

# LAWHILL



## OPERATING MANUAL

FOR

### THE LAWHILL 'JUMBO-WT' FOLIO FINISHING SYSTEM

*Section 1*

*General Description*

*Section 2*

*Operator Controls*

*Section 3*

*Start Up & Normal Operating*

*Section 4*

*Operating Adjustments*

*Section 5*

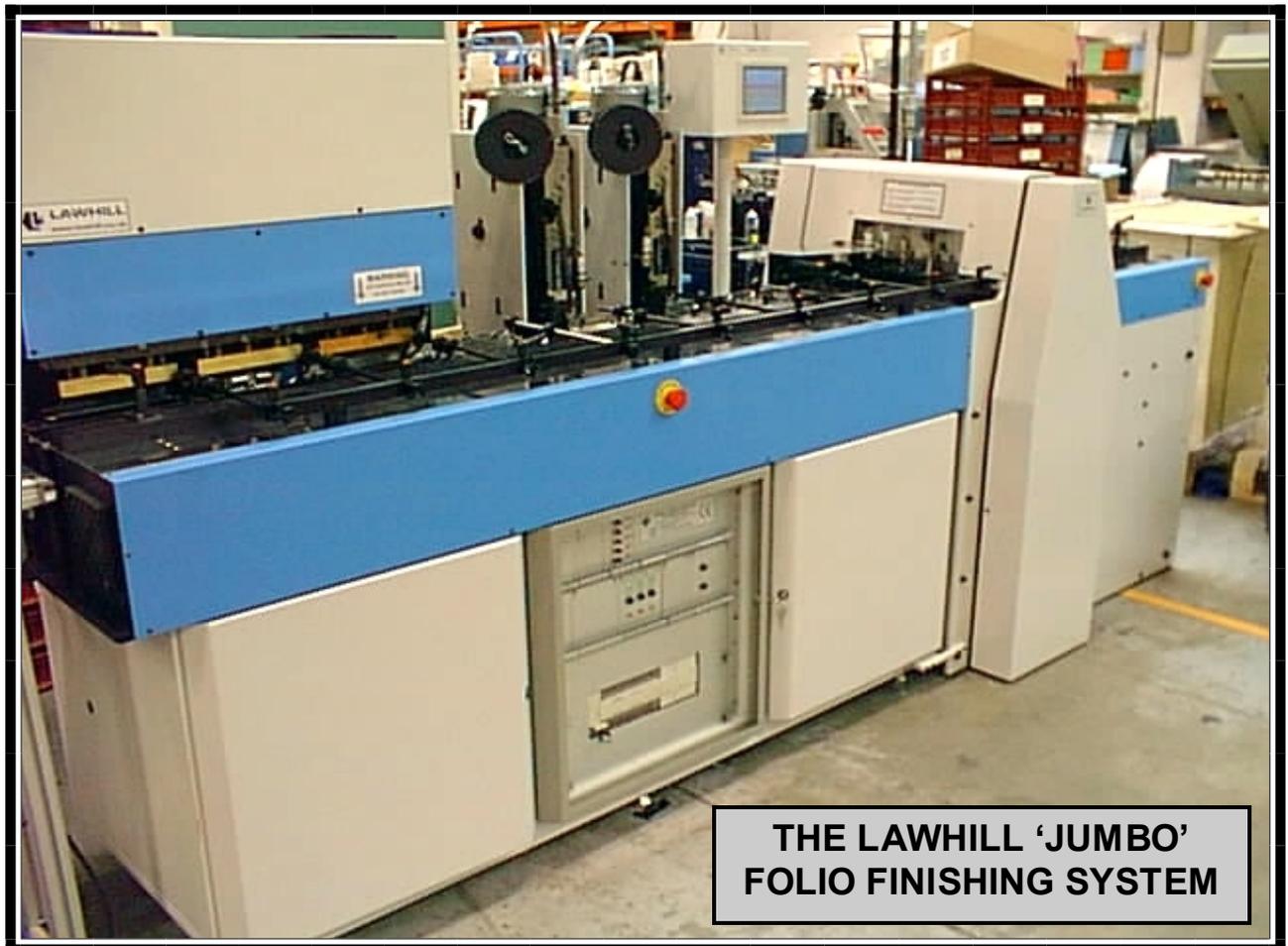
*Fault Correction*

## SECTION 1 - GENERAL DESCRIPTION

The 'Jumbo' Folio Finishing System consists of four modules as shown in the photograph below. From the operating position, the right hand unit is the Guillotine Module onto which the individual folio packs are loaded. As these folios pass along the unit, they are cut into individual booklets and are then passed onto the next unit which is the Outfeed and Book Rotation Module. This unit has a pneumatic device which clamps each book as it is cut from the folio being processed by the Guillotine Module, and passes it onto the reciprocating main track of the Stitching and Binding Modules. As this track moves each book forward in turn, they pass beneath the Book Rotation device. Normal portrait-style cheque books pass through this unit and into the stitching area, but landscape-style or 'top stub' cheque books are turned through 90 degrees so that they pass into the stitching area in the correct orientation. As each book passes through the stitching area two separate stitching heads insert one stitch each through the edge of the book. The reciprocating track now transfers the stitched cheque books onto the Binding Module. As the books pass along this unit, adhesive tape is positioned and applied around the spine edge to neatly cover the stitches.

The application of the tape is in three stages. The first stage cuts the tape to length and applies it to the top of the cheque book. The second stage forms the tape across the back edge and the last stage forms the remaining tape on the underside of the book. The completed cheque books can now be passed onto an adjoining conveyor where they are stacked for transfer elsewhere.

Operation of these four units is monitored continuously by a PLC (programmable logic controller) which is housed, together with all the electronic systems, in the cabinet beneath the stitching units. All the various functions within the machine are processed by this PLC with normal operator function via a back-lit colour touch screen control panel. This panel is housed in a steel cabinet which is mounted on a tubular support at the rear of the Outfeed Module and which is ideally positioned for easy operator access. This manual deals with both the procedures required for operating the machine together with detailed descriptions of the adjustments and fault corrections available to operators in normal day-to-day running and also the procedures for general maintenance of the system.



## SECTION 2 - OPERATOR CONTROLS

The main areas of operator control are the control panel supported at the rear of the Outfeed Module, the module rack housed in the centre cabinet beneath the Stitching Module and the various mechanical adjustments that are required when changing from one cheque book size to another.

### 2.1 CONTROL PANEL

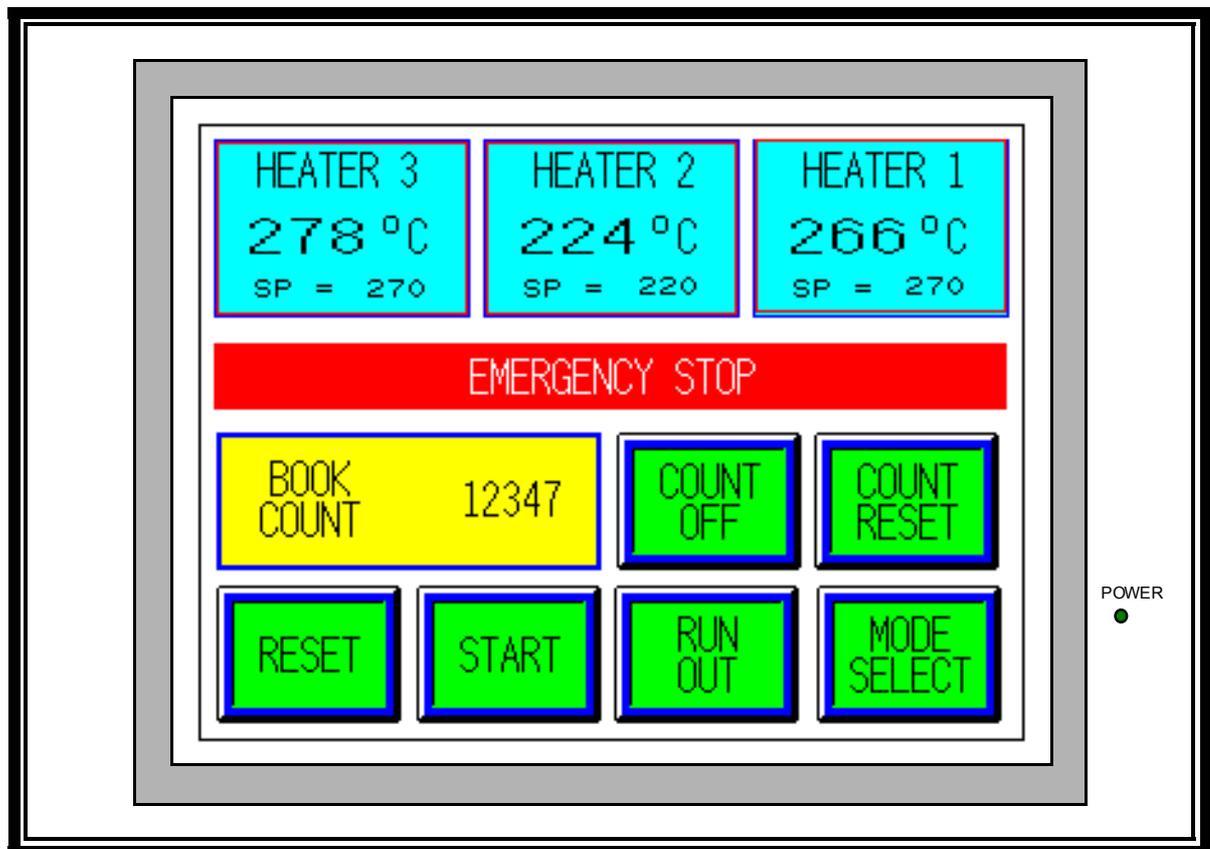
The control panel is housed in a steel cabinet which is mounted to a tubular support which in turn is mounted directly onto the base plate at the rear of the Outfeed Module. The diagram below shows the panel which has a colour touch screen for all operator functions and is linked directly to the PLC controlling the system as a whole.

The screen, or Graphic Operation Terminal (GOT for short) is an eight colour LCD display which acts as an interface between the operator and the system, providing details of machine performance, its operating functions and useful hints for fault rectification.

All keys and buttons for operator use are generated on each screen of the display and allow for complete control the system throughout and allow for resetting, starting, mode selection, programme selection together with various set up functions which vary from book style to book style.

The various screens and the screen sequences which take the operator through all the operating modes of the machine, are described in Section 3. The diagram below shows the control panel displaying the main 'AUTOMATIC MODE' control screen which is shown during normal operation, and this section deals with those buttons associated with this mode of operation, as well as those associated with 'MANUAL MODE', the screen layout for which is shown later. With most screens which appear, a 'HELP' button is included and can be pressed to reveal a screen outlining helpful information. In addition to the current screen information, other buttons will be displayed for returning to the 'MODE SELECTION' screen, which becomes a datum screen from where all other operating modes can be accessed.

### THE OPERATORS CONTROL PANEL



### 2.1.1 Screen Operations in Automatic Mode

The operator's screen buttons that are available during normal running are displayed in the lower part of the Automatic Mode screen as shown in the diagram on the previous page. As with all other screens, only those operator buttons which are displayed can be utilised while that particular screen is active.

At the top of the screen, three individual displays indicate the temperatures of each of the heaters within the tape binding unit. These are numbered from right to left corresponding to the order with which this unit operates. The continuously changing value of the three temperatures is displayed as large digits whilst the set point (SP) is shown below in smaller text.

The 'SELECT MODE' button in the bottom right hand corner will stop the system and return control to the 'MODE SELECTION' screen where a new set of parameters will be activated through a completely new arrangement of buttons. A full description and detailed diagram of all the operator mode screens can be found in Section 4 of the Complete System Service Manual.

The following control buttons are active in 'AUTOMATIC MODE' at all times. Pressing the 'RESET' button resets the system and clears all fault messages and software interlocks so that the machine is ready for normal running. When the system is reset, pressing the 'START' button enables all machine drives and other outputs, so that all motors start and normal running time begins. This sequence is referred to as the reset/start procedure.

