Micromatic Grinding
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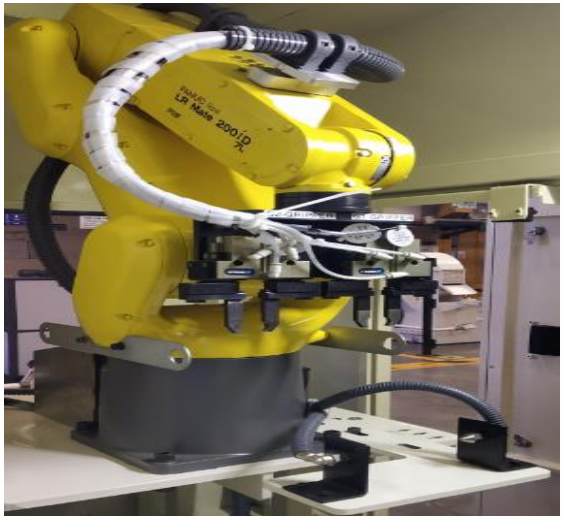


ROBOT PROCEDURE

Done by :-

Mr. SRINATH

FANUC ROBOT RANGE

- SR series (SCARA Robots)
- M-1iA/M2iA/M3iA series (Delta Robots)
- LR-Mate series
- M-10iA/M-10iD series
- M-20iA/M-20iB/M-20iD series
- M-710iC series
- R-1000iA series
- R-2000iC/R-2000iD series
- M-900iA/M-900iB series
- M-2000iA series
- Collaborative series (CR and CRX)
- Arc Mate series
- Palletizing series
- Paint series

FANUC Robot

Accessories

- Vision System
  - 2DV
  - 3DV
  - 3DL
- Force sensors
- Positioner
- Turn Table
- Encoders
- LVC sensor

Features

- Line tracking/ Visual tracking
- Bin picking
- Palletizing
- Collision detection
- Soft float
- DCS
- Robo-guide
- Space function
- Extended axis/ Additional axis

Safety Instructions

General Instructions

- Do not go inside the robot work cell with out pressing emergency stop button.
- Install safety fence over robot work volume and provide interlock.
- If it is not necessary for the robot to operate, turn off the power or press emergency.
- Emergency stop button must be with in Operators reach.
- Use transportation equipment for robot lifting and placing at robot parking position.
- Place the robot on pedestal after grouting and ensure the tightness of grouting bolts.
- Before turning ON the robot check the I/P power.
- Do not touch the servo amplifier untill D7 LED goes off.
- Do not plug/unplug cables or fuses in power on condition.

Robot Teaching Instructions

- Change the mode to T1 and remove the key from Operator panel then perform teaching Operation.
- When programming is completed, check the program in T1 mode (with step, continuous) then T2.
- If it is ok run the program by Auto mode.
- The TP Operator should pay careful attention so that no other workers enter the robot work area.

Pre-conditions

Robot should be in home position, if not jog the robot to home position till you get the home signal at operator pendent.

Make ensure component should not be present in the machine before starting the cycle.

Machine should be in auto mode.

Robot should be in auto mode in controller and operator panel.

Fence door and latches on both side should be closed.

If only one pallet to be processed, please make ensure latch door of respective pallet side should be closed.

Machine door should be closed before start of cycle.

Check for pneumatic air supply and maintain air pressure between (4.5 bar to 5.5 bar)

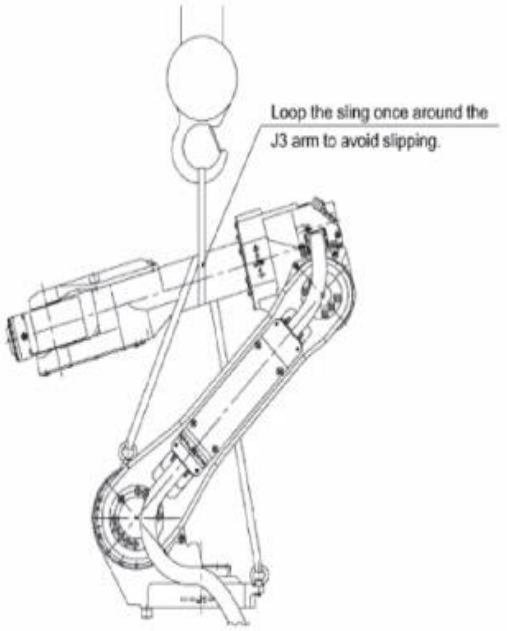
Power supply for Robot controller should be maintained 3Ø 220V +10% -15% 2kVA and for operator panel power should be 1Ø 215- 240 V 1kVA.

Do's and Don't

- Do not walk on Teach Pendent cable.
- Do not open the cabinet door unnecessarily.
- Replace the fuses by same rating.
- Replace the PCBs with same specification.
- Do not use force air on PCBs.
- Do not remove the pulse coder battery in Power off condition.
- Do not remove the pulse coder cable unnecessarily.
- Do not remove the eye mark on each joints.
- Do not step-on at any part of Robot

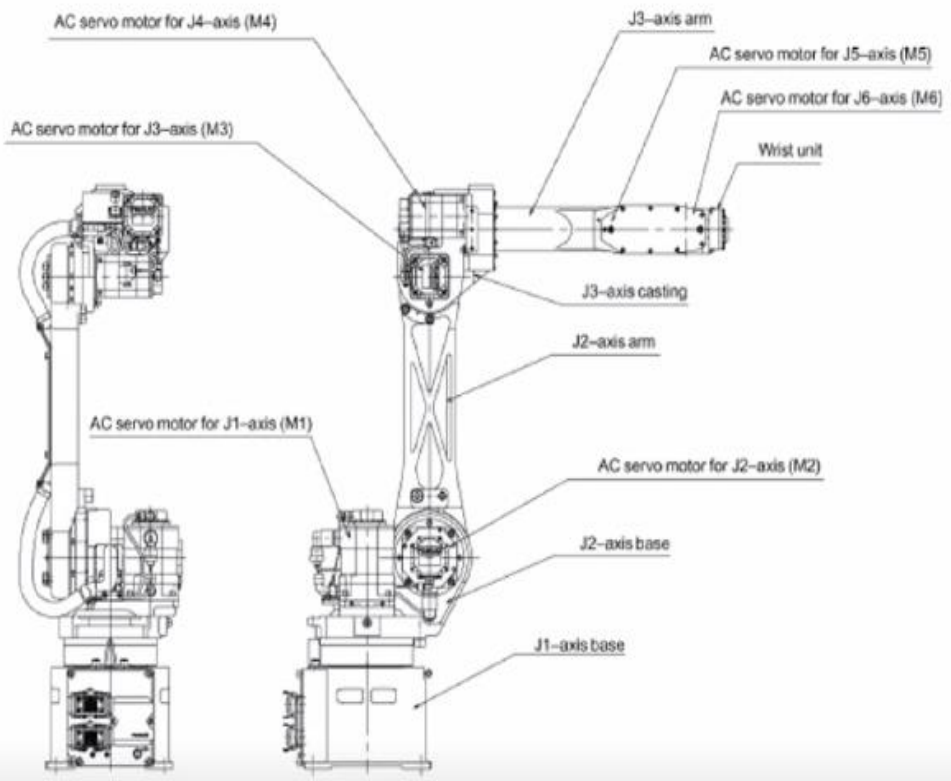
Transportation Procedure

- Bring the robot to a position mentioned in the manual
- Power off and remove the cables
- Ensure the capacity of crane, slings, eye bolts.
- Transport the Robot



Robot Elements

- Mechanical unit



Robot Elements

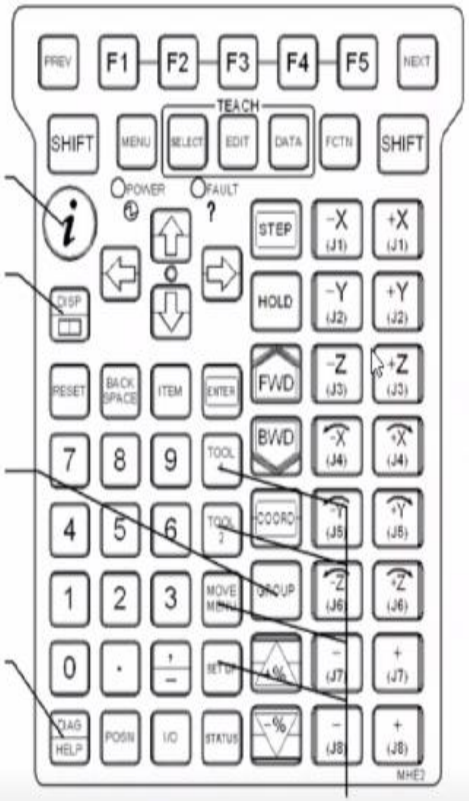
- Controller
  - Compact plus
  - Open air
  - Mate plus
  - A-Cabinet
  - B-Cabinet
- Configuration
  - Robot
  - Robot Controller
  - Teach pendant
  - Safety Fence
  - Interlocked gate
  - Interlocking device
  - End Effector
  - Other peripheral equipment
  - Workpieces

- Interfacing accessories
  - Teach Pendent
  - Camera
  - Encoder (Line tracking/Visual Tracking)
  - LVC
  - Force sensor
  - PMC
  - Protocol available : Ethernet, IO link, Profinet, Device net, CC-link, Ether CAT
  - Aux. axis

Jogging

- Turn ON TP for Jogging
- Select T1 mode in Mode switch
- For safety of the operator during teaching, Robot can be jogged only if Deadman and Shift key is pressed (For teaching)
- Select **COORD** button for Switching Coordinate (World, User and Tool)
- Jogging in world Coordinate (Cartesian) works in Right hand rule
- Jogging in joint will move the robot according to positive & negative markings located directly on the mechanical unit

TP key explanation:



Program creation

- Press **SELECT** button
- Press F2 [**CREATE**] icon
- Enter Program name
- Select F1 [**POINT**] icon

J P[] 100% FINE

Joint Position value Speed in % Motion modify

J – Joint – Non-linear (End point is defined but path is robot preferred)

L P[] 100mm/s FINE

Linear Position value Speed in *unit* Motion modify

L– Linear (End point as well as path is defined)

UNIT

mm/sec
cm/min
Inch/min
deg/sec
sec
msec

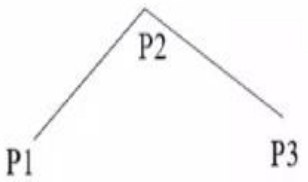
Program creation

FINE

L P[] 100% FINE

Linear Position value Speed in % Motion modify

- FINE – Robot moves to the position taught and proceeds to next position

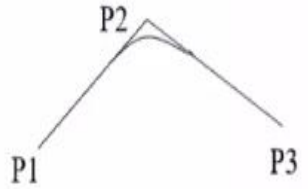


CNT

L P[] 100mm/s CNT5

Linear Position value Speed in *mm/sec* Motion modify

- CNT – Robot will not reach the point which has CNT
  but take a deviated path with respect to taught point
- Deviation can be from 0 to 100 mention after CNT



@ - Indicates robot is currently in that position

Position

To monitor the current Joint and World coordinate values of the Robot

1. Select **Position** button in the Teach pendant

Robot Co-ordinates

1. Joint coordinate system

- Robot position is shown using joint angles
- Possible to move joints independently

2. Cartesian coordinate System

- These coordinates give tool position & orientation
- Possible to move robot linearly or change orientation
  - World
  - User
  - Jog
  - Tool

Program Touch-up

- Open an existing program.
- Place the cursor and jog the robot to modify the position.
- Press Shift + F5.
- Program line has been touch-up

Singularity

Singularity happen when two of the robot's wrist axes (joints 4 and 6) line up with each other.

