Manual

for

MicroJet

Direct Legend Printing System

Installation Manual

MJL7161D/MJL6151L Model

User of Installation Manual: *Unless otherwise specified, Installation Manual will be used by a trained personnel who has enough knowledge about electrical equipment.*

The manual is written using the Model MJL7161D, but MJL6151L also have similar features and operation except for the size of the printing table and for one Shuttle instead of two. User is requested to use discretion while using the specific model

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1. Introduction

The MicroJet DLP (Direct Legend Printer), prints legends on PCBs. It utilizes a splendid inkjet process that combines a special printer Head and UV treated high viscous ink. Thus MicroJet DLP removes the need to design, build, and maintain, costly silk screens for legend printing. This allows for high quality, high-resolution legend printing without the labor-intensive process usually associated with legend printing.

MicroJet is an advanced system that uses digital process to print the legend pattern directly on PCB utilizing Gerber or barcode data. The printer is run with the application software, MicroJet, from a PC that could be installed on the top of the MicroJet Panel with the help of fixtures (PC Arm). The PC could also be installed separately. There is no need for films and silk-screen frames anymore. This Ink Jet Printer, equipped with high viscous UV curable ink and specialized Head, prints on demand only the required information on the PCB.

Fig.1.1 represents the MicroJet Printer with it front cover taken off in order to show the printing Head inside the enclosure. There is a Dual Table, called Shuttle, on the front of the Printer to set the board to be printed.

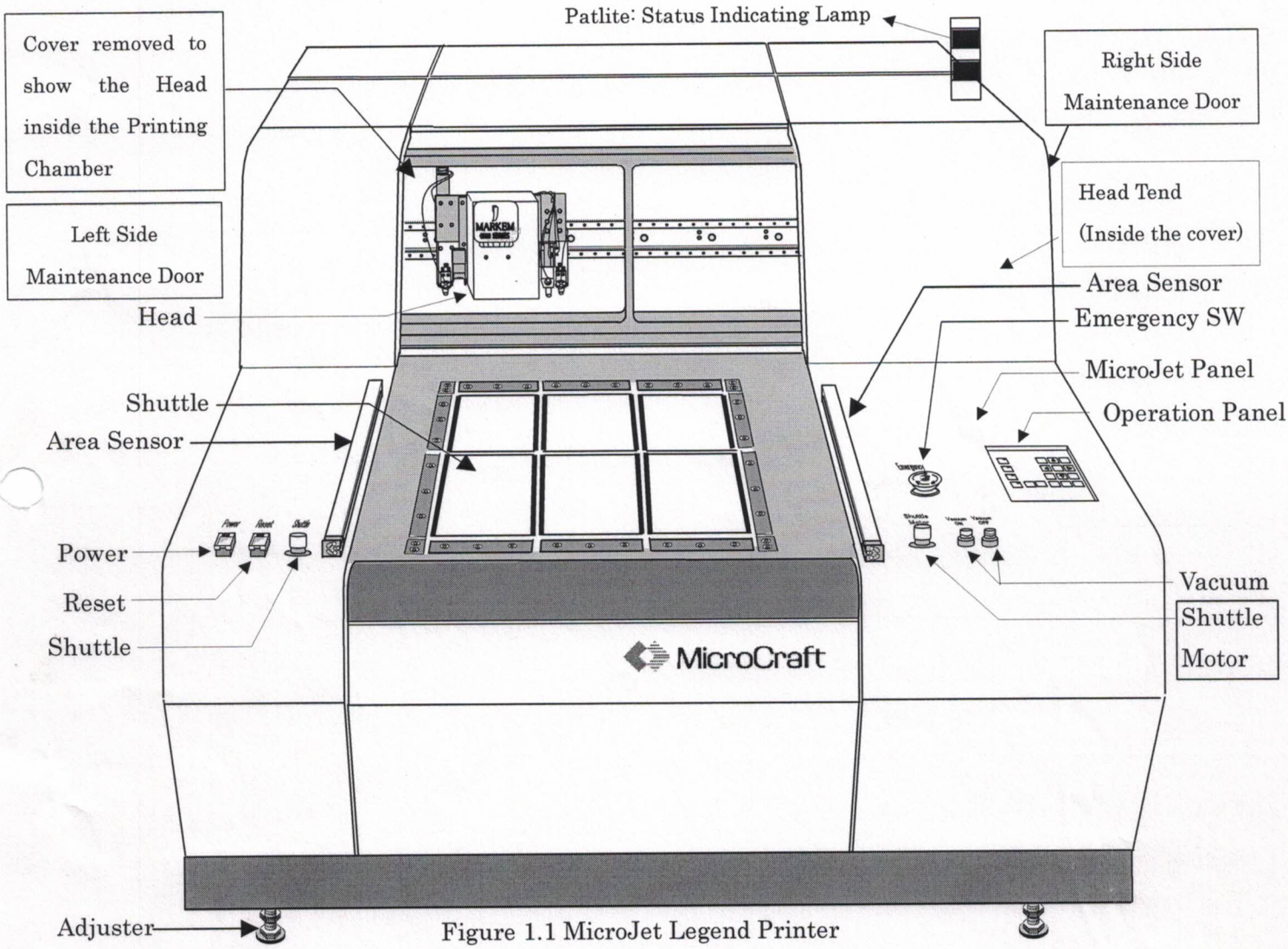


Figure 1.1 MicroJet Legend Printer

2. Structure of MicroJet and Unit Operations

2-1 MicroJet main Components

MicroJet Legend Printing System is mainly composed of a Printing Chamber, Shuttle, Operation Panel and different Operating Switches.

(1) Printing Chamber: It contains the Markem Head that moves along X (left and right) and Z (up and down) directions on LM guided ball bearing axis along X and LM guided KR along Z directions. High powered 3 phase motors are used for travel along X and Y directions. Printing Chamber also contains Head Tend that cleans the printing Head.

(2) Shuttle: The printing board is set on the Shuttle Table located on the front and the Vacuum is switched ON to adhere the board on the Shuttle Table. Then it is

shuttled to the rear end right under the Head for printing. The Shuttle moves along Y (back and forth) direction on LM guided ball bearing axis. The Head moves left and right to drop ink on the board and print the predetermined Legends on it. Once the printing is done, the Shuttle brings the board back to the front for the user to unload it. There are dual Shuttles, one on the top and one below. The user sets board on the bottom Shuttle when the Top Shuttle is in operation at the other end with the Head printing on the previous board. As soon as the top Shuttle returns to the front with the printed board, the Bottom Shuttle is sent towards the Head-end with the next board for printing. The surroundings (front, left and right edges) of the Shuttle Table have Safety Curtain Area sensors to prohibit any access on the Table area during the printing operation.

(3) Operation Panel: The buttons allow movements of the Head in different directions and setting of different speeds at low, medium and high. They are also used during camera alignments on home position and fiducials.

(4) Power, Reset, Vacuum, Shuttle and Emergency SW: *Power SW* switches the power on to the printing system along with the PC. *Reset* resets the hardware of the printing system. *Vacuum SW* switches the Vacuum ON/OFF. There are two *Shuttle buttons* on the two sides. Once the Vacuum is ON to hold the board on the Shuttle Table, pressing both the Shuttle buttons on the two sides carries the Shuttle Table to the rear end right under the printing Head. Two hands on the two sides on the Shuttle buttons assure safeguards against putting any hand on the Table or in front of the edge. The right *Shuttle* button combines the operation of *Motor SW* too. *Power SW* only initializes the Printer Control boards and electrical devices, but not the motors. *Motor SW* switches them on. After putting power onto the printer along with the PC, the *Motor SW* is pressed to switch the Servomotors on. *Emergency SW* disengages all the motors and stops all the moving units instantly.

(5) Adjuster: These wheels are used to level the machine and install it vertically straight on the ground.

(6) Patlite: Signaling status lamp mounted on the top of the machine to indicate the test conditions and results. Indications are made by color and sound. There are two indications: Green and Orange. Normally, a green indication means a successfully completed printing operation, while an orange indication means an interrupted printing not completely finished. An emergency stop by pressing directly the Emergency SW or by tripping of any sensor or tripping of power is also indicated by the orange indication along with the alarm.

(7) Left and Right Maintenance Door and the Maintenance Mode: The left and Right

Maintenance Door lets access inside the Printing Chamber for the maintenance of Head and Head Tend respectively. Since only trained maintenance personnel has the authority to access inside, the maintenance door are normally locked. Opening the maintenance door on either side in a normal operating mode trips the 3-phase motor and brings all moving members to a standstill right away. There is a *Maintenance Mode Key SW* inside the Right Maintenance Door. Switching the key to Maintenance mode bypasses the Side doors in the Motor control circuit and a successive pressing of the Motor SW puts power onto the Motors and allows movements of the head and Shuttle again. The maintenance mode thus allows movements of the Head and Shuttle with the two side doors opened for maintenance purpose. Head height, camera focus, warp sensor adjustments are carried out on the Head accessing the Left Maintenance Door, while ink replacement and Head Tend maintenance are carried out accessing the Right Maintenance Door. After the maintenance, the mode selector is switched back to normal operating mode and then side doors are closed. In this condition, opening either of the Side doors will trip the motors and prohibit any movement of the Head or Shuttle.

2-2 Head and Head Tend

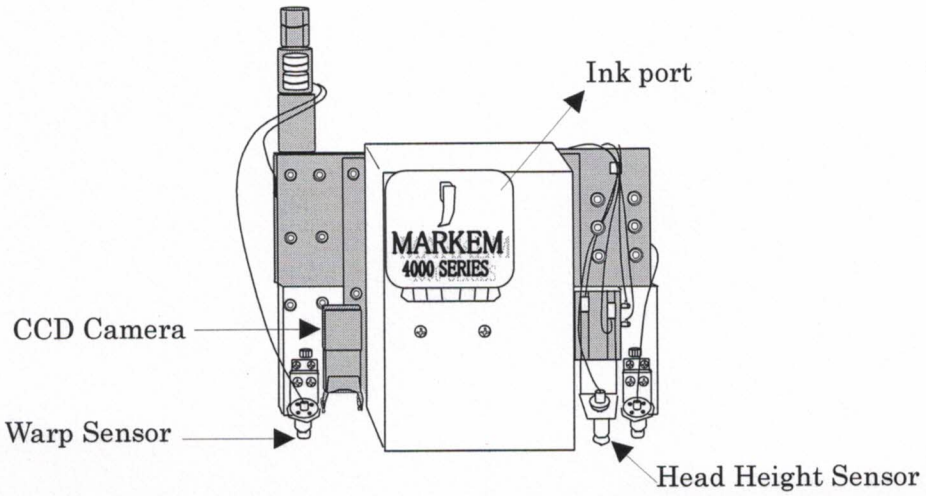


Figure 2.1 The Head

2-2-1 Head

(1) Ink Port: Once ink is finished, new ink cartridge is inserted through the Ink port

(2) Head Height Sensor: It allows adjustment to maintain the Head at a predetermined distance from the board.

(3) Warp Sensor: It informs the operating system if there is any warp on the board and stops the printing operation once the warp crosses allowable height.

(4) CCD Camera: It allows aligning the Head on a reference point on the board just before the printing. The camera is also used during calibration of the printing system.

2-2-2 Head Tend

It cleans the array of the nozzles that drop ink on the board during printing. During maintenance, required commands are executed from the application software window to bring the printing Head right over the top of the Head Tend (see Fig.2.2 below) and then have the Head Tend clean the array of nozzles under the Head.

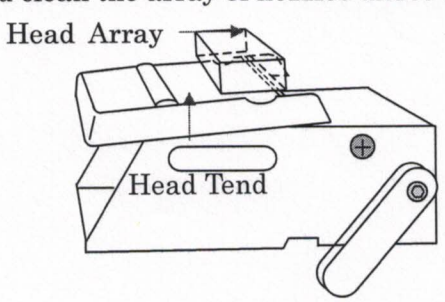


Figure 2.2 The Head Tend

2-2-3 Operation Panel

The operation panel (Figure 2.3) consists of buttons and indicators. Some indicators are provided along with the buttons so that they indicate the state of the respective buttons. This panel is a very important part of the machine, because, besides the computer operation, the operator operates mostly on this panel to run the machine. Following describes the functions of the buttons, however, for a complete operation, the Operation Manual is to be consulted.

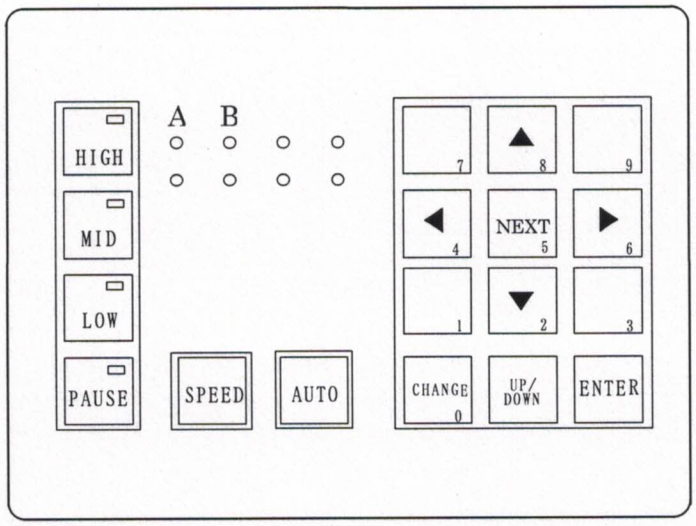


Figure 2.3 Layout of operation panel.

SPEED: Changes the speed of moving Head and Shuttle. This works along with the other three keys/buttons, namely, HIGH MID and LOW. As the name implies, they correspond to setting of high, medium and low speed respectively. While moving the Head/Shuttle manually, the speed is set by first pressing SPEED, and then pressing the button that corresponds to the intended speed (high, medium or low).

HIGH, MID, and LOW: One of these lamps is turned on according to the current speed. These buttons become functional after SPEED (see SPEED) is pressed. All the buttons have their own indicators, which are on when the respective buttons are active or chosen.

PAUSE: In the middle of a printing, it pauses the printing while pressed. A consecutive press on the button releases the pause and resume the printing operation.

