

BASIC
(REV. B)

BINARY TAPE	20392-60001
SOURCE TAPES	20392-80001
	20392-80002
	20392-80003
	20392-80004
	20392-80005
	20392-80006
	20392-80007
	20392-80008
	20392-80009
	20392-80010
	20392-80011
SOURCE LISTING	20392-90001

ASMB,A,B,L,T

BASIC LANGUAGE -- JANUARY 1, 1970

0001	
PREAD	000101
WRITE	000102
PUNCH	000103
REED	000104
LWBH	000106
FHAM	000110
LHAM	000111
PBUFF	000112
PBPTR	000113
FHABP	000114
FCORE	000115
SYMTF	000116
SYMTA	000117
LSTAK	000120
ASBTB	000121
SBTDE	000122
IHOFF	000123
IMON	000124
TLINK	000125
PLSTR	000126
LISTR	000127
TLSTR	000130
.BUFA	000131
BADDR	000132
CCNT	000133
SBUFA	000134
SBPTR	000135
TFLAG	000136
TTYFL	000137
TSTPT	000140
LSTPT	000141
HSTPT	000142
PRADD	000143
NXTST	000144
.LNUM	000145
TYPE	000146
DBTRY	000147
NXTDT	000150
DCCNT	000151
RSYM	000152
SIGN	000153
EXP	000154
XH	000155
XL	000156
TEMPS	000157
MLAX1	000171
B1	000173
B2	000175
B3	000177
START	000201
RUNA	000202
FAGE3	000203
PEXMA	000204
RDYDA	000205
DRQSA	000206

LI8YA	000207
MAJA	000210
EMATA	000211
TORCH	000212
FNDPA	000213
CN8TA	000214
NUMCA	000215
INCHK	000216
ENOTA	000217
NUNDA	000220
POINT	000221
OUTIA	000222
OUTSA	000223
OUTLA	000224
OUTCA	000225
GETCA	000226
DIGCA	000227
LETCA	000230
88YMA	000231
FETCA	000232
FORMA	000233
.LOGA	000234
.EXPA	000235
.FADA	000236
.F88A	000237
.FMFA	000240
.FDVA	000241
ARINA	000242
MPYA	000243
FLUNA	000244
PACKA	000245
FLT	000246
IFIXA	000247
PRNIA	000250
CHR8A	000251
ACCST	000252
DEL8T	000253
FDAT	000254
LCK2A	000255
XEC4A	000256
F8C1A	000257
FOR1A	000260
FOR0A	000261
FOR0B	000262
FOR1B	000263
FR12A	000264
EOF	000265
NOEOF	000266
E6H1A	000267
E8YN3	000270
F8CEF	000271
E6H1A	000272
EDUFA	000273
EBFA	000274
L8UFA	000275
LNBFA	000276

ERBS	000277
REGER	000300
FOPBS	000301
STBAS	000302
XECBR	000303
ARBAS	000304
PDFBS	000305
TBLAD	000306
STTYP	000307
MATIO	000310
MCBOP	000311
PDFNS	000312
MATFN	000313
ANEXT	000314
ADATA	000315
ATHEN	000316
ATO	000317
ASTEP	000320
ANOT	000321
ATAB	000322
MBXL	000323
.1	000324
.2	000325
.3	000326
.4	000327
.6	000330
.7	000331
.8	000332
.9	000333
.10	000334
.12	000335
.15	000336
.23	000337
.26	000340
.27	000341
.28	000342
.30	000343
.31	000344
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.33	000346
.34	000347
.37	000350
.40	000351
.41	000352
.43	000353
.45	000354
.46	000355
.47	000356
.48	000357
.49	000360
.58	000361
.63	000362
B100	000363
E	000364
F	000365
.72	000366

.74	000367
.75	000370
N	000371
8	000372
0133	000373
0177	000374
0200	000375
H0K0	000376
0400	000377
0770	000400
H0K1	000401
01000	000402
02000	000403
03000	000404
0CCNT	000405
04000	000406
LF	000407
01400	000410
UNHNC	000411
02200	000412
02300	000413
DEFOP	000414
RENOP	000415
RDOP	000416
TENTH	000417
OPH0K	000420
H0K4	000421
INF	000422
TYPFL	000423
TABCN	000424
OPDNK	000425
RHODE	000426
UNNRM	000427
HIM0K	000430
M1	000431
M2	000432
M3	000433
M4	000434
M5	000435
M6	000436
M7	000437
M8	000440
M9	000441
M10	000442
M11	000443
M15	000444
M16	000445
M21	000446
M25	000447
M32	000450
D53	000451
D72	000452
D100	000453
M72	000454
M73	000455
M76	000456

D133	000457
M256	000460
M310	000461
M1000	000462
MAXSN	000463
MSK3	000437
FN	000464
QMARK	000465
HALF	000466
HONE	000466
MNEG	000470
FLGBT	000470
MAXFX	000472
MINFX	000474
BLANK	000476
ERROR	000477
MVTOH	000554
MVTO1	000556
CONST	000567
CONS1	000602
CONS2	000605
CONS3	000611
SYE12	000614
NUMCK	000615
NUMC1	000626
NUMC2	000634
NUMC3	000652
NUMC4	000657
NUMC5	000664
NUMC6	000703
NUMC7	000706
NUMER	000716
NUMC8	000725
NUMC9	000727
NUM10	000751
NUM12	000755
NUM13	000772
NUM14	000776
NUM15	001005
.PACK	001020
PACK1	001040
PACK3	001073
UNDER	001074
PACK4	001077
OVRER	001100
OVFLW	001103
NORML	001113
NORM1	001125
NORM2	001127
NORM3	001130
MBY10	001147
DBY10	001200
MPY	001236
MPY1	001256
MPY2	001271
SYNCK	001274

SYMC1	001302
SYMC2	001312
FND5B	001323
FND51	001326
CALER	001330
MDIM	001336
HER9	001352
SBFIX	001353
IFIX	001364
IFIX1	001404
IFIX2	001410
IFIX3	001414
ARINV	001423
ARIN1	001442
ARIN2	001452
.FLUN	001456
SLWST	001467
E1	001473
BHSTP	001476
STTOP	001505
OPCHK	001515
E8	001526
OPCH1	001527
R3CHK	001536
DI0CK	001570
LETCK	001603
GETCR	001614
BCKSP	001633
ENDUT	001643
EDELN	001656
EDEL1	001660
OUTLN	001677
OUTCR	001715
TEMP	000160
TEMP1	000161
TEMP2	000162
TEMP3	000163
TEMP4	000164
COUNT	000165
STEMP	000163
HANT1	001274
HANT2	001336
EXPON	001603
DPFLG	001633
ARYAD	001715
EOL	000567
FINBP	001734
RDYA	002000
READY	002001
LFEEB	002004
QHRKA	002005
STOPA	002006
CMNDA	002007
ENTRY	002010
FLUSH	002020
RDYPT	002027

PEXMK	002041
DATAI	002046
GTNCD	002056
RPRCS	002064
RTLE	002066
RBOUT	002115
DRQST	002121
CKRCD	002126
INVSC	002137
CMNDS	002146
RUN	002146
SCRTH	002150
TLIST	002151
PLIST	002153
PTAPE	002160
PRERR	002170
EOTR	002174
STOP	002200
TAPE	002214
BYEC	002216
SYNTAX	002220
SYNE1	002236
SYNT1	002247
QUOTE	002257
COMMA	002261
SMCLN	002263
RPARN	002265
RBRAC	002267
SCNMA	002271
ASSOP	002273
PLUS	002275
MINUS	002277
TIMES	002301
DIV	002303
EXPS	002305
QTR	002307
LSS	002311
UNEQL	002313
EQUAL	002315
UNMIN	002317
LBRAC	002321
LPARN	002323
UPLUS	002325
OROP	002327
MSFLG	002330
ANDOP	002331
DFLAG	002332
NOTOP	002333
PFLAG	002334
GTREQ	002335
UFLAG	002336
LSSEQ	002337
LETS	002340
SYNE2	002346
EOST	002346
DINS	002351

COMS	002355
SYNE3	002361
COMS1	002363
DEFS	002374
SYNE4	002405
SYNE5	002420
SYNE6	002424
REMS	002434
IFS	002437
SYNE7	002445
OOT08	002445
FORS	002450
SYNE8	002452
SYNE9	002465
SYE10	002500
NXT8	002502
END8	002506
WAIT6	002512
CALL8	002514
CALL2	002532
SYE11	002540
CALL3	002543
DATA8	002547
READ8	002557
SYE13	002561
PRIN1	002573
PRINS	002577
PRIN2	002604
SYE14	002613
PRIN3	002623
SYE15	002625
PRIN4	002647
PRIN5	002651
MAT8	002654
SYE16	002656
SYE17	002671
MAT80	002673
SYE18	002702
MAT81	002710
MAT82	002722
SYE19	002755
SYE20	002775
MAT83	002776
SYE21	003007
MAT84	003010
SYE22	003020
MAT85	003024
SYE23	003041
MAT86	003045
SYE24	003057
MAT87	003061
SYNT8	003067
F8C	003114
F8C1	003117
F8C2	003121
F8C3	003146

FSC4	003162
FSC5	003170
FSC6	003201
FSC7	003210
FSC8	003227
FSC9	003253
FSC10	003255
FSC11	003261
FSC12	003271
FSC13	003275
FSC14	003301
MCBCK	003304
FSC15	003305
MCBCK	003317
FPOP	003322
FRCUR	003330
SSOV	003353
FSC16	003371
SBSC1	003401
SBSC2	003403
SBSC3	003436
SBSC4	003436
SBSC5	003450
SBSC6	003473
ARRYS	003530
ARRE1	003534
ARRID	003544
ARRE2	003547
VAROP	003556
VAR01	003600
VAR02	003604
VAR03	003616
VAR04	003620
VAR05	003624
LTR	003635
STROP	003650
LPCK	003661
RPCK	003671
MATSB	003704
GETPF	003734
NUMOP	003744
SYCMD	003755
STCMD	003776
LET	004006
DIM	004011
COM	004014
DEF	004017
REM	004022
GOTO	004025
IF	004030
FOR	004032
NEXT	004035
GOSUB	004040
RTRN	004044
END	004050
STP	004053
WAIT	004056

CALL	004061
DATA	004064
READ	004067
PRINT	004072
INPUT	004076
RSTOR	004102
MAT	004107
THEN	004112
TO	004115
STEP	004117
NOT	004122
AND	004125
OR	004130
GTE	004132
LTE	004134
AUNEQ	004136
TAB	004140
SIN	004143
COS	004146
TAN	004151
ATN	004154
EXPN	004157
LOG	004162
ABS	004165
SQR	004170
INT	004173
RND	004176
SGN	004201
ZER	004204
CON	004207
IDN	004212
INV	004215
TRN	004220
T00RH	004223
T0RC1	004246
T0RC2	004262
T0R10	004265
T0RC3	004271
T0RC4	004276
T0RC5	004304
T0RC6	004310
T0RC7	004313
T0RC8	004321
T0RC9	004326
PRGIN	004333
8YE25	004344
PRG11	004346
INTCK	004351
INTC1	004354
INTC2	004373
CHR8T	004410
CHR81	004414
CHR82	004432
CHR83	004433
DL8TH	004437
ACT8T	004447

ACCS1	004472
ACCS2	004474
ACCS3	004477
ACCS4	004507
FNDP0	004513
FNDP1	004516
FNDP2	004533
FNDP3	004534
FNDP4	004535
CLPR6	004537
CLPR1	004544
CLPR2	004553
OVCHK	004556
LIST	004572
LIST0	004607
LIST1	004614
LIST3	004635
LIST2	004640
LIST4	004644
LIST5	004670
LIST6	004703
LIST7	004710
LIST8	004725
LIST9	004732
LIST10	004751
LIST11	004765
LIST12	004772
LIST13	005003
LIST14	005011
OUTIN	005010
OUT11	005024
OUT12	005043
OUT13	005046
OUTST	005085
OUTS1	005056
MCOUT	005077
MCOU1	005100
MCOU2	005112
MCOU3	005120
LDVSR	005132
SFLAG	003530
TABLE	004333
LNGTH	000167
SMEND	004351
SENG	004556
TBLPT	004513
TSPTK	004537
INTGR	004556
LFLAG	004333
DIVSR	004351
LDZRO	004556
HIND	004513
MFASE	005137
MLOP1	005151
MLO10	005161
MLO12	005176

MLOP13	005202
MLOP2	005211
MLOP3	005244
MLOP4	005261
MER3	005264
MLOP5	005272
MLOP6	005301
MER4	005312
MLOP7	005320
MLOP8	005335
MLOP9	005370
MLOP9	005373
MER5	005377
M1LOP	005407
MER6	005413
M2LOP	005414
MER10	005431
M3LOP	005445
MER7	005464
M4LOP	005466
STDIM	005500
EGYHT	005501
MER8	005512
M8YMT	005522
M8YM	005541
M8UP	005543
MBOX1	000107
MBIN1	001467
MBIN2	001536
MPTR	000135
MNPTR	001515
COHL	000170
MWDNO	000171
DIGCT	005522
FORMX	005544
FORM1	005547
FORM2	005567
FORM0	005612
FOR11	005617
FOR10	005626
FORM4	005636
FORM5	005645
FORM6	005651
FOR12	005714
FORM7	005726
FORM9	005751
XECT8	005701
XEC	006006
XEC2	006025
XEC4	006044
XEC5	006054
XEC6	006055
FETCH	006064
SETDP	006074
STBRH	006105
STSR1	006110

STSR2	006124
FDATA	006126
FDAT1	006127
E4	006135
FDAT2	006137
FLWBT	006147
FVSRH	006163
FVSR1	006173
FVSR2	006201
ELET	006203
EGOTO	006205
EIF	006210
EFOR	006216
EFOR1	006230
EFOR2	006263
EFOR3	006274
ENEXT	006312
ENEX1	006333
ENEX2	006340
ENEX3	006347
EGOSB	006353
E2	006363
ERTRN	006364
E3	006367
EWAIT	006373
EWAI1	006404
ECALL	006412
ECAL1	006423
ECAL2	006431
EREAD	006441
PRNIN	006456
EPRIN	006474
EPRI0	006477
EPRI1	006502
EPRI2	006510
EPRI3	006527
EPRI4	006536
EPRI5	006542
EPRI6	006556
EPRI7	006565
EPRI8	006603
ETAB	006605
ETAB1	006627
IENTA	006631
EINP1	006632
EINP2	006634
EINPT	006643
EINP3	006652
ERSTR	006656
AROTB	006663
BINOP	006707
BINO1	006717
BINO2	006720
ESCHA	006722
ESCM1	006747
E6	006760

ESBS	006771
EOTR	007002
ESTR1	007007
ESTR2	007022
EFAD	007026
EFBS	007031
EFMP	007034
FDV	007037
EPNR	007042
RPNR	007054
BASER	007057
EPNR1	007060
IPNR	007073
IPNR1	007103
IPNR2	007107
IPNR5	007117
IPNR3	007124
IPNR4	007135
PCHK	007144
POWER	007153
ZRTN0	007156
PCHK1	007161
EOTRT	007164
ELST	007171
EEOL	007176
EEOL1	007200
EGORE	007203
ELORE	007210
ENEOL	007215
ENEQ1	007217
FALSE	007221
TRUE	007224
EUMIN	007227
ELORC	007232
EOR	007240
ORS	007242
ORS1	007244
EAND	007246
ANDS	007250
ENOT	007253
ADHUP	007257
ADHU1	007261
ADHU2	007302
ADHU3	007313
ADHU4	007334
ADHUB	007337
.FAD	007343
.FSB	007347
.FSB1	007362
UNPAK	007366
.FMP	007416
.FDV	007463
.FDV1	007543
.FDV2	007546
DBYZR	007547
IDIV	007552

IDIV1	007577
IDIV2	007601
SYMT	007620
SYMT1	007640
SYMT2	007647
SYMT4	007667
SYMT3	007674
ERR	007701
RCERR	010001
EBUFF	010007
EBFF	010013
LBUFF	010015
LNBFF	010022
PDFT	010024
NUM0T	010040
NS1	010052
NS2	010055
NUM01	010101
NUM02	010110
NUM05	010127
NUM03	010135
EOUT2	010153
EOUT3	010164
EOUT4	010175
EOUT6	010213
EOUT5	010217
EOUT7	010223
EOUT8	010227
ERND1	010242
ERND2	010262
ERND3	010276
EOUT1	010303
EOUT9	010333
EOU10	010340
GETDG	010344
RETCR	010370
A1	006074
A2	006105
C1	006147
C2	006163
ETAN	010406
TRGER	010420
BOTH1	010441
ELSE1	010467
ELSE2	010472
FOPI	010475
K1	010477
XTEMP	010501
YTEMP	010503
UTEMP	010505
K2	010507
COEFF	010511
EATN	010532
BTH1	010546
ELS1	010576
ELS2	010601

EL63	010604
PIDY2	010611
MP2	010613
COEF	010615
EAB8	010642
EC08	010645
ESIN	010647
PAST	010702
TOP1	010717
NM4	010721
COEF1	010723
ERND	010736
ESOR	010768
SORER	010771
BTH2	011008
SBOX	011032
ODD	011034
SA1	011045
SA2	011047
SB1	011051
SB2	011053
EINT	011055
EINT1	011065
ELOG	011070
.LOG	011072
LOGGER	011077
.LOG1	011150
LNZR	011151
R22	011154
LE2	011156
AAA	011160
MB	011162
CCC	011164
ESON	011166
EEXP	011177
.EXP	011201
INTE	011274
ZERE	011276
.EXP1	011301
EXPER	011305
M124	011310
.244	011311
AAAA	011312
BBBB	011314
CCCC	011316
DDDD	011320
L2E	011322
.CHEB	011324
LOPC	011343
COUT	011371
X2TMP	011401
ATMP	011403
BTMP	011405
CTMP	011407
DTMP	011411
.IENT	011413

FLOAT	011432
.PNR2	011440
.RET	011454
TT1	007463
TT2	007552
TT3	000163
TT4	000164
FFLAG	011032
EMAT	011456
EMAT1	011471
EMAT2	011535
EMAT3	011540
EMAT4	011555
EMAT5	011561
EMAT6	011600
EMAT7	011610
EMAT8	011622
EMAT8	011626
EMAT9	011662
LHAP	011666
LBABE	011667
EMA10	011701
EMA11	011711
EMA12	011725
REDIM	011732
REDI1	011746
E7	011766
MCK3	011767
GENER	012000
GEN2	012004
LOOP	012013
MOD1	012017
MOD2	012025
COMPR	012032
LERR	012035
LCHK2	012040
LCHK1	012051
LCHK4	012061
LCHK6	012067
LCHK5	012100
ADD	012103
ADD1	012105
SUB	012116
REPLC	012123
REPL1	012130
SMULT	012137
LCON	012145
LCON1	012150
LCON2	012161
SZER	012170
LIDN	012176
LIDN1	012216
.OLD	012230
.DST	012240
GETAD	012250
GET	012253

ADRES	012264
TINY	012265
TRAN	012266
TRAN1	012362
LNEXT	012364
MULT	012331
MULT4	012361
MULT3	012366
MULT2	012374
LINV	012441
LIN11	012562
LIN10	012522
LINV1	012535
LINV2	012551
LINV7	012571
LINV8	012602
LINV3	012626
LDUM1	012704
LINV6	012716
LIN12	012733
LIN13	012740
LIN14	012752
LINV4	012760
LINV5	013006
LIN15	013033
LIN16	013040
LIN17	013062
LWHR	013067
LWHR2	013101
T1	013113
T2	013114
T3	013115
T4	013116
T5	013117
T6	013120
T7	013121
T8	013122
T9	013123
T10	013124
T11	013125
T12	013126
T13	013127
T16	013130
T18	013132
T19	013133
LPIV	013134
LPLUS	013135
LMIN	013137
LYIME	013140
INCB2	013141
FINIS	013142
** NO ERRORS*	

0001		ASPB,A,B,L,T	BASIC LANGUAGE -- JANUARY 1, 1970
0003	00077	ORG 77B	
0004		SUP PRESS MULTIPLE OPERAND PRINTING	
0005	00077 102077	HLT 77B	CHANGED TO JSB 107B,1 BY 'BOSS'
0006*			
0007**	ENTRY POINT FOR CONFIGURED BASIC		
0008*			
0009	00100 124201	JMP START,I	
0010*			
0011	00101 000000	PREAD BSS 1	PHOTO READER LINK
0012	00102 000000	WRITE BSS 1	TTY OUTPUT LINK
0013	00103 000000	PUNCH BSS 1	PUNCH LINK
0014	00104 000000	REED BSS 1	KEYBOARD LINK
0015	00105 002200	DEF STOP	STOP LINK
0016	00106 000000	LWEM BSS 1	LAST WORD OF AVAILABLE MEMORY
0017	00107 000000	BSS 1	'BOSS' DRIVER LINKAGE
0018	00110 013142	FWAM DEF FINIS	FIRST WORD OF AVAILABLE MEMORY
0019	00111 000000	LWAM BSS 1	LAST WORD OF AVAILABLE MEMORY
0020	00112 000000	PBUFF BSS 1	FIRST WORD OF USERS PROGRAM
0021	00113 000000	PBPTR BSS 1	LAST WORD+1 OF USER'S PROGRAM
0022	00114 001734	FWABP DEF FINBP	FIRST WORD AVAILABLE BASE PAGE
0023	00115 000000	FCORE BSS 1	START OF FREE CORE
0024	00116 000000	SYMTF BSS 1	START OF SYMBOL TABLE
0025	00117 000000	SYMTA BSS 1	SYMBOL TABLE END
0026	00120 000000	LSTAK BSS 1	LOW-CORE STACK ADDRESS
0027	00121 013142	ASBTD DEF FINIS	START OF CALL LINKAGE TABLE
0028	00122 013142	SBTDE DEF FINIS	LAST WORD +1 OF CALL TABLE
0029	00123 000000	IMOFF BSS 1	LINK TO INTERRUPT OFF
0030	00124 000000	IMCN BSS 1	LINK TO INTERRUPT ON
0031	00125 000000	TLINK BSS 1	TTY INTERRUPT LINK
0032	00126 100103	PLSTR DEF PUNCH,I	
0033	00127 100102	LISTR DEF WRITE,I	LIST DEVICE REFERENCE JSB,I
0034	00130 100102	TLSTR DEF WRITE,I	
0035	00131 000000	.BUFA BSS 1	I/O BUFFER ADDRESS
0036	00132 000000	BADDR BSS 1	I/O BUFFER
0037	00133 000000	CCNT BSS 1	POINTERS
0038	00134 000000	SBUFA BSS 1	SYNTAX BUFFER ADDRESS
0039	00135 000000	SBPTR BSS 1	SYNTAX BUFFER POINTER
0040	00136 000000	TFLAG BSS 1	
0041	00137 000000	TTYFL BSS 1	
0042	00140 000000	TSTPT BSS 1	TEMPORARY STACK POINTER
0043	00141 000000	LSTPT BSS 1	LOW-CORE STACK POINTER
0044	00142 000000	HSTPT BSS 1	HIGH-CORE STACK POINTER
0045	00143 000000	PRADD BSS 1	PROGRAM EXECUTION
0046	00144 000000	NXTST BSS 1	SEQUENCING INFORMATION
0047	00145 000000	.LAUM BSS 1	CURRENT LINE NUMBER
0048	00146 000000	TYPE BSS 1	CURRENT STATEMENT TYPE
0049	00147 000000	DSTRT BSS 1	DATA
0050	00150 000000	NXTDT BSS 1	STATEMENT
0051	00151 000000	DCCNT BSS 1	POINTERS
0052	00152 000000	RSYM BSS 1	
0053	00153 000000	SIGN BSS 1	
0054	00154 000000	EXP BSS 1	
0055	00155 000000	XH BSS 1	RANDOM
0056	00156 000000	XL BSS 1	VARIABLE
0057	00157 000000	TEMPS BSS 12	TEMPORARIES

PAGE 0020 #01 BASE PAGE LINKS AND CONSTANTS

0058	00171		HL0X1	EOU	TEMP8+10
0059	00173	000000	01	038	2
0060	00175	000000	02	038	2
0061	00177	000000	03	038	2

PAGE 0021 #01 BASE PAGE LINKS AND CONSTANTS

0003	00201	002010	START DEF ENTRY	INITIATE BASIC SYSTEM
0004	00202	005137	RUNA DEF MFASE	PHASE 2: BUILD SYMBOL TABLE
0005	00203	006006	FASE3 DEF XEC	PHASE 3: PROGRAM EXECUTION
0006	00204	002041	PEXMA DEF PEXMK	RETURN TO MONITOR FROM SYNTAX
0007	00205	002027	RDYDA DEF RDYPT	RETURN TO MONITOR FROM PHASE 3
0008	00206	002121	DRGSA DEF DRGST	REQUEST INPUT DATA
0009	00207	004572	LISTA DEF LIST	LIST OR PUNCH PROGRAM
0070	00210	004110	MATA DEF MAT+1	MAT ENTRY IN PRINT-NAME TABLE
0071	00211	011456	ENATA DEF EMAT	FIRST WORD OF MATRIX EXECUTION
0072	00212	004223	TSRCH DEF TBSRM	SEARCH PRINT-NAME TABLE
0073	00213	004513	FNDPA DEF FNDPS	LOCATE STATEMENT SPECIFIED BY #
0074	00214	000567	CNSTA DEF CONST	SIGNED ASCII TO BINARY
0075	00215	000615	NUMCA DEF NUMCK	UNSIGNED ASCII TO BINARY
0076	00216	004351	INCHK DEF INTCK	ASCII TO INTEGER CONVERSION
0077	00217	001643	ENCTA DEF ENOUT	SIGNED BINARY NUMBER TO ASCII
0078	00220	010040	NUMOA DEF NUMOT	UNSIGNED BINARY NUMBER TO ASCII
0079	00221	004333	PGINT DEF PRGIN	FETCH PROGRAM INTEGER
0080	00222	005015	OUTIA DEF OUTIN	INTEGER TO ASCII CONVERSION
0081	00223	005055	OUTSA DEF OUTST	STRING TO BUFFER
0082	00224	001677	OUTLA DEF OUTLN	DUMP PRINT BUFFER WITH CR/LF
0083	00225	001715	OUTCA DEF OUTCR	PUT CHARACTER INTO PRINT BUFFER
0084	00226	001614	GETCA DEF GETCR	FETCH NEXT NON-BLANK CHARACTER
0085	00227	001870	DIGCA DEF DIGCK	SEE IF CHARACTER IS A DIGIT
0086	00230	001803	LETCA DEF LETCK	SEE IF CHARACTER IS A LETTER
0087	00231	007620	SSYMA DEF SSYMT	SEARCH SYMBOL TABLE FOR SYMBOL
0088	00232	006064	FETCA DEF FETCH	EVALUATE FORMULA & RETURN VALUE
0089	00233	006544	FORMA DEF FORMX	EVALUATE FORMULA
0090	00234	011072	.LOGA DEF .LOG	TAKE NATURAL LOG OF ARGUMENT
0091	00235	011201	.EXPA DEF .EXP	COMPUTE EXPONENTIAL OF ARGUMENT
0092	00236	007343	.FADA DEF .FAD	FLOATING ADD
0093	00237	007347	.FSBA DEF .FSB	FLOATING SUBTRACT
0094	00240	007416	.FMFA DEF .FMP	FLOATING MULTIPLY
0095	00241	007463	.FDVA DEF .FDV	FLOATING DIVIDE
0096	00242	001423	ARINA DEF ARINV	NEGATE FLOATING NUMBER
0097	00243	001236	MPYA DEF MPY	INTEGER MULTIPLY
0098	00244	001456	FLLNA DEF .FLUN	UNPACK FLOATING NUMBER
0099	00245	001020	PACKA DEF .PACK	PACK FLOATING NUMBER
0100	00246	011432	FLT DEF FLOAT	16-BIT INTEGER TO FLOATING
0101	00247	001364	IFIXA DEF IFIX	FLOATING TO INTEGER (TRUNCATION)
0102	00250	006456	PRNIA DEF PRNIN	INITIALIZE PRINT BUFFER
0103	00251	004410	CHRSA DEF CHRST	
0104	00252	004447	ACCST DEF ACTST	
0105	00253	004437	DELST DEF DLSTM	
0106	00254	006126	FDAI DEF FDATA	
0107	00255	012045	LCK2A DEF LCHK2	
0108	00256	006044	XEC4A DEF XEC4	
0109	00257	003317	FSC1A DEF FSC14	
0110	00260	005547	FOR1A DEF FORM1	
0111	00261	000612	FORMA DEF FORM0	
0112	00262	000617	FOR0B DEF FOR11	
0113	00263	006626	FOR1B DEF FOR10	
0114	00264	005714	FR12A DEF FOR12	
0115	00265	014477	EOF JSB ERROR	
0116	00266	014477	NOEOF JSB ERROR	
0117	00267	001525	E0M1A DEF E0-1	
0118	00270	002360	ESYN3 DEF SYNE3-1	

PAGE 0022 001 BASE PAGE LINKS AND CONSTANTS

0110	00271	003401	F8CEF	DEF	F8CE4
0100	00272	000707	EGM1A	DEF	EG-1
0121	00273	010007	EDLFA	DEF	EDUFF
0122	00274	010012	EBFA	DEF	EBFF-1
0123	00275	010015	LDUFA	DEF	LDUFF
0124	00276	010021	LNDFA	DEF	LNDFF-1
0125	00277	007700	ER08	DEF	ERR-1
0126	00300	000100	RECER	DEF	RCERR-ERR
0127	00301	000255	POP08	DEF	QUOTE-2
0128	00302	103038	ST0A8	DEF	SYNT0-26,1
0129	00303	100727	XEC0R	DEF	XECT0-26,1
0130	00304	100655	AR0A8	DEF	AROT0-6,1
0131	00305	010023	PDF08	DEF	PDFT-1
0132	00306	003755	TRLAD	DEF	SYCMD
0133	00307	004006	BTYP	DEF	LET
0134	00310	004067	HATIO	DEF	READ
0135	00311	004126	MC00P	DEF	AND
0136	00312	004143	PBPNS	DEF	SIN
0137	00313	004204	HATFN	DEF	ZER
0138	00314	004035	ANEXT	DEF	NEXT
0139	00315	004064	ADATA	DEF	DATA
0140	00316	004112	ATHEN	DEF	THEN
0141	00317	004115	ATO	DEF	TO
0142	00320	004117	ASTEP	DEF	STEP
0143	00321	004122	ANCT	DEF	NOT
0144	00322	004140	ATAB	DEF	TAB
0145	00323	000171	MBXL	DEF	MLBX1

PAGE 0023 #01 BASE PAGE LINKS AND CONSTANTS

0147	00324	000001	.1	DEC 1
0148	00325	000002	.2	DEC 2
0149	00326	000003	.3	DEC 3
0150	00327	000004	.4	DEC 4
0151	00330	000006	.6	DEC 6
0152	00331	000007	.7	DEC 7
0153	00332	000010	.8	DEC 8
0154	00333	000011	.9	DEC 9
0155	00334	000012	.10	DEC 10
0156	00335	000014	.12	DEC 12
0157	00336	000017	.15	DEC 15
0158	00337	000027	.23	DEC 23
0159	00340	000032	.26	DEC 26
0160	00341	000033	.27	DEC 27
0161	00342	000034	.28	DEC 28
0162	00343	000036	.30	DEC 30
0163	00344	000037	.31	DEC 31
0164	00345	000040	.32	DEC 32
0165	00346	000041	.33	DEC 33
0166	00347	000042	.34	DEC 34
0167	00350	000045	.37	DEC 37
0168	00351	000050	.40	DEC 40
0169	00352	000051	.41	DEC 41
0170	00353	000053	.43	DEC 43
0171	00354	000055	.45	DEC 45
0172	00355	000056	.46	DEC 46
0173	00356	000057	.47	DEC 47
0174	00357	000060	.48	DEC 48
0175	00360	000061	.49	DEC 49
0176	00361	000072	.50	DEC 58
0177	00362	000077	.63	DEC 63
0178	00363	000100	B100	OCT 100
0179	00364	000105	E	OCT 105
0180	00365	000106	F	OCT 106
0181	00366	000110	.72	DEC 72
0182	00367	000112	.74	DEC 74
0183	00370	000113	.75	DEC 75
0184	00371	000116	N	OCT 116
0185	00372	000123	S	OCT 123
0186	00373	000133	B133	OCT 133
0187	00374	000177	B177	OCT 177
0188	00375	000200	B200	OCT 200
0189	00376	000377	MSK0	OCT 377
0190	00377	000400	B400	OCT 400
0191	00400	000776	B776	OCT 776
0192	00401	000777	MSK1	OCT 777
0193	00402	001000	B1000	OCT 1000
0194	00403	002000	B2000	OCT 2000
0195	00404	003000	B3000	OCT 3000
0196	00405	003002	SCCNT	OCT 3002
0197	00406	004000	B4000	OCT 4000
0198	00407	005000	LF	OCT 5000
0199	00410	014000	B1400	OCT 14000
0200	00411	021000	UNFNC	OCT 21000
0201	00412	022000	B2200	OCT 22000
0202	00413	023000	B2300	OCT 23000

0203	00414	035000	DEFOP	OCT	35000	
0204	00415	036000	REHOP	OCT	36000	
0205	00416	032000	RDCP	OCT	32000	
0206	00417	063146	TENTH	OCT	63146	
0207	00420	077000	OPH9K	OCT	77000	
0208	00421	077000	MSK4	OCT	77000	
0209	00422	077777	INF	OCT	77777	
0210	00423	100017	TYPFL	OCT	100017	
0211	00424	100037	TABCN	OCT	100037	
0212	00425	100777	OPDMK	OCT	100777	
0213	00426	130000	RMODE	OCT	130000	
0214	00427	140000	UHNRM	OCT	140000	
0215	00430	174000	HIM9K	OCT	174000	
0216	00431	177777	M1	DEC	-1	
0217	00432	177776	M2	DEC	-2	
0218	00433	177775	M3	DEC	-3	
0219	00434	177774	M4	DEC	-4	
0220	00435	177773	M5	DEC	-5	
0221	00436	177772	M6	DEC	-6	
0222	00437	177771	M7	DEC	-7	
0223	00440	177770	M8	DEC	-8	
0224	00441	177767	M9	DEC	-9	
0225	00442	177766	M10	DEC	-10	
0226	00443	177765	M11	DEC	-11	
0227	00444	177761	M15	DEC	-15	
0228	00445	177760	M16	DEC	-16	
0229	00446	177753	M21	DEC	-21	
0230	00447	177747	M25	DEC	-25	
0231	00450	177749	M32	DEC	-32	
0232	00451	177725	D53	OCT	-53	
0233	00452	177706	D72	OCT	-72	
0234	00453	177700	D100	OCT	-100	
0235	00454	177670	M72	DEC	-72	
0236	00455	177667	M73	DEC	-73	
0237	00456	177664	M76	DEC	-76	
0238	00457	177645	D133	OCT	-133	
0239	00460	177490	M256	DEC	-256	
0240	00461	177312	M310	DEC	-310	
0241	00462	170030	M1000	DEC	-1000	
0242	00463	154300	MAX9N	DEC	-10000	
0243	00437		MSK3	EQU	M7	
0244	00464	043116	FN	ASC	1, FN	
0245	00465	037440	QMARK	ASC	1, 7	
0246	00466	040000	HALF	OCT	40000	
0247	00467	000000		OCT	0	
0248	00466		HONE	EQU	HALF	
0249	00470	100000	MNEG	OCT	100000	MAXIMUM NEGATIVE FLOATING
0250	00471	000376		OCT	376	POINT NUMBER
0251	00470		FLGBT	EQU	MNEG	
0252	00472	102756	MAXFX	DEC	-999999.5	
0253	00474	114631	MINFX	DEC	-0.0999999999	
0254	00476	000040	BLANK	OCT	40	

0256**

0257*** EMIT ERROR MESSAGE **

0258**

0259	00477	000000	ERROR NOP	
0260	00500	060130	LDA TLSTR	SHIFT TO
0261	00501	070127	STA LISTR	COMMAND MODE
0262	00502	060133	LDA CCNT	SAVE
0263	00503	071515	STA OPCHK	OUTPUT
0264	00504	060132	LDA BADDR	BUFFER
0265	00505	071536	STA RSCHK	POINTERS
0266	00506	060274	LDA EBFA	SET BUFFER
0267	00507	070132	STA BADDR	POINTER
0268	00510	060332	LDA .8	SET CHARACTER
0269	00511	070133	STA CCNT	COUNT
0270	00512	064477	LDB ERROR	ERROR SOURCE IN (B)
0271	00513	060277	LDA ERBS	ERROR ADDRESS IN (A)
0272	00514	002004	INA	MOVE TO NEXT ERROR
0273	00515	104000	CPB 0,1	SAME AS ACTUAL ERROR?
0274	00516	003005	CMA,INA,RSS	YES
0275	00517	024514	JMP *-3	NO
0276	00520	040277	ADA ERBS	COMPUTE ERROR
0277	00521	071643	STA ENOUT	SAVE NEGATIVE OF ERROR
0278	00522	003004	CMA,INA	NUMBER
0279	00523	114222	JSB OUTIA,1	NUMBER TO BUFFER
0280	00524	064273	LDB EBUFA	LOAD BUFFER ADDRESS
0281	00525	060133	LDA CCNT	LOAD NEGATIVE OF
0282	00526	003004	CMA,INA	CHARACTER COUNT
0283	00527	114102	JSB WRITE,1	OUTPUT ERROR MESSAGE
0284	00530	060276	LDA LNBFA	OUTPUT
0285	00531	070132	STA BADDR	
0286	00532	060334	LDA .10	
0287	00533	070133	STA CCNT	LINE
0288	00534	060145	LDA .LNUM	
0289	00535	114222	JSB OUTIA,1	
0290	00536	064275	LDB LBUFA	NUMBER
0291	00537	060133	LDA CCNT	
0292	00540	114102	JSB WRITE,1	
0293	00541	061643	LDA ENOUT	RETRIEVE NEGATIVE OF ERROR
0294	00542	040300	ADA RECER	RECOVERABLE
0295	00543	002021	SSA,RSS	ERROR?
0296	00544	124204	JMP PEXMA,1	NO, RETURN TO SYNTAX MODE
0297	00545	060426	LDA RMODE	RETURN TO
0298	00546	070127	STA LISTR	RUN MODE
0299	00547	061515	LDA OPCHK	RESTORE
0300	00550	070133	STA CCNT	OUTPUT
0301	00551	061536	LDA RSCHK	BUFFER
0302	00552	070132	STA BADDR	POINTERS
0303	00553	124477	JMP ERROR,1	RETURN TO PROGRAM

0305**

0306*** MOVE WORDS TO HIGHER CORE **

0307**

0308	00554	000000	MVTOH	NOP	
0309	00555	064162		LDB TEMP2	FETCH SOURCE ADDRESS
0310	00556	054163	MVTO1	CPB TEMP3	ALL RELOCATION DONE?
0311	00557	124554		JMP MVTOH, I	YES, EXIT
0312	00558	003400		CCA	BACK UP
0313	00559	040164		ADA TEMP4	SOURCE AND
0314	00560	070164		STA TEMP4	DESTINATION
0315	00561	044431		ADD M1	ADDRESSES
0316	00562	100001		LDA 1, I	MOVE
0317	00563	170164		STA TEMP4, I	WORD
0318	00564	024556		JMP MVTO1	

0319**

0320*** INPUT A CONSTANT **

0321**

0322	00567	000000	CONST	NOP	
0323	00570	010614		JSB GETCR	
0324	00571	124567		JMP CONST, I	
0325	00572	006400		CLB	SET SIGN
0326	00573	074163		STB SIGN	POSITIVE
0327	00574	000004		INB	
0328	00575	000353		CPA .43	'+' ?
0329	00576	024002		JMP CON81	YES
0330	00577	050354		CPA .43	NO, '-' ?
0331	00600	007401		CCB, R99	YES
0332	00601	024605		JMP CON82	NO
0333	00602	074163	CON81	STB SIGN	RECORD SIGN
0334	00603	010614		JSB GETCR	FETCH NEXT
0335	00604	024613		JMP SYE12-1	CHARACTER
0336	00605	014615	CON82	JSB NUHCK	FETCH CONSTANT
0337	00606	024611		JMP CON83	NONE FOUND
0338	00607	034067		ISZ CONST	SUCCESSFULLY FOUND,
0339	00610	124567		JMP CONST, I	EXIT VIA (P+2)
0340	00611	054163	CON83	CPB SIGN	SIGN FOUND? ((B) = 0)
0341	00612	003401		CCA, R98	NO
0342	00613	014477		JSB ERROR	YES, SOLITARY SIGN
0343	00614	124567	SYE12	JMP CONST, I	EXIT VIA (P+1)

0344**

0345*** FETCH NUMBER AND CONVERT TO BINARY **

0346**

0347	00615	000000	NUHCK	NOP	CHARACTER IN (A), SIGN SET
0348	00616	000400		CLB	
0349	00617	074164		STB EXP	ZERO
0350	00620	070274		STB MANT1	ALL
0351	00621	070336		STB MANT2	COMPONENTS
0352	00622	070603		STB EXPON	OF NUMBER
0353	00623	074163		STB TEMP3	SET 'NUMBER' FLAG FALSE
0354	00624	007400		CCB	SET 'DECIMAL POINT'
0355	00625	070633		STB DPFLG	FLAG FALSE
0356	00626	050355	NUHCK1	CPA .46	DECIMAL POINT?
0357	00627	030633		ISZ DPFLG	YES, SET FLAG TRUE
0358	00630	024634		JMP NUHCK2	NO
0359	00631	002400		CLA	INITIALIZE POST-DECIMAL DIGIT
0360	00632	071603		STA EXPON	DIGIT COUNTER TO ZERO

0361	00633	024653		JMP NUMC3+1	FETCH A CHARACTER
0362	00634	010570	NUMC2	JSB DIGCK	DIGIT?
0363	00635	024706		JMP NUMC7	NO
0364	00636	035603		ISZ EXPON	YES, COUNT DIGIT
0365	00637	001727		ALF, ALF	LEFT-JUSTIFY
0366	00640	001723		ALF, RAR	DIGIT AND
0367	00641	070164		STA TEMP4	SAVE IT
0368	00642	010147		JSB MBY10	MULTIPLY PREVIOUS NUMBER BY 10
0369	00643	004154		LDB EXP	
0370	00644	006002		SZB	ZERO EXPONENT?
0371	00645	024057		JMP NUMC4	NO
0372	00646	050327		LDA .4	YES, SET
0373	00647	070154		STA EXP	EXPONENT TO 4
0374	00650	050164		LDA TEMP4	LOAD
0375	00651	006400		CLB	NUMBER
0376	00652	010113	NUMC3	JSB NORML	NORMALIZE THE NUMBER
0377	00653	034163		ISZ TEMP3	SET 'NUMBER OCCURRED' FLAG
0378	00654	015614		JSB GETCR	ANOTHER CHARACTER?
0379	00655	024755		JMP NUM12	NO
0380	00656	024026		JMP NUMC1	YES
0381	00687	044434	NUMC4	ADB M4	COMPUTE
0382	00660	007000		CMB	EXPONENT
0383	00661	050164		LDA TEMP4	BIAS AND
0384	00662	074164		STB TEMP4	SAVE IT
0385	00663	006400		CLB	
0386	00664	034164	NUMC5	ISZ TEMP4	DIGIT POSITIONED?
0387	00665	024703		JMP NUMC6	NO
0388	00666	000040		CLE	YES, ADD IN
0389	00667	045336		ADB MANT2	LOW PART
0390	00670	103101		CLO	OF NUMBER
0391	00671	002040		SEZ	OVERFLOW?
0392	00672	002904		INA	YES, BUMP (A)
0393	00673	041274		ADA MANT1	ADD IN HIGH PART OF NUMBER
0394	00674	102301		SOS	OVERFLOW?
0395	00675	024652		JMP NUMC3	NO
0396	00676	000065		CLE, ERA	YES, ROTATE
0397	00677	000500		ERB	DOWN AND
0398	00700	034154		ISZ EXP	BUMP
0399	00701	000000		NOP	EXPONENT
0400	00702	024652		JMP NUMC3	
0401	00703	000066	NUMC6	CLE, ERA	SHIFT
0402	00704	000500		ERB	DIGIT
0403	00705	024664		JMP NUMC5	RIGHT
0404	00706	006400	NUMC7	CLB	DECIMAL POINT
0405	00707	074164		STB TEMP4	
0406	00710	054163		CPB TEMP3	OR DIGIT FOUND?
0407	00711	124615		JMP NUMCK, I	NO, EXIT VIA (P+1)
0408	00712	000364		CPA E	YES, 'E' ?
0409	00713	002001		RSS	YES
0410	00714	024755		JMP NUM12	NO, NO EXPONENT PART
0411	00715	015614		JSB GETCR	
0412	00716	014477	NUMER	JSB ERROR	
0413	00717	000353		CPA .43	'+' ?
0414	00720	024725		JMP NUMC8	YES
0415	00721	000354		CPA .45	NO, '-' ?
0416	00722	003401		CCA, RSS	YES

0417	00723	024727	JMP NUMC9	NO
0418	00724	070164	STA TEMP4	NOTE MINUS SIGN
0419	00725	010614	NUMC8 JSB GETCR	
0420	00726	024716	JMP NUMER	
0421	00727	010570	NUMC9 JSB DIGCK	DIGIT?
0422	00730	024716	JMP NUMER	NO
0423	00731	070163	STA TEMP3	YES, SAVE IT
0424	00732	010614	JSB GETCR	
0425	00733	024751	JMP NUM10	SECOND
0426	00734	010570	JSB DIGCK	DIGIT?
0427	00735	024751	JMP NUM10	NO
0428	00736	004163	LDB TEMP3	YES
0429	00737	005020	BL8, BL8	MULTIPLY
0430	00740	044163	ADD TEMP3	PRIOR DIGIT
0431	00741	005000	BL8	BY 10
0432	00742	040001	ADA 1	ADD NEW DIGIT
0433	00743	070163	STA TEMP3	SAVE EXPONENT
0434	00744	010614	JSB GETCR	
0435	00745	024751	JMP NUM10	THIRD
0436	00746	010570	JSB DIGCK	DIGIT?
0437	00747	002001	R88	NO
0438	00750	024716	JMP NUMER	YES
0439	00751	060163	NUM10 LDA TEMP3	LOAD EXPONENT
0440	00752	034164	ISZ TEMP4	POSITIVE?
0441	00753	003004	CMA, INA	YES, COMPLEMENT IT
0442	00754	002001	R88	NO
0443	00755	002400	NUM12 CLA	CLEAR IF NO EXPONENT PART
0444	00756	035633	ISZ DPFLG	DECIMAL POINT?
0445	00757	041603	ADA EXPON	YES, CORRECT EXPONENT
0446	00760	002003	SZA, R88	ZERO EXPONENT?
0447	00761	024776	JMP NUM14	YES
0448	00762	002020	SSA	NO, NEGATIVE EXPONENT?
0449	00763	024772	JMP NUM13	NO
0450	00764	003004	CMA, INA	YES, SET
0451	00765	071603	STA EXPON	COUNTER
0452	00766	010200	JSB DBY10	DIVIDE NUMBER BY 10
0453	00767	030603	ISZ EXPON	DONE?
0454	00770	024766	JMP *-2	NO
0455	00771	024776	JMP NUM14	YES
0456	00772	071603	NUM13 STA EXPON	SET COUNTER
0457	00773	010147	JSB MBY10	MULTIPLY BY 10
0458	00774	030603	ISZ EXPON	DONE?
0459	00775	024773	JMP *-2	NO
0460	00776	061274	NUM14 LDA MANT1	YES, LOAD
0461	00777	060336	LDB MANT2	NUMBER
0462	01000	034153	ISZ SIGN	POSITIVE?
0463	01001	020005	JMP NUM15	YES
0464	01002	003000	CMA	NO,
0465	01003	007007	CHB, INB, SZB, R88	COMPLEMENT
0466	01004	002004	INA	IT
0467	01005	010020	NUM15 JSB .PACK	PACK NUMBER INTO (A) AND (B)
0468	01006	034135	ISZ SBPTR	
0469	01007	170135	STA SBPTR, I	STORE
0470	01010	034135	ISZ SBPTR	NUMBER IN
0471	01011	174135	STB SBPTR, I	PROPER
0472	01012	034135	ISZ SBPTR	LOCATION

