Relocatable PLOT Subroutine-Fortran II

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(fill out in typewriter, ink or pencil)

Program No._____ Date_____

Program Name:_____

1. Does the abstract adequately describe what the program is and what it does? Yes____ No____
   Comment_____

2. Does the program do what the abstract says? Yes____ No____
   Comment_____

3. Is the description clear, understandable, and adequate? Yes____ No____
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4. Are the Operating Instructions understandable and in sufficient detail? Yes____ No____
   Comment_____
   Are the Sense Switch options adequately described (if applicable)? Yes____ No____
   Are the mnemonic labels identified or sufficiently understandable? Yes____ No____
   Comment_____

5. Does the source program compile satisfactorily (if applicable)? Yes____ No____
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6. Does the object program run satisfactorily? Yes____ No____
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7. Number of test cases run_____. Are any restrictions as to data, size, range, etc. covered adequately in description? Yes____ No____
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8. Does the Program meet the minimal standards of COMMON? Yes____ No____
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11/1/65

Relocatable PLOT Subroutine - Fortran II

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Modifications or revisions to this program, as they occur, will be announced in the appropriate Catalog of Programs for IBM Data Processing Systems. When such an announcement occurs, users should order a complete new program from the Program Information Department.

DECK KEY

1. Condensed Subroutine Cards

2. SPS Source Statements for both Subroutines

ABSTRACT

Relocatable Plot Subroutines - Fortran II

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Purpose/Description:

To plot one curve via typewriter, or plot and label via cards up to 9 curves simultaneously.

Restrictions/Range:

Arguments 1 to 76 for cards; 0 to 93 for typewriter plot.

Storage Requirements:

Card plot - 708 positions

Typewriter plot - 174 positions

Methods:

Cards - label on left of plot, curves formed by series of numbers.

Typewriter - series of asterisks positioned by spaces and tabs.

Equipment Specifications:

Same as for Fortran II

Additional Remarks:

S.P.S. source statements and condensed subroutine cards are supplied.

Relocatable Card Plot Subroutines

for 1620 Fortran II

These subroutines are used to plot and label up to 9 curves simultaneously. Curves are formed by a series of digits; the digit for a specific curve is the sequence in which its generating function calls the subroutine. Where two curves intersect, the last curve plotted (highest numbered curve) will cover the earlier curve. The curves are punched on cards which can be printed on a 407 or similar machine using an 80-80 board.

The subroutine call statements are programmed the same as other Fortran library subroutines. In these subroutines the variable to the left of the Fortran call statement will be set equal to the numeric value of the argument; the value of the argument will also specify one point of the curve plot. There are two subroutines used in plotting, subroutine "INCK" must have a fixed point argument and subroutine "PLOT" must have a floating point argument.

The curves are labeled by a 3 digit number in the first columns of each line of the graph. This label is set to zero automatically at the beginning of each program or any time subroutine "INCK" is called with a fixed point zero argument. A label increment is specified by calling subroutine "INCK", the three low order digits of the argument are stored as the increment. Immediately prior to the punching of each plot card this increment is added to the previous value of the label; this creates a sequential numeric label for each line of the graph. A new increment may be specified at any time; if none is specified the previously entered argument will continue to be added.

The first curve point is plotted by calling the "PLOT" subroutine with a floating point argument between 1 and 76; a digit "1" will be plotted to the right of the label the number of spaces specified by the argument. When a second entry is made to the subroutine a digit "2" will be placed in the specified position; this procedure is repeated for each curve. When all curves have been entered, "PLOT" is called with a zero argument; this will punch the card and clear the graph card image. The next entry will be plotted as curve "1".

If the result of the argument is not between 1 and 76 this value will be typed, followed by the curve number. This point will be ignored in the plot. If an attempt is made to plot 10 curves before punching, the word "TEN" is typed and the subroutine initializes as if the curves had been plotted.

Several concepts used in this subroutine were obtained from the Plot Subroutine written by Jesse H. Poore, Program Library number 13.0.001.

Relocatable Typewriter Plot Subroutine (PLOTY)

For 1620 Fortran II

This subroutine is used to plot a curve, formed by a series of asterisks, on the 1620 console typewriter. It is called as any other library subroutine; the argument is a fixed point number which specifies the number of spaces to be placed to the left of the asterisk. For example, if the statement:

J=PLOTY(34)

is used, the typewriter will skip 34 spaces before the asterisk is typed. J will be given the value 34.

