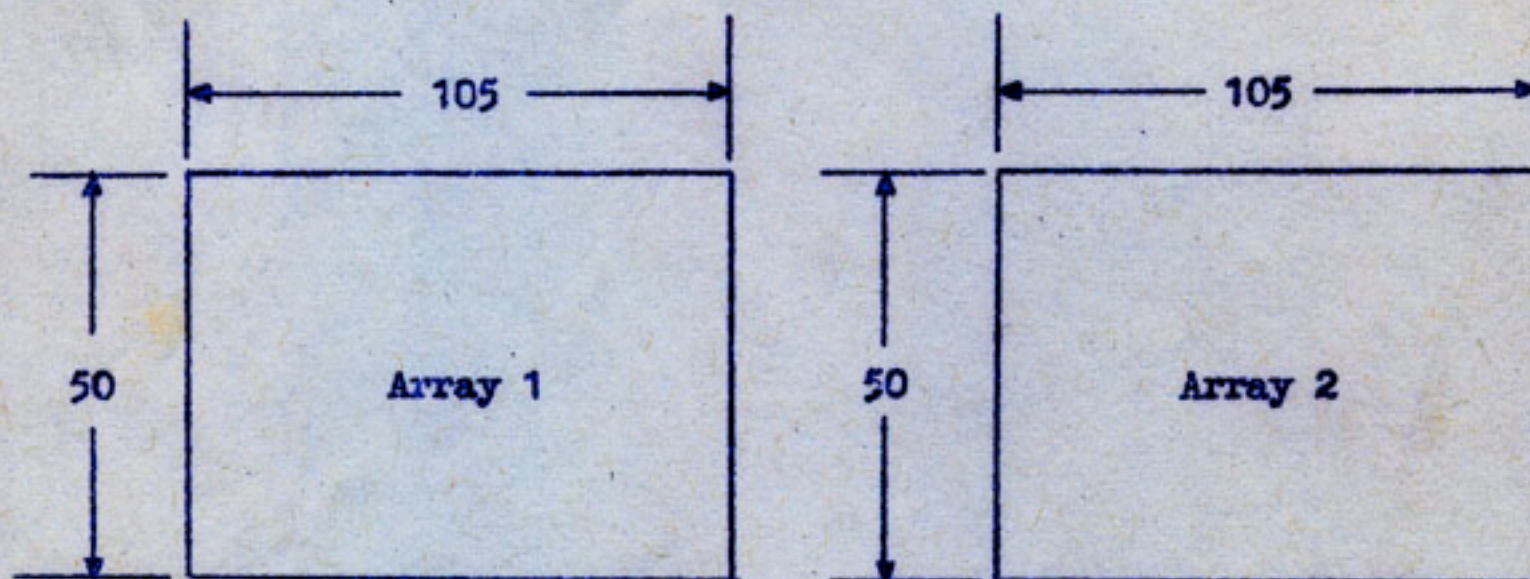<u>The ART1 Program - Notes:</u>

ART1, briefly, is a computer program that permits a person to assemble designs in each of two arrays. Each array is 105 columns by 50 rows. The designs as finally assembled in the arrays are printed one over the other using the computer's off-line printer.

```
            |<--------- 105 --------->|          |<--------- 105 --------->|

        _   +-------------------------+      _    +-------------------------+
        |   |                         |      |    |                         |
        |   |                         |      |    |                         |
       50   |        Array 1          |     50    |        Array 2          |
        |   |                         |      |    |                         |
        |   |                         |      |    |                         |
        _   +-------------------------+      _    +-------------------------+
```

In general a program is made of three parts:

    1.   The program itself.
    2.   Data to which a program may refer.
    3.   Program management cards; they begin with a slash (/).

/IDbbbbbbbbbRAXbS.S.NUMBR,AR701bbbbbbbbbb'NAME

/JOB TIME=02,GO

/FTC NAME=ART1   ───► ART1 program stored in the computer

     Program

/DATA

     Data

/END

/ID ...
/INCLUDE ART1 ◄──────────────────────────
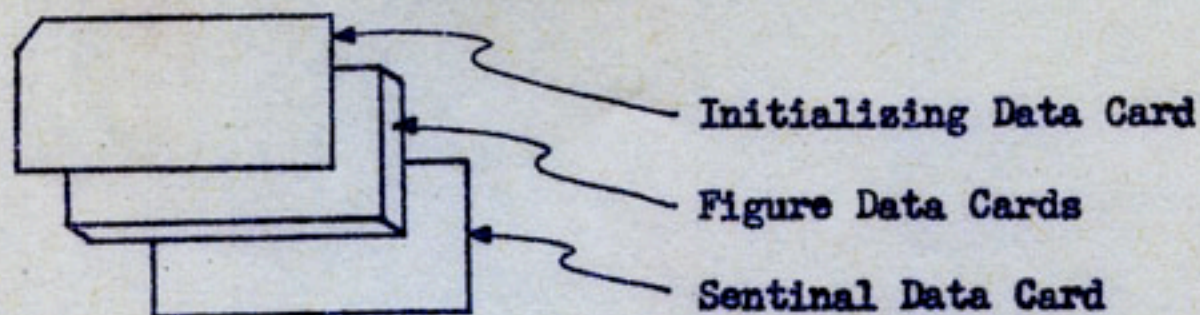
     Data

/END

The Data Cards for ART1

There are three types of data cards used with ART1:

In general there will be several Figure data cards used to make a drawing. Only one Initializing data card is used and it is always first. Only one Sentinal data card is used. It is always last, and it is used to "tell" the ART1 program that all other data cards have been read and that the computer drawing is to be printed.

The Sentinal Data Card

columns

1-2   01 should be entered in columns 1 and 2.

3-80   All remaining columns should be left blank.