0473	01013	015633	JSB BCKSP	FETCH
0474	01014	015614	JSB GETCR	FIRST
0475	01015	060334	LDA .10	UNUSED CHARACTER
0476	01016	034615	ISZ NUMCK	RETURN
0477	01017	124615	JMP NUMCK,I	VIA (P+2)
0478**				
0479***	NORMALIZE AND PACK FLOATING POINT NUMBER **			
0480**				
0481	01020	000000	.PACK NOP	MANTISSA IN (A) AND (B),
0482	01021	015113	JSB NORML	EXPONENT IN EXP, (E) CLEARED
0483	01022	002103	CLE,SZA,RSS	ZERO RESULT?
0484	01023	125020	JMP .PACK,I	YES
0485	01024	044374	ADB B177	NO, ROUND
0486	01025	002021	SSA,RSS	POSITIVE NUMBER?
0487	01026	006004	INB	YES, FINISH ROUND
0488	01027	103101	CLO	
0489	01030	002040	SEZ	OVERFLOW FROM (B)?
0490	01031	002104	CLE,INA	YES, BUMP (A)
0491	01032	102301	SOS	OVERFLOW? (A=100000, B=0)
0492	01033	001200	RAL	
0493	01034	002031	SSA,SLA,RSS	TWO HIGH BITS 1'S? (A=140000)
0494	01035	025040	JMP PACK1	NO
0495	01036	002300	CCE	YES
0496	01037	001130	ARS,SLA,ALS	SET (A) =100000 AND SKIP
0497	01040	001300	PACK1 RAR	COUNTERPART TO *-5
0498	01041	071147	STA MBY10	SAVE (A)
0499	01042	060001	LDA 1	DELETE 8 LOW
0500	01043	010460	AND M256	ORDER BITS OF MANTISSA
0501	01044	070001	STA 1	SAVE LOWER MANTISSA
0502	01045	060154	LDA EXP	FETCH EXPONENT
0503	01046	002040	SEZ	DECREMENT EXPONENT?
0504	01047	040431	ADA M1	YES
0505	01050	102201	SOC	NO, PRIOR OVERFLOW?
0506	01051	002004	INA	YES, INCREMENT EXPONENT
0507	01052	040375	ADA B200	NO, EXPONENT
0508	01053	002020	SSA	UNDERFLOW?
0509	01054	025073	JMP PACK3	YES
0510	01055	040460	ADA M256	NO, EXPONENT
0511	01056	002021	SSA,RSS	OVERFLOW?
0512	01057	025077	JMP PACK4	YES
0513	01060	040375	ADA B200	NO, RESTORE EXPONENT,
0514	01061	001200	RAL	POSITION SIGN,
0515	01062	010376	AND MSK0	MASK TO 8 BITS, AND
0516	01063	044000	ADB 0	COMBINE WITH LOW MANTISSA
0517	01064	061147	LDA MBY10	RETRIEVE HIGH MANTISSA
0518	01065	050470	CPA MNEG	
0519	01066	002001	RSS	NEGATIVE
0520	01067	125020	JMP .PACK,I	
0521	01070	054471	CPB MNEG+1	OVERFLOW?
0522	01071	025077	JMP PACK4	YES
0523	01072	125020	JMP .PACK,I	NO
0524	01073	014477	PACK3 JSB ERROR	
0525	01074	002400	UNDER CLA	ZERO RESULT
0526	01075	006400	CLB	ON UNDERFLOW
0527	01076	125020	JMP .PACK,I	
0528	01077	014477	PACK4 JSB ERROR	

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0529 01100 061147 OVRER LDA HBY10
0530 01101 010103 JSB OVFLW
0531 01102 125020 JMP .PACK,1
0532**
0533*** LOAD INFINITY ON OVERFLOW **
0534**
0535 01103 000000 OVFLW NOP
0536 01104 064432 LDB M2 LOAD
0537 01105 002020 SSA APPROPRIATE
0538 01106 064400 LDB 0776 LOW MANTISSA
0539 01107 030422 IOR INF LOAD
0540 01110 002020 SSA APPROPRIATE
0541 01111 060470 LDA HNEG HIGH MANTISSA
0542 01112 125103 JMP OVFLW,1
0543**
0544*** NORMALIZE (A), (B), AND EXP **
0545**
0546 01113 000000 NORML NOP SET
0547 01114 071147 STA HBY10 LEFT-SHIFT
0548 01115 002400 CLA COUNTER
0549 01116 071236 STA HPY TO ZERO
0550 01117 061147 LDA HBY10
0551 01120 002003 SZA,RSS ON
0552 01121 006002 SZB ZERO
0553 01122 020130 JMP NORM3 CLEAR
0554 01123 070154 STA EXP EVERYTHING
0555 01124 071274 STA MANT1 STORE
0556 01125 070336 NORM1 STB MANT2 MANTISSA
0557 01126 125113 JMP NORML,1 AND RETURN
0558 01127 035236 NORM2 ISZ HPY COUNT LEFT SHIFTS
0559 01130 004066 NORM3 CLE,ELB ROTATE (A) AND
0560 01131 001600 ELA (B) LEFT INTO (E)
0561 01132 002061 SEZ,SSA,RSS TWO HIGHEST BITS 0?
0562 01133 025127 JMP NORM2 YES, + UNNORMALIZED
0563 01134 002060 SEZ,SSA NO, TWO HIGHEST BITS 1?
0564 01135 025127 JMP NORM2 YES, - UNNORMALIZED
0565 01136 001500 ERA SHIFT TO
0566 01137 000540 ERB,CLE NORMALIZE MANTISSA
0567 01140 071274 STA MANT1 NO,
0568 01141 061236 LDA HPY COMPUTE
0569 01142 003004 CMA,INA CORRECTED
0570 01143 040104 ADA EXP EXPONENT
0571 01144 070154 STA EXP VALUE
0572 01145 061274 LDA MANT1
0573 01146 020125 JMP NORM1
0574**
0575*** MULTIPLY UNPACKED NUMBER BY 10 **
0576**
0577 01147 000000 HBY10 NOP
0578 01150 061274 LDA MANT1 RETURN ON
0579 01151 002003 SZA,RSS ZERO
0580 01152 125147 JMP HBY10,1 MANTISSA
0581 01153 064154 LDB EXP MULTIPLY
0582 01154 044326 ADB .3 BY
0583 01155 074154 STB EXP 8
0584 01156 065336 LDB MANT2 LOAD MANTISSA

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0585	01157	000065	CLE,ERA	DIVIDE
0586	01160	005500	ERB	BY
0587	01161	000065	CLE,ERA	4
0588	01162	005540	ERB,CLE	
0589	01163	045336	ADB MANT2	DOUBLE
0590	01164	002040	SEZ	ADD TO
0591	01165	002004	INA	PRODUCE
0592	01166	041274	ADA MANT1	1.25 * MANTISSA
0593	01167	002021	SSA,RSS	CORRECT
0594	01170	025175	JMP **5	
0595	01171	000065	CLE,ERA	ON
0596	01172	005500	ERB	
0597	01173	034154	ISZ EXP	OVERFLOW
0598	01174	000000	NOP	
0599	01175	071274	STA MANT1	
0600	01176	075336	STB MANT2	
0601	01177	125147	JMP MBY10,I	

0602**

0603*** DIVIDE UNPACKED NUMBER BY 10 **

0604**

0605	01200	000000	DBY10 NOP	MULTIPLY BY DOUBLE-LENGTH TENTH
0606	01201	061274	LDA MANT1	RETURN
0607	01202	002003	SZA,RSS	ON ZERO
0608	01203	125200	JMP DBY10,I	MANTISSA
0609	01204	064432	LDB M2	ADD EXPONENT OF
0610	01205	044154	ADB EXP	'TENTH' TO
0611	01206	074154	STB EXP	MANTISSA EXPONENT
0612	01207	061336	LDA MANT2	JUSTIFY
0613	01210	000065	CLE,ERA	LOWER MANTISSA
0614	01211	015236	JSB MPY	MULTIPLY BY
0615	01212	000417	DEF TENTH	63146 (ONE-TENTH)
0616	01213	000066	CLE,ELA	SHIFT
0617	01214	005640	ELB,CLE	BACK
0618	01215	040001	ADA 1	ADD IN LOWER MANTISSA*
0619	01216	002040	SEZ	TENTH*(2)-16
0620	01217	006004	INB	AND ROUND
0621	01220	075336	STB MANT2	TO 16 BITS
0622	01221	061274	LDA MANT1	DO
0623	01222	015236	JSB MPY	SAME
0624	01223	000417	DEF TENTH	FOR
0625	01224	000040	CLE	HIGH
0626	01225	040001	ADA 1	MANTISSA
0627	01226	041336	ADA MANT2	(EFFECTIVELY) SUM
0628	01227	002040	SEZ	DOUBLE-LENGTH
0629	01230	006004	INB	PRODUCTS
0630	01231	075274	STB MANT1	EXCHANGE
0631	01232	070001	STA 1	(A) AND (B)
0632	01233	061274	LDA MANT1	REGISTERS
0633	01234	015113	JSB NORML	NORMALIZE RESULT
0634	01235	125200	JMP DBY10,I	

0001**

0002*** MULTIPLY INTEGER IN (A) **

0003**

0004	01236	000000	MPY	NOP	ADDRESS OF MULTIPLIER IN MPY, I
0005	01237	064432		LDB M2	SET -2 IN
0006	01240	075147		STB MBY10	SIGN TEMP
0007	01241	166236		LDB MPY, I	LOAD
0008	01242	164001		LDB 1, I	MULTIPLIER
0009	01243	002120		CLE, SSA	(A) NEGATIVE?
0010	01244	003204		CHA, CME, INA	YES, COMPLEMENT (A) AND (E)
0011	01245	000020		SSB	(B) NEGATIVE?
0012	01246	007204		CHB, CME, INB	YES, COMPLEMENT (B) AND (E)
0013	01247	002040		SEZ	(E) = 0?
0014	01250	035147		ISZ MBY10	NO, SET SIGN OF RESULT NEGATIVE
0015	01251	075113		STB NORML	SAVE MULTIPLIER
0016	01252	064445		LDB M16	SET
0017	01253	074554		STB MVTOM	COUNTER
0018	01254	006400		CLB	ZERO PRODUCT
0019	01255	001600		ELA	BIAS (A) TO LEFT
0020	01256	001550	MPY1	ERA, CLE, SLA	SHIFT, TEST,
0021	01257	045113		ADB NORML	AND ADD UPON
0022	01260	005500		ERB	NON-ZERO BIT
0023	01261	034554		ISZ MVTOM	DONE?
0024	01262	025256		JMP MPY1	NO
0025	01263	001540		ERA, CLE	YES, ADJUST FINAL RESULT
0026	01264	035147		ISZ MBY10	NEGATIVE RESULT?
0027	01265	025271		JMP MPY2	NO
0028	01266	007000		CMB	YES,
0029	01267	003007		CHA, INA, SZA, RSB	COMPLEMENT
0030	01270	006004		INB	RESULT
0031	01271	103101	MPY2	CLO	
0032	01272	035236		ISZ MPY	
0033	01273	125236		JMP MPY, I	

0034**

0035*** FIND AND STORE ONE-CHARACTER OPERATORS **

0036**

0037	01274	000000	SYMCK	NOP	CHARACTER IN (A)
0038	01275	074165		STB COUNT	-(ENTRIES TO BE SEARCHED)
0039	01276	001727		ALF, ALF	POSITION
0040	01277	030345		IOR .32	CHARACTER
0041	01300	166274		LDB SYMCK, I	STARTING TABLE ENTRY - 2
0042	01301	035274		ISZ SYMCK	SET RETURN ADDRESS
0043	01302	044325	SYMC1	ADD .2	UPDATE TABLE POINTER
0044	01303	160001		CPA 1, I	HATCH?
0045	01304	025312		JMP SYMC2	
0046	01305	034165		ISZ COUNT	NO, CONTINUE SEARCH?
0047	01306	025302		JMP SYMC1	YES
0048	01307	001727		ALF, ALF	NO, RESTORE
0049	01310	010374		AND 0177	CHARACTER
0050	01311	125274		JMP SYMCK, I	AND EXIT
0051	01312	003400	SYMC2	CCA	GET
0052	01313	040001		ADA 1	INFORMATION
0053	01314	160000		LDA 0, I	WORD
0054	01315	010420		AND OPMSK	AND
0055	01316	170135		STA SBPTR, I	STORE IT
0056	01317	050410		CPA 01400	

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0057 01320 124257      JMP F8C1A,I
0058 01321 035274      ISZ SYMCK      RETURN VIA
0059 01322 125274      JMP SYMCK,I      (P+2)
0060**
0061*** FIND CALLED SUBROUTINE **
0062**
0063 01323 000000  FNDSB NOP
0064 01324 074102      STB TEMP2      SAVE SUBROUTINE NUMBER
0065 01325 064121      LDB ASBTB      LOAD (B) WITH SUBROUTINE TABLE
0066 01326 054122  FNDS1 CPB SBTBE      END OF TABLE?
0067 01327 014477      JSB ERROR      YES
0068 01330 160001  CALER LDA 1,I      NO, EXTRACT
0069 01331 010362      AND .63      SUBROUTINE NUMBER
0070 01332 050162      CPA TEMP2      DESIRED ONE?
0071 01333 125323      JMP FNDSB,I    YES
0072 01334 044325      ADB .2      NO, MOVE TO
0073 01335 025326      JMP FNDS1      NEXT TABLE ENTRY

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0075*
0076*
0077*
0078*
0079*
0080*
0081*
0082*
0083*
0084 01336 000000  MDIM NOP
0085 01337 070001      STA 1      STORE PACKED DIMS. TEMPORALILY
0086 01340 010376      AND MSK0
0087 01341 071456      STA .FLUN    STORE # OF COLUMNS
0088 01342 060001      LDA 1
0089 01343 001727      ALF,ALF
0090 01344 010376      AND MSK0      A = # OF ROWS
0091 01345 001000      ALS      DOUBLE FOR FLOATING POINT
0092 01346 015236      JSB MPY
0093 01347 001456      DEF .FLUN    COMPUTE 2*ROWS*COLUMNS
0094 01350 002020      SSA      RESULT < 32768 ?
0095 01351 014477      JSB ERROR    NO, ERROR DIMENSIONS TOO LARGE
0096 01352 125336  MER9 JMP MDIM,I    YES, RETURN

```

0000**

0000*** ROUND A SUBSCRIPT TO AN INTEGER **

0100**

0101*

0102* RETURNS INTEGER IN (1,32767) (BIASED BY -1)

0103* OR EXITS TO ERROR.

0104*

0105	01353	000000	SBFIX	NOP	SUBSCRIPT IN (A) AND (B)
0106	01354	010364		JSB IFIX	24-BIT INTEGER?
0107	01355	124272		JMP E6M1A,I	NO
0108	01356	002041		SEZ,R9S	YES, ROUND AND
0109	01357	044431		ADB M1	BIAS BY -1
0110	01360	002003		SZA,R9S	16-BIT
0111	01361	000020		SSB	POSITIVE INTEGER?
0112	01362	124272		JMP E6M1A,I	NO
0113	01363	125353		JMP SBFIX,I	YES

0114**

0115*** INTEGERIZE FLOATING POINT NUMBER **

0116**

0117	01364	000000	IFIX	NOP	
0118	01365	102101		STO	
0119	01366	071014		STA GETCR	SAVE (A)
0120	01367	010456		JSB .FLUN	EXPONENT
0121	01370	002020		SSA	NON-NEGATIVE?
0122	01371	026414		JMP IFIX3	NO
0123	01372	040445		ADA M16	YES, EXPONENT
0124	01373	002020		SSA	<= 157
0125	01374	103101		CLO	YES
0126	01375	040440		ADA M8	EXPONENT
0127	01376	002021		SSA,R9S	<= 237
0128	01377	125364		JMP IFIX,I	NO, ALL SIGNIFICANCE IS INTEGER
0129	01400	040440		ADA M8	MOVE BINARY POINT TO END OF (B)
0130	01401	071456		STA .FLUN	SAVE SHIFT COUNT
0131	01402	001614		LDA GETCR	RETRIEVE (A)
0132	01403	025410		JMP IFIX2	
0133	01404	000071	IFIX1	CLE,SLA,ARS	SHIFT (A) RIGHT
0134	01405	002200		CHE	SHIFT (B)
0135	01406	004035		SLB,ERB	RIGHT
0136	01407	102101		STO	NOTE IF A 1 IS LOST
0137	01410	000456	IFIX2	ISZ .FLUN	DONE?
0138	01411	020404		JMP IFIX1	NO
0139	01412	030364		ISZ IFIX	YES
0140	01413	125364		JMP IFIX,I	
0141	01414	001614	IFIX3	LDA GETCR	RETRIEVE (A)
0142	01415	002120		CLE,SSA	TRUNCATE
0143	01416	003401		CCA,R9S	TO
0144	01417	002401		CLA,R9S	-1
0145	01420	007401		CCB,R9S	OR
0146	01421	000400		CLB	0
0147	01422	025412		JMP IFIX2+2	

0140**

0150*** TAKE ARITHMETIC INVERSE **

0151**

0152	01423	000000	ARINV	NOP	NUMBER IN (A) AND (B)
0153	01424	071677		STA OUTLN	SWAP
0154	01425	050001		LDA 1	
0155	01426	065677		LDB OUTLN	REGISTERS
0156	01427	007100		CMB,CLE	COMPLEMENT HIGH PART
0157	01430	020460		XOR M256	COMPLEMENT LOW PART
0158	01431	040377		ADA B400	ADD IN 1
0159	01432	002041		SEZ,RSS	OVERFLOW?
0160	01433	025452		JMP ARIN2	NO
0161	01434	000004		INB	YES, INCREMENT HIGH MANTISSA
0162	01435	054470		CPB FLGBT	OVERFLOW?
0163	01436	025442		JMP ARIN1	YES
0164	01437	054427		CPB UNNRM	NO, NEGATIVE UNNORMALIZED?
0165	01440	002001		RSS	YES
0166	01441	025452		JMP ARIN2	NO
0167	01442	044427	ARIN1	ADB UNNRM	FIX HIGH MANTISSA
0168	01443	000033		SLA,RAR	POSITION EXPONENT
0169	01444	030421		IOR MSK4	FILL IN BITS IF NEGATIVE
0170	01445	006021		SSB,RSS	POSITIVE?
0171	01446	002005		INA,RSS	YES, BUMP EXPONENT
0172	01447	040431		ADA M1	NO, DECREMENT EXPONENT
0173	01450	001200		RAL	POSITION
0174	01451	010376		AND MSK0	EXPONENT
0175	01452	071677	ARIN2	STA OUTLN	SWAP
0176	01453	060001		LDA 1	
0177	01454	065677		LDB OUTLN	REGISTERS
0178	01455	125423		JMP ARINV,I	

0179**

0180*** UNPACK LOW WORD OF NUMBER **

0181**

0182	01456	000000	.FLUN	NOP	WORD IN (B)
0183	01457	060001		LDA 1	(A) = (B)
0184	01460	010376		AND MSK0	EXTRACT EXPONENT IN (A)
0185	01461	007000		CMB	SUBTRACT OFF
0186	01462	044000		ADB 0	EXPONENT FROM
0187	01463	007000		CMB	MANTISSA IN (B)
0188	01464	000033		SLA,RAR	NEGATIVE EXPONENT?
0189	01465	030421		IOR MSK4	YES, FILL IN LEADING BITS
0190	01466	125456		JMP .FLUN,I	NO

0191**

0192*** STACK (B) ON LOW-CORE STACK **

0193**

0194	01467	000000	SLWST	NOP	
0195	01470	034141		ISZ LSTPT	ADVANCE 'LOW
0196	01471	060141		LDA LSTPT	STACK' POINTER
0197	01472	050142		CPA HSTPT	STACK OVERFLOW?
0198	01473	014477	E1	JSB ERROR	YES
0199	01474	174141		STB LSTPT,I	NO, STACK (B)
0200	01475	125467		JMP SLWST,I	

0202**

0203*** BUMP HIGH STACK POINTER **

0204**

0205	01476	000000	BHSTP	NOP	
0206	01477	007400	CC0		ADVANCE
0207	01500	044142	ADD	HSTPT	
0208	01501	074142	STB	HSTPT	POINTER
0209	01502	004141	CPB	LSTPT	OVERFLOW?
0210	01503	025473	JMP	E1	YES
0211	01504	125476	JMP	BHSTP,I	NO

0212**

0213*** FETCH TOP OF STACK **

0214**

0215	01505	000000	STTOP	NOP	
0216	01506	015315	JSB	OPCHK	VALIDATE
0217	01507	015336	JSB	RSCHK	OPERAND
0218	01510	164142	LDB	HSTPT,I	SAVE
0219	01511	160001	LDA	1,I	LOAD
0220	01512	006004	INB		
0221	01513	164001	LDB	1,I	NUMBER
0222	01514	125505	JMP	STTOP,I	

0223**

0224*** VERIFY LEGITIMACY OF OPERAND **

0225**

0226	01515	000000	OPCHK	NOP	
0227	01516	164142	LDB	HSTPT,I	OPERAND ADDRESS TO (0)
0228	01517	160001	LDA	1,I	HIGH PART OF
0229	01520	050470	CPA	MNEG	OPERAND 1000000?
0230	01521	006005	INB,RSB		YES
0231	01522	025527	JMP	OPCHK1	NO
0232	01523	160001	LDA	1,I	LOW PART
0233	01524	050471	CPA	MNEG+1	7760?
0234	01525	014477	JSB	ERROR	YES
0235	01526	044431	EB	ADB M1	
0236	01527	054140	OPCHK1	CPB TSTPT	TEMPORARY OPERAND?
0237	01530	002001	RSB		YES
0238	01531	125515	JMP	OPCHK,I	NO
0239	01532	060140	LDA	TSTPT	UNSTACK
0240	01533	040432	ADA	M2	THE TEMPORARY
0241	01534	070140	STA	TSTPT	OPERAND
0242	01535	125515	JMP	OPCHK,I	EXIT WITH ADDRESS IN (0)

0243**

0244*** ALLOT SPACE FOR INTERMEDIATE RESULT **

0245**

0246	01536	000000	RSCHK	NOP	
0247	01537	060140	LDA	TSTPT	ALLOT
0248	01540	040325	ADA	.2	
0249	01541	070140	STA	TSTPT	SPACE
0250	01542	040431	ADA	M1	OVERFLOW INTO
0251	01543	050120	CPA	LSTAK	LOW-CORE STACK?
0252	01544	002001	RSB		YES
0253	01545	125536	JMP	RSCHK,I	NO
0254	01546	060120	LDA	LSTAK	SAVE
0255	01547	002004	INA		LOWER
0256	01550	070163	STA	TEMP3	STACK BOUND
0257	01551	040333	ADA	.9	UPDATE

0258	01552	070120	STA LSTAK	STACK BOTTOM
0259	01553	060141	LDA LSTPT	SET
0260	01554	002004	INA	SOURCE
0261	01555	070162	STA TEMP2	ADDRESS
0262	01556	040333	ADA .9	UPDATE
0263	01557	070141	STA LSTPT	STACK TOP
0264	01560	002004	INA	SET DESTINATION
0265	01561	070164	STA TEMP4	ADDRESS
0266	01562	003004	CMA, INA	OVERFLOW
0267	01563	040142	ADA HSTPT	INTO
0268	01564	002020	SSA	HIGH-CORE STACK?
0269	01565	025473	JMP E1	YES
0270	01566	014554	JSB MVTOH	NO, MOVE
0271	01567	125536	JMP RSCHK, I	LOW-CORE STACK
0272**				
0273***	CHECK FOR DIGIT **			
0274**				
0275	01570	000000	DIGCK NOP	CHARACTER IN (A)
0276	01571	064000	LDB 0	
0277	01572	044452	ADB D72	ASCII 72B
0278	01573	006021	SSB, RSS	OR GREATER?
0279	01574	125570	JMP DIGCK, I	YES, RETURN WITH CHARACTER
0280	01575	044334	ADB .10	NO, ASCII 60B
0281	01576	006020	SSB	OR GREATER?
0282	01577	125570	JMP DIGCK, I	NO
0283	01600	035570	ISZ DIGCK	YES, SET 'SUCCESS' EXIT,
0284	01601	060001	LDA 1	LOAD DIGIT INTO (A),
0285	01602	125570	JMP DIGCK, I	AND RETURN
0286**				
0287***	CHECK FOR LETTER **			
0288**				
0289	01603	000000	LETCK NOP	CHARACTER IN (A)
0290	01604	064000	LDB 0	
0291	01605	044457	ADB D133	ASCII 133B
0292	01606	006021	SSB, RSS	OR GREATER?
0293	01607	125603	JMP LETCK, I	YES, EXIT WITH CHARACTER IN (A)
0294	01610	044340	ADB .26	NO, ASCII 101B
0295	01611	006021	SSB, RSS	OR GREATER?
0296	01612	035603	ISZ LETCK	YES
0297	01613	125603	JMP LETCK, I	NO
0298*				
0299*	ON END-OF-FILE CONDITION RETURN TO P+1 ELSE			
0300*	RETURN TO P+2 WITH NON-BLANK CHARACTER IN (A)			
0301*				
0302	01614	000000	GETCR NOP	
0303	01615	034133	ISZ CCNT	ANY CHARACTERS LEFT?
0304	01616	002001	RSS	
0305	01617	125614	JMP GETCR, I	NO, END-OF-FILE EXIT
0306	01620	064132	LDB BADDR	LOAD BUFFER ADDRESS
0307	01621	034132	ISZ BADDR	UPDATE FOR NEXT TIME
0308	01622	004065	CLE, ERB	SET CHARACTER FLAG
0309	01623	160001	LDA 1, I	LOAD CURRENT BUFFER WORD
0310	01624	002041	SEZ, RSS	FIRST CHARACTER?
0311	01625	001727	ALF, ALF	YES, POSITION IT
0312	01626	010374	AND B177	MASK EXTRANEIOUS BITS
0313	01627	060476	CPA BLANK	BLANK?

0314	01630	025618	JMP GETCR+1	YES, FETCH NEXT CHARACTER
0315	01631	035614	19Z GETCR	UPDATE RETURN ADDRESS
0316	01632	125614	JMP GETCR,1	AND EXIT
0317**				
0318*** BACKSPACE OVER ONE CHARACTER **				
0319**				
0320	01633	000000	BCKSP NOP	
0321	01634	003400	CCA	BACKSPACE
0322	01635	040133	ADA CCNT	OVER
0323	01636	070133	STA CCNT	LAST
0324	01637	003400	CCA	CHARACTER IN
0325	01640	040132	ADA BADDR	INPUT
0326	01641	070132	STA BADDR	BUFFER
0327	01642	125633	JMP BCKSP,1	
0328**				
0329*** PRINT A NUMBER **				
0330**				
0331	01643	000000	ENOUT NOP	
0332	01644	002300	CCE	SET SIGN FLAG TRUE
0333	01645	114220	JSD NUH0A,1	OUTPUT THE NUMBER
0334	01646	015677	JSD OUTLN	END-OF-LINE ACTION
0335	01647	000345	LDA .32	OUTPUT
0336	01650	015715	JSD OUTCR	A BLANK
0337	01651	064172	LDB HL0X1+1	FIELD
0338	01652	044133	ADD CCNT	
0339	01653	006002	SZB	FULL?
0340	01654	025647	JMP *-5	NO
0341	01655	125643	JMP ENOUT,1	
0342**				
0343*** SPACE FOR A COMMA **				
0344**				
0345	01656	000000	EDELH NOP	
0346	01657	064133	LDB CCNT	NO, LOAD CHARACTER COUNT
0347	01658	006003	EDEL1 SZB,R38	ZERO?
0348	01651	125656	JMP EDELH,1	YES
0349	01662	044444	ADD H15	NO, SUBTRACT ZONE WIDTH
0350	01663	006021	SSB,R38	NEGATIVE RESULT?
0351	01664	025660	JMP EDEL1	NO
0352	01665	075677	STD OUTLN	YES, SAVE BLANK COUNT
0353	01666	060345	LDA .32	FETCH BLANK
0354	01667	015715	JSD OUTCR	OUTPUT
0355	01670	035677	18Z OUTLN	
0356	01671	025666	JMP *-3	BLANKS
0357	01672	064133	LDB CCNT	LINE
0358	01673	044456	ADD H76	
0359	01674	006021	SSB,R38	FULL?
0360	01675	015677	JSD OUTLN	YES
0361	01676	125656	JMP EDELH,1	

0363**

0364*** OUTPUT A COMPLETED LINE **

0365**

0366	01677	000000	OUTLN	NOP	
0367	01700	060146	LDA	TYPE	FETCH 'CHARACTERS PRINTED' COUNT
0368	01701	000010	SLA		CORRECT FOR START ON
0369	01702	002004	INA		ODD PRINT POSITION
0370	01703	040133	ADA	CCNT	OUTPUT
0371	01704	064131	LDB	.BUFA	A
0372	01705	114102	JSB	WRITE,I	LINE
0373	01706	064172	LDB	MLBX1+1	CORRECT
0374	01707	044133	ADB	CCNT	
0375	01710	074172	STB	MLBX1+1	MARKER
0376	01711	002400	CLA		RESET COUNT OF
0377	01712	070146	STA	TYPE	CHARACTERS PRINTED
0378	01713	114250	JSB	PRNIA,I	CLEAN UP
0379	01714	125677	JMP	OUTLN,I	

0380**

0381*** ADD A CHARACTER TO OUTPUT BUFFER **

0382**

0383	01715	000000	OUTCR	NOP	CHARACTER IN (A)
0384	01716	071364	STA	IFIX	SAVE CHARACTER
0385	01717	034133	ISZ	CCNT	COUNT IT
0386	01720	064133	LDB	CCNT	FIRST CHARACTER
0387	01721	004010	SLB		OF BUFFER WORD?
0388	01722	034132	ISZ	BADDR	YES, MOVE TO FRESH WORD
0389	01723	160132	LDA	BADDR,I	LOAD BUFFER WORD
0390	01724	004010	SLB		SAVE
0391	01725	001727	ALF,ALF		OTHER
0392	01726	010400	AND	M256	CHARACTER
0393	01727	031364	IOR	IFIX	ADD NEW CHARACTER
0394	01730	004010	SLB		POSITION
0395	01731	001727	ALF,ALF		WORD AND
0396	01732	170132	STA	BADDR,I	STORE IT
0397	01733	125715	JMP	OUTCR,I	

0398*

0399*

0400	00160	TEMP	EQU	TEMPS+1
0401	00161	TEMP1	EQU	TEMPS+2
0402	00162	TEMP2	EQU	TEMPS+3
0403	00163	TEMP3	EQU	TEMPS+4
0404	00164	TEMP4	EQU	TEMPS+5
0405	00165	COUNT	EQU	TEMPS+6
0406	00163	STEMP	EQU	TEMPS+4
0407	01274	MANT1	EQU	SYMCK
0408	01336	MANT2	EQU	MDIM
0409	01603	EXPON	EQU	LETCK
0410	01633	DPFLG	EQU	BCKSP
0411	01715	ARYAD	EQU	OUTCR
0412	00567	EOL	EQU	CONST
0413	01734	FINBP	EQU	*

FIRST UNUSED WORD OF BASE PAGE

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0415*
0416***** BASIC INTERPRETER CONTROL *****
0417*
0418* THIS PROGRAM INTERPRETS THE SYSTEM COMMANDS AND PROVIDES
0419* I/O CONTROL FOR THE BASIC INTERPRETER. ALL USER
0420* COMMUNICATION IS DONE THRU THIS PROGRAM. USER RESPONSES ARE
0421* CHECKED FOR SYSTEM COMMANDS AND IF A VALID COMMAND IS
0422* DETECTED THIS PROGRAM INITIATES APPROPRIATE ACTION.
0423*
0424 02000          ORG 20000
0425*
0426* DATA LOCAL TO MONITOR
0427*
0428 02000 002001 RDYA DEF READY
0429 02001 001105 READY ASC 2,READ
0430 02003 004415          OCT 54415
0431 02004 000407 LFEED DEF LF
0432 02005 000465 GHRKA DEF GMARK
0433 02006 003776 STCPA DEF WCHND
0434 02007 002146 CHNDA DEF CHNDS
0435*
0436 02010 107700 ENTRY CLC 0,C          STARTING POINT, TURN OFF ALL I/O
0437 02011 102100          STF 0          TURN ON INTERRUPT SYSTEM
0438 02012 000106          LDA LWHM        LOADED
0439 02013 000111          CPA LWHM        BY '0000'?
0440 02014 026020-026027 JMP FLUSH RDYPT NO
0441 02015 070111          STA LWHM        YES, RESET
0442 02016 002004          INA          POINTER
0443 02017 070117          STA SYHTA        VALUES
0444*
0445 02020 000110 FLUSH LDA FWHM
0446 02021 070112          STA PDRFF
0447 02022 070113          STA PDPTR
0448 02023 000345          LDA .32
0449 02024 070476          STA BLANK
0450 02025 002400          CLA
0451 02026 070145          STA .LNUM
0452*
0453 02027 000130 RDYPT LDA TLSTR
0454 02030 070127          STA LISTR
0455 02031 002400          CLA
0456 02032 072121          STA DRDST
0457 02033 070136          STA TFLAG
0458 02034 070137          STA TTYFL
0459 02035 114102          JSB WRITE,I
0460 02036 000436          LDA NO
0461 02037 000000          LDB RDYA
0462 02040 114102          JSB WRITE,I
0463*
0464 02041 000130 PEXMK LDA TLSTR
0465 02042 070127          STA LISTR
0466 02043 000136          LDA TFLAG
0467 02044 002002          SZA
0468 02045 020101          JMP PTAPE+1

```

SET PROGRAM BUFFER ADDRESS
 SET PROGRAM BUFFER POINTER
 INITIALIZE
 DELETE CHARACTER FOR OETCR
 SET LINE NUMBER
 TO 0 INITIALLY

 SET TO
 COMMAND MODE

 CLEAR DATA REQUEST FLAG
 CLEAR PHOTO READER INPUT FLAG
 CLEAR TTY TAPE FLAG
 DO A RETURN AND LINE FEED.

 PRINT "READY" ON TTY

 SHIFT TO
 COMMAND MODE

 IS TAPE FLAG SET?
 YES, GET RECORD FROM PHOTO RDR

0470	02046	066004	DATAI	LDB	LFEED	LOAD ADDRESS OF LINE FEED
0471	02047	074152		STB	RSYM	STORE ADDRESS OF READY SYMBOL
0472	02050	060137		LDA	TTYFL	TTY TAPE
0473	02051	002002		SZA		INPUT?
0474	02052	026056		JMP	GTRCD	YES, SUPPRESS LINE FEED
0475	02053	003400		CCA		NO
0476	02054	064152		LDB	RSYM	LOAD LF OR '?' ADDRESS
0477	02055	114102		JSB	WRITE,I	PRINT LF OR '?', NO CR-LF
0478*						
0479	02056	114123	GTRCD	JSB	IMOFF,I	TURN OFF KEYBOARD INTERRUPT MODE
0480	02057	060366		LDA	.72	
0481	02060	064131		LDB	.BUFA	
0482	02061	114104		JSB	REED,I	GET RECORD FROM TTY
0483	02062	050432		CPA	M2	
0484	02063	026115		JMP	RBOUT	RUBOUT IN RECORD, INPUT AGAIN
0485*						
0486	02064	003021	RPRCS	CMA,SSA,RSS		SET A=-1-# CHARS AND CHECK FOR
0487	02065	014477		JSB	ERROR	RECORD TOO LONG
0488	02066	070133	RTLE	STA	CCNT	-1-# CHARACTERS < 0, SET CCNT
0489	02067	060131		LDA	.BUFA	LOAD BUFFER ADDRESS
0490	02070	000066		CLE,ELA		SHIFT LEFT, LEAST BIT USED AS
0491	02071	070132		STA	BADDR	ODD/EVEN FLAG
0492	02072	015614		JSB	GETCR	FETCH FIRST CHARACTER
0493	02073	026046		JMP	DATAI	NULL RECORD, INPUT AGAIN
0494	02074	066121		LDB	DRQST	
0495	02075	006003		SZB,RSS		DATA REQUEST?
0496	02076	026126		JMP	CKRCD	NO DATA REQUEST, GO CHECK RECORD
0497	02077	050372		CPA	S	ASCII S FIRST CHARACTER?
0498	02100	016200		JSB	STOP	ASSUME STOP REQUESTED
0499	02101	002400		CLA		LINE
0500	02102	114102		JSB	WRITE,I	FEED
0501	02103	015633		JSB	BCKSP	BACKSPACE
0502	02104	060426		LDA	RMODE	RETURN TO
0503	02105	070127		STA	LISTR	RUN MODE
0504	02106	066121		LDB	DRQST	
0505	02107	002400		CLA		
0506	02110	072121		STA	DRQST	CLEAR DATA REQUEST FLAG
0507	02111	114124		JSB	IMON,I	DATA REQUEST, TURN ON INTRPT MODE
0508	02112	124001		JMP	1,I	GO TO DATA REQUEST CALLING POINT
0509*						
0510	02113	056040		ASC	1,\	
0511	02114	002113		DEF	*-1	
0512	02115	066114	RBOUT	LDB	*-1	OUTPUT '\ ' WITH
0513	02116	002404		CLA,INA		CARRIAGE RETURN
0514	02117	114102		JSB	WRITE,I	AND LINE FEED
0515	02120	026056		JMP	GTRCD	
0516*						
0517*	THIS	SECTION	REQUESTS	DATA	INPUT	
0518*						
0519	02121	000000	DRQST	NOP		EXIT/ENTRY AND FLAG
0520	02122	064130		LDB	YLSTR	SHIFT TO
0521	02123	074127		STB	LISTR	COMMAND MODE
0522	02124	066005		LDB	QMRKA	
0523	02125	026047		JMP	DATAI+1	PRINT '?' AND WAIT

0525*

0526* THIS SECTION CHECKS RECORD FOR SYSTEM COMMANDS.

0527*

0528	02126	064134	CKNCD	LDB	8BUFA	
0529	02127	074138		STB	8BPTR	INITIALIZE SYNTAX BUFFER POINTER
0530	02130	170138		STA	8BPTR,I	PUT FIRST CHAR IN SYNTAX BUFFER
0531	02131	015603		JSB	LETCK	IS CHARACTER A LETTER
0532	02132	026220		JMP	SYNTAX	NO, TRY SYNTAX

0533*

0534	02133	060306		LDA	TOLAD	LOAD SYS CMND TABLE START POINT
0535	02134	064440		LDB	M8	LOOK FOR A
0536	02135	114212		JSB	TGRCH,I	SYSTEM COMMAND
0537	02136	014477		JSB	ERROR	NOT A VALID COMMAND

0538*

0539	02137		INVSC	EQU	*	INVALID CMND ERROR REFERENCE
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0540*

0541	02137	001727		ALF,ALF		ENTRY FOUND
0542	02149	001100		ARG		MOVE JMP ADDR TO LEAST BITS POS.
0543	02141	042007		ADA	CMNDA	ADD START ADDR. OF CMND ROUTINES
0544	02142	072200		STA	STOP	SAVE (A)
0545	02143	002400		CLA		OUTPUT
0546	02144	114102		JSB	WRITE,I	A CR-LF
0547	02145	120200		JMP	STOP,I	EXECUTE COMMAND

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0549*
0550*   THIS SETS UP AND EXECUTES THE SYSTEM COMMANDS
0551*
0552   02146          CMNDS EQU *          COMMAND LIST REFERENCE
0553*
0554   02146 114124   RUN   JSB IMON,I      TURN ON TTY INTERRUPT MODE
0555   02147 124202          JMP RUNA,I    GO TO RUN ENTRY POINT
0556*
0557   02150 026020   SCRTN JMP FLUSH      SCRATCH CURRENT PROGRAM
0558*
0559   02151 060130   TLIST LDA TLSTR      LIST PROGRAM, TFLAG = 0
0560   02152 006401          CLB,RSS
0561*
0562   02153 060126   PLIST LDA PLSTR      PUNCH PROGRAM, TFLAG # 0
0563   02154 070127          STA LISTR     SET DRIVER ADDRESS
0564   02155 074136          STB TFLAG     SET DEVICE FLAG
0565   02156 114124          JSB IMON,I    TURN ON TTY INTERRUPT MODE
0566   02157 124207          JMP LISTA,I  GO TO LIST ENTRY POINT
0567*
0568   02160 114124   PTAPE JSB IMON,I      PTAPE COMMAND
0569   02161 060366          LDA .72
0570   02162 064131          LDB .BUFA
0571   02163 114101          JSB PREAD,I   GET RECORD FROM PHOTO READER
0572   02164 050432          CPA M2        END OF TAPE?
0573   02165 026174          JMP EOTR      YES, GO SEE IF START OR END
0574   02166 050433          CPA M3        PHOTO READER READY?
0575   02167 014477          JSB ERROR     NO
0576   02170 002003   PRERR SZA,RSS        YES
0577   02171 026161          JMP PTAPE+1   NULL RECORD
0578   02172 070136          STA TFLAG     SET FLAG # 0
0579   02173 026064          JMP RPRCS     GO PROCESS RECORD
0580*
0581   02174 064136   EOTR  LDB TFLAG
0582   02175 006003          SZB,RSS        START OR END OF TAPE?
0583   02176 026161          JMP PTAPE+1   START
0584   02177 026027          JMP RDYPT     GO TO READY POINT
0585*
0586*   STOP COMMAND SERVICE
0587*
0588   02200 000000   STOP  NOP
0589   02201 114123          JSB IMOFF,I    TURN OFF KEYBOARD INTERRUPT MODE
0590   02202 064130          LDB TLSTR      SHIFT TO
0591   02203 074127          STB LISTR      COMMAND MODE
0592   02204 060470          LDA MNEG
0593   02205 002006          INA,SZA
0594   02206 026205          JMP *-1        DELAY FOR 100 MILLISECONDS
0595   02207 114102          JSB WRITE,I    CARRIAGE-RETURN LINE-FEED
0596   02210 060327          LDA .4
0597   02211 066006          LDB STOPA
0598   02212 114102          JSB WRITE,I    PRINT "STOP"
0599   02213 026027          JMP RDYPT

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PAGE 0044 #02 BASIC INTERPRETER CONTROL

