Part 2

Operation

Chapter 1 Overview of the System and Process

Thii chapter outlines the system and its basic operation principles. Read this chapter to acquire preliminary knowledge for operation.

Contents of this Chapter

1.1 Features

① No wasted film

When a conventional hand laminator was used, the film to be cut had to be laminated continuously on the PWBs to an excessive length, in the feeding direction. With this unit, however, it is only necessary to laminated the film after it is cut to the desired length, thereby eliminating wasted film.

② Simple operation

The newly adopted film-roll unit (DF unit) considerably simplifies film-exchanging and setting work at the laminating position, as the laminate module can be pulled out in the front direction. This reduces the preparation time to half or less of that required for a conventional unit, and substantially improves productivity.

③ Film holding with vacuum pressure

The film is held for tacking and cutting by the suction pressure of a vacuum. As the film is held on the protective-film side, the guide rolls do not contact the emulsion side. This keeps the film free from dirt and dust.

④ Film cutting by a rotary cutter

The disk-type rotary cutter has a longer service life than the knife-type cutter, and exhibits stable film-cutting performance.
The cutter cover ensures the safety of cutting operations.

⑤ Elimination of contaminants and increased line speed

The lower cutter rotating speed reduces the amount of contaminants generated when the film is cut. The contaminants are removed by the vacuum pressure of the cutter backup. The higher cutter shuttle speed increases the line speed and minimizes the generation of contaminants. In addition, the structure of the unit has been simplified.

⑥ Higher precision of the dry-film laminating position

The high-speed processing programmable logic controller and the feed detection sensors (two rotary encoders) have improved the precision of front and rear space control. As the motors for driving the feeding rolls and tacking block are separately controlled, a high-precision synchronization speed is attained to improve the precision of the laminating position.

⑦ Quick recovery of the laminating temperature

When the PWB passes a roll, its surface temperature drops as the heat within the PWB is lost. A new type of heater and a new control method prevent such a temperature drop so that the laminating temperature is quickly recovered. As thinner roll rubber is used, temperature differences over the full length of the roll are minimized.

⑧ Improved method of laminate roll pressing

The sliding roll-pressing mechanism of the conventional unit has been changed to a new arm-type pinch-roll mechanism equipped with a cylinder of larger bore diameter. This ensures a greater and more uniformly distributed pressing force.

⑨ Film setup control

The pullout stroke is longer than that of the conventional unit. This enables smoother film setup control (from 700 mm to 1070 mm).

⑩ Feeding speed of the input-conveyor pinch roll synchronized with the line speed

The newly installed synchronizing mechanism eliminates the cumbersome adjustment of the pinch-roll feeding speed that was necessary when the conventional unit was used.

⑪ Countermeasures against contaminants of mechanical parts

To prevent the generation of contaminants, stainless steel and aluminum are widely used in the components (particularly those above the path line.) The tacking-block synchronizing mechanism is totally covered to prevent the entry of contaminants and ensure safety, which was not possible with the conventional unit.

⑫ Package arrangement of the components for operation

All of the components for operation are arranged on the front of the input conveyor to ease operation and improve visibility.

⑬ Improved cleaning feature

The pullout stroke of the main unit has been extended, and the roll immediately after the laminate roll is detachable. As a result, it is easier to clean the upper and lower laminate rolls.

⑭ Simple design

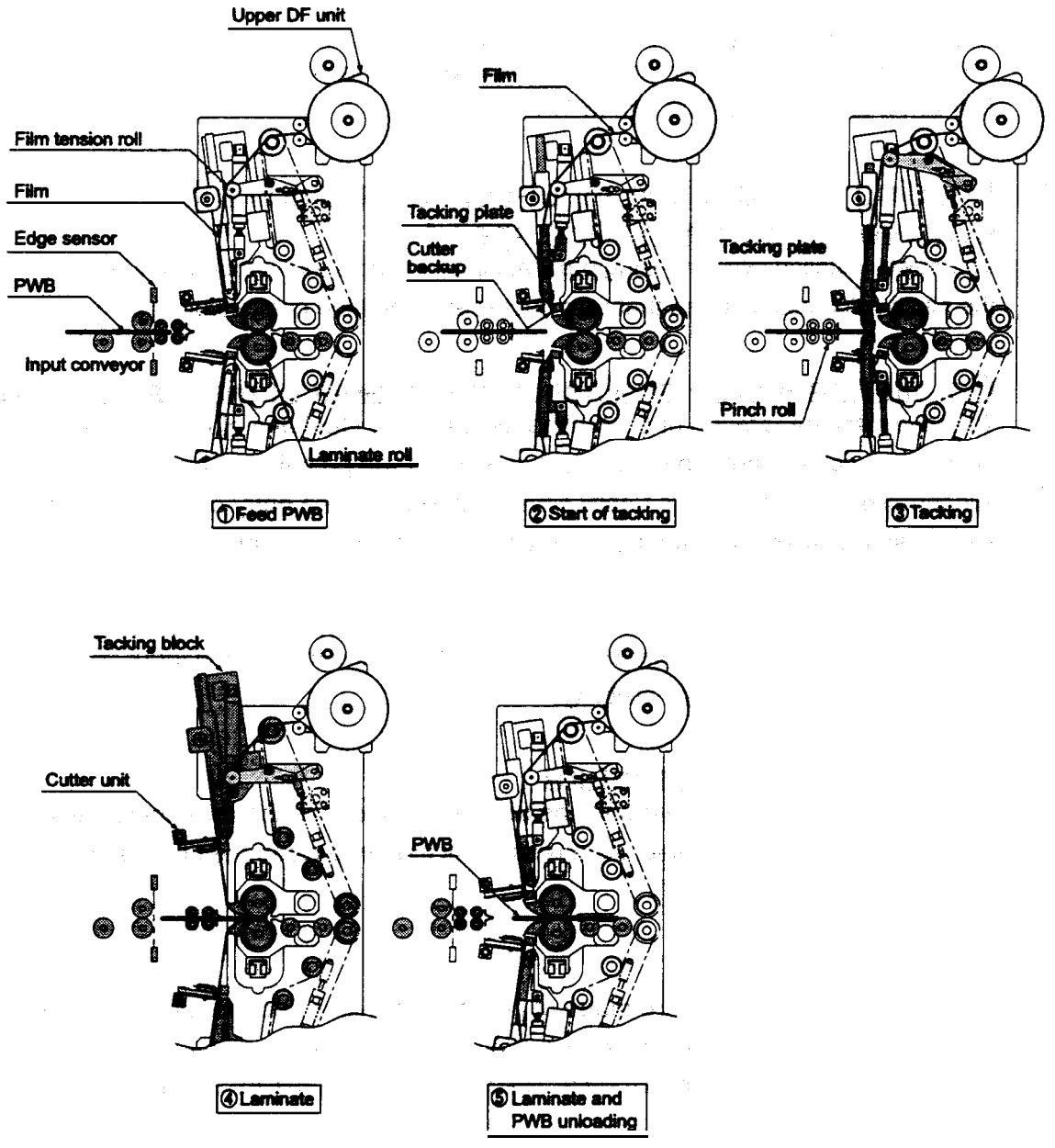
The outside covers, which are made of polished stainless and oxidized aluminum plates and anti-static resins (in smoky color,) feature a neat design making them suitable for operation in clean rooms. The touch panel simplifies the operation module.

⑮ Variety of optional functions

A variety of optional functions have been developed for the unit to meet the needs of users.

1.2 Operation Sequence

Fig.2.1.1

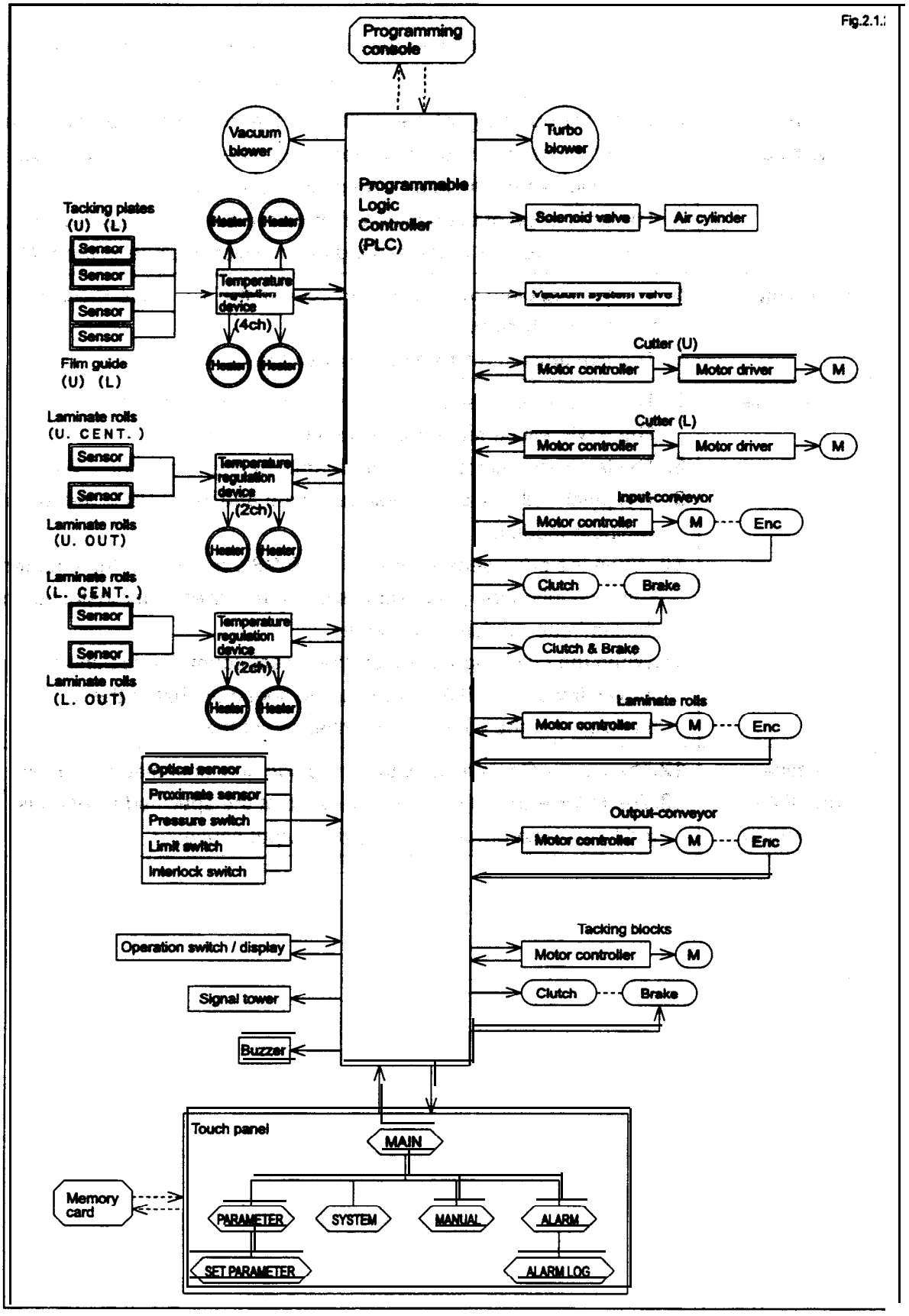


※The above illustration shows the motion of the upper laminate module. The motion of the lower laminate module is symmetrical with that of the upper laminate module in the vertical direction.

【Table 2.1 .1 Operation Sequence】

① Feed PWB	1. The edge sensor detects the position of the front edge of the PWB fed by the input conveyor. 2. The pulse signals of the rotary encoder fixed to the input conveyor are counted after the edge sensor detects the position of the PWB.
② Start of tacking	3. When the pulse signals generated by the rotary encoder reach the preset count, the input conveyor stops. The location of the PWB front edge when the input conveyor stops is the tacking position. 4. The front edge of the laminate film on the cutter backup moves to the tacking rubber of the tacking plate, which is close to the PWB.
③ Tacking	5. The tacking plate tacks the front edge of the film to the PWB, from the top and bottom. 6. The film tension roll rotates to cause the film to sag.
④ Laminate	7. The tacking plate and block move to the opened position. The PWB will be fed together with the pinch roll. 8. The laminate roll rotates to heat-laminate the film to the PWB. 9. The pinch-roll module moves backward and the PWB is fed to the laminate module. 10. When the edge sensor detects the PWB's rear edge, the counter starts counting the pulse signals of the rotary encoder installed on the laminate-module drive shaft. 11. When the pulse signals reach the preset count, the tacking block moves toward the PWB at the same speed as that of the film. In this process, the cutter unit shuttles to cut the film.
⑤ Laminate and PWB unloading	12. The cut dry film is held by the film guide and laminated on a PWB. 13. The PWB with its film heat-laminated at the specified position is fed to the next process unit by the output conveyor.

1.3 System Block Diagram



1.4 Module Locations

Fig.2.1.3

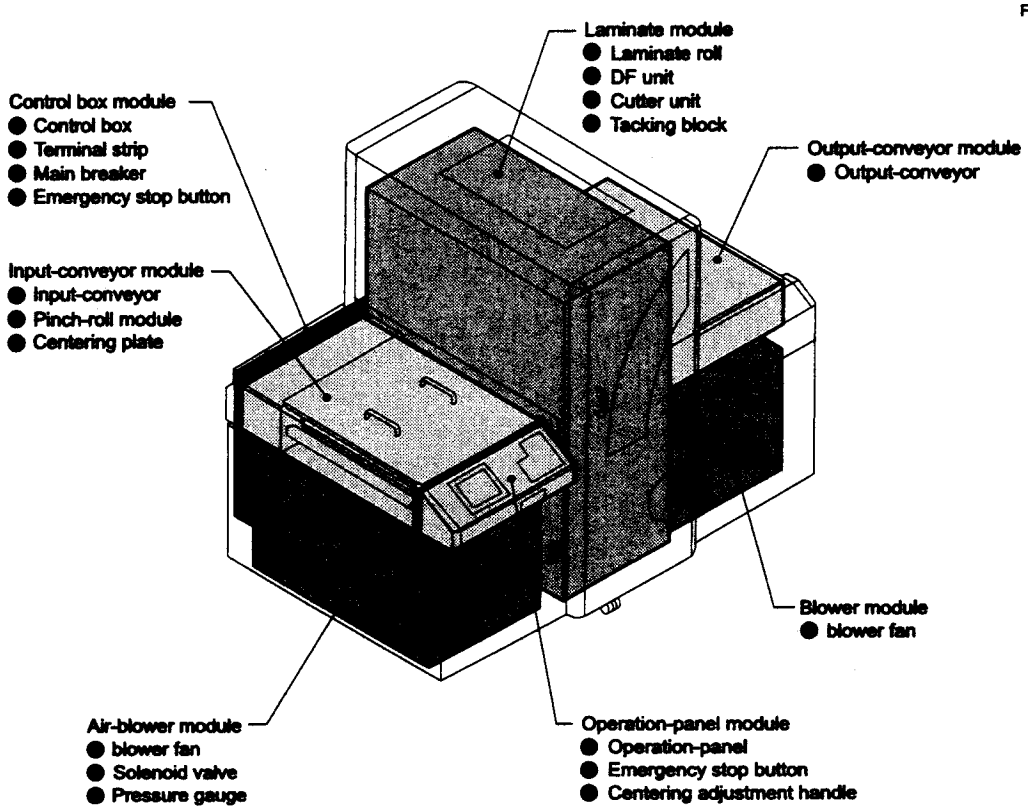


Table 2.1.2 Modules 1

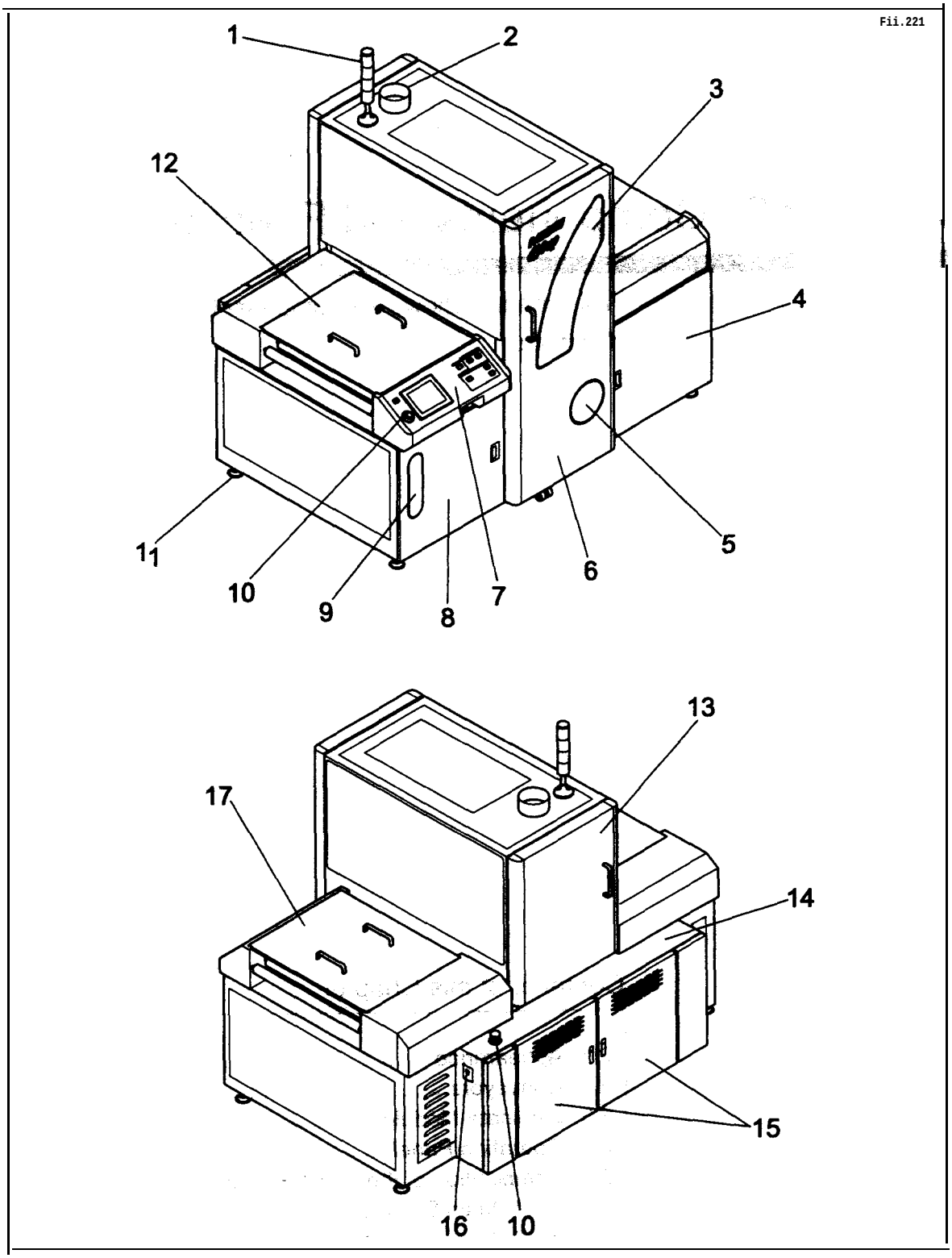
Module	Function
Input-conveyor module	Feeds and positions PWBs (centering and detection of the PWB edge).
Laminate module	Main module of the unit for mounting the DF unit, feeding, tacking, cutting, and heat-laminating film through the use of the laminate roll.
Output-conveyor module	Transfers PWBs to the downstream machine.
Blower module	Blower fan to hold films and suck contaminants when film is cut.
Air-blower module	Has an air inlet for the unit, and houses a regulator to distribute air to modules houses a blower fan to hold films.
Operation-panel module	Has a touch panel and operation buttons used to operate the unit, and a handle for adjusting the centering width.
Control box module	Houses a programmable controller, a DC power supply, and other electrical control parts.

Chapter 2 Components and Functions

This chapter shows the components and their functions.

Contents of this Chapter

2.1 Appearance



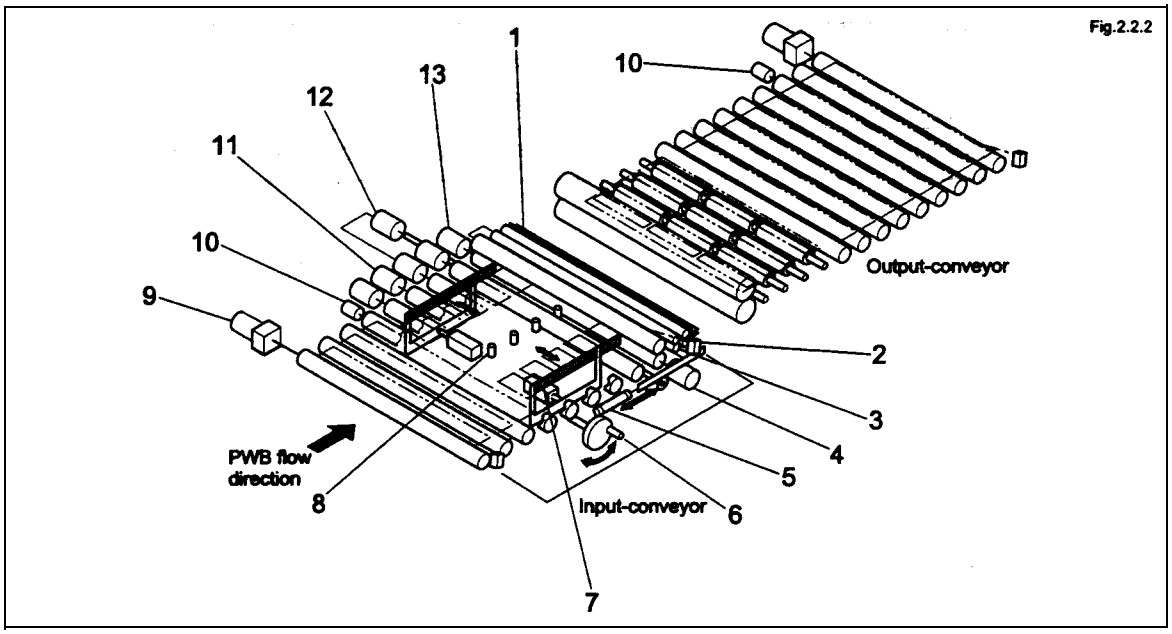
[Table 2.2.1 Component and Functions, External Appearance 1

No.	Component	Function
1	Signal tower	Displays the status of the unit using three lamps (red, yellow, and green). Red lamp: tights when an alarm has been issued in the unit. Yellow lamp: Lights when the unit is in the idle state in the manual and other operation modes. Green lamp: Lights when the unit is in the automat&operation mode.
2	Exhaust duct	Duct connected to the plant duct to discharge heat and contaminants generated within the unit.
3	Upper monitoring window	Window for monitoring the status of the laminate-module operation and upper DF unit.
4	Output-conveyor bottom door	Open this door when performing maintenance on the-blower fan or solenoide valve.
5	Lower monitoring window	Window for monitoring the lower DF unit.
6	Laminate-module front door	Open this door when pulling out the laminate module to replace the DF unit or for maintenance purposes. Do not open it unnecessarily in the automatic-operation mode.
7	Operation panel	Used to set up PWB information and to enter, control, and display automatic operation data. The panel displays information on operational conditions and alarms, if any have been issued.
8	Input-conveyor bottom door	A blower fan is located inside the door. Open this door when connecting the plant air supply to the unit, adjusting the air pressure, replacing solenoide valves, performing maintenance service on the components or confirming the direction of rotation.
9	Pressure-gauge window	Window for checking the indications of the pressure gauges for the laminate roll, upper and lower tacking plates, and main.
10	Emergency stop button	Press this button in emergency or when a failure has occurred in the unit. The unit will immediately stop in the same manner as when the Power button (OFF) is pressed. After correcting the cause of the failure, turn it clockwise to reset.
11	Leveling feet	Feet for adjusting the height and level of the unit. There are four leveling feet, one at each comer.

[Table 2.2.1 Component and Functions, External Appearance (Continued) 1

No.	Component	Function
12	Input-conveyor cover	Cover for protecting the products on the input conveyor.
13	Laminate-module rear door	Open this door when maintenance service is performed on the laminate module. Do not open it unnecessarily in the automatic-operation mode.
14	Control box	Houses a DC power supply, fuses, and other electrical parts.
15	Control-box door	Open this door when the unit is installed or maintenance work is performed on electrical parts. This door has an interlock switch. Do not open it unnecessarily in the automatic-operation mode.
16	Main breaker	Supplies power to the unit. When power is supplied, the Sourcs lamp on the operation panel lights up.
17	Output-conveyor cover	Cover for protecting the products on the output conveyor.