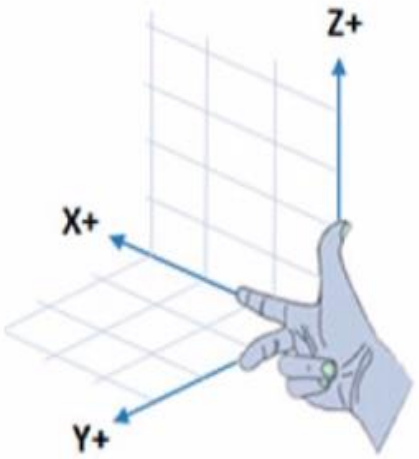
This can cause these joints to try and spin 180 degrees instantaneously.

Payload

To enter Mass, Centre of gravity and Inertia values.

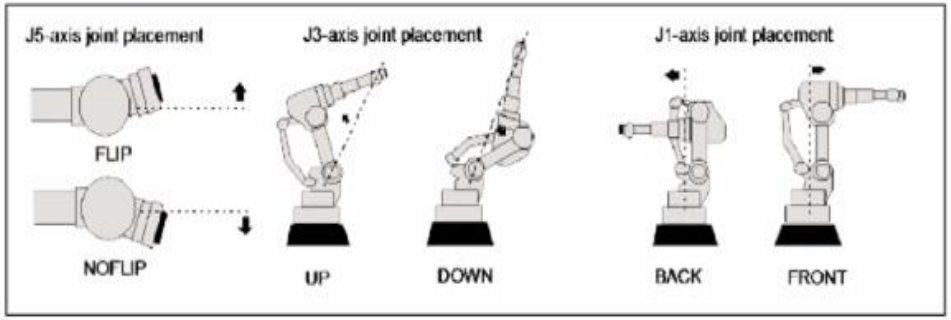
- Select **Menu**
- Select **0 Next**
- Select **6 Setup**
- Select **F1 Type**
- Select **6 Motion**
- Select **Payload number**
- Select **F3 Detail**
- Enter the values
- Call the payload in the program

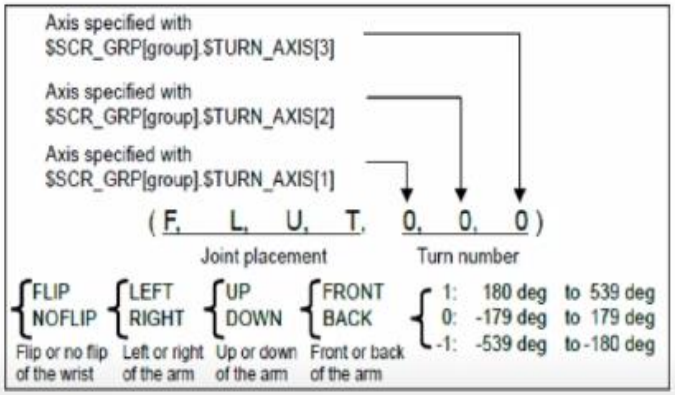
Axis Configurations – World Coordinate



Right hand rule

X,Y,Z
X- Rotation » W
Y- Rotation » P
Z- Rotation » R





User Frame

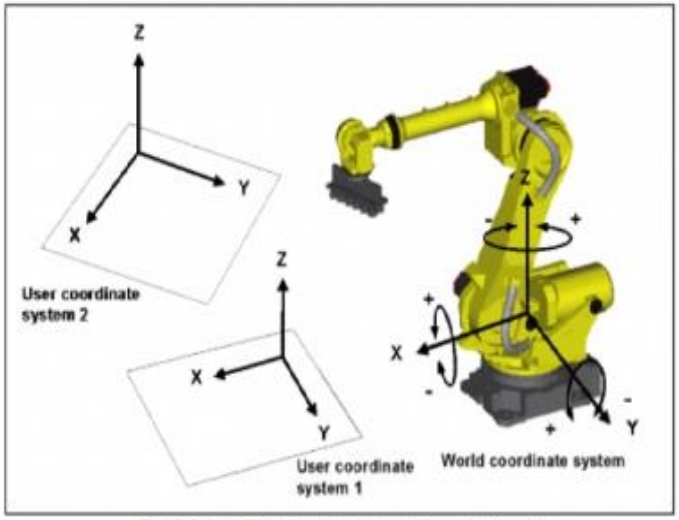


Fig. 3.9.2 (a) World and user coordinate systems

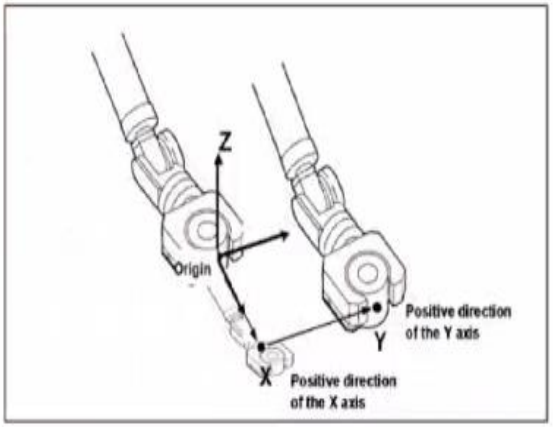
User frame can be set in three methods

- Direct list method – Directly enter the values in X, Y, Z, W, P and R values
- Three point Method
- Four point Method

User Frame

Three point Method

1. Press [MENU] key. The screen menu will be displayed.
2. Select "6 SETUP".
3. Press the F[illegible], [TYPE]. The screen change menu will be displayed.
4. Select "Frames".
5. Press F3, [OTHER] and then select User Frame. The user frame list screen is displayed.



User frame list screen

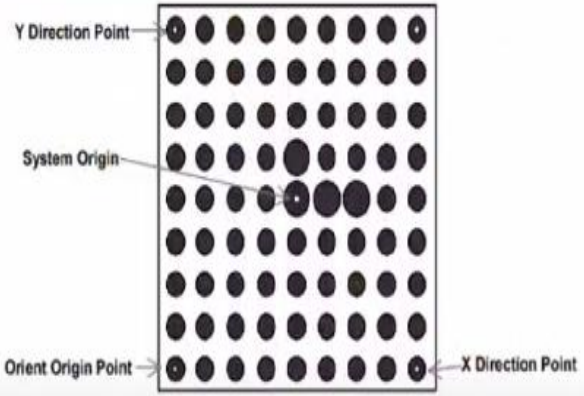
SETUP Frames

User Frame / Direct Entry 1/9

	X	Y	Z	Comment
1	0.0	0.0	0.0	[ ]
2	0.0	0.0	0.0	[ ]
3	0.0	0.0	0.0	[ ]
4	0.0	0.0	0.0	[ ]
5	0.0	0.0	0.0	[ ]
6	0.0	0.0	0.0	[ ]
7	0.0	0.0	0.0	[ ]
8	0.0	0.0	0.0	[ ]
9	0.0	0.0	0.0	[ ]

Active TOOL $MNUTOOLNUM[G:1] = 1

[TYPE] | DETAIL | [OTHER] | CLEAR | SETIND



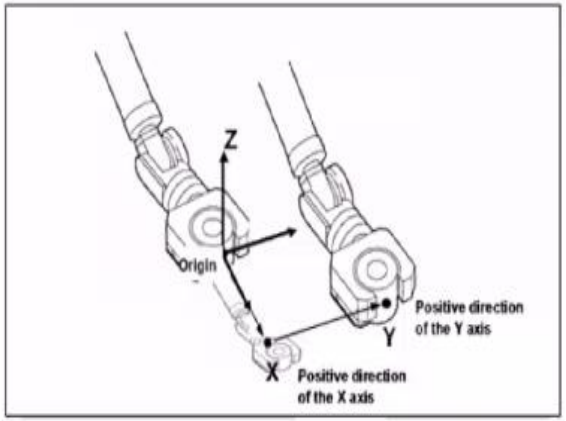
User Frame

Three point Method

7 Move the cursor to the line of the user frame number you want to set.
8 Press F2, "DETAIL". The user frame setup screen of the selected frame number is displayed.
9 Press F2, "METHOD" and then select "Three Point".