0001*
0002** SET LINE FEED SUPPRESSION
0003*
0004 02214 070137 TAPE STA TTYFL SET TO 'TAPE' MODE
0005 02216 026006 JMP GTRCD
0006*
0007** RETURN TO 'BOSS' EXECUTIVE
0008*
0009 02216 002400 BYEC CLA
0010 02217 024077 JMP 770

```

0002*
0003* *****
0004****
0005*** CHECK SYNTAX CF STATEMENT ***
0006****
0007* *****
0008*
0009**
0010*** DETERMINE SEQUENCE NUMBER **
0011**
0012 02220 114216 SYNTAX JSB INCHK,I RECORD
0013 02221 000463 DEF MAXSN SEQUENCE NUMBER
0014 02222 034135 ISZ SBPTR SAVE SPACE FOR LENGTH WORD
0015 02223 074145 STB .LNUM SAVE LINE NUMBER
0016 02224 064134 LDB SBUFA SET
0017 02225 006004 INB TEMP TO
0018 02226 074160 STB TEMP (SBUFF)+1
0019**
0020*** DETERMINE STATEMENT TYPE **
0021**
0022 02227 050334 CPA .10 NULL STATEMENT?
0023 02230 124253 JMP DELST,I YES, DELETE IT
0024 02231 170135 STA SBPTR,I NO, RECORD NEXT CHARACTER
0025 02232 000307 LDA STTYP PRINT-TABLE ADDRESS
0026 02233 064446 LDB M21 -(NUMBER OF ENTRIES)
0027 02234 114212 JSB TSEARCH,I FIND STATEMENT TYPE
0028 02235 014477 JSB ERROR NOT FOUND
0029 02236 064441 SYNE1 LDB M9 SET MULTIPLE STORE
0030 02237 076330 STB MSFLG TO FALSE
0031 02240 064113 LDB PBPTR NULL
0032 02241 054112 CPB PBUFF PROGRAM?
0033 02242 002001 RSS YES
0034 02243 026247 JMP SYNT1 NO
0035 02244 064110 LDB FWAM INSURE NO
0036 02245 074112 STB PBUFF SPURIOUS COMMON
0037 02246 074113 STB PBPTR EXISTS
0038 02247 074157 SYNT1 STB TEMPS SET S-STACK POINTER
0039 02250 006400 CLB SET DEFINE FLAG
0040 02251 076332 STB DFLAG TO FALSE
0041 02252 076334 STB PFLAG SET PARAMETER FLAG TO FALSE
0042 02253 001727 ALF,ALF COMPUTE
0043 02254 001300 RAR ADDRESS OF
0044 02255 040302 ADA STBAS SYNTAX ROUTINE AND
0045 02256 124000 JMP 0,I BRANCH TO IT
0046**
0047*** SINGLE CHARACTER AND/OR FORMULA OPERATORS **
0048**
0049 02257 001000 QUOTE OCT 1000 BITS 15-9 OF THE LABELLED WORD
0050 02260 021040 ASC 1,"
0051 02261 002000 COMMA OCT 2000 ARE THE BASIC CODE OPERATOR
0052 02262 026040 ASC 1,,
0053 02263 003000 SMCLN OCT 3000 NUMBERS. BITS 3-0 ARE THE
0054 02264 035440 ASC 1,,
0055 02265 004001 RPARN OCT 4001 OPERATOR'S HIERARCHICAL
0056 02266 024440 ASC 1,)
0057 02267 005001 RBRAC OCT 5001 PRECEDENCE FOR THOSE OPERATORS

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0058	02270	000440	ASC	1,1	
0059	02271	000002	SCMMA	OCT	6002
0060	02272	020040	ASC	1,,	BELONGING TO FORMULAS. THE
0061	02273	007002	ASSOP	OCT	7002
0062	02274	030440	ASC	1,~	UNLABELLED WORD GIVES THE
0063	02275	010007	PLUS	OCT	10007
0064	02276	020440	ASC	1,+	ASCII REPRESENTATION OF THE
0065	02277	011007	MINUS	OCT	11007
0066	02300	020440	ASC	1,~	SINGLE CHARACTER OPERATORS.
0067	02301	012010	TIMES	OCT	12010
0068	02302	025040	ASC	1,*	
0069	02303	013010	DIV	OCT	13010
0070	02304	027440	ASC	1,/	
0071	02305	014012	EXP8	OCT	14012
0072	02306	007040	ASC	1,^	
0073	02307	015005	GTR	OCT	15005
0074	02310	037040	ASC	1,>	
0075	02311	016005	LSS	OCT	16005
0076	02312	036040	ASC	1,<	
0077	02313	017005	UNEQL	OCT	17005
0078	02314	021440	ASC	1,#	
0079	02315	020005	EQUAL	OCT	20005
0080	02316	036440	ASC	1,=	
0081	02317	021011	UNMIN	OCT	21011
0082	02320	020440	ASC	1,~	
0083	02321	022020	LBRAC	OCT	22020
0084	02322	050440	ASC	1,!	
0085	02323	023020	LPARN	OCT	23020
0086	02324	024040	ASC	1,!	
0087	02325	024011	UPLUS	OCT	24011
0088	02326	025440	ASC	1,+	
0089	02327	025003	ORCP	OCT	25003
0090	02330	000000	MSFLG	NOP	
0091	02331	020004	ANDOP	OCT	26004
0092	02332	000000	DFLAG	NOP	
0093	02333	027011	NOTOP	OCT	27011
0094	02334	000000	PFLAG	NOP	
0095	02335	030005	GTREQ	OCT	30005
0096	02336	000000	UFLAG	NOP	
0097	02337	031005	LSSEQ	OCT	31005
0098*					
0099***					
0100**	LET	STATEMENT SYNTAX	**		
0101***					
0102*					
0103	02340	077530	LET8	STB	SFLAG
0104	02341	060440	LDA	MS	
0105	02342	072330	STA	MSFLG	
0106	02343	017114	JSB	FBC	
0107	02344	007530	CPB	SFLAG	
0108	02345	014477	JSB	ERROR	
0109	02346		SYNE2	EOU	*
0110**					
0111***	CHECK	FOR END OF STATEMENT	**		
0112**					
0113	02346	050334	EO8T	CPA	.10
					END-OF-STATEMENT?

0114 02347 124252
0115 02350 024266

JMP ACCST,I YES, ACCEPT STATEMENT
JMP NOEOF NO, ILLEGAL CHARACTER

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0117*
0118***
0119** DIM STATEMENT SYNTAX **
0120***
0121*
0122 02351 036332 DIMS ISZ DFLAG SET DFLAG TO TRUE
0123 02352 017535 JSB ARRYS CHECK AN ARRAY
0124 02353 124252 JMP ACCST,1 DONE
0125 02354 026352 JMP DIMS+1 WAS A COMMA, CONTINUE
0126*
0127***
0128** COM STATEMENT SYNTAX **
0129***
0130*
0131 02355 064113 COMS LDB PBPTR HAS PROGRAM BUFFER
0132 02356 054110 CPB FNAH BEEN MOVED?
0133 02357 002001 RSB NO
0134 02358 014477 JSB ERROR YES, ILLEGAL COM
0135 02359 074166 SYNE3 STD TEMPS+7 SET ARRAY POINTER
0136 02360 036332 ISZ DFLAG SET DEFINE FLAG TO TRUE
0137 02361 003400 COMS1 CCA SET COMMON FLAG
0138 02362 072334 STA PFLAG TO TRUE
0139 02363 017535 JSB ARRYS CHECK AN ARRAY
0140 02364 002001 RSB DONE
0141 02365 026353 JMP COMS1 MORE ARRAYS
0142 02366 064106 LDB TEMPS+7 FETCH UPDATED POINTER
0143 02367 074112 STB PBUFF SET PROGRAM BUFFER ADDRESS
0144 02368 074113 STD PBPTR SET PROGRAM BUFFER POINTER
0145 02369 124252 JMP ACCST,1 EXIT
0146*
0147***
0148** DEF STATEMENT SYNTAX **
0149***
0150*
0151 02374 017635 DEFS JSB LTR
0152 02375 026405 JMP SYNE4 FIRST
0153 02376 060161 LDA TEMP1 TWO CHARACTERS
0154 02377 001727 ALF,ALF
0155 02400 030162 IOR TEMP2
0156 02401 050464 CPA FN 'FN'?
0157 02402 002001 RSB YES
0158 02403 026405 JMP SYNE4 NO
0159 02404 017635 JSB LTR LETTER FOLLOWST
0160 02405 014477 SYNE4 JSB ERROR NO
0161 02406 060161 LDA TEMP1 YES, RECORD A
0162 02407 064361 LDB .56 FUNCTION
0163 02410 017650 JSB STROP NAME
0164 02411 060162 LDA TEMP2 RETRIEVE CHARACTER
0165 02412 017661 JSB LPCK LEFT PARENTHESIS?
0166 02413 030470 IOR FLOST YES, SET FORMAL
0167 02414 170135 STA SBPTR,1 PARAMETER BIT
0168 02415 017535 JSB VAROP FETCH SIMPLE VARIABLE
0169 02416 000000 NOP NONE FOUND
0170 02417 014477 JSB ERROR SUBSCRIPTED VARIABLE FOUND
0171 02420 017671 SYNE5 JSB RPCK RECORD A RIGHT PARENTHESIS
0172 02421 007400 CCB ASSIGNMENT

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0173	02422	015274	JSB	SYMCK	
0174	02423	002272	DEF	ASSOP-1	OPERATOR?
0175	02424	014477	SYNE6	JSB	ERROR
0176	02425	060432	LDA	M2	NO
0177	02426	040135	ADA	SBPTR	YES,
0178	02427	160000	LDA	0,I	RETRIEVE
0179	02430	010401	AND	MSK1	PARAMETER
0180	02431	072334	STA	PFLAG	AND
0181	02432	017114	JSB	FSC	SAVE IT
0182	02433	026346	JMP	EOST	FETCH DEFINING FORMULA
0183*					END-OF-STATEMENT TEST
0184***					
0185**	REM	STATEMENT SYNTAX	**		
0186***					
0187*					
0188	02434	060334	REPS	LDA	.10
0189	02435	114251	JSB	CHRSA,I	DUMMY STRING TERMINATOR
0190	02436	124252	JMP	ACCS1,I	FETCH CHARACTER STRING
0191*					
0192***					
0193**	IF	STATEMENT SYNTAX	**		
0194***					
0195*					
0196	02437	017114	IFS	JSB	FSC
0197	02440	170135	STA	SBPTR,I	GET DECISION FORMULA
0198	02441	060316	LDA	ATHEN	TABLE
0199	02442	007400	CCB		SEARCH
0200	02443	114212	JSB	TSRCH,I	FOR
0201	02444	014477	JSB	ERROR	'THEN'
0202	02445		SYNE7	EQU *	NOT FOUND
0203*					GET STATEMENT LABEL NUMBER
0204***					
0205**	GO TO AND GOSUB	STATEMENT SYNTAX	**		
0206***					
0207	02445	114221	GOTOS	JSB	PGINT,I
0208	02446	000463	DEF	MAXSN	FETCH AND RECORD
0209	02447	026346	JMP	EOST	SEQUENCE NUMBER
0210*					END-OF-STATEMENT TEST
0211*					
0212***					
0213**	FOR	STATEMENT SYNTAX	**		
0214***					
0215*					
0216	02450	017556	FORS	JSB	VAROP
0217	02451	000000	NOP		FETCH SIMPLE VARIABLE
0218	02452	014477	SYNE8	JSB	ERROR
0219	02453	007400	CCB		NONE FOUND
0220	02454	015274	JSB	SYMCK	SUBSCRIPTED VARIABLE FOUND
0221	02455	002272	DEF	ASSOP-1	ASSIGNMENT
0222	02456	026424	JMP	SYNE6	OPERATOR?
0223	02457	017114	JSB	FSC	NO
0224	02460	170135	STA	SBPTR,I	YES, FETCH INITIAL VALUE FORMULA
0225	02461	060317	LDA	ATO	LOOK
0226	02462	007400	CCB		FOR
0227	02463	114212	JSB	TSRCH,I	THE
0228	02464	014477	JSB	ERROR	'TO'
					MISSING

0229	02465	017114	SYNE9	JSD F8C	GET LIMIT FORMULA
0230	02466	000334		CPA .10	END-OF-STATEMENT?
0231	02467	124252		JMP ACCST,I	YES
0232	02470	007400		CCB	NO, ERASE
0233	02471	044135		ADB SBPTR	ZERO
0234	02472	074135		STB SBPTR	WORD
0235	02473	170135		STA SBPTR,I	NOW
0236	02474	060320		LDA ASTEP	LOOK
0237	02475	007400		CCB	FOR
0238	02476	114212		JSD TBRCH,I	THE 'STEP'
0239	02477	014477		JSD ERROR	MISSING
0240	02500	017114	SYE10	JSD F8C	GET STEP SIZE FORMULA
0241	02501	026346		JMP EOST	END-OF-STATEMENT TEST
0242*					
0243***					***
0244**	NEXT	STATEMENT	SYNTAX	**	
0245***					***
0246*					
0247	02502	017556	NXT8	JSD VAROP	FETCH SIMPLE VARIABLE
0248	02503	000000		NOP	NONE FOUND
0249	02504	026402		JMP SYNE8	SUBSCRIPTED VARIABLE FOUND
0250	02505	026346		JMP EOST	END-OF-STATEMENT TEST
0251*					
0252***					***
0253**	END,	STOP,	RESTORE,	RETURN	STATEMENT SYNTAX **
0254***					***
0255*					
0256	02506	034135	END8	ISZ SBPTR	
0257	02507	010614		JSD GETCR	END-OF-STATEMENT?
0258	02510	124252		JMP ACCST,I	YES
0259	02511	024266		JMP NOEOF	NO
0260*					
0261***					***
0262**	WAIT	STATEMENT	SYNTAX	**	
0263***					***
0264*					
0265	02512	017734	WAIT8	JSD GETPF	
0266	02513	026346		JMP EOST	END-OF-STATEMENT TEST
0267*					
0268***					***
0269**	CALL	STATEMENT	SYNTAX	**	
0270***					***
0271*					
0272	02514	015614	CALL8	JSD GETCR	FETCH AND
0273	02510	024265		JMP EOF	RECORD
0274	02516	034135		ISZ SBPTR	LEFT
0275	02517	017661		JSD LPCK	PARENTHESIS
0276	02520	114221		JSD PGINT,I	FETCH AND RECORD
0277	02521	000453		DEF D100	SUBROUTINE NUMBER
0278	02522	070161		STA TEMP1	SAVE NEXT CHARACTER
0279	02523	015323		JSD FND88	FIND
0280	02524	160001		LDA 1,I	NUMBER
0281	02525	001727		ALF,ALF	OF
0282	02526	010344		AND .31	PARAMETERS
0283	02527	003000		CMA	RECORD
0284	02530	070166		STA TEMPS+7	COMPLEMENT - 1

0285	02531	060161	LDA	TEMP1	RETRIEVE CHARACTER
0286	02532	007480	CALL2	CCB	
0287	02533	015274	JSB	SYMCK	COMMA?
0288	02534	002260	DEF	COMMA-1	
0289	02535	026543	JMP	CALL3	NO
0290	02536	034166	ISZ	TEMP5+7	YES, MORE
0291	02537	002001	RSS		PARAMETERS PERMITTED?
0292	02540	014477	SYE11	JSB ERROR	NO
0293	02541	017114	JSB	FSC	YES, FETCH
0294	02542	026532	JMP	CALL2	PARAMETER FORMULA
0295	02543	034166	CALL3	ISZ TEMP5+7	ALL PARAMETERS PRESENT?
0296	02544	026540	JMP	SYE11	NO
0297	02545	017071	JSB	RPCK	YES, FETCH RIGHT PARENTHESIS
0298	02546	026346	JMP	EOST	END-OF-STATEMENT TEST
0299*					
0300***					***
0301**	DATA STATEMENT SYNTAX				**
0302***					***
0303*					
0304	02547	014867	DATAS	JSB CONST	FETCH A CONSTANT
0305	02550	024613	JMP	SYE12-1	NONE FOUND
0306	02551	017744	JSB	NUMOP	FIX UP PRECEDING OPERATOR
0307	02552	007400	CCB		CHECK
0308	02553	015274	JSB	SYMCK	FOR A
0309	02554	002260	DEF	COMMA-1	COMMA
0310	02555	026346	JMP	EOST	END-OF-STATEMENT TEST
0311	02556	026547	JMP	DATAS	FETCH ANOTHER NUMBER
0312*					
0313***					***
0314**	READ AND INPUT STATEMENT SYNTAX				**
0315***					***
0316*					
0317	02557	017556	READS	JSB VAROP	RECORD VARIABLE OPERAND
0318	02560	014477	JSB	ERROR	MISSING
0319	02561	000000	SYE13	NOP	
0320	02562	007400	CCB		CHECK
0321	02563	015274	JSB	SYMCK	FOR A
0322	02564	002260	DEF	COMMA-1	COMMA
0323	02565	002001	RSS		
0324	02566	026557	JMP	READS	IS, FETCH NEXT ITEM
0325	02567	006400	CLB		APPEND
0326	02570	174135	STB	SBPTR, I	END-OF-FORMULA
0327	02571	034135	ISZ	SBPTR	OPERATOR
0328	02572	026346	JMP	EOST	END OF STATEMENT TEST
0329*					
0330***					***
0331**	PRINT STATEMENT SYNTAX				**
0332***					***
0333*					
0334	02573	064432	PRIN1	LDB M2	NO,
0335	02574	015274	JSB	SYMCK	COMMA OR
0336	02575	002260	DEF	COMMA-1	SEMICOLON?
0337	02576	026604	JMP	PRIN2	NO
0338	02577	003400	PRINS	CCA	YES, ENABLE
0339	02600	170160	STA	TEMP, I	FORMULA
0340	02601	034135	ISZ	SBPTR	

0341	02602	015614		JSB GETCR	END-OF-STATEMENT?
0342	02603	124252		JMP ACCST, I	YES
0343	02604	007400	PRIN2	CCB	
0344	02605	015274		JSB SYMCK	QUOTE?
0345	02606	002256		DEF QUOTE-1	
0346	02607	020023		JHP PRIN3	NO
0347	02610	060347		LDA .34	YES, SET QUOTE AS TERMINATOR
0348	02611	114281		JSB CHRSA, I	CHARACTER AND FETCH STRING
0349	02612	014477		JSB ERROR	MISSING QUOTE
0350	02613	002257	8YE14	LDA QUOTE	RECORD
0351	02614	170135		STA SBPTR, I	QUOTE
0352	02615	034135		ISZ SBPTR	
0353	02616	010014		JSB GETCR	END-OF-STATEMENT?
0354	02617	124252		JMP ACCST, I	YES
0355	02620	007400		CCB	ENABLE
0356	02621	174160		STB TEMP, I	FORMULA
0357	02622	026873		JMP PRIN1	NO
0358	02623	134160	PRIN3	ISZ TEMP, I	TAB OR FORMULA PERMITTED?
0359	02624	014477		JSB ERROR	NO
0360	02625	170135	8YE15	STA SBPTR, I	SEARCH
0361	02626	000322		LDA ATAB	FOR
0362	02627	007400		CCB	'TAB'
0363	02630	114212		JSB TBRCH, I	
0364	02631	002401		CLA, R35	NOT FOUND
0365	02632	000424		LDA TABCN	
0366	02633	007400		CCB	BACKUP
0367	02634	044135		ADB SBPTR	TO WORD WITH
0368	02635	074135		STB SBPTR	PREVIOUS OPERATOR
0369	02636	002003		9ZA, R35	'TAB' ?
0370	02637	026647		JMP PRIN4	NO
0371	02640	130135		IOR SBPTR, I	
0372	02641	170135		STA SBPTR, I	YES, RECORD IT
0373	02642	017734		JSB GETPF	FETCH PARAMETER
0374	02643	000400		CLB	FOLLOW
0375	02644	174135		STB SBPTR, I	WITH A
0376	02645	034135		ISZ SBPTR	ZERO
0377	02646	026601		JHP PRIN5	
0378	02647	015633	PRIN4	JSB BCKSP	BACKSPACE OVER LAST CHARACTER
0379	02650	017114		JSB FOC	FETCH FORMULA
0380	02651	050334	PRIN5	CPA .10	END-OF-STATEMENT?
0381	02652	124252		JMP ACCST, I	YES
0382	02653	026873		JHP PRIN1	NO
0383*					
0384***				***	
0385**	MAT	STATEMENT SYNTAX		**	
0386***				***	
0387*					
0388	02654	017635	MAT9	JSB LTR	FIRST
0389	02655	014477		JSB ERROR	TWO CHARACTERS
0390	02656	015603	8YE16	JSB LETCK	LETTERS?
0391	02657	026732		JMP MAT32	NO
0392	02660	034135		ISZ SBPTR	YES, MOVE TO FRESH 9-BUFFER WORD
0393	02661	064161		LDB YENP1	RETRIEVE FIRST LETTER AND
0394	02662	000727		BLF, BLF	PUT IT IN THE
0395	02663	030001		IOR I	UPPER CHARACTER OF (A)
0396	02664	170135		STA SBPTR, I	SEARCH

0397	02665	060310	LDA MATIO	FOR
0398	02666	064432	LDB M2	'READ' OR
0399	02667	114212	JSB TSRCH,1	'PRINT'
0400	02670	014477	JSB ERROR	NOT FOUND
0401	02671	050416	SYE17 CPA RDOP	READ?
0402	02672	026710	JMP MATS1	YES
0403	02673	017544	MATS0 JSB ARRID	RECORD ARRAY
0404	02674	050334	CPA .10	END-OF-STATEMENT?
0405	02675	124252	JMP ACCST,1	YES
0406	02676	064432	LDB M2	NO,
0407	02677	015274	JSB SYMCK	COMMA OR
0408	02700	002260	DEF COMMA-1	SEMICOLON?
0409	02701	014477	JSB ERROR	NO
0410	02702	015614	SYE18 JSB GETCR	END-OF-STATEMENT?
0411	02703	026706	JMP **3	YES
0412	02704	015633	JSB BCKSP	NO
0413	02705	026673	JMP MATS0	
0414	02706	034135	ISZ SBPTR	INCLUDE
0415	02707	124252	JMP ACCST,1	PARAMETER
0416	02710	017544	MATS1 JSB ARRID	RECORD ARRAY
0417	02711	017704	JSB MATSB	IF SUBSCRIPT,
0418	02712	000000	NOP	RECORD IT
0419	02713	050334	CPA .10	END-OF-STATEMENT?
0420	02714	124252	JMP ACCST,1	YES
0421	02715	007400	CCB	NO
0422	02716	015274	JSB SYMCK	
0423	02717	002260	DEF COMMA-1	COMMA?
0424	02720	026701	JMP SYE18-1	NO
0425	02721	026710	JMP MATS1	YES
0426	02722	070162	MATS2 STA TEMP2	
0427	02723	060135	LDA SBPTR	SAVE
0428	02724	071715	STA ARYAD	OPERAND ADDRESS
0429	02725	060161	LDA TEMP1	RETRIEVE FIRST LETTER
0430	02726	004355	LDB .46	RECORD AN
0431	02727	017650	JSB STROP	ARRAY
0432	02730	060162	LDA TEMP2	RETRIEVE CHARACTER
0433	02731	007400	CCB	ASSIGNMENT
0434	02732	015274	JSB SYMCK	
0435	02733	002272	DEF ASSOP-1	OPERATOR?
0436	02734	026424	JMP SYNE6	NO
0437	02735	161715	LDA ARYAD,1	YES, RETRIEVE
0438	02736	010401	AND MSK1	AND SAVE
0439	02737	170160	STA TEMP,1	PREVIOUS ARRAY IDENTIFIER
0440	02740	017635	JSB LTR	LETTER NEXT?
0441	02741	027010	JMP MATS4	NO
0442	02742	015603	JSB LETCK	YES, SECOND LETTER?
0443	02743	027024	JMP MATS5	NO
0444	02744	034135	ISZ SBPTR	YES,
0445	02745	064161	LDB TEMP1	CONCATENATE
0446	02746	000727	BLF, BLF	LETTERS
0447	02747	030001	IOR 1	AND
0448	02750	170135	STA SBPTR,1	SEARCH
0449	02751	060313	LDA MATFN	FOR
0450	02752	064435	LDB M5	ARRAY
0451	02753	114212	JSB TSRCH,1	FUNCTION
0452	02754	014477	JSB ERROR	NOT FOUND

0453	02755	001727	SYE19	ALF,ALF	FOUND
0454	02756	001723		ALF,RAR	POSITION IT,
0455	02757	040336		ADA .10	COMPLETE OPERAND,
0456	02760	007400		CCB	COMBINE
0457	02761	044135		ADD SBPTR	WITH
0458	02762	130001		IOR 1,I	OPERATOR,
0459	02763	030470		IOR FLOBT	ADD FLAG BIT,
0460	02764	170001		STA 1,I	AND STORE
0461	02765	010401		AND MSK1	'INV'
0462	02766	040460		ADA M256	OR
0463	02767	002021		SSA,R88	'TRN?
0464	02770	026776		JMP MATS3	YES
0465	02771	015614		JSD GETCR	NO, END-OF-STATEMENT?
0466	02772	124282		JMP ACCST,I	YES
0467	02773	017704		JSD MATS8	NO, SUBSCRIPT?
0468	02774	014477		JSD ERROR	NO
0469	02775	024266	SYE20	JMP NOEOF	
0470	02776	015614	MATS3	JSD GETCR	
0471	02777	024265		JMP EOF	
0472	03000	017661		JSD LPCK	GET LEFT PARENTHESIS
0473	03001	017644		JSD ARRID	FETCH AND RECORD AN ARRAY
0474	03002	017671		JSD RPCK	RECORD A RIGHT PARENTHESIS
0475	03003	161718		LDA ARYAD,I	RETRIEVE
0476	03004	010401		AND MSK1	PREVIOUS ARRAY IDENTIFIER
0477	03005	150160		CPA TEMP,I	MATCH LEFT-HAND SIDE ARRAY?
0478	03006	014477		JSD ERROR	YES
0479	03007	124282	SYE21	JMP ACCST,I	NO
0480	03010	034135	MATS4	ISZ SBPTR	
0481	03011	017661		JSD LPCK	FETCH LEFT PARENTHESIS
0482	03012	017114		JSD FSC	FETCH FORMULA
0483	03013	017671		JSD RPCK	FETCH RIGHT PARENTHESIS
0484	03014	007400		CCB	MULTIPLICATION
0485	03015	015274		JSD SYMCK	OPERATOR?
0486	03016	002300		DEF TIMES-1	
0487	03017	014477		JSD ERROR	NO
0488	03020	017644	SYE22	JSD ARRID	YES, FETCH AND RECORD ARRAY
0489	03021	050334		CPA .10	END-OF-STATEMENT?
0490	03022	124282		JMP ACCST,I	YES
0491	03023	024266		JMP NOEOF	NO
0492	03024	070102	MATS5	STA TEMP2	
0493	03025	060135		LDA SBPTR	SAVE
0494	03026	071715		STA ARYAD	OPERAND ADDRESS
0495	03027	060161		LDA TEMP1	RETRIEVE
0496	03030	064355		LDB .46	AND RECORD
0497	03031	017680		JSD STROP	ARRAY
0498	03032	060162		LDA TEMP2	END-OF-
0499	03033	050334		CPA .10	STATEMENT?
0500	03034	124282		JMP ACCST,I	YES
0501	03035	064433		LDB H3	NO, MUST BE
0502	03036	015274		JSD SYMCK	A '+',
0503	03037	002274		DEF PLUS-1	'-', OR '++'
0504	03040	014477		JSD ERROR	ISN'T
0505	03041	006400	SYE23	CLB	IS, SET FOR FALSE
0506	03042	040332		ADA .8	
0507	03043	052301		CPA TIMES	'++'
0508	03044	027061		JMP MATS7	YES

0509	03045	076334	MATS6	STB PFLAG	NO, SET PFLAG
0510	03046	017544		JSB ARRID	GET SECOND ARRAY
0511	03047	050334		CPA .10	END-OF-STATEMENT?
0512	03050	002001		RSS	YES
0513	03051	024206		JMP NOEOF	NO
0514	03052	036334		ISZ PFLAG	WAS OPERATOR A '++'?
0515	03053	124252		JMP ACCST,I	NO
0516	03054	161715		LDA ARYAD,I	YES, RETRIEVE
0517	03055	010401		AND MSK1	SECOND ARRAY
0518	03056	150160		CPA TEMP,I	MATCH LEFT-HAND SIDE ARRAY?
0519	03057	014477	SYE24	JSB ERROR	YES
0520	03060	124252		JMP ACCST,I	NO
0521	03061	161715	MATS7	LDA ARYAD,I	RETRIEVE
0522	03062	010401		AND MSK1	ARRAY
0523	03063	007400		CCB	SET FOR TRUE
0524	03064	150160		CPA TEMP,I	MATCH LEFT-HAND SIDE ARRAY?
0525	03065	027087		JMP SYE24	YES
0526	03066	027045		JMP MATS6	NO

0527**

0528*** JUMP TABLE FOR STATEMENT SYNTAX **

0529**

0530	03067	002340	SYNTB	DEF LETS	LET
0531	03070	002351		DEF DIMS	DIM
0532	03071	002355		DEF COMS	COM
0533	03072	002374		DEF DEFS	DEF
0534	03073	002434		DEF REMS	REM
0535	03074	002445		DEF GOTOS	GO TO
0536	03075	002437		DEF IFS	IF
0537	03076	002460		DEF FORS	FOR
0538	03077	002502		DEF NXTS	NEXT
0539	03100	002445		DEF GOTOS	GOSUB
0540	03101	002506		DEF ENDS	RETURN
0541	03102	002506		DEF ENDS	END
0542	03103	002506		DEF ENDS	STOP
0543	03104	002512		DEF WAITS	WAIT
0544	03105	002514		DEF CALLS	CALL
0545	03106	002547		DEF DATAS	DATA
0546	03107	002557		DEF READS	READ
0547	03110	002577		DEF PRINS	PRINT
0548	03111	002557		DEF READS	INPUT
0549	03112	002506		DEF ENDS	RESTORE
0550	03113	002654		DEF MATS	MAT

0551*

0552*** ***

0553** FORMULA SYNTAX CHECKER **

0554*** ***

0555*

0556	03114	000000	FSC	NOP	
0557	03115	002400		CLA	SET LEFT PARENTHESES
0558	03116	170157		STA TEMPS,I	COUNT TO ZERO
0559	03117	003400	FSC1	CCA	SET UNARY FLAG
0560	03120	072336		STA UFLAG	TO TRUE
0561	03121	017556	FSC2	JSB VAROP	LOOK FOR VARIABLE OPERAND
0562	03122	027261		JMP FSC9	NOT FOUND
0563	03123	027227		JMP FSC6	SUBSCRIBED VARIABLE FOUND
0564	03124	015603		JSB LETCK	FOLLOWED BY LETTER?

0565	03126	027227	JMP FSC6	NO
0566	03126	064432	LDB M2	YES, LOOK FOR
0567	03127	017322	JSB MCBCCK	'AND' OR 'OR'
0568	03130	060161	LDA TEMP1	NOT FOUND, FETCH PREVIOUS
0569	03131	001727	ALF, ALF	CHARACTER AND LEFT-JUSTIFY IT
0570	03132	030102	IOR TEMP2	ADD LATEST CHARACTER
0571	03133	000464	CPA FN	'FN'?
0572	03134	027102	JMP FSC4	YES
0573	03136	170136	STA SBPTR, I	NO,
0574	03136	060312	LDA PDFNS	SEARCH FOR
0575	03137	064443	LDB M11	PREDEFINED
0576	03140	114212	JSB T8RCH, I	FUNCTION
0577	03141	027146	JMP FSC3	NOT FOUND
0578	03142	001727	ALF, ALF	ASSEMBLE
0579	03143	001723	ALF, RAR	OPERAND
0580	03144	030470	IOR FLGBT	ADD FLAG BIT
0581	03145	027170	JMP FSC5	
0582	03146	036336	ISZ UFLAG	'NOT' PERMITTED?
0583	03147	027252	JMP FSC6-1	NO
0584	03150	060321	LDA ANOT	YES,
0585	03151	007400	CCB	SEARCH FOR
0586	03152	114212	JSB T8RCH, I	'NOT'
0587	03153	027202	JMP FSC6-1	'NOT' NOT FOUND
0588	03154	007400	CCB	RETRIEVE
0589	03155	044135	ADB SBPTR	PREVIOUS WORD
0590	03156	160001	LDA 1, I	WORD
0591	03157	010420	AND OPMSK	SET TO
0592	03160	170001	STA 1, I	NULL OPERAND
0593	03161	027317	JMP FSC14	
0594	03162	015614	JSB GETCR	IDENTIFYING
0595	03163	026405	JMP SYNE4	FUNCTION
0596	03164	015603	JSB LETCK	LETTER?
0597	03165	026405	JMP SYNE4	NO
0598	03166	040403	ADA D100	YES,
0599	03167	001700	ALF	ASSEMBLE AND
0600	03170	040336	ADA .15	SAVE
0601	03171	070161	STA TEMP1	FUNCTION IDENTIFIER
0602	03172	007400	CCB	RETRIEVE
0603	03173	044135	ADB SBPTR	PREVIOUS
0604	03174	160001	LDA 1, I	PROGRAM WORD
0605	03175	010420	AND OPMSK	EXTRACT OPERATOR,
0606	03176	030161	IOR TEMP1	APPEND OPERAND,
0607	03177	170001	STA 1, I	AND RECORD
0608	03200	015614	JSB GETCR	LEFT PARENTHESIS
0609	03201	014477	JSB ERROR	OR
0610	03202	017661	JSB LPCK	LEFT BRACKET?
0611	03203	017353	JSB FRCUR	YES, SAVE LOCAL VARIABLES OF FSC
0612	03204	017114	JSB FSC	FETCH ACTUAL PARAMETER
0613	03205	017330	JSB FPOP	RESTORE LOCAL VARIABLES OF FSC
0614	03206	017671	JSB RPCK	FETCH RIGHT PARENTHESIS
0615	03207	027272	JMP FSC10+1	
0616	03210	064432	LDB M2	CHECK FOR
0617	03211	015274	JSB SYNCK	RIGHT PARENTHESIS
0618	03212	002264	DEF RPARN-1	OR RIGHT BRACKET
0619	03213	027253	JMP FSC6	NOT FOUND
0620	03214	060406	LDA B4000	RECORD A

0621	03215	170135		STA SBPTR,I	RIGHT PARENTHESIS
0622	03216	060352		LDA .41	RESTORE RIGHT PARENTHESIS
0623	03217	007400		CCB	MATCHING
0624	03220	144157		ADB TEMPS,I	LEFT
0625	03221	006020		SSB	PARENTHESIS?
0626	03222	027253		JMP FSC8	NO
0627	03223	174157		STB TEMPS,I	YES
0628	03224	034135		ISZ SBPTR	
0629	03225	015614		JSB GETCK	FETCH
0630	03226	060334		LDA .10	CHARACTER
0631	03227	050334	FSC6	CPA .10	END OF FORMULA?
0632	03230	027253		JMP FSC8	YES
0633	03231	072336		STA UFLAG	NO, SET UNARY FLAG TO FALSE
0634	03232	064435		LDB M5	SEARCH FOR A MULTICHARACTER
0635	03233	017322		JSB MCBCK	BINARY OPERATOR
0636	03234	160135		LDA SBPTR,I	NOT FOUND,
0637	03235	001727		ALF,ALF	RESTORE
0638	03236	010374		AND B177	CHARACTER
0639	03237	066330		LDB MSFLG	SEARCH
0640	03240	015274		JSB SYMCK	FOR A
0641	03241	002274		DEF PLUS-1	BINARY OPERATOR
0642	03242	002001		RSS	NOT FOUND
0643	03243	027301		JMP FSC12	FOUND
0644	03244	007400		CCB	ASSIGNMENT
0645	03245	015274		JSB SYMCK	
0646	03246	002272		DEF ASSOP-1	OPERATOR?
0647	03247	027210		JMP FSC7	NO
0648	03250	073530		STA SFLAG	YES, SET
0649	03251	027117		JMP FSC1	'STORE OCCURRED' FLAG
0650	03252	060102		LDA TEMP2	RETRIEVE LETTER
0651	03253	164157	FSC8	LDB TEMPS,I	ALL LEFT PARENTHESES
0652	03254	006002		SZB	MATCHED?
0653	03255	014477	FSC12	JSB ERROR	NO
0654	03256	174135		STB SBPTR,I	YES, RECORD AN
0655	03257	034135		ISZ SBPTR	END-OF-FORMULA AND
0656	03260	127114		JMP FSC,I	EXIT WITH CHARACTER IN (A)
0657*					
0658	03261	050351	FSC9	CPA .40	LEFT
0659	03262	027275		JMP FSC11	PARENTHESIS
0660	03263	060373		CPA B133	OR LEFT BRACKET?
0661	03264	027275		JMP FSC11	YES
0662	03265	006400		CLB	NO, SET SIGN
0663	03266	074153		STB SIGN	POSITIVE
0664	03267	014615		JSB NUMCK	NUMBER?
0665	03270	027304		JMP FSC13	NO
0666	03271	017744	FSC10	JSB NUMOP	YES, FIX UP PRECEDING OPERATOR
0667	03272	064441		LDB M9	UPDATE
0668	03273	076330		STB MSFLG	MULTIPLE STORE
0669	03274	027227		JMP FSC6	FLAG
0670	03276	034135	FSC11	ISZ SBPTR	YES
0671	03276	060413		LDA B2300	RECORD
0672	03277	170135		STA SBPTR,I	IT AND
0673	03300	134157		ISZ TEMPS,I	COUNT IT
0674	03301	064441	FSC12	LDB M9	UPDATE
0675	03302	076330		STB MSFLG	MULTIPLE STORE FLAG
0676	03303	027117		JMP FSC1	FLAG

0677	03304	030336	FSC13	ISZ	UFLAG	UNARY OPERATORS PERMITTED?
0678	03305	014477	FSCE3	JSH	ERROR	NO
0679	03306	064411		LDB	UNHNC	
0680	03307	000353		CPA	.43	'+'?
0681	03310	027314		JMP	*+4	YES
0682	03311	000354		CPA	.45	NO, '-'?
0683	03312	027315		JMP	*+3	YES
0684	03313	027305		JMP	FSCE3	NO
0685	03314	044404		ADD	B3000	STORE
0686	03315	034135		ISZ	SBPTR	UNARY
0687	03316	174135		STB	SBPTR,1	OPERATOR
0688	03317	064441	FSC14	LDB	H0	UPDATE
0689	03320	070330		STB	MSFLG	MULTIPLE STORE FLAG
0690	03321	027121		JMP	F3C2	FLAG
0691**						
0692*** CHECK FOR A MULTICHARACTER BINARY OPERATOR **						
0693**						
0694	03322	000000	MCBCK	NOP		
0695	03323	170135		STA	SBPTR,1	SEARCH
0696	03324	060311		LDA	MCBOP	FOR 'AND'
0697	03325	114212		JSH	TSRCH,1	OR 'OR'
0698	03326	127322		JMP	MCBCK,1	NOT FOUND
0699	03327	027301		JMP	F3C12	FOUND
0001**						
0002*** RESTORE FSC LOCAL QUANTITIES **						
0003**						
0004	03330	000000	FPOP	NOP		
0005	03331	070161		STA	TEMP1	SAVE CHARACTER
0006	03332	064157		LDB	TEMPS	
0007	03333	044435		ADD	H5	
0008	03334	074157		STB	TEMPS	RESTORE S-STACK TOP
0009	03335	000004		INB		
0010	03336	160001		LDA	1,1	
0011	03337	072330		STA	MSFLG	RESTORE MULTIPLE STORE FLAG
0012	03340	000004		INB		
0013	03341	160001		LDA	1,1	
0014	03342	072336		STA	UFLAG	RESTORE UNARY OPERATOR FLAG
0015	03343	000004		INB		
0016	03344	160001		LDA	1,1	
0017	03345	073114		STA	F3C	RESTORE FSC RETURN ADDRESS
0018	03346	000004		INB		
0019	03347	160001		LDA	1,1	RESTORE
0020	03350	073556		STA	VAROP	VAROP RETURN ADDRESS
0021	03351	060101		LDA	TEMP1	RETRIEVE CHARACTER
0022	03352	127330		JMP	FPOP,1	
0023**						
0024*** SAVE LOCAL QUANTITIES OF FSC **						
0025**						
0026	03353	000000	FRCUR	NOP		
0027	03354	064157		LDB	TEMPS	FETCH CURRENT S-STACK POINTER
0028	03355	000004		INB		UPDATE IT
0029	03356	062330		LDA	MSFLG	DUMP MULTIPLE STORE
0030	03357	170001		STA	1,1	FLAG ON S-STACK
0031	03360	000004		INB		
0032	03361	062336		LDA	UFLAG	STACK UNARY OPERATOR
0033	03362	170001		STA	1,1	FLAG

0034	03363	006004	INB	
0035	03364	063114	LDA FSC	STACK FSC
0036	03365	170001	STA 1,I	RETURN ADDRESS
0037	03366	063556	LDA VAROP	STACK VAROP RETURN ADDRESS
0038	03367	017371	JSB SSOV	AND CHECK FOR S-STACK OVERFLOW
0039	03370	127353	JMP FRCUR,I	
0040**				
0041*** PUT ITEM ON S-STACK AND CHECK FOR OVERFLOW **				
0042**				
0043	03371	000000	SSOV NOP	STORE QUANTITY
0044	03372	006004	INB	ADVANCE S-STACK POINTER
0045	03373	170001	STA 1,I	SAVE ITEM IN (A)
0046	03374	006004	INB	ADVANCE S-STACK POINTER
0047	03375	074157	STB TEMPS	AND RECORD IT
0048	03376	007004	CMB,INB	
0049	03377	044106	ADB LWBH	LAST WORD
0050	03400	000020	SSB	EXCEEDED?
0051	03401	014477	FSCE4 JSB ERROR	YES
0052	03402	127371	JMP SSOV,I	
0053**				
0054*** CHECK FOR SUBSCRIPT PART **				
0055**				
0056	03403	000000	SBSC1 NOP	CHARACTER IN (A)
0057	03404	064432	LDB M2	LEFT BRACKET
0058	03405	015274	JSB SYMCK	OR
0059	03406	002320	DEF LBRAC-1	LEFT PARENTHESIS?
0060	03407	127403	JMP SBSC1,I	NO, RETURN VIA (P+1)
0061	03410	037403	ISZ SBSC1	YES, SET RETURN TO (P+2)
0062	03411	161715	LDA ARYAD,I	SET
0063	03412	010445	AND M16	ARRAY
0064	03413	002004	INA	TO
0065	03414	171715	STA ARYAD,I	SINGLE SUBSCRIPT
0066	03415	000412	LDA B2200	RECORD A
0067	03416	170135	STA SBPTR,I	LEFT BRACKET
0068	03417	005400	CLB	DIM OR COM
0069	03420	056332	CPB DFLAG	STATEMENT?
0070	03421	027473	JMP SBSC1	NO
0071	03422	114221	JSB PGINT,I	FETCH INTEGER
0072	03423	000460	DEF M256	SUBSCRIPT BOUND
0073	03424	005727	BLF,BLF	SAVE
0074	03425	074161	STB TEMP1	BOUND
0075	03426	007400	CCB	IS THE
0076	03427	015274	JSB SYMCK	NEXT CHARACTER
0077	03430	002270	DEF SCMA-1	A COMMA?
0078	03431	027436	JMP SBSC1	NO
0079	03432	135715	ISZ ARYAD,I	YES, NOTE SECOND SUBSCRIPT
0080	03433	114221	JSB PGINT,I	FETCH SECOND
0081	03434	000460	DEF M256	INTEGER SUBSCRIPT BOUND
0082	03435	002001	RSS	
0083	03436	006404	SBSC1 CLB,INB	SET ONE-DIMENSIONAL CASE
0084	03437	036334	ISZ PFLAG	COM STATEMENT?
0085	03440	027450	JMP SBSC2	NO
0086	03441	070162	STA TEMP2	SAVE CHARACTER
0087	03442	060001	LDA 1	
0088	03443	030161	IOR TEMP1	RETRIEVE FIRST BOUND
0089	03444	015336	JSB MDIM	FIND STORAGE NEED

0000	03445	040166	ADA	TEMPS+7	UPDATE COM
0001	03446	070166	STA	TEMPS+7	STORAGE POINTER
0002	03447	000162	LDA	TEMP2	RETRIEVE NEXT CHARACTER
0003	03450	004432	008C2	LDB M2	RIGHT PARENTHESIS
0004	03451	015274	JSB	SYNCK	OR
0005	03452	002264	DEF	RPARN-1	RIGHT BRACKET?
0006	03453	027255	JMP	FSC2	NO
0007	03454	060407	LDA	LF	YES, RECORD A
0008	03455	170135	STA	SBPTR,1	RIGHT BRACKET
0009	03456	034135	ISZ	SBPTR	ADJUST S-BUFFER POINTER
0100	03457	015614	JSB	GETCR	FETCH FOLLOWING
0101	03460	000334	LDA	.10	CHARACTER
0102	03461	066332	LDB	DFLAG	DIM OR COM
0103	03462	006092	STB		STATEMENT?
0104	03463	127403	JMP	SBSC2,1	YES
0105	03464	017335	JSB	FPOP	RESTORE FSC LOCAL VARIABLES
0106	03465	004432	LDB	M2	RESTORE
0107	03466	044157	ADD	TEMPS	S-STACK
0108	03467	074157	STB	TEMPS	POINTER
0109	03470	006094	INB		FETCH
0110	03471	164001	LDB	1,1	RETURN ADDRESS
0111	03472	124001	JMP	1,1	AND EXIT
0112	03473	003403	008C3	LDA	SAVE
0113	03474	064157	LDB	TEMPS	RETURN ADDRESS
0114	03475	017371	JSB	SSOV	ON S-STACK
0115	03476	017353	JSB	FRCUR	SAVE FSC LOCAL VARIABLES
0116	03477	004441	LDB	M9	SET MULTIPLE STORE FLAG
0117	03500	076330	STB	MSFLB	TO FALSE
0118	03501	061715	LDA	ARYAD	SAVE
0119	03502	064157	LDB	TEMPS	OPERAND
0120	03503	017371	JSB	SSOV	ADDRESS
0121	03504	017114	JSB	FSC	GET SUBSCRIPT FORMULA
0122	03505	007400	CCB		CANCEL
0123	03506	044135	ADD	SBPTR	END-OF-FORMULA
0124	03507	074135	STB	SBPTR	OPERATOR
0125	03510	064432	LDB	M2	RESTORE
0126	03511	044157	ADD	TEMPS	S-STACK
0127	03512	074157	STB	TEMPS	POINTER
0128	03513	006094	INB		RESTORE
0129	03514	164001	LDB	1,1	OPERAND
0130	03515	075715	STB	ARYAD	ADDRESS
0131	03516	007400	CCB		IS THE
0132	03517	015274	JSB	SYNCK	NEXT CHARACTER
0133	03520	002270	DEF	SCHNA-1	A COMMA?
0134	03521	027450	JMP	008C2	NO
0135	03522	136715	ISZ	ARYAD,1	YES, NOTE SECOND SUBSCRIPT
0136	03523	017114	JSB	FSC	GET SUBSCRIPT FORMULA
0137	03524	007400	CCB		CANCEL
0138	03525	044135	ADD	SBPTR	END-OF-FORMULA
0139	03526	074135	STB	SBPTR	OPERATOR
0140	03527	027450	JMP	008C2	

0142**

0143*** CHECK SYNTAX OF ARRAY DEFINITIONS **

0144**

0145	03530	000000	ARRYS	NOP	
0146	03531	017544		JSB ARRID	FETCH ARRAY IDENTIFIER
0147	03532	017403		JSB SBSCK	RECORD A SUBSCRIPT
0148	03533	014477		JSB ERROR	MISSING SUBSCRIPT
0149	03534	050334	ARRE1	CPA .10	END-OF-STATEMENT?
0150	03535	127530		JMP ARYS,I	YES, RETURN VIA (P+1)
0151	03536	007400		CCB	NO,
0152	03537	015274		JSB SYMCK	MUST BE
0153	03540	002260		DEF COMMA-1	A COMMA
0154	03041	024266		JMP NOEOF	ISN'T
0155	03542	037530		ISZ ARYS	IS, RETURN
0156	03543	127530		JMP ARYS,I	VIA (P+2)

0157**

0158*** FETCH ARRAY IDENTIFIER **

0159**

0160	03544	000000	ARRID	NOP	
0161	03545	017635		JSB LTR	FETCH LETTER
0162	03546	014477		JSB ERROR	NONE FOUND
0163	03047	060135	ARRE2	LDA SBPTR	SAVE
0164	03550	071715		STA ARYAD	OPERAND ADDRESS
0165	03551	060161		LDA TEMP1	RECORD
0166	03552	064355		LDB .46	ARRAY
0167	03553	017650		JSB STROP	IDENTIFIER
0168	03554	060162		LDA TEMP2	RETRIEVE FOLLOWING CHARACTER
0169	03555	127544		JMP ARRID,I	

0170**

0171*** CHECK FOR VARIABLE OPERAND **

0172**

0173	03556	000000	VAROP	NOP	
0174	03557	017635		JSB LTR	LETTER?
0175	03560	127556		JMP VAROP,I	NO, EXIT VIA (P+1)
0176	03561	037556		ISZ VAROP	
0177	03562	050351		CPA .40	LEFT PARENTHESIS?
0178	03563	027624		JMP VARO5	YES
0179	03564	050373		CPA B133	NO, LEFT BRACKET?
0180	03565	027624		JMP VARO5	YES
0181	03566	037556		ISZ VAROP	NO
0182	03567	015670		JSB DIGCK	DIGIT?
0183	03570	027600		JMP VARO1	NO
0184	03571	060161		LDA TEMP1	YES, RETRIEVE LETTER,
0185	03572	044357		ADB .48	AND RESTORE ASCII DIGIT
0186	03573	074161		STB TEMP1	
0187	03574	017650		JSB STROP	RECORD VARIABLE
0188	03575	015614		JSB GETCR	FETCH FOLLOWING
0189	03576	060334		LDA .10	CHARACTER
0190	03577	027604		JMP VARO2	
0191	03600	060161	VARO1	LDA TEMP1	RETRIEVE LETTER,
0192	03601	064356		LDB .47	SET 'NO DIGIT',
0193	03602	017650		JSB STROP	AND RECORD VARIABLE
0194	03603	060162		LDA TEMP2	RETRIEVE FOLLOWING CHARACTER
0195	03604	070162	VARO2	STA TEMP2	SAVE CHARACTER
0196	03605	006400		CLB	INSIDE A
0197	03606	056334		CPB PFLAG	DEF STATEMENT?

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0198	03607	127556	JMP	VAROP,1	NO, EXIT VIA (P+3)
0199	03610	007400	CC8		
0200	03611	044135	ADB	SBPTR	RETRIEVE
0201	03612	100001	LDA	1,1	
0202	03613	010401	AND	MSK1	OPERAND
0203	03614	002334	CPA	PFLAG	MATCH PARAMETER?
0204	03615	027620	JMP	VAR04	YES
0205	03616	000102	VAR03	LDA TEMP2	NO, RETRIEVE
0206	03617	127556	JMP	VAROP,1	CHARACTER AND EXIT VIA (P+3)
0207	03620	100001	VAR04	LDA 1,1	GET OPERAND TO
0208	03621	030470	IOR	FLGBT	ACTUAL PARAMETER
0209	03622	179001	STA	1,1	AND RECORD IT
0210	03623	027616	JMP	VAR03	
0211	03624	000135	VAR05	LDA SBPTR	SAVE
0212	03625	071715	STA	ARYAD	OPERAND ADDRESS
0213	03626	000161	LDA	TEMP1	RETRIEVE LETTER
0214	03627	004355	LDB	.46	RECORD
0215	03630	017650	JSB	STROP	ARRAY IDENTIFIER
0216	03031	000373	LDA	B133	RETRIEVE LEFT BRACKET
0217	03632	017403	JSB	SBSCK	FETCH SUBSCRIPT
0218	03633	000000	NOP		
0219	03634	127556	JMP	VAROP,1	EXIT VIA (P+2)
0220**					
0221*** FETCH A LETTER **					
0222**					
0223	03635	000000	LTR	NOP	
0224	03636	010614	JSB	GETCR	
0225	03637	000334	LDA	.10	
0226	03640	015603	JSB	LETCK	LETTER?
0227	03641	127635	JMP	LTR,1	NO, EXIT VIA (P+1)
0228	03642	037635	ISZ	LTR	YES,
0229	03643	070161	STA	TEMP1	SAVE IT
0230	03644	015614	JSB	GETCR	NEXT CHARACTER
0231	03645	000334	LDA	.10	TO (A)
0232	03646	070162	STA	TEMP2	SAVE SECOND CHARACTER
0233	03647	127635	JMP	LTR,1	EXIT VIA (P+2)
0234**					
0235*** STORE AN OPERAND NAME **					
0236**					
0237	03650	000000	STROP	NOP	LETTER IN (A), NUMBER IN (B)
0238	03651	040453	ADA	D100	NUMERICALLY ADJUST THE
0239	03652	044451	ADB	D53	OPERAND NAME
0240	03653	001700	ALF		COMBINE THE
0241	03654	030001	IOR	1	TWO PARTS
0242	03655	130135	IOR	SBPTR,1	COMPLETE OPERAND-OPERATOR PAIR
0243	03656	170135	STA	SBPTR,1	AND STORE IT
0244	03657	034135	ISZ	SBPTR	UPDATE S-BUFFER POINTER
0245	03660	127650	JMP	STROP,1	

0247**

0248*** CHECK FOR LEFT PARENTHESIS **

0249**

0250	03661	000000	LPCK	NOP	CHARACTER IN (A)
0251	03662	064432		LDB M2	LEFT PARENTHESIS
0252	03663	015274		JSB SYMCK	OR
0253	03664	002320		DEF LBRAC-1	LEFT BRACKET?
0254	03665	027201		JMP FSCE1	NO
0255	03666	060413		LDA B2300	YES, RECORD A
0256	03667	170135		STA SBPTR,I	LEFT PARENTHESIS
0257	03670	127661		JMP LPCK,I	EXIT

0258**

0259*** CHECK FOR RIGHT PARENTHESIS **

0260**

0261	03671	000000	RPCK	NOP	
0262	03672	064432		LDB M2	RIGHT PARENTHESIS
0263	03673	015274		JSB SYMCK	OR
0264	03674	002264		DEF RPARN-1	RIGHT BRACKET?
0265	03675	027255		JMP FSCE2	NO
0266	03676	060406		LDA B4000	YES, RECORD A
0267	03677	170135		STA SBPTR,I	RIGHT PARENTHESIS
0268	03700	034135		ISZ SBPTR	UPDATE SYNTAX BUFFER POINTER
0269	03701	015614		JSB GETCR	FETCH
0270	03702	050334		LDA .10	FOLLOWING CHARACTER
0271	03703	127671		JMP RPCK,I	

0272**

0273*** FETCH MAT STATEMENT SUBSCRIPT **

0274**

0275	03704	000000	MATSB	NOP	
0276	03705	064432		LDB M2	LEFT PARENTHESIS
0277	03706	015274		JSB SYMCK	OR
0278	03707	002320		DEF LBRAC-1	LEFT BRACKET?
0279	03710	127704		JMP MATSB,I	NO
0280	03711	037704		ISZ MATSB	YES, SET RETURN ADDRESS
0281	03712	060412		LDA B2200	RECORD A
0282	03713	170135		STA SBPTR,I	LEFT BRACKET
0283	03714	017114		JSB FSC	FETCH SUBSCRIPT
0284	03715	007400		CCB	
0285	03716	015274		JSB SYMCK	COMMA?
0286	03717	002260		DEF COMMA-1	
0287	03720	062001		RSS	NO
0288	03721	017114		JSB FSC	YES, FETCH SUBSCRIPT
0289	03722	064432		LDB M2	RIGHT PARENTHESIS
0290	03723	015274		JSB SYMCK	OR
0291	03724	002264		DEF RPARN-1	RIGHT BRACKET
0292	03725	027255		JMP FSCE2	
0293	03726	060407		LDA LF	RECORD A
0294	03727	170135		STA SBPTR,I	RIGHT BRACKET
0295	03730	034135		ISZ SBPTR	
0296	03731	015614		JSB GETCR	END-OF-STATEMENT?
0297	03732	124252		JMP ACCST,I	YES
0298	03733	127704		JMP MATSB,I	

0300**

0301*** FETCH PARENTHESESIZED FORMULA **

0302**

0303	03734	000000	GETPF	NOP	
0304	03735	015614	JSB	GETCR	
0305	03736	024265	JMP	EOF	
0306	03737	034135	ISZ	SBPTR	
0307	03740	017661	JSB	LPCK	FETCH LEFT PARENTHESIS
0308	03741	017114	JSB	FSC	FETCH FORMULA
0309	03742	017671	JSB	RPCK	GET RIGHT PARENTHESIS
0310	03743	127734	JMP	GETPF,1	

0311**

0312*** FLAG OPERATOR WHICH PRECEDES NUMBER **

0313**

0314	03744	000000	NUMOP	NOP	
0315	03745	070164	STA	TEMP4	
0316	03746	064433	LDB	M3	FETCH
0317	03747	044135	ADB	SBPTR	PRECEDING
0318	03750	160001	LDA	1,1	OPERATOR
0319	03751	030470	IOR	FLGBT	ADD FLAG BIT
0320	03752	170001	STA	1,1	REPLACE OPERATOR
0321	03753	060164	LDA	TEMP4	
0322	03754	127744	JMP	NUMOP,1	

0324*

0325* SYSTEM COMMAND TABLE

0326*

0327	03755	000003	SYCMD	OCT 00003	
0328	03756	051125		ASC 2,RUN	EXECUTE PROGRAM
0329*					
0330	03760	002003		OCT 02003	
0331	03761	051503		ASC 2,SCR	SCRATCH PROGRAM
0332*					
0333	03763	003004		OCT 03004	
0334	03764	046111		ASC 2,LIST	LIST COMMAND
0335*					
0336	03766	005005		OCT 05005	
0337	03767	050114		ASC 3,PLIST	PUNCH LIST COMMAND
0338*					
0339	03772	012003		OCT 12003	
0340	03773	050124		ASC 2,PTA	ACTIVATE PHOTO-READER
0341*					
0342	03775	033004		OCT 33004	
0343	03776	051524	STCMD	ASC 2,STOP	ABORT CURRENT ACTIVITY
0344*					
0345	04000	046003		OCT 46003	
0346	04001	052101		ASC 2,TAP	ACTIVATE TTY TAPE MODE
0347*					
0348	04003	050003		OCT 50003	
0349	04004	041131		ASC 2,BYE	EXIT SYSTEM

0350**

0351*** PRINT NAME TABLE FOR OPERATORS **

0352**

0353	04006	032003	LET	OCT 32003	BITS 15-9 OF THE LABELLED WORD
0354	04007	046105		ASC 2,LET	
0355	04011	033003	DIM	OCT 33003	ARE THE BASIC CODE OPERATOR
0356	04012	042111		ASC 2,DIM	
0357	04014	034003	COM	OCT 34003	NUMBERS. BITS 2-0 ARE THE
0358	04015	041517		ASC 2,COM	
0359	04017	035003	DEF	OCT 35003	LENGTH IN CHARACTERS OF THE
0360	04020	042105		ASC 2,DEF	
0361	04022	036003	REM	OCT 36003	SYMBOL. THE ASCII VERSION OF
0362	04023	051105		ASC 2,REM	
0363	04025	037004	GOTO	OCT 37004	THE SYMBOL FOLLOWS.
0364	04026	043517		ASC 2,GOTO	
0365	04030	040002	IF	OCT 40002	
0366	04031	044506		ASC 1,IF	
0367	04032	041003	FOR	OCT 41003	
0368	04033	043117		ASC 2,FOR	
0369	04035	042004	NEXT	OCT 42004	
0370	04036	047105		ASC 2,NEXT	
0371	04040	043005	GOSUB	OCT 43005	
0372	04041	043517		ASC 3,GOSUB	
0373	04044	044006	RTRN	OCT 44006	
0374	04045	051105		ASC 3,RETURN	
0375	04050	045003	END	OCT 45003	
0376	04051	042516		ASC 2,END	
0377	04053	046004	STP	OCT 46004	
0378	04054	051524		ASC 2,STOP	
0379	04056	047004	WAIT	OCT 47004	

0380	04057	053501		ASC	2, WAIT
0381	04061	050004	CALL	OCT	50004
0382	04062	041501		ASC	2, CALL
0383	04064	051004	DATA	OCT	51004
0384	04065	042101		ASC	2, DATA
0385	04067	052004	READ	OCT	52004
0386	04070	051105		ASC	2, READ
0387	04072	053005	PRINT	OCT	53005
0388	04073	050122		ASC	3, PRINT
0389	04076	054005	INPUT	OCT	54005
0390	04077	044516		ASC	3, INPUT
0391	04102	055007	RSTOR	OCT	55007
0392	04103	051105		ASC	4, RESTORE
0393	04107	056003	MAT	OCT	56003
0394	04110	046501		ASC	2, MAT
0395	04112	057004	THEN	OCT	57004
0396	04113	052110		ASC	2, THEN
0397	04115	060002	TO	OCT	60002
0398	04116	052117		ASC	1, TO
0399	04117	061004	STEP	OCT	61004
0400	04120	051524		ASC	2, STEP
0401	04122	027003	NOT	OCT	27003
0402	04123	047117		ASC	2, NOT
0403	04125	026003	AND	OCT	26003
0404	04126	040516		ASC	2, AND
0405	04130	025002	OR	OCT	25002
0406	04131	047522		ASC	1, OR
0407	04132	030002	GTE	OCT	30002
0408	04133	037075		ASC	1, >=
0409	04134	031002	LTE	OCT	31002
0410	04135	036075		ASC	1, <=
0411	04136	017002	AUNEQ	OCT	17002
0412	04137	036076		ASC	1, <>
0413*					
0414	04140	001003	TAB	OCT	1003
0415	04141	052101		ASC	2, TAB
0416	04143	002003	SIN	OCT	2003
0417	04144	051511		ASC	2, SIN
0418	04146	003003	COS	OCT	3003
0419	04147	041517		ASC	2, COS
0420	04151	004003	TAN	OCT	4003
0421	04152	052101		ASC	2, TAN
0422	04154	006003	ATN	OCT	5003
0423	04155	040524		ASC	2, ATN
0424	04157	006003	EXP	OCT	6003
0425	04160	042530		ASC	2, EXP
0426	04162	007003	LOG	OCT	7003
0427	04163	046117		ASC	2, LOG
0428	04165	010003	ABS	OCT	10003
0429	04166	040502		ASC	2, ABS
0430	04170	011003	SQR	OCT	11003
0431	04171	051521		ASC	2, SQR
0432	04173	012003	INT	OCT	12003
0433	04174	044516		ASC	2, INT
0434	04176	013003	RND	OCT	13003
0435	04177	051116		ASC	2, RND

ALTERNATE UNEQUAL SIGN

THIS SECTION HAS THE PRE-DEFINED
FUNCTIONS. HERE BITS 13-9 ARE
THE IDENTIFYING NUMBER OF THE
FUNCTION.

0436	04201	014003	SGN	OCT 14003
0437	04202	051507		ASC 2,SGN
0438	04204	015003	ZER	OCT 15003
0439	04205	055105		ASC 2,ZER
0440	04207	016003	CON	OCT 16003
0441	04210	041517		ASC 2,CON
0442	04212	017003	IDN	OCT 17003
0443	04213	044504		ASC 2,IDN
0444	04215	020003	INV	OCT 20003
0445	04216	044516		ASC 2,INV
0446	04220	021003	TRN	OCT 21003
0447	04221	052122		ASC 2,TRN

MATRIX FUNCTIONS

0448**

0449*** TABLE SEARCH FOR MULTICHARACTER SYMBOLS **

0450**

0451	04223	000000	TBSRH	NOP	
0452	04224	072333		STA TABLE	STORE TABLE ADDRESS
0453	04225	074167		STB LNTH	STORE -(NUMBER OF ENTRIES)
0454	04226	060132		LDA BADDR	SAVE
0455	04227	070163		STA TEMP3	INPUT
0456	04230	060133		LDA CCNT	BUFFER
0457	04231	070164		STA TEMP4	STATUS
0458	04232	060135		LDA SBPTR	INITIALIZE END-OF-SYMBOL
0459	04233	072351		STA SMEND	POINTER
0460	04234	002404		CLA,INA	COUNT FIRST CHARACTER OF
0461	04235	072556		STA SLENG	SYMBOL
0462	04236	160135		LDA SBPTR,I	FETCH PARTIAL SYMBOL
0463	04237	010374		AND B177	TWO
0464	04240	150135		CPA SBPTR,I	CHARACTERS?
0465	04241	002001		RSS	NO
0466	04242	026265		JMP TSR10	YES
0467	04243	001727		ALF,ALF	LEFT-JUSTIFY
0468	04244	030345		IOR .32	FIRST CHARACTER AND
0469	04245	170135		STA SBPTR,I	APPEND BLANK
0470	04246	015614	TSRC1	JSB GETCR	FETCH NEXT CHARACTER
0471	04247	026326		JMP TSRC9	END-OF-STATEMENT
0472	04250	066556		LDB SLENG	CHECK FOR
0473	04251	054331		CPB .7	IMPOSSIBLE LENGTH
0474	04252	026326		JMP TSRC9	
0475	04253	004010		SLB	EVEN-NUMBERED CHARACTER?
0476	04254	026262		JMP TSRC2	YES
0477	04255	036351		ISZ SMEND	NO, FETCH FRESH WORD,
0478	04256	001727		ALF,ALF	LEFT-JUSTIFY CHARACTER,
0479	04257	030345		IOR .32	APPEND BLANK,
0480	04260	172351		STA SMEND,I	AND STORE
0481	04261	026265		JMP TSR10	
0482	04262	040450	TSRC2	ADA M32	DELETE BLANK,
0483	04263	142351		ADA SMEND,I	FILL SECOND CHARACTER,
0484	04264	172351		STA SMEND,I	AND STORE
0485	04265	030556	TSR10	ISZ SLENG	COUNT IT
0486	04266	064167		LDB LNTH	INITIALIZE TABLE LENGTH
0487	04267	074165		STB COUNT	COUNTER
0488	04270	062333		LDA TABLE	
0489	04271	072513	TSRC3	STA TBLPT	SET TABLE POINTER
0490	04272	162513		LDA TBLPT,I	EXTRACT SYMBOL LENGTH
0491	04273	010331		AND .7	FROM TABLE AND COMPARE

0492	04274	052556	CPA	SLENG	WITH CURRENT SYMBOL
0403	04275	026304	JMP	TSRC5	EQUAL?
0494	04276	040326	TSRC4	ADA .3	DIFFERENT,
0495	04277	001100	AR8		UPDATE
0496	04300	042513	ADA	TBLPT	TABLE POINTER
0497	04301	034165	ISZ	COUNT	MORE ENTRIES?
0498	04302	026271	JMP	TSRC3	YES
0499	04303	026246	JMP	TSRC1	NO
0500	04304	060513	TSRC5	LDB TBLPT	SET POINTER TO
0501	04305	070537	STB	TSPTR	TABLE SYMBOL
0502	04306	064135	LDB	SBPTR	SET (B) TO INPUT
0503	04307	026313	JMP	TSRC7	SYMBOL POINTER
0504	04310	056351	TSRC6	CP0 SMEND	ALL OF SYMBOL CONSIDERED?
0505	04311	026321	JMP	TSRC8	YES, MATCH OCCURRED
0506	04312	006004	INB		NO, INCREMENT
0507	04313	036837	TSRC7	ISZ TSPTR	SYMBOL POINTERS
0508	04314	162837	LDA	TSPTR,1	FETCH WORD FROM TABLE
0509	04315	150001	CPA	1,1	MATCH WITH INPUT SYMBOL?
0510	04316	026310	JMP	TSRC6	YES
0511	04317	062556	LDA	SLENG	NO, WRONG
0512	04320	026276	JMP	TSRC4	SYMBOL
0513	04321	162513	TSRC8	LDA TBLPT,1	EXTRACT
0514	04322	010420	AND	OPMSK	SYMBOL CODE
0515	04323	170135	STA	SBPTR,1	
0516	04324	036223	ISZ	TBSRH	AND RETURN VIA
0517	04325	126223	JMP	TBSRH,1	'SUCCESS' EXIT
0518	04326	060163	TSRC9	LDA TEMP3	RESTORE
0519	04327	070132	STA	BADDR	INPUT
0520	04330	060164	LDA	TEMP4	BUFFER
0521	04331	070133	STA	CCNT	STATUS
0522	04332	126223	JMP	TBSRH,1	'FAILURE' EXIT
0523**					
0524***	FETCH AND RECORD PROGRAM INTEGER **				
0525**					
0526	04333	000000	PRGIN	NOP	
0527	04334	160135	LDA	SBPTR,1	SET
0528	04335	030470	IOR	FLGBT	'INTEGER
0529	04336	040326	ADA	.3	FOLLOWS'
0530	04337	170135	STA	SBPTR,1	OPERAND
0531	04340	162333	LDA	PRGIN,1	GIVE ADDRESS
0532	04341	072346	STA	PRG11	TO INTCK
0533	04342	034135	ISZ	SBPTR	
0534	04343	015614	JSB	GETCK	
0535	04344	014477	SYE25	JSB ERROR	
0536	04345	016351	JSB	INTCK	FETCH
0537	04346	000000	PRG11	NOP	
0538	04347	036333	ISZ	PRGIN	
0539	04350	126333	JMP	PRGIN,1	
0540**					
0541***	BUILD AN INTEGER **				
0542**					
0543	04351	000000	INTCK	NOP	CHARACTER IN (A)
0544	04352	006400	CLB		STORE
0545	04353	076556	STB	INTGR	PARTIAL RESULT
0546	04354	015570	INTC1	JSB DI0CK	DIGIT?
0547	04355	026373	JMP	INTC2	NO

0548	04356	103101	CLO	
0549	04357	066556	LDB INTGR	MULTIPLY
0550	04360	044001	ADB 1	PARTIAL
0551	04361	044001	ADB 1	RESULT
0552	04362	046556	ADB INTGR	BY
0553	04363	044001	ADB 1	10
0554	04364	044000	ADB 0	ADD LATEST DIGIT
0555	04365	102201	SOC	OVERFLOW?
0556	04366	026344	JMP SYE25	YES
0557	04367	076556	STB INTGR	STORE PARTIAL RESULT
0558	04370	015614	JSB GETCR	NO, FETCH
0559	04371	060334	LDA .10	NEXT CHARACTER
0560	04372	026354	JMP INTC1	
0561	04373	066556	INTC2 LDB INTGR	ZERO
0562	04374	006003	SZB,RSS	INTEGER?
0563	04375	026344	JMP SYE25	YES
0564	04376	174135	STB SBPTR,I	NO, RECORD IT
0565	04377	166351	LDB INTCK,I	INTEGER
0566	04400	164001	LDB 1,I	TOO
0567	04401	046556	ADB INTGR	LARGE?
0568	04402	006021	SSB,RSS	
0569	04403	026344	JMP SYE25	YES
0570	04404	066556	LDB INTGR	NO,
0571	04405	034135	ISZ SBPTR	RETURN WITH
0572	04406	036351	ISZ INTCK	INTEGER
0573	04407	126351	JMP INTCK,I	IN (B)
0574**				
0575***	PROCESS CHARACTER STRING	**		
0576**				
0577	04410	000000	CHRST NOP	
0578	04411	070162	STA TEMP2	RECORD TERMINATOR CHARACTER
0579	04412	060334	LDA .10	DUMMY
0580	04413	070476	STA BLANK	DELETE CHARACTER
0581	04414	015614	CHRS1 JSB GETCR	
0582	04415	026433	JMP CHRS3	TO END-OF-STATEMENT EXIT
0583	04416	060162	CPA TEMP2	TERMINATOR CHARACTER?
0584	04417	026432	JMP CHRS2	YES
0585	04420	130135	IOR SBPTR,I	NO, FILL
0586	04421	170135	STA SBPTR,I	SECOND CHARACTER
0587	04422	015614	JSB GETCR	
0588	04423	026433	JMP CHRS3	TO END-OF-STATEMENT EXIT
0589	04424	060162	CPA TEMP2	TERMINATOR CHARACTER?
0590	04425	026432	JMP CHRS2	YES
0591	04426	034135	ISZ SBPTR	NO, MOVE TO NEW WORD
0592	04427	001727	ALF,ALF	AND STORE
0593	04430	170135	STA SBPTR,I	FIRST CHARACTER
0594	04431	026414	JMP CHRS1	
0595	04432	036410	CHRS2 ISZ CHRST	SET (P+2) EXIT
0596	04433	034135	CHRS3 ISZ SBPTR	MOVE TO NEXT BUFFER WORD
0597	04434	060345	LDA .32	RESTORE BLANK AS
0598	04435	070476	STA BLANK	DELETE CHARACTER
0599	04436	126410	JMP CHRST,I	

0601**

0602*** DELETE STATEMENT **

0603**

0604	04437	160134	DLSTM	LDA	SBUFA,I	LOAD SEQUENCE NUMBER
0605	04440	016513		JSB	FNDPS	FIND STATEMENT TO BE DELETED
0606	04441	124204		JMP	PEXMA,I	DOESN'T
0607	04442	124204		JMP	PEXMA,I	EXIST
0608	04443	002400		CLA		ZERO WORD SKIP FOR DESTINATION
0609	04444	006004		INB		ADDRESS OF SOURCE WORD SKIP IN B
0610	04445	016537		JSB	CLPRG	CLOSE UP PROGRAM
0611	04446	124204		JMP	PEXMA,I	EXIT TO PHASE 1 WAIT

0612*

0613*** **

0614** ACCEPT STATEMENT **

0615*** **

0616*

0617	04447	060134	ACTST	LDA	SBUFA	COMPUTE
0618	04450	003004		CMA,INA		LENGTH
0619	04451	040135		ADA	SBPTR	OF STATEMENT
0620	04452	170160		STA	TEMP,I	AND RECORD IT
0621	04453	160134		LDA	SBUFA,I	LOAD SEQUENCE NUMBER
0622	04454	016513		JSB	FNDPS	SEARCH ON SEQUENCE NUMBER
0623	04455	025472		JMP	ACCS1	APPEND STATEMENT TO PROGRAM
0624	04456	026507		JMP	ACCS4	INSERT STATEMENT IN PROGRAM
0625	04457	006004		INB		REPLACE STATEMENT IN PROGRAM
0626	04460	160001		LDA	1,I	COMPARE LENGTHS OF
0627	04461	003004		CMA,INA		STATEMENT BEING REPLACED
0628	04462	140160		ADA	TEMP,I	AND STATEMENT
0629	04463	002003		SZA,RSS		REPLACING IT
0630	04464	026474		JMP	ACCS2	EQUAL
0631	04465	002021		SSA,RSS		
0632	04466	026510		JMP	ACCS4+1	SHORTER
0633	04467	160160		LDA	TEMP,I	LONGER,
0634	04470	016537		JSB	CLPRG	CLOSE UP PROGRAM
0635	04471	026474		JMP	ACCS2	
0636	04472	160160	ACCS1	LDA	TEMP,I	LOAD PROGRAM SPACE REQUIREMENT
0637	04473	016556		JSB	OVCHK	SUFFICIENT PROGRAM SPACE LEFT?
0638	04474	006400	ACCS2	CLB		YES, SET COUNTER TO ZERO
0639	04475	060134		LDA	SBUFA	INITIALIZE
0640	04476	070162		STA	TEMP2	SOURCE ADDRESS
0641	04477	160162	ACCS3	LDA	TEMP2,I	TRANSFER WORD FROM
0642	04500	170163		STA	TEMP3,I	S-BUFFER TO PROGRAM SPACE
0643	04501	034162		ISZ	TEMP2	INCREMENT SOURCE AND
0644	04502	034163		ISZ	TEMP3	DESTINATION ADDRESSES
0645	04503	006004		INB		BUMP COUNTER
0646	04504	154160		CPH	TEMP,I	ENTIRE STATEMENT MOVED?
0647	04505	124204		JMP	PEXMA,I	YES
0648	04506	026477		JMP	ACCS3	NO
0649	04507	160160	ACCS4	LDA	TEMP,I	LOAD PROGRAM SPACE REQUIREMENT
0650	04510	016556		JSB	OVCHK	SUFFICIENT PROGRAM SPACE LEFT?
0651	04511	014554		JSB	MYTON	MAKE
0652	04512	026474		JMP	ACCS2	ROOM

0654**

0655*** FIND SEQUENTIAL POSITION **

0656**

0657	04513	000000	FNDPS	NOP	
0658	04514	070163		STA TEMP3	SAVE SEQUENCE NUMBER
0659	04515	064112		LDB PBUFF	STARTING ADDRESS
0660	04516	054113	FNEP1	CPB PBPTR	END OF PROGRAM?
0661	04517	026035		JMP FNDP4	YES, EXIT VIA (P+1)
0662	04520	160001		LDA 1,I	SUBTRACT PROGRAM
0663	04521	003004		CMA,INA	SEQUENCE NUMBER FROM
0664	04522	040163		ADA TEMP3	S-BUFFER SEQUENCE NUMBER
0665	04523	002003		SZA,RSS	EQUAL?
0666	04524	026533		JMP FNDP2	YES, SET EXIT TO (P+3)
0667	04525	002020		SSA	NO, P-SEQ NO > S-SEQ NO ?
0668	04526	026534		JMP FNDP3	YES, SET EXIT TO (P+2)
0669	04527	060001		LDA 1	POINT (A) TO
0670	04530	002004		INA	PROGRAM ADDRESS INCREMENT
0671	04531	144000		ADB 0,I	COMPUTE NEW ADDRESS
0672	04532	026516		JMP FNDP1	
0673	04533	036513	FNEP2	ISZ FNDPS	
0674	04534	036513	FNEP3	ISZ FNDPS	
0675	04535	074163	FNDP4	STB TEMP3	SAVE STATEMENT ADDRESS
0676	04536	126513		JMP FNDPS,I	

0677**

0678*** DELETE SPACE IN PROGRAM **

0679**

0680	04537	000000	CLFRG	NOP	REFERENCE LOCATION IN TEMP3
0681	04540	040163		ADA TEMP3	SKIP (A) LOCATIONS FROM TEMP3
0682	04541	070164		STA TEMP4	AND SAVE DESTINATION ADDRESS
0683	04542	164001		LDB 1,I	SKIP TO END OF STATEMENT BEING
0684	04543	044163		ADB TEMP3	DELETED, SOURCE ADDRESS IN (B)
0685	04544	054113	CLPR1	CPB PBPTR	ALL OF PROGRAM MOVED?
0686	04545	026553		JMP CLPR2	YES
0687	04546	160001		LDA 1,I	NO, MOVE WORD FROM SOURCE TO
0688	04547	170164		STA TEMP4,I	DESTINATION ADDRESS
0689	04550	034164		ISZ TEMP4	INCREMENT DESTINATION ADDRESS
0690	04551	006004		INB	INCREMENT SOURCE ADDRESS
0691	04552	026544		JMP CLPR1	
0692	04553	060164	CLPR2	LDA TEMP4	SET END-OF-PROGRAM
0693	04554	070113		STA PBPTR	POINTER
0694	04555	126537		JMP CLPRG,I	

0695**

0696*** CHECK FOR PROGRAM SPACE OVERFLOW **

0697**

0698	04556	000000	OVCHK	NOP	NEW WORD REQUIREMENT IN (A)
0699	04557	064113		LDB PBPTR	SET SOURCE ADDRESS
0700	04560	074162		STB TEMP2	FOR PROGRAM RELOCATION
0701	04561	044000		ADB 0	SET DESTINATION
0702	04562	074164		STB TEMP4	ADDRESS
0703	04563	007004		CMA,INB	ENOUGH
0704	04564	044106		ADB LWBH	FREE
0705	04565	006020		SSB	SPACE?
0706	04566	124271		JMP FSCEF,I	NO, PROGRAM SPACE OVERFLOW
0707	04567	064164		LDB TEMP4	YES, RELOCATE FREE
0708	04570	074113		STB PBPTR	PROGRAM SPACE POINTER
0709	04571	126556		JMP OVCHK,I	

0002*

0003* *****

0004*** ***

0005*** LIST THE PROGRAM ***

0006*** ***

0007* *****

0008*

0009	04572	064112	LIST	LDB PBUFF	INITIALIZE TO FIRST
0010	04573	074157		STB TEMPS	STATEMENT OF PROGRAM
0011	04574	015614		JSB GETCR	SEQUENCE NUMBER GIVEN?
0012	04575	026607		JMP LIST0	NO
0013	04576	064131		LDB .BUFA	YES, SET FOR
0014	04577	074135		STB SBPTR	SEQUENCE NUMBER
0015	04600	114216		JSB INCHK,1	FETCH
0016	04601	000463		DEF MAXSN	IT
0017	04602	160131		LDA .BUFA,1	LOAD SEQUENCE NUMBER
0018	04603	016513		JSB FNDPS	FIND INTIAL STATEMENT
0019	04604	124205		JMP RDYDA,1	
0020	04605	000000		NOP	SAVE
0021	04606	074157		STB TEMPS	ADDRESS
0022	04607	006400	LIST0	CLB	HIGH-SPEED
0023	04610	054136		CPB TFLAG	PUNCH?
0024	04611	026614		JMP LIST1	NO
0025	04612	060373		LDA B133	YES, EMIT
0026	04613	114127		JSB LISTR,1	LEADER
0027	04614	064157	LIST1	LDB TEMPS	MORE
0028	04615	054113		CPB PBPTH	PROGRAM?
0029	04616	027003		JMP LIS13	NO
0030	04617	003400		CCA	INITIALIZE
0031	04620	040134		ADA SBUFA	OUTPUT BUFFER
0032	04621	070132		STA BADDR	POINTER
0033	04622	002400		CLA	INITIALIZE
0034	04623	070133		STA CCNT	CHARACTER COUNT
0035	04624	160157		LDA TEMPS,1	OUTPUT
0036	04625	017015		JSB OUTIN	SEQUENCE NUMBER
0037	04626	060476		LDA BLANK	OUTPUT
0038	04627	015715		JSB OUTCR	BLANK
0039	04630	034157		ISZ TEMPS	FETCH
0040	04631	160157		LDA TEMPS,1	STATEMENT LENGTH
0041	04632	003004		CMA,INA	SET
0042	04633	002004		INA	WORD
0043	04634	071467		STA SLWST	COUNTER
0044	04635	034157	LIST3	ISZ TEMPS	MORE
0045	04636	035467		ISZ SLWST	STATEMENT?
0046	04637	026644		JMP LIST4	YES
0047	04640	064134	LIST2	LDB SBUFA	OUTPUT
0048	04641	060133		LDA CCNT	
0049	04642	114127		JSB LISTR,1	STATEMENT
0050	04643	026614		JMP LIST1	
0051	04644	160157	LIST4	LDA TEMPS,1	
0052	04645	010420		AND OPMSK	
0053	04646	002003		SZA,RSS	NULL OPERATOR?
0054	04647	026670		JMP LIST5	YES
0055	04650	070162		STA TEMP2	NO, SAVE OPERATOR
0056	04651	001727		ALF,ALF	SINGLE
0057	04652	001100		ARS	

0058	04653	064000	LDB 0	CHARACTER
0059	04654	040446	ADA M21	
0060	04655	002021	SSA,RSS	OPERATOR?
0061	04656	026772	JMP LIS12	NO
0062	04657	005000	BLS	YES
0063	04660	006004	INB	LOAD
0064	04661	044301	ADB FOPBS	SYMBOL'S
0065	04662	160001	LDA 1,I	ASCII WORD
0066	04663	061727	ALF,ALF	ADJUST
0067	04664	010376	AND MSK0	CHARACTER
0068	04668	050347	CPA .34	" ?
0069	04666	027011	JMP LIS14	YES
0070	04667	015715	JSB OUTCR	NO
0071	04670	160157	LIST5 LDA TEMPS,I	SAVE
0072	04671	010425	AND OPDMK	OPERAND
0073	04672	070163	STA TEMP3	EXTRACT OPERAND TYPE
0074	04673	010423	AND TYPFL	SET LFLAG FALSE
0075	04674	072333	STA LFLAG	FLAG BIT SET?
0076	04675	002020	SSA	YES
0077	04676	026732	JMP LIST9	NO, NULL OPERAND?
0078	04677	002003	SZA,RSS	YES
0079	04700	026635	JMP LIST3	FUNCTION?
0080	04701	050336	CPA .15	YES
0081	04702	026725	JMP LIST8	
0082	04703	040435	LIST6 ADA M5	LETTER-DIGIT COMBINATION?
0083	04704	002020	SSA	NO
0084	04705	026710	JMP LIST7	YES, SET
0085	04706	003400	CCA	LFLAG FALSE
0086	04707	072333	STA LFLAG	
0087	04710	060163	LIST7 LDA TEMP3	RESTORE AND
0088	04711	001727	ALF,ALF	OUTPUT
0089	04712	001706	ALF	
0090	04713	010374	AND B177	LETTER
0091	04714	040363	ADA B100	DIGIT FOLLOWS?
0092	04715	015715	JSB OUTCR	NO
0093	04716	036333	ISZ LFLAG	YES
0094	04717	026635	JMP LIST3	RESTORE
0095	04720	060163	LDA TEMP3	DIGIT
0096	04721	010336	AND .15	OUTPUT DIGIT
0097	04722	040353	ADA .43	
0098	04723	015715	JSB OUTCR	OUTPUT
0099	04724	026635	JMP LIST3	'F'
0100	04725	060365	LIST8 LDA F	OUTPUT
0101	04726	015715	JSB OUTCR	'N'
0102	04727	060371	LDA N	
0103	04730	015715	JSB OUTCR	NUMBER?
0104	04731	020710	JMP LIST7	NO
0105	04732	020470	LIST9 XOR FLOBT	YES
0106	04733	002102	CLE,SZA	SET SIGN FLAG FALSE
0107	04734	026761	JMP LIS10	
0108	04735	034157	ISZ TEMPS	
0109	04736	070153	STA SIGN	
0110	04737	160157	LDA TEMPS,I	
0111	04740	034157	ISZ TEMPS	
0112	04741	164157	LDB TEMPS,I	
0113	04742	035467	ISZ SLWST	

0114	04743	035467	ISZ	SLWST	
0115	04744	002020	SSA		NEGATIVE NUMBER?
0116	04745	002300	CCE		YES, SET SIGN FLAG TRUE
0117	04746	114220	JSB	NUMOA,1	
0118	04747	000000	NOP		
0119	04750	026635	JMP	LIST3	
0120	04751	050326	LIS10	CPA .3	INTEGER?
0121	04752	026765	JMP	LIS11	YES
0122	04753	050336	CPA	.15	NO, FUNCTION?
0123	04754	002001	RSS		YES
0124	04755	026703	JMP	LIST6	NO, MUST BE A PARAMETER
0125	04756	060163	LDA	TEMP3	COMPUTE
0126	04757	001722	ALF, RAL		PRINT
0127	04760	010420	AND	OPMSK	TABLE
0128	04761	070162	STA	TEMP2	CODE
0129	04762	064322	LDB	ATAB	OUTPUT
0130	04763	017077	JSB	MCOUT	FUNCTION NAME
0131	04764	026635	JMP	LIST3	
0132	04765	034157	LIS11	ISZ TEMPS	OUTPUT
0133	04766	035467	ISZ	SLWST	
0134	04767	160157	LDA	TEMPS,1	INTEGER
0135	04770	017015	JSB	OUTIN	
0136	04771	026635	JMP	LIST3	OPERAND
0137	04772	060476	LIS12	LDA BLANK	OUTPUT
0138	04773	015715	JSB	OUTCR	BLANK
0139	04774	064307	LDB	STTYP	OUTPUT
0140	04775	017077	JSB	MCOUT	OPERATOR
0141	04776	060415	LDA	REMOP	WAS IT
0142	04777	050162	CPA	TEMP2	A REM?
0143	05000	027056	JMP	OUTS1	YES, OUTPUT REMARK
0144	05001	060476	LDA	BLANK	NO, OUTPUT
0145	05002	026667	JMP	LIST5-1	A BLANK
0146	05003	006400	LIS13	CLB	HIGH-SPEED
0147	05004	054136	CPB	TFLAG	PUNCH?
0148	05005	124205	JMP	RDYDA,1	NO
0149	05006	060373	LDA	B133	YES, EMIT
0150	05007	114127	JSB	LISTR,1	TRAILER
0151	05010	124205	JMP	RDYDA,1	
0152	05011	015715	LIS14	JSB OUTCR	OUTPUT "
0153	05012	017055	JSB	OUTST	OUTPUT QUOTE STRING
0154	05013	060347	LDA	.34	OUTPUT
0155	05014	026667	JMP	LIST5-1	
0156*			*		
0157**	OUTPUT AN INTEGER	**			
0158*			*		
0159	05015	000000	OUTIN	NOP	INTEGER IN (A)
0160	05016	064434	LDB	M4	SET
0161	05017	077522	STB	DIGCT	DIGIT COUNTER
0162	05020	067132	LDB	LDVSR	SET DIVISOR
0163	05021	076351	STB	DIVSR	ADDRESS
0164	05022	006400	CLB		SET LEADING
0165	05023	076556	STB	LDZRO	ZERO FLAG
0166	05024	166351	OUT11	LDB DIVSR,1	NEGATE
0167	05025	007004	CMO, INB		AND STORE
0168	05026	076513	STB	MIND	DIVISOR
0169	05027	007400	CCB		SET QUOTIENT

0170	05030	000004		INB	TO ZERO
0171	05031	042513		ADA MIND	SUBTRACT DIVISOR FROM INTEGER
0172	05032	002021		SSA, RSS	NEGATIVE RESULT?
0173	05033	027030		JMP *-3	NO, INCREMENT QUOTIENT
0174	05034	142351		ADA DIVSR, I	YES, RECOVER REMAINDER
0175	05035	073077		STA MCOUT	AND SAVE IT
0176	05036	000001		LDA 1	
0177	05037	002002		SZA	ZERO?
0178	05040	027043		JMP OUT12	NO
0179	05041	052556		CPA LDZRO	YES, LEADING ZERO?
0180	05042	027046		JMP OUT13	YES
0181	05043	040357	OUT12	ADA .48	NO, COMPUTE ASCII FOR DIGIT
0182	05044	072556		STA LDZRO	SET 'ZEROS SIGNIFICANT'
0183	05045	015715		JSB OUTCR	OUTPUT DIGIT
0184	05046	063077	OUT13	LDA MCOUT	RETRIEVE REMAINDER
0185	05047	036351		ISZ DIVSR	SET FOR NEXT DIVISOR
0186	05050	037522		ISZ DIGCT	DIVISION NECESSARY?
0187	05051	027024		JMP OUT11	YES
0188	05052	040357		ADA .48	NO, COMPUTE ASCII FOR LAST
0189	05053	015715		JSB OUTCR	DIGIT AND OUTPUT IT
0190	05054	127015		JMP OUTIN, I	
0191*				*	
0192**	OUTPUT A STRING		**		
0193*			*		
0194	05055	000000	OUTST	NOP	" ENTRY POINT
0195	05056	160157	OUTS1	LDA TEMPS, I	REM ENTRY POINT
0196	05057	010374		AND B177	OUTPUT SECOND CHARACTER
0197	05060	002002		SZA	OF WORD IF
0198	05061	015715		JSB OUTCR	NOT NULL
0199	05062	034157		ISZ TEMPS	BUMP POINTER
0200	05063	035467		ISZ SLWST	REM COMPLETED?
0201	05064	002001		RSS	NO
0202	05065	026640		JMP LIST2	YES
0203	05066	160157		LDA TEMPS, I	EXTRACT
0204	05067	001727		ALF, ALF	FIRST CHARACTER
0205	05070	010374		AND B177	OF WORD
0206	05071	050325		CPA .2	EXIT
0207	05072	127055		JMP OUTST, I	IF A
0208	05073	050326		CPA .3	CLOSING
0209	05074	127055		JMP OUTST, I	QUOTE
0210	05075	015715		JSB OUTCR	OUTPUT
0211	05076	027056		JMP OUTS1	CHARACTER
0212*				*	
0213**	LIST A MULTICHARACTER SYMBOL		**		
0214*			*		
0215	05077	000000	MCCUT	NOP	
0216	05100	160001	MCCU1	LDA 1, I	LOAD INFORMATION WORD
0217	05101	010420		AND OPMSK	COMPARE WITH
0218	05102	050162		CPA TEMP2	OPERATOR CODE
0219	05103	027112		JMP MCCOU2	EQUAL
0220	05104	160001		LDA 1, I	UNEQUAL,
0221	05105	010331		AND .7	COMPUTE
0222	05106	040326		ADA .3	ENTRY
0223	05107	001100		ARS	LENGTH
0224	05110	044000		ADB 0	COMPUTE ADDRESS OF NEXT ENTRY
0225	05111	027100		JMP MCCOU1	

0226	05112	160001	MCCU2	LDA 1,I	COMPUTE
0227	05113	010331		AND .7	ENTRY
0228	05114	003004		CMA,INA	LENGTH
0229	05115	073522		STA DIGCT	AND SAVE IT
0230	05116	006104		CLE,INB	SET FOR FIRST CHARACTER
0231	05117	074163		STB TEMP3	SAVE SYMBOL ADDRESS
0232	05120	160163	MCCU3	LDA TEMP3,I	LOAD WORD
0233	05121	002041		SEZ,RSS	FIRST CHARACTER?
0234	05122	001727		ALF,ALF	YES, POSITION IT
0235	05123	010374		AND B177	EXTRACT CHARACTER
0236	05124	010715		JSB OUTCR	OUTPUT IT
0237	05125	002240		SEZ,CME	SET FOR NEXT CHARACTER
0238	05126	034163		ISZ TEMP3	MOVE TO NEXT WORD OF SYMBOL
0239	05127	037522		ISZ DIGCT	MORE CHARACTERS?
0240	05130	027120		JMP MCCU3	YES
0241	05131	127077		JMP MCCU3,I	
0242*					
0243*					
0244	05132	005133	LDVSR	DEF **1	
0245	05133	023420		DEC 10000	
0246	05134	001750		DEC 1000	
0247	05135	000144		DEC 100	
0248	05136	000012		DEC 10	
0249*					
0250*					
0251	04330		SFLAG	EQU ARRYS	
0252	04333		TABLE	EQU PRGIN	
0253	00167		LNGTH	EQU TEMPS+8	
0254	04351		SMEND	EQU INTCK	
0255	04556		SLENG	EQU OVCHK	
0256	04513		TBLPT	EQU FNDPS	
0257	04537		TSPTR	EQU CLPRG	
0258	04556		INTGR	EQU OVCHK	
0259	04333		LFLAG	EQU PRGIN	
0260	04351		DIVSR	EQU INTCK	
0261	04556		LDZRO	EQU OVCHK	
0262	04513		MIND	EQU FNDPS	

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0264*
0265*
0266*
0267*
0268*
0269*
0270*
0271*
0272*
0273 05137 060113 MFASE LDA PBPTR      NULL
0274 05140 050112      CPA PBUFF      PROGRAM?
0275 05141 124205      JMP RDYDA,I    YES
0276 05142 070115      STA FCORE      NO, SET FOR-TABLE POINTER
0277 05143 060110      LDA FWAM
0278 05144 070170      STA COML      INITIALIZE COMMON POINTER
0279 05145 060117      LDA SYMTA
0280 05146 070116      STA SYMTF      INITIALIZE SYMBOL TABLE POINTER
0281 05147 060112      LDA PBUFF
0282 05100 070135      STA MPTR      INITIALIZE PROGRAM POINTER
0283 05151 164135 MLC01 LDB MPTR,I
0284 05102 074145      STB .LNUM      SET LINE NUMBER
0285 05153 064135      LDB MPTR
0286 05154 034135      ISZ MPTR
0287 05155 144135      ADB MPTR,I    COMPUTE LOCATION OF NEXT
0288 05156 075515      STB MNPTR      STATEMENT AND STORE THIS
0289 05157 034135      ISZ MPTR
0290 05100 160135      LDA MPTR,I    FETCH THE FIRST WORD IN THE
0291 05161 001100 MLC10 ARS              STATEMENT AND SAVE
0292 05162 001727      ALF,ALF        THE STATEMENT TYPE
0293 05163 010362      AND .63
0294 05164 070146      STA TYPE
0295 05165 050355      CPA .46        MAT STATEMENT?
0296 05166 027176      JMP MLC12      YES
0297 05167 050343      CPA .30        NO, REM STATEMENT?
0298 05170 074135      STB MPTR      YES, SET TO SKIP IT
0299 05171 050353      CPA .43        NO, PRINT STATEMENT?
0300 05172 074135      STB MPTR      YES, SET TO SKIP IT
0301 05173 003400      CCA            NO, SET
0302 05174 070171      STA MWDNO      'FIRST VARIABLE'
0303 05175 027212      JMP MLC02+1    FLAG
0304*
0305 05176 060135 MLC12 LDA MPTR      SEEK
0306 05177 002004      INA            SUBSIDIARY
0307 05200 160000      LDA 0,I        STATEMENT
0308 05201 027161      JMP MLC10      TYPE
0309*
0310 05202 010401 MLC13 AND MSK1      YES, ISOLATE OPERAND
0311 05203 064135      LDB MPTR      INDEX THE PROGRAM POINTER BY
0312 05204 002003      SZA,RSS       AN AMOUNT APPROPRIATE TO THE
0313 05205 044325      ADB .2        OPERAND. THE FOLLOWING APPLIES
0314 05206 050326      CPA .3        OPERAND = 0  ADD 2 TO POINTER
0315 05207 006004      INB           OPERAND =3  ADD 1 TO POINTER
0316 05210 074135      STB MPTR
0317*
0318 05211 034135 MLC02 ISZ MPTR      INCREMENT WORD-OF-STATEMENT PTR
0319 05212 060135      LDA MPTR      STATEMENT

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0320	05213	051515	CPA MNPTR	EXHAUSTED?
0321	05214	027272	JMP MLOP5	YES
0322	05215	160135	LDA MPTR,1	NO
0323	05216	002020	SSA	'CONSTANT' OPERAND?
0324	05217	027202	JMP MLO13	YES
0325	05220	010401	AND MSK1	NO
0326	05221	002003	BZA,RSS	NULL OPERAND?
0327	05222	027211	JMP MLOP2	YES
0328	05223	070157	STA MBOX1	NO, SAVE IT
0329	05224	010336	AND .15	PROGRAMMER-DEFINED
0330	05225	050336	CPA .15	FUNCTION?
0331	05226	027301	JMP MLOP6	YES
0332	05227	040434	ADA M4	NO
0333	05230	002020	SSA	ARRAY VARIABLE?
0334	05231	027320	JMP MLOP7	YES
0335	05232	060157	LDA MBOX1	NO, SIMPLE VARIABLE
0336	05233	114231	JSB SSYMA,1	ALREADY IN
0337	05234	006021	SSB,RSS	SYMBOL TABLE?
0338	05235	027244	JMP MLOP3	YES
0339	05236	060470	LDA MNEG	NO
0340	05237	064471	LDB MNEG+1	ENTER
0341	05240	070160	STA MBOX1+1	IT WITH
0342	05241	074161	STB MBOX1+2	'UNDEFINED'
0343	05242	060433	LDA M3	VALUE
0344	05243	017501	JSB ESYMT	
0345	05244	064146	MLOP3 LDB TYPE	
0346	05245	000157	LDA MBOX1	
0347	05246	054347	CPB .34	NEXT STATEMENT?
0348	05247	027261	JMP MLOP4	YES
0349	05250	054346	CPB .33	NO, FOR STATEMENT?
0350	05251	034171	ISZ MWDNO	YES, FIRST VARIABLE?
0351	05252	027211	JMP MLOP2	NO
0352	05253	034115	ISZ FCORE	DEMAND
0353	05254	064115	LDB FCORE	SPACE
0354	05255	054116	CPB SYMTF	FOR NEW
0355	05256	027511	JMP MER3-1	ENTRY
0356	05257	170115	STA FCORE,1	SAVE VARIABLE NAME
0357	05260	027211	JMP MLOP2	
0358*				
0359	05261	064115	MLCP4 LDB FCORE	FOR-TABLE
0360	05262	054113	CPB PBPTR	EMPTY?
0361	05263	014477	JSB ERROR	YES
0362	05264	150115	MER3 CPA FCORE,1	NO, MATCH LATEST ENTRY?
0363	05265	002001	RSS	YES
0364	05266	027263	JMP MER3-1	NO
0365	05267	044431	ADB M1	REMOVE
0366	05270	074115	STB FCORE	MATCHED
0367	05271	027211	JMP MLOP2	ENTRY
0368*				
0369	05272	050113	MLCP5 CPA PBPTR	PROGRAM EXHAUSTED?
0370	05273	002001	RSS	YES
0371	05274	027151	JMP MLOP1	NO
0372	05275	060146	LDA TYPE	YES
0373	05276	050350	CPA .37	END STATEMENT?
0374	05277	027407	JMP MLOP	YES
0375	05300	014477	JSB ERROR	NO

0376	05301	160135	MLOP6	LDA MPTR,1	ISOLATE
0377	05302	010420		AND OPMSK	PRECEDING OPERATOR
0378	05303	050414		CPA DEFOP	'DEF' ?
0379	05304	002001		RSS	YES
0380	05305	027211		JMP MLOP2	NO GO TO PROCESS NEXT WORD
0381	05306	060157		LDA MBOX1	SEARCH SYMBOL TABLE FOR
0382	05307	114231		JSB SSYMA,1	THE FUNCTION
0383	05310	006021		SSB,RSS	
0384	05311	014477		JSB ERROR	FOUND. ERROR MULTIPLY DEFINED
0385	05312	060135	MER4	LDA MPTR	
0386	05313	040326		ADA .3	ENTER THE FUNCTION INTO THE
0387	05314	070160		STA MBOX1+1	SYMBOL TABLE TOGETHER WITH
0388	05315	060432		LDA M2	ITS ENTRY POINT IN THE SOURCE
0389	05316	017501		JSB ESYMT	CODE
0390	05317	027211		JMP MLOP2	GO TO PROCESS THE NEXT WORD
0391*					
0392	05320	070001	MLOP7	STA 1	
0393	05321	060146		LDA TYPE	
0394	05322	050341		CPA .27	DIM STATEMENT?
0395	05323	027335		JMP MLOP8	YES
0396	05324	050342		CPA .28	NO, COM STATEMENT?
0397	05325	027335		JMP MLOP8	YES
0398	05326	017522		JSB MSYMT	NO, LOOK FOR IT IN SYMBOL TABLE
0399	05327	027211		JMP MLOP2	FOUND
0400	05330	002400		CLA	NOT THERE
0401	05331	070160		STA MBOX1+1	ENTER IT WITH
0402	05332	070161		STA MBOX1+2	DIMENSIONS AND
0403	05333	070162		STA MBOX1+3	DIMENSIONALITY
0404	05334	027370		JMP MLOP6	UNDEFINED
0405*					
0406	05335	034135	MLCP8	ISZ MPTR	PROCESS COM OR DIM STMT
0407	05336	034135		ISZ MPTR	
0408	05337	160135		LDA MPTR,1	PICK UP FIRST DIMENSION
0409	05340	001727		ALF,ALF	SHIFT TO M. S. PART OF WORD
0410	05341	054433		CPB M3	IS THIS A SINGLE DIMENSION ARRAY
0411	05342	027347		JMP ++5	YES, JUMP
0412	05343	034135		ISZ MPTR	NO, INDEX POINTER TO THE LOC.
0413	05344	034135		ISZ MPTR	OF SECOND DIMENSION AND PACK
0414	05345	130135		IOR MPTR,1	INTO A WITH THE FIRST DIMENSION
0415	05346	002001		RSS	
0416	05347	030324		IOR .1	
0417	05350	070161		STA MBOX1+2	SET UP TO STORE PACKED
0418	05351	070162		STA MBOX1+3	DIMENSIONS IN FORMAL AND ACTUAL
0419	05352	002400		CLA	SLOTS AND UNDEFINED FLAG IN
0420	05353	070160		STA MBOX1+1	STORAGE ALLOCATION SLOT
0421	05354	017522		JSB MSYMT	IN SYMBOL TABLE?
0422	05355	027373		JMP MLOP9	NO
0423	05356	060146		LDA TYPE	YES
0424	05357	050342		CPA .28	
0425	05360	002001		RSS	IS STMT A COM
0426	05361	027370		JMP MLOP0	NO, JUMP
0427	05362	060161		LDA MBOX1+2	YES PICK UP PACKED DIMENSIONS
0428	05363	015336		JSB MDIM	COMPUTE STORAGE REQUIRED
0429	05364	064170		LDB COML	POINTER TO NEXT FREE LOC IN COM
0430	05365	074160		STB MBOX1+1	STORE IN STORAGE ALLOCATION SLOT
0431	05366	044000		ADH 0	UPDATE POINTER BY THE AMOUNT OF

0432	05367	074170		STB COML	STORAGE ASSIGNED.
0433	05370	060434	MLOP0	LDA M4	ENTER THE FOUR WORD ENTRY
0434	05371	017501		JSB ESYMT	PREVIOUSLY SET UP IN MBOX1 INTO
0435	05372	027211		JMP MLOP2	SYMBOL TABLE AND CONTINUE
0436*					
0437	05373	044325	MLCP9	ADB .2	CHECK THE FORMAL DIMENSIONS
0438	05374	160001		LDA 1,1	LOCATION TO SEE IF THE DIMENSION
0439	05375	002002		SZA	IS ALREADY DEFINED
0440	05376	014477		JSB ERROR	ERROR, DOUBLY DIMENSIONED
0441	05377	060146	MER5	LDA TYPE	
0442	05400	050342		CPA .28	COM STMT?
0443	05401	124270		JMP ESYN3,1	ERROR MISPLACED COM STMT
0444	05402	060161		LDA MBOX1+2	
0445	05403	170001		STA 1,1	STORE THESE DIMENSIONS IN FORMAL
0446	05404	006004		INB	AND ACTUAL SLOTS IN SYMBOL TABLE
0447	05405	170001		STA 1,1	ENTRY
0448	05406	027211		JMP MLOP2	GO TO PROCESS NEXT WORD
0449*					
0450*					
0451*					
0452*					
0453*					
0454*					
0455*					
0456*					
0457*					
0458	05407	060115	MLOP	LDA FCORE	ALL FORS
0459	05410	050113		CPA PBPTR	MATCHED?
0460	05411	002001		RSS	YES
0461	05412	014477		JSB ERROR	NO
0462	05413	064116	MER6	LDB SYMTF	
0463*					
0464	05414	054117	M2LOP	CPB SYMTA	MORE SYMBOLS?
0465	05415	027466		JMP M4LOP	NO
0466	05416	160001		LDA 1,1	YES
0467	05417	010336		AND .15	ACCOUNT FOR
0468	05420	044325		ADB .2	A FUNCTION
0469	05421	050336		CPA .15	IS IT?
0470	05422	027414		JMP M2LOP	YES
0471	05423	006004		INB	NO, ACCOUNT FOR
0472	05424	040434		ADA M4	SIMPLE VARIABLE
0473	05425	002025		SSA,INA,RSS	IS IT?
0474	05426	027414		JMP M2LOP	YES
0475	05427	002003		SZA,RSS	NO, # OF SUBSCRIPTS KNOWN?
0476	05430	014477		JSB ERROR	NO
0477	05431	002004	MER10	INA	SAVE
0478	05432	070160		STA MBOX1+1	FLAG
0479	05433	074157		STB MBOX1	SAVE POINTER
0480	05434	160001		LDA 1,1	DEFINED
0481	05435	002002		SZA	ARRAY?
0482	05436	027445		JMP M3LOP	YES
0483	05437	063500		LDA STDIM	NO, LOAD
0484	05440	034160		ISZ MBOX1+1	APPROPRIATE
0485	05441	040333		ADA .9	STANDARD DIMENSIONS
0486	05442	170001		STA 1,1	RECORD AS
0487	05443	044431		ADB M1	FORMAL AND ACTUAL

0488	05444	170001		STA 1,I	DIMENSIONS
0489	05445	015336	M3LOP	JSB MDIM	SAVE STORAGE
0490	05446	070160		STA MBOX1+1	REQUIREMENT
0491	05447	064157		LDB MBOX1	LOAD
0492	05450	044432		ADB M2	ADDRESS OF
0493	05451	160001		LDA 1,I	ELEMENT SPACE
0494	05452	002002		SZA	DEFINED IN COM?
0495	05453	027464		JMP MER7	YES
0496	05454	060115		LDA FCORE	NO, USE CURRENT
0497	05455	170001		STA 1,I	FREE-CORE ADDRESS
0498	05456	040160		ADA MBOX1+1	UPDATE FREE-CORE
0499	05457	070115		STA FCORE	ADDRESS
0500	05460	003004		CMA, INA	OUT
0501	05461	040116		ADA SYMTF	OF
0502	05462	002020		SSA	SPACE?
0503	05463	014477		JSB ERROR	YES
0504	05464	044326	MER7	ADB .3	NO, ADVANCE POINTER
0505	05465	027414		JMP M2LOP	TO NEXT ENTRY
0506*					
0507	05466	064113	M4LOP	LDB PBPTR	INITIALIZE ALL
0508	05467	054115		CPB FCORE	ARRAY ELEMENTS
0509	05470	124203		JMP FASE3,I	TO 'UNDEFINED'
0510	05471	060470		LDA MNEG	
0511	05472	170001		STA 1,I	
0512	05473	006004		INB	
0513	05474	060471		LDA MNEG+1	
0514	05475	170001		STA 1,I	
0515	05476	006004		INB	
0516	05477	027467		JMP M4LOP+1	
0517*					
0518	05500	005001	STEIM	OCT 5001	

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0520*          *****
0521*          ENTER SYMBOL TABLE SUBROUTINE
0522*          *****
0523*
0524*          TRANSFER -(A) WORDS FROM THE BUFFER ADDRESSED
0525*          BY MBUF TO THE TOP OF THE SYMBOL TABLE.
0526*
0527 05501 000000 ESYMT NOP
0528 05502 071467          STA MBIN1          SAVE NEGATIVE OF LENGTH OF ENTRY
0529 05503 040116          ADA SYMTF
0530 05504 070116          STA SYMTF          MOVE SYMBOL TABLE START LOCATOR
0531 05505 071536          STA MBIN2          UP BY THE LENGTH OF ENTRY
0532 05506 003004          CMA,INA          CHECK THAT THE SYMBOL TABLE AND
0533 05507 040115          ADA FCORE          FOR TABLE DO NOT OVERLAP
0534 05510 002021          SSA,RSS
0535 05511 014477          JSB ERROR          OVERLAP ERROR
0536 05512 067543 MER8 LDB MBUF          POINTER TO REQD ENTRY
0537 05513 160001          LDA 1,I          TRANSFER ENTRY TO THE SYMBOL
0538 05514 171536          STA MBIN2,I      TABLE
0539 05515 006004          INB
0540 05516 035536          ISZ MBIN2
0541 05517 035467          ISZ MBIN1
0542 05520 027513          JMP MER8+1
0543 05521 127501          JMP ESYMT,I      RETURN
0544*
0545*          *****
0546*          SUBROUTINE TO SEARCH SYMBOL TABLE FOR AN ARRAY
0547*          *****
0548 05522 000000 MSYMT NOP          B GIVES ARRAY TYPE -3 = 1 DIM,
0549 05523 075467          STB MBIN1          -2 = 2DIM, -1 = UNDIMENSIONED
0550 05524 060157          LDA MBOX1          LOAD IDENTIFIER
0551 05525 114231          JSB SSYMA,I      SEARCH SYMBOL TABLE
0552 05526 006021          SSB,RSS
0553 05527 127522          JMP MSYMT,I      FOUND, RETURN
0554 05530 035467          ISZ MBIN1          IF ARRAY UNDIMENSIONED
0555 05531 002001          RSS
0556 05532 027541          JMP MSYM          JUMP TO NOT FOUND EXIT
0557 05533 035467          ISZ MBIN1          SET UP TO CHECK THAT ARRAY DOES
0558 05534 040325          ADA .2          NOT APPEAR IN THE TABLE WITH
0559 05535 040431          ADA M1          DIFFERENT DIMENSIONS. CHANGE
0560 05536 114231          JSB SSYMA,I      TYPE 2 TO 1 & TYPE 1 TO 2 AND
0561 05537 006021          SSB,RSS          SEARCH AGAIN
0562 05540 014477          JSB ERROR          FOUND, INCONSISTENT DIMENSIONS
0563 05541 037522 MSYM ISZ MSYMT          NOT FOUND, INCREMENT RETURN
0564 05542 127522          JMP MSYMT,I      ADDRESS AND RETURN
0565*
0566*
0567 05543 000157 MBUF DEF TEMPS
0568 00157 MBOX1 EQU TEMPS
0569 01467 MBIN1 EQU SLWST
0570 01536 MBIN2 EQU RSCHK
0571 00135 MPTR EQU SBPTR
0572 01616 MNPTR EQU OPCHK
0573 00170 COMPL EQU TEMPS+9
0574 00171 MWDND EQU TEMPS+10
0575 05522 DIGCT EQU MSYMT

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0002*
0003***
0004** EVALUATE A FORMULA **
0005***
0006*
0007 05544 000000 FORMX NOP FORMULA BEGINS IN (TEMPS)
0008 05545 006400 CLB INITIALIZE OPERATOR
0009 05546 015467 JSB SLWST STACK
0010 05547 100157 FORM1 LDA TEMPS,I FETCH OPERAND
0011 05550 034157 ISZ TEMPS SET FOR NEXT WORD OF FORMULA
0012 05551 010425 AND OPDMK EXTRACT OPERAND
0013 05552 070165 STA TEMPS+6 AND SAVE IT
0014 05553 002003 SZA,RSS NULL OPERAND?
0015 05554 027567 JMP FORM2 YES
0016 05555 015476 JSB BHSTP SET STACK FOR OPERAND ADDRESS
0017 05556 002020 SSA FLAG BIT SET?
0018 05557 027636 JMP FORM4 YES
0019 05560 114231 JSB SSYMA,I FETCH OPERAND ADDRESS
0020 05561 006007 INB,SZB,RSS EXISTANT?
0021 05562 124207 JMP E8M1A,I NO
0022 05563 010336 AND .15 YES
0023 05564 050336 CPA .15 FUNCTION?
0024 05565 027651 JMP FORM6 YES
0025 05566 174142 STB HSTPT,I NO, STACK OPERAND ADDRESS
0026 05567 160157 FORM2 LDA TEMPS,I FETCH
0027 05570 010420 AND OPMSK OPERATOR
0028 05571 001727 ALF,ALF POSITION IT
0029 05572 064000 LDB 0 LOAD ADDRESS OF
0030 05573 044301 ADB FOPBS OPERATOR'S INFORMATION WORD
0031 05574 040440 ADA M8 NON-FORMULA
0032 05575 002020 SSA OPERATOR?
0033 05576 006400 CLB YES
0034 05577 040451 ADA D53 NO, NON-FORMULA
0035 05500 002021 SSA,RSS OPERATOR?
0036 05601 006400 CLB YES
0037 05602 002400 CLA NO
0038 05603 160001 LDA 1,I LOAD INFORMATION WORD
0039 05604 010401 AND MSK1 SAVE
0040 05605 070166 STA TEMPS+7 PRECEDENCE
0041 05606 120001 XOR 1,I SAVE
0042 05607 001100 ARS
0043 05610 070165 STA TEMPS+6 IDENTIFICATION
0044 05611 027617 JMP FOR11
0045 05612 170140 FORM0 STA TSTPT,I STACK HIGH WORD
0046 05613 060140 LDA TSTPT STACK OPERAND
0047 05614 170142 STA HSTPT,I ADDRESS
0048 05615 002004 INA STORE
0049 05616 174000 STB 0,I LOW WORD
0050 05617 160141 FOR11 LDA LSTPT,I DOES OPERATOR
0051 05620 010376 AND MSK0 ON TOP OF
0052 05621 003000 CMA OPERATOR STACK
0053 05622 040166 ADA TEMPS+7 HAVE HIGHER
0054 05623 002020 SSA PRECEDENCE?
0055 05624 027751 JMP FORM9 YES, EXECUTE IT
0056 05625 002001 RSS NO
0057 05626 034141 FOR10 ISZ LSTPT

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0058	05627	064166	LDB TEMPS+7	RETRIEVE PRECEDENCE
0059	05630	044444	ADB M15	NO, LEFT PARENTHESIS
0060	05631	006020	SSB	OR LEFT BRACKET?
0061	05632	044336	ADB .15	NO, RESTORE PRECEDENCE
0062	05633	044165	ADB TEMPS+6	COMBINE IDENTIFICATION
0063	05634	015467	JSB SLWST	WITH PRECEDENCE AND STACK
0064	05635	027547	JMP FORM1	
0065	05636	050470	FORM4 CPA FLOBT	CONSTANT?
0066	05637	027645	JMP FORM5	YES
0067	05640	010336	AND .15	NO, PRE-DEFINED
0068	05641	050336	CPA .15	FUNCTION
0069	05642	027726	JMP FORM7	YES
0070	05643	064170	LDB TEMPS+9	NO, MUST BE A
0071	05644	027566	JMP FORM2-1	PARAMETER
0072	05645	064157	FORM5 LDB TEMPS	LOAD CONSTANT ADDRESS
0073	05646	034157	ISZ TEMPS	MOVE POINTER TO
0074	05647	034157	ISZ TEMPS	NEXT CODE WORD
0075	05650	027566	JMP FORM2-1	
0076	05651	074165	FORM6 STB TEMPS+6	SAVE SYMBOL TABLE POINTER
0077	05652	064140	LDB TSTPT	SAVE CURRENT POINTER
0078	05653	015467	JSB SLWST	TO TEMPORARY STACK
0079	05654	164165	LDB TEMPS+6,1	
0080	05655	015467	JSB SLWST	SAVE FUNCTION ADDRESS
0081	05656	063544	LDA FORMX	SAVE CURRENT
0082	05657	170142	STA HSTPT,1	FORMX RETURN ADDRESS
0083	05660	017544	JSB FORMX	EVALUATE THE PARAMETER
0084	05661	034157	ISZ TEMPS	UPDATE FORMULA POINTER
0085	05662	034157	ISZ TEMPS	PAST RIGHT PARENTHESIS
0086	05663	060157	LDA TEMPS	SWITCH
0087	05664	164141	LDB LSTPT,1	FORMULA POINTER
0088	05665	074157	STB TEMPS	TO FUNCTION'S
0089	05666	170141	STA LSTPT,1	FORMULA
0090	05667	064170	LDB TEMPS+9	SET
0091	05670	160142	LDA HSTPT,1	PARAMETER POINTER
0092	05671	034141	ISZ LSTPT	TO NEW PARAMETER,
0093	05672	034142	ISZ HSTPT	SAVING PREVIOUS
0094	05673	174141	STB LSTPT,1	SETTING ON
0095	05674	070170	STA TEMPS+9	LOW-CORE STACK
0096	05675	050140	CPA TSTPT	PROTECT PARAMETER IF
0097	05676	015536	JSB RSCHK	ON TEMPORARY STACK
0098	05677	017544	JSB FORMX	EVALUATE FUNCTION
0099	05700	160141	LDA LSTPT,1	RESTORE OLD
0100	05701	070170	STA TEMPS+9	PARAMETER POINTER
0101	05702	060141	LDA LSTPT	CUT RACK
0102	05703	040433	ADA M3	LOW-CORE
0103	05704	070141	STA LSTPT	STACK
0104	05705	002004	INA	RESTORE ORIGINAL
0105	05706	164000	LDB 0,1	TEMPORARY STACK
0106	05707	074140	STB TSTPT	POINTER
0107	05710	002004	INA	RESTORE
0108	05711	164000	LDB 0,1	ORIGINAL
0109	05712	074157	STB TEMPS	FORMULA POINTER
0110	05713	015505	JSB STTOP	POP RESULT

0112*

0113** PRE-DEFINED FUNCTIONS RETURN HERE WITH RESULT

0114*

0115	05714	170140	FOR12	STA TSTPT,I	STORE HIGH WORD
0116	05715	060140		LDA TSTPT	
0117	05716	002004		INA	STORE
0118	05717	174000		STB 0,I	LOW WORD
0119	05720	034142		ISZ HSTPT	
0120	05721	164142		LDB HSTPT,I	RESTORE FORMX
0121	05722	077544		STB FORMX	RETURN ADDRESS
0122	05723	040431		ADA M1	STACK ADDRESS
0123	05724	170142		STA HSTPT,I	OF RESULT
0124	05725	027567		JMP FORM2	
0125	05726	060165	FORM7	LDA TEMPS+6	COMPUTE
0126	05727	001727		ALF,ALF	
0127	05730	001700		ALF	FUNCTION
0128	05731	010344		AND .31	
0129	05732	040305		ADA PDF8S	ADDRESS
0130	05733	164000		LDB 0,I	
0131	05734	015467		JSB SLWST	SAVE FUNCTION ADDRESS
0132	05735	063844		LDA FORMX	SAVE CURRENT
0133	05736	170142		STA HSTPT,I	FORMX RETURN ADDRESS
0134	05737	017544		JSB FORMX	EVALUATE THE PARAMETER
0135	05740	034157		ISZ TEMPS	UPDATE FORMULA POINTER
0136	05741	034157		ISZ TEMPS	PAST RIGHT PARENTHESIS
0137	05742	164141		LDB LSTPT,I	POP
0138	05743	003400		CCA	FUNCTION
0139	05744	040141		ADA LSTPT	ENTRY
0140	05745	070141		STA LSTPT	ADDRESS
0141	05746	077501		STB ESYMT	SAVE
0142	05747	015505		JSB STTOP	POP PARAMETER
0143	05750	127501		JMP ESYMT,I	EVALUATE FUNCTION
0144	05751	160141	FORM9	LDA LSTPT,I	UNSTACK
0145	05752	007400		CCB	OPERATOR
0146	05753	044141		ADB LSTPT	INFORMATION
0147	05754	074141		STB LSTPT	WORD
0148	05755	001727		ALF,ALF	COMPUTE
0149	05756	010374		AND B177	SUBROUTINE
0150	05757	040304		ADA ARBAS	ADDRESS
0151	05760	124000		JMP 0,I	EXECUTE

0152**

0153*** EXECUTION BRANCH TABLE **

0154**

0155	05761	006203	XECT8	DEF ELET	LET
0156	05762	006044		DEF XEC4	DIM
0157	05763	006044		DEF XEC4	COM
0158	05764	006044		DEF XEC4	DEF
0159	05765	006044		DEF XEC4	REM
0160	05766	006205		DEF EGOTO	GO TO
0161	05767	006210		DEF EIF	IF
0162	05770	006216		DEF EFOR	FOR
0163	05771	006312		DEF ENEXT	NEXT
0164	05772	006353		DEF EGOSB	GO SUB
0165	05773	006364		DEF ERTN	RETURN
0166	05774	100205		DEF RDYDA,I	END
0167	05775	100205		DEF RDYDA,I	STOP

0168	05776	006373	DEF	EWAIT	WAIT
0169	05777	006412	DEF	ECALL	CALL
0170	06000	006044	DEF	XEC4	DATA
0171	06001	006441	DEF	EREAD	READ
0172	06002	006474	DEF	EPRIN	PRINT
0173	06003	006643	DEF	EINPT	INPUT
0174	06004	006656	DEF	ERSTR	RESTORE
0175	06005	011456	DEF	EMAT	MAT
0176*					
0177*	*****				
0178***				***	
0179***	EXECUTE THE PROGRAM				***
0180***				***	
0181*	*****				
0182*					
0183**					
0184***	INITIALIZE FOR OUTPUT				**
0185**					
0186	06006	002400	XEC	CLA	SET COUNTER FOR
0187	06007	070146		STA TYPE	CHARACTERS OUTPUTTED
0188	06010	070155		STA XH	INITIALIZE
0189	06011	002004		INA	RANDOM
0190	06012	070156		STA XL	VARIABLE
0191**					
0192***	INITIALIZE THE DATA POINTER				**
0193**					
0194	06013	003400		CCA	SET
0195	06014	070151		STA DCCNT	'NO
0196	06015	070147		STA DSTRT	DATA'
0197	06016	064112		LDB PBUFF	CONDITION
0198	06017	074150		STB NXTDT	
0199	06020	160315		LDA ADATA, I	SEARCH FOR FIRST
0200	06021	016105		JSB STSRH	DATA STATEMENT
0201	06022	026025		JMP XEC2	NONE FOUND
0202	06023	074147		STB DSTRT	SAVE STATEMENT LOCATION
0203	06024	016074		JSB SETDP	SET DATA POINTER
0204**					
0205***	INITIALIZE STACK POINTERS				**
0206**					
0207	06025	064116	XEC2	LDB SYMTF	INITIALIZE
0208	06026	074142		STB HSTPT	POINTERS TO
0209	06027	064115		LDB FCORE	'HIGH CORE' STACK,
0210	06030	074140		STB TSTPT	'TEMPORARY'
0211	06031	044337		ADB .23	STACK, AND
0212	06032	074120		STB LSTAK	'LOW CORE'
0213	06033	074141		STB LSTPT	STACK
0214	06034	007000		CMR	DO
0215	06035	044142		ADB HSTPT	STACKS
0216	06036	006020		SSR	MEET?
0217	06037	025473		JMP E1	YES
0218	06040	064426		LDB RMODE	NO, SHIFT TO
0219	06041	074127		STB LISTR	RUN MODE
0220	06042	064112		LDB PBUFF	BEGIN
0221	06043	026054		JMP XEC5	EXECUTION

0223**

0224*** FIND NEXT STATEMENT TO BE EXECUTED **

0225**

0226	06044	060144	XEC4	LDA NXTST	NEXT STATEMENT NUMBER
0227	06046	064143		LDB PRADD	PROSPECTIVE ADDRESS
0228	06046	150001		CPA 1,I	DESIRED STATEMENT?
0229	06047	026055		JMP XEC6	YES
0230	06050	064112		LDB PBUFF	NO, FIND
0231	06051	114213		JSB FNDPA,I	STATEMENT
0232	06052	000000		NOP	NON-EXISTENT
0233	06053	014477		JSB ERROR	STATEMENT
0234	06054	160001	XEC5	LDA 1,I	SAVE NEW
0235	06055	070145	XEC6	STA .LNUM	SEQUENCE NUMBER

0236**

0237*** SET SUCCESSOR STATEMENT **

0238**

0239	06056	016147		JSB FLWST	
0240	06057	010420		AND OPMSK	EXTRACT STATEMENT TYPE
0241	06060	001727		ALF,ALF	POSITION
0242	06061	001300		RAR	IT
0243	06062	040303		ADA XECBR	COMPUTE EXECUTION ADDRESS
0244	06063	124000		JMP 0,I	BRANCH TO EXECUTION CODE

0245**

0246*** EVALUATE FORMULA AND RETURN RESULT **

0247**

0248	06064	000000	FETCH	NOP	
0249	06065	114233		JSB FORMA,I	EVALUATE FORMULA
0250	06066	015515		JSB OPCHK	
0251	06067	034142		ISZ HSTPT	UNSTACK RESULT ADDRESS
0252	06070	160001		LDA 1,I	LOAD (A) WITH HIGH MANTISSA
0253	06071	006004		INB	LOAD LOW PART
0254	06072	164001		LDB 1,I	OF RESULT INTO (B)
0255	06073	126064		JMP FETCH,I	EXIT

0256**

0257*** SET POINTER TO START OF DATA STATEMENT **

0258**

0259	06074	000000	SETDP	NOP	STATEMENT ADDRESS IN (B)
0260	06075	006004		INB	LOAD
0261	06076	160001		LDA 1,I	STATEMENT LENGTH
0262	06077	003004		CMA,INA	SET
0263	06100	002004		INA	DATA COUNTER
0264	06101	070151		STA DCCNT	TO 1-STATEMENT LENGTH
0265	06102	006004		INB	SET 'NEXT DATA' POINTER ONE
0266	06103	074150		STB NXTDT	WORD ABOVE FIRST CONSTANT
0267	06104	126074		JMP SETDP,I	

0268**

0269*** SEARCH FOR STATEMENT OF GIVEN TYPE **

0270**

0271	06105	000000	STSRH	NOP	TYPE IN (A), ADDRESS IN (B)
0272	06106	010420		AND OPMSK	EXTRACT
0273	06107	070164		STA TEMP4	STATEMENT TYPE
0274	06110	060001	STSR1	LDA 1	EXTRACT
0275	06111	040325		ADA .2	PROGRAM
0276	06112	160000		LDA 0,I	STATEMENT
0277	06113	010420		AND OPMSK	TYPE
0278	06114	050164		CPA TEMP4	DESIRED TYPE?

0279	06115	026124	JMP	STSR2	YES
0280	06116	060001	LDA	1	NO, FETCH
0281	06117	002004	INA		STATEMENT LENGTH
0282	06120	144000	ADB	0, I	COMPUTE NEW ADDRESS
0283	06121	054113	CPB	PBPTR	PAST LAST STATEMENT?
0284	06122	126105	JMP	STSRH, I	YES
0285	06123	026110	JMP	STSR1	NO
0286	06124	036105	STSR2	ISZ STSRH	
0287	06125	126105	JMP	STSRH, I	
0288**					
0289*** FETCH A DATA ITEM **					
0290**					
0291	06126	000000	FDATA	NOP	
0292	06127	034151	FDAT1	ISZ DCCNT	MORE DATA?
0293	06130	026137	JMP	FDAT2	YES
0294	06131	160315	LDA	ADATA, I	NO, SEARCH
0295	06132	064150	LDB	NXTDT	FOR NEXT
0296	06133	016105	JSB	STSRH	DATA STATEMENT
0297	06134	014477	JSB	ERROR	NONE FOUND
0298	06135	016074	E4	JSB SETDP	INITIALIZE THE
0299	06136	026127	JMP	FDAT1	DATA POINTERS
0300	06137	034151	FDAT2	ISZ DCCNT	UPDATE
0301	06140	034151		ISZ DCCNT	POINTER
0302	06141	034150		ISZ NXTDT	
0303	06142	160150	LDA	NXTDT, I	LOAD
0304	06143	034150		ISZ NXTDT	DATA
0305	06144	164150	LDB	NXTDT, I	ITEM
0306	06145	034150		ISZ NXTDT	UPDATE POINTER
0307	06146	126126	JMP	FDATA, I	
0308**					
0309*** SET FOR FOLLOWING STATEMENT **					
0310**					
0311	06147	000000	FLWST	NOP	(B) HOLDS PRESENT ADDRESS
0312	06150	060001	LDA	1	COMPUTE
0313	06151	002004	INA		ADDRESS
0314	06152	160000	LDA	0, I	OF
0315	06153	040001	ADA	1	NEXT
0316	06154	070143	STA	PRADD	STATEMENT
0317	06155	160000	LDA	0, I	RECORD THE
0318	06156	070144	STA	NXTST	SEQUENCE NUMBER
0319	06157	044325	ADB	.2	FETCH
0320	06160	074157	STB	TEMPS	FIRST WORD
0321	06161	160001	LDA	1, I	OF CURRENT
0322	06162	126147	JMP	FLWST, I	STATEMENT
0323**					
0324*** SEARCH STACK FOR GIVEN FOR-VARIABLE **					
0325**					
0326	06163	000000	FVSRH	NOP	
0327	06164	160157	LDA	TEMPS, I	FETCH
0328	06165	010401	AND	MSK1	FOR-VARIABLE
0329	06166	071656	STA	EDELN	SAVE FOR-VARIABLE
0330	06167	114231	JSB	SSYMA, I	FIND ADDRESS IN
0331	06170	006004	INB		SYMBOL TABLE
0332	06171	060142	LDA	HSTPT	SAVE
0333	06172	070163	STA	TEMP3	STACK TOP
0334	06173	050116	FVSR1	CPA SYMTF	STACK BOTTOM?

0335	06174	126163		JMP FVSRH, I	YES, EXIT VIA (P+1)
0336	06175	154000		CPB 0, I	MATCHING FOR-VARIABLE?
0337	06176	026201		JMP FVSR2	YES
0338	06177	040330		ADA .6	NO, MOVE TO
0339	06200	026173		JMP FVSR1	NEXT STACK ENTRY
0340	06201	036163	FVSR2	ISZ FVSRH	EXIT
0341	06202	126163		JMP FVSRH, I	VIA (P+2)
0342*					
0343***			***		
0344**	EXECUTE LET		**		
0345***			***		
0346*					
0347	06203	114233	ELET	JSB FORMA, I	
0348	06204	026044		JMP XEC4	
0349*					
0350***			***		
0351**	EXECUTE GO TO		**		
0352***			***		
0353*					
0354	06205	006004	EGOTO	INB	LOAD SEQUENCE
0355	06206	160001		LDA 1, I	NUMBER
0356	06207	026045		JMP XEC4+1	FIND REFERENCED STATEMENT
0357*					
0358***			***		
0359**	EXECUTE IF		**		
0360***			***		
0361*					
0362	06210	114232	EIF	JSB FETCA, I	FETCH VALUE OF FORMULA
0363	06211	002003		SZA, RSS	RESULTANT TRUE?
0364	06212	026044		JMP XEC4	NO
0365	06213	034157		ISZ TEMPS	YES, BRANCH TO
0366	06214	064157		LDB TEMPS	FOLLOWING
0367	06215	026205		JMP EGOTO	SEQUENCE NUMBER
0368*					
0369***			***		
0370**	EXECUTE FOR		**		
0371***			***		
0372*					
0373	06216	016163	EFCR	JSB FVSRH	FOR-VARIABLE ALREADY IN STACK?
0374	06217	026230		JMP EFOR1	NO
0375	06220	070162		STA TEMP2	YES, SAVE SOURCE ADDRESS
0376	06221	040330		ADA .6	SAVE
0377	06222	070164		STA TEMP4	DESTINATION ADDRESS
0378	06223	074161		STB TEMP1	SAVE FOR-VARIABLE ADDRESS
0379	06224	014554		JSB MVTOH	COMPRESS STACK
0380	06225	064161		LDB TEMP1	RESTORE FOR-VARIABLE ADDRESS
0381	06226	002400		CLA	COMPUTE
0382	06227	002401		CLA, RSS	COMPUTE
0383	06230	060436	EFCR1	LDA M6	NEW TOP OF
0384	06231	040142		ADA HSTPT	FOR-STACK
0385	06232	070142		STA HSTPT	POINTER
0386	06233	070161		STA TEMP1	
0387	06234	003004		CMA, INA	STACK
0388	06235	040141		ADA LSTPT	
0389	06236	002021		SSA, RSS	OVERFLOW?
0390	06237	025473		JMP E1	YES

0391	06240	174161	STB TEMP1,I	NO, RECORD FOR-VARIABLE ADDRESS
0392	06241	114233	JSB FORMA,I	INITIALIZE FOR-VARIABLE
0393	06242	034157	ISZ TEMPS	
0394	06243	034161	ISZ TEMP1	SAVE
0395	06244	060161	LDA TEMP1	LIMIT
0396	06246	072340	STA ENEX2	ADDRESS
0397	06246	114232	JSB FETCA,I	FETCH
0398	06247	170161	STA TEMP1,I	AND
0399	06250	034161	ISZ TEMP1	STORE
0400	06251	174161	STB TEMP1,I	LIMIT
0401	06252	034161	ISZ TEMP1	
0402	06253	064432	LDB M2	SET FOR STEP SIZE
0403	06254	076126	STB FDATA	SIGN CHECK
0404	06255	160157	LDA TEMPS,I	LOOK FOR
0405	06256	002002	SZA	FOLLOWING 'STEP'
0406	06257	026263	JMP EFOR2	FOUND
0407	06260	060466	LDA NONE	NOT FOUND,
0408	06261	064325	LDB .2	DEFAULT
0409	06262	002001	RSS	IS 1.0
0410	06263	114232	EFCR2 JSB FETCA,I	
0411	06264	002020	SSA	STEP SIZE NEGATIVE?
0412	06265	036126	ISZ FDATA	YES
0413	06266	170161	STA TEMP1,I	SAVE
0414	06267	034161	ISZ TEMP1	STEP
0415	06270	174161	STB TEMP1,I	SIZE
0416	06271	034161	ISZ TEMP1	SET POINTER
0417	06272	060144	LDA NXTST	TO STATEMENT
0418	06273	170161	STA TEMP1,I	FOLLOWING THE FOR
0419	06274	160314	EFCR3 LDA ANEXT,I	FIND
0420	06275	064143	LDB PRADD	'NEXT'
0421	06276	016105	JSB STSRH	STATEMENT
0422	06277	000000	NOP	
0423	06300	016147	JSB FLWST	FIND FOLLOWING STATEMENT
0424	06301	010401	AND MSK1	SAME
0425	06302	051656	CPA EDELM	FOR-VARIABLE?
0426	06303	002001	RSS	YES
0427	06304	026274	JMP EFOR3	NO
0428	06305	164142	LDB HSTPT,I	LOAD
0429	06306	160001	LDA 1,I	VALUE
0430	06307	006004	INB	OF
0431	06310	164001	LDB 1,I	FOR-VARIABLE
0432	06311	026337	JMP ENEX2-1	CHECK ACCEPTABILITY
0433*				
0434***				
0435**	EXECUTE NEXT	**		
0436***		***		
0437*				
0438	06312	016163	ENEXT JSB FVSRH	FIND CORRESPONDING STACK ENTRY
0439	06313	026044	JMP XEC4	NONE PRESENT
0440	06314	070142	STA HSTPT	RESET TOP OF STACK
0441	06315	076333	STB ENEX1	SAVE FOR-VARIABLE ADDRESS
0442	06316	002004	INA	SAVE LIMIT
0443	06317	072340	STA ENEX2	ADDRESS
0444	06320	040325	ADA .2	SAVE STEP SIZE
0445	06321	070161	STA TEMP1	ADDRESS
0446	06322	064432	LDB M2	SET STEP SIZE

0447	06323	076126		STB FDATA	SIGN CHECK
0448	06324	160161		LDA TEMP1,I	LOAD
0449	06325	034161		ISZ TEMP1	STEP
0450	06326	164161		LDB TEMP1,I	SIZE
0451	06327	034161		ISZ TEMP1	
0452	06330	002020		SSA	CHECK
0453	06331	036126		ISZ FDATA	SIGN
0454	06332	017343		JSB .FAD	INCREMENT
0455	06333	000000	ENEX1	NOP	FOR-VARIABLE
0456	06334	172333		STA ENEX1,I	AND
0457	06335	036333		ISZ ENEX1	SAVE
0458	06336	170333		STB ENEX1,I	VALUE
0459	06337	017347		JSB .FSB	COMPUTE FOR-VARIABLE - LIMIT
0460	06340	000000	ENEX2	NOP	
0461	06341	036126		ISZ FDATA	POSITIVE STEP SIZE?
0462	06342	001600		ELA	YES, COMPLEMENT SIGN
0463	06343	002020		SSA	NO, NON-NEGATIVE RESULT?
0464	06344	026347		JMP ENEX3	NO
0465	06345	100161		LDA TEMP1,I	YES, GO TO FIRST
0466	06346	026045		JMP XEC4+1	STATEMENT OF LOOP
0467	06347	060142	ENEX3	LDA HSTPT	FAILS,
0468	06350	040330		ADA .6	ERASE
0469	06351	070142		STA HSTPT	STACK
0470	06352	026044		JMP XEC4	ENTRY
0471*					
0472***			***		
0473**	EXECUTE GOSUB		**		
0474***			***		
0475*					
0476	06353	006004	EGCSB	INB	LOAD (A) WITH
0477	06354	100001		LDA 1,I	SEQUENCE NUMBER
0478	06355	064144		LDB NXTST	LOAD (B) WITH
0479	06356	070144		STA NXTST	RETURN SEQUENCE NUMBER
0480	06357	010467		JSB SLWST	STACK RETURN ON LOW-CORE STACK
0481	06360	040442		ADA M10	GOSUBS NESTED
0482	06361	050120		CPA LSTAK	10 DEEP?
0483	06362	014477		JSB ERROR	YES
0484	06363	026044	E2	JMP XEC4	NO
0485*					
0486***			***		
0487**	EXECUTE RETURN		**		
0488***			***		
0489*					
0490	06364	064141	ERTRN	LDB LSTPT	RETURN STACK
0491	06365	054120		CPB LSTAK	EMPTY?
0492	06366	014477		JSB ERROR	YES
0493	06367	160141	E3	LDA LSTPT,I	NO, LOAD RETURN ADDRESS
0494	06370	044431		ADB M1	RESET
0495	06371	074141		STB LSTPT	STACK POINTER
0496	06372	026045		JMP XEC4+1	

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0498*
0499***
0500** EXECUTE WAIT **
0501***
0502*
0503 06373 034157 EWAIT ISZ TEMPS POINT (TEMPS) TO FORMULA
0504 06374 114232 JSB FETCA,I FETCH EVALUATED FORMULA
0505 06375 002020 SSA NEGATIVE?
0506 06376 026044 JMP XEC4 YES
0507 06377 010364 JSB IFIX CONVERT TO INTEGER
0508 06400 002404 CLA,INA LARGE INTEGER
0509 06401 002003 SZA,RSS SMALL
0510 06402 007021 CMB,SSB,RSS INTEGER?
0511 06403 064470 LDB MNEG NO
0512 06404 006007 EWAIT INB,SZB,RSS WAIT?
0513 06405 026044 JMP XEC4 NO
0514 06406 060461 LDA M310 YES, SET INNER LOOP
0515 06407 002006 INA,SZA MORE?
0516 06410 026407 JMP *-1 YES
0517 06411 026404 JMP EWAIT NO
0518*
0519***
0520** EXECUTE CALL **
0521***
0522*
0523 06412 034157 ECALL ISZ TEMPS FETCH
0524 06413 034157 ISZ TEMPS SUBROUTINE
0525 06414 164157 LDB TEMPS,I NUMBER
0526 06415 015323 JSB FND5B FIND
0527 06416 006004 INB ENTRY
0528 06417 164001 LDB 1,I POINT AND
0529 06420 074172 STB TEMPS+11 SAVE IT
0530 06421 060142 LDA HSTPT SAVE HIGH CORE
0531 06422 070171 STA TEMPS+10 STACK POINTER
0532 06423 034157 ECAL1 ISZ YEMPS ANY
0533 06424 160157 LDA TEMPS,I PARAMETERS
0534 06425 050406 CPA B4000 LEFT?
0535 06426 026431 JMP ECAL2 NO
0536 06427 114233 JSB FORMA,I YES, EVALUATE
0537 06430 026423 JMP ECAL1 A PARAMETER
0538 06431 003400 ECAL2 CCA LOAD ADDRESS OF
0539 06432 040171 ADA TEMPS+10 PARAMETER ADDRESSES
0540 06433 114172 JSB TEMPS+11,I AND BRANCH TO SUBROUTINE
0541 06434 060171 LDA TEMPS+10 RESTORE
0542 06435 070142 STA HSTPT
0543 06436 064115 LDB FCORE POINTERS
0544 06437 074140 STB TSTPT
0545 06440 026044 JMP XEC4

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0547*

0548***

0549** EXECUTE READ **

0550***

0551*

0552	06441	054143	EREAD	CPB	PRADD	END-OF-STATEMENT?
0553	06442	026044		JMP	XEC4	YES
0554	06443	114233		JSB	FORMA,1	NO, EVALUATE NEXT ADDRESS
0555	06444	160142		LDA	HSTPT,1	RECORD
0556	06445	071677		STA	OUTLN	ADDRESS
0557	06446	010126		JSB	FDATA	GET DATA ITEM
0558	06447	171677		STA	OUTLN,1	STORE
0559	06450	035677		ISZ	OUTLN	DATA
0560	06451	175677		STB	OUTLN,1	ITEM
0561	06452	034142		ISZ	HSTPT	
0562	06453	064157		LDB	TEMPS	
0563	06454	006004		INB		
0564	06455	026441		JMP	EREAD	

0565**

0566*** INITIALIZE FOR PRINT **

0567**

0568	06456	000000	PRNIN	NOP		
0569	06457	003400		CCA		INITIALIZE
0570	06460	040131		ADA	.BUFA	BUFFER
0571	06461	070132		STA	BADDR	POINTER
0572	06462	060146		LDA	TYPE	INITIALIZE
0573	06463	003004		CMA	INA	'CHARACTERS OUTPUTTED'
0574	06464	070133		STA	CCNT	COUNTER
0575	06465	002011		SLA	RSS	START ON ODD CHARACTER POSITION?
0576	06466	126456		JMP	PRNIN,1	NO
0577	06467	040431		ADA	M1	YES, BIAS
0578	06470	070133		STA	CCNT	COUNTER
0579	06471	002400		CLA		OUTPUT A
0580	06472	015715		JSB	OUTCR	NULL CHARACTER
0581	06473	126456		JMP	PRNIN,1	

0582*

0583***

0584** EXECUTE PRINT **

0585***

0586*

0587	06474	016456	EPRIN	JSB	PRNIN	SET FOR PRINT
0588	06475	002400		CLA		TURN ON
0589	06476	026503		JMP	EPRI1+1	'END-OF-LINE' FLAG
0590	06477	002400	EPRI0	CLA		EXECUTE COMMA
0591	06500	050567		CPA	EOL	IF NOT FOLLOWING
0592	06501	015656		JSB	EDELH	A TAB
0593	06502	003400	EPRI1	CCA		TURN OFF
0594	06503	070567		STA	EOL	'END-OF-LINE' FLAG
0595	06504	160157		LDA	TEMPS,1	EXTRACT
0596	06505	010425		AND	OPDMK	OPERAND
0597	06506	002002		SZA		NULL?
0598	06507	026527		JMP	EPRI3	NO, FORMULA OR TAB
0599	06510	034157	EPRI2	ISZ	TEMPS	YES
0600	06511	064157		LDB	TEMPS	MORE
0601	06512	054143		CPB	PRADD	STATEMENT?
0602	06513	026565		JMP	EPRI7	NO

0603	06514	160157	LDA TEMPS,I	YES, EXTRACT
0604	06515	010420	AND OPMSK	NEXT OPERATOR
0605	06516	050403	CPA B2000	' , ' ?
0606	06517	026477	JMP EPRI0	YES
0607	06520	050404	CPA B3000	NO, ' , ' ?
0608	06521	026502	JMP EPRI1	YES
0609	06522	050402	CPA B1000	NO, " ?
0610	06523	026536	JMP EPRI4	YES
0611	06524	003400	CCA	NO, MUST BE +, -, OR (
0612	06525	040157	ADA TEMPS	BACKUP TO PRIOR
0613	06526	070137	STA TEMPS	NULL OPERAND
0614	06527	003400	EPRI3 CCA	SET
0615	06530	070567	STA EOL	TAB FLAG
0616	06531	114232	JSB FETCA,I	EVALUATE
0617	06532	034567	ISZ EOL	TAB?
0618	06533	026510	JMP EPRI2	YES
0619	06534	015643	JSB ENOUT	NO, PRINT NUMBER
0620	06535	026510	JMP EPRI2	
0621	06536	002400	EPRI4 CLA	TURN ON
0622	06537	070567	STA EOL	'END-OF-LINE' FLAG
0623	06540	071467	STA SLWST	ZERO
0624	06541	071677	STA OUTLN	CHARACTER COUNT
0625	06542	160001	EPRI5 LDA 1,I	
0626	06543	010376	AND MSK0	NON-NULL
0627	06544	002003	SZA,RSS	LOW CHARACTER?
0628	06545	026556	JMP EPRI6	NO
0629	06546	035677	ISZ OUTLN	YES, COUNT IT
0630	06547	006004	INB	
0631	06550	160001	LDA 1,I	
0632	06551	010420	AND OPMSK	" NEXT?
0633	06552	050402	CPA B1000	YES
0634	06553	026556	JMP EPRI6	NO, COUNT HIGH CHARACTER
0635	06554	035677	ISZ OUTLN	
0636	06555	026542	JMP EPRI5	
0637	06556	065677	EPRI6 LDB OUTLN	WILL
0638	06557	044133	ADB CCNT	LINE
0639	06560	044455	ADB M73	EXCEED
0640	06561	006021	SSB,RSS	72 CHARACTERS?
0641	06562	015677	JSB OUTLN	YES, GET FRESH LINE
0642	06563	114223	JSB OUTSA,I	OUTPUT STRING
0643	06564	026504	JMP EPRI1+2	
0644	06565	034567	EPRI7 ISZ EOL	'END-OF-LINE' ?
0645	06566	020603	JMP EPRI8	YES
0646	06567	064146	LDB TYPE	NO, LOAD COUNT OF
0647	06570	007004	CMB,INB	CHARACTERS OUTPUTTED
0648	06571	060133	LDA CCNT	LOAD LINE LENGTH
0649	06572	003004	CMA,INA	SAVE NEW COUNT OF
0650	06573	070146	STA TYPE	CHARACTERS OUTPUTTED
0651	06574	040001	ADA 1	COMPUTE CHARACTERS NOT YET OUT
0652	06575	004010	SLB	CORRECT FOR START ON
0653	06576	040431	ADA M1	ODD PRINT POSITION
0654	06577	064131	LDB .BUFA	OUTPUT
0655	06600	002002	SZA	NON-EMPTY
0656	06601	114102	JSB WRITE,I	BUFFER
0657	06602	026044	JMP XEC4	
0658	06603	015677	EPRI8 JSB OUTLN	PRINT LINE

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0669 06604 026044      JMP XEC4
0660**
0661***  TAB TELEPRINTER  **
0662**
0663 06605 116631  ETAB  JSB IENTA,I  SMALL INTEGER?
0664 06606 026627      JMP ETAB1  NO
0665 06607 006400      CLB          YES, SET
0666 06610 074067      STB EOL      'TAB' FLAG TRUE
0667 06611 040454      ADA M72      EXCEED
0668 06612 002021      SSA,RSS      72?
0669 06613 026627      JMP ETAB1  YES
0670 06614 003004      CMA,INA      NO, COMPUTE
0671 06615 040454      ADA M72      BLANKS?
0672 06616 040133      ADA CCNT      REQUIRED
0673 06617 002021      SSA,RSS      ANY?
0674 06620 124264      JMP FR12A,I  NO
0675 06621 071677      STA OUTLN     YES,
0676 06622 060345      LDA .32      OUTPUT
0677 06623 015715      JSB OUTCR      REQUIRED
0678 06624 035677      ISZ OUTLN     NUMBER
0679 06625 026622      JMP *-3      OF BLANKS
0680 06626 124264      JMP FR12A,I
0681 06627 015677  ETAB1 JSB OUTLN  OUTPUT THE
0682 06630 124264      JMP FR12A,I  LINE
0683*
0684 06631 011413  IENTA DEF .IENT
0685*
0686***
0687**  EXECUTE INPUT  **
0688***
0689*
0690 06632 002006  EINP1 INA,SZA  END-OF-INPUT?
0691 06633 114206      JSB DRQSA,I  YES, CALL FOR MORE
0692 06634 014567  EINP2 JSB CONST  CONVERT AND STORE NUMBER
0693 06635 026632      JMP EINP1  NOT NUMBER
0694 06636 064157      LDB TEMPS  END-OF-
0695 06637 006004      INB
0696 06640 054143      CPB PRADD
0697 06641 026652      JMP EINP3
0698 06642 050334      CPA .10
0699 06643 114206  EINPT JSB DRQSA,I  STATEMENT?
0700 06644 114233      JSB FORMA,I  YES
0701 06645 003400      CCA          NO, INSURE MORE INPUT
0702 06646 140142      ADA HSTPT,I  CALL FOR INPUT
0703 06647 034142      ISZ HSTPT  COMPUTE VARIABLE ADDRESS
0704 06650 070135      STA SBPTR  STORE
0705 06651 026634      JMP EINP2  ADDRESS-1
0706 06652 002400  EINP3 CLA      IN
0707 06653 070146      STA TYPE  POINTER
0708 06654 026044      JMP XEC4  RESET
                                OUTPUT BUFFER

