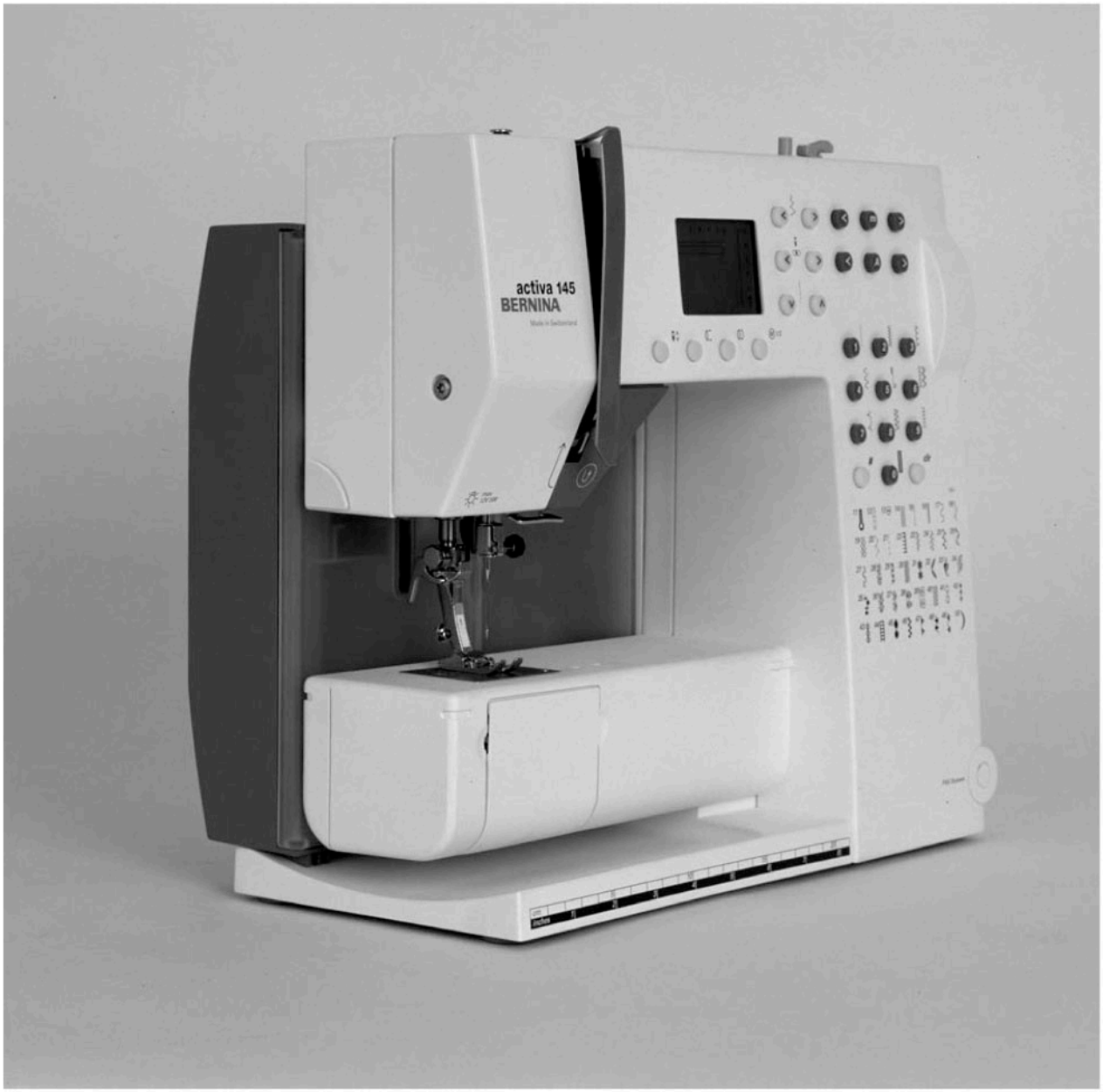
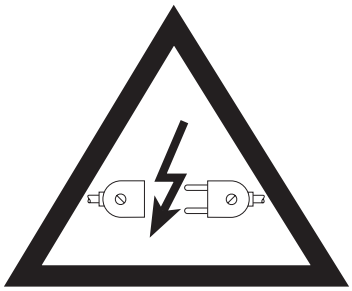
BERNINA®



Service Manual

activa 125/135/145



Attention!
All electrical and electronic components operate at dangerous voltages. The mains plug must be withdrawn before making any adjustments to the machine.
Wait about 30 seconds after removing the plug (capacitor discharge).

The service manual is intended to help with small repairs and adjustments. The instructions lay no claim to completeness. They are not suitable for a complete assembly or disassembly procedure.

Important:
To enable the work described to be performed correctly, the sewing machine must be in good mechanical and electrical condition (running smoothly, properly oiled and all plugs in position). When the adjustments are carried out in the correct order, the machine will sew perfectly.

When doing any service on a machine always use the original accessories that were delivered with the machine, or were purchased afterwards. These are the following:
– Mains cable
– Foot control unit
– Buttonhole foot
– Bobbin case with bobbin
– Other accessories

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This manual is an ever changing document. The recipient is responsible for updating the information which he will receive from Fritz Gegauf Ltd. Switzerland.

Impressum
Author: P. Kenyon, V. Häseler
Layout conception: Melzer-Müller id, Kreuzlingen
Typesetting/DTP: Silvia Bartholdi
Print: Bodan AG, Kreuzlingen

Contents

Technical data 3, 4

Service Panel 4

Tools & Gauges 5

Electronic
- Description 6
- Block diagram 7
- L-Print 8
- S-Print 9
- Diagnosting 10
- Powering of the stepping motors 10
- Bevore service or repair work carried out 10
- Protection of electrical components against electrostatic discharges 10

Service Programme
- Start/Stop the service programme 11

In Basic Service Programme
- Configuration 11
- Foot control unit 11
- P-Print (Positioning) 12
- Bobbin winder motor 12

As a programme

LCD Function of the LCD display 13
No. 1 Sewing-off 13
No. 2 Forward/Reverse feed compensation 13, 14
Test Buttonhole 14
No. 3 Automatic darning 15
No. 4 Software version 15
No. 5 Number of hours sewn 15
No. 6 Maximum speed regulation 16
No. 7 Stepping motor test stitch width 16
No. 8 Pinning position of both stepping motors 17
No. 9 Stepping motor test stitch length (SL) 17
No. 10 Displaying the actual speed 18
No. 11 Displaying the factor of speed regulation 18
No. 12 Start/Stop function 19
No. 13 Testing both stepping motors (SL and SB) 19
Testing ribbon cables 20

Functional inspection 21

Removing covers 22, 23

Cleaning 24

Exchanging parts
- S-Print 25
- Buttonhole sensor 25
- L-Print 26, 27
- Main motor 27
- Stepping motor SB 28
- Stepping motor SL and crank shaft 28
- Bobbin winder motor 29
- Base shaft 29
- Hook race ring 30
- Tension unit 30
- Take-up lever 31
- Main shaft 32

Adjustments
- Belt tension main shaft/main motor 33
- Belt tension main shaft/base shaft 33
- Bobbin winder device 34
- Presser foot fixation 34
- Head frame plate 34
- Presser foot height 35
- Darning foot height 35
- Drive position in the hook race 36
- Distance needle/hook 36
- Needle position zig-zag 36
- Position of synchronisation disc 37
- Feed-dog position in the stitch plate 37
- Height of the feed-dog 38
- Thread passage play 38
- Thread guide plate 39
- Loop lift 39
- Position of Hook/Driver 40
- Needle height 40
- Feed-dog Synchronisation 41
- Basic setting of balance 41
- Knee lifter unit (accessory) 42
- Lower thread tension 42
- Upper thread tension 43
- Adjustment of upper thread tension with a weight 43
- Tension release lever 44
- Thread regulator spring 44

Oiling and Lubrication 45

Sewing-off 46

Cleaning 46

Complaints form 46

Complaints report: Appendix

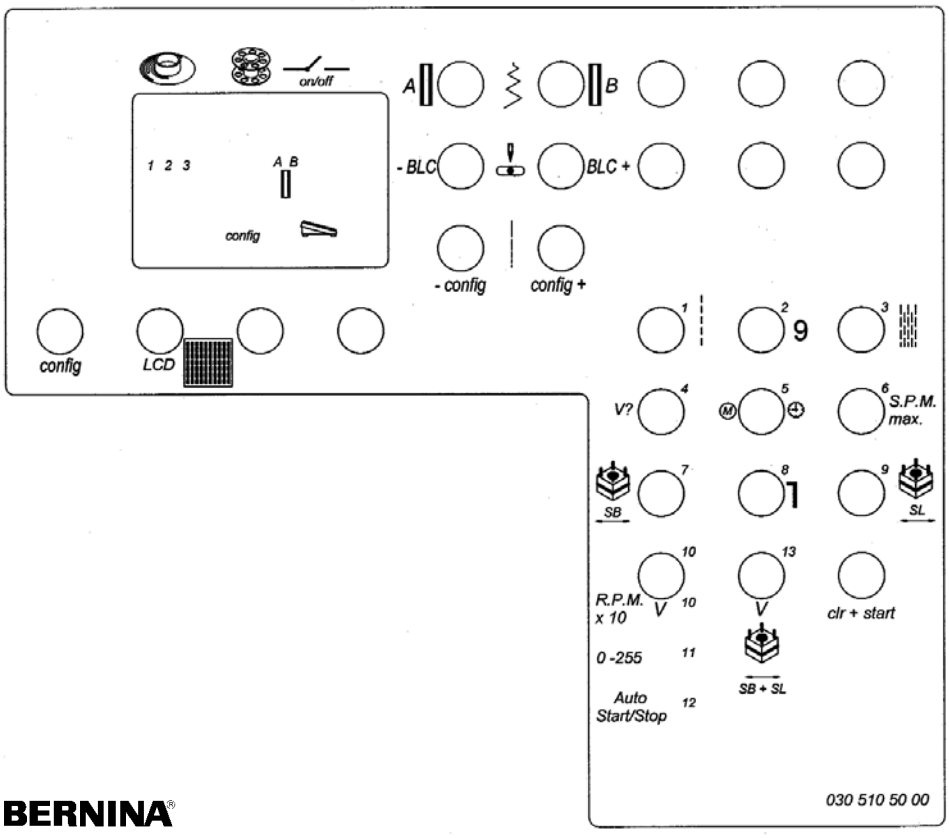
Marina's Little Shoppe on eBay

Features (Stitches)	activa 125	activa 135	activa 145
Stitch length forwards in mm	5	5	5
Increment in mm	0,15	0,15	0,15
Stitch length reverse in mm	5	5	5
Stitch width in mm	5,5	5,5	5,5
Increment in mm	0,23	0,23	0,23
Needle positions	9	9	9
Buttonhole types	3	3	3
Darning programme	1	1	1
Functions by stitch counter	Yes	Yes	Yes
Buttonhole: length measurement	Yes	Yes	Yes
Total practical stitches	10	19	19
Total decorative stitches	5	5	19
Alphabets and numbers	No	No	1
Total number of stitches	20	30	50 (+ 60 charac.)
Functions			
Automatic basic settings	Yes	Yes	Yes
Optimum settings displayed	No	Yes	Yes
Selected stitch function	on screen	on screen	on screen
Clear (clr) button	Yes	Yes	Yes
Balance	mechanical	mechanical	mechanical
Pattern end	Yes	Yes	Yes
Mirror image (lateral)	No	No	Yes
Permanent reverse sewing	Yes	Yes	Yes
Memory (mem)	No	Yes	Yes
Permanent save	No	Yes	Yes
Hopper mechanism	Yes	Yes	Yes
Presser foot attachment	Snap-on	BERNINA	BERNINA
Adjustable presser foot pressure	No	No	No
FHS presser foot lifter	optional	optional	optional
Operating controls			
Buttons	Rubber pad	Rubber pad	Rubber pad
Screen	LCD	LCD	LCD
Size in mm	60 x 40	60 x 40	60 x 40
Type	symbolic	symbolic	symbolic
Background lighting	No	Yes/LED	Yes/LED
Direct stitch/function selection	partly	partly	partly
Stitch width indicator beam	Yes	Yes	Yes
Stitch length indicator beam	Yes	Yes	Yes
Integrated service programme	Yes	Yes	Yes

4 Technical data BERNINA activa series contd.

Drive unit/power unit	activa 125	activa 135	activa 145
Power max.	80W	80W	80W
Motor	DC/65W/24V	DC/65W/24V	DC/65W/24V
Sewing speed S.p.m.	120–900/min	120–900/min	120–900/min
Needle stop	up & down	up & down	up & down
Needle stop via foot control	*	*	*
* optional with virtuosa foot control			
Roll-up foot control cable	Yes	Yes	Yes
Main power switch	Yes	Yes	Yes
Construction/housing			
Through space (diagonal) in mm	160 x 110 (192)	160 x 110 (192)	160 x 110 (192)
Overall length in mm	345	345	345
Overall width in mm	176	176	176
Overall height in mm	307	307	307
Sewing light voltage	12V/5W	12V/5W	12V/5W
Bulb	1 x 5W	1 x 5W	1 x 5W
Presser foot height in mm	7,5 mm	7,5 mm	7,5 mm
Drop feed-dog mechanism	Yes	Yes	Yes
Drop feed-dog via FHS	** Optional	** Optional	** Optional
** possible with added FHS			
Hook system	BERNINA-CB	BERNINA-CB	BERNINA-CB
Needle system	130/705H	130/705H	130/705H
Adjusting needle	130/705H TCN	130/705H TCN	130/705H TCN
Weight (excl. accessories)	ca. 9,6 kg	ca. 9,6 kg	ca. 9,6 kg

Service Panel



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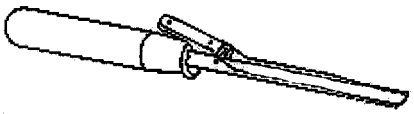
Tools

The following tools and gauges are necessary:

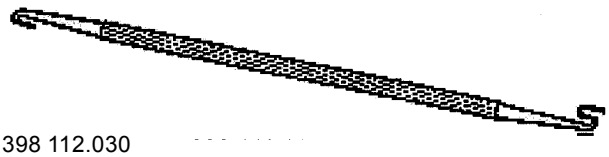
TORX-Screwdriver (Commercially available):
Nr. 6, 8, 9, 10, 12, 15, 20, 25
Not available from BERNINA!

Circlip mounting tool



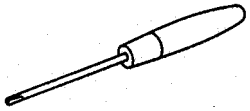
398 083.030

Spring mounting tool



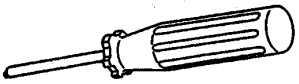
398 112.030

Rectifying tool



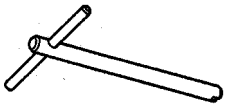
398 097.030

Eccentric Key



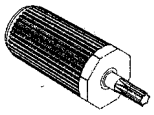
001 361.70.00

Rectifying tool
(Hook/Driver-Play)



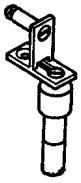
001 357.70.00

Torx Srewdriver
T10s



030 475.50.00

Lower tension

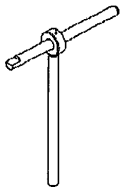


001 358.70.00

Upper tension

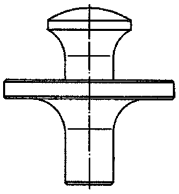
398 080.040

Pinning tool
(Looplift)



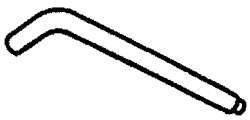
030349.70.00

Hook race gauge



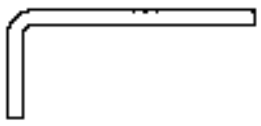
006 765.71.00

Pinning tool
(Stepping motor/Drive crank)



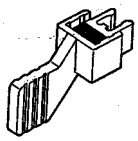
001 356.50.00

Pinning tool
(Stepping motor/Drive crank)



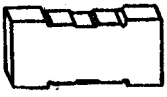
002 733.50.00

Buttonhole filter



008961.70.00

Feed-dog height
0,9/10 mm

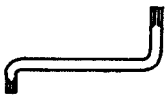


398 024 030

Presser foot height
6,0/8,5 mm

398 031 133

Torx-Screwdriver
TX8z

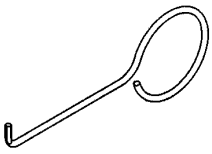


007 993.50.00

Feeler gauge 0,3 mm
(Hook/Driver-Play)

398 022.030 (0,3 mm)
398 111.030 (0,15 mm)

Pinningtool
(Stepping motor stitch length)



030 652.50.00

6 Description of the electronics

The electronics of the BERNINA activa are basically contained in two modules (printed circuits), namely on the power L-print and the S-print (see block diagram).

Power supply L-print
The power L-print is mounted at the rear of the sewing machine. The circuits produce the following direct current voltages:

- 5 V/DC for the logic on the S-print.
- 12 V/DC for the sewing light.
- 30 V/DC for the drive motor, bobbin winder motor and stepping motors.
- 16 V/DC for motor control on the S-print.

In case of malfunction, the fuse F-4A-T protects the parts against overload. If a fuse blows, only an original replacement with the correct ratings must be used.

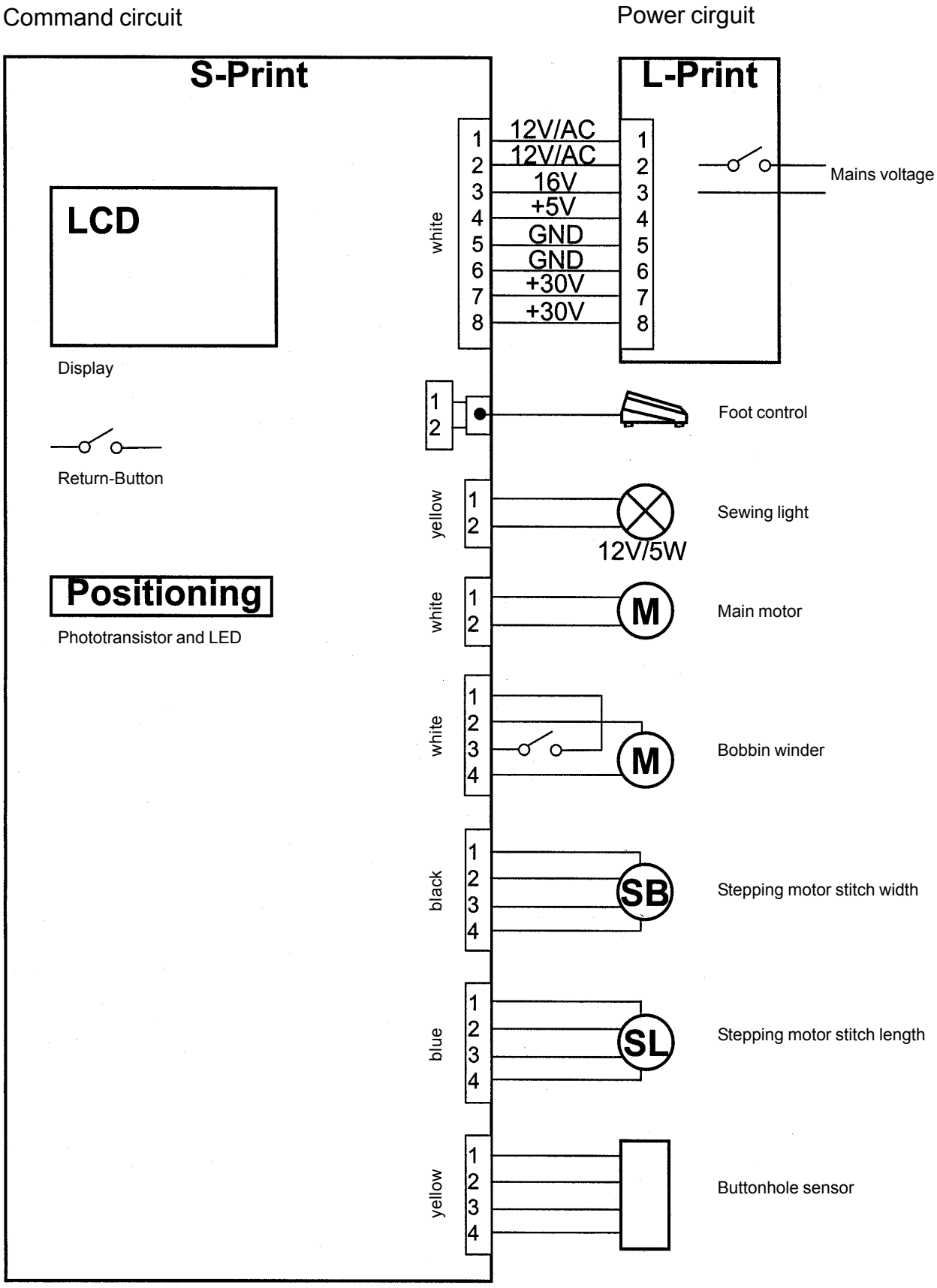
S-print
The S-print is assembled with the latest SMD (Surface Mounted Device) technology. SMD components allow a very compact type of circuitry.
SMD prints cannot be repaired with conventional tools!