The Figure Data Cards

The Figure data cards will be described in detail on the following pages. In brief, however, each Figure data card begins with a number to specify what type of figure is desired:

02   Line

03   Solid Rectangle

04   Open Rectangle

05   Triangle

06   Ellipse

07   Quadrants

08   Exponential

The Initializing Data Card

The Initializing data card is used to:

1. Set up the arrays in some desired initial state.
2. Print a title below the drawing.
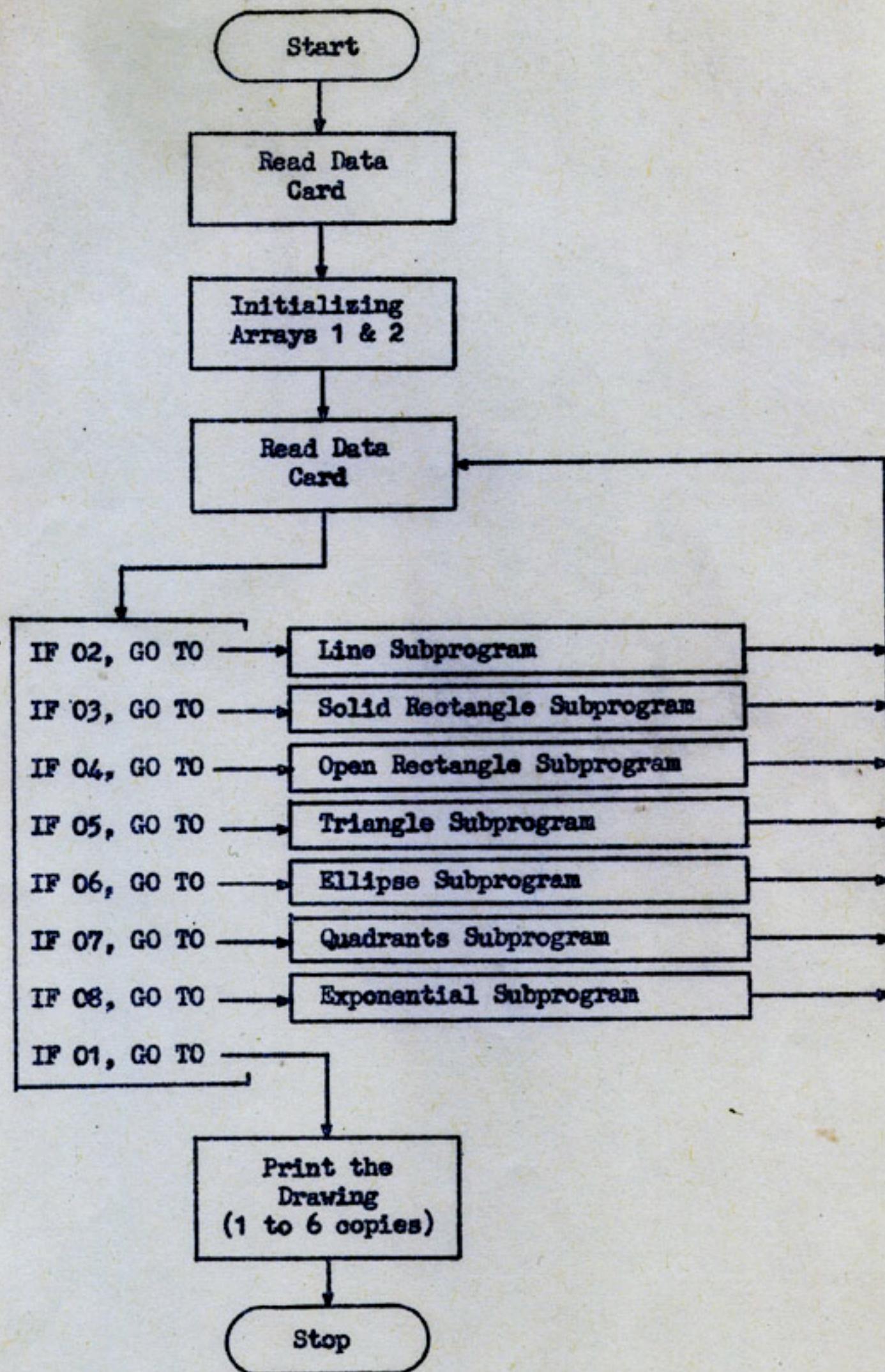3. Specify the number of drawings to be printed.

columns	type	purpose	example
1	symbol	The symbol goes into Array 1	L
2	number, n	in every nth column	2
3	symbol	The symbol goes into Array 2	/
4	number, m	in every mth column	5
5	number	The number of drawings to be printed, 1 to 6.	1
6-10		Not used	
11-70	symbols	Reproduced exactly below the drawing as a title, etc.	(Make any 60 symbols)
71-80		Not used	

Notes: a) If the columns 2, 4, or 5 are left blank then the ART1 program will change the numbers to one (1). If the number in column 5 is greater than 6 the ART1 program will change the number to 6.

b) Normally, if the symbols in columns 1 and 3 are blank the ART1 program would erase (make into blanks) the Arrays 1 and 2. A local UNM printer difficulty requires a non-printable character instead of a blank. Here, use a (") for a blank. (" = 7 and 8 overprinted.)

