

# TSR2000 Series

## 3 Axis Dispensing Robot



## Teaching Pendant User Guide

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## 1. INTRODUCTION

Congratulations on the purchase of a Techcon Systems Automated Dispensing Robot. If you have not done so, see the installation guide provided with your system for installation instructions.

Now that your dispensing system is ready to use, take a few moments to get to know the parts of your dispensing system and software. This manual is designed to help you use the robot as quickly as possible.

We, here at Techcon Systems, hope you find this product beneficial. If you have any questions, please contact us at the details listed below:

### For Sales and Support:

Techcon Systems Corporate Headquarters,  
 10800 Valley View Street, Cypress, California, 90630, USA.  
 Tel: 1-714-230-2398, Fax: 1-714-828-2001  
 E-mail: [OEMorders@okinternational.com](mailto: OEMorders@okinternational.com)

Techcon Systems European Corporate Office,  
 Eagle Close, Chandler's Ford Industrial Estate,  
 Eastleigh, Hampshire, SO53 4NF, UK.  
 Tel: +44 2380 489 100, Fax: +44 2380 489 109  
 E-mail: [europe-orders@okinternational.com](mailto: europe-orders@okinternational.com)

Or visit [www.techconsystems.com](http://www.techconsystems.com)



This manual is designed to provide information about Techcon Systems robot software. Every effort has been made to make this manual as complete and accurate as possible. There is no implied or expressed warranty as to the purpose, suitability or fitness of the information. The information is provided on an as-is basis. Techcon Systems reserves the right to improve and revise its products. This manual specifies and describes the product as it existed at the time of publication. As with any new programming software, a basic understanding of the vocabulary is necessary.

## 2. FUNCTIONS OF THE KEYPAD



Button	Name	Description
F1, F2, F3, F4	Function Buttons	F1 – create new file, insert drawing, start/pause a process. F2 – Edit file or stop a process or group offset. F3 – Data check and file copy. F4 – Array, parameter setting and change file name.
X, Y, Z, R	Navigation Buttons	Control jog movements of X, Y, Z and R axis
0 – 9, A – Z	Alphanumeric Buttons	To create file names and set parameters.
.	Decimal Point Button	To input decimal point.
SHF	Switch Button	Change jog speed (low, med, high), or change parameters
+/-	Front Insert Button	To insert a new point or figure at the front of a selected point.
#	Group Button	Used in group edit and parameter settings.
GO	Go Button	When displayed, press to move valve to position.
ORG	Reset Button	Return to zero position (0, 0, 0, 0)
CLR	Delete Button	Delete a file or part of a file.
ESC	Escape Button	Cancel an operation and/or exit from current interface.
ENT	Enter Button	Download or process the current file, or save an edited file, etc.

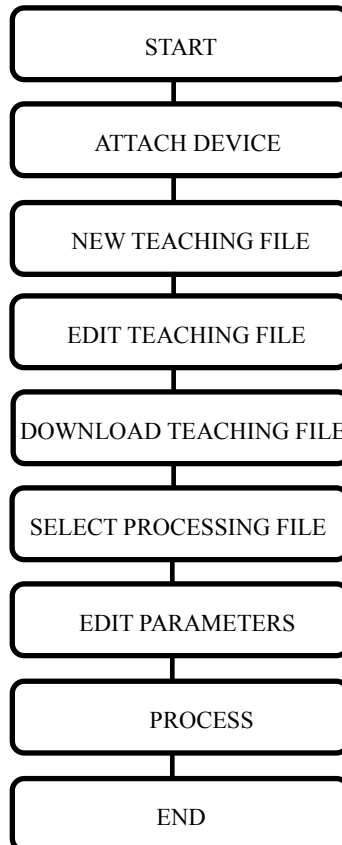
### 3. CLASSIFICATION OF A POINT

The programming has many types of point. Graphic points include point, line origin, etc. Non-graphic points include delay point, clean point, etc and can refer to the following table. When inserting a “point” the operator must select to insert the point at the front or back of the selected point.

No.	Point	Type	Instruction
1	Point	Graphic	The speed between points is the “jog move speed”. Can set the lift height and delay time.
2	Line	Graphic	Includes Line start, Line middle and Line end points
3	Delay (Time)	Non-Graphic	Delay point is used to set delay time in the range of 0 – 65532ms.
4	Mark	Graphic	Mark point is a moving assistant point and is only used to move to another position and is also valid during simulated step.
5	Pause	Non-Graphic	When setting a pause point the robot will pause automatically until a start signal is sent.
6	Clean	Non-Graphic	Set the clean point location and parameters.
7	Subroutine	Non-Graphic	Subroutine is a teaching file and can be inserted into another teaching file but cannot be edited again.
8	Output	Non-Graphic	For setting an input/output by inserting an output point.
9	Origin	Graphic	Reference point. Also a basic point when group skewing.

In the teaching pendant, the teaching file exists as points. A line is a special graphic point and has at least two points: Line-Start and Line-End. In this way it is made of segment lines. When processed it is a continual line.

### 4. RAPID INSTRUCTION OF DISPENSING PROCESS



## 5. EXAMPLES OF TYPICAL DISPENSING PATTERNS

### Dot



Increasing feed on time

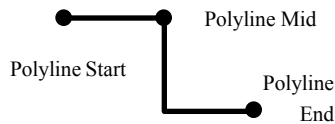
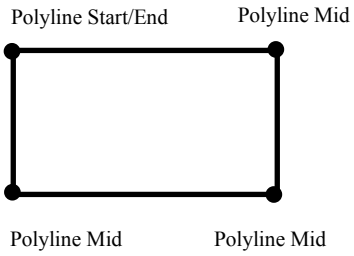
### Line



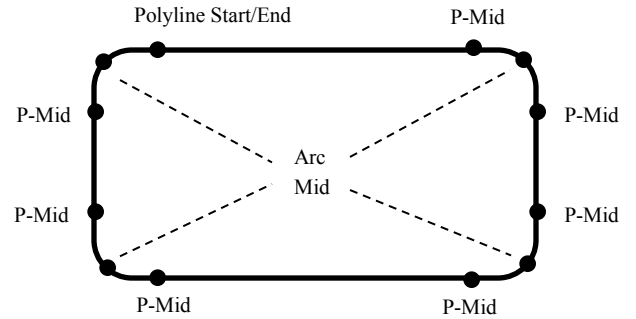
Line Start

Line End

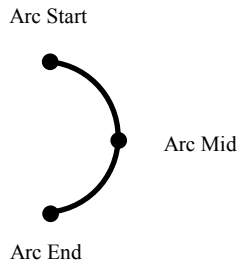
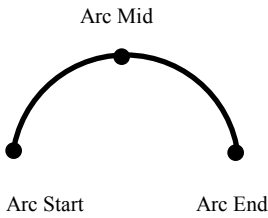
### Polyline



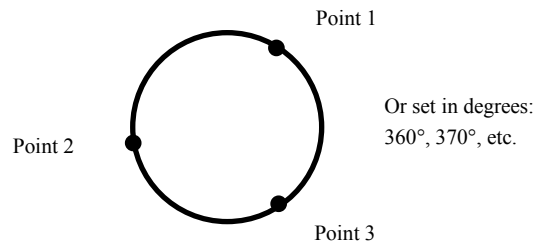
### Polyline with round edges



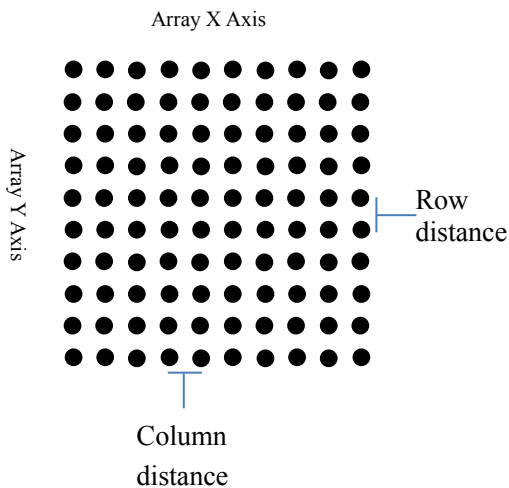
### Arc



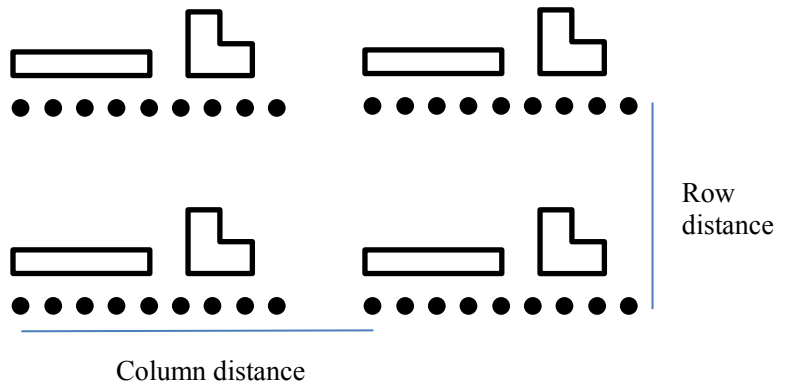
### Circle



### Dot (Point) Array 10 x 10

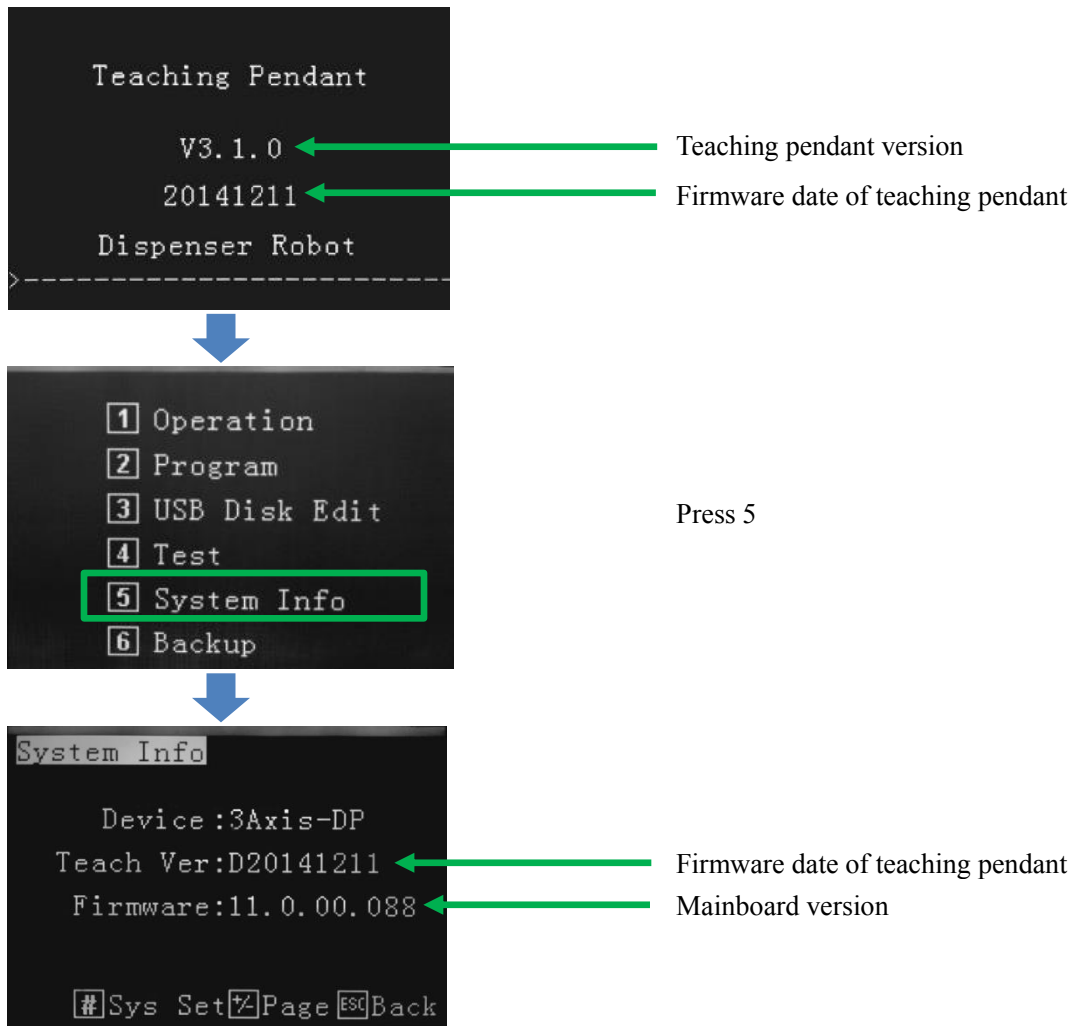


### Pattern Array 2 x 2

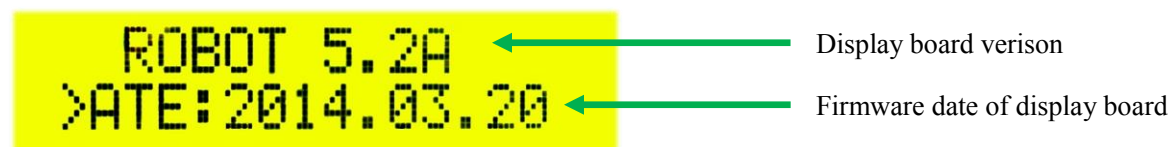


## 6. FIRMWARE SCREENS EXPLAINED

After connecting the teaching pendant to the robot, turn on the power switch. The system will initialize and move to the origin (0, 0, 0) location. For a brief moment the LCD screen will display:

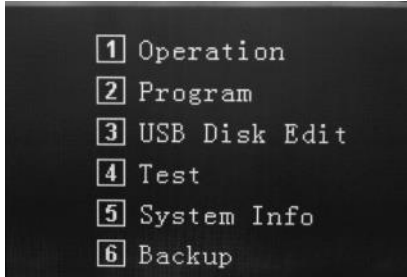


On the main robot front screen, whilst the teaching pendant is attached, the following information is displayed:



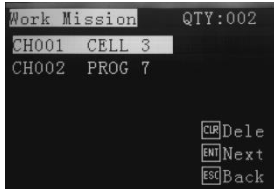
Periodic updates will be made available should new features be added to the robot. These updates can be performed through the teaching pendant's USB port.

## 7. TEACH PENDANT MAIN SCREEN



After the robot has initialized the main screen will be displayed.

Every function of the robot is controlled through one of the 6 choices of the main screen. An overview of each section is provided below.

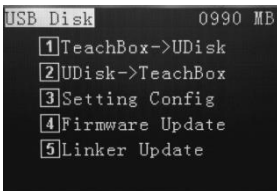


1 – Operation – Select the saved program, apply home adjust, process file and delete file, activate robot by external source (shortcut), setting purge and usage times.

This mode is to run the robot with teach pendant connected once the program has been written and saved.



2 – Program – Create dispensing program, edit parameters, copy, delete, download.



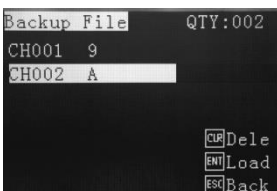
3 – USB Disk Edit – Download/Upload program to USB, system update.



4 – Test – For testing areas of the robot such as axis jogging and I/O ports.



5 – System Info – Device type, teach version, firmware version and connecting safety cover.



6 – Backup – Load teaching file from robot's memory to teaching pendant's memory, or delete the teaching file in the robot.



## 8. OPEARATION – RUNNING A SAVED PROGRAM

```

1 Operation
2 Program
3 USB Disk Edit
4 Test
5 System Info
6 Backup
    
```

Press 1

```

Work Mission QTY:020
CH014 DOTLINE1
CH015 DOTLINEV
CH016 DOTLINEA
CH017 TRACK
CH018 PURGE
CH019 TESTING
CH020 POINT
    
```

Select program to be used and press **ENT**

or  
Select program to be deleted and press **CLR** then **ENT**

If selecting dispense cycle to load, press **ENT** twice.

**This will go to the final step.**

By pressing **ENT** once:  
1 – Calibrate tip position  
2 – Create shortcut  
3 – Reset counter  
4 – Set Purge Position

```

File Name:TRACK
1 Home Adjust
2 Shortcut:---
3 Used Times:0000000
4 Purge Set
    
```

**Note:** Home Adjust is the process in which to adjust/offset the co-ordinates completely in cases such that: the dispensing tip has been changed or the dispensing valve has been removed and refitted. Due to very small differences from product to product or if the valve has been removed and put on at a slightly different position, the operator can calibrate the program to the new position. The entire program will offset to where the operator has set it to.

```

Home Adj
Low
X 053.98
Y 046.81
Z 069.33
    
```

Press **GO** and then use alphanumeric keys to move to the correct location.

```

Home Adj
Hi
X 062.34
Y 046.81
Z 069.33
    
```

Press **ENT**

```

File Name:TRACK
1 Home Adjust
2 Shortcut:---
3 Used Times:0000000
4 Purge Set
    
```

(Optional) Press 2

```

Shortcut Set
Shortcut:--
Trigger:<Unconditional>
    
```

Change current state and press **ENT**

```

File Name:TRACK
1 Home Adjust
2 Shortcut:---
3 Used Times:0000000
4 Purge Set
    
```

(Optional) Press 3

```

Use Period Set
Used Times:0000000
Usable Times:Absolute
    
```

Change counter, press **ENT**

```

File Name:TRACK
1 Home Adjust
2 Shortcut:---
3 Used Times:0000000
4 Purge Set
    
```

(Optional) Press 4

```

Purge Set
Purge Before Starting:<Purge>
Purge After Idling:<Purge>
Waiting Time:00min
    
```

Using the **#** button, select if Purge is required at start or end of program, or not at all.

Press **ENT**

```

File Name:TRACK
1 Home Adjust
2 Shortcut:---
3 Used Times:0000000
4 Purge Set
    
```

Press **ENT**

```

Name:TRACK 0000.0s
X 062.34 Status:Stop
Y 046.81 Tally:00003
Z 000.00
    
```

Press **F1**

This starts the dispensing cycle.

