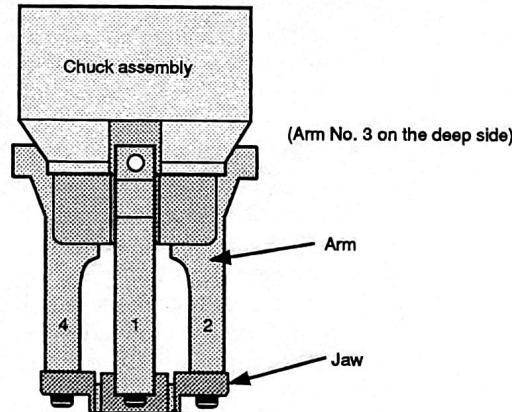


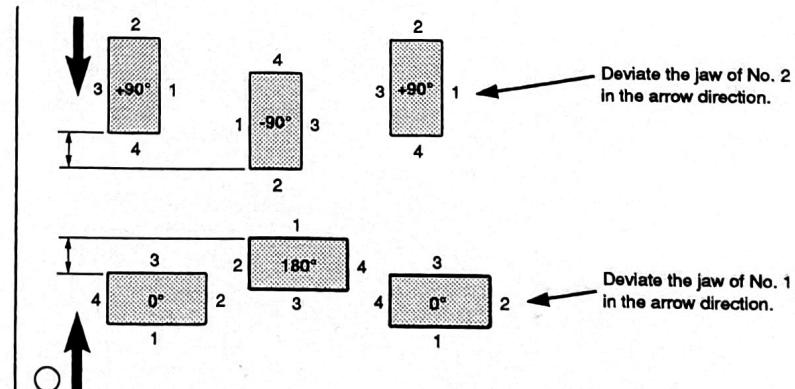
Adjustment of jaw with setup feed-back

No.	Adjusting procedure
4	If any electronic part is set up with the setup data of equal intervals of 0° and 180° (90° and -90°) and is alternately positioned as shown, it is necessary to finely adjust the jaw. If the deviation is not repetitive, adjust the other areas, and check them.
5	At a row of 0° and 180° in the figure, the jaws of Nos. 1 and 3 are deviated, and at a row of $+90^\circ$ and -90° , the jaws of Nos. 2 and 4 are deviated.
6	Until any difference is eliminated between row of 0° and 180° and row of $+90^\circ$ and -90° , repeat the adjustment to reposition the jaw little by little.

Fig. 6-33
Arm number



Deviation of jaws Nos. 2 and 4



Deviation of jaws Nos. 1 and 3

(1 thru 4 in the figure means the arm Nos.)

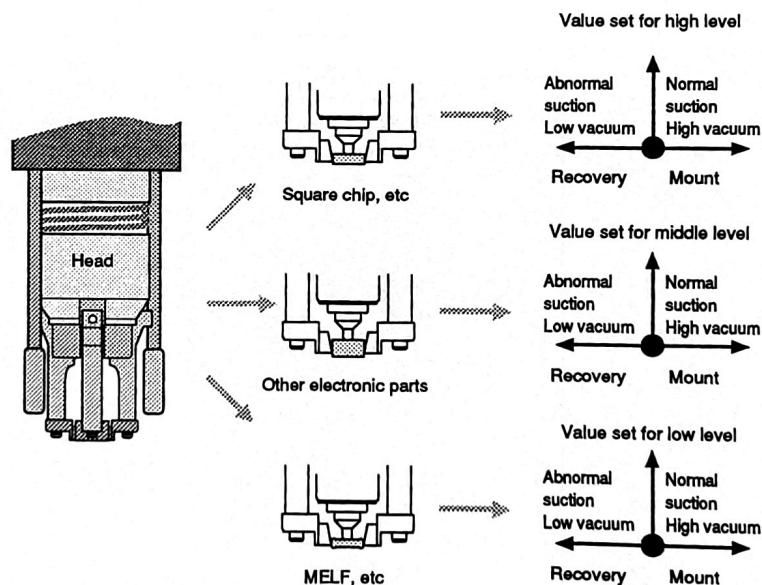
CAUTION !

If it is in strong contact with the nozzle or the jaw is at the elongated hole end, deviate the opposite jaw in the arrow direction.

5) Adjustment of 3-step vacuum sensor

If any electronic part is normally sucked by the nozzle of the head, the vacuum supplied by the vacuum pump will generate a high vacuum in the sensor section for normal operation. On the other hand, if any suction results from shortage of an electronic part, the vacuum sensor will detect it to execute the discarding operation (recovery). Even though any vacuum generated during suction of an electronic part is different depending on the kind of an electronic part, it will be judged according to the level of the electronic part when H (high), M (middle) or L (low) is set. The recovery will be done for improper catching and the mounting operation will be continued for proper catching. On the levels of the 3-step vacuum sensor installed on the head which sets up mainly a chip, H and L were factory-set for the chip (square chips 2123 and 3216) and MELF respectively, and M was done for the middle level at delivery.

Fig. 6-37
Levels of 3-step
vacuum sensor

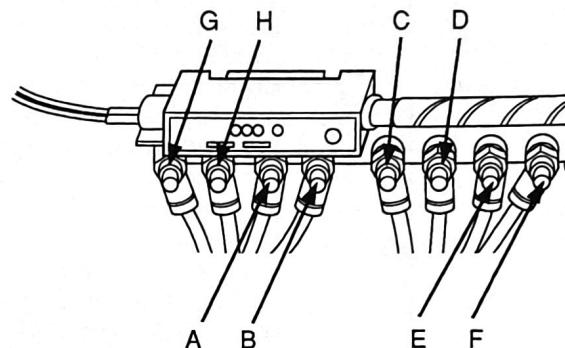


CAUTION !

