Service- and Maintenance Manual

Of the 5 Series (VIO type)

B 590

B 570

B 500

B540

B 535

DRAFT – VERSION

Contents

Chapter 1 - General Information

1.1. Safety Regulations

IMPORTANT!
All electrical and electronic components operate at dangerous voltages. Remove the mains plug before making any adjustments to the machine. Wait about 30 seconds after removing the plug (capacitor discharge).
However, servicing-related work can be carried out in Service Program when the machine is powered.

This service manual is intended to help with minor repairs and adjustments.
The instructions do not claim to be complete or comprehensive. The manual does not provide guidance for complete assembly or disassembly.

Important:
To enable the work described to be performed correctly, the sewing and embroidery computer must be in good mechanical and electrical condition (running smoothly, properly oiled and all leads connected)!
When adjustments are carried out in the correct order, the machine will function flawlessly.

It is important that only devices approved and distributed by BERNINA® are connected to the sewing/embroidery computer ports.

When servicing or repairing, always use genuine parts and original accessories, either those delivered with the machine or purchased afterwards.

Which are:

- Power cable
- Foot control
- Buttonhole foot
- Presser foot 1
- Bobbin
- Other accessories
- BERNINA stitch length regulator (BSR) foot.

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This Manual is subject to revisions without notice. The recipient is responsible for updating the information provided by BERNINA International AG, Steckborn, Switzerland.

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If you don't have access to Infogate, contact your local BERNINA importer. They'll be glad to be of assistance.

Disclaimer

Masthead
Author: Dieter Uhmeier

1.2 Warning: Dangerous voltage levels!

IMPORTANT!

The power connection, the main switch, the PCBA Power, and the power cable all carry dangerous voltages.
Therefore always disconnect the machine from the power supply before starting any work on the machine. This applies unless otherwise instructed where required.

Note:
The capacitors require 30 seconds to discharge after the power supply has been switched off. We recommend to wait for the complete discharging of the capacitors before starting any servicing work on the PCBs.

1.3 ESD-related note: Electrostatic Discharge (ESD)

Electrostatic charges are caused by:
- **a person's walking (influence)**
- **friction between and separation of two insulating materials (triboelectricity)**

If this static electricity discharges through electronic components, these may be partially or irreparably damaged. Electrostatically charged persons represent the greatest danger for components. This can be dissipated by

Protection of electrical and electronic components against electrostatic discharges

Be sure to follow these important guidelines:

1. Always work at a stationary, ESD-compliant workstation equipped with the appropriate ESD protective devices including conductive table and/or floor mat, earth connection box and earthing wristband when doing service work.
   The cable of the earthing wristband and the earth connection box must have a built-in resistance of 1 M ohm to ensure protection.

2. Always put on an earthing wristband before starting to work. Always remove any synthetic parts like plastic bags, covers etc. from your workstation.

3. Only open ESD protective packaging at your ESD-proof workstation while wearing an earthing wristband. Electronic components must be placed on conductive table mats only. Packing is carried out under the same conditions.

4. Only use conductive ESD-capable plastic/foil pouches and ESD transport boxes for dispatching electronic components even if the components might be faulty.

Electrostatic Discharge (ESD)

5. Treat faulty PCBs in the same manner as new ones to prevent consequential damage or harm.
   Note:
   For more information see 2.12

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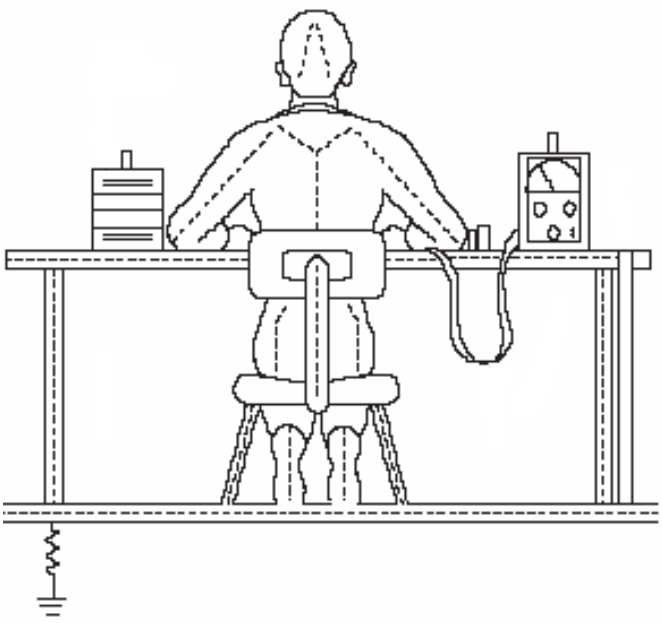
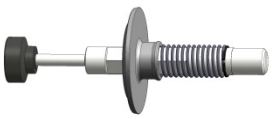
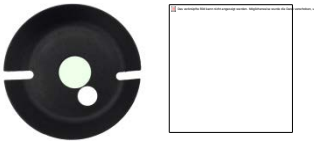
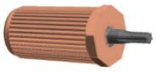
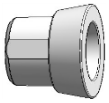


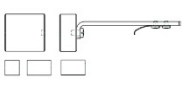
1.4 Tools and gauges

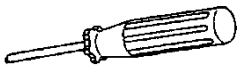
(commercially available, not available from Bernina):
Calliper, multimeter, TORX screwdrivers sizes 6, 8, 10, 10 with 200mm shaft length, 15, 20, 25, 25 with 200mm shaft length, angled Torx sizes 6 and 10, combination spanners in sizes 10mm and 8mm, open-ended spanner in size 6mm

Special Tool set for 5 Series **Art.-No.: 034384.74.07**
Spezialwerkzeug Set 5er Serie
Trousse à outils spéciale pour la Série 5

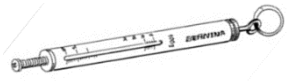
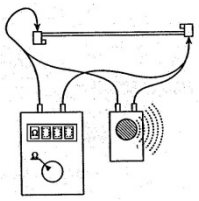
Art.-No.	Name Bezeichnung Nom	Application Verwendung Application	Picture Bild Image
734541.71.00	Adjusting gauge hook driver B9 Einstelllehre Greifertreiber B9 Gabarit d'entraînement de crochet B9	Alignment of hook driver bearing / hook race Zentrierung Greifertreiber Lager / Greiferbahn Alignement du palier d'entraînement de crochet / rail de crochet	
734956.50.00	Distance gauge for the new hook driver (white bullet point) Distanzlehre für den neuen Greifertreiber (weisser Punkt) Gabarit de distance pour le nouvel entraînement de crochet (point blanc)	Adjusting distance between hook and hook driver Distanz-Einstellung zwischen Greifer und Greifertreiber Réglage de la distance entre le crochet et l'entraînement de crochet	
734571.70.01	Loop lift gauge BERNINA 7-Series Schlingenhublehre BERNINA 7er-Reihe Gabarit d'ascension de BERNINA Série 7	Adjusting the loop lift distance of 2.6mm Einstellen des Schlingehubmasses 2.6mm Ajuster l'ascension de 2.6mm	
033924.70.00	Adjusting gauge for the bobbin thread tension Einstelllehre für die Unterfadenspannung Gabarit de réglage de la tension du fil de la boîte à canette	Adjusting the tension on the bobbin case Einstellen der Unterfadenspannung Pour ajuster la tension de la boîte à canette	27.0 g & 3.0 g 
030475.51.01	Torx screwdriver Torx Schraubenzieher **T8** Tournevis torx	Adjusting tool for feed-dog height at back and cutting device Einstellung Transporteurhöhe hinten und Fadenschnitteinheit Réglage de la hauteur de la griffe d'entraînement à l'arrière et coupe fil	
030883.50.02	Distance gauge Distanzlehre **L =19.25mm** Gabarit de distance	Adjusting the needle height Einstellen der Nadelhöhe Réglage de la hauteur de l'aiguille	
034370.50.00	Bobbin winder adjusting gauge Spulerlehre Gabarit pour le dévidoir	Adjusting the thread quantity on the bobbin Einstellen der Füllmenge auf der Spule Ajuster la quantité de fil sur la canette	
734562.50.00	Auxiliary tool for mounting circlip Hilfswerkzeug für die **1.5** Benzingsicherungmontage Outillage auxilaire pour ressort circlip	Reassembling aid Einbauhilfsmittel Aide au montage	
734258.52.00	Timing gauge for the clutch carriage Einstelllehre für den Kupplungsschlitten Jauge pour la barrette d'embrayage pour couper le fil	Setting the timing of the thread cutting system Einstellen des Fadenschnittsystems Ajuster le système de coupe	

Common Tool Set for 5 Series **Art.-No.: 034383.70.00**
Allgemeines Werkzeug Set 5er Serie
Trousse à outils généralement pour la Série 5

Art.-No.	Name Bezeichnung Nom	Application Verwendung Application	Picture Bild Image
338109.03.3+	Adjusting needles Einstellnadeln 130/705 H TCN 80	Needle and hook adjustment Nadel- und Greifereinstellung Réglage de l'aiguille et du crochet	
Com.available Handelsüblich En commerce	130/705 H 100	Needle penetration in Y-direction Nadeleinstich in Y-Richtung Pénétration de l'aiguille en Y-direction	
030475.51.00	Torx screwdriver Torx Schraubenzieher **T10** Tournevis torx	Disassembling & reassembling aid Einbau- und Ausbauhilfsmittel Aide au montage et au démontage	
734101.50.00	**Distance gauge** **Distanzlehre** **Gabarit de distance**	**Threader head height** **Einfädlerkopf-Höhe** **Hauteur de l'enfileur**	
730475.51.00	Distance plate Distanzplatte Plaque-étalon de distance	Adjusting the needle height Einstellen der Nadelhöhe Réglage de la hauteur de l'aiguille	
032798.50.00	Synchroplate Synchroplatte Plaque de synchronisation	Basic position of the BERNINA dual feed Grundposition Obertransportfuss Position de base pour BERNINA dual feed	
398024.03.1+	Feed-dog height gauge Transporteur Höhenlehre Gabarit de hauteur de la griffe d'entraînement	Checking of the feed-dog height Kontrolle der Transporteur Höhe Vérification de la hauteur de la griffe d'entraînement	
398026.13.1+	Darning foot height gauge Stopffuss Höhenlehre Gabarit de hauteur pour le pied de reprisage	Checking the darning foot level Kontrolle der Stopffuss Höhe Vérification du niveau du pied de reprisage	
002733.50.00	Pinning tool long Absteckwerkzeug, lang **2X** Goupille de réglage, long	Pinning positions Absteckpositionen Positions de goupillage	
007937.50.00	Pinning tool 3.0mm Absteckwerkzeug 3.0mm **2X** Goupille de réglage 3.0mm	Pinning positions Absteckpositionen Positions de goupillage	
001356.50.00	Pinning tool, short Absteckwerkzeug kurz Goupille de réglage, court	Pinning positions Absteckpositionen Positions de goupillage	
031563.50.00	Excentric key 2.0mm Exzenterwinkel 2.0mm Clé excentrique 2.0mm	Alignment of head plate to the stitch plate Ausrichtung der Kopfplatte zur Stichplatte Alignement de la plaque frontale et de la plaque à aiguille	
007993.50.00	Angular Torx Winkeltorx **T8** Clé mâle coudée TORX	Adjusting tool for feed-dog height at back Werkzeug, Einstellung hintere Transporteurhöhe Outil de réglage de la hauteur de la griffe d'entraînement à l'arrière	
733019.70.00	Adjusting spanner compl. Einstellschüssel kompl. Tendeur pour le réglage de la tension des courroies compl.	Adjusting the belt tension, setting the distance of the needle bar clamp Einstellung der Riemenspannung, Distanzeinstellung Klemmstück / Nadelstange Réglage de la tension de courroie, réglage de la distance du levier de serrage de la barre à aiguille	
008709.72.00	Upper thread adjusting gauge (5-pieces-set) Oberfaden Einstelllehren-Set (5-teilig) Gabarit de réglage du fil supérieur (jeu de 5 pièces)	Weight for setting the upper thread tension Einstellung der Oberfadenspannung Réglage de la tension du fil supérieur	

Art.-No.	Name Bezeichnung Nom	Application Verwendung Application	Picture Bild Image
398112.03.0+	Spring mounting tool Federhaken Outil pour ressort	Spring hooking & unhooking aid Ein- und aushängen von Federn Crocher et décrocher les ressorts	
001361.70.00	Excentric key Exzenterschlüssel Clé excentrique	Various adjustments Verschiedene Einstellungen Divers réglages	
652010.20.++	Gauging thread DMC 50 BLANC (white) Eichfaden DMC 50 weiss Fil de réglage DMC 50 BLANC	Upper- & lower thread-tension Ober- und Unterfadenspannung La tension des fils supérieur & de la canette	
033958.50.00 (Size 1.5) 033958.50.01 (Size 2.3) 033958.50.02 (Size 3.2)	C-Clip Holding Set Benzinghalter Set Kit outils circlip (3-parted/3-teilig/en 3 parties Ø1.5, 2.3, 3.2)	Assembly C-clips Einbau Benzingsicherungen Montage de circlips	

Helpful Tools for BERNINA Sewing and Embroidery Systems
Hilfreiche Werkzeuge für BERNINA Näh- und Sticksysteme
Trousse à outils secourable pour les maschine à coudre informatisée de BERNINA

006038.50.00	Spring balance gauge Federwaage Pèse-ressort	Tension of thread regulator spring Anzugwert der Fadenregulatorfeder Tension ressort du régulateur du fil	
031935.50.00	Plug mounting tool Steckerstössel Poussoir de la fiche	Mounting aid for plugs and cables Hilfsmittel für Stecker und Kabel Montage Aide pour le montage de fiches et de câbles	
032948.50.00	IC extraction tool Ausziehwerkzeug Tire-IC	Removal of EEPROM Ausbau des EEPROM Extraction de l'EEPROM	
Com,available Handelsüblich En commerce	Multimeter (digital) Multimeter (digital) Multimètre numérique	• Continuity test • Ohm measurement • Voltage tests • Durchgangsprüfungen • Ohm Messungen • Spannungs-Prüfungen • Mesure de la résistance • Mesure de la tension • Mesure de la continuité	
398022030	Feeler gauge 0.3mm Tasterlehre 0,3mm Jauge d'épaisseur 0,3 mm	Distance measurements Distanzmessungen Mesures de distance	
398111030	Feeler gauge 0.15mm Tasterlehre 0,15mm Jauge d'épaisseur 0,15 mm		
Com.available Handelsüblich En commerce	Feeler gauge 0.6mm Tasterlehre 0,6mm Jauge d'épaisseur 0,6 mm		
031564.50.01	Tweezers Pinzette Brucelles	Plugging and unplugging cables Aus- und Einstecken von Kabel Branchement et débranchement de câbles plat	
Com.available Handelsüblich En commerce	Watchmaker's magnifier 2.5x (magnification approx. 4x) Uhrmacherlupe 2.5x (Vergrösserung ca. 4fach) Loupe d'horloger (micros) 2.5x (grossissement env. 4x)	Allows for more precise adjustments in the hook-/needle area Ermöglichung von präziseren Einstellungen im Bereich Greifer – Nadel Permet des réglages plus précis dans la zone du crochet et de l'aiguille	

1.5 Handling adjustments

- Will be explained within the respective items.

1.6 Abbreviations/Names Used

Throughout the whole manual the following abbreviations have been used. We have reserved the right not to explain individual abbreviations within the text.

Abbreviation:	Stands for:
BDF	**B**ERNINA **D**ual **F**eed (upper feed)
BSR	**B**ERNINA **S**titch **R**egulator
DC	**D**irect **C**urrent
EEPROM	**E**lectronically **E**rasable **P**rogramable **R**ead **O**nly **M**emory (elektrisch löschbarer, programmierbarer nur Lesespeicher)
EMB	Embroidery module
EMC	**E**lectro **M**agnetic **C**ompatibility
FHS	**F**ree **H**and **S**ystem (knee-operated lever)
IR	**I**nfra **R**ed
LCD	**L**iquid **C**rystal **D**isplay
LED display	**L**ight **E**mitting **D**iode
LMS	**L**ength **M**easuring **S**ystem
LTO	**L**ower **T**hread **O**bserver
PCBA	**P**rinted **C**ircuit **B**oard **A**ssembled
RET	**RET**urn (PCBA-RET)
SP	**Se**rvice **P**rogram
TFT	**T**hin **F**ilm **T**ransistor
TTA	**T**hread **T**ension
UTO	**U**pper **T**hread **O**bserver

1.7 Cleaning

Remove and clean the covers.
Electrostatic charging may occur during cleaning. To prevent this, use antistatic office-equipment cleaning agents.
We use and recommend BASF's SURFACE CLEAN surface cleaner.
It forms a protective film against static electricity, and is suitable for both plastic and metallic surfaces.

IMPORTANT!
Never use alcohol, benzine, spirits or any other corrosive fluids, or abrasive pastes or detergents!

Inside parts:

- Dust, lint, thread and fabric remnants can accumulate inside the machine behind the covers. and may lead to malfunctions.

Head frame area:

- Thread take-up lever (joints), needle bar, needle bar support, and needle bar coupling.
- Main shaft (behind needle drive balance piece), synchronizer.
- Between the upper-thread tension discs, all along the thread path, incl. thread redirections

Freearm and base area:

- Bobbin carrier (under tension spring)
- Feed dog
- Hook/hook sensors
- Lower thread indicator
- Base shaft (lift-/advance cams)
- In the thread-cutting mechanism

Drive area:

- Drive motor/carbon dust
- Toothed-belt discs, and motor pulley
- Hook drive

Electronics area

- All sensors, light barriers, switches, electronic components

1.8 Technical specifications of 5 Series

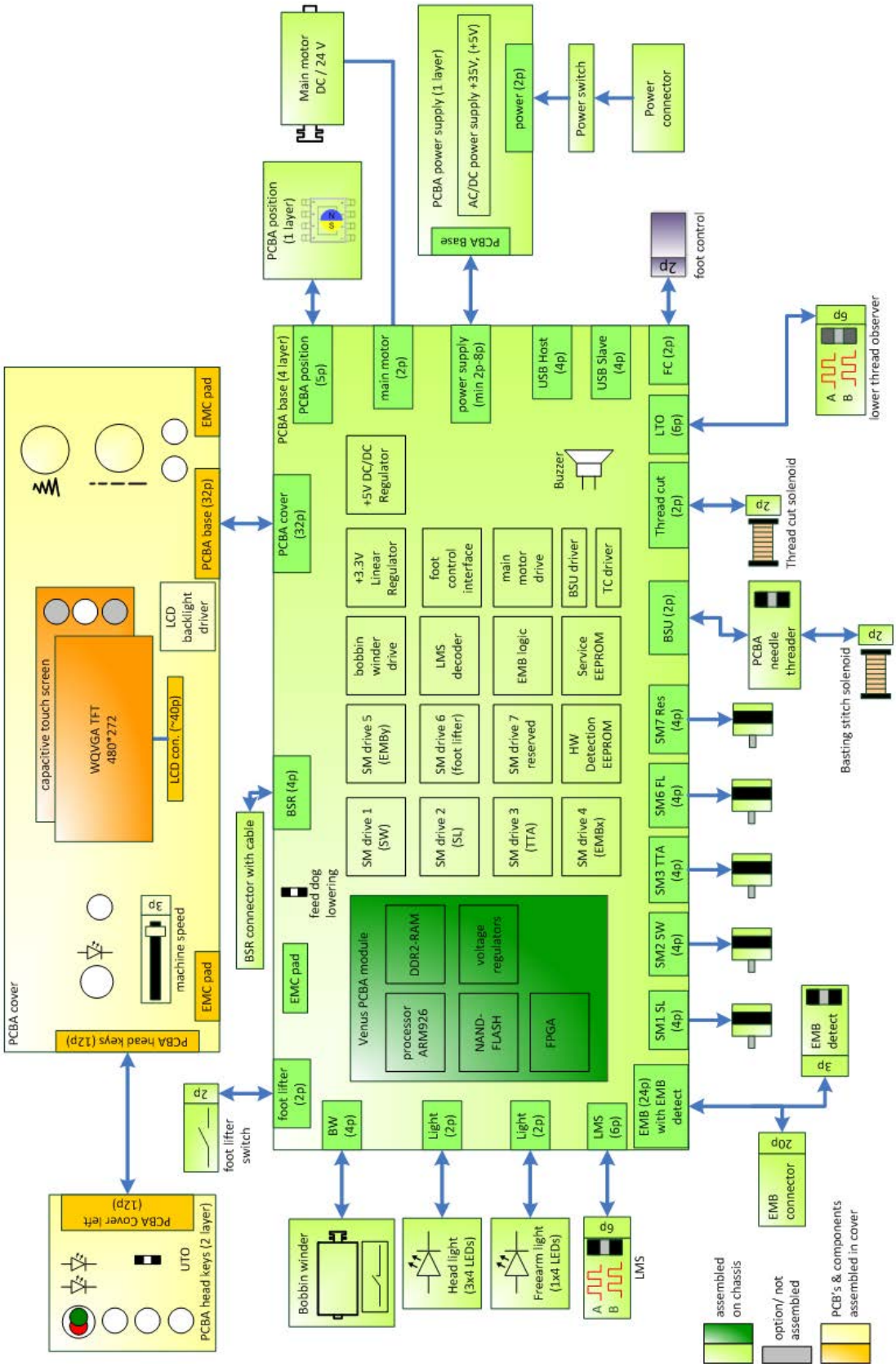
Features	BERNINA 590	BERNINA 570 QE	BERNINA 540	BERNINA 535	BERNINA 500 Embroidery only
Technical					
Supply voltage	100 - 240 Volt 50-60 Hz	100 - 240 Volt 50-60 Hz	100 - 240 Volt 50-60 Hz	100 - 240 Volt 50-60 Hz	100 - 240 Volt 50-60 Hz
maximum power input in Watt	180	180	180	180	180
maximum power output in Watt	145	145	145	145	145
Eco mode (30% reduction)	Yes	Yes	Yes	Yes	Yes
Total memory space in MB	128	128	128		
Overall size in mm, L-W-H	525 x 205 x 415	525 x 205 x 415	525 x 205 x 415	525 x 205 x 415	525 x 205 x 415
Weight in kg without accessories	11.0	11.0	11.0	11.0	11.0
Weight of embroidery module in kg	4.0	4.0	4.0	4.0	4.0
Weight in kg incl. packaging	18.3	18.3	18.3	18.3	18.3
Hook system	BERNINA Hook	BERNINA Hook	BERNINA Hook	BERNINA Hook	BERNINA Hook
Motor	DC / 36 Volt	DC / 36 Volt	DC / 36 Volt	DC / 36 Volt	DC / 36 Volt
Stitching speed, min./max.	100 - 1000 SPM	100 - 1000 SPM	100 – 1000 SPM	100 – 1000 SPM	100 – 1000 SPM
Sideways Motion	--	--	--	--	--
BERNINA **D**ual **F**eed (upper feed)	Yes	Yes	--	--	--
BERNINA **S**titch **R**egulator (BSR) port	Yes	Yes	Yes	Yes	--
Embroidery module connection	Yes	Yes	Yes	Yes	Yes
Automatic thread cutter	Yes	Yes	Yes	Yes	Yes
Embroidery speed, max.	1000 SPM	1000 SPM	1000 SPM	1000 SPM	1000 SPM
Embroidery file formats	EXP	EXP	EXP	EXP	EXP
Langstich und Heftmatik	Yes	Yes	--	--	--
Knee-operated lever/**F**ree **H**and **S**ystem (FHS)	Yes	Yes	Yes	Yes	Yes
Freearm space, diagonal measure in mm	130 / (285)	130 / (285)	130 / (285)	130 / (285)	130 / (285)
Built-in upper thread threader	Yes	Yes	Yes	Yes	Yes
Automatic upper thread tension	Yes	Yes	Yes	Yes	Yes
Automatic presser-foot lifter	Yes	Yes	--	--	--
Presser-foot height in mm, normal	7,5	7.5	7,5	7,5	7,5
Presser-foot height in mm, max. extra lift	15	15	15	15	15
Presser-foot height with FHS in mm	10,5	10,5	10,5	10,5	10,5
Lower- and upper thread sensors	Yes	Yes	No/Yes	Yes	Yes
Max. stitch length forward in mm	6.0	6.0	6.0	6.0	6.0
Max. stitch length reverse in mm	6.0	6.0	6.0	6.0	6.0
Adjustable increments in mm	0,055	0,055	0,055	0,055	0,055
Max. stitch width in mm	9.0	9.0	9.0	5.5	0.0
Adjustable increments in mm	0,1	0.1	0,1		
Sewing light (sewing area)	LED	LED	LED	LED	LED
Freearm area lighting	LED	LED	LED	LED	LED
Color TFT LCD (**T**hin **F**ilm **T**ransistor) with capacitive touchscreen	Yes	Yes	Yes	Yes	Yes
Display size in mm (inch)	10,9 (4,3)	10,9 (4,3)	10,9 (4,3)	10,9 (4,3)	10,9 (4,3)
Resolution in pixel	480 x 272	480 x 272	480 x 272	480 x 272	480 x 272
Number of colors	262‘144	262‘144	262‘144	262‘144	262‘144
Display backlight in white	LED	LED	LED	LED	LED

Features	BERNINA 590	BERNINA 570 QE	BERNINA 540	BERNINA 535	BERNINA 500 Embroidery only
User interface	Touch screen	Touch screen	Touch screen	Touch screen	Touch screen
USB data stick/PC interface	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Stitch packages					
Number of sewing stitch patterns (incl. alphabets)	1306	837	680	**?**	--
Alphabets / characters	8 / 798	6 / 545	5 / 439	5 / 439	--
Number of buttonhole types (incl. eyelets)	16	14	12	12	--
Button sewing-on program	1	1	1	1	--
Number of utility stitch patterns	32	30	29		--
Number of decorative stitch patterns	460	250	200		--
Embroidery design packages					
Alphabets	8	7	4	4	8
Number of embroidery motifs included	275	250	50	50	275

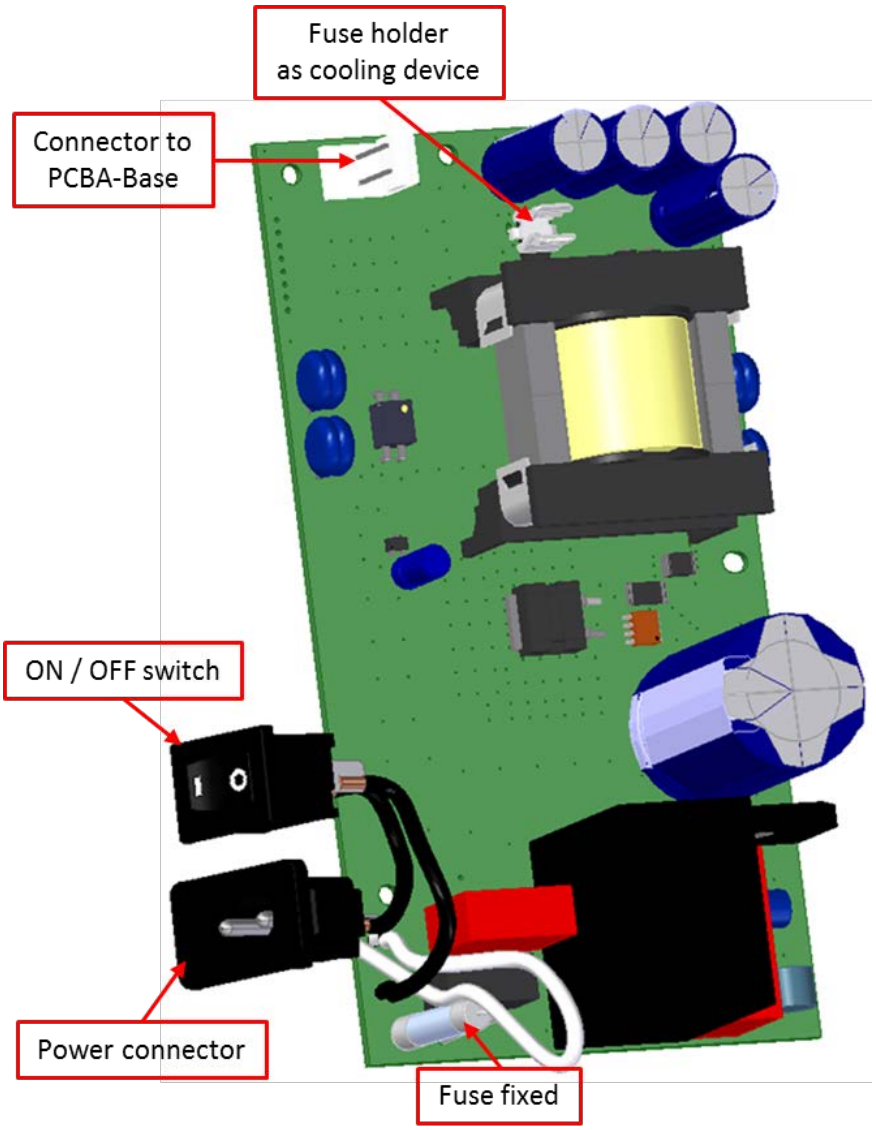
Chapter 2 – Electronics and Wiring

Plug diagram and brief descriptions of electronic components

2.1 BERNINA B 590 (B 570 QE, B 535, B 520 & B 500 Embroidery Only) Block Diagram



2.2 PCBA-Power



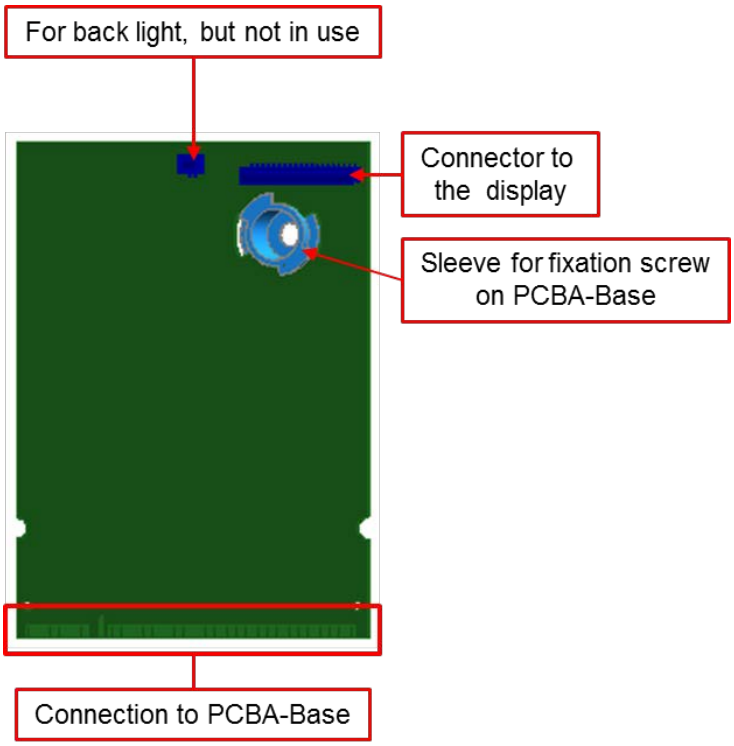
2.3 PCBA-CPU-Module (ARM9) General Information

The PCBA--CPU-module contains:

- Processor (CPU)
- Memory
- Data

PCBA-CPU-Module sits on base PCBA. When replacing base PCBA remove PCBA-CPU-module from the 'old' PCBA and add to new base PCBA.

2.3.1 PCBA-CPU-Module/ARM9



Note:
If a PCBA-CPU-module requires early replacement, please refer to chapter 8.3.

2.4 PCBA-Base General Information

The PCBA-Base contains:

- EEPROM (storing of machine-specific data, e.g. stitch counter and operating hours counter)
- 5-volt and 36-volt voltage control LEDs
- PCBA-CPU-module interface
- FHS light barrier
- Speaker
- Stepping motors drivers

Internal connections:

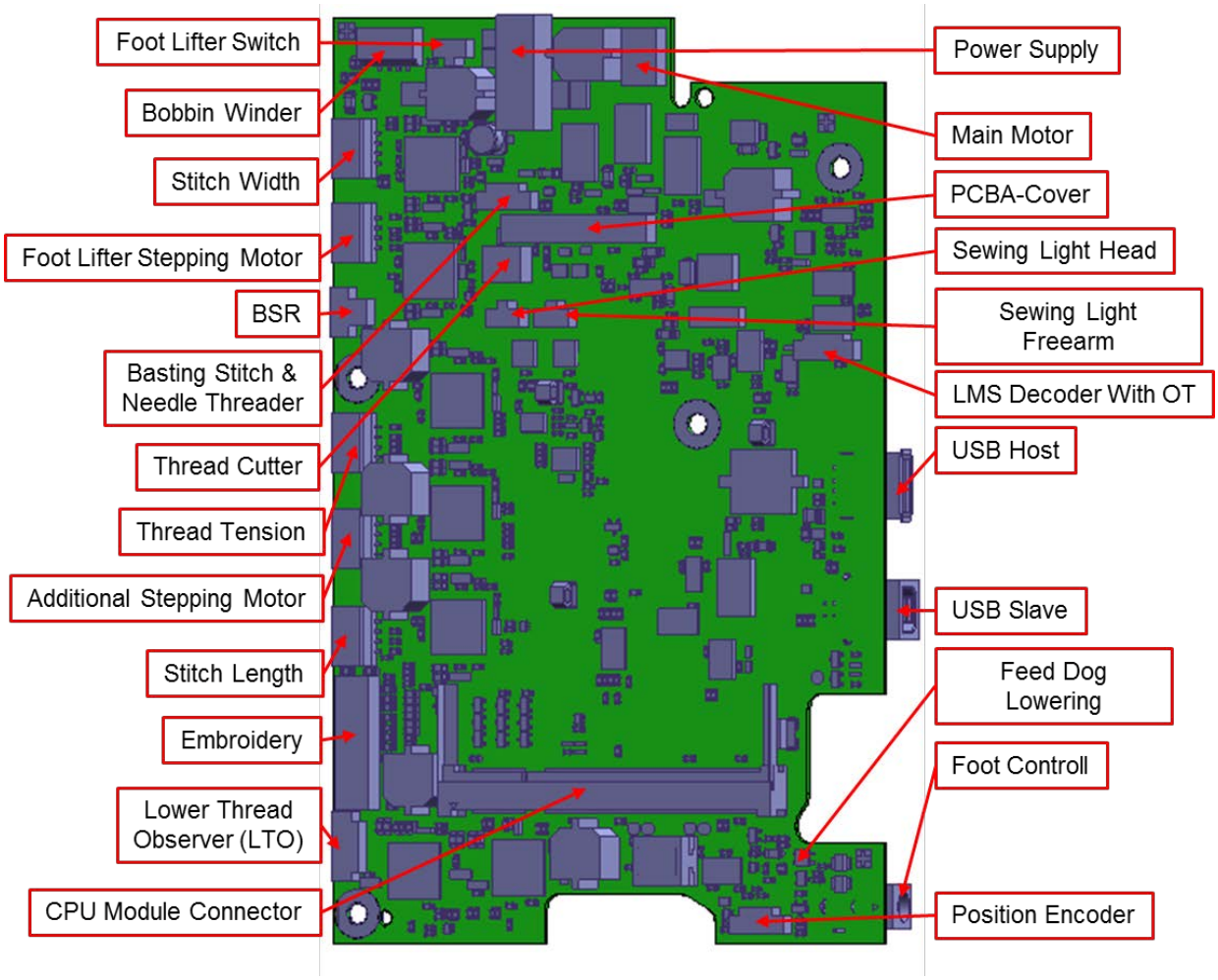
- According to table

External connections:

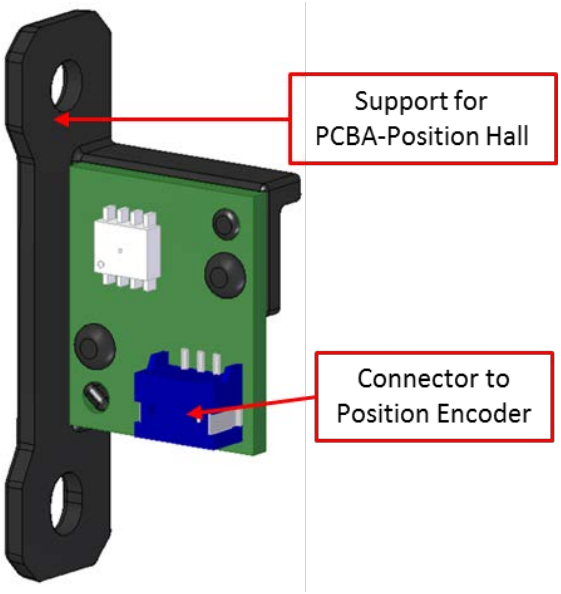
- USB connections for PC and USB stick
- Foot control connection

Important!
When replacing the PCBA-Base, remove the EEPROM from the old PCBA and directly fit it on the new PCBA.
Do not remove or plug in any connections when the sewing computer is switched on or connected to the power supply.

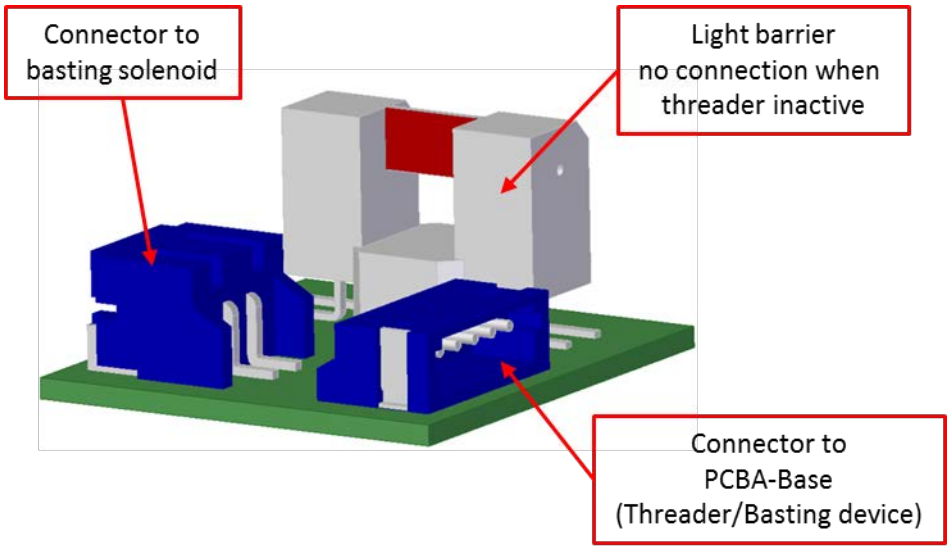
2.4.1 PCBA-Base with feed-dog drop detection



2.5 PCBA-Position Hall

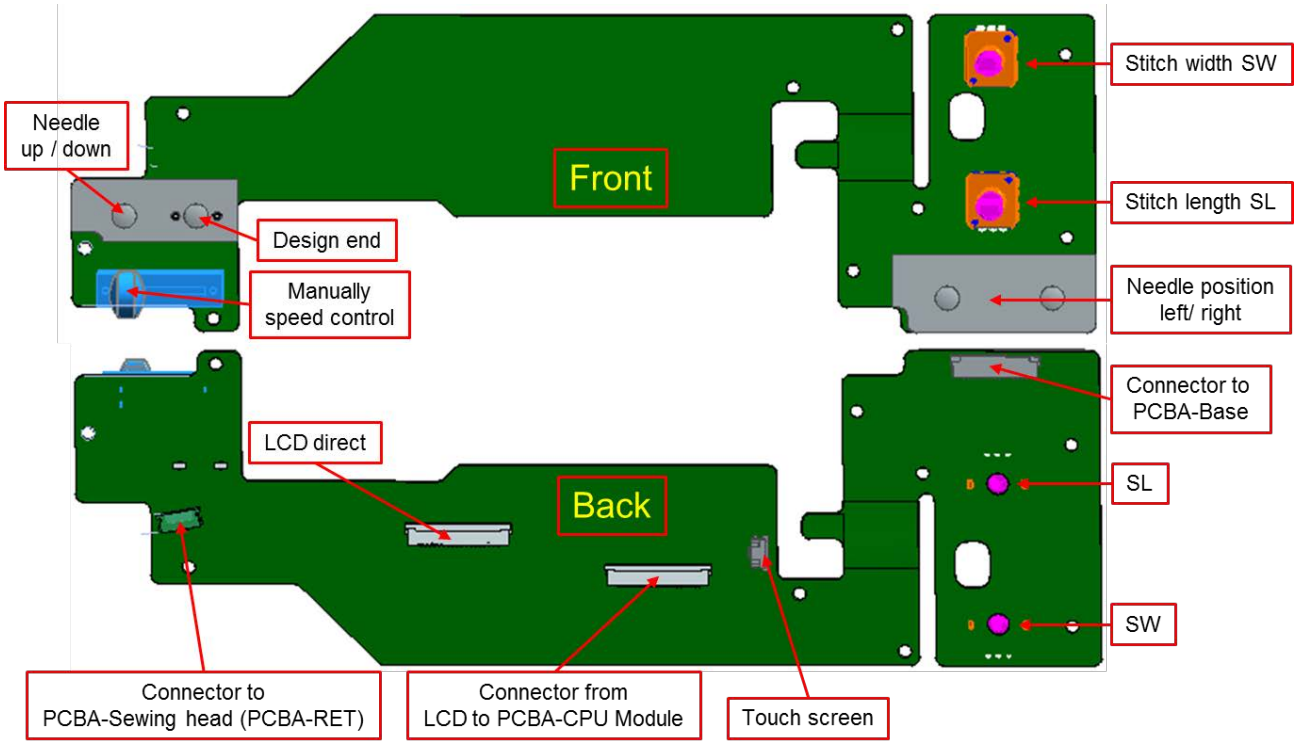


2.6 PCBA-Threader

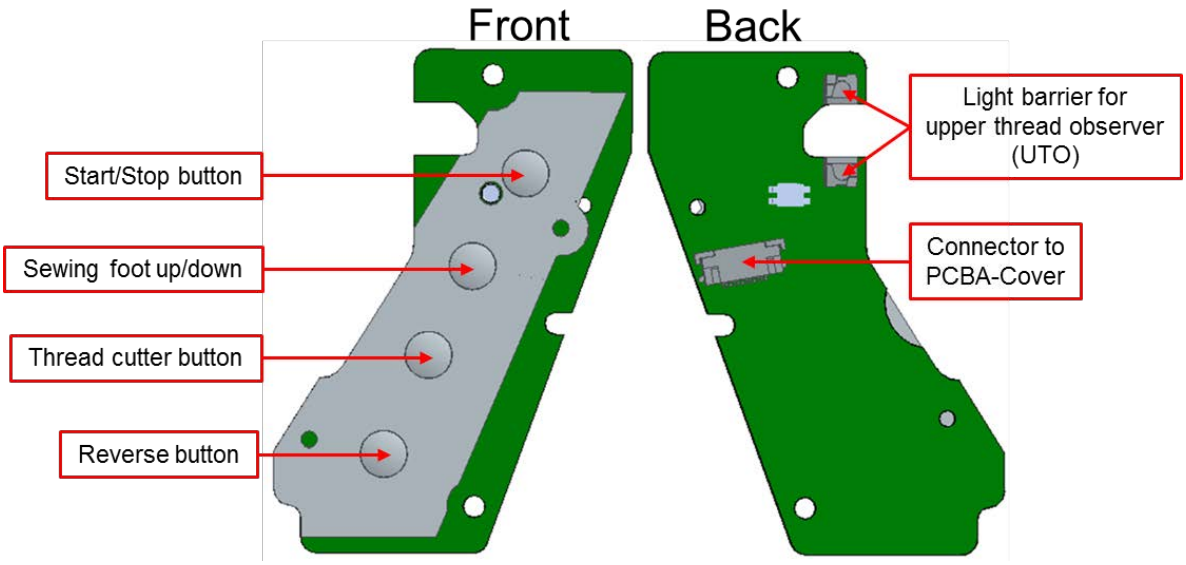


2.7 PCBA-Cover including display and touch screen

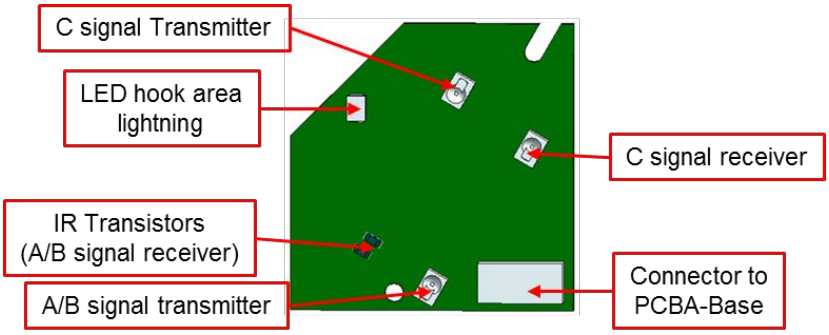
2.7.1 PCBA-Front cover (B 590, B 570 QE, B 540, B 535 & B 500 Embroidery Only)



2.7.2 PCBA-Stitching head (PCBA-RET) (B 590, B 570 QE, B 540, B 535 & B 500 Embroidery Only)



2.8 PCBA-Lower-Thread Observer (LTO)



2.9 ABC sensor support (presser-foot recognition)

The ABC sensors support contains:

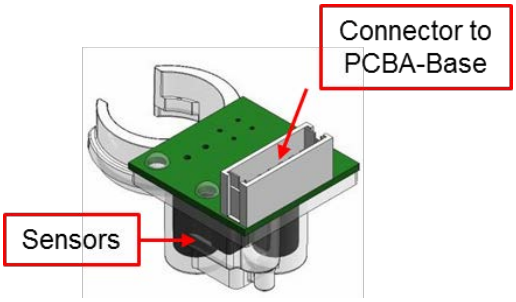
- Infrared (IR) LEDs
- Phototransistors

Connecting

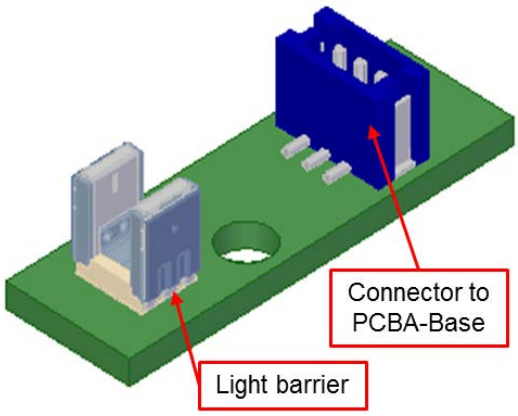
- According to picture

Task

- Recognition of presser feet and buttonhole foot signal via sensors.



2.10 PCBA Embroidery module detection (B 590, B 570 B 540 B 535)



2.11 Handling of Electronic Components

Observe ESD-related notes (see 1.3)!

2.12.1 Returning Defective Electronic Components.

For everybody's safety sake, defective electronic components must be treated like new items.
Only (original) ESD protective packaging must be used when forwarding components.
Check if the EEPROM and the PCBA-CPU module had been removed before forwarding the PCBA-base.
Enclose the filled-in repair form in the packaging.

Electrostatic Discharge (ESD)

2.11.2 Repairs of Electronic Components (PCBA's)

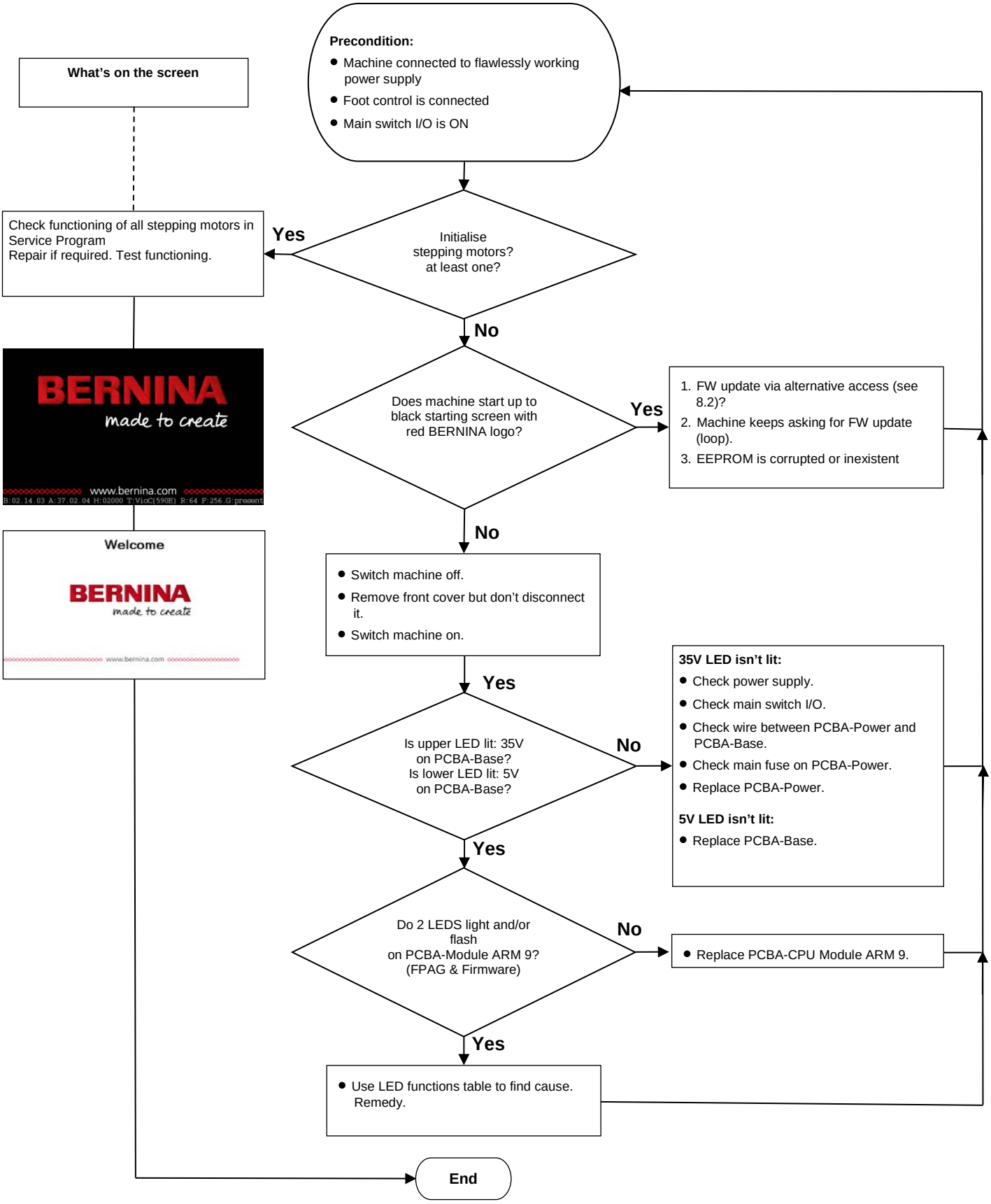
BERNINA International AG offers repaired and tested replacement of almost all electronic components.
Replacement electronics can be identified by article number.
For example:
Article number of returned PCB xxxxxx.**30.01** (to be replaced) / Article number of new PCB xxxxxx**.70.01**

For product liability and safety reasons it is prohibited to repair electronic components by oneself or to have electronic components repaired by third parties.

Electronic components that have been manipulated or repaired by oneself are excluded from the repair-/replacement process. They will be disposed of.
Bernina International AG reserves the right to charge the original price (of the new component) for electronic components that have been manipulated, repaired by oneself or improperly packaged.

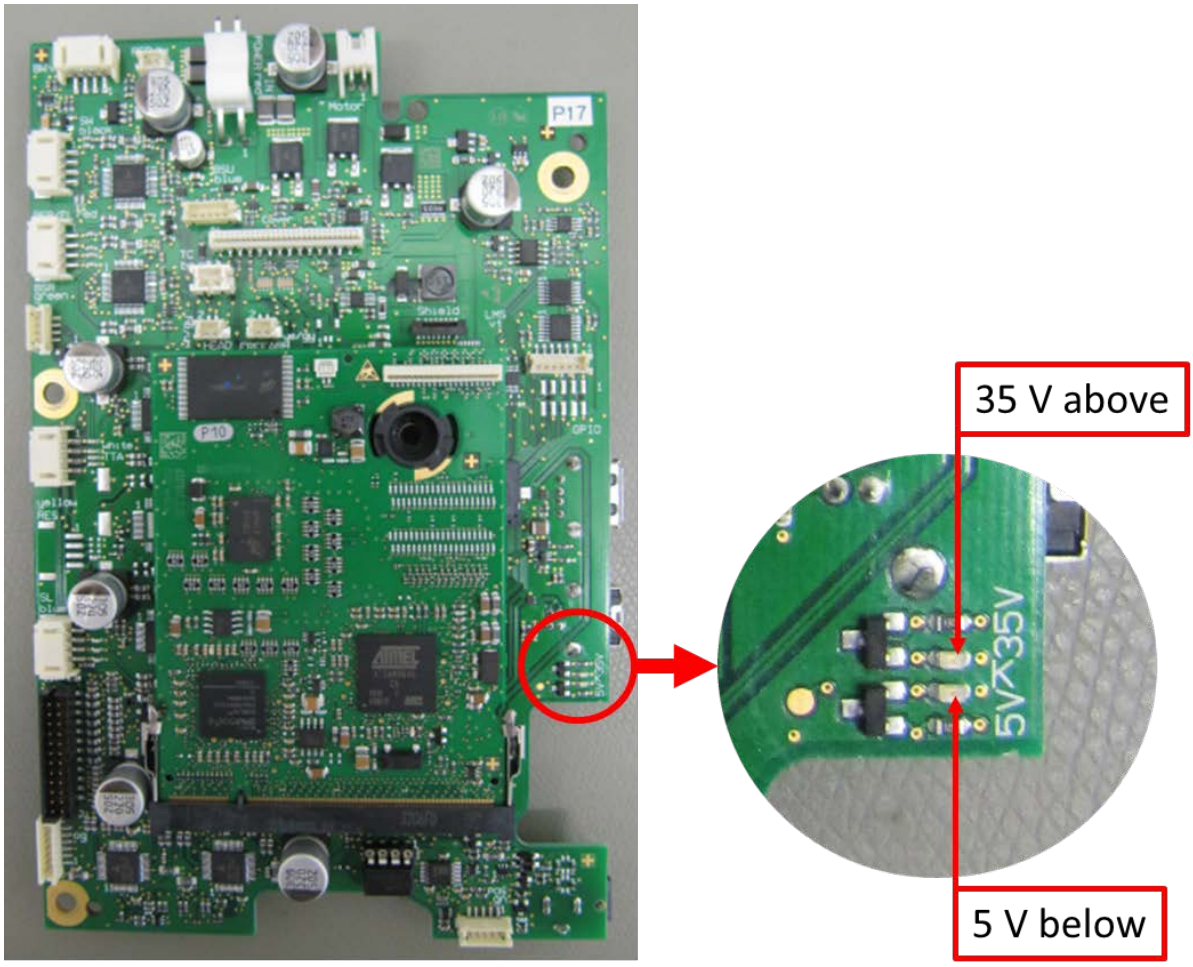
Chapter 3 - Troubleshooting

3.1 General troubleshooting flow chart



3.2 Operating Voltage Functional Test

PCBA-Base voltages are displayed on the PCBA-Base via LEDs.



3.2.1 Use and functions of LEDs

What to test:	Upper LED 35V	Lower LED 5V
Target state:	lit	lit
Actual status:	not lit	not lit
Repair note:	• Check the wiring for deformation, tears or breaks. Replace if necessary. • Check the connectors for deformations. Replace if necessary. • Check PCBA-Power functioning. Replace if necessary. • Replace PCBA-Base.	• Replace PCBA-Base since this 5V are generated directly on the PCBA-Base.