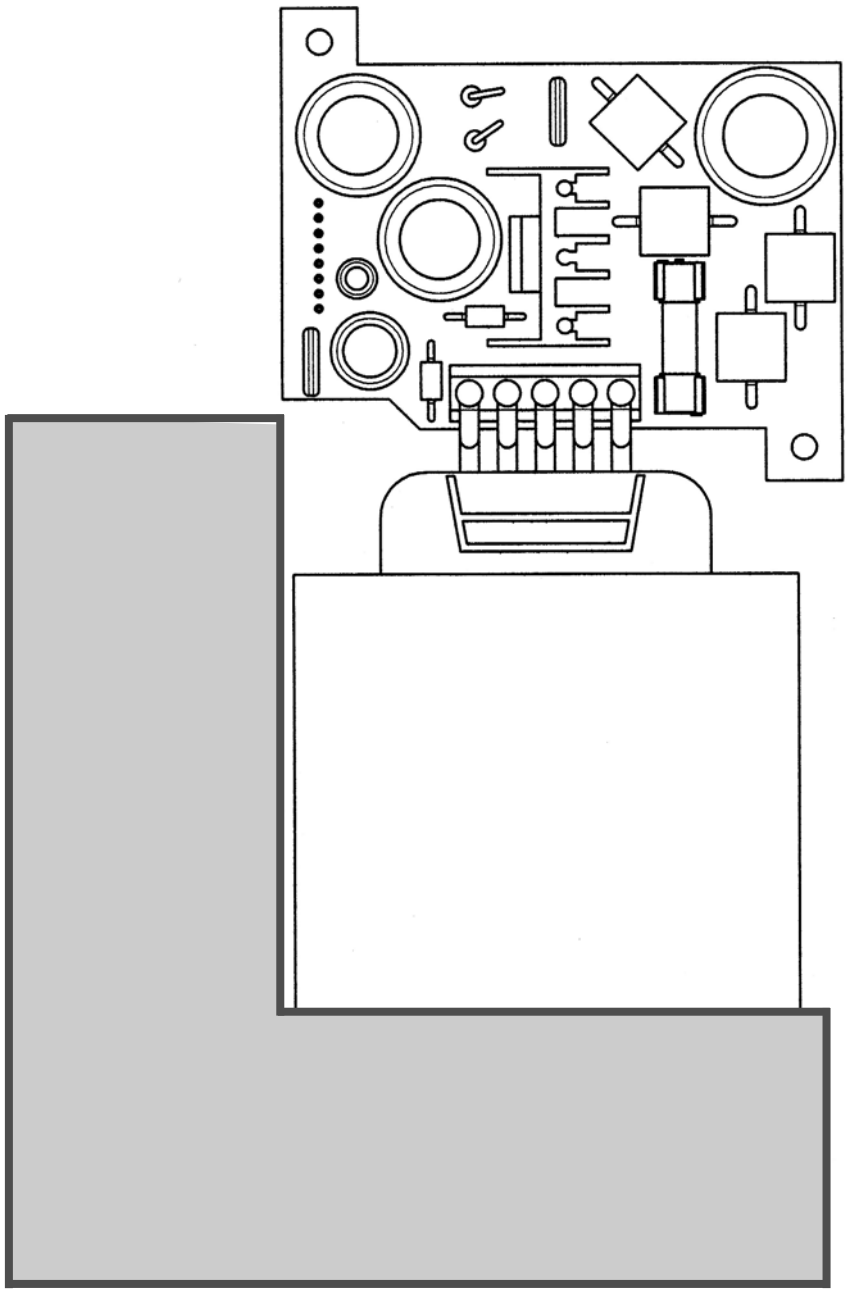
The micro-computer on the S-print receives an analogue signal from the foot control which is converted into a digital signal and given as a nominal value. When the foot control is released (nominal value zero) the micro-computer switches on the electric brake. The motor is stopped very quickly in the required needle position.

When the sewing machine is switched on the stepping motors are in any given position. There can also be any given value in the memory of the micro-computer. So that a defined basis is achieved, the stepping motors are positioned by means of a signal from the micro-computer. This position is then registered and set at zero in the memory of the micro-computer. It is then possible to select and sew any given stitch from this zero position.

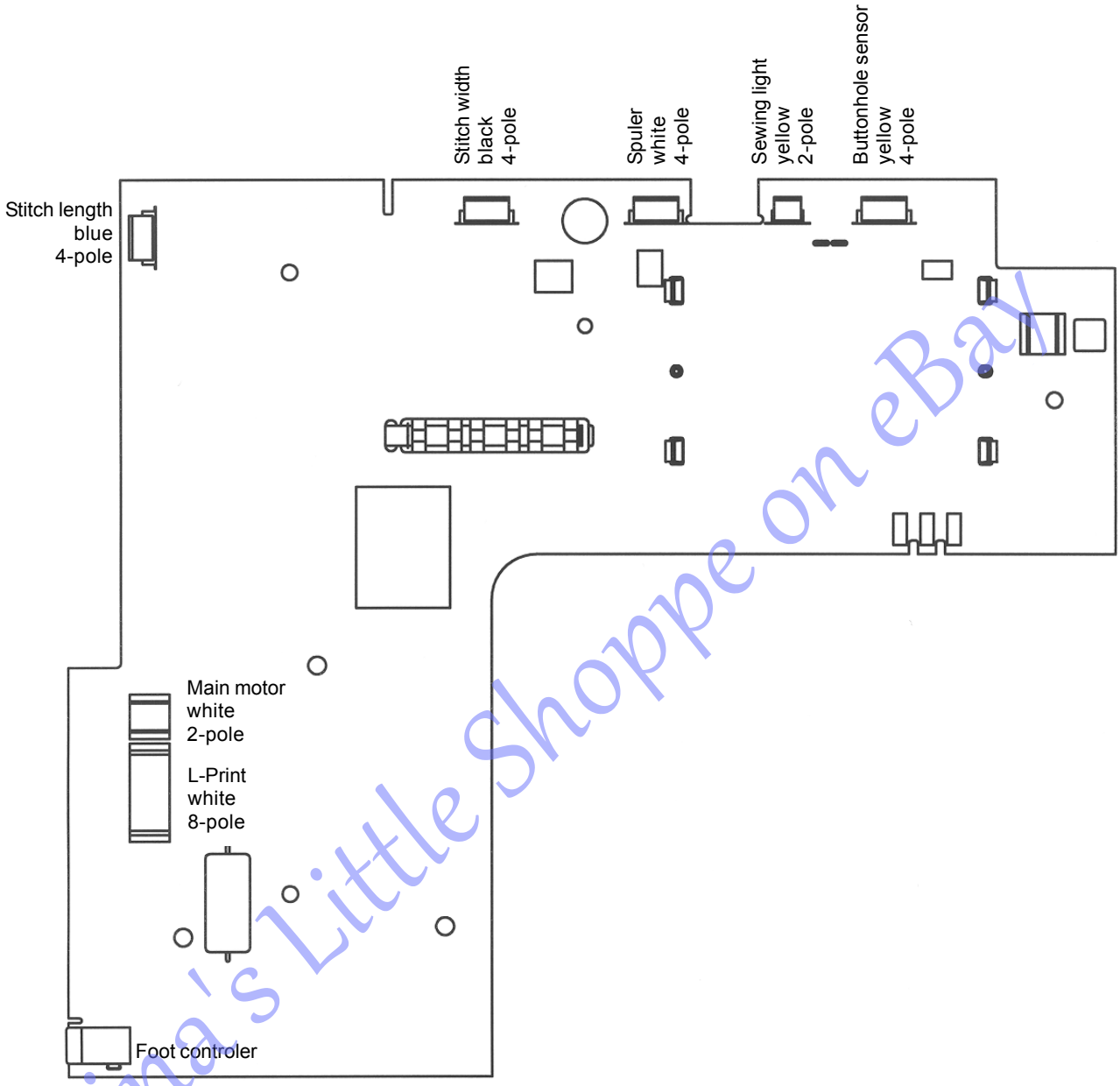
The S-Print controls the functions of the stepping motors to one another, calculates the signals of the sensors, compiles the results and displays them on the screen. Integrated on the S-Print are the display, P-Print and return button.

Block Diagram





Line Voltage!



Marina's Little Shoppe on eBay

10 Diagnostic instructions

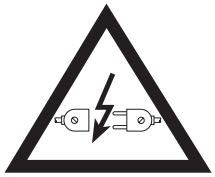
Warning Dangerous voltage levels !
Mains voltage (refer to L-print page 8).

The switch part of the L-print and mains cable carry dangerous voltages.

For your own safety do not touch the L-print until about 30 seconds after the main voltage has been switched off. This is the time required for the capacitors to discharge.

Warning!
The sewing machine may only be connected to the mains supply when the L-Print cover is mounted.

Work may only be carried out on the L-print and mains cable when the mains plug has been withdrawn from the mains supply.



Important:
Follow safetly instructions on page 1!

Powering of the stepping motors

For the correct functioning of the stepping motors, it is essential that they are brought into their «zero» position, which is carried out after each new start of the machine, or each change of functions. In order to adjust, or inspect this «zero» position, the stepping motors must be in a powered state (under current). Exchange motors can be adjusted before they are fitted into the machine. They must be connected to their relative connecting points on the S-Print, which in turn must be connected to the power supply. After connecting the machine to the mains supply, switch the machine on and at the same time keep the Clr-button pressed. Select now the service programme number 8. In this programme the motors are powered with their correct current values. The motors can now be adjusted according to the service instructions given in the service manual.

Before service or repair work is carried out

Before service, or repair work is carried out, in particular when an S-Print is exchanged the following machine data must be secured:

· Specific machine data:

Configuration	Test Config.	page 11
Electronical balance	Test No. 2	page 13
Buttonhole sensor	Test Buttonhole	page 14
Version	Test No. 4	page 15
Hours sewn	Test No. 5	page 15
Speed comp. factor	Test No. 11	page 18

Protection of electrical components against electrostatic discharges

If two insulation materials (e.g. shoe sole and floor) rub together there can be a build-up of static electricity. Should this be discharged through electronic components these can be seriously damaged.

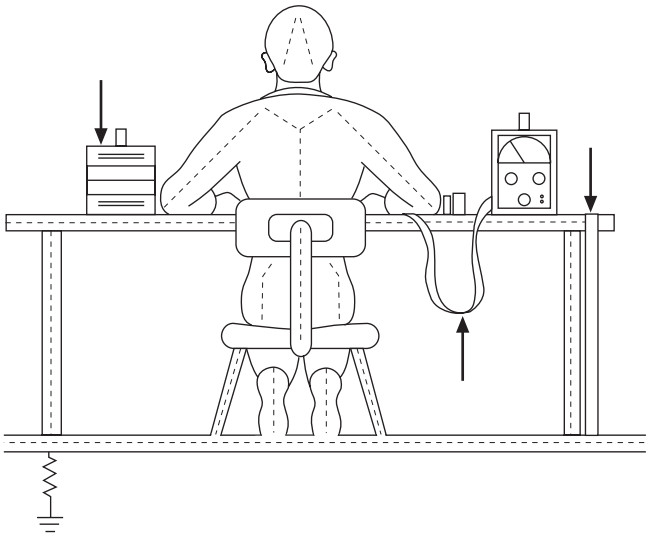
One of the most effective measures to conduct these charges away is earthing.

1. A bench suitable for working with components in today's electronic industry has a surface that does not allow the build-up of static electricity.

   On the one hand the surface should be conductive so that charges are conducted away but on the other hand it should have enough resistance to prevent short-circuiting and earthing of parts laid out on the bench.

2. By wearing a wristband that is connected to the bench surface, static electricity can be conducted away from the person. For safety reasons a resistance of approx. 1 M ohm has to be connected in series with the conductive wristband.

3. Electronic parts may only be dispatched in their original packaging.



Test Programme activa 125/135/145

Starting the test programme
- Attention! Turn the machine off.
- Place the service-panel on the machine.
- When switching the machine on, press at the same time the «start» button.
- The sewing machine moves the stepping motors in the basic position (short acustical nois) and is now in test programme «SP» (Service Programme).

The machine is now in the initial servicing state and any one of the 1–13 individual test programmes can be selected.

By pressing the «clear» button (clr) the machine can at any given time be brought into the initial sate.

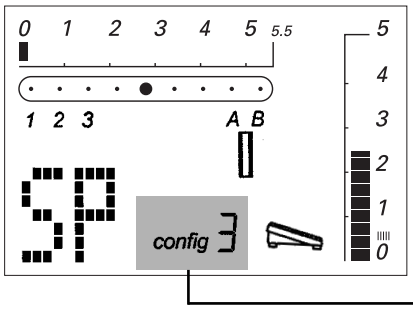
Termination of the test programme
- Switch machine off.
- Switch machine on in the normal manner.
- The sewing machine can now be operated normally.

Test in basic servicing state

The following sensor signals can be checked in the initial state.

Configuaration of the machine

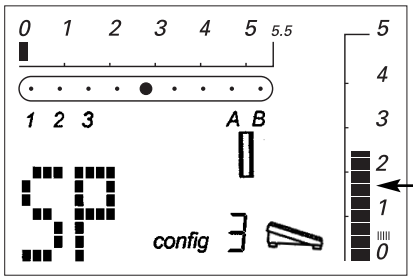
What is to be tested	What to adjust	Normal condition
Configurating the machine type	Initial state of service programme. To modify the number, press simultaneously the «config» button and/or the button «config+» or «config–».	The machine type can now be seen in the display. activa 125 = 1 activa 135 = 2 activa 145 = 3 activa Patchwork Edition (PE) = 4



Configuration state

Function control of the foot control unit

What is to be tested	What to adjust	Normal condition
Foot control unit	Initial state of service operation. Press foot control.	The function of the foot control is indicated in the stitch length beam.



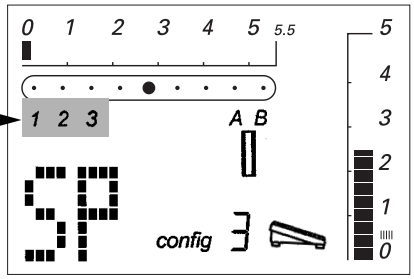
Stitch length bar

12 Test in basic servicing state contd.

Test for the P-Print

What is to be tested	What to adjust	Normal condition
P-Print	Initial state of service programme. a) By turning the handwheel, bring the needle in its lowest position. b) Turn the handwheel slowly forwards and at the same time compare the table in the next column.	In the L.C.R. needle position display three digital signals can be read off. L.C.R. = Left Centre Right

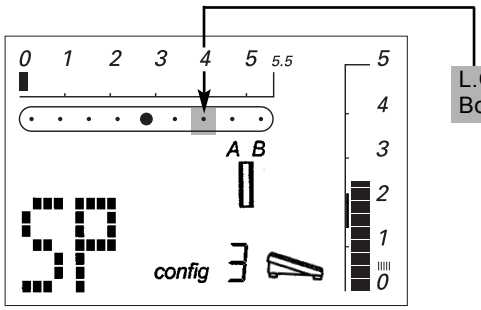
L.C.R. Display
Synchronisatio



	1	2	3
a)			•
b)			
c)		•	
d)		•	•
e)	•	•	•
f)	•	•	
g)	•		
h)	•		•
a)			•

Bobbin winder motor switch

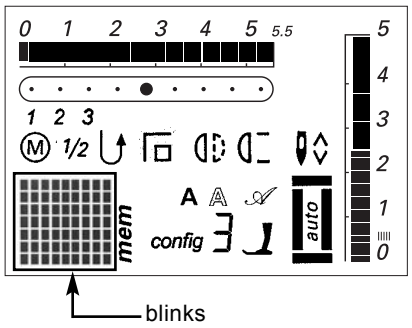
What is to be tested	What to adjust	Normal condition
Winder motor switch Control of motor	Initial state of service programme. Switch on motor. Press the foot control.	Field «bobbin switch» is active in the L.M.R. display. The speed of the bobbin winder motor must be able to be regulated.



L.C.R. Display
Bobbin winder

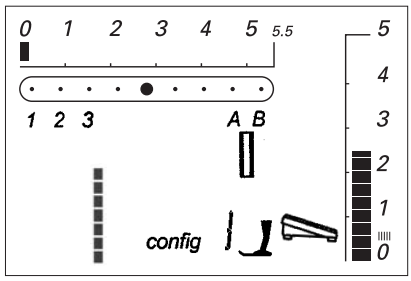
Test LCD Liquid Crystal Display (Service Panel)

What is to be tested	What to adjust	Normal condition
LCD (Liquid Crystal Display)	Select service programme LCD.	All details show up on the screen and the LCD segment scrolls through all possibilities. Attention! Test 13 has a duration of ca 1 min. After which the test will be repeated. The test can be interrupted at any given time by pressing the «clr»-button.



Test No. 1 Sewing-off (Service Panel)

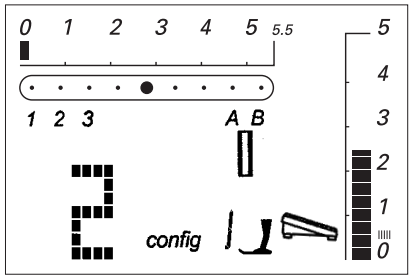
What is to be tested	What to adjust	Normal condition
Sewing-off: Stitch length, width and L.C.R.	Select service programme no. 1.	The machine can now be sewn off. L.M.R., Straight stitch, Stitch length and width can be adjusted.



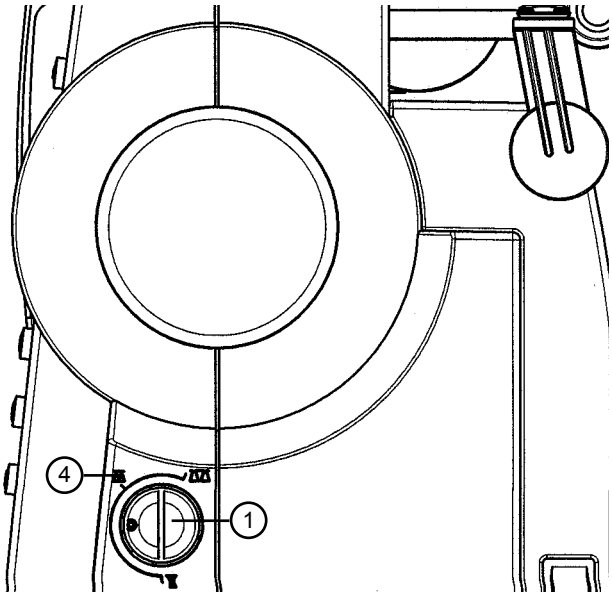
Test No. 2 Forward/reverse feed equalisation (Service Panel)

Electronical fine adjustment

What is to be tested	What to adjust	Normal condition
Forward and reverse feed equalisation	Press BLC+ and BLC– button simultaneously, this will bring you into programm No. 2. – BALANCE + 0 <3 3 >3 6 0 = reverse feed longest 3 = neutral position 6 = reverse feed shortest	In this programme the stitch pattern No. 9 is active. While sewing the forward and reverse feed can be adjusted with the + and – buttons. The stitch pattern No. 9 must be closed. The neutral position is the value 3. The adjusted value is shown on the screen and saved by pressing the clear (clr) button.

