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If you have a problem with placement accuracy, it is necessary to perform a BASIC calibration.

1.Y2 axis Origin Offset à 2.Y axes Compensation à (3.Camera Calibration) à 4.Camera Align Offset à 5.Reference Mark Teaching à 6.Z-axis Origin Offset à 7.R axis Origin Offset à 8.Offset Calibration à 9.System Position Teaching à (10.Machine Calibration) à (11.CRO Calibration) à (12.CPK)

Camera Calibration, CRO Calibration, CPK Calibration is not described on this document.

Step 1. Y2 axis Origin Offset

This calibration should be performed if the difference between Y1 and Y2 axis is more than 0.050mm when the motor power is on and 0.500mm when the motor power is off.

1. Open MrTerminal and type 'initNearOrg' and press enter key.

MrTerminal

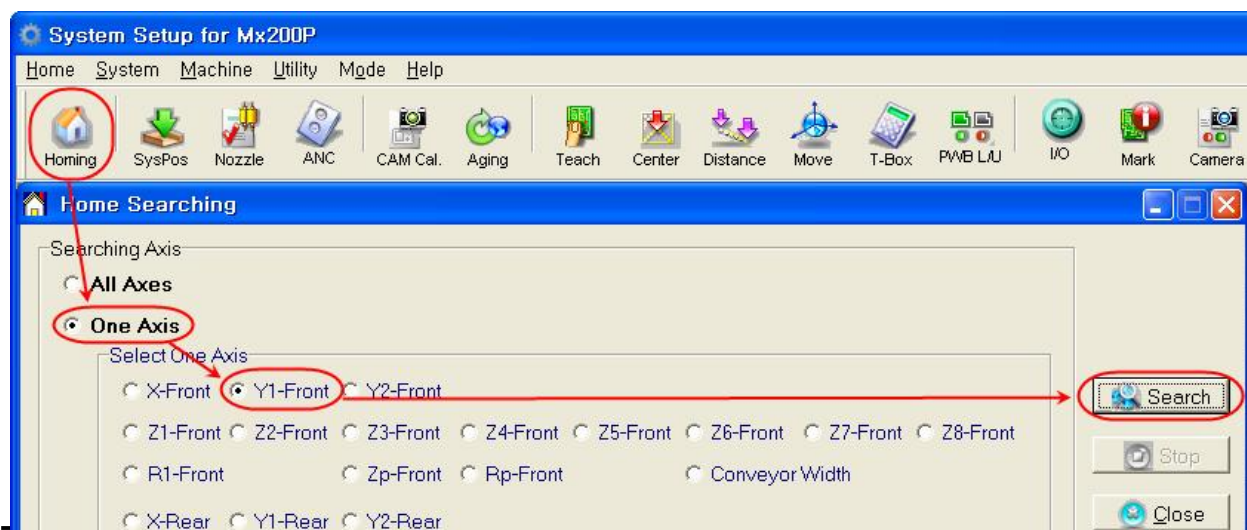
```


->
-> initNearOrg
-> <Flash Memory> Block=0, FlashCount=169, MaxAddr=7c00d616
-> [DEBUG] Flash Data File Writing Complete.
** Finish Flash Writing**value = 0 = 0x0

```

2. Open MSetup (System Setup) and home Y1 axis.

You must Home Y1-Rear for dual gantry machines.



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Step 2. Y axes Compensation

This calibration should be performed if the difference between Y1 and Y2 axis is more than 0.050mm when the motor power is on and 0.500mm when the motor power is off.

1. Open MrTerminal and type 'initNearOrg' and press enter key.

```

-> MrTerminal
-> SetCompen(1)
-> <ServoCheck> Protection Head Z ...(Single Machine)
-> <ServoCheck> Now Head Z was Safty!!!
-> <ServoCheck> CheckServoOn(0,0) = 1
-> <ServoCheck> CheckServoOn(0,1) = 1
-> <ServoCheck> CheckServoOn(0,2) = 0
    HomeCheck Move => iID=0,iAxis=1,iFstVel=-30000,iSndVel=15000)!
-> (Front Gantry) Move to 65536 --> Scale is -15
-> (Front Gantry) Move to 131072 --> Scale is -22
-> (Front Gantry) Move to 196608 --> Scale is -5
-> (Front Gantry) Move to 262144 --> Scale is 1
-> (Front Gantry) Move to 327680 --> Scale is 8
-> (Front Gantry) Move to 393216 --> Scale is -12
-> (Front Gantry) Move to 458752 --> Scale is -6
-> (Front Gantry) Move to 524288 --> Scale is 27
-> (Front Gantry) Move to 589824 --> Scale is 23
-> (Front Gantry) Move to 655360 --> Scale is 35
-> (Front Gantry) Move to 720896 --> Scale is 35
-> (Front Gantry) Move to 786432 --> Scale is 17
-> (Front Gantry) Move to 851968 --> Scale is 30
-> GGGGG SAVE_PARAMETER_FLASH Command....
-> Saving Parameter(Bd=0)....Wait moment....
-> Verify failed!! Try again!!
-> Successfully completed !!!
-> <Motion Board> Front Y2 (MRC Motion Board 0 : 2 Axis) Servo OFF
-> <Motion Board> Front Y1 (MRC Motion Board 0 : 1 Axis) Servo OFF


=====
[IMPORTANT] Please check HOME of Y1&Y2 axis, again. !!!!
=====

```

2. Type 'GameOut' on MrTerminal and **restart** the machine.

Step 3. Camera Calibration

Refer to 'SI-Camera Calibration' procedure.

