

WARNING -

This code likely will not run on an IBM 1401.

The 1403 printer was used on other machines,
such as the IBM 360 series -

May 25, 2016

Michael Albaugh <m.e.albaugh@gmail.com> wrote:

> There is no way it would run on a 1401, btw. As I suspected,
> there are some large arrays, well beyond the 1401's memory.

then Bill Worthington <billworthington@comcast.net> wrote:

"Patrick, the 1403 was a workhorse printer well into the 1970s --
well after the 1401 was let out to pasture.

Your program listing looked as though it was a run on a System/360
-- possibly a System/370 -- with its FORTRAN.

This would date it after 1964, but the program listing has no compilation date.

Regards, Bill"

From Patrick Frank, May 23, 2016

Here

is a Dropbox Link to a copy of the ART1 program, which I got from the author, Richard Williams. He wrote it in March 1969 for the computer setup at the University of New Mexico.

https://www.dropbox.com/sh/1glba380i5pz5hz/AABHF1wqYkhAGi_bbIWw4tg-a

I also have a copy of an 11-page instruction sheet that he created, which purports to explain to artists how to use the program.

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/ID RAX ██████████,EE710 *WILLIAMS, R. H.
/JCB
/FTC NAME=ART1,I,IST,DECK
BPS FORTRAN D COMPILER
S.0001 DIMENSION AR1(50,105), AR2(50,105), RD(10), CD(10), NAME(60)
S.0002 INTEGER S,A,R,C,RD,CD
S.0003 INDEX = 1

C*
C*INITIALIZING THE TWO ARRAYS*
S.0004 READ(5,10) CH1,NCH1,CH2,NCH2,NREP,NAME
S.0005 10 FORMAT(2(A1,I1),I1,5X,60A1)
S.0006 IF(NREP - 1) 50, 51, 51
S.0007 50 NREP = 1
S.0008 51 IF(NREP - 6) 53, 53, 52
S.0009 52 NREP = 6
S.0010 53 CONTINUE
S.0011 IF(NCH1) 5, 5, 6
S.0012 5 NCH1 = 1
S.0013 6 IF(NCH2) 7, 7, 8
S.0014 7 NCH2 = 1
S.0015 8 WRITE(6,11)
S.0016 11 FORMAT(36X,'12345',16X,'T',9X,'T',9X,'T',9X,'T',9X,'T',9X,'T')
S.0017 WRITE(6,12) CH1,NCH1,CH2,NCH2,NREP,NAME
S.0018 12 FORMAT(1X,'YOUR INITIALIZING DATA CARD READS ('
2 ,2(A1,I1),I1,') AND ('',60A1,''),')/)
S.0019 DD 15 I = 1,50
S.0020 DD 15 J = 1,105, NCH1
S.0021 15 AR1(I,J) = CH1
S.0022 DD 20 I = 1,50
S.0023 DD 20 J = 1,105, NCH2
S.0024 20 AR2(I,J) = CH2

C*
C*READING THE DATA CARDS*
S.0025 WRITE(6,25)
S.0026 25 FORMAT(1X,'YOUR OTHER DATA CARDS ARE -')/
S.0027 WRITE(6,26)
S.0028 26 FORMAT(2X,'S',1X,'CH',2X,'A',3X,'R',2X,'C',3X,'NR',2X,'NC',1X,
2 '*****',1X,'R1,C1',2X,'R2,C2',2X,'R3,C3',2X,'R4,C4',2X,
3 'R5,C5',2X,'R6,C6',2X,'R7,C7',2X,'R8,C8',2X,'R9,C9'
4 ,2X,'RT,CT')/

