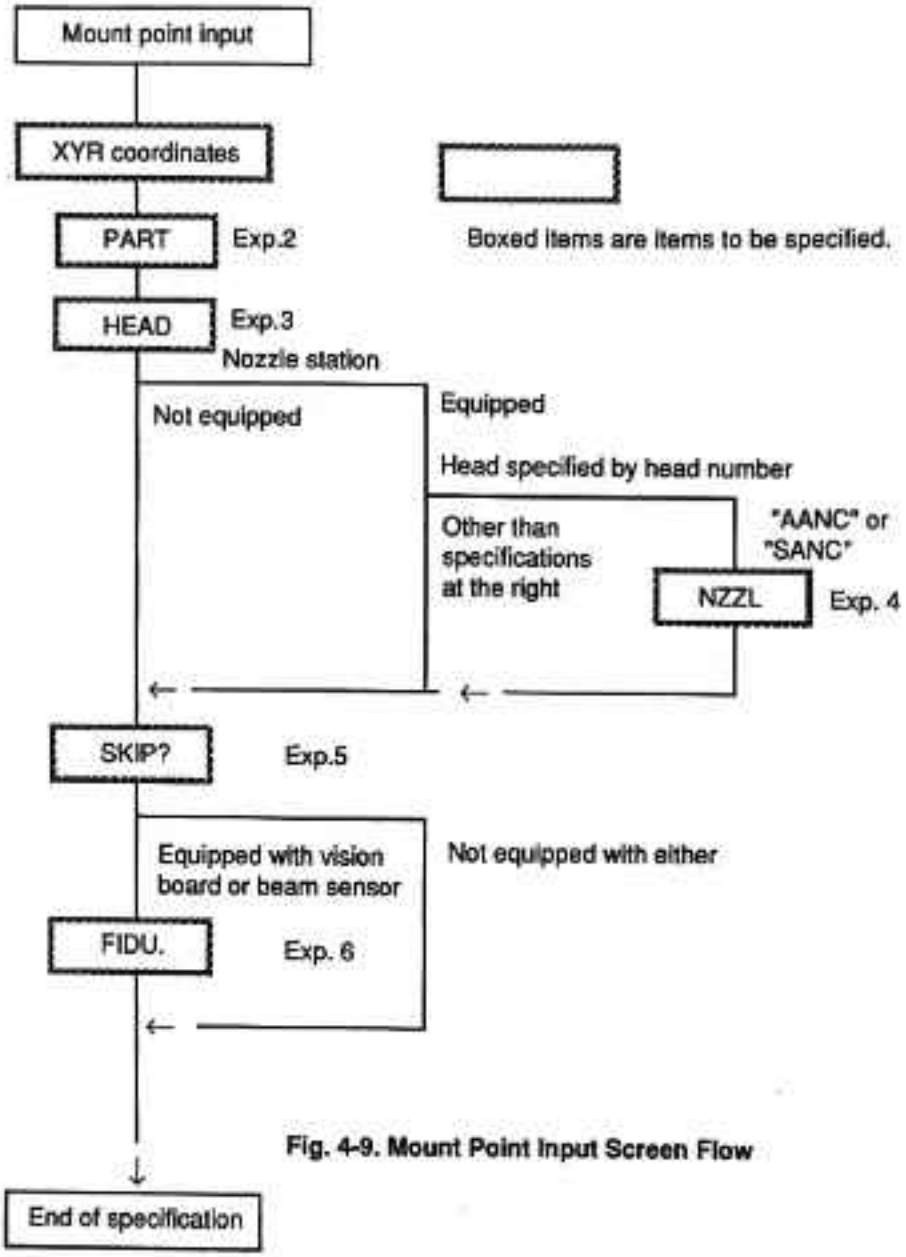


Fig. 4-9. Mount Point Input Screen Flow

[Exp. 3] HEAD
This item is displayed, and input enabled, only if the "Head * Specification" item in the system machine configuration data is set to both "Dot dispenser" and "Line dispenser". It is used to specify which dispenser head is to be used.

[Exp. 4] SKIP
The "Skip?" item is set as shown below.

Display message	Application of relevant no.
NO	Apply
YES	Do not Apply

4-5-8 Pre-dispense and dot dispense

Application of adhesive one point at a time (the actual number of application points depends on the shape of the nozzle) is called "dot dispense".
"Pre-dispense" refers to the processing of dispensing adhesive before the dot dispense operation begins, so that when dot dispensing does start, the flow of dispensed fluid is stable.
The same items are input for pre-dispense points and dot dispense points.

To go to screen f5-8-1 from the main menu, press "MAIN MENU" key. → 3 key → 1 key → F6 key → 5 key.

f5-8-1

[Exp. 1] R,XY
The dot dispense head rotation is driven by a pneumatic cylinder. This items sets whether the rotation angle is 0 or 90 [deg].
All required items other than the above can be specified on the righthand page. Fig. 4-10 shows the flow of specifications screens for these items.
The values for X and Y are related to the PCB orign.
See for Exp. 2 until 4 fig. 5-8-2

[Exp. 2] TIMER [MS]
This sets the amount of time for which dispense fluid is discharged. A value between 0-255 can be input in units of 1mS. A longer discharge time means a heavier volume of application.

NOTE

The resolution power of the discharge time is 1 msec, but there is no actual relation between the discharge time and the linear relationship.

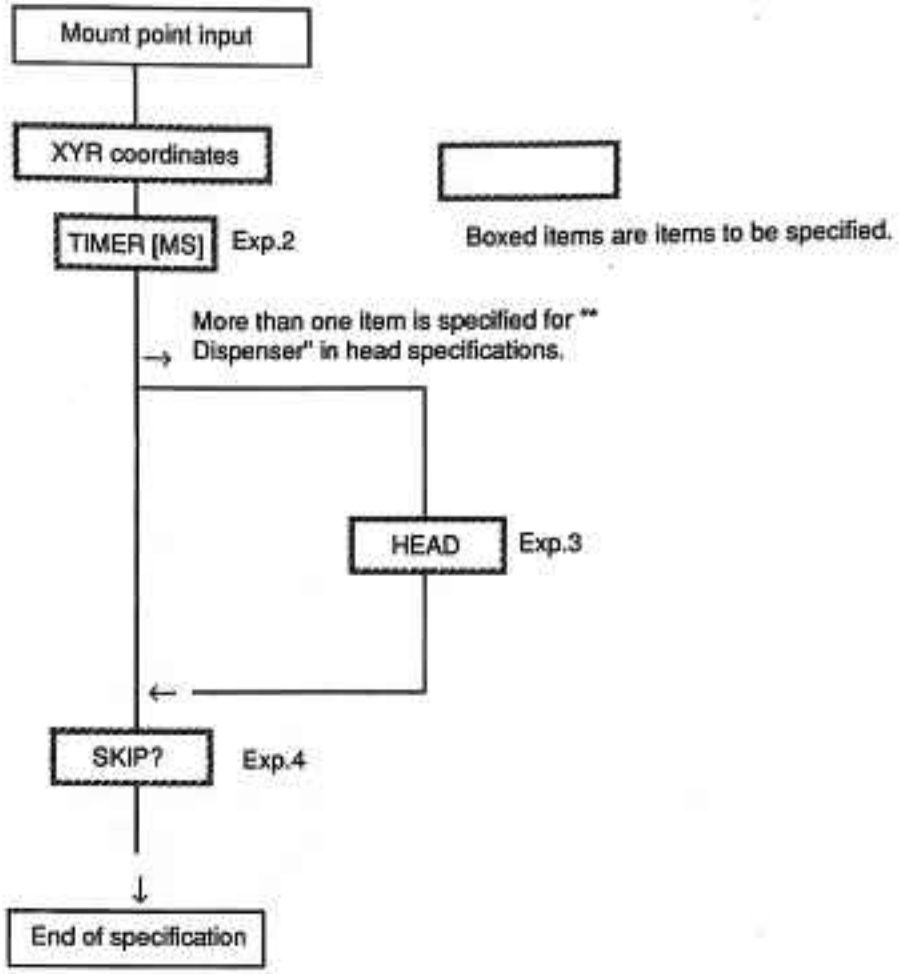


Fig. 4-10. Pre-dispense Point Input Screen Flow

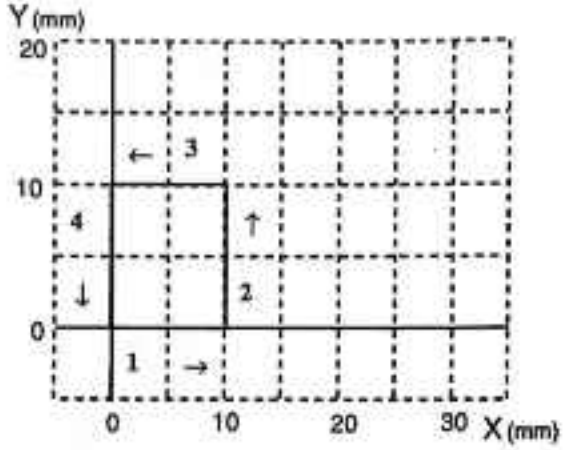
NO.	TIMER[MS]	HEAD	SKIP?
0	5	1	2
1	↑	↑	↑
2	Exp. 2	Exp. 3	Exp.4
3			
4			
5			
6			
7			
8			
9			

f5-8-2

Use the → key to go from screen f5-8-1 to screen f5-8-2.

[Exp: 4] Patterns

NO.0~4 in f5-10-1 are used to set one line dispense pattern. This is illustrated in the diagram below.



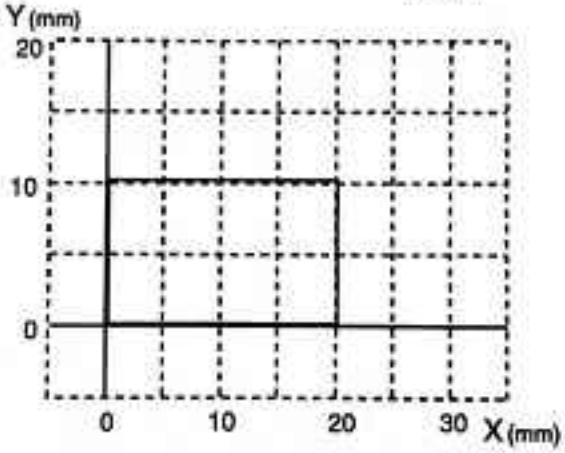
For example, if NO.10~14 contain the following data, the line would be formed as shown in the diagram below.

NO.	X [MM]	Y [MM]	R [DEG]
10	0.00	0.00	0
11	20.00	0.00	0
12	20.00	10.00	0
13	0.00	10.00	0
14	0.00	0.00	0

f5-10-3

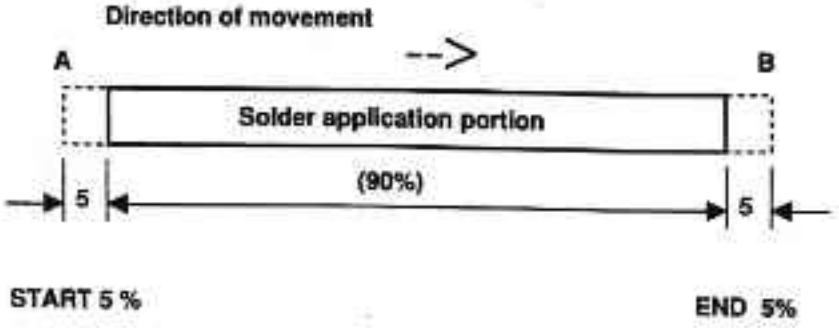
NO.	JOB SET	SPEED	START %	END %
10	MOVE	0		
11	DISP	0	5	10
12	DISP	0	5	10
13	DISP	0	5	10
14	DISP	0	5	10

f5-10-4



[Exp.: 3] START % END %
Because solder can sometimes form lumps at the end of the line, the START % and END % are set.

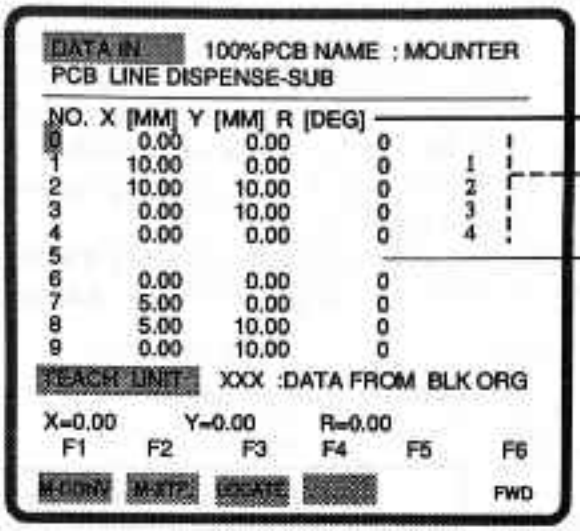
When drawing a line from Point A to Point B, the head moves away from Point A a short distance without applying anything. This interval in which only the arm is moving is called the "START %".
The START % specifies the percentage of the line, starting at the beginning of the line, for which no application is to be made.
The interval before reaching Point B during which no application is made is called the "END".
The END % specifies the percentage of the line, from the point of arrival, for which no application is to be made.



4-5-10 Line Dispense Sub

The line dispense sub function is used to set linear patterns called out by the Sub NO. of the line dispense.

To go to screen f5-10-1 from the main menu, press "MAIN MENU" key. → 3 key → 1 key → F6 key → 8 key.



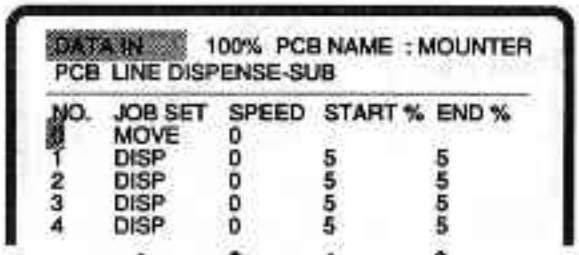
Exp. 5

Exp. 4 NO. 0~4 indicate one pattern.

One line is left open between one pattern and the next.