Since the value set for low level is low, MELF or similar part which causes air leakage is sometimes regarded as normal suction, and is progressively mounted.

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Fig. 6-36
Speed controllers
of head section



- A: Descent of No. 1 head
- B: Ascent of No. 1 head
- C: Descent of No. 2 head
- D: Ascent of No. 2 head
- E: Descent of No. 3 head
 - (Descent of push rod of No. 3 head when Z axis head is provided)
- F: Descent of No. 3 head
 - (Ascent of push rod of No. 3 head when Z axis head is provided)
- G: No. 1 head $0^\circ \rightarrow 90^\circ$ rotation (when dispensing head is provided)
- H: No. 1 head $90^\circ \rightarrow 0^\circ$ rotation (when dispensing head is provided)

- 4) Adjustment of ascending and descending speeds see figures 6-35 and 6-36.

✖ DANGER !!!

⚠ WARNING !!

When adjusting the ascending and descending speeds, always be ready for pressing the emergency stop button.

If the ascending and descending speeds are excessively fast, it will give a shock to the electronic part and board, or the head itself will reduce its service life.

If the ascending and descending speeds are excessively slow, ascending and descending operation itself may be impossible or there is a danger that the feeder may collide with the head.

No.	Adjusting procedure
1	Since the descending and ascending operation of the nozzle is pneumatically driven, adjust the knob of the speed controller of the pneumatic system to gain a suitable ascending and descending speed.
2	On the manual screen, adjust the descending and ascending speed by pressing SHIFT key + A key for adjustment utility. This program is convenient for common use to adjust the elevation and rotation of the head and the speeds of the conveyor equipment (locator pin, push-up, etc) and other pneumatically driven sections. Referring to the messages of this program, input the data, and the area desired to be adjusted will operate the specified number of times. During this operation, adjust the elevation of the head by choking the speed controller in Fig. 6-36 in the following procedure.

- Reference for ascending speed of nozzle head
“The top surface of the plate stopper in the head section slightly collides with the lower side of the double nut for adjustment of the upper limit of the nozzle. This occurs at a rate of approx. 10 times per 50 times.”
- Reference for descending speed of nozzle head
“The bottom surface of the plate stopper in the head section slightly collides with the upper side of the double nut for adjustment of the upper limit of the nozzle. This occurs at a rate of approx. 10 times per 50 times.”

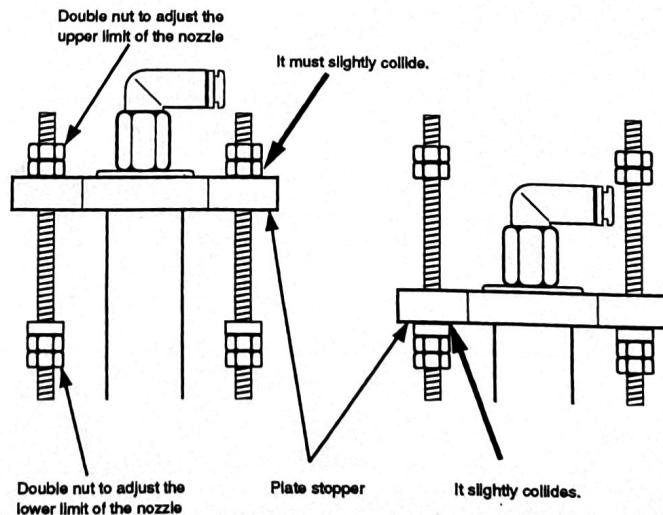


Fig. 6-35
Reference of elevation speed

C. Adjustment of suction level threshold value

No.	Adjusting procedure
1	As an example, it is assumed that the chip 2125 or MELF will be set up with No. 1 head. The vacuum sensor levels for electronic parts are as follows. 2125 > MELF (High level) (Low level)
2	Install the nozzle and jaw of type 2 on the No. 1 head, and press the key F3 on the manual screen to generate the vacuum.
3	Set the threshold value of the low level to approx. 5 to 10 higher than the suction level at which anything is not sucked.
4	Next, make the chip 2125 normally chuck (sucked), and set the high-level threshold value which is approx. 5 to 10 lower than the suction level. Make the chip 2125 improperly chuck (longitudinally, laterally and slantly chuck), and verify that HIGH level is turned to "OFF".
5	Though it is not always applicable since the electronic parts are considerably different in the shape, dimensions, material and so on depending on the maker, the threshold value of HIGH level is used for parts (2125, 3216 etc.) whose vacuum is considerably high, and that of LOW level is used for parts (MELF, etc.) in which vacuum pressure does not rise but leaks. Be sure to set the threshold value of MIDDLE level between the levels. Threshold values HIGH level > MIDDLE level > LOW level ← High vacuum pressure
6	Here, take sufficient care that every electronic part may be recovered or improperly set up if the adjusted state of the threshold value does not match the indication in the data. M or L level may be preferable when SOP is set up with type 8 or 9.
7	If any electronic part for which the vacuum sensor level is not known is present, use a suitable nozzle or jaw to try the suction and chucking. Thus, check which level becomes "ON" among three levels, and use the levels (H, M and L) as the data.
8	Since the vacuum sometimes varies owing to the clogged nozzle (water, oil or dust), be sure to wash the nozzle once per day. Take care that malfunction may result if it is turned "ON" though an electronic part is not sucked at the LOW level.