C*
C FIGURE SUBPROGRAM, S (IN FORMAT I2)
C CHARACTER, CH (IN FORMAT A1)
C ARRAY NUMBER 1 OR 2, A (IN FORMAT I1)
C BEGIN FIGURE IN ROW R, COLUMN C (IN FORMAT I2, I3)
C FIGURE SIZE, NUMBER OF ROWS DOWN, NR (IN FORMAT I3)
C FIGURE SIZE, NUMBER OF COLUMNS TO THE RIGHT, NC (IN FORMAT I4)
C TEN POSSIBLE REPEATED FIGURES STARTING IN ROW RD, COLUMN CD
C (IN FORMAT I2,I3)
C*
S.0029 30 READ(5,31) S, CH, A, R, C, NR, NC,(RD(I), CD(I), I=1,10)
S.0030 31 FORMAT(I2, A1, I1, I2, 2I3, I4, 4X, 10(I2,I3))
S.0031 WRITE(6,32) S, CH, A, R, C, NR, NC, (RD(I), CD(I), I = 1,10)
S.0032 32 FORMAT(1X,I2,2X,A1,2X,I1,2X,I2,I3,2X,I3,I4,4X,10(2X,I2,I3))

C*
C*AFTER EACH DATA CARD IS READ THE DESIRED FIGURE IS GENERATED*
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S.0033 GO TO(41,42,43,44,45,46,47,48),S

C*

C*THIS SUBPROGRAM CAUSES THE ARRAY ENTRIES TO BE PRINTED*

S.0034 41 CONTINUE
S.0035 101 FORMAT('1'////)
S.0036 102 FORMAT(16X, 105A1)
S.0037 103 FORMAT('*+', 15X, 105A1)
S.0038 WRITE (6,101)
S.0039 DO 104 J = 1,50
S.0040 WRITE (6,102) (AR1(J,I), I = 1, 105)
S.0041 104 WRITE (6,103) (AR2(J,I), I = 1, 105)
S.0042 WRITE(6,105) NAME
S.0043 105 FORMAT('0',60X,60A1)
S.0044 IF(NREP - INDEX) 1000, 1000, 106
S.0045 106 INDEX = INDEX + 1
S.0046 GO TO 41

C*

C*THIS SUBPROGRAM GENERATES STRAIGHT LINES*

S.0047 42 CONTINUE
S.0048 ND = 0
S.0049 IF(NR) 202, 201, 202
S.0050 201 NR = 1
S.0051 202 IF(NC) 204, 203, 204
S.0052 203 NC = 1
S.0053 204 NRABS = IABS(NR)
S.0054 NCABS = IABS(NC)
S.0055 NRSIG = NR/NRABS
S.0056 NCSIG = NC/NCABS
S.0057 IF(NRABS - 1) 210, 210, 205
S.0058 205 IF(NCABS - 1) 230, 230, 206
S.0059 206 IF(NCABS - NRABS) 207, 208, 208
S.0060 207 LROC = (NRABS - 1)/(NCABS - 1)
S.0061 LCDR = 1
S.0062 NNN = NCABS
S.0063 GO TO 250
S.0064 208 LCDR = (NCABS - 1)/(NRABS - 1)
S.0065 LROC = 1
S.0066 NNN = NRABS
S.0067 GO TO 250
S.0068 210 KK = 1
S.0069 211 DO 226 I = 1,NCABS
S.0070 N = C + NCSIG*(I - 1)
S.0071 IF(105 - N) 290, 213, 213
S.0072 213 IF(N - 1) 290, 215, 215
S.0073 215 IF(A - 2) 220, 225, 225
S.0074 220 AR1(R,N) = CH
S.0075 GO TO 226
S.0076 225 AR2(R,N) = CH
S.0077 226 CONTINUE
S.0078 GO TO 290
S.0079 230 KK = 2
S.0080 231 DO 246 I = 1, NRABS
S.0081 NN = R + NRSIG*(I - 1)
S.0082 IF(50 - NN) 290, 233, 233
S.0083 233 IF(NN - 1) 290, 235, 235
S.0084 235 IF(A - 2) 240, 245, 245