When a batch of work has been finished and the last folio has passed through the guillotine unit, the system will not process the last eight books which remain, partly finished, along the main track. Pressing the 'RUNOUT' button once, will make the main track cycle and move these last books one station further along the track and obviously pressing this key eight times will finish all the remaining cheque books. However, keeping the 'RUNOUT' button pressed for a longer period will cycle the main track continually. As long as the track has cycled at least twice, releasing the key will not interrupt the full runout feature which will complete all unfinished cheque books remaining in the system.

Also on this screen is a fully updating book count which indicates the cheque books which have been completed since the last count reset. To turn the book count facility on or off, press the button to the right of the book count. This button is green when the count facility is not operating and displays the text 'COUNT OFF', and yellow when the count facility is active with the corresponding text display of 'COUNT ON'. The 'COUNT RESET' button is to the right of the 'COUNT ON/OFF' button and will reset the book count facility to zero. To ensure that this button is not pressed by mistake while the book count is active, its operation will only work when the count is off, ensuring that two buttons must be pressed to disable the feature.

### 2.1.2 Screen Fault Messages in Automatic Mode

If a fault occurs in the system, the machine will stop

immediately and a, normally hidden, fault information line appears on the screen between the three temperature displays and the book count. This line is in red with white text and each fault is indicated by a short phrase as detailed by the 30 fault messages shown below.

**EMERGENCY STOP  
GUARD OPEN  
GUILLOTINE NOT AT TDC  
GUILLOTINE WRECK  
INFEED TRACK NOT BACK  
OUTFEED NOT FULLY BACK  
OUTFEED FORWARD FAIL  
BOOK WRECK AT OPTO 3  
MAIN TRACK NOT BACK  
MAIN TRACK FORWARD FAIL  
BOOK ROTATION WRECK  
STITCH 1 NOT INSERTED  
STITCHER 1 NOT AT TDC  
STITCH 2 NOT INSERTED  
STITCHER 2 NOT AT TDC  
BOOK WRECK AT OPTO 4  
BOOK WRECK AT OPTO 5  
BINDING UNIT NOT AT TDC  
HEATER 1 FAULT  
HEATER 2 FAULT  
HEATER 3 FAULT  
BOOK WRECK AT OPTO 6  
BOOK WRECK AT OPTO 7  
BOOK WRECK AT OPTO 8  
THERMOCOUPLE 1 FAULT  
THERMOCOUPLE 2 FAULT  
THERMOCOUPLE 3 FAULT  
NO TAPE IN TAPING UNIT  
HYDRAULIC MOTOR OVERLOAD  
MOTOR OVERLOAD**

To obtain more information regarding any particular fault, pressing the red fault line provides an additional screen. Section 5 describes each fault in detail and describes suitable corrective action.

### 2.1.3 Other Operator Controls in Automatic Mode

The main isolator for the incoming three phase connection is positioned on the rear guillotine side plate and is used to isolate the complete system from the electrical supply. This rotary switch should be used to turn off the system at the end of each day or during any tasks where the guillotine covers or other protective guards require removal.

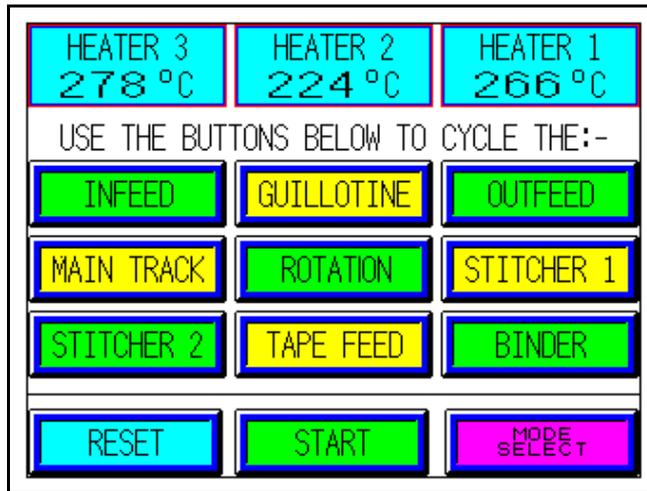
With the system started, the folio infeed lamp, mounted in the blue front cover of the infeed track, begins to flash and indicates that folios can be fed into the system. System logic prevents the lamp flashing until the system is ready to accept the next folio.

Should it be necessary to stop the machine, there are two emergency stop buttons, each mounted in one of the two independent blue front covers. These two buttons both have red mushroom heads with a yellow, 'EMERGENCY STOP', legend plate behind and they are pushed in to instantly stop the system. They remain in the stop position, with the machine disabled, until they are released by

twisting the mushroom head clockwise. Either switch stops the system and both have to be in the released position before the system can be restarted.

### 2.1.4 Screen Operations in Manual Mode

The 'MANUAL MODE' screen can be accessed from the 'MODE SELECTION' screen as with 'AUTOMATIC MODE'. Manual Mode is available for certain functions and adjustments which are easier to undertake in an isolated single operation whilst also being independent of certain fault conditions. The diagram below shows the manual mode control screen which appears as soon as the system has been started in Manual Mode.



As with the Automatic Mode control screen the actual temperatures corresponding to the heaters within the tape binding unit are displayed along the top of this screen. Below these are the nine manual buttons which can be used to cycle the main parts of the system in turn.

Although most faults are ignored in manual mode, emergency stop, guard open or any motor overload will prevent the machine from starting. If this occurs, a 'FAULT' message appears below the temperature displays and as with the fault messages in 'AUTOMATIC MODE' is normally hidden. In this instance the message is black text on a red background, but since the actual individual fault is not displayed all three areas must be examined.

The nine manual functions are as follows :-

#### 'INFEED'

Pressing this 'INFEED' button will cycle the finger carriage forwards and back once and will move a folio one position along the infeed table. This button is most commonly used to step a folio or part folio through the cutting sequence when it has been left in the blade area beneath the guillotine top cover following a fault or other stoppage. In this instance each cycle of the infeed must be followed by a guillotine blade cycle and an outfeed cylinder cycle, as described later in this section, to remove each individual book in turn. Obviously, the last book in each folio will not require a cutting cycle, only an outfeed cycle to bring it onto the main track.

#### 'GUILLOTINE'

Pressing this button will cycle the guillotine blade downwards to cut through a folio and then return it back up to its start position. This function is normally used following a stoppage when a folio or part folio has been left under the guillotine top cover, but is also used during the blade changing procedure.

#### 'OUTFEED'

Pressing this button will cycle the outfeed mechanism once and can be used to remove cut books which have been left in the guillotine blade area, beneath the top cover, following a fault or other stoppage. The action of the mechanism firstly clamps the book between two jaws and then moves it forward onto the main track beyond the guillotine top cover. In the fully forward position the clamp relaxes and releases the book before it returns to its start position.

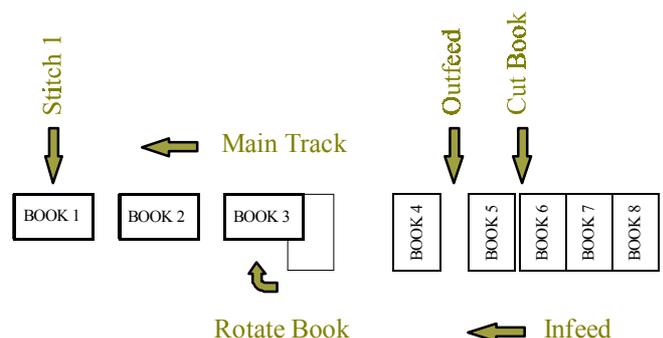
#### 'MAIN TRACK'

Pressing this button will cycle the main track forwards and back in one operation. This feature enables individual cheque books to be moved along the main track through the stitching and binding operations. Both the stitching units and the binding unit will function at each step, providing the operator with an alternative way of completing unfinished books which have been left in the system.

#### ROTATION

This key is only active if 'PROGRAM 3' has been initially selected on the 'PROGRAM SELECTION' screen in the 'JOB SET UP MODE', so that the books can be rotated after the outfeed cycle to enter the stitching and binding processes in landscape, rather than portrait, orientation.

As the cheque book advances during the outfeed cycle, it will be positioned under the book rotation clamp following one cycle of the main track. At this point, pressing the 'ROTATION' button will firstly activate the book clamp cylinder to grip the cheque book. As soon as the clamp is on, the book rotation cylinder turns the book through ninety degrees so that its landscape, or stub, edge is aligned with the fixed guide along the datum edge of the machine. As the main track is now cycled the cheque book will progress through the system in this new orientation, with three stitches and the binding tape being applied to this stub edge.



A diagram showing the movement of these cheque books through the system is shown at the bottom of the previous page. The only size of cheque book which can be processed in this manner is 3.5" x 6" with four like books being cut from a 14" x 6" folio.

### 'STITCHER 1'

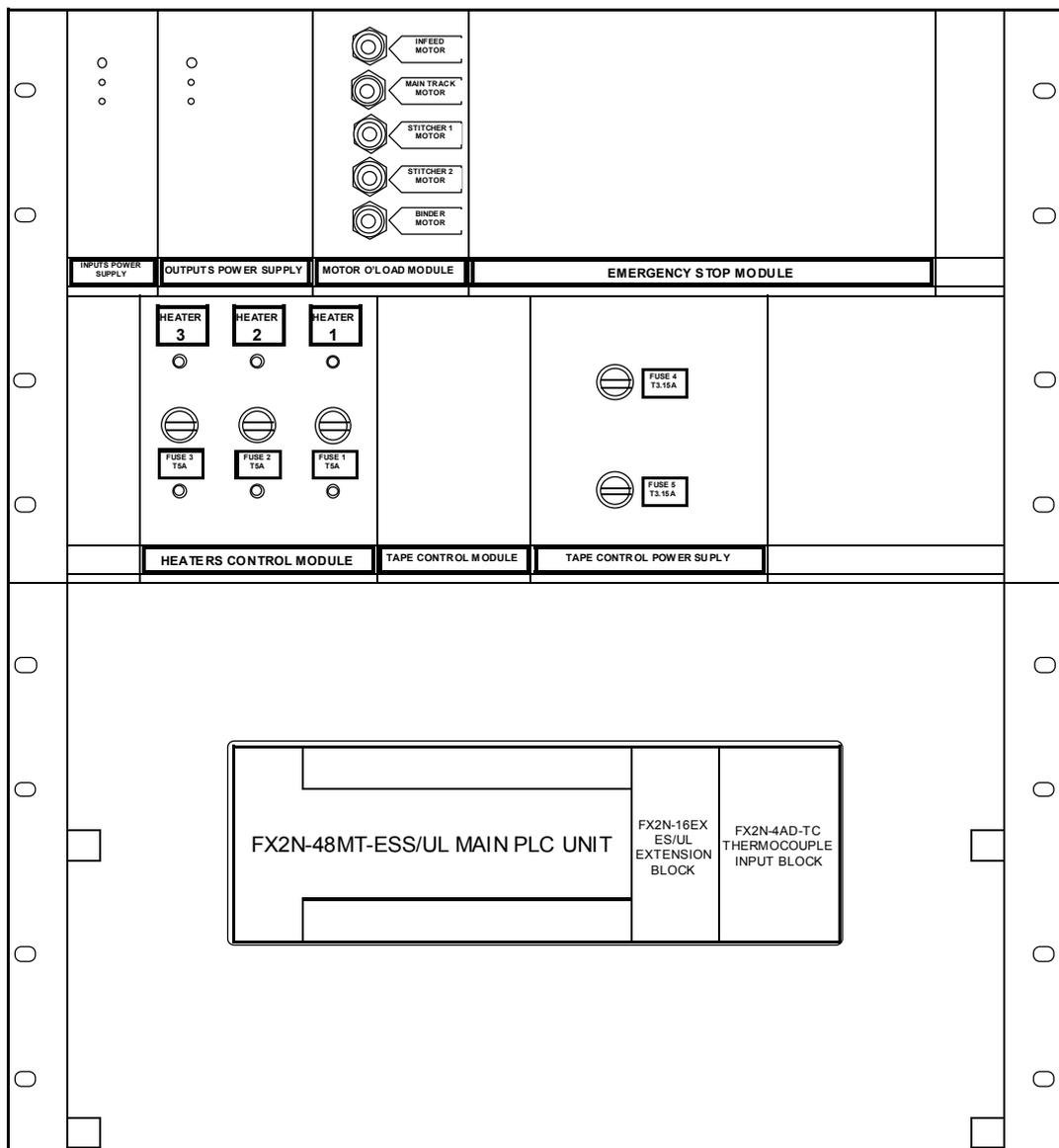
Pressing this button will cycle the first stitching unit once and will enable a stitch to be manually inserted into a book. This feature is used when the stitching unit is being prepared or tested and is necessary when the wire spool is changed or if the Bostitch stitching head jams for any reason. Both of these require the wire to be re-threaded within the unit and details of this procedure can be found in Appendix 1 at the end of this manual. After the wire has been threaded, the stitching unit must be cycled at least twice using a sample book hand held in the normal stitching position to ensure that stitches of satisfactory quality are being produced. It is essential that, whenever either stitching unit is cycled in manual, a sample book is placed in the stitching position so that loose stitches cannot 'jam' in the clincher plate which is mounted below the main track level.