B. Suction level monitor

MANUAL	50%		
VACUUM LEVEL MONITOR			
HEAD NO.	1	2	3
HI	OFF	OFF	OFF
MDL	ON	OFF	OFF
LOW	ON	OFF	OFF
LEVEL	200	4	4
LEVEL BOADER IN	EDIT		
HEAD NO.	1	2	3
HI	230	235	225
MDL	180	185	175
LOW	130	135	125

[Exp. 1] 3-step suction level monitor

On the 3-step suction levels of each head, "OFF" will be displayed if the generated vacuum is lower than the set threshold value and "ON" will be displayed if it is higher.

[Exp. 2] 256-step suction level monitor

On each head, the generated vacuum is displayed in 256 steps.

[Exp. 3] Suction threshold value

On the 3-step suction levels of each head, the set threshold value is displayed.

The set value is changed in the following procedure.

No.	Adjusting procedure
1	With the arrow keys, position the cursor at a desired threshold value, and it will be displayed in the reverse mode.
2	Press EDIT key to select the EDIT mode. In the EDIT mode, "EDIT" will be displayed beside "threshold adjustment" notice.
3	Press the left or right key to change the threshold value. Press the ENTER key, and the current vacuum will be input in the 256-step suction level mode.
4	When it is completely changed, press the EDIT key again to cancel the EDIT mode, and "EDIT" display will go out.
5	To change another threshold value, repeat Steps 1 thru 4.
6	Press DI/DO key again, and it will be automatically stored into the floppy disk.

A. Offset adjustment of vacuum sensor

Though it is usually unnecessary to adjust the offset of vacuum sensor, proceed with the following procedure if the adjustment is necessary because of any reason.

No.	Adjusting procedure
1	Set the offset adjusting controller at the neutral position (center of turn).
2	Keeping the vacuum not generated, turn the controller counterclockwise to align the 256-step suction levels to the minimum value.

To display the suction level monitor screen, press "DISP" of the programmer, and press ROLL UP or ROLL DOWN key.

Fig. 6-38
3-step sensor
board

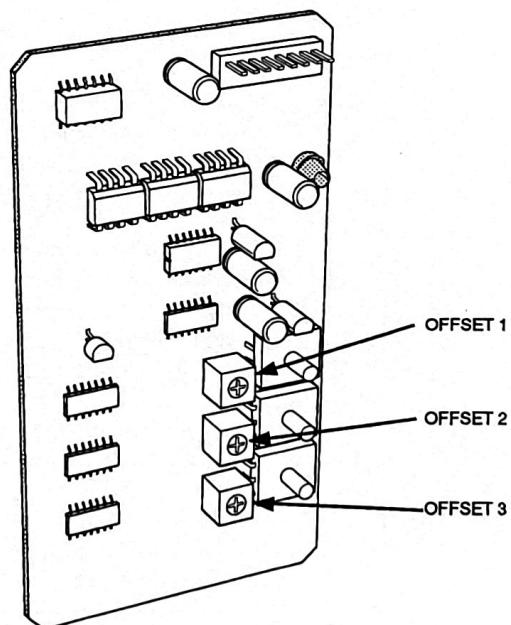


Table 6-39
Description of
controllers on the
3-step sensor

	Offset adjustment
No. 1 head	OFFSET 1
No. 2 head	OFFSET 2
No. 3 head	OFFSET 3

(4) Adjustment and replacement of vacuum generator

1) Adjustment of vacuum breakdown air

Adjust the flow rate and timer (blow-out time) of the vacuum breakdown air.

If the flow rate is excessive or the time set in the timer is excessively long, some part already set up may sometimes be blown off.

If the flow rate is excessively low or the time set in the timer is excessively short, some part already set up may sometimes be brought back.

No.	Adjusting procedure
1	<p>Turn the breakdown time adjusting screw on the rear side with a flat-bladed screwdriver to adjust the timer.</p> <p>As usual, it becomes stable approx. 0.5 to 1.0 second after it is turned 6 to 7 turns from the fully closed state.</p>
2	Loosen the lock of the breakdown air adjuster to adjust the flow rate. As the hole diameter of the nozzle is the smaller, accurately set the value.

CAUTION !

Before adjustment, clean the filter, nozzle or air passage.

