Instructions

Automated Dispensing System

3A5307D

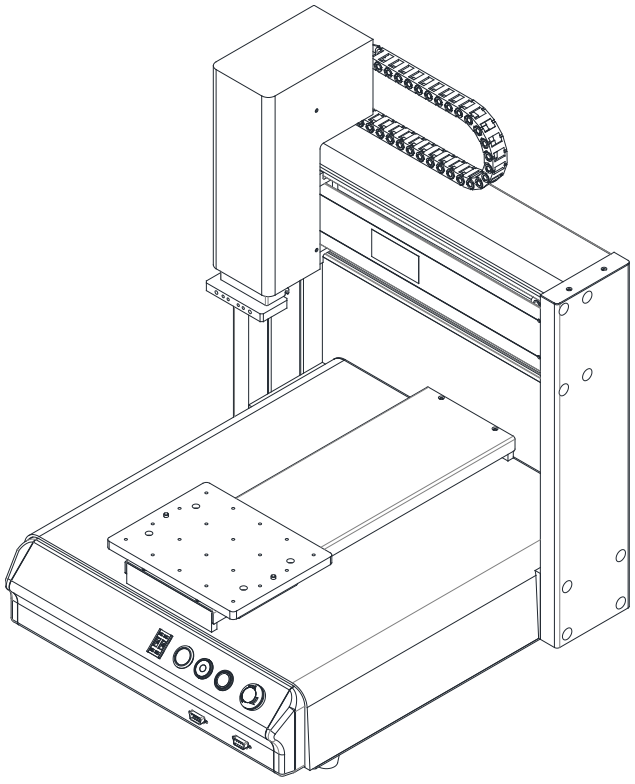
EN

Automation table for automated, programmable, precision micro-dispensing system. For professional use only.

Model 25D104
Model 25D105
Model 25D546
Model 25D547
Model 25D945
Model 25D946

See page 2 for model information.

Important Safety Instructions
Read all warnings and instructions in this manual. Save these instructions.



Contents

Models

Part No.	Description	Maximum Stroke
25D546	Table, UniXact A200	200 mm x 200 mm
25D104	Table, UniXact A300	300 mm x 300 mm
25D105	Table, UniXact A400	400 mm x 400 mm
25D547	Table, UniXact A500	500 mm x 500 mm
25D945	Table, UniXact A400HP	400 mm x 400 mm
25D946	Table, UniXact A500HP	500 mm x 500 mm

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

⚠ WARNING



MOVING PARTS HAZARD

Moving parts can pinch, cut or amputate fingers and other body parts.

- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, disconnect all power sources.


ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.

- Turn off and disconnect power cord before servicing equipment.
- Connect only to grounded electrical outlets.
- Use only 3-wire extension cords.
- Ensure ground prongs are intact on power and extension cords.
- Do not expose to rain. Store indoors.

PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:

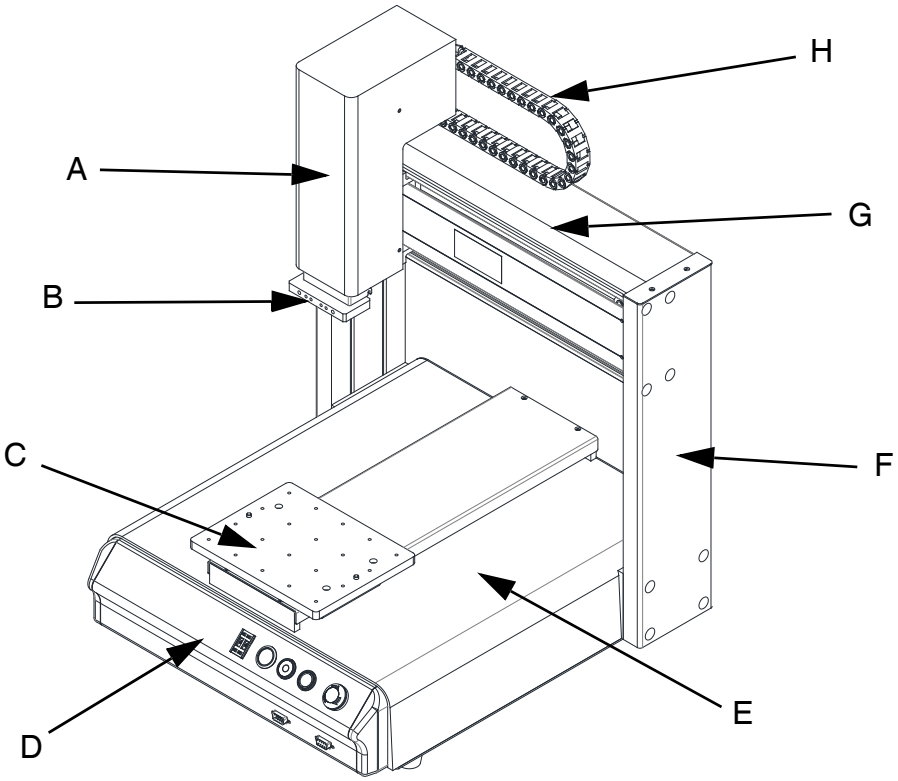
- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.


EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer.
- Turn off all equipment when not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

Component Identification



Control Panel

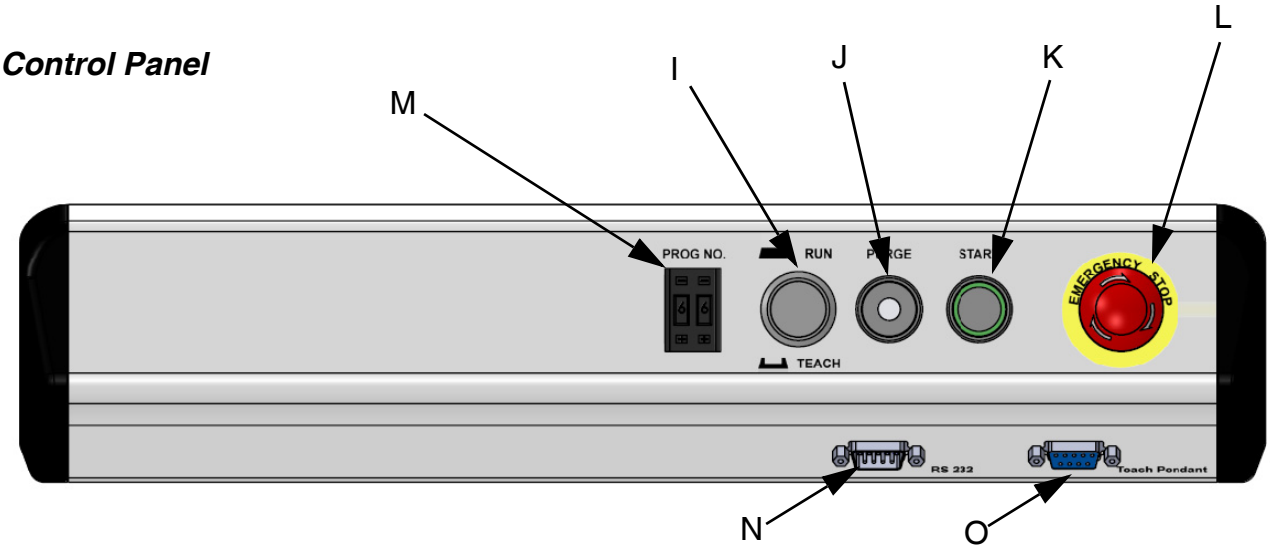


FIG. 1: All Models

Key:

A Z-Axis
B Z-Axis Fix plate
C Y-Axis
D Control Panel
E System Body
F Post
G X-Axis
H Chain
I Run/Teach
J Purge
K Start Power Light
L Emergency Stop
M Program No.
N RS232 Port
O Teach Pendant Port

Installation

NOTICE

Do not store or set up the system in an area where it is directly exposed to sunlight. High temperatures can adversely affect the precision of the system, and sunlight can affect the optical home sensor.

Unpacking the System

In addition to this operating manual, the following items should be included with the system:

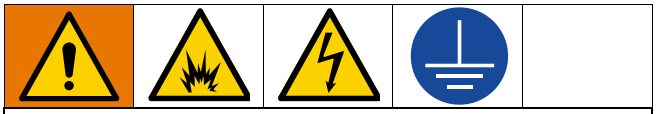
- Main Unit (Desktop Robot, Gantry Robot)
- Teach Pendant
- Dispensing Cable
- Power Cord

The Automated Dispensing System was carefully packaged for shipment. When the system arrives, perform the following procedure to unpack the system:

- Always lift the system from its base. Never lift the system from the cross member.
- Remove all accessories from the shipping package before attempting to remove the system.
- Place the system on a stable workbench before operating.

NOTE: Do not discard the packing material. This material may be needed if the system is shipped or moved in the future.

Grounding



The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current.

The system is grounded through the power cord.

Make sure the power cord is connected to a properly grounded power source before operating.

Setup

NOTE: The Automated Dispensing Systems are available with different configurations. The setup of each robot with its accessories will depend on the customer's application.

Perform the following procedure to setup the system:

1. Connect one end of the dispensing cable to the dispenser and the other end to the dispenser connection on the system. The type of socket on the dispenser should match that used on the pedal switch.

NOTE: Sockets purchased from other manufacturers may differ from that used on the pedal switch. If this is the case, contact the manufacturer for an adapter.

2. Connect one end of the Teach Pendant cable to the Teach Pendant, and connect the other end to the Teach Pendant port on the system.

3. Connect the power cord to the system's power socket. Be sure to use the correct power cord and power source for the system model you are using (110V or 220V).

4. Tie back all cables and air lines so they will not interfere with the system's motion while it is operating. Be sure that the cables and air lines do not restrict the motion of the system's head and table, and make sure that they cannot become jammed as the system moves through the work area.

Teaching Overview

A program consists of a series of instructions stored in the main memory unit. Each instruction is stored in a numbered memory address. A memory address may record a point location with an X, Y, and Z-axis value and point type, or it may store an instruction which sets a parameter such as a dispensing time or line speed.

When the program is executed, the system will go through each memory address in sequence and execute the instruction found there. If the memory address contains a point location, the system will move the X, Y, and Z axes to that location. Depending on the type of point registered at that location, the system may also perform other functions, such as turning the dispenser on or off.

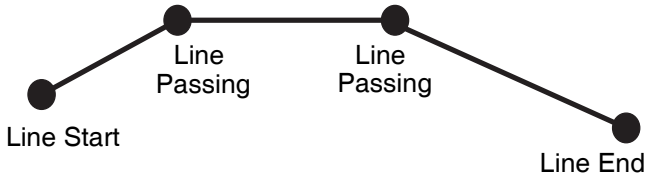
The most commonly used point types are Dispense Dot, Line Start, Line Passing, Arc Point, and Line End.

To program the system to dispense a “dot” of material, the dispensing tip must be jogged to the desired XYZ location. Then that location is registered as a DISPENSE DOT point type by pressing the appropriate keys on the Teach Pendant.

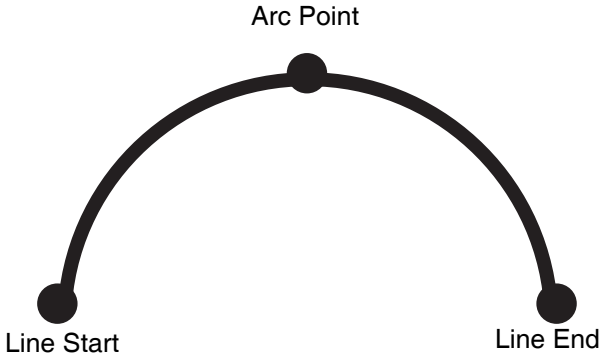
Dispense Dot

To program the system to dispense a bead of material along a linear path, the XYZ location of the start of the line is registered as a LINE START point type. The locations where the tip changes direction are registered as LINE PASSING points. The end of the line is registered as a LINE END point:

The LINE START has already included DISPENSE ON function and the LINE END has already included DISPENSE OFF function.

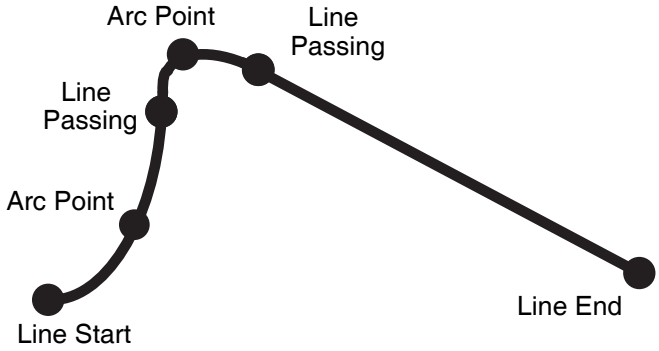


To dispense a bead of material in an arc, the XYZ location of the start of the line is registered as a LINE START point type. The high point of the arc is registered as an ARC POINT. The end of the arc is registered as a LINE END point:



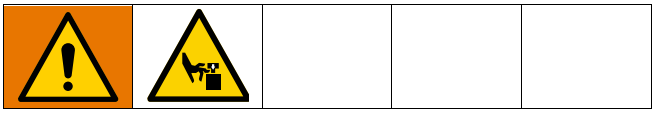
Lines and arcs can also be combined to dispense a bead of material along a complex path:

NOTE: You cannot have 2 consecutive arc points in a program.



Once the required point locations for your program have been taught, the Teach Pendant is no longer required. The unit can be switched to RUN mode and operated using the buttons and switches on the main unit control panel.

Operation



NOTE: Keep away from moving parts while the robot is running.

NOTE: Loading and unloading of parts and material must only be done when the robot is at a complete stop.

NOTE: Changing of fixtures or tooling must be done with the power source disconnected.

NOTE: Do not operate the system where electrical noise is present.

Using the Teach Pendant

The Teach Pendant enables the user to jog the system and input program data.

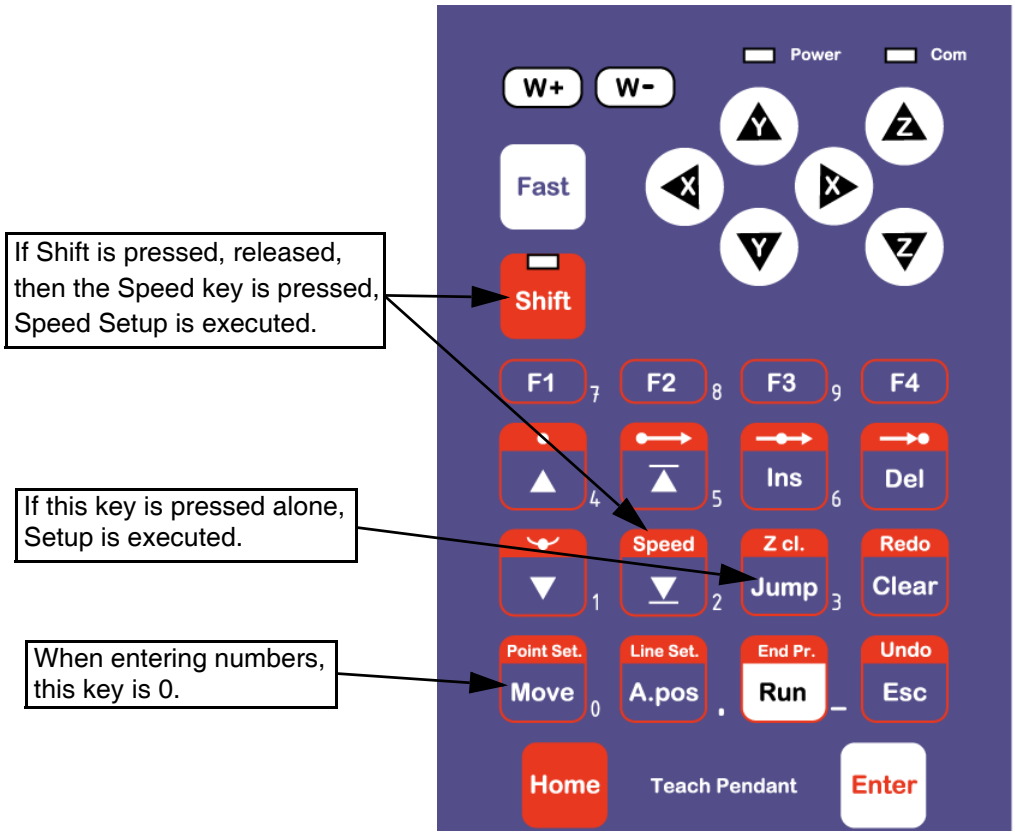


FIG. 2

Key Selection

There are several functions assigned to most keys on the Teach pendant. When a key is pressed alone, the function shown in the dark gray colored area on the key is executed. For example, Ins, Del, Jump, Clear and Esc are the default key functions, which are executed when that key is pressed alone.

To access the function shown in the light gray area at the top of a key, press and release the Shift key first (the LED on the Shift key will be flashing), then press the desired key. For example, to select the Speed function, press and release Shift, then press the Speed key.

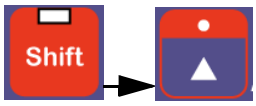
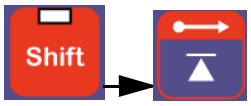
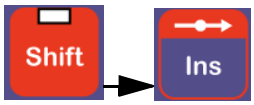
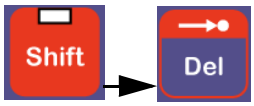
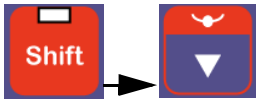
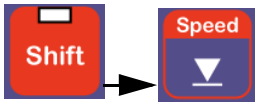
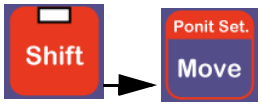
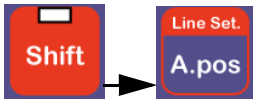
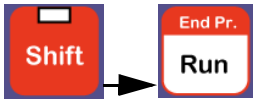
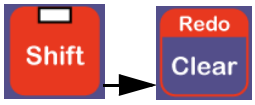
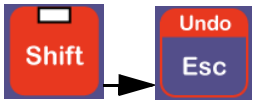
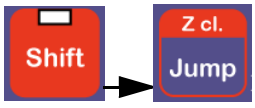
When a number is required, the Teach Pendant will automatically switch to numeric entry mode. The number represented by each key is shown in the lower right corner of the key.

Key Assignments

Key

	Moves backward (1) memory address.		Changes the display to memory address number 1.		Inserts a memory address before the current address.
	Moves forward (1) memory address.		Changes the display to the last memory address used in the program.		Deletes the current memory address.
	Moves the tip to the point location currently in the display.		Jumps to a specified memory address. If pressed alone, Setup is executed.		Clears / erases the numeric value currently shown in the display.
	Adjusts the tips position after a barrel change.		Runs the program.		Homes the system. Initializes all axes and moves the head to the position (0, 0, 0).
	(Enter)–used to confirm data entries. Opens the Point registration menu.		If pressed once, clears the current numeric value. If pressed twice, cancels the current function. If a program is running, cancels the running program. Changes from Point List display mode to Single Point display when teaching point data.		

Key Function

	Registers a DISPENSE DOT point.		Registers a LINE START point.
	Registers a LINE PASSING point.		Registers a LINE END point.
	Registers an ARC POINT.		Registers a Line Speed command.
	Registers a Point Dispense Setup command.		Registers a Line Dispense Setup command.
	Registers the End Program command.		Redo
	Undo		Registers a Z Clearance command.

Jogging the System

Jogging allows you to operate the dispense axes to test and purge the system and to select coordinates when setting parameters.

To jog the X and Y-axes, press the arrow keys X←, → X, Y↑ and Y↓.

To jog the Z-axis, press the Z↑ and Z↓ keys.

Jog Keys

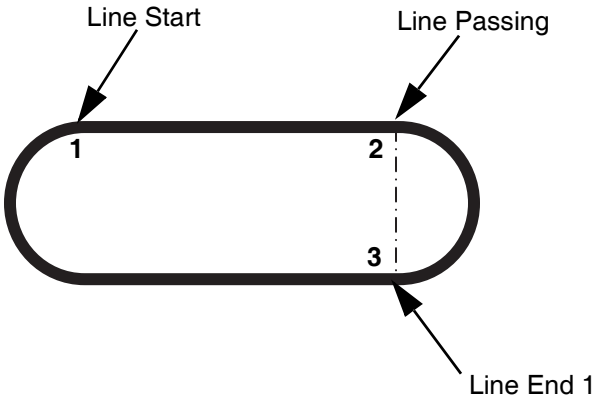
	Jogs the Y-axis in the forward direction.		Jogs the X-axis in the right direction.		Jogs the Z-axis DOWN.
	Jogs the Y-axis in the backward direction.		Jogs the X-axis in the left direction.		Jogs the Z-axis UP.
	Accelerates jog speed – used with X+, X-. Y+, Y-, Z Up, Z Down. If the FAST button is pressed and held first, then one of the jog buttons is pressed, the axis will be jogged at the maximum jog speed. If one of the jog buttons is pressed first, then the FAST button is pressed, the jog motion will accelerate. If the FAST button is released, the jog motion will decelerate.				