The user may be interested in running the following program:

```
/ID ...
/INCLUDE ART1
.2"16      ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789+-*/=.,'()$
01
/END
```

The six figures thus produced may be used in sketching design ideas before any figure data cards are punched.

```
                    ╭─────────╮
                    │  Start  │
                    ╰─────────╯
                         │
                         ▼
                 ┌───────────────┐
                 │   Read Data   │
                 │     Card      │
                 └───────────────┘
                         │
                         ▼
                 ┌───────────────┐
                 │  Initializing │
                 │  Arrays 1 & 2 │
                 └───────────────┘
                         │
                         ▼
                 ┌───────────────┐
                 │   Read Data   │◄──────────────────────┐
                 │     Card      │                        │
                 └───────────────┘                        │
                         │                                │
                         ▼                                │
  IF 02, GO TO ────►┌──────────────────────────┐         │
                    │     Line Subprogram       │─────────┤
  IF 03, GO TO ────►│ Solid Rectangle Subprogram│─────────┤
  IF 04, GO TO ────►│ Open Rectangle Subprogram │─────────┤
  IF 05, GO TO ────►│    Triangle Subprogram    │─────────┤
  IF 06, GO TO ────►│    Ellipse Subprogram     │─────────┤
  IF 07, GO TO ────►│   Quadrants Subprogram    │─────────┤
  IF 08, GO TO ────►│  Exponential Subprogram   │─────────┘
                    └──────────────────────────┘
  IF 01, GO TO ──────┐
                     │
                     ▼
                 ┌───────────────┐
                 │  Print the    │
                 │   Drawing     │
                 │ (1 to 6 copies)│
                 └───────────────┘
                         │
                         ▼
                    ╭─────────╮
                    │  Stop   │
                    ╰─────────╯
```

A Simplified Flowchart of the ART1 Program
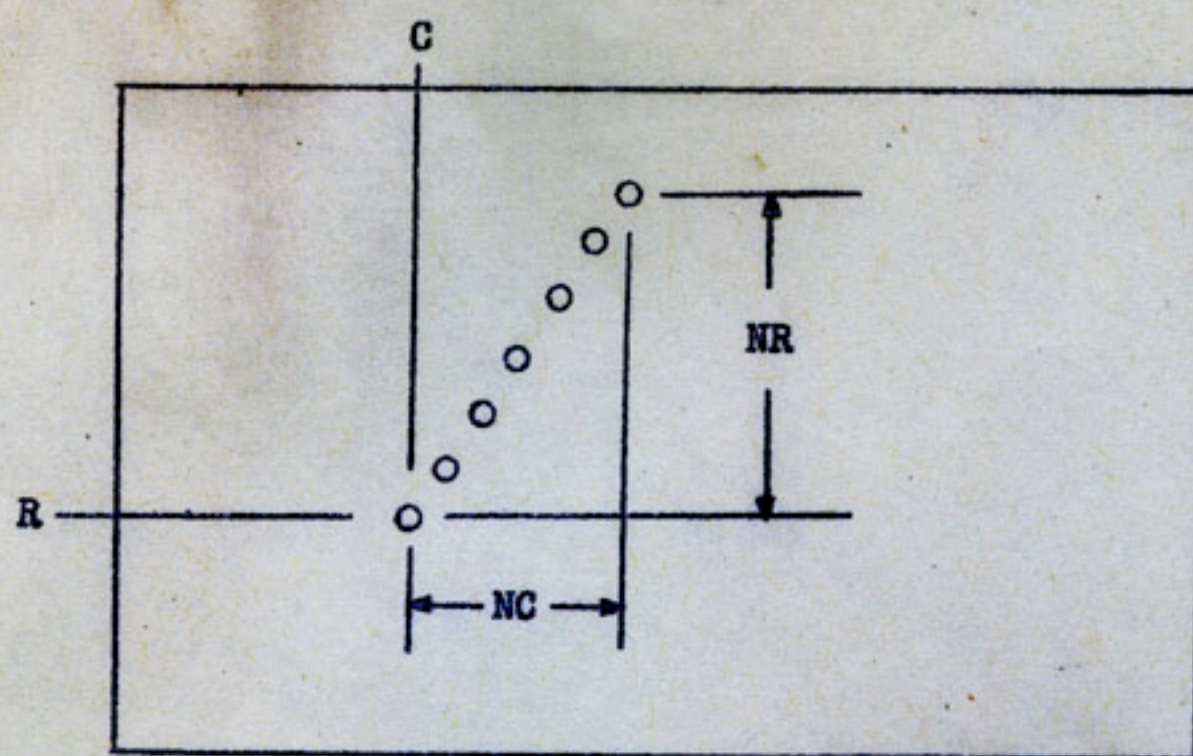
Example in which
NC is positive, and
NR is negative.
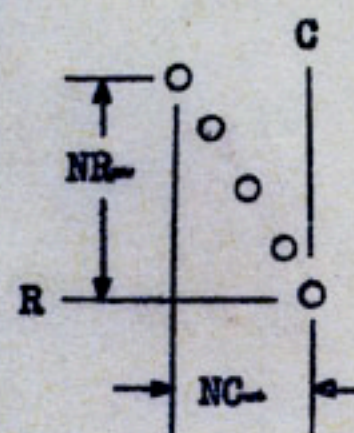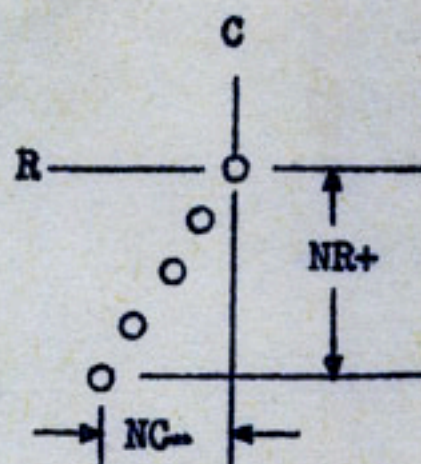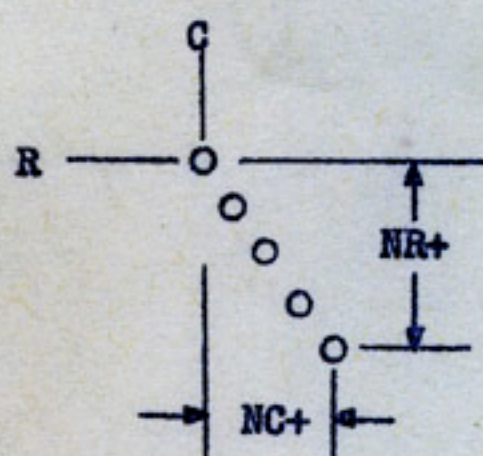
columns		
1-2	02	02 in the first two columns calls LINE
3	symbol	Symbol out of which LINE is assembled
4	array	Array 1 or 2
5-6	R	Row at which LINE starts
7-9	C	Column at which LINE starts
10-12	NR	Number of rows in LINE, + is downward and - is upward
13-16	NC	Number of columns in LINE, + is right and - is left
17-20		Not used
21-25		Row/column (2/3) for the first repeated LINE
26-30		" 2nd "
31-35		" 3rd "
36-40		" 4th "
41-45		" 5th "
46-50		" 6th "
51-55		" 7th "
56-60		" 8th "
61-65		" 9th "
66-70		" 10th "