### 'STITCHER 2'

Pressing this button operates the second stitching unit and its use is the same as for stitching unit 1 except in Program 3. In this instance the book will be stitched along its stub edge and following the first stitch insertion at Stitcher 1 will move to the second stitch position. Immediately after the second stitch is inserted, a finger, initially below the track surface, operates to move the book 50 mm forward for a third stitch to be inserted at the middle of the book.

### 'TAPE FEED'

Pressing this button feeds tape to the length pre-set on the 'NO. OF PAGES' screen in the 'JOB SET UP MODE'. Each press of this key feeds 1 length of tape and this length should correspond to the number of pages in the book. Entering the correct value for the number of pages is described in more detail in Section 3 and can easily be changed from one book size to another. This facility can be used to test the tape prior to applying it to a new size of book to check that the length is correct. If adjustments are required then the set value for the number of pages must be reset by returning to the 'NO. OF PAGES' screen.



MODE' screen. Other adjustments to the tape feed unit are described in Section 4 and also effect the positioning of the tape on the book.

## **'BINDER'**

Pressing this button cycles the binding unit once and during each cycle the three binding stations and also the tape cutting blade at the front of the tape feed unit, operate once.

This tape cutting process is necessary when a new reel of tape has been fitted or following any tape feeding faults. In both these circumstances the tape is fed through the tape feed unit manually and the end protruding from the front of the unit is removed by one cycle of the binding unit.

## **2.2 RACK MODULES AND CONTROLS**

The diagram on the previous page shows the facia of the Module Rack which is located in the centre cabinet beneath the stitching units and is behind a transparent lockable access door through which all the indicators and controls are clearly visible to the operator.

The rack is a standard 19" wide and is 12U high, and contains 8 individual modules which house all the electrical and electronic components utilised in the system. Each module is secured with either 2 or 4 screws and can easily be removed with the system powered down. Each module is located within the rack on plastic rails which are secured to the rack's mechanical structure. The rear of each module plugs into one or two edge connectors also secured within the rack and these transfer signals directly to and from the terminal strips at the rear of the rack from which all machine components are hard wired.

### **2.2.1 Inputs Power Supply Module (2.5A)**

This module is located at the left hand side of the top row of modules in the rack and supplies 24 volt D.C. power to all PLC (Programmable Logic Controller) inputs.

### **2.2.2 Output Power Supply Module (5A)**

This module is the second from the left in the top row and supplies all 24 volt D.C. power to the various output devices (clutches, lamps and solenoids) within the system. This module is switched off when the emergency stop relay is activated.

### **2.2.3 Motor Overload Module**

This module is the third from the left in the top row of the rack and houses five thermal and magnetic overload switches. The power to the five single phase motors is delivered individually through each of these devices which provide protection against any overload situation. The motors are for the Infeed Track, the Main Track, The two Stitching Units and the Tape Binding Unit. If an overload occurs within any of these motors, the corresponding switch cuts the power to the motor indicated by the fault message 'MOTOR(S) OVERLOAD' on the Automatic Mode control screen while the black button within the

corresponding switch is released outwards to visibly protrude about 10mm. Pushing the button inwards, resets the switch, but does not necessarily cure the fault.

### **2.1.4 Emergency Stop Module**

This module is located at the right hand side of the top row of the rack, and houses three relays which control the safe shutdown of the system in the event of an emergency stop or the guillotine top cover being removed.

**Relay 1** - This relay enables the shutdown of all 240 VAC devices such as the single phase motors, the heaters and the starter coil for the three phase hydraulic motor.

**Relay 2** - This relay energises the coil of Relay 1 and is controlled through software from the PLC.

**Relay 3** - This relay controls the power supply (5 amp) to the various 24 volt devices operating in the system.

### **2.2.5 Heaters Control Module**

This module is at the centre of the second row of the rack and contains all the controls and supplies for the three heaters within the binding unit. The power to each heater is supplied through one of three solid state relays mounted to a plate within the module and each of these is switched and controlled from logic in the PLC software programme. In the centre of the facia plate of the module are three fuse holders containing T5A (20mm) fuses for each of the heater cartridges and these have a screw type fitting for easy fuse replacement. Above the fuse holders are three green neon lamps which are normally illuminated and indicate that each fuse is working properly. If any of these neon lamps is extinguished then the corresponding fuse has 'blown'.

Below the fuse holders are three more neon lamps which are coloured amber. These illuminate intermittently during normal running of the system in Automatic Mode and indicate when each heater is being supplied with power.

### **2.2.6 Tape Control Module**

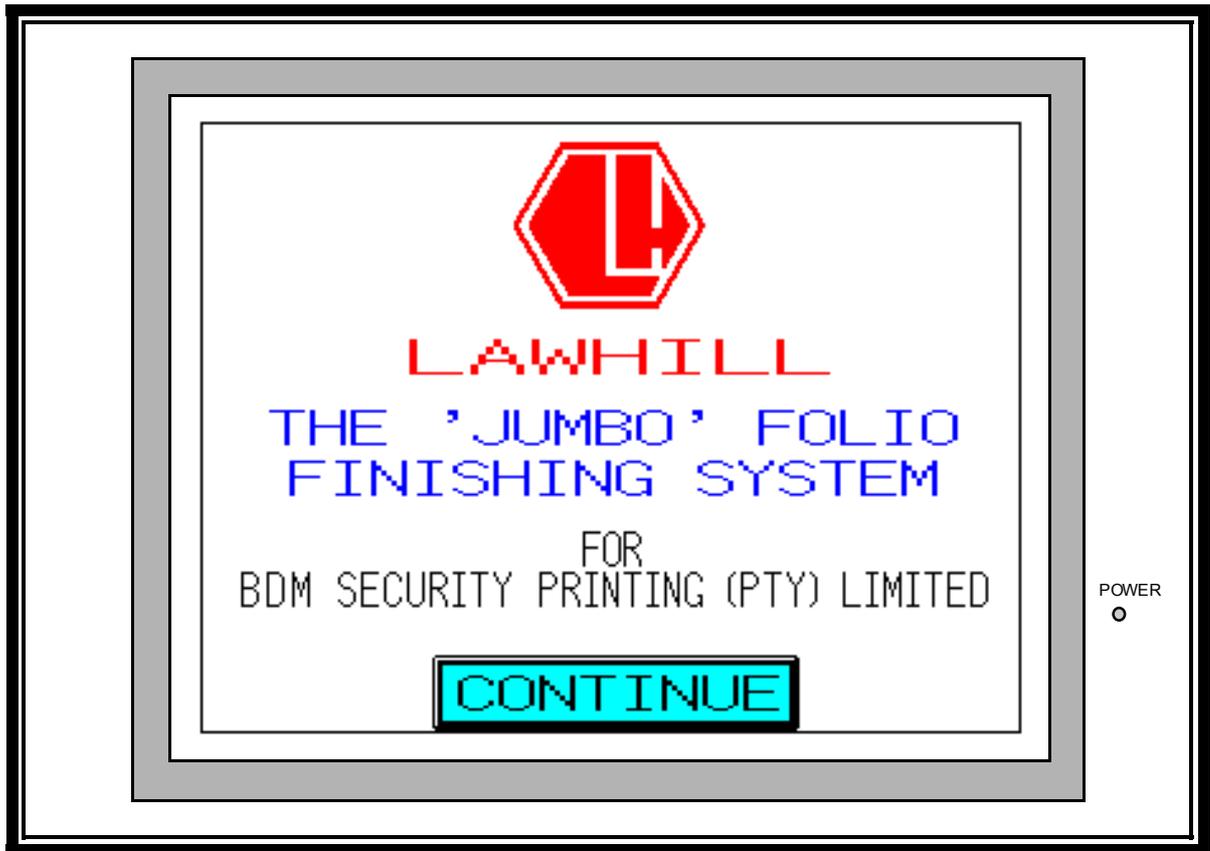
This module to the right of the Heater Control Module in the middle row of the rack and is responsible for turning the tape feed stepping motor on and off in response to the signals from the PLC software programme, while also controlling the actual speed at which the tape is delivered.

Some internal components are variable, so that LINK 1 should be in the 'B' position, LINK 2 should be in the 'C' position, LINK 3 should be in the 'E' position and LINK 4 should be in the 'G' position.

### **2.2.7 Tape Control Power Supply Module**

This module is located at the right hand side of the middle row and supplies power to the Tape Control Module beside it. Also in this module are fuses protecting both the stepping motor and the unit itself. These fuses are both T3.15A and of the 20mm type.

## SECTION 3 - START-UP AND NORMAL OPERATING PROCEDURES



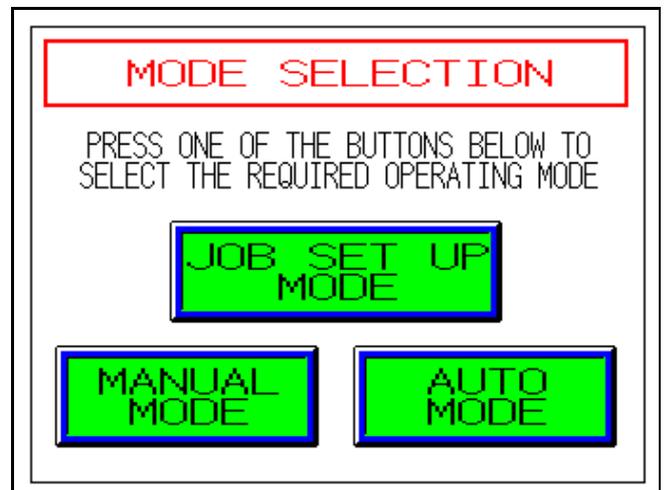
As already mentioned in Section 2, the main area of operator control is the colour LCD control panel and this section deals with the various screens which appear for different system functions, and the screen sequences which take the operator through all the operating modes of the machine.

### 3.1.0 START-UP PROCEDURE

Switch the system on at the main machine isolator which is mounted on the rear guillotine side plate.

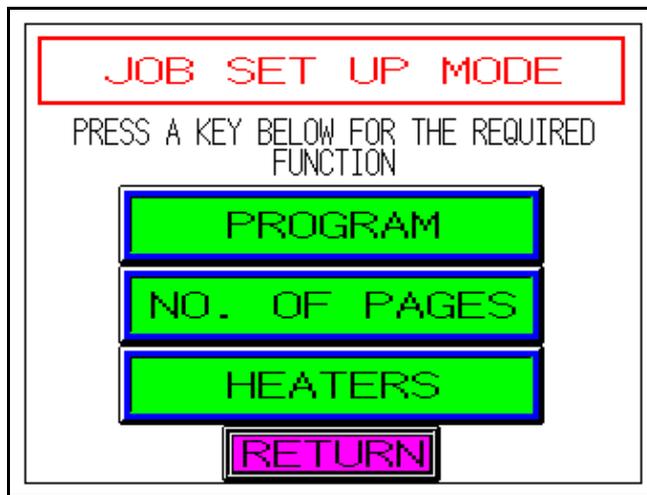
The diagram above shows the display of the control panel with the initial screen which appears after completion of a short 'boot-up' sequence. This screen only appears at the start of the screen sequence following the switching on of the system.