"R" indicates the head rotation.

f5-10-1



Use the → key to go from screen f5-10-1 to screen f5-10-2.

f5-10-2

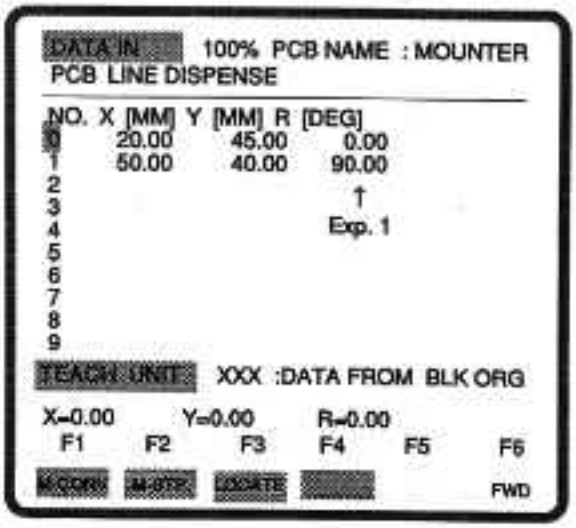
[Exp. 1] JOB SET
This sets the head movement and application operations.

[Exp. 2] SPEED
This set when changing the thickness of the line being applied.
Normally it is set to 0.

1 • • • • • • • • • • • • 9
Fine Heavy

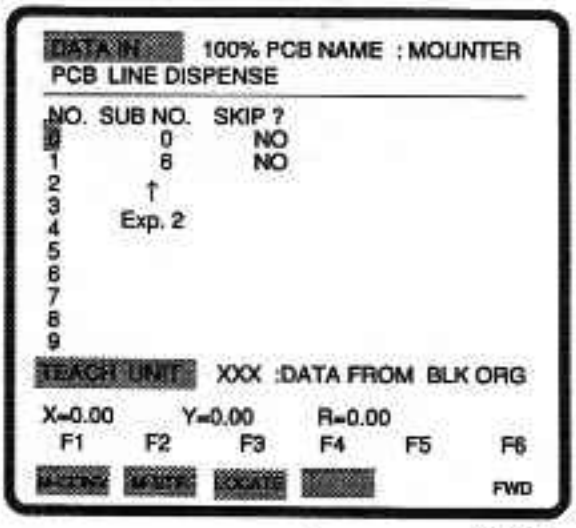
4-5-9 Line Dispense

Using solder cream or another substance and drawing lines on the PCB is called "line dispense". The line dispense and line dispense sub functions are used together, as a set.



To go to screen f5-9-1 from the main menu, press "MAIN MENU" key. → 3 key → 1 key → F6 key → 7 key.

f5-9-1



Use the → key to go from screen f5-9-1 to screen f5-9-2.

f5-9-2

[Exp. 1] R
"R" indicates the pattern rotation set in the line dispense sub settings. For details, please see the section online dispense sub.

[Exp. 2] SUB NO.
This indicates the number of the beginning of the pattern set in the line dispense sub settings.

New Parts Registration

Using the ↑ and ↓ or F1 (UP) and F2 (DOWN) keys, move the highlighted cursor to locations where numbers have not yet been registered, and press the "EDIT" key to start the input process.

Deleting a Parts Registration

Select the part registration to be deleted (move the cursor to it). When the "DEL" key is pressed, a confirmation message is displayed. Follow the directions in the message.

NOTE

When a part is deleted, all of the detailed specifications for that part are deleted.

Like the mount point data screen, the direct point display function can be used here also.

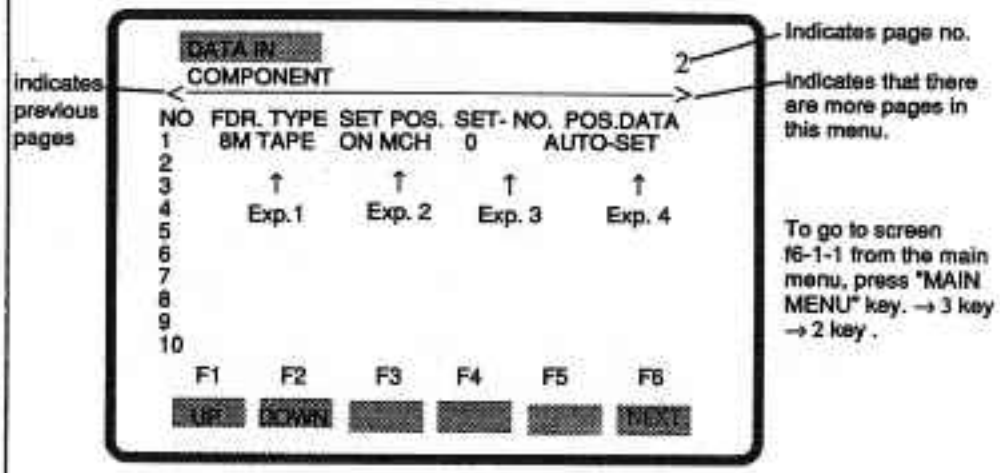
4-6 Parts (DATA IN - COMPONENTS)

A maximum of 120 mounting components can be registered for the CSM, classified by registration numbers 1-120. The value indicated by the "PART" item of the mount point data is this registration number (see par. 4-5-7). The information listed below must be specified for each of the component to be mounted.

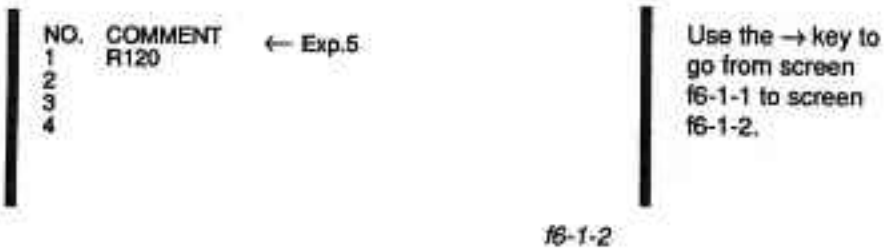
(1) The type of feeder used to supply the parts
(2) Information relating to the feeder equipment and position
(3) The picking sensor check level
(4) Alignment method information
(5) Any other required information

4-6-1 Parts registration

A table of already-registered parts is displayed. On this screen, new registration of parts and deletion of parts can be carried out, as well as specification of sections (1) and (2) of the data listed above, and "Comments". The screen looks like that shown below. Detailed information about the selected parts is provided below.



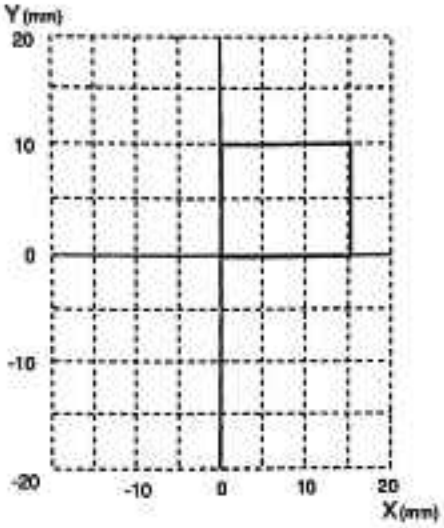
f6-1-1



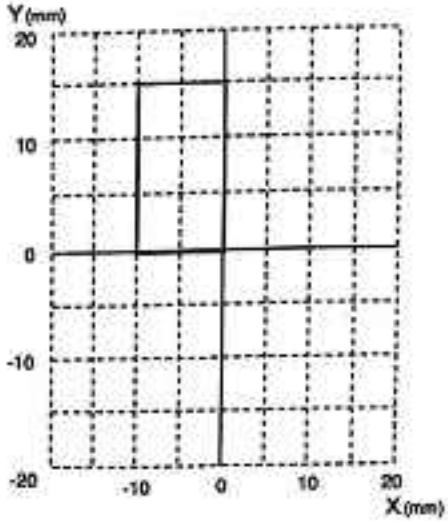
f6-1-2

The SUb NO. 0 is executed as shown in the diagrams below by the line dispense R data.

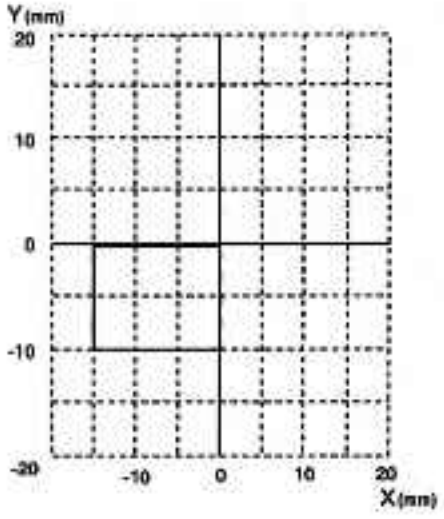
R=0



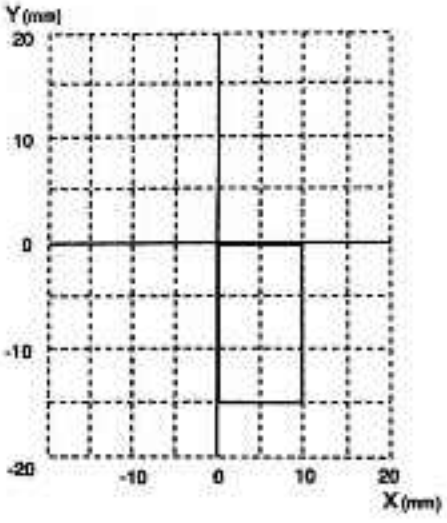
1: R=90



2: R=180



3: R=270



[Exp.: 5] R data for line dispense
The R data for line dispense is set as shown below (1~4).
All sub numbers are hundled in the same way (Sub NO.=0)

DATA IN 100% PCB NAME : MOUNTER
PCB LINE DISPENSE-SUB

NO.	X [MM]	Y [MM]	R [DEG]	
0	0.00	0.00	0.00	
1	0.00	0.00	90.00	1
2	0.00	0.00	180.00	2
3	0.00	0.00	270.00	3
4				

NO.	SUB NO.	SKIP ?
0	0	NO
1	0	NO
2	0	NO
3	0	NO
4		

SUb NO. 0 set in the line dispense sub function is shown below.

DATA IN 100% PCB NAME : MOUNTER
PCB LINE DISPENSE-SUB

NO.	X [MM]	Y [MM]	R [DEG]
0	0.00	0.00	0
1	15.00	0.00	0
2	15.00	10.00	0
3	0.00	10.00	0
4	0.00	0.00	0

NO.	JOB SET	SPEED	START %	END %
0	MOVE	0		
1	DISP	0	5	5
2	DISP	0	5	5
3	DISP	0	5	5
4	DISP	0	5	5

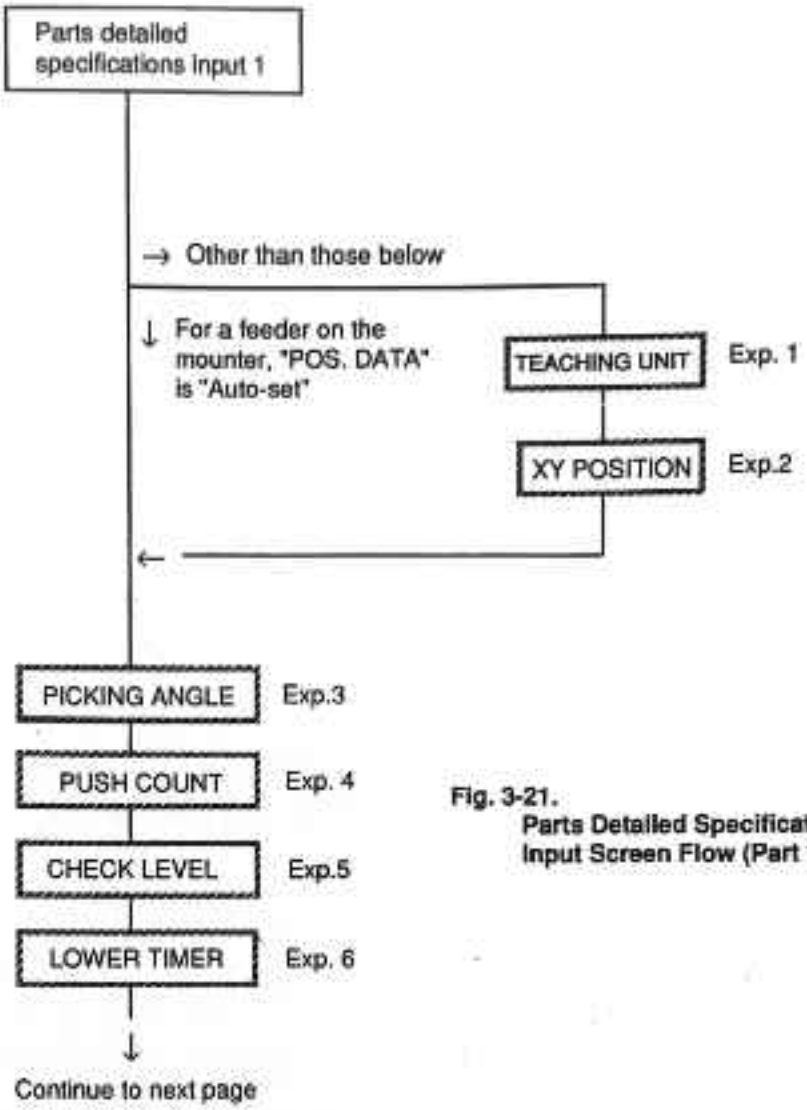


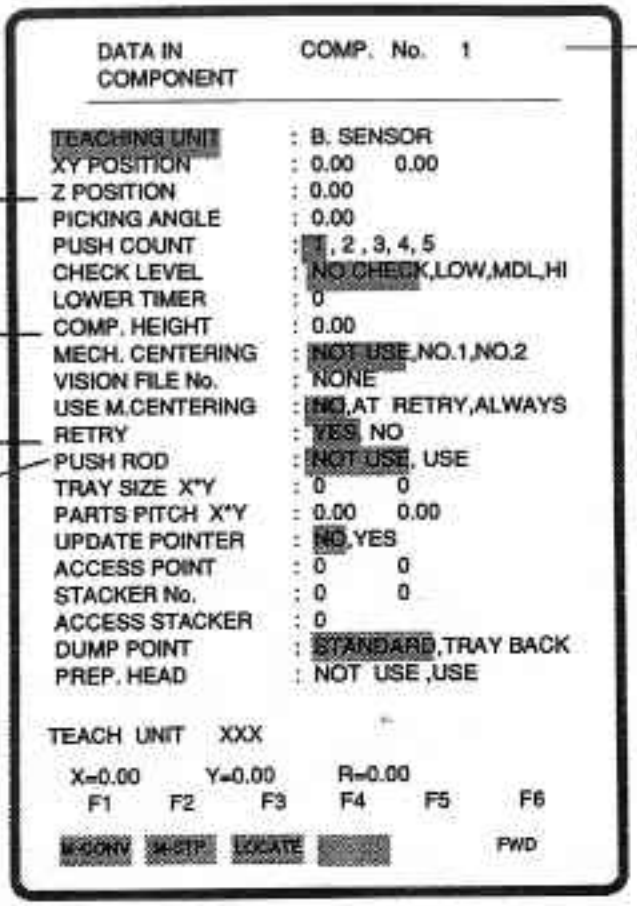
Fig. 3-21.
Parts Detailed Specifications Input Screen Flow (Part 1)

[Exp. 1] TEACHING UNIT
For parts where teaching input is necessary, the required items are displayed and specification is enabled. Normally the teaching unit is specified as the teaching reference (see par. 4-3-3). If teaching is not possible with the teaching reference unit (movement range is exceeded, etc.) specify the head which will actually pick up the parts as the teaching unit, and then carry out teaching using the head which has been specified in this item.