User frame setup screen (Three Point Method)

```
SETUP Frames
      User Frame          Three Point          1/4
      Frame Number:          1

        X:    0.0   Y:    0.0   Z:    0.0
        W:    0.0   P:    0.0   R:    0.0

      Comment:    ********************
      Orient Origin Point:      UNINIT
      X Direction Point:        UNINIT
      Y Direction Point:        UNINIT


    Active UFRAME $MNUFRAMENUM[G:1] = 0

  [ TYPE ] [METHOD] FRAME
```

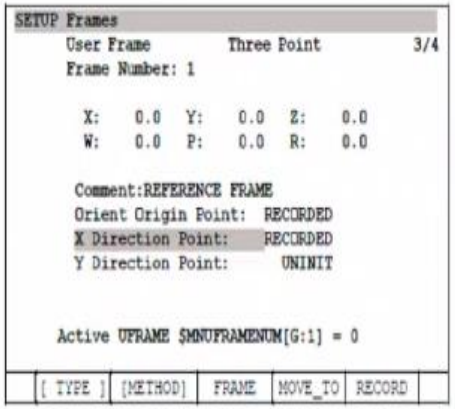


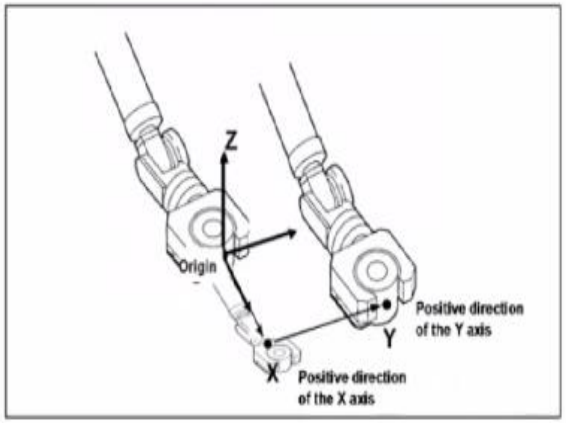
User Frame

Three point Method

11 To add a comment:
   a Move the cursor to the comment line and press [ENTER] key.
   b Select the method of naming the comment.
   c Press the appropriate function keys to add the comment.
   d When you are finished, press [ENTER] key.

12 Record each approach point:
   a Move the cursor to each Approach point.
   b Jog the robot to the position you want to record.
   c Press and hold [SHIFT] key and press F5, "RECORD" to record the current position as the approach point. As for the taught reference point, "RECORDED" is displayed.



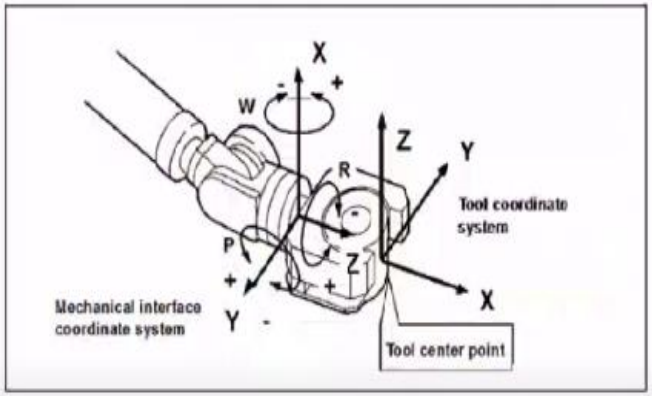


   d When all the reference points are taught, "USED" is displayed. The user frame has been set.

Tool Frame

User frame can be set in six methods

- Direct list method – Directly enter the values in X, Y, Z, W, P and R values
- Three point Method
- Four point Method (Similar to Four point method)
- Six point Method (XY)
- Six point Method (XY)
- Two point Method + Z (For 4 axis robot – Touch a target point with Tool in two different angles and directly enter Z value



Tool Frame

Three point Method

1 Press [MENU] key. The screen menu will be displayed.
2 Select "6 SETUP".
3 Press the F1, [TYPE]. The screen change menu will be displayed.
4 Select "Frames".
5 Press F3, [OTHER] and then select "Tool Frame". Tool frame list screen will be displayed.

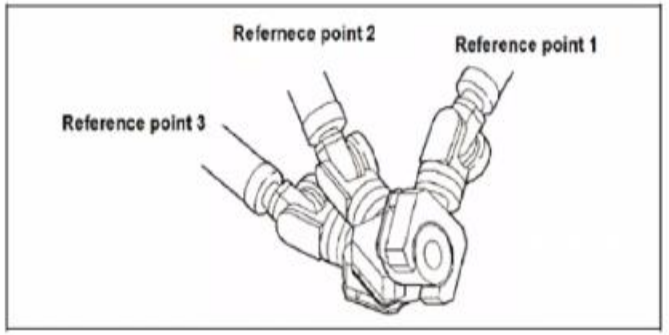
Tool frame list screen

SETUP Frames

Tool Frame	/ Direct Entry			1/10
	X	Y	Z	Comment
1	0.0	0.0	0.0	[ ]
2	0.0	0.0	0.0	[ ]
3	0.0	0.0	0.0	[ ]
4	0.0	0.0	0.0	[ ]
5	0.0	0.0	0.0	[ ]
6	0.0	0.0	0.0	[ ]
7	0.0	0.0	0.0	[ ]
8	0.0	0.0	0.0	[ ]
9	0.0	0.0	0.0	[ ]
10	0.0	0.0	0.0	[ ]

Active TOOL $MNUTOOLNUM[G:1] = 1

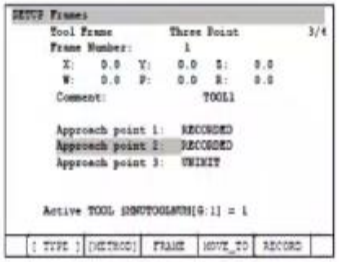
[TYPE] | DETAIL | [OTHER] | CLEAR | SETIND



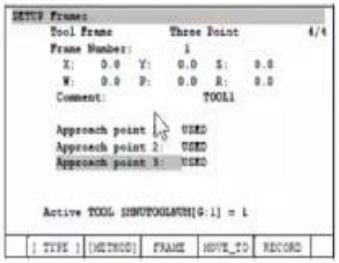
Tool Frame

Three point Method

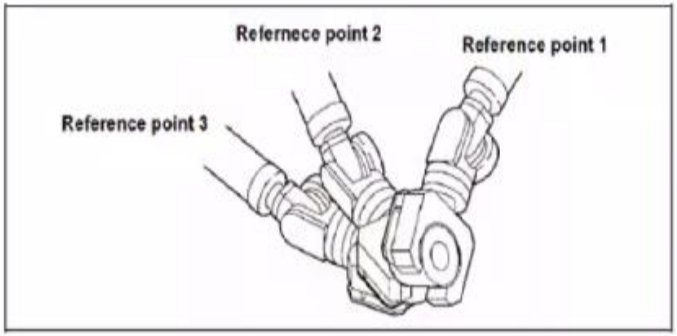
NOTE
Move the tool in three different directions to bring the tool tip to an identical point. Then, record the three reference points.



d When all the reference points are taught, "USED" is displayed. The tool frame has been set.



13 To move the robot to a recorded position, press and hold [SHIFT] key and press F4, "MOVE_TO".
14 To see each recorded position data, move the cursor to each reference position item and press the [ENTER] key. The position detail screen of each position data is displayed. To return to the previous screen, press [PREV] key.
15 To display the tool frame list screen, press [PREV] key. You can see the settings (x, y, z, and



Tool Frame

Six point Method (XZ) / Six point Method (XY)

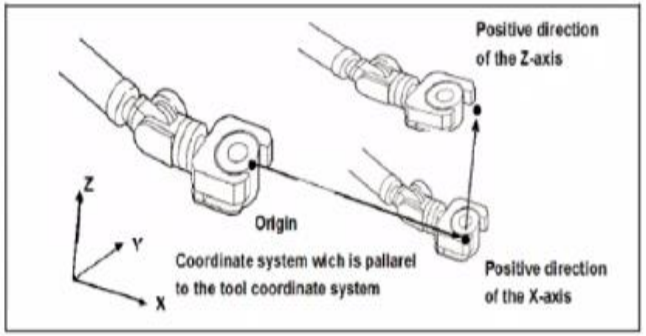
Select Six point method (XZ).

Follow the same procedures as performed for Three point method.

Additionally teach the Orient origin, a point in X-direction and a point in Z-direction of the frame.

Tool frame setup screen (Six Point (XZ) Method)

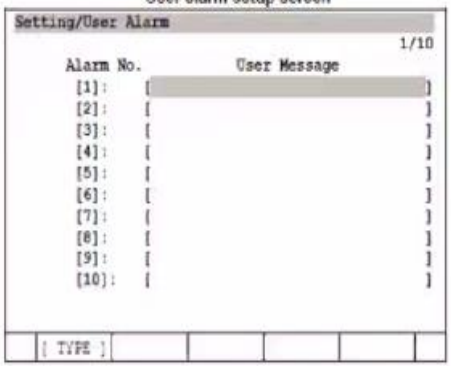
```
SETUP Frames
      Tool Frame          Six Point(XZ)          1/7
      Frame Number:          2
        X:    0.0   Y:    0.0   Z:    0.0
        W:    0.0   P:    0.0   R:    0.0
      Comment:**********************
      Approach point 1:       UNINIT
      Approach point 2:       UNINIT
      Approach point 3:       UNINIT
      Orient Origin Point:    UNINIT
      X Direction Point:      UNINIT
      Z Direction Point:      UNINIT

    Active TOOL $MNUTOOLNUM[G:1] = 1

   [ TYPE ] [METHOD]  FRAME
```



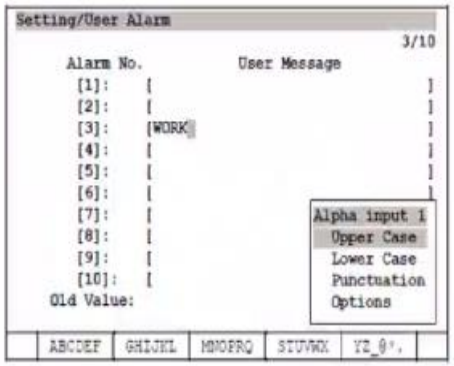
User Alarm

1 Select [MENU] key. The screen menu will be displayed.
2 Select "6 SETUP".
3 Press F1, [TYPE]. The screen change menu will be displayed.
4 Select User Alarm. The user alarm setup screen will be displayed.

User alarm setup screen



5 Move the cursor to the line of the user alarm number you want to set and press [ENTER] key. Enter the message with the function keys.



6 When you are finished to input the message of the user alarm, press [ENTER] key.
The user alarm message has been set.

We can user alarm command to call the UALM[ ], whenever required.

