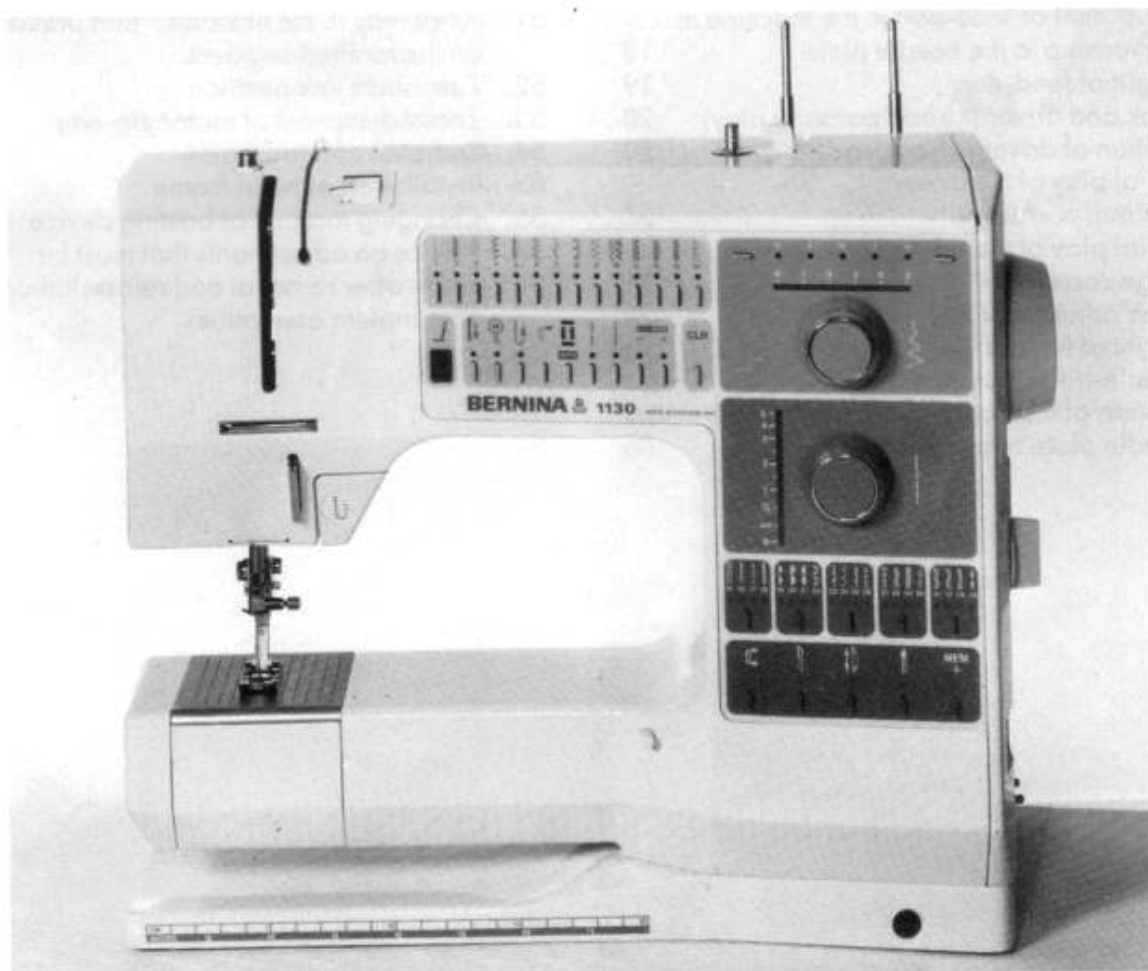


BERNINA

**Service manual 1130
1120**

FRITZ GEGAUF LTD.,
Manufacturers of BERNINA Sewing-Machines
Steckborn (TG) Switzerland



Contents

1. Adjustment of models 1130–1120	4	33. Basting device and automatic long stitch (needle bar guide)	26
2. Technical data	4	34. Basic position of release pin to the latch	27
3. Special D. C. mains adaptor	5	35. Instant of decoupling	28
4. Special gauge for basic adjustments of carrier	6	36. Puffer position	29
5. Changing the bulb	7	37. Knee lifter lever	29
6. Removing belt and chassis cover	7	38. Lowering the feed-dog	30
7. Removing base and needle plate	8	39. Lower thread tension	31
8. Dismantling chassis and motor support	9	40. Upper thread tension (basic adjustment with and without control weight)	31
9. Adjustments possible with rigidity plate	11	41. Reverse feed equalization	32
10. The needle	12	42. Automatic buttonhole foot	33
11. Tensioning of the belt (hook drive)	12	43. Removing the carrier	34
12. Tensioning of the belt (motor drive)	13	44. Installing the carrier	35
13. Adjustment of bobbin winding device	13	45. Synchronization of hook drive and feed-dog using special gauge (hook drive)	35
14. Switching off the motor to bobbin winding device	14	46. Feed-dog (lateral position and height)	36
15. Height of presser foot	14	47. Depth limit stop for feed-dog	36
16. Presser-foot fixation	15	48. Adjustment of stepping-motor support (stitch length)	37
17. Height of darning foot	15	49. Adjustment of stepping-motor for stitch length	37
18. Presser foot crosswise to sewing direction	16	50. Distance between magnet holder and hall-sensor	39
19. Adjustment of the thread take-up lever	16	51. Axial play in the link block and pressure on the toothed segment	40
20. Stitch distribution zig-zag	17	52. Zero stitch link position	40
21. Adjustment of synchronization disc	17	53. Zero adjustment of motor zig-zag	41
22. Adjustment of feed-dog in the machine in relationship to the needle plate	18	54. Removal of head frame	42
23. Height of feed-dog	19	55. Installation of head frame	43
24. Hook and driver (thread passage play)	20	56. Changing magnet of basting device	43
25. Position of driver in hook race	20	57. Advice on adjustments that must be made after removal and reinstallation of complete assemblies	44
26. Radial play of the driver (minimal correction)	21		
27. Radial play of the driver (large correction)	21		
28. Hook adjustment (loop lift)	22		
29. Height of needle	24		
30. Needle-hook distance	24		
31. Position of the thread guide plate	25		
32. Needle plate adjustment	26		

Electrical parts

Description, diagnosis, repair and adjustment

58. Removal of "S" print and operating print	44
59. Replacement of "S" print (PCB)	45
60. Replacement of display PCB	45
61. Assembly of operating chassis, display "S" PCB	45

Electronic Part

62. 0 Description of electronic part	46
62. 1 Block diagram Model 1130	48
62. 2 Print A-4200	49
62. 3 Print S-4200	50
62. 4 Print L-4200	51

Diagnosis instructions

63. 0 Important warnings	52
63. 1 Diagnosis	54

Test instructions

64. 0 Test 1 – Print L-4200	57
– Test adaptor L-4200	
64. 1 Test 2 – Connection print S-4200 to print L-4200	58
– Flat cord 5 pol. red	
– Flat cord 4 pol. green	
64. 2 Test 3 – Mains cord (retractable cord)	59
64. 3 Test 4 – Connection print S-4200 to foot control	
64. 4 Test 5 – Print P-4200	
64. 5 Test 6 – Complete light support	61
64. 6 Test 7 – Step motor	63
Print S-4200	
64. 7 Test 8 – Foot control	64
64. 8 Test 9 – Print A-4200	65
Print S-4200	
– Power supply 4200	
64. 9 Test 10 – Print Ret-4200	67
64.10 Test 11 – Print S-4200	69
– Print Ret-4200	
– Buttonhole-foot	

Function test	71
----------------------	-----------

1. Adjustment of models 1130–1120

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

Important: To enable the work described to be performed, the sewing machine must be in good mechanical and electrical condition. (Running smoothly, properly oiled and all plugs in position).

When the adjustments are done in the correct order, the machine is guaranteed to sew impeccably.

Removal of covers

Warning: The electronic components operate with dangerous voltages. The mains plug must be withdrawn before making any adjustments to the machine. Wait at least 30 seconds afterwards (capacitor discharge).