[Exp. 2] XY POSITION
Input is enabled for this item under the same conditions as described in Explanation 1. Ten-key (keys 0-9) input or teaching input can be used. The unit displayed to the right of the "TEACH UNIT" item should be used for teaching. If the feeder type is "TRAY FDR.", input the position of the tray origin (see Fig. 4-24) for the picking position coordinates.

4-6-2 Detailed specifications

The screen where detailed specifications are entered is accessed from the parts registration screen. Use the F6 (NEXT) key to move the highlighted cursor to the item to be specified.



Currently selected parts registration number

Exp. 1
Exp. 2
Exp. 16
Exp. 3
Exp. 4
Exp. 5
Exp. 6
Exp. 19
Exp. 7
Exp. 8
Exp. 9
Exp. 21
Exp. 20
Exp. 10
Exp. 11
Exp. 16
Exp. 12
Exp. 13
Exp. 17
Exp. 14
Exp. 15

CSM84VZ only

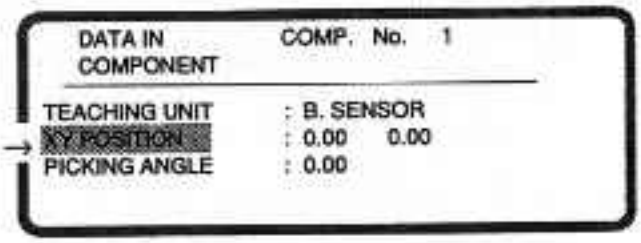
CSM84VZ only

CSM84VZ only

This option is only available with software versions 066 and higher.

To go to screen from the main menu, press "MAIN MENU" key. → 3 key → 2 key → F6 key .

I6-2-1



When the "XY POSITION" are highlighted, axis movement is enabled.

[Exp. 1] FDR TYPE
Feeders are generally divided into the three types according to size, and then broken down into more specific categories by height.

General type	Display message
Tape feeder	8M TAPE 12M TAPE 16M TAPE 24M TAPE 32M EMBOSSED 44M EMBOSSED
Stick feeder	STICK
Tray feeder	TRAY FEEDER.

[Exp. 2] SET POS.
This is displayed, and input enabled, if "LCS" or "Manual tray feeder + LCS" is entered for "TRAY HANDLING" in the system machine configuration data.
When a LCS is used, feeders can either be installed directly on the mounter, or can be installed on the LCS. This is specified at this point.
Use the ← and → keys to change the display.

[Exp. 3] SET-NO.
This can only be set if the feeder type is a tape feeder or stick feeder. The user specifies here the location of the feeder, or in other words, on which feeder bar the feeder is installed. Input the number displayed on the feeder bar.

[Exp. 4] POS. DATA
This is set only for tape feeders installed on the feeder bars at the front and rear of the mounter. As discussed in Explanation 9 of par. 4-4-2, the picking location coordinates for the tape feeder can either be automatically calculated from the reference feeder, or can be specified through actual teaching.
Use the ← and → keys to change the display.

[Exp. 5] COMMENT
The input screen for this item is on the righthand page. It can be used as a remarks column.

Depending on the system machine configuration data and optional equipment conditions, other items may be displayed. Fill these out as required. Fig. 4-20 shows the flow of specifications screens for these items.

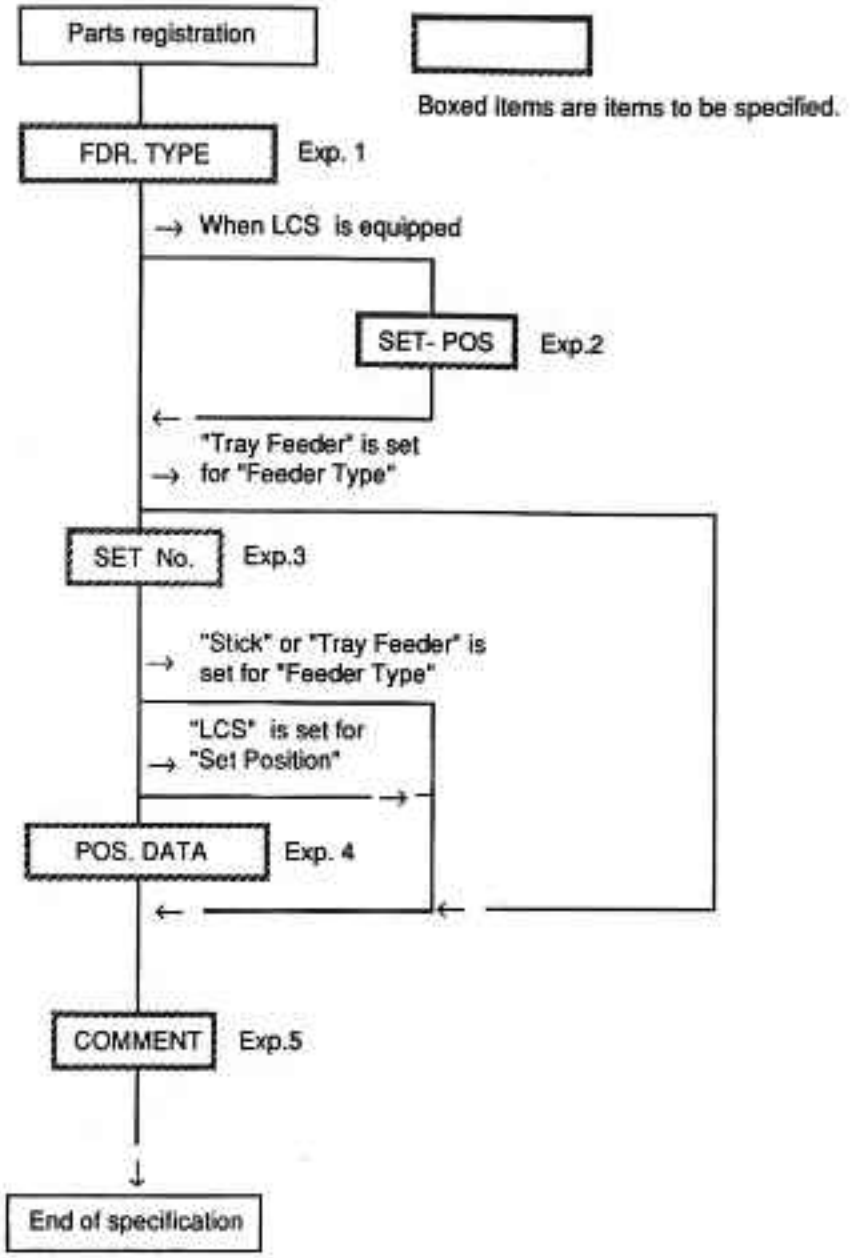


Fig. 4-20. Parts Registration Screen Flow

[Exp. 10] TRAY SIZE XY
"Tray size" means how many rows and how many columns of parts can be lined up on the tray feeder. For example, "5 4" would be input for the tray pictured below.

[Exp. 11] PARTS PITCH XY
"Parts pitch" refers to the amount of space between one row of parts and the next, in the XY directions. For the tray below, these values would be: dX, dY.

[Exp. 12] ACCESS POINT
When parts are supplied from trays, the parts are removed from the tray sequentially, in order. This "Pickup start" item indicates from which column and row the current part is being picked up.
When the tray is full, "Pickup start" is set to 0 0, in order to start supplying parts from Column 1, Row 1. The sequence then travels as shown below, first in the Y direction, then up one column in the X direction and across in the Y direction until all of the parts in that column have been removed. The pickup start value changes each time a part is picked up, always indicating from which position the before part had be picked up. The user can also use ten-key input to have pickup start from any desired point.

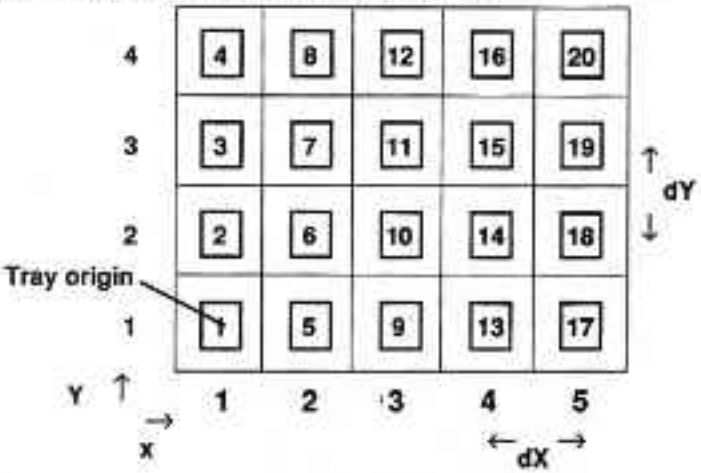


Fig. 4-24.
Tray Feeder

NOTE

The tray origin is set as part position :1 , 1.

[Exp. 13] STACKER NO.
With this surface mounter, various supply device options are available, including a "Manual tray feeder", a "triple pallet feeder (TTF)", and a "LCS". These devices can be used to stack multiple trays containing the same kind of parts. When one tray runs out of parts, that tray is stored away, and the next tray begins supplying immediately. The locations where trays are stored are differentiated by numbers. In this item, the user inputs the beginning and ending numbers for storing trays containing one kind of parts.

NOTE

Trays in the tray supply device should be used in sequence, with the smallest number first.

[Exp. 7] MECHANICAL ALIGNMENT
This is set when a mechanical alignment is used for parts centering. Two types of mechanical alignments can be used with the CSM, so specify which type is being used.No 1: small jaws, No 2: big jaws.

[Exp. 8] VISION FILE NO.
Specify the vision file number if a vision camera is being used for parts centering compensation. Use the arrow keys to select vision number (<---,--->).

[Exp. 9] USE MECHANICAL ALIGNMENT
This is displayed, and setting enabled, only if the mounter is equipped with both a mechanical alignment and vision board. The methods by which the mechanical alignment can be used when parts are mounted by the vision camera are described below:

Display message	Mechanical alignment use
NOT USE	Not used
AT RETRY	Used for retries if a vision error has been made
ALWAYS	Always used before the vision camera is used for viewing

The values specified here all concern tray feeders. They are divided generally into the following classifications:

(1) Tray size and interval placed between parts
(2) How trays are supplied
(3) Other information

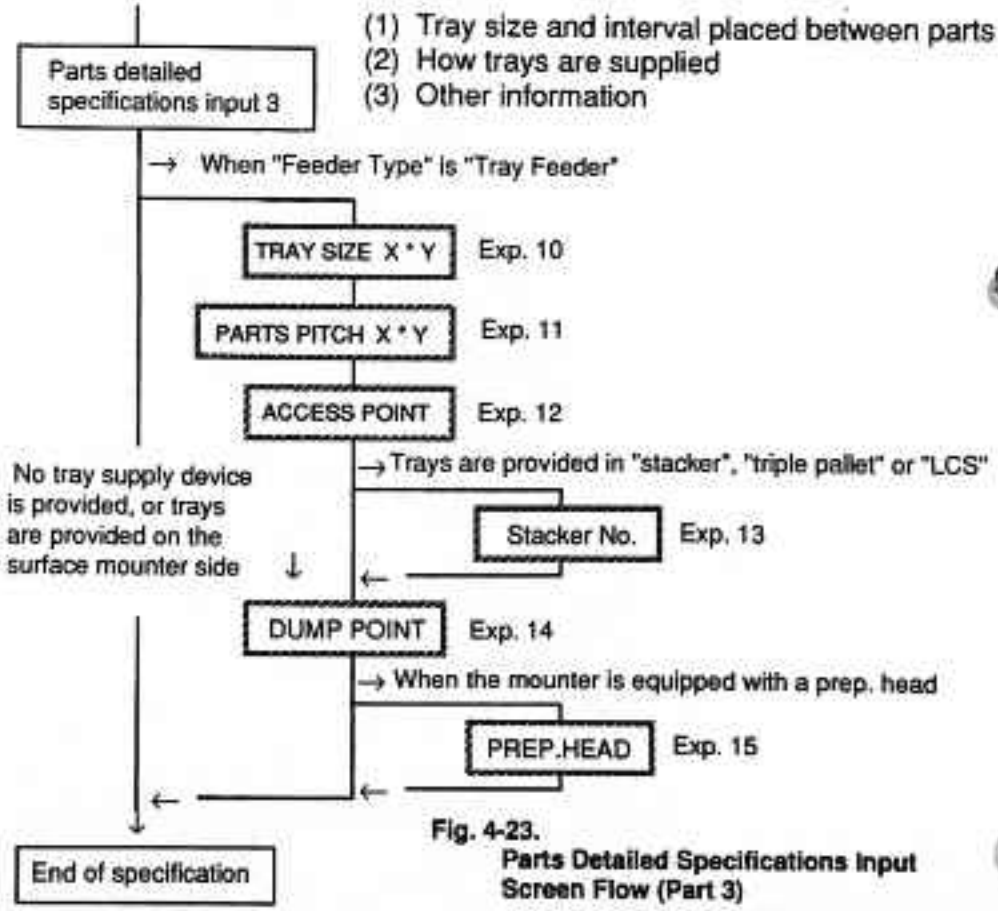


Fig. 4-23.
Parts Detailed Specifications Input Screen Flow (Part 3)

[Exp: 6] LOWER TIMER
This sets the amount of time for which the head stops at the descent end during mounting or picking. For ordinary light chips, this is set to 0. If parts are heavier, however, the timer should be set.
For mounting, this timer indicates the time between the vacuum sensor going off and the head ascend command being issued. For picking, it indicates the time between the vacuum sensor going on (at lowest vacuum level) and the head ascend command being issued.
Please use the following table as a reference.