Point Type and Function Summary

F1 Menu

Below is a list of Point Types, which are found under the Enter or F1 key (F1 Menu):

Function	Description
Dispense Dot	Registers the current XYZ location as a Dispense point for dot dispensing.
Line Start	Registers the current XYZ location as a Line Start point for line dispensing. This function is also included in DISPENSE ON function.
Line Passing	Registers the current XYZ location as a Line Passing point. This is a location on the line where the tip changes direction, such as at the corner on a rectangle.
Circle	Registers a circle with the circle center at the current XYZ location. The display will prompt the user for the circle diameter.
Arc Point	Registers the current XYZ location as an Arc point. Arc points are used to dispense material in an arc or circle.
Line End	Registers the current XYZ location as a Line End point. This function is also included in DISPENSE OFF function.
End Program	Registers the current memory address as the end of the program.
Dispense On / Off	Registers an instruction which turns the dispenser on or off at the current XYZ location.
GOTO Address	Causes the program to jump to the specified memory address.
Step & Repeat	Registers an instruction that will re-run a selected group of memory addresses, stepping by a user-defined distance in the X or Y-axis after each copy. The matrix of parts is defined by specifying the number of rows, the number of columns, the X offset and the Y offset. Step & Repeat X indicates that the system will give priority to the X-axis, running the parts along the X-axis first. Step & Repeat Y indicates that the system will give priority to the Y-axis, running the parts along the Y-axis first.
Brush Area	Causes the tip to “paint” the defined area. The painted area can be in the form of a rectangle or a circle / spiral.
Call Subroutine	Causes the machine to jump to a specified memory address and execute the instructions found there. When the end program instruction is reached, program execution will continue at address immediately after the call Subroutine instruction.
Call Program	Jumps to the specified program number from within the current program.
Set I/O	Registers an instruction, which either sets the value of an output signal or checks the status of an input signal.
Wait Point	After executing the current point (Line start, passing, etc) the system will wait a specified amount of time before moving to the next command.
Stop Point	After executing the current point (Line start, passing, etc), the system will wait until the start button is pressed before moving to the next command.
Home Point	Registers an instruction to “home” all axes, sending them to the home position. See the F4 Menu for instructions on changing the location of the home position.
Loop Address	Causes the program to execute a group of memory addresses a user-specified number of times.

Function	Description
Dummy Point	Registers the current XYZ location as a dummy point. The tip will simply pass through this point. Useful for avoiding obstacles on the work piece.
Initialize	Registers an initialize point. Causes the system to perform a mechanical initialization.
Label	Registers a label that can be used as a reference when used with the GOTO address, Loop address, Set I/O, Step & repeat X, Step & repeat Y and Call Subroutine commands.
Display Counter	Shows a counter at the bottom of the Teach Pendant screen while a program is running.
Loop Counter	To setup the “Loop Counter” to “Keep” or “Clear.”
Line End 1	Registers the current memory address as the end of the “Stadium” path setting: 
Dispense Output Setup	Register the assigned output port (0 – 8) ON or OFF, controlled by LINE START and LINE END (same as dispenser port)

F2 Menu

Below is a list of functions, which are found under the F2 key (F2 Menu):

Function	Description
Group Edit	Allows a function to be applied to a user-defined group of memory addresses. Functions include copy, delete, move, multiply line speed, multiply dispense times, apply X Offset, apply Y Offset, apply Z Offset.
Expand Step & Repeat	Expands the memory address locations which would be performed at a Step & Repeat instruction so individual memory addresses of the repeated instructions can be edited.
Program Name	Allows the user to register a name for the current program number.
Z-axis Limit (mm)	Sets the MAXIMUM Z-axis value (the lowest tip position). Once the Z-axis limit is set, the system will prevent the tip from jogging below the set location.
Initial Output Port	Sets the status of the output signals when the machine is initialized
Utility Menu	Opens the Utility Menu. See the **Utility Menu** section on page 13.
Jog Speed	Allows the user to set the tip jog speed for teach mode: Low, Middle or High jog speed can be selected.
Adjust Position	See **Adjust Position Setup** on page 51.
Control by RS232	Allows the system to be controlled via the RS232 port.

Utility Menu

Below is a list of functions, which are found under the F2 Menu -> Utility Menu:

Function	Description
Program	Opens the Program utility menu. Allows programs to be copied, backed up, restored, or cleared.
Memory	Opens the Memory utility menu. Allows the system memory to be backed up, restored, or cleared.
Teach Pendant	Opens the Teach Pendant utility menu. Allows the current program to be copied to the Teach Pendant for transferring to another system.
Relocate Data	Allows the position of a program to be corrected using two reference points. Corrects for X offset, Y offset and angle of rotation.
Lock Program	Locks or unlocks a program to enable or disable program editing.
Password Setup	Allows the password to be set or reset for the current program. Protects the program from unauthorized editing.
Key Beep	Enabling Key Beep to produce a beep every time a key in the Teach Pendant is touched.
Test Function	Testing the System Sensor, Panel Connector, Input Output signal, Teach Pendant and Motor.
Clear Teach Pendant Data	Clear the program stored in the Teach Pendant.

F3 Menu

Below is a list of functions, which are found under the F3 key (F3 Menu):

Function	Description
Numerical Move	Allows the tip to be positioned numerically by entering a number for the X, Y and Z values.
Save Temp Point	Saves the current XYZ position in a temporary memory area numbered 1 – 9.
Move To Temp Point	Retrieves a XYZ position, which was stored with Save Temp Point.
Undo Program	Cancels the last change to the program. Returns to the program state prior to the last change.
Redo Program	Restores the last change to the program, which was canceled with Undo.
Debug Program	Runs the program in Debug mode starting at the current point location.
Move To Home Position	Causes the tip to move to the home position. The default home position is X=0, Y=0, Z=0.
System Information	Displays system information, including software version number, work area size and control board version.
Execute Point	Runs a selected command.
Program Name List	Displays the program list with program number and program name.

F4 Menu

Below is a list of functions, which are found under the F4 key (F4 Menu):

Function	Description
Line Speed	Registers the LINE SPEED used for all lines from the current memory address forward until another Line Speed instruction is found.
Line Dispense Setup	Registers the LINE DISPENSE SETUP values which sets dispensing wait time at the start of lines (“head” time), wait time at the passing points (“Node” time) and waiting time at the end of lines (“tail” time). The registered values will be used from the current memory address forward until another Line Dispense Setup instruction is found.
Point Dispense Setup	Registers POINT DISPENSE SETUP values, which sets dispensing time and waiting time at the end of dispensing (“tail” time) for dots. The registered values will be used from the current memory address forward until another POINT DISPENSE SETUP instruction is found.
Dispense End Setup	Registers the height and speed the tip should raise at the end of dispensing. The registered values will be used from the current memory address forward until another DISPENSE END SETUP instruction is found.
Z Clearance	Registers the additional distance the tip should rise, beyond the height set in Dispense End Setup, to allow obstacles to be cleared as the tip moves from one figure to another. Values will be used until another Z Clearance instruction is found.
XY Move Speed	Sets the movement speed of the X and Y axes when moving from one figure to another in the program.
Z Move Speed	Sets the movement speed of the Z-axis when moving from one figure to another in the program.
Home Position Setup	Changes the position the system moves to at the end of a program cycle.
Adjust Position Setup	Registers the current XYZ location as the Adjust Position. This reference point can later be used to correct the program location after the dispensing tip has been changed.
Retract Setup	Registers Retract values at the current XYZ location. Retract causes the tip to move up and back over the dispensed bead after line dispensing.
Quickstep	Causes the system to move very fast from one point to another reducing the time of the dispensing cycle.
Auto Purge Setup	Automatically purges the system at the end of the program.
ESTOP Output Status	After receiving the emergency stop signal, ESTOP Output Status can modify the status of all the outputs or leave them as before receiving the emergency signal.
Acceleration	Parameter that controls the system’s acceleration.
Pause Status	Sets the position to which the tip moves after pressing the Start button. The tip can go to the Home position or will stay at the position where the Start button was pressed.
Language	Opens MENU for selecting the Language.
Jog Speed	Allows the user to set the tip jog speed for teach mode: Low, Middle or High jog speed can be selected.
Debug Speed (mm/s)	Sets the speed used when running in Debug mode.
Adjust Origin	See **Adjust Position Setup** on page 51.
Quickstep Path	To setup the move up shape of Z-axis. “Triangle Shape” or “Normal Shape.” Need to use with function “Quickstep.”
USB Up/Down Load	Allows the operator to upload or download program(s) and software updates.
Circle Delay Time	Allows the system to stop at the end of a circle and allow excess material to be removed before the system carries to the next point.

Function Summary

F1 Enter	Page 1 1. Dispense Dot 2. Line Start 3. Line Passing 4. Circle 5. Arc Point 6. Line End 7. End Program	Page 2 1. Dispense On/Off 2. Goto Address 3. Step & Repeat 4. Brush Area 5. Call Subroutine 6. Call Program 7. Set I/O
	Page 3 1. Wait Point 2. Stop Point 3. Home Point 4. Loop Address 5. Dummy Point 6. Initialize 7. Label	Page 4 1. Display Count 2. Loop Count 3. Line End1 4. Dispense Output Setup 5. Needle Adjustment 6. Needle Adjustment Count 7. Arc Dispense Setup
F2	Page 1 1. Group Edit 2. Ex. Step & Repeat 3. Program Name 4. Z Axis Limit (100) 5. Initial Output Port 6. Utility Menu 7. Control By RS232	6.1 Program 6.2 Memory 6.3 Teach Pendant 6.4 Relocate Data 6.5 Lock Program 6.6 Password Setup 6.7 Key Beep
		1. 1. Test Function 2. Clear Teach Pendant Data
F3	Page 1 1. Numerical Move 2. Save Temp Point 3. Move To Temp Point 4. Undo Program 5. Redo Program 6. Debug Program 7. Move To Home position	Page 2 1. System Information 2. Execute Point 3. Program List
F4	Page 1 1. Line Speed 2. Line Dispense Setup 3. Point Dispense Setup 4. Dispense End Setup 5. Z Clearance 6. XY Move Speed 7. Z Move Speed	Page 2 1. Home Position Setup 2. Adjust Position Setup 3. Retract Setup 4. Quickstep 5. Auto Purge Setup 6. ESTOP Output Status 7. Acceleration
	Page 3 1. Pause Status 2. Language 3. Jog Speed 4. Debug Speed (10) 5. Adjust Origin 6. Quickstep Path 7. USB Up/Down Load	Page 4 1. Circle Delay Time 2. Initialize Setup 3. Teach Needle Adjustment 4. Needle Adjustment Setup

Programming Example

In order to become familiar with programming the system, please follow the instructions below to create a program, which dispenses in the following pattern (white path):

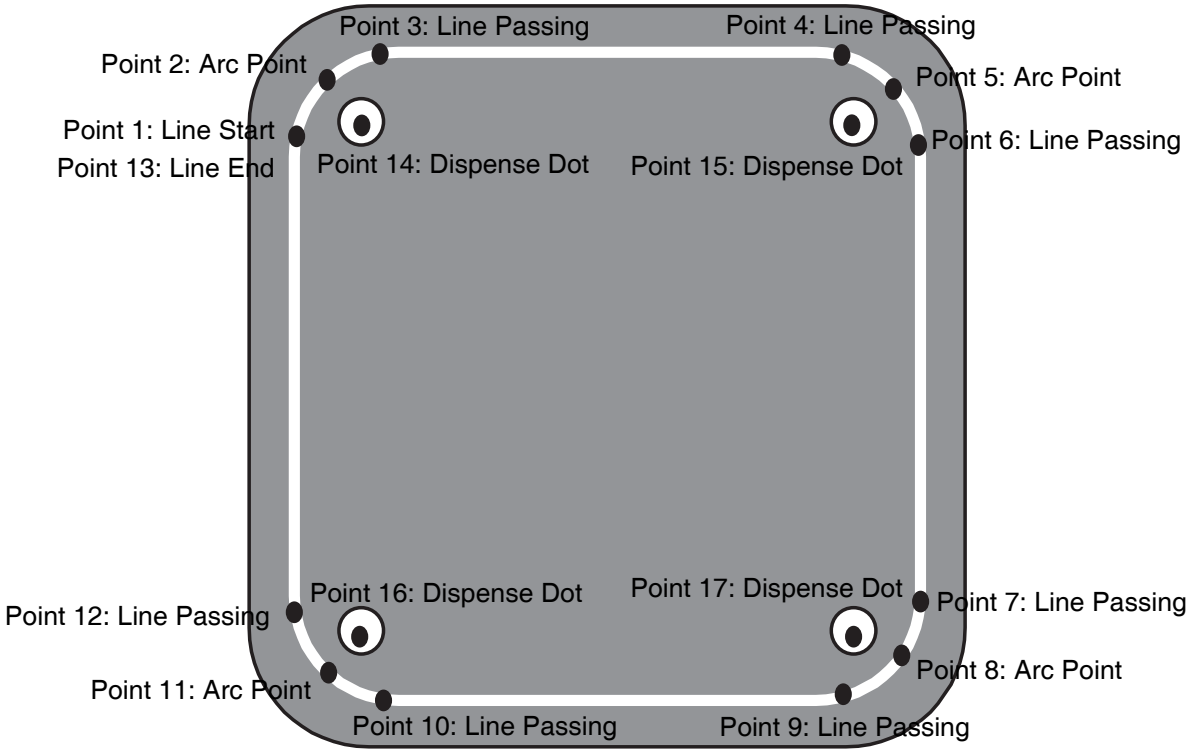


FIG. 3

NOTE:

- This program is created in program #5 (See **Changing the Program Number** on page 21).
- A line speed of 50 mm / second is used for the lines and arcs in this program.
- A dispensing time of 1.5 seconds and a waiting time of 0.2 seconds after dispensing is used for the dots.

	Instruction	Display Shows
1	Follow the instructions found in the **Setup** section on page 6 to setup the system.	
2	Select program 5 using the program number selection switches on the main unit control panel. Turn the power on.	[MACHINE HOME] +------------+ | START/HOME | +------------+
3	Press the START button. The system will move to the home position.	ADDR: 1 PROG: 5 EMPTY X: 0.00 Y: 0.00 Z: 0.00
4	Press the Shift + Speed keys to register a line speed of 50 mm/second at memory address number 1.	Line Speed Setup ---------- Speed: unit: mm/sec
5	The system is now waiting for the speed to be registered. Press 50 then ENTER to register a speed of 50 mm / second.	ADDR: 2 PROG: 5 EMPTY
6	The display shows we are at memory address 2 and that it is empty. Jog the dispensing tip to the first location in the diagram above (Point 1: Line Start). To jog the X and Y-axes, press the arrow keys X←, → X, Y↑ and Y↓. To jog the Z-axis, press the Z↑ and Z↓ keys. Press and hold the FAST key to jog fast.	
7	Once the tip is at the correct X, Y, Z location for the first point (Point 1: Line Start), press the Shift + keys to register the location as a Line Start point. **NOTE:** There is no need to set “Dispense ON” since “Line Start” has already included this function.	ADDR: 3 PROG: 5 EMPTY
8	The display will show we are at memory address 3 and it is empty. Jog the tip to the X, Y, Z location of the second point (Point 2: Arc Point). When the location is correct, press the Shift + keys to register the location as a Line Passing point.	ADDR: 4 PROG: 5 EMPTY

	Instruction	Display Shows
9	Now jog the tip to the location of the third point (Point 3: Line Passing). When the location is correct, press the Shift + Ins keys to register the location as an Arc point.	ADDR: 5 PROG: 5 EMPTY
10	Jog the tip to the location of the fourth point (Point 4: Line Passing). When the location is correct, press the Shift + Ins keys to register the location as a Line Passing point.	ADDR: 6 PROG: 5 EMPTY
11	Repeat the step 8 – 10 to register the point 5 to 12.	
12	Jog the tip to the location of the thirteenth point (Point 13: Line End). When the location is correct, press the Shift + Del keys to register the location as a Line End point.	ADDR: 15 PROG: 5 EMPTY
13	The line is now complete. The next step is to register the dispense settings for the dots. Press the Shift + Ponit Set. Move keys to register the dot dispensing time.	Point Dispense Setup -------------------- Dis. Time: Tail Time: unit: sec
14	Type 1.5 to register a dispensing time of 1.5 seconds, then press ENTER. Type 0.2 to register a waiting time of 0.2 seconds after dispensing, then press ENTER.	ADDR: 16 PROG: 5 EMPTY
15	Jog the tip to the location of the first dispense dot (Point 14: Dispense Dot). When the location is correct, press the Shift + ▲ keys to register the location as a Dispense Dot.	ADDR: 17 PROG: 5 EMPTY
16	Jog the tip to the location of the second dispense dot (Point 15: Dispense Dot). When the location is correct, press the Shift + ▲ keys to register the location as a Dispense Dot.	ADDR: 18 PROG: 5 EMPTY
17	Jog the tip to the location of the third dispense dot (Point 16: Dispense Dot). When the location is correct, press the Shift + ▲ keys to register the location as a Dispense Dot.	ADDR: 19 PROG: 5 EMPTY

	Instruction	Display Shows
18	Jog the tip to the location of the fourth dispense dot (17: Dispense Dot). When the location is correct, press the Shift +  keys to register the location as a Dispense Dot.	`ADDR: 20 PROG: 5` `EMPTY`
19	The program is now complete. Press the Shift + End Pr. Run keys to register address 20 as the END of the program.	`ADDR: 21 PROG: 5` `EMPTY`
20	To run the program, press the End Pr. Run key.	

Good Programming Practices

It is recommended to register the setup commands at the beginning of every program.

The following setup commands are the most commonly used:

- Dispense End Setup
- Point Dispense Setup
- Line Dispense Setup
- Line Speed
- Z Clearance
- Retract Setup
- Adjust Position Setup

For a complete list and description of all the different setup commands, refer to **F4 Menu** on page 14 and **F4 (Setup Menu)** on page 48.

Editing a Program

You can move through the instructions in an existing program by using the following keys:

Key	Function
	Moves forward (1) memory address.
	Moves backward (1) memory address.
	Moves to the first memory address in the program.
	Moves to the last programmed memory address in the program.
	Moves the tip to the XYZ point location of the selected point.
	Jumps to display the specified memory address.

Changing a Point's XYZ Location

To change the XYZ location of a point, press the  or  key until the point you want to change is shown in the display.

You can confirm that the correct point is in the display by pressing the  key. This will cause the tip to move to the XYZ position shown in the display.

Now use the jog keys (X←, →X, Y↑ and Y↓) and the Z↑ / Z↓ keys to jog the tip to the new location.

Once the location is correct, simply re-register the point as you did when it was first taught, by pressing the  key and selecting the point type. The point will be re-registered at the new location.

Insert/Delete an Instruction

To insert an instruction, press the  key. The point currently shown in the display will be moved forward one memory address. A new, empty memory address will be inserted at the current memory address.

To delete the instruction currently shown in the display, press the  key, and then press the (W+) (Yes) key.

Changing the Program Number

The program number is selected by the program number selection switches on the main unit's control panel.

Press the + and - buttons to select the program number.

NOTE: Program 99 is designed for "auto-run" on Run mode. When starting the system with this program, the system starts automatically *without* pressing the Start/Home key for initialization.

Changing from Teach Mode to Run Mode

To change from Teach mode to Run mode, change the position of the mode switch on the main unit's control panel.

When the machine is in Run mode, the Teach Pendant is not required. Programs can be selected and run using the switches on the front control panel of the main unit.

After selecting the desired program number (see **Changing the Program Number** above), press the Start button on the front control panel to run the program.

Function Reference

F1 (Point Menu)

Below is a list of functions which are found under the ENTER key. These functions are “point-type” functions, meaning that the values applied will occupy one memory address.

Dispense Dot

Registers the current XYZ location as a dispense point for dot dispensing.

The dispense time and wait time must be set in a previous memory address by registering a Point Dispense Setup instruction.

The upward motion of the tip after dispensing can be controlled by registering a Dispense End Setup instruction and / or a Z Clearance instruction in a previous memory address.

Dispense End Setup and Z Clearance instructions are registered using the SETUP key.

See **Point Dispense Setup** and **Dispense End Setup** on page 48, and **Z Clearance** on page 49.

Line Start

Registers the current XYZ location as a Line Start point for line dispensing.

The line speed must be set in a previous memory address by registering a Line Speed instruction using the SETUP key.

Dispense delay times used at Line Start and Line End points can be controlled by registering a Line Dispense Setup instruction in a previous memory address. The Line Dispense Setup instruction is registered by pressing the SETUP key.

See also **Line Speed** and **Line Dispense Setup** on page 48.

Line Passing

Registers the current XYZ location as a Line Passing point. This is a location on the line where the tip changes direction, such as at the corner on a rectangle.

Also use a Line passing point before and after an Arc Point instruction.

Circle

There are two ways to dispense a circle:

1. Type I(W-): Using 3 points to form a circle
2. Type II(W+): Using radius to make a circle

Type I: Move the tip to register the XYZ coordinates of the 3 passing points. It will complete the circle after calculation.