03 SOLID RECTANGLE
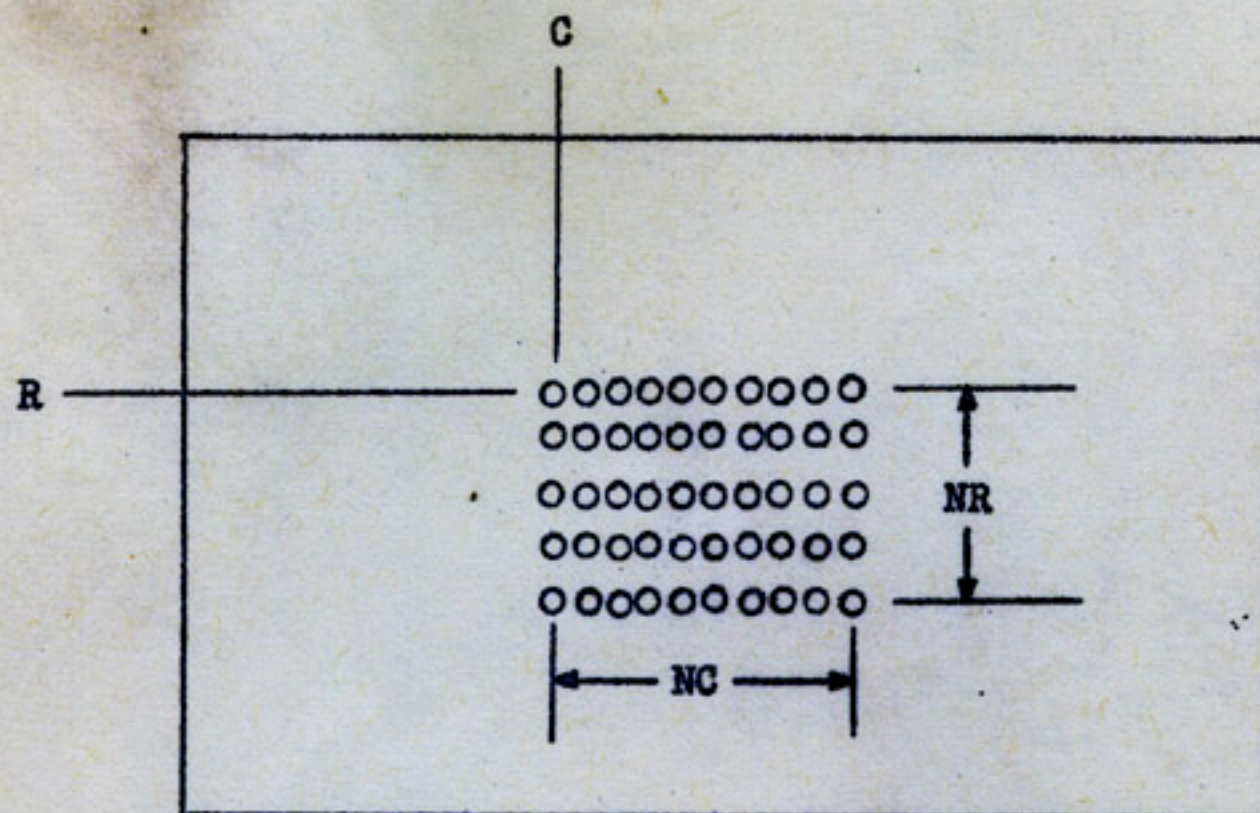
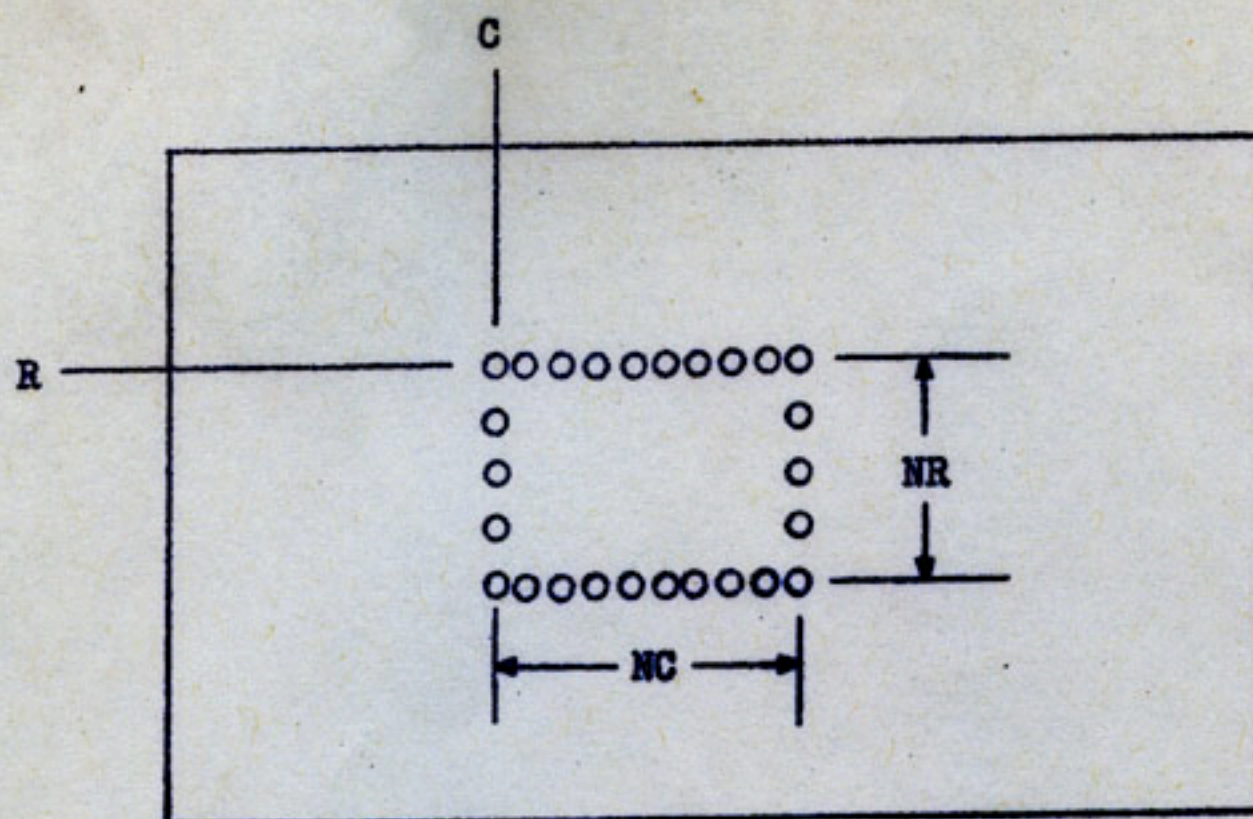columns

1-2	03	03 in the first two columns calls SOLID RECTANGLE
3	symbol	Symbol out of which SOLID RECTANGLE is assembled
4	array	Array 1 or 2
5-6	R	Row of the upper-left starting point
7-9	C	Column of the upper-left starting point
10-12	NR	Number of rows in SOLID RECTANGLE
13-16	NC	Number of columns in SOLID RECTANGLE
17-20		Not used

columns		
21-25	Row/column (2/3) for the first repeated SOLID RECTANGLE	
26-30	"	2nd "
31-35	"	3rd "
36-40	"	4th "
41-45	"	5th "
46-50	"	6th "
51-55	"	7th "
56-60	"	8th "
61-65	"	9th "
66-70	"	10th "

Note: If NR is 'blank', ART1 automatically changes the 'blank' to 1.

