

**5K BASIC**  
**(SOFTWARE #2)**



6200 Hollis Street  
Emeryville, CA 94608  
Phone: (415) 652-8080

PROCESSOR TECHNOLOGY BASIC 5  
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\*\* ALS-8 PROGRAM DEVELOPMENT SYSTEM \*\*  
 PROCESSOR TECHNOLOGY CORP.  
 6200 HOLLIS STREET  
 EMERYVILLE, CALIF. 94608

0000	0003 *
0000	0002 *
0000	0003 *
0000	0004 *
0000	0005 *
0000	0006 *
0000	0007 *
0000	0008 *
0000	0009 *
0000	0010 *
0000	0011 *
0000	0012 *
0000	0013 *
0000	0014 *
0000	0015 *
0000	0016 *
0000	0017 *
0000	0018 *
0000	0019 *
0000	0020 *
0000	0021 *
0000	0022 *
0000	0023 *
0000	0024 *
0000	0025 *
0000	0026 *
0000	0027 *
0000	0028 *
0000	0029 *
0000	0030 *
0000	0031 FPSIZ
0000	0032 LINLEN
0000	0033 FP123
0000	0034 FPNIB
0000	0035 DIGIT
0000	0036 CR
0000	0037 NULL
0000	0038 LF
0000	0039 ESC
0000	0040 EOF
0000	0041 BELL
0000	0042 STESIZ
0000	0043 OPBASE
0000	0044 FTYPE
0000	0045 FORSZ
0000	0046 GTYPE
0000	0047 ETYPE
0000	0048 UMINU
0000	0049 *
0000	0050 *
0000	0051 *
0000	3# 90 17
0000	3E 03
0005	32 92 17

=====

DEVELOPED IN CONJUNCTION WITH:

APPLIED COMPUTER TECHNOLOGY  
 1038 MERCED STREET  
 BERKELEY, CALIF. 94707  
 \*\*\*\*\*

ASSEMBLED USING THE ALS-8 PROGRAM DEVELOPMENT SYSTEM

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 94608 (415) 652-8080

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SYSTEM GLOBAL EQUATES

EQU	5	<i>Size of num</i>
EQU	73	# CHRS IN LEGAL INPUT LINE
EQU	FPSIZ-2	<i>Number of bits per char</i>
EQU	FP123*2	<i>Number of bits per char</i>
EQU	FPNIB/2	<i>Number of bits per char</i>
EQU	15Q	CARRIAGE RETURN VALUE
EQU	0	NULL CHARACTER VALUE
EQU	12Q	LINE FEED
EQU	3Q	ESCAPE CHAR
EQU	7	END OF FILE
EQU	2+FPSIZ	BELL CHARACTER
EQU	1(	SYMBOL TABLE ELEMENT SIZE
EQU	1	CONTROL STACK FOR ENTRY TYPE
EQU	FPSIZ*2+2+2+1	'FOR' CONTROL STACK ENTRY SIZE
EQU	2	CONTROL STACK GOSUB ENTRY TYPE
EQU	0	CONTROL STACK UNDERFLOW TYPE
EQU	61Q	UNARY MINUS

STARTUP BASIC SYSTEM

LXI	SP,CMNDSP
MVI	A,3
STA	NULLCT INITIALIZE NULL COUNT

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0008 32 45 19		STA	SPEED
000B CD 68 0F		CALL	INITS
000E 11 6A 07		LXI	D,FAS
0011 21 53 19		LXI	H, MEMTO+1
0014 CD 3B 10		CALL	FIRST ADDRESS MESSAGE
0017 22 50 19		SHLD	ONE LESS THAN LOWER BOUND
001A 11 76 07		LXI	GET INTEGER GREATER THAN MEMTOP+1
001D CD 3B 10		CALL	START OF USER ASSIGNED MEMORY
0020 22 52 19		SHLD	D,LAS
0023 21 43 07		LXI	GINT
0026 CD 23 0D		CALL	HL HAS 1 LESS THAN LOWER BOUND AGAIN
0029 CD 55 0E		CALL	END OF ASSIGNED MEMORY POINTER
002C 3A D3 18		LDA	"PROGRAM LOADED?" MESSAGE
002F			
002F			
002F			
002F			
002F			
002F FE 4E		CPI	'N'
0031 CA 51 00		JZ	STAR1
0034 FE 59		CPI	'Y'
0036 C2 23 00		JNZ	ST0
0039 2A 50 19		LHLD	BOFA
003C 7E 01		MOV	A,M
003D FE 01		CPI	EOF
003F CA 48 00		JZ	ST3
0042 CD C1 01		CALL	ADR
0045 C3 3C 00		JMP	ST2
0048 22 4E 19		SHLD	EOFA
004B CD DF 01		CALL	CCLEAR
004E C3 54 00		JMP	ST4
0051 CD D7 01		CALL	CSCR
0054 3E 0C		MVI	A,2*FPNIB
0056 32 3A 49		STA	INFES
0059			
0059 11 CF 18		LXI	D,FRAND
005C 21 B1 07		LXI	H,RANDS
005F CD 9C 0C		CALL	VCOPY
0062			
0062			
0062			
0062 CD 19 10		CALL	CMND1
0065 21 3D 07		LXI	H,RDYS
0068 CD 23 0D		CALL	PRNT
006B 3E 01		MVI	A,1
006D 32 94 17		STA	DIRF
0070 31 90 17		LXI	SP,CMNDSP
0073 CD 1C 10		CALL	CRLF
0076 CD 55 0E		CALL	INLINE
0079 CD 9F 06		CALL	PP
007C DA 88 00		JC	CMND3
007F CD 10 01		CALL	LINE
0082 CD DF 01		CALL	CCLEAR
0085 C3 76 00		JMP	CMND2
0088 CD 8E 00		CALL	CMND4

OPTIONAL ENTRY POINT FOR TAPE OR DISK ROUTINES

IF NO PROGRAM CLEAR AND INITIALIZE

FIND END OF PROGRAM

FRAND=RANDOM NUMBER SEED

COMMAND PROCESSOR

PRINT READY MESSAGE

SET DIRECT INPUT FLAG

GET INPUT LINE FROM OPERATOR

PRE-PROCESSOR IT

LINE NUMBER..GO EDIT

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008B C3 6B 00	0111	JMP	CMNDR
008E 21 D3 18	0112	LXI	H,IBUF
0091 22 95 17	0113	SHLD	TXA
0094 CD 02 0D	0114	CALL	GC
0097 E6 A0	0115	ANI	240Q
0099 FE A0	0116	CPI	240Q
009B 11 D2 07	0117	LXI	D,CMNDD
009E CA 8E 02	0118	JZ	ISTAT
00A1 CD 7F 02	0119	CALL	ISTAT
00A4 CD 0A 0D	0120	CALL	GCI
00A7 FE 0D	0121	CPI	CR
00A9 C8	0122	RZ	
00AA 01 53 42	0123 E1	LXI	B,'BS'
00AD C3 C5 00	0124	JMP	ERROR
00B0	0125	* ERROR MESSAGE	PRINT OUT
00B0 01 41 42	0126 E3	LXI	B,'BA'
00B3 C3 C5 00	0117	JMP	ERROR
00B6 01 53 43	0128 E4	LXI	B,'CS'
00B9 C3 C5 00	0129	JMP	ERROR
00BC 01 42 4F	0130 E5	LXI	B,'OB'
00BF C3 C5 00	0131	JMP	ERROR
00C2 01 4D 44	0132 E6	LXI	B,'DM'
00C5	0133 *		
00C5 C5	0134	PUSH	B
00C6 CD 4C 10	0135	CALL	CRLF
00C9 C1	0136	POP	B
00CA CD 95 0E	0137	CALL	CHOUT
00CD 41	0138	MOV	B,C
00CE CD 95 0E	0139	CALL	CHOUT
00D1 21 54 07	0140	LXI	H,ERS
00D4 CD 23 0D	0141	CALL	PRNT
00D7 3A 94 17	0142	LDA	DIRF
00DA B7	0143	ORA	A
00DB C2 62 00	0144	JNZ	CMND1
00DE 21 5B 07	0145	LXI	H,INS
00E1 CD 23 0D	0146	CALL	PRNT
00E4	0147	* FIND LINE NUMBER	
00E4 2A 50 19	0148	LHLD	BOFA
00E7 44	0149	MOV	B,H
00E8 4D	0150	MOV	C,L
00E9 5E	0151	MOV	E,M
00EA 16 00	0152	MVI	D,0
00EC 19	0153	DAD	D
00ED EB	0154	XCHG	
00EE 21 95 17	0155	LXI	H,TXA
00F1 CD 35 0D	0156	CALL	DCMP
00F4 EB	0157	XCHG	
00F5 DA E7 00	0158	JC	ERM2
00F8 03	0159	INX	B
00F9 0A	0160	LDAX	B
00FA 6F	0161	MOV	L,A
00FB 03	0162	INX	B
00FC 0A	0163	LDAX	B
00FD 67	0164	MOV	H,A
00FE 11 D3 18	0165	LXI	D,IBUF
0101 CD FA 0D	0166	CALL	CNS

POINT TO COMMAND OR STATEMENT  
CHECK FOR COMMAND  
PROCESS COMMAND  
PROCESS STATEMENT (IF ALLOWED)

USE IBUF TO ACCUMULATE THE LINE NUMBER STRING

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0104	3E 0D	MVI	A,CR	0167	
0106	12	STAX	D	0168	
0107	21 D3 18	LXI	H,IBUF	0169	
010A	CD 1E 0D	CALL	PRNTR	0170	
010D	C3 62 00	JMP	CMND	0171	
0110				0172	*
0110			LINE EDITOR	0173	*
0110				0174	*
0110	2A 50 19	LHLD	BOFA	0175	LINE
0113	7E	MOV	A,M	0176	FIN
0114	3D	DCR	A	0177	
0115	CA 2F 01	JZ	APP	0178	
0118	EB	XCHG		0179	
0119	13	INX	D	0180	
011A	2A D1 18	LHLD	IBLN	0181	
011D	EB	XCHG		0182	
011E	CD 35 0D	CALL	DCMP	0183	
0121	2B	DCX	H	0184	
0122	DA 44 01	JC	INSR	0185	
0125	CA 44 01	JZ	INSR	0186	
0128	7E C4 01	MOV	A,M	0187	
0129	CD C4 01	CALL	ADR	0188	
012C	C3 13 01	JMP	FIN	0189	
012F			LINE AT END CASE	0190	
012F	3A D0 18	APP	IBCNT	0191	
0132	FE 04	CPI	4	0192	
0134	C8	RZ		0193	
0135	CD C6 01	CALL	FULL	0194	
0138	2A 4E 19	LHLD	EOFA	0195	
013B	CD 98 01	CALL	IMOV	0196	
013E	36 01	MVI	M,FOF	0197	
0140	22 4E 19	SHLD	EOFA	0198	
0143	C9	RET		0199	
0144			LINE IN FILE CASE	0200	
0144	46	INSR	B,M	0201	
0145	22 3D 19	SHLD	INSA	0202	
0148	3A D0 18	LDA	IBCNT	0203	
014B	DA 5C 01	JC	LT	0204	
014E	D6 04	SUI	4	0205	
0150	CA 55 01	JZ	LT	0206	
0153	C6 04	ADI	4	0207	
0155	90	SUB	B	0208	LT
0156	CA 8F 01	JZ	LT	0209	
0159	DA 7B 01	JC	GT	0210	
015C			FILE FOR NEW OR LARGER LINE	0211	
015C	47	LT		0212	
015D	3A D0 18	MOV	B,A	0213	
0160	FE 04	LDA	IBCNT	0214	
0162	C8	RZ		0215	
0163	78	MOV	A,B	0216	
0164	CD C6 01	CALL	FULL	0217	
0167	2A 3D 19	LHLD	INSA	0218	
016A	CD B5 01	CALL	NMOV	0219	
016D	2A 4E 19	LHLD	EOFA	0220	
0170	EB	XCHG		0221	
0171	22 4E 19	SHLD	EOFA	0222	

CHECK FOR EMPTY FILE  
CHECK IF APPENDING LINE AT END

GET INPUT LINE NUMBER  
COMPARE WITH FILE LINE NUMBER  
LESS THAN  
EQUAL  
LENGTH OF LINE  
JUMP FORWARD

DON'T APPEND NULL LINE

CHECK FOR ROOM IN FILE  
PLACE LINE IN FILE

OLD LINE COUNT  
INSERT LINE POINTER  
NEW LINE COUNT  
JMP IF NEW LINE # NOT = OLD LINE NUMBER

TEST IF SHOULD DELETE NULL LINE

LINE LENGTHS EQUAL

DON'T INSERT NULL LINE

0174 03	INX	B	
0175 CD AA 01	CALL	RMOV	
0178 C3 8F 01	JMP	LIN1	
017B 2F	* CONTRACT FILE FOR SMALLER LINE		
017C 3C	CMA		
017D CD C1 01	INR	A	
0180 CD B5 01	CALL	ADR	
0183 EB	CALL	NMOV	
0184 2A 3D 19	XCHG		
0187 C4 9F 01	LHLD	INSA	
018A 36 01	CMZ	LMOV	
018C 22 4E 19	MVI	M,EOF	
018F 2A 3D 19	SHLD	EOFA	
0192 3A D0 18	CURRENT	LINE INTO FILE	
0195 FE 04	LHLD	INSA	
0197 C8	LDA	IBCNT	
0198 11 D0 18	CPI	4	
019B 1A	RZ		
019C 4F	* INSERT CURRENT LINE AT ADDR HL		
019D 06 00	LXI	D,IBCNT	
019F 1A	LDAX	D	
01A0 77	MOV	C,A	
01A1 43	MVI	B,0	
01A2 23	* COPY BLOCK FROM BEGINNING		
01A3 0B	HL IS	DESTIN ADDR, DE IS SOURCE ADDR, BC IS COUNT	
01A4 78	LMOV		
01A5 B1	LDAX	D	
01A6 C2 9F 01	MOV	M,A	
01A9 C9	INX	D	
01AA	INX	H	
01AA 1A	DCX	B	
01AB 77	MOV	A,B	
01AC 2B	ORA	C	
01AD 1B	JNZ	LMOV	
01AE 0B	RET		
01AF 78	* COPY BLOCK STARTING AT END		
01B0 B1	HL IS	DESTIN ADDR, DE IS SOURCE ADDR, BC IS COUNT	
01B1 C2 AA 01	LDAX	D	
01B4 C9	MOV	M,A	
01B5	DCX	H	
01B5 3A 4E 19	DCX	D	
01B8 95	DCX	B	
01B9 4F	MOV	A,B	
01BA 3A 4F 19	ORA	C	
01BD 9C	JNZ	RMOV	
01BE 47	RET		
01BF B1	* COMPUTE FILE MOVE COUNT		
01C0 C9	BC GETS	(EOFA) - (HL), RET Z SET MEANS ZERO COUNT	
01C1	NMOV		
	LDA	EOFA	
	SUB	L	
	MOV	C,A	
	LDA	EOFA+1	
	SBB	H	
	MOV	B,A	
	ORA	C	
	RET		
	* ADD A TO HL		

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01C1 85		0279	ADR	ADD	L			
01C2 6F		0280		MOV	L,A			
01C3 D0		0281		RNC				
01C4 24		0282		INR	H			
01C5 C9		0283		RET				
01C6		0284		* CHECK FOR FILE OVERFLOW, LEAVES NEW EOF A IN DE				
01C6 2A 4E 19		0285		* A HAS INCREASE IN SIZE				
01C9 CD C1 01		0286	FULL	LHLD	EOF A			
01CC EB		0287		CALL	ADR			
01CD 21 52 19		0288		XCHG				
01D0 CD 35 0D		0289		LXI	H, MEMTOP			
01D3 D2 F4 0C		0290		CALL	DCMP			
01D6 C9		0291		JNC	E8			
01D7		0292	*	RET				
01D7		0293	*	COMMANDS				
01D7		0294	*					
01D7		0295	*					
01D7 2A 50 19		0296	CSCR	LHLD	BOFA			
01DA 36 01		0297		MVI	M, EOF			
01DC 22 4E 19		0298		SHLD	EOF A			
01DF 2A 4E 19		0299		* "CLEAR"				
01E2 23		0300	CLEAR	LHLD	EOF A		CLEAR FROM EOF A TO MEMTOP	
01E3 22 1E 19		0301		INX	H			
01E6 EB		0302		SHLD	MATA			
01E7 21 52 19		0303		XCHG				
01EA AF		0304		LXI	H, MEMTOP		END OF ASSIGNED MEMORY	
01EB 12		0305	CCLR 1	XRA	A			
01EC CD 35 0D		0306		STAX	D			
01EF 13		0307		CALL	DCMP			
01F0 C2 EA 01		0308		INX	D			
01F3 2A 52 19		0309		JNZ	CCLR 1			
01F6 22 B3 18		0310		LHLD	MEMTOP			
01F9 21 FA 17		0311		SHLD	STA			
01FC 36 00		0312		LXI	H, CSTKL+CSTKSZ-1			
01FE 22 B5 18		0313		MVI	M, ETYPE			
0201 21 B5 18		0314		SHLD	CSTKA			
0204 22 1C 19		0315		LXI	H, ASTKL+ASTKSZ+FPSIZ-1			
0207 C9		0316		SHLD	ASTKA			
0208		0317		RET				
0208		0318	*	"NULL"				
0208 CD E0 0D		0319	CNULL	CALL	INTGER			
020B DA B0 00		0320		JC	E3		NO ARGUMENT SUPPLIED	
020E 7D		0321		MOV	A, L			
020F 32 92 17		0322		STA	NULLCT			
0212 C3 62 00		0323		JMP	CMND 1			
0215		0324	*	"LIST"				
0215 CD 02 0D		0325	CLIST	CALL	GC			
0218 FE 0D		0326		CPI	CR			
021A 11 00 00		0327		LXI	D, 0			
021D CA 23 02		0328		JZ	CLO		JUMP IF NO ARG SUPPLIED	
0220 CD E0 0D		0329		CALL	INTGER		ERROR DEFAULT IS LIST	
0223 2A 50 19		0330	CLO	LHLD	BOFA			
0226 7E		0331	CL 1	MOV	A, M			
0227 3D		0332		DCR	A			
0228 C8		0333		RZ				
0229 23		0334		INX	H			

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022A CD 35 0D
022D 2B
022E DA 3B 02
0231 CA 3B 02
0234
0234 7E
0235 CD C1 01
0238 C3 26 02
023B D5
023C 11 D3 18
023F CD 09 07
0242 23
0243 E5
0244 21 D3 18
0247 CD 1E 0D
024A CD 26 10
024D CD 1C 10
0250 E1
0251 D1
0252 C3 26 02
0255
0255 CD DF 01
0258 2A 50 19
025B 7E
025C 3D
025D CA 62 00
0260 23
0261 23
0262 23
0263 22 95 17
0266 22 B1 18
0269 AF
026A 32 94 17
026D CD 1C 10
0270
0270
0270 CD 26 10
0273 CD 7F 02
0276 CD 2E 0C
0279 D2 70 02
027C C3 62 00
027F
027F CD 02 0D
0282 B7
0283 F2 9C 02
0286 FE 91
0288 D2 AA 00
028B 11 E0 07
028E CD 0A 0D
0291 E6 1F
0293 07
0294 6F
0295 26 00
0297 19
0298 CD 40 0D

0335
0336
0337
0338
0339 * INCREMENT TO NEXT LINE
0340
0341
0342
0343
0344
0345
0346
0347
0348
0349
0350
0351
0352
0353
0354
0355 * "RUN"
0356 CRUN
0357
0358
0359
0360
0361
0362
0363
0364
0365
0366
0367
0368
0369
0370 *
0370 * INTERPRETER DRIVER
0371 *
0372 ILOOP
0373
0374
0375
0376
0377 * INTERPRET STATEMENT LOCATED BY TXA
0378 ISTAT
0379
0380
0381
0382
0383
0384
0385
0386
0387
0388
0389
0390

CALL DCMP
DCX H
JC CL2
JZ CL2
MOV A,M
CALL ADR
JMP CL1
PUSH D
LXI D,IBUF
CALL UPPL
INX H
PUSH H
LXI H,IBUF
CALL PRNTR
CALL PCHECK
CALL CRLF
POP H
POP D
JMP CL4
CALL CCLEAR
LHLD BOFA
MOV A,M
DCR A
JZ END
INX H
INX H
INX H
SHLD TXA
SHLD RTXA
XRA A
STA DIRF
CALL CRLF
INTERPRETER DRIVER
CALL PCHECK
CALL ISTAT
CALL JOE
JNC ILOOP
JMP END
* INTERPRET STATEMENT LOCATED BY TXA
ISTAT GC
ORA A
JP LET
CPI IRLIM
JNC E1
LXI D,STAT
CALL GCI
ANI 37Q
RLC
MOV L,A
MVI H,0
DAD D
CALL LHLI

POINT TO COUNT CHAR AGAIN

AREA TO UNPREPROCESS TO

CHECK FOR NULL PROGRAM

POINTER FOR 'READ' STATEMENT

CLEAR DIRECT FLAG AND FALL THROUGH TO DRIVER

INTERPRET CURRENT STATEMENT
TEST FOR JUNK ON END
CONTINUE IF NOT AT END OF PROGRAM
EXECUTE END STATEMENT
GET FIRST NON BLANK
MUST BE LET IF NOT RW
IS IT AN INITIAL RW
STATEMENT DISPATCH TABLE BASE
ADVANCE TEXT POINTER
MULTIPLY BY TWO PREPARING FOR TABLE LOOKUP

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Address	Op Code	Op Name	Comments
029B	E9	PCHL	BRANCH TO STATEMENT OR COMMAND
0391	*	STATEMENTS	
0392	*	STATEMENTS	
0393	*	STATEMENTS	
0394	*	STATEMENTS	
0395	*	STATEMENTS	
0396	LET	LET	"LET"
0397	CD EA 0B	CALL	CHECK FOR VARIABLE
0398	DA AA 00	JC	SAVE VALUE ADDRESS
0399	E5	PUSH	SAVE VALUE ADDRESS
0400	F5	MVI	B, EQRW
0401	CD FA 0C	CALL	EATC
0402	D7 05	CALL	EXPRB
0403	D1	POP	D
0404	CD BE 0C	CALL	POPA#
0405	C9	RET	DESTINATION ADDRESS
0406	63 0D	CALL	COPY EXPR VALUE TO VARIABLE
0407	CD EA 0B	CALL	CONTROL VARIABLE
0408	DA AA 00	JC	CONTROL VARIABLE VALUE ADDRESS
0409	E5	PUSH	CONTROL VARIABLE VALUE ADDRESS
0410	F5	MVI	B, EQRW
0411	CD FA 0C	CALL	EATC
0412	D7 05	CALL	EXPRB
0413	D1	POP	D
0414	D5	PUSH	D
0415	CD BE 0C	CALL	POPA#
0416	9E	MVI	B, TORW
0417	CD FA 0C	CALL	EATC
0418	D7 05	CALL	EXPRB
0419	CD 02 0D	CALL	GC
0420	FE 9F	CPI	STEPRW
0421	CA E0 02	JZ	FOR#
0422	87 07	LXI	USE STEP OF #
0423	CD A8 0C	CALL	D, FPONE
0424	C3 E6 02	JMP	PSHA#
0425	CD 0A 0D	CALL	FOR2
0426	CD D7 05	CALL	COMPUTE STEP VALUE
0427	CD 0A 0D	CALL	GCI
0428	CD D7 05	CALL	EXPRB
0429	FE FF	LXI	HERE THE STEP AND LIMIT ARE ON ARG STACK
0430	CD CD 0C	CALL	D, -2
0431	EB	XCHG	PSHCS
0432	EB	XCHG	PSHCS
0433	2E 0C	CALL	XCHG
0434	DA B6 00	JC	JOE
0435	EB	XCHG	E4
0436	72	MOV	M, D
0437	2B	DCX	H
0438	73	MOV	M, E
0439	FB FF	LXI	D, -FPSIZ
0440	CD CD 0C	CALL	PSHCS
0441	E5	PUSH	H
0442	FB FF	LXI	D, -FPSIZ
0443	CD CD 0C	CALL	PSHCS
0444	CD BD 0C	CALL	POPAS
0445	D1	POP	D
0446	CD BE 0C	CALL	POPA#

CHECK FOR VARIABLE  
 SAVE VALUE ADDRESS  
 DESTINATION ADDRESS  
 COPY EXPR VALUE TO VARIABLE  
 CONTROL VARIABLE  
 CONTROL VARIABLE VALUE ADDRESS  
 INITIAL VALUE  
 VARIABLE VALUE ADDRESS  
 SAVE  
 SET INITIAL VALUE  
 RW FOR 'TO'  
 LIMIT VALUE COMPUTATION  
 CHECK NEXT CHARACTER FOR POSSIBLE STEP EXPRESSION  
 EAT THE STEP RW  
 THE STEP VALUE  
 PREPARE TO ALLOCATE 2 BYTES ON CONTROL STACK  
 RETURNS ADDRESS OF THOSE 2 BYTES IN HL  
 TEST FOR JUNK ON END  
 NO "FOR" STATEMENT AT END OF PROGRAM  
 DE HAS LOOP TEXT ADDR, HL HAS CONTROL STACK ADDR  
 HIGH ORDER TEXT ADDRESS BYTE  
 LOW ORDER TEXT ADDRESS BYTE  
 ALLOCATE SPACE FOR LIMIT ON CONTROL STACK  
 ADDR ON CONTROL STACK FOR LIMIT  
 ALLOCATE SPACE FOR STEP ON CONTROL STACK  
 COPY STEP VALUE TO CONTROL STACK  
 CONTROL STACK ADDR FOR LIMIT VALUE  
 LIMIT VALUE TO CONTROL STACK