S.0085 240 AR1(NN,C) = CH
 S.0086 GO TO 246
 S.0087 245 AR2(NN,C) = CH
 S.0088 246 CONTINUE
 S.0089 GO TO 290
 S.0090 250 KK = 3
 S.0091 251 DO 270 I = 1, NNN
 S.0092 N = C + NCSIG*LCOR*(I - 1)
 S.0093 IF(105 - N) 290, 253, 253
 S.0094 253 IF(N - 1) 290, 255, 255
 S.0095 255 NN = R + NRSIG*LROC*(I - 1)
 S.0096 IF(50 - NN) 290, 257, 257
 S.0097 257 IF(NN - 1) 290, 259, 259
 S.0098 259 IF(A - 2) 260, 261, 261
 S.0099 260 AR1(NN,N) = CH
 S.0100 GO TO 270
 S.0101 261 AR2(NN,N) = CH
 S.0102 270 CONTINUE
 S.0103 GO TO 290
 S.0104 290 ND = ND + 1
 S.0105 IF(ND - 10) 291, 291, 299
 S.0106 291 R = RD(ND)
 S.0107 C = CD(ND)
 S.0108 IF(R) 299, 299, 292
 S.0109 292 IF(KK - 2) 211, 231, 251
 S.0110 299 CONTINUE
 S.0111 GO TO 30

C*

C*THIS SUBPROGRAM GENERATES SOLID RECTANGLES*

S.0112 43 CONTINUE
 S.0113 ND = 0
 S.0114 IF(NR) 301, 301, 302
 S.0115 301 NR = 1
 S.0116 302 IF(NC) 303, 303, 306
 S.0117 303 NC = 1
 S.0118 GO TO 306
 S.0119 304 CONTINUE
 S.0120 306 N = C + NC - 1
 S.0121 IF(105 - N) 308, 310, 310
 S.0122 308 N = 105
 S.0123 310 NN = R + NR - 1
 S.0124 IF(50 - NN) 312, 314, 314
 S.0125 312 NN = 50
 S.0126 314 IF(A - 2) 320, 330, 330
 S.0127 320 DO 322 M = R, NN
 S.0128 DO 322 MM = C, N
 S.0129 322 AR1(M,MM) = CH
 S.0130 GO TO 350
 S.0131 330 DD 332 M = R, NN
 S.0132 DD 332 MM = C, N
 S.0133 332 AR2(M,MM) = CH
 S.0134 350 ND = ND + 1
 S.0135 IF(ND - 10) 352, 352, 354
 S.0136 352 R = RD(ND)
 S.0137 C = CD(ND)
 S.0138 IF(R) 354, 354, 304

S.0139 354 CONTINUE
S.0140 GD TO 30

C*

C*THIS SUBPROGRAM GENERATES OPEN RECTANGLES*

S.0141 44 CONTINUE
S.0142 ND = 0
S.0143 IF(NR) 401, 401, 402
S.0144 401 NR = 1
S.0145 402 IF(NC) 403, 403, 406
S.0146 403 NC = 1
S.0147 GD TO 406
S.0148 404 CONTINUE
S.0149 406 N = C + NC - 1
S.0150 IF(105 - N) 408, 410, 410
S.0151 408 N = 105
S.0152 410 NN = R + NR - 1
S.0153 IF(50 - NN) 412, 414, 414
S.0154 412 NN = 50
S.0155 414 IF(A - 2) 420, 430, 430
S.0156 420 DO 422 J = C,N
S.0157 AR1(R,J) = CH
S.0158 422 AR1(NN,J) = CH
S.0159 DO 424 I = R,NN
S.0160 AR1(I,C) = CH
S.0161 424 AR1(I,N) = CH
S.0162 GD TO 450
S.0163 430 DO 432 J = C,N
S.0164 AR2(R,J) = CH
S.0165 432 AR2(NN,J) = CH
S.0166 DO 434 I = R,NN
S.0167 AR2(I,C) = CH
S.0168 434 AR2(I,N) = CH
S.0169 450 ND = ND + 1
S.0170 IF(ND - 10) 452, 452, 454
S.0171 452 R = RD(ND)
S.0172 C = CD(ND)
S.0173 IF(R) 454, 454, 404
S.0174 454 CONTINUE
S.0175 GD TO 30