## 8.1 Calibrating the Dispense Tip

When a dispense tip is changed, or the valve is removed from the robot, it is normal for the tip/valve to be slightly out of the original position when reattached. By creating a physical calibration point, on the device or fixture, the program can be adjusted to suit the new tip position. This change will only effect the current program and not other programs stored in the memory. All programs can have their own unique calibration position.

There are 2 ways to achieve this calibration in the x, y and z axis:

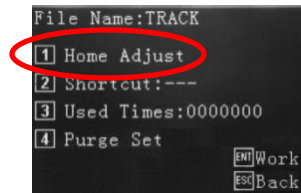
**Reference Point** – by inserting a “REF PT”, into the Points List, during programming, calibration of the tip is performed at a specified place by the user, such as a pointed stick or cross-hair markings on the holding fixture.

**Home Adjust** – if the “REF PT” is not inserted into the program the robot will use the first dispensing location as the calibration co-ordinate.

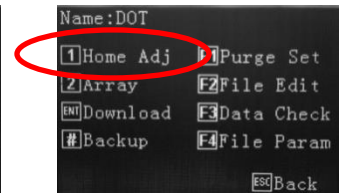
By pressing **Home**, **Home Adjust** or **Home Adj**

Home Adjust can be found in the following screens:

If this function is performed in the Editing screen the program will need to be Downloaded after the Home Adjust.

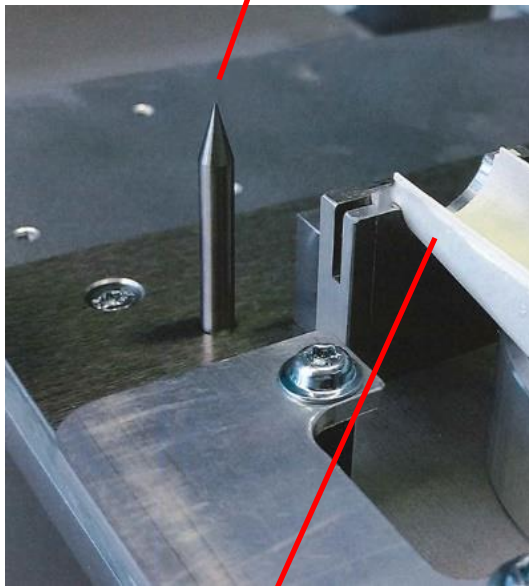


**In Operation Menu**

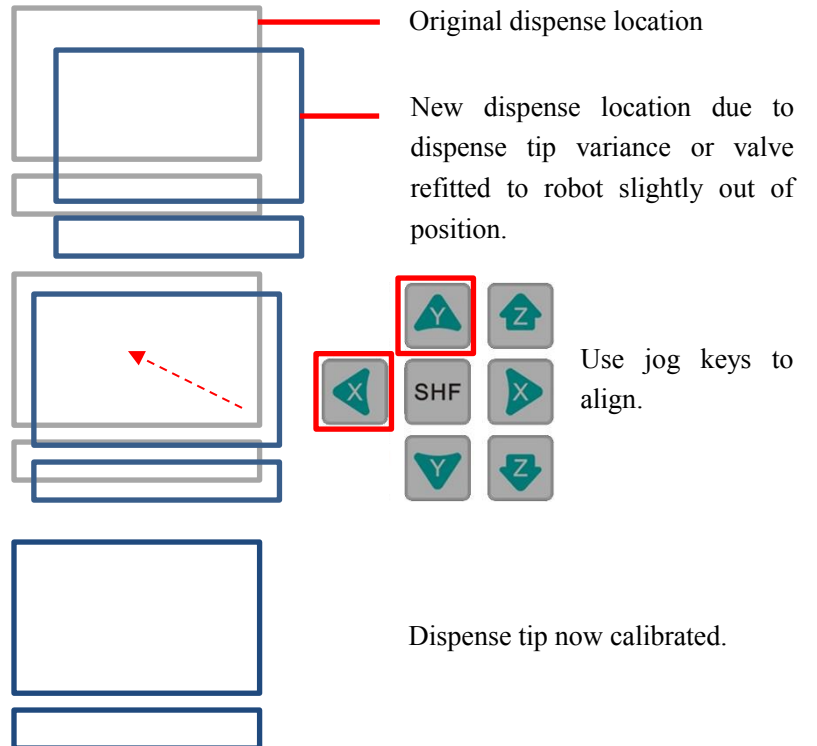


**In Editing Screen**

Typical calibration pin

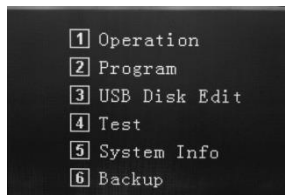


Device to be dispensed onto



## 8.2 Creating the Calibration Location During Programming

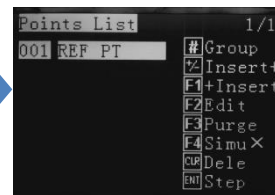
Points List – This method inserts a calibration point (REF PT) into the body of the program, which can be modified at anytime. It is also possible to modify the stored program to include a calibration point (REF PT) later. It is recommended to program in the calibration point (REF PT) at the start



Reference Section 9.2

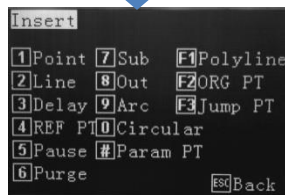


Press **F1**

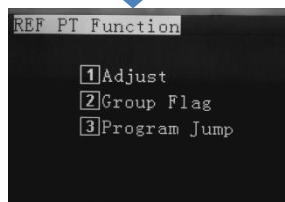


The calibration location is now set. Continue to write program by inserting the dispensing co-ordinates.

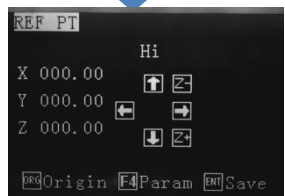
Start by pressing **F1**



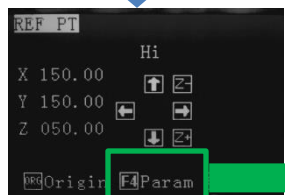
Reference Section 9.2  
From the Insert screen, select option 4 – REF PT



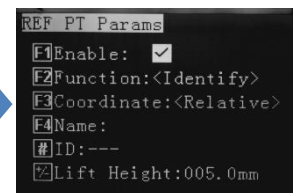
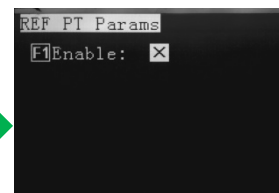
Press 1  
Options 2 and 3 are for future use



Use jog or alphanumeric keys to move to calibration location.



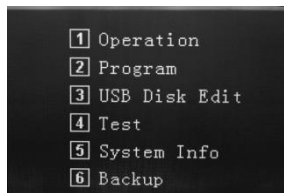
Press **ENT**



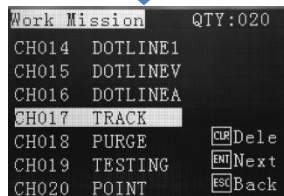
If **F4** is pressed, these functions are for future use and should not be altered.

### 8.3 Verifying the Calibration Location During Live Use

Operation Screen – If a calibration point (REF PT) has been stored in the program the dispense tip will move to this pin location, when **Home Adjust** is pressed. If no calibration point has been stored, in the programming, the dispense tip will move to the first dispensing location, when **Home Adjust** is pressed.

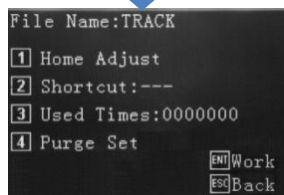


Select 1 - Program



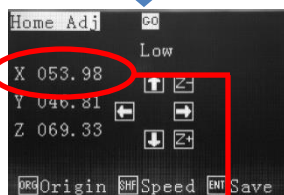
Select the program, to run.

Press



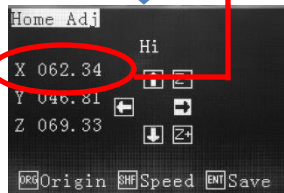
If no tip calibration is required, press

If tip calibration is required, press 1 – Home Adjust



Press

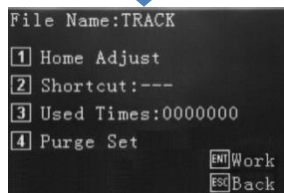
The tip will move to the Cal pin if one is stored or to the first dispensing location if a Cal point is not stored, in the programming.



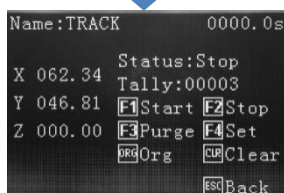
Use jog keys to correct tip position.

Press

**This change does not affect the original written program location.**



Press



The program can be run with

### 8.4 Shortcut – communicates with external PLC when robot used as a “cell” in an in-line robot

Shortcut refers to the robot being a intergrated as a module in an in-line process. The teaching pendant instructions, below, are to set the external binary signal up for this process. The pendant would be disconnected when in live use. The signal is communicated through the rear DB37 connector.

If the robot is on a bench top, being operator controlled, then the Shortcut is not used.

Select 1 - Operation

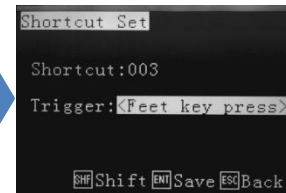
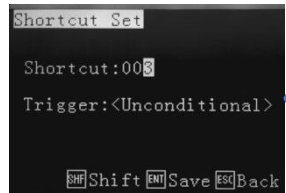
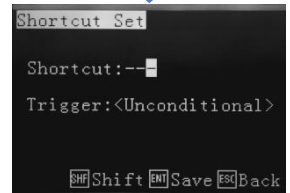
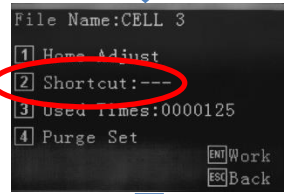
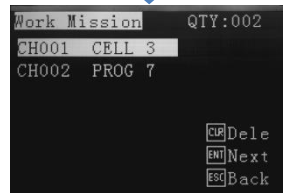
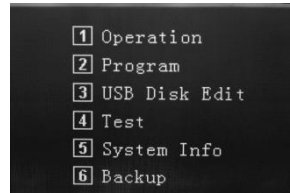
Select the program using the arrow.

Press 

Select 2 – Shortcut

Press 

- - - means no binary Shortcut signal set. Use numeric keys to set Shortcut binary signal (as per external PLC). If Shortcut 003 is set, the external PLC needs to send binary signal 003 to the robot.



Trigger:

**Unconditional** – the robot receives the external signal and completes the dispensing cycle.

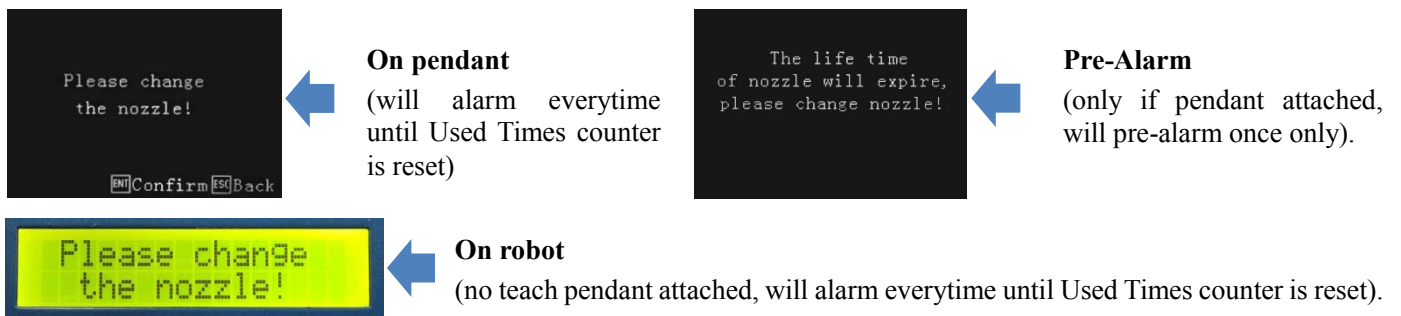
Trigger:

**Feet key press** – the robot receives the external signal but will wait for the line operator to press the the “Feed key”. When Feed key is pressed the dispensing cycle will start.

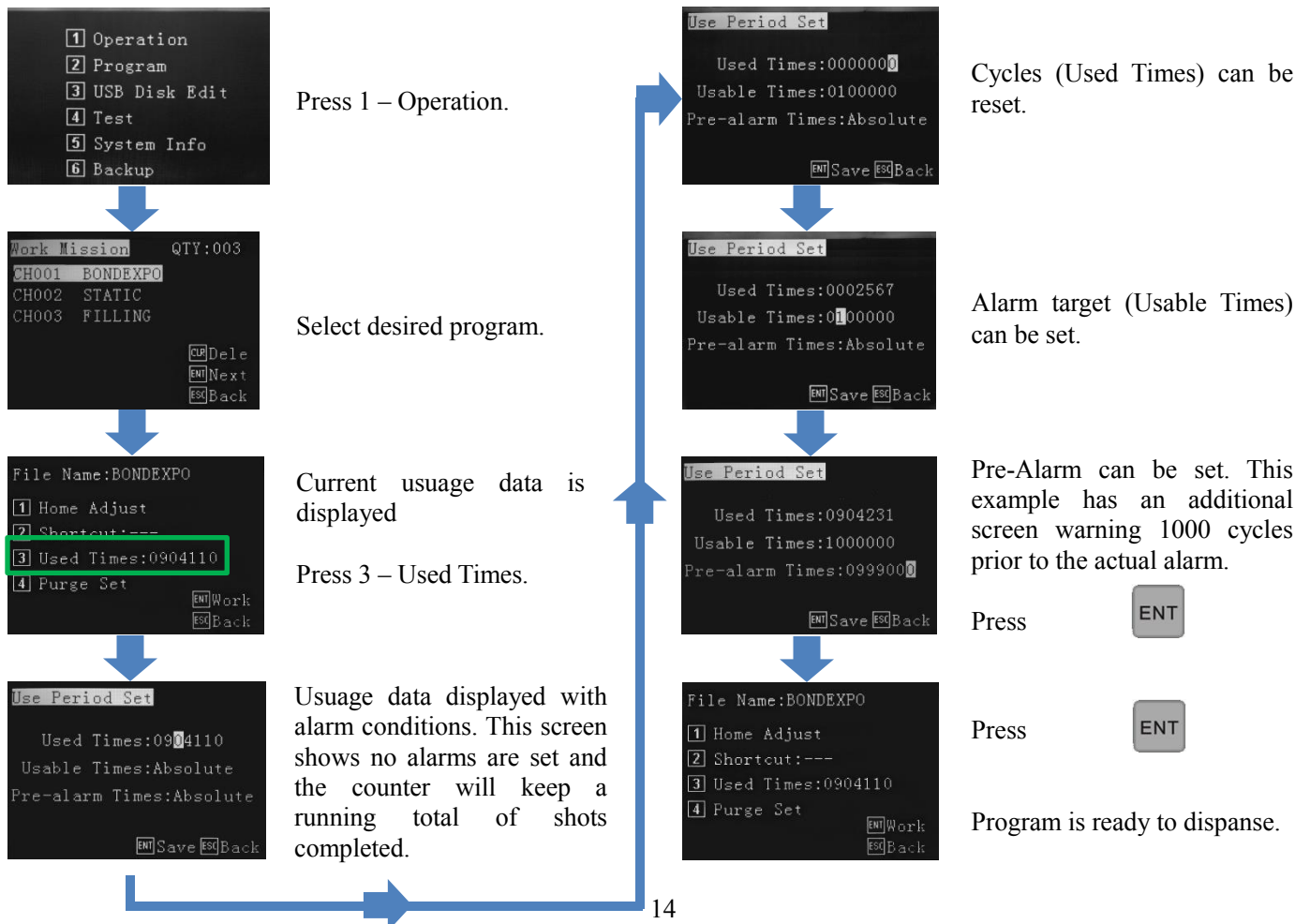


## 8.5 Used Times - Monitoring and Setting Usage and Visual Alarms

“Used Times” shows on the teaching pendant and robot screen (when teaching pendant is disconnected) the status of how many dispensing cycles have been dispensed. This is different to the “Tally” as shown on page 48. The tally displays how many times the entire program has been completed whereas the Used Times records the the accumulatively dispensed cycles/positions giving an indication of how much work the dispensing valve has achieved. If another saved program is selected then the cycle count will not start at zero but continue counting from where it left off. However, the live counter can be reset to zero on the Teach Pendant and robot screen. This feature is particulary useful if the operator needs to change the tip or wetted path, of a dispense valve, to maintain dispensing accuracy, after it has been used a certain number of cycles. The operator is able to set the top limit of dispense activations. When the the robot has reached the target dispense cycles the it will display the following warning on the screen:



This display warns the operator to change the nozzle although the user of the robot can translate this to any internal maintenance procedure if required. Once the procedure is completed the ENT or ESC key can be pressed to calibrate the tip (**8.1 to 8.3**). Possible uses of “Please change the nozzle”: Replace tip, replace disposable path, replace syringe, remove valve for maintenance, flush valve with cleaning agent, re-calibrate valve position, etc.



# 9. PROGRAMMING

## 9.1 Programming by Jog keys or Inputting Co-ordinates



The TSR2000 Series robot is designed to be programmed by either inputting co-ordinates (advanced user) or by using the jog keys (entry level user).

**Note: All pattern creation, over the following pages, are illustrated by the entry level method**

### Inputting Co-ordinates – Advanced User (example of Line)

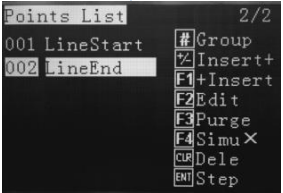


After selecting the type of dispensing (dot, line, arc...) input the X co-ordinate, using the number keys. Use the arrow keys to move down and input the Y and Z co-ordinates. When all 3 co-ordinates have been entered, press **GO**

The dispensing valve will move to this location. Press **ENT** to save the position.



Repeat above process for the Line End.



Once repeated, the Points List will show where more patterns can be inserted.

### Inputting Co-ordinates – Entry Level User (example of Line)

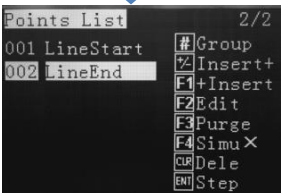


After selecting the type of dispensing (dot, line, arc...) use the jog keys to move to the Line Start position.

