CHAPTER 4

HANDLING & ADJUSTMENT

Pin Standard PCB Positioning

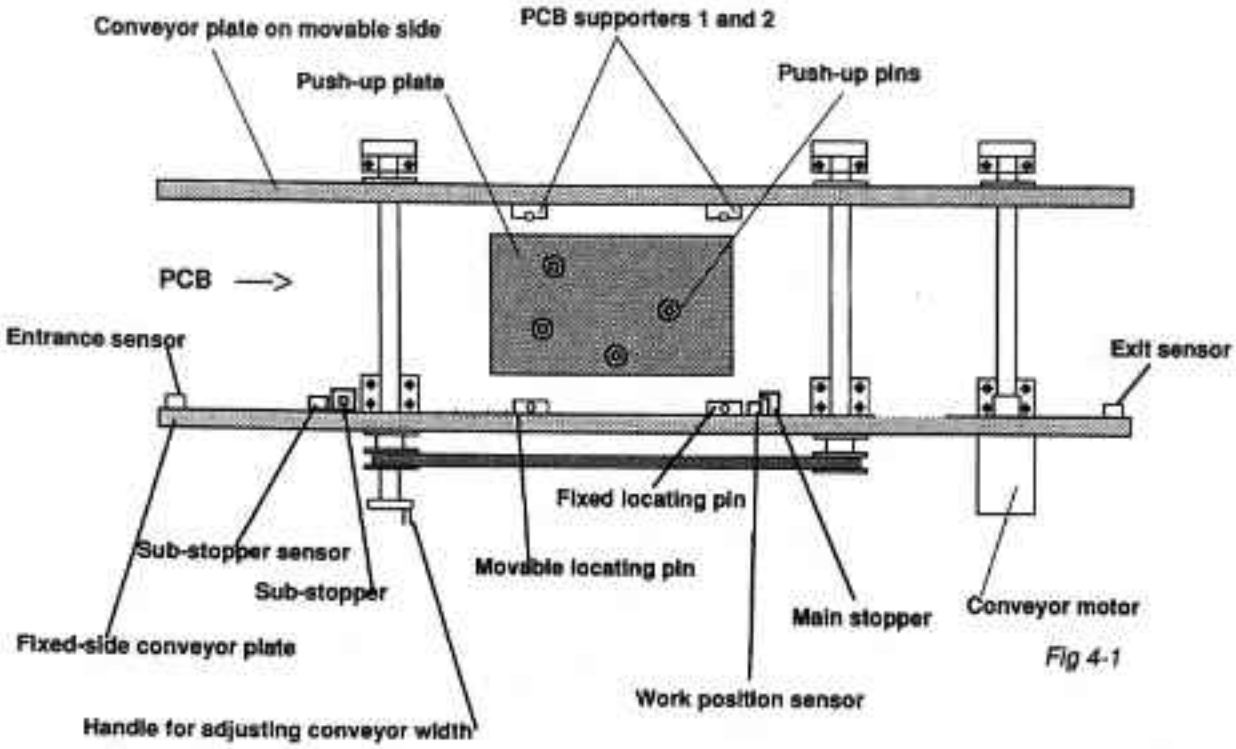

Fig 4-1

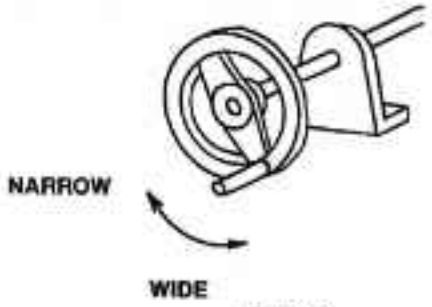

Fig 4-2

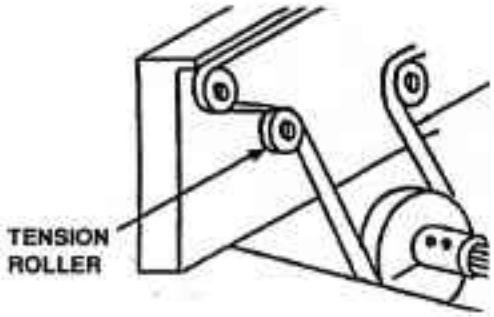

Fig 4-4

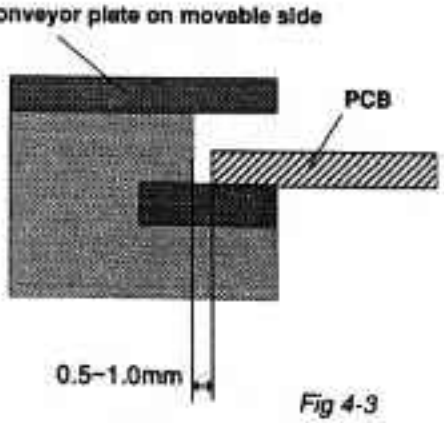

Fig 4-3

SECTION 1 HANDLING AND ADJUSTMENT OF THE CONVEYOR

1-1 PIN STANDARD PCB POSITIONING

1) Adjustable PCB width sizes:
   30—250 mm (CSM 66)
   30—407 mm (CSM 84/84V/84VZ)
   These differ depending on option specifications.

2) Adjustment of conveyor belt tension.

3) Adjustment of the locating pins 1 and 2.

4) Adjustment of the PCB supports.
   The PCB push-ups have the following numbers of push-up pins: for the CSM66, 4 pins, and for the CSM84/84V/84VZ, 8 pins.

5)Adjustment of the sensors for the work position, conveyor entrance and exit.

--- See Fig 4-1

(1)Adjusting the conveyor width

a) The handle for adjusting the conveyor width is found on the left front side of the mounter. Turning the handle left and right moves the movable-side of the conveyor forward and backward. Adjust the handle until the PCB is properly fitted between the conveyor sides. --- See Fig 4-2

b) With the PCB held on the conveyor, return the handle 1/4 of a turn, and adjust the gap between the conveyor plate and the PCB to 0.5-1.0 mm. --- See Fig 4-3

c) After adjusting the gap, move the conveyor belt by means of the F1 key in manual mode, and check to make sure the PCB is transported properly.

d) After adjusting the conveyor width, detach the handle. (Pull it forward to remove it.)

(2)Adjusting the tension of the conveyor belt. — See Fig 4-4

There are tension rollers on both sides of the conveyor for adjusting the belt tension. Loosen the screw holding the roller and move the roller left and right. Secure it at the position where the conveyor belt operates normally.

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Adjusting the height of the locating pins)

CAUTION !

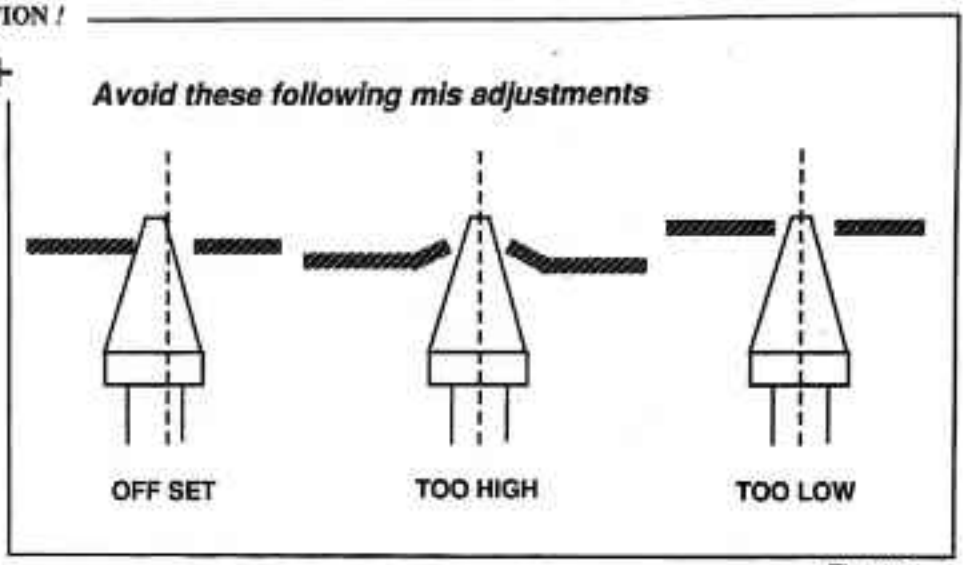
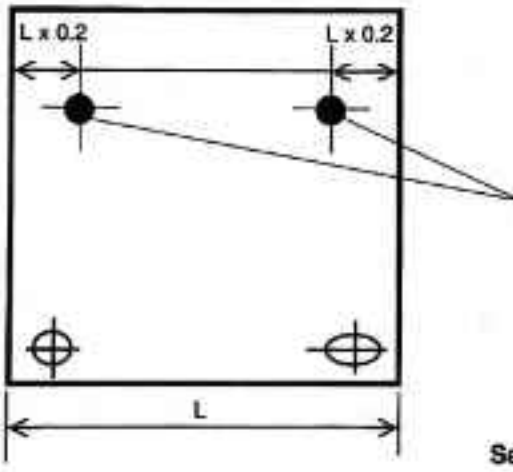


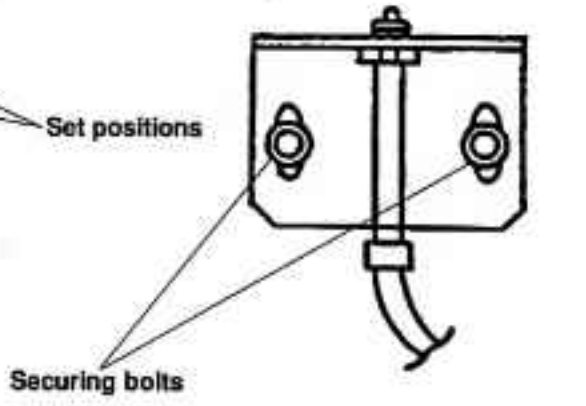
Fig 4-6

Adjusting the positions of the PCB supporters



(View looking down at PCB from above)

Fig 4-7



(PCB supporter assembly diagram)

Fig 4-8

b) Adjusting the height of the locating pins --- See Fig 4-6

When the unit is shipped, the locating pins are adjusted to fit a PCB with a thickness of 1.6 mm. If it is necessary to adjust this height, please use the procedure below.

No.	Steps	Remarks
1	Loosen the screws holding the locating pins on both the fixed and movable sides. (See locating pin assembly diagram.fig. 4-5)	
2	Raise the main stopper.	M-STP. (F2 key on page 1)
3	Rotate the conveyor belt.	M-CONV. (F1 key on page 1)
4	Let the PCB move along the conveyor, and stop the conveyor when the PCB hits the main stopper.	M-CONV. (F1 key on page 1)
5	Raise the locating pin.	LOCATE (F3 key on page 1)
6	Pull the pin upwards, and with the top surface of the PCB contacting the bottom of the PCB supporting plate, lock the securing screw. If the pin is too high when this screw is locked, the PCB will warp, while if the pin is too low, it will be impossible to position the PCB, so be very careful when adjusting the height.	

(4) Adjusting the PCB supporters

1) Adjusting the positions of the PCB supporters --- See Fig 4-7, 4-8

a) Loosen the two bolts holding the PCB supporters in place. If they are loosened too far, the securing bolt will come out, so be careful.
b) Slide each of the PCB supporters left and right until they are positioned approximately "the length of the PCB (L dimension) x 0.2" from the end of the PCB, and secure them at that position.
c) Adjust the height of the PCB supporters by raising the supporter and aligning the tip of the pin with the top surface of the topmost plate on the conveyor.
d) When the adjustment in step c) has been carried out, always raise the push-up plate (F3 key) and make sure there is no interference with the bottom of the supporter.

Adjusting the locating pins (PCB positioning pins)