2.2 Conveyors



[Table 2.2.2 Conveyors]

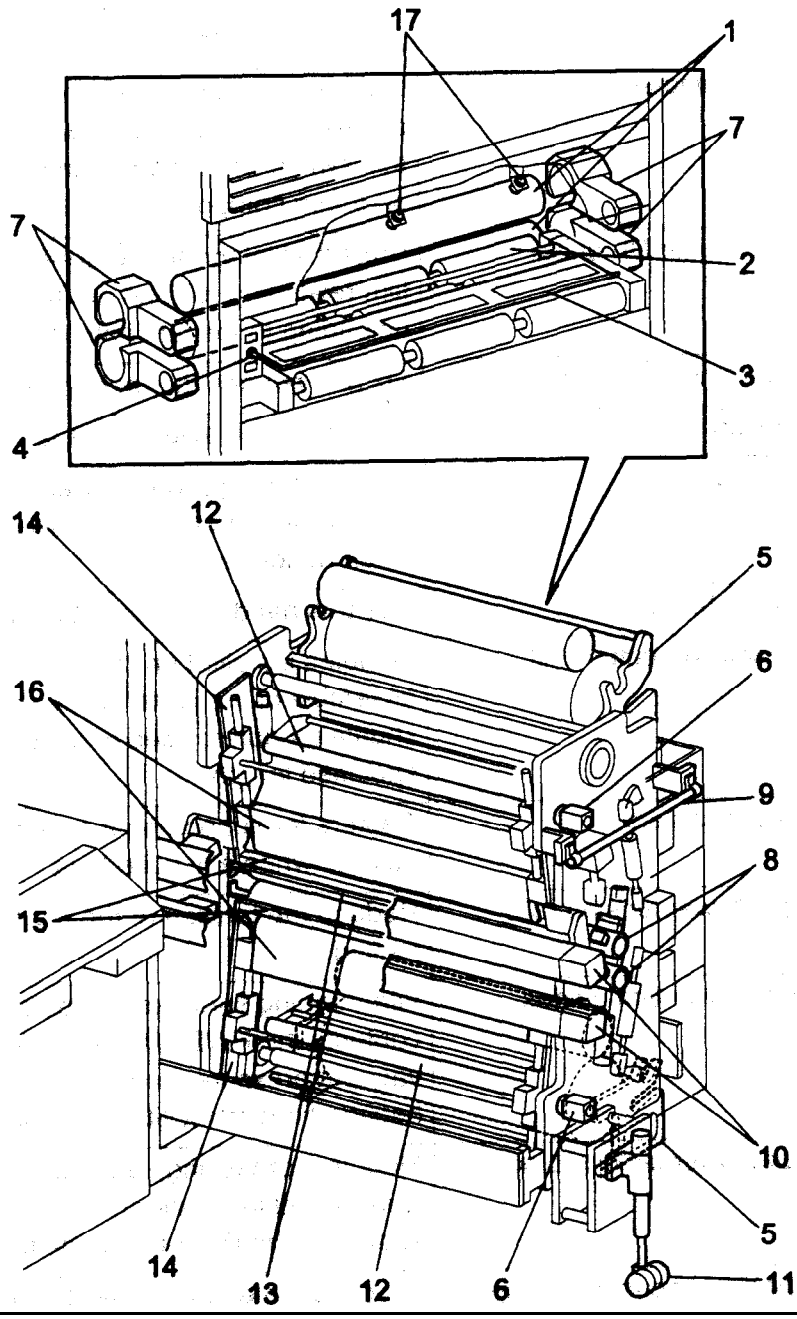
No.	Component	Function
1	Thin-PWB holding guide	Holds the front edge of a thin PWB and moves to the laminate roll.
2	Edge sensor	Detects the PWB front and rear edges.
3	Pinch-roll module	Transfers PWBs from the input conveyor to the laminate roll.
4	Brake	Controls the rotation of the roll of the pinch-roll module, and stops it when necessary.
5	Air cylinder	Moves the pinch roll backward.
6	Centering adjustment handle	Adjusts the centering width of PWBs on the input conveyor.
7	Centering plate	Centers the PWB on the input conveyor.
8	PWB detectiin sensor	Detects the position of the PWB on the input conveyor.
9	Motor	Drives the feeding rollers on the input conveyor.
10	Rotary encoder	Pulse generator for determining the PWB travel distance based on the PWB front or rear detection signal of the edge sensor.
11	Clutch / brake 1	Controls the rotation of each feeding roll based on the PWB detection-sensor signal.

(Table 2.2.2 Conveyors (Continued) 1

No.	Component	Function
12	Clutch / brake 2	Controls the forward movement of each feeding roll through the use of a motor, and stops it when necessary.
13	Clutch	Controls the rotation of the pinch roll.

2.3 Laminate Module

Fig.2.2.3



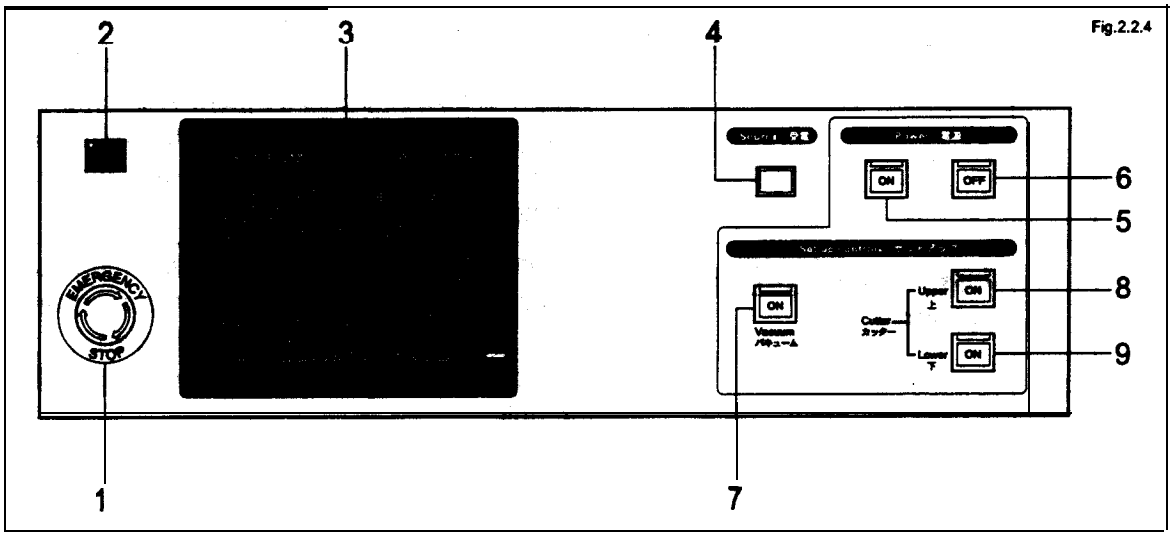
【Table 2.2.3 Laminate Module】

No.	component	Function
1	Upper/lower laminate rolls	Rollers heated by a heater for heat-lamination.
2	Auxiliary roll conveyor	Conveyor for feeding the PWB products unloaded from the laminate roll to the output conveyor.

[Table 2.2.3 Laminate Module (Continued) 1

No.	Component	Function
3	Auxiliary plate *Option	Open this plate when maintenance service is performed on the laminate roll.
4	Roll inching switch	Switch for rotating the laminate roll and the auxiliary roll conveyor forward and backward. Use this switch when performing maintenance service on these components.
5	Upper/lower DF units	Units that Integrate the dry-film roll and protective. film rewinding roll and enable one-touch loading/ unloading to the laminate module.
6	Upper/lower lock pins	Fix and release the tacking block.
7	Housing	Supports both axles of the laminate roll.
8	Slip ring	Slip ring for supplying power to the roll heaters. As the slip-ring brush wears, inspect and replace it when necessary.
9	Pull-out handle	Use this handle to pull out the laminate module.
10	Upper/lower cutter unit	Modules installed on the tacking block for assembly of the cutter assemblies and cutter shuttle modules; used to cut dry films to a specified length.
11	Pull-out casters	Casters for supporting the weight of the laminate module when it k pulled out
12	Upper/lower tension rolls	Reduce the tension of the dry film when it is tacked.
13	Upper/lower film guides	Film running surfaces just before the dry film contacts the PWB. These guides suck films with vacuum pressure, and have a built-in heater for heating films to facilitate heat-lamination.
14	Upper/lower tacking blocks	Modules for tacking, laminating, and cutting films using a tacking plate and cutter unit. They approach the PWB to cut the film on it.
15	Upper/lower cutter backup	Grooved plates that allow the cutter to pass and suck films with vacuum pressure.
16	Upper/lower tacking plates	Plates for sucking the dry film with vacuum pressure, moving toward the PWB, and tacking the film at the PWB-front-edge using the heat generated by the built-into heater of the tacking rubber at their front edge.
17	Laminate-roll temperature sensor	This sensor is used to control the temperate of laminate-roll.

2.4 Operation Panel



[Table 2.2.4 Components and Functii, Operation Panel 1

No.	Component	Function
1	Emergency stop button	Press this button in an emergency or when a failure has occurred in the unit. The unit will immediately stop in the same manner as when the Power OFF button is pressed. After correcting the cause of the failure, turn it clockwise to reset.
2	Buzzer	Sounds when a failure has occurred in the unit, to alert the operator.
3	Touch panel	Has a main screen, displays several hierarchies of information for the setting of PWB information, inputs data on automatic operation and the control of different operation modes, and displays other information. Also displays an alarm when a failure has occurred in the unit.
4	Sourcs lamp	Lights up when the main breaker is turned ON (I) and power is supplied to the unit.
5	Power ON button and lamp	To supply power to system components, press this button, power "ON" will then light up. It has a protection cover to prevent it from being pressed accidentally.
6	Power OFF button and lamp	To stop the supply of power to system components, press this button, power "OFF" will then light up. It has a protective cover to prevent it from being pressed accidentally.

[Table 2.2.4 Components and Functions, Operation Panel (Continued) 1

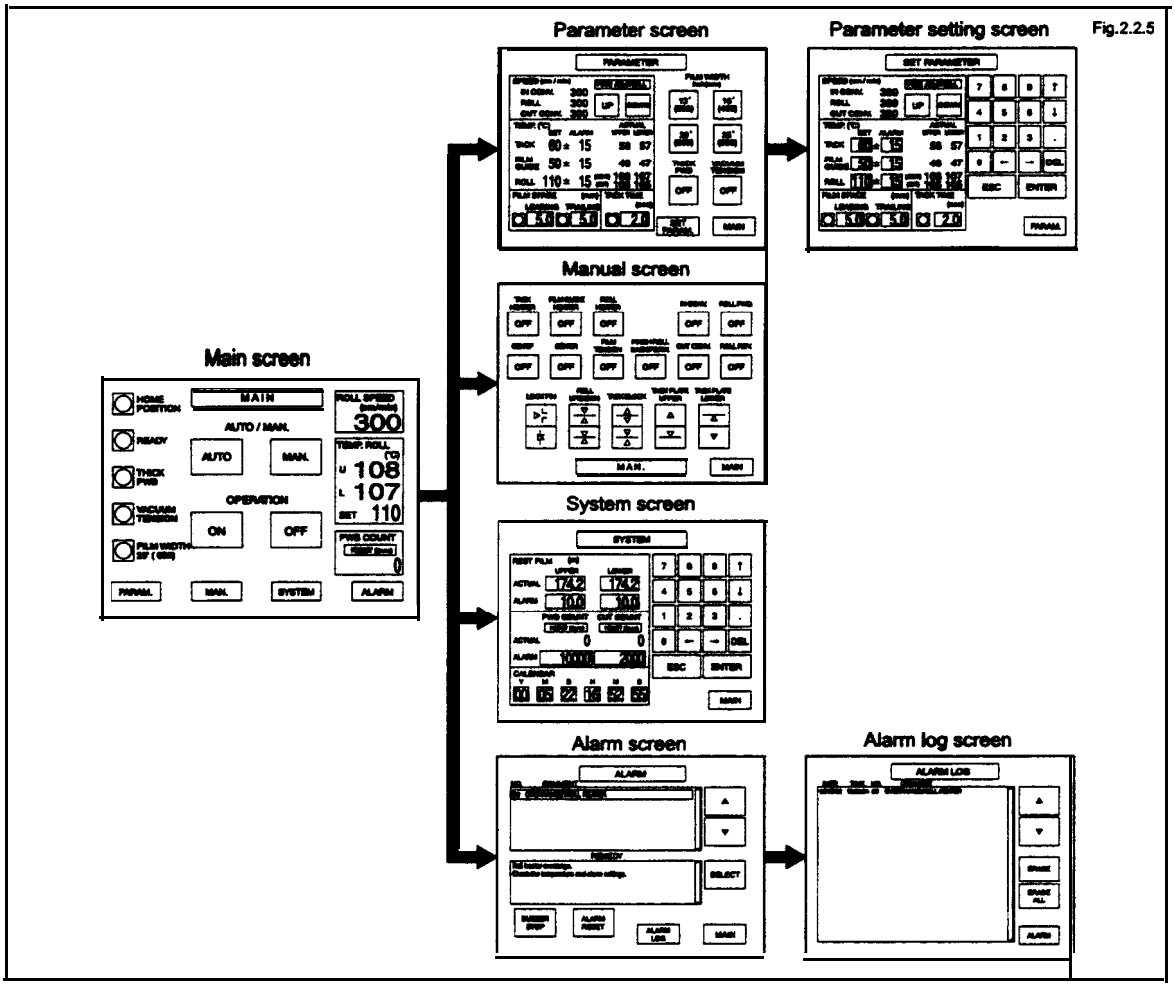
No.	Component	Function
7	Vacuum [ON] button and lamp	To supply power to the blower fan, press this button, vacuum "ON" will then light up. To stop the supply of power, press it again. The lamp will then go off. It has a protective cover to prevent it from being pressed accidentally. Use this button for setting a film to the unit.
8	Upper-Cutter [ON] button and lamp	To run the upper cutter, press this button, upper-cutter "ON" will then light up. It has a protection cover to prevent it from being pressed accidentally. Use this button for setting a film to the unit.
9	Lower-Cutter [ON] button and lamp	To run the lower cutter, press this button, lower-cutter "ON" will then light up. It has a protective cover to prevent it from being pressed accidentally. Use this button for setting a film to the unit.

2.5 Composition of the Touch Panel

The touch panel has a main screen, displays several hierarchies of information for the setting of PWB information, inputs data on automatic operation and the control of various operation modes, and displays other information. For the hierarchies of the touch panel, see the flow diagram below.

Note

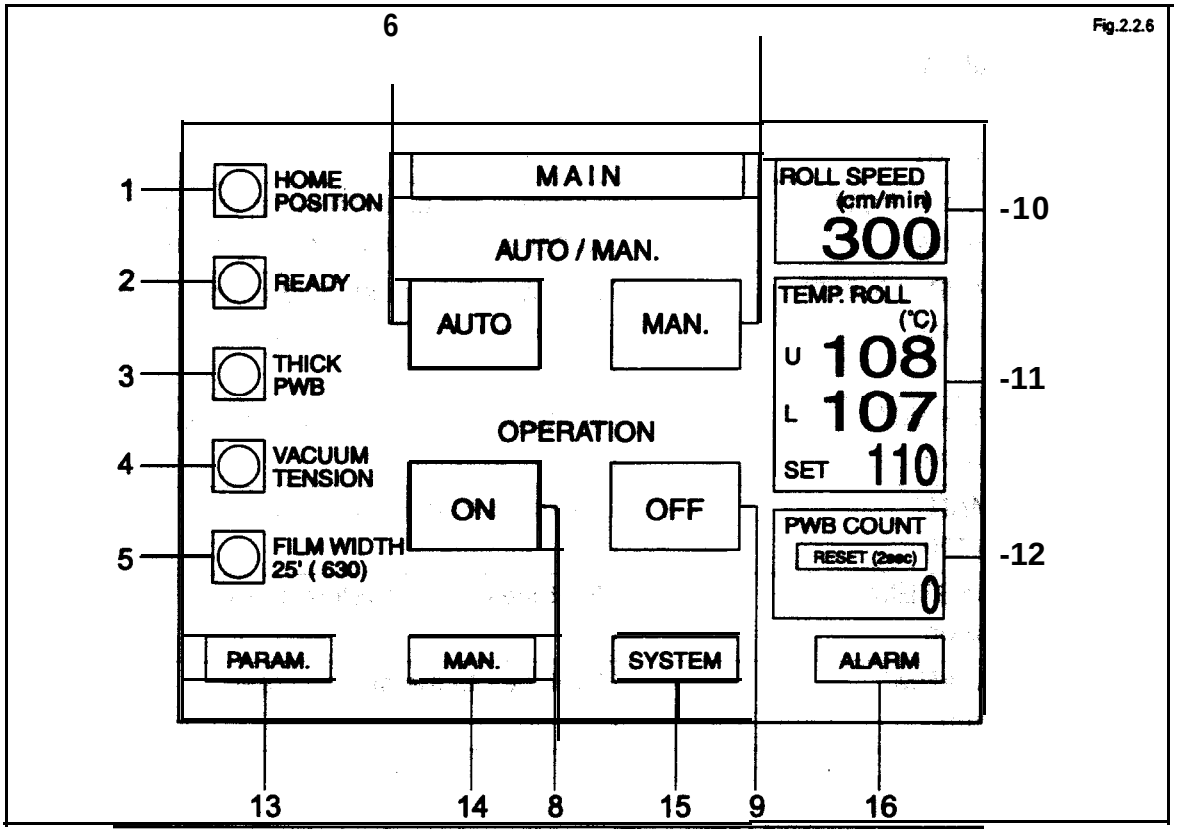
- It is possible to switch between hierarchies in the automatic- and manual-operation modes by pressing the button on the current screen.
- The unit can be operated from the manual screen, but only when the "Manual operation" mode is set on the main screen.
- To protect the backlight, the display on the touch panel automatically disappears if the panel isn't touched for 30 minutes. To reset the display, touch the panel.



[Table 2.2.5 Touch Panel]

Screen	Function
Main screen	The basic screen displayed on the touch panel when the Power [ON] button is pressed. Displays the buttons for selecting operation modes and screens of other hierarchies, the current values for roll speed, and the PWB count.
Parameter screen	Displays the feeding speeds of the conveyors and laminate roll, the heater temperature, and front and. edge spaces of the film. To change the setting, select the parameter setting screen.
System screen	On this screen, the rest film count and PWB count can be set and displayed, and calendar data can be input.
Alarmscreen	Displays alarms, required actions, and an alarm log.
Wanual screen	Displays the operation switches for each module. This screen is valid only when “Manual” (manual-operation mode) is selected on the main screen.

2.51 Main Screen



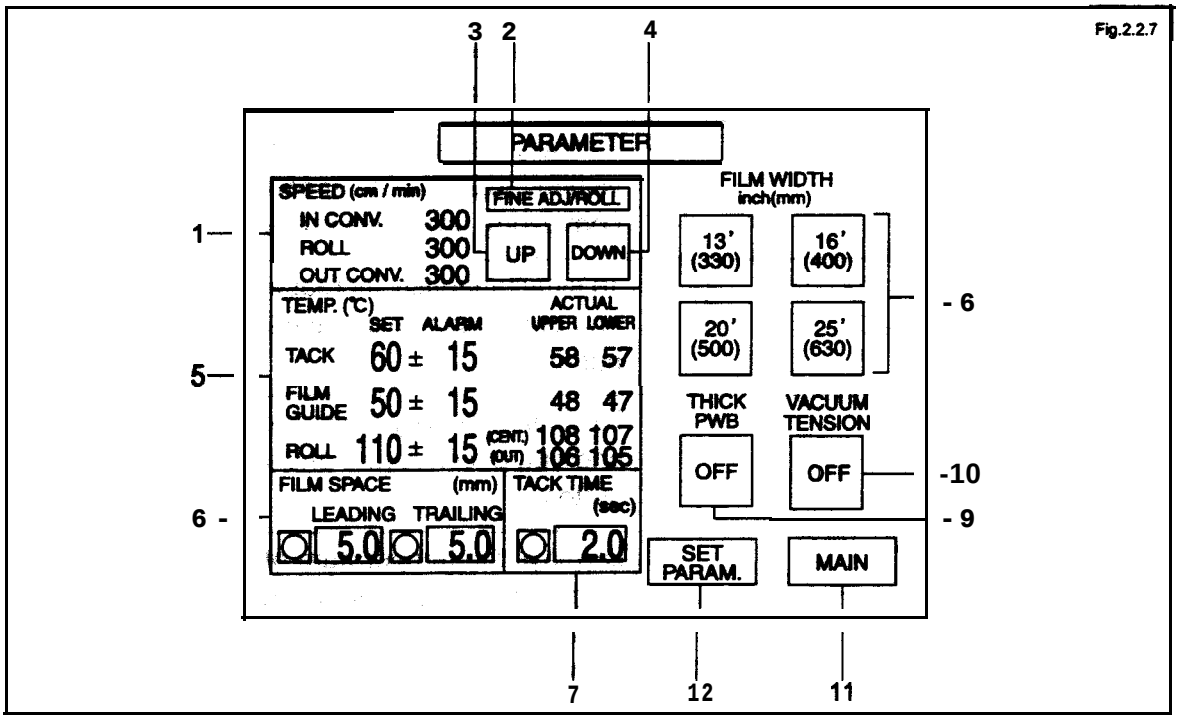
[Table 2.2.6 Components and Functions, Main Screen]

No.	Component	Function
1	"HOME POSITION" lamp	Lights up when all modules are at the home position
2	"READY" lamp	The lamp lights up when the unit is on standby for automatic operation or ready for operation.
3	"THICK PWB" lamp	Lights up when "THICK PWB" mode is ON on the parameter screen
4	"VACUUM TENSION" lamp	Lights up when the "Vacuum Tension" is set to ON on the parameter screen
5	"FILM WIDTH display/lamp	Displays the film width selected on the parameter screen and lights up
6	"AUTO button	Selects "automatic operation" of the operation mode
7	"MAN." button	Selects "manual operation" of the operation mode
8	OPERATION "ON" button	Starts "automatic operation"

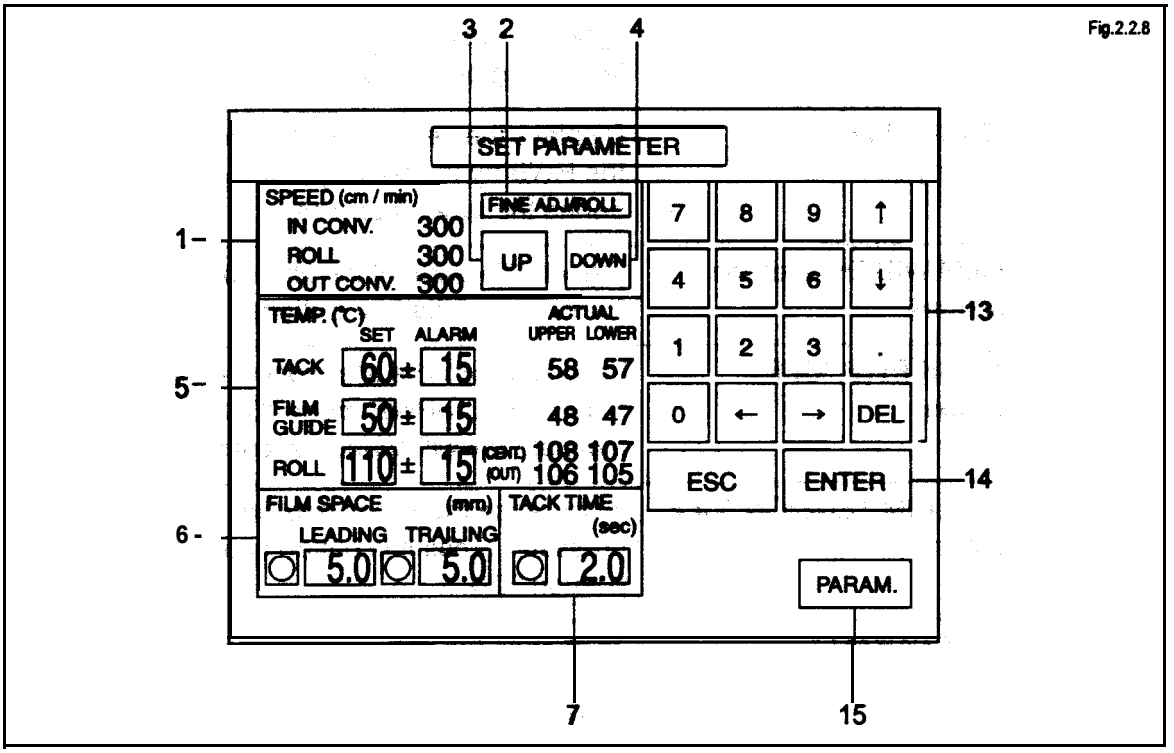
[Table 2.2.6 Components and Functions, Main Screen (Continued)]

No.	Component	Function
9	OPERATION "OFF" button	Stops "automatic operation"
10	"ROLL SPEED" display	Displays the actual laminate-roll feeding speed
11	"TEMP. ROLL display	Displays the actual and set temperatures of the upper/lower laminate-roll surfaces
12	"PWB COUNT" display	Displays the actual PWB count. To reset it to "0," hold down the "RESET" button for two seconds over.
13	"PARAM." button	Switches to the parameter screen
14	"MAN." button	Switches to the manual screen
15	"SYSTEM" button	Switches to the system screen
16	"ALARM" button	Switches to the alarm screen

2.5.2 Parameter Screen



To switch to the parameter setting screen shown in the illustration below, press the "SET PARAM." button on the parameter screen.



