Software

LENGTH

```
LENGT              ORG
                   REM          GENIE ROW(T7) + U, T7

ENTRY              REF          *+ENTRY
ERPR               REF          *+ERPR
                   REF          *LENGTH

                   TRA          @*ENTRY
LNG        B1      LDR          T7,R+B1
                   LDR          B1,U+B1
           R       IF(ZER)TRA   @ERR
           Z       LLS          @15,U+T7
                   TRA          PF

ERR        03      TRA          *ERPR
           Z       TRA          @PF,U+T7

                   END
```

```
PROGRAM      LENGT                                        02/14/68 09.14

        ENTRY   77775    75 44556 36 1400 00000
        ERPR    77776    75 44615 76 1400 00000
                77777    53 44554 66 3400 00000
                    1    01 01000 00 4401 77773     ENTRY
        LNG         2    41 50400 51 0000 00007
                    3    01 50400 41 0002 00000
                    4    02 01010 00 4001 00002     ERR
                    5    00 45062 07 4000 00017
                    6    01 01000 00 4200 00000
        ERR         7    03 01000 00 4401 77766     ERPR
                   10    00 01000 07 4200 00000
********
```

```
  316        ENTRY      0 77775      1           60000000000000     0
  317        ERPR       0 77776      1           70000000000000     0
  320        LNG        0     2      3          120000000000000     0
  321        ERR        0     7      1          170000000000000     0
```

CLENGTH

```
                                                                    1
CLENGTH         ORG                                                 2
                                                                    3
LENGTH          REF             *LENGTH                             4
ENTRY           REF             *+ENTRY                             5
                REF             *CLENGTH                            6
                                                                    7
                TRA             a*ENTRY                            10
                LT7             B6-2,I+B6                          11
                TRA             *LENGTH,CC+1                       12
                                                                   13
                END                                                14
                                                                   15
                                                                   16
```

PROGRAM CLENG 02/14/68 09.19

```
      LENGTH 77775   53 44554 66 3400 00000
      ENTRY  77776   75 44556 36 1400 00000
             77777   42 53445 54 6400 00000
                 1   01 01000 00 4401 77774     ENTRY
                 2   01 50470 76 0100 77775
                 3   01 01000 20 4401 77771     LENGTH
*********
```

```
 316        LENGTH     0 77775     1          200000000000000     0
 317        ENTRY      0 77776     1          300000000000000     0
```

ROW

```
ROW           ORG
              REM     GENIE ROW(T7)+U,T7
LENGTH        REF     *LENGTH
ENTRY         REF     *+ENTRY
              REF     *ROW
              TRA     @*ENTRY
              TRA     *LENGTH,CC+1
              END
```

```
PROGRAM     ROW                                         02/14/68 11.07

      LENGTH 77775    53 44554 66 3400 00000
      ENTRY  77776    75 44556 36 1400 00000
             77777    61 56662 52 5400 00000
                 1    01 01000 00 4401 77774      ENTRY
                 2    01 01000 20 4401 77772      LENGTH
*********

  316       LENGTH    0 77775     1               5000000000000     0
  317       ENTRY     0 77776     1               6000000000000     0
```

CROW

```
CROW            ORG

                REM             GENIE CROW(B6-2,B6-1)+U,T7

CLENGTH         REF             *CLENGTH
ENTRY           REF             *+ENTRY
                REF             *CROW

                TRA             @*ENTRY
                TRA             *CLENGTH,CC+1

                END
```

```
PROGRAM      CROW                                   02/14/68 11.10

      CLENGT 77775    42 53445 54 6400 00000
      ENTRY  77776    75 44556 26 1400 00000
             77777    42 61566 42 5400 00000
                 1    01 01000 00 4401 77774      ENTRY
                 2    01 01000 20 4401 77772      CLENGT
********


 316      CLENGT     0 77775     1          6000000000000     0
 317      ENTRY      0 77776     1          7000000000000     0
```

COL

```
COL                 ORG

                    REM            GENIE COL(T7) + U, T7

ENTRY               REF            *+ENTRY
ERPR                REF            *+ERPR
                    REF            *COL

                    TRA            @*ENTRY
            B1      LDR+2          T7,R+B1
                    LDR            B1,R+B1
            R       IF(ZER)TRA     @ERROR
            B2      LRL            @9,U+T7
            R       DMR            @36,U+B2
            T7      LDR            B1+B2,U+B2
            Z       LLS            @15,U+T7
                    SB1            *36
                    TRA            PF

ERROR       03      TRA            @*ERPR
            Z       TRA            @PF,U+T7

                    END
```

```
PROGRAM       COL                                          02/14/68 09.30

        ENTRY   77775    75 44556 36 1400 00000
        ERPR    77776    75 44615 76 1400 00000
                77777    42 56532 52 5400 00000
                    1    01 01000 00 4401 77773        ENTRY
                    2    41 50402 51 0000 00007
                    3    01 50400 51 0002 00000
                    4    02 01010 00 4001 00006        ERROR
                    5    42 45002 07 4000 00011
                    6    02 44000 42 4000 00044
                    7    07 50400 42 0006 00000
                   10    00 45062 07 4000 00017
                   11    01 40001 00 4500 00000
                   12    01 01000 00 4200 00000
        ERROR      13    03 01000 00 4401 77762        ERPR
                   14    00 01000 07 4200 00000
*********
```

```
316       ENTRY     0 77775     1          6000000000000     0
317       ERPR      0 77776     1          7000000000000     0
320       ERROR     0    13     1         23000000000000     0
```

CCOL

```
CCOL                ORG

COL                 REF             *COL
ENTRY               REF             *+ENTRY
                    REF             *CCOL

                    TRA             a*ENTRY
                    LT7             B6-2,I+B6
                    TRA             *COL,CC+1

                    END
```

```
PROGRAM       CCOL                                          02/14/68 09.34

          COL     77775    42 56532 52 5400 00000
          ENTRY   77776    75 44566 36 1400 00000
                  77777    42 42565 32 5400 00000
                      1    01 01000 00 4401 77774      ENTRY
                      2    01 50470 76 0100 77775
                      3    01 01000 20 4401 77771      COL
********


  316         COL        0 77775      1            20000000000000     0
  317         ENTRY      0 77776      1            30000000000000     0
```

CATAKE

```
                                                                    1
CATAKE          CRG                                                 2
CMTAKE          REF         *CMTAKE                                 3
ENTRY           REF         *-ENTRY                                 4
                REF         *CATAKE                                 5
                                                                    6
                TRA         a*ENTRY                                 7
                STX         a?                                      10
                TRA         a*CMTAKE,CC+X                           11
                                                                    12
                END                                                 13
```

PROGRAM CATAK 04/24/68 10.59

```
        CMTAKE 77775    42 54634 05 2400 00000
        ENTRY  77776    75 44556 36 1400 00000
               77777    42 40634 05 2400 00000
                   1    01 01000 00 4401 77774      ENTRY
                   2    01 43000 00 4000 00002
                   3    01 01000 00 4401 77771      CMTAKE
*********
```

```
 316        CMTAKE     0 77775     1          200000000000000     0
 317        ENTRY      0 77776     1          300000000000000     0
```

TTAKE

```
                                                                    1
TTAKE           ORG                                                 2
                                                                    3
                REM             TAKE SPACE FOR                      4
                REM             TRIANGULAR MATRIX                   5
                                                                    6
ENTRY           REF             *-ENTRY                             7
                REF             *TTAKE                              10
                                                                    11
                TRA             a*ENTRY                             12
          -Z    TRA             a*SAVE,U-R                          13
                LDR             *B6-13,R-B1                         14
          B1    IF(ZER)TRA      aERR,R-Z                            15
          B1    LRS             ad15                                16
          R     ORU             0120440200000                       17
                BAU             B6-14,U-T7                          20
          Z     TSR             a*XCWD,U-B3                         21
AGAIN           CLA             B6-14,U-B2                          22
                CLA             B2,U-B2                             23
          B2    ADD             aB3+1,U-B2                          24
          B1    LRS             ad15,B1-1                           25
          R     ORU             0120000400000                       26
                BAU             aB2,U-T7                            27
                TSR             a*XCWD,B3+1                         30
                CLA             B2                                  31
                LRS             ad27                                32
                ADD             aB3-1                               33
                LLS             ad27                                34
                SUB             aB3-1                               35
                FST             B2                                  36
          B1    IF(PNZ)TRA      AGAIN                               37
OUT             TRA             a*UNSAVE                            40
          PF    AB6             a77775,U-CC                         41
                                                                    42
ERR             CLA             1170000000000                       43
                BAU             B6-14,U-T7                          44
                TSR             a*XCWD                              45
                TRA             aOUT                                46
                                                                    47
SAVE            EQU             136                                 50
UNSAVE          EQU             137                                 51
XCWD            EQU             136                                 52
                END                                                 53
                                                                    54
```

```
        ENTRY   77776    75 44556 36 1400 00000
                77777    63 63405 24 4400 00000
                    1    01 01000 00 4401 77774     ENTRY
                    2    10 01000 02 4400 00136     SAVE
                    3    01 50400 51 0500 77764
                    4    41 01010 10 4001 00024     ERR
                    5    41 45015 00 4000 00017
                    6    02 50010 00 0001 00026     +0000A
                    7    01 20100 07 0100 77763
                   10    00 40000 43 4400 00126     XCWD
        AGAIN       11    01 21700 42 0100 77763
                   12    01 21700 42 0004 00000
                   13    42 10000 42 4010 00001
                   14    41 45015 61 4000 00017
                   15    02 50010 00 0001 00020     +0000B
                   16    01 20100 07 4004 00000
                   17    01 40000 23 4400 00126     XCWD
                   20    01 21700 00 0004 00000
                   21    01 45015 00 4000 00033
                   22    01 10000 00 4010 77776
                   23    01 45062 00 4000 00033
                   24    01 10100 00 4010 77776
                   25    01 20041 00 0004 00000
                   26    41 05150 00 4001 77761     AGAIN
        OUT        27    01 01000 00 4400 00137     UNSAVE
                   30    47 41006 40 4000 77775
        ERR        31    01 21700 00 0001 00005     +0000C
                   32    01 20100 07 0100 77763
                   33    01 40000 00 4400 00126     XCWD
                   34    01 01000 00 4001 77771     OUT
*********
        +0000A     35    00 00001 20 4402 00000
        +0000B     36    00 00001 20 0004 00000
        +0000C     37    00 00011 70 0000 00000
```

316	ENTRY	0	77776	1	1000000000000000	0
317	SAVE	0	136	0	4600000000000000	0
320	ERR	0	31	1	4200000000000000	0
321	+0000A	0	35	1	5200000000000000	0
322	XCWD	0	126	0	5000000000000000	0
323	AGAIN	0	11	1	2200000000000000	0
324	+0000B	0	36	1	5300000000000000	0
325	OUT	0	27	1	4000000000000000	0
326	UNSAVE	0	137	0	4700000000000000	0
327	+0000C	0	37	1	5400000000000000	0

ATAKE

```
                                                                    1
ATAKE           ORG                                                 2
ERPR            REF         *-ERPR                                  3
MTAKE           REF         *MTAKE                                  4
ENTRY           REF         *-ENTRY                                 5
                REF         *ATAKE                                  6
                                                                    7
                TRA         @*ENTRY                                 10
          -Z    TRA         @*SAVE,U-R                              11
                CLA         -*B6-13,U-B1                            12
                CLA         B6+B1-14,U-B3                           13
          -B1   IF(NEG)TRA  @ERR2,U-B2                              14
                IF(NEG)SKP  @6                                      15
                TRA         @ERR2                                   16
          Z     AB6         @1,U-B4                                 17
          B3    STO         B6,B6+1                                 20
                CLA+2       B6+B1-15,B6+1                           21
                IF(ZER)TRA  @ERR3                                   22
                CLA         B6-17                                   23
                IF(ZER)TRA  @ERR3,B2-1                              24
                                                                    25
ZCHK            CLA+2       B6+B1-15,B2-1                           26
                IF(ZER)TRA  @30,B4-1                                27
          B2    IF(PNZ)SKP  @1,B6+1                                 30
                TRA         @ERR4                                   31
                TRA         @*ZCHK                                  32
                                                                    33
GO        -B4   STO         B6+B4-2                                 34
                CLA+2       @B6+B4-2,B6+1                           35
                STX         @*                                      36
                TSR         @*MTAKE,CC+X                            37
                                                                    40
                SB5         @*,B6-1                                 41
          B2    STO         B6,B6+1                                 42
                                                                    43
BDWN      -B4   IF(PNZ)SKP  @35                                     44
                TRA         @RPTMTK                                 45
          B3    BNA         BDCW,U-T7                               46
                TSR         @*XCWD,B5+1                             47
                CLA+2       *B6+B1-14,U-B3                          50
                TRA         @BDWN,B6+1                              51
                                                                    52
RPTMTK    Z     SB5         @77775,U-B3                             53
                CLA+2       *B6+B1-15,B6+1                          54
STLST           CLA+2       B6+B1-14,B3+1                           55
          B2    IF(ZER)SKP  @B3,B6+1                                56
                TRA         @STLST                                  57
                CLA+2       @B6+B1-1,B6+1                           60
                TSR         @*MTAKE,CC+1                            61
                                                                    62
                                                                    63
          T     BUS-        *B6+B1-15                               64
                IF(ZER)TRA  @SETUP                                  65
                TRA         @RPTMTK                                 66
                                                                    67
SETUP           CLA         B6+B5                                   70
                STO         *B6+B1+B5-14                            71
          B4    IF(NNZ)SKP  @35                                     72
                TRA         @EXIT,B6-1                              73
```

```
                  LT7            BUCW,B5-1
                  TSR            @*XCWD
          I       BUS*           *B6+B1+B5-14
                  IF(PNZ)TRA     @BSDWN
                  TRA            @SETUP

BSDWN             CLA            *B6+B1+B5-14
                  BNA            BDCW,U+T7
                  TSR            @*XCWD,B5+1
          B5      IF(ZER)SKP     @77776
                  TRA            @BSDWN
                  TRA            @RPTMTK

ERR2      00      TRA            @*ERPR,U+B4
                  NOP            MESS
                  TRA            @EXIT
ERR4              AB6            @B4
ERR3      7       AB6            @77774,U+B4
          00      TRA            @*ERPR
                  NOP            MESS1
EXIT              AB6            @B4
                  LT7            BZCW
                  TSR            @*XCWD
                  TRA            @*UNSAVE
          B6      SUB            *B6=1,U+B6
          FF      AB6            @77775,U+CC

BDCW              OCT            000000600000000000
BUCW              OCT            000000700000000001
BZCW              OCT            000000700000000000
SAVE              EQU            136
UNSAVE            EQU            137
STEX              EQU            135
XCWD              EQU            126
MESS              BCD            M NEGATIVE OR TOO LARGE/
MESS1             BCD            ILLEGAL OR NO ZERO PARAMETER ADDRESS
                  END
```

```
                ERPR    77774   75 44615 76 1400 00000
                MTAKE   77775   54 63405 24 4400 00000
                ENTRY   77776   75 44556 36 1400 00000
                        77777   40 63405 24 4400 00000
                            1   01 01000 00 4401 77774     ENTRY
                            2   10 01000 02 4400 00136     SAVE
                            3   01 21700 41 1500 77764
                            4   01 21700 43 0102 77763
                            5   51 01510 42 4001 00062     ERP2
                            6   01 02510 00 4000 00004
                            7   01 01000 00 4001 00060     ERR2
                           10   00 41004 44 4000 00001
                           11   43 20001 26 4100 00000
                           12   01 21702 26 0102 77762
                           13   01 01010 00 4001 00060     ERR3
                           14   01 21700 00 0100 77760
                           15   01 01010 42 4001 00056     ERR3
                ZCHK       16   01 21702 42 0102 77762
                           17   01 01010 64 4001 00003     GO
                           20   42 06150 26 4000 00001
                           21   01 01000 00 4001 00051     ERR4
                           22   01 01000 00 4001 77772     ZCHK
                GO         23   54 20001 00 4120 77775
                           24   01 21702 26 4120 77775
                           25   01 43005 00 4000 00002
                           26   01 40000 30 4401 77746     MTAKE
                           27   01 40005 46 4000 00000
                           30   42 20001 26 4100 00000
                BDWN       31   54 06150 00 4040 00000
                           32   01 01000 00 4001 00004     RPTMTK
                           33   43 21600 07 0001 00051     BDCW
                           34   01 40000 25 4400 00126     XCWD
                           35   01 21702 43 0502 77763
                           36   01 01000 26 4001 77771     BDWN
                RPTMTK     37   00 40005 43 4000 77776
                           40   01 21702 26 0502 77762
                STLST      41   01 21702 23 0102 77763
                           42   42 02010 26 4010 00000
                           43   01 01000 00 4001 77774     STLST
                           44   01 21702 26 4102 77776
                           45   01 40000 30 4401 77727     MTAKE
                           46   20 14101 00 0502 77762
                           47   01 01010 00 4001 00001     SETUP
                           50   01 01000 00 4001 77765     RPTMTK
                SETUP      51   01 21700 00 0140 00000
                           52   01 20001 00 4542 77763
                           53   44 06550 00 4040 00000
                           54   01 01000 46 4001 00022     EXIT
                           55   01 50470 65 0001 00030     BUCW
                           56   01 40060 00 4400 00126     XCWD
                           57   20 14101 00 0542 77762
                           60   01 05150 00 4001 00001     BSDWN
                           61   01 01000 00 4001 77766     SETUP
                BSDWN      62   01 21700 00 0542 77763
                           63   01 21600 07 0001 00021     BDCW
                           64   01 40000 25 4400 00126     XCWD
                           65   45 02010 00 4000 77776
                           66   01 01000 00 4001 77772     BSDWN
                           67   01 01000 00 4001 77746     RPTMTK
                ERR2       70   00 01000 44 4401 77703     ERPR
                           71   01 30000 00 0001 00016     MESS
                           72   01 01000 00 4001 00004     EXIT
                ERR4       73   01 41004 00 4020 00000
                ERR3       74   00 41004 44 4000 77774
```

```
               75   00 01[illegible] 00 4401 77776     ERPR
               76   01 30000 00 0001 00014     MESS1
EXIT           77   01 41006 00 4020 00000
              100   01 50470 00 0001 00006     BZCW
              101   01 40030 00 4400 00126     XCWD
              102   01 01000 00 4400 00137     UNSAVE
              103   46 10100 46 0500 77776
              104   47 41006 40 4000 77775
BDCW          105   00 00006 00 0000 00000
BUCW          106   00 00007 00 0000 00001
BZCW          107   00 00007 00 0000 00000
MESS          110   54 25554 44 6406 25065
              111   44 25556 12 5635 65625
              112   53 40614 64 4222 52525
MESS1         113   50 53534 44 6405 22556
              114   61 25525 62 5714 46156
              115   25 57406 14 0544 46344
              116   61 25404 24 3614 46262
              117   22 25252 52 5252 52525

********

316    ERPR      0  77774   1      20000000000000   0
317    MTAKE     0  77775   1      30000000000000   0
320    ENTRY     0  77776   1      40000000000000   0
321    SAVE      0    136   0    1200000000000000   0
322    ERR2      0     70   1     750000000000000   0
323    ERR3      0     74   1    1010000000000000   0
324    ZCHK      0     16   1     230000000000000   0
325    GO        0     23   1     200000000000000   0
326    ERR4      0     73   1    1000000000000000   0
327    BDWN      0     31   1     360000000000000   0
330    RPTMTK    0     37   1     440000000000000   0
331    BDCW      0    105   1    1130000000000000   0
332    XCWD      0    126   0    1230000000000000   0
333    STLST     0     41   1     460000000000000   0
334    SETUP     0     51   1     560000000000000   0
335    EXIT      0     77   1    1640000000000000   0
336    BUCW      0    106   1    1150000000000000   0
337    BSDWN     0     62   1     670000000000000   0
340    MESS      0    110   1    1250000000000000   0
341    MESS1     0    113   1    1310000000000000   0
342    BZCW      0    107   1    1170000000000000   0
343    UNSAVE    0    137   0    1210000000000000   0
344    STEX      0    135   0    1220000000000000   0
```

MAX

```
MAX                 ORG
ERPR                REF          *-ERPR
ENTRY               REF          *-ENTRY
                    REF          *MAX
                    TRA          *ENTRY
                    CLA          MAXT,CC+1
                    CLA          MINT
                    STO          TEST
          -Z        TRA          *SAVE,U→R
                    LDR          T7,R→B1
          I         LDR          B1,U→T7
          P         IF(NUL)TRA   ER,R→B2
          Z         LLS          a15,U→B1
          Z         LLS          a15,U→B3
          B3        LUR          d3,U→B3
                    LT4          B2+B3,I→B2
                    SB4          1,B1-1
LOOP      B1        IF(ZER)TRA   DONE
TEST                BSS          1
          B4        LT4          B2+B4-1,U→T7
                    TRA          LOOP,B1-1
DONE      T7        ADD          aB3-1,U→T7
BACK                TRA          *UNSAVE
          T7        TRA          PF
ER        03        TRA          *ERPR
          Z         TRA          BACK,U→T7
SAVE                EQU          136
UNSAVE              EQU          137
MAXT      T4        IF(POS)SKP   B2+B4,B4+1
MINT      T4        IF(NEG)SKP   B2+B4,B4+1
                    END
```

```
           ERPR     77775     75 44615 76 1400 00000
           ENTRY    77776     75 44556 36 1400 00000
                    77777     54 40672 52 5400 00000
                        1     01 01000 00 4401 77774        ENTRY
                        2     01 21700 20 0001 00024        MAXT
                        3     01 21700 00 0001 00024        MINT
                        4     01 20001 00 4001 00012        TEST
                        5     10 01000 02 4400 00136        SAVE
                        6     01 50400 51 0000 00007
                        7     20 50400 07 0002 00000
                       10     02 01040 52 4001 00014        ER
                       11     00 45062 41 4000 00017
                       12     00 45062 43 4000 00017
                       13     43 45010 43 4000 00003
                       14     01 50440 72 0014 00000
                       15     01 40004 61 4000 00001
           LOOP        16     41 01010 00 4001 00003        DONE
           TEST        17     00 00000 00 0000 00000
                       20     44 50440 07 0024 77776
                       21     01 01000 41 4001 77773        LOOP
           DONE        22     07 10000 07 4010 77776
           BACK        23     01 01000 00 4400 00137        UNSAVE
                       24     07 01000 00 4000 00000
           ER          25     03 01000 00 4401 77747        ERPR
                       26     00 01000 07 4001 77773        BACK
           MAXT        27     04 02110 24 0024 00000
           MINT        30     04 02510 24 0024 00000
*********


   316        ERPR      0 77775     1           20000000000000     0
   317        ENTRY     0 77776     1           30000000000000     0
   320        MAXT      0    27     1           36000000000000     0
   321        MINT      0    30     1           37000000000000     0
   322        TEST      0    17     1           24000000000000     0
   323        SAVE      0   136     0           34000000000000     0
   324        ER        0    25     1           32000000000000     0
   325        LOOP      0    16     1           22000000000000     0
   326        DONE      0    22     1           27000000000000     0
   327        BACK      0    23     1           30000000000000     0
   330        UNSAVE    0   137     0           35000000000000     0
```

