

Backlash Adjustment Procedure

Backlash Parameter Description

Backlash parameter values allow the control to compensate for the physical limitations of the ballscrew when changing tool direction. Values are entered in tenths (ten-thousandths of an inch). The control stores three values for the X-axis and the Y-axis (at center, at negative limit, at positive limit) and one value for each of the Z, A, and B axes (at center).

Note: Values are NOT stored for axes not installed on a given machine.

Entering Backlash Values

Backlash values are entered into the control using the BL command. The format of the command is:

BL, a, b, c, d

where a = axis number (X=1, Y=2, Z=3, A=4, B=5)

b = compensation (in tenths) at center

c = compensation (in tenths) at negative limit (X and Y axes only)

d = compensation (in tenths) at positive limit (X and Y axes only)

Typing BL <ENTER> (that is, without values) will display currently stored values.

Determining Proper Backlash Values

There are several methods for determining the correct value(s) of each axis. The programmatic method described here is the most reliable.

The following is an example of a programmatic method for determining the three backlash values for the X-axis. The same applies to Y-axis, just substitute Y for X. For Z-axis replace Z values with X, and X values with Z. The value determined (i.e., center, negative limit, or positive limit) depends on the tool location on the axis (see STEP 3).

- 1) Enter the cold start command CS <ENTER>. After the cold start, DO NOT return to the last home position.

2) From the command mode, clear the current backlash values for the X axis by typing BL, 1, 0, 0, 0 and pressing the ENTER button.

3) Place a surface indicator in a tool holder and JOG the needle to Z-.1 and X.1 from the X-positive side of a block in the center of the table. The face of the indicator should be toward the right side (X-positive) side of the machine. From the command mode, type SETH and press the ENTER button.

4) Insert the following program into memory:

```
N1 G91 G1X-.1 F (See note below)
N2 G4 P66000
N3Z.25 G5
N4X-.1
N5X.1
N6Z-.25
N7 G4 P66000
N8X.1
N9 M2
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Note: For part programs requiring close tolerances, setting the feed rate in line N1 to match the feed rate of the part program to be run will maximize the accuracy of the backlash values.

5) Run the program in the following manner:

- At line N2, the control will be in the waiting state. Adjust the dial of the surface indicator to zero on the needle, then press the START button to continue.
- At line N7, the control will be in the waiting state. Read the indicator dial to see how many tenths the needle is away from zero.
- Press the START button followed by the MANUAL button.
- Enter the number determined in step b as the backlash value (see ENTERING BACKLASH VALUES above).
- Repeat steps a through c and verify that the indicator now reads zero after step c. If not, adjust the backlash value entered in step d. Continue this process until the indicator consistently reads zero after step c.



Figure 6-19 Establish a Zero Reading



- 6) Repeat step 4, placing the block at the negative limit of the X axis. Repeat step 5 to determine the negative limit value.
- 7) Repeat step 4, placing the block at the positive limit of the X axis. Repeat step 5 to determine the negative limit value.

Note: When entering the value for the negative limit, you MUST enter at least a comma for the at-center value; when entering the value for the positive limit, you MUST enter at least a comma for both the at-center and the negative-limit values. For example, to set a value of 5 tenths (.0005) for the negative limit of the Y axis without affecting the current value for the center, type BL, 2, 5, ENTER; to set a value of 3 tenths (.0003) for the center and 2 tenths (.0002) for the positive limit on the X axis without affecting the current value for the negative limit, type BL, 1, 3, 2, ENTER.

- 8) The home position was set with the indicator tip close to an edge. Before continuing with other operations, the home position must be reset.
 - a. From the command mode, type SETCS and press the ENTER button.
 - b. Type HO and press the ENTER button, followed by the START button.
 - c. After the axes return to the cold start position, type SETH and press the ENTER button.