To return to the parameter screen, press the "PARAM." button on the parameter setting screen.

[Table 2.2.7 Components and Functions, Parameter Screen]

No.	Item	Function
1	"SPEED" display	Displays the current feeding speeds of the laminate roll, input and output conveyor
2	"FINE ADJ/ROLL" button	To finely adjust only the laminate feeding speed, without adjusting the speeds of the input and output conveyors, press this button. *
3	"UP" button	To simultaneously increase the speeds of the input and output conveyors and laminate roll, press this button.
4	"DOWN" button	To simultaneously decrease the speeds of the input and-output conveyors and laminate roll, press this button.
5	"TEMP." display	Displays the temperature of the tacking rubber, film guide, and laminate-roll surface. SET: Displays the set temperature of each surface ALARM: Displays the alarm temperature of each surface ACTUAL: Diiys the actual temperature of the upper/lower surface . *
6	"FILM SPACE display	"LEADING" and "TRAILING" display the set values of the spaces on the PWB to laminate a film. A lamp lights up during both the "Front" and "Rear" laminating processes.
7	"TACK TIME" display	Displays the set time for the tacking of a film onto the PWB by the tacking plate. A lamp lights up during the tacking process.
8	FILM WIDTH selection buttons	Selects the width of the film loaded into the DF unit. Press one of the four buttons.
9	THICK PWB "OFF" button	When thick PWBs are processed, press this button to turn THICK-PWB mode 'ON." The motion of the laminate roll will change accordingly.
10	VACUUM TENSION "OFF" button	To increase the laminatii film tension with vacuum pressure, press this button in order to turn vacuum tension "ON."
11	"SET PARAM." button	To change the setting on the parameter screen, press this button in order to switch to the parameter setting screen.

[Table 2.2.7 Components and Functions, Parameter Screen (Continued)]

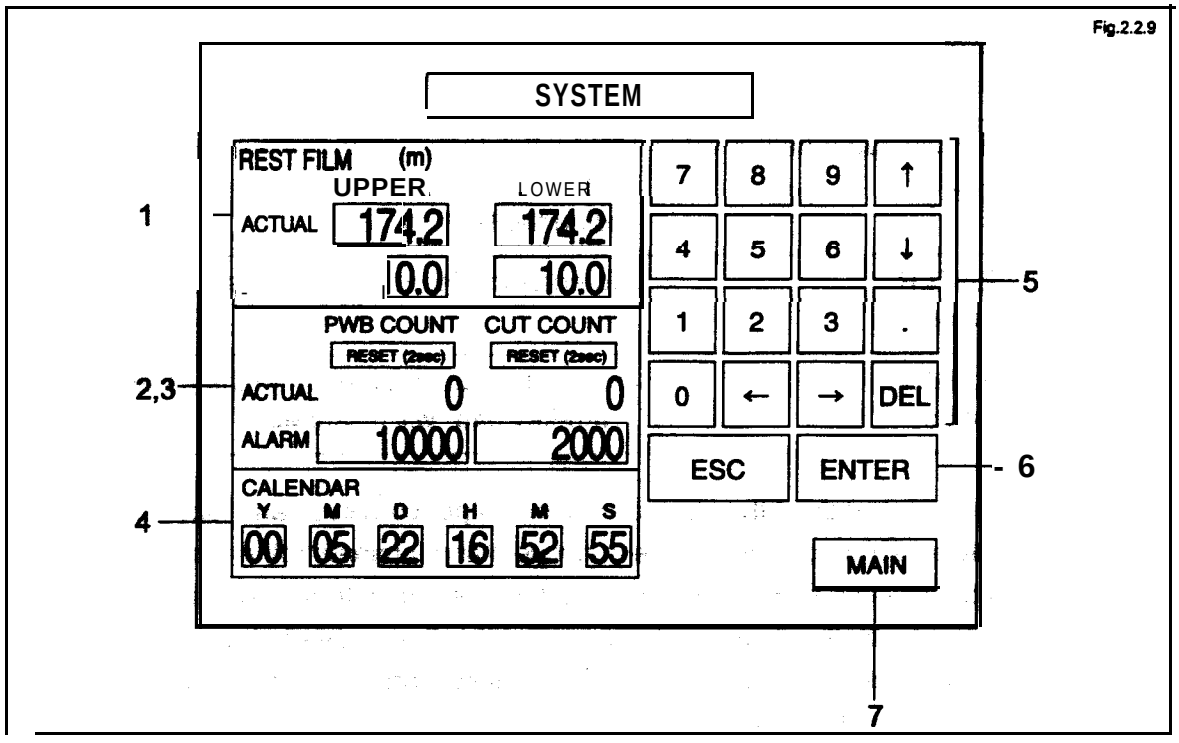
No.	item	Function
12	"MAIN" button	Returns to the main screen
13	Ten-key pad/numeric-value input	Press the square frame of the item for which the setting is to be changed, and input a numeric value using the ten-key pad.
14	"ENTER" button	To enter the input value, press this button.
15	"PARAM." button	Press this button to return to the parameter screen. "Ten-key pa& will disappear.

* The feeding speeds of the input conveyer, output conveyor, and laminate roll shall normally be synchronized. As the conveyors and laminate roll are driven by different sources, however, some time is required for the laminate-roll feeding speed to synchronize with the conveyor feeding speeds after a speed-change command is issued. To quickly synchronize these speeds synchronize or perform fine adjustment, therefore, it may be necessary to press this button.

* The "CENT" and "OUT" of the actual value of the laminate roll indicate the points at which the surface temperature is measured by sensors. The temperature sensor installed at the center of the laminate roll corresponds to "CENT" while that installed at the rear of the unit corresponds to "OUT"

2.5.3 System Screen

Fig.2.2.9



[Table 2.2.8 Items and Functions, System Screen 1

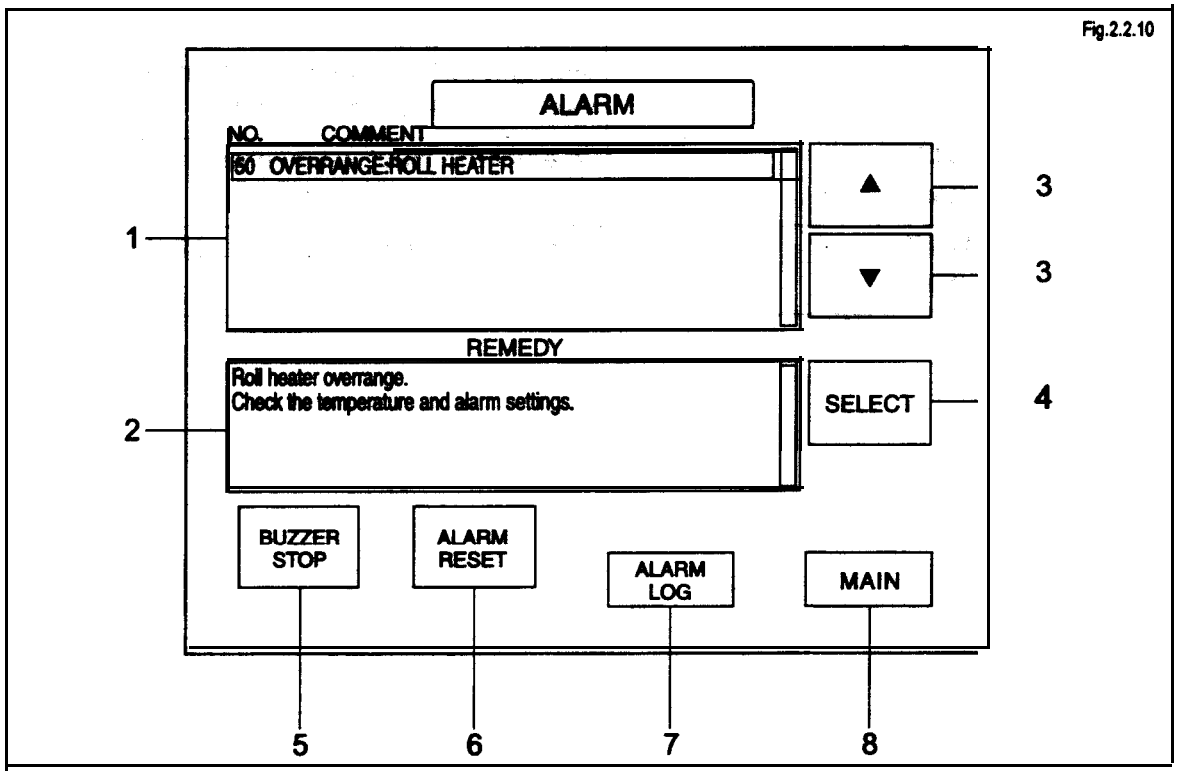
No.	Item	Function
1	"REST FILM" display	The actual (upper/lower, subtraction) and alarm (upper/lower) lengths of the rest films can be input and displayed. When the actual value reaches the alarm value, an alarm is issued, except when "0.0" is input as the ALARM.
2	"PWB COUNT" display	The actual (addition) and alarm values of the number of processing PWBs can be input and displayed. When the actual value reaches the alarm value, an alarm is issued. To reset the current value to "0," hold down the "RESET" button for two seconds over.
3	"CUT COUNT display	The actual (addition) and alarm values of the number of cut films can be input and displayed. When the actual value reaches the alarm value, an alarm is issued. To reset the current value to "0," hold down the "RESET" button for two seconds over.
4	"CALENDAR" display	Displays the actual values for the "Y," "M," "D," "H," "M," and "S," all of which can be changed using the ten-key pad.

[Table 2.2.8 Items and Functions, System Screen (Continued)]

No.	Item	Function
5	Ten-key pad	Press the square frame of the item for which the setting is to be changed, and input a numeric value using the ten-key pad.
6	"ENTER button	To enter the input value, press this button.
7	"MAIN" button	To return to the main screen, press this button.

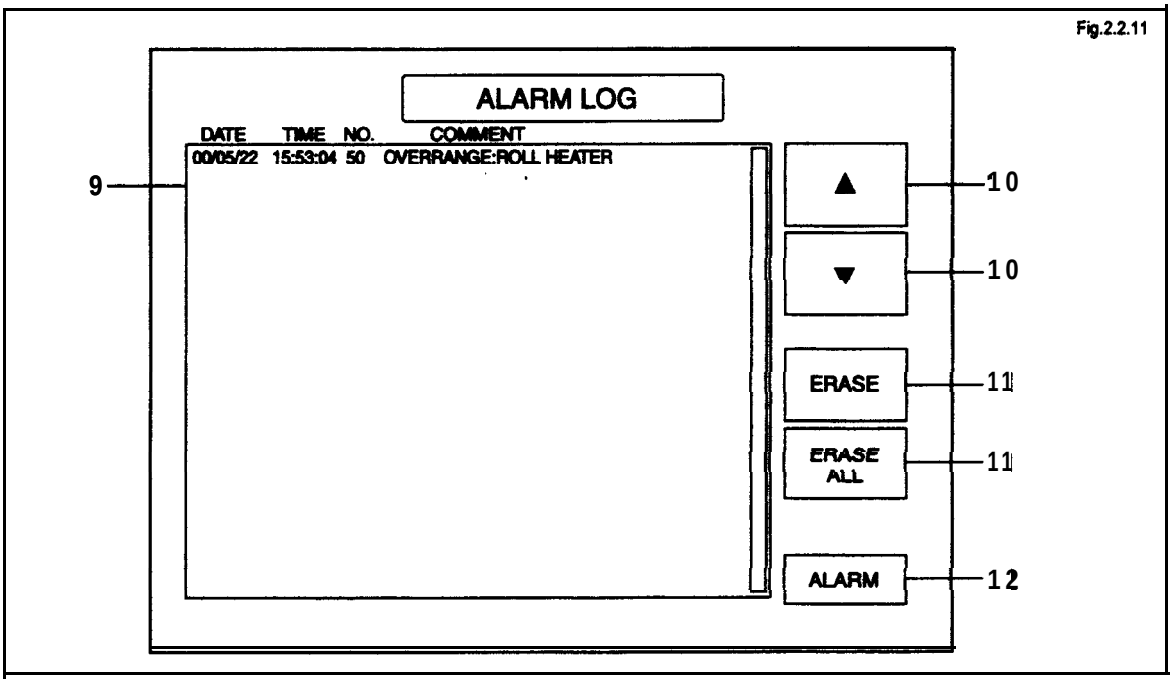
2.5.4 Alarm Screen

Fig.2.2.10



To switch to the alarm-log screen shown in the illustration below, press the "ALARM LOG" button on the alarm screen.

Fig.2.2.11

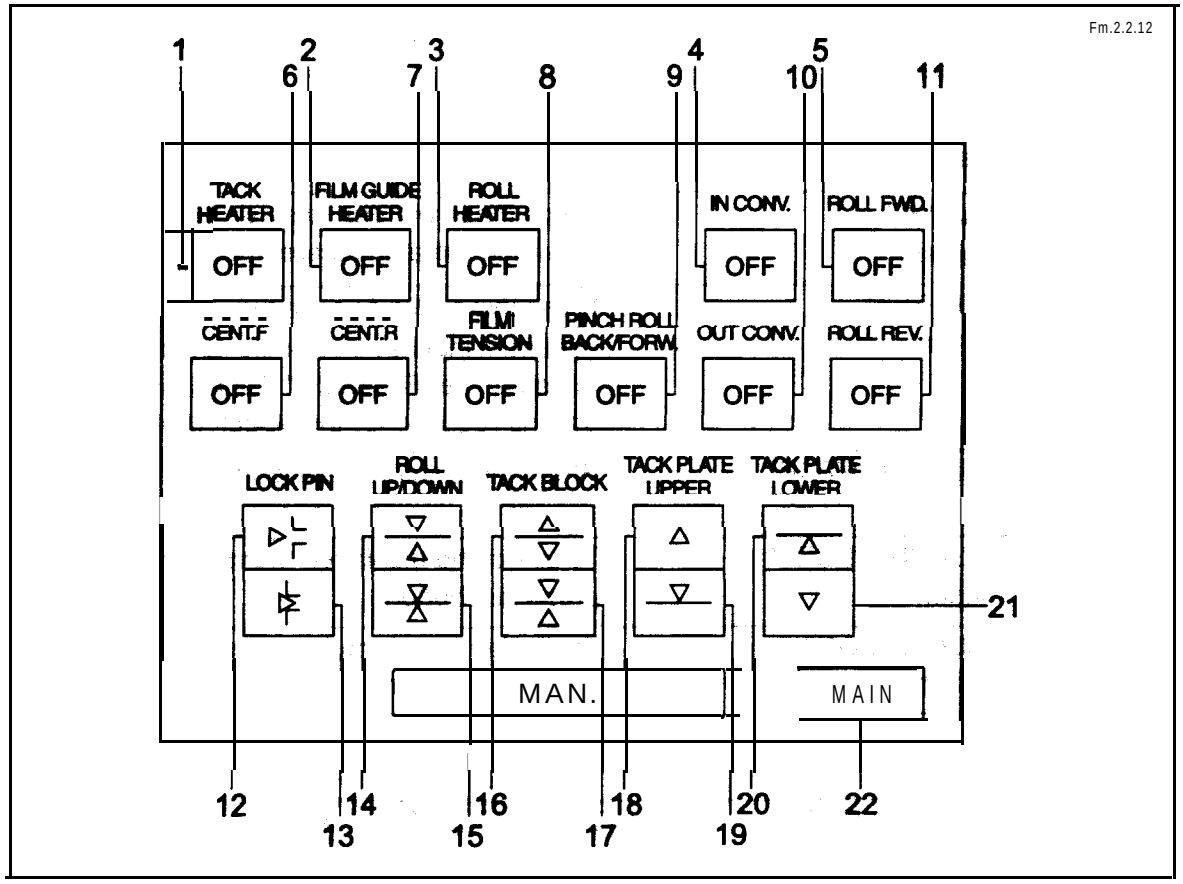


To return to the alarm screen, press the "ALARM" button on the alarm log screen.

(Table 2.2.9 Items and Functions, Alarm Screen 1

No.	Item	Function
1	"ALARM" display	Displays the alarm No, and several comments
2	"REMEDY" display	Displays the actions required for the selected alarm display
3	"A" "▼" buttons	Press these buttons to select the alarm comment for which the actions are to be displayed.
4	"SELECT" button	Press this button to acknowledge the alarm comment that has been selected using the "▲" "▼" buttons, The "REMEDY" display will indicate the actions required for the selected alarm comment.
5	"BUZZER STOP" button	Stops the buzzer activated by an alarm signal
6	"ALARM RESET" button	To select the displayed alarm and rest the unit, press this button.
7	"ALARM LOG" button	To display the alarm log, press this button. The alarm-log screen will be displayed.
8	"MAIN" button	Returns to the main screen
9	"ALARM LOG" display	Lists the log of past alarms
10	"A" "▼" buttons	Select the alarm comment to be erased.
11	"ERASE" and "ERASE ALL" buttons	Erases one or all items in the alarm log
12	"ALARM" button	Returns to the alarm screen

2.5.5 Manual Screen



[Table 2.2.10 Items and Functions, Manual Screen]

No.	Button	Function
1	TACK HEATER "OFF" button	To turn the tacking heater ON, press this button.
2	FILM GUIDE HEATER "OFF" button	To turn the film-guide heater ON, press this button.
3	ROLL HEATER "OFF" button	To turn the roll heater ON, press this button.
4	IN CONV. "OFF" button	To turn the input conveyor ON, press this button.
5	ROLL FWD. "OFF" button	To turn the laminate-roll forward rotation (from the input side to the output side) ON, press this button.
6	CENT F "OFF" button	To turn the input-conveyor centering plate (F) ON, press this button. The plate will be activated.

[Table 2.2.10 Items and Functions, Manual Screen (Continued) 1

No.	Button	Function
	CENT R "OFF" button	To tom the input-conveyor centering plate (R) ON, press this button. The plate will be activated.
8	FILM TENSION "OFF" button	To turn the upper/lower tension rolls ON, press this button. The tension rolls will be activated.
9	PINCH ROLL BACWFORW. "OFF" button	To turn the pinch-roll forward movement ON, press this button. The pinch roll will move forward or backward. However, it will not move forward unless the input conveyor is turned ON.
10	OUT CONV. "OFF" button	To turn the output conveyor ON, press this button.
11	ROLL REV. "OFF" button	To turn the laminate-roll reverse rotation (from the output side to the input side) ON, press this button.
12	LOCK PIN "RELEASE" button	Unlock the tacking block using the lock pin. When the lock pin is released, the tacking block can move to the open position.
13	LOCK PIN "LOCK" button	Lock the tacking block using the lock pin.
14	ROLL UP/DOWN "RISE" button	Moves the upper laminate roll to the risen position
15	ROLL UP/DOWN "DESCENT button	Moves the upper laminate roll to the descent position
16	TACK BLOCK "OPEN" button	Moves the tacking block to the opened position
17	TACK BLOCK "CLOSE" button	Moves the laminate roll to the closed position. However, it will not move to the closed position unless the roll forward button is turned ON.
18	TACK PLATE UPPER "OPEN" button	Moves the upper tacking plate to the opened position (ascending)
19	TACK PLATE UPPER "CLOSE button	Moves the upper tacking plate to the closed position (descending)
20	TACK PLATE LOWER "CLOSE" button	Moves the lower tacking plate to the closed position (ascending)
21	TACK PLATE LOWER "OPEN" button	Moves the lower tacking plate to the opened position (descending)
22	"MAIN" button	Returns to the main screen

Chapter 3 Operation

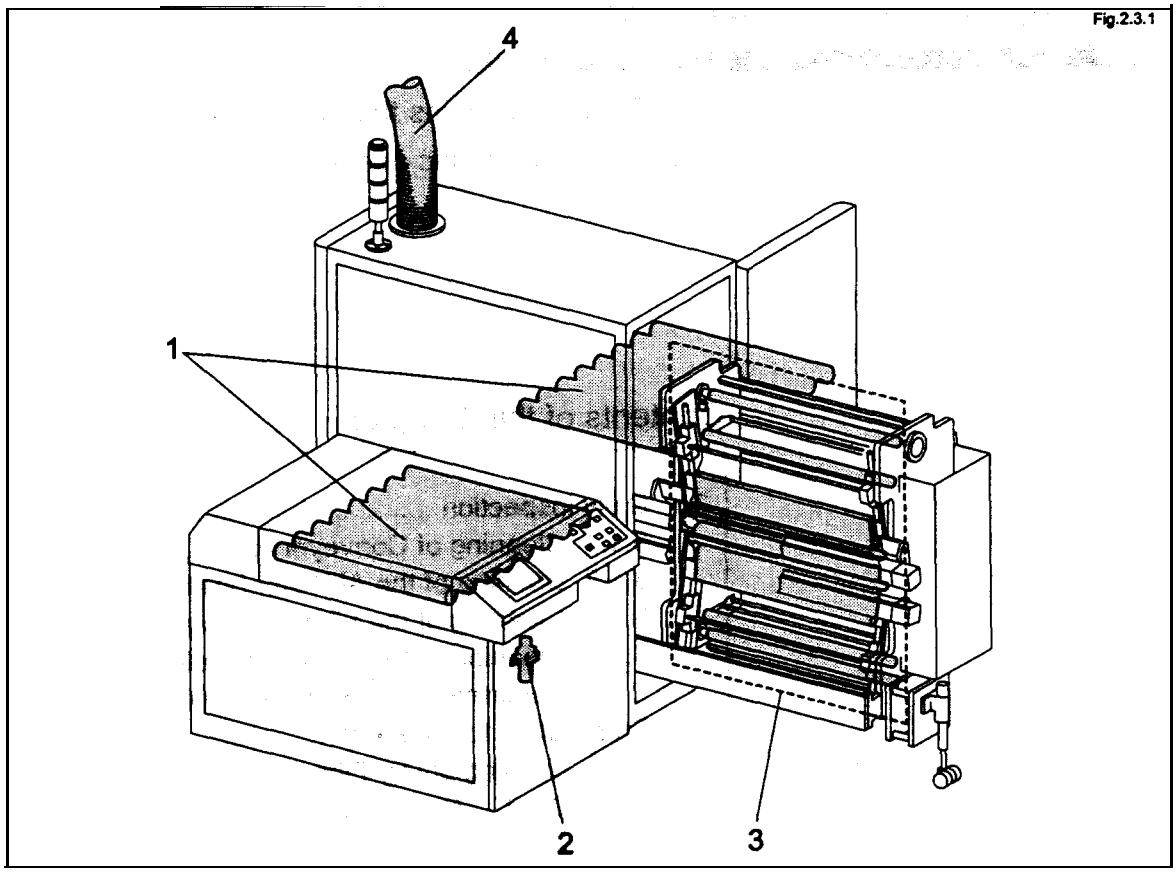
This Chapter explains the procedures for daily inspection, automatic operation, and manual operation.

Contents of this Chapter

3.1 Daily Inspection

Before operating the unit, be sure to inspect the items specified below. There are items to be inspected "Before power switch ON" and those to be inspected "After power switch ON." Follow the steps specified below to perform daily inspection.