Type II: Registers the XYZ coordinates of the center point and the radius of the circle. It will complete the circle after calculation.

Registers a circle, where the circle’s center is at the current XYZ location. To register a circle, jog the tip to the circle’s center and press ENTER, and then press the key 4 (for circle). The display will prompt you to type the following data:

- **Radius:** Type the radius of the circle and press ENTER.
- **Over Angle:** (The value is from 1~ 360). After dispensing the circle, while going through an extra part of the circle defined by the Over Angle, the dispenser will be turned OFF.
- **Z Lift:** 1. Yes 2. No
- **Selection:** If you want the Z-Axis (tip) to lift while going though the Over Angle, you must select 1. Otherwise, select 2.

The speed must be set in a previous memory address by registering a Line Speed instruction using the SETUP key.

Dispense delay times used at the start of the circle and at the end of the circle can be controlled by registering a Line Dispense Setup instruction in a previous memory address. The Line Dispense Setup instruction is registered by pressing the SETUP key.

See also **Line Speed** and **Line Dispense Setup** on page 48.

The upward motion of the tip after dispensing can be controlled by registering a Dispense End Setup instruction and / or a Z Clearance instruction in a previous memory address.

Dispense End Setup and Z Clearance instructions are registered using the SETUP key.

See also **Dispense End Setup** on page 48 and **Z Clearance** on page 49.

Arc Point

Registers the current XYZ location as an Arc Point. Arc points are used to dispense material along an arc or circular path.

See **Function Summary** on page 15 for an example of the use of an Arc point.

Line End

Registers the current XYZ location as a Line End point.

The dispense delay time used at the end of the line can be controlled by registering a Line Dispense Setup instruction in a previous memory address. The Line Dispense Setup instruction is registered by pressing the SETUP key.

See also **Line Dispense Setup** on page 48.

The upward motion of the tip after dispensing can be controlled by registering a Dispense End Setup instruction and / or a Z Clearance instruction in a previous memory address.

Dispense End Setup and Z Clearance instructions are registered using the SETUP key.

End Program

Registers the current memory address as the end of the program. The end program instruction will cause the tip to return to the home position at the end of the program cycle.

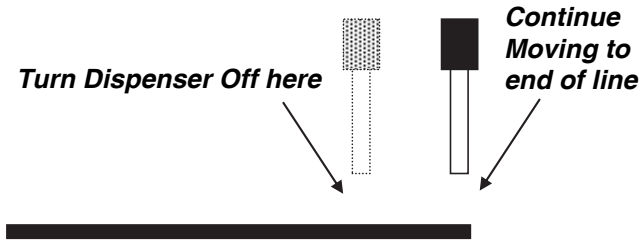
Dispense ON/OFF

The Dispense ON / OFF instruction will allow the user to program an instruction which will turn the dispenser ON or OFF.

This is useful for turning the dispenser OFF before the end of a line to prevent excess material at the line end.

Problem: Too much material at the end of the line.

Solution: Turn the dispenser OFF before the end of the line.



To register a DISPENSE OFF instruction, jog the tip to the XYZ location where you want the dispenser OFF, enter that location as a Line Passing point, then press the ENTER key and select Dispense ON/OFF.

Press 1 to select Dispenser ON, or press 2 to select Dispenser OFF.

GOTO Address

The GOTO Address function causes the program to jump to a specified memory address.

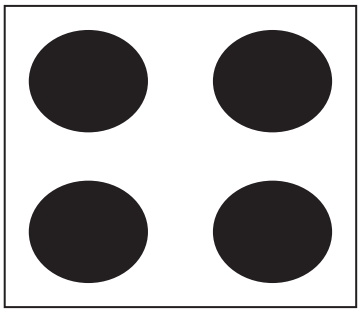
Step & Repeat X

Step & Repeat X allows a group of instructions to be run repeatedly, stepping a given distance in the X-axis or Y-axis between each cycle.

Step & Repeat X is useful when a fixture is mounted on the system, which holds many identical work pieces aligned in rows and columns. The user needs only to create a program for the first work piece in the fixture, and then use the Step & Repeat function to dispense to the other work pieces.

The Step & Repeat function will allow the user to define the number of rows, the number of columns, the X Offset between each part, and the Y Offset between each part.

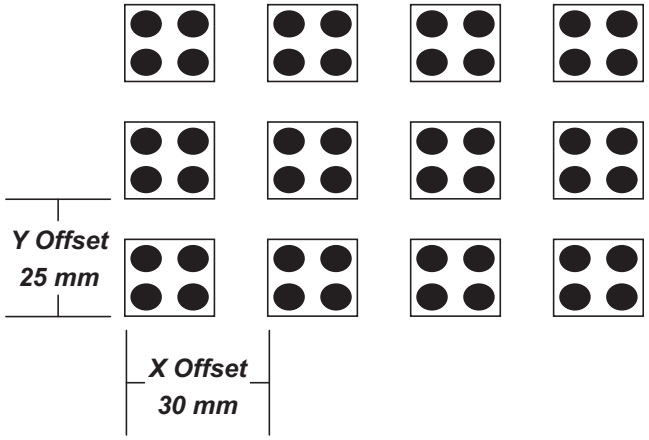
If, for example, we have a program (number 20) which dispenses four dots of material on a work piece:



The program would consist of the following eight instructions:

Address	Instruction
1	Dispense End Setup: H. Speed = 100 mm/s, L. Speed = 15 mm/s L. Length = 5 mm
2	Z Clearance: Relative 10 mm
3	Point Dispense Setup: Disp. Time = 0.25 s Tail Time = 0.10 s
4	Dispense Point
5	Dispense Point
6	Dispense Point
7	Dispense Point
8	End Program

If a fixture is made which holds (12) work pieces, in four columns by three rows:



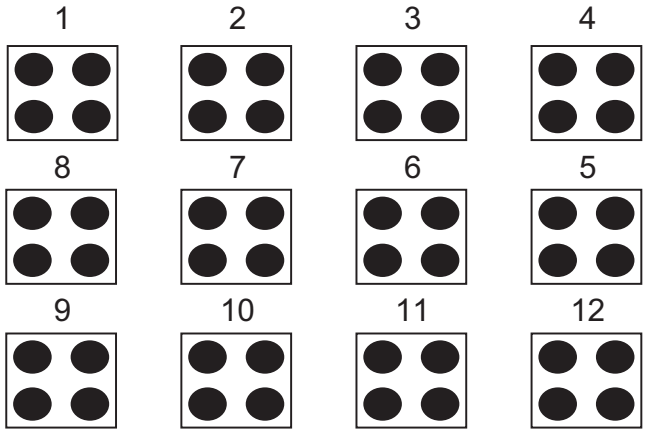
A Step & Repeat X instruction can be used to repeat the program at the additional (11) locations.

The instruction at memory address 8 should be changed from End Program to Step & Repeat X. To register a Step & Repeat X instruction at memory address 8, do the following:

	Instruction	Display Shows
1	Press the +1 or –1 keys until memory address 8 is shown in the display	ADDR: 8 PROG: 20 End Program
2	Press the Enter key, and then press the X→ key to change to page 2. Select Step & Repeat by pressing the key 3.	Step & Repeat Address, 8 ---------- 1.X 2.Y, Start Address, Columns (X): Rows (Y):
3	Type 1 to select X direction, and then press ENTER.	Step & Repeat Address, 8 ---------- 1.X 2.Y, 1 Start Address, Columns (X): Rows (Y): [F1] Address [F2] Label
4	The display will prompt you for the Start Addr: The start address is the memory address of the first instruction, which is part of this Step & Repeat group. In our example, we want to repeat all instructions starting with memory address number 4. Type 4 to specify memory address 4, and then press ENTER.	Step & Repeat Address, 8 ---------- 1.X 2.Y, 1 Start Address, 4 Columns (X): Rows (Y):
5	Type 4 to specify four columns, and then press ENTER.	Step & Repeat Address, 8 ---------- 1.X 2.Y, 1 Start Address, 4 Columns (X): 4 Rows (Y):
6	Type 3 to specify three rows, and then press ENTER.	Step & Repeat Address, 8 ---------- X Offset: Y Offset: Unit: mm

	Instruction	Display Shows
7	In the above example, the X Offset between parts is 30 mm. Type 30 to specify an X Offset of 30 mm, and then press ENTER.	Step & Repeat Address, 8 ---------- X Offset: 30 Y Offset: Unit: mm
8	In the above example, the Y Offset between parts is 25 mm. Type 25 to specify 25 mm, and hen press ENTER.	Step & Repeat Address, 8 ---------- 1. S Path 2. N Path Select:
9	The display will prompt you to select 1. S Path or 2. N. Path. Selecting S Path will cause the first row 1 to 4 to be dispensed, then the second row 4 to 1, and then the third row 1 to 4. Selecting N PATH will cause the first row 1 to 4 to be dispensed, then the second row 1 to 4, and then the third row 1 to 4. Press 1 to select S PATH, and then press ENTER.	ADDR: 9 PROG: 20 EMPTY
10	The program is now complete. Press ENTER, and then select End Program to mark address 9 as the new End Program instruction. Press the 7 key then press ENTER. Press RUN to run the program.	ADDR: 10 PROG: 20 EMPTY

The program will run in the following pattern and consists of the following instructions:

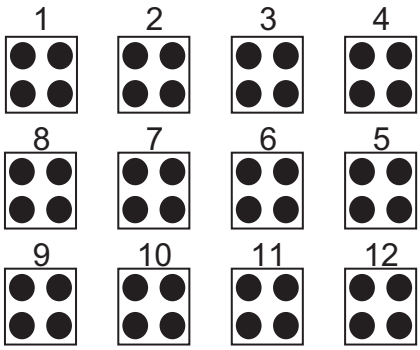


Address	Instruction
1	Dispense End Setup: H. Speed = 100 mm/s, L. Speed = 15 mm/s L. Length = 5 mm
2	Z Clearance: Relative 10 mm
3	Point Dispense Setup: Disp. Time = 0.25 s Tail Time = 0.10 s
4	Dispense Point
5	Dispense Point
6	Dispense Point
7	Dispense Point
8	Step & Repeat X: Cols: 4, Rows: 3, X Off: 30mm, Y Off: 25mm, Addr. 4, S Path
9	End Program

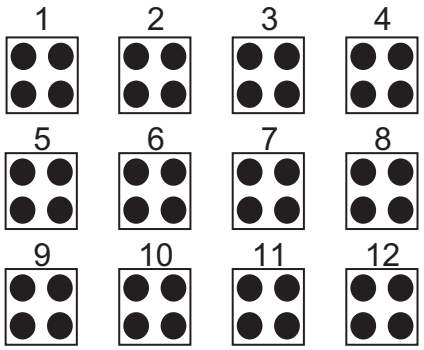
The previous example was done using S Path. The difference between S Path and N Path is the order in which the pieces are run:

Step & Repeat X

S PATH



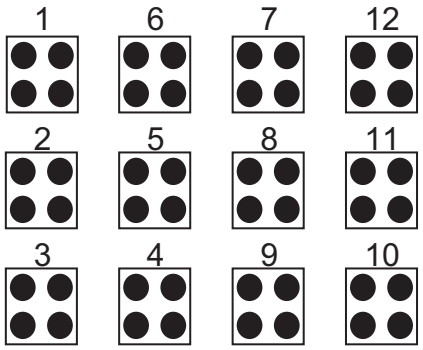
N PATH



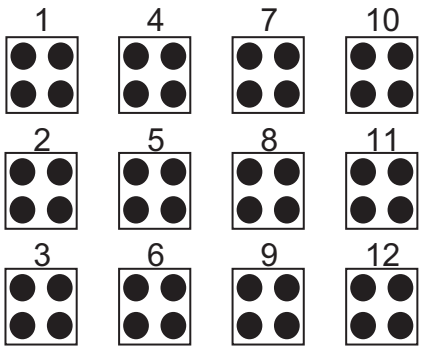
Step & Repeat Y

Step & Repeat Y works just as Step & Repeat X does, with one difference: priority is given to the Y-axis instead of the X-axis.

S PATH



N PATH



Brush Area

The Brush Area command causes the tip to “paint” a defined area.

There are six Brush Area types: Rectangle, Circle, Rectangle 1, Rectangle Band, Circle Band and Circle1. The next pages provide a detailed description of all the Brush area types.

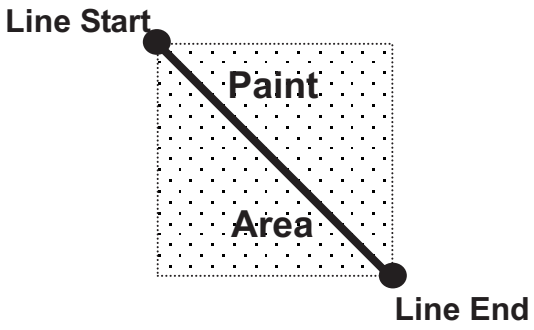
To register a Brush Area command, follow the instructions below.

	Instruction	Display Shows
1	Press ENTER to open the Point Menu.	[POINT] 1/3 1 Dispense Dot 2 Line Start . . 7 End Program
2	Press X→, to go to page 2.	[POINT] 2/3 . . 4 Brush Area .
3	Press 4 to select Brush Area.	Brush Area Setup ---------- 1. Rectangle 4. Rect Band 2. Circle 5. Circle Band 3. Rectangle 1 6. Circle 1 Select:
4	Press the numeric key corresponding to the brush area type then press ENTER.	Brush Area Setup ---------- 1. Rectangle 4. Rect Band 2. Circle 5. Circle Band 3. Rectangle 1 6. Circle 1 Width (mm): Band (mm):
5	Type the width value and press ENTER. Type the band value and press ENTER. Width and band values will be explained further in this section.	

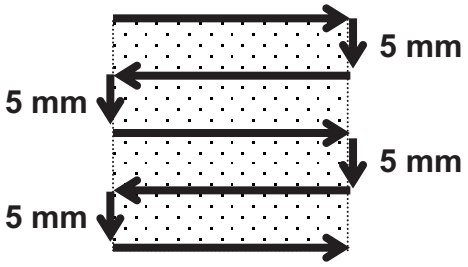
Brush Area: Rectangle

Brush Area Rectangle causes the tip to “paint” the defined area by passing back and forth along the X-axis, while moving the Y-axis a determined Brush Width distance after each pass along the X-axis.

After registering the Brush Area Rectangle command, teach a Line Start point at the top left corner of the area to be brushed, and a Line End point at the bottom right corner of that area (the tip will not dispense a straight line between these two points):



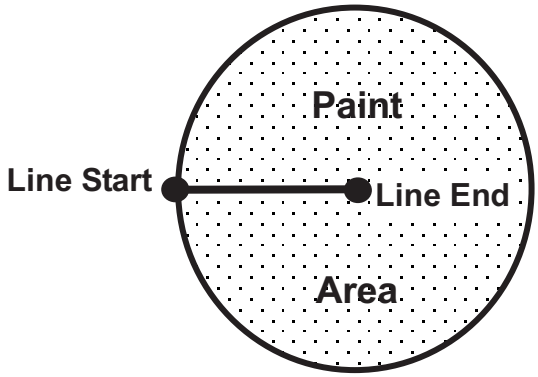
If, for example, a brush width of 5 mm was used, the tip will take the following path when the program is run:



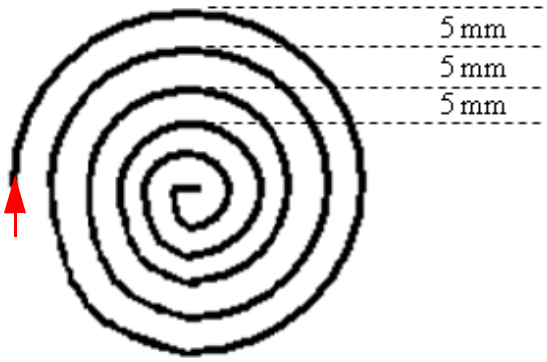
Brush Area: Circle

Brush Area Circle causes the tip to “paint” the defined area by following a spiral path from the outside limit of the circle to the center of the circle. It works in reverse of the Circle 1 function.

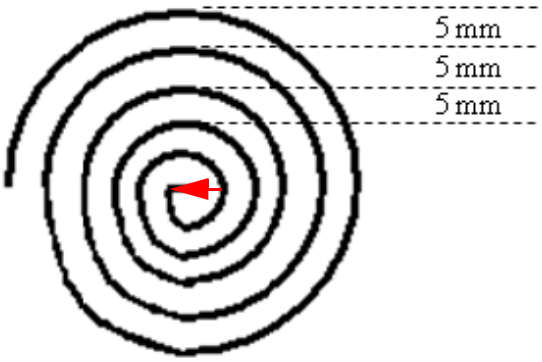
After registering the Brush Area Circle command, jog the tip to a point on the outside limit of the circle to be brushed and register that location as a Line Start point. Then jog the tip directly across to the center of the circle and register that location as a Line End point (the tip will not dispense a straight line between these two points):



If, for example, a brush width of 5 mm was used, the tip will take the following path when the program is run:



Closed Circle: from outside of the circle to the center



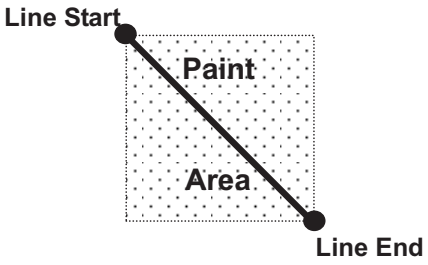
Open Circle: from center of the circle to the outside

An open or closed option is also available for this function. Selecting the Closed option will make a whole circle first before making the spiral. Selecting the Open option will make the spiral without closing the outer circle.

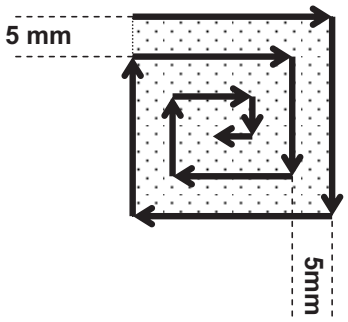
Brush Area: Rectangle 1

Brush Area Rectangle 1 causes the tip to “paint” the defined area by following a square spiral path from the outside of the rectangle to the center.

After registering the Brush Area Rectangle 1 command, teach a Line Starting point at the top left corner of the area to be brushed and a Line End point at the bottom right corner of that area (the tip will not dispense a straight line between these two points):



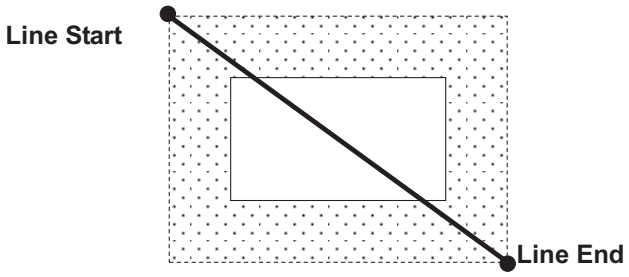
If, for example, a brush width of 5 mm was used, the tip will take the following path when the program is run:



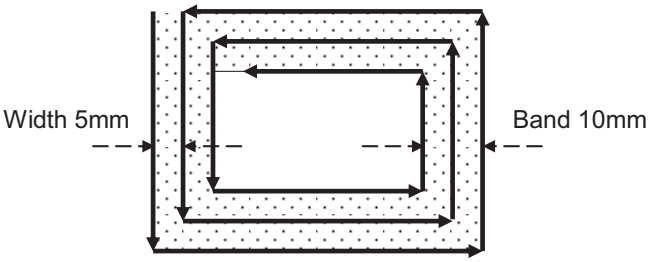
Brush Area: Rect. Band

Brush Area Rect. Band causes the tip to “paint” a defined rectangular band area by following a square spiral path from the outside of the rectangle to the center.

After registering the Brush Area Rect. Band command, teach a Line Start point at the top left corner of the area to be brushed and a Line End point at the bottom right corner of that area (the tip will not dispense a straight line between these two points):



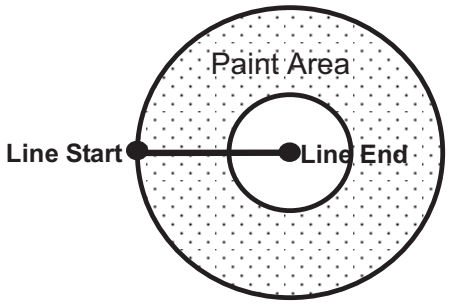
If, for example, a brush width of 5 mm and band of 10mm was used, the tip will take the following path when the program is run:



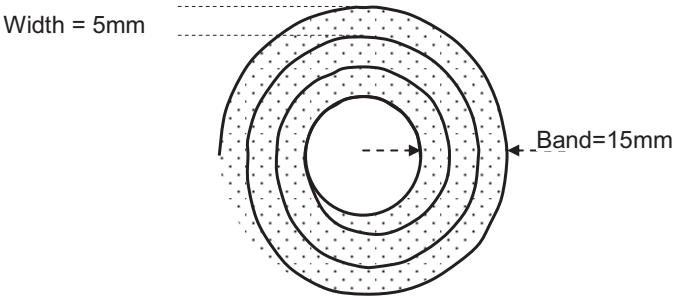
Brush Area: Circle Band

Brush Area Circle Band causes the tip to “paint” a defined circular band area by following a spiral path from the outside limit of the circle to the center of the circle.

