

## M87 External Offset Adjust

**The M87 code performs a workshift or tool offset change based on data from an external measuring device.**

The device sends its data to the CNC over the RS232 connection on the CNC's COM1 serial port.

The M87 adjustment has 2 different modes of operation: it can work with a simple digital indicator or with a more elaborate PLC-controlled measuring system. In either mode, the communication parameters are set by a user-created file called GAGE.TXT (described below). The measurement units provided by either measurement system must match the inch/metric mode of the part program. X values are always treated as radial, even if the part program is in diameter mode.

In the simple indicator mode, the M87 code applies power to the indicator through the handshake signals in the RS232 connector. The control allows approximately a second for the indicator to stabilize, then signals the indicator to send its reading by toggling one of the handshake lines. The indicator responds with an ASCII text string corresponding to the indicator reading, e.g. “-.0050”. This value is applied as a G10 workshift to whichever axis is specified in the GAGE.TXT file, just as if the program contained a G10 statement in place of the M87.

In the PLC-controlled mode, the user's part program must first signal the PLC to start the measurement, then do the M87. As described above, it takes about a second from the time the M87 is executed until the control is ready to receive the measurement from the serial port. The PLC needs to format the measurement readings into a text string to pass to the control. The adjustments may be applied to either a G10 workshift or to a tool offset. The PLC needs to provide either a tool offset number or G10 code in the response string, along with the value of the measurement and the axis (or axes) to which the measurement is to be applied.

*Example strings:*

```
T12X.003  
T10X-.004Z.007  
G10X.0007Z-.002
```

The PLC program is responsible for assembling the text strings. If there are multiple tools that need to be adjusted, it may be necessary to use a different M-function to signal the PLC for each tool's measurement.

### The GAGE.TXT file

This is a file that the user creates in the C:\RUNFILES directory. It needs two lines: the com port parameter string, and the axis to be adjusted in the simple indicator mode.

*Example for Z-axis, as used with the Mahr 1075R indicator:*

```
com1:4800,n,8,1,cs,ds,cd*  
Z
```

Note that the Mahr indicator uses the DTR line as a signal to transmit the reading, so the cable must include that wire. If you are interfacing to a device that doesn't use a handshake line, you can add "rs" to disable the handshake lines and use a 3-wire cable or rs422 converter.

Your gage.txt file would look more like this:

```
com1:9600,n,8,1,cs,ds,rs,cd*  
Z
```

*\* Actual com port parameter string may vary: see manufacturer's datasheet*



Mahr 1075  
Digital  
Indicator