030B 11	FD FF	0447	LXI	D,-3	ALLOCATE SPACE FOR TEXT ADDRESS AND CS ENTRY
030E CD	CD OC	0448	CALL	PSHCS	
0314 D1		0449	POP	D	CONTROL VARIABLE ADDRESS
0312 72		0450	MOV	M,D	HIGH ORDER BYTE OF CONTROL VARIABLE ADDRESS
0313 2B		0451	DCX	H	LOW ORDER BYTE OF CONTROL VARIABLE ADDRESS
0314 73		0452	MOV	M,E	SET CONTROL STACK ENTRY TYPE FOR 'FOR'
0315 2B		0453	DCX	H	GO FINISH OFF CAREFULLY
Q316 36 01		0454	MVI	M,FTYPE	
0318 C3 7C 03		0455	JMP	NEXT5	
031B		0456		* "NEXT"	
031B CD 63 0D		0457	CALL	DIRT	
031E 2A B5 18		0458	LHLD	CSTKA	CONTROL STACK ADDRESS
0321 7E		0459	MOV	A,M	STACK ENTRY TYPE BYTE
0322 3D		0460	DCR	A	MUST BE FOR TYPE ELSE ERROR
0323 C2 B6 00		0461	JNZ	E4	IMPROPER NESTING ERROR
0326 23		0462	INX	H	CONTROL STACK POINTER TO CONTROL VARIABLE ADDRESS
0327 E5		0463	PUSH	H	
0328 CD EA 0B		0464	CALL	VAR	CHECK VARIABLE, IN CASE USER WANTS
032B DA 37 03		0465	JC	NEXT1	SKIP CHECK IF VAR NOT THERE
032E EB		0466	XCHG		
032F E1		0467	POP	H	CONTROL VARIABLE ADDRESS
0330 E5		0468	PUSH	H	SAVE IT AGAIN
0331 CD 35 0D		0469	CALL	DCMP	
0334 C2 B6 00		0470	JNZ	E4	IMPROPER NESTING IF NOT THE SAME
0337 E1		0471	POP	H	CONTROL VARIABLE ADDRESS
0338 E5		0472	PUSH	H	
0339 E5		0473	PUSH	H	
033A 11 06 00		0474	LXI	D,FPSIZ+2-1	COMPUTE ADDRESS TO STEP VALUE
033D 19		0475	DAD	D	
033E E3		0476	XTHL		
033F CD 40 0D		0477	CALL	LHLI	NOW ADDRESS TO VAR IN HL
0342 44		0478	MOV	B,H	VARIABLE ADDRESS
0343 4D		0479	MOV	C,L	COPY VAR ADDRESS TO BC
0344 D1		0480	POP	D	
0345 D5		0481	PUSH	D	STEP VALUE ADDRESS
0346 CD C8 13		0482	CALL	FADD	DO INCREMENT
0349 E1		0483	POP	H	STEP VALUE
034A 2B		0484	DCX	H	POINT TO SIGN OF STEP VALUE
034B 7E		0485	MOV	A,M	SIGN 0=POS, 1=NEG
034C 11 06 00		0486	LXI	D,FPSIZ+1	
034F 19		0487	DAD	D	PUTS LIMIT ADDRESS IN HL
0350 EB		0488	XCHG		
0351 E1		0489	POP	H	VARIABLE ADDRESS
0352 CD 40 0D		0490	CALL	LHLI	GET ADDRESS
0355 D5		0491	PUSH	D	SAVE CONTROL STACK POINTER TO GET TEXT ADDRESS
0356 B7		0492	ORA	A	SET CONDITIONS BASED ON SIGN OF STEP VALUE
0357 CA 5B 03		0493	JZ	NEXT2	REVERSE TEST ON NEGATIVE STEP VALUE
035A EB		0494	XCHG		
035B 44		0495	MOV	B,H	SET UP ARGS FOR COMPARE
035C 4D		0496	MOV	C,L	
035D CD 64 09		0497	CALL	RELOP	
0360 D1		0498	POP	D	TEST <=
0361 FA 6F 03		0499	JM	NEXT3	TEXT ADDRESS
0364 CA 6F 03		0500	JZ	NEXT3	STILL SMALLER?
0367		0501		* TERMINATE LOOP	JUMP IF WANT TO CONTINUE LOOP
0367 21 03 00		0502	LXI	H,3	REMOVE CSTACK ENTRY

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036A 19	DAD	D	CSTKA	
036B 22 B5 18	SHLD			
036E C9	RET			
036F 13	INX	D	TEXT ADDRESS	
0370 EB	XCHG			
0371 CD 40 0D	CALL	LHLI	GET TEXT ADDRESS IN HL	
0374	CALL		JUNK ON END TEST AT ILOOP	
0374 EB	XCHG	.	SAVE NEW TEXT ADDRESS IN DE	
0375 CD 2E 0C	CALL	JOE		
0378 EB	XCHG			
0379 22 95 1'	SHLD	TXA		
037C 21 70 02	LXI	H,ILOOP		
037F E3	XTHL			
0380 C9	RET	.	TO DISPATCHER SKIPPING JOE CALL THERE	
0381				
0381 06 01	MVI	B,1	SPECIFY PRINCIPAL OPERATOR IS RELATIONAL	
0383 CD D9 05	CALL	EXPB1		
0386 2A 1C 19	LHLD	ASTKA	ADDRESS OF BOLLEAN VALUE ON ARG STACK	
0389 34	INR	M	SETS ZERO CONDITION IF RELATIONAL WAS TRUE	
038A F5	PUSH	PSW	SAVE CONDITIONS TO TEST LATER	
038B CD BD 0C	CALL	POPAS	REMOVE VALUE FROM ARG STACK COPY TO SELF	
038E F1	POP	PSW		
038F C2 08 04	JNZ	REM	IF TEST FALSE TREAT REST OF STATEMENT AS REM	
0392				
0392 06 9D	MVI	B, THENRW		
0394 CD FA 0C	CALL	EATC		
0397 CD E0 0D	CALL	INTGER	CHECK IF LINE NUMBER IS DESIRED ACTION	
039A DA 7F 02	JC	ISLAT		
039D C3 AA 03	JMP	GOTO1		
03A0				
03A0 AF	XRA	A	CLEAR DIRECT STATEMENT FLAG	
03A1 32 94 17	STA	DIRF	RETURNS INTEGER IN HL IF LINE NUMBER PRESENT	
03A4 CD E0 0D	CALL	INTGER	SYNTAX ERROR NO LINE NUMBER	
03A7 DA AA 00	JC	E1	LN IN DE	
03AA EB	XCHG	.	RETURNS TEXT ADDRESS POINTS TO COUNT VALUE	
03AB CD 6E 0D	CALL	FINDLN		
03AE 23	INX	H		
03AF 23	INX	H		
03B0 23	INX	H	ADVANCE TEXT POINTER PAST LINE NUMBER AND COUNT	
03B1 C3 74 03	JMP	NEXT4		
03B4				
03B4 CD 63 0D	CALL	DIRT	CREATE CONTROL STACK ENTRY	
03B7 11 FD FF	LXI	D,-3		
03BA CD CD 0C	CALL	PSHCS	SAVE STACK ADDRESS	
03BD E5	PUSH	H		
03BE CD E0 0D	CALL	INTGER		
03C1 DA AA 00	JC	E1	LINE NUMBER TO DE	
03C4 EB	XCHG	.		
03C5 CD 2E 0C	CALL	JOE	STACK ADDRESS	
03C8 44	MOV	B,H	STACK RETURN ADDRESS RETURNED BY JOE	
03C9 4D	MOV	C,L		
03CA E1	POP	H		
03CB 70	MOV	M,B		
03CC 2B	DCX	H		
03CD 71	MOV	M,C		
03CE 2B	DCX	H		

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03CF 36 02	MVI	M, GTYPE	MAKE CONTROL STACK ENTRY TYPE 'GOSUB'
03D1 CD 6E 0D	CALL	FINDLN	
03D4 23	INX	H	
03D5 23	INX	H	
03D6 23	INX	H	
03D7 C3 79 03	JMP	NEXT6	
03DA	* "RETURN"		
03DA CD 63 0D	RETRN	DIRT	
03DD 32 94 17	STA	DIRF	CLEAR DIRT IF ACC IS CLEAR
03E0 2A B5 18	LHLD	CSTKA	
03E3 7E	MOV	A, M	CHECK FOR STACK EMPTY
03E4 B7	ORA	A	
03E5 CA B6 00	JZ	E4	
03E8 FE 02	CPI	GTYPE	CHECK FOR GOSUB TYPE
03EA CA F4 03	JZ	RET2	
03ED	* REMOVE FOR TYPE ENTRY FROM STACK		
03ED 11 0F 00	LXI	D, FORSZ	
03F0 19	DAD	D	
03F4 C3 E3 03	JMP	RET1	
03F4 23	* FOUND A GTYPE STACK ENTRY		
03F4 23	INX	H	
03F5 5E	MOV	E, M	LOW ORDER TEXT ADDRESS
03F6 23	INX	H	
03F7 56	MOV	D, M	HIGH ORDER TEXT ADDRESS
03F8 23	INX	H	ADDRESS OF PREVIOUS CONTROL STACK ENTRY
03F9 22 B5 18	SHLD	CSTKA	
03FC EB	XCHG	.	
03FD 7E	MOV	A, M	PUT TEXT ADDRESS IN HL
03FE 3D	DCR	A	ADDRESS POINTS TO EOF IF GOSUB WAS LAST LINE
03FF C2 74 03	JNZ	NEXT4	END OF FILE?
0402 C3 62 00	JMP	END	
0405	* "DATA AND REM"		
0405 CD 63 0D	CALL	DIRT	DATA STATEMENT ILLEGAL AS DIRECT
0408 CD 0A 0D	CALL	GCI	
040B FE 0D	CPI	CR	
040D C2 08 04	JNZ	REM	
0410 2B	DCX	H	BACKUP POINTER SO NORMAL JOE WILL WORK
0411 22 95 17	SHLD	TXA	
0414 C9	RET		
0415	* "DIMENSION"		
0415 CD 49 0C	CALL	NAME	LOOK FOR VARIABLE NAME
0418 DA AA 00	JC	E4	
041B 79	ORI	A, C	PREPARE TURN ON 200Q BIT TO SIGNIFY MATRIX
041C F6 80	ORI	200Q	
041E 4F	MOV	C, A	
041F CD 58 0C	CALL	STLK	
0422 D2 C2 00	JNC	E6	
0425 E5	PUSH	H	ERROR IF NAME ALREADY EXISTS
0426 06 E0	MVI	B, LPARRW	SYMBOL TABLE ADDRESS
0428 CD FA 0C	CALL	EATC	
042B CD D7 05	CALL	EXPRB	
042E 06 29	MVI	B, ')'	
0430 CD FA 0C	CALL	EATC	
0433 CD 8A 0D	CALL	PFIX	RETURN INTEGER IN DE
0436 21 AC 07	LXI	H, MATUB	MAXIMUM SIZE FOR MATRIX
0439 CD 35 0D	CALL	DCMP	

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043C	D2 C2 00	JNC	E6		
043F	E4	POP	H		SYMBOL TABLE ADDRESS
0440	CD C6 0B	CALL	DIMS		
0443	CD 02 0D	CALL	GC		SEE IF MORE TO DO
0446	FE 2C	CPI	' ,		
0448	CO	RNZ	GCI		EAT THE COMMA
0449	CD 0A 0D	CALL	DIM		
044C	C3 15 04	JMP	DIRT		
044F			CRLF2		
0452	CD 63 0D	CALL	BRKCHR		
0455	32 3F 19	STA	H,STOPS		
0458	21 65 07	LXI	ERM1		
045B	C3 D4 00	JMP	CMND1		
045E			DIRT		
045E			TXA		
045E			H		
0464	2A 95 17	CALL	RTXA		SAVE TXA TEMPORARILY
0464	E5	PUSH	TXA		THE 'READ' TXA
0465	2A B1 18	LHLD	CALL		
0468	22 95 17	SHLD	' ,		
046B	CD 0A 0D	CALL	CPI		
046E	FE 2C	CPI	READ2		
0470	CA 88 04	JZ	DATARW		
0473	FE 87	JZ	READ2		
0475	CA 8B 04	JZ	A		
0478	3D	DCR	READ4		
0479	CA B8 04	JZ	READ4		
047C			HL		
047C	CD 08 04	CALL	REM		LEAVES ADDRESS OF LAST CR IN HL
047F	23	INX	H		
0480	7E	MOV	A,M		
0481	3D	DCR	A		
0482	CA B8 04	JZ	READ4		
0485	23	INX	H		
0486	23	INX	H		
0487	23	INX	H		
0488	C3 68 04	JMP	READ0		HL NOW POINTS TO FIRST BYTE OF NEXT LINE
048B			EXPB		
048B	CD D7 05	CALL	GC		
048E	CD 02 0D	CALL	' ,		
0491	FE 2C	CPI	READ3		SKIP JOE TEST IF COMMA
0493	CA 99 04	JZ	READ3		
0496			JOE		
0496	CD 2E 0C	CALL	TXA		
0499	2A 95 17	LHLD	RTXA		SAVE NEW "READ" TEXT ADDRESS
049C	22 B1 18	SHLD	H		REAL TXA
049F	E1	POP	TXA		
04A0	22 95 17	SHLD	VAR		
04A3	CD EA 0B	CALL	E0		
04A6	DA AA 00	JC	POPAS		PUT READ VALUE INTO VARIABLE
04A9	CD BD 0C	CALL	GC		CHECK FOR ANOTHER VARIABLE
04AC	CD 02 0D	CALL	' ,		
04AF	FE 2C	CPI	RNZ		
04B1	CO	RNZ			

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04B2	CD 0A 0D	0677	CALL	GCI	EAT THE COMMA
04B5	C3 5E 04	0672	JMP	READ	
04B8	E4	0673	POP	H	PROGRAM TXA
04B9	22 95 17	0674	SHLD	TXA	
04BC	04 44 52	0675	LXI	B, 'FD'	
04BF	C3 C5 00	0676	JMP	ERROR	
04C2	2A 50 19	0677	* "RESTORE"		
04C5	23	0678	RESTOR	BOFA	BEGINNING OF FILE POINTER
04C6	23	0679	INX	H	
04C7	23	0680	INX	H	
04C8	22 B4 18	0681	INX	H	
04CB	C9	0682	SHLD	RTXA	
04CC		0683	RET		
04CC	CD 02 0D	0684	* "PRINT"		
04CF	FE 0D	0685	CALL	GC	CHECK FOR STAND ALONE PRINT
04D1	CA 1C 10	0686	CPI	CR	
04D4	FE 22	0687	JZ	CRLF	
04D6	CA 16 05	0688	CPI	' ' ,	
04D9	FE 9C	0689	JZ	PSTR	PRINT THE STRING
04DB	CA 58 05	0690	CPI	TABRW	TABULATION
04DE	FE 25	0691	JZ	PTAB	
04E0	CA 23 05	0692	CPI	' % '	
04E3	FE 0D	0693	JZ	PFORM	SET FORMAT
04E5	C8	0694	CPI	CR	
04E6	FE 3B	0695	RZ	' ; '	
04E8	C8	0696	CPI	' ; '	
04E9	CD D7 05	0697	RZ		
04EC	11 BB 18	0698	CALL	EXPRB	MUST BE EXPRESSION TO PRINT
04EF	CD BE 0C	0699	LXI	D, FPSINK	
04F2	3A 90 17	0700	CALL	POPA1	POP VALUE TO FPSINK
04F5	FE 38	0701	LDA	PHEAD	
04F7	D4 1C 10	0702	CPI	56	DO CRLF IF PRINT HEAD IS PAST 56
04FA	24 BB 18	0703	CNC	CRLF	
04FD	CD 73 10	0704	LXI	H, FPSINK	
0500	06 20	0705	CALL	FPOUT	
0502	CD 95 0E	0706	MVI	B, ' '	
0505	CD 02 0D	0707	CALL	CHOUT	
0508	FE 2C	0708	CALL	GC	GET DELIMITER
050A	C2 1C 10	0709	CPI	' , '	
050D	CD 0A 0D	0710	JNZ	CRLF	
0510	CD 02 0D	0711	CALL	GCI	
0513	C3 D4 04	0712	CALL	GC	
0516	CD 0A 0D	0713	JMP	PRIN2	
0519	CD 23 0D	0714	CALL	GCI	GOBBLE THE QUOTE
051C	23	0715	CALL	PRNT	PRINT UP TO DOUBLE QUOTE
051D	22 95 17	0716	INX	H	MOVE POINTER PAST DOUBLE QUOTE
0520	C3 05 05	0717	SHLD	TXA	
0523	3E 0C	0718	JMP	PR1	
0525	32 3A 19	0719	MVI	A, 2*FPNIB	
0528	CD 0A 0D	0720	STA	INFES	
052B	CD 0A 0D	0721	CALL	GCI	GOBBLE PREVIOUS CHAR
052E	24 3A 19	0722	CALL	GCI	
0531	FE 25	0723	LXI	H, INFES	
0533	CA 05 05	0724	CPI	' % '	DELIMITER
0536	06 80	0725	JZ	PR1	
		0726	MVI	B, 200Q	

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Address	Instruction	Comment
0538	FE 5A	
053A	CA 52 05	
053D	06 01	
053F	FE 45	
0541	CA 52 05	
0544	CD FA 12	
0547	D2 AA 00	
054A	D6 30	
054C	07	
054D	47	
054E	7E	
054F	E6 C1	
0551	77	
0552	7E	
0553	B0	
0554	77	
0555	C3 2B 05	
0558	CD 0A 0D	
055B	06 E0	
055D	CD FA 0C	
0560	CD D7 05	
0563	06 29	
0565	CD FA 0C	
0568	CD 8A 0D	
056B	3A 90 17	
056E	BB	
056F	D2 05 05	
0572	06 20	
0574	CD 95 0E	
0577	C3 6B 05	
057A		
057D	FE 2C	
057F	CA CB 05	
0582	CD 1C 10	
0585	06 3F	
0587	CD 95 0E	
058A	CD 55 0E	
058D	11 D3 18	
0590	D5	
0591	CD EA 0B	
0594	DA AA 00	
0597	D1	
0598	06 00	
059A	1A	
059B	FE 2B	
059D	CA A7 05	
05A0	FE 2D	
05A2	C2 A8 05	
05A5	06 01	
05A7	13	
05A8	C5	
05A9	E5	
05AA	CD 57 12	
05AD	DA D1 05	
05B0	E1	
0727	CPI	
0728	JZ	
0729	MVI	
0730	CPI	
0731	JZ	
0732	CALL	
0733	JNC	
0734	SUI	
0735	RLC	
0736	MOV	
0737	MOV	
0738	ANI	
0739	MOV	
0740	MOV	
0741	ORA	
0742	MOV	
0743	JMP	
0744	CALL	
0745	MVI	
0746	CALL	
0747	CALL	
0748	MVI	
0749	CALL	
0750	CALL	
0751	LDA	
0752	CMP	
0753	JNC	
0754	MVI	
0755	CALL	
0756	JMP	
0757		
0758	CALL	
0759	CPI	
0760	JZ	
0761	CALL	
0762	MVI	
0763	CALL	
0764	CALL	
0765	LXI	
0766	PUSH	
0767	CALL	
0768	JC	
0769	POP	
0770	MVI	
0771	LDAX	
0772	CPI	
0773	JZ	
0774	CPI	
0775	JNZ	
0776	MVI	
0777	INX	
0778	INX	
0779	PUSH	
0780	PUSH	
0781	CALL	
0782	JC	
0783	POP	

TRAILING ZEROS?

SCIENTIFIC NOTATION?

NUMBER OF DECIMAL PLACES

GOBBLE TAB RW

SAVE FOR FPIN

LOOK FOR LEADING PLUS OR MINUS ON INPUT

INPUT FP NUMBER

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05B1 2B	DCX	H	
05B2 F1	POP	PSW	
05B3 77	MOV	M,A	
05B4 CD 02 0D	CALL	GC	
05B7 FE 2C	CPI	' , '	
05B9 C0	RNZ	.	DONE IF NO MORE
05BA CD 0A 0D	CALL	GCI	EAT THE COMMA
05BD 78	MOV	A,B	GET THE TERMINATOR TO A
05BE FE 2C	CPI	' , '	
05C0 CA 90 05	JZ	IN1	GET THE NEXT INPUT VALUE FROM STRING
05C3	* GET NEW LINE FROM USER		
05C3 06 3F	MVI	B,'?',	
05C5 CD 95 0E	CALL	CHOUT	
05C8 C3 85 05	JMP	INPO	
05CB CD 0A 0D	CALL	GCI	
05CE C3 8A 05	JMP	LINP	NOW GET LINE
05D1 01 4E 49	LXI	B,'IN'	
05D4 C3 C5 00	JMP	ERROR	
05D7	* 0801 *		
05D7	* EVALUATE AN EXPRESSION FROM TEXT		
05D7	* HL TAKE OP TABLE ADDR OF PRFVIOUS OPERATOR (NOT CHANGED)		
05D7	* RESULT VALUE LEFT ON TOP OF ARG STACK, ARGF LEFT TRUE		
05D7	* 0805 *		
05D7 06 00	MVI	B,0	
05D9 21 EE 08	LXI	H,OPBOL	
05DC AF	XRA	A	
05DD 32 91 17	STA	RELTYP	
05E0 C5	* ZERO IN B MEANS PRINCIPAL OPERATOR MAY NOT BE RELATIONAL		
05E0 C5	PUSH	B	
05E1 E5	PUSH	H	PUSH OPTBA
05E2 AF	XRA	A	
05E3 32 93 17	STA	ARGF	
05E6 3A 93 17	LDA	ARGF	
05E9 B7	ORA	A	
05EA C2 07 06	JNZ	EXPR2	
05ED CD EA 0B	CALL	VAR	
05F0 D4 A7 0C	CNC	PSHAS	
05F3 D2 07 06	JNC	EXPR2	
05F6 CD 47 0D	CALL	CONST	
05F9 D2 07 06	JNC	EXPR2	
05FC CD 02 0D	CALL	GC	
05FF FE E0	CPI	LPARRW	
0601 21 D6 08	LXI	H,OPLPAR	
0604 CA 83 06	JZ	XLPAR	
0607	* ISN'T OR SHOULDN'T BE AN ARGUMENT		
0607 CD 02 0D	CALL	GC	
060A FE E0	CPI	340Q	CHECK FOR RESERVED WORD OPERATOR
060C D2 25 06	JNC	XOP	
060F FE C0	CPI	300Q	CHECK FOR BUILT IN FUNCTION
0611 D2 74 06	JNC	XBILT	
0614	* ILLEGAL EXPRESSION CHARACTER		
0614 E1	POP	H	GET OPTABA
0615 3A 93 17	LDA	ARGF	
0618 B7	ORA	A	
0619 CA AA 00	JZ	E1	
061C F1	POP	PSW	

LOOK FOR VARIABLE PERHAPS SUBSCRIBTED



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061D 21 94 17	0839	LXI	H, RELTYP	CHECK IF LEGAL PRINCIPAL OPERATOR
0620 BE	0840	COMP	M	
0621 C8	0841	RZ		
0622 C3 AA 00	0842	JMP	E4	
0625 E6 1F	0843	ANI	37Q	CLEANS OFF RW BITS
0627 2A 93 17	0844	LHLD	ARGF	TEST FOR ARGF TRUE
062A 2D	0845	DCR	L	
062B CA 40 06	0846	JZ	XOP1	
062E FE 05	0847	* ARGF WAS FALSE,	UNARY OPS ONLY POSSIBILITY	
062E FE 05	0848	CPI	'-'-OPBASE	
0630 CA 3E 06	0849	JZ	XOPM	
0633 FE 03	0850	CPI	'+'-OPBASE	
0635 C2 AA 00	0851	JNZ	E4	EAT THE '+'
0638 CD 0A 0D	0852	CALL	GCI	
063B C3 E6 05	0853	JMP	EXPR1	
063E 3E 09	0854	MVI	A, UMINUS-OPBASE	
0640 CD 95 06	0855	CALL	OPADR	
0643 D1	0856	POP	D	PREVIOUS OPTBA
0644 1A	0857	LDAX	D	
0645 BE	0858	COMP	M	
0646 D2 1C 06	0859	JNC	XDON1	NON-INCREASING PRECEDENCE
0649	0860	* INCREASING PRECEDENCE CASE		
0649 D5	0861	PUSH	D	SAVE PREVIOUS OPTBA
064A E5	0862	PUSH	H	SAVE CURRENT OPTBA
064B CD 0A 0D	0863	CALL	GCI	TO GOBBLE OPERATOR
064E E1	0864	POP	H	
064F E5	0865	PUSH	H	
0650 06 00	0866	MVI	B, 0	SPECIFY NON-RELATIONAL
0652 CD E0 05	0867	CALL	EXPR	
0655 E4	0868	POP	H	
0656	0869	* HL HAS OPTBA ADDRESS		
0656 E5	0870	* SET UP ARGS AND PERFORM OPERATION ACTION		
0657 7E	0871	PUSH	H	
0658 2A 1C 19	0872	MOV	A, M	
065B 44	0873	LHLD	ASTKA	
065C 4D	0874	MOV	B, H	
065D E6 01	0875	MOV	C, L	
065F C2 6B 06	0876	ANI	1	
0662	0877	* DECREMENT STACK POINTER BY ONE VALUE BINARY CASE		
0662 14 05 00	0878	JNZ	XOP21	
0665 19	0879	LXI	D, FPSIZ	
0666 22 1C 19	0880	DAD	D	
0669 54	0881	SHLD	ASTKA	
066A 5D	0882	MOV	D, H	
066E 21 E6 05	0883	MOV	E, L	
066E E3	0884	LXI	H, EXPR1	
066F 23	0885	XTHL	.	CHANGE RETURN LINK
0670 CD 40 0D	0886	INX	H	SKIP OVER PRECEDENCE
0673 E9	0887	CALL	LHLI	LOAD ACTION ADDRESS
0674	0888	PCHL		
0674	0889	* ACTION ROUTINE CONVENTION		
0674	0890	* DE LEFT ARG AND RESULT FOR BINARY		
0674	0891	* BC RIGHT ARG FOR BINARY, ARG AND RESULT FOR UNARY		
0674	0892	* BUILT IN FUNCTION PROCESSING		
0674	0893	*		
0674	0894	*		