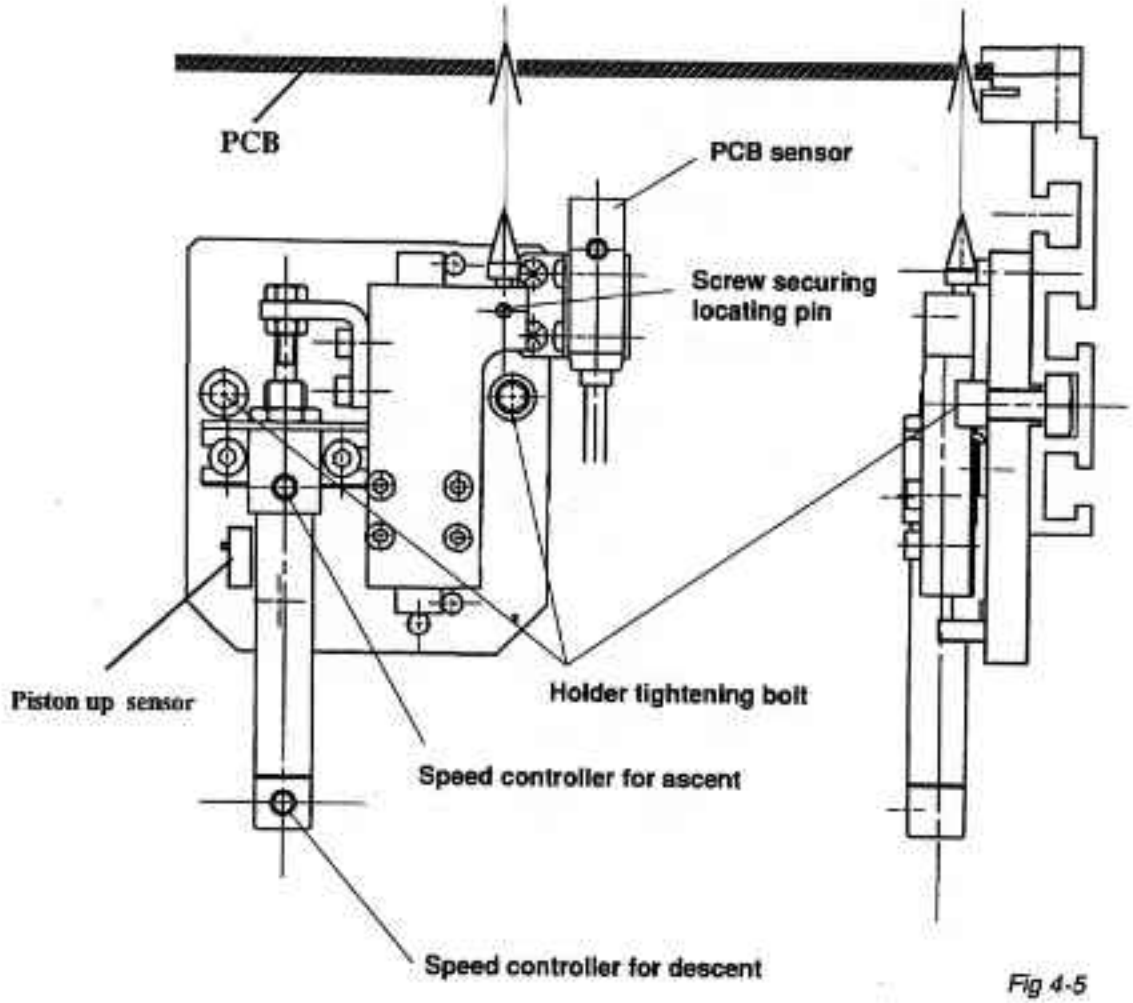


Fig 4-5

(3) Adjusting the locating pins (PCB positioning pins) — See Fig 4-5

a) Adjusting the position of the locating pins

No.	Steps	Remarks
1	Loosen the bolt securing the holder for the movable locating pin. (It is not necessary to remove the bolt.) Refer to the diagrams of the conveyor system on the previous page and the next page, for a diagram of the locating pin assembly.	See the chapter 3, section 3
2	Raise the main stopper.	M-STP. (F2 key on page 1)
3	Rotate the conveyor belt.	M-CONV. (F1 key on page 1)
4	Let the PCB move along the conveyor, and stop the rotation when the PCB hits the main stopper.	
5	The movable locating pin, loosened in step 1, can be shifted left and right. Move the pin until its center is aligned with the positioning hole in the PCB.	
6	Raise the locating pin and make sure it fits into the positioning hole in the PCB. Then tighten the bolt securing the holder.	LOCATE (F3 key on page 1)

Edge-clamp Method PCB Positioning (Optional)

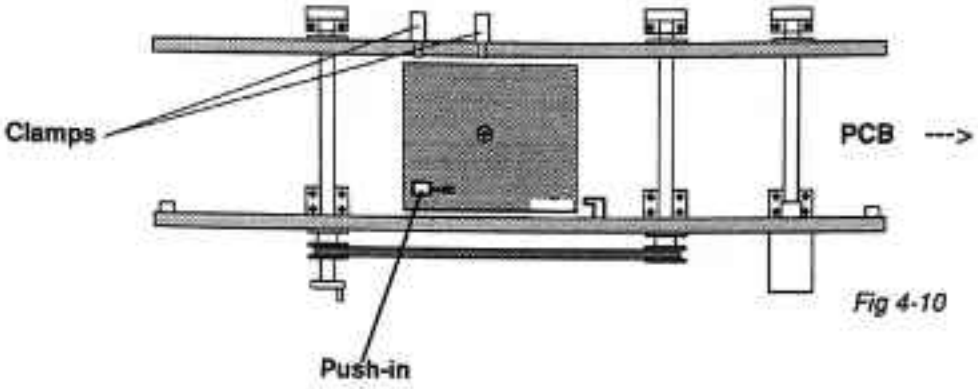
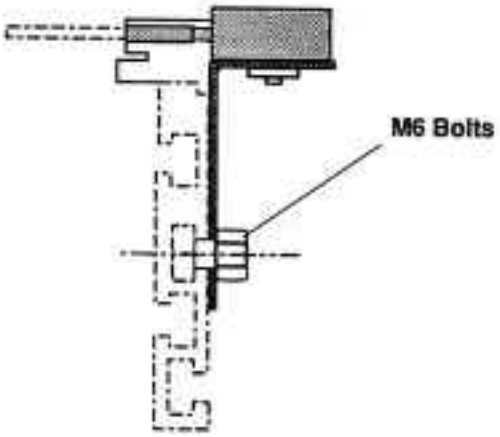
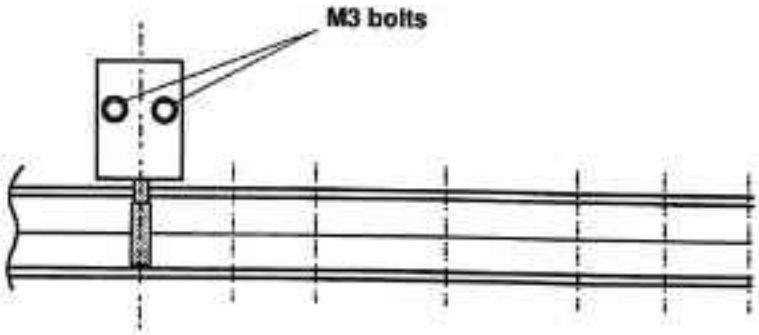


Fig 4-10

Adjusting the clamps



(Clamp assembly diagram) *Fig 4-11*



(Clamp position diagram) *Fig 4-12*

1-2 EDGE-CLAMP METHOD PCB POSITIONING (OPTIONAL)

1) Adjustable PCB width sizes:
   30-220 mm (CSM66)
   30-407 mm (CSM84/84V/84VZ)
   These vary depending on option specifications.

2) Edge-clamp positioning is done with four units: the clamps, push-in, push-up, and main stopper.

   --- See Fig 4-10

(1) Adjusting the clamps — See Fig 4-11,4-12

1.1) Adjusting the position of the clamps

No.	Steps	Remarks
1	Remove the M6 bolt shown in the clamp assembly diagram.	
2	Clamps are attached in the seven positions shown in fig. 4-12. Attach them in positions that match the PCB size, to support the edges of the PCB as well as possible.	
3	Loosen the M6 bolt and make sure the clamp moves smoothly.	CLAMP (F4 key on page 2)
4	The clamp cylinder is secured to the bracket by two M3 bolts. Loosening these M3 bolts allows fine adjustment of the attachment position. Adjust the tips of the left and right cylinders so they are even.	
5	When the clamps are driven, the PCB is pressed uniformly against the front side (the fixed side) of the conveyor. The position is OK if the rear side (the movable side) of the conveyor does not bend to any large extent.	CLAMP (F4 key on page 2)

Adjusting the sensors for the work position, conveyor entrance and exit, and sub-stopper

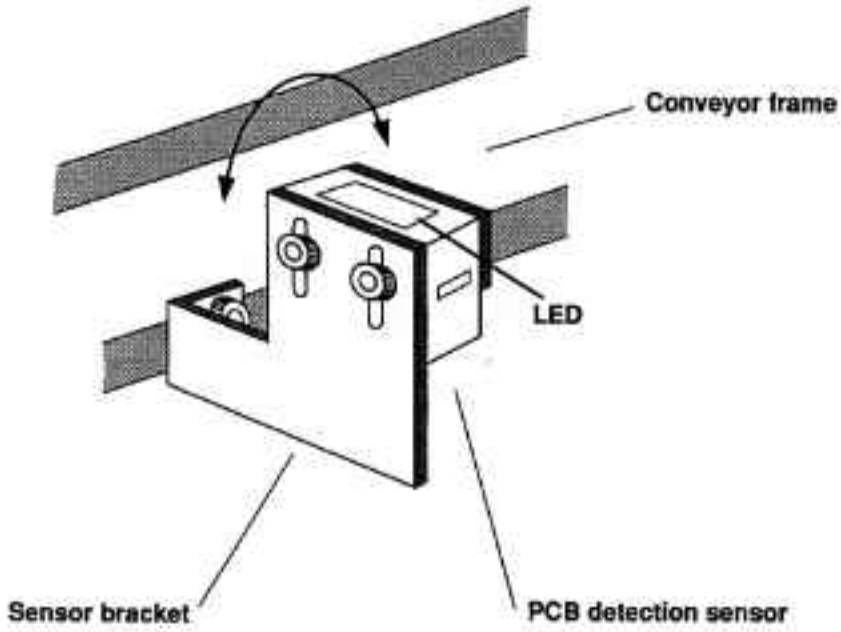


Fig 4-9

(5) Adjusting the sensors for the work position, conveyor entrance and exit, and sub-stopper — See Fig 4-9

The sensitivity of the PCB detection sensor attached to the conveyor varies depending on the material, color, and thickness of the PCB. If good detection cannot be achieved, change the up/down positions of the sensor to adjust the sensitivity. (The specified distance for this sensor is 10-50 mm on white paper and 10-40 mm on black paper.)
Sensitivity can be adjusted even if the sensor is tilted in the directions indicated by the arrow in the diagram below.
If the top of the sensor is dirty or dusty, the mounter may malfunction. The sensor should be kept clean.

Adjusting the position of the ascent end sensor on the PCB push-up

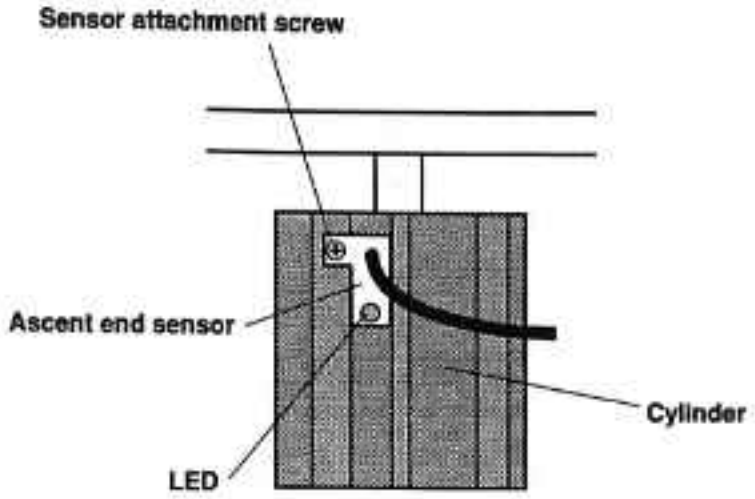


Fig 4-15

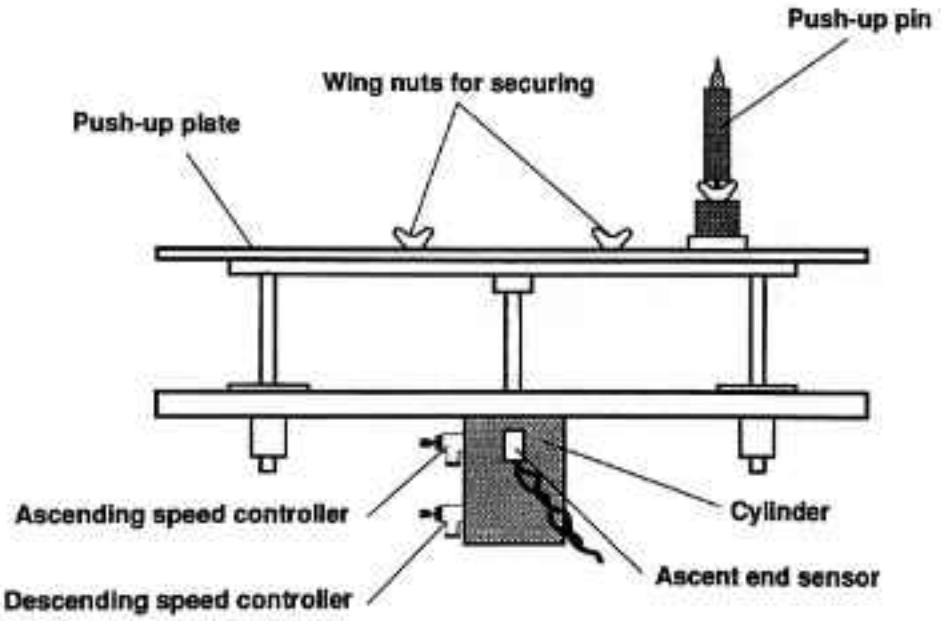


Fig 4-16

3) Adjusting the position of the ascent end sensor on the PCB push-up

— See Fig 4-15, 4-16

No.	Steps	Remarks
1	Raise the PCB push-up.	PUSHUP (F3 key on page 2)
2	Loosen the screw attaching the sensor, and move the ascent end sensor up and down. Find the point where the LED lights, and tighten the screw at that point.	

Adjusting the PCB push-in

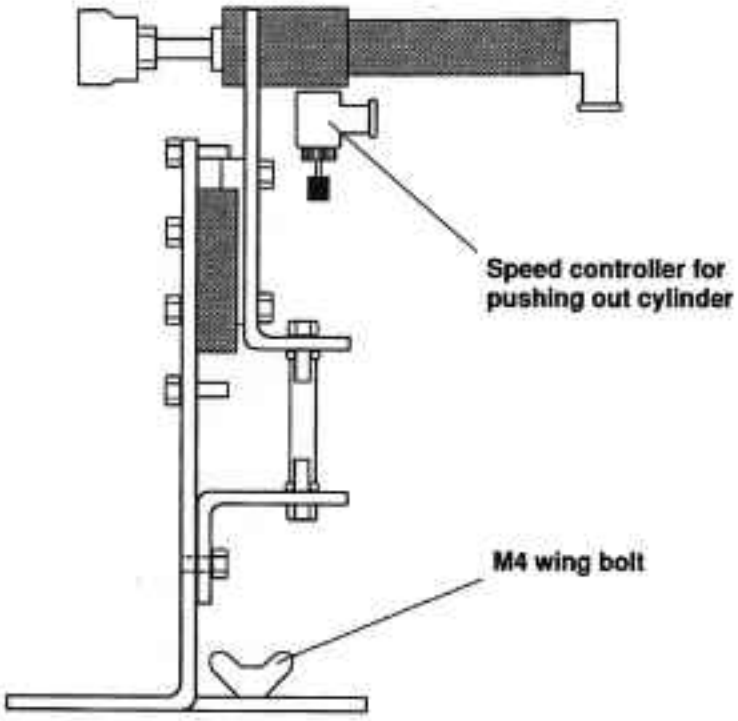


Fig 4-13

Adjusting the height of the push-up plate

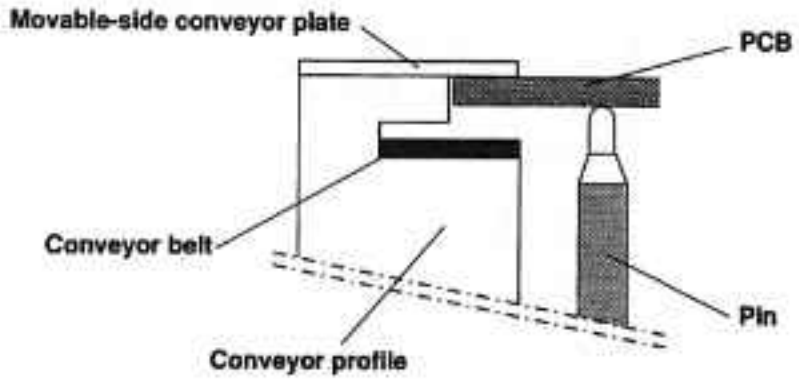


Fig 4-14

Note) If the pin is too high, the PCB will warp upwards, so adjust the height carefully.

