Home the Tool Changer

Mach One S

1. Empty all pockets of the carousel.
2. Load a tool holder in the spindle.
3. Call spindle down (Example: T102; M03 S0;).
4. Make sure machine is in TC manual mode (TC AUTO/MAN pushbutton should <u>not</u> be lit).
5. Jog Y axis towards carousel until this message is displayed:

ALARM MESSAGE
1010   OVER TRAVEL : -Y (TC ARM)

6. Hold down the OT BYPASS pushbutton, TOOL CHANGE pushbutton and the IN POSN pushbutton simultaneously until the TOOL CHANGE and IN POSN pushbuttons illuminate. The carousel should now turn freely (or somewhat freely). You should see this message:

OPERATOR MESSAGE
TC HOME ACTIVE — POSITION TOOL IN POCKET AND PRESS HOME TO COMPLETE

7. Slowly turn the carousel to the approximate home position (pocket 1 in line with the spindle).
8. Using the MPG, move the tool holder into the # 1 pocket – centering it as close as possible.

9. Press the HOME pushbutton to complete the reference sequence. You should see this message:

   This step will "grab" the current Z and Y positions and insert them into macro variables (#500-#505).

OPERATOR MESSAGE
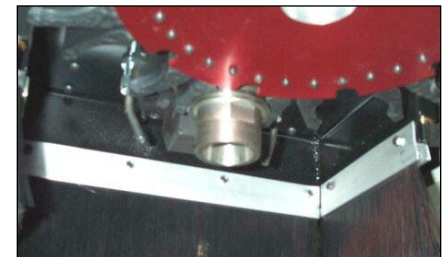TC HAS BEEN SUCCESSFULLY REFERENCED — JOG Y+
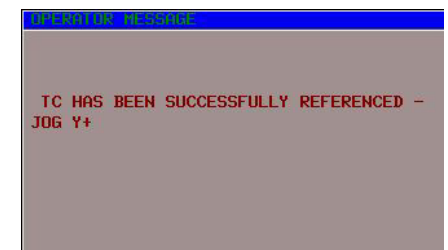
10. Press the RESET key to clear the ATC MUST BE HOMED message:
11. Move the spindle away from the carousel in the positive Y direction.
12. Home the ATC (Press the HOME and Tool Change pushbuttons simultaneously). Empty the spindle as required (even if the spindle is empty the DRAWBAR pushbutton must be pressed).
13. Command a tool change to verify carousel position (Example: T2001 M06;).
14. If successful, home the ATC (Home and Tool Change pushbuttons) and load a tool in pocket 1. Command a tool change for pocket 1 (T2001 M06;).
15. If tool change is successful and alignment looks OK, home the ATC (Home and Tool Change pushbuttons) - load the carousel and run the TC test program for approx. 15 minutes (so every pocket is tested at least once).


OPERATOR MESSAGE
ATC MUST BE HOMED

Mach One S and Solution TG – Fanuc Beta

1. Press the E-STOP button.
2. Rotate the carousel manually 360 Deg and then align pocket one to spindle (carousel should be empty of all tools).
3. Press the SYSTEM hard key and then press the right-most soft key [+] three times until you see PMM.
4. Press the PMM soft key, at this time the screen will turn black, then press the SYSTEM soft key and then the PARAM soft key.
5. Arrow down until you find parameter 11, enter 10000001 then press the INPUT soft key.
6. Cycle the power. Properly shut down Windows "**Shut down, not Restart"** and power off and then back on at the control.
7. Pull E-STOP back out.
8. Power up machine (there should be no alarms) ATC MUST BE HOMED message will be displayed.
9. Go to MDI and lower spindle - T102; M3S0; - INSERT - CYCLE START.
10. Manually put any tool holder in the spindle.
11. Open shroud doors and then press E-STOP.
12. Press the SYSTEM hard key and then press the right-most soft key [+] three times until you see PMM.
13. Press the PMM soft key, at this time the screen will turn black, then press the SYSTEM soft key and then the PARAM soft key.
14. Arrow down until you find parameter 11, enter 10000000 then press the INPUT soft key.

15. Pull the E-STOP back out, 1066 TOOL CHANGER 2 NOT READY alarm should be displayed.
16. Make sure machine is in TC manual mode (TC AUTO/MAN pushbutton should not be lit).
17. Jog Y axis towards carousel until this message is displayed:

18. Hold down the OT BYPASS pushbutton, TOOL CHANGE pushbutton and the IN POSN pushbutton simultaneously until the TOOL CHANGE and IN POSN pushbuttons illuminate. The carousel should now turn freely (or somewhat freely). You should see this message:

19. Carousel pocket 1 should be lined up with the tool in the spindle. If not, do so now. Slowly turn the carousel to the approximate home position (pocket 1 in line with the spindle).
20. Using the MPG, move the tool holder into the # 1 pocket – centering it as close as possible.