If NC is 'blank', ART1 automatically changes the 'blank' to 1.
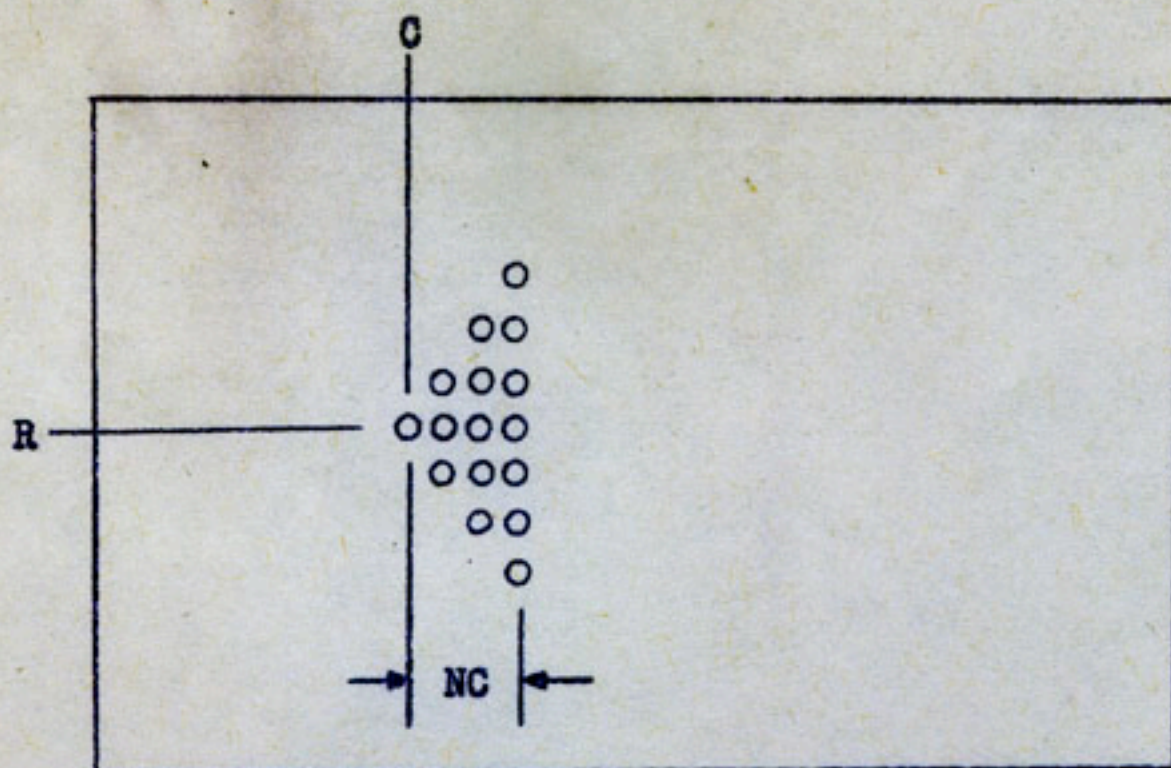
04 OPEN RECTANGLE

columns

1-2	04	04 in the first two columns calls OPEN RECTANGLE
3	symbol	Symbol out of which OPEN RECTANGLE is assembled
4	array	Array 1 or 2
5-6	R	Row of the upper-left starting point
7-9	C	Column of the upper-left starting point
10-12	NR	Number of rows in OPEN RECTANGLE
13-16	NC	Number of columns in OPEN RECTANGLE
17-20		Not used
21-25		Row/column (2/3) for the first repeated OPEN RECTANGLE
26-30		" 2nd "
31-35		" 3rd "
36-40		" 4th "
41-45		" 5th "
46-50		" 6th "
51-55		" 7th "
56-60		" 8th "
61-65		" 9th "
66-70		" 10th "

Note: If NR is 'blank', ART1 automatically changes the 'blank' to 1.