MIN

```
MIN             ORG
ENTRY           REF             *+ENTRY
MAX             REF             *MAX
                REF             *MIN
                TRA             *ENTRY
                STX             2
                TRA             *MAX,CC+X
                END
```

```
PROGRAM      MIN                                        06/15/67 17.03

        ENTRY  77775    75 44556 36 1400 00000
        MAX    77776    54 40672 52 5400 00000
               77777    54 50552 52 5400 00000
                   1    01 01000 00 4401 77773     ENTRY
                   2    01 43005 00 4000 00002
                   3    01 01000 30 4401 77772     MAX
*********

  316        ENTRY     0 77775     1              20000000000000     0
  317        MAX       0 77776     1              30000000000000     0
```

VSPACE

```
                                                                    1
VSPACE          ORG                                                 2
                                                                    3
                REM             GENIE VSPACE(VECTOR,LENGTH)         4
                                                                    5
ENTRY           REF             *+ENTRY                             6
                REF             *VSPACE                             7
                                                                    10
                TRA             a*ENTRY                             11
                CLA             *B6=1                               12
                IF(SLF)SKP      a2,U+R                              13
                TRA             aFAST,B6+1                          14
                IF(ZER)TRA      aDEACT,R+Z                          15
                LRS             a+15,CC+1                           16
DEACT           CLA             1170 0000 00000,CC+1                17
          R     ORU             0220 0000 00000                     20
                BAU             B6-2,I+B6                           21
                TRA             a*XCWD,U+T7                         22
                                                                    23
                REM             TAKE FAST SPACE(BYPASS XCWD)
                                                                    25
FAST      B2    STO             aB6=1,R+B2                          26
          B1    LDR+2           B6-3,B6+1                           27
          PF    RWT             EXIT,R+B1                           30
                SB1             a*G,R+T7                            31
                TSR             a*STEX                              32
          B1    IF(NUL)TRA      aERROR,R+Z                          33
          P2    IF(ZER)TRA      aRDZER+1,B6-1                       34
                LRS             a+15,B1-1                           35
          R     ORU             0001 0002 00000                     36
                BAU             aB1,U+R                             37
          B1    RPA             RDZER,B6+1                          40
                SB1             a*T7,R+T7                           41
                TRA             a*CSTO                              42
          Z     SB1,ERM         a1,B6-1                             43
RDZER           STO             aB1+(Z),B2=1                        44
                SB1             a*B6,B6-1                           45
                SB2             a*B6,B6-1                           46
EXIT            TRA             a(Z),B6-1                           47
                                                                    50
ERROR     02    TRA             a*ERPR                              51
                                                                    52
G               EQU             135                                 53
XCWD            EQU             136                                 54
CSTO            EQU             134                                 55
STEX            EQU             133                                 56
ERPR            EQU             172                                 57
                                                                    60
                END                                                 61
                                                                    62
```

```
        ENTRY   77776    75 44556 36 1400 00000
                77777    65 62574 04 2400 00000
                    1    01 01000 00 4401 77774      ENTRY
                    2    01 21700 00 0500 77776
                    3    01 02070 02 4000 00002
                    4    01 01000 26 4001 00006      FAST
                    5    01 01010 10 4001 00001      DEACT
                    6    01 45015 20 4000 00017
        DEACT       7    01 21700 20 0001 00026      +0000A
                   10    02 50010 00 0001 00026      +0000B
                   11    01 20100 76 0100 77775
                   12    01 01000 07 4400 00126      XCWD
        FAST       13    42 20001 52 4100 77776
                   14    41 50402 26 0100 77774
                   15    47 21641 51 0001 00016      EXIT
                   16    01 40001 17 4400 00125      G
                   17    01 40000 00 4400 00135      STEX
                   20    41 01040 10 4001 00014      ERROR
                   21    42 01010 66 4001 00010      RDZER    +1
                   22    01 45015 61 4000 00017
                   23    02 50010 00 0001 00014      +0000C
                   24    01 20100 02 4002 00000
                   25    41 21601 26 0001 00003      RDZER
                   26    01 40001 17 4400 00007
                   27    01 01000 00 4400 00134      CSTO
                   30    00 40021 66 4000 00001
        RDZER      31    01 20001 62 4002 00000
                   32    01 40001 66 4500 00000
                   33    01 40002 66 4500 00000
        EXIT       34    01 01000 66 4000 00000
        ERROR      35    02 01000 00 4400 00172      ERPR
*********
        +0000A     36    00 00011 70 0000 00000
        +0000B     37    00 00002 20 0000 00000
        +0000C     40    00 00060 01 0002 00000
```

```
  317     ENTRY    0 77776   1     600000000000000   0
  320     FAST     0    13   1     270000000000000   0
  321     DEACT    0     7   1     160000000000000   0
  322     +0000A   0    36   1     600000000000000   0
  323     +0000B   0    37   1     610000000000000   0
  324     XCWD     0   126   0     530000000000000   0
  325     EXIT     0    34   1     500000000000000   0
  326     G        0   125   0     520000000000000   0
  327     STEX     0   135   0     550000000000000   0
  330     ERROR    0    35   1     510000000000000   0
  331     RDZER    0    31   1     450000000000000   0
  332     +0000C   0    40   1     620000000000000   0
  333     CSTO     0   134   0     540000000000000   0
  334     ERPR     0   172   0     560000000000000   0
```

CVSPACE

```
                                                                    1
CVSPACE         ORG                                                 2
                                                                    3
VSPAC           REF             *VSPACE                             4
ENTRY           REF             *-ENTRY                             5
                REF             *CVSPAC                             6
                                                                    7
                TRA             a*ENTRY                            10
          PF    RWT             EXIT                               11
                CLA+2           B6-3,B6+1                          12
                CLA+2           B6-2,B6+1                          13
                TSR             *VSPAC,CC+1                        14
                TSR             *VSPAC,CC+1                        15
EXIT            TRA             (PF),B6-1                          16
                                                                   17
                END                                                20
                                                                   21
                                                                   22
```

PROGRAM CVSPA 03/04/68 11.30

```
      VSPAC  77775   65 62574 04 2400 00000
      ENTRY  77776   75 44556 36 1400 00000
             77777   42 65625 74 0400 00000
                 1   01 01000 00 4401 77774     ENTRY
                 2   47 21641 00 0001 00004     EXIT
                 3   01 21702 26 0100 77774
                 4   01 21702 26 0100 77775
                 5   01 40000 20 4401 77767     VSPAC
                 6   01 40000 20 4401 77766     VSPAC
      EXIT       7   01 01000 66 4000 00000
*********
```

316	VSPAC	0	77775	1	200000000000000	0
317	ENTRY	0	77776	1	300000000000000	0
320	EXIT	0	7	1	130000000000000	0

MSPACE

```
                                                                    1
MSPACE          ORG                                                 2
                                                                    3
                REM             GENIE MSPACE(MATRIX,ROWS,COLS)
                                                                    5
ENTRY           REF             *←ENTRY                             6
                REF             *MSPACE                             7
                                                                    10
                TRA             a*ENTRY                             11
                CLA             *B6=1                               12
                IF(ZER)TRA      aDEACT,R→Z                          13
                LRS             a12                                 14
                CLA             a0420                               15
                LRS             a12                                 16
                CLA             *B6=2                               17
                IF(ZER)TRA      aDEACT                              20
                LRS             a15,CC+1                            21
DEACT           LDR             1170 0000 00000                     22
          R     BAU             B6→3,I→B6                           23
                IF(SLN)SKP      a2,U→T7                             24
                TRA             a*XCWD                              25
                                                                    26
                REM             TAKE FAST SPACE(BYPASS XCWD)
                                                                    30
          -Z    TRA             a*SAVE,U→R                          31
          T7    CRL             a15,R→B1                            32
          B1    IF(NZE)TRA      aTAKE                               33
          T7    SPF             aOUT,U→B1                           34
          Z     SB1             a*3,U→B2                            35
                TRA             a*STEX                              36
TAKE      T7    SB5             a20,U→R                             37
          Z     LLS             a15,U→B2                            40
          Z     LLS             a12,R→B4                            41
          Z     LLS             a12,U→PF                            42
          T7    TRA             a*MATRX,U→T6                        43
OUT             TRA             a*UNSAVE                            44
                TRA             aPF                                 45
                                                                    46
MATRX           EQU             111                                 47
G               EQU             125                                 50
XCWD            EQU             126                                 51
STEX            EQU             135                                 52
SAVE            EQU             136                                 53
UNSAVE          EQU             137                                 54
                                                                    55
                END                                                 56
                                                                    57
```

```
        ENTRY   77776    75 44556 36 1400 00000
                77777    54 62574 04 2400 00000
                    1    01 01000 00 4401 77774    ENTRY
                    2    01 21700 00 0500 77776
                    3    01 01010 10 4001 00006    DEACT
                    4    01 45015 00 4000 00014
                    5    01 21700 00 4000 00420
                    6    01 45015 00 4000 00014
                    7    01 21700 00 0500 77775
                   10    01 01010 00 4001 00001    DEACT
                   11    01 45015 20 4000 00017
        DEACT      12    01 50400 00 0001 00020    *0000A
                   13    02 20100 76 0100 77774
                   14    01 02030 07 4000 00002
                   15    01 01000 00 4400 00126    XCWD
                   16    10 01000 02 4400 00136    SAVE
                   17    07 45066 51 4000 00017
                   20    41 01050 00 4001 00003    TAKE
                   21    07 40007 41 4001 00007    OUT
                   22    00 40061 42 4400 00125    G
                   23    01 01000 00 4400 00135    STEX
        TAKE       24    07 40005 02 4000 00020
                   25    00 45062 42 4000 00017
                   26    00 45062 54 4000 00014
                   27    00 45062 47 4000 00014
                   30    07 01000 06 4400 00111    MATRX
        OUT        31    01 01000 00 4400 00137    UNSAVE
                   32    01 01000 00 4200 00000
*********
        *0000A     33    00 00011 70 0000 00000

  317      ENTRY      0 77776    1       7000000000000000    0
  320      DEACT      0    12    1       2200000000000000    0
  321      *0000A     0    33    1       5700000000000000    0
  322      XCWD       0   126    0       5200000000000000    0
  323      SAVE       0   136    0       5400000000000000    0
  324      TAKE       0    24    1       4100000000000000    0
  325      OUT        0    31    1       4600000000000000    0
  326      G          0   125    0       5100000000000000    0
  327      STEX       0   135    0       5300000000000000    0
  330      MATRX      0   111    0       5000000000000000    0
  331      UNSAVE     0   137    0       5500000000000000    0
```

CMSPACE

```
CMSPACE                ORG

MSPAC                  REF              *MSPACE
ENTRY                  REF              *-ENTRY
                       REF              *CMSPAC

                       TRA              @*ENTRY
              PF       RWT              EXIT
                       CLA+2            B6-4,B6+1
                       CLA,DBL+2        B6-3,B6+1
                       TSR              *MSPAC,CC+1
                       TSR              *MSPAC,CC+1
EXIT                   TRA              (PF),B6-1

                       END
```

```
PROGRAM       CMSPA                                      03/04/68 11.27

        MSPAC   77775   54 62574 04 2400 00000
        ENTRY   77776   75 44556 26 1400 00000
                77777   42 54625 74 0400 00000
                    1   01 01000 00 4401 77774     ENTRY
                    2   47 21641 00 0001 00004     EXIT
                    3   01 21702 26 0100 77773
                    4   01 21706 26 0100 77774
                    5   01 40000 20 4401 77767     MSPAC
                    6   01 40000 20 4401 77766     MSPAC
        EXIT        7   01 01000 66 4000 00000
*********
```

```
316     MSPAC     0 77775     1          2000000000000     0
317     ENTRY     0 77776     1          3000000000000     0
320     EXIT      0     7     1         13000000000000     0
```

MTAKE

```
                                                                    1
MTAKE           ORG                                                 2
                                                                    3
ERPR            REF             *←ERPR                              4
ENTRY           REF             *←ENTRY                             5
                REF             *MTAKE                              6
                                                                    7
                REM             TAKE SPACE FOR MULTI-               10
                REM             DIMENSIONAL REAL ARRAY.             11
                                                                    12
                TRA             *ENTRY                              13
                STX             2,CC+1                              14
                STX             1                                   15
          -2    TRA             @*SAVE,U→R                          16
                CLA             -*36-13,U→PF                        17
                LTS             B6+PF-14,PF+1                       20
          -U    IF(NEG)TRA      ERROR,U→T4                          21
          U     IF(NEG)SKP      @5                                  22
                TRA             ERROR                               23
LOOP            CLA             *B6+PF-14,U→B1                      24
                IF(NEG)TRA      ERROR                               25
          PF    IF(ZER)TRA      ENTER,PF+1                          26
                CLA             CDWDV                               27
                ADD+21          LOOP,I→CC                           30
                                                                    31
                REM             B1→B5 SIZE AT EACH LEVEL.           32
                REM             T4=NO. OF LEVELS.                   33
                REM             T5=CDWD ADDR.                       34
                REM             X=0 NORMAL, 1 FOR                   35
                REM             @-BIT AT LAST LEVEL...              36
                REM             *****THIS PROGRAM DEPENDS ON THE
                REM             *****MEMORY CONFIGURATION           40
                REM             *****GENERATED BY STEX              41
                                                                    42
MMGEN           IF(SLF)SKP      @2                                  43
                TRA             MMGEN                               44
                LT6             MOD31                               45
MGEN       Z    BAU+2           @PF,B6+1                            46
           Z    SUB+2           @*T6,B6+1                           47
                LRS             015                                 50
           P    BAU             T5                                  51
                BIJ             T6,U→T7                             52
           T4   IF(PNZ)SKP      @1                                  53
                TRA             TAKEV,CC+X                          54
           T7   ORU             READM,U→T7                          55
                TSR             *XCWD                               56
           T5   BNA             BASEF,U→T7                          57
           T5   LTS→            B6-1                                60
                TSR             *XCWD                               61
           T6   LUL             1,U→T6                              62
           -1   ADD             T4,U→T4                             63
RECUR           TSR             MGEN                                64
           -I   ADD             T5,U→T5                             65
                IF(PNZ)TRA      RECUR                               66
                LT7             BASEB                               67
                TSR             *XCWD                               70
           T6   LUR             1,U→T6                              71
           I    ADD             T4,U→T4                             72
                LT5             B6-1,I→B6                           73
```

```
                    TRA         *B6-1,B6-1                  74
TAKEV               CLA         READV,CC+1                  75
                    CLA         READA                       76
                    ORJ+        T7,B6-1                     77
                    TSR         *XCWD                       100
                    TRA         *B6-1,B6-1                  101
                                                            102
                    REM         FAST ROUTINE USED           103
                    REM         IF SL14 IS ON...            104
                                                            105
FMGEN       Z       BAU+2       @PF,B6+1                    106
                    BAU+2       X,B6+1                      107
                    BAU+2       @B1,B6+1                    110
                    BAU+2       @B2,B6+1                    111
            T4      STO         B6,B6+1                     112
            T5      STT         Z,U+B1                      113
                    LDR         *3,I+B2                     114
            P2      SFT         B1,U+T5                     115
            P       AND         ABIT                        116
                    IF(NUL)TRA  SPACE                       117
            Z       LLS         015,U+T4                    120
            Z       LLS         015,U+B2                    121
            P2      LUR         3,U+B2                      122
                    LT6         @B2,R+Z                     123
            T4      SUB         @B2-1,U+T4                  124
            P1      BNA         BASEF,U+T7                  125
                    TSR         *XCWD,R+B2                  126
            T4      STX         Z-4,U+B1                    127
                    SB1         *3                          130
                    TSR         *STEX                       131
            -1      ADD+        T4,U+B1                     132
                    IF(POS)JMP  T6                          133
                    LT7         BASEB                       134
            T5      TSR         *XCWD,U+B1                  135
                    CLA         ABIT                        136
                    50215       B1                          137
                                                            140
                    REM         TAKE ALL REQUIRED           141
                    REM         SPACE FOR NEW               142
                    REM         ARRAY..                     143
                                                            144
SPACE               CLA,DBL     B6-3,U+B1                   145
            P       SUR,LT4     B6-1,U+T7                   146
            Z       IF(NZE)SKP  @*FIRSTEX,R+B2              147
                    STT         1                           150
            T4      LRS         6,B6-1                      151
                    LT6         @1                          152
            Z       BEU         R                           153
                    ORJ+        SUM,I+CC                    154
INSUM       T6      ADD         @B2,U+T6                    155
            Z       IF(ZER)SKP  TT                          156
            -I      ADD         T6,U+T6                     157
SUM         40      MPY         T6,R+T6                     160
                    CLA         MINEX                       161
                    ADD+21      SUM                         162
            -1      ADD         T7,U+T7                     163
                    IF(NZE)TRA  INSUM                       164
            T5      SB2         *T6,U+B1                    165
                    TSR         *STEX                       166
```

```
                F1      IF(ZER)TRA      @ERROR2,U+T6
                        LT5             FT
                Z       IF(ZER)SKP      PRCT
                        TRA             NOFIX
                Z       IF(NZE)SKP      TT
                Z       BAU             B1-1,U+T5
NOFIX                   LT7             @R2
                        CLA             @R1+B2
                        RWT             ZSTO
                Z       SB1,ERM         Z-1
ZSTO                    STO             B1+Z,B2-1

                        REM             DO IT TO IT

                -1      ADD             T6,B6-1
                        SFT             *U,B6-1
                        CLA,DBL         B6,U+B1
                        STX             *B6-1,B6-1
                        LT6             MODB1,R+B2
                        TRA             CC+1
GO              Z       BAU+2           @PF,B6+1
                Z       SUR+2           @*T6,B6+1
                        LRS             @15
                F       BAJ             FT
                        BIJ             T6,U+T7
                F1      RWT             LINEAR
                        SB1             *T5
                Z       IF(ZER)SKP      TT
                        TRA             LINEAR
                Z       BAU             @*G
                        STO             *FT
                I       ADD+            FT
LINEAR                  SB1             @7
                        CLA             @*T6
                        ADD+            FT
                T4      IF(PNZ)SKP      @1
                        TRA             SPACEV,CC+X
                T7      ORU             CDWDM
                        SB1             *T5
                        REM             *****PRESERVE TAG ON CODEWORD*****
                        FST             *G
                        SB1             *LINEAR
                T5      BNA             BASEF,U+T7
                T5      LT5+            B6-1
                        TSR             *YCWD
                T6      LUL             1,U+T6
                -I      ADD             T4,U+T4
FRECUR                  TSR             GO
                -I      ADD             T5,U+T5
                        IF(PNZ)TRA      FRECUR
                        LT7             BASEB
                        TSR             *YCWD
                T6      LUR             1,U+T6
                I       ADD             T4,U+T4
                        LT5             B6-1,I+B6
                        TRA             *B6-1,B6-1
SPACEV                  CLA             CDWDV,CC+1
                        CLA             CDWDA
                        ORU+            T7,B6-1
```

```
                        SBI     *T5                                     262
                        REM     *****PRESERVE TAG ON CODEWORD*****
                        FST     *8                                      264
                        SBI     *LINEAR                                 265
                        TRA     *B6-1,B6-1                              266
                                                                        267
ERROR2          C2      TRA     @*ERPRS                                 270
                                                                        271
ABIT                    OCT     4000 00000                              272
MODB1                   OCT     0002 00000                              273
MINEX                   OCT     76 00000 00 0000 00000                  274
BASEF                   OCT     00000 0600 0000 00000                   275
BASEB                   OCT     00000 0700 0000 00001                   276
READM                   OCT     00000 0120 4400 00000                   277
READA                   OCT     00000 0120 4000 00000                   300
READV                   OCT     00000 0120 0000 00000                   301
CDWDM                   OCT     00000 0001 4400 00000                   302
CDWDA                   OCT     00000 0001 4000 00000                   303
CDWDV                   OCT     00000 0001 0000 00000                   304
                                                                        305
FIRSTEX                 EQU     101                                     306
PRCT                    EQU     114                                     307
G                       EQU     125                                     310
XCWD                    EQU     126                                     311
STEX                    EQU     135                                     312
ERPRS                   EQU     172                                     313
                                                                        314
ENTER                   TSR     @MMGEN                                  315
EXIT                    CLA     RLOOP                                   316
                        FST     LOOP                                    317
                        TRA     *+UNSAVE                                320
                B6      SUB     *B6-1,U+B6                              321
                PF      ABS     77775,U+CC                              322
                                                                        323
                        REM     PRINT ERROR MESSAGE                     324
                                                                        325
ERROR           CO      TRA     @*ERPR                                  326
                        NOP     MESS                                    327
                        TRA     EXIT                                    330
MESS                    BCD     INVALID DIMENSION(S)/                   331
                                                                        332
RLOOP                   CLA     *B6+PF-14,U+B1                          333
STEX                    EQU     135                                     334
SAVE                    EQU     136                                     335
UNSAVE                  EQU     137                                     336
                                                                        337
                        END                                             340
                                                                        341
```

```
ERPR    77775    75 44615 76 1400 00000
ENTRY   77776    75 44556 26 1400 00000
        77777    54 63405 24 4400 00000
            1    01 01000 00 4401 77774      ENTRY
            2    01 43005 20 4000 00000
            3    01 43005 00 4000 00001
            4    10 01000 02 4400 00136      SAVE
            5    01 21700 47 1500 77764
            6    01 50450 27 0000 77763
            7    11 01510 04 4001 00237      ERROR
           10    01 02510 00 4000 00005
           11    01 01000 00 4001 00235      ERROR
LOOP       12    01 21700 41 0700 77763
           13    01 01510 00 4001 00233      ERROR
           14    47 01010 27 4001 00224      ENTER
           15    01 21700 00 0001 00222      CDWDV
           16    01 10021 70 0001 77772      LOOP
MMGEN      17    01 02070 00 4000 00002
           20    01 01000 00 4001 00035      FMGEN
           21    01 50460 00 0001 00205      MODB1
MGEN       22    00 20102 26 4200 00000
           23    00 53002 26 4400 00006
           24    01 45015 00 4000 00017
           25    02 20100 00 0000 00005
           26    01 20200 07 0000 00006
           27    04 05150 00 4000 00001
           30    01 01000 30 4001 00220      TAKEV
           31    07 50010 07 0001 00201      READM
           32    01 40000 00 4400 00126      XCWD
           33    05 21600 07 0001 00175      BASEF
           34    05 50451 00 0100 77776
           35    01 40000 00 4400 00126      XCWD
           36    06 45020 06 4000 00001
           37    30 10000 04 0000 00004
RECUR      40    01 40000 00 4001 77760      MGEN
           41    30 10000 05 0000 00005
           42    01 05150 00 4001 77774      RECUR
           43    01 50470 00 0001 00166      BASEB
           44    01 40000 00 4400 00126      XCWD
           45    04 45010 06 4000 00001
           46    20 10000 04 0000 00004
           47    01 50450 76 0100 77776
           50    01 01000 66 4500 77776
TAKEV      51    01 21700 20 0001 00163      READV
           52    01 21700 00 0001 00161      READA
           53    01 50011 66 0000 00007
           54    01 40000 00 4400 00126      XCWD
           55    01 01000 66 4500 77776
FMGEN      56    00 20102 26 4200 00000
           57    01 20102 26 0000 77775
           60    01 20102 26 4002 00000
           61    01 20102 26 4004 00000
           62    04 20001 26 4100 00000
           63    05 43006 41 4000 00000
           64    01 50400 72 0400 00125      G
           65    42 43007 05 4002 00000
           66    02 50314 00 0001 00137      ABIT
           67    01 01040 00 4001 00220      SPACE
           70    00 45062 04 4000 00017
           71    00 45062 42 4000 00017
           72    42 45010 42 4000 00003
           73    01 50460 10 4004 00000
           74    04 10100 04 4004 77776
           75    41 21600 07 0001 00133      BASEF
```

```
                    77   04 43005 41 4000 77773
                   100   01 40001 00 4400 00125      G
                   101   01 40000 00 4400 00135      STEX
                   102   30 10001 41 0000 00004
                   103   01 03110 00 0000 00006
                   104   01 50470 00 0001 00125      BASEB
                   105   05 40000 41 4400 00126      XCWD
                   106   01 21700 00 0001 00117      ABIT
                   107   01 50215 00 0002 00000
SPACE              110   01 21704 41 0100 77774
                   111   02 53440 07 0100 77776
                   112   00 02050 52 4400 00101      FIRSTE
                   113   01 43006 00 4000 00001
                   114   04 45015 66 4000 00006
                   115   01 50460 00 4000 00001
                   116   00 21000 00 0000 00002
                   117   01 50011 70 0001 00003      SUM
INSUM              120   06 10000 06 4000 00002
                   121   00 02010 00 0000 77776
                   122   30 10000 06 0000 00006
SUM                123   40 10200 16 0000 00006
                   124   01 21700 00 0001 00103      MINEX
                   125   01 10021 00 0001 77774      SUM
                   126   30 10000 07 0000 00007
                   127   01 01050 00 4001 77767      INSUM
                   130   05 40002 41 4400 00006
                   131   01 40000 00 4400 00135      STEX
                   132   41 01010 06 4001 00072      ERROR2
                   133   01 50450 00 0000 77777
                   134   00 02010 00 0000 00114      PRCT
                   135   01 01000 00 4001 00002      NOFIX
                   136   00 02050 00 0000 77776
                   137   00 20100 05 0002 77776
NOFIX              140   01 50470 00 4004 00000
                   141   01 21700 00 4006 00000
                   142   01 21641 00 0001 00001      ZSTO
                   143   00 40021 00 4000 77776
ZSTO               144   01 20001 62 4002 00000
                   145   30 10000 66 0000 00004
                   146   01 43007 66 4400 00001
                   147   01 21704 41 0100 00000
                   150   01 43005 66 4500 77776
                   151   01 50460 52 0001 00055      MODB1
                   152   01 01000 00 4001 00001
GO                 153   00 20102 26 4200 00000
                   154   00 53002 26 4400 00004
                   155   01 45015 00 4006 00017
                   156   02 20100 00 0000 77777
                   157   01 20200 07 0000 00006
                   160   41 21641 00 0001 00006      LINEAR
                   161   01 40001 00 4400 00005
                   162   00 02010 00 0000 77776
                   163   01 01000 00 4001 00003      LINEAR
                   164   00 20100 00 4400 00125      G
                   165   01 20001 00 4400 77777
                   166   20 10001 00 0000 77777
LINEAR             167   01 40001 00 4000 00000
                   170   01 21700 00 4400 00006
                   171   01 10001 00 0000 77777
                   172   04 06150 00 4000 00001
                   173   01 01000 30 4001 00022      SPACEV
                   174   07 50010 00 0001 00041      CDWDM
                   175   01 40001 00 4400 00005
                   176   01 20041 00 0400 00125      G
                   177   01 40001 00 4401 77766      LINEAR
```

```
          201   05 50451 00 0100 77776
          202   01 40000 00 4400 00126      XCWD
          203   06 45020 06 4000 00001
          204   30 10000 04 0000 00004
FRECUR    205   01 40000 00 4001 77744      GO
          206   30 10000 05 0000 00005
          207   01 05150 00 4001 77774      FRECUR
          210   01 50470 00 0001 00021      BASEB
          211   01 40000 00 4400 00126      XCWD
          212   06 45010 06 4000 00001
          213   20 10000 04 0000 00004
          214   01 50450 76 0100 77776
          215   01 01000 66 4500 77776
SPACFV    216   01 21700 20 0001 00021      CDWDV
          217   01 21700 00 0001 00017      CDWDA
          220   01 50011 66 0000 00007
          221   01 40001 00 4400 00005
          222   01 20041 00 0400 00125      G
          223   01 40001 00 4401 77742      LINEAR
          224   01 01000 66 4500 77776
ERROR2    225   02 01000 00 4400 00172      ERPRS
ABIT      226   00 00000 00 4000 00000
MODB1     227   00 00000 00 0002 00000
MINEX     230   76 00000 00 0000 00000
BASEF     231   00 00006 00 0000 00000
BASEB     232   00 00007 00 0000 00001
READM     233   00 00001 20 4400 00000
READA     234   00 00001 20 4000 00000
READV     235   00 00001 20 0000 00000
CDWDM     236   00 00000 01 4400 00000
CDWDA     237   00 00000 01 4000 00000
CDWDV     240   00 00000 01 0000 00000
ENTER     241   01 40000 00 4001 77554      MMGEN
EXIT      242   01 21700 00 0001 00012      RLOOP
          243   01 20041 00 0001 77545      LOOP
          244   01 01000 00 4400 00137      UNSAVE
          245   46 10100 46 0500 77776
          246   47 41006 40 4000 77775
ERROR     247   00 01000 00 4401 77525      ERPR
          250   01 30000 00 0001 00001      MESS
          251   01 01000 00 4001 77767      EXIT
MESS      252   50 55654 05 3504 32543
          253   50 54445 56 2505 65533
          254   62 34222 52 5252 52525
RLOOP     255   01 21700 41 0700 77763
*********
```

```
317     ERPR     0 77775   1     2000000000000000   0
320     ENTRY    0 77776   1     3000000000000000   0
321     SAVE     0   126   0     4120000000000000   0
322     ERROR    0   247   1     4010000000000000   0
323     LOOP     0    12   1     2600000000000000   0
324     ENTER    0   241   1     3670000000000000   0
325     CDWDV    0   240   1     3600000000000000   0
326     MMGEN    0    17   1     7100000000000000   0
327     FMGEN    0    56   1     1360000000000000   0
330     MODB1    0   227   1     3360000000000000   0
331     MGEN     0    22   1     7400000000000000   0
```