To proceed, press the 'CONTINUE' button at the bottom of this screen to display the 'MODE SELECTION' screen. The various modes of operation of the system can only be accessed from this screen and as such is frequently used to change from mode to mode. The layout of the 'MODE SELECTION' screen is shown opposite and indicates three modes of operation for the 'Jumbo' Folio Finishing System. These modes are the 'JOB SET UP MODE', 'MANUAL MODE' and 'AUTOMATIC MODE' and each can be selected by pressing the appropriate button.



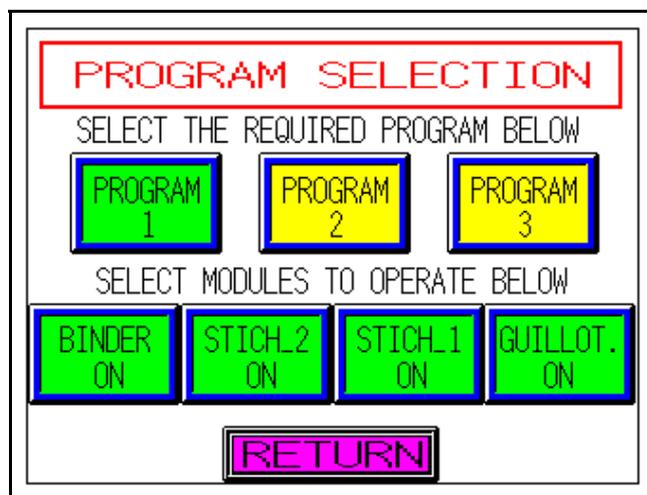
Since direct return to this screen is essential for quick and simple operating, both the 'MANUAL MODE' control screen and the 'AUTOMATIC MODE' control screen display a 'MODE SELECT' button for just this purpose.

Pressing any of these three buttons will take the operator to the initial screen associated with that particular mode and these will be dealt with in turn. Pressing the 'JOB SET UP MODE' button will activate the 'JOB SET UP MODE' screen as shown at the top of the following page. This screen provides buttons for three possible set up options.



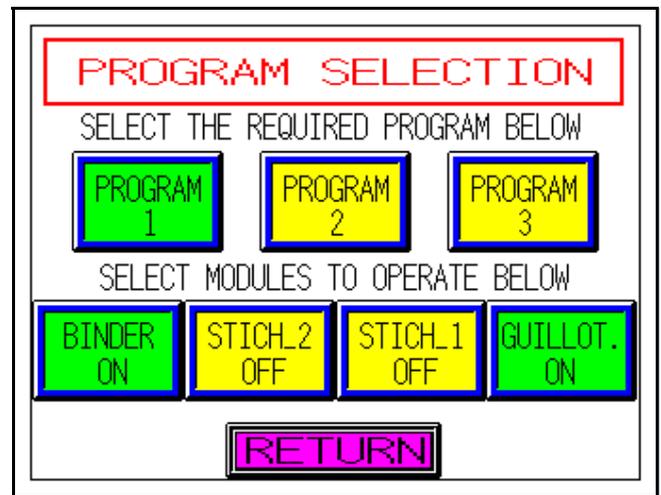
Pressing the 'PROGRAM' button activates the 'PROGRAM SELECTION' screen shown below and provides three upper buttons for selecting the required program and four lower buttons for selecting which modules of the system are required to operate for any particular job.

The upper buttons are labelled, 'PROGRAM 1', 'PROGRAM 2', and 'PROGRAM 3' and are coloured yellow if unselected and change to green when selected. Pressing the 'PROGRAM 1' will enable the system to process cheque books with depths of 3", 3½" or 4". Pressing the 'PROGRAM 2' button will enable the system to process either 6" or 7" deep cheque books and finally, pressing the 'PROGRAM 3' button will enable the system to process top stub cheque books which are rotated through 90 degrees to allow three stitches to be inserted along the top landscape edge of the book.



The lower buttons can be used to switch modules on and off as required by the job being undertaken. Normally the Guillotine, Stitcher 1, Stitcher 2 and Binder would be all on and in this case all the buttons would be green as shown above with each button showing 'ON' text.

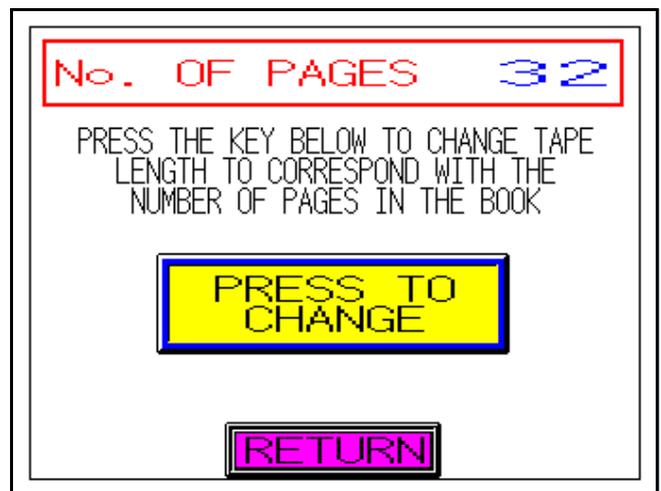
If, however, pre-stitched folios required finishing through the system, then both stitching units would need to be switched off by pressing the appropriate buttons. In this case the 'STICH\_2' and 'STICH\_1' buttons would change



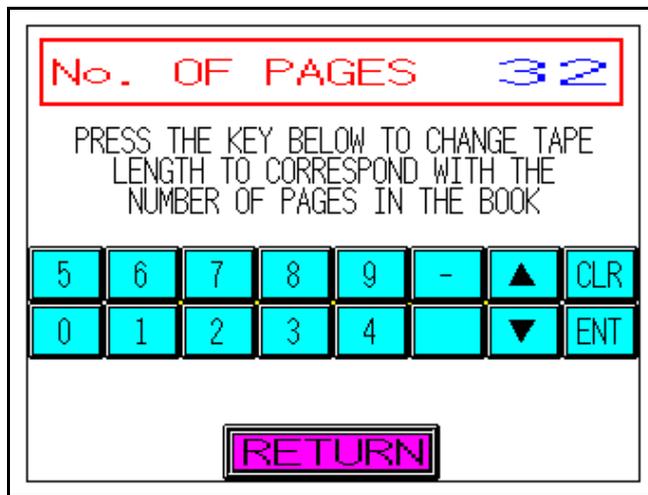
to yellow and would display 'OFF' text as shown on the screen above.

Once the program and module selection is complete, pressing the 'RETURN' button takes the display back to the 'JOB SET UP MODE' screen shown at the start of this page.

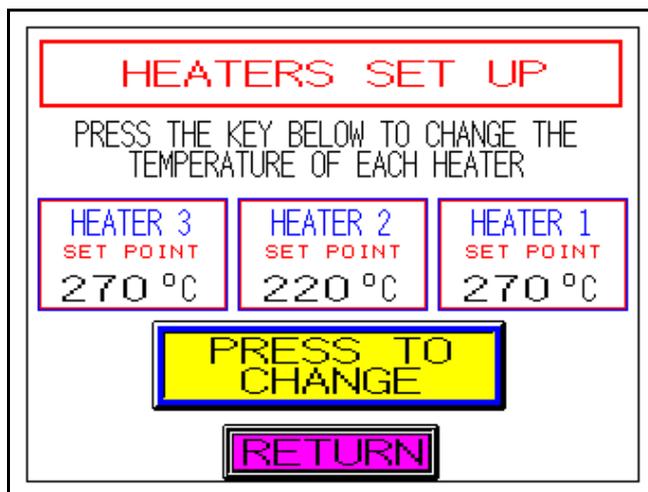
Pressing the 'NO. OF PAGES' button on the 'JOB SET UP MODE' screen activates a new screen which enables the tape length to be varied in accordance with the book thickness. This screen is shown below and has a 'PRESS



Pressing this button produces a number pad in the centre of the screen with a cursor appearing on the right hand, number of pages, digit. The now modified screen is shown at the top of the following page. Using the number pad, select the correct number of pages which corresponds to the required book thickness followed by the 'ENT' key and the new value will now be displayed on the top line of the screen. If a mistake is made or an incorrect value chosen, then pressing the 'CLR' key will restore the previous value at the top of the screen, always providing that the 'ENT' key has not been pressed. If an incorrect value has been registered by the 'ENT' key, then the change process must be repeated to enter the correct setting. Finally, pressing the 'RETURN' button takes the display back to the 'JOB SET UP MODE' screen.



Pressing the 'HEATERS' button on the 'JOB SET UP SCREEN' activates a new screen which enables the working temperatures of the three heaters in the binding unit to be altered to suit both cover paper and tape quality. This screen is shown below and displays the current temperature settings for all three heaters across the top of the screen and also has a 'PRESS TO CHANGE' button at its centre. Pressing this button produces a number pad in

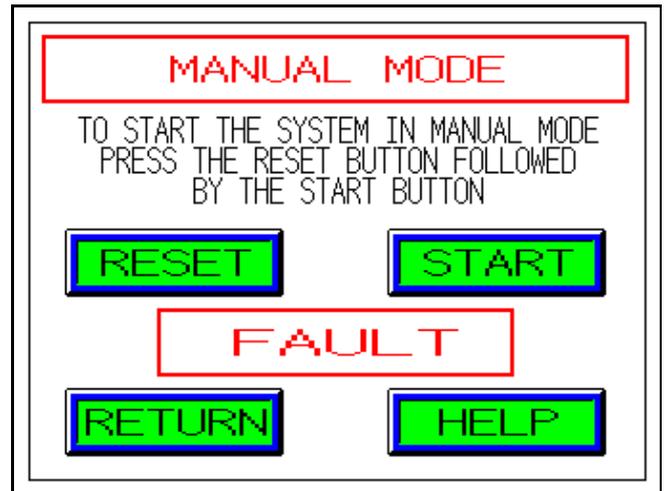


the centre of the screen similar to that displayed in the 'NO. OF PAGES' screen with the cursor appearing on the right hand digit of the heater 1 set point temperature. Using the number pad, select the correct temperature setting for each heater in turn, switching from heater to heater using the ? or ? keys. As each set point is adjusted correctly, enter the information by pressing the 'ENT' key and then repeat the procedure for changing the temperature of any other heaters to be altered. Finally, return to the 'JOB SET UP MODE' screen by pressing the 'RETURN' button.

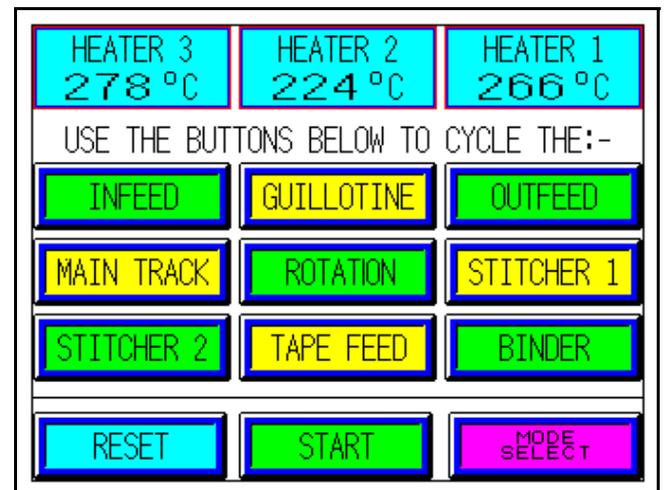
Since the previous settings to be selected remain in the system's memory until changed (even if the system is turned off at the main isolator), then some or all parts of the job set up process can be ignored if the next job uses similar settings.

With all the correct parameters now set, the system is ready to operate and pressing the 'RETURN' screen takes the display back to the 'MODE SELECTION' screen.

Pressing the 'MANUAL MODE' button changes the display to the 'MANUAL MODE' screen as shown below.

