



**MODEL XL-21**

**EYELET BUTTONHOLE MACHINE**

**PARTS AND SERVICE MANUAL**

**MACHINE SERIAL No.**

**PART NUMBER 97. 1800.2.002**

This manual is valid from the machine serial No.: F180291





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*Better Ideas, Better Made*

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## LIMITED WARRANTY ON NEW AMF REECE EQUIPMENT

### Warranty provisions:

A ninety (90) day limited service labor warranty to correct defects in installation, workmanship, or material without charge for labor. This portion of the warranty applies to machines sold as "installed" only.

A one (1) year limited material warranty on major component parts to replace materials with defects. Any new part believed defective must be returned freight prepaid to AMF Reece, Inc. for inspection. If, upon inspection, the part or material is determined to be defective, AMF Reece, Inc. will replace it without charge to the customer for parts or material.

Service labor warranty period shall begin on the completed installation date. Material warranty shall begin on the date the equipment is shipped from AMF Reece, Inc.

### Exclusions:

Excluded from both service labor warranty and material warranty are: (1) Consumable parts which would be normally considered replaceable in day-to-day operations. These include parts such as needles, knives, loopers and spreaders. (2) Normal adjustment and routine maintenance. This is the sole responsibility of the customer. (3) Cleaning and lubrication of equipment. (4) Parts found to be altered, broken or damaged due to neglect or improper installation or application. (5) Damage caused by the use of non-Genuine AMF Reece parts. (6) Shipping or delivery charges.

There is no service labor warranty for machines sold as "uninstalled".

Equipment installed without the assistance of a certified technician (either an AMF Reece Employee, a Certified Contractor, or that of an Authorized Distributor) will have the limited material warranty only. Only the defective material will be covered. Any charges associated with the use of an AMF Reece Technician or that of a Distributor to replace the defective part will be the customer's responsibility.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, AS TO DESCRIPTION, QUALITY, MERCHANTABILITY, and FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER IS GIVEN BY SELLER OR SELLER'S AGENT IN CONNECTION HERewith. UNDER NO CIRCUMSTANCES SHALL SELLER OR SELLER'S AGENT BE LIABLE FOR LOSS OF PROFITS OR ANY OTHER DIRECT OR INDIRECT COSTS, EXPENSES, LOSSES OR DAMAGES ARISING OUT OF DEFECTS IN OR FAILURE OF THE EQUIPMENT OR ANY PART THEREOF.

### WHAT TO DO IF THERE IS A QUESTION REGARDING WARRANTY

If a machine is purchased through an authorized AMF Reece, Inc. distributor, warranty questions should be first directed to that distributor. However, the satisfaction and goodwill of our customers are of primary concern to AMF Reece, Inc. In the event that a warranty matter is not handled to your satisfaction, please contact the appropriate AMF Reece office:

#### Europe/Africa/Americas

Prostejov, Czech Republic  
Phone: (+420) 582-309-275  
Fax: (+420) 582-360-608  
e-mail: service@amfreece.cz

#### Southwest Asia

Istanbul, Turkey  
Phone: (+90) 212-465-0707  
Fax: (+90) 212-465-0711  
e-mail: amfreeceturkey@superonline.com

#### Southeast Asia

Kowloon, Hong Kong  
Phone: (+852) 2787-2273  
Fax: (+852) 2787-5642  
e-mail: amfreece@netvigator.com





# Warranty Registration Card

*(Please Fax or Mail immediately after installation)*

**Note: All Warranty Claims Void, unless Registration Card on file at AMF Reece HQ**

Machine model number:

*(S101, S100, S104, S311, Decostitch, S4000 BH, etc)*

Manufacturer's serial or production number:

## **Installation Site Information:**

Customer's Name:

Customer's Mailing Address:

Customer's Telephone Number:

Supervising Mechanic's or Technician's Name:

Signature of Supervising Technician:

AMF Reece Technician's Name:

AMF Reece Technician's Signature:

Type of garment produced at this location?

Average Daily Production Expected from this machine?

*(number of buttonholes, jackets sewn, pants produced, buttons sewn, etc)*

Any special requirements required at this location?

What other AMF Reece Machines are at this location?

How can we serve you better?

**Tovární 582, 796 25 Prostějov, Czech Republic**

**Fax: +420 582 360 606, e-mail: [service@amfreece.cz](mailto:service@amfreece.cz), website: [www.amfreece.com](http://www.amfreece.com)**



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## INTRODUCTION

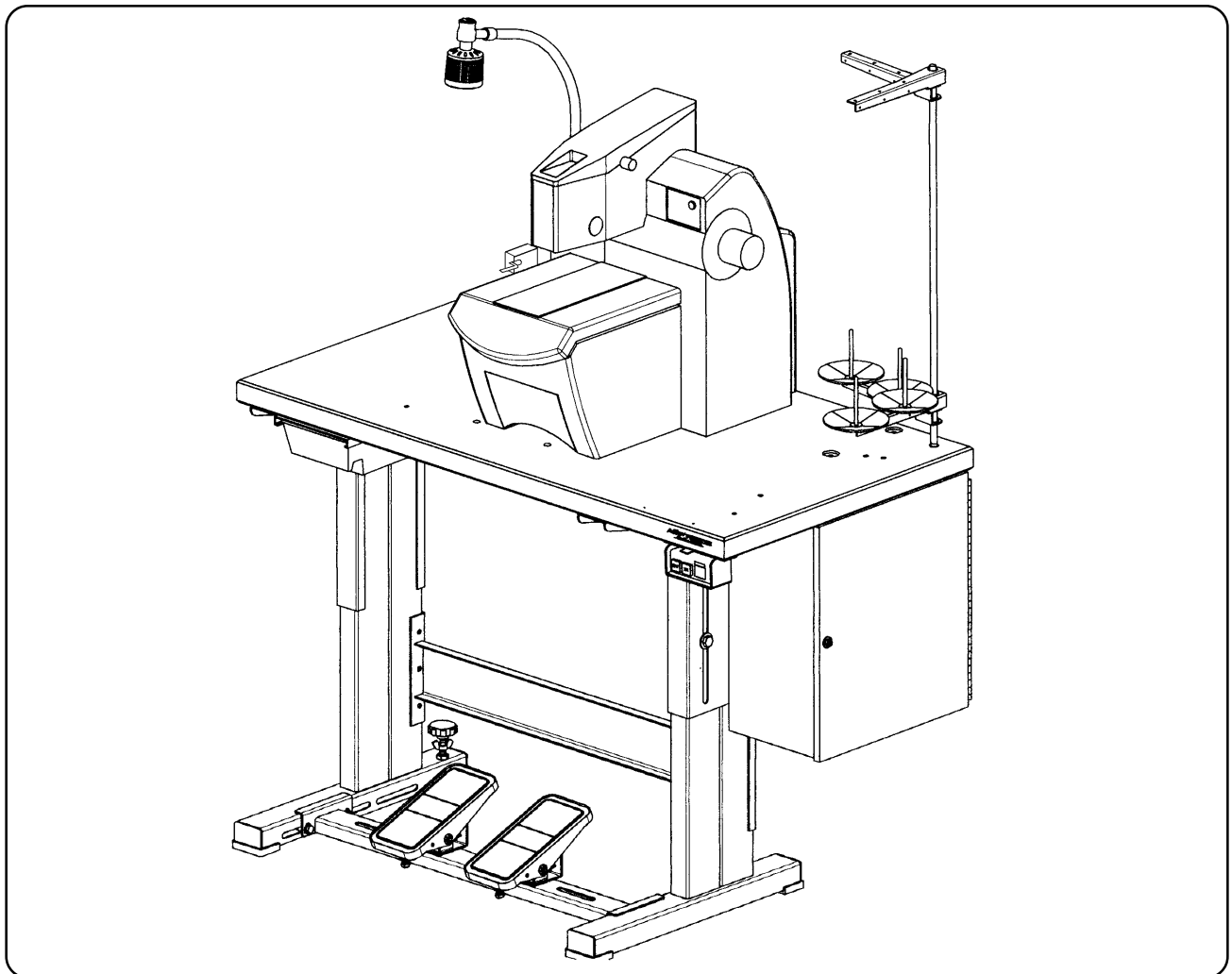
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The XL-21 is the only buttonhole machine which allows alternating from cord trim to adjustable flybar. The Dual DC motor setup independently controls the stitching and feed systems. The electronic stop simplifies operation and enhances machine reliability. The pneumatic cord trimmer mechanism improves consistency and performance. The pneumatic clamping adjusts to ensure equal pressure on both sides of the buttonhole. The Slow Start and the Speed Selector increase buttonhole quality.

The XL-21 eyelet buttonhole machine incorporates a micro computer control system, ensuring a superior quality buttonhole and improved operator performance.

The XL-21 displays an operator control panel with three push-button switches and two LED indicator lights, which along with two treadles, enable the operator to perform every machine function and easily comprehend the information provided by the control system.

The XL-21 eyelet buttonhole machine produces an adjustable flybar buttonhole with a regular eye shape, in lengths from 12 to 32 mm, (1/2 to 1 1/4"), with a stitch bite range between 2 and 4 mm, (5/64 to 5/32"). The cord trim buttonhole lengths range from 16 to 22 mm, (5/8 to 7/8").



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**SPECIFICATIONS**


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|                          |  |
|--------------------------|--|
| Description:             | Eyelet Buttonhole Sewing Machine   |
| Machine Type: adjustment | AF CB/CA RE  |
| adjustment               | Adjustable Flybar, Cut Before/Cut After,<br>Regular Eye  |
|                          | AF CB/CA RE CT   |
|                          | Adjustable Flybar, Cut Before/Cut After,<br>Regular Eye, Adjustable Cord Trim  |
| Maximum Sewing Speed:    | 1,850 Stitches Per Minute  |
| Stitch Type:             | (401) Two Thread Chainstitch   |
| Stitch Density:          | 6 to 16 s/cm, (15 to 40 SPI)   |
| Buttonhole Lengths:      | 12 to 32 mm, (1/2 to 1 1/4")   |
| Eye Shape                | No eye, small, medium, large   |
| Stitch Bite:             | Standard 2 to 4 mm   |
| Thread Trimming:         | Top Thread Only  |
| Adjustable Flybar        | 16, 19, 22 mm - all threads (cord trim adjustment)<br>3 to 7 mm  |
| Needle:                  | 1807 D No. 90 for thin materials<br>No. 100 for coats<br>No. 110 for overcoats<br>No. 120 for jeans and other heavy material |
| Upper and Lower Thread:  | Synthetic 133 tex x 1 x 4<br>Silk 100 tex x 2 x 3<br>Cotton 145 tex x 3  |
| Gimp Thread:             | 600 tex x 3  |
| Thickness of Sewn Work:  | Up to 6 mm, (1/4 in.)  |
| Rear Clamp Foot Height:  | 10 mm, (0.4 in.) when open   |
| Dimensions:              |  |
| Machine Head:            | -Height 500 mm, (20.0")<br>-Length 610 mm, (24.0")<br>-Width 485 mm, (19.0")   |
| Machine Head Weight:     | 64 kg, (141 lbs)   |
| Machine Stand:           | -Height 740 mm, (29.0")<br>-Length 1,100 mm, (43.5")<br>-Width 600 mm, (23.5")   |
| Machine Stand Weight:    | 80 kg, ( 176 lbs)  |

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## SPECIFICATIONS

---

Dimensions:

|                                 |         |                     |
|---------------------------------|---------|---------------------|
| Sewing Head and Table Crated    | -Height | 1,448 mm, (56 1/2") |
|                                 | -Length | 1,168 mm, (44 5/8") |
|                                 | -Width  | 762 mm, (28 9/16")  |
| Shipping Weight: Head and Table |         | 190 kg, (418 lbs.)  |

Lubrication: Semiautomatic wick system

Compressed Air: Trunk main  
5.6 bar, (80 PSI)  
0.25 cfm, (7 l/m)

Pneumatics: In the air distribution behind the air regulator in the machine,  
0.45 to 0.56 MPa, (4.5 to 5.6 bar, 65 to 80 PSI)

Motor: Two AC motors MQ54, 550W

Electrical Requirements: 220 to 240V 1 Phase 50/60 Hz

**Note:** If a customer uses thread size 100 and less, the manufacturer recommends to use left looper part number 17.0069.4.019.

## SAFETY

---

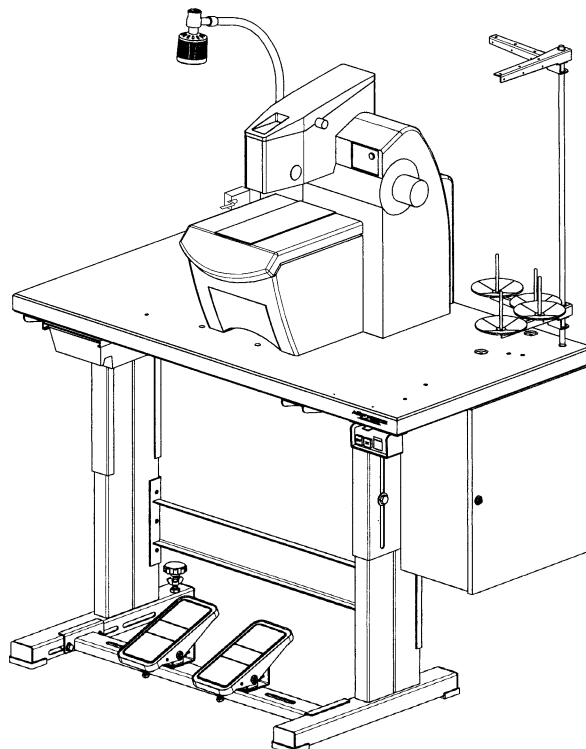
### SAFETY

The XL-21 eyelet buttonhole machine is carefully designed and manufactured to our high quality standards. Special attention is focused on the convenience of operation and effective hazard protection for operating and service personnel.

**WARNING!** Any piece of equipment may become dangerous to personnel when improperly operated or poorly maintained. It is very important all personnel expected to operate or maintain this equipment be familiar with the information contained in the parts and service manual.

It is recommended that AMF Reece service personnel supervise the installation and initial training of your mechanics and operators.

The most effective employee hazard protection is a rigidly enforced safety program which includes effective training in safe operating methods. Supplementary hazard protection, including guards and covers, are useful when attached in the correct manner and properly maintained. Operators and service staff are required to wear safety glasses.




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**SAFETY**

**SAFETY LABELS**

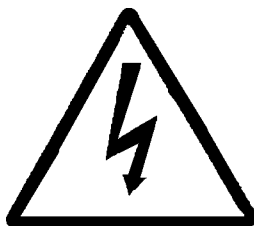


Ground

|   |                      |                       |                              |
|---|----------------------|-----------------------|------------------------------|
|  |                      | <b>AMF REECE</b>      |                              |
|   |                      | <b>XL - 21.</b>       |                              |
| YEAR OF PRODUCTION  | <input type="text"/> | No.                   | <input type="text"/>         |
| VOLTAGE   | <input type="text"/> | V                     | Hz                           |
| POWER OUTPUT  | <input type="text"/> | kW                    | CURRENT <input type="text"/> |
| <b>AMF REECE a.s.</b>   |                      | <b>CZECH REPUBLIC</b> |                              |



Hazard area, work with caution



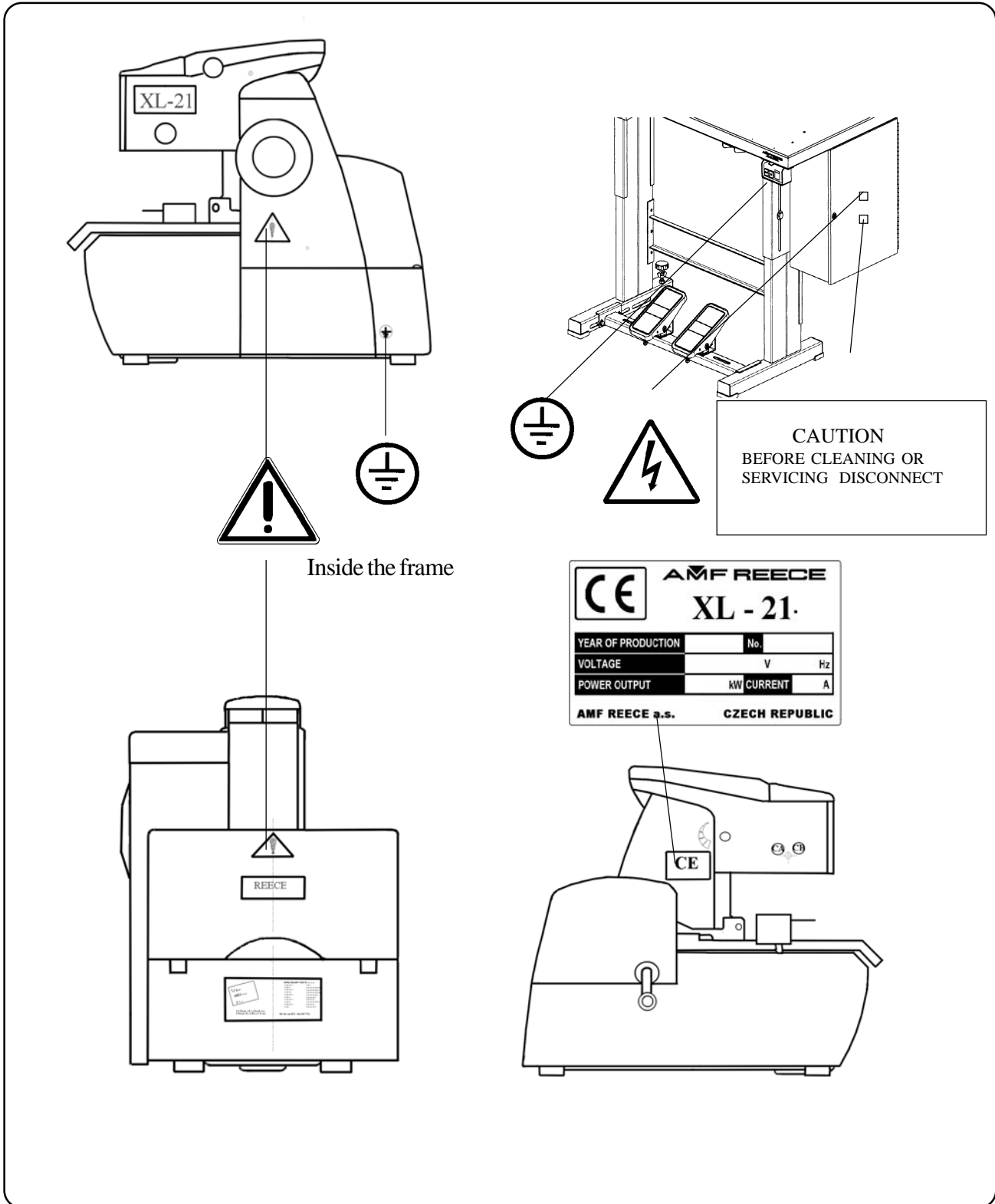
Possible shock.

**WARNING**

BEFORE CLEANING OR  
 SERVICING DISCONNECT  
 POWER SUPPLIES

**SAFETY**

**LABEL LOCATION**



## INSTALLATION

**Caution!** Remove all lubrication from the polished machine surfaces and areas where the bottom and gimp threads may contact the machine surface.

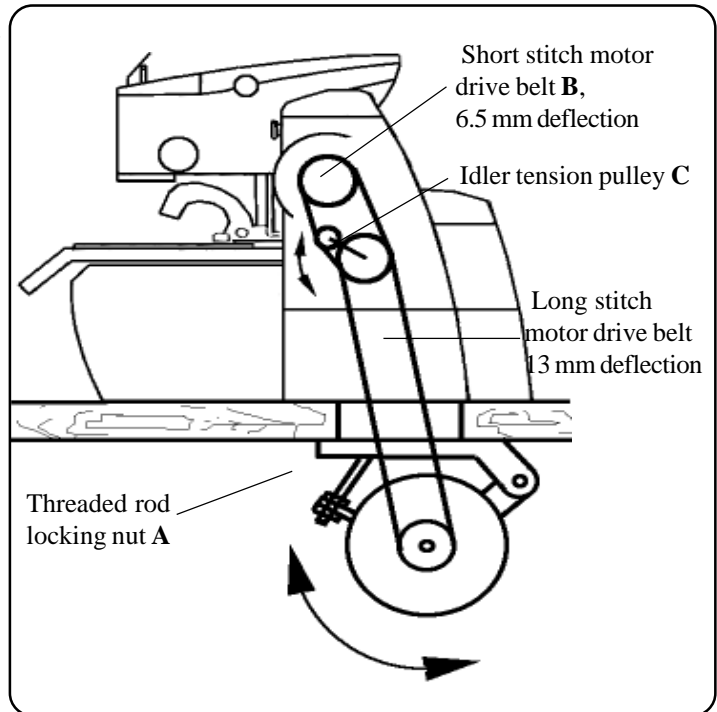
### STITCH DRIVE BELT TENSION

Loosen the threaded rod locking nuts.

Position the motor up or down the threaded rod to obtain a maximum of 13 mm, (1/2") belt deflection in the long stitch motor drive belt.

Using the stitch drive belt idler tension pulley C, adjust the small belt B.

Tighten the threaded rod locking nuts.

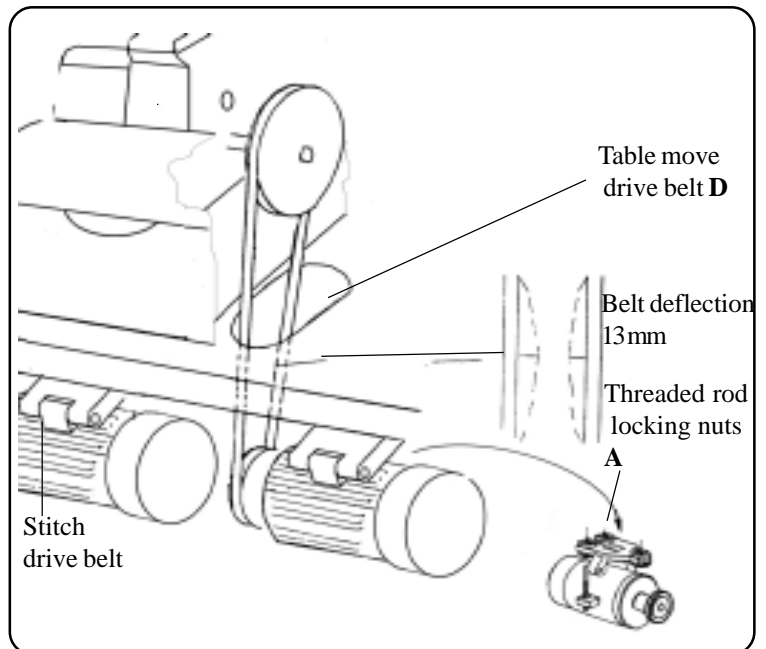


### TABLE MOVE DRIVE BELT TENSION

Loosen the threaded rod locking nuts A.

Position the motor up or down the threaded rod to obtain a maximum of 13 mm, (1/2") belt deflection D.

Tighten the locking nuts A.



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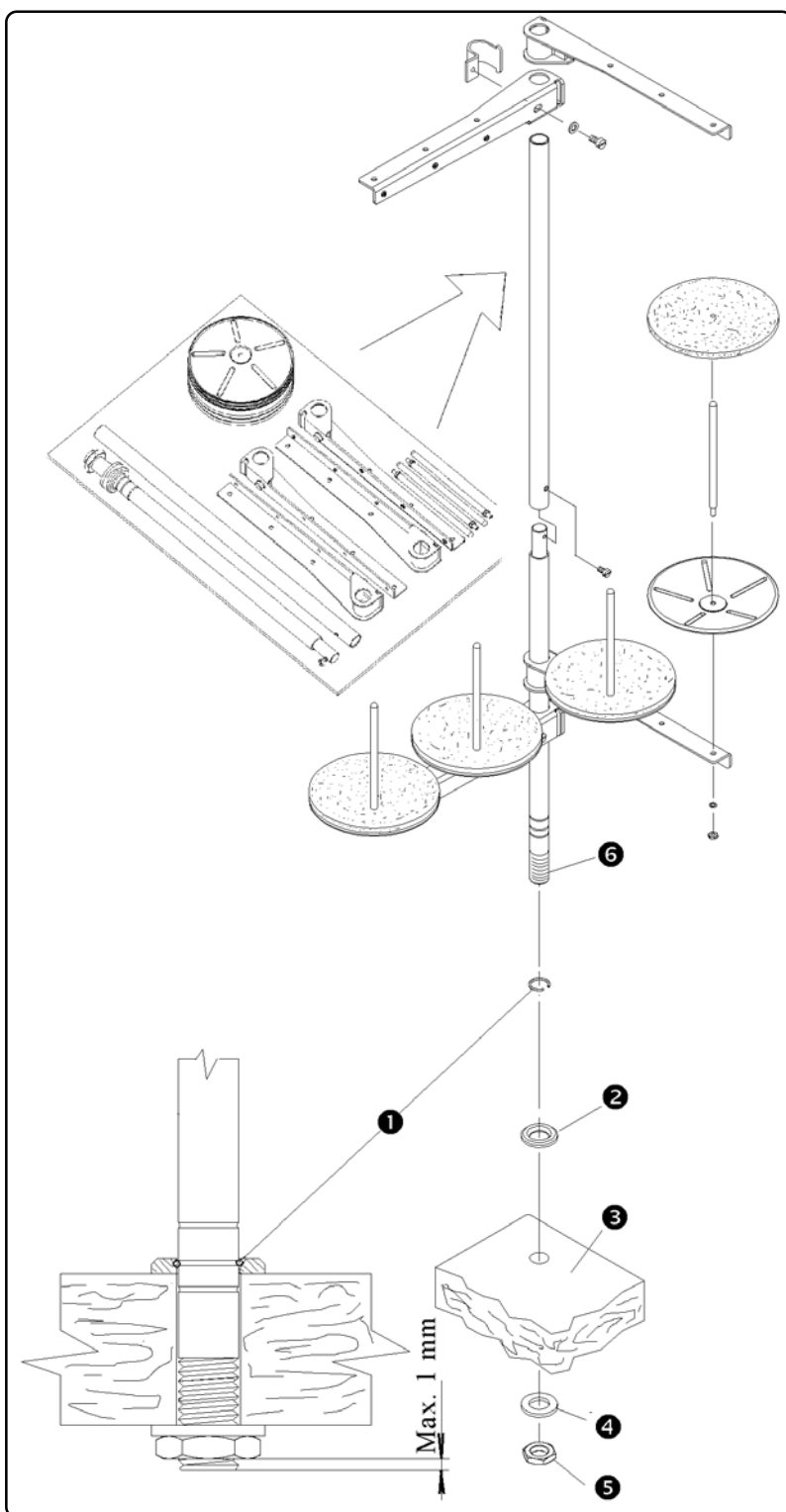
e-mail: [service@amfreece.cz](mailto:service@amfreece.cz); [parts@amfreece.cz](mailto:parts@amfreece.cz); website: [www.amfreece.com](http://www.amfreece.com)

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## INSTALLATION

### THREAD STAND

1. Put the thread stand together according to the drawing.
2. Position of the locking ring **1** allows assembly of the thread stand for various thickness of the bedplate. Threading end of the rod **6** can not overlap the nut **5** more than 1 mm (0,039“).
3. After adjustment of the locking ring **1**, insert the washer **2** by recess to the locking ring and insert the rod to the right rear hole in the bedplate **3** Tighten the nut, under which is washer **4**.



### PREPARATION TO SEW

- Observe all safety requirements and ensure all covers are installed.
- Check for the proper operation of each machine control switch.
- Ensure the sewing head is properly lubricated.
- Check for correct needle installation, size, condition, and ensure proper thread tension and type.
- Perform a final check for correct sewing performance and operation of all machine components.
- Ensure the display indicates the machine is in the correct home position.

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**LUBRICATION**

**Prior to Start-Up**

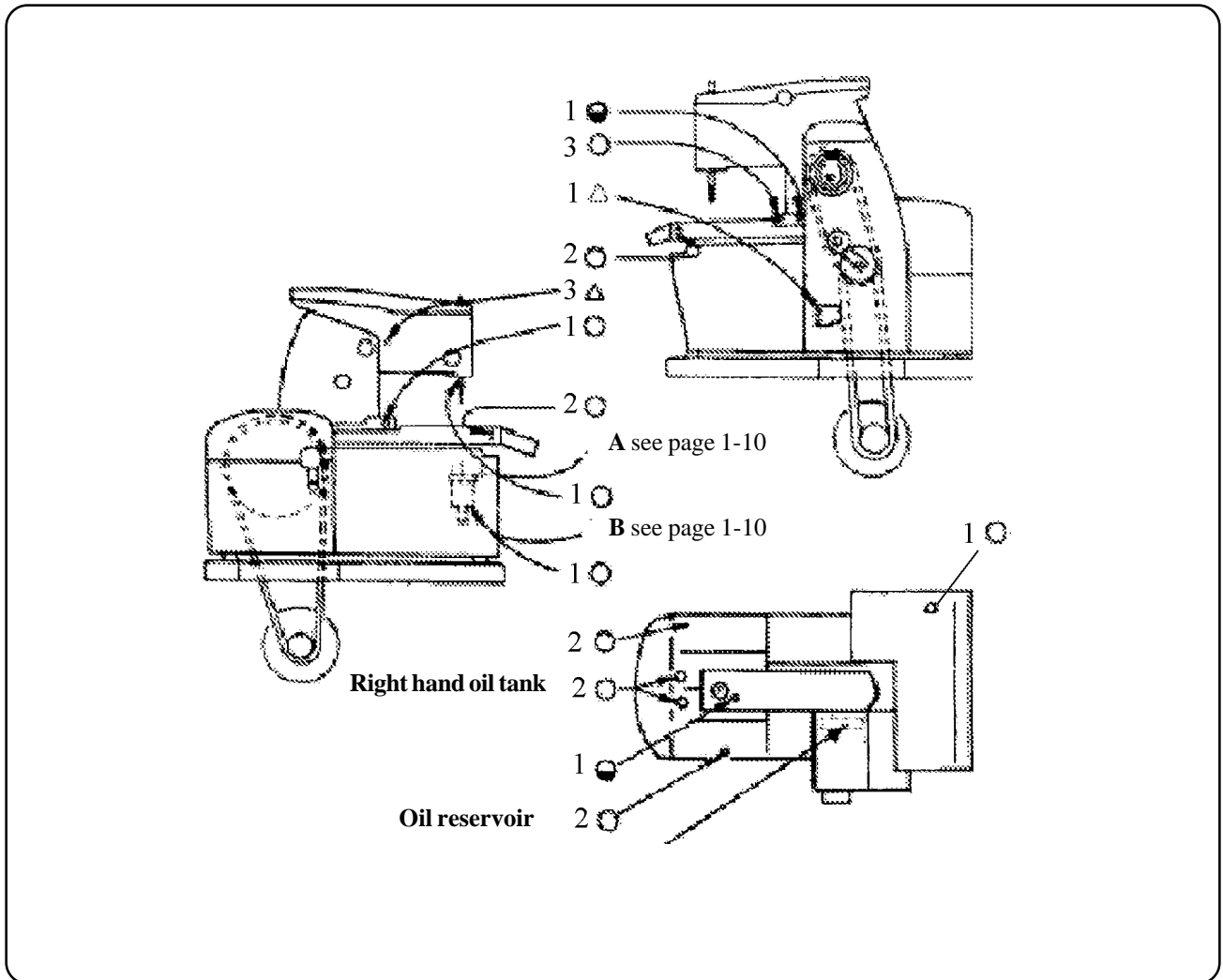
Ensure the areas illustrated are properly lubricated.

The correct amount of oil required for the oil tank, on the right-hand side of the machine, must not exceed the red mark level indicator, located in the center of the gauge. Too much oil added, may leak around the needle bar.

The correct amount of oil required for the oil reservoir, located inside the right cover, is 5 mm.

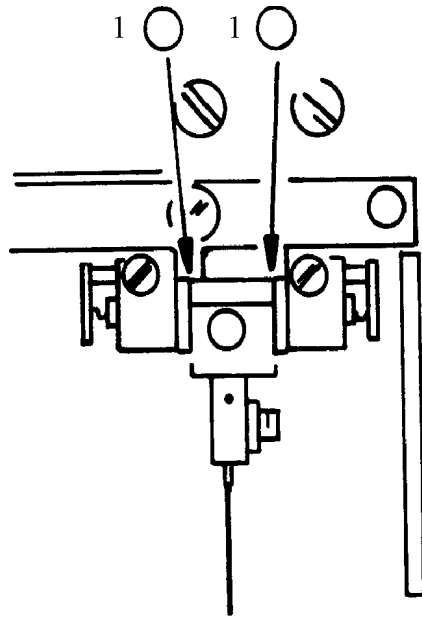
Too much oil may leak.

Using a scrap piece of fabric, cycle the machine 20 times to eliminate any excess oil.



**LUBRICATION**

**Schedule**



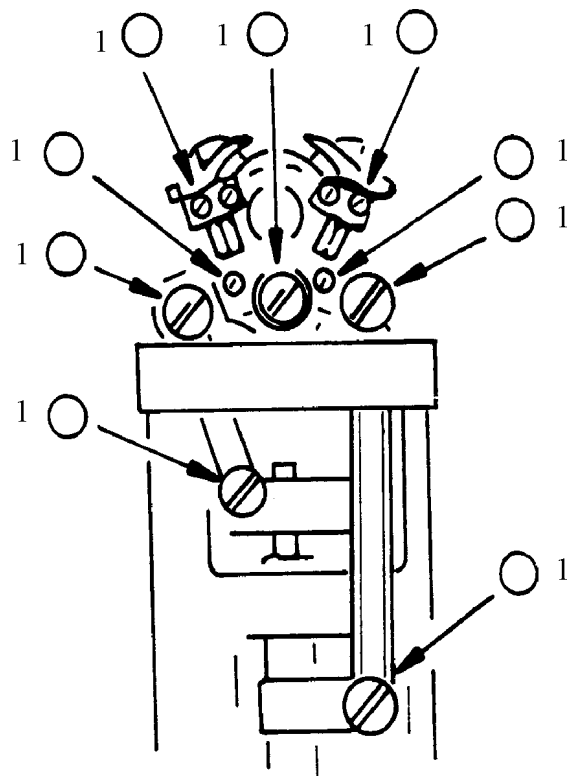
**A Vibrator Assembly**

Lubrication schedule for pages 9 & 10

- Number 1 = Once a week
- Number 2 = Once a month
- Number 3 = Every 6 months

**Symbols**

- Oil
- Oil tank
- △ Lubricating grease



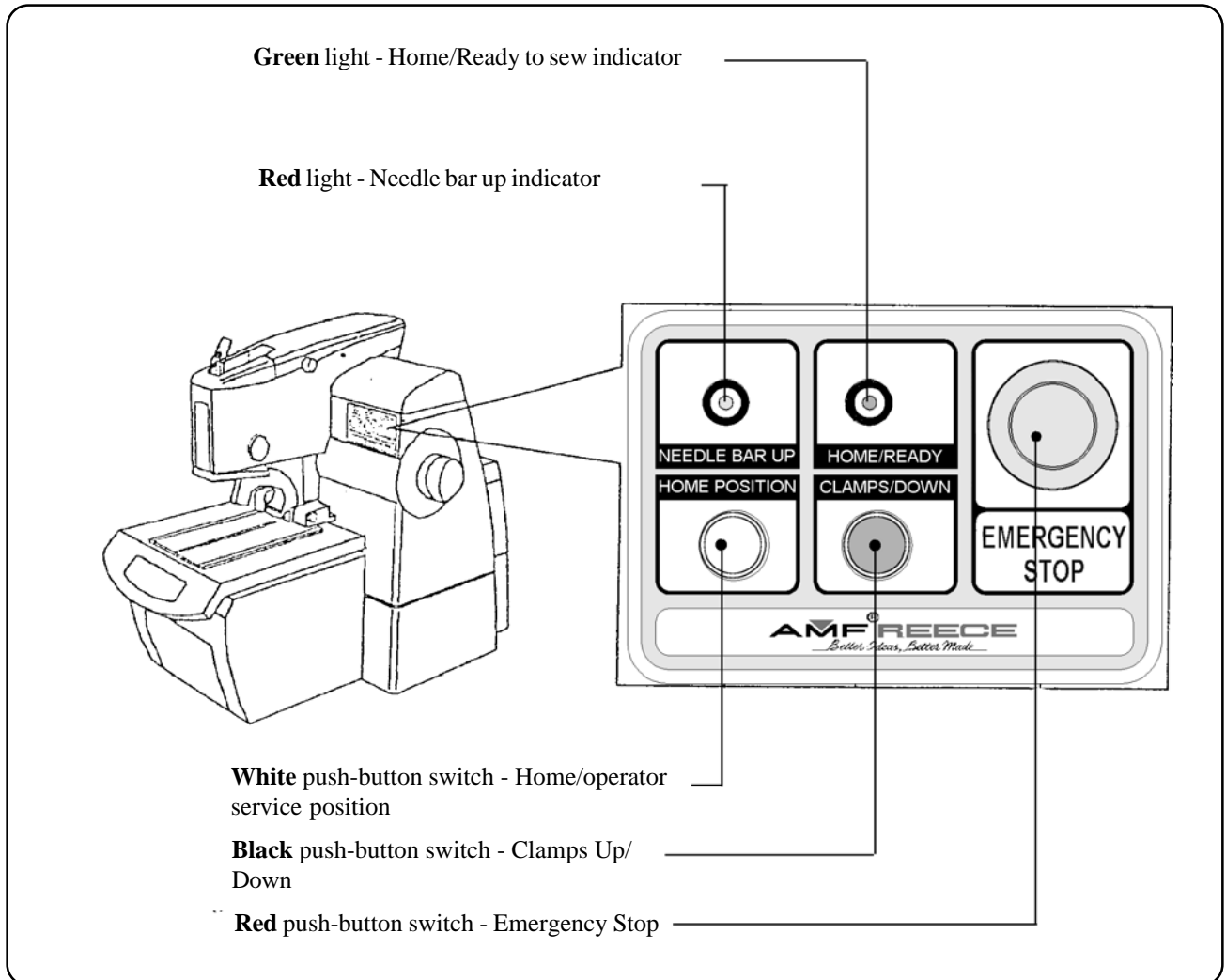
**B Race**

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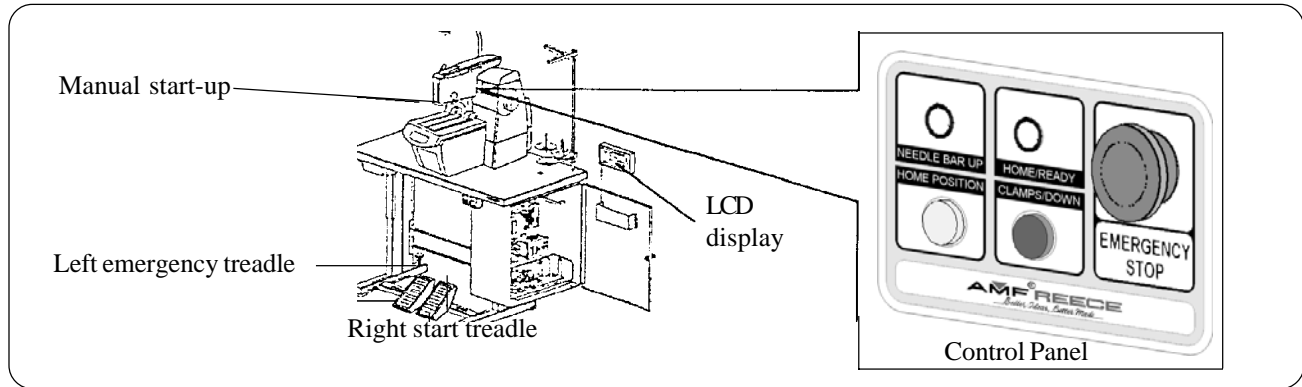
**START-UP AND OPERATION - ELECTRICAL**

**OPERATOR CONTROL PANEL**



## START-UP AND OPERATION ELECTRICAL

The AMF Reece XL-21 is equipped with a micro computer control system designed to improve performance and drastically reduce the maintenance required to operate an eyelet buttonhole machine. Three switches, two treadles, and two indicator lights make it easy to control every function and understand the information provided by the system.

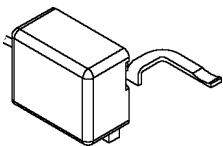


### TREADLE FUNCTIONS

The right start treadle incorporates two different modes of operation. The first mode controls lowering and lifting the clamps, the second mode starts the sewing cycle. The start treadle has 2 stages. Lightly toed down to the first stage, the clamps are lowered, if the treadle is released to the home position, the clamps are risen. Toed all the way down, the material is automatically clamped and the sewing cycle begins.

The left Emergency treadle, when toed all the way down, does not release the clamps after finishing the sewing cycle. Before sewing the next buttonhole release the emergency treadle, or damage may occur to the needle/sewing mechanism.

### Manual start-up



It compensates for the right pedal. The manual switch "Start" has two functions. The first function starts and lifts the clamp feet and the second starts sewing. The Start switch has two positions. If the switch lever is pressed to the first position, the clamp feet are lowered. If the switch lever is returned to the home position, the clamp feet return to the upper position. If the lever is pressed maximum down, the material is clamped and the sewing starts. *Manual start-up is supplied as a special accessories on a special order.*

**Note:** Either pedal or manual switch can be connected. Changing the manual start-up for the pedal start-up - see page 1-96.

### OPERATOR PUSH-BUTTON SWITCHES

#### Home/Operator Service Position Switch



When pressed, the white Home Switch, located on the operator control panel, moves the machine table back to the home position and eliminates accidental machine starting during threading, a needle change, and clamp plate installation. When pressed in the home position, the machine travels to the operator service position and stops, pressed a second time, the machine will travel to the home position. The machine will not operate until the white push-button is engaged the second time.

#### Clamp Switch



When pressed, the black Clamp Switch, located on the operator control panel, manually raises and lowers the clamps holding the material. A toggle switch, pressing it once lowers the clamps, pressing again raises the clamps.

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**START-UP AND OPERATION - ELECTRICAL**

**Emergency Stop Switch**



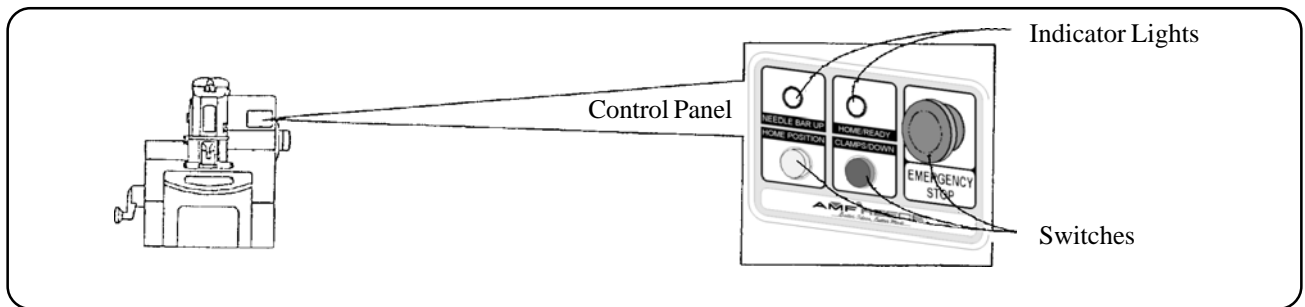
The Emergency Stop, located on the right-hand side of the operator control panel, immediately stops the machine during the sewing cycle and prevents accidental starting of the machine during servicing.

Emergency Stop is a 2 stage switch. The first time the switch is pressed, the stop is engaged, the second time pressed, the stop is released.

**Emergency Stop: First Stage**

Pressing the emergency stop switch once, engages the stop and activates both indicator lights, causing the red light to flash twice and then the green light to flash twice. The lights alternate flashing until the emergency stop push-button is pressed again.

**WARNING!** Before threading the needle, looper and gimp threads, or installing the clamp plates, with the machine in the home position, press the emergency stop switch to avoid accidental starting of the machine and possible operator injury. If the machine is not in the home position, engage the operator service position switch.



**Emergency Stop: Second Stage**

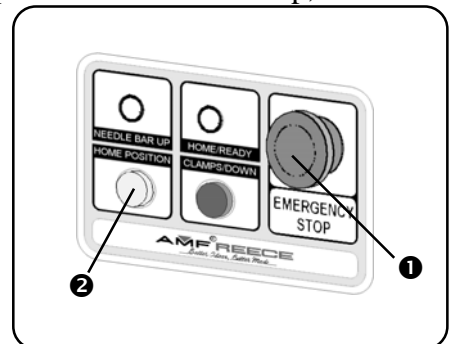
Pressing the emergency stop switch the second time releases the stop, causing the red and green indicator lights to flash once, alternating until the home push-button is pressed and held for at least one second. Pressing the home push-button, resets the control system to the operating mode.

**EXITING EMERGENCY STOP WITH THE MACHINE IN THE HOME POSITION**

If the emergency stop switch is pressed, with the machine in the home position and the needle up, for normal threading of the needle or looper:

Press the emergency stop switch **1** a second time.

Press and hold the home switch **2** until the indicator lights stop flashing. The machine is ready to sew.



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**START-UP AND OPERATION - ELECTRICAL**

**EXITING THE EMERGENCY STOP DURING THE SEWING CYCLE**

**Note:** Material may be removed from the machine by manually rotating the handwheel until the needle is in the up position.



Press the clamp push-button to raise the clamps.  
The material may be removed.