Check:	**LED 3 / FPGA** **F**ield **P**rogrammable **G**ate **A**rray -	**LED 4 / CPU** **C**entral **P**rocessing **U**nit (Zentrale Prozessor Einheit)
Target state:	**flashes = ok - firmware has been saved**	**Flashes long-short = ok - processor is working**
Actual status:	**does not flash = firmware is not loaded or recognized**	**not lit = processor does not work**
Repair note:	• Reload firmware via alternative access • Replace PCBA-Power. • Replace PCBA-Base. • Replace PCBA-CPU-Module	• Check LED 1-2 • Replace PCBA-Power. • Replace PCBA-Base. • Replace PCBA-CPU-Module

3.3 Upper-thread sensor

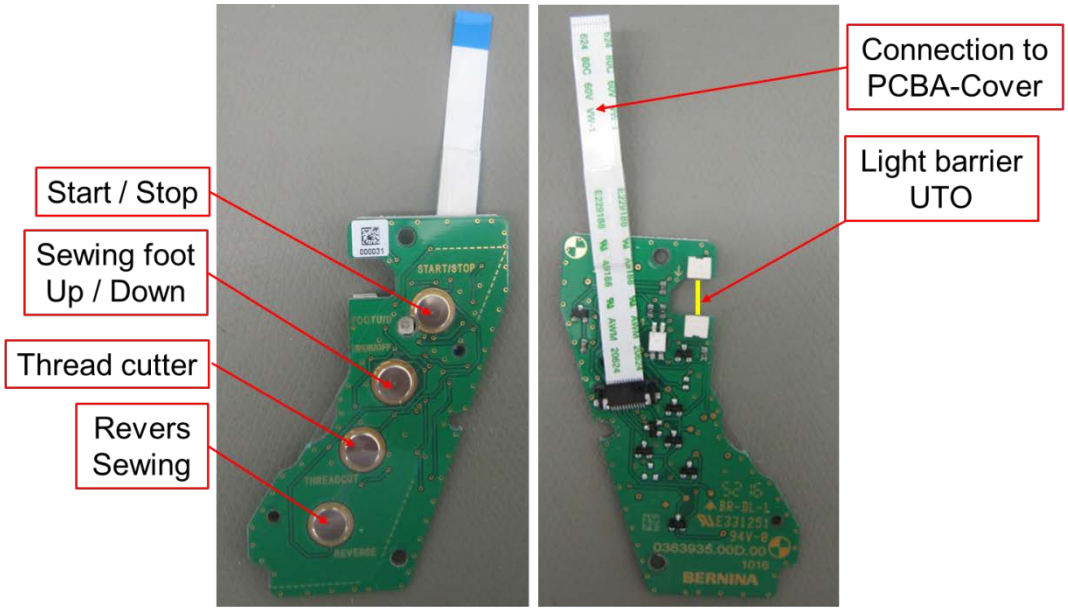
Issue:
Machine stops on its own while stitching. Upper-thread breakage message appears.
But the thread is not broken.

Possible sources:

- Regulator spring is not connected with actuating lug. Therefore the actuating lug remains idle, and the error message appears.
- Faulty upper-thread sensor signal.

Solution:

- The signal can be tested in Service Program Test 4f (upper-thread sensor).
- Hook spring to actuating lug.
- Check regulator spring position and unwinding force (see 5.11)
- Replace PCBA-Stitching head (RET) (see 4.2.8).



3.4 Lower-thread sensor

Issue:
Machine stops on its own while stitching. Lower-thread breakage message appears.
But the thread is not broken.

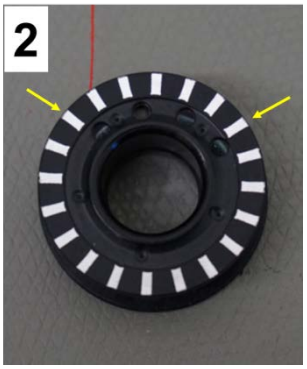
Possible sources:

- Brake spring is not properly inserted in bobbin carrier. A filled bobbin should pop out of the bobbin carrier by a bobbin's side wall width.

Solution:
Insert new brake spring, making sure
That the bobbin carrier isn't damaged
or deformed (picture 1).

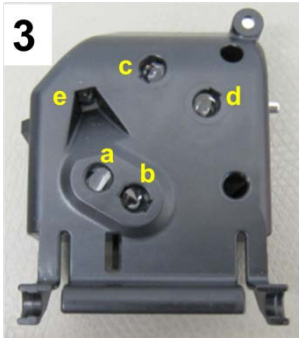
- The reflectors on the bobbin border are worn, and the lower-thread sensor doesn't recognize movements anymore.

Solution:
Replace with new bobbin (picture 2).



- Faulty lower-thread sensor signal.

Solution:
The signal can be tested in Service Program Test 3c
(lower-thread sensor).
(Picture 3). Replace lower-thread sensor if necessary.



a) A/B signal receiver
b) A/B signal sender
c) C signal sender
d) C signal receiver
e) Hook area lighting LED

Note:
With the 5 Series (VIO), it isn't possible to wind
the lower thread wrongly or insert the
bobbin into the bobbin case
the wrong way It works the same as with the 7 Series.

3.5 Touch screen calibration

Since the 5 Series (VIO) comes with a capacitive touch screen, calibration doesn't apply.

3.6 EEPROM missing or misprogrammed

Issue:
Machine starts up until briefly before the welcome screen would appear. 'User update' mode appears instead of Welcome screen, and asks for an update. The stepping motors don't initialise, and the machine cannot be operated at all. The machine cannot be started in Service Program.

Possible sources:

- When replacing the PCBA-Base the EEPROM might not have been moved to the new PCBA-Base, or the EEPROM is faulty for some reason.

Solution:
Connect new EEPROM and recalibrate machine according to table.

Calibration	5 Series
Enter series number as prompted	**Already done**
Upper-thread tension unit	**X**
Presser-foot height light barrier (micro switch)	**X**
Start/Stop Unit (SSU)	**X**
Button length measuring system (buttonhole calibration)	**X**
Electronic balance calibration	**X**

- The EEPROM was plugged in the wrong way (turned by 180°), causing a shortcircuit which might also have destroyed the PCBA-Base.

Solution:
Attach EEPROM the correct way as described in the Service Manual. Replace EEPROM and PCBA-Base if necessary.

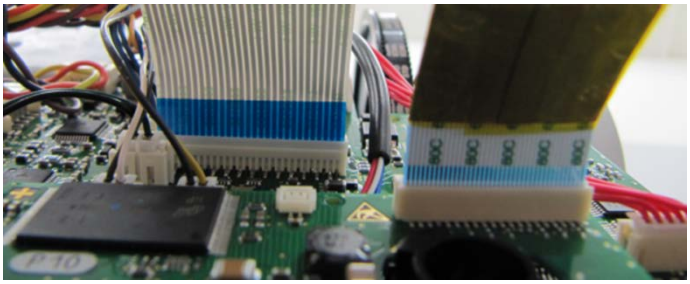
3.7 Machine doesn't start after repair

Issue:
Machine doesn't start anymore after work has been done on machine.

Possible sources:

- Ribbon cable has been fitted the wrong way. Connection between the PCBAs is therefore uncertain.

Solution:
Fit ribbon cable properly (see picture).



Note:
The wide ribbon cable supplying the front cover and its functions is plugged with the blue stabilizing film downward. In this way the contacts of the ribbon cable can be checked. This also applies for the very narrow, EMV-properties-enhancing ribbon cable. View from below

Exceptions in the 5 Series (VIO):
The narrow, touchscreen-supplying ribbon cable has the blue stabilizing film at the top.

3.8 Update failed

Issue:
Updating the machine has failed and update cannot be executed.
A new firmware version might be required for various reasons.

Case 1: Bootloader out of date:
Typically occurs with machines from early production, or when several updates have been skipped.

1. Start normal customer updating process.
2. After rebooting, the black screen with the red BERNINA logo stays, or keeps reappearing.
3. Switch machine off. Connect USB stick containing the relevant firmware for machine. Load firmware from USB stick (see 8.2).
4. Update can be fully loaded in this way. If an older firmware version is on the machine, it is recommended (for safety reasons) to install the bootloader (xbxxxxxx.B5xxx.bin) first, and only then the application and data. This means that only the bootloader is loaded on a FAT32 formated data stick and then installed on the machine. After that, fully update the machine.
5. Rebooting the machine after updating via alternative access (USB stick) must always be carried out manually: **OFF/ON**.

Important! Updating via alternative access deletes all customer data!

Case 2: EEPROM needs replacing
The EEPROM **doesn't work** for unknown reasons, and must be replaced. The machine will ask for a firmware in any case.

1. Machine is switched off.
2. Connect USB data stick containing the relevant firmware for machine.
3. Switch machine on. Firmware updating process starts automatically.
4. Reboot manually.
5. Start machine in Service Program. Carry out the required calibrations:

Calibration	5 Series
Enter series number as prompted	**Already done**
Upper-thread tension unit	**X**
Presser-foot height light barrier (micro switch)	**X**
Start/Stop Unit (SSU)	**X**
Button length measuring system (buttonhole calibration)	**X**
Electronic balance calibration	**X**

Case 3: Replacing a PCBA-Base
The EEPROM has been removed from faulty PCBA-Base and attached to the new one.

1. Machine is switched off.
2. Connect USB data stick containing the relevant firmware for machine.
3. Switch machine on. Firmware updating process starts automatically.
4. Reboot manually.
5. The use of the previous EEPROM makes recalibration unnecessary since all relevant data is saved on it. Checking the data in Service Program, however, is strongly recommended.

Case 4: EEPROM has been replaced, but the loaded machine recognition is wrong.
For unknown reasons, the EEPROM used has already machine recognition, but it is unknown.
The EEPROM counts as 'master'. In this case, the EEPROM must be replaced with a new one, as in **Case 2**.

After updating it, start machine in Service Program. Carry out the required calibrations:

Calibration	5 Series
Enter series number as prompted	**Already done**
Upper-thread tension unit	**X**
Presser-foot height light barrier (micro switch)	**X**
Start/Stop Unit (SSU)	**X**
Button length measuring system (buttonhole calibration)	**X**
Electronic balance calibration	**X**

Note:
When using a blank EEPROM, always carry out the calibrations described above.

Case 5: PCBA-CPU-Module is used in a machine for testing reasons, then put back in stock. When used the next time, it contains the wrong firmware.

1. After installing the new PCBA-CPU-Module and switching on the machine, a new firmware is asked for.
2. Switch machine off.
3. Connect USB data stick containing the relevant firmware for machine.
4. Switch machine on. Firmware updating process starts automatically.
5. Reboot machine manually after ‘successful updating’ message has appeared.

3.9 Sewing-off guidelines

Sewing-off is a way of checking the properly set machine.

Requirement:

- Properly set machine according to the respective Service- and Maintenance Manual.
- Increased wear and tear of parts could cause deviations. Such parts must be replaced.
- All criteria have to be met without changing the balance. If deviations occur, adjust the balance according to the respective Service- and Maintenance Manual.

The following materials meet the sewing-off guidelines, and are therefore recommended for use when sewing-off.

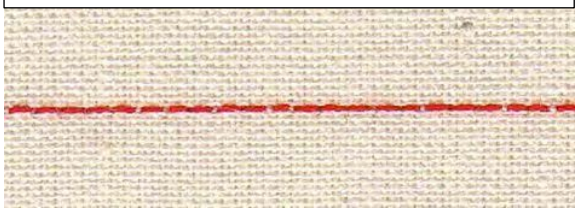
Sewing-off fabric: Cretonne 100% cotton, warp = 17, weft = 18 threads /¼ square inch, thread 20/20 2-ply.
Needle thread: Amann / Mettler Seralon / Metrosene Plus, 100% Polyester, No. 100 red.
Bobbin thread: Amann / Mettler Seralon / Metrosene Plus, 100% Polyester, No. 100 white.

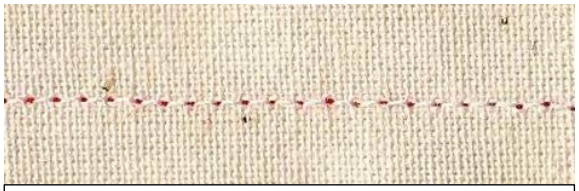
If other fabrics and/or threads are used, especially of a different quality, the stitching result may deviate from the default pattern.

The following stitch and pattern formations must be checked in this order and according to the respective criteria:

3.9.1 Straightstitch (default settings)

Needle-thread stitching target state





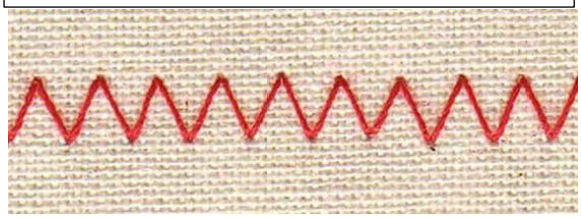
Bobbin-thread stitching target state

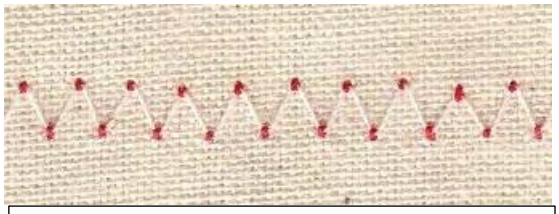
Criteria

- Does the thread-regulator spring move properly?
- Is the row of stitching straight?
- Is the stitch formation on both sides of the fabric regular?
- Do the threads interlock in the middle of the fabric?
- Is the seam free of skipped stitches?

3.9.2 Zigzag stitch (default settings)

Needle-thread stitching target state





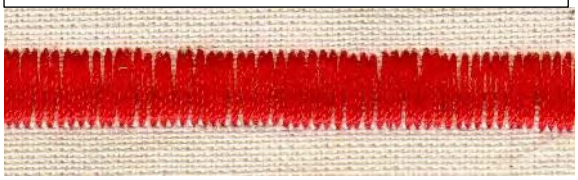
Bobbin-thread stitching target state

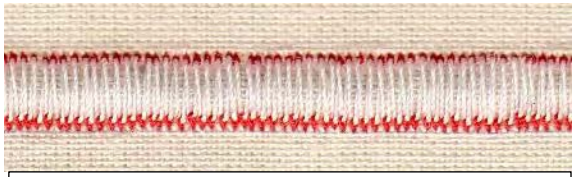
Criteria

- Is the stitch formation symmetrical?
- Is the stitch formation on both sides of the fabric regular?
- Does the bobbin thread show on the right side of the fabric? It shouldn't.
- Do the threads interlock in the middle or on the wrong side of the fabric?
- Is the interlocking of the needle thread and bobbin thread on the wrong side of the fabric regular?
- Does no puckering occur?
- Is the seam free of skipped stitches?

3.9.3 Satinstitching (stitch width 5.0, stitch length 0.4)

Needle-thread stitching target state





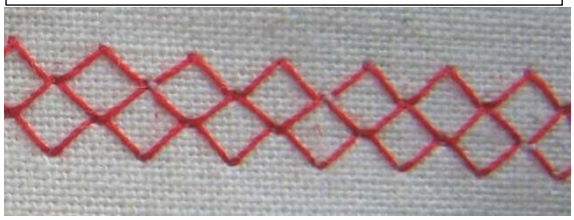
Bobbin-thread stitching target state

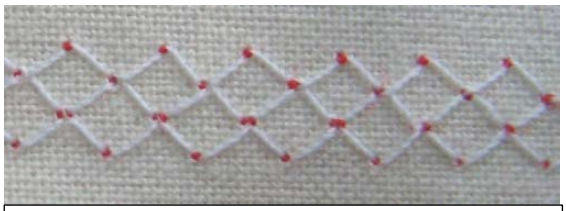
Criteria

- Is the stitch formation symmetrical?
- Is the stitch formation on both sides of the fabric regular?
- Does the bobbin thread show on the right side of the fabric? It shouldn't.
- Do the threads interlock in the middle or on the wrong side of the fabric?
- Is the interlocking of the needle thread and bobbin thread on the wrong side of the fabric regular?
- Does no puckering occur?
- Is the seam free of skipped stitches?

3.9.4 Honeycomb stitch (default settings)

Needle-thread stitching target state





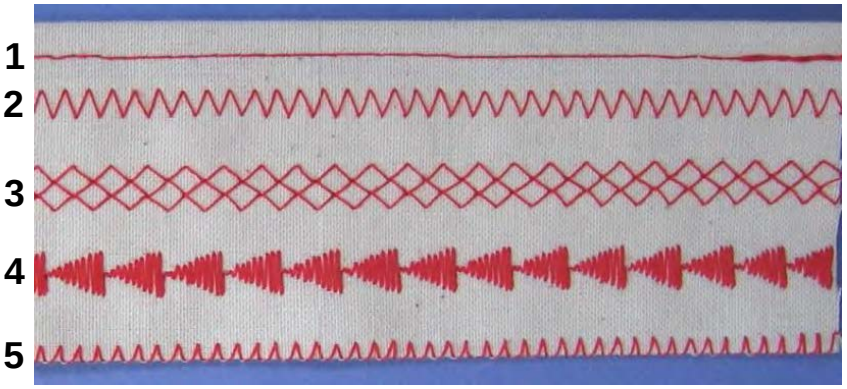
Bobbin-thread stitching target state

Criteria

- Is the stitch formation symmetrical?
- Is the stitch formation on both sides of the fabric regular?
- Does the bobbin thread show on the right side of the fabric? It shouldn't.
- Do the threads interlock in the middle or on the wrong side of the fabric?
- Is the interlocking of the needle thread and bobbin thread on the wrong side of the fabric regular?
- Does no puckering occur?
- Is the seam free of skipped stitches?
- Is the stitch pattern closed without adjusting the balance?

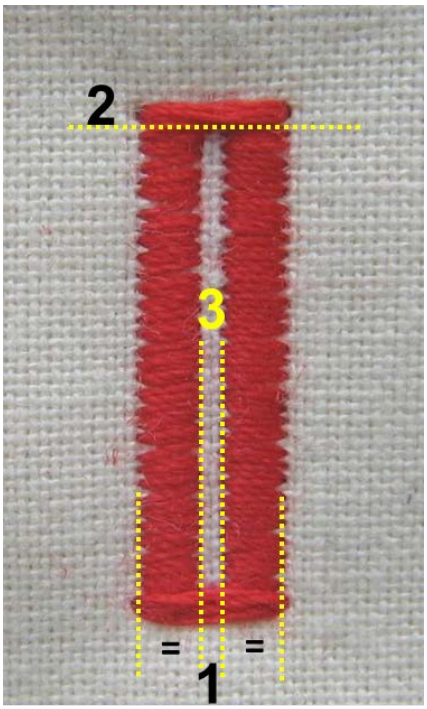
3.9.5 Customer sample

A stitching out sample as to be included with each repaired machine. The sample for the customer must be the technicians business card! It makes sense to include the following stitch patterns (1-5) in the sample. It is absolutely compulsory to include stitch patterns or applications the customer complained about in the sample for the customer or on the material the customer provided.



1. Straightstitch	(**1**)	default settings
2. Zigzagstitch	(**2**)	default settings
3. Honeycomb stitch or leaf pattern	(**8**)	default settings
4. Decorative stitch	(**401**)	in max. stitch width
5. Neatening of fabric edge with zigzag	(**2**)	stitch width 3.0 stitch length 1.0

3.9.6 Standard buttonhole (default settings, max. length 20.0 mm)



If the customer complained about the buttonhole, sew it using the buttonhole foot with slide 3A which came with the machine.

What the buttonhole must look like:

1. Both beads must be the same width and run parallel.
2. Both beads must be the same length.
3. The slit width must be sufficiently wide for cutting a slit between the beads without damaging the beads.

Criteria

- Is the buttonhole foot **3A** calibrated correctly (see SP 6c)
- Does the bobbin thread show on the right side of the fabric? It shouldn't.
- Does no puckering occur? (With thin fabrics, a stabilizer must be used).
- Is the seam free of skipped stitches?

3.10 Personal notes regarding troubleshooting

Chapter 4 – Removal and Refitting of Components

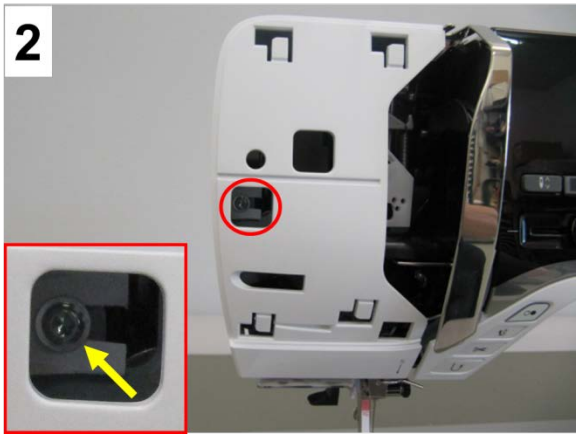
4.1 Covers

See ESD-related note

4.1.1 Service Cover

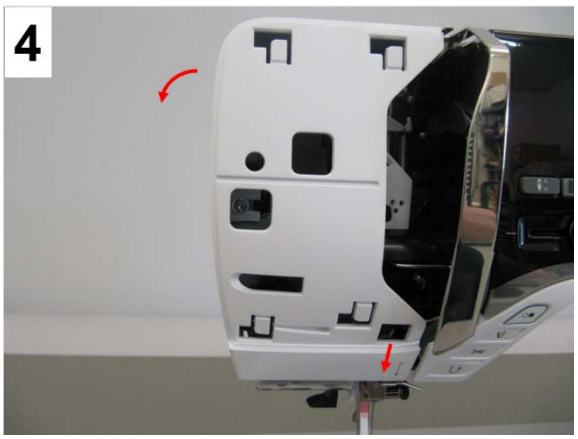
Disassembly:

- **Picture 1** - Slide service cover to left to remove.
- **Picture 2** - Untighten fastening screw (T10) in head area by 2 to 4 rotations.
- **Picture 3** - Remove fastening screw in thread-redirection/pre-tensioner area on head cover.
- **Picture 4** - Carefully pull head cover to front and out, spreading it a little at the bottom right area.



Assembly:

- Carefully pull head cover over machine head. **IMPORTANT:** Doing this, take care of the spring locks, especially the latch in the head frame (pict in bottom left corner in pict 2).
- Firmly push head cover in place. Carefully retighten screw in head area (pict 2).
- Refit fastening screw in thread-redirection/pre-tensioner area and retighten carefully (pict 3).
- Insert service cover into respective openings, then slide to right (pict 1)



4.1.2 Front cover

Disassembly:

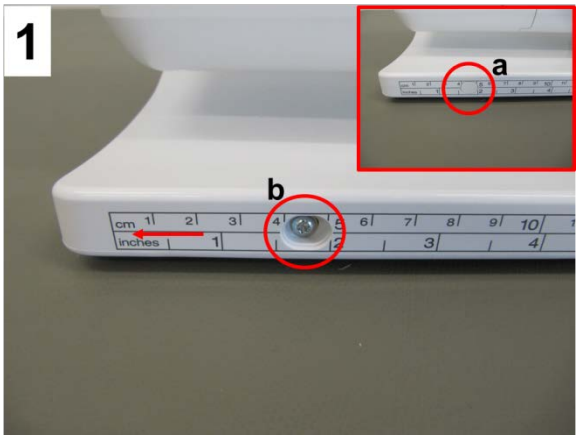
- **Picture 1 -** Remove left and right screw covers **a** from the base plate cover. Untighten fastening screws b (T10M3 X 8).

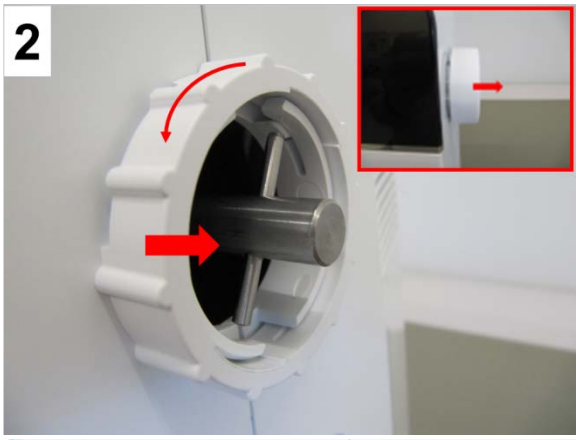
Note:
Move base plate cover to front as far as long holes allow. This makes it easier to remove and refit the front and rear covers.

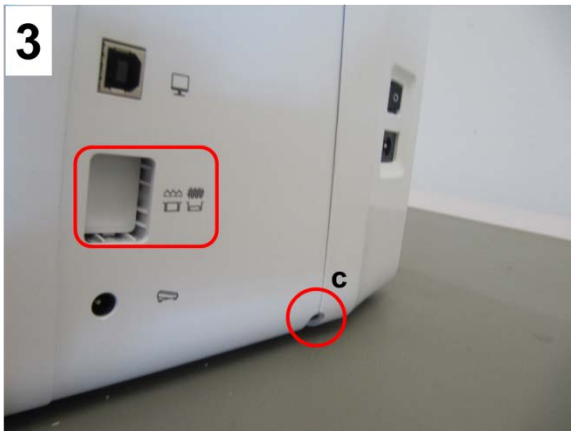
- **Picture 2** - Pull handwheel out. Remove locking ring via bayonet lock.
- **Picture3** - Remove fastening screw and washer **c** (T10 M3 X 10) at the very bottom of the machine - the one that holds front and rear cover together.

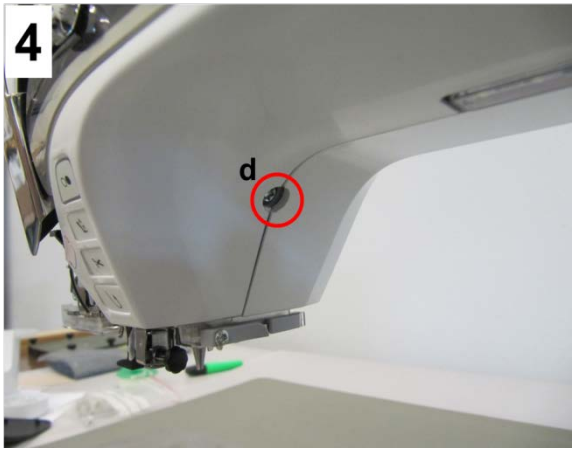
Note:
Engage feed-dog drop in order to ease removal of the front cover.
(red frame in pict 3)

- **Picture 4** - Using a Allen key T20, **slightly untighten** fastening screw **d** on stitching head - the screw that holds the front cover and rear cover together.
- **Picture 5 -** Remove slide-on table anchoring screw **e** (T15).

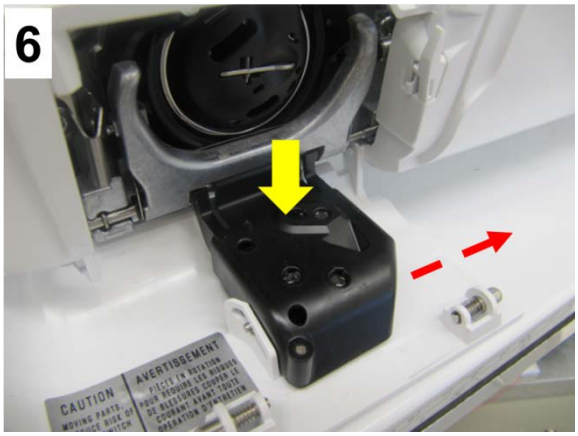


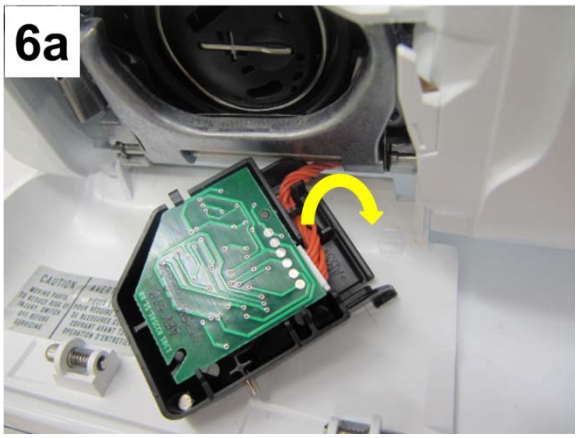


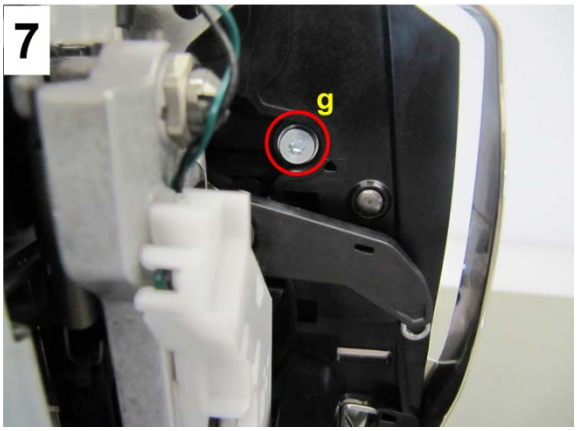


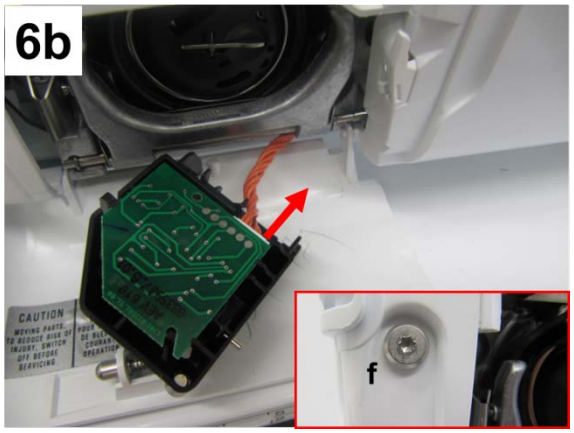


- **Pictures 6, 6a, 6b** - Open bobbin door. Remove lower-thread sensor.
- **Picture bottom right in picture 6b** - Remove fastening screw (T10) **f** left of the bobbin door.
- **Picture 7 -** Untighten fastening screw **g** (T10) next to thread take-up by 2 to 3 rotations.





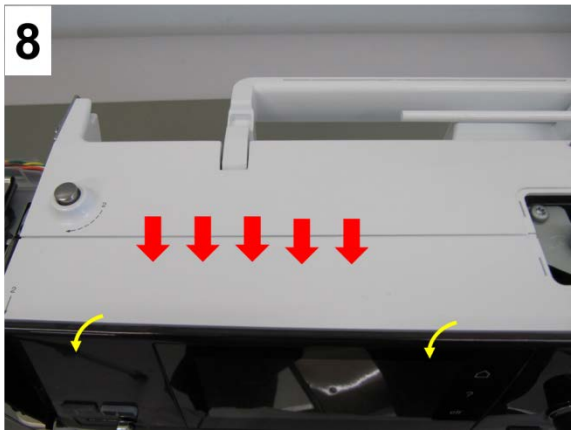


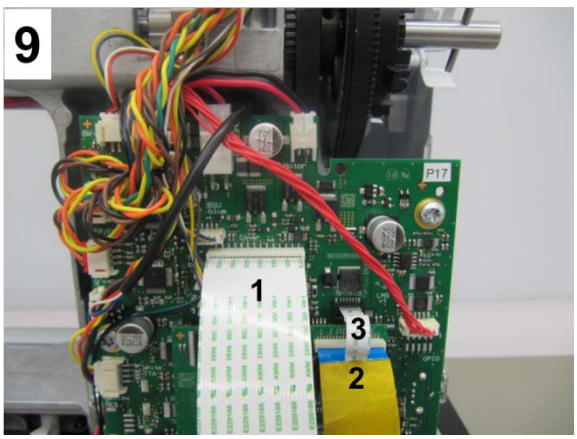


- **Picture 8** - Approximately in the centre of the frame arm, press the front cover to open the spring locks. Pull cover to front and out.

Attention:
Um die USB Stecker nicht von der LPB-Basis abzureissen muss das Verdeck vorne zuerst am Freiarm ausgehängt werden.

- **Picture 9** - Unplug all power-supplying ribbon cables connecting the touchscreen and PCBA-Front cover **1**, display **2**, and EMV **3**.





Note:
It is **not** necessary to remove the winder cover beforehand. When refitting the covers, it'll be refit last.

Assembly:

- **Picture 9** - Replug all power-supplying ribbon cables connecting the touchscreen and PCBA-Front cover **1**, display **2**, and EMV **3**.
- **Picture 10** - Reposition front cover properly, hooking the spring locks into the rear cover. Take care to properly hook in the front cover at screw **g** (see pict. 7) and the lug at fastening screw **d** (see pict. 4).
- Retighten screws **g** and **d**.

Important!
The front cover lug for screw **c must lie over** the rear cover lug. It is necessary to use a washer along with screw **c**! Retighten screw and washer.

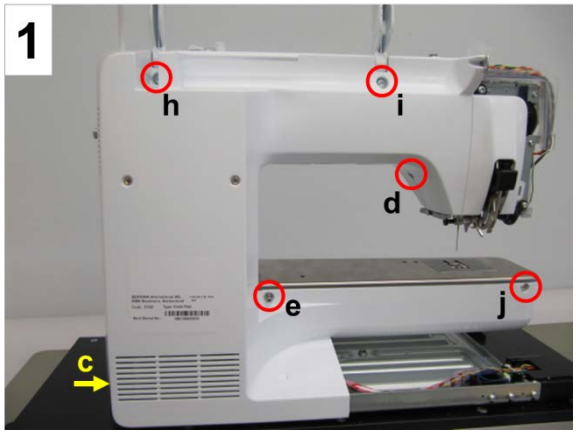
- Picture 3 - **Use a washer** along with the front- and rear cover linking fastening screw **c** at the very bottom of the machine. Refit and retighten fastening screw and washer.
  Disengage feed-dog drop push button, and check if the button sits nicely in the cover opening.
- **Picture 5** - Refit and retighten slide-on table anchoring screw (T15) **e**.
- **Picture bottom right in picture 6b** - Refit and retighten fastening screw (T10) **f** left of the bobbin door.
- Refit lower-thread sensor as outlined in **pictures 6, 6a, and 6b**.

4.1.3 Rear Cover

Note:
Before removing the rear cover, it is better to remove the base-plate cover first (see 4.1.5).

Disassembly:

- Remove base plate cover (see 4.1.5).
- **Picture 1** - Remove fastening screw and washer **c** (T10 M3 X 10) at the very bottom of the machine - the one that holds the front cover and rear cover together.
- **Picture 1** - Using a Allen key **T20**, slightly **untighten** fastening screw **d** on stitching head - the screw that holds the front cover and rear cover together.
- **Picture 1** - Remove rear slide-on table anchoring screw (T15) **e**.
- **Picture 1** - Remove fastening screws **h, i** and **j** (T20 M4 X 10).



Note:
There are washers under screws **h** and i. Remember to **pull up the retractable spool pin** in order to be able to remove the rear cover (pict 2).

- Picture 2 - Pull rear cover into your direction to remove it.

Assembly:

- **Picture 2** - Refit rear cover.

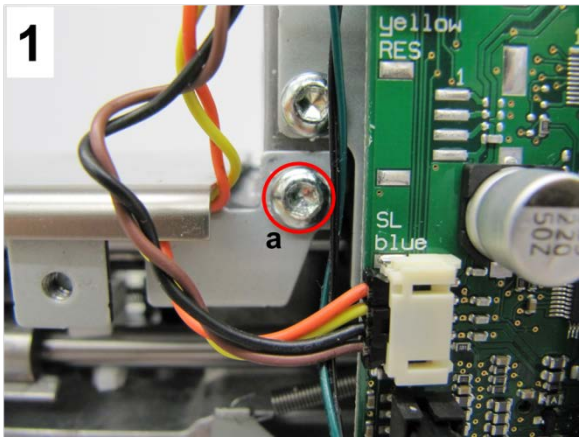
Important!
The rear cover lugs for fastening screws **c** and **d** must be **under the front cover lugs**.
Take care not to pinch the ABC sensors' harness (see 2.9).

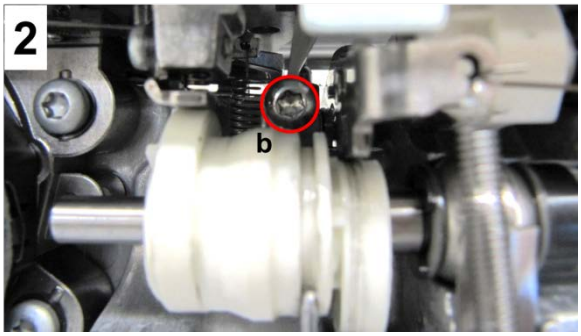
- **Picture 1** - Refit and retighten screws **j, i,** and **h** (T20).
- **Picture 1** - Refit and retighten rear slide-on table anchoring screw (T15) **e**.
- **Picture 1** - Retighten screw **d**.
- Picture 1 - Refit and retighten screw **c** incl. washer.

4.1.4 Freearm cover

Disassembly:

- Remove needle, presser foot, stitch plate, lower-thread sensor (see 4.2.9), and all covers (see 4.1).
- **Pictures 1 and 2** - Remove screws **a** and **b** (T20 M4 X 10).
- **Picture 3** - Remove screws **c** and **d** (T10 M3 X 8).
- **Picture 4** - Remove screw **e** (T20 M4 X 10).
- Lift off and remove freearm cover.

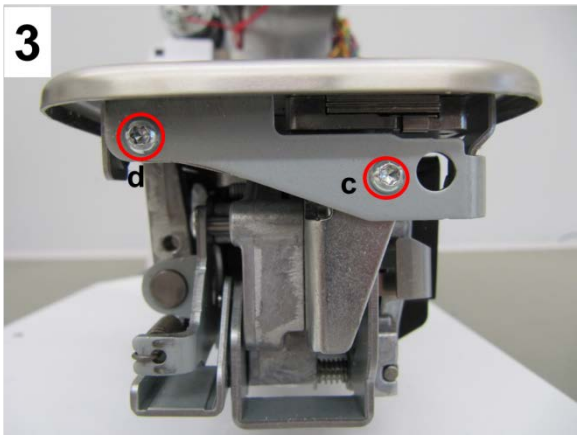




Assembly:

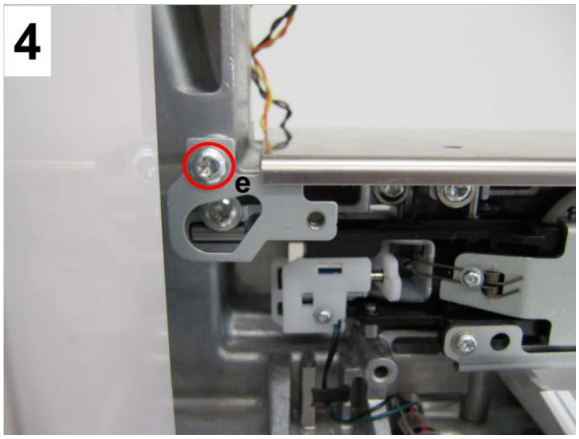
- Position freearm cover on freearm frame.
- Refit stitch plate.
- **Picture 3** - Refit and retighten screws **c** and **d**.

Note:
Take care to keep an **even clearance** between stitch plate and freearm cover.



- **Pictures 1 and 4** - Refit and retighten screws **a** and **d**.
- **Picture 2** - Refit and retighten screw **b**.
- Refit all the covers (see 4.1).

Important!
Take care not to interfere with the lower-thread sensor wires to avoid damaging them.

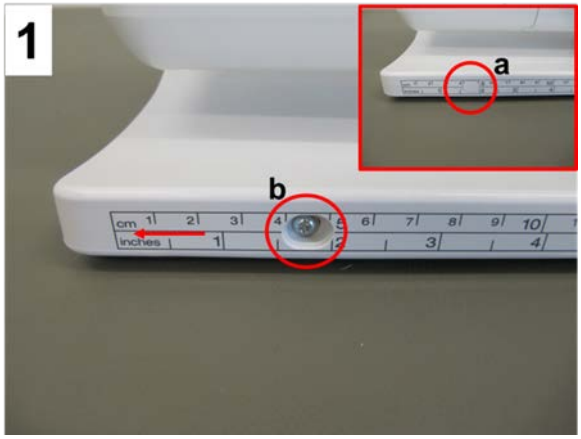


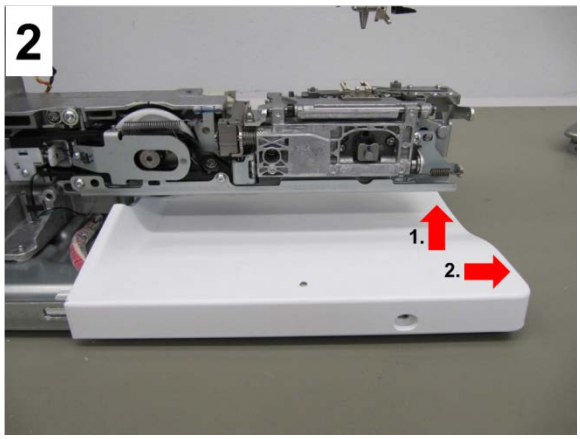
- Refit lower-thread sensor (see 4.2.9)

4.1.5 Base-plate cover

Disassembly:

- **Picture 1 -** Remove left and right screw covers **a** from the base plate cover. Remove fastening screws **b** (T10M3 X 8).
- **Picture 2 -** Lift base plate cover (**1.**), then pull off (**2.**).





Assembly:

- Carefully slide and position base-plate cover under freearm.
- Refit (but don't tighten them yet) fastening screws **b** (T10) on left and right.
- Only after refitting the rear cover and front cover, slide base-plate cover into final position and retighten fastening screws **b**. Refit the screw covers **a** into the left and right long hole.

4.2 Electronics, Sensors, Switches, Magnets

4.2.1 PCBA-Power including PCB housing

Remove power plug to disconnect machine from power supply!

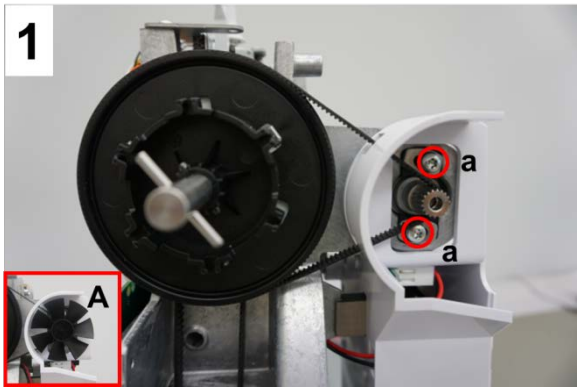
See ESD-related note

Note:
The power supply unit comes complete with housing 036759.70.00 and includes:

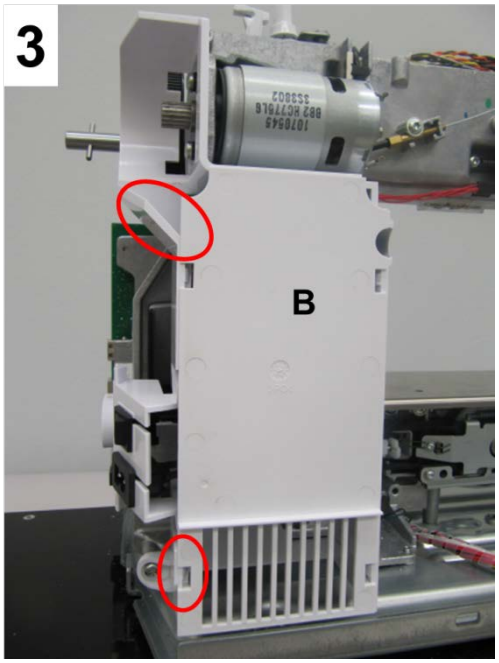
- PCBA-Power Supply 101956.70.00
- Power supply housing 036389.50.00
- Protective cover 036390.50.00
- PCBA-Base wire 100720.70.00
- Conductive fabric gasket 100784.50.00

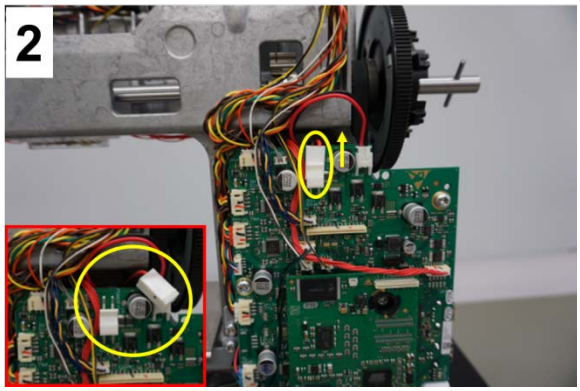
Disassembly:

- Remove the covers (see 4.1).
- **Picture 1** - Remove wheel **A** (see small pict bottom left). Remove fastening screw **a** (T20 M4X10) from main motor so that the drive belt can be removed.
- **Picture 2** - Unplug power supply unit and PCBA-Base connecting cable from PCBA-Base.
- **Picture 3** - In the yellow-circled areas, pull housing apart to unlock snap fits. Remove protective cover.

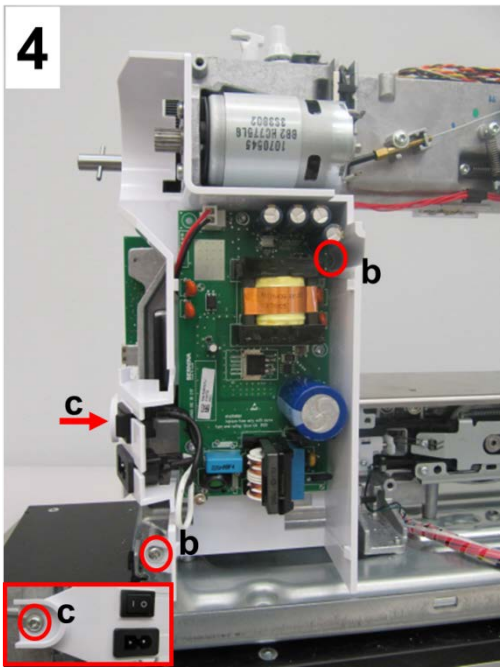


Note:
It is best to remove the protective cover while the housing is still fastened to the machine.





- **Picture 4** - Remove 2 fastening screws **b** (T20 M4X10).
- Remove shoulder screw **c**. Pull out the power supply unit housing along with PCBA-Power Supply Unit.
- **Picture 5** - Remove 3 fastening screws **d** (T10 M3X8) in order to remove PCBA-Power Supply Unit from the housing.

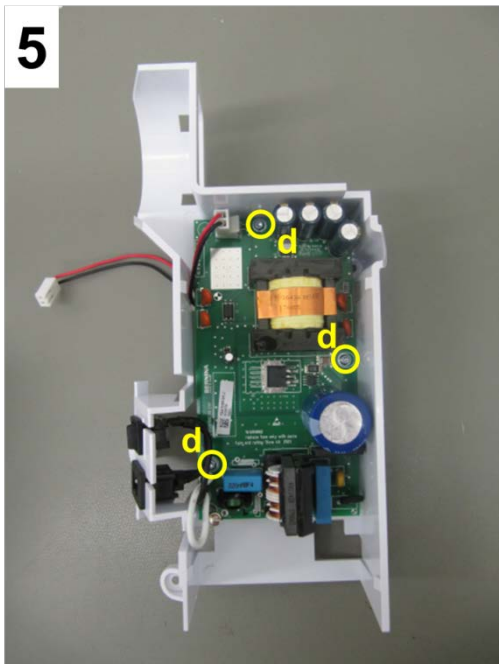


Note:
Since the power supply unit only comes complete with housing as a spare part, it doesn't really make sense to remove the PCBA Power Supply Unit from the housing. Plus, the primary current fuse is built-in and cannot be removed (or replaced).

Note:

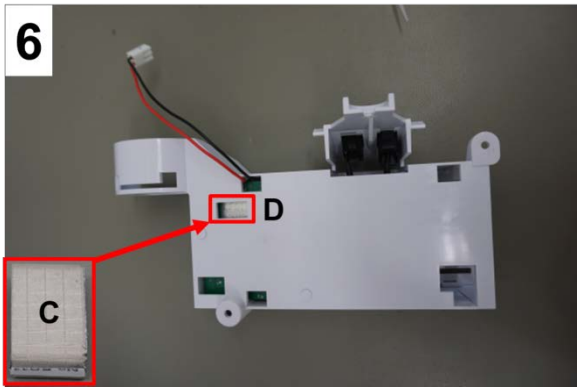
In order to improve EMC (Electromagnetic Compatibility), a conductive fabric gasket is supplied along with the power supply unit, complete as a replacement kit.

- **Picture 6** - Insert conductive fabric gasket C with sticky side down into opening D. Press slightly.



Assembly:

- **Picture 2** - Replug PCBA Power Supply Unit and PCBA-Base connecting power cable to PCBA-Base. If necessary, use round side of spring mounting tool 398112.03.0+ as an aid.
- Ensure that the conductive fabric gasket touches the frame.
- **Picture 4** - Attach power supply unit housing to the frame with screws **b** and **c**.
- **Picture 3** - Refit protective cover **B**.
- **Picture 1** - Thread drive belt into wheel cover and slide onto main motor pinion.
- **Picture 1** - Turn main motor in such way that the drive belt is **slightly** tensioned. Retighten the two screws **a**.
- **Picture 1** - Refit wheel, sliding it onto pinion.
- Refit the covers (see 4.1).

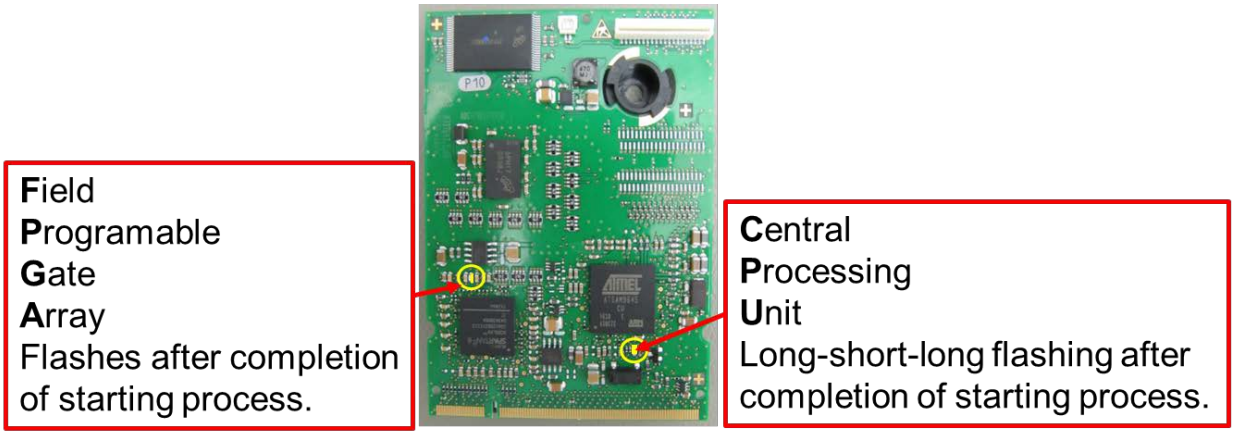


Note:
Test run the machine after refitting the front cover.

4.2.2 PCBA-CPU-Module (ARM9) General Information

The PCBA-CPU-Module (ARM9) is the heart of the machine. It is where the firmware for the operation of the machine is stored.

- PCBA-CPU-Module (ARM9I is the same for these models:
  - B880
  - 7 Series (all models)
  - 5 Series ((VIO) all models)
- PCBA-CPU-Module (ARM9) sits on a coupler strip on PCBA-Base.
- A PCBA-CPU-Module (ARM9) replacement - no matter whether new or repaired - contains only the bootloader, making it possible to load the required firmware for the respective model.
- Owing to the new, capacitive screen, the small wire which connects the PCBA-CPU-Module with the PCBA-Base for the backlighting is no longer needed. Since PCBA-CPU-Module is the same for B 880, 7 Series, and the 5 Series (VIO), the slot for the small backlighting wire is still there, but not on the PCBA-Base for the 5 Series (VIO).
- Note the LEDs on PCBA-CPU-Module (ARM9), see pict. below.

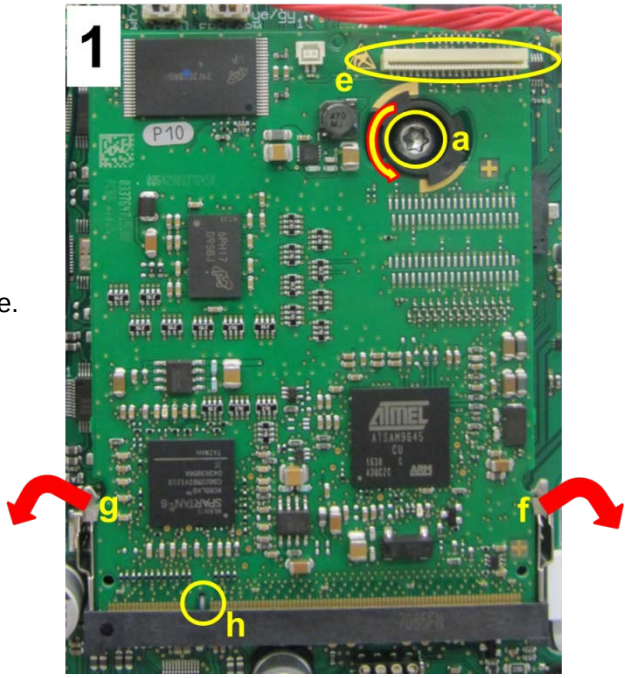


4.2.3 PCBA-CPU-Module (ARM9)

See ESD-related note

Disassembly:

- Remove the covers (see 4.1)
- **Picture 1 -** Screen wire is removed from slot **e**.
- **Picture 1 -** Remove screw **a**.
- **Picture 1 -** Pull latchings **f** and **g** outward at the same time. PCBA-CPU-Module (ARM9) will then come off to front.
- **Picture 1 -** Disconnect PCBA-CPU-Module (ARM9).
- **Picture 1 -** Turn spacer counterclockwise. Then remove.



Assembly:

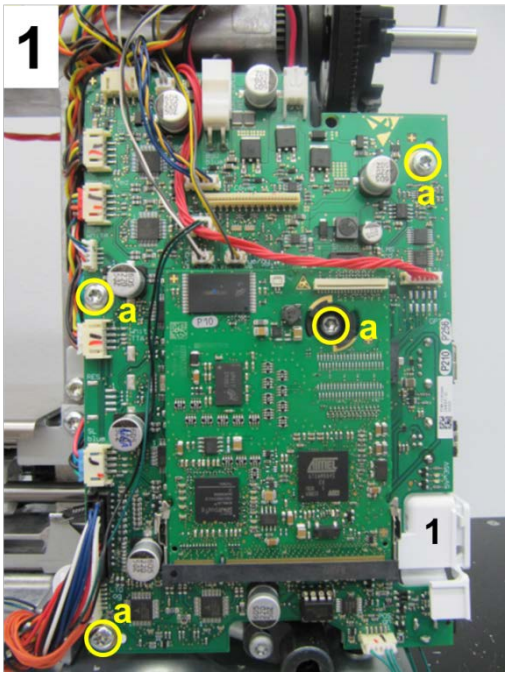
- **Picture 1 -** Turn spacer in clockwise.
- **Picture 1 -** Reconnect PCBA-CPU-Module (ARM9), taking care of coding **h**.
- **Picture 1 -** Push PCBA-CPU-Module (ARM9) down until latchings **f** and **g** engage.
- **Picture 1 -** Refit and retighten screw **a**.

Note:
On fitting a new or repaired PCBA-CPU-Module (ARM9), it is necessary to load the required firmware for the respective model.

4.2.4 PCBA-Base with feed-dog drop detection

When replacing PCBA-Base, EEPROM must be moved from the former to the new PCBA-Base immediately. Important data for flawless operation is stored there. (see 4.2.4.1)

See ESD-related note



Disassembly:

- Remove the covers (see 4.1)
- **Picture 1 -** Disconnect all plugs.
- **Picture 1 -** Remove 5 screws **a** (T20 M4x10).
- **Picture 1 -** Slide PCBA-Base out to front carefully with feed-dog drop **1**.

Assembly:

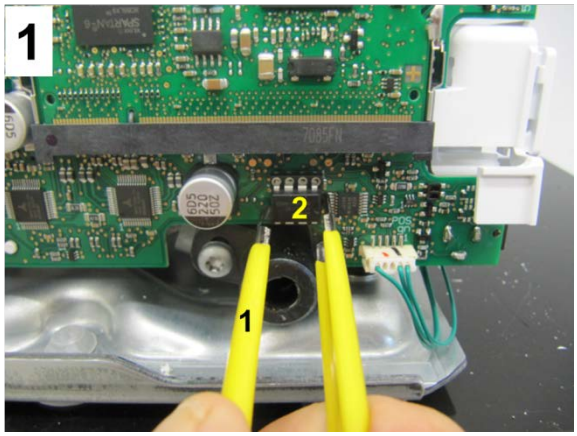
- **Picture 1 -** Position PCBA-Base on frame.
- **Picture 1 -** Refit and retighten four screws **a**.
- **Picture 1 -** Reconnect all plugs (taking note of the labeling)

Important!
Is the EEPROM attached?