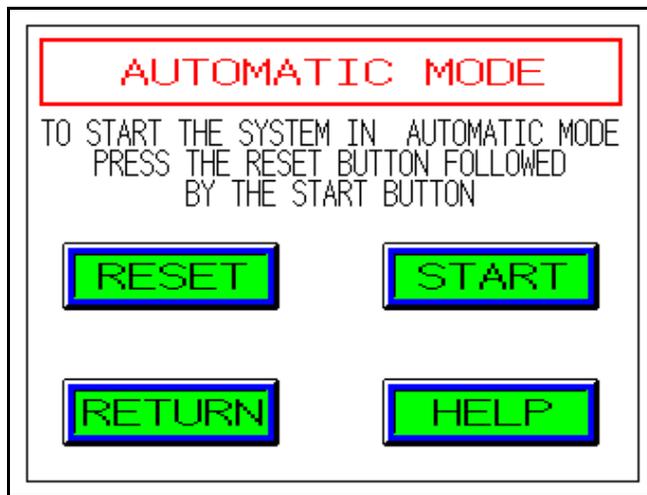


Pressing the 'RESET' button, followed by the 'START' button, will change the display to the Manual Mode control screen as shown below. If the central box indicates a fault, this must be removed, and although the screen will still change, the system will not start. The other buttons on this initial 'MANUAL MODE' screen allow 'RETURN' to the 'MODE SELECTION' screen or additional 'HELP' from another screen displaying useful text about Manual Mode operations.

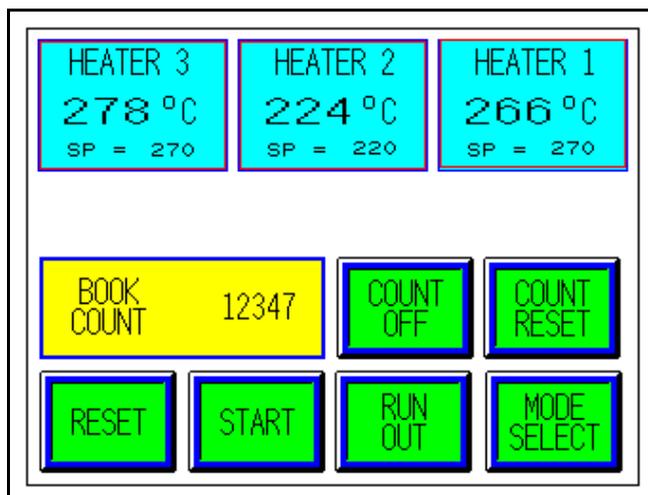


From the Manual Mode control screen the nine manual cycle buttons are active and are normally used for set up testing of various parts of the system prior to starting the machine in Automatic Mode.

After any set up tasks in Manual Mode, the system can be started in Automatic Mode. Pressing the 'MODE SELECT' button on the Manual Mode control screen, returns the display to the 'MODE SELECTION' screen from where Automatic Mode can be selected by pressing the 'AUTO MODE' button. The initial 'AUTOMATIC MODE' screen, shown at the top of the next page, provides four buttons. The 'RETURN' and 'HELP' buttons have similar functions to those on the initial 'MANUAL MODE' screen and pressing the 'RESET' button followed by the 'Start'



button takes the display to the Automatic Mode control screen from which normal running of the system, in Automatic Mode, is continuously monitored and controlled. This screen is shown below and will be the most frequently used screen, as from here are displayed the working temperatures of the binding unit, the book count, buttons for automatic operation of the system and access to other screens through the 'MODE SELECT' button.



### 3.2.0 NORMAL WORKING PROCEDURES

Normal working is only possible with the system running in Automatic Mode. When the system is not running, all outputs are turned off, including the temperature control circuits which monitor the heaters within the binding unit. These will automatically switch back on with the reset/start procedure, but since some cooling normally occurs, the correct working temperature should be attained on all three temperature indicators at the top of the screen before normal production commences.

To proceed in this mode, with normal production, place a folio pack onto the infeed table of the guillotine module and push it back against the infeed trolley at the rear end of the loading area. If the individual sheets of the folio are not in a neat pack, then 'knock up' the pack before placing it on the infeed table.

If the green infeed lamp is flashing, push the infeed trolley

fully forward, at a controlled speed, so that the folio moves forward onto the infeed track until it is ahead of the first pair of infeed fingers.

From this point the folio is now processed automatically and the infeed trolley can be returned to its start position.

Before completion of the first folio, place the next folio onto the infeed table ready for when the infeed lamp begins to flash again, signifying that the system can continue processing the next folio. Repeat the loading procedure by pushing the infeed trolley forward again, and continue this process until all the folios have been completed or until a stoppage occurs.

When the system stops in Automatic Mode' the red bar in the centre of the Automatic Mode control screen appears with the corresponding fault message in white text. Only system faults will stop the machine in this way (with the Automatic Screen still displayed), but the system will obviously stop, and the screen will change, if the 'MODE SELECT' button is pressed to access a different working mode.

### 3.3.0 STOP AND RESTART PROCEDURES

If a fault is pre-empted, or the system is not functioning correctly, then one of the emergency stop pushbuttons should be pressed. This immediately stops the machine by switching off the power to all motors, clutches and solenoids and renders it safe. The display will be similar to that shown at the beginning of Section 2, with the message 'EMERGENCY STOP' shown on the fault line.

When the problem has been resolved, pressing the 'RESET' button will clear the fault message and the system can then be restarted by pressing the 'START' button. If the system has stopped with a book or part folio under the guillotine top cover in the blade area, the machine will not clear the 'GUILLOTINE WRECK' message until such obstructions are removed. In this instance, the offending book, or part folio, should be completed in Manual Mode.

If the system stops by itself then a fault has occurred which will also be indicated by a corresponding fault message. A list of these simple fault messages is shown in Section 2 and described in detail in Section 5, with the correction procedures for most of the minor faults that can occur during day-to-day operation.

When the fault has been remedied, pressing the 'RESET' and 'START' buttons will restart the system.

### 3.4.0 REPLACEMENT OF CONSUMABLES

#### 3.4.1 Stitching Wire

Full details of replacement of stitching wire reels are given in Section 6 of the Complete System Service Manual.

#### 3.4.2 Binding Tape

The following procedure deals only with the replacement of the binding tape reel when the previous reel is depleted.

Details of the other adjustments, which are necessary during changes of book depth or thickness, can be found in Section 4.

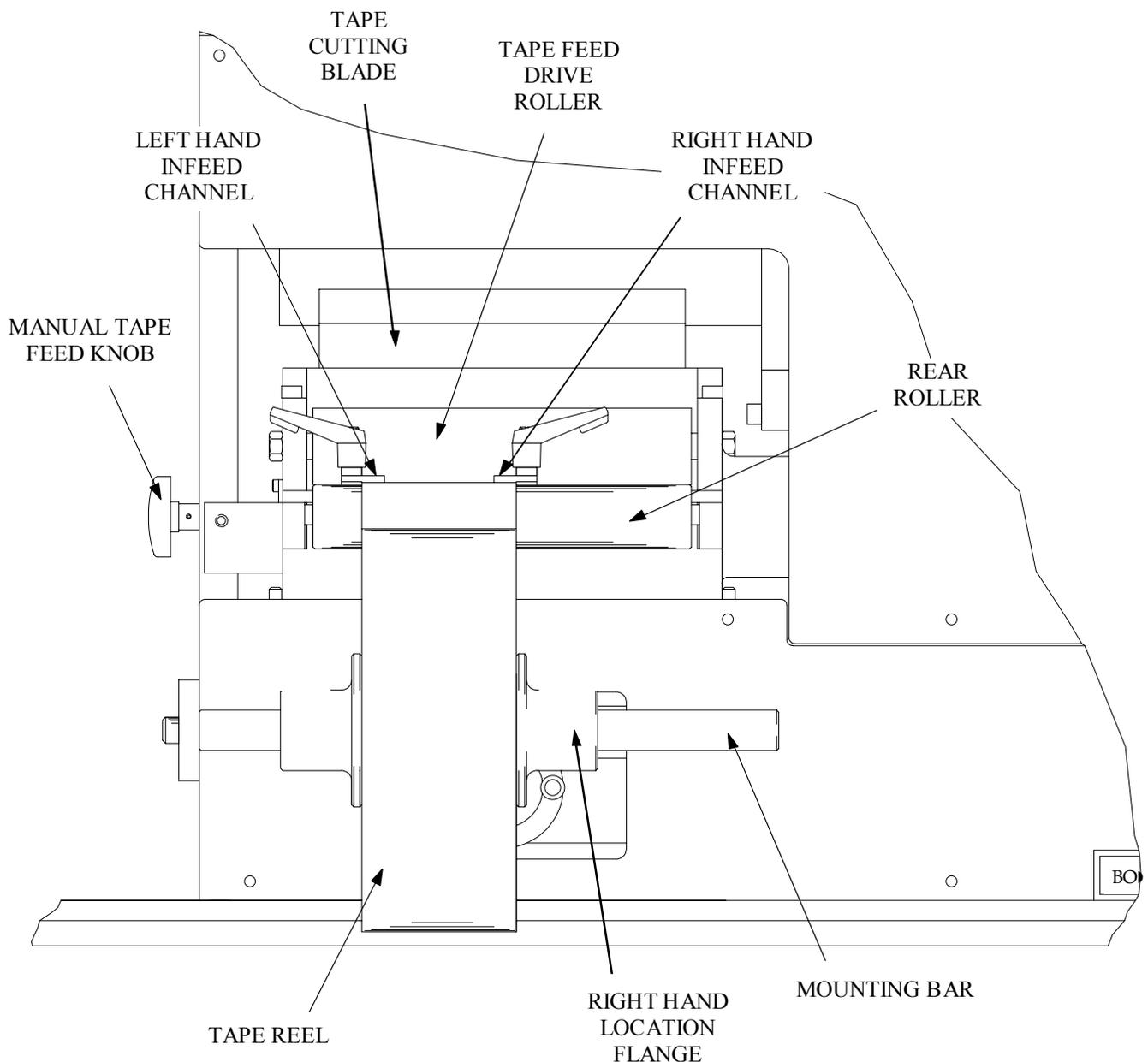
When the end of a reel of binding tape is reached, the system will stop and the fault message 'NO TAPE IN TAPING UNIT' will appear on the fault line. To protect the tape feed motor, one of the emergency stop pushbuttons must be pressed to isolate the machine during the installation of the new reel.

The diagram below shows the location of the binding tape reel at the rear of the binding unit and shows the location of the other items described in this procedure.

The first step is to remove any remaining tape from the tape feed unit. To feed this short length of tape through the drive rollers, turn the manual tape feed knob, which protrudes through the side plate of the binding unit, anti-clockwise. As the tape appears at the front of the unit it can be retrieved by hand and discarded.

Remove the right hand location flange by sliding along and off the mounting bar towards the right. Remove the depleted tape reel core and place a new reel onto the bar ensuring that it is mounted with the glossy side of the tape facing downwards as it passes through the tape feed unit. Replace the right hand location flange, release the leading edge of the tape from the reel and carefully feed it over the rear roller of the tape feed unit and into the small slots in the left hand and right hand infeed channels. Free enough tape from the reel to enable this leading edge to be hand fed up to the drive rollers. Turn the manual tape feed knob anti-clockwise to pull the tape through the tape feed unit and continue until there is about 50 mm protruding at the front.

Release the emergency stop pushbutton and restart the machine in Manual Mode and then press the 'BINDER' button. As the binding unit cycles, the tape cutting blade at the front of the tape feed unit trims the unwanted tape which can be then removed by hand and discarded. With this new reel of tape ready for use, production can be continued in Automatic Mode.



## **SECTION 4 - OPERATING ADJUSTMENTS**

### **4.1.0 SUMMARY OF ADJUSTMENTS**

The mechanical adjustments which are required to be made to the system, when changing from one book size to another, are summarised on four labels positioned at strategic parts of the machine for the operator to use as a simple check list when making size change adjustments. A size change may include all three size parameters ie. book

width, depth and thickness, or only one or two of these. Obviously, only those parameters which change require corresponding machine adjustment. The three labels, shown below and the one on the next page, are positioned as follows :

Labels 1 and 2 are attached either side of the guillotine top cover, Label 3 to one of the stitching unit covers and Label 4 to the lower rear cover of the binding unit.