In operation, this subroutine returns the typewriter carriage, selects the tens digit of the argument and tabulates that number of times, then selects the units digit and spaces that number of times. Therefore, tab stops must be set every tenth column after the left margin if a 1 to 1 graph is to be plotted. Margins should be set as far apart as possible; if an argument larger than the number of spaces available on one line is used the asterisk will be typed in the first column on the next line. If arguments higher than 99 are used the digits other than units and tens will be ignored; negative arguments are not valid as the typewriter will tabulate the specified number of times but will not space.

Deck Modifications

(for both subroutines)

A) If no other relocatable subroutines have been added by the installation

   1) Deck I - replace card 3001 and add cards 3008, 3009, and 3010. These are the first 4 cards in deck A.

   2) Deck III - insert remaining cards of deck A, 80001-100006, between cards 70003 and 51001.

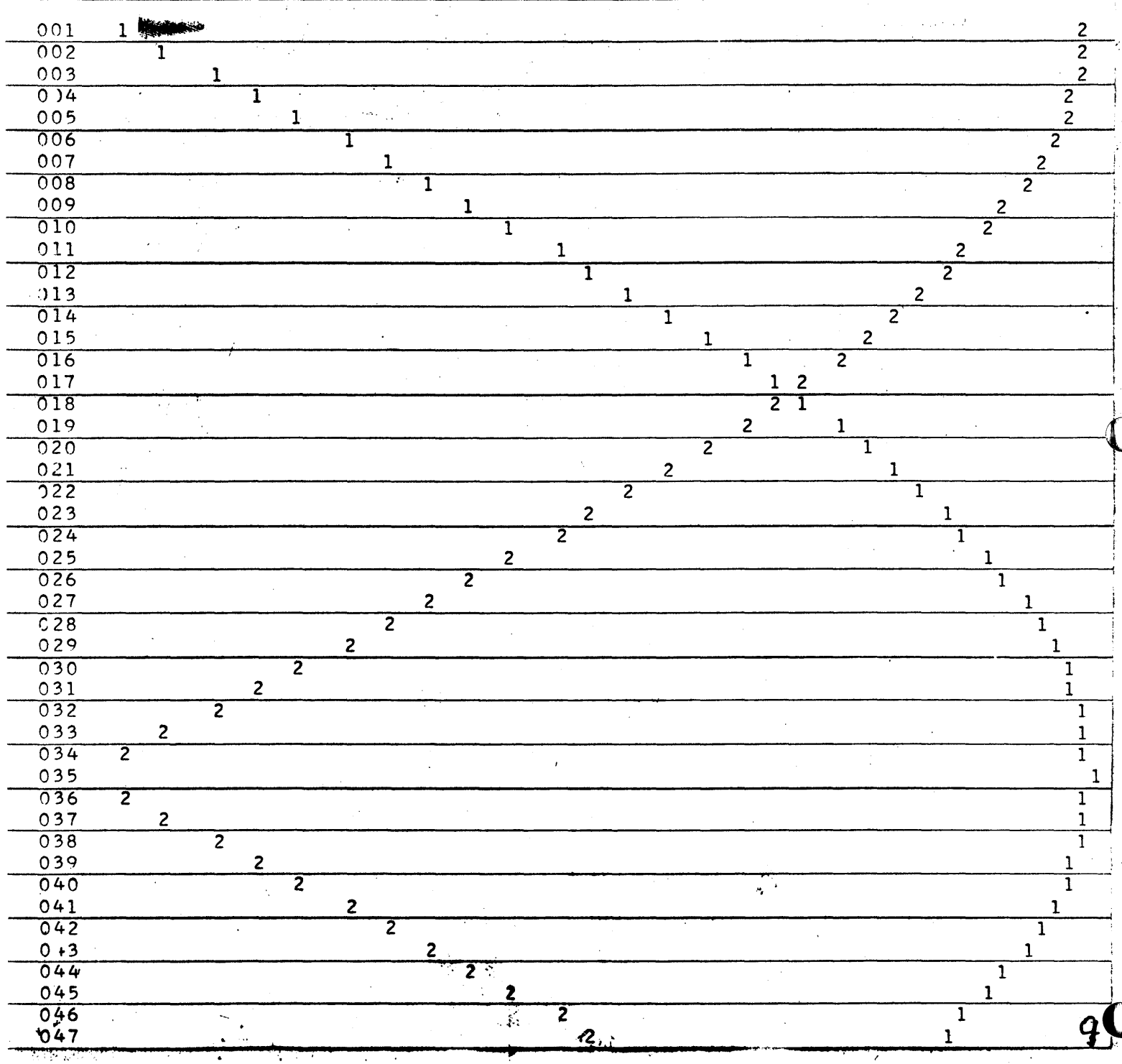
B) If other relocatable subroutines have been added

