

USER MANUAL

(Please Read Before Use)



APPLICABLE MODEL: TM220A TM240A
VERSION : V0.1

Technical Parameters

Version	TM220A
Applicable PCB	20mm*20mm~220mm*200mm
Placement head quantity	2
Applicable Components	0402-5050, SOP, QFN, etc
Component height	=< 3mm
Components supply configuration	Tape reel, bulk package (IC)
Tape width	8mm, 12mm, 16mm
Feeders	16 (8mm=12, 12mm=2, 16mm=1, bulk IC=1)
External Dimension	L 830mm×W 455mm×H 285mm
Vacuum pump	-92KPA (Mute type pump)
Power supply	220V, 50Hz (Convertible to 110V)
Average working power	100W
Weight	G.W: 45KG (N.W: 25KG)

Version	TM240A
Applicable PCB	20mm*20mm~400mm*360mm
Placement head quantity	2
Applicable Components	0402-5050, SOP, QFN, etc
Component height	=< 3mm
Components supply configuration	Tape reel, bulk package (IC)
Tape width	8mm, 12mm, 16mm
Feeders	28 (8mm=21, 12mm=4, 16mm=2, bulk IC=1)
External Dimension	L 980mm×W 655mm×H 285mm
Vacuum pump	-92KPA (Mute type pump)
Power supply	220V, 50Hz (Convertible to 110V)
Average working power	100W
Weight	G.W: 65KG (N.W: 35KG)

1. Safety

1.1 Working Environment

- Normal Operation Temperature 10C ~ 35C. Humidity 50%~70%
- Keep working environment air clean to prevent vacuum valve get clogged from air dust.
- Keep machine level horizontally with stable surface to reduce the working vibration.

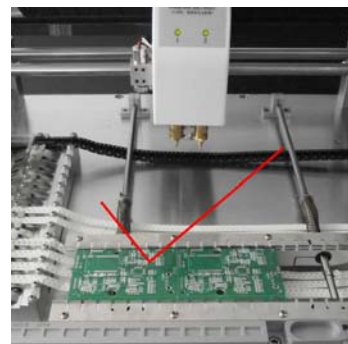
1.2 Power Source

- Standard working power is 50Hz 220 AC. (or 110V if specified)
- Maximum power is 100W.
- To prevent the static discharge, please make sure the machine is well grounded.
- Please turn off machine when not in use.

1.3 Operation Safety



Wrong operation

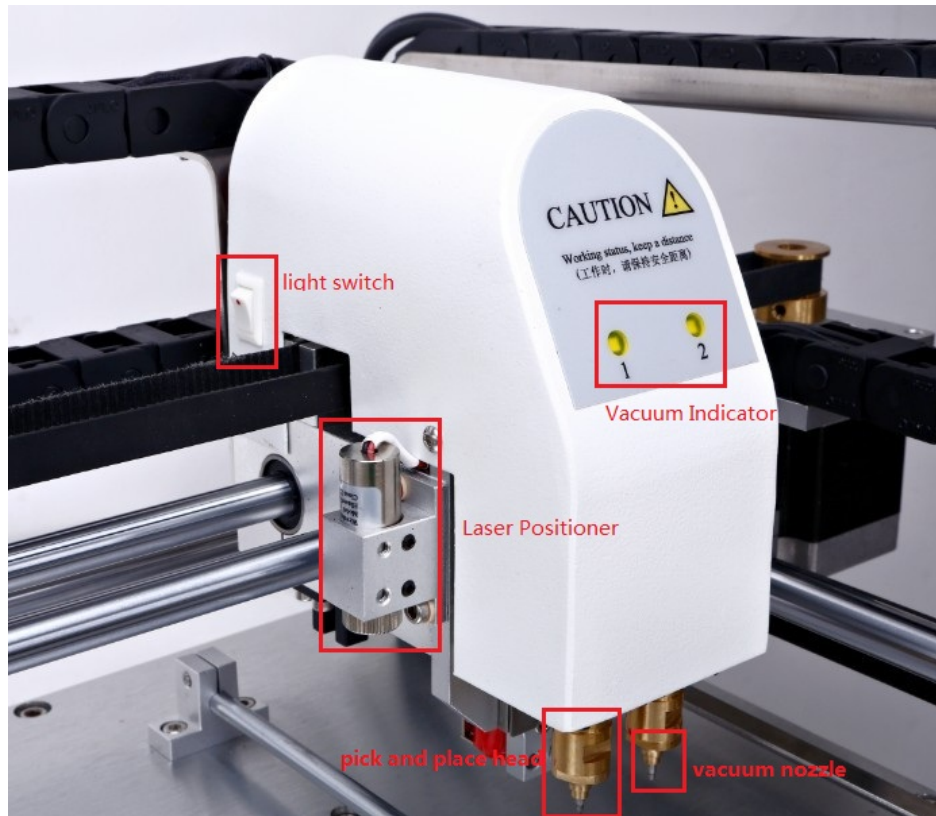


Correct operation

- Keep working area clean with no obstacle. Machine will automatic homing and calibration procedure when turn on.
- Please turn off power before change vacuum nozzle. Machine will readapt new nozzle on next restart.
- Keep hands off from motion area since the machine will have rapid movement during working and calibration.
- Do not operate the task that exceed the working envelope, otherwise machine will selflock for protection.
- Do not modify/remove power outlet, operation panel, head cover and other sensor. Warranty will void for those operation.
- Do not add any liquid lubrication in anywhere on the machine. Working head sensor may break for wrong type of lubrication.
- **Remove all transportation ziptie before turn on the machine.**