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0674	CD	0A	0D	0895	XBILT	CALL	GCI	EAT TOKEN
0677	E6	3F		0896		ANI	77Q	CLEAN OFF RW BITS
0679	2A	93	17	0897		LHLD	ARGF	BUILT IN FUNCTION MUST COME AFTER OPERATOR
067C	2D			0898		DCR	L	
067D	CA	AA	00	0899		JZ	E4	
0680	CD	95	06	0900		CALL	OPADR	OPTBA TO HL
0683	E5			0901	XLPAR	PUSH	H	
0684	06	E0		0902		MVI	B,LPARRW	
0686	CD	FA	0C	0903		CALL	EATC	
0689	CD	D7	05	0904		CALL	EXPRB	
068C	06	29		0905		MVI	B,'')	
068E	CD	FA	0C	0906		CALL	EATC	
0691	E4			0907		POP	H	CODE FOR BUILT-IN FUNTION
0692	C3	56	06	0908		JMP	XOP2	
0695				0909				
0695	4F			0910	OPADR	MOV	C,A	* COMPUTE OPTABLE ADDRESS FOR OPERATOR IN ACC
0696	06	00		0911		MVI	B,0	
0698	21	D6	08	0912		LXI	H,OPTAB	
069B	09			0913		DAD	B	
069C	09			0914		DAD	B	
069D	09			0915		DAD	B	OPTAB ENTRY ADDR IS 3*OP+BASE
069E	C9			0916		RET		
069F				0917				
069F				0918				
069F				0919				
069F				0920				
069F				0921				
069F				0922				
069F				0923				
069F				0924				
069F	21	D3	18	0925	PP	LXI	H,IBUF	FIRST CHARACTER OF INPUT LINE
06A2	22	95	17	0926		SHLD	TXA	SO GCI WILL WORK
06A5	CD	E0	0D	0927		CALL	INTGER	SETS CARRY IF NO LINE NUMBER
06A8	22	D1	18	0928		SHLD	IBLN	STORE LINE NUMBER VALUE (EVEN IF NONE)
06AB	F5			0929		PUSH	PSW	SAVE STATE OF CARRY BIT FOR RETURNING
06AC	2A	95	17	0930		LHLD	TXA	ADDRESS OF NEXT CHARACTER IN IBUF
06AF	0E	04		0931		MVI	C,4	SET UP INITIAL VALUE FOR COUNT
06B1	11	D3	18	0932		LXI	D,IBUF	INITIALIZE WRITE POINTER
06B4				0933				
06B4	D5			0934	PPL	PUSH	D	* COME HERE TO CONTINUE PREPROCESSING LINE
06B5	11	02	08	0935		LXI	D,RWT	BASE OF RWT
06B8	E5			0936	PPL1	PUSH	H	SAVE TEXT ADDRESS
06B9	1A			0937		LDAX	D	RW VALUE FOR THIS ENTRY IN RWT
06BA	47			0938		MOV	B,A	SAVE IN B IN CASE OF MATCH
06BB	13			0939	PPL2	INX	D	ADVANCE ENTRY POINTER TO NEXT BYTE
06BC	1A			0940		LDAX	D	GET NEXT CHARACTER FROM ENTRY
06BD	BE			0941		CMP	M	COMPARE WITH CHARACTER IN TEXT
06BE	C2	C5	06	0942		JNZ	PPL3	
06C1	23			0943		INX	H	ADVANCE TEXT POINTER
06C2	C3	BB	06	0944		JMP	PPL2	CONTINUE COMPARISON
06C5				0945				ADVANCE TEXT POINTER
06C5	B7			0946	PPL3	ORA	A	CONTINUE COMPARISON
06C6	FA	F7	06	0947		JM	PPL6	JUMP IF FOUND MATCH
06C9				0948				ADVANCE ENTRY POINTER
06C9	13			0949	PPL4	INX	D	ADVANCE ENTRY POINTER
06CA	1A			0950		LDAX	D	NEXT BYTE IS EITHER CHARACTER OR RW BYTE

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06CB B7	ORA	A	KEEP SCANNING IF NOT RW BYTE
06CC F2 C9 06	JP	PPL4	AND FAIL OR RETURN CONDITION
06CF	POP	H	RECOVER ORIGINAL TEXT POINTER
06CF E1	POP	377Q	CHECK FOR END OF TABLE
06D0 EE FF	XRI	PPL1	CONTINUE SCAN OF TABLE
06D2 C2 B8 06	JNZ		FIND AN ENTRY AT THE GIVEN TEXT ADDR
06D5	POP	D	
06D5 D1	POP		
06D6 7E	MOV	A, M	GET TEXT CHARACTER
06D7 FE 0D	CPI	CR	CHECK FOR END OF LINE
06D9 CA 00 07	JZ	PPL8	GO CLEAN UP AND RETURN
06DC 12	STAX	D	
06DD 13	INX	D	
06DE 0C	INR	C	
06DF 23	INX	H	
06E0 FE 22	CPI	'"	ADVANCE TEXT POINTER
06E2 C2 B4 06	JNZ	PPL	CHECK FOR QUOTED STRING POSSIBILITY
06E5	JNZ	PPL	RESTART RWT SEARCH AT NET CHARACTER POSITION
06E5 7E	MOV	A, M	RESTORE RWT SEARCH AT NET CHARACTER POSITION
06E6 FE 0D	CPI	CR	SO EAT 'ILL ENDQUOTE
06E8 CA 00 07	JZ	PPL8	NEXT CHARACTER
06EB 12	STAX	D	NO STRING ENDQUOTE, LET INTERPRETER WORRY
06EC 13	INX	D	
06ED 0C	INR	C	
06EE 23	INX	H	
06EF FE 22	CPI	'"	ADVANCE TEXT POINTER
06F1 CA B4 06	JZ	PPL	BEGIN RWT SCAN FROM NEW CHARACTER POSITION
06F4 C3 E5 06	JMP	PPL5	
06F7 F1	POP	PSW	REMOVE UNNEEDED TEST POINTER FROM STACK
06F8 D1	POP	D	
06F9 78	MOV	A, B	
06FA 12	STAX	D	
06FB 13	INX	D	
06FC 0C	INR	C	
06FD C3 B4 06	JMP	PPL	
0700	MVI	A, CR	
0700 3E 0D	STAX	D	
0702 12	LXI	H, IBCNT	SET UP COUNT IN CASE LINE OF LINE NUMBER
0703 21 D0 18	MOV	M, C	
0706 71	POP	PSW	RESTORE CARRY CONDITION (LINE NUMBER FLAG)
0707 F1	POP		
0708 C9	RET		
0709			
0709 23	UPPL	H	SKIP OVER COUNT BYTE
070A E5	PUSH	H	SAVE SOURCE TEXT POINTER
070B CD 40 0D	CALL	LHLI	LOAD LINE NUMBER VALUE
070E CD FA 0D	CALL	CNS	CONVERT LINE NUMBER
0711 3E 20	MVI	A, ' '	
0713 12	STAX	D	PUT BLANK AFTER LINE NUMBER
0714 13	INX	D	INCREMENT DESTINATION POINTER
0715 E1	POP	H	
0716 23	INX	H	INCREMENT H PAST LINE NUMBER

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Address	Op Code	Op Name	Comment
0717 23	1007	UPPO	
0718 7E	MOV	H	INX
0719 B7	ORA	A,M	MOV
071A FA 25 07	JM	UPP4	ORA
071B 12	STAX	D	JM
071C FE 0D	CPI	CR	STAX
0720 C8	RZ		CPI
0721 13	INX	D	RZ
0722 C3 17 07	JMP	UPPO	INX
0725 E5			JMP
0726 21 02 08	PUSH	H	
0729 BE	LXI	H,RWT	
072A 23	CMP	M	
072B C2 29 07	INX	H	
072E 7E	JNZ	UPP2	
072F B7			JNZ
0730 FA 39 07	ORA	A,M	
0733 12	JM	UPP4	
0734 13	STAX	D	
0735 23	INX	D	
0736 C3 2E 07	INX	H	
0739 E1	JMP	UPP3	
073A C3 17 07	POP	H	
073D	JMP	UPPO	
073D			JMP
073D			
073D			
073D			
52 45 41 44			
59 22			
50 52 4F 47			
52 41 4D 20			
4C 4F 41 44			
45 44 3F 20			
22			
0743 20 45 52 52	ASC		
4F 52 22	ASC		
20 49 4E 20	ASC		
4C 49 4E 45	ASC		
20 22	ASC		
0765 53 54 4F 50	ASC		
22	ASC		
076A 46 49 52 53	ASC		
54 20 41 44	ASC		
44 52 20 22	ASC		
0776 4C 41 53 54	ASC		
20 41 44 44	ASC		
52 20 22	ASC		
0781 FF	DB		
0782 00	DB		
0783 10 00	DB		
0784 00 00	DW		
0786 00	DB		
0787 81	DB		

FLAGS END OF SINE COEFFICIENT LIST

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Address	Value	Label	Value	Label
0788	1050	SINE COEFFICIENT LIST		
0788	1051	THE FLOATING PNT	128	128
0788	1052	DB	16+6	16+6
0789	1053	DB	16+6	16+6
078A	1054	DB	16+7	16+7
078B	1055	DB	1	1
078C	1056	DB	128	128
078D	1057	DB	16+3	16+3
078E	1058	DB	16+3	16+3
078F	1059	DB	16+3	16+3
0790	1060	DB	0	0
0791	1061	DB	128-2	128-2
0792	1062	DB	16+9	16+9
0793	1063	DB	16+4	16+4
0794	1064	DB	16+3	16+3
0795	1065	DB	1	1
0796	1066	DB	128-3	128-3
0797	1067	DB	16+7	16+7
0798	1068	DB	16+5	16+5
0799	1069	DB	16+3	16+3
079A	1070	DB	0	0
079B	1071	DB	128-5	128-5
079C	1072	DB	16+5	16+5
079D	1073	DB	16+5	16+5
079E	1074	DB	16+1	16+1
079F	1075	DB	1	1
07A0	1076	DB	128-7	128-7
07A1	1077	COSINE COEFFICIENT LIST		
07A1	1078	DB	-1	-1
07A2	1079	DB	0	0
07A3	1080	DB	16+0	16+0
07A4	1081	DB	0	0
07A5	1082	DB	0	0
07A6	1083	DB	0	0
07A7	1084	DB	128+1	128+1
07A8	1085	DB	16+0	16+0
07A9	1086	DB	0	0
07AA	1087	DB	0	0
07AB	1088	DB	1	1
07AC	1089	MATUB	128	128
07AD	1090	DB	16+1	16+1
07AE	1091	DB	16+6	16+6
07AF	1092	DB	16+7	16+7
07B0	1093	DB	0	0
07B1	1094	RANDS	128-1	128-1
07B2	1095	DB	16+3	16+3
07B3	1096	DB	16+8	16+8
07B4	1097	DB	16+9	16+9
07B5	1098	DB	1	1
07B6	1099	DB	128-2	128-2
07B7	1100	DB	16+4	16+4
07B8	1101	DB	16+0	16+0
07B9	1102	DB	16+6	16+6
07BA	1103	DB	0	0
07BB	1104	DB	128-4	128-4
07BC	1105	DB	16+7	16+7
0788	1050	SINE COEFFICIENT LIST		
0788	1051	THE FLOATING PNT	128	128
0788	1052	DB	16+6	16+6
0789	1053	DB	16+6	16+6
078A	1054	DB	16+7	16+7
078B	1055	DB	1	1
078C	1056	DB	128	128
078D	1057	DB	16+3	16+3
078E	1058	DB	16+3	16+3
078F	1059	DB	16+3	16+3
0790	1060	DB	0	0
0791	1061	DB	128-2	128-2
0792	1062	DB	16+9	16+9
0793	1063	DB	16+4	16+4
0794	1064	DB	16+3	16+3
0795	1065	DB	1	1
0796	1066	DB	128-3	128-3
0797	1067	DB	16+7	16+7
0798	1068	DB	16+5	16+5
0799	1069	DB	16+3	16+3
079A	1070	DB	0	0
079B	1071	DB	128-5	128-5
079C	1072	DB	16+5	16+5
079D	1073	DB	16+5	16+5
079E	1074	DB	16+1	16+1
079F	1075	DB	1	1
07A0	1076	DB	128-7	128-7
07A1	1077	COSINE COEFFICIENT LIST		
07A1	1078	DB	-1	-1
07A2	1079	DB	0	0
07A3	1080	DB	16+0	16+0
07A4	1081	DB	0	0
07A5	1082	DB	0	0
07A6	1083	DB	0	0
07A7	1084	DB	128+1	128+1
07A8	1085	DB	16+0	16+0
07A9	1086	DB	0	0
07AA	1087	DB	0	0
07AB	1088	DB	1	1
07AC	1089	MATUB	128	128
07AD	1090	DB	16+1	16+1
07AE	1091	DB	16+6	16+6
07AF	1092	DB	16+7	16+7
07B0	1093	DB	0	0
07B1	1094	RANDS	128-1	128-1
07B2	1095	DB	16+3	16+3
07B3	1096	DB	16+8	16+8
07B4	1097	DB	16+9	16+9
07B5	1098	DB	1	1
07B6	1099	DB	128-2	128-2
07B7	1100	DB	16+4	16+4
07B8	1101	DB	16+0	16+0
07B9	1102	DB	16+6	16+6
07BA	1103	DB	0	0
07BB	1104	DB	128-4	128-4
07BC	1105	DB	16+7	16+7
0788	1050	SINE COEFFICIENT LIST		
0788	1051	THE FLOATING PNT	128	128
0788	1052	DB	16+6	16+6
0789	1053	DB	16+6	16+6
078A	1054	DB	16+7	16+7
078B	1055	DB	1	1
078C	1056	DB	128	128
078D	1057	DB	16+3	16+3
078E	1058	DB	16+3	16+3
078F	1059	DB	16+3	16+3
0790	1060	DB	0	0
0791	1061	DB	128-2	128-2
0792	1062	DB	16+9	16+9
0793	1063	DB	16+4	16+4
0794	1064	DB	16+3	16+3
0795	1065	DB	1	1
0796	1066	DB	128-3	128-3
0797	1067	DB	16+7	16+7
0798	1068	DB	16+5	16+5
0799	1069	DB	16+3	16+3
079A	1070	DB	0	0
079B	1071	DB	128-5	128-5
079C	1072	DB	16+5	16+5
079D	1073	DB	16+5	16+5
079E	1074	DB	16+1	16+1
079F	1075	DB	1	1
07A0	1076	DB	128-7	128-7
07A1	1077	COSINE COEFFICIENT LIST		
07A1	1078	DB	-1	-1
07A2	1079	DB	0	0
07A3	1080	DB	16+0	16+0
07A4	1081	DB	0	0
07A5	1082	DB	0	0
07A6	1083	DB	0	0
07A7	1084	DB	128+1	128+1
07A8	1085	DB	16+0	16+0
07A9	1086	DB	0	0
07AA	1087	DB	0	0
07AB	1088	DB	1	1
07AC	1089	MATUB	128	128
07AD	1090	DB	16+1	16+1
07AE	1091	DB	16+6	16+6
07AF	1092	DB	16+7	16+7
07B0	1093	DB	0	0
07B1	1094	RANDS	128-1	128-1
07B2	1095	DB	16+3	16+3
07B3	1096	DB	16+8	16+8
07B4	1097	DB	16+9	16+9
07B5	1098	DB	1	1
07B6	1099	DB	128-2	128-2
07B7	1100	DB	16+4	16+4
07B8	1101	DB	16+0	16+0
07B9	1102	DB	16+6	16+6
07BA	1103	DB	0	0
07BB	1104	DB	128-4	128-4
07BC	1105	DB	16+7	16+7

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078D 55	1106	DB	5*16+5	
078E 73	1107	DB	7*16+3	
078F 01	1108	DB		
07C0 7A	1109	DB	128-6	.275573 E-6 (-1/101)
07C1 20	1110	DB	2*16	
07C2 00 00	1111	DW	0	
07C4 00	1112	DB	0	
07C5 81	1113	DB	129	
07C6 15	1114	DB	1*16+5	
07C7 70	1115	DB	7*16+0	
07C8 80	1116	DB	8*16+0	
07C9 00	1117	DB	0	
07CA 81	1118	DB	128+1	PI/2 .157080 E 1
07CB 63	1119	DB	6*16+3	
07CC 66	1120	DB	6*16+6	
07CD 20	1121	DB	2*16+0	
07CE 00	1122	DB	0	
07CF 80	1123	DB	128	2/PI .636620 E 0
07D0 97 17	1124	DB	CSTKL	
07D2	1125	DW		
07D2	1126			
07D2	1127			
07D2 55 02	1128	DW	CRUN	0
07D4 15 02	1129	DW	CLIST	1
07D6 08 02	1130	DW	CNULL	2
07D8 D7 01	1131	DW	CSCR	3
07DA 00 00	1132	DW	START	4
07DC 00 00	1133	DW	TSAV	5
07DE 00 00	1134	DW	TLOAD	6
07E0	1135			
07E0 9C 02	1136	DW	LET	0
07E2 1B 03	1137	DW	NEXT	1
07E4 81 03	1138	DW	SIF	2
07E6 A0 03	1139	DW	SGOTO	3
07E8 B4 03	1140	DW	GOSUB	4
07EA DA 03	1141	DW	RETRN	5
07EC 5E 04	1142	DW	READ	6
07EE 05 04	1143	DW	DATA	7
07F0 B0 02	1144	DW	SFOR	10
07F2 CC 04	1145	DW	PRINT	11
07F4 7A 05	1146	DW	INPUT	12
07F6 15 04	1147	DW	DIM	13
07F8 4F 04	1148	DW	STOP	14
07FA 62 00	1149	DW	END	15
07FC C2 04	1150	DW	RESTOR	16
07FE 08 04	1151	DW	REM	17
0800 DF 01	1152	DW	CCLEAR	20
0802	1153			
0802	1154			
0802	1155			
0802	1156			
0802	1157			
0802	1158			
0802 80	1159	RWT		
0803 4C 45 54	1160	ASC		
0806 81	1161	DB		

COMMAND TABLE  
 CRUN 0  
 CLIST 1  
 CNULL 2  
 CSCR 3  
 START 4  
 TSAVE 5  
 TLOAD 6  
 STATEMENT TABLE  
 LET 0  
 NEXT 1  
 SIF 2  
 SGOTO 3  
 GOSUB 4  
 RETRN 5  
 READ 6  
 DATA 7  
 SFOR 10  
 PRINT 11  
 INPUT 12  
 DIM 13  
 STOP 14  
 END 15  
 RESTOR 16  
 REM 17  
 CCLEAR 20

R/W WORD TABLE FORMAT IS RESERVED WORD FOLLOWED BY CHR  
 OF RESERVED WORD. LAST ENTRY IS FOLLOWED BY A 377Q  
 RW'S THAT ARE SUBSTRINGS OF OTHER RW'S (E.G. >) MUST  
 FOLLOW THE LARGER WORD.

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Address	Instruction	Word Value	Initial Reserved Word
0807 4E 45 58 54	ASC	1162	"NEXT"
080B 82	DB	1163	202Q
080C 49 46	ASC	1164	"IF"
080E 83	DB	1165	203Q
080F 47 4F 54 4F	ASC	1166	"GOTO"
0813 84	DB	1167	204Q
0814 47 4F 53 55	ASC	1168	"GOSUB"
0819 85	DB	1169	205Q
081A 52 45 54 55	ASC	1170	"RETURN"
0820 86	DB	1171	206Q
0821 52 45 41 44	ASC	1172	"READ"
0825 87	DB	1173	207Q
0826 44 41 54 41	ASC	1174	'DATA'
082A 88	EQU	1175	'DATA'
082A 88	DB	1176	210Q
082B 46 4F 52	ASC	1177	"FOR"
082E 89	DB	1178	211Q
082F 50 52 49 4E	ASC	1179	"PRINT"
0834 89	DB	1180	211Q
0835 3A	DB	1181	212Q
0836 8A	DB	1182	"INPUT"
0837 49 4E 50 55	ASC	1183	213Q
083C 8B	DB	1184	'DIM'
083D 44 49 4D	ASC	1185	214Q
0840 8C	DB	1186	'STOP'
0841 53 54 4F 50	ASC	1187	215Q
0845 8D	DB	1188	'END'
0846 45 4E 44	ASC	1189	216Q
0849 8E	DB	1190	'RESTORE'
084A 52 45 53 54	ASC	1191	217Q
084F 4F 52 45	DB	1192	'REM'
0851 8F	ASC	1193	220Q
0852 52 45 4D	DB	1194	'CLEAR'
0855 90	ASC	1195	220Q
0856 43 4C 45 41	ASC	1196	221Q
0856 43 4C 45 41	ASC	1197	237Q
085B	EQU	1198	'STEP'
085B 9F	DB	1199	237Q
085C 53 54 45 50	ASC	1200	'STEP'
0860 9E	EQU	1201	237Q
0860 9E	DB	1202	236Q
0861 54 4F	ASC	1203	'TO'
0863 9D	EQU	1204	236Q
0864 54 48 45 4E	DB	1205	235Q
0864 54 48 45 4E	ASC	1206	'THEN'
0868	EQU	1207	235Q
0868 9C	DB	1208	234Q
0869 54 41 42	ASC	1209	'TAB'
0869 54 41 42	EQU	1210	234Q
086C	DB	1211	240Q
086C A0	ASC	1212	'RUN'
086D 52 55 4E	ASC	1213	240Q

LAST INITIAL RESERVED WORD VALUE + 1

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0870		1212	RUNRW	EQU	240Q
0870	A1	1213		DB	241Q
0871	4C	1214		ASC	'LIST'
0875		1215	LISTRW	EQU	241Q
0875	A2	1216		DB	242Q
0876	4E	1217		ASC	'NULL'
087A		1218	NULLRW	EQU	242Q
087A	A3	1219		DB	243Q
087B	53	1220		ASC	'SCR'
087E		1221	SCRRW	EQU	243Q
087E	A4	1222		DB	244Q
087F	4D	1223		ASC	'MEM'
0882		1224	MEMRW	EQU	245Q
0882	A5	1225		DB	245Q
0883	54	1226		ASC	"TSAV"
0887	A6	1227		DB	246Q
0888	54	1228		ASC	"TLOAD"
0888	44				
088D		1229	LPARRW	EQU	'(-OPBASE+340Q
088D	E0	1230		DB	LPARRW
088E	28	1231		DB	'('
088F	E2	1232		DB	'*-OPBASE+340Q
0890	2A	1233		DB	'*'
0891	E3	1234	PLSRW	EQU	'+'-OPBASE+340Q
0891	E3	1235		DB	PLSRW
0892	2B	1236		DB	'+'
0893		1237	MINRW	EQU	'-'-OPBASE+340Q
0893	E5	1238		DB	MINRW
0894	2D	1239		DB	'_'
0895	E7	1240		DB	'/'-OPBASE+340Q
0896	2F	1241		DB	'/'
0897	EF	1242		DB	67Q-OPBASE+340Q
0898	3E	1243		ASC	'>='
089A	F0	1244		DB	70Q-OPBASE+340Q
089B	3C	1245		ASC	'<='
089D	F1	1246		DB	74Q-OPBASE+340Q
089E	3C	1247		ASC	'<>'
08A0	EA	1248		DB	62Q-OPBASE+340Q
08A1	3D	1249		ASC	'>'
08A3	EB	1250		DB	63Q-OPBASE+340Q
08A4	3D	1251		ASC	'<'
08A6	F4	1252		DB	'<'-OPBASE+340Q
08A7	3C	1253		DB	'<'
08A8		1254	EQRW	EQU	'=-OPBASE+340Q
08A8	F5	1255		DB	EQRW
08A9	3D	1256		DB	'='
08AA	F6	1257		DB	'>'-OPBASE+340Q
08AB	3E	1258		DB	'>'
08AC	C1	1259		DB	301Q
08AD	41	1260		ASC	'ABS'
08B0	C6	1261		DB	306Q
08B1	49	1262		ASC	'INT'
08B4	CC	1263		DB	314Q
08B5	41	1264		ASC	'ARG'
08B8	CD	1265		DB	315Q
08B9	43	1266		ASC	'CALL'
08B9	43				