(2) Adjusting the PCB push-in — See Fig 4-13

No.	Steps	Remarks
1	Raise the main stopper and leave it pressed against the PCB.	M-STP. (F2 key on page 1)
2	Loosen the M4 wing bolt shown in the PCB push-in assembly diagram.	
3	Raise the push-up plate.	PUSHUP (F3 key on page 2)
4	The push-in moves left and right on the push-up plate. Bring it in contact with the PCB with the cylinder protruding 10 mm, and tighten the M4 bolt so that the PCB is caught and held between the pin and the main stopper.	PUSHIN (F2 key on page 3)

(3) Adjusting the PCB push-up

The PCB push-up corrects downward warping of the PCB, and should provide uniform support to the underside of the PCB. The push-up plate can be easily installed and removed, making setups easier.

3.1) Adjusting the height of the push-up plate

No.	Steps	Remarks
1	Raise the main stopper and leave it in contact with the PCB.	M-STP. (F2 key on page 1)
2	Raise the PCB push-up plate.	PUSHUP (F3 key on page 2)
3 4	Loosen the wing nut attached to the push-up pin, and rotate the pin to adjust the height. The pin should be set to a low height at first and then rotated little by little to raise the height. When the top surface of the PCB contacts the underside of the movable-side conveyor plate, as shown at the right, the wing nut is tightened to secure the position of the pin.	— See Fig 4-14

3.2) Adjusting the vertical speed of the PCB push-up

Using the speed controller pictured in the push-up assembly diagram on the following page, adjust the vertical speed. Both the ascending and descending speed should be adjusted to the point where any parts loaded on the PCB will not be shaken out of position during ascent or descent.

Adjusting the beam sensor

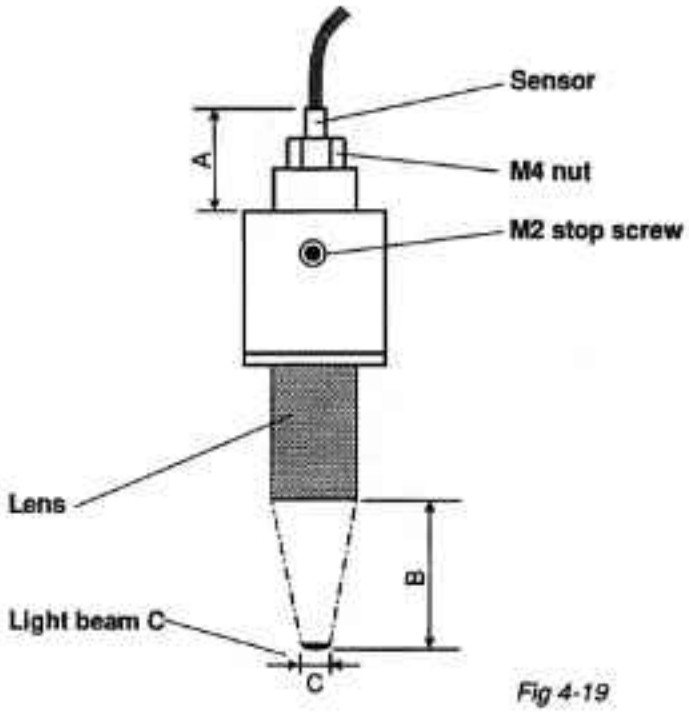
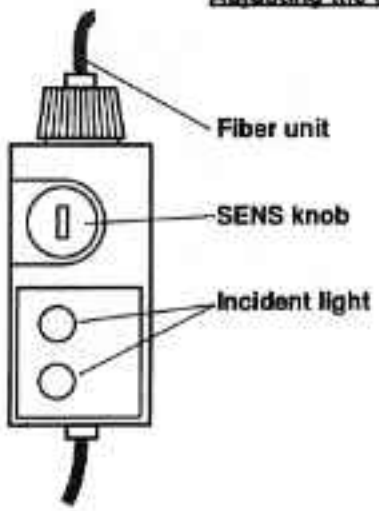


Fig 4-19

(Front view of beam sensor)

Adjusting the sensitivity of the beam sensor



(Beam sensor amplifier)

Fig 4-20

1-4 BEAM SENSOR

(1) Functions of the beam sensor

1) The beam sensor focuses the red sensor light into a beam with a diameter of ø0.8-1.0, through a lens. This is optimum for teaching point data on the PCB.

2) The sensor can be used for bad mark detection. For example, if a PCB is divided into 10 compartments, and neither mounting nor dispensing is to be carried out in compartments 2 and 7, a bad mark (a type of seal, etc.) is affixed to those compartments. The beam sensor detects those marks before mounting or dispensing is carried out, to eliminate wasteful mounting and dispensing operations.

3) The beam sensor can also be used for fiducial (PCB compensation system) operations.

(2) Adjusting the beam sensor --- See Fig 4-19

1) Adjusting the beam diameter of the beam sensor

No.	Steps	Complementary
1	Position the PCB on the conveyor.	
2	With the sensor about 5 mm (A dimension) from the lens, secure the M4 nut (see diagram showing front of beam sensor unit).	
3	With the lens about 10 mm (B dimension) above the PCB, adjust the height so that the diameter of the light beam (C dimension) is ø0.8-1.0. Then tighten the M2 stop screw to secure the position. (See diagram showing front of beam sensor unit.)	

2) Adjusting the sensitivity of the beam sensor (when detecting bad marks) (When the light detected is reflected light) --- See Fig 4-20

1) Set the target object in the desired position, and turn the SENS knob from the MIN to the LIGHT position (rotate the knob to the right). Set the position where light enters as Point A.

2) With no target object is in place (this means the light is obstructed; otherwise, detection is not possible), again turn the SENS knob to the LIGHT (right) position. Once incident light has been introduced, turn the knob back to the DARK position (left), and set the position where light is obstructed as Point B.

3) Align the line marked on the case with the center point between Points A and B.
   • When the SENS knob position has been adjusted, set the target object in place again and check operation at the actual speed to be used.

   The position of the SENS knob may have to be adjusted somewhat when operating on-line.

Note : SENS stands for "sensitivity".

Adjusting the sub-stopper

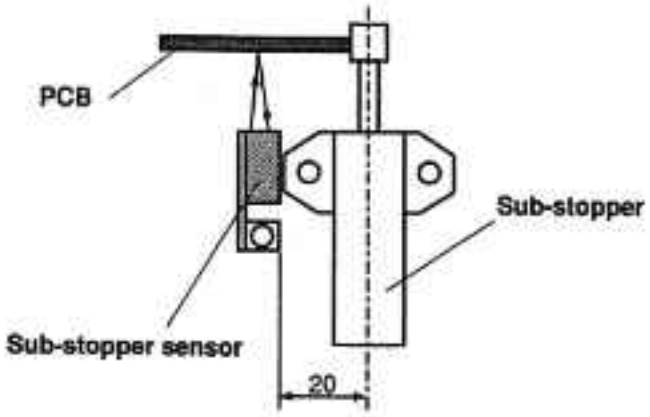


Fig 4-17

Adjusting the conveyor plates

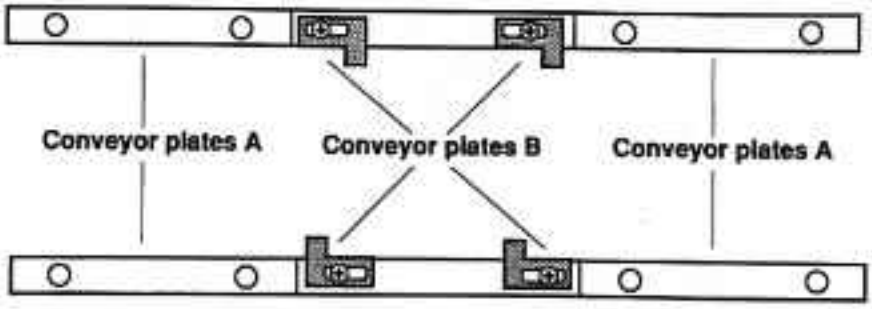


Fig 4-18

1-3 OTHER CONVEYOR EQUIPMENT

(1) Adjusting the sub-stopper --- See Fig 4-17

Adjusting the position of the sub-stopper
The position of the sub-stopper is adjusted by loosening the M6 bolt and sliding the sub-stopper right and left to the desired position. Then the M6 bolt is tightened to secure the position. The closer the sub-stopper is to the main stopper, the shorter the cycle time will be for PCB transport.

(2) Adjusting the conveyor plates --- See Fig 4-18

Conveyor plates A are held in place by several M4 bolts. Fine adjustment of the conveyor width is possible by adjusting the positions of these bolts. Conveyor plates B press down on the PCB from above, so that changing the positions of these allows loading on the edges of the PCB as well as the center.

2-3 Adjustment of the vacuum sensor.

a. An overview of the recovery function. (see fig. 4-25 and 4-26)
When the nozzle of the head has picked up a part correctly, negative pressure produced by the negative pressure generator induces a high volume of negative pressure in the sensor section, and the LED lights.
If the part was not picked up correctly, for instance when parts have run out or the nozzle has not picked up the part correctly, the error is detected by the sensor, and the head moves to the discard point and discards the erroneous part. A recovery function is then initiated in which the same part is picked up and mounted again. The number of times that recovery is attempted can be set by the user, but if the part cannot be recovered within the specified number of attempts, a yellow patrol light goes on and the operation of the machine is suspended (pickup error). After eliminating the cause of the problem, press the ERROR CLEAR button and then press the RUN button again to resume operation.

b. Vacuum pressure sensor board
The vacuum pressure sensor board uses a transducer on the board to detect negative pressure. It then compares the value of the negative pressure with the set value, and determines whether or not the pickup is good, within a 3-step scale.
The 3-step vacuum pressure sensor detects vacuum pressure generated when electronic parts are picked up. This pressure may differ depending on the type of electronic part, but if the part is set to H (high level), M (middle level), or L (low level), the sensor arrives at a judgment in response to the level of the part. If the sensor determines that erroneous chucking has occurred, the recovery operation is initiated. If the chucking took place normally, mounting is carried out without interference from the sensor. On the accessory 3-step vacuum pressure sensor provided on heads for chip mounting, the H level is set for chip detection, the L level for MELF, and the M level to an intermediate level between H and L when the unit is shipped from the factory.

Description of the Various Knobs

	0 adjustment	Rough adjustment	Fine adjustment		
			L (LOW)	M (MIDDLE)	H (HIGH)
HEAD 1	VR 1	VR 2	VR 3	VR 4	VR 5
HEAD 2	VR 6	VR 7	VR8	VR 9	VR 10
HEAD 3	VR 11	VR 12	VR 13	VR 14	VR 15

NOTE

VR1, VR6 and VR11, which are for 0 adjustment, should not be adjusted by the user. (These are marked accordingly.)

c. Rough adjustment of the vacuum pressure sensor
Rough adjustment of the vacuum pressure sensor is not normally required. If it is necessary, for some reason, the procedure below can be used.

(1) Set the fine adjustment knobs (Head 1: VR3, 4, 5; Head 2: VR8, 9, 10; Head 3: VR13, 14, 15) to the neutral position (the center of rotation).

(2) Next, rough adjustment of VR2 (Head 1), VR7 (Head 2), and VR12 (Head 3) is done while picking up parts. Each of these should be adjusted to the point where the LED for the 1M (Head 1), 2M (Head 2), and 3M (Head 3) has either just lighted or just gone out.