2. Technical data BERNINA models 1130–1120

	1130	1120		1130	1120
Stitch length max. forward 5 mm	x	x	Automatic long stitch 10 mm/2:1	x	x
max. reverse 5 mm	x	x	Basting device 30 mm/6:1	x	x
Increment 0–1 0,05 mm	x	x	Working space 105x195	x	x
1–3 0,1 mm			Overall length 375 mm	x	x
3–5 0,2 mm			Overall width 184 mm	x	x
Max. stitch width 5,5 mm	x	x	Overall height 350 mm	x	x
Increment 0,1 mm	x	x	Motor 90 W	x	x
Needle system 130/705 H	x	x	No of stitches per/minute min.-max.		
Adjusting needle 130/705 H/TCN	x	x	120–1050/min	x	x
Hook system BERNINA CB =			reduced min.-max. 120–600/min	x	x
Central bobbin	x	x	Sewing light: bulb 2x6 V/4 W	x	x
Lowest point of needle bar =			Weight 10,5 kg		
0 degree					
Presser foot height = 7,5 mm	x	x			
Darning foot height = 0,5 mm	x	x			

Features and functions

	1130	1120		1130	1120
Needle position	x	x	Needle positioning upper/lower		
Light beam	x	x	with foot pedal	x	x
Zig-zag and stitch length			Permanent reverse sewing	x	x
(freely adjustable)	x	x	Pattern start	x	x
Automatic basic adjustments	x	x	Fully automatic buttonhole	x	—
Basic marking Blinker	x	x	Buttonhole 3 step	x	x
LED display for presser foot	x	—	Automatic long stitch	x	x
Upper needle stop (general)	x	x	Basting device	x	x
Lower needle stop (general)	x	x	Balance for forward and		
			reverse feed	x	x

	1130	1120
Clear switch	x	x
Single pattern	x	—
Mirror image	x	—
Stitch pattern extended, stitch density remains constant	x	—
2 needle limiter	x	—
Memory	x	—
Practical stitches without reverse motion	10	8
Practical stitches with reverse motion	6	5
Decorative stitches without reverse motion	8	1

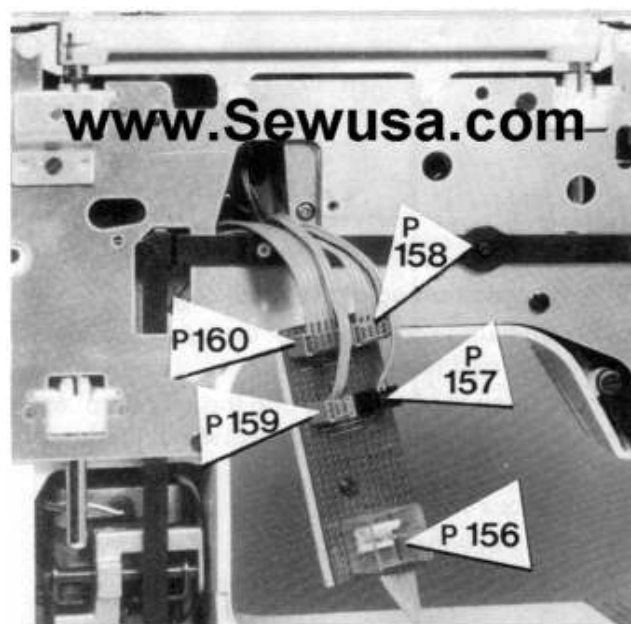
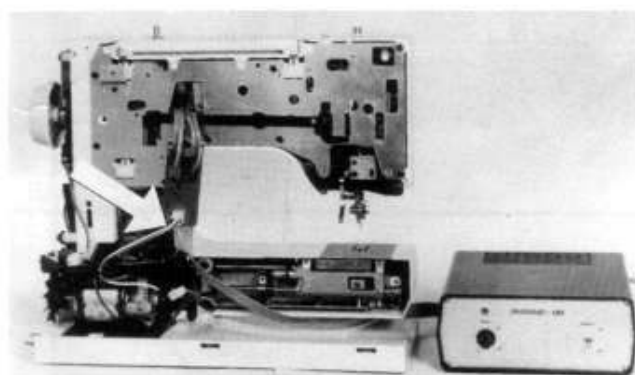
	1130	1120
Decorative stitches with reverse motion	11	1
Number of stitch patterns	35	15
LED control for programmed pattern	x	x
Manual stitch size adjustment, memorized	x	x
Main switch	x	x
Separate light switch	x	x
Winder with separate motor	x	x

3. Special D.C. mains adaptor for models 1130/1120

This adaptor allows the machine to run with a direct current of 30V, so that you will not come into contact with dangerous voltages while working on it.

Use of the adaptor

- Remove chassis cover (section 6).
- Completely remove chassis with L-print (section 8).
- Connect P156/P157/P158/P159/P160 to appropriate PCB.
- Plug in the adaptor to the mains.
- You can check that the motor is being powered via this adaptor, as there is only a current of 30V the max. speed of the machine should be approx. 120 U/min.



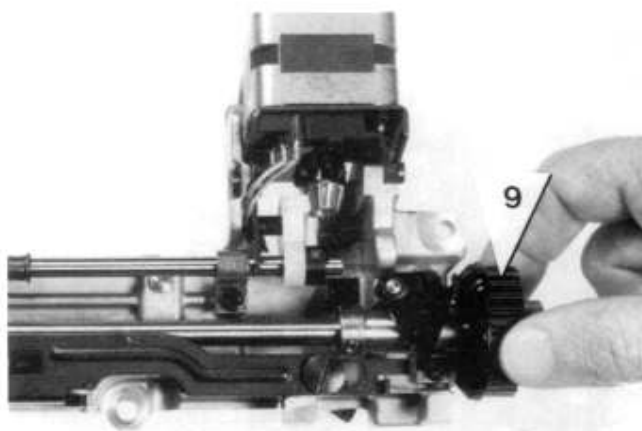
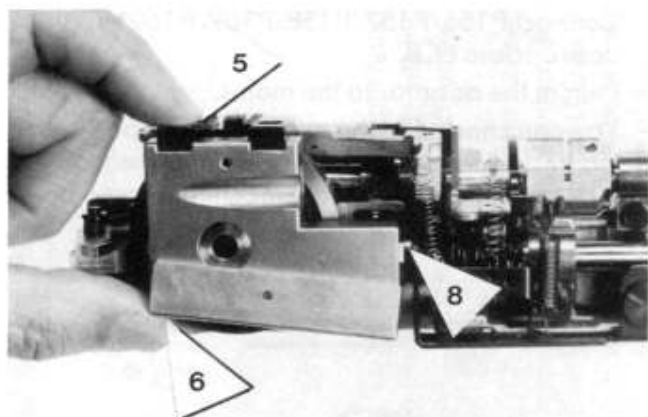
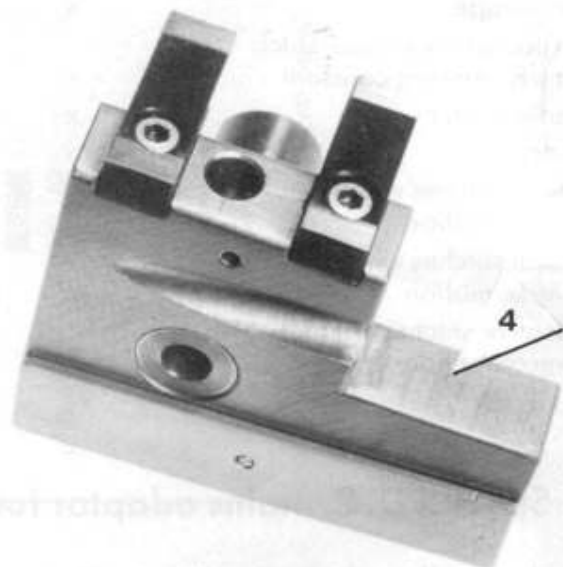
4. Use of the special gauge (4) for the basic adjustment of the carrier

The following positions can be adjusted using gauge (4).

1. Lateral positioning of the feed-dog
2. Feed-dog height
3. Feed-dog lift and advance according to hook movement (hook drive).

Setting the gauge

Squeeze gauge together at points (5) and (6), and place over the drive shaft. Care must be taken on the right hand side of the gauge that the angled part of base shaft (8) is in position. At the same time the bevel gear should be turned until the flat on the base shaft (8) leans against the gauge (4). Release points (5) and (6) (the gauge is secured). It should not be possible to turn base shaft (8) anymore.



Sideways positioning of the feed-dog

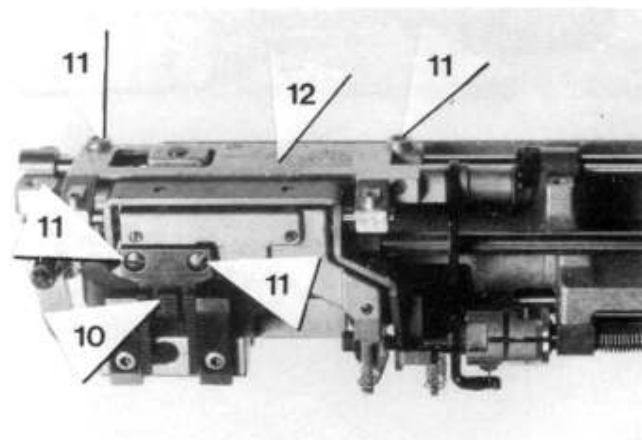
- Loosen fixing screws (11) of the feed-dog lifter fork (12) and feed-dog (10).
- To position the feed-dog and thrust fork, place eccentric (13) on the left-hand side of the feed-dog.
- Tighten screws (11).
- Loosen eccentric (13).
- Check the movement of the feed-dog support.

Feed-dog height:

Check or adjust as described in section (23).

Synchronization of hook drive crank and base shaft:

As described in section (46).