After registering the Brush Area Circle Band command, jog the tip to a point on the outside limit of the circle to be brushed and register that location as a Line Start point. Then jog the tip directly across to the center of the circle and register that location as a Line End point (the tip will not dispense a straight line between these two points):



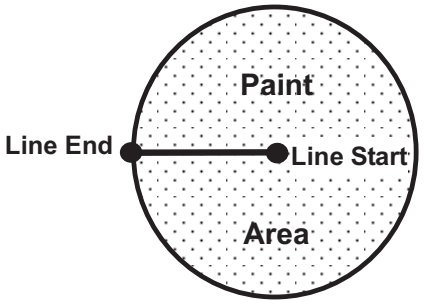
If, for example, a brush width of 5 mm and Band of 15mm was used, the tip will take the following path when the program is run:



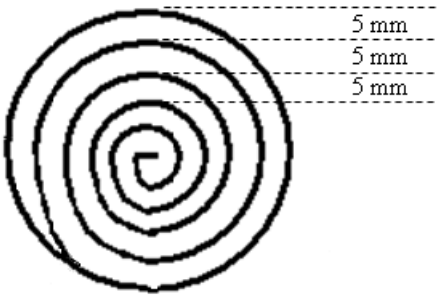
Brush Area: Circle 1

Brush Area: Circle 1, causes the tip to “paint” the defined area by following a spiral path from the center of the circle to the outside limit of the circle. It works in reverse of the Circle function.

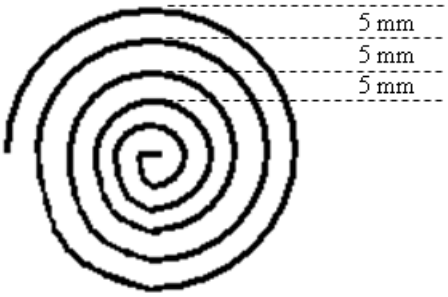
After registering the Brush Area Circle command, jog the tip to a point where you want to register the center of the circle and register that location as a Line Start. Then jog the tip directly across on the outside limit of the circle to be brushed and register that location as a Line End point (the tip will not dispense a straight line between these two points):



If, for example, a brush width of 5 mm was used, the tip will take the following path when the program is run:



Closed



Open

An open or closed option is also available for this function. Selecting the Closed option will make a whole circle before making the spiral. Selecting the Open option will make the spiral without closing the outer circle.

Call Subroutine

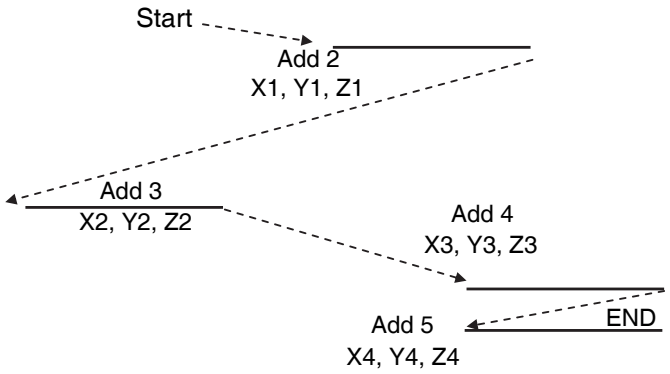
A subroutine is a set of instructions that are located after the End Program instruction.

Call Subroutine causes the machine to jump to a specified memory address and execute the instructions found there using coordinates specified at the Call Subroutine instruction. When the End Program instruction for the subroutine is reached, program execution will continue at the address immediately after the Call Subroutine instruction.

The Call Subroutine function is most useful to repeat a pattern anywhere on the work- piece, as opposed to the Step & Repeat function where the pattern must be repeated in straight lines, at fixed distances from each other.

The following example illustrates the use of the Call Subroutine instruction. An explanation follows.

Address	Instruction
1	Line Speed = 20
2	Call Subroutine (X1, Y1, Z1) address 7
3	Call Subroutine (X2, Y2, Z2) address 7
4	Call Subroutine (X3, Y3, Z3) address 7
5	Call Subroutine (X4, Y4, Z4) address 7
6	End Program
7	Line Start (Xs, Ys, Zs)
8	Line End (Xe, Ye, Ze)
9	End Program



Addresses 7 and 8 comprise the subroutine that will be executed whenever it is called within the main program. The coordinates in the body of the subroutine (Xs, Ys, Zs, Xe, Ye, Ze) are not important; the critical information is the relative position to each other. The actual work will be performed on the coordinates in the main body of the program.

Before using the Call Subroutine instruction, the tip must be jogged to the first point where the user wants the work to occur. This point must correspond to the relative first point defined in the subroutine.

Call Program

Call Program will jump to the specified program number and execute the program data in the destination program until the End Program command is reached. When the destination program is executed, the system will return to the calling program.

Set I/O

Set I/O registers an instruction, which either sets the value of an output signal or checks the status of an input signal.

When the Set I/O function is registered, the user is prompted to select 1. Input or 2. Output.

If 1. Input is selected; the user can enter the input Port (input # 1 – 8), the input Status (1/0) and the address to GOTO if that input status occurs. The input status is (0) when the input pin is connected to ground. The input status is (1) if the input pin is disconnected.

If 2. Output is selected, the user can enter the output Port (output # 0 – 8), and whether the output should be turned ON or OFF.

Wait Point

Registers a Wait Point at the current X, Y, Z location. When executed, the tip will move to that location and wait for the specified period of time.

Wait Point can only be implemented on RUN Mode.

Stop Point

Registers a Stop Point at the current X, Y, and Z location. When executed, the tip will move to that location and wait until the start button is pressed.

Home Point

Registers an instruction to HOME all axes, by sending them to the home position. It works like a “Move” command.

It works like an “End Program” function when registered at the end of the program. After program completion, the dispensing tip moves to the home position. If used in the body of the program, the tip is moved to the home position and the next instruction is executed.

This function uses the Home Position Setup coordinates (under F4 (Setup Menu)) if a new home position is made. Otherwise, it uses the default home position (X=0, Y=0, Z=0). See the Setup Menu for instructions on changing the location of the home position.

Loop Address

Registers an instruction, which will execute a group of instructions a user-specified number of times.

When the Loop Address instruction is registered, the display will prompt for an Address and Count.

Address is the memory address to jump to from the current address. This address must be less than the current memory address.

Count is the number of times to execute the loop.

Dummy Point

Registers the current XYZ location as a Dummy point. The tip will simply pass through this point. A dummy point is useful for avoiding obstacles on the work piece.

Initialize

Registers an Initialize point causing the system to perform a mechanical initialization. The tip will home to position (0, 0, 0) and the system will re-find the home position using the home position sensors.

Label

Registers a label that can be used as a reference when used with the GOTO, Loop address, Set I/O, Step & repeat X, Step & repeat Y and Call Subroutine commands.

Label can be used instead of Address number. A maximum of 64 labels is permitted per program; each label can have up to 8 characters.

Display Counter

The Display Counter instruction shows a counter at the bottom of the Teach Pendant screen while a program is running. Every time this instruction is executed, the counter increases by one and is shown again on the screen. The counter begins at one (1).

Loop Counter

The Loop Counter either clears or keeps the current tally of the counter when an I/O signal is received. The tally is cumulatively added to the current count on the display counter.

Dispense Output Setup

Dispense Output Setup assigns the dispense output port number (0-8) for the line and dot under control of the line dispense setup and point dispense setup. The default dispense output port number is zero.

Programming Sample:

Address	Instruction
1	**Line Dispense Setup** *Head Time: 0.1* *Tail Time: 0.1* *Node Time: 0* *Tail Length: 0*
2	**Dispense Output: 3**
3	**Line Start**
4	**Line End**
5	**Line Dispense Setup** *Head Time: 0.15* *Tail Time: 0.1* *Node Time: 0* *Tail Length: 0*
6	**Dispense Output: 2**
7	**Line Start**
8	**Line End**
9	**Point Dispense Setup** *Head Time: 0.1* *Tail Time: 0.1*
10	**Dispense Output: 1**
11	**Dispense Dot**
12	**Dispense Dot**
End Program	

F2 (Menu 1)

Group Edit

Group Edit is a powerful utility, which allows several different functions to be applied to a user-defined group of addresses. These functions include copy, delete, move, multiply line speed, multiply dispense times, apply X Offset, apply Y Offset, and apply Z Offset.

Copy

For example, to use group edit to copy addresses 1 – 20 in the current program to memory address 21 - 40:

	Instruction	Display Shows
1	Press the F2 (MENU 1) key, then 1 to select Group Edit. The display will prompt the user to enter the starting memory address of the group to edit (From) and the ending number of the group to edit (To).	GROUP EDIT FROM: 1 TO: 1 (1 <-> 4000) F1: All F2: End
2	Type 1 then press ENTER to register 1 in From. Type 20 then press ENTER to register 20 in To.	GROUP EDIT ADDR: 1-20 ---------- 1. Copy 5. Dispense Time 2. Delete 6. Offset 3. Move 7. Offset (R.E) 4. Line Speed Select:
3	The Group Edit menu will then appear, allowing the user to select an operation to be applied to the range of points. Press 1 to select Copy. Then press ENTER.	GROUP COPY ---------- SOURCE 1-20 Destination:
4	The display will prompt the user to type the destination memory address where the data will be copied. Press the Clear key to erase the old value, then type 21 and press ENTER to select destination memory address number 21.	GROUP COPY SOURCE 1-20 Destination: 21 1. Yes 2. No Select:
5	The display will now prompt the user to confirm the copy. Press 1 and then press ENTER to select Yes and perform the copy.	

Delete

To use group edit to delete addresses 15 - 25 in the current program:

	Instruction	Display Shows
1	Press the F2 (MENU 1) key, then 1 to select Group Edit. The display will prompt the user to enter the starting memory address of the group to edit (From) and the ending number of the group to edit (To).	GROUP EDIT FROM: 1 TO: 1 (1 <-> 4000) F1: All F2: End
2	Type 15 then press ENTER to register 15 in From. Type 25 then press ENTER to register 25 in To.	GROUP EDIT ADDR: 15-25 ------------------------------ 1. Copy 5. Dispense Time 2. Delete 6. Offset 3. Move 7. Offset (R.E) 4. Line Speed Select:
3	The Group Edit menu will then appear, allowing the user to select an operation to be applied to the range of points. Press 2 to select Delete. Then press ENTER.	GROUP DELETE ADDR: 15-25 ------------------------------ 1. Yes 2. No Select:
4	The display will now prompt the user to confirm the deletion. Press 1 and then press ENTER to select Yes and delete the data.	

Move

To use group edit to move addresses 10 - 20 in the current program to memory addresses 50 -60:

	Instruction	Display Shows
1	Press the F2 (MENU 1) key, then 1 to select Group Edit. The display will prompt the user to enter the starting memory address of the group to edit (From) and the ending number of the group to edit (To).	GROUP EDIT FROM: 1 TO: 1 (1 <-> 4000) F1: All F2: End
2	Type 10 then press ENTER to register 10 in From. Type 20 then press ENTER to register 20 in To.	GROUP EDIT ADDR: 10-20 ---------- 1. Copy 5. Dispense Time 2. Delete 6. Offset 3. Move 7. Offset (R.E) 4. Line Speed Select:
3	The Group Edit menu will then appear, allowing the user to select an operation to be applied to the range of points. Press 3 to select Move. Then press ENTER	GROUP MOVE ---------- SOURCE 10-20 Destination:
4	The display will prompt the user to type the destination memory address where the data will be moved. Press the Clear key to erase the old value, then type 50 and press ENTER to select destination memory address number 50.	GROUP MOVE SOURCE 10-20 Destination: 50 1. Yes 2. No Select:
5	The display will now prompt the user to confirm the move. Press 1 and then press ENTER to select Yes and move the data.	

Line SP (Line Speed)

To use group edit to increase all of the line speed commands in memory address range 1 - 200 by 20%:

	Instruction	Display Shows
1	Press the F2 (MENU 1) key, then 1 to select Group Edit. The display will prompt the user to enter the starting memory address of the group to edit (From) and the ending number of the group to edit (To).	GROUP EDIT FROM: 1 TO: 1 (1 <-> 4000) F1: All F2: End
2	Type 1 then press ENTER to register 1 in From. Type 200 then press ENTER to register 200 in To.	GROUP EDIT ADDR: 1-200 ------------------------------ 1. Copy 5. Dispense Time 2. Delete 6. Offset 3. Move 7. Offset (R.E) 4. Line Speed Select:
3	The Group Edit menu will then appear, allowing the user to select an operation to be applied to the range of points. Press 4 to select Line Speed. Then press ENTER.	GROUP LINE SPEED ADDR: 1-200 ------------------------------ Multiple Value:
4	The display will prompt the user to type the Multiple Value to be applied to the line speeds. For example, a value of 1.2 will increase all speeds by 20%. A value of 0.8 will decrease all speeds by 20%. Type 1.2 and press ENTER to select a multiplier of 1.2.	GROUP LINE SPEED ADDR: 1-200 ------------------------------ Multiple Value: 1. 2 1. Yes 2. No Select:
5	The display will now prompt the user to confirm the change. Press 1 to select Yes. Then press ENTER. All of the line speed instructions in the select range of points will now be multiplied by 1.2.	

Dispense Time

To use group edit to increase all of the dispensing times (Point Dispense Setup) in memory address range 1 - 200 by 15%:

	Instruction	Display Shows
1	Press the F2 (MENU 1) key, then 1 to select Group Edit. The display will prompt the user to enter the starting memory address of the group to edit (From) and the ending number of the group to edit (To).	GROUP EDIT FROM: 1 TO: 1 (1 <-> 4000) F1: All F2: End
2	Type 1 then press ENTER to register 1 in From. Type 200 then press ENTER to register 200 in To.	GROUP EDIT ADDR: 1-200 ------------------------------ 1. Copy 5. Dispense Time 2. Delete 6. Offset 3. Move 7. Offset (R.E) 4. Line Speed Select:
3	The Group Edit menu will then appear, allowing the user to select an operation to be applied to the range of points. Press 5 to select Dispense Time. Then press ENTER.	GROUP DISPENSE TIME ADDR: 1-200 ------------------------------ Multiple Value:
4	The display will prompt the user to type the Multiple Value to be applied to the dispense times. For example, a value of 1.15 will increase all dispense times by 15%. A value of 0.85 will decrease all dispense times by 15%. Type 1.15 and press ENTER to select a multiplier of 1.15.	GROUP DISPENSE TIME ADDR: 1-200 ------------------------------ Multiple Value: 1. 15 1. Yes 2. No Select:
5	The display will now prompt the user to confirm the change. Press 1 to select Yes. Then press ENTER. All of the Point Dispense Setup instructions in the select range of points will now be multiplied by 1.15.	

Offset

The Offset function allows all XYZ locations in a program to be shifted in the X, Y, or Z-axis by a user-defined distance.

To use group edit to add 15 mm to all X-axis values in memory address range 1 - 200:

	Instruction	Display Shows
1	Press the F2 (MENU 1) key, then 1 to select Group Edit. The display will prompt the user to enter the starting memory address of the group to edit (From) and the ending number of the group to edit (To).	GROUP EDIT FROM: 1 TO: 1 (1 <-> 4000) F1: All F2: End
2	Type 1 then press ENTER to register 1 in From. Type 200 then press ENTER to register 200 in To.	GROUP EDIT ADDR: 1-200 --- 1. Copy 5. Dispense Time 2. Delete 6. Offset 3. Move 7. Offset (R.E) 4. Line Speed Select:
3	The Group Edit menu will then appear, allowing the user to select an operation to be applied to the range of points. Press 6 to select Offset. Then press ENTER.	GROUP OFFSET ADDR: 1-200 --- X Offset: 0 Y Offset: 0 Z Offset: 0 Unit: mm
4	The display will prompt the user to type the X, Y, and Z offset amounts to be added to all points in address range 1 – 200. Type 15 and press ENTER to add 15 mm to the X-axis values. Press ENTER two more times to leave the Y and Z offsets at zero.	GROUP OFFSET ADDR: 1-200 --- X Offset: 15 Y Offset: 0 Z Offset: 0 1. Yes 2. No Select:
5	The display will now prompt the user to confirm the change. Press 1 to select Yes. Then press ENTER. 15 mm will be added to all of the X-axis values in the selected range.	

Offset to

This function allows to be corrected automatically the offset problems which can appear when changing the tip, the barrel and/or the item to be dispensed on.

Move the tip using the original coordinates stored in program memory with the MOVE button. The next step is to jog the tip to the where it should be. The system will realign all of the data points with the original program.

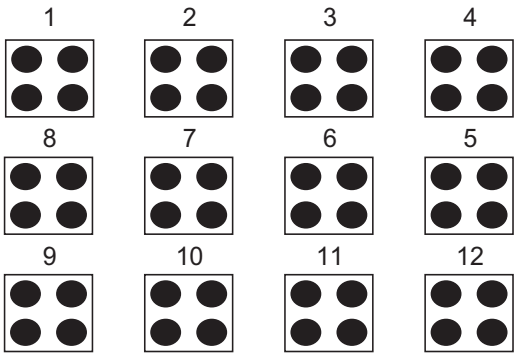
	Instruction	Display Shows
1	Press Move key. The tip will move to the saved position that was recorded in the current Address. If the new tip location is slightly different from the last tip location, you should see that the tip is not exactly at the reference point.	Line Start X:50 Y:10 Z:35 X: 50, Y: 10, Z: 35
2	Jog the tip to the correct location for the reference point.	Line Start X:50 Y:10 Z:35 X: 50.3, Y: 10.5, Z: 35
2	Press the F2 (MENU 1) key, then 1 to select Group Edit. The display will prompt the user to enter the starting memory address of the group to edit (From) and the ending number of the group to edit (To).	GROUP EDIT FROM: 1 TO: 1 (1 <-> 4000) F1: All F2: End
3	Type 1 then press ENTER to register 1 in From. Type 200 then press ENTER to register 200 in To. The Group Edit menu will then appear, allowing the user to select an operation to be applied to the range of points. Press 7 to select Offset to. Then press ENTER	GROUP EDIT 1-200 1. Copy 5. Dispen.Time 2. Delete 6. Offset 3. Move 7. Offset to 4. Line Speed Select:
4	The program origin will be adjusted for the new tip location.	X: 0.3, Y: 0.5, Z: 0.0

Expand Step & Repeat

Expand Step & Repeat will expand a step and repeat instruction to the actual data it represents. This can be useful in situations where the user must edit selected elements in a Step & Repeat group, although an expanded Step & Repeat instruction will occupy more memory space than an unexpanded instruction.

For example, if the following program was created:

Before:

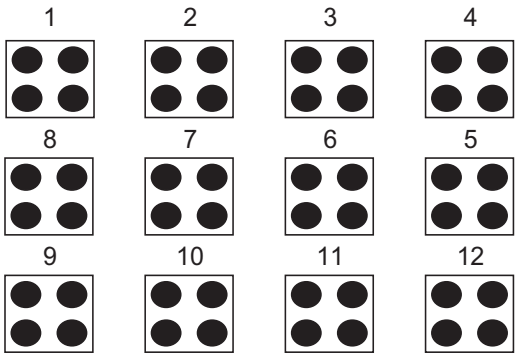


Address	Instruction
1	Dispense End Setup
2	Z Clearance
3	Point Dispense Setup
4	Dispense Point
5	Dispense Point
6	Dispense Point
7	Dispense Point
8	Step & Repeat X, Addr=4
9	End Program

The original program occupies 9 memory addresses.

If the user brings memory address number 8 into the display and then selects F2 (MENU 1), Expand Step & Repeat, address 8 will be expanded into the 44 points which it represents, bringing the total number of memory addresses used to 51 (plus the End Program instruction at address 52).

After:



Address	Instruction
1	Dispense End Setup
2	Z Clearance
3	Point Dispense Setup
4	Dispense Point
5	Dispense Point
6	Dispense Point
7	Dispense Point
8	Dispense Point
9	Dispense Point
10	Dispense Point
-	-
-	-
-	-
51	Dispense Point
52	End Program

Program Name

Program Name allows the user to register a name for the current program. If a program name is registered, it will appear on the display when that program is selected in Run mode.

Z-axis Limit (mm)

Z-axis Limit allows the user to limit the range of the Z-axis.

Use the Z↑ and Z↓ keys to bring the Z-axis to the lowest point the Z-axis should be allowed to travel (the highest Z-axis numeric value), then select F2 (Menu 1), 4. Z-axis Limit (mm).

The Z-axis range of motion will be limited to the current value.

Initial Output Port

Initial Output Port sets the ON/OFF status of the output signals at the start of each program cycle.

The Initial Output Port value is the decimal representation of the 8 binary bit values controlling the 8 output signals.