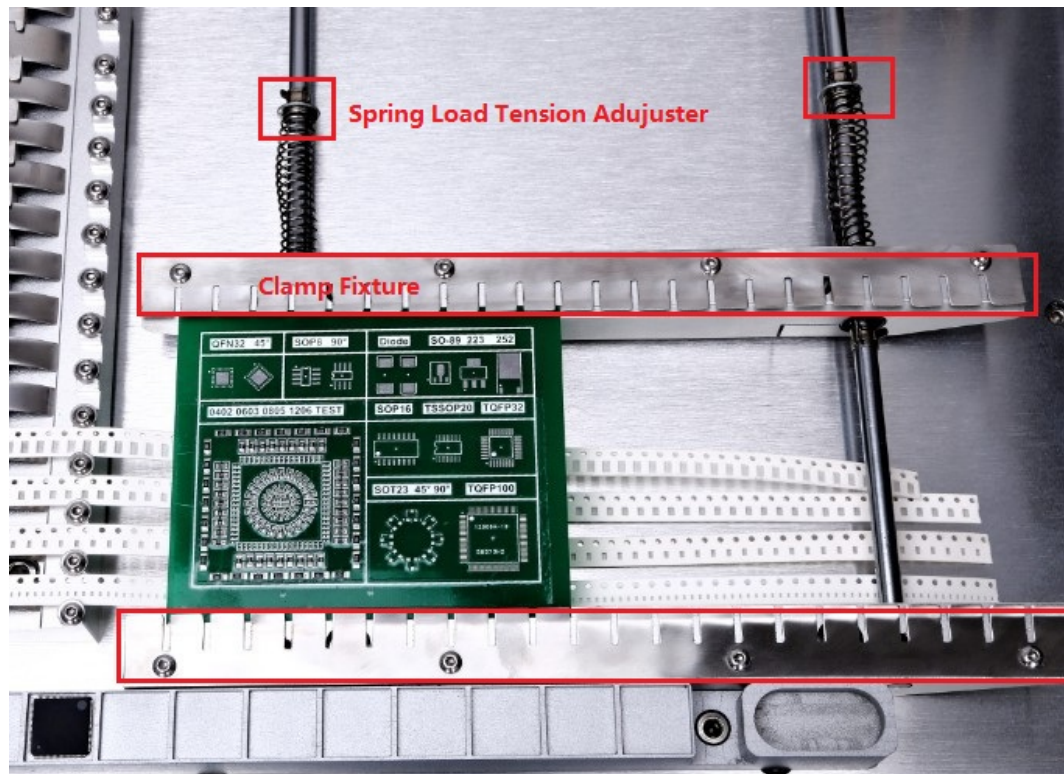
2. Module

2.1 Working Head



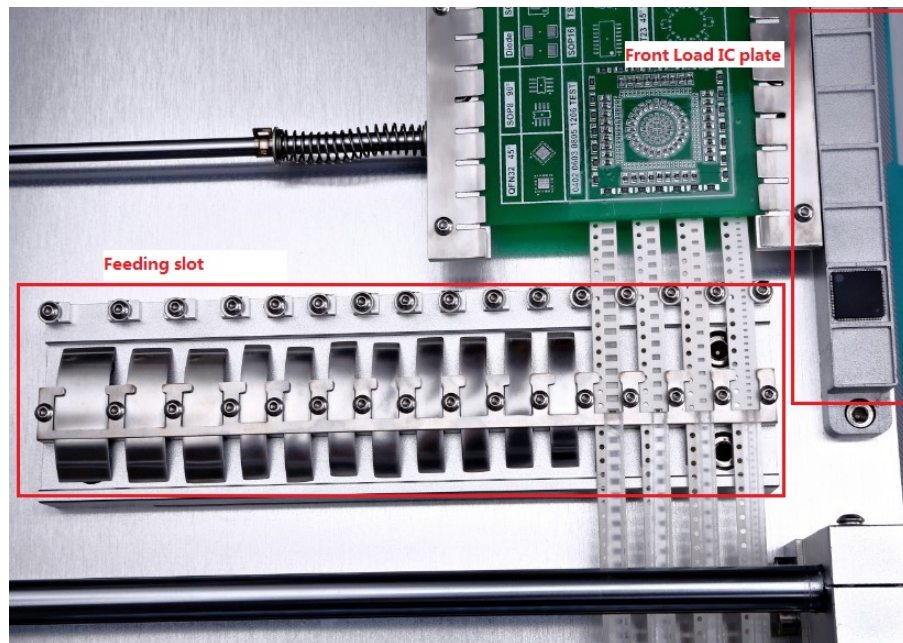
- Pick and Place head
 - Using vacuum control to perform pick and drop task. It can work with 4 type size of nozzle
 - Dual Pick and Place head design helps increase throughput. It can be configured as different size of nozzle for both passive component and IC pick and place at same time.
- Vacuum Indicator
 - Built in with sensitive air pressure sensor to visualize the current working status for easy tuning job.
 - With vacuum detection, working head will automatically dispose the chip if picking fail or pick misaligned. Then the machine will perform the make up pick and place so no manual finishing are required afterward.
- Laser Positioner
 - With calibrated laser position indicator, easy for manual editing the component coordinates.
- Working Light
 - High bright light. Easy for tuning and editing.