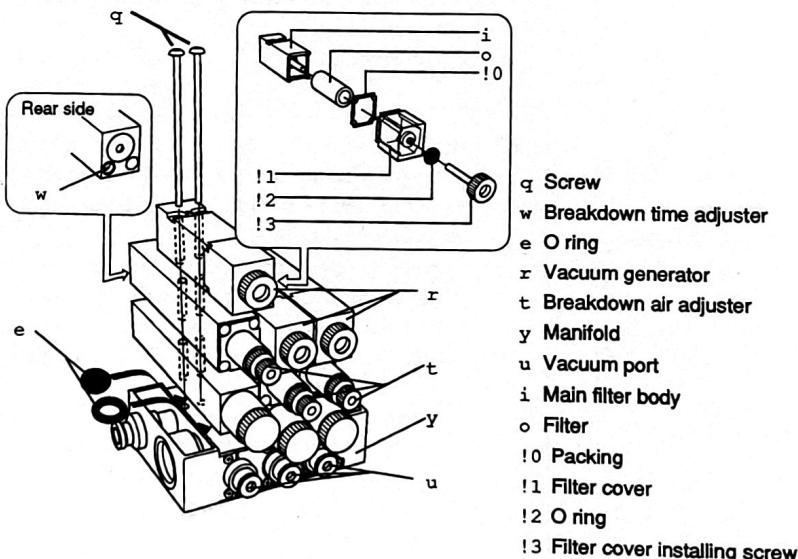


Fig. 6-40
Vacuum generator

(6) Adjustment of dispenser head

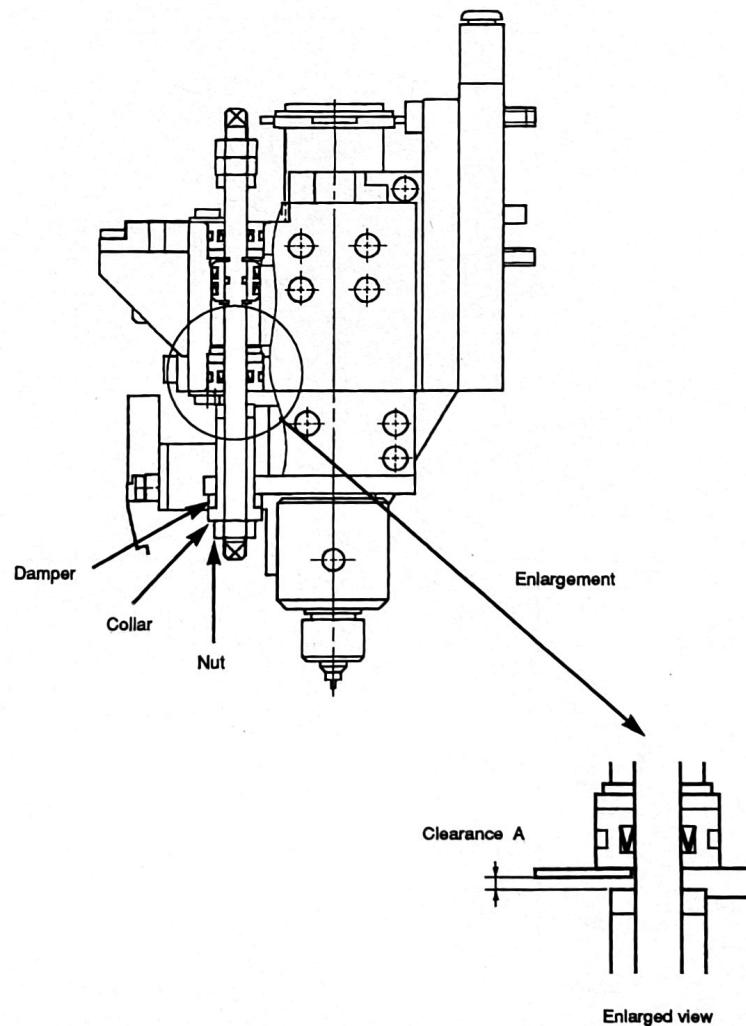
When the head is replaced or an error results from the insufficient error, the following adjustment is necessary.

- 1) Adjustment of upper limit of nozzle
- 2) Adjustment of lower limit of nozzle
- 3) Adjustment of nozzle turn angle (0° and 90°)
- 4) Adjustment of elevation and turn speeds

1) Adjustment of upper limit of nozzle

No.	Adjusting procedure
1	Loosen the nut.
2	The collar is threaded. Turn the collar to move the upper limit of the nozzle. As reference, adjust the clearance in the enlarged view to 0 to 3mm.

Fig. 6-42
Nozzle upper-limit
adjusting section

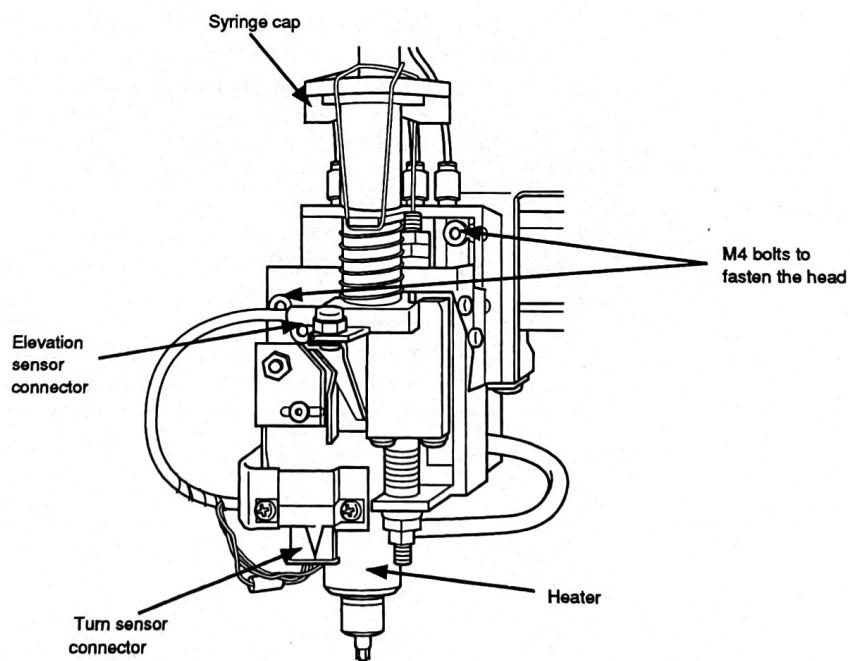


(5) Replacement of dispenser head

No.	Replacing procedure
1	Turn off the air and power supplies.
2	Disconnect all connectors of the elevation/turn sensors, heater cable and thermocoupler.
3	Remove the syringe cap of the dispenser head top from the main body.
4	The main body of the dispenser head is installed on the X axis with two M 4 bolts.
5	Press in the new dispenser head referring to the knock pin which is projected from the air adapter, and fasten the dispenser head with M4 bolts. Hereafter, reassemble the removed syringe cap and connectors.

