```
                        .Z80
0000'                   ASEG
                            ORG 2000H
                        ;
                        ;
                C       INCLUDE POPORTS.INC
0000            C       PGPORT  EQU     0;255;0
0005            C       SENSE1    EQU 5;197
0006            C       SENSE2    EQU 6;198
0005            C       DR        EQU 5;197
                C
                        ;
                        ;
0010                    .RADIX 16

0E56                    ABS     EQU     0E56
FDCC                    ACC1    EQU     0FDCC
128F                    ACCSTA  EQU     128F
0E86                    ADD     EQU     0E86
35F9                    ADJDES  EQU     35F9
0C4F                    ADJVAL  EQU     0C4F
FDBE                    ADLABE  EQU     0FDBE
3C45                    AE      EQU     3C45
1FA5                    ALIST   EQU     1FA5
13F3                    ALOP1   EQU     13F3
3B87                    ALPHA   EQU     3B87
209A                    ANDACC  EQU     209A
FDB7                    APROG   EQU     0FDB7
FACC                    ARRTOP  EQU     0FACC
FDA8                    ASBYTE  EQU     0FDA8
3F4B                    ASC     EQU     3F4B
FD6D                    ASTACK  EQU     0FD6D
241D                    ATN     EQU     241D
2452                    ATNT2   EQU     2452
FD7B                    AUTOCT  EQU     0FD7B
FD77                    AUTOIN  EQU     0FD77
FD79                    AUTOST  EQU     0FD79
FAAA                    BASBOT  EQU     0FAAA
FACF                    BASELI  EQU     0FACF
FDC7                    BASEM   EQU     0FDC7
025D                    BASENT  EQU     025D
0259                    BASIC   EQU     0259
0244                    BASIC0  EQU     0244
0244                    BASIC1  EQU     0244
0250                    BASIC2  EQU     0250
024A                    BASIC4  EQU     024A
0205                    BASICS  EQU     0205
FAD1                    BASLNP  EQU     0FAD1
FAA7                    BASTOP  EQU     0FAA7
FAAC                    BASTP0  EQU     0FAAC
FAA9                    BASTP6  EQU     0FAA9
0D3C                    BAUDST  EQU     0D3C
0DD0                    BCDEC   EQU     0DD0
1C33                    BEGIN   EQU     1C33
0953                    BELL    EQU     0953
0DE4                    BIND1   EQU     0DE4
```

```
20FD                    BINTOA  EQU     20FD
35C9                    BLOCK   EQU     35C9
0CF3                    BREAID  EQU     0CF3
FD81                    BREAK   EQU     0FD81
09B0                    BREAKK  EQU     09B0
09F2                    BREAKM  EQU     09F2
3A6F                    BSLOAD  EQU     3A6F
FE3F                    BSSTR   EQU     0FE3F
0679                    BSTPHL  EQU     0679
FA7F                    CALCBO  EQU     0FA7F
FAB1                    CALCST  EQU     0FAB1
1B43                    CALLEN  EQU     1B43
3980                    CAPITA  EQU     3980
3D0B                    CARAC   EQU     3D0B
FD5F                    CASBAU  EQU     0FD5F
FE14                    CHAN    EQU     0FE14
3296                    CHKS30  EQU     3296
32A1                    CHKST1  EQU     32A1
3299                    CHKSTK  EQU     3299
1B6A                    CHOUT   EQU     1B6A
FF59                    CHPTR   EQU     0FF59
0A3A                    CHR$    EQU     0A3A
0A43                    CHR0    EQU     0A43
0A41                    CHR1    EQU     0A41
153A                    CHRDS   EQU     153A
FD57                    CLOCK   EQU     0FD57
1BE3                    CODETE  EQU     1BE3
FDBC                    COMAD   EQU     0FDBC
FD82                    COMMAN  EQU     0FD82
FDBB                    COMMEN  EQU     0FDBB
3F5B                    COMP$   EQU     3F5B
3F8A                    COMP5   EQU     3F8A
0FEA                    COMPAC  EQU     0FEA
115D                    COMPAD  EQU     115D
1163                    COMPAR  EQU     1163
11EC                    COMPBC  EQU     11EC
1BC4                    COMPST  EQU     1BC4
FD6A                    CONTAD  EQU     0FD6A
FD69                    CONTFL  EQU     0FD69
FD6C                    CONTPG  EQU     0FD6C
FDDE                    COPY    EQU     0FDDE
12F3                    COPYAC  EQU     12F3
04B0                    COPYDO  EQU     04B0
0EE3                    CORECS  EQU     0EE3
137D                    COSINE  EQU     137D
001B                    CRLF    EQU     001B
FAD3                    CRNTPG  EQU     0FAD3
FA52                    CTRBAD  EQU     0FA52
FB45                    CTYSLT  EQU     0FB45
FDC9                    CURLAB  EQU     0FDC9
FF5B                    CURSCR  EQU     0FF5B
FDA6                    DADD    EQU     0FDA6
FB46                    DATAAD  EQU     0FB46
FDC3                    DATALA  EQU     0FDC3
FB48                    DATAPG  EQU     0FB48
FDC6                    DBLABE  EQU     0FDC6
```

```
FDAA                    DBYTE   EQU     0FDAAH
05D1                    DDBCM   EQU     05D1H
06ED                    DECPG   EQU     06EDH
06CF                    DELET1  EQU     06CFH
06C7                    DELETE  EQU     06C7H
FE52                    DELSPR  EQU     0FE52H
FB49                    DESAVE  EQU     0FB49H
1274                    DESTAC  EQU     1274H
06E7                    DETPN   EQU     06E7H
FDAF                    DETYPE  EQU     0FDAFH
3B96                    DIGIT   EQU     3B96H
0BEB                    DIROUT  EQU     0BEBH
FDB1                    DISAD   EQU     0FDB1H
0E3D                    DIV10   EQU     0E3DH
0E28                    DIVBY1  EQU     0E28H
109E                    DIVIDE  EQU     109EH
0C9D                    DJVL4   EQU     0C9DH
FE4F                    DLSPNO  EQU     0FE4FH
331F                    DODIM   EQU     331FH
3E38                    DOJUMP  EQU     3E38H
0FBE                    DONIB   EQU     0FBEH
FDB3                    DPROG   EQU     0FDB3H
FDB0                    DTYPE   EQU     0FDB0H
1448                    EDEND   EQU     1448H
02D9                    EDENT   EQU     02D9H
FDAD                    EDIT    EQU     0FDADH
1424                    EDIT1   EQU     1424H
1429                    EDITOR  EQU     1429H
02CB                    EFFENT  EQU     02CBH
2CFE                    ENDLIN  EQU     2CFEH
FDB9                    ENDTAB  EQU     0FDB9H
1C03                    ENTER3  EQU     1C03H
1C11                    ENTERI  EQU     1C11H
2499                    ENUMBE  EQU     2499H
20C0                    EQUAL   EQU     20C0H
197B                    ERR34   EQU     197BH
FD84                    ERRPOS  EQU     0FD84H
3D84                    EVALAB  EQU     3D84H
3E5B                    EVALFN  EQU     3E5BH
3E7E                    EVALSE  EQU     3E7EH
1183                    EXCHAN  EQU     1183H
23EC                    EXP     EQU     23ECH
1372                    EXP01   EQU     1372H
23F2                    EXP2X   EQU     23F2H
FA9E                    FEXPAN  EQU     0FA9EH
19DD                    FIND    EQU     19DDH
3FEC                    FIND$   EQU     3FECH
3FE9                    FIND1$  EQU     3FE9H
0689                    FINDJP  EQU     0689H
316E                    FINDLE  EQU     316EH
061A                    FINDLI  EQU     061AH
2E39                    FINDNO  EQU     2E39H
1A19                    FINDNS  EQU     1A19H
0BFE                    FINFF   EQU     0BFEH
FD86                    FLAGS1  EQU     0FD86H
FB44                    FORCOU  EQU     0FB44H
```

```
112B                    FRAC    EQU     112B
033C                    FREESP  EQU     033C
FE16                    FREQ    EQU     0FE16
FE02                    GASH    EQU     0FE02
351A                    GET5VA  EQU     351A
0BC5                    GETBAS  EQU     0BC5
2FF3                    GETCHA  EQU     2FF3
2350                    GETDE1  EQU     2350
06DB                    GETLIN  EQU     06DB
06DE                    GETLN1  EQU     06DE
19E5                    GETLNE  EQU     19E5
24CC                    GETNEX  EQU     24CC
351D                    GETNVA  EQU     351D
2FE9                    GETSPA  EQU     2FE9
00BC                    GETSTR  EQU     00BC
3066                    GETVAL  EQU     3066
FB41                    GOPTR   EQU     0FB41
FB43                    GOSNUM  EQU     0FB43
FAD8                    GOSTAC  EQU     0FAD8
10A6                    GOTZER  EQU     10A6
20C8                    GREATE  EQU     20C8
20DB                    GREEQU  EQU     20DB
1541                    GRRDS   EQU     1541
3505                    GST5VA  EQU     3505
3508                    GSTNVA  EQU     3508
0A8C                    HIGH    EQU     0A8C
097F                    IJINIT  EQU     097F
FFF0                    IJTABL  EQU     0FFF0
1C73                    IMOVE   EQU     1C73
0A6B                    INBIT   EQU     0A6B
0ACB                    INBLK2  EQU     0ACB
0ABA                    INBLOC  EQU     0ABA
0A9A                    INBYTE  EQU     0A9A
35AC                    INCLRA  EQU     35AC
06F3                    INCPG   EQU     06F3
FDA8                    INDEX   EQU     0FDA8
FDC1                    INDEXL  EQU     0FDC1
3ECE                    INKEY$  EQU     3ECE
0AAE                    INOUT   EQU     0AAE
02FE                    INSERT  EQU     02FE
1B85                    INSTR   EQU     1B85
200A                    INT     EQU     200A
0996                    INT125  EQU     0996
121D                    INT64K  EQU     121D
119D                    INTEGE  EQU     119D
FD5E                    INTFFF  EQU     0FD5E
FDF2                    INTTAB  EQU     0FDF2
FA8F                    IOPL    EQU     0FA8F
FD76                    IOPR    EQU     0FD76
FD87                    ITYPE   EQU     0FD87
07B8                    JPHL    EQU     07B8
0079                    KBD     EQU     0079
FA83                    KBDBUF  EQU     0FA83
3618                    KBDPO   EQU     3618
FA91                    KBFLAG  EQU     0FA91
3622                    KEY1    EQU     3622
```

```
098A                    KILLIN  EQU     098A
27FB                    KILLVA  EQU     27FB
093A                    KILSND  EQU     093A
FDB5                    LABTAB  EQU     0FDB5
11C5                    LARGE1  EQU     11C5
11C8                    LARGEN  EQU     11C8
FD7D                    LASTAS  EQU     0FD7D
FD7E                    LASTDR  EQU     0FD7E
FD7C                    LASTKY  EQU     0FD7C
06AC                    LDBSBT  EQU     06AC
3F20                    LEFT$   EQU     3F20
3F95                    LEN     EQU     3F95
FDAE                    LENGTH  EQU     0FDAE
FF57                    LENHI   EQU     0FF57
FF56                    LENLO   EQU     0FF56
20E2                    LESEQU  EQU     20E2
20D2                    LESSTH  EQU     20D2
2680                    LEXFUN  EQU     2680
FDAC                    LINKER  EQU     0FDAC
0B40                    LOAD    EQU     0B40
089E                    LOAD2   EQU     089E
0891                    LOADER  EQU     0891
2D0C                    LOADSN  EQU     2D0C
2398                    LOG     EQU     2398
23A5                    LOG2X   EQU     23A5
2494                    LOGE2   EQU     2494
23BC                    LOGNX   EQU     23BC
0A82                    LOW     EQU     0A82
3593                    LRATOV  EQU     3593
FA7A                    LSTPG   EQU     0FA7A
FD91                    MAF     EQU     0FD91
FD89                    MAFD    EQU     0FD89
0351                    MAKESP  EQU     0351
FD93                    MBC     EQU     0FD93
FD8B                    MBCD    EQU     0FD8B
FD95                    MDE     EQU     0FD95
FD8D                    MDED    EQU     0FD8D
FDD9                    MEM1    EQU     0FDD9
FDA1                    MEMPOI  EQU     0FDA1
FD97                    MHL     EQU     0FD97
FD8F                    MHLD    EQU     0FD8F
3EDD                    MID$    EQU     3EDD
FD60                    MIDVAL  EQU     0FD60
FD99                    MIX     EQU     0FD99
FD9B                    MIY     EQU     0FD9B
297E                    MOREHE  EQU     297E
12B9                    MOVDEO  EQU     12B9
224C                    MOVEAC  EQU     224C
12A7                    MOVEDE  EQU     12A7
1BDD                    MOVHL   EQU     1BDD
FD9F                    MPC     EQU     0FD9F
FD9D                    MSP     EQU     0FD9D
100B                    MULPLY  EQU     100B
FE4D                    MVDIST  EQU     0FE4D
FE51                    MVNO    EQU     0FE51
FAA4                    NBTOP   EQU     0FAA4
```

```
FAA6                    NBTPG   EQU     0FAA6
06F7                    NCP1    EQU     06F7
0F13                    NEGACC  EQU     0F13
0221                    NEWENT  EQU     0221
2BC9                    NEWLIN  EQU     2BC9
2F90                    NEWSCR  EQU     2F90
2D7C                    NODDY   EQU     2D7C
FA9B                    NODLOC  EQU     0FA9B
02C0                    NOGOOD  EQU     02C0
FE4E                    NOSPR   EQU     0FE4E
20AF                    NOTACC  EQU     20AF
20E9                    NOTEQU  EQU     20E9
08C6                    OFREQ   EQU     08C6
24F3                    OL1     EQU     24F3
29AF                    ONELIN  EQU     29AF
399E                    ONESP   EQU     399E
FDD2                    OP11    EQU     0FDD2
129E                    OP1STA  EQU     129E
2672                    OPS     EQU     2672
0D72                    OPTABL  EQU     0D72
20A6                    ORACC   EQU     20A6
0AFC                    OTBLK2  EQU     0AFC
0A7B                    OUTBIT  EQU     0A7B
0AE6                    OUTBLO  EQU     0AE6
0AA4                    OUTBYT  EQU     0AA4
1219                    OUTRAN  EQU     1219
39C1                    OUTSP   EQU     39C1
1907                    OUTSTR  EQU     1907
121B                    OVERFL  EQU     121B
3B73                    OVERHL  EQU     3B73
3B74                    OVERSP  EQU     3B74
08F9                    OVOL    EQU     08F9
FFED                    OVRLAY  EQU     0FFED
2E6B                    P1JTBL  EQU     2E6B
FAD2                    PAGE    EQU     0FAD2
2BE8                    PAU1    EQU     2BE8
0671                    PGCHK   EQU     0671
066E                    PGCHK1  EQU     066E
FAD4                    PGN1    EQU     0FAD4
FAD5                    PGN2    EQU     0FAD5
0647                    PGSLC1  EQU     0647
0644                    PGSLC2  EQU     0644
064A                    PGSLCT  EQU     064A
FAD6                    PGTOP   EQU     0FAD6
120B                    PIOP1   EQU     120B
FE50                    PLSPNO  EQU     0FE50
FDA5                    POINTE  EQU     0FDA5
13C1                    POLY2   EQU     13C1
13D2                    POLYNO  EQU     13D2
233F                    POWER   EQU     233F
0CAB                    PRINTX  EQU     0CAB
FD75                    PRORPL  EQU     0FD75
3037                    PSHNAM  EQU     3037
3534                    PST5VA  EQU     3534
3537                    PSTNVA  EQU     3537
3544                    PUT5VA  EQU     3544
```

```
3547                    PUTNVA  EQU     3547
2FCD                    PUTSTA  EQU     2FCD
34FE                    RAMPGC  EQU     34FE
2BD7                    RAND1   EQU     2BD7
FA90                    REALBY  EQU     0FA90
