

# Program Description I

Program Title ALGEBRAIC NOTATION WITH 10 LEVELS OF PARENTHESES

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Program Description, Equations, Variables THIS PROGRAM TURNS THE HP-67 INTO AN ALGEBRAIC CALCULATOR WITH 10 LEVELS OF PARENTHESES AND 11 PENDING OPERATIONS. ALL INTERMEDIATE RESULTS ARE RETURNED TO X SO THAT ANY KEY FUNCTION CAN BE PERFORMED ON THEM. IF YOU GET LOST WITH ALL THOSE PARENTHESES YOU CAN EVEN WRITE THE CURRENT STATE OF AFFAIRS ONTO A DATA CARD AND RETURN LATER, READ IN THE DATA CARD, AND CONTINUE WITH YOUR CONFUSION! ALL INVALID OPERATIONS ARE DETECTED (SUCH AS ENTERING A LEFT PAREN WITHOUT A PRIOR OPERATOR) AND CAN BE RECOVERED FROM WITHOUT DESTROYING WHAT YOU HAVE ALREADY DONE.

THIS PROGRAM WAS WRITTEN AS AN EXERCISE IN INDIRECT ADDRESSING. IT ALSO TERMINATES ALL ARGUMENTS ABOUT RPN vs ALGEBRAIC -- WITHOUT ACTUALLY SETTLING THEM. AND, IT'S NO ACCIDENT THAT IT PROVIDES ONE MORE PARENTHESES LEVEL THAN ANOTHER CALCULATOR ON THE MARKET.

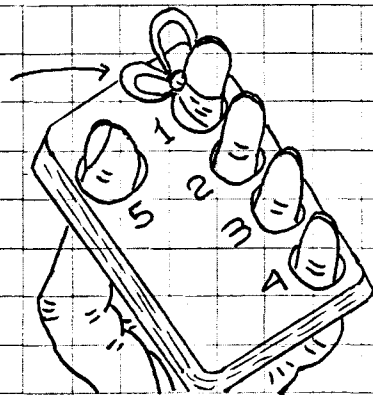
Operating Limits and Warnings THE PROGRAMMING GENERAL HAS DETERMINED THAT ALGEBRAIC NOTATION IS DANGEROUS TO YOUR HEALTH.

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Sketch(es)

MEMORY!



THE ORIGINAL "DIGITAL" CALCULATOR WITH ALGEBRAIC NOTATION. NUMBER OF PARENTHESES DEPENDS ON IQ. OF OPERATOR. ALSO AVAILABLE IN LEFT HAND MODEL (TURN OVER)

Sample Problem(s)

- 1)  $5 + 8 = ?$
- 2)  $8 \times 3 \div (4 + 2) = ?$
- 3)  $3 \times (8 \times 2)^2 = ?$
- 4)  $2 \times (3 \times (4 \times (5 \times (6 + 3)))) = ?$
- 5)  $2 \times (144 \div 12) = ?$  THEN RESULT  $\times (4 + 3) = ?$
- 6) (4)) ERROR

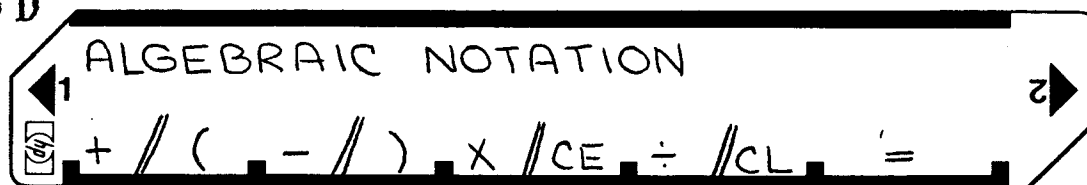
Solution(s) KEYS SHOWN ARE USER FUNCTIONS  $\boxed{CL}$   $\boxed{CE}$   $\boxed{(}$   $\boxed{)}$   $\boxed{+}$   $\boxed{-}$   $\boxed{\div}$   $\boxed{\times}$   $\boxed{=}$ 

