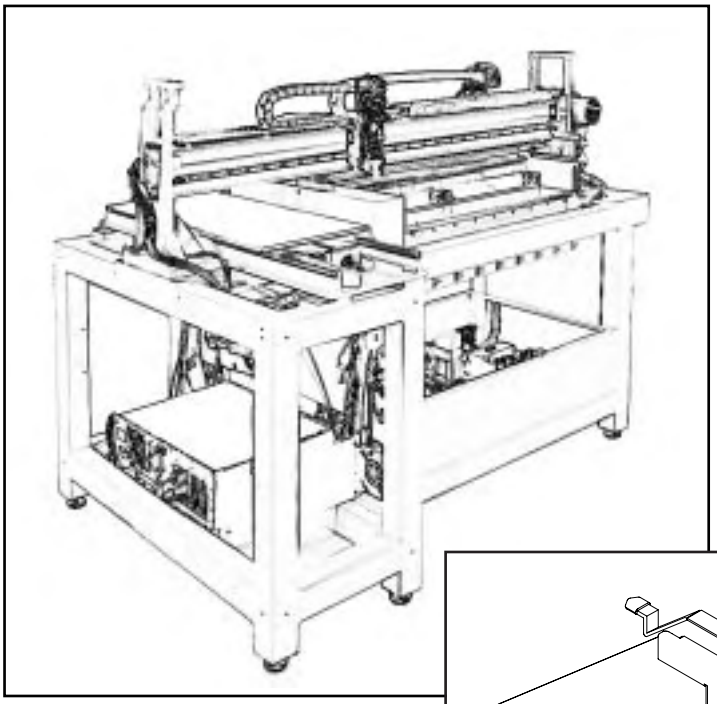
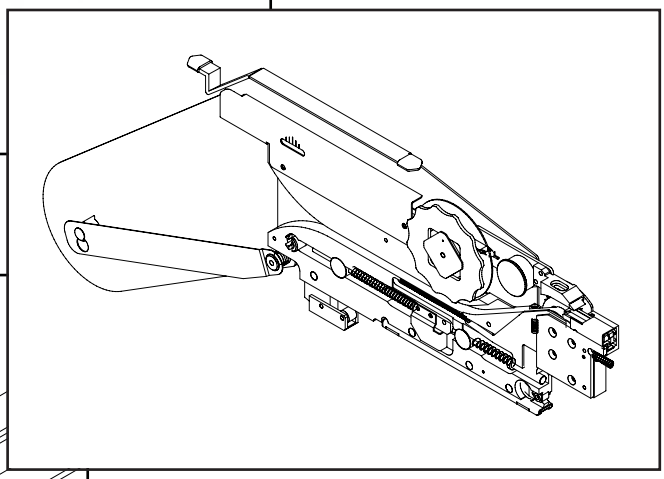
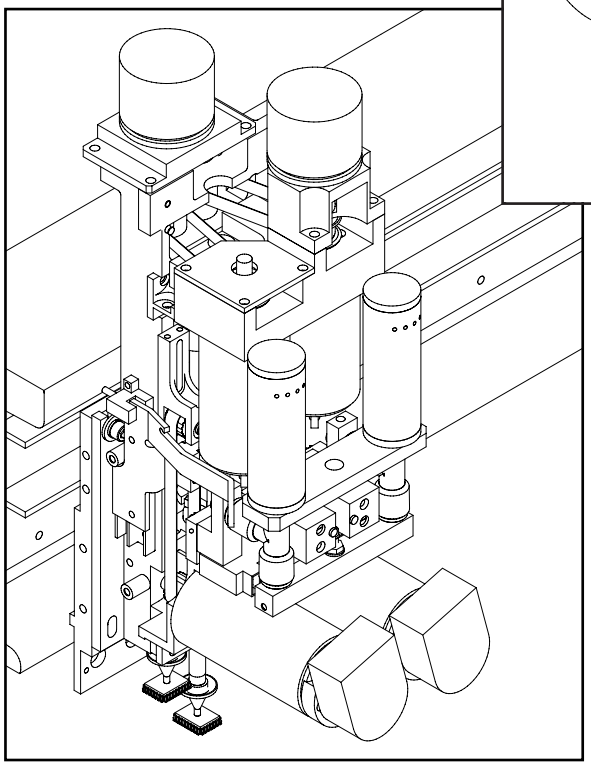
specifications & technical data

CONTACT 3Z

SMT PLACEMENT MACHINE







CONTACT 3Z
SMT PLACEMENT MACHINE

SPECIFICATIONS & TECHNICAL DATA

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The Contact 3Z SMT Placement Machine

Machine Description:

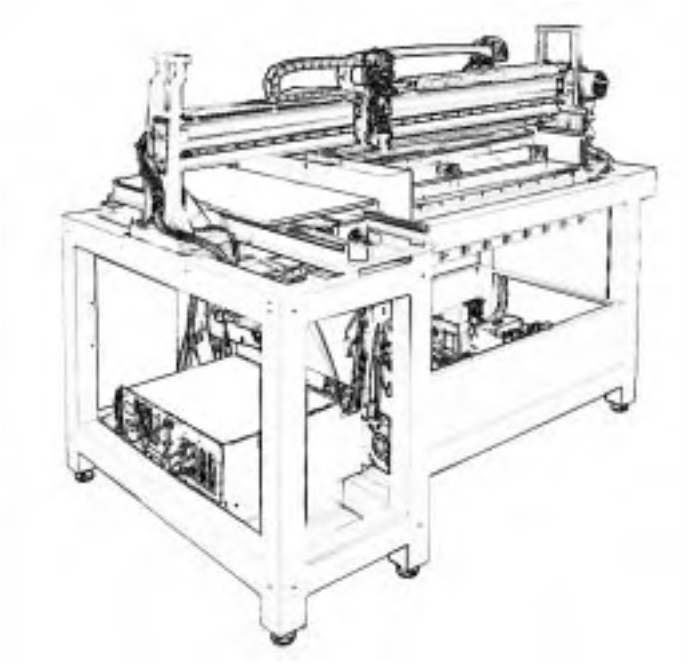
Overview

General Machine Data

Design	Split Axis, Independent Dual Heads
Centering Method	100% Vision
Lighting	Strobe Backlighting (Front Lighting optional)
Range of Components	0402 thru 2.4" x 2.4" (61mm^2)
Minimum Lead Pitch	12 mil (.3mm)
Max. Placement Rate	13,000 cph (.30 sec. tact time)
Feeder Capacity	100 8mm tape feeders
Feeder Types	8, 12, 16, 24, 32, 44, 56, and 72mm tape feeders; matrix tray; tube
Operator Control	Color Touch Screen monitor

The Contact 3Z, a true dual head SMT placement machine, can randomly pick and place components at a rate of up to 13,000 per hour.

The machine has a capacity of up to 100 8mm tape feeders, and a variety of feeder types can be intermixed. The Contact 3Z can handle a full range of components from small chip resistors and capacitors, to large, leaded integrated circuits, including fine pitch devices. All components are aligned with vision. No mechanical centering is used.

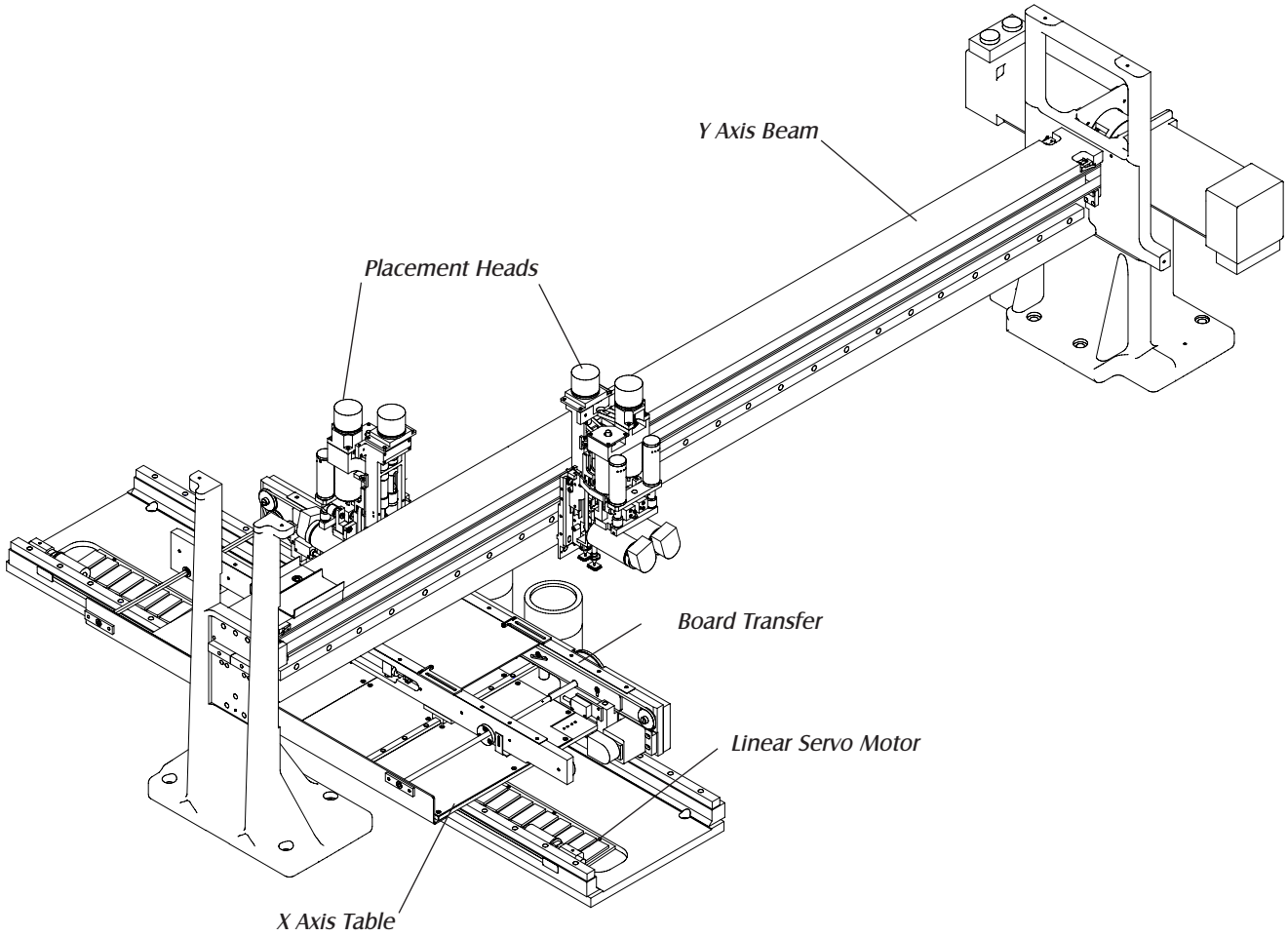


Split Axis Design

In the split axis design, both the Y axis beam and the X axis table are rigidly mounted directly to the base frame. In the Y axis, the distance from the placement area to the feeders is relatively long. For this reason the placement heads travel at high acceleration and top speed along the Y axis beam. Since the beam is fixed directly to the frame, the force is transferred to the frame resulting in extremely low vibration and settling time for the placement heads. The X motion (PC board) is relatively short and a lower acceleration and speed is used for this axis. By comparison, the conventional X/Y gantry machine which carries one axis on top of the other, (including the mass of the placement head and the axis motor) must be massive in design to provide the same vibration dampening, settling time, acceleration, and speed characteristics achieved by the 3Z.