333	READM	0	223	1	3460000000000000	0
334	XCWD	0	126	0	3640000000000000	0
335	BASEF	0	231	1	3420000000000000	0
336	RECUR	0	40	1	1120000000000000	0
337	BASEB	0	232	1	3440000000000000	0
340	READV	0	235	1	3520000000000000	0
341	READA	0	234	1	3500000000000000	0
342	G	0	125	0	3630000000000000	0
343	ARIT	0	226	1	3340000000000000	0
344	SPACE	0	110	1	2000000000000000	0
345	STEX	0	135	0	4110000000000000	0
346	FIRSTE	0	101	0	3610000000000000	0
347	SUM	0	123	1	2130000000000000	0
350	INSUM	0	120	1	2100000000000000	0
351	MINEX	0	230	1	3400000000000000	0
352	ERROR2	0	225	1	3320000000000000	0
353	PRCT	0	114	0	3620000000000000	0
354	NOFIX	0	140	1	2300000000000000	0
355	ZSTO	0	144	1	2340000000000000	0
356	GO	0	153	1	2460000000000000	0
357	LINEAR	0	147	1	2620000000000000	0
360	SPACEV	0	216	1	3160000000000000	0
361	CDWD1	0	236	1	3540000000000000	0
362	FRECUR	0	205	1	3050000000000000	0
363	CDWDA	0	237	1	3560000000000000	0
364	ERPRS	0	172	0	3660000000000000	0
365	EXIT	0	242	1	3700000000000000	0
366	RLOOP	0	255	1	4100000000000000	0
367	UNSAVE	0	127	0	4130000000000000	0
370	MESS	0	252	1	4050000000000000	0

CMTAKE

```
                                                                    1
CMTAKE          ORG                                                 2
                                                                    3
ENTRY           REF     *+ENTRY                                     4
MTAKE           REF     *MTAKE                                      5
ATAKE           REF     *ATAKE                                      6
                REF     *CMTAKE                                     7
                                                                    10
                REM     TAKE SPACE FOR MULTI-                       11
                REM     DIMENSIONAL COMPLEX ARRAY,                  12
                                                                    13
                TRA     *ENTRY                                      14
          Z     RWT     TEST,CC+1                                   15
          I     RWT     TEST                                        16
          PF    RWT     EXIT                                        17
          B5    SUR     -*B6-1,U+PF                                 20
                CLA+2   B6+PF-3,PF=1                                21
         -PF    LT7     a,B6+PF-1,U+PF                              22
          T7    RPA     PSTO,R+T7                                   23
          PF    LDR     a,B6+PF+1,U+B6                              24
          R     RPA     PLIST,B6+1                                  25
          I     SB5,ERM a,B6=1,U+PF                                 26
PSTO              CLA+3 (Z)+PF,B5-1                                 27
PLIST     T7      SB6   (Z),U+B5                                    30
TEST      Z       IF(ZER)SKP a(Z)                                   31
                  TRA   aCMPLX                                      32
                  TSR   *MTAKE,CC+1                                 33
                  TSR   *MTAKE,CC+1                                 34
EXIT              TRA   Z,B6-1                                      35
                                                                    36
CMPLX             TSR   a*ATAKE,CC+1                                37
                  TSR   a*ATAKE,CC+1                                40
                  TRA   aEXIT                                       41
                                                                    42
                END                                                 43
                                                                    44
```

```
ENTRY   77774   75 44556 26 1400 00000
MTAKE   77775   54 63405 24 4400 00000
ATAKE   77776   40 63405 24 4400 00000
        77777   42 54654 05 2400 00000
            1   01 01000 00 4401 77772   ENTRY
            2   00 21641 20 0001 00013   TEST
            3   20 21641 00 0001 00012   TEST
            4   47 21641 00 0001 00015   EXIT
            5   45 53000 47 1500 77776
            6   01 21702 47 0300 77774
            7   57 50470 47 4300 77776
           10   07 21601 17 0001 00003   PSTO
           11   47 50400 46 4200 00001
           12   02 21601 26 0001 00002   PLIST
           13   20 40025 47 4100 77776
PSTO       14   01 21702 45 0200 00000
PLIST      15   07 40006 45 4000 00000
TEST       16   00 02010 00 4000 00000
           17   01 01000 00 4001 00003   CMPLX
           20   01 40000 20 4401 77754   MTAKE
           21   01 40000 20 4401 77753   MTAKE
EXIT       22   01 01000 46 4000 00000
CMPLX      23   01 40000 20 4401 77752   ATAKE
           24   01 40000 20 4401 77751   ATAKE
           25   01 01000 00 4001 77773   EXIT
********
```

```
316   ENTRY   0 77774   1   20000000000000   0
317   MTAKE   0 77775   1   30000000000000   0
320   ATAKE   0 77776   1   40000000000000   0
321   TEST    0    16   1   33000000000000   0
322   EXIT    0    22   1   37000000000000   0
323   PSTO    0    14   1   31000000000000   0
324   PLIST   0    15   1   32000000000000   0
325   CMPLX   0    23   1   40000000000000   0
```

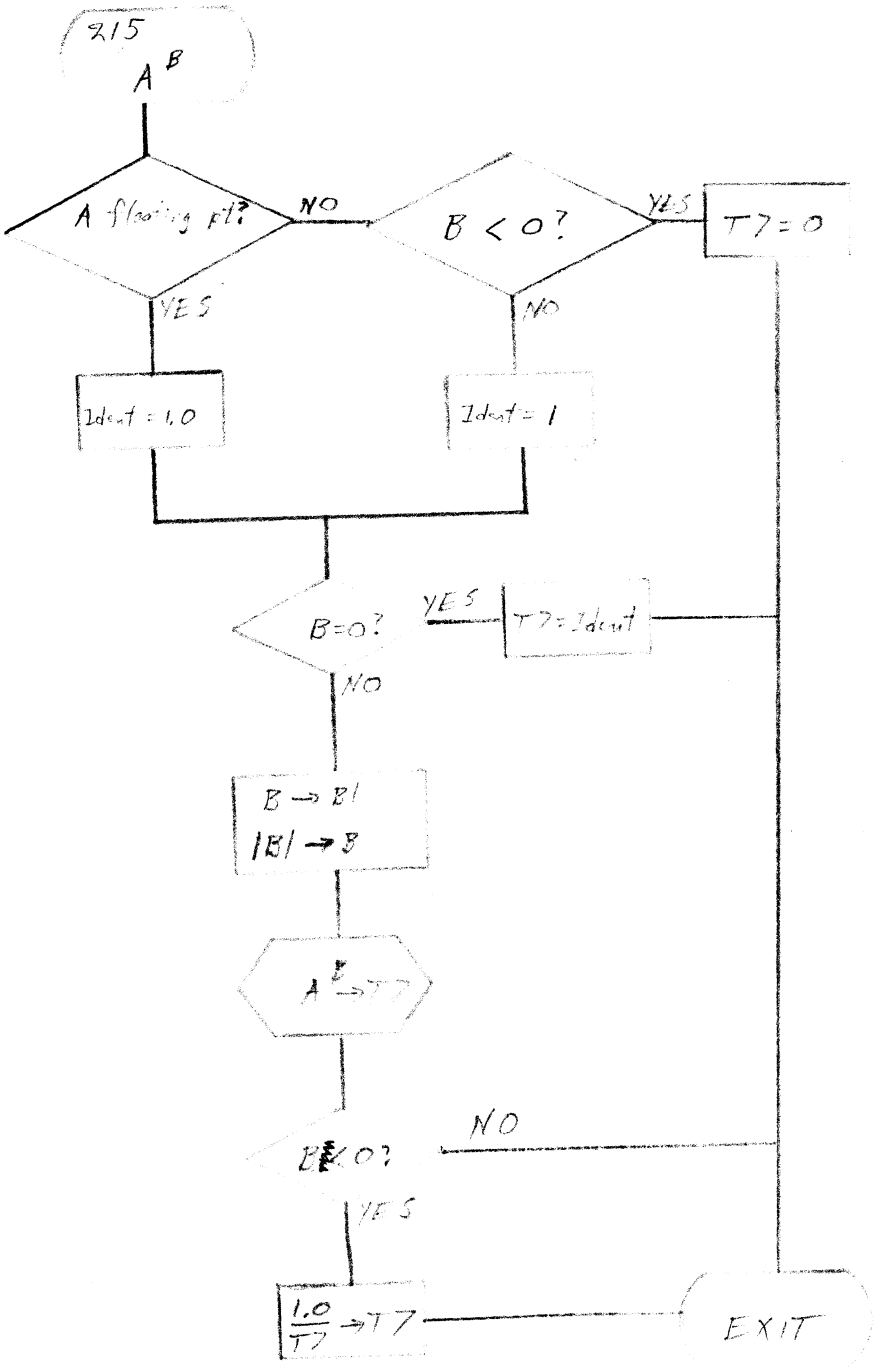
FXEXP

```
                                                                        1
FXEXP           ORG                                                     2
                                                                        3
ERPR            REF             *-ERPR                                  4
ELOC            REF             -ELOC                                   5
                                                                        6
                REM             FXEXP(U, R) - U, T7                     7
                                                                        10
                TRA             CC+1,U-T7                               11
                TRA             CC+2,U-T7                               12
          PF    21600           NAME                                    13
                STO             *ELOC                                   14
          T7    IF(NZE)TRA      FINE                                    15
          R     IF(PNZ)TRA      BYE                                     16
          CO    TRA             *ERPR                                   17
                NOP             MESS2                                   20
BYE       Z     TRA             PF,U-T7                                 21
FINE      PF    RWT             LEAVE                                   22
          P     RWT             TEST,R-PF                               23
          T6    LT6+2           a1,B6+1                                 24
          Z     BEU+2           T7                                      25
                IF(NUL)TRA      aCC+1                                   26
                LT6             a1,0,CC+1                               27
          PF    IF(NNZ)TRA      aOUT                                    30
          PF    IF(ZER)TRA      aEXIT                                   31
MORE      |PF|  IF(EVN)TRA      aCC+1                                   32
          T7    FMP+22          T6,U-T6                                 33
          |PF|  CUR             a1,U-PF                                 34
                IF(NUL)TRA      aTEST                                   35
          T7    FMP+22          T7,U-T7                                 36
                TRA             aMORE                                   37
TEST      Z     IF(NEG)SKP      a(Z)                                    40
          T6    VDF+2           a1,0,CC+1                               41
OUT       T7    IF(ZER)SKP      a1                                      42
                LT6             B6                                      43
EXIT      T6    LT6             B6-1,B6-1                               44
LEAVE           TRA             a(Z),U-T7                               45
MESS            BCD             BASE IS NEGATIVE,,,RESULT=Z/
MESS2           BCD             ZERO BASE WITH NON-POSITIVE             47
                                EXPONENT,,,RESULT=Z/                    50
NAME            BCD             FXEXP000000                             51
                                                                        52
                END                                                     53
                                                                        54
```

```
       ERPR    77776        75 44615 76 1400 00000
       ELOC    77777        75 44535 64 2000 00000
FXEXP(U, R) + U, T7
                   1        01 01000 07 4001 00001
                   2        01 01000 07 4001 00002
                   3        47 21600 00 0001 00044      NAME
                   4        01 20001 00 4401 77772      ELOC
                   5        07 01050 00 4001 00004      FINE
                   6        02 05150 00 4001 00002      BYE
                   7        00 01000 00 4401 77766      ERPR
                  10        01 20000 00 0001 00031      MESS2
       BYE        11        00 01000 07 4200 00000
       FINE       12        47 21641 00 0001 00022      LEAVE
                  13        02 21641 57 0001 00014      TEST
                  14        06 50462 26 4000 00001
                  15        00 21002 00 0000 00007
                  16        01 01040 00 4001 00001
                  17        01 50460 20 0001 00032      +0000A
                  20        47 05550 00 4001 00011      OUT
                  21        47 01010 00 4001 00012      EXIT
       MORE       22        67 01020 00 4001 00001
                  23        07 10622 06 0000 00006
                  24        67 45010 47 4000 00001
                  25        01 01040 00 4001 00002      TEST
                  26        07 10622 07 0000 00007
                  27        01 01000 00 4001 77771      MORE
       TEST       30        00 02510 00 4000 00000
                  31        06 16702 20 0001 00020      +0000A
       OUT        32        07 02010 00 4000 00001
                  33        01 50460 00 0100 00000
       EXIT       34        06 50460 66 0100 77776
       LEAVE      35        01 01000 07 4000 00000
       MESS       36        41 40624 42 5506 22555
                  37        44 46406 35 0654 42323
                  40        23 61446 26 4536 33671
                  41        22 25252 52 5252 52525
       MESS2      42        71 44615 62 5414 06244
                  43        25 66506 34 7255 55655
                  44        21 57566 25 0635 06544
                  45        25 44675 75 6554 45563
                  46        23 23236 14 4626 45363
                  47        36 71222 52 5252 52525
       NAME       50        45 67446 75 7000 00000
                  51        00 00252 52 5252 52525
*********
       +0000A     52        01 00100 00 0000 00000
```

```
315    ERPR     0 77776    1     2000000000000     0
316    ELOC     0 77777    1     3000000000000     0
317    NAME     0      50  1    62000000000000     0
320    FINE     0      12  1    21000000000000     0
321    BYE      0      11  1    20000000000000     0
322    MESS2    0      42  1    53000000000000     0
323    LEAVE    0      35  1    44000000000000     0
324    TEST     0      30  1    37000000000000     0
325    +0000A   0      52  1    65000000000000     0
326    OUT      0      32  1    41000000000000     0
327    EXIT     0      34  1    43000000000000     0
```