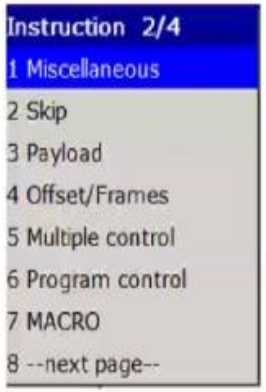
Classification of I/O

1. General Purpose I/O
   - Digital I/O
   - Group I/O
   - Analog I/O

2. Specialized I/O
   - Robot I/O
   - Peripheral (UOP) I/O
   - Operator's Panel (SOP) I/O

Instruction List

- Motion
- Register
- I/O
- Branch/Loop
- Wait
- Skip condition
- Payload
- Offset condition
- Frame
- Program Control
- Other
- Palletizing
- Vision



Instruction List

Backup - File

Procedure :

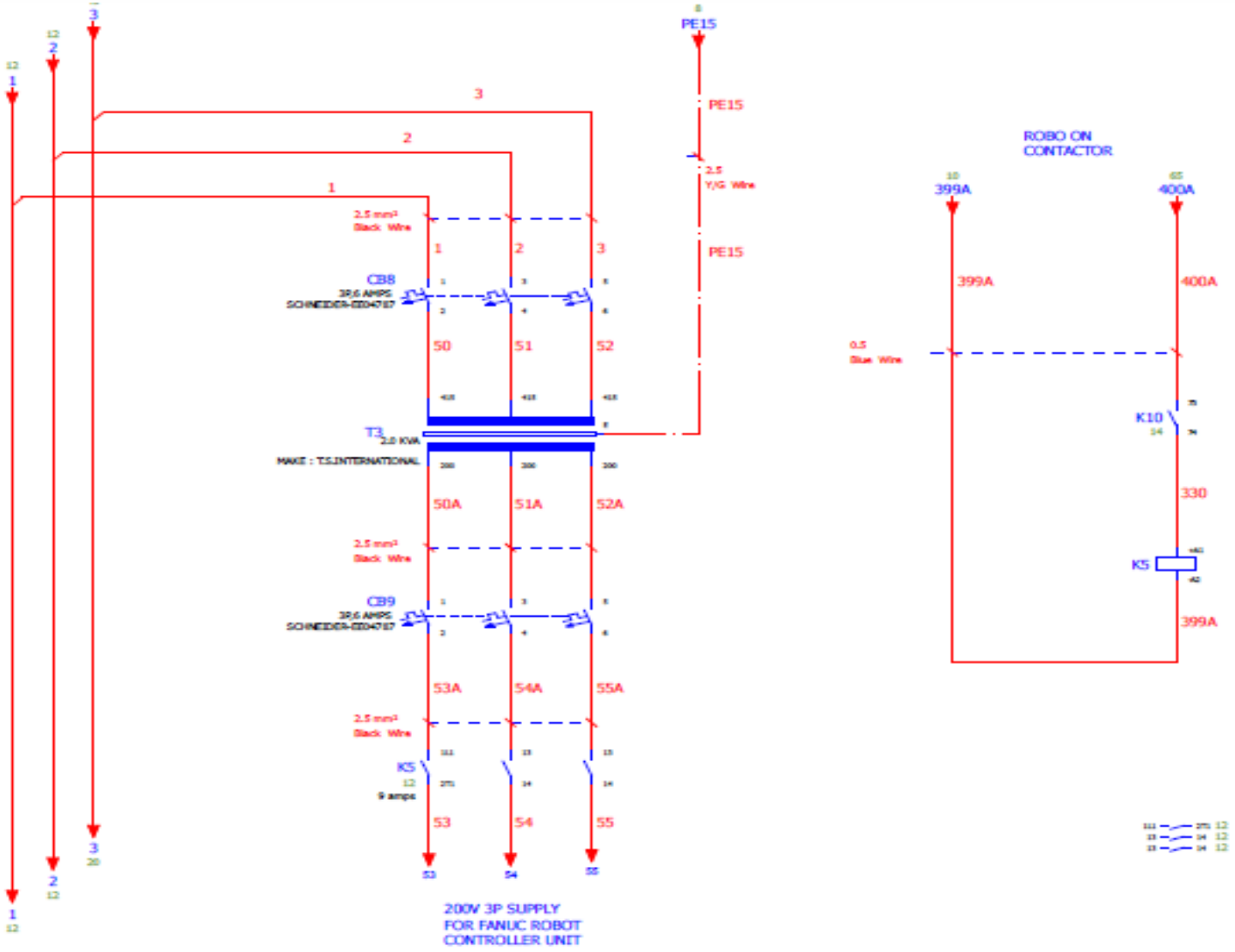
- Select [UTIL]
- Select Set device
- Select UD1:
- Select [UTIL]
- Select Make DIR
- Enter Directory Name
- Select [BACKUP]
- Select the data required to be backed up (i.e.) All of the above
- Delete UD1: Directory Name before backup??? message will be displayed, Select Yes
- Delete UD1: Directory Name and backup all files? message will be displayed, Select Yes
- Backup will be initiated
- Please wait until the backup is complete

Restore - File

Procedure :

- Press F1 and F5 and power on the controller
- Select [UTIL]
- Select Set device
- Select UD1:
- Select [UTIL]
- Select Directory Name
- Select [Restore]
- Select the data required to be restored (i.e.) All of the above
- File restoration will be initiated
- Please wait until the restoration is complete