- 1)  $\boxed{CL}, 5 \boxed{+}, 8 \boxed{=}$  13
- 2)  $\boxed{CL}, 8 \boxed{\times}, 3 \boxed{\div}, \boxed{(}, 4 \boxed{+}, 2 \boxed{)}, \boxed{=}$  4
- 3)  $\boxed{CL}, 3 \boxed{\times}, \boxed{(}, 8 \boxed{\times}, 2 \boxed{)}, 9 \times^2, \boxed{=}$  768
- 4)  $\boxed{CL}, 2 \boxed{\times}, \boxed{(}, 3 \boxed{\times}, \boxed{(}, 4 \boxed{\times}, \boxed{(}, 5 \boxed{\times}, \boxed{(}, 6 \boxed{+}, 3 \boxed{)}, \boxed{)}, \boxed{)}, \boxed{=}$  1080
- 5)  $\boxed{CL}, 2 \boxed{\times}, \boxed{(}, 144 \boxed{\div}, 12 \boxed{)}, \boxed{=}$  24 THEN  $\boxed{\times}, \boxed{(}, 4 \boxed{+}, 3 \boxed{)}, \boxed{=}$  168
- 6)  $\boxed{CL}, \boxed{(}, 4 \boxed{)}, \boxed{)}$  error - TO RECOVER  $\boxed{CLX}, \boxed{CE}, \boxed{=}$  4

Reference(s)

# User Instructions

00226D



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	LOAD SIDE 1 AND SIDE 2		<input type="text"/> <input type="text"/>	
2	CLEAR <input type="text"/>		f D	0.00
3	OPTIONAL - SET DISPLAY MODE		<input type="text"/> <input type="text"/>	
4	ENTER THE EQUATION LEFT TO RIGHT AND SEE ANSWER IN X. IF YOU MAKE AN ERROR WHILE ENTERING A NUMBER, JUST DO A <input type="text"/> AND THE PRIOR X WILL RETURN.		<input type="text"/> <input type="text"/>	
	IT IS NEARLY IMPOSSIBLE TO WRITE STEP-BY-STEP INSTRUCTIONS FOR THIS PROGRAM WITHOUT ENDING UP WITH A CALCULATOR HANDBOOK. THEREFORE, WHAT FOLLOWS IS A DESCRIPTION OF WHAT EACH FUNCTION DOES.		<input type="text"/> <input type="text"/>	
+	CAN FOLLOW A RIGHT PAREN BUT SHOULD NOT HAVE A DIGIT ENTRY IF IT DOES. SAME WITH EQUAL SIGN.		A <input type="text"/>	INTER RESULT
-	SEE +		B <input type="text"/>	INTER RESULT
X	SEE +		C <input type="text"/>	INTER RESULT
÷	SEE +		D <input type="text"/>	INTER RESULT
(	CAN BE THE FIRST ENTRY OR CAN FOLLOW +, -, X, OR =. IF "error", YOU DID NOT DO THE ABOVE OR MORE THAN 10 ( HAVE BEEN USED. TO RECOVER STORE A ZERO IN C, THEN <input type="text"/>		f A <input type="text"/>	0
)	CAN FOLLOW A +, -, X, ÷, OR ). IF "error", you HAVE ENTERED MORE ) THAN (.		f B <input type="text"/>	INTER RESULT
=	IF "error" YOU HAVE (S PENDING.		E <input type="text"/>	FINAL RESULT
CE	CAN BE USED AFTER ANY ERROR TO RESTORE X. ALSO AFTER READING IN DATA CARD.		f C <input type="text"/>	X

