

## Section 22: Operation of the TRM

### Introduction

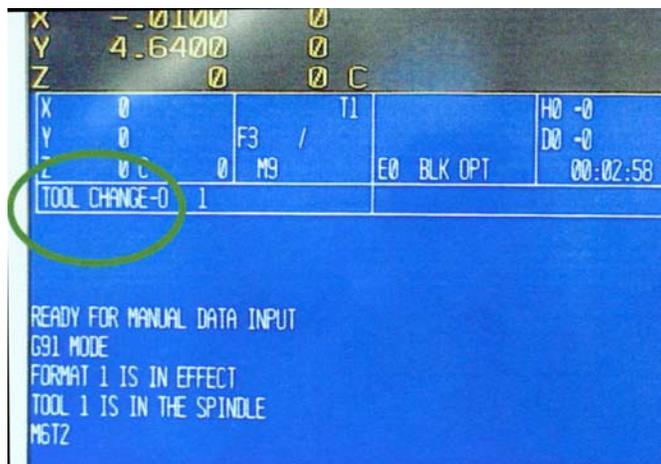
Fadal's smallest VMC model is the Tool Room Mill. Although It has many similarities with Fadal's larger models, it has a few operational differences that warrant a separate section in the User Manual.

### Existing Programs

An important feature of the Tool Room Mill is its capabilities to run existing programs that run currently on the standard Fadal CNC control. The Feeds and Speeds of the program will have to match the TRM specifications, but as a whole the program will run without changes. Since the machine does not have a tool changer, a message to make a manual tool change will be requested when a tool change is executed.

### Tool Changes

The TRM does not have a tool changer, but tool changes in Auto and MDI can still be executed. This will allow programs to run unmodified if they were written for machines with a tool change present. When the control is asked for a tool change, a waiting message "TOOL CHANGE—" will blink on the screen. Before the machine will proceed with the program, the tool has to be changed manually. Use the TOOL IN/OUT button to release the tool in the spindle and then put the requested correct tool into the spindle. When the correct tool is in the spindle, the START button can be pressed to continue the program with the new tool inserted in the spindle.



### Manual Mode Using the MPG Hand Wheels

The Tool Room Mill uses a fully manual mode to move the machine's axes. Each axis has its own dedicated MPG, Manual Pulse Generator, hand wheel. For this reason, there is no axis selector switch on the machine. The X and Y axis MPG hand wheels are located parallel to the axis that they operate. The Z axis MPG hand wheel is located on the pendant of the machine. The Z axis MPG hand wheel has a dual function; it will also operate when MPD, Manual Pulse Dry run, is used. To see how to use the MPD function, read about it in the appropriate section of the User Manual.

To enter the Manual Mode of the machine, press the JOG key. The full display will be used to show current position. Using the axis increment selector switch, the stepping resolution of each of the MPG hand wheel can be modified from .0001", .001" or .01". The axis load is display to the right of the current position of the axis as a percentage.

Each of the axes position can be zero while in this mode. By pressing the associated letter for the axis, the position display will be zeroed out. For example, pressing the Y key will result in the Y axis position to be cleared to zero. This feature can be helpful to set reference points as the machine is positioned to points on a part print.



Figure 22-1 Full position display during manual mode (Jog)



Figure 22-2 Manual MPG hand wheels for the X, Y, and Z axes

**Keyboard** The TRM uses a notebook style keyboard with added functionality. Two of the keys are operated by holding the Shift key down and pressing the desired function key. They are identified by common color of the key text. The first of these two keys is the TOOL IN/OUT key, holding the SHIFT key down and then pressing the TOOL IN/OUT will operate the tool release or locking mechanism. The other key is the SPINDLE ON/OFF key, holding the SHIFT key down and then pressing the SPINDLE ON/OFF key will start the spindle at the last programmed spindle speed. Pressing the SPINDLE ON/OFF key by itself will turn off the spindle.



**Learn Mode** The Learn mode on the Fadal control has always been available, but when used on the TRM this feature can be very handy. As the machine is jogged to positions, the program can be built automatically. See the full description of this feature in the appropriate section of the Fadal User Manual.

**Spindle and Axis  
Motor Power Load  
Percentage**

The current spindle and axis motor power load percentage is shown on the control display while operating the machine in Manual mode or Jog mode. 100% is the continuous power output of the machine. When the power percentage is above 100%, the machine will only be able to maintain it for short periods of time. This time varies on the duty cycle above and below the 100% limit. When the machine is cutting material and the load goes above 100%, begin to back off on the load applied. This will prevent the machine from faulting from an overload.



**Tool Room User  
Macro**

For added capabilities, the TRM custom macro can be used to machine simple features. Using this custom macro will alleviate the need to move the machine manually or writing a CNC program. To use the Tool Room Mill Custom Macro program, the program will have to be loaded into memory and then accessed from the Quick Key menu. To get to this menu from any of the three Command Menu Editor menus, go to the Quick Key Menu by pressing Q. This will display the following menu at the bottom of the screen:

1-DRY RUN	4-SET FIXTURE	7-AXIS ZERO	0-CUSTOM MACRO
2-NEXT TOOL	5-SET LENGTH	8-READ	AUTO
3-ZERO RETURN	6-OFFSETS	9-PUNCH	

Press the 0 key to start the TRM Custom Macro loaded into program O9999. The custom macro program will then automatically be switched to and run in Auto Mode. Acknowledge the start of the program by pressing the START key. Note, there are minimum SETP (set parameters) requirements to use this special program which are as follows in SETP set to Format 1, tool table must be set to Diameter and be in Inch programming mode. In some cases, the Jog Mode may need to be entered first before running the TRM custom macro for the first time.