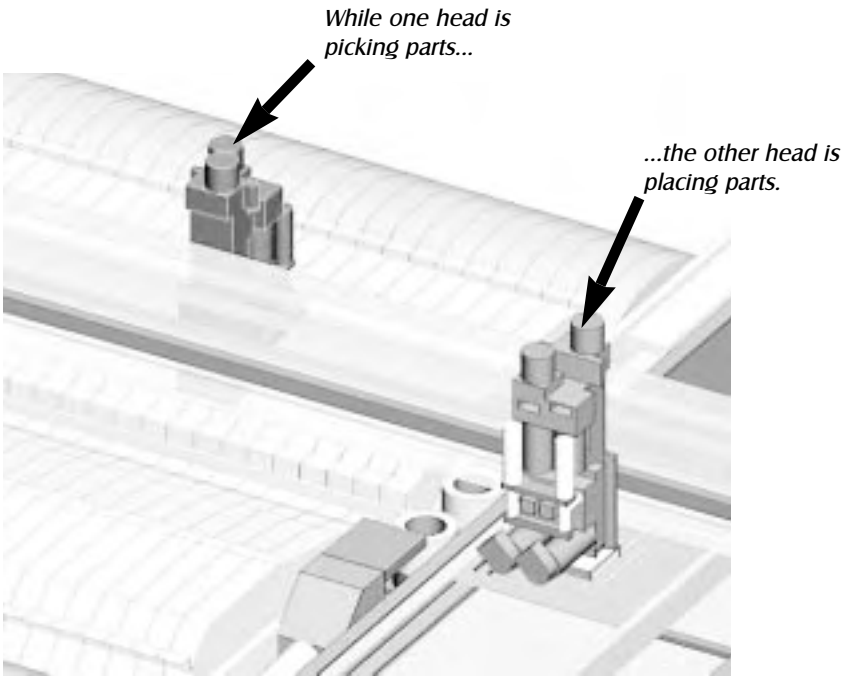
The simple design of the 3Z split axis machine is unique because only three axes of travel are required for two independent heads, as opposed to four axes of travel with a dual beam gantry machine.

Since the Contact 3 series split axis platform was introduced in 1992, is has been recognized for its high accuracy, repeatability and long term durability.



Independent Dual Heads

The Contact 3Z is fast because it truly is an independent dual head machine. Rather than having two heads ganged on one carriage, the Contact 3Z's dual heads work out of phase from one another. While one head is picking parts from the feeders, the other head is placing parts on the board. This means that there is no idle time during component picking which always occurs with single head machines.



Y Axis Drive Data

Drive Type	Belt driven by AC brushless servo motors with non-contact linear encoders and rotary encoders (dual loop)
Resolution	.000195" (5μm)
Repeatability	+/- 00039" (10μm)
Maximum Speed	160" (4.064m) per second
Acceleration	4 g's
Settling Time	Less than 30ms

Speed and acceleration are 100% programmable.

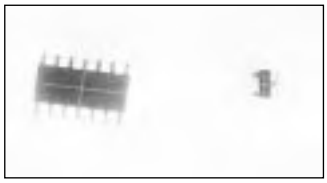
X Axis Drive Data

Drive Type	AC brushless linear servo motor with non-contact linear encoder
Resolution	.000195" (5μm)
Repeatability	+/- 00039" (10μm)
Maximum Speed	50" (1.27m) per second
Acceleration	2 g's
Settling Time	Less than 30ms

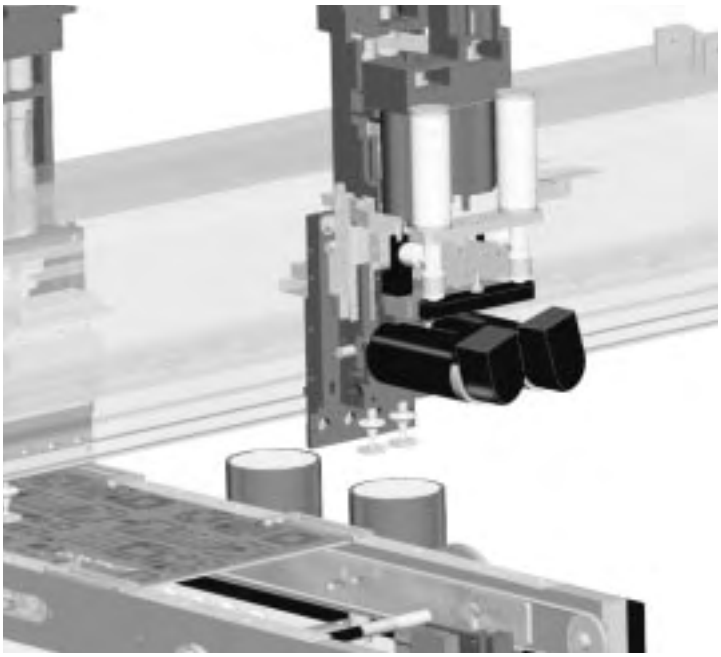
Speed and acceleration are 100% programmable. The software automatically determines the maximum speed allowable for each component. Large components are placed last.

Vision Centering

Each placement head moves in a straight line between its feeder bank and the board, passing directly over its dedicated centering camera. At the precise moment that the head passes over the camera, a picture is taken of the two components without slowing down the head. Digital analyzation of the image will locate the leads and/or the body of the component, from which the center point and rotation can be calculated and compared to the known center of the tool tips. With the exact positions of the components on the tips established, the machine makes a "correction" to the pre-programmed X, Y, and Theta coordinates. In addition to centering the component, a size check verification is done to prevent the wrong component from being placed. All these calculations are done in an instant, without slowing the machine down.

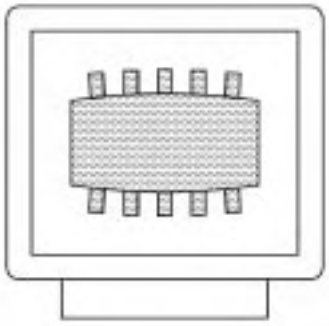


Actual screen capture of vision centering process.

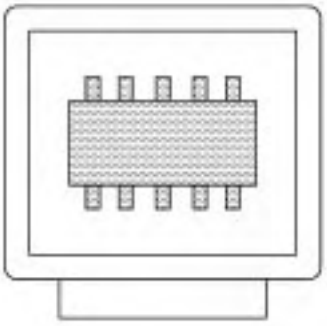


Telecentric Lenses

The 3Z's two vision centering cameras, and its downward viewing head camera all have telecentric lenses. The advantage of telecentric lenses is that they reduce or eliminate the viewing angle error and magnification error inherent in conventional lenses. These perspective distortions can create problems for accurate edge detection, as the illustration (below, left) shows. Telecentric lenses maintain a constant viewing angle regardless of its position and proximity to the camera's field of view. This enables consistently accurate vision centering.



Conventional Lenses are subject to viewing angle error, creating a distorted image. (Distortion exaggerated for illustrative purposes)



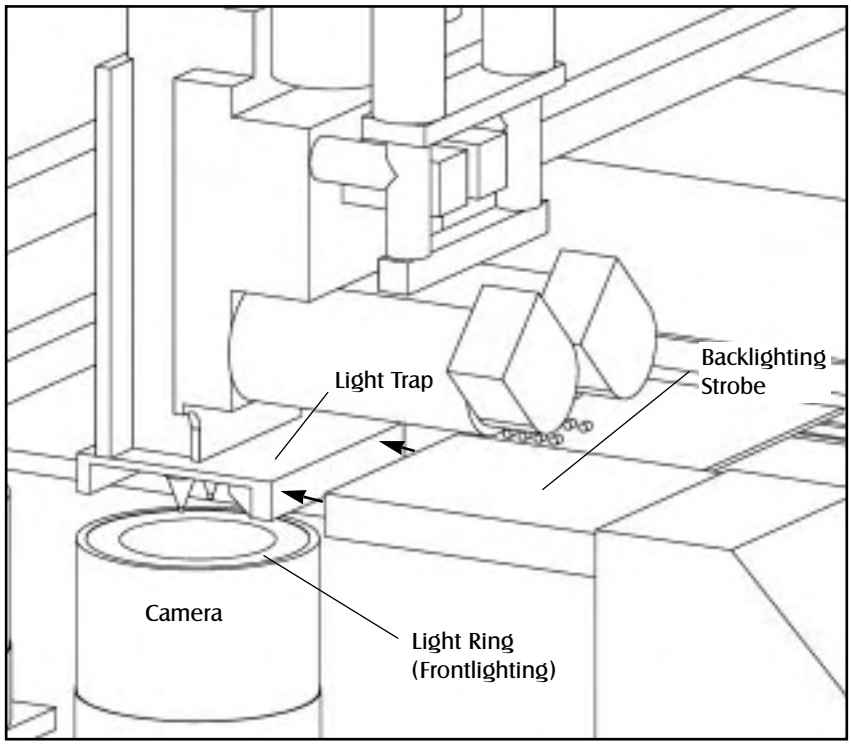
Telecentric Lenses eliminate viewing angle error, producing a clear, undistorted image.

Lighting

Backlighting

The Contact 3Z uses strobe backlighting as its lighting source for vision centering. Backlighting produces a sharp, black on white silhouette that eliminates the problems that occur with reflective (front) lighting. Factors such as lead plating, body color, and contour can cause poor images with reflective lighting. The high contrast backlit image gives well defined edges regardless of these factors.

When the head passes over the camera, a signal is sent to trigger the strobe light. The strobe is directed at the head's light trap, creating the white background for the component silhouette.



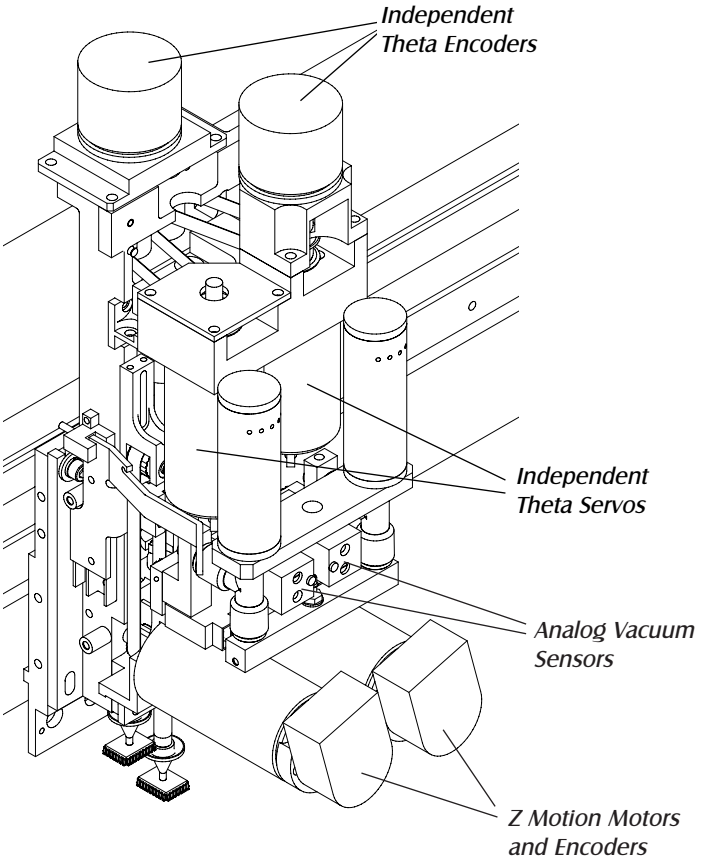
Optional Frontlighting

The optional strobe frontlighting can be used for centering components with bottom side terminals such as BGA's.

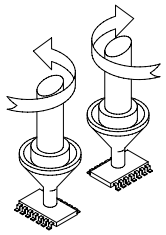
Vision System Data

Lens Type	Telecentric
Sub Pixel Processing	1/4 pixel
Field Of View	1" x .8" (25.4mm x 20.3mm)
Standard Lighting	Strobe Backlighting
Optional Lighting	Strobe Frontlighting

The Placement Head

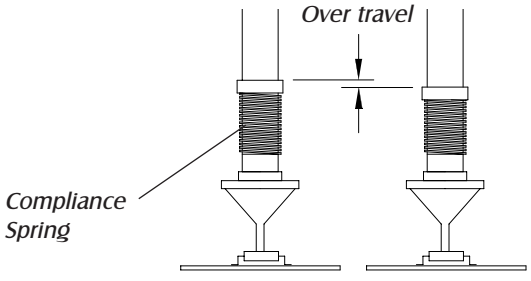


Each placement head has two spindles in a lightweight and compact design. The Z motion of the placement spindles are servo driven, and optimum speed and acceleration can be customized for each part type. Each spindle has an independent servo theta motor with rotary encoder. This allows the spindles to rotate independently with high theta accuracy. By comparison, most competitive machines use one theta motor to drive all spindles through a belt or gear train, resulting in marginal theta accuracy.