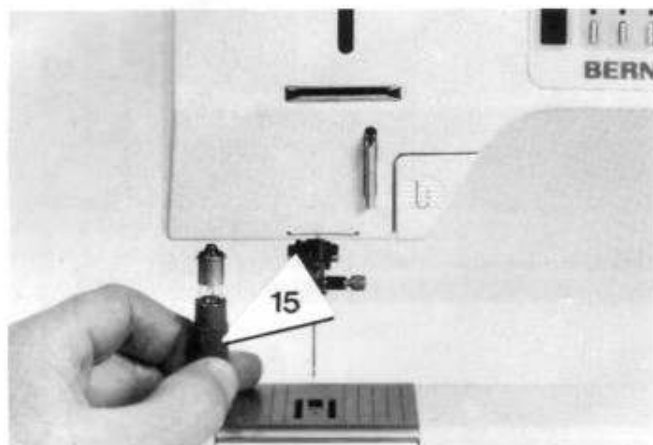


5. Changing the bulb

There are two low voltage lamps both 6V, 4W. One bulb is situated at the front, left, the other behind the presser bar, right.

To change the bulbs use special tool (15) [bayonet socket].

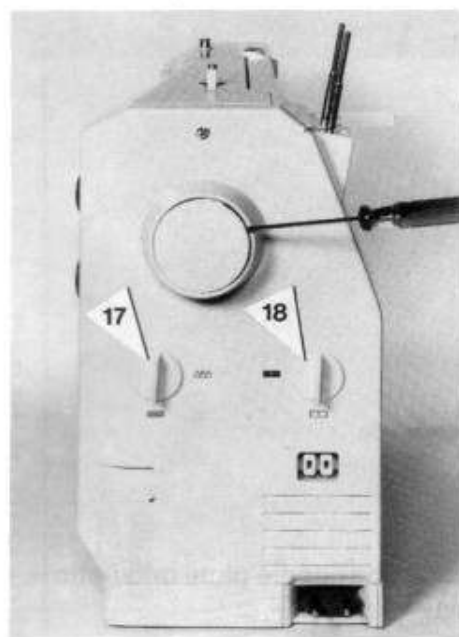
To change the bulb at the rear, remove diffuser (16).



6. Removing belt cover

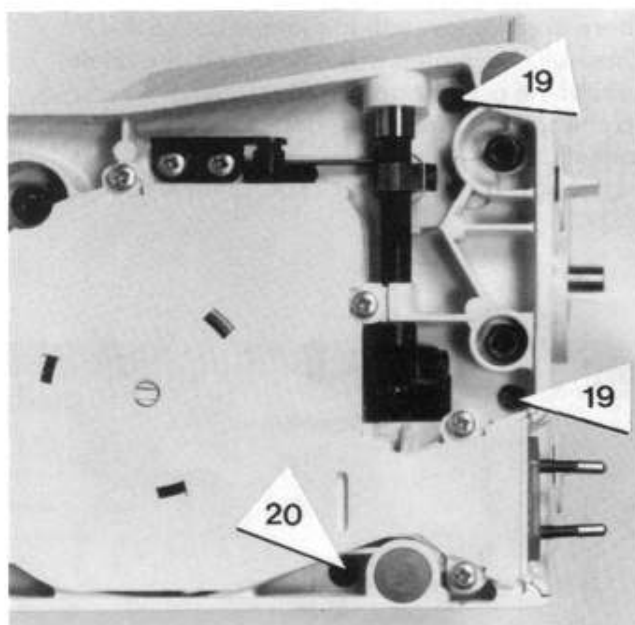
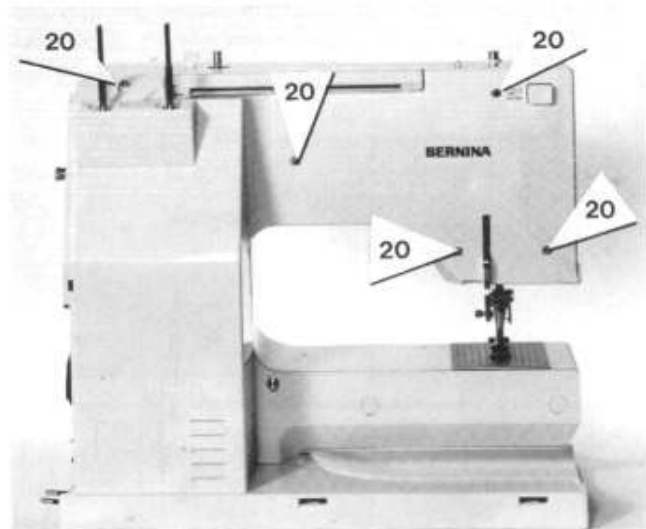
- Remove cover plate on handwheel with small screw-driver
- Release handwheel screw and remove hand-wheel.
- Remove sewing/darning knob (17) and remove the main switch (18).

- Loosen and remove three screws (19).
- Remove the belt cover.



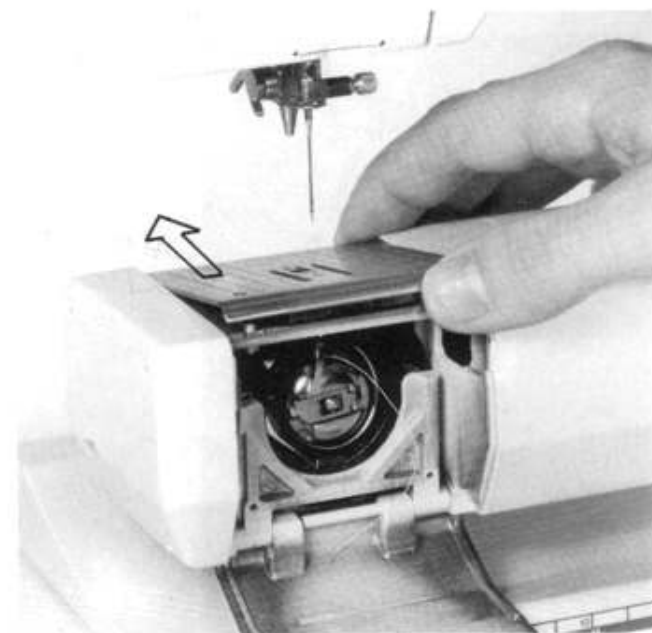
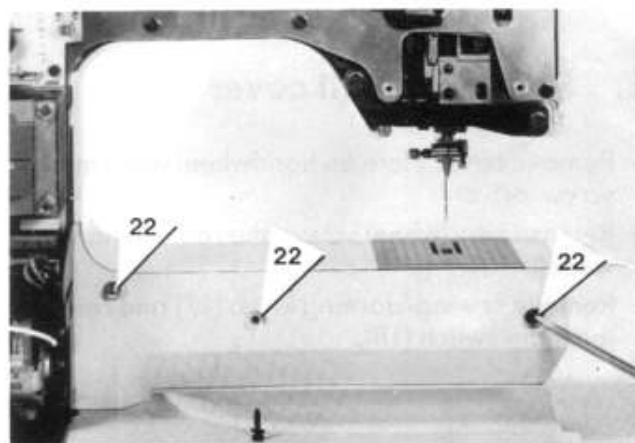
Removing chassis cover

- Remove six screws (20).
- Place the lifting lever in upward position and remove chassis cover.



7. Removing base cover

- Remove cap covers (21).
- Remove three screws (22) and base cover.