2.2 Working Zone



- PCB Holder
 - Using for hold the PCB and should always keep it flat and clean. Distortion caused by wrong movement and dirt will affect machine accuracy.
- Clamp Fixture
 - To assist hold down the PCB. Please make sure no residual chips stuck in the gap when install new board.
- Spring Load Tension Adjuster
 - By moving the spring clamp to adjust the tension of holder. Keep it light when working with thin board.

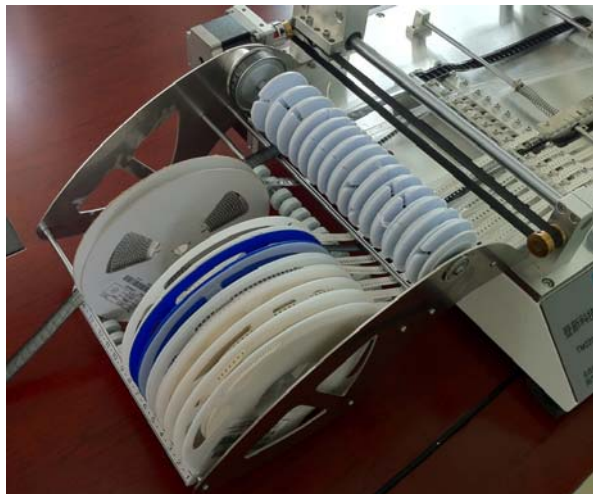
2.3 Feeding Zone



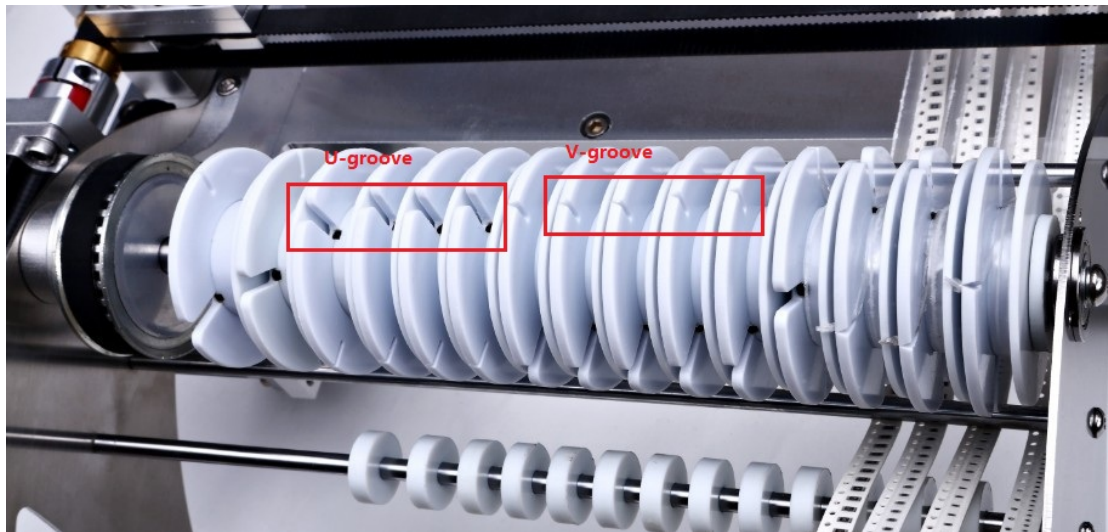
- Feeding slot
 - Fixture for different size of reel tape.
 - TM220A has total 16 tape feeder. Default is 8mm feeder x 12, 12mm feeder x 2, 16mm feeder x1. Front Load IC Plate x1. Keep clean to prevent stuck.
 - TM240A has total 28 tape feeder. Default is 8mm feeder x 21, 12mm feeder x 4, 16mm feeder x2. Front Load IC Plate x1. Keep clean to prevent stuck.
- Front Load IC Plate
 - For large size component or not reel tape package. For example, TSSOP, QFN, and 0.5mm pitch IC. The loading area is in absolute coordinate and can be custom made depend on the package.

2.4 Reel Rack

- To hold up to 15 reels for TM220A
- To hold up to 27 reels for TM240A



2.5 Nylon Spool Wheel



- To collect the nylon string on top of tape. Total of 15/27 spool correspond to the reel. Spool needs clean up every 20M. There are two type of groove on the wheel. V-groove is use for secure the nylon string head. U-groove is used for adjust the peel tension of nylon string.

2.6 Operation Panel



- SD Card slot
 - Use standard SD card for CSV working file storage.support hot plug .
- LCD
 - 320x240 TTF Touch Screen for interface input/output
 - Touch supported GUI can be easy finish jobs when use with real buttons.
- Button
 - Long life contact switch.

3. Operation Guide

3.1 Boot



- Plug the power and turn on switch will finish the boot.
- The system starts to initialize itself and show the boot interface including unique OEM SN number. After initialization, the machine will perform self-checking which include adapt new size of vacuum nozzle and working head homing. After self-checking succeeded, working head will move to top right corner and beep once. If error occurred during self-checking, the machine will pause and keep beeping. Please turn off the machine and check working head if happened.

(p.s. During booting process or manual control mode, the machine is in a special self checking mode. So it ' s normal that machine movement sound is louder)

3.2 Interface

- Home page



Enter the home page after the self-checking of machine. You can see three labels on the home screen: Task, Manual and Setting.