0FFA                    REMAIN  EQU     0FFA
2316                    REPDEC  EQU     2316
0B06                    RESINT  EQU     0B06
2C8D                    RESTEN  EQU     2C8D
12D1                    RETACC  EQU     12D1
FD61                    RETSAV  EQU     0FD61
07B5                    RETT    EQU     07B5
FD4B                    RICHJL  EQU     0FD4B
3F1A                    RIGHT$  EQU     3F1A
0697                    RMTPHL  EQU     0697
204B                    RND     EQU     204B
FD7F                    RNSEED  EQU     0FD7F
0FA1                    ROAHL   EQU     0FA1
0FBD                    ROTR    EQU     0FBD
0F2B                    ROUNAC  EQU     0F2B
2CFD                    RUN4    EQU     2CFD
2CF0                    RUN5    EQU     2CF0
2CDB                    RUN55   EQU     2CDB
2CEC                    RUN8    EQU     2CEC
26F7                    RWTAB   EQU     26F7
15FC                    SAANGL  EQU     15FC
15BB                    SADJSP  EQU     15BB
16CE                    SARC    EQU     16CE
15E2                    SATTR   EQU     15E2
0A07                    SAUTO   EQU     0A07
0B90                    SAVE    EQU     0B90
12BF                    SAVEAC  EQU     12BF
0D3B                    SBAUD   EQU     0D3B
1876                    SCENT   EQU     1876
188F                    SCENT4  EQU     188F
00CB                    SCENTR  EQU     00CB
180F                    SCIRCL  EQU     180F
1595                    SCLS    EQU     1595
00DA                    SCODE   EQU     00DA
15B3                    SCOLOU  EQU     15B3
FF5D                    SCRN0   EQU     0FF5D
FF6C                    SCRN1   EQU     0FF6C
FF7B                    SCRN2   EQU     0FF7B
FF8A                    SCRN3   EQU     0FF8A
FF99                    SCRN4   EQU     0FF99
FFA8                    SCRN5   EQU     0FFA8
FFB7                    SCRN6   EQU     0FFB7
FFC6                    SCRN7   EQU     0FFC6
15EA                    SCRVS   EQU     15EA
159B                    SCTLSP  EQU     159B
1583                    SCURSO  EQU     1583
1687                    SDRAW   EQU     1687
157C                    SDSI    EQU     157C
3C91                    SE      EQU     3C91
3EA1                    SEQO    EQU     3EA1
2000                    SET1AC  EQU     2000
```

```
FD48                    SETCAL  EQU     0FD48
27B7                    SETINI  EQU     27B7
0B10                    SETINT  EQU     0B10
10A9                    SETZER  EQU     10A9
15A3                    SGENPA  EQU     15A3
00AD                    SHIF    EQU     00AD
FDD8                    SIGN    EQU     0FDD8
208F                    SIGNAC  EQU     208F
161F                    SINCOS  EQU     161F
1382                    SINE    EQU     1382
1590                    SINK    EQU     1590
29DA                    SLET    EQU     29DA
1574                    SLINE   EQU     1574
11B9                    SMALL1  EQU     11B9
11BB                    SMALLE  EQU     11BB
FF55                    SMBYTE  EQU     0FF55
15D1                    SMVSPR  EQU     15D1
27B3                    SNDBUF  EQU     27B3
0205                    SNEW    EQU     0205
09FD                    SOUT    EQU     09FD
158A                    SPAPER  EQU     158A
2BE4                    SPAUSE  EQU     2BE4
FE4C                    SPBASE  EQU     0FE4C
FE4B                    SPEED   EQU     0FE4B
1670                    SPLOT   EQU     1670
2B88                    SPRINT  EQU     2B88
FE55                    SPRTBL  EQU     0FE55
236E                    SQROOT  EQU     236E
2391                    SQUA1   EQU     2391
1008                    SQUARE  EQU     1008
0A15                    SQUASH  EQU     0A15
160A                    SRANGL  EQU     160A
27AA                    SREM    EQU     27AA
009E                    SROM    EQU     009E
2CAF                    SRUN    EQU     2CAF
2D0C                    SSOUND  EQU     2D0C
15C4                    SSPRIT  EQU     15C4
FA96                    SSTACK  EQU     0FA96
1311                    STA     EQU     1311
1317                    STAC    EQU     1317
FD73                    STACCT  EQU     0FD73
FD48                    STACK   EQU     0FD48
1286                    STACKA  EQU     1286
1298                    STACKO  EQU     1298
0744                    STACKS  EQU     0744
0F58                    STAHLH  EQU     0F58
1CC3                    STASEM  EQU     1CC3
1348                    STBC    EQU     1348
136B                    STHLHL  EQU     136B
315B                    STKLEN  EQU     315B
FA92                    STKLIM  EQU     0FA92
3EC9                    STKTES  EQU     3EC9
FA7A                    STKTOP  EQU     0FA7A
2D62                    STOP    EQU     2D62
2D56                    STOPPP  EQU     2D56
3FC6                    STR$    EQU     3FC6
```

```
02E7                    STRHL   EQU     02E7
0DBE                    STRJP   EQU     0DBE
02E8                    STROUT  EQU     02E8
3FCB                    STRSTA  EQU     3FCB
0E83                    SUBTRA  EQU     0E83
15F6                    SVS     EQU     15F6
15DA                    SWINDO  EQU     15DA
00F4                    SWITCH  EQU     00F4
3C40                    SYFAIL  EQU     3C40
398C                    SYN     EQU     398C
14B9                    SYNPRO  EQU     14B9
FA94                    SYSTOP  EQU     0FA94
3C3B                    SYSUCC  EQU     3C3B
FE04                    TEMP    EQU     0FE04
1A0C                    TEST1   EQU     1A0C
2A8D                    TEST2B  EQU     2A8D
1BB6                    TESTHL  EQU     1BB6
0344                    TESTSP  EQU     0344
3F3B                    TIME$   EQU     3F3B
2A7A                    TINSER  EQU     2A7A
FD71                    TMPA    EQU     0FD71
FD6F                    TMPHL   EQU     0FD6F
124F                    TOKMIN  EQU     124F
06BB                    TPCH1   EQU     06BB
FD6B                    TYPE    EQU     0FD6B
FFD5                    TYPTBL  EQU     0FFD5
3182                    UPDATE  EQU     3182
FA89                    USER    EQU     0FA89
FA98                    USERIN  EQU     0FA98
FD51                    USERIO  EQU     0FD51
FAA1                    USERNO  EQU     0FAA1
FD54                    USERRO  EQU     0FD54
203D                    USR     EQU     203D
FD4E                    USRRST  EQU     0FD4E
34A0                    UVITOS  EQU     34A0
3F9E                    VAL     EQU     3F9E
FA7D                    VALBOT  EQU     0FA7D
3580                    VALRA1  EQU     3580
FA7B                    VARNAM  EQU     0FA7B
357C                    VATOLR  EQU     357C
FD65                    VAZERO  EQU     0FD65
FE53                    VCOUNT  EQU     0FE53
2E85                    VDINIT  EQU     2E85
FE54                    VDPSTS  EQU     0FE54
FD67                    VERIF   EQU     0FD67
3A55                    VINT    EQU     3A55
FF58                    VINTF6  EQU     0FF58
FE18                    VOL     EQU     0FE18
FDA3                    WCHJUM  EQU     0FDA3
FE1A                    WKAREA  EQU     0FE1A
253B                    WORDLS  EQU     253B
FDD7                    YORN    EQU     0FDD7
0FAF                    ZERACC  EQU     0FAF
355D                    ZERONV  EQU     355D
```

```
000A                    .RADIX 10
                        ;
0028                    JT      EQU     28H
000B                    DEHL    EQU     8
00C3                    ELSE    EQU     195
0030                    GETRST  EQU     30H
0010                    SCRRST  EQU     10H
0018                    OSPRST  EQU     18H
00C2                    CODE    EQU     194
00FF                    ENDMARK EQU     255
00C8                    TO      EQU     200
00C8                    DELBOT  EQU     200
00CE                    DELTOP  EQU     206
00CF                    OPTOP   EQU     207
00D9                    OPBOT   EQU     217
00DA                    BOOTOP  EQU     218
00DC                    BOOBOT  EQU     220
00DD                    MFTOP   EQU     221
00F4                    MFBOT   EQU     244
00F5                    SFTOP   EQU     245
00FD                    SFBOT   EQU     253
0096                    GOTO    EQU     150
0028                    ERRRST  EQU     28H
                        ;
                        ;**************************
                C       INCLUDE MATOP.INC
                C       ;
                C       ;    New format for numbers
                C       ;    **********************
                C       ;
                C       ;First numbers are stored without the
                C       ;bit that specifies the one.i.e.
                C       ;1 comes out as 0 with some exponent
                C       ;
                C       ;0 comes as 0 in the mantissa and 0 in the
                C       ;exponent
                C       ;
                C       ;the exponent is calculated as a 2's complement
                C       ;but with 81h as zero exponent
                C       ;
                C       ;All operations act on positive numbers
                C       ;with a High bit set.
                C       ;
0030            C       FRONT   EQU  30H
0028            C       ERROR   EQU  28H
0028            C       ERRORS  EQU  28H
0038            C       MATHSRST EQU 38H
0028            C       JT      EQU  28H
                C       ;
                C       ;
                C       ;This sets ACC to 1
                C       ;
2000  E5         C       SET1ACC: PUSH HL
2001  F5         C                PUSH AF
2002  CD 10A6    C                CALL GOTZER
2005  36 81      C                LD   (HL),81H
```

```
2007  F1          C             POP  AF
2008  E1          C             POP  HL
2009  C9          C             RET
                  C     ;
                  C     ;
                  C     ;
                  C     ;This takes the integer part of ACC
                  C     ;
200A  CD 0FAF     C     INT:    CALL ZERACC
200D  C8          C             RET  Z
200E  1F          C             RRA
200F  32 FDD8     C             LD   (SIGN),A
2012  17          C             RLA
2013  D6 A0       C             SUB  80H+32
2015  D2 0EE3     C             JP   NC,CORECSIGN
2018  FE E1       C             CP   -31
201A  DA 10A9     C             JP   C,SETZER
201D  ED 44       C             NEG       ;- it
201F  28 19       C             JR   Z,DOSIGN
2021  21 FDCC     C             LD   HL,ACC1
                  C     ;
                  C     ;This sets B bits to zero from
                  C     ;HL at the low byte
                  C     ;
2024  FE 08       C     MORE80: CP   8
2026  38 09       C             JR   C,DOLAST
2028  36 00       C             LD   (HL),0
202A  23          C             INC  HL
202B  D6 08       C             SUB  8
202D  20 F5       C             JR   NZ,MORE80
202F  18 09       C             JR   DOSIGN
2031  47          C     DOLAST: LD   B,A
2032  3E FF       C             LD   A,0FFH
2034  CB 27       C     REM0:   SLA  A
2036  10 FC       C             DJNZ REM0
2038  A6          C             AND  (HL)
2039  77          C             LD   (HL),A
203A  C3 0EE3     C     DOSIGN: JP   CORECSIGN
                  C
                  C     ;
                  C     ;
00FF              C     ENDAR   EQU  0FFH
                  C     ;
                  C     ;
                  C     ;
                  C     ;This does a USR function returns the
                  C     ;value in BC
                  C     ;
203D  EF          C     USR:    RST  JT
203E  9D          C             DB   9DH
                  C     ;       CALL LARGEN
203F  C2 1219     C             JP   NZ,OUTRANG
2042  21 1348     C             LD   HL,STBC      ;To evalute BC
2045  E5          C             PUSH HL
2046  C5          C             PUSH BC
```

```
2047  C9          C             RET
                  C   ;
                  C   ;
                  C   ;
                  C   ;
                  C   ;Routine to take 2-byte seed from address RNSEED and use it to generate a new
                  C   ;2-byte random number which is put back at RNSEED. The routine returns a
                  C   ;floating point no. in the range 0 to 1 at ACC1
                  C   ;
                  C   ;The formula used for the random number is
                  C   ;
                  C   ;     x (i+1)  =  1509  *  x (i)  +  41
                  C   ;
                  C   ;     New r.n.            Old r.n.
                  C   ;
                  C   ;
                  C   ;
2048  2A FD7F     C   RND:    LD HL,(RNSEED)      ;HL = seed = a
204B  E5          C           PUSH HL             ;Save seed
204C  54          C           LD D,H
204D  5D          C           LD E,L              ;DE = a
                  C   ;
204E  29          C           ADD HL,HL           ;2a
204F  29          C           ADD HL,HL           ;4a
2050  E5          C           PUSH HL             ;Save 4a
2051  19          C           ADD HL,DE           ;HL = 5a
2052  44          C           LD B,H
2053  4D          C           LD C,L              ;BC = 5a
                  C   ;
2054  55          C           LD D,L
2055  1E 00       C           LD E,0              ;DE = 256 * 5a
                  C   ;
2057  3E 05       C           LD A,5
2059  29          C   RND1:   ADD HL,HL
205A  3D          C           DEC A
205B  20 FC       C           JR NZ,RND1          ;HL = 32 * 5a
205D  19          C           ADD HL,DE
205E  EB          C           EX DE,HL            ;DE = 5a * (256 + 32)
                  C   ;
205F  60          C           LD H,B
2060  69          C           LD L,C              ;HL = 5a
                  C   ;
2061  29          C           ADD HL,HL
2062  29          C           ADD HL,HL
2063  29          C           ADD HL,HL           ;HL = 8 * 5a
2064  19          C           ADD HL,DE           ;HL = 5a * (256 + 32 + 8)
                  C   ;
2065  60          C           LD H,B
2066  69          C           LD L,C              ;HL = 5a
                  C   ;
2067  29          C           ADD HL,HL
2068  29          C           ADD HL,HL           ;HL = 4 * 5a
2069  19          C           ADD HL,DE           ;HL = 5a * (256 + 32 + 8 + 4)
206A  09          C           ADD HL,BC           ;HL = 5a * (256 + 32 + 8 + 4 + 1)
                  C   ;
206B  C1          C           POP BC              ;BC = 4a
```

```
206C  09          C            ADD HL,BC
206D  01 0029     C            LD BC,41
2070  09          C            ADD HL,BC          ;HL = 5a * (256+32+8+4+1) + 4a + 41
                  C  ;                               = 1509 * a + 41 = NEW RANDOM NUMBER
                  C  ;
2071  D1          C            POP DE             ;DE = old random number
2072  EB          C            EX DE,HL
2073  A7          C            AND A
2074  ED 52       C            SBC HL,DE
2076  20 03       C            JR NZ,RND2         ;Jump if numbers different
                  C  ;
2078  11 0000     C            LD DE,0
                  C  ;
207B  ED 53 FD7F  C  RND2:     LD (RNSEED),DE     ;Store random no
                  C  ;
                  C  ;Convert 2-byte no. to floating point no. in range 0 to 1
                  C  ;