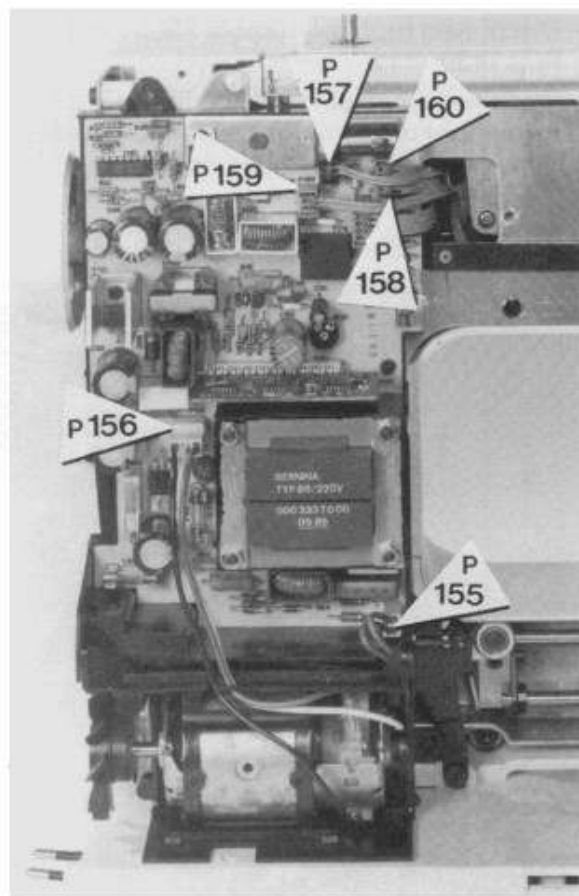


Removing needle plate

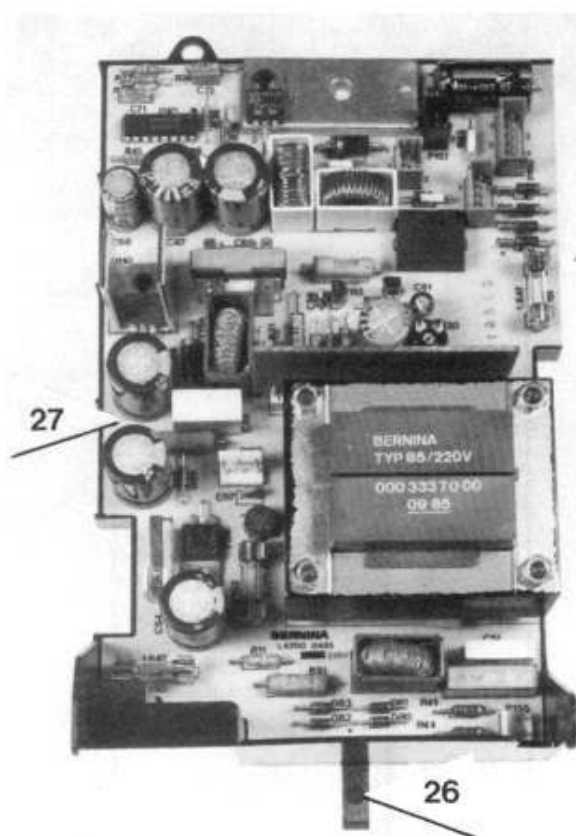
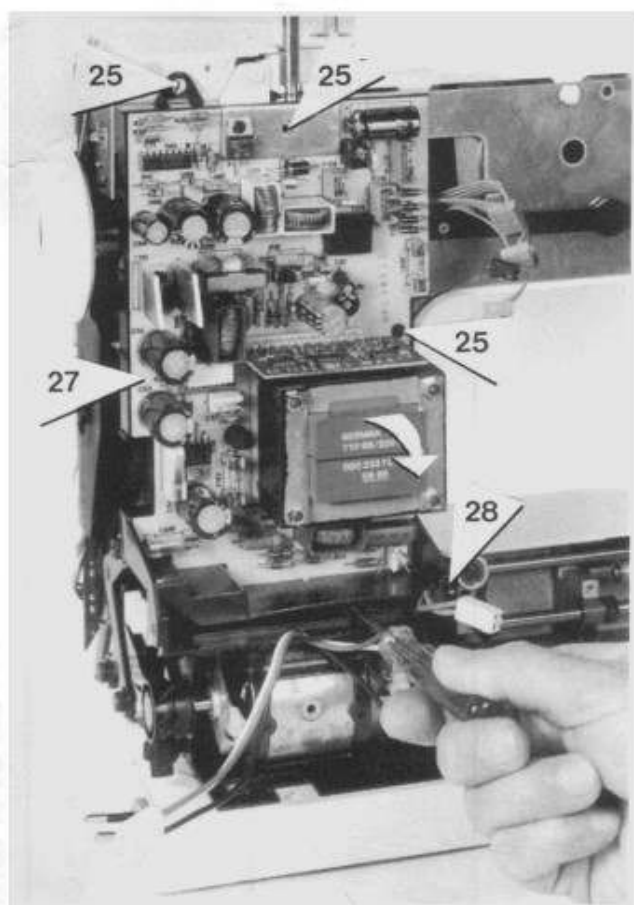
- Lower feed-dog.
- Open hinged cover.
- Lightly lift front of the needle plate and remove by sliding away from you.

8. Complete removal of chassis with "L" PCB 1130–1120

- Disconnect wires to "L" PCB 1130–1120 (P 155/P 156/P 157/P 158/P 159/P 160)



- Remove three screws (25).
- Press lightly with a screwdriver on the snap-action lock (26) situated on the chassis (27), and at the same time tilt the chassis in the direction indicated by the arrow.
- Press the right-hand hinge (28) slightly outwards and remove chassis (27).

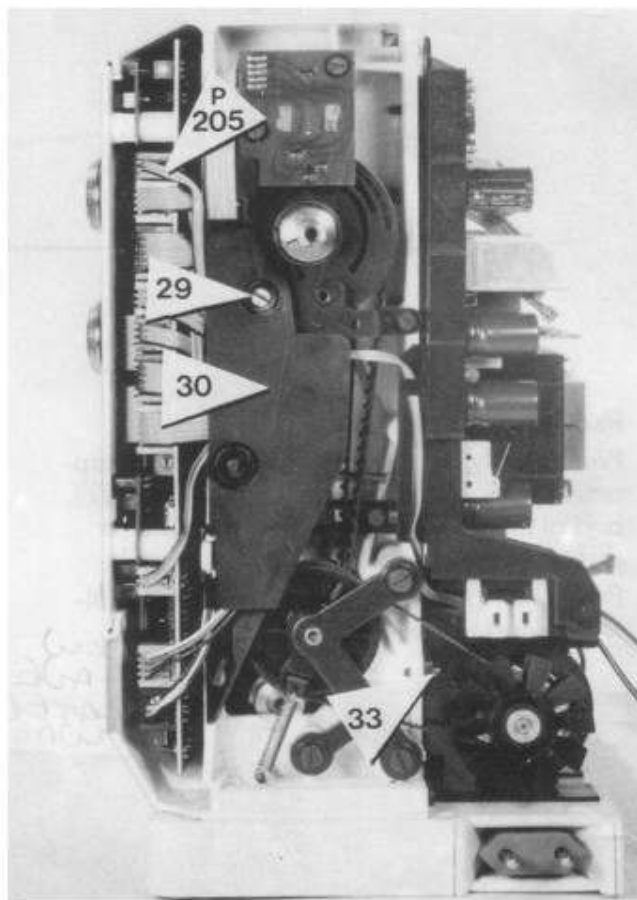
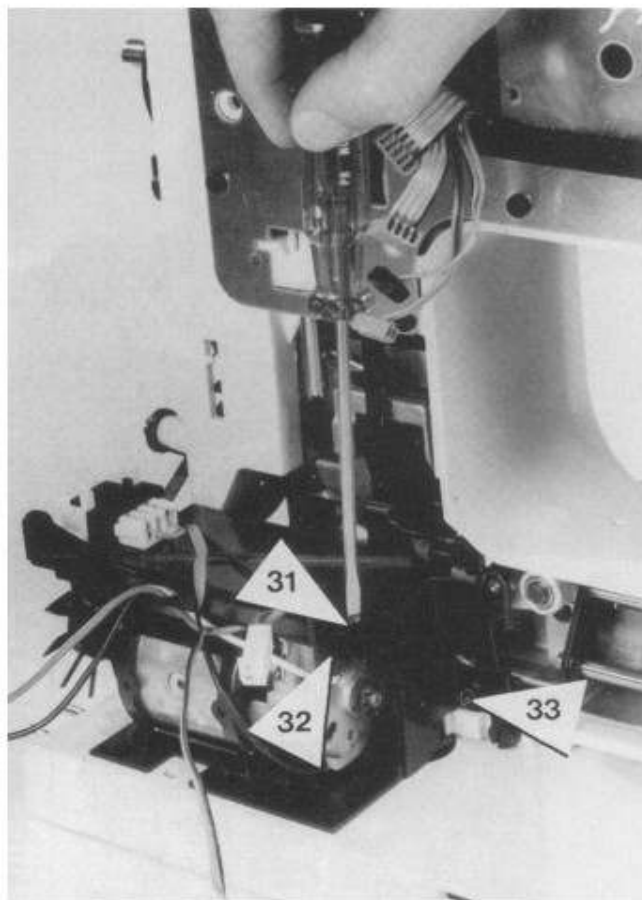


Dismantling motor support

- Remove screw (29).
- Remove cable covering (30).
- Disconnect foot pedal cable P205 from "S" PCB 1130–1120.
- Remove cover from cable channel (31). This is to the right of the motor support (32) and is removed by pushing to the right.