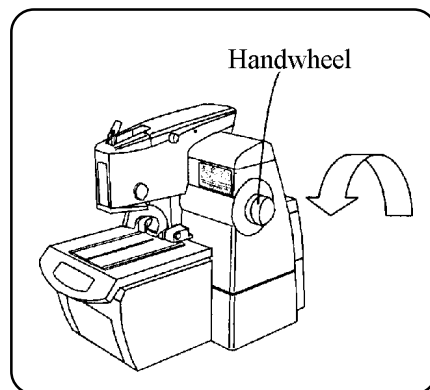
If the emergency stop was pressed, while the machine was sewing, press the emergency stop switch again to disengage the emergency stop condition.



Press and hold the home switch for one full second, to stop the flashing of the indicator lights.



If the needle up (red) indicator light is not activated, manually rotate the handwheel slowly counterclockwise, until the light activates.



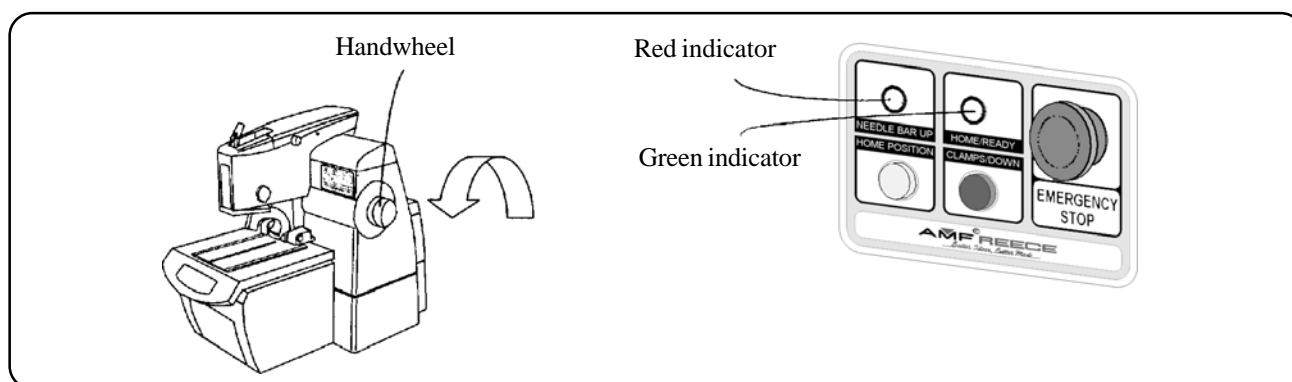
Press the home switch again. Press the white push-button to return the machine to the home position.

## START -UP AND OPERATION - ELECTRICAL

### INDICATOR LIGHTS

The red Needle Up light, located on the control panel, indicates the needle bar is in the correct up position.

**Note:** The machine will not operate unless the needle bar is in the up position. If the light is not activated, manually rotate the handwheel slowly counterclockwise, until it activates. The machine is now ready to sew.





The green Home/Ready to Sew light, located on the control panel, indicates the machine is in the home position and ready for normal sewing.

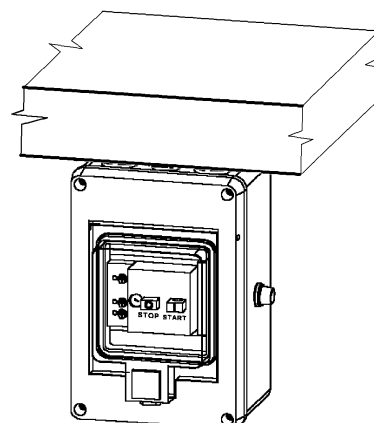
**Note:** If both the red and green lights are flashing at the same time, a system error has occurred, call a technician to reset the machine.

### START/STOP SWITCHES

The Start and Stop switches, located beneath the tabletop on the right-hand side, regulate the main electrical power to the XL-21.

Press the  black switch to engage the power.

Press the  red switch to disengage the power.



**WARNING!** Ensure the main power is off when threading the machine, the looper, and the gimp.

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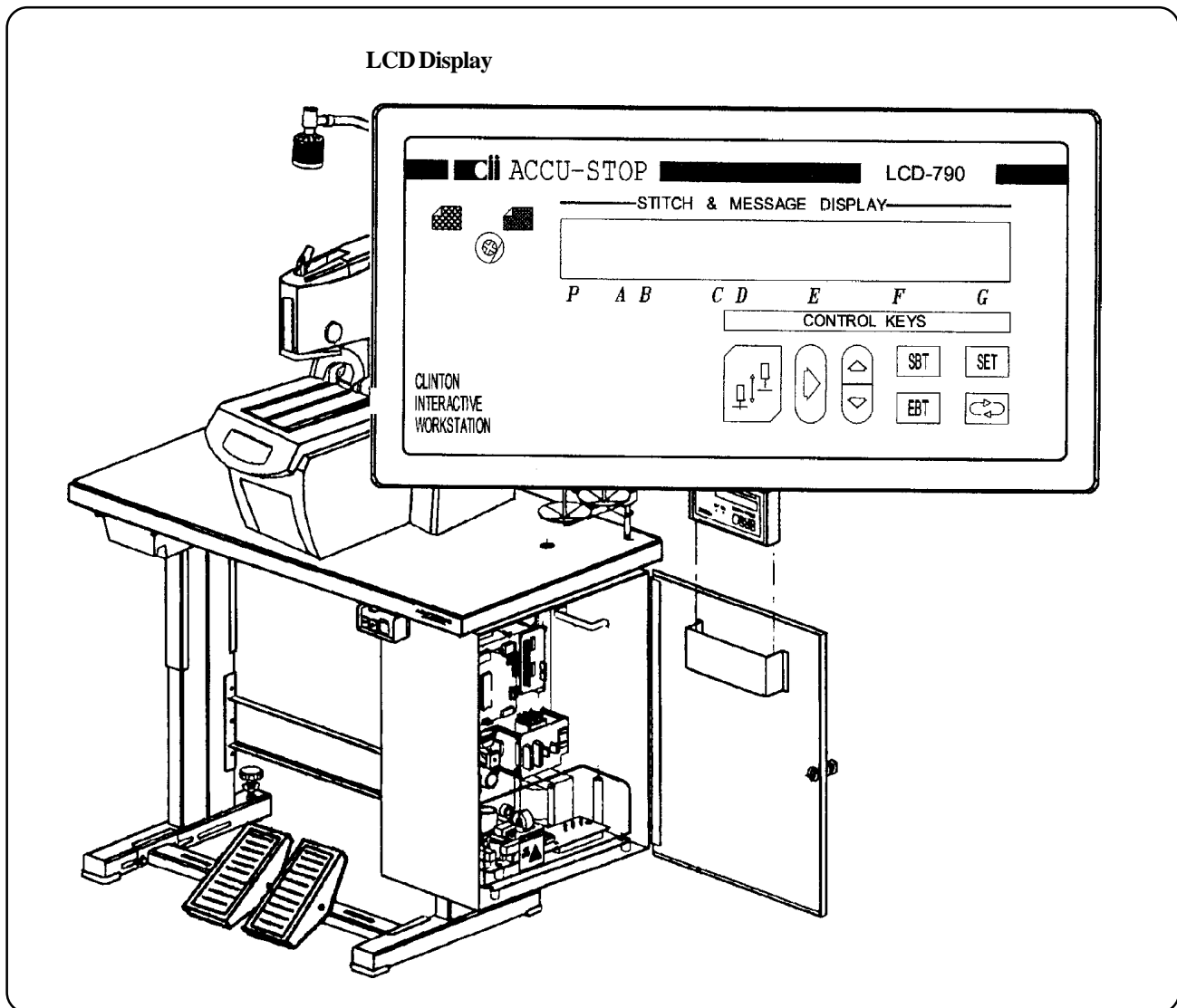
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## LCD DISPLAY PROGRAMMING

### LCD LOCATION

**WARNING!** Use extreme caution when working around the electrical control box.

The LCD display box is located in a pocket on the back side of the door which protects the electrical panel assembly. To access the display box, open the door and remove the display box from the door pocket. Complete the programming and return the display box to the door pocket and close the door.




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## LCD DISPLAY PROGRAMMING

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### KEYPAD FUNCTIONS

Round Arrow - Press  to activate the parameter display.

Right Arrow - Press  to change/return to the operating mode to access any program.

The four LCD modes of operation include:

Full Cycle  
Single Step  
Move Table Only  
Repair Cycle



SET - Press  to access the sub-parameters and automatically return to the last parameter changed.



EBT - Press  to display the cycle count.

Home - Press  to return to the home position.

Up Arrow - Press  to increase the parameter settings.

Down Arrow - Press  to decrease the parameter settings.

**Note:** The   Up/Down Arrow, in any of the four modes of operation, allows raising and lowering the clamps.

Up Arrow  and the  - Pressed at the same time, activate the shears to check for the correct amount of crossover.

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## LCD DISPLAY PROGRAMMING

---

### EMERGENCY STOP

Pressing the emergency stop switch causes the display message to read “REL-EMERGENCY STOP” (release emergency stop). To exit, press and release the red push-button on the operator control panel, the display now reads, “EMERGENCY STOP” press and hold the



home push-button or the

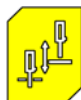


white push-button for at least one second.

**WARNING!** The extended hold time is a safety device, ensuring the emergency stop mode can not be exited accidentally.

The display now reads “cont. or go home”. Options:

- 1) Move the table to the home position.
- 2) Continue the program where stopped.



Press the home push-button or the



white push-button to move the table to the home position.

or

Toe the start treadle to continue the program where stopped.

**Note:** The table motor will not start unless the needle is in the up position. The display reads “NOT NEEDLE UP” and disappears when the machine is manually rotated to the needle up position. There is only one true needle up position for every two needle bar strokes.



**LCD DISPLAY PROGRAMMING**

**PARAMETER CHECKLIST** (Use the blank spaces to record installation settings for future reference)

| PARAMETER                   | RANGE            | SETTING | DEFAULT |
|-----------------------------|------------------|---------|---------|
| <b>SPEEDS</b>               |                  |         |         |
| SLOW STRT                   | 400-1600 S.P. M. | _____   | 800     |
| EYE SPD                     | 400-1600 S.P. M. | _____   | 800     |
| <b>TIMERS</b>               |                  |         |         |
| STRT DEL                    | 30-300 ms        | _____   | 40      |
| TRIM ON                     | 30-250 ms        | _____   | 150     |
| <b>COUNTERS</b>             |                  |         |         |
| SLOW STRT                   | 1-5 Stitches     | _____   | 2       |
| EYE STRT                    | 1-15 Stitches    | _____   | 1       |
| SLOW EYE                    | 5-20 Stitches    | _____   | 10      |
| SLOW END                    | 0-5 Stitches     | _____   | 0       |
| ENDCOUNT                    | 1-15 Stitches    | _____   | 2       |
| <b>TOGGLE SWITCHES</b>      |                  |         |         |
| SLOW EYE                    | ON/OFF           | _____   | OFF     |
| SLOW STRT                   | ON/OFF           | _____   | OFF     |
| SLOW TBL                    | ON/OFF           | _____   | OFF     |
| CUTTING                     | BEFORE/AFTER     | _____   | AFTER   |
| TOGG CMP                    | ON/OFF           | _____   | OFF     |
| STRT MODE                   | 1 STEP/2 STEP    | _____   | 1 STEP  |
| AIR SENSOR                  | ON/OFF           | _____   | OFF     |
| <b>HIDDEN PARAMETERS</b>    |                  |         |         |
| <b>****SPEEDS</b>           |                  |         |         |
| POSITION                    | 200-700 S.P.M.   | _____   | 600     |
| SEW SPEED                   | 600-1840 S.P.M.  | _____   | 1840    |
| TABLE SPD                   | 300-1200 S.P.M.  | _____   | 1000    |
| <b>****MISCEL</b>           |                  |         |         |
| CLMP DTY                    | 30 to 80%        | _____   | 40%     |
| CLAMP DL                    | 1-45 ms          | _____   | 38 ms   |
| TRIM DEL                    | 1-45 ms          | _____   | 36 ms   |
| NDL POS                     | 0-40             | _____   | 4       |
| LANGUAGE                    | ENGLISH/SPANISH  | _____   | ENGLISH |
| REL TIME                    | 20-250 ms        | _____   | 50 ms   |
| <b>**** TOGGLE SWITCHES</b> |                  |         |         |
| EM-STOP                     | CLOSED/OPEN      | _____   | CLOSED  |

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## LCD DISPLAY PROGRAMMING

### MODES OF OPERATION

The LCD display may be operated in three different modes:

Operating Mode  
 Programming Mode  
 Test Mode

This mode includes:

“Full Cycle”  
 “Step Move”  
 “Move Table Only”  
 “Repair Cycle”



When the display is set to Full Cycle, the machine is ready to automatically sew a complete buttonhole. Toe the start treadle to begin the sewing cycle and the table motor will move the table from the home position to the sew position.

**Note:** Sewing speed may be adjusted up to 1,850 spm.

In the sew position, the table motor stops, the sew motor starts, and the following options may be selected:

- 1) Slow start
- 2) Slow end

To overlap the last stitch with the first stitch, use the adjustable stitch counter.

The table motor starts again and moves the table back to the home position. While moving to home, the hole is punched. Once the hole is punched, the clamps may be raised before the table reaches the home position.

The Single Step mode provides the option of stepping through each operation for easy adjustments and maintenance. To access:

Toe the Start treadle and the table moves to the sew position.

Toe the Start treadle again to sew the buttonhole.

Toe the Start treadle a third time and the table moves back to the home position, after punching the hole and lifting the clamps.

The Move Table Only mode, primarily for adjusting the buttonhole puncher, moves the table only from home to home position.

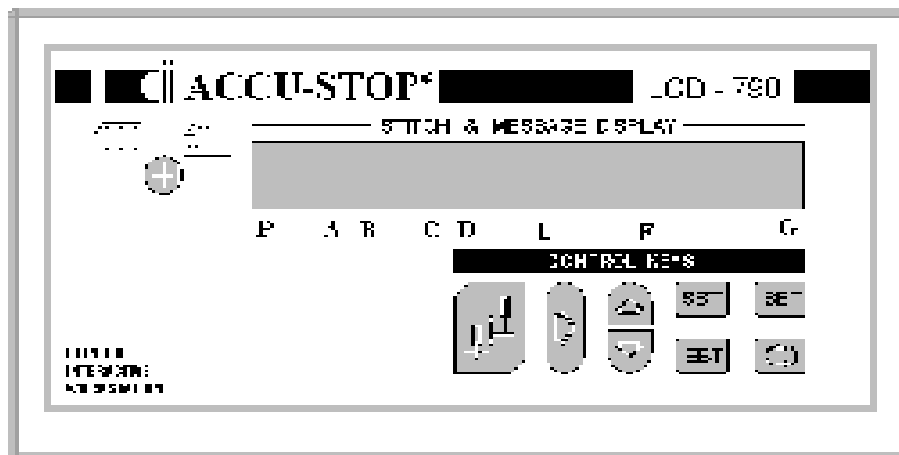
## LCD DISPLAY PROGRAMMING

### REPAIR CYCLE

Toe and fully release the Start treadle. The table moves to the sew position and stops. Slowly toe the Start treadle to the first stage, until the clamps lower into the normal operating mode. The table moves very slowly through the cycle. Release the treadle and the machine stops. Toe the treadle fully down and the machine begins sewing and completes the cycle.


### PROGRAMMING MODE


There are two ways to change from the Operating mode to the Programming mode to vary the parameters.



Press the  Round arrow push-button to access the first category, Speeds.  
Continue pressing to step through all of the categories.

or

Press the  push-button to access the last changed parameter.

After changing parameters, press the  push-button to return to the operating mode.

### AIR PRESSURE

Recommended air pressure is 4.5 to 5.6 bar, (65 to 80 PSI, 0.45 to 0.56 MPa).

**Caution!** Operating the XL-21 without the proper air pressure may cause serious machine damage.  
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## LCD DISPLAY PROGRAMMING

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### EXPLANATION OF PARAMETERS

Parameters with direct access:

#### **SPEEDS** (spm, Stitches Per Minute)

**SLOW STRT** - Allows sewing the first stitches at the beginning and the last stitches at the end of the buttonhole in a slower speed. To vary the number of stitches, see the parameter group **Counters**. To enable or disable this function, see the parameter group **Toggle Switches**, set by the software.

|                  |                  |
|------------------|------------------|
| Ranges:          | 400 to 1,600 spm |
| Steps:           | 10 spm           |
| Default Setting: | 800 spm          |

**EYE SPD** - The slow eye function determines the number of stitches/speed, the eye will be sewn. Not presently available. To enable or disable, select the parameter group Toggle Switches. To vary the number of stitches, select the parameter group Counters.

|                  |                  |
|------------------|------------------|
| Ranges:          | 400 to 1,600 spm |
| Steps:           | 10 spm           |
| Default Setting: | 800 spm          |

#### **TIMERS** (ms, Milliseconds)

**STRT DEL** (Start Delay) - Delays the start (motor) after toeing the Start treadle fully down with the clamps in the **Up** position, allows the clamps time to lower and hold the material before the machine starts sewing. If the clamp is **Down**, this time delay will have no affect.

|                  |              |
|------------------|--------------|
| Range:           | 30 to 300 ms |
| Steps:           | 10 ms        |
| Default Setting: | 40 ms        |

**TRIM ON** (Pneumatic shears only) - Establishes the amount of time the shears solenoid is energized.

|                  |              |
|------------------|--------------|
| Range:           | 30 to 300 ms |
| Steps:           | 10 ms        |
| Default Setting: | 150 ms       |

**Note:** When the range selected is 260 ms, the trim on function will not activate.

## LCD DISPLAY PROGRAMMING

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### COUNTERS

**SLOWSTRT** (Soft or Slow Start) - The number of stitches sewn with limited speed, after starting the sewing mode.

Range: 1 to 5 stitches  
Steps: 1 stitch  
Default Setting: 2 stitches

**EYE STRT** (Eye Start) - The Slow Eye sensor is stationary, no mechanical adjustments are available. The number of stitches selected, determines the beginning of the slow eye. Increasing the number makes the slow eye start later.

Range: 1 to 15 stitches  
Steps: 1 stitch  
Default Setting: 1 stitch

**SLOW END** - The number of end stitches sew in the slow speed mode.

Range: 0 to 15 stitches  
Steps: 1 stitch  
Default Setting: 0 stitches

**ENDCOUNT** - The number of stitches sewn after sensing the last stitch.

Range: 1 to 15 stitches  
Steps: 1 stitch  
Default Setting: 2 stitches

**Caution!** To keep the knives from breaking the needle, the minimum setting for cord trimming is 3 stitches.

---

**LCD DISPLAY PROGRAMMING**

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**TOGGLE SWITCHES** - Set by the software.

**SLOWSTRT** (Slow Start) - Switches the Slow Start mode on or off.

Default Setting: Off

**SLOW TBL** (Slow Table) -

**Note:** This parameter is ONLY used in the three sensor version.

On: The first edge of the sew sensor slows the table to half speed.

Off: The table goes full speed to stop.

Default Setting: Off

**CUTTING** - This function sets the system for Cut Before or Cut After stitching.

Default Setting: After

**TOGG CMP** (Toggle Clamp) - On, causes the clamps to remain in the Down position even if the Start switch is released, the clamps remain down until the Start switch is depressed a second time. Off, the clamp will feather with the Start switch.

Default Setting: Off

**STRT MODE** (Toggle Switches) - For the "Full Cycle" mode only.

1 Step: First stage of the Start switch automatically starts the sewing cycle.

2 Step: First stage of the Start switch operates the clamps, the second stage starts the new cycle.

Default Setting: 1 Step

**NO AIR PRESSURE** (Air Pressure Sensor) - When insufficient air pressure is detected, the red indicator light on the pressure gauge activates. To avoid machine damage, the machine will not operate, until a minimum 4.2 bar, (60 PSI) air pressure is detected.



Default Setting: Off

## LCD DISPLAY PROGRAMMING

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### HIDDEN PARAMETERS

Switch off the main machine electrical power.

Press and hold the  and  push-buttons at the same time.

Switch on the main machine electrical power.

Release the push-buttons. The display indicates stars (\*\*\*\*\*) which are counting down to zero.

Press the **SBT** push-button before the stars disappear.

Select the desired parameter as usual. The hidden parameters have stars in front of the group name.

Normal parameters: SPEEDS,      Hidden parameter: \*\*\*\*SPEEDS

**Note:** Access to the Hidden parameters is disabled after the power is switched off.

#### \*\*\*\*SPEEDS

**POSITION** (Trim and Positioning Speeds) - Determines the trimming or positioning speeds, both are the same.

|                  |                |
|------------------|----------------|
| Range:           | 200 to 700 spm |
| Steps:           | 100 spm        |
| Default Setting: | 600 spm        |

**SEWSPEED** (Sew Speed) - Determines the speed the buttonhole is sewn.

|                  |                 |
|------------------|-----------------|
| Range:           | 600 to 1840 spm |
| Steps:           | 10 spm          |
| Default Setting: | 1840 spm        |

**TABLESPD** (Table Speed) - Determines the speed the table moves.

|                  |                 |
|------------------|-----------------|
| Range:           | 300 to 1200 rpm |
| Steps:           | 10 rpm          |
| Default Setting: | 1000 rpm        |

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## LCD DISPLAY PROGRAMMING

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### \*\*\*MISCEL (Miscellaneous Hidden Parameters)

**CLMP DTY** (Clamp Duty Cycle) - Based on the percentage of current applied to keep the solenoid energized, the duty cycle must be set to the minimum value required, when the solenoid is energized.

**Caution!** Set too high, the solenoid may turn hot and the de-energized time will be too long. Set too low, the solenoid vibrates (creating noise) and the clamps may drop.

|                  |            |
|------------------|------------|
| Range:           | 30% to 80% |
| Steps:           | 1          |
| Default Setting: | 40%        |

**CLMP DL** (Clamp Delay) - The set time the clamps release. When the number is decreased, the clamps lift quicker. If the number selected, is too low, the clamps lift before trimming. When sewing thicker fabrics, the selected time must be reduced, (example: jeans 29 ms), otherwise the thread trim knife will cut the fabric.

**Note:** The lower the number, the quicker the clamps will lift.

|                  |            |
|------------------|------------|
| Range:           | 1 to 45 ms |
| Steps:           | 1          |
| Default Setting: | 38 ms      |

**TRIM DEL** (Trim Delay) - Determines when the cutter activates.

1-14 ms: trims before the cut, (this scale if not always functional)

15-33 ms: shears are contacting the knife

34-41 ms: trims after the cut

**Note:** This parameter is important to the delay time.

|                  |            |
|------------------|------------|
| Range:           | 1 to 45 ms |
| Steps:           | 1          |
| Default Setting: | 36 ms      |



## LCD DISPLAY PROGRAMMING

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### \*\*\*\*MISCEL (Miscellaneous Hidden Parameters)

**NDL POS** (Needle Position) - The amount of power applied to the motor (in the reverse mode) during stopping for accurate needle positioning. If the braking current number is too low, the machine may overshoot, if too high, the machine may bounce back.

**Note:** The higher the number, the stronger the brake force.

|                  |         |
|------------------|---------|
| Range:           | 0 to 40 |
| Steps:           | 1       |
| Default Setting: | 4       |

**Caution!** If the table overshoots the “HOME POSITION” (and the display reads “not home”), do not try to correct the problem by adjusting the “NEEDLE POS” parameter. (The parameter does not affect the table motor because of the one-way bearing in the table pulley). Adjust the HOME SENSOR, lower the TABLE SPEED, or choose the SLOW TABLE function, page 1-24.

**LANGUAGE** - The languages available are English and Spanish.

Default Setting: English

**REL TIME** (Relay Time) - delays the start of the table motor after the sew head has been positioned to compensate for the delay of the relay. If the time delay is too short, the relay may arc (spark) and the needle may move out of position, if the start pulse for the table motor goes to the sew motor.

|                  |           |
|------------------|-----------|
| Range:           | 20-250 ms |
| Steps:           | 1         |
| Default Setting: | 50 ms     |

### \*\*\*\*TOGGLE SWITCHES

**EM/STOP** (Emergency Stop) - Controls the program according to the switch wiring connections.

Normally Open - when the push-button is pressed, the switching contact (C-NO) is connected.

Normally Closed - when the push-button is pressed, the switch off contact (C-NC] is disconnected.

Default Setting: Normally Closed

## LCD DISPLAY PROGRAMMING

### TESTING PROGRAMS

A program is available to test the major input functions, synchronizer, and encoder for correct operation. To access the test program:

Press the  and **SBT** push-buttons.

#### Input tests

When the message SYSTEM TEST is displayed, the following may be tested:

- Needle position
- Start pedal
- Home and sew sensors

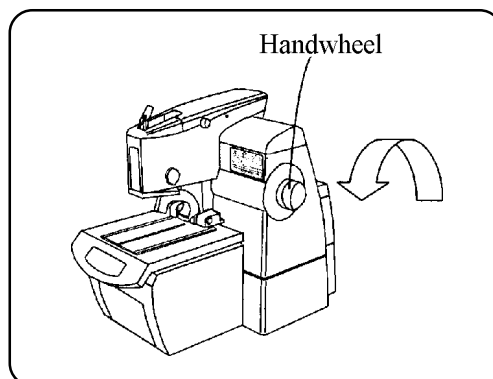
With the machine in the home position, the display reads “1-HOMESENSOR”, indicating the processor is receiving a signal from the home sensor and the table is in the home position.

**Note:** Any other message indicates a home sensor malfunction.

**Note:** Only one function may be displayed, if two signals are being received the signal with the highest priority will be displayed.

The order of priorities:

- 1- Home Sensor
- 2- Sew Sensor
- 3- Last Stitch
- 4- Clamp Down
- 5- Start
- 6- Needle Up
- 7- Air Pressure
- 8- Reset/Home
- 9- Emerg. Stop
- 10- Togg. Clamp



#### Home and Sew Sensor Testing

Manually rotating the machine through a cycle, changes the display and indicates which signal is being received.

**Example:** Starting the machine in the home position, the display indicates -1- “HOMESENSOR”. When the handwheel is rotated away from the home position, the display indicates -6- “NEEDLE UP”. If the machine is not in the Needle Up position and no other signals are received, the display indicates “TEST INPUTS”.

Continue rotating the handwheel and the display will indicate -1- “HOMESENSOR” as the machine reaches the punch position plateau of the home sensor block.

Continue rotating the handwheel until the Sew sensor reaches the first stitch plateau of the Sew sensor block. The display indicates “2-SEW SENSOR”.

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## LCD DISPLAY PROGRAMMING

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### Testing the Clamp Down Switch and the Start Treadle

Use the handwheel to rotate the machine manually until the display message reads “6-NEEDLE UP” or “TEST INPUTS”.

Lightly toe the Start treadle to the first position, until the message reads “4-CLAMP DOWN”.

Fully toe the START treadle. The message will read “5-START”.

### Testing the buttons of the control panel

Push the white button “Home position” - on the display appears -8- RESET/HOME.

Push the black button, on the display appears -10- Togg.Clamp.

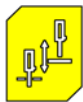
Push the red button Emergency Stop, on the display appears -9- Emerg. Stop.

### Output tests

Push , on the display appears “OUTPUT TESTS”.

Now, it is possible to test pneumatic valves, relay and LEDs on the control panel.

Overview of functions:



-1- CLAMP



-2- THR.D.TRIM 1



-3- THR.D.TRIM 2



-4- RELAY



-5- BET.PLT. HOME

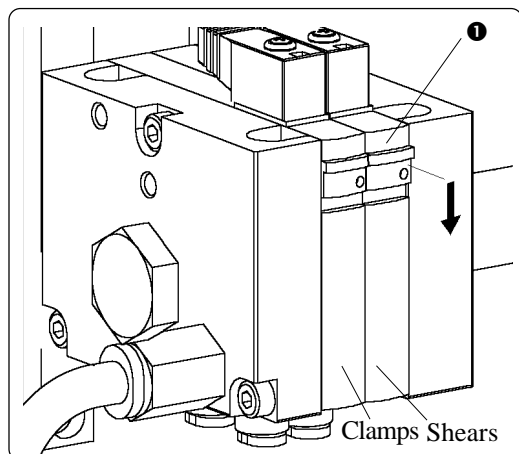



-6- NEEDLE UP

When you push the LCD button on the control panel, orange LED lights on the pneumatic valve, which is placed on the read side of the electrical box.

## LCD DISPLAY PROGRAMMING

### Output tests - tests by means of switches on the valves



When the main power switch is switched on and the machine does not sew, the left LED “Clamp” lights. If you shift the shifter to the down position, the necessary cylinder is activated. This function is the same, when you push  button.

**Note:** During the testing, the LED can not light. If the left LED lights, it is necessary to push black button “Clamp”, the position of the clamps is changed.

**WARNING!** If you want to start the machine, both switches must be in the upper position, otherwise the machine could be damaged.

### Test relay

Push , on the display appears “ONLY W/ADAPTER”.

**Note:** Relay is placed inside of the electrical box, please be careful.

Push SET, on the display appears “RELAY FAILED!!!”

**Note:** Push SET and listen the sound of the relay. If you do not listen any sound, the relay is not functional - change the relay.

### Motor tests


**Caution!** It is necessary to remove the V-belts before you start testing the motors.

Push , on the display appears “TEST TABLE MOTOR”.

Lightly push right pedal START to the first position. Motor start to rotate with lowered power supply (there is no check of the speed)

When you release the pedal START, on the display appears ENCODER “800 pls”. Any other number indicates machine error and such a machine can not be used for sewing, until the error is removed.

Push the pedal START and motor rotates by controlled speed 100 rpm and on the display appears “CONTRLD.100RPM.” .


Push , on the display appears “TEST SEW MOTOR”

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## LCD DISPLAY PROGRAMMING

### Test “Sew Motor”

**Note:** If you want to move from the “Operating Mode” to the regime Motor Tests, push  **SBT**


together and 3 times .




Process for this test is the same as previous motor test.

Push  for re-entry to the programming regime.

### RESET PARAMETER RENEWAL

Caution! Annul the program in memory, which is set from producer.

Switch off the main power switch .

Push ,  and  together.

When all three buttons are pushed, switch on the main power switch.

Display will change from **“PUSH SET”** to **“FOR SET”**.

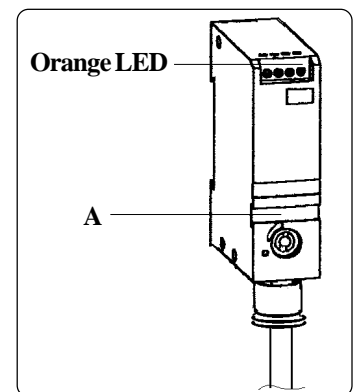
Push and hold the button **SET** during 10 cycles. On the display appears **“PROGRAMMING”**.

**Note:** If the button **SET** is not pushed during 10 cycles, program moves to the main menu without **“MASTER RESET”**.

### PRESSURE SWITCH ADJUSTMENT

**Note:** The pressure switch is placed in the electrical box on the right side of the box.

1. Bring the machine to the home position, on the display appears **“FULL CYCLE, 2 STEPS”**
2. Adjust the air pressure 0.45 MPa (4.5 bar, 65 PSI) on the pressure reducing valve.
3. Turn the screw **A** to the stop anti-clockwise.
4. Keep turning the screw **A** of the pressure switch anti-clockwise, until the orange LED lights on the pressure switch.
5. Adjust the pressure reducing valve to the original value 0.56 MPa, (5.6 bar, 80 PSI).



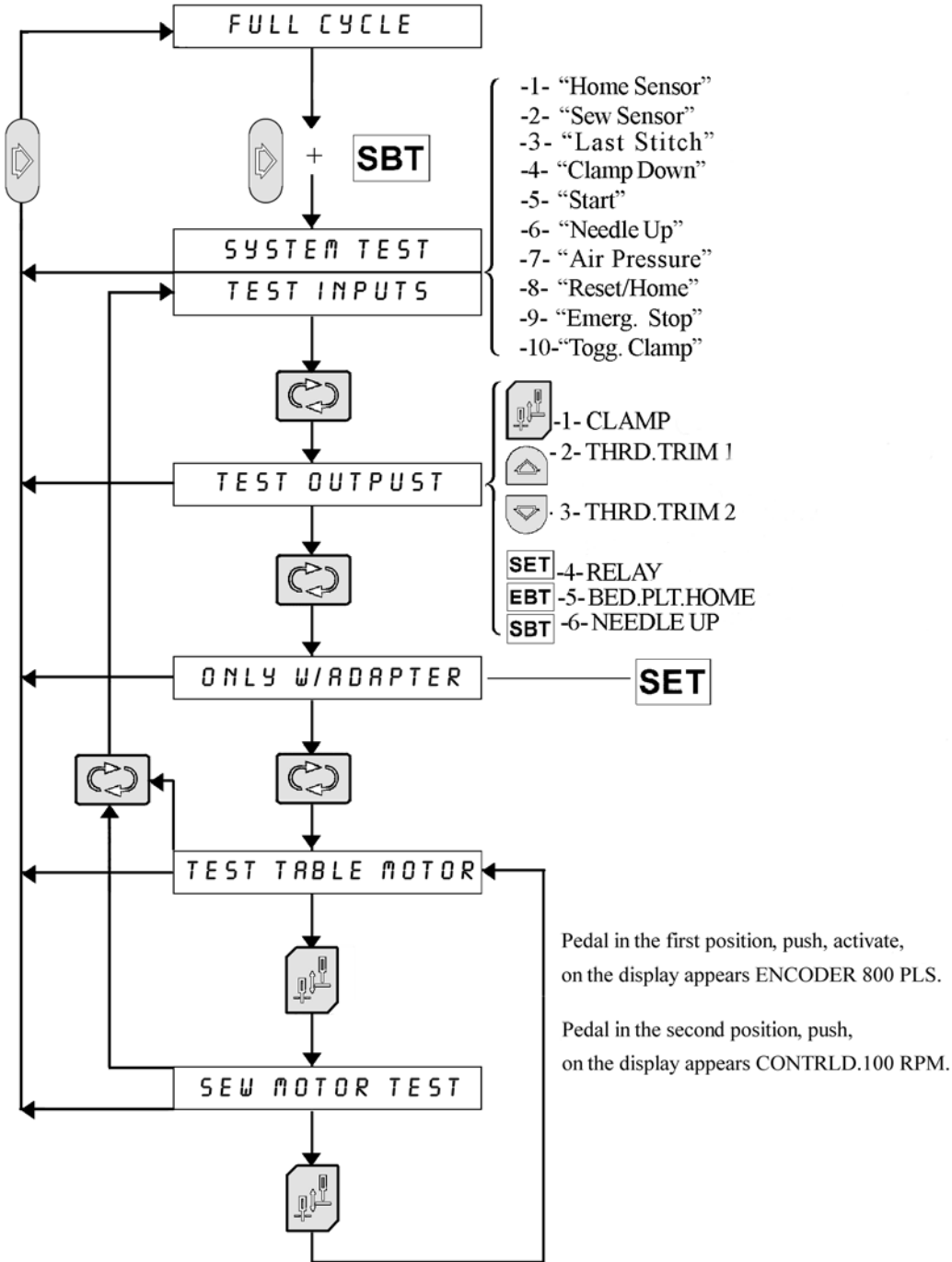
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**LCD DISPLAY PROGRAMMING**

**SCHEME OF THE TESTING REGIME**



## START-UP AND OPERATION - MECHANICAL

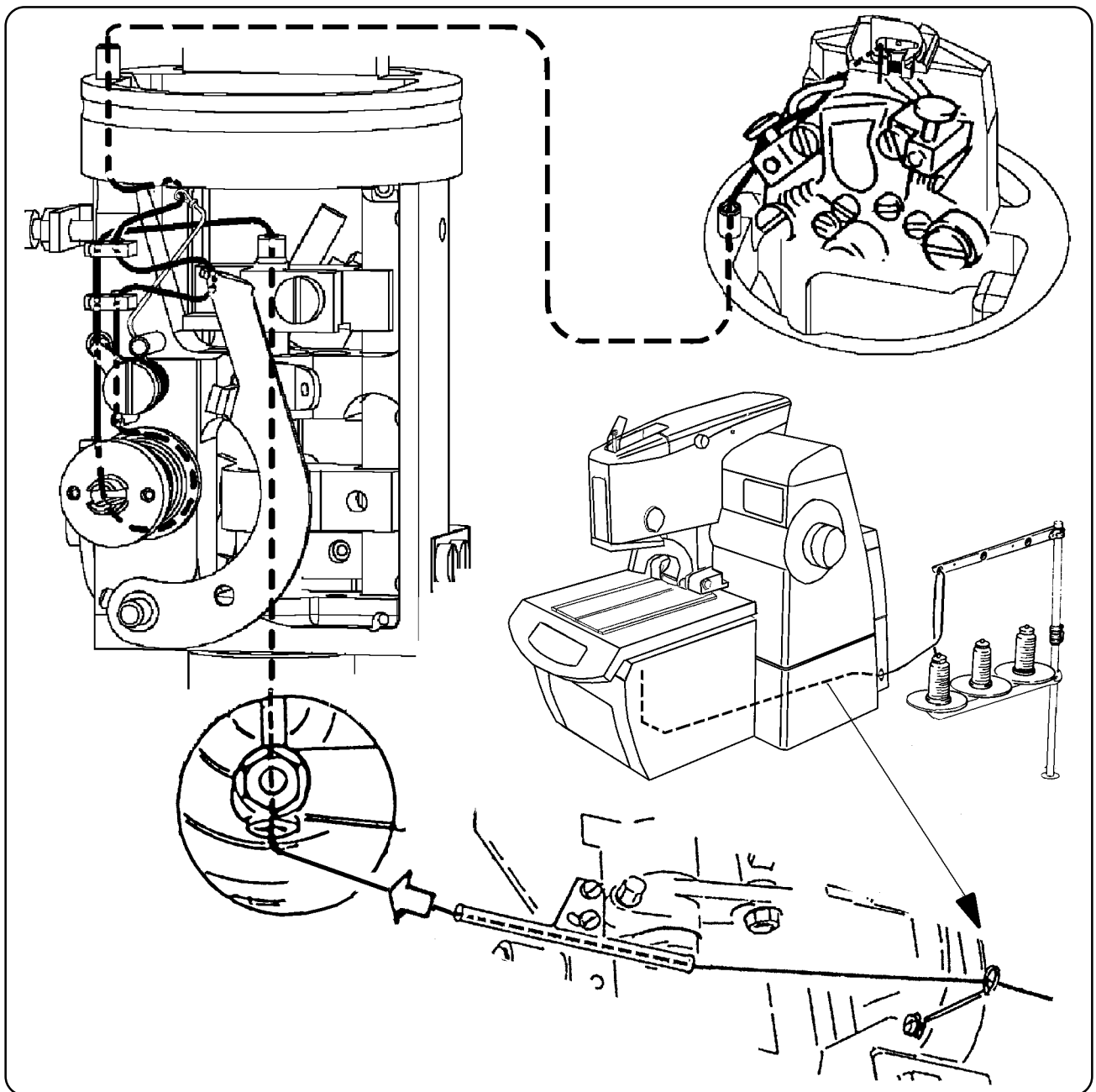
### THREADING THE BOTTOM THREAD

**WARNING!** Disconnect the air supply and dissipate any stored energy. Switch off the main machine power.

Using the left-hand crank, rotate the machine through a cycle until the race is facing the rear of the machine, as illustrated.

Using the threading wire, part number 17.0027.1.223, thread the machine.

**Caution!** Using different bottom thread from the manufacturer specifications, may cause damage to the bar tack during trimming.



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**START-UP AND OPERATION - MECHANICAL**
**BOTTOM THREAD TENSION MECHANISM**

**WARNING!** Disconnect the air supply and dissipate any stored energy. Switch off the main machine power.

Manually rotate the machine until the last stitch has been sewn and the needle thread is in the trim position, with the needle bar fully raised.

Align the tension mechanism, to position the tip of the stop **A** with the pawl **B**, when fully raised. Adjust the stop lever **D**, when the cord trim is activated, to the upper position, so that the stop lever arm **C** has a clearance 0.5 mm (0.097" for mechanism AF) and 0.5 - 2.5 mm (0.0197 - 0.0984" for mechanism CT) during the tilting to the extreme position. Adjust the correct thread draw-off by the stop arm lever screw **C**.

Using the spring lever locking screws **G**, adjust the spring lever **F** to the stop arm lever **C** clearance to 0.3 mm, (0.012").

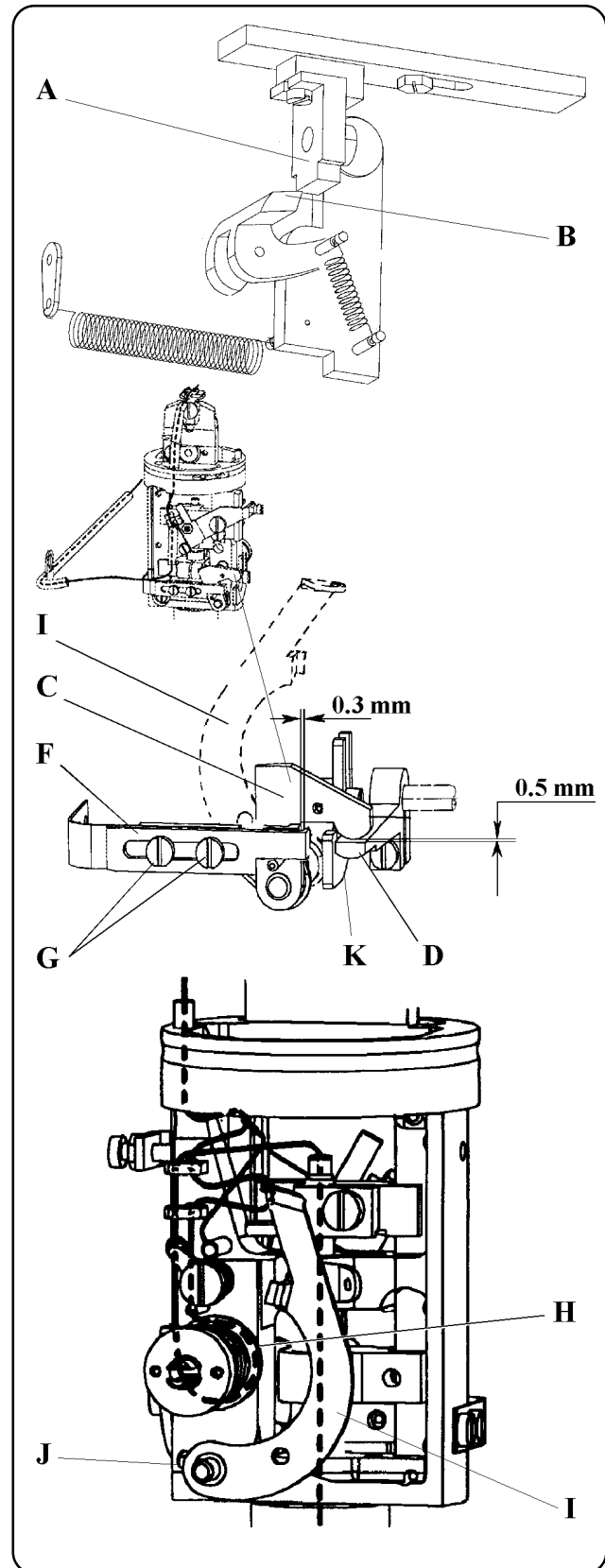
**Bottom Thread Tension**

**WARNING!** Disconnect the air supply and dissipate any stored energy. Switch off the main machine power.

At this position the tension disk **H** must be opened. Loosen the lever locking screw **J**. Swing out the lever **I** to the right and tighten the lever locking screw **J**.

Adjust the needle bar to the lowest position, the lever **I** will release and the stop **K** will rest against the stop arm lever **C**.

The bottom thread tension is controlled by swinging out the lever **I**. When the bottom thread tension changes, the stop arm lever **C** and stop **K** must be adjusted.