```

```

0710**
0711*** EXIT FORMULA CN EMPTY STACK **
0712**
0713 06658 105344 DEF FORMX,I
0714*
0715*** ***
0716** EXECUTE RESTORE **
0717*** ***
0718*
0719 06656 064147 ERSTR LDB DSTRT GET FIRST DATA STATEMENT ADDRESS
0720 06657 054431 CPB M1 IMPOSSIBLE ADDRESS?
0721 06660 026044 JMP XEC4 YES, DONE
0722 06661 016074 JSB SETDP NO, SET DATA POINTER
0723 06662 026044 JMP XEC4 DONE
0001**
0002*** FORMULA OPERATOR JUMP TABLE **
0003**
0004 06663 006722 ARCTB DEF ESCHA SUBSCRIPT SEPARATOR
0005 06664 007002 DEF ESTR ASSIGNMENT OPERATOR
0006 06665 007026 DEF EFAD '+'
0007 06666 007031 DEF EFSB '-'
0008 06667 007034 DEF EFMP '*'
0009 06670 007037 DEF EFDV '/'
0010 06671 007042 DEF EPWR '^'
0011 06672 007164 DEF EGTRT '>'
0012 06673 007171 DEF ELST '<'
0013 06674 007215 DEF ENEQL '#='
0014 06675 007176 DEF EEQL '='
0015 06676 007227 DEF EUMIN UNARY '-'
0016 06677 007232 DEF ELBRC '['
0017 06700 100260 DEF FOR1A,I '('
0018 06701 100262 DEF FOR0B,I UNARY '+'
0019 06702 007240 DEF EOR OR
0020 06703 007246 DEF EAND AND
0021 06704 007253 DEF ENOT NOT
0022 06705 007203 DEF EGORE '>='
0023 06706 007210 DEF ELORE '<='
0024**
0025*** EXECUTE A BINARY OPERATOR **
0026**
0027 06707 000000 BINOP NOP SAVE
0028 06710 162707 LDA BINOP,I SUBROUTINE
0029 06711 072717 STA BIN01 CALL
0030 06712 036707 ISZ BINOP SET RETURN ADDRESS
0031 06713 015515 JSB OPCHK SAVE ADDRESS OF
0032 06714 076720 STB BIN02 TOP OPERAND
0033 06715 034142 ISZ HSTPT UNSTACK ADDRESS
0034 06716 015505 JSB STTOP LOAD SECOND OPERAND
0035 06717 000000 BIN01 NOP PERFORM OPERATION
0036 06720 000000 BIN02 NOP ADDRESS OF SECOND OPERAND
0037 06721 126707 JMP BINOP,I