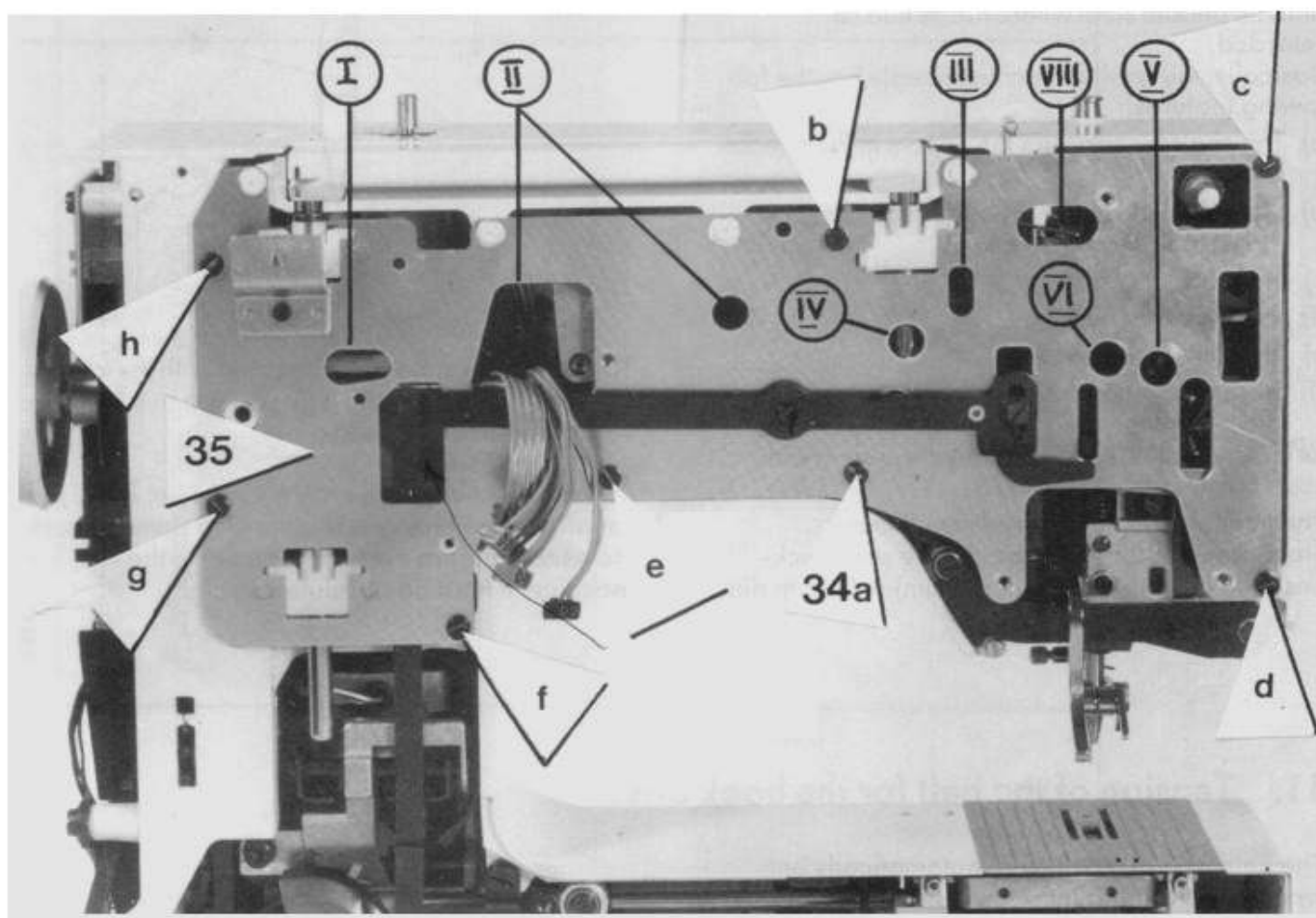
- Remove screws (33) from motor support.
- Release the drive belt.
- Remove motor support.

To assemble reverse the procedure.



9. At the points marked the following adjustments can be made with the rigidity plate

1. Even winding.
2. Stitch distribution ZZ.
3. Pining position of needle drive and swivel piece.
4. Fixing screws to top of head frame.
5. Instant of decoupling (Basting device and automatic long stitch).
6. Height of presser foot bar.
7. Screws (34) a, b, c, d, e, f, g, h of rigidity plate (35).
8. Darning lever adjustment.



10. The needle

The needle is one of the most important items of sewing equipment. Its function is to pierce the material and take the upper thread to the hook for linking with the lower thread and to form the loop for acceptance by the hook.

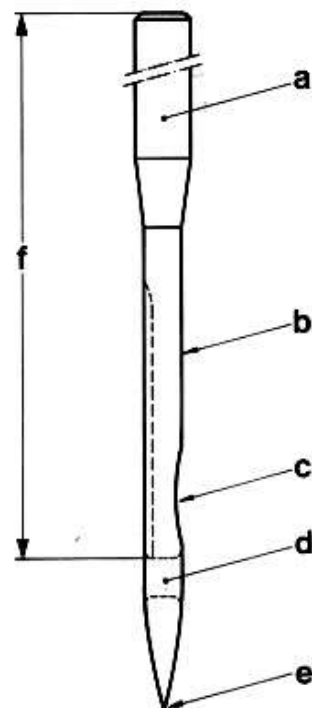
The loop is formed after the needle has pierced the material and reached its lowest point. The thread is drawn tight and lies in a long groove at the front. At the rear the thread lies in a short groove which is higher up between the needle stem and the hole pierced in the fabric. When the needle rises slightly, the so-called «loop lift», the loop is produced at the eye of the needle on the short groove side, which the tip of the hook can enter, as a result of the friction between the work and the needle stem where the thread is retarded.

Basically, the sewing machine needle has the following features:

- a) The shaft for securing the needle in the needle bar,
- b) the stem with a long groove for guiding the thread and forming the loop,
- c) the scarf,
- d) the eye of the needle,
- e) the point of the needle,
- f) the needle length.

Bernina uses the 130/705 H needle system with scarf for models 1130–1120.

The needle size is measured in millimeters. Needle size "100" means a needle stem thickness = 1 mm or Nm80 (Needle mm) = 0,8 mm dia.



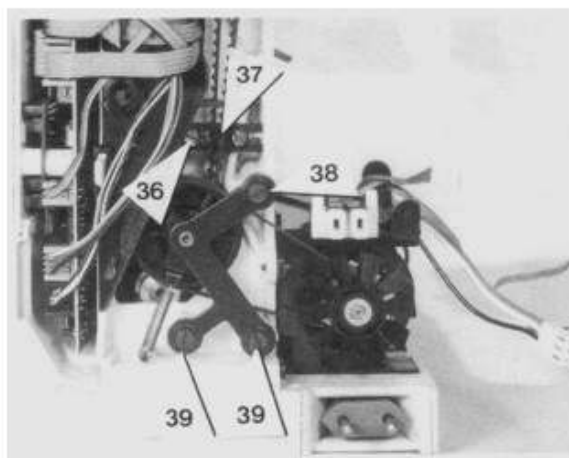
The needle must be firmly secured with the knurled screw on the needle holder. Tighten this screw with the special screwdriver.

Important: Always use an "Nm 80" TCN needle for all adjustments unless otherwise stated. Check the needle before every adjustment to the machine. It must be absolutely straight.

11. Tension of the belt for the hook drive

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

- Slightly loosen the two fixing screws (36) from the tension roller holder (37).
- Turn the handwheel forwards and backwards.
- Tighten the two fixing screws (36).



12. Tensioning the drive belt

The drive belt is automatically tensioned by means of a tensioning spring.

- Slightly loosen fixing screws (38) and (39). Turn the handwheel forwards and backwards.
- Tighten screws (38) and (39).

13. Checking the bobbin winding device

The device should be wound evenly with pre-tension, the bobbin should be correctly filled.



Correction for one-sided winding

- Connect the bobbin winding device to the special D.C. adaptor (see section 3).
Removal of rigidity plate (35) is not necessary.
- Slightly loosen fixing screw (41) of support (40).
- With eccentric key (42) adjust the support plate (40) accordingly left or right.
- Tighten fixing screw (41).

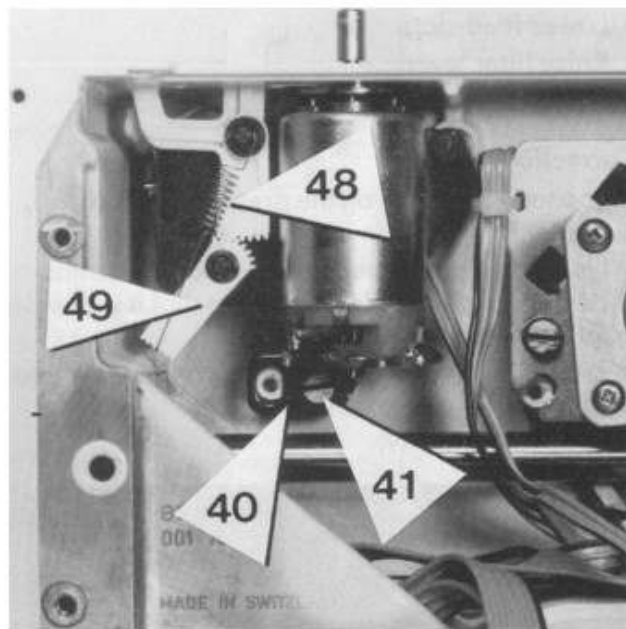
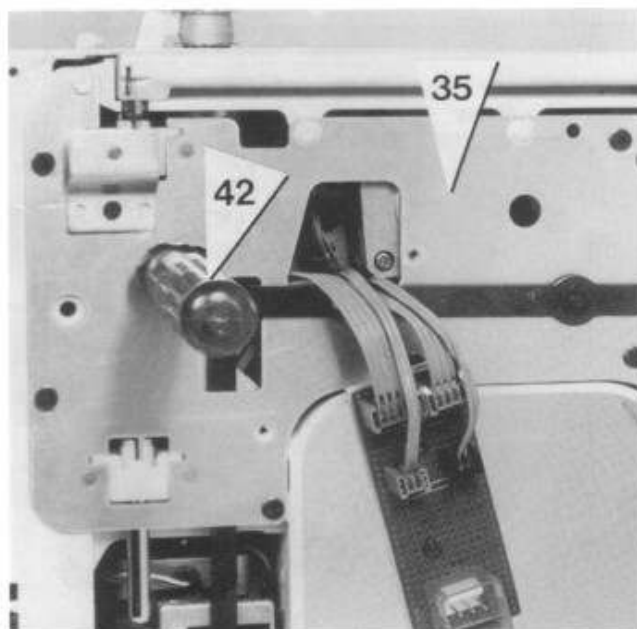
Corrections when filling the bobbin

Bobbin insufficiently filled

- Move tensioning spring (48) to the right on toggle lever (49).