4.2.4.1 EEPROM (Electrically Erasable Programmable Read-Only Memory)

When replacing the PCBA-Base, remove the EEPROM from the old PCBA and directly fit it on the new PCBA**.**

See ESD-related note

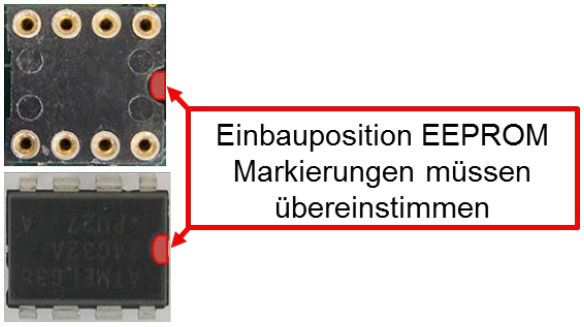


Disassembly:

- **Picture 1 -** Use IC extraction tool **1** (032948.50.00) to remove EEPROM 2.

Assembly:

- Attach EEPROM 2 to base.
- Take care to fit EEPROM in the correct position (markings must match) and avoid bending the contacts.

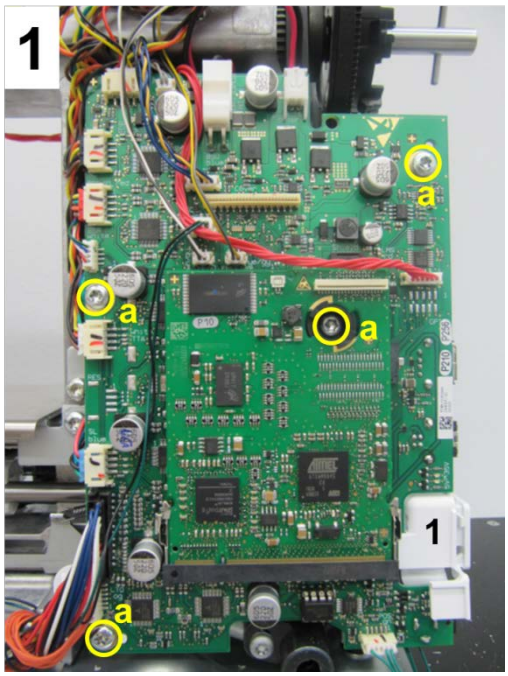


4.2.5 PCBA-Position Hall

See ESD-related note

Disassembly:

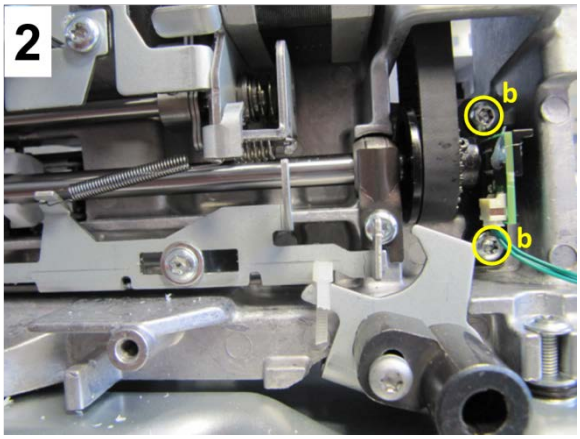
- Remove the covers (see 4.1)
- **Picture 1 –** Remove PCBA-Base (see 4.2.4).
- **Picture 2 -** Remove screws **b** and PCBA-Position Hall.
- **Picture 3 -** PCB with black mounting plate and Hall sensor **c**.
- **Picture 4 -** The magnetic encoder e for the Hall sensor **c** sits at the end of base shaft **2**.

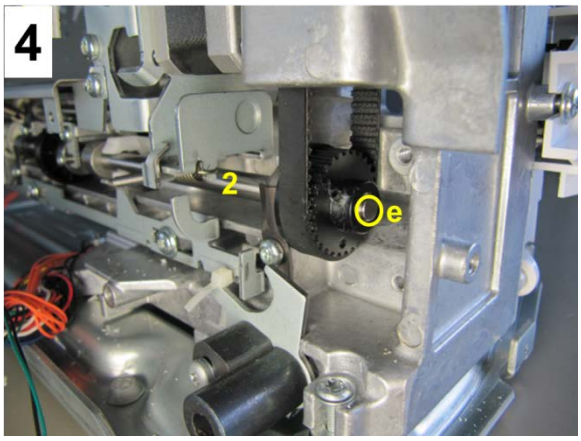


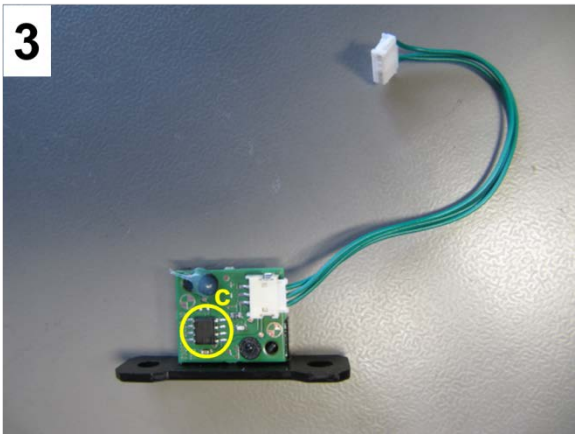
Assembly:

- **Picture 2 -** Position PCBA-Position Hall and fasten with screws **b**.
- **Picture 1 -** Hook feed-dog drop **1** in behind PCBA-Base.

  Position the whole unit and fasten with four screws **a**.
- **Picture 1 -** Reconnect all plugs.
- Refit all covers (if appropriate).







4.2.6 PCBA-Threader

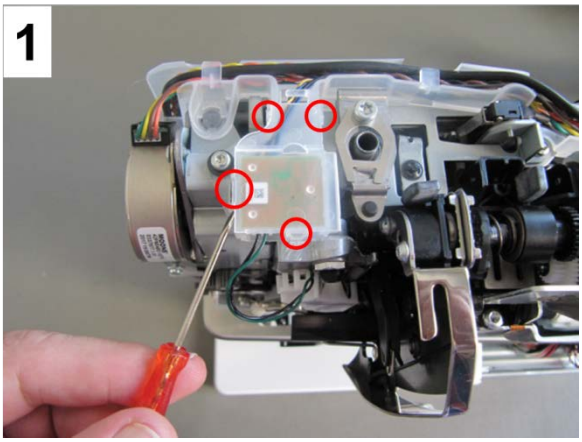
See ESD-related note

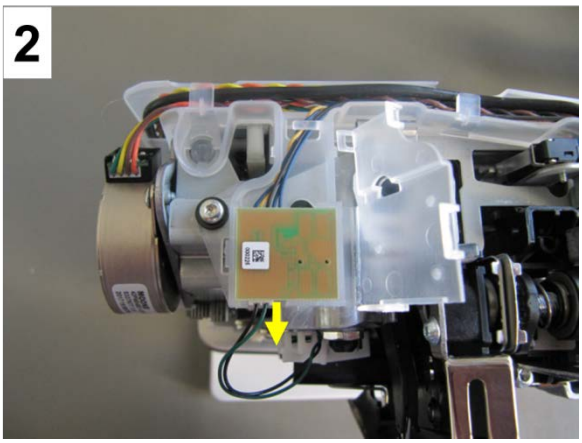
Disassembly:

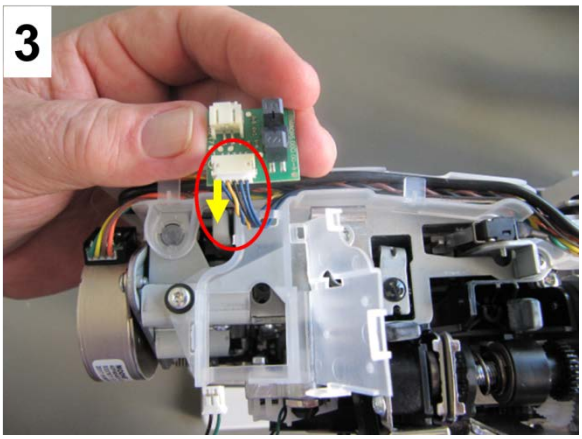
- Remove head cover (see 4.1.1)
- **Picture 1 -** With the aid of a small screwdriver, unlock the four links of the cover.
- **Picture 2 -** Disconnect basting solenoid wire.
- **Picture 3 -** Remove PCBA-Threader from the protective casing. Remove PCBA-Base connection.

Assembly:

- Picture 3 - Refit PCBA-Base connector.
- Picture 2 - Reconnect basting solenoid wire.
- Picture 1 - Refit four links of protective casing cover.
- Refit head cover (if appropriate).





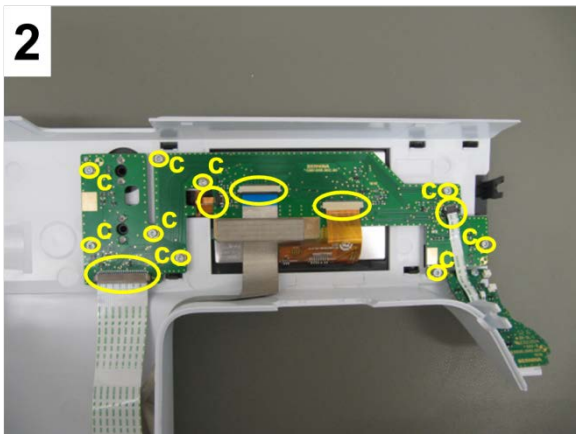


4.2.7 PCBA-Front cover including display and touchscreen

See ESD-related note

Disassembly:

- Remove covers. (see 4.1)
- **Picture 1 -** Remove SSU slide and knobs.
- **Picture 2 -** Disconnect PCBA-RET flat ribbon cable.
- **Picture 2 -** Disconnect LC display flat ribbon cable.
- **Picture 2 -** Carefully remove EMC gasket and disconnect the flat ribbon cable connecting PCBA-Base and LCD .
- **Picture 2 -** Disconnect flat ribbon cable from touchscreen.
- **Picture 2 -** Remove flat ribbon cable function from PCBA-Base.
- **Picture 2** - Remove all nine screws T10 (3x8) using a screwdriver.
- Pull off PCBA-Front cover.



Assembly:

- Position PCBA-Front cover properly, taking care not to jam any flat ribbon cables.
- Refit and retighten all nine screws T10 using a screwdriver.
- Refit PCBA-Base flat ribbon cable function.
- Reconnect touchscreen flat ribbon cable.
- Lay LCD and PCBA-Base connecting flat ribbon cable under EMC gasket, reconnect. Press EMC gasket firmly to seal.
- Reconnect LC display flat ribbon cable.
- Reconnect PCBA-RET flat ribbon cable.
- Refit SSU slide and knobs.
- Refit covers (if appropriate).

Note:
The faceplate is easiest to remove from front cover by unlocking the snap fits after PCBA-Front cover is removed from machine. With the new 5 Series (VIO) faceplate, touchscreen and LCD form one unit, and is only available as such.

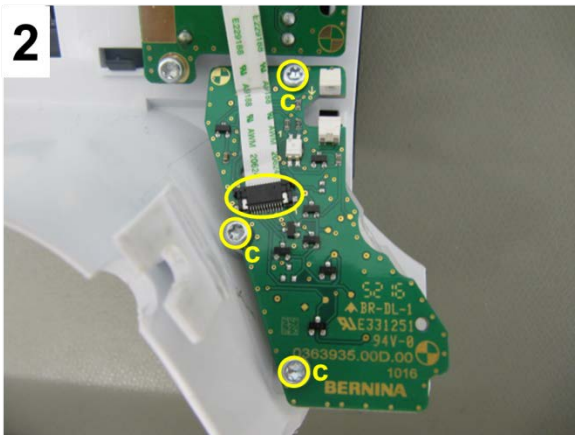
Spare part no.	Description	Color
036391.70.00	Faceplate cpl. with touchscreen and display	black
036391.70.01	Faceplate cpl. with touchscreen and display	silver
036391.70.02	Faceplate cpl. with touchscreen and display	white

4.2.8 PCBA-RET (B 590, B 570 QE, B 540, B 520 & B 500 Embroidery Only)

See ESD-related note

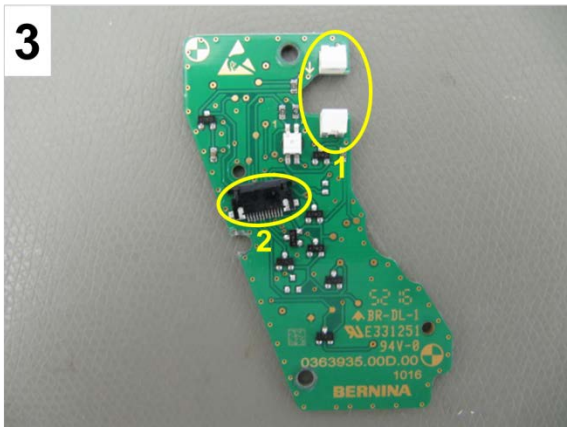
Disassembly:

- Remove the covers (see 4.1)
- **Picture 1 -** Remove SSU slide and knobs.
- **Picture 2 -** Disconnect PCBA-RET flat ribbon cable.
- **Picture 2 -** Remove three screws **c** T10 (3x8).
- Lift PCBA-RET off.
- **Picture 3 -** Upper-thread sensor light barrier **1**.
- **Picture 3 -** PCBA-Front cover flat ribbon cable connector **2**.



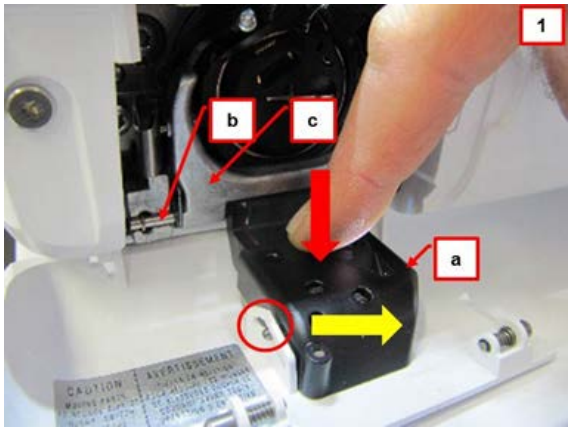
Assembly:

- Position PCBA-RET properly, taking care not to jam the flat ribbon cable.
- **Picture 2 -** Refit PCBA-RET with three screws **c**.
- **Picture 2 -** Reconnect PCBA-RET flat ribbon cable.



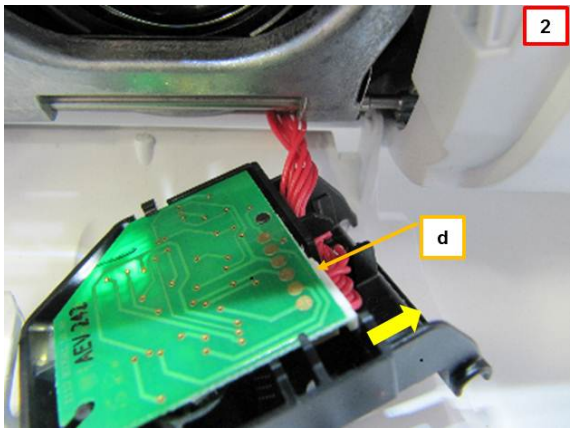
4.2.9 PCBA-Lower thread sensor cpl.

See ESD-related note



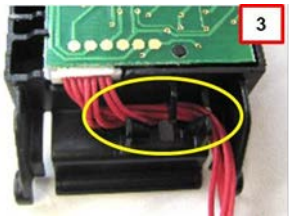
Disassembly:

- Open bobbin door.
- Press centre of lower-thread sensor **a** until sensor comes off hook race cover holder **c** pin **b** (pict. 1).
- Remove PCBA-Lower-Thread-Sensor connector **c** (pict. 2).
- Remove lower-thread sensor (see 3.1.4).



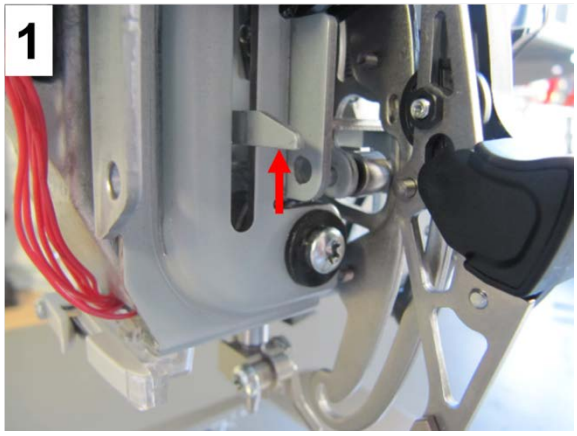
Assembly:

- Reconnect PCBA-Lower-hread-sensor connector **d** (pict. 2).
- Click lower-thread sensor **a** into place on hook race cover holder **c** pin **b** (pict. 1).
- Insert guiding pin on the left of the lower-thread sensor into guiding rail (red circle, pict. 1).
- **Take care that wires are lain correctly (picts 3 and 4)**
- Close bobbin door.



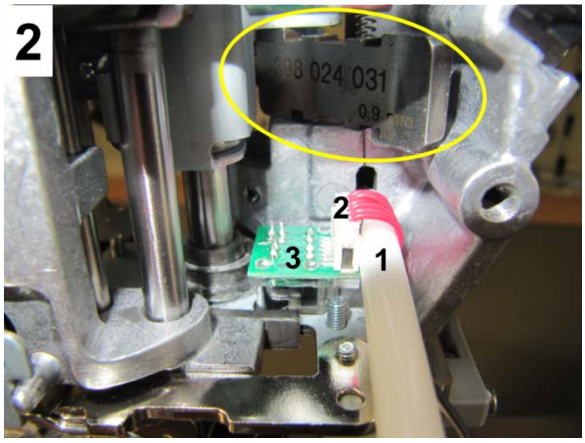
4.2.10 Sensor support ABC (presser foot recognition)

See ESD-related note



Disassembly:

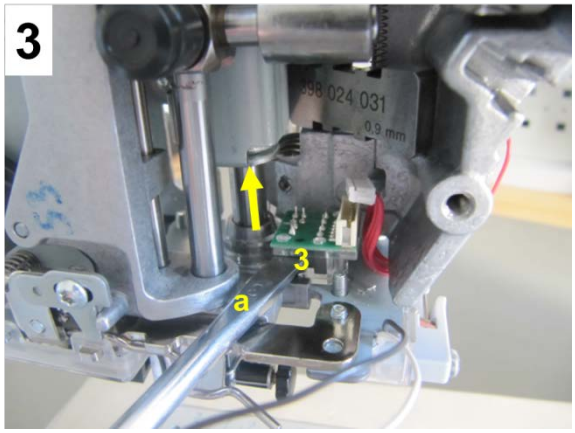
- Remove the covers (see 4.1)
- Move needle bar to upper dead center. Remove needle.
- Remove take-up lever cover. (see 4.4.12).
- **Picture 1 -** Move presser-foot bar to highest position by hand.
- **Picture 2 -** Lock presser-foot bar in highest position using the feed-dog height gauge (**398024.03.1**). Unplug connector **2** from ABC sensor **3** using plug ram **1** (**031935.50.00**).
- **Picture 3 -** Use screwdriver **a** to lift sensor support **3** over spherical bearing in direction of arrow as indicated.
- Turn sensor support slightly to front, then slide it off presser-foot bar to right.



Assembly:

- Bring ABC sensor support over needle bar. Then push it down carefully over spherical bearing and into correct position.
- Use plug ram to reconnect ABC sensor and PCBA-Base.
- **Picture 1 -** Mover presser-foot bar slightly up by hand.
- **Picture 2 -** Remove feed-dog height gauge. Lower presser-foot bar.
- Refit thread take-up lever cover.
- Insert a new needle.
- Refit covers (if appropriate).

Caution: Risk of Breakage!
Take care that sensor support 3 doesn't catch edges while fitting it.

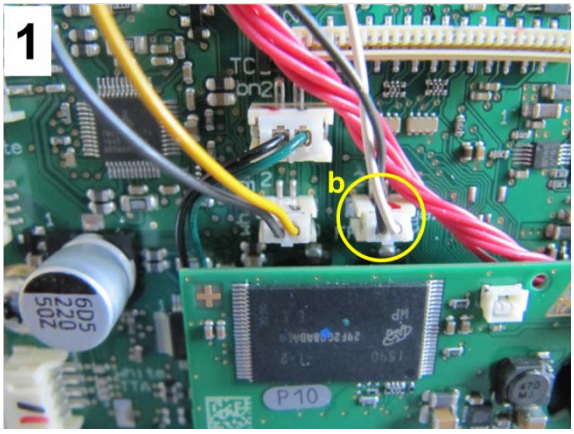


Note:
Check ABC sensor for functioning in Service Program 4l. Calibrate buttonhole foot with slide 3A in Service Program 6c.

4.2.11 Head frame and frame arm LED sewing light

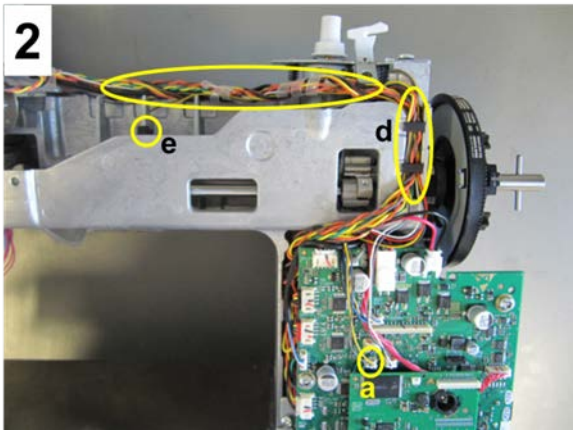
4.2.11.1 Head frame LED sewing light

See ESD-related note



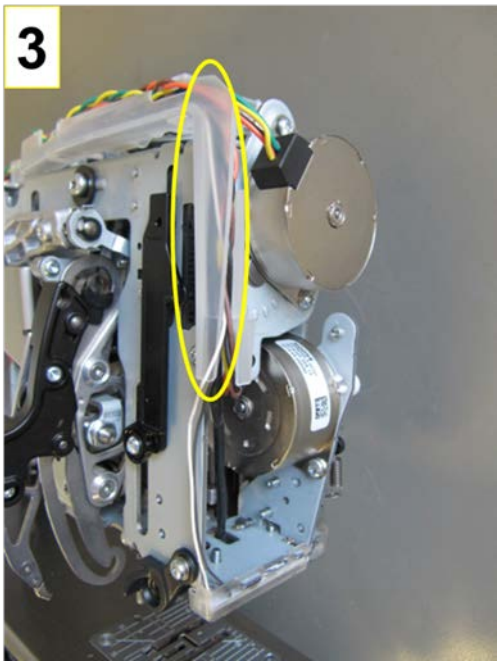
Disassembly:

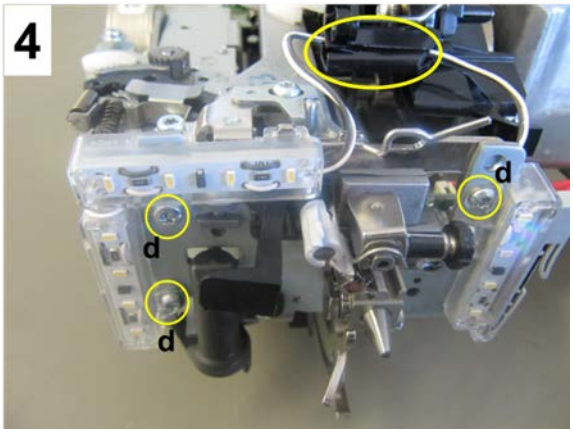
- Remove the covers (see 4.1)
- **Picture 1 -** Unplug PCBA-Base connector **b**.
- **Picture 2 -** Remove two clips **d** and remove wire from harness.
- **Picture 3 -** Remove the black/white wire from cable duct (marked in red).
- **Picture 4 -** Remove wire from guide (marked in yellow).
- **Picture 4 -** Starting at the rear bottom left, remove screws **d** T10 (M3x8 including washer) clockwise.
- The 3-part head frame sewing light is now freely accessible.



Assembly:

- **Picture 4 -** Starting at the front top right, refit the 3-part head frame sewing light. Refit and retighten screws **d** T10 including washers.
- **Picture 4 -** Refit and lay wire in area marked with a yellow circle.
- **Picture 3 -** Lay black/white wire into cable duct (marked in red).
- **Picture 2 -** Bring wire into position and rethread into harness. Refit two clips **d**.
- **Picture 1 -** Lay wires. Replug connector **a**.
- Refit covers (if appropriate).



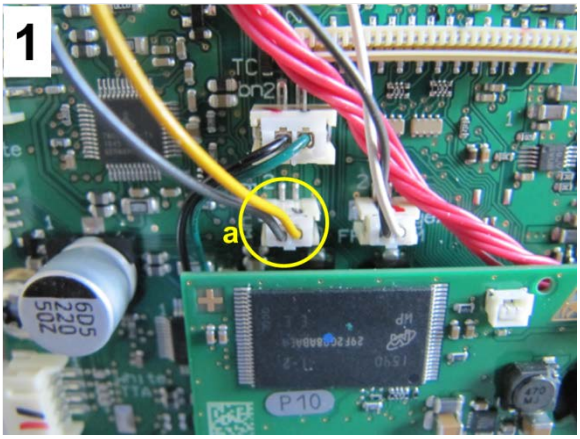


4.2.11.2 Head arm sewing light

See ESD-related note

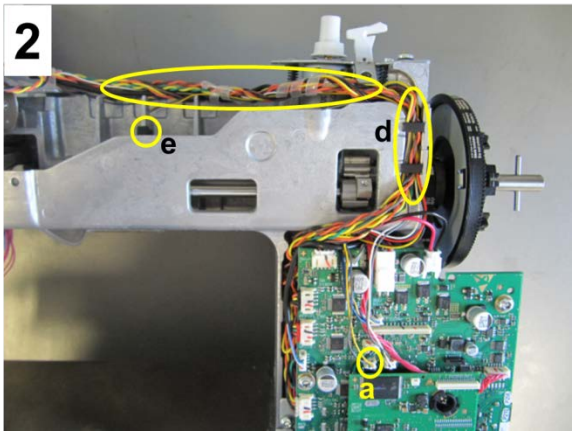
Disassembly:

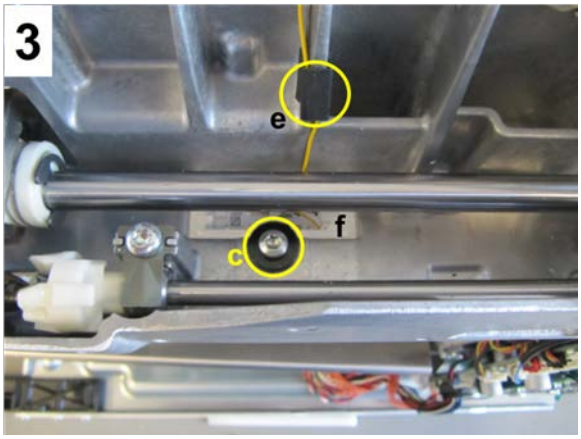
- Remove the covers (see 4.1)
- **Picture 1 -** Unplug PCBA-Base connector **a**.
- **Picture 2 -** Remove two clips **d** and clip **e**. Remove wire from harness.
- **Picture 3 -** Remove screw **c** T20 (M4x8 incl. washer). Pull sewing light **f** down and out, taking care not to damage the wire.



Assembly:

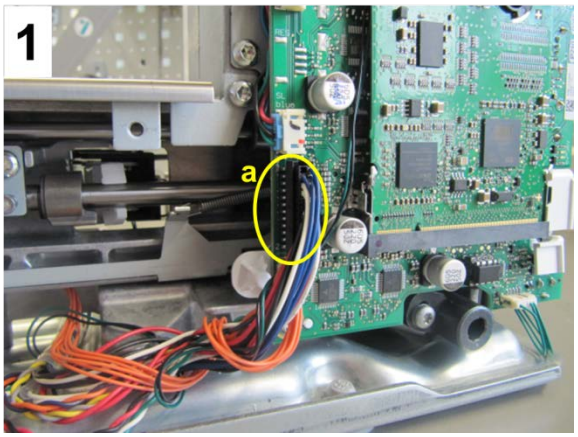
- **Picture 3 -** Insert sewing light **f** wire into head frame opening. Attach sewing light.
  Refit and retighten screw **c** T20 incl. washer to fasten sewing light.
- **Picture 2 -** With clip **e** bring wire into position and rethread into harness. Refit two clips **d**.
- **Picture 1 -** Lay wires. Replug connector **a**.
- Refit covers (if appropriate).





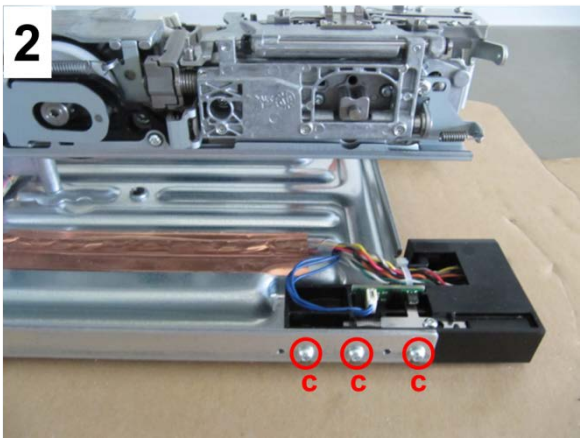
4.2.12 PCBA-Embroidery module detection

See ESD-related note



Disassembly:

- Remove the covers (see 4.1)
- **Picture 1 -** Disconnect plug **a**.
- **Picture 2 -** Remove three screws **c** (T10 (3x8) from base plate.
- Remove entire unit.



Assembly:

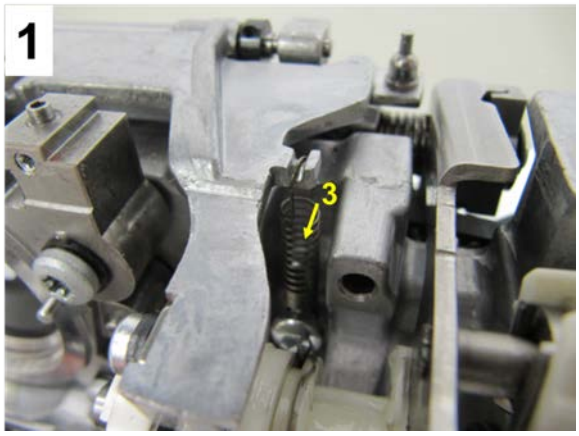
- **Picture 2 -** Refit PCBA-Embroidery module detection. Refit and retighten three screws **c** T10.
- **Picture 1 -** Lay PCBA-Embroidery module detection unit wire in such way that it won't be damaged when refitting the cover. Reconnect plug **a**.

4.3 Electromechancial/Mechanical Components

4.3.1 Hook and hook driver

Disassembly:

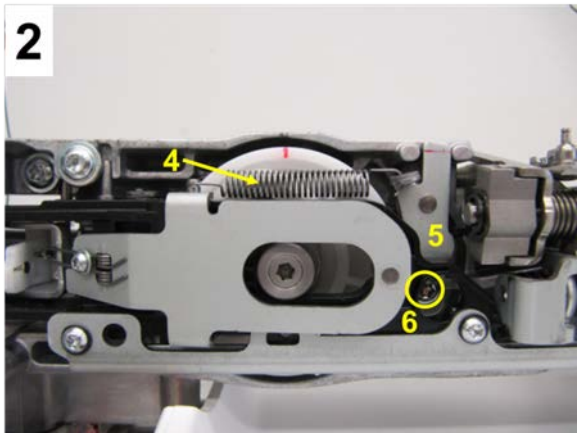
- Remove all covers (see 4.1).
- Remove thread-cutter unit (see 4.3.4).
- Remove bobbin case.
- Remove hook.
- **Picture 1**- Unhook spring **3** of feed-dog carrier.
- **Picture 2** - Unhook tension spring **4** between clutch carriage and belt tensioner **5**.
- **Picture 2** - Remove belt tensioner **5** with screw **6**.
- **Picture 3** - Untighten hook driver shaft securing screw **7** (T8).

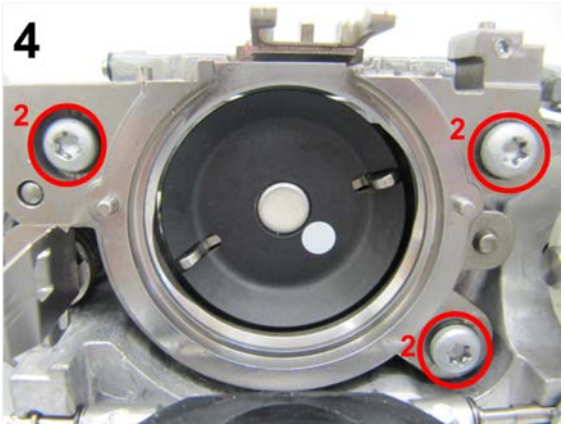


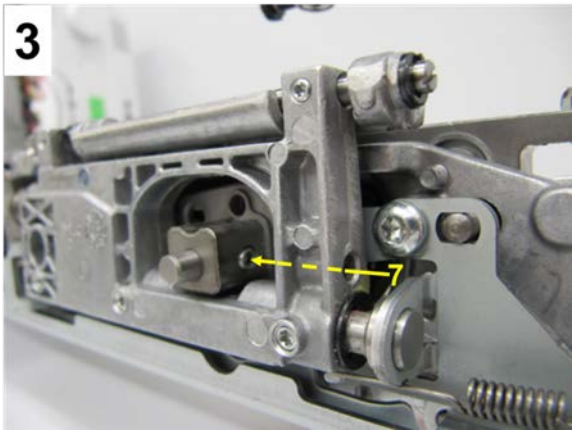
- Bring hook driver into its neutral position, then pull out carefully, pushing slightly from the back with a screwdriver (e.g. T8) if required.

Note:
The hook driver is in its neutral position if the hook driver cams protrude from the hook driver casing the same length.

- **Picture 4** - Remove the three fastening screws **2** (T20) from the hook race ring. Carefully remove hook race ring.



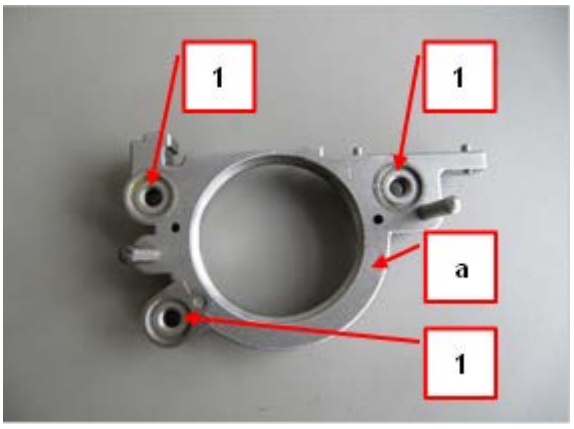




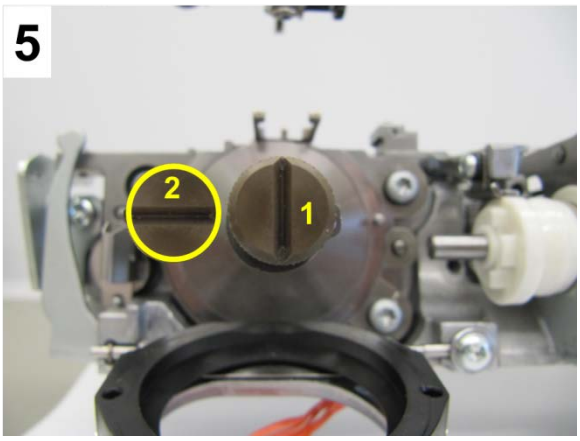
Note:
Take care not to lose the spherical washers.

Assembly:

- Carefully insert hook race ring **a**, taking care to position the 3 spherical washers **b** correctly, i.e. flat side up and sitting between hook race ring and aluminium base.
  Picture 4 - Tighten the 3 securing screws **2** (T20) only so much that the hook race ring can still be moved in x-axis direction. Hook race ring movement is locked for all other directions.



- **Picture 5** - Insert the setting hook including gauge shaft **734591.70.00** and fitted pressure spring into hook race ring. Then slide the 5.0mm thick end of gauge shaft through the hook race bearing up to stop. Secure gauge end using the plastic knurled nut. It must now be possible to compress the gauge shaft to check for smooth running.
- Align gauge shaft bracing horizontally. Check if hook race ring is properly centred by briefly pressing the gauge shaft. The gauge shaft must be pushed back by the spring automatically.
- **Picture 4** – Slightly retighten the three screws **2** of hook race ring 1 => 2 => 3. Then retighten completely in this order: 1 => 2 => 3
- The hook race ring is now locked in all directions.
- Align gauge shaft bracing vertically. Check if hook race ring is properly centred by briefly pressing the gauge shaft. The gauge shaft must be pushed back by the spring automatically

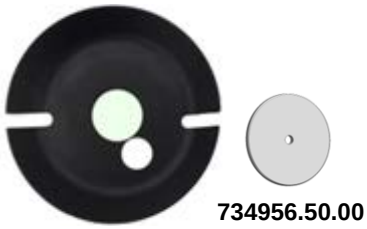


Note:

If the gauge shaft is pushed back by the spring automatically, the z-axis setting of the hook race bearing is fine. Repeat this procedure 3 times.

- Insert the hook drive in its neutral position in such way that the drive belt can be loaded onto the gearwheel using spring mounting tool **398112.03.0+**. The flat side of the hook drive shaft is opposite the hook drive securing screw **8**. With screw driver T8 put race securing screw **8** back into place without fixing it.
- Position circlip **235020.53.++** onto hook magnet. Then insert hook.
- With the left hand and simultaneously, press hook into hook race and hook driver up to stop.
- With screw driver T8 retighten hook race securing screw **8**.
- Remove hook. Then remove circlip **235020.53.++** from hook.
- Refit hook.

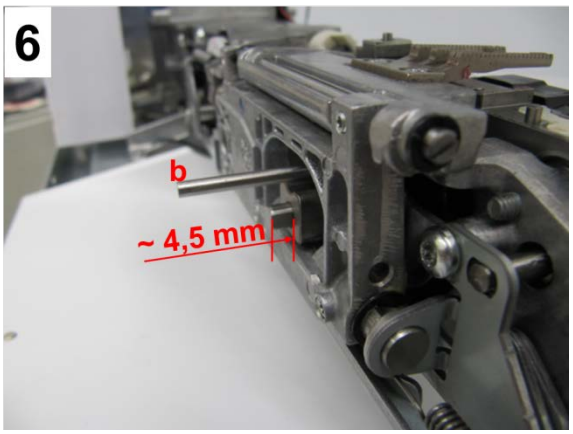
Note:
It is necessary to use the distance gauge **734956.50.00** with the distance 1.025mm.



734956.50.00

Check:

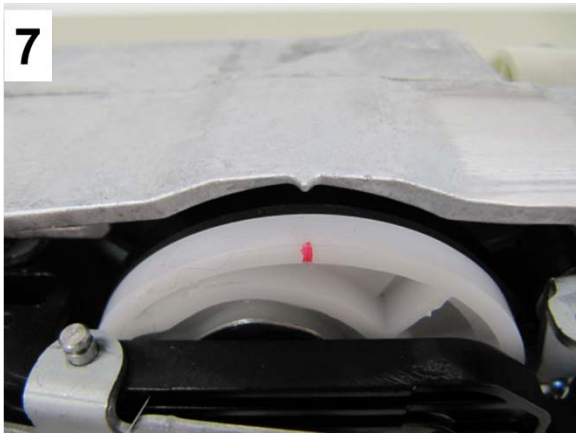
- **Picture 6** - The hook drive shaft end protrudes ca. 4.5mm from the hook bearing.
  Use 3.0mm pin **b** to lock hook drive in loop lift position.



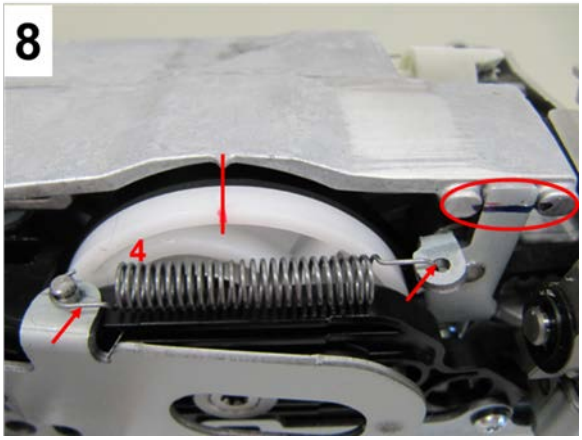
- **Picture 7** - Now turn the hand wheel in direction of rotation until the mark on the white plastic belt wheel stands in front of the frame lug mark.
- **Picture 8** - Refit and adjust belt tensioner.

Check:

- **Picture 8** – The mark on the white plastic belt wheel must be **exactly** flush with the freearm frame lug mark.
- **Picture 8** – Rehook tension spring between clutch carriage and belt tensioner.

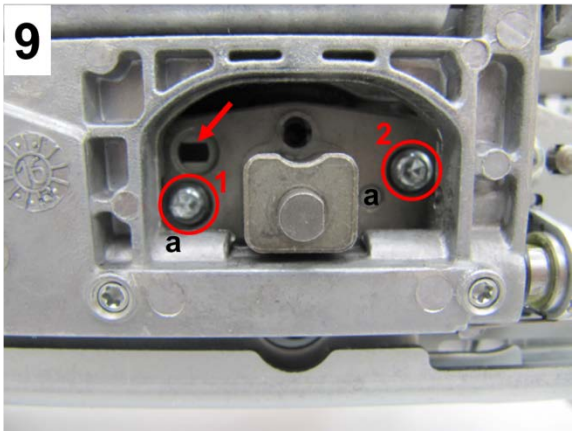


- Refit and adjust thread-cutter unit (see 4.3.4).
- **Picture 1** – Refit spring **A**.
- Insert hook and close hook race cover.
- Insert bobbin case.
- Test run the machine. If it runs smoothly and quietly, all the fitting and adjusting work has been carried out properly.



Note:

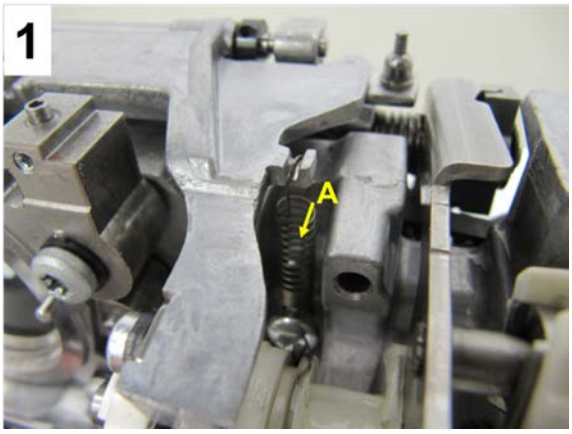
- **Picture 9** - If the hook makes noise, untighten the 2 hook bearing screws **a** by an eighth rotation.
- With the motor running at slow speed, use eccentric key 001361.70.00 to find the position in which the machine runs quietest.
- Slightly retighten the two hook bearing screws 1 => 2. Then retighten fully 1 => 2.



Note regarding servicing:

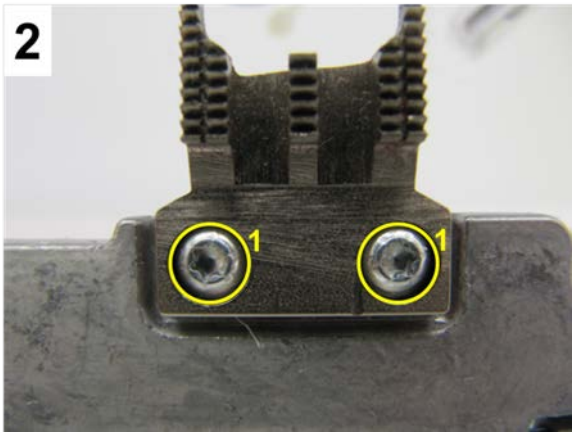
- Use a polishing disk to remove cinch marks on the hook body or slight damages to the hook tips. Replace hook if it is badly scratched or has broken hook tips.
- For lubrication of hook refer to lubrication diagram (see 7).

4.3.2 Main feed-dog and feed-dog carrier



Disassembly:

- Remove presser foot and needle.
- Remove stitch plate.
- Remove the covers (see 4.1)
- **Picture 1** – Remove spring **A**
- Remove main feed-dog carrier (see 4.3.8).
- **Picture 2** - Remove the two screws **1** (T10) to remove the main feed-dog.
-



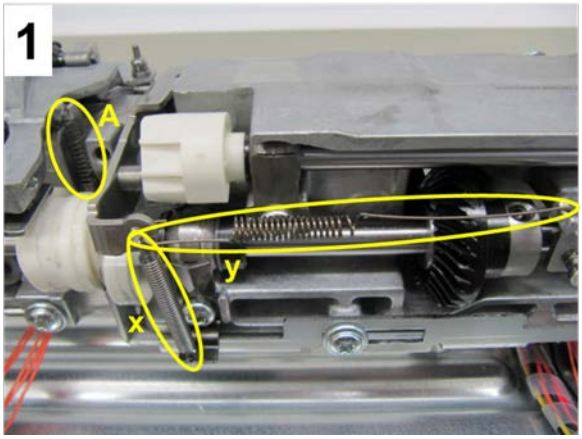
Assembly:

- **Picture 2** – Refit main feed dog with 2 screws **1** (T10).
- Refit main feed-dog carrier with refitted main feed dog (see 4.3.8).
- Adjust main feed-dog (see 5.6).
- Refit covers (if appropriate) (see 4.1)
- Refit stitch plate.
- Attach needle and presser foot.

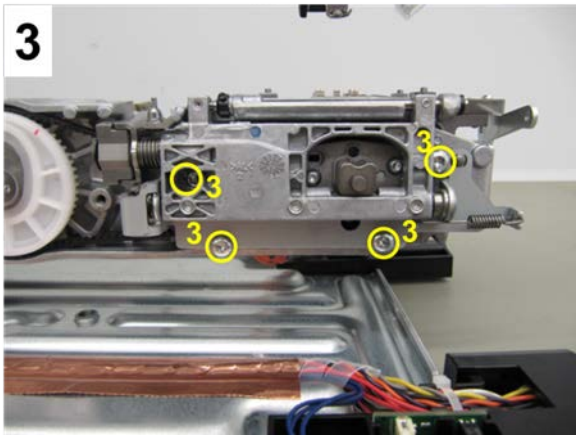
Note:
The main feed dog could be removed also after removing the main feed dog carrier.

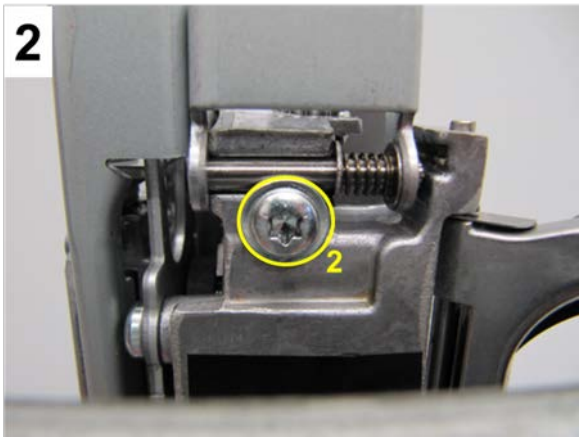
4.3.3 Replacing the hook driver drive belt

Disassembly:

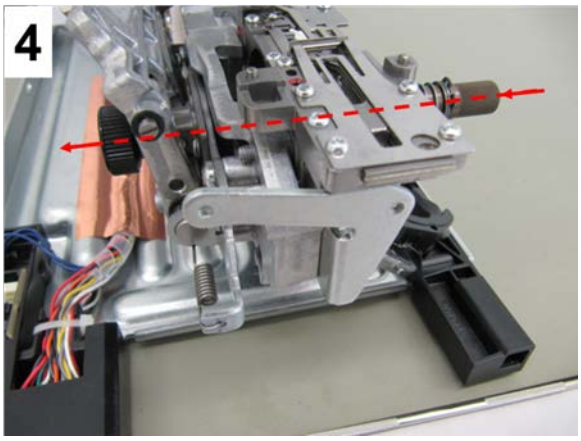


- Remove presser foot and needle.
- Remove stitch plate.
- Remove the covers (see 4.1)
- **Picture1** – remove the springs **A**, **x** and **y**.
- Removal of clutch carriage (see 4.3.11)
- **Picture 2** – Remove screw **2** (T20, M4X10mm) down at center of rotation of the thread cutter release link. Remove the whole unit.
- Removal of hook and hook driver (see 4.3.1)
- **Picture 3** – Remove 4 fastening screws **3** (T20, M4X10mm) of the feed dog fork complete and the attached position plate from the hook driver.
- Remove hook driver drive belt.





Assembly:



- Refit hook driver drive belt.
- **Picture 3** – Refit the feed dog fork complete with the attached position plate for the hook driver, slightly retighten the 4 fastening screws **3**, taking care not to jam the hook driver drive belt.
- **Picture 4** – Set the feed dog fork with adjusting gauge **734541.70.0**0 in the right position (see 4.3.1) and tighten the 4 screws **3** (T20).
- Picture 1 – Rehook springs **A**, **x** and **y**, taking care that the slide block sits properly in the feed cam.
- Position stitch plate, taking care that the feed-dog sits centred in the opening. Retighten the 4 screws. Remove stitch plate.
- Refit hook driver and hook (see 4.3.1)
- Adjust loop lift (see 5.5.3)
- **Picture 2** – Refit thread cutter release link with screw **2**, take care that the end of the release link fits into the slot of the thread catcher.
- Refit clutch carriage (siehe 4.3.11)
- Adjust clutch carriage and thread cutter (see 5.7)
- Refit covers (see 4.1), stitch plate, needle and presser foot if appropriate.

4.3.4 Stitch plate carrier with integrated thread-cutting unit

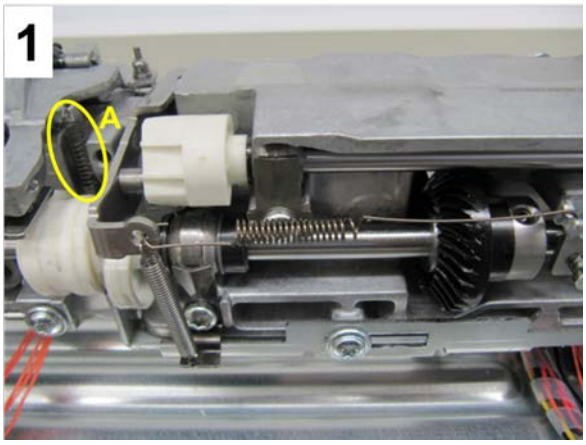
Disassembly stitch plate carrier with integrated thread cutting unit of thread-cutting unit:

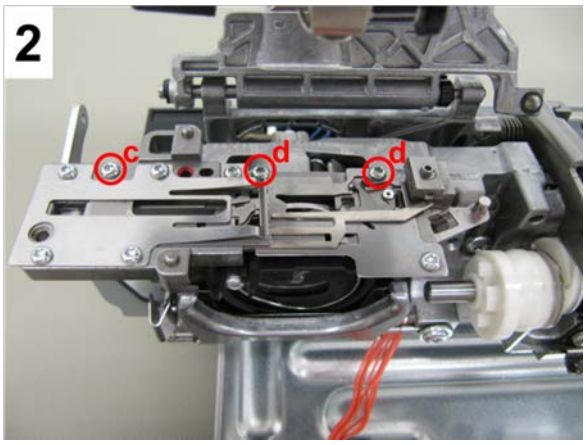
- Remove presser foot, needle, and stitch plate.
- Remove the covers (see 4.1).
- **Picture 1** – Remove spring **A**.
- **Picture 2** – Remove the whole thread cutting unit with the screw **c** (T8, M2.5X10mm) and the screws **d** (T8, M2.5X3mm, see **Picture 3**).

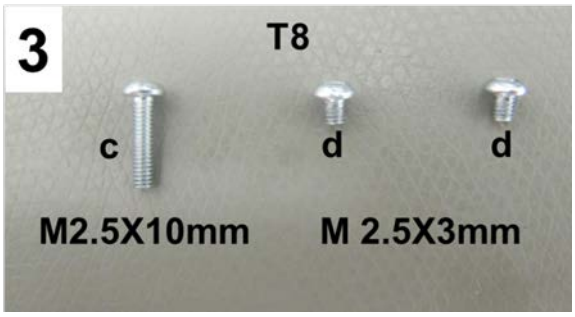
Note:
Ensure that the thread cutter release link is in its home position (far left).

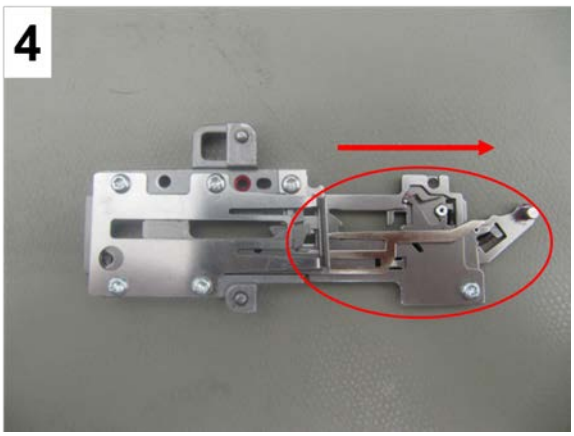
Disassembly of blade:

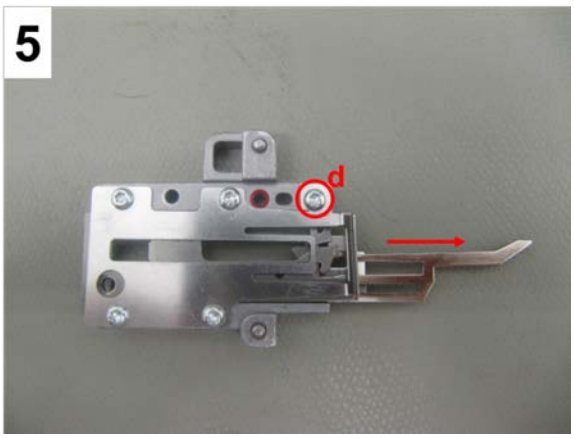
- **Picture 4** – Remove the thread clamping unit from the thread cutting unit.
- **Picture 5** – Remove the blade fastening screw d (T8, M2.5X3mm) Move thread catcher slightly to the right.
- **Picture 6** – Pull out the blade slightly to the right and up.

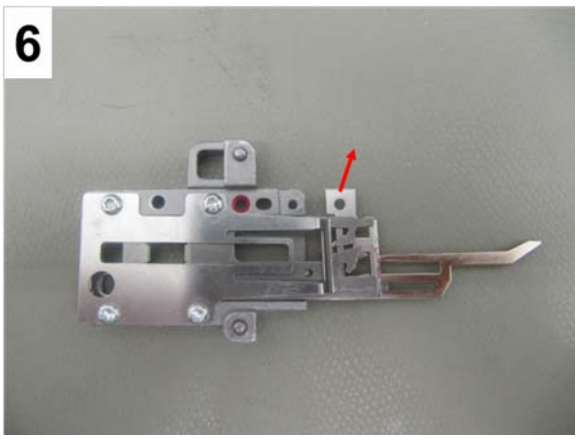






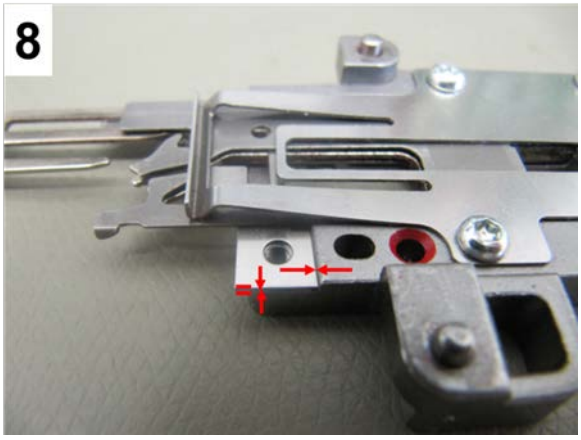






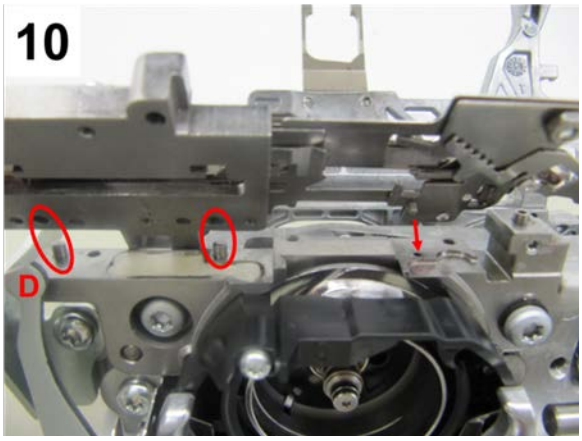
Assembly of blade:

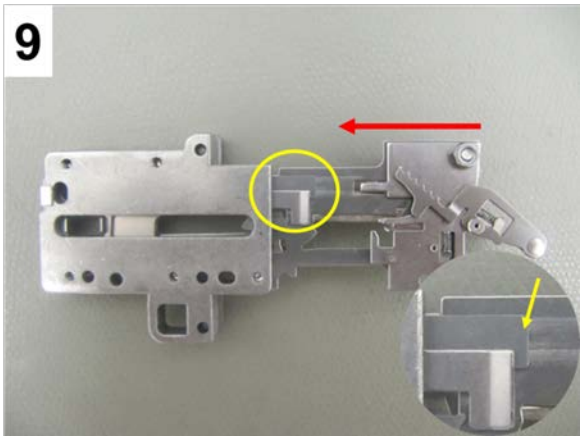
- **Picture 7** – Position the new blade under the first layer of metal sheeting.
- **Picture 8** – The edge of the blade's fastening lug MUST butt against the recessed edge..
- **Picture 5** – Refit and retighten blade securing screw **d** (T8).