21. Press the HOME pushbutton to complete the reference sequence. You should see this message: TC HAS BEEN SUCCESSFULLY REFERENCED – JOG Y+. This will "grab" the current Z and Y positions and insert them into macro variables (#500-#505).
22. Press the SYSTEM hard key and then press the right-most soft key [+] three times until you see PMM.
23. Press the PMM soft key, at this time the screen will turn black, next press the SYSTEM soft key and then the PARAM soft key.
24. Page down until you find parameter 11, enter 10000001 then press the INPUT soft key (this will set home position of the carousel).
25. Move the spindle away from the carousel in the positive Y direction.
26. Cycle the power. Properly shut down Windows "**Shut down, not Restart**" and power off and then back on at the control.
27. Upon Power Up, home X axis as required (TG Models only). If not a TG Model, then continue with next step.
28. Home the ATC (Press the HOME and Tool Change pushbuttons simultaneously). Empty the spindle as required (even if the spindle is empty the DRAWBAR pushbutton must be pressed).
29. Turn RAPID OVERRIDE knob to 25%. Command a tool change to empty pocket to verify carousel position (Example: T2001 M06; - INSERT – CYCLE START).
30. If successful, home the ATC (Home and Tool Change pushbuttons) and load a tool in pocket 1. Command a tool change for pocket 1 (T2001 M06;).
31. If tool change is successful and alignment looks OK, home the ATC (Home and Tool Change pushbuttons) - load the carousel and run the TC test program for approx. 15 minutes (so every pocket is tested at least once).
32. Sample tool changer program:
    T2001M6;G4 X4.; T2002M6;G4X4.; T2003M6;G4 X4.; T2004M6;G4X4.;M99;

Home the Tool Changer
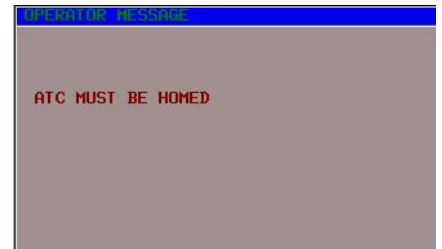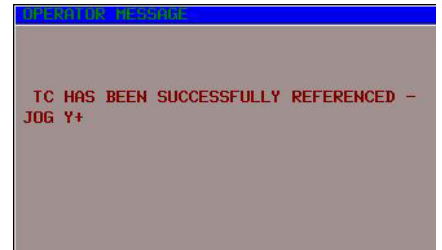
Mach One, Mach II – 180i, 210i

1. Install a tool holder in the spindle manually using the OPEN DRAWBAR button.
2. If the carousel will rotate with the ROTATE MAGAZINE pushbutton, put pocket #1 in front of the spindle; if it will not, push in an EMERGENCY STOP button, turn the carousel by hand, and release the E-STOP button once it is close.
3. To lower the spindle manually:
   a) Open the small panel door, locate the valve with a 3/8" clear line and a 3/8" blue line as well, use a small blade screwdriver and lower the spindle using this valve by turning the manual override slot below the electrical coil hood connection (DIN plug). The cable going into the connector should be labeled O1583, turn this to the 1 position to lower the spindle into the tool change position, then turn the 1/0 manual override back to 0.

   Manual Override shown in the *On* or "**1**" position.

   b) Find the valve with the yellow and black hoses, the cable going into the DIN connector has a label, find the wire label O1328, turn the manual 1/0 slot to the 1 position to extend the carousel into the spindle. This valve can be turned back to the 0 position. This will make the gripper go around the tool. Press in an EMERGENCY STOP to relax the motor, this way it is truly in the right position. leave it on for the remainder of this procedure.

   Manual Override shown in the *Off* or "**0"** position.

Note: For all valves to work properly they must be in the 0 position once finished.

4. Press SYSTEM hard key (the keys to the right of the display).
5. Press RIGHT ARROW soft key, + key, 3 times (soft keys are under the screen).
6. Press PMM soft key (see figure A).
7. If you have more than one spindle you will need to select the correct group # by using the NEXT↑ and BACK↓ soft keys, if you have only one spindle, this step will be disregarded.
8. Press SYSTEM soft key (see figures B and C).
9. Press PARAM soft key (see figure D).
10. Press DOWN ARROW cursor hard key down to Parameter #11 (see figure E).
11. If this parameter reads 10000000, you will need to change it to 10000001 to mark the home position. Whenever you change this parameter, shut down the control, and power back on again.
12. If you have not lost home and need to reset the tool changer to the correct position, you will need to toggle the parameter from 10000001 to 10000000 and back to 10000001. Remember to power off after each time you change this parameter.
13. Before any tool changes can be made, the carousel has to be retracted, do this by turning the manual 1\0 slot on the opposite valve of O1328, this valve is labeled O1329.
14. Next, turn the manual 1\0 slot on the O1585 valve from the 0 position to 1, this should raise the spindle back to the upright, home position, and make sure all over ride slots are back to the 0 position.