207F  42          C            LD B,D
2080  4B          C            LD C,E             ;BC = R.N
2081  CD 1348     C            CALL STBC          ;Convert to f.p.
2084  3A FDD0     C            LD A,(ACC1+4)
2087  A7          C            AND A
2088  C8          C            RET Z
                  C  ;
2089  D6 10       C            SUB 16
208B  32 FDD0     C            LD (ACC1+4),A
208E  C9          C            RET
                  C  ;
                  C
                  C
                  C  ;
                  C  ;
                  C  ;
                  C  ;This calculates the sign of the number
                  C  ;in ACC if it is 0 then ACC is set to zero
                  C  ;if ACC is positive then ACC is set to one
                  C  ;if ACC is negative then ACC is set to minus
                  C  ;one
                  C  ;
                  C  ;
208F  CD 0FAF     C  SIGNACC:  CALL ZERACC
2092  CA 10A9     C            JP   Z,SETZER
2095  D2 2000     C            JP   NC,SET1ACC
2098  18 1D       C            JR   GOTMIN1
                  C  ;
                  C  ;
                  C  ;This ands the number in ACC with the
                  C  ;number in OP1 answer in ACC
                  C  ;OP1 and ACC can only be 0 or -1
                  C  ;If either is zero then 0
                  C  ;
209A  21 FDD0     C  ANDACC:   LD   HL,ACC1+4
209D  3A FDD6     C            LD   A,(OP11+4)
20A0  A6          C            AND  (HL)
20A1  CA 10A6     C  ANDT:     JP   Z,GOTZER
20A4  18 11       C            JR   GOTMIN1
```

```
                        C     ;
                        C     ;
                        C     ;This ORs the number in ACC with the number
                        C     ;in OP1 answer in ACC again only 0 or -1
                        C     ;
                        C     ;
20A6   21 FDD0          C     ORACC:   LD   HL,ACC1+4
20A9   3A FDD6          C              LD   A,(OP11+4)
20AC   B6               C              OR   (HL)
20AD   18 F2            C              JR   ANDT
                        C     ;
                        C     ;
                        C     ;This nots the value in ACC either
                        C     ;0 or -1.
                        C     ;
                        C     ;
20AF   21 FDD0          C     NOTACC:  LD   HL,ACC1+4
20B2   7E               C              LD   A,(HL)
20B3   A7               C              AND  A
20B4   C2 10A6          C              JP   NZ,GOTZER
                        C     ;
20B7   CD 10A6          C     GOTMIN1: CALL GOTZER
20BA   36 81            C              LD   (HL),81H
20BC   2B               C              DEC  HL
20BD   36 80            C              LD   (HL),80H
20BF   C9               C              RET
                        C
                        C     ;
                        C     ;Routines to test zero and carry flags after arithmetic or string comparison
                        C     ;Z=1 equal; Z=0 not equal; C=1 less than; C=0 greater than or equal
                        C     ;N.B. Zero flag has priority and is tested first
                        C     ;
                        C     ;
20C0   CD 115D          C     EQUAL:   CALL COMPAO
20C3   28 0A            C              JR Z,YES              ;True =
20C5   C3 10A6          C     NO:      JP GOTZER             ;FALSE (return value zero)
                        C     ;
20C8   CD 115D          C     GREATER: CALL COMPAO
20CB   28 F8            C              JR Z,NO               ;False =
20CD   30 F6            C     GRE1:    JR NC,NO              ;False <
20CF   C3 20B7          C     YES:     JP GOTMIN1            ;TRUE (return value -1)
                        C     ;
20D2   CD 115D          C     LESSTH:  CALL COMPAO
20D5   28 EE            C              JR Z,NO               ;False =
20D7   30 F6            C     LESS1:   JR NC,YES             ;True <
20D9   18 EA            C              JR NO                 ;False >
                        C     ;
20DB   CD 115D          C     GREEQUL: CALL COMPAO
20DE   28 EF            C              JR Z,YES              ;True =
20E0   18 E8            C              JR GRE1               ;False if <; True if >
                        C     ;
20E2   CD 115D          C     LESEQUL: CALL COMPAO
20E5   28 E8            C              JR Z,YES              ;True =
20E7   18 EE            C              JR LESS1              ;True if <; False if >
                        C     ;
20E9   CD 115D          C     NOTEQUAL: CALL COMPAO
```

```
20EC  20 E1     C            JR NZ,YES          ;True if ^=
20EE  18 D5     C            JR NO              ;False if =
                C     ;
                C     ;
                C     ;
                C     ;IMATHS.MAC
                C     ;
                C     ;
00FF            C     ENDMARK  EQU  0FFH
                C     ;
                C     ;
20F0  21 FDDF   C     PRINTZER: LD  HL,COPY+1
20F3  36 FF     C               LD  (HL),0FFH
20F5  2B        C               DEC HL
20F6  36 30     C               LD  (HL),'0'
20F8  2B        C               DEC HL
20F9  36 20     C               LD  (HL),' '
20FB  EB        C               EX  DE,HL
20FC  C9        C               RET
                C     ;
                C     ;
                C     ;BINTOASC CONVERTS A BINARY NUMBER IN ACC1
                C     ;TO  AN ASCII DECIMAL NUMBER IN COPY WITH
                C     ;EXPONENT
                C     ;DE points to the start of the number HL
                C     ;to the end this always has a ENDMARK there.
                C     ;
                C     ;
20FD  CD 0FAF   C     BINTOASC: CALL ZERACC
2100  28 EE     C               JR  Z,PRINTZER
2102  F5        C               PUSH AF            ;Sign,C negative
2103  0E 00     C               LD  C,0         ;Count 10 power
2105  C5        C     REPASC:   PUSH BC
2106  3A FDD0   C               LD  A,(ACC1+4)
2109  D6 A3     C               SUB 80H+35
210B  30 07     C               JR  NC,TESDIV
210D  CD 220A   C               CALL MULACC
2110  C1        C               POP BC
2111  0D        C               DEC C
2112  18 F1     C               JR  REPASC
2114  FE 05     C     TESDIV:   CP  5
2116  38 07     C               JR  C,FINASC
2118  CD 21ED   C               CALL DIVACC10
211B  C1        C               POP BC
211C  0C        C               INC C
211D  18 E6     C               JR  REPASC
211F  CD 0DE4   C     FINASC:   CALL BIND1
2122  13        C               INC DE          ;Skip1
2123  21 FDEA   C               LD  HL,COPY+12     ;end
2126  78        C               LD  A,B
2127  C1        C               POP BC          ;GET POWER
2128  47        C               LD  B,A         ;Return B
2129  D6 0B     C               SUB 11
212B  D4 21D2   C               CALL NC,MDELETE
212E  78        C               LD  A,B
212F  FE 0A     C               CP  10
```

```
2131  D4 2189     C            CALL NC,ROUND
2134  79          C            LD   A,C       ;9 digit number
2135  A7          C            AND  A
2136  CA 217F     C            JP   Z,NOTHING
2139  F2 2142     C            JP   P,NEEDEXP
213C  ED 44       C            NEG
213E  FE 0C       C            CP   12
2140  38 2A       C            JR   C,NEEDPOIN
2142  3E 01       C  NEEDEXP:  LD   A,1
2144  CD 219B     C            CALL ADDPOIN
2147  79          C            LD   A,C
2148  C6 0B       C            ADD  A,8
214A  36 45       C            LD   (HL),'E'
214C  23          C            INC  HL
214D  0E 2B       C            LD   C,'+'
214F  F2 2156     C            JP   P,POSI
2152  0E 2D       C            LD   C,'-'
2154  ED 44       C            NEG
2156  71          C  POSI:     LD   (HL),C
2157  23          C            INC  HL
2158  0E 50       C            LD   C,50H
215A  EF          C            RST  JT
215B  A3          C            DB   0A3H
                    C  ;         CALL DIV10
215C  47          C            LD   B,A
215D  E6 0F       C            AND  0FH
215F  EF          C            RST  JT
2160  A3          C            DB   0A3H
                    C  ;         CALL DIV10
2161  CD 21E2     C            CALL SAVEA
2164  78          C            LD   A,B
2165  CD 21E2     C            CALL SAVEA
2168  36 FF       C            LD   (HL),ENDMARK
216A  18 13       C            JR   NOTHING
216C  ED 44       C  NEEDPOIN: NEG            ;Real exponent
216E  C6 08       C            ADD  A,8
2170  F2 217B     C            JP   P,MOVE1
2173  EB          C            EX   DE,HL
2174  2B          C  MORE0:    DEC  HL
2175  36 30       C            LD   (HL),'0'
2177  3C          C            INC  A
2178  20 FA       C            JR   NZ,MORE0
217A  EB          C            EX   DE,HL
217B  3C          C  MOVE1:    INC  A
217C  CD 2198     C            CALL ADDPOIN
                    C  ;
217F  F1          C  NOTHING:  POP  AF
2180  3E 20       C            LD   A,' '
2182  30 02       C            JR   NC,NOMINUS
2184  3E 2D       C            LD   A,'-'
2186  1B          C  NOMINUS:  DEC  DE
2187  12          C            LD   (DE),A
2188  C9          C            RET
                    C  ;
                    C  ;
                    C  ;This rounds off the number in copy
```

```
                        C       ;
                        C       ;
2189    2B              C       ROUND:  DEC  HL
218A    E5              C               PUSH HL
218B    C5              C               PUSH BC
218C    CD 21BC         C               CALL AROUND
218F    C1              C               POP  BC
2190    38 03           C               JR   C,REMHL
2192    0C              C               INC  C
2193    36 31           C               LD   (HL),'1'
2195    E1              C       REMHL:  POP  HL
2196    0C              C               INC  C
2197    C9              C               RET
                        C       ;
                        C       ;This adds a decimal point to the end of
                        C       ;the number A positions along it
                        C       ;DE points at start HL at the end
                        C       ;
2198    C5              C       ADDPOIN:  PUSH BC
2199    D5              C                 PUSH DE
219A    EB              C                 EX   DE,HL
219B    4F              C                 LD   C,A
219C    06 00           C                 LD   B,0
219E    09              C                 ADD  HL,BC
219F    E5              C                 PUSH HL
21A0    44              C                 LD   B,H
21A1    4D              C                 LD   C,L
21A2    03              C                 INC  BC
21A3    CD 1C73         C                 CALL IMOVE
21A6    E1              C                 POP  HL
21A7    36 2E           C                 LD   (HL),'.'
21A9    EB              C                 EX   DE,HL
21AA    2B              C                 DEC  HL
21AB    D1              C                 POP  DE
21AC    C1              C                 POP  BC
                        C       ;
                        C       ;This moves up a number until a point
                        C       ;is reached or nonzero
                        C       ;
21AD    7E              C       REMZER:   LD   A,(HL)
21AE    2B              C                 DEC  HL
21AF    FE 30           C                 CP   '0'
21B1    28 FA           C                 JR   Z,REMZER
21B3    23              C                 INC  HL
21B4    FE 2E           C                 CP   '.'
21B6    28 01           C                 JR   Z,GOTP
21B8    23              C                 INC  HL
21B9    36 FF           C       GOTP:     LD   (HL),ENDMARK
21BB    C9              C                 RET
                        C       ;
                        C       ;
                        C       ;This almost rounds off the number in copy
                        C       ;
21BC    05              C       AROUND:   DEC  B
21BD    7E              C                 LD   A,(HL)
21BE    36 FF           C                 LD   (HL),ENDMARK
```

```
21C0  FE 35       C            CP  '5'
21C2  D8          C            RET C
21C3  2B          C    MORROUN: DEC HL
21C4  7E          C            LD  A,(HL)
21C5  3C          C            INC A
21C6  FE 3A       C            CP  '9'+1
21C8  38 02       C            JR  C,NOOVER
21CA  3E 30       C            LD  A,'0'
21CC  77          C    NOOVER: LD  (HL),A
21CD  D8          C            RET C
21CE  05          C            DEC B
21CF  C8          C            RET Z
21D0  18 F1       C            JR  MORROUN
                  C    ;
                  C    ;This deletes A characters from the string
                  C    ;
                  C    ;
21D2  C5          C    MDELETE:  PUSH BC
21D3  06 00       C              LD  B,0
21D5  4F          C              LD  C,A
21D6  37          C              SCF
21D7  ED 42       C              SBC HL,BC
21D9  36 FF       C              LD  (HL),ENDMARK
21DB  C1          C              POP BC
21DC  B1          C              ADD A,C
21DD  4F          C              ID  C,A
21DE  0C          C              INC C
21DF  06 0A       C              LD  B,10 ;10 characters
21E1  C9          C              RET
                  C    ;
                  C    ;This saves A at HL
                  C    ;
21E2  07          C    SAVEA:    RLCA
21E3  07          C              RLCA
21E4  07          C              RLCA
21E5  07          C              RLCA
21E6  E6 0F       C              AND 0FH
21E8  C6 30       C              ADD A,'0'
21EA  77          C              LD  (HL),A
21EB  23          C              INC HL
21EC  C9          C              RET
                  C    ;
                  C    ;**************************************
                  C    ;
                  C    ;This divides ACC by 10 to give a 5 byte
                  C    ;normalised answer.rounding'is done on the
                  C    ;5th. byte
                  C    ;
21ED  0E 50       C    DIVACC10: LD  C,50H    ;for divide
21EF  21 FDCF     C              LD  HL,ACC1+3
21F2  CD 0E28     C              CALL DIVBY10
21F5  CB 5F       C              BIT 3,A      ;Round
21F7  3A FDCF     C              LD  A,(ACC1+3)
21FA  2A FDCD     C              LD  HL,(ACC1+1)
21FD  D9          C              EXX
21FE  2A FDCB     C              LD  HL,(ACC1-1)
```

```
2201  D9           C            EXX
2202  C4 0FA1      C            CALL NZ,ROAHL
2205  0E 80        C            LD   C,80H
2207  C3 0F58      C            JP   STAHLHLD
                   C    ;++++++++++++++++++++++++++++++++++
                   C    ;
                   C    ;This multiplies ACC by 10 to give
                   C    ;a 5 byte normalised answer.Rounding
                   C    ;is done before multyply.
                   C    ;
220A  06 05        C    MULACC: LD   B,5       ;Counter
220C  21 FDD0      C            LD   HL,ACC1+4 ;pointer
220F  3E 00        C            LD   A,0
2211  2B           C    SHIFT4: DEC  HL
2212  ED 67        C            RRD
2214  10 FB        C            DJNZ SHIFT4
2216  FE 08        C            CP   8         ;Round Y or N
2218  3A FDCF      C            LD   A,(ACC1+3)
221B  2A FDCD      C            LD   HL,(ACC1+1)
221E  D9           C            EXX
221F  2A FDCB      C            LD   HL,(ACC1-1)
2222  D9           C            EXX
2223  D4 0FA1      C            CALL NC,ROAHL
2226  CD 222E      C    NO1EXX: CALL MUL10     ;Multyply by 10
2229  0E B4        C            LD   C,80H+4   ;Displacement
222B  C3 0F58      C            JP   STAHLHLD  ;Save it
                   C    ;
                   C    ;++++++++++++++++++++++++++++++++++
                   C    ;Multiplies HL HL' by 10 to give an
                   C    ;answer in A HL HL',A is assumed to have
                   C    ;zero.