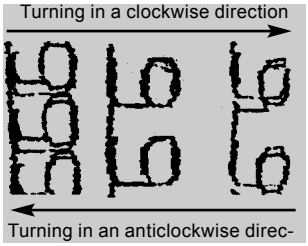


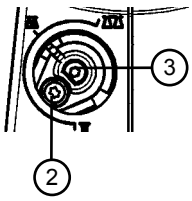
Mechanical fine adjustment



If the stitch formation is not absolutely closed after electronic compensation, a fine adjustment can be made with the balance regulating shaft 3.

Procedure:
- Remove the balance knob 1.
- Loosen screw 2.
- Turn the balance regulating shaft 3 as required.

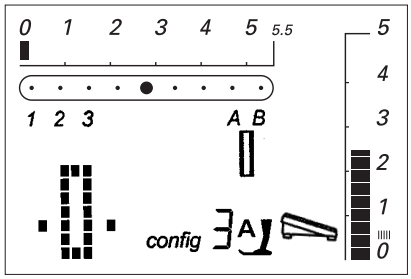




- The balance knob (marker pin) can now be brought into the basic position 4.
- Tighten the screw 2.
- Replace the balance button.

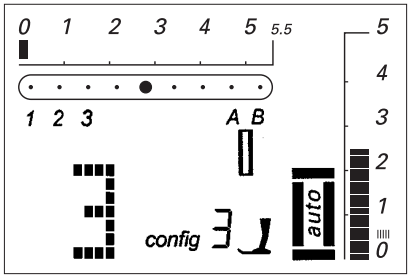
Function of the automatic buttonholing device

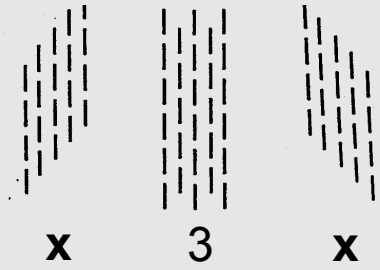
What is to be tested	What to adjust	Normal condition
Automatic buttonhole compensation	Initial state of service programme. Feed-dog at its highest point. Mount the buttonhole foot. Secure the buttonhole filter No. 008 961.70.00 to the presser foot bar. Lower presser foot and simultaneously press both buttonhole buttons.	The feed-dog will move to and fro, until the compensation has been achieved. If no compensation is possible, then the programme will terminate the test after ca. 3 seconds.



Test No. 3 Automatic darning programme (Service Panel)

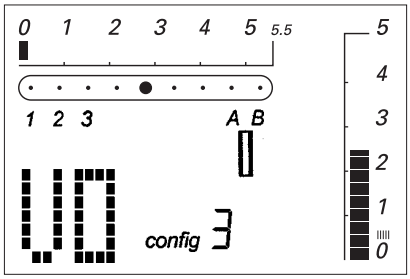
What is to be tested	What to adjust	Normal condition
Automatic darning programme (Secondary test to buttonhole compensation)	Select service programme No. 3.	The darning pattern must run parallel on both ends. Sketch!!





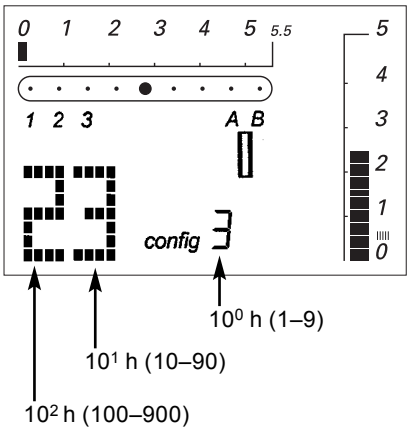
Test No. 4 Software version (Service Panel)

What is to be tested	What to adjust	Normal condition
Software version	Select service programme No. 4.	The software version appears as a number on the screen, e.g. VO = Version 0



Test No. 5 Amount of sewing hours (Service Panel)

What is to be tested	What to adjust	Normal condition
Amount of sewing hours (running time of motor)	Select service programme No. 5.	The number of hours appears as a number on the screen.



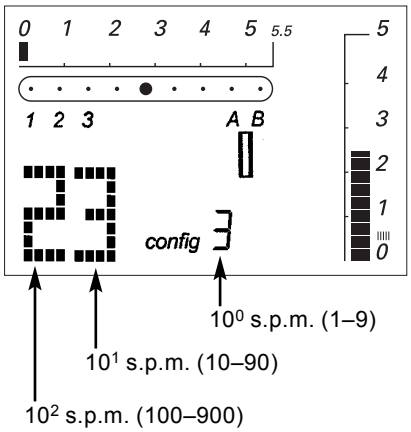
5 ≙ 60 min

3 ≙ 36 min

1 ≙ 12 min

Test No. 6 Maximum speed equalisation (Service Panel)

What is to be tested	What to adjust	Normal condition
Maximum speed equalisation (s.p.m. = stitch/minute) The speed is set automatically	Select service programme No. 6.	Press foot control until «ok» appears on the screen.The maximum speed appears on the screen. Used for example after disassembly /assembly operation to compensate the machine's software. If an F (Fault) appears then there is something jamming. In test No. 11 the speed compensation factor can be read-off.The smoothness of running for all shafts must be



10^0 s.p.m. (1–9)

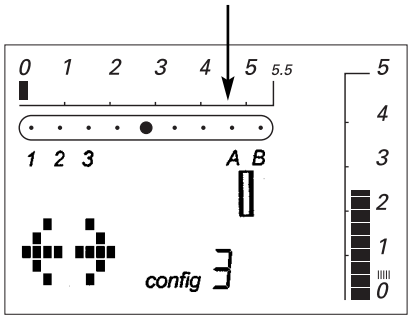
10^1 s.p.m. (10–90)

10^2 s.p.m. (100–900)

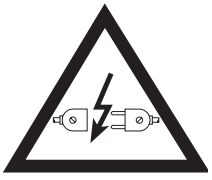
Test No. 7 Stepping motor stitch width (Service Panel)

What is to be tested	What to adjust	Normal condition
Step motor and S-print	Select service programme No. 7.	The step motor rotates back and forth, the needle bar must move to

Stitch width bar blinks



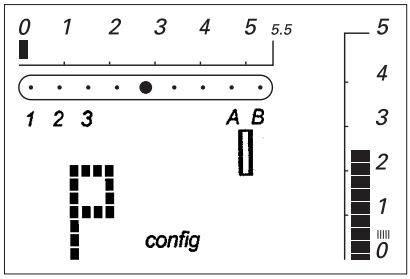
If the step motor does not rotate then the fault can lie either with the step motor or S-print. The faulty components can be identified by swapping the connections of the step motors.



Warning: Disconnect from the electricity supply!

Test No. 8 Pinning position of stepping motors (Service Panel)

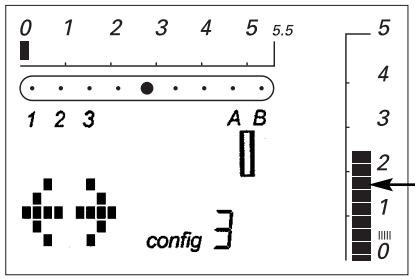
What is to be tested	What to adjust	Normal condition
Pinning position of step motors	Select service programme No. 8.	The step motors are activated to the step position for pinning. «P» appears on the screen.



Note:
Only used when the motors are external.

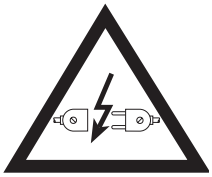
Test No. 9 Stepping motor stitch length (Service Panel)

What is to be tested	What to adjust	Normal condition
Step motors	Select service programme No. 9.	The step motor rotates back and forth, the feed-dog must move to and



Stitch length bar blinks

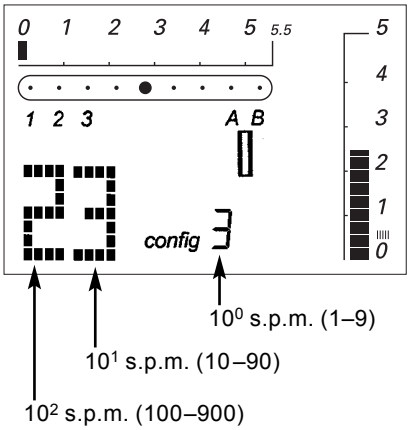
If the step motor does not rotate then the fault can lie either with the step motor or S-print. The faulty components can be identified by swapping the connections of the step motors.



Warning: Disconnect from the electricity supply!

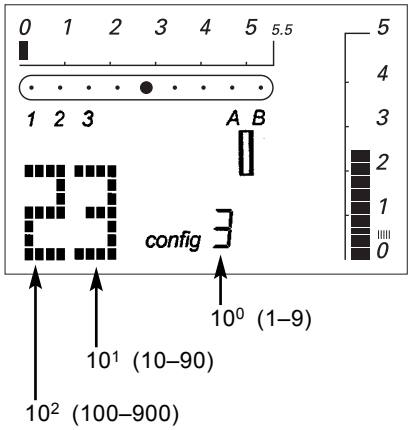
Test No. 10 Speed of the machine (Service Panel)

What is to be tested	What to adjust	Normal condition
Actual speed of the machine	Select programme No. 10.	Press foot control. The speed is shown on the screen as a number x 10 (e.g. 233 = 233



Test No. 11 Displaying the speed compensation factor (Service Panel)

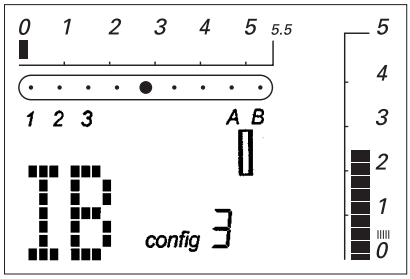
What is to be tested	What to adjust	Normal condition
Speed compensation factor (Factor between 0–255)	Select programme No. 11.	The speed compensation factor is used for declaring the mechanical characteristics of the machine. The higher the number, the more heavy the machine is running. The higher the value, the more the machine is running sluggish and vice-versa. The factor is normally between 160–200.



Test No.12 Start/Stop function (Service Panel)

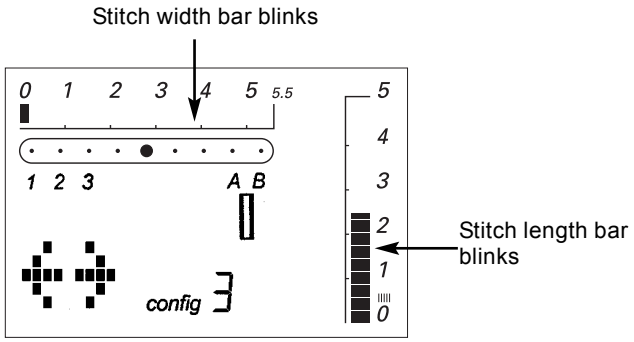
Factory use only

What is to be tested	What to adjust	Normal condition
Permanent test of the machine	Select service programme No. 12.	Press the foot control. The machine will start and stop at a 7 second interval.

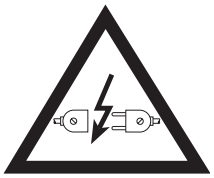


Test No.13 Stepping motors and S-print (Service Panel)

What is to be tested	What to adjust	Normal condition
Stepping motors and S-print	Select service programme No. 13.	The stepping motors rotate back and forth, the feed-dog and needle bar must move to and fro.

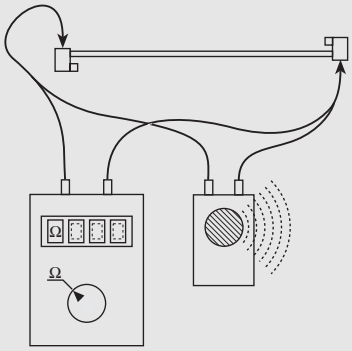


If the stepping motors do not rotate then the fault can lie either with the stepping motors or S-print. The faulty components can be identified by swapping the connections of the stepping motors.



Warning: Disconnect from the electricity supply!

Test for the cable connection S-Print to L-Print

What is to be tested	What to adjust	Normal condition
Connection S-print to L-print	Disconnect mains plug. Disconnect plugs from L-print and S-print.	
Visual inspection		Inspect the cable for damage, short circuits, interruption. Plugs and sockets must be inspected for damage and loose contacts.
Elektronische Messung Ohmmeter oder Durchgangsprüfer (Piepser) 	Check on the upper side of the plugs with a circuit tester or ohmmeter, that each wire is continuous. Test every wire as described above.	Every wire separately: Wire ok: 0 Ohm on multi-meter; Signal noise with a circuit tester. Wire defective: • Ohm on multi-meter; No signal noise with a circuit tester (circuit interruption). Every wire against all the other wires: Wire ok: • Ohm on multi-meter; No signal noise with a circuit tester. Wire defective: 0 Ohm on a multi-meter; Signal noise with a circuit tester (short circuit, or pinched wire).

Visual-, Functional-, Mechanical-, Sewing- and Technical-Inspection 21

Visual Inspection:
Visual inspection of the whole machine
Visual inspection of:
- Bobbin holder
- Thread guide parts
- Needle and its position
- Stitch plate
- Feed-dog
- Bobbin case
- Hook
- Driver

Functional inspection:
Function of the knee lifter
Function of the drop feed mechanism
Function of the presser foot pressure
Remove the bobbin case
Function of the thread cutter
Connect machine with original cable and foot control unit
LCD-Display with background lighting
Function of the sewing light
Function of the needle position left and right
Function of the stitch length and width
Function of the bobbin winder motor
Run the machine and inspect the noise level
Inspect main and foot control cable for loose connections
Function of the stepping motors
Note the amount of hours, software version and balance number
Select basic settings

Mechanical inspection:
Remove the covers
Clean mechanical parts
Inspect the bevel gears for play/yesmming
Inspect for play, or binding in:
- Main shaft
- Base shaft
- Take-up lever
- Needle bar holder
- Feed-dog

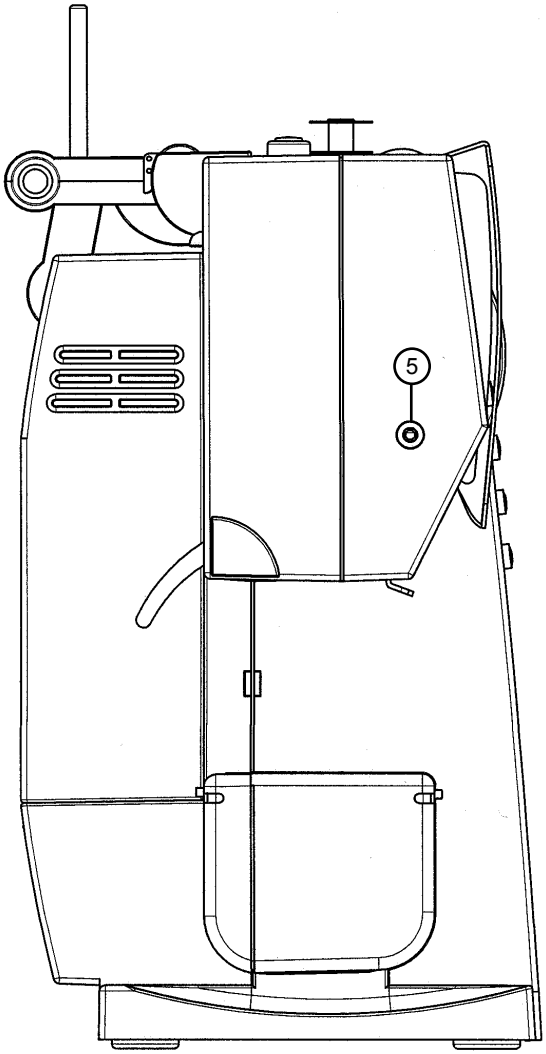
Function of the bobbin case
Function of the thread tension both upper and lower
Lubricate the machine

Sewing Technical Inspection:
Sew-off using straight stitch
Function of reverse sewing
Sew-off using:
- Zig Zag stitch
- Honeycomb stitch
- Automatic buttonhole
- Automatic darning

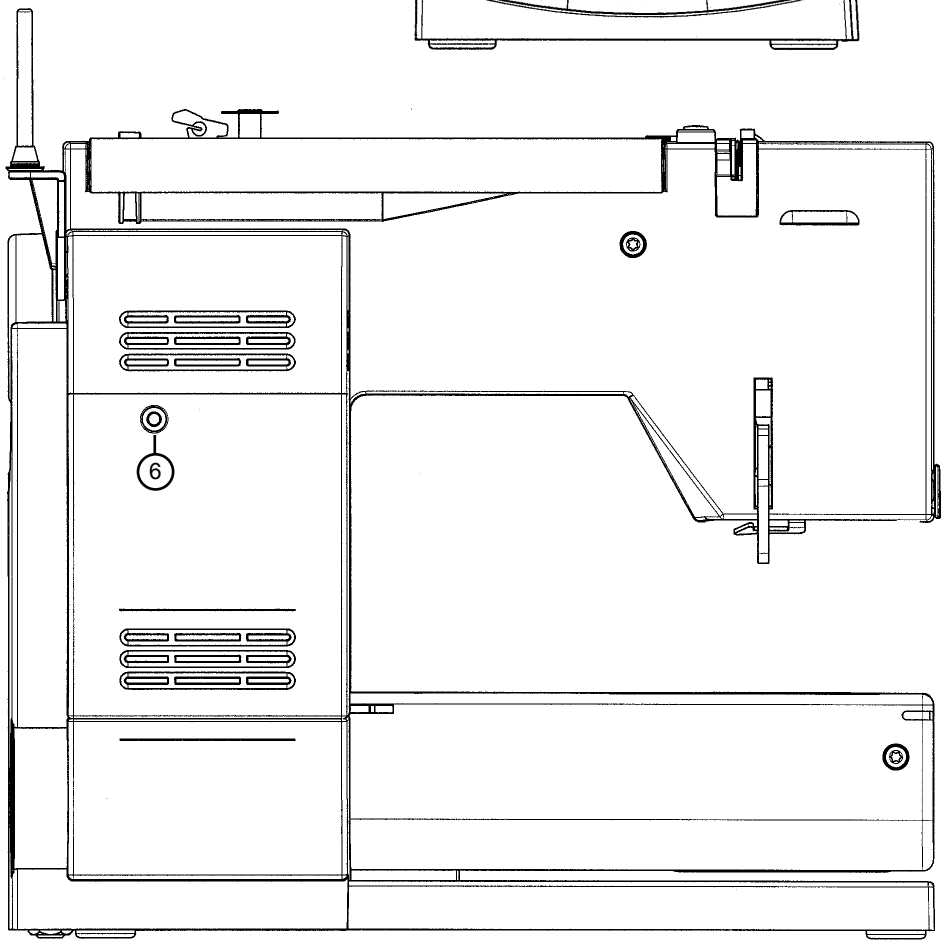
22 Removing covers

To do necessary adjustments the covers must be removed in the following order:

Head cover:
Remove the screw 5.
Remove head cover.