Press **ENT** to save the position.



Repeat above process for the Line End.



Once repeated, the Points List will show, where more patterns can be inserted.

## 9.2 Creating a New Program



Press 2



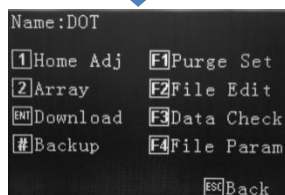
Press **F1**



Enter a program name. Use the alphanumeric keypad and press **ENT**

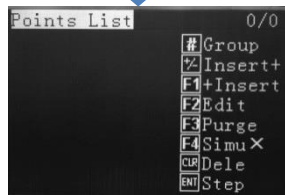


Press **F2**

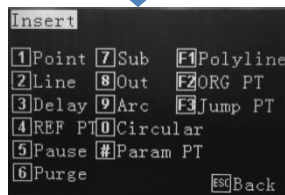


Press **F2**

● See Section 10 for Explanation of File Parameters.



Press **F1**

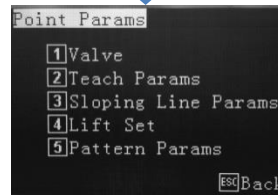


From the Insert screen, select one of the options. (for this Line example, select option 2)

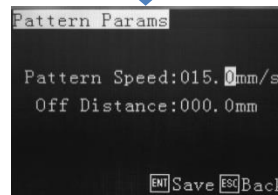


Change the move speed with the **SHF** key.

When line start location is reached press **F4**

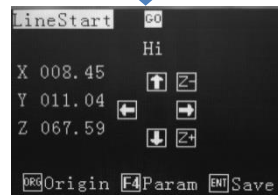


Press 5



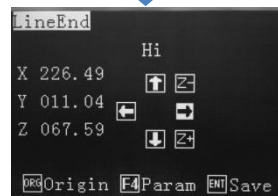
Use alphanumeric keys to change dispense speed. (Pattern Speed).

Press **ENT** twice



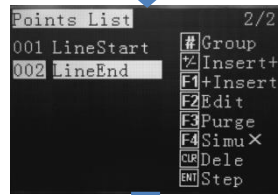
If "GO" is flashing at the top of screen, press

**GO** then press **ENT**



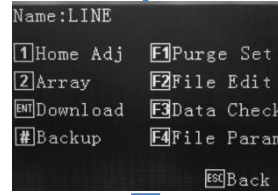
Use alphanumeric keys to move the line end location.

Press **ENT**



Press **ESC** twice.

This will go to the file processing menu



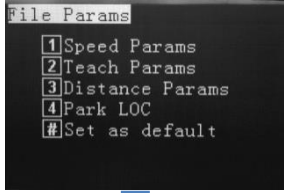
Press **F4**

This enables changes to the file parameters.

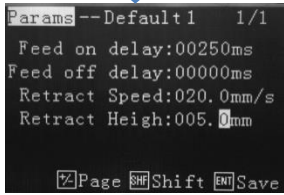
Go to page 17



Cont. from page 16

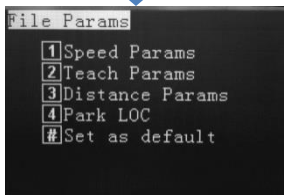


Press 3



Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press [ENT]



Press 4

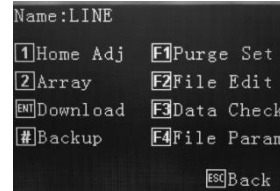


Select where the valve should go to after dispensing.

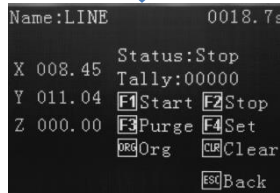


Use the alphanumeric keys to select a park location.

Press [ENT] then [ESC]



To save, press [ENT]



Press [F1]

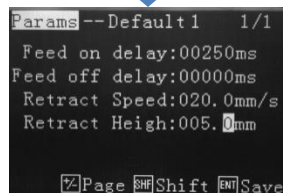
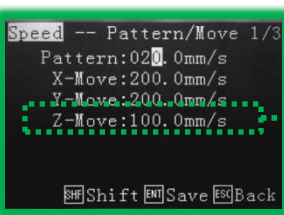
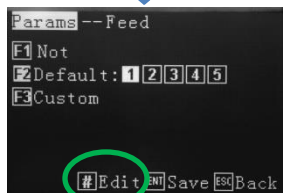
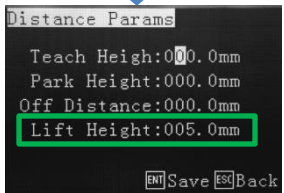
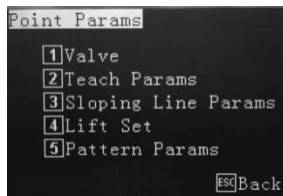
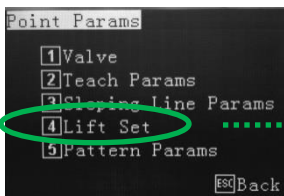
This starts the dispensing cycle.

### Understanding Lift Height and Retract Height

**Lift Height** - is found in the Point Parameters Menu under the the **Lift Set** option. After the dispensing cycle, the Z-axis will move up to the Lift Height at the normal moving (non-dispensing) speed of the machine. If required, a different Lift Height can be applied to any or all of the dispensing patterns, however, if the speed is set to slow this would also mean that when the robot is required to go to Origin (0, 0, 0), the z-axis will take a long time to home.

**Retract Height** - can be found within the Teach Parameters Menu. Retract Heights are applied to the Feed Slots used to created patterns. If a dot is created using Feed Slot 1 and a 2<sup>nd</sup> dot is created using the same feed slot, the same parameters will be applied to dot 2 including Retract Height. A **Retract Speed** can be applied to Retract Heights.

If Retract Height is greater than Lift Height, Retract Height Overrides. If Lift Height is greater than Retract Height, Retract parameters will operate first (height and speed) then the Lift parameters will complete the up movement. If Retract and Lift Height are the same the Retract Height and Speed override the Lift Height and Speed.



### 9.3 How to Delete a Program



In the File List menu, select the program to delete.

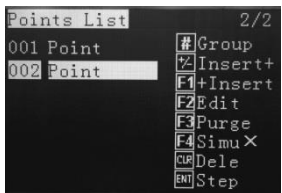
Press



Press

This confirms deletion.

### 9.4 How to Delete a Point in a Program



In the “Points List”, within a Program, select a point in the Program to delete.

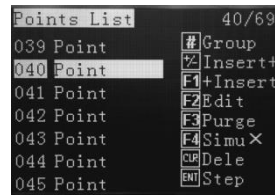
Press



Press

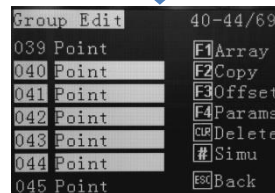
This confirms deletion.

### 9.5 How to Delete Multiple Points in a Program



Press in the Points List.

This goes to Group Edit.



Use up/down arrow keys to select points to delete.

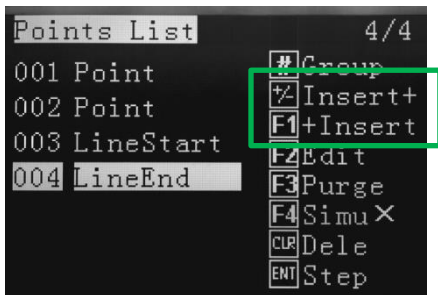
To confirm...

press twice.

Press then

This confirms deletion.

### 9.6 Insert + / + Insert Definition



Insert + and + Insert are both methods on inserting a dispense location into the Points List.

Insert + inserts the co-ordinate **above** the highlighted line.

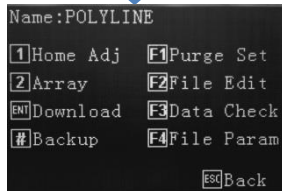
+ Insert Inserts the co-ordinate **below** the highlighted line.

## 9.7 How to Edit a Program

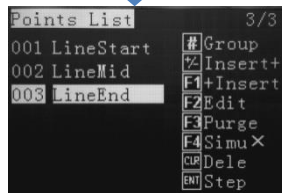


From the File List, use the arrow keys to select the program requiring the edit.

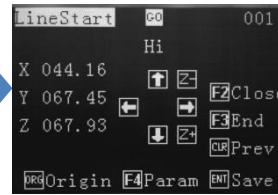
Press **F2**



Press **F2**

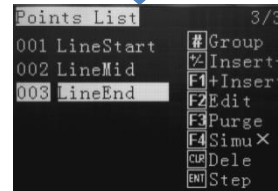


Use the arrow keys to select the part of the program requiring editing. In this case the start of the line will be increased in length. Press **F2**



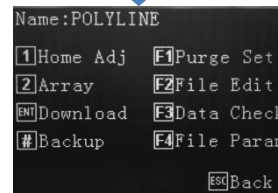
Press “GO”. The robot will move to the original start position. Use either jog keys or input the new dimensions.

Press **GO** then **ENT**



Continue editing, when complete ...

press **ESC** twice.



To save, press **ENT**

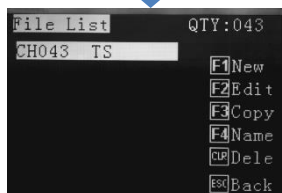
## 9.8 How to Copy a Program

Copying programs is generally used when a 2<sup>nd</sup> application is very similar to the first and that it is more efficient to modify an existing program instead of creating from the start.

It is also quite common to use the copied program to make a qualification/verification program, of the dispensing output at the start of a shift, before making a productions run. This ensures the valve can be “dialed-in” before the use.



**Reference Section 9.2** (creating a new program) or if the program is already saved/downloaded press 2.



Using the jog keys, select the program that needs to be copied.

Press **F3**



Give the copied program a name. If using the same name the robot will prompt for an alternative name.

Press **ENT**



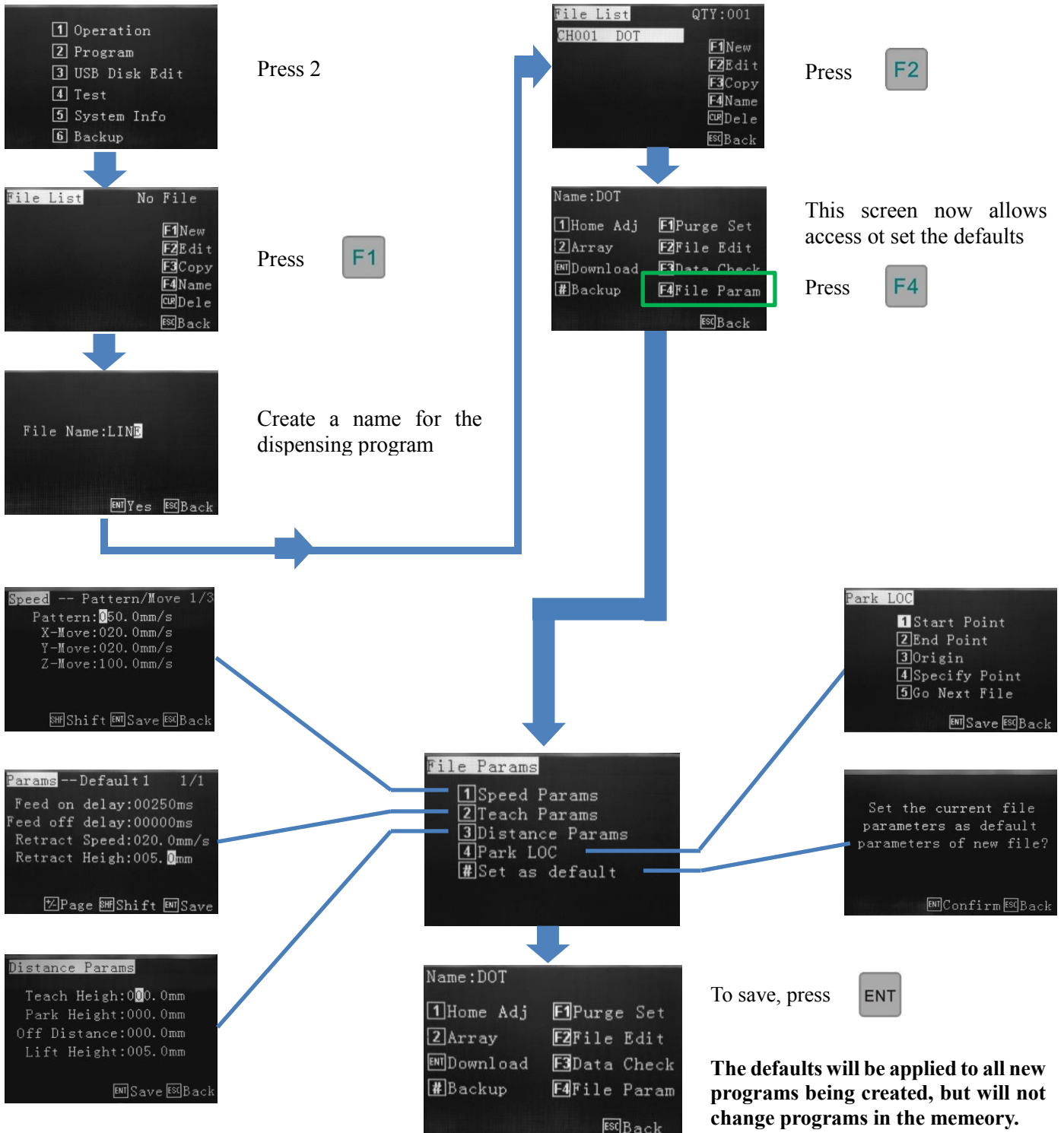
The copied program will be added to the File List where it can be edited.

The program must be downloaded

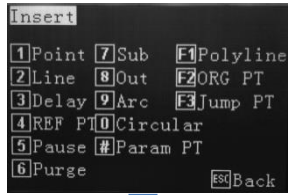
## 9.9 Setting Program Defaults

Upon arrival the robot is set to factory default dispensing speed and movement speed. The “after dispense” location is also factory set. These factory settings will normally be unsuitable for the dispensing application. Every program written will have these factory settings applied, although they can be individually edited during program creation/editing.

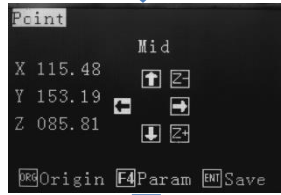
If more than one program will be used on the robot, defaults will save time if having to change every co-ordinates speed. Any older programs, in the robots memory, will not be affected by setting defaults. Only new programs will have the defaults applied.



## 9.10 How to Create a Single Point (Dot)

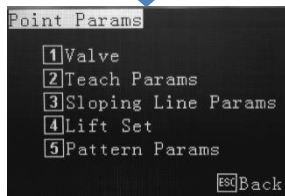


**Reference Section 9.2**  
From the Insert screen, select option 1.

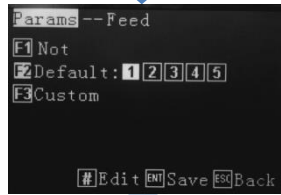


Change the move speed with the **SHF** key.

Press **ENT** at the dot  
Press **F4**

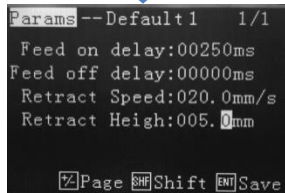


Press 2 – Teach Params



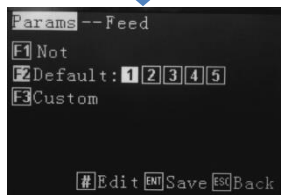
Ensure F2 is highlighted.

Press **#**

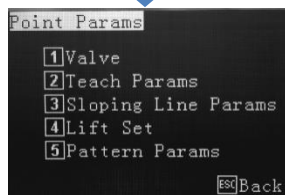


Set Feed on delay (dispensing time)  
Set retract height and speed.

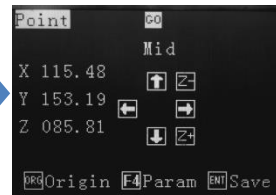
Press **ENT**



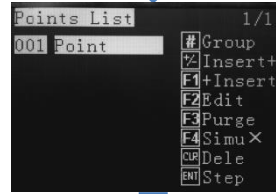
Press **ENT**



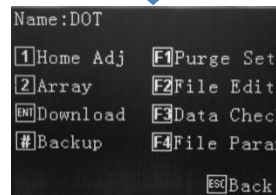
Press **ENT**



Press **ENT**

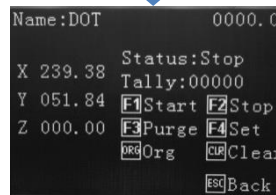


Press **ESC** twice



Continue to edit or...

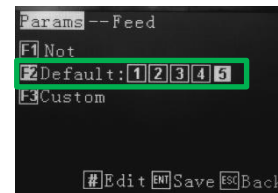
to save, press **ENT**



Press **F1**

This starts the dispensing cycle.

The above procedure will apply the same dispensing time (Feed On Delay) to all dots within the program. To create a different sized dot in the same program...



At the Feed screen, select any of the available feed slots (1 - 5).

The feed time can be changed by pressing **#**



## 9.11 How to Create a Single Line (Bead)

```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge
Esc Back
    
```

Reference Section 9.2 and 9.24. From the Insert screen, select option 2.

```

LineStart
Hi
X 008.45
Y 011.04
Z 067.59
Orig Origin F4 Param Ent Save
    
```

Change the move speed with the SHF key.

When line start location is reached press F4

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
Esc Back
    
```

Press 5.

```

Pattern Params
Pattern Speed:015.0mm/s
Off Distance:000.0mm
Ent Save Esc Back
    
```

Use alphanumeric keys to change the dispense speed (pattern speed).

Press ENT twice.