                   C    ;
                   C    ;
222E  CD 2245      C    MUL10:  CALL ESHIFTACC
2231  F5           C            PUSH AF
2232  44           C            LD   B,H       ;ROTATE LEFT ONCE
2233  4D           C            LD   C,L       ;AND STORE IN BC BC'
2234  D9           C            EXX            ;TO BE ADDED
2235  44           C            LD   B,H
2236  4D           C            LD   C,L
2237  CD 2246      C            CALL SHIFTACC
223A  CD 2245      C            CALL ESHIFTACC
223D  D9           C            EXX            ;GET DASHED REGISTERS
223E  09           C            ADD  HL,BC     ;DO ADDITION
223F  D9           C            EXX
2240  ED 4A        C            ADC  HL,BC
2242  C1           C            POP  BC        ;0 or 1
2243  88           C            ADC  A,B
2244  C9           C            RET
                   C    ;
                   C    ;
                   C    ;SHIFTACC SHIFTS HL HL' BY ONE BIT
                   C    ;LEFT.TWO ENTRY POINTS TO ENTER ON
                   C    ;NORMAL OR DASH REGISTERS.RETURNS ON
                   C    ;NORMAL REGISTERS
                   C    ;
```

```
                        C       ;
2245    D9              C       ESHIFTACC:EXX
2246    29              C       SHIFTACC: ADD  HL,HL
2247    D9              C                 EXX
2248    ED 6A           C                 ADC  HL,HL
224A    17              C                 RLA
224B    C9              C                 RET
                        C
                        C       ;
0030                    C       UNDEFINE  EQU  FRONT
0030                    C       FRONT     EQU  30H
000D                    C       CR        EQU 13
000A                    C       LF        EQU 10
00FF                    C       INPUT     EQU 0FFH
0002                    C       CONOUT    EQU 2
0009                    C       STRNG     EQU 9
0006                    C       DIRIO     EQU 6
0030                    C       ASCINO    EQU  '0'
                        C       ;
                        C       ;
                        C       ;converts the ASCII decimal
                        C       ;floating point number pointed
                        C       ;to by DE to a binary floating point
                        C       ;number in ACC1.
                        C       ;
                        C       ;
224C    D5              C       MOVEACC:  PUSH DE
224D    CD 121D         C                 CALL INT64K
2250    20 15           C                 JR   NZ,DOLAR
2252    CD 2316         C                 CALL REPDEC
2255    30 10           C                 JR   NC,DOLAR
2257    E1              C                 POP  HL
2258    D5              C                 PUSH DE
2259    CD 1348         C                 CALL STBC      ;To float
225C    D1              C                 POP  DE
225D    1A              C                 LD   A,(DE)
225E    FE 45           C                 CP   'E'
2260    C0              C                 RET  NZ        ;Do exponent
2261    D9              C                 EXX
2262    26 00           C                 LD   H,0       ;None from start
2264    D9              C                 EXX
2265    18 26           C                 JR   STQU
2267    D1              C       DOLAR:    POP  DE
2268    CD 2309         C                 CALL DECBIN    ;CONVERT NO
226B    01 80AB         C                 LD   BC,80H*100H+80H+40;Start exponent
226E    08              C                 EX   AF,aF'
226F    CD 136B         C                 CALL STHLHLD  ;Store number
                        C       ;
                        C       ;Number is saved now
                        C       ;
2272    D9              C                 EXX
2273    63              C                 LD   H,E
2274    D9              C                 EXX
2275    EF              C       MORE:     RST  JT
2276    A4              C                 DB   0A4H
                        C       ;CALL REPDEC
```

```
2277  30 FC     C          JR   NC,MORE
2279  D9        C          EXX
227A  7B        C          LD   A,E
227B  94        C          SUB  H
227C  67        C          LD   H,A       ;Power 10
227D  14        C          INC  D         ;ON DASH
227E  20 02     C          JR   NZ,NOPOIN
2280  53        C          LD   D,E
2281  14        C          INC  D
2282  15        C  NOPOIN: DEC  D
2283  7A        C          LD   A,D
2284  93        C          SUB  E
2285  84        C          ADD  A,H
2286  67        C          LD   H,A
2287  D9        C          EXX
2288  1A        C          LD   A,(DE)
2289  FE 45     C          CP   'E'
228B  20 27     C          JR   NZ,NO10
228D  13        C  STQU:   INC  DE
228E  CD 124F   C          CALL TOKMIN
2291  F5        C          PUSH AF
2292  26 00     C          LD   H,0
2294  EF        C  MORE10: RST  JT
2295  A4        C          DB   0A4H
              C  ;CALL REPDEC
2296  38 12     C          JR   C,NOMORE10
2298  4F        C          LD   C,A
2299  7C        C          LD   A,H
229A  87        C          ADD  A,A
229B  47        C          LD   B,A
229C  87        C          ADD  A,A
229D  87        C          ADD  A,A
229E  80        C          ADD  A,B
229F  81        C          ADD  A,C
22A0  67        C          LD   H,A
22A1  FE 0A     C          CP   10
22A3  38 EF     C          JR   C,MORE10
22A5  EF        C          RST  JT
22A6  A4        C          DB   0A4H
              C  ;         CALL REPDEC
22A7  D2 121B   C          JP   NC,OVERFLOW
22AA  F1        C  NOMORE10: POP  AF
22AB  7C        C          LD   A,H
22AC  38 02     C          JR   C,NOT1ONEG
22AE  ED 44     C          NEG
22B0  D9        C  NOT1ONEG: EXX
22B1  84        C          ADD  A,H
22B2  67        C          LD   H,A
22B3  D9        C          EXX
22B4  D9        C  NO10:   EXX
22B5  7C        C          LD   A,H
22B6  A7        C          AND  A
22B7  D9        C          EXX
22B8  47        C          LD   B,a
22B9  28 1B     C          JR   Z,FINSIGN
22BB  D5        C          PUSH DE
```

```
22BC  CD 0FAF     C   TOPMUL:  CALL ZERACC
22BF  28 14       C            JR   Z,FINMUL
22C1  78          C            LD   A,B
22C2  A7          C            AND  A
22C3  C5          C            PUSH BC
22C4  FA 22CE     C            JP   M,DIVOP
22C7  CD 220A     C            CALL MULACC
22CA  C1          C            POP  BC
22CB  05          C            DEC  B
22CC  18 05       C            JR   FINiMUL
22CE  CD 21ED     C   DIVOP:   CALL DIVACC10
22D1  C1          C            POP  BC
22D2  04          C            INC  B
22D3  20 E7       C   FINiMUL: JR   NZ,TOPMUL
22D5  D1          C   FINMUL:  POP  DE
22D6  CD 0F2B     C   FINSIGN: CALL ROUNACC
22D9  21 FDCF     C            LD   HL,ACC1+3
22DC  CB BE       C            RES  7,(HL)
22DE  C9          C            RET
                  C   ;
                  C   ;
                  C   ;GETDEC converts an ASCII number pointed to by DE
                  C   ;to a hex number in A' HL HL'.If it returns on A'
                  C   ;then NC is sent.Reading is terminated
                  C   ;when a non number is found.Or a C goes into A'
                  C   ;D' returns with 0FFh if no decimal point is
                  C   ;found.E' returns with the number of characters
                  C   ;read D' returns with the position of the decimal
                  C   ;point.
                  C   ;
                  C   ;
22DF  AF          C   GETDEC:  XOR  A
22E0  67          C            LD   H,A
22E1  6F          C            LD   L,A
22E2  D9          C            EXX
22E3  67          C            LD   H,A
22E4  6F          C            LD   L,A
22E5  5F          C            LD   E,A
22E6  16 FF       C            LD   D,0FFH     ;COUNTER FOR POINT
22E8  D9          C   EREPBIN: EXX             ;GET NORMAL REGS
22E9  08          C   REPBIN:  EX   AF,AF'
22EA  EF          C            RST  JT
22EB  A4          C            DB   0A4H
                  C   ;        CALL REPDEC
22EC  D8          C            RET  C
22ED  08          C            EX   AF,AF'
22EE  CD 222E     C            CALL MUL10     ;THEN FINISH.MULTIPLY ACC
                  C                           ;BY 10
22F1  D9          C            EXX            ;GET DASH REGISTERS
22F2  08          C            EX   AF,AF'
22F3  4F          C            LD   C,A
22F4  06 00       C            LD   B,0
22F6  09          C            ADD  HL,BC
22F7  D9          C            EXX
22F8  30 09       C            JR   NC,REP1BIN
22FA  2C          C            INC  L
```

```
22FB  20 06       C            JR   NZ,REP1BIN
22FD  24          C            INC  H
22FE  20 03       C            JR   NZ,REP1BIN
2300  08          C            EX   AF,AF'    ;NC from mul10
2301  3C          C            INC  A
2302  08          C            EX   AF,AF'
2303  08          C  REP1BIN:  EX   AF,AF'
2304  FE 10       C            CP   10H
2306  38 E1       C            JR   C,REPBIN
2308  C9          C            RET
                  C  ;
                  C  ;This is the same as GETDEC but tests
                  C  ;to see if any numbers were actually
                  C  ;typed (NZ), returns on AF register
                  C  ;
2309  CD 22DF     C  DECBIN:   CALL GETDEC
230C  38 01       C            JR   C,NOAF
230E  08          C            EX   AF,AF'
230F  D9          C  NOAF:     EXX
2310  7B          C            LD   A,E
2311  D9          C            EXX
2312  FE 01       C            CP   1
2314  9F          C            SBC  A,A
2315  C9          C            RET
                  C  ;
                  C  ;this reads the byte pointed to by DE
                  C  ;if a '.' is found then D'=E' otherwise
                  C  ;C is set if character not found
                  C  ;
                  C  ;
2316  CD 231C     C  REPDEC:   CALL READDEC
2319  D0          C            RET  NC
231A  1B          C            DEC  DE
231B  C9          C            RET
                  C  ;
231C  1A          C  READDEC:  LD   A,(DE)    ;GET BYTE
231D  13          C            INC  DE
231E  FE 2E       C            CP   '.'
2320  20 05       C            JR   NZ,TESTNUM
2322  D9          C            EXX
2323  53          C            LD   D,E
2324  D9          C            EXX
2325  18 F5       C            JR   READDEC
2327  D6 30       C  TESTNUM:  SUB  '0'       ;PUT ASCII NO INTO BCD
2329  D8          C            RET  C         ;IF CHARACTER IS NOT ASCII
232A  FE 0A       C            CP   10
232C  3F          C            CCF
232D  D8          C            RET  C
232E  D9          C            EXX
232F  1C          C            INC  E
2330  D9          C            EXX
2331  C9          C            RET
                  C  ;
                  C  ;
                  C  ;This takes the recipricoal of ACC1
                  C  ;
```

```
2332  F5          C   RECEP:  PUSH AF       ;Save flags
2333  21 FDD6     C           LD   HL,OP11+4
2336  CD 10A9     C           cALL SETZER
2339  36 81       C           LD   (HL),81H
233B  EF          C           RST  JT
233C  8A          C           DB   8AH
                  C   ;       CALL DIVIDE   ;ACC1/OP11
233D  F1          C           POP  AF
233E  C9          C           RET
                  C   ;
                  C   ;This calculates X^Y where X=OP11,Y=ACC1
                  C   ;checks for integers
                  C   ;
233F  CD 119D     C   POWER:  CALL INTEGER
2342  20 32       C           JR   NZ,DOLONG
2344  A7          C           AND  A
2345  CA 2000     C           JP   Z,SET1ACC
2348  CD 1183     C           CALL EXCHANGE
234B  CB 10       C           RL   B        ;Test sign
234D  DC 2332     C           CALL C,RECEP  ;Reciprocal
2350  CD 238E     C           CALL SQUA
2353  3F          C           CCF           ;NC
2354  18 0E       C           JR   SAVEP
2356  A7          C   POELOP: AND  A
2357  C8          C           RET  Z
2358  CD 1286     C           CALL STACKACC ;Current result
235B  CD 12D1     C           CALL RETACC
235E  CD 2391     C           CALL SQUA1
2361  CD 129E     C           CALL OP1STACK
2364              C   SAVEP:          ;Power result so far
2364  CD 12BF     C           CALL SAVEACC
2367  F5          C           PUSH AF
2368  DC 100B     C           CALL C,MULPLY
236B  F1          C           POP  AF
236C  18 E8       C           JR   POELOP
                  C   ;
                  C   ;This does the square root of ACC1
                  C   ;By Xi+1=(Xi+C/Xi)/2,After first taking
                  C   ;out power of 2
                  C   ;
236E  CD 12F3     C   SQROOT: CALL COPYACC      ;put in OP11
2371  CD 10A6     C           CALL GOTZER       ;Put to .5
2374  36 80       C           LD   (HL),80H     ;Now OP11^.5
                  C   ;
2376  3A FDD6     C   DOLONG: LD   A,(OP11+4)
2379  A7          C           AND  A
237A  20 0A       C           JR   NZ,NONZER
237C  3A FDCF     C           LD   A,(ACC1+3)
237F  A7          C           AND  A
2380  F2 10A6     C           JP   P,GOTZER
2383  C3 1219     C           JP   OUTRANG
2386  EF          C   NONZER: RST  JT
2387  C5 C6 C7 C4 C           DB   0C5H,0C6H,0C7H,0C4H
238B  C8 89       C           DB   0C8H,89H
                  C   ;       CALL STACKACC     ;Save power
```

```
                        C       ;       CALL EXCHANGE
                        C       ;       CALL LOG2X      ;LOg X
                        C       ;       CALL OP1STACK
                        C       ;       CALL MULPLY
                        C       ;       CALL EXP2X
238D    C9              C               RET
                        C       ;
                        C       ;This squares the number in ACC1 until
                        C       ;there is a carry in A
                        C       ;
238E    CB 3F           C       SQUA:   SRL  A
2390    D8              C               RET  C
2391    F5              C       SQUA1:  PUSH AF
2392    CD 1008         C               CALL SQUARE
2395    F1              C               POP  AF
2396    18 F6           C               JR   SQUA
                        C
                        C       ;
                        C       ;
                        C       ;
                        C       ;This is a routine to calculate LOG A
                        C       ;A is assumed to be in ACC1
                        C       ;and in the range 1 < X < 2.
                        C       ;The series is then calculated
                        C       ;by converting A to X where
                        C       ;X=(A-1)/(A+1)
                        C       ;then LOG A becomes the series
                        C       ;2*(X+X^3/3+X^5/5+X^7/7.....)
                        C       ;The numbers 2,3,5,7 are stored at
                        C       ;numbers
                        C       ;
                        C       ;Top of stack       2/7
                        C       ;                   X   *
                        C       ;                   X   *
                        C       ;                   2/5 +
                        C       ;                   X   *
                        C       ;                   X   *
                        C       ;                   2/3 +
                        C       ;                   X   *
                        C       ;                   X   *
                        C       ;                   2   +
                        C       ;                   X   *
                        C       ;Bottom of stack
                        C       ;
                        C       ;
                        C       ;This calculates the log of a number in
                        C       ;ACC if the number is negative an error
                        C       ;is given.