#### **LABEL 1**

**INFEED TRACK ADJUSTMENTS**

- 1) ENSURE THAT THE CORRECT FINGER CARRIAGE IS POSITIONED BENEATH THE INFEED TABLE TO SUIT THE DEPTH OF THE BOOKS WHICH MAKE UP THE FOLIO YOU ARE PROCESSING
- 2) SET THE ADJUSTABLE SIDE GUIDE TO SUIT THE WIDTH OF FOLIOS YOU ARE PROCESSING
- 3) ADJUST THE HOLD DOWN STRIPS FOR THE CORRECT TENSION TO SUIT THE THICKNESS OF FOLIOS YOU ARE PROCESSING

#### **LABEL 2**

**MAIN TRACK ADJUSTMENTS**

- 1) ADJUST THE KNOCK-UP FINGERS TO SUIT THE DEPTH OF THE BOOKS YOU ARE PROCESSING
- 2) SET THE TWO ADJUSTABLE SIDE GUIDES TO SUIT THE WIDTH OF BOOKS YOU ARE PROCESSING
- 3) ADJUST THE NINE SETS OF HOLD DOWN STRIPS FOR THE CORRECT TENSION TO SUIT THE THICKNESS OF THE BOOKS YOU ARE PROCESSING

#### **LABEL 3**

**STITCHING UNIT ADJUSTMENTS**

- 1) ADJUST EACH STITCHING UNIT SIDE -WAYS TO THE CORRECT BOOK DEPTH SETTING OF EITHER 3", 3½", 4", 6", 7" OR THE SPECIAL TOP STUB BOOK SETTING
- 2) ADJUST EACH STITCHING UNIT TO THE CORRECT BOOK THICKNESS SETTING BY SIZING THE THICKNESS OF BOOK TO THE GAP IN THE SETTING GAUGE AT THE LEFT HAND SIDE OF EACH UNIT

## BINDING UNIT ADJUSTMENTS

- 1) ADJUST BINDING UNIT SIDEWAYS USING THE HANDWHEEL AT THE RIGHT HAND END OF THE UNIT
- 2) ADJUST POSITION OF THE TAPING UNIT WITH THE LOWER REAR HANDWHEEL FOR CORRECT BOOK THICKNESS USING THE SETTING GAUGE AT THE LEFT HAND SIDE OF THE TAPING UNIT
- 3) POSITION THE CORRECT BOOK DEPTH SIZE GAUGE IN THE LEFT HAND SIDE OF THE TAPING UNIT
- 4) MOVE THE LEFT HAND TAPE GUIDE AGAINST THE SIZE GAUGE AND LOCK IN POSITION
- 5) FIT THE CORRECT SIZE AND COLOUR OF TAPE REEL ONTO THE TAPE REEL SPINDLE
- 6) POSITION THE TAPE AND ADJUST THE RIGHT HAND TAPE GUIDE TO FIT TAPE WIDTH
- 7) ALIGN THE TAPE REEL WITH THE TAPE GUIDES AND POSITION THE FLANGED STOPS EITHER SIDE

### 4.2.0 GUILLOTINE ADJUSTMENTS

As already stated, the adjustments of every module in the system can be divided into cheque book width, cheque book depth and cheque book thickness and 4.1.0 above summarises these adjustments. The following sub-sections describe these adjustments in more detail.

#### 4.2.1 Book Width Adjustments

The guillotine module is normally the start of the book making process, the folio pack being hand fed onto the guillotine infeed table. The rear vertical face of this table is the datum edge for the book folio and as such is a fixed guide, while the front vertical face is an adjustable guide which can be easily moved to accommodate different widths of folio. The diagram on the next page shows the guillotine infeed table with all the important components identified.

Initially, the clamping handles which hold the adjustable guide in position, must be removed and the guide set loosely along the front edge of the test folio. The two clamping handles are now re-located in the pair of fixing holes which are directly beneath the slots in the guide and are tightened following final setting of the guide such that the folio is free to move, but with minimum sliding clearance.

#### 4.2.2 Book Depth Adjustment

The infeed side of the guillotine consists of a table, below

which an interchangeable carriage reciprocates. Attached to both sides of this carriage are fingers which are precisely spaced at a pitch corresponding to the book depth. A change of book depth will therefore require that the finger carriage be replaced with one which has a finger pitch equal to the required book depth.

The 'Jumbo' Folio Finishing System is supplied with two finger carriages set to book depth sizes chosen by BDM, and these are for 3" deep books and 3½" deep books which are also used 6", 7" and Top Stub cheque books.

To replace the finger carriage, first remove the existing carriage fitted in the machine, by unscrewing the large handwheel which is accessible through the aperture in the rear cover. When this handwheel is fully released from its screw fixing, the finger carriage can be withdrawn through the same aperture and put to one side.

The replacement finger carriage is aligned by locating the front pair of 'V' shaped plastic wheels onto the parallel guide bars which protrude at either side of the aperture. The carriage is pushed forward until the rear pair of 'V' wheels are also positioned on the guide bars and then pushed further still until the handwheel locates at the beginning of the screw fixing. Rotating the handwheel until hand tight will draw the carriage up to the fixed stop at the operating position leaving the system ready to process the new size.

**At no time should the finger carriage be over-tightened.** Although fine adjustments can be made to each finger on the carriage, the position of each is normally set on installation to exactly suit the particular book depth so that

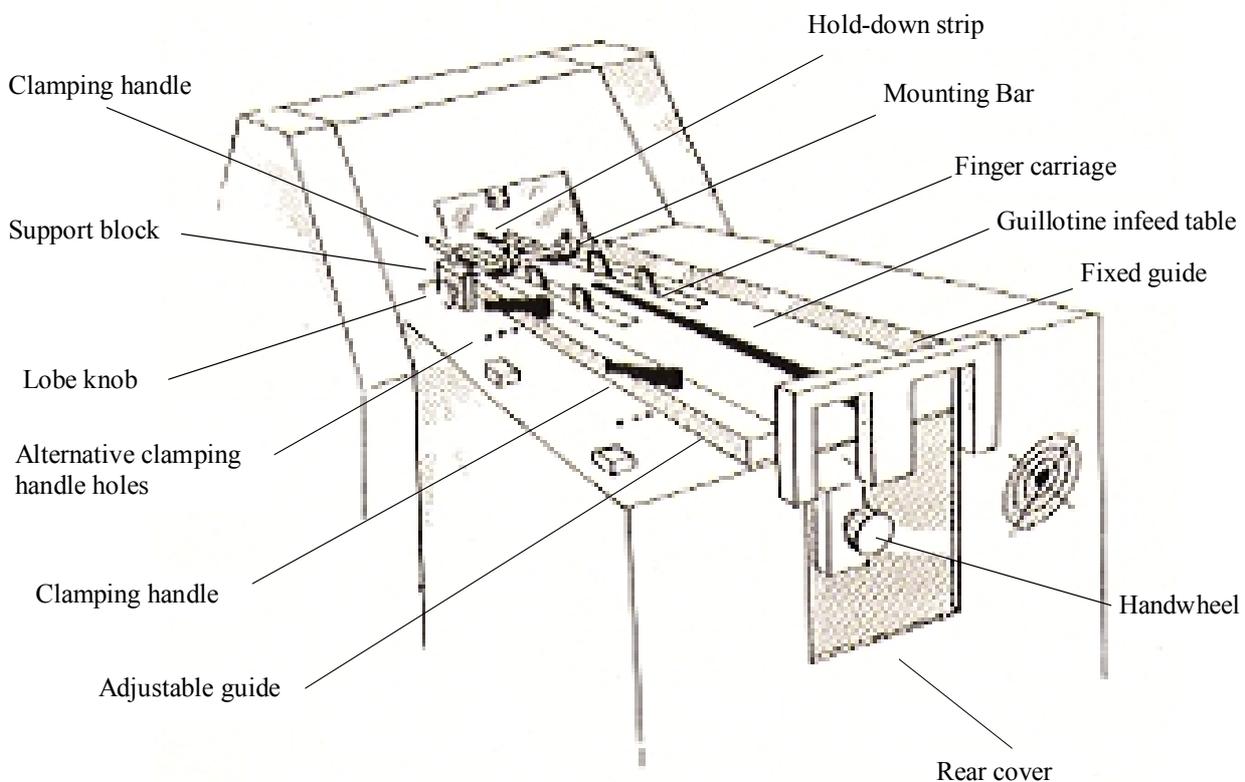
carriage replacement is straightforward.

### 4.2.3 Book Thickness Adjustments

Mounted at the front of the guillotine infeed table are two 'hold-down' strips which can be adjusted so that constant holding pressure may be applied to books of all thicknesses. The basic principle of these 'hold-down' strips applies for each station of the machine and is an important design feature of the system. The correct setting of the 'hold-down' strips cannot be quantified easily, as booklet thickness, quality of paper, machine station and machine speed influence their effect. However, the normal skills

and experience obtained from operating the system are sufficient in most instances for gauging the pressures that are required.

The infeed table has three such 'hold-down' strips which are mounted on a pair of bars, anchored by support blocks, which in turn are attached to the front of the infeed table. The rotary movement of these bars provides the variation in hold-down pressure and are adjusted by releasing the small clamping handle in the support block so that the bar may be rotated by hand, using the lobe knob provided, until the required pressure under the strips, is attained. At this point, the clamping handles may be re-locked to maintain the bar in the chosen position.



### 4.3.0 STITCHING HEAD ADJUSTMENTS

To assist with the various adjustments of the stitching unit, the diagram on the following page identifies the main components referred to in this section.

#### 4.3.1 Book Width Adjustments

As with the guillotine module the combined outfeed, and stitching and binding module also has width adjustment and can cover the full range of book sizes. The rear edge

of this module is the datum edge and is therefore fixed, but the front edge is formed by two adjustable side guides which can be easily moved to accommodate different book widths. The method of adjusting these side guides is the same as for the guillotine module side guide, the clamping handles being finally tightened when the optimum position regarding booklet width clearance, has been attained.

#### 4.3.2 Book Depth Adjustments

It is normal to position the stitches in each cheque book equally about the centre and at a suitable distance from

each edge so that a good balance and neat appearance results. To achieve this, both stitching units are adjustable sideways so that the required positioning can be attained over the full range of depth sizes.

To move a stitching unit, the clamping handle securing the unit to the plastic base plate must first be loosened. The unit can now be easily slid sideways by hand on the low friction plastic surface and to help position the unit accurately a scale is provided at the rear of the stitching unit, which can be easily aligned to a mark on the base plate. When the correct position has been achieved, the clamping handle is tightened locking the unit at the new setting.