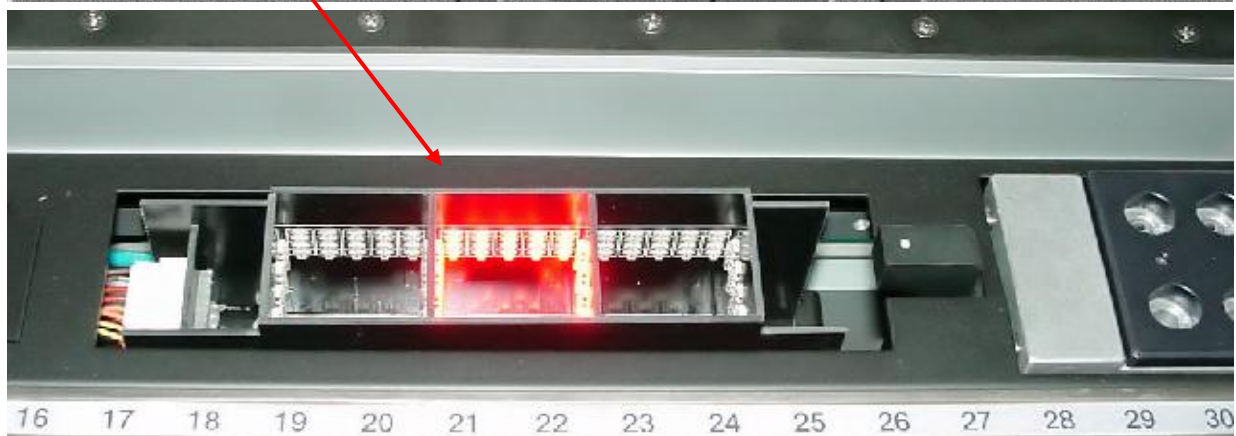
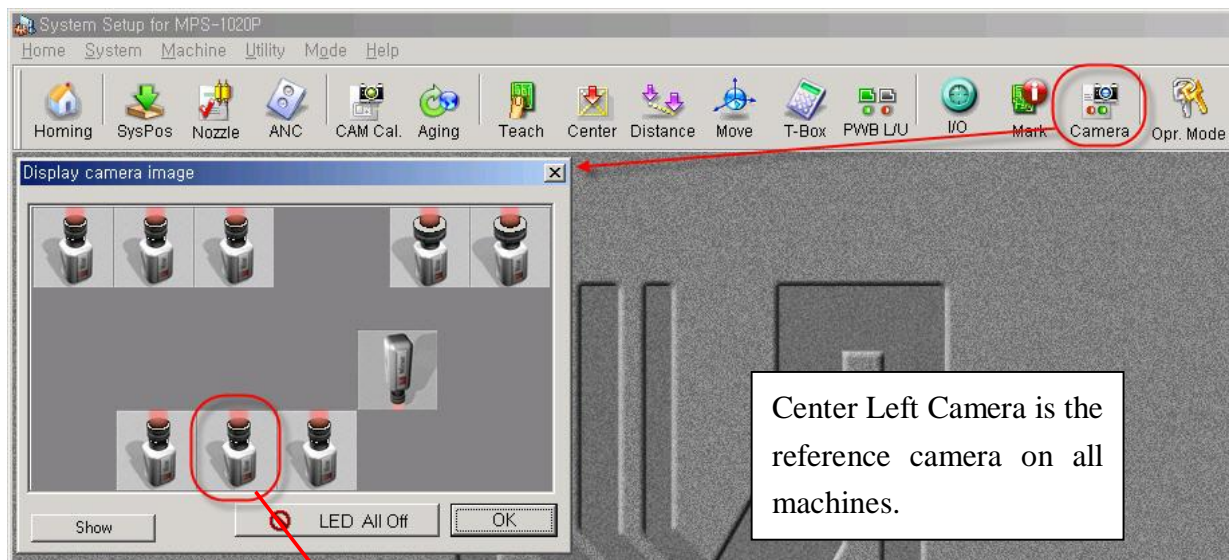
 Mirae	Service Information	Basic Calibration on Mx series			
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Step 4. Camera Align Offset calibration


Required tool : Head Calibration Jig Assy (Align offset Jig)
(Part number : 2100C-J02-00)

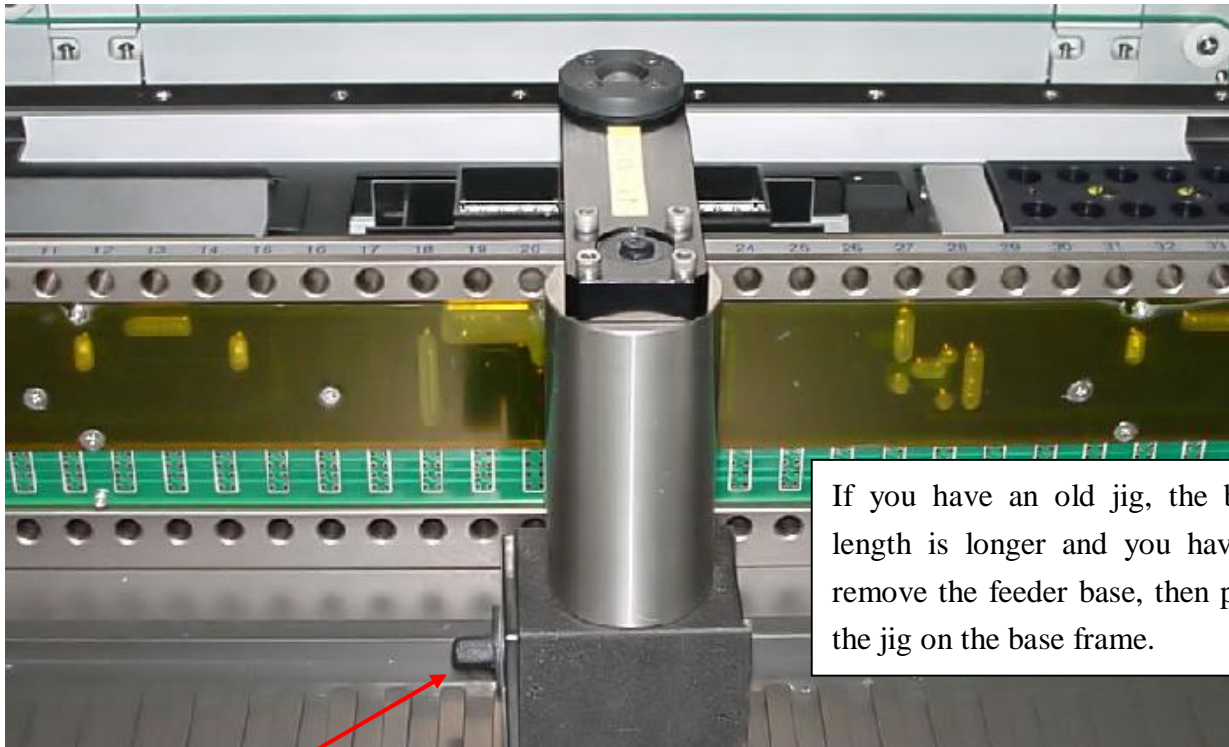


1. Remove the front feeder base.
2. Open Msetup, click on 'Camera' icon and click on '**Front Center Left** Camera' button.



3. Place the align offset jig on the base frame and move the white mark over the front center left camera (second camera from left hand side). You must see the vision monitor and make sure the cross hair points near the center of the mark.

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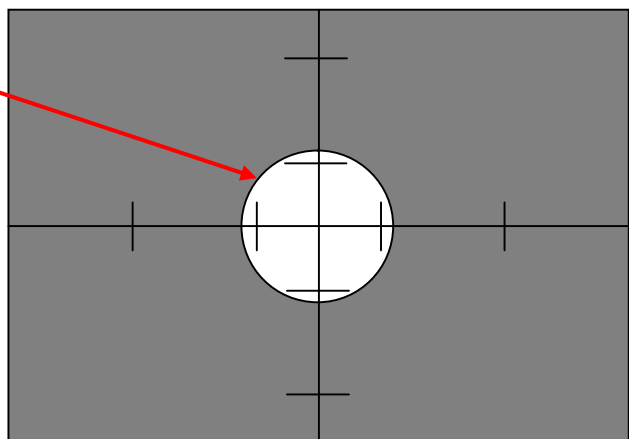


If you have an old jig, the body length is longer and you have to remove the feeder base, then place the jig on the base frame.


4. Lock the lever and the magnet in the jig will be attached to the base frame. Adjust the jig position to the center of the mark.

If the vision monitor becomes dark, it is because the camera LED is turned off after 30 seconds. Click on the camera icon to turn on the LED.

If it is ready, close the door and press 'Servo On' key from the front key panel.