                        C       ;
2398    EF              C       LOG:    RST  JT
2399    CD C5 A0        C               DB   0CDH,0C5H,0A0H
                        C       ;       CALL LOGNX
                        C       ;       CALL STACKACC  ;Save it
                        C       ;       CALL STAC
239C    11 2494         C               LD   DE,LOGE2
239F    EF              C               RST  JT
```

```
23A0  CE C8 C4 8B   C             DB   0CEH,0C8H,0C4H,8BH
                    C     ;       CALL MOVDEOP1
                    C     ;       CALL MULPLY
                    C     ;       CALL OP1STACK
                    C     ;       CALL ADD
23A4  C9            C             RET
                    C     ;
                    C     ;This gets the log base 2 of X
                    C     ;
23A5  CD 23BC       C     LOG2X:  CALL LOGNX
23A8  F5            C             PUSH AF
23A9  11 248F       C             LD   DE,LOG2E
23AC  CD 12B9       C             CALL MOVDEOP1
23AF  CD 100B       C             CALL MULPLY
23B2  CD 1183       C             CALL EXCHANGE
23B5  F1            C             POP  AF
23B6  CD 1317       C             CALL STAC
23B9  C3 0EB6       C             JP   ADD
                    C     ;
                    C     ;This gets the log of the number in ACC1
                    C     ;taking out the power of 2.Returns a value
                    C     ;of LN (FRac part left(1<=z<2)) the exponent
                    C     ;in A.
                    C     ;
23BC  CD 0E56       C     LOGNX:  CALL ABS
23BF  CA 1219       C             JP   Z,OUTRANG
23C2  DA 1219       C             JP   C,OUTRANG
23C5  36 81         C             LD   (HL),81H  ;1<=x<2
23C7  F5            C             PUSH AF        ;Save exponent
23C8  CD 23CF       C             CALL LOG12
23CB  F1            C             POP  AF
23CC  D6 81         C             SUB  81H
23CE  C9            C             RET
                    C     ;
                    C     ;
                    C     ;This calculates the LOG of a number
                    C     ;in ACC which lies between 1 and 2
                    C     ;
                    C     ;
23CF  CD 23DF       C     LOG12:  CALL CALCX
23D2  21 2461       C             LD   HL,LNUMBERS
23D5  EF            C             RST  JT
23D6  91            C             DB   91H
                    C     ;        CALL POLY2
23D7  21 FDD0       C             LD   HL,ACC1+4
23DA  7E            C             LD   A,(HL)
23DB  A7            C             AND  A
23DC  C8            C             RET  Z
23DD  34            C             INC  (HL)      ;*2
23DE  C9            C             RET
                    C     ;
                    C     ;
                    C     ;This calculates (A-1)/(A+1)
                    C     ;
                    C     ;
23DF  EF            C     CALCX:  RST  JT
```

```
23E0  C5 C6 CF CB   C           DB   0C5H,0C6H,0CFH,0CBH
23E4  C4 C5 CF D0   C           dB   0C4H,0C5H,0CFH,0D0H
23E8  C4 C6 8A      C           DB   0C4H,0C6H,8AH
                    C    ;      CALL STACKACC
                    C    ;      CALL EXCHANGE
                    C    ;      CALL SET1ACC
                    C    ;      CALL ADD
                    C    ;      CALL OP1STACK
                    C    ;      CALL STACKACC
                    C    ;      CALL SET1ACC
                    C    ;      CALL SUBTRACT
                    C    ;      CALL OP1STACK
                    C    ;      CALL EXCHANGE
                    C    ;      CALL DIVIDE
23EB  C9            C           RET
                    C    ;
                    C    ;
                    C    ;This calculates e^ACC1
                    C    ;
23EC  11 248F       C    EXP:   LD   DE,LOG2E
23EF  EF            C           RST  JT
23F0  CE 88         C           DB   0CEH,88H
                    C    ;      CALL MOVDEOP1
                    C    ;      CALL MULPLY    ;ACC1*log 2 e
                    C    ;
                    C    ;This calculates 2^x by taking the
                    C    ;integer part of the number and then
                    C    ;working out 2^(decimal number)
                    C    ;
23F2  CD 12F3       C    EXP2X: CALL COPYACC   ;Op11=ACC1
23F5  CD 11BB       C           CALL SMALLEN
23F8  C2 121B       C           JP   NZ,OVERFLOW
23FB  F5            C           PUSH AF        ;save it
23FC  11 FDD2       C           LD   DE,OP11
23FF  EF            C           RST  JT
2400  DC 8C         C           DB   0DCH,8CH
                    C    ;      CALL MOVEDE    ;ACC1=OP11
                    C    ;      CALL FRAC      ;Fractional part
2402  CD 1372       C           CALL EXP01
2405  21 FDD0       C           LD   HL,ACC1+4
2408  4E            C           LD   C,(HL)
2409  F1            C           POP  AF
240A  38 09         C           JR   C,ADDNEG
240C  81            C           ADD  A,C
240D  DA 121B       C           JP   C,OVERFLOW
2410  F2 121B       C           JP   P,OVERFLOW
2413  77            C    ARANG: LD   (HL),A
2414  C9            C           RET
                    C    ;
2415  81            C    ADDNEG: ADD  A,C
2416  38 FB         C           JR   C,ARANG
2418  F2 10A9       C           JP   P,SETZER
241B  18 F6         C           JR   ARANG
                    C
                    C    ;
                    C    ;
```

```
241D  3A FDD0      C     ATN:    LD   A,(ACC1+4);>1
2420  FE 81        C             CP   81H
2422  F5           C             PUSH AF
2423  D4 2332      C             CALL NC,RECEP
2426  21 2438      C             LD   HL,ATNT1
2429  EF           C             RST  JT
242A  D1 C5        C             DB   0D1H,0C5H
242C  C2 D2 C4 8A  C             DB   0C2H,0D2H,0C4H,8AH
                   C     ;       CALL POLY2
                   C     ;       CALL STACKACC  ;Top term calculated
                   C     ;       CALL RETACC    ;Get x2
                   C     ;       CALL ALOP1
                   C     ;       CALL OP1STACK
                   C     ;       CALL DIVIDE
2430  F1           C             POP  AF
2431  D8           C             RET  C
2432  EF           C             RST  JT
2433  94           C             DB   94H
                   C     ;       CALL PIOP1
2434  35           C             DEC  (HL)
2435  C3 0E83      C             JP   SUBTRACT
0010               C     .RADIX 16
                   C     ;
                   C     ;For ATN
2438  04           C     ATNT1:  DB   4    ;Number of numbers
2439  01 F0 9D 97  C             DB   1,0F0,9D,97,79
243D  79           C
243E  70 05 A8 79  C             DB   70,05,0A8,79,7E
2442  7E           C
2443  A2 93 B9 0D  C             DB   0A2,93,0B9,0D,83
2447  83           C
2448  0C 96 AD 58  C             DB   0C,96,0AD,58,84
244C  84           C
244D  93 95 36 26  C             DB   93,95,36,26,84
2451  84           C
2452  05 63 50 00  C     ATNT2:  DB   05,63,50,00,84
2456  84           C
2457  98 8E 0A 08  C             DB   98,8E,0A,08,85
245B  85           C
245C  93 95 36 26  C             DB   93,95,36,26,84
2460  84           C
                   C     ;For ln x
                   C     ;
2461  07           C     LNUMBERS: DB  7    ;Number of numbers
2462  89 88 88 08  C               DB  89,88,88,8,7D      ;1/15
2466  7D           C
2467  9E D8 89 1D  C               DB  9E,0D8,89,1D,7D    ;1/13
246B  7D           C
246C  A3 8B 2E 3A  C               DB  0A3,8B,2E,3A,7D    ;1/11
2470  7D           C
2471  E4 3B 8E 63  C               DB  0E4,38,8E,63,7D    ;1/9
2475  7D           C
2476  92 24 49 12  C               DB  92,24,49,12,7E     ;1/7
247A  7E           C
247B  CD CC CC 4C  C               DB  0CD,0CC,0CC,4C,7E  ;1/5
247F  7E           C
```

```
2480  AA AA AA 2A  C            DB  0AA,0AA,0AA,2A,7F  ;1/3
2484  7F           C
2485  00 00 00 00  C            DB  0,0,0,0,81         ;1
2489  81           C
                   C
248A  F1 F0 F0 70  C            DB  0F1,0F0,0F0,70,7C  ;1/17
248E  7C           C
                   C    ;
248F  29 3B AA 38  C    LOG2E:  DB  29,3B,0AA,38,81
2493  81           C
2494  F8 17 72 31  C    LOGE2:  DB  0F8,17,72,31,80
2498  80           C
                   C    ;
2499  09           C    ENUMBERS: DB  9
249A  2B 1D EF 38  C              DB  2B,1D,0EF,3B,6E    ;1/9!
249E  6E           C
249F  D0 00 0D 50  C              DB  0D0,0,0D,050,71    ;1/8!
24A3  71           C
24A4  D0 00 0D 50  C              DB  0D0,0,0D,050,74    ;1/7!
24A8  74           C
24A9  B6 60 0B 36  C              DB  0B6,60,0B,36,77    ;1/6!
24AD  77           C
24AE  89 88 88 08  C              DB  89,88,88,8,7A      ;1/5!
24B2  7A           C
24B3  AB AA AA 2A  C              DB  0AB,0AA,0AA,2A,7C  ;1/4!
24B7  7C           C
24BB  AB AA AA 2A  C              DB  0AB,0AA,0AA,02A,7E ;1/3!
24BC  7E           C
24BD  00 00 00 00  C              DB  0,0,0,0,80         ;1/2!
24C1  80           C
24C2  00 00 00 00  C              DB  0,0,0,0,81
24C6  81           C
24C7  00 00 00 00  C              DB  0,0,0,0,81
24CB  81           C
                   C
000A               C    .RADIX 10
                        ;
                        ;
24CC                    GETNEXT:
24CC  CD 2CFE                   CALL ENDLIN
24CF  28 19                     JR Z,ENDGET
24D1  FE 29                     CP ')'
24D3  28 15                     JR Z,ENDGET
24D5  CD 3D84                   CALL EVALAB          ;NUMBER IS IN ACC1
24D8  CD 2CFE                   CALL ENDLIN
24DB  28 05                     JR Z,GN1
24DD  FE 29                     CP ')'
24DF  28 01                     JR Z,GN1
24E1  13                        INC DE
24E2  D5                GN1:    PUSH DE
24E3  CD 11C5                   CALL LARGE1          ;BC=ACC1 :NZ IF OUT OF RANGE
24E6  D1                        POP DE
24E7  79                        LD A,C
24EB  18 03                     JR ENDG1
24EA  2E 00             ENDGET: LD L,0
24EC  2C                        INC L
```

```
24ED  FD E1           ENDG1:  POP IY
24EF  DD E1                   POP IX
24F1  E1                      POP HL
24F2  C9                      RET
                      ;
                      ;
                      ;
24F3  7E              OL1:    LD A,(HL)     } Get character
24F4  23                      INC HL        }
24F5  FE FF                   CP ENDMARK    } Jump if ENDMARK
24F7  CA 2BC9                 JP Z,NEWLINE  }
24FA  FE DD           OL2:    CP 221        } Jump if function token
24FC  30 16                   JR NC,OUTFUNC }
24FE  FE DA                   CP 218        } Jump if boolean operator
2500  30 17                   JR NC,OUTRS   }
2502  FE CF                   CP 207        } Jump if arithmetic operator
2504  30 0E                   JR NC,OUTFUNC }
2506  FE 80                   CP 128        } Jump if token
2508  30 0F                   JR NC,OUTRS   }
250A  FE 20                   CP 32         } Jump if printable character
250C  30 02                   JR NC,OL3     }
250E  CB F7                   SET 6,A       - Converts control code to CAPS
2510  EF              OL3:    RST JT        } Print character
2511  AC                      DB 0ACH       }
                      ;CALL PRINTX
2512  18 DF                   JR OL1        - Repeat
2514                  OUTFUNC:
2514  CD 252D                 CALL OUTWORD  } Print token
2517  18 DA                   JR OL1        }
                      ;
2519  D7              OUTRS:  RST SCRRST    } Print space
251A  81 20                   DB 81H,32     }
251C  F5                      PUSH AF       - Save token
251D  CD 252D                 CALL OUTWORD  - Print expanded token
2520  F1                      POP AF        - Restore token
2521  FE 80                   CP 128        } Jump if REM
2523  28 CE                   JR Z,OL1      }
2525  D7                      RST SCRRST    } Print space
2526  81 20                   DB 81H,32     }
2528  FE C2                   CP 194        } Exit if CODE
252A  C8                      RET Z         }
252B  18 C6                   JR OL1        - Repeat
                      ;
252D                  OUTWORD:
252D  E5                      PUSH HL       - Save pointer
252E  E6 7F                   AND 7FH       - Clear leading bit
2530  21 253B                 LD HL,WORDLST - Load HL with start of token table
2533  CD 19DD                 CALL FIND     - Find token string
2536  CD 1907                 CALL OUTSTR   - Print token
2539  E1                      POP HL        - Restore pointer
253A  C9                      RET           Exit
                      ;
                      ;
                      ;
253B                  WORDLST:
253B  52 45 CD                DC 'REM'      128
```

```
253E  43 4C D3              DC 'CLS'     129
2541  41 53 53 45           DC 'ASSEM'   130
2545  CD
2546  41 55 54 CF           DC 'AUTO'    131
254A  42 41 55 C4           DC 'BAUD'    132
254E  56 D3                 DC 'VS'      133
2550  43 4F 4E D4           DC 'CONT'    134
2554  55 53 45 D2           DC 'USER'    135
2558  43 52 56 D3           DC 'CRVS'    136
255C  43 4C 45 41           DC 'CLEAR'   137
2560  D2
2561  43 4C 4F 43           DC 'CLOCK'   138 ;ROTATE,MOVE ETC ;CLOCK####
2565  CB
2566  41 54 54 D2           DC 'ATTR'    139
256A  43 4F 4C 4F           DC 'COLOUR'  140
256E  55 D2
2570  49 4E CB              DC 'INK'     141
2573  43 53 D2              DC 'CSR'     142
2576  44 41 54 C1           DC 'DATA'    143
257A  50 52 49 4E           DC 'PRINT'   144
257E  D4
257F  44 49 CD              DC 'DIM'     145
2582  41 44 4A 53           DC 'ADJSPR'  146
2586  50 D2
2588  45 44 49 D4           DC 'EDIT'    147
258C  4E 45 58 D4           DC 'NEXT'    148
2590  46 4F D2              DC 'FOR'     149
2593  47 4F 54 CF           DC 'GOTO'    150
2597  47 4F 53 55           DC 'GOSUB'   151
259B  C2
259C  49 4E 50 55           DC 'INPUT'   152
25A0  D4
25A1  49 C6                 DC 'IF'      153
25A3  4D 56 53 50           DC 'MVSPR'   154
25A7  D2
25A8  4C 49 53 D4           DC 'LIST'    155
25AC  4C 45 D4              DC 'LET'     156
25AF  4C 4C 49 53           DC 'LLIST'   157
25B3  D4
25B4  4C 4F 41 C4           DC 'LOAD'    158
25B8  4C 50 52 49           DC 'LPRINT'  159
25BC  4E D4
25BE  53 50 52 49           DC 'SPRITE'  160
25C2  54 C5
25C4  43 54 4C 53           DC 'CTLSPR'  161
25C8  50 D2
25CA  4E 4F 44 C5           DC 'NODE'    162
25CE  4E 45 D7              DC 'NEW'     163
25D1  50 41 50 45           DC 'PAPER'   164
25D5  D2
25D6  4E 4F 44 44           DC 'NODDY'   165
25DA  D9
25DB  4F CE                 DC 'ON'      166
25DD  4F 55 D4              DC 'OUT'     167
25E0  50 4C 4F C4           DC 'PLOD'    168
25E4  50 41 4E 45           DC 'PANEL'   169
```

```
25E8  CC
25E9  47 45 4E 50          DC 'GENPAT' 120
25ED  41 D4
25EF  50 41 55 53          DC 'PAUSE' 121
25F3  C5
25F4  50 48 C9             DC 'PHI'  122
25F7  50 4F 4B C5          DC 'POKE' 123
25FB  52 41 4E C4          DC 'RAND' 124
25FF  52 45 54 55          DC 'RETURN' 125
2603  52 CE
2605  52 45 41 C4          DC 'READ'  126
2609  56 49 45 D7          DC 'VIEW'  127
260D  52 45 53 54          DC 'RESTORE' 128
2611  4F 52 C5
2614  52 4F CD             DC 'ROM'  129
2617  52 55 CE             DC 'RUN'  130
261A  53 41 56 C5          DC 'SAVE'  131
261E  53 4F 55 4E          DC 'SOUND' 132
2622  C4
2623  45 44 49 54          DC 'EDITOR' 133
2627  4F D2
2629  44 53 C9             DC 'DSI'  134
262C  50 4C 4F D4          DC 'PLOT'  135
2630  53 54 4F D0          DC 'STOP'  136
2634  41 4E 47 4C          DC 'ANGLE' 137
2638  C5
2639  53 42 55 C6          DC 'SBUF'  138
263D  56 45 52 49          DC 'VERIFY' 139
2641  46 D9
2643  44 52 41 D7          DC 'DRAW'  140
2647  41 52 C3             DC 'ARC'  141
264A  43 49 52 43          DC 'CIRCLE' 142
264E  4C C5
2650  4C 49 4E C5          DC 'LINE'  143
2654  43 4F 44 C5          DC 'CODE'          ;194
2658  45 4C 53 C5          DC 'ELSE'          ;195
265C  46 CB                DC 'FK'      ;196
265E  4F 46 C6             DC 'OFF'           ;197
2661  53 54 45 D0          DC 'STEP'          ;198
2665  54 48 45 CE          DC 'THEN'          ;199
2669  54 CF                DC 'TO'      ;200
266B  00                   DB 0

                           ;
266C  C9 CA CB CC          DB 201,202,203,204,205,206
2670  CD CE

                           ;
2672  AB          OPS:     DC '+'       ;207
2673  AD                   DC '-'       208
2674  AA                   DC '*'       209
2675  AF                   DC '/'       210
2676  DE                   DC '^'       211
2677  BD                   DC '='       ;212
2678  BE                   DC '>'       213
2679  BC                   DC '<'       214
267A  3E BD                DC '>='      215
267C  3C BD                DC '<='      216
```

```
267E  3C BE                   DC '<>'        ;217
2680  41 4E C4          LEXFUN: DC 'AND'              ;218
2683  4F D2                   DC 'OR'        ;219
2685  4E 4F D4                DC 'NOT'              ;220
2688  41 42 D3          MFUNC:  DC 'ABS'              ;221
268B  41 54 CE                DC 'ATN'   222
268E  43 4F D3                DC 'COS'   223
2691  45 58 D0                DC 'EXP'   224
2694  46 52 C5                DC 'FRE'   225
2697  49 4E D4                DC 'INT'   226
269A  49 4E D4                DC 'INT'   227
269D  4C CE                   DC 'LN'    228
269F  50 45 45 CB             DC 'PEEK'  229
26A3  53 47 CE                DC 'SGN'   230
26A6  53 49 CE                DC 'SIN'   231
26A9  53 51 D2                DC 'SQR'   232       ;220 (?)