R-axis Head External View

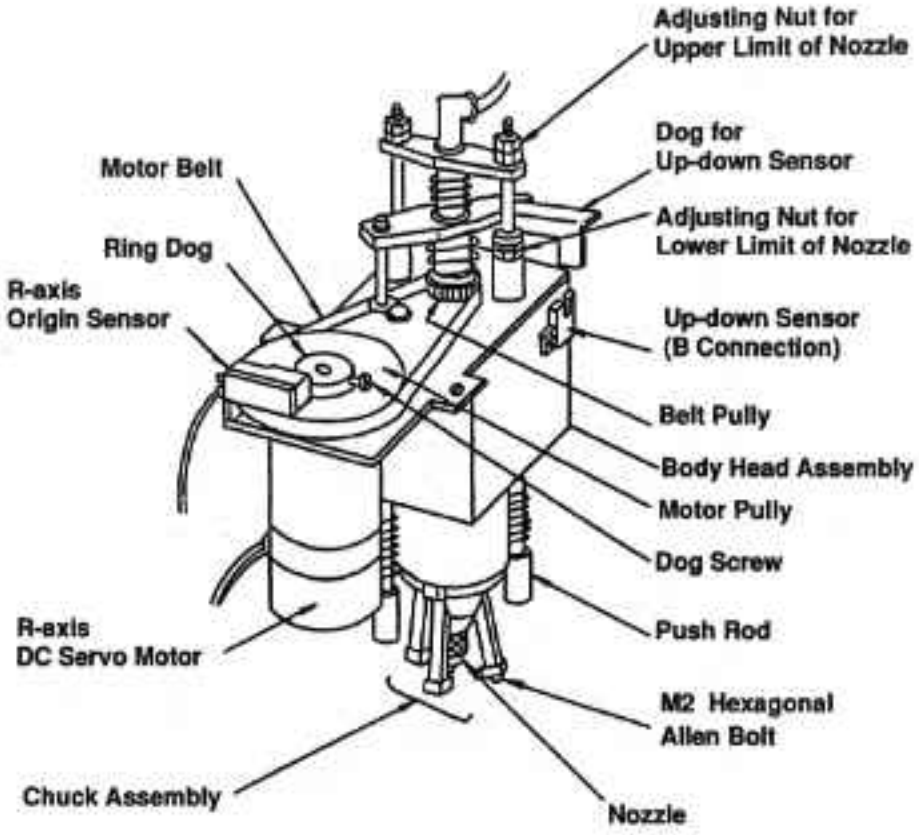
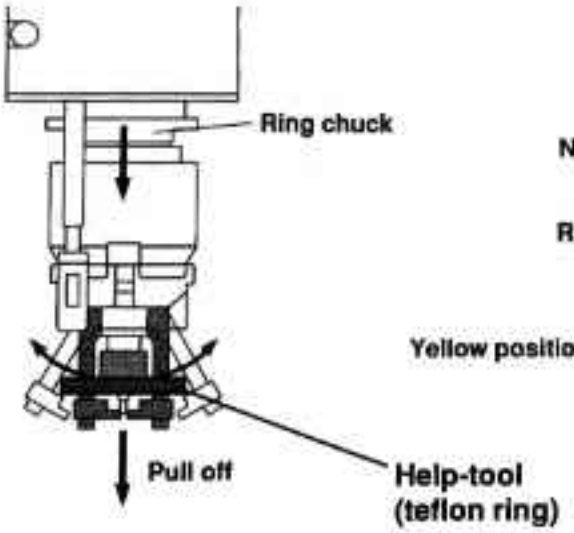


Fig 4-22

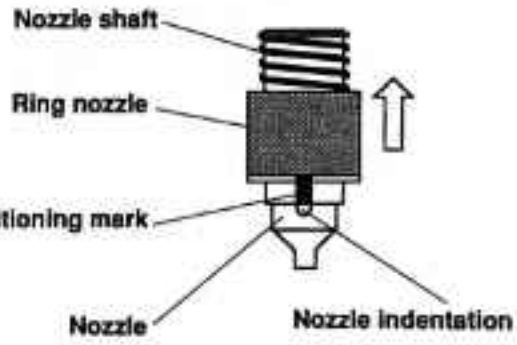
Replacing the jaws



(One-touch replacement system for chuck assembly)

Fig 4-23

Replacing the nozzle



(One-touch replacement system for nozzle)

Fig 4-24

SECTION 2 HANDLING AND ADJUSTING OF THE MOUNTING HEAD

2-1 EXTERNAL VIEW AND NAMES OF PARTS

The R—DC head, driven by the DC servo motor, can rotate a full 360° in units of 0.01°. This makes it possible to mount electronic parts at any angle.

--- See Fig 4-22

2-2 REPLACING THE NOZZLE AND JAWS OF THE MOUNTING HEAD

(1) Replacing the jaws --- See Fig 4-23

The jaws are designed so that four jaws make up one set (chuck assembly), which can then be removed from the mounting head in a one-touch operation, for easy replacement.

a. As shown in the diagram at the upper right, lower the ring chuck, and spread the four jaws slightly apart and inserting a help-tool (teflon ring) so the four jaws stay open, pulling them downwards to remove them.
b. The four jaws are attached by means of an M2 bolt with a hex hole. Remove the bolt with a hex wrench and take off the set of jaws.
c. When attaching the new chuck assembly to the mounting head, spread the four jaws apart and pass the assembly over the shaft of the mounting head, aligning the positioning key with the scraper on the mounter. When the rotation angle of the R-axis is 0 degree, the positioning key of the Chuck Assy is a the rear side.
d. After attaching the new chuck assembly, pull it downwards and make sure it doesn't come off.

NOTE: The help-tool can be ordered at the Philips Consumer Services (Order no: **5322 532 40193**)

(2) Replacing the nozzle --- See Fig 4-24

The nozzle can also be removed from the mounting head in a one-touch operation for replacement.

a. As shown in the diagram at the lower right, move the ring nozzle upwards to remove the nozzle.
b. Replace the nozzle.
c. When attaching the new nozzle to the mounting head, slide the ring nozzle upwards again and align the indentation on the nozzle with the yellow positioning mark on the nozzle shaft. Make sure the spring is inside the nozzle shaft and insert the nozzle. When the rotation angle of the R-axis is 0 degree, the yellow mark of the nozzle is at the right side.

1-5 SOFT-STOP CONVEYOR

If there are parts on the PCBs transported from upstream machinery which have not yet been fastened, they may be shaken out of position or fall over when the board hits the main stopper.

If a soft-stop conveyor is used, the board comes to rest gently against the main stopper with little impact, so that parts stay in their correct positions.

(1) Change the mounter program to utility "SPEEDCON" and select <CONVEYOR> (select in Run Mode).

(2) Set a board at the conveyor entrance (the position where the conveyor entrance sensor detects the board).

(3) Make sure there is a distance of about 45 mm from the main stopper to the work position PCB sensor.

(4) Press the "RUN" switch to start the board moving, and make sure it slows down and stops at the stopper position.
The soft-stop function begins to operate the instant the sensor detects the board. However, if the board appears likely to hit the stopper hard, turn the FAST SPEED knob of the speed control unit counterclockwise to slow the conveyor speed. To speed up the conveyor, turn the FAST SPEED knob clockwise.

--- See Fig 4-21

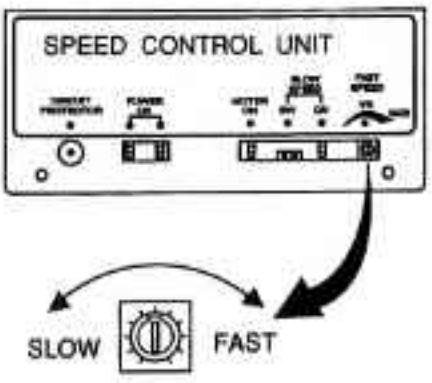


Fig 4-21

2) High percentage of throw-away parts (recovery)
Workpieces are picked up, but are thrown away.

No.	CAUSE	SOLUTION
1	There is a gap between workpiece and nozzle, allowing vacuum to leak. a. Gap is caused by wearing or scratching of nozzle or jaw. b. Head ascends too quickly, so that impact causes a gap. c. Jaw is not positioned to grip workpiece well, causing a gap. d. Jaw grips lead wire of parts like mini-mold transistors, that have lead wires. e. Tip of workpiece is oval rather than long (2125, 3216, etc.).	-> Replace nozzle or jaw. -> Adjust speed controller. -> Adjust nozzle ascent end. -> Adjust nozzle ascent end and check picking accuracy. -> Consult with manufacturer of workpiece, or replace workpiece. (Sometimes problem can be corrected by changing picking angle by 90°.)
2	Poor adjustment of vacuum pressure sensor	Readjust sensor.
3	Adjustment conditions of vacuum pressure sensor knobs H, M and L do not match data indications.	Correct data.
4	Air pressure supplied to mounter is too low.	Align to within 5 kg/cm^2.
5	Leak in vacuum pressure line keeps vacuum pressure in nozzle from reaching proper level.	Repair leaking spot.

2-4 CAUSES AND SOLUTIONS FOR DEFECTIVE PICKING AND MOUNTING

When problems occur with picking and mounting, check the items listed below. Checking is done most effectively in Step Mode.

1) Erroneous picking
The nozzle which descended to pick up a workpiece ascended without picking up anything.

No.	CAUSE	SOLUTION
1	Offset picking point (nozzle did not descend in center of workpiece) a. X and Y coordinates of picking point are off. b. Poor feeder adjustment resulted in incomplete pitch feed. c. Defective feeder attachment	(Important) -> Teach picking point again. -> Readjust feeder. -> Reattach feeder.
2	Defective feeding because empty tape has jammed	Free the tip of the paper tape.
3	Feeder is not winding top of tape properly.	Fit the tape to the feeder again.
4	When nozzle picks up workpiece, tip of nozzle does not touch workpiece, or nozzle presses hard into middle of workpiece tape.	Readjust head descent end.
5	Dirt is clogging the head (solder, adhesives, water, oil).	Adjust vacuum pressure line of head. * Clean nozzles once a day.
6	Vacuum pressure generator itself is defective.	Replace unit.
7	Leak in vacuum pressure line	Check and replace air tubes and couplings.
8	With 32 mm tape, adhesive tape does not peel away easily, leaving workpiece stuck to tape.	Fit tape to 32 mm tape feeder again. Position so that when feeder pushrod is pressed, adhesive tape peels away cleanly and workpiece can be removed smoothly.
9	Nozzle does not ascend and descend smoothly, but catches partway.	Detach nozzle and clean nozzle and shaft. Then apply grease.

d. Fine adjustment of the vacuum pressure sensor

The 3-step vacuum pressure sensor detects vacuum pressure generated when parts are picked up. This pressure may differ depending on the type of part, but if the part is set to H (high vacuum pressure level), M (medium vacuum pressure level), or L (low vacuum pressure level), the sensor arrives at a judgment in response to the level of the part. If erroneous chucking has occurred, the recovery operation is initiated. If the chucking took place normally, mounting is carried out without interference from the sensor. The following method can be used for fine adjustment of the vacuum pressure sensor.

(1) Suppose, for an example, that the No. 1 head is going to be used for mounting 2125, tantalum electrolytic capacitors, and MELF parts. The vacuum pressure sensor level is set as follows for each of the parts:

2125 > tantalum capacitors > MELF
(High level) (Medium level) (Low level)

(2) Attach the Type 2 nozzle and jaws to the No. 1 head, and on the manual screen, generate negative pressure (F3 key).

(3) Turn the 1L knob (see previous page) in the clockwise direction, until the LED goes on. Then turn the knob counterclockwise. At the point where the LED changes from on to off, turn the knob counterclockwise a little farther, about 0.5 scale degrees.

(4) Next, chuck a 2125 part normally, and find the level where the LED of the 1H knob lights. Next chuck the 2125 part erroneously (grip it vertically, horizontally, or at a slant), and find the level where the LED of the 1H knob does not light.

(5) If the knob is within either 1H or 1L and the LED lights when the tantalum electrolytic capacitor is chucked normally and goes out when it is chucked erroneously, it is not necessary to reset the vacuum pressure sensor level of the tantalum electrolytic capacitor. 1M is simply left open, and should be aligned somewhere between 1H and 1L. If the vacuum pressure sensor level of the tantalum electrolytic capacitor is not consistent with either the level of 1H or 1L, adjust the 1M knob using the same procedure as that described above for 2125 parts.

(6) Since the shape, dimensions, and materials of parts differ depending on the manufacturer, it is difficult to generalize. Parts with fairly high vacuum pressure (2125, 3216, etc.), however, are adjusted using the 1, 2, and 3H knobs on the sensor board. Parts which leak vacuum pressure at high level (MELF, etc.) are adjusted using the 1, 2, and 3L knobs. The 1, 2, and 3M knobs should be adjusted to somewhere between the H and L knobs.

1, 2, 3H knobs > 1, 2, 3M knobs > 1, 2, 3L knobs
← High vacuum pressure

(7) If the adjustment conditions of the H, M and L knobs are not consistent with the indications in the data, parts may be thrown away each time and a recovery operation initiated, or chip parts may stand on the PCB. When loading SOPs with Type 8 and 9 nozzles, the M or L level should be used.

(8) When loading parts whose vacuum pressure sensor level is unknown, use the appropriate nozzle and jaws and pick up and center the part. Check which of the three LEDs lights, and set that level (H, M, L) in the data as the level for that part.

(9) The vacuum pressure may change because of factors like a clogged nozzle (water,oil, dirt). Always make sure nozzles are cleaned once a day. Also, if the L level LED comes on and stays lighted when no part is being picked up, erroneous operation may result, so be careful if this occurs.

