APPENDIX A

PROGRAMMING FEATURES

BOSS 4

To be Used in Conjunction with M129 E

RESTRICTED USE BOSS 4 ONLY

Boss 4 Optional Equipment

The following Options are made available for this system:

Diagnostic Routines for on line debugging consisting of a set of punched tape diagnostic programs.

Option	-	Programmable Inch/Metric
Option	-	Manual Data Input

Restart, Start/Continue, Edit, Remote Data Input Functions Sequence Search (with MDI option).

Display of X Y Z Absolute Position (with MDI Option), Tool Length Offset and Tool Diameter.

Auto/Block/Setup Modes: Manual Data Input (optional).

Option	-	Auxiliary Control Group

Option B5 Cutter Diameter Compensation, Polar Coordinate, Transformation

CNC Features

Storage capacity	80 ft. of equivalent EIA RS-358 tape	24m of equivalent ASCII
Sub routines	16 Macros	
Repetitive programming	4 levels of nested DO-loops	
Editing	16 command characters	

Programming Axis Motion Using Circular Interpolation, Feed Mode.

Any arc with a radius of 999.9999" (9999.999mm) or less which falls in one quadrant can be programmed with a single block of data. Arcs which lie in more than one quadrant require two or more blocks of data. (See NOTE under G02 below.) Circular interpolation is possible in any of three planes defined by the X-Y-Z coordinate system.

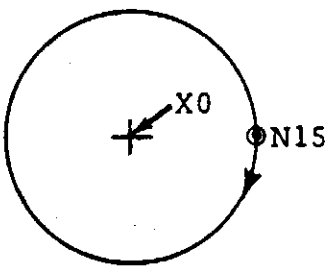
The block contents are as follows:

G02 (G03)

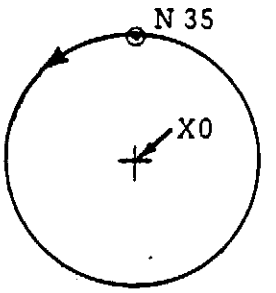
Defines whether the arc is to be generated in the clockwise or counterclockwise direction respectively.

NOTE: With BOSS 4.0 only, it is possible to program one complete circle of 360 degrees in the XY plane with one block of data. This will not operate with BOSS 4.1.

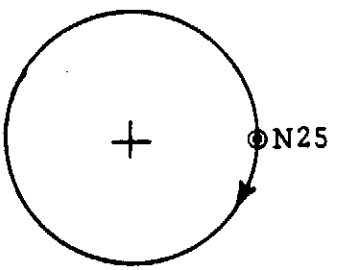
Examples using a circle with a 3" radius:



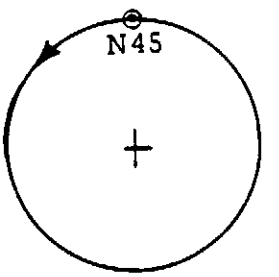
N15G90G2X3.0I3.0F100



N35G90G3X0J3.0F100



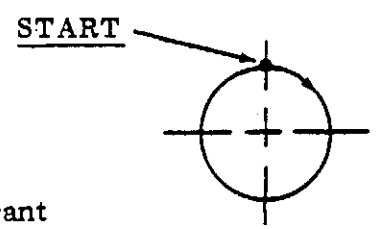
N25G91G2X0I3.0F100



N45G91G3X0J3.0F100

Axis data must be X axis only in Absolute or Incremental coordinates. Motion can be clockwise or counterclockwise and the start-point can be at zero degrees (3 o'clock) or at 90 degrees (12 o'clock) (J) relative to the arc center.

To program 4 quadrants of a circle with a 1.0" tool path radius beginning at 90 degrees and moving clockwise:




```
N1G1X0Y0
N2G2X1.0Y-1.0J1.0F75
N3I1.0
N4J1.0
N5I1.0
```

NOTE: If the next data block is a full quadrant and a continuation of the present arc, only the I or J value need be programmed.

Tangency Conditions

This technique is useful if subsequent motion is tangential as in a circle crossing quadrants.

Example #1

Move along a 2.0" radius circle clockwise from 270 to 0 degrees at 32 ipm. (The start point of the circle is X=0, Y= -2.0 with center at 0, 0.)

```
N1G91G2G99X-2.0Y2.0J2.0F320
N2G99I2.0
N3J2.0
```

The table will cross over from arc 1 to arc 2 (block number N1) and arc 2 to arc 3 (block N2) without decelerating. At the end of arc 3 (block N3) deceleration will occur.