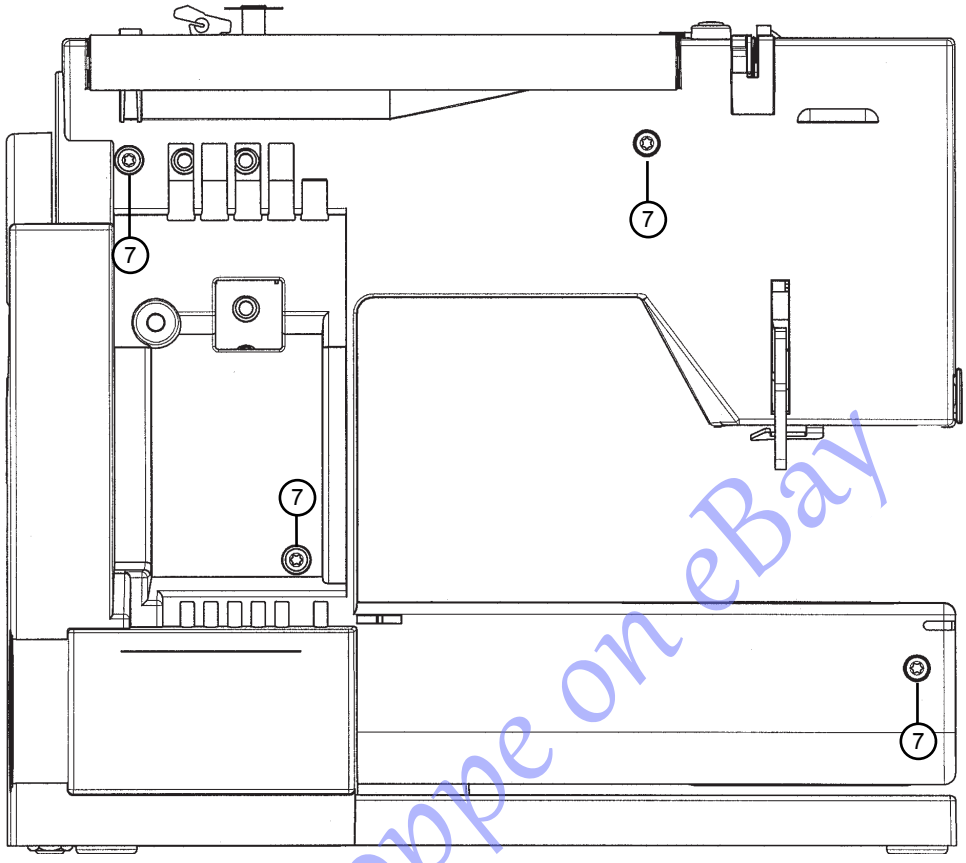


Removing L-print:
Remove L-print cover screw 6.
Swing out the cover and disconnect the cable connection
Remove the complete L-print.

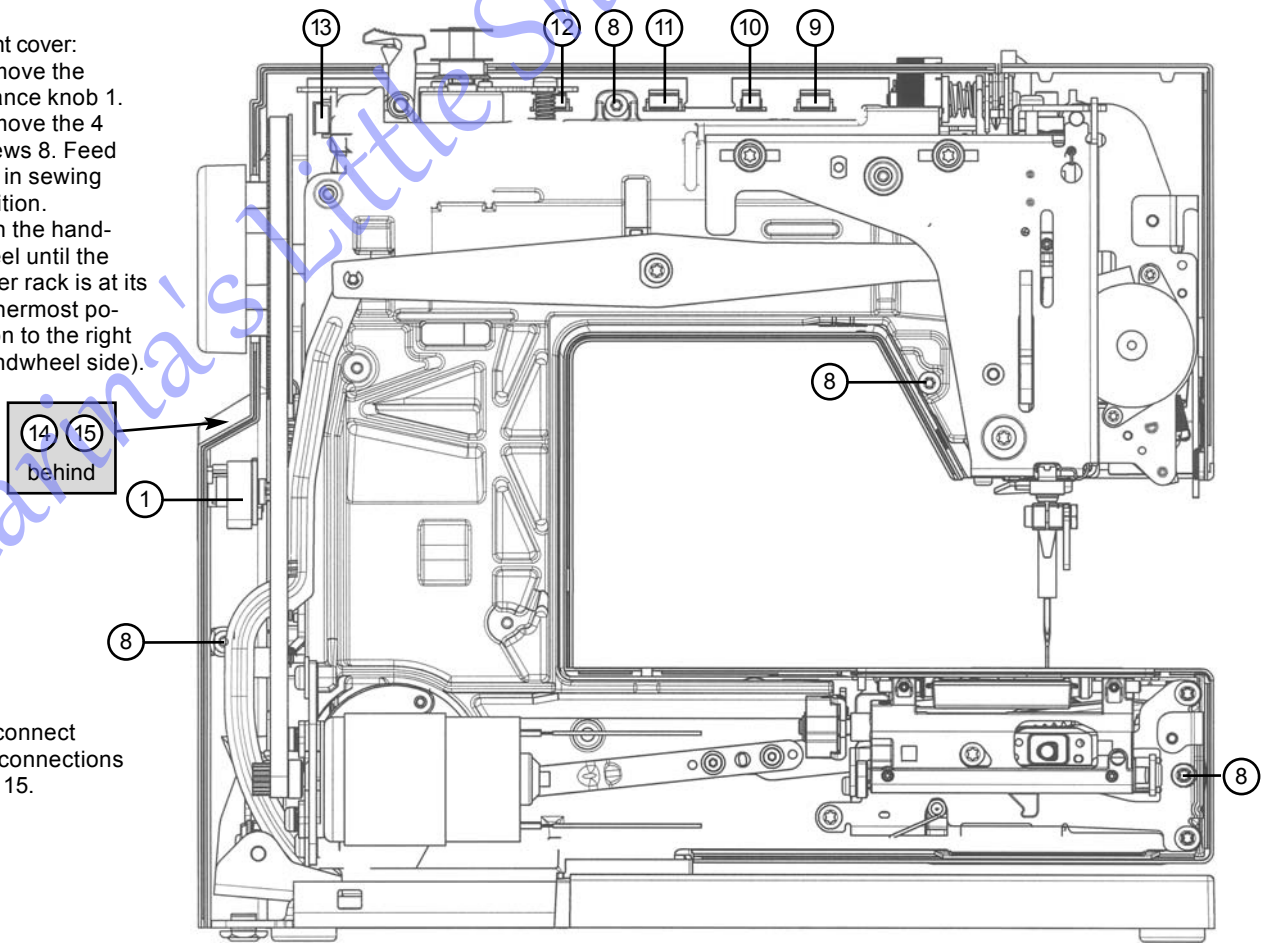


Remove the rear cover:
Remove the 4 screws 7.
Remove the rear cover.

Note:
For adjustment purposes refit the L-print.



Front cover:
Remove the balance knob 1.
Remove the 4 screws 8. Feed dog in sewing position.
Turn the hand-wheel until the driver rack is at its furthermost po-sition to the right (handwheel side).



Disconnect the connections 9 to 15.

Marina's Little Shoppe on eBay

24 Cleaning

Remove the covers and clean.

Attention!
Never use alcohol, petrol, spirits, or any other acid type of liquid.
When cleaning covers it can happen that they will become electrostatically charged. To clean the covers, a liquid which is also used in the office equipment industry with an anti-
static agent can be used.
We use and recommend the surface cleaner SURFACE CLEAN from BASF Ltd. This liquid builds up a protected film against static electricity and is suitable for both composite materials as well as metal parts.

Parts on the inside
Behind the covers on the inside of the machine a lot of dust, fluff, thread and fabric remnants can accumulate, which can cause malfunctions to occur:
Especially in the region of the head frame in the area of
- the take-up lever,
- main shaft (behind the balance piece) and
- the tension unit.

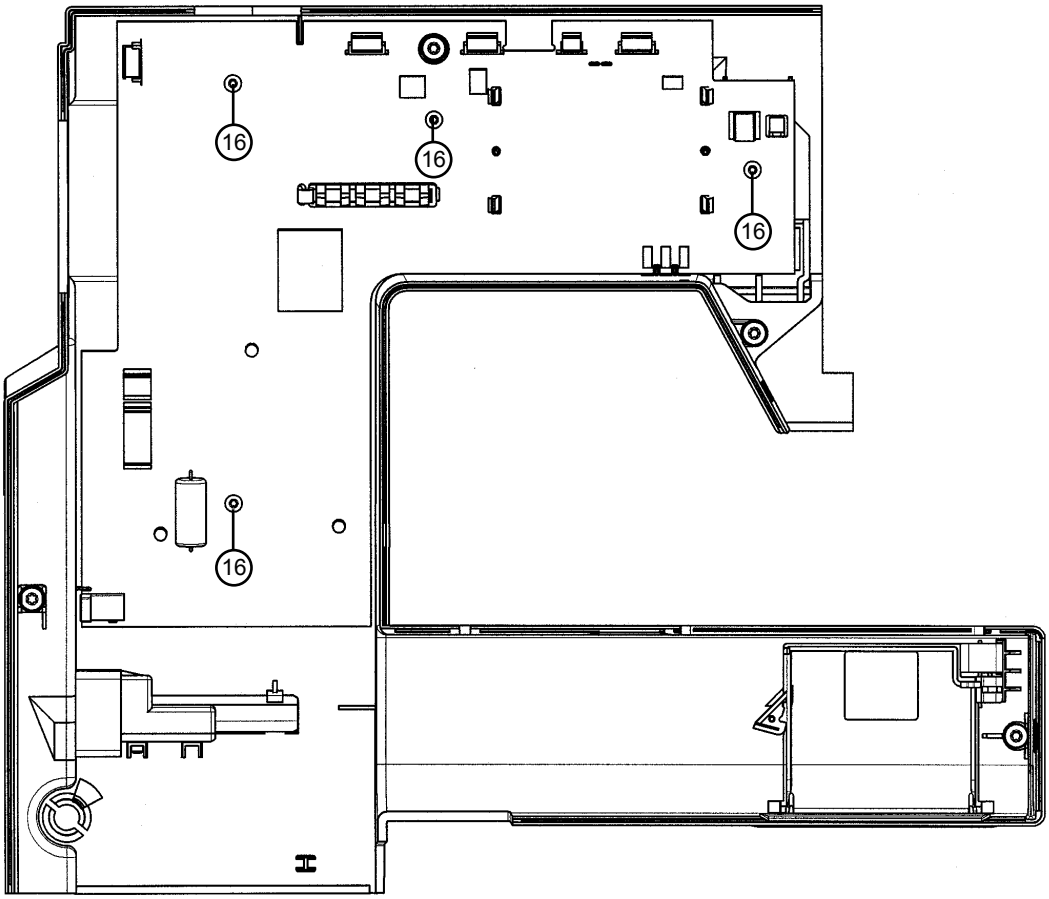
In the region of the free-arm, in the area of the
- bobbin case,
- feed-dog,
- hook,
- hook driver,
- hook race,
- base shaft (lifter and advance eccenter) and
- the toothed rack.

Also affected is the transmission drive system, where belt residue can accumulate.

Replacing the S-print

Disassembly:
1) Remove the covers.
2) Remove the 4 screws 16.
3) Exchange the S-Print.

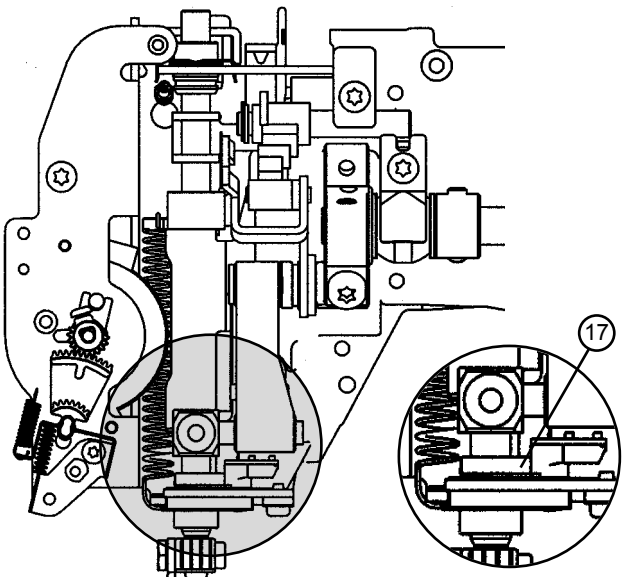
Assembly:
1) Fit the new S-Print in the front cover.
2) Secure with 4 screws.
3) Assemble the front cover.
4) Inspect the configuration (page 11).
5) Carry out a speed calibration (test No. 6) and balance (test No. 2).
6) Carry out a functional inspection.
7) Sew-off.



Exchanging the buttonhole sensor

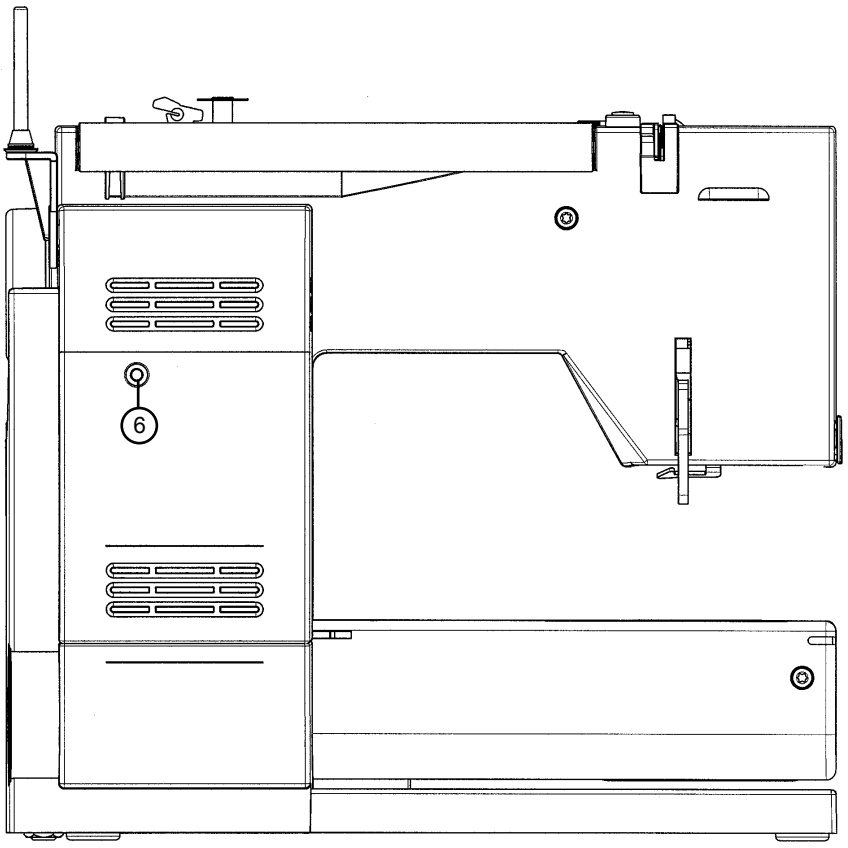
Disassembly:
1) Remove all the covers.
2) Remove the upper tension unit (page 30).
3) Remove the buttonhole sensor 17 with a screwdriver, pressing against the clip and the holder.
4) Turn the sensor towards the front and remove.
5) Exchange the sensor.

Assembly:
1) Fit the sensor in the positioning bore and position against the head plate.
2) Place lifter lever downwards and by using the clip press firmly down.
3) Place the ribbon cable so that it doesn't come into conflict with any moveable parts.
4) Refit the cover.
5) Recalibrate the buttonhole sensor (see page 14).
6) Carry out functional inspection.
7) Sew-off.

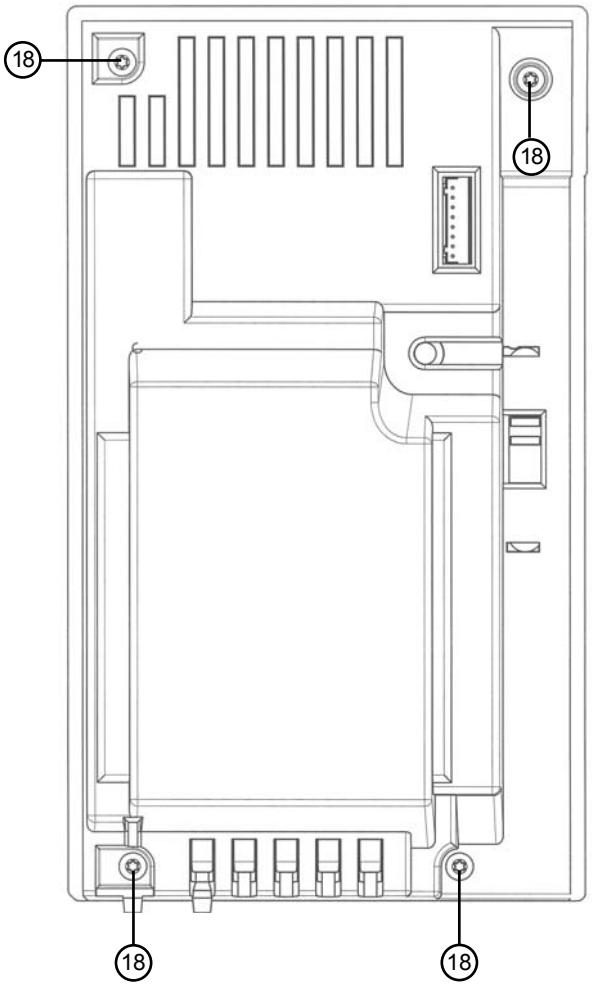


26 Exchanging the L-Print

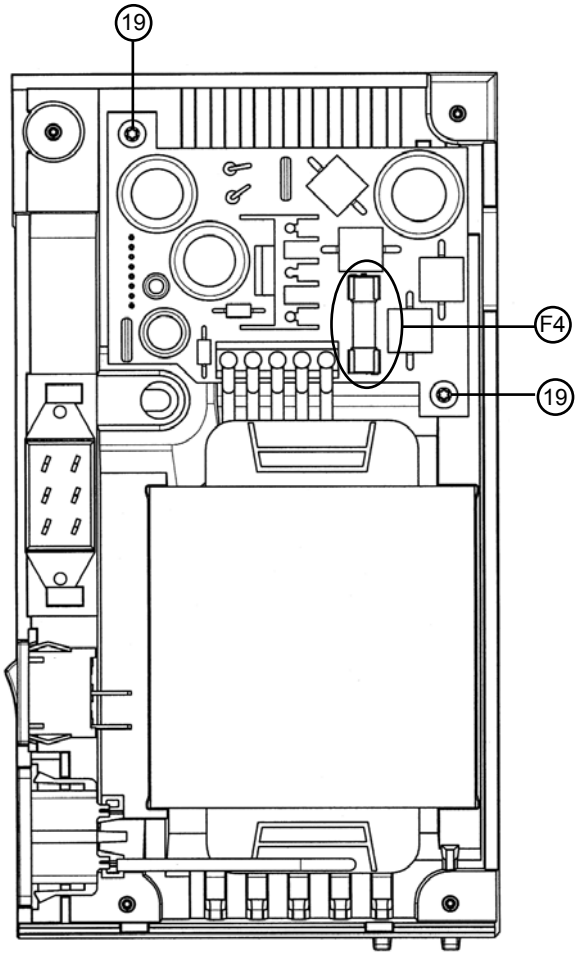
Disassembly:
1) Remove screw 6 and disconnect the ribbon cable.
2) Remove the complete housing.



3) Remove the 4 screws 18 from the cover.