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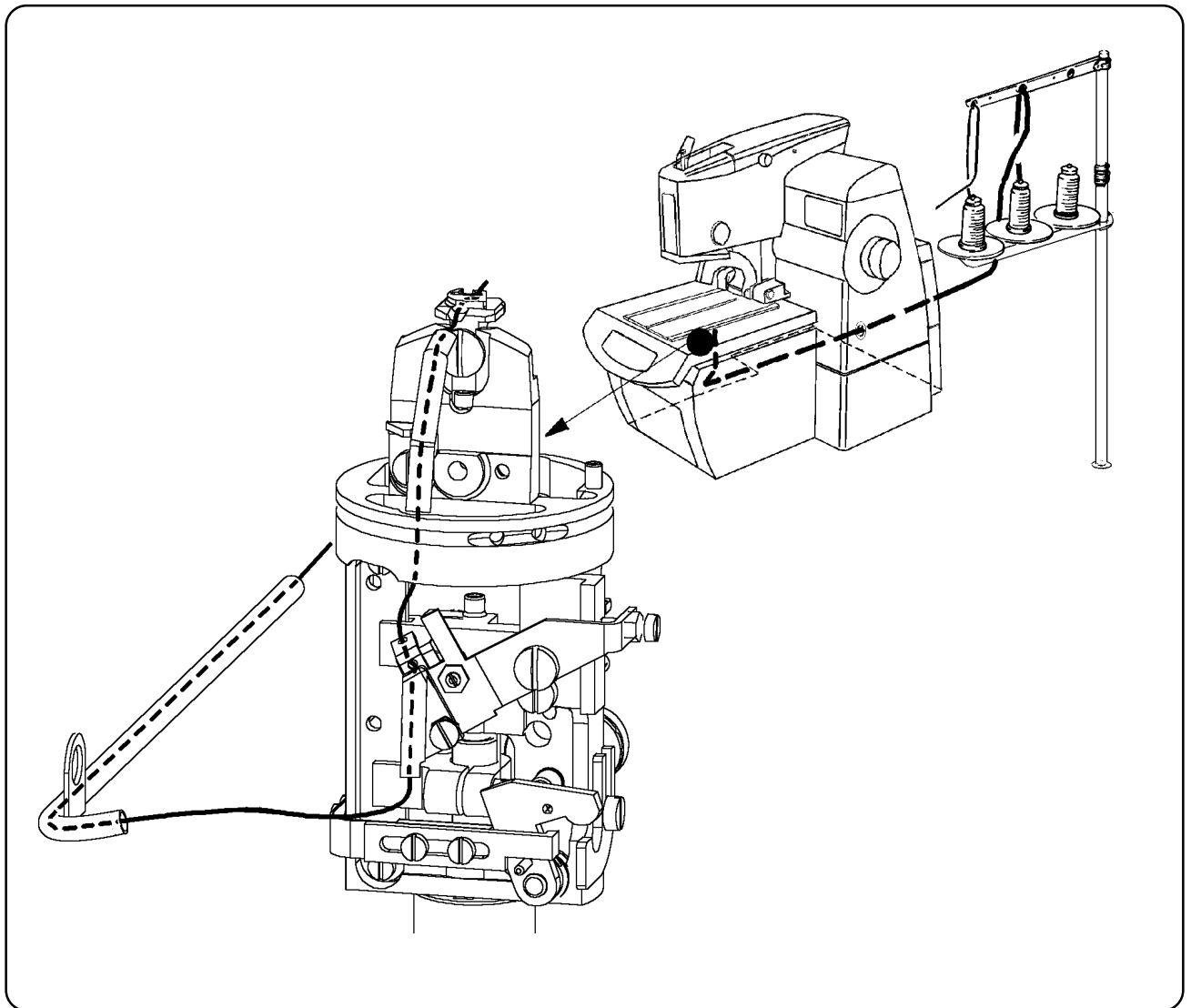


## START-UP AND OPERATION - MECHANICAL

### THREADING THE GIMP TO THE MACHINE

**WARNING!** Before making the adjustments, disconnect the air supply and release any stored energy. Switch off the main machine power.

Using the threading wire, part number 17.0027.1.123, thread the gimp.



**CAUTION!** Thick threads and gimp may damage the bar tack during trimming.

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**START-UP AND OPERATION - MECHANICAL****GIMP TENSION**

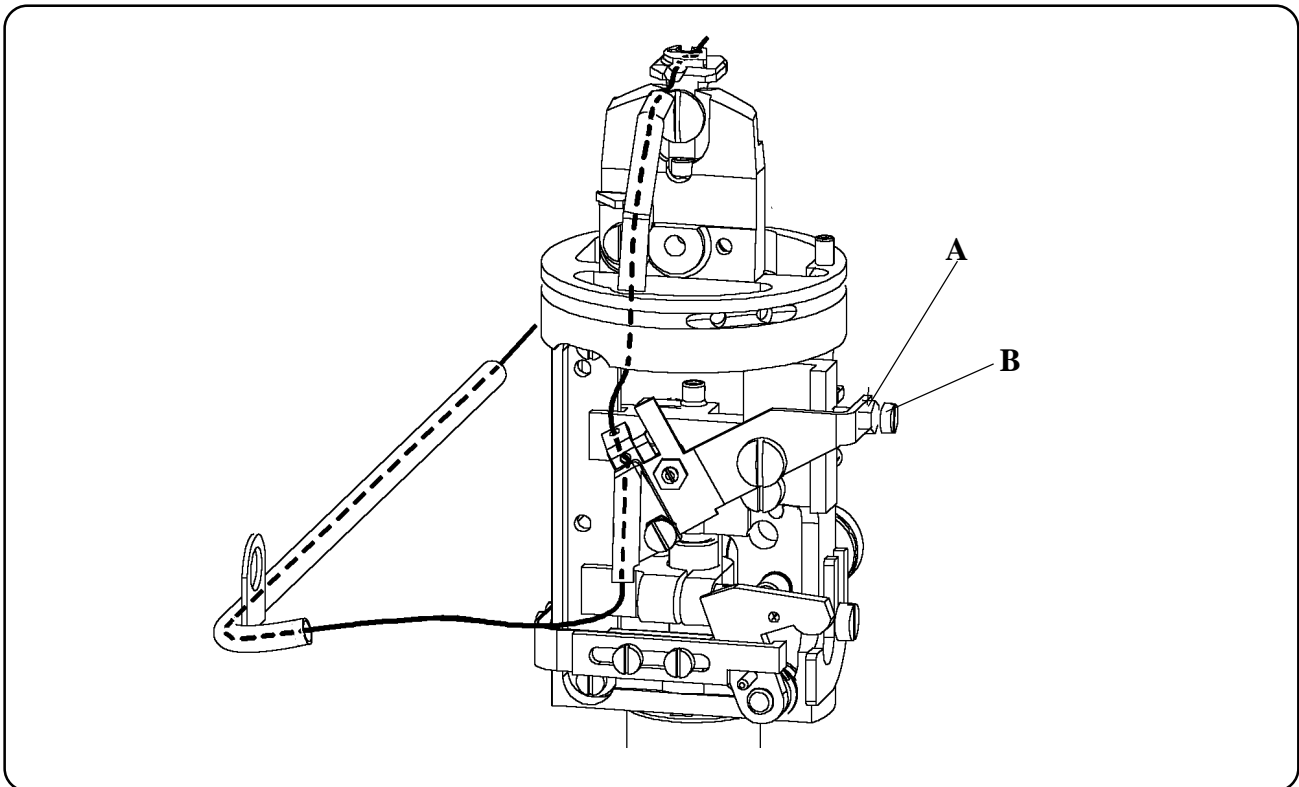
**WARNING!** Before making the adjustments, disconnect the air supply and release any stored energy. Switch off the main machine power.

To determine the length of the starting thread, loosen the nut **A** and rotate the screw **B**.

Rotating the screw in, decreases the length, rotating the screw out, increases the length.

The recommended gimp thread length, from the throat plate, is 4 to 5 mm, (0.157 to 0.197").

**Note:** The recommended length of the gimp from the throat plate is 4 mm - 5 mm (0.157" - 0.197"). When the machine is adjusted for Cord trim, thread length must always be adjusted when the buttonhole length is changed.



**START-UP AND OPERATION - MECHANICAL**

**THREADING THE UPPER THREAD, THREAD TENSION AND  
THREAD DRAW-OFF ADJUSTMENT**

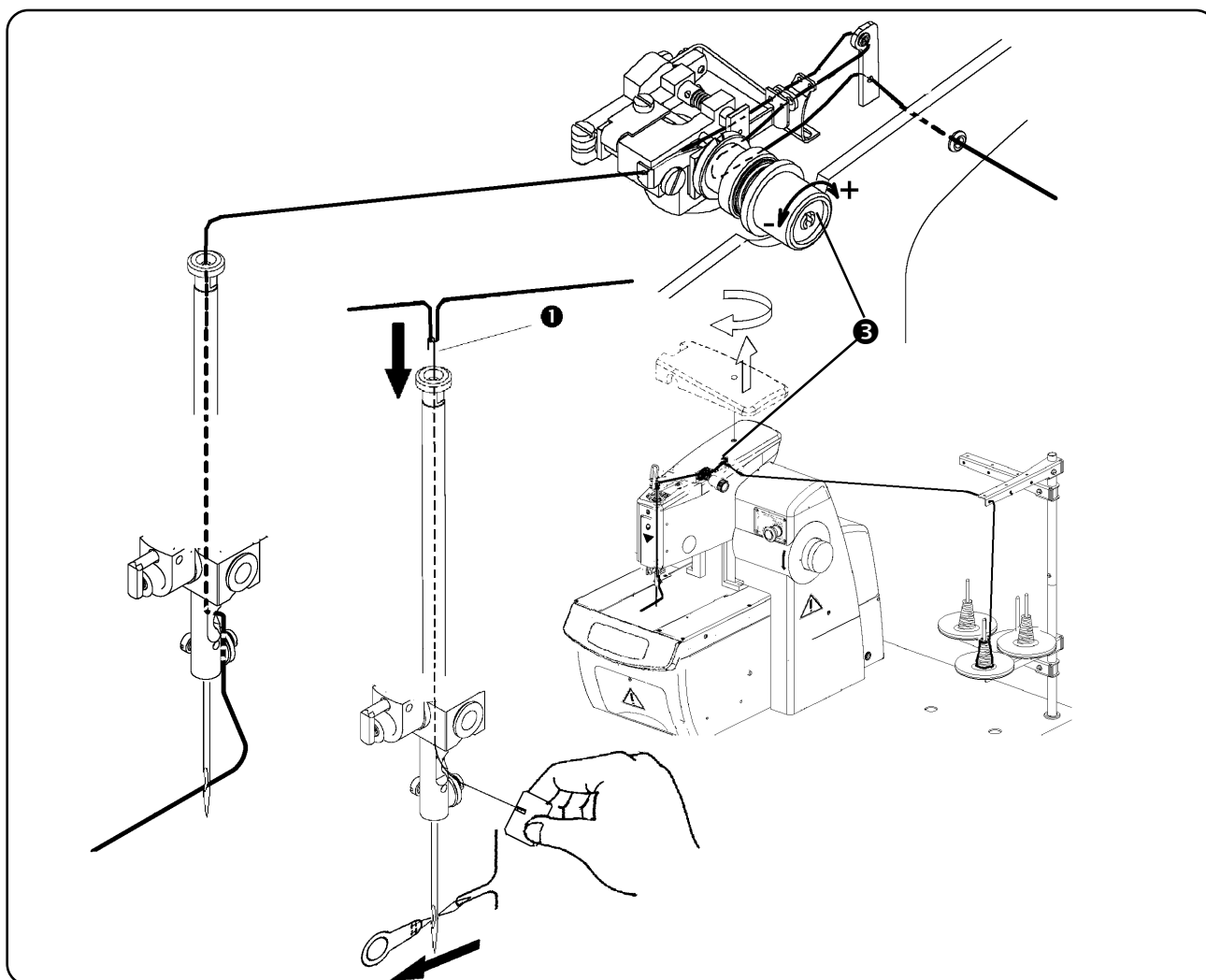
**WARNING:** Switch off the main machine power, disconnect the air supply and release any stored energy.

**Note:** When threading the machine XL-21 in the home position, the race faces backwards. Thread the machine as illustrated.

Raise the upper cover and rotate it by 90°. Thread the machine as illustrated. For easy threading use threading device ❶, ❷ from accessories kit.

**1. UPPER THREAD DRAW-OFF ADJUSTMENT**

If you change a sewing material, you usually change the thread material too. Then it is necessary to adjust thread tension. Since the quality of the threads influences the result of the sewing machine operation, it is necessary to use the quality threads with little elasticity, smooth. When you change any parts which influence threads passage, check a surface smoothness, which is in contact with thread. Adjust a thread tension change by nut ❸ according to the sewing conditions. Turning the button clockwise, *upper thread tension* increases, counter-clock wise decreases.

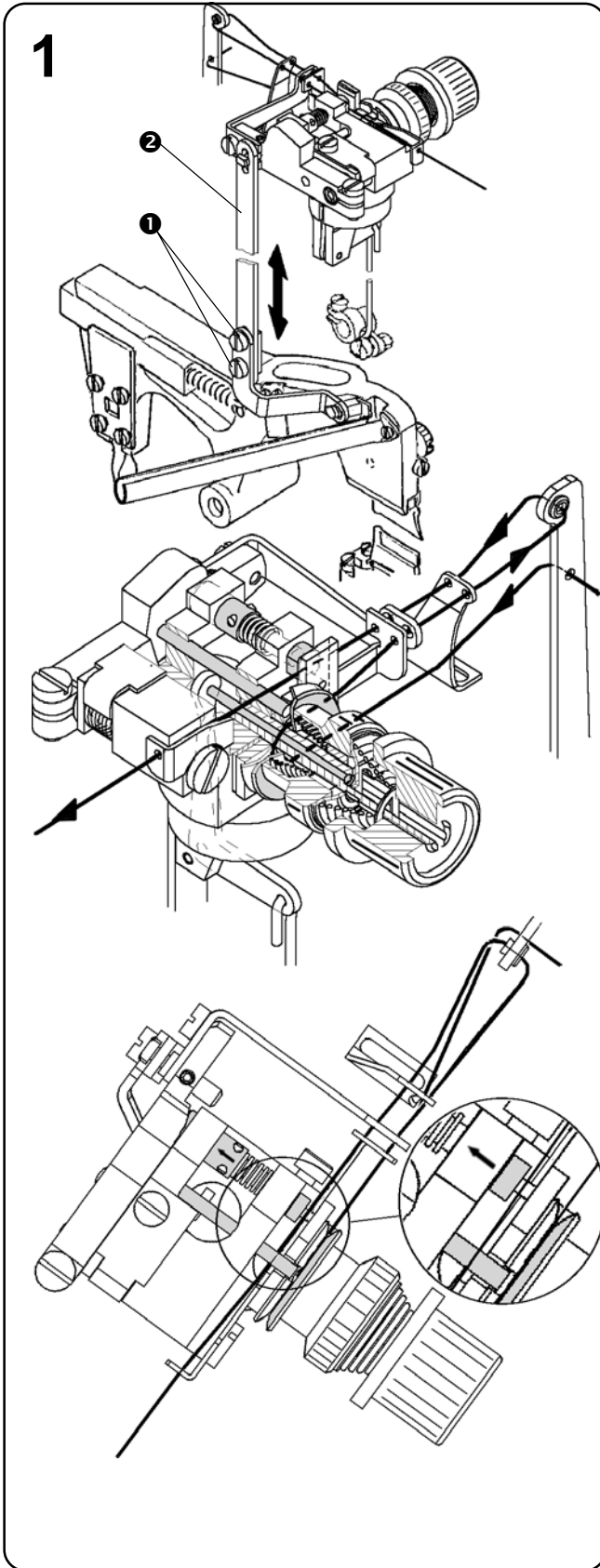


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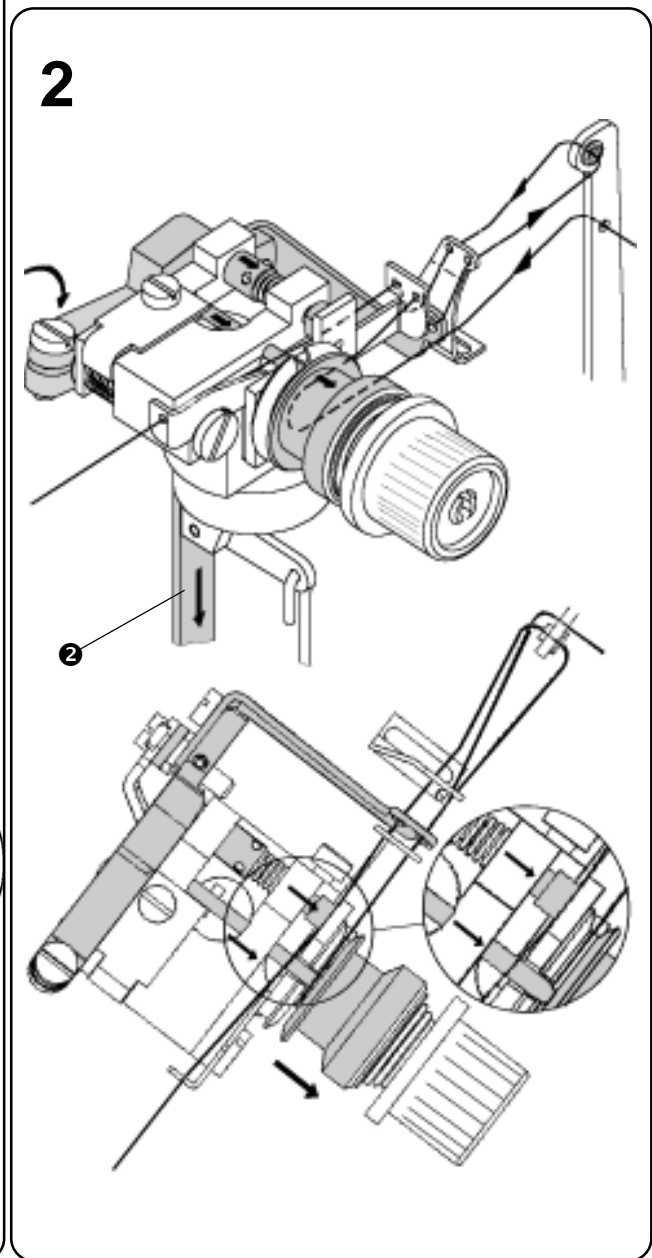
**START-UP AND OPERATION - MECHANICAL**



**2. UPPER THREAD TENSION ADJUSTMENT**

Using the screw ① adjust the rod ②. Moving the rod ② down, the upper thread tension is increasing, moving the rod up, the upper thread tension is decreasing.

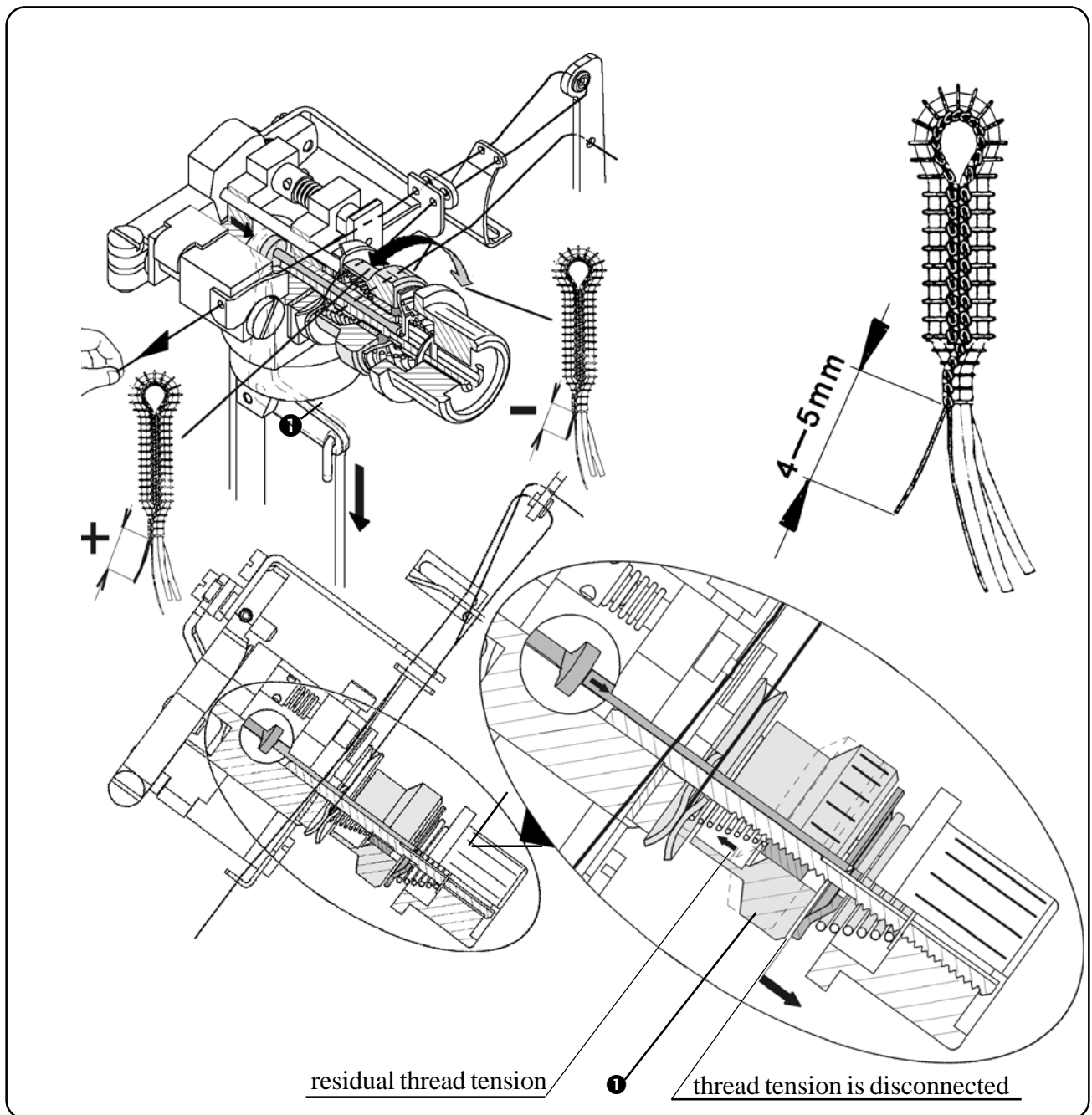
*Note:* The thinner material, the stronger thread tension.



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**3. THE LENGTH OF THE UPPER THREAD END ADJUSTMENT**

When the machine stops in the home position, the thread tension is disconnected. Then using the nut ❶ adjust the residual tension, which influences the length of the upper thread end. Try minimal tension by pulling the thread. Sew a buttonhole, check the length of the upper thread end (it should be 4 - 5 mm). Tightening the nut to the right, the length is decreasing, tightening the nut to the left, the length is increasing. ( *If the thread is not trimmed, the adjusted tension is too small.* )



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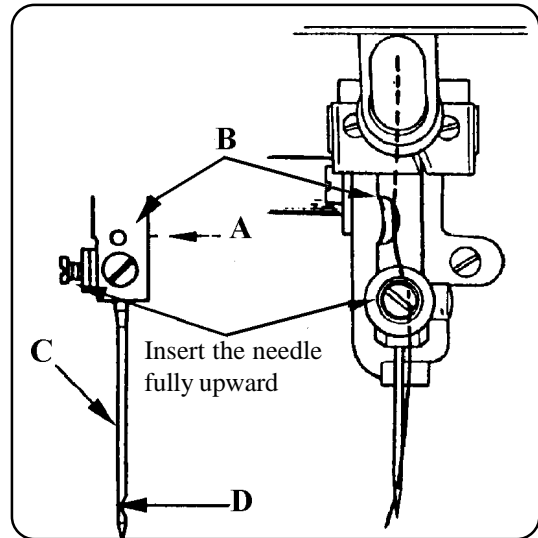
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## START-UP AND OPERATION - MECHANICAL

### INSTALLING AND THREADING THE NEEDLE

**WARNING!** Switch off the main machine electrical power.

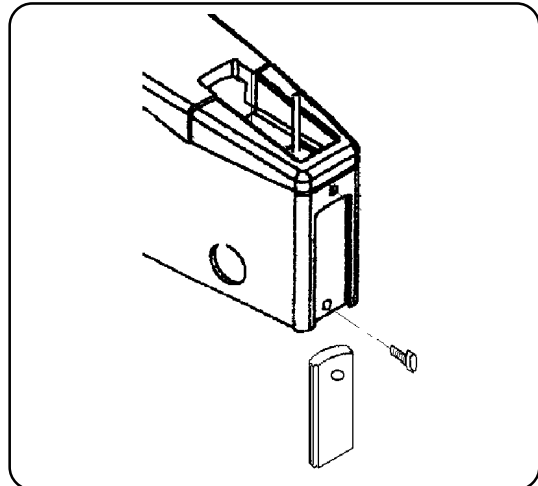
In the home position, the tension disks **A**, located on the needle bar **B**, must be toward the front of the machine. Install the needle with the long groove **C** toward the front of the machine and the needle scarf **D** toward the rear. Thread the needle by passing the thread through the needle's eye from the front, long groove **C**, to the rear, scarf **D** of the needle.



### PLASTIC NEEDLE GUARD

The movable plastic needle guard is located on the front side of the head cover.

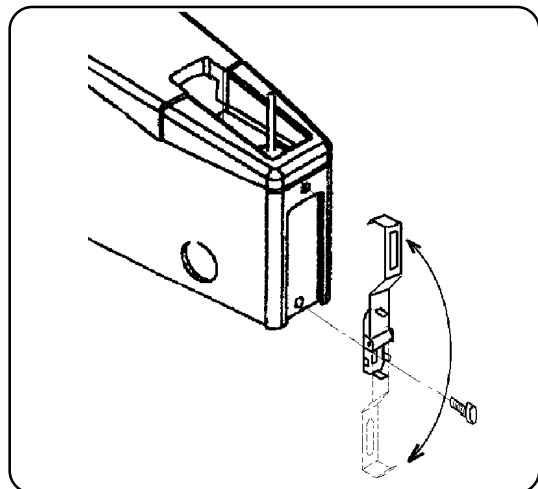
**Note:** Before installing the guard, remove the clamp plates.



### METAL NEEDLE GUARD AND UPPER SEWING MATERIAL HOLDER

The metal needle guard and upper sewing material holder, illustrated page 3-62, item 16, delivered as a part of the standard accessories, may be used when sewing pocket buttonholes.

The holder may be installed, instead of the plastic needle guard.




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## START-UP AND OPERATION - MECHANICAL

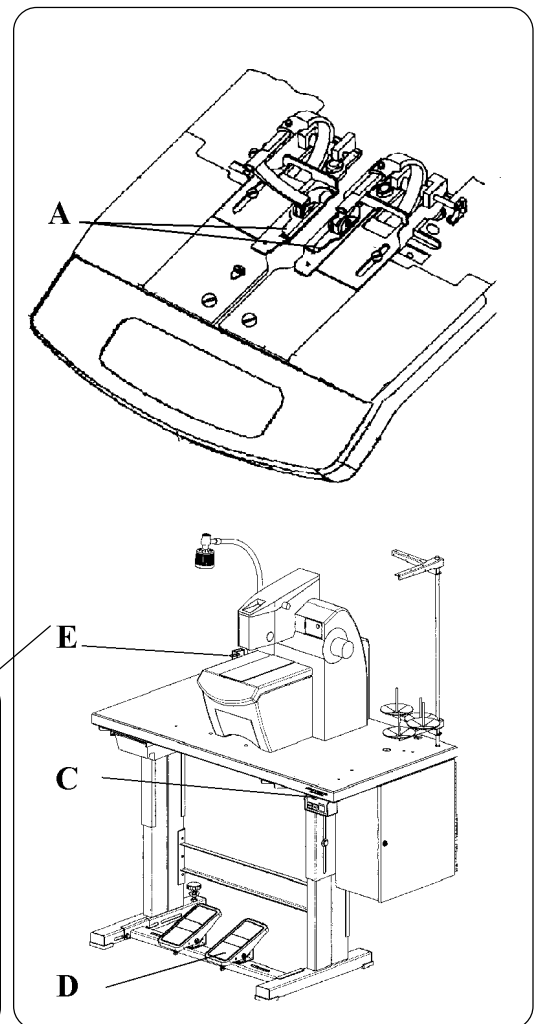
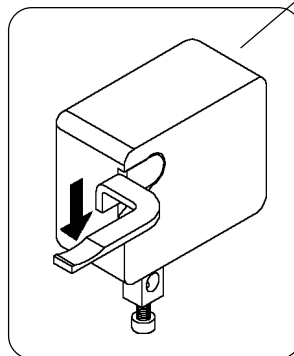
### START-UP

**Note:** To ensure the machine is sewing correctly, sew a few buttonholes on a scrap piece of fabric.

Position the fabric under the clamp feet **A**.

Press the main power **C**  switch.

Toe the start treadle **D** or press the manual switch **E** to begin sewing.



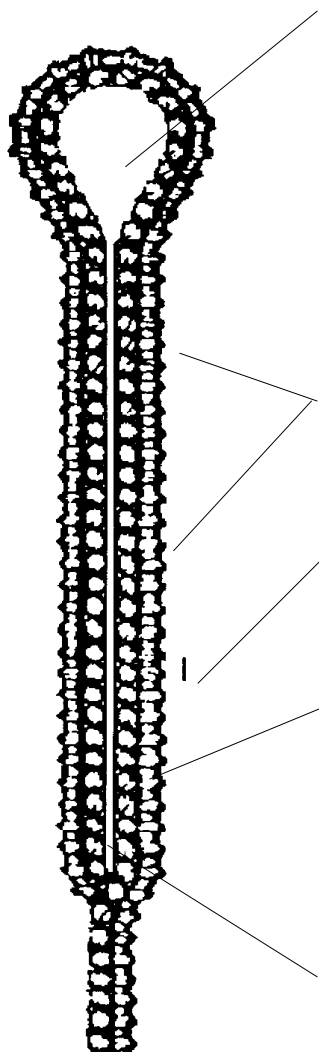
**WARNING!** Do not try to hold or remove the fabric while the machine is sewing, after the machine has fully stopped, remove the fabric from under the clamp feet.

## BUTTONHOLE QUALITY FEATURES

### THE PERFECT BUTTONHOLE WILL FEATURE:

- Uniform stitching.
- Consistent purl formation.
- Symmetrical eye shape.
- Proportional shape and size.
- Tacked/trimmed.

### WHAT TO LOOK FOR



**Cut Before/Cut After (CB/CA)** - The material may be cut before or after the buttonhole is sewn, depending upon the application and the type of material.

With a cut before buttonhole, the material is cut and the machine sews around the edge of the material.

With a cut after buttonhole, the material is held tightly in place while being sewn and cut after the buttonhole is complete.

**Stitch density** - The number of stitches in a given area. An increased number of stitches usually gives the buttonhole a higher quality appearance.

**Bite width** - Also called the stitch bite (or bight), is the width of the stitch from side to side. Variations between applications are primarily designer driven.

**Gimp** - Eyelet buttonholes are sewn using a double chain stitch. A third thread (gimp) is used under the bottom thread. The gimp thread is not sewn, but placed under the bottom thread next to the fabric.

Gimp allows the stitching and purl to stand out, giving body and strength to the buttonhole.

**Purl** - The double chain stitch creates a knit stitch on top of the buttonhole. The purl is created on top of the gimp and is seen on the front of the garment.

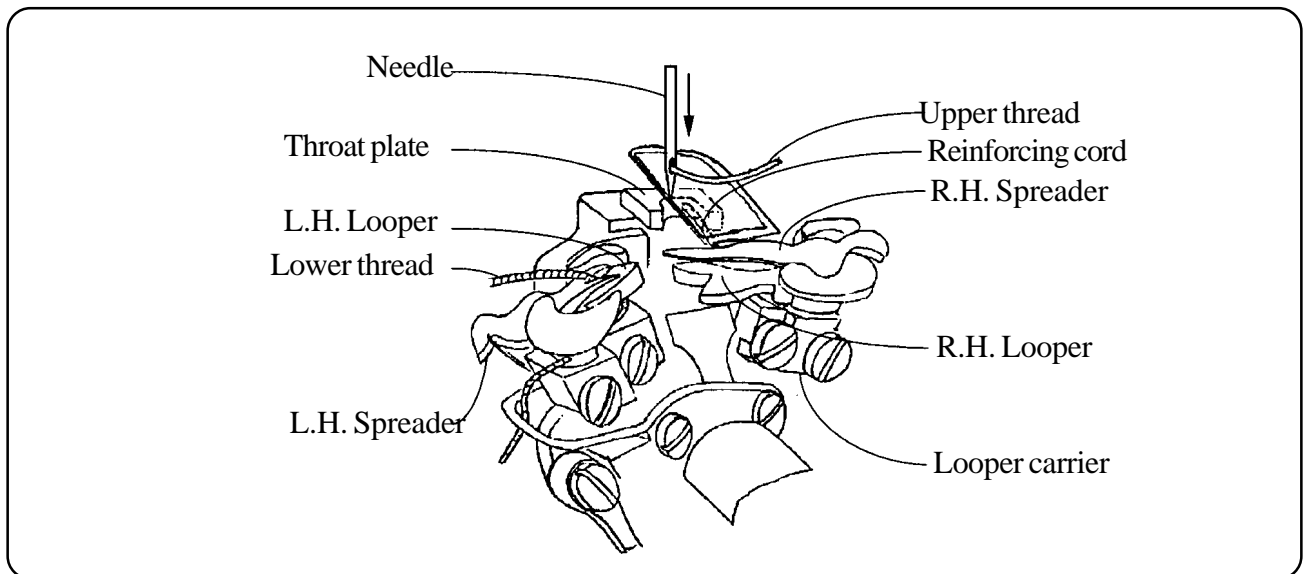


**SEWING PRINCIPLES**

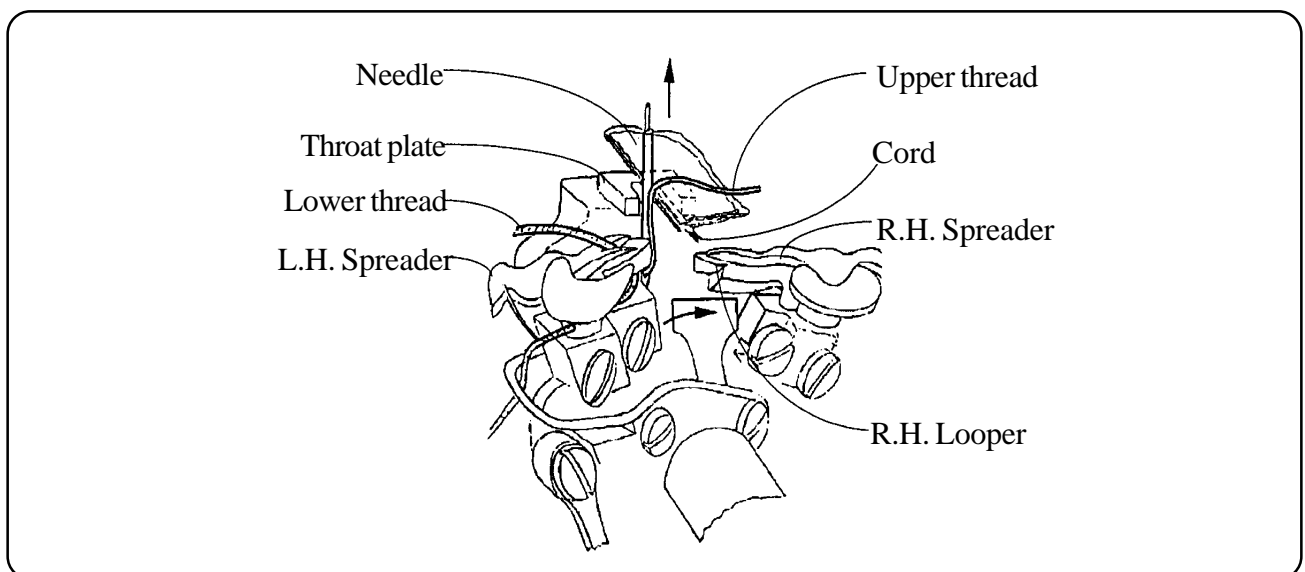
A stitch is the unit of thread formed in the production of seams and stitching.

Stitching is defined as a series of stitches embodied in a material for ornamental purposes, for finishing an edge, or both.

The type of stitch used in the eyelet buttonhole machine is a two-thread, chain lock, purl stitch enveloping a reinforcing cord. When the thread, loopers, and spreaders create a buttonhole:

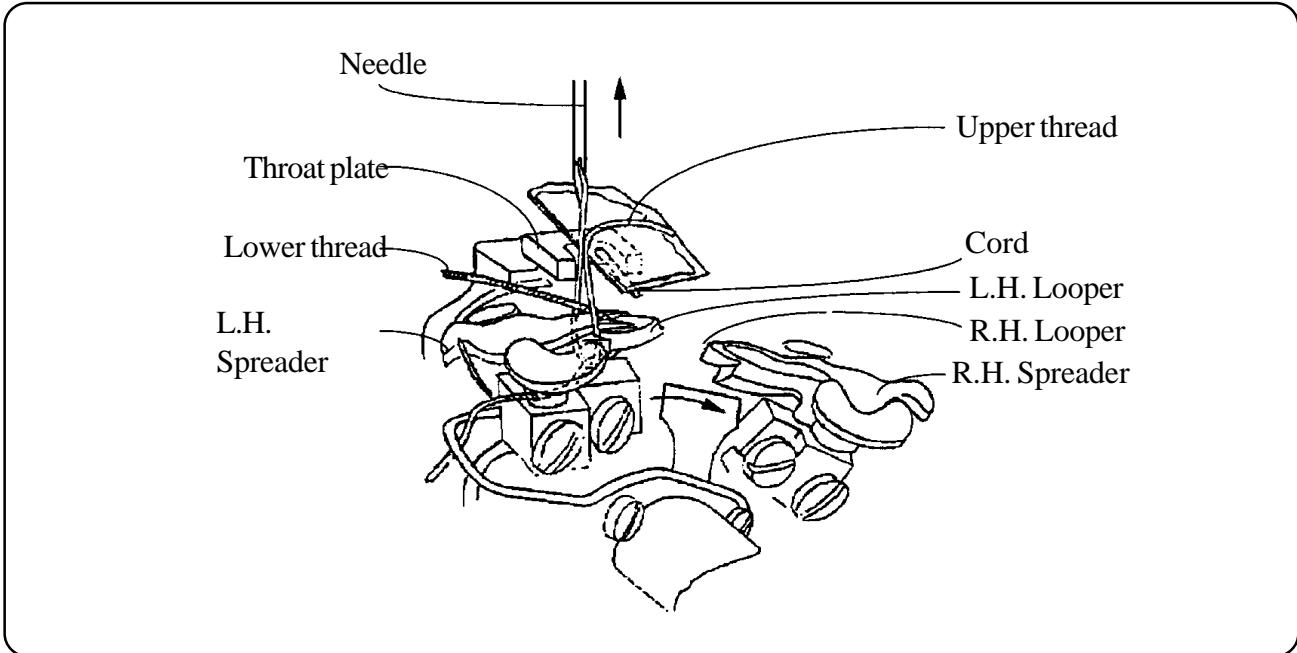


The needle lifts up and forms a loop. The looper carrier moves to the right and the left-hand looper enters the loop formed.

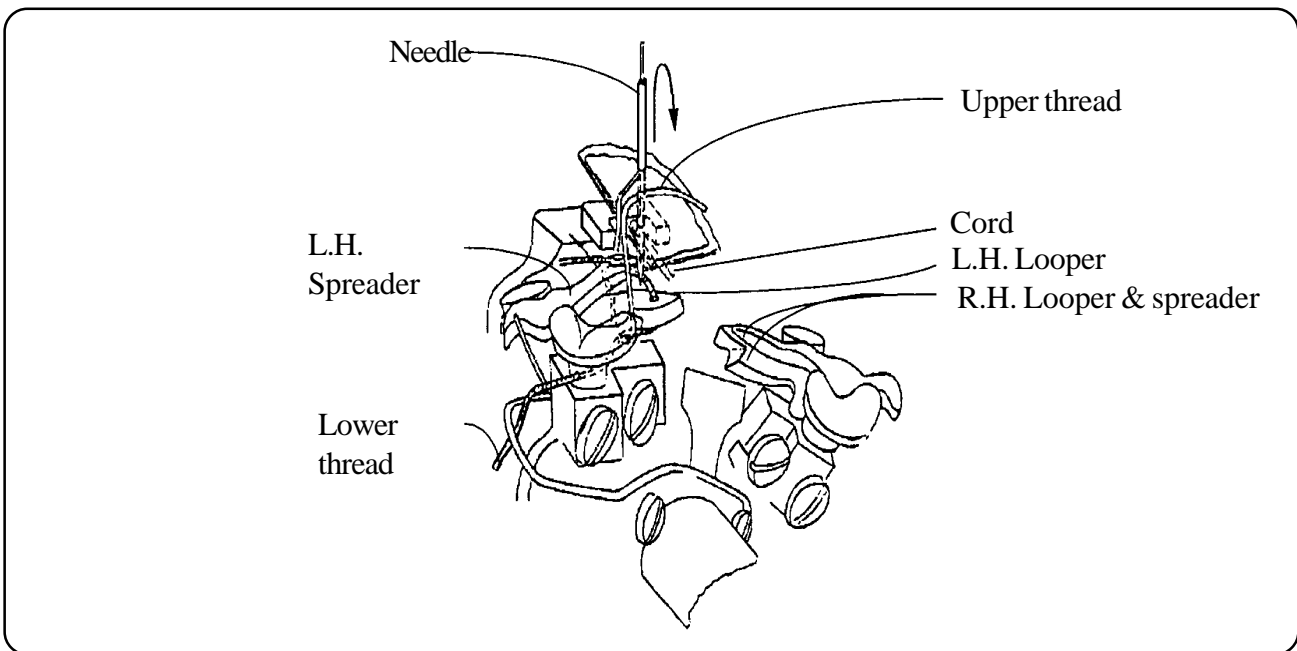


**SEWING PRINCIPLES**

The looper carrier continues moving to the right, carrying the lower thread, the left-hand looper, and the spreader, fully into the loop formed.

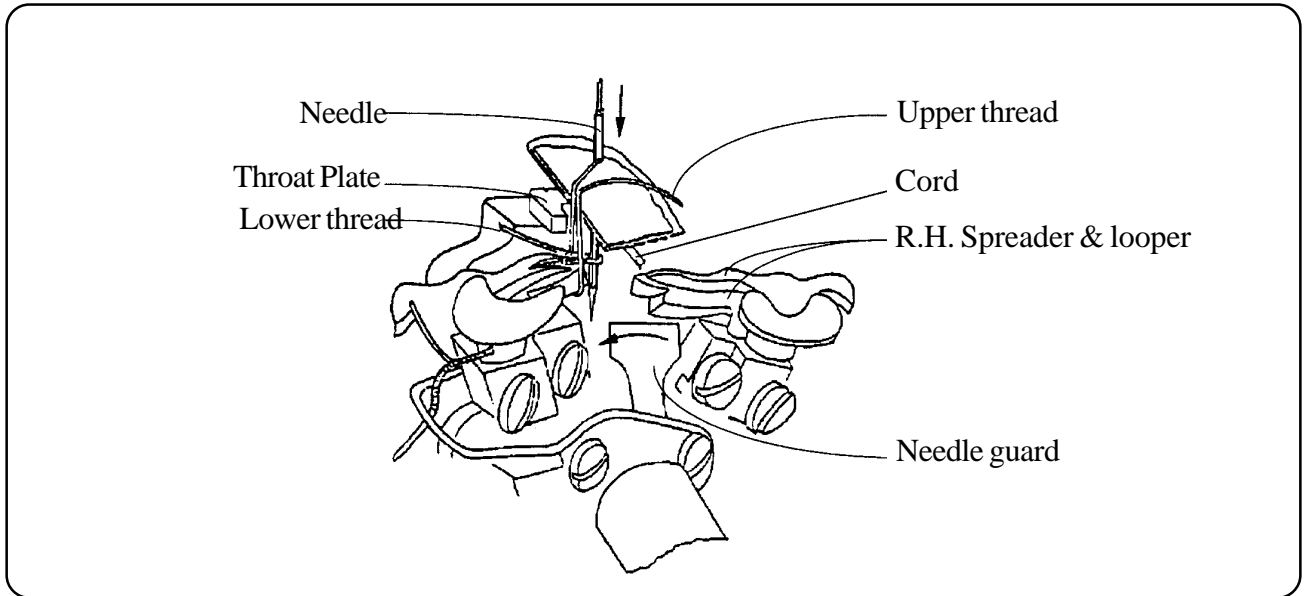


The left-hand spreader opens, making room for the needle to pass through the loop formed by the lower thread. This penetration, allows the needle to encompass the cord.

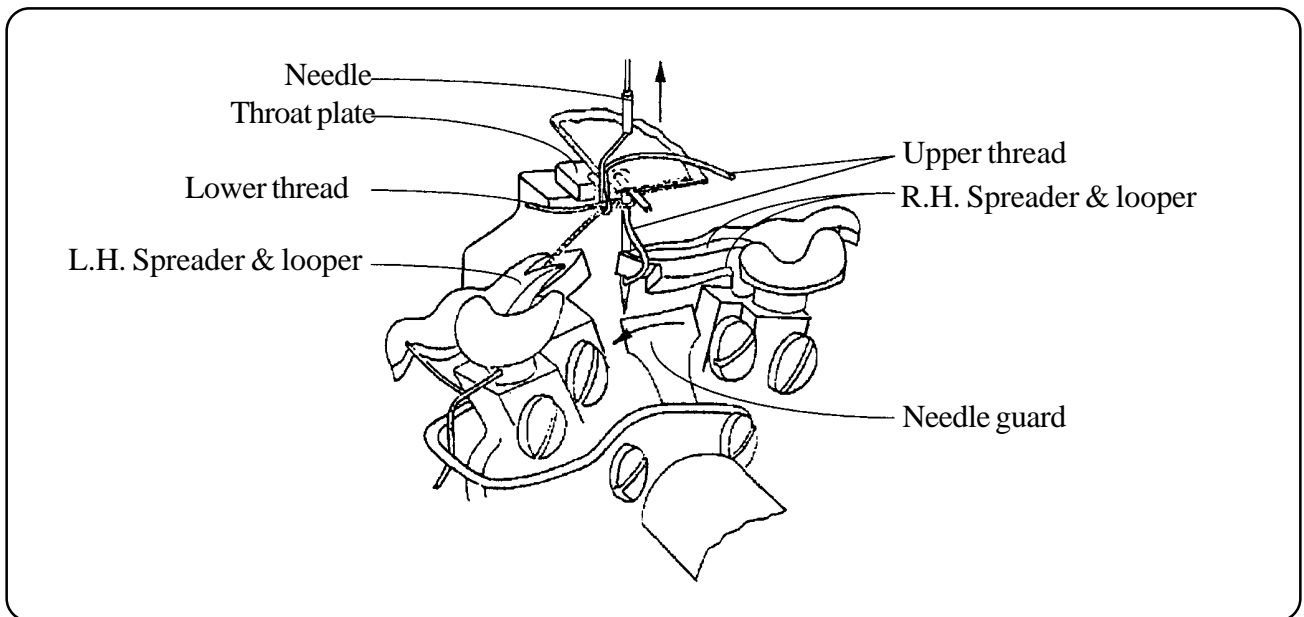


**SEWING PRINCIPLES**

As the needle moves down to form a new loop, an implement called a take-up, pulls the upper thread up and into the material, bringing along the lower thread.

