

Compucorp

Advanced Programming
Reference Manual
for the
122/125 Scientist
Similar to Ø2s

Contents

SECTION I – INTRODUCTION	1-1
Related Documentation	1-1
Programming Features	1-1
SECTION II – FUNDAMENTALS	2-1
Program Memory Organization	2-1
LEMP Addressing	2-1
Branching	2-1
Registers	2-6
Internal Data Format	2-7
Index Registers	2-7
SECTION III – PROGRAM INSTRUCTIONS	3-1
Keyboard Functions	3-1
Machine Instructions	3-3
Data Transfer Instructions	3-3
Store Instructions	3-3
Recall Instructions	3-3
Exchange Instructions	3-3
Control Instructions	3-3
Halt Instruction	3-4
Branch Instructions	3-4
Recall P Instruction	3-4
Jump Instructions	3-4
No Operation Instruction	3-5
Conditional Instructions	3-5
Flag 1 Instructions	3-5
Flag 4 Instructions	3-6
Skip Instructions	3-6
Skip If Index 1 Is Zero	3-6
Skip Except on Least Significant Digit	3-6
Skip If Exponent Is Zero	3-6
Skip If Exponent Is Positive	3-6
Skip on Digit Zero	3-6
Skip If Flag 1 Is Set	3-6
Skip If Flag 4 Is Set	3-6
Data Manipulation Instructions	3-7
Register Operations	3-7
Clear Instructions	3-7
Change Sign Instruction	3-7
Numeric Instructions	3-7
Add Numeric	3-7
Subtract Numeric	3-7
Change Sign Exponent	3-7
Add Exponents	3-7
Subtract Exponents	3-7
Increment Exponent Instructions	3-7
Decrement Exponent Instructions	3-8

CONTENTS (Cont.)

Shift Instructions	3-8
Shift Right A	3-8
Shift Left A	3-8
Shift Right E	3-8
Index Register Instructions	3-8
Reset Index 1	3-8
Increment Index 1	3-8
Decrement Index 1	3-9
Reset Index 2	3-9
Preset Index 2	3-9
Increment Index 2	3-9
Transfer Index to M	3-9
Transfer Index to E	3-9
Load Index	3-9
Miscellaneous Instructions	3-10
Summation in Register 7	3-10
Absolute Value	3-10
Normalize Instruction	3-10
Identifier Instruction	3-10
Pause Instruction	3-10
Programming Techniques	3-11
Index Register	3-11
Subroutines	3-11
Decision Making	3-11
Sample Program	3-16
SECTION IV - LEMP OPERATIONS	4-1
Loading a Program	4-1
Verifying a Program	4-1
Executing a Program	4-2
Stepping Through a Program	4-2
Modifying a Program	4-2

APPENDIXES

A REGISTER USAGE	A-1
B INSTRUCTIONS ARRANGED NUMERICALLY	B-1
C INSTRUCTIONS ARRANGED ALPHABETICALLY	C-1

ILLUSTRATIONS

2-1 Calculator Memory Organization	2-2
2-2 LEMP Storage Locations	2-3
2-3 P-Store	2-4
2-4 Branch and Recall P Instructions	2-5
2-5 Data Register Organization	2-7
2-6 Index Registers	2-7
3-1 Using Index Registers for Data Manipulation	3-12
3-2 Using Subroutines	3-13
3-3 Decision Making for Printer Models	3-14
3-4 Decision Making for Display Models	3-15
3-5 Sample Program	3-17

TABLES

2-1 Register Usage	2-6
3-1 Keyboard Functions	3-1
3-2 Branch Point Addresses	3-4

Appendix B

Instructions Arranged Numerically

Octal Code	Mnemonic	Function	Octal Code	Mnemonic	Function
000-011	0-9	Numeral entry	047	ABS	Absolute value
012	DP	Decimal point	050	LOG	Logarithm
013	CHSE	Change sign	051	INT	Integer/fraction
014	EXP	Exponent	052	SUMX	Summation of squares
015	CLRX	Clear E-register	053	ALOG	Antilogarithm
016	RT	Right half	054	INV	Reciprocal
017	PI	Enter π or e	056	SQRT	Square Root
020	EQ	Equals	060	PLUS	Addition
022	SUM7	Summation in register 7	062	MIN	Subtraction
023	SUM8	Summation in register 8	070	MULT	Multiplication
024	RSET	Reset	072	DIV	Division
025	STR	Store in register n	074	ATOX	Raise to power
026†	PRTX	Print entry	075	PTOR	Polar to rectangular
027†	PRTA	Print answer	076	RTOP	Rectangular to polar
030	EXCH	Register exchange	401	HALT	Stop program execution
031	RCL	Recall register n	402	XCEA	Exchange contents of E- and A-registers
033	LE FT	Left half	403	XCMA	Exchange contents of M- and A-registers
034,000	PAUS	Pause	404	CHSN	Change sign in E-register
034,001	SINH	Hyperbolic sine/cosine	405	CHSX	Change sign of exponent in E-register
034,002	ASNH	Arc hyperbolic sine	406	STXA	Store exponent
034,003	ACSH	Arc hyperbolic cosine	407	RCXA	Recall exponent
034,004	BRS4	Branch on Sense switch	410	ADDN	Add mantissas of E- and A-registers
034,005	BRN5	Branch if E ≤ 0	411	SUBN	Subtract mantissa of E-register from that of A-register
034,006	ID	Identifier	412	ADDX	Add exponents of E- and A-registers
035	ADDM	Add to register	413	SUBX	Subtract exponent of E-register from that of A-register
036	F2	Second function			
040	SINE	Sine/cosine			
042	ASIN	Arc sine/arc cosine			
044	FACT	Factorial			
046	RTD	Radians to degrees			