```

0039**

0040*** EXECUTE SUBSCRIPT COMMA **

0041**

0042	06722	016771	ESCM1	JSB ESBS	INTEGERIZE COLUMN SUBSCRIPT
0043	06723	034141		ISZ LSTPT	
0044	06724	016771		JSB ESBS	INTEGERIZE ROW SUBSCRIPT
0045	06725	164142		LDB HSTPT, I	FETCH
0046	06726	044325		ADB .2	SUBSCRIPT
0047	06727	160001		LDA 1, I	ROUNDS 1
0048	06730	010376		AND MSK0	SAVE
0049	06731	071677		STA OUTLN	COLUMN BOUND
0050	06732	160001		LDA 1, I	EXTRACT
0051	06733	001727		ALF, ALF	ROW
0052	06734	010376		AND MSK0	BOUND
0053	06735	003004		CMA, INA	ACTUAL
0054	06736	140141		ADA LSTPT, I	ROW SUBSCRIPT
0055	06737	002021		SSA, RSS	LEGAL?
0056	06740	026757		JMP E6-1	NO
0057	06741	061677		LDA OUTLN	YES
0058	06742	050324		CPA .1	COLUMN MATRIX?
0059	06743	026747		JMP ESCM1	YES
0060	06744	015236		JSB MPY	NO, COMPUTE ADDRESS
0061	06745	100141		DEF LSTPT, I	DISPLACEMENT
0062	06746	002001		RSS	DUE TO ROWS
0063	06747	160141	ESCM1	LDA LSTPT, I	
0064	06750	007400		CCB	UNSTACK
0065	06751	044141		ADB LSTPT	ROW
0066	06752	074141		STB LSTPT	SUBSCRIPT
0067	06753	065677		LDB OUTLN	ACTUAL
0068	06754	007004		CMB, INB	COLUMN
0069	06755	144141		ADB LSTPT, I	SUBSCRIPT
0070	06756	006021		SSB, RSS	LEGAL?
0071	06757	014477		JSB ERROR	NO
0072	06760	140141	E6	ADA LSTPT, I	YES, ADD IN COLUMN DISPLACEMENT
0073	06761	001000		ALS	DOUBLE DISPLACEMENT
0074	06762	164142		LDB HSTPT, I	COMPUTE
0075	06763	140001		ADA 1, I	ACTUAL
0076	06764	170142		STA HSTPT, I	ADDRESS
0077	06765	064141		LDB LSTPT	UNSTACK
0078	06766	044431		ADB M1	
0079	06767	074141		STB LSTPT	
0080	06770	124260		JMP FOR1A, I	