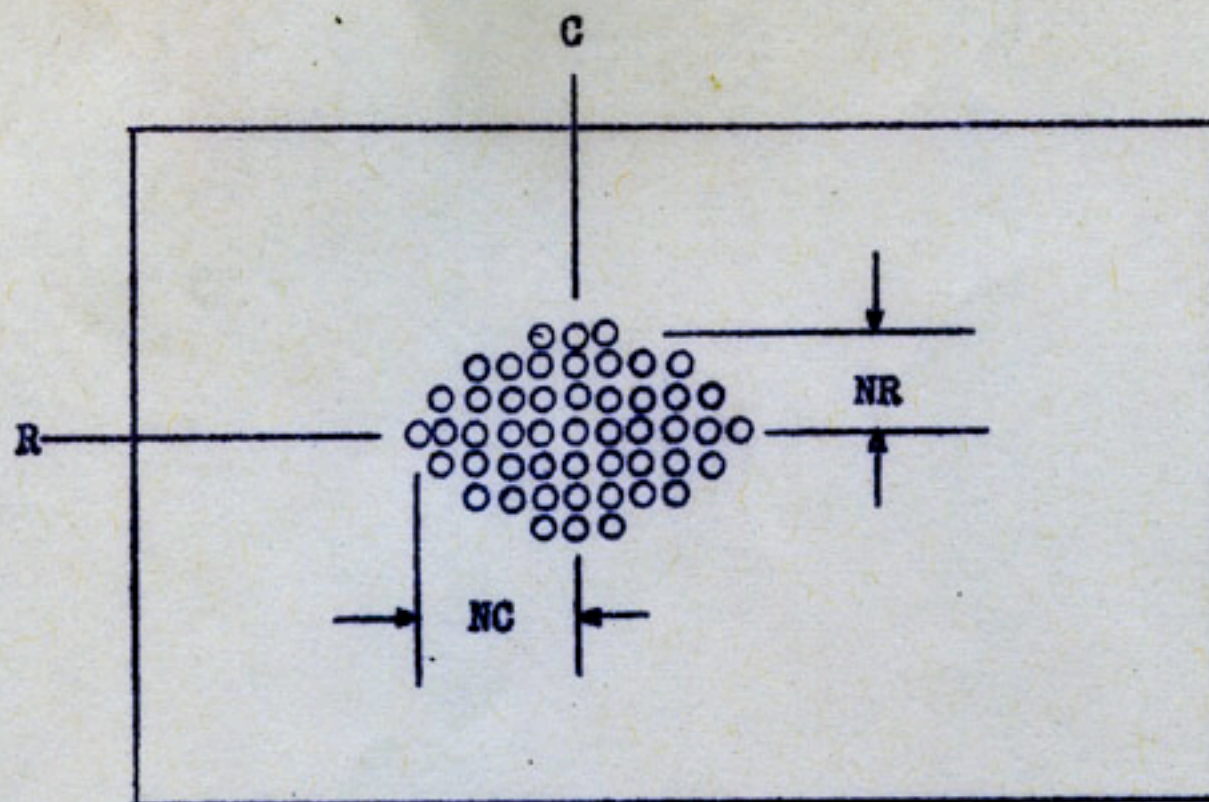If NC is 'blank', ART1 automatically changes the 'blank' to 1.

Example in which
NC is positive, and
NR is 'blank'.

NC is
'blank'

NR+

NR is
'blank'

NC-

NR

NC is
'blank'
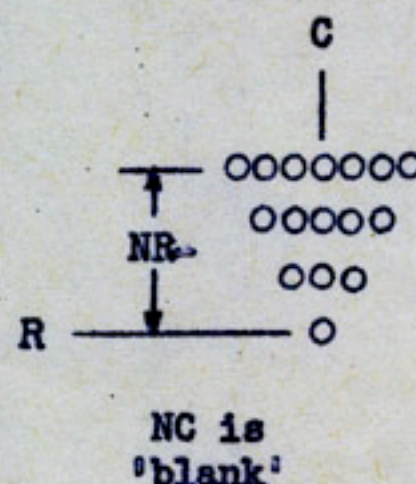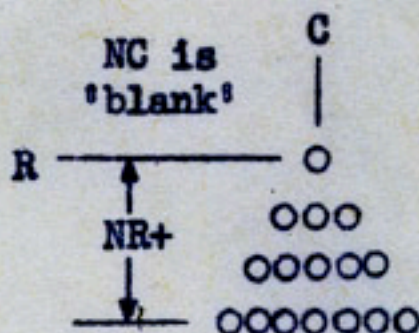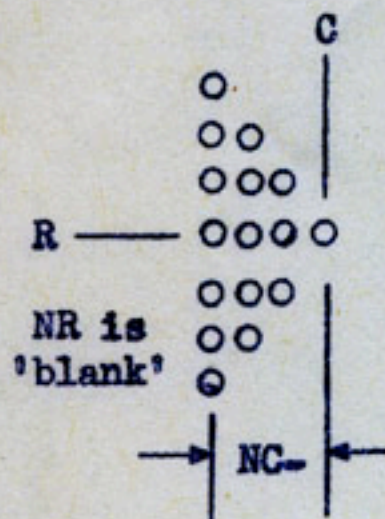
columns