Part type	Recommended timer
2.0 x 1.25 3.2 x 1.6 Mini-TR	0
SOP PLCC	0.10,0.15

4-6-3 Mechanical alignment specification

This is where the main data concerning the alignment of parts is specified. Ordinary chip parts are centered by the chuck of the head, but no chucking mechanism is provided with ANE and vision ANE heads. This is why this specification is necessary.

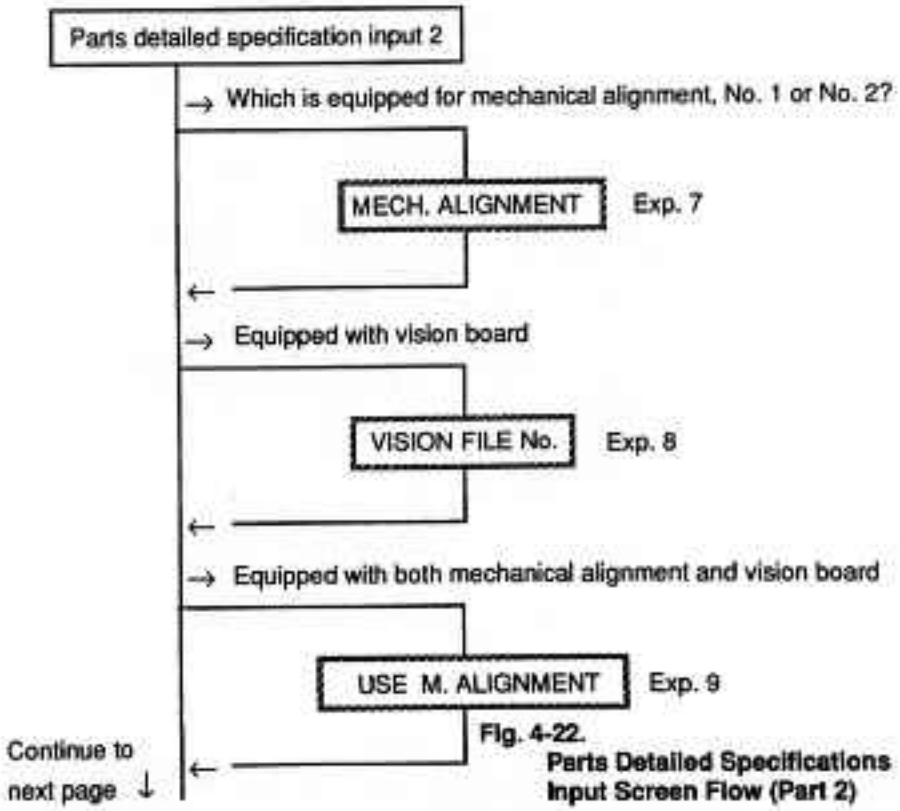
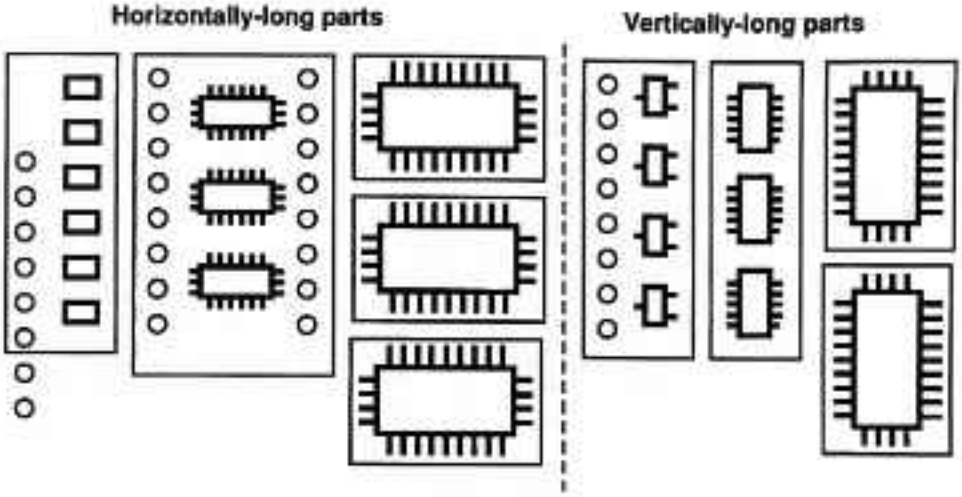


Fig. 4-22. Parts Detailed Specifications Input Screen Flow (Part 2)

[Exp. 3] PICKING ANGLE
For this item, input the rotation angle of the chuck when the head approaches to pick up parts from the feeder. This value is determined by the orientation of the part in the supply device (feeder). The unit of specification is [deg]. The picking angle is related to the machine origin (absolute angle method).
Usually, for parts that are shaped with a long horizontal edge (left figure below), the pickup angle is 0.00 degrees, while for parts with a long vertical edge (right figure below), the pickup angle is 90.00 degrees.

NOTE

Heads which use the chuck to perform centering have a directional bias which must also be specified. If this setting is erroneous, the part will not be gripped correctly by the chuck, resulting in poor mounting precision and outright picking errors.



[Exp. 4] PUSH COUNT
Parts are fed from tape or stick feeders on this mounter by the ratchet being fed as the head moves up and down in picking. Ratchet feeding may be required 2 or 3 times, depending on the type of feeder. The number of feeds is specified here.

[Exp. 5] CHECK LEVEL
The pickup mounting check is carried out by a vacuum sensor. Up to 3 stages for the check level can be specified for one head. This item is used to specify which level will be used for each part.

Display message	Check content
NO CHECK	Vacuum check not carried out.
LOW	1L volume used for vacuum check (MELF, etc.)
MDL.	1M volume used for vacuum check
HI.	1H volume used for vacuum check (1206, etc.)

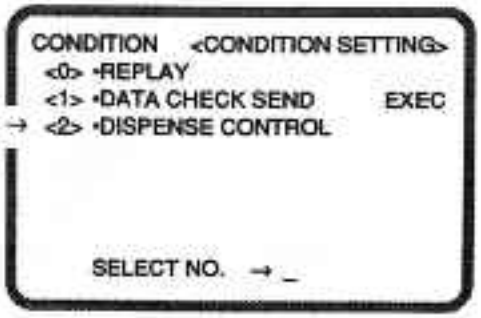
4-7-2 Stabilizing the discharge for the dispensing head

(1) Description of the function

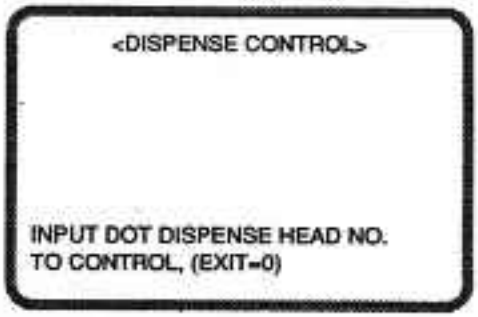
The function of stabilizing the discharge for the dispensing head can only be used with dot dispensing, and not with line dispensing. The amount of adhesive dispensed is controlled by factors such as temperature, positive and negative discharge pressure, and discharge time. Because of the nature and number of factors involved, it is very difficult to control the dispensing amount precisely. This function is used to compensate for the problem of the dispensing amount being reduced as the volume of air in the syringe increases (the volume of adhesive diminishes).

(2) How the function is used

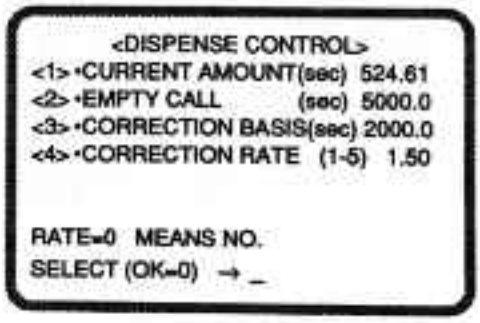
1) Setting "JOB CONDITION" in RUN MODE 1 and then pressing the RUN key produces the screen shown at the right. On this screen, select "DISPENSE CONTROL".



2) The screen changes to that shown at the right. Input the number of the dot dispensing head to which control is to be applied.



3) This produces the screen at the right. There are four items to be set on this screen. Set values for each of them in order. The four items are explained on the following page.
When the discharge stabilizing function is not being used, set item <4>, "CORRECTION RATE", to 0.



4-7 Functions of the 00DS Program Specification Mounter

Normally, mounting and dispensing operations are handled through programs contained in the ROM1 inside the controller. The ROM1 also houses the programs used to run various other functions, this is indicated by the ROM notation: 00SM, 00DS or 00PP. When using the 00DS rom, following features are possible:

(1) Synchronized picking function for the R—DC mounting heads
(2) Discharge stabilizing function for the dispensing head
(3) Dispense feedback system (**only** for High Speed Dispenser Systems)

When the RUN key is pressed on the Run Screen, the version number of the COMMON program is displayed on the CRT. Check the version number (VER: ROM1=ROM-00DS-***). See also par. 1-1-4.

NOTE

When the 00DS program is being used however, a number of functions like, auto tray stacker (ATS), triple tray feeders(TTF), LCS and Vision system cannot be used.

4-7-1 Synchronized picking of the R—DC mounting heads

Synchronized picking is initiated automatically when the following conditions are fulfilled.

(1) The mounting data is organized (order of picking and mounting) in any of the following sequences:
Head 1 → Head 2 → Head 3
Head 1 → Head 2
Head 1 → Head 3
Head 2 → Head 3

(2) The picking positions for the feeders used in synchronized picking are:
X: within 0.3 mm
Y: within 0.3 mm
R: within 10°

(3) The three rules listed below must be followed.
Rule 1: Vision heads and precision heads cannot be included in synchronized picking operations.
Rule 2: Parts whose picking position is not set to "Auto Set" cannot be included in synchronized picking operations.
Rule 3: Feeders with two or more pushes cannot be included in synchronized picking operations.

NOTE

Depending on the circumstances, if there are parts to which synchronized picking is not to be applied, set those parts to "Teaching", so that synchronized picking will not be initiated, in keeping with Rule 2. (Continuous picking will be implemented instead.)

CSM 84VZ only

[EXP..19] : COMPONENT HEIGHT

This specifies the height of the vision head when the component is **mounted.** This is used for "soft landing" of the component since the height of the component is taken into consideration. If the value is 0.00 (this is also the initial value), the Z-OFFSET value (see section 4-4-3) will then automatically be used as the picking coordinates (the Z-OFFSET value is the value at which the PCB surface and the underside of the nozzle first come in contact). (See Figure 4-4-1)

CSM 84VZ only

[EXP. 20] : PUSH ROD

This specifies whether the push rod will be used or not when picking a component. This is displayed only when TRAY FDR. is selected as the feeder in the COMPONENT setting. NOT USE should generally be set when using tray feeders (manual tray, tripple tray, LCS). This saves cycle time and enhances system performance.

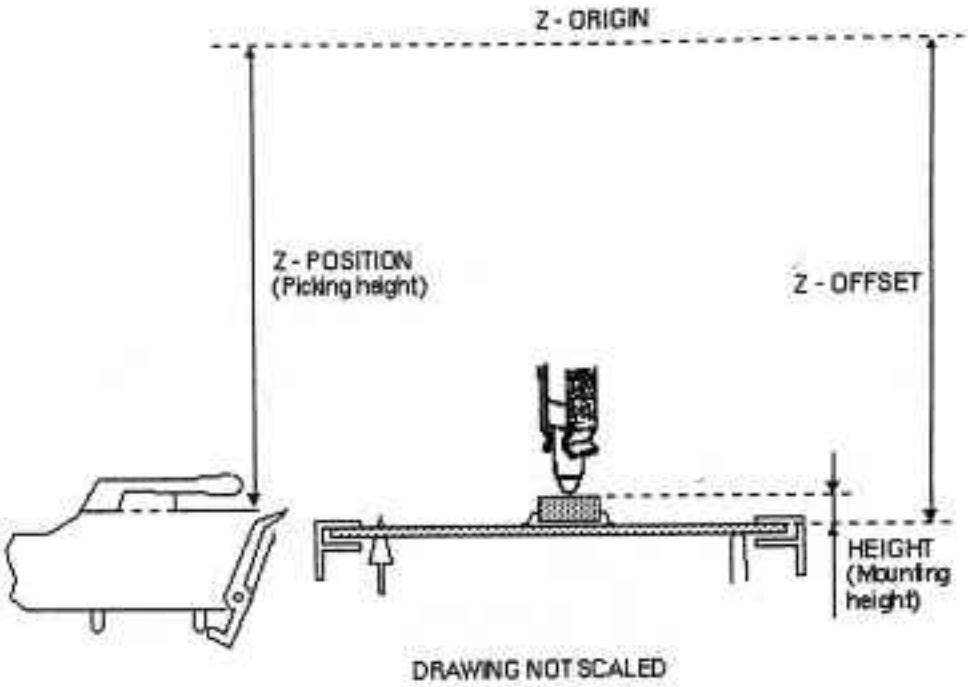


Fig. 4-4-1

[EXP. 21] : RETRY

In the DATA IN-SYSTEM-PARAMETER-COUNTER menu the number of retries is defined (see section 4-4-5). In case of component picking it determines how many retries should be performed before an error message is shown on the screen. Some application, however, do not allow retries for certain special feeder types. In this case the RETRY parameter can be set to' NO' and the system will report an error immediately after the first pick. If the normal retry count value must be used, this parameter should be set to 'YES'.

Note: This function is only available in firmware version 066 and higher.