Assembly of thread-cutting unit:

- Picture 9 - Refit the left part of the thread cutter unit. Insert it from the left and link it with the right part, ensuring that the thread catcher stands over the metal plate of the right part (pict. 3.3.2a).
- The left part of the thread catcher/thread cutter unit must lie flat on the hook race ring to ensure that the locating pins on the hook race ring mesh correctly and the thread catcher actuating lever sits correctly in the opening provided.
- Fasten the left part of the thread-cutting unit with 3 screws **1** (3xT8).





Note regarding servicing:

- When servicing the machine, the thread cutter must always be removed for cleaning purposes.
- The blade is a wear part and therefore available as an individual part.

4.3.4.1 Replacing the blade of built-in thread-cutter unit

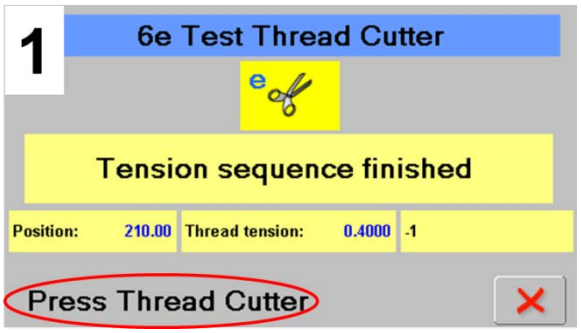
Attention:
Do not touch blade of knife, risk of injury!

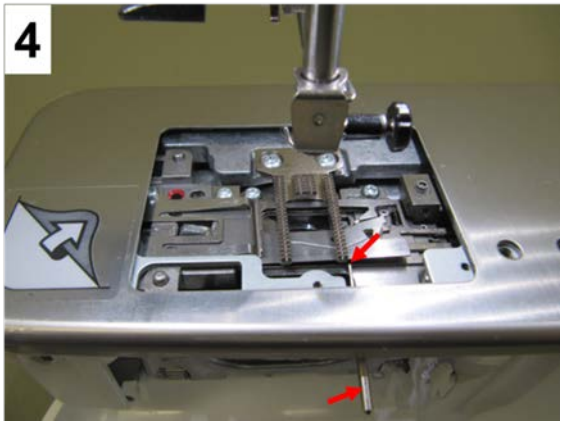
Disassembly:

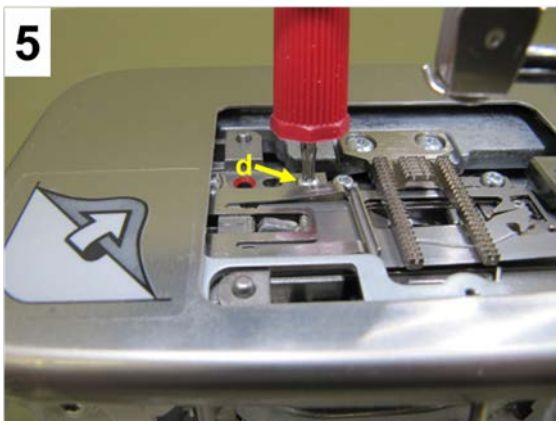
- **Picture 1** – Start machine in service program, select test **6e**, remove presser foot, needle, and stitch plate.Press thread cutter button on head frame.
- **Picture 2** – Press the green check button one time.
- **Picture 3** – The thread catcher moves to its right position.
- **Picture 4** – Open the bobbin door. Slip a needle between the first and second plate. This helps to pull out the knife, and it'll mark the correct position for reinsertion of the new knife.

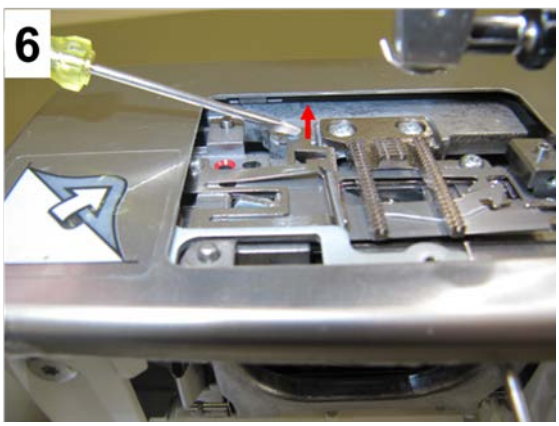
Tip: Cover the hook drive area with a piece of fabric to prevent screws from falling under the hook drive.

- **Picture 5** – With the small TORX screwdriver **030475.51.01** remove the screw **d** (T8)
- **Picture 6** – With the help of a small screwdriver bring the blade backwards until it can be hold and pulled out with tweezers.



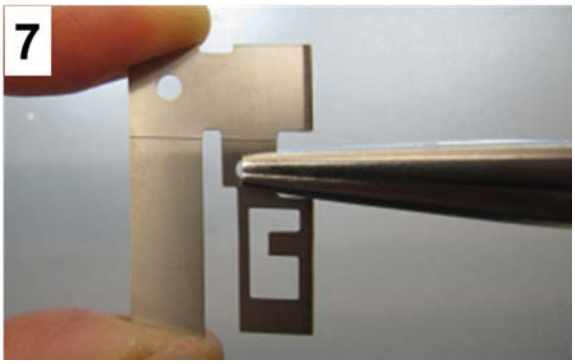


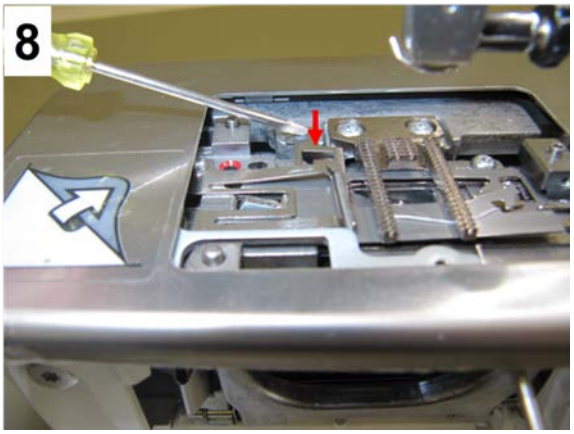




Assembly:

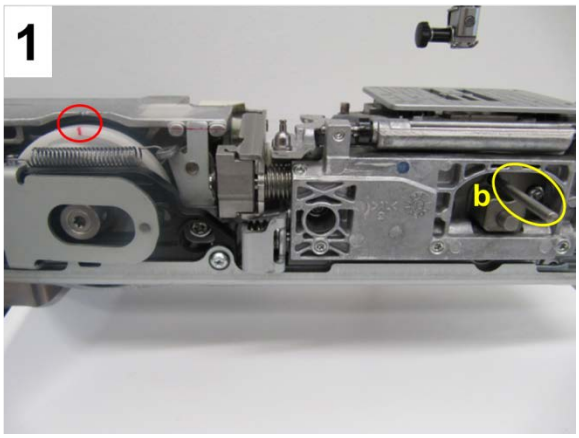
- **Picture 7** – Hold the new knife, breaking if from the holder at the predetermined breaking point with the aid of pliers.
- **Picture 8** – Slide the new knife from behind into place between the first and second plate.
- **Picture 5** – Slightly retighten knife securing screw **d** with TORX screwdriver **T8.** Use a small screwdriver to push the knife into its final position in the left corner of the stitch plate carrier. Retighten knife securing screw (the torque of a small TORX screwdriver is quite sufficient).
- **Remove piece of fabric and squeezed sewing needle.**
- **Picture 9** – Complete test **6e** (press green check button 7 times).
- **Picture 10** – Refit stitch plate, needle, and presser foot and close the bobbin door.
- Sew-off, also testing the thread cutter.





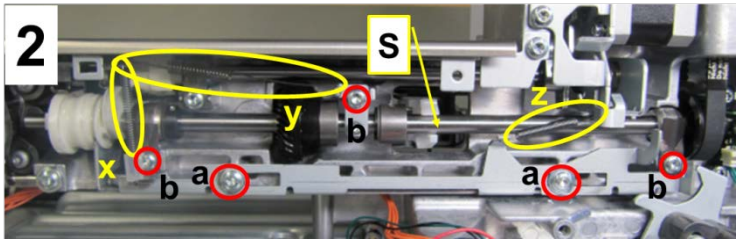
4.3.5 Base shaft

See ESD-related note



Disassembly:

- Remove the covers (see 4.1).
- Remove PCBA-Base (see 4.2.4)
- **Picture 1 –** Use pinning tool **b** (007937.50.00) to pin hook driver (loop lift position), taking care that the (marked) notch in the white hook drive wheel matches up with the marking on the base.
- **Picture 2 –** Unhook tension springs **x**, **y** and **z**. Put aside.
- **Picture 2 –** Remove screws **a** T20 (M4x10). Remove feed-dog drop lug.
- **Picture 2 –** Remove screws **b** T20 (M4x10) including clamps.
- **Picture 2 –** Slide drive belt off base shaft. Lift base shaft out.



Assembly:

- Using loop lift gauge 734571.70.01, lock vertical shaft in loop lift position (see 5.5.3).
- **Picture 2 –** Slide base shaft in drive belt, so that base shaft can be locked.
- **Picture 2 –** Refit clamps and screws **b** first.
- **Picture 2 –** Refit shaft support in the centre, fastening it with screw **b** with a distance to the base shaft of 0.1mm.
- **Picture 2 –** Refit feed-dog drop lug, and refit and retighten screws **a**.
- **Picture 2 –** Rehook tension springs **x**, **y,** and **z**. Check for proper fitting.

Note:

It is important to check base shaft for correct functioning of timing, loop lift, thread cutting etc. Adjust if necessary.

4.3.6 Crank shaft and stitch length stepping motor

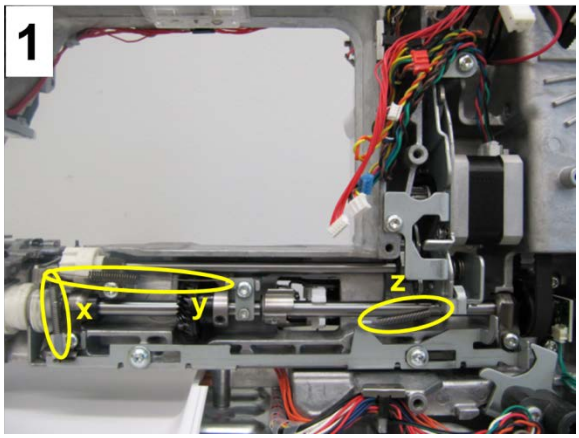
See ESD-related note

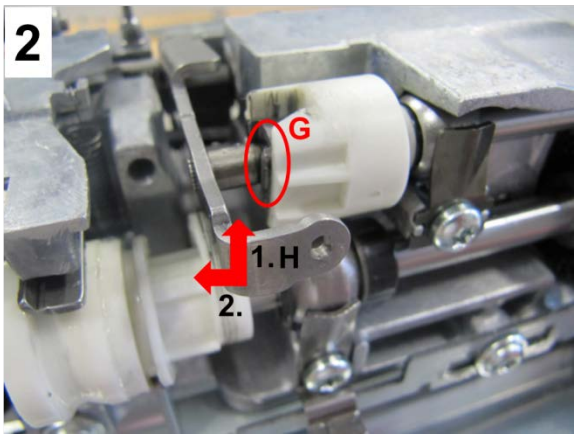
Disassembly:

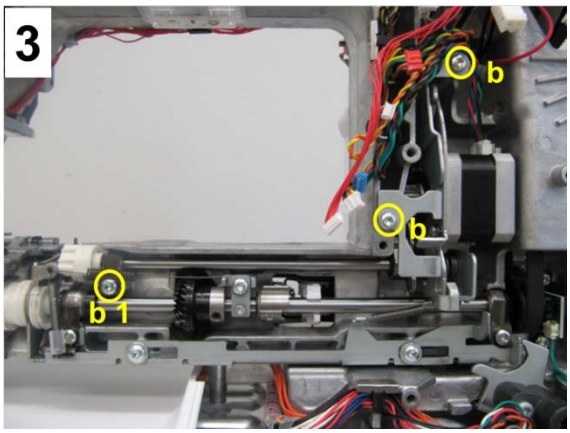
- Remove the covers (see 4.1)
- Remove PCBA-Base (siee 4.2.4)
- **Picture 1 –** Unhook tension springs **x**, **y** and **z**. Put aside.
- **Picture 2 –** Slide lift-/advance link **H** up, and remove shoe **G**.
- **Picture 3 –** First, remove screw **b1** T20 (M4X10) and clamp. Then remove the other screws **b** T20 (M4X10).
- **Picture 3 –** Remove the entire crankshaft-/SL stepping motor unit. Then remove crankshaft from SL stepping motor.
- **Picture 4 –** Remove 2.3mm circlip. Then slide crankshaft out of upper-feed crank link.

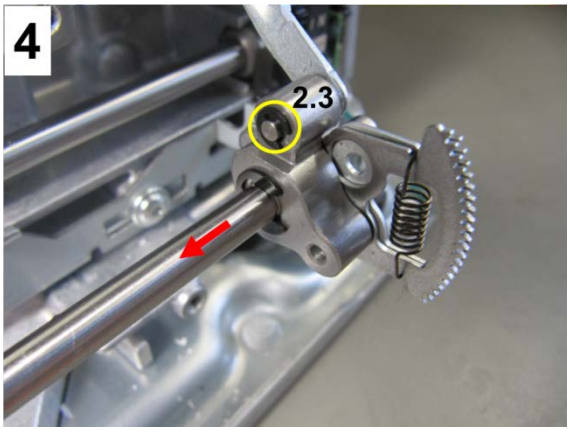
Assembly:

- **Picture 4 –** Slide crankshaft into upper-feed crank link. Refit circlip with 2.3mm circlip mounting tool (**033958.50.01**).
- **Picture 3 –** Refit crankshaft to stitch-length stepping motor. Then refit entire unit. Retighten screws **b** and **b1** T20 to fasten unit.
- **Picture 2 –** Slide lift-/advance link **H** up. Refit shoe **G** and bring into correct position.
- **Picture 1 –** Rehook tension springs **x**, **y** and **z**.
- Adjusting the crankshaft see 5.6.4 Main feed mechanical balance - basic setting.
- Refit PCBA-Base. Refit all connectors (see 4.2.4).
- Refit all covers (if appropriate).





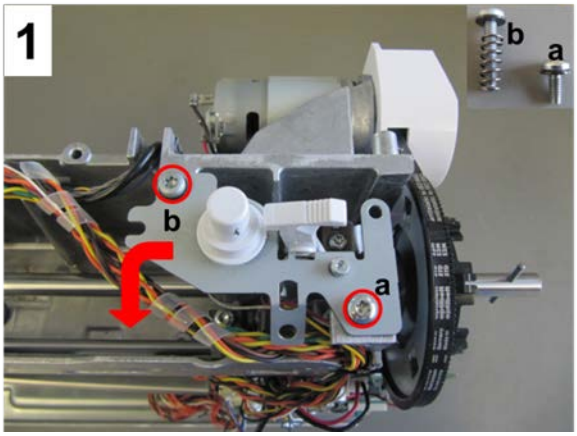




4.3.7 Replacing base shaft and vertical shaft connecting belt

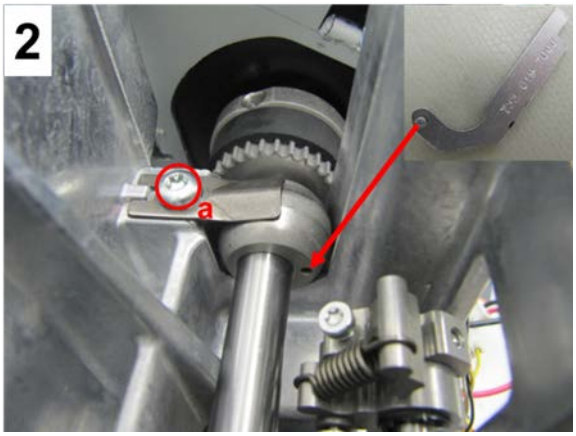
Disassembly:

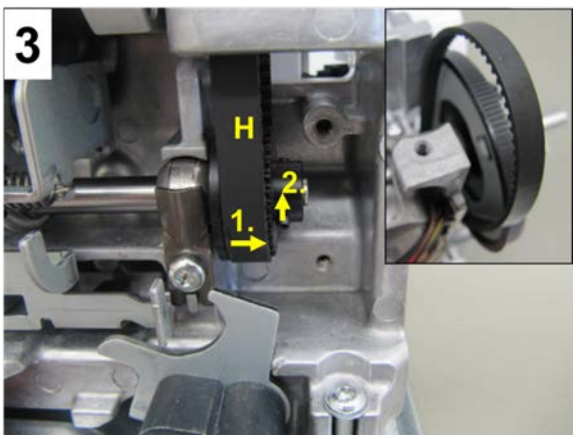
- Remove the covers (see 4.1)
- Remove PCBA-Base (see 4.2.4)
- Remove PCBA-Position Hall (see 4.2.5)
- Remove main motor-/vertical shaft drive belt (see 4.3.19).
- **Picture 1** – Remove winder unit.
- **Picture 2** – Untighten screw **a** of clamp on vertical-shank spherical bearing. Use adjusting spanner **733019.70.00** to turn spherical bearing in such way that drive belt slackens.
- **Picture 3** – Slide drive belt **H** off base shaft, then over vertical-shaft drive wheel and out.



Assembly:

- **Picture 3** – Slide drive belt **H** over vertical-shaft drive wheel, then down onto base-shaft belt pulley.
- **Picture 2** – Refit drive belt **H** onto vertical-shaft drive wheel. Then, using adjusting spanner **733019.70.00**, tighten drive belt over spherical bearing. Retighten clamp screw.
- Refit PCBA-Position Hall. Setting (see 5.8).
- **Picture 1** – Refit and adjust winder unit (see 5.13).
- Refit main-motor drive belt and tension (see 5.1.2).
- Refit PCBA-Base (see 4.2.4).
- Set synchronization again (see 5.5)
- Refit covers (if appropriate).

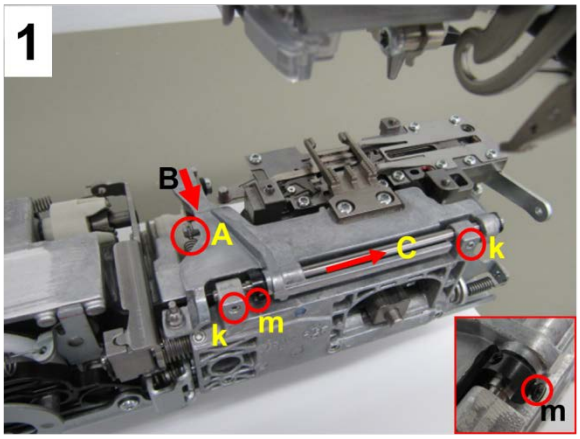




4.3.8 Feed-dog carrier and advance link

Disassembly:

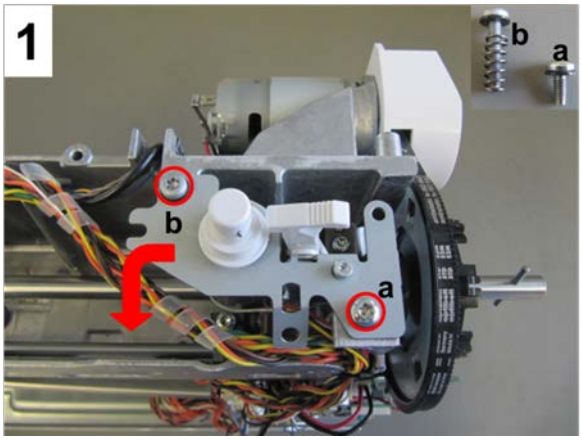
- Remove the covers (see 4.1)
- **Picture 1 –** Remove tension spring **A**.
- **Picture 1 –** Untighten two setscrews **k** T6 (M3x4).
- **Picture 1 –** Use a small screwdriver (M2x2) to untighten adjusting collar screw **m**.
- **Picture 1 –** Push feed-dog carrier and advance link **B** in direction of arrow. Then slide eccentric shaft **C** out in direction of arrow.
- **Picture 1 –** Remove feed-dog carrier **B** and advance link.



Assembly:

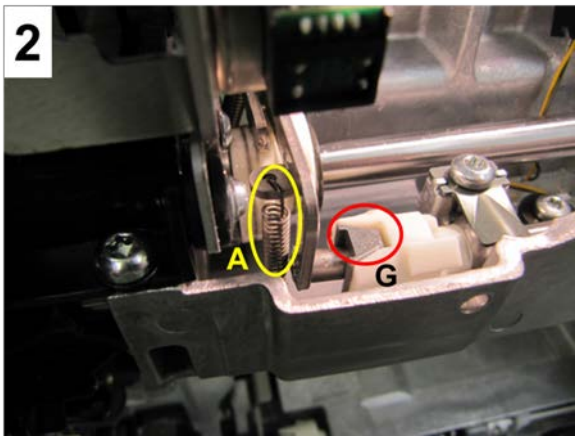
- **Picture 1** – Position feed-dog carrier **B**. Slide eccentric shaft **C** back into respective seats up to stop, including the black adjusting collar.
- **Picture 1 –** Hold eccentric shaft at stop, position black adjusting collar against it. Then slightly retighten screw **m**.
- **Picture 1 –** Rehook tension spring **A**.
- **Picture 1 –** After adjusting eccentric shaft (see 5.6.1), retighten two setscrews **k**.
- Refit covers (if appropriate).

4.3.9 Upper feed crank



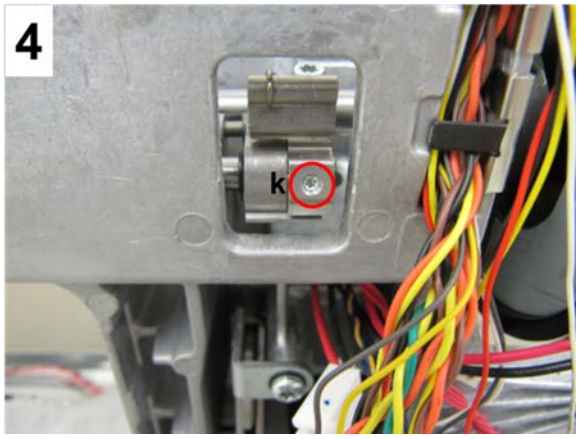
Disassembly:

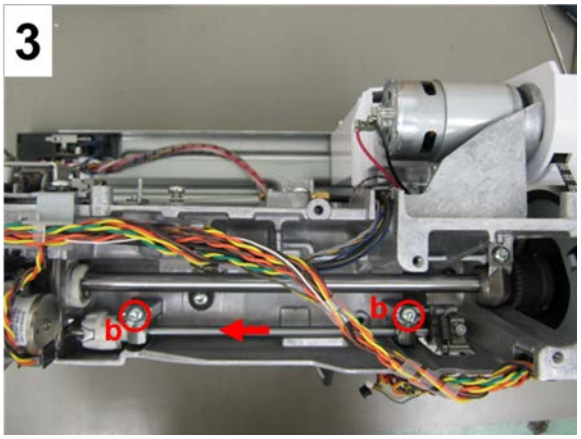
- **Picture 1** – Remove winder unit.
- Remove the covers (see 4.1)
- **Picture 2 –** Remove tension spring **A** and shoe **G**.
- **Picture 3 –** Remove screws **b** T20 (M4x10) including clamps.
- **Picture 4 –** Untighten setscrews k T6 (M3x6) of crankshaft clamp.
- **Picture 3 –** Slide crankshaft out in direction of arrow.



Assembly:

- **Picture 3 –** Refit crankshaft into crankshaft clamp against direction of arrow.
- **Picture 4 –** Slightly retighten setscrew **k** of crankshaft clamp.
- **Picture 3 –** Refit screws **b** including clamps.
- **Picture 2 –** Refit shoe **G** and tension spring **A**.
- Adjustment (see 5.6.6).
- Picture 1 – Refit winder unit and adjust it (see 5.13).

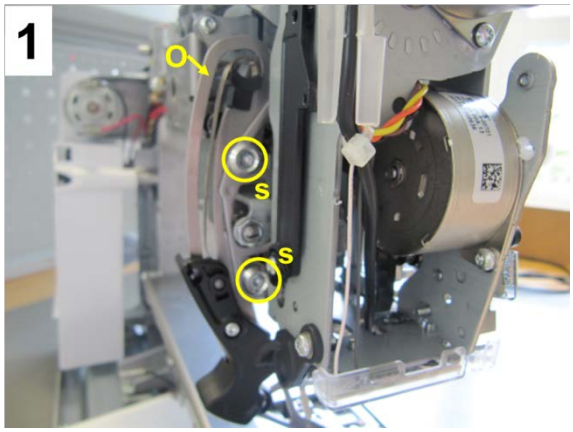




4.3.10 Upper feed (Dual Feed)

Disassembly:

- Remove the covers (see 4.1)
- **Picture 1 –** Remove countersunk screws **s** T10 (M3x6mm).
- **Picture 1 –** Remove upper-feed carrier **O**.



Assembly:

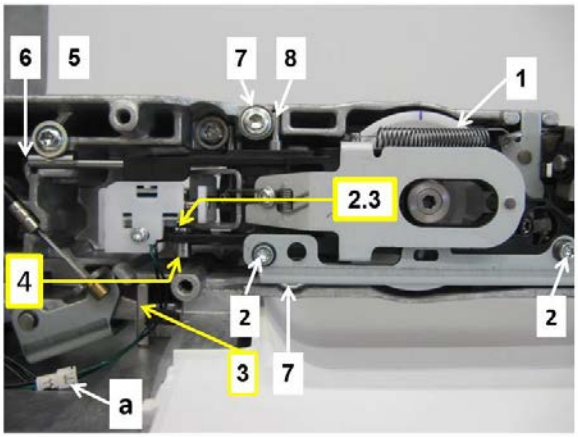
- **Picture 1 –** Refit upper-feed carrier. Slightly tighten countersunk screws to fasten carrier and special washers.
- Adjustment (see 5.6.5).

4.3.11 Clutch carriage

Disassembly:

- Remove tension spring **1**.
- Untighten screws **2** (2 x T10) to remove connecting strap between clutch carriage and thread-cutter release lever.
- Remove bracket **3** and unplug pull soleoid connector **a**.
- Remove size **2.3** circlip from stop pin **4**. Then remove stop pin.
- Remove fillisterhead stop screw **5** (1 x T20) and horizontal eccentric guiding pin **6**.
- Untighten 1 lower fillisterhead stop screw **7** (1x T20). Remove 1 upper fillisterhead stop screw **7** (1 x T20). Remove vertical guiding pin **8**.
- Remove clutch carriage, taking care not to interfere with the pull solenoid wire.

Assembly:



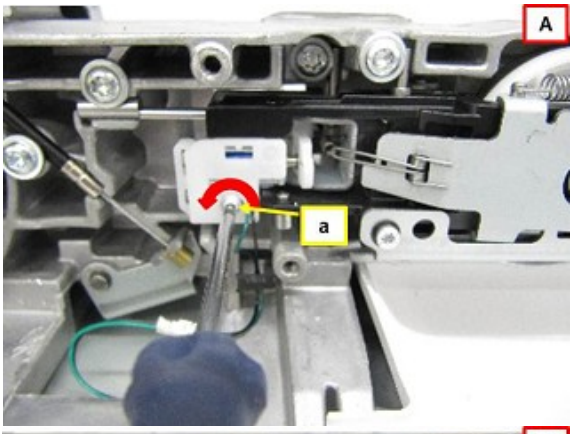
- Refit clutch carriage, taking care not to interfere with the pull solenoid wire.
- Refit vertical guiding pin **8**. Slide it on lower stop. Then secure with lower fillisterhead stop screw **7** (1 x T20). Refit and retighten upper fillisterhead stop screw **7** (1 x T20).
- Refit horizontal, eccentric guiding pin **6,** securing it by tightening fillisterhead stop screw **5**. Don't tighten completely - eccentric pin must still be turnable.
- Turn eccentric guiding pin until clutch carriage won't move when tightening fillisterhead stop screw **6**.
- Refit stop pin **4** to clutch carriage. Then secure with size **2.3** circlip.
- Refit pull solenoid wire properly. Replug connector **a**, and refit bracket **3**.
- Refit connecting strap between clutch carriage and thread-cutter release lever, and retighten screws **2** (2 x T10) just slightly.
- Use 3.0mm pinnning tool **a** (007937.50.00) to pin thread-cutter unit thread catcher.
- Use 3.0mm pinning tool **b** (007937.50.00) to pin link between clutch carriage and thread-cutter release lever. Ensure that screws **2** (2xT10) are untightened.
- Use eccentric key (001361.70.00) to position the clutch lever in such way that the clutch lever fork won't touch the base shaft in any position and that it can easily be brought into home position by the pull solenoid pressure spring.
- In this position, retighten connecting strap screws **2** (2 X T10).
- Rehook tension spring **1**.
- Check and adjust base shaft synchronization (see 5.5.1)
- Function-check solenoid (see Service Program test 6d).

4.3.11.1 Adjusting the thread-cutter and stitching-start solenoid

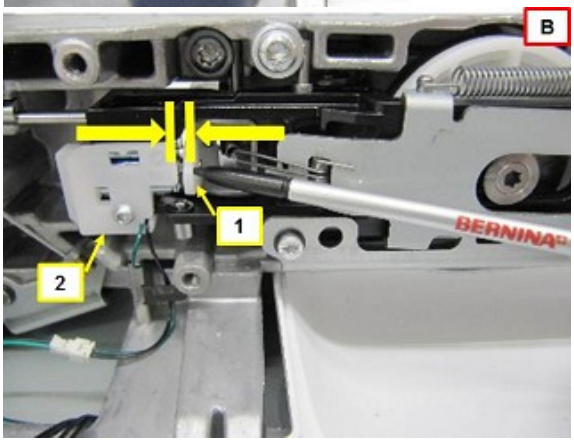
Disassembly/Assembly of clutch carriage see 4.4.4.

Adjustment:

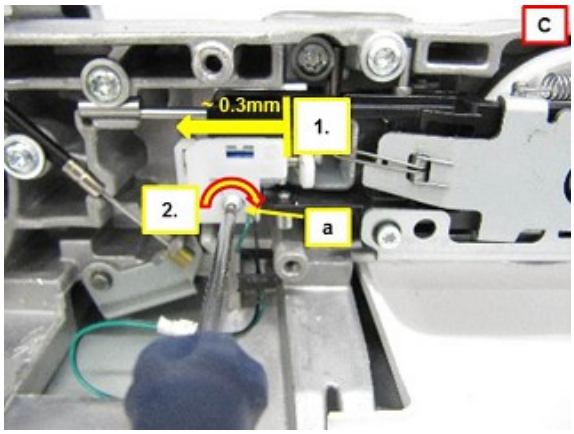
- Remove head cover and rear cover (see 3.1)
- Set needle bar to TDC.



- Slightly untighten solenoid bracket screw (pict. A).



- On the rear of the machine bring clutch lever **1** to left stop (pict. B).
- Move solenoid bracket **2** to right up to stop (pict. B).



- Move solenoid bracket ca. 0.3mm to left. Then retighten screw **a** (pict. C).
- Start machine in Service Program. Run tests **6d** and **6e**.
- Refit the covers (see 3.1).
- Sew-off including thread-cutting.

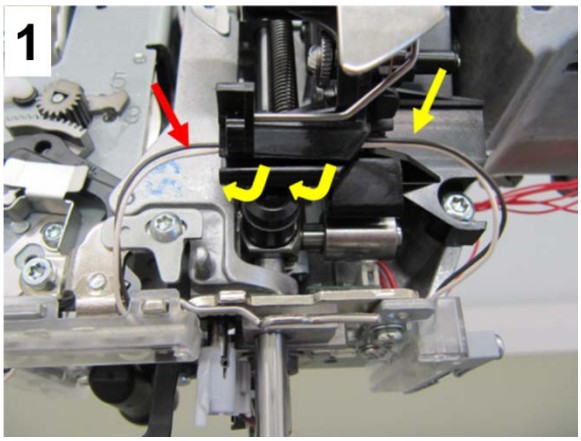
4.3.12 Thread take-up cover with automatic upper-thread tensioning unit

See ESD-related note

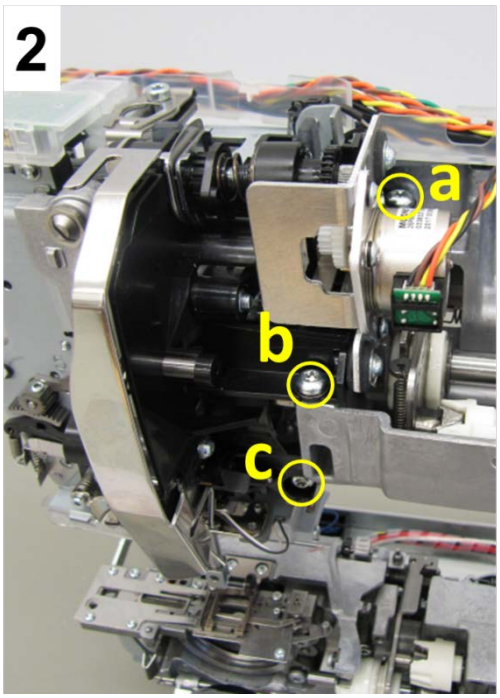
Disassembly:

- Remove the covers (see 4.1)**.**
- **Picture 1 -** Carefully remove the two stranded wires (black/white) from the small cable duct.
- **Picture 2 -** Remove screws **a**, **b**, and **c** (T20) including washers.

Note:
The screw holes are slotted, but in different directions. Therefore we recommend to remove the screws entirely.
Take care not to damage the very thin stranded wires of the lighting when removing parts.
The unit can be put down in the frame arm.



Warning!
The electric connection on the thread-tensioning stepping motor is NOT protected.
Take care not to produce short-circuiting.



Assembly:

- Bring the thread take-up cover with automatic thread tensioner into position, taking care not to damage the fine stranded lighting wires.
- Tighten fastening screws **a**, **b**, and **c** (T20 M4X10) to attach the unit.
- Carefully reinsert the two stranded wires (black/white) into the small cable duct.
- If nothing else has to be taken care of, refit the covers (see 4.1)

4.3.13 Needle-bar support

Disassembly of needle-bar support

- Remove the covers (see 4.1)**.**
- Remove thread take-up cover (see 4.3.8 Thread take-up cover).
- Remove LED sewing light (see 4.2.6).
- Untighten screw 40 (T10 M3x4.5). Turn setting knee away.
- Unhook tension spring **50**.
- Unhook tension spring **21**.
- Pull needle-bar support to front completely **30**. Slide needle-bar cam out of joint **31**.

Assembly of needle-bar support:

- Reinsert needle-bar cam into joint a.
- Position needle-bar support on head-frame plate.
- Rehook tension spring **37**.
- Position setting knee, adjust (no play or clamping), retighten screw 40 (T10 M3x4.5).
- Use pinning tool 002733.50.00 to pin drive pinion.
- Make sure that the zigzag segment is in the centre.
- Rehook tension spring **50**.
- Refit thread take-up cover.
- Adjust needle span (see 5.4.2).
- Adjust stitch-width stop (see 5.4.3).
- Adjust threader head level (see 5.8.1)
- Refit covers (see 4.1)
- Carry out a functional check. Sewing-off.

4.3.14 Needle bar

Disassembly:

- Remove needle-bar support (see 3.3.7).
- Unhook spring **1**.
- Untighten setscrew **b** (T6 M3x4) and remove needle-bar guide **033145.70.00.**
- Disengage needle bar **3** by pressing catch **2**, then slide it down and out of needle-bar support.

Assembly:

- Insert needle bar **3** into needle-bar support from underneath. Insert needle-bar cam into needle-bar guide **033145.70.00** while keeping catch **2** pressed.
- Rough-set the needle-bar guide and secure setscrew **b** (T6 M3x4).
- Rehook spring **1**.
- Refit needle-bar support (see 3.3.7)
- Adjust threader (see 4.9).

4.3.15 Needle clamp

Disassembly:

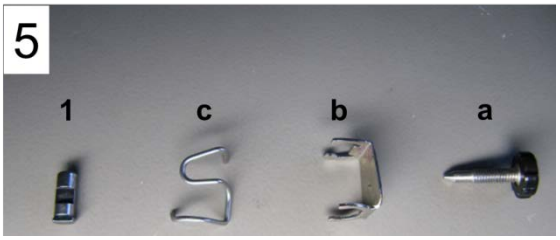
- Remove presser foot and needle.
- Remove needle clamp screw **a**.
- Remove thread guide clamp **b**.
- Remove thread guide wire **c**.
- From behind, push out needle stop pin **1** using a small screwdriver.

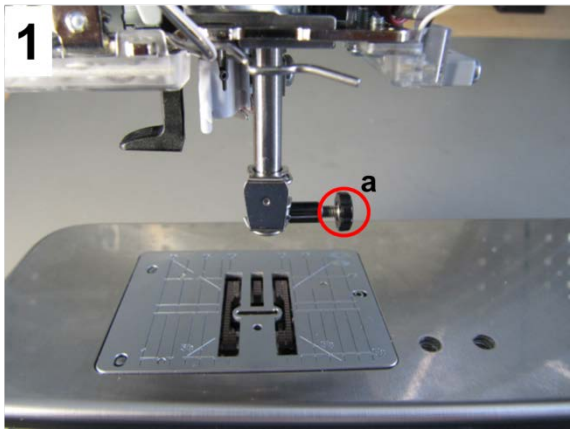
Assembly:

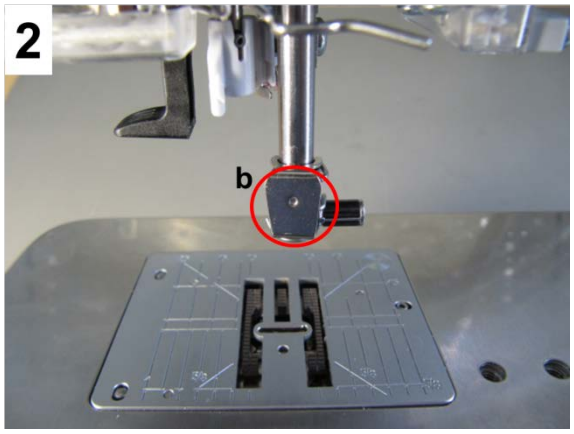
- Properly refit respective needle stop pin **1** (flat side down).
- Position thread guide wire **c** and hold.
- Add and engage thread guide clamp **b**.
- Refit needle clamp screw **a**.
- Refit needle and presser foot (if appropriate).

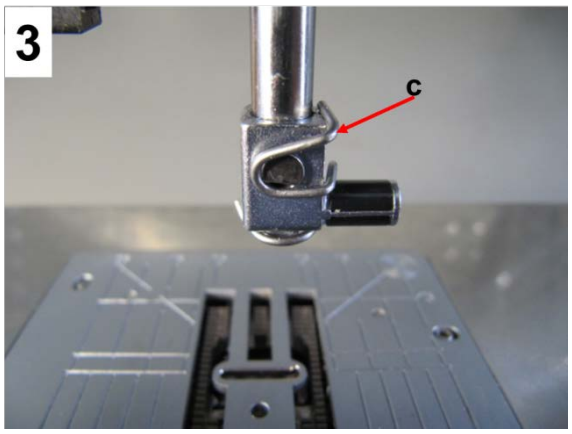
Needle stop pin table

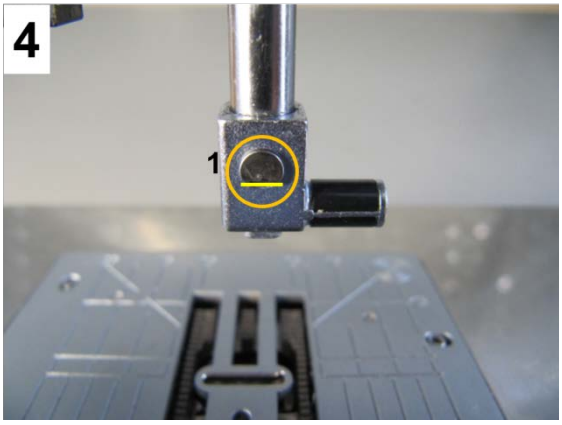
Item no.	Name	Dimension in mm
036687.50.00	Needle stop pin	2.2
036687.50.01	Needle stop pin	2.4
036687.50.02	Needle stop pin	2.6
036687.50.03	Needle stop pin	2.8
036687.50.04	Needle stop pin	3.0
036687.50.05	Needle stop pin	3.2
036687.50.00	Needle stop pin	3.4
036687.50.07	Needle stop pin	3.6











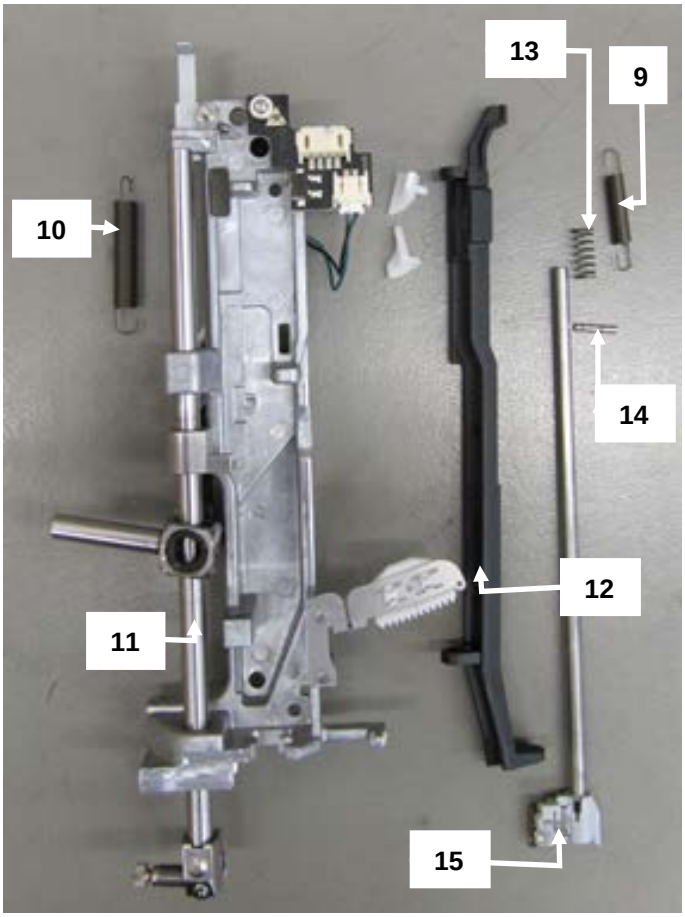
4.3.16 Threading mechanism

Disassembly:

- Unhook tension spring **9**.
- Unhook tension spring **10**.
- Move needle bar **11** down.
- Move threader holder **12** down.
- Pinch pressure spring **13**.
- Remove dowel **14** with tweezers.
- Slide threader bar **15** down and out.

Assembly:

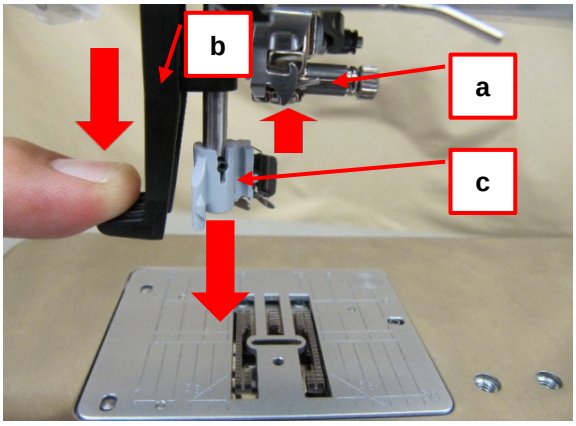
- Position threader holder **12** on needle-bar support.
- Slide threader bar **15** in from below by 3/4.
- Insert pressure spring **13** onto threader bar. Slide threader bar up entirely.
- Pinch pressure spring **13**.
- Refit dowel **8**.
- Position dowel **8** in such way that the pressure spring sits in the entry of the dowel **8** (pict. **a**).
- Rehook tension spring **10**.
- Rehook tension spring **9**.



4.4.16.1 Threader head

Disassembly:

- Set needle bar **a** to its top position.
- Remove needle.
- Move needle threader holder **b** down a little.
- Slide threader head **c** off threader bar.



Assembly:

- Push threader head **c** onto threader bar in correct position.
- Release needle threader holder **b**.
- Insert needle.
- Functional check.
- Adjust threader if necessary (**see 5.9**).

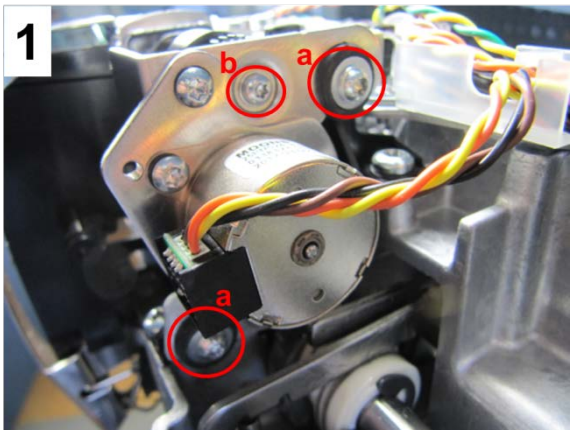
%

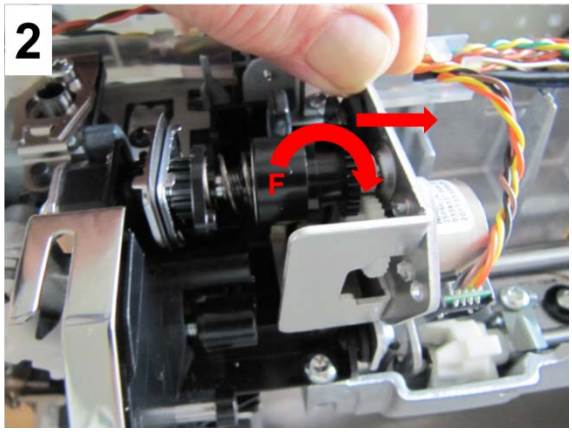
4.3.17 Thread tension

Disassembly:

- Remove the covers (see 4.1).
- **Picture 1 -** Untighten screw **a** by 2 rotations. Remove screw **b**.
- **Picture 2 -** Push stepping-motor carrier to right in direction of arrow. Then lift thread tension out.
- **Picture 3 -**

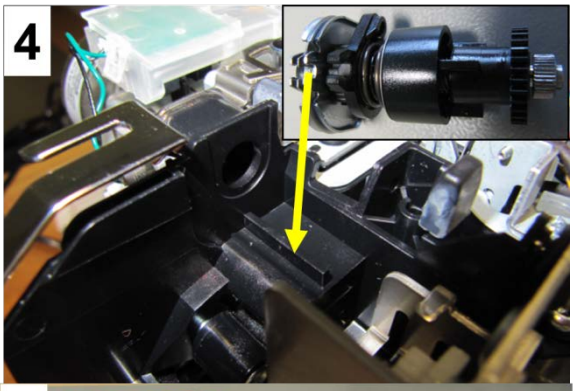
No.	Parts
1	Rubber mount
2	Thread tension axis
3	Left tension disc
4	Centre tension disc
5	Right tension disc
6	Buffer with position retainer
7	Tension spring
8	Washer
9	
10	Drive wheel
11	Spacer

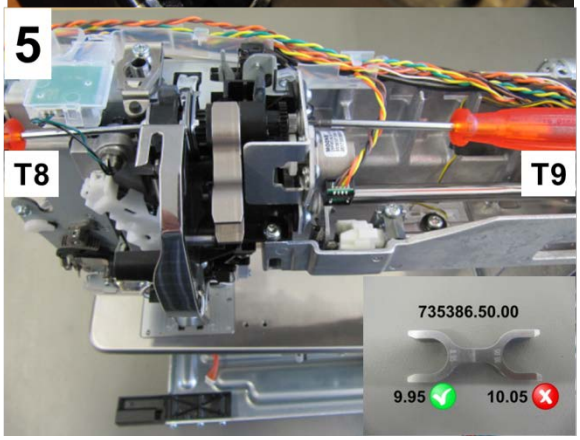




Assembly:

- Picture 3 - Reassemble upper-thread tension in this order.
- **Picture 4 -** Turn tension discs closed until guiding slots match. This will make it easier to fit them onto the guide rail.
- **Picture 2 -** Push stepping motor to right in direction of arrow. Then refit thread tension.
- **Picture 1 -** Refit and retighten screw **b**.
- **Picture 5 -** Using distance gauge 735386.50.00, reset to mechanical basic setting.





4.3.18 Thread take-up lever and thread regulator spring

Disassembly:

- Remove the covers (see 4.1)
- Remove thread take-up cover (see 4.3.12).
- Remove micro switch bracket screw (T10) (thread tension release when presser foot is raised).
- Untighten screw (T20) and u-bolt so far as to be able to slide link shaft out.
- Fold shaft to front and slide thread take-up lever to left and out of shaft.

Assembly:

- Slide thread take-up lever back onto shaft to the right.
- Fold link shaft to back and bring under u-bolt. Slide take-up lever to right and retighten screw (T20) and u-bolt.
- Position micro switch bracket and micro switch properly, taking care that the positioning knob sits properly and the contactor runs in the guiding fork. Retighten screw (T10).
- Refit thread take-up cover (see 4.3.12).
- Refit covers (if appropriate) (see 4.1).

4.3.18.1 Thread regulator spring

Disassembly:

- Remove head cover.
- Untighten screw **17** (T10 M3x5).
- Remove thumb wheel **16**.
- Remove regulator spring **15**.

Assembly:

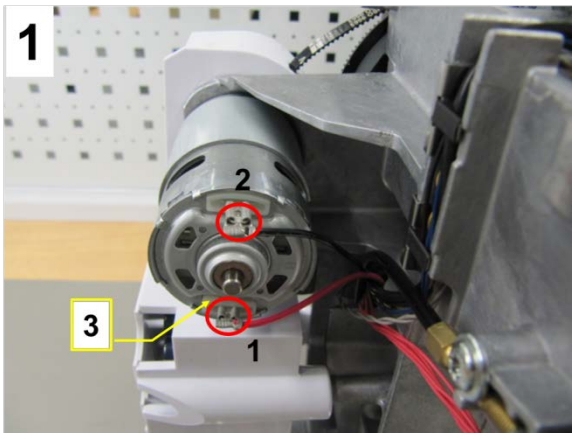
- Refit regulator spring **15**.
- Refit thumb wheel **16**, taking care that regulator spring slides into bore.
- Refit screw **17** (T10 M3x5). Retighten slightly.
- Adjust thread regulator spring (see 5.11**).**
- Retighten screw **17** (T10 M3x5).
- Refit head cover.

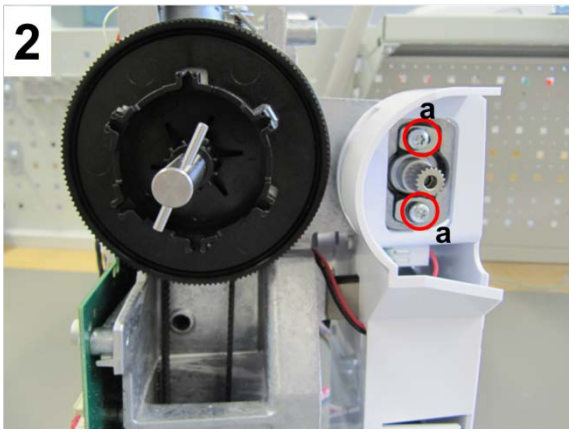
4.3.19 Main motor

See ESD-related note

Disassembly:

- Remove the covers (see 4.1).
- Remove wheel.
- Remove screws **a** (T20 M4x12, u-washer 5.3x10x1, serrated washer 5.1x9x0.5).
- Remove drive belt.
- **Picture 1 -** Disconnect plugs **1** and **2**.
- **Picture 2 -** Remove screws **a** (T20 M4x12, u-washer 5.3x10x1, serrated washer 5.1x9x0.5).
- Slide main motor out of motor bracket.





Assembly:

- Position motor back into motor bracket.
- **Picture 2 -** Slightly retighten screw **a** including u-washer and serrated washer.
- **Picture 1 -** Reconnect plugs **1** (red positive pole '+') and **2** (black negative pole '-').
  Note: The positive pole can be identified by the salient **3**.
- Refit drive belt and wheel.
- Adjust belt tension (see 5.1.2).

4.3.20 Stitch length stepping motor

See ESD-related note

Removal of crankshaft:

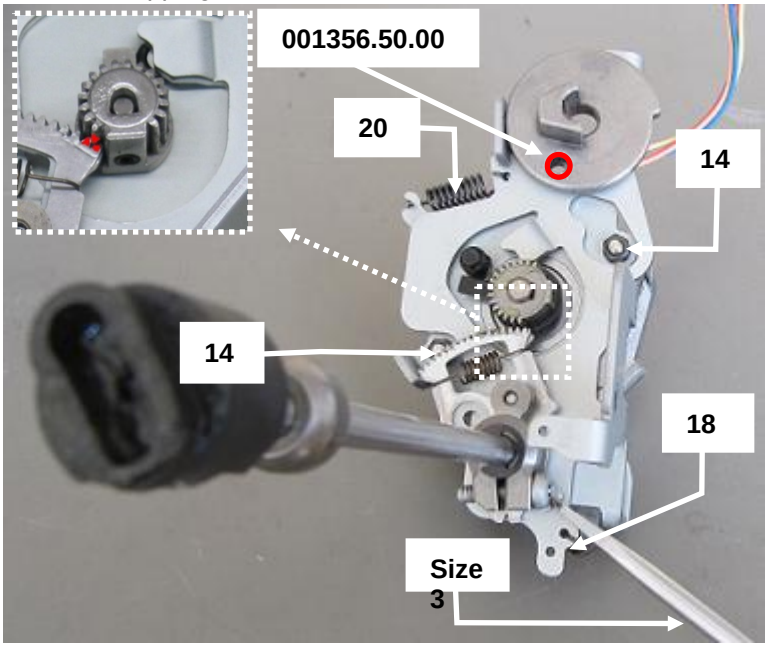
- Remove the covers **(see 4.1)**.
- Remove screw 5 (T10 30x10). Remove balance axis **3**.
- Remove tension springs **13, 23** and **28**.
- Disconnect stitch-length stepping motor plug from PCBA-Position.
- Untighten three screws **22** (T20 M4x10).
- Remove clamp, crankshaft and stitch length drive.

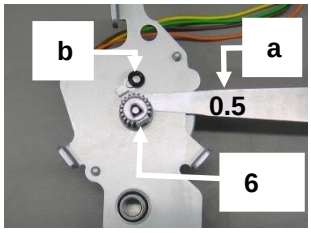
Removal of stepping motor:

- Remove springs **18** and **20**. Remove carrier plate.
- Untighten setscrew **6** (T6 3x4). Remove pinion.
- Untighten two screws **14** (T10 M3x6). Remove stepping motor.