AUTO: Not used in MJL7161D

CHANGE: Switches the Shuttle between the Top and Bottom to engage it into operation

UP/DOWN: Not used in MJL7161D

ENTER: Acknowledges an operation and terminates a process or an event consisting of a single operation or a sequence of operations initiated by a command or pressing of a key/button.

Button Operations: Buttons are mainly used to move the Head and the top and Bottom shuttle in different directions; Head is moved along up-down (Z) and left-right (X) while Shuttle is moved along back and forth (Y). The aforementioned units are moved with the help of the FORG command (see later section in this manual). While maneuvered into the move mode, Button 4 and 6 move the Head left and right respectively while Button 8 and 2 move the Shuttle back and forth respectively. Button 9 and 3 move the Head up and down respectively while Button 1 and 3 allow selecting the Top and Bottom Shuttle respectively for movement after pressing the CHANGE button. LED A and B light indicating respectively the Top and Bottom Shuttle presently engaged in operation. While Head height Adjustment is carried out sending command from the MicroJet software (see Head Height Adjustment in the later section), Button 8 and 2 move the Head up and down respectively.

Note : A few other indicators are not in use, but provided, to cope with the future development of the machine.

2-2-4 Emergency Stop Button

This is a knob-type red button placed left to the Operation panel. To make it distinctly

visible, it has a yellow circular pad as its background. This switch is engaged or released as the situation demands.

Pressing or engaging the button: While pressed, it remains in its depressed position cutting the power supply to all the motor-drivers and thereby stopping all motion of Head and Shuttle instantly. Usually, emergency switch is pressed

- For any emergency situation, like, fire or burn inside the machine, or any kind of hazards.

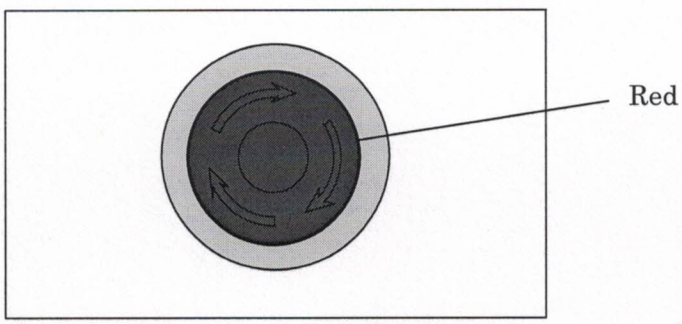


Figure 2.4. Emergency stop button

- When the machine goes out of control, like, some unusual movement of the Head or Shuttle. There are sensors to limit the movement of the moving units. A sensor may not work and consequently, one moving unit may cross the limit set by that sensor, and hit any neighboring support structures.
- For unintended movement of the moving units initialized mistakenly by the operator.

Releasing the button: A turn in the clockwise direction (the direction is marked on the button as shown in Figure 2.4) releases the button and restores the power back to the motor-drivers. This restoration of power involves the operation of Motor switch too; switching the Motor SW right after releasing the Emergency SW switches the servomotors on. Only that, sometimes, a *pdreset* (see Mechanism test later in this Manual) is necessary to obtain a steady operating state.

2-2-5 Normal Operation and Maintenance Mode

The Printer is in a Normal Operation mode when the two Maintenance doors on

the left and right sides of the Printer are closed. The maintenance doors are to be opened for certain adjustment and maintenance works. In normal operating mode, the motors trips off the power when either of the Maintenance doors are opened. The noral operation mode is switched to Maintenance mode in the following way (see (7) of section 2.1):

(1) Open the Maintenance (left or right) door with the help of locking keys. The motors trip off.
(2) Open the Right Maintenace door if the door in the (1) above is the left one.
(3) The mode select key is at the opening of the Right Maintenace door. Insert the key in te mode-select key and turn it to Maintenace mode.
(4) Press the Motor SW on the Right-Front panel. It puts power onto the mtotrs.
(5) Carryout the necessary maintenace/adjustment works with the Maintenace door opened.
(6) After finishing the maintenace/adjustment work, switch the mode select back to Normal Operation mode. The motor will again trip off.
(7) Close and lock both the Maintenace doors. Switch the motors ON by pressing the Motor SW. The Printer is now back to Normal Operating Mode.

3. Installing the Printer

A very simple system organization is required to run the printer. The only device needed to have the machine operate is a computer. Figure 3.1 outlines the machine and the external accessories that constitute the entire system. This section describes installing the connections, adjustments and testing required to put the machine to its operating condition.

3-1 Location of Installation

The machine is meant for indoor use with clean environment. It should not be placed in the outside. The installation site should be strong enough to withstand the weight (see weight of 'Different particulars of EMMA' at the beginning of the Manual) of the machine. If the machine is placed against a wall, enough space should be left on the back so that one can get access in to the machine from the back. There are power and air supply connections and bolted (by screw) steel sheets on the back of the lower half (Cabinet) of the machine. Therefore, the machine should be placed at least one meter from the wall so that Power and Air supply connections can be made with ease and the bolted steel covers on the rear can be taken off as well in a situation that requires accessing the machine from the rear side. This space also serves the purpose of ventilation of the machine too. Nothing should be placed near or around the main and emergency switches.

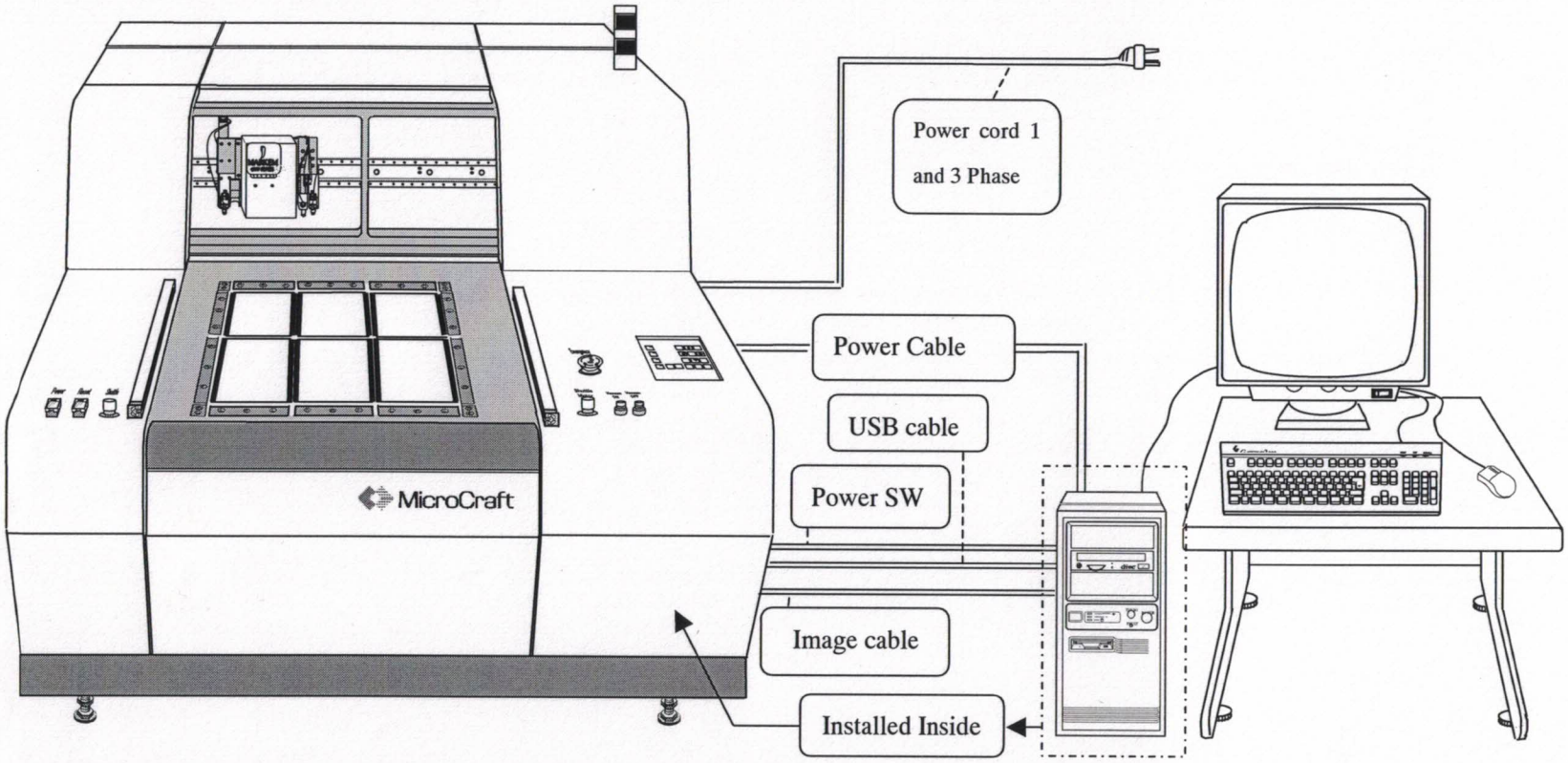


Figure 3.1 Entire MicroJet Operating system: the Printer and the accessories it is connected to.

3-2 Erection of the Printer

The machine should be erected on a flat floor or basement. With the help of Adjusters, the machine is to be installed such that it stays vertically straight and completely stable on its place.

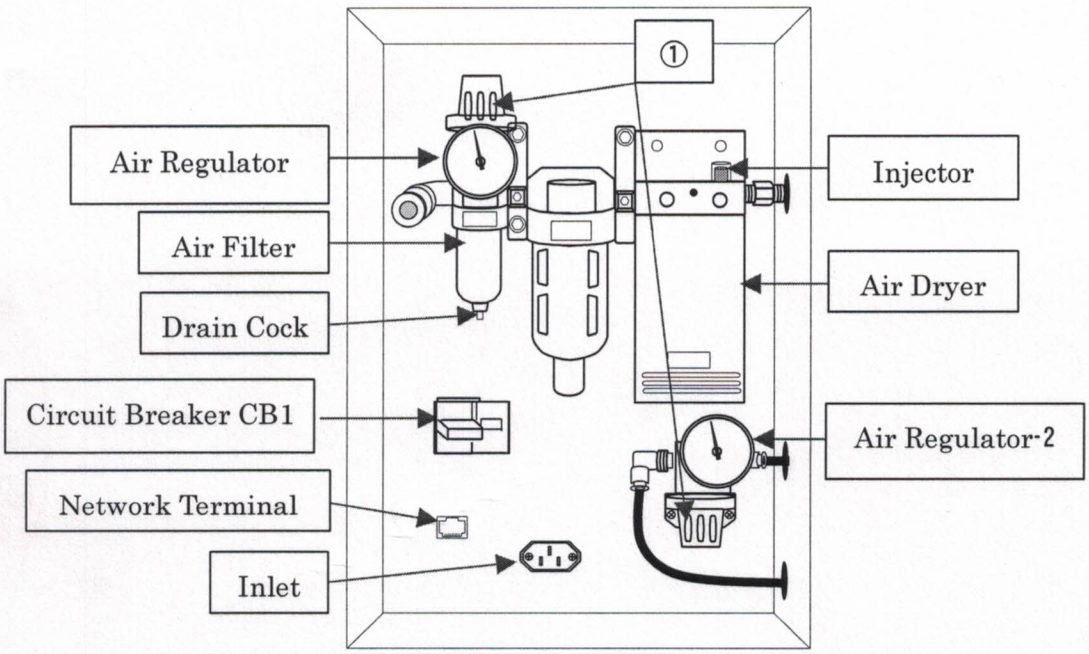


Figure 3.2.1 Back Panel for Single-Phase Supply on the left

3-3 Making connections to the Printer

The machine is connected to rated three and single-phase power supply and a computer. Six connecting cords (see Figure 3.1) are supplied along with the machine. Among them, 2 are used to connect the machine to the 3 and single-phase power supply, and the rest 4 are connected between MicroJet and the PC for power connection of the PC, image process and Data transfer. The PC is installed inside the MicroJet inside the Cabinet on the right side; it is shown outside of eth Printer in Fig.3.1 just to explain the connections. The Power Cable supplies power to the PC from the AC single-phase input of the MicroJet, while the Power SW Cable connects the Power SW of MicroJet to the PC to switch the PC ON with the Power SW of MicroJet. USB cable is used for the Data transfer.

3-3-1 Connecting the Printer to Power Supply

A three pin, 10 A, 50/60 Hz, 240V power cord, which has a socket at one end and a plug at the other, is used for connecting the machine to a power supply.

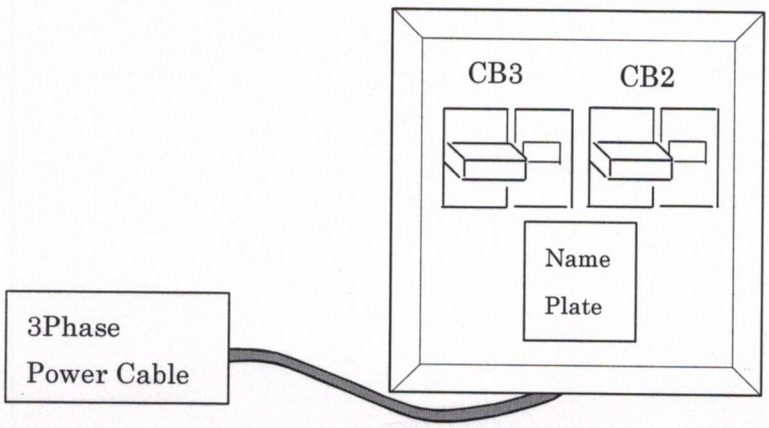


Figure 3.2.2 Back Panel for 3-Phase Supply on the right

3-phase supply uses 4pin 10A 440V power cord. The Single-phase and 3-phase power cords are connected to the Printer on the left and right back panel as shown in Fig. 3.2.1 and 3.2.2 respectively. Note that single-phase power cord is connected to the inlet on the Panel, while 3-phase power cord is passed from the bottom of the respective panel to install the connection.

