CORVALLIS DIVISION COLUMN

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THE HP-41C POSTFIX TABLE

The last Corvallis Division Column discussed the Main Function Table of the HP-41C. The Main Function Table defines the internal representation of the first byte of all HP-41C programmable functions. This article deals with subsequent bytes of multibyte functions.

Row 9 of the Main Function Table defines the first byte of two byte RCL, two byte STO, register arithmetic and other two byte HP-41C functions. In program memory, each leading byte from row 9 is followed by one byte from the Postfix Table.

As an example of the use of the Postfix Table, the program representation for STO+27 in the HP-41C is 92, 1B hexidecimal. The first byte (92) comes from the Main Function Table and represents STO+. The second byte (1B) comes from the 1st row Bth column of the Postfix Table. Other examples of row 9 functions and their corresponding hexidecimal representations are:

Function	Byte 1	Byte 2
VIEW X	98	73
FIX 3	9C	03
DSE 67	97	43

HP-41C POSTFIX TABLE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Direct Functions 0	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99			A	B	C	D	E	F	G	H	I	J
7	T	Z	Y	X	LSTX							a	b	c	d	e
Indirect Functions 8	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
9	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
A	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
B	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
C	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
D	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
E	96	97	98	99												
F	T	Z	Y	X	LSTX											

Indirect functions are represented by the lower eight rows of the Postfix Table. Thus the indirect functions corresponding to the direct functions above would be:

Function	Byte 1	Byte 2
VIEW IND X	98	F3
FIX IND 03	9C	83
DSE IND 67	97	C3

Flags, local GTO's, local labels, local executes and exchanges also make use of the Postfix Table.

Three byte local GTO's and local executes contain one byte from the Postfix Table which specifies the label of interest. The remaining bits are used to remember the address of the label once it has been found by a LBL search. This technique allows improved execution speed since the slow label search process is only done once. On all subsequent executions of the GTO or XEQ function the location of the label is known and no search is needed.

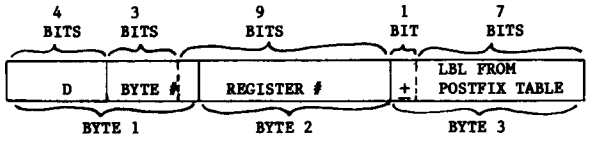
A three byte GTO 22 instruction has the following form immediately after it has been keyed into program memory:

Function	Byte 1	Byte 2	Byte 3
GTO 22	D0	00	16

If LBL 22 was the third byte of a register, 30 registers away from the GTO 22 instruction, the GTO 22 would have the following form after being executed:

Function	Byte 1	Byte 2	Byte 3
GTO 22	D6	16	16

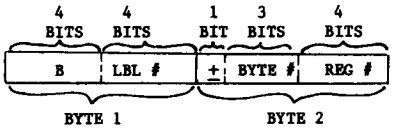
If the three bytes are put end to end, the entire instruction may be viewed as:



Thus the first four bits give the type of instruction (GTO), the next three bits give the location of the LBL within the register where it is stored, the next nine bits give the distance from the GTO to that register, the next bit tells whether the register is before or after the GTO and the last seven bits retain the name of the LBL. The name of the LBL must be retained in case program modifications invalidate the address retained in the first two bytes. Any addition or deletion of program steps sets all address bits in all GTO's and XEQ's to zero.

The local XEQ function is analogous except that the first four bits are hexidecimal E instead of D.

The two byte GTO has the following form:



Since there are less bits in the register number field, the range of addresses that can be remembered is also reduced. Thus a two byte GTO can remember a LBL ± 16 registers away (2**4=16). Since each register contains 7 bytes, a two byte GTO has a maximum range of 112 bytes.

GTO and XEQ indirect use the Postfix Table in a slightly different manner. Both GTO and XEQ indirect have the same first byte (AE hexidecimal). The HP-41C uses the second byte to differentiate between the two functions. GTO indirect has a postfix from the first half of the Postfix Table while XEQ indirect has a postfix from the second half of the Table. Thus:

Function	Byte 1	Byte 2
GTO IND T	AE	70
XEQ IND T	AE	F0

ALPHA postfix functions such as GTO ALPHA, XEQ ALPHA, and ALPHA LBL form their postfixes using one byte from row 15 and the ASCII representation of the characters in the postfix. The byte from row 15 gives the string length just as it does in a standard ALPHA string. Some ALPHA functions and the corresponding internal representations are:

Function	Byte 1	Byte 2	ASCII ALPHA BYTES
GTO ABC	1D	F3	41,42,43
GTO A13CD	1D	F5	41,31,33,43,44
XEQ X	1E	F1	5A

In the next Corvallis Division Column, the HP-41C data and program structure will be discussed.

R/S