Independent Theta Rotation

The servo driven Z axis also enables precise placement force control. Users can select a placement force for each component in the assembly program. The machine uses the component's size code data and the known board height to gauge how far down to travel. When a higher force setting is selected, the spindle will over travel a set distance. This causes the compliance spring to compress, applying more force to the component. The more the spring is compressed, the more force is exerted



Analog Vacuum Sensing

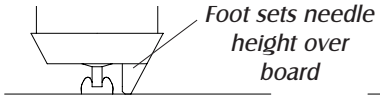
Due to the varying characteristics of surface mount devices, it is impossible to achieve a perfect vacuum seal on some components. A few examples of these are MELF's, trimpots, sockets, and rough surfaced chips. The Contact 3Z uses analog vacuum sensing to detect the presence of components on the tool tip. The advantage of analog sensing is that a custom vacuum profile can be created for each component, rather than having one fixed trigger point. This eliminates the delays caused by the false pick errors common with digital sensing.

Placement Spindle Data

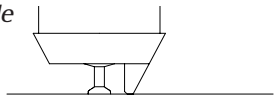
Number of Spindles	Two per head
Spindle Z Drive Type	Servo with rotary encoders
Spindle Z Cycle Time	100 milliseconds
Spindle Z Acceleration	8.5 - .005 g's programmable
Spindle Theta Drive Type	Servo with rotary encoders
Spindle Theta Resolution	.005 degrees

3GDF Glue Dispenser

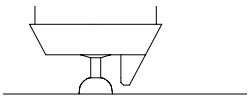
The programmable 3GDF Glue Dispenser gives the user total control over dot sizes. Dots are dispensed using a time vs. pressure method. Air pressure is applied to the glue syringe, allowing adhesive to flow for a user-specified length of time. The user can create or edit dot sizes quickly and easily. The temperature controller keeps the glue viscosity stabilized to ensure consistent dots and eliminate stringing. The temperature is displayed on the controller and is easily adjusted. The dispenser can be programmed to employ a second height. When the time specified for the first height is complete, a cylinder is activated, lifting the needle a set distance. Dispensing continues for the amount of time specified for the second height. The second height enables a large dot to be dispensed without adhering to the needle. The illustrations below show a large dot being dispensed without a second height; then with the second height. An adjustment knob allows the user to set the second height.



*Dispensing a large dot **without** a second height causes the glue to adhere to the needle, creating inconsistent dots and dot tails.*

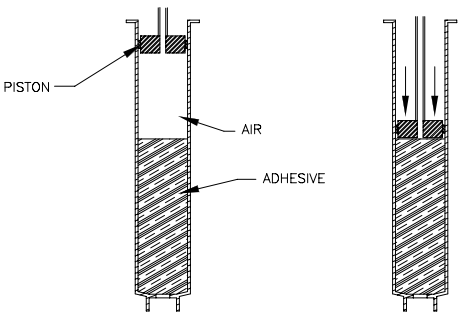


*Dispensing a large dot **with** a second height allows the glue to adhere to the board at the first height.....*



....then the remainder of the adhesive is dispensed at the second height. No adhesion to the needle allows consistent dot sizes without causing tails.

With time pressure dispensing, dot diameters can be programmed to change "on the fly". This feature is required in most applications because different dot sizes are required for the variety of SMD's used on typical boards. To achieve variable dot size with positive displacement, multiple pumps must be mounted to a positioning head. With time pressure one dispenser can produce a range of dots from .5mm to 1.5mm. Consistent dot diameter is normally difficult to control in a time pressure dispenser because as the glue in the syringe empties, the volume of air in the syringe increases. Consequently, more time is required to compress the larger volume of air above the glue. The 3GDF dispenser solves this problem by moving a piston in the syringe to maintain a constant volume of air. Glue viscosity is another variable that affects dot size. The 3GDF employs a heater around the needle which keeps the glue at a constant viscosity. Of the three dispensing methods: time pressure, positive displacement, and Archimedes metering, the time pressure dispenser with air volume and viscosity control provides the most cost effective solution to programmable dot sizes.



3GDF Glue Dispenser Data

Dispenser Type	Time vs. Pressure
Dots per hour	10,000
Dot Size Range	.5mm to 1.5mm

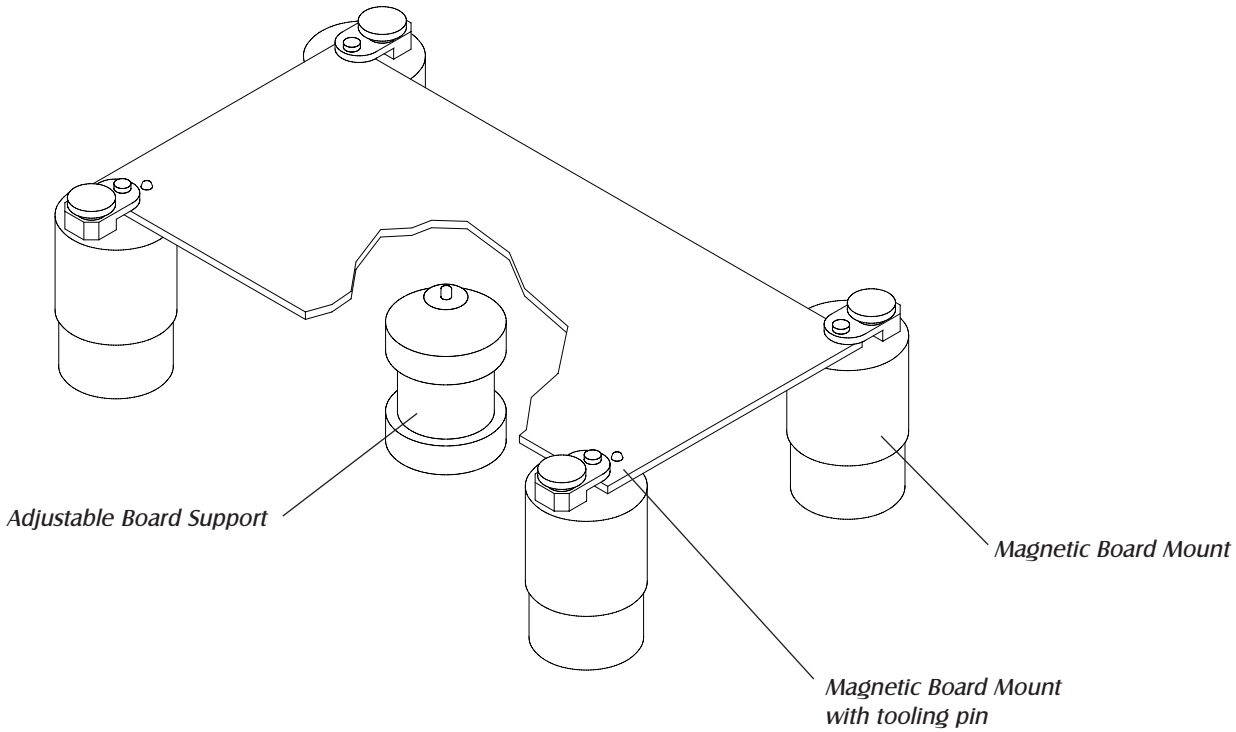
Board Handling

Manual Board Mounting

The Contact 3Z offers two board mounting options. The standard table consists of magnetic board mounts that can be positioned anywhere on the steel covered table. These mounts secure the board at the exact height required, and tooling holes can be used for more precise board registration. An adjustable board support is also provided to maintain a flat, even surface across the board. Boards can be mounted and populated one at a time, or additional mounts can be used to populate several boards at once.

Maximum Board Sizes - Magnetic Table

100 Feeder Capacity	26" x 13" (660mm x 330mm)
80 Feeder Capacity	26" x 19" (660mm x 482mm)

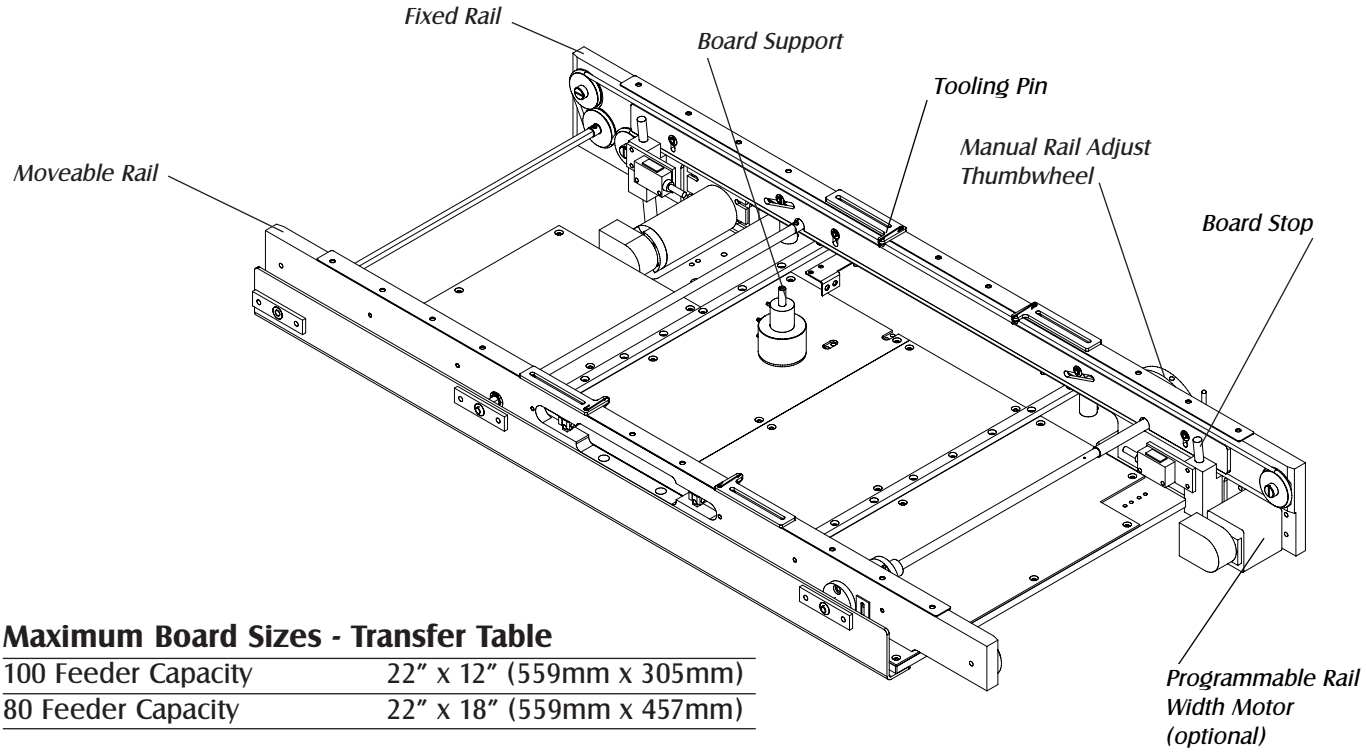


Part No.	Description
3ZBFS	Board Mounts - Magnetic Table (set of 4)
3ZBSS	Adjustable Board Support - Magnetic Table
3BST-A	Pneumatic Board Support - Transfer Table
3ZBT(100/80)*	Board Transfer - Manual Rail Adjust
3ZBT(100/80)-P*	Board Transfer - Programmable Rail Adjust
3BC(100/80)*	Board Conveyor - Manual Rail Adjust
3BC(100/80)-P*	Board Conveyor - Programmable Rail Adjust

* *Specify standard table (100 feeder capacity) or large table (80 feeder capacity), fixed rail location (front or rear), and direction of travel (left or right) when ordering.*

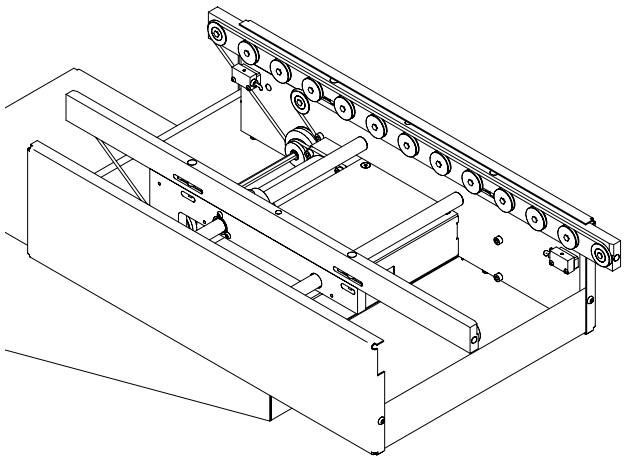
Automated Board Mounting - 3BT Board Transfer

The optional 3BT board transfer automates the board mounting procedure. Boards can be fed into the end of the transfer by hand or by the optional board conveyor. Photodetectors sense the presence of the board and the board stop and tooling pins insure repeatable board registration. The transfer has one fixed rail which can be in the front or rear, and one adjustable rail to accommodate different board widths. Unless specified otherwise, the front rail is fixed to conform to SMEMA standards. If a fixed rear rail is specified, the P.C. board will be closer to the feeders, and therefore the placement rate may improve up to 10% when a full compliment of feeders is used. The moveable rail is adjusted manually with a thumbwheel on the standard board transfer. The programmable rail width option further automates the process by using a motor to adjust the rail to the programmed board width. A pneumatic board support is included with each board transfer. This keeps the center of the board from bowing or flexing during assembly.