3-3-2 Connecting the Printer to PC

The connections to be made between the printer and the PC are as follows

- USB cable: Connect it to the USB port of the PC. This is used to transfer command and data between Printer and the PC.
- Image cable: Video capture card is already preinstalled in the PC. Connect the Image cable to the Video Capture port. This cable is employed to transmit image data between Printer and the computer
- Power and Power SW cable: Hook up the Power cable onto the power inlet of the PC. It receives power supply from the AC single-phase input power of the Printer. Connect also the Power SW cable inside the PC drive. There are two connectors, replace the PC switch connections with the red-black wire connector, and connect the other orange-black wire connector to the spare connections of the switching power regulator of the PC. On switching from the Power SW of MicroJet, the orange-black wire activates relays to initialize the

power-control circuit of MicroJet and Markem Controller.

Note that after the connections, the PC is installed inside the MicroJet.

3-3-3 Connecting the Printer to Compressed Air Supply

With the help of coupler, hookup the air duct from a compressed Air Supply onto the inlet of the Air Regulator shown in Fig. 3.2.1. Pull up the cap at ① shown in the figure and rotate the cap left or right to adjust the pressure to 0.3MPa. After the adjustment, push the cap back to its locked position.

3-3-4 Connecting the Printer to Vacuum Pump

Connect the 2 Vacuum pump ducts to the two inlet located on the right of the left back panel of the Printer. The two vacuum pump regulates the top and bottom shuttles independently.

3-3-5 Installing Signaling Status Lamp on the Printer

As the Signaling Lamp protrudes outside of the cabinet or enclosure of the machine, during shipment, it is disconnected from the main body of the machine and sent in a separate package along with the machine. It is done for the safety of this device and ease in shipment of the machine. It is then connected again to the main body when the machine reaches the customer's end.

- Mechanical Connection: Fit the Lamp on its location on the top if the printer with the help of nuts and screws.
- Electrical Connection: Patlite (Signaling Lamp) connection wiring hangs from its bottom inside the Printing Chamber. Accessing from the Right Maintenance Door, connect the Patlite wiring on the MicroJet side to the bottom of the Patlite with the help of the male and female intermediate connectors.

4. Install the Application Software

Install the MicroJet software that came along with the tester. Save the MicroJet.INI and other related files as instructed in software manual.

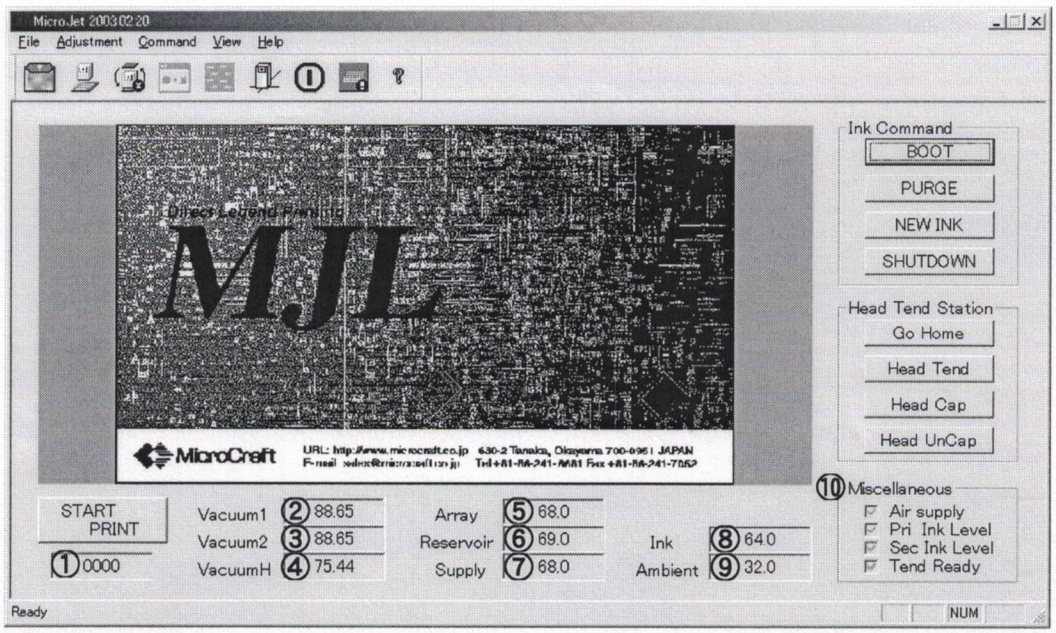
5. Application Software Window

It displays the condition of each operating unit.

[Procedure]

(1) Double click and open the MicroJet icon  displaying on the desktop.

(2) The following MicroJet software window opens up.



The following describes the parameters shown in the bottom section of the Microjet window

① Debug Window. Usually, it doesn't require any attention

② Displays the vacuum pressure in the Primary Reservoir

③ Displays the vacuum pressure in the Secondary Reservoir

④ Displays the pressure in High Vacuum

⑤ Displays the actually measured temperature in the Head Array (Setting value 68℃)

⑥ Displays the actually measured temperature in the Ink Reservoir (Both Primary and Secondary; Setting value 68℃)

⑦ Displays the actually measured temperature in the Supply Reservoir. (Setting

value 68℃)

⑧ Displays the actually measured temperature in the Supply Reservoir of Ink. (Setting value 68℃)

⑨ Displays the actually measured temperature inside of the Head (No Setting value)

⑩ Displays information on the condition of the following units

Item of Unit	Status and Condition	Displayed Checked
Air supply	Displays whether air is supplied to Head Tend	Air is there
Pri Ink Level	Displays whether there is any remaining ink in the Primary Reservoir	Ink is there
Sec Ink Level	Displays whether there is any remaining ink in the Secondary Reservoir	Ink is there
Tend Ready	Displays whether Head Tend is ready for use	Ready for use

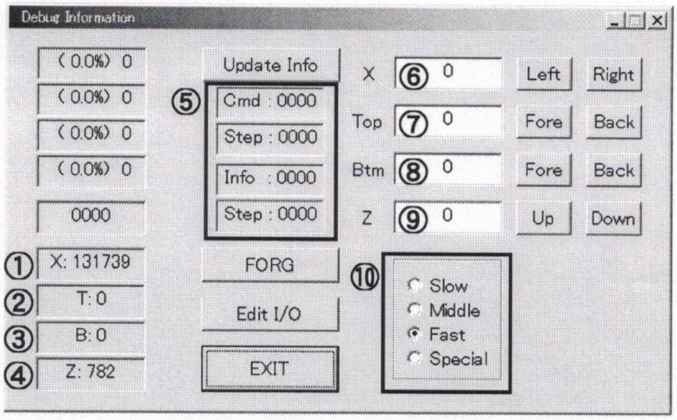
6. Status Information

It displays the present status of each operating unit. It also provides the mechanism to move the moving units.

[Procedure]

(1) Double click and open the MicroJet icon  displaying on the desktop.

(2) Select [Status Information] form the [Help] menu. The following Status Window pops up; check each status.



※All the units of distances are in pulses

① Displays the X distance from the home origin of the Head

② Displays the Y distance from the home position of the Top Shuttle

③ Displays the Y distance from the home position of the Bottom Shuttle

④ Displays the Z distance from the home origin of the Head

⑤ Displays the command under execution and the conditions in use. This is only used during debugging, hence in usual normal operating condition, its not paid any attention.

⑥ Moves Head along X direction by the amount indicated in the list box. There are two buttons, Left and Right; the Head moves towards left and right as the buttons are pressed respectively.

⑦ Moves the Top Shuttle by the amount indicated in the list box. There are two buttons, For and Back; the Shuttle moves towards the front when For is pressed, and to the rear when Back is pressed.

⑧Moves the Bottom Shuttle by the amount indicated in the list box. There are two buttons, For and Back; the Shuttle moves towards the front when For is pressed, and to the rear when Back is pressed.

⑨ Moves Head along Z direction by the amount indicated in the list box. There are two buttons, Up and Down; the Head moves towards up and down as the buttons are pressed respectively.

⑩ ⑥~⑨ executions require their speed to be indicated. Following 4 types of Speed can be selected.

Slow	Low Speed
Middle	Medium Speed
Fast	High Speed
Special	Speed during Printing

7. Mechanism Test

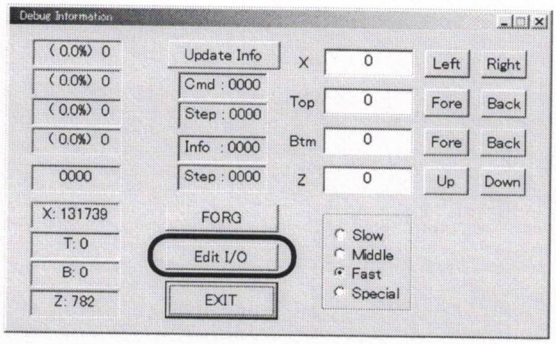
It conforms whether each sensor responds properly.

[Procedure]

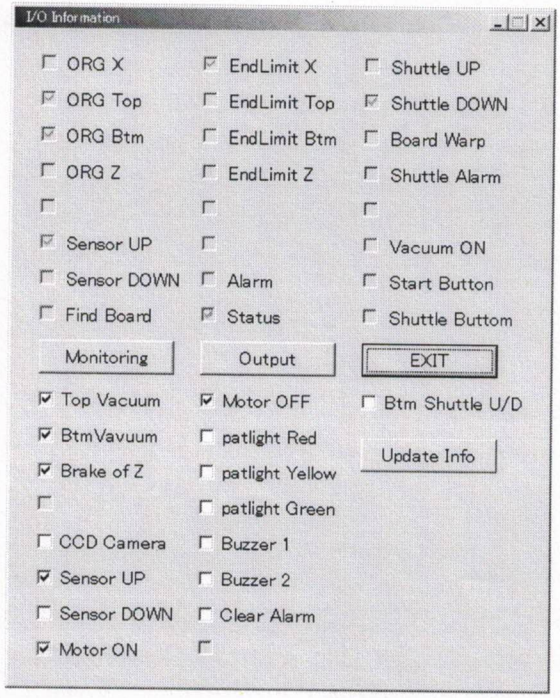
(1) Open MicroJet

(2) Select {Status Information} from the [Help] menu.

(3) The following dialog pops up. Click on the Edit I/O button.



(4) As the following dialog is displayed, confirm a proper response of each sensor.



Following describes the contents of all the parameters.

[Input Information]

It displays present status

ORG X	Detects the Head moved towards the left end terminal
EndLimit X	Detects the Head moved towards the right end terminal
ORG Top	Detects the Top Shuttle to be in the extreme front
EndLimit Top	Detects the Top Shuttle to be in the extreme rear
Shuttle UP	Detects the Bottom Shuttle to be in the extreme top position
Shuttle DOWN	Detects the Bottom Shuttle to be in the extreme bottom position
ORG Btm	Detects the Bottom Shuttle to be in the extreme front
EndLimit Btm	Detects the Bottom Shuttle to be in the extreme rear
ORG Z	Detects whether the Head is in its up position
EndLimit Z	Detects whether the Head is in its down position
Board Warp	Detects whether the printing board has any warps
Shuttle Alarm	Detects whether the Shuttle is entangled with anything on the front
Sensor UP	Detects whether the board detecting sensor is in its up position
Sensor DOWN	Detects whether the board detecting sensor is in its down position
Vacuum ON	Detects whether the Vacuum is ON
Alarm	Detects whether there is any alarm from the Servo pack
Start Button	Detects whether the Start button (Vacuum OFF button) is pressed
Find Board	Board detecting sensor detects whether there is a board
Status	Detects whether there is any record of any motor power down in the past
Shuttle Bottom	Detects whether both the SHUTTLE button on eth 2 sides are pressed simultaneously

[Output Information]

After checking in or taking the check off the box, clicking the Output button activates the function of the respective box

Top Vacuum	The Vacuum of the Top Shuttle is switched ON/OFF
Btm Vacuum	The Vacuum of the Bottom Shuttle is switched ON/OFF
Motor ON Motor OFF	Usually not used As a default, both have checked status □ Motor ON = Motor is OFF ? Motor OFF Similar to when EMERGENCY is pressed ? Motor ON □ Motor OFF = Motor Reset (= PDRESET Command)
Btm Shuttle U/D	Moves the Bottom Shuttle UP/DOWN. Be careful not to collide one shuttle with another
patlight Red	Switches the Red lamp of the Patlite ON/OFF
patlight Yellow	Switches the Yellow lamp of the Patlite ON/OFF
patlight Green	Switches the Green lamp of the Patlite ON/OFF
Brake of Z	Applies/releases the upward/downward directed brake of the Head
CCD Camera	Switches the Camera LED ON/OFF
Buzzer 1	Buzzer1 goes off and makes sound
Buzzer 2	Buzzer2 goes off and makes sound
Sensor UP	Puts the Board detecting sensor in its up position
Sensor DOWN	Puts the Board detecting sensor in its down position
Clear Alarm	Clears the power down record of the motor

※ Be very careful while hitting the Output button. A wrong operation or setting may lead to collision of the two Shuttles, collision of the Head with the Shuttle, etc

8. Editing the Environment Setting File

[HARDWARE]
PitchX=10
PitchY=10
HeadToClean=751 ;Z distance of the Head from its home origin while carrying out Head Tend Operation
HeadToBoardHigh=5145 ;Distance between Head and the board with head at high
HeadToBoardLow=5238 ;Distance between Head and the board with head at low
CameraDefHi=0
CamToSens-X=9000
CamToSens-Y=5000
ShuttleType=1
PrintSpeed=2 ;Head travel Speed (0=25inch/Sec, 1=12.5inch/Sec, 2=6.25inch/Sec)

[IMAGE]
ImageProcess=4 ; Indicates the type of Image processing (depends on the video card)
ImgPixel=2 ; Completion value for Image processing
ImageWait=50 ; Wait value during acquisition of the Image
ImageWait2=30 ; Wait value during Image acquisition after the 2nd one