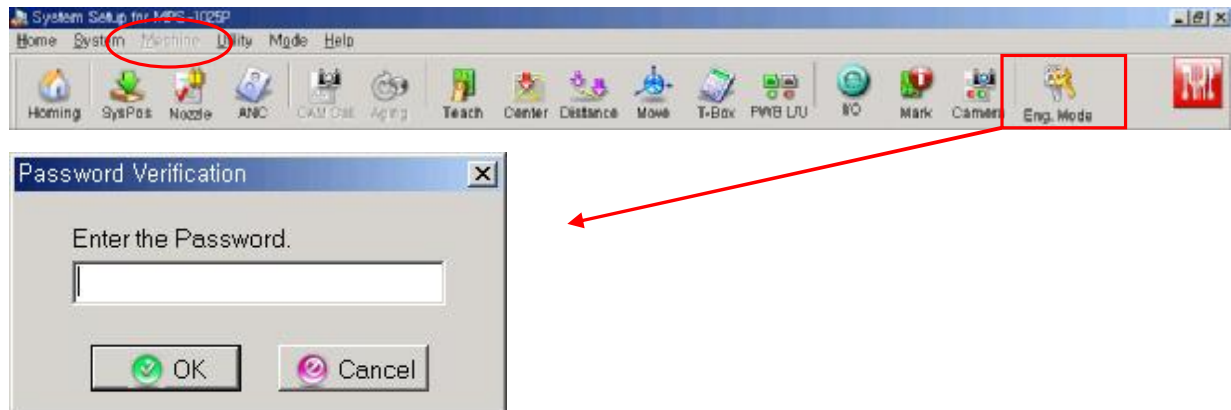


[Vision Monitor]

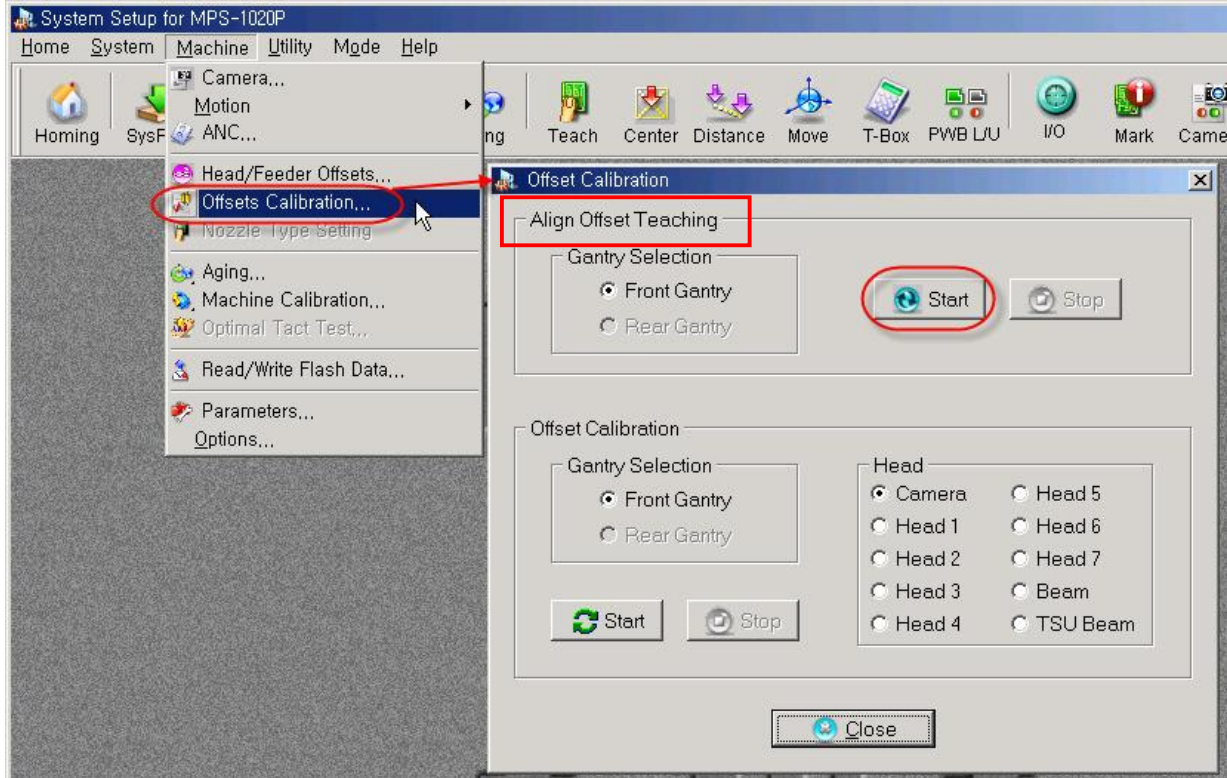
 Mirae	Service Information	Basic Calibration on Mx series			
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5. Open 'Msetup' and click on 'Eng. Mode' icon to change the mode to 'Engineer mode' so that you can access 'Machine' menu. Click 'OK' button on the password verification window.

- Do not need to type the password. (mrcjet)



6. Click on 'Machine / Offsets Calibration' from the main menu.



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6. Click on 'Start' button on 'Align Offset Teaching' part.

The machine will perform the calibration automatically and it takes less than 20 seconds. The module camera (upward camera) will read the mark position and find the offsets, then the head camera (downward camera) will do the same. The machine will calculate the head camera position automatically.

During the calibration, 'Start' button will be inactivated and if the calibration is completed, the 'Start' button will be activated. Try this calibration a few times to make sure the calibration result is correctly saved in the machine. You do not need to move the jig position but just click on the 'Start' button.



Service Information

Basic Calibration on Mx series

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Step 5. Machine Reference Mark Teaching

1. Open Msetup and click on 'SysPos' icon to open System Positions.

2. Click on 'P1' on Reference Positions / Machine.

3. Move the head camera over Front Machine Reference Mark and teach the center. When you teach the center, use 'Mark Recognition' to move to the center.

4. Move the head camera over Rear Machine Reference Mark (P2) and teach the center.

System Positions

Standby Positions

Stand-by | Front gantry warmup | Rear gantry warmup

	X(mm)	Y(mm)	R(deg)	Z(mm)
Table 1	300.000	20.000	0.000	5.000
Table 2	300.000	700.000	0.000	5.000

Discarding Positions

Front module head | Rear module head | Precision head

	X(mm)	Y(mm)	R(deg)	Z(mm)
P1	355.430	133.990	0.000	15.000
P2	355.430	133.990	0.000	15.000

Other Positions

Align Offset | TSU shuttle | Conveyor mark | PWB fix

	X(mm)	Y(mm)	R(deg)	Z(mm)
Front	148.148	122.148	0.000	0.000
Rear	149.413	650.426	0.000	0.000

Reference Positions

Machine | Feeder | TF

	X(mm)	Y(mm)
P1	100.359	121.964
P2	200.595	650.750

Mark Recognition

Camera | Head | Mark | Color

Front: Head | Head 1 | Circle | White

LED Level

Side Top: 1

Side Bottom: 1

Bottom: 1

Apply Now

Mark State

Bad | Good

Use Multi Bad Mark

Window

X: 175 | Y: 180 | X2: 475 | Y2: 400

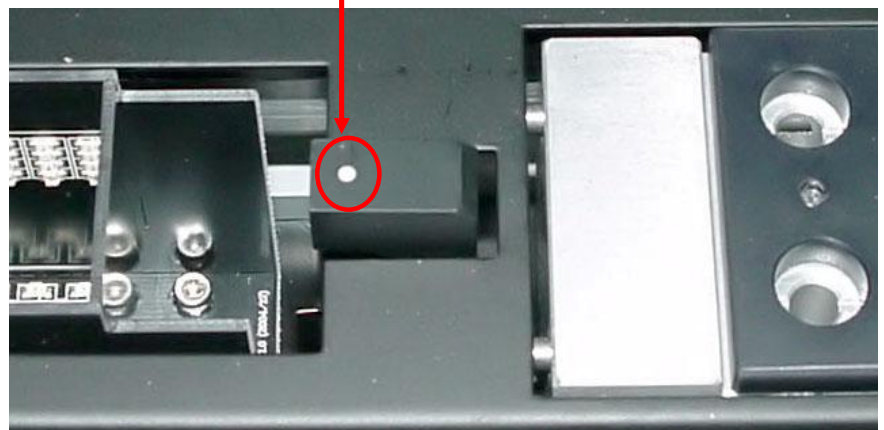
Offset


X: 0.00 | Y: 0.00 | R: 0.00

Result

d1: 0.00 | d2: 0.00 | d3: 0.00 | d4: 0.00

OK | Cancel



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Step 6. Z-axis Origin Offset Calibration