Maximum Board Sizes - Transfer Table

100 Feeder Capacity	22" x 12" (559mm x 305mm)
80 Feeder Capacity	22" x 18" (559mm x 457mm)



3BC Board Conveyor

The 3BC board conveyor is used to connect machines. It can be mounted on either side of the 3Z and used as an input or output conveyor. When used as an input conveyor, one P.C. board can be buffered on the conveyor. The front rail is fixed (SMEMA standard) and the rear rail is movable, but this can be reversed if desired. The movable rail is manually adjusted (standard) or is available with the optional motorized rail adjust. In this case the board width is programmed and the rail width is automatically set. Output conveyors can be programmed to adjust belt speeds, and can operate in an "inspection mode". This feature will pause a board leaving the 3Z, allowing the operator to inspect the board before sending it to the reflow oven or next machine.

Tray Handling

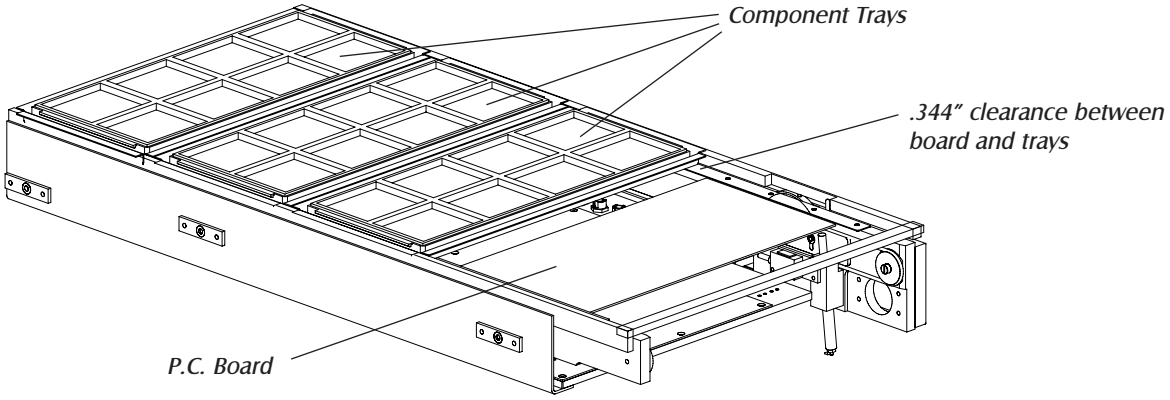
Table Mounting

Several standard JEDEC trays (322 x 136mm) can be mounted on the 3Z positioning table. The board size determines the space available for trays. The larger the board, the less space available for trays. With the standard magnetic table, the trays are held in magnetic mounts. There are two versions, the 3ZMTSS magnetic tray supports that hold one tray and the 3ZMTF26S magnetic tray fixture, which holds up to two trays. Both versions are adjustable to fit odd size trays.

Up to five trays can also be mounted over the board transfer with the 3ZTF fixture. Individual trays can be removed to accommodate larger boards. Several configurations are possible to obtain the most efficient setup.

For additional capacity the TM10 tray module is used.

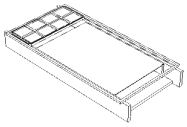
3BT Board Transfer with 3ZTF Tray Mounting Fixture



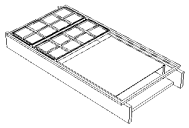
3ZTF Tray Fixture Configurations

Below are the maximum board sizes for each of the eight configurations; three for standard size tables (100 feeder capacity), and five for large size tables (80 feeder capacity)

Std. Table - 1 Tray
11.75" x 18"
299mm x 457mm

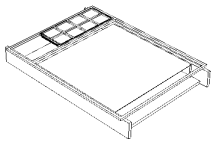


Std. Table - 2 Trays
11.75" x 12"
299mm x 305mm

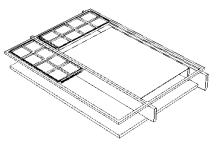


Std. Table - 3 Trays
11.75" x 6"
299mm x 152mm

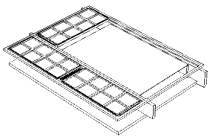
Large Table - 1 Tray
18" x 18"
457mm x 457mm



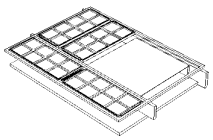
Large Table - 2 Trays
12" x 18"
305mm x 457mm



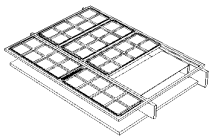
Large Table - 3 Trays
12" x 18"
305mm x 457mm



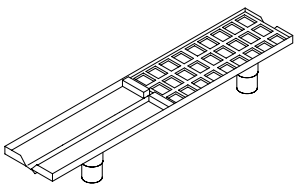
Large Table - 4 Trays
12" x 12"
305mm x 305mm



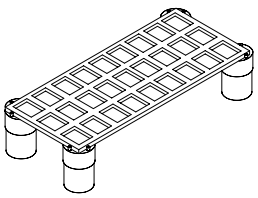
Large Table - 5 Trays
12" x 6"
305mm x 152mm



Magnetic Table Tray Mounting

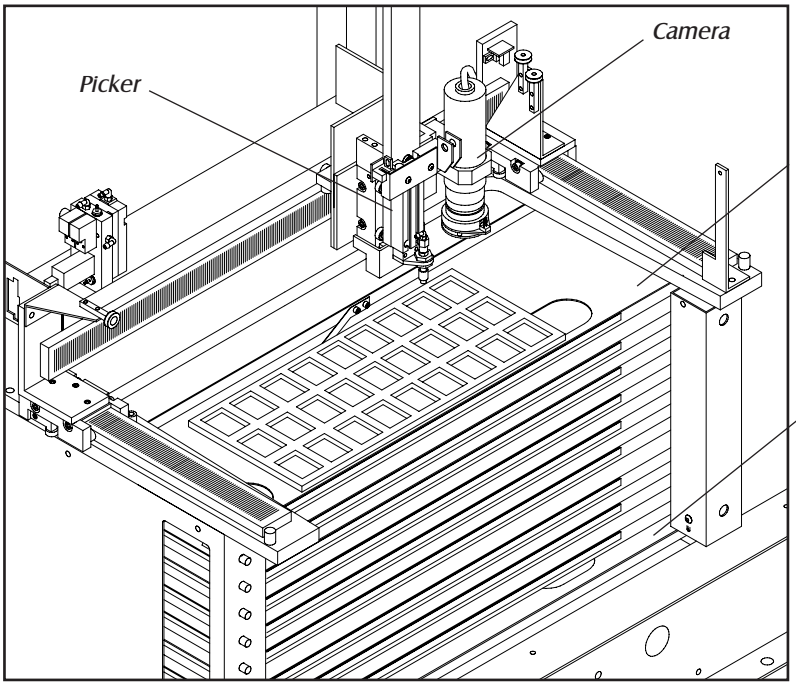


Magnetic Tray Fixture (one pair) Part No. 3ZMTF26S



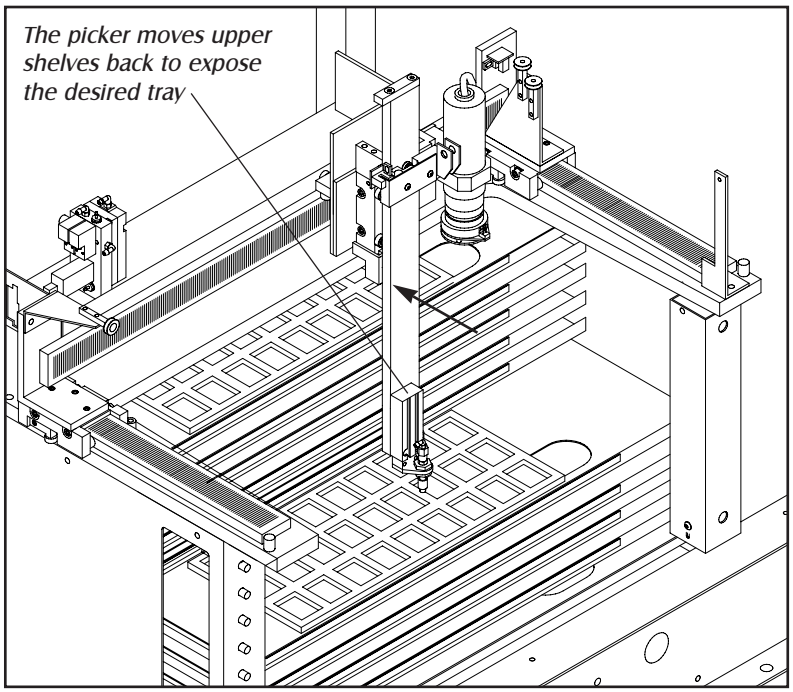
Magnetic Tray Supports (set of four) Part No. 3ZMTSS

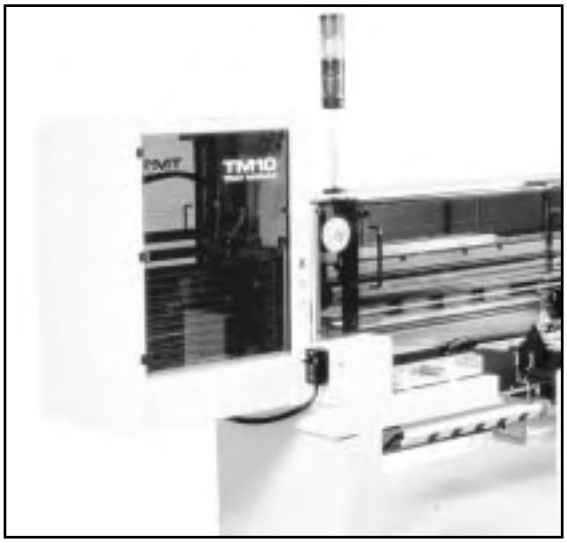
TM10 Tray Module



TM10 Tray Module

The TM10 tray module allows random access to ten trays **without** sacrificing feeder bank or table space. Ten shelves hold the component trays on top of one another. The first illustration on the left shows the picker accessing the top shelf (# 1). To access any of the lower levels, the picker moves in front of the shelves, then down to the desired height. The picker then moves back, sliding the upper shelves with it to expose the desired tray as shown in the second illustration. When the component is picked, the TM10 places the component on a shuttle which then positions the component for the 3Z placement head. The TM10 picker is independent from the placement heads, allowing it to pre-pick components ahead of time, eliminating delays. A CCD camera allows easy programming of tray coordinates.





The TM10 Tray Module

Tape Feeders

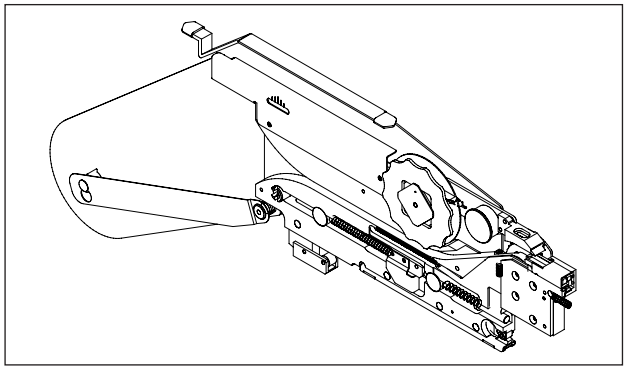
The Contact tape feeders have been designed to be accurate, reliable, and capable of rapid successive picks. Available from 8mm to 72mm tape widths, every feeder has adjustable pitch for varying pocket spacing, and can accommodate any reel size up to 15". The feeders are actuated by an assembly that travels the length of the feeder bank. No internal power source is needed by each feeder.