C*

C*THIS SUBPROGRAM GENERATES TRIANGLES*

S.0176 45 CONTINUE
S.0177 ND = 0
S.0178 IF(NR) 502, 540, 502
S.0179 502 NRABS = IABS(NR)
S.0180 NRSIG = NR/NRABS
S.0181 KK = 1
S.0182 503 DO 520 I = 1, NRABS
S.0183 NNR = R + NRSIG*(I-1)
S.0184 IF(50 - NNR) 590, 506, 506
S.0185 506 IF(NNR - 1) 590, 508, 508
S.0186 508 NNCL = C - I + 1
S.0187 IF(NNCL - 1) 509, 510, 510
S.0188 509 NNCL = 1
S.0189 510 NNCR = C + I - 1
S.0190 IF(105 - NNCR) 511, 512, 512

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S.0191      511 NNCR = 105
S.0192      512 DD 520 J = NNCL, NNCR
S.0193      IF(A - 2) 514, 516, 516
S.0194      514 AR1(NNR,J) = CH
S.0195      GO TO 520
S.0196      516 AR2(NNR,J) = CH
S.0197      520 CONTINUE
S.0198      GO TO 590
S.0199      540 IF(NC) 542, 599, 542
S.0200      542 NCABS = IABS(NC)
S.0201      NCSIG = NC/NCABS
S.0202      KK = 2
S.0203      543 DD 560 I = 1, NCABS
S.0204      NNC = C + NCSIG*(I - 1)
S.0205      IF(105 - NNC) 590, 546, 546
S.0206      546 IF(NNC - 1) 590, 548, 548
S.0207      548 NNRT = R - I + 1
S.0208      IF(NNRT - 1) 549, 550, 550
S.0209      549 NNRT = 1
S.0210      550 NNRB = R + I - 1
S.0211      IF(50 - NNRB) 551, 552, 552
S.0212      551 NNRB = 50
S.0213      552 DD 560 J = NNRT, NNRB
S.0214      IF(A - 2) 554, 556, 556
S.0215      554 AR1(J,NNC) = CH
S.0216      GO TO 560
S.0217      556 AR2(J,NNC) = CH
S.0218      560 CONTINUE
S.0219      590 ND = ND + 1
S.0220      IF(ND - 10) 591, 591, 599
S.0221      591 R = RD(ND)
S.0222      C = CD(ND)
S.0223      IF(R) 599, 599, 592
S.0224      592 IF(KK - 2) 503, 543, 543
S.0225      599 CONTINUE
S.0226      GO TO 30

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C*

C*THIS SUBPROGRAM GENERATES ELLIPSES*

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S.0227      46 CONTINUE
S.0228      ND = 0
S.0229      IF(NR-2) 602,604,604
S.0230      602 NR = 2
S.0231      604 IF(NC-2) 606,608,608
S.0232      606 CNC = NR - 1
S.0233      NC = CNC*1.7 + .5
S.0234      608 NCR = C + NC - 1
S.0235      IF(NCR-105) 612, 612, 610
S.0236      610 NCR = 105
S.0237      612 NCL = C - NC + 1
S.0238      IF(NCL-1) 614, 616, 616
S.0239      614 NCL = 1
S.0240      616 IF(A-1) 618, 618, 622
S.0241      618 DD 620 I = NCL, NCR
S.0242      620 AR1(R,I) = CH
S.0243      GO TO 626
S.0244      622 DD 624 I = NCL, NCR