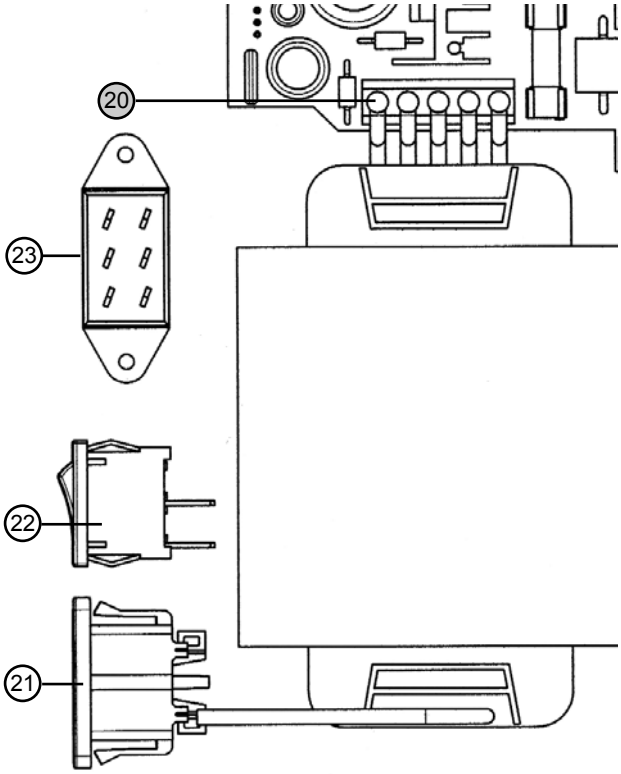
4) Remove the 2 screws 19.



Exchanging the L-Print (contd.)

5) Remove the switch, transformer and L-Print from the housing.
6) Loosen all the electrical connection wires L-Print–transformer. Note the order of connections!
7) Exchange the L-Print.
8) If needed unsolder the mains cable bushes 21, main switch 22, voltage change-over switch 23 and exchange.

Assembly:
1) Reconnect the transformer wires, being careful of the individual positions.
2) Position the switch, transformer and L-Print in the housing.
3) Secure the L-Print with the 2 screws.
4) Secure the rear cover with the 4 screws.
5) Connect the ribbon cable.
6) Refit the complete housing to the machine.
7) Recalibrate the maximum speed of the machine (test programme No. 6).
8) Test the functions.
9) Sew-off.

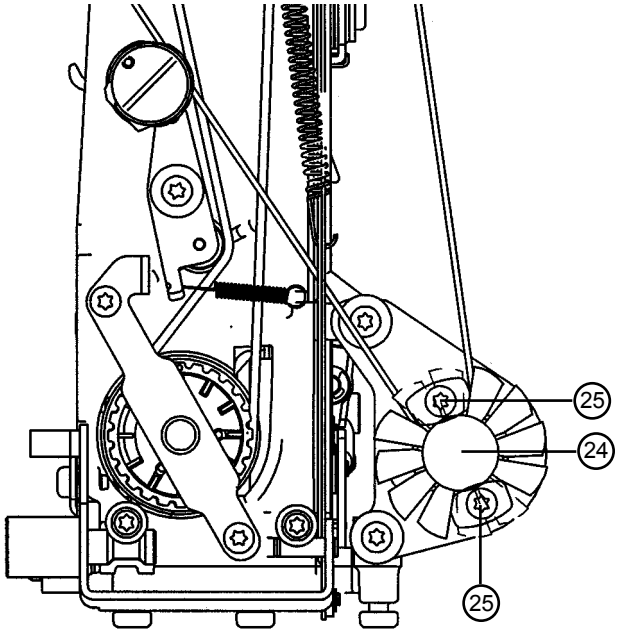


Exchanging the main motor (available only as a complete unit)

Disassembly:
1) Remove the covers.
2) Pull the motor cable through the opening of the machine.
3) Remove the ventilator fan 24.
4) Remove the 2 securing screws 25.
5) Exchange the motor.

Assembly:
1) Mount the motor and secure with the 2 securing screws.
2) Adjust the belt tension (see page 30).
3) Refit the ventilator fan.
4) Replace the cable through the opening in the machine.
5) Replace the covers.
6) Recalibrate the maximum speed of the machine (test programme No. 6).
7) Test the functions.
8) Sew-off.

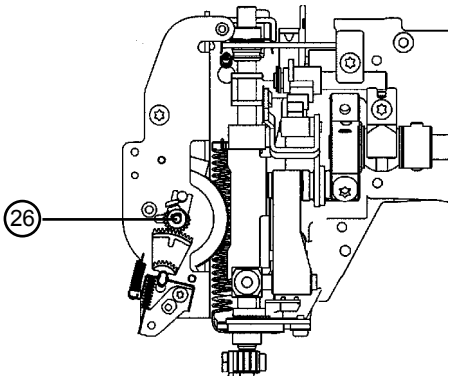
Attention:
The choke position must be placed outwards, so that there is no possibility of the cable comming into contact with the motor shaft. The clamp must be brought into position and the cable laid in such a way, that there is no possibility of it catching in the hook drive crank.

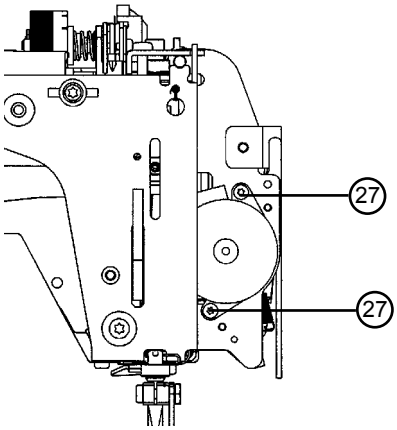


28 Exchanging the stepping motor stitch width (SB)

Disassembly:
1) Remove the balance knob.
2) Remove L-Print housing and covers.
3) Remove the drive gear 26.
4) Remove the 2 screws 27.
5) Exchange the stepping motor.

Assembly:
1) Mount the new stepping motor and secure with the 2 screws.
2) Refit the drive gear, but do not secure.
3) Reconnect the motor and refit the front cover.
4) Refit the rear cover.
5) Refit the balance knob.
6) Refit the L-Print housing.
7) Switch the machine in service programme on.
8) Select test No.8 (page 17).
9) Pin the drive gear and secure.
10) Adjust the needle position (page 40).
11) Refit the head cover.
12) Recalibrate the buttonhole (test programme page 14)
13) Test the functions.
14) Sew-off.

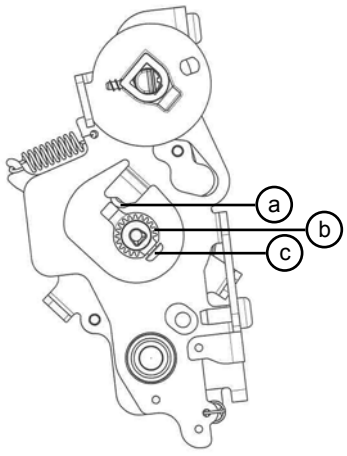


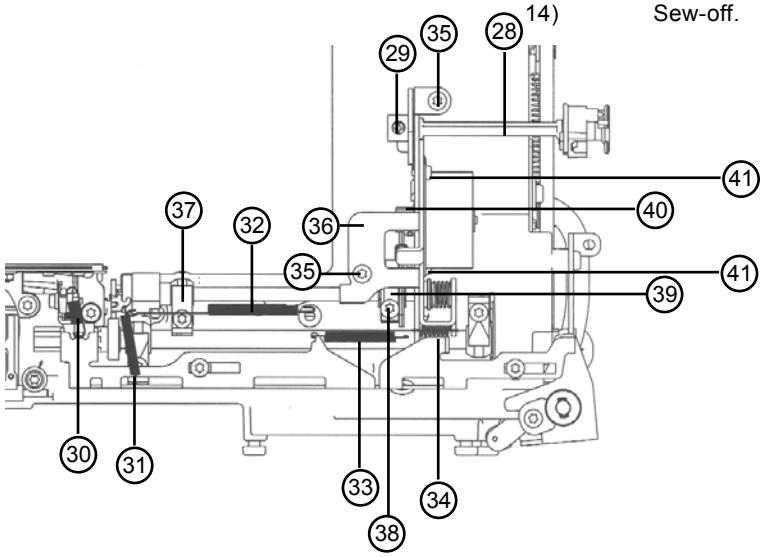


Exchanging the stepping motor stitch length (SL) and/or the crank shaft

Disassembly:
1) Remove the covers.
2) Remove the balance shaft 28 along with the screw 29.
3) Disconnect the springs 30 to 34.
4) Remove the 2 screws 35 from the motor holder 36.
5) Remove the bearing holder bracket 37 and screw 38 of the toothed segment 39 from the crank shaft.
6) If necessary exchange the crank shaft.
7) Remove the drive gear 40.
8) Remove the 2 securing screws 41.
9) Exchange the stepping motor.

Assembly:
1) Fit the new stepping motor and secure with the 2 securing screws.
2) Mount the drive gear.
3) Fit the crank shaft into the motor holder.
4) Position the crank shaft and motor holder.
5) Secure the crank shaft with the bearing holder bracket.
6) Reconnect the springs.
7) Position the toothed segment (page 41).
8) Refit the balance shaft.
9) Adjust the basic position of balance (page 41).
10) Refit all covers.
11) Recalibrate maximum speed (test programme No. 6, p. 16).
12) Adjust the fine setting of balance (test programme No. 2, page 13, 14).
13) Test the functions.
14) Sew-off.

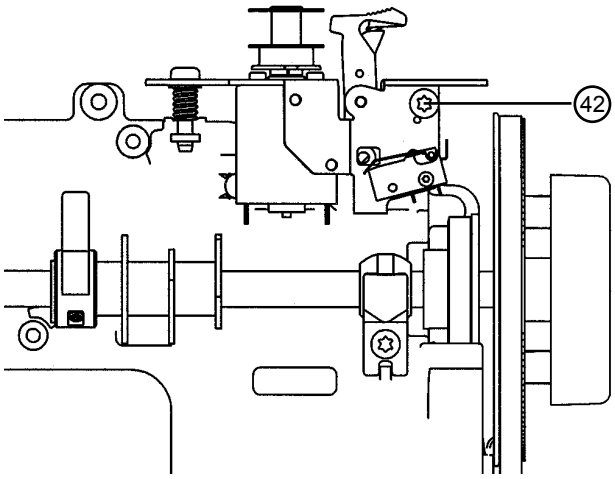




Exchanging the bobbin winder motor

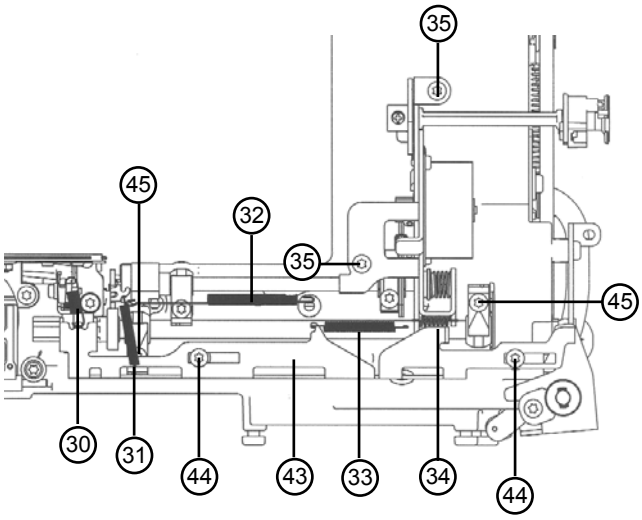
Disassembly:
1) Remove all covers.
2) Remove the securing screw 42.
3) Exchange the bobbin winder motor.

Assembly:
1) Mount the new bobbin winder motor and secure with screw.
2) Refit all covers.
3) Check the functions of bobbin winding (page 34).



Exchanging the base shaft

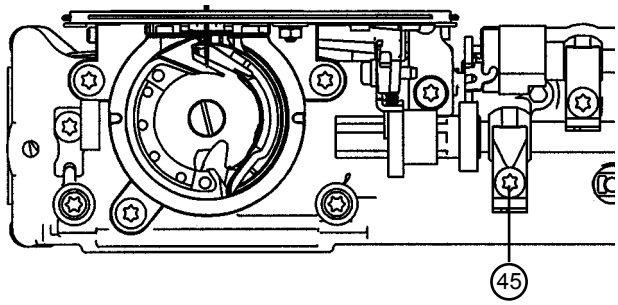
Disassembly:
1) Remove all covers.
2) Disconnect springs 30 – 34.

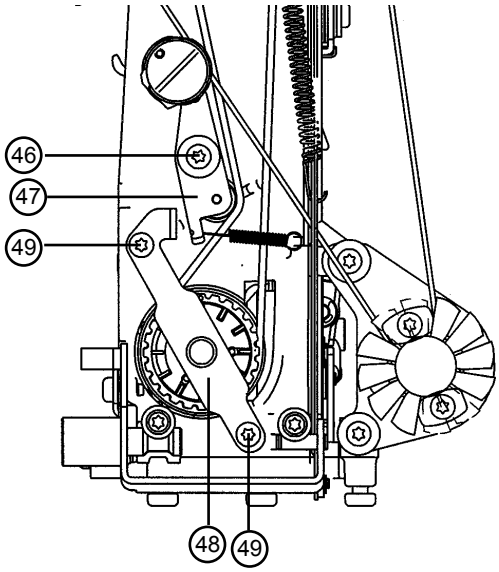


5) Loosen screw 46, along with the belt tensioner 47, release the tension and retighten screw 46.
6) Remove the shaft bearing 48 along with screw 49. Do not loose ball bearing and springs!
7) Loosen screws 35 of the stepping motor SL.
8) Remove the shaft by pulling to the front and to the right.
9) Exchange the shaft.

Assembly:
1) Refit the new shaft.
2) Pin the balance piece and the hook drive crank (motor must be removed).
3) Position the bevel gear and the base shaft, so that the marker pin is in a horizontal position (270°) to the front.
4) Secure the bearing holder bracket.
5) Refit the belt to the main and base shafts, being careful of the position and set the belt tension.
6) Remove the pinning tools.
7) Refit the feed-dog drop mechanism.
8) Secure the stepping motor SL.

3) Remove the feed-dog mechanism 43 by loosen the securing screws 44.
4) Remove the two bearing holder brackets 45.

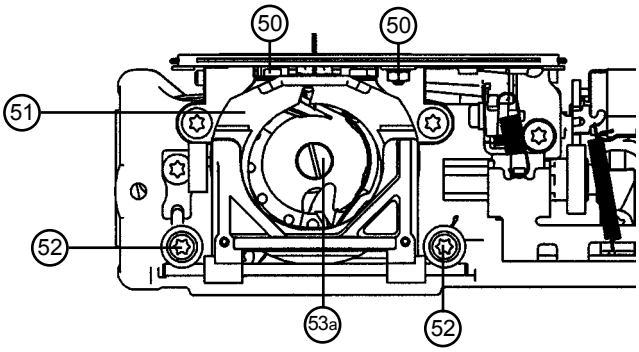


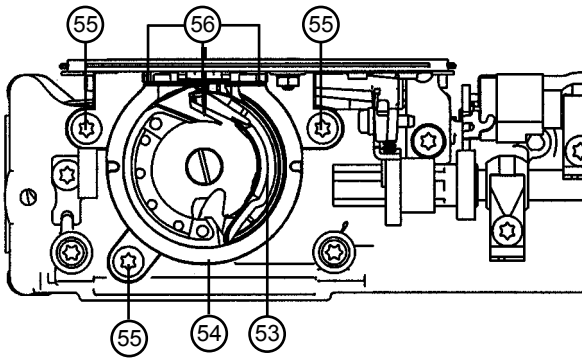


9) Reconnect the springs.
10) Refit the shaft bearing 48 (ball bearing and springs!!).
11) Refit the main motor and set belt tension.
12) Refit the ventilator fan.
13) Refit all covers.
14) Recalibrate the maximum speed (test programme No. 6, page 16)
15) Recalibrate the buttonhole.
16) Test the functions.
17) Sew-off.

30 Exchanging the hook race ring

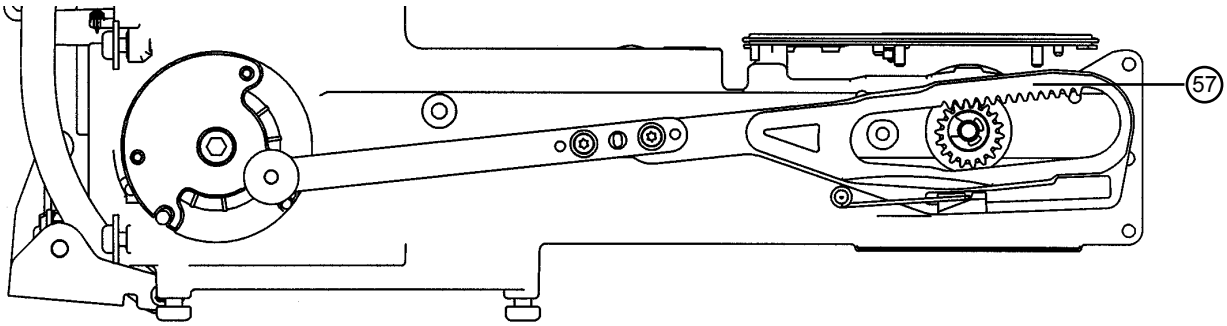
Disassembly:
1) Remove all covers.
2) Using the special screwdriver 50 remove the stitch plate and surround.
3) Remove the hook race cover 51 by removing screws 52.
4) Remove the hook 53 and hook driver by removing screw 53a.
5) Remove the 3 securing screws 55 and remove the hook race ring 54.
6) Remove the thread guide plate and thread guide finger 56.





7) Exchange the hook race ring.

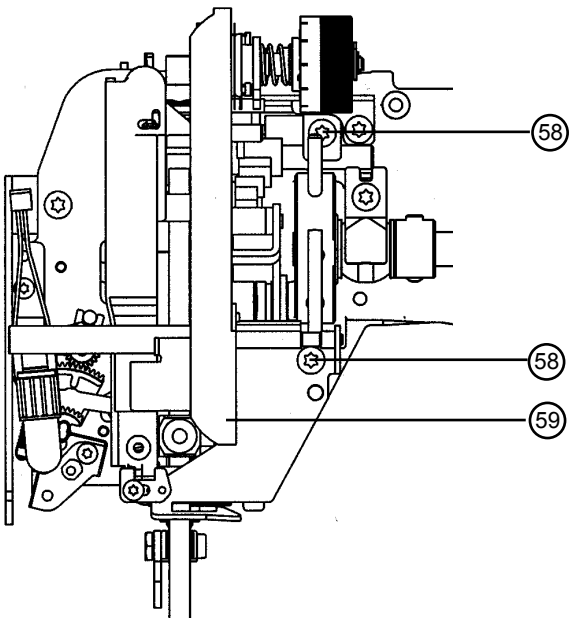
Assembly:
1) Refit the thread guide plate and thread guide finger to the new race ring.
2) Refit the hook race ring using the special gauge, but don't secure.
3) Refit the stitch plate, along with the surround.
4) Position the hook race ring, so that the feed-dog height gauge is moved equally from both sides of the feed-dog and secure.
5) Remove the hook race ring gauge.
6) By turning the handwheel, bring the needle in its highest position.
7) Lift slightly the drive rack 57.
8) Refit the driver.
9) Refit the hook race cover.
10) Inspect and if necessary adjust the lateral position of the feed-dog.
11) Refit all covers.
12) Recalibrate maximum speed (test programme No. 6, page 16).
13) Test the functions.
14) Sew-off.



Exchanging the thread tension unit

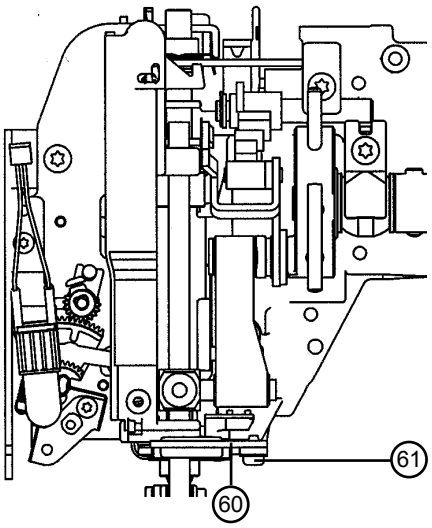
Disassembly:
1) Remove all covers.
2) Remove the securing screws 58.
3) Exchange the tension unit 59.
4) Attention: Tension release lever can fall out!