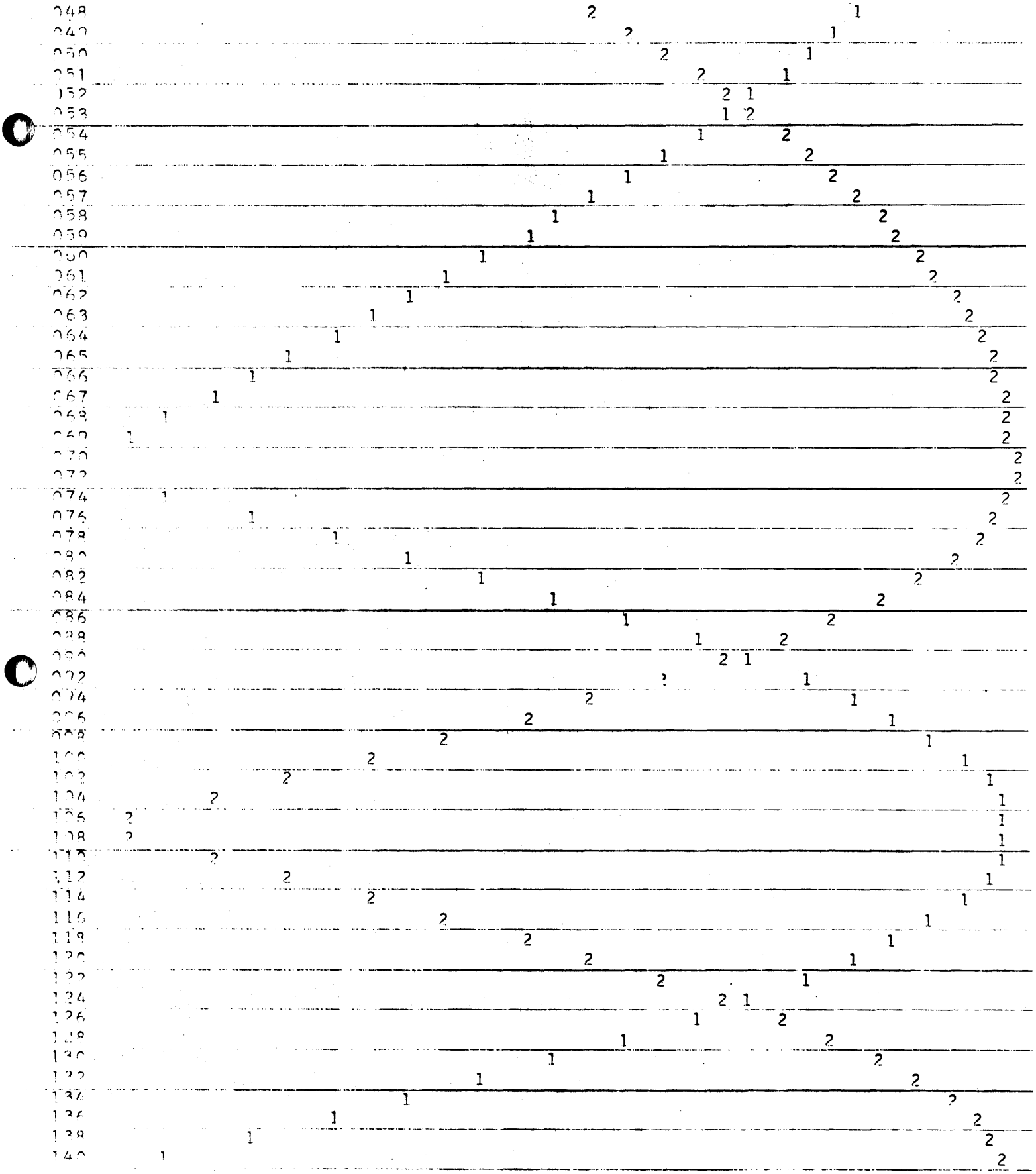
   1) Add 2 to count on card 3001. Add cards 3008, 3009, and 3010; modify serial numbers if necessary to avoid duplication of card numbers.

   2) Deck III - If necessary, modify remaining cards so that numbers in columns 75-76 agree with modified serial numbers. Insert remaining cards of deck A, 80001-100006, after any other relocatable subroutine.