- Using Task screen to navigate, mount, edit. It displays all files with suffix “.csv” in the SD card on the left side, you can use the touch screen or

the direction keys on the front panel to select the file which is needed. The operation buttons on the right side “LOAD”, “EDIT”, “NEW” are respectively used to import and edit the selected file, or create a new working file.

- Using Manual screen to test the working status of each module manually.
 - ✧ DROP1,DROP2 : movements and angle of pick and place head
 - ✧ LOCATE : fixed position of working head
 - ✧ VACUUN1,VACUUN2 : vacuum control of each pick and place head
 - ✧ BLOW1,BLOW2 : test air flush of each head
 - ✧ LASER : calibrated laser position indicator
 - ✧ VOLUM : rotation of spool
 - ✧ NEEDLE: check the position of needle with selecting the drop-down box of each stack.
- Using Settings screen to set some basic parameters of the machine and factory settings.
 - ✧ The basic parameters including the working speed of machine and vacuum detection switch. The working speed refers to the default speed of each mount work (from 10%-150%, defaults set is 100%). The vacuum detection switch is used to control the open/close the baroreceptor which can determine to Do/Do not perform feeding and dropping the material (default set is ON, You can turn off when necessary.)
 - ✧ Factory settings: language (English or Chinese), calibration, etc. You'll need a manufacturer password to save any of these setting permanently.

➤ Working Page



Work -- (TY083.CSV)								
No.	head	stack	X	Y	↑	H	skip	description
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	12	0	0	0	0	0	0	
1	1	1	39.6	6.3	0	0	0	R12
2	1	1	42	6.3	0	0	0	R13
3	1	1	54.32	11.9	0	0	0	R11
4	1	1	27.8	15.8	0	0	0	R25
5	1	1	55.88	11.95	0	0	0	R15
6	1	1	9.51	21.26	0	0	0	R8
7	1	2	30	10.1	90	0	0	R23
8	1	2	33.23	10.33	90	0	0	R22
9	1	2	36.58	10.33	90	0	0	R21

time: 00:00 board: 0 state: standby

- Introduction : enter the working page via using button “LOAD” in the home page. Working page consists of title bar, component list and status information block.
- The blue window field is the title bar which indicates the working file selected currently.
- Component list shows the information of component item in the working file, they are No. of component, No. of head, No. of stack, X-coordinate, Y-coordinate, angle of placement, height of component, skip and description by sequentially.

- Status information block is in the bottom of the page which shows the work accumulated time, the number of finished board, working condition currently.
- There are corresponding physical buttons in the front panel to control the placement process. ESC (back to front page), STEP (enter the step by step operating mode), Hspeed (to switch between the speed setting value of machine and the highest speed setting), START/PAUSE.

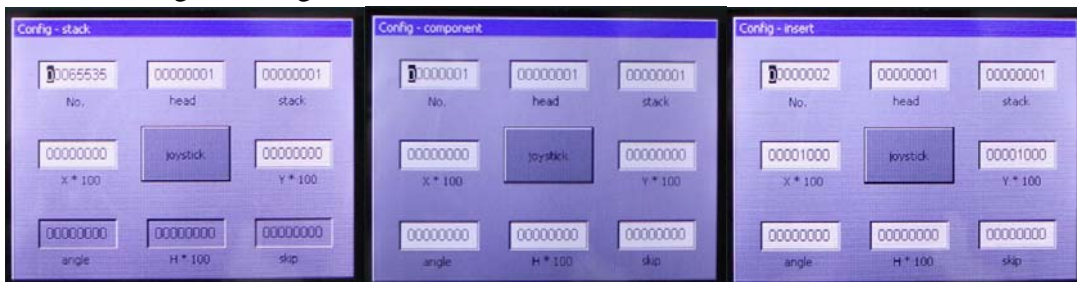
➤ Edit Page



No.	head	stack	X	Y	H	skip
65535	1	11	0	0	%	
65535	1	12	0	0	%	
65535	1	13	3.1	0	%	
65535	1	14	4.1	0	%	
65535	1	15	4.5	0	%	
% 进给设定 料栈号 进给量						
65535	2	1	4			
65535	2	2	4			
65535	2	13	8			
65535	2	14	8			
65535	2	15	8			
% 拼板 X Y						

- Introduction: Enter the Edit page via using button “Edit” in the home page OR via using button “New” to create a new page. Edit page can do almost all the editing operations of work file, which can set configuration items, modify, insert, create and delete the component.
- The corresponding item of Edit page can be selected via the touch screen or the direction keys .Many operations also need to meet the physical button on the operation panel. ESC (back to the front page), Del (delete the selection currently), F1 (insert a new item), F2 (add a new item at the end of file), UP/DOWN (select the previous/next item), LEFT/ RIGHT (page turning).

➤ Configure dialog box



- Introduction: Enter the corresponding dialog box when modify, insert, create at the edit page.
- All the effective edit-box in the configure dialog box correspond to relevant parameter of this item, which can be set via the touch screen of direction key.
- The button "joystick" is valid only in config-stack and config-component. When press the button in config-stack, the head will locate the corresponding material stack and align the position of the reclaimer. When press the button in config-component, it will open the laser locator and navigate to the location specified by the X and Y coordinates. While

"Joystick" pressed, the direction key will be able to increase or decrease the X and Y coordinates and control the position of the head in real time. Real-time changes and feedback proofreading function of the "joystick" button has high practicability while editing.