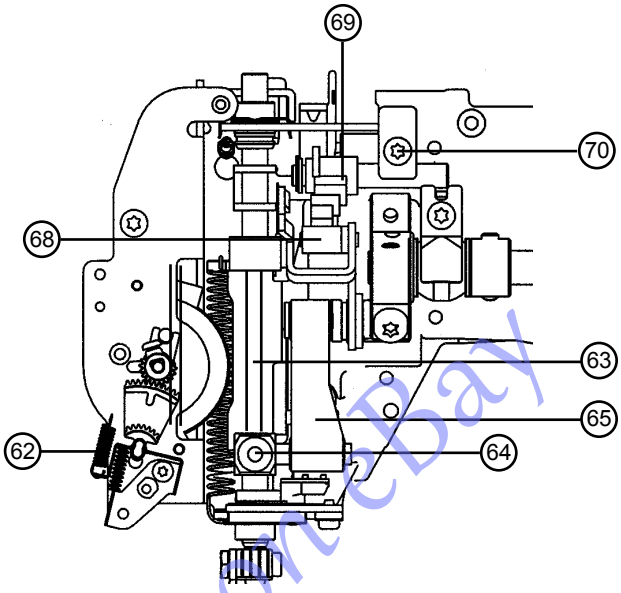
Assembly:
1) Refit the new tension unit.
2) Refit tension release mechanism and adjust accordingly.
3) Adjust the stitch width limiter.
4) Refit all covers.
5) Check and adjust the tension unit (page 43).
6) Check and andjust the tension release leveler.
7) Sew-off.



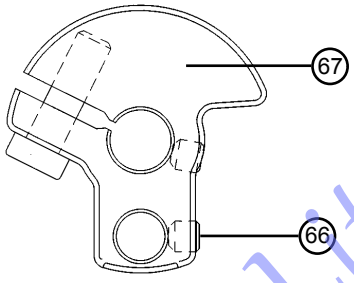
Exchanging the thread take-up lever

Disassembly:
1) Remove all covers.
2) Remove the thread tension unit.
3) Remove the angular guide piece 60 along with screw 61.



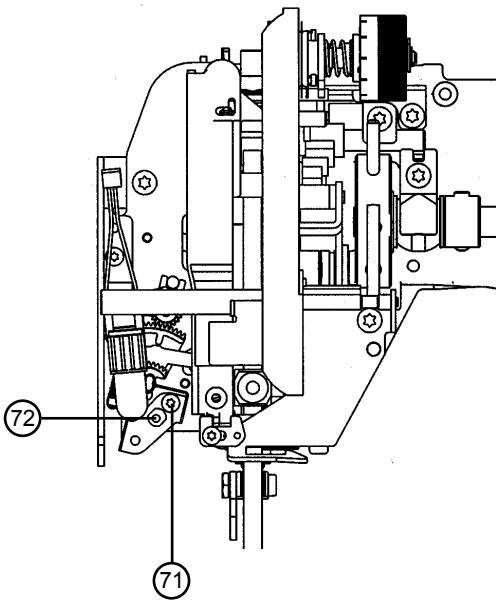


4) Disconnect the spring 62.
5) Pull the needle bar guide piece 63 to the front, so that the take-up lever crank 64, can be pulled out of the crank guide piece 65.



Note: For ease of operation the light assembly can be removed.

6) Loosen screw 66 in the balance piece 67.
7) Remove the crank from the balance piece – don't loose the washer!
8) Remove the take-up lever 68 from link piece 69.
9) The link piece can be replaced by loosening the screw 70 and sliding it from the shaft.
10) Exchange the thread take-up lever.



Assembly:
1) Refit the link piece.
2) Refit the take-up lever in the link piece.
3) Place the crank in the take-up lever, mount the washer and place in the balance piece.
4) Place the crank guide piece in the take up lever crank.
5) Replace the angular guide piece.
6) Place the guide rack in the centre needle position and replace the spring.
7) Pin the stepping motor in its zero position.
8) Loosen screw 71 and adjust the needle position 72 in the centre.
9) Secure screw.
10) Refit the thread tension unit.
11) Refit all covers.
12) Adjust the needle in the centre of the stitch plate (front to back).
13) Recalibrate the maximum speed (test programme No. 6, page 16).
14) Test the functions.
15) Sew-off.

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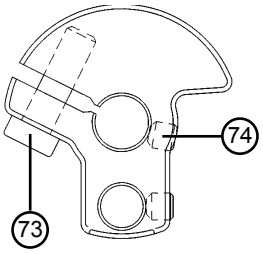
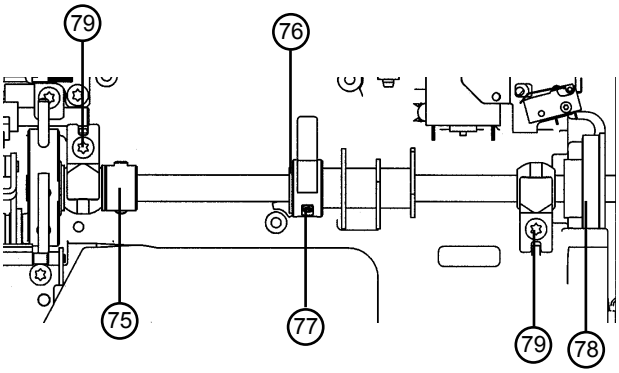
32 Exchanging the main shaft and or the synchronisation disc

Disassembly:
1) Remove all covers.
2) Loosen securing screws 73 + 74 from the balance piece.
3) Remove the drive belt.
4) Loosen belt tension of the main shaft.
5) Loosen the clamps 79 and remove.
6) Remove the complete main shaft to the right.
7) Exchange the necessary parts on the shaft, or the shaft itself.



Assembly:
1) Fit all the parts on the main shaft (synthetic washer, steel washer, spherical bush, steel washer, synthetic washer, setting collar 75, circlip 76, synchronisation disc 77, spherical bush with clamp 79 and belt drive flange 78).
2) Position the balance piece so that the take-up lever faces the front.
3) Pass the main shaft through the belt drive flange and into the balance piece.
4) Position the spherical bushes into their sockets and secure with the clamps
5) Position the main shaft in the balance piece so that the marking on the take-up lever link can be easily seen.
6) Set the setting collar free of play against the balance piece.
7) Bring the synchronisation disc into position (page 37) and secure.
8) Pin the balance piece into position.
9) Remove the lower securing screw of the main motor. Loosen the upper screw and swing the motor in an upwards position and secure the screw.
10) Pin the hook drive crank.
11) Fit and tension the belt of the drive flange and base shaft.
12) Secure the drive flange in position.
13) Fit the motor drive belt, position the motor and secure it (page 33).
14) Connect the front cover.
15) Connect the L-print.
16) Connect the machine to the mains supply.
17) Adjust the synchronisation disc (page 12).
18) Disconnect the machine from the power supply.
19) Disconnect the L-print.
20) Assemble all covers.
21) Calibrate the speed of the machine (test programme no.6 page 16).
22) Carry out a functional inspection.
23) Sew-off the machine.



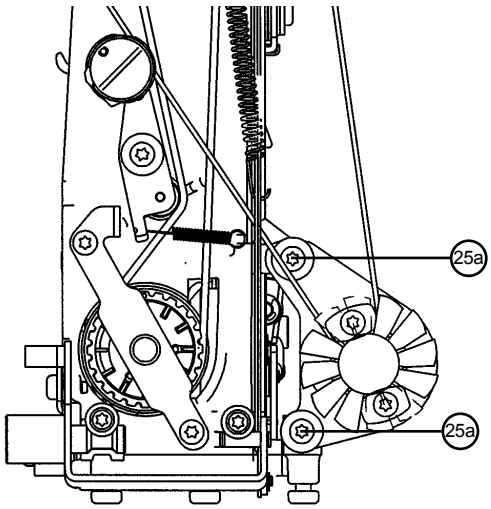
Important:
To enable the work described to be performed correctly, the sewing machine must be in good mechanical and electrical condition (running smoothly, properly oiled and all plugs
in position). When the adjustments are carried out in the correct order, the machine will sew perfectly.

Important:
For all adjustments and in case no other needle size is given, always use a size Nm 80 needle. Before beginning any adjustments the needle must be tested for being straight! BERNINA uses needle system 130/705H TCN for all adjustments.

Any service work being done on any machine, must be done using the original accessories that were delivered with the machine, or purchased later. These are:
Mains cable, foot control unit, automatic buttonhole foot, zig zag foot, bobbin case and bobbin.

Tensioning the drive belt (motor)

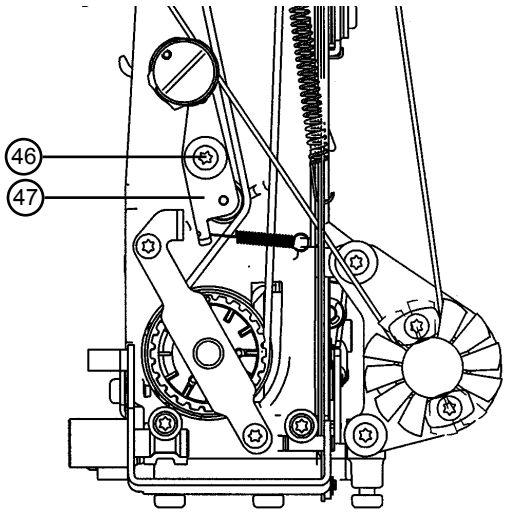
- Loosen the fixing screws 25a slightly.
- Bring the motor into the desired position.
- Tighten both screws.



Tensioning the drive belt (base shaft)

The belt tension is achieved automatically between the tension roller and the tension spring.

- Loosen the screw 46 slightly of the tension roller 47 holder.
- Turn handwheel backwards and forwards.
- Tighten the screw 46.



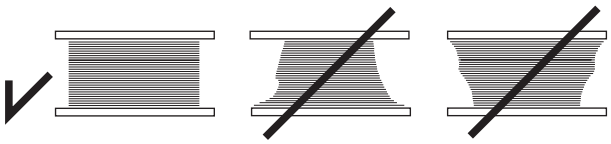
34 Bobbin winder device

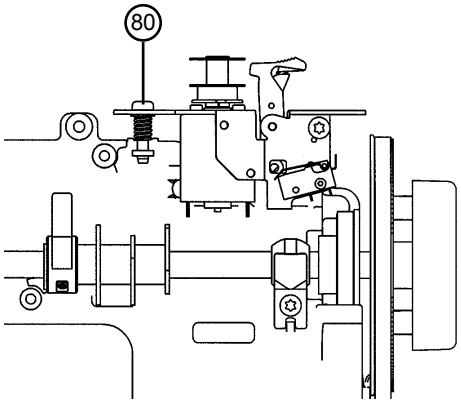
Standard:
The thread should be wound evenly with pre-tension and the bobbin should be correctly filled.
Correction for one-sided winding:
Turn the adjustment screw 80 in or out as appropriate.

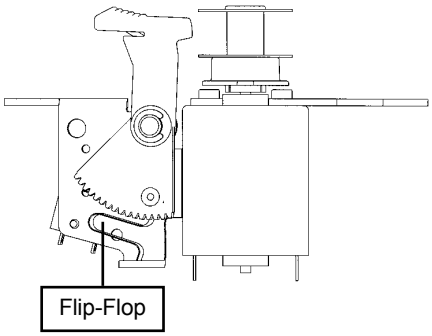
Correcting the bobbin filling:
The flip-flop spring should be in the third tooth of the release lever.

Attention!
The filling of the bobbin cannot be adjusted by moving the spring to another tooth position.

The filling of the bobbin can at the best, only be adjusted by means of rectifying the bracket (basic spring position).



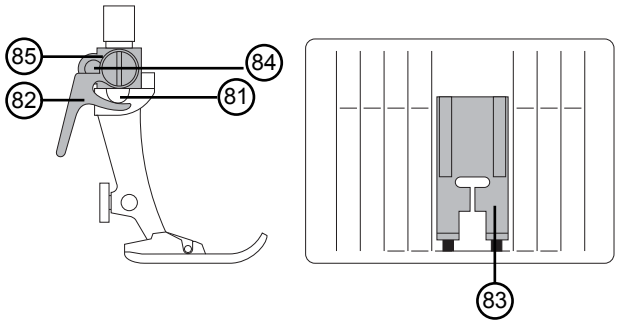




Presser foot fixation

Standard:
The tension pin 81 should be one third to half way along the tension lever 82. The presser foot sole 83 must be parallel with the markings on the needle plate.

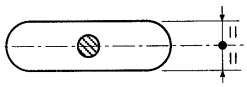
Correction:
- Loosen screw 84 on clamp 85.
- Adjust the height of clamp 85 until the correct tension position is reached.
- Align the presser foot sole 83 with the markings on the needle plate.
- Tighten screw 84.

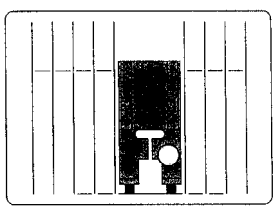


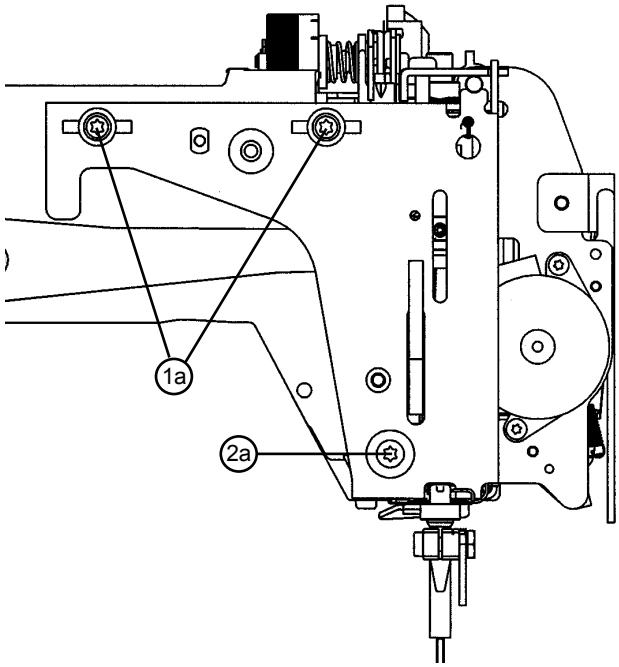
Position of head frame plate

Standard:
The presser foot must be sideways in the centre of the stitch plate.
A size 90 needle must be in the centre (front to the back) of the stitch plate.

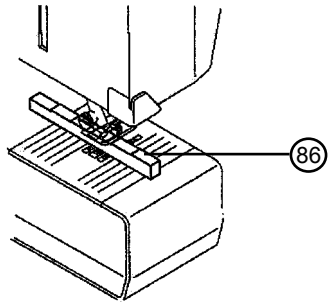
Correction:
- Affix the presser foot no. 1.
- Loosen screws 1a and 2a.
- Move the head plate until the presser foot is sideways in the centre of the stitch plate.
- Secure screws 1a.
- Remove the presser foot and insert a size 90 needle.
- Screw in, or out screw 2a until the needle is in the centre of the stitch plate (front to the back).

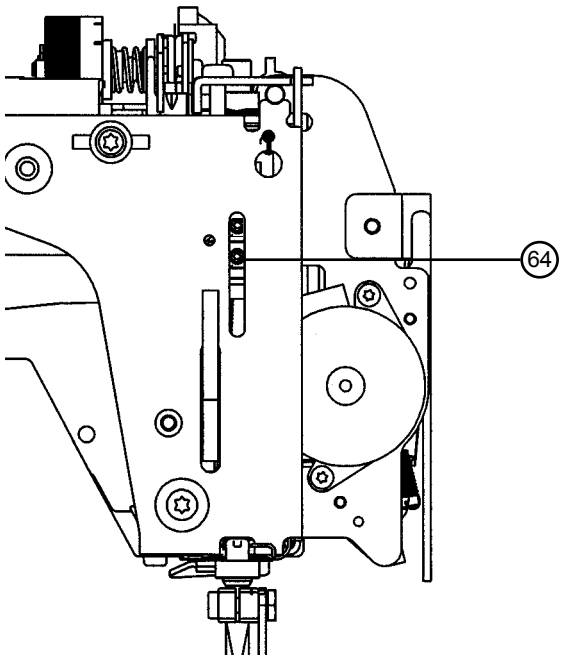






Presser foot height





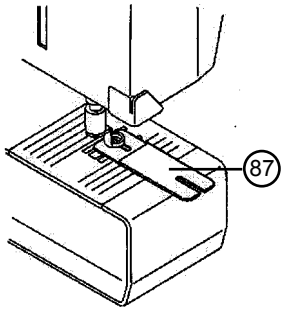
Standard:
- Lower the feed-dog.
- Raise the lifter lever.
- Check the height with 7.5 mm gauge 86.

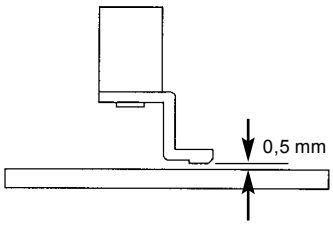
Correction:
- Loosen screw 64 on the presser foot bar guide.
- Place the presser foot on the gauge (7.5 mm). Keeping it parallel to the markings.
- Press the presser foot bar down by hand.
- Tighten screw 64.

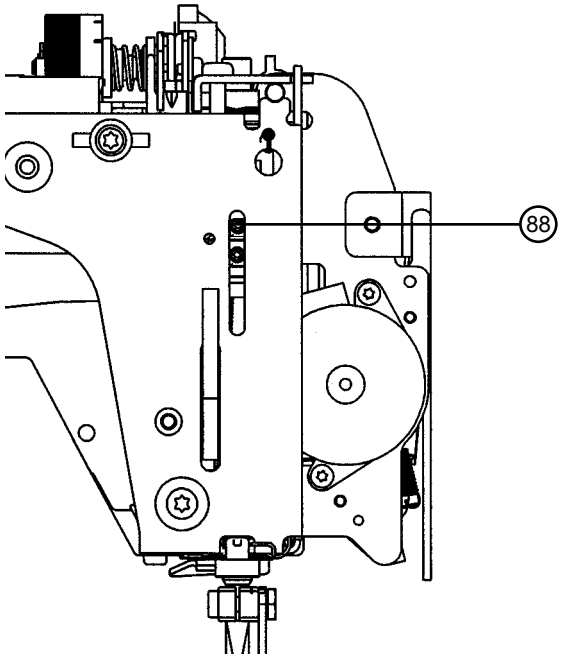
Darning foot height

Standard:
- Attach the darning foot.
- Lower the feed-dog.
- Turn the handwheel until the presser foot bar has reached its lowest position.
- Use the gauge 87 (0.5 mm) to check the distance between the needle plate and darning foot sole.

Correction:
- Loosen screw 88 on the hopper mechanism lever.
- Place darning foot on the gauge 87.
- Tighten screw 88 (note position in regards to the cam).



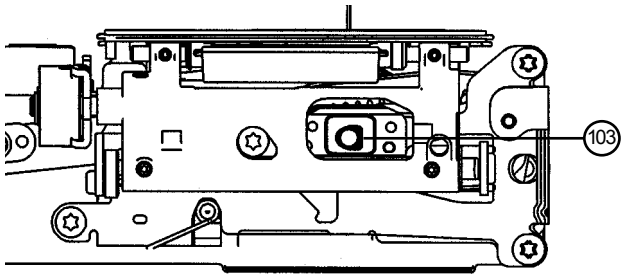




36 Position of the driver in the hook race

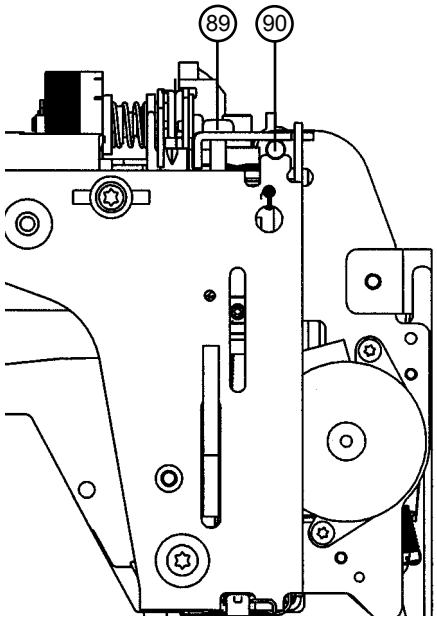
Standard:
The hook driver 102 should be 0.1–0.15 mm behind the front edge of the hook race.