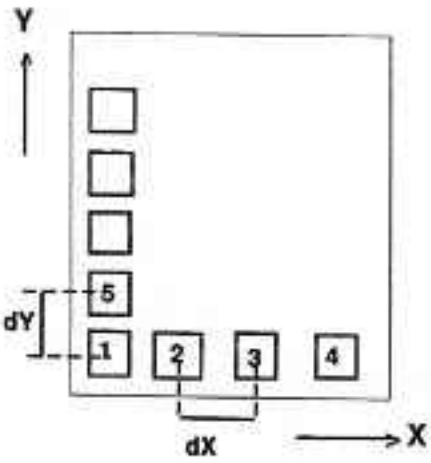
[Exp. 14] DUMP POINT
If an picking error occurs with respect to the parts on a tray, the part is discarded. This item specifies the location where the part will be discarded, and is set as shown below.

Display message	Discard position
STANDARD	Ordinary discard position (see 4-4-2, Exp. 2)
TRAY BACK	Return to original tray

[Exp. 15] PREP. HEAD
This is displayed, and setting enabled, only if the mounter is equipped with a spare head. It is used to specify whether or not the spare head will be used when parts are picked up from trays.

[Exp. 16] UPDATE POINTER
This is displayed, and setting enabled, only if the mounter is equipped with a LCS. It is used to specify whether or not the LCS pick up access point and tray access NO. resetting [Exp. 12] &[Exp. 17] value at data transmission to LCS

[Exp. 17] ACCESS STACKER
This is displayed, and setting enabled, only if the mounter is equipped with a tray feeder (without manual tray). It is used to specify which NO. of tray will be used (current tray NO.) when parts are picked up from trays.



With the LCS, the machine moves first in the X+ direction and when all parts are picked up in the X direction it shifts to the Y direction.

LCS -tray

It is also possible to declare a tray build-up out of a number of the same stick-feeders. Make sure to place the stick feeders next to each other so the distance between them is the same. The parts pitch is in this case: dX,0. The TRAY-ORIGIN is the pick-up position of the stick feeder which is closest to the machine origin.

<2-3> Condition for production

The DISPENSE FEEDBACK system need s:

"Dispensing dot which can be recognized by the vision system"
" A Vision file for dispensing dot "

[DISPENSING DOT RECOGNITION]

Set vision file NO.30 before you enter the CALIB - DISPENSING DOT RECOGNITION utility .

```
MODE      :BINARY
```

Set OBJECT,BINARY,FILL,CUT functions for easy recognition .\

For example ...
AMICON co.,

```
OBJECT   :WHITE
BINARY   :AUTO
FILL     :3
CUT      :2
```

4-7-3 Dispense Feedback System

NOTE: *The dispense feedback system can only be used on HSD (High Speed Dispenser) systems. This section describes briefly the dispense feedback system. For full explanation on this subject, please refer to the HSD Operating Manual:* ***4822 871 60622***

Instead of a DISPENSE CONTROL system, where a dispense timer correction curve was used, a new DISPENSE FEEDBACK system is developed in combination with the vision system.

<1-2> Condition of DISPENSE FEEDBACK system.

The DISPENSE FEEDBACK system requires the following machine and software versions:

"Machine with vision system"
"ROM1 with DS type and after a version E55 or higher"
"ROM2 with after V3.68"
"I/O board with 1.02 version or higher"
"STANDARD VISION board, version 4.07 or higher"

<2> DISPENSE FEEDBACK system.

<2-1> EFFECT OF DISPENSE FEEDBACK system

DISPENSE FEEDBACK in automatic operation flow is
pre-dispense -> glue dot recognition (with the moving camera) -> line dispense -> dot dispense -> mount

The DISPENSE FEEDBACK system will work with pre-dispense and dot dispense and can also be used with line-dispense .

<2-2> USAGE of the DISPENSE FEEDBACK mode.

If the CSM is specified with a vision system and a dispense head, the parameter "VISION" will be shown in PRE-DISPENSE (DATA-IN-PCB PRE-DISPENSE). When this parameter is set to "VISION=USE" then the machine recognizes dots by the vision moving camera after pre-dispense and calculates then the amount of each dot and corrects the dispense timer.

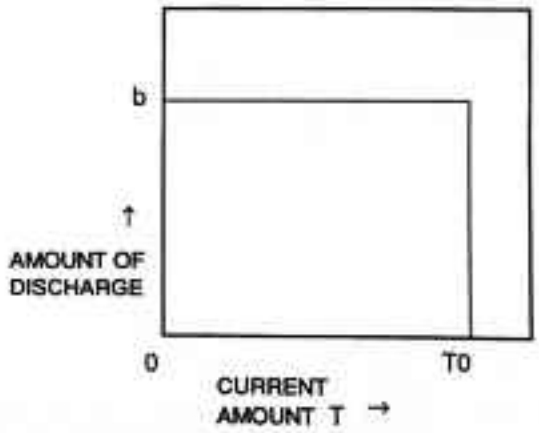
CAUTION!!

1. Set vision window for all dots , which is selected by "VISION = USE", so all dots can be recognized by the vision moving camera .
2. Set the dot position for all dots , so the vision camera moves the center of all selected dots .
3. The DISPENSE FEEDBACK system corrects every PCBs, but the 1st. PCB may be less due to a not optimal feedback . At the time , please flow some PCBs as test dispensing before production .

```
MOUNT          :SKIP
PRE DISPENSE   :EXEC
DOT DISPENSE   :SKIP
LINE DISPENSE  :SKIP
```

e..Determining the values for T, T0, Ta, and b/a
Actually, the relation between amount and time should be determined as shown in the figure above for the adhesive being used in mounting. However, the following methods can also be used to determine values.

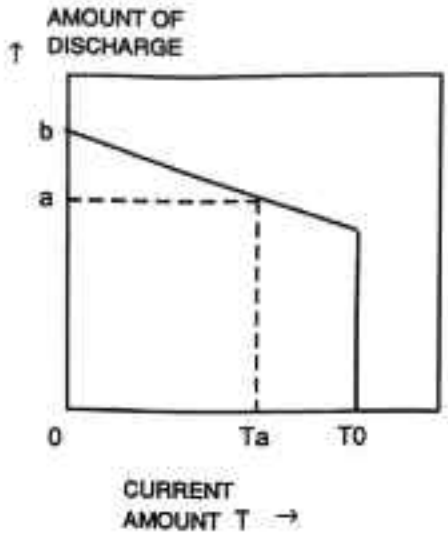
(1) Since the maximum capacity of the syringe is 10 cc, fill the syringe with 10 cc of adhesive and fit it to the dispensing head.
(2) The value for T should initially be set to 0.
(3) The value for T0 and Ta is 30000.0.
(4) The value for b/a is 1.
(5) Set the adhesive dispensing time (timer) to 20 ms for the time being.
(6) Put 10 cc of adhesive in the syringe, and begin discharging (start punching dots). Check the size of the dots after the first 10 dots or so have been dispensed.
(7) When about 1-2 cc of adhesive is left in the syringe, press the STOP key to halt the machine (this can be done at any point). Check the size of the dots at that point. Change (lengthen) the discharge timer so that the dots will be about the same size as those in step (6). For example, if dots of about the same size can be obtained at 40 ms, the value for the CORRECTION RATE b/a will be 40 ms/20 ms = 2.
(8) With conditions set as in (7), check the value of the CURRENT AMOUNT T on the screen (see page 3-117), and set that value as the value for Ta.
(9) Next, continue dispensing dots until the syringe is empty. Then press the STOP key, check the value for the CURRENT AMOUNT T (see page 3-117), and set that value as the value for T0.
Values have now been determined for T0, Ta, and b/a. Fill the syringe again with 10 cc of adhesive, set the value for T to 0, and begin working.
(10) After the values above have been set, the ideal relationship between the various factors looks like that shown below.



NOTE

If there is sediment or drainage on the inside of the nozzle hole, it will be impossible to correct as explained above. Always make sure the nozzle is thoroughly cleaned when work is ended (especially the inside of the hole).

a. CURRENT AMOUNT T (sec)
The figure at the right shows the relationship between the dispensing time and the amount of discharge when adhesive was dispensed without the stabilizing function being used. The longer the dispensing time, the more the amount of dots being dispensed diminishes. The CURRENT AMOUNT T is an integrated value showing the total amount of time that the head has been dispensing. If dispensing is continued until the syringe is completely empty, Empty Call T0 = T.
When the syringe is refilled with adhesive, the CURRENT AMOUNT should be reset to 0.



b. EMPTY CALL T0 (sec)
As explained above, the value for T0 is the CURRENT AMOUNT up to the point where the syringe is empty.

c. CORRECTION BASIS Ta (sec)
In the figure at the upper right, the discharge amount per shot decreases by an amount of b-a during the time Ta passed from the start of dispensing. Consequently, at a given CURRENT AMOUNT Ta, the discharge amount will have decreased by a in relation to the initial amount b. By discharging b/a times, discharge can be continued at the same level as the initial conditions.
This given point, the CURRENT AMOUNT Ta, is called the "CORRECTION BASIS".

d. CORRECTION RATE b/a
As explained above, the discharge ratio of b/a, by which the discharge amount will be returned to the initial level at point Ta, is called the "correction gradient".

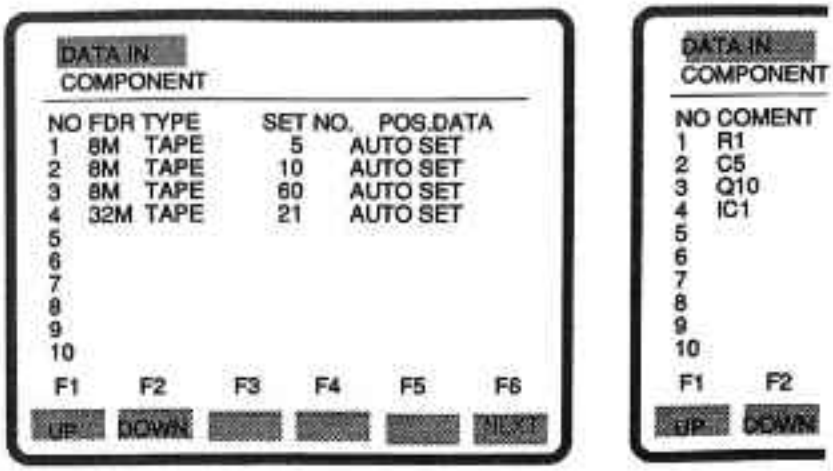


Fig. 5-3. Parts Registration Results

Here, the four types of components have been registered as registration numbers 1-4. These registration numbers will be referred to in creating the mount point data.
The above registration numbers extend from 1 to 120, and parts may be registered under any number. Comments do not have to be input unless necessary.

5-2-2 Detailed specifications

When parts registration has been finished, detailed specifications are input for each registered part. The results are shown in Figs. 5-4 to 5-7.

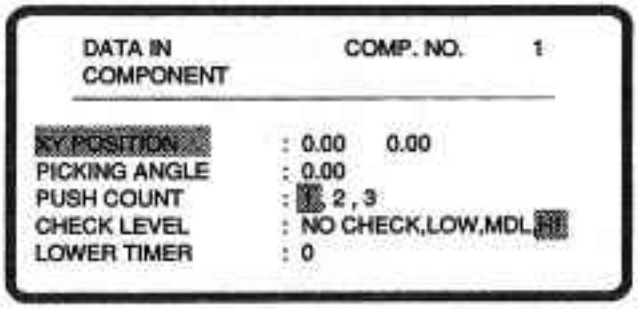


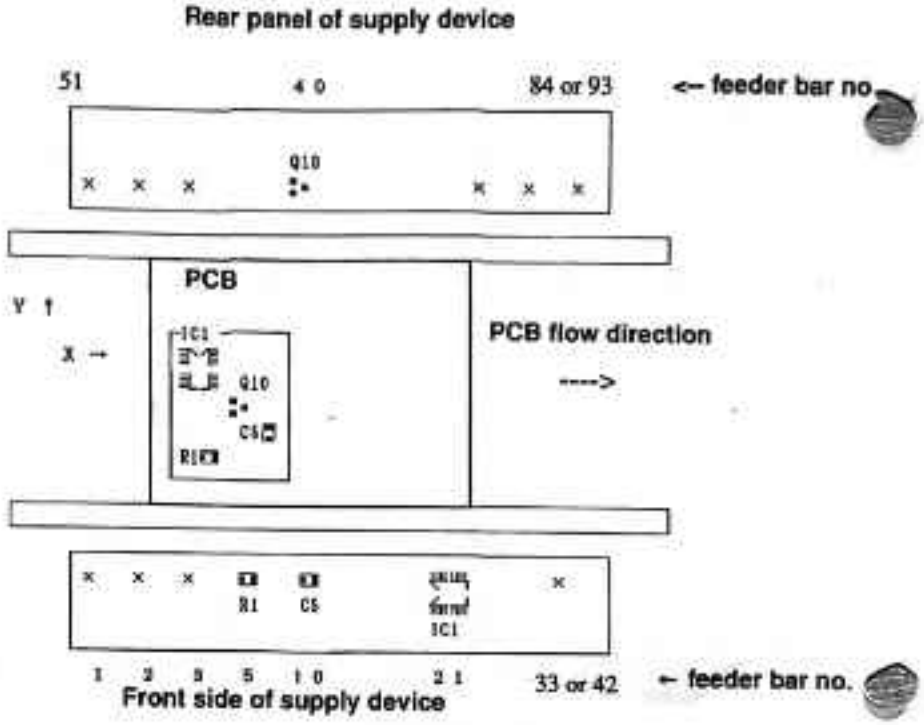
Fig. 5-4. R 1 Resistor Specifications

5-2 Creating Parts Data

Let's create the data relating to parts.

5-2-1 Parts registration

First, determine the types of feeders from which the four types of parts will be supplied, and how the feeder plates are to be organized, and register this data. In this example, the data has been determined as follows.



Part name	Feeder used	Plate no.
R 1 Resistor	8mm tape	5
C 5 Capacitor	8mm tape	10
Q10 Transistor	8mm tape	40 or 60
IC1 SOIC	32mm tape	21

Fig. 5-2. Parts Arrangement

Registering the parts according to the above data gives the results shown in Fig. 5-3.

Suppose we have a PCB that looks like the one in Fig. 5-1. There are four of these PCBs.