1-2	05	05 in the first two columns calls TRIANGLE
3	symbol	Symbol out of which TRIANGLE is assembled
4	array	Array 1 or 2
5-6	R	Apex of TRIANGLE is at row R
7-9	C	Apex of TRIANGLE is at column C
10-12	NR	Number of rows in TRIANGLE, + is downward and - is upward Or 'blank'
13-16	NC	Number of columns in TRIANGLE, + is right and - is left Or 'blank'
17-20		Not used
21-25		Row/column (2/3) for the first repeated TRIANGLE
26-30		" 2nd "
31-35		" 3rd "
36-40		" 4th "
41-45		" 5th "
46-50		" 6th "
51-55		" 7th "
56-60		" 8th "
61-65		" 9th "
66-70		" 10th "

06 ELLIPSE

columns

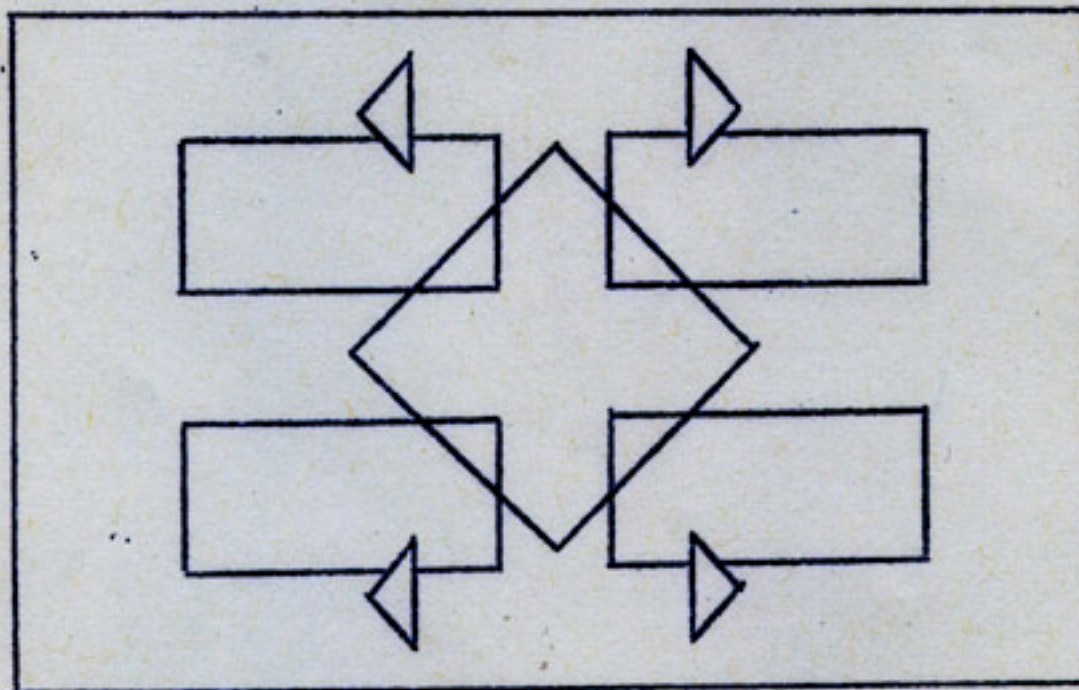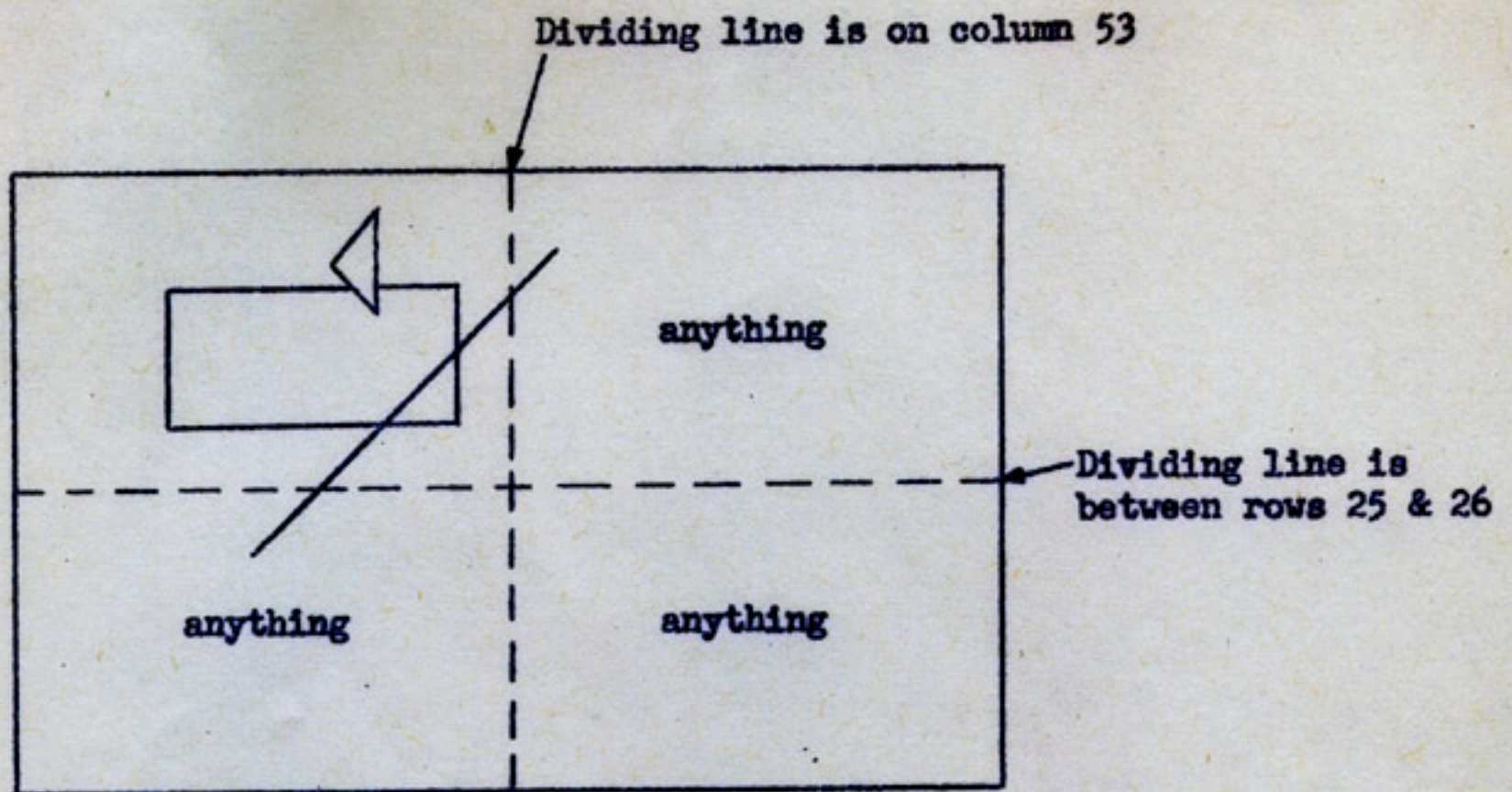| 1-2 | 06 | 06 in the first two columns calls ELLIPSE |
3	symbol	Symbol out of which ELLIPSE is assembled
4	array	Array 1 or 2
5-6	R	The center of ELLIPSE is on row R
7-9	C	The center of ELLIPSE is on column C
10-12	NR	Number of rows on one-half vertical axis
13-16	NC	Number of columns on one-half horizontal axis
17-20		Not used
21-25		Row/column (2/3) for the first repeated ELLIPSE
26-30		" 2nd "
31-35		" 3rd "
36-40		" 4th "
41-45		" 5th "
46-50		" 6th "
51-55		" 7th "
56-60		" 8th "
61-65		" 9th "
66-70		" 10th "