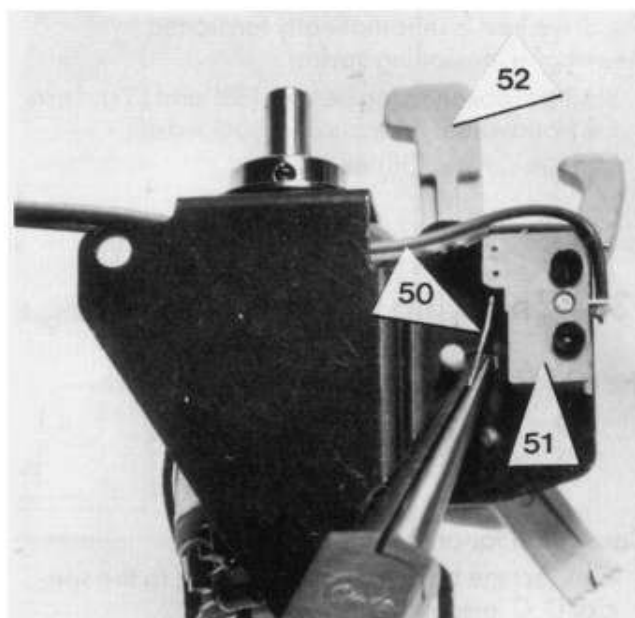
Bobbin too full

- Move tensioning spring (48) to the left on toggle lever (49).



14. Checking the switching off of motor to bobbin winding device

The motor should only switch off when release lever (52) springs back.



Correction

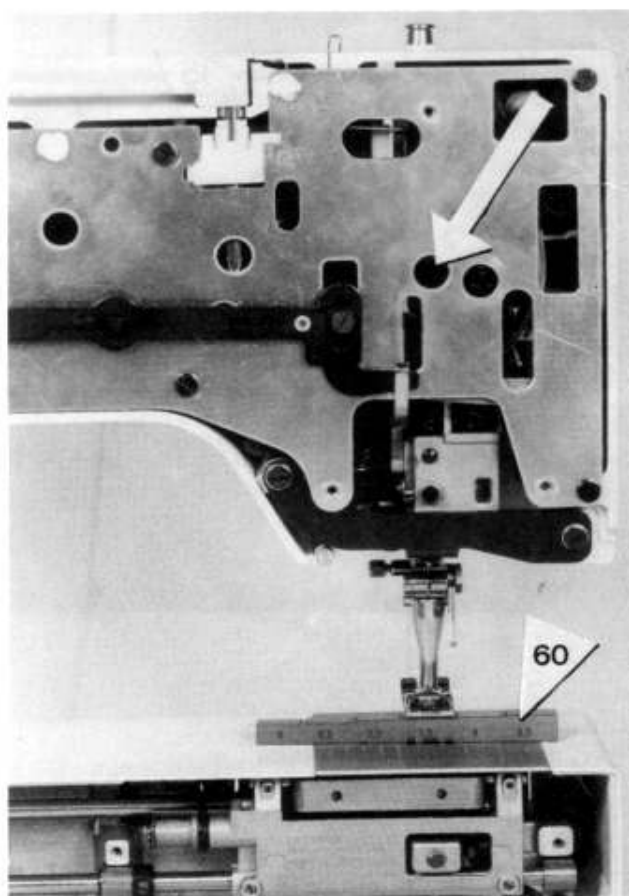
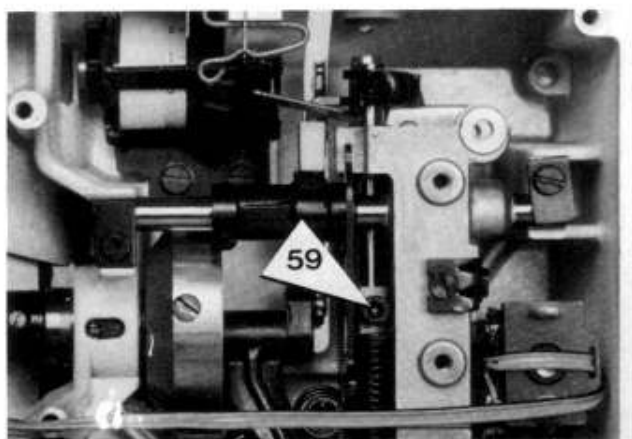
- Bend contact element (50) on switch (51) accordingly. For this operation the bobbin winding device has to be removed (see sketch).

15. Checking the presser foot height

- Lower feed-dog.
- Raise lifter lever.
- Using gauge (60) 7,5 mm check the height.

Correction

- Loosen screw (59) on the presser foot bar guide.
- Using the cone on the presser foot, place this on the gauge (60) 7,5 mm. (Note that it is parallel to the marked line).
- Press down the presser foot bar by hand. (Note darning lever position).
- Tighten screw (59).

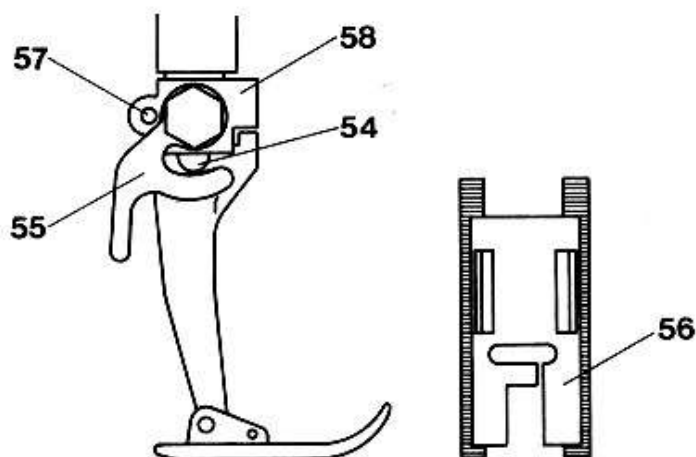


16. Checking presser foot fixation and its height

- Tension pin (54) should be one third to half the way up tension lever (55). The presser foot sole must be parallel with the markings on the needle plate.

Correction

- Loosen screw (57) on clamp (58).
- Adjust the height of clamp (58) until the correct tension position is reached. Align the presser foot sole with the markings on the stitch plate.
- Tighten screw (57).

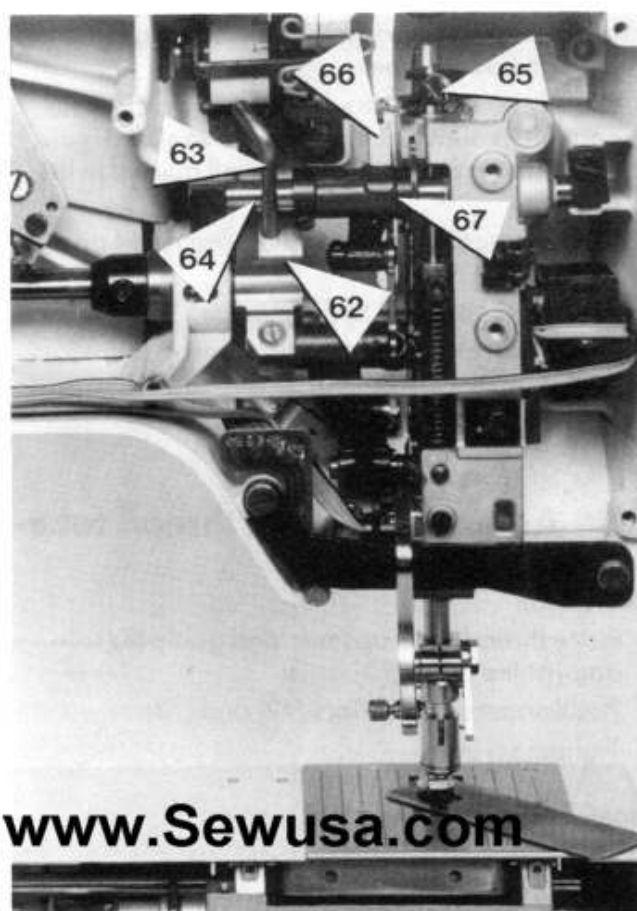


17. Checking the darning foot height

- Remove presser foot.
- Fit darning foot.
- Lower feed-dog.
- Turn the handwheel until the presser foot bar has reached its lowest position.
- Using feeler gauge (61) 0,5 mm check the distance between the needle plate and the darning foot sole.