C) Deck 2 contains the source statements for both subroutines.

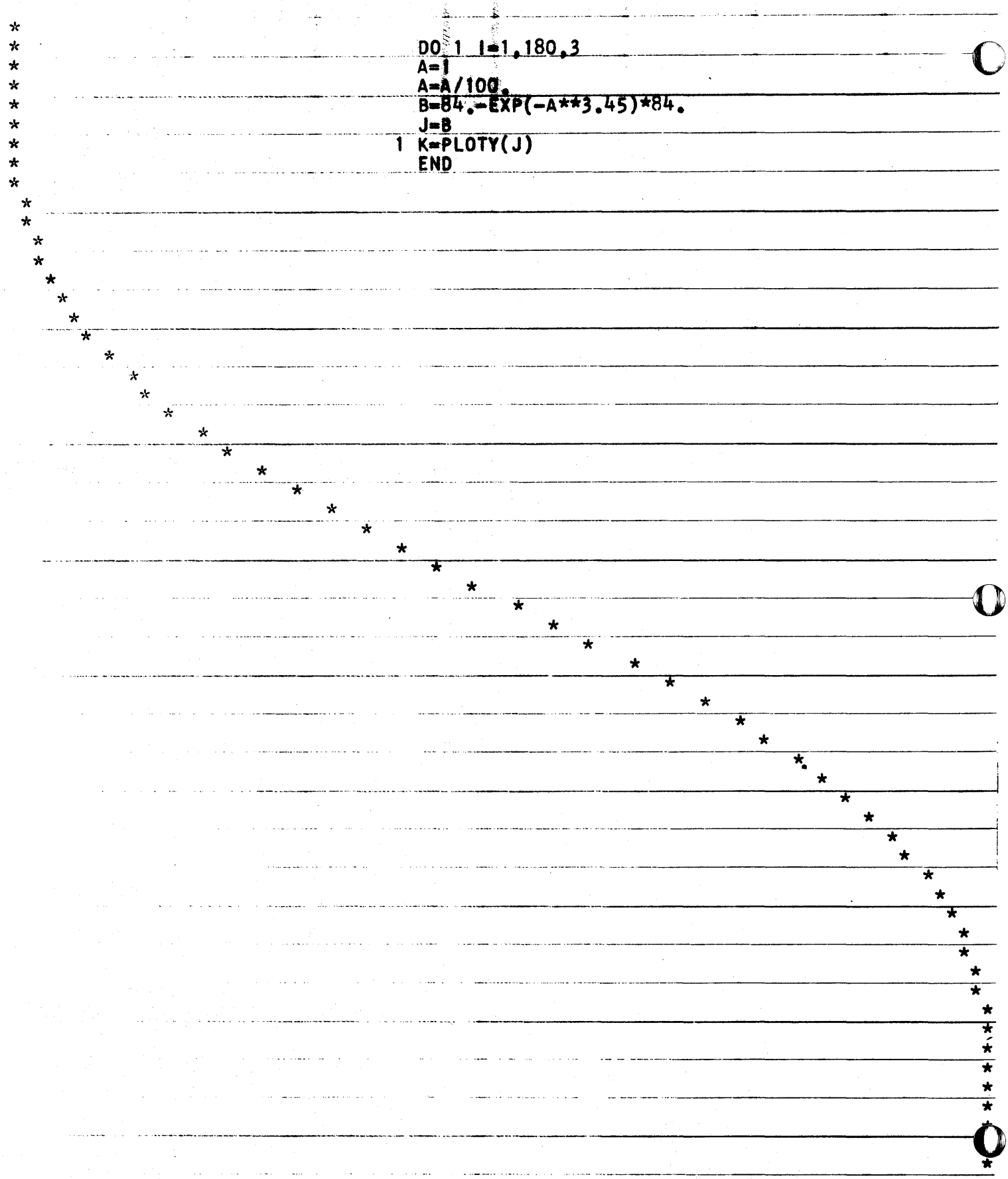
```
      J=INCR(1)
      DO1 I=1,70
      A=I
      X=PLOT(SIN((A/70.)*3.1416)*76.)
      X=PLOT(COS((A/70.)*3.1416)*76.)
    1 X=PLOT (0.)
      J=INCR(2)
      DO 2 I=70,140,2
      A=I
      X=PLOT(SIN((A/70.)*3.1416)*76.)
      X=PLOT(COS((A/70.)*3.1416)*76.)
    2 X=PLOT (0.)
      END
```