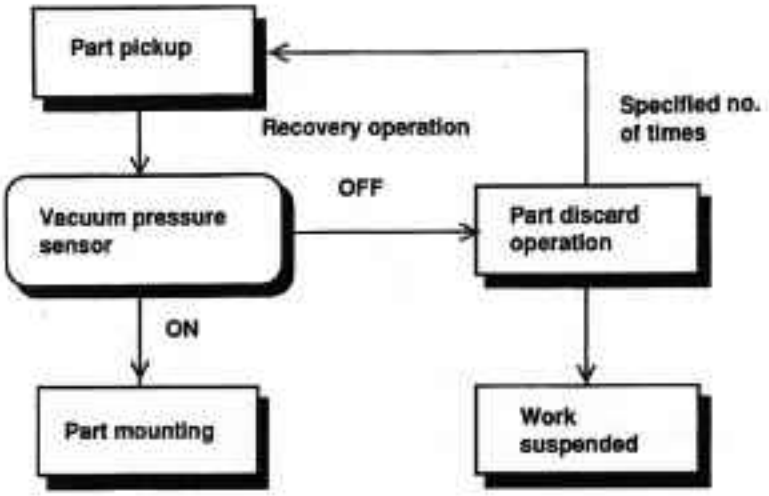
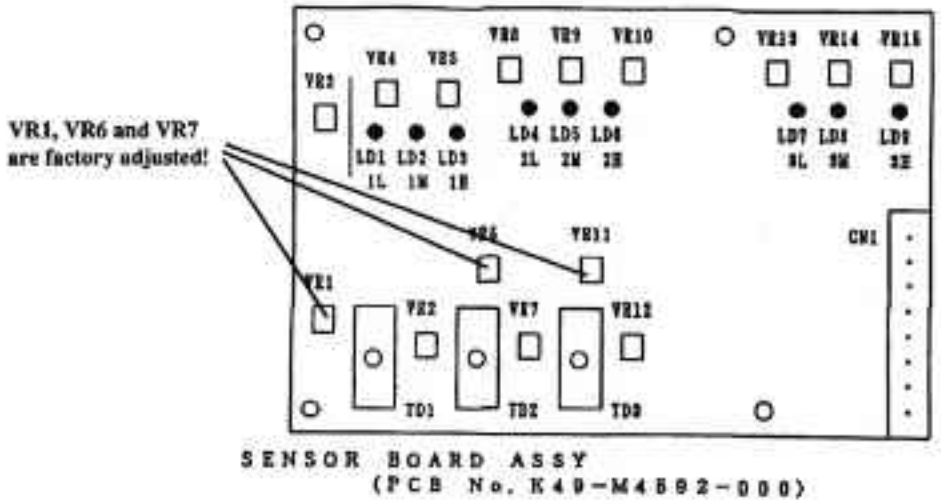


Fig 4-25



SENSOR BOARD ASSY
(PCB No. K49-M4592-000)

VR: Variable resistor for adjustment
TD: Transducer for pressure detection
LD: LED which lights when ON

Fig 4-26

(2) Replacing tape reels — See Fig 4-30

a. Feeders are attached to and removed from the feeder plate by moving the clamp lever shown at the right in the direction of the arrow. When the tape reel is empty, first remove the feeder from the mounter.

b. Detach the empty tape reel from the feeder, and check whether there are any chips or dirt sticking to the feeder.

c. With the tape holder lifted upwards, peel off the top tape (transparent) on top of the tape, as well as the carrier tape containing the parts. Then fit the top tape and carrier tape into position along the route shown in the diagram below.

d. Lower the tape holder to restrain the carrier tape. Check to make sure the guide hole of the carrier tape and the feeder sprocket have fit together properly.

e. Press the push-lever several times and make sure that the carrier tape feeds at an even pitch, and that the top tape fits properly between the two pulleys and feeds downwards at each press of the lever.

f. Set the brake lever on the tape reel.

g. The top tape and the carrier tape both drop downwards towards the front of the mounter. Set the optional empty tape box or a carton under the mounter to catch empty reels.

12, 16 and 24mm Air-driven Feeders

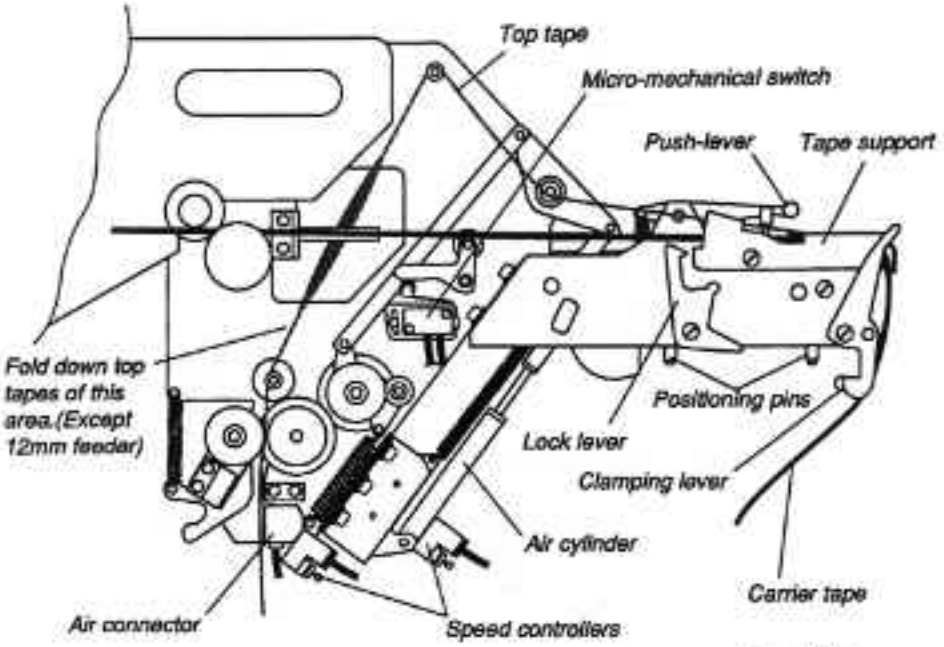


Fig 4-28

Fold down top tapes in this area.

32, 44mm Embossed Air-driven Feeders

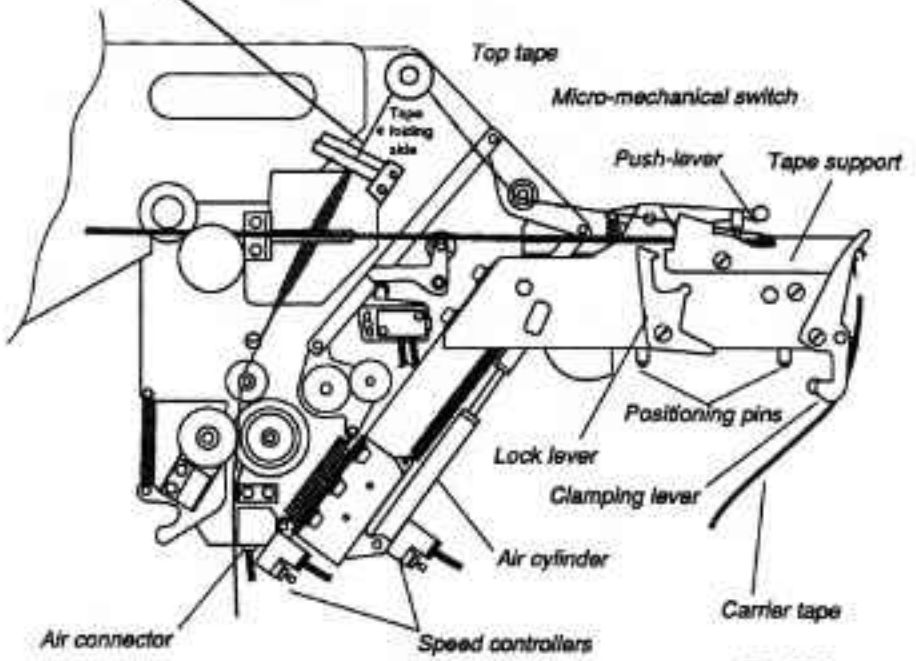


Fig 4-29

3-1

8 AND 12 MM MECHANICALLY -DRIVEN FEEDERS, 12, 16 AND 24 MM AIR-DRIVEN FEEDERS, AND 32 AND 44 MM EMBOSSED AIR-DRIVEN FEEDERS

(1) External diagram— See Fig 4-27, 4-28, 4-29

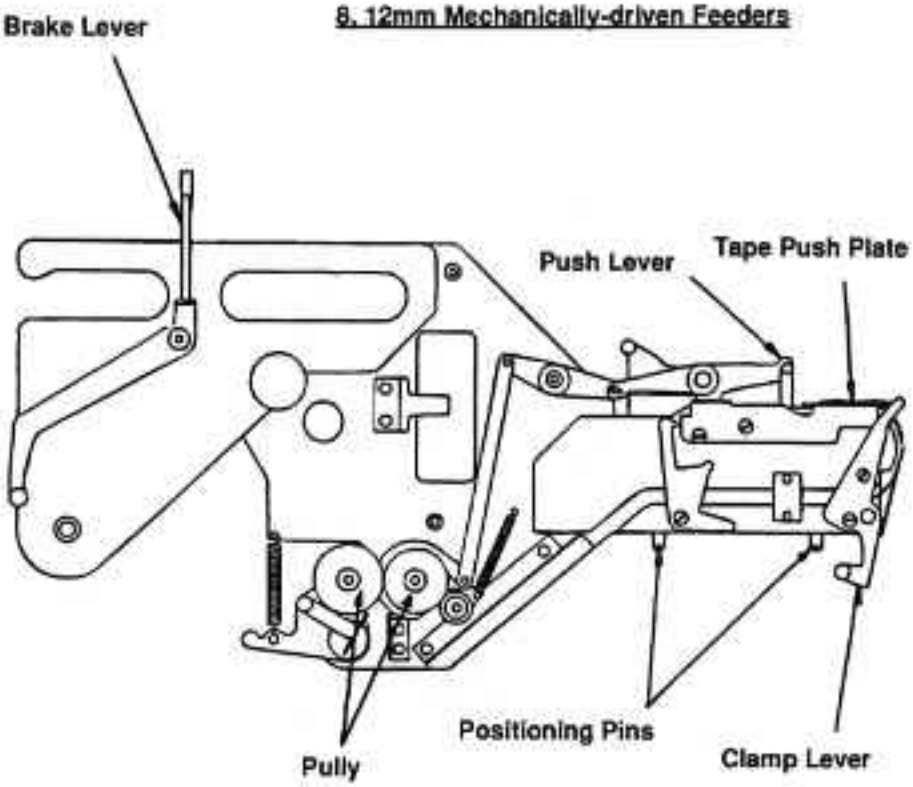


Fig 4-27

3) Irregular chip pickup, offset angle, offset position

No.	CAUSE	SOLUTION
1	Irregular workpiece pickup or large angle offset a. Nozzle tip is not reaching PCB, or is descending too far and sinking into workpiece. b. Notched grooves on inner and outer sleeves of chuck assembly do not fit properly. c. Nozzle or jaw is worn or scratched. d. Poor adjustment of vacuum pressure sensor	-> Adjust nozzle descent end. -> Align grooves correctly. -> Replace nozzle or jaw.
2	Small angle offset or position offset of workpiece a. Poor adjustment of jaw b. Nozzle or jaw is worn or scratched. c. Timer at descent end is too short. d. Water or oil is adhering to nozzle tip. e. Defective PCB positioning f. Offset caused by impact when PCB positioning is cancelled. g. No wave washer in chuck assembly	-> Readjust sensor. -> Readjust jaw. -> Replace nozzle or jaw. -> Lengthen timer. -> Clean nozzle. -> Readjust positioning. -> Slow descent speed of locating pins or pushup. -> Insert wave washer.
3	Nozzle is not picking up in exact center of feeder picking point.	Fine adjustment of picking point (NG may result if picking point is off from workpiece by about 0.2 mm)
4	Defective feed of feeder	Readjust or replace feeder.

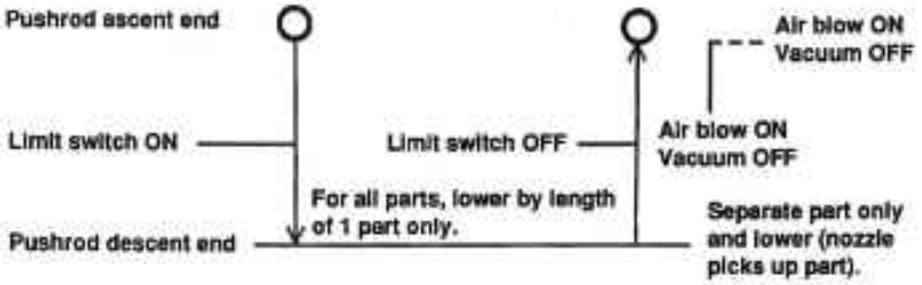
4) Mounting operation without workpiece

No.	CAUSE	SOLUTION
1	Vacuum pressure line of head is clogged.	Clean line.
2	Poor adjustment of vacuum pressure sensor	Readjust sensor.
3	Adjustment conditions of vacuum pressure sensor knobs H, M, and L are not consistent with data indications.	Correct data.