After pressing START to begin the program, the machine will move to the last SET home position. Once the TRM Custom Macro is started, the menu displayed will show the simple features that can be accomplished with the TRM Custom macro:

1 - DRILL	X - ZERO X AXIS
2 - TAP	Y - ZERO Y AXIS
3 - CIRCLE	Z - ZERO Z AXIS
4 - RECTANGLE	A - ZERO A AXIS
5 - MOVE TO XYZ	
0 - PARAMETERS	

PRESS KEY SELECTION?

At this menu, the individual MPG hand wheels are enabled. The machine may manually be moved with the wheels to desired locations. Use the X, Y, Z or A keys to set zero references. All functions on the menu will work as incremental moves.

**Default Parameters  
for TRM Custom  
Macro**

To aid in repetitive tasks, there are a set of default parameters that are stored by the program that are shown in the following Parameter Menu:

- 1) SPINDLE SPEED/DIRECTION, S[1000.] M[3]
- 2) TOOL DIAMETER, D[0.125]
- 3) CUTTING FEED, F[20.]
- 4) CONVENTION/CLIMB CUTTING, [CLIMB]
- 5) PECK AMOUNT, Q[0.1]
- 6) Z PLUNGE FEED RATE F[3.]

PRESS KEY SELECTION?

The values shown between the brackets in the menu are the current default values set. These values are stored even if the TRM Macro program is stopped and exited. Select the parameter from the menu to change it. To keep certain parameters at their default value, simply press the ENTER key to use defaults.

**Drill Function**

From the main menu, move the machine with either the MPG hand wheels or the Incremental Move function over the desired hole location. The spindle speed, feeds and pecking amount can be set in the parameters section. Position the tool tip at a known distance above the hole. The incremental depth of the hole is taken from the Z position when the Drill function is started.

INCREMENTAL DEPTH FROM CURRENT Z [-1.]?

The incremental depth shown in the brackets is the default depth. If this is the depth of the hole desired, press ENTER to continue with default value. Otherwise, type in desire depth from the current Z position.

S 1000. M 3

PLUNGE AT F 5.

CUT AT F 20.

DEPTH Z- 1.

\* PRESS START TO CONTINUE OR ANY OTHER KEY TO ABORT \*

If the settings for the Drilling function are the correct, press the START button to begin the cycle.

**Tapping Function** The tapping function will use a compression tapping cycle. From the main menu, move the machine with either the MPG hand wheels or the Incremental Move function over the desired hole location. Position the tool tip at a known distance above the hole. The incremental depth of the hole is taken from the Z position when the Tapping function is started.

```
INCREMENTAL DEPTH FROM CURRENT Z [-1.]?
SPINDLE SPEED [500.] = S
THREAD LEAD [.05]?
```

The incremental depth shown in the brackets is the default depth. If this is the depth of the tapping desired, press ENTER to continue with default value. Otherwise, type in desired depth from the current Z position. Do the same for the spindle speed to tap with and the thread lead to follow.

```
S 1000. M 3
PLUNGE AT F 5.
CUT AT F 20.
DEPTH Z- 1.
* PRESS START TO CONTINUE OR ANY OTHER KEY TO ABORT *
```

If the settings for the Tapping function are the correct, press the START button to begin the cycle.

**Circle and Rectangle Functions** The circle and the rectangle function can make either inside or outside shapes. They both use the diameter that is set up in the parameters, 0 from main menu. The position of the shapes are always from the XY center of the shape, i.e. center of circle. From the main menu, move the machine with either the MPG hand wheels or the Incremental Move function over the desired circle/rectangle location. Position the tool tip at a known distance above the shape. The incremental depth of the circle/rectangle is taken from the Z position when the function is started.

```
1=INSIDE OR 2=OUTSIDE CIRCLE?
INCREMENTAL DEPTH FROM CURRENT Z [-1.]?
DIAMETER OF CIRCLE [ 1.125]?
1=POCKET OR 2=MILL BORE?
```

Choose whether the shape will be either an outside or inside feature. When inside is chosen, there will be an addition prompt at the end whether to make a pocket or to just mill bore the hole. The values shown in the brackets are the default values, if these are the desire values, press ENTER to continue with default value. Otherwise, type in desired values.

```
CIRCLE DIAMETER = 1.125
```

S 1000. M 3  
PLUNGE AT F 5.  
CUT AT F 20.  
DEPTH Z- 1.

\* PRESS START TO CONTINUE OR ANY OTHER KEY TO ABORT \*

If the settings for the function are the correct, press the START button to begin the cycle. Note, that the diameter of the tool is automatically compensated using the value in the parameters. The direction of the cutting is determined by the spindle direction and the desired direction of climb or convention.