330	MORE	0	22	1	3100000000000000	0
331	MESS	0	36	3	4600000000000000	0


215
A^B
A floating pt?
NO
B < 0?
YES
T7 = 0
YES
NO
Ident = 1.0
Ident = 1
B=0?
YES
T7 = Ident
NO
B → B1
|B| → B
A^B → T7
B=0?
NO
YES
1.0/T7 → T7
EXIT

ODD

```
                                                                    1
ODD             ORG                                                 2
                                                                    3
                REM             GENIE ODD (T7)=TRUE                 4
                                                                    5
                IF(EVN)TRA      ACC+1                               6
-Z              TRA             PF,U+T7                             7
-I              TRA             PF,U+T7                             10
                                                                    11
                END                                                 12
```

PROGRAM ODD 04/26/68 15.56

```
1   27 01020 00 4001 00001
2   10 01000 07 4300 00000
3   30 01000 07 4300 00000
*********
```

MODUL

```
                                                                    1
MODUL           ORG                                                 2
                                                                    3
                REM             A MOD B→U,T7                        4
                                                                    5
                CLA             *B6=2,B6-1                          6
                IDV             *B6,R→T7                            7
          T7    TRA             8PF,B6-1                            10
                END                                                 11
                                                                    12
```

PROGRAM MODUL 01/29/68 16.33

```
     1   01 21700 66 0500 77775
     2   01 13300 17 0500 00000
     3   07 01000 66 4200 00000
*********
```

FLEXP

```
                                                                    1
FLEXP           ORG                                                 2
LOG             REF             *LOG                                3
EXP             REF             *EXP                                4

ERPR            REF             *-ERPR                              5

ELOC            REF             -ELOC                               6
                REM             FLEXP(U,R)-U,T7                     7
                TRA             CC+1,U-T7                           10

                TRA             CC+2,U-T7                           11
                PF      21600   NAME                                12
                STO             *ELOC                               13
                T7      XUR+2   Z,U-R                               14
                T7      IF(PNZ)TRA GO                               15
                00      TRA     *ERPR                               16
                        NOP     MESS1                               17
ZERO            Z       TRA     PF,U-T7                             20
ONE             PF      SUR,LT7 d1.0,R-CC                           21
GO              PF      RWT     EXIT,B6+1                           22
                        TSR     *LOG,CC+1                           23
EXIT            PF      SPF     Z                                   24
                T7      FMP     B6-1,U-T7                           25

                        IF(POS)SKP d170.0,B6-1                      26
                        TRA     *EXP,CC+1                           27
                00      TRA     *ERPR                               30

                        NOP     MESS2                               31
                PF      SUR,LT7 37 0231 0516 1340 2663,R-CC         32
MESS1           BCD             NEGATIVE OR ZERO BASE/              33
MESS2           BCD             OVERFLOW IN RESULT/                 34
NAME            BCD             FLEXP                               35
                END                                                 36
                                                                    37

                                                                    40
```

```
        LOG     77774        53 56462 52 5400 00000
        EXP     77775        44 67572 52 5400 00000
        ERPR    77776        75 44615 76 1400 00000

        ELOC    77777        75 44535 64 2000 00000

FLEXP(U,R)+U,T7
                     1       01 01000 07 4001 00001
                     2       01 01000 07 4001 00002
                     3       47 21600 00 0001 00026      NAME
                     4       01 20001 00 4401 77772      ELOC
                     5       07 54002 02 0000 00000
                     6       07 05150 00 4001 00004      GO
                     7       00 01000 00 4401 77766      ERPR
                    10       01 20000 00 0001 00013      MESS1
        ZERO        11       00 01000 07 4200 00000
        ONE         12       47 53470 50 0001 00020      +0000A
        GO          13       47 21641 26 0001 00001      EXIT

                    14       01 40000 20 4401 77757      LOG
        EXIT        15       01 40007 00 4000 00000
                    16       07 10600 07 0100 77776
                    17       01 02110 66 0001 00014      +0000B
                    20       01 01000 20 4401 77754      EXP

                    21       00 01000 00 4401 77754      ERPR
                    22       01 20000 00 0001 00004      MESS2
                    23       47 53470 50 0001 00011      +0000C
        MESS1       24       55 44464 06 3506 54425
                    25       56 61257 14 4615 62541
                    26       40 62442 22 5252 52525
        MESS2       27       56 65446 14 5535 66625
                    30       50 55256 14 4626 45363
                    31       22 25252 52 5252 52525
        NAME        32       45 53446 75 7252 52525
********
        +0000A      33       01 00100 00 0000 00000
        +0000B      34       01 25200 00 0000 00000

        +0000C      35       37 02310 51 6134 02663


   315      LOG        0 77774     1          20000000000000     0
   316      EXP        0 77775     1          30000000000000     0
   317      ERPR       0 77776     1          40000000000000     0
   320      ELOC       0 77777     1          50000000000000     0
   321      NAME       0    32     1         450000000000000     0
   322      GO         0    13     1         230000000000000     0
   323      MESS1      0    24     1         350000000000000     0

   324      ZERO       0    11     3         210000000000000     0
   325      ONE        0    12     3         220000000000000     0
   326      +0000A     0    33     1         470000000000000     0
   327      EXIT       0    15     1         250000000000000     0
   330      +0000B     0    34     1         500000000000000     0

   331      MESS2      0    27     1         410000000000000     0

   332      +0000C     0    35     1         510000000000000     0
```

EVEN

```
EVEN            ORG
                REM             GENIE  EVEN(T7) = TRUE
        |T7|    IF(ODD)TRA      CC+1
        -Z      TRA             PF,U+T7
        -I      TRA             PF,U+T7

                END
```

PROGRAM EVEN 02/14/68 10.00

```
        1   27 01060 00 4001 00001
        2   10 01000 07 4200 00000
        3   30 01000 07 4200 00000
*********
```

FIX

```
                                                                    1
FIX             ORG                                                 2
                                                                    3
ERPR            REF             *←ERPR                              4
ENTRY           REF             *←ENTRY                             5
                REF             *FIX                                6
                                                                    7
                REM             GENIE FIX(T7) → U,T7                10
                                                                    11
                TRA             *ENTRY                              12
          |T7|  IF(POS)SKP      LOWER                               13
          Z     TRA             PF,U→T7                             14
          |T7|  IF(NNZ)SKP      UPPER                               15
                TRA             SEE                                 16
          T7    FAD             LOWER                               17
                FAD+60          0600000000000000000                 20
                DML             a1                                  21
                BEU             Z,U→T7                              22
                IF(PNZ)TRA      PF                                  23
          T7    SUB             a1,U→T7                             24
                TRA             PF                                  25
SEE       00    TRA             *ERPR                               26
                NOP             MESS1                               27
          Z     TRA             PF,U→T7                             30
                                                                    31
LOWER           DEC             0.5                                 32
UPPER           DEC             16383.5                             33
                                                                    34
MESS1           BCD             ARGUMENT LARGER THAN 16383.5...RESUL
                BCD             T SET TO 0/                         36
                                                                    37
                END                                                 40
                                                                    41
                                                                    42
```

```
ERPR      77775   75 44615 76 1400 00000
ENTRY     77776   75 44556 36 1400 00000
          77777   45 50672 52 5400 00000
              1   01 01000 00 4401 77774   ENTRY
              2   27 02110 00 0001 00015   LOWER
              3   00 01000 07 4200 00000
              4   27 06550 00 0001 00014   UPPER
              5   01 01000 00 4001 00007   SEE
              6   07 10400 00 0001 00011   LOWER
              7   01 10460 00 0001 00020   +0000A
             10   01 44010 00 4000 00001
             11   01 21000 07 0000 00000
             12   01 05150 00 4200 00000
             13   07 10100 07 4000 00001
             14   01 01000 00 4200 00000
SEE          15   00 01000 00 4401 77757   ERPR
             16   01 30000 00 0001 00003   MESS1
             17   00 01000 07 4200 00000
LOWER        20   77 20000 00 0000 00000
UPPER        21   02 07777 70 0000 00000
MESS1        22   40 61466 45 4445 56325
             23   53 40614 64 4612 56347
             24   40 55250 10 6031 00323
             25   05 23232 36 1446 26453
             26   63 25624 46 3256 35625
             27   00 22252 52 5252 52525
*********
+0000A       30   06 00000 00 0000 00000
```

```
316   ERPR     0 77775   1    20000000000000   0
317   ENTRY    0 77776   1    30000000000000   0
320   LOWER    0    20   1   310000000000000   0
321   UPPER    0    21   1   330000000000000   0
322   SEE      0    15   1   250000000000000   0
323   +0000A   0    30   1   450000000000000   0
324   MESS1    0    22   1   350000000000000   0
```

FLOAT

```
                                                                    1
FLOAT           ORG                                                 2
                                                                    3
                REM             FLOAT(T7) → U, T7                   4
                                                                    5
        -T7     CPL             a7                                  6
                FMP             TW047,U→T7                          7
                TRA             aPF                                10
TW047           OCT             0620000000000000000                11
                                                                   12
                END                                                13
                                                                   14
```

PROGRAM FLOAT 02/14/68 10.03

```
                1   17 50100 00 4000 00000
                2   01 10600 07 0001 00001      TW047
                3   01 01000 00 4200 00000
        TW047   4   06 20000 00 0000 00000
*********
```

316 TW047 0 4 1 110000000000000 0

RANDM

```
RANDM           ORG

                REM           QUASI-RANDOM NUMBER
                REM           0 < T7 < 1.0

          T7    IF(ZER)TRA    @CC+1
          I     STO           @ACCUM
                CLA           RANDOM
                IMP*          ACCUM
                FAD           @7,U*T7
                TRA           @PF

ACCUM           OCT           1
RANDOM          OCT           770425434430110475

                END
```

```
PROGRAM      RANDM                                   02/14/68 10.05

                  1   07 01010 00 4001 00001
                  2   20 20001 00 4001 00004     ACCUM
                  3   01 21700 00 0001 00004     RANDOM
                  4   01 10221 00 0001 00002     ACCUM
                  5   01 10400 07 4000 00000
                  6   01 01000 00 4300 00000
        ACCUM     7   00 00000 00 0000 00001
        RANDOM   10   77 04254 34 4301 10475
*********
```

```
  316      ACCUM    0    7    1        200000000000000    0
  317      RANDOM   0   10    1        220000000000000    0
```

CADD

```
CADD    ORG
        REM             COMPLEX SCALAR ADD
REAL    REF             CMPLX
IMAG    REF             *****

        CLA             B1
        FAD             B2,U*T7
        CLA             B1+1
        FAD             B2+1,U*R
T7      STO,DBL         *REAL
        TRA             *B2

        END
```

PROGRAM CADD 5/23/66 12.03

COMPLEX SCALAR ADD

```
REAL   77776    42 54575 36 7000 00000
IMAG   77777    75 75757 57 5000 00000
           1    01 21700 00 0002 00000
           2    01 10400 07 0004 00000
           3    01 21700 00 0002 00001
           4    01 10400 02 0004 00001
           5    07 20005 00 4401 77770     REAL
           6    01 01000 00 4400 77774
********
```

```
315    REAL    0 77776   1          500000000000000    0
316    IMAG    0 77777   3          600000000000000    0
```

CSUB

```
CSUB            ORG
                REM             COMPLEX SCALAR SUBTRACT
REAL            REF             CMPLX
IMAG            REF             *****
                CLA             B1
                FSB             B2,U→T7
                CLA             B1+1
                FSB             B2+1,U→R
          T7    STO,DRL         *REAL
                TRA             *B2
                END
```

edit:
10 11 1
~~B2~~ LDR+2 B1
15 16 1
TRA *B6

PROGRAM CSUB 5/23/66 12.03

COMPLEX SCALAR SUBTRACT

```
REAL   77776     42 54575 36 7000 00000
IMAG   77777     75 75757 57 5000 00000
                 1  01 21700 00 0002 00000
                 2  01 10500 07 0004 00000
                 3  01 21700 00 0002 00001
                 4  01 10500 02 0004 00001
                 5  07 20005 00 4401 77770      REAL
                 6  01 01000 00 4400 77774
*********
```

315	REAL	0	77776	1	60000000000000	0
316	IMAG	0	77777	3	70000000000000	0

CMPY

```
CMPY          ORG
              REM            COMPLEX SCALAR MULTIPLY

REAL          REF            CMPLX
IMAG          REF            +++++

              CLA            B1,U+T7
              FMP+2          B2+1,B6+1
        T7    FMP+2          B2,B6+1
              CLA            B1+1,U+T7
              FMP+2          B2,B6-1
       -T7    FMP            B2+1,B6-1
              FAD            B6+1,U+T7
              CLA            B6+2
              FAD            B6,U+R
        T7    STO,DBL        *REAL
              TRA            *P2

              END
```

```
PROGRAM     CMPY                                  5/23/66 12.06

COMPLEX SCALAR MULTIPLY
        REAL    77776      42 54575 36 7000 00000
        IMAG    77777      75 75757 57 5000 00000
                    1      01 21700 07 0002 00000
                    2      01 10602 26 0004 00001
                    3      07 10602 26 0004 00000
                    4      01 21700 07 0002 00001
                    5      01 10402 66 0004 00000
                    6      17 10600 66 0004 00001
                    7      01 10400 07 0100 00001
                   10      01 21700 00 0100 00002
                   11      01 10400 02 0100 00000
                   12      07 20005 00 4401 77763      REAL
                   13      01 01000 00 4400 77774
*********
```

```
315      REAL      0 77776     1          60000000000000     0
316      IMAG      0 77777     3          70000000000000     0
```

CDIV

```
CDIV                  ORG

                      REM         COMPLEX SCALAR DIVIDE

REAL                  REF         CMPLX
IMAG                  REF         *****

                      CLA         B2,U+T7
                      FMP+2       U,B6+1
           T7         FMP+2       B1,B6+1
           T7         FMP+2       B1+1,B6+1
                      CLA         B2+1,U+T7
                      FMP         U
                      FAD+2       B6-3,B6+1
          -T7         FMP+2       B1,B6-1
           T7         FMP         B1+1,B6-1
                      FAD         B6-1,B6-1
                      FDV         B6+2,U+T7
                      CLA         B6+1,B6-1
                      FAD         B6+4
                      FDV         B6+3,U+R
           T7         STO,DBL     *REAL
                      TRA         *B2

                      END
PROGRAM        CDIV                                  5/23/66 12.07

COMPLEX SCALAR DIVIDE
       REAL   77776      42 54575 36 7000 00000
       IMAG   77777      75 75757 57 5000 00000
                  1      01 21700 07 0004 00000
                  2      01 10602 26 0000 00001
                  3      07 10602 26 0002 00000
                  4      07 10602 26 0002 00001
                  5      01 21700 07 0004 00001
                  6      01 10600 00 0000 00001
                  7      01 10402 26 0100 77774
                 10      17 10602 66 0002 00000
                 11      07 10600 66 0002 00001
                 12      01 10400 66 0100 77776
                 13      01 10700 07 0100 00002
                 14      01 21700 66 0100 00001
                 15      01 10400 00 0100 00004
                 16      01 10700 02 0100 00003
                 17      07 20005 00 4401 77756     REAL
                 20      01 01000 00 4400 77774
*********




375          REAL        0 77776      1                6000000000000     0
376          IMAG        0 77777      3                7000000000000     0
```

CXEXP

```
                                                                    1
CXEXP           ORG                                                 2
                REM     CXEXP(*U,R)→CMPLX,CMPLX+1 AND U,R
                REM     (X+/Y)↑N↓=(.R*e↑.ITHETA↓)↑N↓=.R↑N↓*e↑
REAL            REF     CMPLX           I X N X THETA↓              5
IMAG            REF     ←←←←←                                       6
POLAR           REF     *POLAR                                      7
CARTN           REF     *CARTN                                      10
FXEXP           REF     *FXEXP                                      11
ELOC            REF     ←ELOC                                       12
                                                                    13
                XUR+2   Z,CC+1                                      14
                TRA     JUMP                                        15
                PF      21600   NAME,B6+1                           16
                STO     *ELOC,CC+1                                  17
JUMP            XUR+2   Z,B6+1                                      20
                PF      RWT     EXIT,R→PF                           21
                CLA,DBL+2       PF,B6+1                             22
                CLA,DBL+2       aB6=2,B6+1                          23
                TSR     *POLAR,CC+1                                 24
                -LDU    -B6-3,B6-1                                  25
                FMP     0620000000000000000,B6-1                    26
                FMP+2   *IMAG,B6+1                                  27
                CLA     *REAL                                       30
                LDR     B6-2                                        31
                TSR     *FXEXP,CC+1                                 32
                STO     B6-2                                        33
                CLA,DBL+2       aB6=2,B6+1                          34
                TSR     *CARTN,CC+1                                 35
                CLA,DBL         *REAL,B6-1                          36
EXIT            TRA     Z,B6-1                                      37
NAME            BCD     CXEXP0000                                   40
                                                                    41
                END                                                 42
```

```
          REAL      77772     42 54575 36 7000 00000
          IMAG      77773     75 75757 57 5000 00000
          POLAR     77774     57 56534 06 1400 00000
          CARTN     77775     42 40616 35 5400 00000
          FXEXP     77776     45 67446 75 7400 00000
          ELOC      77777     75 44535 64 2000 00000
                          1   01 54002 20 0000 00000
                          2   01 01000 00 4001 00002     JUMP
                          3   47 21600 26 0001 00021     NAME
                          4   01 20001 20 4401 77772     ELOC
          JUMP            5   01 54002 26 0000 00000
                          6   47 21641 57 0001 00015     EXIT
                          7   01 21706 26 0200 00000
                         10   01 21706 26 4100 77775
                         11   01 40000 20 4401 77762     POLAR
                         12   01 50414 46 1100 77774
                         13   01 10600 66 0001 00012     +0000A
                         14   01 10402 26 0401 77756     IMAG
                         15   01 21700 00 0401 77754     REAL
                         16   01 50400 00 0100 77775
                         17   01 40000 20 4401 77756     FXEXP
                         20   01 20051 00 4100 77775
                         21   01 21706 26 4100 77775
                         22   01 40000 20 4401 77752     CARTN
                         23   01 21704 66 0401 77746     REAL
          EXIT           24   01 01000 66 4000 00000
          NAME           25   42 67446 75 7000 00000
*********
          +0000A         26   06 20000 00 0000 00000


     316        REAL       0 77772     1          15000000000000000    0
     317        IMAG       0 77773     1          16000000000000000    0
     320        POLAR      0 77774     1          17000000000000000    0
     321        CARTN      0 77775     1          20000000000000000    0
     322        FXEXP      0 77776     1          21000000000000000    0
     323        ELOC       0 77777     1          22000000000000000    0
     324        JUMP       0     5     1          27000000000000000    0
     325        NAME       0    25     1          50000000000000000    0
     326        EXIT       0    24     1          46000000000000000    0
     327        +0000A     0    26     1          52000000000000000    0
```

CFEXP

```
CFEXP               ORG
                    REM          CFEXP(*U,R)+CMPLX,CMPLX+1  AND U,R
  1       1       1 REM          (X+/Y) NO=( ,Rxe  .ITHETAO)  NO= .R Noxe  ,IxN
REAL                REF          CMPLX
IMAG                REF          +++++
POLAR               REF          *POLAR
CARTN               REF          *CARTN
FLEXP               REF          *FLEXP
ERR                 REF          *+ERPR
ELOC                REF          +ELOC
                    XUR+2        Z,CC+1
                    TRA          JUMP
          PF        21600        NAME,B6+1
                    STO          *ELOC,CC+1
JUMP                XUR+2        Z,B6+1
          PF        RWT          EXIT,R+PF
                    CLA,DBL+2    PF,R+T7
                    IF(NZE)SKP   Z,B6+1
          T7        IF(ZER)TRA   ERRM
                    CLA,DBL+2    aB6-2,B6+1
                    TSR          *POLAR,CC+1
                    CLA          *IMAG,B6-1
                    FMP          B6-2,B6-1
                    LDR+2        B6-1,B6+1
                    CLA          *REAL
                    TSR          *FLEXP,CC+1
                    STO          B6-2
                    CLA,DBL+2    aB6-2,B6+1
                    TSR          *CARTN,CC+1
                    CLA,DBL      *REAL,B6-1
                    TRA          Z,B6-1
EXIT                SPF          *EXIT,B6-1
ERRM                TRA          *ERR
          Z         NOP          MESS
                    LDR          Z
          Z         STO,DBL      *REAL
                    TRA          EXIT
MESS                BCD          ZERO BASE/
NAME                BCD          CFEXP0000
                    END
```

```
CFEXP(*U,R)→CMPLX,CMPLX+1 AND U,R
(X+/Y)↓N↓=(R×e↑÷THETA↓)↓N↓=R↓N↓×e↑÷×N×THETA↓
        REAL    77771       42 54575 36 7000 00000
        IMAG    77772       75 75757 57 5000 00000
        POLAR   77773       57 56534 06 1400 00000
        CARTN   77774       42 40616 35 5400 00000
        FLEXP   77775       45 53446 75 7400 00000
        ERR     77776       75 44615 76 1400 00000
        ELOC    77777       75 44535 64 2000 00000
                    1       01 54002 20 0000 00000
                    2       01 01000 00 4001 00002      JUMP
                    3       47 21600 26 0001 00032      NAME
                    4       01 20001 20 4401 77772      ELOC
        JUMP        5       01 54002 26 0000 00000
                    6       47 21641 57 0001 00016      EXIT
                    7       01 21706 17 0200 00000
                   10       01 02050 26 0000 00000
                   11       07 01010 00 4001 00014      ERRM
                   12       01 21706 26 4100 77775
                   13       01 40000 20 4401 77757      POLAR
                   14       01 21700 66 0401 77755      IMAG
                   15       01 10600 66 0100 77775
                   16       01 50402 26 0100 77776
                   17       01 21700 00 0401 77751      REAL
                   20       01 40000 20 4401 77754      FLEXP
                   21       01 20001 00 4100 77775
                   22       01 21706 26 4100 77775
                   23       01 40000 20 4401 77750      CARTN
                   24       01 21704 66 0401 77744      REAL
        EXIT       25       01 01000 66 4000 00000
        ERRM       26       01 40007 66 4401 77775      EXIT
                   27       00 01000 00 4401 77746      ERR
                   30       01 30000 00 0001 00003      MESS
                   31       01 50400 00 0000 00000
                   32       00 20005 00 4401 77736      REAL
                   33       01 01000 00 4001 77770      EXIT
        MESS       34       71 44615 62 5414 06244
                   35       22 25252 52 5252 52525
        NAME       36       42 45446 75 7000 00000
*****
```