†On printer models only

Octal Code	Mnemonic	Function	Octal Code	Mnemonic	Function
414	INXA	Increment exponent in A-register by 1	446	STR7	Store content of E-register in register 7
415	INXE	Increment exponent in E-register by 1	447	STR8	Store content of E-register in register 8
416	DCXA	Decrement exponent in A-register by 1	450	STR9	Store content of E-register in register 9
417	DCXE	Decrement exponent in E-register by 1	454	STRM	Store content of E-register in register M
420	SHRA	Shift content of A-register right one digit position	455	STRA	Store content of E-register in register A
421	SHLA	Shift content of A-register left one digit position	457	STR0	Store content of E-register in register 0
422	SHRE	Shift content of E-register right one digit position	460	RCR1	Recall content of register 1 to E-register
423	CLRE	Clear E-register	461	RCR2	Recall content of register 2 to E-register
424	CLRA	Clear A-register	462	RCR3	Recall content of register 3 to E-register
425	NOP	No operation	463	RCR4	Recall content of register 4 to E-register
430	SFAE	Set flag 1 if content of A-register is greater than that of E-register	464	RCR5	Recall content of register 5 to E-register
431	SFEA	Set flag 1 if content of E-register is greater than that of A-register	465	RCR6	Recall content of register 6 to E-register
432	SFNE	Set flag 1 if contents of E- and A-registers are not equal	466	RCR7	Recall content of register 7 to E-register
433	SFRA	Set flag 1 if content of register 0 is greater than that of A-register	467	RCR8	Recall content of register 8 to E-register
434	SFNZ	Set flag 1 if content of A-register is not zero	470	RCR9	Recall content of register 9 to E-register
435	SFAN	Set flag 1 if content of A-register is negative	474	RCRM	Recall content of register M to E-register
436	SFEN	Set flag 1 if content of E register is negative	475	RCRA	Recall content of register A to E-register
437	SFE0	Set flag 1 if content of E-register is zero	477	RCR0	Recall content of register 0 to E-register
440	STR1	Store content of E-register in register 1	512	RSI1	Reset index 1 to zero
441	STR2	Store content of E-register in register 2	513	INI1	Increment index 1 by 1
442	STR3	Store content of E-register in register 3	514	DCI1	Decrement index 1 by 1
443	STR4	Store content of E-register in register 4	515	LDIX	Load digit from M-register into index 1
444	STR5	Store content of E-register in register 5	516	XFIM	Transfer content of index 1 to M-register
445	STR6	Store content of E-register in register 6	517	XFIE	Transfer content of index 1 to E-register

Octal Code	Mnemonic	Function	Octal Code	Mnemonic	Function
523	SFSS	Set flag 1 if Sense switch is latched	557	RCLP	Recall content of P-store to P-counter
533	SKI0	Skip if index 1 contains zero	563	SFL4	Set flag 4
534	SKLD	Skip except on least significant digit	570	RFL4	Reset flag 4
535	SKX0	Skip if exponent in A-register is zero	575	RSI2	Reset index 2 to 1
536	SKXP	Skip if exponent in A-register is nonnegative	576	PSI2	Preset index 2 to 15
537	SKD0	Skip if guard digit is not 0 or 15	577	INI2	Increment index 2 by 1
540	SKF1	Skip if flag 1 is set	6xy	JUMP	Transfer control to program step xy
543	SKF4	Skip if flag 4 is set	7xy	BR	Transfer control to branch point xy
556, 735	NORM	Equalize exponents in E- and A-registers	732	IDEN	Generate identifier in E-register
			771	PAUS	Pause

Computer Design Corporation, 12401 West Olympic Boulevard, Los Angeles, California 90064.
Sales and service offices in principal cities throughout the world.