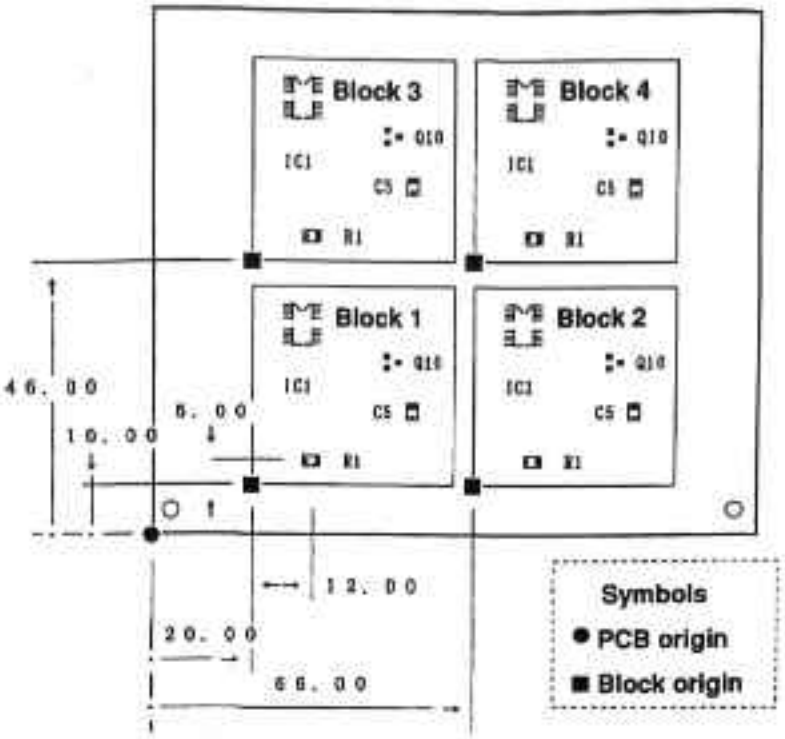


Fig. 5-1. Mounting PCB

The names of the components to be mounted in one block, and the coordinate data, is as described below. The coordinate data in this case indicates the distance from the block origin.

Part name	Coordinate data (mm)	
	X	Y
R 1 Resistor	12.00	5.00
C 5 Capacitor	31.00	19.00
Q10 Transistor	27.50	33.00
IC1 SOIC	10.00	40.50

SECTION 5 Creating Actual Data

5-1 Introduction

In this section, we will look at an actual example of the data necessary for a mounting operation. The system configuration specifications used in this example are all commonly-used settings. Let's imagine that the specifications look like the screen below.

DATA IN
SYSTEM MACHINE CONFIG.

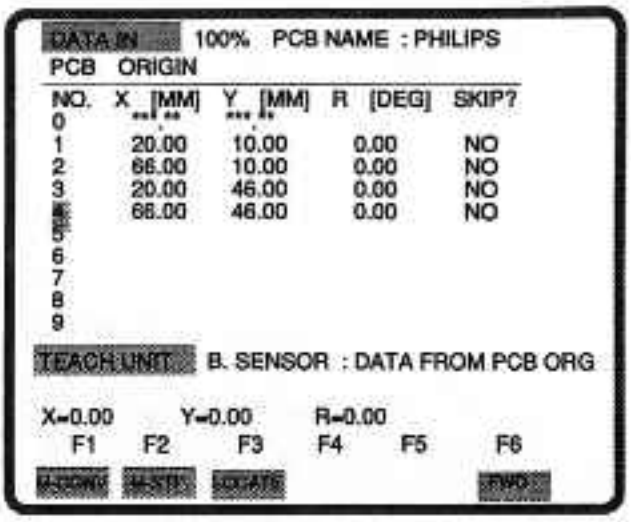
CMU MODE	:ONLINE,OFFLINE
TEACH INPUT	:1POINT, 2POINT
MOUNT ATTRIBUTE	:REL,ABS
BAD MARK DATUM	:PCB ORG, BLOCK ORG
HEAD1 SPEC.	:STANDARD
HEAD2 SPEC.	:IC
HEAD3 SPEC.	:DOT-DISPENSER
BEAM SENSER	:NO,YES
PREP. HEAD	:NO,YES
CONVEYOR SPEC.	:LINE,LETURN,MANUAL
EDGE CLAMP	:NO,YES
SUB-STOPPER	:NO,YES
M.CENTERING 1	:NO,YES
M.CENTERING 2	:NO,YES
NOZZLE STATION	:NO,YES
TRAY HANDLING	:NO

As explained in the section on machine configuration, the mounter is equipped with the heads listed below.

Head 1 Standard head, straight arm chuck
Head 2 Standard head, bend arm chuck (for ICs)
Head 3 Standard dispenser head

In this example an CSM84 machine (no vision) is used.

[Inputting the Block Origin]
The block origin can be input using either teaching input or ten-key (keys 0-9) input. In the example in Fig. 5-1, all of the dimensions have already been obtained, so ten-key input can be used. The XY data of the block origin shows the distance from the PCB origin to the origin of each block. For Fig. 5-1, the results are as shown below. Work is carried out on blocks in the order in which the block origins were input. In this case, the sequence will be lower left, lower right, upper left, upper right.



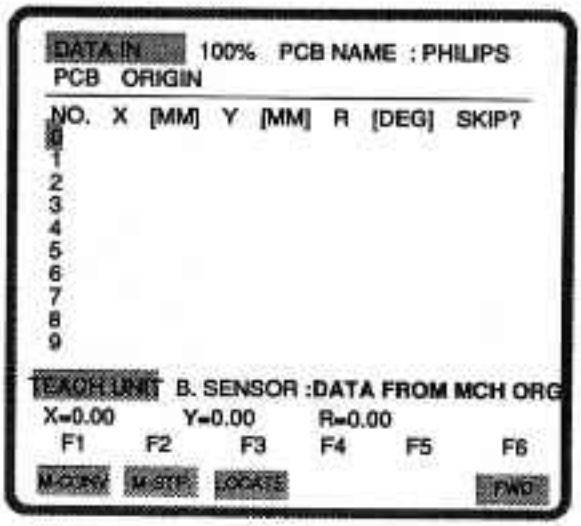
NOTE

As shown above, fill in the block origin data one after another, with no blank numbers in between. If a number is skipped, operation will not continue to the blocks after the skipped number, but will stop at the last block before the skip.

5-3-2 Creating origin data

Now we will create the PCB origin and block origin data.

[Inputting the PCB Origin]
Teaching input is used to enter the PCB origin. **Make sure a return to origin has been carried out,** and then use manual operation to fix the working position of the PCB.
In Fig. 5-1, the black dot (●) indicates the PCB origin. Teach this point with the teaching unit and input the coordinate values as Origin Point No. 0. The teaching unit is the device displayed next to the "TEACH UNIT" item on the origin point input screen (in this case, a beam sensor).

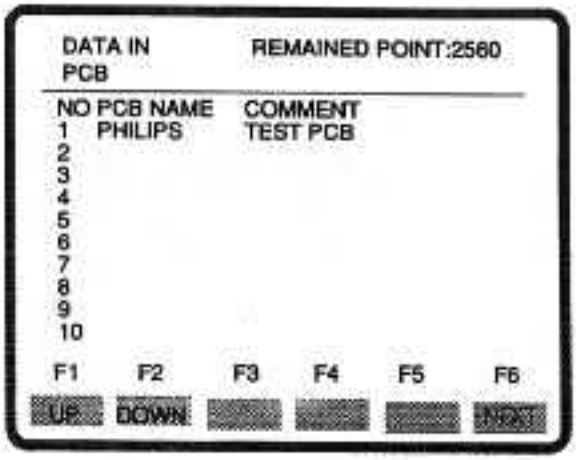


5-3 Creating PCB Data

Now we will create the PCB data, for information regarding data input operations.

5-3-1 PCB registration

Here we register the PCB type. It is generally easiest to understand if PCBs are registered by model or type.
In this case, the PCB has been registered under the name "PHILIPS".



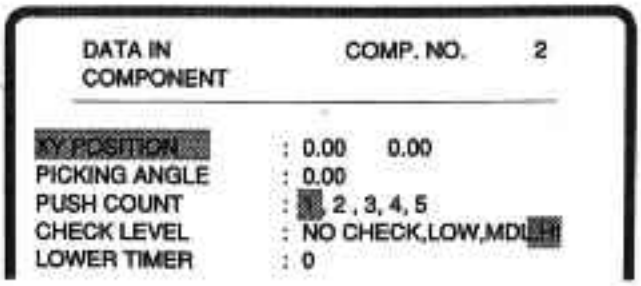
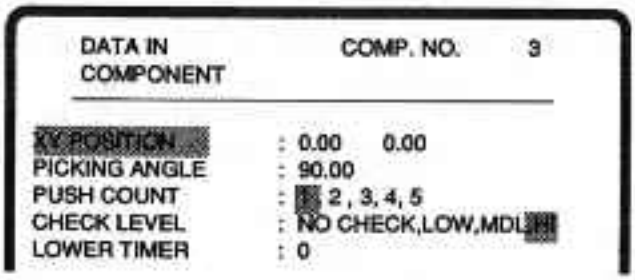


Fig. 5-5. C 5 Capacitor Specifications



This is set to 90.00 because the transistor is oriented vertically.

Fig. 5-6. Q10 Transistor Specifications

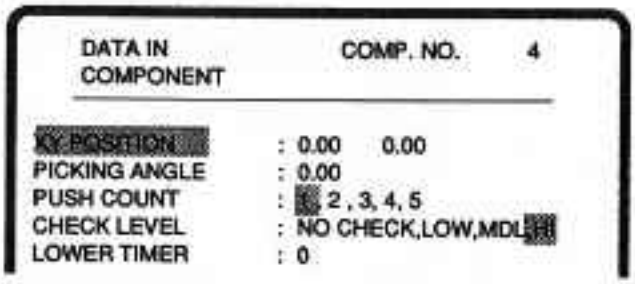


Fig. 5-7. IC1SOIC Specifications

[Exp. 1]
The angle specified here will be the value indicating how many degrees the part must be rotated for mounting, depending on the orientation of the part when it is supplied from the feeder (see Fig. 5-2). Seen from above, counter-clockwise rotation is the + direction. For example, IC1 should be rotated 90 degrees in the clockwise direction after being supplied from the feeder, in order to be positioned properly for mounting. This is done by inputting a value of -90.00.

NOTE

As shown in the above example, fill in mount point data consecutively, without skipping any numbers. If a number is skipped, operation stops at the last number before the skipped line.

5-3-6 Creating data through teaching

Up to this point, we have explained how to input data when the coordinate values for mounting parts on the PCB were already known. Now, however, we will look at how to create data when the coordinate values are not known.

[Origin Point]
As explained previously, the PCB origin is entered by teaching input to origin point No. 0. When this PCB origin point has been input, the values input through teaching for the block origin points starting from No. 1 are calculated automatically to be the distance from the origin point to the block origin.
Using the teaching unit displayed on the screen, input the ■ mark for each block by teaching.

NOTE

If you try to input block origin points starting from No. 1 without already having input the PCB origin point in No. 0, the error message "76: INPUT ORIGIN POINT" will be displayed, and input will be inhibited.

[Other Points]
When teaching pre-dispense, dot dispense, and mount dispense points, always teach the point on the block indicated as the No. 1 of the block origin. When the PCB origin point and No. 1 block point have been input, values input to these other points through teaching will be automatically calculated as the distance from the No. 1 block origin point.

NOTE

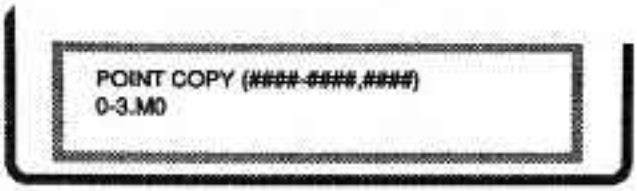
If you try to input these points through teaching without having already input the PCB origin point and No. 1 block origin, the error message "76: INPUT ORIGIN POINT" will be displayed, and input will be inhibited.

5-3-5 Creating mount point data

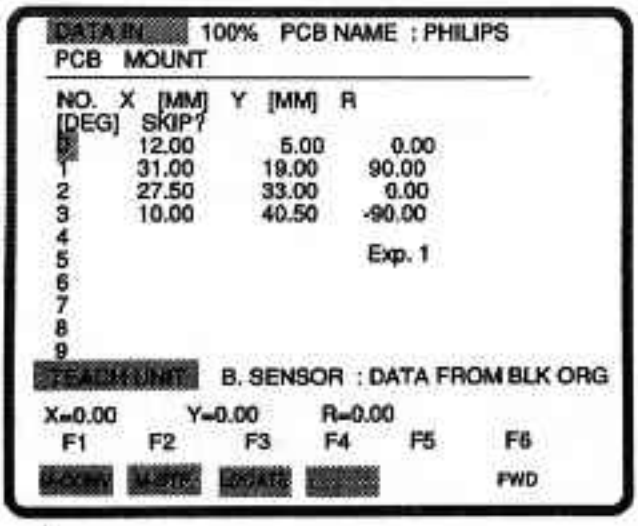
The registration numbers of parts and the heads used for mounting are shown in the table below.

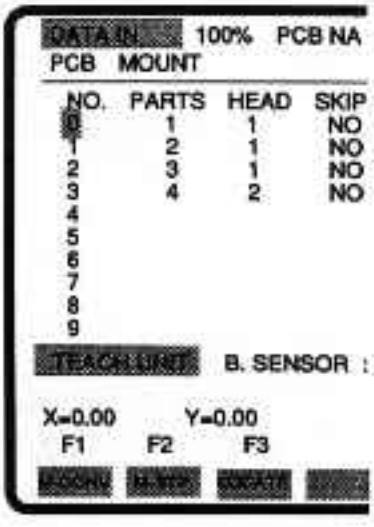
Part name	Parts registration no.	No. of head used
R 1 Resistor	1	1
C 5 Capacitor	2	1
Q10 Transistor	3	1
IC1 SOIC	4	2

The XY coordinates for the mount points are the same as those input previously for the dot dispense point data. Dot dispense point numbers 0-3 can simply be copied and used as the mount point data, starting with No. 0.
In this case, the "COPY" key was pressed on the dot dispense point screen, and the data input as shown below.