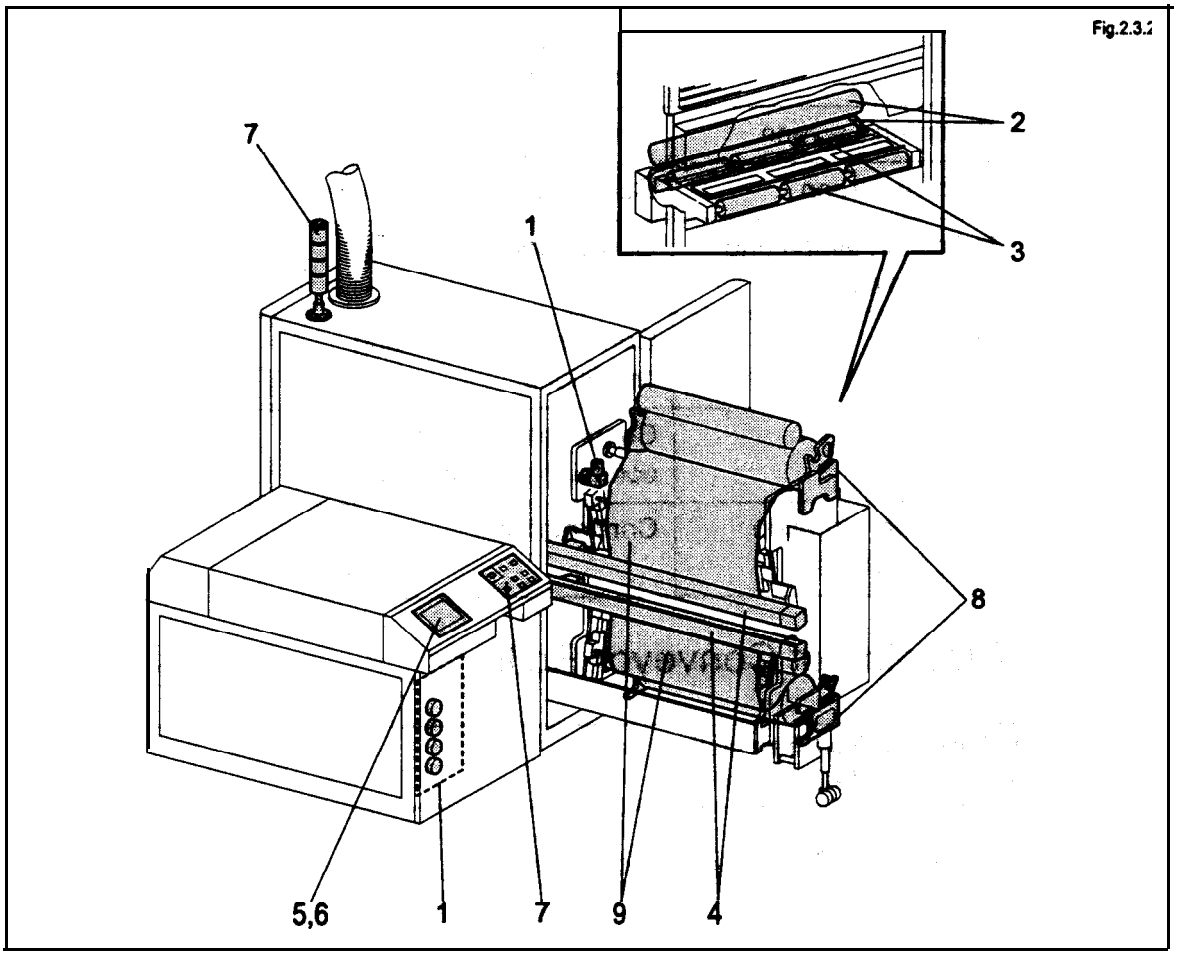
■ Inspection before Power Switch ON



[Table 2.3.1 Inspection Items before Power Switch ON]

No.	Inspection item	Inspection method	Reference
1	Conveyor rolls	Cleaning	3.1.1
2	Air-filter bowl	Drainage	3.1.2
3	Film-running section	Cleaning	3.1.3
4	Exhaust duct ,	Check the operation	—

■ Inspection after Power Switch ON



[Table 2.3.2 Inspection Items before Power Switch ON]

No.	Inspectiin item	Inspection method	Reference
1	Air pressure	Confirmation of pressure . Secondary supply pressure . Laminate-roll pressure . Upper-tacking-plate pressure .Lower-tacking-plate pressure . Vacuum-breaking pressure	2.62 Confirmation of the Connection of Compressed Air, Part 1, Installation.
2	Laminate roll	Cleaning and confirmation of surface conditions	3.1.4
3	Auxiliary conveyor roll	Cleaning and confirmation of surface conditions	3.1.4

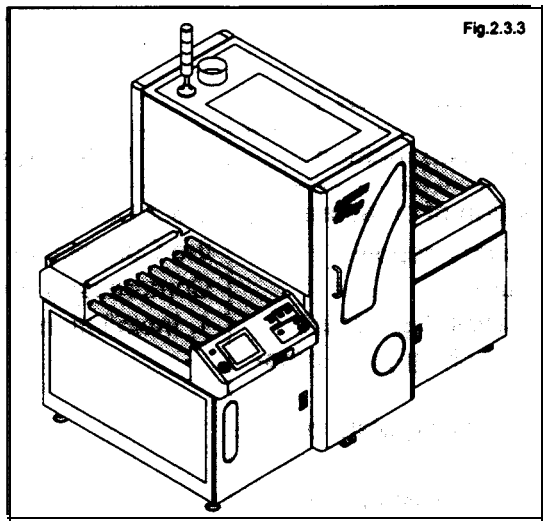
[Table 23.2 Inspection Items before Power Switch ON (Continued)]

No.	Inspection item	Inspection method	Reference
4	Cutter	Confirmation of cutting performance and function	—
5	Parameter screen	Confirmation of set values	3.2.3.1
6	System screen	Confirmation of set values	3.2.3.2
7	Indication lamps and signal tower	Confirmation of lighting	—
8	DF unit	Confirmation of loading conditions	3.2.1.3
9	Dry film	Confirrnatiin of loading conditions and film route	3.2.1.2 3.2.1.3
10	Abnormal vibration, heat, and noise	Confirmation	—

3.1 .1 Cleaning of Conveyor Rolls

Necessary tools	. Dust-free cloth • Methyl alcohol

1. Open the input and output conveyor covers.

2. 
Fig.2.3.3

Laterally wipe any dirt off the conveyor rolls using a dust-free cloth moistened with methyl alcohol.

3. Upon completion of cleaning, dose the input and output conveyor covers.

3.1.2 Draining of the Air-Filter bowl

Necessary tool	. Dust-free cloth

Note

Before draining the Air-Filter bowl, confirm that the primary-side compressed air is supplied (from the plant compressed-air supply system).

1. Open the input-conveyor bottom door.

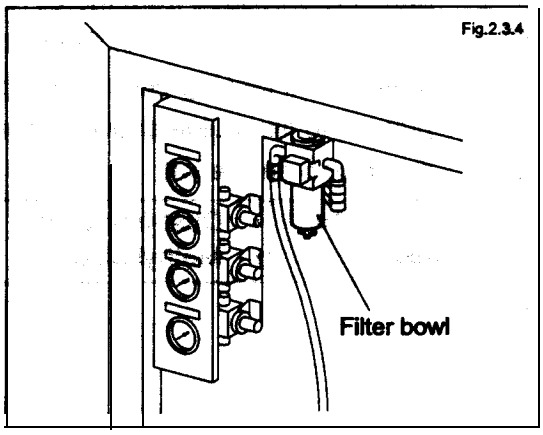
2. 

Fig.2.3.4

Confirm that there are no droplets in the filter bowl of the filter regulator unit.

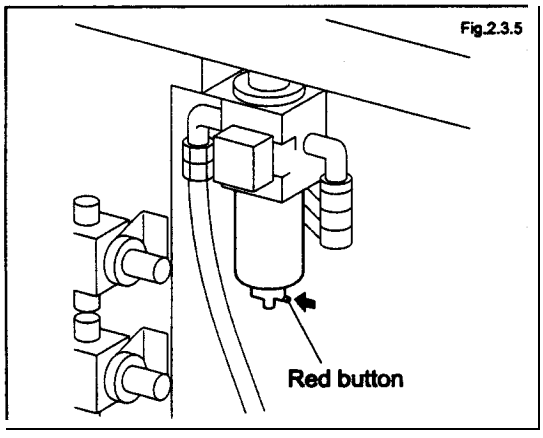
3. 

Fig.2.3.5

If there are any water or droplets in the filter bowl, press the red button at the bottom of filter bowl to drain them-

- Use a dust-free cloth to completely wipe away any water remaining in the unit.

Note

Droplets in the filter bowl indicate that the compressed air supplied from the plant contains water.

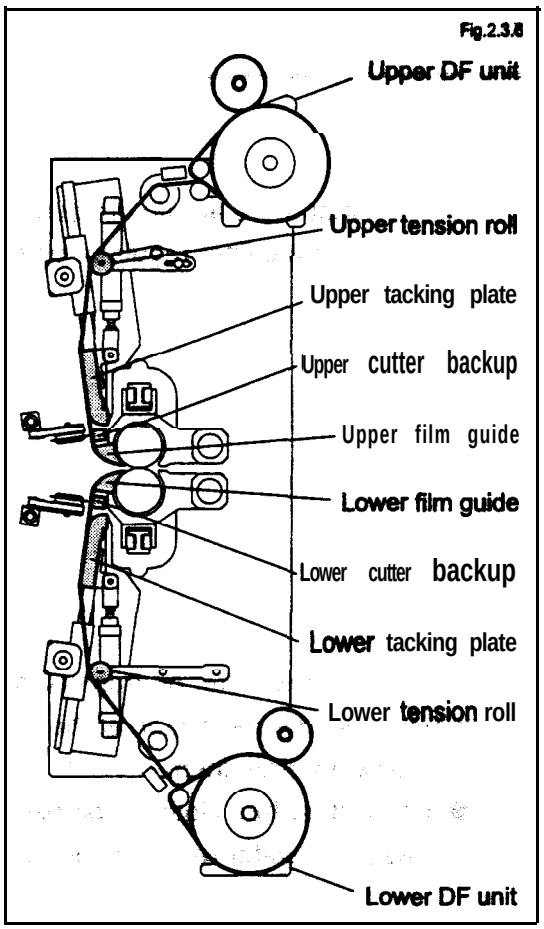
If the unit is operated with air containing water, the solenoid valves and other parts will fail. Inspect and make any necessary repairs to the plant compressed-air supply system.

3.1.3 Cleaning of the Film-Running Surface

Necessary tools	. Dust-free cloth . Methyl alcohol

1. Open the front door and pull out the laminate module.

2. Wipe the film-running surface with a dust-free cloth moistened with methyl alcohol.



- The film-running surface includes all sections touched by the dry film, from after it is unloaded from the DF unit until it reaches the film guide. Clean the tension roll tacking plate, cutter backup plate, and film guide shown in the illustration on the left.

Tools to be used	• Dust-free cloth • Methyl alcohol

3.1.4 Cleaning of the Laminate Roll and Confirmation of Surface Conditions

Necassary tools	• Dust-free cloth • Methyl alcohol

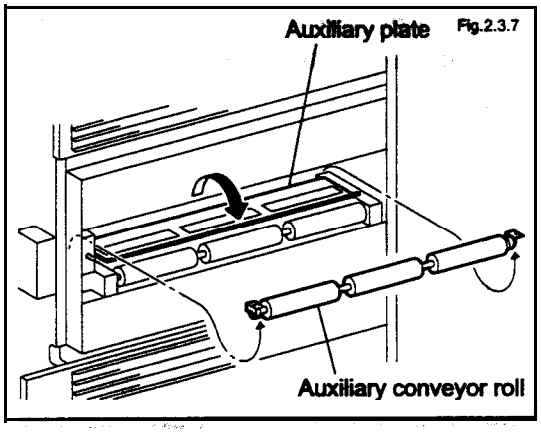
⚠ Warning

Clean the laminate roll while supplying power and compressed air. To prevent inadvertent operation by unautttoriied workers, affix a tag indicating "Under inspection" in a conspicuous location.

⚠ Caution

- **When cleaning the laminate roll, be careful to prevent your finger from being caught by or wound in the roll.**
- **Do not scratch the laminate-roll surface, or the quality of the PWB will be degraded.**

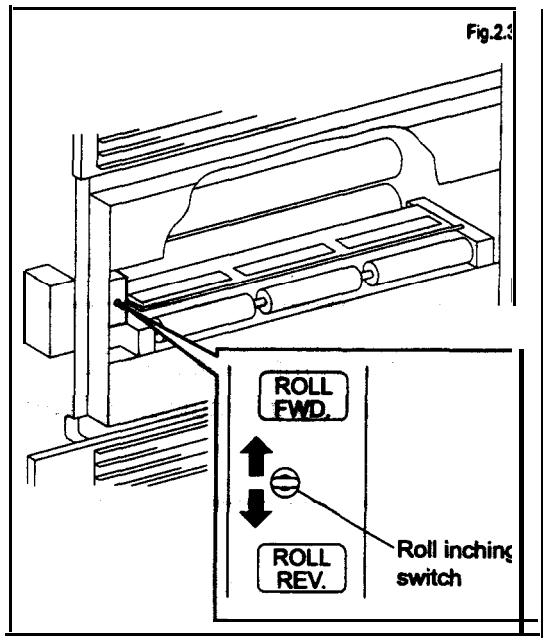
1. Open the front door and pull out the laminate module.

2. 

Open the auxiliary plate and remove the auxiliary conveyor roll. • Optkn

- Lii the auxiliary conveyor roll to remove it.
- Clean the conveyor roll and check its surface condition.

3.



Turn the roll inching switch to "ROLL FWD." "ROLL REV." and laterally wipe away any dirt from the laminate-roll surface and auxiliary conveyor roll using a dust-free cloth moistened with methyl alcohol.

- Check the surface conditions of the laminate roll. 'If it has faults or is deteriorated, see "2.2.4 Replacing the laminate roll and roll heater, Part 3 Maintenance" and follow the rep&cement procedures.

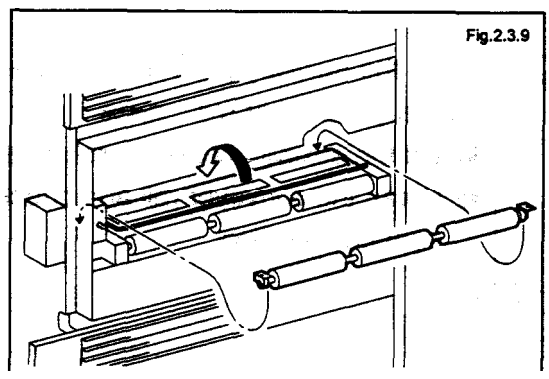
Necessary tools	• Dust-free cloth • Methyl alcohol

'7

⚠ Caution

Do not wipe the laminate roll by rotating it using the roll switch, or your finger may be caught by or wound in the roll. Repeatedly rotate the roll, then stop to wipe.

4.



Upon completion of cleaning, fix the auxiliary conveyor roll and close the auxiliary plate. *Option

'7

⚠ Caution

The auxiliary plate is monitored by a sensor. Be sure to close it, as an error will result if it is left open. 'Option

3.2 Preparation for Operation

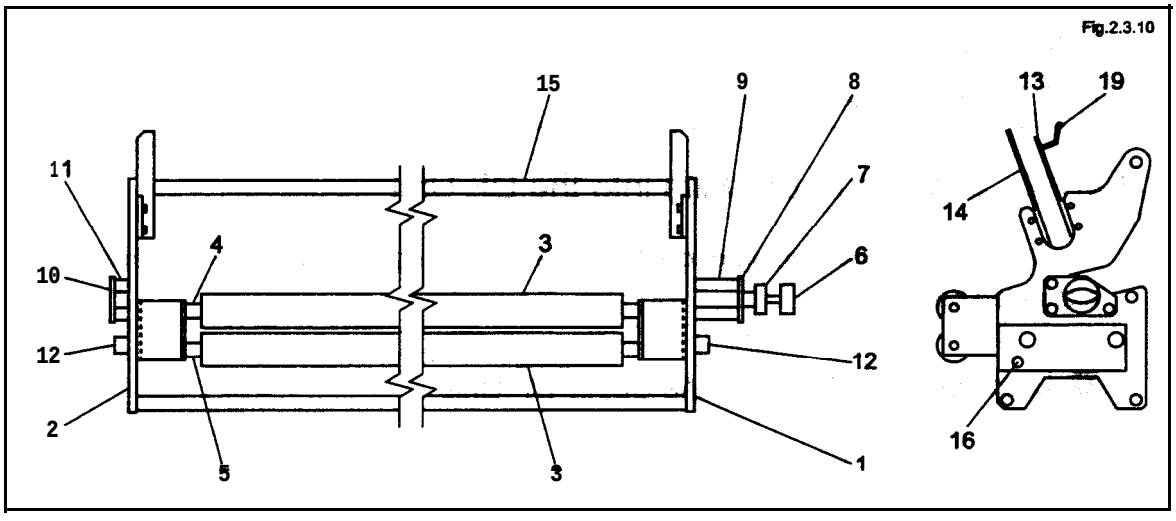
Before starting automatic operation, follow the steps specified below to install dry film and set the PWB information.

3.2.1 Loading of Dry Film

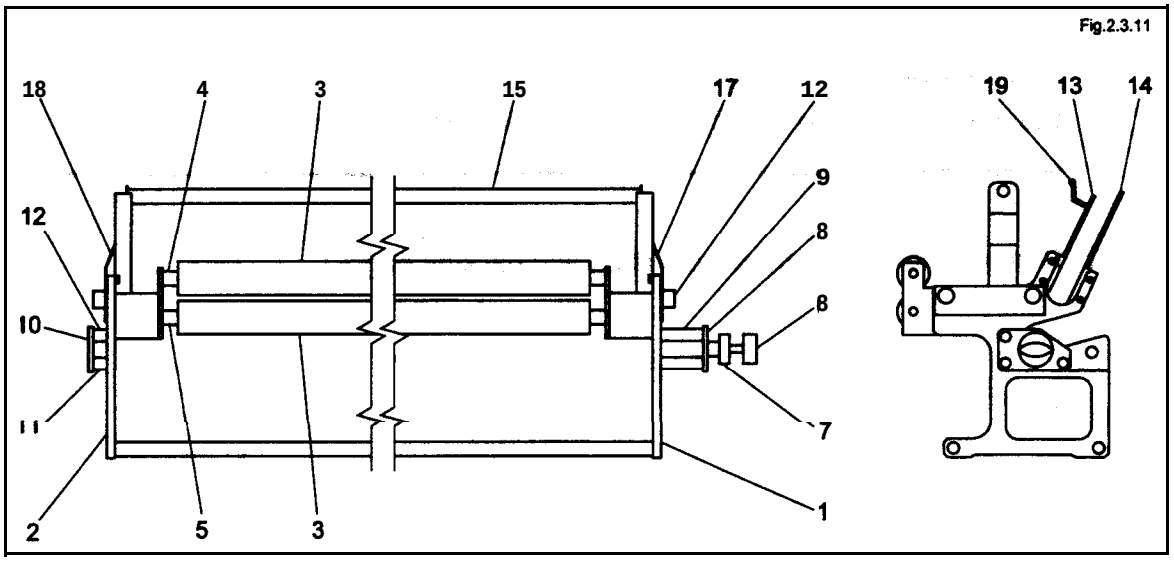
The DF unit can be used to supply dry film to the unit. This section explains the methods of loading dry film into the DF unit and of loading the DF unit into the unit, as well as the precautions for handling of the DF unit.

3.21 .1 Components of the DF Unit

DF Unit (Upper)



DF Unit (Lower)



[Table 2.3.3 Component, DF unit]

No.	Component	No.	Component
1	Side plate (right)	11	Spacer8
2	Side plate (left)	12	Cam follower
3	Protective-film separation roll	13	Guide A
4	Upper roll shaft	14	Guide B
5	Lower roll shaft	15	Tie rod
6	Axial-directionadjustment handle	16	Protective plate *Only DF unIt (Upper)
7	Locknut	17	Bracket (right) *Only DF unit (Lower)
8	Handle-fixing plate	18	Bra&et (left) *Only DF unit (Lower)
9	Spacer A	19	Winding-roll holding bracket
10	Film roll-shaft receiving plate		

3.2.1.2 Loading of Dry Film into the OF Unit

The methods for the loading of dry film differ for the upper and lower DF units, as explainedbelow.

■ **Loading of Dry Film into the Upper DF Unit**

1. Place the upper DF unit on a level and stable work bench.

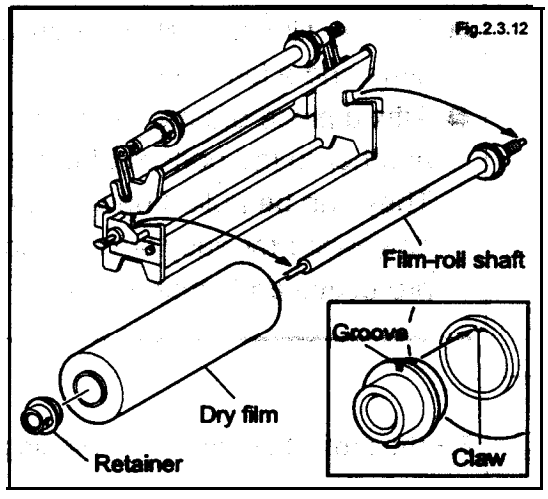
❑ Note

The weight of the DF unit is approximately 10 kg when loaded with dry film. Load the dry film on the floor or a stable work bench capable of withstanding the weight. Secure a sufficiently large working space.

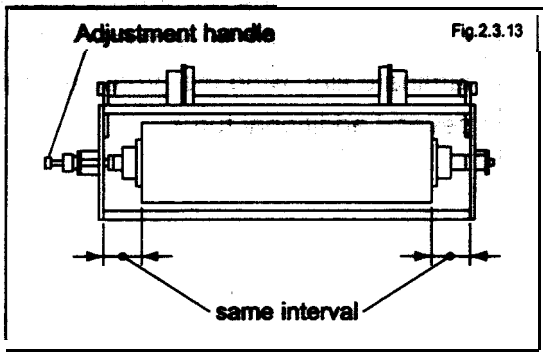
2. Remove the dry film from the crating and packing bag.

Note

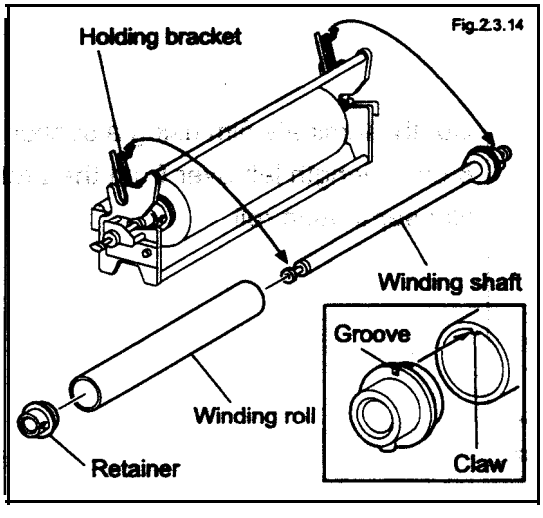
If it ts exposed to tight for an extended period, the dry film will be sensitized. Therefore, it is packed in a tight-shielded bag for storage. To avoid exposing it to strong light, remove it from the packing bag and load it into the DF unit in a room under yellow tight.

3. 

Remove the film-roll shati from the DF unit and position the dry film at approximately the center of the shaft. When positioning the dry film, align the daw of its core with the groove of the retainer.

4. 

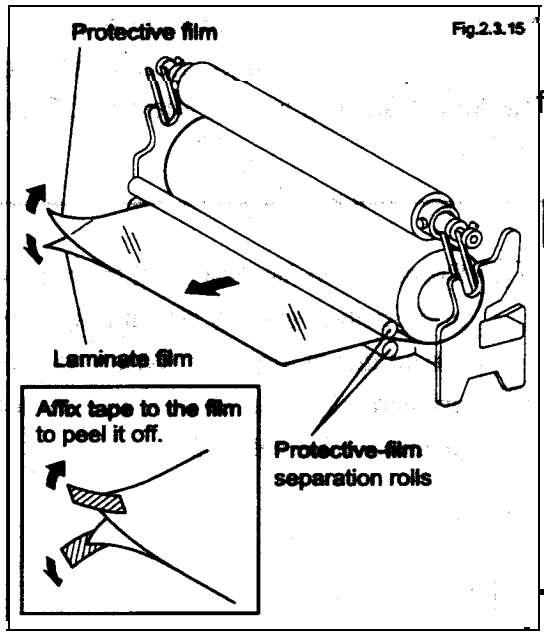
Position the film-roll shaft loaded with the dry film at the DF unit. Use the axial-adjustment handle to position the dry film so that it is laterally symmetrical when measured from the side plates at the edges of the unit.

5. 

Remove the winding shaft from the DF unit and position the winding roll (the empty core of a used dry film) at approximately the center of the winding-roll shaft. When . positioning the winding roll, align its claw with the groove of the retainer.

6. Place the winding shaft loaded with the winding roll in the winding-roll holding bracket.

7.

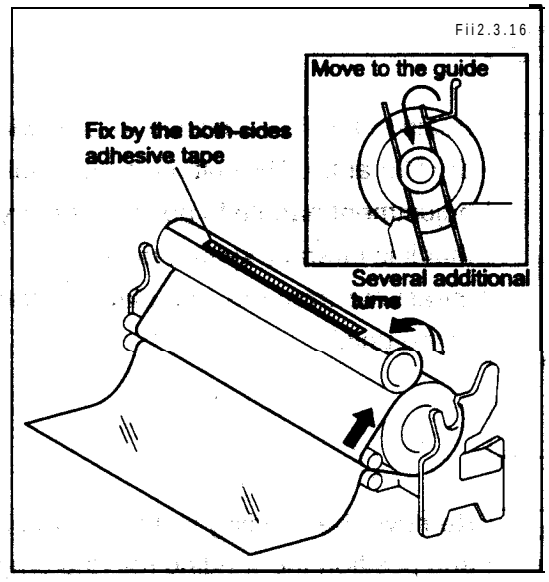


Pull out the dry film, and run it between the protective-film separation rolls to separate it from the laminate Mm.