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08BD CE	4E 44	1267	DB	316Q
08BE 52	4E 44	1268	ASC	'RND'
08C1 D2	47 4E	1269	DB	322Q
08C2 53	47 4E	1270	ASC	'SGN'
08C5 D3	49 4E	1271	DB	323Q
08C6 53	49 4E	1272	ASC	'SIN'
08C9 C4	51 52	1273	DB	304Q
08CA 53	51 52	1274	ASC	'SQR'
08CD D7	44 4E	1275	DB	327Q
08CE 54	44 4E	1276	ASC	'TAN'
08D1 D8	4F 53	1277	DB	330Q
08D2 43	4F 53	1278	ASC	'COS'
08D5 FF		1279	DB	377Q
08D6		1280 *		
08D6		1281 *		
08D6		1282 *		
08D6 OF		1283 OPTAB	DB	15
08D7 BC 09		1284 OPLPAR	EQ	OPTAB
08D9 OF		1285	DW	ALPAR
08DA CC 09		1286	DB	15
08DC 0A		1287	DW	AABS
08DD 9D 09		1288	DB	10
08DF 06		1289	DW	AMUL
08E0 89 09		1290	DB	6
08E2 OF		1291	DW	AADD
08E3 57 0A		1292	DB	15
08E5 06		1293	DW	ASQR
08E6 93 09		1294	DB	6
08E8 OF		1295	DW	ASUB
08E9 AA 0B		1296	DB	15
08EB 0A		1297	DW	ASIN
08EC A7 09		1298	DB	10
08EE 04		1299	DW	ADIV
08EF 00 00		1300 OPBOL	DB	1
08F1 0D		1301	DW	0
08F2 BD 09		1302	DB	13
08F4 04		1303	DW	ANEG
08F5 4C 09		1304	DB	4
08F7 04		1305	DW	AGE
08F8 58 09		1306	DB	4
08FA 0F		1307	DW	ALE
08FB 79 0B		1308	DB	15
08FD 0F		1309	DW	AARG
08FE 86 0B		1310	DB	15
0900 OF		1311	DW	ACALL
0901 AD 0A		1312	DB	15
0903 04		1313	DW	ARND
0904 4C 09		1314	DB	4
0906 04		1315	DW	AGE
0907 58 09		1316	DB	4
0909 04		1317	DW	ALE
090A 43 09		1318	DB	4
090C 0F		1319	DW	ANE
090D D2 09		1320	DB	15
090F 0F		1321	DW	ASGN
		1322	DB	15

OPERATION TABLE

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0910	ED 09	1323	DW	ASIN
0912	04	1324	DB	4
0913	2D 09	1325	DW	ALT
0915	04	1326	DB	4
0916	3A 09	1327	DW	AEQ
0918	04	1328	DB	4
0919	24 09	1329	DW	AGT
091B	0F	1330	DB	15
091C	3C 0A	1331	DW	ATAN
091E	0F	1332	DB	15
091F	30 0A	1333	DW	ACOS
0921		1334		*
0921		1335		*
0921		1336		*
0921	CD 64 09	1337	AGT	
0924	CA 2A 09	1338		
0927	FA 36 09	1339		
092A	AF	1340	RFALSE	
092B	12	1341		
092C	C9	1342		
092D	CD 64 09	1343	ALT	
0930	CA 2A 09	1344		
0933	FA 2A 09	1345		
0936	3E FF	1346	RTRUE	
0938	12	1347		
0939	C9	1348		
093A	CD 64 09	1349	AEQ	
093D	CA 36 09	1350		
0940	C3 2A 09	1351		
0943	CD 64 09	1352	ANE	
0946	CA 2A 09	1353		
0949	C3 36 09	1354		
094C	CD 64 09	1355	AGE	
094F	CA 36 09	1356		
0952	FA 36 09	1357		
0955	C3 2A 09	1358		
0958	CD 64 09	1359	ALE	
095B	CA 36 09	1360		
095E	FA 2A 09	1361		
0961	C3 36 09	1362		
0964		1363		*
0964		1364		*
0964		1365		*
0964		1366		*
0964	D5	1367	RELOP	
0965	0B	1368		
0966	1B	1369		
0967	60	1370		
0968	69	1371		
0969	1A	1372		
096A	96	1373		
096B	23	1374		
096C	13	1375		
096D	C2 82 09	1376		
0970	01 BB 18	1377		
0973	CD 1F 14	1378		

ACTION ROUTINES FOR RELATIONAL OPERATORS

CALL	RELOP
JZ	RFALSE
JM	RTRUE
XRA	A
STAX	D
RET	
CALL	RELOP
JZ	RFALSE
JM	RFALSE
MVI	A,377Q
STAX	D
RET	
CALL	RELOP
JZ	RTRUE
JMP	RFALSE
CALL	RELOP
JZ	RFALSE
JMP	RTRUE
CALL	RELOP
JZ	RTRUE
JM	RTRUE
JMP	RFALSE
CALL	RELOP
JZ	RTRUE
JM	RFALSE
JMP	RTRUE

COMMON ROUTINE FOR RELATIONAL OPERATOR ACTION

PUSH	D
DCX	B
DCX	D
MOV	H,B
MOV	L,C
LDAX	D
SUB	M
INX	H
INX	D
JNZ	RLOP1
LXI	B,FPSINK
CALL	FSUB

TEST SIGNS OF ARGS IF DIFFERENT THEN RET

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0976	3A	BB	18	LDA	FPSINK	CHECK FOR ZERO RESULT
0979	B7			ORA	A	
097A	CA	82	09	JZ	RLOP	
097D	3A	BA	18	LDA	FPSINK	SIGN OF FPSINK
0980	07			RLC	A	
0981	3D			DCR	A	
0982	3E	01		MVI	A	
0984	32	91	17	STA	RELTP	SET RELTP TRUE
0987	D1			POP	D	
0988	C9			RET		
0989						
0990						
0991						
0992						
0993						
0994						
0995						
0996						
0997						
0998						
0999						
1000						
1001						
1002						
1003						
1004						
1005						
1006						
1007						
1008						
1009						
1010						
1011						
1012						
1013						
1014						
1015						
1016						
1017						
1018						
1019						
1020						
1021						
1022						
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1037						

ACTION ROUTINES FOR ARITHMETIC OPERATORS  
(CODE WASTERS)

ZERO RESULT ON UNDERFLOW

UNARY AND BUILT IN FUNCTION ACTION ROUTINES

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09C8 C9	1438	RET	B		
09C9 0B	1439	DCX	A		
09CD AF	1440	XRA	B		
09CE 02	1441	STAX	B		
09CF C3 C7 09	1442	JMP	ANEG4		
09D2 CD C7 09	1443	CALL	ANEG4		
09D5 50	1444	MOV	D,B		
09D6 59	1445	MOV	E,C		
09D7 0A	1446	LDA	B		GET EXPONENT
09D8 B7	1447	ORA	A		
09D9 C2 DE 09	1448	JNZ	ASGN4		
09DC 42	1449	STAX	D		MAKE ARGUMENT ZERO
09DD C9	1450	RET			
09DE 0B	1451	DCX	B		
09DF 0A	1452	LDA	B		
09E0 B7	1453	ORA	A		
09E4 24 87 07	1454	LXI	H,FPONE		
09E4 CA 9C 0C	1455	JZ	VCOPY		
09E7 24 C7 43	1456	LXI	H,FPNONE		
09EA C3 9C 0C	1457	JMP	VCOPY		
09ED	1458				
09ED	1459				
09ED	1460				
09ED	1461				
09ED CD 34 0B	1462	CALL	QUADC		COMPUTE QUADRANT
09F0 2A 4C 19	1463	LHLD	ASTKA		
09F3 54	1464	MOV	D,H		
09F4 5D	1465	MOV	E,L		
09F5 01 C0 18	1466	LXI	B,FTMP		
09F8 CD A4 09	1467	CALL	AMUL4		FTEMP=X*X
09FB F1	1468	POP	PSW		
09FC F5	1469	PUSH	PSW		A=QUADRANT
09FD 1F	1470	RAR			
09FE DA 27 0A	1471	JC	SIN10		QUAD ODD. COMPUTE COSINE
0A01	1472				
0A01 14 C5 18	1473	LXI	D,FTMP4		
0A04 2A 4C 19	1474	LHLD	ASTKA		
0A07 CD 9C 0C	1475	CALL	VCOPY		FTEMP=X*X
0A0A 04 A0 07	1476	LXI	B,SINX		
0A0D CD 03 0B	1477	CALL	POLY		P(X*X)
0A10 CD 2A 0B	1478	CALL	PREPOP		
0A13 24 C5 18	1479	LXI	H,FTMP4		
0A16 CD A4 09	1480	CALL	AMUL4		X*p(X*X)
0A19	1481				
0A19	1482				
0A19 F4	1483				
0A1A 47	1484	POP	PSW		COMPUTE SIGN OF RESULT
0A1B F4	1485	POP	B,A		
0A1C 07	1486	POP	PSW		
0A1D A8	1487	RLC			
0A1E 2A 4C 19	1488	XRA	B		SIGN
0A21 2B	1489	LHLD	ASTKA		SIGN, 2 TO THE 4ST BIT
0A22 D6 02	1490	DCX	H		QUADRANT, MAYBE MODIFIED FOR NEGATIVE ARG.
0A24 F8	1491	SUI	2		PTR TO SIGN
0A25 34	1492	RM			
	1493	INR	M		QUADRANT 0 OR 1
					ELSE SET RESULT NEGATIVE

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0A26 C9
0A27 01 C0 07
0A2A CD 03 0B
0A2D C3 19 0A
0A30
0A30
0A30
0A30
0A30 CD 2A 0B
0A33 24 CA 07
0A36 CD 8D 09
0A39 C3 ED 09
0A3C
0A3C
0A3C
0A3C
0A3C
0A3C
0A3C 2A 1C 19
0A3F CD A7 0C
0A42 CD 30 0A
0A45 11 CA 18
0A48 CD BE 0C
0A4B CD ED 09
0A4E CD 2A 0B
0A51 24 CA 18
0A54 C3 AB 09
0A57
0A57
0A57
0A57 2A 1C 19
0A5A 11 C0 18
0A5D CD 9C 0C
0A60
0A60 2A 1C 19
0A63 7E
0A64 B7
0A65 C8
0A66 D6 80
0A68 FA 74 0A
0A6B 0F
0A6C E6 7F
0A6E C3 78 0A
0A71 2F
0A72 3C
0A73 0F
0A74 E6 7F
0A76 2F
0A77 3C
0A78 C6 80
0A7A 77
0A7B 2B
0A7C 7E

1494
1495 * COMPUTE P(X*X) -- COSINE
1496 LXI B,COSX
1497 CALL POLY P(X*X)
1498 JMP SIN5
1499 *
1500 * COMPUTE COS(X) X=TOP OF ARGUMENT STACK
1501 * RETURN RESULT IN PLACE OF X
1502 * COS(X)=SIN(X+PI/2)
1503 *
1504 ACOS CALL PREPOP
1505 LXI H,PIC2 PI/2
1506 CALL AADD1 TOS=TOS+PI/2
1507 JMP ASIN
1508 *
1509 * COMPUTE TAN(X) X=TOP OF ARGUMENT STACK
1510 * RETURN RESULT IN PLACE OF X
1511 * TAN(X)=SIN(X)/COS(X)
1512 *
1513 ATAN LHLD ASTKA
1514 CALL PSHAS PUSH COPY OF X ONTO ARG STACK
1515 CALL ACOS COS(X)
1516 LXI D,FTEM2
1517 CALL POPA1 FTEM2=COS(X)
1518 CALL ASIN
1519 CALL PREPOP
1520 LXI H,FTEM2
1521 JMP ADIV1 SIN(X)/COS(X)
1522 *
1523 * COMPUTE SQR(X) X=TOP OF ARGUMENT STACK
1524 * RETURN RESULT IN PLACE OF X
1525 *
1526 ASQR LHLD ASTKA
1527 LXI D,FTEMP
1528 CALL VCOPY SAVE X IN FTEMP
1529 * COMPUTE EXPONENT OF FIRST GUESS AS EXPONENT OF X/2
1530 LHLD ASTKA
1531 MOV A,M
1532 ORA A
1533 RZ
1534 SUI 128 X=0
1535 JM SQR5 NEGATIVE EXPONENT
1536 RRC
1537 ANI 127
1538 JMP SQR6
1539 SQR5 CMA
1540 INR A
1541 RRC
1542 ANI 127
1543 CMA
1544 INR A
1545 SQR6 ADI 128
1546 MOV M,A M.A
1547 * TEST FOR NEGATIVE ARGUMENT
1548 DCX H
1549 MOV A,M

```

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```

0A7D 04 41 4E      LXI      B,'NA'
0A80 B7           ORA      A
0A84 C2 C5 00     JNZ      ERROR      NEG ARGUMENT
0A84           * DO NEWTON ITERATIONS
0A84           * NEWGUESS = ( X/OLDGUESS + OLDGUESS ) / 2
0A84 3E 06       MVI      A,6        DO 6 ITERATIONS
0A86 F5         PUSH     PSW      SET NEW ITERATION COUNT
0A87 04 C5 18     LXI      B,FTEM1    FTEMP IS 'X'
0A8A 41 C0 18     LXI      D,FTEMP    GUESS
0A8D 2A 1C 19     LHL D,ASTKA        ASTKA
0A90 CD AB 09     CALL     ADIV4      FTEM1=X/GUESS
0A93 41 C5 18     LXI      D,FTEM1
0A96 2A 1C 19     LHL D,ASTKA
0A99 44         MOV      B,H
0A9A 4D         MOV      C,L
0A9B CD 8D 09     CALL     AADD4      TOS=(X/GUESS)+GUESS
0A9E CD 2A 0B     CALL     PREPOP     PREPOP
0AA1 24 C5 07     LXI      H,FTWO     H,FTWO
0AA4 CD AB 09     CALL     ADIV4
0AA7 F4         POP      PSW
0AA8 3D         DCR      A          DECREMENT COUNT
0AA9 C2 86 0A     JNZ      SQR20      DO ANOTHER ITERATION
0AAC C9         RET
0AAD           *
0AAD           * COMPUTE RND(X) X=TOP OF ARGUMENT STACK
0AAD           * FRAND IS UPDATED TO NEW RANDOM VALUE
0AAD           * A RANDOM NUMBER IN THE RANGE 0<RND<1 IS RETURNED IN PLACE
0AAD CD 2A 0B     CALL     PREPOP
0AB0 41 CF 18     LXI      D,FRAND
0AB3 24 CF 18     LXI      H,FRAND
0AB6 CD A1 09     CALL     AMUL1      TOS=FRAND*FRAND
0AB9           * SET EXPONENT=0
0AB9 2A 1C 19     LHL D,ASTKA
0ABC 36 80       MVI      M,128     EXPONENT=128 (0 IN EXTERNAL FORM)
0ABE           * PERMUTE DIGITS OF X AS
0ABE 01 FC FF     LXI      B,-4
0ABE 09 09       DAD     B          SAVE 12
0AC2 46         MOV      B,M
0AC3 23         INX     H
0AC4 23         INX     H
0AC5 CD FE 0A     CALL     PERMU     56=12
0AC8 CD FE 0A     CALL     PERMU     34=56
0ACB CD FE 0A     CALL     PERMU     12=34
0ACE           * NORMALIZE NUMBER
0ACE 2A 1C 19     LHL D,ASTKA
0AD1 04 FC FF     LXI      B,-FPSIZ+1 TOS
0AD4 09         DAD     B
0AD5 7E         MOV      A,M      FIRST DIGIT PAIR
0AD6 E6 F0       ANI     15*16     NUMBER IS NORMALIZED
0AD8 C2 F4 0A     JNZ     RND10
0ADB           * SHIFT LEFT ONE DIGIT
0ADB 2A 1C 19     LHL D,ASTKA
0ADE 7E         MOV      A,M      EXPONENT
0ADF 3D         DCR     A

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0AF0	32	29	17	1606	STA	EXP	
0AF3	CD	84	16	1607	CALL	LOAD	TOS INTO TEMP
0AF6	06	04		1608	MVI	B,4	
0AF8	CD	CE	16	1609	CALL	LEFT	SHIFT LEFT
0AFB	CD	2A	0B	1610	CALL	PREPOP	
0AFE	CD	9A	16	1611	CALL	STORE	
0AF4	C3	CE	0A	1612	JMP	RND5	TEST IF NORMALIZED
0AF4	11	CF	18	1613	LXI	D,FRAND	* SAVE NEW RANDM NUMBER IN FRAND CELL
0AF7	2A	4C	19	1614	LHLD	ASTKA	
0AFA	CD	9C	0C	1616	CALL	VCOPY	FRAND=TOS
0AFD	C9			1617	RET		
0AFE	7E			1618	* PERMUTE PAIR OF	DIGIT PAIRS	
0AFE	7E			1619	PERMU	MOV	A,M
0AFF	70			1620	MOV	M,B	
0B00	47			1621	MOV	B,A	
0B04	2B			1622	DCX	H	
0B02	C9			1623	RET		
0B03				1624	*		
0B03				1625	* EVALUATE P(X) USING HORNERS METHOD (X IS IN FTEMP)		
0B03				1626	* COEFFICIENT LIST POINTER IS IN BC		
0B03				1627	* RESULT REPLACES NUMBER ON TOP OF ARGUMENT STACK (Y)		
0B03	2A	1C	19	1628	POLY	ASTKA	
0B06	EB			1629	XCHG	.	DE=PTR TO Y
0B07	60			1630	MOV	H,B	
0B08	69			1631	MOV	L,C	HL PTR TO COEFFICIENT LIST
0B09	CD	9C	0C	1632	CALL	VCOPY	Y=FIRST COEFFICIENT
0B0C	E5			1633	* MULTIPLY BY X		
0B0C	E5			1634	PUSH	H	SAVE COEFF LIST POINTER
0B0D	CD	2A	0B	1635	CALL	PREPOP	
0B10	21	C0	18	1636	LXI	H,FTEMP	
0B13	CD	A1	09	1637	CALL	AMUL4	Y=Y*X
0B16	CD	2A	0B	1638	* ADD NEXT COEFF		
0B16	CD	2A	0B	1639	CALL	PREPOP	
0B19	E4			1640	POP	H	
0B1A	E5			1641	PUSH	H	HL=COEFF. LIST POINTER
0B1B	CD	8D	09	1642	CALL	AADD4	Y=Y+COEFF.
0B1E	E4			1643	* BUMP POINTER TO NEXT COEFFICIENT		
0B1E	E4			1644	POP	H	COEFF. POINTER
0B1F	01	FA	FF	1645	LXI	B,-FPSIZ-1	
0B22	09			1646	DAD	B	NEXT COEF SIGN
0B23	7E			1647	MOV	A,M	
0B24	23			1648	INX	H	PTR TO EXPONENT
0B25	B7			1649	ORA	A	
0B26	F2	0C	0B	1650	JP	POLY4	PROCESS NEXT COEFFICIENT
0B29	C9			1651	RET	.	NEGATIVE SIGN (-1) - ENDS LIST
0B2A				1652	*		
0B2A				1653	* PREPARE FOR OPERATION		
0B2A				1654	*		
0B2A	2A	1C	19	1655	PREPOP	ASTKA	DE=ASTKA
0B2D	EB			1656	LHLD	XCHG	.
0B2E	42			1657	MOV	B,D	
0B2F	4B			1658	MOV	C,E	
0B30	C9			1659	RET		
0B31				1660	*		
0B31				1661	*	QUADRANT COMPUTATION	

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OB334	1662	* POPS TOP OF ARGUMENT STACK	LHLD	ASTKA	H	POINT TO SIGN
OB334	1663	* COMPUTE/GETS SIGN OF ARGUMENT	DCX	B,M		
OB334	1664	* AND INDEX INTO QUADRANT	MOV	A		
OB334	1665	*	XRA	A		
OB334	1666	* EXITS WITH:	MOV	M,A	ARG. SIGN=0	
OB334	1667	* SP POINTING TO QUADRANT, MOD 4	MOV	H,B		
OB334	1668	* SP+2 POINTING TO SIGN OF ARGUMENT	XTHL	.		
OB334	1669	* TOP OF ARGUMENT STACK HAS INDEX INTO QUADRANT	PUSH	H	PUT SIGN ON STACK, POP RETURN	
OB334	1670	QUADC			PUSH RETURN	
OB334	1671	2A 1C 19				
OB334	1672					
OB334	1673					
OB334	1674					
OB334	1675					
OB334	1676					
OB334	1677					
OB334	1678	* COMPUTE QUADRANT OF ABS(X)				
OB334	1679		LHLD	ASTKA		
OB334	1680		CALL	PSHAS	PUT COPY OF ARG. ONTO STACK	
OB334	1681		CALL	PREPOP		
OB334	1682		LXI	H,PIC4	2/PI	
OB334	1683		CALL	AMUL4	TOS=X*2/PI	
OB334	1684		CALL	PREPOP		
OB334	1685		CALL	AIN	TOS=INT(X*2/PI)	
OB334	1686		LHLD	ASTKA		
OB334	1687		CALL	PSHAS	ANOTHER COPY	
OB334	1688		CALL	PFIX	POP TOS TO DE	
OB334	1689		MOV	A,E	QUADRANT	
OB334	1690		PUSH	PSW		
OB334	1691		CALL	PREPOP		
OB334	1692		LXI	H,PIC2		
OB334	1693		CALL	AMUL4	TOS=INT(X*2/PI)	
OB334	1694		LXI	D,FTEMP	FTEMP=TOS	
OB334	1695		CALL	POPA4		
OB334	1696		CALL	PREPOP		
OB334	1697		LXI	H,FTEMP		
OB334	1698		CALL	ASUB1	TOS=TOS-FTEMP	
OB334	1699		POP	PSW	A=QUADRANT, LOW ORDER BYTE	
OB334	1700		ANI	3	MOD 4	
OB334	1701		POP	H		
OB334	1702		PUSH	PSW	SAVE QUADRANT ON STACK	
OB334	1703		PCHL	.	RETURN	
OB334	1704	* SET UP ARG FOR USER CALL				
OB334	1705	AARG	CALL	PFIX		
OB334	1706		XCHG			
OB334	1707		SHLD	CALLA		
OB334	1708		LXI	D,FPSIN		
OB334	1709		JMP	PSHA4		
OB334	1710	* USED TO CALL USER ROUTINE				
OB334	1711	ACALL	CALL	PFIX	PUTS BACK THE ARG VALUE ON ARG STACK	
OB334	1712		LHLD	CALLA	GET THE ADDRESS	
OB334	1713		XCHG		GET THE USER ARGUMENT	
OB334	1714		LXI	B,ACAL4	RETURN LINK FOR USER ROUTINE	
OB334	1715		PUSH	B		
OB334	1716		PCHL			
OB334	1717	ACAL4	LXI	D,CALST		



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OB95	CD FA 0D	1718	CALL	CNS
OB98	3E 0D	1719	MVI	A,CR
OB9A	12	1720	STAX	D
OB9B	11 46 19	1721	LXI	D,CALST
OB9E	21 BB 18	1722	LXI	H,FPSIN
OBAA	CD 57 12	1723	CALL	FPI
OBAA	11 BB 18	1724	LXI	D,FPSIN
OBAA	C3 A8 0C	1725	JMP	PSHA1
OBAA		1726		
OBAA		1727		
OBAA		1728		
OBAA	0A	1729	LDAX	B
OBAB	D6 81	1730	SUI	429
OBAD	F2 B3 0B	1731	JP	AIN11
OBBO		1732		* ZERO IF VALUE LESS THAN ONE
OBBO	AF	1733	XRA	A
OBBA	02	1734	STAX	B
OBBA	C9	1735	RET	
OBBA		1736		* EXP > 0
OBBA	D6 05	1737	SUI	FPNIB-1
OBBA	D0	1738	RNC	
OBBA	57	1739	MOV	D,A
OBBA	0B	1740	DCX	B
OBBA	0B	1741	DCX	B
OBBA	0A	1742	LDAX	B
OBBA	E6 F0	1743	ANI	360Q
OBBA	02	1744	STAX	B
OBBA	14	1745	INR	D
OBBA	C8	1746	RZ	
OBBA	AF	1747	XRA	A
OBBA	02	1748	STAX	B
OBBA	14	1749	INR	D
OBBA	C2 B8 0B	1750	JNZ	AIN2
OBBA	C9	1751	RET	
OBBA		1752		
OBBA		1753		* DIMENSION MATRIX
OBBA		1754		* SYMTAB ADDRESS IN HL, HL NOT CLOBBEDED
OBBA		1755		* DE CONTAINS SIZE IN NUMBER OF ELEMENTS
OBBA		1756		*
OBBA	E5	1757	PUSH	H
OBBA	13	1758	INX	D
OBBA	D5	1759	PUSH	D
OBBA	21 00 00	1760	LXI	H,0
OBBA	0E 05	1761	MVI	C,FPSIZ
OBBA	CD 18 0D	1762	CALL	RADD
OBBA	EB	1763	XCHG	
OBBA	2A 1E 19	1764	LHLD	MATA
OBBA	E5	1765	PUSH	H
OBBA	19	1766	DAD	D
OBBA	CD E2 0C	1767	CALL	STOV
OBBA	22 1E 19	1768	SHLD	MATA
OBBA	C1	1769	POP	B
OBBA	D1	1770	POP	D
OBBA	E1	1771	POP	H
OBBA	E5	1772	PUSH	H
OBBA	72	1773	MOV	M,D

MULTIPLY NELTS BY BYTES PER VALUE

CHECK THAT STORAGE NOT EXHAUSTED  
UPDATE MATRIX FREE POINTER  
BASE ADDR  
NELTS  
SIMTAB ADDR

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OBE2 2B	1774	DCX	H		
OBE3 73	1775	MOV	M,E		
OBE4 2B	1776	DCX	H		
OBE5 70	1777	MOV	M,B		
OBE6 2B	1778	DCX	H		
OBE7 71	1779	MOV	M,C		SYMTAB ENTRY NOW SET UP
OBE8 E1	1780	POP	H		
OBE9 C9	1781	RET			
OBEA	1782				
OBEA	1783				FIND VARIABLE OPTIONALLY SUBSCRIPTED IN TEXT
OBEA	1784				SETS CARRY IF NOT FOUND
OBEA	1785				RETURNS ADDRESS OF VARIABLE IN HL
OBEA	1786				UPDATES TXA IF FOUND
OBEA	1787				
OBEA CD 80 OC	1788	CALL	ALPHA		
OBEA D8	1789	RC			
OBEA CD 4D OC	1790	CALL	NAME2		
OBEA CD 02 OD	1791	CALL	GC		
OBEA FE E0	1792	CPI	LPARRW		
OBEA CA FE OB	1793	JZ	VAR4		TEST IF SUBSCRIPTED
OBEA CD 58 OC	1794	CALL	STLK		RETURNS ENTRY ADDRESS IN HL
OBEA B7	1795	ORA	A		CLEAR CARRY
OBEA C9	1796	RET			
OBEA	1797				
OBEA	1798				GOBBLE LEFT PAREN
OBEA CD 0A OD	1799	CALL	GCI		
OBEA 3E 80	1800	MVI	A,200Q		
OBEA B1	1801	ORA	C		
OBEA CD 4F	1802	MOV	C,A		SET TYPE TO MATRIX
OBEA CD 58 OC	1803	CALL	STLK		
OBEA E5	1804	PUSH	H		SYMBOL TABLE
OBEA 1A 0A 00	1805	LXI	D,40		DEFAULT MATRIX SIZE
OBEA DC C6 OB	1806	CC	DIMS		DEFAULT DIMENSION MATRIX
OBEA CD D7 05	1807	CALL	EXPRB		EVALUATE SUBSCRIPT EXPRESSION
OBEA CD 8A OD	1808	CALL	PFX		DE NOW HAS INTEGER
OBEA 06 29	1809	MVI	B,')		
OBEA CD FA OC	1810	CALL	EATC		GOBBLE RIGHT PAREN
OBEA E1	1811	POP	H		
OBEA 2B	1812	DCX	H		
OBEA CD 35 OD	1813	CALL	DCMP		BOUNDS CHECK INDEX
OBEA D2 BC 00	1814	JNC	E5		
OBEA 2B	1815	DCX	H		
OBEA 2B	1816	DCX	H		
OBEA CD 40 OD	1817	CALL	LHLI		GET BASE ADDR
OBEA OE 05	1818	MVI	C,FPSIZ		
OBEA 13	1819	INX	D		
OBEA CD 18 OD	1820	CALL	RADD		BECAUSE BASE ADDR IS TO ELEMENT --1
OBEA C9	1821	RET			ADD INDEX, CLEAR CARRY
OBEA	1822				
OBEA	1823				JUNK ON END OF STATEMENT, TEST IF AT END OF FILE
OBEA	1824				DOES NOT CLOBBER DE
OBEA	1825				EATS CHARACTER AND LINE COUNT AFTER CR
OBEA	1826				LEAVES NEW TXA IN HL
OBEA	1827				SETS CARRY IF END OF FILE
OBEA	1828				
OBEA CD 0A OD	1829	CALL	GCI		

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1830 CPI
1831 RZ
1832 CR
1833 JNZ
1834 MOV
1835 DCR
1836 JZ
1837 INX
1838 INX
1839 INX
1840 SHLD
1841 RET
1842 STC
1843 JMP
1844 *
1845 * GET NAME FROM TEXT
1846 * SETS CARRY IF NAME NOT FOUND
1847 * IF SUCCEEDS RETURNS NAME IN BC, C=0 IF NO DIGIT IN NAME
1848 NAME CALL ALPHA
1849 RC
1850 MOV B,A
1851 MVI C,0
1852 CALL DIG
1853 CMC
1854 RNC
1855 MOV C,A
1856 ORA A
1857 RET
1858 *
1859 * SYMBOL TABLE LOOKUP
1860 * BC CONTAIN NAME AND CLASS
1861 * IF NOT FOUND THEN CREATE ZEROED ENTRY AND SET CARRY
1862 * HL HAS ADDRESS ON RET
1863 *
1864 STLK LHLD MEMTOP
1865 LXI D,-STESIZ SET UP BASE AND INCREMENT FOR SEARCH LOOP
1866 MOV A,M
1867 ORA A
1868 JZ STLK2 TEST IF END OF TABLE
1869 CMP B
1870 JNZ STLK4 TEST IF ALPHA COMPARES
1871 DCX H
1872 MOV A,M LOOK FOR DIGIT
1873 CMP C
1874 DCX H
1875 RZ
1876 INX H CARRY CLEAR 00 RET
1877 INX H
1878 DAD D DIDN'T COMPARE, DECREMENT POINTER
1879 JMP STLKO
1880 * ADD ENTRY TO SYMTAB
1881 STLK2 MOV M,B
1882 DCX H
1883 MOV M,C
1884 INX H
1885 XCHG