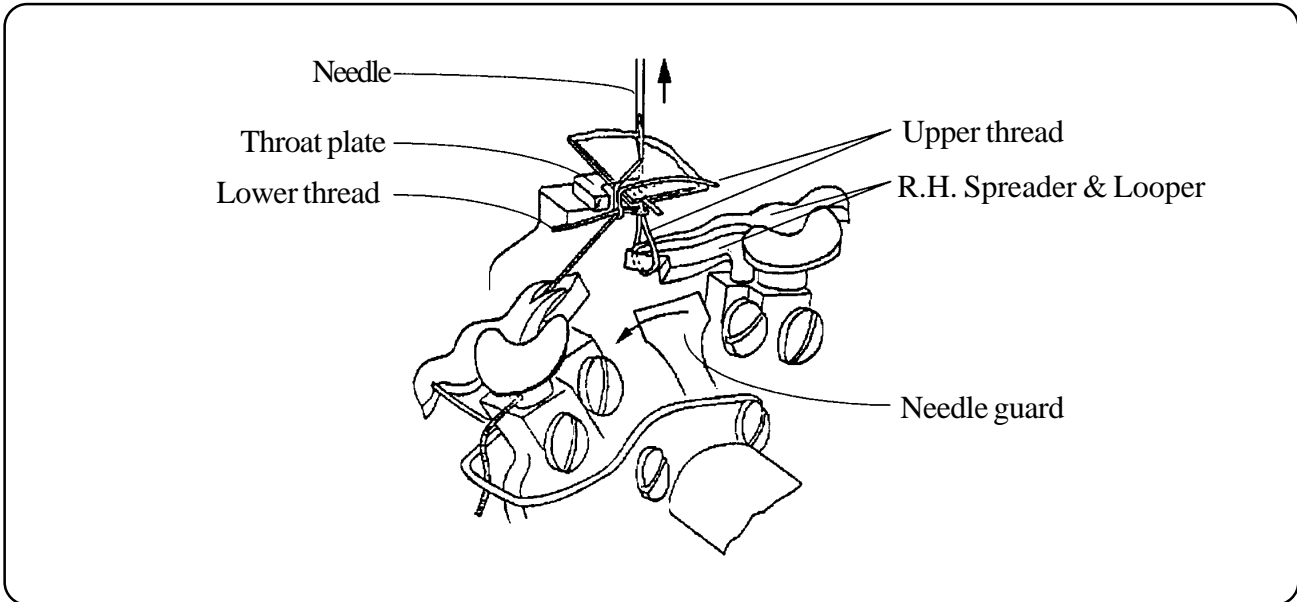


A loop is formed as the needle rises. The looper carrier continues moving to the left and the right-hand looper enters the new loop formed. The previous loop is pulled up tight against the material.

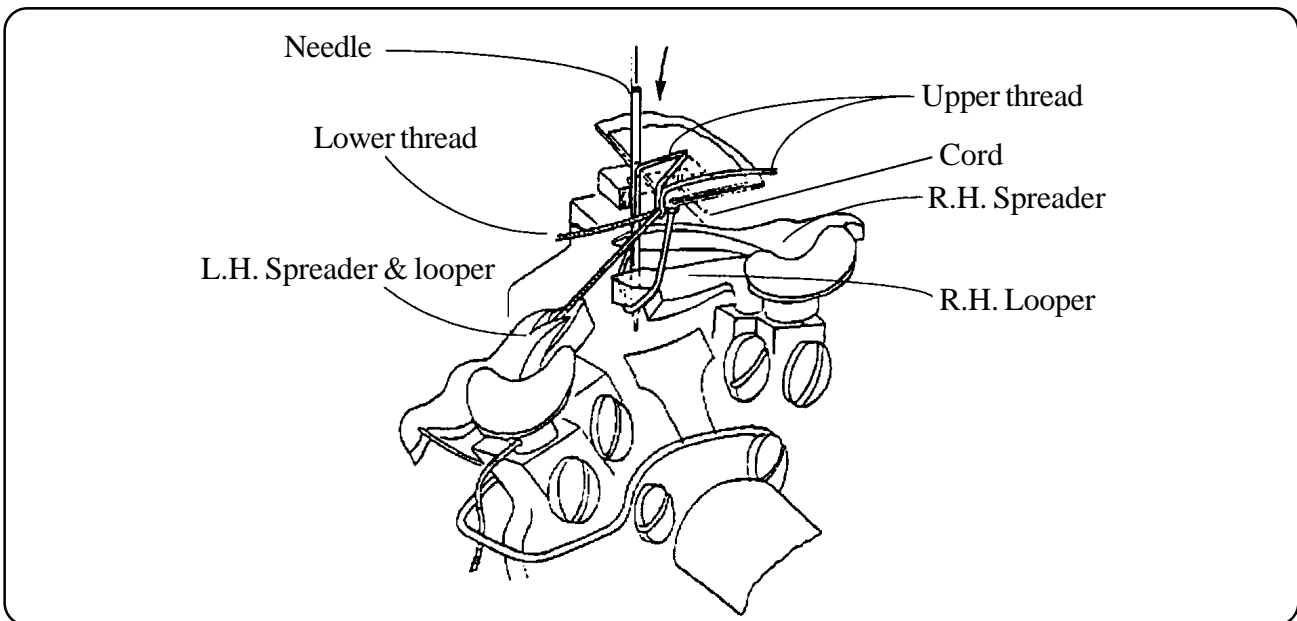


**SEWING PRINCIPLES**

The looper carrier continues moving to the left. The right-hand looper and spreader fully enter the loop formed.

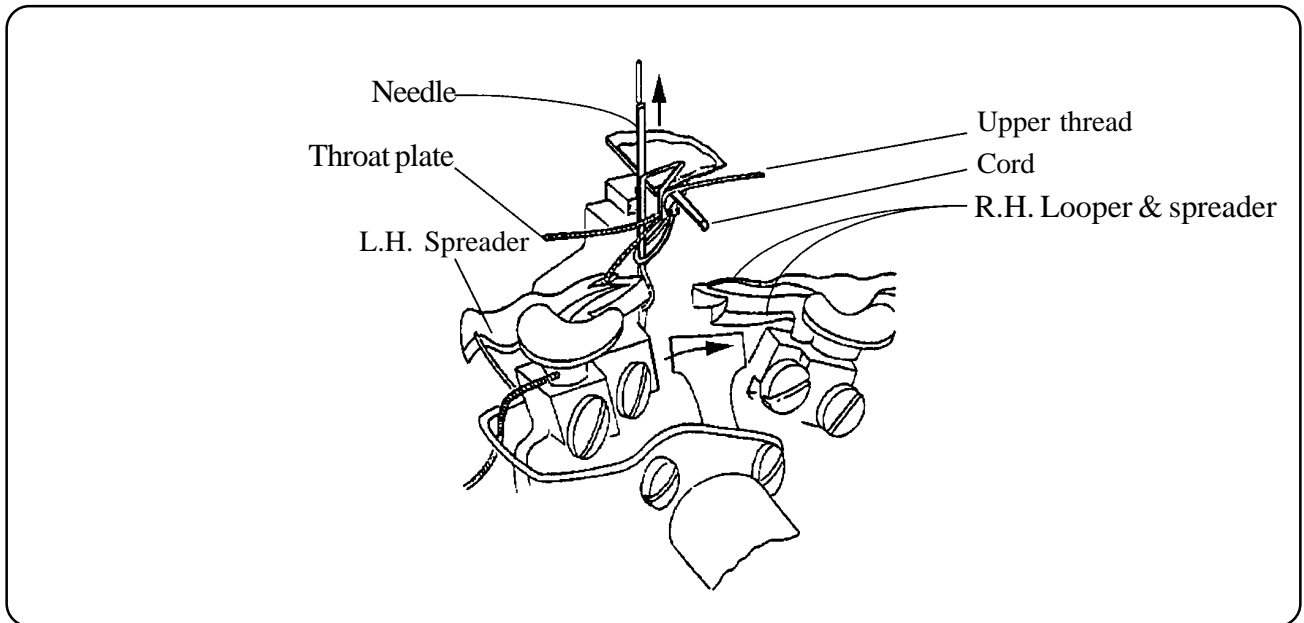


The right-hand spreader opens, making room for the needle to pass through a loop formed by the upper thread.

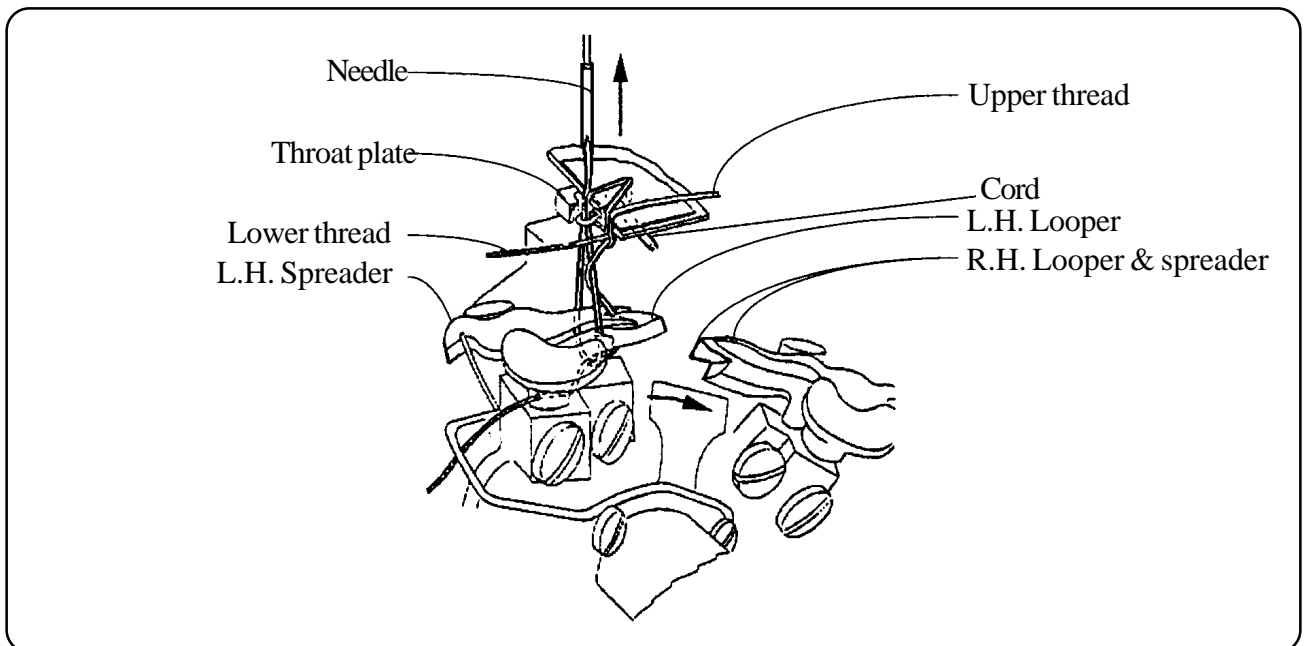


**SEWING PRINCIPLES**

The looper carrier moves to the right as the needle “strips” the loop previously formed. The left-hand looper enters the new loop being formed.



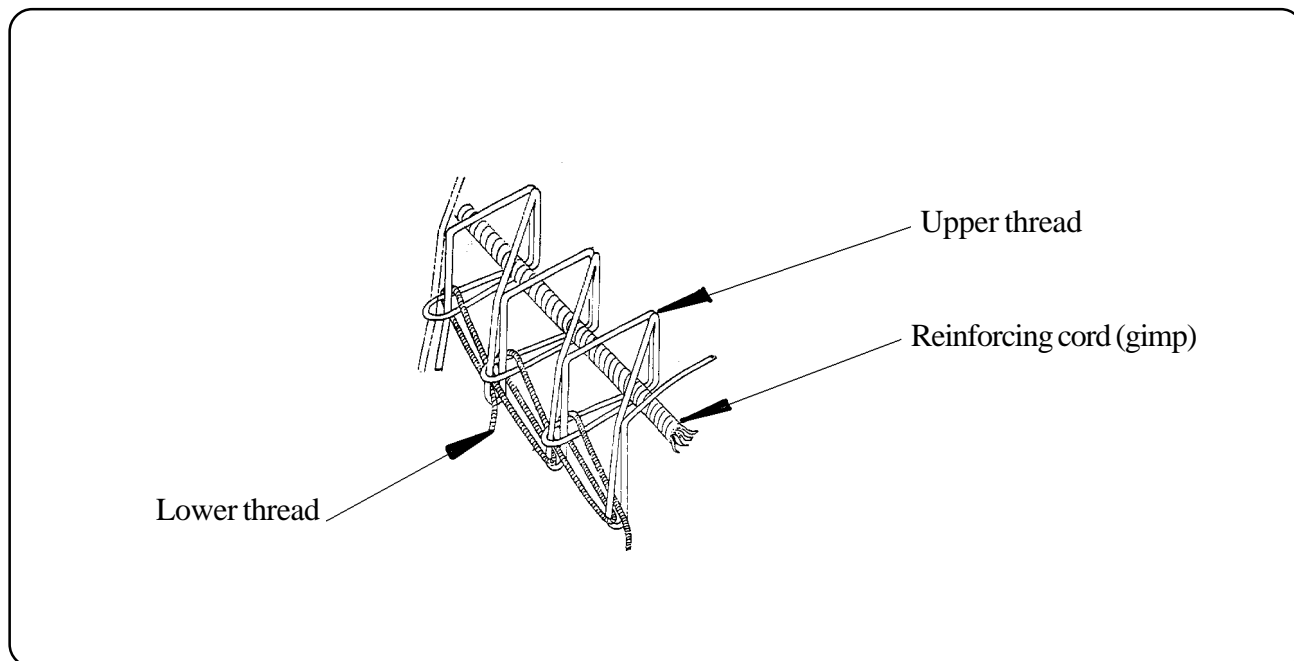
The lower thread forms a purl and along with the previously formed thread loop, is pulled up against the material. The enveloped cord provides body to the buttonholes.



## SEWING PRINCIPLES

---

The AMF Reece two-thread, chain lock, purl stitch with reinforcing cord.



## ADJUSTMENTS

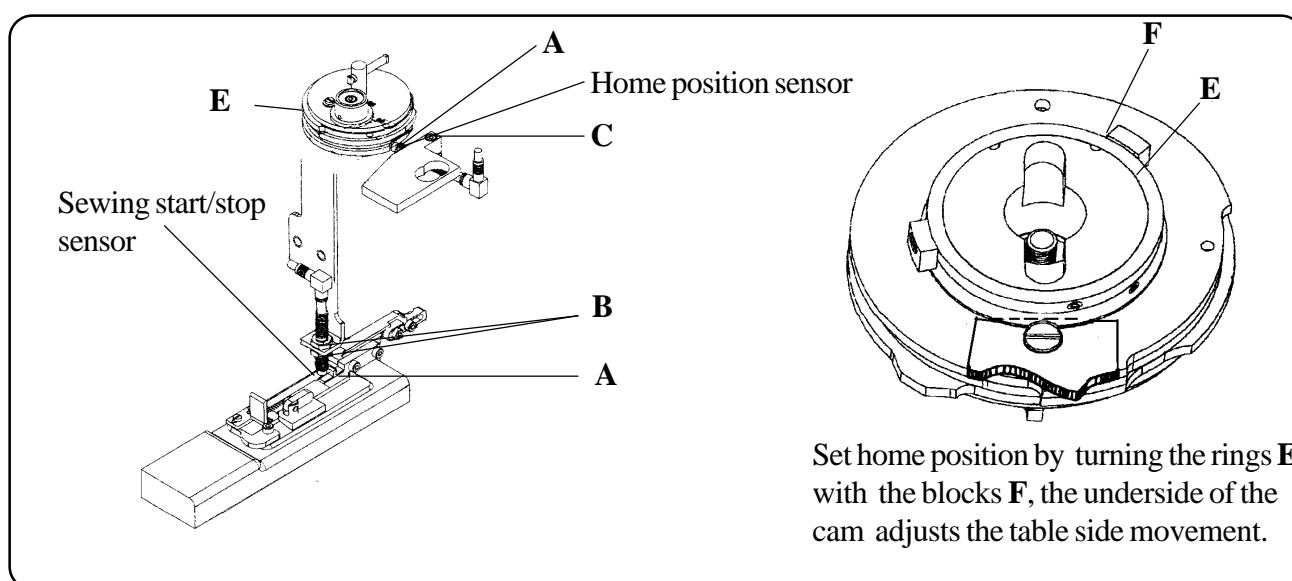
### CONTROL SENSORS

Two control sensors with LED indicators are located on the sewing head: one sensor controls the starting and stopping of the sewing and the other sensor controls the home position.

The clearance between the sensors and the actuator must be 0.5 to 1.0 mm, (.020 to .040").

To adjust:

Loosen the screw **C** on sensor. Set the clearance between the sensor and the plateau by rotating the sensor. Using the gauges check the clearance. Tighten the screw **C**. Loosen the locking nuts **B**. Set the clearance between the sensor and the plateau by rotating the sensor. Using the gauges check the clearance. Tighten the locking nuts **B**.

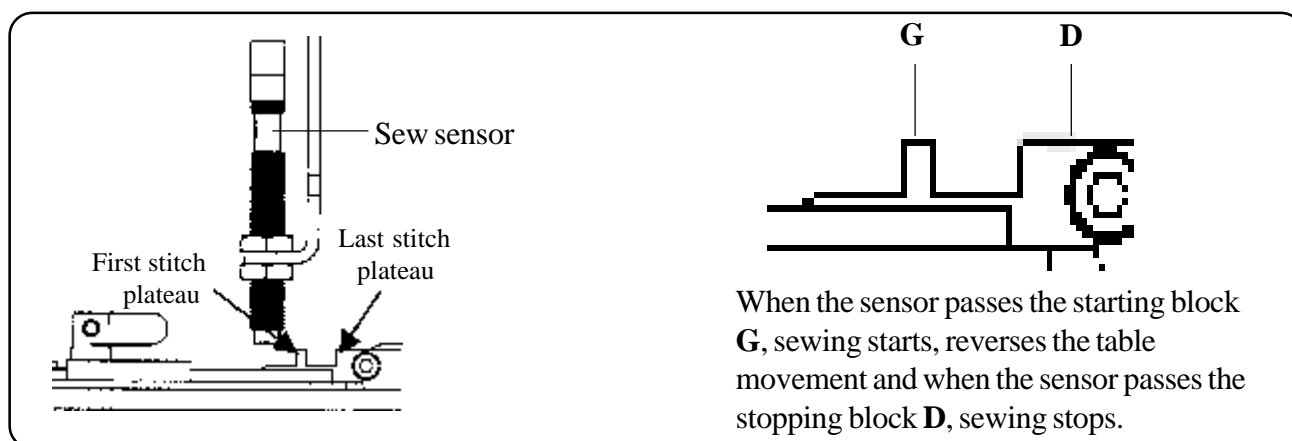


### Sew Sensor Locks and Plateaus

The sew sensor has two plateaus, the first stitch and the last stitch.

With the table in the home position, press the start treadle to the first stage and the clamps lower.

Fully press the start treadle to the second stage, to start the table moving at the table speed selected, page 1-25, toward the leading edge of the sew sensor.



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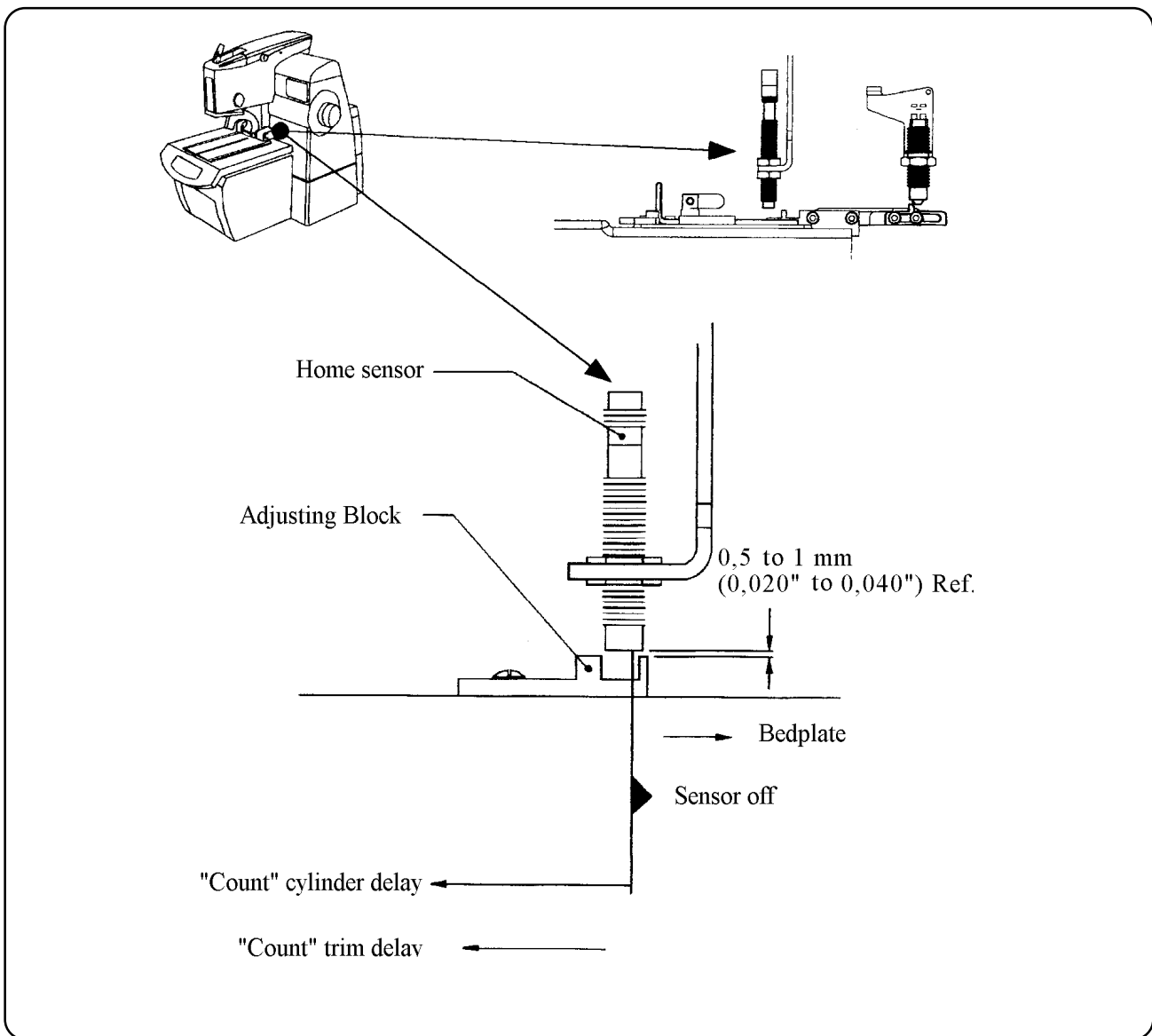
**ADJUSTMENTS**

**SENSOR**

**WARNING!** Before making adjustments, disconnect the air supply and dissipate any stored energy.

If incorrect:

Manually rotate the machine and adjust as illustrated.





## ADJUSTMENTS

### PLATEAUS

**WARNING!** Before making adjustments, disconnect the air supply and dissipate any stored energy.

When the table reaches the leading edge, the speed decreases to half the set parameter. At the trailing edge of the first stitch plateau, table motion stops and the sew motor starts. As the machine begins to sew, the leading edge of the last stitch plateau will be ignored. As sewing continues, the trailing edge of the last stitch plateau starts the final stitch count to complete the buttonhole.

### MAGNETIC DISK

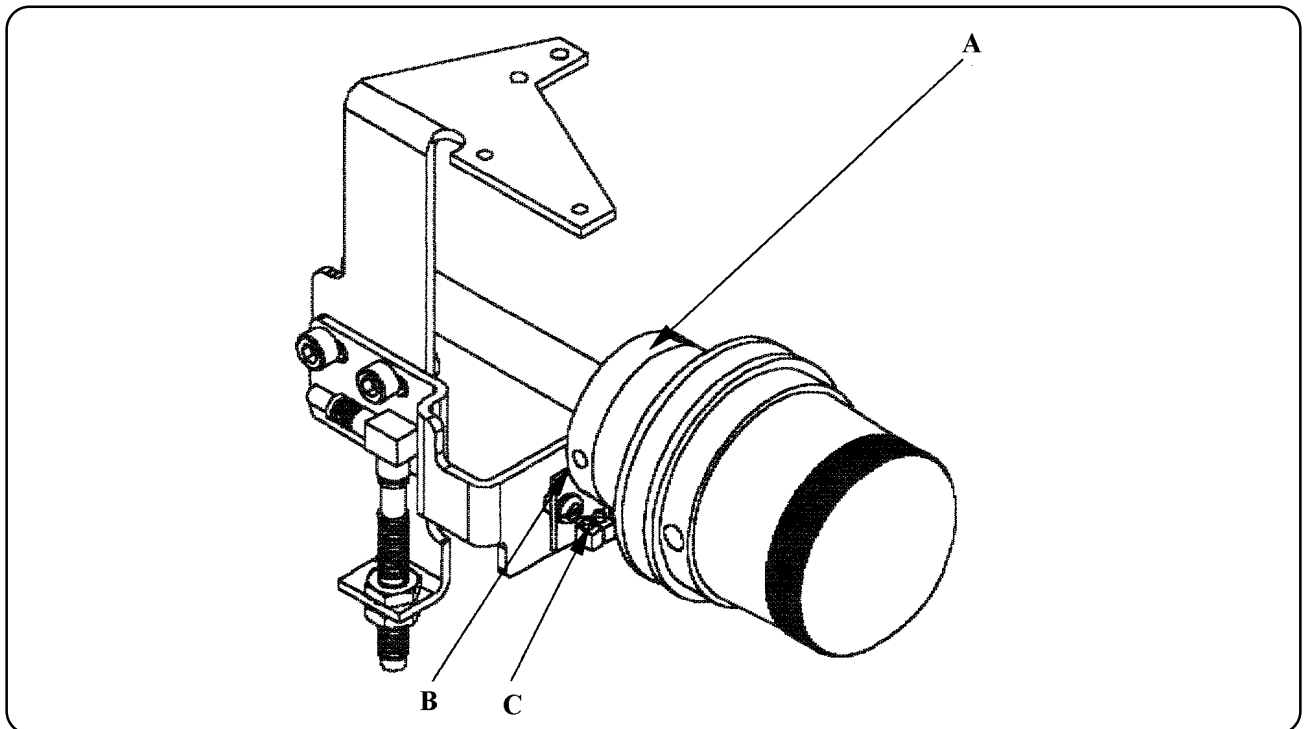
The magnetic disk **A**, which controls the position of the needle bar, must be adjusted until the sewing is complete and the needle bar is in the top of its right-hand stroke.

To Adjust:

Loosen the set screw **B**.

Rotate the magnetic disk **A** until the green light **C**, located on the synchronizer board and the red light, located on the operator control panel, activate.

Tighten the set screw.



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## ADJUSTMENTS

### RACE

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

#### Race to the Side of the Bedplate

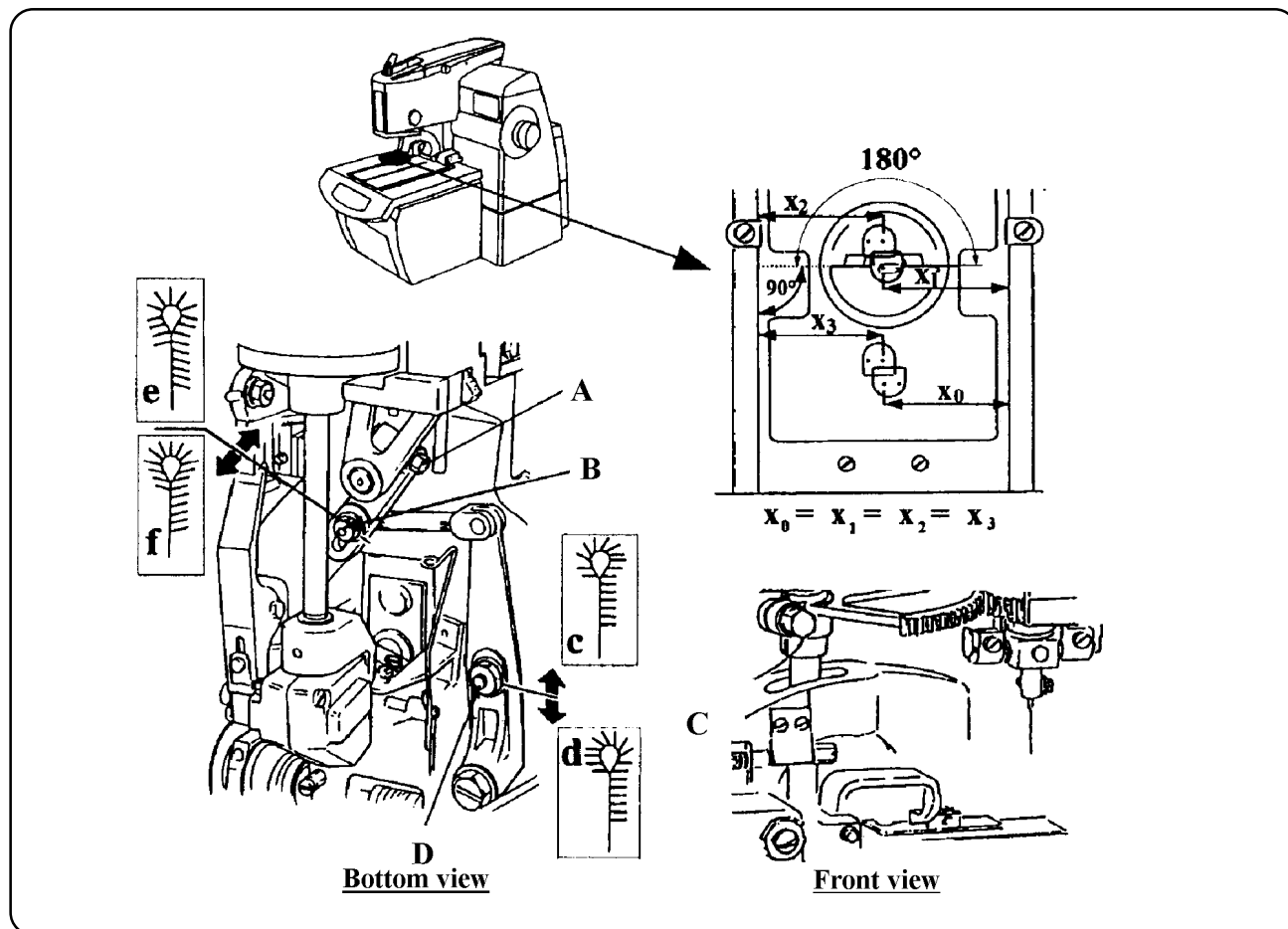
The race must be set 90° to the bedplate. To adjust: Loosen the screw **A** and move the race as needed. Tighten the screw **A**. Rotate the machine until the race moves 180°.

The race must be set 90° to the side of the bedplate. To adjust: Loosen the adjusting screw **B** and move half the distance. Tighten the adjusting screw **B** and rotate the machine until the race moves 180°. Loosen the screw **A** and adjust as needed. Repeat setting until the race turns exactly 180°.

#### Race to the Needle Bar Gear

The upper needle bar gear must be positioned 90° to the race. To adjust: Loosen the screw and move as needed, tighten the screw **C**. The stud **D** may be used to move the stitch from one side of the eye to the other.

Check 90° and 180° movement of the race, reset if necessary.



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**ADJUSTMENTS**

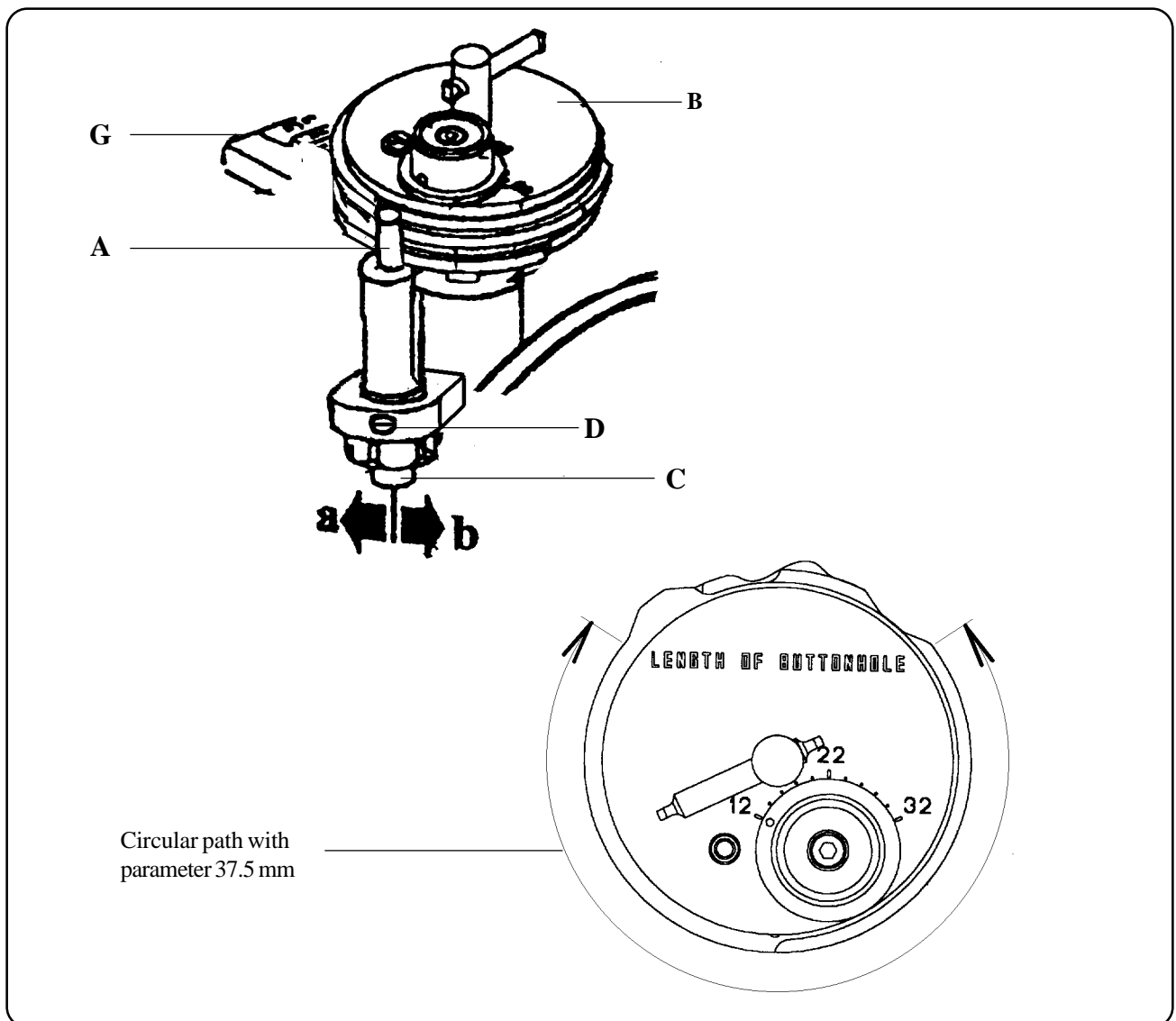
**TABLE ALIGNMENT**

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

Set the scanning pin inside the circular path area with a parameter of 37.5 mm, (1.470") from the center of the cam **B**.

Loosen the nuts **C** and the screw **D**.

Tap the pin **A** forward with a rubber hammer and tighten the screw **D** to ensure clearance from the table edge **G** is set for  $x_0 = x_1 = x_2 = x_3$ .



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## ADJUSTMENTS

### CLAMP FEET SPREAD

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

**Note:** After a material change, the clamp feet mechanism must be adjusted.

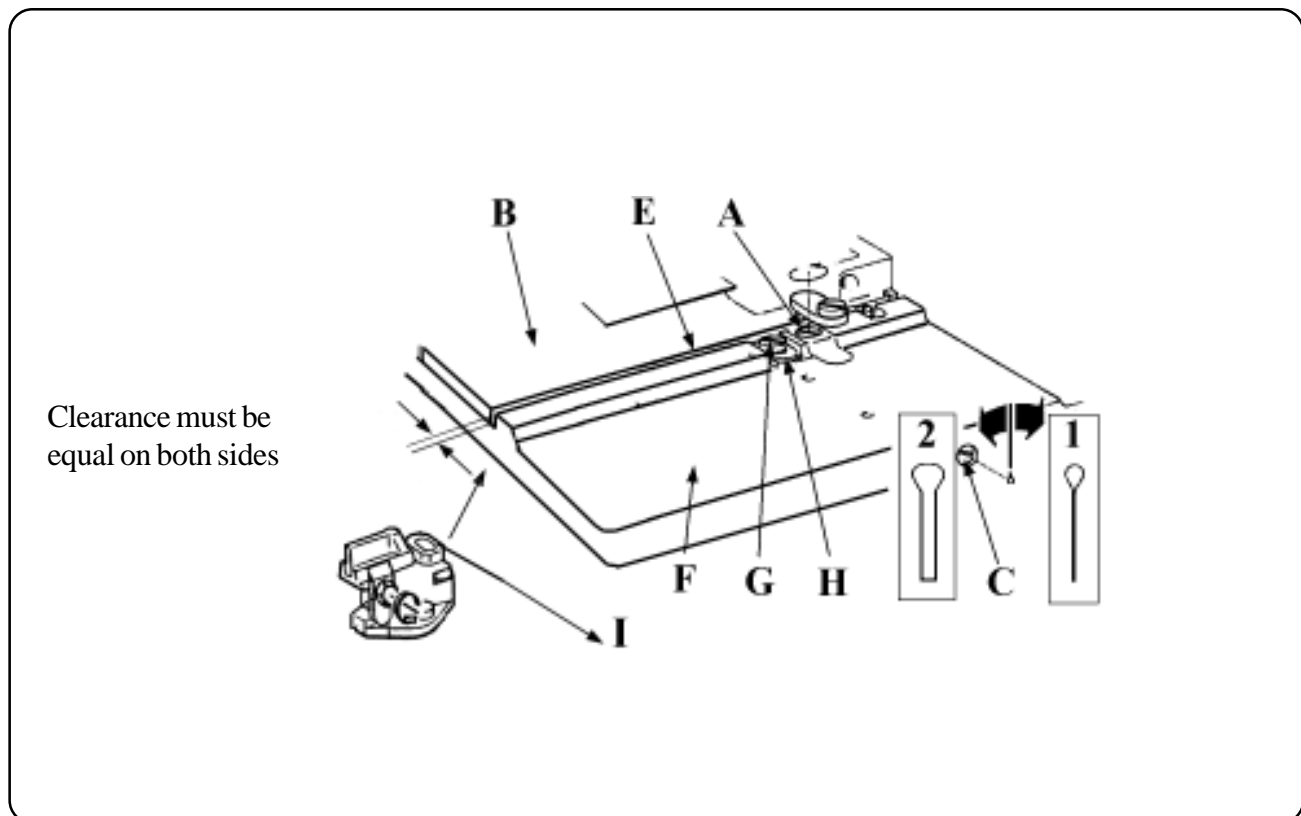
Loosen the clamp plate locking screws **A** on both sides of the bedplate **F**. Using the clamp plate **B** adjusting screws **C**, adjust both sides of the bedplate to obtain equal clearance to correctly spread the material. Adjusting the screw in, decreases the amount of spread, adjusting the screw out, increases the amount of spread. Tighten the clamp plate locking screws **A**. Both clamp plates **B** must move an equal distance.

**Note:** The factory set yellow stop locking screws **G**, should never require adjusting.

If incorrect:

Loosen the stop locking screw **G**. Rotate the feed handle to position the bedplate **F** until the clamp plate **B** roller reaches the spreader block **I** and the clamp plates are fully spread. Lightly press the stop **H** against the side of the clamp plate **B** to obtain approximately 0.6 to 0.7 mm, (.023 to .027") clearance. Tighten the stop locking screws **G**.

**Note:** Using the cord trim clamps, the right clamp plate clearance must be reduced to 0.4 mm, (.016").



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## ADJUSTMENTS

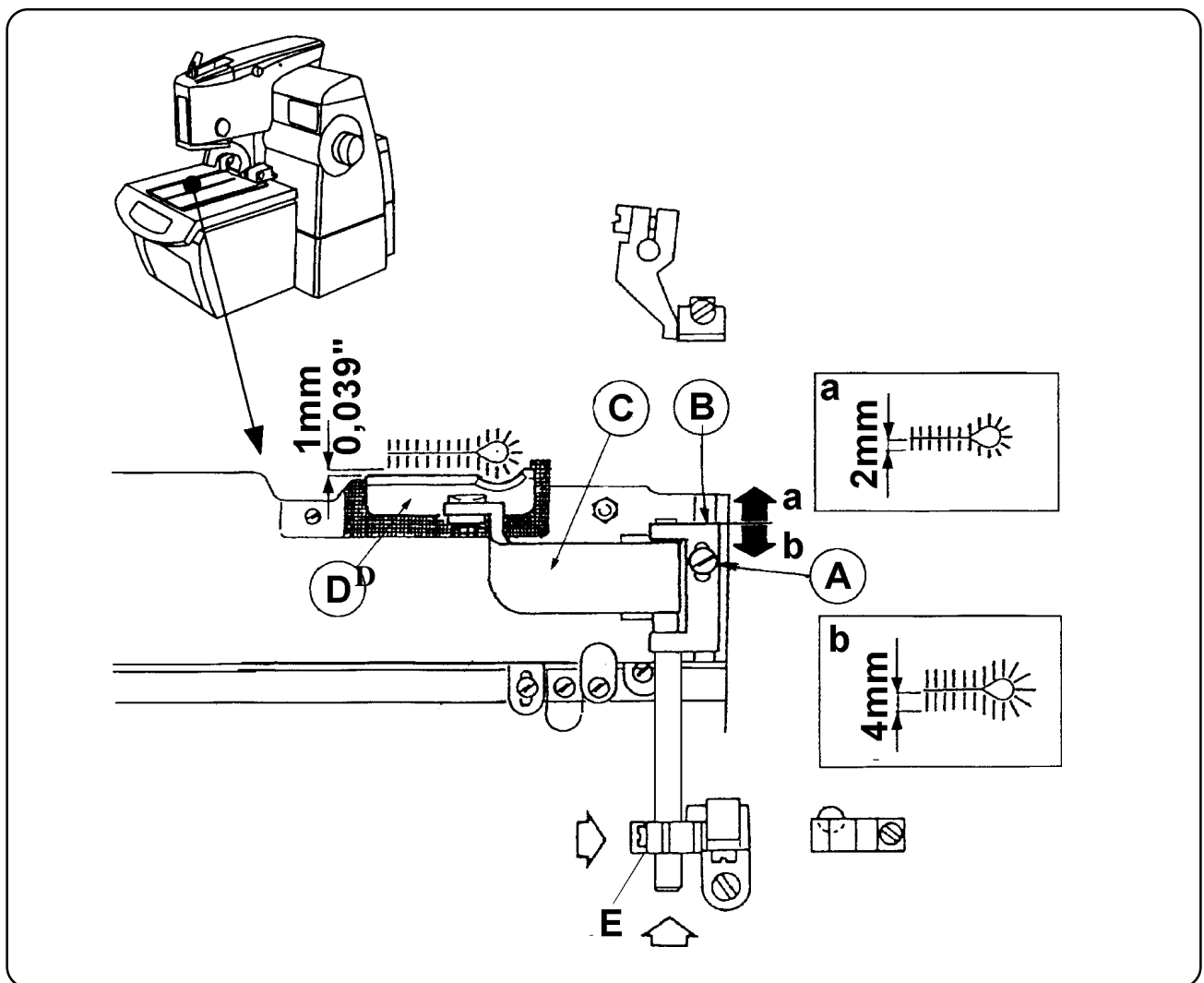
### CLAMP FEET POSITION AND NEEDLE ENTRY POINT

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

The standard clearance between the clamp feet and the outside needle entry point is 1 mm (0.040").

To change the standard stitch bite width from 2.5 to 3.5 mm, (0.1 to 0.14") to 2 to 3 mm, (0.08 to 0.12") or 3 and 4 mm, (0.12 to 0.16"), loosen the set screw **A** in the mounting base **B** of the clamp arm **C** and adjust the clearance. Tighten the mounting base of the clamp arm in place.

**Note:** Moving the mounting base of the clamp arm to the left will reduce the clearance between the clamp feet **D** and the outside needle entry point. After completing the correct clamp feet position and the needle entry point adjustments, the spread clamps stop **E** must be adjusted.