315	REAL	0	77771	1	1500000000000000	0
316	IMAG	0	77772	1	1600000000000000	0
317	POLAR	0	77773	1	1700000000000000	0
320	CARTN	0	77774	1	2000000000000000	0
321	FLEXP	0	77775	1	2100000000000000	0
322	ERR	0	77776	1	2200000000000000	0
323	ELOC	0	77777	1	2300000000000000	0
324	JUMP	0	5	1	3000000000000000	0
325	NAME	0	36	1	6300000000000000	0
326	EXIT	0	25	1	5000000000000000	0
327	ERRM	0	26	1	5100000000000000	0
330	MESS	0	34	1	6000000000000000	0

CCEXP

```
                                                                    1
CCEXP           ORG                                                 2
                REM     CCEXP(*U,*R)→CMPLX,CMPLX+1 AND U,R
                REM     Z↑W↓=e↑WxLOG(Z)↓ WHERE Z AND W ARE CO
CLOG            REF     *CLOG                                       5
CEXP            REF     *CEXP                                       6
CMPY            REF     *CMPY                                       7
REAL            REF     CMPLX                                      10
IMAG            REF     ←←←←                                       11
ELOC            REF     ←ELOC                                      12
                LT7     U,CC+1                                     13
                TRA     CC+2,U→T7                                  14
          PF    21600   NAME                                       15
                STO     *ELOC                                      16
          PF    RWT     EXIT,R→PF                                  17
                CLA+2   aB1,B6+1                                   20
                CLA+2   aB2,B6+1                                   21
                CLA,DBL+2 PF,B6+1                                  22
                SPF     *T7                                        23
                CLA,DBL+2 PF,R→T7                                  24
                IF(NZE)SKP Z,B6+1                                  25
          T7    IF(ZER)TRA ZERO,R→Z                                26
                CLA,DBL+2 aB6=2,B6+1                               27
                TSR     *CLOG,CC+1                                 30
                CLA,DBL+2 *REAL,B6+1                               31
                SB1     aB6=2                                      32
                SB2     aB6=6                                      33
                TSR     *CMPY                                      34
                CLA,DBL+2 *REAL,B6+1                               35
                CLA,DBL+2 aB6=2,B6+1                               36
                TSR     *CEXP,CC+1                                 37
                AB6     Z-B6,CC+1                                  40
ZERO      Z     STO,DBL *REAL,B6-1                                 41
                SB2     *B6=3,B6-1                                 42
                SB1     *B6=3,B6-1                                 43
                CLA,DBL *REAL,B6-1                                 44
EXIT            TRA     Z,B6-1                                     45
NAME            BCI     CCEXP0000                                  46
                END                                                47
```

```
         CLOG     77772     42 53564 62 5400 00000
         CEXP     77773     42 44675 72 5400 00000
         CMPY     77774     42 54577 02 5400 00000
         REAL     77775     42 54575 26 7000 00000
         IMAG     77776     75 75757 57 5000 00000
         ELOC     77777     75 44535 64 2000 00000
                      1     01 50470 20 0000 00001
                      2     01 01000 07 4001 00002
                      3     47 21600 00 0001 00030      NAME
                      4     01 20001 00 4401 77772      ELOC
                      5     47 21641 57 0001 00025      EXIT
                      6     01 21702 26 4002 00000
                      7     01 21702 26 4004 00000
                     10     01 21706 26 0200 00000
                     11     01 40007 00 4400 00007
                     12     01 21706 17 0200 00000
                     13     01 02050 26 0000 00000
                     14     07 01010 10 4001 00012      ZERO
                     15     01 21706 26 4100 77775
                     16     01 40000 20 4401 77753      CLOG
                     17     01 21706 26 0401 77755      REAL
                     20     01 40001 00 4100 77775
                     21     01 40002 00 4100 77771
                     22     01 40000 00 4401 77751      CMPY
                     23     01 21706 26 0401 77751      REAL
                     24     01 21706 26 4100 77775
                     25     01 40000 20 4401 77745      CEXP
                     26     01 41006 20 4000 77771
         ZERO        27     00 20005 66 4401 77745      REAL
                     30     01 40002 66 4500 77774
                     31     01 40001 66 4500 77774
                     32     01 21704 66 0401 77742      REAL
         EXIT        33     01 01000 66 4000 00000
         NAME        34     42 42446 75 7000 00000
*********
```

```
  316       CLOG     0 77772     1          150000000000000     0
  317       CEXP     0 77773     1          160000000000000     0
  320       CMPY     0 77774     1          170000000000000     0
  321       REAL     0 77775     1          200000000000000     0
  322       IMAG     0 77776     3          210000000000000     0
  323       ELOC     0 77777     1          220000000000000     0
  324       NAME     0    34     1          570000000000000     0
  325       EXIT     0    33     1          550000000000000     0
  326       ZERO     0    27     1          510000000000000     0
```

CONTROL

```
                                                                    1
CONTROL         ORG                                                 2
                                                                    3
                REM             CONTROL(N,WXYZ,R,NAME)              4
                                                                    5
                CLA             *B6=2,R+Z                           6
                LRS             &+12,B6-1                           7
                CLA             *B6=2                              10
                LRS             &+12,B6-1                          11
                CLA             *B6=2                              12
                LRS             &+15,B6-1                          13
          Z     IF(ZER)SKP      PRCT,B6-1                          14
          R     BAU             *B6+3,CC+1                         15
          R     BAU             B6+3                               16
                TRA             &*XCWD,U+T7                        17
                                                                   20
PRCT            EQU             114                                21
XCWD            EQU             126                                22
                                                                   23
                END                                                24
                                                                   25
```

PROGRAM CONTR 05/07/68 09.33

```
     1   01 21700 10 0500 77775
     2   01 45015 66 4000 00014
     3   01 21700 00 0500 77775
     4   01 45015 66 4000 00014
     5   01 21700 00 0500 77775
     6   01 45015 66 4000 00017
     7   00 02010 66 0000 00114      PRCT
    10   02 20100 20 0500 00003
    11   02 20100 00 0100 00003
    12   01 01000 07 4400 00126      XCWD
*********
```

316	PRCT	0	114	0	200000000000000	0
317	XCWD	0	126	0	210000000000000	0

CCONTROL

```
                                                                    1
CCONTROL        ORG                                                 2
                                                                    3
CONTROL         REF             *CONTROL                            4
                                                                    5
          PF    RWT             SETPF                               6
                CLA,DRL+2       B6-5,B6+1                           7
                CLA,DRL+2       B6-5,B6+1                          10
                TSR             *CONTROL                           11
                CLA             B6-1                               12
                STO             B6-2,B6-1                          13
SETPF           SPF             (PF)                               14
                TRA             *CONTROL                           15
                                                                   16
                END                                                17
                                                                   20
                                                                   21
```

```
PROGRAM      CCONT                                  02/14/68 11.36

      CONTRO 77777   42 565B6 36 1400 00000
                 1   47 21641 00 0001 00005      SETPF
                 2   01 21706 36 0100 77772
                 3   01 21706 36 0100 77772
                 4   01 40000 00 4401 77772      CONTRO
                 5   01 21700 00 0100 77776
                 6   01 20001 66 4100 77775
      SETPF      7   01 40007 00 4000 00000
                10   01 01000 00 4401 77766      CONTRO
*********
```

```
  316       CONTRO    0 77777     1          200000000000000     0
  317       SETPF     0     7     1          110000000000000     0
```