```

LineStart GO
Hi
X 008.45
Y 011.04
Z 067.59
Orig Origin F4 Param Ent Save
    
```

If "GO" is flashing, at the top of the screen press

GO then press ENT

```

LineEnd
Hi
X 226.49
Y 011.04
Z 067.59
Orig Origin F4 Param Ent Save
    
```

Use alphanumeric keys to move the line end location and press ENT

```

Points List 2/2
# Group
001 LineStart
002 LineEnd
F2 Insert++
F1 +Insert
F2 Edit
F3 Purge
F4 Simu X
Del
Ent Step
    
```

Press ESC twice

```

Name:LINE
1 Home Adj F1 Purge Set
2 Array F2 File Edit
Ent Download F3 Data Check
# Backup F4 File Param
Esc Back
    
```

Press F4

```

Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
Shf Shift Ent Save Esc Back
    
```

Press 2

```

Params -- Default 1 1/1
Feed on delay:00250ms
Feed off delay:00000ms
Retract Speed:020.0mm/s
Retract Heigh:005.0mm
F2 Page Shf Shift Ent Save
    
```

Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press ENT

```

Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
Shf Shift Ent Save Esc Back
    
```

Press 4

```

Park LOC
1 Start Point
2 End Point
3 Origin
4 Specify Point
5 Go Next File
Ent Save Esc Back
    
```

Select where the valve should go to after dispensing.

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
Esc Back
    
```

(Optional) Use the alphanumeric keys to select a park location.

ENT ENT then ESC

```

Name:LINE
1 Home Adj F1 Purge Set
2 Array F2 File Edit
Ent Download F3 Data Check
# Backup F4 File Param
Esc Back
    
```

To save, press ENT

```

Params -- Default 1 1/1
Feed on delay:00250ms
Feed off delay:00000ms
Retract Speed:020.0mm/s
Retract Heigh:005.0mm
F2 Page Shf Shift Ent Save
    
```

Press F1

This starts the dispensing cycle.

## 9.12 How to Create an Elevated Line (Bead)

```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge Esc Back
    
```

```

LineStart Low
X 100.00 ↑ Z↓
Y 100.00 ← →
Z 100.00 ↓ Z↑
Orig Origin F4 Param ENT Save
    
```

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
Esc Back
    
```

```

Pattern Params
Pattern Speed:015.0mm/s
Off Distance:000.0mm
ENT Save Esc Back
    
```

```

LineStart Low
X 100.00 ↑ Z↓
Y 100.00 ← →
Z 100.00 ↓ Z↑
Orig Origin F4 Param ENT Save
    
```

```

LineEnd Low
X 200.00 ↑ Z↓
Y 100.00 ← →
Z 050.00 ↓ Z↑
Orig Origin F4 Param ENT Save
    
```

```

Points List 2/2
001 LineStart # Group
002 LineEnd # Insert+
          F1+Insert
          F2 Edit
          F3 Purge
          F4 Simu X
          CLR Dele
          ENT Step
    
```

Reference Section 9.2 and 9.24 From the Insert screen, select option 2.

Change the move speed with the SHF key

When line start location is reached press F4

Press 5.

Use alphanumeric keys to change the dispense speed (pattern speed).

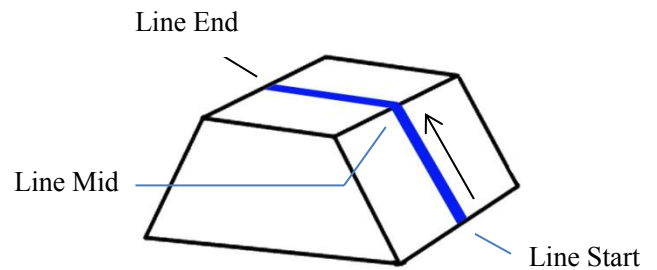
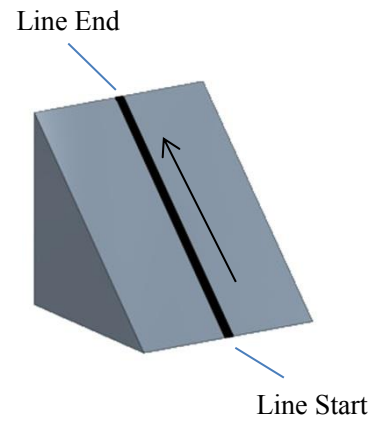
Press ENT twice.

If "GO" is flashing, at the top of the screen press ENT GO

Use alphanumeric keys to move the line end location and press ENT

Press ESC twice

The program can now be downloaded or edited further.



## How to Create a Multiple Point Elevated Line

```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge Esc Back
    
```

```

#LineMid Hi 002
X 117.39 ↑ Z↓
Y 067.45 ← → F2 Close
Z 067.93 ↓ Z↑ F3 End
Orig Origin F4 Param ENT Save
    
```

```

Points List 3/3
001 LineStart # Group
002 LineMid # Insert+
          F1+Insert
          F2 Edit
          F3 Purge
          F4 Simu X
          CLR Dele
          ENT Step
    
```

Reference Section 9.2 and 9.24

From the Insert screen, select option F1

Follow the instructions in Section 9.16 for creating a Polyline.

Press ESC twice

The program can now be downloaded or edited further.

### 9.13 How to Create an Arc

```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge
ESC Back
    
```

Reference Section 9.2 and 9.24. From the Insert screen, select option 9.

```

Arc Start
Hi
X 068.91
Y 121.44
Z 069.36
OR Origin F4 Param ENT Save
    
```

Change the move speed with the SHF key.

When arc start location is reached press F4

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
ESC Back
    
```

Press 5.

```

Pattern Params
Pattern Speed:015.0mm/s
Off Distance:000.0mm
ENT Save ESC Back
    
```

Use alphanumeric keys to change dispense speed (pattern speed).

Press ENT twice.

```

Arc Start GO
Hi
X 068.91
Y 121.44
Z 069.36
OR Origin F4 Param ENT Save
    
```

If "GO" is flashing at the top of the screen press

GO then press ENT

```

# Arc Mid
Hi
X 099.60
Y 151.01
Z 069.36
OR Origin F4 Param ENT Save
    
```

Use jog keys to move to Arc mid-point location.

Press ENT

```

Arc End
Hi
X 185.59
Y 099.25
Z 069.36
OR Origin F4 Param ENT Save
    
```

Use jog keys to move to Arc end-point location.

Press ENT

```

Points List 3/3
001 Arc Start # Group
002 Arc Mid F2 Insert+
003 Arc End F1+Insert
F2 Edit
F3 Purge
F4 Simu X
CUP Dele
ENT Step
    
```

Press ESC twice.

```

Name:ARC
1 Home Adj F1 Purge Set
2 Array F2 File Edit
ENT Download F3 Data Check
# Backup F4 File Param
ESC Back
    
```

Press F4

```

Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
SHF Shift ENT Save ESC Back
    
```

Press 2

```

Params -- Default 1 1/1
Feed on delay:00000ms
Feed off delay:00000ms
Retract Speed:020.0mm/s
Retract Heigh:015.0mm
F2 Page SHF Shift ENT Save
    
```

Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press ENT

```

Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
SHF Shift ENT Save ESC Back
    
```

Press 4

```

Park LOC
1 Start Point
2 End Point
3 Origin
4 Specify Point
5 Go Next File
ENT Save ESC Back
    
```

Select where the valve should go to after dispensing.

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
ESC Back
    
```

(Optional) Use the alphanumeric keys to select a park location.

ENT ENT then ESC

```

Name:ARC
1 Home Adj F1 Purge Set
2 Array F2 File Edit
ENT Download F3 Data Check
# Backup F4 File Param
ESC Back
    
```

To save, press ENT

F1 Starts the dispensing cycle



## 9.14 How to Create a Circle (3-Point Method)

```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge Esc Back
    
```

**Reference Section 9.2**  
From the Insert screen, select option 0.

```

Program method
1 Teach three points
2 Input length params
    
```

Select option 1.

```

Cir Start
Hi
X 060.98
Y 102.99
Z 064.93
Orig Origin Param Save
    
```

Change the move speed with the SHF key.  
When circle start location is reached press F4

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
Esc Back
    
```

Press 5.

```

Pattern Params
Pattern Speed:015.0mm/s
Off Distance:000.0mm
Ent Save Esc Back
    
```

Use alphanumeric keys to change dispense speed. (Pattern Speed).

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
Esc Back
    
```

Press ENT twice.

```

Cir Start GO
Hi
X 060.98
Y 102.99
Z 064.93
Orig Origin Param Save
    
```

If "GO" is flashing at the top of the screen press GO then press ENT

```

Cir Mid
Hi
X 123.68
Y 040.28
Z 064.93
Orig Origin Param Save
    
```

Use jog keys to move to circle mid point location.

Press ENT

```

Cir End
Hi
X 153.15
Y 169.81
Z 064.93
Orig Origin Param Save
    
```

Use jog keys to move to circle mid point location.

Press ENT

```

Points List 3/3
001 Cir Start #Group
002 Cir Mid Z Insert+
003 Cir End F1+Insert
Edit
Purge
F3 Simu X
CUP Dele
Ent Step
    
```

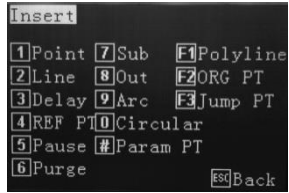
Press ESC twice.

```

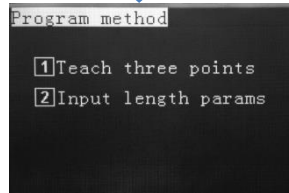
Name:CIRCLE
1 Home Adj F1 Purge Set
2 Array F2 File Edit
Ent Download F3 Data Check
# Backup F4 File Param
Esc Back
    
```

Follow instructions, on next page, by ●

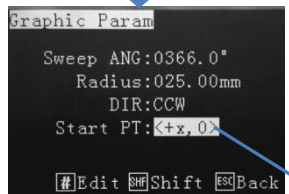
## 9.15 How to Create a Circle (Inputting Dimensions)



**Reference Section 9.2**  
From the Insert screen,  
Select option 0.

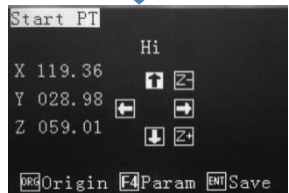


Select option 2.



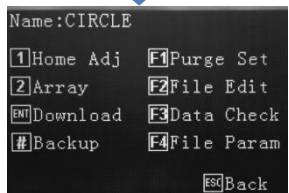
Use arrows to input data  
Choose direction with  
Choose start Point with  
With **SHF** then press **#**

**Refer to 9.23**

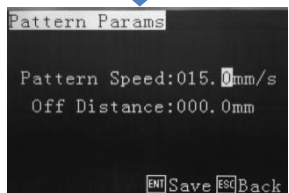


Use jog keys to move to  
circle start point location.

Press **F4**

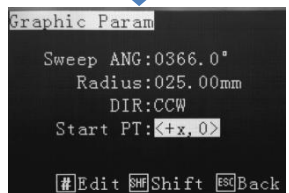


Press 5.



Use alphanumeric keys to  
change dispense speed.  
(Pattern Speed).

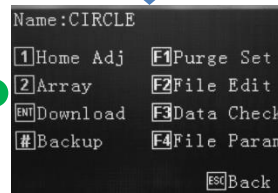
Press **ENT**



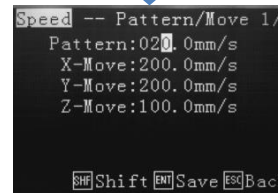
Press **ENT**



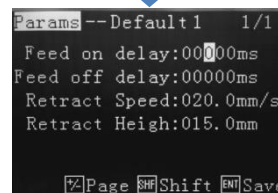
Press **ESC** twice



Press **F4**

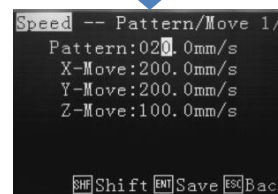


Press 2

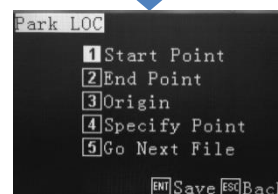


Use the alphanumeric keys to  
change the retract speed,  
retract height and feed  
on/feed off delay.

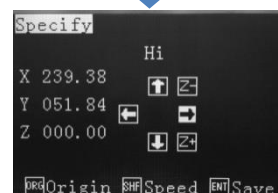
Press **ENT**



Press 4

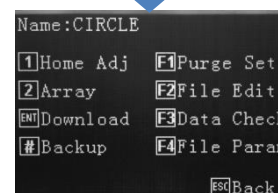


Select where the valve should  
go to after dispensing.



(Optional) Use the  
alphanumeric keys to select  
a park location.

**ENT** **ENT** then **ESC**



To save, press **ENT**

**F1** Starts the  
dispensing  
cycle

## 9.16 How to Create a Polyline (Multiple Joined Lines)

```
Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge
ESC Back
```

Reference Section 9.2 and 9.24. From the Insert screen, Select option **F1**

```
LineStart 001
Hi
X 044.16
Y 067.45
Z 067.93
F2 Close
F3 End
CUR Prev
ORG Origin F4 Param ENT Save
```

Change the move speed with the **SHF** key

When line start location is reached, press **F4**

```
Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
ESC Back
```

Press 5 (Repeat this speed change for every LineMid in the Points List).

```
Pattern Params
Pattern Speed:015.0mm/s
Off Distance:000.0mm
ENT Save ESC Back
```

Use alphanumeric keys to change the dispense speed (Pattern Speed).

Press **ENT** twice.

```
LineStart GO 001
Hi
X 044.16
Y 067.45
Z 067.93
F2 Close
F3 End
CUR Prev
ORG Origin F4 Param ENT Save
```

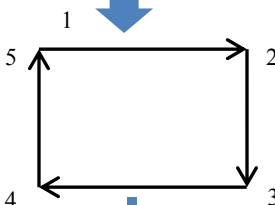
If "GO" is flashing, at the top of the screen

**GO** then press **ENT**

```
# LineMid 002
Hi
X 117.39
Y 067.45
Z 067.93
F2 Close
F3 End
CUR Prev
ORG Origin F4 Param ENT Save
```

Use jog keys to move to next position.

Press **ENT**



Continue moving to each location and press **ENT**

Press **F3** at the final location to end the pattern.

```
Points List 3/3
001 LineStart # Group
002 LineMid 7 Insert+
003 LineEnd F1+Insert
F2 Edit
F3 Purge
F4 Simu X
CUR Dele
ENT Step
```

Press **ESC** twice.

```
Name:POLYLINE
1 Home Adj F1 Purge Set
2 Array F2 File Edit
ENT Download F3 Data Check
F Backup F4 File Param
ESC Back
```

Press **F4**

```
Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
SHF Shift ENT Save ESC Back
```

Press 2

```
Distance Params
Teach Heigh:000.0mm
Park Height:000.0mm
Off Distance:000.0mm
Lift Height:005.0mm
ENT Save ESC Back
```

Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press **ENT**

```
Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
SHF Shift ENT Save ESC Back
```

Press 4

```
Params -- Feed
F1 Not
F2 Default: 1 2 3 4 5
F3 Custom
F Edit ENT Save ESC Back
```

Select where the valve should go to after dispensing.