For example:

Decimal Value	Output Status (X = on, blank = OFF)							
	#1	#2	#3	#4	#5	#6	#7	#8
0								
1	X							
2		X						
4			X					
8				X				
16					X			
32						X		
64							X	
128								X

Debug Speed (mm/s)

This allows the debug speed to be set. The debug speed is the speed at which the tip will move when running in Debug mode.

Utility Menu

Opens the Utility Menu.

Jog Speed

The Jog Speed setting allows the user to select the jog speed for programming in Teach mode. The Jog speed can be set to Low, Middle or High speed.

The default value is 2. Middle.

Adjust Origin

Allows the position of a program to be corrected using the reference points. Adjust Origin corrects the X offset and Y offset. Please refer to **Adjust Position Setup** on page 51.

Control by RS232

This command allows the system to be controlled via the RS232 port. This is possible with the Fisnar Windows software package *Robot Edit* feature.

To enable or disable this functionality, select F2 (Menu 1) → Control by RS232 and select Enable or Disable.

Utility Menu (within menu 1)

Program

Opens the program utility menu. The program utility menu includes the following four options:

1. Backup	Creates a backup of the current program in a reserved backup location on the memory card. A separate backup location is reserved for each program number.
2. Restore	Restores program data backed up with 1. Backup above. The current program number data is restored.
3. Clear	Erases data in the current program number.
4. Copy	Copies the current program number to a different program number.

Memory

Opens the Memory utility menu.

The Master Password is 777.

1. Backup	Creates a backup of the entire memory contents - all program numbers. The backup is written to a reserved location on the memory card.
2. Restore	Restores the entire contents of the system memory backed up with 1. Backup above.
3. Clear	Erases the entire contents of the system memory. If Clear is selected, the user will be prompted for a password.

Teach Pendant

Opens the Teach Pendant utility menu. The Teach Pendant utility menu includes two options:

1. Backup	Copies the current program number data to the Teach Pendant.
2. Restore	Restores the contents of the Teach Pendant memory into the current program number.

The above Teach Pendant utilities provide an easy method of moving program data from one system to another.

Relocate Data

The Relocate Data function allows the position of a program to be corrected, including correction of the X offset, Y offset, and angle of rotation.

If, for example, the work piece fixture has been changed, the program position can be adjusted automatically for the new fixture.

The Relocate Data function requires two reference points for the calculations. Choose two point locations from your program, which will be used as reference points. For example, to relocate the program after a fixture change:

	Instruction	Display Shows
1	In this example, memory address 3 is the first reference point and memory address 4 is the second reference point. Jog the tip to the new, correct position for the first reference point.	

2	Press the MENU 2 key, then select Save Temp Point to save the location. The display will prompt for the temporary point number to save.	`Save temp point`
		`------------------------------`
		`Point (1-9):`
		
		`Relocate Save To 1,2 Point`

3	Press 1 to save the first location in temporary position #1. Then press ENTER	
4	Jog the tip to the new, correct position for the second reference point.	

5	Press the MENU 2 key, then select Save Temp Point to save the location. The display will prompt for the temporary point number to save.	`Save temp point`
		`------------------------------`
		`Point (1-9):`
		
		`Relocate Save To 1,2 Point`

6	Press 2 to save the second location in temporary position #2. Then press ENTER.	

7	Press F2 (Menu 1), then 7. Utility Menu, and select Relocate Data.	`Relocate Data`
		`------------------------------`
		`1.All Points`
		`2.Some Points`
		`SELECT:`

8	Press 1 to select All Points. Then press ENTER.	`Relocate All Point`
		`S1->`
		`S2->`

9	Type 3 and press ENTER to designate memory address number 3 as reference point 1 (temp point #1).	`Relocate All Point`
		`S1->3`
		`S2->`

10	Type 4 and press ENTER to designate memory address number 4 as reference point 2 (temp point #2).	`Relocate All Point`
		`S1->3`
		`S2->4`

11	The program location will be adjusted for the X offset, Y offset and angle of rotation.	

Lock or Unlock Program

Lock or Unlock Program allows the user to protect a program from editing. If the program is locked, the user will not be able to change any of the program data. Unlocking the program will allow the data to be changed again.

Password Setup

Password Setup allows the password to be set or reset for the current program.

To set the password, select F2 (MENU 1), Utility Menu, and Password Setup. The user will be prompted for a NEW PASSWORD. Type the new password and press ENTER.

If the password is left blank and ENTER is pressed, the password will be removed. After changing or resetting the password, the system power should be turned off.

The purpose of the password is to protect the program from unauthorized editing. The user will not be allowed to enter Teach mode unless the correct password is entered. If the password is forgotten, the master password (777) can be used to gain access to the program.

Cycle Counter

When in run mode, the first line of the display shows the number of program cycles, which have run to completion for the current program number: [RUN MODE][X].

It is possible to reset this number by selecting F2 (MENU 1), Utility Menu, Cycle Counter. When prompted for the New Data: press 0 and ENTER to reset the cycle counter.

It is also possible to cause an alarm to be generated after a fixed number of program cycles. Select F2 (MENU 1), Utility Menu, Cycle Counter. When prompted for the New Data: type the number of program cycles to complete before generating the alarm and press ENTER.

In run mode, when the set number of program cycles has been completed, the display will show Counter Full [Shift + Enter], and by pressing the Shift + Enter buttons the system will be disabled and the program may be run again.

Key Beep

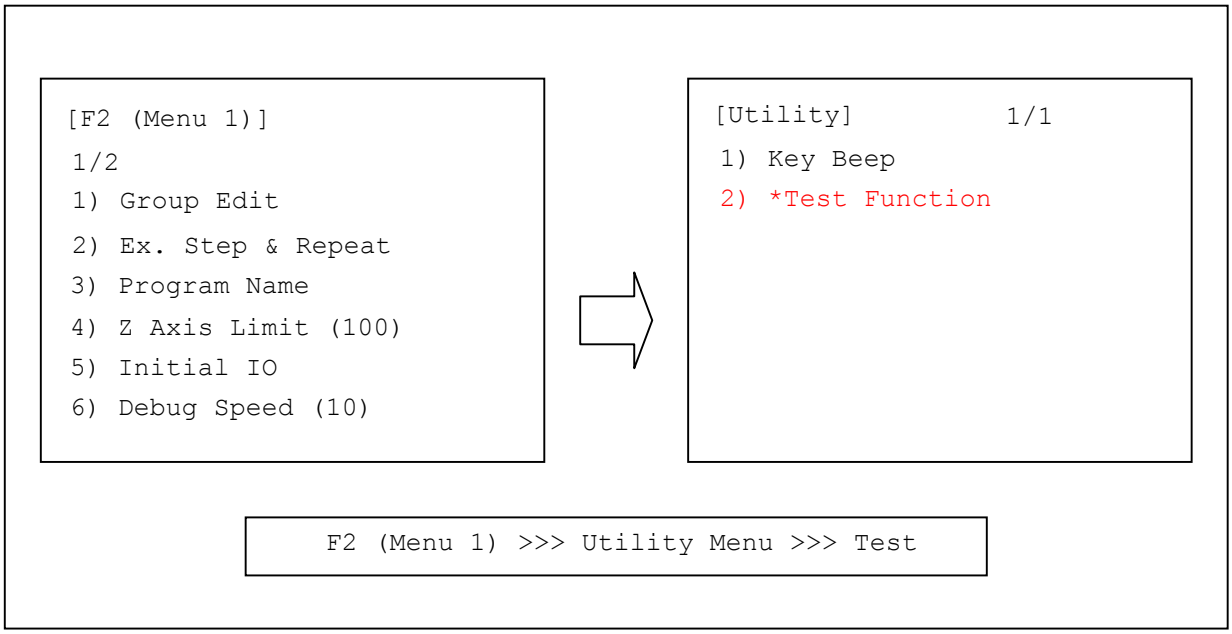
This allows the user to turn on the key beep by selecting the ENABLE option, as well as turn it off by selecting the DISABLE option.

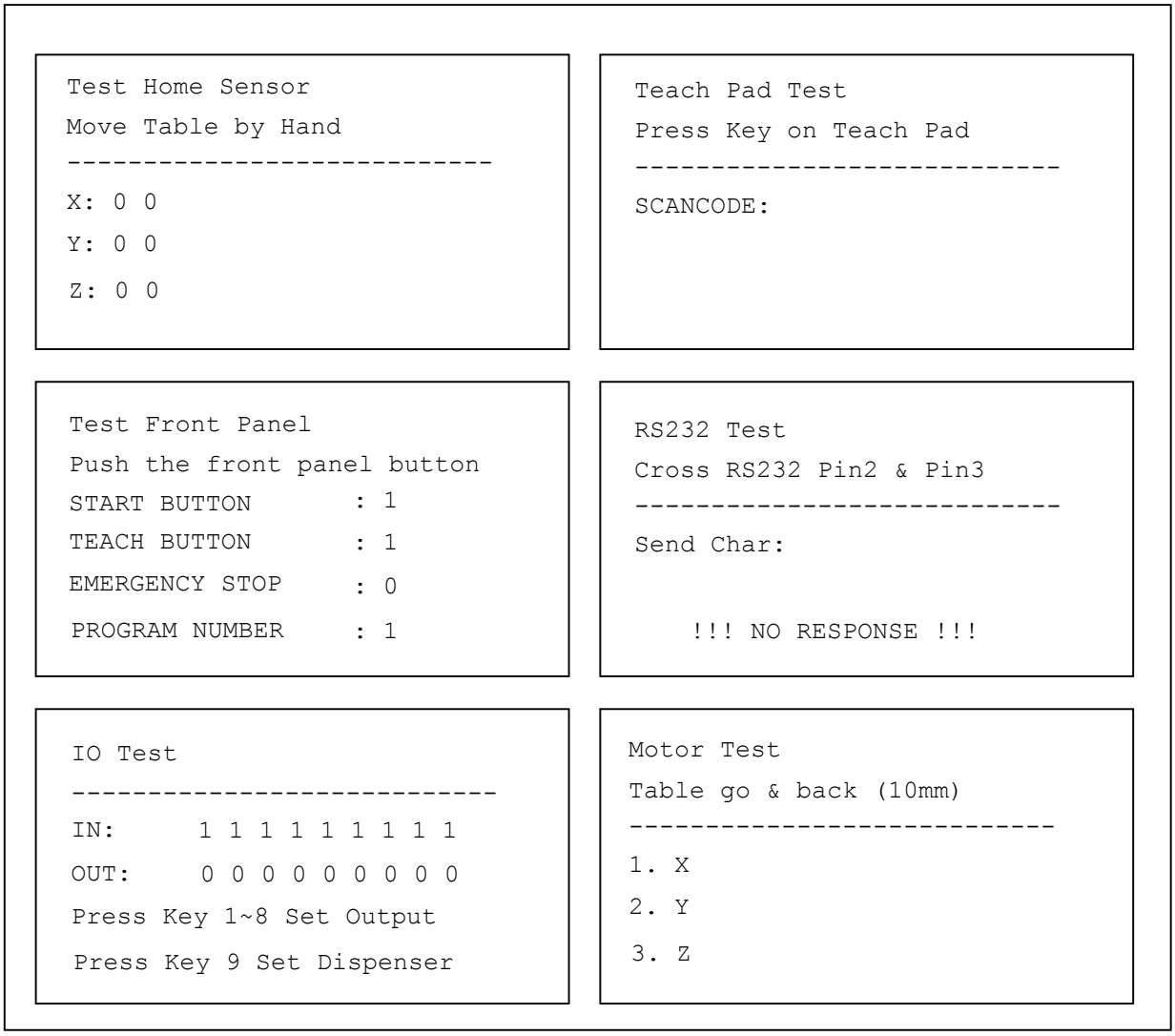
Test Function

The Test Function is a diagnostic command used for troubleshooting your system easily through the system Teach Pendant.

Instructions:

1. After initializing the system, press the F2 button MENU 1 on the Teach Pendant.
2. Select Utility Menu (see next page).
3. Select Test Function (see next page).


[F2 (Menu 1)]
1/2
1) Group Edit
2) Ex. Step & Repeat
3) Program Name
4) Z Axis Limit (100)
5) Initial IO
6) Debug Speed (10)
[Utility] 1/1
1) Key Beep
2) *Test Function
F2 (Menu 1) >>> Utility Menu >>> Test


Test Home Sensor
Move Table by Hand
X: 0 0
Y: 0 0
Z: 0 0
Teach Pad Test
Press Key on Teach Pad
SCANCODE:
Test Front Panel
Push the front panel button
START BUTTON : 1
TEACH BUTTON : 1
EMERGENCY STOP : 0
PROGRAM NUMBER : 1
RS232 Test
Cross RS232 Pin2 & Pin3
Send Char:
!!! NO RESPONSE !!!
IO Test
IN: 1 1 1 1 1 1 1 1
OUT: 0 0 0 0 0 0 0 0
Press Key 1~8 Set Output
Press Key 9 Set Dispenser
Motor Test
Table go & back (10mm)
1. X
2. Y
3. Z

F3 (Menu 2)

Numerical Move

Numerical Move allows the tip to be positioned numerically by entering a number for the X, Y, Z values.

Save Temp Point

Save Temp Point saves the current XYZ position in a temporary memory area numbered 1 – 9. The Save Temp Point function is also used with the Relocate Data function (See **Relocate Data** on page 44).

Move to Temp Point

Move to Temp Point retrieves an XYZ position, which was stored with Save Temp Point.

Undo Program

Undo Program cancels the last change to the program. This returns to the program state prior to the last change.

Redo Program

This re-does the last change to the program, which was canceled with Undo.

Debug Program

Debug Program runs the program in Debug mode, using the speed set in Debug Speed starting at the current point location.

Move to Home Position

Move to Home Position will move the tip to the home location using either the default values (X=0, Y=0, Z=0) or the user-specified location defined in the Setup → Home Position Setup command.

This command cannot be used as a program instruction. It can be used during program editing to confirm the location of the home position.

System Information

System information will display the dispensing Software version currently installed in the system.

Execute Point

Execute Point will run a selected command. Use the –1 & +1 keys to locate the command that you want to execute.

For example, if you select an address containing a circle, the Execute Point will cause the tip to move in a circular path.

Program List

Program List allows the operator to see all programs previously written in the memory.

F4 (Setup Menu)

Below is a list of functions, which are found under the SETUP key. These functions are all related to the setup of dispensing parameters.

Line Speed

Line Speed registers the line speed used for all lines from the current memory address forward until another Line Speed instruction is found.

Line Dispense Setup

When dispensing high viscosity materials, there is often a delay from the moment the dispenser is turned on until the material begins to flow. The following parameters are set under this function: Head Time, Tail Time, Node Time, and Tail Length.

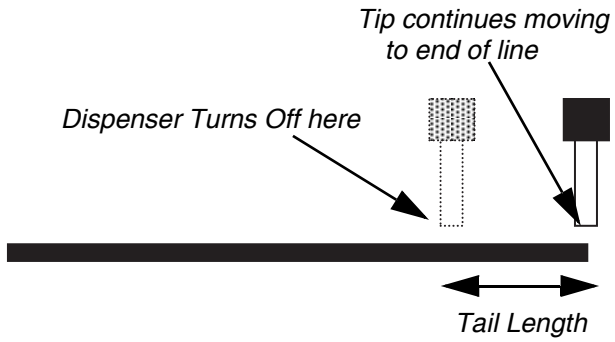
The Head Time setting is a delay time used at the start of line dispensing to prevent the tip from moving along the line path until the material is flowing. The tip will move to the start of the line, turn on the dispenser and wait for the time period specified in the head time setting before moving. The time value can be adjusted to ensure that the material begins flowing at the same time as the line movement begins.

At the end of dispensing, a delay is often required after the dispenser is turned off to allow the barrel pressure to equalize before moving to the next point location. This prevents material from being “spilled” where it is not wanted. This time delay at the end of dispensing is called the Tail Time.

The Node Time parameter enters a wait time that only affects the Line Passing command. The tip will pass through line passing point and will wait at line passing point with the dispenser activated for the time specified in the Node Time.

Usually the material continues flowing after the dispenser is off, due to pressure built in the system. Tail Length automatically turns off the dispenser at a user defined distance before the end of a line, preventing excess of material to be deposited at the end of the line.

The value will be used for all lines from the current memory address forward until another Tail Length instruction is found.



Values for the Head Time and Tail Time used when performing line dispensing are registered by pressing the SETUP key, then selecting Line Dispense Setup. The set values will be used by all lines from that memory address forward until a new set of Line Dispense Setup values are found.

Point Dispense Setup

Point Dispense Setup registers POINT DISPENSE SETUP values which set dispensing time and waiting time at the end of dispensing (“tail” time) for dots. The registered values will be used from the current memory address forward until another POINT DISPENSE SETUP instruction is found.

Dispense End Setup

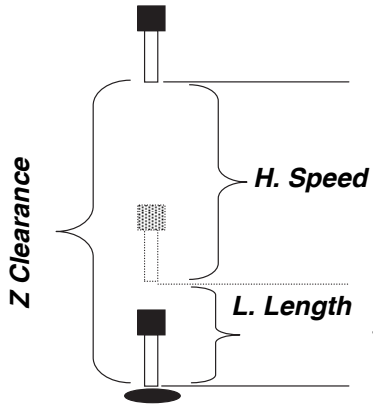
Dispense End Setup allows the L. Length, L. Speed, and H. Speed values to be registered at a memory address. These values will effect how far and how fast the tip rises after dispensing.

After dispensing a dot or line, it is often required to raise the tip a short distance at a slow speed. This allows the material to cleanly break free from the tip, without “dragging” material where it is not wanted.

The distance and speed that the tip raises after dispensing is controlled by the L. Length and L. Speed settings.

After the tip raises the length specified by L. Length at the speed specified by L. Speed, the tip will continue rising to the Z Clearance height at the speed specified by H. Speed.

The purpose of specifying a Z Clearance height is to allow the tip to raise high enough to clear any obstacles it may encounter on the way to the next point.



Values for H. Speed, L. Speed, and L. Length are registered with the Dispense End Setup function by pressing the SETUP key, then choosing Dispense End Setup.

Once Dispense End Setup values have been registered at a memory address, all points after that memory address will use the values specified. If Dispense End Setup values are registered again, at a higher memory address, all points from that memory address forward will use the new values.

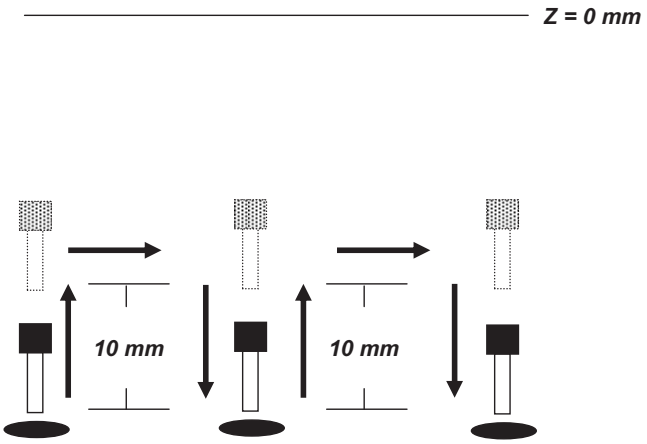
Z Clearance

The purpose of the Z Clearance function is to cause the tip to raise high enough to clear all obstacles as it moves from one point to another. If there are no obstacles between any of the program points, a small Z Clearance value, such as 5 mm, can be used to minimize the program cycle time.

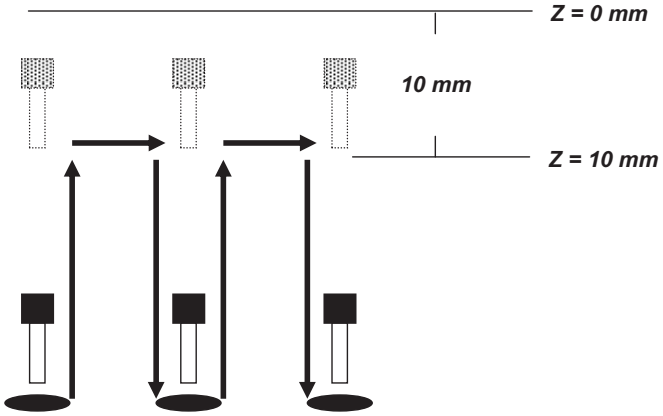
Values for the Z Clearance are registered by pressing the SETUP key, then choosing Z Clearance. The Z Clearance value will be used by all points from that memory address forward until another Z Clearance value is found. Normally, a Z clearance instruction should be registered in the beginning of a program, at one of the first memory addresses.

The Z Clearance value may be specified as a relative value or an absolute value. When specified as a relative value, it is the distance to rise relative to the taught point location. When it is specified as an absolute value, it is a distance from the Z-axis zero position, where the tip will rise to, regardless of the Z-axis value of the taught point location. For example:

Z Clearance = 10 mm RELATIVE:



Z Clearance = 10 mm ABSOLUTE:



X/Y Move Speed

X/Y Move Speed sets default X and Y-axis movement speed as the tip moves between figures in a program, such as from one dispense point to another or from the end of line dispensing to the next start of line dispensing.