SCRIBE

```
                                                                    1
SCRIB           ORG                                                 2
                                                                    3
LINCT           REF             LINCT                               4
                                                                    5
                REM             GENIE FORMAT PRINT                  6
                                                                    7
        -Z      TRA             *SAVE,U→R                           10
                LDR             -B6-13,I→B5                         11
        Z       21600           R,R→B3                              12
                IF(NUL)TRA      aCC=1,CC+1                          13
                AB5             a7-1                                14
                SB4             *B5,U→T4                            15
        B5      RWT             DIMEND                              16
                LDR             B4,R→B2                             17
        B2      RPA             DIMB2                               20
        T4      IF(NUL)TRA      CC+1,B3-1                           21
        7       LLS             a15,U→B3                            22
        -B3     ADD             aB5                                 23
                LDR             PM,U→B5                             24
        R       RPA             PRINMX                              25
        B2      ADD             aB4+1                               26
                RPA             LOAD                                27
                CLA             aB6+50                              30
                RWT             STADD,U→B4                          31
        Z       STO             B4                                  32
        B5      RWT             BACKB6                              33
RETURN  -B2     STT             Z,U→B2                              34
        Z       SFT             Z,U→B4                              35
NULIN   I       SPF             a14NLUP,U→B3                        36
        Z       RWT             PRINT                               37
                                                                    40
MANLUP  B4      IF(NZE)TRA      NOLOAD,R→Z                          41
        B2      IF(ZER)TRA      FLAGTS                              42
                SB4             a49                                 43
LOAD            LT4             (7)+B2,B2+1                         44
NOLOAD  T4      CRL             a6,U→T4                             45
        Z       IF(ZER)SKP      TT,B4-1                             46
                TRA             FTEST                               47
        R       IF(NZE)SKP      a17                                 50
        PF      STT             a1,U→CC                             51
        P       IF(POS)SKP      a12                                 52
                TRA             FULLTS                              53
        P       IF(POS)SKP      a17                                 54
                TRA             DUMMY                               55
        Z       IF(NZE)SKP      FT                                  56
                TRA             FULLTS                              57
        P       IF(NZE)SKP      a20                                 60
                TRA             DUMMY                               61
        P       IF(NZE)SKP      a21                                 62
                TRA             DUMMY                               63
        R       IF(NZE)SKP      a23                                 64
                TRA             DUMMY                               65
                TRA             FULLTS                              66
                                                                    67
FTEST   Z       IF(ZER)SKP      FT,R→T7                             70
                TSR             NUMBER                              71
        R       IF(NZE)SKP      a17,R→T5                            72
                TRA             PRISET                              73
```

```
                           CLA          @410
                           IMP*         FCOUNT
                  T5       ADD*         FCOUNT
                           TRA          FF
PRISET            Z        LDR*         FCOUNT,R*B3
                  B3       IF(ZER)TRA   EXPLIN
                  FF       STT          Z,J*CC

DUMMY             Z        IF(ZER)SKP   FT
                           TRA          PACK
                  R        IF(NZE)SKP   @12
                  Z        RPA          DISCRIM,CC+1
                  R        IF(NZE)SKP   @13,CC+1
                           TRA          PACK-1
                  I        RPA          DISCRIM,CC+1
                  -I       RPA          DISCRIM
                  Z        SFT          @1,U*B1
PACK              R        STO          B4+B1,B1+1
                           TRA          FF,B3+1

FULLTS            Z        IF(ZER)SKP   FT,R*T7
                           TSR          NUMBER
                  R        IF(NZE)SKP   @20,R*T5
                           TRA          LOKHED
                  R        IF(NZE)SKP   @21
                           TRA          LOKHED
                  R        IF(ZER)SKP   @23
                           TRA          SHIFT
LOKHED            B4       IF(ZER)TRA   CC+1
                           LDR          T4,CC+1
                           LDR          *LOAD
                  Z        LLS          @6,U*R
                  R        IF(NZE)SKP   @15
                  T5       TRA          DUMMY,U*R
                  R        IF(ZER)SKP   @23
                           TRA          SHIFT
                  B4       IF(NEG)SKP   @1
                           LDR          T4,CC+1
                           LDR          *LOAD
                           LRL          @6
                  Z        LLS          @6,U*R
                  R        IF(NZE)SKP   @15
                  T5       TRA          DUMMY,U*R
SHIFT                      TRA          SETUPM

                           REM          VARIABLE TYPE DISCRIMINATION

NUMBER            FF       RPA          SETB2+3
                  FI       RPA          NEDBE
                  R        STO          RSAV
RETRY             Z        BAU          DIMEND,U*PF
                  B5       IF(NNZ)SKP   @PF
                           TRA          TERMIN
                           CLA          B5
                           AND          0777 00000
                           SYD          0400 00000
                           IF(NZE)TRA   @OLDCS
REIN              Z        BAU          B5,U*B1
                           LT6          B1
```

```
                    SPF     a*STADD                 167
LISTES      Z       IF(ZER)SKP  PF                  170
                    TRA     FINTES                  171
            T6      CRL     a+30,R+B1               172
            P1      DMR     a3,U+B1                 173
            T6      AND     0777 00000              174
                    IF(NZE)TRA  NORM                175
            B1      IF(NUL)TRA  IGNORE              176
            B1      IF(NZE)SKP  a1                  177
                    TRA     IGNORE                  200
            B1      LDR     T6,R+B1                 201
                    ADD     aB1-1                   202
                    TRA     ADDST                   203
IGNORE              BAU     T6,U+B1                 204
            B1      TRA     ADDST                   205
NORM        B1      LDR     T6,R+B1                 206
                    ADD     aB1                     207
ADDST               STO     PF                      210
                    RPA     FINADD                  211
            T6      CRL     a+15,R+B1               212
FINADD      B1      ADD     a(Z)                    213
                    STO     PF+1                    214
            Z       STO     PF+2                    215
FINTES              CLA     PF                      216
                    IF(NNZ)SKP  PF+1                217
                    TRA     PFDEC,PF-1              220
            T6      AND     4000 00000              221
                    IF(NUL)TRA  BOTTOM              222
                    CLA     PF,U+B1                 223
                    LT6     B1,PF+1                 224
                    TRA     LISTES,PF+1             225
BOTTOM              LT6     *PF,I+B1                226
            Z       STO     BCDADD                  227
            I       ADD+    PF                      230
NEDBE               SB1     a(Z)                    231
                    LDR     RSAV                    232
HEXTES              TRA     CC+1                    233
                    TRA     REHEX                   234
                    TRA     DISCRIM                 235
PFDEC       Z       STO     PF+1,PF-1               236
STADD       PF      IF(POS)SKP  aZ                  237
                    TRA     RETRY,B5+1              240
            I       ADD+    PF                      241
                    TRA     RETN                    242
TERMIN              SFT     Z                       243
                    TRA     FLAGTS                  244
OLDCS               LT6     *B5,I+PF                245
                    CLA     NEDBE,U+B1              246
                    LDR     RSAV                    247
            PF      STO     BCDADD,B5+1             250
DISCRIM             TRA     CC+(Z),CC+1             251
                    TRA     DECSET                  252
                    TRA     HEXSET                  253
                                                    254
                    REM     OCTAL VARIABLE          255
                                                    256
            B3      RPA     SETB3                   257
            B2      RPA     SETB2                   260
                    SB2     aB1+1                   261
```

```
SETLUP      B2      IF(NNZ)TRA      SETB3,B3-1                  262
                    LDR             B6+B2,B2-1                  263
            R       IF(NZE)SKP      @14                         264
                    TRA             SETLUP                      265
            T6      LRS             @3,U+T6                     266
            7       LLS             @3,U+T5                     267
                    TSR             SETUPM                      270
                    TRA             SETLUP,B3-1                 271
SETB3               SB3             @(Z)                        272
SETB2               SB2             @(Z)                        273
            T7      SFT             Z,U+T5                      274
                    SPF             @MANLUP                     275
                    TRA             (Z),U+R                     276
                                                                277
                    REM             HEXAD VARIABLE              300
                                                                301
HEXSET      B2      RPA             RESETB2,R+Z                 302
            B1      RPA             @TEST,R+B2                  303
            B4      RPA             RESTB4                      304
            -B1     ADD             @B3,U+B3                    305
                    SB4             @B4                         306
HEXLUP              LDR             B6+B2,B2+1                  307
            R       IF(NZE)SKP      @14,R+Z                     310
                    TRA             HEXLUP,B3+1                 311
            T6      CRL             @6,U+T6                     312
                    TSR             SETUPM,R+T5                 313
BTEST       B2      IF(NZE)SKP      @(B1),B4-1                  314
                    TRA             RESETB2                     315
            B4      IF(PNZ)TRA      HEXLUP                      316
            Z       IF(NZE)SKP      BCDADD                      317
            7       RPA             HEXTES                      320
                    TRA             NUMBER+1                    321
REHEX       I       RPA             HEXTES                      322
                    TRA             HEXLUP-1                    323
            I       ADD+            BCDADD                      324
                    LT6             *BCDADD                     325
                    TRA             HEXLUP-1                    326
RESETB2             SB2             @(B2)                       327
REST84              SB4             @(B4)                       330
                    TRA             SETB2+1                     331
                                                                332
                    REM             DECIMAL VARIABLE            333
                                                                334
DECSET      B6      RPA             SAVB6                       335
                    RPA             SETB6                       336
                    AB6             @B1                         337
            B1      RWT             SAVB1                       340
            -Z      TRA             *SAVE,U+R                   341
SAVB6       Z       SB6             Z,U+B5                      342
                    SB4             Z,I+B5                      343
            7       STO             DCOUNT                      344
STOSIN      T6      IF(POS)TRA      CC+1                        345
                    CLA             @21,CC+1                    346
                    CLA             @20                         347
                    STO             MSIGN                       350
                    LT6             (T6)                        351
LODLUP              LDR             B6+B5,B5+1                  352
            R       IF(NZE)SKP      @15                         353
                    TRA             TESOUT,B2+1                 354
```

```
                R       IF(NZE)SKP      &23                             355
                B2      STO             DCOUNT                          356
                R       IF(NZE)SKP      &16                             357
                        TRA             ESCALE                          360
TESOUT          B5      IF(ZER)SKP      &B1                             361
                        TRA             LOOLUP                          362
                        SB2             Z,I+B5                          363
                        TRA             SCAN1                           364
ESCALE                  CLA+            -DCOUNT,B5-1                    365
                B5      RWT             SAVB5,J+B1                      366
                T6      IF(NZE)TRA      CC+3,R+Z                        367
                T7      STO             SAVT7,R+B4                      370
                I       LT6             Z,J+T5                          371
                        TRA             SCAN1-3                         372
                Z       BEU             T6                              373
                        IF(NUL)TRA      CC+1                            374
                        TRA             CALSCA                          375
                        53100           -T6                             376
                        FMP             0432000000000000000,U+T6        377
CALSCA                  SB4             &*DCOUNT                        400
                T7      STO             SAVT7                           401
                        LT4             TENTH                           402
                        LT7             TEN                             403
                T7      STX             X,J+T5                          404
                B4      IF(ZER)TRA      CC+1,B4+1                       405
                T5      FMP+            T4,CC+X                         406
                T4      FMP+            T5,B4-1                         407
                T6      IF(POS)SKP      T4,B4-1                         410
                T7      FMP+            T6,CC+X                         411
                T6      IF(NN7)SKP      T6,B4+1                         412
                T7      VDF+            T6,CC+X                         413
                B4      STO             EXPONT,R+Z                      414
                T5      STO             UPBOND,R+B5                     415
                        SB2             Z,I+B4                          416
SCAN1                   LDR             B6+B5,B5+1                      417
                R       IF(NZE)SKP      &23                             420
                        TRA             DECPON                          421
                        AB2             &1                              422
                B5      IF(ZER)SKP      &B1                             423
                        TRA             SCAN1                           424
ROUND           B4      LT4             HALF,U+B5                       425
                        LT5             TENTH                           426
                        STX             X                               427
                B5      IF(ZER)TRA      ADDRON,B5-1                     430
                T5      FMP+            T4,CC+X                         431
DECPON          B5      IF(NZE)SKP      &B1                             432
                        TRA             ROUND                           433
                        LDR             B6+B5,B5+1                      434
                R       IF(NZE)SKP      &15                             435
                        AB4             &1                              436
                        TRA             DECPON                          437
ADDRON          Z       BEU             T6                              440
                        IF(NUL)TRA      INTEGER                         441
                T4      FAD+            IT61,U+R                        442
                        CLA             DCOUNT                          443
                        IF(PSN)TRA      SEPRAT                          444
                T6      IF(POS)SKP      UPBOND                          445
                T6      TRA             SEPRAT,U+R                      446
                T7      VDF+            T6,U+R                          447
```

```
                IZI     ADD*        EXPONT                      450
SEPRAT          Z       LLS         &6                          451
                        LUL         &3,U*B5                     452
                        SUB         &400                        453
                        IF(POS)TRA  NEGEXP                      454
                Z       BMU         T6,U*R                      455
                Z       DML         &35,U*T4                    456
                        TRA         PREINT,R*T5                 457
INTEGER                 LT4         IT6I                        460
                Z       TRA         PREINT,U*T5                 461
NEGEXP          B5      LUL         &6,U*B5                     462
                        LT4         Z                           463
                -B5     LUR         &6,U*B5                     464
                Z       LRR         &35*1,R*T5                  465
PREINT          B2      IF(ZER)TRA  PREFRA                      466
                Z       AB6         &32*1,U*B5                  467
                T4      IF(NZE)TRA  CC+2                        470
                        SB5         &32*1                       471
                I       RWT         LEADZ                       472
LOADUM                  LDR         B6                          473
                B       IF(ZER)SKP  &14                         474
                        TRA         SIGTES                      475
                        CLA+2       &35,B6-1                    476
                        TRA         ENDTES                      477
SIGTES          B       IF(ZER)SKP  &30                         500
                        TRA         MINTES                      501
                Z       LDR*        MSIGN                       502
                        CLA+2       &35                         503
                B       STO         B6+B5                       504
                        TRA         ENDTES,B6-1                 505
MINTES          B       IF(ZER)SKP  &21                         506
                        TRA         DIGIT                       507
                Z       LDR*        MSIGN                       510
                        CLA+2       &35                         511
                B       IF(ZER)SKP  &30                         512
                B       STO         B6+B5                       513
                        TRA         ENDTES,B6-1                 514
DIGIT           T4      IF(NZE)TRA  INDIGT                      515
LEADZ           Z       IF(NZE)SKP  &Z                          516
                        TRA         NODIGT                      517
INDIGT          T4      IDV         &12,U*T4                    520
                B       20002       Z                           521
                Z       RWT         LEADZ                       522
                T4      IF(NZE)TRA  CC+1,B6-1                   523
                B6      SUB         &*SETB6,U*B5                524
                        TRA         ENDTES                      525
NODIGT                  CLA+2       &35,B6-1                    526
ENDTES          B6      IF(NNZ)SKP  &*SETB6                     527
                        TRA         LOADUM                      530
                T4      IF(ZER)TRA  PREFRA,B6+1                 531
                        CLA+2       &35                         532
PREFRA                  SB6         &*SETB6                     533
                        SB5         &36+B1                      534
                        AB6         &32+1                       535
FRATES          B6      IF(NNZ)SKP  &35                         536
                        TRA         SETDIG                      537
FRALOD                  LDR         B6                          540
                B       IF(ZER)SKP  &14                         541
                        TRA         FRASET                      542
```

```
                        CLA+2           @B5,B6+1                    543
                        TRA             FRATES                      544
FRASET      T5          MPY             @12,R+T5                    545
                        20002           Z,B4-1                      546
                        TRA             FRATES,B6+1                 547
SETDIG      Z           LDR+            DCOUNT                      550
            F           IF(PSN)TRA      NOEXP,B6+1                  551
            B6          RPA             SETB6                       552
SAVB1                   CLA             @7                          553
SAVB5                   SUB             @7,U+B1                     554
                        LT7             SAVT7                       555
                        LT6             EXPONT,B1-1                 556
                        SB2             Z,I+B4                      557
            T6          IF(POS)TRA      CC+1                        560
                        CLA             @B1,CC+1                    561
                        CLA             @B0                         562
                        STO             MSIGN                       563
            Z           TRA             SCAN1,U+B5                  564
NOEXP                   SB4             @*SAVB1                     565
            -B4         ADD             @B3,U+B3                    566
                        SB6             @*SAVB6                     567
            B6          RPA             SETB6                       570
DUMSET                  LT5             B6,B6+1                     571
                        TSR             SETUPM,B4-1                 572
            B4          IF(NZE)TRA      DUMSET                      573
                        AB6             @12                         574
                        TRA             *UNSAVE                     575
SETB6                   SB6             @(B6)                       576
                        TRA             SETB2+1                     577
HALF                    DEC             .5                          600
TENTH                   DEC             .1                          601
MSIGN                   OCT             Z                           602
TEN                     DEC             10.0                        603
DCOUNT                  OCT             Z                           604
EXPONT                  OCT             Z                           605
UPBOND                  OCT             Z                           606
SAVT7                   OCT             Z                           607
                                                                    610
                                                                    611
                        REM             PRINT, CLEAR, AND EXIT      612
                                                                    613
FLAGTS      Z           IF(ZER)SKP      FT,R+T7                     614
                        TSR             NUMBER                      615
PRINT       Z           IF(ZER)SKP      @Z,I+B1                     616
                        TSR             *SETPM,B1+1                 617
DIMB2                   SB2             Z                           620
            I           ADD+            *LINCT                      621
DIMEND      B5          IF(ZER)SKP      @(Z)                        622
                        TRA             @RETURN                     623
                        TRA             *UNSAVE                     624
BACKB6      FF          SB6             Z,U+CC                      625
                                                                    626
                        REM             FOR TO TERMINATE LINE       627
                                                                    630
EXPLIN      Z           STI             Z,U+B1                      631
            I           ADD+            *LINCT,B1+1                 632
                        TSR             *SETPM,B1+1                 633
                        TRA             NULIN                       634
                                                                    635
```

```
                    RE 1            SET UP ONE HEXAD IN PRNMX          636
                                    FROM T5 AT B3                      637
                                                                       640
SETUPM      T5      IF(NZE)SKP      825,R+Z                            641
                    TRA             FF,B3+1                            642
            T5      LUL             81,U+B1                            643
            I       LRS             E?-56                              644
                    ORU+            *CC,B1+1                           645
PRINMX      R       ORU+            B1+(Z),B3+1                        646
            I       RWT             PRINT                              647
                    TRA             FF                                 650
                                                                       651
FCOUNT              OCT             4                                  652
                                                                       653
PM                  EQU             116                                654
SAVE                EQU             136                                655
UNSAVE              EQU             137                                656
SETPM               EQU             127                                657
                                                                       660
                    END                                                661
                                                                       662
```

```
LINCT  77777   53 50554 26 3000 00000
           1   10 01000 02 4400 00136      SAVE
           2   01 50400 75 1100 77764
           3   00 21600 53 0000 00002
           4   01 01040 20 4001 77776
           5   01 41005 00 4000 77776
           6   01 40004 04 4440 00000
           7   45 21441 00 0001 00557      DIMEND
          10   01 50400 52 0020 00000
          11   42 21601 00 0001 00553      DIMB2
          12   04 01040 63 4001 00001
          13   00 45062 43 4000 00017
          14   53 10000 00 4040 00000
          15   01 50400 45 0000 00116      PM
          16   02 21401 00 0001 00565      PRINMX
          17   42 10000 00 4020 00001
          20   01 21601 00 0001 00013      LOAD
          21   01 21700 00 4100 00050
          22   01 21441 44 0001 00176      STADD
          23   00 20001 00 4020 00000
          24   45 21441 00 0001 00545      BACKB6
RETURN    25   52 43006 42 4000 00000
          26   00 43007 44 4000 00000
NULIN     27   20 40007 43 4001 00001      MANLUP
          30   00 21441 00 0001 00532      PRINT
MANLUP    31   44 01050 10 4001 00003      NOLOAD
          32   42 01010 00 4001 00526      FLAGTS
          33   01 40004 00 4000 00011
LOAD      34   01 50440 22 0004 00000
NOLOAD    35   04 45066 04 4000 00006
          36   00 02010 64 0000 77776
          37   01 01000 00 4001 00017      FTEST
          40   02 02050 00 4000 00017
          41   47 43006 40 4000 00001
          42   02 02110 00 4000 00012
          43   01 01000 00 4001 00041      FULLTS
          44   02 02110 00 4000 00017
          45   01 01000 00 4001 00024      DUMMY
          46   00 02050 00 0000 77777
          47   01 01000 00 4001 00035      FULLTS
          50   02 02050 00 4000 00020
          51   01 01000 00 4001 00020      DUMMY
          52   02 02050 00 4000 00021
          53   01 01000 00 4001 00016      DUMMY
          54   02 02050 00 4000 00023
          55   01 01000 00 4001 00014      DUMMY
          56   01 01000 00 4001 00026      FULLTS
FTEST     57   00 02010 17 0000 77777
          60   01 40000 00 4001 00054      NUMBER
          61   02 02050 15 4000 00017
          62   01 01000 00 4001 00004      PRISET
          63   01 21700 00 4000 00012
          64   01 10221 00 0001 00522      FCOUNT
          65   05 10001 00 0001 00521      FCOUNT
          66   01 01000 00 4200 00000
PRISET    67   00 50401 53 0001 00517      FCOUNT
          70   43 01010 00 4001 00502      EXPLIN
          71   47 43006 40 4000 00000
DUMMY     72   00 02010 00 0000 77777
          73   01 01000 00 4001 00007      PACK
          74   02 02050 00 4000 00012
          75   00 21601 20 0001 00135      DISCRI
          76   02 02050 20 4000 00013
          77   01 01000 00 4001 00002      PACK     -1
```

```
                101   30 21601 00 0001 00131     DISCRI
                102   00 43007 41 4000 00001
PACK            103   02 20001 21 4102 00000
                104   01 01000 23 4200 00000
FULLTS          105   00 02010 17 0000 77777
                106   01 40000 00 4001 00026     NUMBER
                107   02 02050 15 4000 00020
                110   01 01000 00 4001 00004     LOKHED
                111   02 02050 00 4000 00021
                112   01 01000 00 4001 00002     LOKHED
                113   02 02010 00 4000 00023
                114   01 01000 00 4001 00017     SHIFT
LOKHED          115   44 01010 00 4001 00001
                116   01 50400 20 0000 00004
                117   01 50400 00 0401 77713     LOAD
                120   00 45062 02 4000 00006
                121   02 02050 00 4000 00015
                122   05 01000 02 4001 77746     DUMMY
                123   02 02010 00 4000 00023
                124   01 01000 00 4001 00007     SHIFT
                125   44 02510 00 4000 00001
                126   01 50400 20 0000 00004
                127   01 50400 00 0401 77703     LOAD
                130   01 45002 00 4000 00006
                131   00 45062 02 4000 00006
                132   02 02050 00 4000 00015
                133   05 01000 02 4001 77735     DUMMY
SHIFT           134   01 01000 00 4001 00442     SETUPM
NUMBER          135   47 21601 00 0001 00117     SETB2    +3
                136   41 21601 00 0001 00054     NEDBE
                137   02 20001 00 4001 00450     RSAV
RETRY           140   00 20100 47 0001 00426     DIMEND
                141   45 06500 00 4200 00000
                142   01 01000 00 4001 00062     TERMIN
                143   01 21700 00 0040 00000
                144   01 50314 00 0001 00444     *0000A
                145   01 53200 00 0001 00444     *0000B
                146   01 01050 00 4001 00060     OLDCS
REIN            147   00 20100 41 0040 00000
                150   01 50400 00 0002 00000
                151   01 40007 00 4401 00047     STADD
LISTES          152   00 02010 00 0200 00000
                153   01 01000 00 4001 00024     FINTES
                154   06 45066 51 4000 00036
                155   41 44000 41 4000 00003
                156   06 50314 00 0001 00432     *0000A
                157   01 01050 00 4001 00010     NORM
                160   41 01040 00 4001 00005     IGNORE
                161   41 02050 00 4000 00001
                162   01 01000 00 4001 00003     IGNORE
                163   41 50400 51 0000 00006
                164   01 10000 00 4002 77776
                165   01 01000 00 4001 00004     ADDST
IGNORE          166   01 20100 41 0000 00006
                167   41 01000 00 4001 00002     ADDST
NORM            170   41 50400 51 0000 00006
                171   01 10000 00 4002 00000
ADDST           172   01 20001 00 4200 00000
                173   01 21601 00 0001 00001     FINADD
                174   06 45066 51 4000 00017
FINADD          175   41 10000 00 4000 00000
                176   01 20001 00 4200 00001
                177   00 20001 00 4200 00002
FINTES          200   01 21700 00 0200 00000
                201   01 06550 00 0200 00001
```

```
                203  06 50314 00 0001 00407      +0000C
                204  01 01040 00 4001 00003      BOTTOM
                205  01 21700 41 0200 00000
                206  01 50460 27 0002 00000
                207  01 01000 27 4001 77741      LISTES
BOTTOM          210  01 50460 71 0600 00000
                211  00 20001 00 4001 00402      BCDADD
                212  20 10001 00 0200 00000
NEDBE           213  01 40001 00 4000 00000
                214  01 50400 00 0001 00373      RSAV
HEXTES          215  01 01000 00 4001 00001
                216  01 01000 00 4001 00057      REHEX
                217  01 01000 00 4001 00013      DISCRI
PFDEC           220  00 20001 67 4200 00001
STADD           221  47 02110 00 4000 00000
                222  01 01000 25 4001 77714      RETRY
                223  20 10001 00 0200 00000
                224  01 01000 00 4001 77721      REIN
TERMIN          225  01 43007 00 4000 00000
                226  01 01000 00 4001 00332      FLAGTS
OLDCS           227  01 50400 77 0440 00000
                230  01 21700 41 0001 77761      NEDBE
                231  01 50400 00 0001 00356      RSAV
                232  47 20001 25 4001 00361      BCDADD
DISCRI          233  01 01000 20 4001 00000
                234  01 01000 00 4001 00051      DECSET
                235  01 01000 00 4001 00020      HEXSET
                236  43 21601 00 0001 00012      SETB3
                237  42 21601 00 0001 00012      SETB2
                240  01 40002 00 4002 77776
SETLUP          241  42 05550 63 4001 00007      SETB3
                242  01 50400 62 0104 00000
                243  02 02050 00 4000 00014
                244  01 01000 00 4001 77773      SETLUP
                245  06 45015 06 4000 00003
                246  00 45062 05 4000 00003
                247  01 40000 00 4001 00327      SETUPM
                250  01 01000 63 4001 77767      SETLUP
SETB3           251  01 40003 00 4000 00000
SETB2           252  01 40002 00 4000 00000
                253  07 43007 05 4000 00000
                254  01 40007 00 4001 77553      MANLUP
                255  01 01000 02 4000 00000
HEXSET          256  42 21601 10 0001 00024      RESETB
                257  41 21601 52 0001 00010      BTEST
                260  44 21601 00 0001 00023      RESTB4
                261  51 10000 43 4010 00000
                262  01 40004 00 4000 00011
HEXLUP          263  01 50400 22 0104 00000
                264  02 02050 10 4000 00014
                265  01 01000 23 4001 77774      HEXLUP
                266  06 45066 06 4000 00006
                267  01 40000 15 4001 00307      SETUPM
BTEST           270  42 02050 64 4000 00000
                271  01 01000 00 4001 00011      RESETB
                272  44 05150 00 4001 77767      HEXLUP
                273  00 02050 00 0001 00320      BCDADD
                274  00 21671 00 0001 77717      HEXTES
                275  01 01000 00 4001 77637      NUMBER  +1
REHEX           276  20 21601 00 0001 77715      HEXTES
                277  01 01000 00 4001 77761      HEXLUP  -1
                300  20 10001 00 0001 00313      BCDADD
                301  01 50460 00 0401 00312      BCDADD
                302  01 01000 00 4001 77756      HEXLUP  -1
RESETB          303  01 40002 00 4000 00000
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```
                305   01 01000 00 4001 77744     SETB2   +1
DECSET          306   46 21401 00 0001 00004     SAVB6
                307   01 21401 00 0001 00237     SETB6
                310   01 41006 00 4002 00000
                311   41 21441 00 0001 00212     SAVB1
                312   10 01000 02 4400 00136     SAVE
SAVB6           313   00 40006 45 4000 00000
                314   01 40004 72 4000 00000
                315   00 20001 00 4001 00237     DCOUNT
STOSIN          316   06 01110 00 4001 00001
                317   01 21700 20 4000 00021
                320   01 21700 00 4000 00020
                321   01 20001 00 4001 00231     MSIGN
                322   01 50460 00 2000 00006
LODLUP          323   01 50400 25 0140 00000
                324   02 02050 00 4000 00015
                325   01 01000 22 4001 00004     TESOUT
                326   02 02050 00 4000 00023
                327   42 20001 00 4001 00225     DCOUNT
                330   02 02050 00 4000 00016
                331   01 01000 00 4001 00004     ESCALE
TESOUT          332   45 02010 00 4002 00000
                333   01 01000 00 4001 77766     LODLUP
                334   01 40002 75 4000 00000
                335   01 01000 00 4001 00032     SCAN1
ESCALE          336   01 21701 65 1001 00216     DCOUNT
                337   45 21441 41 0001 00165     SAVB5
                340   06 01050 10 4001 00003
                341   07 20001 54 4001 00216     SAVT7
                342   20 50460 05 0000 00000
                343   01 01000 00 4001 00021     SCAN1   -3
                344   00 21000 00 0000 00006
                345   01 01040 00 4001 00001
                346   01 01000 00 4001 00002     CALSCA
                347   01 53100 00 1000 00006
                350   01 10600 06 0001 00244     =0000D
CALSCA          351   01 40004 00 4401 00203     DCOUNT
                352   07 20001 00 4001 00205     SAVT7
                353   01 50400 00 0001 00176     TENTH
                354   01 50470 00 0001 00177     TEN
                355   07 43005 05 4000 77775
                356   44 01010 24 4001 00001
                357   05 10601 30 0000 00004
                360   04 10401 64 0000 00005
                361   06 02110 64 0000 00004
                362   07 10401 30 0000 00006
                363   06 06550 24 0000 00005
                364   07 16701 30 0000 00006
                365   44 20001 10 4001 00170     EXPONT
                366   05 20001 55 4001 00170     UPBOND
                367   01 40002 74 4000 00000
SCAN1           370   01 50400 25 0140 00000
                371   02 02050 00 4000 00023
                372   01 01000 00 4001 00010     DECPON
                373   01 41002 00 4000 00001
                374   45 02010 00 4002 00000
                375   01 01000 00 4001 77771     SCAN1
ROUND           376   44 50440 45 0001 00152     HALF
                377   01 50450 00 0001 00152     TENTH
                400   01 43005 00 4000 77775
                401   45 01010 65 4001 00007     ADDRON
                402   05 10601 30 0000 00004
DECPON          403   45 02050 00 4002 00000
                404   01 01000 00 4001 77770     ROUND
                405   01 50400 25 0140 00000
```

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                407   01 41004 00 4000 00001
                410   01 01000 00 4001 77771      DECPON
ADDRON          411   00 21000 00 0000 00006
                412   01 01040 00 4001 00016      INTEGE
                413   04 10401 02 2000 00006
                414   01 21700 00 0001 00140      DCOUNT
                415   01 01100 00 4001 00004      SEPRAT
                416   06 02110 00 0001 00140      UPBOND
                417   06 01000 02 4001 00002      SEPRAT
                420   07 16701 02 0000 00006
                421   20 10001 00 0001 00134      EXPONT
SEPRAT          422   00 45062 00 4000 00006
                423   01 45020 45 4000 00003
                424   01 10100 00 4000 00400
                425   01 01110 00 4001 00005      NEGEXP
                426   00 20700 02 0000 00006
                427   00 44010 04 4040 00000
                430   01 01000 15 4001 00006      PREINT
INTEGE          431   01 50440 00 2000 00006
                432   00 01000 05 4001 00004      PREINT
NEGEXP          433   45 45020 45 4000 00006
                434   01 50440 00 0000 00000
                435   55 45010 45 4000 00006
                436   00 45001 15 4040 77776
PREINT          437   42 01010 00 4001 00044      PREFRA
                440   00 41006 45 4004 77776
                441   04 01050 00 4001 00002
                442   01 40005 00 4004 77776
                443   20 21641 00 0001 00023      LEADZ
LOADUM          444   01 50400 00 0100 00000
                445   02 02010 00 4000 00014
                446   01 01000 00 4001 00002      SIGTES
                447   01 21702 66 4000 00025
                450   01 01000 00 4001 00027      ENDTES
SIGTES          451   02 02010 00 4000 00020
                452   01 01000 00 4001 00004      MINTES
                453   00 50401 00 0001 00077      MSIGN
                454   01 21702 00 4000 00025
                455   02 20001 00 4140 00000
                456   01 01000 66 4001 00021      ENDTES
MINTFS          457   02 02010 00 4000 00021
                460   01 01000 00 4001 00005      DIGIT
                461   00 50401 00 0001 00071      MSIGN
                462   01 21702 00 4000 00025
                463   02 02010 00 4000 00020
                464   02 20001 00 4140 00000
                465   01 01000 66 4001 00012      ENDTES
DIGIT           466   04 01050 00 4001 00002      INDIGT
LEADZ           467   00 02050 00 4000 00000
                470   01 01000 00 4001 00006      NODIGT
INDIGT          471   04 13300 04 4000 00012
                472   02 20002 00 0000 00000
                473   00 21641 00 0001 77772      LEADZ
                474   04 01050 66 4001 00001
                475   46 10100 45 4401 00051      SETB6
                476   01 01000 00 4001 00001      ENDTES
NODIGT          477   01 21702 66 4000 00025
ENDTES          500   46 06550 00 4401 00046      SETB6
                501   01 01000 00 4001 77741      LOADUM
                502   04 01010 26 4001 00001      PREFRA
                503   01 21702 00 4000 00035
PREFRA          504   01 40006 00 4401 00042      SETB6
                505   01 40005 00 4102 00000
                506   01 41006 00 4004 00001
FRATFS          507   46 06550 00 4040 00000
```

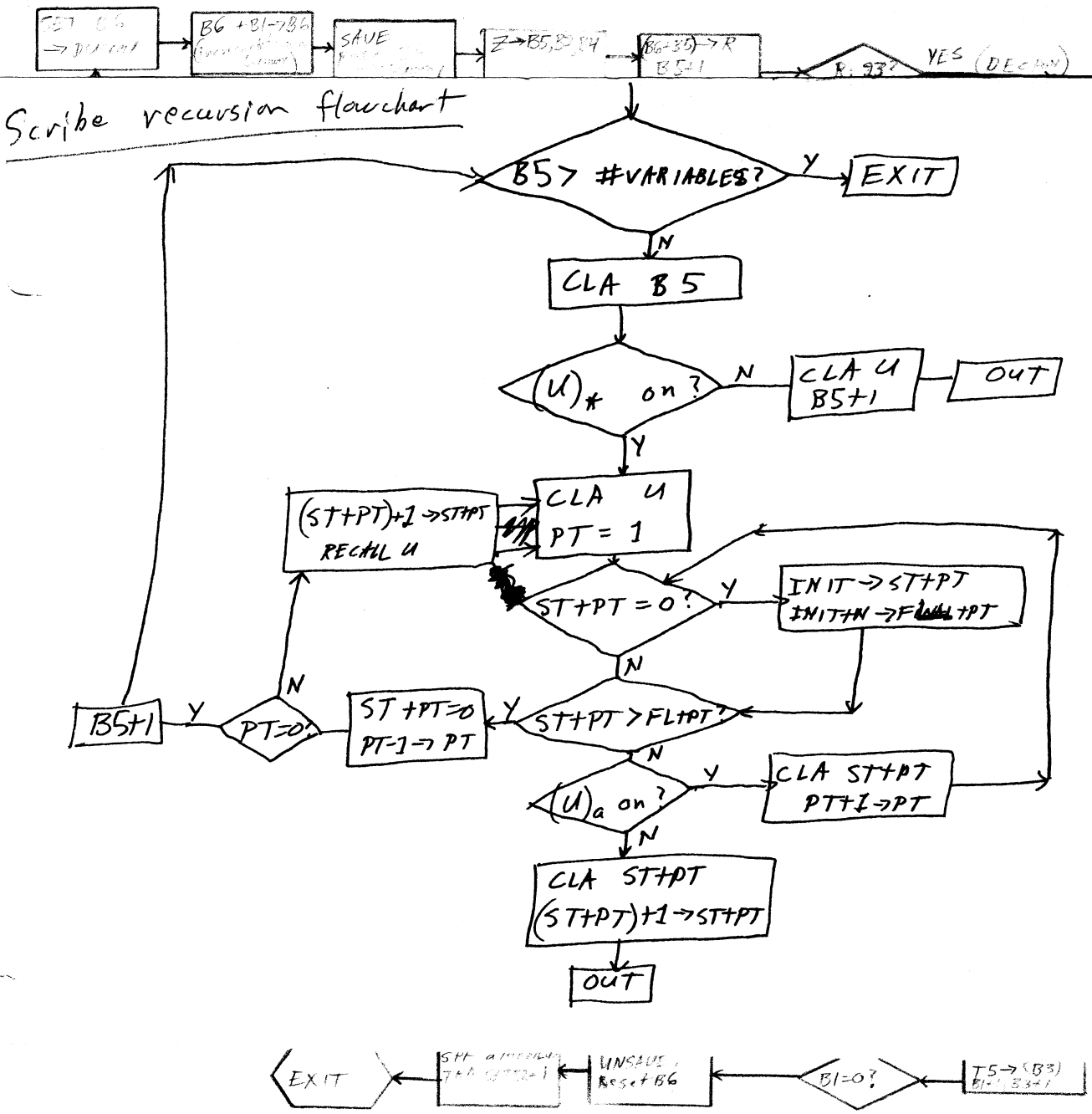
```
FRALOD   511   01 50400 00 0100 00000
         512   02 02010 00 4000 00014
         513   01 01000 00 4001 00002      FRASET
         514   01 21702 26 4000 00025
         515   01 01000 00 4001 77770      FRATES
FRASET   516   05 10200 15 4000 00012
         517   01 20002 64 0000 00000
         520   01 01000 26 4001 77765      FRATES
SETDIG   521   00 50401 00 0001 00033      DCOUNT
         522   02 01100 26 4001 00013      NOEXP
         523   46 21601 00 0001 00023      SETB6
SAVB1    524   01 21700 00 4000 00000
SAVB6    525   01 10100 41 4000 00000
         526   01 50470 00 0001 00031      SAVT7
         527   01 50460 61 0001 00026      EXPONT
         530   01 40002 74 4000 00000
         531   06 01110 00 4001 00001
         532   01 21700 20 4000 00021
         533   01 21700 00 4000 00020
         534   01 20001 00 4001 00016      MSIGN
         535   00 01000 45 4001 77631      SCAN1
NOEXP    536   01 40004 00 4401 77764      SAVB1
         537   54 10000 43 4010 00000
         540   01 40006 00 4401 77551      SAVB6
         541   46 21601 00 0001 00005      SETB6
DUMSET   542   01 50450 26 0100 00000
         543   01 40000 64 4001 00033      SETUPM
         544   44 01050 00 4001 77774      DUMSET
         545   01 41006 00 4000 00012
         546   01 01000 00 4400 00137      UNSAVE
SETB6    547   01 40006 00 4000 00000
         550   01 01000 00 4001 77501      SETB2    +1
HALF     551   77 20000 00 0000 00000
TENTH    552   77 63146 31 4631 46314
MSIGN    553   00 00000 00 0000 00000
TEN      554   01 01200 00 0000 00000
DCOUNT   555   00 00000 00 0000 00000
EXPONT   556   00 00000 00 0000 00000