Assembly:

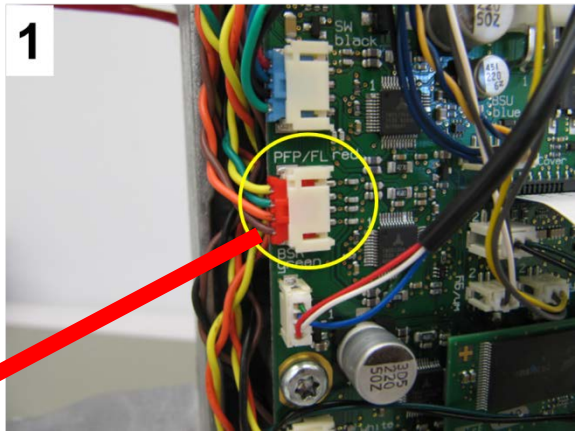
- **Fsten stepping motor with two screws 14** (T10 M3X6).
- **Reconnect PCBA-Position, front cover and rear cover with the aid of** service cables 734149.50.00 and 734150.50.00**.**
- Start machine in Service Program.
- **Machine with touchscreen: Select test** 5e **(stepping motors pinning position).**





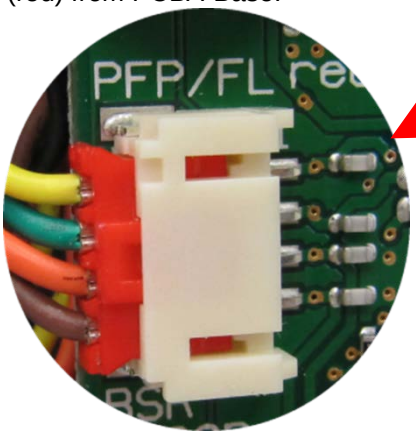
4.3.21 Presser-foot pressure stepping motor

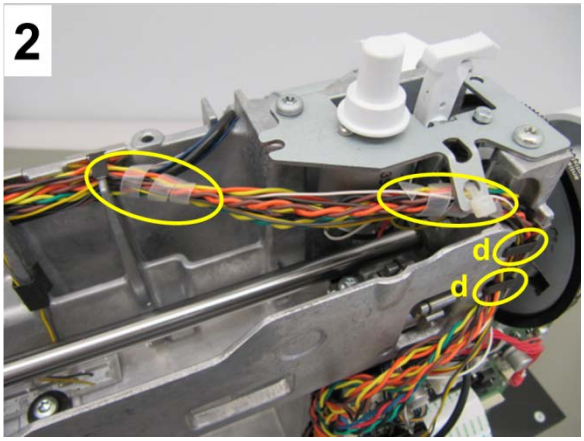
See ESD-related note



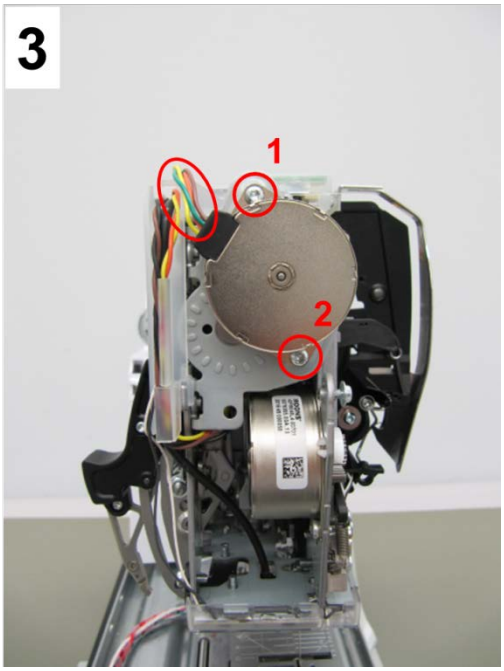
Disassembly:

- Remove the covers (see 4.1).
- **Picture 1 -** Unplug stepping motor wire including PFP connector (red) from PCBA-Base.





- **Picture 2 -** Remove the two clips **d**.
- **Picture 2 -** Unthread stranded wires (yellow/green/orngae/brown) from the two spiraled wire bundles, and remove them from the cable duct.
- **Picture 3 -** Remove fastening screws (T10) **1** and **2** (M3X6mm).
- Carefully remove stepping motor.



Assembly:

- **Picture 3 -** Refit stepping motor. Slightly retighten screws **1** and **2**.
- **Picture 3 -** Take care that there is no play between drive gear pinion and wheel (no play or clamping). Then retighten screws **1** and **2**.
- **Picture 2 -** Reinsert stranded wires into cable duct and rethread them into spiraled wire bundles.
- **Picture 1 -** Replug connector (red) into respective slot labelled ‘PFP/FL red’.
- If nothing else has to be taken care of, refit the covers.

Note:
Since the stepping motors don’t have connectors attached to the motors, they must be replaced fully and including the wires when wires are damaged.

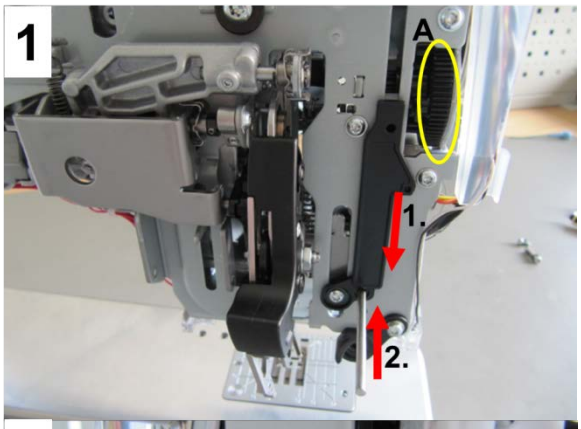
4.3.22 Stitch-width stepping motor

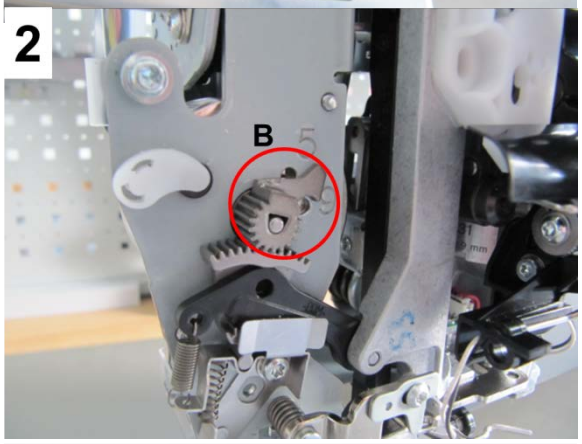
See ESD-related note

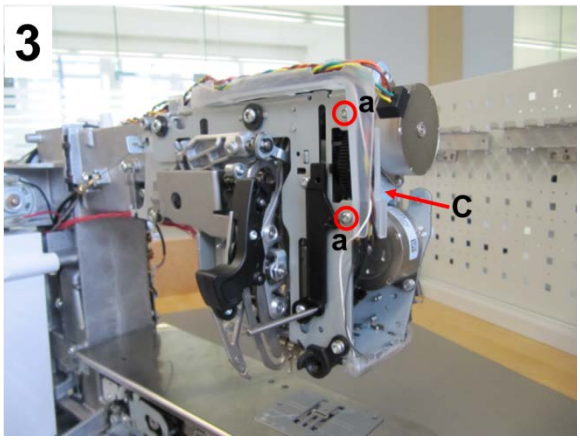
Note:
The stitch-width stepping motor can only initialize with the needle out of the stitch hole. **This does NOT apply for the Pinning Position in Servie Program 5e.**

- Remove the covers (see 4.1)
- **Picture 1 -** Turn gearwheel **A** of presser-foot pressure and height stepping motor down until

  black guide of toothed rack is lockable with 3.0mm pinning tool (007937.50.00).
- **Picture 2 -** With the aid of a T8 screwdriver, remove gear pinion **B** from stitch-width stepping motor.
- **Picture 3 -** Remove the two screws **a** T10 (M3x6 including washer). Remove carrier plate including presser-foot pressure and height stepping motor.
- **Picture 4 -** Remove carrier plate **C** including presser-foot pressure and height stepping motor.
- **Picture 5 -** Remove two screws **b** T10 (M3x4) from stitch-width stepping motor. Slightly turn stepping motor to rear and out of sewing head.

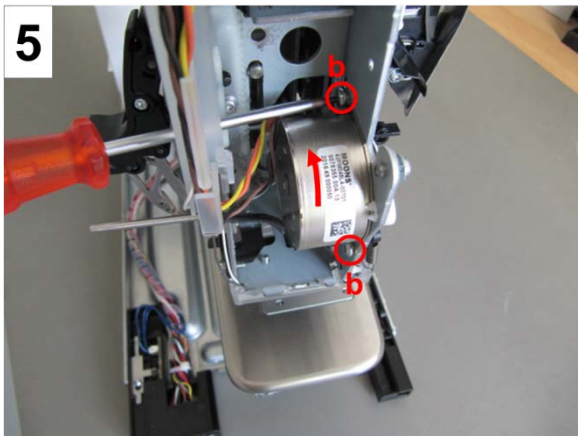


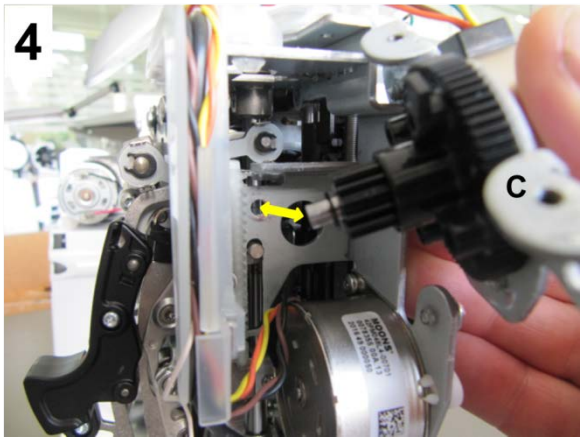




Assembly:

- **Picture 5 -** Reinsert stitch-width stepping motor to sewing head, and fasten it with screws **b**.
- **Picture 4 -** For easier fitting of shaft on carrier plate **C**, apply a drop of oil on the shaft before carefully sliding it into bore (marked in yellow).
- **Picture 3 -** Retighten two scews **a** T10 on presser-foot pressure and height stetpping motor carrier plate to fasten it.
- **Picture 2 -** Refit stitch-width stepping motor gear pinion **B** in such way that each side has the same amount of teeth when pinning it at 9.0mm left and right.
- **Picture 1 -** Remove 3.0mm pinning tool.





Chapter 5 – Adjustments

Basics - General Information

To enable the settings and adjustments described to be performed correctly, the machine must be in good mechanical and electrical condition. (running smoothly, properly oiled and all leads connected)!
When adjustments are carried out in the correct order, the machine will function flawlessly.

Important:
Always use a needle size «Nm 80» when adjusting and setting the machine, unless otherwise specified.
Always check the needle before carrying out adjustments on the machine! The needle must be absolutely straight (**130/705 H TCN**).

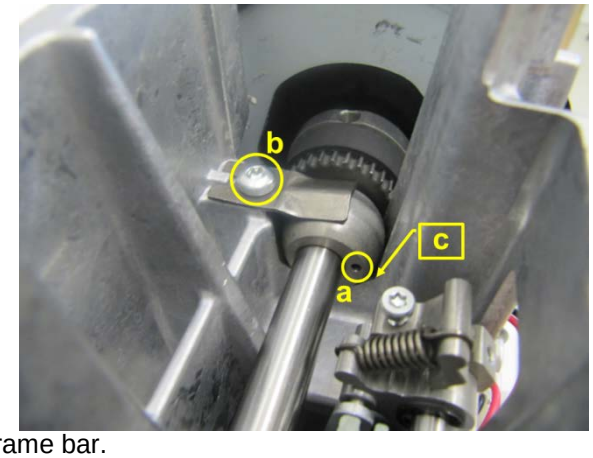
For servicing, we recommend that you always use the accessories included with the machine or purchased specifically for it. Which are: power cable, foot control, buttonhole foot, embroidery module and hoop, BSR foot, and other accessories.

5.1 Belt Tensions

5.1.1 Vertical shaft-/base shaft belt tension

Check:

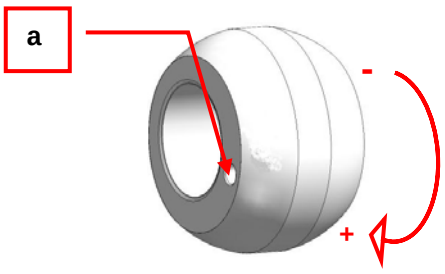
- Check condition of main shaft-/base shaft drive belt 030955.50.07.
- When slightly pressed (approx. 100g) in the center of the belt, the belt mustn't move more than 2-3mm.



Note:
Too tightly tensioned belts will cause stiff running.
Too slackly tensioned belts may bounce off.

Adjustment:

- Remove winder unit.
- Basic position of main shaft eccentric spherical bearing: The adjustment opening **a** of the eccentric spherical bearing sits ca. 5.0mm above corner **c** of frame bar.
- Untighten screw **b** (T20). Then use adjusting spanner 733019.70.00 to turn the bearing until the specified tension value has been reached.
- Retighten screw **b**.



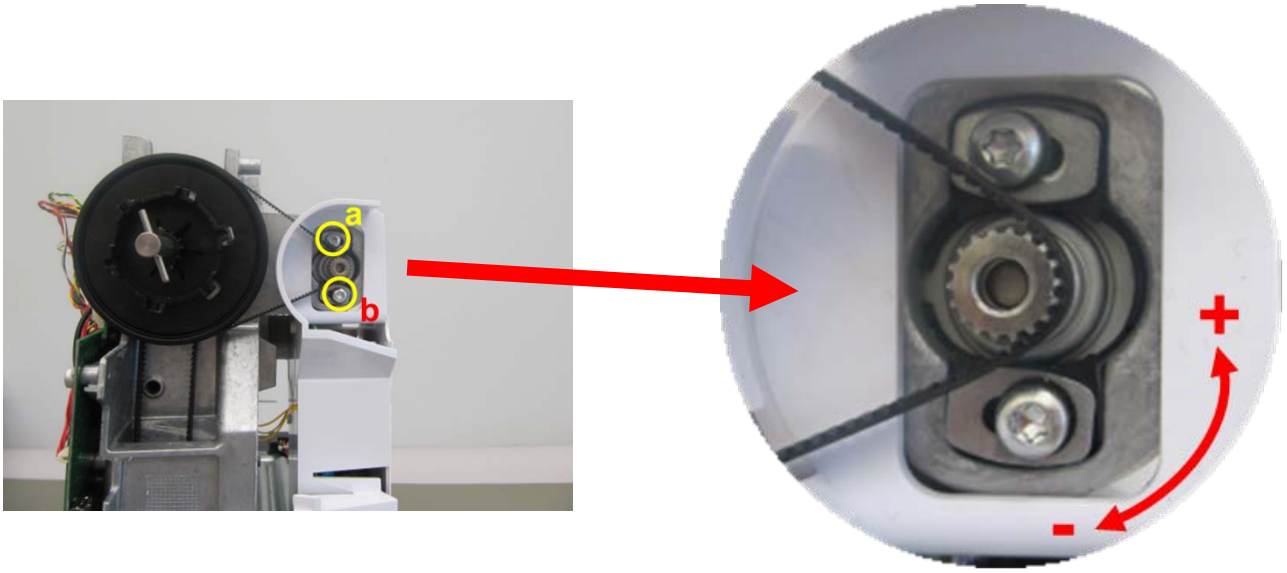
5.1.2 Drive motor belt tension

Check:

- With a pressure of approx. 500g onto the belt center **a**, the belt mustn't move more than ca. 8mm.

Adjustment:

- Remove the two motor fastening screws **a** and **b** (T20 M4X12 u-washer 4.2x14x1.5).
- Turn motor clockwise until specified value has been reached. Turn motor counterclockwise to slacken belt tension.
- Retighten fastening screws **a** and **b**.



5.1.3 Hook drive belt tension

Note:
Check condition of hook drive belt when removing the clutch carriage and/or hook drive.

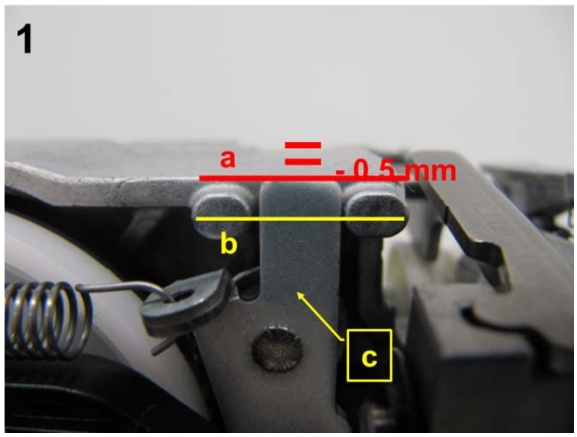
Check:

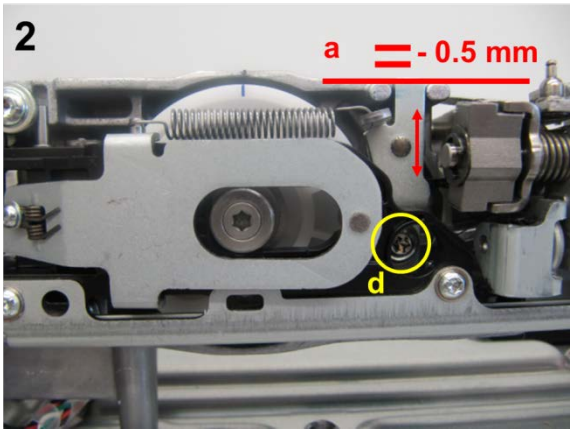
- Belt tensioner **c** (033108.70.00) must be flush with freearm frame surface. Deviation of max. -0.5mm is possible.

Note:
To avoid stiff running, the drive belt mustn't be too taut.

Adjustment:

- Before removing the belt tensioner, we recommend to mark **b** the position to be able to find the best adjustment point from the beginning when refitting the belt (pict. 1).
- Untightening screw **d** allows for moving the belt tensioner up and down. Moving up slackens the tension, moving down tightens the tension (pict. 2).





5.2 Head-frame plate position

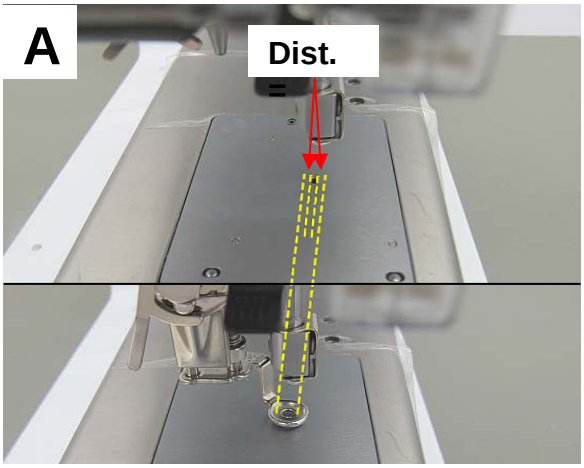
Important!
In order to avoid any damage at all, the following settings up to and including item 5.3.2 shall be carried out without sewing needle(see 4.3.2)!

5.2.1 Position of head-frame plate/stitch plate in Y-direction

5.2.1 Position of head-frame plate/stitch plate in Y-direction

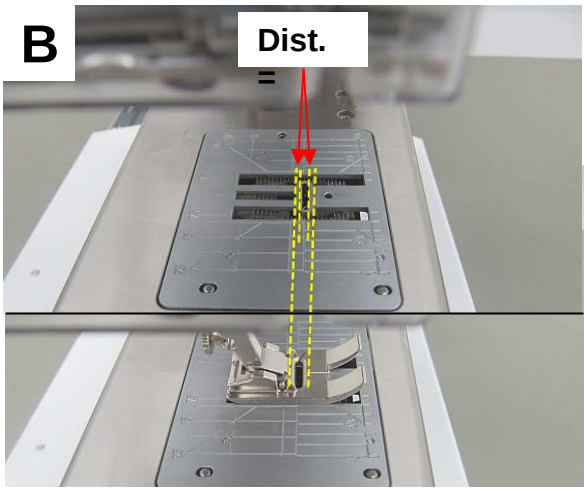
Check embroidery machine (pict. A):

- Remove needle.
- Attach stitch plate.
- Attach presser foot 26.
- Lower presser foot.
- Set needle bar to BDC.
- The distance between presser foot and stitch hole must be the same at tip and end of foot.

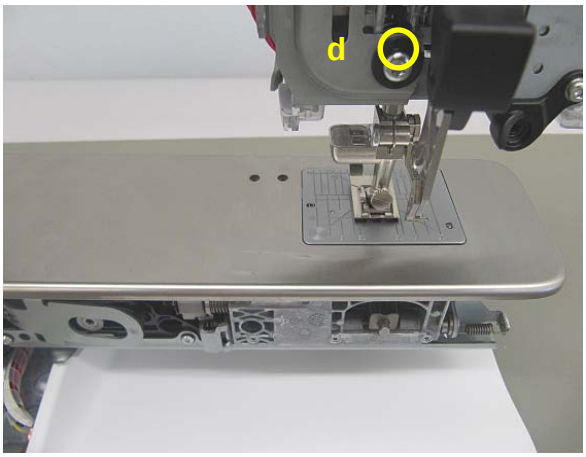


Check sewing-/embroidery machine (pict. B):

- Remove needle.
- Attach stitch plate.
- Attach presser foot 1 or 1C.
- Lower presser foot.
- The distance between presser foot and stitch hole must be the same at tip and end of foot.



Note:
This setting affects (5.5.3 needle-/hook distance)



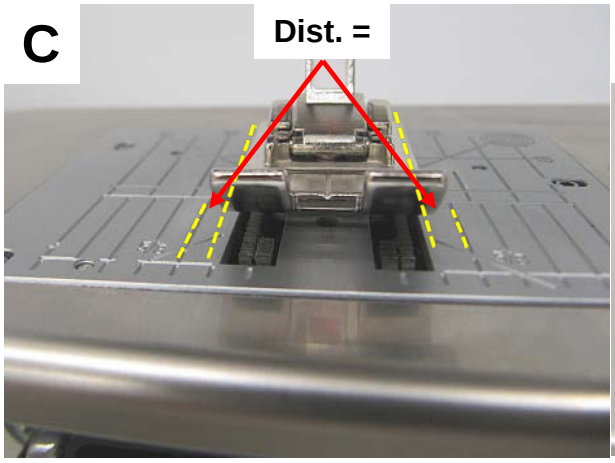
Adjustment:

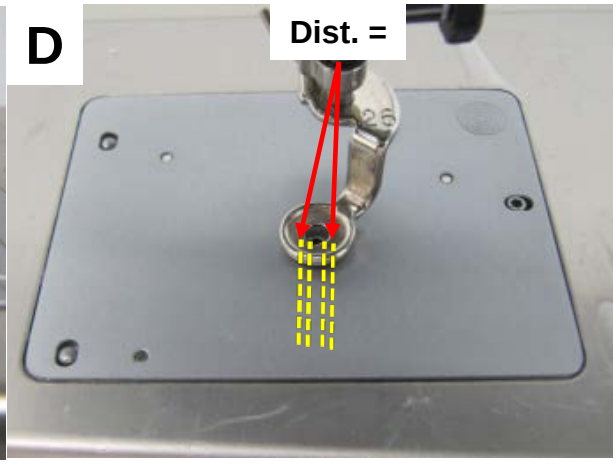
- Raise presser foot ca. 1mm from stitch plate.
- Use screw **d** (T20 M4x16) to set distance:
  - Turning it clockwise moves the foot forward.
  - Turning it counterclockwise moves the foot backward.

5.2.2 Position of head-frame plate/stitch plate in X-direction

Check embroidery machine (pict. C):

- Remove needle.
- Attach stitch plate.
- Attach presser foot 26.
- Lower presser foot.
- Set needle bar to BDC.
- The distance between sides of presser foot and stitch plate must be the same left and right.



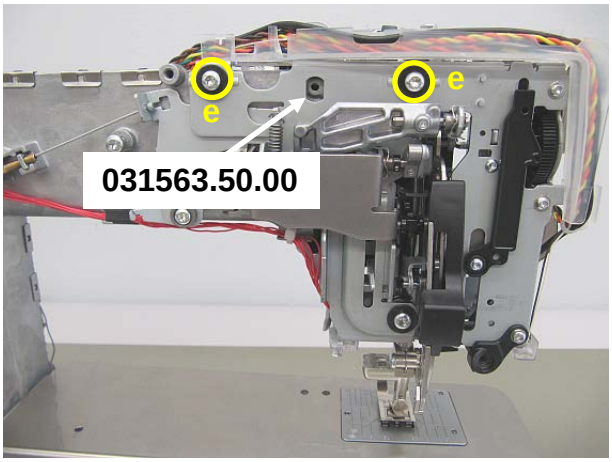


Check sewing-/embroidery machine (pict. D):

- Remove needle.
- Attach stitch plate.
- Attach presser foot 1 or 1C.
- Lower presser foot.
- The distance between sides of presser foot and stitch plate must be the same left and right.

Adjustment:

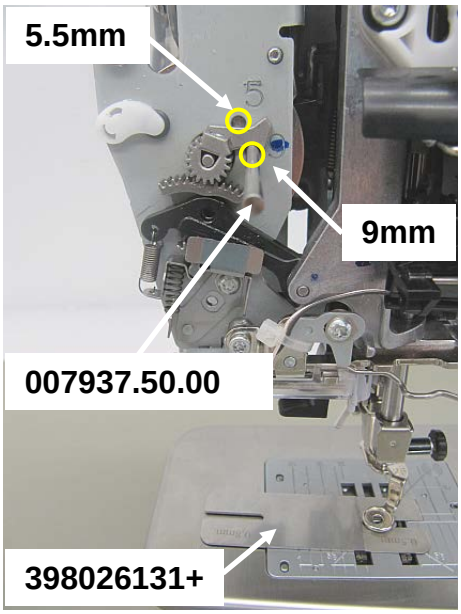
- Raise presser foot ca. 1mm from stitch plate.
- Slightly untighten two screws **e** (T20 M4x16).
- Use setting excenter 031563.50.00 to bring head-frame plate into position.
- Retighten two screws **e**.



5.3 Presser-foot adjustment

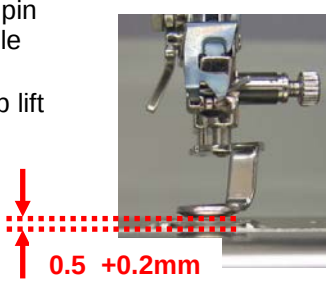
5.3.1 Darning foot height

Note:
This adjustment will set the foot height of the presser feet at the same time on machines with manual presser-foot lowering

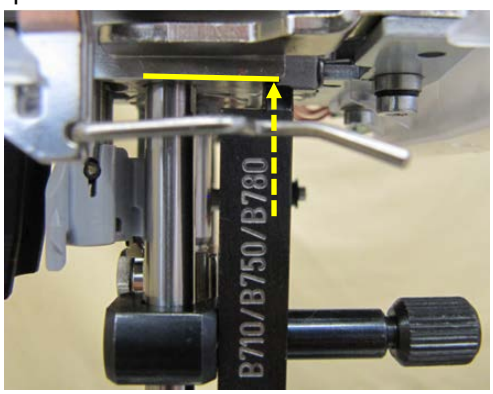


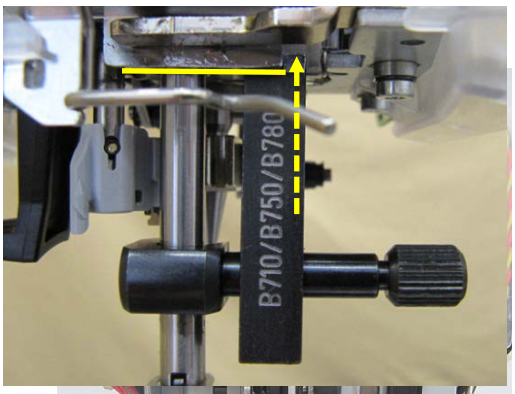
Check

- Attach stitch plate.
- Attach embroidery foot 26.
- Use pinning tool 007937.50.00 to pin SW stepping motor = center needle position
- Use new loop lift gauge to set loop lift (2.618mm).
  - Set needle bar to BDC.
  - Use gauge **734571.70.01** to attach clamp from the right in such way that the machine is locked in BDC position.

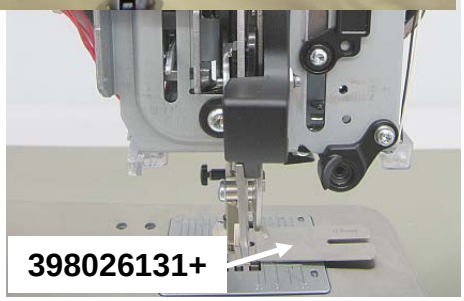


  - Move gauge to right until the needle bar is risen by 2.618mm and stops.
- Lower presser foot.





- Use darning-foot height gauge 398026131+ to check distance (0.5 mm +0.2) between stitch plate and sole of darning foot or drop-shaped presser foot.



Adjustment:

- Attach embroidery foot 26.
- Use new loop lift gauge to set loop lift (2.618mm). See above.
- Lower presser foot.
- Slightly untighten setscrew **b** (T8).
- Slide presser foot bar up or down until the distance is 0.5mm +0.2. Ensure that presser foot and stitch plate are parallel.
- Retighten setscrew **b**.

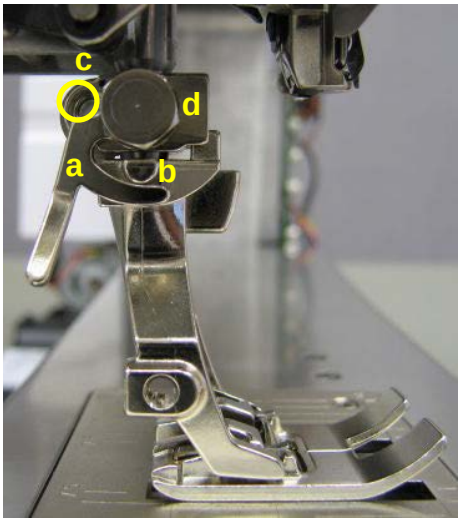
5.3.2 Presser-foot fixation

Check:

- Use a new presser foot to check if clamping lever **a** meshes with clamping bar **b** by a third to a half.
- The presser foot sole and the markings on the stitch plate must be parallel.

Adjustment:

- Untighten screw **c** (T20) on clamp **d**.
- Adjust clamp height until correct clamping position is reached (one third of clmaping span). Ensure that presser foot and stitch plate are parallel.
- Retighten screw **c**.
- Recheck that presser foot and stitch plate are parallel.
  - Sewing-/embroidery machines - Presser-foot sole and stitch plate must be parallel.
  - Embroidery machines - Stitch hole in embroidery foot 26 and stitch hole in stitch plate must be centred.



5.4 Needle settings

5.4.1 Distance between needle bar and presser-foot bar

Important!
The adjusting screw (g) must only be used for the parallel setting of the needle bar and presser foot bar. It mustn't be used for the setting of the needle-/hook distance.
Adjustment of needle-/hook distance (see 5.5.3).

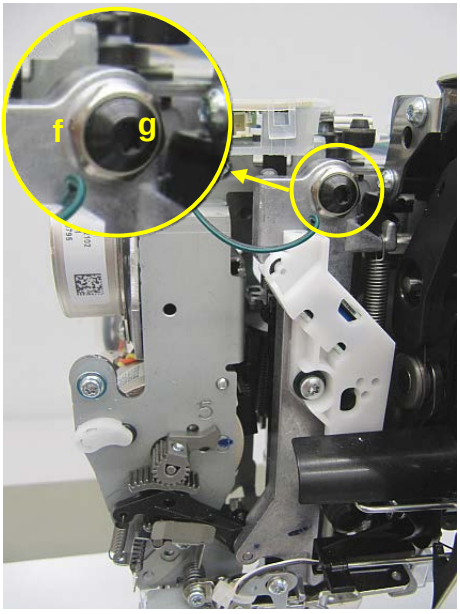
Check:

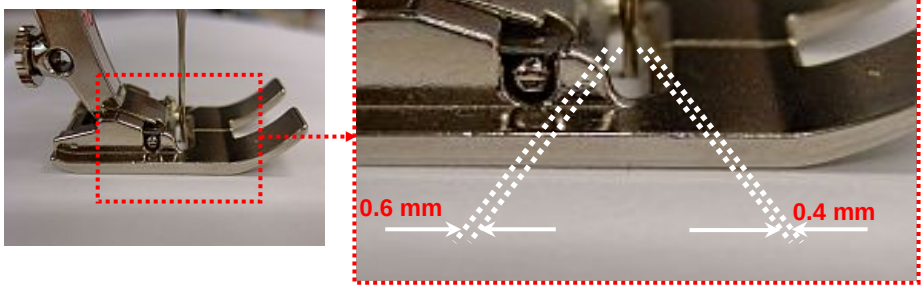
- Attach presser foot 1.
- Attach needle size 130/705 Nm **100**.
- Lower needle bar until needle tip is level with stitch plate.
- Lower presser foot as far as sole can still be moved.
- Carefully move presser-foot sole up and down to stop, taking care not to force off the needle.

Note:
For a better view, use a white paper sheet to rest the tip of the needle on.

Adjustment:
Note:
This setting affects (5.5.3 needle-/hook distance)

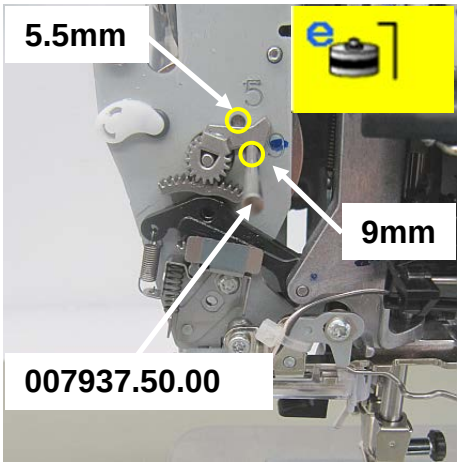
- Untighten lock nut **f** (10mm).
- Use screw **g** (T15) to correct the position.
- The distance should be ca. 0.4mm in front of needle 130/705 Nm **100** and ca. 0.6mm behind the needle.
- Retighten lock nut **f.**





5.4.2 Needle distribution

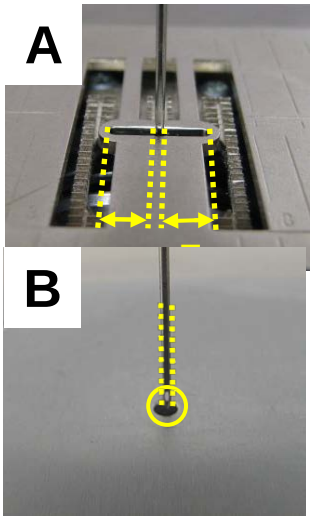
Note:
To use the Service Program, the machine must be running (switched on). Refer to the safety instructions, please.



Checking sewing-/embroidery machines

- Remove head cover.
- Start machine in Service Program. Select test **5e**.
- Use pinning tool 007937.50.00 to pin SW stepping motor = center needle position (at 9 on 9mm SW machines, at 5 on 5.5mm SW machines).
- Use a size 130/705H TCN 80Nm needle (pct. A).
- The needle must now be in the center of the stitch hole.

Note: Should the stitch-width stepping motor not be pinnable, check the needle bar support for smooth running (see 4.2.22). ~~Adjust the pinning position.~~



Checking embroidery machines

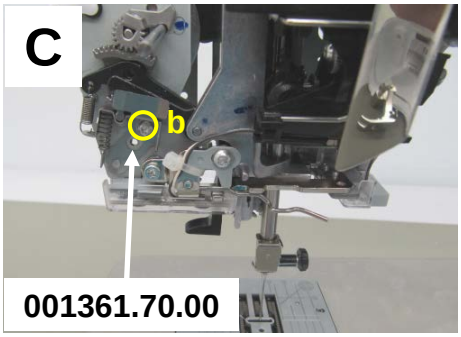
- Remove head cover.
- Use a size 130/705H TCN 80Nm needle.
- The needle must now be in the center of the stitch hole (pict. B).

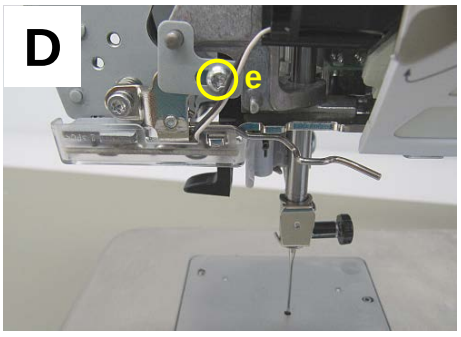
Adjusting sewing-/embroidery machines

- Use pinning tool 002733.50.00 to pin stitch-width stepping motor.
- Slightly untighten screw **b** (T10).
- Use eccentric key 001361.70.00 in eccentric mesh to center the needle (pict. C).
- Retighten screw **b**.

Adjusting embroidery machines

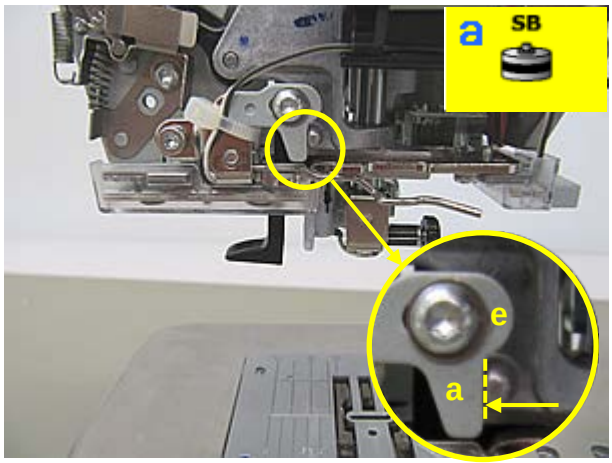
- Slightly untighten screw **e** (T10).
- Set needle to center (pict. C).
- Retighten screw **e.**





5.4.3 Zigzag stitch width limiter

Note:
To use the Service Program, the machine must be running (switched on). Refer to the safety instructions, please.



Check:

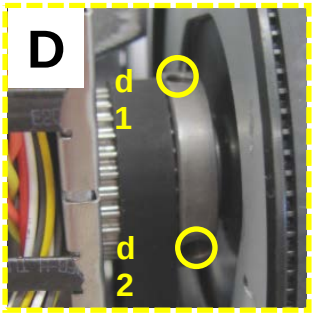
- Start machine in Service Program.
- Select test 5a Stitch Width Stepping Motor.
- Needle bar support mustn't touch the zigzag stitch width limiter **a**.

Adjustment:

- Untighten screw **e** (T10).
- Position limiter **a**.
- Retighten screw **e**.

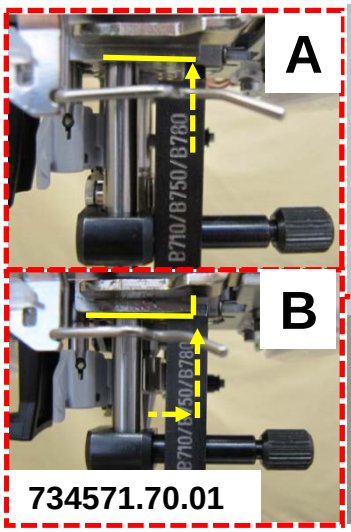
5.5 Hook, needle drive and feed-dog movement timing

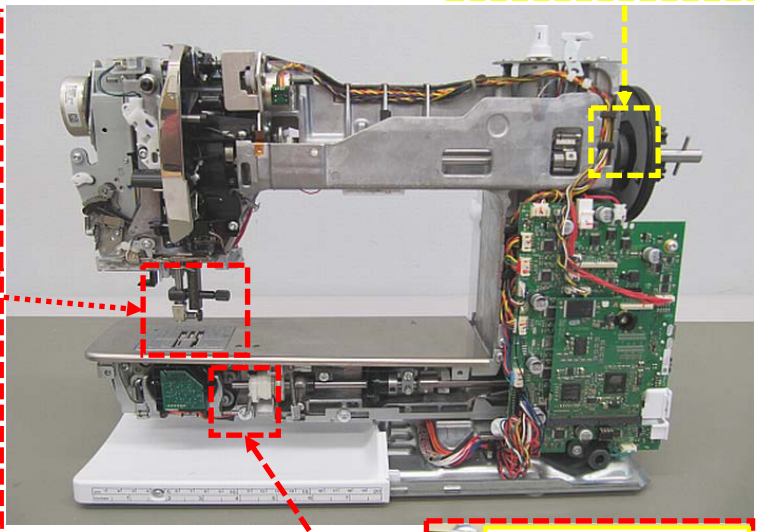
5.5.1 Feed-dog lift movement (base shaft and main shaft timing)



Check:

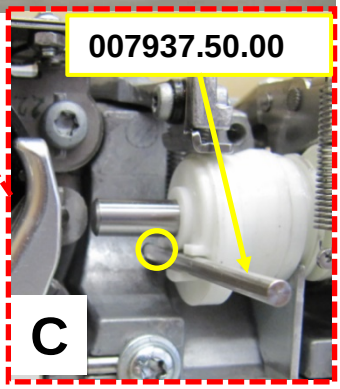
- Set needle bar position as follows (loop lift):
  - Set needle bar to BDC.
  - Use loop-lift gauge **734571.70.01** to attach clamp from right in such way that the machine is locked in BDC position (pict A).
  - Move base body of gauge to right until needle bar is risen by



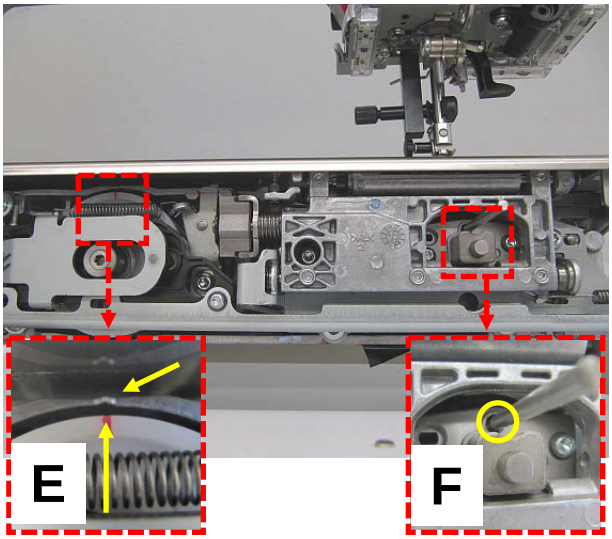


2.618mm (pict. B).

- Front view - Base shaft should be pinnable using pinning tool **0079937.50.00** (pict. C).



- Rear view - Marking on belt edge must exactly match marking on base (pict. E). At the same time, hook driver must be pinnable using pinning tool **0079937.50.00** (pict. F).



Main shaft / base shaft adjustment

- Remove pinning tool **007937.50.00** from base shaft (pict. C).
- Untighten second setscrew **d2** (T10) on main shaft belt pulley in direction of rotation (pict. D).
- Use new loop lift gauge **734571.70.01** to set loop lift (2.618mm).
- Untighten first setscrew **d1** (T10) on belt pulley.
- Turn belt pulley until base shaft can be pinned against lift cam with the 3.0mm pinning tool **007937.50.00** (pict. C).
- Retighten first setscrew **d1** (T10) on belt pulley in direction of rotation.
- Remove gauges.
- Retighten second setscrew **d2** (T10) on belt pulley.

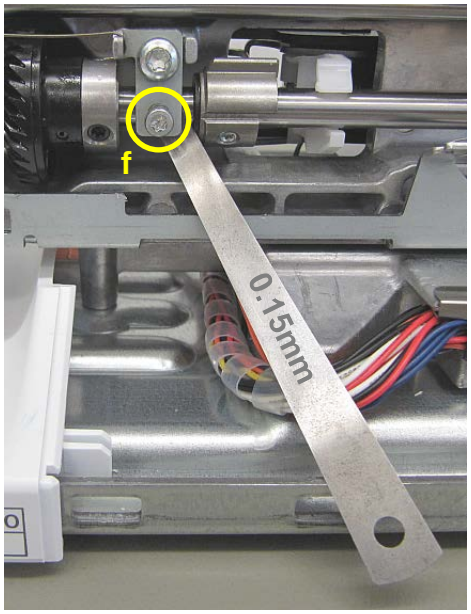
Base shaft / belt pulley adjustment

- Check fitting position of belt pulley.
- Check fitting of hook driver (see 4.4.1).

5.5.2 Base shaft-/load lock screw distance

Check:

- Measure distance between base hsaft and load lock screw with a feeler gauge.
- The distance should be 0.15mm.

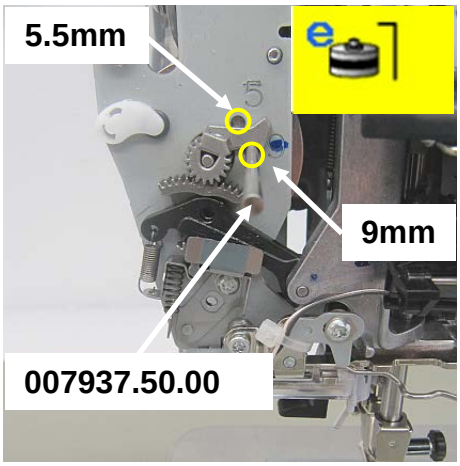


Adjustment:

- Turn screw **f** (T10) to set 0.15mm distance between base shaft and load lock.

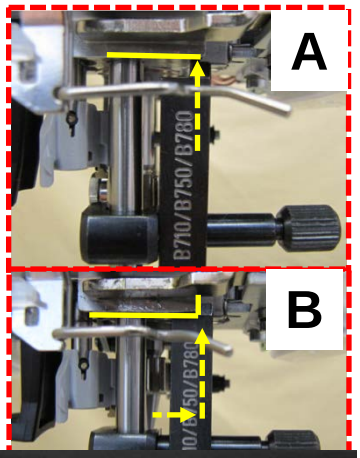
5.5.3 Loop lift

Check:

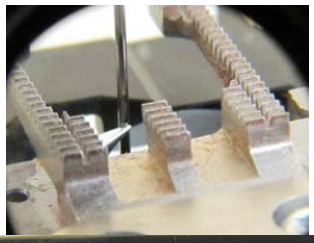


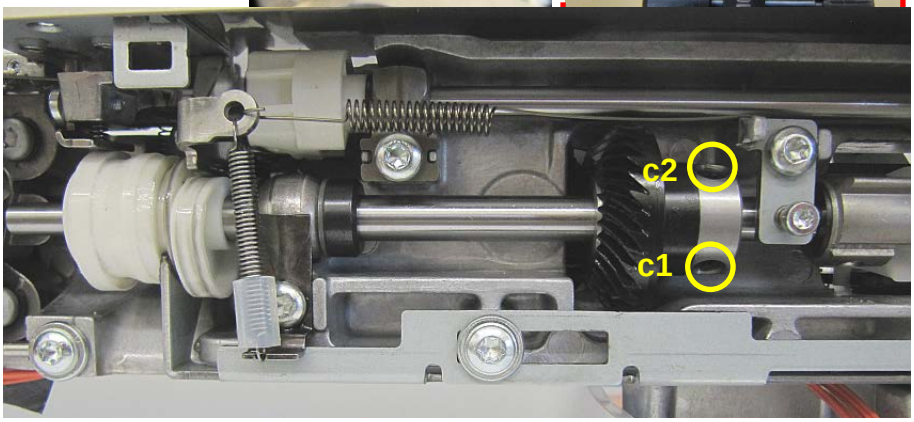
- Start machine in Service Program. Select test **5e**.
- Use pinning tool **007937.50.00** to pin SW stepping motor = center needle position (at 9 on 9mm SW machines, at 5 on 5.5mm SW machines).
- Use a size 130/705H TCN 80Nm needle.
- Set needle bar position as follows (loop lift):
  - Set needle bar to BDC.
  - Use loop-lift gauge **734571.70.01** to attach clamp from right in such way that the machine is locked in BDC position (pict A).
  - Move base body of gauge to right until needle bar is risen by 2.618mm (pict. B).
- Hook tip must be flush with left needle edge.

Adjustment:



- Remove loop lift gauge.
- Use pinning tool **007937.50.00** to pin stitch-width stepping motor = center needle position.
- Slightly untighten second setscrew **c2** (T10) on bevel gear in direction of rotation.
- Adjust needle bar position again:
  - Set needle bar to BDC.
  - Use loop-lift gauge **734571.70.01** to attach clamp from right in such way that the machine is locked in BDC position (pict A).
  - Move base body of gauge to right until needle bar is risen by 2.618mm (pict. B).





- First setscrew is now accessible. Slightly untighten setscrew **c1** (T10) on bevel gear in direction of rotation.
- Turn bevel gear until the hook tip is flush with the left needle edge.
- Slightly push bevel gear against white wheel (undo clearance) and retighten first setscrew **c1** at the same time. The two gear wheels must run smoothly (no play, no clamping).
- Remove loop lift gauge.
- Retighten second setscrew **c2** in direction of rotation.
- Check again and repeat setting if required.
- Recheck loop lift.

<u>Front cover connected</u>

Recheck:

- Start machine in Service Program.

- In Service Program section 4h, bring needle bar to BDC (Bottom Dead Centre).
- ‘Position’ must show 0.00 degree.
- In direction of rotation (counterclockwise), set machine to 27.00 degree ‘Position’.
- Hook tip must be flush with left needle edge.

Adjustment:

- See 5.5.3 above

Front cover disconnected

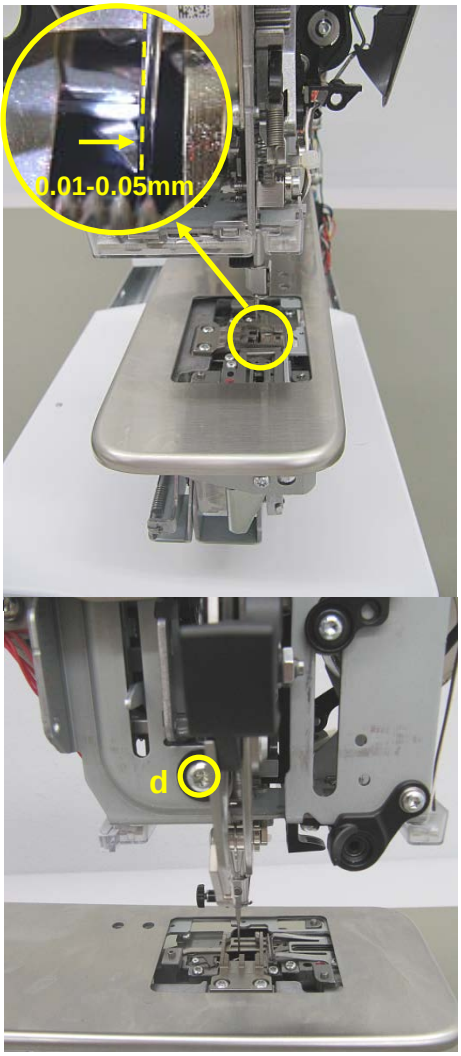
Recheck:

- Use 3.0mm pinning tool **007937.50.00** to pin stitch-width stepping motor at ‘9’ position (590, 570, 540 9.0mm), at ‘5’ position for B 535 5.0mm.
- Bring needle bar to bottom turning point. Use a screwdriver for utmost accuracy.
- Attach loop lift gauge (**734571.70.01)** from right in such way that the machine is locked in BDC position (loop lift 2.625mm).
- Move gauge to right until the needle bar is risen by 2.625mm (loop lift value) and stops.
- Hook tip must be flush with left needle edge.

Adjustment:

- See 5.5.3 above

5.5.4 Needle-/hook distance



Check:

- Remove stitch plate and presser foot.
- Use **new** needle 130/705H TCN Nm **80**.
- Use pinning tool no. 002733.50.00 to pin stitch-width stepping motor = center needle position.
- Turn handwheel until hook tip is behind the needle.
- The distance between the needle scarf and the hook tip must not exceed 0.01 - 0.05mm.

Note:
This setting affects (5.2.1 Position of head-frame plate/stitch plate in Y-direction)

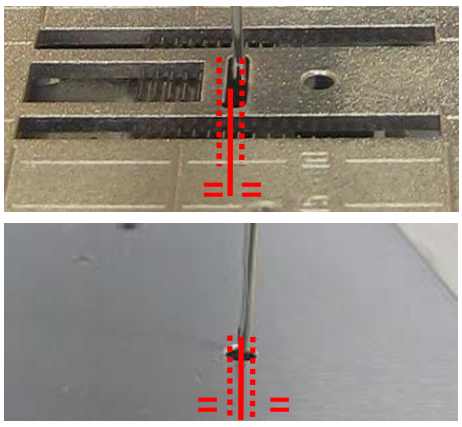
Adjustment:

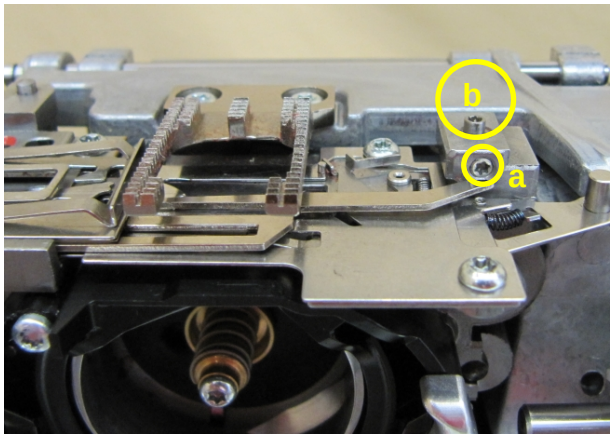
- We recommend to use a magnifying glass to ensure accurate setting.
- Use screw **d** (T20 M4x16) to set distance:
  - Turning clockwise moves needle to front, away from hook.
  - Turning counterclockwise moves needle nearer to hook.

5.5.4.1 Needle penetration in Y directions

Check:

- Use needle 130/705H Nm **100**.
- The distances between needle and edges of stitch hole in





front of and back of needle are the same.

Adjustment:

- Untighten screw **a** (T6) above catcher tip.
- Refit stitch plate.
- Turn eccentric pin **b** (T6 Torx wrench) to bring stitch plate into specified position.
- Retighten screw **a** (T6).

Note: We recommend to use a magnifying glass to ensure accurate setting.

5.5.5 Needle height

Check:

- Remove needle.
- Attach distance gauge **a** (**030883.50.03** silver-coloured with 3 punctures).
- Lower the feed-dog.
- Select ‘centre’ needle position.
- Switch machine off if required.
- Place distance plate **b** (**730475.51.00)** under distance gauge **a** on stitch plate.
- Needle bar BDC represents 'target’ **c** on distance plate **b** level **2**.

Note:
If the position of the gauge **b** deviates from value **c = 2,** the needle stop pin must be replaced. This applies to all 5Series machines with basting device (VIO).

Adjustment:

- Remove distance gauge **a**.
- Remove needle clamp (see 4.3.15)
- Replacing the needle stop pin **d** (T6) allows for modification of the height.
- Needle stop pins are available in **8** different diameters (see table).
- Select the appropriate needle stop pin **d** to correct any deviation from the target.
- Refit needle clamp (see 4.2.15).

Note:

- The height difference between levels corresponds to the diameter difference of the next larger or smaller needle stop pin **d**.
- If the needle requires lifting = use smaller diameter.
- If the needle requires lowering = use larger diameter.

Available sizes of needle stop pins			
No.	Item no.	Height in mm	labelled
1	036687.50.00	2.2	n.a.
2	036687.50.01	2.4	n.a.
3	036687.50.02	2.6	n.a.
4	036687.50.03	2.8	n.a.
5	036687.50.04	3.0	n.a.
6	036687.50.05	3.2	n.a.
7	036687.50.06	3.4	n.a.
8	036687.50.07	3.6	n.a.

5.5.5.1 Needle height without basting device

Check:

- See 5.5.5

Adjustment:

- Remove head cover (see 4.1.1)
- Bring needle bar to BDC (Bottom Dead Centre).
- Untighten needle-bar clamp screw.
- Place distance plate **b** (**730475.51.00)** under distance gauge **a** on stitch plate.
- The needle bar represents 'target' **c** and must be set to level **2** of distance plate **b**.
- Retighten needle-bar clamp screw.
- Check functioning of threader (see 5.9)
- Refit heas cover (if appropriate).

5.6 Presser-foot settings

5.6.1 Main feed-dog horizontal position

Check:

- Attach stitch plate.
- Bring feed-dog into operating position (switch on).
- Position feed-dog height gauge **398024.03.1+** with 0.9mm height setting onto rear end of feed-dog.
- The feed-dog should move on both sides evenly forth and back.

Note:
This setting affects (5.6.3 Main feed-dog - Position within stitch plate in X-direction).