```

SKIP OVER COUNT AND LINE NUMBER

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OC77 19	1886	DAD	D	STA	D
OC78 22 B3 18	1887	SHLD	STA		STORE NEW END OF STMTAB POINTER
OC7B 1B	1888	DCX	D		
OC7C 1B	1889	DCX	D		
OC7D EB	1890	XCHG			
OC7E 37	1891	STC			
OC7F C9	1892	RET			
OC80	1893	*			
OC80	1894	* GOBBLES NEXT TEXT CHARACTER IF ALPHABETIC			
OC80	1895	* SETS CARRY IF NOT			
OC80	1896	* NEXT CHAR IN ACC ON FAILURE			
OC80	1897	*			
OC80 CD 02 0D	1898	CALL	GC		
OC83 FE 41	1899	CPI	'A'		
OC85 D8	1900	RC			
OC86 FE 5B	1901	CPI	'Z'+1		
OC88 3F	1902	CMC			
OC89 D8	1903	RC			
OC8A C3 97 0C	1904	JMP	DIGT1		
OC8D	1905	* GOBBLES NEXT TEXT CHAR IF DIGIT			
OC8D	1906	* SETS CARRY IF NOT			
OC8D	1907	* NEXT CHAR IN ACC ON FAILURE			
OC8D CD 02 0D	1908	CALL	GC		
OC90 FE 30	1909	CPI	'0'		
OC92 D8	1910	RC			
OC93 FE 3A	1911	CPI	'9'+1		
OC95 3F	1912	CMC			
OC96 D8	1913	RC			
OC97 23	1914	INX	H		
OC98 22 95 17	1915	SHLD	TXA		
OC9B C9	1916	RET			
OC9C	1917	*			
OC9C	1918	* COPIES FPSIZ BYTES AT ADDR HL TO ADDR DE			
OC9C	1919	* ON EXIT HL POINTS TO ADR-1 OF LAST BYTE COPIED			
OC9C	1920	*			
OC9C 0E 05	1921	VCOPY	C,FPSIZ		
OC9E 7E	1922	MOV	A,M		
OC9F 12	1923	STAX	D		
OCA0 2B	1924	DCX	H		
OCA1 1B	1925	DCX	D		
OCA2 0D	1926	DCR	C		
OCA3 C2 9E 0C	1927	JNZ	VCOP1		
OCA6 C9	1928	RET			
OCA7	1929	*			
OCA7	1930	* PUSH VALUE ADDRESSED BY HL ONTO ARG STACK			
OCA7	1931	* SETS ARGF, CLEARS CARRY			
OCA7	1932	*			
OCA7 EB	1933	PSHAS	XCHG		
OCA8 2A 1C 19	1934	LHLD	ASTKA		
OCA8 01 FB FF	1935	LXI	B,-FPSIZ		
OCAE 09	1936	DAD	B		
OCAF 22 1C 19	1937	SHLD	ASTKA		DECREMENT ARG STACK POINTER
OCB2 EB	1938	XCHG			
OCB3 CD 9C 0C	1939	CALL	VCOPY		
OCB6 3E 01	1940	MVI	A,1		
OCB8 32 93 17	1941	STA	ARGF		CLEAR ARGF

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OCBB B7	1942	ORA	A	CLEAR CARRY
OCBC C9	1943	RET		
OCBD	1944 *			
OCBD	1945 *	POP ARG STACK		
OCBD	1946 *	HL CONTAINS ADDRESS TO PUT POPENED VALUE AT		
OCBD	1947 *			
OCBD EB	1948	POPAS	XCHG	
OCBE 2A 1C 19	1949	POPAN	LHLD	ASTKA
OCCE 1 E5	1950	PUSH	H	
OCCE 2 01 05 00	1951	LXI	B, FPSIZ	
OCCE 5 09	1952	DAD	B	
OCCE 6 22 1C 19	1953	SHLD	ASTKA	INCREMENT STACK POINTER
OCCE 9 E1	1954	POP	H	
OCCE A C3 9C 0C	1955	JMP	VCOPY	
OCCE D	1956 *			
OCCE D	1957 *	PUSH FRAME ONTO CONTROL STACK		
OCCE D	1958 *	TAKES MINUS AMOUNT TO SUB FROM CSTKA IN DE		
OCCE D	1959 *	DOES OVERFLOW TEST AND RETURNS OLD CSTKA-1		
OCCE D	1960 *			
OCCE D 2A B5 18	1961	PSHCS	LHLD	CSTKA
OCCE D E5	1962	PUSH	H	
OCCE D 1 19	1960	DAD	D	
OCCE D 22 B5 18	1961	SHLD	CSTKA	
OCCE 5 EB	1962	XCHG		
OCCE 6 21 D0 07	1963	LXI	H, LCSTKA	ADDR CONTAINS CSTKL
OCCE 9 CD 35 0D	1964	CALL	DCMP	
OCCE D A B6 00	1965	JC	E4	
OCCE D E1	1966	POP	H	
OCCE 0 2B	1967	DCX	H	
OCCE 1 C9	1968	RET		
OCCE 2	1969 *			
OCCE 2	1970 *	STORAGE OVERFLOW TEST		
OCCE 2	1971 *	TEST THAT VALUE IN HL IS BETWEEN MATA AND STA		
OCCE 2	1972 *	DOES NOT CLOBBER HL		
OCCE 2	1973 *			
OCCE 2 EB	1974	STOV	XCHG	
OCCE 3 21 1E 19	1975	LXI	H, MATA	
OCCE 6 CD 35 0D	1976	CALL	DCMP	
OCCE 9 DA F4 0C	1977	JC	E8	
OCCE C 21 B3 18	1978	LXI	H, STA	
OCCE F CD 35 0D	1979	CALL	DCMP	
OCCE 2 EB	1980	XCHG		
OCCE 3 D8	1981	RC		
OCCE 4 01 4F 53	1982	LXI	B, 'SO'	
OCCE 7 C3 C5 00	1983	JMP	ERROR	
OCCE A	1984 *			
OCCE A	1985 *	INCREMENT TXA IF NEXT NON-BLANK CHAR IS EQUAL TO B		
OCCE A	1986 *	ELSE SYNTAX ERROR		
OCCE A	1987 *			
OCCE A CD 0A 0D	1988	EATC	CALL	GCI
OCCE D B8	1989	CMP	B	
OCCE E C8	1990	RZ		
OCCE F C3 AA 00	1991	JMP	E1	
OD02	1992 *			
OD02	1993 *	GET NEXT NON-BLANK CHAR INTO ACC		
OD02	1994 *	INCREMENT PAST BLANKS ONLY		

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0D02 1995 * CALL GCI
0D02 CD 0A 0D 1996 GC H
0D05 2B 1997 DCX H
0D06 22 95 17 1998 TXA
0D09 C9 1999 SHLD
0D0A RET
0D0A 2000 * GET NEXT NON-BLANK TEXT CHAR AND INCREMENT TXA
0D0A 2001 * DOES NOT CLOBBER DE, BC
0D0A 2002 * RETURN CHAR IN ACC
0D0A 2003 *
0D0A 2004 *
0D0A 2005 GCI TXA
0D0A 2A 95 17 2006 GCI0 A,M
0D0D 7E 2007 LHL D TXA
0D0E 23 2008 MOV A,M
0D0F FE 20 2009 INX H
0D11 CA 0D 0D 2009 JZ CPI
0D14 22 95 17 2010 SHLD GCIO
0D17 C9 2011 RET TXA
0D18 2012 * REPEAT ADD
0D18 2013 *
0D18 2014 * ADDS DE TO HL C TIMES
0D18 2015 *
0D18 19 2016 RADD D
0D19 0D 2017 DCR C
0D1A C2 18 0D 2018 JNZ RADD
0D1D C9 2019 RET
0D1E 2020 *
0D1E 2021 * PRINT MESSAGE ADDRESSED BY HL
0D1E 2022 * ENDS WITH CHARACTER PROVIDED IN C
0D1E 2023 * RETURN IN HL ADDRESS OF TERMINATOR
0D1E 2024 *
0D1E 0E 0D 2025 PRNTR MVI C,CR
0D20 C3 25 0D 2026 JMP PRN1
0D23 0E 22 2027 PRN MVI C,""
0D25 7E 2028 PRN1 MOV A,M
0D26 47 2029 MOV B,A
0D27 B9 2030 CMP C
0D28 C8 2031 RZ
0D29 FE 0D 2032 CPI CR
0D2B CA AA 00 2033 JZ F1
0D2E CD 95 0E 2034 CALL CHOUT
0D31 23 2035 INX H
0D32 C3 25 0D 2036 JMP PRN1
0D35 2037 *
0D35 2038 * 16 BIT UNSIGNED COMPARE
0D35 2039 * COMPARE DE AGAINST VALUE ADDRESSED BY HL
0D35 2040 * CLOBBERS A ONLY
0D35 2041 *
0D35 7B 2042 DCMP MOV A,E
0D36 96 2043 SUB M
0D37 23 2044 INX H
0D38 7A 2045 MOV A,D
0D39 9E 2046 SBB M
0D3A 2B 2047 DCX H
0D3B C0 2048 RNZ
0D3C 7B 2049 MOV A,E
0D3D 96 2050 SUB M

```

GET NEXT CHAR  
FOR CHOUT  
END OF MESSAGE TEST

NEVER PRINT A CR IN THIS ROUTINE

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0D3E B7	2051	ORA	A	CLEAR CARRY
0D3F C9	2052	RET		
0D40	2053 *			
0D40	2054 *	INDIRECT LOAD HL THRU HL		
0D40	2055 *			
0D40 F5	2056	LHLI		
0D41 7E	2057	PUSH	PSW	
0D42 23	2058	MOV	A,M	
0D43 66	2059	INX	H	
0D44 6F	2060	MOV	H,M	
0D45 F1	2061	MOV	L,A	
0D46 C9	2062	POP	PSW	
0D47	2063 *	RET		
0D47	2064 *			
0D47	2065 *	GET FP CONSTANT FROM TEXT		
0D47	2066 *	PUSHES VALUE ON ARG STACK AND SETS ARGF FLAG		
0D47	2067 *	SETS CARRY IF NOT FOUND		
0D47 2A 95 17	2068	CONST	TXA	PREPARE CALL FPIN
0D4A EB	2069	LHLD		
0D4B 21 BB 18	2070	XCHG		
0D4E CD 57 12	2071	LXI	H,FPIN	
0D51 D8	2072	CALL	FPIN	
0D52 1B	2073	RC		
0D53 EB	2074	DCX	D	
0D54 22 95 17	2075	XCHG		
0D57 11 BB 18	2076	SHLD	TXA	NOW POINTS TO TERMINATOR
0D5A CD A8 0C	2077	LXI	D,FPIN	
0D5D AF	2078	CALL	PSHA1	
0D5E 3C	2079	XRA	A	
0D5F 32 93 17	2080	INR	A	SET A TO 1 AND CLEAR CARRY
0D62 C9	2081	STA	ARGF	
0D63	2082 *	RET		
0D63	2083 *	DIRECT STATEMENT CHECKING ROUTINE		
0D63	2084 *			
0D63 3A 94 17	2085	DIRT	LDA	DIRF
0D66 B7	2086	ORA	A	
0D67 C8	2087	RZ		
0D68 01 49 44	2088	LXI	B,'DI'	
0D6B C3 C5 00	2089	JMP	ERROR	
0D6E	2090 *			
0D6E	2091 *	FIND TEXT LINE WITH LINE NUMBER GIVEN IN DE		
0D6E	2092 *	RETURNS TEXT ADDRESS COUNT BYTE IN HL		
0D6E	2093 *			
0D6E 2A 50 19	2094	FINDLN	LHLD	BOFA
0D71 06 00	2095	MVI	B,0	
0D73 4E	2096	MOV	C,M	
0D74 79	2097	MOV	A,C	
0D75 FE 01	2098	CPI	EOF	
0D77 CA 84 0D	2099	JZ	LERR	
0D7A 23	2100	INX	H	
0D7B CD 35 0D	2101	CALL	DCMP	
0D7E 2B	2102	DCX	H	
0D7F C8	2103	RZ		
0D80 09	2104	DAD	B	
0D81 C3 73 0D	2105	JMP	FIND1	
0D84 01 4E 4C	2106	LXI	B,'LN'	

\*\* ALS-8 PROGRAM DEVELOPMENT SYSTEM \*\*

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6200 HOLLIS STREET  
EMERYVILLE, CALIF. 94608

PROCESSOR TECHNOLOGY BASIC 5  
\*\* COPYRIGHT 1976 \*\*

Address	Op Code	Op Name	Comments
0D87	C3 C5 00	JMP	ERROR
0D8A			
2107	*		
2108	*		
2109	*		FIX FLOATING TO POSITIVE INTEGER
2110	*		RETURN INTEGER VALUE IN DE
2111	*		FP VALUE FROM TOP OF ARG STACK, POP ARG STACK
2112	*		
2113	*		
2114	*		
2115	*		
2116	*		
2117	*		
2118	*		
2119	*		
2120	*		
2121	*		
2122	*		
2123	*		
2124	*		
2125	*		
2126	*		
2127	*		
2128	*		
2129	*		
2130	*		
2131	*		
2132	*		
2133	*		
2134	*		
2135	*		
2136	*		
2137	*		
2138	*		
2139	*		
2140	*		
2141	*		
2142	*		
2143	*		
2144	*		
2145	*		
2146	*		
2147	*		
2148	*		
2149	*		
2150	*		TAKE NEXT DIGIT IN A (MASK TO 170), ACCUMULATE TO DE
2151	*		PRESERVES ALL BUT A, DE
2152	*		
2153	MUL10	PUSH	H
2154		INX	SP
2155		INX	SP
2156		MOV	H,D
2157		MOV	L,E
2158		DAD	H
2159		RC	
2160		DAD	H
2161		RC	
2162		DAD	D
0D8A	2A 1C 19	LHLD	ASTKA
0D8D	44	MOV	B,H
0D8E	4D	MOV	C,L
0D8F	E5	PUSH	H
0D90	CD AA 0B	CALL	AINT
0D93	21 BB 18	LXI	H,PPSINK
0D96	CD BD 0C	CALL	POPAS
0D99	E1	POP	H
0D9A	4E	MOV	C,M
0D9B	2B	DCX	H
0D9C	7E	MOV	A,M
0D9D	B7	ORA	A
0D9E	C2 BC 00	JNZ	E5
0DA1	11 FC FF	LXI	D,-FPSIZ+1
0DA4	19	DAD	D
0DA5	11 00 00	LXI	D,0
0DA8	79	MOV	A,C
0DA9	B7	ORA	A
0DAA	C8	RZ	
0DAB	0D	DCR	C
0DAC	23	INX	H
0DAD	7E	MOV	A,M
0DAE	0F	RRC	
0DAF	0F	RRC	
0DB0	0F	RRC	
0DB1	0F	RRC	
0DB2	CD C6 0D	CALL	MUL10
0DB5	DA BC 00	JC	E5
0DB8	0D	DCR	C
0DB9	F0	RP	
0DBA	7E	MOV	A,M
0DBB	CD C6 0D	CALL	MUL10
0DBE	DA BC 00	JC	E5
0DC1	0D	DCR	C
0DC2	FA AC 0D	JM	PFIX1
0DC5	C9	RFT	
0DC6			
0DC6			
0DC6			
0DC6			
0DC6	E5		
0DC7	33		
0DC8	33		
0DC9	62		
0DCA	6B		
0DCB	29		
0DCC	D8		
0DCD	29		
0DCE	D8		
0DCF	19		

PLUS ORIGINAL MAKES 5 TIMES ORIG



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0DD0 D8	2163	RC			
0DD1 29	2164	DAD	H		
0DD2 D8	2165	RC			TIMES TWO MAKES TEN
0DD3 EB	2166	XCHG			
0DD4 3B	2167	DCX	SP		
0DD5 3B	2168	DCX	SP		
0DD6 E4	2169	POP	H		
0DD7 E6 0F	2170	ANI	17Q		
0DD9 83	2171	ADD	E		
0DDA 5F	2172	MOV	E, A		
0DDB 7A	2173	MOV	A, D		
0DDC CE 00	2174	ACI	0		
0DDE 57	2175	MOV	D, A		
0DDF C9	2176	RET			PROPOGATE THE CARRY
0DE0	2177 *				
0DE0	2178 *				GET INTEGER FROM TEXT
0DE0	2179 *				SET CARRY IF NOT FOUND
0DE0	2180 *				RETURN INTEGER VALUE IN HL
0DE0	2181 *				RETURN TERMINATOR IN ACC
0DE0	2182 *				
0DE0 CD 8D 0C	2183	INTGER			
0DE3 D8	2184	CALL			DIG
0DE4 14 00 00	2185	LXI	D, 0		
0DE7 C3 F4 0D	2186	JMP			INTG2
0DEA CD 8D 0C	2187	CALL			DIG
0DED 62	2188	MOV	H, D		
0DEE 6B	2189	MOV	L, E		
0DEF 3F	2190	CMC			
0DF0 D0	2191	RNC			
0DF1 D6 30	2192	SUI	'0'		
0DF3 CD C6 0D	2193	CALL	MUL10		
0DF6 D2 EA 0D	2194	JNC	INTG1		
0DF9 C9	2195	RET			
0DFA	2196 *				
0DFA	2197 *				CONVERT INTEGER TO STRING
0DFA	2198 *				DE CONTAINS ADDRESS OF STRING, RETURN UPDATED VALUE IN DE
0DFA	2199 *				HL CONTAINS VALUE TO CONVERT
0DFA	2200 *				
0DFA AF	2201	CNS			
0DFB 04 F0 D8	2202	XRA	A		SET FOR NO LEADING ZEROES
0DFE CD 4F 0E	2203	LXI	B, -10000		
0E04 04 38 FC	2204	CALL	RSUB		
0E07 04 4F 0E	2205	CALL	B, -1000		
0E0A CD 1F 0E	2206	CALL	RSUB		
0E0D 04 F6 FF	2207	CALL	B, -100		
0E10 CD 4F 0E	2208	CALL	RSUB		
0E13 04 FF FF	2209	CALL	B, -10		
0E16 CD 4F 0E	2210	LXI	B, -1		
0E19 C0	2211	CALL	RSUB		
0E1A 3E 30	2212	RNZ			
0E1C 12	2213	MVI	A, '0'		
0E1D 13	2214	STAX	D		
0E1E C9	2215	INX	D		
0E1F	2216 *	RET			
0E1F	2217 *				
0E1F	2218 *				TAKE VALUE IN HL

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0E1F 2219 * SUB MINUS NUMBER IN BE THE MOST POSSIBLE TIMES
0E2F 2220 * PUT VALUE ON STRING AT DE
0E3F 2221 * IF A=0 THEN DONT PUT ZERO ON STRING
0E4F 2222 * RETURN NON-ZERO IN A IF PUT ON STRING
0E5F 2223 *
0E6F D5 PUSH D
0E70 46 FF MVI D,-1
0E71 E5 PUSH H
0E72 33 INX SP
0E73 33 INX SP
0E74 44 INR D
0E75 09 DAD B
0E76 DA 22 0E JC RSUB#
0E77 3B DCX SP
0E78 3B DCX SP
0E79 E4 POP H
0E7A 42 MOV B,D
0E7B D4 POP D
0E7C B0 ORA B
0E7D C8 RZ
0E7E 3E 30 MVI A,'0'
0E7F 80 ADD B
0E80 42 STAX D
0E81 43 INX D
0E82 C9 RET
0E83 *
0E84 *
0E85 *
0E86 *
0E87 *
0E88 *
0E89 *
0E8A *
0E8B *
0E8C *
0E8D *
0E8E *
0E8F *
0E90 *
0E91 *
0E92 *
0E93 *
0E94 *
0E95 *
0E96 *
0E97 *
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0FF9 *
0FFA *
0FFB *
0FFC *
0FFD *
0FFE *
0FFF *

```

A GETS 0 IF A WAS 0 AND B IS 0

INPUT CHARACTER FROM TERMINAL

LOOP UNTIL CHAR RECEIVED

IGNORE LINE FEEDS

IGNORE NULLS

DELETE

ECHO

LINE DELETION

IN CASE WE ARE DONE

DO LF THEN RETURN

```

CALL STATUS
JZ INCHAR
IN INCHAR
ANI 477Q
CPI ESC
JZ CMND#
CPI LF
JZ INCHAR
CPI 0
JZ INCHAR
MOV B,A
RET
CALL CALL
LXI H,IBUF
MVI C,LINLEN
CALL INCHAR
CPI 5FH
JZ INL2
MOV M,A
CALL CHOUT
MVI A,B
CPI '@'
JZ INLO
MVI B,LF
CPI CR
JZ CHOUT
INX INX

```

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0E74 0D	DCR	C	INL4	2275		
0E75 C2 5A 0E	JNZ	B, 'LL'		2276		
0E78 04 4C 4C	LXI	ERROR		2277		
0E7B 03 C5 00	JMP	A, C		2278		
0E7E 79	MOV	B, BELL	INL2	2279		
0E7F 06 07	MVI	LINLEN		2280		
0E81 FE 49	CPI	INL3		2281		
0E83 CA 9A 0E	JZ	B, 5FH		2282		
0E86 06 5F	MVI	H		2283		
0E88 2B	DCX	C		2284		
0E89 0C	INR	CHOUT		2285		
0E8A CD 95 0E	CALL	INL1	INL3	2286		
0E8D C3 5A 0E	JMP			2287		
0E90				2288		
0E90 DB 00	IN	0	STATUS	2289		
0E92 E6 40	ANI	40H		2290		
0E94 C9	RET			2291		
0E95				2292		
0E95				2293		
0E95				2294		
0E95				2295		
0E95 DB FF	IN	OFFH	CHOUT	2296		
0E97 4F	RAR	GET SENSE SWITCH INPUT		2297		
0E98 DA E4 0F	JC	TEROT		2298		
0E9B				2299		
0E9B				2300		
0E9B				2301		
0E9B				2302		
0E9B				2303		
0E9B 78	MOV	A, B	ALSO	2304		
0E9C FE 7F	CPI	7FH		2305		
0E9E C8	RZ			2306		
0E9F FE 07	CPI	BELL		2307		
0EA1 CA E4 0F	JZ	TEROT		2308		
0EA4				2309		
0EA4				2310		
0EA4				2311		
0EA4				2312		
0EA4				2313		
0EA4 E5	PUSH	H	TIMER	2314		
0EA5 D5	PUSH	D		2315		
0EA6 C5	PUSH	B		2316		
0EA7 3A 45 19	LDA	SPEED		2317		
0EAA 67	MOV	H, A		2318		
0EAB 2E 80	MVI	L, 80H		2319		
0EAD CD C3 0E	CALL	NUMCK		2320		
0EB0 AF	XRA	A		2321		
0EB1 2B	DCX	H		2322		
0EB2 BC	CMP	H		2323		
0EB3 C2 B 0E	JNZ	TIME		2324		
0EB6 C1	POP	B		2325		
0EB7 C5	PUSH	B		2326		
0EB8 78	MOV	A, B		2327		
0EB9 CD 03 0F	CALL	SCOUT		2328		
0EBC C1	POP	B		2329		
0EBD D4	POP	D		2330		

OUTPUT ROUTINES

SENSE SWITCH 4 (A8) CONTROLS VDM OR STANDARD TERMINAL

GET SENSE SWITCH INPUT

SWITCH UP IS STANDARD TERMINAL

OUTPUT DRIVER FOR PROCESSOR TECHNOLOGY VIDEO DISPLAY MODULE. SEE VDM MANUAL FOR ADDITIONAL CODE COMMENTS

"DING" GOES THE STANDARD TERMINAL

THIS ROUTINE ALLOWS AN OUTPUT RATE SELECTABLE FROM THE KEYBOARD BETWEEN THREE CHARACTERS PER SECOND TO APPROX 2000 LINES PER MINUTE.