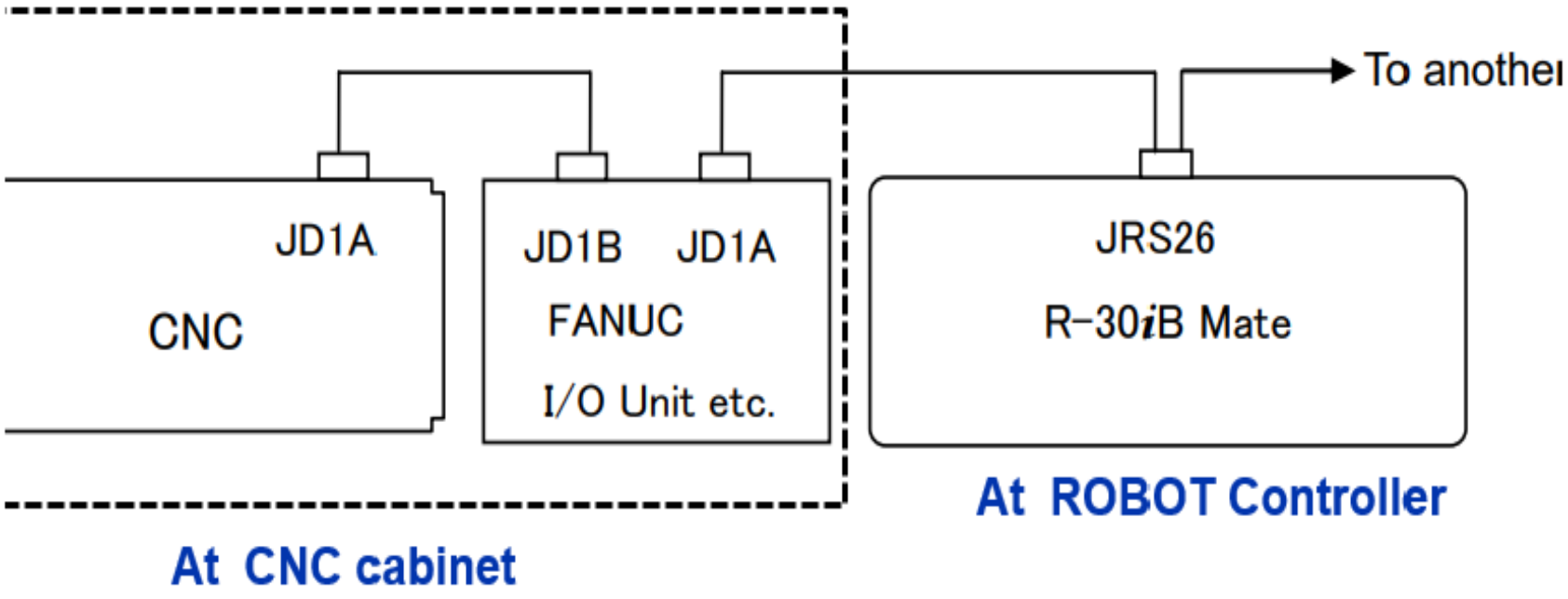
Robot power connection



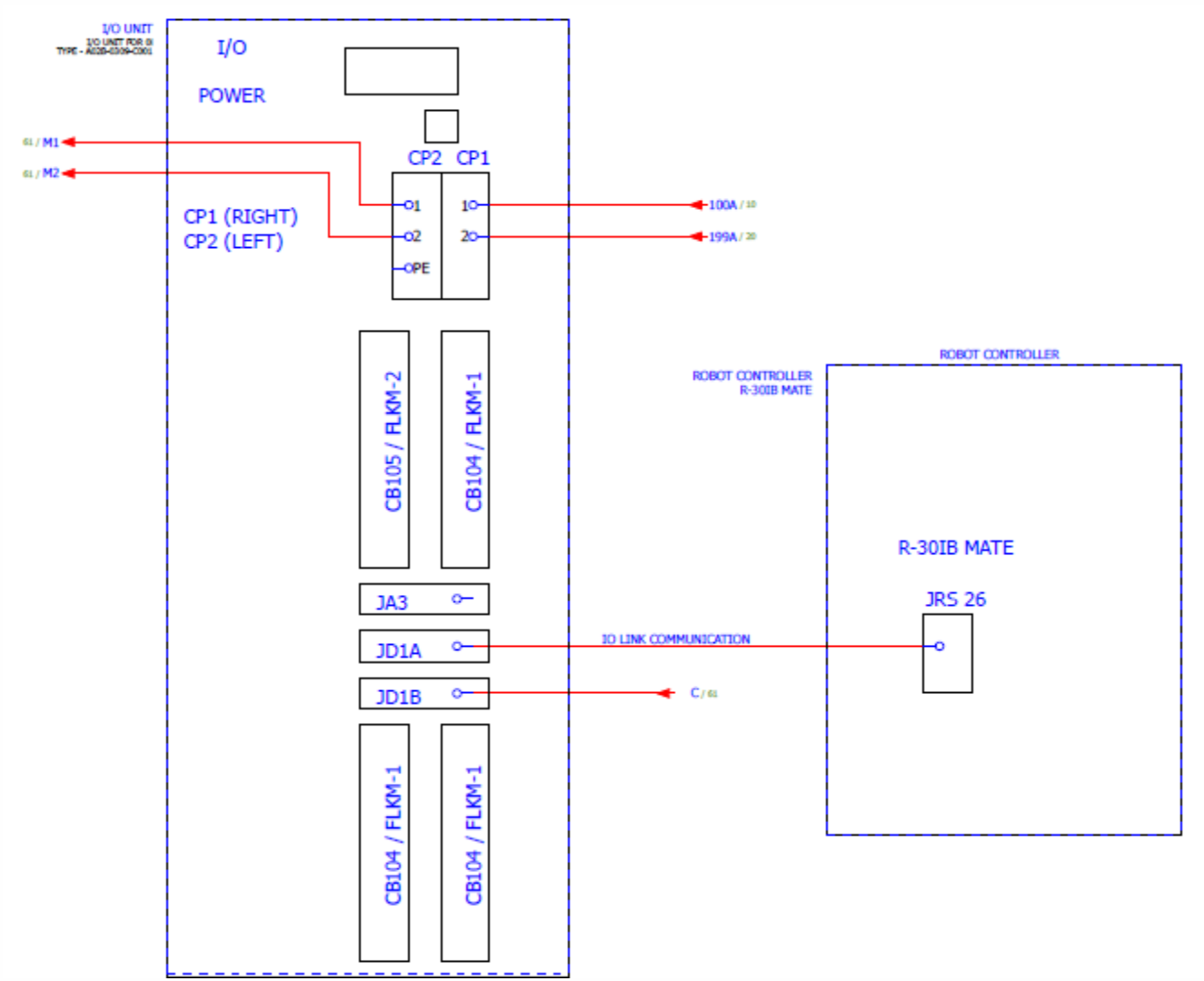
Robot I/O Link connection

When the R-30*i*B Mate controller is used as an I/O link and I/O link *i* slave

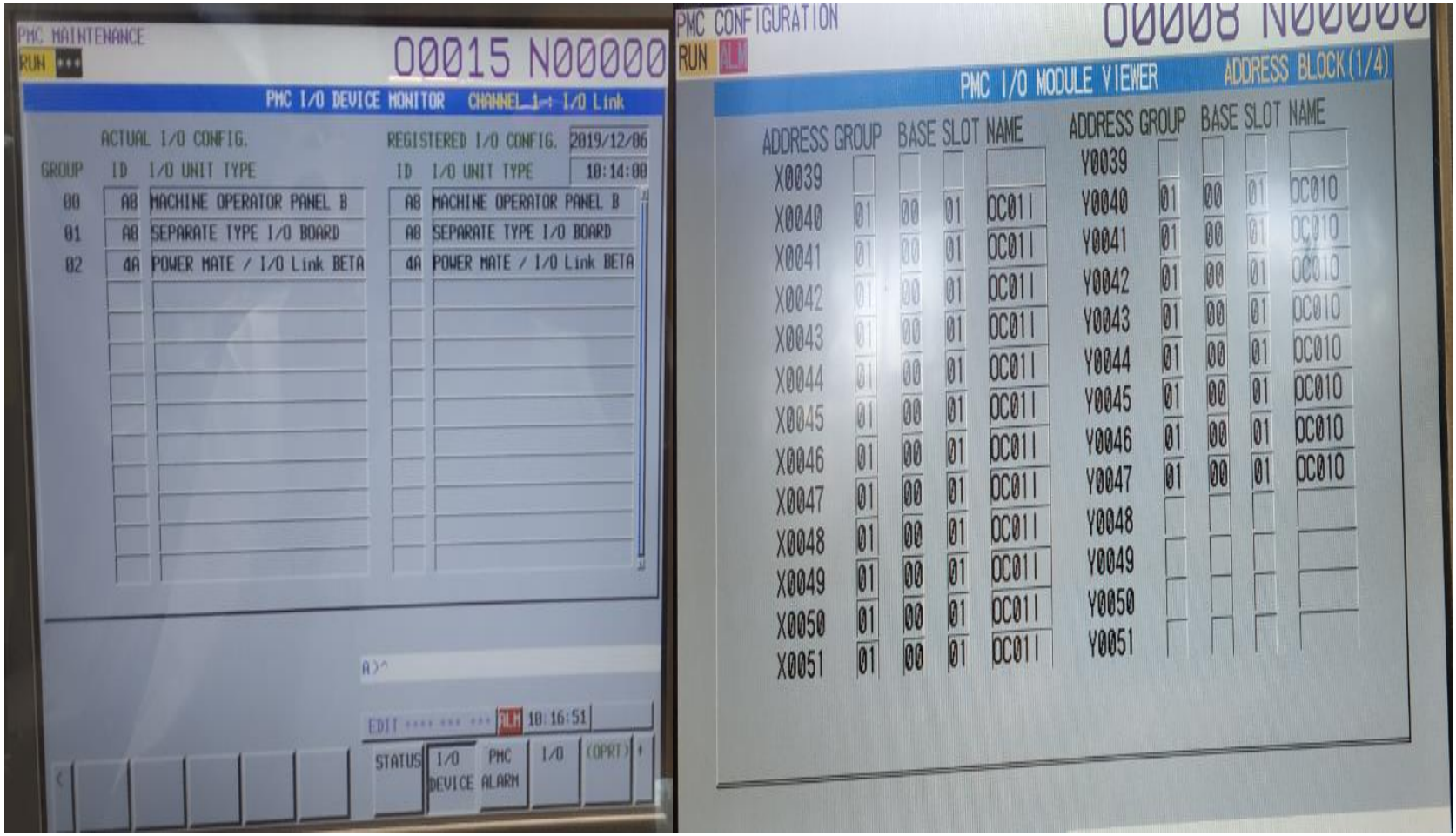
When a CNC is the I/O link and I/O link *i* master)