Note: NR may be greater than, equal to, or less than NC as desired.

If NC is 'blank', ART1 automatically computes NC so as to make the ELLIPSE look as much as possible like a CIRCLE.

Dividing line is on column 53

anything

Dividing line is
between rows 25 & 26

anything   anything

In QUADRANT, all designs assembled in the three quadrants other than the
upper-left are replaced by the design in the upper-left quadrant rotated
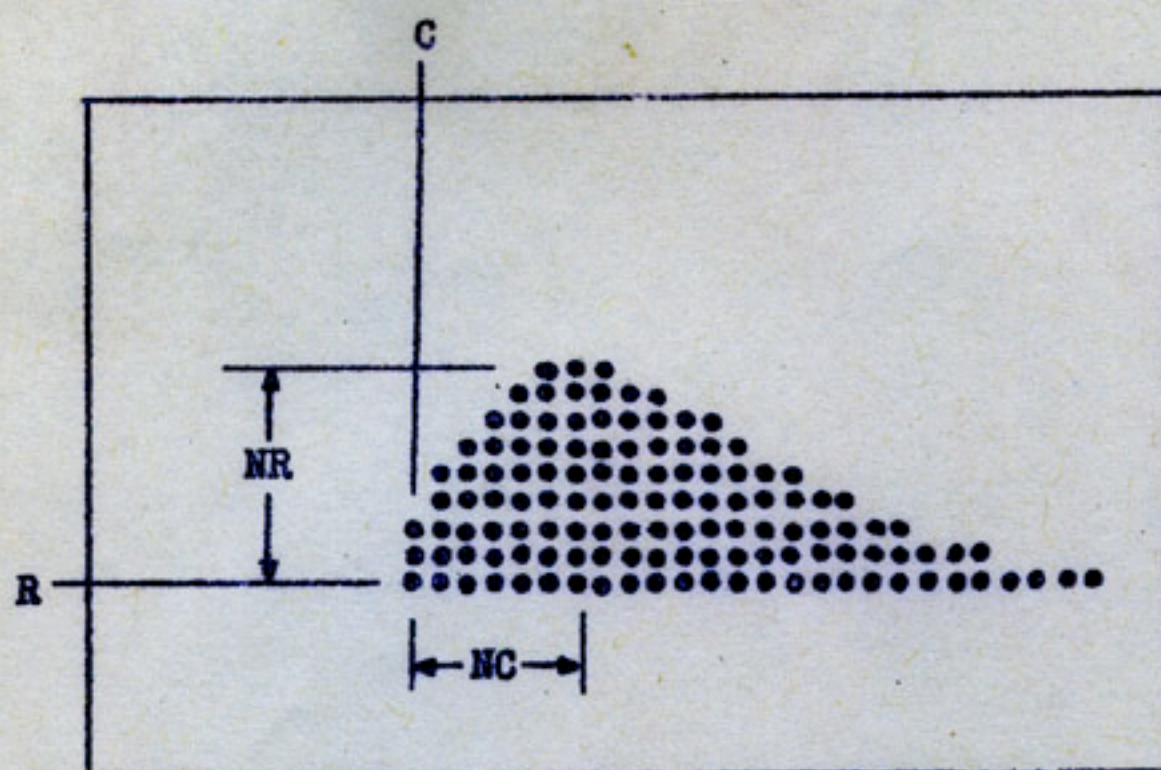about the vertical and horizontal axes.

columns

1-2   07   07 in the first two columns calls QUADRANT

3-80   All remaining columns should be left 'blank'.

columns

1-2	08	08 in the first two columns calls EXPONENTIAL
3	symbol	Symbol out of which EXPONENTIAL is assembled
4	array	Array 1 or 2
5-6	R	The base row of EXPONENTIAL is row R
7-9	C	The left-most column in EXPONENTIAL is column C
10-12	NR	Height of EXPONENTIAL -- If NR is negative EXPONENTIAL will appear rotated about row R
13-16	NC	Number of columns between the column C and the maximum height of EXPONENTIAL
17-80		All remaining columns should be left 'blank'