Required tool : CALIB. JIG ASSY, MODULE CAMERA

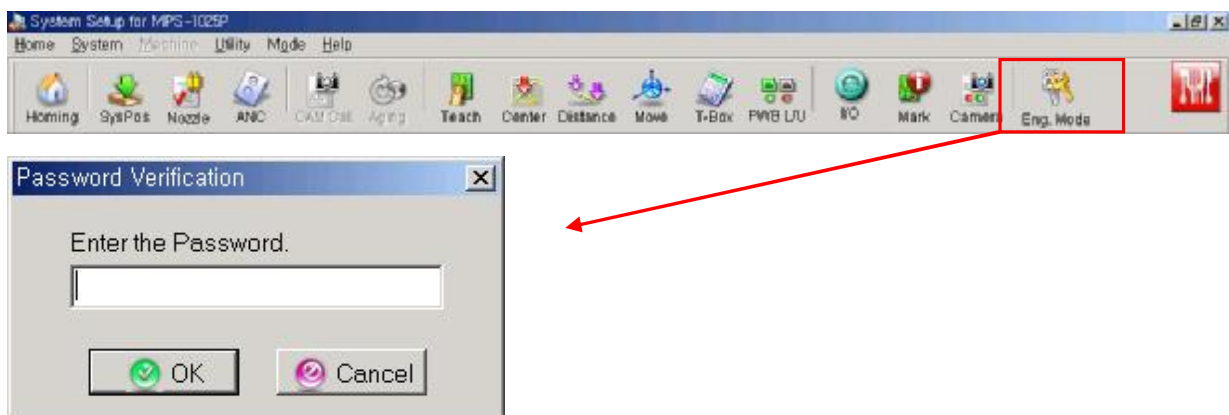
(Part number : 2100C-J03-01-00)

or B-Type nozzle

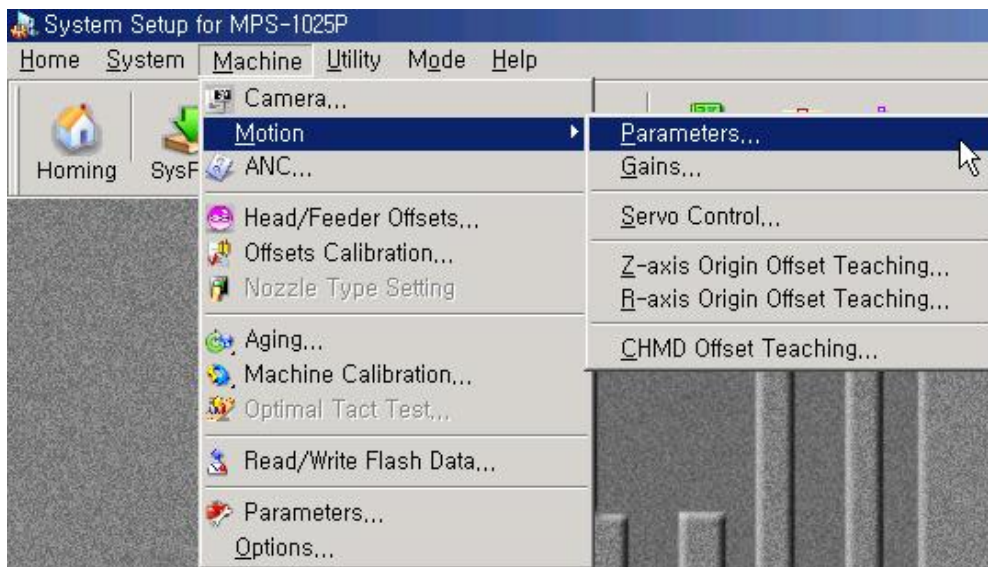



1. Execute Msetup and change the mode to 'Engineer mode'.

- Do not need to type the password.

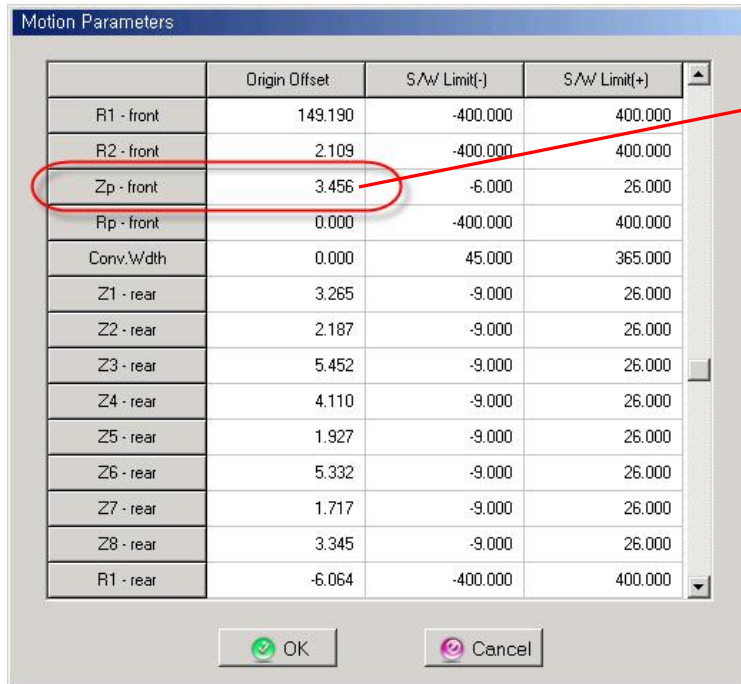


2. Open 'Machine > Motion > Parameters' from the main menu.



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3. Change the origin offset of 'Zp-front' to 0 (zero) and click OK.



	Origin Offset	S/W Limit(-)	S/W Limit(+)
R1 - front	149.190	-400.000	400.000
R2 - front	2.109	-400.000	400.000
Zp - front	3.456	-6.000	26.000
Rp - front	0.000	-400.000	400.000
Conv.Width	0.000	45.000	365.000
Z1 - rear	3.265	-9.000	26.000
Z2 - rear	2.187	-9.000	26.000
Z3 - rear	5.452	-9.000	26.000
Z4 - rear	4.110	-9.000	26.000
Z5 - rear	1.927	-9.000	26.000
Z6 - rear	5.332	-9.000	26.000
Z7 - rear	1.717	-9.000	26.000
Z8 - rear	3.345	-9.000	26.000
R1 - rear	-6.064	-400.000	400.000

0

[MPS-1030P Axis Map]

Z1 front: 1st module head (from left)