Note

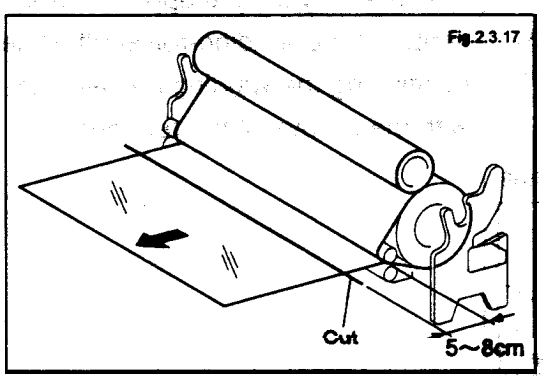
- The dry film consists of a protective films and a laminate film.
- Affix a piece of tape to 'the top and another to the bottom of the film. They can be pulled upward and downward for easy separation of the protective and laminate films.

8.



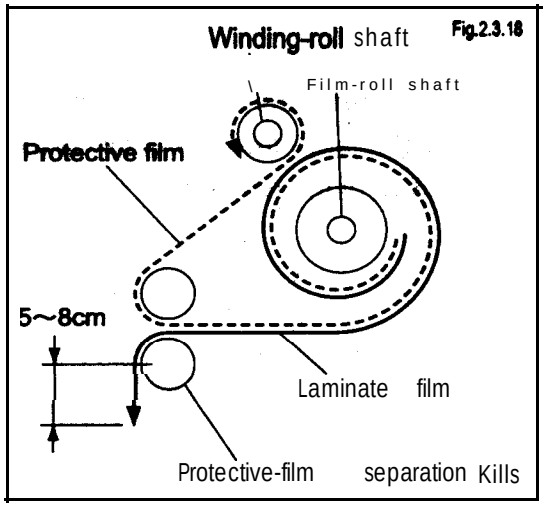
Fix the protective film at the winding roll using both-side adhesive tape, and transfer it from the winding-roll holding bracket to the guide section. While separating it from the laminate film, wind the protective film several additional turns.

9.



Cut the laminate film using a section 5 an to 8 cm in length left over from the protective-film separation roll.

10



The dry film has now been loaded into the upper DF unit, along the route shown in the illustration to the left.

■ Loading- of Dry Film into the Lower DF Unit

1. Place the lower DF unit on a level and stable work bench.

⚠ Caution

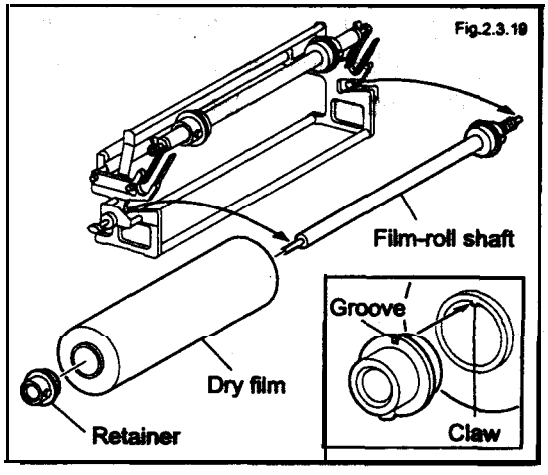
The DF unit weighs approximately 10 kg when loaded with dry film. Load the dry film on the floor or on a stable work bench capable of withstanding the weight. Secure a sufficiently large working space.

2. Remove the dry film from the crating and-packing bag.

⚠ Caution

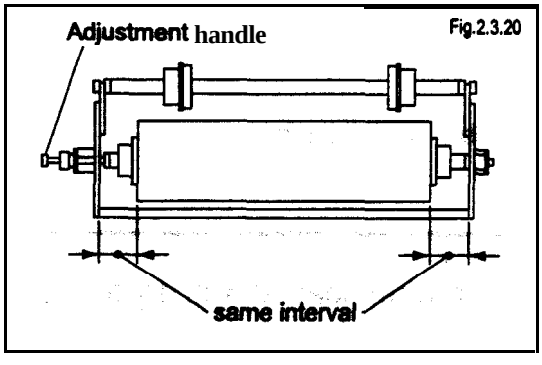
If it is exposed to light for an extended period, the dry film will be sensitized. It is therefore packed in a light-shielded bag 'for storage. To avoid exposing it to strong light, remove it from the packing bag and load it into the DF unit in a room under yellow light.

3.



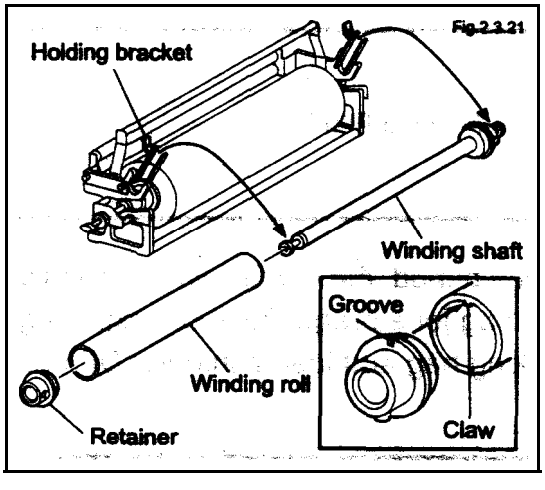
Remove the film-roll shaft from the DF unit and position the dry film at the approximately the center of the shaft. When positioning the dry film, align the claw of its core with the groove of the retainer.

4.



Position the film-roll shaft loaded with the dry film at the DF unit. Use the axial-adjustment handle to position the dry film so that it is laterally symmetrical when measured from the side plates at the edges of the unit.

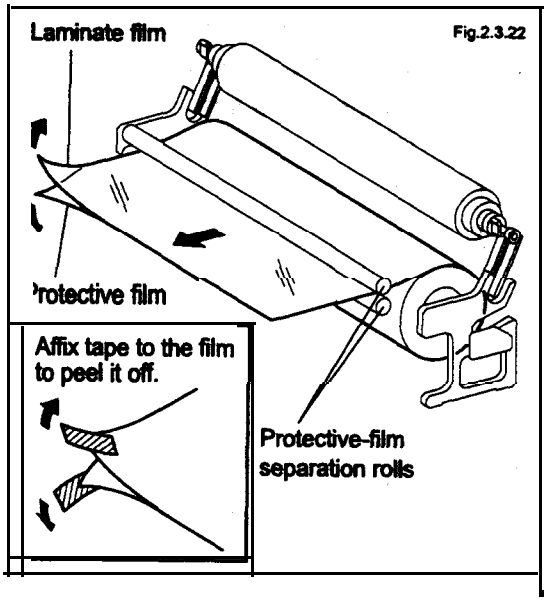
5.



Remove the. winding shaft from the DF unit and position the winding roll (the empty core of a used dry film) at approximately the center of the winding-roll shaft. When positioning the winding roll, align its claw with the 'groove of the retainer.

6. Place the winding shaft loaded with the winding roll in the winding-roll holding bracket.

7.

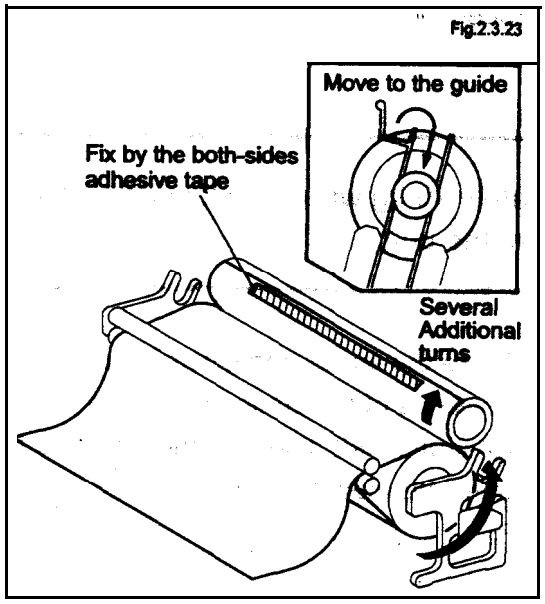


Pull out the dry film, and run it between the protective-film separation rolls to separate it from the laminate film.

Note

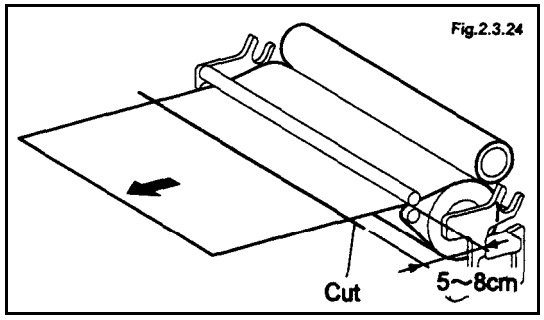
- The dry film consists of a protective films and a laminate film.
- Affix a piece of tape to the top and another to the bottom of the film. They can be pulled upward and downward for easy separation of the protective and laminate films.

a.



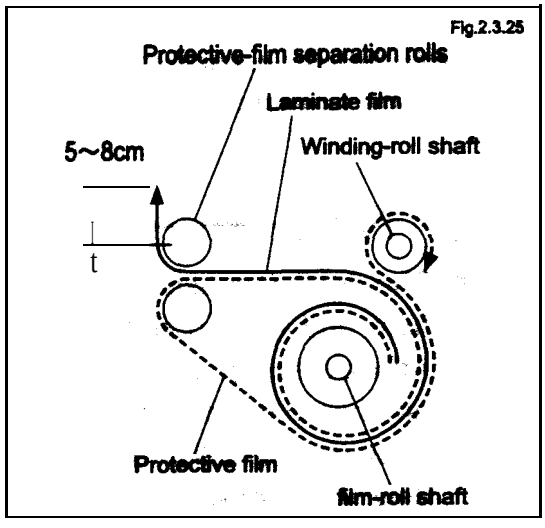
Fix the protective film running under the dry film using both-side adhesive tape, and transfer it from the winding-roll holding bracket to the guide section. While separating it from the laminate Mm, wind the protective Mmseveral additionalturns.

9.



Cut the laminate film using a section 5 cm to 8 cm in length left over from the protective-film separation roll.

10



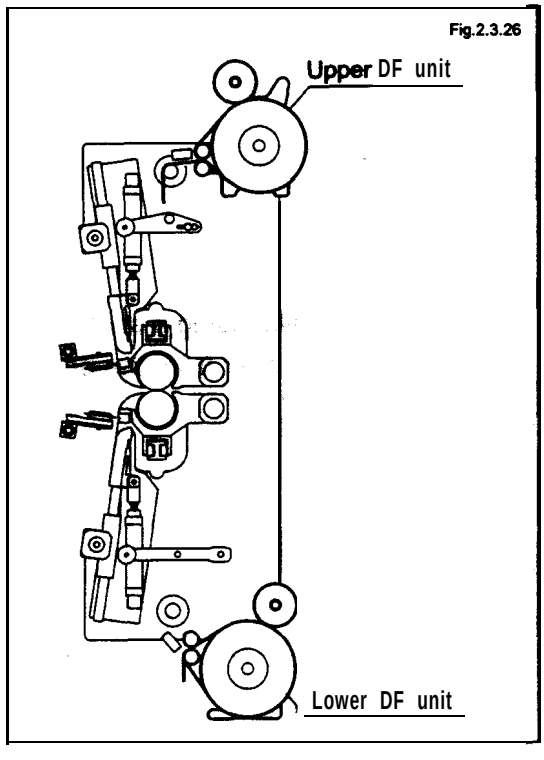
The dry film has now been loaded into the lower DF unit, along the route shown in the illustration to the left.

321.3 Loading of DF Unit

This Section explains the method for loading a DF unit containing dry film into the unit. To unload the DF unit, perform the loading procedure in reverse.

⚠ Caution

The weight of the DF unit is approximately 10 kg when it is loaded with dry film. Carefully toad and unload it to and from the unit.



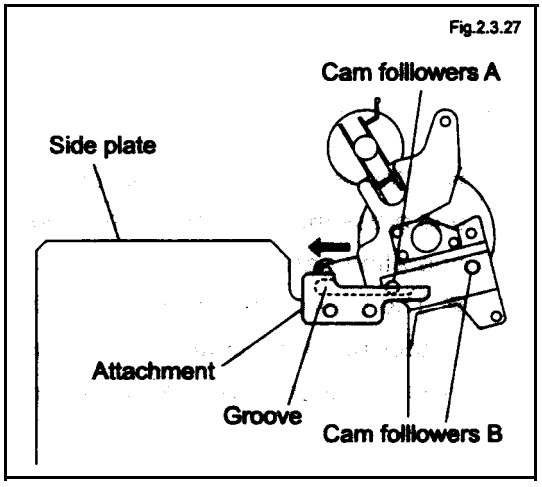
Place the upper and lower DF units at the positions of the laminate module shown in the illustration left, then run the laminate film at laminate module.

■ Loading of the Upper DF Unit

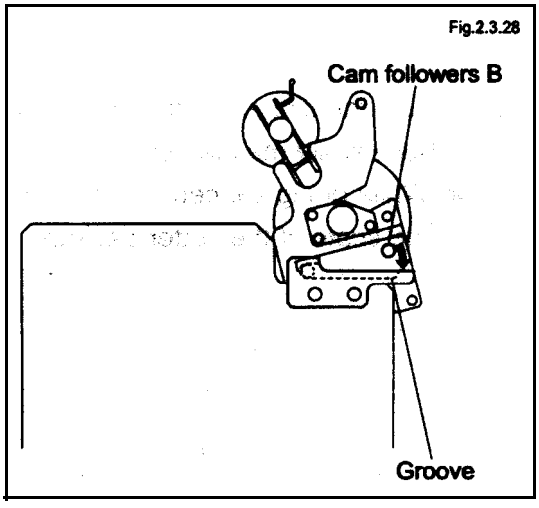
1. Open the front door and pull out the laminate module.

⚠ Caution

Load the upper DF unit with the power switch turned ON . The laminate module contains high-temperature and high-voltage parts, so be careful to prevent bums and electric shock.

2. 

Place the front and rear cam followers A of the upper DF unit in the grooves of the attachment. Lift cam followers B and insert it in the direction indicated by the arrow.

3. 

Contact cam followers A to the end of the groove, and lower cam follower B to fix the upper DF unit in the groove of the attachment.

4.

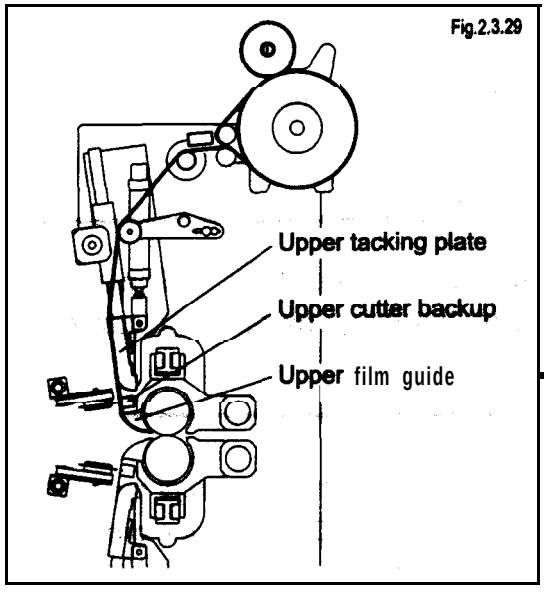


Fig.2.3.29

Run the laminate film along the film-running surface as shown in the illustration to the left.

⚠ Caution

Be careful, as the laminate module contains high-temperature parts.

5.

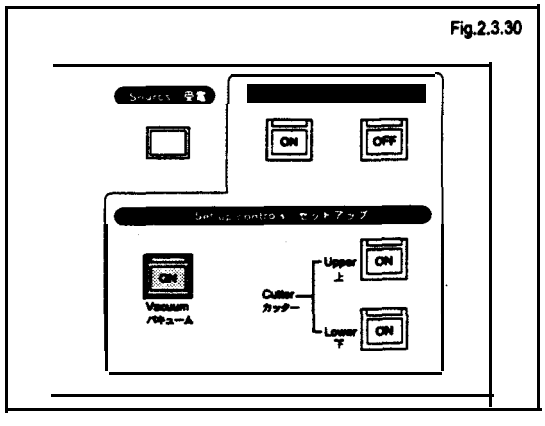


Fig.2.3.30

Run the laminate film up to the film guide and press the Vacuum ON button on the operation panel.

- The blower fan will start, activating the tacking plate, cutter backup, and guide for vacuum-pressure operation.

6.

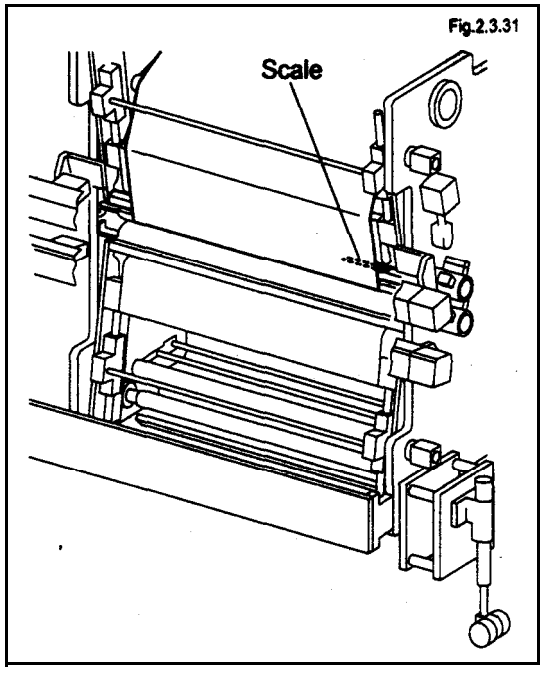


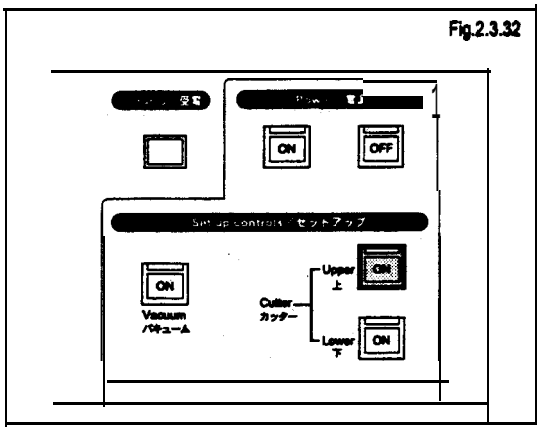
Fig.2.3.31

Extend the film along the film-running surface while maintaining its tautness.

- While doing so, center it by referring to the scale of the cutter backup.

7.

Fig.2.3.32



Press the Upper Cutter [ON] button on the operation panel.

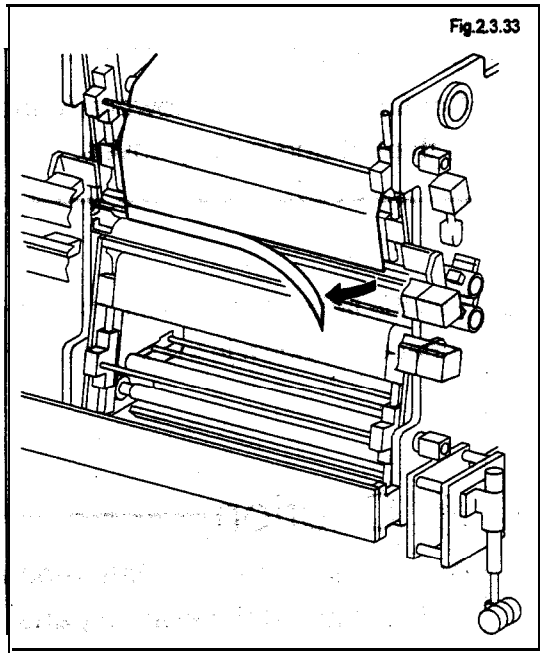
- The cutter assembly will run to cut the excess-film section.

⚠ Caution

- Be careful when running the cutter to cut the film with the laminate module pulled out.
- Keep the cutter cover closed even when the cutter is not in operation.

8.

Fig.2.3.33

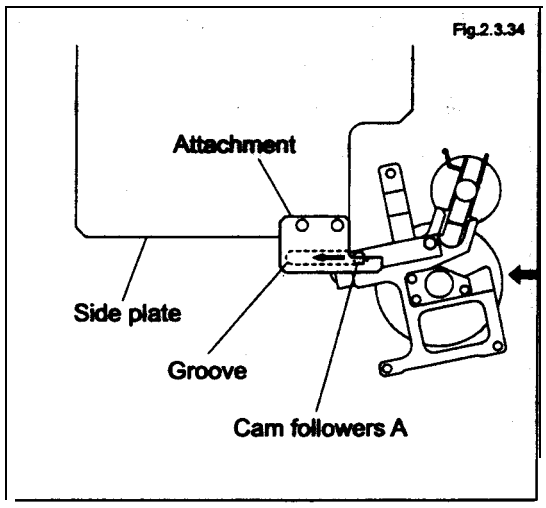


Remove the excess film that has been cut off.

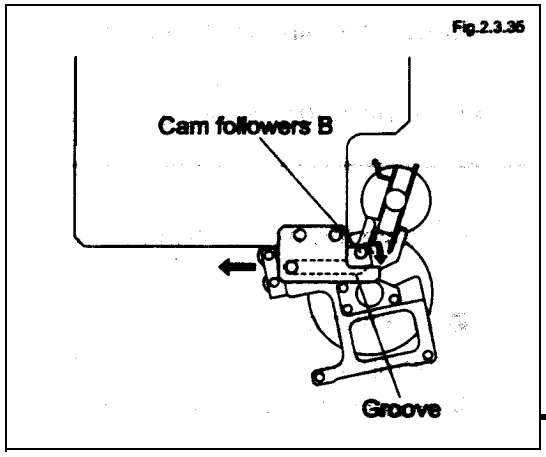
- Loading of the upper DF unit is now complete.
- Push in the laminate module and close the front door, except when the tower DF unit is loaded immediately.

■ Loading of the Lower DF Unit

1. Open the front door and pull out the laminate module.
   - This step is not required if the lower DF unit is loaded immediately after the upper DF unit, as the laminate module would already have been pulled out.

2. 

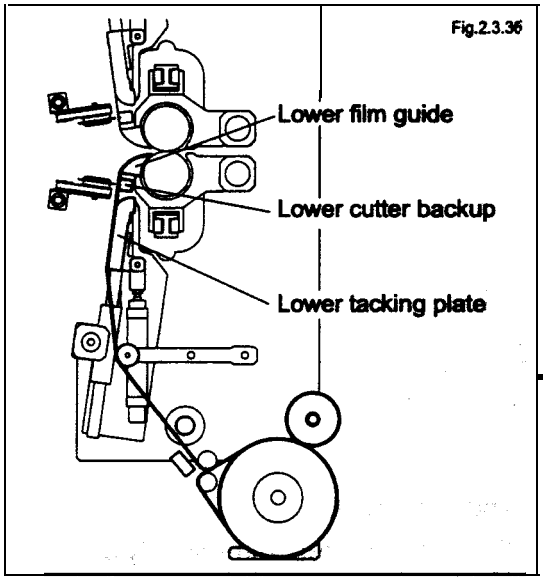
Place the front and rear cam followers A of the lower DF unit in the groove of the attachment along theguide.

3. 

Contact cam followers A to theend of the groove, and lower cam followers B to the groove in order to fix the lower DF unit to the attachment.

Note

Confirm that cam followers A and B are in the left and hght grooves.

4. 

Run the laminate film along the film-running surface as shown in the illustration to the left.

Caution

Be careful, as the laminate module contains high-temperature parts.

5.

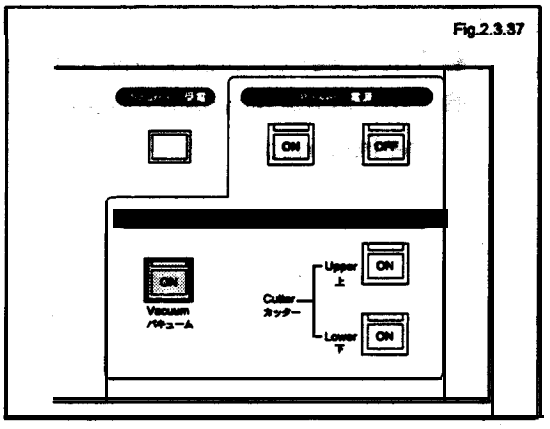


Fig.2.3.37

Run the laminate film up to the film guide, and press the Vacuum ON button on the operation panel.

- The blower fan will start, activating the tacking plate, cutter backup, and film guide for vacuum-pressure operation.

6.