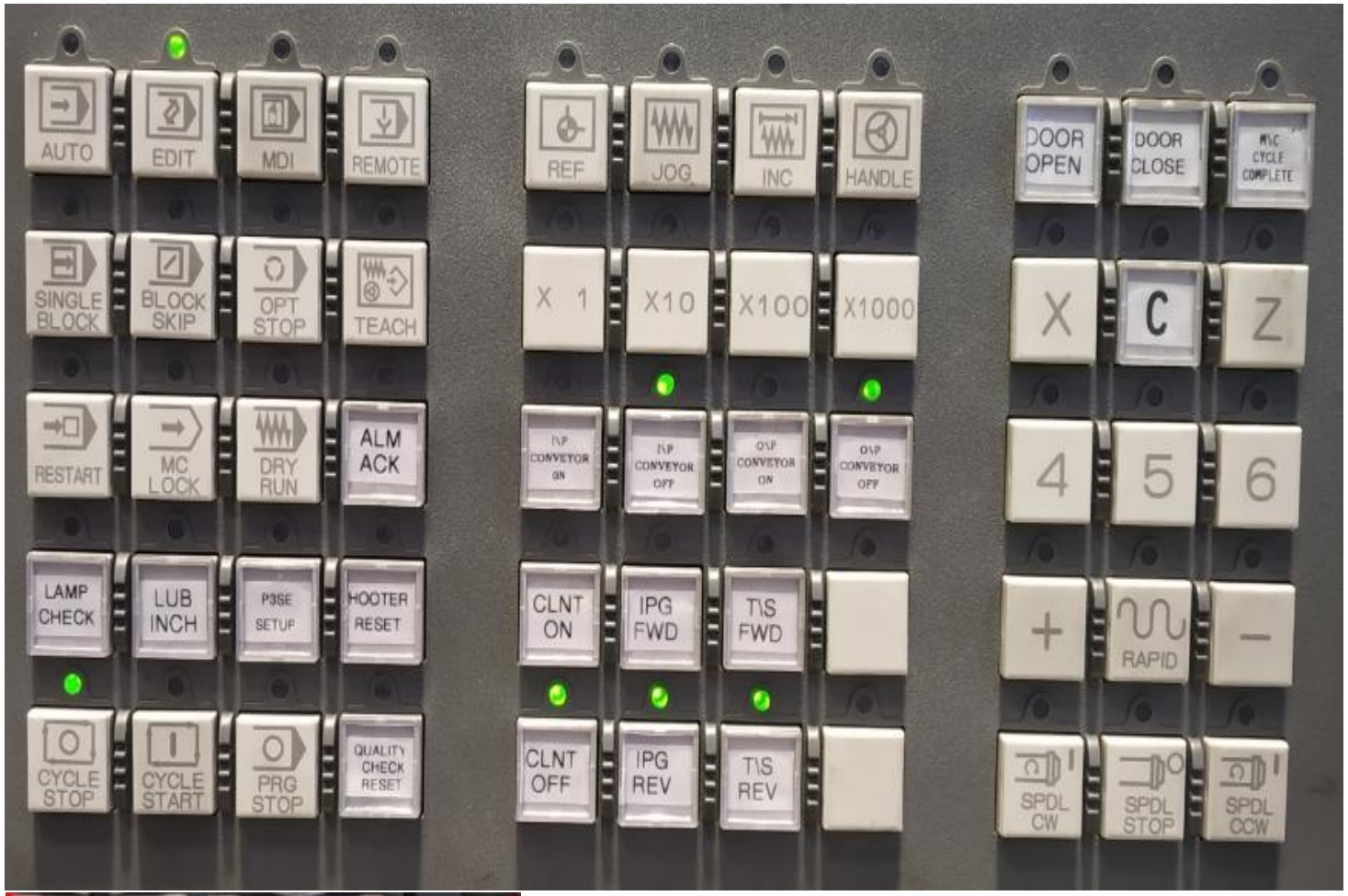
Robot I/O Link connection



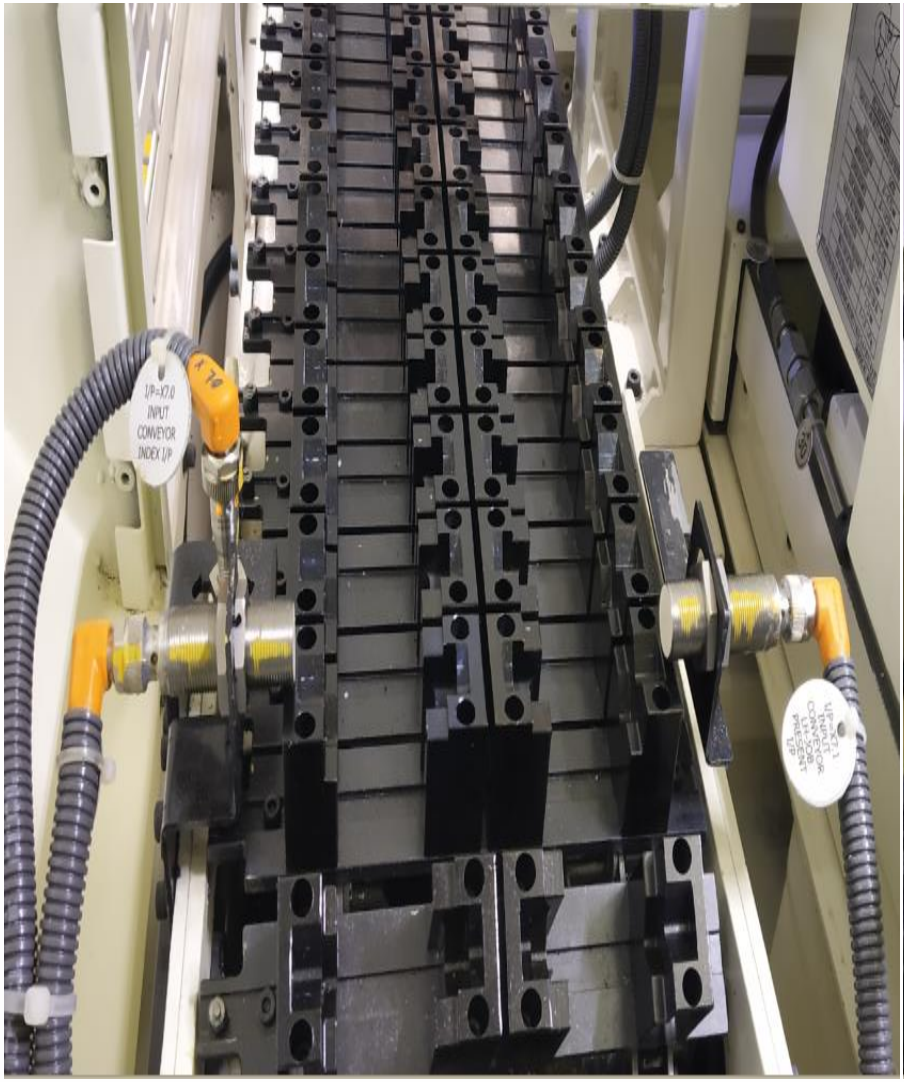
Robot I/O Link communication in CNC



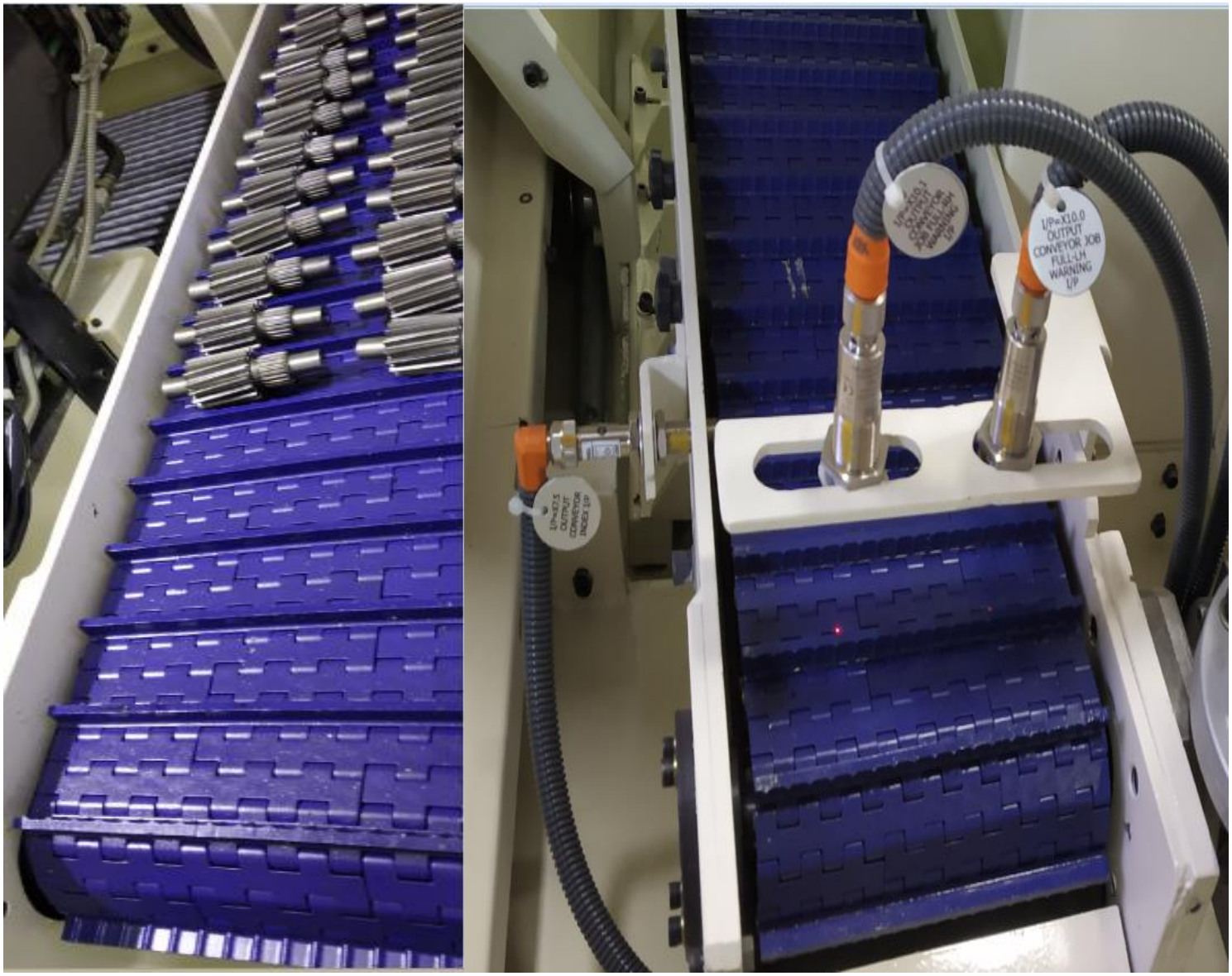
Push buttons and led



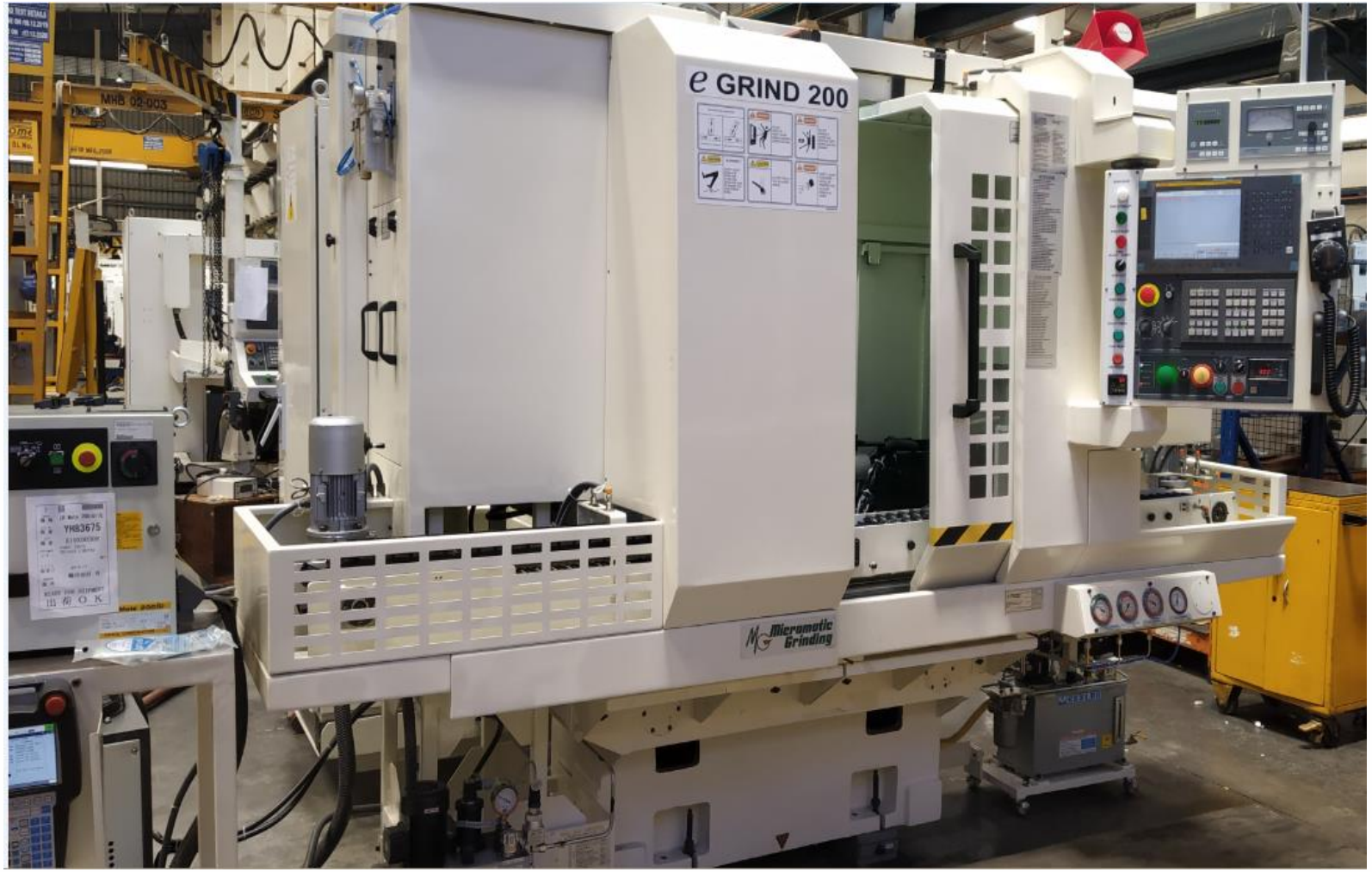
I/P Conveyor



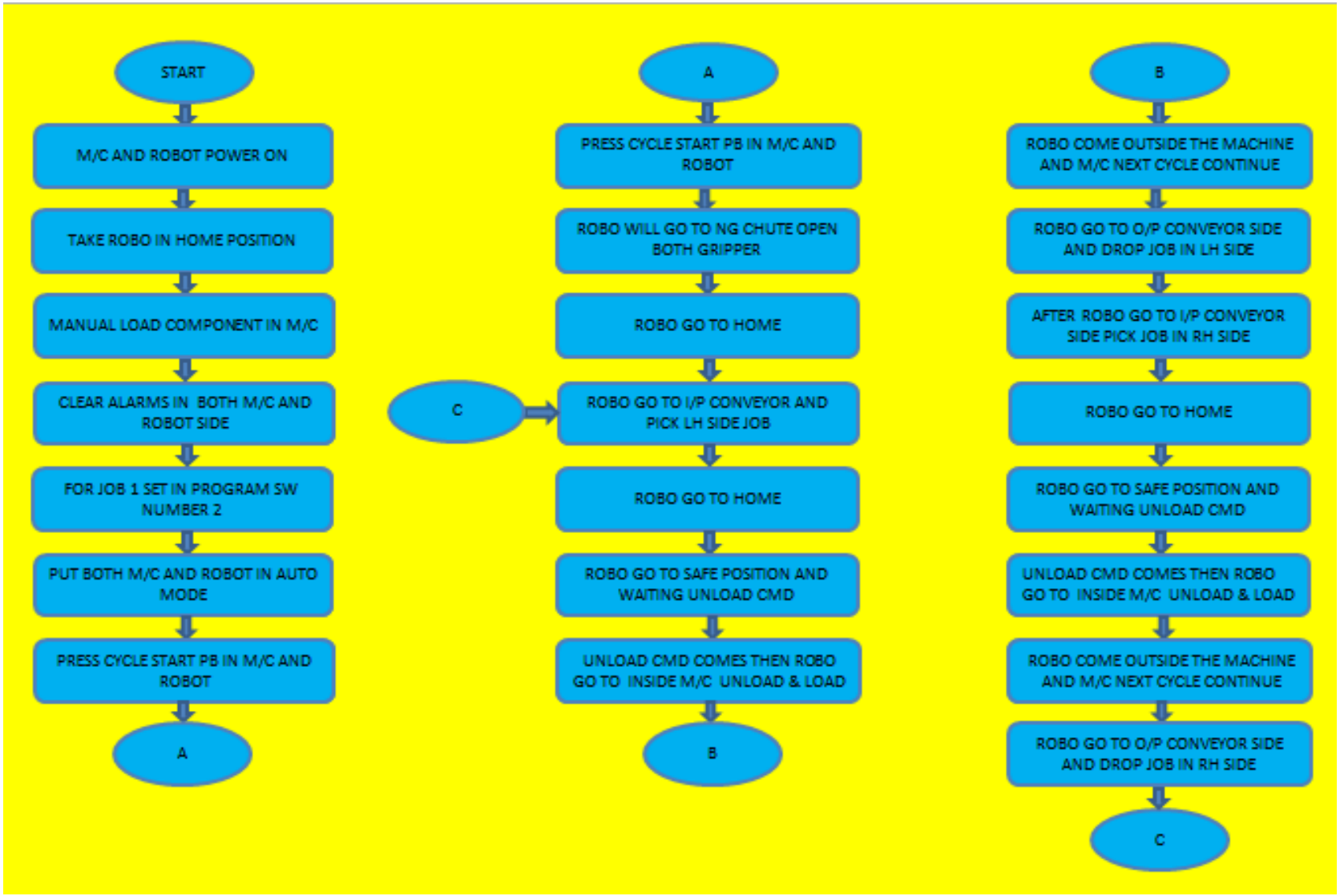
O/P Conveyor



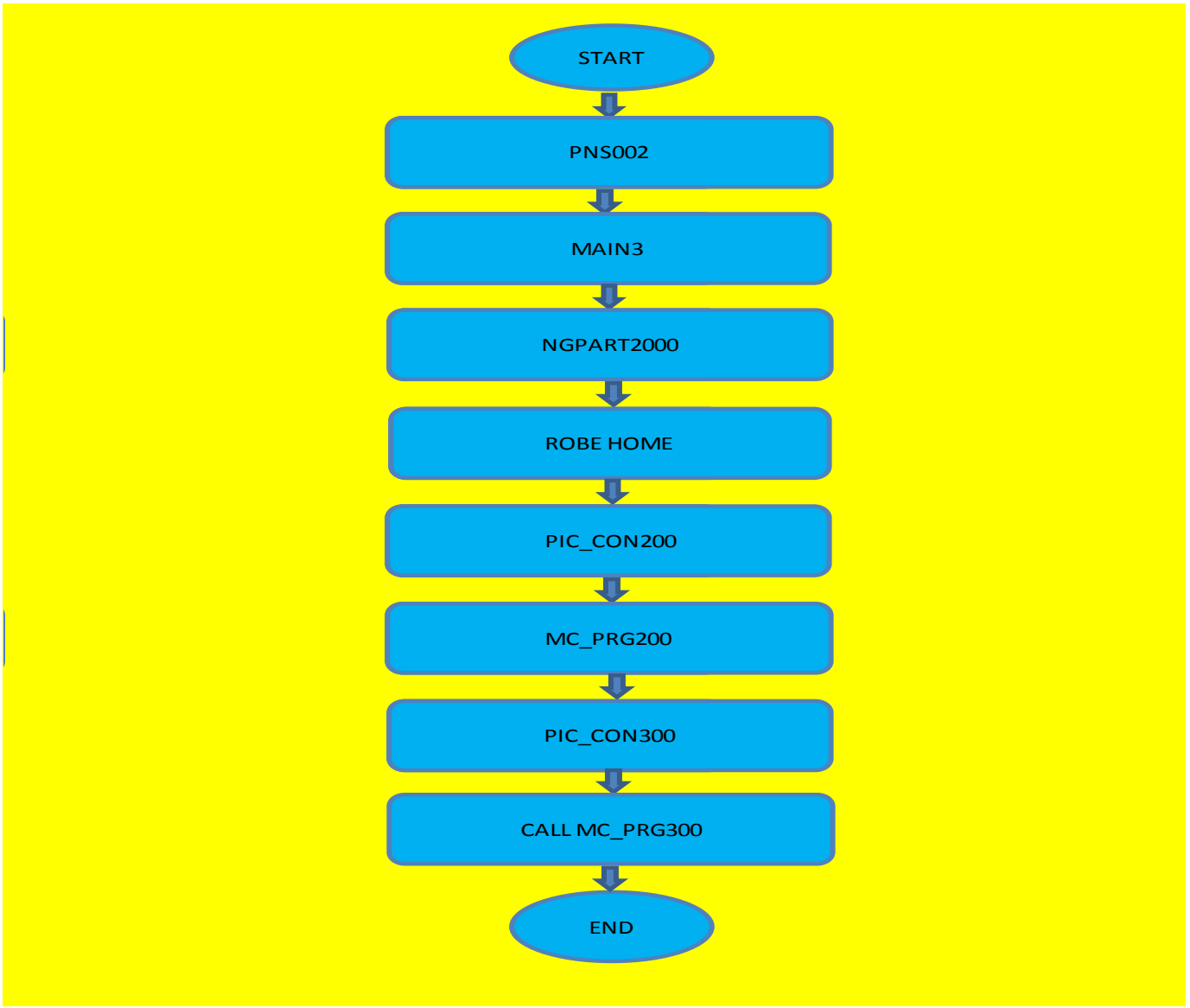
Machine



Mushashi m/c robot sequence operation



Mushashi m/c robot sequence program



Robo program

PNS002

```
OVERRIDE=20% ;
IF DO[260:ROBO HOME]=OFF,JMP LBL[100] ;
CALL MAIN3   ;
LBL[100] ;
UALM[5] ;
/POS
/END
```

NGPART2000

```
WAIT DI[298]=ON   ;
J P[1] 100% CNT25   ;
L P[6] 100mm/sec FINE   ;
J P[2] 100% FINE   ;
L P[7] 100mm/sec FINE   ;
L P[14] 100mm/sec FINE   ;
CALL G2_UNGRP   ;
L P[8] 100mm/sec FINE   ;
L P[4] 100mm/sec FINE   ;
L P[9] 100mm/sec FINE   ;
L P[10] 100mm/sec FINE   ;
L P[11] 100mm/sec FINE   ;
CALL G1_UNGRP   ;
DO[281]=PULSE,1.0sec ;
L P[3] 100mm/sec FINE   ;
L P[5] 100mm/sec FINE   ;
L P[12] 500mm/sec FINE   ;
/POS
```

MAIN3

```
CALL NGPART2000   ;
CALL ROB_HOME   ;