Z2 front: 2nd module head

Z3 front: 3rd module head

Z4 front: 4th module head

Zp front: Precision head

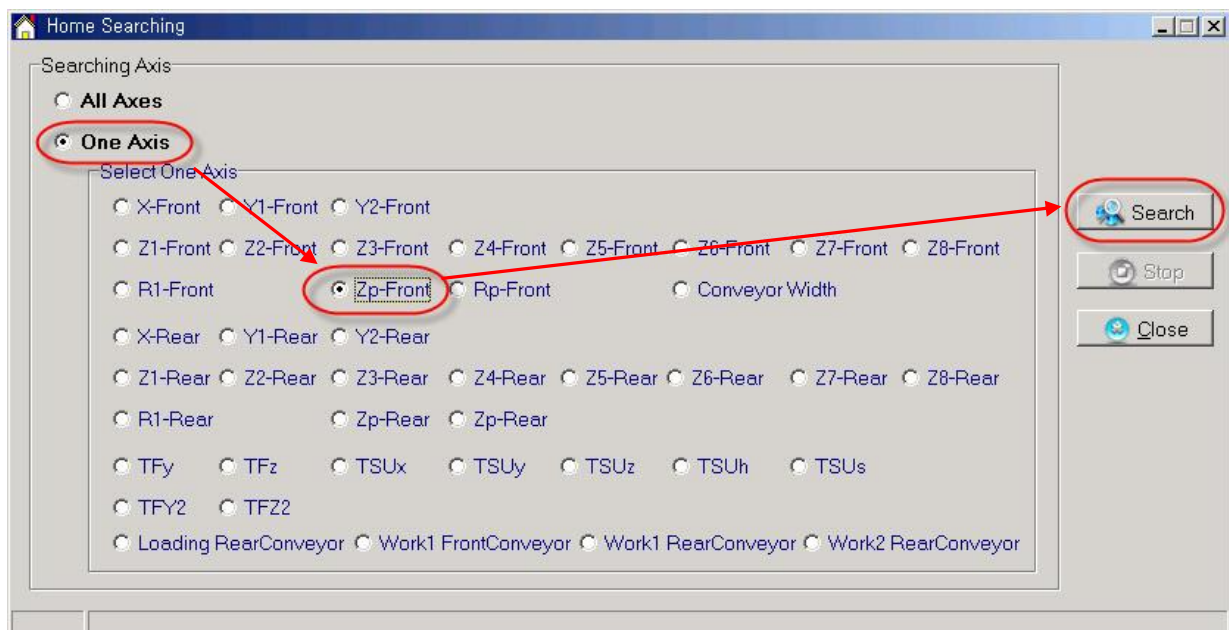
[MPS-1020 Axis Map]

Z1 front: 1st module head (from left)

~

Z8 front: 8th module head (from left)

4. Open 'Homing' window and select 'One Axis' and 'Zp-Front', then click on 'Search' button.



Home Searching

Searching Axis

☐ All Axes

☒ One Axis

Select One Axis

☐ X-Front ☐ Y1-Front ☐ Y2-Front

☐ Z1-Front ☐ Z2-Front ☐ Z3-Front ☐ Z4-Front ☐ Z5-Front ☐ Z6-Front ☐ Z7-Front ☐ Z8-Front

☐ R1-Front ☒ Zp-Front ☐ Rp-Front ☐ Conveyor Width

☐ X-Rear ☐ Y1-Rear ☐ Y2-Rear


☐ Z1-Rear ☐ Z2-Rear ☐ Z3-Rear ☐ Z4-Rear ☐ Z5-Rear ☐ Z6-Rear ☐ Z7-Rear ☐ Z8-Rear

☐ R1-Rear ☐ Zp-Rear ☐ Zp-Rear

☐ TFy ☐ TFz ☐ TSUx ☐ TSUy ☐ TSUz ☐ TSUh ☐ TSUs

☐ TFY2 ☐ TFZ2

☐ Loading RearConveyor ☐ Work1 FrontConveyor ☐ Work1 RearConveyor ☐ Work2 RearConveyor

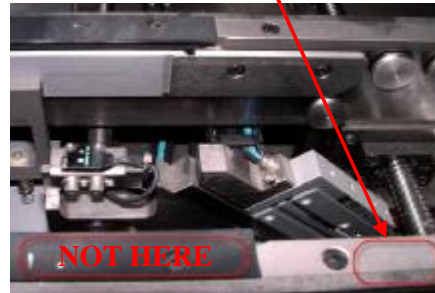
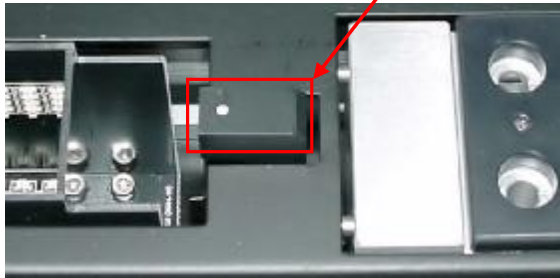
 Mirae	Service Information	Basic Calibration on Mx series			
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5. Open the door and insert 'CALIB. JIG ASSY' in the head socket.

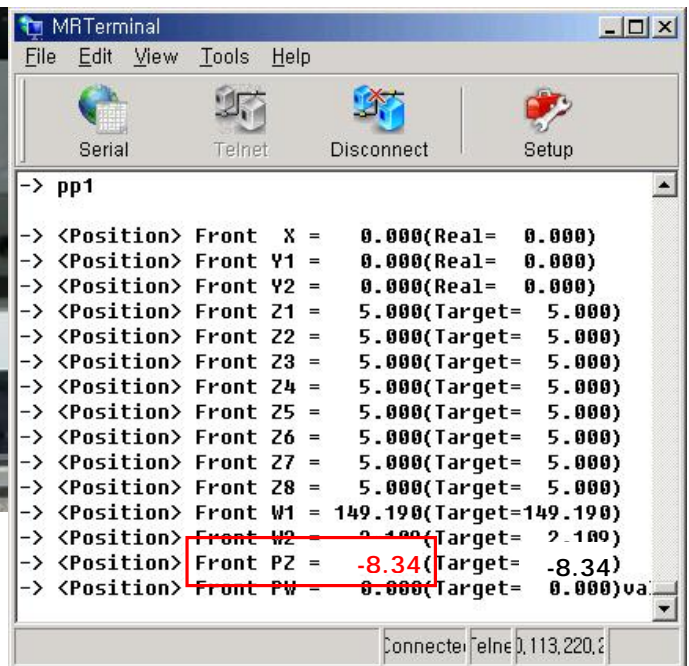
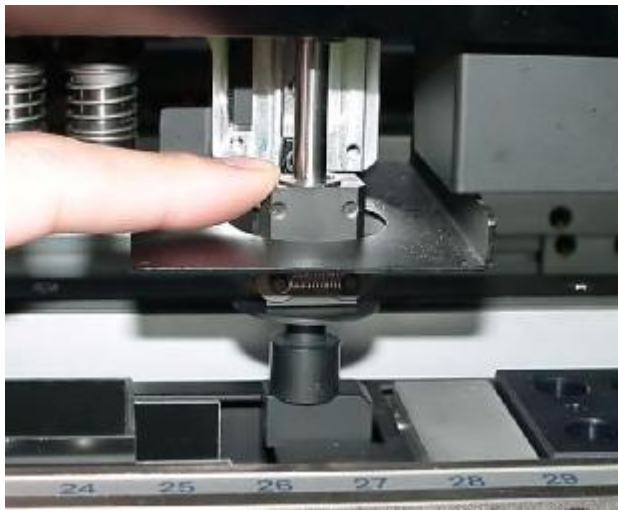


6. Move the head over the 'Machine Reference mark' by hand.

If the machine does not have a reference mark, you have to use conveyor.



7. Move down the shaft until the bottom of the 'head offset jig' touches the machine reference mark and type 'pp1' in MrTerminal.