Correction

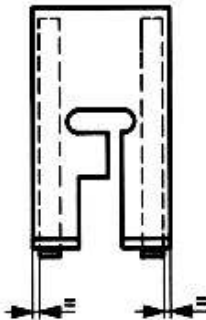
- Position balance piece, by using a 4 mm pin placed against the head frame shaft.
- Loosen screw (65) of the presser foot bar carrier (66).
- Position the presser foot bar to the prescribed height.
- Press the presser foot bar carrier (66) on the eccentric (67). (Note its working position.)
- Tighten screw (65).



18. Presser foot crosswise to sewing direction

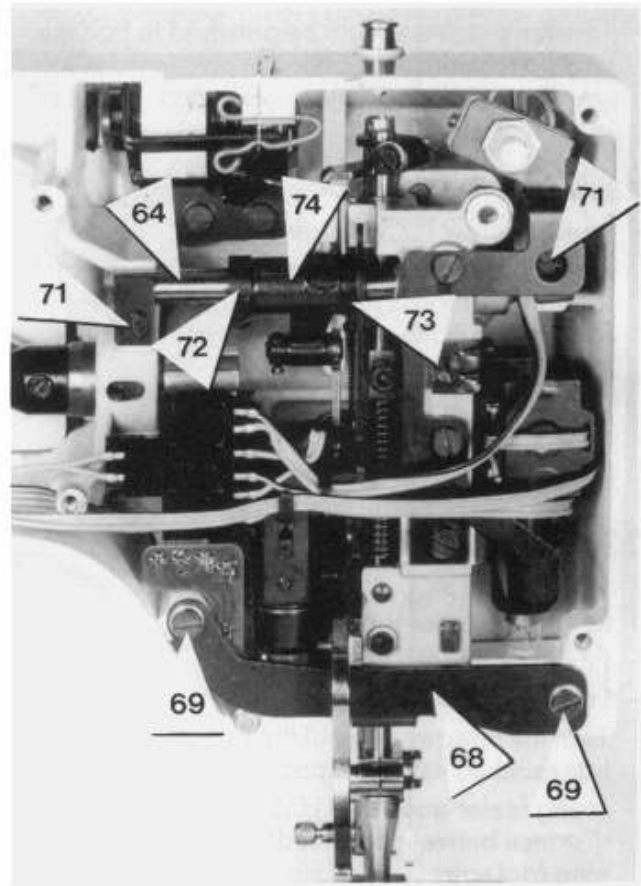
Checking the position of presser foot crosswise to sewing direction

The presser foot sole must be evenly distributed sideways of the feed-dog slit.



Correction

- Remove rigidity plate (35).
- Release setting collars (72) and (73) from thread guide (74).
- Loosen both screws (69) from securing strap (68), on head frame.
- Slightly loosen screws (71) of the two clamps, enough to allow the head frame to slide freely. Also ensure that shaft (64) is well guided in the prism.
- Slide the head frame into the prescribed position.
- Tighten screws (71) of the clamps.
- Tighten screws (69) of securing strap (68).



19. Adjustment of the thread take-up lever

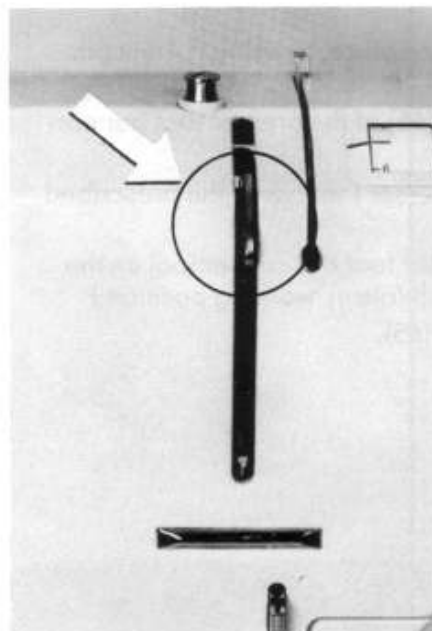
Correction

- Place thread take-up lever and guide (74) against the crank.
- Position securing collars (72) and (73).
- Tighten screws.

Note: Check smoothness of running.

Checking

After this adjustment has been done, the position of the thread take-up lever in the frame slit should not be more than plus/minus 4/10 mm from centre.

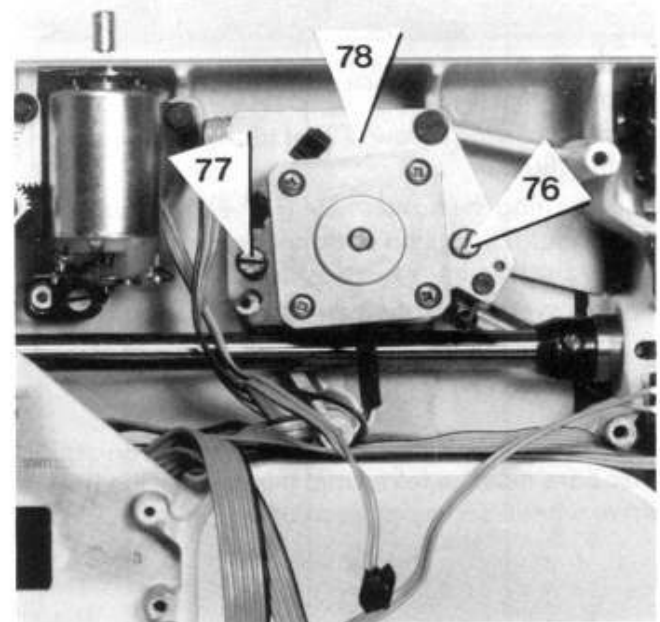
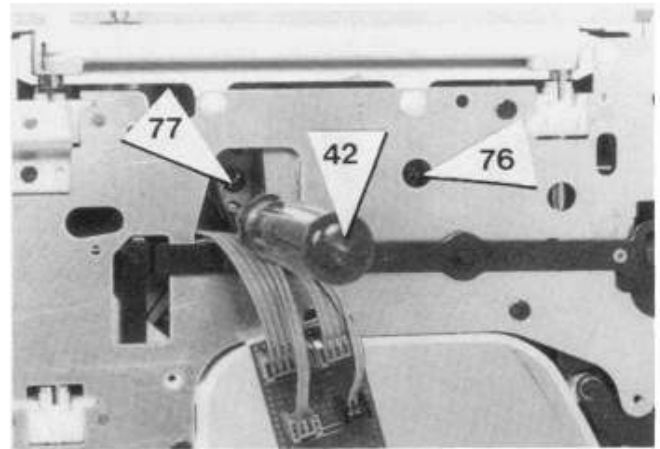
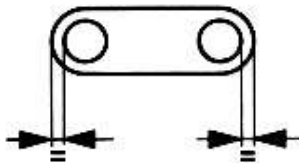


20. Stitch distribution zig-zag

Checking the stitch position with the zig-zag stitch

(Only to be undertaken with the rigidity plate fitted).

- Insert needle No. 90. As seen in the direction of the material feed the needle should be in the center of the stitch hole.
- Switch on the machine.
- Press ZZ button.
- Set to maximum stitch width (5,5 mm).
- Turn the handwheel and observe that, the lateral spacing from the edge of the stitch hole is the same to the left and right. (This is also valid for needle position L-C-R).



Correction

- Slightly loosen lower fixing screws (76) and (77) of the zig-zag stepping-motor support (78).
- Using eccentric key (42) adjust the motor support until the prescribed needle position in the stitch hole is obtained.
- Tighten screw (76) first, then remove the eccentric key. Tighten screw (77).

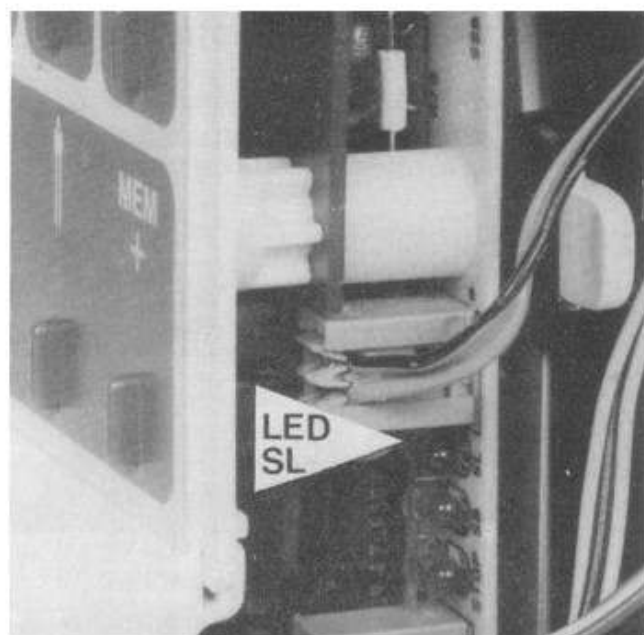
21. Checking the position of the synchronization disc

Warning: Position indicator reacts to light. Avoid direct light (e.g. table lamp).

Remove belt cover and fit handwheel.

- Switch machine on.
- Turn the handwheel until LED SL goes out. The bottom edge of the needle eye should now be flush with the needle plate.