GET DELAY TIME

SEE IF NEW SPEED IS WANTED

ZERO YET?

GET BACK CHR

OUTPUT CHR TO SCREEN

*Handwritten notes:*  
...  
...  
...  
...  
...  
...

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OEBE E1	2334	POP	H	BRKCHR	
OEBF 78	2332	MOV	A,B	B,A	
OECO C3 EE OF	2333	JMP	CHCHK		NOW PROCESS THE REST
OEC3	2334	*			
OEC3	2335	*			CHECK FOR TIMER CONTROL VALUE
OEC3	2336	*			
OEC3 3A 3F 19	2337	LDA			
OEC6 47	2338	MOV			
OEC7 B7	2339	ORA			
OEC8 CC 90 OE	2340	CZ			STATUS
OECB CA D3 OE	2341	JZ			NINP
OECE DB 04	2342	IN			
OEDO E6 7F	2343	ANI			7FH
OED2 47	2344	MOV			B,A
OED3 78	2345	MOV			A,B
OED4 B7	2346	ORA			A
OED5 C8	2347	RZ			
OED6 FE 3A	2348	CPI			'9'+1
OED8 D2 F2 OE	2349	JNC			WAIT
OEDB FE 34	2350	CPI			'1'
OEDD DA F2 OE	2351	JC			WAIT
OEE0 E6 OF	2352	ANI			OFH
OEE2 4F	2353	MOV			C,A
OEE3 AF	2354	XRA			A
OEE4 37	2355	STC			
OEE5 32 45 19	2356	STA			SPEED
OEE8 17	2357	RAL			
OEE9 OD	2358	DCR			C
OEEA C2 E5 OE	2359	JNZ			LESS
OEEA AF	2360	XRA			A
OEEE 32 3F 19	2361	STA			BRKCHR
OEF1 C9	2362	RET			
OEF2	2363	*			
OEF2 FE 20	2364	WAIT			
OEF4 DA EE OE	2365	JC			20H
OEF7 C2 ED OE	2366	JNZ			SBRK
OEFA CD 90 OE	2367	CALL			CBRK
OEPD CA FA OE	2368	JZ			STATUS
OF00 C3 EE OE	2369	JMP			WAIT2
OF03	2370	*			SBRK
OF03	2371	*			OUTPUT CHR IN REG A TO SCREEN
OF03	2372	*			
OF03 4F	2373	SCOUT			
OF04 24 44 19	2374	MOV			C,A
OF07 46	2375	MOV			H,CCP
OF08 FE OD	2376	CPI			B,M
OF0A CA 2F OF	2377	JZ			CR
OF0D FE 5F	2378	CPI			SCOT2
OF0F CA 58 OF	2379	JZ			5FH
OF12 FE 04	2380	CPI			BKSPA
OF14 CA 8E OF	2381	JZ			'A'-10H
OF17 FE 1A	2382	CPI			CURTG
OF19 CA 68 OF	2383	JZ			'Z'-10H
OF1C FE 20	2384	CPI			INITS
OF1E D8	2385	RC			20H
OF1F	2386	*			NO OTHER CONTROL CHRS

NO NEW INPUT VALUE

REMOVE ASCII BIAS  
SAVE DELAY NUMBER

INITIALIZE DELAY BIT IN CARRY

WAIT FOR KEYBOARD INPUT

GET CURRENT CURSOR POSITION

CARRIAGE RETURN?

BACKSPACE?

CURSOR ON-OFF

CLEAR SCREEN

NO OTHER CONTROL CHRS

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OF1F	2387	*	STORE CHR IN VDM MEMORY
OF1F	2388	*	
OF1F	2389		CLN
OF22	2390		CLNA
OF25	2391		M,C
OF26	2392		CCP
OF29	2393		INR
OF2A	2394		CPI
OF2C	2395		JNZ
OF2F	2396	*	ADVANCE CURSOR
OF2F	2397	SCOT2	LDA
OF32	2398		CALL
OF35	2399		CALL
OF38	2400		SUB
OF39	2401	SCOT1	STA
OF3C	2402		MOV
OF3D	2403		LDA
OF40	2404	SCUR	ANI
OF42	2405		STA
OF45	2406		CALL
OF48	2407		MOV
OF49	2408		STA
OF4C	2409		LDA
OF4F	2410		ORA
OF50	2411		MOV
OF51	2412		JZ
OF54	2413		ORI
OF56	2414		MOV
OF57	2415		RET
OF58	2416	*	BACKSPACE AND ERASE LAST CHR
OF58	2417	BKSPA	LDA
OF5B	2418		CALL
OF5E	2419		DCX
OF5F	2420		MVI
OF61	2421		DCR
OF62	2422		LDA
OF65	2423		JMP
OF68	2424	*	
OF68	2425	*	CLEAR SCREEN AND INITIALIZE PARAMETERS
OF68	2426	*	
OF68	2427	INITS	LXI
OF6B	2428		LXI
OF6E	2429	IL2	MVI
OF70	2430		INX
OF71	2431		DCX
OF72	2432		MOV
OF73	2433		ORA
OF74	2434	*	SCREEN IS CLEAR NOW SET PARAMETERS
OF77	2435		JNZ
OF77	2436		STA
OF7A	2437		STA
OF7D	2438		STA
OF80	2439		STA
OF83	2440		STA
OF86	2441		MVI
OF88	2442		STA

CLN  
CLNA  
M,C  
CCP  
A  
64  
SCOT1  
LINE  
CLN  
CCUR  
SCRL  
A  
CCP  
B,A  
CLN  
OFH  
CLN  
CLNA  
A,B  
CCP  
CURF  
A  
A,M  
CCUR2  
80H  
M,A

CALL  
MOV  
LDA  
ANI  
STA  
CALL  
MOV  
STA  
LDA  
ORA  
MOV  
JZ  
ORI  
MOV  
RET

BACKSPACE AND ERASE LAST CHR  
LDA  
CALL  
DCX  
MVI  
DCR  
LDA  
JMP

LXI  
LXI  
MVI  
INX  
DCX  
MOV  
ORA  
JNZ  
STA  
STA  
STA  
STA  
STA  
MVI  
STA

H,VDMBASE  
B,1024  
M,  
H  
B  
A,B  
C  
IL2  
CLEAR NOW SET PARAMETERS  
BOSL  
BOTL  
PHEAD  
CCP  
CURF  
A,15  
CLN

*Handwritten notes:*  
 Loop until all 4K character places have a space  
 parameters  
 loop until all 4K character places have a space

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0F8B	CD	BB	0F	2443				CALL	VDMOT
0F8E	3A	42	19	2444	* TOGGLE CURSOR			LDA	(ON--OFF---ON.....)
0F91	EE	04		2445	CURTG			XRI	CURF
0F93	32	42	19	2446				STA	↓
0F96	3A	41	19	2447				LDA	CURF
0F99	47			2448				MOV	CCP
0F9A	3A	40	19	2449				LDA	B,A
0F9D	C3	40	0F	2450				JMP	CLN
0FA0	24	44	19	2451	* SCRL			LXI	SCUR
0FA3	E5			2452				PUSH	H,BOTL
0FA4	7E			2453				MOV	H
0FA5	34			2454				INR	A,M
0FA6	96			2455				SUB	M
0FA7	04	00	00	2456				LXI	M
0FAA	CD	C9	0F	2457				CALL	B,0
0FAD	04	40	20	2458				LXI	CLNA
0FB0	70			2459				MOV	B,2040H
0FB1	2C			2460	SCRL2			INR	M,B
0FB2	0D			2461				DCR	L
0FB3	C2	B0	0F	2462				JNZ	C
0FB6	E4			2463				POP	SCRL2
0FB7	7E			2464				MOV	H
0FB8	E6	0F		2465				ANI	A,M
0FBA	77			2466				MOV	OFH
0FBB	3A	43	19	2467				LDA	M,A
0FBE	07			2468	* VDMOT			RLC	BOSL
0FBF	07			2469				RLC	
0FC0	07			2470				RLC	
0FC1	07			2471				RLC	
0FC2	24	44	19	2472				LXI	H,BOTL
0FC5	B6			2473				ORA	M
0FC6	D3	C8		2474				OUT	VDMDEV
0FC8	C9			2475				RET	
0FC9				2476					
0FC9				2477					
0FC9				2478					
0FC9				2479					
0FC9				2480					
0FC9				2481					
0FC9	6F			2482	CLNA			MOV	L,A
0FCA	3A	44	19	2483				LDA	BOTL
0FCD	85			2484				ADD	L
0FCE	0F			2485				RRC	
0FCE	0F			2486				RRC	
0FD0	6F			2487				MOV	L,A
0FD1	E6	03		2488				ANI	3
0FD3	C6	CC		2489				ADI	VDMPAGE
0FD5	67			2490				MOV	H,A
0FD6	7D			2491				MOV	A,L
0FD7	E6	C0		2492				ANI	OC0H
0FD9	80			2493				ADD	B
0FDA	6F			2494				MOV	L,A
0FDB	C9			2495				RET	
0FDC	CD	C9	0F	2496	* CCUR			CALL	CLNA
0FDF	7E			2497				MOV	A,M
0FDF	7E			2498					

CALCULATE SCREEN ADDRESS AND RETURN IN HL

LOW MOD MATH

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0FE0	E6 7F	2499	CCUR2	ANI	7FH
0FE2	77	2500		MOV	M,A
0FE3	C9	2501		RET	
0FE4		2502	*		
0FE4		2503	*	STANDARD TERMINAL OUTPUT DRIVER	
0FE4		2504	*		
0FE4	DB 00	2505	TEROT	IN	0
0FE6	E6 80	2506		ANI	80H
0FE8	CA 95 0E	2507		JZ	CHOUT
0FEB	78	2508		MOV	A,B
0FEC	D3 04	2509		OUT	↑
0FEE	FE 0D	2510	CHCHK	CPI	CR
0FF0	C2 F7 0F	2511		JNZ	CHLF
0FF3	AF	2512		XRA	A
0FF4	C3 03 10	2513		JMP	PSTOR
0FF7		2514	*		RETURN PHEAD TO ZERO
0FF7	FE 0A	2515	CHLF	CPI	LF
0FF9	CA 07 10	2516		JZ	NULCH
0FFC	FE 20	2517		CPI	40Q
0FFE	D8	2518		RC	
0FFF	3A 90 17	2519		LDA	PHEAD
1002	3C	2520		INR	A
1003	32 90 17	2521	PSTOR	STA	PHEAD
1006	C9	2522		RET	
1007	3A 92 17	2523	*		
1007	3A 92 17	2524	NULCH	LDA	NULCT
100A	B7	2525		ORA	A
100B	C8	2526		RZ	
100C	C5	2527		PUSH	B
100D	4F	2528		MOV	C,A
100E	06 00	2529		MVI	B,NULL
1010	CD 95 0E	2530	CH2	CALL	CHOUT
1013	0D	2531		DCR	C
1014	C2 10 10	2532		JNZ	CH2
1017	C4	2533		POP	B
1018	C9	2534		RET	
1019	CD 1C 10	2535	CRLF2	CALL	CHLF
101C	06 0D	2536	CRLF	MVI	B,CR
101E	CD 95 0E	2537		CALL	CHOUT
1021	06 0A	2538		MVI	B,LF
1023	C3 95 0E	2539		JMP	CHOUT
1026		2540	*		
1026		2541	*	CHECK IF PANIC CHARACTER HAS BEEN HIT	
1026		2542	*		
1026	3A 3F 19	2543	PCHECK	LDA	BRKCHR
1029	B7	2544		ORA	A
102A	CC 90 0E	2545		CZ	STATUS
102D	C8	2546		RZ	
102E	DB 04	2547		IN	↑
1030	E6 7F	2548		ANI	7FH
1032	FE 03	2549		CPI	ESC
1034	CA 52 04	2550		JZ	STOP↑
1037	32 3F 19	2551		STA	BRKCHR
103A	C9	2552		RET	
103B		2553	*		
103B		2554	*	GET INTEGER FROM TERMINAL	

IF LINEFEED PROCESS THE NULLS  
NO PHEAD INC IF CONTROL CHAR

OUTPUT COUNT "C" NULLS

GET LAST CHR INPUT

GET INTEGER FROM TERMINAL

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103B	2555	* DE CONTAINS STRING TO PRINT FIRST			
103B	2556	* HL HAS 1 LESS THAN ACCEPTABLE LOWER BOUND			
103B	2557	* THIS ROUTINE GOES TO START IF BAD NUMBER			
103B	2558	* INTEGER VALUE RETURNED IN HL			
103B	2559	*			
103B E5	2560	GINT	H	PUSH	
103C EB	2561	XCHG			
103D 3A	2562	LDA		PHEAD	
1040 B7	2563	ORA	A		
1041 C4	2564	CNZ		CRLF	
1044 CD	2565	CALL		PRNT	
1047 CD	2566	CALL		INLINE	
104A 21	2567	LXI	H,IBUF		
104D 22	2568	SHLD	TXA		
1050 CD	2569	CALL	INTGR		
1053 DA	2570	JC	START		
1056 FE	2571	CPI	CR		
1058 C2	2572	JNZ	START		
105B D1	2573	POP	D		
105C 22	2574	SHLD	IBUF	USE IBUF AS A TEMP	
105F 21	2575	LXI	H,IBUF		
1062 CD	2576	CALL	DCMP		
1065 D2	2577	JNC	START		
1068 2A	2578	LHLD	IBUF	GET THE VALUE BACK TO HL	
106B 7E	2579	MOV	A,M		
106C 2F	2580	CMA			
106D 77	2581	MOV	M,A	TRY TO STORE THERE	
106E BE	2582	CMP	M		
106F C2	2583	JNZ	START	BAD OR MISSING MEMORY	
1072 C9	2584	RET			
1073	2585	*			
1073	2586	*			
1073	2587	*			
1073	2588	FPOUT		OUTPUT FP NUMBER ADDRESSED BY HL	
1073 01	2589	FC	FF		
1076 09	2590	DAD			
1077 44	2591	MOV	B,H		
1078 4D	2592	MOV	C,L		
1079 21	2593	LXI	H,ABUF	OUTPUT BUFFER	
107C 3A	2594	LDA	INFES	OUTPUT FORMAT	
107F 32	2595	STA	FES	STORE IT	
1082 4E	2596	MVI	E,DIGIT		
1084 36	2597	MVI	M,0	CLEAR ROUND-OFF OVERFLOW BUFFER	
1086 23	2598	INX	H	ABUF+1	
1087	2599	*			
1087 0A	2600	LDAX	B	GET DIGIT AND UNPACK	
1088 57	2601	MOV	D,A		
1089 4F	2602	RAR			
108A 4F	2603	RAR			
108B 4F	2604	RAR			
108C 4F	2605	RAR			
108D E6	2606	ANI	17Q	REMOVE BOTTOM DIGIT	
108F 77	2607	MOV	M,A	STORE TOP DIGIT IN OUTPUT BUFFER (ABUF)	
1090 23	2608	INX	H		
1091 7A	2609	MOV	A,D	NOW GET BOTTOM DIGIT	
1092 E6	2610	ANI	17Q		
1094		MOV	M,A	STORE IT	



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1095 23	2611	INX	H	STORE SIGN OF NUMBER
1096 03	2612	INX	B	CLEAR ROUND-OFF BUFFER (ABUF+13) 12 DIGIT NO RND
1097 1D	2613	DCR	E	EXPONENT SIGN STORE
1098 C2 87 10	2614	JNZ	NXT	CLEAR XSIGN
1098 0A	2615	LDAX	B	GET EXPONENT
109C 32 29 19	2616	STA	FSIGN	EXPONENT ZERO?
109F AF	2617	XRA	A	REMOVE NORMALIZING BIAS
10A0 77	2618	MOV	M,A	INCREMENT XSIGN TO NE ACTIVE FLAG (1)LATER ZERO
10A1 21 37 19	2619	LXI	H,XSIGN	ITS A NEGATIVE EXPONENT
10A4 77	2620	MOV	M,A	INCREMENT XSIGN TO NEGATIVE (1)
10A5	2621 *			EXPONENT TEMP STORE
10A5 03	2622 FIX	INX	B	FORMAT TEMP BYTE
10A6 0A	2623	LDAX	B	FORCE EXPONENTIAL PRINTOUT
10A7 B7	2624	ORA	A	FORMAT FOR XOUT
10A8 CA B6 10	2625	JZ	ZRO	CHECK IF EXPONENTIAL PRINTOUT
10AB D6 80	2626	SUI	128	
10AD C2 B1 10	2627	JNZ	FIX2	
10B0 34	2628	INR	M	
10B1 F2 B7 10	2629 FIX2	JP	CHK43	
10B4 2F	2630	CMA	.	
10B5 34	2631	INR	M	
10B6 3C	2632 ZRO	INR	A	
10B7 21 38 19	2633 CHK13	LXI	H,EXPO	
10BA 77	2634	MOV	M,A	
10BB 5F	2635	MOV	E,A	
10BC FE 06	2636	CPI	DIGIT*2	
10BE 21 39 19	2637	LXI	H,FES	
10C1 DA C8 10	2638	JC	CHKX0	
10C4 3E 01	2639	MVI	A,1	
10C6 B6	2640	ORA	M,SET	
10C7 77	2641	MOV	M,A	
10C8	2642 *			
10C8 7E	2643	MOV	A,M	
10C9 1F	2644	RAR		
10CA D2 DB 10	2645	JNC	CHKX3	
10CD E6 0F	2646	ANI	17Q	
10CF FE 06	2647	CPI	DIGIT*2	
10D1 DA D6 10	2648	JC	CHKX2	
10D4 3E 05	2649	MVI	A,DIGIT*2-1 MAX DIGITS	
10D6 57	2650	MOV	D,A	
10D7 3C	2651	INR	A	
10D8 C3 21 11	2652	JMP	ROUND	
10DB	2653 *			
10DB E6 0F	2654	ANI	17Q	
10DD 57	2655	MOV	D,A	
10DE 83	2656	ADD	E	
10DF FE 07	2657	CPI	DIGIT*2+1	
10E1 47	2658	MOV	B,A	
10E2 DA EB 10	2659	JC	CHKXN	
10E5 7E	2660	MOV	A,M	
10E6 E6 40	2661	ANI	1000	
10E8 C2 C4 10	2662	JNZ	CHK40	
10EB	2663 *			
10EB 3A 37 19	2664	LDA	XSIGN	CHECK EXPONENT SIGN
10EE B7	2665	ORA	A	
10EF C2 F6 10	2666	JNZ	XNEG	ITS NEGATIVE

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Address	Op Code	Op Name	Comments
0717 23	1007	UPPO	
0718 7E	MOV	H	INX
0719 B7	ORA	A, M	NEXT TOKEN IN SOURCE
071A FA 25 07	JM	UPP4	JUMP IF TOKEN IS RW
071B 12	STAX	D	PUT CHARACTER IN BUFFER
071E FE 0D	CPI	CR	CHECK FOR DONE
0720 C8	RZ		
0721 13	INX	D	ADVANCE DESTINATION BUFFER ADDRESS
0722 C3 17 07	JMP	UPPO	
0725 E5	1016	* COME	HERE WHEN RW BYTE DETECTED IN SOURCE
0726 21 02 08	1017	UPP4	SAVE SOURCE POINTER
0729 BE	LXI	H, RWT	BASE OF RWT
072A 23	CMP	M	SEE IF RW MATCHED RWT ENTRY
072B C2 29 07	INX	H	ADVANCE RWT POINTER
072E 7E	JNZ	UPP2	CONTINUE LOOKING IF NOT FOUND
072F B7	1022	* FOUND	MATCH, ENTRY POINTER LOCATES FIRST CHARACTER
0730 FA 39 07	1023	UPP3	MOV A, M
0731 12	ORA	A	CHARACTER OF RW
0732 13	JM	UPP4	CHECK FOR DONE
0733 12	STAX	D	
0734 13	INX	D	
0735 23	INX	H	
0736 C3 2E 07	JMP	UPP3	
0739 E1	1030	* COME	HERE IF DONE WITH RW TRANSFER
073A C3 17 07	1031	UPP4	POP H
073D	JMP	UPPO	SOURCE POINTER
073D	1033	*	
073D	1034	*	CONSTANTS AND TABLES
073D	1035	*	
073D	1036	RDYS	ASC 'READY''
52 45 41 44	ASC		
59 22	ASC		'PROGRAM LOADED? ''
0743 50 52 4F 47	ASC		
52 41 4D 20			
4C 4F 41 44			
45 44 3F 20			
22			
0754 20 45 52 52	ASC		'ERROR''
4F 52 22			
075B 20 49 4E 20	ASC		' IN LINE ''
4C 49 4E 45			
20 22			
0765 53 54 4F 50	ASC		'STOP''
22			
076A 46 49 52 53	ASC		'FIRST ADDR ''
54 20 41 44			
44 52 20 22			
0776 4C 41 53 54	ASC		'LAST ADDR ''
20 41 44 44			
52 20 22			
0781 FF	DB	-1	FLAGS END OF SINE COEFFICIENT LIST
0782 00	DB	0	
0783 10	DB	16	
0784 00 00	DW	0	
0786 00	DB	0	
0787 81	DB	29	EXPONENT