Correction:
- Loosen the screw 103 of the driver shaft.
- Push the complete driver 102 to the prescribed position.
- Tighten the screw 103.

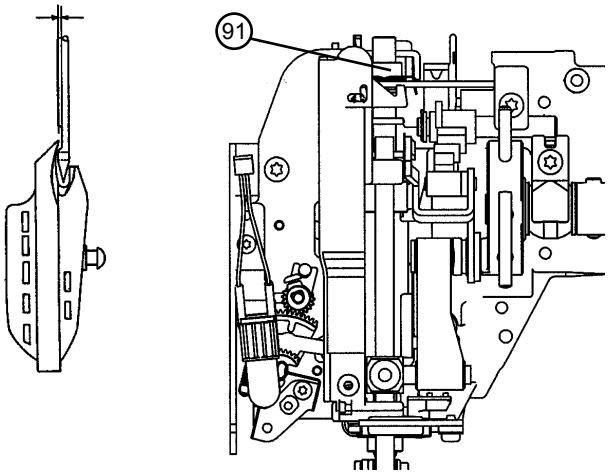


Needle position in the direction of feed (needle/hook distance)

Standard:
Remove stitch plate. Insert now needle (TCN). The lateral distance between needle and hook (in the scarf) should be 0.01 mm to 0.05 mm.



Correction:
- Loosen screw 89 of the pivot pin 90.
- Adjust the needle bar holder 91 to the prescribed position.



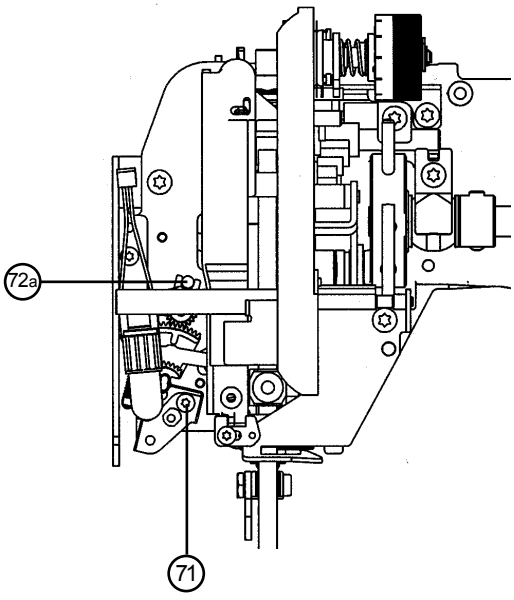
Needle position of the zig-zag stitch

Standard:
- Switch machine on (initial state of service programme).
- Inspect the pinning position of the stepping motor 72a, if necessary adjust this first.
- Switch machine off.
- Pin the stepping motor for stitch width.
- The needle must be in the centre of the stitch plate.

Correction:
- Slightly loosen the fixing screws 71 on the needle bar support.
- Using the eccentric key (0013617000) adjust the support until the prescribed needle position in the stitch hole is obtained.
- Tighten the screws 71.

Correction and fine adjustment:
- Switch the machine on
- Select zig zag stitch
- Select maximum stitch width.
- Turn the handwheel and observe whether the lateral spacing from the edge of the stitch hole is the same to the left and right. (This is also valid for needle position L C R).
- To correct see above.

Attention: Spring tensioning the drive gears must be pust to the rear.



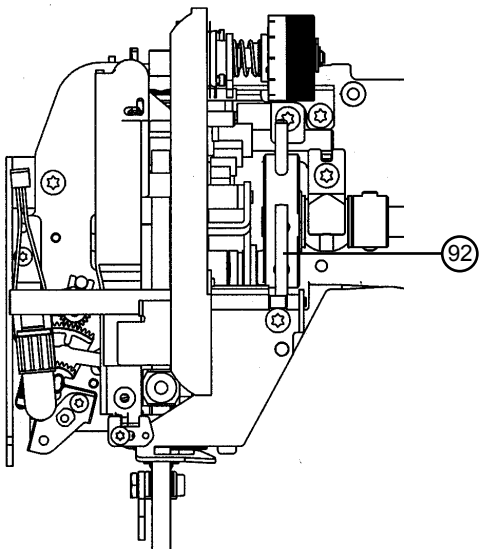
Position of the synchronisation disc

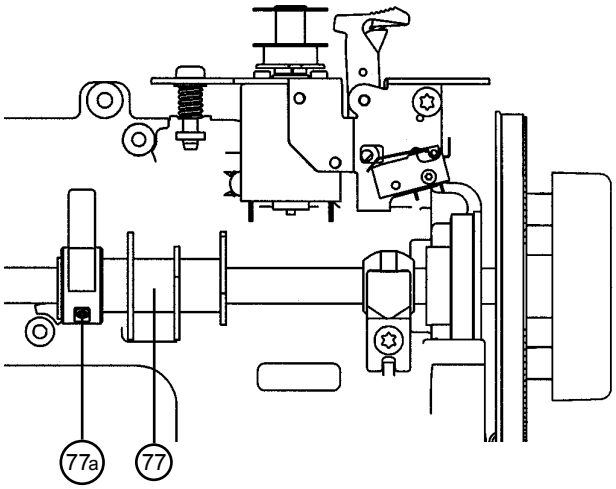
Rough adjustment after disassembling

Standard:
- Position the balance piece with pin 92.
- Fixation screw 77a on the synchronisation disc 77 must be approx. at 30° above the horizontal position.

Correction (Rough adjustment):
- Loosen the screw 77a.
- Turn the handweel until the needle bar is in the highest position.
- Adjust the synchronization disk until the screw 77a is facing straight towards the front.
- Tighten the screw 77a.

Fine adjustment (e.g. as check):
- Standard:Go into basic setting of service programme (page 12).
- Turn handwheel in the direction of rotation until signal no.3 is no longer active (all 3 must be inactive at the same time).
- The balance piece should now be in the pinning position.
- Check the signals of the synchronisation disc.





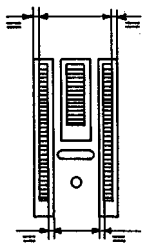
Feed-dog position in the needle plate

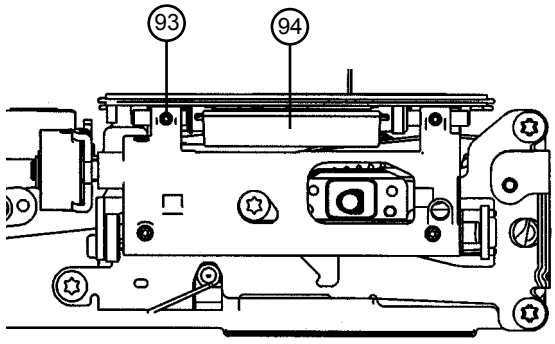
Standard:
- The feed-dog must be equidistant to each side of the needle plate.

Check:
- When lowering the feed-dog, it must drop by itself.

Correction:
- Loosen screw 93.
- Move the feed-dog carrier shaft 94 sideways to the correct position.
- Tighten screw 93.

Attention: Check for ease of movement!

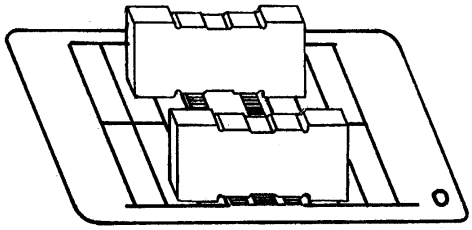


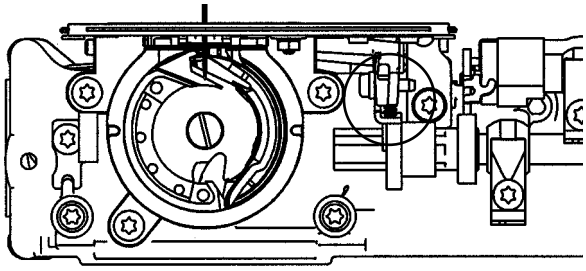


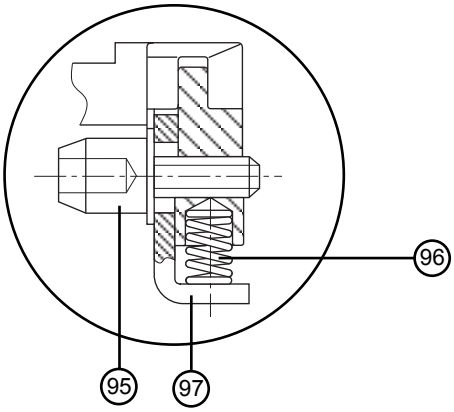
38 Feed-dog height

Standard:
At their highest point the tips of the feed-dog teeth should be 0.05mm higher at front than at the back.

Example:
- Front 0.95 mm, back 0.90 mm
- Front 1.00 mm, back 0.90 mm
- Front 1.00 mm, back 0.95 mm

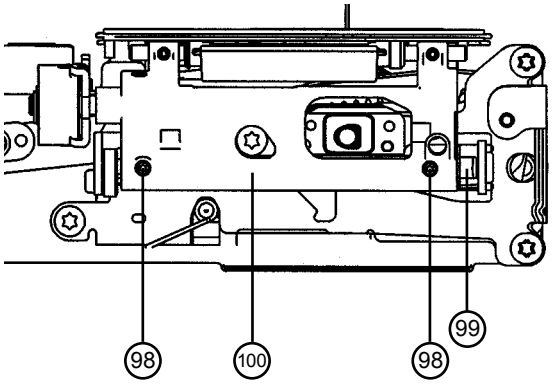






Correction (front of feed-dog):
- Loosen the screw 95.
- The pressure spring 96 causes the adjustment plate 97 to move independently.
- Place gauge 0.9 mm in position and press down.
- Tighten the screw 95.

Attention:
Check again after re-tightening the screw!



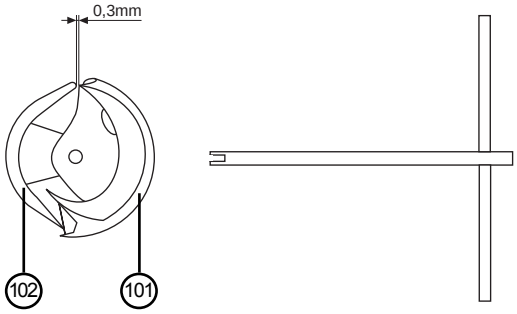
Correction: (rear of feed-dog)
- Loosen the screws 98.
- Using a 5.5 mm open end wrench, turn the eccentric pin 99 until a height of 0.9 mm. is reached.
- Tighten the screws 98.

Attention:
The feed dog carrier (100) must lie on the circlip. Eccentricity must be facing outwards!

Thread passage

Standard:
There must be 0.3 mm play between the hook (101) and the hook driver (102). Check with a feeler gauge 398 022 030.

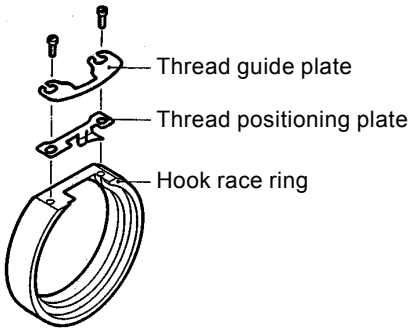
Correction:
If the distance is too large or too small, adjust the short arm of the driver with the adjustment key 001357.70.00.

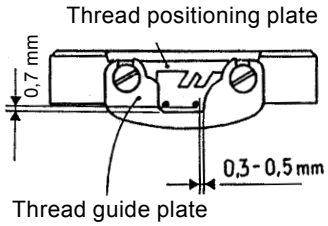


Thread guide plate

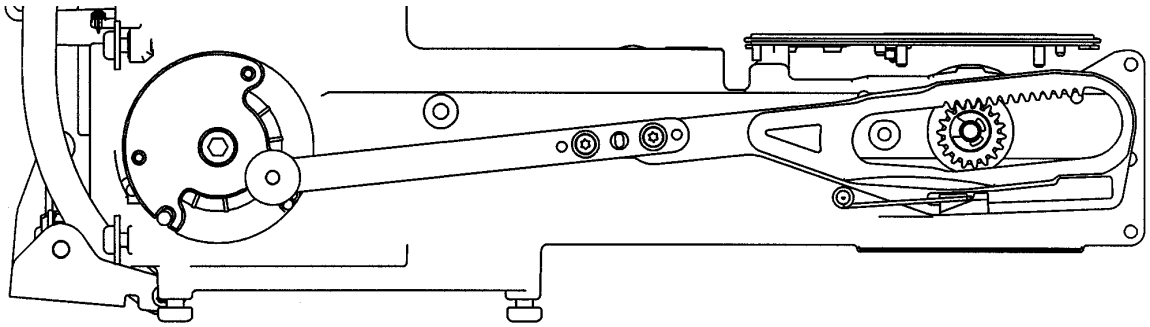
Standard:
The distance of the thread guide plate should be 0,3 to 0,5 mm from the right edge and 0,7 mm to the hook race.

Correction:
The thread guide plate should be in a position, that distances are within the tollerances.



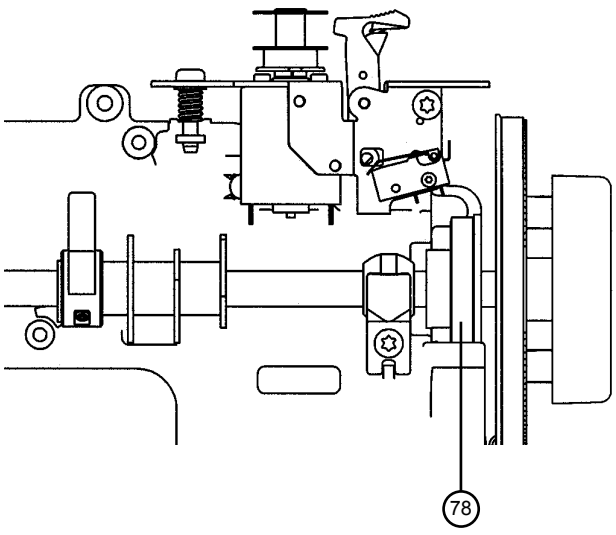


Hook adjustment loop lift (synchronisation)



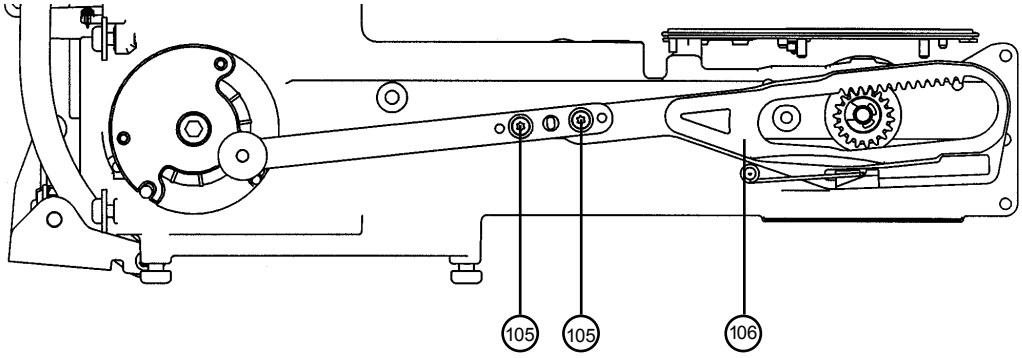
Standard:
- Remove the needle plate
- Pin the stepping motor to needle position centre
- Pin the balance piece of the needle drive (4 mm pin 030349.70.00) and turn the handwheel until the stop position is reached.
- Hook drive crank 104 must now be pinned with pin (001356.50.00).

Correction hook drive crank:
- Loosen the second screw 78 in direction of rotation of the drive belt flange.
- Loosen the first screw in direction of rotation. Now turn the drive belt flange, until the hook drive crank can be pinned.
- Tighten the screws.

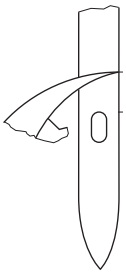


40 Position of hook in relation to the needle

Standard:
- Pin the balance piece, stepping motor zig-zag and the hook drive crank.
- The hook point must now be flush with the right hand edge of the needle (see encircled part of diagram).

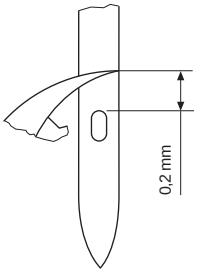


Correction:
- Pin the balance piece, stepping motor zig-zag and the hook drive crank.
- Loosen screws 105 on the rack clamping piece 106.
- Using the eccentric key (001361.70.00), move the rack until the hook is flush with the right hand edge of the needle.
- Tighten screw 105.

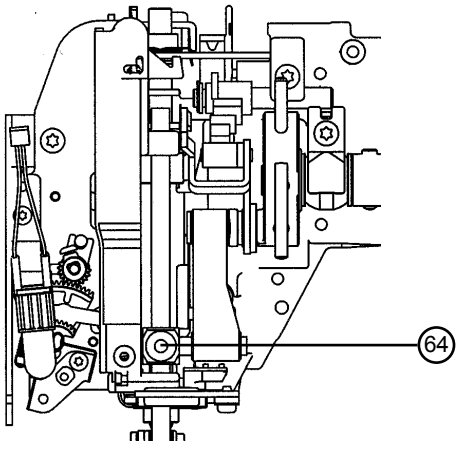


Needle height

Standard:
- Set needle position to the right.
- Position the hook tip flush with the right-hand edge of the needle.
- The lower edge of the hook tip should now be 0,2 mm above the needle eye.

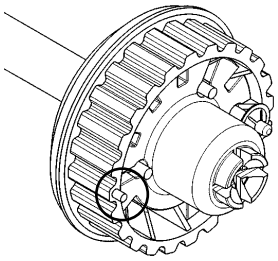


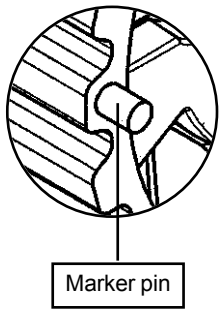
Correction:
- Loosen the screw 64 of the needle bar clamp. Move the needle bar to the prescribed position.
  Attention: The needle bar must not be turned radially.
  Check if necessary with twin needles.
- Tighten screw 64.



Feed-dog synchronisation (feed-dog lift and advance)

Standard:
- Pin the balance piece.
- The base shaft must now be in a position, where the marker pin on the drive gear is in a front horizontal position (09:00 hours) to the shaft.



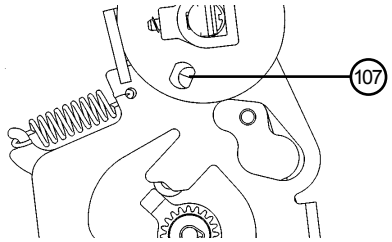


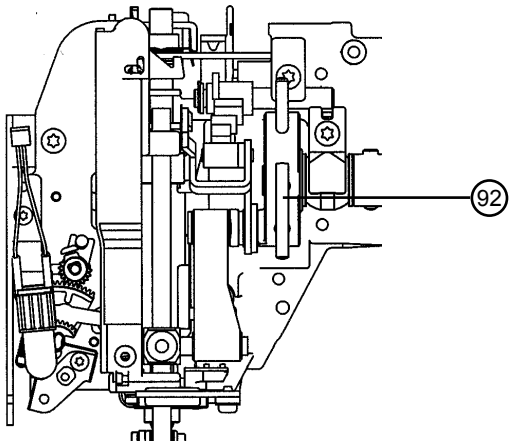
Correction:
As both lifter and advance eccentrics are pressed into the shaft, continue as follows:
- Remove the screw (49)
- Fold the linkage (48) down and at the same time remove the ball bearing (48a).
- Pull the shaft (48b) and the drive gear (b) out of mesh.
- Turn the hook drive crank into the pinning position (a)
- Position the gear (b) with the marker pin at 09:00 hours.
- Move the shaft (48b) and drive gear back into mesh.
- Insert the ball bearing (48a) an tighten the linkage (48). Refit the screw (49).