The tape feeders come in two styles; the 8A/12A, which uses a sprocket to index the tape, and the 16mm thru 72mm style which uses pins to index the tape.

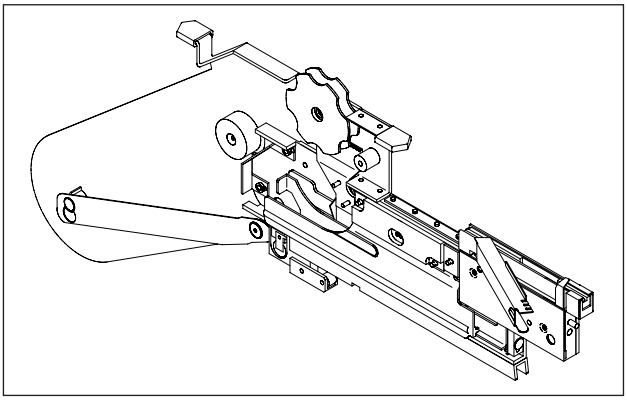
- *8 & 12mm feeders include a tether which requires only 3mm of exposed cover tape. Eliminates wasted components.*
- *Contact tape feeders operate with embossed plastic tape, and punched paper tape.*

Each tape feeder is individual, which offers the following advantages:

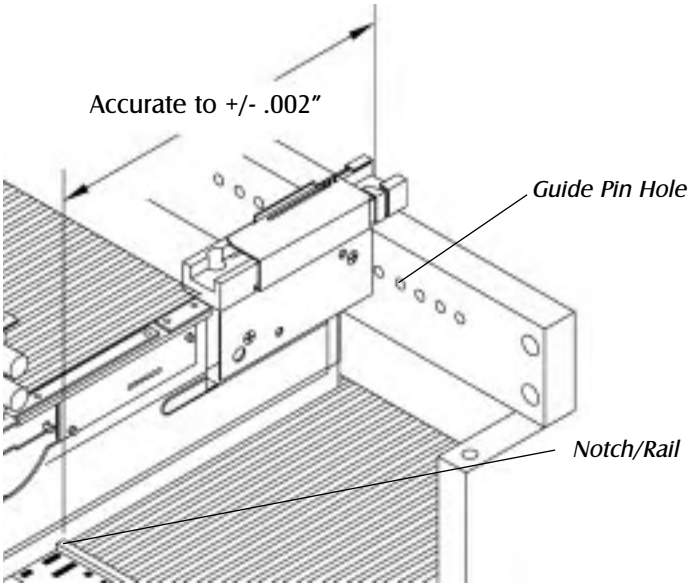
- *Buy only the exact number of feeders needed.*
- *When a feeder runs out, it can be removed and replaced without interrupting assembly.*
- *The feeders can be easily repositioned for each job to obtain the most efficient setup with no gaps or wasted space.*



The 8A/12A Tape Feeder (sprocket drive)



The 16mm thru 72mm Tape Feeder (index pin drive)

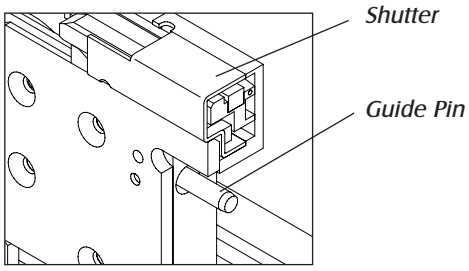


Feeder Shutters

High-speed feeders require a shutter to assure that the component does not pop out during actuation. The 8A and 12A tape feeders have a shutter. The 16 - 44mm tape feeders are not used with high speed chip components and therefore do not require a shutter.

Feeder Accuracy

Accuracy and repeatability of the feeder's pick position is crucial for reliable micro component pick up. The Contact feeder is a precision machined assembly. Its pick position is established from a notch in the feeder body. The distance from the notch to the pick position is factory calibrated to .002". When mounted to the machine the feeder is accurately held in position by a guide pin on the front of the feeder and the notch at the rear. Contact's feeder mounting system is accurate, repeatable, and requires no adjustments or electronic compensation.

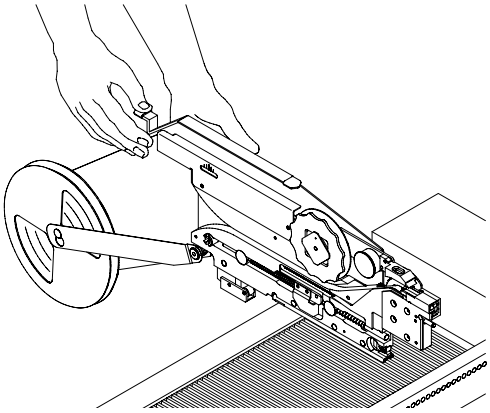


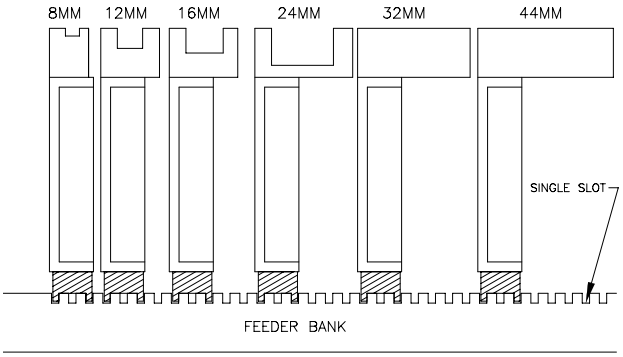
Feeder Packing Density

The unique slotted feeder base allows back to back loading of feeders of all sizes. Most competitive machines have fixed spacing between feeders and, thus, cannot pack a mixture of feeder sizes efficiently. The drawing illustrates how feeders of different sizes can be packed closely together. They can also be rearranged to the most efficient order without sacrificing feeder capacity.

The following chart lists the number of feeder bank slots that each tape feeder occupies. The 100 feeder capacity machine has 150 slots on each side, and the 80 feeder capacity machine has 120 slots on each side.

Feeder Size	# of Slots
8mm	3
12mm	4
16mm	5
24mm	6
32mm	7
44mm	9
56mm	12
72mm	15





Feeder cycle time

Tape feeders play an important role in determining a machine's maximum placement rate. For example, if components are picked repeatedly from one feeder, and its cycle rate is slower than the tact time, then the machine can place no faster than its feeders. For this reason the maximum advertised rate of most competitive machines is not derived by picking from one feeder. However, in actual production it is quite normal that high usage components will be supplied in one feeder. Thus, feeder cycle time is relevant. The 8A and 12A feeders have a cycle time of 350 milliseconds. The 3Z has two spindles/head. In operation, the feeder is pre-actuated so only the second pick is affected by the feeder cycle time, or no more than 50% of the time. By comparison, with a six spindle head the feeder cycle time comes into play on five spindles, up to 83% of the time. This is one reason the 3Z runs closer to its rated maximum speed than many competitive multi spindle machines.

TAPE FEEDER ORDERING GUIDE

Part No.	Feeder Size/Pitch
TFS8A	8mm Smart Tape Feeder/2mm and 4mm pitch
TFS12A	12mm Smart Tape Feeder/4mm pitch
TFS12-12*	12mm Smart Tape Feeder/12mm pitch
TFS16	16mm Smart Tape Feeder/4, 8, and 12mm pitch
TFS24	24mm Smart Tape Feeder/4, 8, 12, and 16mm pitch
TFS32	32mm Smart Tape Feeder/4, 8, 12, and 16mm pitch
TFS44	44mm Smart Tape Feeder/4, 8, 12, and 16mm pitch
TFS56	56mm Smart Tape Feeder/4, 8, 12, and 16mm pitch
TFS72	72mm Smart Tape Feeder/4, 8, 12, and 16mm pitch

** The TFS12-12 is for applications requiring high speed 12mm pitch actuations on a 12mm tape.*

Smart Feeder System

Overview

The Smart Feeder System is designed to eliminate "wrong part" errors from the production floor. It will also speed up job changeover time, reduce or eliminate machine downtime due to empty reels, and assist in inventory and maintenance functions.

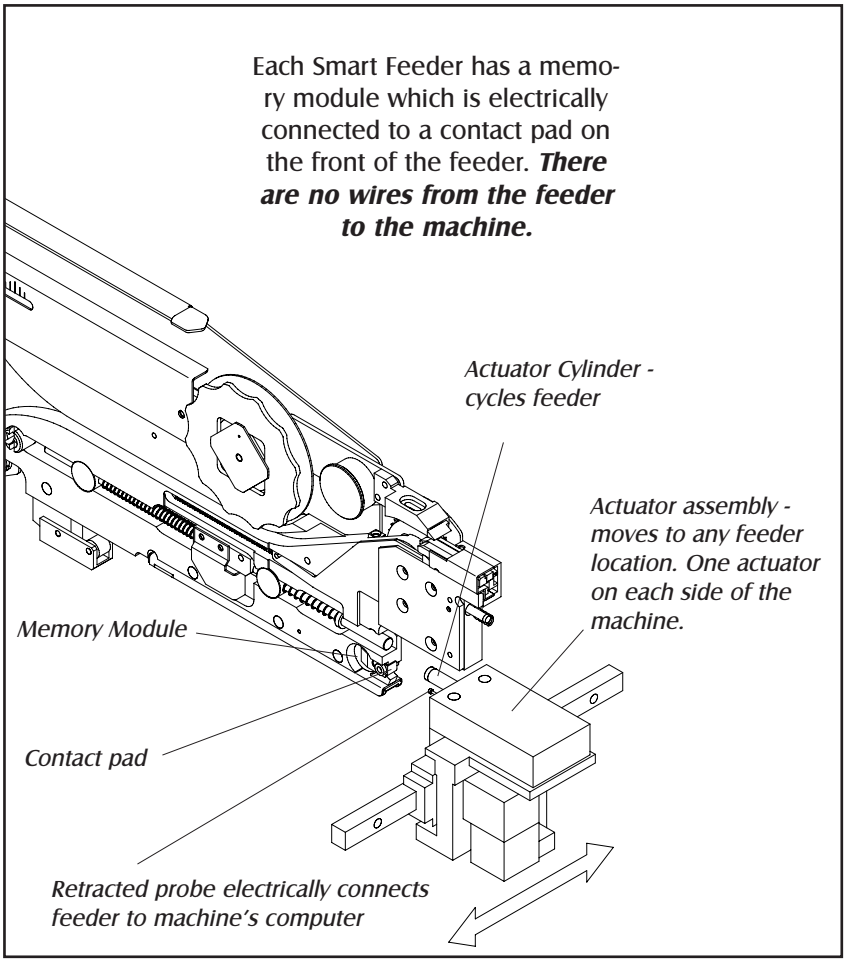
The complete Smart Feeder System comprises three main elements; the individual feeders, the feeder loading fixture, and a personal computer. The system will ensure that the correct components are loaded onto the machine before a job is begun. It will automatically compensate for mispositioned feeders. It will forewarn production personnel when a feeder is getting low. And with the Offline Smart Feeder Programming package, it will be able to read and print bar code labels that are placed onto component reels.

How It Works

Each component feeder has a memory module built into it for storing information about the component on the reel; the part number, the quantity of parts remaining on the reel, a user defined "low quantity" value for the reel, and a scratch pad for additional notes or descriptions. The low quantity value will determine at what point the 3Z will alert the production operator that the reel is getting low on components. The feeders can be programmed on the machine, or with the optional Smart Feeder Offline Programming package (SMOFF '95).

The 3Z interfaces with each smart feeder through a retractable probe mounted on the actuator assembly. When smart feeders are mounted, the machine scans the entire feeder banks and learns the exact location and content of each feeder.

During assembly, the data on each smart feeder is read, verified, and updated every time the feeder is accessed. When the user defined "low quantity" value is reached, the operator is notified.



Eliminating "Wrong Part" Errors

Without smart feeders, wrong part errors occur either because a feeder was loaded with the wrong reel, or a correctly loaded feeder was placed in the wrong position on the machine.

With the smart feeder system, the possibilities of reel loading errors are very remote. If the operator programmed the part number incorrectly, the Contact 3Z would catch it because it would be a non existent number, or one that didn't belong on the current job. If, by coincidence, the operator entered a number incorrectly, and the entered number happened to be a valid number for that board, the error would still be caught, because there would be two feeders with the same part number, and one component would be missing.