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1150 7E	2723	TRL3	MOV	A, M	
1151 B7	2724		ORA	A	IS IT A ZERO?
1152 C2 5D 11	2725		JNZ	FPRNT	NO - GO PRINT
1155 2B	2726		DCX	H	
1156 0D	2727		DCR	C	YES- FIX OUTPUT DIGIT COUNT
1157 FA 48 12	2728		JM	ZERO	
115A C3 50 11	2729		JMP	TRL3	
115D	2730	*			
115D 21 2F 19	2731	*			Here starts the print format routines
1160 7E	2732	FPRNT	LXI	H, ABUF	CHECK IF ROUNDED UP TO 1
1161 B7	2733		MOV	A, M	
1162 CA 83 11	2734		ORA	A	JUMP IF NOT
1165 06 01	2735		JZ	NRND	
1167 3A 37 19	2736		MVI	B, 1	
116A B7	2737		LDA	XSIGN	IS EXPONENT NEGATIVE?
116B CA 70 11	2738		ORA	A	
116E 06 FF	2739		JZ	POSR	
1170 3A 38 19	2740	*	MVI	B, -1	
1173 B7	2741	POSR	LDA	EXPO	GET EXPONENT
1174 C2 7C 11	2742		ORA	A	IS IT ZERO? (E+0)
1177 32 37 19	2743		JNZ	PO2	
117A 06 01	2744		STA	XSIGN	
117C 80	2745		MVI	B, 1	
117D 32 38 19	2746		ADD	B	FIX EXPONENT COUNT
1180 1C	2747	PO2	STA	EXPO	
1181 0C	2748		INR	E	
1182 2B	2749		INR	C	
1183	2750		DCX	H	
1183 23	2751	*			
1184 79	2752	NRND	INX	H	
1185 FE 07	2753		MOV	A, C	CHECK FOR MAXIMUM DIGITS OUT
1187 C2 8B 11	2754		CPI	DIGIT*2+1	
118A 0D	2755		JNZ	NRND4	
118B 3A 29 19	2756		DCR	C	CHECK IF NEGATIVE NUMBER
118E 4F	2757	NRND1	LDA	FSIGN	
118F D2 98 11	2758		RAR		GO OUTPUT RADIX AND NUMBER
1192 CD 43 12	2759		JNC	PRIN2	OUTPUT (-)
1195 C3 9B 11	2760		CALL	NEG	
1198	2761	*	JMP	PR121	
1198 CD 4D 12	2762		CALL	SPACE	OUTPUT A SPACE
119B 3A 39 19	2763	PRIN2	LDA	FES	GET OUTPUT FORMAT
119E 4F	2764	PR121	RAR	.	CHECK IF EXPONENTIAL OUTPUT FORMAT
119F DA D6 11	2765		JC	XPRIN	
11A2 3A 37 19	2766		LDA	XSIGN	GET EXPONENT SIGN
11A5 B7	2767		ORA	A	CHECK IF NEGATIVE EXPONENT
11A6 CA C8 11	2768		JZ	POSIT	
11A9 79	2769		MOV	A, C	
11AA B7	2770		ORA	A	OUTPUT RADIX AND NUMBER
11AB C2 B2 11	2771		JNZ	PRIN4	NO DIGITS AFTER RADIX, OUPUT ZERO AND DONE
11AE CD 48 12	2772		CALL	ZERO	
11B1 C9	2773	*	RET		
11B2 CD 52 12	2774		CALL	RADIX	PRINT DECIMAL POINT
11B5 AF	2775	PRIN4	XRA	A	

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11B6 B3	2779	ORA	E	ORA	PRINT5	JUMP IF NO ZEROS TO PRINT
11B7 CA 11	2780	JZ	ZERO	JZ	ZERO	FORCE PRINT A ZERO
11B8 CD 12	2781	CALL	E	CALL	PRINT4+3	
11B9 DD	2782	DCR	PRINT5	DCR	PRINT5	
11BE C2 B5 11	2783	JNZ	NOUT	JNZ	PRINT ASCII DIGIT	
11C1	2784	CALL	PRINT5	CALL	PRINT5	
11C4 CD 39 12	2785	JNZ	NOUT	JNZ	BUMP EXPONENT COUNT	
11C4 C2 C1 11	2786	RET	POSIT	RET	CHECK IF MORE DIGITS TO OUTPUT	
11C7 C9	2787	ORA	A	ORA	NO, DONE	
11C8	2788	CALL	PRINT5	CALL	NOW PRINT DECIMAL POINT	
11C8 CD 39 12	2789	DCR	NOUT	DCR	output format	
11CB 1D	2790	JNZ	POSIT	JNZ	INTEGER?	
11CC C2 C8 11	2791	MOV	A,C	MOV	NO.....PRINT DECIMAL POINT	
11CF 79	2792	ORA	A	ORA		
11D0 B7	2793	RZ	.	RZ		
11D1 C8	2794	RM	PRINT4	RM		
11D2 F8	2795	JMP	PRINT4	JMP		
11D3 C3 B2 11	2796					
11D6	2797					
11D6 CD 39 12	2798	CALL	NOUT	CALL		
11D9 CA E5 11	2799	JZ	NDEC	JZ		
11DC CD 52 12	2800	CALL	RADIX	CALL		
11DF CD 39 12	2801	CALL	NOUT	CALL		
11E2 C2 DF 11	2802	JNZ	XPRI2	JNZ		
11E5	2803					
11E5 06 45	2804					
11E7 CD 95 0E	2805	MVI	B,'E'	MVI	OUTPUT 'E'	
11EA 3A 37 19	2806	CALL	CHOUT	CALL		
11ED B7	2807	LDA	XSIGN	LDA		
11EE CA FB 11	2808	ORA	A	ORA		
11F1 CD 43 12	2809	JZ	XPRI3	JZ		
11F4 3A 38 19	2810	CALL	NEG	CALL		
11F7 3C	2811	LDA	EXPO	LDA		
11F8 C3 04 12	2812	INR	A	INR		
11FB 06 2B	2813	JMP	XOUT2	JMP		
11FD CD 95 0E	2814	MVI	B,'+'	MVI	PRINT EXPONENT SIGN (-)	
1200	2815	CALL	CHOUT	CALL	EXPONENT (+)	
1200	2816					
1200 3A 38 19	2817					
1203 3D	2818					
1204 0E 64	2819	DCR	EXPO	DCR		
1206 16 00	2820	MVI	A	MVI		
1208 CD 2E 12	2821	MVI	C,100	MVI		
120B FE 30	2822	MVI	D,0	MVI		
120D CA 14 12	2823	CALL	CONV	CALL		
1210 14	2824	CPI	'0'	CPI		
1211 CD 95 0E	2825	JZ	XO21	JZ		
1214 7B	2826	INR	D	INR		
1215 0E 0A	2827	CALL	CHOUT	CALL		
1217 CD 2E 12	2828	MOV	A,E	MOV		
121A FE 30	2829	MVI	C,10	MVI		
121C C2 23 12	2830	CALL	CONV	CALL		
121F 15	2831	CPI	'0'	CPI		
1220 C2 26 12	2832	JNZ	XO3	JNZ		
	2833	DCR	D	DCR		
	2834	JNZ	XO4	JNZ		

\* This routine is used to convert the exponent  
binary to ASCII and print the result

SKIP LEADING ZEROS

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1223	CD 95 0E	2835	X03	CALL	CHOUT
1226	7B	2836	X04	MOV A,E	
1227	C6 30	2837		ADI '0'	ADD ASCII BIAS
1229	47	2838		MOV B,A	
122A	CD 95 0E	2839		CALL	CHOUT
122D	C9	2840		RET	
122E	06 2F	2841	CONV	MVI B,'0'-1	
1230	04	2842		INR B	
1231	94	2843		SUB C	
1232	D2 30 12	2844		JNC CONV+2	
1235	84	2845		ADD C	
1236	5F	2846		MOV E,A	
1237	78	2847		MOV A,B	
1238	C9	2848		RET	
1239		2849	*		
1239		2850	*	This routine adds ASCII bias to a BCD digit	
1239		2851	*	and calls the output routine	
1239	7E	2852	NOUT	MOV A,M	
123A	C6 30	2853		ADI '0'	
123C	47	2854		MOV B,A	
123D	CD 95 0E	2855		CALL	CHOUT
1240	23	2856		INX H	
1241	0D	2857		DCR C	
1242	C9	2858		RET	
1243		2859	*		
1243		2860	*	Common symbol loading routines	
1243	06 2D	2861	NEG	MVI B,'-'	
1245	C3 95 0E	2862		JMP	CHOUT
1248	06 30	2863	ZERO	MVI B,'0'	
124A	C3 95 0E	2864		JMP	CHOUT
124D	06 20	2865	SPACE	MVI B,' '	
124F	C3 95 0E	2866		JMP	CHOUT
1252	06 2E	2867	RADIX	MVI B,'.'	
1254	C3 95 0E	2868		JMP	CHOUT
1257		2869	*	CONVERTS FP STRING AT DE, UPDATE DE PAST TERMINATOR	
1257		2870	*	PUTS TERMINATOR IN B, PUTS FP NUMBER AT ADDRESS IN HL	
1257	E5	2871	*SETS CARRY IF NOT FOUND		
1258	D5	2872	FPIN	PUSH H	
1259	EB	2873		PUSH D	
125A	2B	2874		XCHG	
125B	22 20 19	2875		DCX H	
125E	21 26 19	2876		SHLD ADDS	CLEAR TEMPORARY STORAGE AREAS AND BC BUFFER
1261	0E 09	2877		LXI H,OPST	
1263	CD 1B 13	2878		MVI C,DIGIT+6	
1266		2879		CALL	CLEAR
1266	11 00 00	2880	*		
1269	21 2A 19	2881	SCANC	LXI D,0	
126C	22 24 19	2882		LXI H,BC	BC=PACK BUFFER
126F	21 6F 12	2883	SCANO	SHLD BCADD	PACK BUFFER POINTER
1272	E5	2884	SCANP	LXI H,SCANP	
1273	AF	2885		PUSH H	USED FOR RETURN FROM OTHER ROUTINES
1274	32 37 19	2886		XRA A	
1277	CD ED 12	2887	*	STA	CLEAR EXPONENT SIGN BYTE
127A	DA A4 12	2888			
		2889	SCANG	CALL	IBSCN
		2890		JC	SCANX
					FOUND A NUMBER, GO PACK IT

DECREMENT TOTAL DIGITS OUT COUNT

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127D FE 2E	2891	CPI	'.'	RADIX?	
127F CA 95 12	2892	JZ	SCAN5	PROCESS RADIX POINTERS	
1282 FE 45	2893	CPI	'E'	EXPONENT?	
1284 CA 23 13	2894	JZ	EXCON	FOUND 'E', GO PROCESS EXPONENT NUMBER	
1287 47	2895			*NOT A CHARACTER LEGAL IN NUMBER	
1288 3A 26 19	2896	MOV	B,A	MOVE TERMINATOR TO B	
128B E6 10	2897	LDA	OPST	CHECK IF ANY DIGITS YET	
128D C2 01 13	2898	ANI	20Q		
1290 E1	2899	JNZ	ENR2		
1291 D1	2900			*GET HERE IF LEGAL FP NUMBER NOT FOUND	
1292 E1	2901	POP	H	SCAMP LINK	
1293 37	2902	POP	D	TEXT POINTER	
1294 C9	2903	POP	H	FP # ADDR	
1295 AF	2904	STC			
1296 B2	2905	RET			
1297 C2 9F 12	2906			*FOUND DECIMAL POINT	
1298 B3	2907	XRA	A	FOUND RADIX PROCESS RADIX POINTERS FOR EXP	
1299 C6 C0	2908	ORA	D	ANY DIGITS YET?	
129A B3	2909	JNZ	SCAN6		
129B 5F	2910	ADI	300Q		
129C 3E 80	2911	ORA	E	SET ECNT - STOP COUNTING DIGITS	
129D 77	2912	MOV	E,A	NO INT DIGITS, BIT 7 IS COUNT/DON'T COUNT FLAG	
129E 3E 80	2913	RET		BIT 6 IS NEGATIVE EXPONENT FLAG	
12A1 B3	2914	MVI	A,200Q		
12A2 5F	2915	ORA	E	SET ECNT TO COUNT DIGITS	
12A3 C9	2916	MOV	E,A		
12A4 E6 0F	2917	RET			
12A5 47	2918				
12A6 21 26 19	2919	ANI	17Q	FOUND NUMBER-REMOVE ASCII BIAS	
12AA 3E 30	2920	MOV	B,A		
12AC B6	2921	LXI	H,OPST	SET FIRST CHARACTER FLAG	
12AD 77	2922	MVI	A,60Q		
12AE AF	2923	ORA	M		
12AF B0	2924	MOV	M,A		
12B0 C2 BC 12	2925	XRA	A	IS CHARACTER ZERO?	
12B1 B2	2926	ORA	B		
12B2 7B	2927	JNZ	PACK	LEADING ZERO? IE; ANY INT DIGITS?	
12B3 B2	2928	ORA	D		
12B4 C2 BC 12	2929	JNZ	PACK		
12B5 5F	2930	ORA	E		
12B6 C8	2931	MOV	E,A		
12B7 7A	2932	RZ	.	IF COUNTING YET,	
12B8 4C	2933	INR	E	ECNT+1-COUNT ZEROS FOR EXPONENT COUNT	
12B9 C9	2934	RET			
12BA 7B	2935				
12BB 47	2936			* This subroutine BCD packs digits into reg BC	
12BC DA C2 12	2937				
12BD 7B	2938	MOV	A,E		
12BE DA C2 12	2939	RAL			
12C1 1C	2940	JC	PACK1		
12C2 7B	2941	INR	E		
12C3 32 28 19	2942	MOV	A,E		
12C4 44	2943	STA	ECNT		
12C5 7A	2944	INR	D		
12C6 E6 7F	2945	MOV	A,D		
12C7 7A	2946	ANI	177Q		

DIGIT COUNT FOR EXPONENT COUNT  
TOTAL DIGIT COUNT (D ALSO HAS TOP/BOTM FLAG BIT 7)  
REMOVE TOP/BOTTOM FLAG

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12CA FE 07	2947	CPI	DIGIT*2+1	LIMIT INPUT DIGITS
12CC D0	2948	RNC		
12CD AF	2949	XRA	A	
12CE B2	2950	ORA	D	
12CF FA DF 12	2951	JM	BOTM	
12D2	2952 *			
12D2 F6 80	2953	ORI	200Q	SET MSB FOR TOP FLAG
12D4 57	2954	MOV	D,A	
12D5 78	2955	MOV	A,B	
12D6 2A 24 19	2956	LHLD	BCADD	GET BC ADDRESS
12D9 07	2957	RLC		
12DA 07	2958	RLC		
12DB 07	2959	RLC		
12DC 07	2960	RLC		
12DD 77	2961	MOV	M,A	SAVE CHR IN BC
12DE C9	2962	RET		
12DF E6 7F	2963 *			
12E1 57	2964	ANI	177Q	STRIP MSB (BOTTOM FLAG)
12E2 78	2965	MOV	D,A	
12E3 2A 24 19	2966	MOV	A,B	
12E6 B6	2967	LHLD	BCADD	
12E7 77	2968	ORA	M	OR IN TOP NUMBER
12E8 23	2969	MOV	M,A	PUT NUMBER BACK IN BC
12E9 C1	2970	INX	H	
12EA C3 6C 12	2971	POP	B	
12ED 2A 20 19	2972	JMP	SCANO	
12F0 23	2973	LHLD	ADDS	INPUT BUFFER POINTER
12F1 7E 20	2974	INX	H	GET NEXT BYTE
12F2 FE 20	2975	MOV	A,M	
12F4 CA F0 12	2976	CPI	'0'	
12F7 22 20 19	2977	JZ	IBSCN+3	
12FA FE 3A	2978	SHLD	ADDS	NOTE: THIS ROUTINE FALLS THROUGH TO BELOW
12FC D0	2979	CPI	'0'	
12FD FE 30	2980	CMC		
12FF 3F	2981	RET		
1300 C9	2982			
1301	2983			
1301	2984			
1301	2985 *			
1301	2986			
1301	2987			
1301	2988			
1301	2989			
1301	2990			
1301	2991			
1301	2992			
1301	2993			
1301	2994			
1301	2995			
1301	2996			
1301	2997			
1301	2998			
1301	2999			
1301	3000			
1301	3001			
1301	3002			

NOTE: THIS ROUTINE FALLS THROUGH TO BELOW

\* This routine is used to adjust a number in BC BUFFER

TERMINATOR  
NORMALIZE FLOATING POINT NUMBER  
TERMINATOR  
SCANP LINK  
OLD TEXT ADDR  
RETURN ADDR  
C, DIGIT+2  
H, BC+DIGIT+1  
VCOPY  
ADDS  
D  
A