0081**

0082*** INTEGERIZE A SUBSCRIPT **

0083**

0084	06771	000000	ESBS	NOP	
0085	06772	015515		JSB OPCHK	VALIDATE SUBSCRIPT
0086	06773	160001		LDA 1, I	FETCH
0087	06774	006004		INB	SUBSCRIPT
0088	06775	164001		LDB 1, I	
0089	06776	015353		JSB SBFIX	INTEGERIZE
0090	06777	174141		STB LSTPT, I	SAVE IN OPERATOR STACK
0091	07000	034142		ISZ HSTPT	POP OPERAND STACK
0092	07001	126771		JMP ESBS, I	

0094**

0095*** EXECUTE STORE **

0096**

0097	07002	064166	ESTR	LDB TEMPS+7	IS NEXT OPERATOR
0098	07003	006002		SZB	AN END-OF-FORMULA?
0099	07004	124263		JMP FOR1B,I	NO, DEFER STORE
0100	07005	054165		CPB TEMPS+6	YES, FIRST STORE OPERATOR USED?
0101	07006	027022		JMP ESTR2	YES
0102	07007	160142	ESTR1	LDA HSTPT,I	SET
0103	07010	070170		STA TEMPS+9	DESTINATION
0104	07011	060165		LDA TEMPS+6	SOURCE ADDRESS IN (A)
0105	07012	164000		LDB 0,I	TRANSFER HIGH
0106	07013	174170		STB TEMPS+9,I	PART OF SOURCE
0107	07014	034170		ISZ TEMPS+9	UPDATE
0108	07015	002004		INA	POINTERS
0109	07016	164000		LDB 0,I	TRANSFER LOW
0110	07017	174170		STB TEMPS+9,I	PART OF SOURCE
0111	07020	034142		ISZ HSTPT	POP STACK
0112	07021	124262		JMP FOR0B,I	
0113	07022	015315	ESTR2	JSB UPCHK	SAVE ADDRESS
0114	07023	074165		STB TEMPS+6	OF QUANTITY
0115	07024	034142		ISZ HSTPT	YES, POP HIGH-CORE
0116	07025	027007		JMP ESTR1	STACK AND EXECUTE STORE

0117**

0118*** CALL ADD **

0119**

0120	07026	016707	EFAD	JSB BINOP
0121	07027	017343		JSB .FAD
0122	07030	124261		JMP FOR0A,I

0123**

0124*** CALL SUBTRACT **

0125**

0126	07031	016707	EF5B	JSB BINOP
0127	07032	017347		JSB .FSB
0128	07033	124261		JMP FOR0A,I

0129**

0130*** CALL MULTIPLY **

0131**

0132	07034	016707	EFMP	JSB BINOP
0133	07035	017416		JSB .FMP
0134	07036	124261		JMP FOR0A,I

0135**

0136*** CALL DIVIDE **

0137**

0138	07037	016707	EFIV	JSB BINOP
0139	07040	017463		JSB .FDV
0140	07041	124261		JMP FOR0A,I

0141**

0142*** EXECUTE * **

0143**

0144	07042	164142	EPWR	LDB HSTPT,I	LOAD
0145	07043	160001		LDA 1,I	
0146	07044	006004		INB	POWER
0147	07045	164001		LDB 1,I	
0148	07046	016364		JSB IFIX	
0149	07047	027052		JMP *+3	

0150	07050	102301	SOS	INTEGER?
0151	07051	027055	JMP EPWR1	YES
0152	07052	016707	JSB BINOP	NO
0153	07053	027054	JMP RPHR	
0154	07054	017144	RPHR JSB PCHK	CHECK ARGUMENTS
0155	07055	002020	SSA	NEGATIVE BASE?
0156	07056	014477	JSB ERROR	YES
0157	07057		BASER EQU *	
0158	07057	066717	LDB BIN01	NO, LOAD BASE
0159	07060	114234	JSB .LOGA,I	TAKE NATURAL LOG
0160	07061	017416	JSB .FMP	MULTIPLY
0161	07062	106720	DEF BIN02,I	BY POWER
0162	07063	114235	JSB .EXPA,I	EXPONENTIATE
0163	07064	124261	JMP FOR0A,I	RESULT
0164	07068	077463	EPWR1 STB TT1	SAVE SIGN
0165	07066	006020	SSB	SAVE
0166	07067	007004	CMB,INB	ABSOLUTE VALUE
0167	07070	077552	STB TT2	OF POWER
0168	07071	016707	JSB BINOP	
0169	07072	027073	JMP IPWR	
0170	07073	017144	IPWR JSB PCHK	CHECK ARGUMENTS
0171	07074	066717	LDB BIN01	STORE
0172	07075	072717	STA BIN01	
0173	07076	076720	STB BIN02	BASE
0174	07077	060466	LDA HONE	INITIALIZE
0175	07100	070163	STA TT3	RESULT
0176	07101	060325	LDA .2	TO
0177	07102	070164	STA TT4	1.0
0178	07103	067552	IPWR1 LDB TT2	DIVIDE POWER
0179	07104	004031	SLB,BRS	BY 2
0180	07105	027124	JMP IPWR3	WAS ODD
0181	07106	077552	STB TT2	WAS EVEN
0182	07107	006002	IPWR2 SZB	ZERO?
0183	07110	027135	JMP IPWR4	NO
0184	07111	063463	LDA TT1	YES
0185	07112	002020	SSA	POSITIVE POWER?
0186	07113	027117	JMP IPWR5	NO
0187	07114	060163	LDA TT3	YES,LOAD
0188	07115	064164	LDB TT4	RESULT
0189	07116	124261	JMP FOR0A,I	
0190	07117	060466	IPWR5 LDA HONE	LOAD
0191	07120	064325	LDB .2	1.0
0192	07121	017463	JSB .FDV	DIVIDE BY
0193	07122	000163	DEF TT3	RESULT
0194	07123	124261	JMP FOR0A,I	
0195	07124	077552	IPWR3 STB TT2	SAVE POWER
0196	07125	062717	LDA BIN01	LOAD
0197	07126	066720	LDB BIN02	BASE
0198	07127	017416	JSB .FMP	MULTIPLY BY
0199	07130	000163	DEF TT3	RESULT-SO-FAR
0200	07131	070163	STA TT3	SAVE PARTIAL
0201	07132	074164	STB TT4	RESULT
0202	07133	067552	LDB TT2	LOAD POWER
0203	07134	027107	JMP IPWR2	
0204	07135	062717	IPWR4 LDA BIN01	LOAD
0205	07136	066720	LDB BIN02	BASE

0206	07137	017416	JSB .FMP	SQUARE
0207	07140	006717	DEF BIN01	IT
0208	07141	072717	STA BIN01	SAVE
0209	07142	076720	STB BIN02	RESULT
0210	07143	027103	JMP IPWR1	
0211**				
0212*** INSURE VALID CPERATION **				
0213**				
0214	07144	000000	PCHK NOP	
0215	07145	076717	STB BIN01	LOAD
0216	07146	106720	LDB BIN02,1	POWER
0217	07147	002002	SZA	BASE ZERO?
0218	07150	027161	JMP PCHK1	NO
0219	07151	006003	SZB,RSS	YES, POWER ZERO?
0220	07152	014477	JSB ERROR	YES
0221	07153		POWER EQU *	
0222	07153	006021	SSB,RSS	NO, POWER POSITIVE?
0223	07154	027221	JMP FALSE	YES
0224	07155	014477	JSB ERROR	NO
0225	07156	060422	ZRTNG LDA INF	USE POSITIVE
0226	07157	064432	LDB M2	INFINITY
0227	07160	124261	JMP FORMA,1	
0228	07161	006003	PCHK1 SZB,RSS	POWER ZERO?
0229	07162	027224	JMP TRUE	YES, RETURN 1.0
0230	07163	127144	JMP PCHK,1	NO
0231**				
0232*** EXECUTE > **				
0233**				
0234	07164	016707	EGTGT JSB BINOP	COMPUTE OPERAND
0235	07165	017347	JSB .FSB	DIFFERENCE
0236	07166	002020	SSA	NEGATIVE?
0237	07167	027221	JMP FALSE	YES
0238	07170	027217	JMP ENEQ1	NO
0239**				
0240*** EXECUTE < **				
0241**				
0242	07171	016707	ELST JSB BINOP	COMPUTE OPERAND
0243	07172	017347	JSB .FSB	DIFFERENCE
0244	07173	002020	SSA	NEGATIVE?
0245	07174	027224	JMP TRUE	YES
0246	07175	027221	JMP FALSE	NO
0247**				
0248*** EXECUTE = **				
0249**				
0250	07176	016707	EEQL JSB BINOP	COMPUTE OPERAND
0251	07177	017347	JSB .FSB	DIFFERENCE
0252	07200	002002	EEGL1 SZA	ZERO?
0253	07201	027221	JMP FALSE	NO
0254	07202	027224	JMP TRUE	YES

```

0256**
0257*** EXECUTE >= **
0258**
0259 07203 016707 EGCRC JSB BINOP      COMPUTE OPERAND
0260 07204 017347          JSB .FSB      DIFFERENCE
0261 07205 002020          SSA            POSITIVE?
0262 07206 027221          JMP FALSE     NO
0263 07207 027224          JMP TRUE      YES
0264**
0265*** EXECUTE <= **
0266**
0267 07210 016707 ELCRC JSB BINOP      COMPUTE OPERAND
0268 07211 017347          JSB .FSB      DIFFERENCE
0269 07212 002020          SSA            NEGATIVE?
0270 07213 027224          JMP TRUE     YES
0271 07214 027200          JMP EEQL1    NO
0272**
0273*** EXECUTE # **
0274**
0275 07215 016707 ENEQL JSB BINOP      COMPUTE OPERAND
0276 07216 017347          JSB .FSB      DIFFERENCE
0277 07217 002002 ENEQ1 SZA            NON-ZERO?
0278 07220 027224          JMP TRUE     YES
0279**
0280*** SET LOGICAL VALUES **
0281**
0282 07221 002400 FALSE CLA            LOAD
0283 07222 000400          CLB          ZERO
0284 07223 124261          JMP FOR0A,I
0285 07224 060466 TRUE LDA HONE        LOAD
0286 07225 064325          LDB .2      ONE
0287 07226 124261          JMP FOR0A,I
0288**
0289*** EXECUTE UNARY - **
0290**
0291 07227 010505 EUMIN JSB STTOP      LOAD NUMBER
0292 07230 010423          JSB ARINV   NEGATE NUMBER
0293 07231 124261          JMP FOR0A,I
0294**
0295*** EXECUTE LEFT BRACKET **
0296**
0297 07232 034141 ELBRC ISZ LSTPT      LOAD SUBSCRIPT COMMA
0298 07233 064405          LDB SCCNT    INFORMATION WORD
0299 07234 015467          JSB SLWST   STACK IT
0300 07235 015476          JSB BHSTP   STACK
0301 07236 015536          JSB RSCHK
0302 07237 027224          JMP TRUE    1
0303**
0304*** EXECUTE OR **
0305**
0306 07240 016707 EOR JSB BINOP      VALIDATE
0307 07241 027242          JMP ORS      OPERANDS
0308 07242 002002 ORS SZA            SECOND OPERAND NON-ZERO?
0309 07243 027224          JMP TRUE     YES
0310 07244 162720 ORS1 LDA BIN02,I    NO, CHECK SECOND
0311 07245 027217          JMP ENEQ1   OPERAND

```

0312**

0313** EXECUTE AND **

0314**

0315	07246	016707	EAND	JSB DINOP	VALIDATE
0316	07247	027250		JMP ANDS	OPERANDS
0317	07250	002003	ANDS	SZA,RSS	SECOND OPERAND ZERO?
0318	07251	027221		JMP FALSE	YES
0319	07252	027244		JMP ORS1	NO

0320**

0321** EXECUTE NOT **

0322**

0323	07253	015505	ENCT	JSB STTOP	LOAD OPERAND
0324	07254	002002		SZA	ZERO?
0325	07255	027221		JMP FALSE	NO
0326	07256	027224		JMP TRUE	YES

0327**

0328** ADD TWO FLOATING POINT QUANTITIES **

0329**

0330	07257	000000	ADMUP	NOP	
0331	07260	061677		LDA OUTLN	COMPUTE
0332	07261	003004	ADPU1	CMA,INA	EXPONENT
0333	07262	040154		ADA EXP	DIFFERENCE
0334	07263	002021		SSA,RSS	ARG 1 LARGER?
0335	07264	027302		JMP ADMU2	YES
0336	07265	062074		LDA A1	NO,
0337	07266	066105		LDB A2	SWAP
0338	07267	072105		STA A2	ARGUMENTS
0339	07270	076074		STB A1	
0340	07271	062147		LDA C1	
0341	07272	060163		LDB C2	
0342	07273	072163		STA C2	
0343	07274	076147		STB C1	
0344	07275	060154		LDA EXP	
0345	07276	065677		LDB OUTLN	
0346	07277	071677		STA OUTLN	
0347	07300	074154		STB EXP	
0348	07301	027261		JMP ADMU1	
0349	07302	040447	ADPU2	ADA M25	SHIFT COUNT >=
0350	07303	066147		LDB C1	
0351	07304	002021		SSA,RSS	25 ?
0352	07305	027334		JMP ADMU4	YES, IGNORE SMALLER ARGUMENT
0353	07306	003100		CMA,CLE	NO, COMPUTE
0354	07307	040447		ADA M25	SHIFT COUNT
0355	07310	071677		STA OUTLN	AS NEGATIVE
0356	07311	062105		LDA A2	LOAD SMALLER
0357	07312	066163		LDB C2	MANTISSA
0358	07313	035677	ADPU3	ISZ OUTLN	MORE SHIFTS?
0359	07314	027337		JMP ADMU5	YES
0360	07315	046147		ADB C1	NO, ADD LOW MANTISSAS
0361	07316	103101		CLO	
0362	07317	006326		RBR,ELB	SAVE (E) IN B(0)
0363	07320	000040		CLE	
0364	07321	042074		ADA A1	ADD HIGH MANTISSAS
0365	07322	004010		SLB	OVERFLOW FROM LOWER MANTISSA?
0366	07323	002004		INA	YES, ADD IT IN
0367	07324	005566		ERB,CLE,ELB	ERASE B(0)

0365	07325	102301		SOS	OVERFLOW?
0369	07326	027335		JMP ADMU4+1	NO
0370	07327	001500		ERA	YES, SHIFT
0371	07330	005500		ERD	MANTISSA DOWN AND
0372	07331	034154		ISZ EXP	CORRECT EXPONENT
0373	07332	027335		JMP ADMU4+1	
0374	07333	002001		RSS	
0375	07334	062074	ADPU4	LDA A1	RETRIEVE HIGH MANTISSA
0376	07335	015020		JSB .PACK	NORMALIZE AND PACK
0377	07336	127257		JMP ADMUP, I	
0378	07337	000071	ADPU5	CLE, SLA, ARS	ARITHMETIC
0379	07340	002200		CME	DOUBLE
0380	07341	005540		ERD, CLE	SHIFT
0381	07342	027313		JMP ADMU3	
0382**					
0383*** ADD TWO FLOATING POINT NUMBERS **					
0384**					
0385	07343	000000	.FAD	NOP	
0386	07344	017366		JSB UNPAK	UNPACK THE ARGUMENTS
0387	07345	017257		JSB ADMUP	ADD THEM UP
0388	07346	127343		JMP .FAD, I	
0389**					
0390*** SUBTRACT TWO FLOATING POINT NUMBERS **					
0391**					
0392	07347	000000	.FSB	NOP	
0393	07350	017366		JSB UNPAK	UNPACK THE ARGUMENTS
0394	07351	062105		LDA A2	TWO'S COMPLEMENT
0395	07352	003000		CMA	THE SECOND ARGUMENT
0396	07353	007006		CMB, INB, SZB	LOW PART ZERO?
0397	07354	027362		JMP .FSB1	NO
0398	07355	002025		SSA, INA, RSS	YES, ORIGINAL NUMBER NEGATIVE?
0399	07356	002021		SSA, RSS	YES, STILL NEGATIVE?
0400	07357	027362		JMP .FSB1	NO
0401	07360	001300		RAR	YES, SHIFT DOWN AND
0402	07361	035677		ISZ OUTLN	CORRECT EXPONENT
0403	07362	076163	.FSB1	STB C2	SAVE COMPLEMENTED
0404	07363	072105		STA A2	NUMBER
0405	07364	017257		JSB ADMUP	ADD ARGUMENTS
0406	07365	127347		JMP .FSB, I	
0407**					
0408*** UNPACK ARGUMENTS FOR ARITHMETIC OPERATIONS **					
0409**					
0410	07366	000000	UNPAK	NOP	
0411	07367	072074		STA A1	SAVE HIGH PART OF ARG 1
0412	07370	002003		SZA, RSS	UNPACK
0413	07371	006404		CLB, INB	SECOND
0414	07372	015456		JSB .FLUN	WORD
0415	07373	076147		STB C1	SAVE LOW PART OF ARG 1
0416	07374	070154		STA EXP	SAVE EXPONENT OF ARG 1
0417	07375	063366		LDA UNPAK	COMPUTE ADDRESS OF
0418	07376	040432		ADA M2	CALLING ROUTINE
0419	07377	164000		LDB 0, I	
0420	07400	134000		ISZ 0, I	SET CALLING ROUTINE'S RETURN
0421	07401	164001		LDB 1, I	LOAD
0422	07402	005275		RBL, CLE, SLB, ERB	ADDRESS OF
0423	07403	027401		JMP *-2	ARG 2

0424	07404	160001	LDA 1,I	LOAD
0425	07405	006004	INB	ARG 2
0426	07406	164001	LDB 1,I	
0427	07407	072105	STA A2	SAVE HIGH PART OF ARG 2
0428	07410	002003	SZA,RSS	UNPACK
0429	07411	006404	CLB,INB	SECOND
0430	07412	015456	JSB .FLUN	WORD
0431	07413	076163	STB C2	SAVE LOW PART OF ARG 2
0432	07414	071677	STA OUTLN	SAVE EXPONENT OF ARG 2
0433	07415	127366	JMP UNPAK,I	
0434**				
0435*** MULTIPLY TWO FLOATING POINT NUMBERS **				
0436**				
0437	07416	000000	.FMP NOP	UNPACK THE
0438	07417	017366	JSB UNPAK	ARGUMENTS
0439	07420	040154	ADA EXP	ADD EXPONENTS
0440	07421	002004	INA	PLUS 1 FOR
0441	07422	070154	STA EXP	NORMALIZATION
0442	07423	005300	RBR	POSITION LOW PART OF ARG 2
0443	07424	060001	LDA 1	COMPUTE A
0444	07425	015236	JSB MPY	CROSS PRODUCT
0445	07426	006074	DEF A1	
0446	07427	072163	STA C2	SAVE RESULT
0447	07430	062147	LDA C1	LOAD AND POSITION
0448	07431	001300	RAR	LOW PART OF ARG 1
0449	07432	076147	STB C1	SAVE REST OF PRIOR RESULT
0450	07433	015236	JSB MPY	COMPUTE SECOND
0451	07434	006105	DEF A2	CROSS PRODUCT
0452	07435	046147	ADB C1	ADD
0453	07436	000040	CLE	CROSS
0454	07437	042163	ADA C2	PRODUCTS
0455	07440	002040	SEZ	CORRECT
0456	07441	006004	INB	FOR CARRY
0457	07442	076163	STB C2	SAVE RESULT
0458	07443	062074	LDA A1	COMPUTE
0459	07444	015236	JSB MPY	HIGH PART
0460	07445	006105	DEF A2	OF PRODUCT
0461	07446	000065	CLE,ERA	POSITION LOW PART
0462	07447	042163	ADA C2	ADD IN CROSS TERMS
0463	07450	000066	CLE,ELA	REPOSITION
0464	07451	002041	SEZ,RSS	CARRY FROM LOW PART?
0465	07452	027456	JMP **4	NO
0466	07453	102201	SOC	YES, POSITIVE CARRY?
0467	07454	006005	INB,RSS	YES
0468	07455	044431	ADB M1	NO
0469	07456	072074	STA A1	EXCHANGE
0470	07457	060001	LDA 1	
0471	07460	066074	LDB A1	REGISTERS
0472	07461	015020	JSB .PACK	NORMALIZE AND PACK
0473	07462	127416	JMP .FMP,I	

0475**

0476*** PERFORM FLOATING DIVIDE **

0477**

0478	07463	000000	.FDV	NOP	
0479	07464	017366		JSB UNPAK	UNPACK ARGUMENTS
0480	07465	066105		LDB A2	DIVISOR
0481	07466	006003		SZB,RSS	ZERO?
0482	07467	027546		JMP .FDV2	YES
0483	07470	066074		LDB A1	NO, DIVIDEND
0484	07471	006003		SZB,RSS	ZERO?
0485	07472	027543		JMP .FDV1	YES
0486	07473	003004		CMA,INA	NO, COMPUTE
0487	07474	002004		INA	EXPONENT
0488	07475	040154		ADA EXP	DIFFERENCE
0489	07476	070154		STA EXP	PLUS 1
0490	07477	062147		LDA C1	LOAD DIVIDEND
0491	07500	004071		CLE,SLB,BRS	ARITHMETIC
0492	07501	002200		CME	RIGHT SHIFT
0493	07502	001500		ERA	TWICE TO
0494	07503	004071		CLE,SLB,BRS	PREVENT
0495	07504	002200		CME	DIVISION
0496	07505	001500		ERA	OVERFLOW
0497	07506	017552		JSB IDIV	DIVIDE
0498	07507	071677		STA OUTLN	SAVE QUOTIENT
0499	07510	005100		BRS	DIVIDE REMAINDER BY 2 TO
0500	07511	002400		CLA	PREVENT DIVISION OVERFLOW
0501	07512	017552		JSB IDIV	DIVIDE REMAINDER AND
0502	07513	070615		STA NUMCK	SAVE LOW PART OF QUOTIENT
0503	07514	066163		LDB C2	
0504	07515	002500		CLA,CLE	SCALE TO
0505	07516	005521		ERB,BRS	PREVENT
0506	07517	005100		BRS	OVERFLOW
0507	07520	017552		JSB IDIV	COMPUTE B2/A2 = Q
0508	07521	003004		CMA,INA	COMPUTE
0509	07522	015236		JSB MPY	-HIGH QUOTIENT*Q
0510	07523	001677		DEF OUTLN	
0511	07524	005066		BLS,CLE,ELB	SHIFT SIGN TO (E)
0512	07525	060615		LDA NUMCK	LOW QUOTIENT
0513	07526	002020		SSA	NEGATIVE?
0514	07527	003401		CCA,RSS	YES, SET (A)=-1 (EXTEND
0515	07530	002400		CLA	NO, SET (A)=0 SIGN)
0516	07531	003040		CMA,SEZ	IF (E)=1 SUBTRACT
0517	07532	002004		INA	1 AS EXTENSION
0518	07533	003100		CMA,CLE	OF PRODUCT
0519	07534	044615		ADB NUMCK	ADD IN LOW QUOTIENT
0520	07535	002040		SEZ	CARRY
0521	07536	002004		INA	INTO (A)
0522	07537	004066		CLE,ELB	POSITION
0523	07540	001600		ELA	REGISTERS
0524	07541	041677		ADA OUTLN	ADD IN HIGH QUOTIENT
0525	07542	002001		RSS	
0526	07543	002400	.FDV1	CLA	SET MANTISSA TO ZERO
0527	07544	015020		JSB .PACK	NORMALIZE AND PACK
0528	07545	127463		JMP .FDV,1	
0529	07546	014477	.FDV2	JSB ERROR	DIVIDE-BY-ZERO
0530	07547	062074	DBYZR	LDA A1	