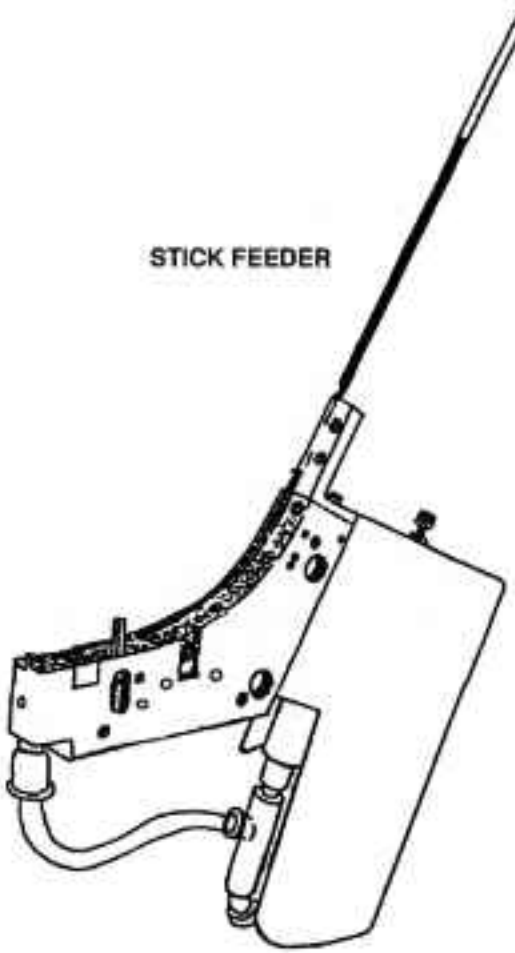
PNEUMATIC STICK FEEDERS OBSOLETE

3-2
STICK FEEDERS

(1) Stick feeder operation



STICK FEEDER



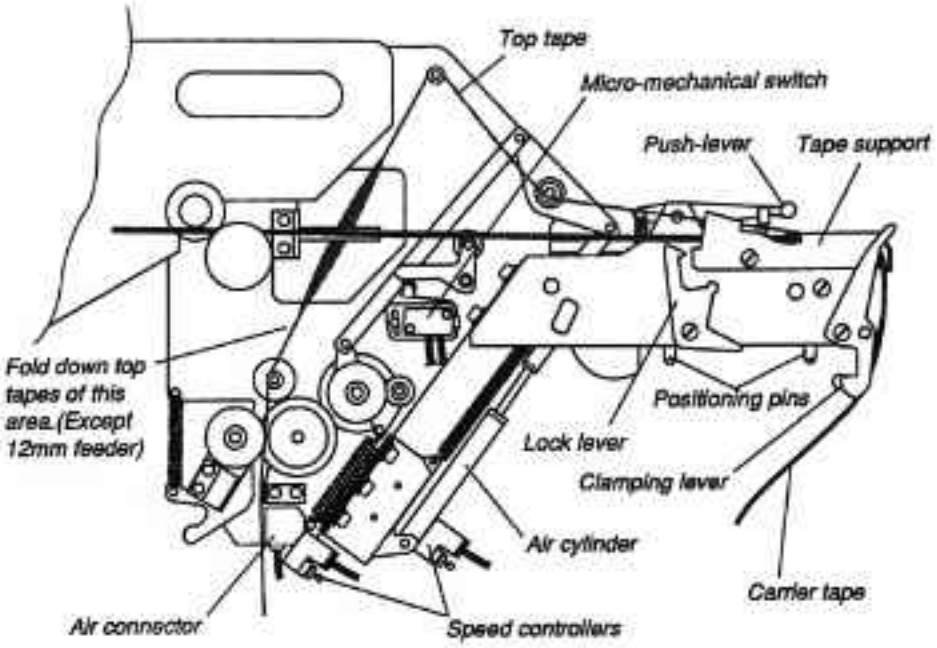


Fig. 4-32
Tape Channel for 12 mm, 16 mm, and 24 mm Air-driven Feeders

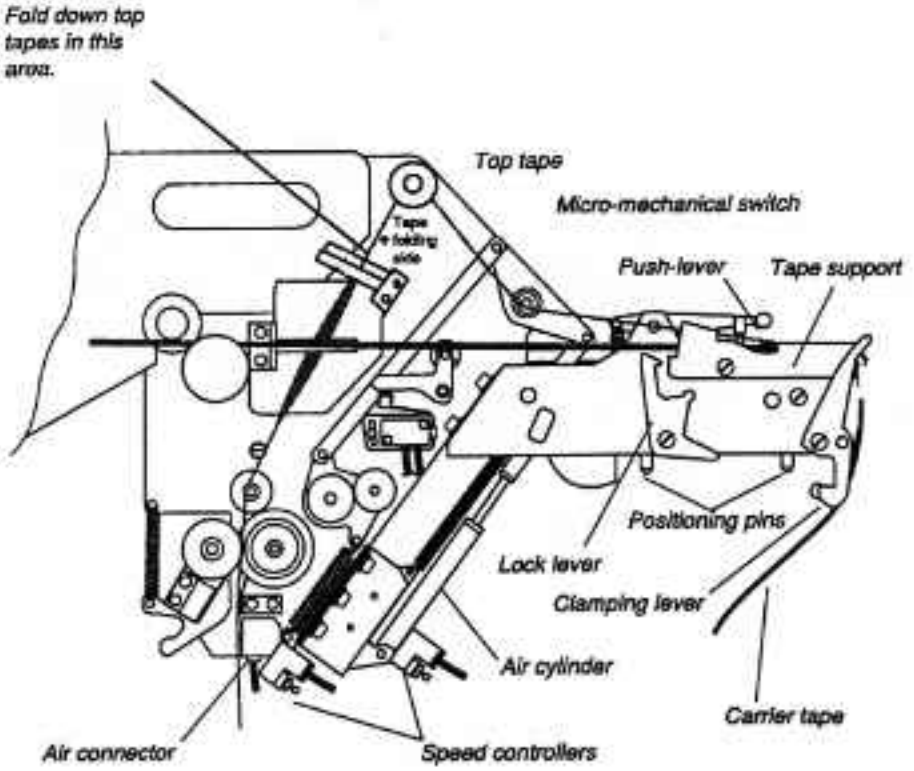


Fig. 4-33
Tape Channel for 32 mm and 44 mm Embossed Air-driven Feeders

(3) Adjusting the air speed for air-driven feeders

With air-driven feeders, the tape feeds by means of an air cylinder. The speed controller on the air cylinder section governs the speed at which the cylinder is drawn back in, and the speed controller on the air connector side governs the projection speed of the cylinder.
If the speed at which the cylinder is drawn back is too fast, the mechanical system may be adversely affected. Rather than opening the speed controller, leave it slightly closed.
The projection speed of the cylinder is different from the speed of the tape from which parts are supplied. If the cylinder speed is too fast, however, parts may be skipped, or the sprocket may come out of the guide hole, making it impossible for parts to feed accurately. The projection speed should therefore be set slightly on the slow side.

(4) Adjusting the stroke amount (feed pitch) of the air-driven feeders
--- See Fig 4-34
Depending on the type of tape, parts may be fed at a pitch of 4, 8, 12, or 16 mm. With air-driven feeders, the stroke amount of the cylinder can be changed to correspond to the pitch.

a. Loosen the two screws shown at the right.
b. Set the pitch to the desired length: 4, 8, 12, or 16 mm.
c. Tighten the two screws.

(5) Precautions regarding handling
a. Be careful not to drop parts, and to avoid sharp impact.
b. Make sure feeders and feeder plates are kept clean, with no dirt or grime on them.
c. Secure feeders tightly to the feeder plate. If a feeder comes off the feeder plate, it may bump into the head.
d. The separation force noted in the standards is sufficient for separating the top tape and carrier tape. If using a particularly strong tape, please consult a PHILIPS service centre.

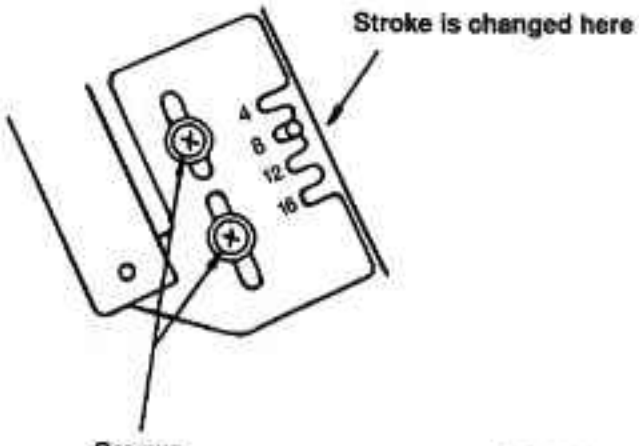


Fig 4-34

TAPE FEEDERS

Replacing Tape Reels

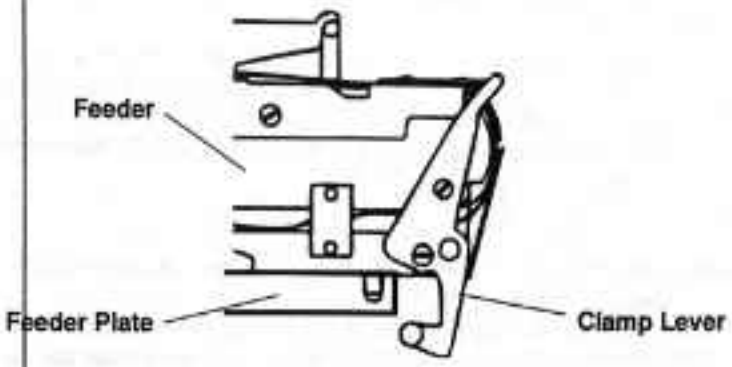


Fig 4-30

8, 12mm Mechanically-driven Feeders

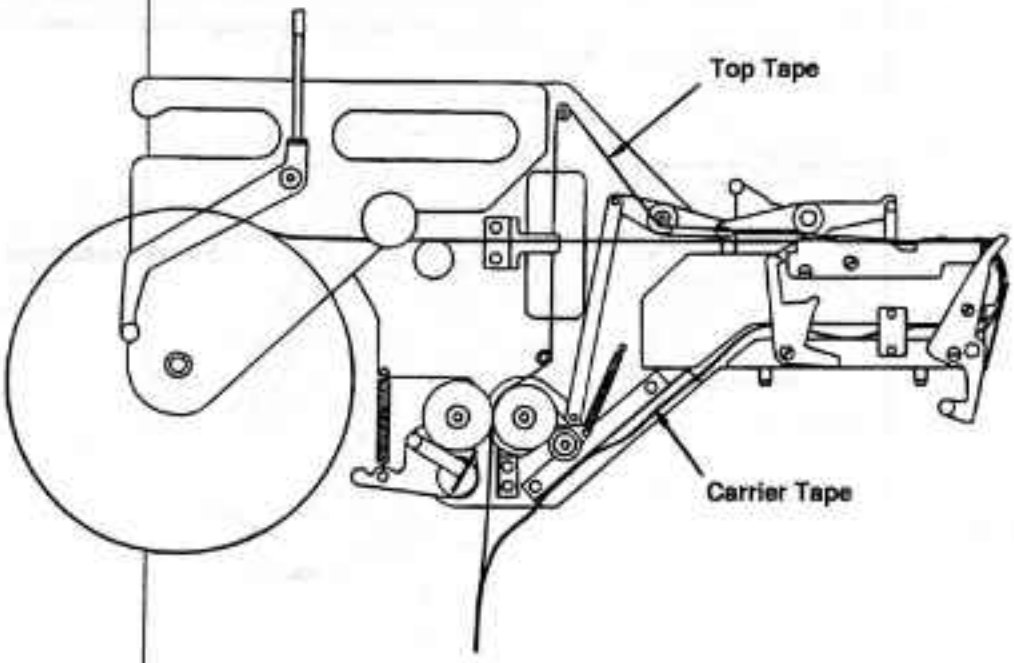


Fig 4-31

(3) Inserting a stick of components --- See Fig 4-39

Insert the stick of components into the stick guide at the top of the stick feeder. Leave about 5mm of space before it strikes the bottom, and remove the rubber stopper on the tweezer. Then insert the stick all the way in.

(4) Adjustment of air volume for pushing components --- See Fig 4-40

Components which slip and fall from the stick to the shooter are discharged by air through a hole partway down the shooter, and slide to the picking point of the head. Then they strike against the stopper, where they are held in place by suction.

Adjustment of the air supply for pushing components is performed using the knob shown in the figure at the right. If the knob is screwed clockwise, the air volume is increased, while moving the knob the opposite way decreases the air volume. The time that air is discharged is adjusted using the adjustment screw. If the screw is rotated to the right, the air supply discharge time is lengthened, and if the screw is turned to the left, the time is shortened. Set a stick feeder in place, and use an actual part to check whether the part is held properly in position against the head picking point. If not, perform adjustment accordingly.

(5) Adjustment of the components position --- See Fig 4-41

The chip stopper is held in place by the screw pan head. Loosen this with a Phillip's-head (plus) screwdriver and change its position. The stopper should be positioned so that chips can be correctly picked. If the position is incorrect, chips will not be picked up properly, so please adjust this carefully. But usually it.

(6) Adjustment of the chip latch --- See Fig 4-42

The components latch is used to dispatch components one by one. If the latch is protruding beyond the shooter surface, it cannot perform its function properly and has to be adjusted. Loosen the setscrew in the position shown at the lower right, and with a flat-bladed screwdriver rotate the eccentric pin from the opposite surface. Align it in the appropriate position and tighten the setscrew.

(7) Check after adjustment --- See Fig 4-43

Turn on the main switch of the CSM, and press the pushrod with your finger to check whether or not a components is supplied smoothly. When you take your finger off the pushrod, check whether the LED on the rear surface of the stick feeder lights. If it doesn't light, please consult a Philips service centre.

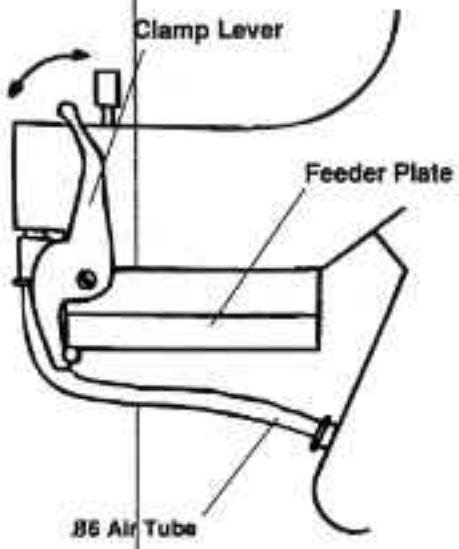


Fig 4-36

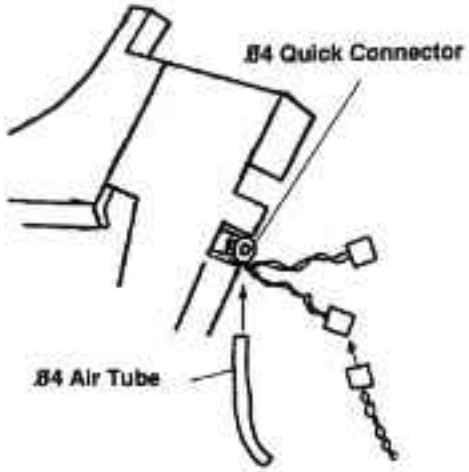


Fig 4-37

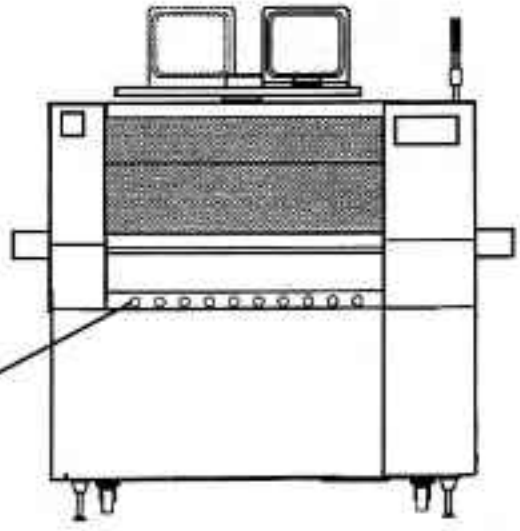


Fig 4-38

(2) Mounting stick feeders --- See Fig 4-36, 4-37, 4-38

1) Align the positioning pin in the bottom of the stick feeder with the pin hole in the feeder plate, and move the clamp lever shown in the diagram at the upper left in the direction of the arrow to attach and eject feeders.

2) As shown at the upper left, pass the ø6 air tube under the feeder plate and connect it.