26AC  54 41 CE                DC 'TAN'   233
26AF  49 4E D0                DC 'INP'   234
26B2  55 53 D2                DC 'USR'   235
26B5  4C CE                   DC 'LN'    236
26B7  41 53 C3                DC 'ASC'   237       ;MATHS FUNCS WITH
26BA  4C 45 4E A0             DC 'LEN '  238       ;STRING ARGS
26BE  56 41 CC                DC 'VAL'   239
26C1  4C CE                   DC 'LN'    240
26C3  4D 4F C4                DC 'MOD'   241
26C6  50 C9                   DC 'PI'    242 ;MATHS FUNC WITH NO ARGS
26C8  52 4E C4                DC 'RND'   243
26CB  50 C9                   DC 'PI'    244 ;NO ARG (FINDS X$IN Y$ FROM POS I)
                        ;
                        ;
26CD                    STRINGS:
26CD  43 48 52 A4             DC 'CHR$'  245 ;245 ;STRING
26D1  53 50 4B A4             DC 'SPK$'  246 ;STRING
26D5  49 4E 4B 45             DC 'INKEY$' ;NO ARG  247
26D9  59 A4
26DB  4C 45 46 54             DC 'LEFT$' 248 ;(INT64K , STRING)
26DF  A4
26E0  4D 49 44 A4             DC 'MID$'  249 ;(INT64K,INT64K,STRING)
26E4  52 49 47 48             DC 'RIGHT$' ;(INT64K,STRING) 250
26E8  54 A4
26EA  47 52 A4                DC 'GR$' ;INT64K ;X SPACES 251
26ED  53 54 52 A4             DC 'STR$' 252 ;NUMBER ;STRING OF A NUMBER
26F1  54 49 4D 45             DC 'TIME$' 253 ;253 1,2,3
26F5  A4
26F6  00                      DB 0
                        ;
                        ;
26F7  27AA              RWTAB:  DW SREM      128
26F9  1595                    DW SCLS      129
26FB  2784                    DW SASSEMB   130
26FD  0A07                    DW SAUTO     131
26FF  0D38                    DW SBAUD     132
2701  15F6                    DW SVS       133
2703  2787                    DW SCONT     134
2705  FAB9                    DW USER      135
2707  15EA                    DW SCRVS     136
```

```
2709  27FB          DW SCLEAR     177
270B  2AD6          DW SSCLOCK    138
270D  15E2          DW SATTR      139
270F  15B3          DW SCOLOUR    140
2711  1590          DW SINK       141
2713  1583          DW SCURSOR    142
2715  27AA          DW SDATA      143
2717  2B88          DW SPRINT     144
2719  2837          DW SDIM       145
271B  15BB          DW SADJSPR    146
271D  2846          DW SEDIT      147
271F  2A64          DW SNEXT      148
2721  2867          DW SFOR       149
2723  288F          DW SGOTO      150
2725  289C          DW SGOSUB     151
2727  28DC          DW SINPUT     152
2729  2961          DW SIF        153
272B  15D1          DW SMVSPR     154
272D  297D          DW SLIST      155
272F  29DA          DW SLET       156
2731  2941          DW SLLIST     157
2733  2AEE          DW SLOAD      158
2735  2A37          DW SLPRINT    159
2737  15C4          DW SSPRITE    160
2739  159B          DW SCTLSPR    161
273B  277F          DW SNODE      162
273D  0205          DW SNEW       163
273F  158A          DW SPAPER     164
2741  2B44          DW SNODDY     165
2743  2B4F          DW SON        166
2745  09FD          DW SOUT       167
2747  2B32          DW SPLOD      168
2749  2BF8          DW SPANEL     169
274B  15A3          DW SGENPAT    170
274D  2BE4          DW SPAUSE     171
274F  160A          DW SRANGLE    172
2751  2C02          DW SPOKE      173
2753  2C09          DW SRAND      174
2755  2C11          DW SRETURN    175
2757  2C74          DW SREAD      176
2759  15DA          DW SWINDOW    177
275B  2C8C          DW SRESTORE   178
275D  009E          DW SROM       179
275F  2CAF          DW SRUN       180
2761  2B03          DW SSAVE      181
2763  2D0C          DW SSOUND     182
2765  28C5          DW SEDITOR    183
2767  157C          DW SDSI       184
2769  1670          DW SPLOT      185
276B  2D55          DW SSTOP      186
276D  15FC          DW SAANGLE    187
276F  27B3          DW SNDBUF     188
2771  2B1A          DW SVERIFY    189
2773  1687          DW SDRAW      190
2775  16CE          DW SARC       191
2777  180F          DW SCIRCLE    192
```

```
2779  1574                    DW SLINE      193
277B  00DA                    DW SCODE      196
                        ;
277D                    ENDFUNC:
277D  C9                      RET
                        ;
277E  07                      DB 7
277F  CD FA9B           SNODE:  CALL NODLOC
2782  C9                      RET
2783  06                      DB 6
                        ;
                        ;
                        ;
2784                    SASSEMB:
2784  EF                      RST JT
2785  40                      DB 40H
                        ;CALL STASEM
2786  C9                      RET
                        ;
                        ;
2787  3A FD6C           SCONT:  LD A,(CONTAD+2)
278A  EF                      RST JT
278B  B1                      DB 0B1H
                        ;CALL P6SLC1
278C  ED 5B FD6A              LD DE,(CONTAD)
2790  D7                      RST SCRRST
2791  45                      DB 45H
2792  3A FD69                 LD A,(CONTFL6)
2795  E1                      POP HL
2796  E3                      EX (SP),HL
2797  FE 01                   CP 1                  ;STOP
2799  DA 0250                 JP C,BASIC2
279C  28 05                   JR Z,CONTST
279E  E1                      POP HL
279F  21 2CDD                 LD HL,RUN6
27A2  E5                      PUSH HL
27A3  21 2CC1           CONTST: LD HL,RUN3
27A6  E3                      EX (SP),HL
27A7  E5                      PUSH HL
27A8  C9                      RET
27A9  07                      DB 7
                        ;
                        ;
27AA                    SREM:
27AA  EB                SDATA:  EX DE,HL
27AB  CD 1B43                 CALL CALLEN
27AE  09                      ADD HL,BC
27AF  EB                      EX DE,HL
27B0  1B                      DEC DE
27B1  C9                      RET
                        ;
                        ;LD A,0FFH
                        ;LD BC,0
                        ;EX DE,HL
                        ;CPIR
```

```
                        ;EX DE,HL
                        ;DEC DE
                        ;RET
                        ;
27B2  02                        DB 2
27B3                    SNDBUF::
27B3  01 0001                   LD BC,1
27B6  F7                        RST GETRST              ;BC = size of buffer
27B7                    SETINIT::
27B7  20 05                     JR NZ,OUTR
27B9  AF                        XOR A
27BA  47                        LD B,A
27BB  B9                        CP C
27BC  20 02                     JR NZ,CONOK
27BE  EF                OUTR:   RST ERRORST
27BF  22                        DB 34
27C0  D5                CONOK:  PUSH DE
27C1  60                        LD H,B
27C2  69                        LD L,C
27C3  29                        ADD HL,HL
27C4  09                        ADD HL,BC
27C5  29                        ADD HL,HL
27C6  29                        ADD HL,HL ;HL=12*BC
27C7  E5                        PUSH HL
27C8  29                        ADD HL,HL
27C9  29                        ADD HL,HL
27CA  24                        INC H                   ;HL = BC * 48 + 256
27CB  C5                        PUSH BC
27CC  44                        LD B,H
27CD  4D                        LD C,L
27CE  CD 3299                   CALL CHKSTK
27D1  C1                        POP BC
27D2  EB                        EX DE,HL                ;DE = BC * 48 + 256
27D3  21 FA52                   LD HL,CTRBADR
27D6  E5                        PUSH HL
27D7  AF                        XOR A                   ;Zero A, clear carry flag
27D8  ED 52                     SBC HL,DE
27DA  22 FA92                   LD (STKLIM),HL
27DD  EB                        EX DE,HL                ;DE -> bottom of sound buffers
27DE  E1                        POP HL
27DF  06 04                     LD B,4
27E1  77                SLOOP:  LD (HL),A
27E2  23                        INC HL
27E3  73                        LD (HL),E
27E4  23                        INC HL
27E5  72                        LD (HL),D
27E6  23                        INC HL
27E7  71                        LD (HL),C
27E8  23                        INC HL
27E9  77                        LD (HL),A
27EA  23                        INC HL
27EB  23                        INC HL
27EC  23                        INC HL
27ED  23                        INC HL
27EE  23                        INC HL
27EF  77                        LD (HL),A
```

```
27F0  23                  INC HL
27F1  E3                  EX (SP),HL          ;(SP) = ptr, HL = BC * 12
27F2  EB                  EX DE,HL            ;DE = BC * 12, HL = old DE
27F3  19                  ADD HL,DE           ;HL = old DE + BC * 12
27F4  EB                  EX DE,HL            ;DE = new DE, HL = BC * 12
27F5  E3                  EX (SP),HL          ;(SP) = BC * 12, HL = ptr
27F6  10 E9               DJNZ SLOOP
27F8  E1                  POP HL
27F9  D1                  POP DE
27FA  C9                  RET
                          ;
                          ;
                          ;
                          ;
27FB                      SCLEAR:
                          ;
27FB                      KILLVAR::
27FB  D5                          PUSH DE
27FC  2A FAA4                     LD HL,(NBTOP)
27FF  3A FAA6                     LD A,(NBTOP+2)  ;AHL = LRA FOR FIRST BYTE ABOVE NODDY/BASIC
2802  CD 3593                     CALL LRAtoVA    - Literal Address to Virtual Address
2805  22 FACC                     LD (ARRTOP),HL  ;KILL ARRAYS
2808  32 FACE                     LD (ARRTOP+2),A
                          ;
                          ;Check whether program extends into top page
                          ;
280B  ED 5B FAA4                  LD DE,(NBTOP)
280F  3A FAA6                     LD A,(NBTOP+2)
2812  47                         LD B,A
2813  21 C000                     LD HL,48*1024
2816  3A FA7A                     LD A,(LSTP6)
2819  B7                         OR A
281A  ED 52                       SBC HL,DE
281C  98                          SBC A,B
281D  30 04                       JR NC,NORMAL
                          ;
                          ;Program has invaded top 16K
                          ;
281F  EB                          EX DE,HL
2820  78                          LD A,B                ;AHL = LRA OF TOP OF PROGRAM
2821  18 02                       JR SRPTRS
                          ;
                          ;Program has not invaded top 16K
                          ;
2823  19                  NORMAL: ADD HL,DE
2824  88                          ADC A,B               ;AHL = LRA OF TOP 16K
                          ;
2825  22 FA7B             SRPTRS: LD (VARNAM),HL  ;KILL VARIABLE NAMES
2828  36 FF                      LD (HL),0FFH
282A  23                          INC HL
282B  22 FA7D                     LD (VALBOT),HL  ;KILL SIMPLE VARIABLE VALUES
282E  22 FA7F                     LD (CALCBOT),HL ;KILL CALCULATOR STACK
2831  22 FA81                     LD (CALCST),HL          ;RESET CALC STACK AND RETURN
2834  D1                          POP DE
2835  C9                          RET
                          ;
```

```
                        ;
                        ;
2836  0F                        DB 15
                        ;
2837  CD 3037          SDIM:   CALL PSHNAM
283A  CD 331F                 CALL DODIM
283D  1A                      LD A,(DE)
283E  FE 2C                   CP ','
2840  C0                      RET NZ
2841  13                      INC DE
2842  18 F3                   JR SDIM
2844  C9                      RET
2845  06                      DB 6
2846  CD 06DB         SEDIT:  CALL GETLIN
2849  C0                      RET NZ
284A  CD 1BE3                 CALL CODETEST
284D  CA 0250                 JP Z,BASIC2
2850  2B                      DEC HL
2851  2B                      DEC HL
2852  D7                      RST SCRRST      ;PRINT TO EDIT SCREEN AND RETURN
2853  68 1E                   DB 68H,30
2855  AF                      XOR A
2856  32 FD75                 LD (PRORPL),A
2859  CD 29AF                 CALL ONELINE
285C  E1                      POP HL
285D  C3 02D9                 JP EDENT
2860  C9                      RET
                        ;
                        ;
                        ;
2861  0A 02 C8 02             DB 10,2,TO,2,212,0
2865  D4 00
                        ;
                        ;On the calculator stack is the name no.