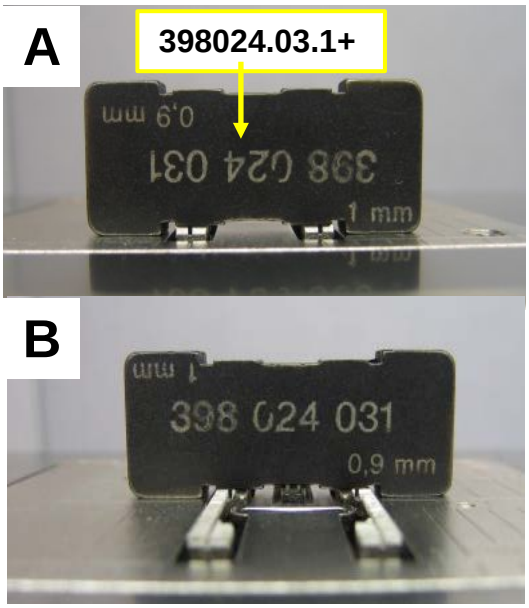
Adjustment:

- Slightly untighten two setscrews **a** (T6).
- Bring eccentric shaft **b** into required position with a small standard screwdriver.
- Retighten two setscrews **e** (T6).

5.6.2 Main feed-dog height 0.9-1.0mm

Check:

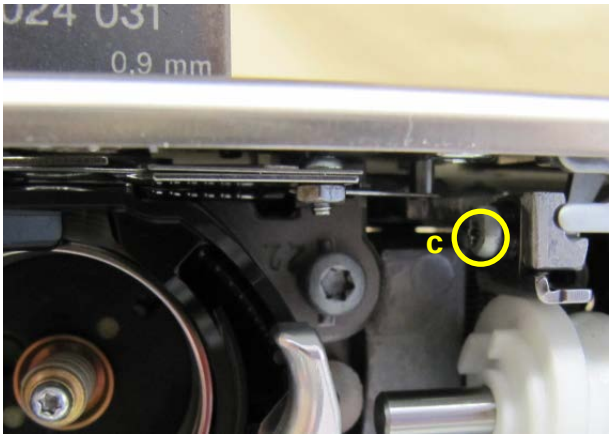
- Attach stitch plate.
- Bring feed-dog into operating position (switch on).
- Position feed-dog height gauge **398024.03.1+** onto front end of first row of teeth (pict. A).
- In the feed-dog's highest position, the peaks of the feed-dog teeth must be at least 0.05 mm higher at the front than at the back (pict B).

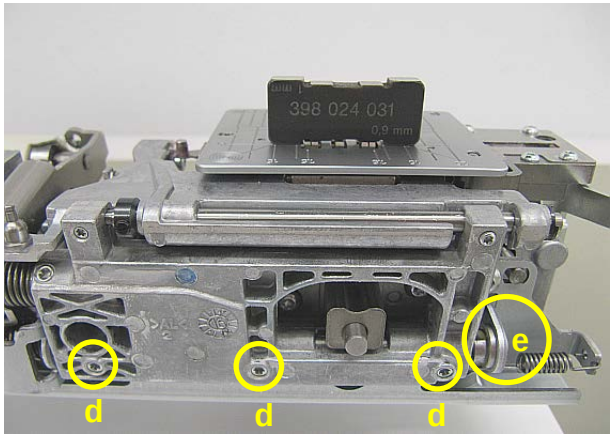


Examples:
front 0.95 mm, back 0.90 mm
front 1.00 mm, back 0.95 mm

Adjusting main feed-dog front height

- Position feed-dog height gauge **398024.03.1+** onto first row of teeth.
- Slightly untighten screw **c** (T10).
  Note: The adjusting plate is pressure springed!
- Push the feed-dog carrier up to the required height by hand.
- Retighten screw **c**.
- Recheck setting.
- Repeat adjustment if necessary.



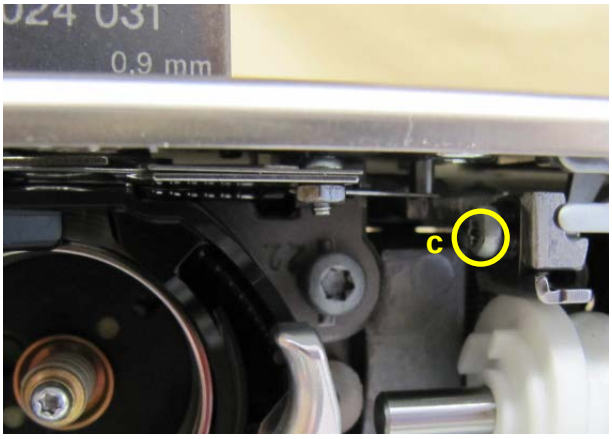


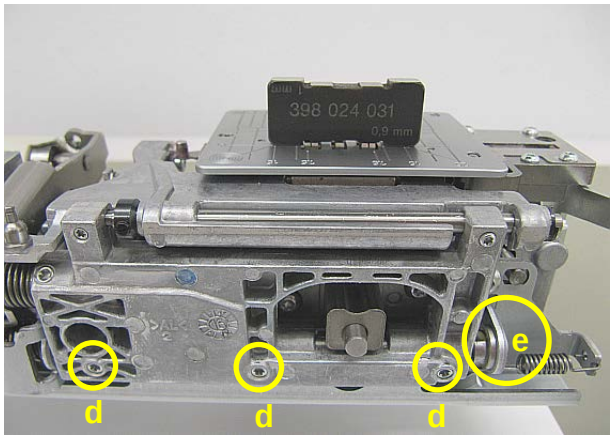
Adjusting main feed-dog rear height

- Position feed-dog height gauge **398024.03.1+** onto last row of teeth.
- Untighten three setscrews **d** (T8) in the lower part of the pusher fork.
- On the right, move eccentric shaft **e** into required position with open-end wrench 6.
- Retighten three setscrews **d** (T8).
- Recheck setting.
- Repeat adjustment if necessary.

Adjusting main feed-dog front height

- Position feed-dog height gauge **398024.03.1+** onto first row of teeth.
- Slightly untighten screw **c** (T10).
  Note: The adjusting plate is pressure springed!
- Push the feed-dog carrier up to the required height by hand.
- Retighten screw **c**.
- Recheck setting.
- Repeat adjustment if necessary.





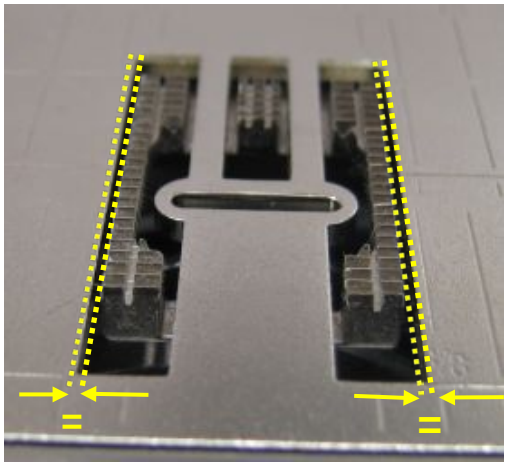
Adjusting main feed-dog rear height

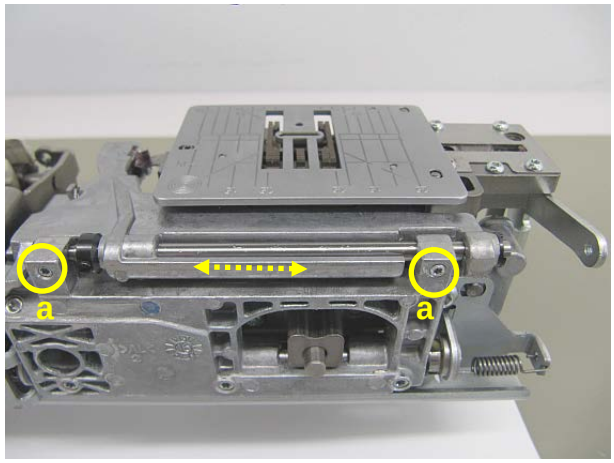
- Position feed-dog height gauge **398024.03.1+** onto last row of teeth.
- Untighten three setscrews **d** (T8) in the lower part of the pusher fork.
- On the right, move eccentric shaft **e** into required position with open-end wrench 6.
- Retighten three setscrews **d** (T8).
- Recheck setting.
- Repeat adjustment if necessary.

5.6.3 Main feed-dog Position within stitch plate in X-direction.

Check:

- Bring feed-dog into operating position (switch on).
- Feed-dog must be equidistant from each side of the stitch plate.





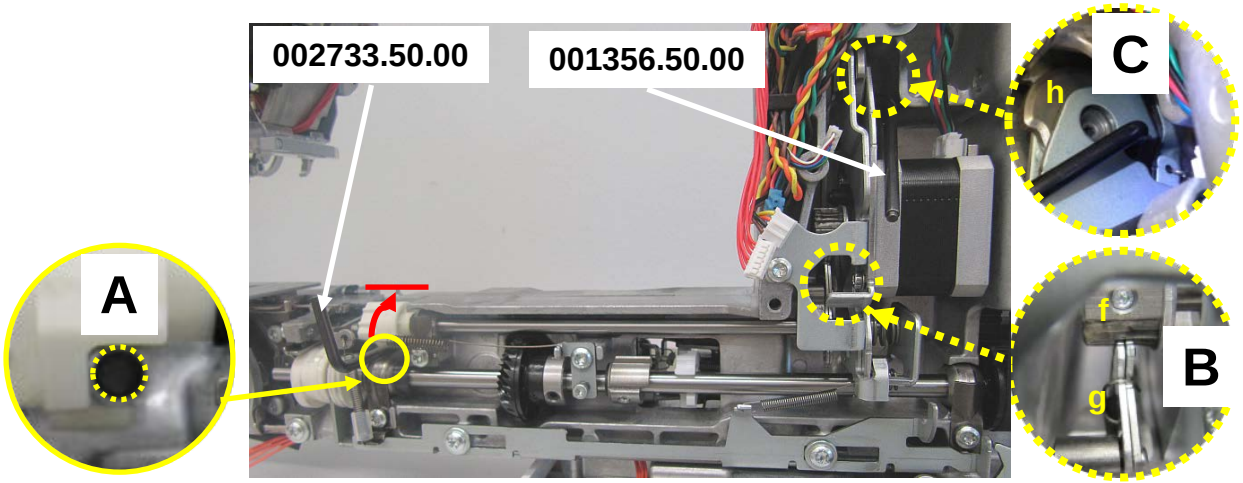
Adjustment:

- Untighten two setscrews **a** (T6).
- Move feed-dog into the specified position.
- Retighten two setscrews **a** (T6).

5.6.4 Main feed mechanical balance - basic setting

Check:

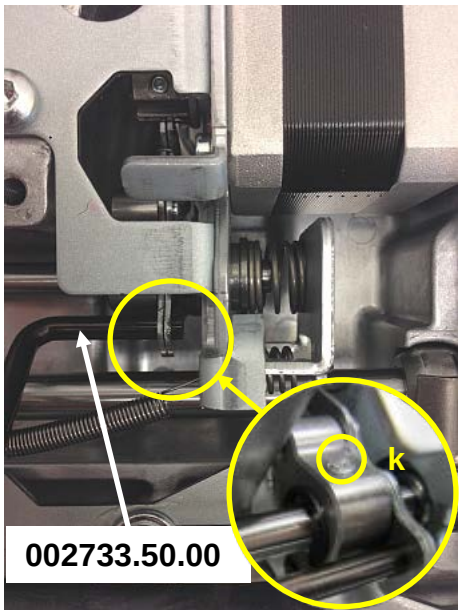
- Remove PCBA-Base (see 4.2.4)
- Turn stitch-length crank against stop = maximum stitch length
- In stop position, the stitch-length crank should be pinnable with the pinning tool **002733.50.00** (pict. A). At the same time, the first tooth **d** of drive gear **g** must gear into the first gap of the toothed segment **f** (pict. B).
- Balance adjusting cam should be pinnable with short pinning tool **001356.50.00** (pict. C).



Adjustment:

Gearing of toothed segment and drive gear.

- Remove pinning tool **002733.50.00** from stitch-length crank (pict. A).
- Pin toothed segment **g**, at underside, using pinning tool **002733.50.00**.
- Slide spherical bearing **i** out to the right and retain it in this position (spring pressure).
- Slide toothed segment **g** out of the gearing of drive gear **f.**
- Turn drive gear **f** against stop = maximum stitch length
- Slide toothed segment into gearing.
- The first tooth of drive gear **f** must gear into the first gap of the toothed segment **g**.
- Use spring pressure to reposition spherical bearing **i** to the left into the motor holding plate.



Stitch-length crank

- Stitch-length crank should now be pinnable with second pinning tool **002733.50.00** (pict. A).
- If not, slightly untighten setscrew **k** of clamp on crankshaft.
- Use pinning tool **002733.50.00** to pin crankshaft.
- Retighten setscrew **k**.

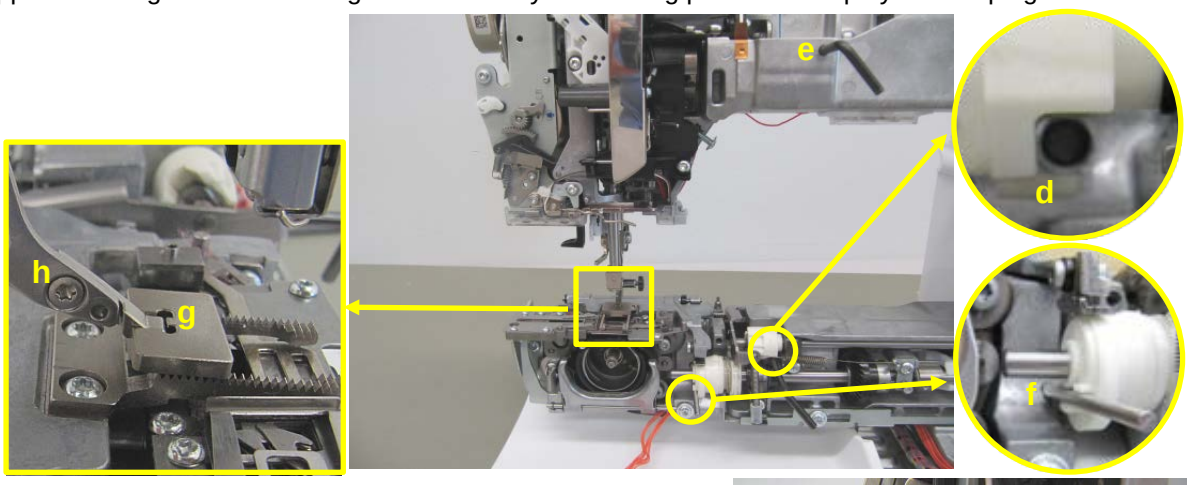
Balance adjusting cam

- Turn balance adjusting cam **h** with T10 screwdriver in such way that it is pinnable with short pinning tool **001356.50.00** (pict. C).
- Remove pinning tools.
- Refit PCBA-Base (see 4.2.4)
- Balance fine-adjusting in Service Programm Test 6b

5.6.5 Upper feed (Dual Feed)-/main feed synchronization (pinning position)

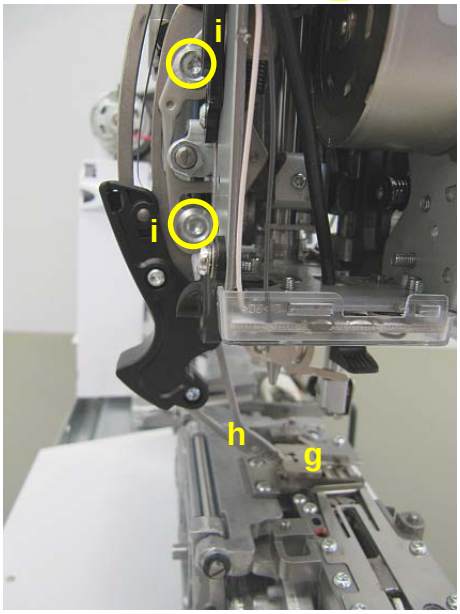
Check:

- Remove stitch plate.
- Switch on upper feed-dog and main feed-dog.
- Turn main feed-dog stitch-length crank to maximum stitch length.
- Use pinning tool 030430.51.00 in pinning bore **d** to pin main feed-dog stitch length crank.
- Use pinning tool 030430.51.00 in pinning bore **e** to pin upper feed-dog stitch length crank.
- Use 3mm pinning tool 007937.50.00 in pinning bore **f** to pin base shaft.
- With opening at back, position synchronizing plate **g** 032798.50.00 onto main feed-dog.
- Lower presser foot.
- Upper feed-dog must sit flush against front of synchronizing plate without play or clamping.



Adjustment:

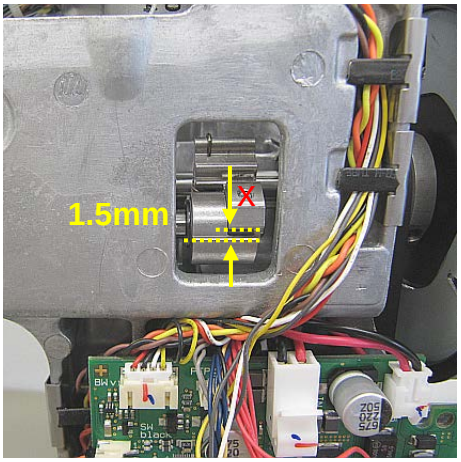
- Untighten two screws **i** (T10).
- Bring upper feed-dog **g** into specified position.
- Retighten two screws **i** (T10).



5.6.6 Upper feed-dog (Dual Feed) mechanical balance – Basic setting

Check:

- Start machine in Service Program.
- Carry out test 6b BERNINA Duel Feed Balance.

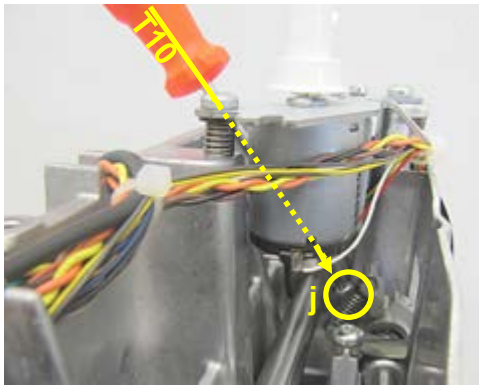


Rough-adjustment:

- Turn main feed-dog stitch-length crank to maximum stitch length.
- The distance between crown gear and adjusting hub should be 1.5mm.

WARNING! Danger of winder motor short-circuiting!

- The machine must be unpowered when carrying out this adjustment (see 1.2)
- Turn adjusting screw **j** (T10) fully in.
- Untighten adjusting screw by three rotations.
- This should produce a 1.5mm gap.



Fine-adjustment:

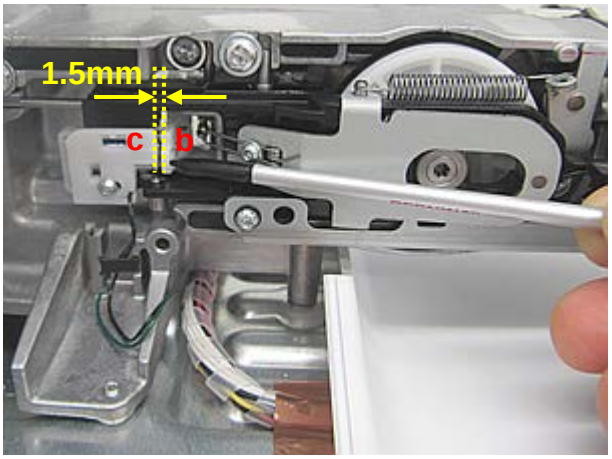
- Start machine in Service Program.
- Carry out test 6b BERNINA Duel Feed Balance.

5.7 Clutch carriage/thread cutter

5.7.1 Clutch carriage solenoid adjustment

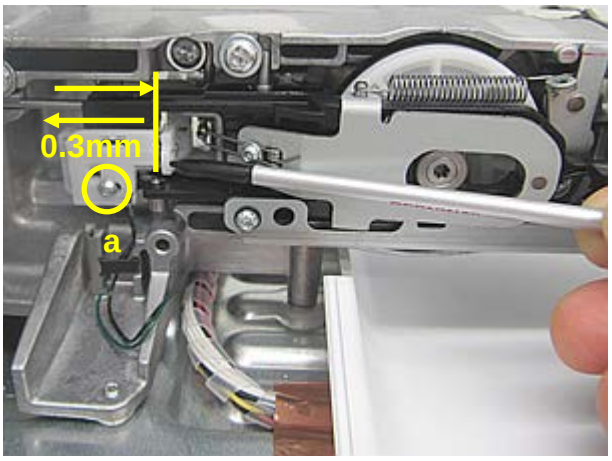
Check:

- Set needle bar to top dead center (TDC).
- On the rear of the machine bring clutch lever to left stop.
- The distance between clutch lever **a** and solenoid casing **b** should be 1.5mm.



Adjustment:

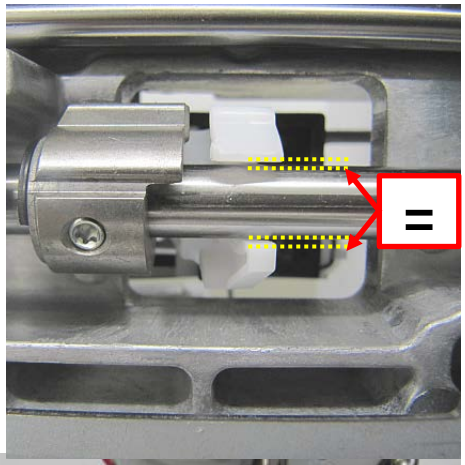
- Slightly untighten solenoid bracket screw **a**.
- Move solenoid casing to right up to stop.
- Now move solenoid casing ca. 3mm to left. Retighten screw **a**.
- Start machine in Service Program, and run Test 6d.

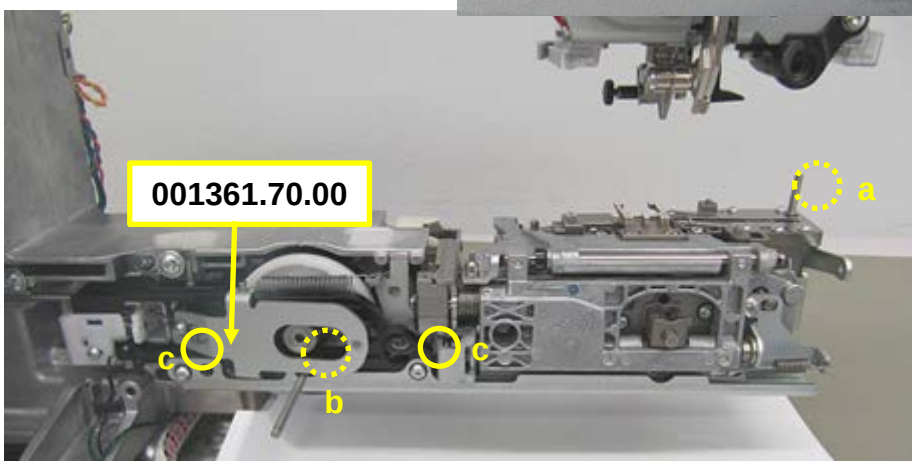


5.7.2 Clutch carriage alignment

Check:

- The clutch lever fork mustn't touch the base shaft in any position.
- The pull solenoid pressure spring must be easily able to bring the clutch lever into its home position.





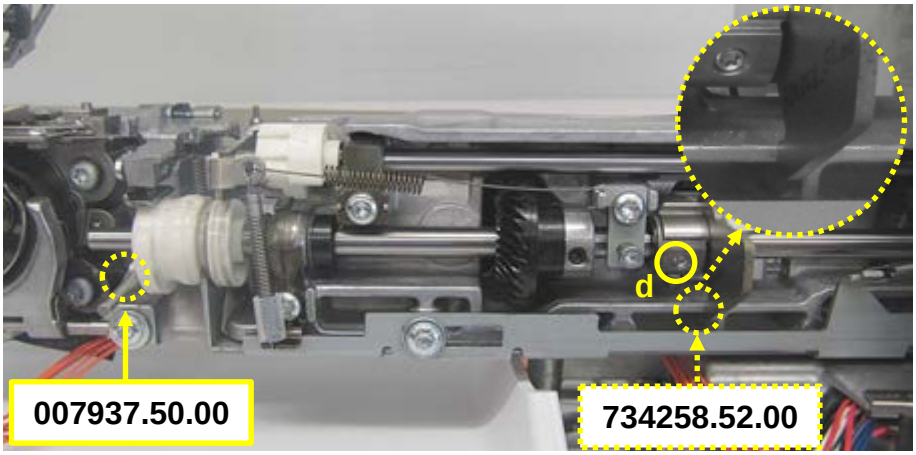
Adjustment:

- Use 3.0mm pinning tool **a** 007937.50.00 to pin the cutting unit.
- Use 3.0mm pinning tool **b** 007937.50.00 to pin link between clutch carriage and cutting-unit release lever.
- Untighten two screws **c** (T10) on link between clutch carriage and cutting-unit release lever.
- Use eccentric spanner 001361.70.00 to position the clutch lever in such way that the clutch lever fork won't touch the base shaft in any position and that it can easily be brought into home position by the pull solenoid pressure spring.
- Retighten two screws (T10) on link between clutch carriage and cutting-unit release lever.

5.7.3 Clutch carriage timing

Check:

- Use 3.0mm pinning tool **007937.50.00** to pin base shaft in loop lift position.
- In this position, it must be possible to sit setting gauge **734258.52.00** onto clutch ring. At the same time the gauge must lie against the collar of the base.



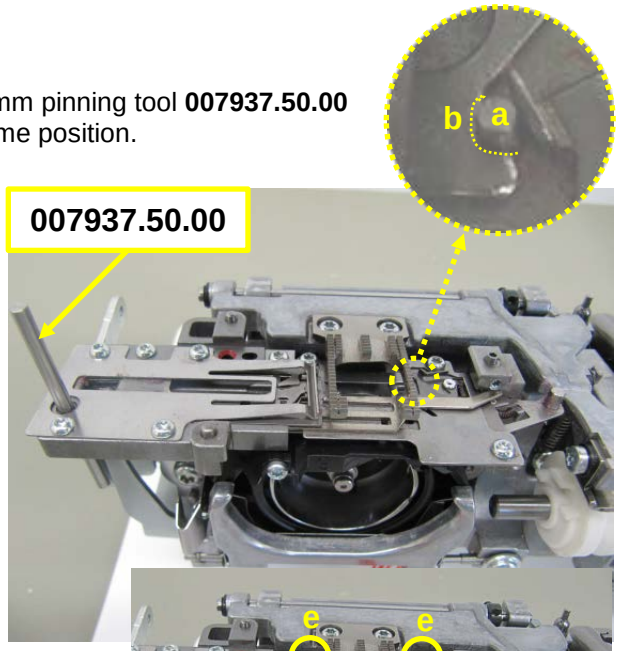
Adjustment:

- Use 3.0mm pinning tool **007937.50.00** to pin base shaft in loop lift position.
- Untighten clutch-ring setscrew **d** (T10).
- Position setting gauge **734258.52.00** onto clutch ring.
- Position clutch ring at base collar.
- Retighten clutch-ring setscrew **d** (T10).

5.7.4 Thread cutter

Check:

- The thread cutting unit should be lockable with 3mm pinning tool **007937.50.00** when the cutting-unit release lever is in its left home position.
- Positioning pin **a** must be exactly in corner **b** of the thread guide plate.

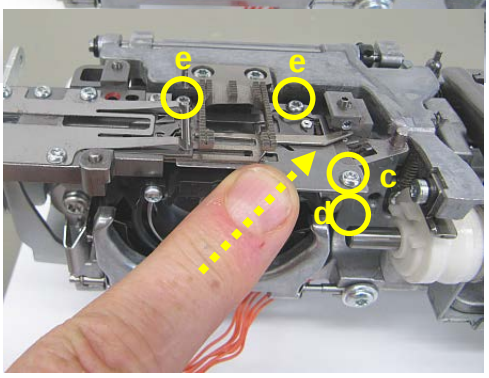


Adjustment:

- If 3mm pinning tool **007937.50.00** cannot be inserted, check clutch carriage fitting (see 4.4.11)

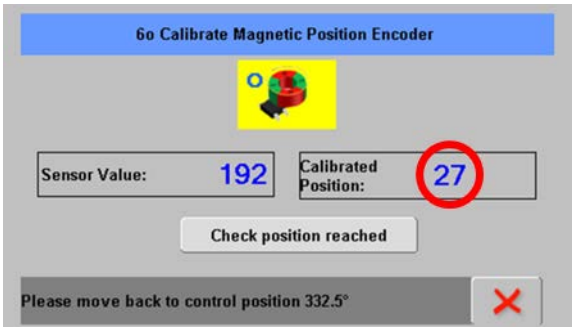
Positioning pin

- Untighten two thread-guide plate screws **e** (T8 angled Torx wrench).
- Untighten thread-guide plate screw **c** (T8, angled Torx wrench) and thread-stop nut **d** (ring wrench 5).
- From the left and with the index of your left hand, move the thread guide plate in the opening slightly back diagonally, taking care that the end of the positioning pin sits exactly in corner **b**.
- Untighten thread-guide plate screw **c** (T8 angled Torx wrench) and thread-stop nut **d** (ring wrench 5).
- Untighten two thread-guide plate screws **e** (T8, angled Torx wrench).



5.8 Hall position synchronization

Note: To use the Service Program, the machine must be running (switched on). Refer to the safety instructions, please.

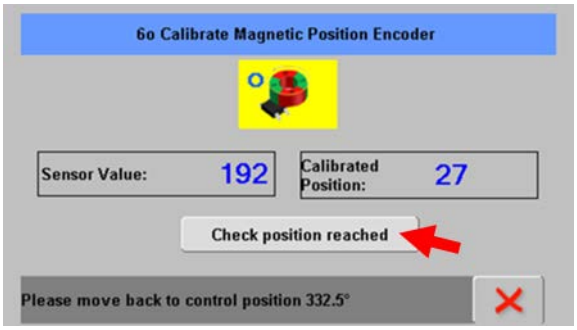


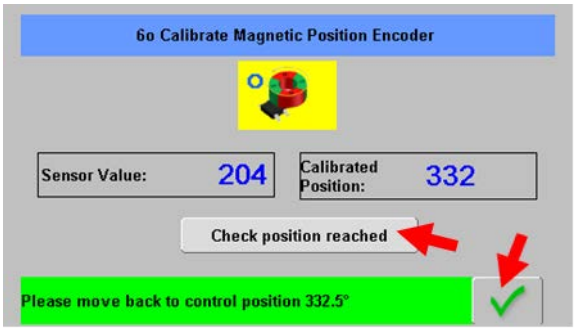
Check:

- Remove the stitch plate.
- Select Service Program test 6o.
- Bring machine into loop lift position by hand. Hook tip must be behind needle and flush with left needle edge.
- Service Program test 6o should display a value in the area of between 27 to 29 degrees.

Adjustment:

- Start Service Program test 6o.
- Adjust loop lift (see 5.5.3).
- Click ‘Check position reached’ bar.
- Turn handwheel clockwise until loop lift gauge hits stop again.
- The bottom bar must now change colour from grey to green.
  The area desplayed in green spans from 335 to 330 degrees.
- Click ‘Checked position reached’ bar. A green check button appears to the right of the bottom bar.
- Click green check button to exit Service Program.





5.9 Threader

Check:

- Remove needle. Attach threader gauge **734101.50.00**.
- Set needle bar to top dead center.
- Push threader downward until threader head turns in under the gauge

Adjustment:

- Remove basting solenoid housing **51** if there is one.
- Untighten needle bar guide adjusting screw **17** (T8).
- The threader head can be properly adjusted by moving it up, or down.
- Retighten needle bar guide adjusting screw **17** (T8).
  Refit basting solenoid housing.

5.10 Basting Device

5.10.1 Needle bar guide

Check:

- Set needle bar to bottom dead center (BDC).
- Disengage needle bar manually via basting solenoid clutch **1**.
- Twist needle bar to the left **2** and pull down **3**, ensuring that the clutch pin that gears into the needle bar engages smoothly.
- Set needle bar back to BDC and release again **1**.
- Check in the same manner by twisting needle bar to the right **2**.

Adjustment:

- Remove basting solenoid housing **51**.
- Set needle bar to top dead center (TDC).
- Remove needle. Attach threader gauge **734101.50.00**.
- Push threader **10** downward until threader head turns in under the gauge. Hold threader in this position.
- Untighten needle bar guide adjusting screw **17** (T8).
- Center needle bar bore within clutch-bolt clearance **4**.
- Retighten needle bar guide adjusting screw **17** (T8).
  Refit basting solenoid housing.

5.10.2 Time of clutch release

Note: To use the Service Program, the machine must be running (switched on).
Refer to the safety instructions, please.

Standard:
Adjustment:

Check:

- Select basting device.
- Turn cushioner adjusting screw **a** out by exactly two rotations (counterclockwise), mark before if required.
- In upward motion, the needle bar must disengage approx. 3mm before reaching the top dead center.
- Turn buffer adjusting screw **a** back by exactly two rotations (clockwise).

Adjustment:

- Turn adjusting screw **a** (cylinder head screw M4x8 T20) out of buffer until the needle bar doesn't engage anymore.
- Untighten screw b (fillister head screw with collar M3x8 T10).
- Move basting solenoid housing up or down as appropriate.
- Retighten screw **b**.

Set buffer position:

- Start machine and select basting function.
- Run machine at medium speed while turning adjusting screw **a** (T20) out (counterclockwise) until needle bar won't engage anymore.
- Switch off basting function.
- Run machine at medium speed while turning adjusting screw **a** slowly in (clockwise) until needle bar engages again.
- After the engaging of the needle bar turn adjusting screw **a** in another quarter rotation in maximum in order to ensure center positioning of clutch pin in clutch hole.

Functional check:

- Presser foot 1d (with sensor).
- Run machine at highest speed to test basting solenoid in left and right needle positions.

Note: If functional test fails in one, some or all needle positions, recheck the setting of the buffer position and the needle bar guiding and adjust as required.

5.11 Thread regulator

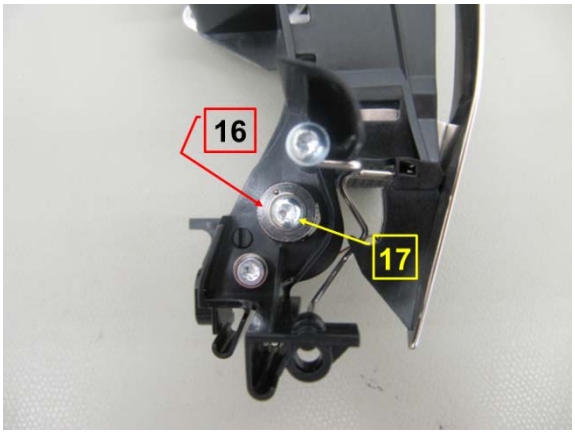
Checking the tension power:

- Thread an approx. 30cm long thread into thread regulator.
- Attach the two thread ends to the BERNINA tension spring scales (006038 50.00).
- Slowly move the scales up.
- On moving the regulator spring, the tension value must be between 14 g and 17g.

Note:
Ensure that the spring scales are gauged.

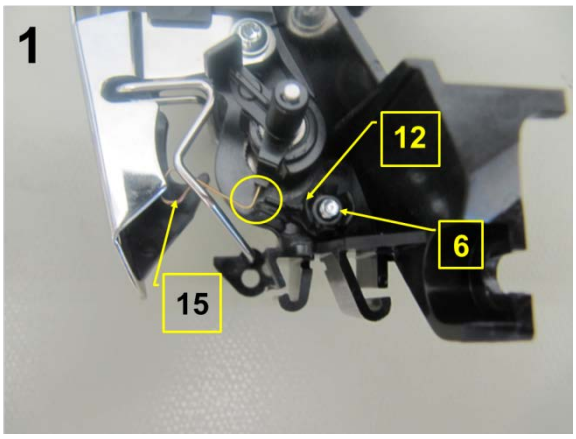
Adjusting the tension power:

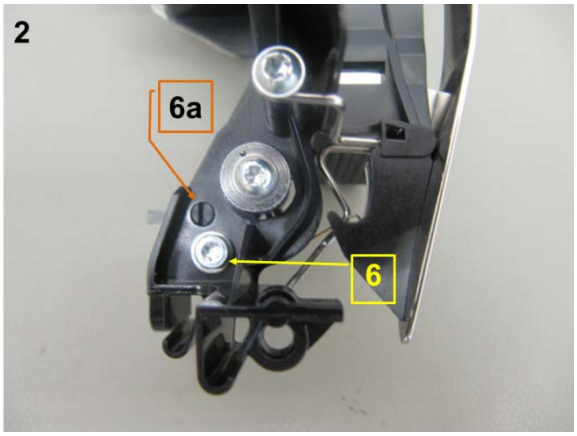
- Slightly untighten screw **17** (T10).
- Turning the thumb wheel **16** will tighten or slacken the tension.
- Retighten screw **17** (T10).



Checking correct position:

- The thread regulator spring **15** must sit on the setting lever **12** (pict. 1 - rear side)
- At the same time, the distance between spring and cover must be 1.6mm (+/-0.3mm).



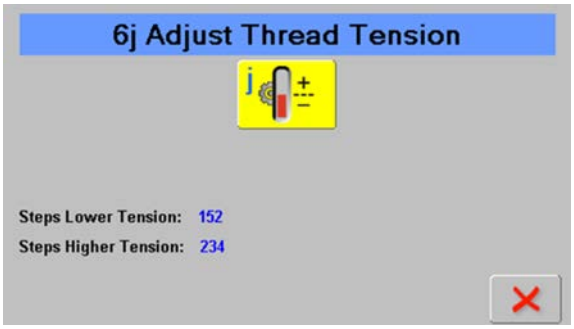


Adjusting the position:

- Slightly untighten screw **6** (T10).
- Using a small screwdriver and positioning aid **6a**, adjust setting lever **12** until a distance of 1.6mm is reached (pict. 2 - front side).
- Retighten screw **6**.

5.12 Thread tension

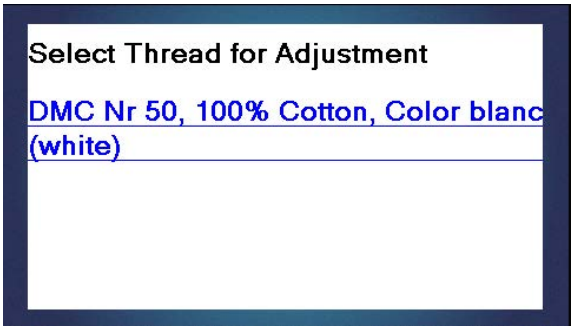
Important! To use the Service Program, the machine must be running (switched on). Refer to the safety instructions, please.



5.12.1 Upper thread tension

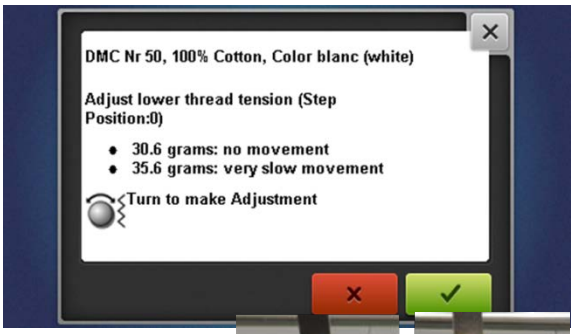
- 6j Automatic upper-thread tension

- Use a cotton thread DMC 50 BLANC **(recommendation by BERNINA, see Service Information in Infogate, Ref: 18249)** to thread machine up to and including thread take-up.



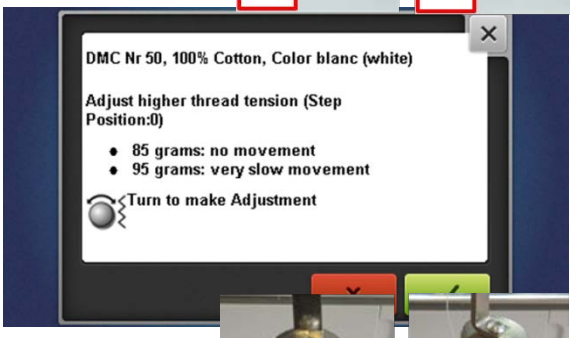
Step 1:

- Attach the 30.6-gram gauge 008709.72.00 to the upper thread (see fig. 1).
- Carefully tilt the machine forward until the gauge hangs freely in the air. (Caution: Don't drop it)
- Select test 6j for thread tension adjustment. Then select the icon in the screen. The selected gauging thread appears.
- Select DMC 50, 100% cotton, color 'blanc' (white).
- The gauge mustn't move down. Turn the stitch-width knob to adjust if necessary.
- Add an additional 5-gram weight (fig. 2). The gauge should move down slowly now. Turn the stitch-width knob to adjust to correct value if necessary. Press ✓ to save the set value. You will automatically be brought to step 2.



Step 2:

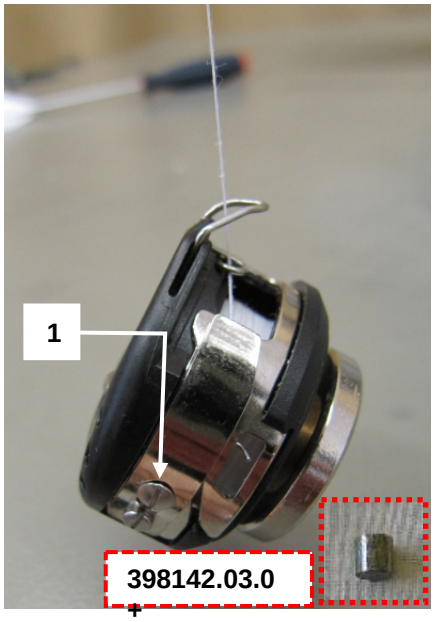
- Replace the 5-gram weight with the 54.4-gram weight (85gr total weight). See pict. 3. The gauge mustn't move down. Turn the stitch-width knob to adjust if necessary.
- Add another 10g (2x5g). See fig. 4. The gauge should move down slowly now. Use the stitch-width knob to adjust if necessary.
- Press ✓ to save the set value.
- "Successful" appears along with the set tension values.



5.12.2 Lower-thread tension (basic setting)

Check:

- Use white cotton thread DMC 50 BLANC 652010.20.++ for gauging.
- Use no. 0033924.70.00 gauge to adjust lower thread tension.
- The bobbin case is inserted into the weight gauge in the same way as into the hook.
- Hold free end of thread firmly and let the bobbin case and setting weight (without additional weight) hang free.
- The bobbin case must not move downwards.
- After attaching an additional 3-gram weight 398142.03.0+ the thread should unwind fast (unwinding speed: 1m/2-4 sec.).

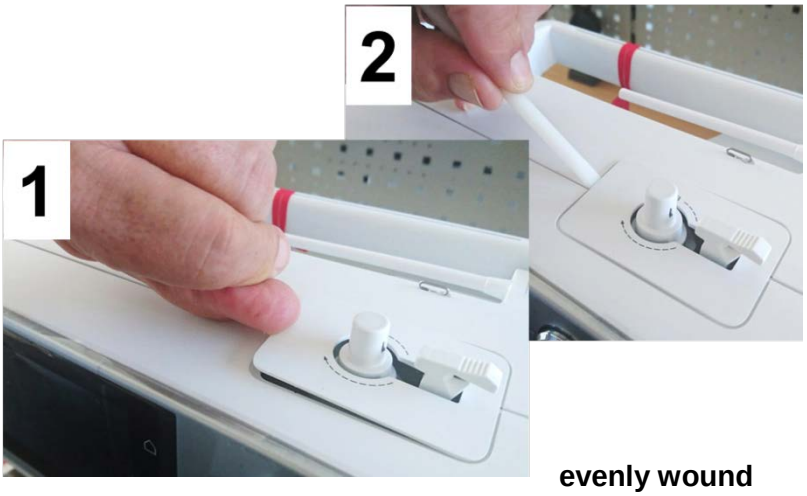


Adjustment:

- Use a small screwdriver to adjust the lower thread tension by turning the bobbin case spring screw as appropriate.
- Turn screw counterclockwise (to left) to slacken .
- Turn screw clockwise (to right) to tighten.

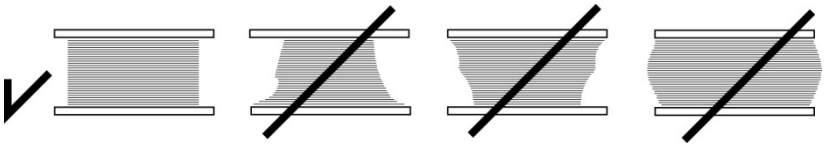
5.13 Winder

Note:
The new winder cover allows for setting the winder without having to remove large covers. See pict. 1 and 2.



Check:

- **The thread should be with pre-tension, and the bobbin should be correctly filled.**



evenly wound

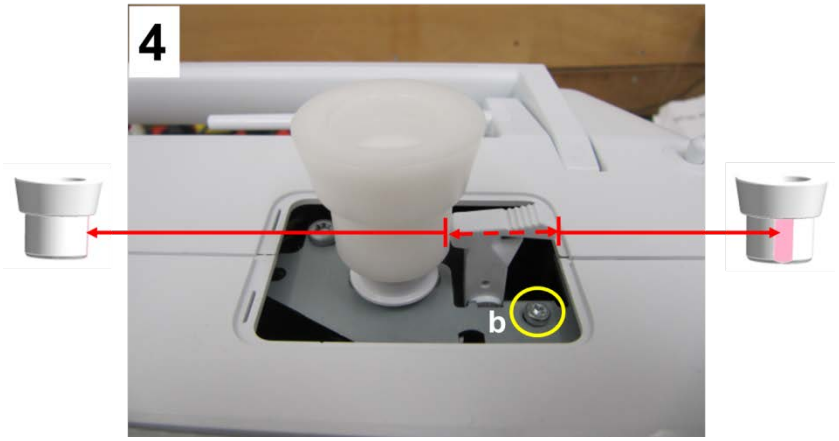
Adjusting if filling is uneven:

- Turn screw **a** (T20) in or out as appropriate.

Adjusting if filling is too high/too low:

- **Picture 4 -** Turn screw **b** (T10) in or out as appropriate.

Note:
Incorrectly or unevenly filled bobbins can affect the stitch quality and impair the functioning of the lower thread sensor.



5.14 Lower-thread sensor position

Check:

- Functional check in Service Program section 3 (see 3c)

Adjustment:

The position of the lower thread sensor is given and cannot be adjusted.

- Disassembly and refitting (see 4.2.9).

Note:

If the lower-thread indicator doesn't work flawlessly, check the state of the bobbin, especially the inner and outer reflectors on the bobbin.
If the bobbin is in mint condition, replace the lower-thread sensor unit.

Chapter 6 - Service Program

Starting the Test Program

Entering:

- Switch machine off ("0").
- Keep **Quick revers**-button pressed, and switch machine on.
- The machine moves the stepping motors to their home positions (brief motor noise).
- The machine is now in the Service Program basic position.

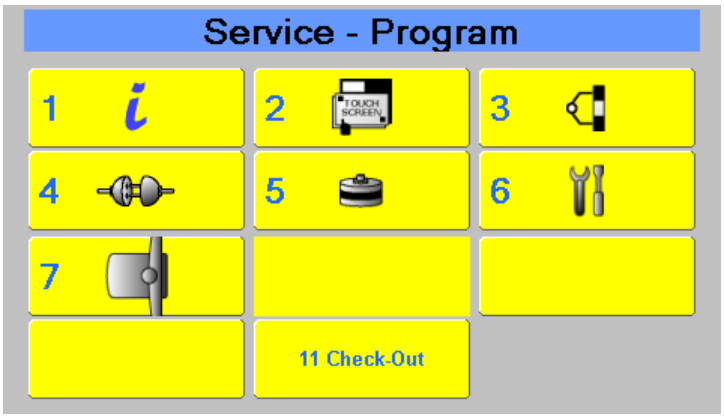
Exiting the test program:

- Switch machine off.
- Wait ca. 30 seconds. Then switch machine on again.
- The machine can now be used normally.

Basic position:
Sections 1 to 11 are selected in the basic position of the Service Program.

BERNINA 590, 570, 565, 540, 520, 500

1 Information
2 Screen, symbols
3 Location of sensors in the machine
4 Signals
5 Location of stepping motors in the machine
6 Adjustments
7 Embroidery module (EMB)
11 Check-out tests



Sections and tests:

- Sections 1 to 11 are selected in the Service Program home window.
- The testing level contains the active part of the program.
- Press ✓ to save the test and return to previous window.
- Press ✗ to return without saving.

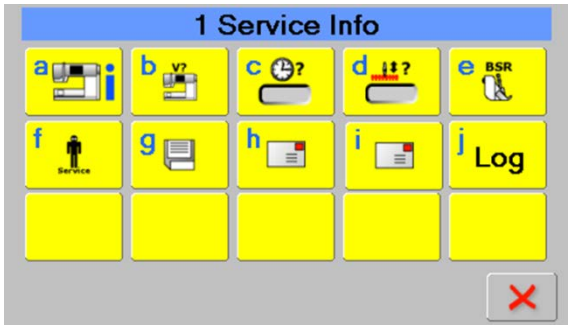
Virtual keyboard

The following tests require data entering:

- 1a Machine basic data
- 1f Machine servicing data
- 1h Customer related data (Customer Information)
- 1i Dealer related data (Dealer Information)

No.	Description	Explanation
1	**Data display field**	**To completely delete, press it**
2	**Delete key** ⌫	**to individually delete, press it**
3	**virtual keyboard incl. shift keys for special characters**	**letters, numbers and symbols depending on display**
4	**Data entering field modes:**	**a. Upper-case letters** **b. Lower-case letters** **c. Numbers, symbols, punctuation marks** **d. Special characters**

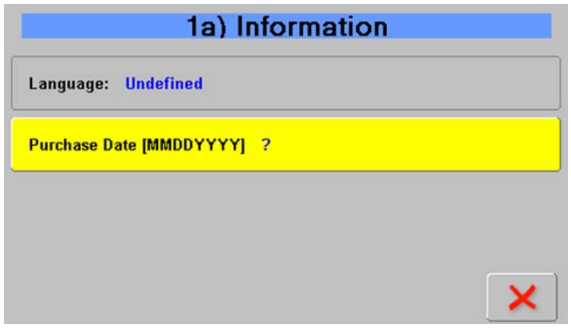
6.1 Section 1 – Service Information



1a Machine basic data
1b Machine firmware data and technical information
1c Machine operating hours data
1d Stitch counter data
1e BSR (BERNINA Stitch Regulator) data
1f Machine servicing data
1g Saving customer data
1h Customer related data (Customer Information)
1i Dealer related data (Dealer Information)
1j Log file

1a Machine basic data

Shows selected language as well as purchase date



Check:

- Language
- Purchase date (MMDDYYYY)
  MM = month
  DD = day
  YYYY = year

1b Machine firmware data and technical information

Check:

- Firmware version (application and data).
- Boot loader version
- Memory flash.

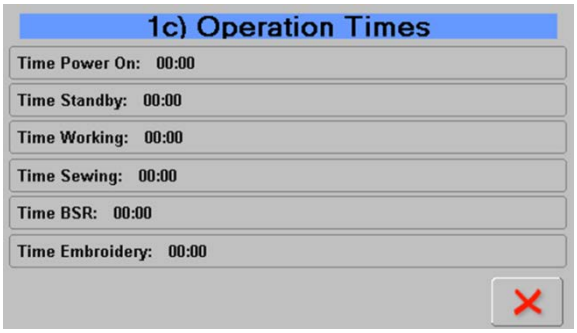
- Press  to go to next page.
- Technical information (1 - 10).

Tip:

- Using the virtual keyboard, technical data can be entered in the page.
- The entered data gives the technician information on already made improvements.

1c Machine operating hours data

Shows run times of operations

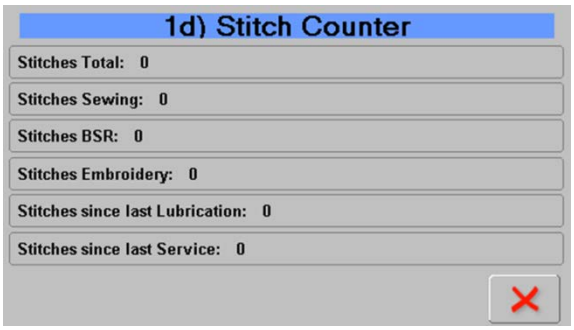


Check:

- Total Time Power On
- Total Time Standby
- Total Time Working
- Total Time Sewing
- Total Time BSR
- Total Time Embroidery
-

1d Stitch counter data

Shows numbers of stitches in operations



Check:

- Stitches Total (total number of stitches)
- Stitches Sewing (total number of sewing stitches)
- Stitches BSR (total number of stitches using BSR)
- Stitches Embroidery (total number of enbroidery stitches)
- Stitches since last Lubrication
- Stitches since last Service

1e BSR (BERNINA Stitch Regulator) data

Shows information's about attached BSR

Check:

The BSR foot **must** be connected so see these informations:

- Serial Number
- Chassis Number
- Production Date
- Hardware Revision
- Bootloader Version
- Application Version
- Sensor Resolution X
- Sensor Resolution Y

1f Machine servicing data

Lubrication and service times here can be reset

Check:

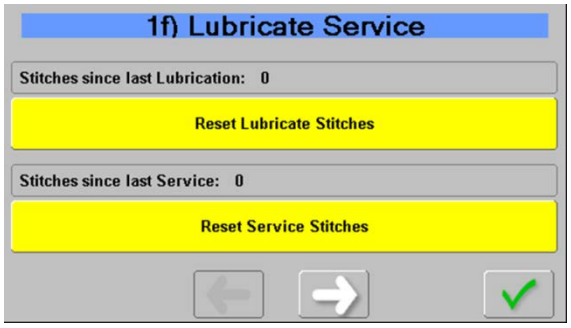
- Lubrication stitches = Time for cleaning/oiling (appears after 500‘000 stitches)
- Reset lubrication stitches = Resetting cleaning/oiling interval to 0 stitches
- Service stitches = Time for servicing (appears after 3‘000‘000 stitches)
- Reset service stitches = Resetting servicing interval to 0 stitches

Cleaning/oiling interval

- The stitch counter triggers a reminder after 500,000 stitches (intended for the customer to carry out): Please clean and oil the machine.

Servicing interval

- The stitch counter triggers a reminder after 3,000,000 stitches:
  “It is time for the regular maintenance. Please contact your BERNINA dealer to make an appointment”

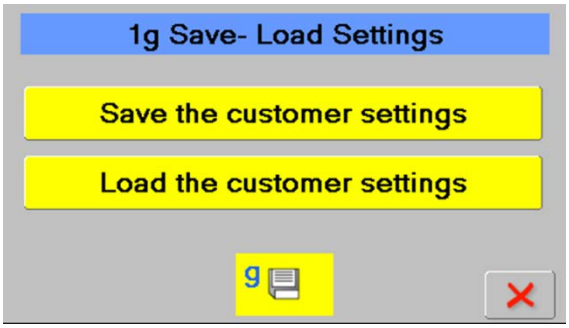


Important:

- Remember to always reset the counters for cleaning/oiling (Reset Lubricate Stitches) and servicing (Reset Service Stitches) after servicing or repairing.
- When resetting the servicing stitches, the virtual keyboard opens. Repair data must be entered to reset the stitch counter to zero.
- Use these symbols  or  to go to the previous or next page.
- There are 5 entry lines available. The sixth entry will overwrite the first entry.
  Maintained by…on = entered by (name) on (date)

1g Saving customer data

Customer machine data can here be saved or loaded here

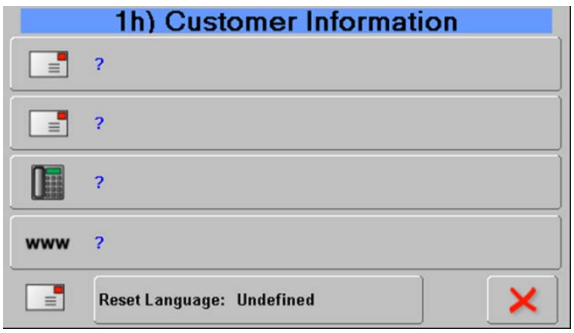


Check:

- Before starting to repair or servicing the machine and/or replacing electronic parts, it is essential to save the customer's data.
- For this use a BERNINA USB data stick.
- Save the customer settings = Save customer data onto data stick
- Load the customer settings = Load customer data onto machine
- Connect BERNINA USB data stick and select required button.
- Remove the data stick after saving/loading of data has been confirmed.