15. Do some tool changes in MDI and make sure the tool holder is going up into the spindle straight and is being pulled up tight into the spindle.
16. Program example: T2001 M06; G4X7.0; T2006 M06; G4X7.0; M99; this will do a tool change, dwell, change the other tool, and repeat over and over until you stop it.
17. If the alarm is still present (TOOL CHANGE NOT READY), pull out the E-STOP and turn the carousel one full revolution with the ROTATE MAGAZINE pushbutton; if it will not rotate by the pushbutton put the machine in E-STOP and rotate the carousel by hand one full revolution. This procedure assumes that you have a good battery installed and only have a small "u" on the amplifier. If you have anything other than that on the amplifier, you will have to correct those alarms before doing this procedure, refer to the alarm codes below.
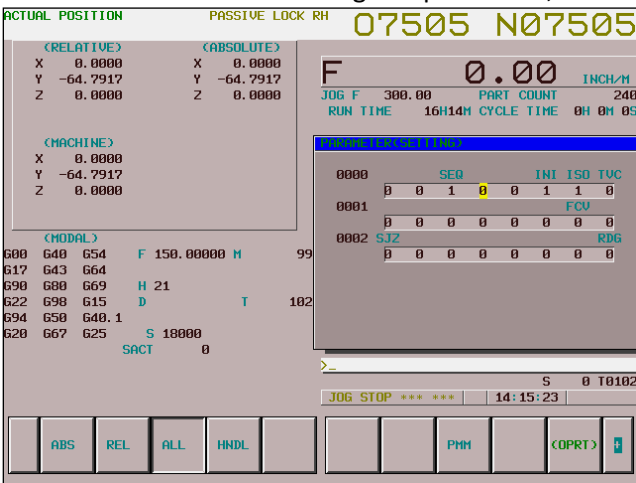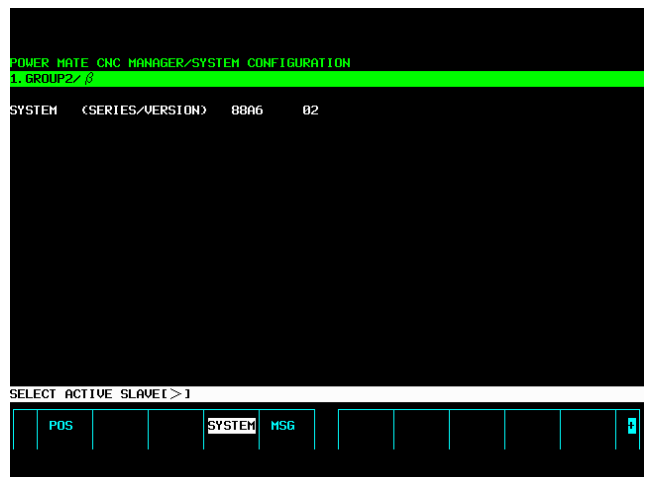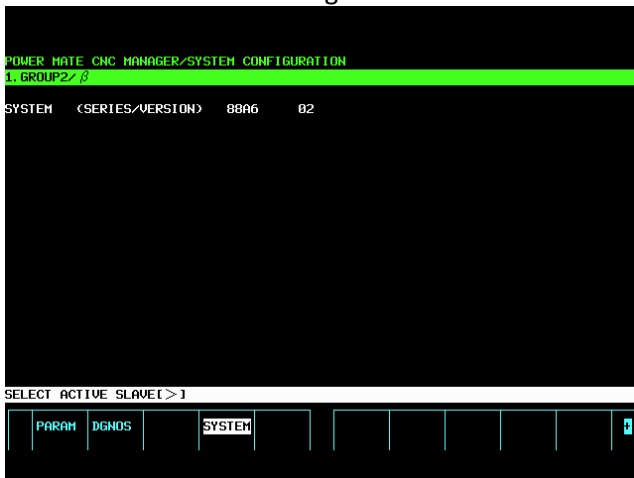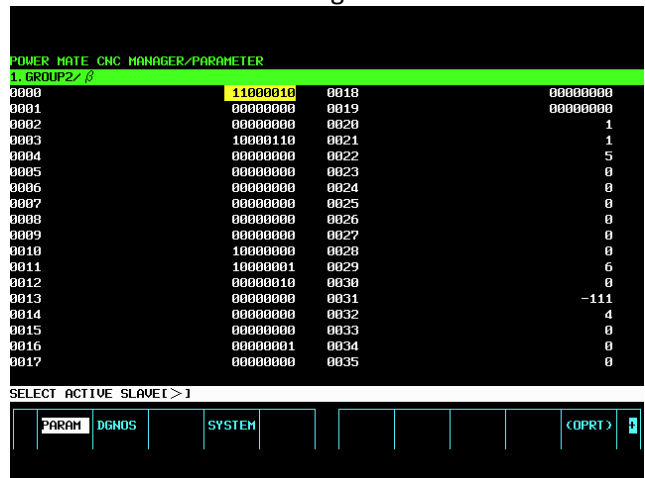
Figure A

Figure B

Figure C

Figure D

```
POWER MATE CNC MANAGER/PARAMETER
1, GROUP2∕ β
0000            11000010    0018            00000000
0001            00000000    0019            00000000
0002            00000000    0020                   1
0003            10000110    0021                   1
0004            00000000    0022                   5
0005            00000000    0023                   0
0006            00000000    0024                   0
0007            00000000    0025                   0
0008            00000000    0026                   0
0009            00000000    0027                   0
0010            10000000    0028                   0
0011            10000001    0029                   6
0012            00000010    0030                   0
0013            00000000    0031                -111
0014            00000000    0032                   4
0015            00000000    0033                   0
0016            00000001    0034                   0
0017            00000000    0035                   0

>10000000_              READ:NC← β  ,  PUNCH:NC→ β

    NO. SRC              INPUT        READ  PUNCH
```
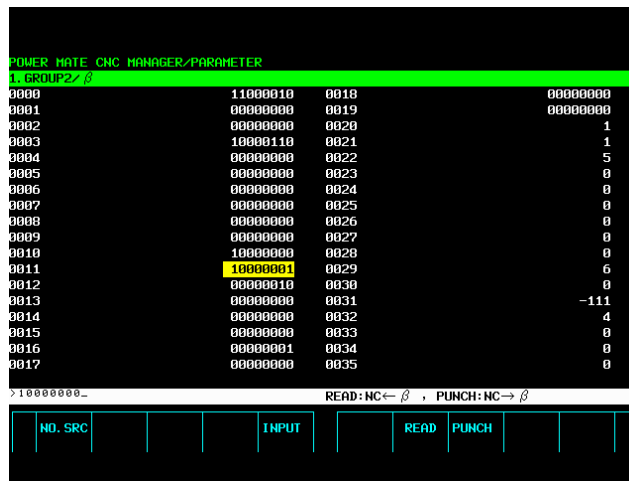
Figure E

If you receive "TOOL CHANGER #2 NOT READY" alarm on Beta driven tool changer amplifier and observe (1, 2, 11, u, U) on the seven segment display, you will need to replace the battery, rotate the carousel one rotation, and re-home the tool changer. The loss of battery will cause the Beta amplifier to lose its home which needs to be re-loaded.