Errors from placing a feeder in the wrong location on the machine are completely eliminated with the smart feeder system. The Contact 3Z reads each feeder every time it accesses it. If the feeder contains the wrong part number, the machine will either stop and report the error, or carry on assembly using the feeder in its present location.

Quick Job Changeover

If this is a priority, feeders can be loaded onto the 3Z without checking a feeder location list. They can simply be loaded anywhere on the machine (preloaded carts would make this even faster). The Contact 3Z will find the feeder locations and work with them that way.

Reduce Machine Downtime Due to Empty Reels

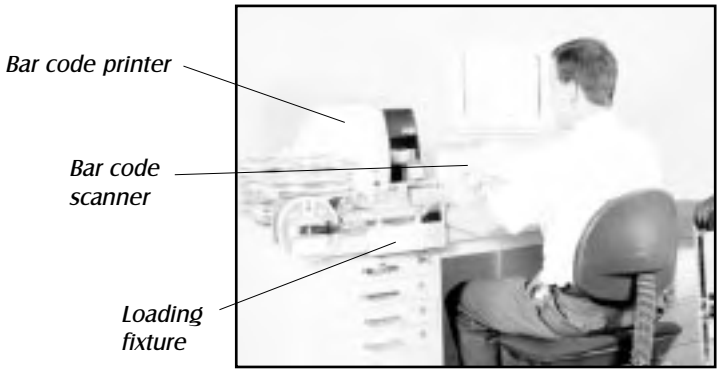
Whenever the 3Z accesses a feeder, it decrements the feeder's component count and compares it to the "low quantity" value for that feeder. If the low quantity value has been reached, the Contact 3Z notifies the operator of the situation. The operator can then get a new tape reel for that component and be prepared to replace it when the feeder runs out.

Assist In Inventory

Since the smart feeders continually update the quantity remaining on each reel, inventory tracking is easy and accurate.

Offline Smart Feeder Programming

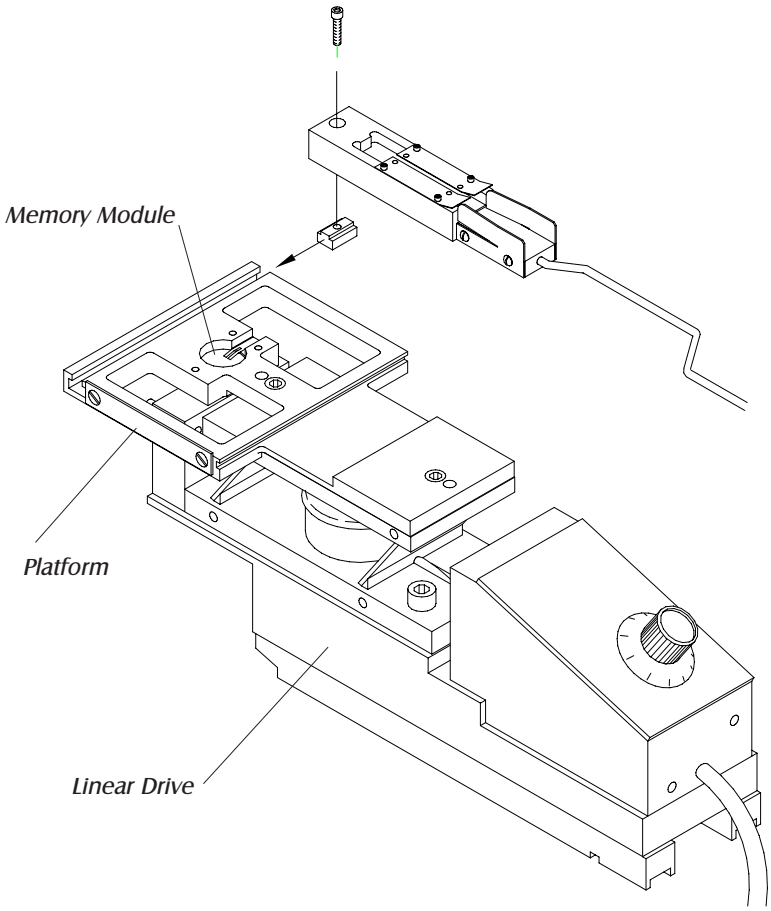
The Offline Smart Feeder Programming package helps users take full advantage of the Smart Feeder System. First and foremost, it allows you to program Smart Feeders without tying up the machine. This can enable users to run one job while setting up for the next. It also provides a means of compiling a database of component information. This data can be valuable for tasks such as inventory control and feeder maintenance scheduling. A barcoding system can also be employed, further simplifying and speeding up feeder programming.



3SF-BASIC	SMOFF '95 w/interface cable
3SF-BARCODE-LSR	SMOFF '95 w/interface cable, barcode printer, and laser scanner

Here's how the offline station works. A Smart Feeder is mounted on the loading fixture. The fixture has a probe that connects to the back of your P.C. allowing you to read and write data on the feeder's memory module. You can enter the reel's part number and quantity in two ways: either type in the data manually, or read the bar code label on the reel with the optional scanner. If the reel has no bar code, you can create one with the optional bar code printer. When removing the reel, the quantity remaining can be read from the feeder, and the reel can be labeled either by hand or with a bar code. The SMOFF '95 software package provides a means of not only programming feeders offline, but to generate a log of feeder activity. Each time parts are loaded and removed from a feeder, the log file records the date and all the data on the feeder. This can be useful in tracking inventory and for scheduling periodic feeder maintenance.

Vibratory Feeders



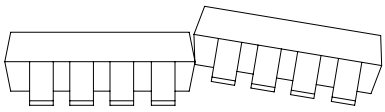
Overview

Contact's vibratory feeder system consists of a linear drive base, a removable platform, and individual tracks.

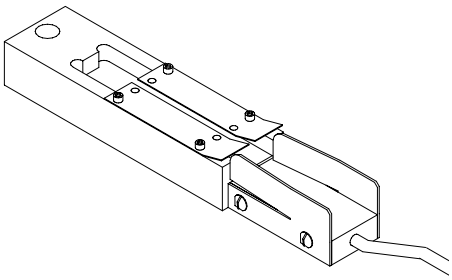
Linear Drive - Features adjustable vibration amplitude and soft-start control for reliable stick feeding.

Smart Platform - Holds up to seven tracks and contains a smart feeder memory module.

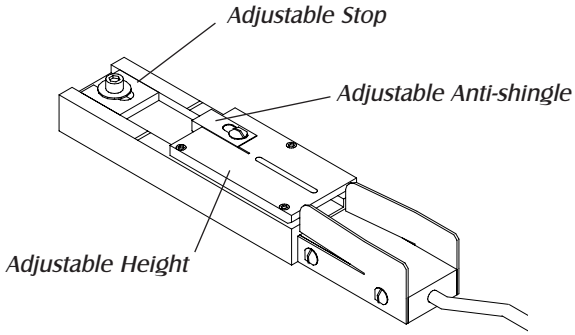
Individual Tracks - Tracks are interchangeable, and you only buy what you need. Dedicated tracks accommodate one component type with no adjustments necessary. Adjustable tracks can run parts of varying lengths.



Shingling commonly occurs when vibration causes the second component in line to climb up the back of the first component and trap it. The anti-shingle device prevents the second component from climbing.



Dedicated vibratory lanes are designed to handle one type of component. No adjustments are necessary.



Adjustable lanes can accommodate several components of equal widths. The component stop, height, and anti-shingle are all adjustable. The pickup point is clearly etched in each adjustable track so adjustments can be made offline.

VIBRATORY FEEDER ORDERING GUIDE

Part No.	Description
3-FSP	Platform Base (3.5" wide)
LDS110	Smart Linear Drive

INDIVIDUAL LANES

Part No.	Applications	Lane Width	Component Width
3S08-16*	SO-8 thru SO-16	0.500	0.250
3SOL16-28*	SOL-16 thru SOL-28	0.750	0.425
3PLCC20	PLCC-20	0.750	0.400
3PLCC28-32*	PLCC-28, PLCC-32	0.750	0.500
3PLCC-44	PLCC-44	1.000	0.700
3PLCC-52	PLCC-52	1.125	0.800
3PLCC-68	PLCC-68	1.250	1.000
3PLCC-84	PLCC-84	1.500	1.200
3PLCC20-SOC	PLCC-20 Sockets	1.000	0.615
3PLCC28,32-SOC*	PLCC-28, 32 Sockets	1.000	0.715
3PLCC44-SOC	PLCC-44 Sockets	1.250	0.915
3PLCC52-SOC	PLCC-52 Sockets	1.500	1.015
3PLCC68-SOC	PLCC-68 Sockets	1.500	1.215
3PLCC84-SOC	PLCC-84 Sockets	1.750	1.415
3SOLJ16-32*	SOLJ-16 thru SOLJ-32	0.750	0.345
3SOM8-24*	SOM-14 thru SOM-18	0.750	0.315
3DPAK	DPAK	1.000	0.405
3D2PAK	D2PAK	1.500	0.615
3SOXJ24/28-40*	SOJX-24, 28, thru 40	0.750	0.445
3SOW28-32*	SOW-28, 32	0.875	0.475
3SSOP8-30*	SSOP-8 thru 30	0.750	0.317
3SOY28-44*	SOY-28 thru 44	1.000	0.570

** Denotes Adjustable Lane. Custom lanes are also available. Ask your Contact sales representative for details.*

Feeder Carts

The Contact feeder cart system consists of a cart and a removable feeder bank. The bank uses the same slotted base plate as used on the Contact 3Z. Thus standard Contact tape and vibratory feeders can be mounted in an efficient back to back manner. The cart can remain attached to the bank when it is mated to the machine or it can be detached from the bank. In this case, the banks can be stored on the available docking station.

The use of feeder carts should be considered when frequent job change overs are required. With feeder carts you can prekit the next job and change up to 100 feeders on the placement machine in two minutes. By comparison, removing 100 feeders, changing all the reels, and replacing them on the machine can take several hours. Of course, the cost of additional feeders and carts should be carefully compared to the cost savings due to the reduced set up time. The Contact individual feeder system has a cost advantage over competitive dedicated magazines because each job will be set up with only the exact feeders required. By comparison dedicated magazines typically have unused feeders in each magazine. Thus the overall feeder requirements for dedicated magazines are higher than individual feeders.

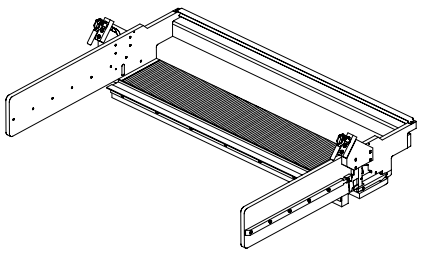
3FB *Removable Feeder Bank*

3FBDS *Feeder Bank Docking Station (holds two Feeder Banks)*

3FC-D *Feeder Cart*

Removable Feeder Bank Option
Includes two removable Feeder banks w/hardware. Makes machine "Cart Ready" for use with Feeder Carts (not included).

Standard Fixed Feeder Bank



Removable Feeder Bank

A low cost alternative for quick change over is to load feeders for the next job and bring them to the machine on the mobile 3FSC storage cart. In this case the feeders are exchanged individually instead of en mass (as on the 3FC cart). Either way it requires a substantial investment in additional feeders (which may be offset by the quicker change over). Feeder storage carts are handy even when a limited amount of feeders are purchased.

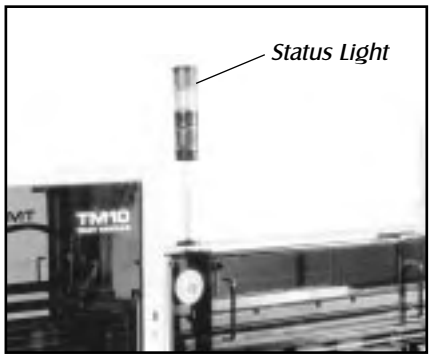
The 3FSC Feeder Storage Cart provides a means of transporting a large number of feeders safely and easily. It can accommodate all sizes of Contact feeders; both tape and vibratory. The cart has a total capacity of up to 52 feeders with an additional bottom rack for storing reels.