COMPUTER TECHNOLOGY

```
      DO 1 I=1.180.3
      A=I
      A=A/100.
      B=84.-EXP(-A**3.45)*84.
      J=B
    1 K=PLOTY(J)
      END
```



```
                         01010 **      CARD  PLOT SUBROUTINE, FORTRAN II                                  0002
10000                    01020         DORG  10000                                                        0004
10000 M1 10096 00000     01030 START   NOP   L1          ,           ,0,   THIS IS A SWITCH, CLEAR OR FILL  000
10012 J0 10042 J0613     01040         TFM   L3+6        ,OUTPUT+3   ,017,                              0008
10024 J6 10033 00000     01050 L2      TF    *+9         ,80         ,010,                              0010
10036 J5 J0613 00000     01060 L3      TDM   OUTPUT+3    ,           ,02,  CLEAR OUTPUT AREA LOOP       001
10047    00001           01070         DNB   1           ,*          ,                                  0014
10048 J1 10042 000-1     01080         AM    L3+6        ,1          ,010,                              0017
10060 J2 10033 000-1     01090         SM    L2+9        ,1          ,010,                              001
10072 M7 10036 01200     01100         BNE   L3          ,           ,0,   REPEAT LOOP - 80 COLUMNS     0021
10084 J5 10001 00009     01110         TDM   START+1     ,9          ,0,   SET SWITCH TO FILL MODE      0023
10096 20 00485 0999R     01120 L1      TF    FAC         ,START-1    ,111, ARGUMENT TO FAC              002
10108 J2 09999 -0002     01121         SM    START-1     ,2          ,07, FINDS ADDRESS OF MANTISSA     0027
10120 20 00483 0999R     01122         TF    FAC-2       ,START-1    ,111,                              0029
10132 M3 10194 0769L     01130         BD    DIGIT       ,FNH        ,011, BRANCH IF ARGUMENT NOT ZERO  003
10144 J1 10612 0-000     01131 INCR    AM    OUTPUT+2    ,           ,08, INCREMENT LABEL               0033
10156 L8 10610 00400     01140         WNCD  OUTPUT      ,           ,0,   PUNCH PRIOR RESULTS          0035
10168 J6 10202 000-0     01150 L5      TFM   PLOT        ,           ,010, SET CURVE COUNTER TO ZERO    003
10180 J5 10001 00001     01160         TDM   START+1     ,1          ,0,   SET SWITCH TO CLEAR MODE     0039
10192 42 00000 00000     01170         BB                ,           ,                                  0041
10194                    01180         DORG  *-9         ,           ,                                  004
10194 J1 10202 000-1     01190 DIGIT   AM    PLOT        ,1          ,010, STEP CURVE COUNTER           0045
10206 J4 10202 000J0     01200         CM    PLOT        ,10         ,010,                              0047
10218 M6 10586 01200     01210         BE    PLT         ,           ,0,   ERROR IF TENTH CALL          004
10230 J0 10528 J0613     01220 L6      TFM   L4+6        ,OUTPUT+3   ,017,                              0051
10242 14 00485 000-1     01230         CM    FAC         ,1          ,10,  IS EXPONENT 1                0053
10254 M6 10498 01200     01240         BE    ONEDIG      ,           ,0,   YES, PLOT SINGLE DIGIT CASE  005
10266 M7 10536 01300     02010         BL    RANGE       ,           ,0,  ARG LESS THAN ONE             0057
10278 14 00485 000-2     02020         CM    FAC         ,2          ,10,                               0059
10290 M6 10536 01100     02030         BH    RANGE       ,           ,0,   ARG OVER 100                 006
10302 14 0767R 000P6     02040         CM    FH          ,76         ,610,                              0063
10314 M6 10536 01100     02050         BH    RANGE       ,           ,0,  ARG OVER 76                   0065
10326 K1 10528 0767R     02060         A     L4+6        ,FH         ,011,ADD VALUE OF PLOT             006
10338 M9 10522 00000     02070         B     L4          ,           ,0,   GO TO 2 DIGIT PLOT           0069
                         02071 *             SUBROUTINE INCR, SECTION TO ACCEPT NEW INCREMENT OR CLEAR  0071
                         12071 *       INCR  SUBROUTINE NUMBER 11.  ENTRY POINT (ALTERNATE) IS HERE     007
10350 KO 10433 10349     02072 A       TF    UNITS+11    ,A-1        ,01, FIND ADDRESSES OF ARGUMENT    0075
10362 20 00485 1034R     12072         TF    FAC         ,A-1        ,111                               0077
10374 J2 10349 -0001     22072         SM    A-1         ,1          ,07, FIND ADDRESS OF PREVIOUS DIGIT 007
10386 KO 10445 10349     02073         TF    TENS+11     ,A-1        ,01,                               0081
```

```
10398 J2 10349 -0001 12073          SM   A-1          ,1          ,07, FIND ADDRESS OF PREVIOUS DIGIT      008
10410 K0 10457 10349 02074          TF   HUNDS+11     ,A-1        ,01,                                     0085
10422 K5 10155 -0000 02075 UNITS    TD   INCR+11      ,0          ,07, SAVE 3 DIGITS OF ARGUMENT           0087
10434 K5 10154 -0000 02076 TENS     TD   INCR+10      ,0          ,07,                                     008
10446 K5 10153 -0000 02077 HUNDS    TD   INCR+9       ,0          ,07,                                     0091
10458 J4 10155 0-000 02078          CM   INCR+11      ,0          ,08, CHECK IF ZERO INCREMENT             0093