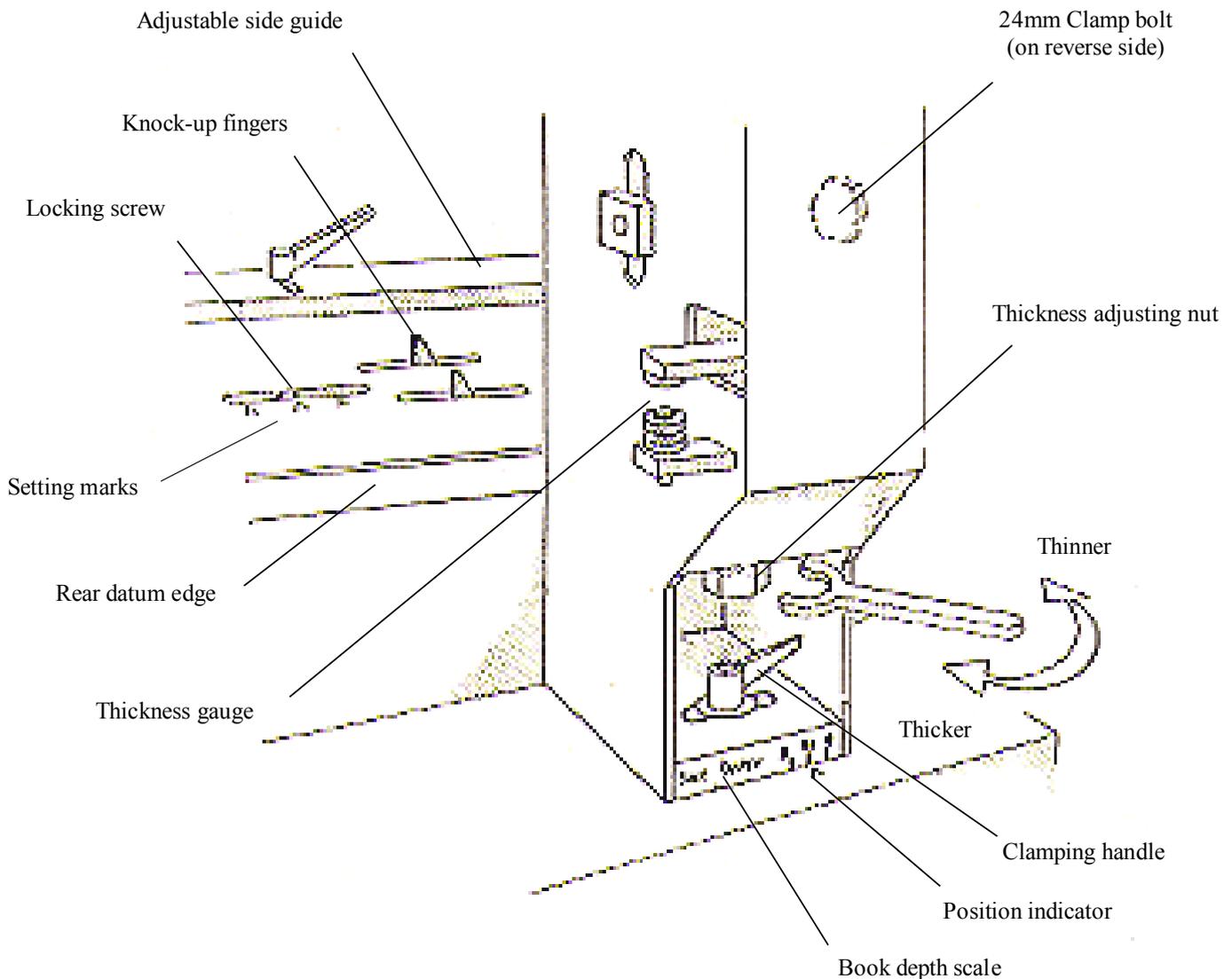
In addition to adjusting the stitch position, a change of book depth will also require a change of position of the knock-up fingers. These fingers are located under the main track and during the cycle are automatically raised at the appropriate time, so that they form a stop for the advancing book.

To move the fingers, first release the locking screws with the hexagon key provided, and with the key held in one of the screw heads, it can be moved in the retaining slot. The marks on the top surface of the central plate provide a reference for rapid change for alternative book depths, but fine adjustment may be required to give the best knock-up results.

### 4.3.3 Book Thickness Adjustments

As the book thickness varies, the length of the stitch must also be varied to provide a balanced shape which complies with a 'PERFECT STITCH' which is shown in Section 6 of the Complete System Service Manual. Since both stitching units are the same, the adjustment described here must be repeated for both units.

At one side of the stitching unit is a thickness gauge which varies as the unit is adjusted. The correct adjustment will enable the book to fit fairly tightly between the two gauge 'button' jaws.



To adjust the stitching unit, the large clamp bolt at one side is loosened with the 21 mm ratchet spanner provided. The same spanner is now used to turn the adjusting nut which is located at the rear of the unit, beneath the rear cover. turning the nut in the clockwise direction adjusts for a thinner book size and vice-versa. When the correct setting has been achieved, the clamp bolt is tightened in readiness for production. However, since the first stitch is produced with stitching wire that was formed with the previous thickness setting, it will be necessary to first operate the unit in manual mode with a test book.

#### **4.4.0 BINDING & TAPE UNIT ADJUSTMENTS**

The diagram on the next page shows the tape feed unit at the rear of the binding unit as well as many of the components detailed in this section. It may therefore be useful to refer to this diagram where the description indicates.

##### **4.4.1 Book Width Adjustment**

A full description of this adjustment is given in Section 4.3.1. since the adjustable side guide spans both the stitching units and the binding unit.

##### **4.4.2 Book Depth Adjustment**

Since the binding tape covers the full depth of the book, any change in depth necessitates a change of width of binding tape. The procedure for changing the binding tape reel is described fully in Section 3.4.2. and may be followed for removal of the existing reel. However, where the book depth has changed, the tape will be of a different width and therefore the tape infeed channels of the tape feed unit must be adjusted according to this new width of tape.

To make this adjustment, first loosen the two pairs of clamping handles which lock in position both adjustable infeed channels of the tape feed unit, and then move the left hand channel to the right and fit the correct tape setting gauge onto the two location pegs provide. Now move the left hand setting gauge back towards the left and hold it firmly against the face of setting gauge while the clamping handles are re-tightened. With the new tape fitted into the left hand channel, move the right hand channel to locate the right hand edge of the tape. In this position the tape should move freely within the two channels, but should not have excess sideways movement. When the correct adjustment has been made the second pair of adjustable handles are tightened and the tape fed forward through the rollers as described in Section 3.4.2.

With the new binding tape now re-positioned within the tape feed unit, the binding unit must now be moved to the position which corresponds to this new book depth. To achieve this, the complete binding unit must be moved sideways by turning the large, binder adjustment handwheel at the end of the machine. This handwheel is turned clockwise or anti-clockwise to adjust the unit, one way or the other, to its new position and to help position

the unit accurately an adjustment scale is provided on the lower rear cover which can be easily aligned to a mark on the lower base plate along which the binding unit slides. No locking device is required to fix the binding unit in a particular position as it is retained by its own weight and internally by special shoulder screws on two keyways.

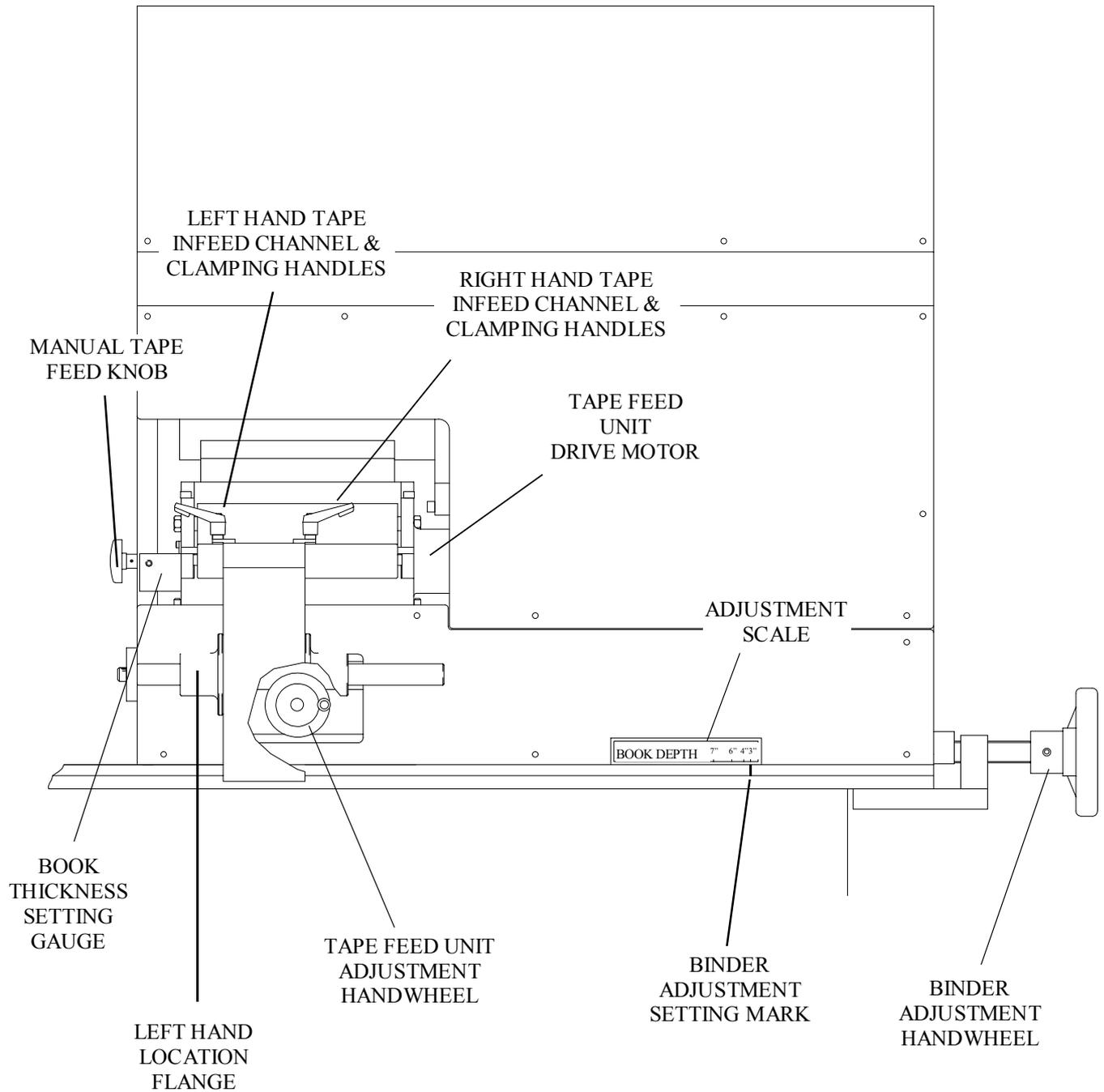
##### **4.4.3. Book Thickness Adjustment**

If the thickness of the cheque book changes there are three adjustments which may be required to provide a correctly bound finish. As the thickness varies, the amount of tape required to bind the cheque book evenly, also varies. The amount of tape applied to the top and underside of the book remains the same, so the change in tape length is directly equivalent to the book thickness. For the tape feed unit to apply more or less tape, the input to the tape feed drive motor must be altered. To change this input, the number of pages must be altered on the 'NO. OF PAGES' screen which can be accessed at any time from the 'JOB SET UP MODE' screen. Selecting this screen and entering data relating to the number of pages is described fully in Section 3.

When the new value has been entered the tape feed unit must be re-positioned so that the new length of tape will be applied evenly around the spine of the book. With a book held within the setting gauge at the left hand side of the tape feed unit, the tape feed unit adjustment handwheel located beneath the infeed channels can be turned, clockwise or anticlockwise, until the correct thickness book is held firmly within the gauge.

When the tape feed unit has been correctly adjusted, the machine may be re-started and production of books commenced. The final adjustment which may be required is to alter the pressure applied to the books by the 'hold-down' strips. These strips are very important at the three stations of the binding unit and a substantial change in the booklet thickness will result in all of them requiring some adjustment. As with all the 'hold-down' strips throughout the machine, the amount of adjustment relies on the experience of the operator and paper quality.

**DIAGRAM OF THE REAR VIEW OF THE BINDING UNIT SHOWING  
DETAILS AND LOCATIONS OF THE MAIN COMPONENT PARTS**



**FOR DETAILS AND LOCATIONS OF OTHER COMPONENTS  
SEE THE DIAGRAM AT THE END OF SECTION 3.**

## SECTION 5 - FAULT CORRECTION

### 5.1 GENERAL

In normal automatic operation the 'AUTOMATIC MODE' control screen will appear, without displaying any fault message. If a machine detectable fault occurs, the system will immediately stop as if one of the emergency stop buttons had been pressed. In fact all faults detected by the machine will interrupt the emergency stop circuitry, halting the supply to all the outputs such as motors, clutches, heaters and the like. As the machine stops, a fault message, corresponding to the particular cause of stoppage, will appear as white text within a red bar across the centre of the screen and below the heater displays. Most of the fault messages are of obvious meaning, but a detailed description of the fault, with a suitable correction procedure can be obtained by pressing the red bar containing the message. Pressing this key provides a dedicated screen for the particular fault and provides explanatory text describing suitable corrective action. Pressing the 'RETURN' button at the bottom of the help screen will re-activate the normal 'AUTOMATIC MODE' control screen and here, once the fault has been successfully cleared, pressing the 'RESET' button will clear the red bar and allow the system to be restarted by pressing the 'START' button. The faults which are monitored by the system are described below and are described in module order.