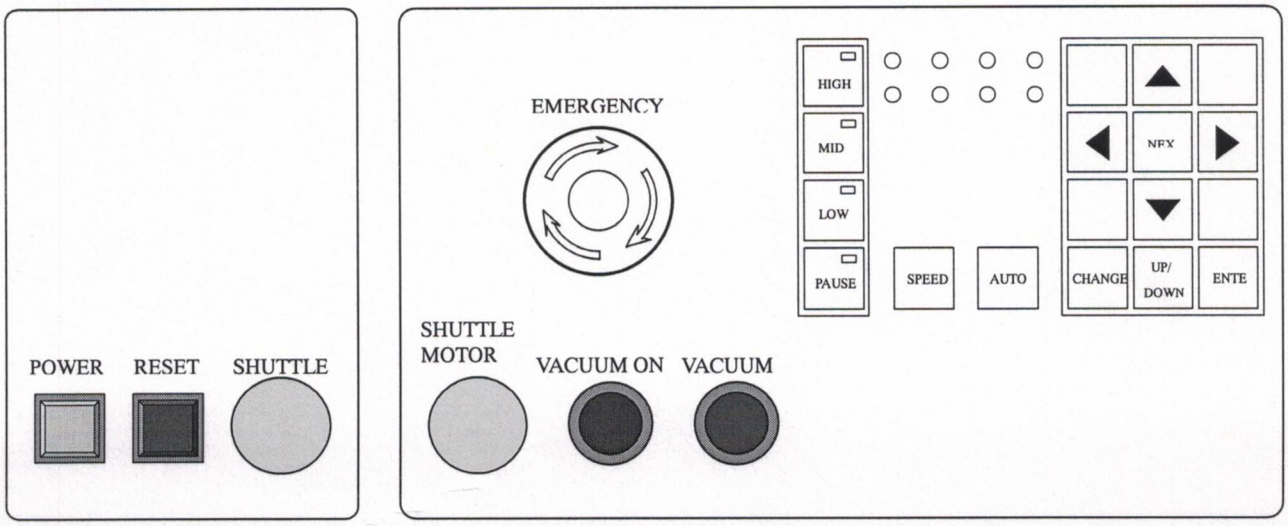
[NETWORK]
MarkemIP=172.16.2.54 ; IP address of the Markem Controller
MarkemPort=4000
DataFolder=C:¥DATA

[CPDATA]
ORG-X=27000 ; X coordinate of the Shuttle home
ORG-Y=74300 ; Y coordinate of the Shuttle home
CAM-X=15247 ; X offset between the Camera and the Head (leftmost terminal nozzle)
CAM-Y=125 ; Y offset between the Camera and the Head (leftmost terminal nozzle)
DOT-X=53230/6000
DOT-Y=2210/256

TopAngle=1/25402
BtmAngle=4/25400
LIMIT_X=131730
LIMIT_T=146436
LIMIT_B=144999

[MARKEM]
HeadTend=1 ; Indicates the type of the Head Tend
OffsetRun=50
PreCompHigh=104
PreCompLow=104
SetStrobe1=5

9. MJL7161D operation Panel



Left-Front Panel

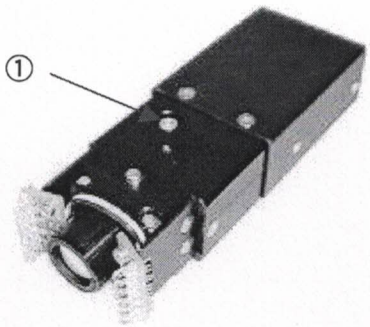
Right Front Panel

Button	Function
POWER	This button collectively puts power onto the main Printer MJL7161D, PC and the Monitor. While pressed, the POWER button switches those devices collectively ON and OFF.
RESET	Resets the Printer, MJL7161D by resetting the CPU board. This is executed in cases like, when the USB firmware doesn't download successfully.
EMERGENCY	Button used in Emergency to stop the Printer instantly. All the motors go out of power as soon as the button is pressed. A right turn releases the button up from its locked pressed position.
SHUTTLE	Moves the Shuttle. Its imperative that both the SHUTTLE buttons are presses simultaneously at the same time
MOTOR	The Shuttle button on the Right-Front Panel acts as the Motor button. It switched the motors ON. Switching the CB1-3 ON and then the POWER button on the Left-Front Panel ON initializes the PC and other control boards and electrical and electronic devices. In this condition, pressing the SHUTTLE/MOTOR button switches power onto the motors.
VACUUM ON	Switches ON the Vacuum presently engaged
VACUUM OFF	Switches OFF the Vacuum presently engaged
HIGH	Runs Head and the Shuttle in high speed. It is operated after

	hitting the SPEED key
MID	Runs Head and the Shuttle in medium speed. It is operated after hitting the SPEED key
LOW	Runs Head and the Shuttle in low speed. It is operated after hitting the SPEED key
PAUSE	In the middle of a printing, it pauses the test while pressed. A consecutive press on the button releases the pause and resume the printing operation.
SPEED	While pressed it allows changes of the Arm speed by successively selecting either of the buttons, HIGH / MID / LOW
AUTO	Not used in MJL7161D
NEXT	Not used in MJL7161D
CHANGE	Switches the Shuttle to engage it in operation
UP/DOWN	Not used in MJL7161D
ENTER	Acknowledges an operation

10. Adjustment of Camera Focus

Camera is used to find the starting location for the printing. Usually, the focus of the camera, once sharpened, doesn't easily get distorted. However, the focus adjusted with respect to the thickness of a board may loose its sharpness due to collision between different units and so on. In such case, adjust the focus in the following way.



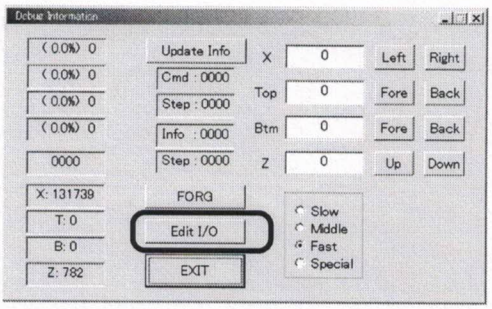
[Procedure]

(1) Open MicroJet

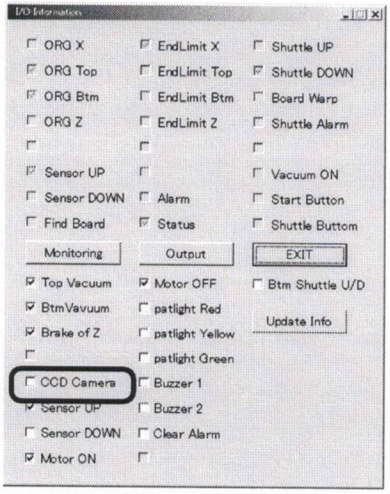
(2) On the Top Shuttle, set the board with the intended thickness

(3) Select [Status Information] from the [Help] menu.

(4) As the following dialog pops up, hit the Edit I/O button.



(5) Edit I/O opens up the following dialog. Insert check in the box for CCD Camera.



(6) Click on the Output button.

(7) Move the camera so that the image of the board is taken and reflected by the camera

(8) If the camera needs focusing adjustment, one has to access inside the Printing Chamber opening the Maintenance door. Open the Maintenance door and switch the system to Maintenance mode (see section 2-2-5). Loosen the Camera Fixing Screw ① with the help of a hexagonal wrench, slide the camera up and down to obtain a sharp focus and finally tighten the Camera Fixing Screw back. Put back the system to normal operating mode after finishing the adjustment (see section 2-2-5)

11. Adjustment of Head Tend

11-1 Location Adjustment of the Head Tend

The head is adjusted so that it reaches just straight above the Head Tend.

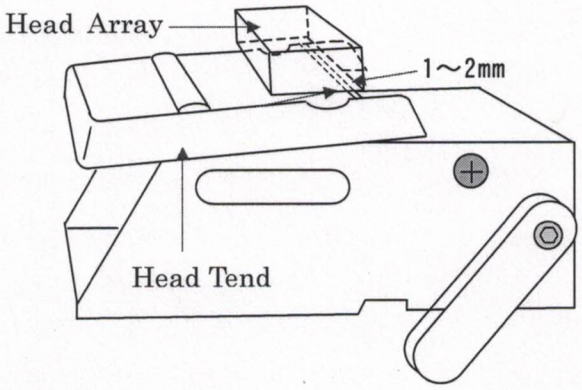
[Procedure]

① Click  on the Tool bar and return the Head to its home origin.

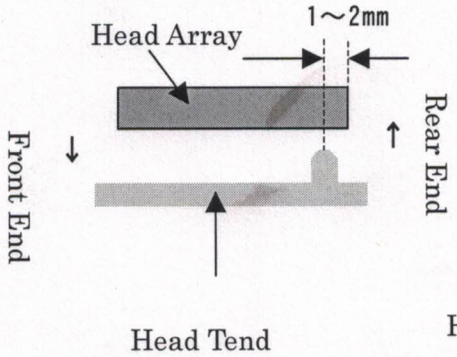
② Select [Locate Tend Position] from the [Adjustment] menu.

③ Click Go Home. The Head moves to the position where Head Tend is.

④ After clicking Head Cap, adjust the unit so that orientation of Head Array and Head Tend becomes the one shown in the following figure. Then press the ENTER key of the Operation Panel.

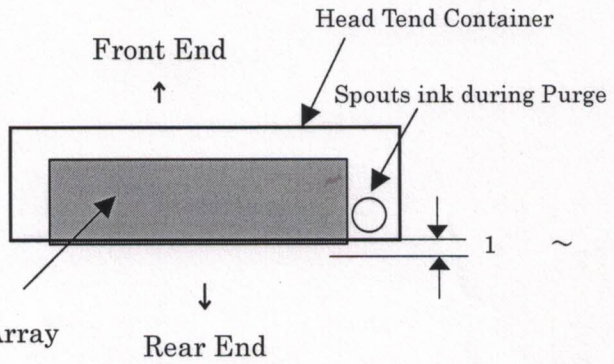


[Viewing Head from the side]



The space between the Head Tend blade and the terminal Head Array should be of1 ～2 mm

[Viewing Head from the bottom]



Set so that the ink spouted during Purge is collected inside the Head Tend Container

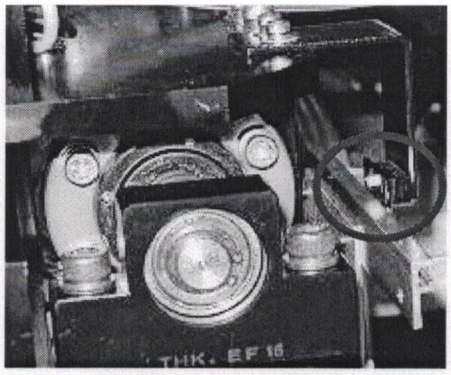
[Adjustment Method]

Since the adjustment entails an access inside the Printing Chamber, switch the system to Maintenance mode (see section 2-2-5) before the adjustment and again put it back to Normal Operating mode after finishing the adjustment.

(1) Adjustment along X direction

Make sure that the Head moves to the correct X location when Go Home of ③ in above is pressed.

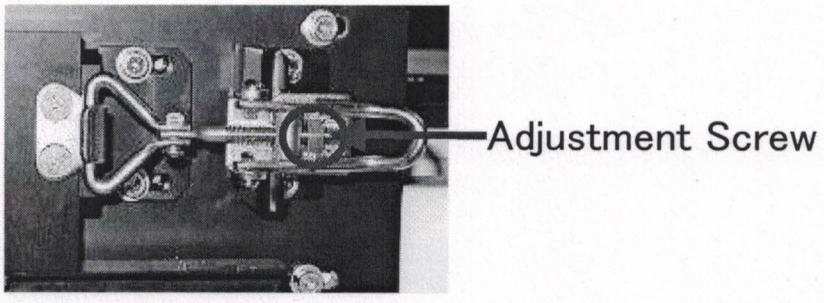
Adjust the location of the X-axis limit sensor of the Head



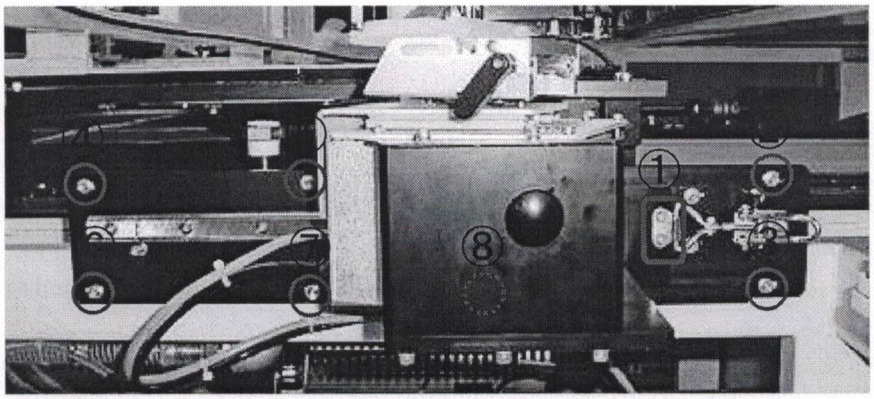
(2) Adjustment along Y direction

Make sure that the Head moves to the correct Y location when Go Home of ③ in above is pressed.

Adjust the location of the Y-axis limit sensor of the Head



If a proper adjustment could still not be achieved even after adjusting the position of the Swing Angle, adjust it after loosening the straining 8 bolts (①~⑧ in the following figure, 8th one being not exposed) that fit the Head Tend unit.



(⑧th bolt is on the rear side of the head Tend unit)

⑤ Click [icon] on the Tool bar and return the Head to its home origin.

11-2 Height Adjustment of the Head Tend

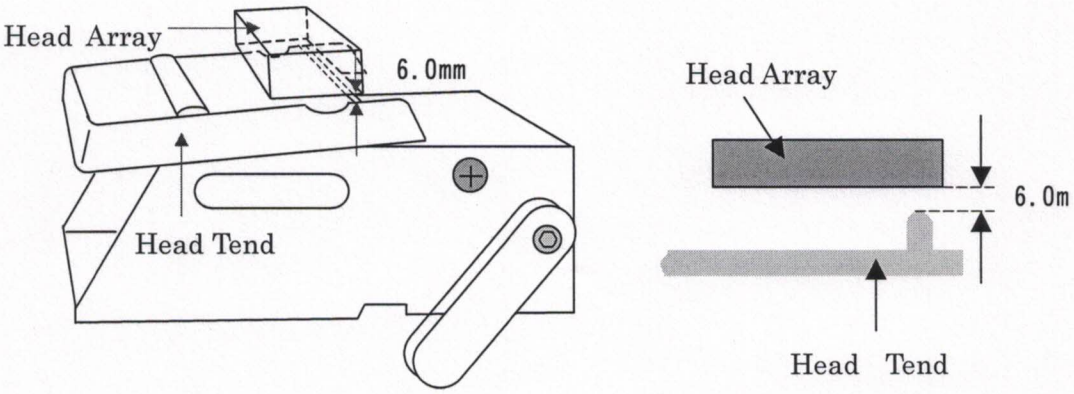
The adjustment is carried out to have a proper clearance distance between the Head and the Head Tend.