10470 M6 10484 01200 02079          BE   CLEAR        ,           ,0,                                      009
10482 42 00000 00000 02080          BB                                                                     0097
10484                02081          DORG *-9                                                               0099
10484 J6 10612 0-000 02082 CLEAR    TFM  OUTPUT+2     ,0          ,08, CLEAR LABEL                         010
10496 42 00000 00000 02083          BB                                                                     0103
10498                02084          DORG *-9                                                               0105
10498 K5 10521 0769L 02090 ONEDIG   TD   *+23         ,FNH        ,011,                                    010
10510 J2 10528 000-0 02100          SM   L4+6         ,           ,010,                                    0109
10522 2N 00000 10202 02110 L4       TD                ,PLOT       ,1,                                      0111
10534 42 00000 00000 02120          BB                ,           ,                                        011
10536                02130          DORG *-9          ,           ,                                        0115
10536 34 00000 00102 02140 RANGE    RCTY                                                                   0117
10548 38 0769L 00100 02142          WNTY FNH          ,           ,6,   ERROR,WRITE ARGUMENT               011
10560 34 00000 00101 02150          SPTY              ,           ,                                        0121
10572 L8 10202 00100 02160          WNTY PLOT         ,           ,0,                                      0123
10584 42 00000 00000 02170          BB                ,           ,                                        012
10586                02180          DORG *-9          ,           ,                                        0127
10586 L9 10695 00100 02190 PLT      WATY TEN          ,           ,0                                       0129
10598 49 10168 00000 02200          B    L5                                                                013
10610    00083       02210 OUTPUT   DSS  83                                                              0133
10202    00002       02220 PLOT     DS   2,DIGIT+8,    ,                                                  0135
10203    00001       02230          DC   1,@,DIGIT+9                                                      013
10695    00004       02240 TEN      DAC  4,TEN@,                                                          0140
00485                02250 FAC      DS   ,485                                                             0143
07693                02260 FNH      DS   ,7693                                                            014
07679                02270 FH       DS   ,7679                                                            0147
                     02280          DEND                                                                  0149
```

```
                                   *          TYPEWRITER PLOTTING SUBROUTINE, FIXED POINT                0002
10000                                         DORG  10000                                               0004
10000 34 00140 00102               A          RCTY  140                                                 0006
10007    00001                               DC    1,@,A+7                                             0008
10012 20 00485 0999R                          TF    00485,A-1,111                                       0011
10024 KN 10138 0999R                          TD    SPACE+6,A-1,0111                                    0013
10036 J2 09999 -0001                          SM    A-1,1,707                                           0015
10048 KN 10090 0999R                          TD    TAB+6,A-1,0111                                      0017
10060 J2 10090 000-1               TABS       SM    TAB+6,1,010                                         0019
10072 M7 10108 01300                          BL    SPACES,,0                                           0021
10084 34 000-0 00108               TAB        TBTY  ,,5                                                 0023
10096 M7 10060 01200                          BNZ   TABS,,0                                             0025
10108 J2 10138 000-1               SPACES     SM    SPACE+6,1,010                                       0027
10120 M7 10156 01300                          BL    TYPE,,0                                             0029
10132 34 000-0 00101               SPACE      SPTY  ,,5                                                 0031
10144 M7 10108 01200                          BNZ   SPACES,,0                                           0033
10156 L9 10005 00100               TYPE       WATY  A+5,,0                                              0035
10168 42 00000 00000                          BB                                                        0037
                                              DEND                                                      0039
```