0531	07550	015103		JSB OVFLW	RETURN INFINITY
0532	07551	127463		JMP .FDV,I	
0533**					
0534**			INTEGER DIVIDE	**	
0535**					
0536	07552	000000	IDIV	NOP	DIVIDEND IN (B) AND (A)
0537	07553	076074		STB A1	SAVE HIGH DIVIDEND
0538	07554	066105		LDB A2	
0539	07555	000120		CLE,SSB	SET (B) TO ABS(B)
0540	07556	007204		CMB,CME,INB	AND (E) TO SIGN(B)
0541	07557	077343		STB .FAD	SAVE POSITIVE DIVISOR
0542	07558	007004		CMB,INB	SAVE
0543	07559	077347		STB .FSB	NEGATIVE DIVISOR
0544	07560	004445		LDB M16	SET
0545	07561	076147		STB C1	COUNTER
0546	07562	004432		LDB M2	SET
0547	07563	074153		STB SIGN	SIGNS
0548	07564	077416		STB .FMP	RETRIEVE HIGH DIVIDEND
0549	07565	066074		LDB A1	POSITIVE?
0550	07566	006021		SSB,RSS	YES
0551	07567	027577		JMP IDIV1	NO, SET REMAINDER SIGN
0552	07568	037416		ISZ .FMP	NEGATIVE AND COMPLEMENT
0553	07569	007200		CMB,CME	THE DIVISOR
0554	07570	002002		SZA	AND (E)
0555	07571	003005		CMA,INA,RSS	
0556	07572	006004		INB	QUOTIENT POSITIVE?
0557	07573	002040	IDIV1	SEZ	NO
0558	07574	034153		ISZ SIGN	SHIFT
0559	07575	000066	IDIV2	CLE,ELA	DIVIDEND
0560	07576	005600		ELB	SUBTRACT DIVISOR
0561	07577	047347		ADB .FSB	OK?
0562	07578	006021		SSB,RSS	YES
0563	07579	002005		INA,RSS	NO, RESTORE DIVIDEND
0564	07580	047343		ADB .FAD	DONE?
0565	07581	036147		ISZ C1	NO
0566	07582	027601		JMP IDIV2	YES, NEGATE QUOTIENT
0567	07583	003004		CMA,INA	RESULT TO BE POSITIVE?
0568	07584	034153		ISZ SIGN	YES
0569	07585	003004		CMA,INA	NO, REMAINDER POSITIVE?
0570	07586	037416		ISZ .FMP	YES
0571	07587	127552		JMP IDIV,I	NO
0572	07588	007004		CMB,INB	
0573	07589	127552		JMP IDIV,I	

```

0575*          *****
0576*          SYMBOL TABLE SEARCH SUBROUTINE
0577*          *****
0578*
0579*          THE SUBROUTINE IS CALLED WITH THE IDENTIFIER TO BE
0580*          SEARCHED FOR IN A . THE SUBROUTINE RETURNS WITH
0581*          THE ADDRESS OF THE MATCHING ENTRY IN B OR -1 IN
0582*          B IF THERE IS NO MATCHING ENTRY
0583*          THE FOLLOWING RULES APPLY WHEN SEARCHING FOR ARRAYS
0584*
0585*          TYPE 1 (1 DIMENSION) SEARCH FOR CORRESPONDING TYPE 1
0586*          OR TYPE 3 ARRAY. IF TYPE 3 IS FOUND CHANGE THE ENTRY
0587*          TYPE TO TYPE 1
0588*
0589*          TYPE 2 (2 DIMENSIONS) SEARCH FOR CORRESPONDING TYPES
0590*          OR TYPE 3 ARRAY. IF TYPE 3 IS FORND CHANGE THE ENTRY
0591*          TYPE TO TYPE 2
0592*
0593*          TYPE 3 (UNDIMENSIONED) SEARCH FOR CORRESPONDING
0594*          TYPE 3 OR TYPE 1 OR TYPE 2 ARRAY
0595*
0596 07620 000000 SSYMT NOP
0597 07621 070163 STA STEMP      STORE IDENTIFIER
0598 07622 010336 AND .15      ISOLATE IDENTIFIER TYPE
0599 07623 040434 ADA M4
0600 07624 002024 SSA,INA
0601 07625 027631 JMP **4      JUMP IF ARRAY TYPE
0602 07626 060163 LDA STEMP      RESTORE A
0603 07627 070001 STA 1      STORE IN B
0604 07630 027643 JMP SYMT1+3
0605 07631 002020 SSA      SKIP IF UNDIMENSIONED
0606 07632 027640 JMP SYMT1
0607 07633 060163 LDA STEMP      RESTORE A
0608 07634 010437 AND MSK3      1777710 SET TYPE TO 1
0609 07635 070001 STA 1
0610 07636 006004 INB      SET TYPE IN B TO 2
0611 07637 027643 JMP **4
0612 07640 007400 SYMT1 CCB      SET DIMENSIONED FLAG IN B
0613 07641 060326 LDA .3
0614 07642 030163 IOR STEMP      SET TYPE TO UNDEFINED
0615 07643 070164 STA STEMP+1    STORE A
0616 07644 074166 STB STEMP+2    STORE B
0617 07645 064116 LDB SYMTF      START OF SYMBOL TABLE
0618 07646 027667 JMP SYMT4
0619 07647 160001 SYMT2 LDA 1,1    PICK UP 1ST WORD OF ENTRY
0620 07650 050163 CPA STEMP      COMPARE WITH IDENTIFIER
0621 07651 127620 JMP SSYMT,1    MATCH ? RETURN
0622 07652 050164 CPA STEMP+1    COMPARE WITH DIFFERENT DIM.
0623 07653 027674 JMP SYMT3
0624 07654 050165 CPA STEMP+2    COMPARE WITH DIFFERENT DIM.
0625 07655 027674 JMP SYMT3
0626 07656 160001 LDA 1,1
0627 07657 010336 AND .15      ISOLATE ENTRY TYPE
0628 07660 050336 CPA .15      FUNCTION ?
0629 07661 027666 JMP **5      YES
0630 07662 040434 ADA M4

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0631	07663	002020		SSA	ARRAY ?
0632	07664	006004		INB	YES INCREMENT POINTER
0633	07665	006004		INB	INCREMENT POINTER
0634	07666	044325		ADB .2	ADD 2 TO POINTER
0635	07667	054117	SYMT4	CPB SYMTA	SYMBOL TABLE EXHAUSTED?
0636	07670	007401		CCB,RSS	YES
0637	07671	027647		JMP SYMT2	NO, CHECK NEXT ENTRY FOR MATCH
0638	07672	060163		LDA STEMP	RETRIEVE SYMBOL
0639	07673	127620		JMP SSYMT,1	RETURN WITH B NEGATIVE
0640	07674	060163	SYMT3	LDA STEMP	RESTORE A
0641	07675	034165		ISZ STEMP+2	DIMENSIONED IDENTIFIER?
0642	07676	002001		RSS	NO, SKIP
0643	07677	170001		STA 1,1	YES CHANGE 1ST WORD OF ENTRY TO
0644	07700	127620		JMP SSYMT,1	APPROPRIATE DIMENSION TYPE

0002**

0003*** ERROR TABLE **

0004**

0005	07701	000266	ERR	DEF EOF+1	PREMATURE STATEMENT END
0006	07702	002066		DEF RTLE	INPUT EXCEEDS 71 CHARACTERS
0007	07703	002137		DEF INVSC	SYSTEM COMMAND NOT RECOGNIZED
0008	07704	002236		DEF SYNE1	NO STATEMENT TYPE FOUND
0009	07705	000717		DEF NUMER+1	BAD EXPONENT PART
0010	07706	002656		DEF SYE16	NO LETTER WHERE EXPECTED
0011	07707	002346		DEF SYNE2	LET STATEMENT HAS NO STORE
0012	07710	002361		DEF SYNE3	ILLEGAL COM STATEMENT
0013	07711	002406		DEF SYNE4+1	NO FUNCTION IDENTIFIER (OR BAD)
0014	07712	002420		DEF SYNE5	MISSING PARAMETER
0015	07713	002425		DEF SYNE6+1	MISSING ASSIGNMENT OPERATOR
0016	07714	002445		DEF SYNE7	MISSING 'THEN'
0017	07715	002453		DEF SYNE8+1	MISSING OR IMPROPER FOR-VARIABLE
0018	07716	002465		DEF SYNE9	MISSING 'TO'
0019	07717	002500		DEF SYE10	BAD 'STEP' PART IN FOR STATEMENT
0020	07720	001330		DEF CALER	CALLED ROUTINE DOES NOT EXIST
0021	07721	002541		DEF SYE11+1	WRONG NUMBER OF CALL PARAMETERS
0022	07722	000614		DEF SYE12	NO CONSTANT WHERE EXPECTED
0023	07723	002561		DEF SYE13	NO VARIABLE WHERE EXPECTED
0024	07724	002613		DEF SYE14	NO CLOSING QUOTE FOR STRING
0025	07725	002625		DEF SYE15	PRINT JUXTAPOSES FORMULAS
0026	07726	002671		DEF SYE17	IMPROPER WORD IN MAT STATEMENT
0027	07727	002702		DEF SYE18	NO COMMA WHERE EXPECTED
0028	07730	002755		DEF SYE19	IMPROPER ARRAY FUNCTION
0029	07731	002775		DEF SYE20	NO SUBSCRIPT WHERE EXPECTED
0030	07732	003007		DEF SYE21	ARRAY INVERSION INTO SELF
0031	07733	003020		DEF SYE22	MISSING MULTIPLICATION OPERATOR
0032	07734	003041		DEF SYE23	IMPROPER ARRAY OPERATOR
0033	07735	003060		DEF SYE24+1	ARRAY MULTIPLICATION INTO SELF
0034	07736	003202		DEF FSCE1+1	MISSING LEFT PARENTHESIS
0035	07737	003256		DEF FSCE2+1	MISSING RIGHT PARENTHESIS
0036	07740	003306		DEF FSCE3+1	UNRECOGNIZED OPERAND
0037	07741	003534		DEF ARRE1	MISSING SUBSCRIPT
0038	07742	003547		DEF ARRE2	MISSING ARRAY IDENTIFIER

0039	07743	004345	DEF SYE25+1	MISSING OR BAD INTEGER
0040	07744	000267	DEF NOEOF+1	CHARACTERS AFTER STATEMENT END
0041	07745	003402	DEF FSCE4+1	OUT OF CORE DURING SYNTAX
0042	07746	002170	DEF PRERR	PHOTO READER NOT READY
0043	07747	005312	DEF MER4	FUNCTION MULTIPLY DEFINED
0044	07750	005413	DEF MER6	UNMATCHED FOR STATEMENT
0045	07751	005264	DEF MER3	UNMATCHED NEXT
0046	07752	005512	DEF MER8	OUT OF STORAGE-SYMBOL TABLE
0047	07753	005341	DEF MSYM	INCONSISTENT DIMENSIONS
0048	07754	005301	DEF MLOP6	LAST STATEMENT IS NOT 'END'
0049	07755	005377	DEF MER5	ARRAY DOUBLE DIMENSIONED
0050	07756	005431	DEF MER10	NO OF DIMENSIONS UNSPECIFIED
0051	07757	001352	DEF MER9	ARRAY TOO LARGE
0052	07760	005464	DEF MER7	OUT OF STORAGE-ARRAY ALLOCATION
0053	07761	006760	DEF E6	SUBSCRIPT TOO LARGE
0054	07762	001526	DEF E8	UNDEFINED OPERAND ACCESSED
0055	07763	007057	DEF BASER	NEGATIVE BASE POWERED TO REAL
0056	07764	007153	DEF POWER	ZERO TO ZERO POWER
0057	07765	006054	DEF XEC5	MISSING STATEMENT
0058	07766	006363	DEF E2	GOSUBS NESTED 10 DEEP
0059	07767	006367	DEF E3	RETURN FINDS NO ADDRESS
0060	07770	006135	DEF E4	OUT OF DATA
0061	07771	001474	DEF E1+1	OUT OF STORAGE - EXECUTION
0062	07772	011766	DEF E7	RE-DIMENSIONED ARRAY TOO LARGE
0063	07773	012036	DEF LERR+1	DIMENSIONS NOT COMPATIBLE
0064	07774	012100	DEF LCHK5	MATRIX UNASSIGNED
0065	07775	012704	DEF LDUM1	NEARLY SINGULAR MATRIX
0066	07776	010420	DEF TRGER	ARGUMENT TOO LARGE
0067	07777	010771	DEF SQRRR	SQRT HAS NEGATIVE ARGUMENT
0068	10000	011077	DEF LOGER	LOG OF NEGATIVE ARGUMENT
0069	10001		RCERN EQU *	** RECOVERABLE ERRORS FOLLOW **
0070	10001	001100	DEF OVRER	OVERFLOW
0071	10002	001074	DEF UNDER	UNDERFLOW
0072	10003	011151	DEF LNZR	LOG OF ZERO
0073	10004	011305	DEF EXPER	EXPONENTIAL OVERFLOW
0074	10005	007547	DEF DBYZR	DIVIDE BY ZERO
0075	10006	007156	DEF ZRTNG	ZERO TO NEGATIVE POWER
0076*				
0077*				
0078	10007	006412	EBLFF OCT 6412	
0079	10010	042522	ASC 3,ERROR	
0080	10013	000000	EBFF BSS 2	
0081	10015	020111	LBLFF ASC 5, IN LINE	
0082	10022	000000	LNBFF BSS 2	

0084**

0085*** PREDEFINED FUNCTION JUMP TABLE **

0086**

0087	10024	006605	PDFT	DEF	ETAB
0088	10025	010647		DEF	ESIN
0089	10026	010645		DEF	ECOS
0090	10027	010406		DEF	ETAN
0091	10030	010532		DEF	EATN
0092	10031	011177		DEF	EEXP
0093	10032	011070		DEF	ELOG
0094	10033	010642		DEF	EABS
0095	10034	010765		DEF	ESQR
0096	10035	011055		DEF	EINT
0097	10036	010736		DEF	ERND
0098	10037	011166		DEF	ESGN

0099**

0100*** OUTPUT A NUMBER **

0101**

0102	10040	000000	NUMOT	NOP	NUMBER IN (A) AND (B)
0103	10041	071603		STA EXPON	SAVE NUMBER
0104	10042	002041		SEZ,RSS	SIGN?
0105	10043	026055		JMP NS2	NO
0106	10044	002021		SSA,RSS	YES, NEGATIVE NUMBER?
0107	10045	026052		JMP NS1	NO
0108	10046	015423		JSB ARINV	YES, INVERT IT
0109	10047	071603		STA EXPON	
0110	10050	060354		LDA .45	
0111	10051	002001		RSS	
0112	10052	060345	NS1	LDA .32	STORE
0113	10053	070153		STA SIGN	SIGN
0114	10054	061603		LDA EXPON	
0115	10055	076344	NS2	STB GETDG	SAVE NUMBER
0116	10056	015364		JSB IFIX	INTEGERIZE
0117	10057	000000		NOP	
0118	10060	162040		LDA NUMOT,1	SET
0119	10061	072101		STA NUM01	END-OF-LINE
0120	10062	072135		STA NUM03	OPERATION
0121	10063	036040		ISZ NUMOT	BUMP RETURN ADDRESS
0122	10064	102201		SOC	WAS IT AN INTEGER?
0123	10065	026110		JMP NUM02	NO

0124**

0125*** OUTPUT AN INTEGER **

0126**

0127	10066	002400		CLA	SAVE
0128	10067	074174		STB B1+1	INTEGER
0129	10070	044462		ADB M1000	5 OR MORE
0130	10071	006021		SSB,RSS	CHARACTERS?
0131	10072	040326		ADA .3	YES
0132	10073	040330		ADA .6	COMPUTE
0133	10074	040133		ADA CCNT	END-OF-FIELD
0134	10075	003004		CMA,INA	SAVE MARKER TO
0135	10076	070172		STA MLBX1+1	END-OF-FIELD
0136	10077	040367		ADA .74	ENOUGH
0137	10100	002020		SSA	ROOM?
0138	10101	000000	NUM01	NOP	NO
0139	10102	060153		LDA SIGN	

0140	10103	002002	SZA	SIGN?
0141	10104	015715	JSB OUTCR	YES, OUTPUT IT
0142	10105	060174	LDA 01+1	OUTPUT
0143	10106	114222	JSB OUTIA,1	THE INTEGER
0144	10107	126040	JMP NUMOT,1	
0145	10110	003400	NUM02 CCA	SET 'FIXED'
0146	10111	073032	STA FFLAG	FLAG FALSE
0147	10112	061603	LDA EXPON	LOAD
0148	10113	066344	LDB GETDG	NUMBER
0149	10114	114236	JSB .FADA,1	IS NUMBER
0150	10115	000472	DEF MAXFX	LESS THAN
0151	10116	002021	SSA,RSS	999999.5 ?
0152	10117	020127	JMP NUM05	NO
0153	10120	061603	LDA EXPON	YES, IS
0154	10121	066344	LDB GETDG	NUMBER
0155	10122	114236	JSB .FADA,1	LESS
0156	10123	000474	DEF MINFX	THAN
0157	10124	064335	LDB .12	0.09999995?
0158	10125	002021	SSA,RSS	
0159	10126	037032	ISZ FFLAG	NO, SET FFLAG = 0 AND SKIP
0160	10127	064336	NUM05 LDB .15	YES, LOAD 'FLOATING' FIELD WIDTH
0161	10130	044133	ADB CCNT	SAVE
0162	10131	007004	CHB,INB	END-OF-FIELD
0163	10132	074172	STB MLBX1+1	MARKER
0164	10133	044370	ADB .75	ROOM
0165	10134	006020	SSB	ENOUGH?
0166	10135	000000	NUM03 NOP	NO
0167**				
0168**	OUTPUT A FLOATING POINT NUMBER **			
0169**				
0170	10136	061603	LDA EXPON	
0171	10137	071274	STA MANT1	
0172	10140	066344	LDB GETDG	UNPACK
0173	10141	015486	JSB .FLUN	
0174	10142	075336	STB MANT2	NUMBER
0175	10143	070154	STA EXP	
0176	10144	060153	LDA SIGN	
0177	10145	002002	SZA	SIGN?
0178	10146	015715	JSB OUTCR	YES, OUTPUT IT
0179	10147	002400	CLA	INITIALIZE COUNTER
0180	10150	071603	STA EXPON	FOR DECIMAL EXPONENT
0181	10151	050154	CPA EXP	EXPONENT ZERO?
0182	10152	026175	JMP EOUT4	YES
0183	10153	015147	EOUT2 JSB MBY10	NO,
0184	10154	060154	LDA EXP	MULTIPLY
0185	10155	003004	CHA,INA	NUMBER BY 10
0186	10156	002020	SSA	UNTIL
0187	10157	026162	JMP ++3	IT IS
0188	10160	035603	ISZ EXPON	GREATER
0189	10161	026153	JMP EOUT2	THAN 1
0190	10162	015200	JSB DBY10	DIVIDE BY 10
0191	10163	061603	LDA EXPON	
0192	10164	064154	EOUT3 LDB EXP	DIVIDE
0193	10165	007004	CHB,INB	NUMBER
0194	10166	006021	SSB,RSS	BY 10
0195	10167	026175	JMP EOUT4	UNTIL

0196	10170	071603	STA EXPON	IT IS
0197	10171	015200	JSB DBY10	LESS
0198	10172	003400	CCA	THAN
0199	10173	041603	ADA EXPON	1
0200	10174	026164	JMP EOUT3	
0201	10175	003000	EOUT4 CMA	SET EXPONENT
0202	10176	071603	STA EXPON	TO TRUE VALUE-1
0203	10177	064437	LDB M7	SET DIGIT
0204	10200	076370	STB RETCR	COUNTER
0205	10201	007400	CCB	SET DECIMAL
0206	10202	075677	STB OUTLN	POINT FLAG
0207	10203	057032	CPB FFLAG	FIXED POINT?
0208	10204	026213	JMP EOUT6	NO
0209	10205	003000	CMA	YES, SET
0210	10206	071677	STA OUTLN	DECIMAL POINT FLAG
0211	10207	050324	CPA .1	.1?
0212	10210	026217	JMP EOUT5	YES
0213	10211	002021	SSA, RSS	LEADING DECIMAL POINT?
0214	10212	026225	JMP EOUT7+2	YES
0215	10213	016344	EOUT6 JSB GETDG	OUTPUT
0216	10214	040357	ADA .48	A
0217	10215	015715	JSB OUTCR	DIGIT
0218	10216	026227	JMP EOUT8	
0219	10217	060355	EOUT5 LDA .46	OUTPUT
0220	10220	015715	JSB OUTCR	DECIMAL POINT
0221	10221	060357	LDA .48	OUTPUT
0222	10222	026226	JMP EOUT8-1	LEADING ZERO
0223	10223	035677	EOUT7 ISZ OUTLN	DECIMAL POINT NEXT?
0224	10224	026213	JMP EOUT6	NO
0225	10225	060355	LDA .46	YES,
0226	10226	015715	JSB OUTCR	OUTPUT IT
0227	10227	036370	EOUT8 ISZ RETCR	MORE MANTISSA?
0228	10230	026223	JMP EOUT7	YES
0229	10231	060133	LDA CCNT	NO,
0230	10232	072101	STA NUM01	SAVE
0231	10233	060132	LDA BADDR	OUTPUT
0232	10234	072135	STA NUM03	POINTERS
0233	10235	016344	JSB GETDG	NEXT DIGIT
0234	10236	040435	ADA M5	FIVE OR
0235	10237	002020	SSA	GREATER?
0236	10240	026303	JMP EOUT1	NO
0237	10241	003400	CCA	SET DECIMAL
0238	10242	071274	ERND1 STA SYMCK	POINT COUNTER
0239	10243	016370	JSB RETCR	RETRIEVE CHARACTER
0240	10244	050355	CPA .46	DECIMAL POINT?
0241	10245	026241	JMP ERND1-1	YES, FLAG IT
0242	10246	015570	JSB DIGCK	NO, DIGIT?
0243	10247	026262	JMP ERND2	NO
0244	10250	050333	CPA .9	YES, 9?
0245	10251	026264	JMP *+3	YES
0246	10252	040360	ADA .49	NO, BUMP
0247	10253	026276	JMP ERND3	DIGIT 1
0248	10254	060357	LDA .48	OVERLAY
0249	10255	015715	JSB OUTCR	A ZERO
0250	10256	016370	JSB RETCR	BACKSPACE
0251	10257	003400	CCA	DECREMENT

0252	10260	041274	ADA	SYMCK	DECIMAL POINT
0253	10261	026242	JMP	ERN01	COUNTER
0254	10262	015715	ERN02	JSB	OUTCR
0255	10263	035603	ISZ	EXPON	RESTORE CHARACTER
0256	10264	000000	NOP		CORRECT
0257	10265	060360	LDA	.49	EXPONENT
0258	10266	067032	LDB	FFLAG	OVERLAY A 1
0259	10267	000002	SZB		FIXED
0260	10270	026276	JMP	ERN03	POINT?
0261	10271	015715	JSB	OUTCR	NO
0262	10272	000357	LDA	.48	YES, OUTPUT CHARACTER
0263	10273	035274	ISZ	SYMCK	PREPARE TO OVERLAY A ZERO
0264	10274	026271	JMP	*-3	DECIMAL POINT NEXT?
0265	10275	000355	LDA	.46	NO
0266	10276	015715	ERN03	JSB	YES
0267	10277	062101	LDA	NUM01	RESTORE
0268	10300	070133	STA	CCNT	OUTPUT
0269	10301	002135	LDA	NUM03	POINTERS
0270	10302	070132	STA	BADDR	
0271	10303	037032	EOUT1	ISZ	FFLAG
0272	10304	026333	JMP	EOUT9	NO, FIXED POINT?
0273	10305	060364	LDA	E	YES
0274	10306	015715	JSB	OUTCR	NO,
0275	10307	060354	LDA	.45	OUTPUT 'E'
0276	10310	063603	LDB	EXPON	LOAD '-'
0277	10311	006020	SSB		POSITIVE
0278	10312	007005	CMB, INB, RSS		EXPONENT?
0279	10313	060353	LDA	.43	NO
0280	10314	075603	STB	EXPON	YES, LOAD '+'
0281	10315	015715	JSB	OUTCR	OUTPUT SIGN
0282	10316	065603	LDB	EXPON	
0283	10317	060357	LDA	.48	COMPUTE
0284	10320	044442	ADB	M10	
0285	10321	006020	SSB		EXPONENT
0286	10322	026325	JMP	*+3	
0287	10323	002004	INA		DIGIT
0288	10324	026320	JMP	*-4	
0289	10325	044361	ADB	.58	COMPUTE
0290	10326	075603	STB	EXPON	SECOND DIGIT
0291	10327	015715	JSB	OUTCR	OUTPUT
0292	10330	061603	LDA	EXPON	
0293	10331	015715	JSB	OUTCR	EXPONENT
0294	10332	126040	JMP	NUM0T, 1	
0295	10333	010370	EOUT9	JSB	RETRIEVE CHARACTER
0296	10334	050357	CPA	.48	ZERO?
0297	10335	026340	JMP	EOU10	YES
0298	10336	015715	JSB	OUTCR	NO, RESTORE CHARACTER
0299	10337	126040	JMP	NUM0T, 1	
0300	10340	060345	EOL10	LDA	.32
0301	10341	015715	JSB	OUTCR	OVERLAY
0302	10342	010370	JSB	RETR	A BLANK
0303	10343	026333	JMP	EOUT9	BACKSPACE

0305**

0306*** GET DIGIT TO CUTPUT **

0307**

0308	10344	000000	GETDG NOP	
0309	10345	015147	JSB MBY10	MULTIPLY BY 10
0310	10346	064154	LDB EXP	GET EXPONENT IN (B)
0311	10347	007004	CMB, INB	AS NEGATIVE
0312	10350	010430	AND H1MSK	KEEP 5 HIGH BITS OF (A)
0313	10351	001200	RAL	NORMALIZE TO BIT 15
0314	10352	006024	SSB, INB	ROTATE INTEGER
0315	10353	026351	JMP *-2	INTO (A)
0316	10354	010376	AND MSK0	EXTRACT
0317	10355	070615	STA NUMCK	DIGIT
0318	10356	064154	LDB EXP	ROTATE
0319	10357	007004	CMB, INB	
0320	10360	001300	RAR	BACK
0321	10361	006024	SSB, INB	
0322	10362	026360	JMP *-2	
0323	10363	021274	XOR MANT1	REMOVE
0324	10364	065336	LDB MANT2	DIGIT
0325	10365	015113	JSB NORML	NORMALIZE REMAINDER
0326	10366	060615	LDA NUMCK	LOAD (A) WITH DIGIT
0327	10367	126344	JMP GETDG, I	

0328**

0329*** RETRIEVE CHARACTER FROM OUTPUT BUFFER **

0330**

0331	10370	000000	RETCR NOP	
0332	10371	064133	LDB CCNT	DECREMENT
0333	10372	044431	ADB M1	CHARACTER
0334	10373	074133	STB CCNT	COUNT
0335	10374	160132	LDA BADDR, I	POSITION
0336	10375	006011	SLB, RSS	AND
0337	10376	001727	ALF, ALF	EXTRACT
0338	10377	010376	AND MSK0	CHARACTER
0339	10400	004010	SLB	FIRST CHARACTER OF WORD?
0340	10401	126370	JMP RETCR, I	NO
0341	10402	064132	LDB BADDR	YES, DECREMENT
0342	10403	044431	ADB M1	BUFFER
0343	10404	074132	STB BADDR	POINTER
0344	10405	126370	JMP RETCR, I	

0345*

0346*

0347	06074	A1	EQU SETDP
0348	06105	A2	EQU STSRH
0349	06147	C1	EQU FLWST
0350	06163	C2	EQU FVSRH

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0352*          *****
0353*          SUBROUTINE TO CALCULATE TAN(X)
0354*          *****
0355*
0356*          CALLED BY A JMP ETAN WITH THE ARGUMENT
0357*          IN FLOATING RADIAN IN THE REGISTERS.
0358*          THE FLOATING RESULT IS RETURNED IN A & B
0359*
0360 10406 114240 ETAN JSB .FMFA,I
0361 10407 010475      DEF FOPI      4/PI
0362 10410 072501      STA XTEMP
0363 10411 076502      STB XTEMP+1
0364 10412 114236      JSB .FADA,I
0365 10413 010477      DEF K1
0366 10414 017440      JSB .PWR2
0367 10415 177776      DEC -2
0368 10416 017413      JSB .IENT
0369 10417 014477      JSB ERROR
0370 10420 017432 TRGER JSB FLOAT
0371 10421 015423      JSB ARINV
0372 10422 017440      JSB .PWR2
0373 10423 000002      DEC 2
0374 10424 114236      JSB .FADA,I
0375 10425 010501      DEF XTEMP
0376 10426 072501      STA XTEMP
0377 10427 076502      STB XTEMP+1      X=X-4*ENTIER((X+1)/4)
0378 10430 114237      JSB .FSBA,I
0379 10431 010477      DEF K1
0380 10432 073032      STA SBOX      TEMPORARY
0381 10433 002020      SSA          X<1?
0382 10434 026467      JMP ELSE1     YES
0383 10435 062507      LDA K2        NO
0384 10436 060510      LDB K2+1
0385 10437 114237      JSB .FSBA,I
0386 10440 010501      DEF XTEMP
0387 10441 072503 BOTHI STA YTEMP
0388 10442 076504      STB YTEMP+1      Y= 2-X
0389 10443 114240      JSB .FMFA,I
0390 10444 010503      DEF YTEMP
0391 10445 114240      JSB .FMFA,I
0392 10446 010507      DEF K2
0393 10447 114237      JSB .FSBA,I
0394 10450 010477      DEF K1
0395 10451 017324      JSB .CHEB
0396 10452 010511      DEF COEFF
0397 10453 114240      JSB .FMFA,I
0398 10454 010503      DEF YTEMP
0399 10455 072503      STA YTEMP
0400 10456 076504      STB YTEMP+1      Y=Y*CHEBY(2+Y**2-1)
0401 10457 063032      LDA SBOX
0402 10460 002020      SSA          X<1 ?
0403 10461 026472      JMP ELSE2     YES
0404 10462 062477      LDA K1
0405 10463 060500      LDB K1+1
0406 10464 114241      JSB .FDVA,I
0407 10465 010503      DEF YTEMP

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0408 10466 124264      JMP FR12A,I      ANS = 1/Y
0409 10467 062501  ELSE1 LDA XTEMP
0410 10470 066502      LDB XTEMP+1
0411 10471 026441      JMP BOTH1      Y=X
0412 10472 062503  ELSE2 LDA YTEMP
0413 10473 066504      LDB YTEMP+1
0414 10474 124264      JMP FR12A,I      ANS = Y
0415*
0416 10475 050574  FOP1 DEC 1.273239545      4/PI
0417 10477 040000  K1 DEC 1.
0418 10501 000000  XTEMP BSS 2
0419 10503 000000  YTEMP BSS 2
0420 10505 000000  UTEMP BSS 2
0421 10507 040000  K2 DEC 2.
0422 10511 076061  COEFF DEC 1.4458E-8
0423 10513 066034      DEC 2.013766E-7
0424 10515 057035      DEC 2.804816E-6
0425 10517 050755      DEC 3.906637E-5
0426 10521 043523      DEC 5.4417038E-4
0427 10523 076112      DEC 7.586101578E-3
0428 10525 066520      DEC .10675392857
0429 10527 070512      DEC 1.7701474227
0430 10531 000000      OCT 0

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0432*          *****
0433*          SUBROUTINE TO CALCULATE ATN(X)
0434*          *****
0435*
0436*          CALLED BY A JMP EATN WITH THE ARGUMENT
0437*          IN FLOATING POINT FORM IN THE REGISTERS.
0438*          THE FLOATING RESULT IN THE RANGE -PI/2
0439*          TO PI/2 IS RETURNED IN A & B
0440*
0441 10532 072501 EATN STA XTEMP
0442 10533 076502      STB XTEMP+1
0443 10534 060001      LDA 1
0444 10535 010376      AND MSK0
0445 10536 073032      STA SBOX          TAN = EXP OF (X)
0446 10537 002002      SZA
0447 10540 000010      SLA          ABS (X) > 1 ?
0448 10541 026576      JMP ELS1          NO
0449 10542 062477      LDA K1
0450 10543 066500      LDB K1+1
0451 10544 114241      JSB .FDVA,I
0452 10545 010501      DEF XTEMP          U=1/X
0453 10546 072505      BT-1 STA UTEMP
0454 10547 076506      STB UTEMP+1
0455 10550 114240      JSB .FMFA,I
0456 10551 010505      DEF UTEMP
0457 10552 114240      JSB .FMFA,I
0458 10553 010507      DEF K2
0459 10554 114237      JSB .FSBA,I
0460 10555 010477      DEF K1
0461 10556 017324      JSB .CHEB
0462 10557 010615      DEF COEF
0463 10560 114240      JSB .FMFA,I
0464 10561 010505      DEF UTEMP
0465 10562 072503      STA YTEMP
0466 10563 076504      STB YTEMP+1          Y=U*CHEBY(2*U**2-1)
0467 10564 063032      LDA SBOX
0468 10565 002002      SZA
0469 10566 000010      SLA          ABS(X)>1 ?
0470 10567 026601      JMP ELS2          NO
0471 10570 062501      LDA XTEMP
0472 10571 002020      SSA          X<0 ?
0473 10572 026604      JMP ELS3          YES
0474 10573 062611      LDA PIBY2
0475 10574 066612      LDB PIBY2+1
0476 10575 026606      JMP ELS3+2          ANS = PI/2 - Y
0477 10576 062501      ELS1 LDA XTEMP
0478 10577 066502      LDB XTEMP+1
0479 10600 026546      JMP BTH1          U=X
0480 10601 062503      ELS2 LDA YTEMP
0481 10602 066504      LDB YTEMP+1
0482 10603 124264      JMP FR12A,I          ANS = Y
0483 10604 062613      ELS3 LDA MP2
0484 10605 066614      LDB MP2+1
0485 10606 114237      JSB .FSBA,I
0486 10607 010503      DEF YTEMP          ANS=-PI/2-Y
0487 10610 124264      JMP FR12A,I

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0488*
0489 10611 062207 PIBY2 DEC 1.5707963268 PI/2
0490 10613 115570 MP2 DEC -1.5707963268 -PI/2
0491 10615 106671 COEF DEC -1.33034E-8
0492 10617 056335 DEC 8.64888E-8
0493 10621 131601 DEC -56.99186E-8
0494 10623 040033 DEC 3.821037E-6
0495 10625 111013 DEC -2.6215196E-5
0496 10627 060542 DEC 1.8574297E-4
0497 10631 122573 DEC -1.381195004E-3
0498 10633 055471 DEC .01113584206
0499 10635 111620 DEC -.1058929245
0500 10637 070320 DEC 1.762747174
0501 10641 000000 OCT 0

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0503*
0504* *****
0505* SUBROUTINE TO COMPUTE ABS(X)
0506* *****
0507* CALLED BY A JMP EABS WITH THE ARGUMENT
0508* IN FLOATING POINT FORM IN THE REGISTERS.
0509* THE ABSOLUTE VALUE IN FLOATING POINT
0510* IS RETURNED IN A & B
0511*
0512 10642 002020 EABS SSA NEGATIVE?
0513 10643 015423 JSB ARINV YES, NEGATE IT
0514 10644 124264 JMP FR12A,I

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0002*          *****
0003*          SUBROUTINE TO CALCULATE SIN(X)
0004*          *****
0005*
0006*          CALLED BY A JMP ESIN WITH THE ARGUMENT
0007*          IN FLOATING RADIAN IN THE REGISTERS.
0008*          THE FLOATING RESULT IS RETURNED IN A & B
0009*
0010 10645 114236 ECOS JSB .FADA,I
0011 10646 010611 DEF PIBY2
0012 10647 114240 ESIN JSB .FMFA,I
0013 10650 010717 DEF TOPI
0014 10651 072501 STA XTEMP
0015 10652 076502 STB XTEMP+1 X=2*X/PI
0016 10653 114236 JSB .FADA,I
0017 10654 010477 DEF K1
0018 10655 017440 JSB .PWR2
0019 10656 177776 DEC -2
0020 10657 017413 JSB .IENT
0021 10660 026417 JMP TRGR-1 ERROR IF EXPONENT >= 15
0022 10661 017432 JSB FLOAT
0023 10662 114240 JSB .FMFA,I
0024 10663 010721 DEF MM4
0025 10664 114236 JSB .FADA,I
0026 10665 010501 DEF XTEMP
0027 10666 072501 STA XTEMP
0028 10667 076502 STB XTEMP+1 X=X-4*ENTIER((X+1)/4)
0029 10670 114237 JSB .FSBA,I
0030 10671 010477 DEF K1
0031 10672 002020 SSA X<1 ?
0032 10673 028702 JMP PAST YES
0033 10674 062507 LDA K2
0034 10675 066510 LDB K2+1
0035 10676 114237 JSB .FSBA,I
0036 10677 010501 DEF XTEMP
0037 10700 072501 STA XTEMP
0038 10701 076502 STB XTEMP+1 X=2-X
0039 10702 062501 PAST LDA XTEMP
0040 10703 060502 LDB XTENP+1
0041 10704 114240 JSB .FMFA,I
0042 10705 010501 DEF XTEMP
0043 10706 017440 JSB .PWR2
0044 10707 000001 DEC 1
0045 10710 114237 JSB .FSBA,I
0046 10711 010477 DEF K1
0047 10712 017324 JSB .CHEB
0048 10713 010723 DEF COEF1
0049 10714 114240 JSB .FMFA,I
0050 10715 010501 DEF XTEMP
0051 10716 124264 JMP FR12A,I ANS=X+CHEBY(2*X**2-1)
0052*
0053 10717 050574 TOPI DEC .636619772 2/PI
0054 10721 100000 MM4 DEC -4.
0055 10723 047605 COEF1 DEC 1.18496E-6
0056 10725 134143 DEC -1.365875E-4
0057 10727 045261 DEC 9.118016E-3

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0058	10731	133371	DEC -.2852615692
0059	10733	050656	DEC 2.5525579248
0060	10735	000000	OCT 0

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0062*          *****
0063*          SUBROUTINE TO COMPUTE RND(X)
0064*          *****
0065*
0066*          THE ARGUMENT OF RND IS A DUMMY ONE
0067*          THE ROUTINE GENERATES A RANDOM NUMBER
0068*          IN THE A & B REGISTERS
0069*
0070*          R=X/M, X=C*X MOD M, M=231, C=215 + 3
0071*
0072 10736 002400  ERND  CLA          X IS INITIALLY 1
0073 10737 070154      STA EXP      INITIALIZE EXPONENT
0074 10740 060155      LDA XH        COMPUTE
0075 10741 001000      ALS          HIGH
0076 10742 040155      ADA XH        PART
0077 10743 064156      LDB XL        2*XH
0078 10744 004065      CLE,ERB      + XH +
0079 10745 040001      ADA 1        XL*215
0080 10746 064156      LDB XL
0081 10747 005275      RBL,CLE,SLB,ERB  ADD XL[15] TO
0082 10750 002004      INA          (A) (FROM 2*XL)
0083 10751 004066      CLE,ELB      2*XL
0084 10752 044156      ADB XL        + XL
0085 10753 001675      ELA,CLE,SLA,ERA  ADD OVERFLOW
0086 10754 002104      CLE,INA      TO (A)
0087 10755 044470      ADB FLGBT     ADD IN TRAILING BIT OF XL*215
0088 10756 002040      SEZ          ADD OVERFLOW
0089 10757 002004      INA          TO (A)
0090 10760 001665      ELA,CLE,ERA  ERASE A[15]
0091 10761 070155      STA XH        STORE
0092 10762 074156      STB XL        INTEGER
0093 10763 015020      JSB .PACK     NORMALIZE AND PACK
0094 10764 124264      JMP FR12A,I

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0096*          *****
0097*          SUBROUTINE TO CALCULATE SQR(X)
0098*          *****
0099*
0100*          CALLED BY A JMP ESQR WITH THE ARGUMENT
0101*          IN FLOATING POINT FORM IN THE REGISTERS.
0102*          THE FLOATING RESULT IS RETURNED IN A & B
0103*
0104 10765 002003  ESQR  SZA,RSS          X=0 ?
0105 10766 124264          JMP FR12A,I      YES, ANS = 0
0106 10767 002020          SSA              X<0 ?
0107 10770 014477          JSB ERROR        YES ERROR
0108 10771 072501  SQRER  STA XTEMP
0109 10772 015456          JSB .FLUN
0110 10773 002031          SLA,ARS          EXP(X) ODD?
0111 10774 027034          JMP ODD
0112 10775 040431          ADA M1
0113 10776 073032          STA SBOX          SBOX=EXP(X)/2-1
0114 10777 076502          STB XTEMP+1      LOW MANTISSA/2
0115 11000 062501          LDA XTEMP
0116 11001 114240          JSB .FMFA,I
0117 11002 011047          DEF SA2
0118 11003 114236          JSB .FADA,I
0119 11004 011053          DEF SB2          Y=SB2+SA2*X
0120 11005 072503  BT+2  STA YTEMP
0121 11006 076504          STB YTEMP+1
0122 11007 062501          LDA XTEMP
0123 11010 060502          LDB XTEMP+1
0124 11011 114241          JSB .FDVA,I
0125 11012 010503          DEF YTEMP
0126 11013 114236          JSB .FADA,I
0127 11014 010503          DEF YTEMP
0128 11015 017440          JSB .PWR2
0129 11016 177777          DEC -1
0130 11017 072503          STA YTEMP
0131 11020 076504          STB YTEMP+1      Y=(Y+X/Y)/2
0132 11021 062501          LDA XTEMP
0133 11022 060502          LDB XTEMP+1
0134 11023 114241          JSB .FDVA,I
0135 11024 010503          DEF YTEMP
0136 11025 114236          JSB .FADA,I
0137 11026 010503          DEF YTEMP
0138 11027 072503          STA YTEMP
0139 11030 076504          STB YTEMP+1
0140 11031 017440          JSB .PWR2
0141 11032 000000  SBCX  OCT 0
0142 11033 124264          JMP FR12A,I      ANS=(P+F/P)*2**SBOX
0143 11034 073032  ODL   STA SBOX          SBOX = EXP(X)/2
0144 11035 044376          ADB MSK0
0145 11036 076502          STB XTEMP+1      LOW MANTISSA/2
0146 11037 062501          LDA XTEMP
0147 11040 114240          JSB .FMFA,I
0148 11041 011045          DEF SA1
0149 11042 114236          JSB .FADA,I
0150 11043 011051          DEF SB1
0151 11044 027005          JMP BTH2          Y=SB1+SA1*X

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0152*

0153	11045	070000	SA1	DEC .875
0154	11047	045000	SA2	DEC .578125
0155	11051	043824	SB1	DEC .27863
0156	11053	066000	SB2	DEC .421875

0158*

0159*

0160*

0161*

0162*

0163*

0164*

0165*

0166*

0167*

0168*

SUBROUTINE TO CALCULATE INT(X)

CALLED BY A JMP EINT WITH THE ARGUMENT
 IN FLOATING POINT FORM IN THE REGISTERS.
 ENTIER(X) IS FLOATED AND RETURNED IN A & B

CALCULATES THE FLOATING POINT EQUIVALENT
 OF ENTIER(X)

0169	11055	077032	EINT	STB SBOX	SAVE LOW WORD
0170	11056	064344		LDB .31	PRESET BIAS FOR
0171	11057	074154		STB EXP	BINARY POINT
0172	11060	067032		LDB SBOX	24-BIT
0173	11061	015364		JSB IFIX	INTEGER?
0174	11062	027065		JMP EINT1	NO
0175	11063	015020		JSB .PACK	YES, PACK IT
0176	11064	124264		JMP FR12A,I	
0177	11065	061614	EINT1	LDA GETCR	RETRIEVE
0178	11066	067032		LDB SBOX	NUMBER
0179	11067	124264		JMP FR12A,I	

```

0181*
0182*
0183*
0184*
0185*
0186*
0187*
0188*
0189 11070 017072  ELOG  JSB .LOG
0190 11071 124264      JMP FR12A,I
0191 11072 000000  .LOG  NOP
0192 11073 002003      SZA,RSS      NON-ZERO ARGUMENT?
0193 11074 027150      JMP .LOG1      NO
0194 11075 002020      SSA          YES, POSITIVE ARGUMENT?
0195 11076 014477      JSB ERROR      NO
0196 11077 072501  LOGER  STA XTEMP      YES
0197 11100 015456      JSB .FLUN
0198 11101 076502      STB XTEMP+1
0199 11102 017432      JSB FLOAT
0200 11103 072503      STA YTEMP
0201 11104 076504      STR YTEMP+1      Y=EXPO(X)
0202 11105 062501      LDA XTEMP
0203 11106 066502      LDB XTEMP+1
0204 11107 114236      JSB .FADA,I
0205 11110 011154      DEF R22
0206 11111 072505      STA UTEMP
0207 11112 076506      STB UTEMP+1      U=X+SQR(0.5)
0208 11113 062501      LDA XTEMP
0209 11114 066502      LDB XTEMP+1
0210 11115 114237      JSB .F3BA,I
0211 11116 011154      DEF R22
0212 11117 114241      JSB .FDVA,I
0213 11120 010505      DEF UTEMP
0214 11121 072505      STA UTEMP
0215 11122 076506      STB UTEMP+1      U=(X-SQR(0.5))/U
0216 11123 114240      JSB .FMFA,I
0217 11124 010505      DEF UTEMP
0218 11125 114237      JSB .FSBA,I
0219 11126 011164      DEF CCC
0220 11127 072501      STA XTEMP
0221 11130 076502      STB XTEMP+1
0222 11131 063162      LDA MB
0223 11132 067163      LDB MB+1
0224 11133 114241      JSB .FDVA,I
0225 11134 010501      DEF XTEMP
0226 11135 114236      JSB .FADA,I
0227 11136 011160      DEF AAA
0228 11137 114240      JSB .FMFA,I
0229 11140 010505      DEF UTEMP
0230 11141 114237      JSB .FSBA,I
0231 11142 000466      DEF HALF
0232 11143 114236      JSB .FADA,I
0233 11144 010503      DEF YTEMP
0234 11145 114240      JSB .FMFA,I
0235 11146 011156      DEF LE2
0236 11147 127072      JMP .LOG,I      ANS=LOG(2)*(EXPO(X)-0.5+U*

```

0237*				(A-B/X))
0238	11150 014477	.LCG1 JSB ERROR	LOG OF ZERO	
0239	11151 060470	LNZR LDA MNEG	RETURN	
0240	11152 064400	LDB B776	NEGATIVE	
0241	11153 127072	JMP .LOG, I	INFINITY	
0242*				
0243	11154 055202	R22 DEC .707106781	SQR(0.5)	
0244	11156 054271	LE2 DEC .6931471806	LOG BASE E OF 2	
0245	11160 051260	AAA DEC 1.2920070987		
0246	11162 125606	MB DEC -2.6398577035		
0247	11164 065010	CCC DEC 1.6567626301		

0249*		*****
0250*		SUBROUTINE TO COMPUTE SGN(X)
0251*		*****
0252*		
0253*		CALLED BY A JMP ESGN WITH THE ARGUMENT
0254*		IN FLOATING POINT FORM IN THE REGISTERS.
0255*		ON RETURN A & B CONTAIN THE FOLLOWING:
0256*		
0257*		IF X>0 THEN +1.
0258*		IF X=0 THEN 0
0259*		IF X<0 THEN -1.
0260*		
0261	11166 006400	ESGN CLB
0262	11167 002003	SZA, RSS
0263	11170 124264	JMP FR12A, I
0264	11171 002021	SSA, RSS
0265	11172 064325	LDB .2
0266	11173 060470	LDA FLGBT
0267	11174 006002	SZB
0268	11175 001300	RAR
0269	11176 124264	JMP FR12A, I

ZERO?
YES
NO, POSITIVE?
YES, SET EXPONENT
LOAD MANTISSA
POSITIVE?
YES, CORRECT MANTISSA

```

0271*          *****
0272*          SUBROUTINE TO CALCULATE EXP(X)
0273*          *****
0274*
0275*          CALLED BY A JMP EEXP WITH THE ARGUMENT
0276*          IN FLOATING POINT FORM IN THE REGISTERS.
0277*          THE FLOATING RESULT IS RETURNED IN A & B
0278*
0279 11177 017201 EEXP JSB .EXP
0280 11200 124264     JMP FR12A,I
0281 11201 000000 .EXP NOP
0282 11202 114240     JSB .FMPA,I
0283 11203 011322     DEF L2E
0284 11204 072501     STA XTEMP
0285 11205 076502     STB XTEMP+1      X=Z*LOG2(E)
0286 11206 017413     JSB .IENT
0287 11207 027301     JMP .EXP1
0288 11210 073274     STA INTE      INTE = ENTIER(X)
0289 11211 017432     JSB FLOAT
0290 11212 072503     STA YTEMP
0291 11213 076504     STB YTEMP+1    Y=ENTIER(X)
0292 11214 063274     LDA INTE
0293 11215 043310     ADA M124
0294 11216 002021     SSA,RSS      INTE >=124 ?
0295 11217 027304     JMP EXPER-1   YES,ERROR
0296 11220 043311     ADA .244      INTE <=-120 ?
0297 11221 002020     SSA
0298 11222 027276     JMP ZERE      YES,ANS=0
0299 11223 062001     LDA XTEMP
0300 11224 066502     LDB XTEMP+1
0301 11225 114237     JSB .FSBA,I
0302 11226 010503     DEF YTEMP
0303 11227 072501     STA XTEMP
0304 11230 076502     STB XTEMP+1    X=X-ENTIER(X)
0305 11231 114240     JSB .FMPA,I
0306 11232 010501     DEF XTEMP
0307 11233 072505     STA UTEMP
0308 11234 076506     STB UTEMP+1    U=X**2
0309 11235 114236     JSB .FADA,I
0310 11236 011312     DEF AAAA
0311 11237 072503     STA YTEMP
0312 11240 076504     STB YTEMP+1    Y=X**2+AAAA
0313 11241 063314     LDA BBBB
0314 11242 067315     LDB BBBB+1
0315 11243 114241     JSB .FDVA,I
0316 11244 010503     DEF YTEMP
0317 11245 072503     STA YTEMP
0318 11246 076504     STB YTEMP+1    Y=BBBB/Y
0319 11247 063316     LDA CCCC
0320 11250 067317     LDB CCCC+1
0321 11251 114240     JSB .FMPA,I
0322 11252 010505     DEF UTEMP
0323 11253 114236     JSB .FADA,I
0324 11254 011320     DEF DDDD
0325 11255 114237     JSB .FSBA,I
0326 11256 010501     DEF XTEMP

```

0327	11257	114237		JSB .FSBA,I	
0328	11260	010503		DEF YTEMP	
0329	11261	072503		STA YTEMP	
0330	11262	076504		STB YTEMP+1	$Y = -X + DDDD + CCCC * X ** 2 - Y$
0331	11263	062501		LDA XTEMP	
0332	11264	066502		LDB XTEMP+1	
0333	11265	114241		JSB .FDVA,I	
0334	11266	010503		DEF YTEMP	
0335	11267	114236		JSB .FADA,I	
0336	11270	000466		DEF HALF	
0337	11271	037274		ISZ INTE	
0338	11272	000000		NOP	
0339	11273	017440		JSB .PWR2	
0340	11274	000000	INTE	OCT 0	
0341	11275	127201		JMP .EXP,I	$ANS = (0.5 + X/Y) * 2 ** INTE$
0342	11276	002400	ZERE	CLA	
0343	11277	006400		CLB	
0344	11300	127201		JMP .EXP,I	$ANS = 0$
0345	11301	063401	.EXP1	LDA X2TMP	
0346	11302	002020		SSA	
0347	11303	027276		JMP ZERE	
0348	11304	014477		JSB ERROR	
0349	11305	060422	EXFER	LDA INF	
0350	11306	064432		LDB M2	
0351	11307	127201		JMP .EXP,I	
0352*					
0353	11310	177604	M124	DEC -124	
0354	11311	000364	.244	DEC 244	
0355	11312	053552	AAAA	DEC 87.417497202	
0356	11314	046477	BBBB	DEC 617.9722695	
0357	11316	043372	CCCC	DEC .03465735903	
0358	11320	047643	DDDD	DEC 9.9545957821	
0359	11322	056125	L2E	DEC 1.4426950409	

```

0361*          *****
0362*          SUBROUTINE TO COMPUTE CHEBY(X)
0363*          *****
0364*
0365*          CALLING SEQUENCE:
0366*
0367*          LDA X          (FLOATING)
0368*          LDB X+1
0369*          JSB .CHEB      (RESULT FLOATING)
0370*          DEF C          (TABLE OF CHEBY.COEFFS.,FLOATING)
0371*
0372 11324 000000 .CHEB NOP
0373 11325 114240 JSB .FMPA,I
0374 11326 010507 DEF K2
0375 11327 073401 STA X2TMP
0376 11330 077402 STB X2TMP+1      X2 =X*2
0377 11331 167324 LDB .CHEB,I
0378 11332 077407 STB CTMP      C POINTS TO COEFFICIENT TABLE
0379 11333 160001 LDA 1,I
0380 11334 006004 INB
0381 11335 164001 LDB 1,I      GET FIRST COEFF
0382 11336 073411 STA DTMP
0383 11337 077412 STB DTMP+1      D=C(N)
0384 11340 002400 CLA
0385 11341 073405 STA BTMP
0386 11342 073406 STA BTMP+1      B=0
0387 11343 037407 LOPC ISZ CTMP
0388 11344 037407 ISZ CTMP      N=N-1
0389 11345 163407 LDA CTMP,I
0390 11346 002003 SZA,RSS      C(N)=0 ?
0391 11347 027371 JMP COUT      ZERO FLAGS END OF TABLE
0392 11350 063405 LDA BTMP      NO
0393 11351 067406 LDB BTMP+1
0394 11352 073403 STA ATMP
0395 11353 077404 STB ATMP+1      A=B
0396 11354 063411 LDA DTMP
0397 11355 067412 LDB DTMP+1
0398 11356 073405 STA BTMP
0399 11357 077406 STB BTMP+1      B=D
0400 11360 114240 JSB .FMPA,I
0401 11361 011401 DEF X2TMP
0402 11362 114237 JSB .FSBA,I
0403 11363 011403 DEF ATMP
0404 11364 114236 JSB .FADA,I
0405 11365 111407 DEF CTMP,I
0406 11366 073411 STA DTMP
0407 11367 077412 STB DTMP+1      D=C(N) -A+B*X2
0408 11370 027343 JMP LOPC
0409 11371 063411 COUT LDA DTMP
0410 11372 067412 LDB DTMP+1
0411 11373 114237 JSB .FSBA,I
0412 11374 011403 DEF ATMP
0413 11375 114240 JSB .FMPA,I
0414 11376 000466 DEF HALF
0415 11377 037324 ISZ .CHEB
0416 11400 127324 JMP .CHEB,I      ANS=(D-A)/2

```

0417*

0418	11401	000000	X2TMP	BSS	2
0419	11403	000000	ATMP	BSS	2
0420	11405	000000	BTMP	BSS	2
0421	11407	000000	CTMP	BSS	2
0422	11411	000000	DTMP	BSS	2

0424*

0425*

0426*

0427*

0428*

0429*

0430*

0431*

0432*

0433*

0434*

0435*

0436*

0437	11413	000000
0438	11414	073401
0439	11415	060001
0440	11416	010376
0441	11417	000033
0442	11420	027424
0443	11421	040444
0444	11422	002021
0445	11423	127413
0446	11424	037413
0447	11425	063401
0448	11426	015364
0449	11427	000000
0450	11430	060001
0451	11431	127413

 SUBROUTINE TO COMPUTE THE ENTIER OF A NUMBER
 WHOSE EXPONENT IS LESS THAN 15

CALLING SEQUENCE:

LDA X	(FLOATING)
LDA X+1	
JSB .IENT	(RESULT INTERGER)
JSB ERROR	(EXIT IF EXPO(X)>14)

.IENT	NOP	
	STA X2TMP	STORE HIGH PART
	LDA 1	MOVE LOW PART TO A
	AND MSK0	ISOLATE EXPONENT
	SLA,RAR	
	JMP **4	IF NEGATIVE OK
	ADA M15	
	SSA,RSS	EXPO(X) > 14
	JMP .IENT,I	YES, ERROR RETURN
	ISZ .IENT	NO BUMP RETURN POINT
	LDA X2TMP	RESTORE HIGH PART
	JSB IFIX	CALL ENTIER
	NOP	
	LDA 1	PUT RESULT INTO (A)
	JMP .IENT,I	

```

0453*          *****
0454*          SUBROUTINE TO FLOAT AN INTEGER
0455*          *****
0456*
0457*          CALLED BY JSB FLOAT WITH INTEGER IN A
0458*          THE FLOATING POINT EQUIVALENT IS RETURNED
0459*          IN A & B
0460*
0461 11432 000000  FLCAT NOP
0462 11433 064336      LDB .15
0463 11434 074154      STB EXP
0464 11435 006400      CLB
0465 11436 015020      JSB .PACK
0466 11437 127432      JMP FLOAT,I

```

```

0468*          *****
0469*          SUBROUTINE TO MULTIPLY BY A POWER OF TWO
0470*          *****
0471*
0472*          CALLING SEQUENCE
0473*
0474*          LDA X          (FLOATING)
0475*          LDB X+1
0476*          JSB .PWR2      (RESULT FLOATING)
0477*          DEC N          (INTEGER POWER)
0478*
0479*          RETURNS WITH X*2^N IN A&B
0480*          NO CHECK IS MADE FOR EXPONENT
0481*          OVERFLOW OR UNDERFLOW
0482*
0483 11440 000000  .PWR2 NOP
0484 11441 002003      SZA,RSS          X=0 ?
0485 11442 027454      JMP .RET          YES, ANS=0
0486 11443 073401      STA X2TMP
0487 11444 015456      JSB .FLUN
0488 11445 077402      STB X2TMP+1
0489 11446 143440      ADA .PWR2,I
0490 11447 001200      RAL
0491 11450 010376      AND MSK0          NEW EXPO = (OLD EXPO) +N
0492 11451 070001      STA 1
0493 11452 047402      ADB X2TMP+1      KEEP OLD MANTISSA
0494 11453 063401      LDA X2TMP
0495 11454 037440      .RET  ISZ .PWR2
0496 11455 127440      JMP .PWR2,I

```

```

0498 07463  TT1  EQU  .FDV
0499 07552  TT2  EQU  IDIV
0500 00163  TT3  EQU  TEMPS+4
0501 00164  TT4  EQU  TEMPS+5
0502 11032  FFLAG EQU  SBOX

```

```

0002*
0003*
0004*
0005 11456 160157
0006 11457 034157
0007 11460 010401
0008 11461 002002
0009 11462 027010
0010 11463 160157
0011 11464 010420
0012 11465 070171
0013 11466 050416
0014 11467 002001
0015 11470 114250
0016*
0017 11471 160157
0018 11472 010401
0019 11473 002003
0020 11474 124256
0021 11475 114231
0022 11476 006007
0023 11477 124267
0024 11500 034157
0025 11501 160001
0026 11502 070173
0027 11503 060171
0028 11504 050416
0029 11505 027561
0030 11506 044325
0031 11507 160001
0032 11510 070174
0033 11511 010376
0034 11512 003004
0035 11513 070175
0036 11514 070176
0037 11515 160001
0038 11516 001727
0039 11517 010376
0040 11520 003004
0041 11521 070177
0042 11522 114255
0043 11523 002400
0044 11524 073767
0045 11525 060157
0046 11526 050143
0047 11527 027540
0048 11530 160157
0049 11531 010420
0050 11532 050404
0051 11533 037767
0052 11534 027540
0053 11535 006400
0054 11536 057767
0055 11537 015656
0056 11540 160173
0057 11541 034173

*****
MATRIX STMT EXECUTION CONTROL
*****
EMAT LDA TEMPS,I
      ISZ TEMPS      MAT READ
      AND MSK1       OR
      SZA            MAT PRINT?
      JMP EMAT7      NO
      LDA TEMPS,I    YES
      AND OPMSK      SAVE
      STA MLBX1      TYPE
      CPA RDOP       PRINT?
      RSS            NO
      JSB PRNIA,I    YES

EMAT1 LDA TEMPS,I    LOAD
      AND MSK1      OPERAND
      SZA,RSS       NULL? (END OF MAT PRINT)
      JMP XEC4A,I    YES
      JSB SSYMA,I    NO, SEARCH SYMBOL TABLE
      INB,SZB,RSS    FOUND?
      JMP EBM1A,I    NO
      ISZ TEMPS      YES
      LDA 1,I        SAVE ARRAY
      STA B1         BASE ADDRESS
      LDA MLBX1
      CPA RDOP       READ?
      JMP EMAT5      YES
      ADB .2         NO
      LDA 1,I        SAVE
      STA B1+1       DIMENSIONS
      AND MSK0       SET
      CMA,INA        COLUMN
      STA B2         COUNTERS
      STA B2+1
      LDA 1,I        SET
      ALF,ALF
      AND MSK0       ROW
      CMA,INA
      STA B3         COUNTER
      JSB LCK2A,I    ENSURE ARRAY IS DEFINED
      CLA           SET DELIMITER
      STA MCKS      AS COMMA
      LDA TEMPS     MORE
      CPA PRADD     STATEMENT?
      JMP EMAT3     NO
      LDA TEMPS,I   YES
      AND OPMSK     EXTRACT DELIMITER
      CPA B3000     SEMICOLON?
      ISZ MCKS      YES
      JMP EMAT3
EMAT2 CLB          COMMA
      CPB MCKS      DELIMITER?
      JSB EDELM     YES
EMAT3 LDA B1,I     LOAD
      ISZ B1        NEXT

```

0058	11542	164173	LDB B1,I	ELEMENT
0059	11543	034173	ISZ B1	
0060	11544	015643	JSB ENOUT	OUTPUT IT
0061	11545	034175	ISZ B2	ROW COMPLETE?
0062	11546	027335	JMP EMAT2	NO
0063	11547	015677	JSB OUTLN	YES, DO
0064	11550	015677	JSB OUTLN	SPACING
0065	11551	060176	LDA B2+1	RESET
0066	11552	070175	STA B2	COLUMN COUNTER
0067	11553	034177	ISZ B3	ARRAY EXHAUSTED?
0068	11554	027340	JMP EMAT3	NO
0069	11555	064157	EMAT4 LDB TEMPS	YES, MORE
0070	11556	054143	CPB PRADD	STATEMENT?
0071	11557	124256	JMP XEC4A,I	NO
0072	11559	027471	JMP EMAT1	YES
0073*				
0074	11561	074175	EMAT5 STB B2	SAVE SYMBOL TABLE POINTER
0075	11562	160157	LDA TEMPS,I	EXTRACT
0076	11563	010420	AND OPMSK	NEXT OPERATOR
0077	11564	064157	LDB TEMPS	STATEMENT
0078	11565	054143	CPB PRADD	EXHAUSTED?
0079	11566	002400	CLA	YES
0080	11567	050412	CPA B2200	'I' ?
0081	11570	017732	JSB REDIM	YES, REDIMENSION ARRAY
0082	11571	060175	LDA B2	LOAD
0083	11572	040325	ADA .2	ARRAY
0084	11573	160000	LDA 0,I	DIMENSIONS
0085	11574	015336	JSB MDIM	SET
0086	11575	001100	ARS	ARRAY
0087	11576	003004	CMA,INA	ELEMENT
0088	11577	070177	STA B3	COUNTER
0089	11600	114254	EMAT6 JSB FDAT,I	FETCH VALUE
0090	11601	170173	STA B1,I	STORE
0091	11602	034173	ISZ B1	
0092	11603	174173	STB B1,I	IT
0093	11604	034173	ISZ B1	
0094	11605	034177	ISZ B3	ARRAY EXHAUSTED?
0095	11606	027600	JMP EMAT6	NO
0096	11607	027555	JMP EMAT4	YES
0097*				
0098	11610	114231	EMAT7 JSB SSYMA,I	SAVE
0099	11611	006004	INB	BASE ADDRESS
0100	11612	160001	LDA 1,I	OF DESTINATION
0101	11613	070177	STA B3	ARRAY
0102	11614	074175	STB B2	SAVE SYMBOL TABLE ADDRESS
0103	11615	044325	ADB .2	SAVE
0104	11616	160001	LDA 1,I	ITS
0105	11617	070200	STA B3+1	DIMENSIONS
0106	11620	002404	CLA,INA	ASSUME MAT
0107	11621	071656	STA EDELM	REPLACEMENT
0108	11622	160157	EMAT8 LDA TEMPS,I	LOAD NEXT
0109	11623	034157	ISZ TEMPS	OPERAND
0110	11624	002020	SSA	ARRAY FUNCTION?
0111	11625	027711	JMP EMAT11	YES
0112	11626	010401	EMAT8 AND MSK1	NO
0113	11627	002003	SZA,RSS	SCALAR MULTIPLICATION?

0114	11630	027701	JMP EMA10	YES
0115	11631	114231	JSB SSYMA,1	NO
0116	11632	006004	INB	SAVE
0117	11633	160001	LDA 1,1	BASE
0118	11634	070173	STA B1	ADDRESS AND
0119	11635	044325	ADB .2	DIMENSIONS
0120	11636	160001	LDA 1,1	OF FIRST
0121	11637	070174	STA B1+1	SOURCE ARRAY
0122	11640	064157	LDB TEMPS	STATEMENT
0123	11641	084143	CPB PRADD	EXHAUSTED?
0124	11642	027662	JMP EMAT9	YES
0125	11643	160157	LDA TEMPS,1	NO
0126	11644	001100	ARS	EXTRACT
0127	11645	001727	ALF,ALF	AND
0128	11646	010362	AND .63	RECORD
0129	11647	040436	ADA M6	EMAT
0130	11650	071656	STA EDELM	OPERATOR
0131	11651	160187	LDA TEMPS,1	SAVE
0132	11652	010401	AND MSK1	
0133	11653	114231	JSB SSYMA,1	BASE ADDRESS
0134	11654	005004	INB	
0135	11655	160001	LDA 1,1	AND DIMENSIONS
0136	11656	070175	STA B2	
0137	11657	044325	ADB .2	OF SECOND
0138	11660	160001	LDA 1,1	
0139	11661	070176	STA B2+1	SOURCE ARRAY
0140*				
0141	11662	061656	EMAT9 LDA EDELM	TRANSFER TO
0142	11663	043666	ADA LMAP	APPROPRIATE
0143	11664	114000	JSB 0,1	ROUTINE
0144	11665	124256	JMP XEC4A,1	
0145*				
0146	11666	111666	LMAP DEF LBASE-1,1	
0147	11667	012123	LBASE DEF REPLC	
0148	11670	012103	DEF ADD	
0149	11671	012116	DEF SUB	
0150	11672	012331	DEF MULT	
0151	11673	012170	DEF SZER	
0152	11674	012145	DEF LCON	
0153	11675	012176	DEF LIDN	
0154	11676	012441	DEF LINV	
0155	11677	012266	DEF TRAN	
0156	11700	012137	DEF SMULT	
0157*				
0158	11701	060334	EMA10 LDA .10	SET SMULT
0159	11702	071656	STA EDELM	OPERATOR
0160	11703	114232	JSB FETCA,1	EVALUATE
0161	11704	070171	STA MLBX1	AND SAVE
0162	11705	074172	STB MLBX1+1	SCALAR
0163	11706	034157	ISZ TEMPS	GO TO
0164	11707	034157	ISZ TEMPS	PROCESS
0165	11710	027622	JMP EMAT0	SOURCE ARRAY
0166*				
0167	11711	001727	EMA11 ALF,ALF	EXTRACT
0168	11712	001700	ALF	
0169	11713	010344	AND .31	TYPE

0170	11714	040440	ADA M8	RECORD EMAT
0171	11715	071656	STA EDELM	OPERATOR TYPE
0172	11716	040440	ADA M8	INV OR
0173	11717	002020	SSA	TRN?
0174	11720	027725	JMP EMA12	NO
0175	11721	160157	LDA TEMPS, I	YES, LOAD
0176	11722	034157	ISZ TEMPS	SOURCE
0177	11723	034157	ISZ TEMPS	ARRAY
0178	11724	027626	JMP EMAT6	SYMBOL
0179*				
0180	11725	064157	EMA12 LDB TEMPS	REDIMENSIONING
0181	11726	054143	CPB PRADD	PART?
0182	11727	027662	JMP EMAT9	NO
0183	11730	017732	JSB REDIM	YES
0184	11731	027662	JMP EMAT9	

0186*			*****	
0187*			SUBROUTINE TO REDIMENSION ARRAY	
0188*			*****	
0189	11732	000000	REDIM NOP	
0190	11733	017767	JSB MCKS	EVALUATE
0191	11734	005727	BLF, BLF	AND SAVE
0192	11735	074200	STB B3+1	ROW COUNT
0193	11736	006404	CLB, INB	LOAD DEFAULT COLUMN COUNT
0194	11737	034157	ISZ TEMPS	SINGLE
0195	11740	160157	LDA TEMPS, I	DIMENSION
0196	11741	010420	AND OPMSK	ARRAY?
0197	11742	050407	CPA LF	
0198	11743	027746	JMP RED11	YES
0199	11744	017767	JSB MCKS	NO, EVALUATE COLUMN COUNT
0200	11745	034157	ISZ TEMPS	MOVE PAST
0201	11746	034157	RED11 ISZ TEMPS	RIGHT BRACKET
0202	11747	044200	ADB B3+1	PACK
0203	11750	074200	STB B3+1	DIMENSIONS
0204	11751	060175	LDA B2	STORE IN
0205	11752	040325	ADA .2	SYMBOL
0206	11753	174000	STB 0, I	TABLE
0207	11754	040431	ADA M1	COMPUTE
0208	11755	160000	LDA 0, I	PHYSICAL
0209	11756	015336	JSB MDIM	ARRAY SPACE
0210	11757	070172	STA MLBX1+1	SIZE
0211	11760	060200	LDA B3+1	COMPUTE
0212	11761	015336	JSB MDIM	NEW SIZE
0213	11762	003004	CMA, INA	NEW
0214	11763	040172	ADA MLBX1+1	SIZE
0215	11764	002020	SSA	ACCEPTABLE?
0216	11765	014477	JSB ERROR	NO
0217	11766	127732	E7 JMP REDIM, I	YES