These are the descriptions of the above alarms:

Large U   A parameter has been changed, need to cycle power
Small u   Tool changer needs to be homed
#11   Need to rotate the carousel one full revolution with the ROTATE MAGAZINE pushbutton
#2   No Battery – this needs to be fixed first before continuing
#1   Battery is low

Tool number 2 generally means the machine has one spindle on it, if you have multiple spindles it may say number 1, 3, etc.

Home the Tool Changer

Mach IIS, Mach III – 180i, 210i

1. Install a tool holder in the spindle manually using the OPEN DRAWBAR button.
2. If the carousel will rotate with the ROTATE MAGAZINE pushbutton, put pocket #1 in front of the spindle; if it will not, push in an EMERGENCY STOP button, turn the carousel by hand, and release the E-STOP button once it is close.
3. To lower the spindle manually:
   a) Remove the red cover from the tool changer, locate the valve with a single 3/8" clear line, use a small blade screwdriver and lower the spindle using this valve by turning the manual override slot below the electrical coil hood connection (DIN plug). The cable going into the connector should be labeled O1583, turn this to the 1 position to lower the spindle into the tool change position, leave it there until told otherwise.

Manual Override shown in the *On* or "**1**" position.

   b) Find the valve with the yellow and black hoses, the cable going into the DIN connector has a label, find the wire label O1328, turn the manual 1/0 slot to the 1 position to extend the carousel into the spindle. This valve can be turned back to the 0 position. This will make the gripper go around the tool. Press in an EMERGENCY STOP to relax the motor, this way it is truly in the right position. leave it on for the remainder of this procedure.

Manual Override shown in the *Off* or "**0"** position.

Note: For all valves to work properly they must be in the 0 position once finished.

4. Press SYSTEM hard key (the keys to the right of the display).
5. Press RIGHT ARROW soft key, + key, 3 times (soft keys are under the screen).
6. Press PMM soft key (see figure A).
7. If you have more than one spindle you will need to select the correct group # by using the NEXT↑ and BACK↓ soft keys, if you have only one spindle, this step will be disregarded.
8. Press SYSTEM soft key (see figures B and C).
9. Press PARAM soft key (see figure D).
10. Press DOWN ARROW cursor hard key down to Parameter #11 (see figure E).
11. If this parameter reads 10000000, you will need to change it to 10000001 to mark the home position. Whenever you change this parameter, shut down the control, and power back on again.
12. If you have not lost home and need to reset the tool changer to the correct position, you will need to toggle the parameter from 10000001 to 10000000 and back to 10000001. Remember to power off after each time you change this parameter.
13. Before any tool changes can be made, the carousel has to be retracted, do this by turning the manual 1\0 slot on the opposite valve of O1328, this valve is labeled O1329.
14. Next, turn the manual 1\0 slot on the O1585 valve from the 0 position to 1, this should raise the spindle back to the upright, home position, and make sure all over ride slots are back to the 0 position.

15. Do some tool changes in MDI and make sure the tool holder is going up into the spindle straight and is being pulled up tight into the spindle.
16. Program example: T2001 M06; G4X7.0; T2006 M06; G4X7.0; M99; this will do a tool change, dwell, change the other tool, and repeat over and over until you stop it.
17. If the alarm is still present (TOOL CHANGE NOT READY), pull out the E-STOP and turn the carousel one full revolution with the ROTATE MAGAZINE pushbutton; if it will not rotate by the pushbutton put the machine in E-STOP and rotate the carousel by hand one full revolution. This procedure assumes that you have a good battery installed and only have a small "u" on the amplifier. If you have anything other than that on the amplifier, you will have to correct those alarms before doing this procedure, refer to the alarm codes below.