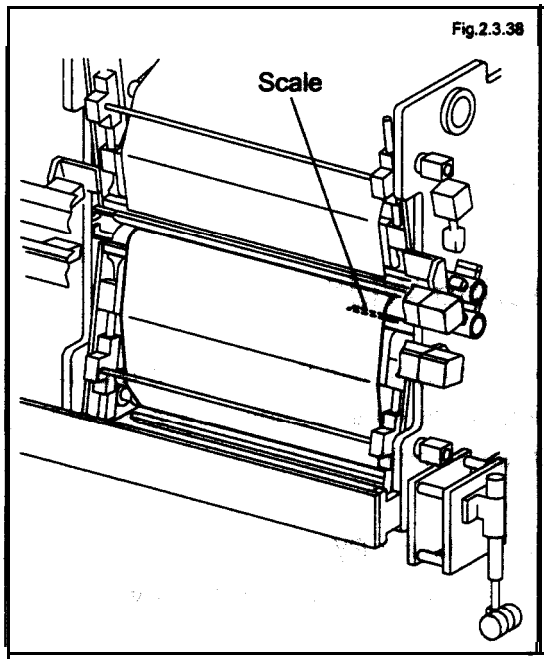


Fig.2.3.38

Extend the film along the film-running surface white maintaining its tautness.

- While doing so, center it by referring to the scale of the cutter backup.

7.

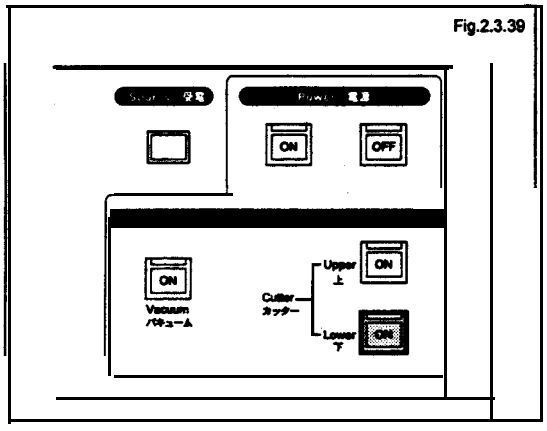


Fig.2.3.39

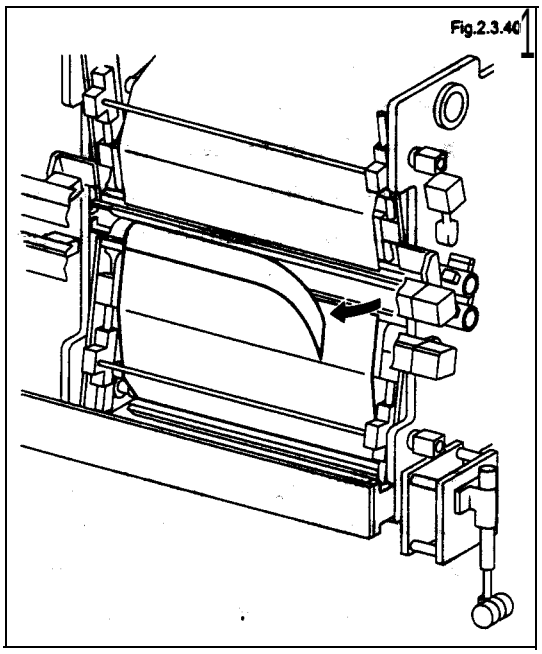
Press the Lower Cutter ON button on the operation panel.

- The cutter assembly will run to out the excess-film section.

⚠ Caution

- Be careful when using the cutter to cut film with the laminate module pulled out.
- Keep the cutter cover closed even when the cutter is not in operation.

8.



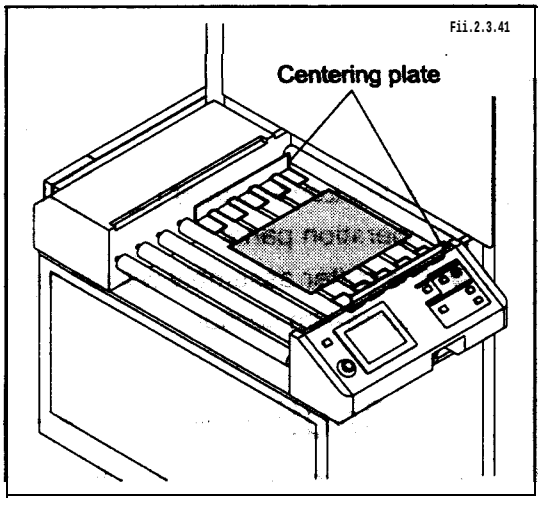
Remove the excess film that has been cut.

- The lower DF unit is now loaded.
- Push in the laminate module and close the-front door.

3.2.2 Adjustment of the Centering Width

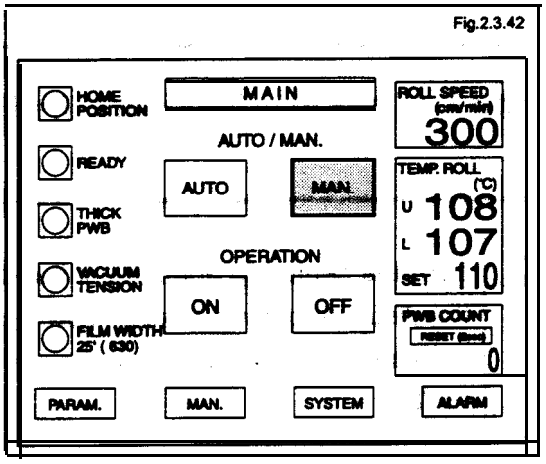
To align the PWB at the center of the input conveyor, use the front and rear centering plates. The centering width of the centering plates must be adjusted in accordance with the width of PWB with a centering adjustment handle.

1.



Place a PWB at the position of centering plates on the input conveyor.

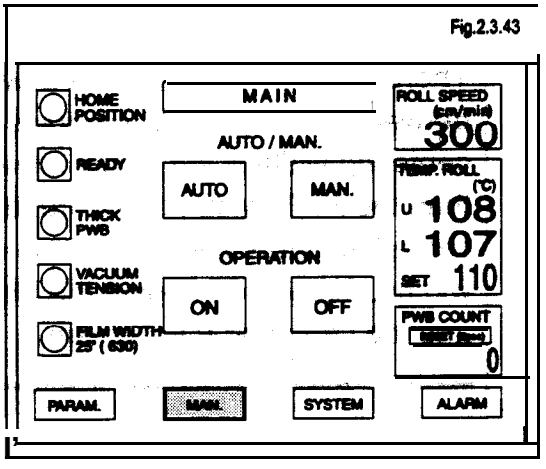
2.



Press the "MAN." button on the main screen.

- The unit will enter the "Manual operation" mode to allow operation on the manual screen.

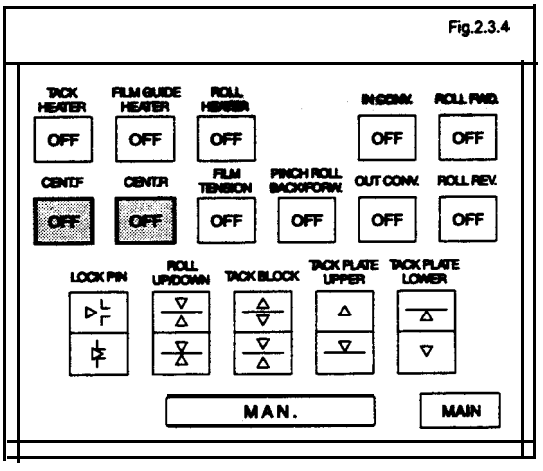
3.



Press the "MAN." button on the main screen.

- The manual screen will be displayed.

4.



Press the CENT. F "OFF" and CENT. R "OFF buttons to activate cantering plates (F) and (R). Adjust the centering width to the width of PWB.

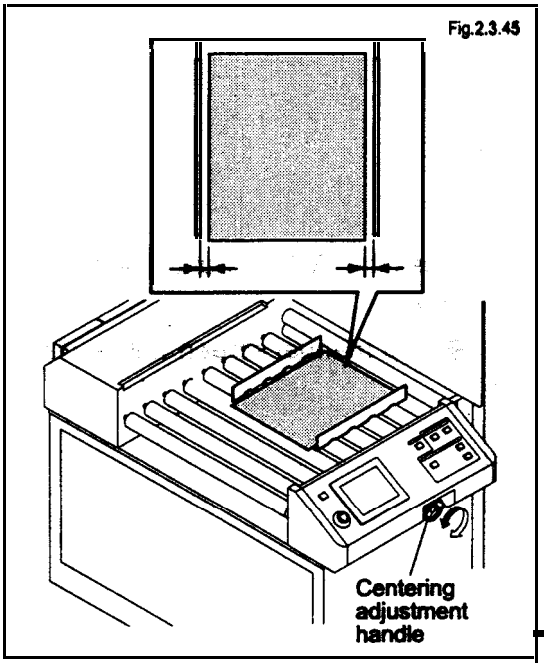
- When pressed, the CENT. F "OFF" and CENT. R "OFF" buttons turn "ON" to activate the centering plates (F) and (R).

⚠ Warning

Be sure to close the cover of the input conveyor when it is in operation. If the input conveyor is operated with its cover open, workers' hands may be caught.

⚠ Caution

Do not set the centering width such that it is smaller than the width of PWB, or the input conveyor will be damaged.

5. 

Turn the centering adjustment handle to set the distance between the centering plates to a value slightly greater than the width of PWB.

⚠ Caution

There are subtle differences in width between different PWB products. If the centering width is set a little bit wider than the PWB width, therefore, the centering plates will catch those of large widths, thereby damaging the PWBs and the centering mechanism.

6. To stop the centering motion of the centering plates (F) and (R), press the CENT. F "ON' and CENT. R "ON" buttons.
   - When pressed, the CENT. F "ON" and CENT. R "ON" buttons will turn "OFF" to return to the home position the centering-platers (F) and (R).

3.2.3 Setting on the Operation Panel

Follow the steps specified below to set the PWB information and lamination conditions in accordance with the specification of the PWB products displayed on the parameter screen and the system screen.

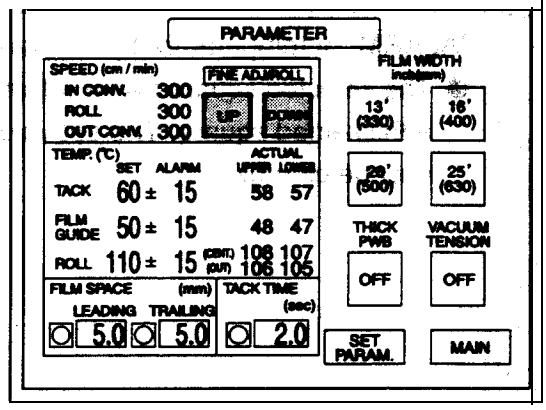
3.2.3.1 Setting of Parameters

Set the speeds and temperatures of the conveyors and laminate roll, leading and trailing spaces for film, tacking time, and film width on the parameter screen., Press the "PARAM." button on the main screen to switch to the parameter screen.

■ Setting Speed

Set the speeds (cm/min) of the input conveyor, output conveyor, and laminate roll.

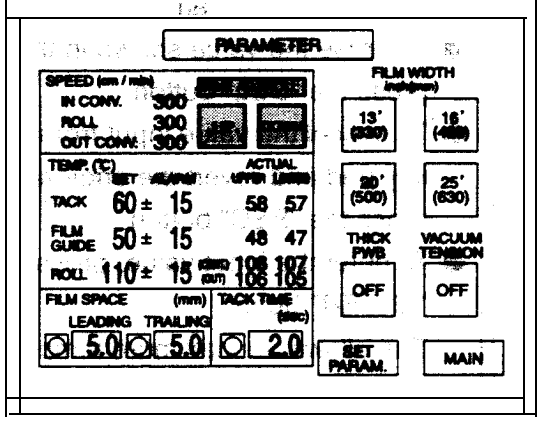
1. Fq.2.3.46



To increase or decrease the speeds of the input conveyor, output conveyor, and laminate roll, press the "UP" or "DOWN" button

- The speeds increase or decrease simultaneously.
- To finely adjust only the laminate-roll speed, follow the steps specified below.

2. Fig.2.3.47



To finely adjust only the "ROLL" (laminate roll) speed, press the "UP" or "DOWN" button while holding down the "FINE ADJ/ROLL" button.

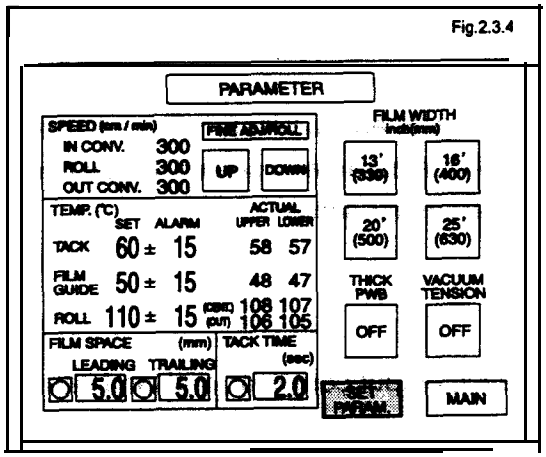
- The "UP" and "DOWN" buttons, are valid only for the laminate-roll speed, while the "FINE ADJ/ROLL" button is kept pressed.
- To return to the normal speed-adjusting mode, release the "FINE ADJ/ROLL" button.

■ Temperature Setting

Follow the steps specified below to set the alarm values and the temperature (℃) of the tacking rubber, film guide, and laminate roll.

1.

Fig.2.3.4

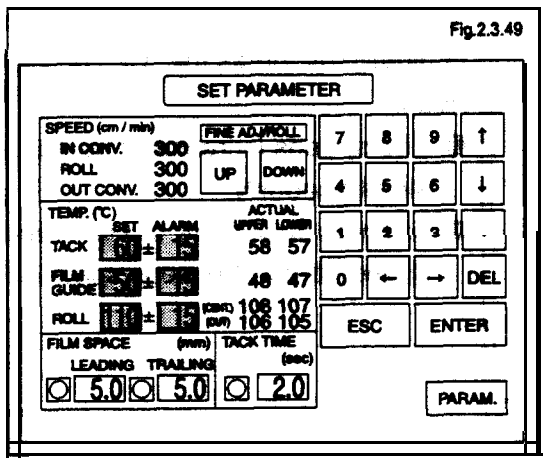


Press the "SET PARAM." button to switch to the parameter-setting screen.

- A ten-key pad will be displayed. The set temperature and alarm values can now be changed.

2.

Fig.2.3.49

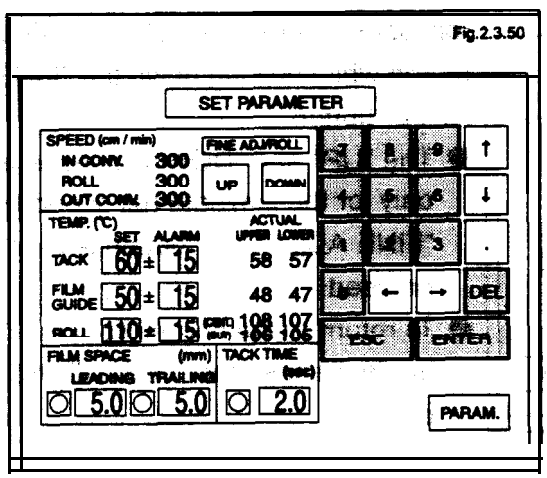


Press the square frame for the "SET" or "ALARM" of temperature to be changed.

- The selected square frame will change to a thick-lined square, The set value can now be changed.

3.

Fig.2.3.50



Use the ten-key pad to input a value to be set.

- To erase the vafue shown in the frame, press the "DEL" button.
- To cancel the value input from the ten-key pad and revert the original value, press the "ESC" button.
- To enter the input value, press the "ENTER" button.

The allowable maximum temperature to be set is,

Tacking plate	70°C
Film guide	60°C
Laminate roll	150°C

■ Setting of the Leading and Trailing Film Spaces

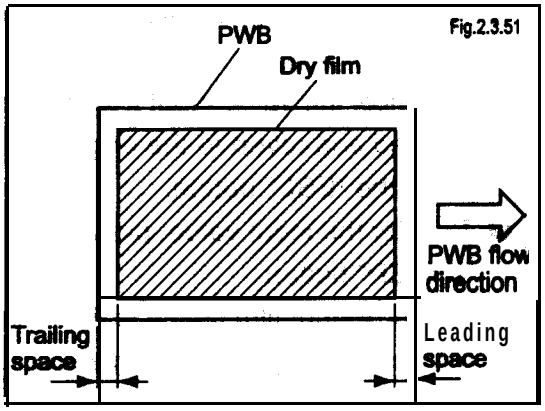


Fig.2.3.51

Follow the steps specified below to set the leading and trailing film spaces where the film cannot be pasted when the laminate film is pasted on the PWB (length in mm.)

1. Press the "SET PARAM." button to switch to the parameter-setting screen.

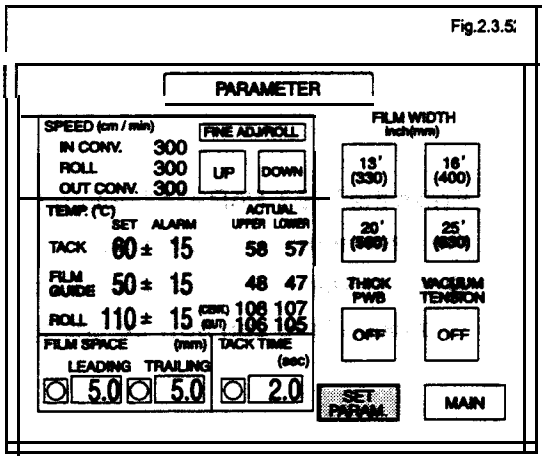
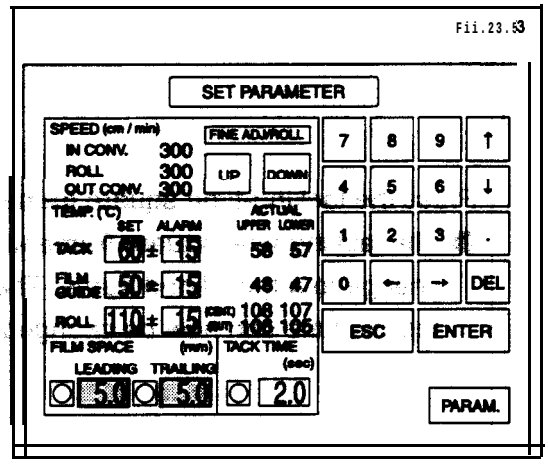


Fig.2.3.52

- A ten-key pad will be displayed. The setting of film spaces can now be changed.

2. Press the square frame of FILM SPACE "LEADING" or "TRAILING" space to be changed.

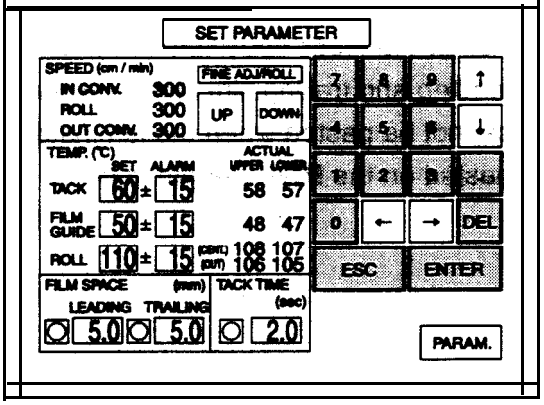


Fii.23.53

- The selected frame will change to a thick-lined frame. The set value can now be changed.

3.

Fig.2.3.5



Use the ten-key pad to input a value to be set.

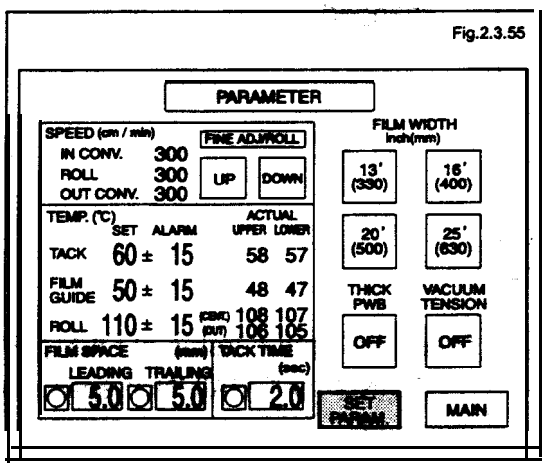
- To erase the value shown in the frame, press the "DEL".
- To cancel the value input from the ten-key pad and revert to the original value, press the "ESC" button.
- To enter the input value, press the "ENTER" button.
- The maximum film space is 99.9 mm for both the leading and trailing spaces.

■ Setting of Tacking Time

Follow the steps specified below to set the time (in sec) for tacking the dry film at the PWB front edge the tacking plate.

1.

Fig.2.3.55

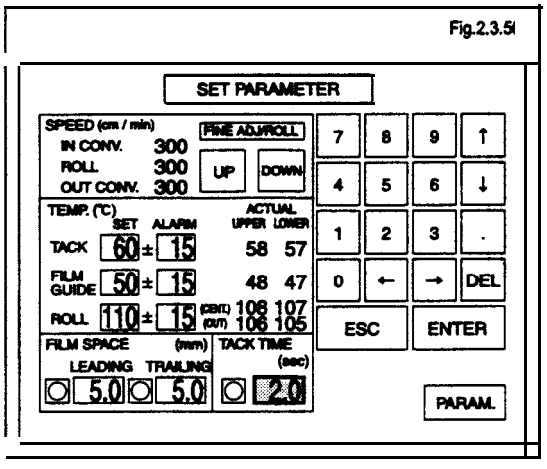


Press the "SET PARAM." button to switch to the parameter-setting screen.

- A ten-key pad will be displayed. The set tacking time can now be changed.

2.

Fig.2.3.5(

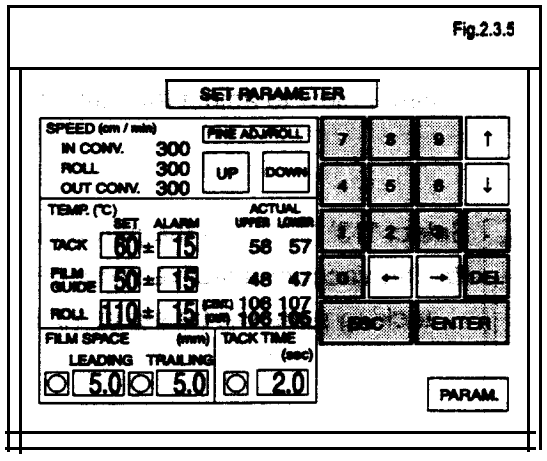


Press the tacking-time Square frame.

- The tackii-time square frame will change to a thick-lined frame. The set tacking time can now be changed.

3.

Fig.2.3.5



Use the ten-key pad to input the value to be set.

- To erase the value shown in the frame, press the "DEL" button.
- To cancel the value input from the ten-key pad and revert to the original value, press the "ESC" button.
- To enter an input value, press the "ENTER" button.
- The maximum allowable tacking time that can be set is 99.9 sec.

■ Setting of Film Width

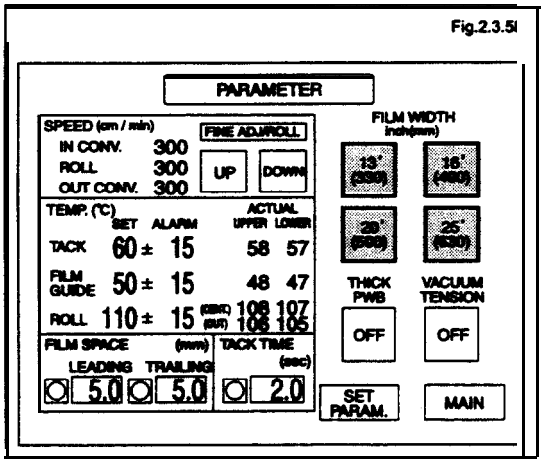
Follow the steps specified below to set the width (inches (mm)) of the dry film loaded into the laminate module.

Note

When the film width is set, the vacuum-effective width of the tacking plate is automatically adjusted. If an incorrect film width is set, proper, vacuum pressure will not be obtained. Therefore, be sure to correctly set the width of the dry film to be used.

1.