```
Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
ESC Back
```

(Optional) Use the alphanumeric keys to select a park location.

**ENT** **ENT** then **ESC**

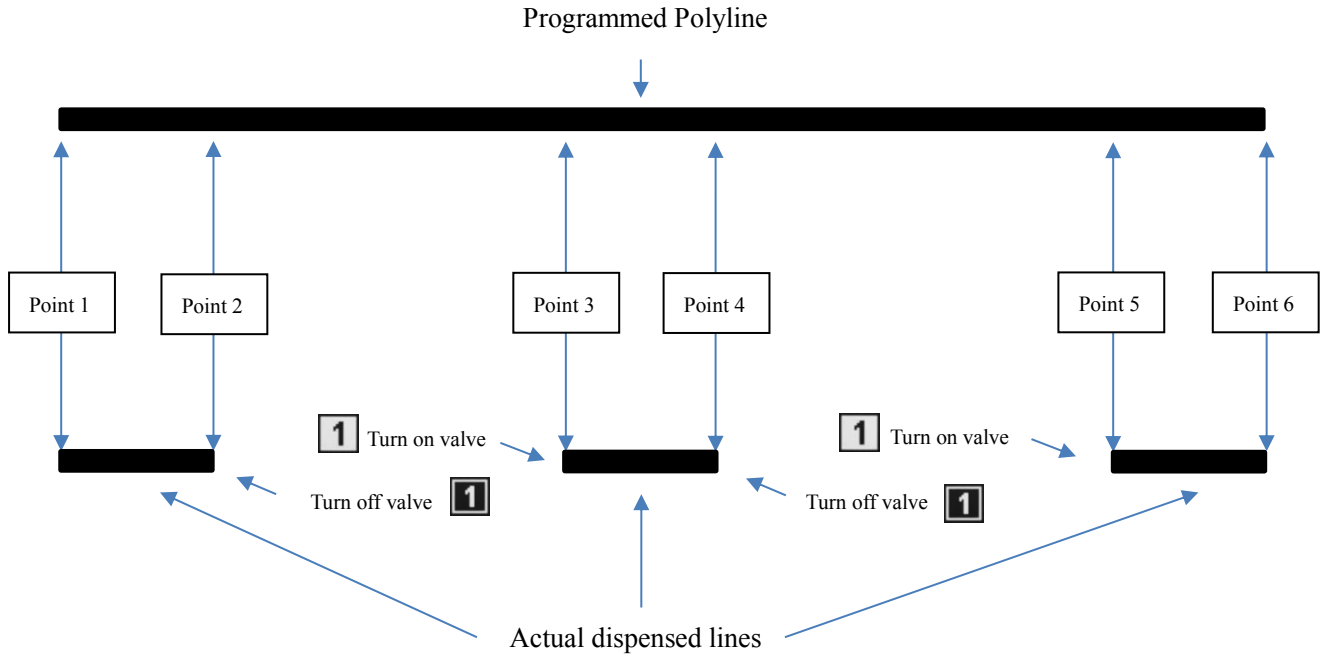
```
Name:POLYLINE
1 Home Adj F1 Purge Set
2 Array F2 File Edit
ENT Download F3 Data Check
F Backup F4 File Param
ESC Back
```

To save, press **ENT**

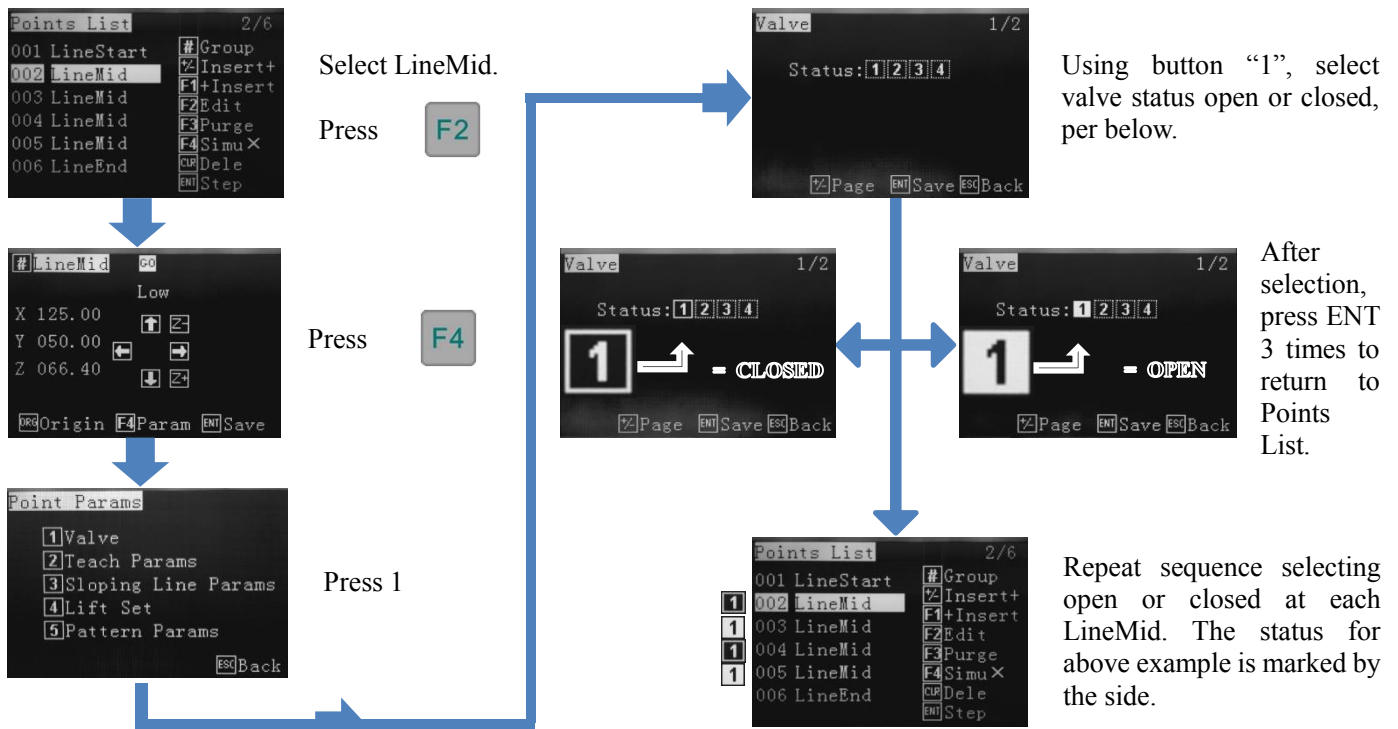
**F1** Starts the dispensing cycle

## 9.17 How to Create an Interrupted Polyline Whilst Moving

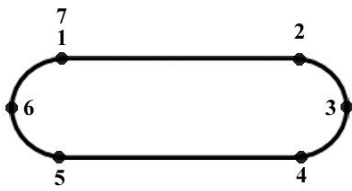
This program makes one continuous line whilst the dispensing valve is opened and closed as instructed by the robot. The dispensing valve remains at one height during the entire line. It is easier to write Polyline and “mid” positions first and change the valve open/closed status second in Edit mode. This method helps to prevent “dog bones”, at the end of the lines.



### Reference section 9.16



## 9.18 How to Create Parallel Lines Connected by Arcs



- 1 Line Start
- 2 Line Mid
- 3 Arc Mid
- 4 Line Mid
- 5 Line Mid
- 6 Arc Mid
- 7 End

```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge
Esc Back
    
```

Reference Section 9.2 and 9.24 From the Insert screen, Select option **F1**

```

LineStart 001
Hi
X 052.41
Y 019.51
Z 070.51
F2 Close
F3 End
Orig Origin F4 Param Ent Save
    
```

Change the move speed with the **SHF** key.

When line start location is reached (1), press **ENT**

```

# LineMid 002
Low
X 198.58
Y 020.11
Z 070.51
F2 Close
F3 End
Orig Origin F4 Param Ent Save
    
```

When line mid location is reached (2), press **ENT**

Press **#**

```

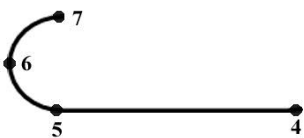
# Arc Mid 003
Mid
X 225.74
Y 050.30
Z 070.51
F2 Close
F3 End
Orig Origin F4 Param Ent Save
    
```

When arc mid location is reached (3), press **ENT**

```

# LineMid 003
Mid
X 198.38
Y 079.89
Z 070.51
F2 Close
F3 End
Orig Origin F4 Param Ent Save
    
```

When line mid location is reached (4), press **ENT**



Repeat above process for Lines/Arc points 4 – 7. When final position is Reached, press **F3**

```

Points List 7/7
001 LineStart # Group
002 LineMid % Insert+
003 Arc Mid F1 +Insert
004 LineMid F2 Edit
005 LineMid F3 Purge
006 Arc Mid F4 SimuX
007 LineEnd CLR Dele ENT Step
    
```

Lines and arcs are listed in the Points List.

Press **ESC** twice

```

Name: TRACK
1 Home Adj F1 Purge Set
2 Array F2 File Edit
ENT Download F3 Data Check
# Backup F4 File Param
Esc Back
    
```

Press **F4**

```

Speed -- Pattern/Move 1/3
Pattern: 020.0mm/s
X-Move: 200.0mm/s
Y-Move: 200.0mm/s
Z-Move: 100.0mm/s
SHF Shift ENT Save Esc Back
    
```

Press **1**

```

Speed -- Pattern/Move 1/3
Pattern: 020.0mm/s
X-Move: 200.0mm/s
Y-Move: 200.0mm/s
Z-Move: 100.0mm/s
SHF Shift ENT Save Esc Back
    
```

Input pattern speed...

press **ENT**

```

Distance Params
Teach High: 000.0mm
Park Height: 000.0mm
Off Distance: 000.0mm
Lift Height: 005.0mm
ENT Save Esc Back
    
```

Press **2** and use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press **ENT**

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
Esc Back
    
```

(Optional) Press **4** and use the alphanumeric keys to select a park location. then **ENT ENT**

**ESC**

```

Params -- Feed
F1 Not
F2 Default: 1 2 3 4 5
F3 Custom
# Edit ENT Save Esc Back
    
```

Press **ENT** then **ESC**

```

Name: TRACK 0000.0s
Status: Stop
Tally: 00000
X 054.68 F1 Start F2 Stop
Y 019.36 F3 Purge F4 Set
Z 000.00 Orig CLR Clear
Orig Org CLR Clear
Esc Back
    
```

Press **F1**

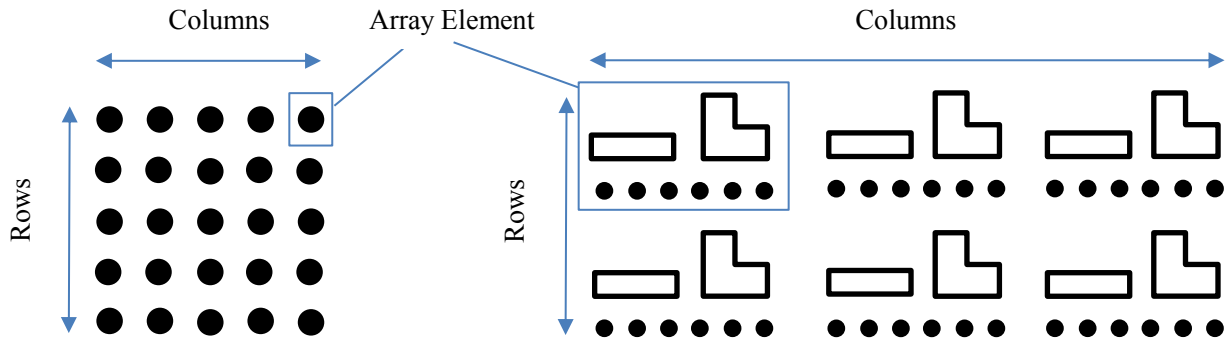
This starts the dispensing cycle.



## 9.19 How to Create an Array Pattern



An Array Pattern is a series of dispensing parameters in a programmed number of rows and columns. The array can either be made up of rows and columns of dots, or rows and columns of multi-point patterns. Only 1 dot, or 1 pattern, is needed to be created and by using the Array function capability, the teaching pendant will plot the co-ordinates of each “array element”.



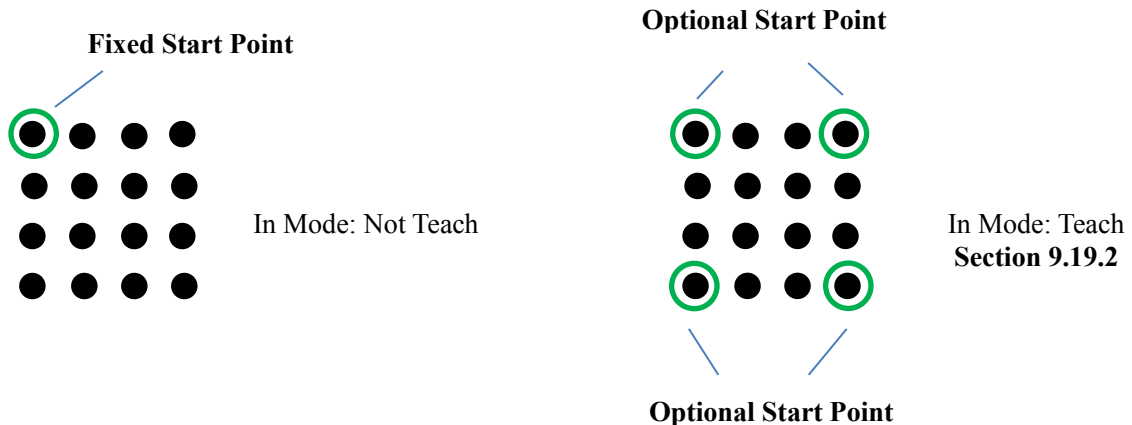
Example of 25 (5 rows x 5 columns) bottles for filling with ink.

Example of 6 (2 rows x 3 columns) automotive switches for dispensing conductive grease onto.

There are 2 options to create an Array Pattern:

1. **Array function outside of the main program:** This is a quick and simple way to create an array. All patterns in the main program will be set in the same Array function. The co-ordinates of each point in the array are not recorded in the main program so editing is limited. **Follow Section 9.19.3**
2. **Array function within the program “Points List”-** The co-ordinates of each point in the array is recorded in the program “Points List”. This function also allows multiple arrays to be created within the program with the ability to edit any point, if required. **Follow Section 9.19.4**

All array patterns will start at the top left co-ordinate first, unless set in teach mode and then any corner co-ordinate can be selected.



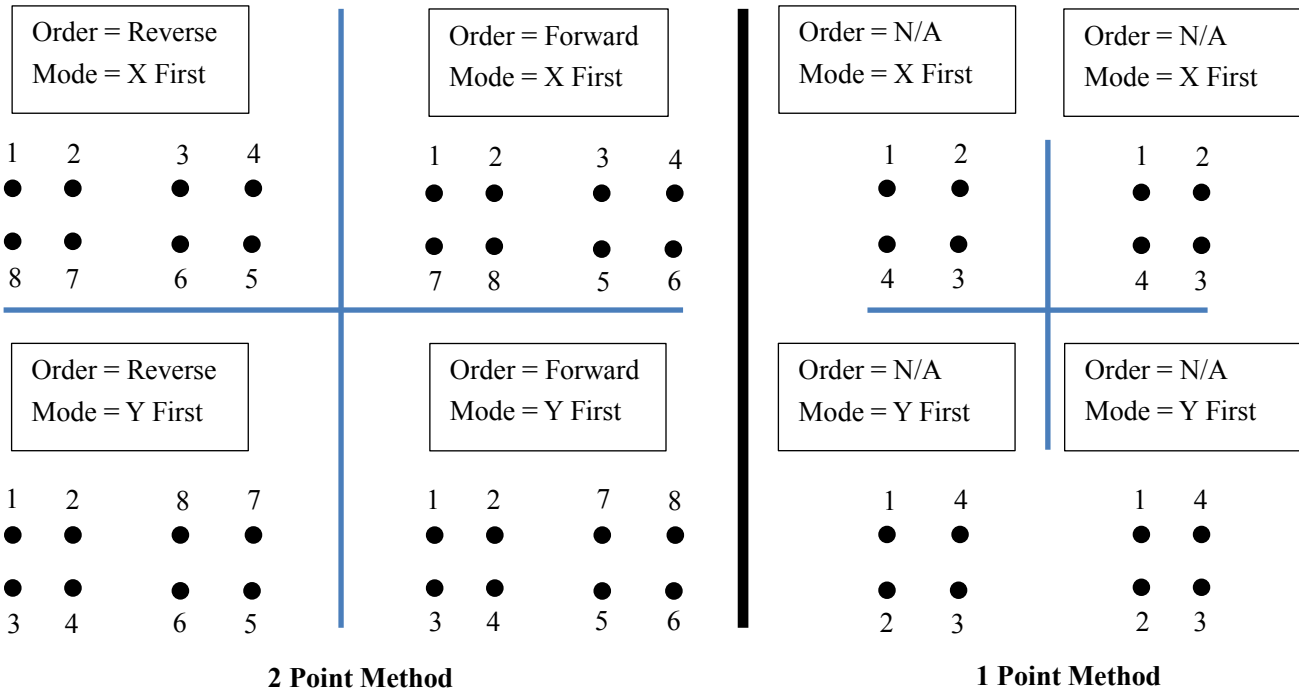
### 9.19.1 Array Pattern Directional Setting

Please note these instructions, they will be referred to in the following pages:

There are 4 pre-set options to set the array pattern move direction in the Points List array:

1. Order = Reverse; Mode = X First
2. Order = Forward; Mode = X First – works in 2 point method only
3. Order = Reverse; Mode = Y First
4. Order = Forward; Mode = Y First – works in 2 point method only

The examples below show the pattern move direction for each option. The Points List program was created with 2 points (1 and 2). The array pattern was created with 2 rows and 2 columns.



#### Advantages of 1 Point and 2 Point Method

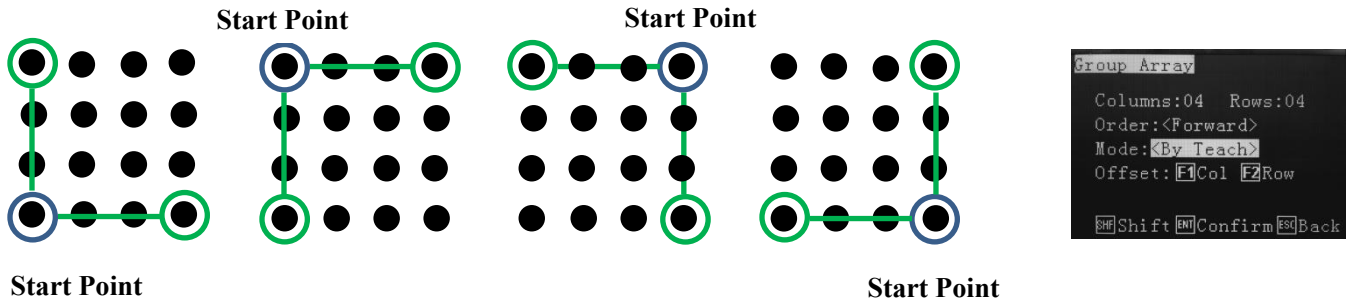
The 1 point method does not allow changes to the “Order”, so the pattern on the right is followed whereby only Mode can be changed – Mode allows the pattern to follow a X or Y movement. This method is also used when the array pattern in an odd number of pattern elements (5 x 5, 9 x 9). Even pattern elements work also but without the Order feature.

The 2 point method allows full use of directional Order in combination with the Mode, so the pattern on the left is followed. This methods will work with an even nukber of pattern elements only (4 x 4, 10 x 10).

**If Order (Forward/Reverse) and/or Mode (X-first/Y-first) are not important to the dispensing application continue with the the 1 point method for ease of programming.**

### 9.19.2 Array Pattern Starting Position (can only be set in “Mode: Teach”)

The array pattern can be started in any corner co-ordinate. The robot should be moved to the starting position and the co-ordinate saved. The furthestmost corner should then be set in the X and Y positions. The robot will automatically plot the other array co-ordinates based on the number of rows and columns set.