UPBOND   557   00 00000 00 0000 00000
SAVT7    560   00 00000 00 0000 00000
FLAGTS   561   00 02010 17 0000 77777
         562   01 40000 00 4001 77351      NUMBER
PRINT    563   00 02010 71 4000 00000
         564   01 40000 21 4400 00127      SETPM
DIMB2    565   01 40002 00 4000 00000
         566   20 10001 00 0401 77210      LINCT
DIMEND   567   45 02010 00 4000 00000
         570   01 01000 00 4001 77233      RETURN
         571   01 01000 00 4400 00137      UNSAVE
BACKF6   572   47 40006 40 4000 00000
EXPLIN   573   00 43006 41 4000 00000
         574   20 10001 21 0401 77202      LINCT
         575   01 40000 21 4400 00127      SETPM
         576   01 01000 00 4001 77227      NULIN
SETUPM   577   05 02050 10 4000 00025
         600   01 01000 23 4200 00000
         601   05 45020 41 4000 00001
         602   20 45015 00 4010 77711
         603   01 50011 21 0401 00000
PRINMX   604   02 50011 23 0002 00000
         605   20 21641 00 0001 77754      PRINT
         606   01 01000 00 4200 00000
FCOUNT   607   00 00000 00 0000 00000
*********
```

+00000A	611	00	00000	00	0777	00000
+00000B	612	00	00000	00	0400	00000
+00000C	613	00	00000	00	4000	00000
BCDADD	614	00	00000	00	0000	00000
+00000D	615	06	20000	00	0000	00000

316	LINCT	0	77777	1	2000000000000000	0
317	SAVE	0	136	0	6630000000000000	0
320	DIMEND	0	567	1	6260000000000000	0
321	DIMB2	0	565	1	6240000000000000	0
322	PM	0	116	0	6620000000000000	0
323	PRINMX	0	604	1	6550000000000000	0
324	LOAD	0	34	1	4100000000000000	0
325	STADD	0	221	1	2330000000000000	0
326	BACKB6	0	572	1	6310000000000000	0
327	RETURN	0	25	1	3200000000000000	0
330	NULIN	0	27	1	3400000000000000	0
331	MANLUP	0	31	1	3600000000000000	0
332	PRINT	0	564	1	6220000000000000	0
333	NOLOAD	0	38	1	4200000000000000	0
334	FLAGTS	0	561	1	6200000000000000	0
335	FTEST	0	57	1	6400000000000000	0
336	FULLTS	0	105	1	1120000000000000	0
337	DUMMY	0	77	1	7700000000000000	0
340	NUMBER	0	135	1	1470000000000000	0
341	PRISET	0	67	1	7400000000000000	0
342	FCOUNT	0	607	1	6610000000000000	0
343	EXPLIN	0	573	1	6360000000000000	0
344	PACK	0	103	1	1100000000000000	0
345	DISCRI	0	234	1	2450000000000000	0
346	LOKHED	0	115	1	1220000000000000	0
347	SHIFT	0	134	1	1410000000000000	0
350	SETUPM	0	577	1	6500000000000000	0
351	SETB2	0	252	1	2670000000000000	0
352	NEOBE	0	213	1	2250000000000000	0
353	RSAV	0	610	1	6670000000000000	0
354	RETRY	0	140	1	1520000000000000	0
355	TERMIN	0	225	1	2370000000000000	0
356	+00000A	0	611	1	6700000000000000	0
357	+00000B	0	612	1	6710000000000000	0
360	OLDCS	0	227	1	2410000000000000	0
361	REIN	0	147	1	1610000000000000	0
362	LISTES	0	152	1	1640000000000000	0
363	FINTES	0	200	1	2120000000000000	0
364	NORM	0	170	1	2020000000000000	0
365	IGNORE	0	166	1	2000000000000000	0
366	ADDST	0	172	1	2040000000000000	0
367	FINADD	0	175	1	2070000000000000	0
370	PFDEC	0	220	1	2320000000000000	0
371	+00000C	0	613	1	6720000000000000	0
372	BOTTOM	0	210	1	2220000000000000	0
373	BCDADD	0	614	1	6730000000000000	0
374	HEXTES	0	215	1	2270000000000000	0
375	REHEX	0	276	1	3160000000000000	0
376	DECSET	0	304	1	3310000000000000	0
377	HEXSET	0	256	1	2760000000000000	0
400	SETB3	0	251	1	2660000000000000	0
401	SETLUP	0	241	1	2560000000000000	0
402	RESETB	0	303	1	3230000000000000	0
403	BTEST	0	270	1	3100000000000000	0
404	RESTB4	0	304	1	3240000000000000	0

406	SAVB6	0	313	1	3360000000000000	0
407	SETB6	0	547	1	5720000000000000	0
410	SAVB1	0	524	1	5470000000000000	0
411	DCOUNT	0	555	1	6050000000000000	0
412	STOSIN	0	316	3	3410000000000000	0
413	MSIGN	0	553	1	6010000000000000	0
414	LODLUP	0	323	1	3460000000000000	0
415	TESOUT	0	337	1	3550000000000000	0
416	ESCALE	0	334	1	3610000000000000	0
417	SCAN1	0	370	1	4130000000000000	0
420	SAVB5	0	525	1	5500000000000000	0
421	SAVT7	0	560	1	6130000000000000	0
422	CALSCA	0	351	1	3740000000000000	0
423	+0000D	0	615	1	6740000000000000	0
424	TENTH	0	55C	1	5770000000000000	0
425	TEN	0	554	1	6030000000000000	0
426	EXPONT	0	556	1	6070000000000000	0
427	UPBOND	0	557	1	6110000000000000	0
430	DECPON	0	403	1	4260000000000000	0
431	ROUND	0	376	1	4210000000000000	0
432	HALF	0	551	1	5750000000000000	0
433	ADDRON	0	411	1	4340000000000000	0
434	INTEGE	0	431	1	4540000000000000	0
435	SEPRAT	0	422	1	4450000000000000	0
436	NEGEXP	0	433	1	4560000000000000	0
437	PREINT	0	437	1	4620000000000000	0
440	PREFRA	0	504	1	5270000000000000	0
441	LEADZ	0	467	1	5120000000000000	0
442	LOADUM	0	444	1	4670000000000000	0
443	SIGTES	0	451	1	4740000000000000	0
444	ENDTES	0	500	1	5230000000000000	0
445	MINTES	0	457	1	5020000000000000	0
446	DIGIT	0	466	1	5110000000000000	0
447	INDIGT	0	471	1	5140000000000000	0
450	NODIGT	0	477	1	5220000000000000	0
451	FRATES	0	507	1	5320000000000000	0
452	SETDIG	0	521	1	5440000000000000	0
453	FRALOD	0	511	3	5340000000000000	0
454	FRASET	0	516	1	5410000000000000	0
455	NOEXP	0	536	1	5610000000000000	0
456	DUMSET	0	542	1	5650000000000000	0
457	UNSAVE	0	137	0	6640000000000000	0
460	SETPM	0	127	0	6650000000000000	0

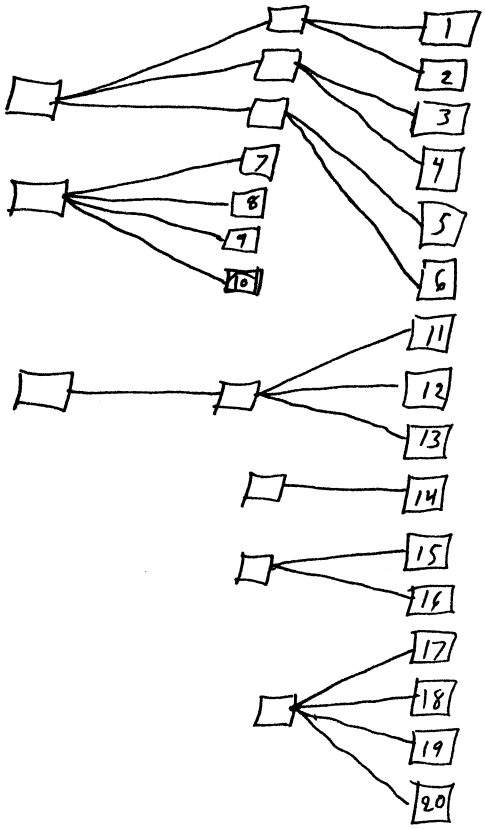

Scribe recursion flowchart
B5 > #VARIABLES?
Y
EXIT
N
CLA B5
(U)* on?
N
CLA U
B5+1
OUT
Y
CLA U
PT = 1
(ST+PT)+1 → ST+PT
RECALL U
ST+PT = 0?
Y
INIT → ST+PT
N
ST+PT > FL+PT?
Y
ST+PT = 0
PT-1 → PT
PT=0?
N
Y
B5+1
(U)a on?
Y
CLA ST+PT
PT+1 → PT
N
CLA ST+PT
(ST+PT)+1 → ST+PT
OUT
EXIT
UNSAVE
Reset B6
B1=0?
T5 → (B3)
B1+1 B3+1

(Read not quite finished) 7.

Revised SCRIBE and PRESCRIBE

It is now possible to print entire arrays by specifying only the array name. The number of variables in a FORMAT statement and the number of elements in the input list need no longer be the same. SCRIBE and PRESCRIBE will print all the elements of an array in structural order using the specified FORMAT line as many times as necessary. For example, an ordinary two-dimensional matrix will be printed by rows, since storage is by rows. Consider the following more complex example.

The array C:



The array might be printed with the following statements

```
        EXECUTE  SCRIBE ( C, FORM)
                 !
FORM     FORMAT
-ddd     -ddd    -ddd
```

with the following resultant output:

```
 1        2        3
 4        5        6
 7        8        9
10       11       12
13       14       15
16       17       18
19       20
```

Of course, any combination of scalars, specific elements of vectors and matricies and entire arrays may be specified in the parameter list of the execute statement. Printing is now terminated when the list is exhausted whether the end of the format has been reached or not.

Hexad variables are treated the same as any other unless more than nine hexads per variable are specified in the format. If, say, 12 hexads are specified, the first 9 are taken from the current list element and the next 3 are taken ~~for the following memory local~~ from the left most portion of the following memory location if

the list element used was a scalar. The next 3 are taken from the leftmost portion of the next list element if previous list element was an element of an array and the remainder of that next list element is ignored.

These new capabilities require that the programs using it be compiled with a new compiler (Sept. '65 or later) and run with a new Genie Spirel (Sept. '65 or later).

Technically, the new compiler adds an additional parameter to the parameter list of all EXECUTE SCRIBE and EXECUTE PRESCRIBE statements. This parameter is the negative of the number of previous parameters and this negative integer is placed directly on the B6-list. The new SCRIBE uses this integer to determine when the parameter list is exhausted. Users who wish to use SCRIBE and PRESCRIBE in AP1 or AP2 must be careful to specify list elements on the B6-list in exactly the same manner that Genie does.

Obsolete
5/16/68
EES
[Become obsolete as early as 9/65]

Use of SCRIBE by AP1 Programs

The GENIE subroutine SCRIBE (*234) may be used as a subroutine of a program which is coded in the assembly language by storing the addresses of the arguments on the B6-list in the proper order followed by the FWA of the special format block. The format block will consist of a special codeword followed by the actual format in BCD form. The following calling sequence might be used:

```
        CLA/2    aARG1, B6/1
        CLA/2    aARG2, B6/1
    ..............
        CLA/2    aARGK, B6/1
        CLA/2    aCODWRD, B6/1
        TSR      a*SCRIBE
```

where

```
SCRIBE          EQU      234
CODWRD          OCT      kkkkk 0000 0000 wwwww
FORMAT          BCD      ........
```

and K is the number of arguments
W is the number of words in FORMAT.

Notes.

(1) W must be less than or equal to twelve decimal.
(2) FORMAT must immediately follow CODEWRD.
(3) The SETS field of FORMAT is formed according to the rules for forming format statements in GENIE.

Pat Groves
November 1964

PRESCRIBE

```
                                                                    1
PRESC           ORG                                                 2
                                                                    3
SCRIBE          REF     *SCRIB                                      4
PAGCT           REF     PAGCT                                       5
LINCT           REF     LINCT                                       6
                                                                    7
                REM     PAGE CONTROL FOR USE WITH SCRIBE
                                                                   11
                REM     B6-1 = LINE LIMIT POINTER                  12
                REM     B6-2 = TITLE POINTER,                      13
                REM          EXTERNAL VECTOR OR                    14
                REM          INTERNAL FORMAT                       15
                REM     B6-3 = NUMBER OF SPACES AFTER PRINT
                REM     PREVIOUS B6 IS INPUT TO SCRIBE
                                                                   20
PAGER     PF    RPA,WTG EXIT                                       21
          Z     21600   -B6=1,R+Z                                  22
                IF(NUL)TRA CC-1,CC+1                               23
                LDR     -B6=1,B6=1                                 24
          R     RWT     SVCT                                       25
                CLA     *LINCT                                     26
                IF(ZER)TRA NPAGE                                   27
                IF(NNZ)SKP *B6=1                                   30
                TRA     NPAGE                                      31
PRLINE          CLA     *B6=3,B6=1                                 32
                RPA,WTG SPACES,B6-1                                33
SVCT            CLA     A7,B6-1                                    34
                IF(NUL)TRA CC+1                                    35
          -U    ADD+2   A3,B6+1                                    36
                TSR     *SCRIBE                                    37
SPACES          SPF     A(Z)                                       40
          PF    IF(ZER)TRA *EXIT                                   41
                ADD+    *LINCT                                     42
                MLN     20000                                      43
                SPA     A7,PF-1                                    44
EXIT            TRA     (Z)                                        45
                                                                   46
NPAGE     P1    RPA     SV3A                                       47
          B3    RPA,WTG SV3C                                       50
          T7    STO     TSVN                                       51
                PAG     GPAGE                                      52
          S     SP2     A7,U+T7                                    53
          I     GB3     GPAGE,U+B1                                 54
                TSR     *SETPM                                     55
          I     ADD+    *PAGCT,U+T7                                56
                SB3     GPAGE-11,B1+1                              57
                TSR     *SETPM,B1+1                                60
          B1    STO     *LINCT                                     61
          Z     BAU     P4                                         62
                ADD     APLADR,U+B3                                63
          Z     STO     B3                                         64
          Z     STO     B3+1                                       65
                LT7     00000 4310 0001 00131                      66
                TSR     *XCWD                                      67
                CLA     B6=2,U+B3                                  70
                AND     0777 00000                                 71
                SYD     STAR                                       72
                IF(NZE)TRA EMT,R+Z                                 73
```

```
VECT            CLA     B3                                      74
                CRL     a17,B6+1                                75
          R     SUB     a1                                      76
                IDV     a#12                                    77
                ADD*    *LINCT                                  100
                TRA     FRT                                     101
FMT             CLA     *B6=2*I+B1                              102
                LRS     a15,B1+1                                103
                SB3     a36                                     104
          R     BAU+2   a31,B6+1                                105
PRT       B3    21600   00000 4110 0000 00000,U+T7              106
          7     BAU+2   SL,B6+1                                 107
                SLN     00002                                   110
                TSR     *XCWD                                   111
                SLF     00002                                   112
                SLN     *B6=1,B6=1                              113
SVBA            SB1     a(Z),B6-1                               114
SVBC            SB3     a(Z)                                    115
                LT7     TSVN                                    116
                SPA     aPRLINE,I+CC                            117
                                                                120
TSVN            OCT     0                                       121
QPAGE           BCD     PAGE                                    122
STAR            OCT     0400 00000                              123
                                                                124
CPAGE           EQU     60                                      125
PLADR           EQU     40                                      126
PM              EQU     116                                     127
SETPM           EQU     127                                     130
XCWD            EQU     125                                     131
                                                                132
                END                                             133
                                                                134
```