Part No.	Description
3FC100-D	Feeder Cart - 100 feeder machine
3FC80-D	Feeder Cart - 80 feeder machine
3FB100	Feeder Bank - 100 feeder machine
3FB80	Feeder Bank - 80 feeder machine
OPTION-118-80/100*	Removable Feeder Bank Option
3FBDS	Feeder Bank Docking Station
3FSC	Feeder Storage Cart

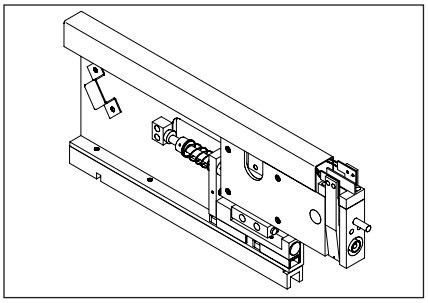
** Available at time of purchase only. Specify 100 or 80 feeder bank.*

Options

3SL-1 Status Light
A four color status light allows operators to monitor machine activity at a glance from across the room. When operator attention is needed, the light will change from green to either yellow, blue, or red, depending on the situation.



3V Component Verifier
This option adds a test station to each feeder bank to test resistors, capacitors, inductors, and diode polarity. The test stations have two pads that clamp on the terminals of a component. It can be programmed to test the first component in each reel, or each and every component prior to placement.



Component Verifier Test Station

Option-122 Step Up Transformer
The 3Z requires 220 Volts AC. Since this is not commonly available in many factories, this option will provide an easy way to step up 208 Volts to the machine's requirements.

UPS-230 Uninterruptable Power Supply
This option protects the machine from data loss and machine damage as a result of sudden power outages. It will supply the machine with power long enough to finish the task at hand and power down correctly.

10HSEA300 Refrigerated Air Dryer
The refrigerated air dryer removes the excess moisture that accumulates in air compressors. This moisture can hamper machine performance and cause damage if allowed to circulate through the machine.

Standard Software Features

Touchscreen Interface - Easy and intuitive to use operator controls.

Picture-in-Picture - Both vision centering and operator controls on a single monitor.

Graphical User Interface - Provides the most user-friendly interface. Easier than traditional small text mode displays. Large text buttons and pictures guide operator every step of the way during programming and placements.

Resume Feature - This utility can restore the user to the last component placement sequence after a power outage.

Fiducial and Skew Correction - Corrects board location and alignment using fiducials and skew points.

Board Scaling - Software utility that uses board fiducials to compensate for expansion or contraction of circuit boards prior to component placement.

Maintenance Facility - many of the calibration and offsets procedures are automated to help technicians quickly re-calibrate for improved picking and placement.

Smart Feeders - Individual feeders each with a memory module chip built in. Enables extremely fast changeover because the machine will run no matter where the feeders are placed. The software can also assign the best feeder locations for highest machine throughput. Operators can see actual part usage, and current component quantity levels.

Smart Feeder Loading Station - SMOFF '95 software allows operators to ***Barcode*** reels for error free machine setup. Management information from each feeder can be downloaded to various types of Database programs (i.e. Microsoft word, Access, Excel, Lotus, etc.).

Barcode - Feeders and boards can have bar code labels to provide even quicker and error free setup times.

Project Editor - Multiple image panels frequently have identical odd shaped images rotated to conserve panel size. It is also common for panels to have a variety of different images. This feature provides an easy means to describe any panel layout to the machine. A practical application of this feature is when it is desirable to build ***different*** boards at the same time; for a complete system for example.

Free Software Upgrades - Machine software upgrades provided free for the life of the machine.

Network Connectable - PC based system offers the ability to connect to most networks. This allows a program to be generated off-line quickly and easily from any workstation. The operator of the machine only needs to choose that program from the file chooser menu on the machine for a seamless interface. Also has the ability for multiple machines to share common libraries

Auto Setup - Recognizes board from its barcode. Automatically sets rail width, loads program, and starts placing components.

Full featured Vision Library - Hundreds of components predefined in the standard machine library. The user has the ability to add an infinite number of new part types to this library.

CAD Conversion Utility - A utility to convert CAD data to a program. Another standard software feature on the Contact SMT machines.

Test Load Function - Verifies all programming files are correct to run a board. Will identify any errors and bring the operator to that location.

Matrix Tray Library - Will handle all standard JEDEC trays as well as any custom tray configurations. Tray confirmation feature prevents users from making common mistakes.

Fiducial Library - Includes all standard fiducial library shapes. Also allows operators to teach other points as fiducials and save them to a Fiducial library database for future use.

Scan Place Mode - Allows operator to scan through a first board production run and verify that all the placements and Theta rotations are correct.

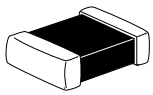
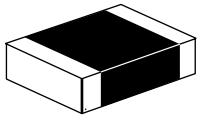
Place Control - Allows operators to automatically or manually skip a defective board, an unavailable part number, or even one unique placement. A valuable resource to handle mid production engineering changes.

Offline Programming - Convert ASCII, Gerber files, or Scanned Image PCB's into optimized placement programs from the comfort of your own workstation.

Component Types

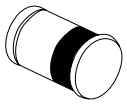
The following lists the package types that are pre-loaded onto the Contact 3Z. This library is continually expanding, and represents the virtually unlimited range of devices that the 3Z can handle. A built-in utility allows users to create new codes, and modify existing codes to keep current with the ever changing world of surface mount components.

Rectangular Chips
(resistors, capacitors, etc.)

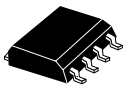
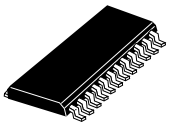
0402	1505-050	2225
0504	1515	2308
0505	1612	2309
0508	1706	2312
0510	1804	2312-105
0603	1805	2315
0606	1806	2321
0612	1808	2511
0705	1810	2512
0803	1812	2520
0805	1816	2607
0805-040	1825	2611
0907	2005	2611-125
1002	2005-050	2810
1005	2010	2815
1005-050	2010-050	2815-125
1008	2010-100	2816
1010	2014	2817
1020	2018	2817-120
1204	2020	2822
1206	2020-020	3333
1206-020	2110	3530
1206-040	2208	3640
1206-070	2210	4020
1210	2212	4048
1311	2213	4418
1406	2214	4540
1411	2218	5020
1411-075	2220	5040
1505	2221	5440

MELF's
(resistors, diodes)



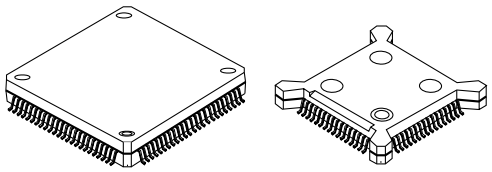

MELF-1206	MELF-2009
MELF_DIODE-1406	MELF_DIODE-2010
MELF_RES-1406	MELF_RES-2308
MELFSQ-1910	

Small Outline IC's
(Gull Wing Leads)

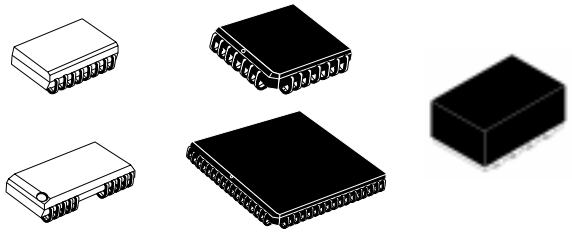
SOIC8	SOLIC20	TSOP40
SOMIC8	SOMIC24	SO44
SOIC14	SOLIC24	SSOP48
SOMIC14	SOWIC24	TSOP48
SOLIC14	SSOP24	SSOP56
SOIC16	SOLIC28	SO56-025-405
SO16-040-300	SOWIC28	SO56-030-605
SO16-100-430	SSOP28	TSOP20\32
SOMIC16	SOWIC32	TSOP24\32
SOLIC16	SOYIC32	TSOP28\32
SOLIC18	TSOP32	

QFP's
(with and without bumpers)



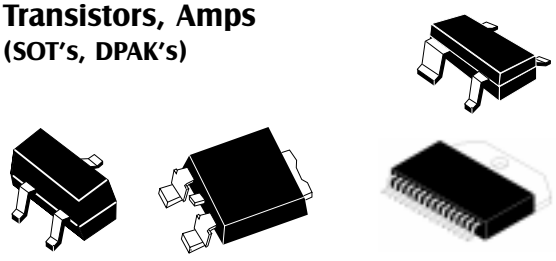
TQFP32-7X7
QFP44-10X10
QFP44A-10X10
QFP44B-10X10
QFP44C-10X10
TQFP48-7X7
QFP54/56-14X20
TQFP64-10X10
QFP64B-14X14
QFP64C-14X14
QFP64-14X20
QFP80-14X20
QFP84-18X18
QFP100-14X20
QFP100-18X18
QFP100-23X23
TQFP120-14X14
QFP120-28X28
QFP128-28X28
QFP132
TQFP144-20X20
QFP144-28X28
QFP160-28X28
QFP169-28X28
QFP208-28X28
QFP216-28X28
QFP256-28X28
QFP304-40X40
BQFP100
BQFP132

"J" Leaded IC's
(small outline packages, PLCC's, and variants)



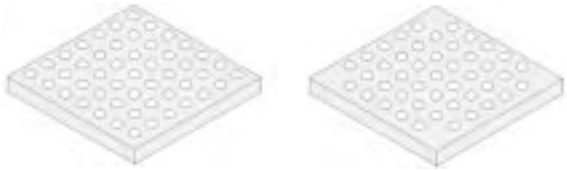
SOLJ24
SOLJ26
SOJ26-26-050-350
SOLJ28
SOXJ28
SOLJ32
SOXJ32
SOJ44-44-050-440
SOLJ20/26
SOJ26-20-050-350
SOLJ24/26
PLCC18
PLCC20
PLCC28
PLCC32
PLCC40-070
PLCC40-140
PLCC44
PLCC52
PLCC68
PLCC84
PLCC100
JVAR4-3113
JVAR4-5538
JVAR8-5131
JVAR12-10-3810
JVAR18-15-5824

Transistors, Amps
(SOT's, DPAK's)



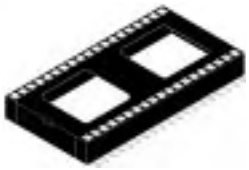
SOT23
SOT89
SOT143
SOT223
SOT353
SC59
DPAK
D2PAK
DD-3
XSTR-1825
XFMR-5170
AMP-7987

BGA's
(with and without corner balls)



BGA18
BGA165
BGA169
BGA225

Sockets



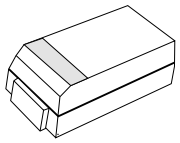
SOCKET16
SOCKET18
SOCKET20
SOCKET24
SOCKET28
SOCKET32
PLCCSOCKET20-1
PLCCSOCKET20-2
PLCCSOCKET20-3
PLCCSOCKET28-1
PLCCSOCKET28-2
PLCCSOCKET28-3
PLCCSOCKET32-1
PLCCSOCKET32-2
PLCCSOCKET32-3
PLCCSOCKET44-1
PLCCSOCKET44-2
PLCCSOCKET44-3
PLCCSOCKET52-1
PLCCSOCKET52-2
PLCCSOCKET52-3
PLCCSOCKET68-1
PLCCSOCKET68-2
PLCCSOCKET68-3
PLCCSOCKET84-1
PLCCSOCKET84-2
PLCCSOCKET84-3

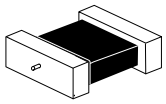
Headers

HEAD30-150-29
HEAD34-169-29
HEAD40-120-225
HEAD41-83-21
HEAD50-170-34
HEAD100-135-28

Miscellaneous Capacitors

(molded, pointed, aluminum, variants, cans)



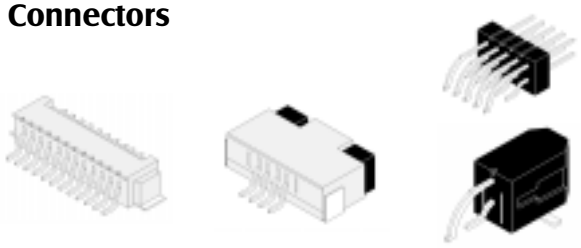


TANT_MOLD_A
TANT_MOLD_B
TANT_MOLD_C
TANT_MOLD_D
TANT_COAT_A
TANT_COAT_B
TANT_COAT_C
TANT_COAT_D
TANT_COAT_E
TANT_COAT_F
TANT_COAT_G
TANT_COAT_H
TANT_COAT_J
RECTVAR-0805-035
RECTVAR-1404-030
RECTVAR-1503-050
RECTVAR-1702-060
RECTVAR-1802-060
RECTVAR-1902--060
RECTVAR-2114-090
RECTVAR-2302-105
RECTVAR-31124-085
ALUM_CAP_B
ALUM_CAP_B-1
ALUM_CAP_C
ALUM_CAP_D
ALUM_CAP_D-1
ALUM_CAP_E
ALUM_CAP_F
ALUM_CAP_G
CAN-1702
CAN-1803
CAN-2204
CAN-2626
CAN-2803