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S.0245      624 AR2(R,I) = CH
S.0246      626 MR = NR - 1
S.0247      BB = MR
S.0248      MC = NC - 1
S.0249      XNC = MC
S.0250      AA = XNC/1.7
S.0251      DD 666 I = 1, MR
S.0252      630 IF(MC) 634, 634, 631
S.0253      631 XR = I
S.0254      XNC = MC
S.0255      XMC = XNC/1.7
S.0256      THETA = ATAN(XR/XMC)
S.0257      RE = AA*BB*SQRT(1./((AA*SIN(THETA))**2 + (BB*COS(THETA))**2))
S.0258      RR = SQRT(XR**2 + XMC**2)
S.0259      IF(RE + .5 - RR) 632, 634, 634
S.0260      632 MC = MC - 1
S.0261      GO TO 630
S.0262      634 MCR = C + MC
S.0263      IF(MCR-105) 638, 638, 636
S.0264      636 MCR = 105
S.0265      638 MCL = C - MC
S.0266      IF(MCL-1) 640, 642, 642
S.0267      640 MCL = 1
S.0268      642 MRB = R + I
S.0269      IF(MRB-50) 644, 644, 654
S.0270      644 IF(A-1) 646, 646, 650
S.0271      646 DO 648 J = MCL, MCR
S.0272      648 ARI(MRB,J) = CH
S.0273      GO TO 654
S.0274      650 DO 652 J = MCL, MCR
S.0275      652 AR2(MRB,J) = CH
S.0276      654 MRT = R - I
S.0277      IF(MRT-1) 666, 656, 656
S.0278      656 IF(A-1) 658, 658, 662
S.0279      658 DO 660 J = MCL, MCR
S.0280      660 ARI(MRT,J) = CH
S.0281      GO TO 666
S.0282      662 DO 664 J = MCL, MCR
S.0283      664 AR2(MRT,J) = CH
S.0284      666 CONTINUE
S.0285      ND = ND + 1
S.0286      IF(ND-10) 668, 668, 670
S.0287      668 R = RD(ND)
S.0288      C = CD(ND)
S.0289      IF(R) 670, 670, 608
S.0290      670 CONTINUE
S.0291      GO TO 30

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C*

C*THIS SUBPROGRAM GENERATES *QUADRANTS**

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S.0292      47 CONTINUE
S.0293      DO 675 I = 1, 25
S.0294      DO 675 J = 1, 53
S.0295      CH3 = ARI(I,J)
S.0296      CH4 = AR2(I,J)
S.0297      JR = 106 - J
S.0298      IB = 51 - I

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S.0299      AR1(I,JR) = CH3
S.0300      AR1(IB,J) = CH3
S.0301      AR1(IB,JR) = CH3
S.0302      AR2(I,JR) = CH4
S.0303      AR2(IB,J) = CH4
S.0304      675 AR2(IB,JR) = CH4
S.0305      GO TO 30

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C*

C*THIS SUBPROGRAM GENERATES (EXPONENTIAL)*(TIME)

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S.0306      48 CONTINUE
S.0307      XC = C - 1
S.0308      XNC = NC
S.0309      ALPHA = 1./XNC
S.0310      XNR = NR
S.0311      AK = XNR*ALPHA*2.7183
S.0312      AKMAG = ABS(AK)
S.0313      AKSIG = AK/AKMAG
S.0314      DD 724 I = C, 105
S.0315      TIME = I
S.0316      NY = AKMAG*(TIME-XC)*EXP(-ALPHA*(TIME-XC)) + .5
S.0317      IF(AKSIG) 704, 724, 710
S.0318      704 NNN = R
S.0319      MMM = R + NY - 1
S.0320      IF(MMM -50) 708, 708, 706
S.0321      706 MMM = 50
S.0322      708 GO TO 714
S.0323      710 MMM = R
S.0324      NNN = R - NY + 1
S.0325      IF(NNN -1) 712, 714, 714
S.0326      712 NNN = 1
S.0327      714 IF(A-1) 716, 716, 720
S.0328      716 DD 718 J = NNN, MMM
S.0329      718 AR1(J,I) = CH
S.0330      GO TO 724
S.0331      720 DD 722 J = NNN, MMM
S.0332      722 AR2(J,I) = CH
S.0333      724 CONTINUE
S.0334      GO TO 30
S.0335      1000 CALL EXIT
S.0336      END

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SIZE OF COMMON 00000 PROGRAM 50532

END OF COMPILATION ART1