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Fig. 6-41
Installation and
removal of dis-
penser head

**CAUTION !**

Don't forcibly insert the cable of the heater or thermocoupler into the sheet metal box to the deepest position. Or, there will be a possible danger that the dispenser head does not descend.

- 2) Replacement of vacuum generator (cleaning and replacement of air filter)

If any environmental dust or dirt is sucked by the vacuum generator, its performance will drop to adversely influence the suction operation of the head. In this case, clean or replace the air filter in the following procedure.

No.	Replacing procedure
1	Turn off the air and power supplies, and verify that the safety is assured.
2	Remove the screws which fasten the filter cover, and remove the filter cover. Remove the white filter, and clean it if internally dirty. For washing, use neutral detergent or similar. If excessively dirty, renew the filter. If the vacuum generator itself is troubled, replace it in the following procedure.
3	The vacuum generators are installed on the right side of the speed controller in the head section, and are numbered No. 1, 2 and 3 from the left when viewed toward the front side. The cable routed from the vacuum generator is routed to the board on the left side. Follow the cable, and it will be found that the cable is inserted into the terminal on the board. To disconnect the cable, insert the narrow rod through the hole under the terminal which the cable enters. If it is difficult to disconnect, cut the cable on the way and process the connector, and the work will become easier.
4	Since the vacuum generator is installed on the exclusive manifold with two screws, remove it with a cross-pointed screwdriver, and renew it.
5	Install the new vacuum generator, and insert the cable into the hole again as it was. (Keeping the narrow rod inserted through the lower hole, insert the cable into the upper hole.)
6	Turn on the power supply, select the manual screen, and generate vacuum with the vacuum generator. Check for functional problems.

4) Adjustment of elevation and turn speeds

✖ DANGER !!!**⚠ CAUTION !**

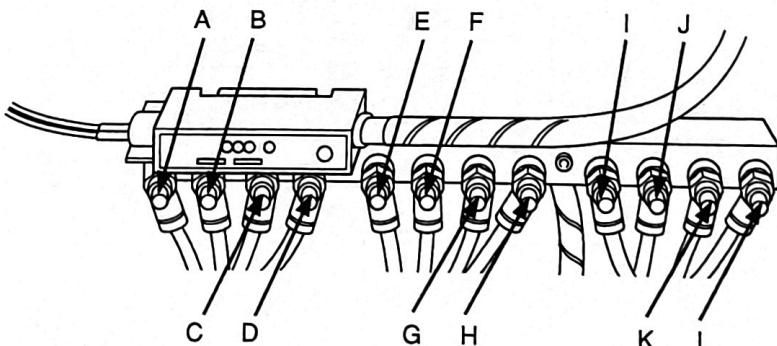
When adjusting the elevation and turn speeds, always be ready to press the emergency stop button.

If the elevation or turn speed of the dispenser head nozzle is excessively fast, it will give a shock to the board or shorten the service life of the head itself.
If the elevation or turn speed is excessively slow, the elevation or turn itself will become impossible or there will be a possible danger that the head nozzle collides with the conveyor frame.

No.	Adjusting procedure
1	Since elevation or turn of the nozzle head is pneumatically driven, adjust the knob of the air speed controller to gain the suitable elevation or turn speed. When No. 1 head of CSM66 and 84 is used as the dispenser head, adjust the speeds with the speed controllers A, B, C and D. The speed controller is shown below in figure 6-45 "AIR CYLINDER SPEED ADJUSTMENT".
2	The utility program is commonly used to adjust the elevation and turn speeds. Observing the messages of the program, input the data, and the area desired to be adjusted will operate the specified times alone. For this while, choke the speed controller to the following reference for adjustment. <ul style="list-style-type: none"> • Reference of elevation and turn speeds "During elevation and turn, it must securely move from the end (stroke end) to the end without the halt time at each end."

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Fig. 6-45
Speed controller section