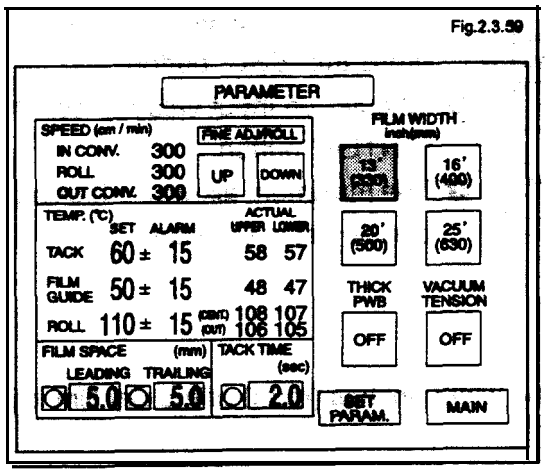
Fig.2.3.5l



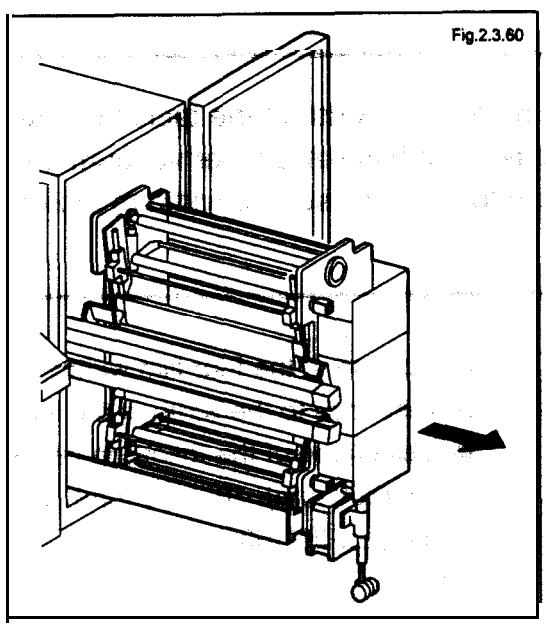
Select one of the four film widths that corresponds to the width of the loaded film.

- Select one of the following Mm widths: 13' (330 mm), 16' (400 mm), 20' (500 mm), or 25' (630 mm).

● To load a film of a width smaller than 13' (330 mm):
If it is necessary to laminate a film of a width smaller than 13' (330 mm), such as that with a width of 250 mm, follow the steps specified below to adjust the vacuum-effective width of the tacking plate.

1. 

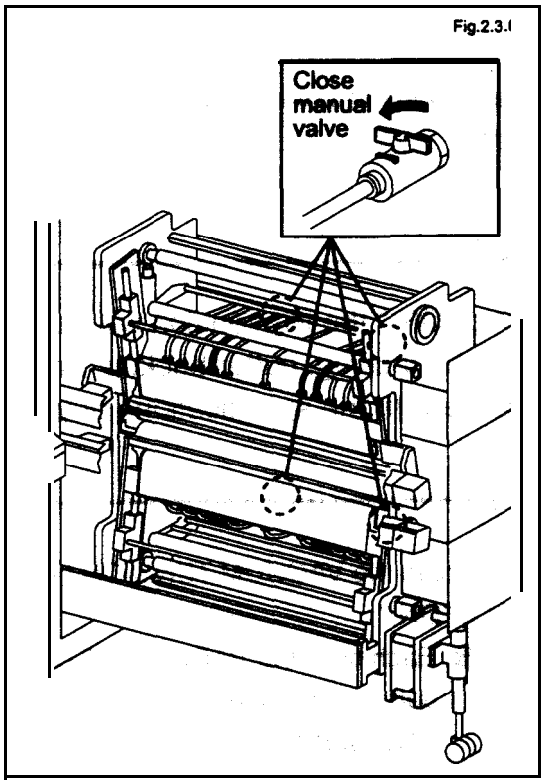
Select "13' (330)" on the parameter screen. . The vacuum-effective width of the tacking plate will be set at 13' (330 mm).

2. 

Open the front door and pull out the laminate module.

3.

Fig.2.3.I



Close the four manual valves around the center of the air tube connected to the tacking plate.

■ **Setting of Thick-PWB Mode**

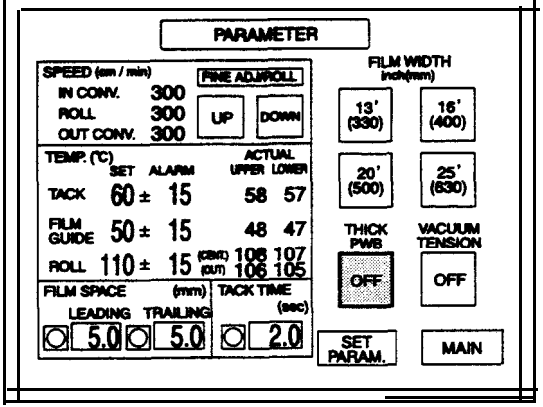
When thick PWB products are used, turn the THICK PWB mode "ON."

Note

When the thick PWB mode is set, the laminating motion of the laminate module will change. If the thick PWB mode is set for thin PWBs, the appropriate laminate pressure will not be obtained or the unit will adversely be affected. Be sure to set the thick PWB mode only for thick PWBs.

1.

Fig.2.3.I



Press the THICK PWB button to turn it "ON."

- Each time the THICK PWB button is pressed, it switches between "ON" and "OFF."
- The default setting at shipment is "OFF."

Setting of Vacuum Tension

To increase the film tension through the use of vacuum pressure when the dry film is laminated, turn the VACUUM TENSION "ON."

Note

If the VACUUM TENSION button is turned "ON," the film tension will be increased for laminating by the vacuum pressure of the tacking, cutter backup, and film guide. Select the film tension in accordance with the specifications of your products and the dry film.

1. Press the VACUUM TENSION button to turn it "ON."

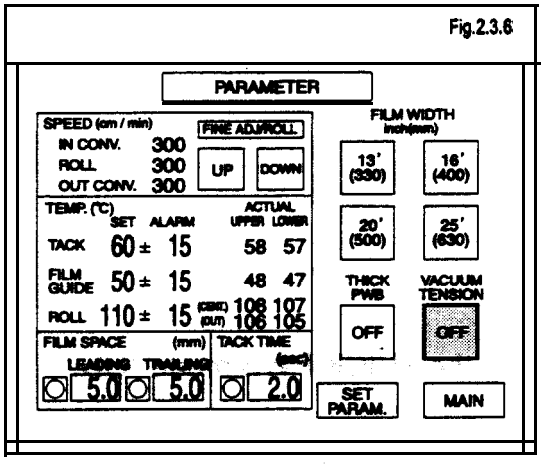


Fig.2.3.6

- Each time the VACUUM TENSION button is pressed, it switches between "ON" and "OFF."
- The default setting at shipment is "OFF."

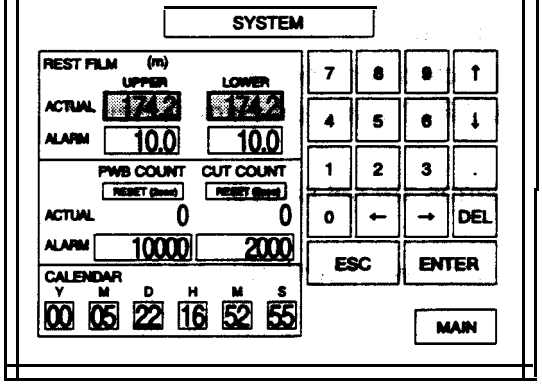
323.2 Setting of System Data

The rest film counter, PWB count, cut count, and calendar data are set on the system screen. To set these values, follow the steps specified below. Press the "SYSTEM" button on the main screen to enter the system screen.

■ Setting of the REST FILM Counter

Input the actual value of rest film and the alarm value when dry film is loaded.

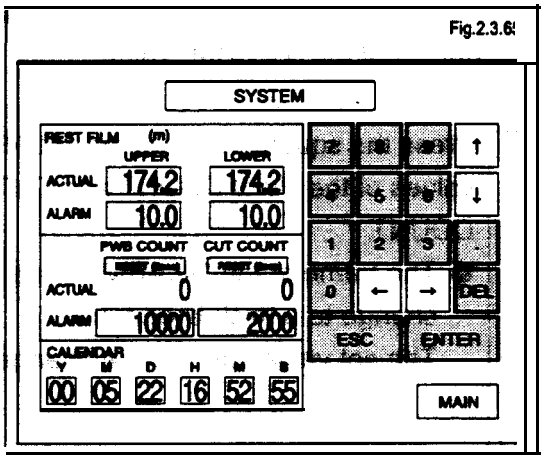
1. Fig.2.3.64



Press the square frame of the "ACTUAL value of the REST FILM counter (m).

- The square frame of the "ACTUAL" value will change to 8 thick-fined frame. The set value can now be changed.

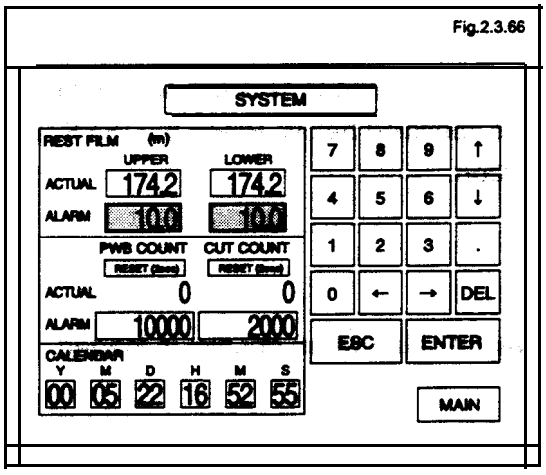
2. Fig.2.3.6



Use the ten-key pad to input the value to be set.

- To erase the value shown in the frame, press the "DEL" button.
- To cancel the value input from the ten-key pad and revert to the original value, press the "ESC" button.
- To enter an input value, press the "ENTER" button.
- The maximum allowable rest film counter value as actual value to be set is 9999.9 m, for both the upper and lower counters.
- Set the actual value at both the upper and lower counters.

3. Fig.2.3.66



Press the square frame of the "ALARM" value.

- The frame of the "ALARM" value will change to a thick-lined frame. The set value can now be changed.

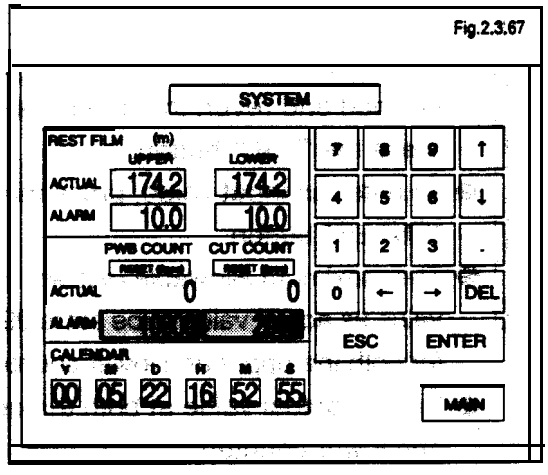
4. Use the ten-key pad to input the value to be set.

- The length of the used film will be subtracted from the "ACTUAL" value. When the actual value reaches the "ALARM" value, an alarm is issued.
- If the "ALARM" value is set at "0.0," alarms are not issued.
- Set the alarm value at both the upper and lower counters.

■ Setting of the PWB Count

Follow the steps specified below to display/reset the "ACTUAL" values of PWB count and cut count (number of films cut by the cutter), and input the "ALARM" value.

1. Fig.2.3.67

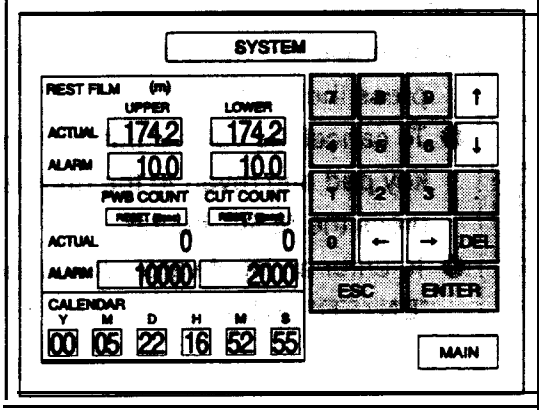


Press the square frame of the "ALARM" values of the PWB COUNT and CUT COUNT.

- The frame of the "ALARM" value will change to a thick-lined frame. The set value can now be changed.

2.

Fig.2.3.68

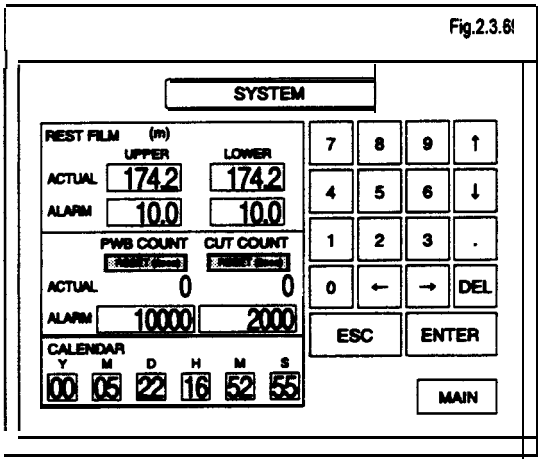


Use the ten-key pad to input the value to be set.

- To erase the value shown in the frame, press the "DEL" button.
- To cancel the value input from the ten-key pad and revert to the original value, press the "ESC" button.
- To enter an input value, press the "ENTER" button.

3.

Fig.2.3.69



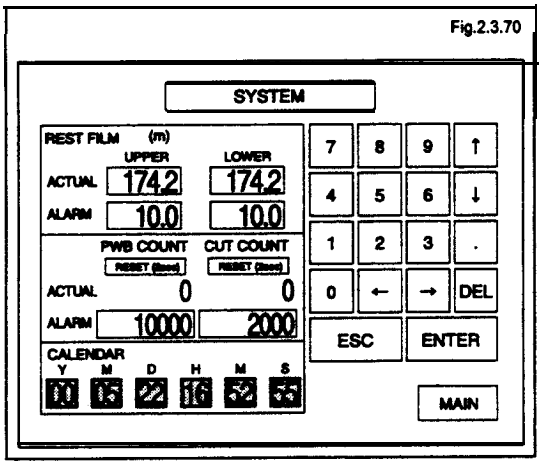
Hold down the "RESET" button for two seconds over.
The "ACTUAL" value will be reset to "0."

■ Setting of Calendar Data

To input the Year, Month, Day, Hour, Minute, or Second, follow the steps specified below.

1.

Fig.2.3.70



Press the square frame for the "Y", "M", "D", "H", "M", or "S".

- The selected square frame will change to a thick-lined frame.
  The set value can now be changed.

2.

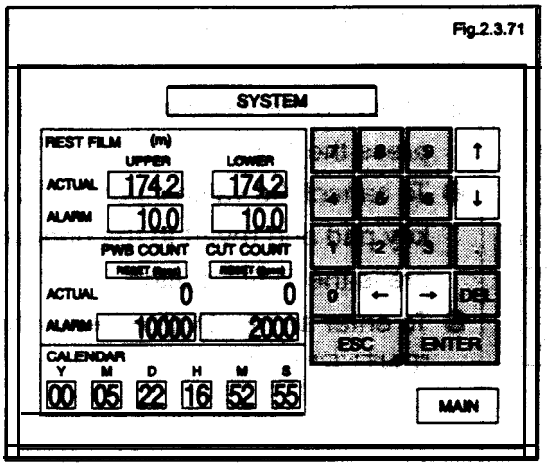


Fig.2.3.71

Use the ten-key pad to input the value to be set.

- To erase the value shown in the frame, press the “DEL” button.
- To cancel the value input from the ten-key pad and revert to the original value, press the "ESC" button.
- To enter an input value, press the "ENTER" button.

3.3 Automatic Operation

After the system data and parameters have been set, the unit can be used for film lamination in automatic operation. This Section explains the procedure for starting and stopping automatic operation, and the remedies in the event of the issuance of alarms.

3.3.1 Procedure for Starting Automatic Operation

Before starting automatic operation, confirm that daily inspection and preparation for operation have completed.

● To start automatic operation, follow the steps specified below.

1. Daily inspection (see page 2-34.)
Confirm that the unit is connected properly to a power source, compressed-air supply system, and exhaust duct, and that all modules are normal.

↓

2. Power ON
Press the Power ON switch on the operation panel to start the unit. The main screen will be displayed on the touch panel.

↓

3. Parameter setting (See page 2-57.)
Set parameters on the parameter screen.

1

4. System-data setting (See page 2-65.)
Set system data on the system screen.

↓

5. "MAN." button
Press the "MAN." button on the main screen to enter the manual-operation mode. The unit can now be operated from the manual screen.

1

6. "MAN." button
The manual screen will be displayed.

1

7. Heaters and rolls "ON"
Turn the TACK HEATER, FILM GUIDE HEATER, ROLL HEATER, and ROLL FWD buttons "ON." The heaters will start to warm-up.

❑ Note

The ROLL FWD. button should be turned "ON" to quickly complete warm-up and ensure that the laminate-roil temperature is evenly distributed.

⚠ Caution

Be careful, as the heaters become extremely hot after they are turned "ON."

↓

8. Adjustment of the centering width (See page 2-54.)
Use the centering adjustment handle to adjust the centering width.

↓

9. Positioning of dry film and the DF unit (See pages 2-41 and 2-48.)
Position the DF unit loaded with dry film at the laminate module.
Run the laminate film along the film-running surface, and use the cutter to cut off the excess.

↓

10. Home-position check
Confirm that the "HOME POSITION" lamp on the main screen lights. If it is not lit, return to the manual screen and move each unit to its home position.

1

11 ."READY" lamp lights

When the heaters have warmed up and the unit is ready for automatic operation, the “READY” lamp will light up.

↓

12."AUTO"button

The unit enters the automatic-operation mode.

↓

1 &OPERATION "ON" button

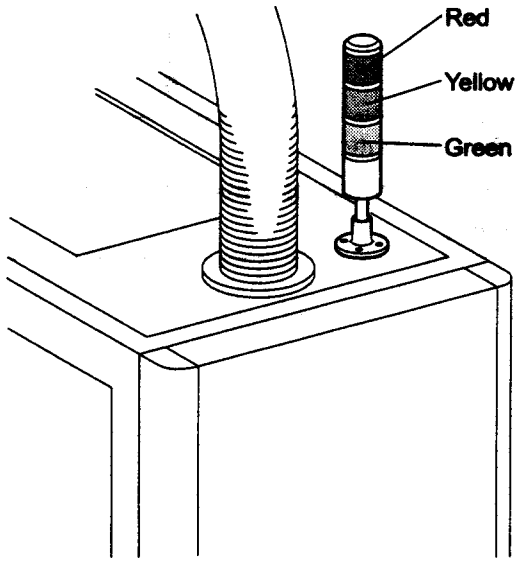
The unit starts automatic operation and laminates the film automatically when a PWB is input.

3.32 Alarms and Remedies

When a failure has occurred in the unit, a buzzer sounds, the alarm screen is displayed, and the signal tower lights up to alert the operator.

■ Signal-Tower Status and Lighting Conditions

Fig.2.3.72



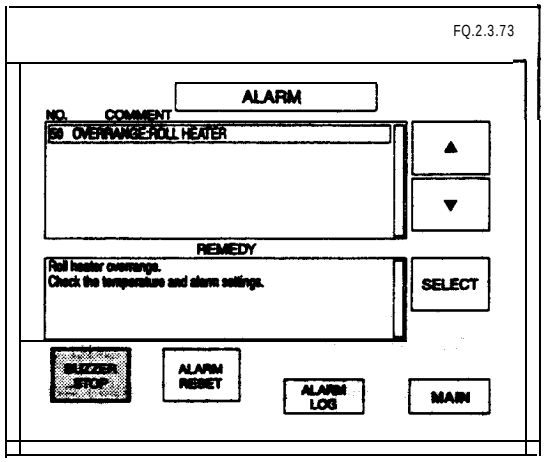
[Table 2.3.4 The Signal Tower]

Color	status	Meaning
Red	light	A failure has occurred in the unit. Take necessary actions immediately in accordance with the display on the alarm screen.
Yellow	light	The unit is in the idle mode (e.g., manual-operation mode).
Green	light	The unit is in the automatic-operation mode.
	blinking	The unit is preparing for automatic operation.

■ Operation on the Alarm Screen

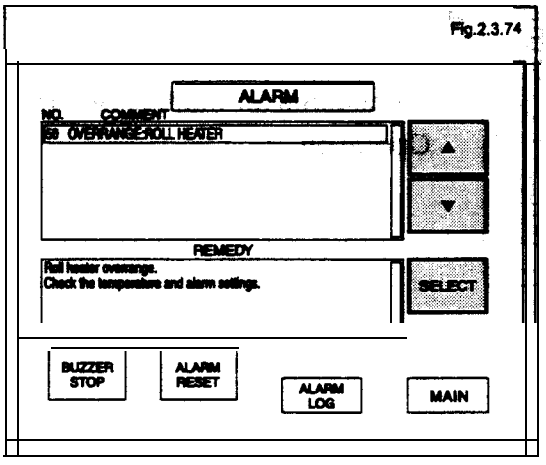
When a failure occurs in the unit, the alarm screen will be displayed on the touch panel.

● Follow the steps specified below to take the required actions.

1. 

Press the "BUZZER STOP" button on the alarm screen to stop the buzzer.

● The illustration to the left shows an example of display.

2. 

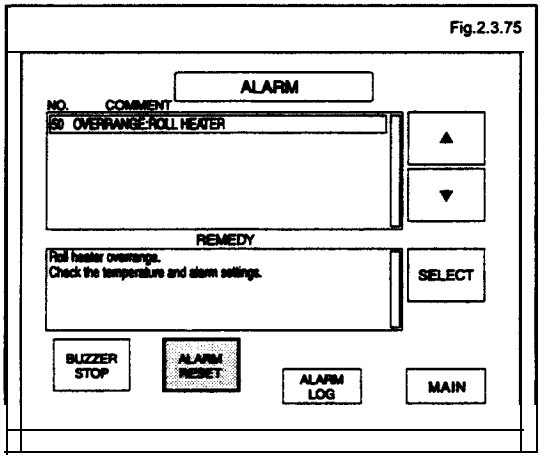
Press the "SELECT" button.

● The remedies required in response to the displayed alarm will be&played.

● If two or more alarms are issued simultaneously, use the "A" and "▼" buttons to select the one for which remedies are to be taken, and press the "SELECT" button.

3. Take the required actions specified in the displayed instructions.

● For more information, see "3.1 Troubleshooting in Part 3 Maintenance" on page 3-64.

4. 

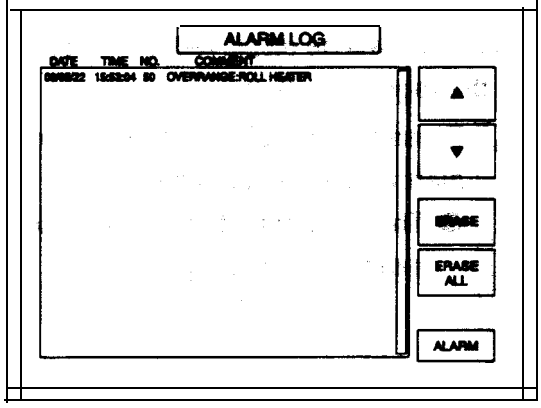
Press the "ALARM RESET" button to erase the alarm.

● Comments on the alarm will disappear.

● Before erasing the alarm, be sure to take the necessary actions.

5.

Fig.2.3.76

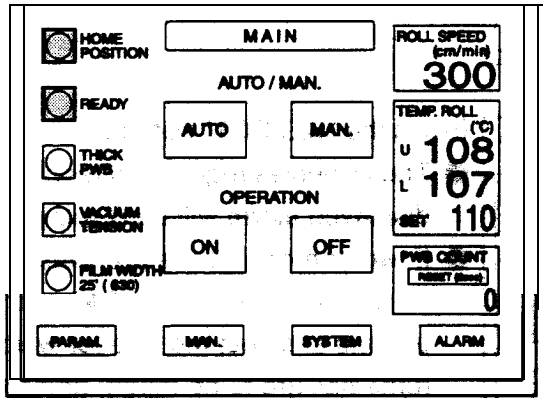


To display the log of past alarms, press the "ALARM LOG" button.

- The alarm log screen will be displayed.

6.

Fig.2.3.77



Return to the main screen and confirm that the "HOME POSITION" lamp and "READY" lamp are light- Press the OPERATION "ON" button to start automatic operation.

- For more information on starting automatic operation, see "3.3.1 Procedures for Starting Automatic Operation."

3.3.3 Procedures for Stopping Automatic Operation

To stop automatic operation, follow the steps specified below.

1. Confirmation of the completion of cycle motion
Confirm that no PWB products remain in the unit.

↓

2. OPERATION "OFF" button
Press the OPERATION "OFF" button on the main screen to stop automatic operation.

↓

3. "MAN." button
Press the "MAN." button to enter the manual-operation mode.

↓

4. Laminate-module pullout
Open the front door and pull out the laminate module.

↓

5. Vacuum (ON) button
Press the vacuum [ON] button (the lamp for which is lit) on the operation panel to stop vacuum-pressure motion by manual operation.
● The Vacuum (ON) lamp will go off.

↓

6. Rewinding of dry film
Manually turn the film rolls of the upper and lower DF units to rewind in the dry film pulled out on the film-running surface.