When the copy procedure is finished, only the XY data is copied as mount point data. Any other required information is then input, resulting in the following:





5-3-4 Creating dot dispense point data

The nozzle used with the dot dispenser is normally a standard 2-point nozzle. The head rotation indication and application conditions when this type of nozzle is used are as shown in Fig. 5-9

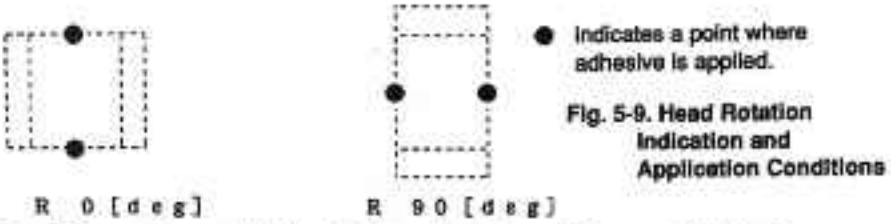
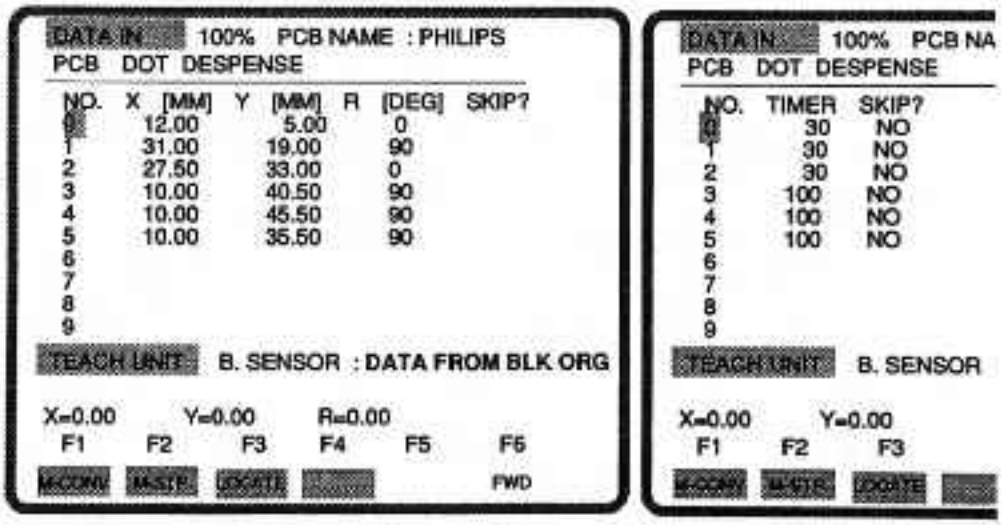


Fig. 5-9. Head Rotation Indication and Application Conditions

For IC1, as shown in Fig. 5-10, adhesive will be applied in 3 locations on each chip.

Fig. 5-10. Application Positions on IC1

When the dot dispense point data based on the above data is input, the results look like this:



NOTE

As shown in the above example, fill in dot (pre-) dispense point data consecutively, without skipping any numbers. If a number is skipped, application stops at the last number before the skipped line.

5-3-3 Creating pre-dispense point data

In order to stabilize the volume of adhesive material, the material is applied in advance to parts of the PCB which are not used in the work. In the example below, this is done at the five points marked with Xs.

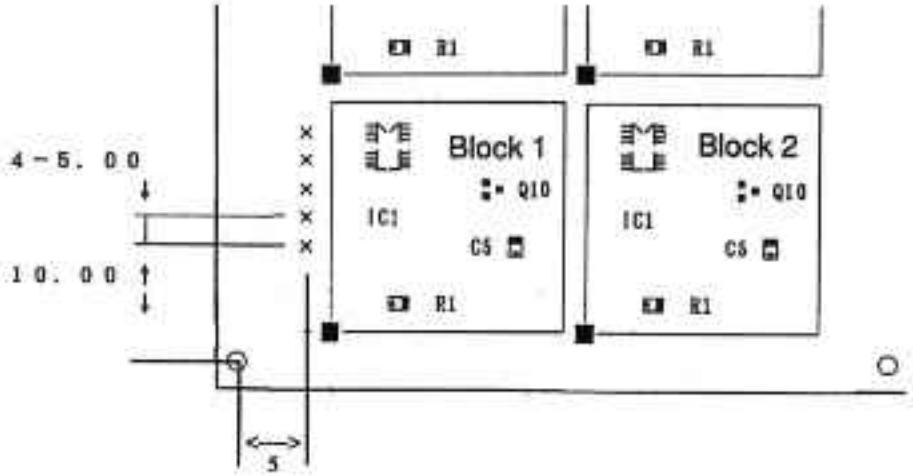


Fig. 5-8. Pre-dispense Positions

When pre-dispense point data based on the above data is input, the results are as shown below. In this case, there is only one dot dispense head, so it is not necessary to specify a head number.

DATA IN 100% PCB NAME : PHILIPS
PCB PRE. DESPENSE

NO.	X [MM]	Y [MM]	R [DEG]	SKIP?
0	-5.00	10.00	0	
1	-5.00	15.00	0	
2	-5.00	20.00	0	
3	-5.00	25.00	0	
4	-5.00	30.00	0	
5				
6				
7				
8				
9				

TEACH UNIT B. SENSOR : DATA FROM PCB ORG

X=0.00 Y=0.00 R=0.00
F1 F2 F3 F4 F5 F6
M.CONV M.STP LOCATE FWD

DATA IN 100% PCB NA
PCB PRE. DESPENSE

NO.	TIMER	SKIP?
0	100	NO
1	100	NO
2	100	NO
3	100	NO
4	100	NO
5		
6		
7		
8		
9		

TEACH UNIT B. SENSOR

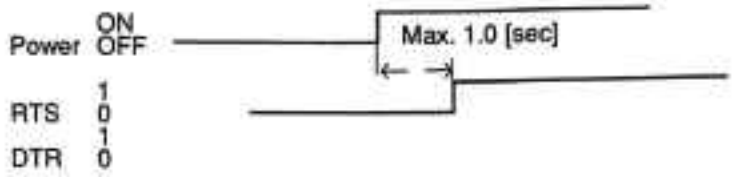
X=0.00 Y=0.00
F1 F2 F3
M.CONV M.STP LOCATE

NOTE

Keep in mind that the pre-dispense coordinates (X,Y) data is measured from PCB origin and not from BLOCK origin !!

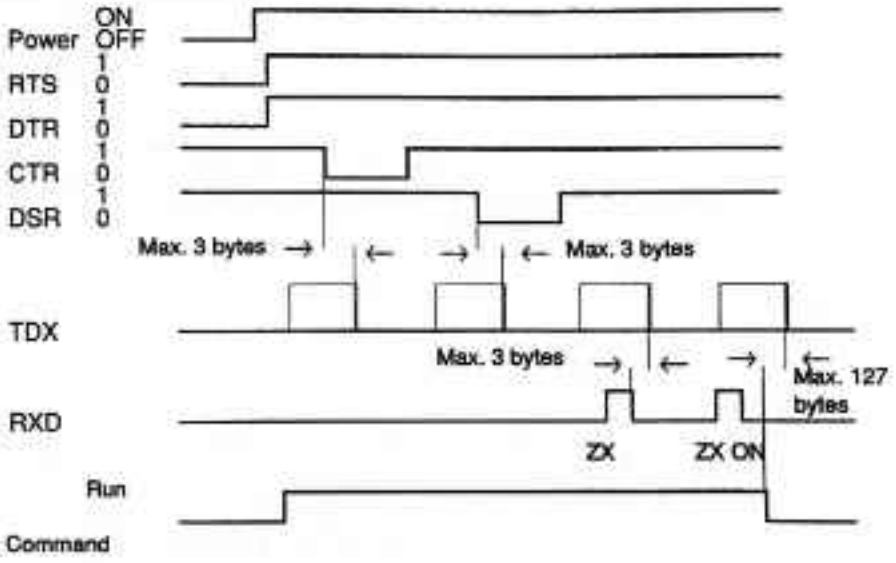
[Exp. 2]
The timing chart for XON/XOFF control is as shown below.

POWER ON



(1) RTS and DTR become active within 1.0 seconds after power goes on, following which RTS remains in that status until power is turned off. When DTR becomes active, the communications port simultaneously enters Data Reception Enabled status.

Mounter Transmission



(1) Data is transmitted when CTS and DTR are "1". If either one becomes "0", theCSM stops transmitting within 3 bytes.
(2) When XON/XOFF control is used, theCSM stops transmitting within 3 bytes after receiving XOFF (=13H). When XON (=11H) is received, the CSM resumes transmission.
(3) When the transmission command is finished, any data remaining in the 127 bytes of the transmission buffer is transmitted.

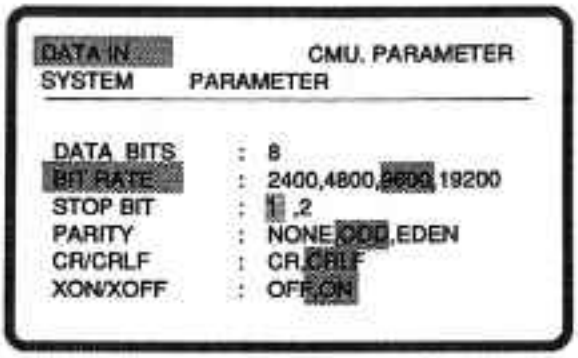
6-4 Transmission Methods and Communications Parameters

The various transmission methods and communications parameters are shown below.

Transmission method	Full binary
Synchronizing method	Start/stop synchronization
Baud rate	2400, 4800, 9600, 19200 [bps] (selectable)
Character length	8 bits (fixed)
Stop bit length	1 or 2 bits (selectable)
Parity	None, odd, even (selectable)
Busy control on control path	Yes (DTR used for reception, CTS, DTR check for transmission)
XON/XOFF control	Yes or no (selectable) (XON=11H, XOFF=13H)
Reception buffer	255 bytes
Transmission buffer	127 bytes

6-5 Setting Communications Parameters

On the setting screen, data input, parameters, and communications parameters can be selected. For whichever item is selected, the appropriate input screen will be displayed.



NOTE

Always make sure the same communications specifications are set for both the CSM and the external device parameters. Changing the communications parameters initializes the communications port. If this happens, any existing errors relating to communications are cleared, as is the reception buffer. The system then enters Reception Enabled status.

[Exp. 1]
This shows how CR/CRLF codes are handled in terms of LF codes (=OAH).

Display message	When mounter is transmitting	When mounter is receiving
CR	Only the CR code (=0DH) is added at the end of the line.	Data up to the CR code is treated as one line.
CRLF	An LF code (0AH) is always added after a CR code.	Data up to the CR code is treated as one line, and the LF code is ignored.

6-2 Connector

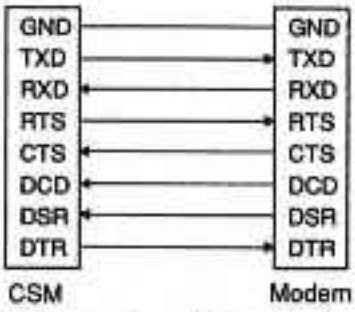
Connect the cable used for RS-232C communications to the "HOST" connector on the front panel of the CSM, where a receptacle is provided for connection to an external device.
The connector pin assignment is shown below.

Pin No.	Name	Meaning	Input/Output
2	TXD	TRANSMIT DATA	FROM CSM
3	RXD	RECEIVE DATA	TO CSM
4	RTS	REQUEST TO SEND	FROM CSM
5	CTS	CLEAR TO SEND	TO CSM
6	DSR	DATA SET READY	TO CSM
7	GND	SIGNAL GROUND	
8	DCD	DATA CARRTER READY	TO CSM
20	DTR	DATA TRANSMISSION READY	FROM CSM

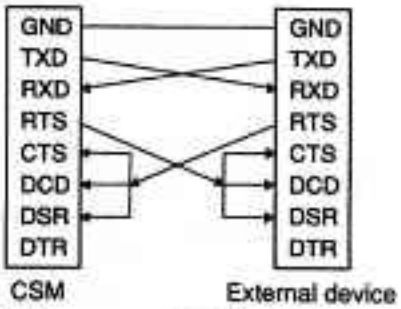
6-3 Connection Examples

When an RS-232C cable is used and the CSM is connected to an external device, the pin connections vary depending on the specifications of that particular device. Refer to the connection examples shown below when making connections.

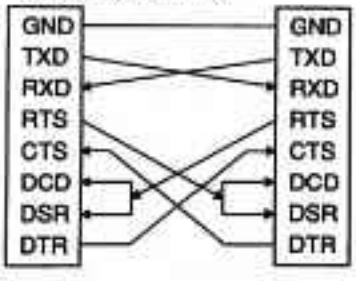
(1) Connecting to a modem



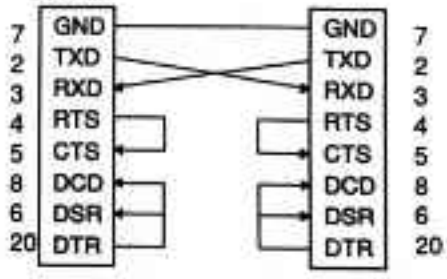
(2) When simply checking with RTS signal whether communication is open



(3) When using DTR signal for busy control



(4) When no control line is used at all



NOTE

DCD input is not used with the mounter.

SECTION 6 RS-232C Interface

6-1 An Overview

This section explains communications functions between the surface mounter and external devices. By "external devices", we mean any device equipped with an RS-232C interface. The mounter and external device are connected by means of an RS-232C serial line (explained later). When the "Communications" item in the machine configuration data is set to "Online", the mounter is able to receive and transmit data. In this status, the mounter can receive commands (online commands) from an external source.