1h Customer related data (Customer Information)

Customer addressee date can be entered here



Check:

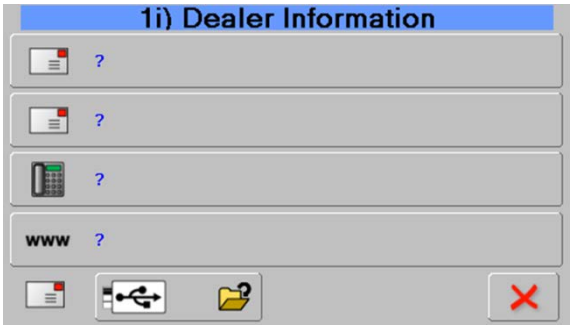
- Name of customer
- Address of customer
- Telephone number of dealer
- Email address of customer

Tip:

- A virtual keyboard opens on selecting a field, and data can be entered.
- Selecting the ‘Reset Language’ button resets the language to ‘undefined’. Language can be reselected after restarting the machine.

1i Dealer related data (Dealer Information)

Dealer addressee date can be entered here



Check:

- Name of dealer
- Address of dealer
- Telephone number of dealer
- Internet address of dealer

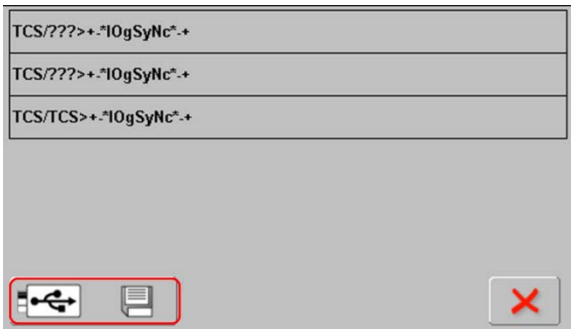
Tip:

- A virtual keyboard opens on selecting a field, and data can be entered.
- Dealer data can also be read and entered in .**txt format** from BERNINA USB data stick. **Important:** The file must be named **dealerdata.txt** (see example below).
- The dealer-related data will automatically appear on the screen when a maintenance reminder is triggered.

For example:
BERNINA Nähmaschinen AG
8266 Steckborn
0123456789
www.bernina.com

1j Log file

The Log file can be saved here



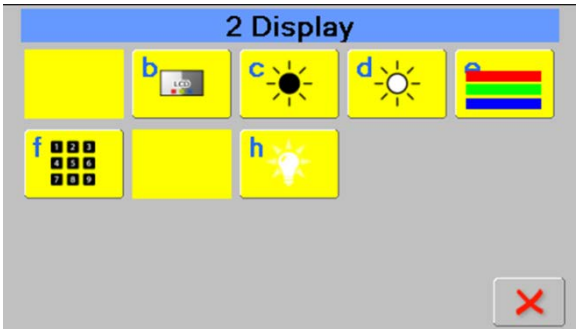
Check:

- External saving of internal processes (log book) on a BERNINA USB data stick.
- The log file contains processes and configuration data.

Tip:

- If firmware problems occur, send the log files, with a detailed description of the symptoms, to the importer/distributor **by ticket system** or email.

6.2 Section 2 – Screen, symbols



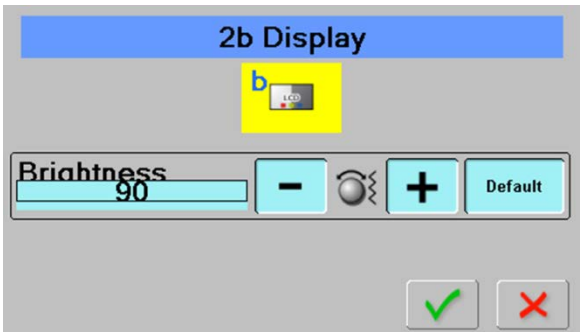
2b LCD (screen brightness)
2c Blank dark LC display (screen)
2d Blank white LC display (screen
2e RGB (Red, Green and Blue) screen
2f Keyboard lights
2h LED sewing light and brightness

2a Touch screen calibration

The introduction of **capacitive touch screens** with the 5 Series (VIO) makes calibration superfluous

2b LCD (screen brightness)

The screen brightness can be set here



Check:

- Use + and - keys or the stitch width adjusting knob to adjust the screen brightness.
- Select 'Default to reset to default value.
- Press ✓ to save and close,
  press ✗ to close without saving.

2c Blank dark LC display (screen)

Is used to check the screen

Check:

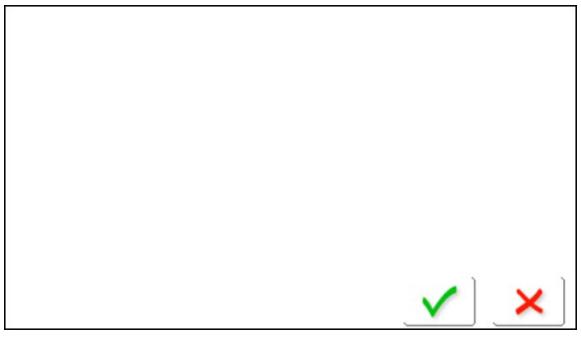
- Blank dark screen to find any pixel errors.
- To return to section 2, press ✓ or ✗.

Repair note:

- Check plugs and cables for deformation and/or wear and tear.

2d Blank white LC display (screen)

Is used to check the screen



Check:

- White blank screen to find dirt or stains.
- To return to section 2, press ✓ or ✗.

Repair note:

- Clean touch screen.
- If necessary, replace faceplate (see 4.2.7).

Important!
Do not use any corrosive cleaning agents, such as alcohol, benzine, thinner or other.

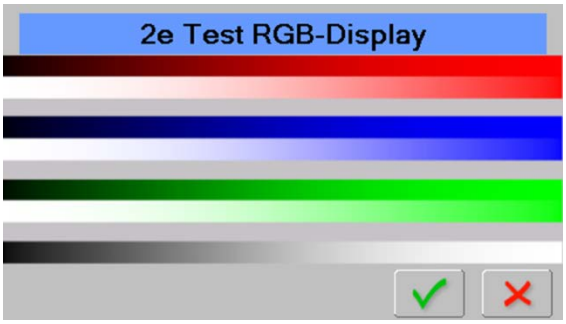
2e RGB (Red, Green and Blue) screen

Is used to check the screen

The color screen is built up from the basic colors RGB (**R**ed, **G**reen, **B**lue). All other colors are merely a mixture of these 3 colours. The screen will detect if any colour faults occur.

Check:

- The coloured bar graphs run from right to left.
- The colour should be a true colour at the right side, running through to black resp. white at the left side
- If any colour defects occur, it will show within the bar graphs
- To return to section 2, press ✓ or ✗.



Repair note:

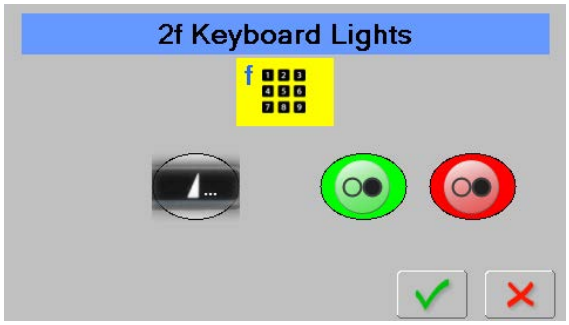
- Check cables for deformation and/or wear and tear.
- Check if ribbon cables are properly plugged.
- Replace LCD if any colour defects occur (see 4.2.7).

2f Keyboard lights

Is used to check if button will light up

Check:

- Selecting a icon will light up the respective button on the machine.
- The start-/stop button will light up green or red respectively.
- To return to section 2, press ✓ or ✗.

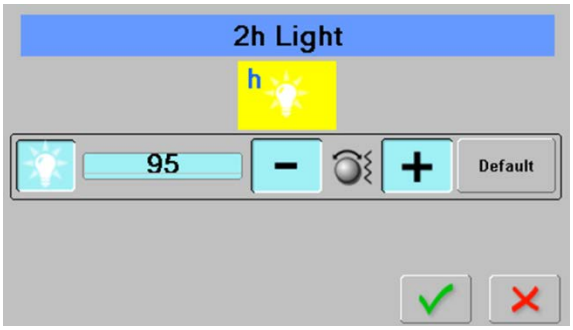


Repair note:

- Check cables for deformation and/or wear and tear.
- Replace PCBA-RET if a key won't light up (see 4.2.8).

2h LED sewing light and brightness

Is used to check the sewing light



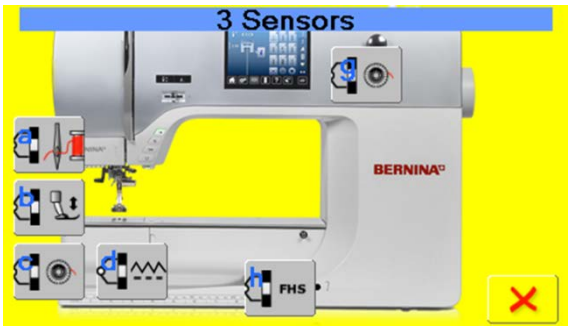
Check:

- Use + and - keys or the stitch width adjusting knob to adjust the LED brightness.
- Press ✓ to save and close, press ✗ to close without saving.

Repair note:

- Check plugs and cables for deformation and/or wear and tear.
- Determine which set of LEDs are not working.
- Check connections P-38 and P-3111 on the PCBA-Base.
- Replace LED sewing light (see 4.2.11).
- Replace PCBA-Base (see 4.2.4).

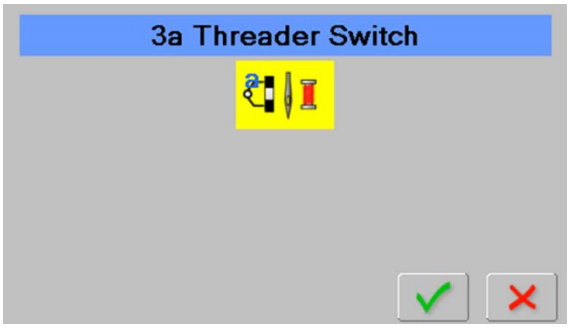
6.3 Section 3 – Location of sensors in the machine



3a Threader sensor
3b Presser-foot micro switch
3c Lower-thread sensor
3d Feed-dog drop
3g Winder micro switch
3h Frei Hand System FHS

3a Threader sensor

Is used to check threader sensor



Check:

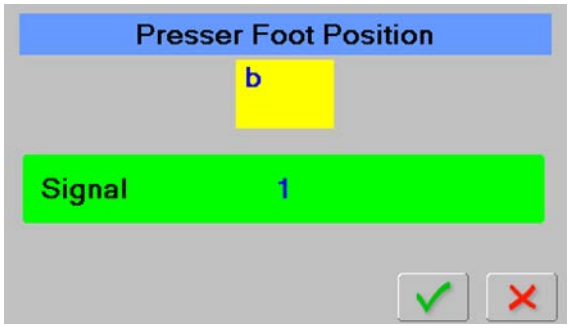
- Select test 3a. A checkbox appears.
- Pull threader down, the signal in the box will change from 1 to 0.
- To return to section 2, press ✓ or ✗.

Repair note:

- Check cables for deformation and/or wear and tear.
- Check correct positioning of PCBA-Threader. The PCBA Threader is held in position with a pin and fastening screw 007752.50.34 (T10) in the needle bar support.
- If sensor doesn't respond, replace PCBA-Threader (see 4.2.6).

3b Presser-foot micro switch

Is used to check presser foot micro switch



Check:

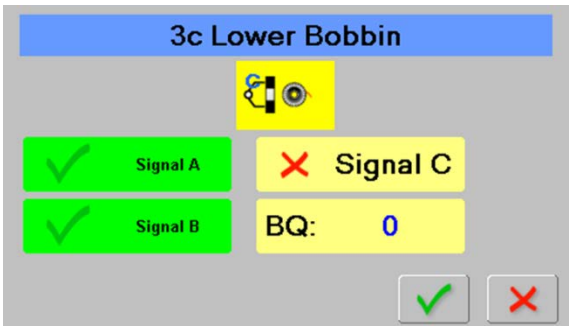
- Select test 3b.
- By lifting the presser foot, the micro- switch is activated and the bar flashes green
- To return to section 3, press ✓ or ✗.

Repair note:

- Check cables for deformation and/or wear and tear.
- Replace presser foot micro switch
- Replace PCBA-Base (see 4.2.4).

3c Lower-thread sensor

Is used to check lower-thread sensor



Check:

- Select test 3c.
- Open bobbin door.
- Insert a bobbin with a very low filling of thread.
- Hold the thread and close the bobbin door.
- Slowly pull the thread.
- Signals A, B and C must change their colour to green alternately.
- To return to section 3, press ✓.

Tip:

Signal **C** might not respond if there is too much thread on the bobbin.

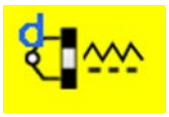
Repair note:

If signals A, B and C won't change their colour as described above, check these points:

- Check sensor for stains. Clean carefully if necessary.
- Repeat the test using a new bobbin.
- Check cables for deformation and/or wear and tear.
- Replace lower thread sensor.
- Replace PCBA-Base (see 4.2.4).

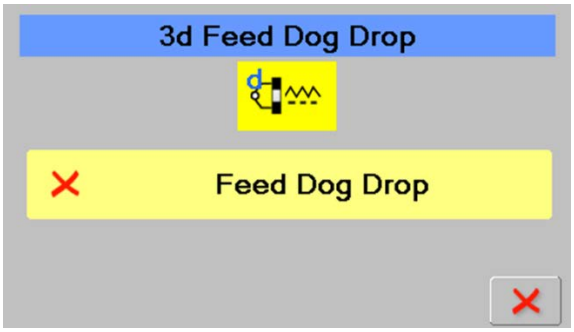
3d Feed-dog drop

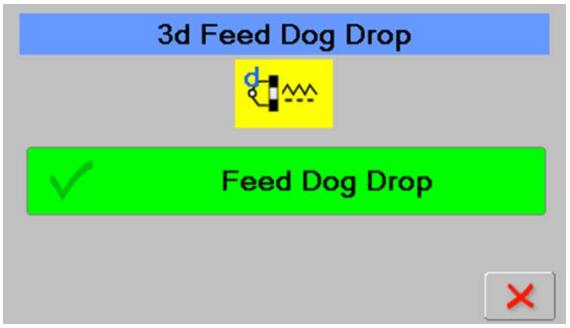
Is used to check feed-dog drop sensor



Check:

- Select test 3d. A feed-dog drop checkbox appears.
- Press feed-dog drop key on belt cover.
- The colour of the checkbox changes to green.
- To return to section 3, press  .





Repair note:

Signal doesn't respond:

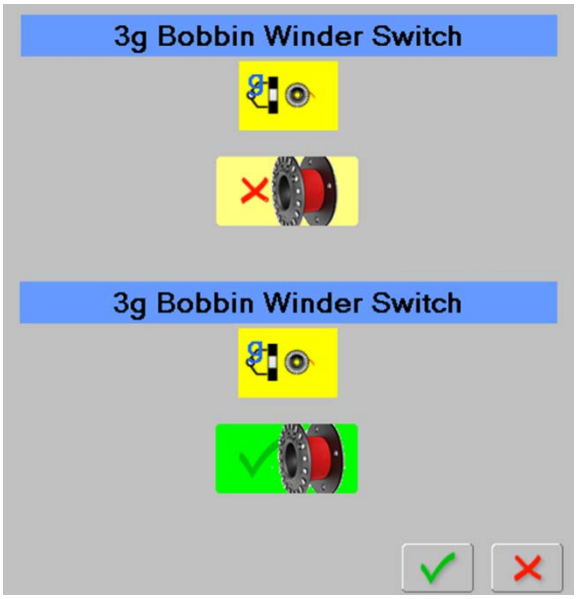
- Remove the covers (see 4.1).
- Check mechanical function of feed dog drop.
- Replace PCBA-Base (see 4.2.4).

3g Bobbin winder micros witch

Is used to check bobbin winder micro switch

Check:

- Select test 3g. A yellow winder checkbox appears.
- Pushing the winder actuating lever to left will activate the microswitch, and the winder spindle turns.
- The colour of the checkbox changes to green.
- To return to section 3, press ✓.



Repair note:

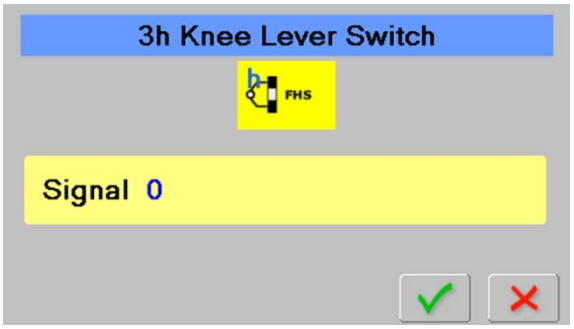
- Check cables for deformation and/or wear and tear.
- Replace winder.
- Replace PCBA-Base (see 4.2.4).

3h Frei Hand System FHS

Is used to check FHS sensor

Check:

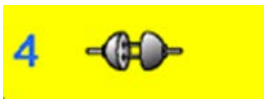
- Select test 3g. A yellow knee lever switch checkbox appears.
- Connect knee lever to machine. Then move lever normally.
- The signal in the checkbox will change from 0 to 1.
- To return to section 3, press ✓.

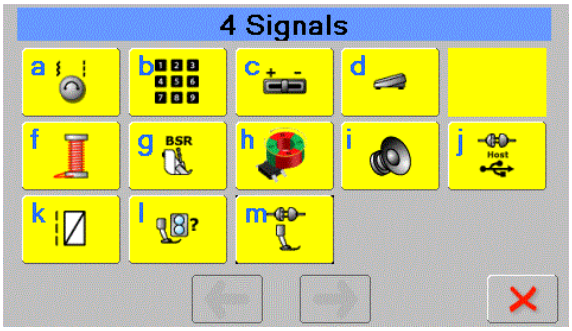


Repair note:

- Check cables for deformation and/or wear and tear.
- Check if PCBA-Base sensor area is free of sewing dust or loose cables.
- If the signal doesn't respond, replace the PCBA-Base (see 4.2.4).

6.4 Section 4 – Signals

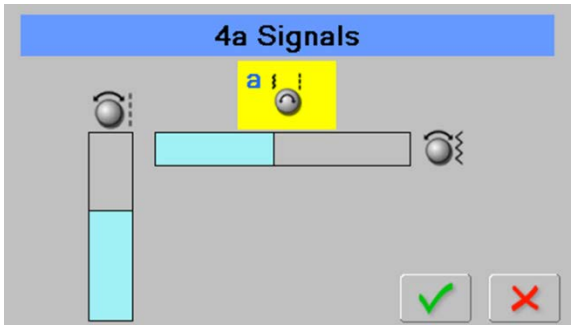




4a Stitch width and stitch length knob(s)
4b Functions of keys and buttons on machine
4c Start-/Stop Slide (SSU)
4d Foot control
4f **U**pper **T**hread **O**bserver (UTO)
4g **B**ERNINA **S**titch **R**egulator (BSR)
4h PCBA-Position
4i Speaker
4j USB ports
4k Basting solenoid
4l Presser-foot recognition
4m BSR foot interface

4a Stitch width and stitch length knob(s)

Is used to check function of stitch width and stitch length knobs



Check:

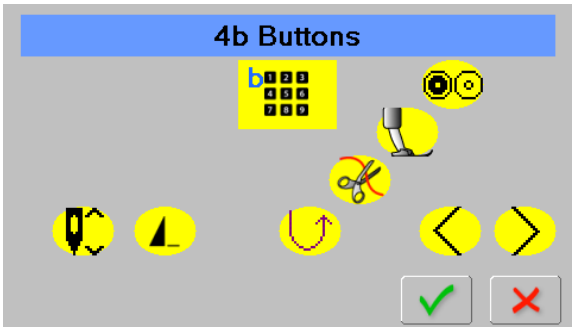
- Select test 4a.
- Turn the stitch length or the stitch width knob.
- The respective bar will fill to reflect the movement.
- To return to section 4, press ✓ or ✗.

Repair note:

- Check knobs and PCBA-Front cover for correct fit and fitting.
- Replace PCBA-Front cover (4.2.7).
- Replace PCBA-Base (see 4.2.4).

4b Functions of keys and buttons on machine

Is used to check functions of keys and buttons on machine



Check:

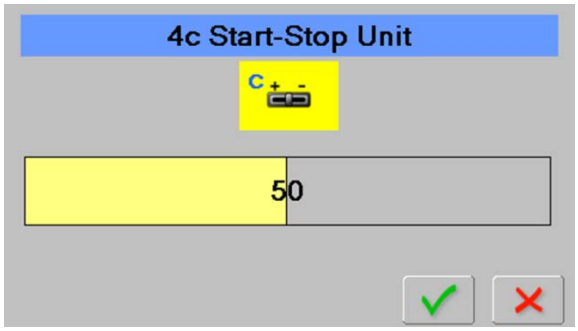
- Select test 4b.
- Press the key of the function to be tested.
- The respective symbol will light up in the display.
- To return to section 4, press ✓ or ✗.
-

Repair note:

- Check the mechanical functioning of the key if the function doesn't light up.
- Check rubber contact mat.
- Check cables for deformation and/or wear and tear.
- Replace PCBA-RET (see 4.2.8).
- Replace PCBA-Base (see 4.2.4).

4c Start-/Stop Slide (SSU)

Is used to check Start-/Stop Slide function



Check:
The position of the slide is reflected on the bar.

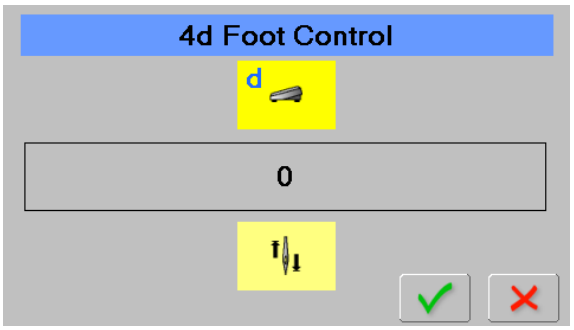
- Select test 4c.
- Move the Start-/Stop slide from left (0) to right (100):
- The bar will fill accordingly.
- To return to section 4, press ✓ or ✗.

Repair note:

- Check cables for deformation and/or wear and tear.
- Replace PCBA-RET (see 4.2.8).
- Replace PCBA-Base (see 4.2.4).

4d Foot control

Is used to check foot control function



Check:

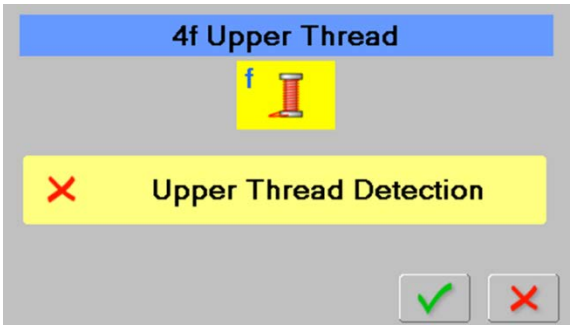
- Select test 4d.
- Slowly press foot control down as far as stop. The position is reflected on the bar.
- Heel-kicking the foot control will light up the needle stop up/down icon.
- To return to section 4, press ✓ or ✗.

Repair note:

- Check foot control cable for deformation and/or wear and tear and loose contacts.
- Check foot control ceramic plate and spring-mounted carbon pin holder for correct fitting and functioning.
- Replace PCBA-Base (see 4.2.4).

4f Upper Thread Observer (UTO)

Is used to check upper thread observer function



Check:

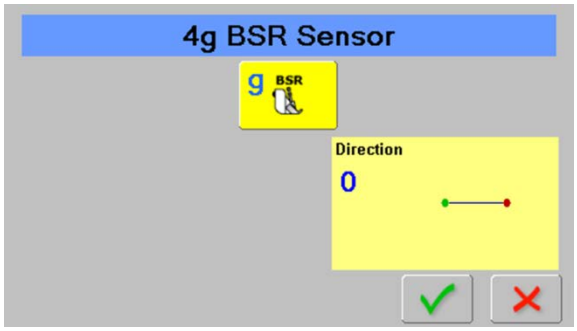
- Select test 4f.
- Insert thread loop from below into the thread tension unit up to the regulator spring.
- Move regulator spring with thread loop up and down.
- With the thread, move regulator spring up and down.
- The color of the bar changes to green.
- To return to section 4, press ✓ or ✗.

Repair note:

- Check regulator spring for damage (bent or broken).
- Check if regulator spring is connected with actuating lug (see 4.3.18.1).
- Check if regulator spring is properly set (see 5.11).
- Check cables for deformation and/or wear and tear.
- Replace PCBA-RET (see 4.2.8).
- Replace PCBA-Base (see 4.2.4).

4g BERNINA Stitch Regulator (BSR)

Is used to check BSR sensor function



Check:

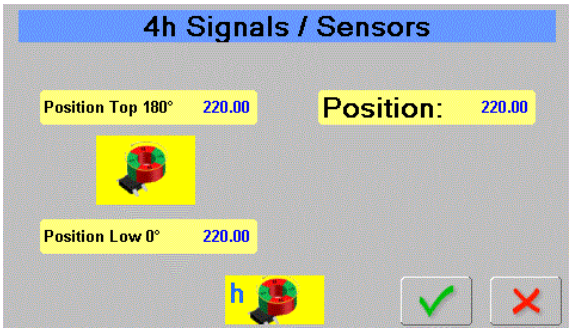
- Attach BSR foot.
- Select test 4g.
- Place fabric under the presser foot.
- Lower presser foot.
- Press the icon to start the test.
- Move the fabric in different directions.
- The directions of the movement will be displayed in the screen.
- The covered distances X and Y will be displayed in mm.
- To return to section 4, press ✓ or ✗.

Repair note:

- Check cables for deformation and/or wear and tear.
- Check BSR foot for dust or stains.
- Check BSR socket and connection.
- Replace Check BSR socket.
- Replace BSR foot.

4h PCBA-Position

Is used to check signals of PCBA-Base



Check:

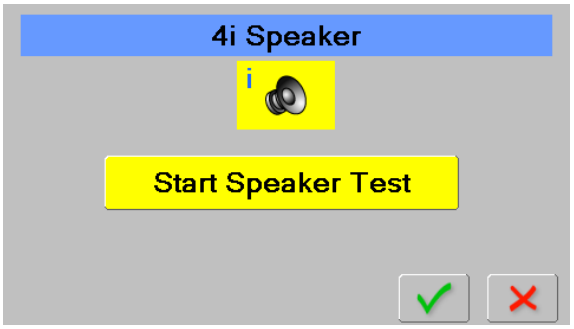
- Select test 4h.
- Set needle bar to TDC.
- The colour of the checkbox changes to green.
- Set needle bar to TDC
- The colour of the checkbox changes to green.
- To return to section 4, press ✓ or ✗.

Repair note:

- Calibrate magnetic position encoder (see test 6o).
- Replace PCBA-Positon Hall (see 4.2.5).
- Replace PCBA-Base (see 4.2.4).

4i Speaker

Is used to check buzzer function



Check:

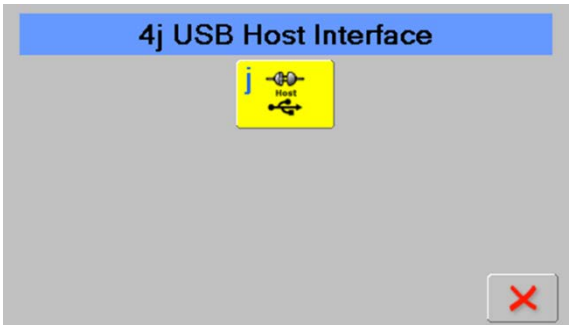
- Select test 4i.
- Press 'Start Speaker Test' bar to start the test.
- A few beep sounds can be heard.
- Press bar again to finish the test.
- To return to section 4, press ✓ or ✗.

Repair note:

- Replace PCBA-Base (see 4.2.4).

4j USB ports

Is used to check USB ports



Check:

- Select test 4j.
- Connect a USB cable from the USB host to a USB client.
- Press icon in the screen to start the test.
- A 'Successful' or 'Test Failed' message will appear.
- To return to section 4, press ✓ or ✗.

Repair note:

If 'Test Failed' message appears:

- Repeat the test using another USB cable.
- Check host and client ports on machine.
- Replace PCBA-Base (see 4.2.4).

4k Basting solenoid

Is used to check basting solenoid function

Only machines with basting devise

Check:

- Select test 4k.
- Press the icon. The basting solenoid will click, and 'Running' appears.
- Press the icon again to stop the test. 'Successful' appears.
- To return to section 4, press ✓ or ✗.

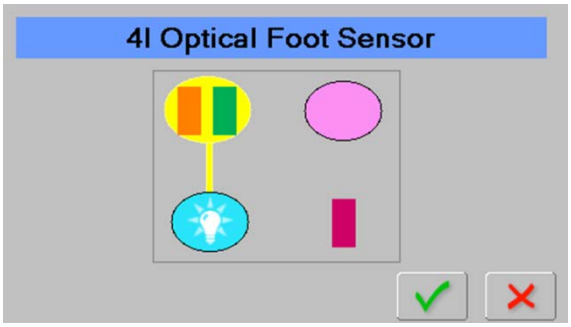
Repair note:

- Check cables and plugs for deformation and/or wear and tear.
- Replace basting solenoid.
- Replace PCBA-Threader (see 4.2.6).
- Replace PCBA-Base (see 4.2.4).

4l Presser-foot recognition

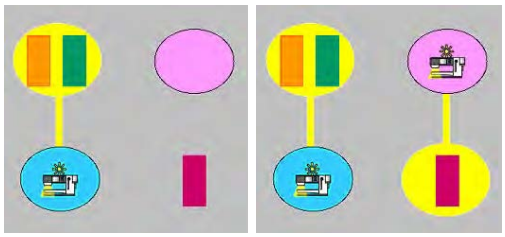
Is used to check presser-foot recognition

Only machines with Dual Feed



Check:

- Lift presser-foot bar.
- When a coded presser foot is attached, the machine will recognize automatically if it is a 5.5mm or 9.00mm presser foot.
  Note: This machines are able to work with C and D coded presser foot.
- Not coded presser feet will be set to 5.5mm automatically.
- With a buttonhole foot with slide (e.g. 3A), signals A and B can be tested by moving the slide.
- To return to section 4, press ✓ or ✗.

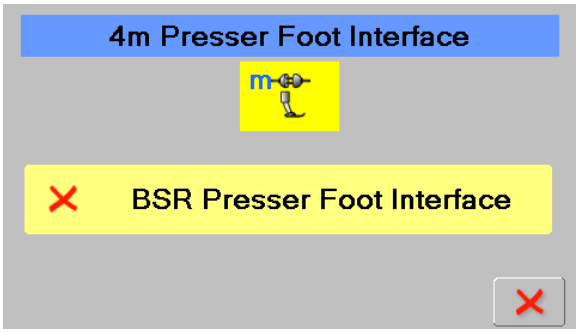


Repair note:
If the presser-foot recognition doesn't work, repeat the test with another presser foot of the same group.

- Check cables for deformation and/or wear and tear.
- If the presser-foot recognition still fails to work, clean ABC sensor support. Replace ABC sensor support if necessary.
- Replace PCBA-Base (see 4.2.4).

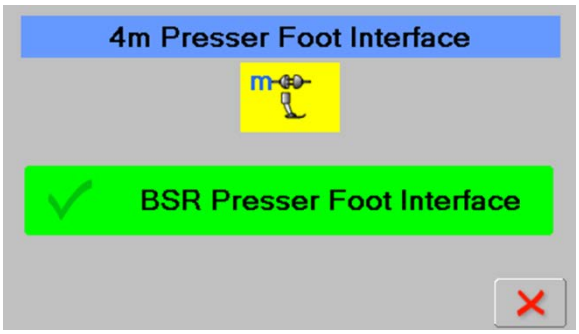
4m BSR foot interface

Is used to check BSR plug and connection



Check:

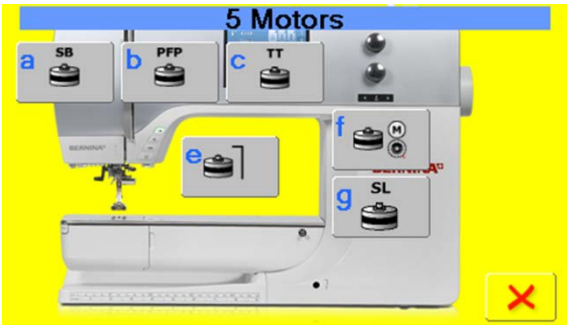
- Attach and connect BSR foot.
- Select test 4m.
- The colour of the checkbox changes to green.
- To return to section 4, press ✓ or ✗.



Repair note: Check:

- Check BSR plug and connection.
- Test BSR foot on a working sewing machine.
- Check cables for deformation and/or wear and tear.
- Replace Check BSR socket.
- Replace PCBA-Base (see 4.2.4).

6.5 Section 5 – Locations of stepping motors in the machine



5a SB = Stitch-width stepping motor¨
5b PFP = Presser-foot pressure stepping motor
5c TT = Upper-thread tension stepping motor
5e All stepping motors in pinning position
5f Winder motor
5g SL = Stitch-length stepping motor

Important!

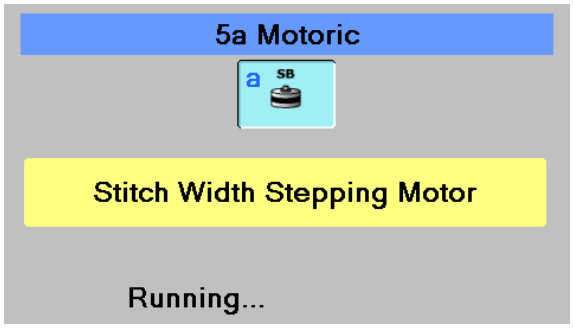
If the main motor isn't running, the machine won't synchronize. With the result that the stepping motors won't be released.

5a Stitch-width stepping motor

Is used to check stepping motor function

Check:

- Select test 5a.
- Press icon to activate the stepping motor. The colour of the icon will change to light blue, 'Running' appears, and the needle bar support moves back and forth.
- Press icon again to stop the stepping motor. 'Successful' appears.
- To return to section 5, press ✓.



Repair note:

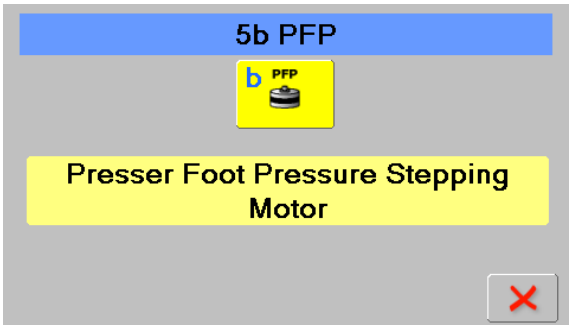
- If the stepping motor doesn't move, the fault might be with the motor itself, the wiring or the PCBA-Base.
- Check cables and plugs for deformation and/or wear and tear.
- Replace PCBA-Base (see 4.2.4).
- Replace stitch-width stepping motor (see 4.3.22)

Important!

Disconnect machine from the power supply. Do not disconnect or reconnect when the machine is powered.

5b Presser-foot pressure stepping motor

Is used to check presser foot pressure stepping motor function



Check:

- Select test 5b.
- Press icon to activate the stepping motor. The colour of the icon will change to light blue, ‘Running’ appears, and the presser-foot bar moves up and down.
- Press icon again to stop the stepping motor. ‘Successful’ appears.
- To return to section 5, press ✓.

Repair note:

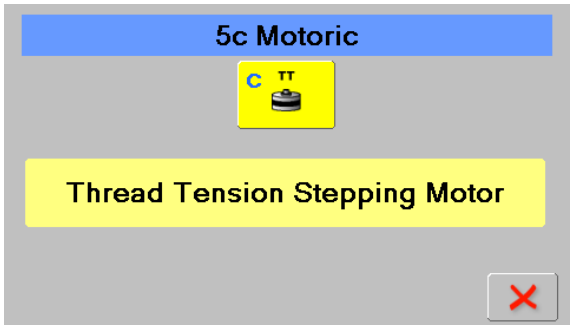
- If the stepping motor doesn’t move, the fault might be with the motor itself, the wiring or the PCBA-Base.
- Check cables and plugs for deformation and/or wear and tear.
- Replace PCBA-Base (see 4.2.4).
- Replace presser-foot pressure stepping motor (see 4.3.21)

Important!

Disconnect machine from the power supply.
Do not disconnect or reconnect when the machine is powered.

5c Upper-thread tension stepping motor

Is used to check upper thread tension stepping motor function



Check:

- Select test 5b.
- Press icon to activate the stepping motor. The colour of the icon will change to light blue, ‘Running’ appears, and the upper-thread tension unit moves back and forth.
- Press icon again to stop the stepping motor. ‘Successful’ appears.
- To return to section 5, press ✓.

Repair note:

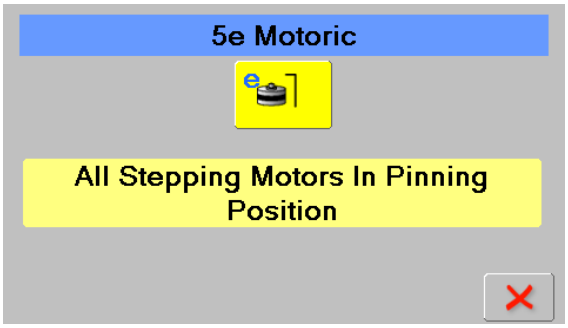
- If the stepping motor doesn’t move, the fault might be with the motor itself, the wiring or the PCBA-Base.
- Check cables and plugs for deformation and/or wear and tear.
- Replace PCBA-Base (see 4.2.4).
- Replace upper-thread tension stepping motor (see 4.3.17)

Important!

Disconnect machine from the power supply.
Do not disconnect or reconnect when the machine is powered.

5e All stepping motors in pinning position

Is used to bring all stepping motors in pinning position



Check:

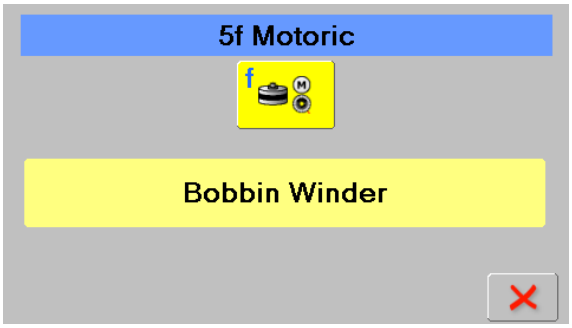
- Select test 5e.
- Press icon to activate the stepping motors. The colour of the icon will change to light blue, 'Running' appears, and all motors move into pinning position.
- To check the positions, use pinning tools.
- Press icon again to stop the test. 'Successful' appears.
- To return to section 5, press ✓.

Repair note:

- Check pinning positions as indicated above. Replace motor(s) according to Service Manual if necessary.
- Check cables and plugs for deformation and/or wear and tear.

5f Bobbin winder motor

Is used to check bobbin winder motor function



Check:

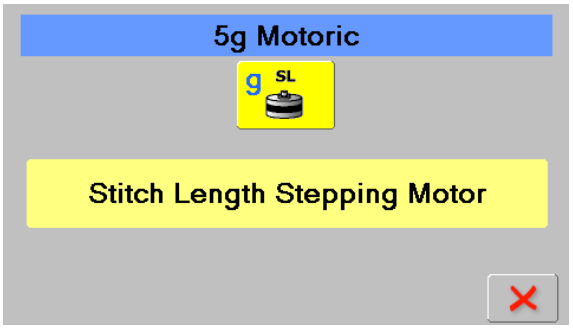
- Select test 5f.
- Press icon to activate the winder motor. The colour of the icon will change to light blue, 'Running' appears, and the winder motor starts.
- Press icon again to stop the winder motor. 'Successful' appears.
- To return to section 5, press ✓.

Repair note:

- If the stepping motor doesn't move, the fault might be with the motor itself, the wiring or the PCBA-Base.
- Check cables and plugs for deformation and/or wear and tear.
- eplace PCBA-Base (see 4.2.4).
- Replace winder motor.

5g Stitch-length stepping motor

Is used to check stitch-length stepping motor function



Check:

- Select test 5g.
- Press icon to activate the stepping motor. The colour of the icon will change to light blue, ‘Running’ appears, and the feed-dog moves back and forth in the stitch plate.
- Press icon again to stop the stepping motor. ‘Successful’ appears.
- To return to section 5, press ✓.

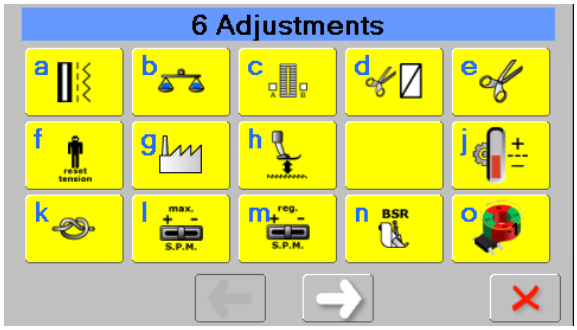
Repair note:

- If the stepping motor doesn’t move, the fault might be with the motor itself, the wiring or the PCBA-Base.
- Check cables and plugs for deformation and/or wear and tear.
- eplace PCBA-Base (see 4.2.4).
- Replace stitch-length stepping motor (see 4.3.20)

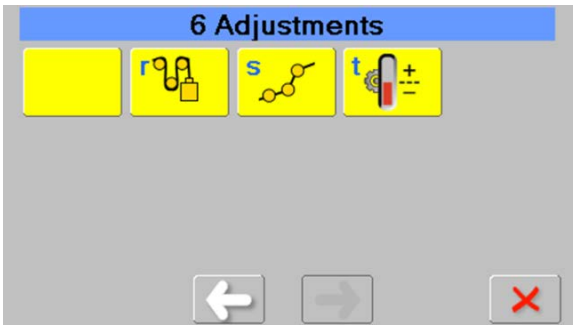
Important!

Disconnect machine from the power supply.
Do not disconnect or reconnect when the machine is powered.

6.6 Section 6 – Adjustments



6a Sewing-off (user interface)
6b Electronic balance calibration
6c Buttonhole calibration
6d Thread cutter clamping mechanism (solenoid)
6e Thread cutting
6f Resetting upper-thread tension to default
6g Resetting to factory settings (Reset all)
6h Presser foot height
6j Automatic upper-thread tension
6k Test Tie On
6l Start-/Stop slide (SSU) calibration
6m Normal SSU stitching speed
6n BSR sewing mode
6o Magnetic position encoder calibration



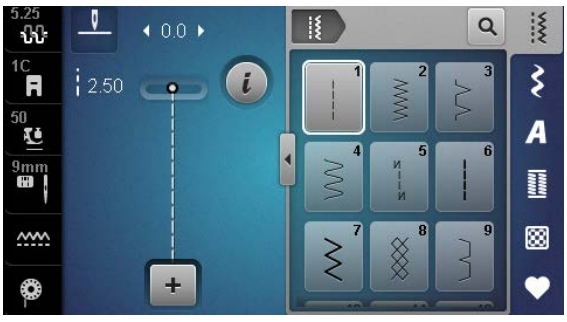
Adjustments on the second page are for Production only.
They are for information only:
6r Weight difference measuring
6sUpper-thread tension calibration
6t Number pad

6a Sewing-off (user interface)

Is used to go to sewing interface

Check:

- Select test 6a.
- Press the eye icon in the right box to switch the upper-thread sensor off.
- Press the yellow icon to access sewing mode.
- The machine can now be sewn off using various stitch patterns.
- Press clr to exit sewing mode.



Note:
Ensure to carry out all crucial adjustments and calibrations by following the check list in section 11.

Important!

Do not run a threaded machine without fabric!

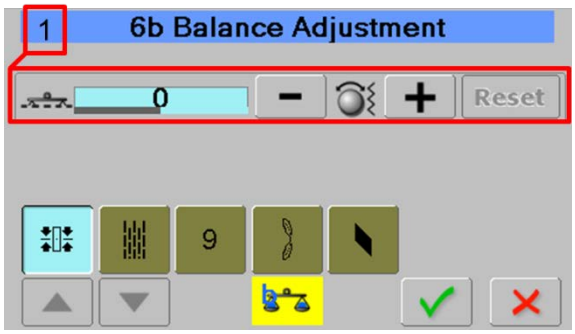
6b Electronic balance calibration

Is used to check balancer calibration

Note:

- The following balance adjustments require correct pinning positions (see 5.6.4 and 5.6.6).
- The two crankshafts, the feeding system mechanism, the lift-and-advance lever must move smoothly, without play or jamming.
- Increased wear of the parts could cause deviations of the test sample (default pattern).
- The machine must reach room temperature prior to adjustments.
- We recommend to use the slide-on extension table.

Zero feed rough adjustment



Check:

- Attach foot 1C.
- Place two layers of Cretonne (cotton) underneath the presser foot without threading the machine.
- Feed-dog in the up position (normal sewing).
- Select zero feed key.
- Run the machine. The fabric should not move.

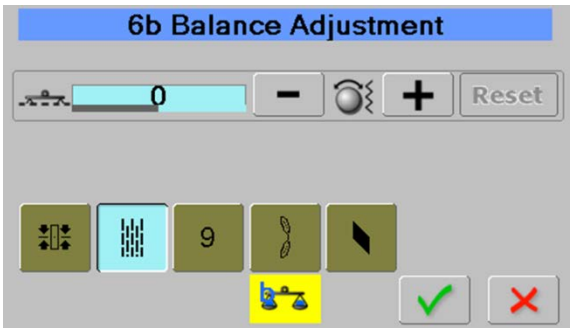
Adjust:

- Use the + (= forward) and − (= reverse) icons in section 1 to set zero feed to the lowest possible forward and reverse feed.
- The basic value is 0, the setting ranges from +4 to -4.
- Press ✓ to save the settings.

Fine-adjustment:

There are 3 different test patterns available for the fine-adjustment of the stitching:

1. Darning Program
2. **The number 9 (preferred)**
3. Leaf pattern



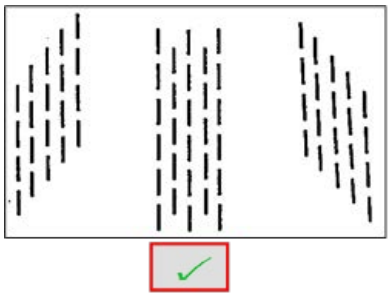
1. Darning program (stitch counter):

Check:

- Attach foot 1C.
- Thread machine and place two-layered sewing-off cotton under the presser foot.
- Feed-dog in the up position (normal sewing).
- Select Darning Program and stitch the pattern.
- The darning pattern must form square with a virtual straight top and bottom line (see picture).

Adjust:

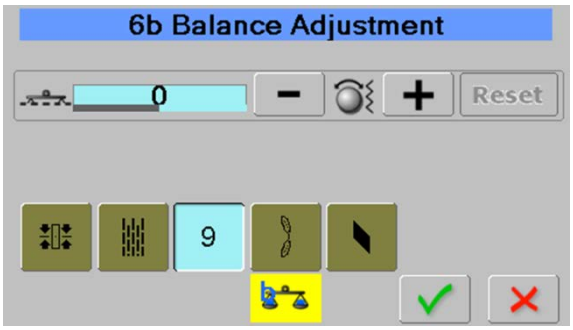
- Turn balance adjusting cam **a** (T 10, blade length at least 110mm) until the pattern is stitched properly.



2. The number 9 (preferred)

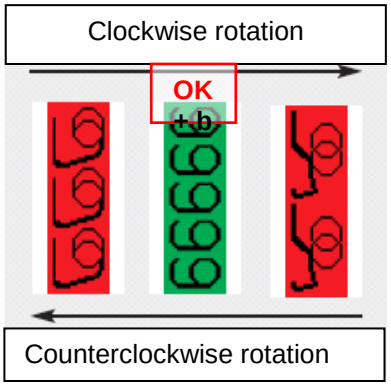
Check:

- Attach foot 1C.
- Thread machine and place two-layered sewing-off cotton under the presser foot.
- Feed-dog in the up position (normal sewing).
- Select the number 9 to stitch it.
- The 9 must be stitched without gaps between the stitched lines.



Adjust:

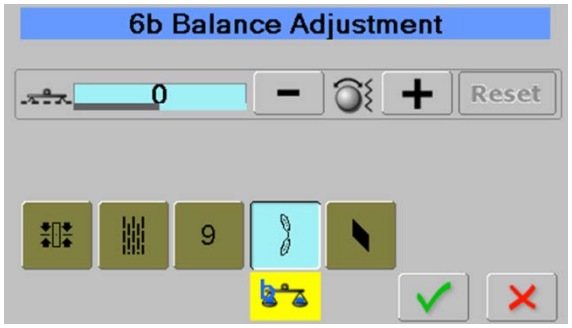
- Turn balance adjusting cam **a** (T 10, blade length at least 110mm) until the number 9 is stitched properly.



3. Leaf pattern

Check:

- Attach foot 1C.
- Thread machine and place two-layered sewing-off cotton under the presser foot.
- Feed-dog in the up position (normal sewing).
- Select the leaf to stitch it.
- The leaf pattern outline must be stitched in such way that the stitching line ends meet exactly.

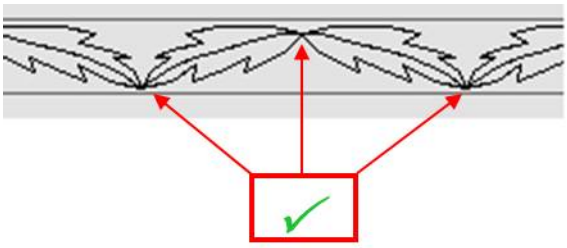


Adjust:

- Turn balance adjusting cam **a** (T 10, blade length at least 110mm) until the leaf pattern is stitched properly.

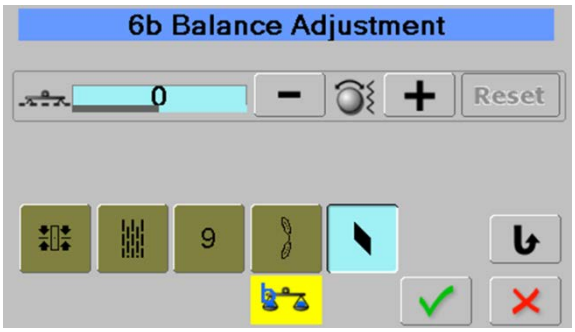
Note:

- Rotate balance cam a clockwise = the leaf pattern pulls together
- Rotate balance cam **a** counterclockwise = the leaf pattern pulls apart.



BERNINA **D**ual **F**eed **balance**

Check:
- Synchronization of feed-dog and upper feed motion (BERNINA Dual Feed BDF).



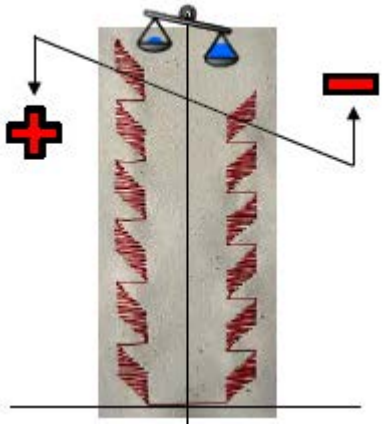
Difference in length between the repeats:
- Attach foot 1D.
- Thread machine and place two-layered sewing-off cotton under the presser foot.
- Feed-dog in the up position (normal sewing).
- Engage Dual Feed.
- Select the diamond stitch pattern.
- Stitch the pattern (the machine will automatically stop after 6 repeats).
- Raise the presser foot and move the fabric ca. 1.0cm to the right.
- Make sure that the needle pierces at level with the end point of the last of the 6 diamond repeats.
- Lower the presser foot. Press the permanent reverse button on the screen.
- Stitch the pattern in reverse (the machine will automatically stop after 6 repeats).
- The **difference in length** between the two stitched rows should **not be larger than 7.0 mm**.

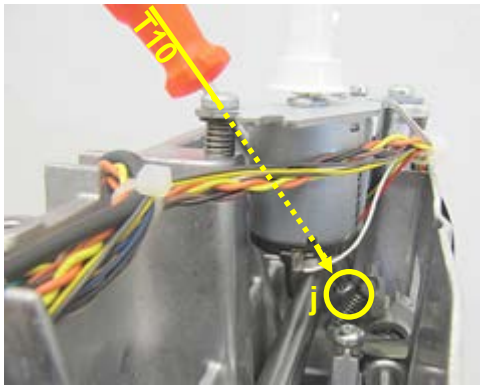
Difference in length max. 7.0mm

Adjust:
- Check BDF rough-adjustment (see 5.6.6)

WARNING! Danger of winder motor short-circuiting!

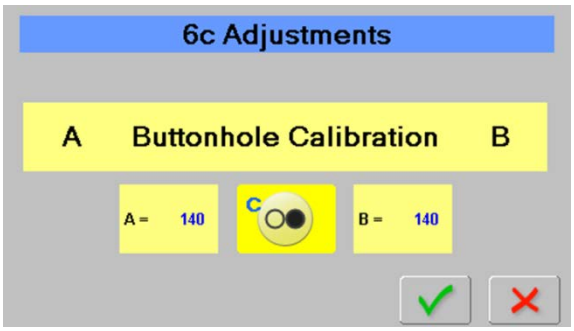
- **Fine-adjustment:** The machine must be unpowered when carrying out this adjustment (see 1.2)
- Turning screw **j** clockwise will lengthen the left side of the diamond stitch pattern while the right side of the diamond pattern will be shortened.
- Turning screw **j** counterclockwise will shorten the left side of the diamond stitch pattern while the right side of the diamond pattern will be lengthened





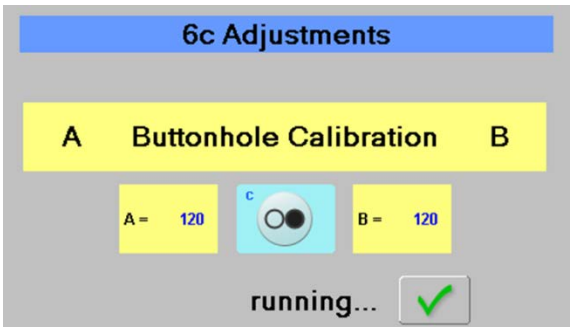
6c Buttonhole calibration

Is used to carry out buttonhole calibration

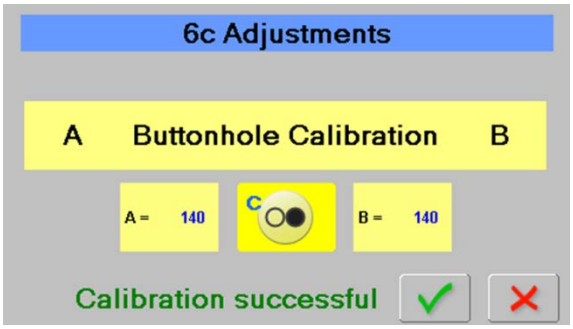


Check:

- Attach buttonhole foot with slide 3A.
- Select test 6c.
- Lower presser foot.
- Press Start-/Stop button.
- Buttonhole foot calibration starts.



- 'Running' appears, and the colour of the Start-/Stop icon changes to light blue.
- The buttonhole foot moves back and forth, and signals A and B are recorded.
- A 'Calibration successful' message appears if the calibration has been successful.
- A 'Calibration failed' message appears if the calibration failed.
- Press ✓ to save and return.
- Press ✗ to return without saving.



Repair note:

- Check the ABC sensor board for dust or stains. Clean if necessary (see 2.9).
- Check the balance adjustment done previously.
- Check the mechanical parts of the buttonhole foot with slide (smooth sliding of carriage, motion of the signal prism).
- Check foot recognition in test 4l.
- Replace buttonhole foot with slide.
- Check cables and plugs for deformation and/or wear and tear.
- Replace ABC sensor board (see 4.2.10).
- Replace PCBA-Base (see 4.2.4).