1

7. Removal of the DF unit (See page 2-41.)
Remove the upper and tower DF units and store them at the specified storage.

↓

8. "MAN." button
Press the "MAN." button on the main screen to display the manual screen.

↓

9. "ROLL UP/DOWN" buttons and "ROLL FWD." button

Press the ROLL UP/DOWN "RISE" button on the manual screen to raise the upper laminate roll. Press the ROLL FWD. "OFF" button to turn "ON" the laminate roll and rotate it forward. Rotate it for 15 to 26 minutes.

Note

This operation is performed to cool down the laminate roll. To maintain its quality, it is recommended that the laminate roll be rotated in the above manner, though it is not mandatory.

↓

10. Push-in of the laminate module

Push in the laminate module and close the front door.

↓

11. Power OFF

Press the Power button on the operation panel to cut off the power supply.

The Power OFF lamp will light up and the display on the touch panel will disappear.

↓

12. Main breaker OFF (0)

Turn "OFF (0)" the main breaker on the control box at the rear of the unit.

↓

13. Primary-side compressed-air supply valve "Close"

Close the plant-side compressed-air supply valve to stop air supply to the unit.

↓

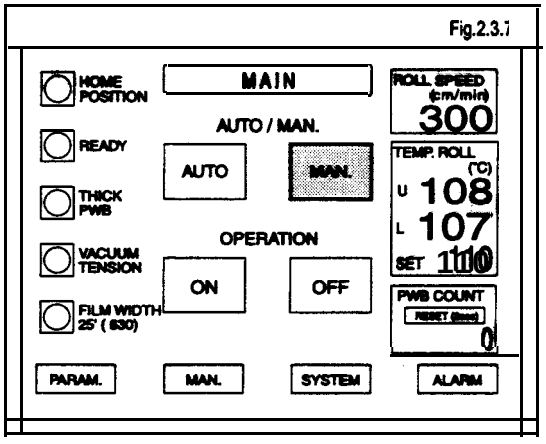
This completes the procedures for stopping automatic operation.

3.4 Manual Operation

If automatic operation has been stopped urgently to load dry film, inspect the unit, or for other reasons, follow the steps specified below to return each unit to the home position by manual operation.

3.4.1 Procedures for Manual Operation

If the unit is to be operated manually, it must be set in the “Manual operation” mode.



To set to in the manual-operation mode, press the “MAN.” button on the main screen.

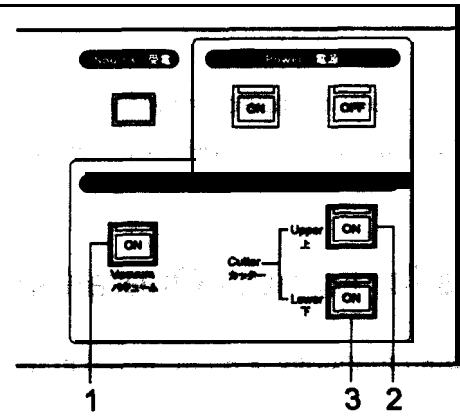
Note

The hardware buttons for setup control or operation on the manual screen are invalid unless the "MAN." button has been pressed to set the unit to the manual mode.

■ Setup Control

Located on the operation panel are setup control buttons that are valid only for vacuum and cutter operations. These buttons are used to loading a film at the laminate module and for some other purposes. When these buttons are used, the protective cover should be open.

Fig.2.3.79



1. Vacuum [ON] button

Starts the blower fan, and vacuum operation of each part of the laminate module.

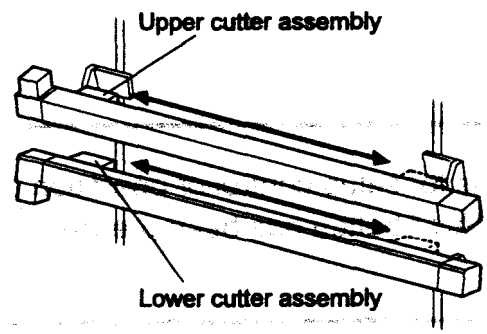
2. Upper Cutter [ON] button

Runs the upper cutter assembly to cut the film.

3. Lower Cutter [ON] button

Runs the lower cutter assembly to cut the film.

Fig.2.3.80

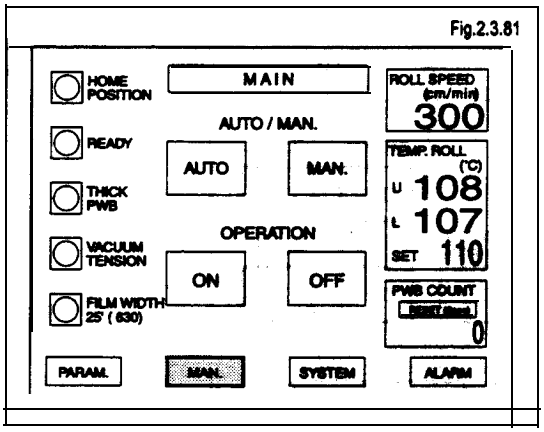


⚠ Caution

- Be careful when running the cutter to cut the film with the laminate module pulled out
- Keep the cutter cover closed (even when the cutter is not in operation).

■ Manual Screen

Fig.2.3.81



Press the "MAN." button on the main screen.

● The manual screen will be displayed.

For the operation and function of each button on the manual screen, see "3.4.2 Motions by Manual Operation."

3.4.2 Motions by Manual Operation

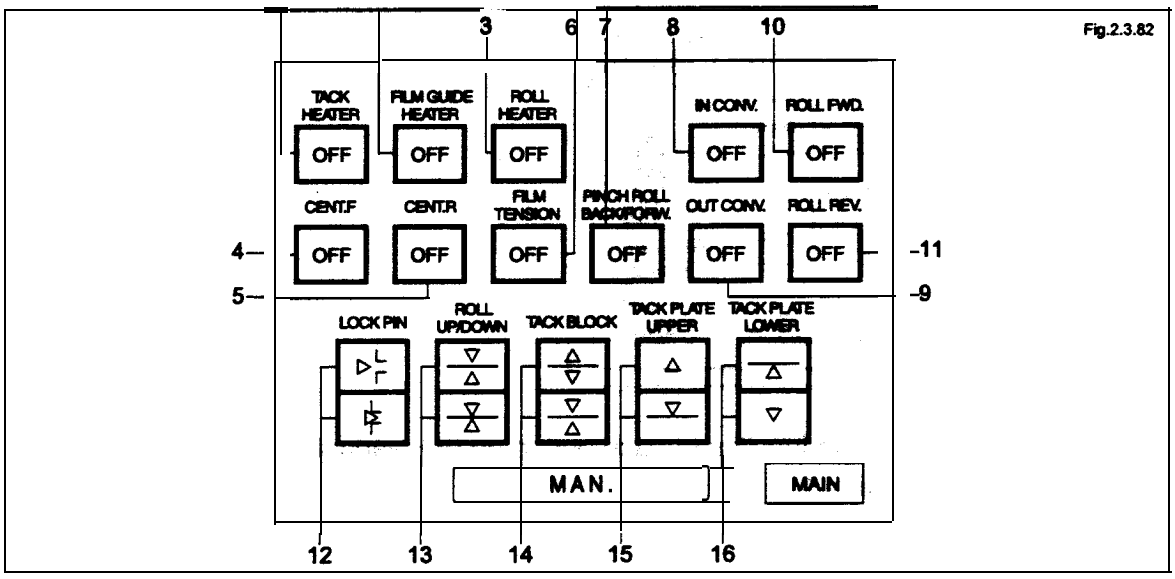


Fig.2.3.82

1. TACK HEATER

Turns "ON"/"OFF" the tacking heater built into the tacking rubber at the tip of the upper and lower tacking plates.

2. FILM GUIDE HEATER

Turns "ON"/"OFF" the film-guide heater built into the upper and lower film guides.

3. ROLL HEATER

Turns "ON"/"OFF" the roll heater built into the upper and lower laminate rolls.

⚠ Warning

- Do not touch the heaters or rollers even when they are not in operation or your fingers may be caught and burned.
- If you need to touch them, confirm that they have completely stopped and cooled down, or your fingers may be caught and burned.

4. CENT.F

Activates the input-conveyor centering plate (F) to perform centering.

5. CENT.R

Activates the input-conveyor centering plate (R) to perform centering.

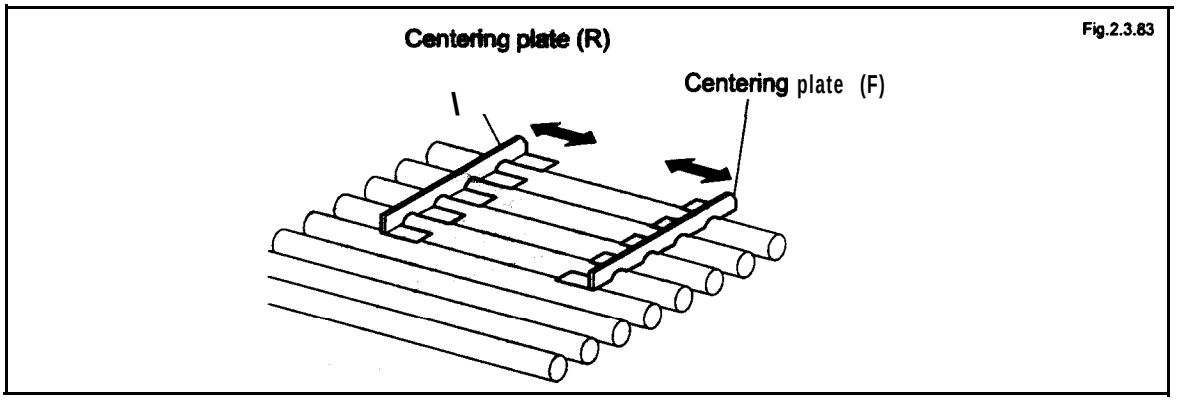


Fig.2.3.83

⚠ Warning

Do not open the cover of the input conveyor when it is in operation, or your fingers may be caught.

⚠ Caution

Do not set the centering width smaller than the width of PWB, or the input conveyor will be damaged.

6. FILM TENSION

Activates the upper and lower tension rolls.

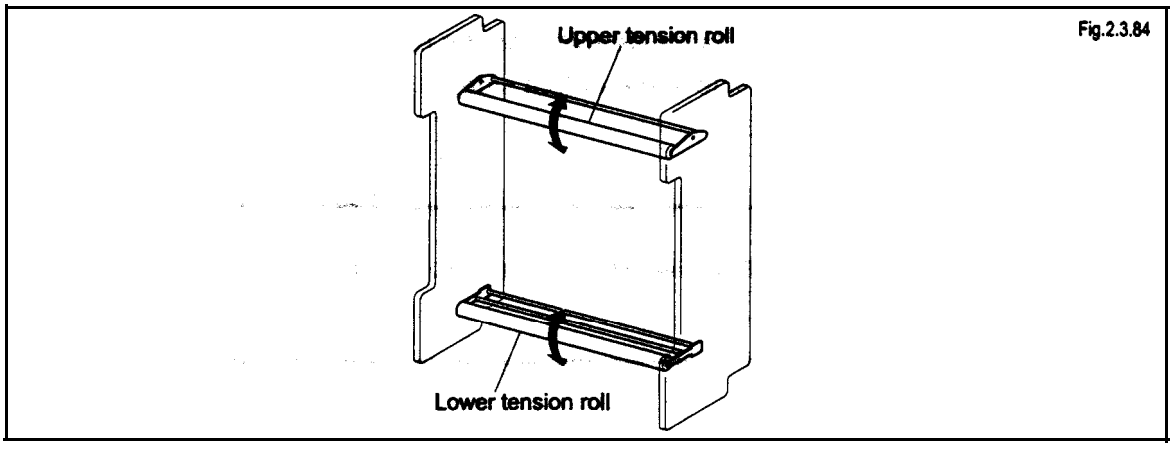


Fig.2.3.84

Note

The tension rolls are “ON” only when the film tension “OFF” button is pressed.

7. PINCH ROLL BACWFORW.

Moves the pinch roll forward when turned “ON” and backward when turned “OFF.”

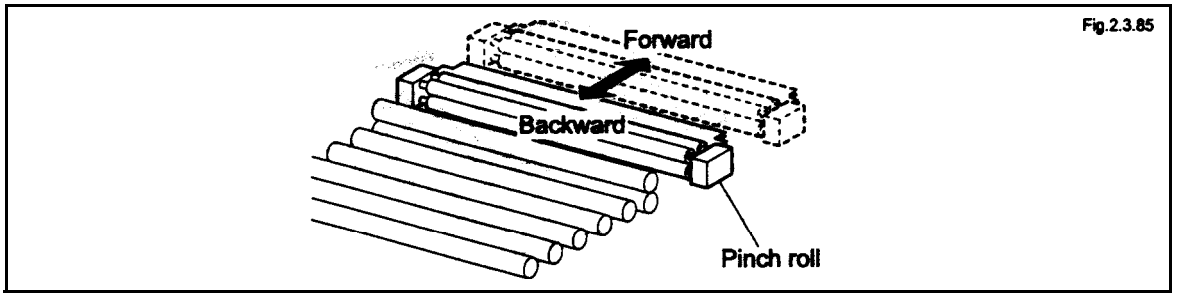


Fig.2.3.85

Note

As the pinch roll is driven by the driving force of the input conveyor, it will not move forward unless the input conveyor is turned "ON." It will move backward, however, even when the input conveyor is not turned “ON,” as it is driven in the backward direction by an air cylinder.

8. IN CONV.

Runs the input conveyor.

9. OUT CONV.

Runs the output conveyor.

10. ROLL FWD.

Runs the upper and lower laminate rolls and the roll auxiliary conveyor in the forward direction (from the input side to the output side.)

Warning

Do not touch the rolls even when they are not in operation, or your fingers may be caught and burned.

⚠ Caution

Do not insert foreign articles or the laminate roll will break.

11 .ROLL REV.

Runs the upper and lower laminate roils and the roll auxiliary conveyor in the reverse direction (from the output side to the input side.)

⚠ Warning

Do not touch the rolls even when they are not in operation. Be careful, particularly when cleaning the laminate roll, as your fingers may be caught and burned.

⚠ Caution

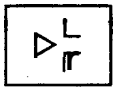
Do not insert foreign articles or the laminate roll will break.

Note

As the backward operation of rolls is abnormal, the roll backward drive button turns "ON" to rotate rolls only when the roll backward "OFF" button has been pressed.

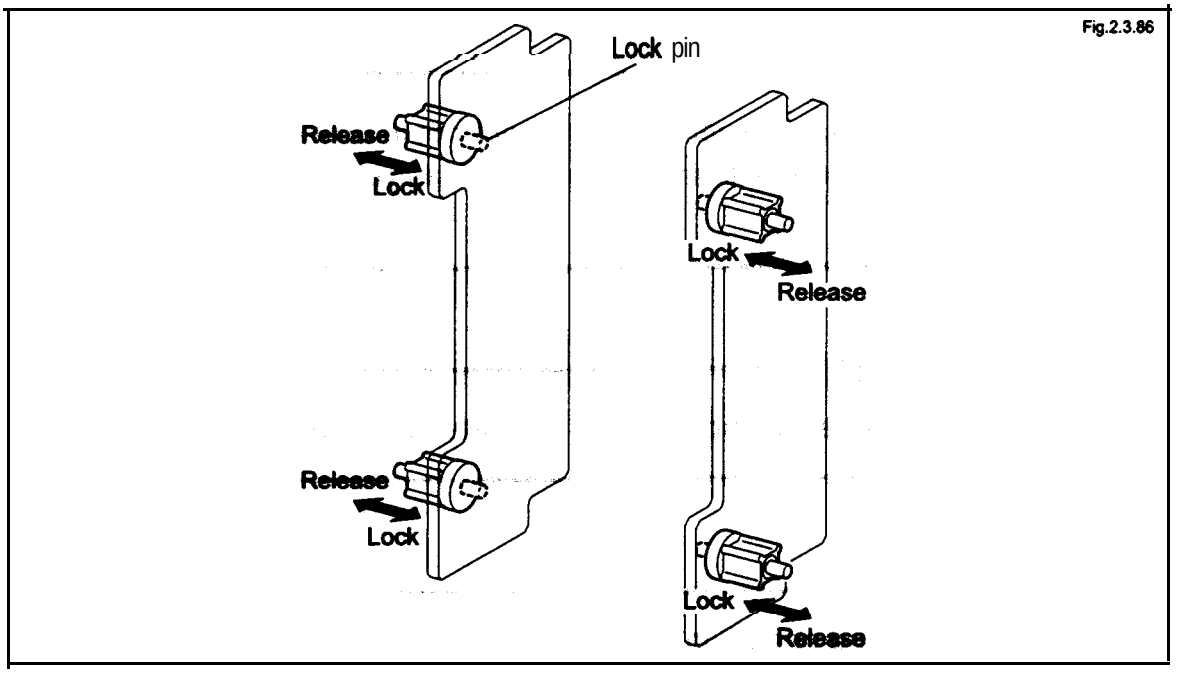
12.LOCK PIN

Fixes or releases the tacking block. The tacking block will not move to the open position if it is locked.



LOCK PIN "RELEASE" button:
Releases the lock pin to activate the tacking block

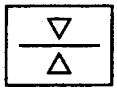
LOCK PIN "LOCK" button:
Fixes the lock pin to inactivate the tacking block



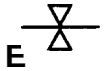
13. ROLL UP/DOWN

Runs the upper laminate roll in the vertical direction

- In the pressing motion, the upper laminate roll moves and the lower laminate roll is fixed.

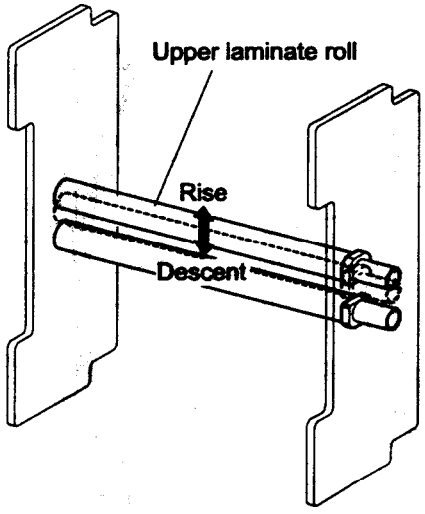


ROLL UP/DOWN "RISE" button:
Raises the upper laminate roll



ROLL UP/DOWN "DESCENT" button:
Lowers the lower laminate roll

Fig.2.3.87



⚠ Warning

Do not touch the rolls even when they are not in operation, or your fingers may be caught and burned.

⚠ Caution

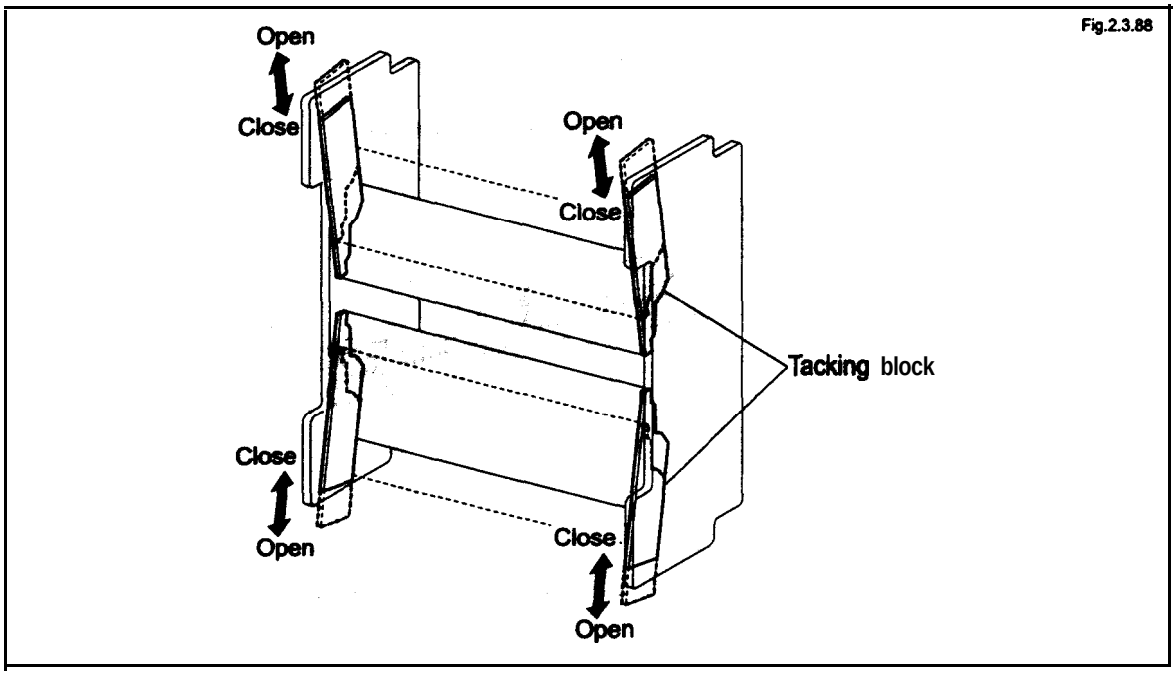
Do not put foreign objects onto the laminate roll or the laminate roll may be damaged.

14. TACK BLOCK

Moves the tacking block to the closed end opened positions

TACK BLOCK "OPEN" button:
Moves the tacking block to the opened position

TACK BLOCK "CLOSE" button:
Moves the tacking block to the closed position



Note

- Before moving the tacking block to the opened position, be sure to press the "RELEASE" button to release the lock pin. The tacking plate will not move if the lock pin is not released.
- Before moving the tacking block to the closed position, be sure to press the ROLL FWD. "OFF: button to turn "ON" and rotate the laminate roll. The tacking plate will not move if the laminate roll is not rotating.
- The tacking block moves to the closed position only when the TACK BLOCK "CLOSE" butt& is pressed.

15. TACK PLATE UPPER

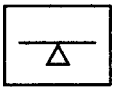
Moves the upper tacking plate to the closed and opened positions

TACK PLATE UPPER "OPEN" **button:**
Moves the upper tacking plate to the opened position

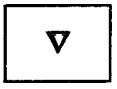
TACK PLATE UPPER "CLOSE" **button:**
Moves the upper tacking plate to the closed position

16. TACK PLATE LOWER

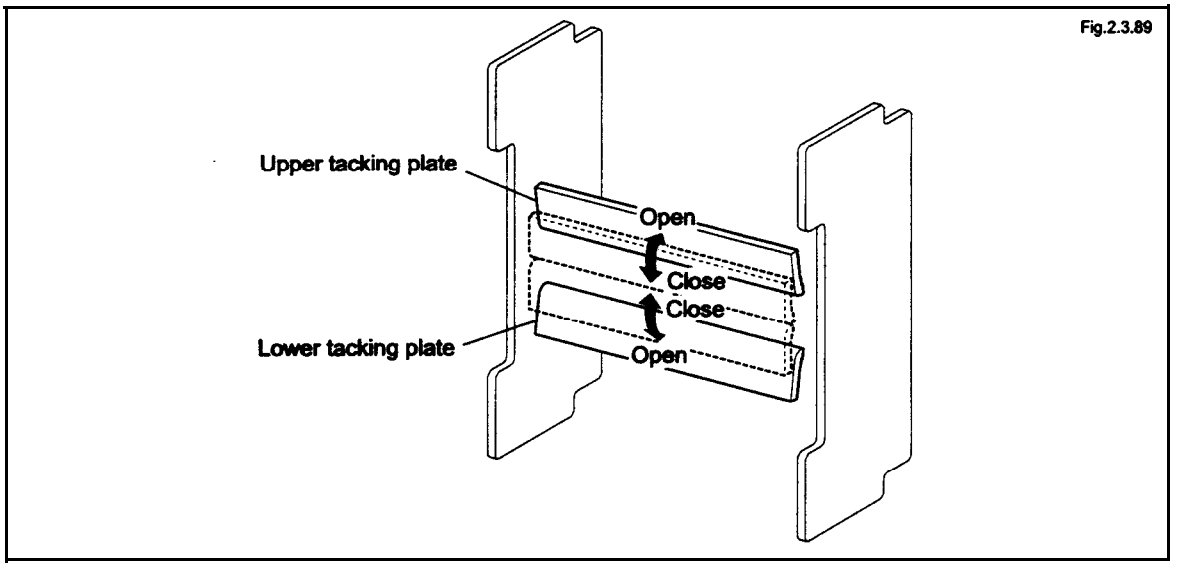
Moves the lower tacking plate to the closed and opened positions



TACK PLATE LOWER "CLOSE" **button:**
Moves the lower tacking plate to the closed position



TACK PLATE LOWER "OPEN" button:
Moves the lower tacking plate to the opened position



⚠ Warning

Do not touch the tacking **plates,** even when they are not in operation, or your fingers may be caught and burned.

⚠ Caution

Do not put foreign objects onto tacking plate, or the tacking plates may be damaged.