                        ;then the return address then value to
                        ;reach then step size.
                        ;
2867  CD 29DA          SFOR::  CALL SLET
286A  C5                      PUSH BC               ;Save number
286B  13                      INC DE
286C  EF                      RST JT
286D  C0 B8                   DB 0C0H,0B8H
                        ;     CALL EVALAB           ;upto
                        ;     CALL ENDLIN
286F  28 05                   JR Z,STEP1
2871  13                      INC DE
2872  EF                      RST JT
2873  80                      DB 80H
                        ;     CALL EVALAB           ;step
2874  18 03                   JR UNSTEP
2876  EF              STEP1:  RST JT
2877  CF 85                   DB 0CFH,85H
                        ;CALL SET1ACC
                        ;CALL STACKACC
2879  2A FA81         UNSTEP: LD HL,(CALCST)
287C  73                      LD (HL),E             ;return address
```

```
287D  23                  INC HL
287E  72                  LD (HL),D
287F  23                  INC HL
2880  3A FAD3             LD A,(CRNTP6)
2883  77                  LD (HL),A
2884  23                  INC HL
2885  C1                  POP BC                ;Label number
2886  CD 315E             CALL STKLN1
2889  21 FB44             LD HL,FORCOUNT
288C  34                  INC (HL)
288D  C9                  RET
                          ;
                          ;
                          ;
288E  06                  DB 6
                          ;
288F  CD 06DB             SGOTO:: CALL GETLIN
2892  28 02               JR Z,GOTO1
2894  EF                  SGOTO3: RST ERRRST
2895  2A                  DB 42
2896  EB                  GOTO1:  EX DE,HL
2897  C3 2CBF             JP RUN2
289A  C9                  RET
                          ;
                          ;
289B  06                  DB 6
289C                      SGOSUB::
289C  3A FAD3             LD A,(CRNTPG)
289F  F5                  PUSH AF
28A0  CD 06DB             CALL GETLIN
28A3  20 EF               JR NZ,SGOTO3
28A5  C1                  POP BC
28A6  E5                  SGOSU3: PUSH HL
28A7  2A FB41             LD HL,(GOPTR)         ;HL = gosub stack ptr
28AA  3A FB43             LD A,(GOSNUM)
28AD  D6 21               SUB 33          ;Error if no room on gosub stack
28AF  30 10               JR NC,GOSERR
28B1  73                  GOSUB2: LD (HL),E
28B2  23                  INC HL
28B3  72                  LD (HL),D             ;Store new address
28B4  23                  INC HL
28B5  70                  LD (HL),B             ;Store page (zero for time being)
28B6  23                  INC HL
28B7  22 FB41             LD (GOPTR),HL         ;Store new gosub ptr
28BA  21 FB43             LD HL,GOSNUM
28BD  34                  INC (HL)              ;Increment gosub counter
28BE  E1                  POP HL
28BF  18 D5               JR GOTO1
28C1  EF                  GOSERR: RST ERRRST
28C2  25                  DB 37                 ;Gosub stack full
28C3  C9                  RET
                          ;
                          ;
                          ;
28C4  10                  DB 16
28C5                      SEDITOR:
```

```
28C5  CD 28D2                 CALL KBCHK
28C8  D7                      RST SCRRST
28C9  60 1E                   DB 60H,30
28CB  D5                      PUSH DE
28CC  D5                      PUSH DE
28CD  EF                      RST JT
28CE  E9 AA                   0E9H,0AAH
28D0  18 28                   JR SINED
                        ;
28D2  2A FA83           KBCHK:  LD HL,(KBDBUF)
28D5  ED 52                   SBC HL,DE
28D7  DA 0250                 JP C,BASIC2
28DA  C9                      RET
28DB  08                      DB 8
                        ;
                        ;Check for direct comand
                        ;
28DC  D5                SINPUT: PUSH DE
28DD  CD 28D2                 CALL KBCHK
28E0  1A                      LD A,(DE)
28E1  FE 22                   CP '"'
28E3  20 0E                   JR NZ,SINP1
28E5  13                SINP0:  INC DE
28E6  1A                      LD A,(DE)
28E7  FE 22                   CP '"'
28E9  28 04                   JR Z,SINP11
28EB  EF                      RST JT
28EC  AC                      DB 0ACH
                        ;CALL PRINTX
28ED  18 F6                   JR SINP0
28EF  13                SINP11: INC DE
28F0  13                      INC DE
28F1  18 03                   JR SINP2
28F3  D7                SINP1:  RST SCRRST
28F4  81 3F                   DB 81H,'?'
28F6  D5                SINP2:  PUSH DE
28F7  CD 1B85                 CALL INSTR
28FA  D1                SINED:  POP DE
                        ;
                        ;DE -> variables
                        ;
                        ;
28FB  2A FA83           SINEE:  LD HL,(KBDBUF)
28FE  EF                INPUTC: RST JT
28FF  B8                      DB 0B8H
                        ;CALL ENDLIN
2900  C1                      POP BC
2901  CA 2BC9                 JP Z,NEWLINE
2904  FE 3B                   CP ';'
2906  C8                      RET Z
2907  C5                      PUSH BC
2908  FE 2C                   CP ','
290A  20 01                   JR NZ,INPUTD
290C  13                      INC DE
290D  D5                INPUTD: PUSH DE
290E  CD 2945                 CALL GGETST
```

```
2911  D1                        POP DE
2912  7E                        LD A,(HL)
2913  3C                        INC A
2914  28 01                     JR Z,INPUTE
2916  23                        INC HL
2917  CD 2927           INPUTE: CALL GETINP
291A  28 E2                     JR Z,INPUTC
291C  CD 0CF3                   CALL BREAIO
291F  D7                        RST 10H
2920  83 3F 0D 0A               DB 83H,'?',13,10
2924  D1                        POP DE
2925  18 B5                     JR SINPUT
                        ;
                        ;
2927  1A               GETINP: LD A,(DE)         ;First char
2928  CB 77                    BIT 6,A
292A  E5                       PUSH HL           ;Save HL
292B  28 0A                    JR Z,NOTNUM
292D  D5                       PUSH DE           ;Save DE during maths
292E  CD 3F9E                  CALL VAL
2931  C2 3F73                  JP NZ,COMP1       ;Pop DE,HL and return
2934  EF                       RST JT
2935  85                       DB 85H
                        ;CALL STACKACC
2936  D1                       POP DE            ;Restore DE
2937  CD 3037          NOTNUM: CALL PSHNAM       ;Returns DE -> end
293A  CD 3182                  CALL UPDATE
293D  E1                       POP HL
293E  AF                       XOR A
293F  C9                       RET
                        ;
                        ;
                        ;
2940  04                       DB 4
                        ;
2941  3E 01             SLLIST: LD A,1
2943  18 39                    JR LLIST
                        ;
                        ;
                        ;
2945  01 0000           GGETST: LD BC,0
2948  EB                       EX DE,HL
2949  2A FA81                  LD HL,(CALCST)
294C  1A                 SR1:    LD A,(DE)
294D  FE FF                      CP 0FFH
294F  28 0A                      JR Z,SREND
2951  FE 2C                      CP ','
2953  28 06                      JR Z,SREND
2955  77                         LD (HL),A
2956  23                         INC HL
2957  13                         INC DE
2958  03                         INC BC
2959  18 F1                      JR SR1
295B  CD 315E            SREND:  CALL STKLN1
295E  EB                         EX DE,HL
295F  C9                         RET
```

```
                        ;
                        ;
                        ;
2960  09                        DB 9
                        ;
2961  CD 3D84           SIF:   CALL EVALAB
2964  CD 128F                  CALL ACCSTACK
2967  3A FDD0                  LD A,(ACC1+4)
296A  A7                       AND A
296B  13                       INC DE            ;Skip THEN
296C  20 09                    JR NZ,IF2         ;If true then return to loop,
296E  1A           IF1:   LD A,(DE)         ;otherwise find ELSE or EOL,
296F  FE FF                    CP 0FFH           ;then return with DE -> 0FFH,
2971  C8                       RET Z             ;or statement after ELSE.
2972  FE C3                    CP ELSE
2974  13                       INC DE
2975  20 F7                    JR NZ,IF1
2977  E1           IF2:   POP HL
2978  C3 2CDD                  JP RUN6
297B  C9                       RET
                        ;
                        ;
                        ;
297C  04                       DB 4
                        ;
297D  AF           SLIST: XOR A
297E  32 FD75      LLIST: LD (PRORPL),A
2981  01 0000                  LD BC,0
2984  F7                       RST GETRST
2985  C5                       PUSH BC
2986  01 FFFF                  LD BC,0FFFFH
2989  F7                       RST GETRST
298A  60                       LD H,B
298B  69                       LD L,C
298C  C1                       POP BC
298D  D5                       PUSH DE
298E  E5                       PUSH HL
298F  CD 06DE                  CALL GETLN1
2992  CD 2D6B          LIST1: CALL TOPCH
2995  28 15                    JR Z,LISTEND
2997  CF                       RST DEHL
2998  E5                       PUSH HL
2999  CF                       RST DEHL
299A  E1                       POP HL
299B  E3                       EX (SP),HL
299C  E5                       PUSH HL
299D  A7                       AND A
299E  ED 52                    SBC HL,DE
29A0  E1                       POP HL
29A1  E3                       EX (SP),HL
29A2  38 08                    JR C,LISTEND
29A4  CD 29AF                  CALL ONELINE
29A7  CD 09F2                  CALL BREAKMON
29AA  28 E6                    JR Z,LIST1
                        ;
29AC                    LISTEND:
```

```
29AC  C3 0250                 JP BASIC2
                              ;
                              ;
29AF                          ONELINE::
29AF  D5                      PUSH DE
29B0  CF                      RST DEHL
29B1  42                      LD B,D
29B2  4B                      LD C,E
29B3  E5                      PUSH HL
29B4  CD 0DD0                 CALL BCDEC
29B7  CD 02E8                 CALL STROUT
29BA  E1                      POP HL
29BB  D1                      POP DE
29BC  7E                      LD A,(HL)
29BD  FE C2                   CP CODE
29BF  C2 24F3                 JP NZ,OL1
29C2  CD 2519                 CALL OUTRS
29C5  CD 2BC9                 CALL NEWLINE
29C8  2B                      DEC HL
29C9  2B                      DEC HL
29CA  2B                      DEC HL
29CB  2B                      DEC HL
29CC  CD 1BE3                 CALL CODETEST
29CF  EF                      RST JT
29D0  41                      DB 41H
                          ;CALL ALIST
29D1  2A FDB9                 LD HL,(ENDTABL)
29D4  23                      INC HL
29D5  C3 2BC9                 JP NEWLINE
29D8  C9                      RET
                              ;
                              ;
                              ;
29D9  0C                      DB 12
                              ;
29DA  D5                  SLET:  PUSH DE
29DB  EB                      EX DE,HL
29DC  CB 76                   BIT 6,(HL)
29DE  F5                      PUSH AF
29DF  23                  FE:    INC HL
29E0  7E                      LD A,(HL)
29E1  FE D4                   CP 0D4H
29E3  28 08                   JR Z,ENDVAR
29E5  FE 28                   CP 28H
29E7  28 04                   JR Z,ENDVAR
29E9  FE 24                   CP 24H
29EB  20 F2                   JR NZ,FE
29ED  54                  ENDVAR: LD D,H
29EE  5D                      LD E,L
29EF  2B                      DEC HL
29F0  EB                      EX DE,HL
29F1  7E                      LD A,(HL)
29F2  FE 24                   CP 24H
29F4  20 02                   JR NZ,NDDDD
29F6  23                      INC HL
29F7  7E                      LD A,(HL)
```

```
29F8  FE 28           NDDDD:  CP 28H
29FA  2B                      DEC HL
29FB  20 21                   JR NZ,NA
29FD  11 0000                 LD DE,0H
2A00  23              ALP:    INC HL
2A01  7E                      LD A,(HL)
2A02  FE 28                   CP 28H
2A04  20 07                   JR NZ,NLB
2A06  AF                      XOR A
2A07  A3                      AND E
2A08  20 F6                   JR NZ,ALP
2A0A  14                      INC D
2A0B  18 F3                   JR ALP
2A0D  FE 22           NLB:    CP 22H
2A0F  20 06                   JR NZ,NQT
2A11  3E 01                   LD A,1
2A13  A9                      XOR C
2A14  4F                      LD C,A
2A15  18 E9                   JR ALP
2A17  FE 29           NQT:    CP 29H
2A19  20 E5                   JR NZ,ALP
2A1B  15                      DEC D
2A1C  20 E2                   JR NZ,ALP
2A1E  23              NA:     INC HL
2A1F  23                      INC HL
2A20  EB                      EX DE,HL
2A21  F1                      POP AF
2A22  28 05                   JR Z,LET1
2A24  CD 3D84                 CALL EVALAB
2A27  18 02                   JR LET2
                      ;
2A29  EF              LET1:   RST JT
2A2A  BB                      DB 0BBH
                      ;CALL EVALSE
                      ;
2A2B  E1              LET2:   POP HL
2A2C  EB              LET3:   EX DE,HL
2A2D  E5                      PUSH HL
2A2E  CD 3037                 CALL PSHNAM
2A31  CD 3182                 CALL UPDATE
2A34  D1                      POP DE
2A35  C9                      RET
                      ;
                      ;
2A36  03                      DB 3
                      ;
2A37                  SLPRINT:
2A37  3E 01                   LD A,1
2A39  C3 2B89                 JP SPR1
                      ;
                      ;
2A3C  CD 3037         NPAR:   CALL PSHNAM
2A3F  D5                      PUSH DE
2A40  CD 316E                 CALL FINDLEN
2A43  2A FA81                 LD HL,(CALCST)
```

```
2A46  2B              TOPN:  DEC HL
2A47  56                     LD D,(HL)
2A48  2B                     DEC HL
2A49  5E                     LD E,(HL)
2A4A  EB                     EX DE,HL
2A4B  A7                     AND A
2A4C  ED 42                  SBC HL,BC
2A4E  28 2B                  JR Z,DON
2A50  21 FB44                LD HL,FORCOUNT
2A53  35                     DEC (HL)
2A54  28 0A                  JR Z,NEXWIO