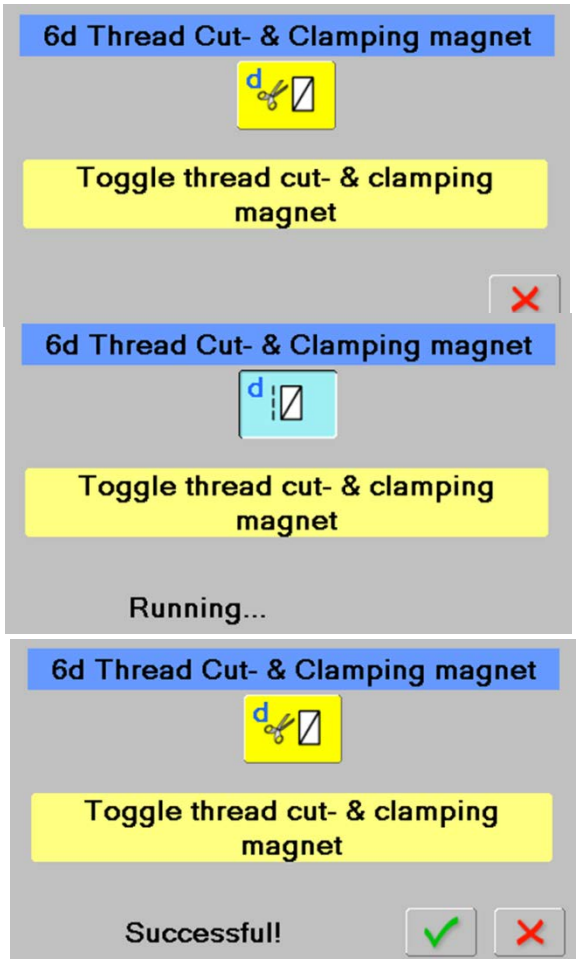
User view in Setup menu:

6d Thread cutter clamping mechanism (solenoid)

Is used to carry out thread cutter solenoid test

Check:

- Select test 6d.
- Press icon to activate the solenoid. The colour of the icon will change to light blue, ‘Running’ appears, and the solenoid clicks.
- Press icon again to stop the solenoid. ‘Successful’ appears.
- To return to section 6, press ✓.

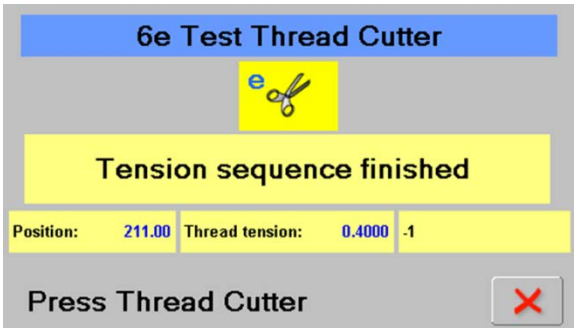


Repair note:

- Check cables for deformation and/or wear and tear.
- Replace complete clutch carriage (see 4.3.11).
- Replace PCBA-Base (see 4.2.4).

6e Thread cutting

Is used to carry out, step by step, thread cutting function test



Check:

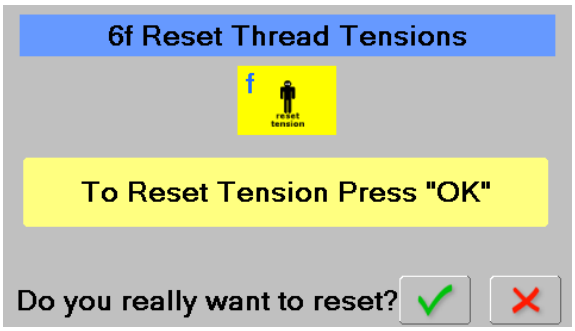
- Select test 6e.
- Press thread cutter key to change between the different processes.
- A new window opens, and the first step is prompted.
- Press green check key to see the next step (8 steps in total). See table:

Prompt:	Action	* Base shaft position (needle position)
Start thread cutting sequence	Start thread cutting sequence	211.00
Lower thread in thread reservoir	Lower thread cached by tread catcher	35.00
Open thread tension	Thread tension open	137.00
Upper thread caught by thread catcher	Upper thread cached by tread catcher	143.00
Close thread tension	Thread tension closed	179.00
Separate upper and lower thread	Upper and lower thread cut	185.00
Restore thread tension	Thread tension restored	212.00
Tension sequence finished	Tension sequence finished	212.00

* Value in degree on machine can slightly differ from given value

6f Resetting upper-thread tension to default

Is used to reset from customer changed tension value

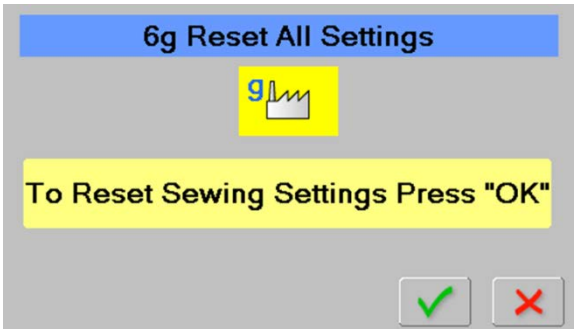


Check:

- Select test 6f.
- 'To Reset Tension Press OK' appears.
- Press to continue.
- 'Do you really want to reset?' appears.
- If the answer is Yes, press to reset the upper-thread tension to default and return to section 6.
- If the answer is No, press to leave the upper-thread tension settings and return to section 6.

6g Resetting to factory settings (Reset all)

Is used to reset from customer changed settings



Check:

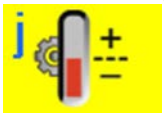
- Select test 6g.
- 'To Reset Sewing Settings Press „OK"' appears.
- Press ✓ to continue.
- 'Do you really want to reset?' appears.
- If the answer is yes, press ✓ to reset the sewing settings to factory settings and return to section 6.
- If the answer is No, press ✗ to leave the sewing settings and return to section 6.

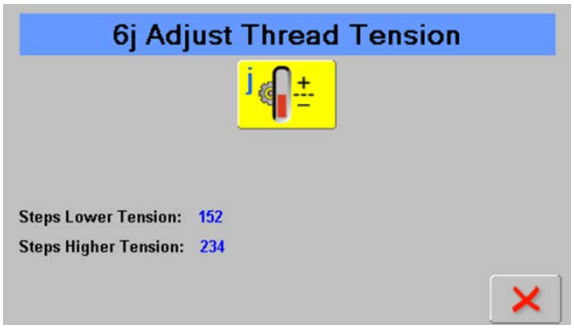
Important!

It is essential to save all the customers data on a BERNINA USB data stick before resetting to factory settings! See customer data saving in 1g.

6j Automatic upper-thread tension

Is used to adjust upper thread tension basic value





Check:

- Select test 6j.
- Press the icon to start the calibration. The colour of the icon changes to light blue.
- Use the recommended gauging thread DMC 50 white.
- A 'Successful!' message will appear on successfully completed adjustment.
- To return to section 6, press ✓.

Adjustment note:

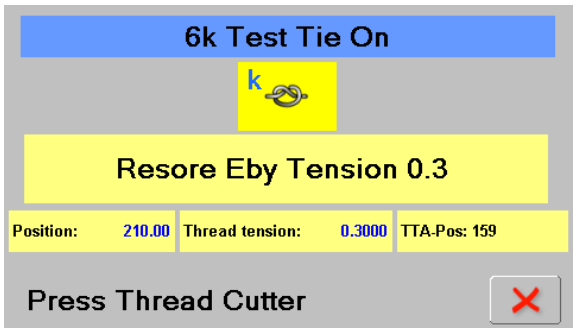
- For detailed electronic upper-thread adjustment (see 5.12.1).

Important!

- Gauging thread DMC 50 white can be ordered from BERNINA under item no. 652010.20.++.
- Cotton thread is prone to dry out. Moisture loss reduces tensile strength and gliding properties of thread.

6k Test Tie On

Is used to carry out, step by step, tie-on function test



Check:

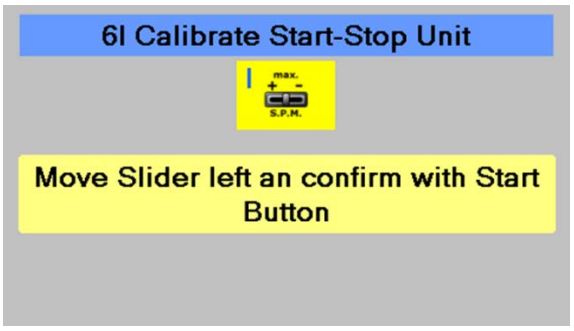
- Select test 6k.
- Press thread cutter key on head frame.
- Start of tie-on sequence. Needle position is at 210 degree.
- Press presser-foot lift key on head frame.
- Increase thread tension.
- Thread catcher is activated.
- Reset thread tension to 0.3.
- To return to section 6, press ✓.

Repair note:

- Check stitch plate carrier and thread catcher for dirt or dust and check mechanical smooth running.
- Carry out test 6d. Check cables for deformation and/or wear and tear.
- Replace complete clutch carriage (see 4.3.11).
- Replace PCBA-Base (see 4.2.4).

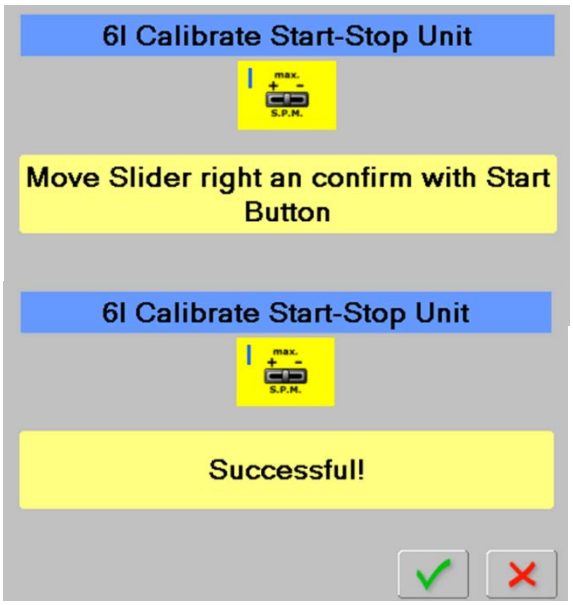
6l Start-/Stop slide (SSU) calibration

Is used to carry out SSU calibration



Check:

- Select test 6l.
- **1. step:**
  Move slider to the left entirely. Confirm pressing Start-/Stop button on machine.
- **2. step:**
  Move slider to the right entirely. Confirm pressing Start-/Stop button on machine.
- 'Successful' appears.
- Press ✓ to save the calibration and return to section 6.
- Press ✗ to return to section 6 without saving.

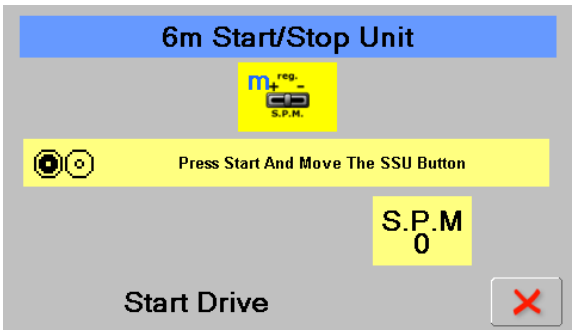


Repair note:

- Check slider for dust or stains and smooth mechanical running.
- Check cables and plugs for deformation and/or wear and tear.
- Replace PCBA-Front cover (see 4.2.7).

6m Normal SSU stitching speed

Is used to check machine speed



Check:

- Select test 6m.
- Press Start-/Stop button. The motor speed changes depending on the SSU slide control position.
- Motor speed is displayed in Stitches Per Minute (S.P.M.) on the right.
- Press Start-/Stop button to stop the machine.
- To return to section 6, press ✓.

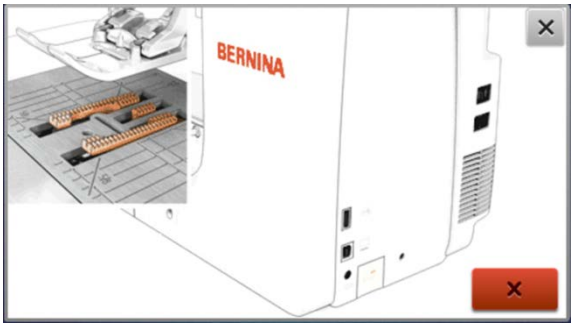
Repair note:

Check slider for dust or stains and smooth mechanical running.

- Check cables and plugs for deformation and/or wear and tear.
- Replace PCBA-Front cover (see 4.2.7).
- Replace PCBA-Base (see 4.2.4).

6n BSR sewing mode

Is used to go to BSE sewing mode

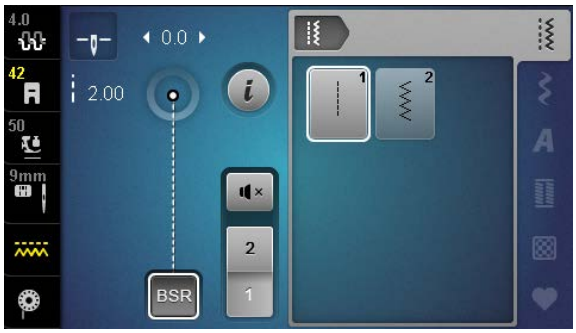


Check:

- Select test 6n.
- An animated prompt to lower the feed-dog appears.
- On pressing the red button the prompt to attach the BSR presser foot appears.
- Attach BSR foot. Press green key to confirm.
- BSR mode 1 appears automatically.
- To switch to BSR 2 mode, press the respective button.
- Press clr to retrun to Service Program.

Repair note:

- Check BSR for dust or stains.
- Replace BSR foot.
- Replace Check BSR socket.
- Replace PCBA-Base (see 4.2.4).

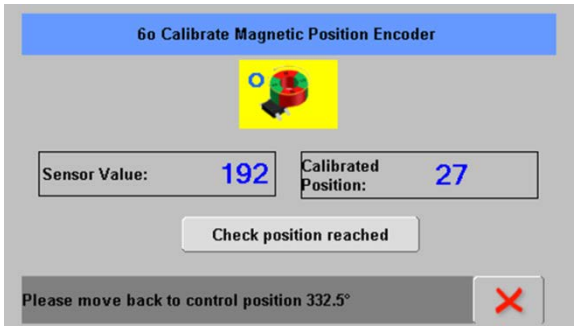


6o Magnetic position encoder calibration

Is used to carry calibration of magnetic position encoder

Check:

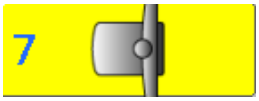
- Use loop-lift gauge 734571.70.01 to adjust loop lift position.
- Select test 6o.
- In loop lift position, press grey key reading ‘Calibration position reached’. With this, the magnetic position encoder is calibrated.
- Now turn handwheel back clockwise until the loop-lift gauge reaches stop again.
- A reference value of between 330 and 335 degree should appear, and the dark grey bar at the bottom should change to green.
- To return to section 6, press ✓.



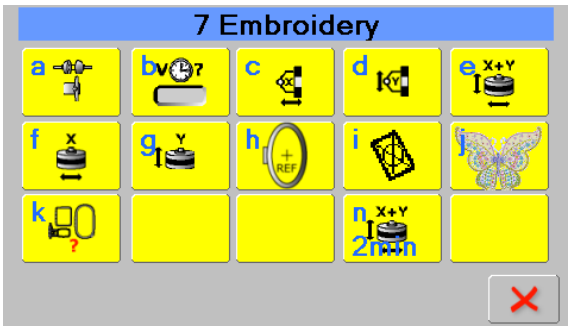
Repair note:

- Check loop lift (see 5.5.3).
- Check functionality PCBA-Position (see test 4h).
- Replace PCBA-Position Hall (see4.2.5).
- Replace PCBA-Base (see 4.2.4)

6.7 Section 7 – Embroidery module (EMB)



7a Embroidery module connection
7b Embroidery hours
7c X-direction sensor
7d Y-direction sensor
7e X- and Y-directions of stepping motors
7f X-direction stepping motor
7g Y-direction stepping motor
7h Hoop reference point
7i Testing the test patterns
7j Customer view embroidery mode
7k Hoop recognition
7n Duration Run Embroidery Motors



A detailed description of the Service Program section 7 can be found in the Embroidery Module Service- and Maintenance Manual.

6.11 Section 11 – Check-out tests

Check:
This check-out is designed to give the technician the possibility to check the machine in its main categories, before delivering it to the customer.
The first test (lower-thread sensor) as listed below will appear automatically on starting menu 11. On successful completion of the test (lower-thread sensor) and confirming with ✓, the next test follows automatically.

Important!

If the test (lower-thread sensor) fails or is cancelled with ✗, the program returns from check-out to Service Program **without saving the settings**.

Check-out tests:

1 Lower-thread sensor, test 3c
2 Upper-thread sensor, test 4f
3 Balance, test 6b
4 Buttonhole calibration, test 6c
5 Lubrication and resetting the service stitches, test 1f

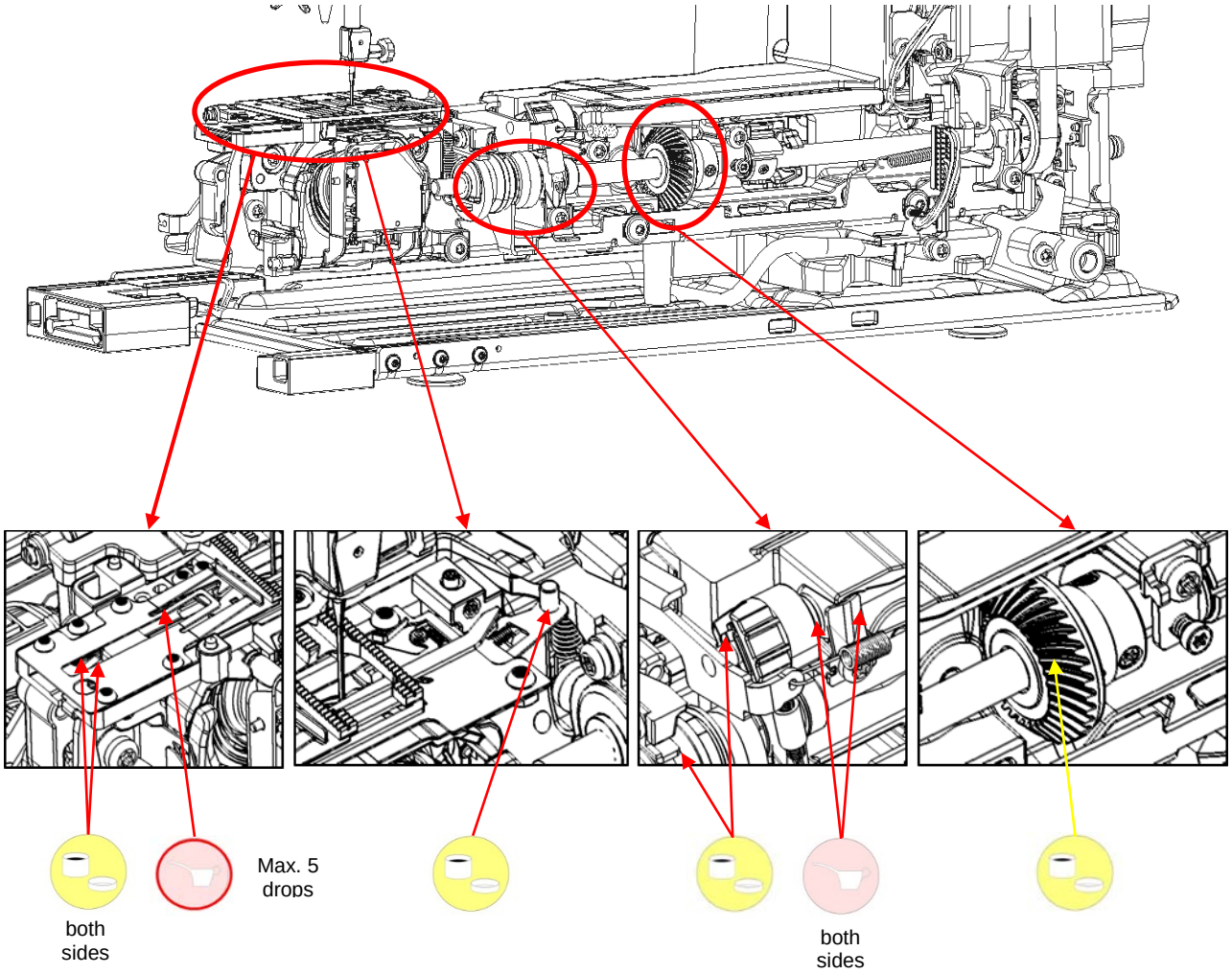
On completion of the last test and confirmation with ✓, check-out program returns to Service Program main menu.

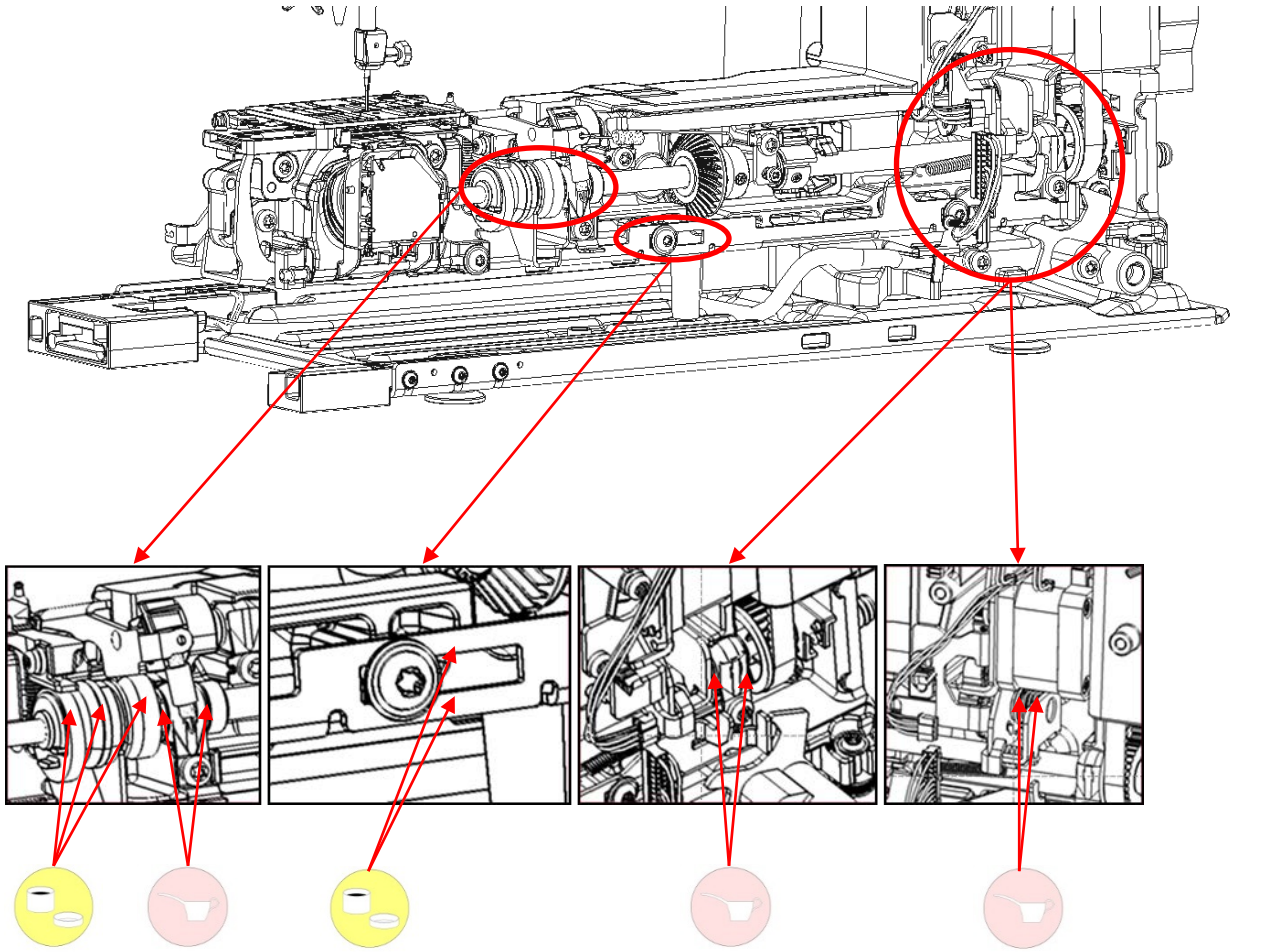
Chapter 7 – Lubrication Diagram

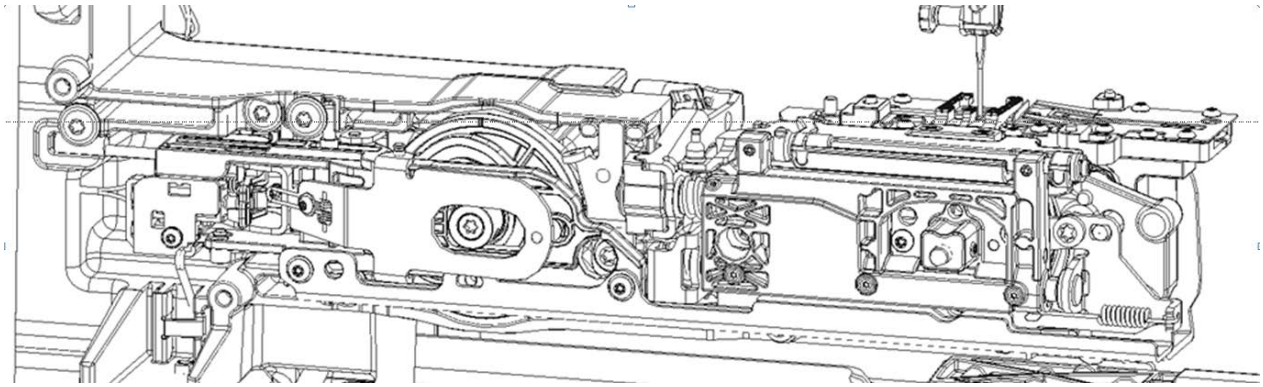
= Klüber OY 100 (002779.70.01)

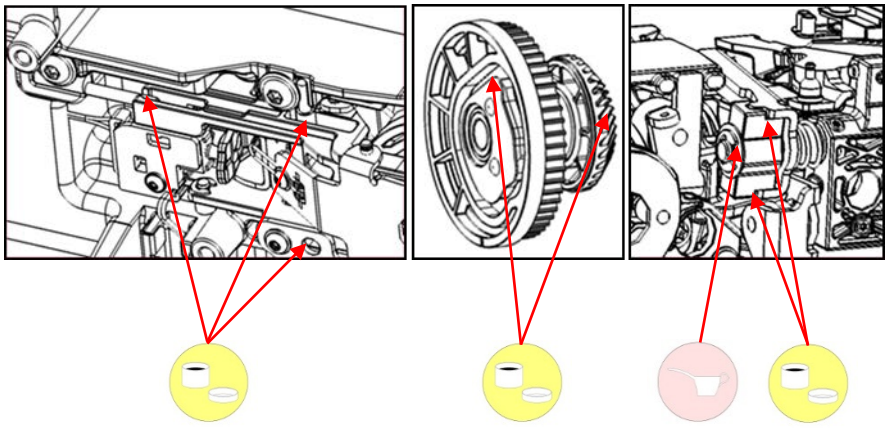
= Velocite 6 (033567.50.01)

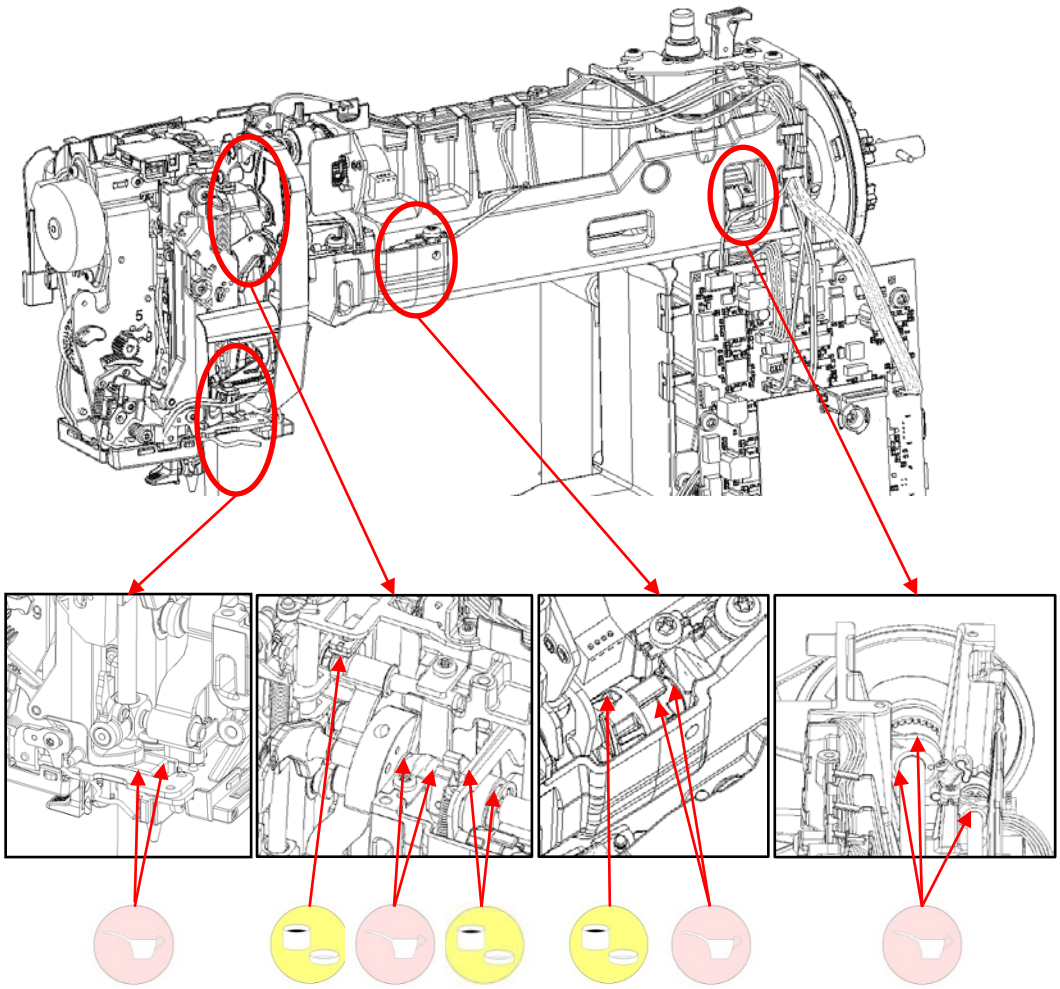
= Klübersynth UH1 14-1600 (002779.72.02)

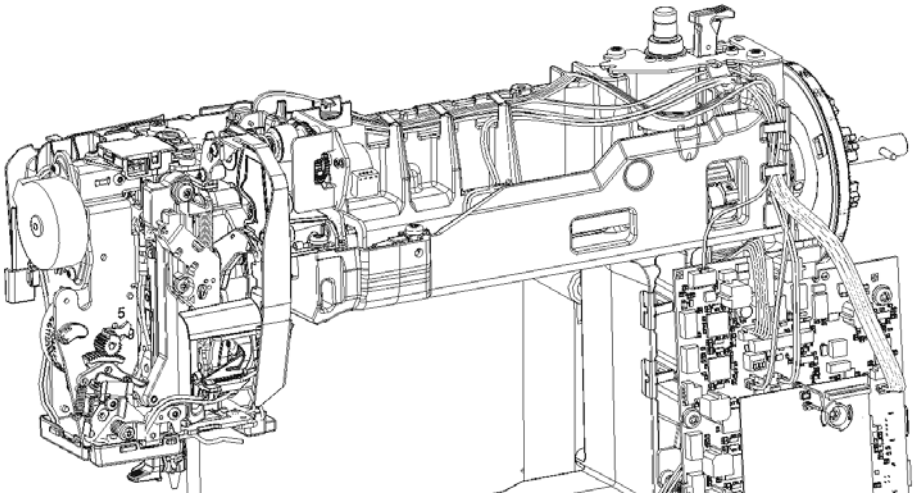


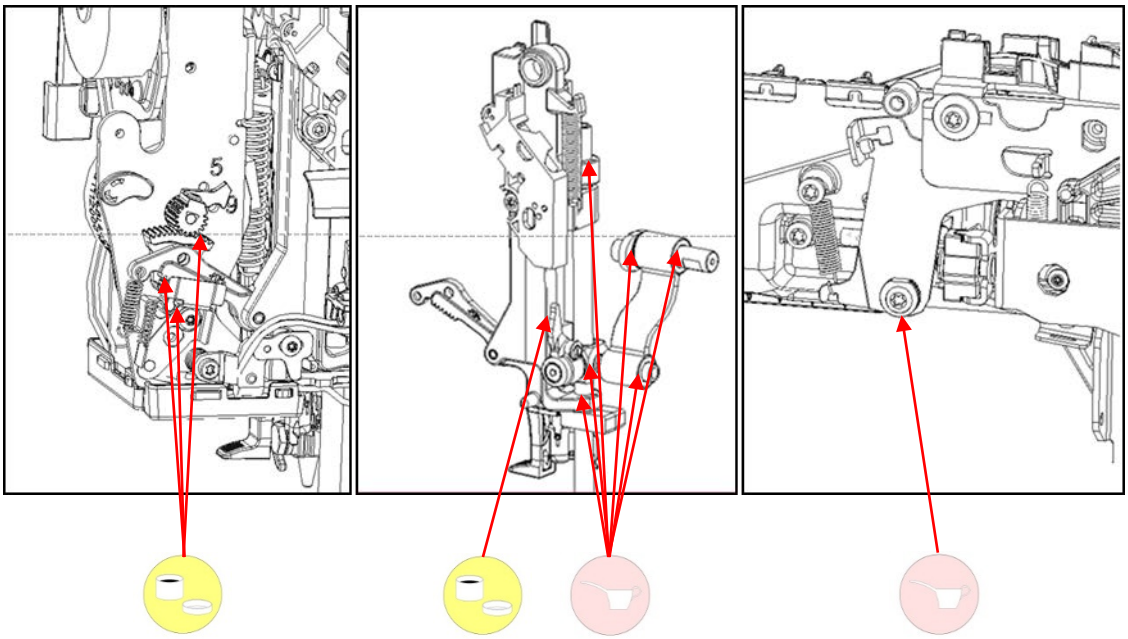


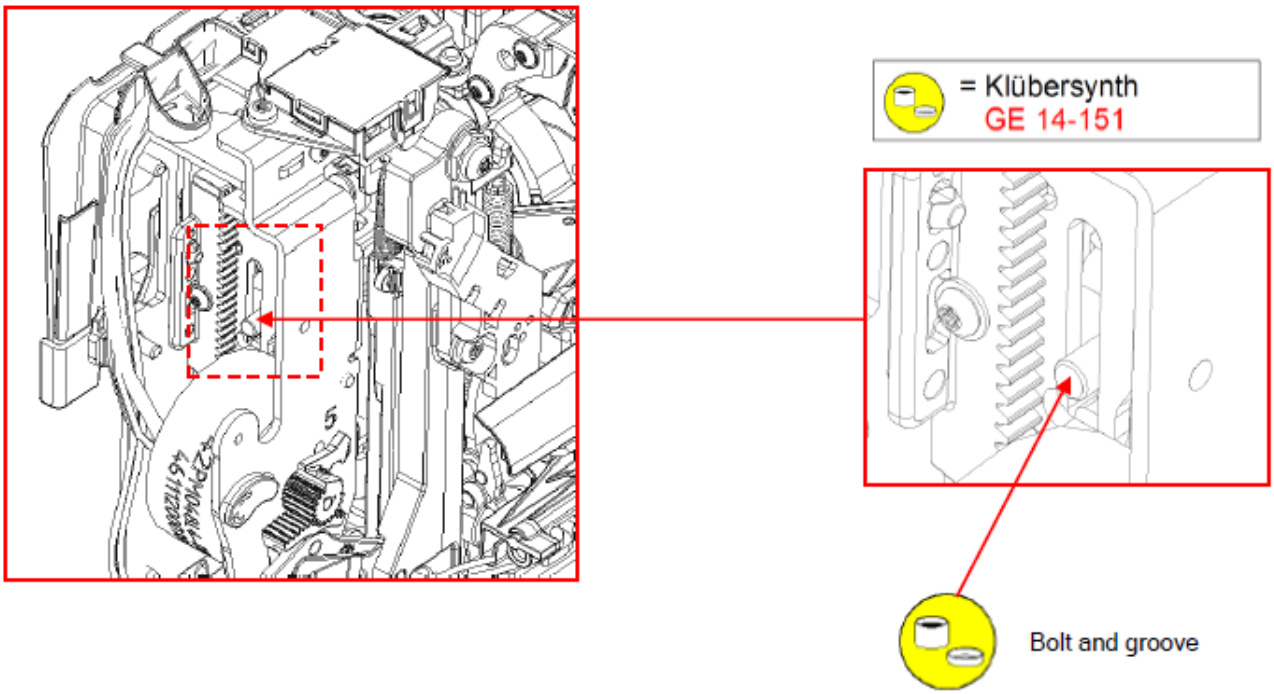








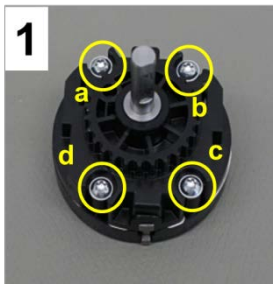


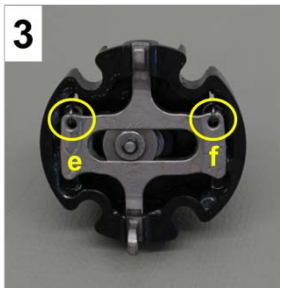


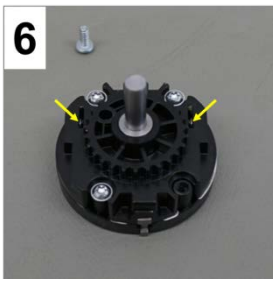
7.1. Lubrication of modified hook driver when removed from machine is not necessary at the moment

General information:
The hook driver of the new 5 Series has been modified.
The modification improves process reliability considerably.
The driving part of the hook driver has been made of synthetic material (new), (right part **1** in pict.).
Previously the driving part of the hook driver was made of sinter material (left part **2** in pict)

The modified hook driver will replace the previous hook driver type completely. It will be used in all machines with BERNINA hooks.







Oiling/lubrication:
- Remove screws **a**, **b**, **c**, and **d** (T9).
- Remove hook driver cover (pict. 2).
- Use spring mounting tool **398112.03.0+** to remove tension springs **e** and **f.** Remove hook drive shaft (pict. 3).

Note:
New - the hook drive shaft consists of one piece now (pict 4).

Oil to be used:
Klübersynth UH1-1600 / OY 100 K

- Use **Klübersynth UH1-1600** to lubricate link, link block, and drive shaft sparingly.
- **Fill OY 100 K** in oil inlet (pict. 5).

Assembly:
- Refit hook drive shaft into hook driver driving part. Use spring mounting tool **398112.03.0+** to rehook tension springs in their proper positions (pict. 3)
- Refit hook driver cover.
- Refit black hook driver cover with white dot (see top pict.)
- Retighten 4 fastening screws **a**, **b**, **c**, and **d** crosswise. (pict. 6)

Note:
- Recheck if tensions springs are correctly hooked at both ends. (pict. 3 and 6)
- To avoid cutting a new thread, find the proper thread with the screws.
- Don’t tighten the screws too tight to avoid stiff running of the drive shaft.

Chapter 8 – Firmware Update

8.1 Update Procedure

Note:

- The BERNINA 590, 570 QE, and 535 do **not** have the same firmware (FW).
- Update files are available for downloading from Infogate.
- Update files for BERNINA 590, 570 QE, 540, and 535 **CANNOT** be saved on the same BERNINA USB data stick.

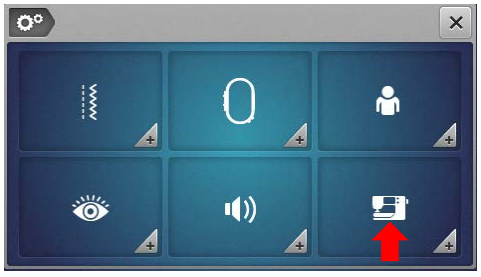
Note:
If the files are saved in a folder or subfolder on the USB stick, the machine will not be able to find them and will consequently not be able to update.

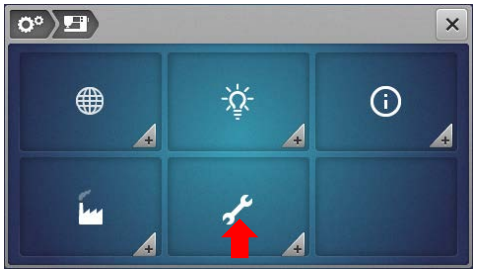
1 Save the update files to a BERNINA USB stick (**> 512 MB**).

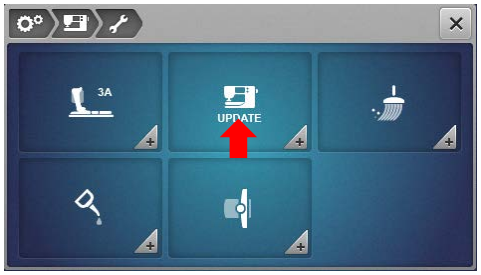
For BERNINA dealers: https://infogate.bernina.com
For BERNINA end customers: www.bernina.com/downloads

2 Connect BERNINA USB stick to machine and switch main switch ON.

3 Select Setup Program, then press the Update button.







4 The ‘Update’ windows opnes. Press ‘Update’ icon. The updating process starts.

5 The update files will be checked, data and settings saved to the USB stick and a reset triggered.
6 On resetting the update will be carried out and the machine will start and run in update mode automatically.
7 The saved settings and data are copied back from the USB stick to the sewing machine and the application changes to normal mode.
8 Now the machine is ready for normal usage with the new version.
9 If the update can not be started or in the event of problems occuring while updating, one of the error messages below may appear:

Error message	Possible cause	Possible solution

No valid updates on USB stick.	Files not complete or faulty.	Save the proper update files to the USB stick (again).
	Update files were not saved to the first level of the USB memory.	Move the update files to the first level of the USB memory (root directory).
	Defective or incompatible USB stick.	Use a BERNINA USB stick. Check functioning of USB stick on a pc.
Restore of customer data failed	USB stick not recognized.	Is the USB stick connected?
		Connect BERNINA USB Stick with updates and customer data to machine, wait for 10 seconds, then try again.
		Switch the machine with the USB stick connected, off and on again.
		Check functioning of USB stick on a pc.
	Saved settings / personal data missing.	Repeat update procedure.
		Load the saved settings / personal data again via the service program (1g load the customer settings)
Update failed	Updating of machine with new application failed.	Switch the machine off and wait for 30 sec. Then switch on and run the update process again.
		Save the proper update files to the USB stick (again). Then repeat the updating.
		Try alternative access.
		Replace PCBA-Module.

8.2 Update alternative access

Note:
If the update can not be carried out in Setup, or if the machine fails to reboot, an alternative access is provided.

Important: Avoid loss of data!
If the sewing/embroidery system fails to reboot (e.g. due to not recognizing the firmware), the data saved by the customer will not be saved any more.
However, the machine-related data in the EEPROM (e.g. hours and stitch counter, calibration settings) remain saved.

- With the B590, keep buttons **a** and **b** pressed while switching machine on..
- With the B570, B540, B535 **the same buttons apply but they have different assignments.**
- After the machine has been switched on, the update process will start and check the data on the USB stick.

Note:
On completion of the manual update procedure, the machine must be **started manually**.

8.3 After replacing the PCBA-CPU module

On replacing the PCBA-CPU module the most recent firmware must be loaded. It can happen that **ONLY** the bootloader will load at first attempt. **It is therefore necessary to recheck**! If so, the updating must be repeated.
The updating process corresponds to chapters 8.1 or 8.2.

Reason:
Since the PCBA-CPU modules had been used on other BERNINA products before the launch of the current 5 Series, it can be that the bootloader on the CPU won't be recognised by the current 5 Series, and consequently the machine won't be able to load the firmware. However, if the bootloader has been loaded at first attempt, the firmware should load without any difficulty at second attempt.

This procedure might be necessary especially at the beginning of the introduction of the new 5 Series until all PCBA-CPU module spare parts will be used up in the markets. From the start of the 5 Series on, BERNINA International AG will only deliver PCBA-CPU modules with new-5-Series-compatible bootloaders.

Chapter 9 - Maintenance Guidelines

9.1 Purpose of the Maintenance Guidelines

- The technician is given guidelines for carrying out the service.
- This improves service- and repair quality.
- The dealer or service technician can calculate the expected maintenance costs for the user → transparency.
- Calculable maintenance costs offer the opportunity for service contracts. These result in additional business, and a degree of customer retention that should not be underestimated.
- Same service quality worldwide.
- The wear-and-tear-parts definition helps to identify (unjustified) warranty claims by the customer, mainly in the case of intensive use.
- Defined wear-and-tear parts are subject to a charge; the parts declared in the spare-parts-warranty extension (Bernina warranty provision) are excepted.
- Compliance with maintenance intervals allows system functioning to be ensured and increases the service life of the sewing and embroidery machines.
- Should the service and maintenance intervals of these Maintenance Guidelines not be complied with, the guarantee may be limited.

The Maintenance Guidelines consists of

- the wear-and-tear-parts definition.
- the service check to be carried out during a service.

9.2 Explanatory notes on the stitch- and hour counter

Every sewing stitch is counted. Owing to the lower mechanical load, only every second embroidery stitch is counted.

9.2.1 When is a cleaning message displayed?

On reaching 500,000 stitches a cleaning reminder appears. Cleaning can be carried out by the customer. The stitch counter can be found under Information in the Setup Program.

9.2.2 When is a maintenance message displayed?

On reaching **3,000,000** stitches a maintenance/servicing reminder appears.

9.2.3 How are the stitches counted?

In sewing mode alone, 3,000,000 stitches are counted.
In embroidery mode alone, a 3,000,000 stitch count corresponds to 6,000,000 stitches in real terms. This is due to the lower overall mechanical loading of the system.
A combination of sewing and embroidery can be assumed for most machine uses. That means that 4,500,000 stitches have actualls been carried out when the stitch counter says 3,000,000.
The hours are counted consecutively 1 to 1, not permanently, but always after about 2 minutes (reduction of the “write” cycles).
The hours can only be read out via the Service Program, and are not accessible by the customer.

Calculation table

This table is meant to show how many hours are required for a maintenance message to be displayed as a function of the SPM (stitches per minute) speed.
For example:

Näh- und Stickstunden Total	Total Minuten	SPM (Stiche pro Min.)	Total Stiche
1'000	60'000	650	39'000'000

9.2.4 Implementation of the maintenance intervals

A servicing message appears on reaching the 3rd interval (9 million stitches) each time the machine is switched on.
The message only disappears after resetting to zero by the technician making a service entry in the Service Program.

9.3 Maintenance intervals

To calculate the maintenance intervals, an average sewing or embroidering speed of about 650 spm is assumed.

Maintenance interval	Stitch counter	Hour counter
1	3,000,000	77
2	6,000,000	154
3	9,000,000	231
4	12,000,000	308
5	15,000,000	385
6	18,000,000	462
7	21,000,000	538
8	24,000,000	615
9	27,000,000	692
10	30,000,000	769
11	33,000,000	846
12	36,000,000	923
13	39,000,000	1000
14	42,000,000	1077
15	45,000,000	1154
16	48,000,000	1231
17	51,000,000	1308
18	54,000,000	1385
19	57,000,000	1462
20	60,000,000	1538

9.3.1 Cleaning- and service-stitch reset

- Service entries must be made by the technician in the Service Program after maintenance or repair work. If not, the maintenance stitches will not reset to zero.
- The same holds true for the cleaning-stitch reset.

9.4 Wear-and-tear-parts definition

Explanations:

- The service life of the machine was defined for household use.
- In the case of intensive use for which the machine was not designed, increased wear-and-tear of parts cannot be ruled out.
- In order to ensure continuously flawless operation of the sewing and embroidery machine, BERNINA recommends replacing the parts according to the table (9.4.2) once the tenth maintenance interval is reached.
- The customer has a right to the replaced parts, with the exception of the replaced electronic components, should these be repaired by BERNINA.
- The defined wear-and-tear parts are subject to a charge.
- The maintenance work to be carried out is listed on the Maintenance Checklist.

9.4.1 Non-hour-related parts

Depending upon purpose, handling, climatic conditions and use, the following parts cannot be defined in time terms, and are therefore to be individually assessed or replaced when signs of wear and tear appear and/or functionality is impaired:

- Sensors and actuators
- Electronic components
- Display / touch screen
- Sewing light / back lighting
- Lower thread and upper thread sensors
- Regulator spring
- Stitch plate (scratch marks of needle around stitch hole)
- Foot control cable and cable plate
- Cables and wires in general (squashed, interrupted etc.)
- Feed-dog (blunt or worn teeth tips)
- Covers, casings (cracked/worn threaded holes, tears, scratch marks and signs of wear and tear)
- Presser feet (scratch marks, wear)
- Thread cutter
- Blade of automatic thread cutter
- Components of automatic/built-in threading process
- Pressure springs and tension springs
- Thread take-up crank / needle bar drive
- Needle bar and needle bar support

9.5 Maintenance checklist

The Maintenance Checklist explains what work is to be carried out after the maintenance messages are displayed.

Note:
The Maintenance Checklist refers to maintenance work only (cleaning, lubrication, visual and functional checks) and not to repairs (excluded owing to their complexity).

The parts whose replacement is recommended after the display of the tenth maintenance interval are listed in the Wear-and-Tear-Parts Definition.

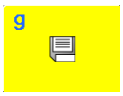
The Service and Maintenance Manual and the service and technical information notices serve as a basis for the service work to be carried out.

The service works listed in the Maintenance Checklist must be carried out in the order listed, at each maintenance interval.

9.5.1 Measures to be taken before the servicing

Note: To use the Service Program, the machine must be running (switched on). Refer to the safety instructions, please.

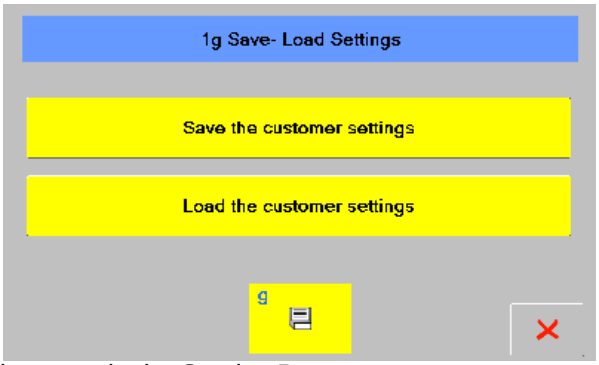
- Customer data must be saved each time before maintenance or repair work is carried out.
- Update the machine to the latest firmware.
- Read out the stitch and hour counter and enter on the Service Report.



Customer data backup in Service Program **1g** of the BERNINA 590, 570 QE, 540, 535, 500.

Connect BERNINA USB data stick and select required button. Remove stick after confirmation by the machine.

- Save the customer settings = Customer data saved onto the storage medium
- Load the customer settings = Customer data loaded into the sewing and embroidery system.



9.5.2 Measures to be taken after the service

- Loading of the customer data into the sewing and embroidery system = Load the customer settings.
- Maintenance- and cleaning-stitches reset, service entry in the Service Program.

Recommended:
Create a Service Report and save in a customer database, or file a copy.

Furthermore, the following data should be noted in the Service Report.
Customer and machine data, standard accessories (supplied with the machine), stitch and hour counter, report number, service interval, complaint, work carried out, time and material input, date next service due, name of technician.

9.5.3 Functional check

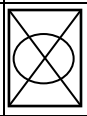
Consider customer complaints, if any, when carrying out functional checks.
The resulting diagnosis must be taken into account in addition to the normal maintenance check.

	What to check	What to check for specifically
1.	Visual check: Covers LCD / touch screen Spool holder	• Scratch marks and signs of having dropped the machine • Tears and cracks • Clearance/gap widths
2.	Functioning	• Power Switch
3.	Needles	• Properly attached • Bent • Blunt • of low quality • wrong system
4.	Power cable Foot control cable	• Damaged insulation • Loose contacts / interruptions • Squashed cables • Connectors
5.	Switch machine on and let it run	• Listen for unusual noises and noise level • Foot control adjustment
6.	Functions to test with machine switched on Machine	• Stepping motors • Sewing light • Keys and buttons • Stitch width and stitch length adjustment • Touch screen • Screen / LCD • Threading process
7.	Functioning of connections	• Embroidery module • Foot control • USB data stick • M/C-PC link
8.	(Remove covers) Ribbon cable Single-strand cable	• Damaged insulation • Loose contacts / interruptions • Squashed cables • Connections
9.	Rough visiual check of settings	• Needle tolerance • Needle-/hook distance • Feed-dog synchronization (lift and advance timing) • Main shaft-/base shaft synchronization
10.	Drive motor	• Bearing play • Mechanical ease of movement (smooth running) • Drive belt
11.	Smooth running of the machine mechanical ease of movement	Shaft and axes play • Main and base shaft • Thread take-up crank • Needle bar support / needle bar • Swing bearing • Bevel gears • Bobbin case / hook • Drive belt tensions

9.5.4 Maintenance checklist BERNINA 590, 570 QE, 540, 520, 500

1.	Covers to be removed	Front and rear cover
		Base casing
2.	Parts that must be removed	Stitch plate
		Hook
		Bobbin case
		Recommended parts according to Tear-and-Wear Parts Definition
3.	These areas must be cleaned	Free-arm area
		Needle bar / needle bar support
		Thread take-up crank
		Upper thread tension disks
		Complete drive unit including motor
		Lower-thread sensor
		Sensors / light barriers
4.	Check these parts for scratch marks, deformations, exceptional wear and/or oxidation and polish or replace if required	Thread redirecting guides
		Thread regulator spring / upper thread indicator actuating lug
		Needle holder thread guide / thread redirections
		Hook
		Bobbin carrier (check for thread remnants under tension spring)
		Stitch plate
		Presser feet
		Feed-dogs
5.	Assembly	of the removed and replaced parts
6.	Oiling / lubrication according to lubrication diagram in Service Manual	Needle bar / needle bar support
		Thread take-up crank
		Spherical bearing
		Hook drive shaft and hook drive eccentric
		Hook
		Shafts / axes
		Eccentric / cams
7.	Check / adjust settings according to Service Manual (Use a new needle 130/705H 80 TCN)	all drive belts
		Position of head plate in y- and x-direction
		Darning foot level
		Presser foot fixation
		Distance between and parallel alignment of needle bar and presser foot bar
		Needle distribution / zigzag stop
		Hook, feed-dog and needle drive synchronization
		Loop lift
		Needle-/hook distance
		Needle penetration in Y direction
		Needle level
		Feed-dogs
		Mechanical basic settings of balance
		Automatic thread cutter
		Synchronizing disk
		Threader mechanism
		Basting solenoid
		Thread tensions
		Winder
8.	Fitting	Covers (ensure correct placement of cables and connections)
9.	Check /calibrate tests in Service Program	Balance
		Buttonhole calibration (only use presser foot 3A that has come with the machine).
		Cleaning- and service-counters reset
		Enter service/maintenance date etc.
10.	Sewing-off	According to Sewing-Off Guideline SI 47-050
11.	Cleaning	Covers
12.	Final check	Does the machine run, are the accessories complete? Check-out tests in Service Program (see 11)

9.5.5 Embroidery module

1.	Covers to be removed	y-arm top cover
		Top x-cover
2.	Parts that must be removed	Recommended parts according to Tear-and-Wear Parts Definition
3.	These areas must be cleaned	X- and y-axes idler pulleys
		X-axis
		Y-guiding rail
		Covers
		Sensors / light barriers
4.	Check these parts for deformations, exceptional wear and/or oxidation and polish or replace if required	Connection plugs
		Flex wheels
		Idler pulleys
		Ball bearing
		X-axis
		Actuator (hoop recognition)
		Drive belt
5.	Assembly	of the removed and replaced parts
6.	Oiling/lubrication	Y-arm guide rolls (Klüber OY 100)
		Belt pulley axes (Klübersynth UH1 14-1600)
		Gear wheel axes (Klübersynth UH1 14-1600)
		X-axis (Klüber OY 100)
		Gear wheels (Klübersynth UH1 14-1600)
7.	Check/adjust settings according to Service and Maintenance Manual of Embroidery Module	Y-/X-drive belts
		Hoop holder on y-profile
8.	Fitting	Covers (ensure correct placement of cables and connections)
9.	Check /calibrate tests in Service Program	Calibration using the blue template and the reference point is essential and must be carried out.
10.	Sewing-off	 For X/Y test pattern assessment refer to Service and Maintenance Manual of Embroidery Module
11.	Cleaning	Covers
12.	Final check	Is the set of accessories complete?

Chapter 10 – Document Revision History

Date	Version	Description	Author
November 2017	1.1	First German version	After Sales Service
November 2017	1.1	First English version as DRAFT	After Sales Service