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## ADJUSTMENTS

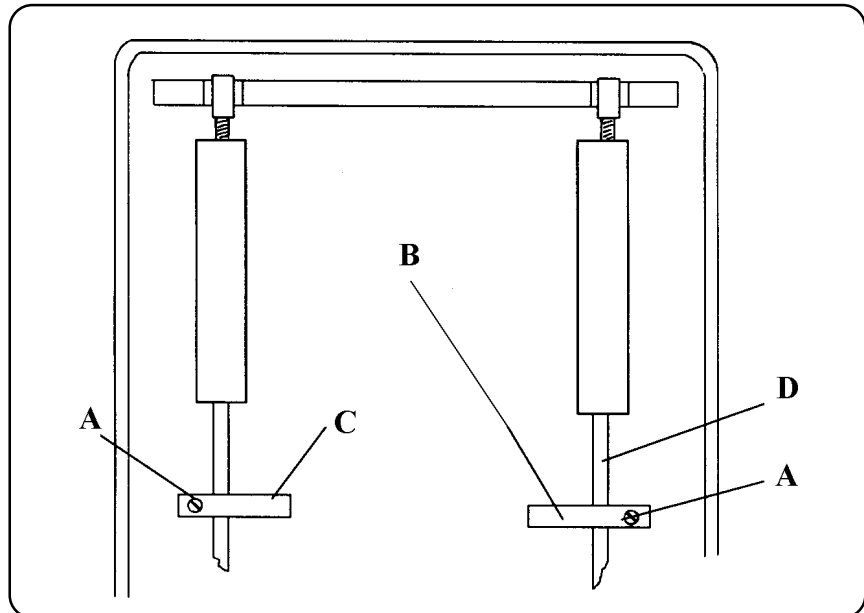
### CLAMP HEIGHT

**WARNING!** Switch off the main machine power, disconnect the air supply and dissipate any stored energy.

Loosen the screws **A** and move the right clamp arm paddle **B** and the left clamp arm paddle **C** up or down the shaft **D**, as needed.

**Note:** Moving the clamp arm paddle **A** and **B** up increases the clamp height, down decreases the clamp height.

Tighten the screws **A**.



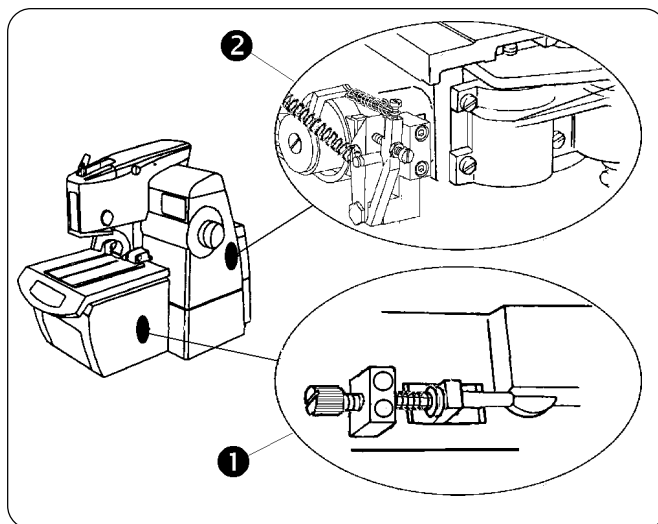
## ADJUSTMENTS

### STITCH DENSITY

#### Machine Brakes Adjustment

**WARNING!** Switch off the main machine power, disconnect the air supply and dissipate any stored energy.

There are two brakes in the machine. The main cam brake ❶ and the main shaft brake shoe ❷.

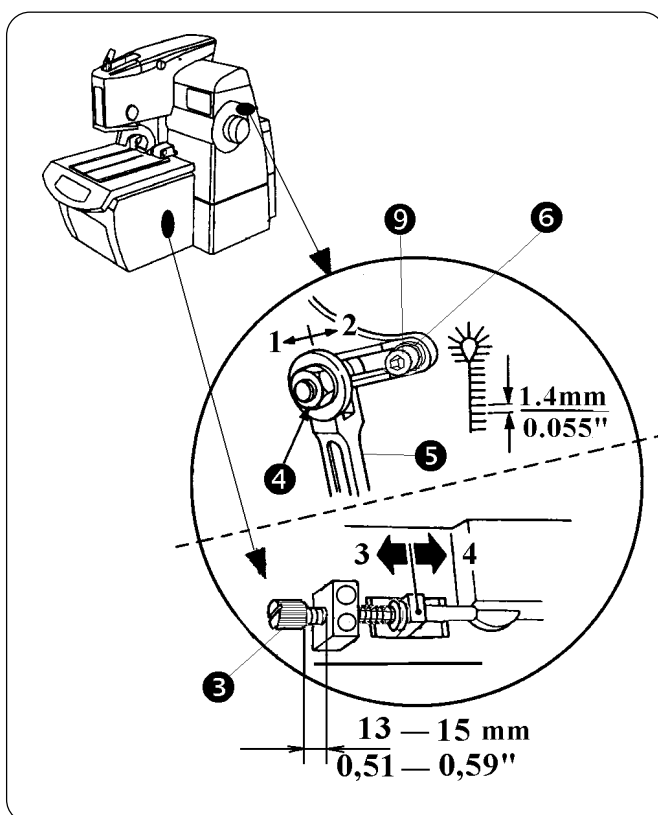


Loosen the brakes and adjust:

#### a) Main cam brake

Adjust the basic thrust of the brake bank by tightening screws ❸ to the distance 13 — 15 mm between its face and the brake holder.

After loosening the nut ❹, move the rod ❺ towards ❷ to the stop ❻ and tighten the nut.

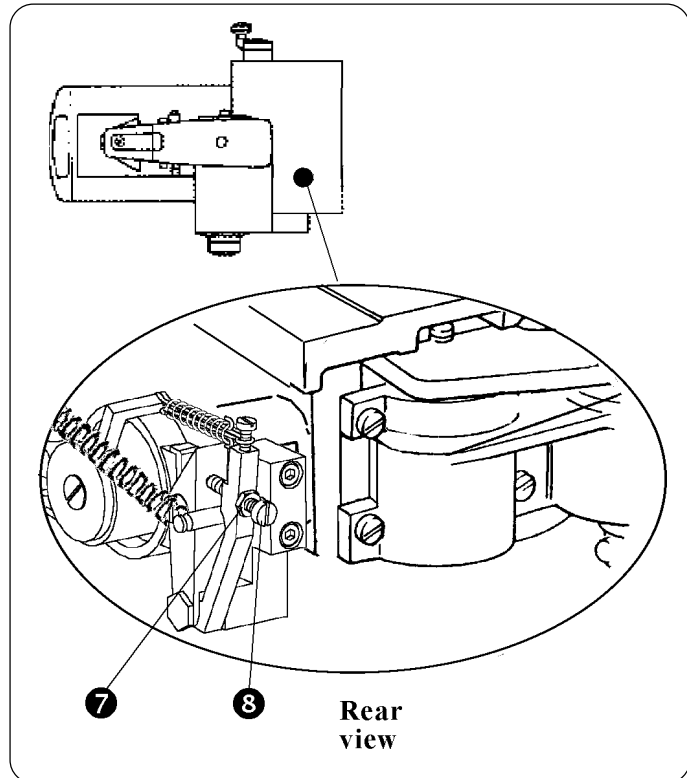


## ADJUSTMENTS

### b) Main shaft brake shoe

After loosening the nut ⑦ of the adjusting screw ⑧, adjust the thrust of the brake shoe. The stitch density should be 7 stitches / cm in the straight part of the buttonhole, it means feeding length 1.4 mm. Lock the nut in this position.

To obtain a smaller density than 7 stitches / cm, remove the stop ⑥, after loosening the screw ⑨.



**Caution!** The main shaft brake shoe is an auxiliary brake. Use the main shaft brake shoe to obtain equalization of stitch density on the left and right-hand sides. If the pressure of the main shaft brake is excessively high, the machine components may malfunction, the brake pressure must be minimized, yet still functional.



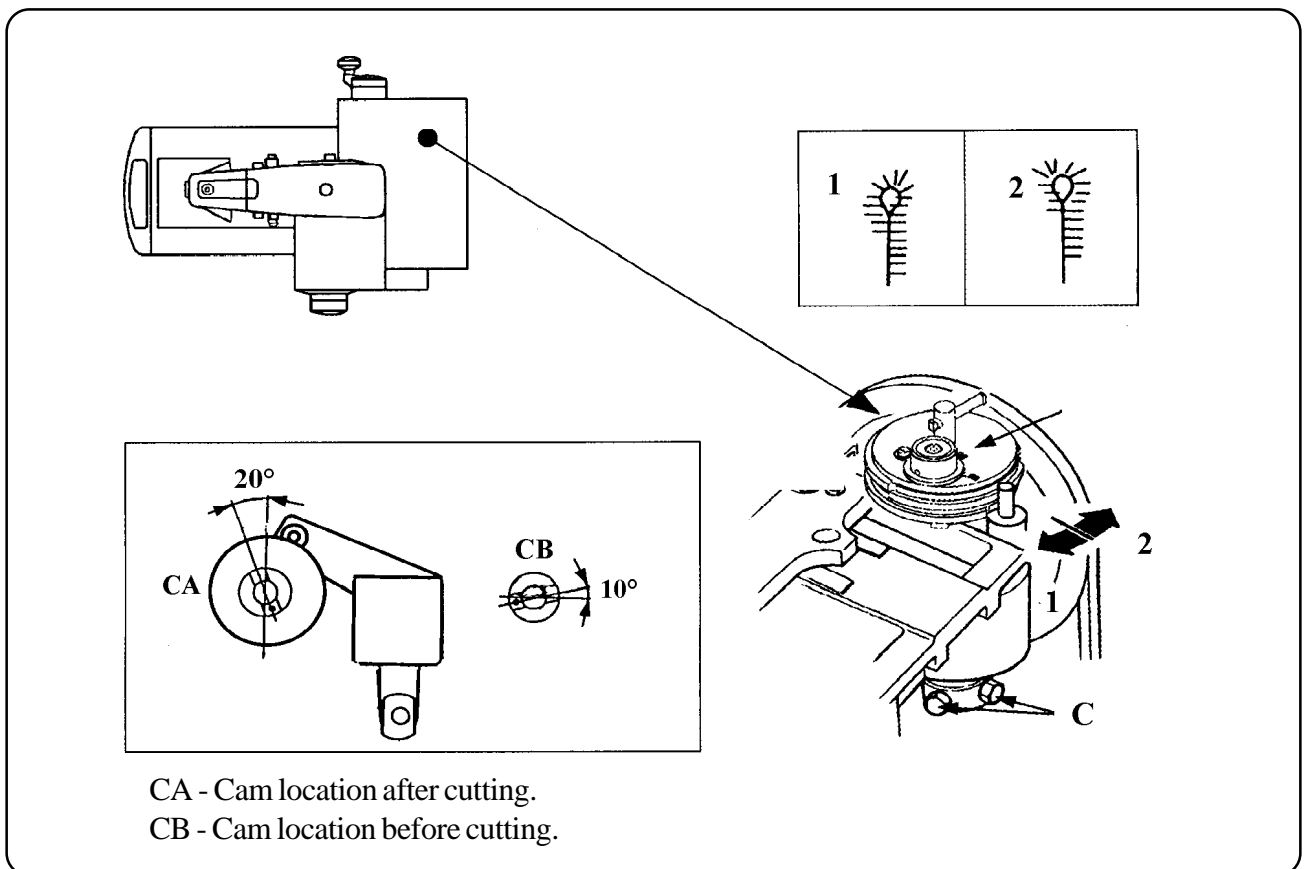
**ADJUSTMENTS**

**LATERAL CAM FOR THE EYE SHAPE**

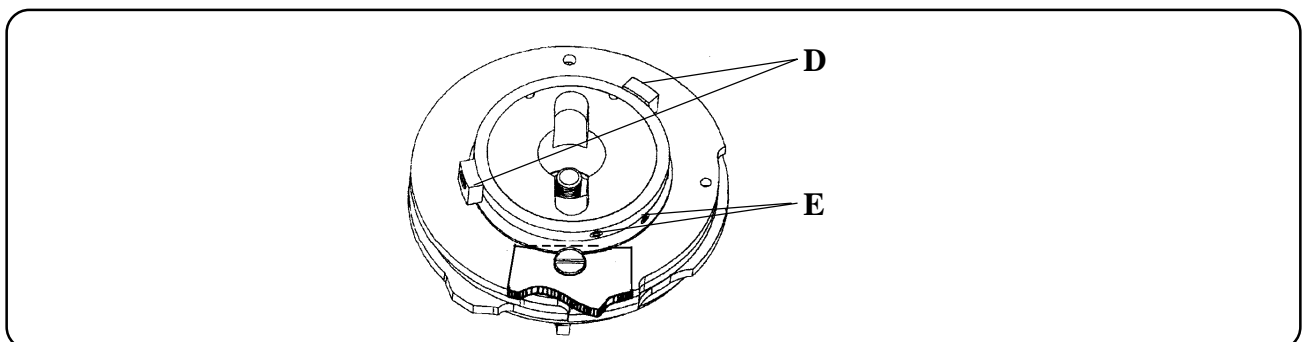
**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

Loosen the set screws **C** in the lateral cam shaft to change the eye shape of the buttonhole and rotate the cam **B** as needed. Tighten the set screws **C**.

Remove the cutting knife and thread from the machine. Place paper under the clamp feet for a prick-in to check the eye shape of the buttonhole. If the shape at the eye section looks like figure **1**, rotate the lateral cam in direction **1**. If the shape of the eye section looks like figure **2**, rotate the lateral cam in direction **2**.



When changing the stop position, adjust the blocks **D** on the cam by using the adjusting screws **E**.



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## ADJUSTMENTS

### CHANGING THE STITCH BITE WIDTH

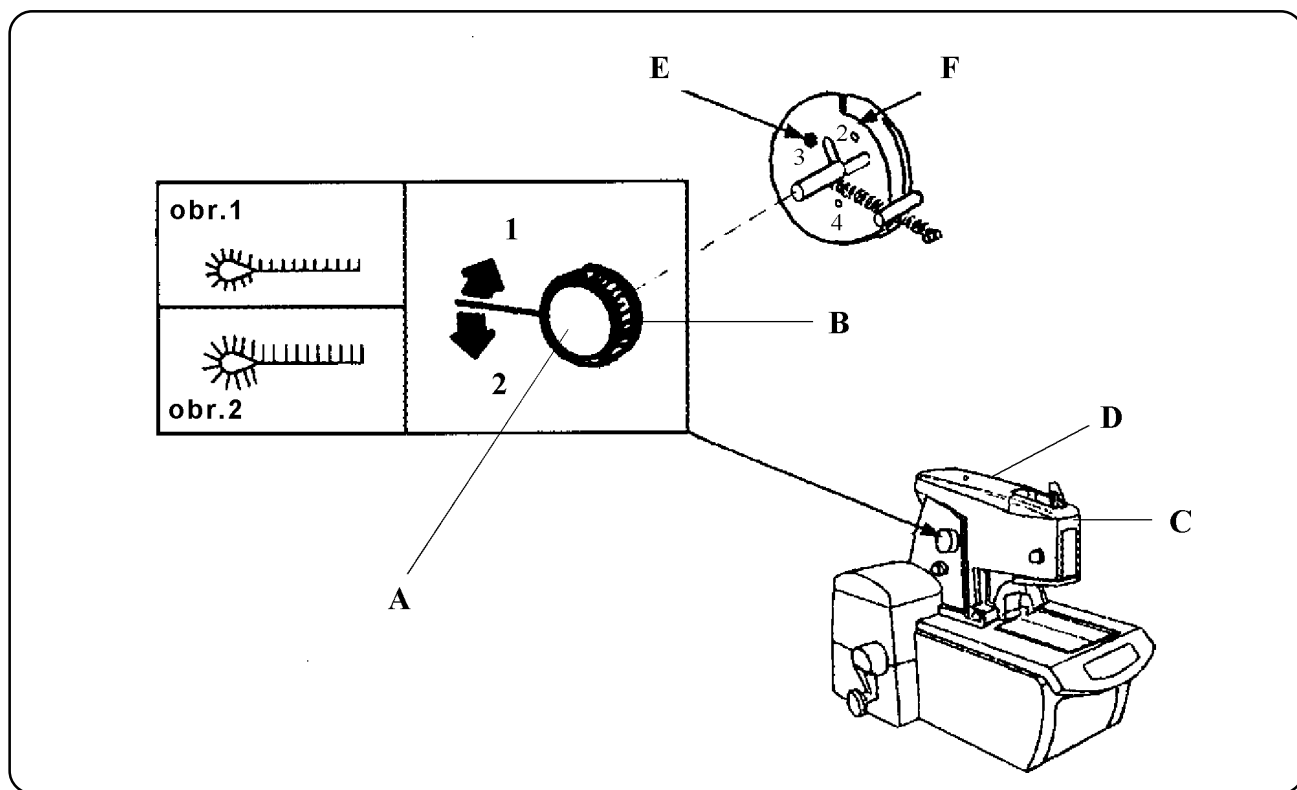
Rotate the stitch bite adjusting knob **A** clockwise to decrease the stitch bite width, as illustrated in example number **2**. Rotate the knob **A** counterclockwise to increase the stitch bite width, as illustrated in example number **1**.

The standard stitch bite width, between 2.8 and 3.2 mm, (0.110 and 0.124") is factory set.

To change the stitch bite factory setting:

Loosen the adjusting knob **A** set screw **B** and remove the adjusting knob **A**. Loosen the upper thread pick up holder (harpoon holder) and remove the pick up holder. Remove the front cover **C**. Locate the four headless screws under the front cover. Loosen the two left side screws and the arm cover screws **D**, remove the arm cover. Loosen the left side screw under the cover and remove the left-hand cover. Loosen the set screw **E** and rotate the stitch bite adjusting segment **F** until obtaining the required hole to provide the correct stitch bite setting. Tighten the set screw **E**. Install all parts.

**Note:** Check the looper timing after changing the stitch bite width, set if necessary.

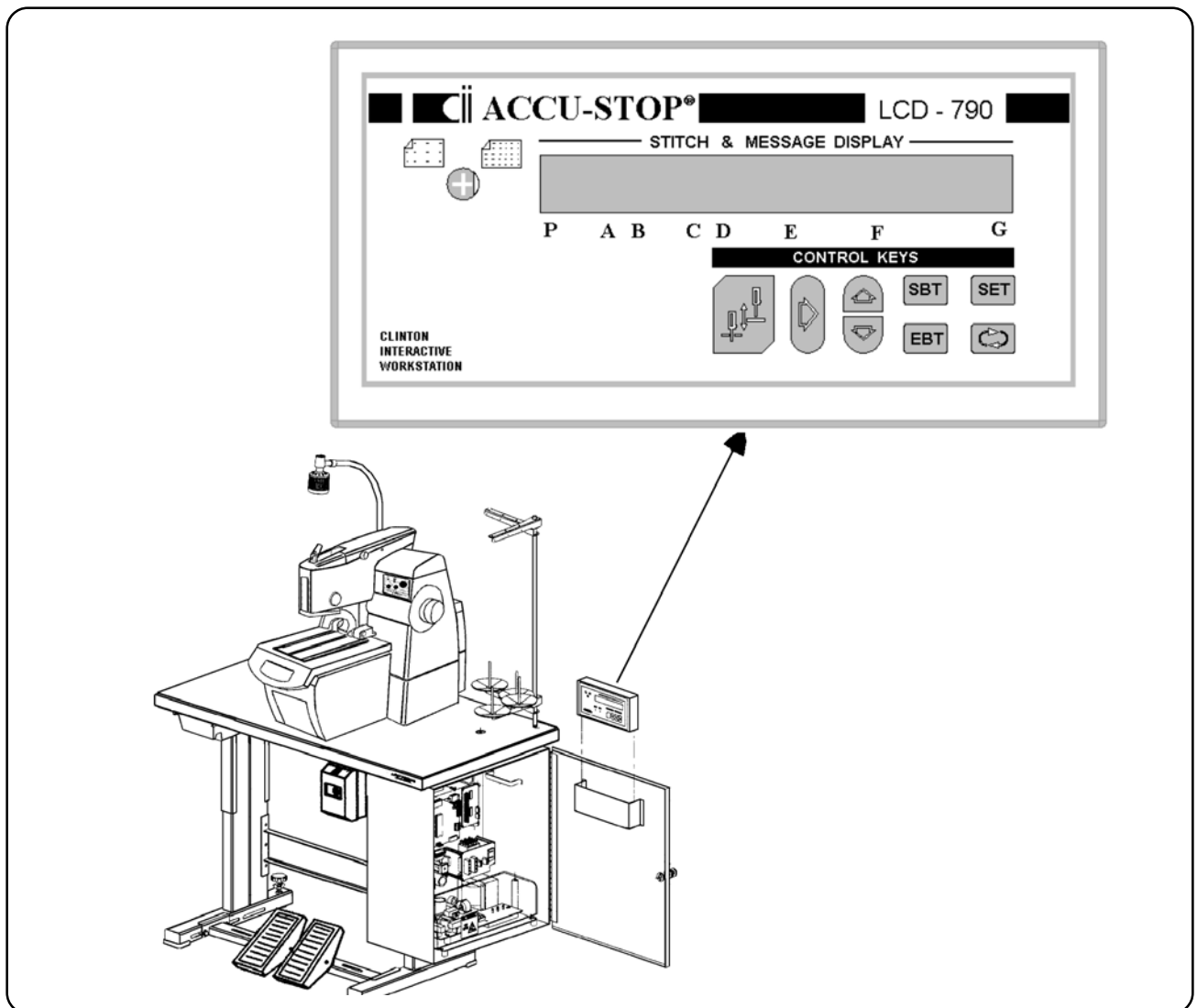
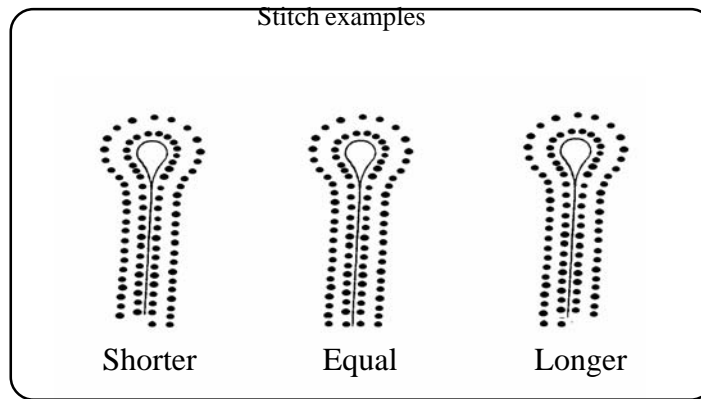


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## ADJUSTMENTS

### LAST STITCH STOP

The end adjustment is made using the LCD display, page 1-23, End Count.



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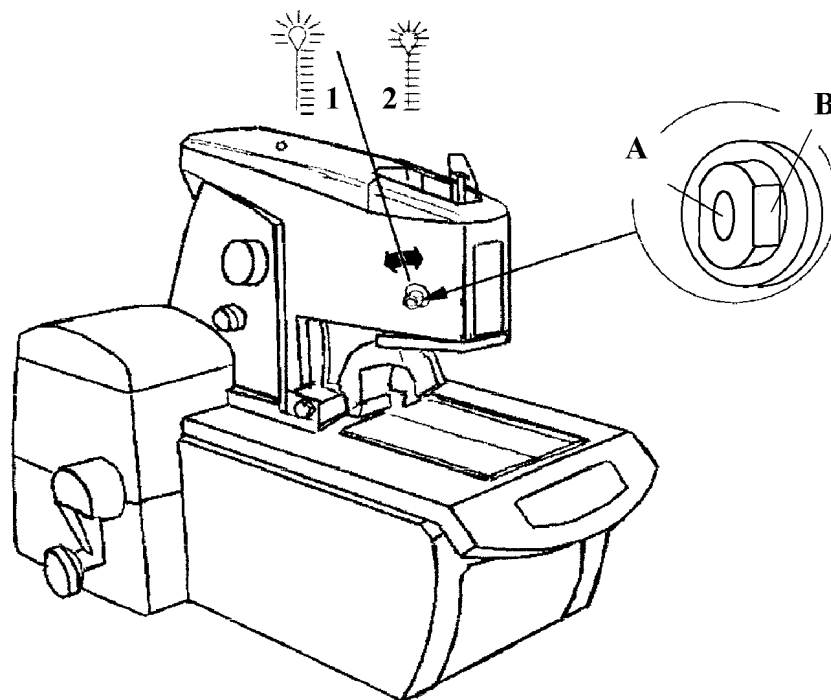
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## ADJUSTMENTS

### CUTTING SPACE

Loosen the locking screw **A**. Rotate the adjusting pin **B** clockwise to increase the cutting space, as illustrated in example **2**. Rotate the adjusting pin counterclockwise to decrease the cutting space, as illustrated in example **1**.

**Note:** Check the looper timing after changing the cutting space, set if necessary.



**ADJUSTMENTS**

**BUTTONHOLE SHAPE AND THE INSIDE CUT LENGTH**

The XL-21 eyelet buttonhole machine is supplied with the capability of producing adjustable fly and cord trim buttonholes.

**Adjustable Fly**

**AF CB/CA RE**, following only **AF** - with buttonhole lengths from 12 to 32 mm and upper thread trim. Cutting before or cutting after sewing. The buttonhole may be adjusted with the eye shapes (0/0; 2.5/4; 3/5; 4/5; - width - height ratio), page 1-65.

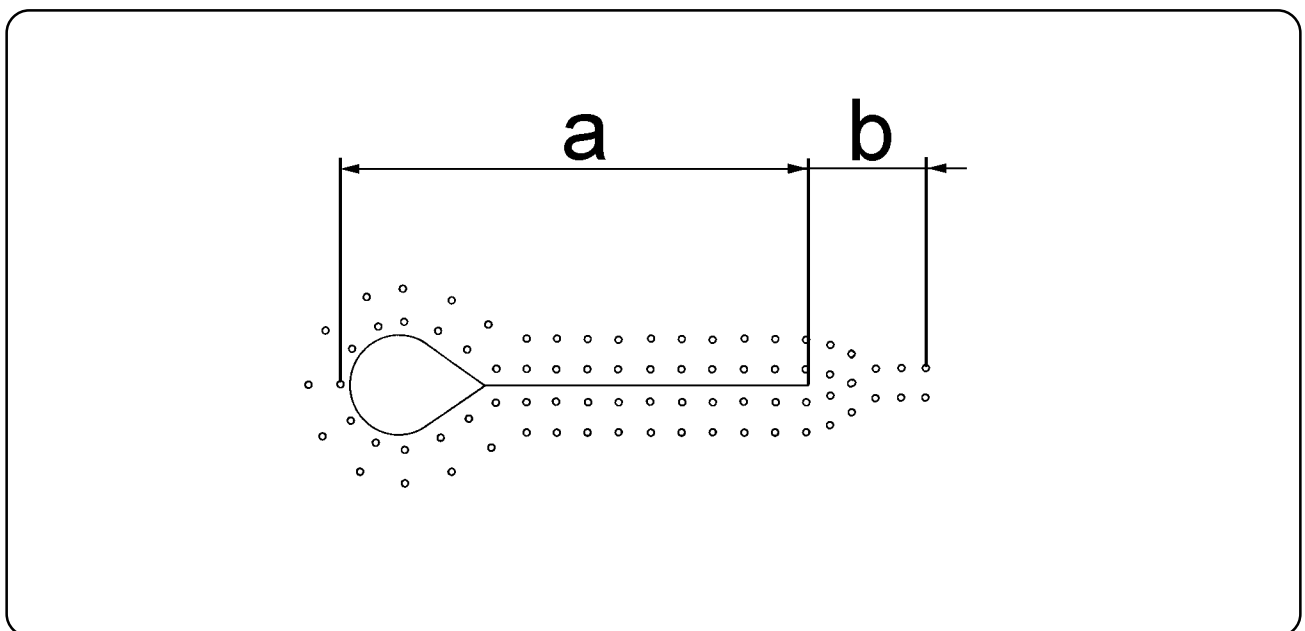
**Cord Trim**

**AF CB-CARE**, following **CT** - with buttonhole lengths of 16 - 22 mm, all threads are trimmed, (upper, bottom, and inserted gimp thread). Trimming of thin materials is only adjusted when the sewn buttonhole has a eye shape of (0/0; 2.5/4; 3/5; 4/5; - width - height ratio), page 1-65.

The XL-21 eyelet buttonhole machine is supplied with the capability of producing variable eye shapes.

**Buttonhole length**

The finished buttonhole has two main parameters. One parameter is the **buttonhole length - a** (eye and straight part, which is cut by the cutting knife before or after sewing). The other parameter is **bar - b** (tapered part and straight bar), both are adjustable.



## ADJUSTMENTS

### ELEMENTS FOR BUTTONHOLE LENGTH ADJUSTMENT

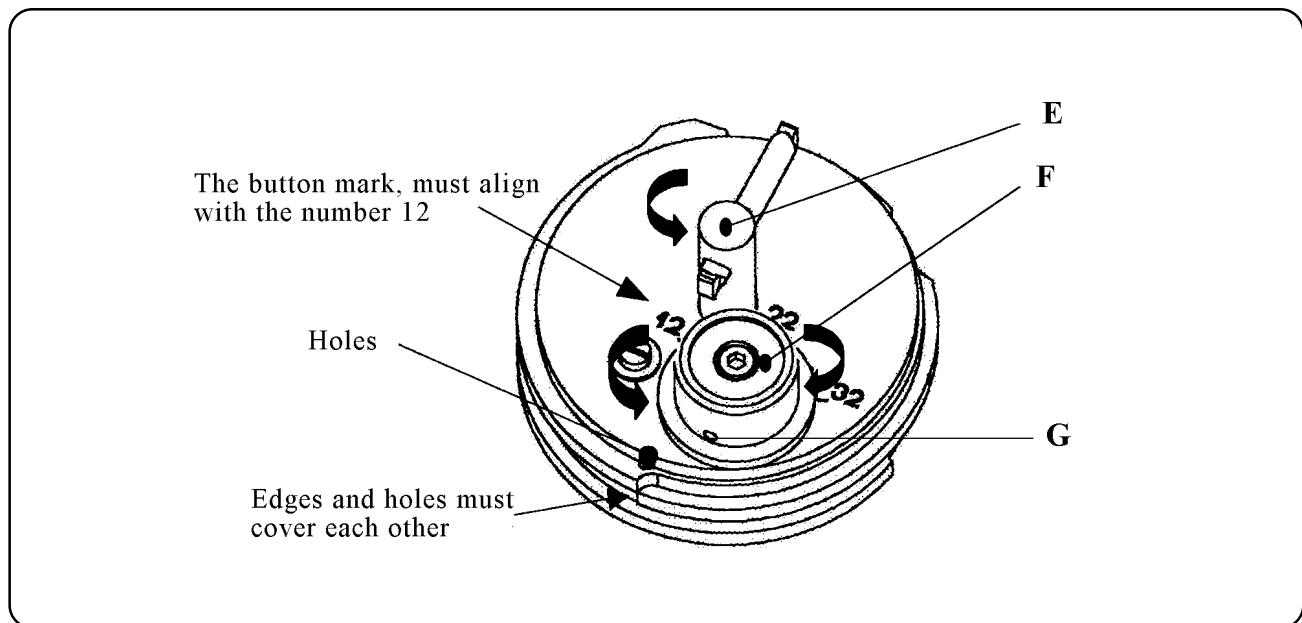
Buttonhole length is adjusted by using two mechanical and one electronic element:

1. The adjustable cam
2. The adjustable pull rod dial
3. The LCD display

#### Adjustable Cam

Home position of the cam is adjusted as follows:

Loosen the locking screw **E**, turn the button **F** to the left until the edges of each disk and the hole in the upper disk are covered. The disks are turned so their lobes and cavities are coming closer from the left and right side up all the way to the stop position. When you are unable to turn further, you have reached the home position. Loosen the screw **G** and align the button **F** mark (white point at the edge) with the number **12** on the circular scale. Tighten the screw **G** and the locking screw **E**.



#### Cam Setting According to the Buttonhole Length

Loosen the locking screw **E**. Turn the button **F** to the required buttonhole length “a”, page 1-65, according to the circular scale. Tighten the adjusting screw **E**. The underside of the fixed disk segments for the eye shape (0/0; 2.5/4; 3/5; 4/5) may be changed.

## ADJUSTMENTS

### Adjustable Pull Rod Dial

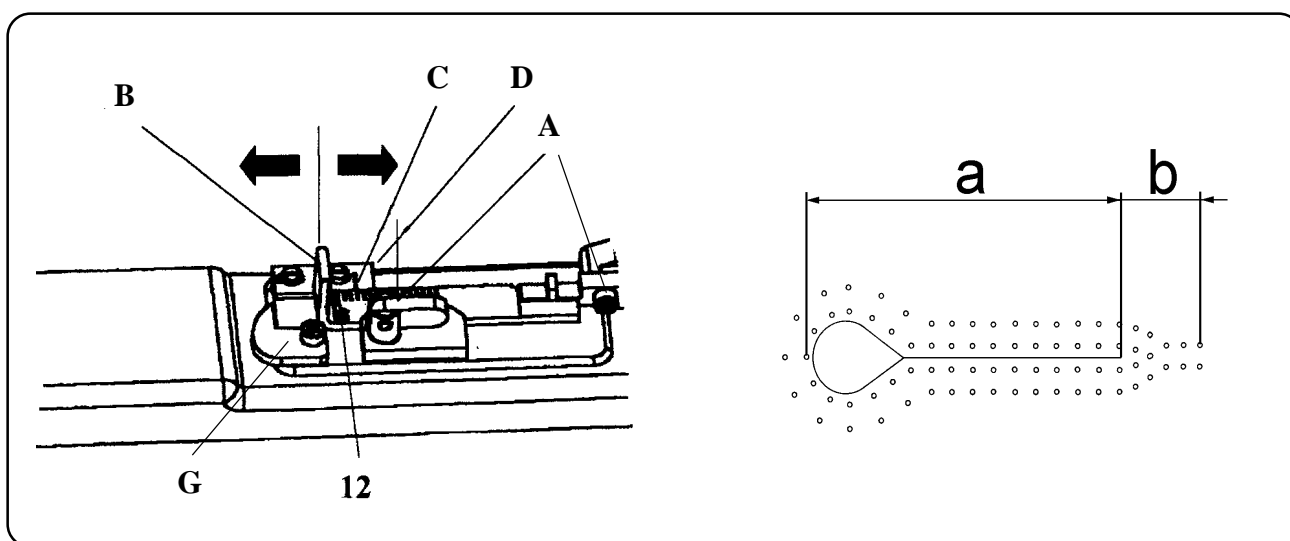
Using the adjustable pull rod dial, set the buttonhole length “a” and the buttonhole bar “b”:

Loosen the screws **A**.

Example: for buttonhole length **a = 22 mm** and the bar **b = 6 mm**, the final total length is **28 mm**.

Set this final value by pulling the pull rod **B** to the front or back until the desired final value, set on the pull rod dial **B**, is aligned with the groove **C** of the indicator **D** (on the left side from the pull rod dial **B**)

The maximum total length is **32 mm**, therefore a buttonhole **32 mm** long may only be sewn as an opened buttonhole without the bar, the bar = 0, see the table below.



### Buttonhole Length Table

| Buttonhole length                 | 12-25 mm | 26 mm | 27 mm | 28 mm | 29 mm | 30 mm | 31 mm | 32 mm |
|-----------------------------------|----------|-------|-------|-------|-------|-------|-------|-------|
| Minimum bar length for appearance | 3 mm     | 3 mm  | 3 mm  | 3 mm  | 3 mm  | 0     | 0     | 0     |
| Maximum bar length                | 7 mm     | 6 mm  | 5 mm  | 4 mm  | 3 mm  | 0     | 0     | 0     |

### LCD Display

The fine adjustment of the left and right row of the buttonhole and the first and last stitch may be performed with the LDC display.

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## ADJUSTMENTS

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### Adjustable Flybar

All the variable parts for the AF adjustment are marked with a white color. The parts are:

- LH clamp plate assembly
- RH clamp plate assembly
- Throat plate
- Cutting steels in lengths 12-32 (only the selected set 12, 16, 19, 22, 26, 29 is delivered with the machine)
- Knife with the large eye for cutting before sewing
- Knife with the small eye for cutting after sewing
- Straight knife for cutting the straight buttonhole
- Segments for the eye shape 0/0; 2.5/4; 3/5; 4/5; segment 3.5 is already assembled in the machine, the other segments are delivered with the machine.

**Caution!** If the parts are changed for the parts marked with a blue color, the machine may be damaged.

When the parts are correctly installed, the buttonhole length adjustment may be performed according to the steps in the “Buttonhole Shape and inside cut length” and “Elements for Buttonhole Length Adjustment”. There is only one exception from the description, the stop G must be turned 90° to allow free movement of the adjustable pull rod dial. The scale, 12 - 32 mm is marked with a white color on the pull rod dial.

### Cord Trim

All the exchangeable parts for CT adjustment are marked by a blue color. The parts are following:

- LH clamp plate assembly
- RH clamp plate assembly
- Throat plate
- Cutting steels in lengths 16, 19 and 22
- Shortened knife with the large eye for cutting before sewing
- Shortened knife with the small eye for cutting after sewing
- Shortened straight knife for cutting the straight buttonhole
- Segments for the eye shape 0/0; 2.5/4; 3/5; 4/5; segment 3.5 is already assembled in the machine, another segments are part of delivery

**Caution!** If parts marked with the white color are incorrectly exchanged, machine damage may occur.

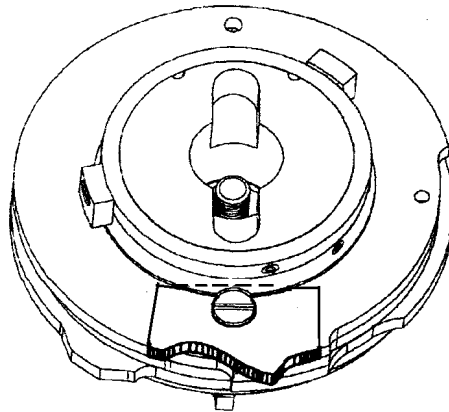
When the parts are correctly fixed, buttonhole length adjustment can be made according already described steps in “Buttonhole shape and inside cut length” and “Elements for Buttonhole Length Adjustment”. There is only one exception from the description, the stop G must be turned to prevent adjustable pull rod dial B from free movement towards setting the longer buttonhole then 22 mm and bar 7 mm, so the total value 29 mm. The scale 16 mm - 32 mm is marked by a blue color on the pull rod dial. If different setting from the above described is made trim function is not functional or knives can contact needle and some parts would be damaged.

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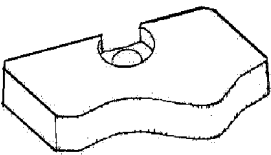

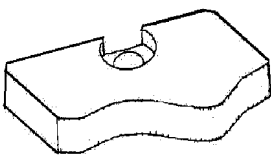
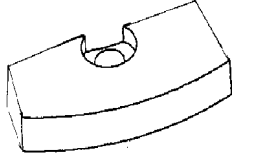


**ADJUSTMENTS**

**Variable Cam Segments**



According to the type of eyelet, only the segment of the cam changes.

| Variable Cam Segments   |   |  |   |
|---|---|--|---|
|  |  |  |  |
| Small eye<br><b>2.5 x 4</b>   | Medium eye<br><b>3 x 5</b>  | Large eye<br><b>4 x 5</b>  | No eye<br><b>0</b>  |
| Part Number   | Part Number   | Part Number  | Part Number   |
| 18.0067.2.402   | 18.0067.2.403   | 18.0067.2.404  | 18.0067.2.402   |

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## ADJUSTMENTS

### NEEDLE BAR HEIGHT

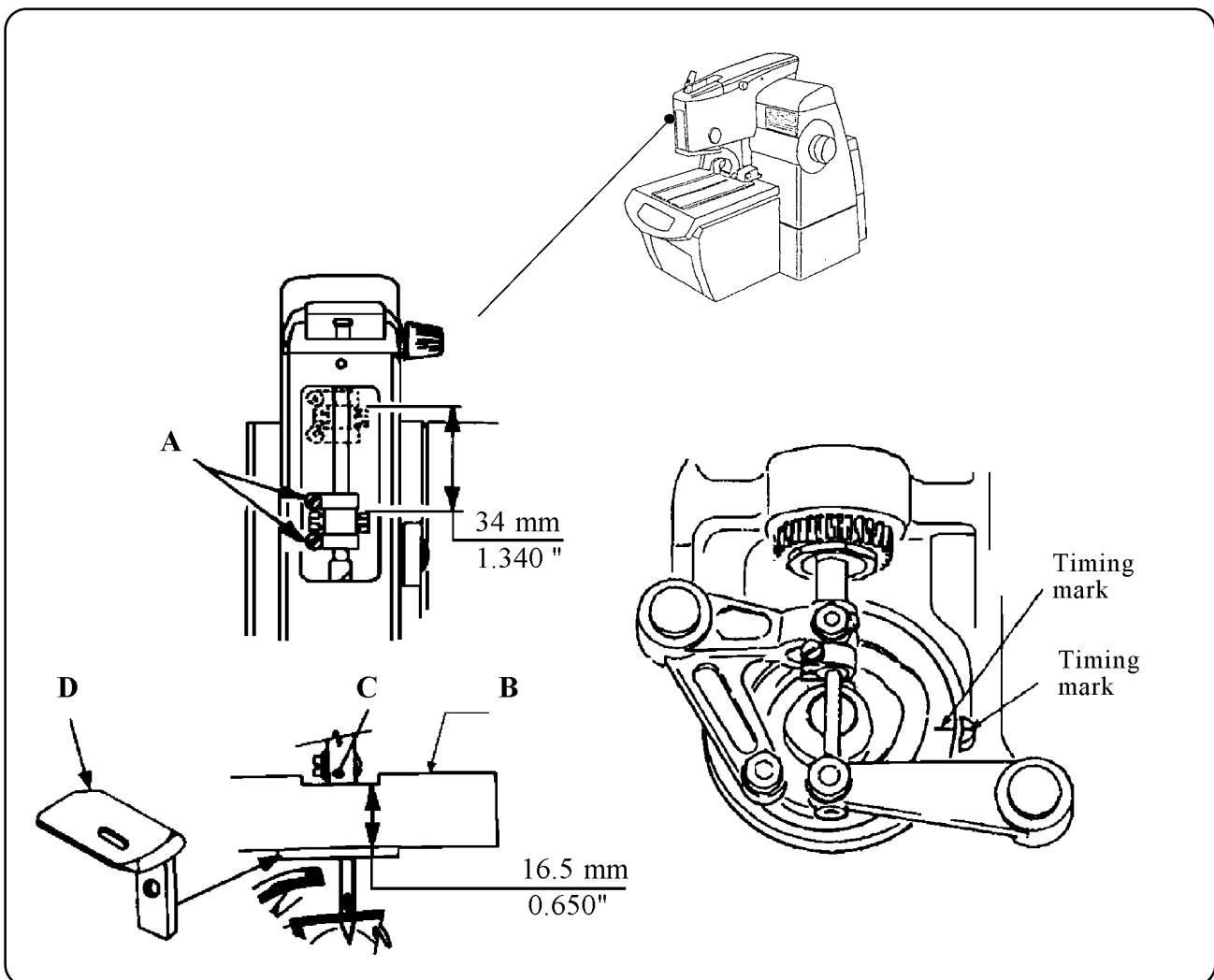
**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

Using the throat plate gauge **D**, replace the throat plate. Check the needle bar **C** height with the height gauge **B**. With the needle bar **C** set at the bottom of its stroke, the timing marks must align.

Standard height of the needle bar **C** is 16.5 mm, (0.650") between the top of the height gauge **B** and the bottom of the needle bar, when the needle bar is in the lowest position.

To adjust:

Loosen the screws **A** and move the needle bar **C** up or down as needed. Tighten the screws **A**. Using the needle bar height gauge **B**, ensure the needle bar height setting is correct.



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## ADJUSTMENTS

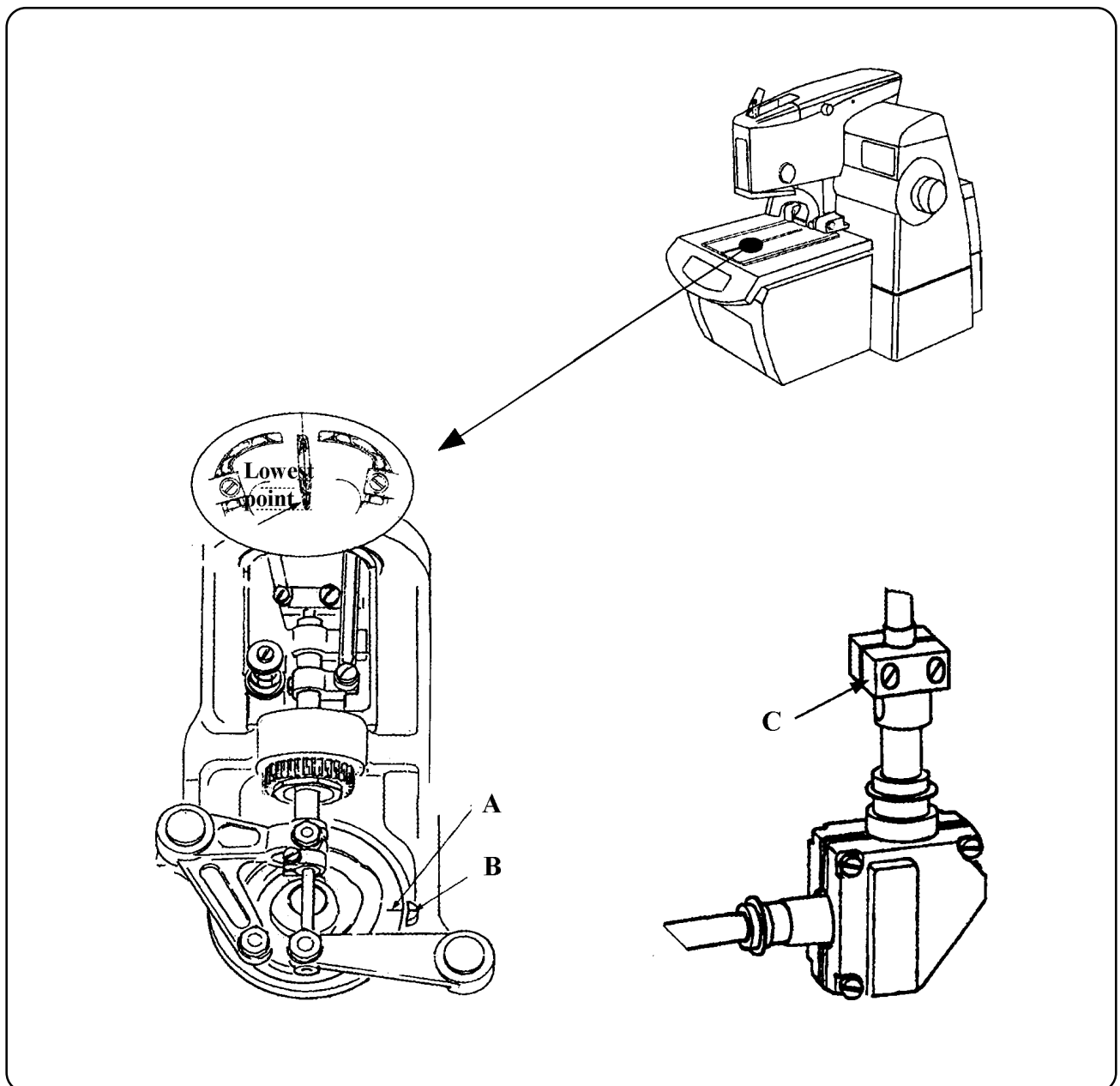
### LOOPERS AND NEEDLE TIMING

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

Rotate the right-hand stitch wheel until the red light activates. Insert the needle. Rotate the right-hand stitch wheel until the needle bar reaches the lowest point of the first stroke.