Figure A
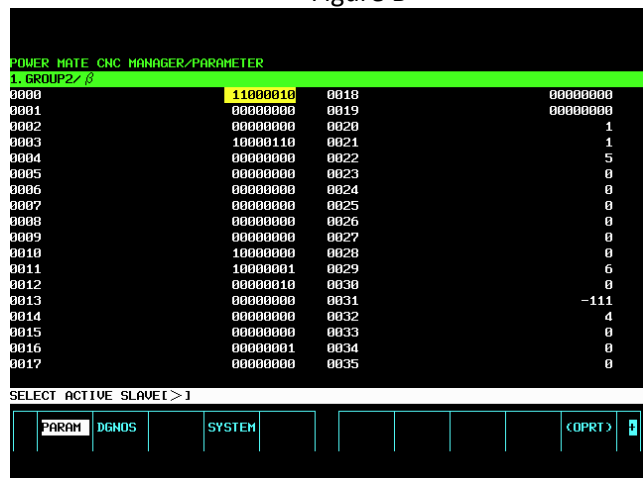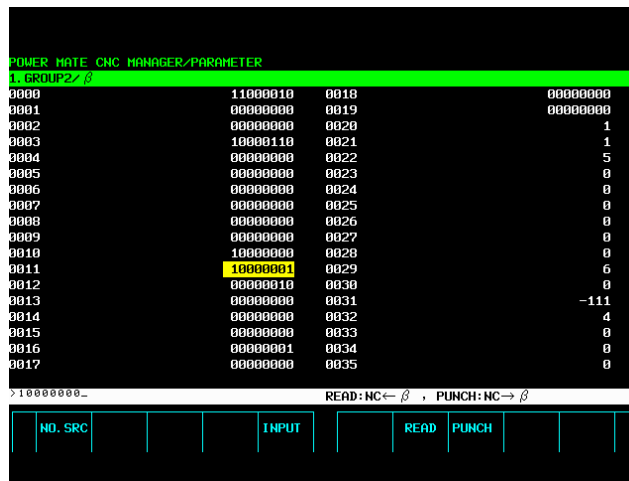

Figure B

Figure C

Figure D

Figure E

If you receive "TOOL CHANGER #2 NOT READY" alarm on Beta driven tool changer amplifier and observe (1, 2, 11, u, U) on the seven segment display, you will need to replace the battery, rotate the carousel one rotation, and re-home the tool changer. The loss of battery will cause the Beta amplifier to lose its home which needs to be re-loaded.

These are the descriptions of the above alarms:

Large U	A parameter has been changed, need to cycle power
Small u	Tool changer needs to be homed
#11	Need to rotate the carousel one full revolution with the ROTATE MAGAZINE pushbutton
#2	No Battery – this needs to be fixed first before continuing
#1	Battery is low

Tool number 2 generally means the machine has one spindle on it, if you have multiple spindles it may say number 1, 3, etc.

Mach IIS
Logic version M2SZ1-6 or later

1. Empty carousel.
2. Load a tool holder in the spindle.
3. Make sure machine is **not** in TC AUTO mode.
4. Hold down the OT BYPASS pushbutton, TOOL CHANGE pushbutton and the IN POSN pushbuttons simultaneously until the TOOL CHANGE and IN POSN pushbuttons illuminate. The spindle will drop to the tool change position and the carousel should now turn freely (or somewhat freely). You will see this message: TC HOME ACTIVE – POSITION TOOL IN POCKET AND PRESS HOME TO COMPLETE.
5. Slowly turn the carousel to the approximate home position (pocket 1 in line with the spindle).
6. Use the **+** pushbutton (located to the right of the IN POSN pushbutton on the operator panel) to extend the carousel into the spindle.
7. Press the HOME pushbutton to set the reference point and re-enable the TC servo.
8. Retract the carousel using the **–** pushbutton (to the left of IN POSN).
9. Raise the spindle with the pushbutton directly <u>above</u> the IN POSN pushbutton.
10. Press the TOOL CHANGE pushbutton to complete the reference sequence. You should see this message: TC HAS BEEN SUCCESSFULLY REFERENCED.
11. Cycle power.
12. Home the ATC and empty the spindle as required.
13. Command a tool change to verify carousel position.
14. If successful, home the ATC again and load a tool in pocket 1. Command a tool change for pocket 1.
15. If tool change is successful and alignment looks OK, home the ATC again. Load the carousel and run the TC test program for approximately 15 minutes.

Raise Spindle ←

Retract Carousel → [**–**] [IN POSN] [**+**] ← Extend Carousel

↑ Lower Spindle to TC Position
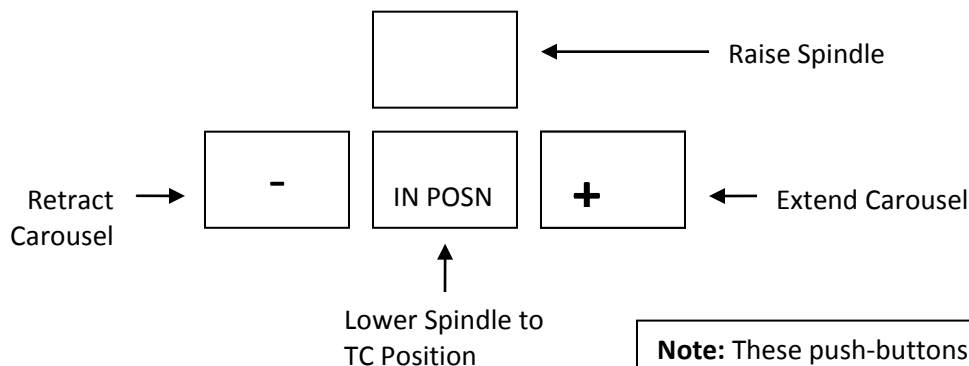
Note: These push-buttons will only perform this way when TC HOME mode is active (after the OT BYPASS, TC and IN POSN push-buttons have been simultaneously pressed and held for 3 seconds).