Inductors
(inductors, filters)

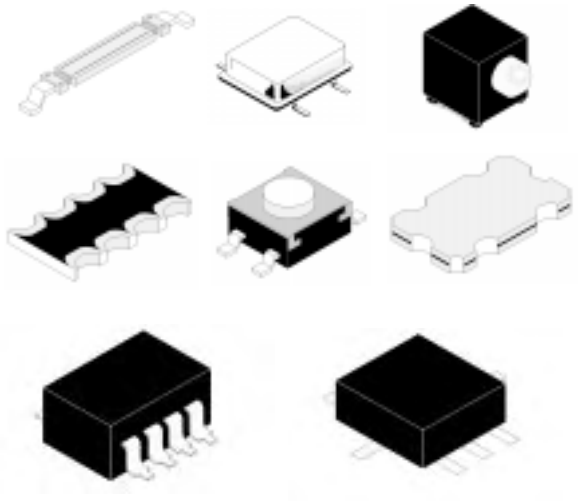
INDCTR-3028-125
INDCTR-4444-330
INDCTR-4747-230
INDCTR-5020-190
INDCTR-5509-230
INDCTR-7125-250
INDCTR-7220-240
RECTVA-1206-070
RECTVA-1210-060
RECTVA-1210-080
EMI-FILTER-2607

Connectors



FPC04-040
FPC09-025
FPC12-040
FPC12-050-OPEN
FPC16-020
FPC26-040
FPC30-020
CONN2-2052
CONN3-3052
CONN4-4052
CONN2X4-3431
CONN2X5-5064
CONN2X7-7064
CONN2X10-10064

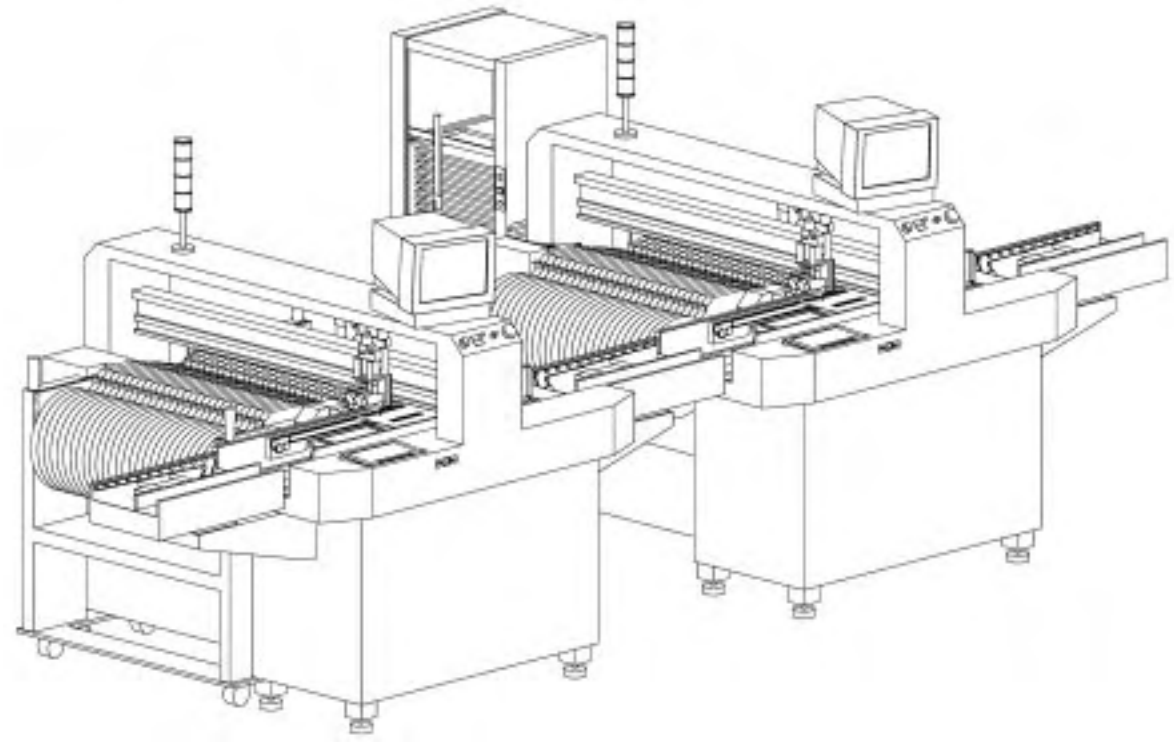
Miscellaneous
(crystals, pots, LED's, buttons, resistor arrays, irregular leaded components)

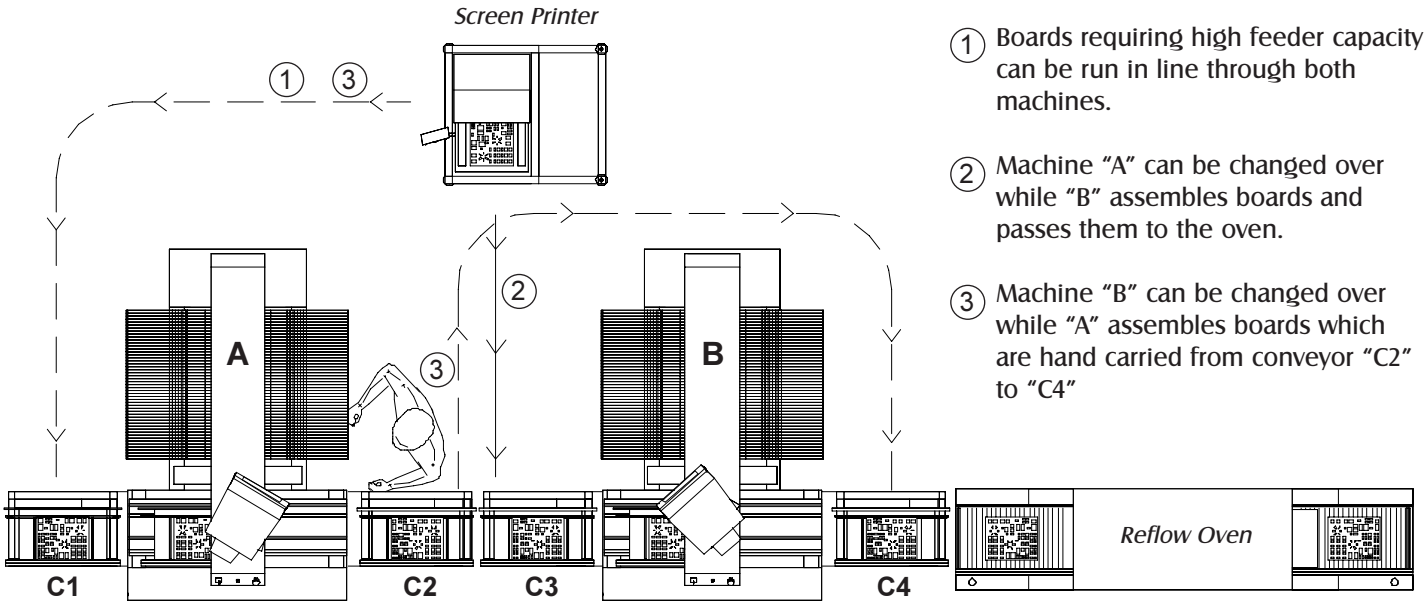


XTAL-5220-175
XTAL-4702-160
OSC-METAL-5058
RECTVAR-1915-210
LED-2417
ARRAY-4508
ARRAY-1306
COUPLER
FUSE-7605
BUTTON-3526
BUTTON-3825
BUTTON-4025
GVAR4-2235-FLT
GVAR10-5546-FLT
GVAR10-5647-FLT
GVAR10-8-5936-FLT
GVAR16-9037-FLT
GVAR4-1838-TPR
GVAR6-3158-TPR
GVAR6-3438-TPR
GVAR8-3838-TPR
GVAR8-4239-TPR
GVAR16-8540-TPR
GVAR14-8-7741-TPR
GVAR6X2-2826

Line Configurations

The traditional dual machine line consists of a high-speed chip placer and a lower speed machine capable of placing larger components. Since each 3Z can place all components, a dual 3Z line offers more flexibility than the traditional dual line. For example, if a higher feeder capacity is required for a specific job each 3Z will populate a portion of the PC board. However, if the day's production requirement is for small lot sizes, it may be advantageous to run different boards on each machine. In this case, one job can be running on one machine while another job is being set up on the other machine. The 3Z line shown below illustrates the board handling for this scenario.

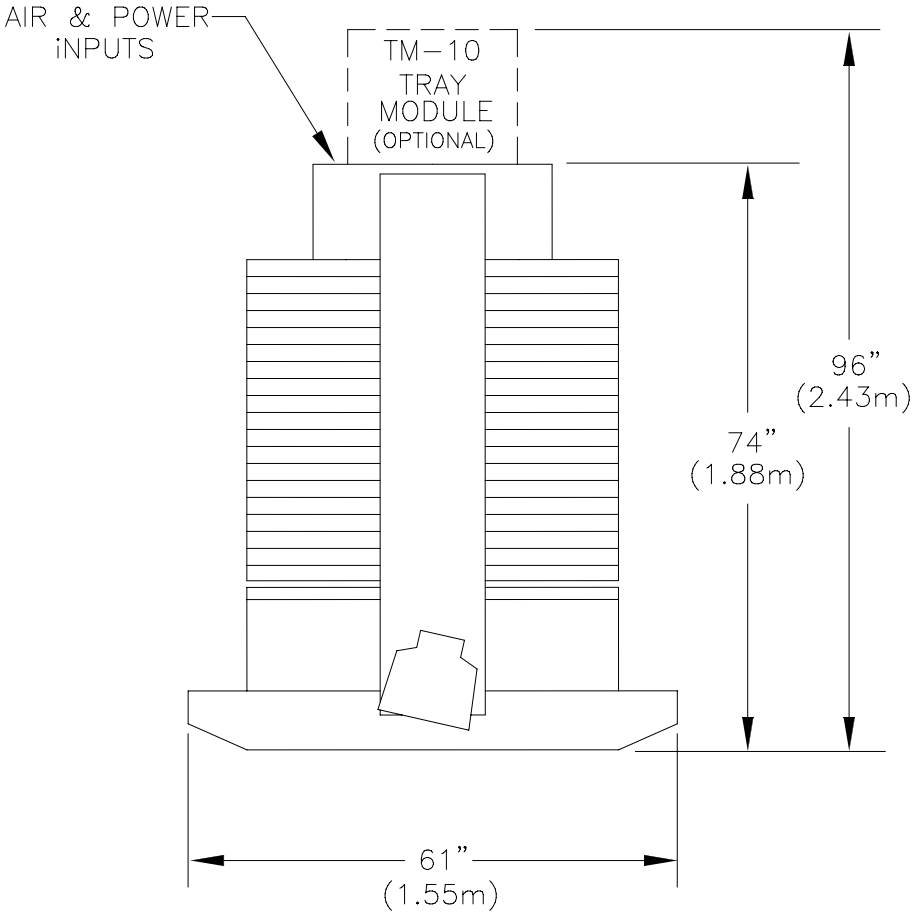




1. Boards requiring high feeder capacity can be run in line through both machines.

2. Machine "A" can be changed over while "B" assembles boards and passes them to the oven.

3. Machine "B" can be changed over while "A" assembles boards which are hand carried from conveyor "C2" to "C4"



Facility Requirements Data

Power	220 Volts AC @ 60/50Hz 15A
Air Pressure	90 psi, 5 CFM (142 1/min)
Air Purity	99.9% based on .3 micrometer filtration with a dew point of 40 degrees Fahrenheit
Length	74" (1.88m) standard 96" (2.43m) w/TM10
Width	61" (1.55m) standard 86" (2.18m) w/one conveyor 111" (2.82m) w/two conveyors
Height	68" (1.73m)
Weight	2,000 lbs. (907 Kg.)