[Procedure]

(1) Click [icon] on the Tool bar and return the Head to its home origin.

(2) Select [Adjust Tend Height] from the [Adjustment] menu.

(3) With the help of [▲][▼] on the Operation Panel, adjust the distance between the Head Array and the Head tend to be at 6.0mm and press the [ENTER] key on the Panel.



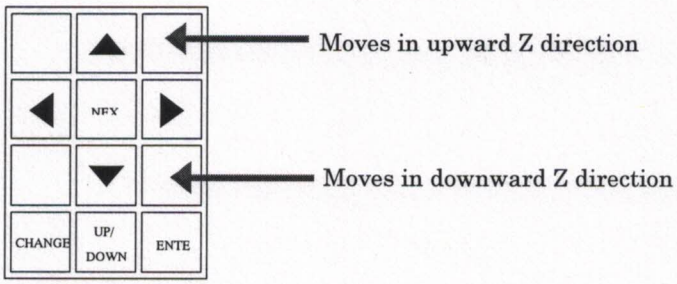
[Adjustment Method]

Since the adjustment entails an access inside the Printing Chamber, switch the system to Maintenance mode (see section 2-2-5) before the adjustment and again put it back to Normal Operating mode after finishing the adjustment.

The Head cannot be moved in the Z direction even if [Forg] is selected from the [Command] on the menu bar. Executing the Forg command from the Operation Panel activates the Z-directed travel as follows.

① Press PAUSE on the Panel and then press CHANGE and AUTO keys simultaneously at the same time.

② Select a suitable speed and then move the Head up or down using the appropriate button as labeled in the following figure.



③ After completing the adjustment for the Z position, press PAUSE and then ENTER keys to terminate the Forg command.

(4) Click Go Home and move the Head right over the top of the Head Tend. Confirm that the clearance between them is 6.0mm.

(5) Click  on the Tool bar and return the Head to its home origin.

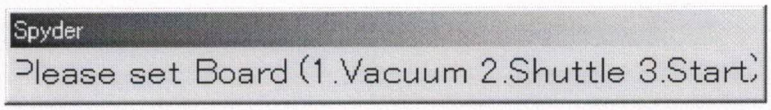
12. Adjustment of Head (Low Position/High Position)

Adjustment is carried out to have an appropriate distance between the Head and the Board.

[Procedure]
Since the adjustment entails an access inside the Printing Chamber, switch the system to Maintenance mode (see section 2-2-5) before the adjustment and again put it back to Normal Operating mode after finishing the adjustment.

(1) Select [Adjust Board height (Low/High)] from the [Adjustment] menu.

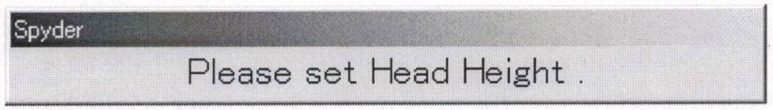
(2) The following message pops up. Set the board on the Top Shuttle and press the VACUUM ON button on MJL7161D.



(3) Press both the SHUTTLE button on the two sides simultaneously for about 2secs.

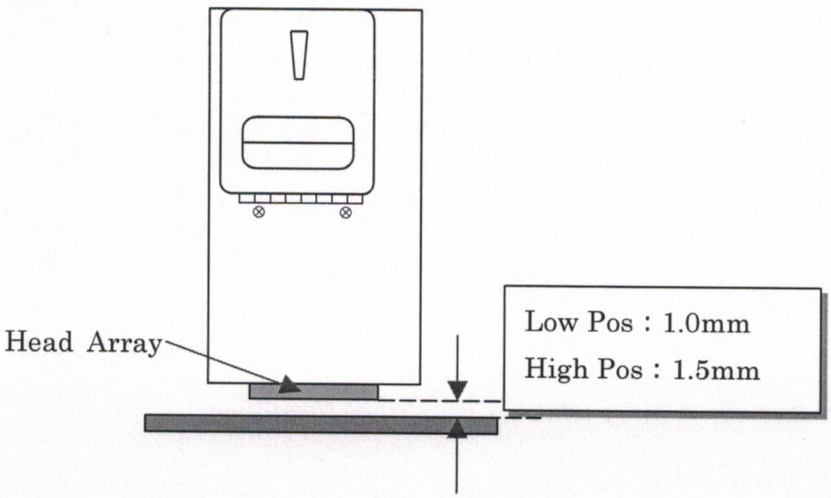
(4) The Shuttle moves to the farthest rear end. Take your hands off the SHUTTLE button as soon as you hear the sound indicating the execution of the operation.

(5) As soon as the following message pops up, with the help of the Arrow-keys ▲▼ on the Panel, move the Head down to the location where the Head Array stays at a height of 1.0mm from the board. Then press the ENTER key.



※ Confirm the clearance height of the Head Array from the Board with the help of a Clearance Gauge Plate.
※ Refer to the 'Command from the Operation Panel' of section 21 for the method of moving the Head Array up-down.
※ The height (1.0mm) to which the Head is set at in (5) above refers to low

position. For setting it at high position, move the Head Array down to the location so that it stays at a height of 1.5mm from the board. Then press the ENTER key.



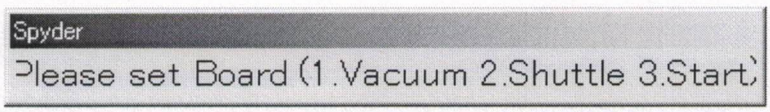
13. Adjustment of Warp Sensor

Adjustment is carried out for the sensor that checks for the board warps.

[Procedure]
Since the adjustment entails an access inside the Printing Chamber, switch the system to Maintenance mode (see section 2-2-5) before the adjustment and again put it back to Normal Operating mode after finishing the adjustment.

(1) Select [Check Warp Sensor (Use High)] from the [Adjustment] menu.

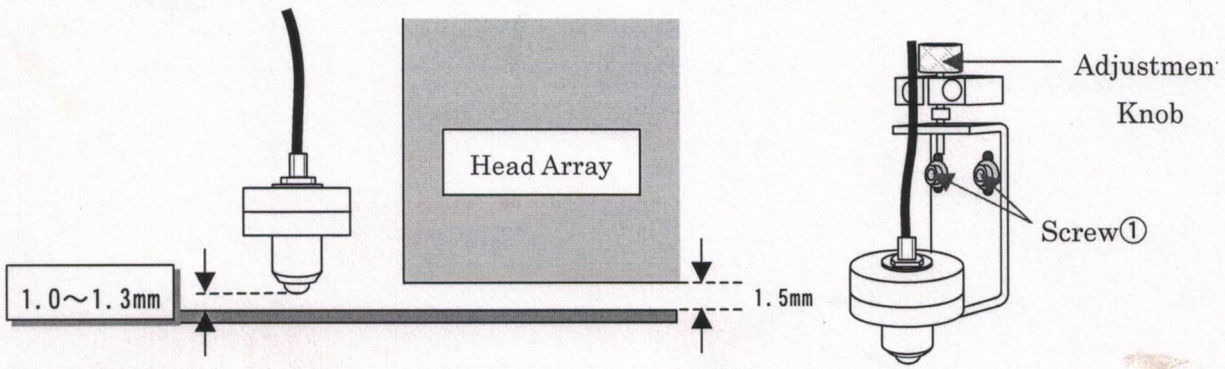
(2) The following message pops up. Set the board on the Top Shuttle and press the VACUUM ON button on MJL7161D.



(3) Press both the SHUTTLE button on the two sides simultaneously for about 2secs.

(4) The Shuttle moves to the farthest rear end. Take your hands off the SHUTTLE button as soon as you hear the sound indicating the execution of the operation.

(5) Move the Head Array to a height 1.5mm from the Board. The warp sensor is adjusted to such a height that the buzzer doesn't go off when a Clearance Gauge plate of 1.0mm is slid under the Warp Sensor on the left side, but it goes off when a Clearance Gauge of 1.3 is slid underneath. For any adjustments, loosen the Screw ① in two places, carryout the intended adjustment by turning the Adjustment Knob and then tighten back the 2 screws at ①.



(6) In a similar way as described above, adjust the Warp sensor on the right side.

14. Squaring of the XY Axes

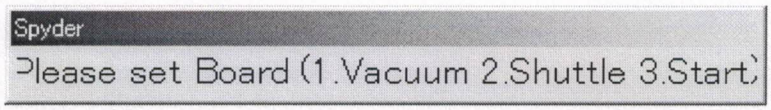
Adjustment is carried out to make X and Y axes perpendicular to each other.

[Procedure]

(1) Click [icon] on the Tool bar and return the Head to its home origin.

(2) Select [Adjust X-Y Squaring] from the [Adjustment] menu.

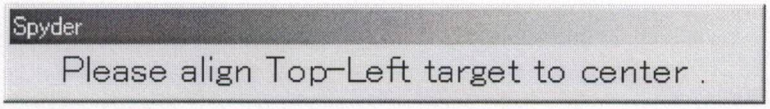
(3) The following message pops up. Set the Glass Plate on the Top Shuttle and press the VACUUM ON button on MJL7161D.

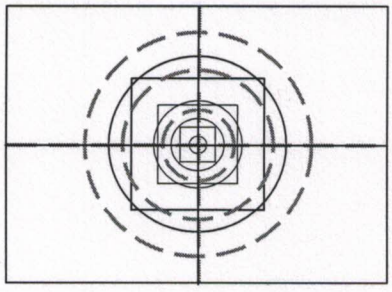


(4) Press both the SHUTTLE button on the two sides simultaneously for about 2secs.

(5) The Shuttle moves to the farthest rear end. Take your hands off the SHUTTLE button as soon as you hear the sound indicating the execution of the operation.

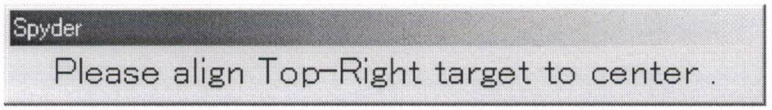
(6) The message shown below is displayed instructing for the camera alignment. Move the Camera with the help of the Arrow-keys ▲ ▼ ◀ ▶ on the Operation panel and align it at the center of the target mark at the top-left corner. Then press the ENTER key.

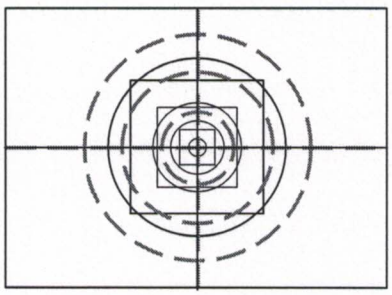




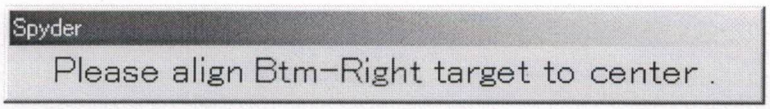
(7) Again, the message shown below is displayed for the camera alignment on another target. Move the Camera with the help of the Arrow-keys ▲ ▼ ◀ ▶ on the Operation panel and align it at the center of the target mark at the

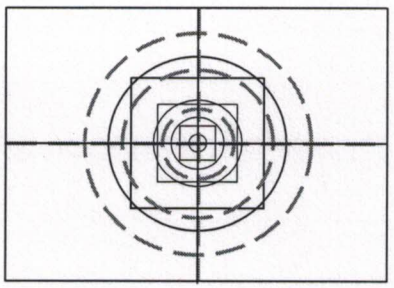
top-right corner. Then press the ENTER key.



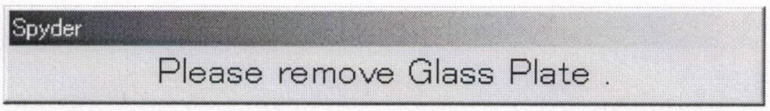


(8) Further, as the following message comes up, align the camera at the center of the target at the bottom-right corner with the help of the ▲▼◀▶ on the Operation Panel and press ENTER.





(9) The following message is displayed. Press the VACUUM OFF button on MJL7161D and then remove the Glass Plate from the Shuttle.



(10) Next, press the VACUUM ON button on MJL7161D.

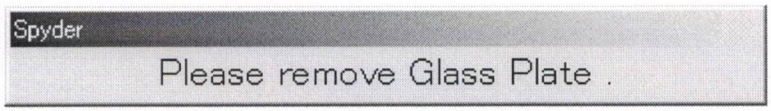
(11) Press both the SHUTTLE button on the two sides simultaneously for about 2secs.

(12) The Shuttle moves to the farthest rear end. Take your hands off the SHUTTLE button as soon as you hear the sound indicating the execution of the operation.

(13) Set the Glass Plate on the Bottom Shuttle and press the VACUUM ON button on MJL7161D.

(14) Carryout the steps of (4) to (8) above.

(15) As the following message is displayed, press the VACUUM OFF button on MJL7161D and then remove the Glass Plate from the Shuttle.



(16) Next, press the VACUUM ON button on MJL7161D.

(17) Press both the SHUTTLE button on the two sides simultaneously for about 2secs.

(18) Take your hands off the SHUTTLE button as soon as you hear the sound indicating the execution of the operation.

15. Position Calibration of XY Axes (CP)

Alignment is carried out between the locations of the camera and the nozzle.

[Procedure]

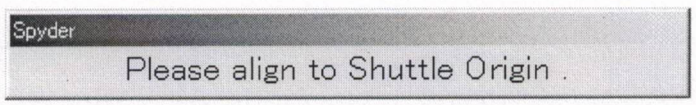
(1) Boot and Purge executions are completed beforehand so that the Printer reaches the state of a normal printing condition.