Home the Tool Changer

Innova – 210-MB with Beta Drive

1. Using the ROTATE MAGAZINE pushbutton on the tool changer rotate the tool changer until pocket #1 is facing the spindle. If it will not rotate with the button, it will need to be aligned manually to line up with pocket #1.
   To line it up manually insert a tool holder into the spindle. Shut off the air supply to the machine and you will be able to push the tool changer in by hand to line it up with pocket #1.
2. Push E-STOP with tool holder pocket #1 aligned. (REMAIN IN E-STOP UNTIL DONE).
3. Click SYSTEM (center).
4. Click CHAPTER (left).
5. Click NEXT.
6. Click RELAY (center or handy page on some models).
7. Turn PARAMETER WRITE on (put check in the box, must be in MDI).
8. Go to the KEEP RELAY screen.
9. Turn K0.2 and K0.3 on (put checks in the boxes or some machines use K0.4 and K0.5)
10. Example K000 o o o o \ \ o o
11. Shut down Windows and power off computer, and turn back on.
12. Repeat steps 3 and 4.
13. Click DATA (center).
14. Click OPR (right).
15. Click GROUP DATA (left).
16. Click GROUP COUNT (pull down and pick 2)
17. Set #1 (D14) data to 11 and hit TAB, set #2 (D16) data to 128 and hit TAB, and hit CYCLE STOP. It should flash to clear home.
18. Set #1 (D14) data to 11 and hit TAB, set #2 (D16) data to129 and hit TAB, and hit CYCLE STOP. It should flash to set home.
19. Go back to the RELAY screen.
20. Click FCT (left).
21. Repeat steps 3-4-5.
22. Turn K0.2 and K0.3 (or K0.4 and K0.5 if used above) off (un-check the box).
23. Turn PARAMETER WRITE off (un-check the box).
24. Power off (off/on).
25. Pull E-STOP back out.
26. Turn air back on to the machine.
27. Try to home the tool changer. If the error is still there, rotate magazine and power off (you must take tool changer out of AUTO mode).

Dynamic Tool Changers (ride with the spindle)
Logic versions MXS1-7, TGT4-0, F1-0, FTT1-0, M3FBT4-5, M3LRT4-7, MS5A2-0 and later

1. Place a tool holder into the spindle manually.
2. If the machine has a rotary axis, program the rotary axis to the proper position determined using the table below:

| Machine Model	Position for Rotary Axis
Fusion F-B, M3 F-B	0 Degrees
Fusion TT, M3 LR	90 Degrees

3. Turn on the proper keep relay for the tool changer you are referencing. This keep relay will turn off automatically.
4. The carousel should now turn somewhat freely and you should see a message similar to this:


```
OPERATOR MESSAGE
          ATC 2 HOME ACTIVE
          POSITION TOOL & PRESS HOME
```
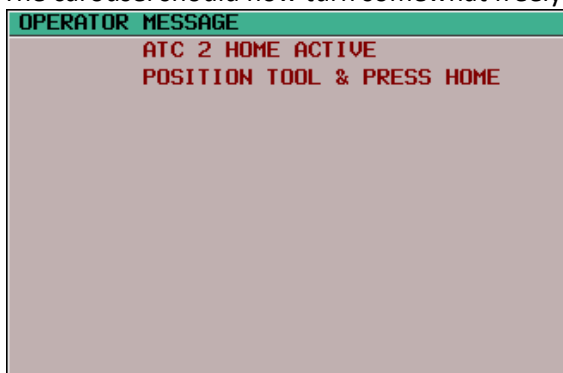
5. While in reference mode:
   Pressing "**5**" on the touch screen will **raise the spindle**.
   Pressing "**INPOS**" on the touch screen will **lower the spindle**.
   Pressing "**+**" on the touch screen will **extend the carousel**.
   Pressing "**–**" on the touch screen will **retract the carousel**.
6. If the carousel alignment is off vertically, use an indicator along with the 5, INPOS, + and – buttons to correct the height difference.
7. Rotate the carousel manually 360 degrees and then align pocket 1 to the spindle (the carousel should be empty of all tools).
8. Extend the carousel into the tool holder using the + button.

9. Press the **HOME** pushbutton to continue the reference sequence. You should see a message similar to this:

```
OPERATOR MESSAGE
        ATC 2 POSITION SET
        RETRACT & PRESS TC
```
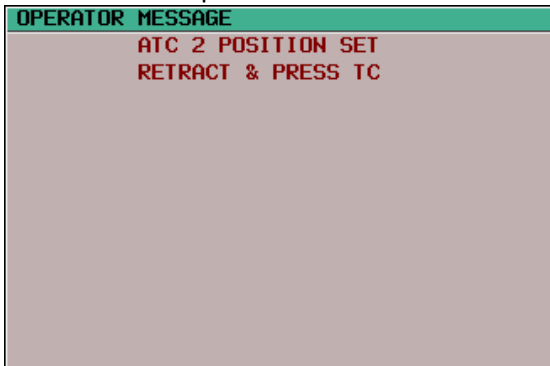
10. At this point the beta home position has been set.
11. Retract the carousel using the "**–**" pushbutton and then raise the spindle using the "**5**" pushbutton.
12. Press the **TOOL CHANGE** pushbutton to complete the sequence. You should see a message similar to this:

```
OPERATOR MESSAGE
        ATC 2 REFERENCE COMPLETE
        CYCLE POWER
```
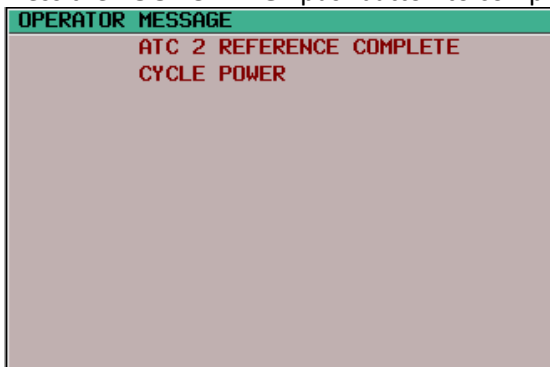
13. Cycle power on the control by properly shutting down (not restarting) Windows and pressing the **Power Off** button on the HMI.
14. After powering on, home the ATC (while in TC MANUAL mode, press the **HOME** pushbutton and then the **TOOL CHANGE** and **CYCLE STOP** pushbuttons simultaneously). Empty the spindle as required. Even if the spindle is empty the **DRAWBAR** pushbutton must be pressed.
15. Turn the **RAPID OVERRIDE** knob to 20%. Command a tool change to an empty pocket to verify carousel position (Example: T2001 M06 ;).
16. If successful, home the ATC and load a tool into pocket 1 of the carousel. Command a tool change for pocket 1 (T2001 M06 ;).
17. If tool change is successful and alignment looks OK, home the ATC (while in TC MANUAL mode, press the **HOME** pushbutton and then the **TOOL CHANGE** and **CYCLE STOP** pushbuttons simultaneously), load the carousel and run the tool changer test program until every pocket had been tested.