3) As seen in the diagram at the right, fit one end of the ø4 air tube into the ø4 coupling at the back of the stick feeder, and connect the other end to the coupling attached at the position shown in the lower diagram.

4) There is a 24 V power supply connector coming from the controller section of the stick feeder. Connect it to the 24 V power supply connector coming from the bottom of the feeder plate on the mounter side.

PNEUMATIC STICK FEEDERS (OBSOLETE)

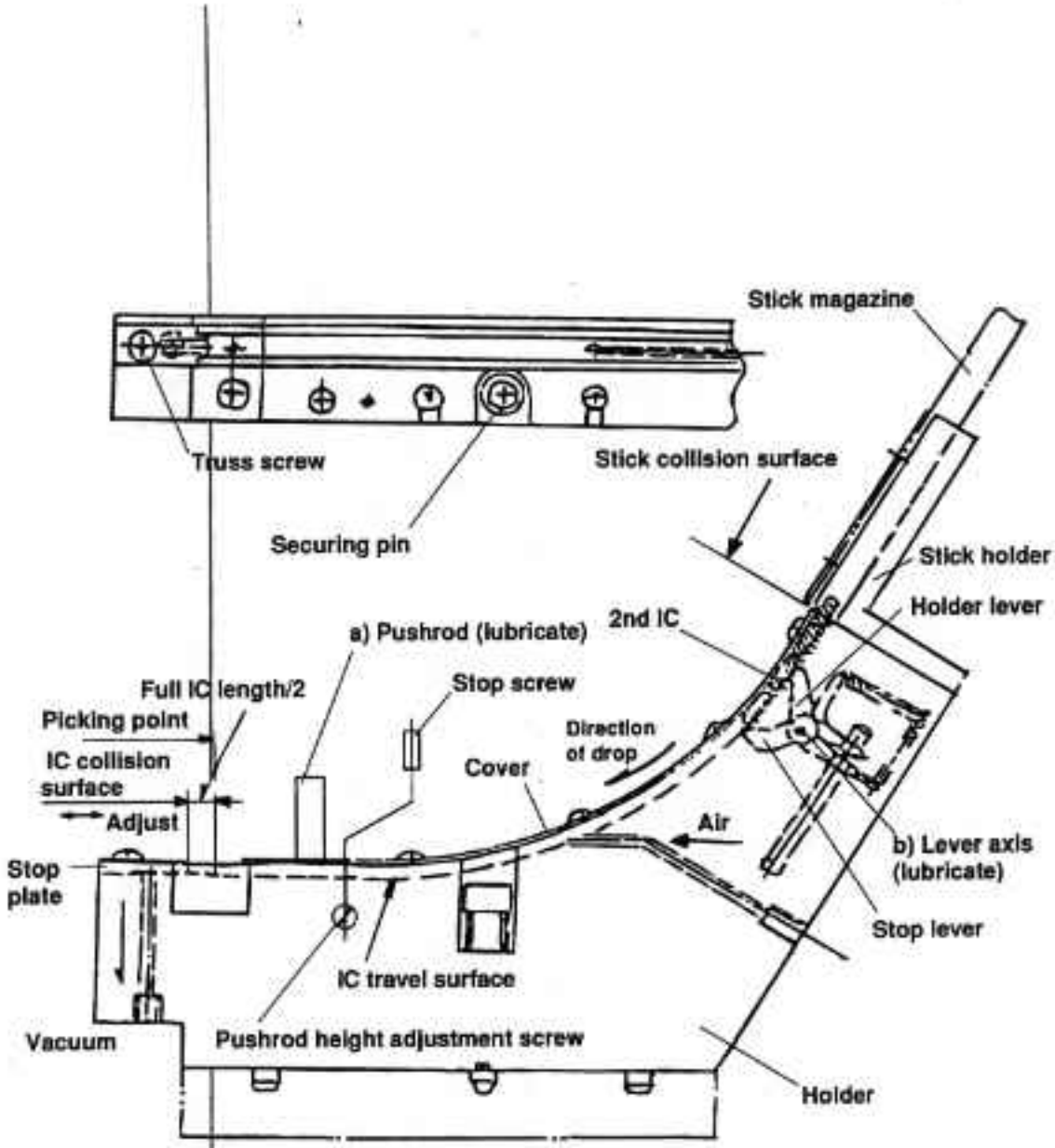


Fig 4-35

items:

- components which are going to be used
- package thickness
- component thickness
- heads of the CSM
- push-rods of the chuck and vision heads.

The following adjustments must be carried out after replacement of the reverse feed mechanism or when the mechanism is defective. Figure 4-43-1 and 4-43-2 can be used as a reference:

1) Check, and if required, adjust (loosen socket screw 'A' in the bearing-block first) the height between feeder-bar and top-surface of the pressure piece, with the reverse feed mechanism in *lower position,* in such a way that it is possible for the vision head to pick the component from the feeder. Normally this distance is 72mm as is indicated in figure 4-43-2 (the lowest point of the pressure piece when measuring this distance). In the rare case that the vision head cannot pick components with this 72mm height, lower the pressure piece (making the distance smaller) in such a way that the vision head can reach the component. The tolerance of these measurements must be within ±0.2mm

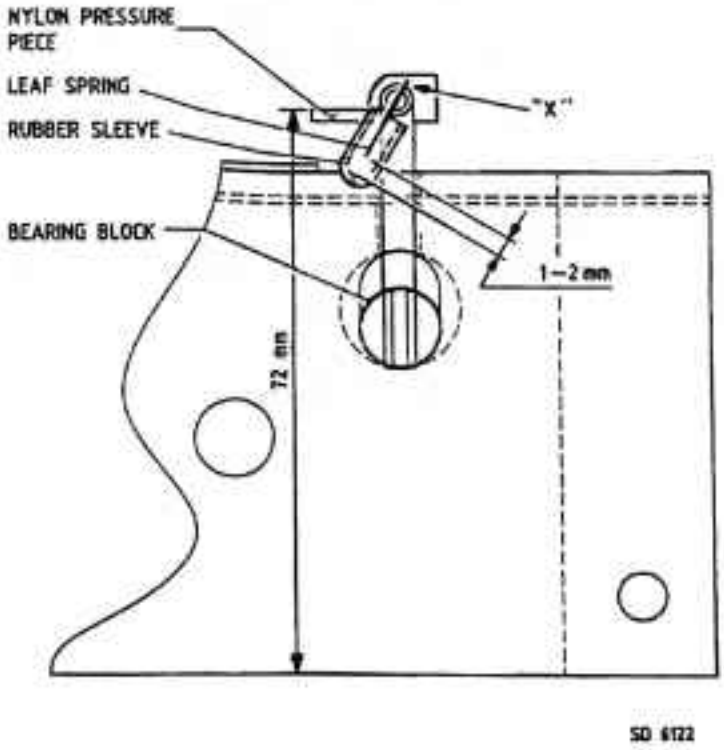


Figure 4-43-2

PA2697/2x GRAVITY STICK FEEDERS

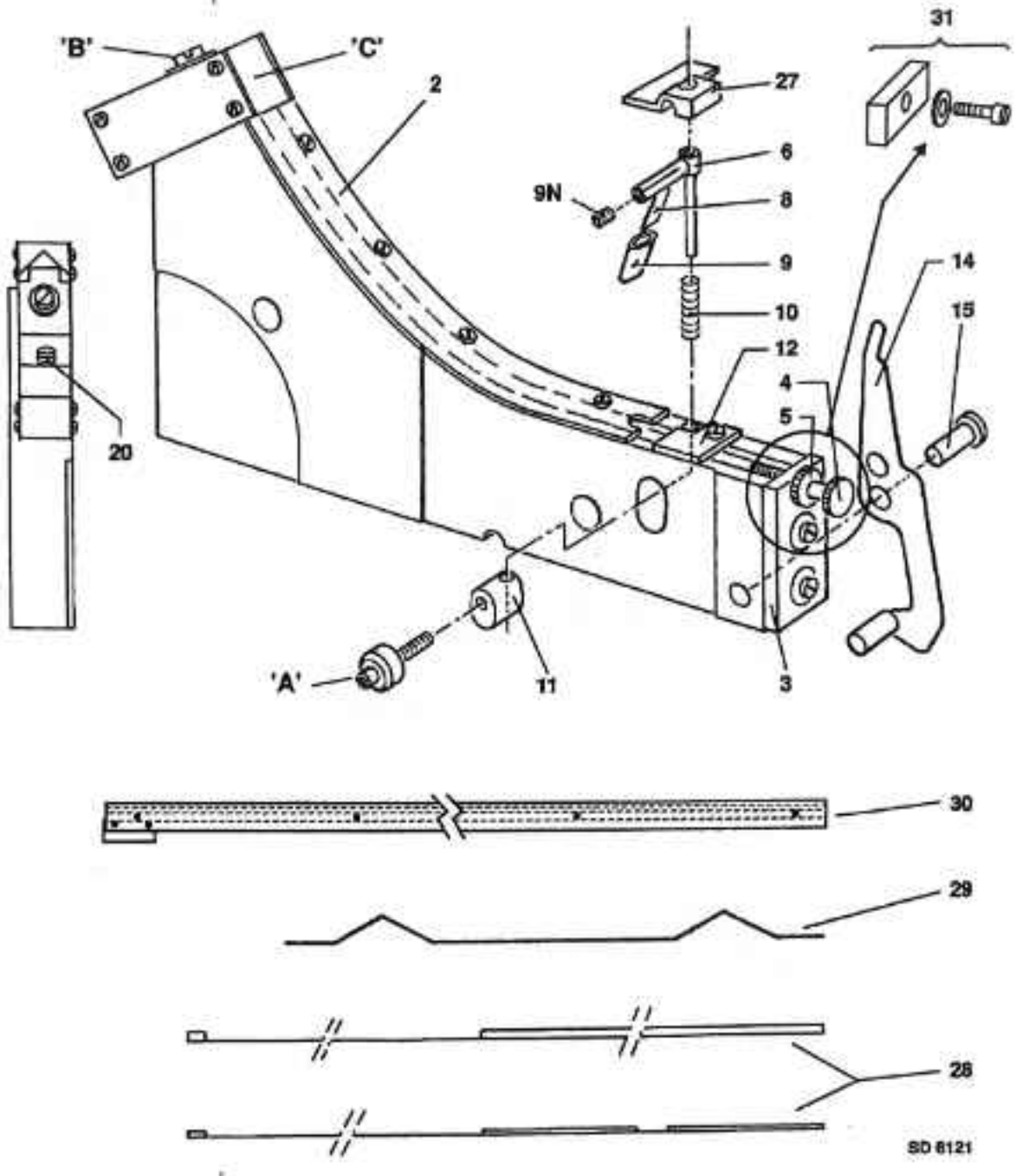


Figure 4-43-1

PA2697/2x GRAVITY STICK FEEDERS

3-3 Gravity Stick Feeder

Besides the pneumatic controlled stick feeder there is a stick feeder which works on gravity force.
Gravity Stick Feeders come in various block widths. These block widths refer to the width of the Gravity Stick Feeder in [mm]. The block widths and their type of Gravity Stick Feeders are devided in the following way:-

BLOCK WIDTH	GRAVITY STICK FEEDER
15	SO8/14/16
15	SSOP20
20	SO8L.....SO28L
20	SO16M
20	PLCC20
20	SSOP24 M51567P
20	SOP16 YM3016F
20	SOJ-20-24-26
25	SOXL / VSO40
25	PLCC28/32
25	SSOP36 M51564P
30	PLCC44
30	DL3-28S
40	PLC52/68/84

Thie availabilty of some feeders is subject to change

3.3.1. Placing the feeder on the feeder Bar.

- Bring the feeder to the correct physical position on the feeder bar.
- Pull the clamping lever (item 14) backwards and insert the feeder onto the feeder bar. Make sure the clamping lever is correctly wrapped around the front of the feeder bar.

3.3.2. Adjustments

3.3.2.1. Adjustmets of the Reverse feed mechanism

Under normal conditions the factory adjusts the height of the reverse feed mechanism to 72mm (see figure 4-43-2). THis 72mm is an average value for the CSM84V vision head. All other adjustments must be carried out at the customer site because they are depending on the toleances of the following

PNEUMATIC STICK FEEDERS (OBSOLETE)

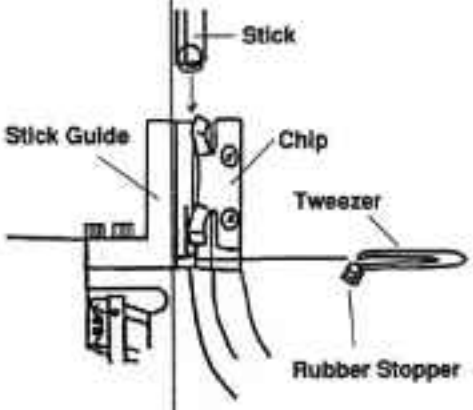


Fig 4-39

Side View of Stick Feeder

Fig 4-41

Front View of Stick Feeder

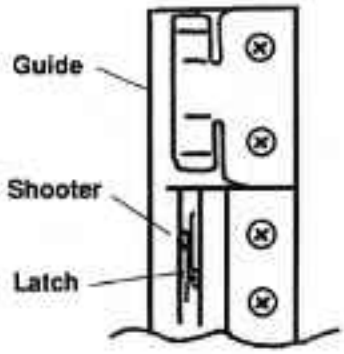


Fig 4-42

Behind View of Stick Feeder

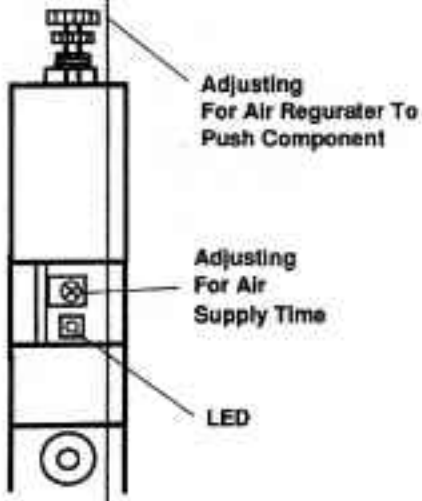


Fig 4-40

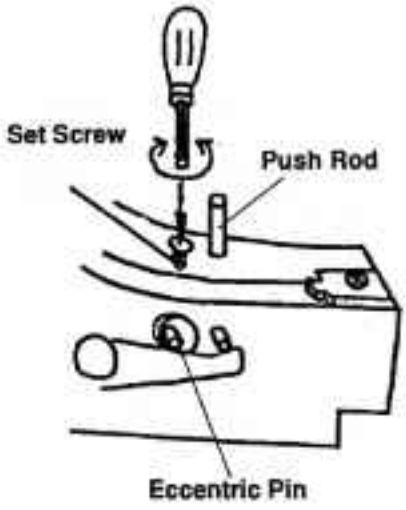


Fig 4-43

3) Loosen the socket screw '9N' inside the leaf-pin and adjust initially the leaf spring so it is not sticking out of the leaf-pin at the top side, see point 'X' in figure 4-43-2.