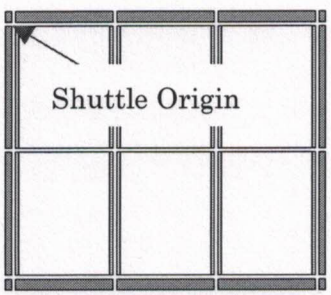
(2) Click [icon] on the Tool bar and return the Head to its home origin.

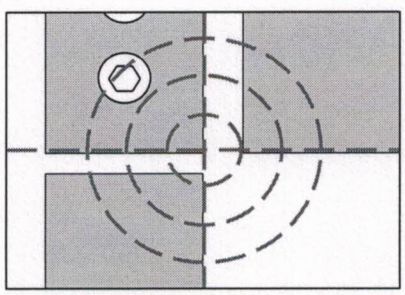
(3) Select [CP from Shuttle Origin] from the [Adjustment] menu.

(4) Following the on-screen instructions, set the board used for calibration on the Shuttle, press VACUUM ON and then the two SHUTTLE buttons to send the Shuttle in, as much as like any regular printing operation.

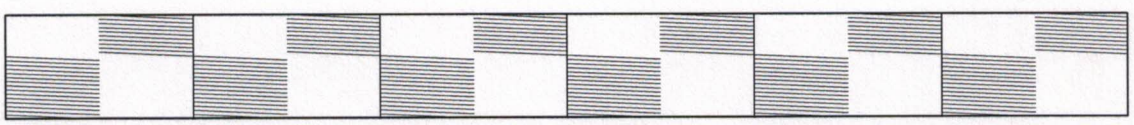
(5) The Head measures the height from the board and the following message comes up. Move the camera and align its center at the center of the Shuttle Origin with the help of the [▲][▼][◀][▶] keys on the Operation Panel and press [ENTER].



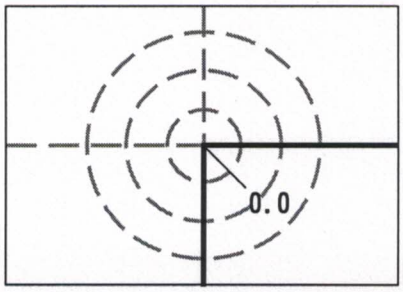




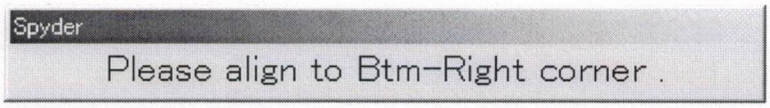
(6) The following pattern is printed on the board

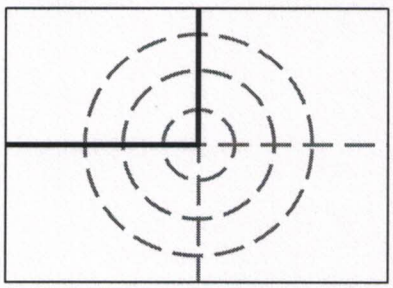


(7) As the following message comes up, move the camera and align its center at the center of the top-left corner of the board with the help of the ▲▼◀▶ keys on the Operation Panel and press ENTER.



(8) Following is the message that comes up next. Move the camera and align its center at the center of the bottom-right corner of the board with the help of the ▲▼◀▶ keys on the Operation Panel and press ENTER.





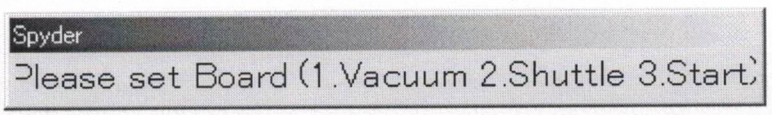
16. Adjustment of the Printing

16-1 Check the Printing Condition (Low Position/High Position)

[Procedure]

(1) Select [Printing for Head Alignment (Low/High)] from the [Adjustment] menu.

(2) The following message pops up. Set the Board on the Top Shuttle and press the VACUUM ON button on MJL7161D.



(3) Press both the SHUTTLE button on the two sides simultaneously for about 2secs.

(4) The Shuttle moves to the farthest rear end. Take your hands off the SHUTTLE button as soon as you hear the sound indicating the execution of the operation.

(5) The test pattern is printed. Check the printing condition.

When a≠b as shown in Fig.①, its required to adjust the spraying out timing of the ink. When c≠0 as shown in Fig.① and ②, its required to adjust the inclination of the Head. When |d|≠0 as shown in Fig.③, its required to adjust the rap on the back and front.

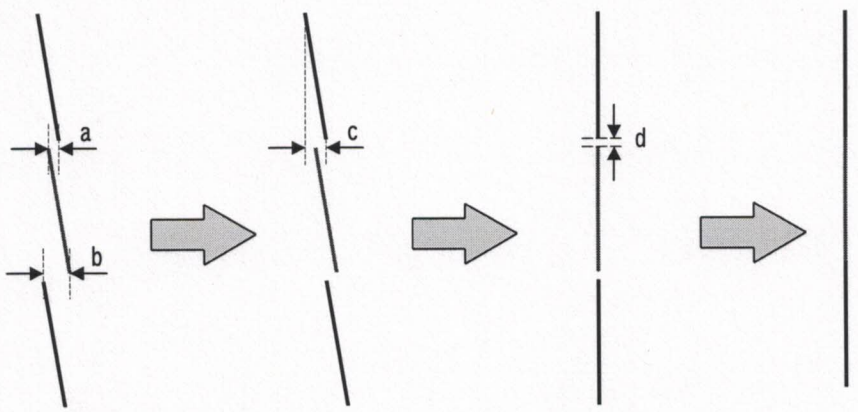
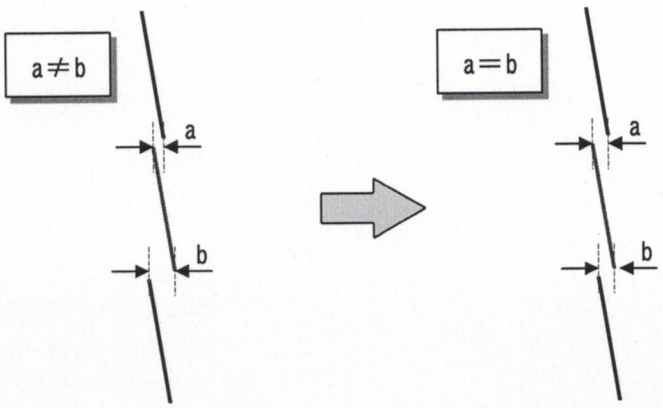


Fig. ① Fig.② Fig.③ Fig.④

16-2 Adjustment of Printing (Low Position/High Position)

16-2-1 Adjustment of Ink Spraying out timing

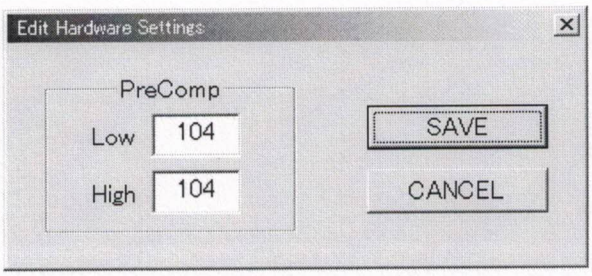
When a≠b as shown in the following figure, adjustment is to be carried out to make it a=b.



[Procedure]

(1) Select [Hardware Setting] from the [help] menu.

(2) The following dialog is displayed. Adjust the value for Low in the PreComp section.



※ Higher the value, the pattern at the center (printing while moving from right to left) moves towards right.

※ The value in High of PreComp is adjusted when the Head is at High Position.

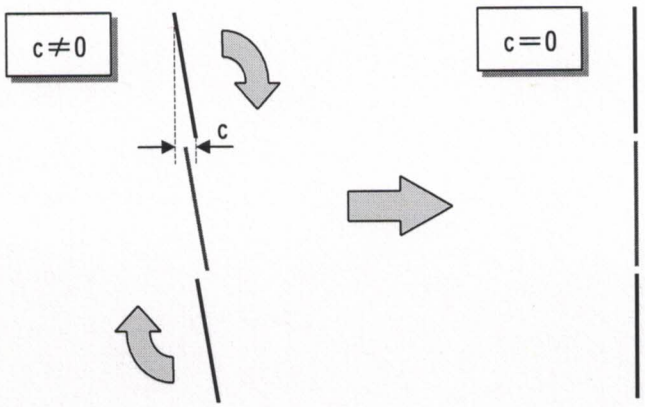
(3) Click Save.

(4) Select [Printing for Head Alignment (low/high)] from the [help] menu and check

the printing condition.

※ Repeat the steps (1)-(3) in above if the printing condition is still not satisfactory.

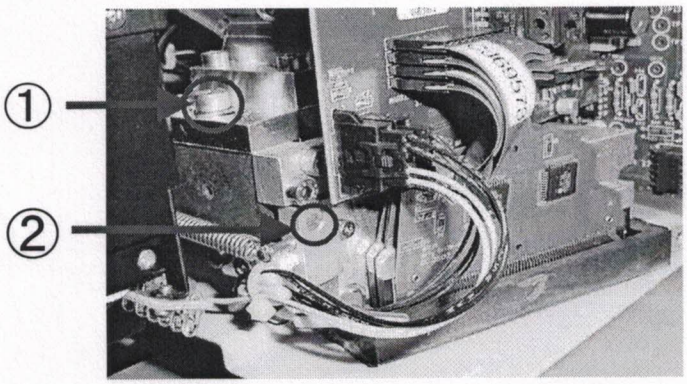
16-2-2 Adjustment of Head Inclination



[Procedure]

Since the adjustment entails an access inside the Printing Chamber, switch the system to Maintenance mode (see section 2-2-5) before the adjustment and again put it back to Normal Operating mode after finishing the adjustment.

(1) The Head is adjusted for its inclination by loosening the screw at the left-bottom portion of the Head. Loosen the Screw at ①.



(2) By turning the Screw at ②, adjust the angle the Head is fitted with.

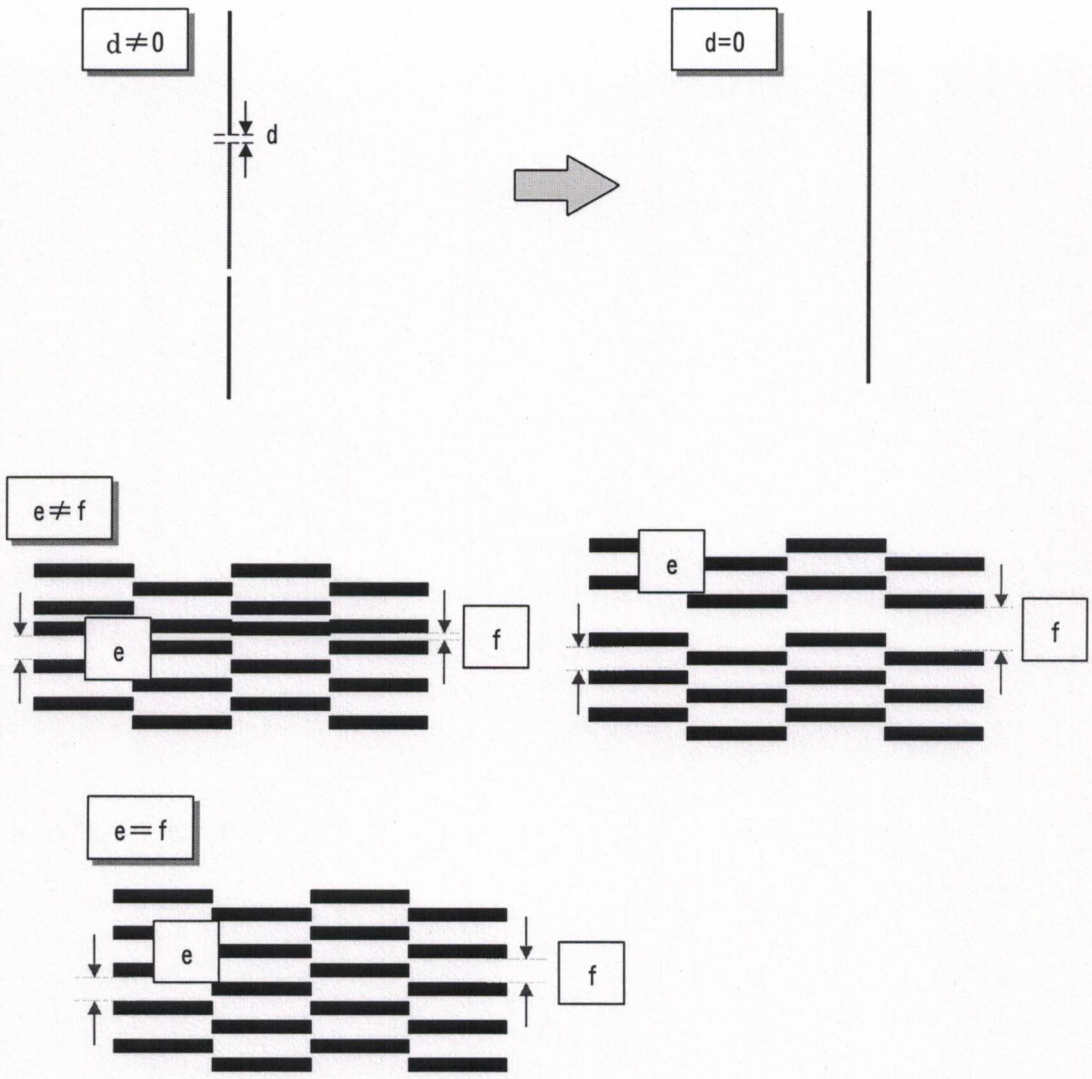
※ A clockwise turning of the adjustment screw will result in the pattern rotating anti-clockwise in the printing.

(3) Tighten back the Screw at ①.

(4) Select [Printing for Head Alignment (low/high)] from the [Adjustment] menu and check the printing condition.

※ Repeat the steps (1)-(4) in above if the printing condition is still not satisfactory.

16-2-3 Adjustment of Head Inclination



[Procedure]

(1) Select [Edit IniFile] from the [Help] menu.

(2) MicroJet.ini will popup. Change the xxx value (numerator part) of the parameter DOT-Y=xxx/256 inside the [CPDATA] section.