Z Move Speed

Z Move Speed sets default Z-axis movement speed as the tip moves between figures in a program, such as from one dispense point to another or from the end of line dispensing to the next start of line dispensing.

Home Position Setup

Home Position Setup allows the user to change the location of the program home position. The home position is the location where the tip will move to at the end of a program cycle if the “End Program” or “Home Point” instruction is registered. The default home position is (X=0, Y=0, Z=0).

To change the home position, jog the tip to the desired location for the new home position, then press Setup → Home Position Setup.

NOTE: When executing a program in TEACH MODE, the system will move to the mechanical home position (X=0, Y=0, Z=0) at the start of every program cycle. When executing a program in RUN MODE, the system will move to the home position set under Setup → Home Position Setup.

Adjust Position Setup

When the dispensing barrel or tip is removed and replaced, the new tip is often in a slightly different XYZ position than the old tip was.

A reference point should be chosen someplace on the work piece fixture or on the work piece itself. The reference point must be registered in the program data. This only needs to be done one time, such as when the program is originally created.

	Instruction	Display Shows
1	Jog the tip to the reference point (i.e. X=10, Y=20, Z=30). Or if the reference point is an existing point in your program, press the MOVE key to bring the tip to that XYZ location.	

2	Press the SETUP key, and go to page two.	`[SETUP]  2/3`
		`1 Home Position Setup`
		`2 Adjust Position Setup`
		`.`
		`.`
		`7 Acceleration`

	Press 2 to Select Adjust Position Setup. The current point will be saved automatically. (The point will not be registered at any address in the program, but it will be saved as a global variable for the current program)	`Set Adjust Position`
		`------------------------------`
		`X: 10`
		`Y: 20`
		`Z: 30`

When the tip/barrel is changed, use the following procedure to adjust the program's origin for the new tip location:

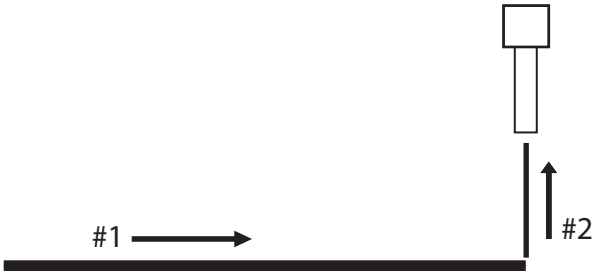
	Instruction	Display Shows
	Switch the system to RUN mode (the main unit mode switch is in the RUN position).	Counter: 0 +------------+ | START/HOME | +------------+
1	Press the F1 key.	[Run Menu] 1/1 1. Reset Counter 2. Adjust Origin 3. Relocate Data
2	Press 2 to select Adjust Origin.	[MESSAGE BOX] ---------- ADJUST ORIGIN ---------- Press [ENTER] Adjust Position ---------- ADJUST ORIGIN ----------
3	Press the ENTER key. The tip will move to the reference point previously saved (X=10, Y=20, Z=30). If the new tip's location is slightly different than the last tip's location, you should see that the tip is not exactly at the reference point.	[MESSAGE BOX] ---------- ADJUST ORIGIN ---------- Move TIP ---------- ADJUST ORIGIN ---------- X10 Y20 Z30
4	Jog the tip to the correct location for the reference point. When the location is correct, press ENTER. All the coordinates in the current program will be offset to compensate the tip offset.	[MACHINE HOME] +------------+ | START/HOME | +------------+

Retract Setup

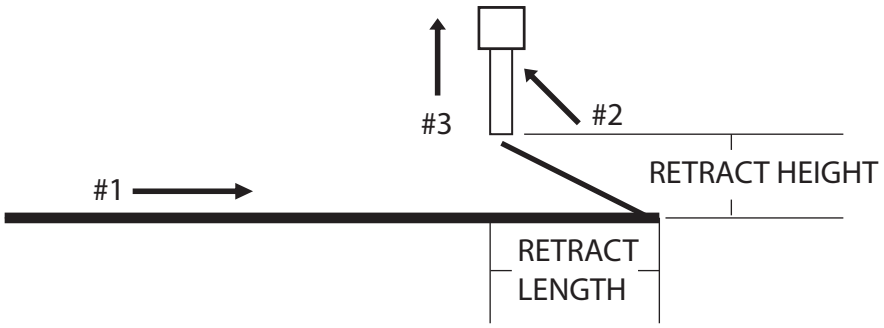
The Retract function gives the programmer a high level of tip control at the end of line dispensing. This is useful when dispensing high viscosity or “stringy” materials as it will lay the material’s tail down on the dispensed bead.

There are five types of the Retract Setup functions: 0 (Normal), 1 (Back), 2 (Square Back), 3 (Forward) and 4 (Square Forward).

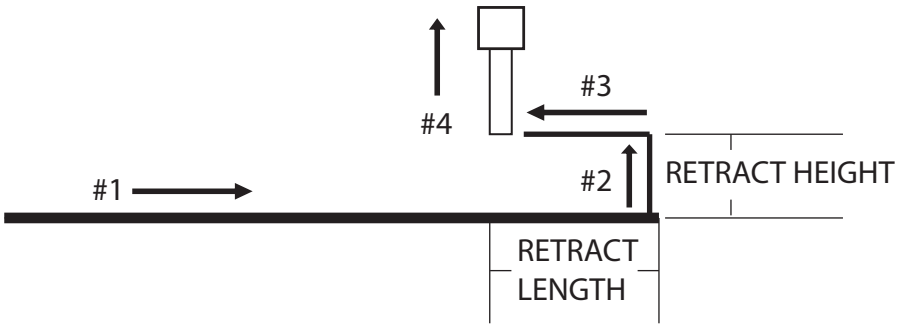
#0: RETRACT (NORMAL)



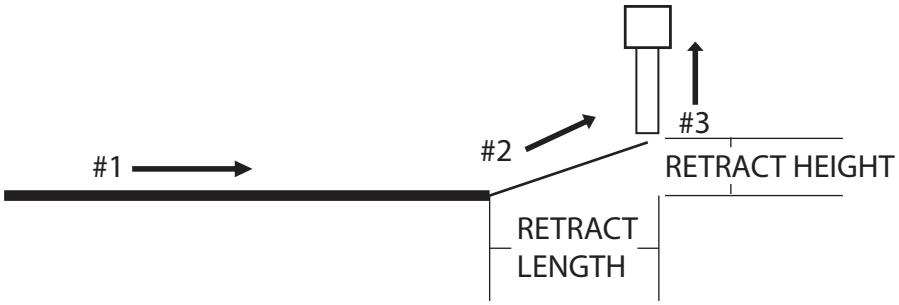
#1: RETRACT (BACK)



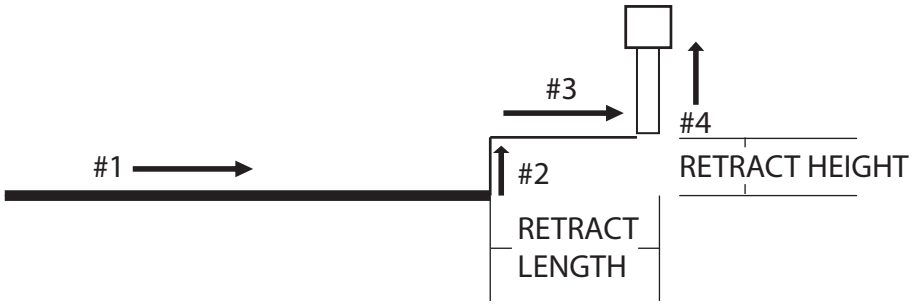
#2: RETRACT (SQUARE BACK)



#3: RETRACT (FORWARD)



#4: RETRACT (SQUARE FORWARD)



The retract function requires the following parameters:

RETRACT LENGTH: the distance to travel away from the line end point

RETRACT HEIGHT: the distance to rise as the tip moves away from the line end (must be smaller than the value of Z clearance in that point)

RETRACT SPEED: the speed at which the tip moves along the retract path

RETRACT TYPE: 0. NORMAL
1. BACK
2. SQUARE BACK
3. FORWARD
4. SQUARE FORWARD

Retract values will be used for all lines from the current memory address forward until another Retract instruction is found or the function is canceled.

Quickstep

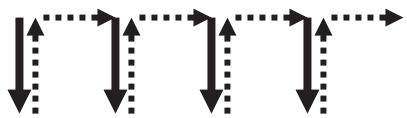
This function causes the system to move very fast from one point to another reducing the time of the dispensing cycle.

Quickstep Path

When Quickstep is enabled, it provides two kinds of paths to use:

1. Triangle:

2. Normal:

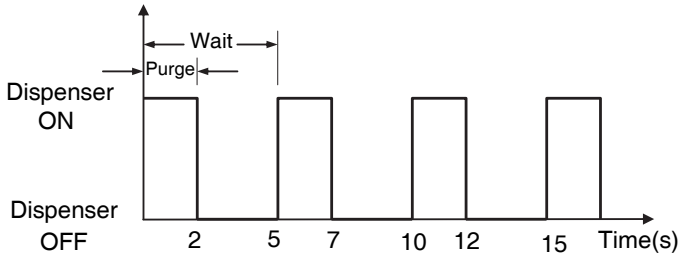


Auto Purge Setup

After the end of a program, the tip will go to the home position and material will be purged in a continuous loop according to the parameters registered in the Auto Purge Setup command.

This command is very useful for two part materials that have a very short pot life.

For example, if a Wait Time of 5s and a Purge Time of 2s is registered in the Auto Purge Setup, the following chart shows the Purge pattern.



ESTOP Output Status

After receiving the emergency stop signal, the system can set the status of all the outputs as:

- **INITIAL:** The status (On/Off) of the outputs is set as the status set by the Initial IO command.
- **KEEP OUTPUT STATUS:** The status (On/Off) of the outputs is left as it was before the emergency signal.

Acceleration

This controls the acceleration of each axis. The value entered in this setting is a system parameter, and its exact relation to the system's acceleration is beyond the scope of this manual.

In general, the value of the acceleration parameter is inversely related to the system's acceleration. A small value will result in a high acceleration and vice versa. Very small values can make the motors slip and can cause the driver cards to overheat.

The default value is 25 for all the axes, and values lower than 15 are not recommended.

Pause Status

Pause Status sets the position to which the tip will move after pressing the Start button.

There are two options:

- Home Position: The tip will move to the home position.
- Stand: The tip will stay at the position where the Start button was pressed.

USB Up/Down Load

To upload system program files, perform the following procedure:

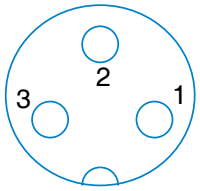
1. Prepare a USB drive (formated and less than 8G memory size).
2. Turn the system OFF and plug the USB drive into the rear port of the system.
3. Turn the system ON.
4. Switch to Teach mode and connect Teach pendant to the system.
5. After homing, press F4 to enter the menu.
6. On page 3, select 7. USB Up/Down Load.
7. Select 1 for uploading programs to the USB.
8. Then you can choose to copy all programs or some programs to the USB drive.
9. After selected, it will upload the desired programs to the USB drive.
10. When finished, a completed sign is shown on the display. Do not unplug the USB drive during uploading process.
11. Programs are saved in the folder titled Programs.

To download system program files, perform the following procedure:

1. Follow upload steps 1- 3. Plug the USB drive into the system where programs are copied to.
2. Select 2. Download from USB.
3. When downloading a desired program, select 2. Part Data. This will show all of the programs saved in the USB drive.
4. For example, if you want to download the program #99, press 4. The program will then download automatically.
5. Repeat step 4 to download another program.

I/O Specifications

Dispenser Connector



Pin #	Description
1	NO
2	COM
3	EARTH

The MAXIMUM Voltage	The MAXIMUM Current
12A	125 VAC
7A	250 VAC
7A	30 VDC

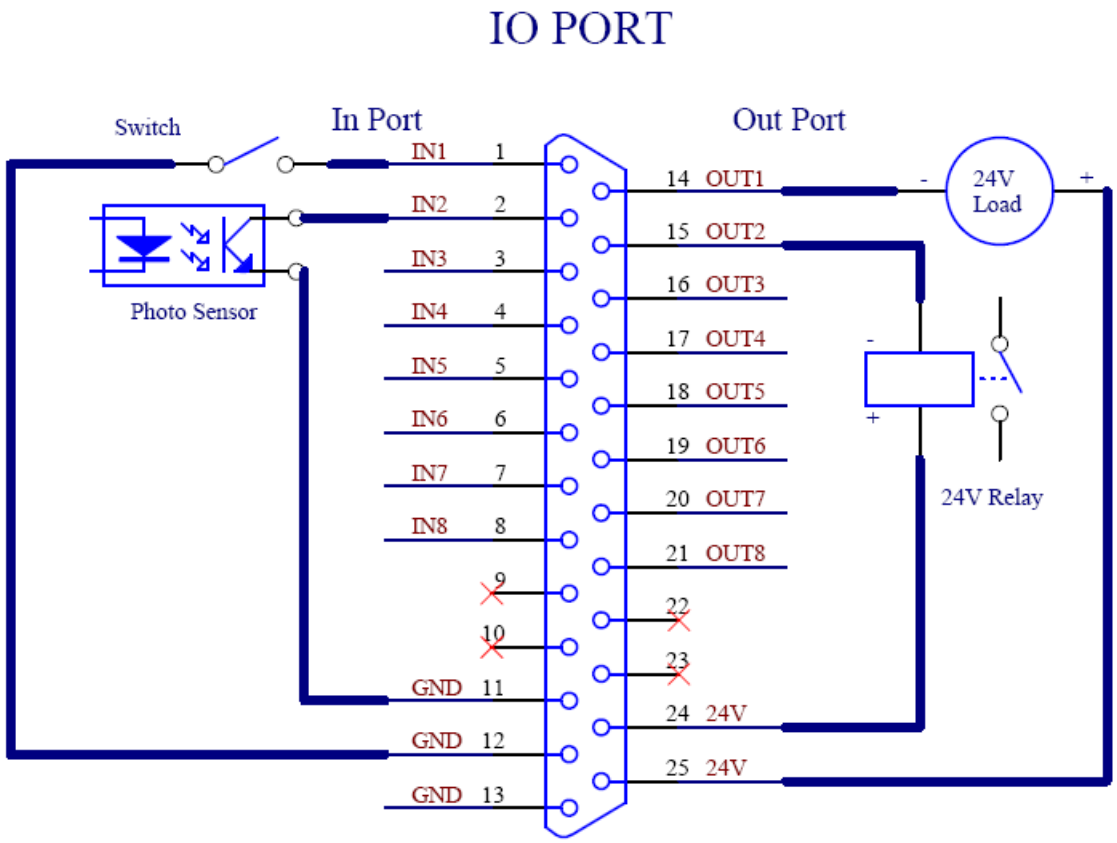
Output Signals

Pin #	Description
14	OUT #1
15	OUT #2
16	OUT #3
17	OUT #4
18	OUT #5
19	OUT #6
20	OUT #7
21	OUT #8
22	RESERVE
23	RESERVE
24	+24V
25	+24V

Input Signals

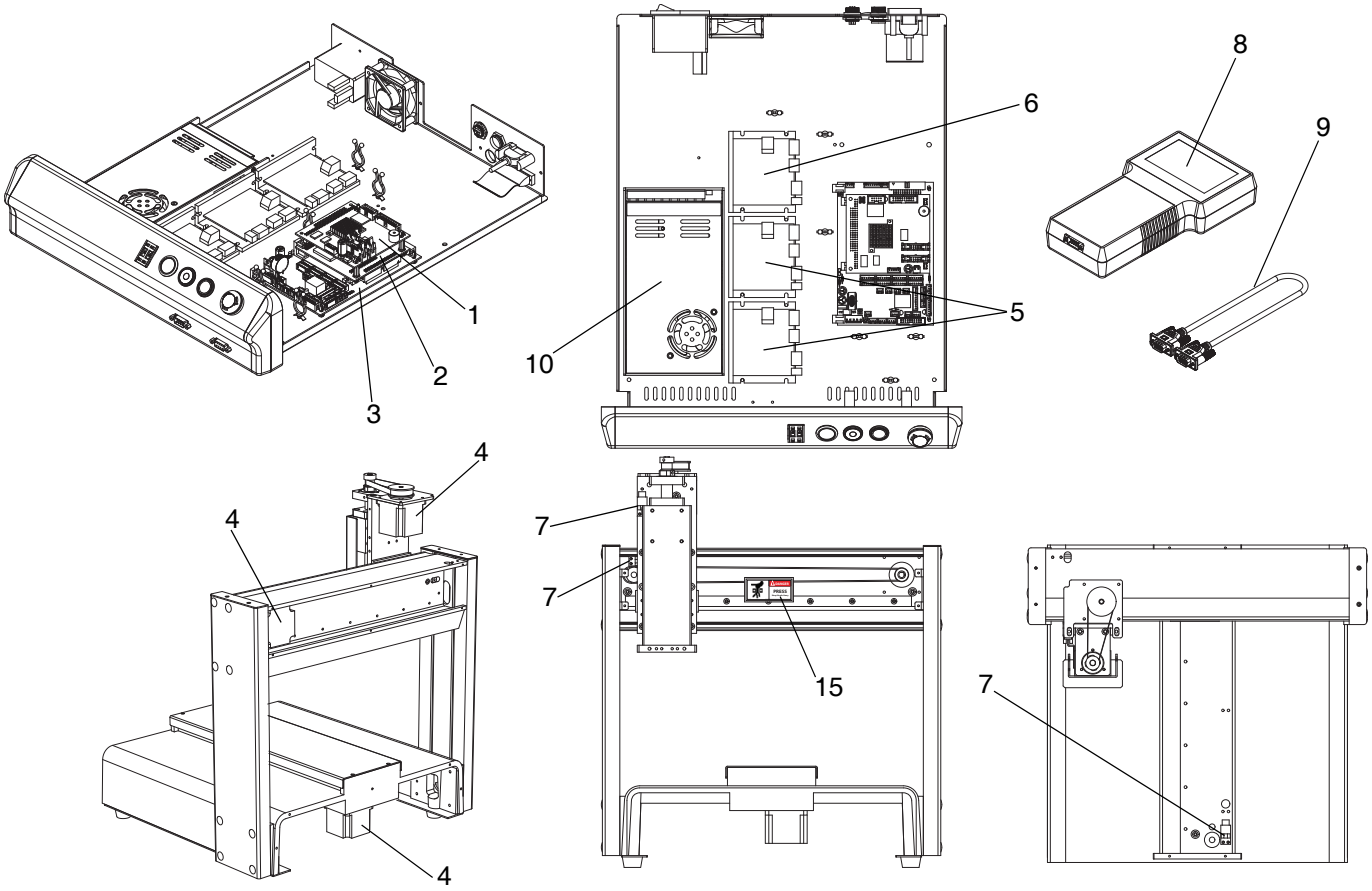
Pin #	Description
1	IN # 1
2	IN # 2
3	IN # 3
4	IN # 4
5	IN # 5
6	IN # 6
7	IN # 7
8	IN # 8
9	RESERVE
10	RESERVE
11	GND
12	GND
13	GND

Example:


IO PORT
Switch
In Port
Out Port
IN1 1
IN2 2
IN3 3
IN4 4
IN5 5
IN6 6
IN7 7
IN8 8
9
10
GND 11
GND 12
GND 13
14 OUT1
15 OUT2
16 OUT3
17 OUT4
18 OUT5
19 OUT6
20 OUT7
21 OUT8
22
23
24 24V
25 24V
Photo Sensor
24V Load
24V Relay