Static Tool Changers (stationary, do not ride with the spindle)

1. Place a tool holder into the proper spindle manually.
2. If the machine has a rotary axis, program the rotary axis to the proper position determined using the table below:

| Machine Model	Position of Tool Changer	Position for Rotary Axis
Xtreme, Fusion F-B, M3 F-B, Solution	Right side	90 Degrees
	Left side	270 Degrees
Fusion TT, M3 LR	Right side	180 Degrees
	Left Side	0 Degrees

3. Turn on the proper keep relay for the tool changer you are referencing. This keep relay will turn off automatically.
4. The carousel should now turn somewhat freely and you should see a message similar to this:
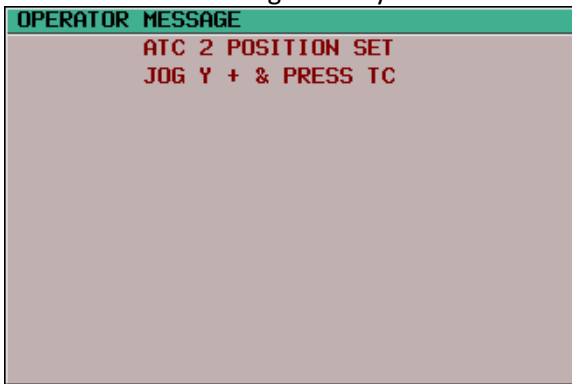
```
OPERATOR MESSAGE
        ATC 2 HOME ACTIVE
        POSITION TOOL & PRESS HOME
```

5. While in REFERENCE mode, if the tool changer has a slide and it is enabled:
   Pressing "**INPOS**" on the touch screen will **extend the carousel**.
   Pressing "**5**" on the touch screen will **retract the carousel**.
   While in REFERENCE mode, if the head has a slide:
   Pressing "**4**" on the touch screen will raise the spindle.
   Pressing "**6**" on the touch screen will lower the spindle.
6. Extend the carousel (if on a slide) and rotate it manually 360 degrees. Then align pocket 1 to the spindle (the carousel should be empty of all tools).
7. Use the MPG to position the tool holder into pocket 1 on the carousel.

8. Press the **HOME** pushbutton to continue the reference sequence. You should see a message similar to this if there is a tool changer slide:

```
OPERATOR MESSAGE
        ATC 2 POSITION SET
        RETRACT & PRESS TC
```
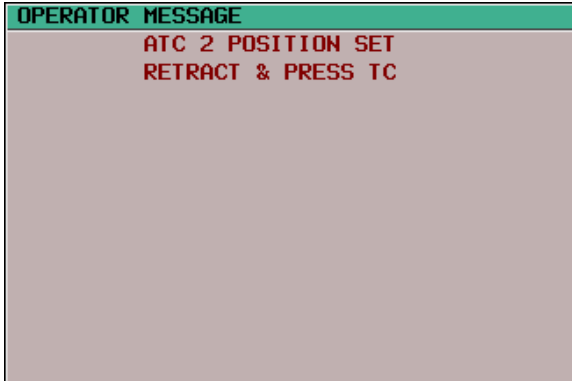
If there is no tool changer slide you will see a message similar to this:

```
OPERATOR MESSAGE
        ATC 2 POSITION SET
        JOG Y + & PRESS TC
```