※ The higher the value, the larger is the spacing of d.

(3) Save the edited MicroJet.inifile.

(4) Close the MicroJet window.

(5) Reopen the MicroJet window.

(6) Select [Printing for Head Alignment (low/high)] from the [Adjustment] menu and check the printing condition.

※ Repeat the steps (1)-(3) in above if the printing condition is still not satisfactory.

17. Adjustment of Air Pressure

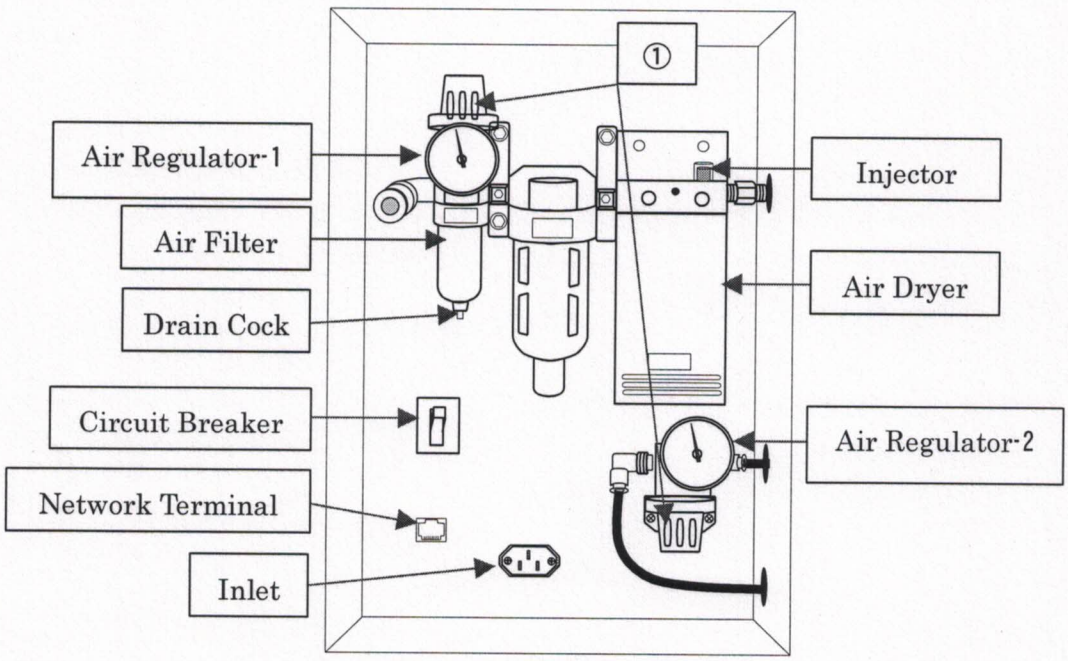
The Air pressure is adjusted for the Markem Head as well as the other machinery units that utilize the compressed air.

[Procedure]

(1) Check that the indicators of the two Air Regulators located at the bottom on the rear side of MJL7161D read the pressure at 0.3Mpa.

In the following figure, Air Regulator-1 supplies compressed air to machinery parts, while Air Rergulator-2 supplies to Markem part, and hence they display the respective pressures.

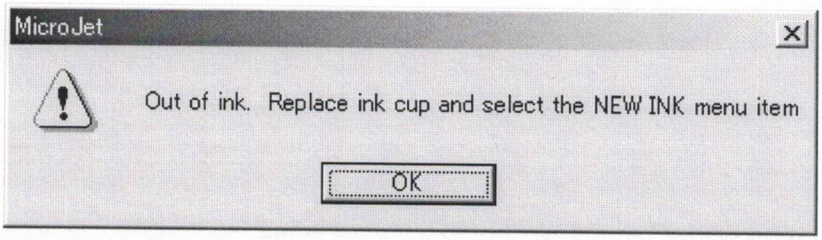
(2) In case the pressures are not at proper values, pull out the cap at ① in the following figure and rotate the cap left or right to adjust the respective pressure. After the adjustment, push the cap back to its locked position.



18. Replacement of Ink

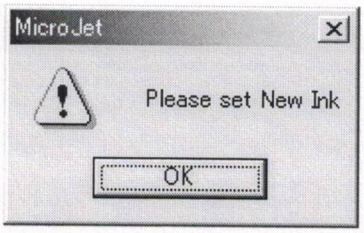
[Procedure]

(1) The following message is displayed as the printer goes out of ink. Click OK on the message box.

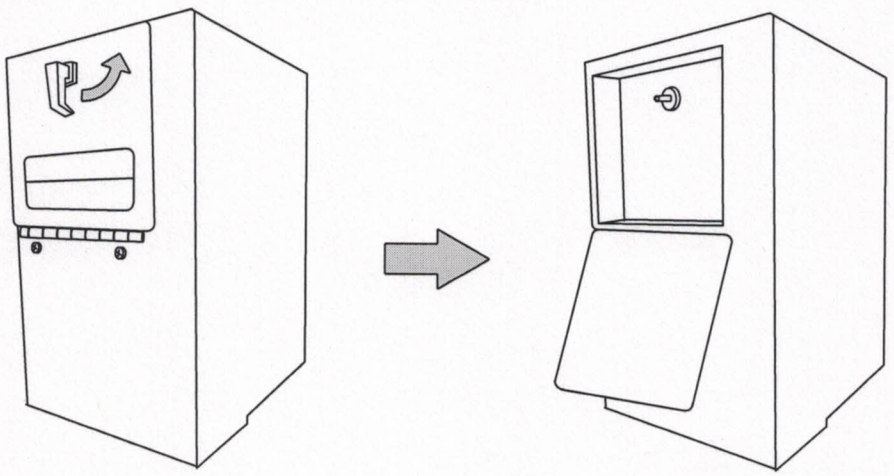


(2) Click on NEW INK onside the Ink Command section of the Microjet Window.

(3) Click OK as the following message is displayed.



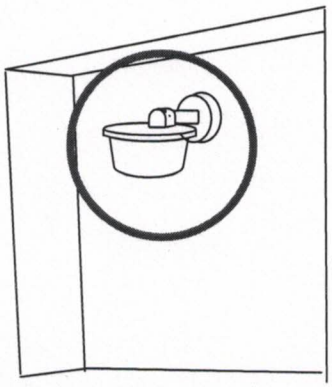
(4) Open the Right Maintenance door. The motor will trip off. Turn the knob of the Head shown in the following figure and open the Head Cover.



For safety aspects regarding handling the ink, please refer to INK MSDS provided at the end of this manual.

(5) Open the cap of the new ink cartridge and insert it into the Ink Insertion port.

※ While replacing the ink, shake the new cartridge well for about 2 minutes before inserting it in. Otherwise, there may be uneven or clogged printing



(6) Wait for a while, the following message is displayed when the ink is filled up completely. Click OK on the message box.

(7) Take out the Ink cartridge.

※ Check that there is no ink inside the cartridge. If there is any ink left in the cartridge, it may have an effect in the print quality. If there is any ink left in the cartridge, re-execute NEW INK of the Ink Command section and carryout the ink replacement again.

(8) Turn the knob to close the Head Cover. Close the Maintenance Door and then switch the motors ON by pressing the MOTOR SW to put the system back to normal operating condition.

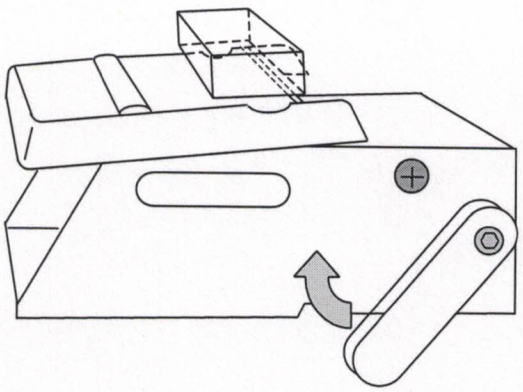
(9) Click  on the Tool bar and return the Arm to its home position.

19. Replacement of the Head Tend (Blade and Liner)

[Procedure]

Since the adjustment entails an access inside the Printing Chamber, switch the system to Maintenance mode (see section 2-2-5) before the adjustment and again put it back to Normal Operating mode after finishing the adjustment

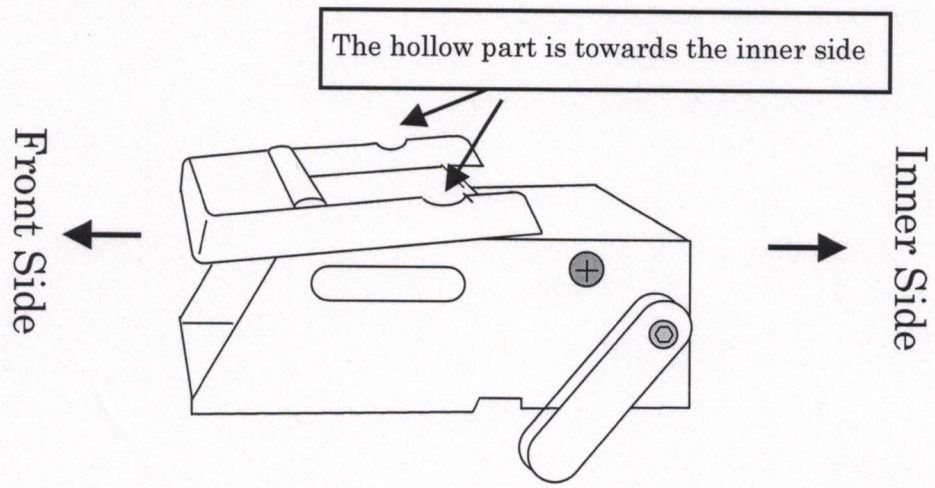
(1) The Head Tend is secured in its position with the help of a locking lever. Rotate the locking lever to release the Head Tend from its constrained position.



(2) Take off the Head Tend.

(3) Attach new Head Tend to the Head Cleaner

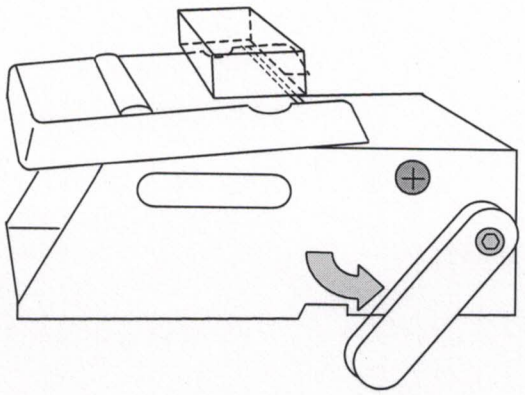
※ Be careful about the direction of the Head Cleaner while assembling the Head Tend to it.



(4) Install the head Tend back.

※ The Head Tend is attached pressing it with the hand so that it doesn't stay pushed out.

(5) Rotate the locking lever back to secure the Head Tend in its position.



(6) Carryout the adjustment of Head Tend as described in section 11.

Note: During the replacement of blade and liner, make sure to put on gloves in case there is a chance of touching the ink. The gloves should be of 100% Nitrile material with a thickness above 0.2mm. Once one glove is used over 20minutes with ink on it, throw it away to get a new one. Regarding maintenance and cleaning of the Head and Head Tend Station, refer to Operation/Service Guide Section 3 [Care and Cleaning] of MARKEM Manual.

20. Replacement of the Head

During shipment, for safety reason, the Head is taken out of the Printer and shipped separately. It's then installed inside the Printer at the installation site. Moreover, the 300 and 600 dpi Head are also replaced between each other. These thereby entail the replacement or installation of the Head an absolutely necessary maintenance job. The Head is replaced or installed in the following way.

[Cautions before the start of Head Installation]

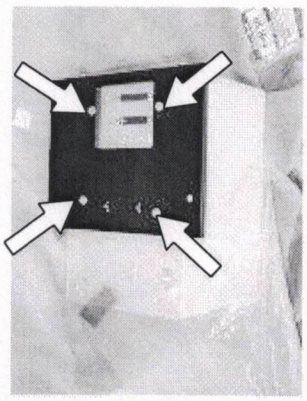
(1) Since the detachment of the Head is only temporary, there may be ink in the Ink Tank inside the Head. In such case, do not lay the Head on its sides, always put it vertically up.
(2) When the Head is put vertically up with its nozzle directing downwards, lay a paper or any similar thing underneath the Head and make sure that it's protected from all possible damage.

Since the adjustment entails an access inside the Printing Chamber, switch the system to Maintenance mode (see section 2-2-5) before the adjustment and again put it back to Normal Operating mode after finishing the adjustment

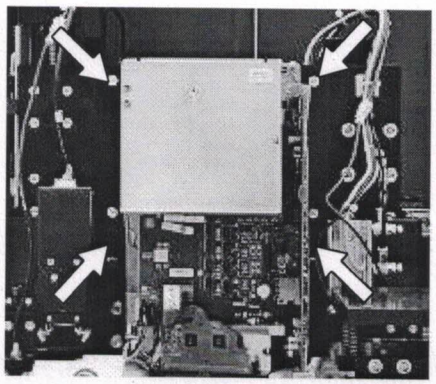
20-1 Installation of the Head

[Procedure]

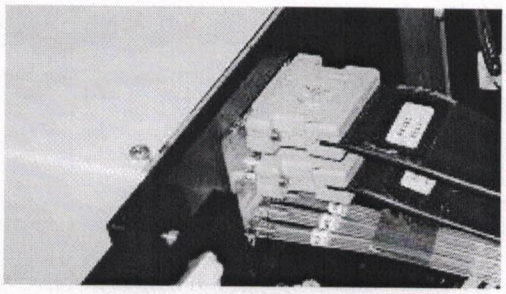
(1) Attach Markem Head to its Base Plate with the help of M6×10 hexagonal cap bolts on 4 places (indicated with arrows in the following figure).



(2) The Head assembled with the Base Plate in (1) is attached to the Slide Base with the help of M6×10 hexagonal cap bolts on 4 places (indicated with arrows in the following figure).