Parts

25D104

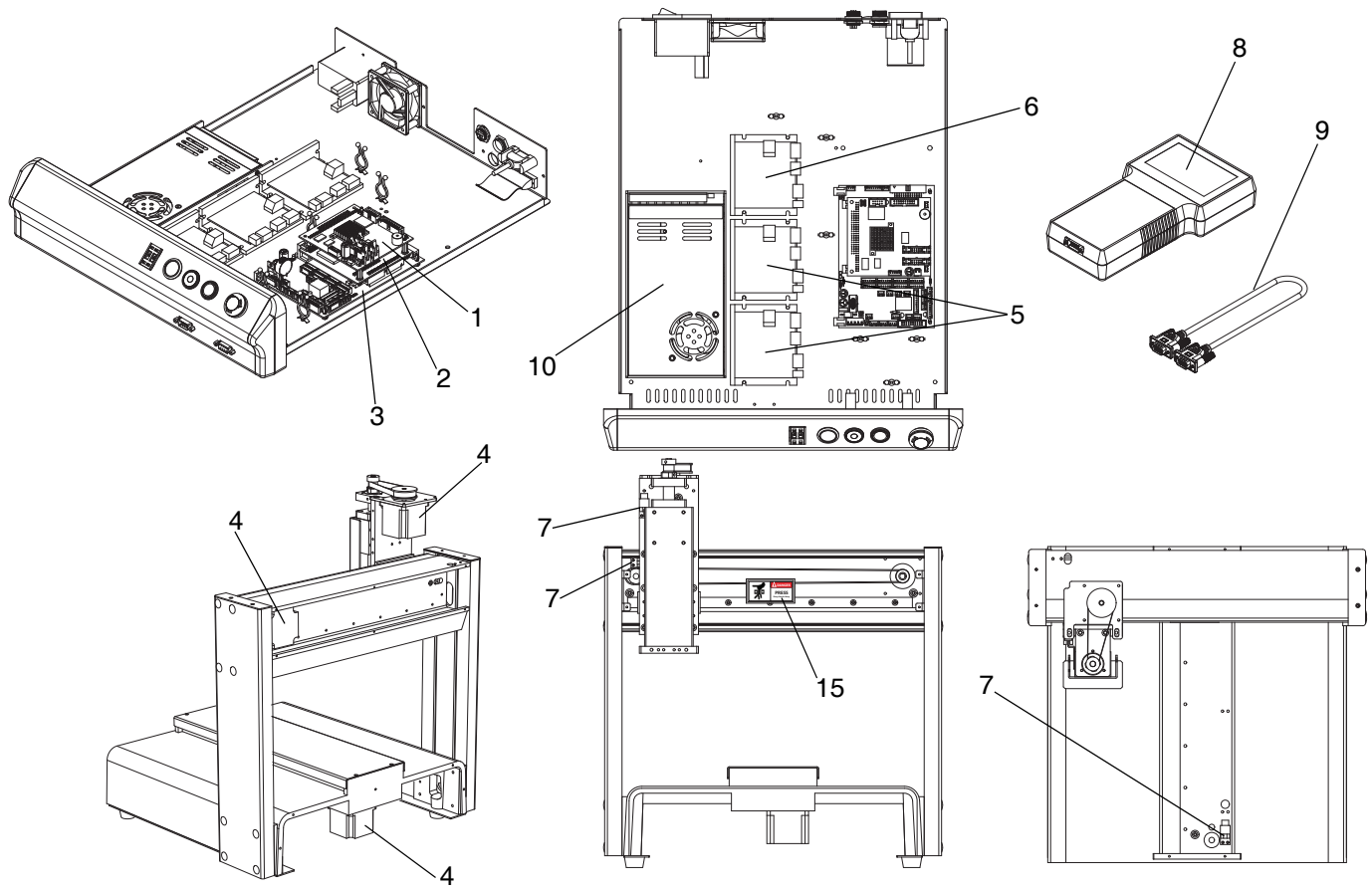


Ref.	Part	Description	Qty.
1	17T677	CARD, PC	1
2	17T678	CARD, motion	1
3	17T679	BOARD, control transfer	1
4	17T680	MOTOR	1
5	17T681	MOTOR, driver x/y	1
6	17T682	MOTOR, driver z	1
7	17T683	SENSOR, home	1
8	17T684	PENDANT, teach	1
9	17T685	CABLE, teach pendant	1
10	17T686	POWER SUPPLY, 24v	1
15▲	---	LABEL, press, keep hands away	1
16*	17V078	BELT, z	1
23*	17V252	BELT, x	1
24*	17V253	BELT, y	1
25*	17V211	CABLE, motor x	1
26*	17V212	CABLE, motor y	1
27*	17V213	CABLE, motor z	1
28*	17V217	CABLE, x-axis sensor	1
29*	17V218	CABLE, y-axis sensor	1
30*	17V219	CABLE, z-axis sensor	1

* *Not Shown*

▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

25D105

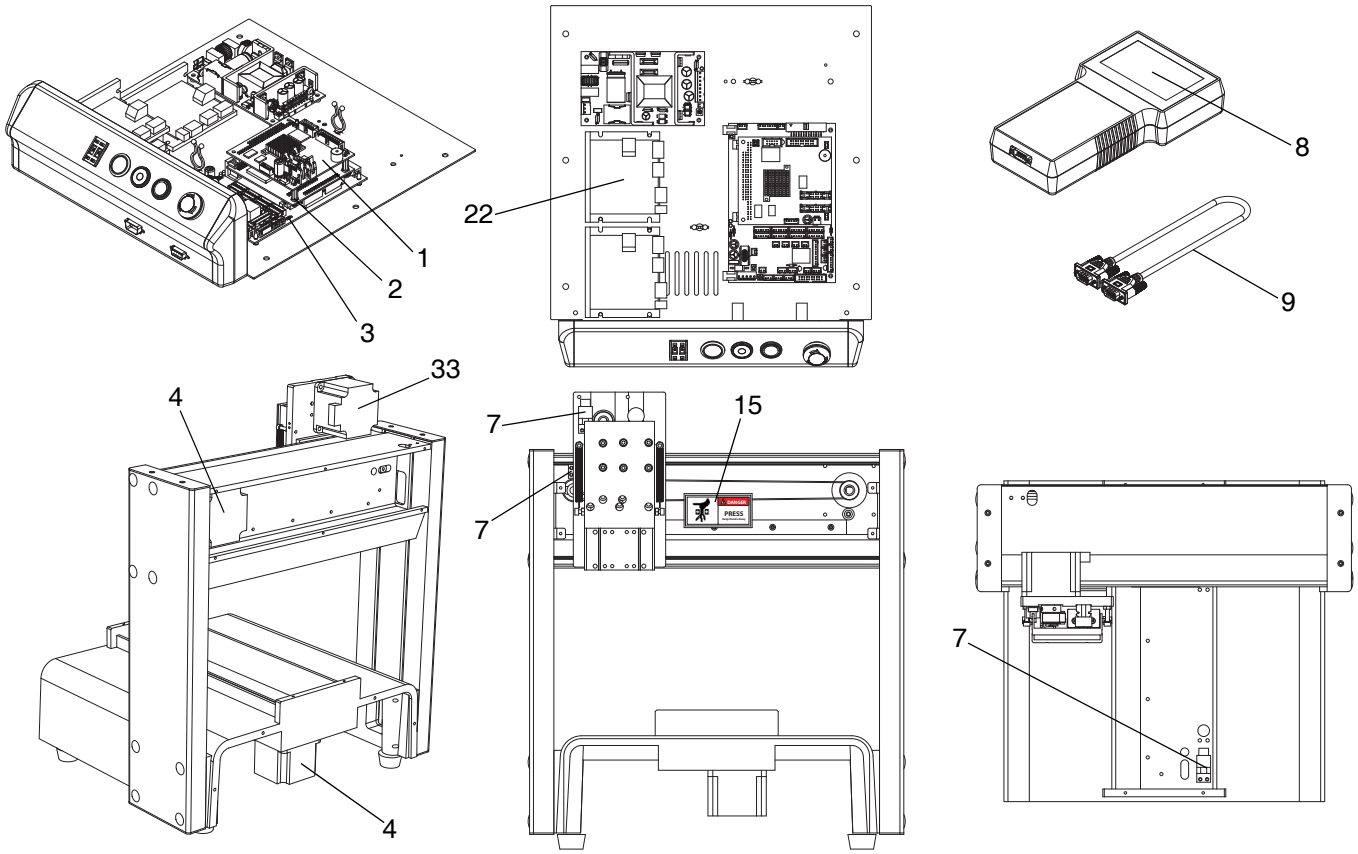


Ref.	Part	Description	Qty.
1	17T677	CARD, PC	1
2	17T678	CARD, motion	1
3	17T679	BOARD, control transfer	1
4	17T680	MOTOR	1
5	17T681	MOTOR, driver x/y	1
6	17T682	MOTOR, driver z	1
7	17T683	SENSOR, home	1
8	17T684	PENDANT, teach	1
9	17T685	CABLE, teach pendant	1
10	17T686	POWER SUPPLY, 24v	1
15▲	---	LABEL, press, keep hands away	1
16	17V078	BELT, z	1
25*	17V211	CABLE, motor x	1
26*	17V212	CABLE, motor y	1
27*	17V213	CABLE, motor z	1
28*	17V217	CABLE, x-axis sensor	1
29*	17V218	CABLE, y-axis sensor	1
30*	17V219	CABLE, z-axis sensor	1
31*	17V254	BELT, x	1
32*	17V255	BELT, y	1

* *Not Shown*

▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

25D546

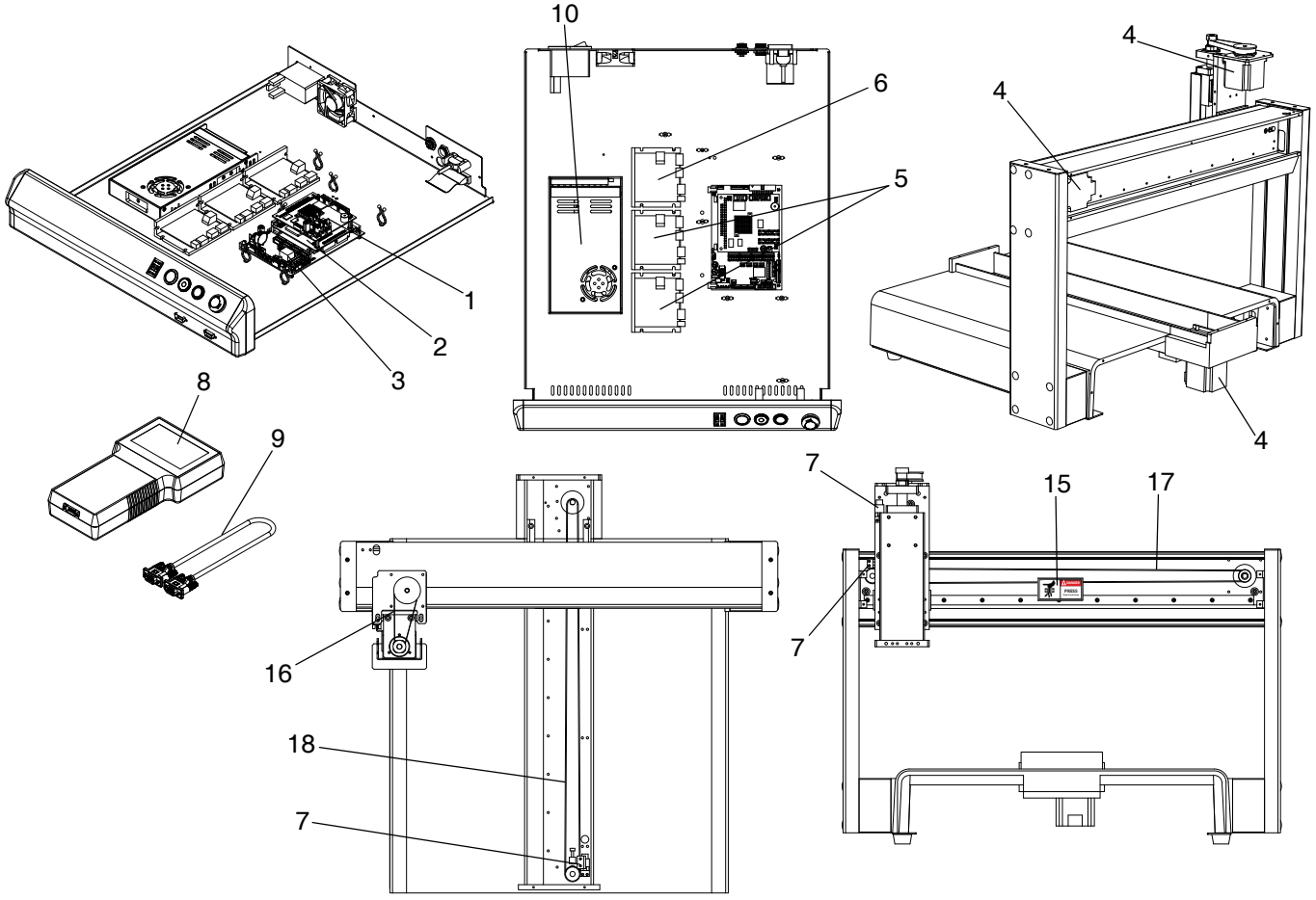


Ref.	Part	Description	Qty.
1	17T677	CARD, PC	1
2	17T678	CARD, motion	1
3	17T679	BOARD, control transfer	1
4	17T680	MOTOR	1
7	17T683	SENSOR, home	1
8	17T684	PENDANT, teach	1
9	17T685	CABLE, teach pendant	1
15▲	---	LABEL, press, keep hands away	1
22	17V088	MOTOR, driver x, y, z	1
33	17V248	MOTOR 200F-Z	1
34*	17V249	BELT, z	1
35*	17V250	BELT, x	1
36*	17V251	BELT, y	1
37*	17V208	CABLE, motor x	1
38*	17V209	CABLE, motor y	1
39*	17V210	CABLE, motor z	1
40*	17V214	CABLE, x-axis sensor	1
41*	17V215	CABLE, y-axis sensor	1
42*	17V216	CABLE, z-axis sensor	1

* *Not Shown*

▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

25D547

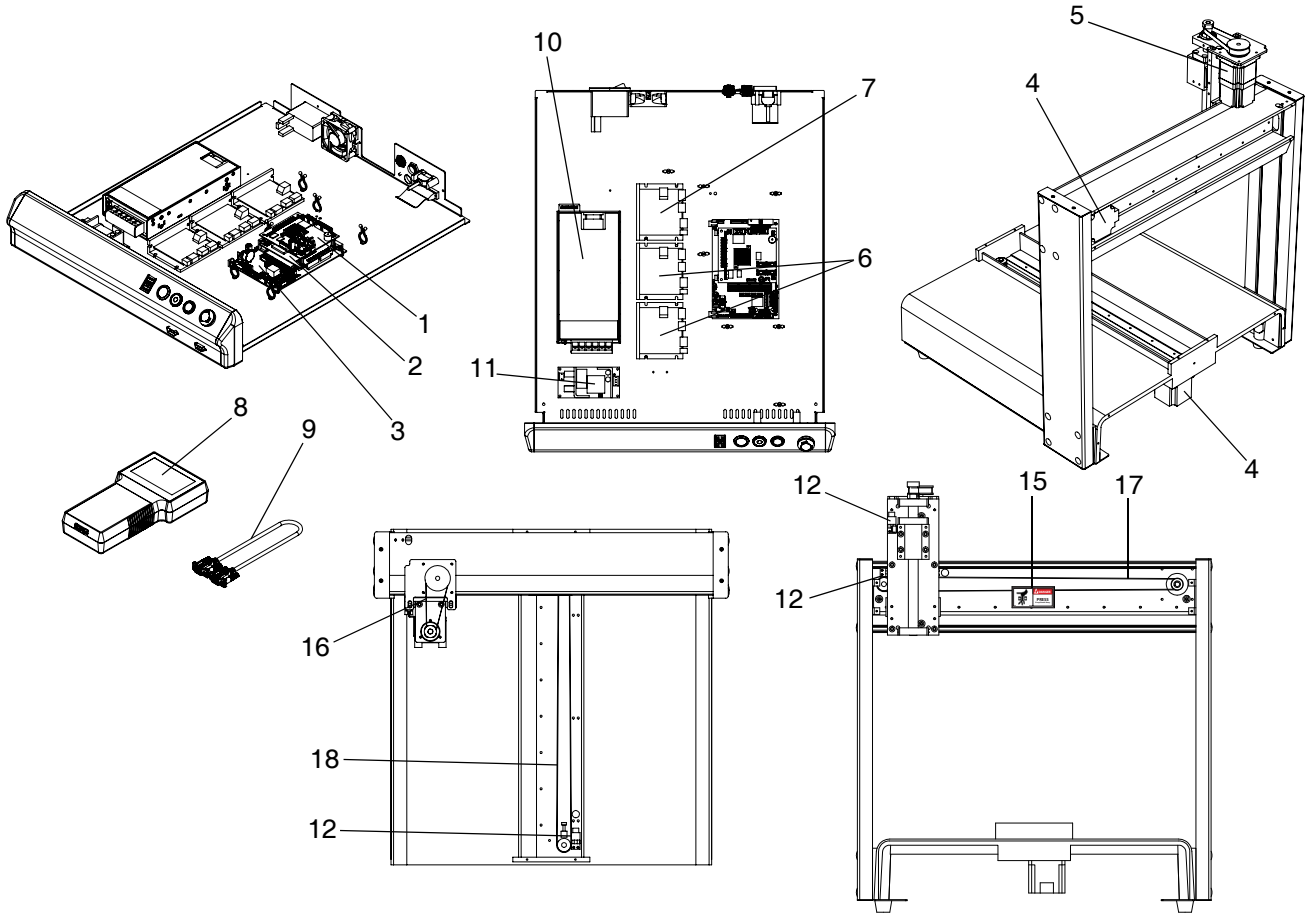


Ref.	Part	Description	Qty.
1	17T677	CARD, PC	1
2	17T678	CARD, motion	1
3	17T679	BOARD, control transfer	1
4	17T680	MOTOR	1
5	17T681	MOTOR, driver x/y	1
6	17T682	MOTOR, driver z	1
7	17T683	SENSOR, home	1
8	17T684	PENDANT, teach	1
9	17T685	CABLE, teach pendant	1
10	17T686	POWER SUPPLY, 24v	1
15▲	---	LABEL, press, keep hands away	1
16	17V078	BELT, z	1
17	17V079	BELT, x	1
18	17V084	BELT, y	1
19	17V085	CABLE, motor x	1
20	17V086	CABLE, motor y	1
21	17V087	CABLE, motor z	1
43*	17V220	CABLE, x-axis sensor	1
44*	17V221	CABLE, y-axis sensor	1
45*	17V222	CABLE, z-axis sensor	1

* *Not Shown*

▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

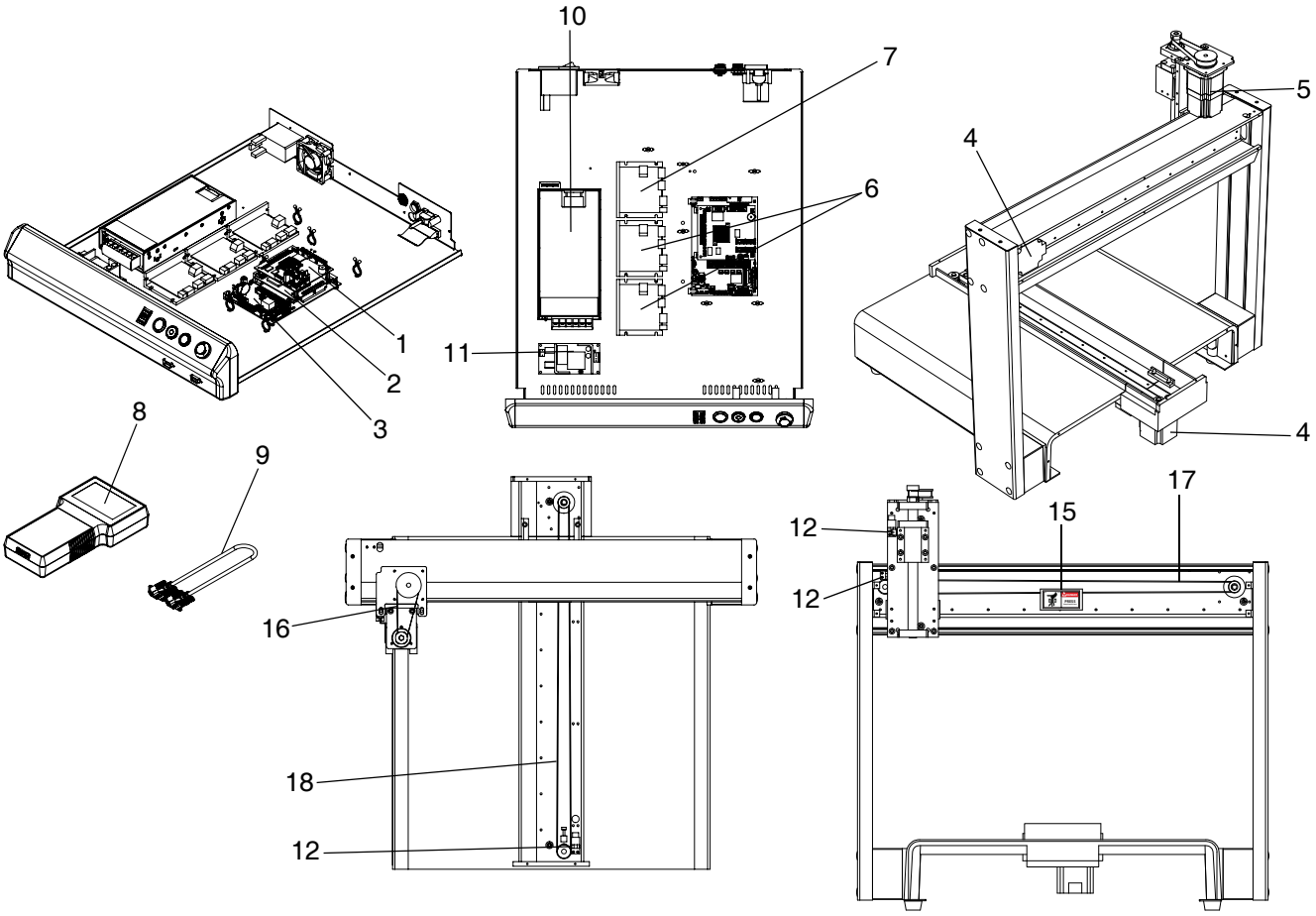
25D945



Ref.	Part	Description	Qty.
1	17T677	CARD, PC	1
2	17T678	CARD, motion	1
3	17T679	BOARD, control transfer	1
4	17T680	MOTOR	1
5	17V758	MOTOR, with brake (z-axis)	
6	17T681	MOTOR, driver x/y	1
7	17T682	MOTOR, driver z	1
8	17T684	PENDANT, teach	1
9	17T685	CABLE, teach pendant	1
10	17V760	POWER SUPPLY, 48V	1
11	17V759	POWER SUPPLY, 24V small	
12	17T683	SENSOR, home	1
15▲	---	LABEL, press, keep hands away	2
16	17V078	BELT, z	1
17	17V254	BELT, x	1
18	17V255	BELT, y	1

▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

25D946

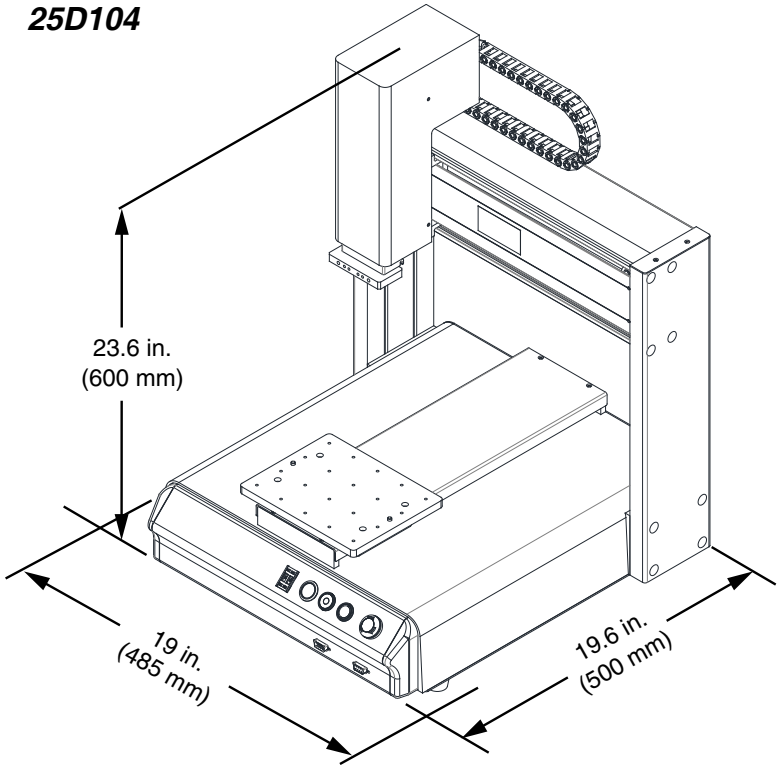


Ref.	Part	Description	Qty.
1	17T677	CARD, PC	1
2	17T678	CARD, motion	1
3	17T679	BOARD, control transfer	1
4	17T680	MOTOR	1
5	17V758	MOTOR, with brake (z-axis)	
6	17T681	MOTOR, driver x/y	1
7	17T682	MOTOR, driver z	1
8	17T684	PENDANT, teach	1
9	17T685	CABLE, teach pendant	1
10	17V760	POWER SUPPLY, 48V	1
11	17V759	POWER SUPPLY, 24V small	
12	17T683	SENSOR, home	1
15▲	---	LABEL, press, keep hands away	2
16	17V078	BELT, z	1
17	17V079	BELT, x	1
18	17V084	BELT, y	1

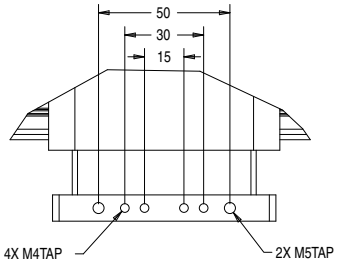
▲ *Replacement Danger and Warning labels, tags, and cards are available at no cost.*

Dimensions

25D104

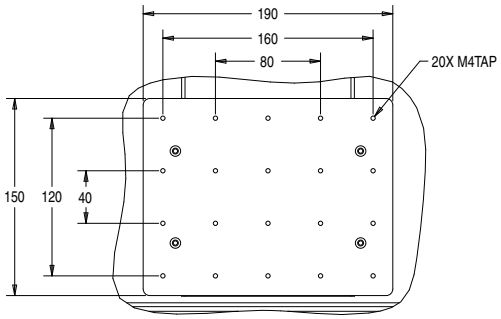


Z-Axis Mounting Plate Layout



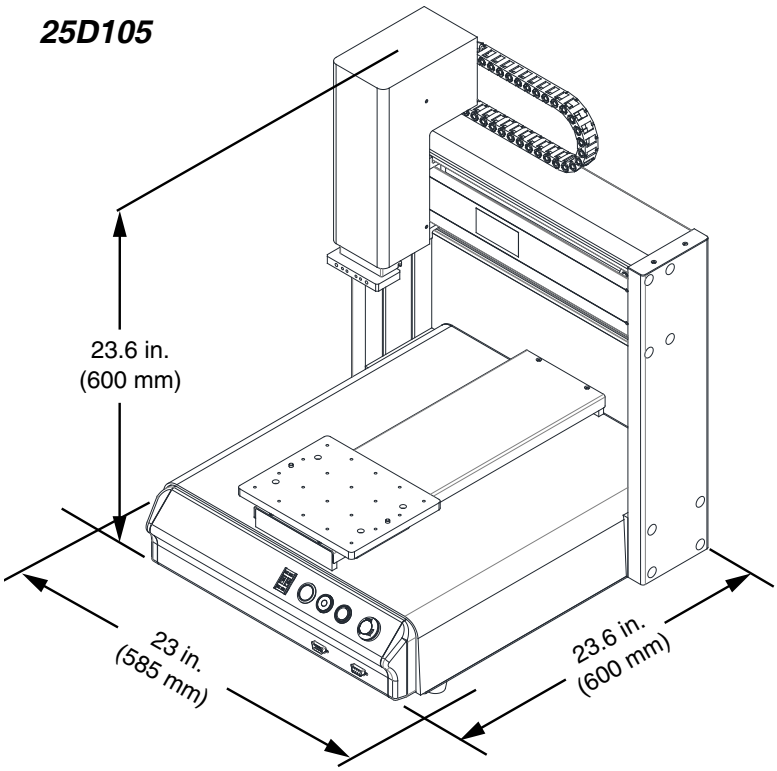
DETAIL A
SCALE 1/1

X/Y-Axis Mounting Plate Layout

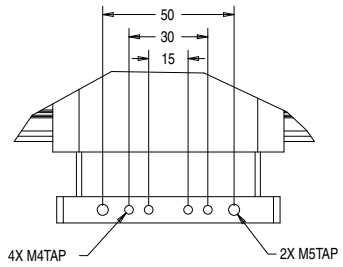


DETAIL B
SCALE 1/2

25D105

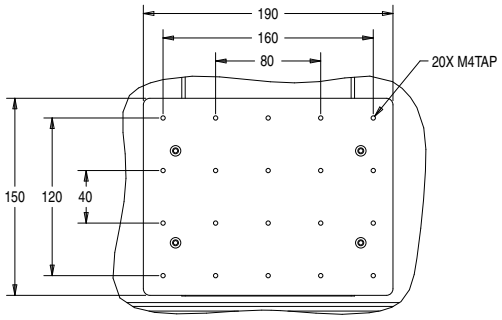


Z-Axis Mounting Plate Layout



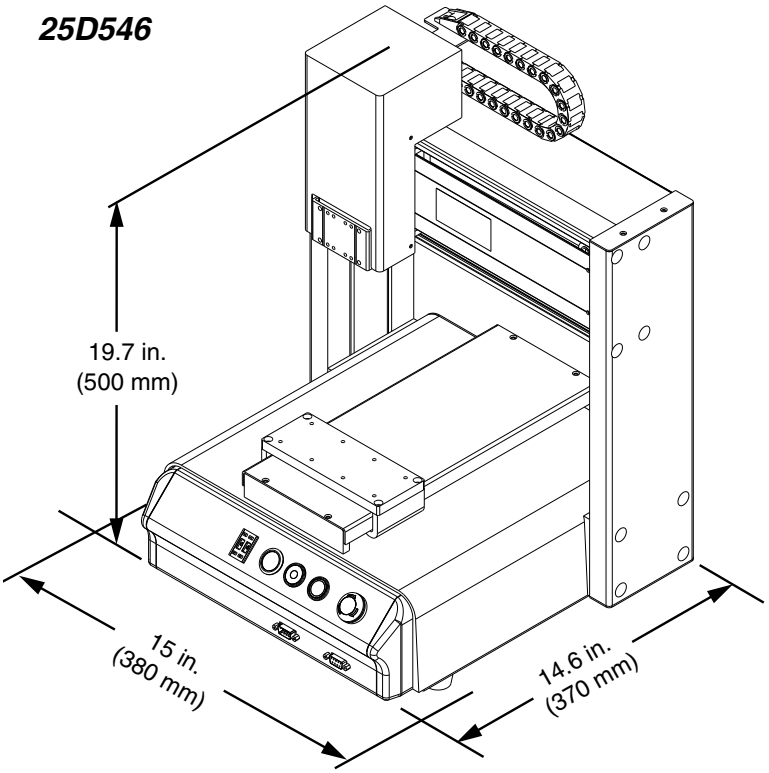
DETAIL A
SCALE 1/1

X/Y-Axis Mounting Plate Layout

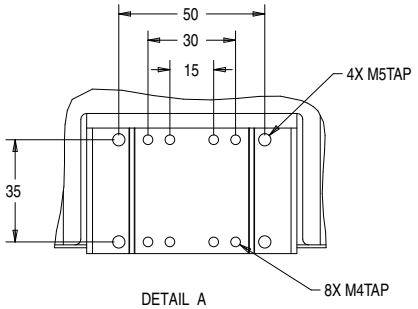


DETAIL B
SCALE 1/2

25D546

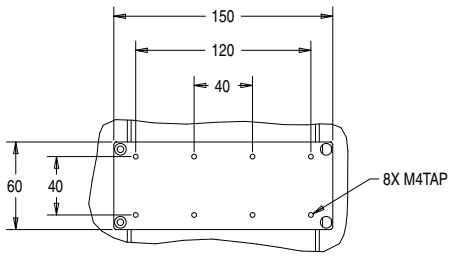


Z-Axis Mounting Plate Layout



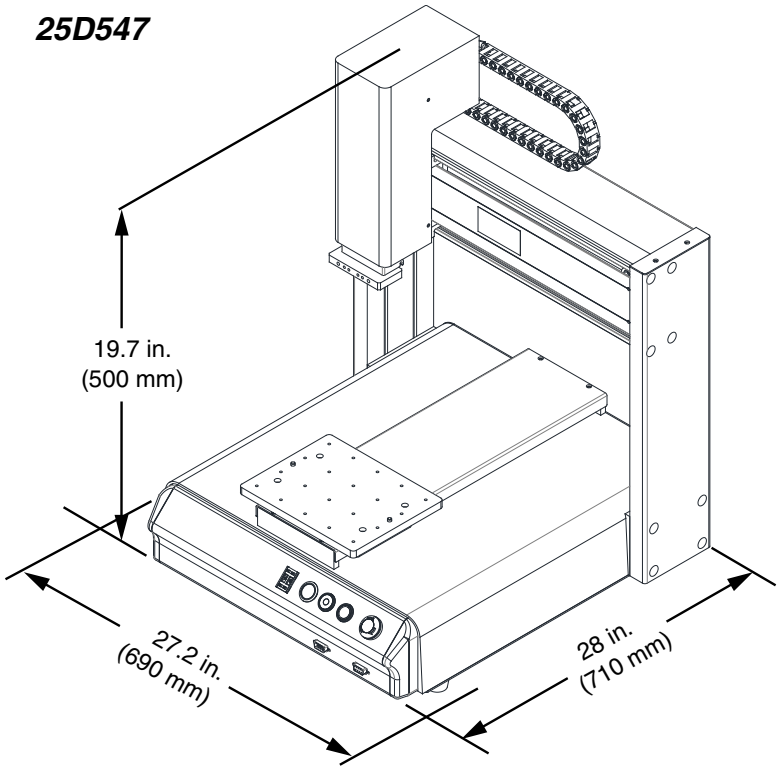
DETAIL A
SCALE 1/1

X/Y-Axis Mounting Plate Layout

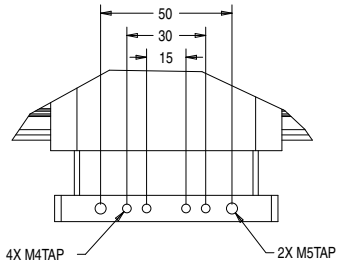


DETAIL B
SCALE 1/2

25D547

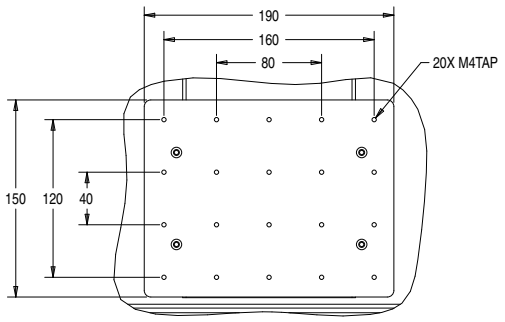


Z-Axis Mounting Plate Layout



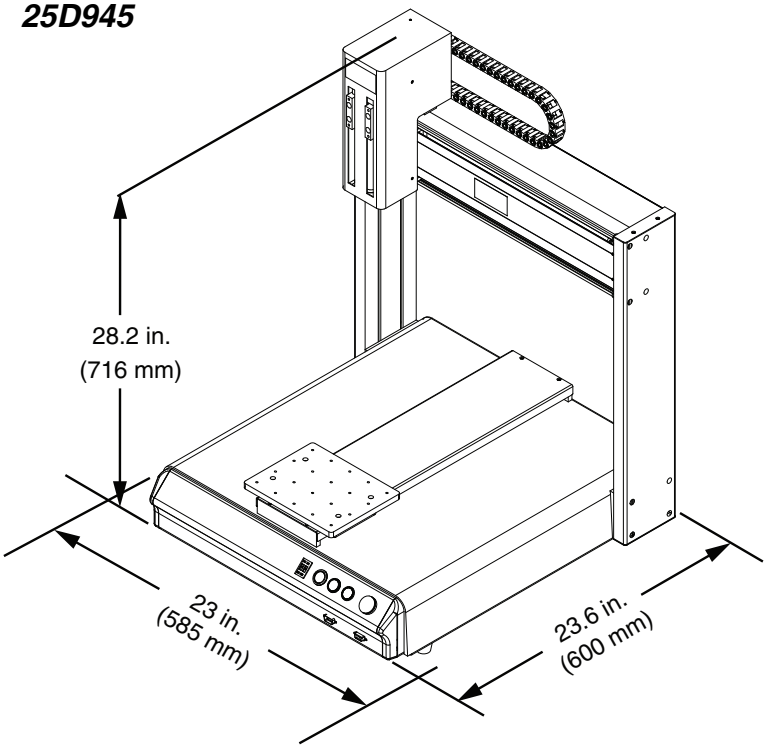
DETAIL A
SCALE 1/1

X/Y-Axis Mounting Plate Layout

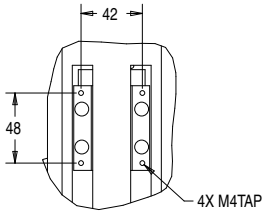


DETAIL B
SCALE 1/2

25D945

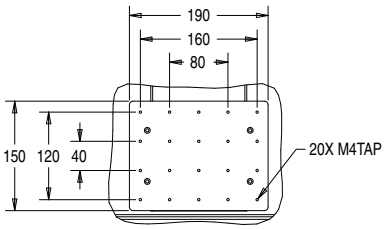


Z-Axis Mounting Plate Layout



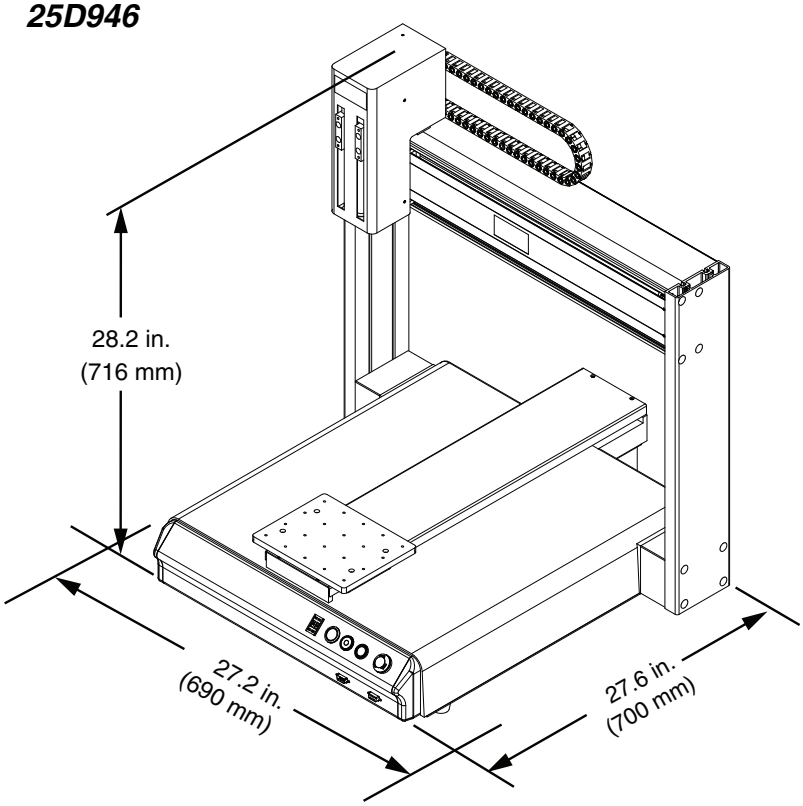
DETAIL A
SCALE 1/2

X/Y-Axis Mounting Plate Layout

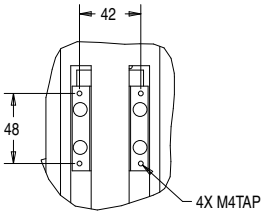


DETAIL B
SCALE 1/4

25D946

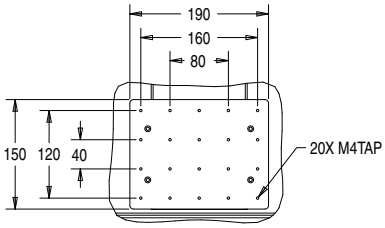


Z-Axis Mounting Plate Layout



DETAIL A
SCALE 1/2

X/Y-Axis Mounting Plate Layout



DETAIL B
SCALE 1/4

Technical Specifications

Automated Dispensing System			
		US	**Metric**
Programming Interface		Teach Pendant	
Drive System		3 phase	
Resolution		0.01 mm	
Repeatability		+/- 0.02 mm/Axis	
Edit Mode		PTP & CP	
Motion Interpolation Function		3 axes	
Program Capacity		4000 points/program, 100 programs	
Program Selection		00~99	
I/O Port		8 Inputs / 8 Outputs	
Storage Capacity		256 MB	
External Control		START/EMG	
Input Voltage		110/220 VAC	
Working Temperature		0 - 104° F	0 - 40° C
Working Humidity		20 - 90% no condensation	
Stroke X/Y/Z			
25D546		7.9/7.9/2.0 in.	200/200/50 mm
25D104		11.8/11.8/3.9 in.	300/300/100 mm
25D105 and 25D945		15.7/ 15.7/3.9 in.	400/400/100 mm
25D547 and 25D946		19.7/19.7/3.9 in.	500/500/100 mm
Maximum Payload			
XY Axis	25D104, 25D105, 25D547, 25D945, 25D946	22 lb	10 kg
	25D546	11 lb	5 kg
Z Axis	25D104, 25D105, 25D547	11 lb	5 kg
	25D546	6.6 lb	3 kg
	25D945, 25D946	17.6 lb	8 kg
Driving Method			
XY Axis	All models	Belt	
Z Axis	25D104, 25D105, 25D547, 25D945, 25D946	Ball Screw + Belt	
	25D546	Belt	
Maximum Speed			
XY Axis	25D104, 25D105, 25D547	23.6 in/s	600 mm/s
	25D546, 25D945, 25D946	19.7 in/s	500 mm/s
Z Axis	25D104, 25D105, 25D546, 25D547	11.8 in/s	300 mm/s
	25D945, 25D946	7.8 in/s	200 mm/s
Weight			
25D546		51 lb	23 kg
25D104		66 lb	30 kg
25D105		88 lb	40 kg
25D547		99 lb	45 kg
25D945		93 lb	42 kg
25D946		104 lb	47 kg

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This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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Revision D, March 2018