Lift the machine and check the alignment of the timing marks **A** and **B**. If not aligned, loosen the screws **C** and rotate the cam as needed, to align the timing marks.

Tighten the screws **C**.



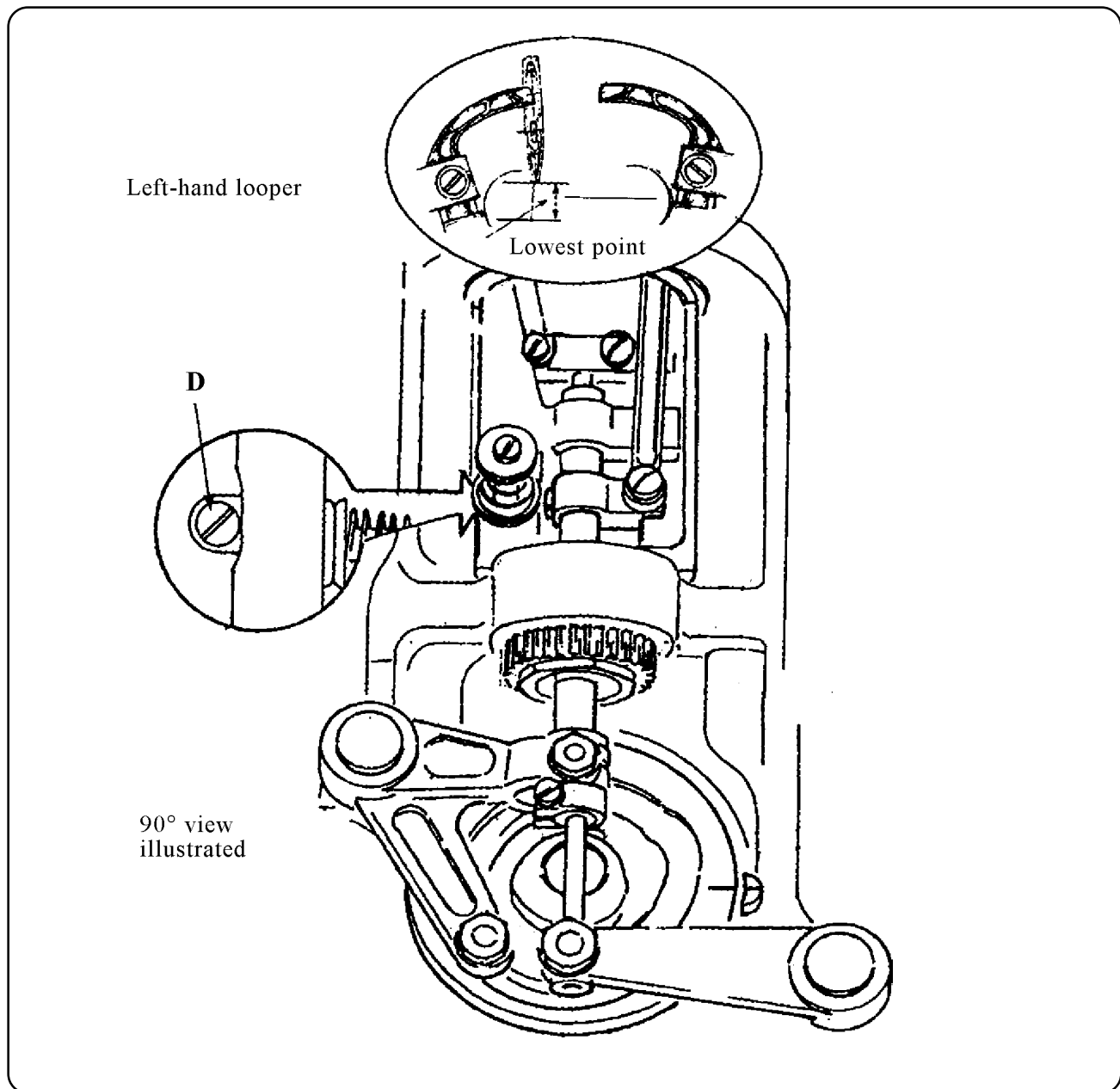
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**ADJUSTMENTS**

Insert the gauge, rotate the right-hand stitch wheel to raise the needle bar up to 3.5 mm, (0.140"). The point of the left-hand looper, must be half way across the needle. If incorrect, loosen the screw **D** and position the left-hand looper to the right or left, to bring the looper to the center line of the needle.



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## ADJUSTMENTS

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

The standard clearance between the loopers and the needle is between 0.05 to 0.10 mm, (.002 to .004").

To adjust:

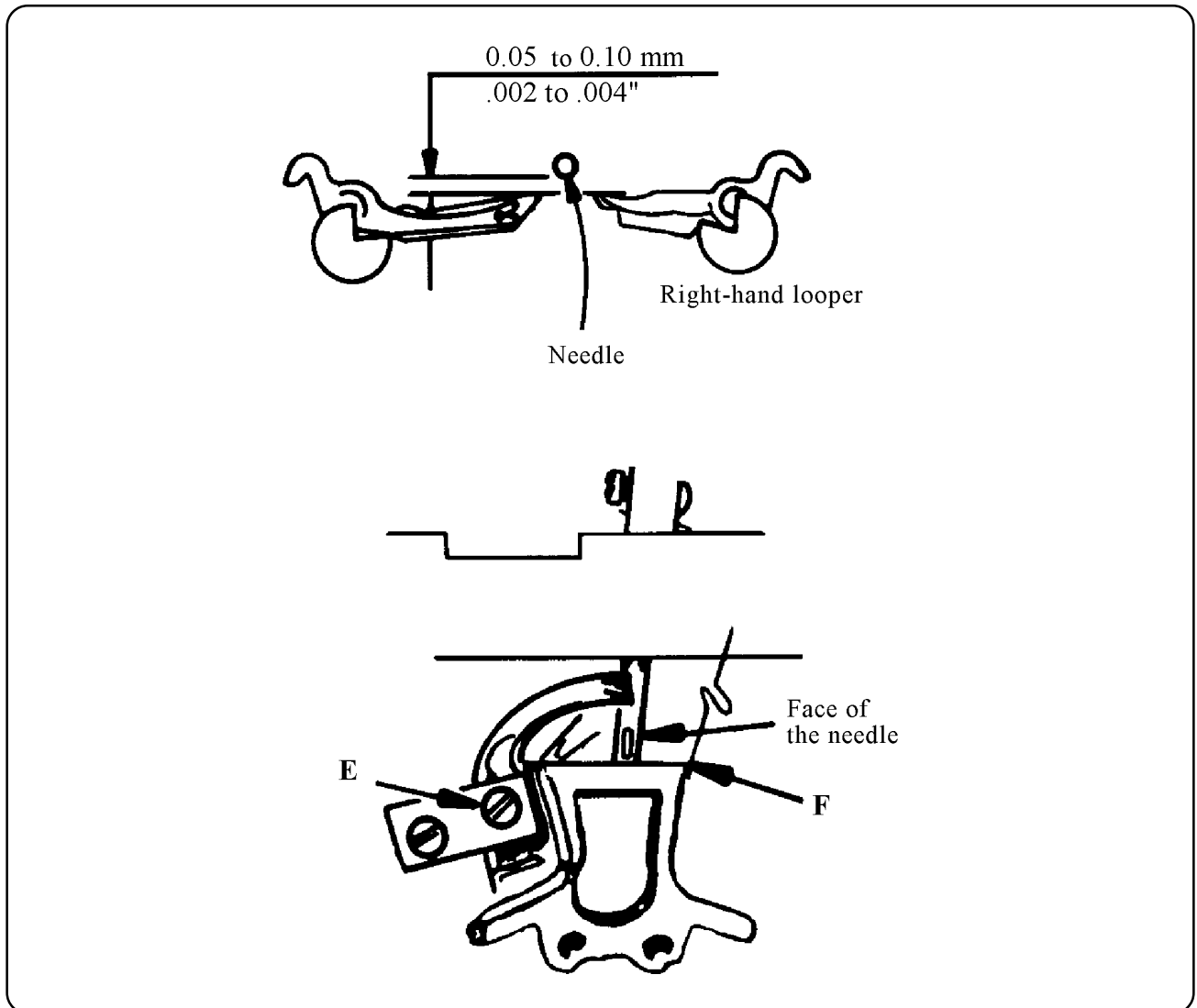
Loosen the screw **E** and position the loopers in or out as needed to obtain the proper clearance.

Tighten the screw **E**.

The standard clearance between the face of the needle and the back of the needle guard **F** is 0.05 to 0.1 mm, (.002 to .004").

To adjust:

Bend the needle guard **F** in or out as necessary to obtain the correct clearance.



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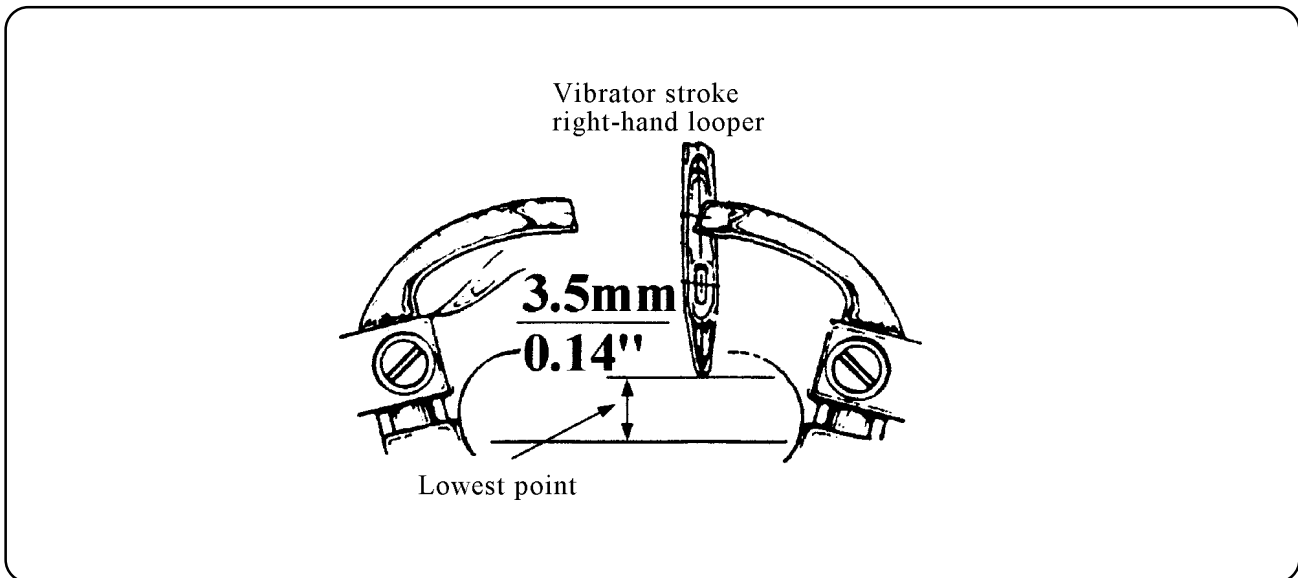
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## ADJUSTMENTS

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

Rotate the left-hand crank until the needle bar is in the lowest point of the vibrator stroke. Insert the gauge, rotate the right-hand stitch wheel to move the needle bar up to 3.5 mm, (0.140"). The point of the right-hand looper must be halfway across the needle. If incorrect, repeat the setting.

**CAUTION!** When purchasing new loopers and spreaders, it is imperative only XL-21 AMF Reece designed parts be used for this machine. The part numbers are listed in the Parts Section of this manual.



## ADJUSTMENTS

### SPREADER OPEN/CLOSE TIMING

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

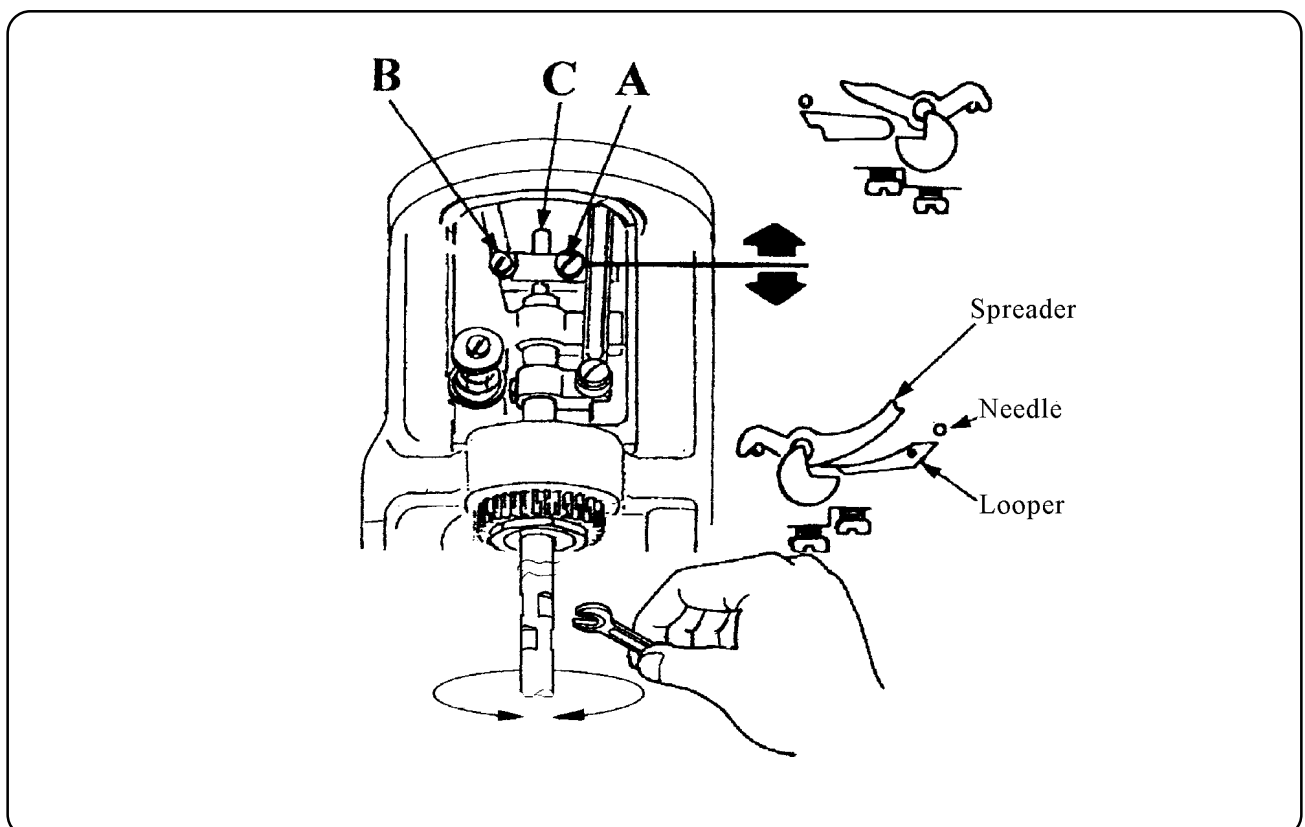
**Note:** The factory set yellow screw **A**, should never need adjusting.

**Note:** Adjust until the spreaders open and close **equally** on the left and right without contacting the needle.

If incorrect:

Loosen the set screw **A** in the spreader crosshead **B**, located in the spreader spindle **C**. Rotate the spreader spindle, by holding the wrench on the flats on the bottom of the spindle, until obtaining the correct position. Once the adjustment is correct, tighten the set screw **A** holding the crosshead **B** in place.

It is very important both the right-hand and left-hand spreaders are on **equal** distance from the needle.



## ADJUSTMENTS

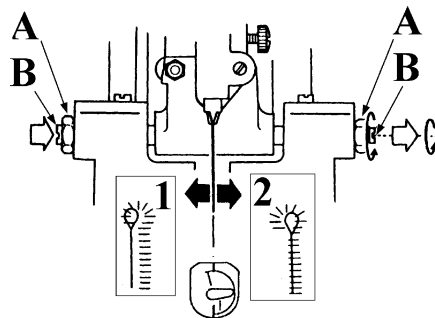
### KNIFE AND CUTTING LEVER

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

Upper Knife - Loosen the cutting lever studs locknuts **A** and adjust by moving the studs **B** to the left or right, as needed. Tighten the studs. If the buttonhole cut looks like illustration **1**, rotate the studs **B** to the right, if the buttonhole cut looks like illustration **2**, rotate the studs **B** to the left.

Cutting Steel - Loosen the cutting steel set screws **C** and obtain the proper setting by moving the base **D** to the left or right. Tighten the base.

**Note:** The upper knife and the cutting steel must be aligned with the axes of a sewn buttonhole.



### CUTTING KNIVES

Cutting knives supplied with the machine:

| Knife Style | Buttonhole Length | Part Number   |
|-------------|-------------------|---------------|
| 3/5CA       | 10-40 mm          | 18.0087.0.405 |
| 3/5CB       | 10-40 mm          | 18.0087.0.406 |
| Without Eye | 10-40 mm          | 17.0064.5.863 |
| 3/5CA-T     | 10-22 mm          | 18.0087.0.407 |
| 3/5CB-T     | 10-22 mm          | 18.0087.0.408 |
| Without Eye | 10-22 mm          | 17.0064.6.325 |

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## ADJUSTMENTS

### CHANGING THE KNIFE AND THE CUTTING STEEL

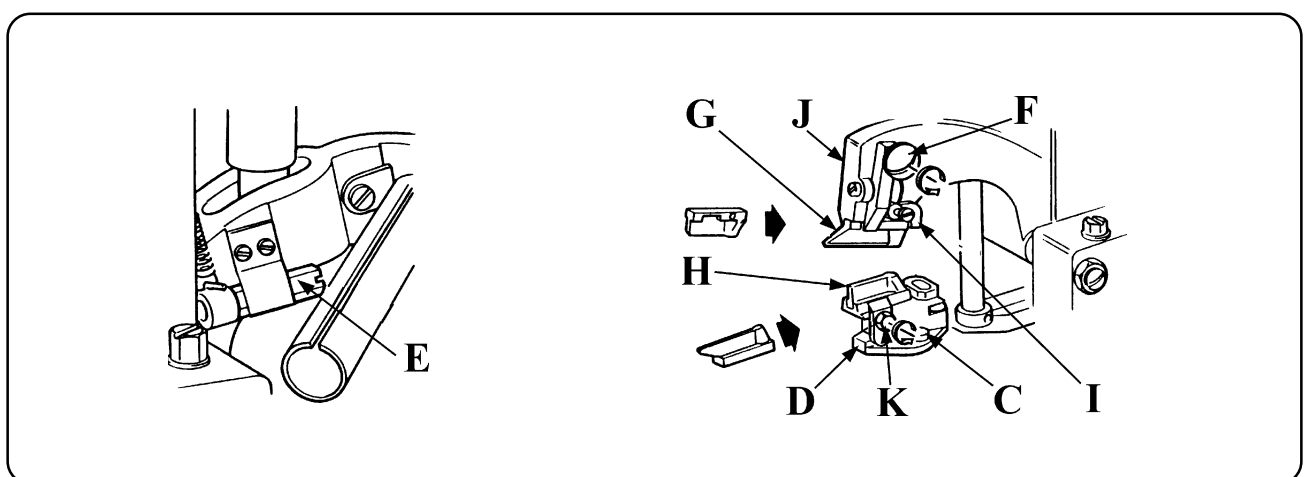
**Note:** The cutting pressure must be adjusted when the cutting steel or the knife is replaced, or when the type of fabric being sewn changes. The cutting steel varies according to the buttonhole length.

**Caution!** To obtain correct buttonhole cuts perform each step of the following procedure. Failure to follow these steps may cause knife breakage and possible machine damage.

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

Remove the knife **G** and the cutting steel **H**. Ensure the contact surface of the cutting lever **J** and the knife holder are not damaged. Install the new cutting steel **H**. Install the new knife **G** against the stop **I** and lightly tighten the knife locking screw **F**. Manually lower the knife **G** against the cutting steel **H** to seat the knife **G** in the holder and fully tighten the knife locking screw **F**. Manually position the cutting lever toward the knife holder and ensure the knife **G** and the cutting steel **H** are correctly aligned. Decrease the cutting lever pressure by rotating the pressure adjusting screw **E** counterclockwise three revolutions. Position a piece of paper between the knife **G** and the cutting steel **H**. Manually rotate the handwheel through a cycle to lower the knife and create a knife impression on the paper. Increase the cutting pressure screw **E** one revolution at a time, until the entire length of the impression mark is obtained. Position a piece of fabric between the knife **G** and the cutting steel **H**. Manually rotate the handwheel through a cycle to lower the knife, cut the fabric and ensure the entire length of the cut is correct. Increase the cutting pressure screw, one revolution at a time, until the entire length of the fabric cut is correct.

**Caution!** Using the lightest cutting pressure possible to obtain a correct cut will greatly decrease the possibilities of damaging the casting or the cutting lever. After installing a new cutting steel, decrease the cutting pressure, activate the knife and ensure proper clearance between the knife and the cutting steel. Gradually increase the pressure to obtain a correct cut and maintain proper clearance..



## ADJUSTMENTS

### TOP THREAD PICKER MECHANISM AND TRIM TIMING

**WARNING!** Switch off the main machine power and disconnect the air supply and release any stored energy.

The top thread picker mechanism provides the required thread length to ensure the next buttonhole is sewn correctly. The picker is controlled by a pneumatic switch **A** and cylinder **B**, as illustrated.

First, the top thread is trimmed by the standard trim mechanism and about the same time, the trimmed thread must be pulled out of the fabric. The lower and gimp threads are trimmed just before the race rotates. The control is under the rear cover. The top thread is trimmed first and pulled out of the fabric by the thread picker mechanism.

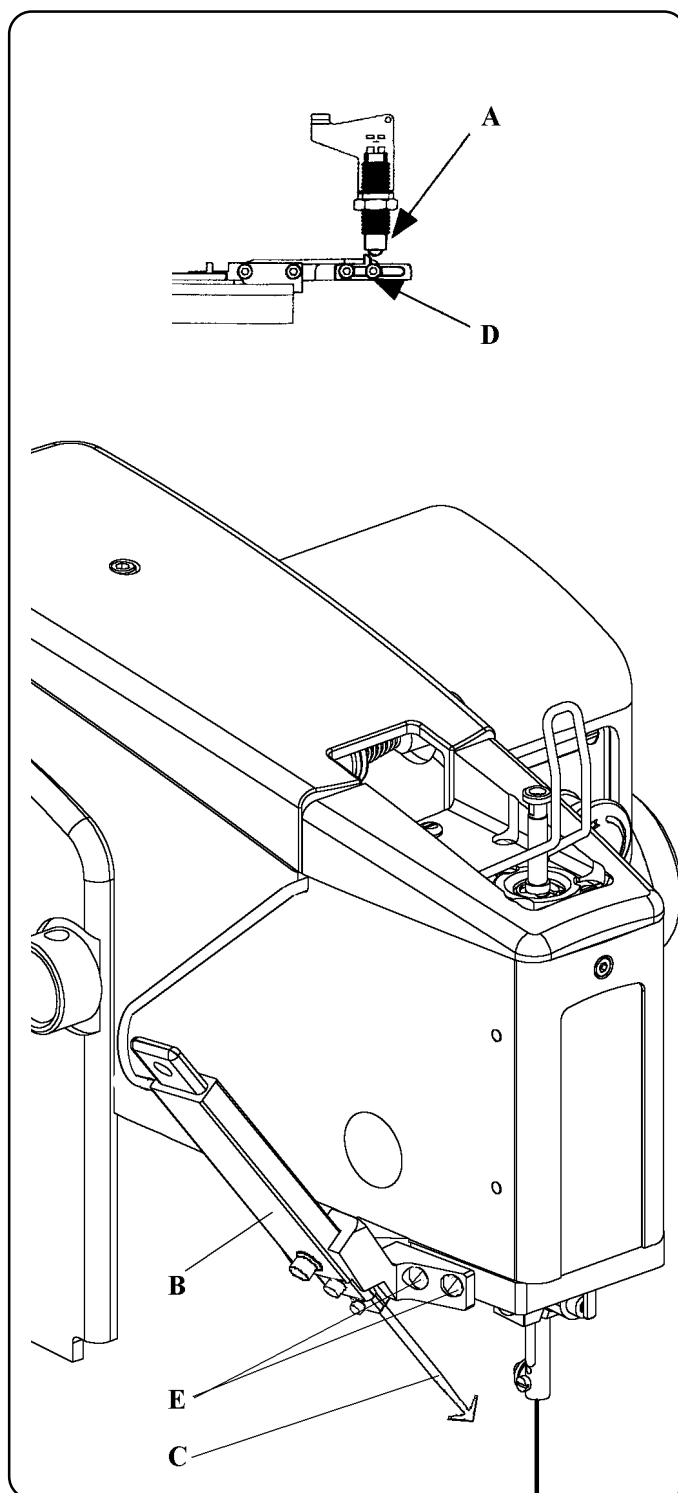
Rotate the feed handle, on the left side of the machine to position the bedplate until the upper thread trim mechanism is not actuated. Immediately after thread trimming, the thread is pulled from the fabric.

#### *To adjust:*

Sew a buttonhole and lock the machine in the last stitch position, the red light will be activated. Loosen the screw **D** and align the upper cam actuator to the pneumatic picker ball switch **A**. Connect the air supply and ensure the correct operation of the picker cylinder **B**.

If incorrect:

After sewing the buttonhole, ensure the needle thread trimmer has activated and the picker **C** lowers. Manually move the table and the picker **C** must rise. Adjust the picker direction by two screws **E** in the cylinder holder.



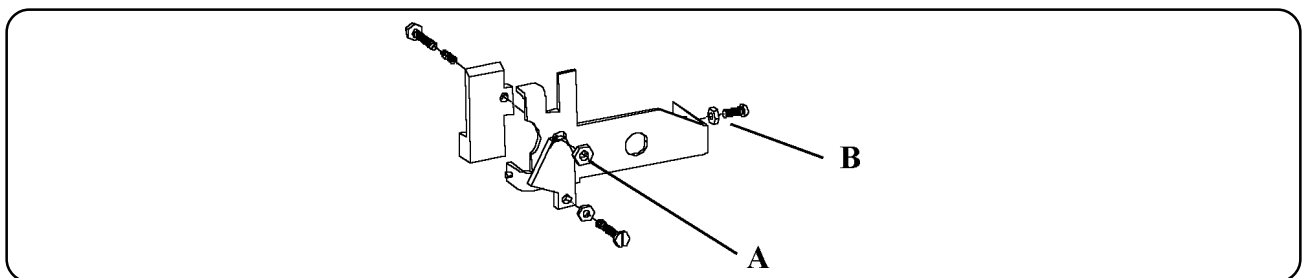
Revised 02/2003

## ADJUSTMENTS

### GIMP CONTROL MECHANISM

**WARNING!** Before making the adjustments, disconnect the air supply and release any stored energy and ensure the main machine power is off.

Loosen the nut and rotate the thread tension adjusting screw **A** to obtain the proper tension. The gimp thread must draw-out freely and not allow the thread to be pulled backwards. The beginning gimp thread length may be changed by loosening the nut and rotating the gimp thread length adjusting screw **B**. Rotating the screw in shortens the thread length, out lengthens the thread. The end of the gimp thread must project 4 to 5 mm, (5/32 to 3/16") past the throat plate opening.



### CORD TRIM MECHANISM ADJUSTMENT

**WARNING!** Before making the adjustments, disconnect the air supply and release any stored energy.

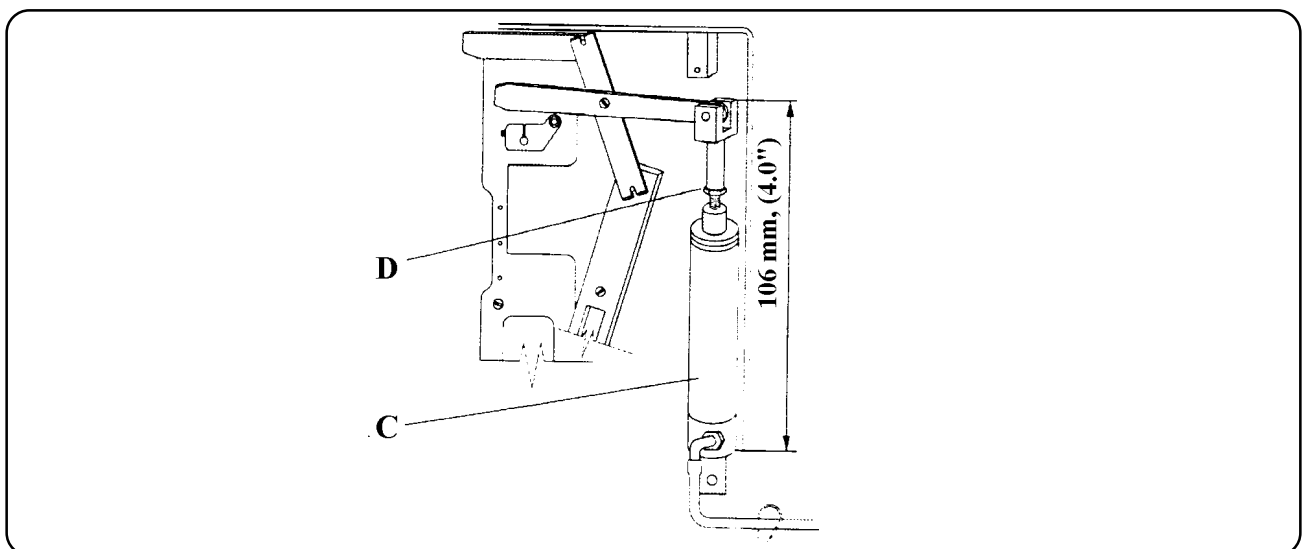
**Note:** The air cylinder **C** must be in the home position.

To adjust the air cylinder **C** travel, loosen the jam nut **D** and remove the retaining clip.

Rotate the clevis in or out to obtain the correct length of 106 mm, (4.0").

Tighten the jam nut **D** and install the retaining clip.

**Note:** The travel is set by the manufacturer. Adjustment is usually only necessary when replacing parts.



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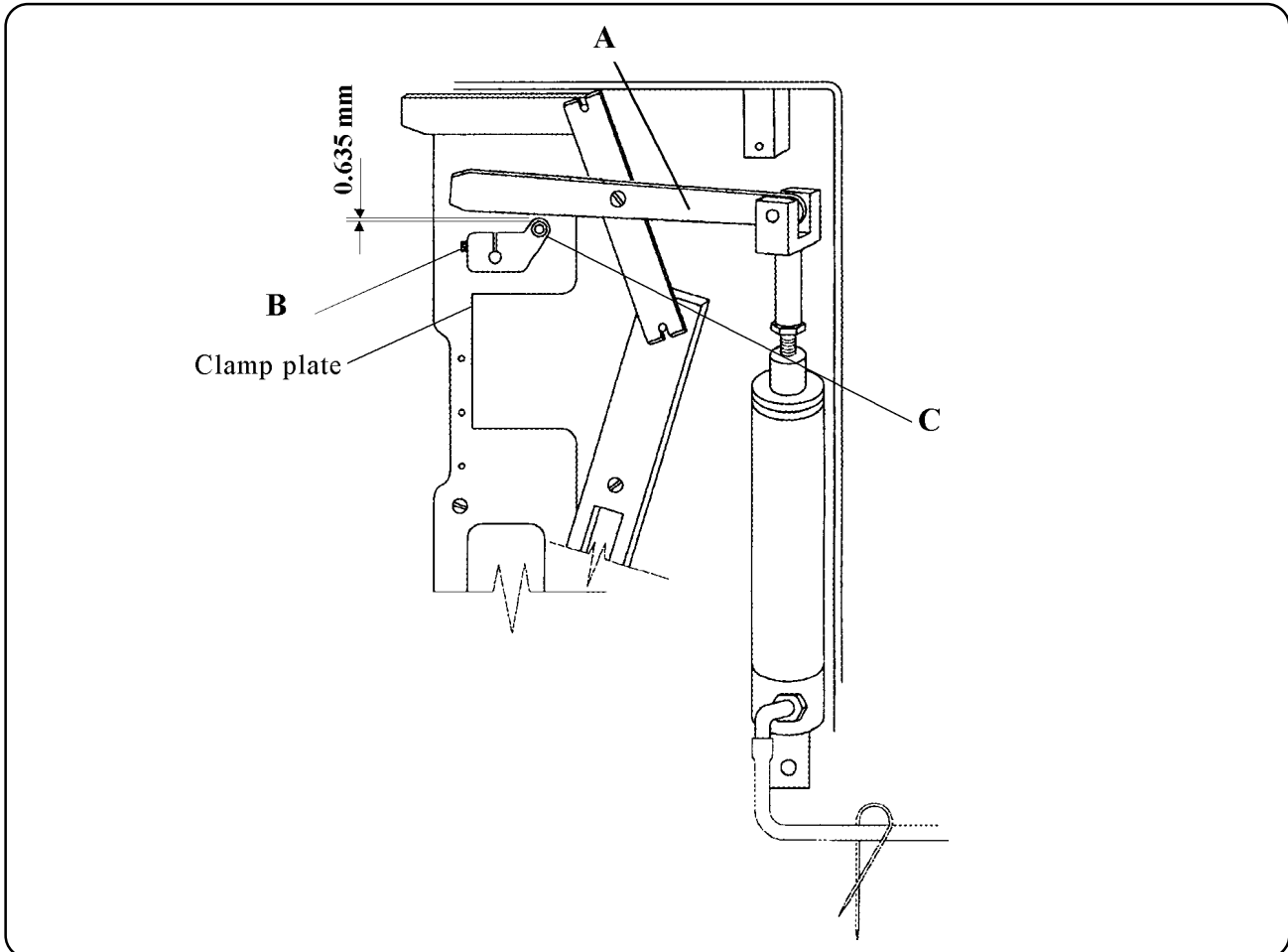
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## ADJUSTMENTS

### CORD TRIM MECHANISM ADJUSTMENT

**WARNING!** Before making the adjustments, disconnect the air supply and release any stored energy.



**Note:** View shown is from the underside of the bedplate with the machine in the upright position.

To adjust:

Loosen the actuator **B** screw and pivot the actuator to obtain a clearance of .635 mm, (.025") between the roller **C** and the drive lever **A**, this is a starting point.

Tighten the actuator screw.

**Caution!** Shears set with a large amount of cross over may damage the machine and/or parts.

## ADJUSTMENTS

---

### **Cord Trim Mechanism**

**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy.

Each cord trim model includes a set of shears and a knife for cutting the upper looper thread and all thread tails between the sewn buttonhole end and the stitch plate, eliminating the possibility of dropping stitches from the next buttonhole.

To ensure the shears perform correctly, it is imperative the following are properly adjusted:

- Shears set
- Lower thread tension
- Upper thread trim-off and draw-off
- Trimmed off upper thread draw-out

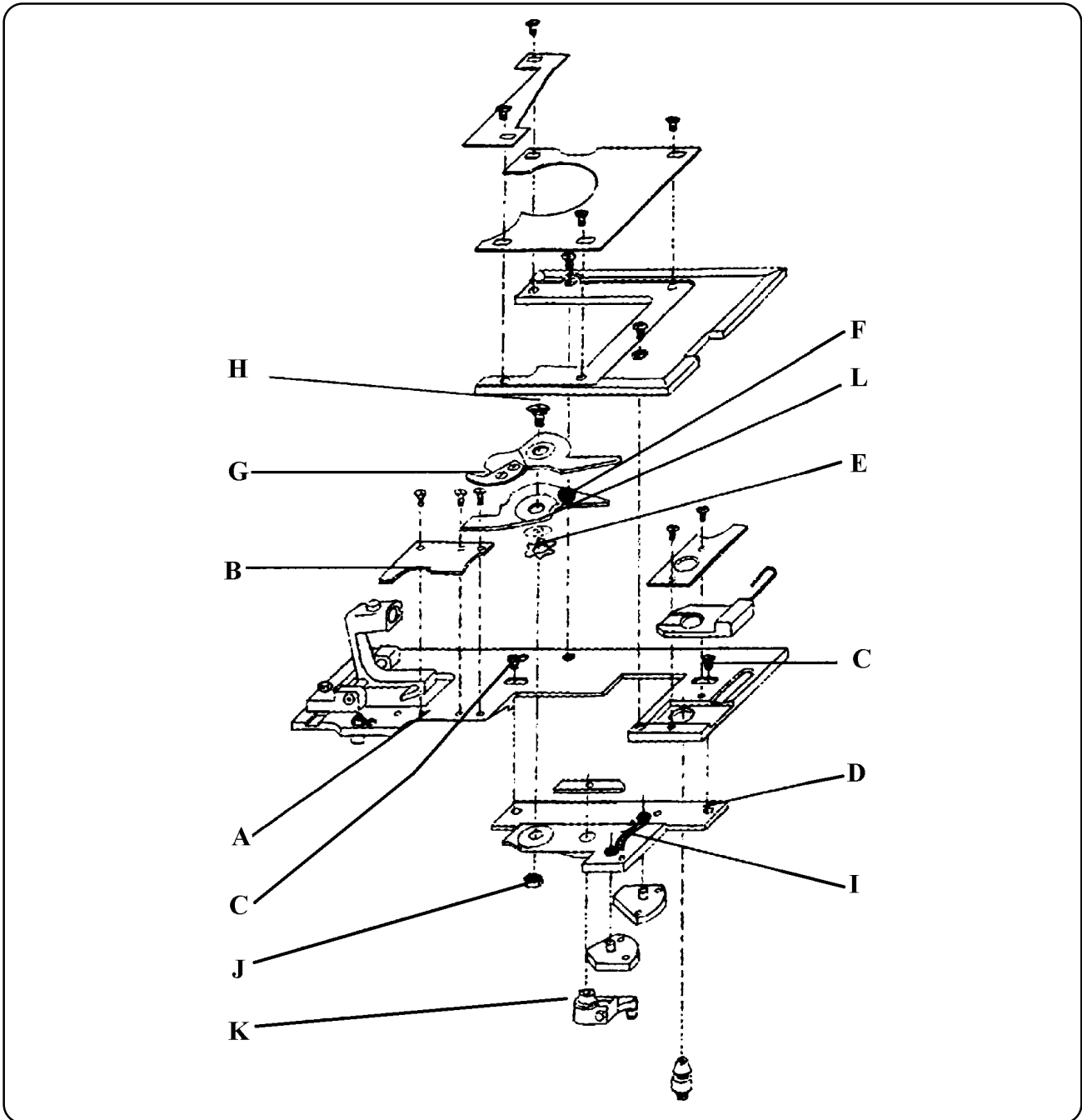
**Caution!** Failure to maintain these adjustments will result in poor trimming and unnecessary machine down time. Continued operation of the machine out of adjustment will damage key machine parts, including the main cam.

**ADJUSTMENTS**

**Shear Sets**

**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy. The cord trim shears are designed like a pair of scissors. During trimming, their edges must cross over (0.5 - 1 mm).

**Caution!** Too much cross over will cause the machine to malfunction and damage key parts. It is imperative the correct adjustment be maintained.



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## ADJUSTMENTS

---

### Shear Sets

**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy.

To adjust the shears to the clamp plate installation:

Remove the covers on the right foot plate.

Remove the shears set, sliding the pressure springs **I** and the nut **J**. Check the condition of the shears, replace if necessary.

Holding the clamp plate, projections pointing up, insert the shear spring **E** into the circle cutout area of the clamp plate and place the lower shear **F**. Place the upper shear **G** on top of the lower shear.

Insert the shoulder screw **H** in the circle cutout area of the clamp plate, through the upper and lower shears, spacer, and spring. Add a few drops of oil to the shears.

Rotate the upper and lower shears to ensure the center shoulder screw **H** has gone through all the parts without binding.

Tighten the center shoulder screw **H** and attach the springs **I** to the outside edges of the upper and lower shears.

Turn the clamp plate upside down and install the shears nut **J** onto the center shoulder screw **H**. Using your fingers, rotate the nut **J** as far as possible, without tightening.

Position the clamp plate top up and facing forward, use your thumb to move the actuator **K** to the left, closing the shears.

If the shears are locked into position, adjust the center shoulder screw **H** just enough to allow the shears to open, rotate the screw **H** counterclockwise 1/4 of a turn.

Hold the center shoulder screw **H**, not allowing it to rotate, turn the plate over and tighten the shears nut **J**. Ensure the shears cross over each other and return to the open position. If incorrect: repeat steps.

Install the cover plate. Ensure the shears cross over each other and return to the open position. If incorrect, repeat previous steps.

To adjust the clearance:

Loosen the knife holder screws **C** and adjust the knife holder **D**, as needed, ensuring the shears movement is not restricted by the clamp mat **B**. Tighten the knife holder screws **C**. This adjustment is required only after a knife support **D** change. Install the spacer only for enlargement of the clearance between upper shears and throat plate.

**Caution!** The shears must move easily. To prevent damage, do not increase the amount of shear cross over if the shears are not cutting correctly. Do not use the center shoulder screw to increase the shear knife pressure. Check the knife edges and clearances by manually cutting at least 3 threads, replace if needed.

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## ADJUSTMENTS

### Shear Sets

**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy.

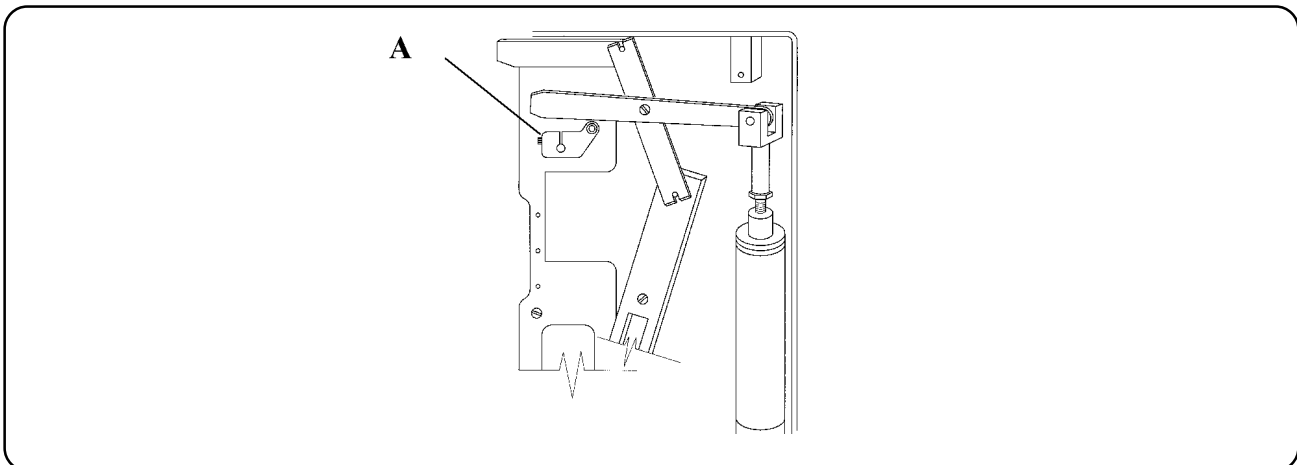
Push the latch on the left-hand clamp plate and position the clamp plate onto the bedplate.

Manually operate the clamps to ensure correct installation.

Make the final adjustment of the actuator arm **A**. The shear blades must cross over each other approximately 1-1.5 mm, (.040 to .060") in their end positions.

**Caution!** To prevent damage, the shears must cut the gimp and bottom threads easily. Do not increase the amount of shear cross over if shears are not cutting correctly. Do not use the center screw, illustrated on page 1-78, to increase shear knife pressure. Check the knife edges and clearances, replace if needed.