8. Read the head 3 position.

(For example it was -8.34. ---②)

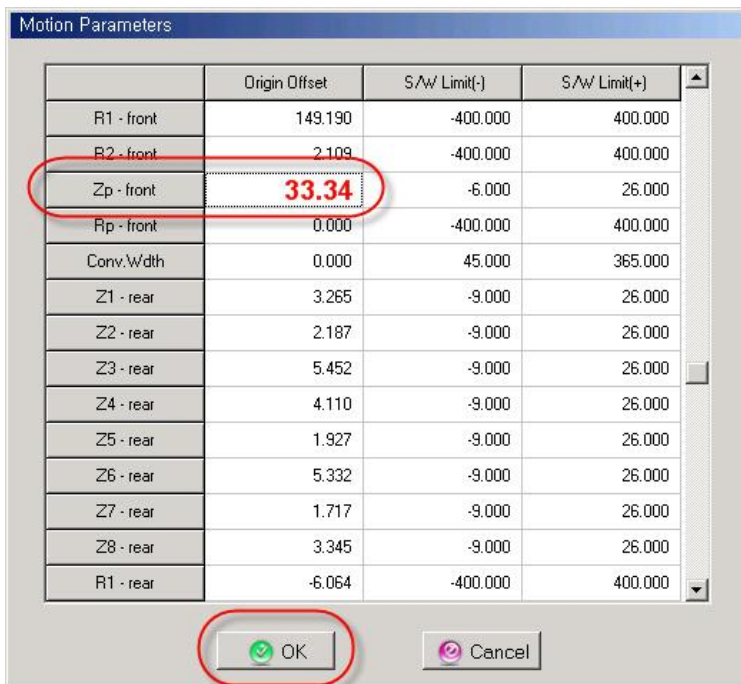
9. Calculate the new origin offset as below.

New Origin Offset = 25 - ② = 25 - (- 8.34) = 33.34

10. Open 'Machine > Motion > Parameters' from the menu again.

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11. Change the origin offset of 'Zp-front' to the calculated value (ex. 33.34) and click OK.



	Origin Offset	S/W Limit(-)	S/W Limit(+)
R1 - front	149.190	-400.000	400.000
R2 - front	2.109	-400.000	400.000
Zp - front	33.34	-6.000	26.000
Rp - front	0.000	-400.000	400.000
Conv.Width	0.000	45.000	365.000
Z1 - rear	3.265	-9.000	26.000
Z2 - rear	2.187	-9.000	26.000
Z3 - rear	5.452	-9.000	26.000
Z4 - rear	4.110	-9.000	26.000
Z5 - rear	1.927	-9.000	26.000
Z6 - rear	5.332	-9.000	26.000
Z7 - rear	1.717	-9.000	26.000
Z8 - rear	3.345	-9.000	26.000
R1 - rear	-6.064	-400.000	400.000

12. Close the door.

13. Open Msetup 'Homing' window and select 'One Axis' and 'Zp-Front', then click on 'Search' button.

14. Open the door and drop down the PZ axis on the Machine Reference Mark and type 'pp1' on MrTerminal.

15. Make sure that the Zp-front height is 25.000mm.


If the value is not 25.000, try this calibration again.

* This calibration is to make the Z axes height correctly. The top surface of PCB becomes 25mm with Z axes.

* If the origin offset is incorrect, the Z axis shaft or nozzle could be broken.

Read this procedure carefully and perform the calibration correctly.

* Module head (Z1~Z6) calibration procedure is same as the precision head calibration.

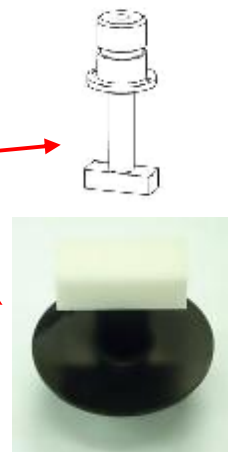
 Mirae	Service Information	Basic Calibration on Mx series			
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Step 7. R axis (Theta) Origin Offset

Required tool :

R-Offset JIG (2540E-J01-00) for a modular head

HEAD OFFSET JIG-1 ASSY (2110C-J07-00) for a precision head



1. Insert the modular head calibration tool into **head 1**.
2. Insert the precision head calibration tool into the precision head.

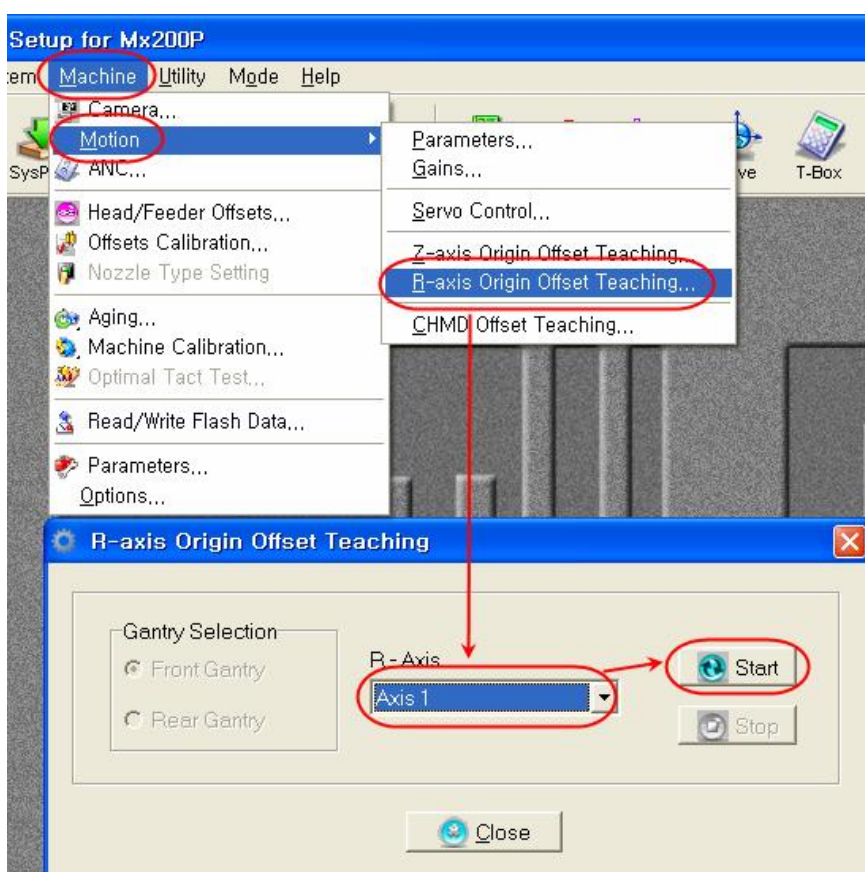
3. Open Msetup and click on 'Eng. Mode' icon then 'Password Verification' window will be open.

4. Click 'OK' button then you can access 'Machine' menu.


5. Select 'R-axis Origin Offset Teaching' in the 'Machine' menu.

6. Select '**Axis 1**' for **modular head R axis** (theta) and click on Start button.

7. Select '**Axis 2**' for a **precision head R axis** (theta) and click on Start button.



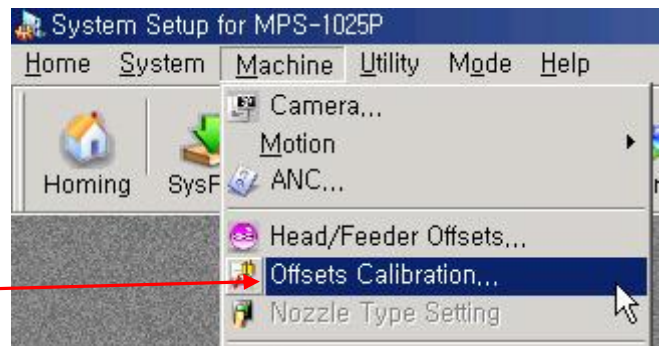
* Note : In case you have a vision error during the precision head R axis calibration, you must restart the machine and try the precision head R axis calibration first.