7-2 Vision File Setting and Adjustment

7-2-1 Introduction

In order to use the vision system which identifies PCB fiducial marks and QFP-type components for the CSM84V, it is necessary to set up a vision file (VFILE). The VFILE is initially set prior to shipping, **but a new setting must be established if:**

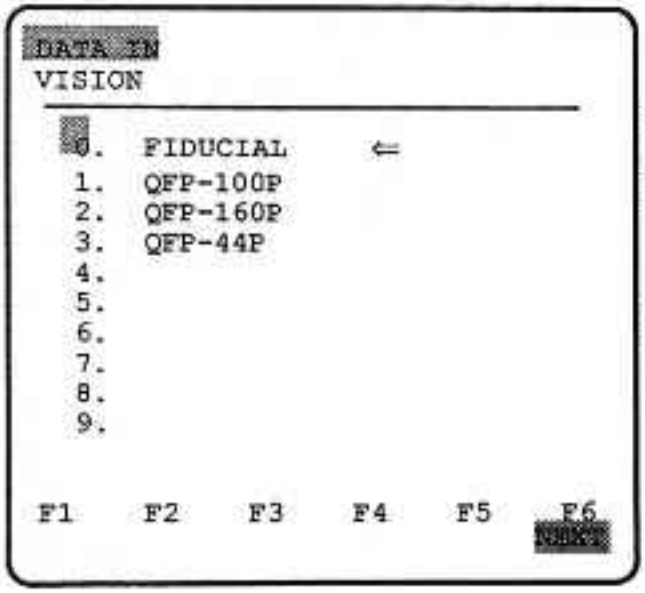
1) a new part is to be mounted,
2) the unit is moved,
3) a camera or head has been removed or readjusted.

Please refer to the section called "Vision Mode" (Section 7-3) for more details regarding vision system functions and vision mode operation. This section will deal mainly with the procedures for setting and adjustment of the VFILE used with the fixed and movable cameras which identify PCB fiducial marks and QFP-type components.

A total of 31 files can be set in the VFILE, and these can be specified for recognition of fudicials, components, bad marks or dispense dots. For example, if one file is used for fudicial recognition and the remaining 29 for components recognition, the recognition feature can extend to include 29 different types of components with different shapes.
Remark: - It is of course possible to define more then one fiducial file.
- The vision file no. 30 is always defined for dispense glue dot recognition.

Setting and adjustment must always be done after the CSM84V has been positioned for operation. This position must be checked with a level, and fixed securely in place with adjuster bolts. Only after finishing of the installation of the system, calibration of the vision system can start. Also, the head height adjustment should be completed prior to any operations. If the unit is moved or the height of the head is changed, the position of the fixed camera and heads may shift slightly, requiring a recalibration.

Shown below is the initial screen for vision mode. (Pressing MAIN->DATA IN ->VISION will change to vision mode.)



To access screen f7-1-1 from the main menu,MAIN MENU → 3 → 3.

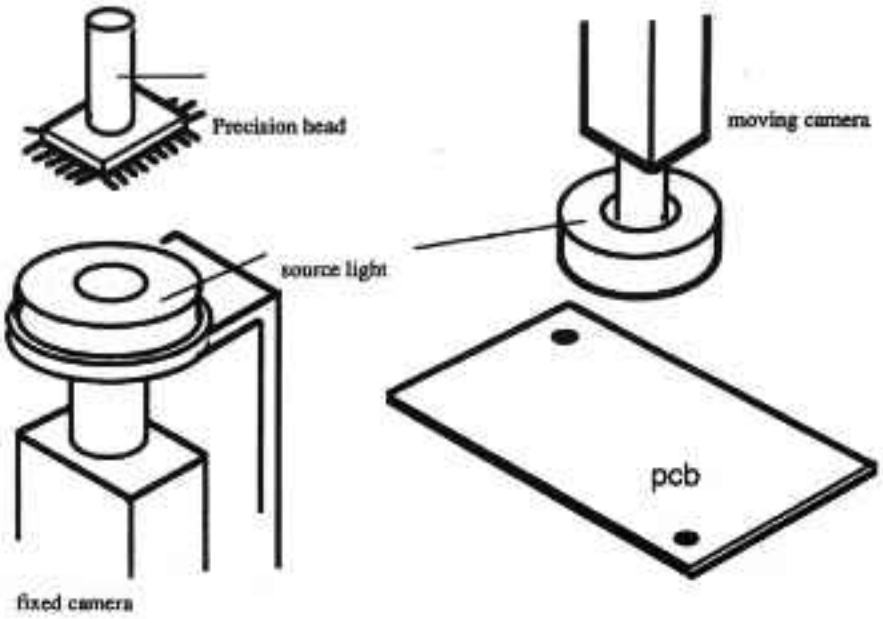
The highlighted vision file is the selected file.

f7-1-1

SECTION 7 : STANDARD VISION SYSTEM

7-1 GENERAL

The CSM84V is equipped with 2 (or 3) CCD cameras and a vision system to provide precision mounting of PLCC, SO, Chip and QFP-type components. This vision system (which we will call "the system") receives and processes images from the CCD cameras and distinguishes the volume specified for the unit being mounted. Because this system uses language extended from the robot controller, it can identify the shape and position of an object. This allows it to control the robot (i.e. mechanical section of the CSM).



In the vision system, a camera attached to the CSM arm **reads the pair of fiducial marks on the printed circuit board,** and **calculates how much offset/ rotation** is present in the PCB pattern.
In addition, another camera attached to the stand takes a **reading of the component which the head has picked up,** and **calculates how far off-centre** (from the centre of the head) it is. Compensation for these two calculations is then loaded into the mount data. By means of these corrections it is possible to align very precisely when mounting components.

It is necessary to preset a vision file (VFILE) for the system to be used properly. The new "vision mode" has been incorporated into the VFILE operations. A VFILE can be considered one kind of data storage facility for the processing of images in the system. The VFILE is set initially prior to shipping of the machine, but when new types of components are to be mounted, or if the machine is being moved (or if a head or a camera is removed), a new VFILE setting must be entered. **The VFILE can hold 31 file settings altogether, and these are used for recognition of fiducials, components, gluedots and bad mark sensors.** The **scaling and shift coordinates** for the image processing methods, conditions, windows, and the vision coordinate systems for the cameras **have to be set for each of the files.**

Section 2 covers in detail vision-related items which must be adjusted by the user. Section 3 discusses the general content of the vision system, as well as details relating to image processing methods and parameters, and the specific operations involved.

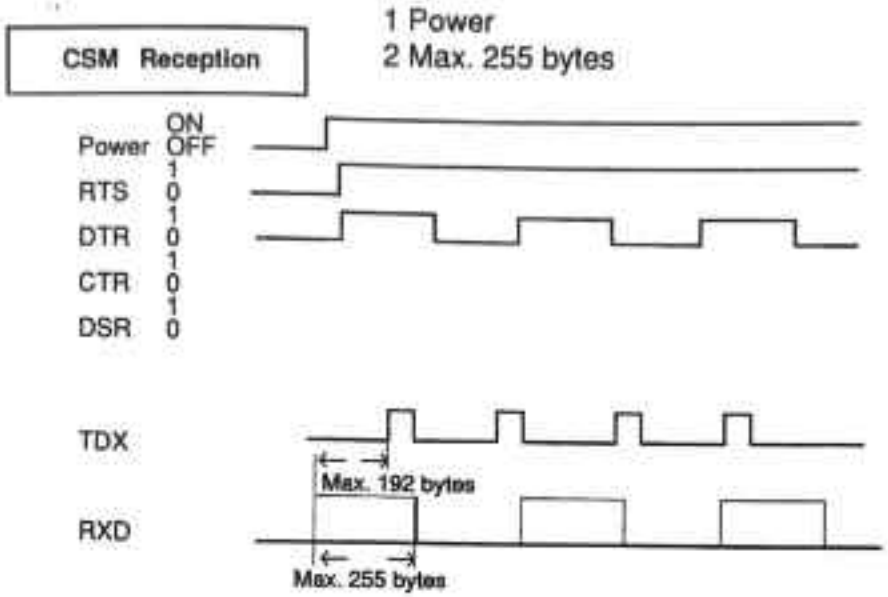
(3) When the CSM is transmitting, transmission begins after all of the data has been written to the transmission buffer. If no external device is connected, or if it is not yet in "Ready" status, the data is held in the transmission buffer. If this condition lasts longer than 5 seconds, the error message "126: Communications Off" is displayed.
If this happens, either make sure the external device is ready to receive transmissions, or initialize the transmission buffer. The transmission buffer is initialized in the following circumstances:
1) The power is turned on.
2) The "RESET" key on the work conditions selection screen is pressed.

(4) If the external device is not equipped with busy or XON/XOFF control, requests for these processes cannot be made during transmission, and in some cases a transmission error may occur. If this happens, change the baud rate to lower the transmission speed.

6-7 Online Commands

Online commands enable imitated key operations from an external device (e.g. a Personal Computer) to be executed.

A detailed description of the on-line commands can be found in Chapter 9 - section 7, of the CSM Operating Manual.



(1) As soon as RTS and DTR become "1", reception is enabled on the CSM side. When 3/4 (192 bytes) of the reception buffer capacity (255 bytes total) has filled, DTR becomes "0", cutting off transmission from the external device. The CSM processes the data in the reception buffer and when the data in the buffer has dropped to 1/4 of the buffer capacity (64 bytes), DTR becomes "1" again and reception is enabled.

(2) When XON/XOFF control is being used, the CSM transmits XOFF and XON in sync with the "0" and "1" of the DTR.

6-6 Other Precautions

(1) As long as there is still room in the reception buffer, the CSM continues to be in Reception Enabled status. However, in the following circumstances, the reception buffer is initialized.
1) The power is turned on.
2) The "RESET" key on the work conditions selection screen is pressed.
3) The "Communications" parameter in the machine configuration data is changed.
4) The settings of the communications parameters are changed.

(2) When the power to the external device is turned on, unstable or corrupted data may be transmitted. If the power to the CSM is already on, this corrupted data is taken into the reception buffer, where it may cause a communications error. If this happens, initialize the reception buffer, using steps 1) or 2) of item (1) above.
This situation can be avoided by turning on the power to the CSM after the power to the external device has already been turned on.

7-2-2-1
Fiducial camera
Hardware
set-up

1) Fiducial camera lens magnification adjustment.

In figure 1 is shown how to set-up the **magnification** by adjusting the length of the lens tube. After adjustment secure the tube with the lock nut.

2) Focussing of fiducial camera.

Mount a test PCB in the CSM and make sure it is correctly fixed by the push-up and locate pins.Loosen the camera fixation bolts a little and look for a fiducial mark or QFP pattern on the screen and adjust the camera height so that an optimum sharp picture is obtained. Tighten the camera fixation bolts. See figure 2.

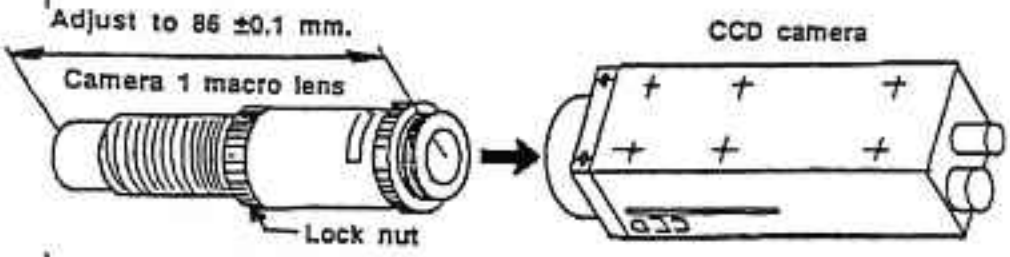


Figure 1

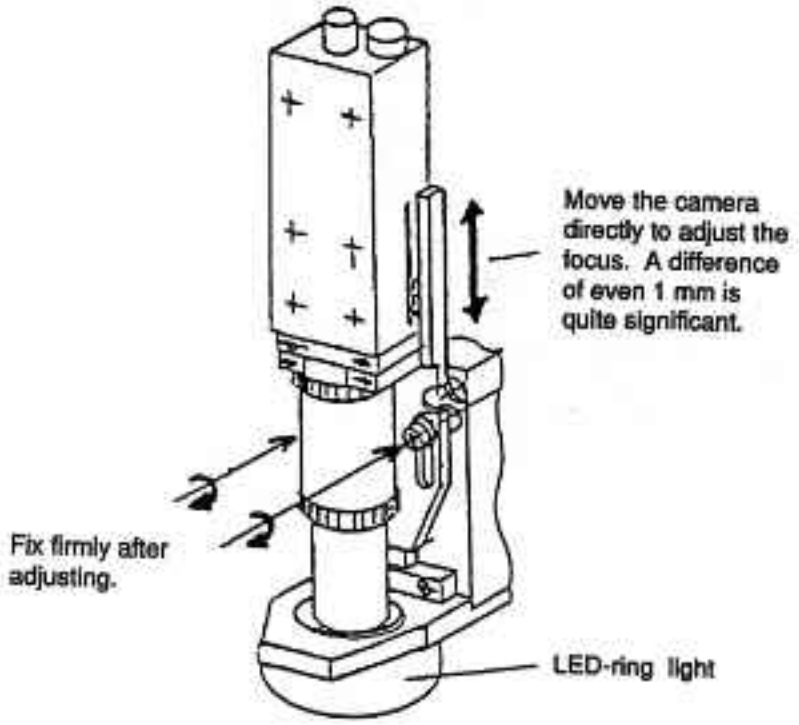
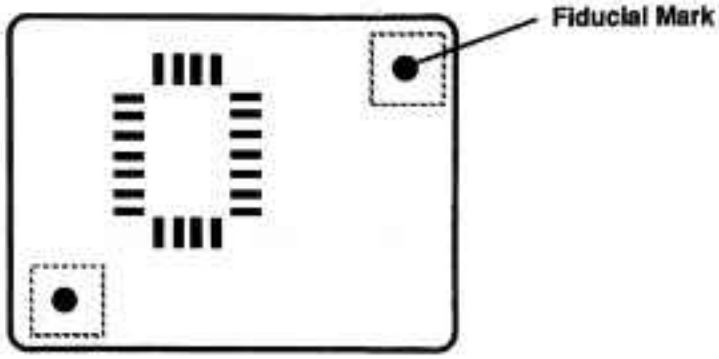


Figure 2

7-2-2-2
Fiducial camera software set-up and calibration

(1) Vision file for fiducials

The file number can be any file munber (0-29), but usually file 0. Basically, the file name is not important, but here the file used to align circuit boards will be called "FUDICIAL". In case of fiducial mark identification, binary image processing is used to find the center of gravity of the fiducial marks. This process is done at two locations to align the X,Y offset and the rotation of the pattern of the boards.



PCB

To create files, copy an already-existing PCB recognition file on the initial screen of the Vision Mode, and then correct only the components which are different.