- The corresponding physical buttons in the front panel: ESC (back to the previous page without saving),SURE (back to the previous page with saving) ,Direction Key(modify the parameter value or other auxiliary operations)

3.3 Working File

➤ Format

- The device uses file format as CSV file, which can be directly edited by almost all the file editor, (such as NOTE, UltraEdit etc.). Also you can open it by Excel. We recommend that derive the CSV file via editing software like Protel and PCB by using the special Excel tool from our company.

➤ Grammar

- Data line: each line of the CSV file, means a data collection.
- Keyword-comma: the data items of each data line are separated by keyword comma",,". We can insert a space or TAB character before or after comma. Each comma in the data line must to trail behind an effective data item .Separate meaningless comma will be treated as a grammar error.
- Keyword- percent: The data line with the beginning of percent sign"%" will be treated as a comment line. It means that the line has no real meaning, which is just a description of the line.
- The type of data line : configuration line , component line, speed line, comment line

- ✧ The configuration line generally appear in the beginning of the file, and the first data item must be "65535", the second data item is configuration type and subsequently the data for the corresponding configuration parameters. For example:

65535,0,0.08,-0.42,	(type 1, Origin Offset)
65535,1,1,0,0	(type 2, Stack Offset)
65535,2,1,4,	(type 3, Feed Rate set)
65535,3,45,0,	(type 4, Panelized boards)

- ✧ Component line is the main body of the working file, and each component match with one component line. There are 8 or 9 data items in one component line. No. of component (1-65534), No. of head (1 or 2), Stack (0-15 or 0-27), X-coordinate(0-200 or 0-360) ,Y-coordinate(0-220 or 0-400) , Angle(-180 -180), H(0-3.00) ,Skip(0 or 1), Description(any character) .
- ✧ Speed line is a fictitious component. It will directly change the currently speed, thus the machine can pick and place different components at different speed. Speed line is comprised of two data items, the first item no. must be "0", the second speed item is an integer which from 1 to 15 , the data items behind generally do not require but can not be empty.
- ✧ Comment line exist for the easy understanding of the line.

➤ NOTE

- The system will check the grammar of file while entering working interface. If failed it will pop up a warning dialog box and prompt the line number where grammar error occurred, so the user can find where the problem lies.
- The blank line without any character is permitted in grammar. It's easy to produce blank line only with a comma via software processing, which will cause a grammar error result that can not be resolved. We recommend that user generally do not produce the blank line. If there is a grammar error in a blank line while input, please delete the blank line under edit interface.
- Parameters for scale, distance, and attributes are in millimeter with two decimal places at most. Other parameters are integers.
- More details on the file format and usage can refer to the working file of our company SMTDEMO.CSV



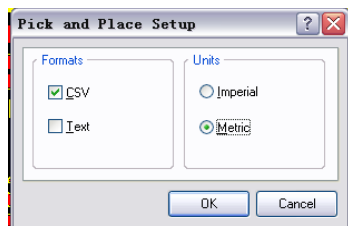
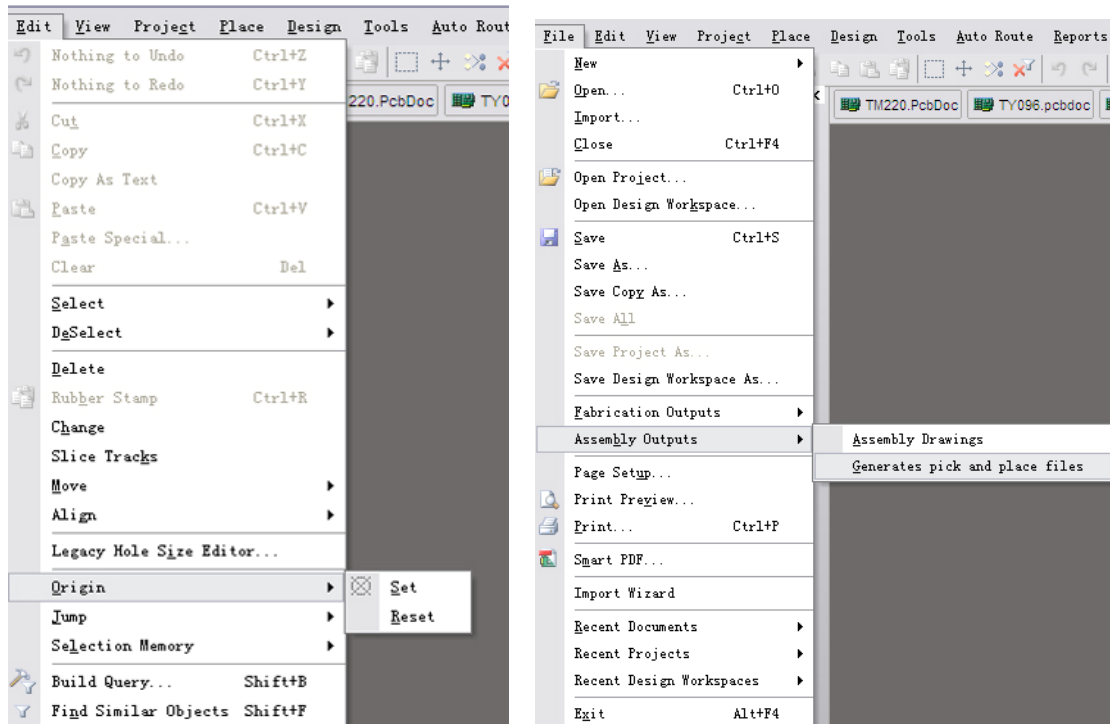
3.4 Trouble Shooting