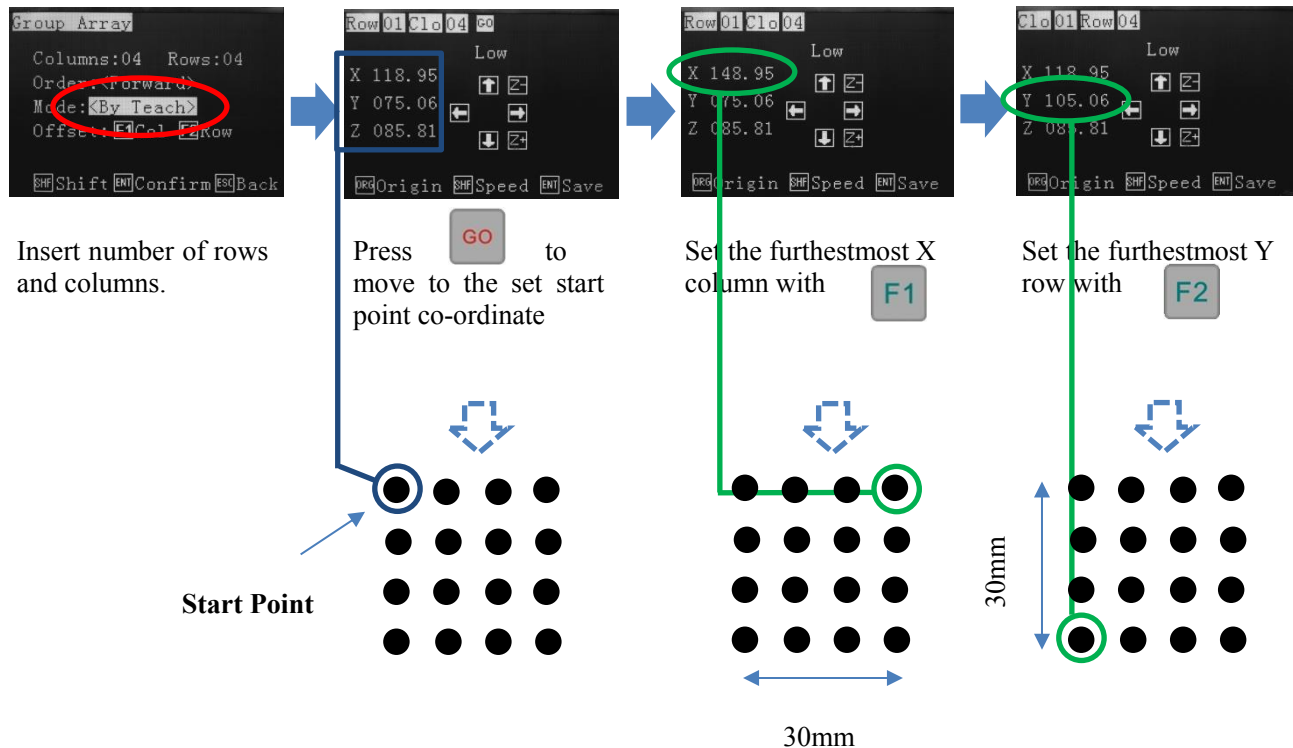
**Note:**

**Columns:** Set how many rows and columns – above example would be set to **Column: 4 Row: 4**

**Order:** Cannot be changed

**Offset: F1 Col** – Only set the furthestmost X column. Do not set the Y co-ordinate here.

**Offset: F2 Row** – Only set the Y furthestmost Y column. Do not set the X co-ordinate here.





### 9.19.3 Creating Array Pattern Outside of the Program

```
Name:ARRAY
1]Home Adj  F1]Purge Set
2]Array     F2]File Edit
ENT]Download F3]Data Check
#]Backup    F4]File Param
           ESC]Back
```

Create the array element (dot or pattern) in the Points List. On the Download screen Press 2 (Array)

```
Group Array
Columns:10 Rows:10
Order:<Forward>
Mode:<Y First>
Offset: F1]Col F2]Row
           SHF]Shift ENT]Confirm ESC]Back
```

Input number of rows and columns.

```
Group Array
Columns:10 Rows:10
Order:<Forward>
Mode:<Y First>
Offset: F1]Col F2]Row
           SHF]Shift ENT]Confirm ESC]Back
```

Order cannot be changed.

Select Mode: X First first, Y First or Teach. Press F1 and F2 to set row and column distances. For "Teach" follow instructions in 9.19.2 – press ENT

```
Array Offset
Column:+005.00mm
Row :+005.00mm
           ENT]Confirm ESC]Back
```

If X first or Y first was selected, input offset distances.

Press ENT

```
Group Array
Columns:10 Rows:10
Order:<Forward>
Mode:<Y First>
Offset: F1]Col F2]Row
           SHF]Shift ENT]Confirm ESC]Back
```

Press ENT to go back to the download screen.

```
Name:ARRAY
1]Home Adj  F1]Purge Set
2]Array     F2]File Edit
ENT]Download F3]Data Check
#]Backup    F4]File Param
           ESC]Back
```

Either, press ENT to Download and run array program or select other options.

```
Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
           SHF]Shift ENT]Save ESC]Back
```

Press 4

```
Speed -- Pattern/Move 1/3
Pattern:020.0mm/s
X-Move:200.0mm/s
Y-Move:200.0mm/s
Z-Move:100.0mm/s
           SHF]Shift ENT]Save ESC]Back
```

Use the alphanumeric keys to change the retract speed, retract height and feed on/feed off delay.

Press ENT

```
Park LOC
1]Start Point
2]End Point
3]Origin
4]Specify Point
5]Go Next File
           ENT]Save ESC]Back
```

Press 4

```
Specify
Hi
X 239.38  ↑]Z]
Y 051.84  ←]→]
Z 000.00  ↓]Z+]
           ESC]Origin SHF]Speed ENT]Save
```

Select where the valve should go to after dispensing. If 4 follow below.

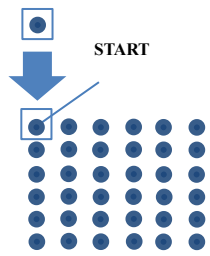
```
Name:ARRAY
1]Home Adj  F1]Purge Set
2]Array     F2]File Edit
ENT]Download F3]Data Check
#]Backup    F4]File Param
           ESC]Back
```

Make other changes

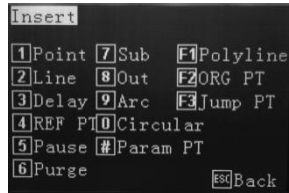
or

press ENT to Download

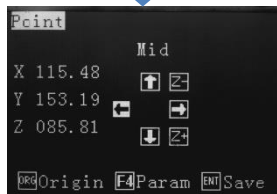
### 9.19.4 Creating Array Pattern Inside the Points List – Single Point Element



6 x 6 array to be created from a single dot element, showing start position and travel direction.

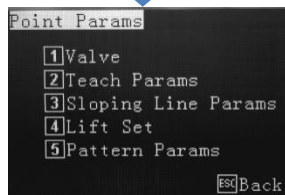


**Reference Section 9.2**  
From the Insert screen, select option 1.

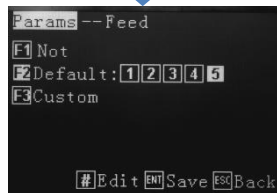


Change the move speed with the **SHF** key.

Press **ENT** at the dot location  
Press **F4**

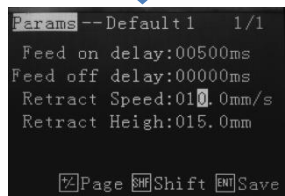


Press 2 – Teach Params

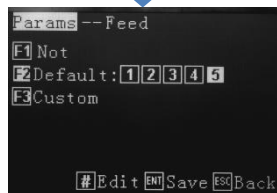


Ensure F2 is highlighted.

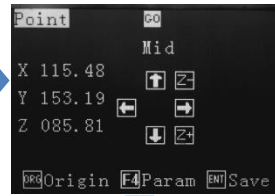
Press **#**



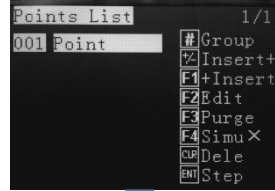
Set Feed on delay (dispensing time)  
Set retract height and speed.  
Press **ENT**



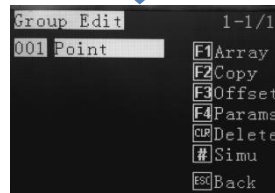
Press **ENT** twice.



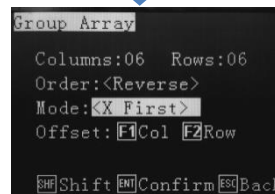
Press **ENT**



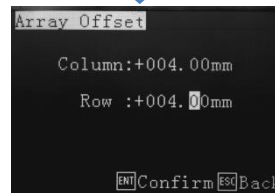
Press **#**



Press **F1**

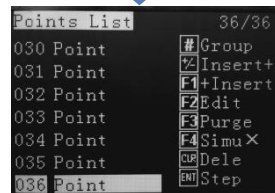


Input number of rows and columns. Order cannot be changed. Set "Mode" – dispensing direction.  
Press either **F1** or **F2**



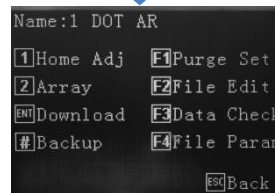
Input row and column distances.

Press **ENT** twice.



Continue editing or...

Press **ESC** twice.

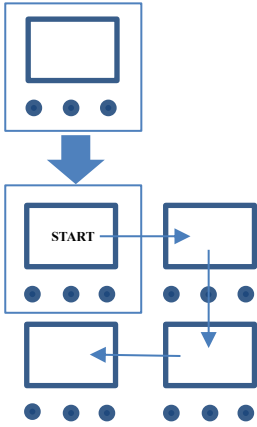


Continue editing or...

Press **ENT** to download.

Press **F1** to start.

### 9.19.5 Creating Array Pattern Inside the Points List – Pattern Element



This is the pattern element to be created.

This is the 2 x 2 array to be created from the pattern element showing start position and “X” travel direction.

```

Insert
1]Point 7]Sub F1]Polyline
2]Line 8]Out F2]ORG PT
3]Delay 9]Arc F3]Jump PT
4]REF PT 0]Circular
5]Pause #]Param PT
6]Purge
[ESC]Back
    
```

**Reference Section 9.2**  
From the Insert screen, select option 1.

```

LineStart
Hi
X 157.54
Y 153.93
Z 085.81
[OR]Origin F4]Param [ENT]Save
    
```

Create the pattern element.

```

Points List 1/7
001 LineStart #]Group
002 LineMid %]Insert+
003 LineMid F1]+Insert
004 LineEnd F2]Edit
005 Point F3]Purge
006 Point F4]SimuX
007 Point [C]Dele [ENT]Step
    
```

All co-ordinates are listed in the Points List.

Press #

```

Group Edit 1-1/7
001 LineStart F1]Array
002 LineMid F2]Copy
003 LineMid F3]Offset
004 LineEnd F4]Params
005 Point [C]Dele
006 Point #]Simu
007 Point [ESC]Back
    
```

Use up/down arrow keys to select all co-ordinates.

```

Group Edit 1-7/7
001 LineStart F1]Array
002 LineMid F2]Copy
003 LineMid F3]Offset
004 LineEnd F4]Params
005 Point [C]Dele
006 Point #]Simu
007 Point [ESC]Back
    
```

When all co-ordinates are selected press ENT

Press F1

```

Group Array
Columns:02 Rows:02
Order:<Reverse>
Mode:<X First>
Offset: F1]Col F2]Row
[SH]Shift [ENT]Confirm [ESC]Back
    
```

Input number of rows and columns. Order cannot be changed. Set “Mode” – dispensing direction. Press either F1 or F2

```

Array Offset
Column:+040.00mm
Row :+040.00mm
[ENT]Confirm [ESC]Back
    
```

Input row and column distances. Press ENT twice.

```

Group Array
Columns:02 Rows:02
Order:<Reverse>
Mode:<X First>
Offset: F1]Col F2]Row
[SH]Shift [ENT]Confirm [ESC]Back
    
```

Press ENT

```

Points List 28/28
022 LineStart #]Group
023 LineMid %]Insert+
024 LineMid F1]+Insert
025 LineEnd F2]Edit
026 Point F3]Purge
027 Point F4]SimuX
028 Point [C]Dele [ENT]Step
    
```

Continue editing or... Press ESC twice.

```

Name:PATTERN
1]Home Adj F1]Purge Set
2]Array F2]File Edit
[ENT]Download F3]Data Check
#]Backup F4]File Param
[ESC]Back
    
```

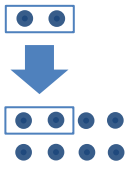
Continue editing or... Press ENT to download.

```

Name:PATTERN 0036.6s
X 171.94 Status:Stop
Y 035.96 Tally:00001
Z 000.00 F1]Start F2]Stop
[C]Org [C]Clear
[ESC]Back
    
```

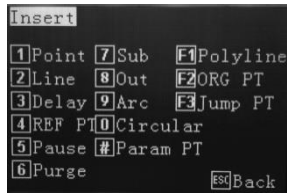
Press F1 to start.

### 9.19.6 Creating Array Pattern Inside the Points List – 2 Point or 2 Pattern Element Method

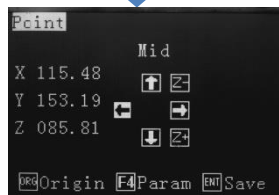


The Points List is made up of 2 dots. When applying row and column values the 2 dots will be arraying 2 dots by a 2 x 2 array the result will be a total of 8 dots.

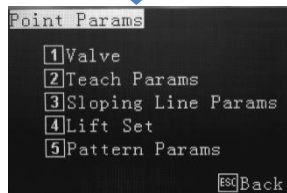
**Advantage: Full Mode/Order directional movement as per section 9.19.1 – not suitable for an array with an odd number of elements, example 5 x 5 (25 positions), 7 x 7 (49 positions).**



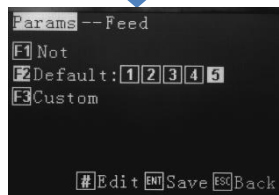
**Reference Section 9.2**  
From the Insert screen, select option 1.



Insert the first dot co-ordinates

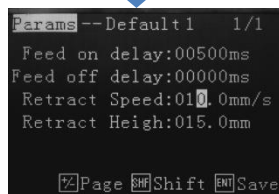


Press 2 – Teach Params

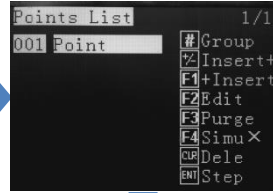


Ensure F2 is highlighted.

Press #

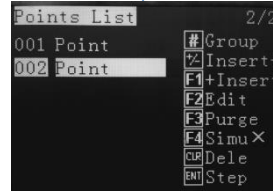


Set Feed on delay (dispensing time)  
Set retract height and speed.  
Press ENT



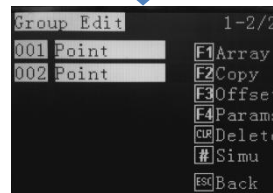
Press F1

Insert the second dot co-ordinates (as in the illustration).



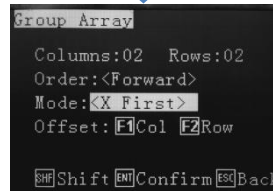
All co-ordinates are listed in the Points List.

Press #



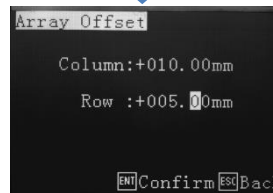
Use up/down arrow keys to select all co-ordinates.

Press F1



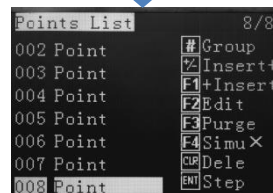
Input number of rows and columns. Order cannot be changed. Set “Mode” – dispensing direction.

Press either F1 or F2



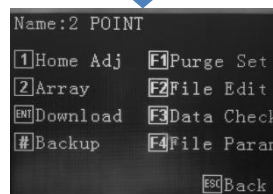
Input row and column distances, based on the pattern element.

Press ENT twice.



Continue editing or...

Press ESC twice.



Continue editing or...

Press ENT to download.

Press F1 to start.



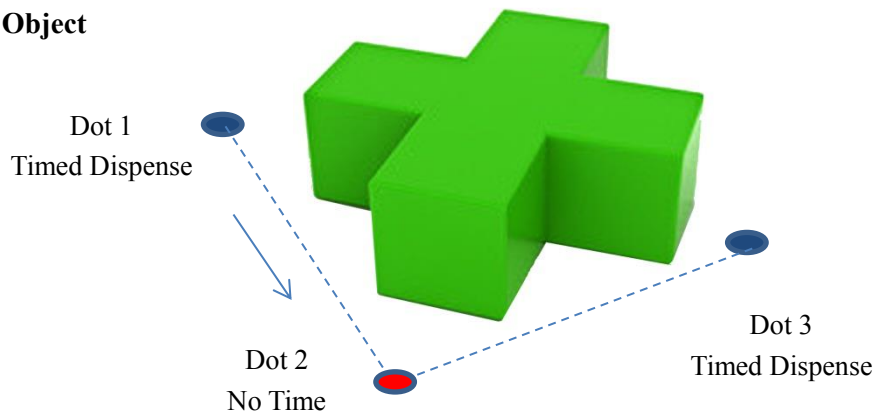
## 9.20 How to Move Around or Over a Tall Object

### Option 1 – Move Around

Program “Points” around device.

### Option 2 – Move Over

Using “Lift” height to clear device height.



### Option 1 – Move Around Device

```
Insert
1 Point 7 Sub F4 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge
```

**Reference Section 9.2**  
From the insert screen select option 1. Points will be used to create a movement, as well as dispensing co-ordinates.

```
Distance Params
Teach Heigh:000.0mm
Park Height:000.0mm
Off Distance:000.0mm
Lift Height:005.0mm
```

Input Feed on delay (dispense time), Retract Speed and Height for Dot 1. Cycle through to the Points List by pressing **ENT**

```
Points List 1/1
001 Point # Group
          # Insert+
          # +Insert
          # Edit
          # Purge
          # Simu X
          # Dele
          # Step
```

Insert Dot 1 (dispense), as per 9.10.