LBL[1000] ;
IF DI[291:OK PICK COMP I/P CNVY LH]=ON,JMP LBL[10] ;
 IF DI[292:OK PICK COMP I/P CNVY RH]=ON,JMP LBL[20] ;
 LBL[10] ;
 TIMER[1]=RESET ;
 TIMER[1]=START ;
CALL PIC_CON200   ;
TIMER[1]=STOP ;
TIMER[2]=RESET ;
TIMER[2]=START ;
CALL MC_PRG200   ;
LBL[20] ;
TIMER[1]=STOP ;
TIMER[3]=RESET ;
TIMER[3]=START ;
CALL PIC_CON300   ;
TIMER[3]=STOP ;
TIMER[4]=RESET ;
TIMER[4]=START ;
CALL MC_PRG300   ;
TIMER[3]=STOP ;
JMP LBL[1000] ;
/POS
/END
```

Robo program

ROBO HOME

```
J PR[21] 20% FINE   ;
/POS
/END
```

PIC_CON200

```
WAIT DI[289:I/P CONVEYOR RUNNING]=OFF   ;
J P[3] 100% FINE   ;
WAIT DI[291:OK PICK COMP I/P CNVY LH]=ON   ;
DO[269:ROBO I/P CONVEYOR SIDE]=ON ;
L P[4] 2000mm/sec FINE   ;
L P[6] 2000mm/sec FINE   ;
CALL G1_GRIP   ;
L P[8] 2000mm/sec FINE   ;
L P[3] 4000mm/sec FINE   ;
L P[5] 2000mm/sec CNT25   ;
L P[7] 2000mm/sec CNT25   ;
L P[1] 1500mm/sec FINE   ;
J P[15] 70% FINE   ;
L P[9] 100mm/sec FINE   ;
DO[271:JOB CLEANING SOL ON]=ON ;
WAIT   2.00(sec) ;
DO[271:JOB CLEANING SOL ON]=OFF ;
L P[18] 500mm/sec FINE   ;
CALL ROB_HOME   ;
/POS
/END
```