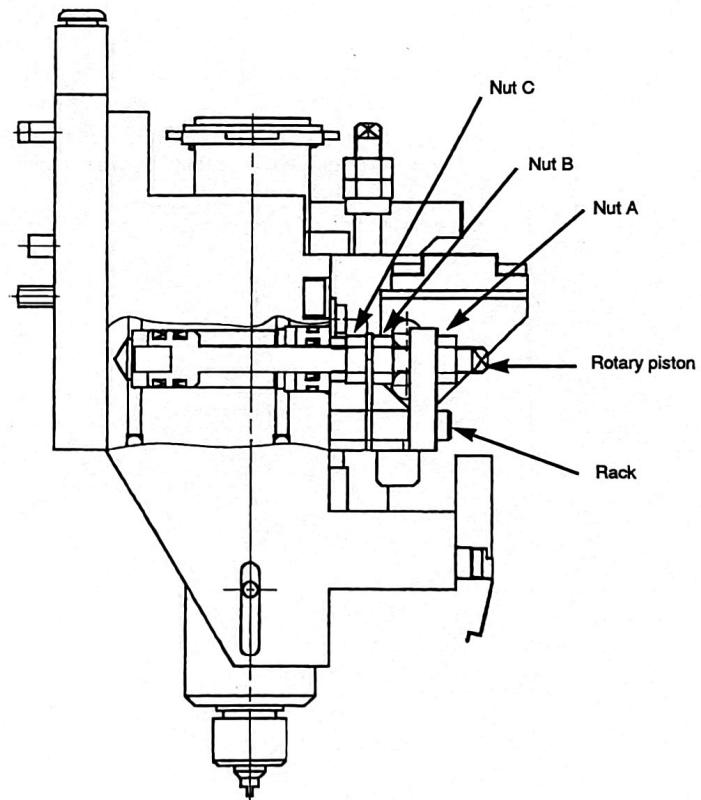


- A : No. 1 head turn ($0^\circ \rightarrow 90^\circ$)
- B : No. 1 head turn ($90^\circ \rightarrow 0^\circ$)
- C : No. 1 head descent
- D : No. 1 head ascent
- E : No. 2 head turn ($0^\circ \rightarrow 90^\circ$)
- F : No. 2 head turn ($90^\circ \rightarrow 0^\circ$)
- G : No. 2 head descent
- H : No. 2 head ascent
- I : No. 3 head turn ($0^\circ \rightarrow 90^\circ$)
- J : No. 3 head turn ($90^\circ \rightarrow 0^\circ$)
- K : No. 3 head descent
- L : No. 3 head ascent

3) Adjustment of nozzle turn angle (0° and 90°)**CAUTION !**Adjustment is unnecessary if the hole nozzle alone is used.

No.	Adjusting procedure
1	For adjustment of $+90^\circ$ turn, first pull the rack and rotary piston toward your. Keeping the nuts A, B and C in the figure loose, turn the rotary piston, and the turn angle will vary. Visually check the turn motion or practically coat the liquid, and adjust the angle. After adjustment, tighten the nut A.
2	For adjustment of 0° position, press the rack and rotary piston to the stroke end. Keeping the nuts B and C loose, turn the nut B to change the turn angle of the nozzle. After adjustment, screw in and lock the nut C, keeping the nut B not loose.

Fig. 6-44
Nozzle turn angle
adjusting section



2) Adjustment of lower limit of nozzle

No.	Adjusting procedure
1	In the "manual" screen, use the function keys to position the board. On the pin reference type, the locator pin and supporter are used for positioning with push-up motion. On the edge reference type, the main stopper and clamp are used for positioning with push-in/out motion. Position the board without unevenness.
2	Move the dispenser head to above the board. (<u>X+</u> , <u>X-</u> , <u>Y+</u> and <u>T-</u> keys)
3	Lower the head nozzle (with F1 key), and adjust the double nut to bring the nozzle tip into contact with the top surface of the board.
4	If the surface of any board is uneven, it is necessary to make it possible to bring the nozzle tip into contact with the lowest area. Take care that a strong impact will sometimes be applied to a board if the nozzle tip is set to touch the excessively low area.

Fig. 6-43
Nozzle lower-limit
adjusting section

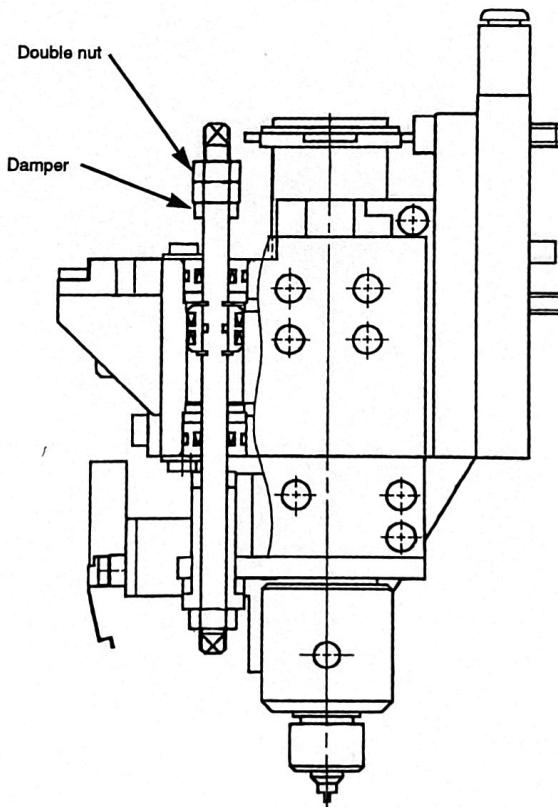


Fig. 6-46
Front cross-sectional view of
motor fixture

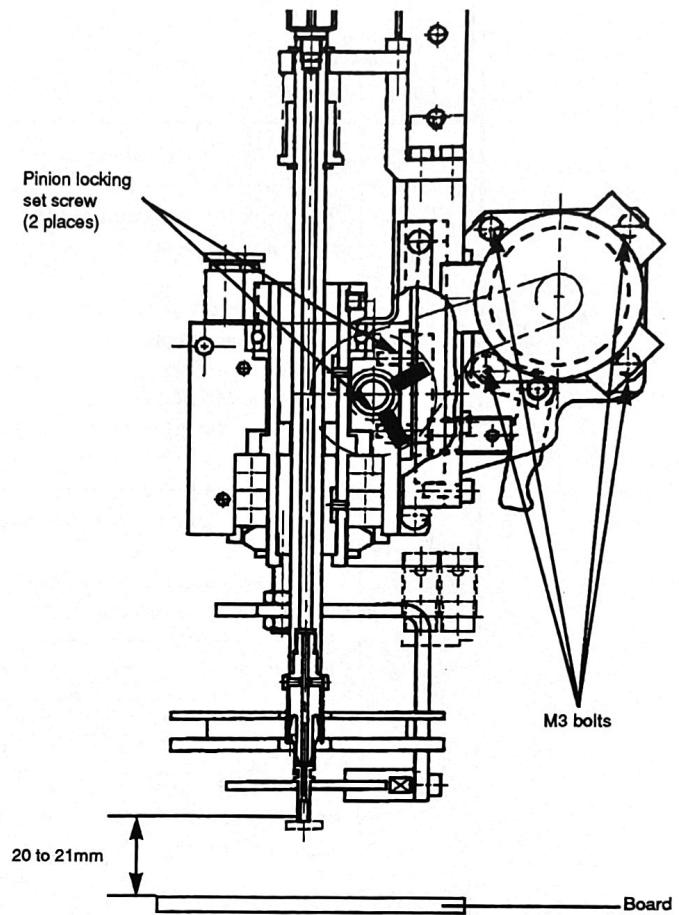
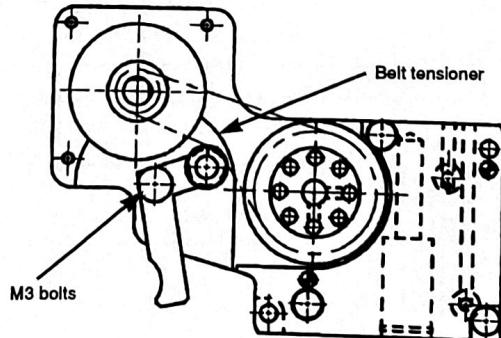