Press **F2**

```
Points List 2/2
001 Point # Group
002 Point # Insert+
          # +Insert
          # Edit
          # Purge
          # Simu X
          # Dele
          # Step
```

Insert move dot (Dot 2). Whilst in co-ordinate screen press “F4”. Option 2 (Teach Params) allows the use of a spare Feed slot.

```
Point Mid
X 070.19
Y 036.74
Z 067.48
```

Press **F4**

**Note:** dispense height of Dot 2 must be offset against the Dot 1 and 2 React Height so that Dot 2 passes through, without stopping and lowering at co-ordinate.

```
Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
```

Press 2 – Teach Params

```
Params -- Feed
F1 Not
F2 Default: 1 2 3 4 5
F3 Custom
```

Press **#**

```
Params -- Feed
F1 Not
F2 Default: 1 2 3 4 5
F3 Custom
```

Up to 5 dispense times can be programmed and recalled. In this example Dot 1 and 3 will use slot 1. The movement Point will use the spare slot 5.

```
Params -- Default 5 1/1
Feed on delay:00000ms
Feed off delay:00000ms
Retract Speed:010.0mm/s
Retract Heigh:000.0mm
```

Input 0.0 time and 0.0 Retract Height - prevents valve from stopping at the Dot 2 thus creating the Move command. Cycle through to Points List by pressing ENTER.

```
Points List 3/3
001 Point # Group
002 Point # Insert+
003 Point # +Insert
          # Edit
          # Purge
          # Simu X
          # Dele
          # Step
```

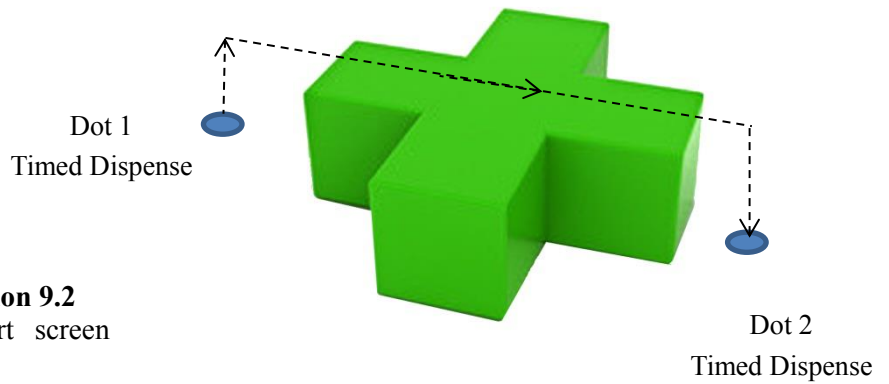
Press **#**

```
Points List 3/3
001 Point # Group
002 Point # Insert+
003 Point # +Insert
          # Edit
          # Purge
          # Simu X
          # Dele
          # Step
```

Repeat sequence for 003 Point (Dot 3). Use the same Feed slot as used for Dot 1 or antoher slot if dispense time is different.

Press **F2** then **F4**

## Option 2 – Move Over Device



```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge
    
```

**Reference Section 9.2**  
From the insert screen select option 1.

```

Point
Mid
X 036.74
Y 036.74
Z 068.76
    
```

Create both points as per **Section 9.10**

```

Distance Params
Teach High:000.0mm
Park Height:000.0mm
Off Distance:000.0mm
Lift Height:005.0mm
    
```

Set dispense time, for Dot 1 and/or, Retract Speed and Retract Height. **Ensure Retract Height is high enough to clear device.**

```

Points List 2/2
001 Point # Group
002 Point # Group
    
```

Press **F2** to edit dot.

```

Points List 2/2
001 Point # Group
002 Point # Group
    
```

Repeat sequence for 002 Point (Dot 2). Feed slot 2 can be selected if the parameters are different, or continue to use Feed slot 1.

```

Point
Mid
X 070.19
Y 036.74
Z 067.48
    
```

Press **F4**

Either continue to insert patterns or press **ESC** twice to modify or download the program.

```

Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
    
```

Press 2 – Teach Params

```

Insert
1 Point 7 Sub F1 Polyline
2 Line 8 Out F2 ORG PT
3 Delay 9 Arc F3 Jump PT
4 REF PT 0 Circular
5 Pause # Param PT
6 Purge
    
```

```

Params -- Feed
F1 Not
F2 Default: 1 2 3 4 5
F3 Custom
    
```

Up to 5 dispense times can be programmed and recalled. Dot 1 & 2 will use slot 1, in this example, meaning both dots will have the same dispense time.

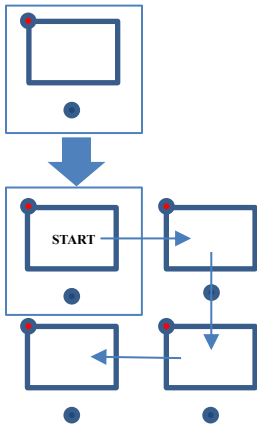
```

Name:DOT 0000.0s
X 239.38 Status:Stop
Y 051.84 Tally:00000
Z 000.00 F1 Start F2 Stop
    
```

Press **#**

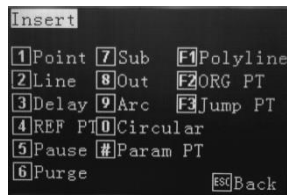
## 9.21 Copying and Pasting a Pattern

Copying and pasting a pattern saves the user a lot of time as only the first pattern element requires programming. Once the first element is created it can be copy and pasted as many times as required. Each individual co-ordinate will be listed in the programs Point List enabling further editing, if needed. Although the pattern can be jogged to the next pattern, it is better practice to input the true measurement using the numeric keys.



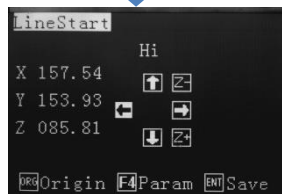
This is the pattern **element** to be created and should be written into the Points List.

This is the full pattern to be created from the pattern element showing start position and travel direction. The red dot signifies the start location of each element.

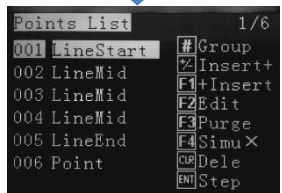


From the Insert screen, create the very first element.

POLYLINE + POINT

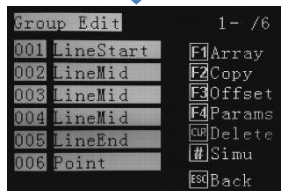


Continuing creating the pattern element.



All of Element 1's co-ordinates are listed in the Points List.

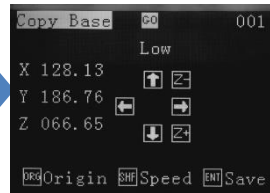
Press (Group) #



Use up/down arrow keys to select all co-ordinates of the first element.

Press ENT to confirm

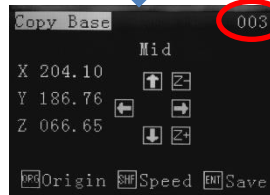
Press F2 to copy.



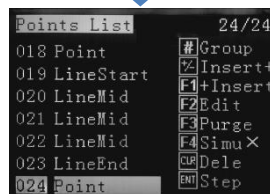
Press GO

Dispense tip will move to Element 1's (already created) start location, so does not need to be saved. Jog to each Element's start location.

Press ENT when ● reached



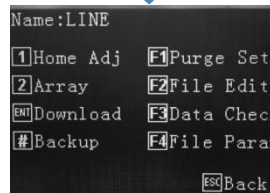
This image shows that the first 3 elements have been created. Continue until all elements are completed.



The Points list shows 24 co-ordinates – 4 Elements.

When all Elements are completed...

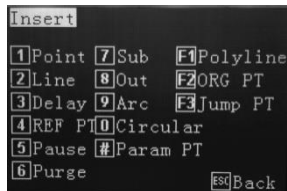
Press ESC twice.



Continue editing or download program.

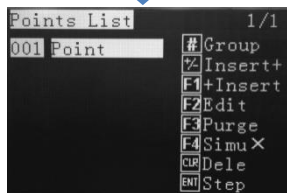
## 9.22 Operating up to 4 Dispensing Valves

The TSR2000 Series robot has the capability to operate up to 4 dispensing valves independently, by using an advanced I/O cable, available from Techcon Systems. Each valve requires a separate controller to perform this function. Triggering of each I/O signal is set in the editing screen. This example will demonstrate 2 valves dispensing different fluids, through 2 TS500R controllers, creating dots.

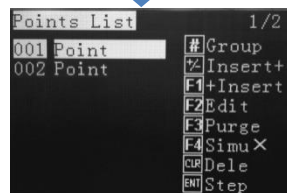


### Reference Section 9.2 and 9.10

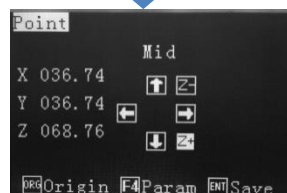
From the insert screen select option 1.



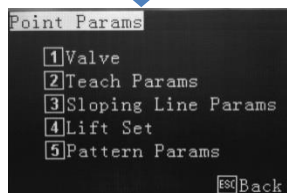
Move the **valve 1** to the dispensing location and save the point position.



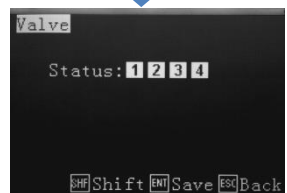
Move the **valve 2** to the dispensing location and save the point position. Both Points need to be edited. Press **F2**



Press **F4**

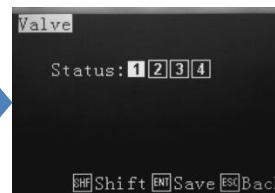


Press 1 – Valve



All outputs will become active and the user will need to switch off unused outputs.

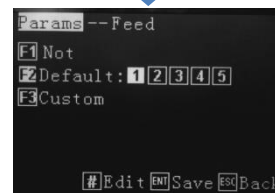
**3** Output Off  
**3** Output On



After switching off unused outputs:

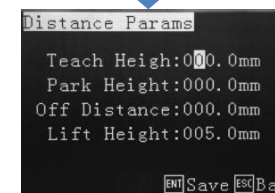
Press **ENT**

Press 2 – Teach Params.



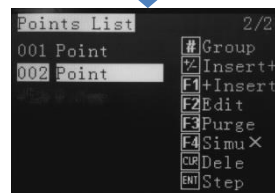
Select a Feed slot for dot 1. For this example slot 1 will be used.

Press **#**

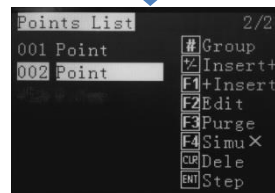


Input the dispensing time (Feed On Delay) for dot 1 along with Retract Speed and Height.

Press **ENT** until the Points List is shown.



Repeat process for Dot 2 by using Valve 2 and Feed slot 2 and setting a different Dispensing Time (Feed On Delay).



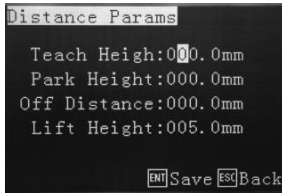
Repeat process for Dot 2 by using Feed slot 2 and setting a different Dispensing Time (Feed On Delay).



## 9.23 Definition of Additional Programming Features

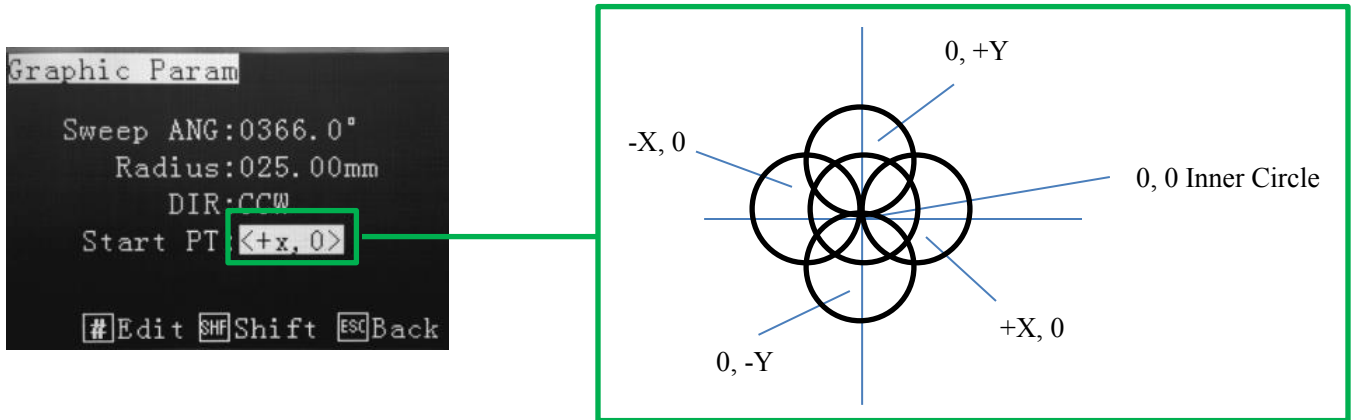
### Dot Point – Feed on Delay

In the distance parameter screen, the Feed on Delay should only be used to set the dispensing time for a dot.



### Circular – Start Point Definition

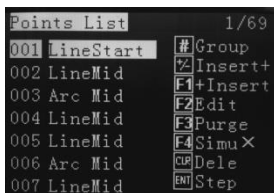
In the Graphic Parameter screen, whilst inputting circle dimensions, the Start Points are as follows, in relation the centre of the circle.



### Program Step-Through

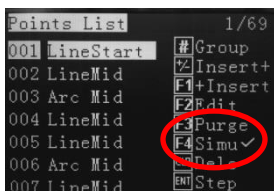
A simulated run can be performed within the points list, anytime throughout the program. Use the up/down jog keys to select where in the program the run is to be started. All co-ordinates will move at their programmed speeds. To switch between Simu X and Simu  $\sqrt$  press **F4**

By pressing **ENT** the robot will move to the next location and wait until **ENT** is press again.



#### Simu X Mode (dry run)

This mode will move to locations so the operator can verify the position and speed of the co-ordinates. Editing can be performed by pressing **F2** on a selected line.



#### Simu $\sqrt$ Mode (wet run)

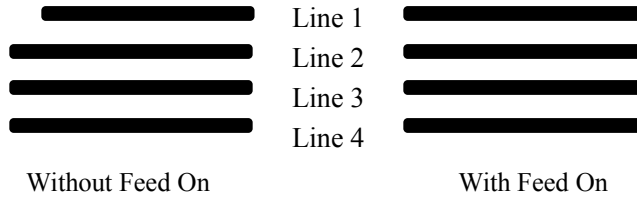
This mode will move to locations, whilst dispensing, so the operator can verify the position, speed and dispense quality of the co-ordinates. Editing can be performed by pressing **F2** on a selected line.

## 9.24 Line Dispensing Adjustments

### 9.24.1 Valve Feed On Delay - Lines

Usually, when a dispensing valve has been stationary for a period of time, for example at the beginning of a dispensing program, there is a requirement for the initial dispensing to have a delay applied. This delay is usually small, such as 50-100ms, which allows the fluid to flow and adhere to the correct position at the start of the pattern. If no delay is applied, to the first dispensing location, the dispensing will be smaller than the rest or the start of the line will be without adhesive.

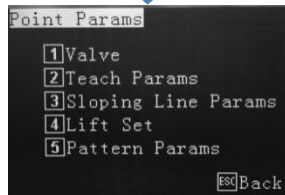
Example of line with and without feed on delay:



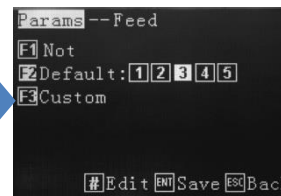
From the Line Start screen:

Press **F4**

To go to the Points Parameters screen.



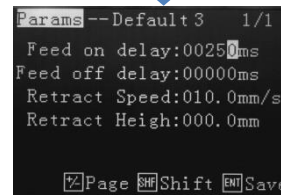
Press 2, to go to the Teach Parameters screen.



Press **F2**

Select an available Feed function, 1-5.

Press **#**



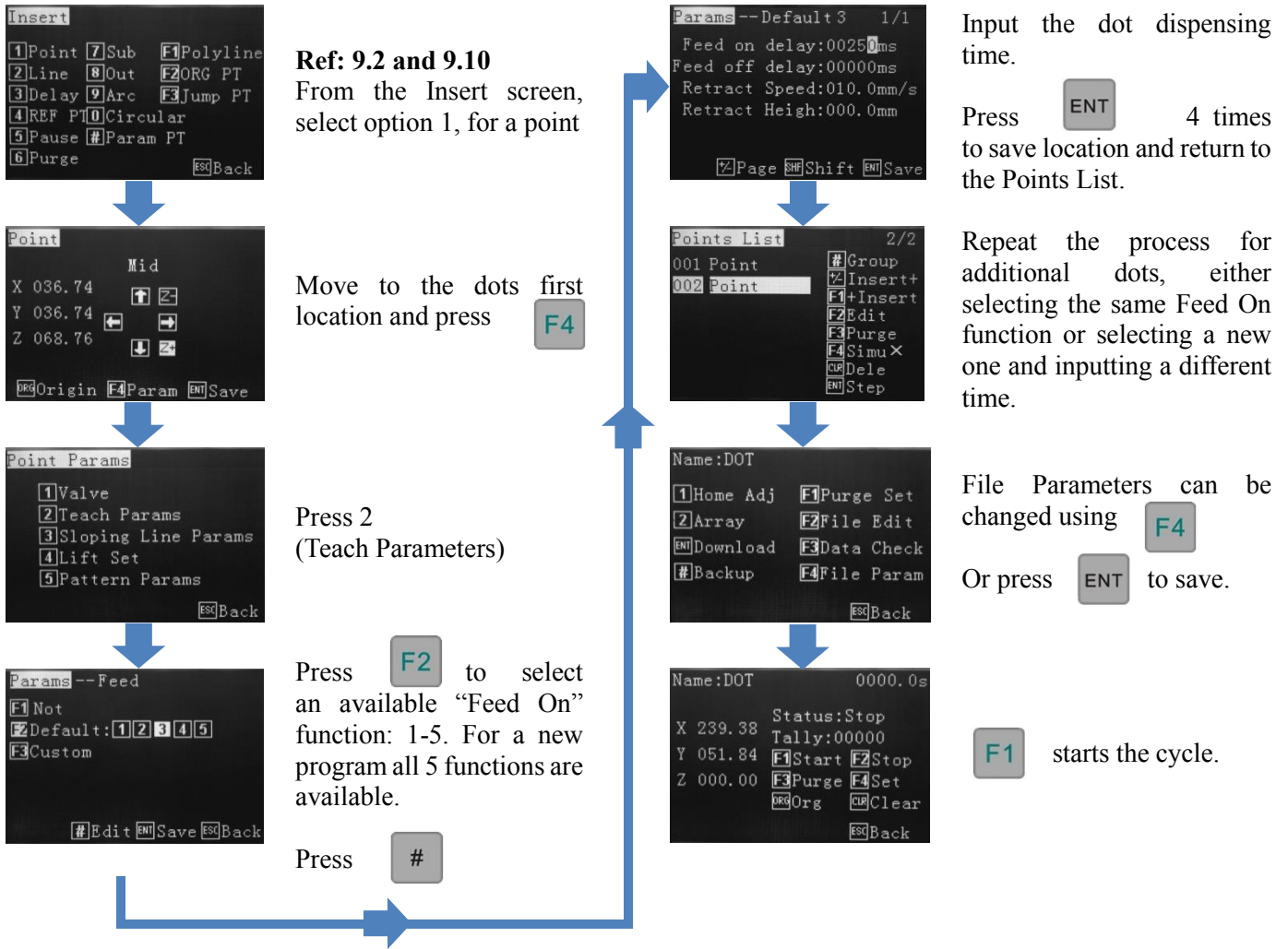
Input the Feed On delay time.