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```

3003 * This routine is used to clear storage areas
3004 * The starting address is in H&L and the count
3005 * is in reg C
3006 CLEAR XRA A
3007 MOV M,A
3008 INX H
3009 DCR C
3010 JNZ CLEAR+1
3011 RET
3012 *
3013 * This routine converts the ASCII exponent of
3014 * number in the input buffer to binary, and
3015 * normalizes exponent according to the input
3016 * format of the number
3017 EXCON CALL IBSCN GET CHARACTER
3018 JC EXC3
3019 CPI PLSRW CHECK FOR UNARY SIGNS
3020 JZ EXC4
3021 CPI '+'
3022 JZ EXC4
3023 CPI '-'
3024 JZ EXC2
3025 CPI MINRW
3026 JNZ FPERR
3027 EXC2 MVI A,# NO SIGN OR NUMBER?
3028 STA XSIGN SAVE SIGN
3029 CALL IBSCN
3030 JNC FPERR NO NUMBER?
3031 EXC3 CALL ASCDC CONVERT ASCII TO BINARY
3032 JMP ENT1 NORMALIZE NUMBER AND RETURN
3033 *
3034 * This routine converts ASCII to binary
3035 * Three consecutive numbers <128 may be converted
3036 ASCDC XCHG
3037 LXI H,0
3038 ASC1 LDAX D
3039 CALL NMCHK
3040 JNC ASC2
3041 SUI '0' REMOVE ASCII BIAS
3042 MOV B,H
3043 C,L
3044 DAD H
3045 DAD H
3046 DAD B
3047 DAD H
3048 MOV C,A
3049 MVI B,0
3050 DAD B
3051 INX D
3052 JMP ASC1
3053 XCHG
3054 MOV B,A
3055 SHLD ADDS SAVE TERMINATOR
3056 MOV A,D
3057 ORA A
3058 JNZ T00 BIG >255
  
```



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1373 7B	MOV	A,E	
1374 17	RAL		
1375 DA 7A 13	FPERR	TOO BIG >127	
1378 1F	RAR		
1379 C9	RET		
137A C1	POP	ASDC RET LINK	
137B C3 90 12	JMP	FPIN1	
137E	JMP		
137E EB	XCHG		
137F 3A 2A 19	LDA		
1382 B7	ORA	IS IT ZERO?	
1383 CA 8B 13	JZ		
1386 CD 8F 13	CALL	SET EXPONENT POSITIVE/NEGATIVE	
1389 C6 80	ADI	ADD EXPONENT BIAS	
138B 32 2E 19	STA	BC+DIGIT+1 STORE NORMALIZED EXPONENT IN BC	
138E C9	RET		
138F 3A 28 19	LDA		
1392 5F	MOV	ECNT GET EXPONENT COUNT-SET IN 'SCAN' ROUTINE	
1393 E6 3F	ANI	E,A	
1395 47	MOV	77Q STRIP BITS 7&8	
1396 3A 37 19	LDA		
1399 B7	ORA		
139D 24	JZ		
139E 3E 40	INR		
13A0 A3	MVI	A,100Q EXPONENT IS POSITIVE	
13A1 CA AC 13	ANA	SET SIGN IN H ** THIS SHOULD BE INR H NOT INX H	
13A4 7D	JZ	L IS NEGATIVE	
13A5 68	MOV	CHECK IF E IS NEGATIVE	
13A6 CD BD 13	CALL	BOTH E&L NEGATIVE	
13A9 2F	CMA		
13AA 3C	INR		
13AB C9	RET		
13AC 7D	MOV	A,L	
13AD 2F	CMA	E&L NEGATIVE	
13AE 3C	INR		
13AF 80	ADD		
13B0 C9	RET		
13B1		BACK TO FIXE	
13B1 3E 40	MVI		
13B3 A3	ANA	A,100Q EXPONENT POSITIVE	
13B4 CA BC 13	JZ	IS E NEGATIVE?	
13B7 78	MOV	BPOS	
13B8 45	MOV	A,B	
13B9 C3 AD 13	JMP	B,L	
13BC		EPOS+1	
13BC 78	MOV	A,B	
13BD 85	ADD	L	
13BE F0	RP		
13BF E1	POP		
13C0 C3 7A 13	JMP	FPERR	
13C3 10	DB	1*16	

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13C4	00 00	1315	DW	0	
13C6	01	1316	DB	1	
13C7	81	1317	FPNONE	129	
13C8		1318	*		
13C8		1319	*		THIS PROGRAM WRITTEN BY
13C8		1320	*		MICROTEC
13C8		1321	*		990 E. ARQUES
13C8		1322	*		SUNNYVALE, CA. 94086
13C8		1323	*		
13C8		1324	*		THIS PROGRAM IS A FOUR FUNCTION FLOATING POINT BCD
13C8		1325	*		MATH PACKAGE.
13C8		1326	*		EACH FUNCTION MAY BE EXPRESSED AS: BC=DE # HL
13C8		1327	*		<BC> = ADDRESS OF RESULT
13C8		1328	*		<DE> = ADDRESS OF 1ST ARGUMENT
13C8		1329	*		<HL> = ADDRESS OF 2ND ARGUMENT
13C8		1330	*		# IS ONE OF THE FUNCTIONS: +, -, X, /.
13C8		1331	*		ALL ADDRESSES ON ENTRY, POINT TO THE EXPONENT PART OF
13C8		1332	*		THE FLOATING POINT NUMBER.
13C8		1333	*		EACH FLOATING POINT NUMBER CONSISTS OF (2*DIGIT) PACKED
13C8		1334	*		DECIMAL DIGITS, A SIGN AND A BIASED BINARY EXPONENT. THE
13C8		1335	*		EXPONENT RANGE IS 10**-127 TO 10**127.
13C8		1336	*		THE NUMBER ZERO IS REPRESENTED BY THE EXPONENT 0.
13C8		1337	*		THE NUMBERS ARE STORED IN MEMORY AS (DIGIT) BYTES OF
13C8		1338	*		OF DECIMAL DIGITS
13C8		1339	*		STARTING AT THE LOW ORDER ADDRESS
13C8		1340	*		ALL NUMBER ARE ASSUMED TO BE NORMALIZED. THAT IS EACH
13C8		1341	*		NUMBER CAN BE REPRESENTED AS F**E.
13C8		1342	*		WHERE .4<=F<.0 AND F IS THE
13C8		1343	*		EXPONENT.
13C8		1344	*		
13C8		1345	*		FLOATING POINT ADDITION
13C8		1346	*		
13C8	C5	1347	FADD		
13C9	CD 42 16	1348	PUSH	B	EXPCK
13C9	0E 00	1349	CALL	C,0	FETCH ARGUMENTS
13C9	1B	1350	MVI	D	
13CF	EB	1351	DCX		
13D0	3A 28 17	1352	XCHG	SIGN	
13D3	AE	1353	LDA	M	FORM SIGN OF RESULT
13D4	47	1354	XRA	B,A	
13D5	EB	1355	MOV		
13D6	4A	1356	XCHG	D	
13D7	1B	1357	LDAX	D	
13D8	A9	1358	DCX	D	
13D9	32 28 17	1359	XRA	C	
13DC	24 2A 17	1360	STA	SIGN	
13DF	7E	1361	LXI	H,CTRL	ROUNDING CONTROL FLAG
13E0	B7	1362	MOV	A,M	
13E1	23	1363	ORA	A	
13E2	7E EA 13	1364	INX	H	
13E3	07	1365	MOV	A,M	GET ROUNDING DIGIT
13E6	07	1366	JZ	ADSR	
13E7	07	1367	RLC		
13E8	07	1368	RLC		
13E9	07	1369	RLC		
13EA	C6 B0	1370	ADI	OB0H	FORCE CARRY IF DIGIT > 5

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Address	Instruction	Operation	Comments
13EC 78	MOV	A, B	
13ED 1F	RAR		
13EE DA 2E 14	JC	ADS1	HAVE SUBTRACTION
13F1 17	RAL		RESTORE CARRY
13F2 CD 0D 14	CALL		PERFORM ADDITION
13F5 D2 04 14	JNC	ADS2	
13F8 06 04	MVI	B, J	
13FA CD A8 16	CALL		
13FD 21 29 17	LXI	H, EXP	
1400 34	INR	M	INCREMENT EXPONENT
1401 CA F4 16	JZ	OVER	
1404 C4	POP	B	GET RESULTS ADDRESS
1405 CD 9A 16	CALL	STORE	SAVE RESULTS
1408 C9	RET		
1409 E1	POP	H	
140A C3 04 14	JMP	ADS2	
140D 21 27 17	LXI	H, BUF+DIGIT-1	
1410 06 03	MVI	B, DIGIT	
1412 1A	LDAX	D	
1413 8E	ADC	M	
1414 27	DAA		
1415 77	MOV	M, A	
1416 2B	DCX	H	
1417 1B	DCX	D	
1418 05	DCR	B	
1419 C2 12 14	JNZ	ADD1	
141C D0	RNC		
141D 34	INR	M	
141E C9	RET		
141F			
141F			
141F C5	PUSH	B	FLOATING POINT SUBTRACTION
1420 CD 42 16	CALL	EXPC	GET ARGUMENTS
1423 3A 28 17	LDA	SIGN	
1426 EE 04	XRI	1	COMPLEMENT SIGN
1428 32 28 17	STA	SIGN	
142B C3 CE 13	JMP	ADSUM	
142E 17	RAL		RESTORE CARRY
142F 3F	CMC		COMPLEMENT FOR ROUNDING
1430 CD 82 14	CALL		SUBTRACT ARGUMENTS
1433 24 28 17	LXI	H, SIGN	
1436 DA 4D 14	JC	ADS1	
1439 7E 04	MOV	A, M	GET SIGN
143A EE 04	XRI	1	COMPLEMENT
143C 77	MOV	M, A	
143D 2B	DCX	H	
143E 06 03	MVI	B, DIGIT	
1440 3E 9A	MVI	A, 9AH	
1442 9E	SBB	M	COMPLEMENT RESULT
1443 C6 00	ADI	0	
1445 27	DAA		
1446 77	MOV	M, A	
1447 2B	DCX	H	
1448 05	DCR	B	
1449 3F	CMC		

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144A C2 40 14	3227	JNZ	ADS3
144D 21 25 17	3228	LXI	H,BUF
1450 01 03 00	3229	LXI	B,DIGIT
1453 7E	3230	MOV	A,M
1454 B7 66 14	3231	ORA	A
1455 C2 66 14	3232	JNZ	ADS6
1458 23	3233	INX	H
1459 04	3234	INR	B
145A 04	3235	INR	B
145B 0D	3236	DCR	C
145C C2 53 14	3237	JNZ	ADS5
145F AF	3238	XRA	A
1460 32 29 17	3239	STA	EXP
1463 C3 04 14	3240	JMP	ADS2
1466 FE 40	3241	CPI	40H
1468 D2 6C 14	3242	JNC	ADS9
146B 04	3243	INR	B
146C 21 29 17	3244	LXI	H,EXP
146F 7E	3245	MOV	A,M
1470 90	3246	SUB	B
1471 CA FA 16	3247	JZ	UNDER
1474 DA FA 16	3248	JC	UNDER
1477 77	3249	MOV	M,A
1478 78	3250	MOV	A,B
1479 07	3251	RLC	
147A 07	3252	RLC	
147B 47	3253	MOV	B,A
147C CD CE 16	3254	CALL	LEFT
147F C3 04 14	3255	JMP	ADS2
1482 21 27 17	3256	LXI	H,BUF+DIGIT-1
1485 06 03	3257	MVI	B,DIGIT
1487 3E 99	3258	MVI	A,99H
1489 CE 00	3259	ACI	O
148B 96	3260	SUB	M
148C EB	3261	XCHG	
148D 86	3262	ADD	M
148E 27	3263	DAA	
148F EB	3264	XCHG	
1490 77	3265	MOV	M,A
1491 2B	3266	DCX	H
1492 1B	3267	DCX	D
1493 05	3268	DCR	B
1494 C2 87 14	3269	JNZ	SUB1
1497 C9	3270	RET	
1498	3271	*	
1498	3272	*	FLOATING POINT MULTIPLY
1498	3273	*	
1498 C5	3274	FMUL	
1499 7E	3275	MOV	B
149A B7	3276	ORA	A,M
149B CA B2 14	3277	JZ	FMUL1+2
149E 1A	3278	LDAX	D
149F B7	3279	ORA	A
14A0 CA B2 14	3280	JZ	FMUL1+2
14A3 86	3281	ADD	M
14A4 DA AD 14	3282	JC	FMOVR
			ARGUMENT = 0?
			ARGUMENT = 0?
			FORM RESULT EXPONENT

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14A7 F2 FA 16	3283	JP	UNDER
14A8 C3 B0 14	3284	JMP	FMUL1
14AD FA F4 16	3285	JM	OVER
14B0 D6 80	3286	SUI	REMOVE EXCESS BIAS
14B2 32 29 17	3287	STA	SAVE EXPONENT
14B5 1B	3288	DCX	D
14B6 2B	3289	DCX	H
14B7 1A	3290	LDAX	D
14B8 AE	3291	XRA	M
14B9 2B	3292	DCX	H
14BA 1B	3293	DCX	D
14BB E5	3294	PUSH	H
14BC 24 28 17	3295	LXI	H, SIGN
14BF 77	3296	MOV	GET SIGN ADDRESS
14C0 2B	3297	DCX	M, A
14C1 AF	3298	XRA	H
14C2 06 05	3299	MVI	B, DIGIT+2
14C4 77	3300	MOV	M, A
14C5 2B	3301	DCX	H
14C6 05	3302	DCR	B
14C7 C2 C4 14	3303	JNZ	FMUL2
14CA 3A 29 17	3304	LDA	EXP
14CD B7	3305	ORA	A
14CE CA 09 14	3306	JZ	ZEREX
14D1 0E 03	3307	MVI	C, DIGIT
14D3 21 05 17	3308	LXI	H, HOLD1+DIGIT
14D6 1A	3309	* GET MULTIPLIER INTO HOLDING REGISTER	
14D7 77	3310	LDAX	D
14D8 2B	3311	MOV	M, A
14D9 1B	3312	DCX	H
14DA 0D	3313	DCX	D
14DB C2 D6 14	3314	DCR	C
14DE 71	3315	JNZ	FMUL3
14DF 2B	3316	MOV	M, C
14E0 06 FA	3317	DCX	H
14E2 11 04 00	3318	MVI	B, 250
14E5 4B	3319	LXI	D, DIGIT+1
14E6 19	3320	MOV	C, E
14E7 EB	3321	DAD	D
14E8 19	3322	XCHG	
14E9 04	3323	DAD	D
14EA F2 1E 15	3324	INR	B
14ED 1A	3325	JP	FMUL8
14EE 8F	3326	LDAX	D
14EF 27	3327	ADC	A
14F0 77	3328	DAA	
14F1 1B	3329	MOV	M, A
14F2 2B	3330	DCX	D
14F3 0D	3331	DCX	H
14F4 C2 ED 14	3332	DCR	C
14F7 04	3333	JNZ	FMUL5
14F8 C2 E2 14	3334	INR	B
14FB	3335	JNZ	FMUL4
14FB 23	3336	* FORM 10X BY ADDING 8X AND 2X	
	3337	* FIRST GET 8X	
	3338	INX	H

PUT IN REGISTER  
SET LOOP COUNT  
H, L=NEXT HOLDING REGISTER  
FINISHED  
GET DIGITS  
TIMES 2  
PUT IN HOLDING REGISTER  
INCRREMENT LOOP COUNT

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14FC 11 12 17	3339	LXI	D,HOLD5	NEXT HOLDING REGISTER
14FF 0E 04	3340	MVI	C,DIGIT+1	
1501 41	3341	MOV	B,C	
1502 7E	3342	MOV	A,M	
1503 12	3343	STAX	D	
1504 23	3344	INX	H	
1505 13	3345	INX	D	
1506 0D	3346	DCR	C	
1507 C2 02 15	3347	JNZ	FMUL6	
150A 21 09 17	3348	LXI	H,HOLD2+DIGIT	GET 2X
150D 1B	3349	DCX	D	
150E 1A	3350	LDAX	D	
150F 8E	3351	ADC	M	FORM 10X
1510 27	3352	DAA		
1511 12	3353	STAX	D	
1512 1B	3354	DCX	D	
1513 2B	3355	DCX	H	
1514 05	3356	DCR	B	
1515 C2 0E 15	3357	JNZ	FMUL7	
1518 06 F9	3358	MVI	B,249	
151A EB	3359	XCHG		
151B C3 E2 14	3360	JMP	FMUL4	
151E EB	3361	XCHG		
151F 23	3362	INX		
1520 36 04	3363	MVI	H	DIGIT+1 SET NEXT LOOP COUNT
1522 C1	3364	POP	M	ACCUMULATION OF PRODUCT
1523 21 22 17	3365	POP	B	GET MULTIPLIER
1526 35	3366	LXI	H,HOLD8+DIGIT+1	
1527 CA 54 15	3367	DCR	M	DECREMNT LOOP COUNT
152A 0A	3368	JZ	FMUL4	FINISHED
152B 0B	3369	LDAX	B	
152C C5	3370	DCX	B	
152D 2B	3371	PUSH	B	
152E EB	3372	DCX	H	
152F 87	3373	XCHG		
1530 DA 3E 15	3374	ADD	FMUL10	
1533 CA 4C 15	3375	JC		CHECK FOR BIT IN CARRY
1536 21 FC FF	3376	JZ	FMUL11	FOUND A BIT
1539 19	3377	LXI	H,-DIGIT-1	ZERO - FINISHED THIS DIGIT
153A EB	3378	DAD	D	POINT TO NEXT HOLDING REGISTER
153B C3 2F 15	3379	XCHG		
153E 4F	3380	JMP	FMUL10	
153F B7	3381	MOV	C,A	
1540 CD 0D 14	3382	ORA	A	CLEAR CARRY
1543 1A	3383	CALL	ADD	ACCUMULATE PRODUCT
1544 86	3384	LDAX	D	
1545 27	3385	ADD	M	
1546 77	3386	DAA		
1547 79	3387	MOV	M,A	
1548 1B	3388	MOV	A,C	
1549 C3 2F 15	3389	DCX	D	
154C	3390	JMP	FMUL10	
154E CD 08	3391	ROTATE	RIGHT 1 BYTE	
154E CD A8 16	3392	MVI	B,8	
1551 C3 22 15	3393	CALL	RIGHT	
	3394	JMP	FMUL9	

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1554 3A 25 17	3395 FMU14	LDA	BUF
1557 E6 F0	3396	ANI	OF0H
1559 CA 65 15	3397	JZ	FMU17
155C 7A	3398	MOV	A,D
155D E6 F0	3399	ANI	OF0H
155F 21 27 17	3400	LXI	H,SIGN-1
1562 C3 76 15	3401	JMP	FMU18
1565 06 04	3402	MVI	B,u
1567 21 29 17	3403	LXI	H,EXP
156A 35	3404	DCR	M
156B CA FA 16	3405	JZ	UNDER
156E CD CE 16	3406	CALL	LEFT
1571 7A	3407	MOV	A,D
1572	3408	* PERFORM ROUNDING	
1572 OF	3409	RRC	
1573 OF	3410	RRC	
1574 OF	3411	RRC	
1575 OF	3412	RRC	
1576 FF 50	3413	CPI	50H
1578 DA 9A 15	3414	JC	FMU16
157B 3C	3415	INR	A
157C E6 OF	3416	ANI	OFH
157E 0E 03	3417	MVI	C,DIGIT
1580 8E	3418	ADC	M
1581 27	3419	DAA	
1582 77	3420	MOV	M,A
1583 3E 00	3421	MVI	A,0
1585 2B	3422	DCX	H
1586 0D	3423	DCR	C
1587 C2 80 15	3424	JNZ	FMU15
158A D2 04 14	3425	* CHECK FOR ROUNDING OVERFLOW	
158D 23	3426	JNC	ADS2
158E 36 10	3427	INX	H
1590 21 29 17	3428	MVI	M,10H
1593 34	3429	LXI	H,EXP
1594 C2 04 14	3430	INR	M
1597 C3 F4 16	3431	JNZ	ADS2
159A	3432	JMP	OVER
159A E6 OF	3433	* ROUNDING NOT NEEDED	
159C 86	3434	ANI	OFH
159D 77	3435	ADD	M
159E C3 04 14	3436	MOV	M,A
15A1	3437	JMP	ADS2
15A1	3438	*	
15A1	3439	* FLOATING POINT DIVISION	
15A1	3440	*	
15A1 C5	3441	FDIV	
15A2 7E	3442	PUSH	B
15A3 B7	3443	MOV	A,M
15A4 CA F4 16	3444	ORA	A
15A7 1A	3445	JZ	DIVZ
15A8 B7	3446	LDAX	D
15A9 CA FF 16	3447	ORA	A
15AC 96	3448	JZ	INSP
15AD DA B6 15	3449	SUB	M
15B0 FA F4 16	3450	JC	DIVUN
		JM	OVER

CHECK IF NORMALIZED

NORMALIZE  
GET DIGIT SHIFTED OFF

NO OVERFLOW

FETCH DIVISOR EXP  
DIVIDE BY 0?

DIVIDEND = 0?

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15B3	C3 B9 15	3451	JMP	FDI4
15B6	F2 FA 16	3452	JP	UNDER
15B9	C6 81	3453	ADI	FORM QUOTIENT EXP
15BB	32 06 17	3454	STA	EXPD
15BE	EB	3455	XCHG	D
15BF	D5	3456	PUSH	LOAD
15C0	CD 84 16	3457	CALL	D
15C3	D1	3458	POP	SIGN
15C4	EB	3459	XCHG	H
15C5	3A 28 17	3460	LDA	M
15C8	2B	3461	DCX	SIGND
15C9	AE	3462	XRA	D
15CA	32 05 17	3463	STA	B, HOLD1
15CD	EB	3464	XCHG	L, DIGIT+DIGIT
15CE	1B	3465	DCX	B
15CF	01 02 17	3466	LXI	H
15D2	2E 06	3467	MVI	C, 0
15D4	C5	3468	PUSH	QUOTIENT DIGIT = 0
15D5	E5	3469	PUSH	SET CARRY
15D6	0E 00	3470	MVI	H, BUF+DIGIT-1
15D8	37	3471	STC	B, DIGIT
15D9	21 27 17	3472	LXI	A, 99H
15DC	06 03	3473	MVI	0
15DE	3E 99	3474	MVI	M
15E0	CE 00	3475	ACI	M
15E2	EB	3476	XCHG	M, A
15E3	96	3477	SUB	H
15E4	EB	3478	XCHG	D
15E5	86	3479	ADD	B
15E6	27	3480	DAA	DIV4
15E7	77	3481	MOV	A, M
15E8	2B	3482	DCX	0
15E9	1B	3483	DCX	M, A
15EA	05	3484	DCR	H, DIGIT
15EB	C2 DE 15	3485	JNZ	D
15EE	7E	3486	MOV	C
15EF	3F	3487	CMC	DIV3
15F0	DE 00	3488	SBI	A
15F2	77	3489	MOV	ADD
15F3	1F	3490	RAR	RESTORE DIVIDEND
15F4	21 03 00	3491	LXI	H, DIGIT
15F7	19	3492	DAD	D
15F8	EB	3493	XCHG	INCREMENT QUOTIENT
15F9	OC	3494	INR	
15FA	17	3495	RAL	
15FB	D2 D8 15	3496	JNC	
15FE	B7	3497	ORA	CLEAR CARRY
15FF	CD 0D 14	3498	CALL	
1602	21 03 00	3499	LXI	
1605	19	3500	DAD	
1606	EB	3501	XCHG	
1607	C5	3502	PUSH	
1608	06 04	3503	MVI	
160A	CD CE 16	3504	CALL	
160D	C1	3505	POP	
160E	0D	3506	DCR	



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1607 E1	3507	POP	H	STORE QUOTIENT
1610 61	3508	MOV	H,C	
1611 C1	3509	POP	B	
1612 7D	3510	MOV	A,L	
1613 C2 25 16	3511	JNZ	DIV5	
1616 FE 06	3512	CPI	DIGIT+DIGIT	
1618 C2 25 16	3513	JNZ	DIV5	
161B 21 06 17	3514	LXI	H,EXPD	
161E 35	3515	DCR	M	
161F CC FA 16	3516	CZ	UNDER	
1622 C3 D2 15	3517	JMP	DIV5	
1625 1F	3518	RAR		
1626 7C	3519	MOV	A,H	
1627 D2 35 16	3520	JNC	DIV6	
162A 0A	3521	LDAX	B	
162B 07	3522	RLC		
162C 07	3523	RLC		
162D 07	3524	RLC		
162E 07	3525	RLC		
162F 84	3526	ADD		
1630 02	3527	STAX		
1631 03	3528	INX	B	
1632 C3 36 16	3529	JMP	DIV7	
1635 02	3530	STAX		
1636 2D	3531	DCR	DIV6	
1637 C2 D4 15	3532	JNZ	DIV7	
163A 21 06 17	3533	LXI	DIV4	
163D C1	3534	POP	H,EXPD	
163E CD 9D 16	3535	CALL	B	
1641 C9	3536	RET	STORO	
1642	3537	* FETCH AND ALIGN ARGUMENTS FOR		
1642 1A	3538	* ADDITION AND SUBTRACTION		
1643 96	3539	LDAX	D	
1644 0E 00	3540	SUB	M	DIFFERENCE OF EXPS
1646 D2 4D 16	3541	MVI	C,0	
1649 0C	3542	JNC	EXPC1	
164A EB	3543	INR	C	
164B 2F	3544	XCHG		
164C 3C	3545	CMA		
164D 47	3546	INR	A	
164E 1A	3547	MOV	B,A	
164F 32 29 17	3548	LDAX	D	
1652 78	3549	STA		
1653 FE 06	3550	MOV	A,B	
1658 DA 5A 16	3551	CPI	DIGIT+DIGIT	
165A 07	3552	JC	EXPC2	
165B 07	3553	MVI	A,DIGIT+DIGIT	
165C 47	3554	RLC		
165D E6 04	3555	RLC		
165F 32 2A 17	3556	MOV	B,A	
1662 C5	3557	ANI		
1663 D5	3558	STA	RCtrl	SFT ROUNDING CONTROL
1664 CD 84 16	3559	PUSH	B	
1667 3E 28	3560	PUSH	D	
	3561	CALL	LOAD	LOAD SMALLER VALU
	3562	MVI	A,8*DIGIT+16	

*Handwritten notes:*

- EXPC1 ← REMEMBER ROUNDING CONTROL
- EXPC2 ← EXCHANGE NUMBER PARTITION
- A ← INITIAL NUMBER
- B, A ← SAVE STATE ENT IN 13
- EXP ← SAVE EXPONENT
- DIGIT+DIGIT ← IS STATE OVER MAX
- A, DIGIT+DIGIT ← YES SET MAX STATE TO # OF DIGITS
- ← SAVE STATE ENT IN 14

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1669	90						SUB	B	
166A	FE	28					CPI	8	DIGIT+16
166C	CA	7E	16				JZ	EXPC3	
166F	E6	F8					ANI	OF8H	
1671	1F						RAR		
1672	1F						RAR		
1673	1F						RAR		
1674	83						ADD		
1675	5F						MOV	E, A	
1676	7A	00					MOV	A, D	
1677	CE	00					ACI	0	
1679	57						MOV	D, A	
167A	1A						LDAX	D	GET ROUNDING DIGIT
167B	32	2B	17				STA	RDIGI	SAVE
167E	CD	A8	16				CALL	RIGHT	ALIGN VALUES
1681	D1						POP	D	
1682	C1						POP	B	
1683	C9						RET		
1684	11	28	17				RET		
1687	0E	04					LXI	D, SIGN	*LOAD ARGUMENT INTO BUFFER
1689	2B						MVI	C, DIGIT+1	LOAD
168A	7E						DCX	H	
168B	12						MOV	A, M	LOAD1
168C	2B						STAX	D	
168D	1B						DCX	H	
168E	0D						DCX	D	
168F	C2	8A	16				DCR	C	
1692	AF						JNZ	LOAD1	
1693	12						XRA	A	
1694	1B						STAX	D	
1695	12						DCX	D	
1696	32	2B	17				STAX	D	
1699	C9						STA	RDIGI	ZERO ROUNDING DIGIT
169A	21	29	17				RET		
169A	21	29	17				RET		
169D	1E	05					LXI	H, EXP	* STORE RESULTS IN MEMORY
169F	7E						MVI	E, DIGIT+2	STORE
16A0	02						MOV	A, M	STOR1
16A1	0B						STAX	B	
16A2	2B						DCX	B	
16A3	1D						DCX	H	
16A4	C2	9F	16				DCR	E	
16A7	C9						JNZ	STOR1	
16A8							RET		
16A8	0E	04					RET		
16A8	21	24	17				RET		
16A8	21	24	17				RET		
16AD	78						MVI	C, DIGIT+1	* SHIFT RIGHT NUMBER OF DIGITS
16AE	D6	08					LXI	H, BUF-1	* IN B/4
16B0	D2	C4	16				MOV	A, B	RIGHT
16B3	05						SUI	8	
16B4	F8						JNC	RIGH3	
16B5	B7						DCR	B	CHECK IF BYTE CAN BE SHIFTED
16B6	7E						RM		
16B7	1F						ORA	A	
16B7	1F						MOV	A, M	
16B7	1F						RAR		

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16B8 77	MOV	M, A
16B9 23	INX	H
16BA 0D	DCR	C
16BB C2 B6 16	JNZ	RIGHT
16BE C3 A8 16	JMP	RIGHT
16C1 47	* SHIFT RIGHT ONE BYTE	
16C1 47	MOV	B, A
16C2 AF	XRA	A
16C3 56	MOV	D, M
16C4 77	MOV	M, A
16C5 7A	MOV	A, D
16C6 23	INX	H
16C7 0D	DCR	C
16C8 C2 C3 16	JNZ	RIGHT
16CB C3 A8 16	JMP	RIGHT
16CE	* SHIFT LEFT NUMBER OF DIGITS	
16CE	* IN B/4	
16CE 0E 04	MVI	C, DIGIT+1
16D0 21 27 17	LXI	H, SIGN-1
16D3 78	MOV	A, B
16D4 D6 08	SUI	8
16D6 D2 E7 16	JNC	LEF3
16D9 05	DCR	B
16DA F8	RM	
16DB B7	ORA	A
16DC 7E	MOV	A, M
16DD 17	RAL	
16DE 77	MOV	M, A
16DF 2B	DCX	H
16E0 0D	DCR	C
16E1 C2 DC 16	JNZ	LEF2
16E4 C3 CE 16	JMP	LEFT
16E7 47	* SHIFT LEFT ONE BYTE	
16E7 47	MOV	B, A
16E8 AF	XRA	A
16E9 56	MOV	D, M
16EA 77	MOV	M, A
16EB 7A	MOV	A, D
16EC 2B	DCX	H
16ED 0D	DCR	C
16EE C2 E9 16	JNZ	LEF4
16F1 C3 CE 16	JMP	LEFT
16F4	* SET FLAGS FOR OVERFLOW, UNDERFLOW,	
16F4	* AND DIVIDE BY ZERO	
16F4 01 50 46	OVER	B, 'PP'
16F7 C3 C5 00	JMP	ERROR
16FA 3E FF	UNDER	A, -1
16FC 32 23 17	MVI	ERRI
16FF 33	INX	SP
1700 33	INX	SP
1701 C9	RET	
1702	EQU	OVER
1702	* FLOATING POINT RAM	
1702	* DS	DIGIT+1
1702	HOLD	

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1706	3675	HOLD2	DS	DIGIT+1
170A	3676	HOLD3	DS	DIGIT+1
170E	3677	HOLD4	DS	DIGIT+1
1712	3678	HOLD5	DS	DIGIT+1
1716	3679	HOLD6	DS	DIGIT+1
171A	3680	HOLD7	DS	DIGIT+1
171E	3681	HOLD8	DS	DIGIT+1
1722	3682		DS	↑
1723	3683	ERRI	DS	↑
1724	3684		DS	↑
1725	3685	BUF	DS	DIGIT WORKING BUFFER
1728	3686	SIGN	DS	SIGN BIT
1729	3687	EXP	DS	EXPONENT
172A	3688	CTRL	DS	ROUNDING CONTROL FLAG 1=MSD
172B	3689	DIGI	DS	ROUNDING DIGIT
172C	3690	SIGND	EQU	HOLD1+DIGIT
172C	3691	EXPD	FQU	HOLD1+DIGIT+1
172C	3692	*		
172C	3693	*		
172C	3694	*		
172C	3695	EROM	DS	0
172C	3696		DS	100
1790	3697	CMNDSP	DS	0
1790	3698	PHEAD	DS	1
1791	3699	RELTYP	DS	1
1792	3700	NULLCT	DS	1
1793	3701	ARGF	DS	1
1794	3702	DIRF	DS	1
1795	3703	TXA	DS	2
1797	3704	CSTKSZ	DS	100
1797	3705	ASTKSZ	EQU	FPSIZ*LINLEN/2
1797	3706	CSTKL	EQU	CSTKSZ
1797	3707	ASTKL	DS	ASTKSZ
18B1	3708	R1XA	DS	2
18B3	3709	STA	DS	2
18B5	3710	CSTKA	DS	2
18B7	3711	SINK	DS	FPSIZ-1
18BB	3712	FPSINK	DS	1
18BC	3713		DS	FPSIZ-1
18C0	3714	FTEMP	DS	1
18C1	3715		DS	FPSIZ-1
18C5	3716	FTEM1	DS	1
18C6	3717		DS	FPSIZ-1
18CA	3718	FTEM2	DS	1
18CB	3719		DS	FPSIZ-1
18CF	3720	FRAND	DS	1
18D0	3721	IBCNT	DS	1
18D1	3722	IBLN	DS	2
18D3	3723	IBUF	DS	LINLEN
191C	3724	ASTKA	DS	2
191E	3725	MATA	DS	2
1920	3726	ADDS	DS	2
1922	3727	ADDT	DS	2
1924	3728	BCADD	DS	2
1926	3729	OPST	DS	1
1927	3730	OPSTR	DS	1

SYSTEM RAM

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1928	3734	ECNT	DS	1	
1929	3732	FSIGN	DS	1	
192A	3733	BC	DS		DIGIT+2
192F	3734	ABUF	DS		DIGIT*2+2
1937	3735	XSIGN	DS	1	
1938	3736	EXPO	DS	4	
1939	3737	FES	DS	1	
193A	3738	INFES	DS	1	
193B	3739	MAXL	DS	2	
193D	3740	INSA	DS	2	
193F	3741	*			VDM GLOBAL
193F	3742	*			VDM GLOBAL
193F	3743	*			VDM GLOBAL
1940	3744	BRKCHR	DS	1	BREAK CHR STORAGE
1941	3745	CLN	DS	1	CURRENT SCREEN LINE NUMBER
1942	3746	CCP	DS	1	CURRENT CURSOR POSITION
1943	3747	CURF	DS	1	CURSOR DISPLAY SWITCH
1944	3748	BOSL	DS	1	BEGINNING OF SCREEN LINE
1945	3749	BOTL	DS	1	BOTTOM OF SCREEN LINE
1945	3750	*			
1945	3751	VDMDEV	EQU	0C8H	VDM PORT ADDRESS FOR SCROLL CONTROL
1945	3752	VDMBASE	EQU	0CC00H	VDM SCREEN MEMORY ADDRESS
1945	3753	VDMPAGE	EQU	VDMBASE/256	
1945	3754	SPEED	DS	1	
1946	3755	*			
1946	3756	*			SPECIAL INTERFACE GLOBAL
1946	3757	*			SPECIAL INTERFACE GLOBAL
1946	3758	CALLST	DS	6	
194C	3759	CALLA	DS	2	
194E	3760	EOFA	DS	2	END OF FILE ADDRESS
1950	3761	BOFA	DS	2	START OF FILE ADDRESS
1952	3762	MEMTOP	DS	2	STORAGE FOR LAST ASSIGNED MEMORY LOCATION
1954	3763	*			
1954	3764	*			