- Boot alarm: keep beeping, and no self-checking.
 - Please turn off power and check if the needle is stuck by feed belt or sundries. No self-checking if needle is not in original position.
- Stuck alarm: Keep beeping when the needle stuck.
 - Please check if the reel is stuck, and gently shake the reel to help the needle reset. Do not forcibly pull the reel or flip the working head, what will result in the needle deformation even break. (The needle is a sophisticated component. A slight deformation will directly affect the accuracy of feeder position and need to modify the factory settings to correct the discrepancies after replacing.)
 - The system will automatically go into PAUSE mode if the needle is reset successful, please press the “Start/Pause” button to continue the work.
- Material shortage alarm
 - The system will try to do again when pick failed, and it will confirm the stack is empty after three times try. The system will pause at the feeder location and keep beeping. Please find the cause. (For example, the stack is empty or the feeder position is not exact). Please press the “Start/Pause” button to continue the work after solving problem.

4. Usage Example

4.1 Create PnP file (using Protel Altium Designer 6.9)

- Open the PCB file in Altium.
- Edit→Origin→Set(click on bottom left of board)
- Pick and Place Setup
 - Formats → CSV
 - Units→Metric
 - Create working file using Excel Script



- Generate a PnP file



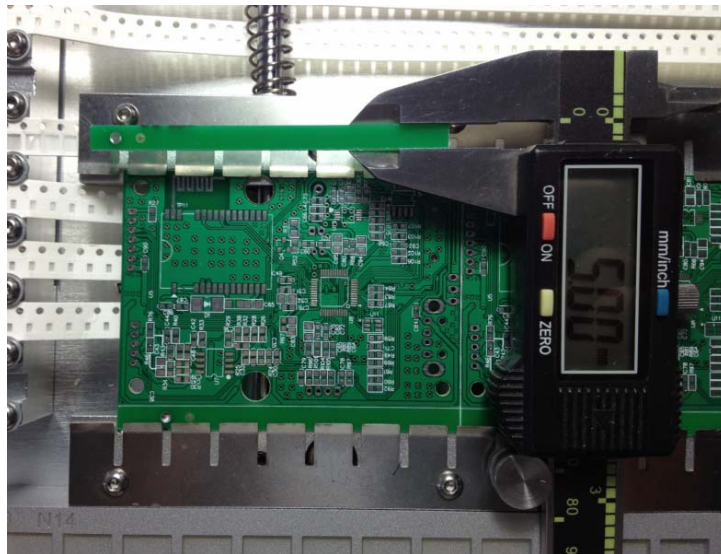
- Conversion tool :
- Generate a PnP file via our conversion tool which default to save at C:/
- If Excel security warning window pop-up, please change VBA script security level to “LOW” and reopen excel again.

4.2 Origin Offset Setting

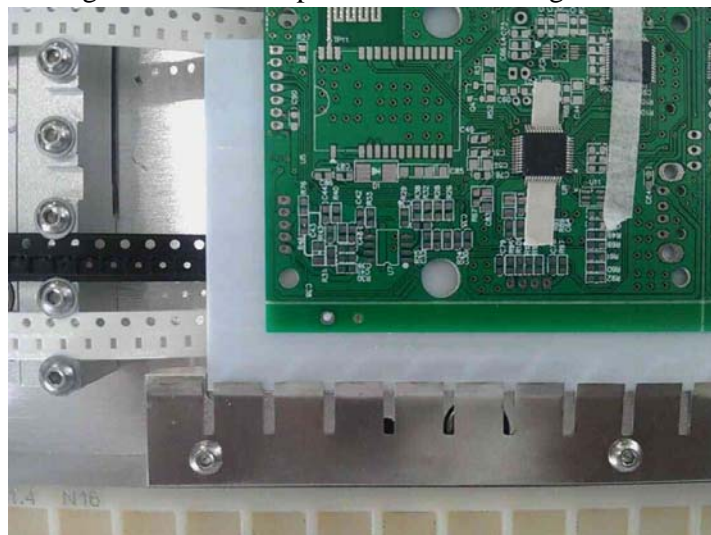
Origin offset command=0

%	Command	X	Y
65535	0	0	0

- Need to set Origin Offset in the following condition generally.
 - PCB manufacture offset. As figure below, the margin is 5mm so Y-axis offset of 5mm.



- Mounting Plate offset: Depend on the mounting location.

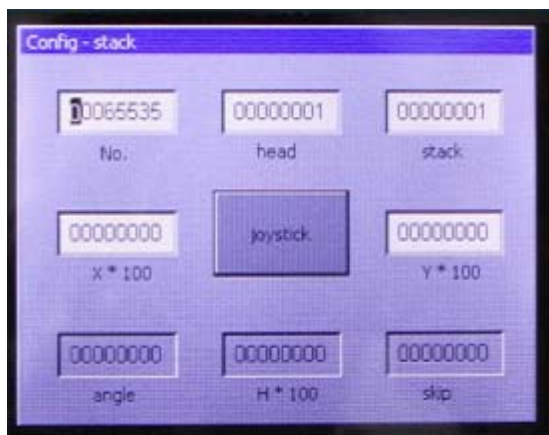


- PCB manufacture Outline offset: Usually this error is very small. It is caused by actual manufacture draft. Shift origin accordingly.