9. At this point the beta home position has been set and the position of the tool changer has been saved into G.Data.
10. If there is a tool changer slide retract it using the "**5**" pushbutton. If there is no slide present, MPG the Y axis directly out of the carousel approximately 16".
11. Press the **TOOL CHANGE** pushbutton to complete the sequence. You should see a message similar to this:

```
OPERATOR MESSAGE
        ATC 2 REFERENCE COMPLETE
        CYCLE POWER
```
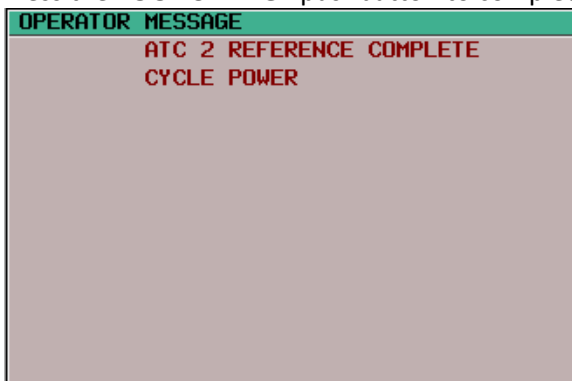
12. Cycle power on the control by properly shutting down (not restarting) Windows and pressing the **POWER OFF** button on the HMI.
13. After powering on, home the ATC (while in TC MANUAL mode, press the **HOME** pushbutton and then the **TOOL CHANGE** and **CYCLE STOP** pushbuttons simultaneously). Empty the spindle as required. Even if the spindle is empty the **DRAWBAR** pushbutton must be pressed.
14. Turn the **RAPID OVERRIDE** knob to 20%. Command a tool change to an empty pocket to verify carousel position (Example: T2001 M06 ;).
15. If successful, home the ATC and load a tool into pocket 1 of the carousel. Command a tool change for pocket 1 (T2001 M06 ;).

16. If tool change is successful and alignment looks OK, home the ATC (while in TC manual mode, press the **HOME** pushbutton and then the **TOOL CHANGE** and **CYCLE STOP** pushbuttons simultaneously), load the carousel and run the tool changer test program until every pocket has been tested.

17. The tool change position is saved in G.Data. In order to see the positions, a data table needs to be setup.
    a. To get to the G.Data press **SYSTEM→PMC→PMCPRM→DATA.**
    You will see a screen similar to this:
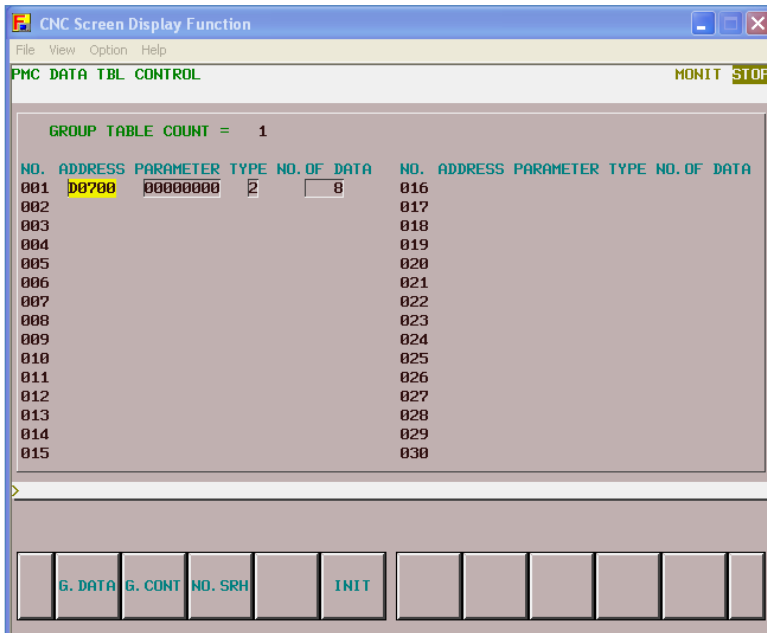
18. If there is not a data table setup at D700 you will need to set the following:
    TYPE=2, NO. OF DATA=8, PARAMETER=0, ADDRESS=D700.

19. Once the data table is setup, press the G.DATA button at the bottom of the screen.
    You will see a screen similar to this:
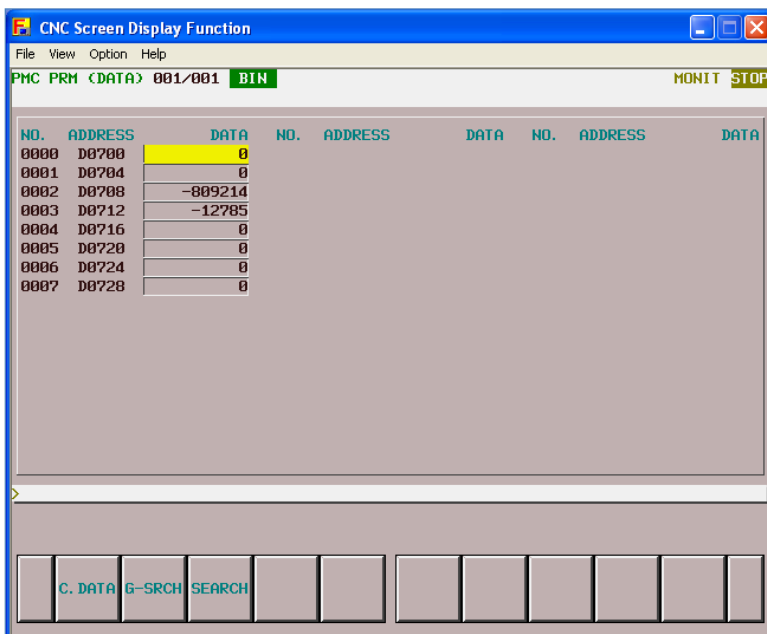
20. The memory locations are assigned as follows:

Location	Description		Location	Description
D700	ATC 1 Gantry Axis		D716	ATC 3 Gantry Axis
D704	ATC 1 Z-Axis		D720	ATC 3 Z-Axis
D708	ATC 2 Gantry Axis		D724	ATC 4 Gantry Axis
D712	ATC 2 Z-Axis		D728	ATC 4 Z-Axis