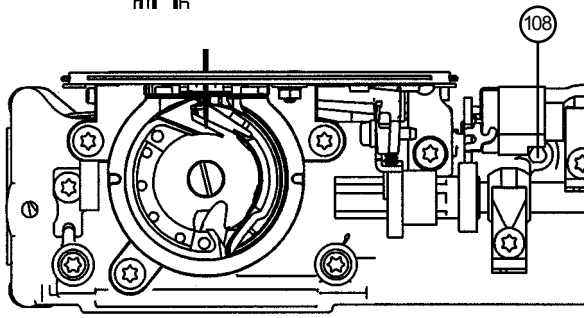
Next: Step should be (3) hook adjustment loop lift, and then the (4) Position of hook in relation to the needle Page 40a

Basic position of balance

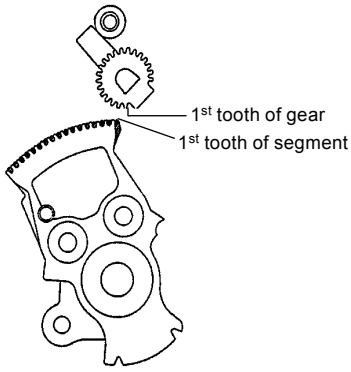
Standard (the front cover must be removed):
- Pin the balance piece 92.
- Pin the hook driver crank.
- Pin the balance adjustment cam 107.
- Push the toothed segment all the way towards the back.
- In this position the stitch length crank 108 can now be pinned.

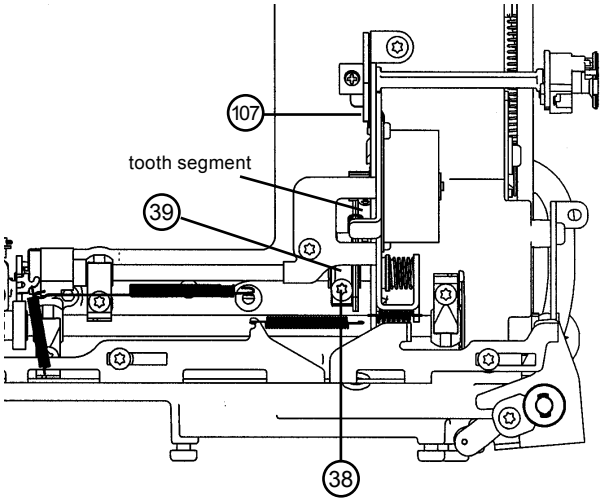






Correction:
- Loosen the screw of the clamping piece 38.
- Turn the crank 39 into its pinning position.
- The toothed segment must now be against the stop at the same time on the opposite side, a distance of 1,1 mm must be at hand between the toothed segment and the stop pin (see sketch).
- Tighten the screw of the clamping piece 38.





Attention: First tooth of the gear must be in the first tooth of the segment!

42 Basic adjustment to the knee lifter lever

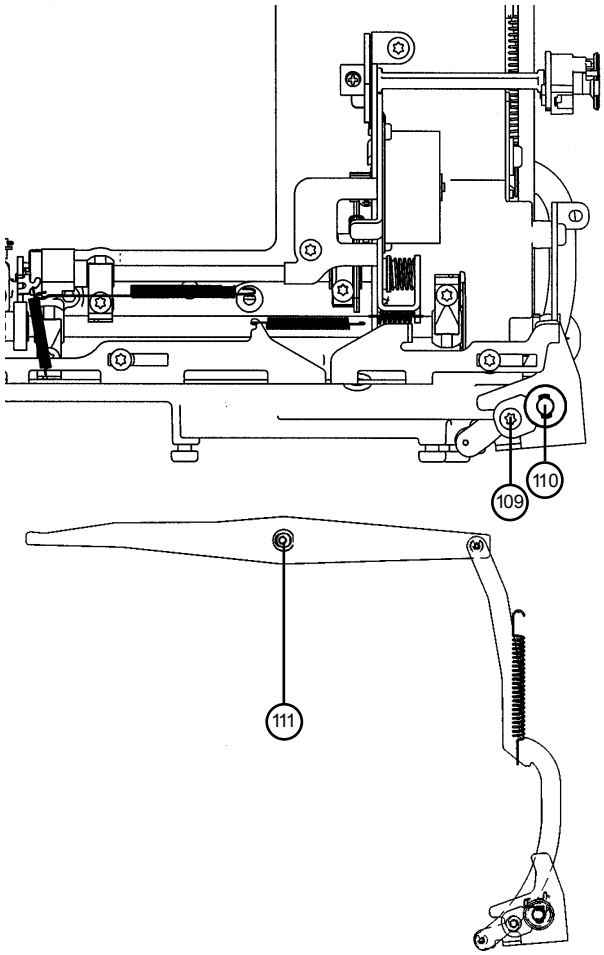
(Available as a special accessory)

Standard:
- The end of the knee lifter should be vertical under the right edge of the LCD.

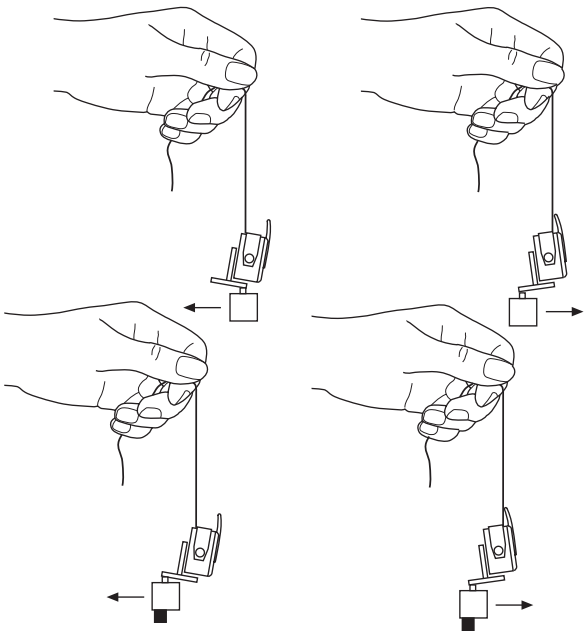
Correction:
- Loosen the screw 109 of the feed-dog drop unit.
- Insert knee lifter lever 110.
- Adjust the lifter to the convenient position.
- Tighten the screw 109.

Checking the release of the lifter lever:
- Place the lifter lever in its highest position.
- Turn the upper tension dial to no.10.
- When the knee lifter is actuated, the lifter lever must drop down.

Correction:
- Turn the adjustment nut 111 until the lever drops down.
- Check the tension release mechanism and if necessary correct (lever must be free).



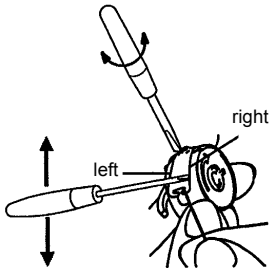
Lower thread tension



Standard:
For testing use Mettler white thread (BW Ne 60/2 resp. NM 43.1/2). The lower thread tension is checked with the moveable setting weight No. 006 543 7001. The bobbin case is placed in the weight gauge just as in the hook. Hold the free end of the thread and suspend the bobbin case with the setting weight (without any additional weight).
The bobbin case must not move downwards. After attaching an additional weight (5 gr.) the thread should move downwards (speed 1m/2 – 4 sec.). If you test with darning thread the speed should be 1m/25 sec.

Correction:
Regulation of the lower thread tension is made with the bobbin case adjusting screw and a small screwdriver.

Anti-Clockwise = weaker
Clockwise = stronger



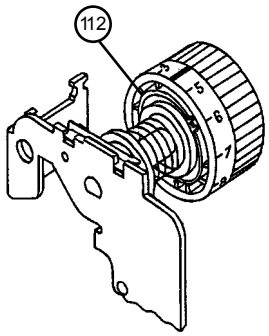
Adjustment of upper thread tension with a weight

Standard:
- Test thread Mettler white (BW Ne 60/2 resp. NM 43.1/2).
- Thread the machine including the take-up lever.
- Bring the take-up lever/needle bar to the highest position.
- Lower the presser foot.
- Turn the tension adjustment dial until the red mark is in line with the mark on the top cover.
- Draw off approx. 30cm of thread from the bobbin.
- Using the weight 93 g (85 g + 8 g) wrapped around the thread at the take-up lever side, check the upper tension.
- The weight of 85 g must not move down.
- Attach the extra magnetical weight of 8 g. The weight must now move down slowly.

Correction:
- See correction basic adjustment.

Basic adjustment of the upper thread tension

- Thread the machine up with the inspection thread including the take-up lever and affix the control weight. Attention: The thread must be also threaded through the thread guide.
- Use as a control thread (BW Ne 60/2 resp. NM 43 1/2) Mettler white.
- Inspect the bobbin case tension against the correct values (see basic adjustment of bobbin case tension).
- Turn the adjustment dial until the red marker is in line with the marking on the housing.
- Sew off a sample stitch (running stitch).

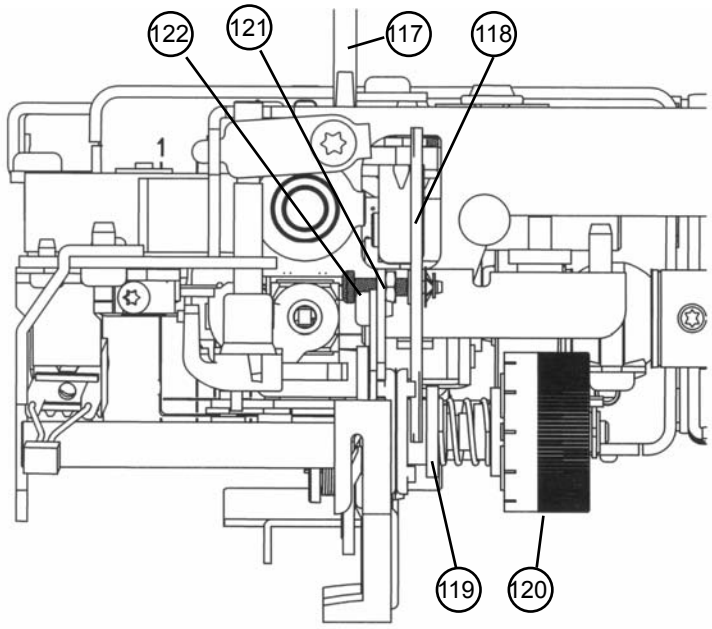


Correction:
- Turn the adjustment dial accordingly.
- Press the locking lever 112 down the dial is now free.
- Turn the dial until the red mark is in line with the marker of the housing.
- Release the locking lever 112 into the locking position.

44 Tension release lever

Standard:
Lifter lever (117) down
Release lever (118) doesn't toutch the pressure disc (119) when the adjusting dail (120) is at 0 or 10.
Lift lever (117) up.
Turn dail (120) to 10
The distance between the tension discs must be min. 0.3mm.

Correction:
Lifter lever (117) up
Adjusting dail (120) on 10
Loosen the counter nut (121)
Adjust the distance between the pressure disc to 0.3mm with the screw (122)



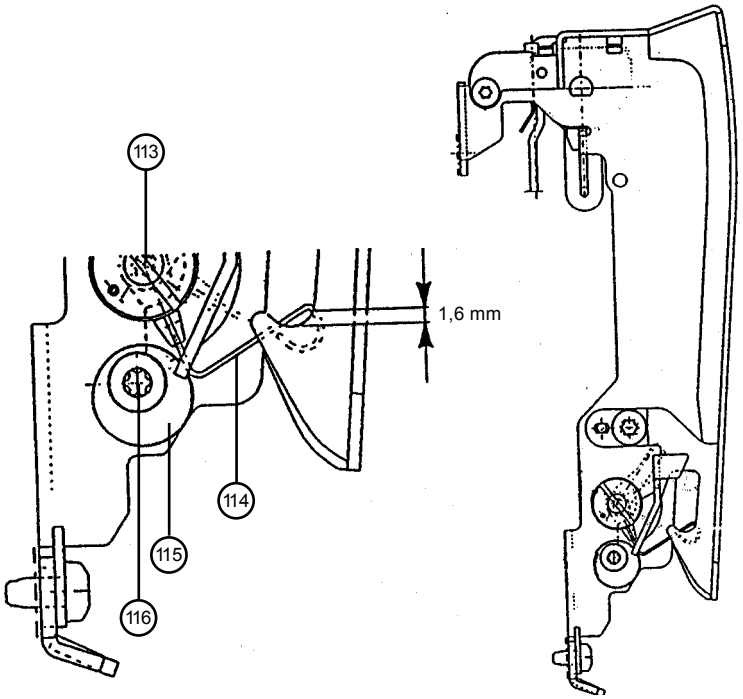
Thread regulator spring

Checking the tension:
12 g – 15 g (use BERNINA Tension spring 006 038 5000)

Correction tension:
By turning screw 113 clockwise or anti-clockwise, the tension will become more or less.

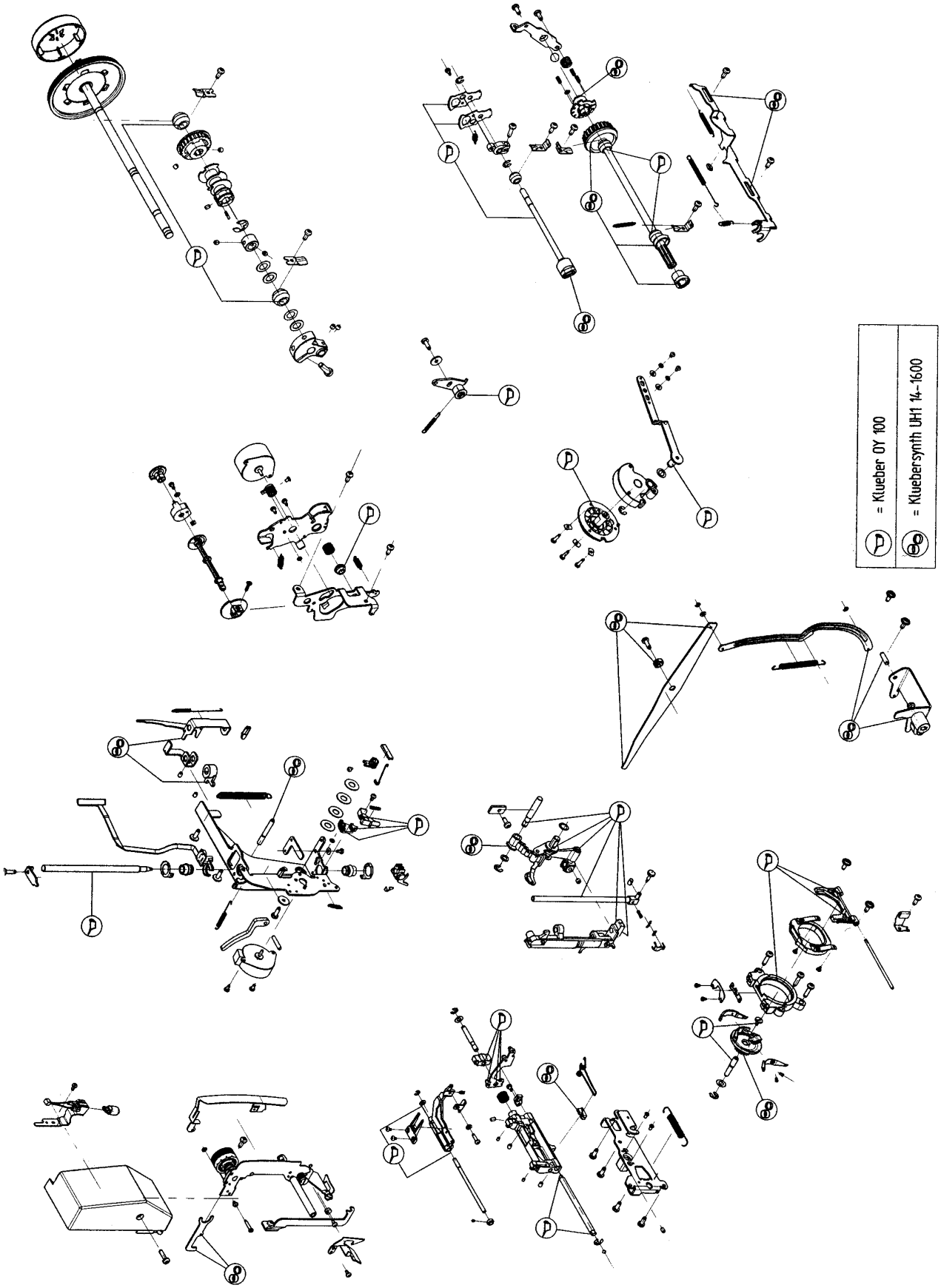
Checking position:
- The thread regulator spring 114 must lie on the limiter piece 115.
- At the same time a distance between the spring and the cover of 1.6 mm +/– 0.3 mm should be at hand.

Correction position:
- Loosen screw 116 and by means of turning the eccentric bring the stop piece against the spring until a distance of 1.6 mm is achieved.
- Retighten the screw 116.



Oiling and Lubrication

In the lubrication plan, parts that have to be lubricated after a certain time are marked with the corresponding lubricant to be used.



46 Sewing-off

The sewing off operation is used as a control method to inspect whether the machine has reached the required standards after adjustments have been carried out and that it is functioning correctly.
The following patterns should be used in the order given and with the corresponding criteria:

1) Straight stitch
   · is the thread regulating spring working correctly
   · is the stitch straight
   · is the stitch formation equal

2) Zig Zag (default values)
   · is the stitch formation symmetrical
   · is the stitch formation equal
   · is the fabric puckering

3) Satin stitch
   · is the stitch formation symmetrical
   · is the stitch formation equal
   · is the fabric puckering

4) Running stitch
   · is the stitch formation symmetrical
   · is the stitch formation equal
   · is the fabric puckering

5) Balance using “9” as a pattern
   · is the stitch formation symmetrical
   · the stitch formation of the pattern “9” must be closed

6) Any other pattern (e.g. Honeycomb stitch)
   · is the stitch formation symmetrical
   · is the stitch formation equal
   · is the fabric puckering

7) Buttonhole
   Standard buttonhole
   · is the stitch formation symmetrical
   · are the beads equal
   · is the feeding correct

   Automatic buttonhole
   · is the stitch formation symmetrical
   · are the beads equal
   · is the feeding correct

   Keyhole buttonhole
   · is the stitch formation symmetrical
   · are the beads equal
   · is the feeding correct
   · is the keyhole shaped correctly

8) Sew-off sample for the customer
   At the end of a service a sample for the customer must be made. In this way the customer can see in which condition the machine is sewing. The sample should consist of the following patterns:
   · Straight stitch
   · Zig Zag stitch
   · Running stitch
   · Any other pattern

Should the customer have a special complaint such as a buttonhole, or any other pattern, then this must also be included.

Cleaning

Attention!
Never use alcohol, petrol, spirits, or any other acid type of liquid.

When cleaning covers it can happen that they will become electrostatically charged. To clean the covers, a liquid which is also used in the office equipment industry with an anti-
static agent can be used.
We use and recommend the surface cleaner SURFACE CLEAN from BASF Ltd. This liquid builds up a protected film against static electricity and is suitable for both composite materials as well as metal parts.

Complaints form

The complaints form (2 pages) are to be found in the appendix section and are designed to be used for photo copying.

Please note:
Copy the original and fill out only on the copies.

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030 578 51 02