4.3 Stack Offset Setting

Stack Offset command=1

%	Command	Stack number	X	Y	Comment
65535	1	0	0	0	Front IC tray
65535	1	1	0	0	First reel in stack
...	Reels 2-14
65535	1	15	0	0	Last reel in stack



- Please press "joystick", the pick and place head will move to the current location of stack automatically. Please hold down the joystick key, and using the direction keys to trimming if the location of stack is not exact.
- All the feeder from 0-15, 0-27 are same way to adjust it.

4.4 Feed Rate setting

Feed rate command=2

%	Command	Stack	Feed rate
65535	2	0	18
65535	2	1	4
.....
65535	2	15	8



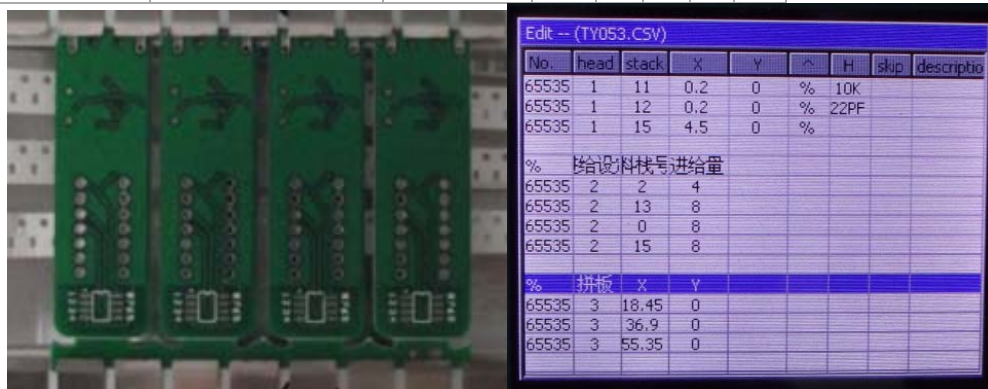
No.	head	stack	X	Y	%	H	skip
65535	1	11	0	0	%		
65535	1	12	0	0	%		
65535	1	13	3.1	0	%		
65535	1	14	4.1	0	%		
65535	1	15	4.5	0	%		
%	进给设定 料栈号 进给量						
65535	2	1	4				
65535	2	2	4				
65535	2	13	8				
65535	2	14	8				
65535	2	15	8				
%	拼板 X Y						

- Feed rate=4mm, for the component : 0603,0805,1206,1210.etc
- Feed rate=2mm, for the component :0402
- Stack 13, 14 is for the 12mm reel , stack 15 is for 16mm reel . Set in accordance with the actual situation, in general, under the 8mm
- The feed rate according to the default settings if not been set.

4.5 Panelized boards Setting

Panelized boards command=3

%	Command	X	Y					
65535	3	18.45	0	0	0	0	0	0
65535	3	36.9	0	0	0	0	0	0
65535	3	55.35	0	0	0	0	0	0



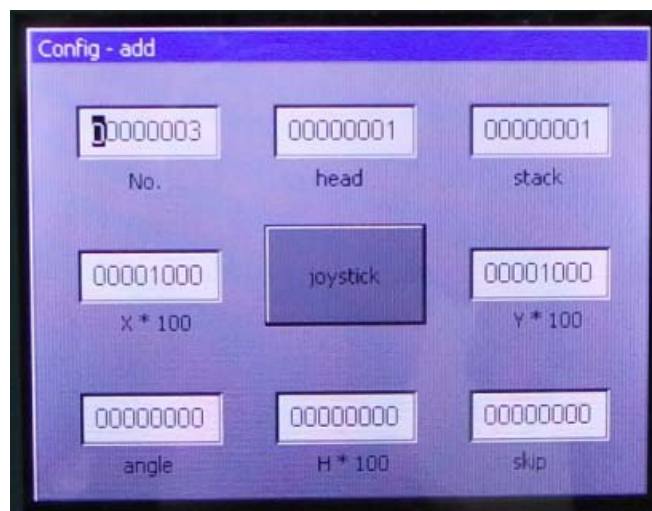
- It is in common mode if there is no information in panelized boards.
- Please enter the x&y of every board. The information of Default board is not show in the Panelized boards settings.

4.6 Create Manual Procedure

- Enter TASK →NEW to create a new PnP file which including the information of Origin Offset Setting (0, 0), Stack Offset Setting (0, 0), no panelized board. Please enter direction key to turn page.

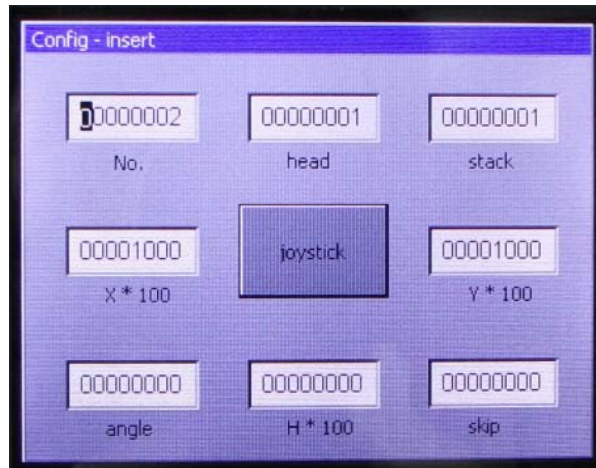


- ADD component: Press the button "F2" to add a component at the end of the file. It shows the Config-add.