**Caution!** Ensure the clamp plates are open, when closed, the shearing mechanism cannot operate correctly.

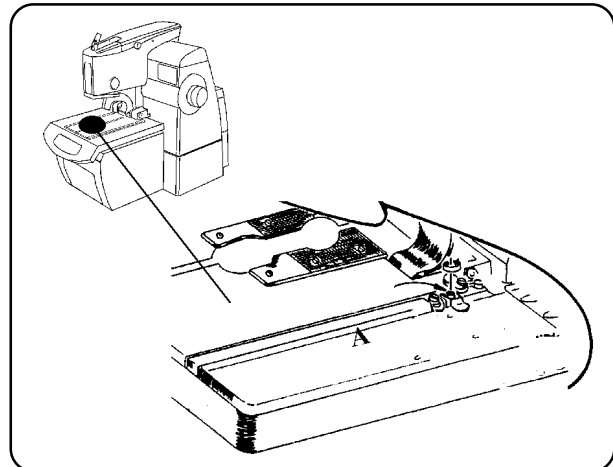


### CLAMP PLATE INSTALLATION

**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy.

**Note:** After installing the clamp plate, review the clamp feet spreading instructions, page 1-52.

Move the clamp hold-down and install the clamps.



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## ADJUSTMENTS


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### TRIM DELAY


**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy. Using heavy material may cause excessive and incorrectly cut tails.

To correct:  
 Increase the trim delay.

To adjust:

Press the  push-button to switch off the main machine electrical power.

Press and hold the  and  push-buttons.

Press the  push-button to supply power to the machine.

The LCD display indicates WAIT ! then \*\*\*\*\*


Release the two push-buttons and press the **SBT** push-button before the stars disappear.


The LCD display indicates FULL CYCLE 2 step .

Press the sequence  push-button to access the hidden parameters.

The LCD display indicates \*\*\*\* MISCEL .



Press the **SET** push-button to access the TRIM DEL ( ) LCD display.

To change the number, scroll up or down with the  push-buttons.

To set a new number, press the  push-button.

The LCD display indicates \*\*\*\*\* WAIT when the display indicates FULL CYCLE 2 step

the machine is ready to run. If change is needed, press the **SET** push-button to return to the last changed parameter, in this instance, TRIM DEL ( ) LCD display.

To return to the full menu, press the  push-button to switch off the main machine power, then press the  push-button to switch the main machine power on and prepare the machine for operation.

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## ADJUSTMENTS

### LATERAL CAM BLOCKS CUT BEFORE AND CUT AFTER

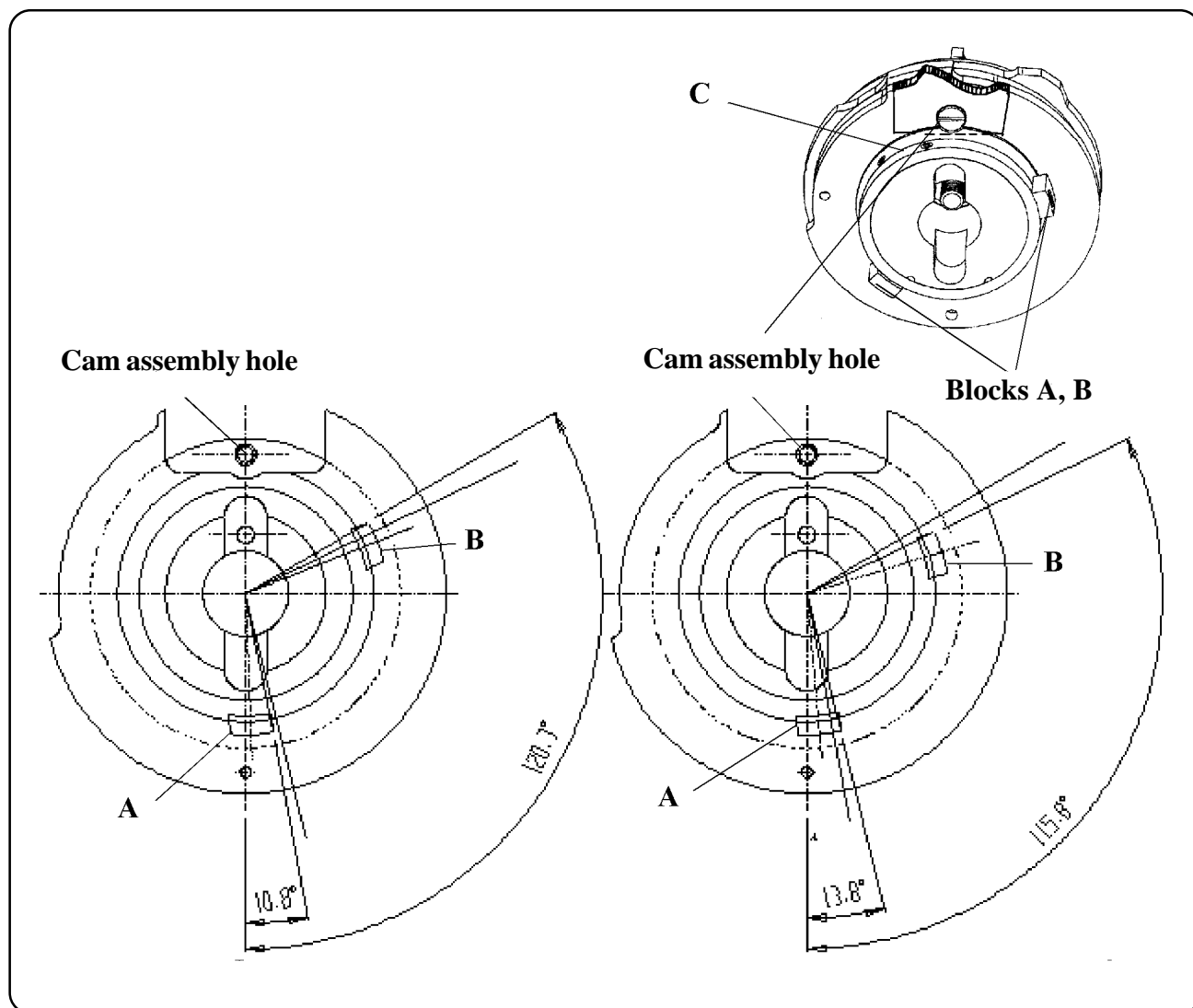
**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy.

**Caution!** The manufacturer has positioned the blocks to enable programming the LCD to produce cut before or cut after buttonholes.

If the desired action is not maintained, such as the thread ends trimming before the cut after buttonhole is sewn, a mechanical problem may exist and the block positions may have changed.

To obtain cut after sewing with thread ends trimmed before the cut, with the machine in the home position, the cut before block **A** is located at a  $10.8^\circ$  angle and the cut after block **B** is located at a  $120.3^\circ$  angle.

Ensure the machine is in the home position. Loosen the rings **C**. Align the edge of the block with the lines as illustrated. Tighten the rings **C**. If the action is not correct, the cut before block **A** may be gradually moved within the 2 marks illustrated, a  $3^\circ$  range and the cut after block **B** may be gradually moved within the 2 marks illustrated, a  $4.5^\circ$  range.



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## ADJUSTMENTS

### ADJUSTMENT OF THE HEIGHT OF THE UPPER THREAD TRIM KNIFE

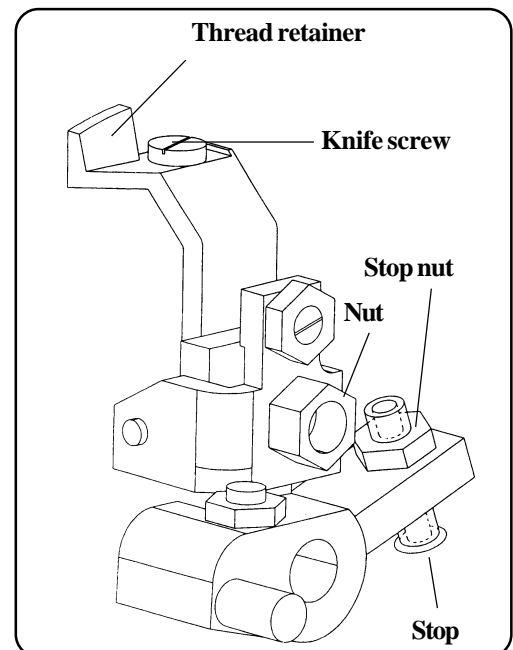
The upper thread trim knife is caught on the thread retainer and it should be adjusted so that releases both lower edge of the throat plate and top of the right-hand spreader.

Position of the knife must be according to the section MACHINE ADJUSTMENT - Knife adjustment for upper thread trim.

Height adjustment:

Loosen the nut and move the knife up or down, as needed. It is necessary to tighten the nut well.

Position in horizontal direction adjust after loosening of the knife screw. Knife can not touch the needle. Ensure, whether top edge of the thread retainer catch the lower thread, which goes through the groove of the throat plate.

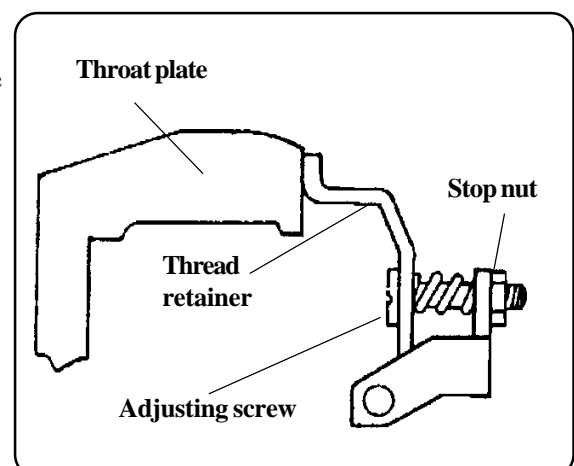


### ADJUSTMENT OF THE THREAD RETAINER

The thread retainer must rest squarely on the front face of the throat plate to correctly retain the lower thread for the next buttonhole. During the trim knife movement, the retainer must travel across the throat plate without binding.

**Note:** The throat plate must be installed to correctly set the spring pressure.

To adjust: Loosen the nut. Adjust the screw in or out, as needed. Tighten the nut.



The home position of the thread retainer is when the configuration of the trim knife is above the right stop of the spreader. To adjust it: loosen the stop nut and screw the stop in or out, as needed. If it is correct, the thread retainer covers the hole in the throat plate and will be opposite the pin, which ensures the correct home position. Tighten the screw.

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## ADJUSTMENTS

### TRIM KNIFE TRAVEL

**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy.

The amount of trim knife travel must be maintained, too much travel, will cut the lower thread and not enough travel, will prevent upper thread trimming.

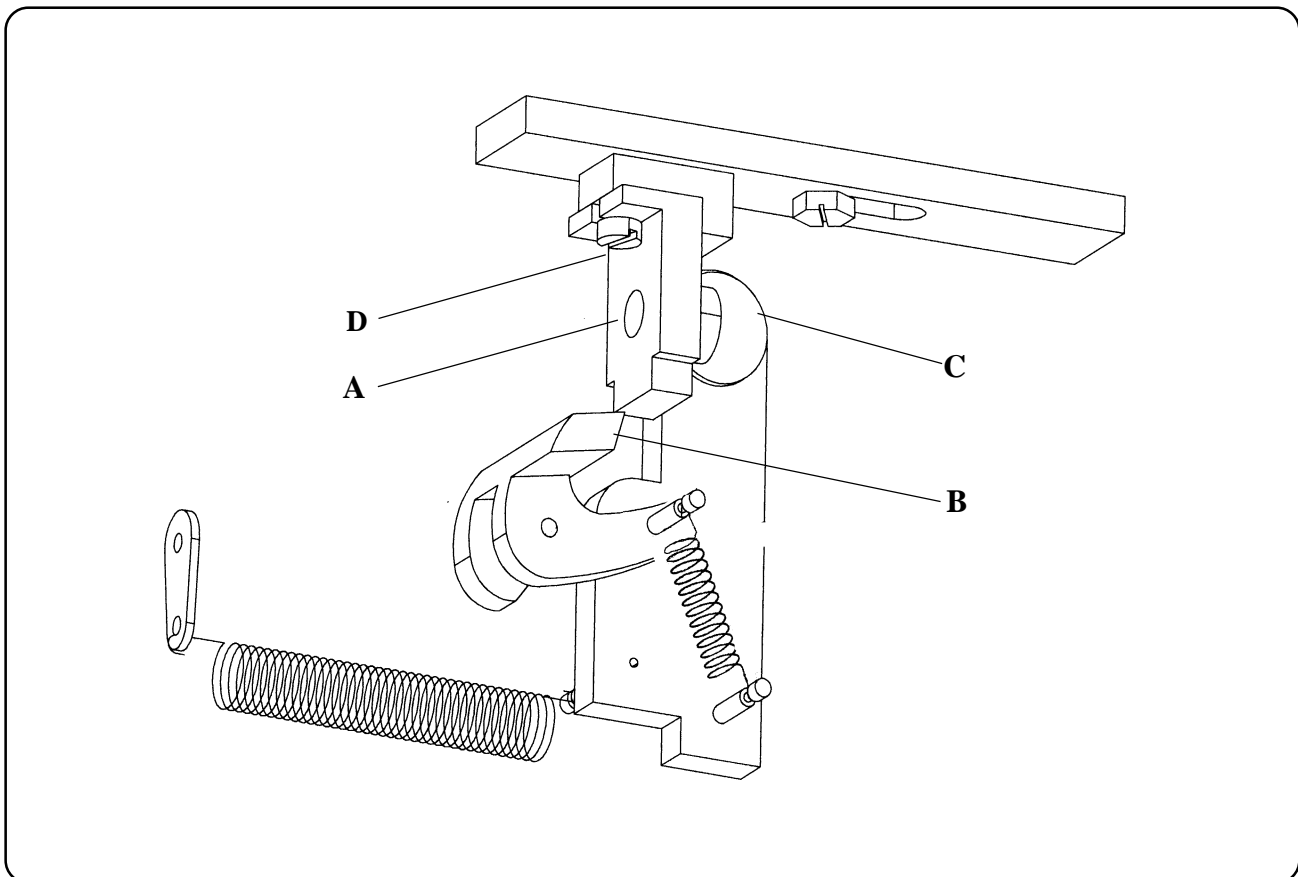
Engage the stop **A** and the pawl **B** to establish the correct amount of the trim knife travel.

To adjust:

Loosen the nut **C** and rotate the screw **D** up or down as needed. Up decreases the travel and down increases the travel. When correct, tighten the nut **C**.

If correct:

The point of the top trim knife clears the opening in the throat plate, but doesn't travel beyond the point of the left-hand looper.

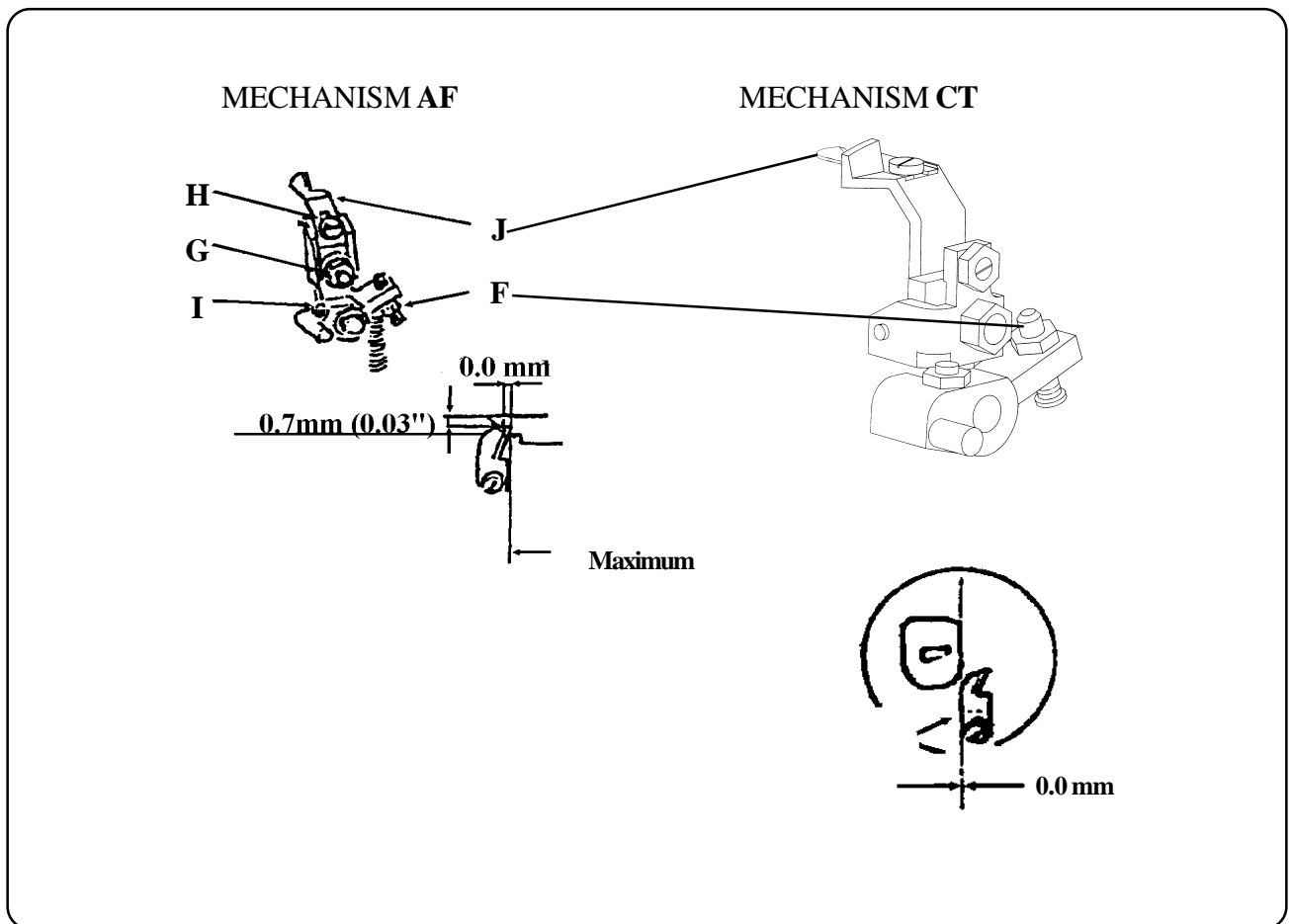


**ADJUSTMENTS**

**Trim knife travel**

Set the position of the trim knife **J** by rotating the stop screw **F**. The trim knife left edge must be aligned with the throat plate right edge.

Loosen the nut **G** and set the trim knife clearance 0.1 to 0.15 mm, (0.004 to 0.006") to the spreader. Loosen the screw illustrated above and adjust the knife position 0.7 mm, (0.030"), for trapping the loop created from the upper thread.



## ADJUSTMENTS

### Trim Knife Travel

**Caution!** If the small play is not observed, a risk of trapping and trimming the bottom thread exists.

The stop nut **I**, page 1-84, determinates the trim knife movement scale and prevents the bottom thread from trapping and trimming.

After establishing the amount of travel, set the clearance between the lever **F** and the trim knife arm **G** to 0.5 mm, (0.020") for AF mechanism and 2.0 mm for CT mechanism.

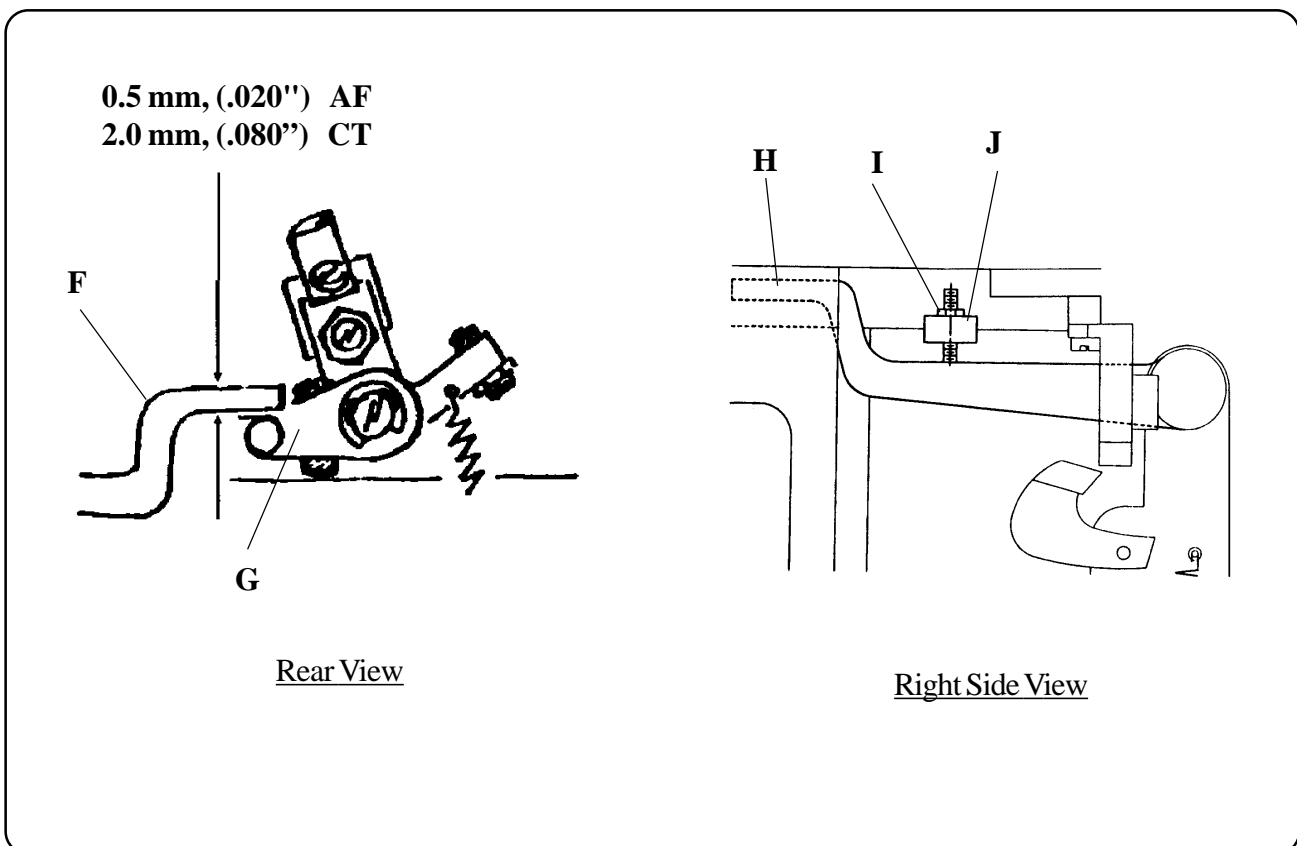
To adjust:

Manually rotate the trim knife arm **G** under the lever **H**.

Loosen the nut **I** on the height screw **J** and adjust up or down as needed.

Tighten the nut **I**.

**Caution!** This adjustment must be maintained to avoid possible damage to both the knife and the machine.



## ADJUSTMENTS

### THREAD TRIMMING TIMING

**WARNING!** Before making adjustments, disconnect the air supply and release any stored energy.

**Note:** This adjustment corresponds to the buttonhole length and must be performed immediately before the top thread picker activates.

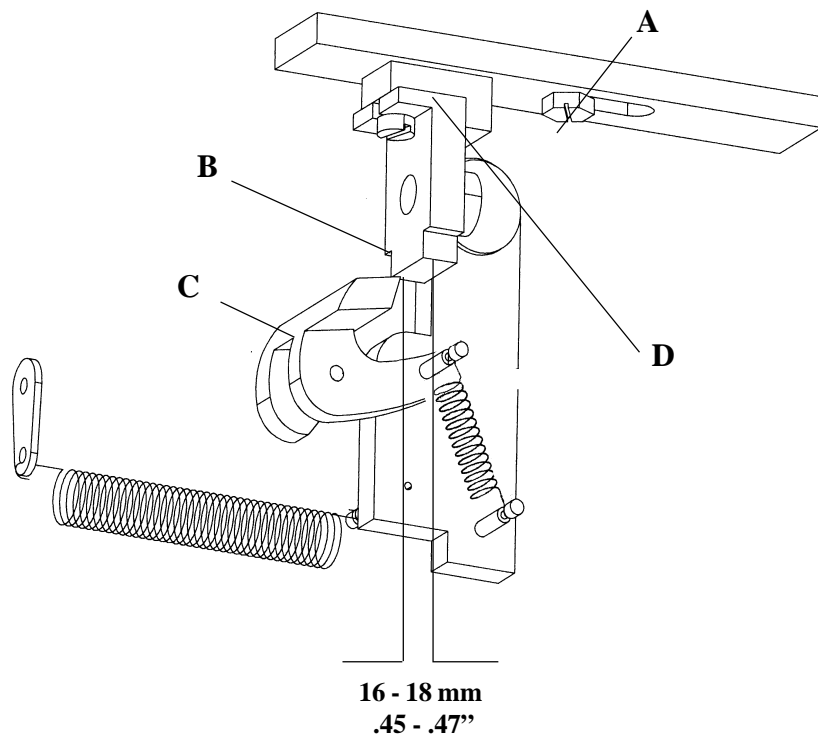
To adjust:

With the machine in the home position, loosen the screw **A** and adjust the clearance between the stop **B** and the pawl **C** from 18 to 19 mm, ( $45/64$  to  $3/4$ ", 0.700 to 0.750").

Move the holder **D** to the front or rear as needed.

When the distance is correct, tighten the screw **A**.

**Caution!** This adjustment must be maintained, the tip of the knife must clear the throat plate hole and not move behind the tip of the left looper. Failure to maintain the proper clearance may result in damage to the knife and/or machine.



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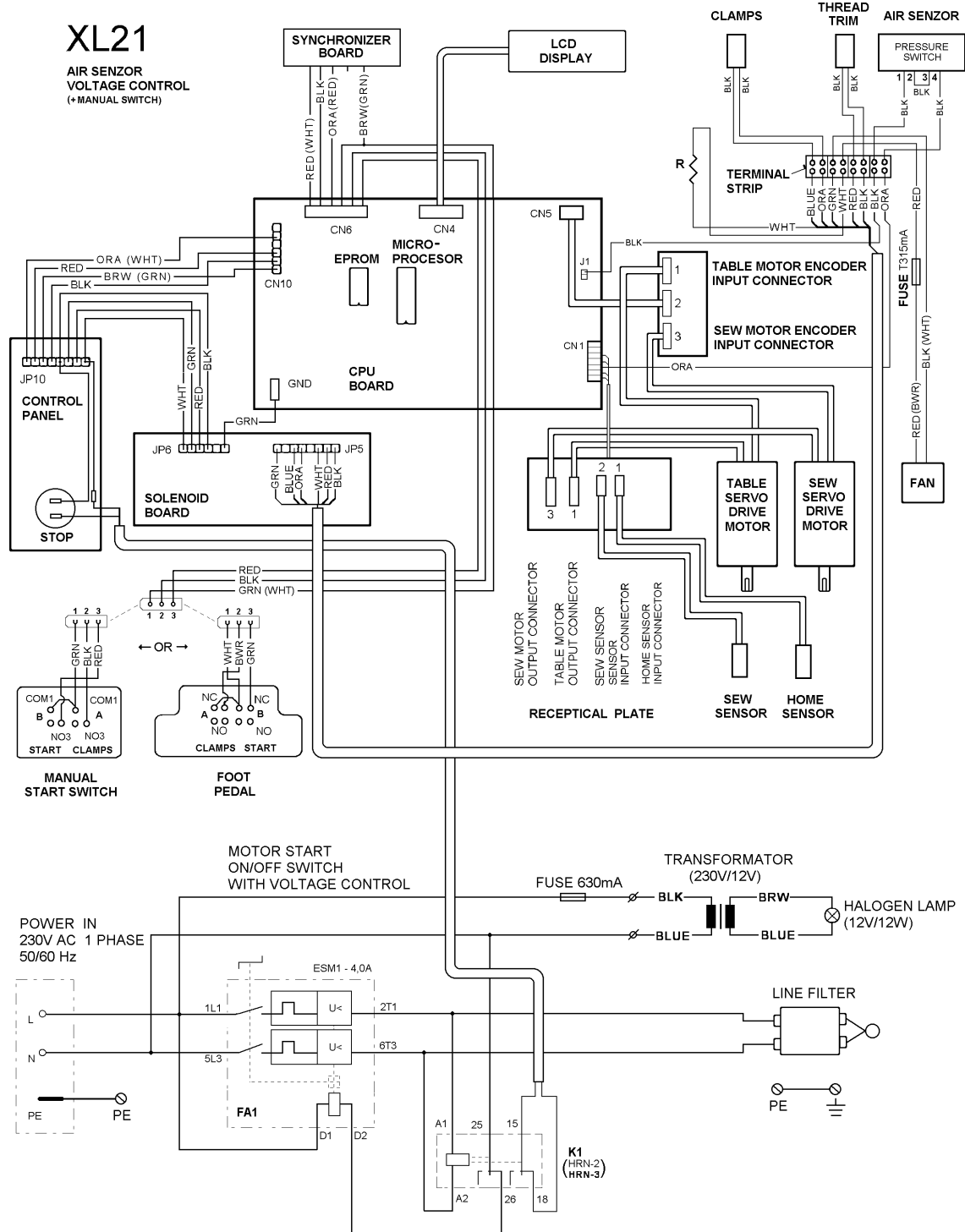
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**ELECTRICAL DIAGRAM XL-21, XL-21 ST**

**WARNING!** Electrical assembly to be performed by qualified personnel.

**Note:** Most wiring and air lines pass through the holes provided in the base and table top. The table assembly drawing illustrates the correct path for the access holes, allowing the lines to be connected to the electrical box.



Note: Minimal electrical box clearance is 0,8m (31,5")  
12.8000.0.001

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## PNEUMATIC DIAGRAM

### POWER AND AIR CONNECTION

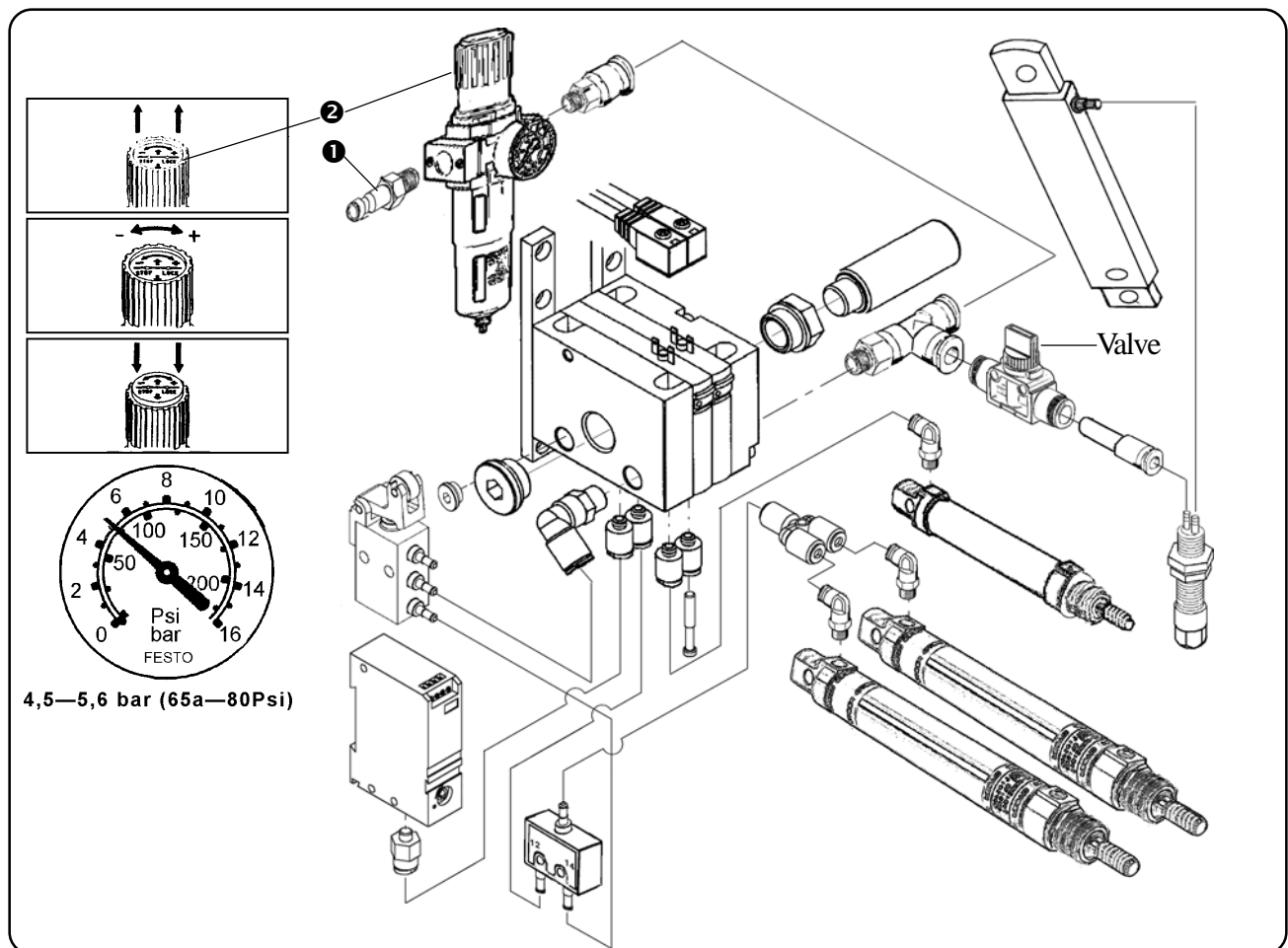
**WARNING!** Before performing any maintenance, switch off the main machine power to prevent accidental starting of the machine. Disconnect the air supply and release any stored energy.

1. Simple connection for air adaptation will ensure socket of quick coupler. Standardly is used socket 25 KE AK 13 (order number FESTO 151776 - marking KD 1/4 - S, order number RECTUS 38044). The unit has corresponding input **1**.

Input pressure must minimally be 1 bar (0,1 MPa) bigger than output pressure set on regulator. Alternatively, another connection of air is also possible. In this case, manufacturer recommends to add hand stopper on connection so that it is possible to close the air supply, if necessary.

2. After air connection, check set air pressure on the regulator dial. It should be in range 4.5-5.6 bar (65 - 80 Psi). To make a correction: pull the stopper **2** out; to increase the set pressure turn clockwise; to decrease the set pressure, turn anticlockwise. Tighten the stopper **2** again. The lower pressure can cause incorrect trimming. Clean the filter regularly to ensure clean and water free air.

### PNEUMATIC DIAGRAM XL-21



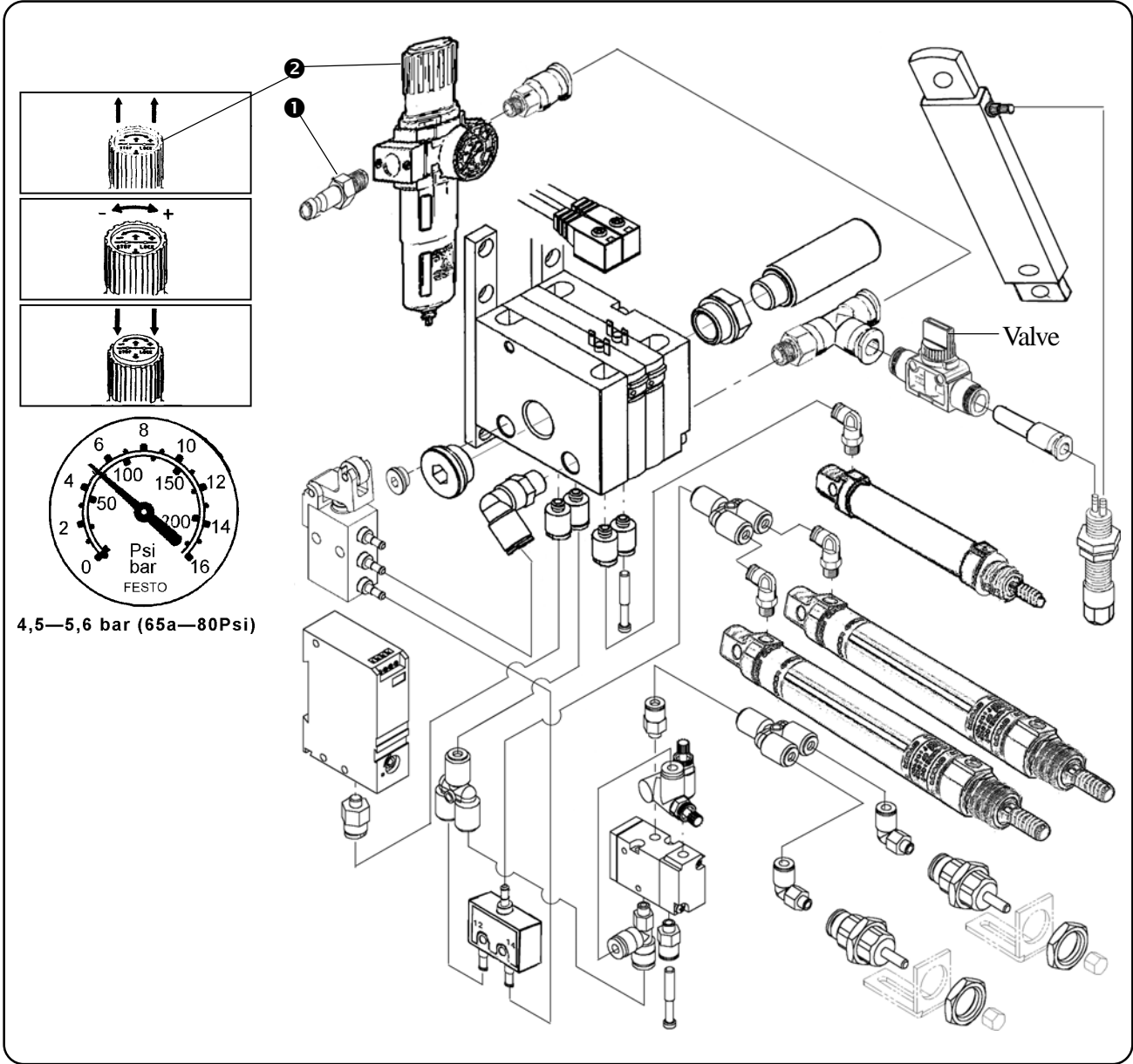
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**PNEUMATIC DIAGRAM**

**PNEUMATIC DIAGRAM XL-21 ST**



## MACHINE MAINTENANCE

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### PREVENTIVE MAINTENANCE

**WARNING!** Before performing any maintenance, switch off the main machine power to prevent accidental starting of the machine. Disconnect the air supply and release any stored energy.

To obtain the maximum quality product with the least amount of machine down time and cost, a good preventive maintenance program must be regularly enforced.

Routine cleaning and upkeep requires:

- oil
- vacuum cleaner
- paint brush
- parts brush

**WARNING!** Never use an air pressure hose instead of a vacuum. Dirt particles may contaminate the cam causing possible machine damage or personal injury.

Periodic Maintenance Checklist:

Daily:

- Remove lint from the loopers and spreaders.
- Clean the oil pan.

Weekly:

- Visual inspection of internal and external mechanisms.
- Inspect and replace the knife and block, if needed.
- Oil the machine according to the lubrication diagram, page 1-9.
- Ensure correct belt tension.

Monthly:

- Check for loose fasteners and tighten, if necessary.
- Inspect for worn and damaged parts and replace, if needed.
- Check throat plate wear and replace, if needed.

6 Months:

- Perform complete machine parts inspection.
- Ensure the correct stitch drive clearance.
- Ensure all machine adjustments are accurate.
- Perform complete wiring inspection.
- Change lubricant in the ball bearings.
- Clean the dirt and water from the air pressure regulator filter.

**MACHINE MAINTENANCE**

---

**RECOMMENDATION FOR MACHINE MAINTENANCE*****Gearings dismantling***

The machine is operated for 8 hours in a company to modify all machine gears for optimal machine liveness. During the assembly, the manufacturer recommends to make the colour marks on the appropriate teeth and teeth blank of the gearings and assemble the parts according to these marks.

***The bearing (see page 3-26, det. 32) of the rear drive shaft is dismantled with its bushing:***

- after head and bedplate dismantling
- after drive shaft removing
- after loosening the screw M8 from the base bottom
- change the bearing outside the machine and then assemble the bushing with new bearing to the machine

***Machine noisiness***

Rolls (17.0041.8.003, 17.0041.8.096) in the stitch cam (page 3-52) and the round key (see page 3-18) should not have any clearance to protect against machine noisiness. Therefore, change the rolls during every dismantling and check a clearance of the drive lever stud.

**SPECIAL PARTS**

**CLAMP FEET FOR SEWING HEAVY OR THIN FABRIC**

The accessories CT is mentioned in manual on page 3-64.

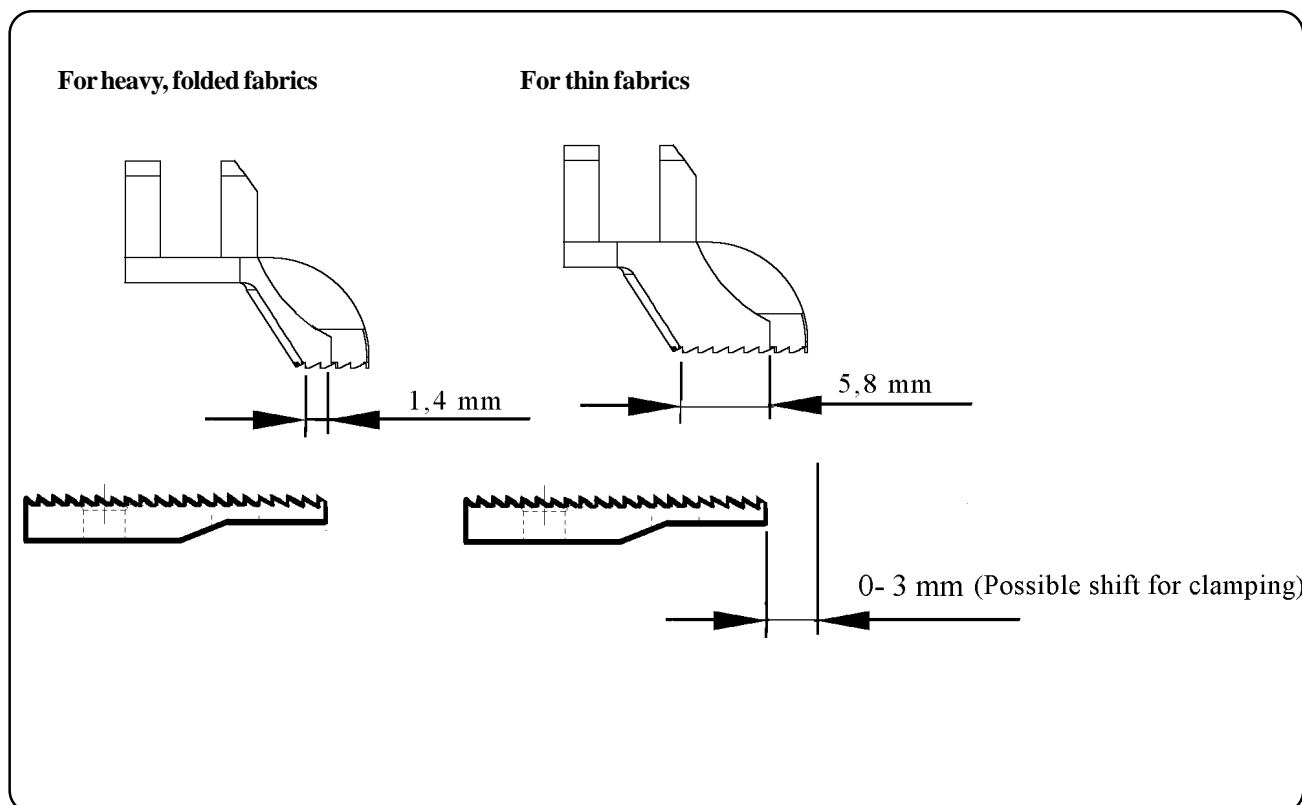
This accessory contains clamp feet for sewing on heavy fabrics, especially denim (**18.0066.7.408-9** width of teeth 1.4 mm) and clamp feet for sewing on thin fabrics (**18.066.7.412-13** width of teeth 5.8 mm).

*Narrow clamp feet for sewing on the heavy, folded fabrics*, is possible to adjust according to the sewing needs (according to the picture by the whole surface against the short clamp mat or only part of the edge against the short clamp mat according to the fabric elasticity.)

*Clamp feet for sewing on the thin fabric* clamp sewn fabrics by the whole surface, which is advantageous for thin fabric sewing.

**Caution!**

When you individually adjust the clamp feet, the clamp plate can not touch the needle during sewing. After clamp feet mounting, it is necessary by slow hand turning of the hand wheel try if there is a clearance between the needle and the right and left clamp feet.