PIC_CON300

```
WAIT DI[289:I/P CONVEYOR RUNNING]=OFF   ;
J P[1] 100% FINE   ;
WAIT DI[292:OK PICK COMP I/P CNVY RH]=ON   ;
DO[269:ROBO I/P CONVEYOR SIDE]=PULSE,0.5sec ;
L P[4] 2000mm/sec FINE   ;
L P[2] 2000mm/sec FINE   ;
CALL G2_GRIP   ;
L P[5] 4000mm/sec FINE   ;
L P[3] 4000mm/sec FINE   ;
DO[266:I/P CONVEYOR ON]=PULSE,1.0sec ;
L P[8] 2000mm/sec CNT25   ;
L P[9] 2000mm/sec CNT25   ;
L P[6] 2000mm/sec FINE   ;
L P[7] 1000mm/sec FINE   ;
DO[271:JOB CLEANING SOL ON]=ON ;
WAIT   2.00(sec) ;
DO[271:JOB CLEANING SOL ON]=OFF ;
L P[10] 1000mm/sec FINE   ;
CALL ROB_HOME   ;
/POS
```

Robo program

MC_PRG200

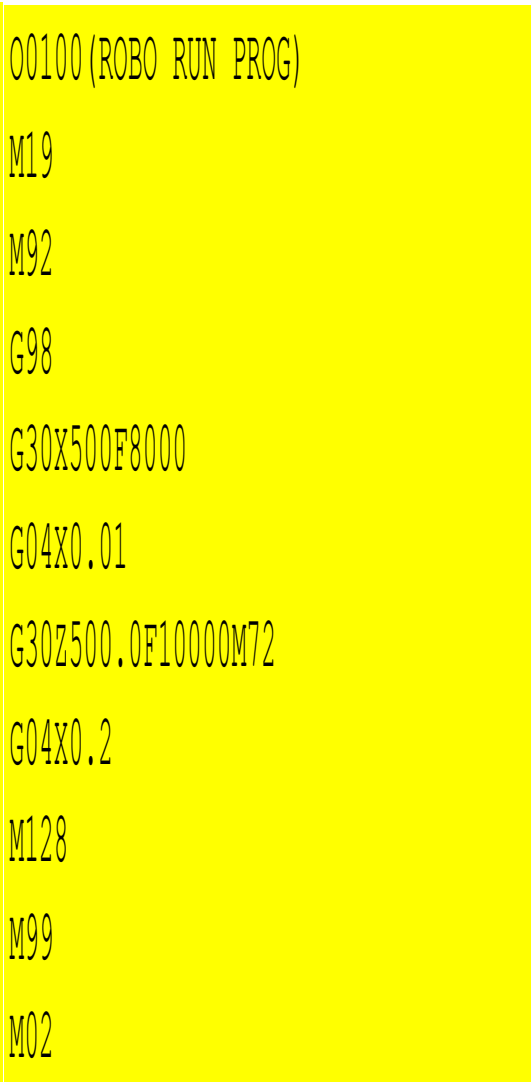
```
DO[282]=OFF ;
J P[10] 70% CNT20   ;
DO[261:PART PLACED INSIDE M/C]=OFF ;
WAIT DI[261:READY FOR UNLOAD/LOAD]=ON   ;
DO[268:ROBO OUTSIDE MACHINE]=OFF ;
TIMER[2]=RESET ;
TIMER[2]=START ;
L P[13] 3500mm/sec FINE   ;
L P[28] 2000mm/sec FINE   ;
L P[14] 1000mm/sec FINE   ;
CALL G2_GRIP   ;
L P[16] 2000mm/sec FINE   ;
L P[17] 2000mm/sec FINE   ;
L P[11] 3000mm/sec FINE   ;
//L P[12] 100mm/sec FINE   ;
L P[2] 2000mm/sec FINE   ;
L P[29] 3000mm/sec FINE   ;
L P[1] 2000mm/sec FINE   ;
L P[20] 100mm/sec FINE   ;
CALL G1_UNGRP   ;
L P[19] 250mm/sec FINE   ;
L P[4] 1000mm/sec FINE   ;
L P[21] 1200mm/sec FINE   ;
L P[22] 1200mm/sec FINE   ;
L P[3] 2500mm/sec FINE   ;
L P[5] 3000mm/sec FINE   ;
DO[268:ROBO OUTSIDE MACHINE]=ON ;
DO[261:PART PLACED INSIDE M/C]=PULSE,1.0sec ;
TIMER[2]=STOP ;
TIMER[1]=START ;
L P[6] 2000mm/sec FINE   ;
 //L P[7] 1000mm/sec FINE   ;
 //DO[271:JOB CLEANING SOL ON]=ON ;
//WAIT   3.00(sec) ;
//DO[271:JOB CLEANING SOL ON]=OFF ;
//L P[8] 500mm/sec FINE   ;
IF DI[271:NG COMPONENT]=ON,JMP LBL[1000] ;
IF DI[271:NG COMPONENT]=OFF,JMP LBL[2000] ;
END ;
LBL[2000] ;
L P[9] 2000mm/sec FINE   ;
L P[18] 1000mm/sec FINE   ;
WAIT DI[290:O/P CONVEYOR RUNNING]=OFF   ;
WAIT DI[295:O/P CONVEYOR FULL]=OFF   ;
L P[15] 1000mm/sec CNT25   ;
L P[25] 1500mm/sec FINE   ;
CALL G2_UNGRP   ;
L P[15] 1500mm/sec FINE   ;
J P[27] 100% FINE   ;
DO[282]=ON ;
END ;
LBL[1000] ;
CALL NGPART2000   ;
CALL ROB_HOME   ;
/POS
/END
```

Robo program

```
CALL MC_PRG300
DO[282]=OFF ;
J P[10] 70% CNT20    ;
DO[261:PART PLACED INSIDE M/C]=OFF ;
WAIT DI[261:READY FOR UNLOAD/LOAD]=ON    ;
DO[268:ROBO OUTSIDE MACHINE]=OFF ;
L P[1] 1000mm/sec FINE    ;
L P[2] 1000mm/sec FINE    ;
L P[22] 1000mm/sec FINE    ;
L P[5] 1000mm/sec FINE    ;
CALL G1_GRIP    ;
L P[6] 500mm/sec FINE    ;
L P[11] 400mm/sec FINE    ;
L P[12] 800mm/sec FINE    ;
L P[13] 1000mm/sec FINE    ;
L P[16] 800mm/sec FINE    ;
L P[14] 1000mm/sec FINE    ;
L P[28] 100mm/sec FINE    ;
CALL G2_UNGRP    ;
//L P[21] 1000mm/sec FINE    ;
L P[17] 1000mm/sec FINE    ;
L P[23] 1000mm/sec FINE    ;
L P[24] 1000mm/sec FINE    ;
L P[4] 2000mm/sec FINE    ;
L P[3] 1000mm/sec FINE    ;
L P[7] 2500mm/sec FINE    ;
DO[268:ROBO OUTSIDE MACHINE]=ON ;
DO[261:PART PLACED INSIDE M/C]=PULSE,1.0sec ;
TIMER[4]=STOP ;
TIMER[3]=START ;
L P[8] 1500mm/sec FINE    ;
J P[15] 50% FINE    ;
//L P[9] 100mm/sec FINE    ;
//DO[271:JOB CLEANING SOL ON]=ON ;
 //WAIT   2.00(sec) ;
//DO[271:JOB CLEANING SOL ON]=OFF ;
//L P[18] 500mm/sec FINE    ;
IF DI[271:NG COMPONENT]=ON,JMP LBL[1000] ;
IF DI[271:NG COMPONENT]=OFF,JMP LBL[2000] ;
END ;
LBL[2000] ;
L P[19] 1500mm/sec CNT20    ;
L P[20] 1500mm/sec FINE    ;
WAIT DI[290:O/P CONVEYOR RUNNING]=OFF    ;
WAIT DI[295:O/P CONVEYOR FULL]=OFF    ;
L P[25] 2000mm/sec FINE    ;
CALL G1_UNGRP    ;
L P[26] 4000mm/sec FINE    ;
DO[267:O/P CONVEYOR ON]=PULSE,1.0sec ;
J P[27] 100% FINE    ;
DO[282]=ON ;
END ;
LBL[1000] ;
CALL NGPART2000    ;
DO[267:O/P CONVEYOR ON]=PULSE,1.0sec ;
CALL ROB_HOME    ;
/POS
/END
```

Machine part program

```
O0002(GRIND PROG  SHAFT INTERMEDIATE)
G98
M74
M19
M73
N40IF[#522NE2]THEN#3000=8(WRONG JOB CODE)
M126 (NG CMD TO ROBO)
G04X0.1
N1000
M73
N2M98P9126(CONSTANT SURFACE SPEED PROG)
M98P2002(GRINDING ALARM CODE)
N45IF[#518NE#519]GOTO50
M98P8502(CALL DRESS PROG)
N50G10P0X0Z0
N55G54T0
N60G01X500.0F8000
G98
N65#640=#640+#516
N70#641=#641+#517
N75#516=0
N80#517=0
N90G10P0X#640W#641
G56T1
M62
M03S#504
N92G01Z0.0F8000
N155G01X20.00F8000M08
N160G01X18.500F6000
N170G01X17.750F4000
N170G01X17.500F500
N180G01X17.320F50
M95
N182G31P4X17.02F15.0M91
N185G31P1X16.900F2.90
N192G31P1X16.800F1.45
N208G31P2X16.757F0.50
N210G31P3X16.745F0.04
G04X0.2
#560=#5061
#561=#560+#529
M98P9999
N75G01U0.20F200M92
N80G01U10.0F8000M09
N225G10P0X0Z0
N230G54T0
M05
N235G01X500.0F10000M19
N240#519=#519+1
M76
/M98P100
/GOTO1000
M72
M75
M02
M30
```




THANK
YOU