number. The **fff** value must always be specified as a three-digit number (e.g., an **fff** value of 10 would be specified as 010).

The **cc** portion of the number tells the calculator how you wish to count. Current counter value **iiiii** is incremented or decremented by the increment value of **cc**. If you do not specify a **cc** value, the HP-41C assumes you wish to count by one's (**cc**=01). A **cc** value must be specified as two digits (e.g., 01, 03, 55).

Using $\boxed{\text{ISG}}$, when **iiiii** is greater than **fff**, the HP-41C skips the next line in the program. If **iiiii** is not greater than **fff**, no lines are skipped. Using $\boxed{\text{OSE}}$, when **iiiii** is less than or equal to **fff**, the next line in the program is skipped. If **iiiii** is not less than or equal to **fff**, no lines are skipped.

Conditionals

The conditional operations on your HP-41C are useful as program instructions to allow your programs to make decisions. The 10 conditionals available in the HP-41C are shown in the function index on page 9.

Two of these conditionals, (x=y) and (x=y) can be used to compare ALPHA strings as well as numbers. All of the other conditionals compare only numbers. If two strings are "equal" ((x=y)), then they are *exactly* equal in length and have identical characters.

Conditionals follow the "do if true" rule. If the conditional test is true, the next program line is executed. If false, the next line is skipped. Executed manually from the keyboard, these conditionals return an answer to the display: **YES** if true, and **NO** if false. No program lines are executed or skipped.

Indirect Operations

An indirect address is selected by following a function with the shift key, \square , and then a register address. The function then uses the number in the specified register as an *address*. Pressing $\square \square$ and X, Y, T, Z or L (for LAST X) specifies an indirect stack address.

Valid indirect address specifications are 00 through 99 and X, Y, Z, T, L. The indirectly addressed register can be numbered 000 through 318. Here is a complete listing of all HP-41C functions that can be used with indirect addresses (valid parameters are given where applicable):

sто 🗖 n	n	Store.
STO +	nn	Store add (keyboard form).
STO -	nn	Store subtract (keyboard form).
STO X	nn	Store multiply (keyboard form).
STO +	nn	Store divide (keyboard form).
ST+ n	n	Store add (display form).
ST- n	n	Store subtract (display form).
STX n	n	Store multiply (display form).
st+ n	n	Store divide (display form).
ASTO	nn	ALPHA store.
RCL n	n	Recall.
ARCL	nn	ALPHA recall.
VIEW	nn	View register contents.
GTO n	n	Go to (00 through 99).
XEQ n	n	Execute (00 through 99 or ALPHA name).
FIX n	n	FIX display format (0 through 9).
sci 🗖 n	n	SCI display format (0 through 9).
ENG n	n	ENG display format (0 through 9).
DSE 📕 n	n	Controlled decrement loop.
ISG n	n	Controlled increment loop.
TONE	nn	Audible tone pitch (0 through 9).
ΣREG	nn	Define accumulation registers.
SF 📕 nn		Set flag (00 through 29).
CF 📕 nn		Clear flag (00 through 29).
FS?	n	"Flag set" test (00 through 55).
FC?	in	"Flag clear" test (00 through 55).
FS?C	nn	"Flag set" test and clear (00 through 29).
FC?C	nn	"Flag clear" test and clear (00 through 29).
X<> n	n	Exchange X and any register.
CATALOG	nn	Catalog List (1, 2, or 3).

The **COPY** Function

Functions in application modules may be executed by following the instructions given in the corresponding application book. However, if you wish to alter the way a program works, use **COPY** to copy it from an application module into program memory. These programs can be altered and the altered programs executed only while they are in program memory. They cannot be saved in the application module. With the application module in place and the desired program name in mind, execute **COPY** and spell out the program name (**ALPHA** name **ALPHA**).

The application module program must be able to fit into program memory. If it does not it cannot be copied. Here is what happens when you execute \boxed{COPY} :

- 1. The HP-41C searches for the specified name. If not found the display will show **NONEXISTENT**.
- 2. If the unused portion of program memory is large enough to accept the entire application program, it is copied into program memory.
- 3. If there is not enough room, the HP-41C will pack program memory. You will momentarily see **PACKING** and then **TRY AGAIN** in the display: reenter the **COPY** function.
- 4. If there is enough room after packing, the application program will be copied into program memory. If there is still not enough room, the calculator will again display *PACKING* and *TRY AGAIN*.
- 5. You must insert a memory module or clear programs from program memory to make room.

Attempting to \boxed{COPY} a program from program memory to another location in program memory will result in the **RAM** message. Attempting to \boxed{DEL} , \boxed{CLP} , \boxdot , or insert into a program that is currently in an application module will result in the **ROM** display.

COPY ALPHA ALPHA copies the application module program that the calculator is currently positioned to into program memory.