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Step 8. Offset Calibration

Required tool : CALIB. JIG ASSY (2100C-J03-01-00)

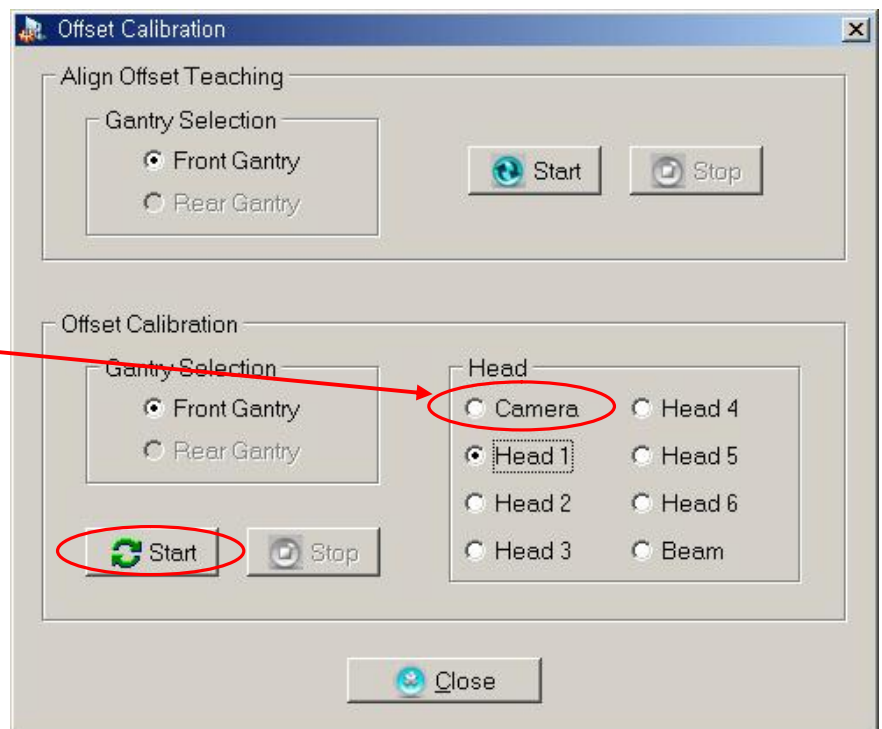
1. Insert the 'CALIB. JIG ASSY' into the nozzle socket.
2. Execute 'Msetup.exe' and click on 'Eng. Mode' icon then 'Password Verification' window will be open.
3. Click 'OK' button then you can access 'Machine' menu.
4. Select 'Offsets Calibration' in the 'Machine' menu.



If there is **no rear module camera** on the machines, you have to type the below command on MrTerminal..

k24(1)

1. Close the door.
 2. Press 'Servo On' button.
 3. Select 'Camera' to perform all axes calibration at once.
- If you have only one calibration tool, you have to select a head one by one.
4. Click on 'Start' button then machine performs the calibration automatically.



* Offset calibration is to find the center of each Z axis shaft.

Basic Calibration on Mx series

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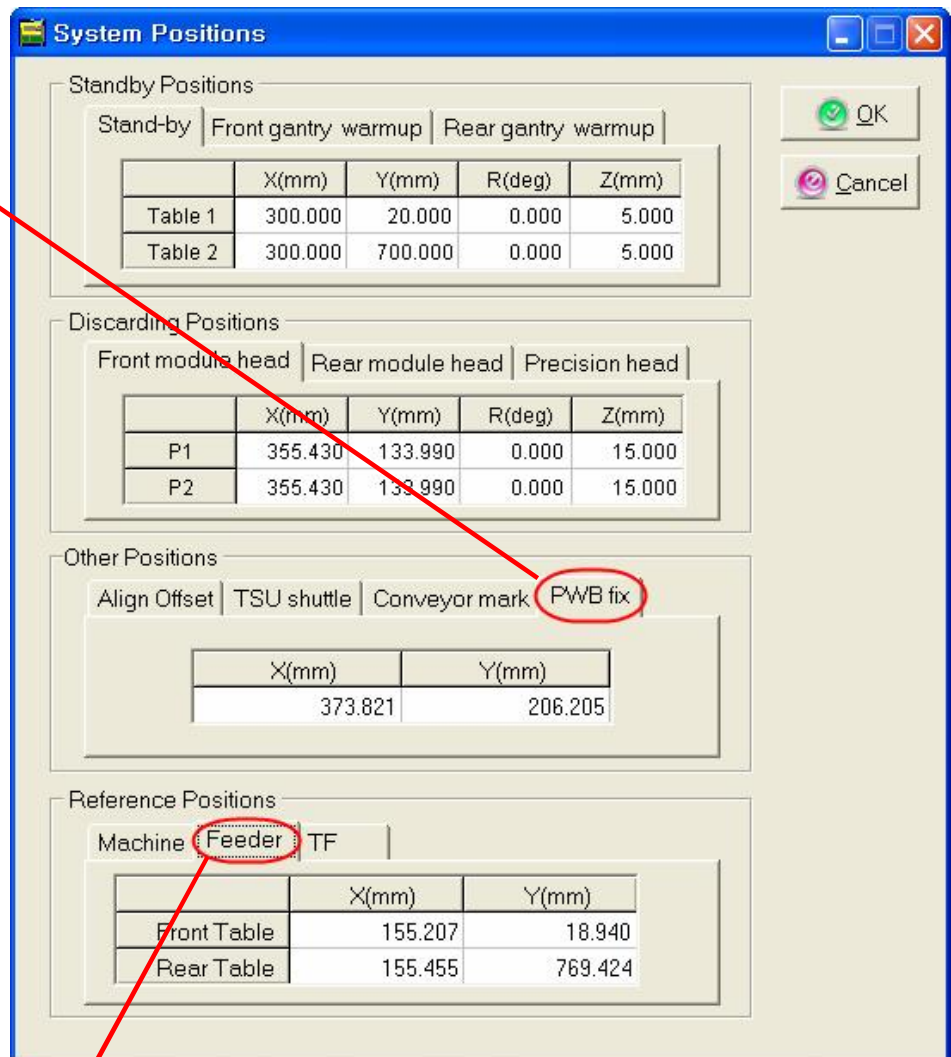
Step 9. System Position Teaching

PWB fix

1. Load a PCB on the conveyor and move the head camera over the right bottom of the PCB.

2. Change the T-box speed to 'High' and mode to 'INCH'

3. Click on down arrow on the T-box two times and teach.



System Positions

Standby Positions

	X(mm)	Y(mm)	R(deg)	Z(mm)
Table 1	300.000	20.000	0.000	5.000
Table 2	300.000	700.000	0.000	5.000

Discarding Positions

	X(mm)	Y(mm)	R(deg)	Z(mm)
P1	355.430	133.990	0.000	15.000
P2	355.430	133.990	0.000	15.000