4) Thighten the socket screw '9N' a little

5) Mount the rubber sleeve on the leaf-spring. Make sure that the rubber sleeve rests against the leaf spring.

6) Check that the lower-end of the leaf-spring is ***not touching*** the lower part of the inner rubber sleeve.
Remark: This is a difficult measurement, but if the leaf-spring is touching the inner lower part of the rubber sleeve, indentation can occur which shortens the lifetime of the rubber sleeve (space should be approx. 1-2mm, see figure 4-43-2.

7) If the rubber sleeve is not touching the leaf-pin, retract the leaf-spring until the sleeve hits the leaf-pin. Repeat, if necessary, steps 4), 5) and 6).

8) Place a full stick with components onto the feeder, or, if the stick feeder is equipped with a fixed component stick; fill this stick with components.

9) Activate, preferably with the vision head push-rod, the reverse feed mechanism in such a way that the bearing-block (item 11) is completely downwards, then check if the component under the rubber sleeve is shifting back 0.1 - 1.0mm. If the distance is >1.0mm, reduce the length of the rubber sleeve and start again the adjustment procedure from 5) onwards. If the distance is <0.1mm, replace the rubber sleeve by a longer one and repeat the adjustment procedure from step 5) and onwards.

NOTES:

- *Do not bend the leaf spring.*
- *If a different component is going to be used in the GSF, a check and/or re-adjustment of the reverse feed mechanism is required.*
- *A large push-back distance will shorten the lifetime of the rubber sleeve.*
- ***Always** mount the rubber sleeve **against** the leaf-pin.*
- *The leaf-spring must not touch the inner lower part of the rubber sleeve.*

3.3.2.2. Adjustment of the Stick Clamp

A) Separate component tubes used:

Check if the stick-clamp is properly adjusted so that there is a smooth transition of the components **from the stick into the feeder and from the feeder into the stick**. If not, loosen bolt 'B' and adjust the clamp by shifting it in such a way that a smooth transition is obtained. Do this by moving the stick feeder + full stick up and down.

The stick-clamp adjustment must be carried out each time a different (in size) stick is going to be used. It is very important that the transition of the components from the feeder into the stick goes smoothly since the reverse feed mechanism is pushing the components back into the stick.

Recommendation:

*It is recommended to adjust the clamp for **one particular stick** and refill this stick without removing it from the feeder.*

B) Fixed component stick (item 30)

In case of a fixed component stick, item 'C' is replaced by the fixed stick assembly. This stick is, just like item 'C', attached to the feeder by means of bolt 'B'. The main function of the fixed stick is that adjustments should take place only once. Filling the stick feeder is done by emptying a component stick (which is delivered by a component factory) into the fixed component stick. By loosening bolt 'B', the stick should be adjusted in such a way that there is a smooth transition of the components **from the stick into the feeder and from the feeder into the stick.** It is very important that the transition of the components from the feeder into the stick goes smoothly since the reverse feed mechanism is pushing the components back into the stick. Thighten bolt 'B' when a smooth transition of components in the feeder is established.

3.4.3.3. Brake adjustment.

The brake is responsible for holding the components steady in the stick in order to allow the component in the pick-up position to be picked. The break should be adjusted in the following way:

step 1. Place a component under the spring of the brake and hold the pusher down.

step 2. Turn the spring with a 1.5mm allenwrench until the brake mechanism is lifted for 0.1 ~ 0.3 mm.

Fig. 3.4.3.3.1. Brake adjustment

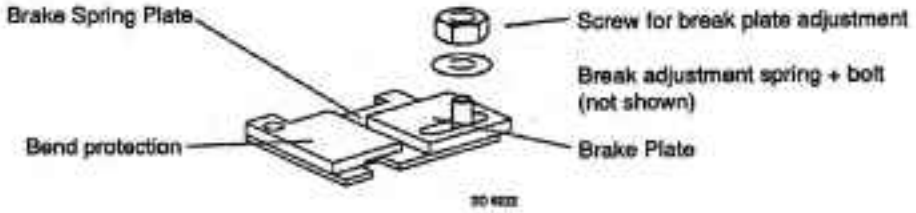


Fig. 3.4.3.3.2. Brake assembly

3.4.4. Running Conditions

3.4.4.1. Stick empty weight

Use the emptying weight to let the feeder run completely empty. When this stick empty weight is not used, it will case mispicks while the stick is not yet empty. But because there is not enough gravity force, the components cannot be pushed into the pick position.

3.4.4.2. AUTO-SET

The gravity stick feeder has the same pick position as with the tape feeders. UFOS does not allow the 'STICK' setting to be AUTO-SET. If it is wished to use this option, then define the stick feeder as a 8mm tape feeder. In this case the AUTO SET condition can be used for the gravity stick feeders.

3.4.3.2. Stop block adjustment.

All PLCC gravity stickfeeders /SF+ are equipped with a fixed stop block assembly. However, the SO, SOL and SOXL gravity stickfeeders are equipped with a 'slot adjustable' stop block. This is to support the various range of components that can be handled with the same gravity stick feeder /SF+. In this case, the following adjustments should be performed:

step 1. Insert at least 2 parts into the feeder.

step 2. Move the parts all the way to the stop block.

step 3. Hold the index pusher all the way down and check if the middle of the component is equal to the engraved line on the stickfeeder (engraved line is underneath the right jaw when viewing from the front).

step 4. If not, then adjust the top of the stop block to be positioned in that position where the component is located on such a way that its center is at the same height as the engraved line.

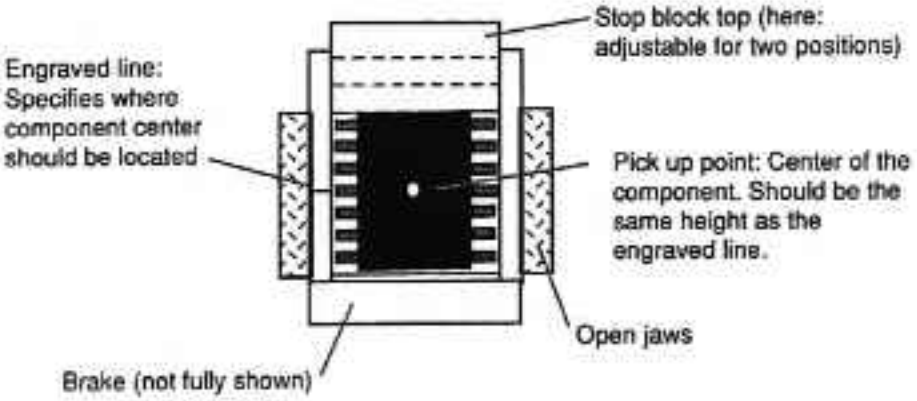


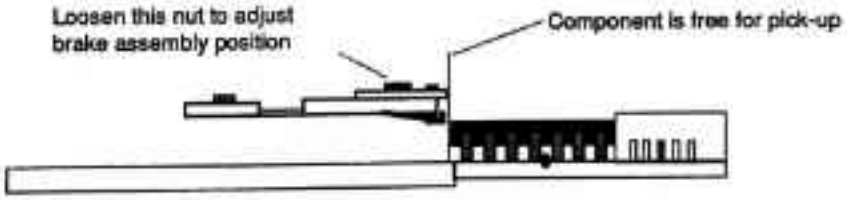
Fig. 3.4.3.2. Adjusting the stop block.

3.4.3.3. Brake plate adjustment

The brake plate should be located in such a way that the component, to be picked, is just completely uncovered (without activating the pusher).

step 1. Loosen the brake plate assembly with a 5.5mm socketwrench.

step 2. Move the brake assembly in such a way that the component, to be picked, is completely uncovered.



3.4.3. Feeder SETUP

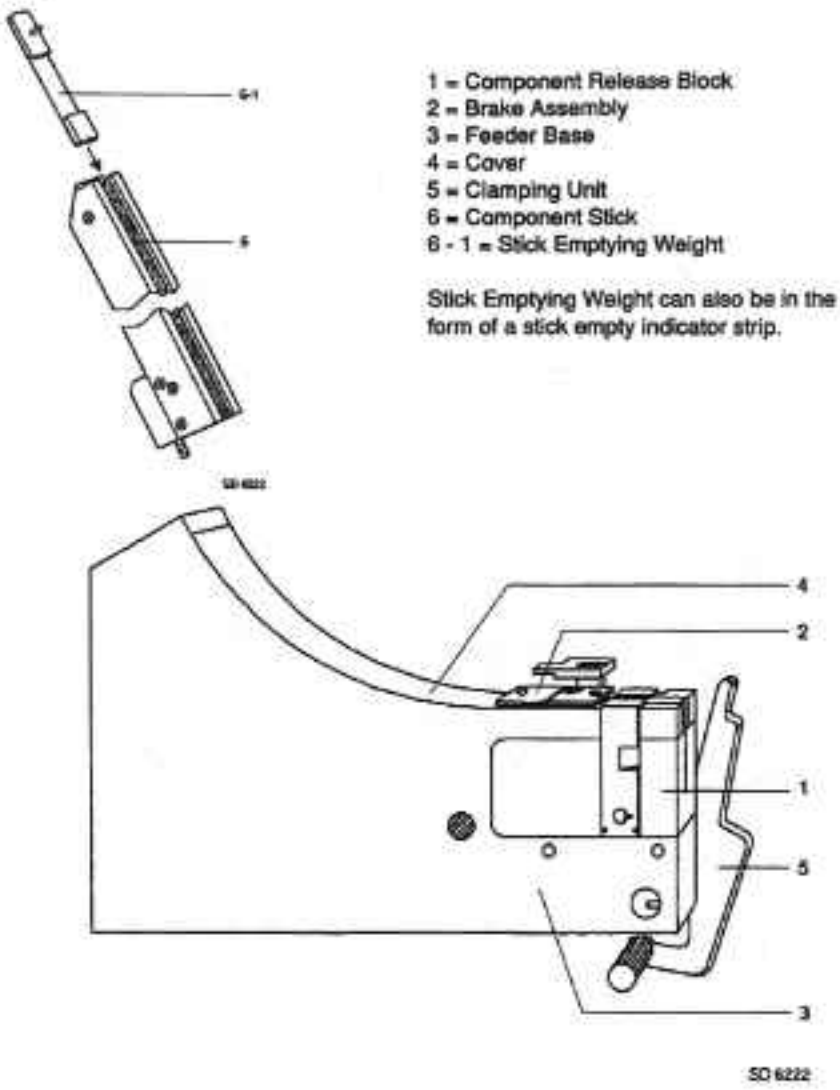


Fig. 3.4.3. Gravity Stick Feeder /SF+

3.4.3.1. Component stick (item 6).

The components slide only in one direction. Compared to the previous stick, no reversed feed mechanism is used. Therefore only the transition from the stick into the feeder base must be smoothly.

step 1. Take at least two components and insert these into the stick.

step 2. Check if the transition from the stick into the base is performed smoothly. If not, then perform the following steps:

1. Loosen the retaining bolt that secures the stick onto the feeder base.
2. Move the stick in the required direction in order to have the smooth transition.
3. If the correct position is obtained, then secure the stick to the feeder base by means of fixing the retaining bolt.

3.4. GRAVITY STICKFEEDERS /SF+

The gravity stickfeeders /SF+ are a follow-up of the standard /SF stickfeeders. The main difference between this new stick and its predecessor is the new pick-up mechanism. By gravity the components will arrive in the component release block assembly. The jaws on the release block will prevent the components from jumping out of the feeder due to the force behind the components. During pick of the component, the pushrod activates the feeder index mechanism in the release block. This mechanism activates the brake. The brake will hold all components in the stick on its place. It activates the release mechanism also, which pulls the component, by means of the rubber strip on the release block, 0.3mm forward. The component is now free from any obstacles and can safely be picked.

3.4.1. Available Gravity Stickfeeders /SF+

The following gravity stickfeeders are commercially available:

PA NUMBER	COMPONENT(S)
PA2697/30	SO8, SO14, SO16
PA2697/31	SO8L ~ SO28L
PA2697/32	SOXL, VSO40
PA2697/33	PLCC20
PA2697/34	PLCC28
PA2697/35	PLCC32
PA2697/36	PLCC44
PA2697/37	PLCC52
PA2697/38	PLCC68
PA2697/39	PLCC84

Table 3.4.1. Available Gravity Stickfeeders /SF+

NOTE

The list of available stickfeeders is as per November 1, 1993 and is subject to change.

3.4.2. Installation

Step 1. Bring the feeder to the correct physical position on the feeder bar.
Step 2. Wipe the feederbar clean to make sure that there are no obstructive items located under the feeder.
Step 3. Pull the clamping unit (item 5 in figure 3.4.3.) backward and insert the feeder onto the feeder bar. After insertion, secure the stickfeeder by means of the clamping unit. Make sure this clamping unit is fully wrapped around the feeder bar.
Step 4. Empty a stick with components into the gravity stick feeder.
Step 5. Insert the stick empty weight (refer also to section 3.4.6.).

Removing feeders is performed in reverse order. For the PA2697/30 feeder removal, please read section 3.4.7. first.