2A56  EB                     EX DE,HL
2A57  11 FFF3                LD DE,-13
2A5A  19                     ADD HL,DE
2A5B  22 FA81                LD (CALCST),HL
2A5E  18 E6                  JR TOPN
2A60  EF              NEXWIO: RST ERRRST
2A61  28                     DB 40                ;"NEXT without FOR"
2A62  C9                     RET
                      ;
                      ;
                      ;
2A63  0D                     DB 13
                      ;
2A64  3A FB44         SNEXT:: LD A,(FORCOUNT)
2A67  A7                     AND A
2A68  28 F6                  JR Z,NEXWIO
2A6A  1A                     LD A,(DE)
2A6B  FE 41                  CP 'A'
2A6D  38 04                  JR C,NOPAR
2A6F  FE 5B                  CP 'Z'+1
2A71  38 C9                  JR C,NPAR
2A73  D5              NOPAR: PUSH DE
2A74  2A FA81                LD HL,(CALCST)
2A77  2B                     DEC HL
2A78  46                     LD B,(HL)
2A79  2B                     DEC HL
2A7A  4E                     LD C,(HL)
2A7B  CD 34A0         DON:   CALL UVItoSRA
2A7E  E5                     PUSH HL              ;Variable address
2A7F  EB                     EX DE,HL             ;Save value
2A80  CD 12A7                CALL MOVEDE          ;Into ACC1
2A83  2A FA81                LD HL,(CALCST)
2A86  01 FFF6                LD BC,-10
2A89  09                     ADD HL,BC            ;Step value
2A8A  EB                     EX DE,HL
2A8B  CD 12B9                CALL MOVDEOP1
2A8E  3A FDD5                LD A,(OP11+3)
2A91  F5                     PUSH AF
2A92  CD 0E86                CALL ADD             ;Got new value
2A95  CD 1286                CALL STACKACC        ;Save new value
2A98  2A FA81                LD HL,(CALCST)
2A9B  01 FFEF                LD BC,-12-5          ;One on stack
2A9E  09                     ADD HL,BC
2A9F  11 FDCF                LD DE,ACC1+3
2AA2  CD 1163                CALL COMPARE         ;Changed yet
```

```
2AA5  C1                  POP BC              ;Get sign
2AA6  28 05               JR Z,DONEXT
2AA8  1F                  RRA                 ;A has carry
2AA9  A8                  XOR B
2AAA  17                  RLA
2AAB  3F                  CCF
2AAC  9F                  SBC A,A
                          ;
                          ;NZ at this point implies next has stopped
                          ;
2AAD  E1          DONEXT: POP HL
2AAE  F5                  PUSH AF
2AAF  01 0004             LD BC,4
2AB2  09                  ADD HL,BC
2AB3  EB                  EX DE,HL
2AB4  CD 1274             CALL DESTACK
2AB7  F1                  POP AF
2AB8  D1                  POP DE
2AB9  2A FA81             LD HL,(CALCSTK)
2ABC  20 0B               JR NZ,NEXTSTOP
2ABE  2B                  DEC HL
2ABF  2B                  DEC HL
2AC0  2B                  DEC HL
2AC1  7E                  LD A,(HL)
2AC2  2B                  DEC HL
2AC3  56                  LD D,(HL)
2AC4  2B                  DEC HL
2AC5  5E                  LD E,(HL)
2AC6  C3 0647             JP PGSLC1
                          ;
2AC9                      NEXTSTOP:
2AC9  01 FFF1             LD BC,-15
2ACC  09                  ADD HL,BC
2ACD  22 FA81             LD (CALCSTK),HL
2AD0  21 FB44             LD HL,FORCOUNT
2AD3  35                  DEC (HL)
2AD4  C9                  RET
                          ;
                          ;
                          ;
2AD5  01                  DB 1
                          ;
2AD6                      SSCLOCK:
2AD6  EF                  RST JT
2AD7  BB                  DB 0BBH
                          ;CALL EVALSE
2AD8  D5                  PUSH DE
2AD9  EF                  RST JT
2ADA  B9                  DB 0B9H
                          ;CALL FIND1$
2ADB  EB                  EX DE,HL
2ADC  22 FAB1             LD (CALCST),HL
2ADF  3E 06               LD A,6
2AE1  91                  SUB C
2AE2  B0                  OR B
2AE3  C2 1219             JP NZ,OUTRANG       ;Must have 6 chars in string
```

```
2AE6  11 FD57              LD DE,CLOCK
2AE9  ED B0                LDIR
2AEB  D1                   POP DE
2AEC  C9                   RET
                      ;
                      ;
                      ;
2AED  01                   DB 1
                      ;
2AEE  CD 2B25         SLOAD:  CALL SPLOD1
2AF1  AF                   XOR A               ;Indicates loading
2AF2  CD 0B40              CALL LOAD
2AF5  2A FD63              LD HL,(RETsave+2)
2AF8  E5                   PUSH HL
2AF9  2A FD61              LD HL,(RETsave)
2AFC  E5                   PUSH HL
2AFD  ED 5B FB49           LD DE,(DEsave)
2B01  C9                   RET
                      ;
                      ;
                      ;
2B02  01                   DB 1
                      ;
2B03  CD 2B25         SSAVE:  CALL SPLOD1    - Evaluate file name
2B06  ED 53 FB49           LD (DEsave),DE
2B0A  D5                   PUSH DE
2B0B  3A FAD2              LD A,(PAGE)
2B0E  F5                   PUSH AF             ;Save current page
2B0F  AF                   XOR A               ;Indicates saving (bit 0=0) program (bit 1=0)
2B10  CD 0B90              CALL SAVE
2B13  F1                   POP AF
2B14  CD 34FF              CALL SRAMPG         ;Reset (PAGE)
2B17  D1                   POP DE
2B18  C9                   RET
                      ;
                      ;
                      ;
2B19  01                   DB 1
                      ;
2B1A                  SVERIFY:
2B1A  CD 2B25              CALL SPLOD1
2B1D  D5                   PUSH DE
2B1E  3E 01                LD A,1          ;Indicates verifying
2B20  CD 0B40              CALL LOAD
2B23  D1                   POP DE
2B24  C9                   RET
                      ;
                      ;
                      ;
2B25  2A FA81         SPLOD1: LD HL,(CALCST)
2B28  36 FF                LD (HL),0FFH
2B2A  23                   INC HL
2B2B  22 FA81              LD (CALCST),HL
2B2E  EF                   RST JT
2B2F  BB                   DB 0BBH
                      ;CALL EVALSE
```

```
2B30  C9                    RET
                          ;
                          ;
                          ;
2B31  01                    DB 1
                          ;
2B32  CD 2B25         SPLOD:  CALL SPLOD1
2B35  D7                    RST SCRRST
2B36  4D                    DB 4DH
2B37  D5                    PUSH DE
2B38  3A FAD3               LD A,(CRNTPG)
2B3B  F5                    PUSH AF
2B3C  CD 2EB8               CALL NODENT
2B3F  F1                    POP AF
2B40  EF                    RST JT
2B41  B1                    DB 0B1H
                        ;CALL PGSLC1
2B42  D1                    POP DE
2B43  C9                    RET
2B44  D7              SNODDY: RST SCRRST
2B45  4D                    DB 4DH
2B46  D5                    PUSH DE
2B47  CD 2D7C               CALL NODDY
2B4A  D1                    POP DE
2B4B  C9                    RET
2B4C  04 0B 02              DB 4,11,2
2B4F  F7              SON:  RST GETRST          ;Evaluate X
2B50  30 02                 JR NC,SON1
2B52  EF                    RST 28H
2B53  22                    DB 34
2B54  1B              SON1: DEC DE
2B55  1A                    LD A,(DE)           ;A = GOTO or GOSUB
2B56  F5                    PUSH AF             ;Save A
2B57  13                    INC DE              ;First line number
2B58  EF                    RST JT
2B59  B8                    DB 0B8H
                        ;CALL ENDLIN            ;If end then continue
2B5A  28 29                 JR Z,CONTON
2B5C  0C                    INC C
2B5D  0D              NEXTON: DEC C             ;C= Cth line number
2B5E  28 0C                 JR Z,FOUNDG
2B60  1A              NEXON1: LD A,(DE)
2B61  EF                    RST JT
2B62  B8                    DB 0B8H
                        ;CALL ENDLIN
2B63  28 20                 JR Z,CONTON
2B65  FE 2C                 CP ','
2B67  13                    INC DE
2B68  28 F3                 JR Z,NEXTON
2B6A  18 F4                 JR NEXON1
2B6C  F1              FOUNDG: POP AF
2B6D  FE 96                 CP GOTO
2B6F  CA 288F               JP Z,SGOTO
2B72  3A FAD3               LD A,(CRNTPG)
2B75  F5                    PUSH AF
2B76  CD 06DB               CALL GETLIN
```

```
2B79  C1                    POP BC
2B7A  C2 2894               JP NZ,SGOTO3
2B7D  EF                FOUG2:  RST JT
2B7E  B8                    DB 0B8H
                        ;CALL ENDLIN
2B7F  CA 28A6               JP Z,SGOSU3
2B82  13                    INC DE
2B83  18 F8                 JR FOUG2
                        ;
2B85  F1                CONTON: POP AF
2B86  C9                    RET
                        ;
                        ;
                        ;
2B87  03                    DB 3
                        ;
2B88                    SPRINT::
2B88  AF                    XOR A
2B89  32 FD75           SPR1:   LD (PRORPL),A
2B8C  EF                SPRI2:  RST JT
2B8D  B8                    DB 0B8H
                        ;CALL ENDLIN
2B8E  CC 2BC9               CALL Z,NEWLINE
2B91  28 4B                 JR Z,PREND
2B93  FE 3B             SP0:    CP ';'
2B95  28 06                 JR Z,SP1
2B97  FE 2C                 CP ','
2B99  20 06                 JR NZ,SP2
2B9B  D7                    RST SCRRST
2B9C  09                    DB 9
2B9D  13                SP1:    INC DE
2B9E  1A                    LD A,(DE)
2B9F  18 F2                 JR SP0
                        ;
2BA1  EF                SP2:    RST JT
2BA2  B8                    DB 0B8H
                        ;CALL ENDLIN
2BA3  28 39                 JR Z,PREND
2BA5  D5                    PUSH DE
2BA6  EB                    EX DE,HL
2BA7  CD 3C45               CALL AE
2BAA  D1                    POP DE
2BAB  28 04                 JR Z,PRNNUM
2BAD  EF                    RST JT
2BAE  BB                    DB 0BBH
                        ;CALL EVALSE
2BAF  18 07                 JR SPR
2BB1  EF                PRNNUM: RST JT
2BB2  80                    DB 80H
                        ;CALL EVALAB
2BB3  D5                    PUSH DE
2BB4  CD 3FC6               CALL STR$
2BB7  D1                    POP DE
2BB8  D5                SPR:    PUSH DE
2BB9  2A FA81               LD HL,(CALCST)
2BBC  CD 3FEC               CALL FIND$
```

```
2BBF  ED 53 FA81            LD (CALCST),DE
2BC3  CD 2BCD               CALL PRNTSTR
2BC6  D1                    POP DE
2BC7  18 C3                 JR SPRI2
                      ;
2BC9                  NEWLINE::
2BC9  D7                    RST SCRRST
2BCA  2D 0A                 DB 2DH,0AH
2BCC  C9                    RET
                      ;
                      ;
2BCD                  PRNTSTR:
2BCD  78                    LD A,B
2BCE  B1                    OR C
2BCF  C8                    RET Z
2BD0  0B                    DEC BC
2BD1  1A                    LD A,(DE)
2BD2  EF                    RST JT
2BD3  AC                    DB 0ACH
                      ;CALL PRINTX
2BD4  13                    INC DE
2BD5  18 F6                 JR PRNTSTR
                      ;
                      ;
2BD7  ED 5F           RAND1:: LD A,R          ;Get "random" no
2BD9  4F                    LD C,A
2BDA  06 00                 LD B,0
2BDC  18 2E                 JR R2
                      ;
                      ;
2BDE  AF              PREND:  XOR A
2BDF  32 FD75               LD (PRORPL),A
2BE2  C9                    RET
                      ;
                      ;
                      ;
2BE3  02                    DB 2
                      ;
2BE4  E5              SPAUSE: PUSH HL
2BE5  F7                    RST GETRST
2BE6  60              PAU0:   LD H,B
2BE7  69                    LD L,C
2BE8  06 E7           PAU1:   LD B,231
2BEA  CD 09F2               CALL BREAKMON
2BED  20 07                 JR NZ,PAU3
2BEF  10 FE           PAU2:   DJNZ PAU2
2BF1  2B                    DEC HL
2BF2  7D                    LD A,L
2BF3  B4                    OR H
2BF4  20 F2                 JR NZ,PAU1
2BF6  E1              PAU3:   POP HL
2BF7  C9                    RET
                      ;
                      ;
                      ;
```

```
2BF8  D7              SPANEL: RST SCRRST
2BF9  6D                      DB 40H+5+8+20H
2BFA  48                      DB 40H+0+8
2BFB  C3 1C33                 JP BEGIN
2BFE  C9                      RET
                      ;
                      ;
                      ;
2BFF  02 2C 02                DB 2,',',2
                      ;
2C02  F7              SPOKE:  RST GETRST
2C03  C5                      PUSH BC
2C04  F7                      RST GETRST
2C05  C1                      POP BC
2C06  02                      LD (BC),A
2C07  C9                      RET
                      ;
                      ;
                      ;
2C08  02                      DB 2
                      ;
2C09  F7              SRAND:  RST GETRST
2C0A  38 CB                   JR C,RAND1
2C0C  ED 43 FD7F      R2:     LD (RNSEED),BC
2C10  C9                      RET
                      ;
                      ;
2C11                  SRETURN:
2C11  3A FB43                 LD A,(GOSNUM)
2C14  A7                      AND A
2C15  28 13                   JR Z,RETERR         ;Error if no return addresses on stack
2C17  2A FB41                 LD HL,(GOPTR)       ;HL = gosub stack ptr
2C1A  2B              RET1:   DEC HL              ;HL -> page or high byte of recursion count
2C1B  7E                      LD A,(HL)
2C1C  2B              RET11:  DEC HL
2C1D  56                      LD D,(HL)
2C1E  2B                      DEC HL
2C1F  5E                      LD E,(HL)           ;DE = return address
2C20  22 FB41                 LD (GOPTR),HL       ;Store new gosub stack ptr
2C23  21 FB43                 LD HL,GOSNUM
2C26  35                      DEC (HL)            ;Decrement gosub counter
                      ;RST JT
                      ;DB 0B1H
2C27  C3 0647                 JP PGSLC1
2C2A  EF              RETERR: RST 28H
2C2B  29                      DB 41               ;"RETURN WITHOUT GOSUB" (35 is not correct)
                      ;
                      ;
2C2C                  FINDDATA:
2C2C  D5                      PUSH DE             ;Save text ptr
2C2D  3A FAD3                 LD A,(CRNTPG)
2C30  F5                      PUSH AF             ;Save current page
2C31  3A FB48                 LD A,(DATAPG)       ;High bit set if first time
2C34  07                      RLCA
2C35  CB 3F                   SRL A               ;Carry flag set if first time (high bit reset)
```