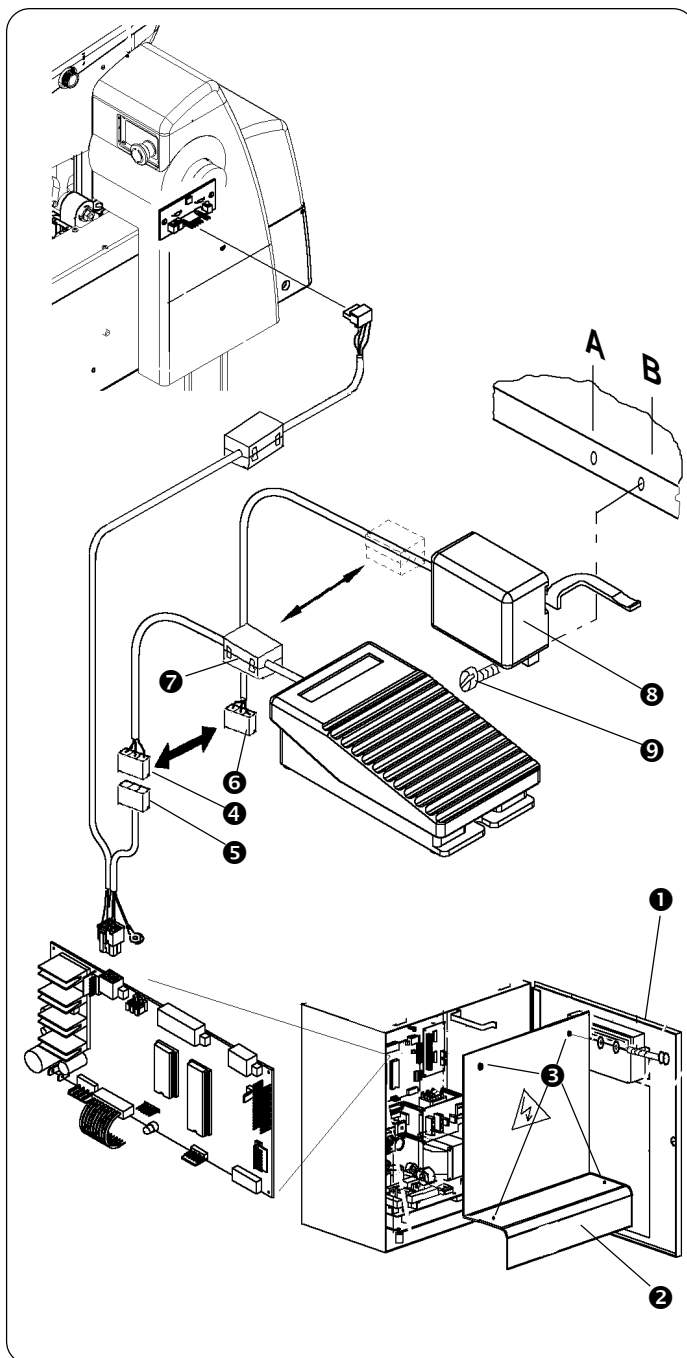


## SPECIAL PARTS

### CHANGING THE MANUAL START-UP FOR THE PEDAL START-UP

- Switch off the machine.
- Open the doors **1** of the control unit.
- Remove the cover **2** after loosening 4 screws **3**.
- Disconnect the connector **4** from the socket **5** in the upper part of the control board. Suitable fix the loose connector **4**. Connect the connector **6** to the socket **5**.
- Install the cover **2**.
- Close the door **1** of the control unit.
- Remove the sleeve snap **7** from the cable near pedal and install it on the cable near manual switch.
- Using a screw **9** install the manual switch **8** on the table top either to the **A** position or to the **B** position.

Changing the manual start-up for the pedal start-up is similarly performed.



**SPECIAL PARTS**

**UPPER THREAD DRAW-OFF**

It is not a part of supply, but it is possible to order it (see page 3-69, Parts). It is not possible to adjust the upper thread end on this upper thread draw-off. This one is suitable for thicker materials (for example denim) and is not suitable for light materials.

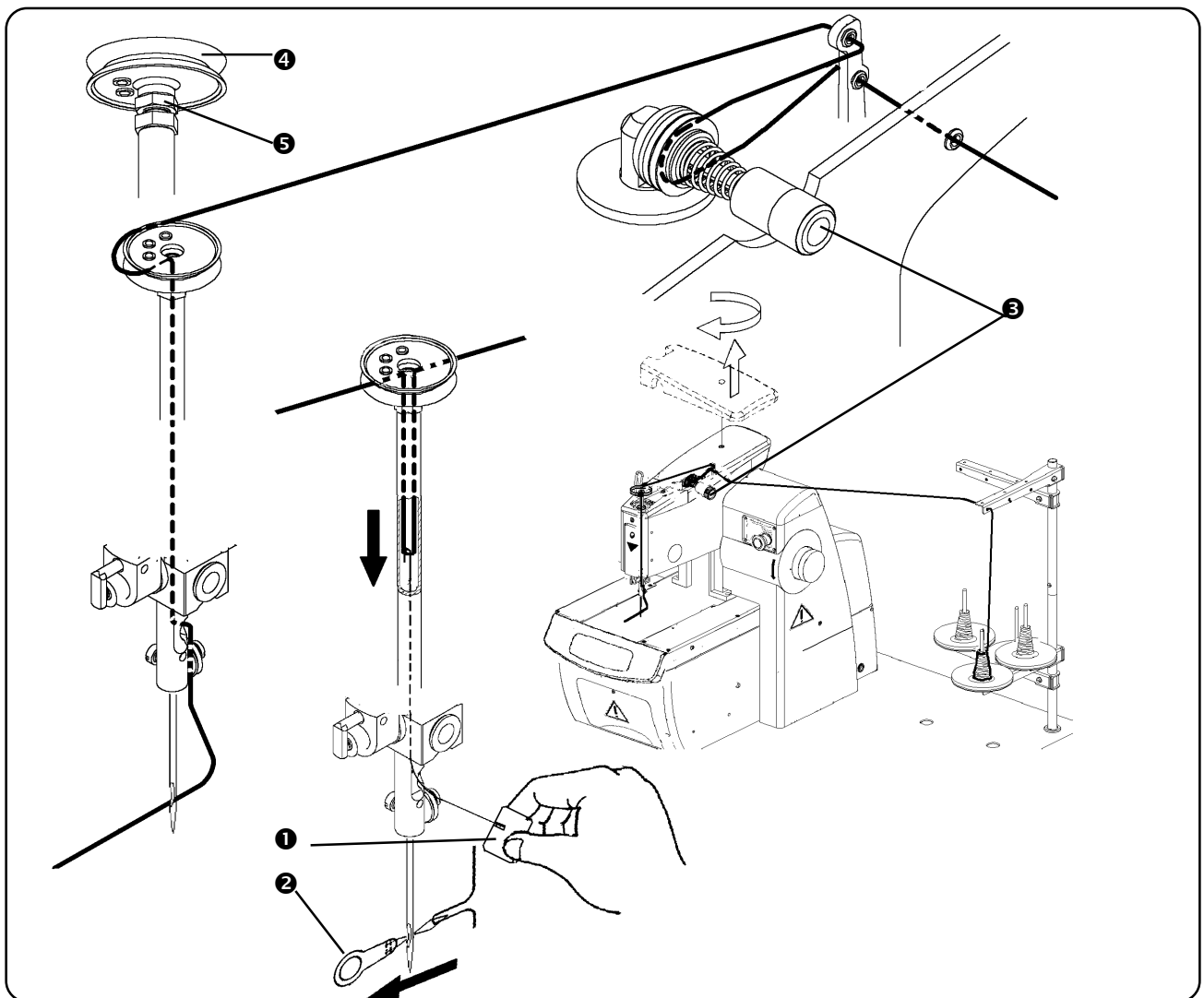
**Threading the Machine**

**WARNING!** Switch off the main machine power, disconnect the air supply and release any stored energy.

**Note:** When threading the XL-21 in the home position, the race will be toward the rear of the machine.

Raise the upper cover and rotate 90°. Thread the machine, as illustrated. Threading wires ①, ② ensure easy threading. Change the tension by nut ③. Adjust the disc ④ after loosening the nut ⑤ and rotate the disc clockwise to decrease the tension or anti-clockwise to increase. Tighten the nut.

**Note:** Using thin fabric requires increased upper thread tension.



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## INTRODUCTION

The XL-21 ST machine is only supplied in the modification CT, which mean all threads trimming, cutting after sewing and with the auxiliary pneumatic clamping of the sewn work, which disallow early extraction of the sewn work. It avoids incorrect trimming of the thread ends and possible fabric trimming.

It is used for buttonhole sewing in a small pockets, especially on denim. The buttonholes sewing in a small pockets is allowed by:

- the short travel of the table, which is 12 mm shorter in this mechanism than in standard machine
- the possibility to hold the outer material of the pocket to avoid its incorrect sewing.

The XL-21 ST allows the buttonholes sewing from 16 to 22 mm. The buttonhole sewing without cord trim and with short ends is also possible on this machine type, but after changing the clamp plates (however, the maximal buttonhole length is 12 to 22 mm).

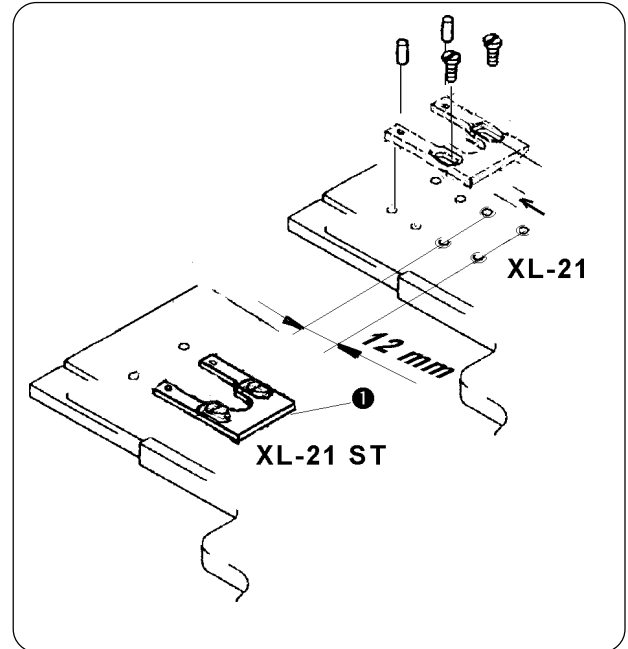


**SHORT TRAVEL**

**THE DIFFERENT SETTING OF SOME MECHANISMS**

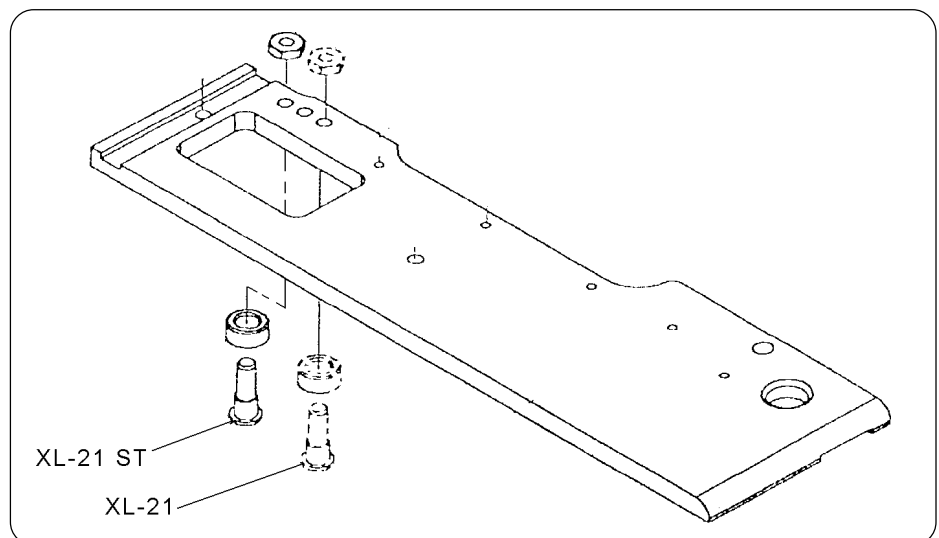
**The guide plate**

On the machine XL-21 ST, the guide plate ❶ is 12 mm closer to operator. There are two pairs of threads on the bedplate. That is why it is possible to rearrange it to standard mechanism. The guide plate is fixed by pins to the bedplate.



**Clamp Feet Spreading**

The clamp feet spreading on the XL-21 ST machine is similar to XL-21 standard machine. The spreading rollers are installed in the outside thread, see picture.



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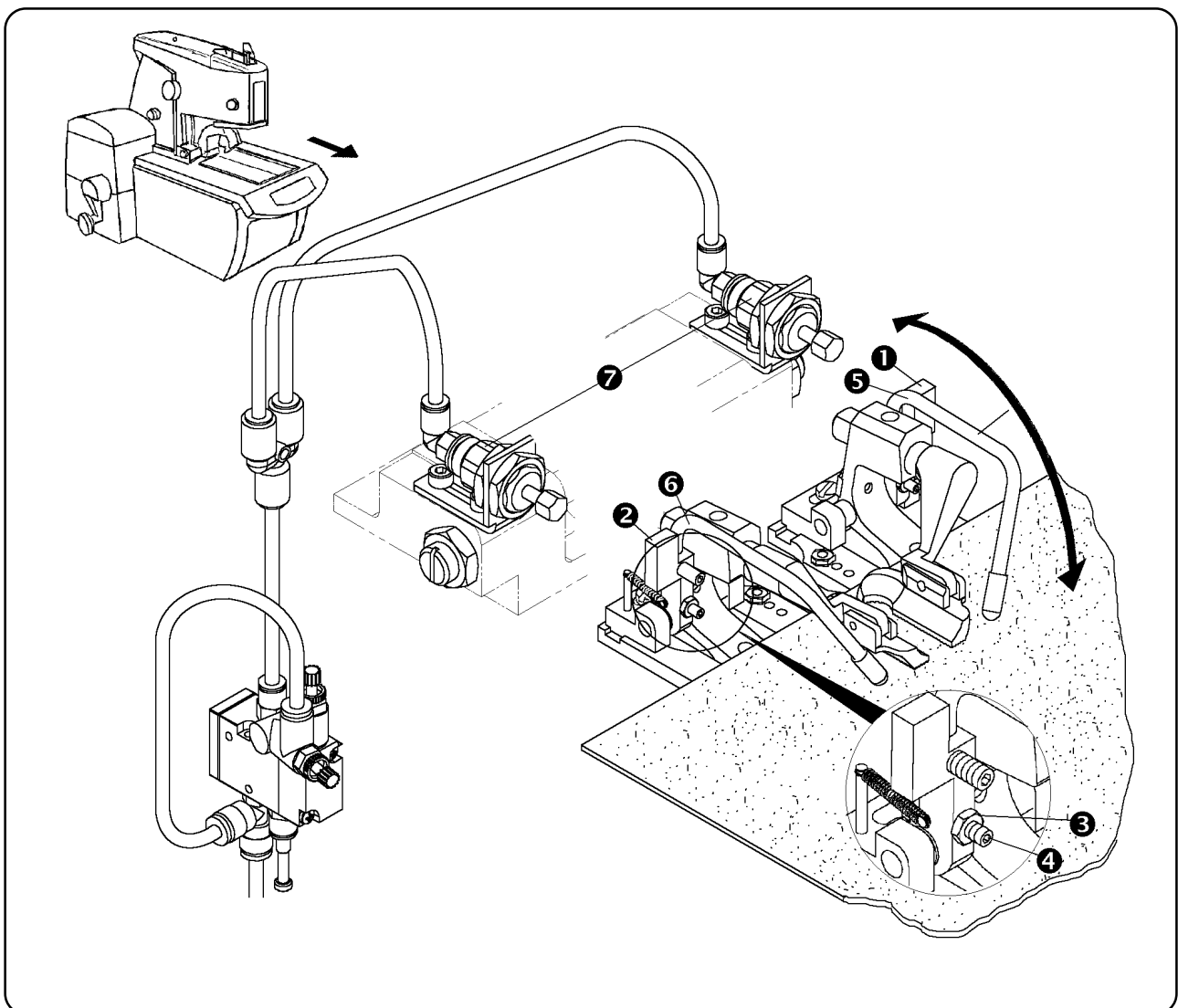
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## SHORT TRAVEL

### THE AUXILIARY FABRIC CLAMPING ADJUSTMENT

#### Adjustment of the auxiliary clamping stroke in connection of clamp feet:

Insert a piece of material under the clamp feet and press the black push-button **CLAMPS DOWN**. By pressing the white push-button **HOME POSITION**, the table moves to the operator service position (see page 1-12 Operator push-button switches). Loosen the locking nut **3** on the arms **1**, **2** and adjust the auxiliary arms **5**, **6** by screw **4**. The auxiliary arms must properly hold the material without pneumatic cylinders **7**. Press the **HOME POSITION** push-button to bring the machine to the home position.

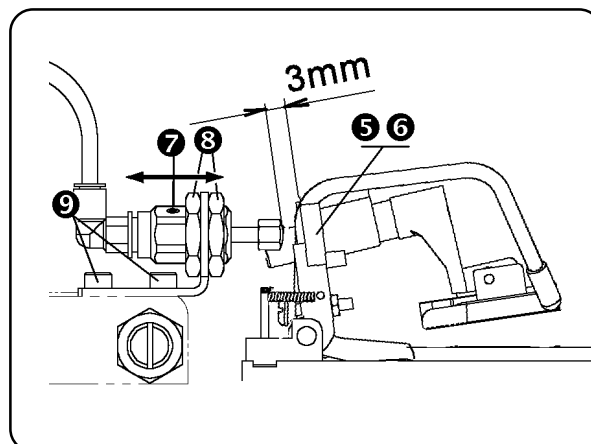


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## SHORT TRAVEL

### Adjustment of the working cylinder distance for the auxiliary clamping stroke:

Adjust the distance of the pneumatic cylinder **7** from the stop of the auxiliary clamping **5**, **6**. Adjust the pneumatic cylinder to the distance 3 mm in the home position (see picture). To adjust the cylinder distance, loosen the nut **8** on the cylinder and then loosen the screws **9** under this cylinder and move the cylinder holder.



### Adjustment of the auxiliary pneumatic holding of the sewing work:

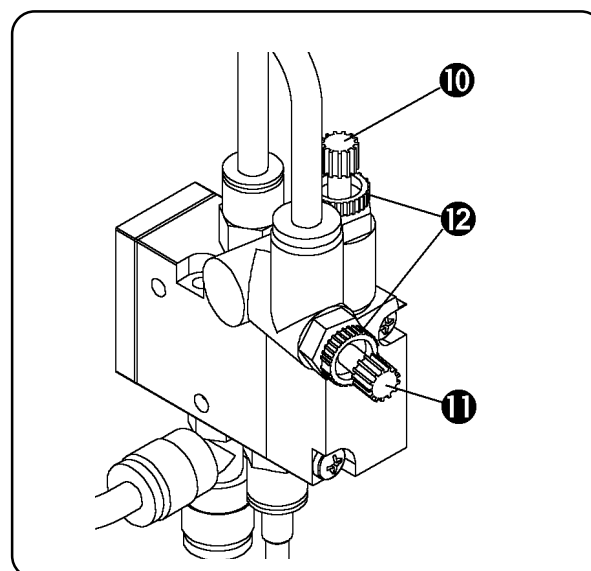
The arms **5** **6** are controlled by valve delay during the trimming action. To adjust:

1. Open the both screws **10** of the speed controller ASD 230F 04 - M5 (loosen counterclockwise) after loosening the locking nut **12**.

2. To obtain the correct thrust, adjust the screw **10** of the speed controller (tighten clockwise). It is possible to adjust the thrust in range 0 ATM to maximal supplied pressure to the input device.

3. Then, adjust the screw **11** (tighten clockwise). Where a delayed lifting of the auxiliary arms starts to display, adjust needed delay. It is possible to adjust the delay in range 0-2 s.

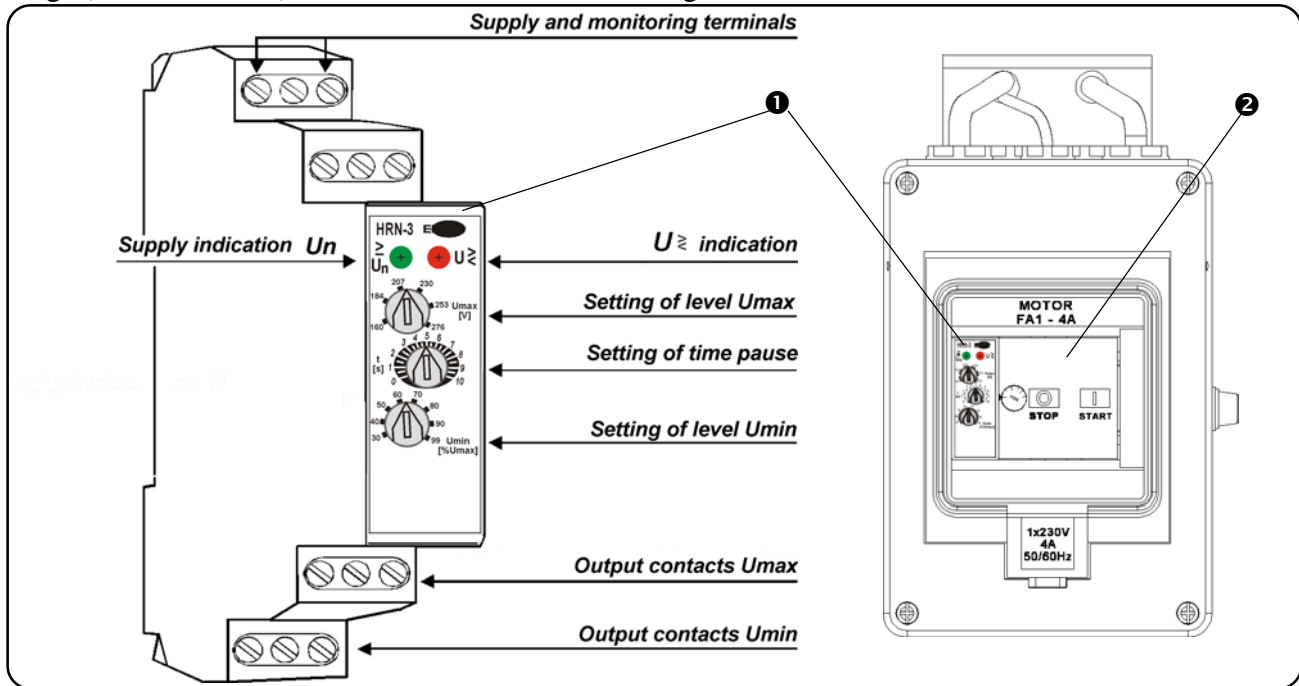
4. After speed controller adjustment, tighten the screws **10** **11** by nut **12**.



**THE MACHINE POWER SUPPLY PROTECTION**

**THE MACHINE VOLTAGE PROTECTION**

The power voltage control ❶ (*Voltage monitoring relay HRN-3*) is installed in the machine control system. This power voltage control cautions a machine operator if the supply voltage is not in the required range (165 V to 255 V) and the machine could be damaged.



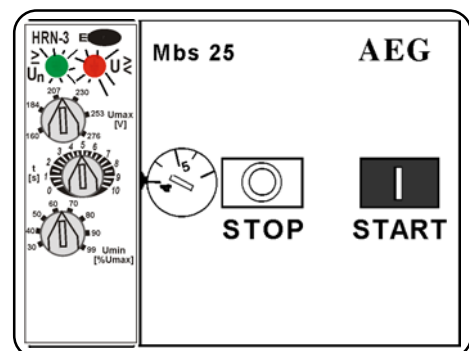
The voltage monitoring relay HRN-3 ❶ is placed next to the main power switch ❷. It is adjusted and sealed from the manufacturer. If the supply voltage is in the **required range**, the **green LED Un** indicates it on the voltage monitoring relay. If the upper limit (255 V) of the supply voltage is exceeded, the **red LED U ≥** indicates it. If the supply voltage is lower than 165 V, the **green LED** stops indicating and the **red LED U ≥** indicates it.

If the supply voltage returns to the required range, the **red LED** stops indicating.

**The upper limit (255 V) is exceeded**

If the supply voltage is higher than the upper limit, the black START button will not stay engaged.

1. a) When the START button is pressed and will not stay engaged, the LEDs **Un** and **U ≥** blink. (*The upper limit is exceeded*)
- b) When the START button is pressed and will not stay engaged, only **Un** LED blinks. (*See Troubleshooting, page 2-2*).



If the supply voltage is higher than the upper limit during a sewing, the machine is automatically switched off to prevent control electronics damage. When the voltage level is restored to acceptable levels (165 - 255 V), it is possible to start the machine by the standard way (See - 1-17).

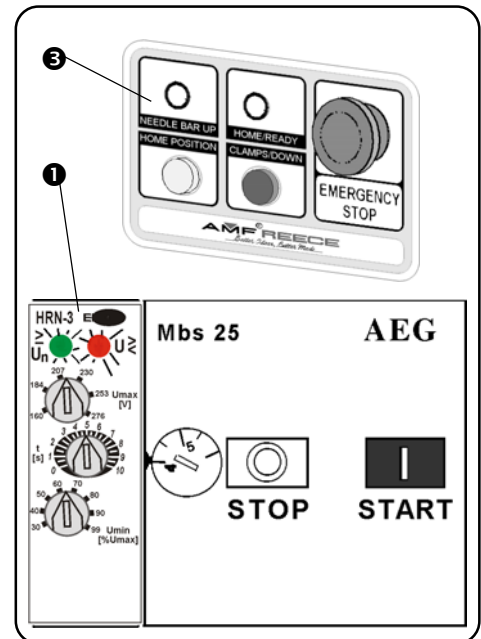
**THE MACHINE POWER SUPPLY PROTECTION**

**The supply voltage is below the lower limit 165 V**

If the supply voltage is below the lower limit 165 V, the machine automatically enters **EMERGENCY STOP** and the red and green LEDs will begin flashing on the operator control panel ③). The *only* red  $U_{\geq}$  LED indicates on the voltage monitoring relay ①).

If the supply voltage is decreased during a sewing, the machine automatically stops.

When the voltage level is restored to acceptable levels (165 - 255 V), it is possible to start the machine by the standard way (See - 1-17).





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**TROUBLESHOOTING**

| SYMPTOM   | POSSIBLE CAUSE  | POSSIBLE SOLUTION  |
|---|---|--|
| Motor fails to start.                                       | No power to the electrical panel.<br><br>The message, Air sensor yes, is displayed.<br>Defective starter switch.<br>The upper limit (255V) of the supply voltage is exceeded<br>The supply voltage is lower than 165V | Check the electrical plug and wiring.<br>Change the Air sensor parameter to no.<br>Replace the starter switch.<br>See page 1-102<br><br>See page 1-103   |
| Motors started and operated for a short time, then stopped. | Incorrect voltage.<br><br>Excessive cutting pressure.<br><br>Incorrect belt tension.<br><br>Dirt in the sector teeth.   | Check the electrical plug and wiring connections.<br>Decrease the cutting pressure, page 1-75<br>Correct the belt tension, page 1-7.<br>Clean the sector teeth and test by freely rotating the complete assembly forward and backward. |
| The machine fails to cycle.                                 | Belt has fallen off.  | Install the belt.  |
| Uneven feeding.   | Main cam friction is too tight or too loose.<br>Improperly set main shaft brake.<br><br>Worn feed clutch.   | Adjust for proper friction, page 1-57.<br>Adjust for proper compression, page 1-58.<br>Replace the feed clutch.  |
| Machine rotating hard at the eye.                           | Dirt lodged between the upper and lower sector teeth.   | Remove the dirt.   |
| Machine fails to stop stitching.                            | Relays not functioning correctly.   | Repair or replace the relays.  |
| Machine does not reach home position.                       | Worn or incorrectly adjusted drive belt.<br>Excessive cutting pressure.   | Replace and adjust the drive belt.<br><br>Decrease the cutting knife and the block pressure, page 1-75.  |
| Machine fails to stop.                                      | Home sensor not activating.   | Set clearance between the sensor and the sensor block, page 1-49.<br><br>Test sensor and replace if needed.  |

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**TROUBLESHOOTING**

| SYMPTOM   | POSSIBLE CAUSE  | POSSIBLE SOLUTION   |
|---|---|---|
| Machine does not grip the fabric, or releases too soon. | Clamp feet incorrectly adjusted.<br>Incorrect or insufficient air pressure.   | Adjust the clamp feet, page 1-54.<br>Ensure the air pressure indicates the minimum 4.5 bar, (65 PSI), increase pressure if needed.  |
| Machine does not release the fabric.                    | Machine is not reaching the home position.<br>Incorrect clamp disengagement.  | Check the sensors, page 1-47.<br>Check the air supply line.   |
| Machine fails to cut the fabric.                        | Damaged knife.<br>Damaged cutting block.<br><br>Insufficient cutting pressure.<br><br>Damaged cutting lever.<br>Damaged cutting cam.<br>Damaged cutting lever cam follower. | Replace the knife.<br>Repair or replace the cutting block, page 1-73.<br>Increase the cutting knife and block pressure, page 1-73.<br>Replace the cutting lever.<br>Replace the cutting cam.<br>Replace the cam follower. |
| Cutting lever sticks and fails to return.               | Faulty extension spring.<br>Pins sticking.<br>Excessive cutting lever pressure.   | Replace the spring, page 1-73.<br>Adjust and/or lubricate the pins.<br>Decrease the cutting lever pressure.   |
| Uneven cutting.   | Uneven clamp spread.<br><br>Cutter is not centered.<br>Incorrectly installed cutting steels.<br>Cutting steel is not fitted to the knife.                                   | Adjust the clamp spread, page 1-52.<br><br>Center the cutter, page 1-73.<br>Correctly install the cutting steels.<br>Perform the replacement of the cutting steel adjustment, page 1-73.                                  |
| Cutting stitches, on a Cut After machine.               | Loose upper thread tension.<br><br>Insufficient clamp spread.<br><br>Clamps not holding the fabric correctly.<br>Cutting knife is not centered.                             | Increase the upper thread tension, page 1-36.<br>Increase the clamp spread, page 1-52.<br>Adjust the clamp gripping pressure, page 1-54.<br>Center the cutting knife, page 1-73.  |

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## TROUBLESHOOTING

| SYMPTOM                                 | POSSIBLE CAUSE  | POSSIBLE SOLUTION   |
|---|---|---|
| Cutting stitches on a Cut After machine | Cutting steel is not centered to the knife.           | Center the cutting steel to the knife, page 1-73.   |
|   | Stitches are being cut on both sides.                 | Adjust the bite and cutting space, page 1-60.<br>Ensure the correct looper and spreader timing. |
|   | Incorrect buttonhole length.                          | Adjust for the proper length buttonhole, page 1-61.   |
| Skipping stitches.                      | Incorrect needle installation.                        | Correctly install the needle.   |
|   | Bent or burred needle point.                          | Replace the needle.   |
|   | Needle deflection.                                    | Ensure the needle does not contact any object.  |
|   | Excessive looper to needle clearance.                 | Decrease the looper to the needle clearance, page 1-67.   |
|   | Incorrect looper and needle timing.                   | Correct the looper timing, page 1-67 to 1-70.   |
|   | Excessive looper carrier end play.                    | Replace worn parts.<br>Ensure correct looper carrier adjustment.                                |
|   | Bent or worn loopers.                                 | Replace loopers.  |
|   | Incorrect spreader timing.                            | Correctly adjust the spreader timing.   |
| Skipping at the flybar "Y" junction.    | Excessive clamp foot to needle entry point clearance. | Decrease the clamp foot to needle entry point clearance, page 1-53.                             |
|   | Incorrect clamp spread.                               | Correctly adjust the clamp spread, page 1-52.   |
|   | Improper threading.                                   | Correctly thread the machine, page 1-31 to 1-37.  |
|   | Incorrect tension settings.                           | Correctly adjust the tension settings, pages 1-32 to 1-36                                       |
|   | Incorrect cutting space.                              | Adjust for the proper cutting space, page 1-60.   |
|   | Hard and heavy cord is deflecting the needle.         | Slightly increase the bite size and set the loopers and spreaders.                              |
|   |   |   |

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**TROUBLESHOOTING**

| SYMPTOM                     | POSSIBLE CAUSE   | POSSIBLE SOLUTION   |
|-----------------------------|--|---|
| Sew start skipped stitches. | <p>Sew start thread length is too short.</p> <p>Fork spreader is not positioned over the eye looper hole.</p> <p>Incorrect right hand looper timing.</p> <p>Excessive clamp foot to needle entry point clearance.</p> <p>Damaged loopers and/or spreaders.</p> | <p>Adjust the upper tension start release, page 1-36.</p> <p>Position the fork spreader over the eye looper hole.</p> <p>Properly adjust the looper timing, page 1-49 to 1-71.</p> <p>Decrease the clamp foot to needle entry point clearance, page 1-53.</p> <p>Replace the loopers and/or spreaders.</p>                                      |
| Upper thread breakage.      | <p>Excessive upper thread tension.</p> <p>Incorrect needle to looper clearance.</p> <p>Incorrect looper to spreader timing.</p> <p>Sharp edges along the thread path.</p> <p>Incorrect needle insertion, or bent needle.</p> <p>Incorrect threading.</p>       | <p>Decrease the upper thread tension, page 1-36.</p> <p>Adjust the needle to looper clearance, page 1-67.</p> <p>Correct the looper to spreader timing, pages 1-66 to 1-71.</p> <p>Eliminate the sharp edges along the thread path.</p> <p>Replace or correctly insert the needle.</p> <p>Correct the machine threading, page 1-31 to 1-37.</p> |
| Lower thread breakage.      | <p>Excessive lower thread tension.</p> <p>Incorrect left-hand spreader setting.</p> <p>Refer to the breakage of the upper thread possible causes.</p>  | <p>Decrease the lower thread tension, page 1-32.</p> <p>Correct the left-hand spreader setting, page 1-71.</p> <p>Refer to the breakage of the upper thread possible solutions.</p>   |

## TROUBLESHOOTING

| SYMPTOM   | POSSIBLE CAUSE   | POSSIBLE SOLUTION  |
|---|--|--|
| Lower thread breakage with cord trim adjustment.                  | Thread is incorrectly positioned in the throatplate:<br>Lints in the throatplate<br>Broken spring<br>Incorrectly loosened lower thread.<br>Thread ends drawn into the throatplate.<br>Refer to the breakage of the upper thread possible causes. | Clean the throat pate.<br>Replace the spring.<br>Adjust the thread.<br><br>Set 8-9 CLAMP DL on the LCD panel.<br>Refer to the breakage of the upper thread possible solutions..  |
| Thread breaking and running back out of the needle bar.           | Incorrect trimming.<br><br>Incorrect tension.<br>Incorrect threading.  | Correctly adjust the trimming, page 1-81.<br>Correctly adjust the tension.<br>Correctly thread the machine.  |
| Incorrect eye shape.  | Incorrect lateral cam timing.<br>Incorrect cutting lever adjustment.<br><br>Gimp is pulling hard through the throat plate.<br><br>Incorrect race swing.<br><br>Incorrect clamp spread.   | Correct the lateral cam timing, page 1-57.<br>Correct the cutting lever adjustment, page 1-73<br>Clean the throat plate gimp hole to correctly tension the gimp thread, pull through easily and does not pull back, page 1-75.<br>Ensure the race swing rotates a full 180 degrees and ensure a square setting, page 1-50.<br>Correct the clamp plates and spread adjustment, page 1-52. |
| Inconsistent stitching on the straight portion of the buttonhole. | Incorrect machine alignment.<br>Incorrect clamp spread.<br><br>Incorrect looper to spreader timing.  | Correctly align the machine.<br>Correct the clamp spread, page 1-52.<br>Correct the looper to spreader timing, page 1-66 to 1-71.  |

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**TROUBLESHOOTING**


| SYMPTOM  | POSSIBLE CAUSE   | POSSIBLE SOLUTION  |
|--|--|--|
| Row of stitching is cut by the knife after the sewing cycle is complete. | <p>Incorrect cutting width.</p> <p>Incorrect cutting lever setting.</p> <p>Incorrect clamp spread.</p> <p>Buttonhole length too short.</p>   | <p>Correct the cutting width page 1-60.</p> <p>Correct the cutting lever setting, page 1-73.</p> <p>Correct the clamp spread setting, page 1-52.</p> <p>Correctly adjust the length gauge, page 1-63.</p>  |
| Uneven stitch density.   | Main shaft brake shoe or brake band is loose.  | <p>Tighten main shaft brake shoe , page 1-56.</p> <p>If even stits density is not obtained, you may need to tighten the brake band, page 1-56.</p>   |
| Noisy brakes   | Main shaft brake shoe or brake band is overtightened.  | Reduce high thrust, page 1-56, otherwise machine could be damaged.   |
| Decreased buttonhole quality.  | <p>The functional and aesthetic quality of a buttonhole is influenced by:</p> <p>Stitch density.</p> <p>Number of buttonhole eye stitches.</p> <p>Incorrect amount of fabric spread.</p> <p>Incorrect distance between the stitch line and the buttonhole axis.</p> <p>Incorrect loopers and spreaders timing.</p> | <p>Adjustments, pages 1-45 to 1-87.</p> <p>Correct the stitch density.</p> <p>Correct the number of buttonhole eye stitches.</p> <p>Correct the amount of fabric spread.</p> <p>Correct the distance between the stitch line and the buttonhole axis.</p> <p>Correct the loopers and spreaders timing.</p> |
| Stitches are pulling up.   | <p>The type of thread and fabric will affect the buttonhole appearance.</p> <p>Incorrect upper and lower thread tensions.</p> <p>Incorrect loopers and spreaders timing.</p>   | <p>Adjust settings to accommodate thread and fabric.</p> <p>Correct the upper and lower thread tensions, pages 1-32 to 1-36.</p> <p>Correct the looper and spreader timing, page 1-66 to 1-71.</p>   |

**TROUBLESHOOTING**

| SYMPTOM  | POSSIBLE CAUSE  | POSSIBLE SOLUTION  |
|--|---|--|
| Machine power is switched on, but the LCD screen is blank.   | The LCD is not properly connected to the control box.<br>The power supply is not properly connected to the control box.<br>The LCD unit has failed. | Ensure the correct connection according to the diagram.<br>Ensure the correct connection according to the diagram..<br>Ensure the synchronizer board red LED is activated, if not activated, the LCD has failed.<br>Replace the LCD.   |
| Machine power is switched on, but the LCD screen only displays blank boxes.  | The LCD is not properly connected to the control box.<br>The LCD unit has failed.   | Switch off the main power and unplug the LCD from the control box. Insert the LCD connection again, switch on the main power and check the display for correct operation.<br>If problem still exists, replace the failed LCD.  |
| Machine power is switched on, the display indicates “full cycle”, the start treadle is pressed to the first stage, (clamps down), but the clamps do not lower. | Malfunctioning treadle switch.<br><br>Incorrect DC solenoid valve connection.   | Using the “System Test” ensure the start treadle is operating correctly.<br>Check the clamp solenoid valve connection inside the control box and ensure the valve connector light is activated and if this connector is connected to the valve, the valve must be activated. |
| Lights and switches on the operator control panel are not operating. The machine will not cycle and the display indicates “Not Needle Up”.                     | Incorrect wiring.<br><br>Needle is not in the up position.<br><br>No power on the synchronizer board.   | Using the operator panel wiring diagram, correct the wiring.<br>Manually rotate the handwheel until the machine is in the needle up position, and the red indicator light is activated.<br>Ensure the synchronizer board has power and the red LED is activated.             |

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**TROUBLESHOOTING**

| SYMPTOM   | POSSIBLE CAUSE   | POSSIBLE SOLUTION   |
|---|--|---|
| <p>Lights and switches on the operator control panel are not operating. The machine will not cycle and the display indicates “Not Needle Up”.</p> | <p>The synchronizer disk is too far from the sensor to interpret the signal.</p>               | <p>Align the synchronizer disk magnet with the board sensor. If the green LED is activated, a signal is received. If the green LED is not activated, adjust the synchronizer to obtain a 3 mm, (.118") clearance between the disk and the sensor.</p> |
| <p>Lights/switches are activated.</p>   | <p>Synchronizer disk magnet is installed backwards.</p>  | <p>Reverse the magnet, if no signal received, replace the synchronizer board.</p>   |
| <p>The machine will not cycle and the display indicates “not home”.</p>   | <p>The machine is not in the home position.</p>  | <p>Press the home push button  on the <b>LCD</b>, or press the white control panel push-button..</p>   |
| <p>The machine will not cycle and the display indicates “watch dog error”.</p>  | <p>Incorrect home sensor clearance.<br/><br/>The home sensor signal is not being received.</p> | <p>Ensure the home sensor height is 0.5 to 1 mm (.020 to .040"), above the home position sensor block.<br/><br/>Using the “System Test”, check the home sensor operation.<br/>Check the connection from the terminal board to the control box.</p>    |
| <p>The machine will not cycle and the display indicates “watch dog error”.</p>  | <p>The motor cables are not properly connected to the control box.</p>                         | <p>Ensure proper cable connections.<br/>Remove the drive belt and perform the table test in the “Systems Test”.</p>   |



## TROUBLESHOOTING

| SYMPTOM   | POSSIBLE CAUSE  | POSSIBLE SOLUTION  |
|---|---|--|
| Pressing the start treadle moves the machine bedplate, but the machine does not sew and the bedplate continuously cycles. | <p>The first stitch sensor is not receiving a first stitch sensor block signal.</p> <p>Incorrect start treadle connections.</p> | <p>Switch on the machine power and ensure the red first stitch sensor LED is activated, (the metal object must be close to the sensor).</p> <p>Ensure the sensor and the sensor block clearance is 0.5 to 1 mm (.020 to .040").</p> <p>Check the connection from the terminal board to the control box. Perform the "Systems Test".</p> <p>Using the start treadle wiring diagram, or the Test Menu, correct the connections</p> |
| The machine moves from the home position to the sew position and stops. The display indicates "watch dog error".          | The cables are not properly connected to the control box.   | Ensure proper connections from the sew motor to the control box. Remove the V-belt and perform the "Systems Test".   |
| The machine sews a buttonhole, then stops and does not complete the cycle. The display indicates "not needle up".         | <p>Loose sewing motor drive belt.</p> <p>Incorrect positioning speed and brake force parameters.</p>                            | <p>Properly tension the drive belt, page 1-7.</p> <p>Correct the parameter settings.</p>   |
| The machine sews a buttonhole, then stops and does not complete the cycle. The display indicates "watch dog error".       | Malfunctioning control box relay.   | Perform the "Relay Test" to ensure correct mechanical operation.   |
| The machine sews a buttonhole, and stops while punching the buttonhole slot. The display indicates "watch dog error".     | Loose table motor drive belt.   | Properly tension the table motor belt, page 1-7.   |

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**TROUBLESHOOTING**

| SYMPTOM                   | POSSIBLE CAUSE   | POSSIBLE SOLUTION  |
|---------------------------|--|--|
| Machine fails to start.   | Incorrect function of pressure switch.   | Check function of pressure switch  |
| Clamping not operational. | Disconnected or incorrect air pressure.<br>Incorrect LCD parameters.<br>Mechanism binding. | Check all connections and ensure proper 4.5 bar, (65 PSI) of minimal air pressure.<br>Check parameter settings.<br>Ensure free movement of the clamp arm assembly.   |
|                           | Clamping air cylinder not operating.   | Press the arrow up/down  push button on the LCD, or use the black button on the operator control panel to check for proper operation.                                     |
|                           | Solenoid valve not operating.  | Replace cylinder if needed.<br>Ensure the valve connector light is activated, the valve must be activated. Ensure this connector is connected to the valve.  |
|                           | Damaged supply line.<br>Restricted air flow.<br>Disconnected or incorrect air pressure.    | Replace supply line.<br>Correct air flow.<br>Check all connections and ensure proper 4.5 bar, (65 PSI) of minimal air pressure.  |
|                           | Incorrect LCD parameters.<br>Solenoid valve not operating.                                 | Check parameter settings.<br>Ensure the valve connector light is activated, the valve must be activated. Ensure this connector is connected to valve.  |
|                           | Damaged supply line.<br>Restricted air flow.<br>Shearing air cylinder not operating.       | Replace supply line.<br>Correct air flow.<br>Press the SBT and the arrow up  push button on the LCD to ensure proper cylinder operation. Replace the cylinder if needed |


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## TROUBLESHOOTING

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### Built-In Test Programs

A program is available to test the major input functions, synchronizer, and encoder for correct operation. To access the test program:

Press the  and **SBT** push buttons at the same time.

When the message SYSTEM TEST is displayed, the following may be tested:

- Needle position
- Start treadle
- Home and sew sensors

With the machine in the home position, the display reads “1-HOMESENSOR”, indicating the processor is receiving a signal from the home sensor.

**Note:** Any other message indicates a home sensor malfunction.

**Note:** Only one function may be displayed, if two signals are being received the signal with the highest priority will be displayed.

The order of priorities:

- 1- Home sensor
- 2- Sew sensor
- 4- Clamp down
- 5- Start treadle
- 6- Needle up

### Home and Sew Sensor Testing

Manually rotating the machine through a cycle, changes the display and indicates which signal is being received.

Example: Starting the machine in the home position, the display indicates “HOMESENSOR”. When the handwheel is rotated away from the home position, the display indicates “NEEDLE UP”. If the machine is not in the Needle Up position and no other signals are received, the display will indicate “TEST INPUTS”. Continue rotating the handwheel and the display will indicate “HOMESENSOR” as the machine reaches the punch position plateau of the home sensor block.

Continue rotating the handwheel until the Sew sensor reaches the first stitch plateau of the Sew sensor block, page 1-44. The display indicates “2-SEW SENSOR”.

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## TROUBLESHOOTING

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### Testing the Clamp Down And Start Treadle

Use the handwheel to rotate the machine manually until the display message reads “NEEDLE UP” or “TEST INPUTS”.


Lightly toe the start treadle until the message reads “4-CLAMP DOWN”.


Fully toe the start treadle. The message should now read “5-START”.

### Motors Belt Tension

**Caution!** To avoid damage to the machine, remove the belts before performing this test.

### Testing the Motors

Press the  Round arrow push button, the display indicates “ONLY w/adapter”.


Press the  Round arrow push button again, the display indicates “TEST TABLE MOTOR”.

Lightly toe the right-hand start treadle to the first position. The motor will begin to rotate with a fixed low current (no speed control).

Fully release the start treadle. The message now reads 800 pls (pulses). Any number other than 800 indicates a failure in the system and the machine must not be used until the failure is corrected.

Fully toe the start treadle. The message now reads 100 pls (pulses). Any number other than 100 indicates a failure in the system, and the machine must not be used until this failure is corrected.

### Sew Motor Test

Press the  home push button, the display indicates “TEST SEW MOTOR”.

Test the sew motor by following the same procedure to test the table motor.

## **TROUBLESHOOTING**

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