Fig. 6-47
Belt tensioner



- (7) Replacement of Z axis motor (adjustment of motor belt tension and Z-axis machine reference amount) see figures 6-46 and 6-47.

No.	Replacing procedure
1	Turn off the air and power supplies.
2	Disconnect the connector of the motor cable. The connector is housed in the acrylic box on the top of Z axis motor.
3	The motor is fastened on the bracket with M3 bolts (4 places). Remove the bolts, and the motor will be ready to be pulled out toward your.
4	Loosen the M4 bolts which fasten the belt tensioner adjusting plate in Fig. 6-47. Move the plate leftward and rightward, and the tension will be released.
5	Prepare new Z axis motor, and reverse the above procedure for installation.
6	To give the suitable tension, apply a load of 0.3kgf to the center of the belt to gain a sag of approx. 1 to 2mm.
7	Connect the connector of the motor cable, and arrange the cables in order.
8	Turn on the air and power supplies, return the machine to the origin point, and verify that a clearance of approx. 20.00mm to 21.00mm is present between the bottom surface of the nozzle and the top surface (top surface of conveyor) of the board. At this time, the Z axis reference amount is in a range of 30 to 50%.
9	If any above specified value is not gained, loosen the set screws (2 places) which fasten the pinion as shown in Fig. 6-46, and adjust the above state. After standing by the machine at the origin point, give a Z coordinate of -20.00 to -21.00mm to bring the bottom surface of the nozzle into contact with the top surface of the board (top surface of the conveyor), and tighten the set screw. Otherwise, give a Z coordinate of 0.00mm, and pinch a 20mm thick material between the nozzle and the top surface of the board.
10	Stand by the machine at the origin point, and verify that the distance between the top surface of the nozzle and top surface of the board, and the Z axis machine reference value are within the specified ranges.
11	After the above adjustment is completed, adjust the Z offset value.

(9) Adjustment of vision head with Z axis

- 1) Focus adjustment of LED illumination and camera (movable type)
 - 2) Adjustment of Z-axis origin point
- 1) Focus adjustment of LED illumination and camera (movable type)

WARNING !!

Since the system data of the vision machine is edited on the basis of the movable camera, it is necessary to readjust the system data and vision file after the camera is mechanically adjusted.