```

0219*
0220*
0221*
0222 11767 000000 MCKS NOP
0223 11770 114232 JSB FETCA,I CALL FOR EVALUATION
0224 11771 015353 JSB SBFIX CONVERT TO INTEGER (ROUNDED)
0225 11772 006004 INB UNBIAS SUBSCRIPT
0226 11773 060001 LDA 1 PUT INTO (A)
0227 11774 040460 ADA M256 LESS THAN
0228 11775 002021 SSA,RSS 256?
0229 11776 124272 JMP E6M1A,I NO
0230 11777 127767 JMP MCKS,I YES, RETURN SUBSCRIPT IN (B)

```

0232 12000 ORG 120000

0253*

0234*****

0235***** MATRIX ROUTINES *****

0236*****

0237*CALL FOR MATRIX OPERATION IS MADE WITH FOUR*

0238*PARAMETERS,ROUTINE NUMBER AND ADDRESS OF *

0239*SYMBOL TABLE OF THREE MATRICES. FOR SCALAR *

0240*MULT, LAST IS ADDRESS OF SCALAR VALUE *

0241*OPERATION IS OF FORM B3=B1 OP B2 *

0242*THE ADDRESS OF THE BASE ADDRESS OF MATRICES*

0243*IS GIVEN IN B1,B2,B3. THE DIMENSIONS OF A *

0244*MATRIX IS GIVEN IN B(1)+1, ROWS IN MOST SIG*

0245*PART(MSP) AND COLUMN IN LEAST SIG PART(LSP)*

0246*****

0247*

0248*

0249*

0250*****

0251*** SUBROUTINE GENERAL ***

0252*****

0253*B3=B1 OP B2 SUBROUTINE COMPUTES AN ELEMENT*

0254*OF B3 AND INCREMENTS TO NEXT ELEMENT. THE *

0255*OPERATION THAT IS PERFORMED AND *

0256* THE MATRICES INCREMENTED ARE *

0257* MODIFIED BY ROUTINES ADD, SUB, REPL *

0258*SCALAR MULT, CON,ZERO,IDN. ROUTINE CHECKS *

0259*COMPATIBILITY OF THREE MATRICES USING SUB *

0260*COMPARE (PARAMETERS SUPPLIED IN REG A,B) *

0261*****

0262*

0263	12000	000000	GENER	NOP	SUBROUTINE GENERAL
0264	12001	060176		LDA B2+1	LOAD DIM FOR MATRIX 2
0265	12002	064174		LDB B1+1	LOAD DIM FOR MATRIX 1
0266	12003	016032		JSB COMPR	CHECKS ROW AND COL DIM
0267*					ARE COMPATIBLE
0268	12004	060174	GEN2	LDA B1+1	LOAD DIM FOR MATRIX 1
0269	12005	064200		LDB B3+1	LOAD DIM FOR MATRIX 3
0270	12006	016032		JSB COMPR	CHECK ROW AND COL DIM
0271	12007	015236		JSB MPY	COLUMNS IN (A)
0272	12010	013115		DEF T3	ROWS IN T3
0273	12011	003004		CMA,INA	
0274	12012	073134		STA LPIV	-ROWS*COLUMNS
0275*					COMPUTES B3=B1 OP B2
0276	12013	160173	LOCP	LDA B1,I	LOAD
0277	12014	034173		ISZ B1	NEXT
0278	12015	164173		LDB B1,I	SOURCE
0279	12016	034173		ISZ B1	ELEMENT
0280	12017	000000	MUL1	NOP	USUALLY A JSB
0281	12020	000000		NOP	USUALLY DEF B2,I
0282	12021	170177		STA B3,I	STORE
0283	12022	034177		ISZ B3	NEXT
0284	12023	174177		STB B3,I	DESTINATION
0285	12024	034177		ISZ B3	ELEMENT
0286	12025	000000	MUL2	NOP	ISZ B2 FOR
0287	12026	000000		NOP	MAT ADD OR SUB

```

0288 12027 037134      ISZ LPIV
0289 12030 020013      JMP LOOP      COMPUTE NEXT ELEMENT
0290 12031 126000      JMP GENER,I
0291*
0292*
0293*****
0294***      SUBROUTINE COMPARE      ****
0295*****
0296*ROUTINE COMPARES DIM OF TWO MATRICES GIVEN *
0297*THEIR DIM IN REGISTERS A,B      *
0298*DIMENSIONS ARE GIVEN IN B(1)+2      *
0299*****
0300*
0301 12032 000000      COMPR NOP
0302 12033 050001      CPA 1      EQUAL?
0303 12034 002001      RSS      YES
0304 12035 014477      LEER JSB ERROR      NO
0305 12036 001727      ALF,ALF      SAVE
0306 12037 010376      AND MSK0      # OF
0307 12040 073115      STA T3      ROWS
0308 12041 060001      LDA 1
0309 12042 010376      AND MSK0      SAVE #
0310 12043 073116      STA T4      OF COLUMNS
0311 12044 126032      JMP COMPR,I
0312*
0313*
0314*****
0315*****      SUBROUTINE LCHK      *****
0316*****
0317*TESTS THAT NO ELEMENT IN A MATRIX IS      *
0318*UNASSIGNED. ENTRY1 CHECKS MATRICES GIVEN BY*
0319*B1 AND B2 AND ENTRY 2 CHECKS ONLY B1      *
0320*****
0321*
0322 12046 000000      LCHK2 NOP
0323 12046 062045      LDA LCHK2
0324 12047 072051      STA LCHK1
0325 12050 026055      JMP ++5
0326 12051 000000      LCHK1 NOP
0327 12052 064175      LDB B2      BASE ADDR
0328 12053 060176      LDA B2+1      ROW AND COL DIM.
0329 12054 016061      JSB LCHK4      TEST EACH TERM OF B2
0330 12055 064173      LDB B1      BASE ADDR
0331 12056 060174      LDA B1+1      ROW AND COL DIM.
0332 12057 016061      JSB LCHK4      TEST EACH TERM OF B1
0333 12060 126051      JMP LCHK1,I
0334*
0335 12061 000000      LCHK4 NOP      SUBROUTINE TO TEST TERMS
0336 12062 077120      STB T6      SAVE
0337 12063 015336      JSB MDIM      COMPUTE SIZE OF MATRIX
0338 12064 001100      ARS      SET NEGATIVE
0339 12065 003004      CMA,INA
0340 12066 073121      STA T7      COUNTER FOR ELEMENTS
0341 12067 163120      LCHK6 LDA T6,I      LOAD
0342 12070 037120      ISZ T6
0343 12071 167120      LDB T6,I      ELEMENT

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0344 12072 037120      ISZ T6
0345 12073 050470      CPA MNEG      COMPARE WITH PRESET QTY.
0346 12074 026076      JMP **2
0347 12075 026100      JMP LCHK5
0348 12076 054471      CPB MNEG+1
0349 12077 014477      JSB ERROR      ERROR 'MAT UNASSIGNED'
0350 12100 037121      LCHK5 ISZ T7      DONE?
0351 12101 026067      JMP LCHK6      NO
0352 12102 126061      JMP LCHK4,I    YES
0353*
0354*
0355*****
0356*** SUBROUTINE MATRIX ADD *****
0357*****
0358*B1,B2,B3 CONTAIN ADDRESS OF BASE ADDRESS OF*
0359*THREE MATRICES. ROUTINE EXECUTES B3=B1+B2 *
0360*BY MODIFYING INSTR IN ROUTINE GENERAL *
0361*****
0362*
0363 12103 000000      ADD NOP
0364 12104 063135      LDA LPLUS      JSB .FAD
0365 12105 072017      ADD1 STA MOD1      SET IN GENER
0366 12106 063136      LDA LPLUS+1    DEF OF B2,I
0367 12107 072020      STA MOD1+1    MODIFY ROUTINE GENERAL
0368 12110 063141      LDA INC82      ISZ B2
0369 12111 072025      STA MOD2
0370 12112 072026      STA MOD2+1
0371 12113 016051      JSB LCHK1      TEST B1,B2 FOR UNASSIGNED TERMS
0372 12114 016000      JSB GENER      ROUTINE GENERAL
0373 12115 126103      JMP ADD,I      EXIT TO MAIN PROGRAM
0374*
0375*
0376*****
0377*** SUBROUTINE MATRIX SUBTRACT *****
0378*****
0379*B1,B2,B3 CONTAIN ADDRESS OF BASE ADDRESS OF*
0380*THREE MATRICES. ROUTINE EXECUTES B3=B1-B2 *
0381*BY MODIFYING INSTR IN ROUTINE GENERAL *
0382*****
0383*
0384 12116 000000      SUB NOP      LET
0385 12117 062116      LDA SUB      ADD DO
0386 12120 072103      STA ADD      RETURN
0387 12121 063137      LDA LMIN      JSB .FSB
0388 12122 026105      JMP ADD1

```

0390*

0391*****

0392**** SUBROUTINE MATRIX REPLACE ****

0393*****

0394*B1,B3 GIVE ADDRESS OF BASE ADDRESS OF GIVEN*

0395*MATRIX AND RECEIVING MATRIX RESPECTIVELY *

0396*****

0397 12123 000000 REPLC NOP LET

0398 12124 062123 LDA REPLC GENER DO

0399 12125 072000 STA GENER RETURN

0400 12126 002400 CLA NO

0401 12127 006400 CLB OPERATION

0402 12130 072017 REPL1 STA MOD1 SET

0403 12131 076020 STB MOD1+1 OPERATION

0404 12132 002400 CLA B2

0405 12133 072025 STA MOD2 NOT

0406 12134 072026 STA MOD2+1 USED

0407 12135 016045 JSB LCHK2 TEST B1 FOR UNASSIGNED ELEMENTS

0408 12136 026004 JMP GEN2

0409*

0410*

0411*****

0412**** SUBROUTINE MATRIX SCALAR MULT ****

0413*****

0414*B1,B3 GIVE ADDRESS OF BASE ADDRESS OF GIVEN*

0415*MATRIX AND RECEIVING MATRIX RESPECTIVELY *

0416*MBXL HOLDS ADDRESS OF SCALAR VALUE *

0417*****

0418*

0419 12137 000000 SMLT NOP LET

0420 12140 062137 LDA SMULT GENER DO

0421 12141 072000 STA GENER RETURN

0422 12142 063140 LDA LTIME SET FOR

0423 12143 064323 LDB MBXL MULTIPLY

0424 12144 026130 JMP REPL1

0425*

0426*

0427*****

0428**** SUBROUTINE MATRIX CON ****

0429*****

0430*SETS MATRIX TO ALL ONES. B3 IS ADDRESS OF *

0431*BASE ADDRESS OF MATRIX. *

0432*****

0433*

0434 12145 000000 LCON NOP

0435 12146 060466 LDA HONE

0436 12147 064325 LDB .2

0437 12150 070171 LCCN1 STA MLBX1 SET

0438 12151 074172 STB MLBX1+1 CONSTANT

0439 12152 060200 LDA B3+1

0440 12153 015336 JSB MDIM SET

0441 12154 001100 ARS ELEMENT

0442 12155 003004 CMA,INA COUNTER

0443 12156 073134 STA LPIV

0444 12157 060171 LDA MLBX1 LOAD

0445 12160 064172 LDB MLBX1+1 CONSTANT

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0446 12161 170177 LCCN2 STA B3,I      STORE
0447 12162 034177      ISZ B3      IN
0448 12163 174177      STB B3,I      NEXT
0449 12164 034177      ISZ B3      ELEMENT
0450 12165 037134      ISZ LPIV     DONE?
0451 12166 026161      JMP LCON2     NO
0452 12167 126145      JMP LCON,I    YES
0453*
0454*
0455*****
0456****      SUBROUTINE MATRIX ZERO      ****
0457*****
0458*SETS MATRIX TO ZERO. B3 IS ADDRESS OF BASE *
0459*ADDRESS OF MATRIX. B1,B2 ARE REDUNDANT *
0460*SET B1=0 AND USE SUBROUTINE CON,ENTRY2 *
0461*****
0462*
0463 12170 000000 SZER NOP
0464 12171 062170      LDA SZER      CONVERT
0465 12172 072145      STA LCON
0466 12173 002400      CLA      LCON
0467 12174 006400      CLB
0468 12175 026150      JMP LCON1      TO SZER
0469*
0470*
0471*****
0472****      SUBROUTINE MATRIX IDN      ****
0473*****
0474*ROUTINE SETS UP IDENTITY MATRIX *
0475*B3 IS ADDRESS OF BASE ADDRESS OF MATRIX *
0476*USE SZER TO SET MATRIX TO ALL ZEROS. ON *
0477*RETURN CHECK FOR SQUARE MATRIX. *
0478*****
0479*
0480 12176 000000 LIDN NOP
0481 12177 060177      LDA B3
0482 12200 073123      STA T9      SAVE BASE ADDRESS
0483 12201 016170      JSB SZER     SET ALL MATRIX TO ZERO
0484 12202 060200      LDA B3+1     IS
0485 12203 001727      ALF,ALF      ARRAY
0486 12204 050200      CPA B3+1     SQUARE?
0487 12205 001010      ALS,SLA      YES
0488 12206 026035      JMP LERR     NO
0489 12207 010401      AND MSK1     SAVE ROW
0490 12210 070171      STA MLBX1    LENGTH
0491 12211 001100      ARS          SAVE
0492 12212 003004      CMA,INA      ROW
0493 12213 070172      STA MLBX1+1  COUNTER
0494 12214 067123      LDB T9      RESTORE
0495 12215 074177      STB B3      B3
0496 12216 060466 LIDN1 LDA HONE     STORE
0497 12217 170001      STA 1,I
0498 12220 006004      INB          1.0 ON
0499 12221 060325      LDA .2
0500 12222 170001      STA 1,I      DIAGONAL
0501 12223 006004      INB

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0502 12224 044171      ADB MLBX1      MOVE TO NEXT DIAGONAL ELEMENT
0503 12225 034172      ISZ MLBX1+1    DONE?
0504 12226 026216      JMP LIDN1      NO
0505 12227 126176      JMP LIDN,I     YES
0506*
0507*
0508*****
0509*****      SUBROUTINES DLD AND DST      *****
0510*****
0511*
0512*
0513*
0514 12230 000000      .DLD  NOP
0515 12231 016250      JSB GETAD      GET ADDRESS
0516 12232 112230      DEF .DLD,I
0517 12233 036230      ISZ .DLD      BUMP RETURN ADDRESS
0518 12234 162264      LDA ADRES,I    LOAD HIGH PART.
0519 12235 036264      ISZ ADRES
0520 12236 166264      LDB ADRES,I    LOAD LOW PART.
0521 12237 126230      JMP .DLD,I
0522*
0523 12240 000000      .DST  NOP
0524 12241 016250      JSB GETAD      GET ADDRESS.
0525 12242 112240      DEF .DST,I
0526 12243 036240      ISZ .DST      BUMP RETURN ADDRESS.
0527 12244 172264      STA ADRES,I    STORE HIGH PART.
0528 12245 036264      ISZ ADRES
0529 12246 176264      STB ADRES,I    STORE LOW PART.
0530 12247 126240      JMP .DST,I
0531*
0532 12250 000000      GETAD  NOP      COMPUTES EFFECTIVE ADDRESS.
0533 12251 072265      STA TINY      SAVE A REGISTER.
0534 12252 162250      LDA GETAD,I   GET POINTER TO ADDRESS.
0535 12253 072264      GET  STA ADRES  STORE IN ADRES.
0536 12254 062265      LDA TINY      RESTORE A REGISTER.
0537 12255 162264      LDA ADRES,I
0538 12256 001275      RAL,CLE,SLA,ERA  TEST FOR INDIRECT
0539 12257 026253      JMP GET        IT IS INDIRECT.
0540 12260 072264      STA ADRES      EFFECTIVE ADDRESS.
0541 12261 062265      LDA TINY
0542 12262 036250      ISZ GETAD
0543 12263 126250      JMP GETAD,I   RETURN
0544 12264 000000      ADRES  BSS 1
0545 12265 000000      TINY   BSS 1

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0547*
0548*
0549***      SUBROUTINE  TRANSPOSE      *****
0550*
0551*TRANSPOSE OF FORM B3(M,N)=T(B1(N,M))      *
0552*B1,B3 GIVE ADDRESS OF BASE ADDRESS OF GIVEN*
0553*AND RECEIVING MATRICES RESPECTIVELY.      *
0554*
0555*
0556 12266 000000  TRAN  NOP
0557 12267 016045      JSB LCHK2      TEST B1 FOR UNASSIGNED TERMS
0558*                                CHECK DIMENSIONS
0559 12270 060200      LDA B3+1      PARAMETERS OF B3
0560 12271 001727      ALF,ALF      INTERCHANGE ROW AND COLUMN
0561 12272 064174      LDB B1+1      PARAMETERS OF B1
0562 12273 016032      JSB COMPR      SUBROUTINE COMPARE
0563*                                DIMENSIONS COMPATIBLE
0564 12274 015236      JSB MPY      # OF COLUMNS IN (A)
0565 12275 013115      DEF T3      # OF ROWS IN T3
0566 12276 073134      STA LPIV      PRODUCT OF ROW*COL
0567 12277 063116      LDA T4      SET
0568 12300 003004      CMA,INA      COLUMN
0569 12301 073117      STA T5      COUNTER
0570*                                T6 IS INDICATOR TO SELECT
0571*                                WHICH ELEMENT IN A COL OF
0572*                                B1 IS TO BE TRANSPOSED
0573 12302 002400  TRAN1 CLA
0574 12303 073120      STA T6      SET T6=0
0575 12304 067120  LNEXT LDB T6      LOAD
0576 12305 005000      BLS
0577 12306 044173      ADB B1      NEXT ELEMENT
0578 12307 160001      LDA 1,I
0579 12310 006004      INB      OF COLUMN
0580 12311 164001      LDB 1,I
0581 12312 170177      STA B3,I      STORE
0582 12313 034177      ISZ B3      IN
0583 12314 174177      STB B3,I      ROW
0584 12315 034177      ISZ B3
0585 12316 063120      LDA T6      SET T6=T6+T4
0586 12317 043116      ADA T4      T6 POINTS TO NEXT TERM IN
0587 12320 073120      STA T6      A COLUMN TO BE TRANSPOSED
0588 12321 053134      CPA LPIV      TEST FOR LAST IN COL
0589 12322 026324      JMP **2
0590 12323 026304      JMP LNEXT
0591*
0592*
0593 12324 034173      ISZ B1
0594 12325 034173      ISZ B1
0595 12326 037117      ISZ T5
0596 12327 026302      JMP TRAN1      TRANSPOSE NEXT COL
0597 12330 126266      JMP TRAN,I      EXIT TO MAIN PROGRAM

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0002*
0003*****
0004*** SUBROUTINE MATRIX MULT ****
0005*****
0006ROUTINE IS OF FORM B3(M,P)=B1(M,N)*B2(N,P) *
0007B1,B2,B3 ARE ADDRESSES OF BASE ADDRESSES OF*
0008THREE MATRICES *
0009*****
0010*
0011 12331 000000 MULT NOP
0012 12332 016051 JSB LCHK1 TEST B1,B2 FOR UNASSIGNED TERMS
0013* CHECK DIMENSIONS
0014 12333 060200 LDA B3+1 PARAMETERS OF B3
0015 12334 010376 AND MSK0 SAVE COLUMN COUNT
0016 12335 073120 STA T6
0017 12336 060176 LDA B2+1 PARAMETERS OF B2
0018 12337 010376 AND MSK0
0019 12340 053120 CPA T6 COLUMNS EQUAL
0020 12341 002001 RSS IN NUMBER?
0021 12342 026035 JMP LERR NO
0022* COMBINE B3,B2 PARAMETERS
0023* INTO (M,N) AND COMPARE
0024* WITH THOSE OF B1
0025 12343 060200 LDA B3+1 PARAMETERS OF B3
0026 12344 010460 AND M256
0027 12345 070001 STA 1 STORE ROW IN MSP OF B
0028 12346 060176 LDA B2+1 PARAMETERS OF B2
0029 12347 001727 ALF,ALF GET ROW COUNT
0030 12350 010376 AND MSK0 IN (A)
0031 12351 040001 ADA 1 COMBINE A AND B
0032 12352 064174 LDB B1+1 PARAMETERS OF B1
0033 12353 016032 JSB COMPR COMPARE ROW AND COL
0034* DIMENSIONS ARE COMPATIBLE
0035* M,N ARE STORED IN T3,T4
0036* SAVE B2 AS DESTROYED IN
0037 12354 060175 LDA B2 MULT
0038 12355 073117 STA T5
0039 12356 063115 LDA T3 SET
0040 12357 003004 CMA,INA ROW
0041 12360 073123 STA T9 COUNTER
0042 12361 063120 MULT4 LDA T6
0043 12362 003004 CMA,INA
0044 12363 073124 STA T10 SET COUNTER
0045 12364 063117 LDA T5
0046 12365 070175 STA B2 RESTORE BASE ADDRESS B2
0047 12366 002400 MULT3 CLA
0048 12367 073125 STA T11 COUNTER FOR B2. INCR BY
0049* 2*P AND POINTS TO NEXT TERM
0050* IN COL TO BE MULTIPLIED
0051 12370 073126 STA T12 COUNTER FOR B1. INCR BY 2
0052* AND POINTS TO NEXT TERM
0053* IN ROW TO BE MULTIPLIED
0054 12371 006400 CLB
0055 12372 016240 JSB .DST CLEAR TO ZERO
0056 12373 100177 DEF B3,I
0057 12374 064173 MULT2 LDB B1 COMPUTE PROD OF ONE TERM

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0058	12375	047126	ADB T12	IN ROW BY ONE TERM IN COL
0059	12376	077132	STB T18	
0060	12377	064175	LDB B2	
0061	12400	047125	ADB T11	
0062	12401	016230	JSB .DLD	
0063	12402	100001	DEF 1,I	
0064	12403	114240	JSB .FMPA,I	
0065	12404	113132	DEF T18,I	
0066	12405	114236	JSB .FADA,I	COMPUTES RUNNING SUM
0067	12406	100177	DEF B3,I	
0068	12407	016240	JSB .DST	
0069	12410	100177	DEF B3,I	
0070	12411	037126	ISZ T12	SELECT NEXT TERM IN ROW
0071	12412	037126	ISZ T12	
0072	12413	063120	LDA T6	SELECT NEXT TERM IN COL
0073	12414	001000	ALS	
0074	12415	043125	ADA T11	
0075	12416	073125	STA T11	
0076*				TEST IF HAVE MULT ONE ROW
0077*				BY ONE COLUMN
0078	12417	063116	LDA T4	
0079	12420	001000	ALS	
0080	12421	053126	CPA T12	
0081	12422	026424	JMP *+2	
0082	12423	026374	JMP MULT2	MULT AND ADD IN NEXT TERM
0083*				SUMMATION OF PRODUCTS FOR
0084*				ONE TERM OF B3 IS DONE
0085*				MULT SAME ROW BY NEXT COL
0086	12424	034177	ISZ B3	INCR RECEIVING MAT
0087	12425	034177	ISZ B3	
0088	12426	034175	ISZ B2	BASE ADDRESS OF NEXT COL
0089	12427	034175	ISZ B2	
0090*				TEST IF HAVE MULT ONE ROW
0091*				BY ALL COLUMNS
0092	12430	037124	ISZ T10	SKIP IF INNERPRODUCT DONE
0093	12431	026366	JMP MULT3	COMPUTE SAME ROW*NEXT COL
0094*				SELECT NEXT ROW
0095	12432	063116	LDA T4	
0096	12433	001000	ALS	
0097	12434	040173	ADA B1	
0098	12435	070173	STA B1	ADDRESS OF NEXT ROW
0099	12436	037123	ISZ T9	
0100	12437	026361	JMP MULT4	MULT ROW BY ALL COLUMNS
0101	12440	126331	JMP MULT,I	EXIT TO MAIN PROGRAM

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0103*
0104******
0105*** SUBROUTINE MATRIX INVERT *****
0106******
0107*OPERATION OF FORM MAT B3 = INV B1 *
0108*B1,B3 ARE ADDRESSES OF BASE ADDRESS OF *
0109*MATRIX TO BE INVERTED AND RECEIVING MATRIX *
0110*RESPECTIVELY. B2 IS REDUNDANT. METHOD USED *
0111*IS GAUSSIAN ELIMINATION WITH COLUMN *
0112*PIVOTING *
0113******
0114*
0115 12441 000000 LINV NOP SUBROUTINE MATRIX INVERT
0116 12442 016045 JSB LCHK2 TEST B1 FOR UNASSIGNED TERMS
0117 12443 060174 LDA B1+1 DIMENSIONS OF MATRIX B1
0118 12444 064200 LDB B3+1 DIMENSIONS OF MATRIX B3
0119 12445 016032 JSB COMPR CHECK DIMENSIONS
0120* ROW AND COL VALUES T3,T4
0121* MAKE COPY OF MATRIX B1
0122* IN FREE CORE
0123 12446 060177 LDA B3 SAVE
0124 12447 073127 STA T13 B3
0125 12450 060174 LDA B1+1 COMPUTE SIZE
0126 12451 015336 JSB MDIM OF MATRIX
0127 12452 003004 CMA,INA
0128 12453 001100 ARS SAVE
0129 12454 073114 STA T2 ELEMENT
0130 12455 001000 ALS COUNTER
0131 12456 064141 LDB LSTPT SAVE
0132 12457 006004 INB ADDRESS OF
0133 12460 074175 STB B2 FREE CORE
0134 12461 074177 STB B3
0135 12462 007004 CMB,INB COMPUTE SIZE OF
0136 12463 044142 ADB HSTPT FREE CORE AREA
0137 12464 040001 ADA 1 ENOUGH
0138 12465 002020 SSA CORE LEFT?
0139 12466 025473 JMP E1 NO
0140 12467 016123 JSB REPLC YES, COPY SOURCE MATRIX
0141 12470 063127 LDA T13 RESTORE
0142 12471 070177 STA B3 B3
0143 12472 016176 JSB LIDN SET DESTINATION TO IDENTITY
0144 12473 063127 LDA T13 RESTORE ITS
0145 12474 070177 STA B3 BASE ADDRESS
0146 12475 002400 CLA INITIALIZE
0147 12476 073126 STA T12 MAXIMUM
0148 12477 073127 STA T13 ELEMENT
0149 12500 060175 LDA B2 COPY B2 INTO B1 AS
0150 12501 070173 STA B1 B2 NEEDED LATER
0151 12502 160173 LIN11 LDA B1,I LOAD
0152 12503 034173 ISZ B1 NEXT
0153 12504 164173 LDB B1,I ELEMENT
0154 12505 034173 ISZ B1
0155 12506 002020 SSA GET ABSOLUTE VALUE
0156 12507 015423 JSB ARINV IF NUMBER IS NEGATIVE
0157 12510 073132 STA T18 SAVE NUMBER
0158 12511 077133 STB T19

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0159	12512	114237	JSB .FSBA,I	SUBTRACT EXISTING MAX.
0160	12513	013126	DEF T12	VALUE
0161	12514	002020	SSA	SKIP AND SWAP IF POSITIVE
0162	12515	026522	JMP LIN10	
0163	12516	063132	LDA T18	SWAP
0164	12517	067133	LDB T19	
0165	12520	073126	STA T12	
0166	12521	077127	STB T13	
0167	12522	037114	LIN10 ISZ T2	ALL ELEMENTS EXHAUSTED?
0168	12523	026502	JMP LIN11	NO
0169	12524	063126	LDA T12	COMPUTE RELATIVE TOLERANCE
0170	12525	067127	LDB T13	TOL=ABSOLUTE TOL * MAX VALUE
0171	12526	114240	JSB .FMPI,I	
0172	12527	013130	DEF T16	ABSOLUTE TOLERANCE
0173	12530	070171	STA MLBX1	RELATIVE
0174	12531	074172	STB MLBX1+1	TOLERANCE
0175	12532	002400	CLA	INITIALIZE PIVOT
0176	12533	073134	STA LPIV	
0177	12534	037116	ISZ T4	REQUIRE CONSTANT (ROW+1)
0178	12535	037134	LIN11 ISZ LPIV	SELECT NEXT PIVOT
0179	12536	063134	LDA LPIV	TEST IF HAVE PROCESSED
0180	12537	053116	CPA T4	LAST PIVOT
0181	12540	126441	JMP LINV,I	NORMAL EXIT TO MAIN PROG
0182*				SCAN PIVOTAL COLUMN FOR
0183*				LARGEST ELEMENT
0184	12541	063134	LDA LPIV	COMPUTE ADDRESS OF PIVOT
0185	12542	067134	LDB LPIV	COLUMN USING ROUTINE LWHR
0186	12543	073114	STA T2	ROW COUNTER
0187	12544	017067	JSB LWHR	ON RETURN, ADDRESS IN A
0188	12545	073113	STA T1	
0189	12546	002400	CLA	
0190	12547	073126	STA T12	T12,T13 IS STORE
0191	12550	073127	STA T13	FOR GREATEST VALUE
0192	12551	016230	LIN12 JSB .DLD	LOAD FP NUMBER
0193	12552	113113	DEF T1,I	
0194	12553	002020	SSA	OBTAIN ABSOLUTE VALUE
0195	12554	015423	JSB ARINV	IF NUMBER IS NEGATIVE
0196	12555	073132	STA T18	STORE VALUE OF FP NUMBER
0197	12556	077133	STB T19	
0198	12557	114237	JSB .FSBA,I	SUBTR EXISTING LARGEST VALUE
0199	12560	013126	DEF T12	
0200	12561	002020	SSA	SKIP AND SWAP IF POSITIVE
0201	12562	026571	JMP LINV7	T2 STILL CONTAINS MAX VALUE
0202	12563	063132	LDA T18	STORE NEW MAX VALUE
0203	12564	067133	LDB T19	
0204	12565	073126	STA T12	
0205	12566	077127	STB T13	
0206	12567	063114	LDA T2	SET T5 TO POSITION IN
0207	12570	073117	STA T5	COLUMN OF MAX VALUE
0208	12571	037114	LIN13 ISZ T2	
0209	12572	063114	LDA T2	TEST FOR LAST TERM IN COL
0210	12573	053116	CPA T4	
0211	12574	026602	JMP LINV8	SWAP ROWS
0212	12575	063115	LDA T3	COMPUTE
0213	12576	001000	ALS	NEXT ADDRESS
0214	12577	043113	ADA T1	IN PIVOT

0215	12600	073113	STA T1	COLUMN
0216	12601	026551	JMP LINV2	SELECT NEXT TERM
0217				SWAP ROWS LPIV AND T5
0218	12602	063134	LINV8 LDA LPIV	COMPUTE ADDRESS
0219	12603	006404	CLB, INB	OF PIVOTAL ROW
0220	12604	017067	JSB LWHR	
0221	12605	073113	STA T1	ADDRESS OF PIVOTAL ROW
0222	12606	063117	LDA T5	
0223	12607	006404	CLB, INB	
0224	12610	017067	JSB LWHR	
0225	12611	073114	STA T2	ADDR OF ROW TO BE SWAPPED
0226	12612	063134	LDA LPIV	
0227	12613	006404	CLB, INB	COMPUTE ADDRESS OF
0228	12614	017101	JSB LWHR2	PIVOTAL ROW IN I-MATRIX
0229	12615	073123	STA T9	
0230	12616	073124	STA T10	KEEP COPY
0231	12617	063117	LDA T5	
0232	12620	006404	CLB, INB	COMPUTE ADDR OF ROW TO
0233	12621	017101	JSB LWHR2	BE SWAPPED IN I-MATRIX
0234	12622	073125	STA T11	
0235	12623	063115	LDA T3	
0236	12624	003004	CMA, INA	
0237	12625	073126	STA T12	COUNTER FOR TERMS IN A ROW
0238	12626	016230	LINV3 JSB .DLD	SWAP ONE ELEMENT OF ROW
0239	12627	113113	DEF T1, I	
0240	12630	073132	STA T18	
0241	12631	077133	STB T19	
0242	12632	016230	JSB .DLD	
0243	12633	113114	DEF T2, I	
0244	12634	173113	STA T1, I	
0245	12635	037113	ISZ T1	
0246	12636	177113	STB T1, I	
0247	12637	037113	ISZ T1	
0248	12640	063132	LDA T18	
0249	12641	067133	LDB T19	
0250	12642	173114	STA T2, I	
0251	12643	037114	ISZ T2	
0252	12644	177114	STB T2, I	
0253	12645	037114	ISZ T2	
0254	12646	016230	JSB .DLD	SWAP ONE ELEMENT IN A ROW
0255	12647	113123	DEF T9, I	OF I-MATRIX
0256	12650	073132	STA T18	
0257	12651	077133	STB T19	
0258	12652	016230	JSB .DLD	
0259	12653	113125	DEF T11, I	
0260	12654	173123	STA T9, I	
0261	12655	037123	ISZ T9	
0262	12656	177123	STB T9, I	
0263	12657	037123	ISZ T9	
0264	12660	063132	LDA T18	
0265	12661	067133	LDB T19	
0266	12662	173125	STA T11, I	
0267	12663	037125	ISZ T11	
0268	12664	177125	STB T11, I	
0269	12665	037125	ISZ T11	
0270	12666	037126	ISZ T12	SKIP IF DONE

0271	12667	026626	JMP LINV3	SWAP NEXT ELEMENT
0272*				HAVE LARGEST ELEMENT IN
0273*				PIVOTAL POSITION. FIND
0274*				VALUE AND TEST TO ZERO
0275*				FOR SINGULAR MATRIX
0276	12670	063134	LDA LPIV	COMPUTE
0277	12671	067134	LDB LPIV	ADDRESS OF
0278	12672	017067	JSB LWHR	PIVOT
0279	12673	073113	STA T1	ELEMENT
0280	12674	016230	JSB .DLD	PIVOT VALUE
0281	12675	113113	DEF T1,I	
0282	12676	002020	SSA	OBTAIN ABSOLUTE VALUE
0283	12677	015423	JSB ARINV	IF NUMBER IS NEGATIVE
0284	12700	114237	JSB .FSBA,I	SUBTRACT TOLERANCE AND
0285	12701	000171	DEF MLBX1	
0286	12702	002020	SSA	COMPARE TO ZERO
0287	12703	014477	JSB ERROR	PRINT 'NEARLY SING MATRIX'
0288*				DIVIDE PIVOT ROW AND ROW
0289*				IN I-MAT BY PIVOT VALUE
0290	12704	063113	LDUM1 LDA T1	ADDRESS OF PIOT ELEMENT
0291	12705	073114	STA T2	
0292	12706	060466	LDA HONE	LOAD
0293	12707	064325	LDR .2	1.0
0294	12710	114241	JSB .FDVA,I	
0295	12711	113113	DEF T1,I	
0296	12712	073132	STA T18	INVERSE OF PIVOT
0297	12713	077133	STB T19	
0298*				MULT ROW BY 1/PIVOT
0299*				STARTING AT PIVOT+1
0300	12714	063134	LDA LPIV	
0301	12715	073125	STA T11	COUNTER FOR ROW
0302	12716	037125	LINV6 ISZ T11	INCREMENT COUNTER
0303	12717	063125	LDA T11	
0304	12720	053116	CPA T4	TEST FOR END OF ROW
0305	12721	026733	JMP LIN12	
0306	12722	037114	ISZ T2	ADDRESS OF NEXT ELEMENT
0307	12723	037114	ISZ T2	
0308	12724	016230	JSB .DLD	
0309	12725	113114	DEF T2,I	
0310	12726	114240	JSB .FMPA,I	
0311	12727	013132	DEF T18	
0312	12730	016240	JSB .DST	
0313	12731	113114	DEF T2,I	
0314	12732	026716	JMP LINV6	
0315*				MULT ROW IN I-MATRIX BY
0316*				1/PIVOT. SKIP IF ELEMENT=0
0317	12733	063124	LIN12 LDA T10	ADDRESS OF PIVOT ROW
0318	12734	073117	STA T5	IN I-MATRIX
0319	12735	063115	LDA T3	
0320	12736	003004	CMA,INA SET	
0321	12737	073125	STA T11	ROW COUNTER
0322	12740	016230	LIN13 JSB .DLD	
0323	12741	113117	DEF T5,I	
0324	12742	002003	SZA,RSS	SKIP MULTIPLICATION IF ZERO
0325	12743	006002	SZB	
0326	12744	026746	JMP **2	NOT ZERO

0327	12745	026782	JMP LIN14	ZERO
0328	12746	114240	JSB .FMPA,I	
0329	12747	013132	DEF T18	
0330	12750	016240	JSB .DST	
0331	12751	113117	DEF T5,I	
0332	12752	037117	LIN14 ISZ T5	NEXT ELEMENT IN I-MATRIX
0333	12753	037117	ISZ T5	
0334	12754	037125	ISZ T11	DONE?
0335	12755	026740	JMP LIN13	NO
0336*				PERFORM ROW MANIPULATIONS
0337*				AND SUBTRACTIONS TO REDUCE
0338*				PIVOT COLUMN TO ZERO
0339	12756	002400	CLA	
0340	12757	070173	STA B1	
0341	12760	034173	LIN14 ISZ B1	SELECT NEXT ROW
0342	12761	060173	LDA B1	
0343	12762	053116	CPA T4	TEST FOR LAST ROW
0344	12763	026535	JMP LIN14	SELECT NEXT PIVOT
0345	12764	053134	CPA LPIV	TEST TO SKIP PIVOTAL ROW
0346	12765	026760	JMP LIN14	SKIP PIVOTAL ROW
0347	12766	060173	LDA B1	
0348	12767	006404	CLB,INB	
0349	12770	017101	JSB LWHR2	ADDRESS OF ROW TO BE TRANSFORMED
0350	12771	073125	STA T11	IN I-MATRIX
0351*				COMPUTE MULTIPLIER WHICH
0352*				IS THAT ELEMENT IN ROW TO
0353*				BE TRANSFORMED WHICH LIES
0354*				IN THE PIVOTAL COLUMN
0355	12772	060173	LDA B1	
0356	12773	067134	LDB LPIV	
0357	12774	017067	JSB LWHR	
0358	12775	073123	STA T9	SAVE ADDRESS
0359	12776	016230	JSB .DLD	
0360	12777	100000	DEF 0,I	
0361	13000	073121	STA T7	VALUE OF MULTIPLIER
0362	13001	077122	STB T8	
0363*				DO ELIMINATION OF ROWS IN
0364*				ORIGINAL MATRIX, START AT
0365*				COLUMN LPIV+1
0366	13002	063134	LDA LPIV	
0367	13003	073127	STA T13	COUNTER
0368	13004	063113	LDA T1	
0369	13005	073114	STA T2	
0370	13006	037127	LIN15 ISZ T13	
0371	13007	063127	LDA T13	
0372	13010	053116	CPA T4	TEST FOR LAST TERM IN ROW
0373	13011	027033	JMP LIN15	
0374	13012	037123	ISZ T9	T9 IS ADDRESS OF
0375	13013	037123	ISZ T9	ELEMENT TO BE CHANGED
0376	13014	037114	ISZ T2	T2 IS ADDR OF CORRESPONDING
0377	13015	037114	ISZ T2	ELEMENT IN PIVOTAL ROW
0378	13016	063121	LDA T7	
0379	13017	067122	LDB T8	
0380	13020	114240	JSB .FMPA,I	
0381	13021	113114	DEF T2,I	
0382	13022	073132	STA T18	MULTIPLIER*VALUE IN

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0383 13023 077133      STB T19          PIVOT ROW
0384 13024 016230      JSB .DLD
0385 13025 113123      DEF T9,I
0386 13026 114237      JSB .FSBA,I
0387 13027 013132      DEF T18
0388 13030 016240      JSB .DST          TRANSFORMED ELEMENT
0389 13031 113123      DEF T9,I
0390 13032 027006      JMP LINV5          SELECT NEXT TERM
0391*                                     DO ELIMINATION OF ROWS IN
0392*                                     IDENTITY MATRIX. START AT
0393*                                     BEGINNING OF ROW AND LEAVE
0394*                                     ELEMENT UNCHANGED WHEN ZERO
0395*                                     IN PIVOTAL ROW.
0396 13033 063124      LIN15 LDA T10          ADDRESS OF
0397 13034 073117      STA T5              PIVOTAL ROW
0398 13035 063115      LDA T3
0399 13036 003004      CMA,INA          SET
0400 13037 073127      STA T13          COUNTER
0401 13040 163117      LIN18 LDA T5,I
0402 13041 037117      ISZ T5
0403 13042 167117      LDB T5,I
0404 13043 037117      ISZ T5
0405 13044 002003      SZA,RSS          SKIP IF ZERO
0406 13045 006002      SZB
0407 13046 027050      JMP **2          NOT ZERO
0408 13047 027062      JMP LIN17        ZERO
0409 13050 114240      JSB .FMPI,I      MULTIPLY BY
0410 13051 013121      DEF T7          MULTIPLIER
0411 13052 073132      STA T18
0412 13053 077133      STB T19
0413 13054 016230      JSB .DLD
0414 13055 113125      DEF T11,I
0415 13056 114237      JSB .FSBA,I
0416 13057 013132      DEF T18
0417 13060 016240      JSB .DST
0418 13061 113125      DEF T11,I
0419 13062 037125      LIN17 ISZ T11
0420 13063 037125      ISZ T11
0421 13064 037127      ISZ T13
0422 13065 027040      JMP LIN18          SELECT NEXT TERM
0423 13066 026760      JMP LINV4          ELIMINATE NEXT ROW
0424*
0425*
0426*****
0427*****      SUBROUTINE LWHR          *****
0428*****
0429*SUBROUTINE COMPUTES ADDRESS OF AN ELEMENT *
0430*IN MATRIX GIVEN BY B2. ROW AND COL VALUES *
0431*ARE SUPPLIED IN A,B. ADDRESS IS LEFT IN A *
0432*ENTRY LWHR2 COMPUTES ADDR IN MAT B3 *
0433*****
0434*
0435 13067 000000      LWHR NOP
0436 13070 077121      STB T7          SAVE COLUMN #
0437 13071 040431      ADA M1
0438 13072 015236      JSB MPY

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0439 13073 013115      DEF T3      (A-1)*T3
0440 13074 043121      ADA T7
0441 13075 040431      ADA M1      +(B-1)
0442 13076 001000      ALS
0443 13077 040175      ADA B2      DDR=B2+2((A-1)*T3+(B-1))
0444 13100 127067      JMP LWHR,I
0445 13101 000000      LWHR2 NOP
0446 13102 077121      STB T7
0447 13103 040431      ADA M1
0448 13104 015236      JSB MPY
0449 13105 013115      DEF T3
0450 13106 043121      ADA T7
0451 13107 040431      ADA M1
0452 13110 001000      ALS
0453 13111 040177      ADA B3
0454 13112 127101      JMP LWHR2,I

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0455*

0456*

0457*****

0458* CONSTANTS *

0459*****

0460*

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0461 13113 000000      T1      BSS 1      TEMPORARY CONSTANTS
0462 13114 000000      T2      BSS 1
0463 13115 000000      T3      BSS 1
0464 13116 000000      T4      BSS 1
0465 13117 000000      T5      BSS 1
0466 13120 000000      T6      BSS 1
0467 13121 000000      T7      BSS 1
0468 13122 000000      T8      BSS 1
0469 13123 000000      T9      BSS 1
0470 13124 000000      T10     BSS 1
0471 13125 000000      T11     BSS 1
0472 13126 000000      T12     BSS 1
0473 13127 000000      T13     BSS 1
0474 13130 041433      T16     DEC +1E-6      ABSOLUTE TOLERANCE
0475 13132 000000      T18     BSS 1
0476 13133 000000      T19     BSS 1
0477 13134 000000      LPIV    BSS 1
0478 13135 114236      LPLUS   JSB .FADA,I      GENERATES CODE
0479 13136 100175      DEF B2,I
0480 13137 114237      LMIN     JSB .F98A,I      GENERATES CODE
0481 13140 114240      LTIME    JSB .FMFA,I      GENERATES CODE
0482 13141 034175      INCB2    ISZ B2      GENERATES CODE
0483 13142              FINIS    EQU *
0484                      END

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** NO ERRORS*