### 5.2 GUILLOTINE FAULTS

#### 'EMERGENCY STOP'

This message indicates that an emergency stop switch has been pressed. There are two emergency stop switches, one in the near side blue cover of the guillotine and one in the front blue cover of the combined stitching and binding unit. Both switches are labelled 'EMERGENCY STOP' and both are the 'PUSH ON / TWIST OFF' type, with a large red mushroom head. They are also in series, so that either will stop the machine. If either switch has been pressed it must be twisted clockwise to release the switching mechanism. With both switches released the machine can be restarted using the reset/start procedure. The normal use of these switches is for operator control of the book making process, or for switching the machine 'OFF' while minor operator adjustments are made.

#### 'GUARD OPEN'

There is one guard switch which is actuated by the top cover of the guillotine unit. This cover is over the blade area giving protection from the most potentially dangerous part of the machine. This switch is normally closed and opens the guard switch circuit if the cover is removed or dislodged in any way. As the switch operates the fault message 'GUARD OPEN' appears on the screen and the system stops. Normally the cause is a guard which has not been tightened down properly or that the switch is defective. If the cause of the fault cannot be readily found, an engineer should investigate the problem. If the guard is removed to investigate the fault, the machine **MUST** be

switched off at the main isolator first and must be repositioned and secured before the system is switched back on again.

#### 'GUILLOTINE NOT AT T.D.C.'

This message indicates that the guillotine blade is not in its top dead centre position after the guillotine's hydraulic system has been energised during the normal machine cycle. This situation can occur if either the hydraulic motor, the hydraulic valve or the top dead centre photocell (Opto 12) are defective. If the fault does not respond to the reset/start procedure, then the fault is probably within the hydraulic system and an engineer should be contacted immediately to rectify the problem.

#### 'GUILLOTINE WRECK'

This message normally indicates that a book is present somewhere in the guillotine blade area between the Opto 1 and Opto 2 photocells when that area should be clear. This situation will normally arise when an emergency stop or other such fault has stopped the machine and a book, part of the folio or all of the folio is halted prior to the completion of the guillotine cutting process. Since the normal cycle has now been interrupted, the reset/start procedure will only re-start the machine when the, folio or part folio has been removed and the 'GUILLOTINE WRECK' message eliminated. To achieve this, the 'MODE SELECT' button must be pressed to return to the 'MODE SELECTION' screen where the system can be re-activated in 'MANUAL MODE'. The offending books can now be progressed onto the main track by use of the 'INFEED', 'GUILLOTINE' and 'OUTFEED' buttons on the 'MANUAL MODE' control screen. When all remnants of the folio have been fully removed from the guillotine blade area, 'AUTOMATIC MODE' can now be re-selected, via the 'MODE SELECTION' screen, to continue book production.

#### 'HYDRAULIC MOTOR OVERLOAD'

The message 'HYDRAULIC MOTOR OVERLOAD' indicates that a problem has occurred with the hydraulic motor which drives the guillotine blade. The overload trip which activates this fault is normally preset at manufacture to the correct working current of the motor. This can be exceeded for a number of reasons, such as a drop in supply voltage, and pushing the stop and start buttons on the guillotine motor isolator, mounted at the rear of the guillotine unit, will normally rectify the fault. The machine can then be re-started using the reset/start procedure. If the machine cannot be re-started successfully then the fault must be rectified by an engineer.

#### 'INFEED TRACK NOT BACK'

During one complete cycle of the reciprocating infeed carriage, the forward and back positions are indicated by

switches. In the back position the carriage begins and ends its movement, while fully forward it positions the folio ready for cutting by the guillotine blade. If the messages 'INFEED TRACK NOT BACK' is displayed as a machine fault, then the back switch is not operating correctly and will prevent further cycling of the infeed track. Adjustment of the switch or replacement should be carried out by an engineer.

#### **'OUTFEED NOT FULLY BACK'**

This fault occurs when the outfeed cylinder does not return to its fully back position and is detected by a switch attached to the side of the outfeed cylinder. If this fault message appears an engineer should investigate the problem before the system is restarted in 'AUTOMATIC MODE'.

#### **'OUTFEED FORWARD FAIL'**

This fault occurs when the outfeed cylinder does not complete the forward half of its cycle. This is detected by a switch attached to the side of the outfeed cylinder and could occur as a result of a 'jam' within the outfeed area or a faulty switch. If this fault message appears an engineer should investigate the problem before the system is restarted in 'AUTOMATIC MODE'.

### **5.3 TRACK DRIVE FAULTS**

#### **'BOOK WRECK AT OPTO 3'**

The message 'BOOK WRECK AT OPTO 3' indicates that a booklet has not been properly advanced onto the combined stitching and binding module by the first pair of fingers of the main track, and that all or some of the cheque book has remained under the Opto 3 photocell. Normally the cause of the fault will be obvious, and the 'wrecked' booklet can easily be removed or re-positioned by hand. In most cases, this fault can be rectified while the machine is in 'AUTOMATIC MODE' without the need to access the 'MANUAL MODE' screen and pushing the 'RUNOUT' button on the screen once will move the offending book one station along the main track so that the automatic process can proceed.

#### **'MOTOR(S) OVERLOAD'**

The message 'MOTOR(S) OVERLOAD' indicates that one of the five single phase motors in the system has been overloaded and the contact breaker for that particular motor has 'cut out'. All five of the breakers can be found on the front of the control rack, behind the perspex door. Each overload switch is marked with the motor it controls, the five motors being the INFEED MOTOR, the MAIN TRACK MOTOR, the STITCHER 1 MOTOR, the STITCHER 2 MOTOR, and the BINDER MOTOR. When an overload occurs the red/black button of the particular contact breaker automatically springs out and cuts the power to the motor. An overload fault is normally caused by overheating due to the motor drawing too much current and usually occurs if the particular drive components have

been damaged or have 'jammed'. The switched 'off' breaker will identify the particular motor and the inner black button can be re-pressed so that the system can be restarted, but if the cause of the overload is not obvious, or re-occurs shortly after restart, then an engineer should investigate the problem.

#### **'MAIN TRACK FORWARD FAIL'**

As with the infeed track, the main track cycles between forward and back switches which may cause a fault through lack of adjustment, wear or damage. 'MAIN TRACK FORWARD FAIL' indicates a fault at the forward switch and will prevent the stitching and binding units from operating. If this fault message appears an engineer should investigate the problem.

#### **'MAIN TRACK NOT BACK'**

The 'MAIN TRACK NOT BACK' message indicates a fault at the rear switch, and prevents main track movement if a cheque book is under the Opto 3 photocell. This in turn halts any folio in the guillotine area. Again this fault should be remedied by an engineer.

#### **'BOOK ROTATION WRECK'**

This fault can only occur when processing 'Top Stub' cheque books and indicates that the book rotation device has not returned to its datum position or that a wreck has occurred beneath Opto 10, the book rotation photocell. The fault could be a faulty switch or a book 'wreck' beneath the rotation clamp cylinder, but in any event should be investigated by an engineer.

### **5.4 STITCHING UNIT FAULTS**

#### **'BOOK WRECK AT OPTO 4' (or OPTO 5)**

The two messages 'BOOK WRECK AT OPTO 4' or 'BOOK WRECK AT OPTO 5' both indicate that a book has 'wrecked' at either stitching unit 1 or stitching unit 2 respectively. Normally this is a simple paper wreck caused by applying the wrong pressure to the hold-down strips or incorrect adjustment of the side guide. When the 'wreck' has been cleared the reset/start procedure may be followed without switching into manual mode.

#### **'STITCH 1 (STITCH2) NOT INSERTED'**

The 'STITCH 1 NOT INSERTED' or 'STITCH 2 NOT INSERTED' fault messages indicate that a stitch has not been inserted into the booklet by either stitching unit 1 or stitching unit 2 depending on the message displayed. The most common causes for this are excessive drag from the wire reel or incorrect adjustment of the wire straightener on the face plate of the Bostitch stitching head. Excessive drag is most likely to occur when a new reel of wire is fitted, since the stitching unit must then 'pull' against the maximum resistance of the weight of wire. Normally, turning the reel about one turn by hand will remedy this problem, but if the fault occurs frequently the pressure spring, which provides resistance to the rotation of the reel,

should be modified or an engineer should investigate the problem. If failure to insert a stitch is due to the wire not being straight then refer to Section 6 in the Complete System Service Manual where full details can be found of the wire straightening adjustment procedure for the Bostitch stitching head.

#### **‘STITCHER 1 (STITCH 2) NOT AT TDC’**

The ‘STITCHER 1 NOT AT TDC’ or ‘STITCHER 2 NOT AT TDC’ fault messages indicate that the top dead centre switch on either stitching unit 1 or stitching unit 2 has not operated at the end of the stitching cycle. These switches protect the system by stopping the machine should either stitching unit ‘jam’ at some point during the stitching cycle. If this fault occurs because of obvious damage to the stitching head or the drive system, then repair must be carried out by an engineer. If the stitching unit appears to be undamaged, the actual switch may be at fault or require adjustment. Because this switch is mounted beneath the stitching unit cover, replacement or adjustment should also be carried out by an engineer.

### **5.5 BINDING & TAPE UNIT FAULTS**

#### **‘BINDER NOT AT TDC’**

The message ‘BINDER NOT AT TDC’ is similar to the incomplete cycle faults associated with each stitching unit. A top dead centre switch indicates that the binding cycle has been completed, but if a fault occurs the machine will stop and adjustment or replacement of the switch or repair to any damage sustained by the binding unit, must be carried out by an engineer before production can continue.

#### **‘NO BINDING TAPE’**

The fault message ‘NO BINDING TAPE’ indicates that the binding tape switch (Opto 11) is uncovered and that all the tape on the existing reel has been used or that the tape is not correctly located between the infeed channels. With reference to Section 3.4.2 a new reel of tape should be fitted. When the new tape has been positioned correctly the machine can be re-started using the reset/start procedure.

#### **‘HEATER 1 (2 OR 3) FAULT’**

The temperature of the three heated irons of the binding unit are monitored by the PLC unit in the main rack. Software settings allow for normal over-temperature fluctuations which will occur during normal operation, but if the temperature of any of the heaters exceeds a preset alarm level the system will stop. Depending which heater is at fault, the fault message ‘HEATER 1 FAULT’, ‘HEATER 2 FAULT’ or ‘HEATER 3 FAULT’ is displayed on the screen. If the problem is caused by the integral thermocouple probe a separate fault message occurs, but if the fault is due to a defective heater then replacement or repair must be carried out by an engineer. It is important to ensure that power to the machine has been switched off during any replacement or repair operations and only when the fault has been successfully resolved should the machine be returned to ‘AUTOMATIC MODE’.

#### **‘BOOK WRECK AT OPTO 6 (OPTO 7 OR OPTO 8)’**

The three messages ‘BOOK WRECK AT OPTO 6’, ‘BOOK WRECK AT OPTO 7’ or ‘BOOK WRECK AT OPTO 8’ indicate that a booklet has ‘wrecked’ at the first, second or third stages of the binding unit. Normally this is a paper wreck due to incorrect pressure applied by the hold-down strips or incorrect adjustment of the side guide and can easily be remedied without leaving the ‘AUTOMATIC MODE’ screen.

#### **‘THERMOCOUPLE 1 (2 OR 3) FAULT’**

The three messages ‘THERMOCOUPLE 1 FAULT’, ‘THERMOCOUPLE 2 FAULT’ or ‘THERMOCOUPLE 3 FAULT’ indicate, depending on the actual message, that one of the integral thermocouple probes attached to each heater is faulty. These probes measure the exact temperature of each heater and are necessary for controlling the heat required to provide a good tape binding finish. Normally this fault can only be rectified by an engineer.