Press **ENT** until the Line Start screen is reached. Continue to program as normal.

Up to 5 Feed On delay or 5 Feed Off delay times can be set per program. **Valve Feed Off Delay** is the time the robot will stay at the end of the dispensing location before moving to the next dispensing position. No fluid will be dispensed during to the Feed Off time period. Note that dots use a feed slot and could conflict will line start delay if the same slot is chosen for a dot and a line.

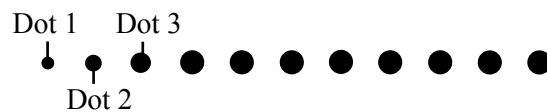
### 9.24.2 Valve Feed On Delay – Dots

Feed on delay, for a dot, sets the dot dispensing time. Up to 5 dots sizes (set by time) can be inputted per program. Feed Off delay times can be set also. **Valve Feed Off Delay** is the time the robot will stay at the end of the dispensing location before moving to the next dispensing position. No fluid will be dispensed during the Feed Off time period.



It is common, when dispensing dots, to see that the first few dots, of a new program, are smaller than the rest, if all dots are programmed with the same dispensing time. This is due to the fluid being stationary, within the syringe or pressure tank, whilst the valve is idle. The above process can be used to program the few dots slightly longer in time to compensate but it is also common practice to dispense 2-3 test dots somewhere outside of the working area, to get the fluid moving at a normal pace.

Dots 1 -3 require more dispensing time (Feed ON Delay) to achieve the same volume as the other dots, in the program.



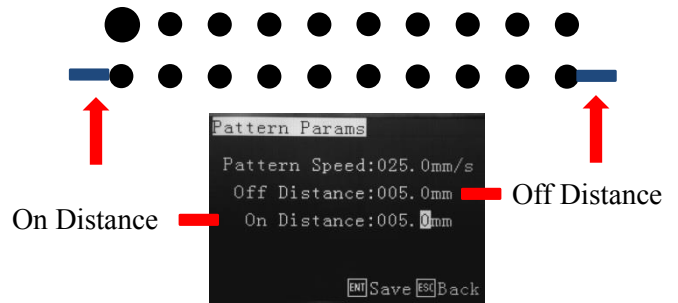
### 9.24.3 Line On/Off Distance

**On Distance** - the robot will move for a set distance before the valve starts dispensing. This prevents the first dispense being too large, for example in a jet valve line. By dispensing, whilst moving, the first dot is the same size as all other dots, within the jetted line.

Move and dispense and at the same time.

Move for preset distance and dispense whilst moving.

**Off Distance** – the robot will continue to move past the finished dispensing pattern, preventing a build up of fluid.



```
Points List 1/2
001 LineStart
002 LineEnd
#Group
F2 Insert+
F1+Insert
F2 Edit
F3 Purge
F4 SimuX
CUP Dele
ENT Step
```

Create a Line as per Section 9.11

Press **F2**

```
LineStart Mid
X 071.25
Y 078.45
Z 071.68
ORG Origin F4 Param ENT Save
```

Press **F4**

```
Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
ESC Back
```

Press 2 – Teach Params

```
Params -- Feed
1 Not
F2 Default: 1 2 3 4 5
F3 Custom
# Edit ENT Save ESC Back
```

Press **F2**

```
Params -- Default 1 1/1
Feed on delay: 00250ms
Feed off delay: 00000ms
Retract Speed: 020.0mm/s
Retract Heigh: 005.0mm
Page SHF Shift ENT Save
```

Ensure Feed slot 1 is highlighted.

Press **ENT**

```
Point Params
1 Valve
2 Teach Params
3 Sloping Line Params
4 Lift Set
5 Pattern Params
ESC Back
```

Press 5 – Pattern Params

```
Pattern Params
Pattern Speed: 025.0mm/s
Off Distance: 005.0mm
On Distance: 005.0mm
ENT Save ESC Back
```

Change Speed  
Set Off Distance.  
Set On Distance.

Keep pressing **ENT** to get to Points List

```
Points List 1/2
001 LineStart
002 LineEnd
#Group
F2 Insert+
F1+Insert
F2 Edit
F3 Purge
F4 SimuX
CUP Dele
ENT Step
```

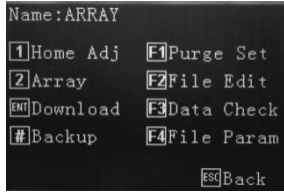
Press **ESC** twice.

```
Name: LINE
1 Home Adj F1 Purge Set
2 Array F2 File Edit
ENT Download F3 Data Check
# Backup F4 File Param
ESC Back
```

Continue to modify or press **ENT** to download

**Note:** If the pattern is 50mm in length and a 5mm On and Off Distance is set, the actual pattern will be 40mm (50mm – 5mm On – 5mm Off = 40mm). On/Off Distances should be added to the pattern length during programming or during editing.

## 10. PROGRAM PROCESSING MENU



The Program Processing Menu screen is displayed before the program is written and again after the program co-ordinates are written and prior to Download.

press 

1 -Home Adjust - described through Section 8.

2 -Array – described through Section 9.19.

ENT - Download - pressed once the program is written and will save a copy to the robot's and pendant's memory.

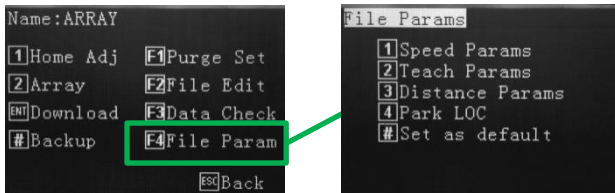
# - Backup – described in Section 7.

F1 - Purge Set – future development.

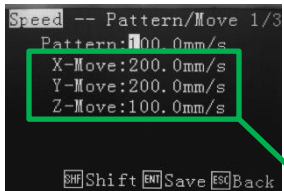
F2 - File Edit – creating or editing a file. Described in Sections 9.2 and 9.7.

F3 – Data Check – checks or co-ordinates are within the working area of the robot.


F4 - File Parameters – specific speed/movement program defaults, park position, distance parameters.

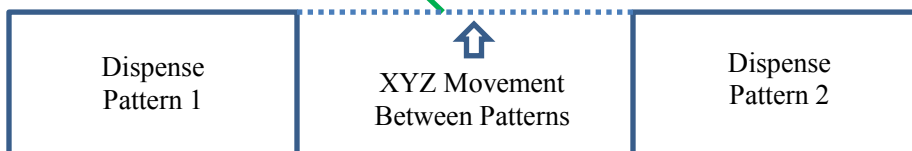


### 10.1 Speed Parameters:

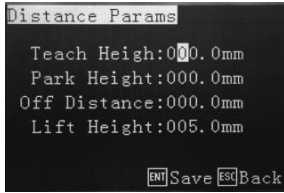


A change to the “Pattern” will apply this speed to all lines, polylines, circle and arcs, contained within the program. Individual speed changes can be changed by editing the program and selecting the co-ordinate (Line 1, Line 2), to edit.

Acceleration speeds can be changed by pressing 

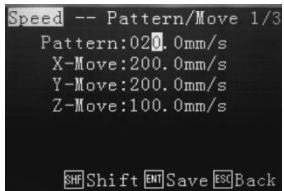


## 10.2 Teach Parameters:



The feed on delay relates the dispensing time for a dot. Feed off delay is the time the dispensing valve will stay at the end of the dispensing co-ordinate not dispensing, before moving to the next co-ordinate. Retract Speed is the speed of the tip retracting after a finished cycle and Retract height is the height the tip move up to after the dispensing of each position is complete, before moving to the next dispense location.

## 10.3 Distance Parameters:



Teach Height – during program it is usually set to 000.0, the height from moving from one point to the next is the Teach Height.

Park Height – when program is completed the Z-axis will lift to a safety height. If no co-ordinate is set the Z-axis will lift to 0 co-ordinate and back to finishing point. Before processing, the z-axis will also move to this safety point.

Off Distance – the distance at which the valve will stop dispensing **before** the finish point. Normally used when joining one line to another for a clean finish.

Lift Height – the distance the z axis will move up after a dispense cycle.

**Refer to section 9.2 - Understanding Lift Height and Retract Height**

### Note:

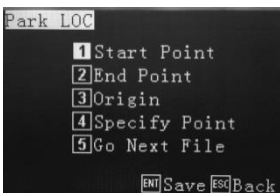
Lift height = Z-retract Height, the default lift height is 5mm and can be changed in the “Distance Params” menu. The “Lift Speed” is the same speed as the Z-speed, and cannot be changed.

Retract height = Z-retract Height, no default setting. It can be changed in the “Teach Params” menu. The “Retract Speed” also can be set in the same menu.

If the Retract height is bigger than the lift height then the Z-retract speed will override the lift height speed.

If the Retract height is less than the lift height then the Z-retract speed will apply to the retract height first.

## 10.4 Park Location:



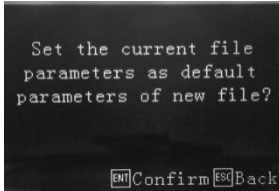
The Park Location is the position the dispensing tip should move to once the program has completed. For the tip to move the Start, End or Origin location, the operator must select option 1, 2 or 3. The operator to program a Specific Point, which is anywhere within the robots working area by using the same programming method used to create a dot. The operator can also choose to Go to next file by selecting option 5. This will display a File List and the next program to follow can be selected from the List. The selected next file will start dispensing once the original program has been completed.



When selecting Specify, the display requires a position anywhere in the robots working area to be selected. At the end of the dispensing program the tip will move to this specified location.

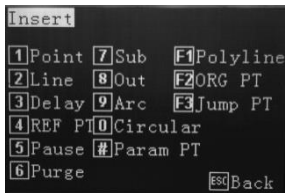


## 10.5 # Set as Default:



By applying this option all speeds, delay times, lift heights dot dispensing time, etc, will be applied to all new programs being created.







## 10.6 Insert Screen:

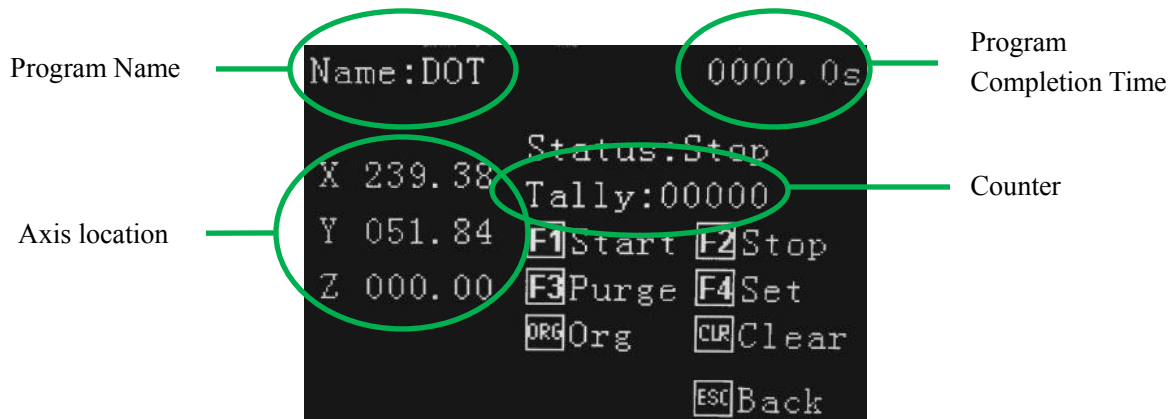


- 1 – a dispensing dot.
- 2 – a line consisting of a start and end position.
- 3 – the time delay from 1 location to the immediate next.
- 4 – Calibration Point, used when a calibration pin is fixed to the base of device fixture.
- 5 – robot pauses and waits for input signal or manual (F1) start to run the next step.
- 6 – Setting a location for the valve to wait. Adding time will allow purge with fluid.
- 7 – insert another program, from the memory, at that specific location.
- 8 – turn on output signals (UV light, another dispense valve, camera, etc)
- 9 – an arc using 3 point programming.
- 0 – a circle using 3 point programming or by inputting circle dimensions.
- # – setting motion speeds from one dispense location to another.
- F1 – a series of lines connected with no dispensing interruption.
- F2 – moves to origin position before moving to next dispensing location.
- F3 – to run the front dispensing again.

## 11. SET MENU

This display is shown once a program has been download. In the Set Menu the following can be achieved:

- Run the program by pressing 
- Stop the program by pressing 
- Perform a Purge function by pressing (separate function) 
- Set up a Looping sequence by pressing 
- Go to Origin location by pressing 
- Reset the program counter (Tally) by pressing 



## 11.1 How to Set a Program to Run in a Loop

From the Program Processing Menu, which is displayed after the program has been saved, downloaded or selected, from the the Operation Menu, the following screen will be displayed.

```
Name:DLINE      0000.0s
X 078.40      Status:Stop
                Tally:00000
Y 078.45      F1Start F2Stop
Z 000.00      F3Purge F4Set
                ORG Org  CLR Clear
                ESC Back
```

Press 

```
Loop Params
Loop Times:0000
Loop Interval:000.0s
Org Interval:0000
Purge Interval:0000
ENT Save  ESC Back
```

Set how many times the program is to loop. Set the time delay, which is the wait time between each repeated cycle.


Set the Origin Interval - the number of times the program will return to Origin.

Set the Purge Interval – the number of times the program performs a Purge function.

**Note:** The Loop, Origin and Purge functions cannot be saved as part of the program and must be set each time the robot is turned off or another program is selected.

Press 

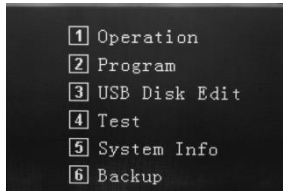
```
Name:POLYLINE   0009.1s
X 000.00      Status:Stop
                Loop00000/00150
Y 000.00      F1Start F2Stop
Z 000.00      F3Purge F4Set
                ORG Org  CLR Clear
                ESC Back
```

The display now shows the loop counter, ready to start. Press  to start the looped program.

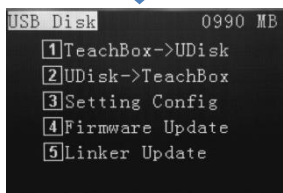
## 12. FILE TRANSFER

### 12.1 How to Transfer Program to USB Stick

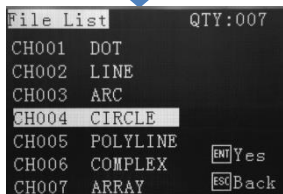
This feature is particularly useful if more than 1 robot exists at a facility and are both running the same program. By copying the program, from 1 robot to another, will save the operator time by not having to duplicate the programming. **Use 2GB or lower USB.**



Insert USB stick into teach pendant. Press 3 to go to USB menu.



Press 1.



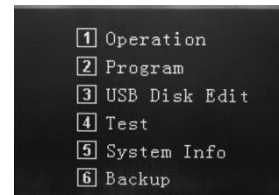
Select program to transfer from Teach Box to USB Stick.

Press .

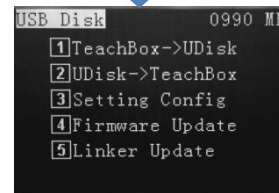
Continue transferring files, as above, if required.

Press twice to return to main menu.

### 12.2 How to Transfer Program from USB Stick



Press 3



Press 2



Select the program, stored on the USB stick.

Press .

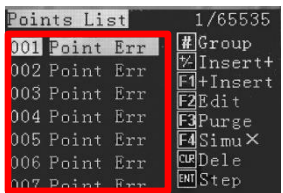
Continue transferring files, as above, if required.

Press twice to go back to main menu.

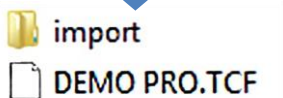


An error message will be displayed if the program selected has the same name as on the robot it is transferred to. Rename the program being transferred, using the alphanumeric keypad.

Press twice to return to the main menu.



For a variety of reasons, a conflict could occur, showing errors on the receiving teach pendant. In these cases the USB stick is required to have an empty “import” folder created, for successful importation. Transfer the program to the USB stick, then add the import folder from a standard computer. The receiving teach pendant will now be able to read the program.



## 13. TROUBLESHOOTING

### LCD is displaying “Please Reset”

- 1 – the emergency switch has been engaged.
  - Check emergency switch and if engaged release to working condition.
- 2 – the communication cable is not connected fully.
  - Check communication cable is correctly fitted and tightened.
- 3 – the “Stop” button on the teaching pendant has been pressed.
  - Press “ORG” to reset the robot’s positioning.
- 4 – the teaching pendant has developed a fault.
  - Contact Techcon Systems.

### Displaying unusual message after power up

- 1 – The hardware version is not correct.
  - Check the version of teaching pendant and PCB.
- 2 – The teaching pendant cables may have become loose or damaged.
  - If the teaching pendant cannot communicate normally, or the display is a little dark, disconnect the power supply and then disconnect and reconnect the teaching pendant.  
**DO NOT DISCONNECT THE TEACHING PENDANT WHILST THE POWER IS ON.**

### For Sales and Support:

Techcon Systems Corporate Headquarters,  
10800 Valley View Street, Cypress, California, 90630, USA.  
Tel: 1-714-230-2398, Fax: 1-714-828-2001  
E-mail: [oemorders@okinternational.com](mailto:oemorders@okinternational.com)

Techcon Systems European Corporate Office,  
Eagle Close, Chandler’s Ford Industrial Estate,  
Eastleigh, Hampshire, SO53 4NF, UK.  
Tel: +44 2380 489 100, Fax: +44 2380 489 109  
E-mail: [europa-orders@okinternational.com](mailto:europa-orders@okinternational.com)

Or visit [www.techconsystems.com](http://www.techconsystems.com)