Other Positions

	X(mm)	Y(mm)
	373.821	206.205

Reference Positions

	X(mm)	Y(mm)
Front Table	155.207	18.940
Rear Table	155.455	769.424

Reference Feeder Position

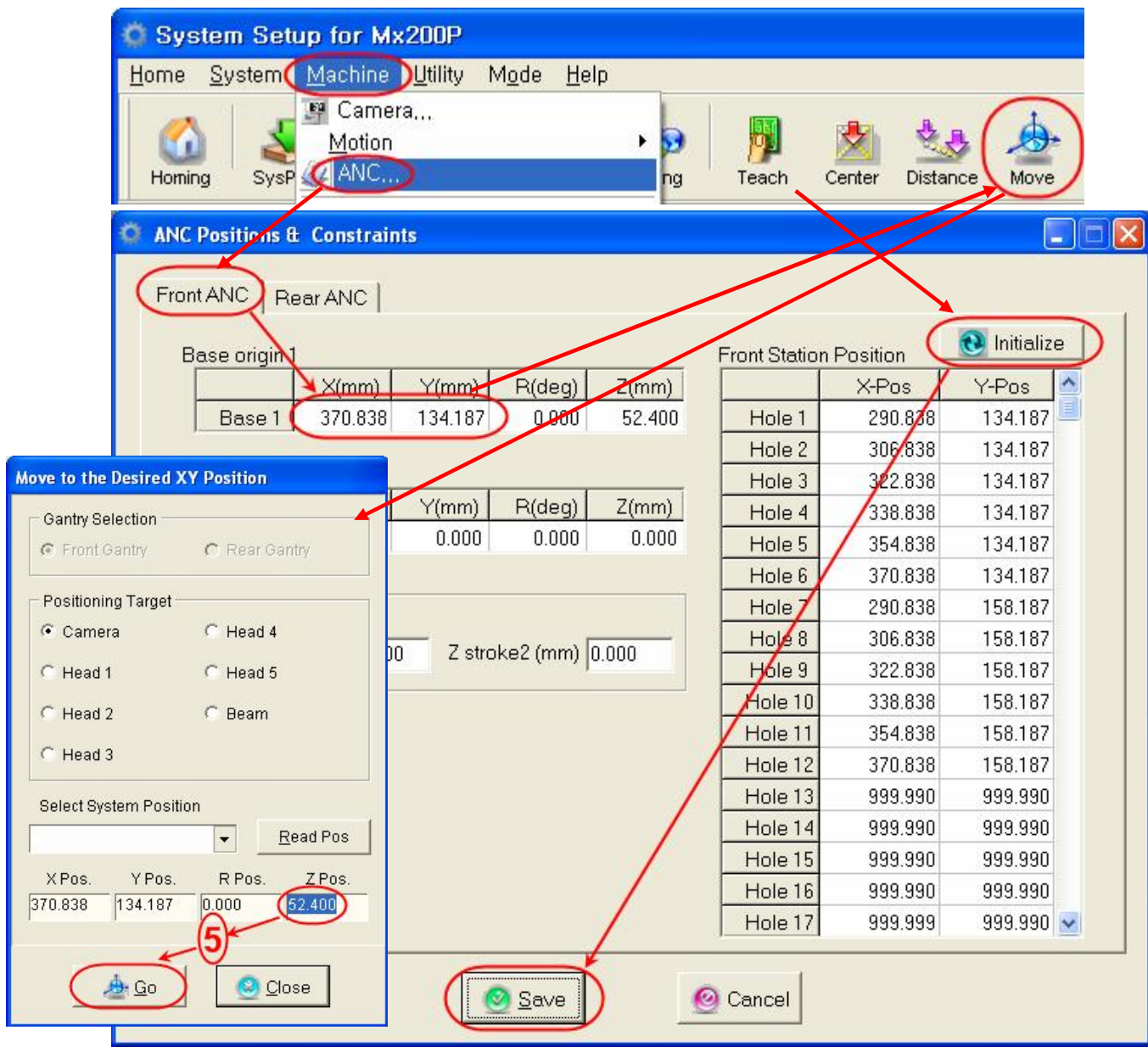
1. Load an 8mm feeder (2mm pitch if possible) with a component reel on slot 20 for the front base and slot 70 for the rear base.
2. Press feeding button a few times and teach the center of the pocket.

Basic Calibration on Mx series

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Front ANC Position Teaching

1. Click on Machine / ANC on the Menu.
2. On Front ANC, select 'Base origin 1' position and click on 'Move' icon.
3. Change Z position value to '5' and click 'Go' button. (If you do not change it, the Z axes will go down and crash with the nozzle base.)
4. Move the head camera over the center of a nozzle with a T-box and teach the position.
5. Click on 'Initialize' button and 'Save' button. (Automatic calculation from the base origin)
6. Open ANC Position window and make sure you have correct position values.



System Setup for Mx200P

Home System **Machine** Utility Mode Help

Camera... Motion **ANC...** Teach Center Distance **Move**

ANC Positions & Constraints

Front ANC Rear ANC

Base origin 1

	X(mm)	Y(mm)	R(deg)	Z(mm)
Base 1	370.838	134.187	0.000	52.400

Front Station Position

	X-Pos	Y-Pos
Hole 1	290.838	134.187
Hole 2	306.838	134.187
Hole 3	322.838	134.187
Hole 4	338.838	134.187
Hole 5	354.838	134.187
Hole 6	370.838	134.187
Hole 7	290.838	158.187
Hole 8	306.838	158.187
Hole 9	322.838	158.187
Hole 10	338.838	158.187
Hole 11	354.838	158.187
Hole 12	370.838	158.187
Hole 13	999.990	999.990
Hole 14	999.990	999.990
Hole 15	999.990	999.990
Hole 16	999.990	999.990
Hole 17	999.999	999.990

Move to the Desired XY Position

Gantry Selection: ☒ Front Gantry ☐ Rear Gantry

Positioning Target: ☒ Camera ☐ Head 4 ☐ Head 1 ☐ Head 5 ☐ Head 2 ☐ Beam ☐ Head 3

Select System Position: [Dropdown] [Read Pos]

X Pos. Y Pos. R Pos. Z Pos.

370.838 134.187 0.000 **52.400**

5 [Go] [Close]

[Save] [Cancel]



Service Information

Basic Calibration on Mx series

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Rear ANC Position Teaching (Precision Head ANC)

The procedure to teach the rear ANC is same as front but the only difference is there are two base origins on the Precision Head ANC. (You have to teach two base origins.)

On the base origins, there are reference marks and you have to move the ANC base up with IO Control to see the mark.

ANC Positions & Constraints

Front ANC | Rear ANC

Base origin 1

	X(mm)	Y(mm)	R(deg)	Z(mm)
Base 1	-51.909	935.716	90.000	32.400

Base origin 2

	X(mm)	Y(mm)	R(deg)	Z(mm)
Base 2	-52.215	1025.680	0.000	0.000

Constraints for ANC

Z stroke1 (mm) 30.000 Z stroke2 (mm) 0.000

Rear Station Position Initialize

	X-Pos	Y-Pos
Hole 1	-75.459	905.716
Hole 2	-75.459	935.716
Hole 3	-75.459	965.716
Hole 4	-75.459	995.716
Hole 5	-75.459	1025.716
Hole 6	-75.459	1055.716

Gripper Station Position Initialize

	X-Pos	Y-Pos
Hole 1	0.000	0.000
Hole 2	0.000	0.000
Hole 3	0.000	0.000
Hole 4	0.000	0.000
Hole 5	0.000	0.000
Hole 6	0.000	0.000

Save Cancel

Rear ANC Position Teaching (Module Head ANC) – Mx400, Mx800

Refer to the Front ANC Position Teaching.