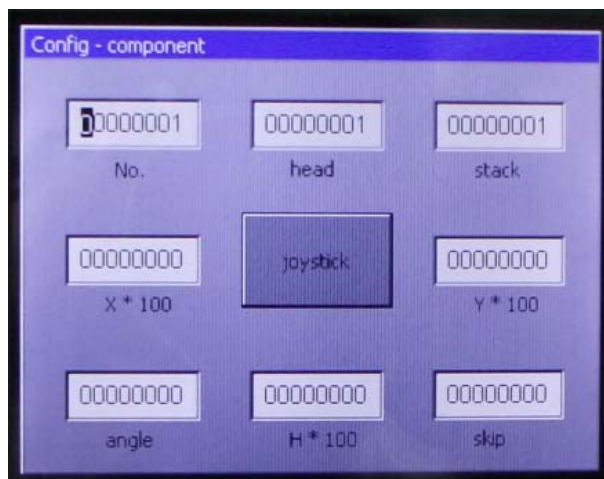


- NO.: sequence number of the component.
- Head : pick and place head (1 or 2)
- Stack : number of stack (1-15) ,
- X*100: modify X of component for precision 0.01mm
- Y*100: modify Y of component for precision 0.01mm
- Angle : the angle of component (-180 to 180)
- H *100: modify height of component for precision 0.01mm
- Skip : make sure if skip the component (1 for skip, 0 for pick and place)

- Insert component: Press the button "F1" to insert a component before the currently component. It shows the Config-insert.



- Modify component : Press " ENTER" to show the config-component



- Press the joystick key, the laser will open and position the current coordinates, such as map (0, 0). Modify the coordinates where you need, then save it.

4.7 Advanced start function

During the mounting process, if there's half-way exit condition happen, and user would like to continue with the process instead of mounting from the beginning, please refer to the below method.

- Press "F1" after you re-load the pick and place working file, the following dialog box will pop up, input the start component no. to continue the mounting.

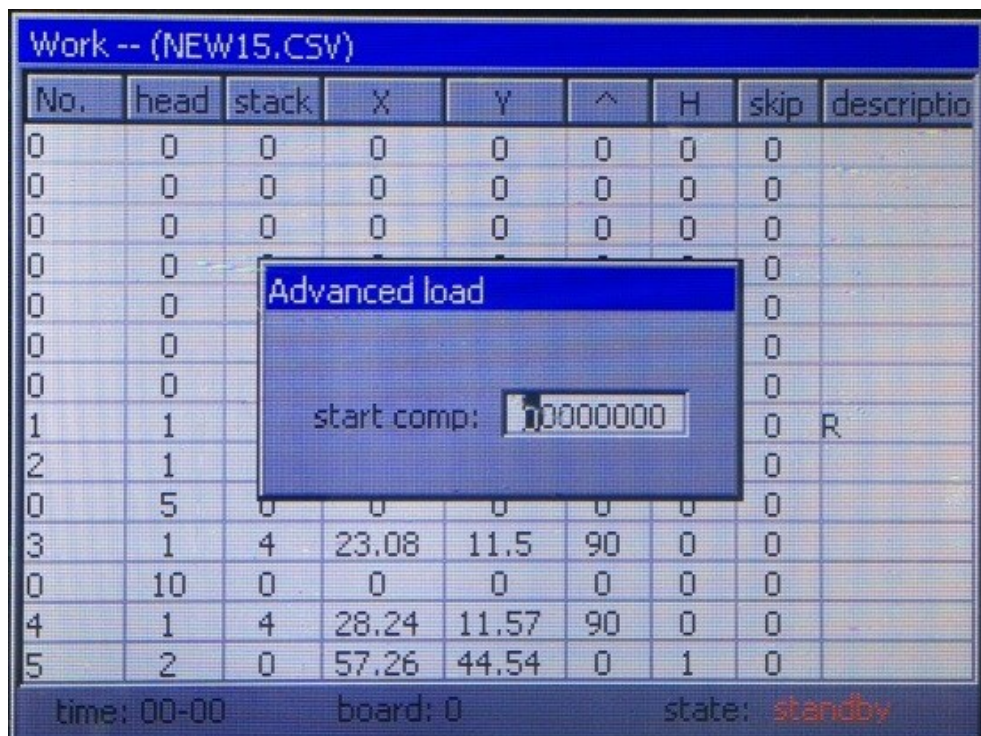
Example:

1) If half-way exit condition happen when mounting the first PCB board.

If before half-way exit component 1 – 10 has been placed, then input the start component no. as 11, the machine will continue the mounting start from the no. 11 component.




2) If half-way exit condition happen when mounting jointed boards, and the first board has been finished.

If there're totally 20 components on the first PCB board, input the start component no. as 21 to skip the whole first board and start the mounting again from the second jointed board.



- Press "ENTER" after start comp no. input, the machine will displays all the left components that needs to mount. Press "START".

Appendix Type of vacuum nozzle

TYPE	PIC	applicative component
XS		<p>recommendation: 0402、0603</p> <p>Also can : 0805、1206、1210、 2512、3528、 diode</p>
S		<p>recommendation: 0805、1206、1210、2512、3528</p> <p>Also can : 5050</p>
M		<p>recommendation: 5050、SOP-8</p>
ML		<p>recommendation: SOP-8 及 IC</p> <p>IC size must be under 16*16mm, 100 pins or less, fine-pitch above 0.5mm, the height of component must be less than 3mm.</p>