# 00226D Program Listing I

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STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	* F L B L A	312511	+ OP = 1		* F L B L 2	312502	PROCESS -
	1	01			h S T I	3533	
	G T O 9	2209			f I S Z	3134	
	* F L B L B	312512	- OP = 2	060	h X Z Y	3552	
	2	02			R C L (i)	3424	
	G T O 9	2209			h X Z Y	3552	
	* F L B L C	312513	X OP = 3		-	51	
	3	03			h R T N	3522	
	G T O 9	2209			* F L B L 3	312503	PROCESS X
010	* F L B L D	312514	÷ OP = 4		h S T I	3533	
	4	04			f I S Z	3134	
	G T O 9	2209			h X Z Y	3552	
	* 9 L B L b	322512	) OP = 0 IF STACK		R C L (i)	3424	
	h R C T	3534	POINTER IS ZERO, TOO	070	X	71	
	f X = 0	3151	MAY ) ENTERED		R T N	3522	
	G T O f e	223115			* F L B L 4	312504	PROCESS ÷
	C L X	44			h S T I	3533	
	* F L B L 9	312509	PROCESS PENDING		f I S Z	3134	
	S T O D	3314	OPERATION. USES		h X Z Y	3552	
020	h X Z Y	3552	DATA IN X. PUTS		R C L (i)	3424	
	S T O E	3315	CURRENT OPERATION		h X Z Y	3552	
	R C L (i)	3424	IN STACK WHEN DONE		÷	81	
	h X Z I	3524			h R T N	3522	
	f G S B (i)	312224		080	* F L B L 5	312505	PROCESS =
	h F ? 2	357102			h S T I	3533	
	G T O 9	2209			f I S Z	3134	
	S T O (i)	3324			h X Z Y	3552	
	S T O E	3315			h R T N	3522	
	h X Z Y	3552			* F I B L E	312515	= IF LAST OPER-
030	h S T I	3533			S T O E	3315	ATION WAS =, DO
	R C L D	3414			R C L O	3400	NOTHING EXCEPT
	S T O (i)	3324			5	05	REPLACE LEVEL 0
	R C L E	3415			9 X ≠ Y	3261	WITH X. OTHERWISE
	h R T N	3522		090	G T O O	2200	PUT 5 IN OP AND
	* F L B L O	312500	PROCESS ), PUSHES		R C L E	3415	GO TO PROCESS
	2	02	STACK DOWN. IF		S T O I	3301	PENDING OPERATION.
	-	51	STACK POINTER IS		h R T N	3522	
	f X > 0	3181	ZERO AND CURRENT		* F L B L O	312500	
	G T O O	2200	OPERATION IS ),		2	02	
040	R C L D	3414	THEN TOO MANY )'S		h R C T	3522	
	f X = 0	3151	HAVE BEEN ENTERED.		9 X > Y	3281	
	G T O f e	223115	IF OK, FLAG TWO IS		G T O f e	223115	
	h X Z Y	3552	SET SO PENDING		C L X	44	
	* F L B L O	312500	OPERATION ROUTINE	100	h S T I	3533	
	h S T I	3533	WILL EXECUTE AGAIN.		R C L E	3415	
	R C L E	3415			5	05	
	R C L D	3414			G T O 9	2209	
	h S F 2	355102			* 9 L B L 2	322511	( IF LAST OPER-
	h R T N	3522			R C L (i)	3424	ATION WAS ) ERROR.
050	* F L B L 1	312501	PROCES +		f X = 0	3151	IF NOT INCREASE
	h S T I	3533			G T O f e	223115	STACK LEVEL AND
	f I S Z	3134			5	05	STORE + 0 IN PEND-
	h X Z Y	3552			9 X = Y	3251	ING OPERATION. IF
	R C L (i)	3424		110	G T O f e	223115	REG C IS NOT ZERO,
	+	61			f I S Z	3134	TOO MANY ( 'S HAVE
	h R T N	3522			f I S Z	3134	BEEN ENTERED

REGISTERS									
0	1	2	3	4	5	6	7	8	9
REGISTERS WITH ADDRESS 0 THRU 22 ARE USED FOR STACK.									
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A	B	C	USED	D	SAVE OP	E	SAVE X	I	STACK POINTER