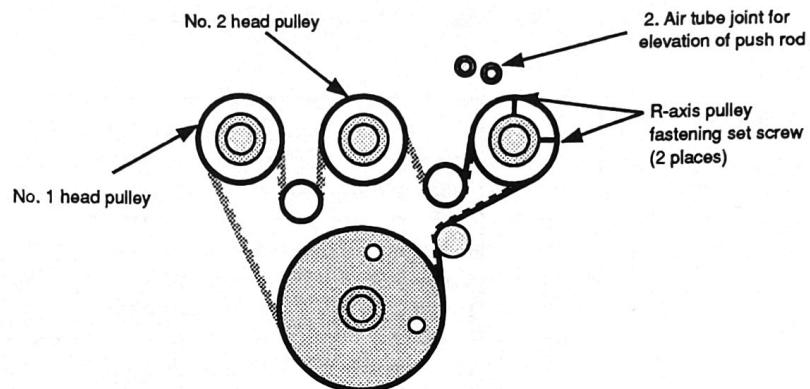
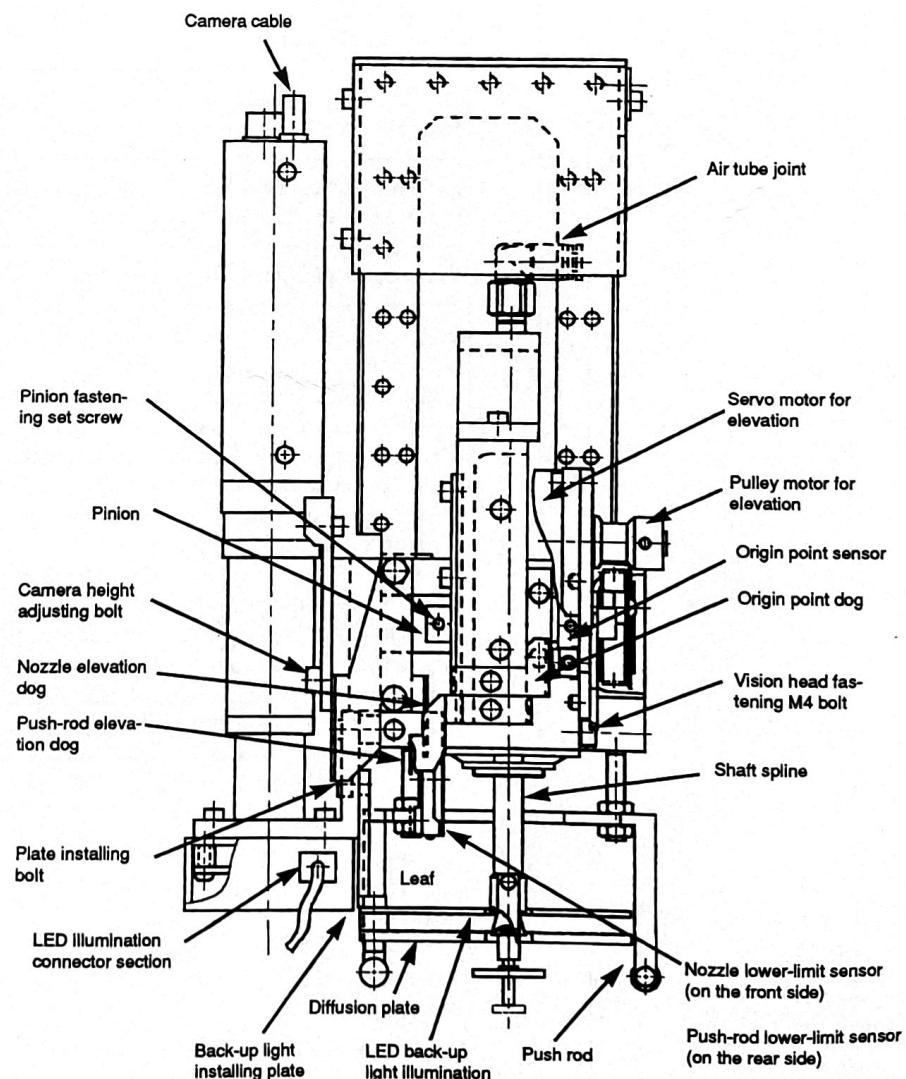
No.	Adjustment procedure
1	Turn on the air and power supplies, and stand by the machine at the origin point.
2	Position the board with care to prevent warpage or looseness on the conveyor. (The board is provided with fiducial mark.)
3	Slightly back off the volume controller of LED illumination from the maximum graduation.
4	Move the vision head to the position at which the fiducial mark of the board is displayed on the CRT screen.
5	Loosen the height adjusting bolts (camera bracket bolts), and adjust the height of the camera to focus the fiducial mark on the CRT screen.

2) Adjustment of Z-axis origin point

WARNING !!

The origin point of Z axis is the stand-by position of Z axis during movement of X and Y axes. If any suitable position is not determined, it will cause a collision.

No.	Adjustment procedure
1	Turn on the air and power supplies, return the machine to the origin point, and verify that a clearance of approx. 20.00mm to 21.00mm is present between the bottom surface of the nozzle and the top surface (top surface of conveyor) of the board. At this time, the Z axis reference amount is in a range of 30 to 50%.
2	If any above specified value is not gained, loosen the set screws (2 places) which fasten the pinion as shown in Fig. 6-46, and adjust the above state. After standing by the machine at the origin point, give a Z coordinate of -20.00 to -21.00mm to bring the bottom surface of the nozzle into contact with the top surface of the board (top surface of the conveyor), and tighten the set screw. Otherwise, give a Z coordinate of 0.00mm, and pinch a 20mm thick material between the nozzle and the top surface of the board.
3	Stand by the machine at the origin point, and verify that the distance between the top surface of the nozzle and top surface of the board, and the Z axis machine reference value are within the specified ranges.
4	After the above adjustment is completed, adjust the Z offset value.

Fig. 6-48
BeltFig. 6-49
Appearance drawing
of vision head
(CSM84V)

(8) Replacement of vision head (CSM84V) see figures 6-48 and 6-49.

No.	Replacing procedure
1	Turn off the air and power supplies.
2	Loosen the R axis motor to loosen the belt tension. Loosen the R axis motor with M3 wrench from the bottom side and with M3 hex. socket wrench from the top side.
3	Remove the belt from all pulleys (on the motor and head sides).
4	Disconnect all the air tube (for vacuum) at the top of the vision head and two air tubes (for elevation of push rod) at the deep side, the connectors of the sensor at the lower nozzle limit and the lower push-rod limit, the connector for LED illumination, the camera cable and the sensor of the servo motor for elevation.
5	Since the vision head is fastened on the X axis with 2 M4 bolts from the front side, remove these bolts, and the head will be removed.
6	Referring to the knock pin projected from the head holder of X axis, fit the vision head, and tighten two M4 bolts.
7	Connect the disconnected air tube, connector and cable.
8	Turn on the air and power supplies, and stand by the machine at the origin point with care for the belt. (Turn R axis to an angle of 0°.) Check for air leakage, check the elevation of the head, and the vacuum generation, check whether the LED illumination, back-up light, and red photo lamps of the elevation sensors come on or not, and check the camera image. If any abnormality is found, reconnect the connectors.
9	Turn off the air and power supplies.
10	Route the belts on the pulleys in the same way as before, and apply a tension. Here, it is important that the leaf springs of the vision head are securely arranged in the left and right directions when the tension is applied. (If they are not arranged in order, loosen two set screws which fasten the R axis pulley as shown in Fig. 6-48, and turn the shaft spline into proper position.)

(10) Data resetting during replacement of vision head with Z axis

When the vision head is replaced, it is necessary to reset the following data.