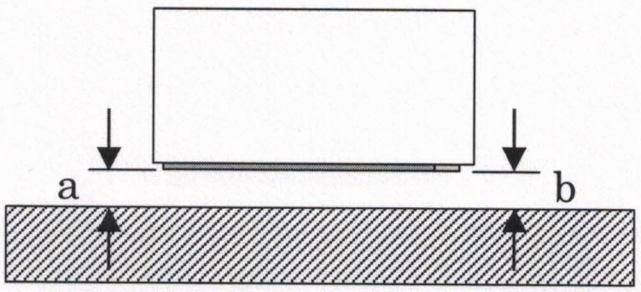


(3) Connect the cables (2) and the Air Ducts (A～C) onto the Head.



20-2 Leveling the Head

Adjustment is carried to make the Head parallel to the Shuttle.



Adjust to make **a = b**

[Method]

(1) Click  on the Tool bar and return the Head to its home origin.

(2) Set a board on the Shuttle.

(3) Press PAUSE on the Operation Panel and then press both CHANGE and AUTO simultaneously to initiate the Forg mode.

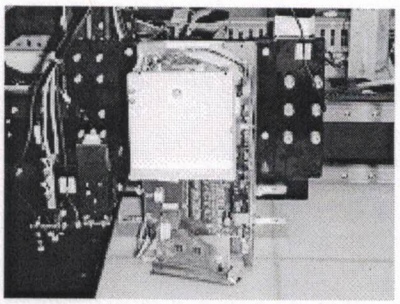
(4) Press ▲ on the Operation Panel and move the Top Shuttle to the location underneath the Head.

(5) Set the leveling device underneath the Head Array. In this condition, the device will have its axis of screw holes oriented vertically.

(6) Move the Head down very slowly to the closest vicinity of the Leveling device (for operation, refer to the 'Command from the Operation panel' of Section 21). Terminate the Forg command by pressing PAUSE and then ENTER keys on the Operation Panel.

(7) Press the EMEGENCY button.

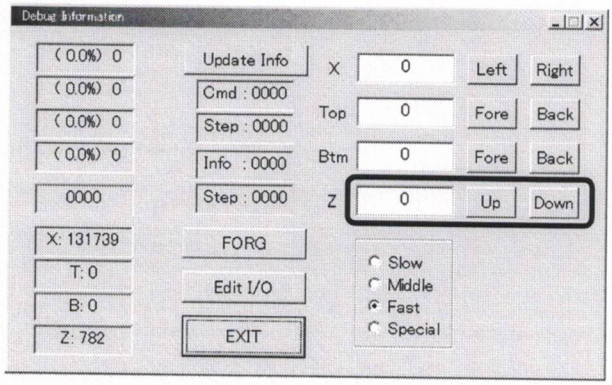
(8) Loosen the 14 screws on the Head as shown in the following figure.



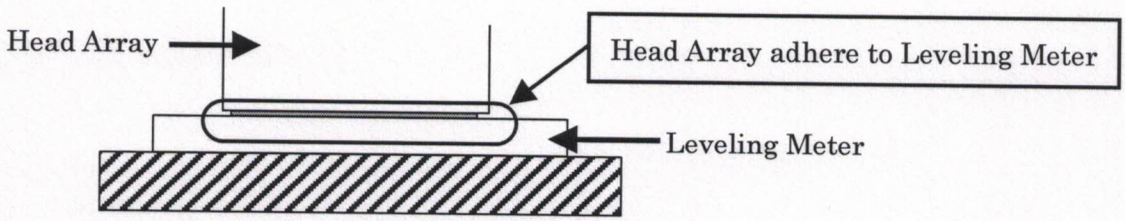
(9) Release the EMERGENCY switch and put power to the motors.

(10) Select [Status Information] from the [Help] menu.

(11) [Debug Information] window will pop up. Enter appropriate value (about 20) in the box for Z and hit the Down button to gradually lower the Head little by little.



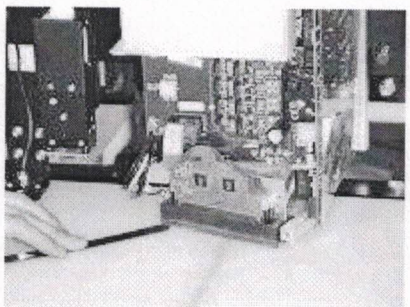
(12) Repeat step (11) to lower the Head very slowly each time, until the Head presses against the Leveling device and is parallel to it.



(13) Temporarily screw back lightly the 14 Screws that were loosened in step (8). Fit the screws in such a way that the forces are applied uniformly as much as possible, on the screws located on the left and right.

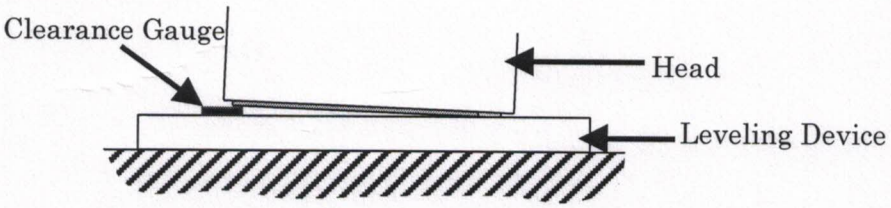
(14) Switch into the Forg mode by first pressing PAUSE and then CHANGE and AUTO keys simultaneously on the Operation Panel, move the Head up and then take the Leveling device off.

(15) Move the Head down until the Head Array reaches the closest vicinity of the Board surface and then insert Clearance Gauge Plate underneath the Head Array on both left and right sides. Check whether the Head Array is in parallel with the board surface.



(16) If the Head Array is found to be in parallel with the board surface, tighten the 14 Head fitting screws temporarily screwed lightly in Step (13) and move to step (18). If they are not parallel, slide in the Clearance gauge plate underneath the Head Array on both left and right sides and measure which side is in higher level.

(17) If Head Array is not found in parallel with the board surface in Step (16), repeat the steps (3) to (16) until they become parallel to each other. In this process, carryout the adjustment by correcting the discrepancy found in (16) through utilizing the Clearance Gauge plate underneath the Head as shown in the following figure.



Example: In case the measured result of (16) shows the left side of the Array falls short of 0.5mm

Adjustment in (17) is performed by sliding in a Clearance Gauge of 0.5mm underneath the Array

(18) Once the head and the Shuttle plane become parallel to each other, terminate the Forg command by pressing PAUSE and then ENTER keys on the Operation Panel.

(19) Execute return to home origin by pressing PAUSE and then AUTO.

(20) Execute the following adjustments in order after selecting them from the [Adjustment] menu.

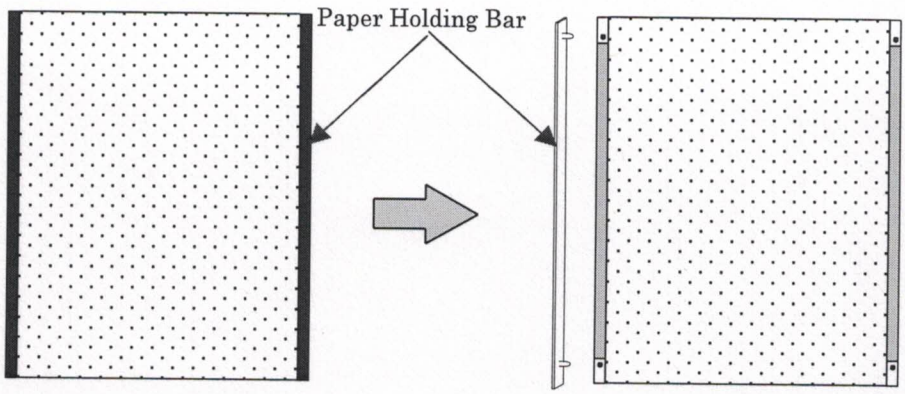
(1) Locate Tend Position
(2) Adjust Tend Height
(3) Adjust Board Height (low/high)
(4) CP form Shuttle Origin
(5) Printing for Head alignment (low/high)

21. Replacement of Vacuum Plate Paper

[Procedure]

(1) Switch OFF Vacuum.

(2) Take out the Paper Holding Bar that encloses and secures the Vacuum Plate paper.



(3) Remove the paper.

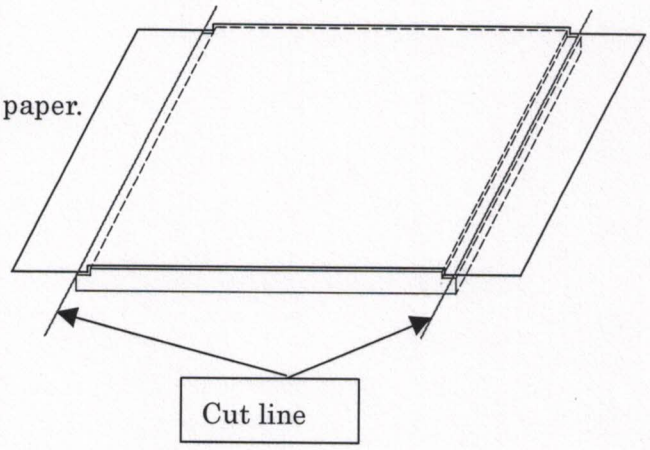
(4) Set new paper.

(5) Bend the paper along the edges of the Vacuum Plate.

(6) Switch the Vacuum ON.

(7) Attach the Paper Holding Bar.

(8) Cut off the redundant portion of the paper.



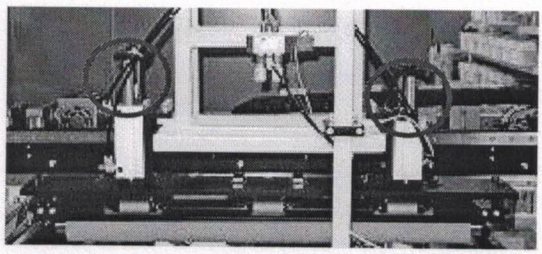
22. Adjustment of the Roller

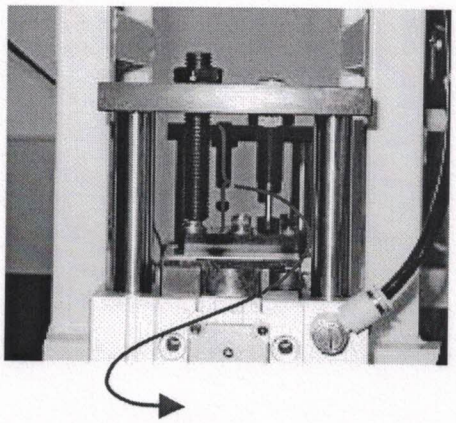
In case of Roller is installed in MicroJet, following is adopted to adjust the Roller pressure.

[Procedure]

(1) Set the board on the Top Shuttle.

(2) Extend the stopper of the Roller towards downward as much as possible. There are two stoppers (circled in the figure) on the left and right side of the Roller. Extend both of them.





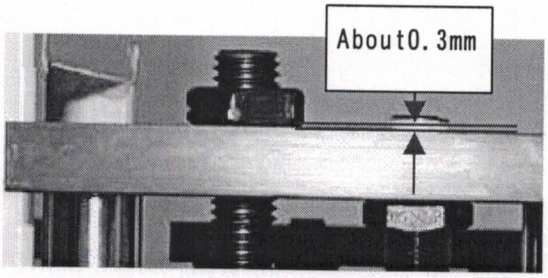
Extend towards downward

(3) Execute [Forg] selecting it from the [Command] menu and move the Top Shuttle to straight below the Roller.

(4) Switch the Vacuum on by pressing the VACUUM ON button.

(5) Click on the Roller Down button and move the Roller down to the closest vicinity of the Shuttle.

(6) Rotate the 2 Stopper of Step (2) in the clockwise direction and lower the Roller down little by little until it reaches the position shown in the following figure.



(7) Click  on the Tool bar and return the Head to its home origin.

23. Parallel Leveling during Installation

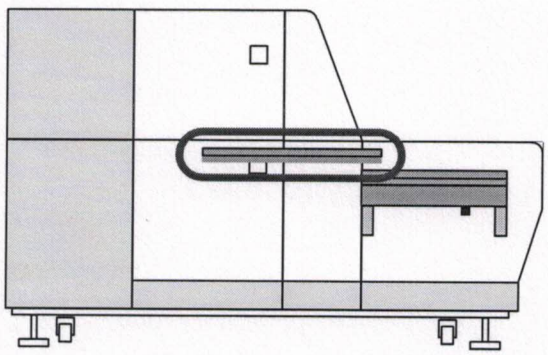
Parallel leveling of MicroJet, MJL7161D is checked after it is installed.

[Procedure]

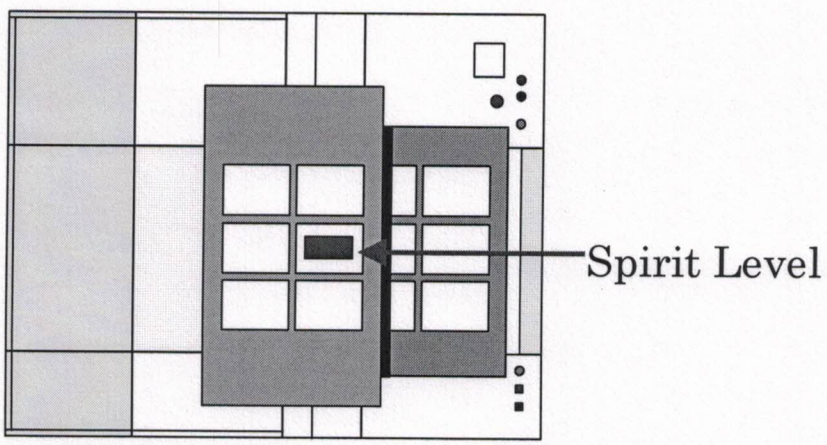
Shutdown MicroJet without switching the Circuit Breakers 1-3 off (see section 2-(2) of Operation Manual).

(1) Click  on the Tool bar and return the Head to its home origin.

(2) Execute Forg selecting it from the [Command] menu and move the Top Shuttle to the center of the machine.



(3) Put the Spirit Level Indicator on the Top Shuttle such that it stays only on one section of Vacuum Plate surrounded by paper holding bars.



(4) Printer MJL7161D has Adjsuters legs at the bottom with which it props on the ground. Adjust the height of the Adjusters to level the Spirit Level.

(5) Click  on the Tool bar and return the Shuttle to its home.