```
SCRIBE  77775    62 42615 04 1400 00000
PAGCT   77776    57 40464 26 3000 00000
LINCT   77777    53 50554 26 3000 00000
PAGEP        1   47 21641 00 0001 00023    EXIT
             2   00 21600 10 1100 77776
             3   01 01040 20 4001 77776
             4   01 50400 66 1100 77776
             5   02 21641 00 0001 00004    SVCT
             6   01 21700 00 0401 77770    LINCT
             7   01 01010 00 4001 00016    NPAGE
            10   01 06550 00 0500 77776
            11   01 01000 00 4001 00014    NPAGE
PRLINE      12   01 21700 66 0500 77774
            13   01 21641 66 0001 00004    SPACES
SVCT        14   01 21700 66 4000 00000
            15   01 01040 00 4001 00001
            16   11 10002 26 4000 00003
            17   01 40000 00 4401 77765    SCRIBE
SPACES      20   01 40007 00 4000 00000
            21   47 01010 00 4401 00003    EXIT
            22   01 10001 00 0401 77754    LINCT
            23   01 42002 00 4000 20000
            24   01 61010 67 4000 00000
EXIT        25   01 01000 00 4000 00000
NPAGE       26   41 21601 00 0001 00044    SVBA
            27   43 21641 00 0001 00044    SVBC
            30   07 20001 00 4001 00046    TSVN
            31   01 61070 00 0001 00046    QPAGE
            32   03 61000 07 4000 00000
            33   20 40003 41 4000 00060    CPAGE
            34   01 40000 00 4400 00127    SETPM
            35   20 10001 07 0401 77740    PAGCT
            36   01 40003 21 4000 00047    CPAGE   +1
            37   01 40000 21 4400 00127    SETPM
            40   41 20001 00 4401 77736    LINCT
            41   00 20100 00 0000 00116    PM
            42   01 10000 43 4000 00040    PLADR
            43   00 20001 00 4010 00000
            44   00 20001 00 4010 00001
            45   01 50470 00 0001 00034    +0000A
            46   01 40000 00 4400 00126    XCWD
            47   01 21700 43 0100 77775
            50   01 50314 00 0001 00032    +0000B
            51   01 53220 00 0001 00027    STAR
            52   01 01050 10 4001 00004    FMT
VECT        53   01 21700 00 0010 00000
            54   01 45066 26 4000 00017
            55   02 10100 00 4000 00001
            56   01 13300 00 4000 00014
            57   01 10001 00 0401 77717    LINCT
            60   01 01000 00 4001 00004    PRT
FMT         61   01 21700 71 0500 77775
            62   01 45015 21 4000 00017
            63   01 40003 00 4100 00000
            64   02 20102 26 4002 00000
PRT         65   43 21600 07 0001 00016    +0000C
            66   00 20102 26 0000 77770
            67   01 42000 00 4000 00002
            70   01 40000 00 4400 00126    XCWD
            71   01 42004 00 4000 00002
            72   01 42000 66 4500 77774
SVBA        73   01 40001 66 4000 00000
SVBC        74   01 40003 00 4000 00000
            75   01 50470 00 0001 00001    TSVN
```

	TSVN	77	00 00000 00 0000 00000			
	QPAGE	100	57 40464 42 5252 52525			
	STAR	101	00 00000 00 0400 00000			
*********						
	←0000A	102	00 00042 10 0001 00131			
	←0000B	103	00 00000 00 0777 00000			
	←0000C	104	00 00041 10 0000 00000			

316	SCRIBE	0	77775	1	2000000000000000	0
317	PAGCT	0	77776	1	3000000000000000	0
320	LINCT	0	77777	1	4000000000000000	0
321	PAGER	0	1	3	4400000000000000	0
322	EXIT	0	2	1	7000000000000000	0
323	SVCT	0	14	1	5700000000000000	0
324	NPAGE	0	26	1	7100000000000000	0
325	PRLINE	0	12	1	5500000000000000	0
326	SPACES	0	20	1	6300000000000000	0
327	SVBA	0	73	1	1360000000000000	0
330	SVBC	0	74	1	1370000000000000	0
331	TSVN	0	77	1	1430000000000000	0
332	QPAGE	0	100	1	1450000000000000	0
333	CPAGE	0	60	0	1500000000000000	0
334	SETPM	0	127	0	1530000000000000	0
335	PM	0	116	0	1520000000000000	0
336	PLADR	0	40	0	1510000000000000	0
337	←0000A	0	102	1	1560000000000000	0
340	XCWD	0	126	0	1540000000000000	0
341	←0000B	0	103	1	1570000000000000	0
342	STAR	0	101	1	1470000000000000	0
343	FMT	0	61	1	1240000000000000	0
344	VECT	0	53	3	1160000000000000	0
345	PRT	0	65	1	1300000000000000	0
346	←0000C	0	104	1	1600000000000000	0

PLOT

```
                                                                    1
PLOT            ORG                                                 2
                                                                    3
                REM     PLOT *X VS. *Y                              4
                REM     IF X = 0, PLOT                              5
                REM     Y VS. ITS INDEX                             6
                REM     ACROSS THE PAGE.                            7
                REM     IF Y = 0, PLOT                             10
                REM     X VS. ITS INDEX                            11
                REM     DOWN THE PAGE.                             12
                                                                   13
PRNMAT          REF     *-DUMY                                     14
ENTRY           REF     *-ENTRY                                    15
ERPR            REF     *-ERPR                                     16
                REF     *PLOT                                      17
                                                                   20
                TRA     @*ENTRY                                    21
          Z     BAU+2   SL,B6+1                                    22
          Z     BAU+2   X,B6+1                                     23
         -Z     TRA     @*SAVE,U-R                                 24
                CLA     B6-15,U-B2                                 25
                CLA     B6-16,U-B1                                 26
                CLA     B2,U-T6                                    27
                STX     @2                                         30
                PAX     0,U-B5                                     31
          S     SLF     @B5,U-R                                    32
                IF(ZER)TRA @INDPLT,R-B4                            33
                LLS     @-15,U-B3                                  34
                LLS     @-15,U-B1                                  35
          P1    LXR     @B3,U-B1                                   36
          T6    IF(NZE)TRA @XYPLT,B3-1                             37
          P1    SLN     @1,U-PF                                    40
          B3    RWT     XLNTH,B3+1                                 41
                TRA     @MLTPAG                                    42
INDPLT    T6    IF(ZER)TRA @ERROR                                  43
                SLN     @5,CC+1                                    44
XYPLT           SLN     @2,B3+1                                    45
                CLA     @-100                                      46
                RWT     XLNTH                                      47
                CLA     CODEWD                                     50
                BAU     PRNMAT                                     51
                TSX     @*XCWD,U-T7                                52
          T6    CRL     @-15,R-B2                                  53
                CRL     @-15,R-PF                                  54
          PF    LXR     @B3,U-PF                                   55
          PF    IF(SLN)SKP @4,J-T4                                 56
                TRA     @JUMP                                      57
          P2    ABS     @PF-1,J-B4                                 60
                LTS     @B2+PF-1                                   61
                TRA     @SKIP                                      62
JUMP      T4    IF(NEG)SKP @B1,I-PF                                63
                SPF     @*T4                                       64
                AB4     @PF-1                                      65
         -PF    ABS     @PF-1,J-PF                                 66
          T4    ADD     @B2,U-B2                                   67
                IF(NEG)SKP @B3+B1                                  70
                SB2     @B3+B1                                     71
                SB1     @B2+PF,CC+1                                72
MLTPAG    B3    AB4     @B1-1,U-B1                                 73
```

```
                P1      LT4             B4+B1,U→B2                      74
                        LT5             B4+B1,B1-1                      75
SCAN1                   LT6             B4+B1,B1-1                      76
                T5      IF(POS)SKP      T6                              77
                        LT5             T6                              100
                T4      IF(NEG)SKP      T6                              101
                        LT4             T6                              102
                P1      IF(PNZ)TRA      @SCAN1                          103
SKIP            T5      STO             @MAXX                           104
                T4      STO             @MINX                           105
                        IF(SLF)JMP      @1,I→B1                         106
                PF      LT4             @B3+PF-1,U→T5                   107
                        TRA             @HERE                           110
                P2      LT4             B5+B2,U→B3                      111
                        LT5             B5+B2,B2-1                      112
SCAN2                   LT6             B5+B2,B2-1                      113
                T4      IF(POS)SKP      T6                              114
                        LT4             T6                              115
                T5      IF(NEG)SKP      T6                              116
                        LT5             T6                              117
                P2      IF(PNZ)TRA      @SCAN2                          120
HERE            T4      STO             @MAXY                           121
                T5      STO             @MINY                           122
                T4      FSB             T5,U→T4                         123
                -T5     IF(SLN)SKP      @1,U→T5                         124
                        FMP             @200.1,CC+1                     125
                        IMP             @*XLNTH                         126
                        FDV+3000        T4                              127
                        IF(SLN)JMP      @1,U→B2                         130
                        FAD+40          EXP06,U→B2                      131
                T4      VDF             @200.1,U→T4                     132
                P2      IF(NNZ)SKP      @7                              133
                P2      IF(NEG)SKP      @*XLNTH,B2-1                    134
                        SB2             @*3,B2-1                        135
                        IF(SLN)SKP      @1                              136
                -B2     ADD             @*XLNTH,CC+1                    137
                        CLA             @B2+2                           140
                        RWT             AXIS                            141
                        CLA             -MINX,U→T6                      142
                        FAD             MAXX,U→T7                       143
                T6      IF(SLN)SKP      @4                              144
                        FMP             @200.1,CC+1                     145
                        IMP             @4100                           146
                        FDV+3000        T7                              147
                        IF(SLN)JMP      @4,U→B2                         150
                        FAD+40          EXP06,U→B2                      151
                T7      VDF             @200.1,U→T7                     152
                P2      IF(NNZ)SKP      @1,B2+1                         153
                P2      IF(NEG)SKP      @4101                           154
                        SB2             @*3                             155
                Z       SUR             @10                             156
                        LRS             @B2-@51                         157
                        STO,DBL         @LAXIS                          160
                        IF(SLF)SKP      @1                              161
                T7      TRA             @TITLE,U→T4                     162
STOLP           T5      FAD             B5+B3                           163
                        FMP             T4,B3-1                         164
                        FAD+40          EXP06,U→B2                      165
                        IF(SLN)SKP      @4,B2+1                         166
```

```
                 TRA            @NOIND
         B3      JMP            @4100
                 IDV            @34-1,U+PF
                 TRA            @SHIFT
NOIND    T6      FAD            B4+B3+1
                 FMP            T7
                 FAD+40         EXP06,U+PF
SHIFT    I       LDR            @7
                 LRS            @PF-d53
                 ORU+           *PRNMAT,B1+1
         R       ORU+           *PRNMAT,B1-1
         B3      IF(PNZ)TRA     @STOLP
TITLE    Z       SB2            @5,U+B5
                 SPA            @10,I+B3
                 MLN            @2000
TTLP     I       LT7            WORD+B5,U+B1
                 TSR            @*SETPM
         B2      LT7            MINX+B5,U+B1
                 TSR            @*SETPM,B5+1
         B5      IF(ZER)SKP     @4
                 TRA            @TTLP
         I       SB1            @2,U+B2
                 TSR            @*SETPM
XLNTH            SP2            @(Z),I+B2
AXIS             SB3            @(Z),B2+1
         I       SB5            @*PM,U+B1
PRNTLP           IF(SLN)SKP     @1,B3-1
                 TRA            @FETCH
         T6      FAD            B4+B1
                 FMP            T4
                 FAD+40         EXP06,U+PF
         I       LDR            @7
                 LRS            @PF-d53
                 TRA            @NFTCH,B1+1
FETCH            CLA            *PRNMAT,B1+1
                 LDR            *PRNMAT,B1-1
NFTCH            STO,DBL        @35+62,R+T5
                 AND            LAXIS,R+Z
                 IF(NUL)TRA     @CC-1,CC+1
                 LDR            LAXIS
         R       STO            @35+40
         T5      AND            RAXIS,R+Z
                 IF(NUL)TRA     @CC-1,CC+1
                 LDR            RAXIS
         R       STO            @35+41
         B3      IF(NZE)TRA     @NOAXIS
         T5      -SUR           B5+62
                 STO            @35+40
         R       ORU            @177
                 CPL+           @35+41
NOAXIS           PRN            @35,R+Z
         Z       STO,DBL        @35+62
                 STO,DBL        @35+40,B2-1
         B2      IF(PNZ)TRA     @PRNTLP
                 IF(SLN)JMP     @1
                 CLA            PRNMAT,U+B1
         Z       TSR            @*STEX,U+B2
LEAVE            TRA            @*UNSAVE
                 SLF            @7
```

```
                    STX     a*B6-1,B6-1                     262
                    SLN     a*B6-1,B6-1                     263
                    SPA     a B6-2,I*B6                     264
              PF    MLF     a 2000,U*CC                     265
                                                            266
ERROR         03    TRA     a*ERPR                          267
                    TRA     aLEAVE                          270
                                                            271
CODEWD              OCT     0000204200145000000             272
EXP06               OCT     0600000000000000000             273
LAXIS               OCT     Z                               274
RAXIS               OCT     Z                               275
MINX                OCT     Z                               276
MAXX                OCT     Z                               277
MINY                OCT     Z                               300
MAXY                OCT     Z                               301
WORD                BCD       1INX =                        302
                    BCD     , 1AXY =                        303
                    BCD     , 1INY =                        304
                    BCD     , 1AXY =                        305
PM                  EQU     16                              306
XCWD                EQU     26                              307
SETPM               EQU     27                              310
STEX                EQU     35                              311
SAVE                EQU     36                              312
UNSAVE              EQU     37                              313
                    END                                     314
                                                            315
```

```
PRNMAT  77774    75 43645 47 0400 00000
ENTRY   77775    75 44556 36 1400 00000
ERPR    77776    75 44615 76 1400 00000
        77777    57 53556 32 5400 00000
            1    01 01000 00 4401 77773    ENTRY
            2    00 20102 26 0000 77770
            3    00 20102 26 0000 77775
            4    10 01000 02 4400 00136    SAVE
            5    01 21700 42 0100 77762
            6    01 21700 41 0100 77761
            7    01 21700 06 0004 00000
           10    01 43005 00 4000 00002
           11    01 61070 45 0002 00000
           12    03 42004 02 4000 00005
           13    01 01010 54 4001 00007    INDPLT
           14    01 45062 43 4000 00017
           15    01 45062 41 4000 00017
           16    41 45010 41 4000 00003
           17    06 01050 63 4001 00005    XYPLT
           20    41 42000 47 4000 00001
           21    43 21441 23 0001 00154    XLNTH
           22    01 01000 00 4001 00030    MLTPAG
INDPLT     23    06 01010 00 4001 00222    ERROR
           24    01 42000 30 4000 00006
XYPLT      25    01 42000 23 4000 00002
           26    01 21700 00 4000 00144
           27    01 21441 00 0001 00146    XLNTH
           30    01 21700 00 0001 00217    CODEWD
           31    01 20100 00 0001 77742    PRNMAT
           32    01 40000 07 4400 00126    XCWD
           33    06 45066 52 4000 00017
           34    01 45066 57 4000 00017
           35    47 45010 47 4000 00003
           36    47 02030 04 4000 00004
           37    01 01000 00 4001 00003    JUMP
           40    42 41005 44 4200 77776
           41    01 50450 00 4204 77776
           42    01 01000 00 4001 00021    SKIP
JUMP       43    04 02510 77 4002 00000
           44    01 40007 00 4400 00004
           45    01 41004 00 4200 77776
           46    57 41005 47 4200 77776
           47    04 10000 42 4004 00000
           50    01 02510 00 4012 00000
           51    01 40002 00 4012 00000
           52    01 40001 20 4204 00000
MLTPAG     53    43 41004 41 4002 77776
           54    41 50440 42 0022 00000
           55    01 50450 41 0022 00000
SCAN1      56    01 50440 41 0022 00000
           57    05 02110 00 0000 00006
           60    01 50450 00 0000 00006
           61    04 02510 00 0000 00006
           62    01 50440 00 0000 00006
           63    41 05150 00 4001 77771    SCAN1
SKIP       64    05 20001 00 4001 00170    MAXX
           65    04 20001 00 4001 00166    MINX
           66    01 03070 71 4000 00001
           67    47 50440 05 4210 77776
           70    01 01000 00 4001 00010    HERE
           71    42 50440 43 0044 00000
           72    01 50450 42 0044 00000
SCAN2      73    01 50440 42 0044 00000
           74    04 02110 00 0000 00006
```

```
                76  05 02510 00 0000 00006
                77  01 50450 00 0000 00006
               100  42 05150 00 4001 77771      SCAN2
HERE           101  04 20001 00 4001 00155      MAXY
               102  05 20001 00 4001 00153      MINY
               103  04 10500 04 0000 00005
               104  15 02030 05 4000 00001
               105  01 10600 20 0001 00156      +0000A
               106  01 10220 00 4001 00067      XLNTH
               107  01 13700 00 0000 00004
               110  01 03030 42 4000 00001
               111  01 10440 42 0001 00137      EXP06
               112  04 16700 04 0001 00151      +0000A
               113  42 06550 00 4000 00000
               114  42 02510 42 4001 00061      XLNTH
               115  01 40002 42 4400 00003
               116  01 02030 00 4000 00001
               117  52 10000 20 4401 00056      XLNTH
               120  01 21700 00 4004 00002
               121  01 21641 00 0001 00055      AXIS
               122  01 21730 06 1001 00131      MINX
               123  01 10400 07 0001 00131      MAXX
               124  06 02030 00 4000 00004
               125  01 10600 20 0001 00136      +0000A
               126  01 10220 00 4000 00144
               127  01 13700 00 0000 00007
               130  01 03030 42 4000 00004
               131  01 10440 42 0001 00117      EXP06
               132  07 16700 07 0001 00131      +0000A
               133  42 06550 22 4000 00001
               134  42 02510 00 4000 00145
               135  01 40002 00 4400 00003
               136  00 53000 00 4000 00010
               137  01 45015 00 4004 77714
               140  01 20005 00 4001 00111      LAXIS
               141  01 02070 00 4000 00001
               142  07 01000 04 4001 00020      TITLE
STOLP          143  05 10400 00 0050 00000
               144  01 10600 43 0000 00004
               145  01 10440 42 0001 00103      EXP06
               146  01 02030 22 4000 00004
               147  01 01000 00 4001 00003      NOIND
               150  43 10220 00 4000 00144
               151  01 13300 47 4020 77776
               152  01 01000 00 4001 00003      SHIFT
NOIND          153  06 10400 00 0030 00001
               154  01 10600 00 0000 00007
               155  01 10440 47 0001 00073      EXP06
SHIFT          156  20 50400 00 4000 00000
               157  01 45015 00 4000 77712
               160  01 50011 21 0401 77613      PRNMAT
               161  02 50011 41 0401 77612      PRNMAT
               162  43 05150 00 4001 77757      STOLP
TITLE          163  00 40002 45 4000 00005
               164  01 61010 73 4000 00010
               165  01 42002 00 4000 02000
TTLP           166  20 50470 41 0041 00071      WORD
               167  01 40000 00 4400 00127      SETPM
               170  42 50470 41 0041 00063      MINX
               171  01 40000 25 4400 00127      SETPM
               172  45 02010 00 4000 00004
               173  01 01000 00 4001 77771      TTLP
               174  20 40001 42 4000 00002
               175  01 40000 00 4400 00127      SETPM
XLNTH          176  01 61020 72 4000 00000
```

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                200  20 40005 41 4400 00116      PM
PRNTLP          201  01 02030 63 4000 00001
                202  01 01000 00 4001 00006      FETCH
                203  06 10400 00 0023 00000
                204  01 10600 00 0000 00004
                205  01 10440 47 0001 00043      EXP06
                206  20 50400 00 4000 00000
                207  01 45015 00 4000 77712
                210  01 01000 21 4001 00002      NFTCH
FETCH           211  01 21700 21 0401 77562      PRNMAT
                212  01 50400 61 0401 77561      PRNMAT
NFTCH           213  01 20005 15 4040 00062
                214  01 50314 10 0001 00035      LAXIS
                215  01 01040 20 4001 77776
                216  01 50400 00 0001 00033      LAXIS
                217  02 20001 00 4040 00040
                220  05 50314 10 0001 00032      RAXIS
                221  01 01040 20 4001 77776
                222  01 50400 00 0001 00030      RAXIS
                223  02 20001 00 4040 00041
                224  42 01000 00 4001 00004      NOAXIS
                225  05 53004 00 0040 00062
                226  01 20001 00 4040 00040
                227  02 50010 00 4000 00177
                230  01 50101 00 4040 00041
NOAXIS          231  01 61110 10 4040 00000
                232  00 20005 00 4040 00062
                233  01 20005 42 4040 00040
                234  42 05100 00 4001 77742      PRNTLP
                235  01 03030 00 4000 00001
                236  01 21700 41 0001 77535      PRNMAT
                237  00 40000 42 4400 00135      STEX
LEAVE           240  01 01000 00 4400 00137      UNSAVE
                241  01 42004 00 4000 00007
                242  01 43005 66 4500 77776
                243  01 42000 66 4500 77776
                244  01 61010 76 4100 77775
                245  47 42006 40 4000 02000
ERROR           246  03 01000 00 4401 77527      ERPR
                247  01 01000 00 4001 77767      LEAVE
CODEWD          250  00 00004 20 0145 00000
EXP06           251  06 00000 00 0000 00000
LAXIS           252  00 00000 00 0000 00000
RAXIS           253  00 00000 00 0000 00000
MINX            254  00 00000 00 0000 00000
MAXX            255  00 00000 00 0000 00000
MINY            256  00 00000 00 0000 00000
MAXY            257  00 00000 00 0000 00000
WORD            260  25 25545 05 5672 53625
                261  37 25544 06 7672 53625
                262  37 25545 05 5702 53625
                263  37 25544 06 7702 53625
********
                264  01 31006 31 4631 46314      *00006
```

317	ENTRY	0	77775	1	3000000000000000	0
320	ERPR	0	77776	1	3100000000000000	0
321	SAVE	0	136	0	3360000000000000	0
322	INDPLT	0	23	1	5500000000000000	0
323	XYPLT	0	25	1	5700000000000000	0
324	XLNTH	0	176	1	2300000000000000	0
325	MLTPAG	0	53	1	1050000000000000	0
326	ERROR	0	246	1	3000000000000000	0
327	CODEND	0	250	1	3030000000000000	0
330	XCWD	0	126	0	3330000000000000	0
331	JUMP	0	43	1	7500000000000000	0
332	SKIP	0	44	1	1160000000000000	0
333	SCAN1	0	56	1	1100000000000000	0
334	MAXX	0	255	1	3150000000000000	0
335	MINX	0	254	1	3130000000000000	0
336	HERE	0	101	1	1230000000000000	0
337	SCAN2	0	73	1	1250000000000000	0
340	MAXY	0	257	1	3210000000000000	0
341	MINY	0	256	1	3170000000000000	0
342	*OOOOA	0	264	1	3410000000000000	0
343	EXPOS	0	251	1	3050000000000000	0
344	AXIS	0	177	1	2310000000000000	0
345	LAXIS	0	252	1	3070000000000000	0
346	TITLE	0	163	1	2150000000000000	0
347	STOLP	0	147	1	1750000000000000	0
350	NOIND	0	153	1	2050000000000000	0
351	SHIFT	0	156	1	2100000000000000	0
352	TTLP	0	144	1	2200000000000000	0
353	WORD	0	242	1	3230000000000000	0
354	SETPM	0	127	0	3340000000000000	0
355	PM	0	116	0	3320000000000000	0
356	PRNTLP	0	201	1	2330000000000000	0
357	FETCH	0	211	1	2430000000000000	0
360	NFTCH	0	213	1	2450000000000000	0
361	RAXIS	0	253	1	3110000000000000	0
362	NOAXIS	0	231	1	2630000000000000	0
363	STEX	0	135	0	3350000000000000	0
364	LEAVE	0	240	1	2720000000000000	0
365	UNSAVE	0	137	0	3370000000000000	0