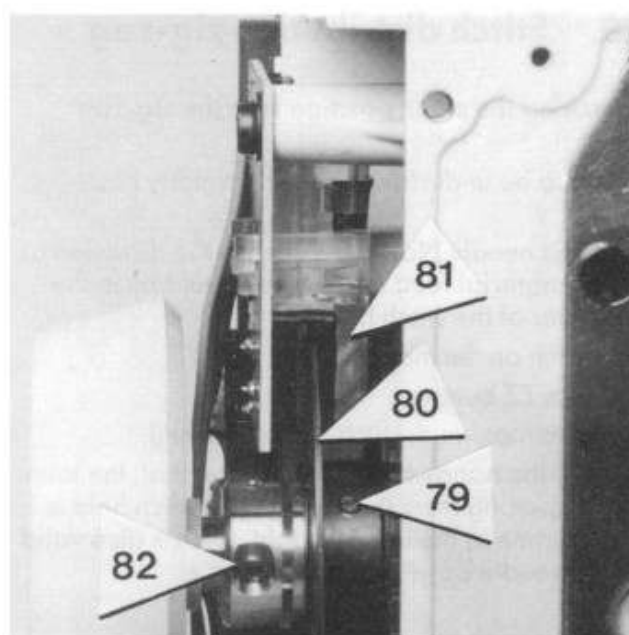




Correction

- Loosen fixing screw (79) of the synchronization disc (80).
- By turning the handwheel (in the direction of rotation), bring the bottom edge of the needle eye flush with the needle plate.
- Turn synchronization disc (80) (in direction of rotation) until LED SL goes out.
- Tighten screw (79).

Important: After adjustment of the synchronization disc care must be taken that it is against the belt drive wheel (serves as positioning ring).



Checking

Check lateral distribution of the synchronization disc (80) in position indicator (81). It should run in the middle of the indicator.

Correction

- Loosen securing screw (82) of the belt drive wheel (83).
- Move belt drive wheel (83) sideways as much as required.

Note: The belt drive wheel must not be turned radially during this operation.

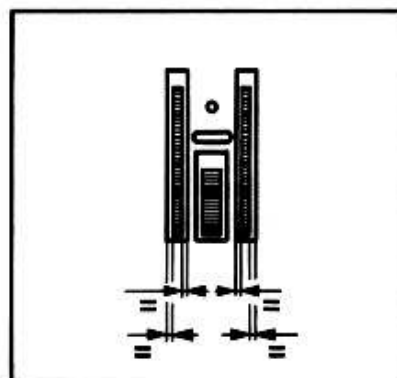
22. Adjustment of feed-dog in the machine

Checking the feed-dog position in the needle plate.

- the feed-dog must be equidistant from each side of the needle plate.

Correction

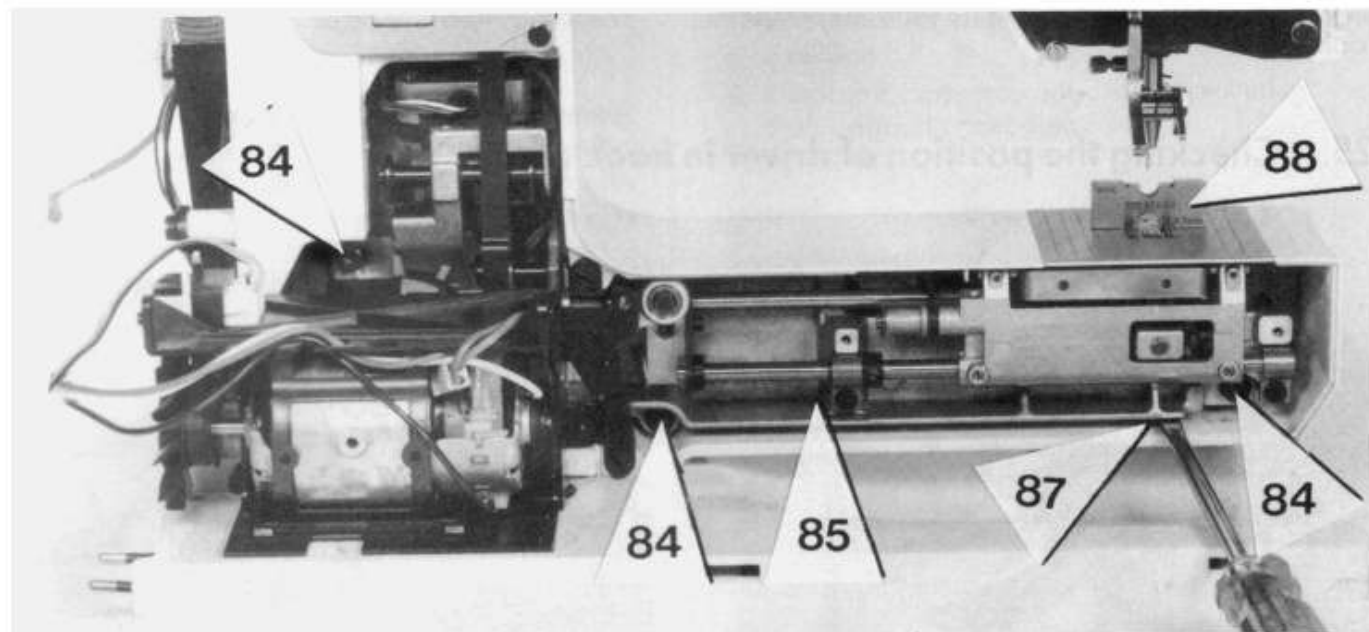
It is assumed that for this adjustment, the basic adjustment for the feed-dog height and sideways position has been done with the special gauge.



- Loosen carrier fixing screws (84) until the carrier can be moved sideways.
- Position carrier (85) in the correct place.
- Lightly tighten carrier fixing screws (84).

Warning: Sideways adjustment to the feed-dog position should not be attempted with the feed-dog advance fork (86).

23. Checking the feed-dog height



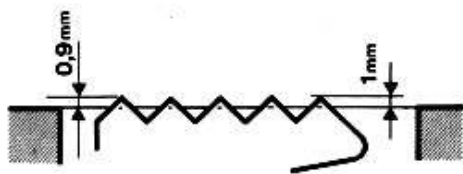
At their highest point, the tips of the feed-dog teeth should be 0,9 mm to max. 1,0 mm above the needle plate. [Check with gauge (88)].

Correction

- Slightly loosen carrier fixing screw (84).
- Using the end of a screw driver at point (87) move the carrier until the height 0,9–1,0 mm is attained (watch that it stays parallel).
- Tighten screw (84).

Note: When adjusting it is an advantage to make a feed motion.

After this adjustment is made it is important to check the distance between needle and hook (section 30).



24. Adjustment of the hook

(CB-hook = Central Bobbin)

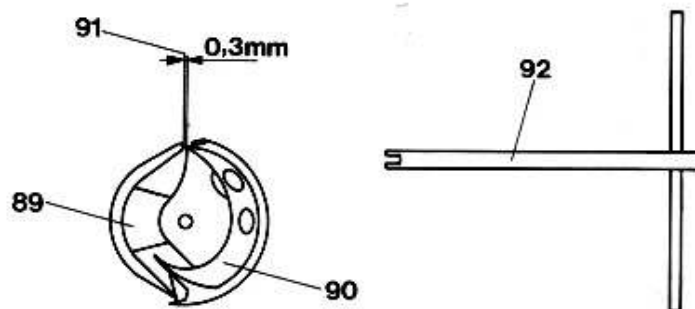
When adjusting the hook a straight needle must be used!

Checking the thread passage

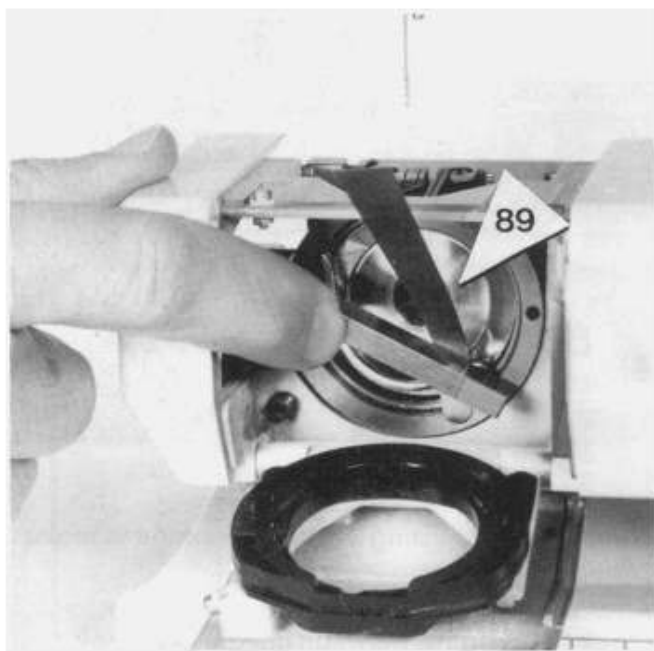
There must be a play of 0,3 mm between hook (90) and hook drive (89) for the thread passage. Check with feeler gauge (91).

Correction

If the spacing is too large or too small, the short stem of the hook driver should be set with special tool (92).



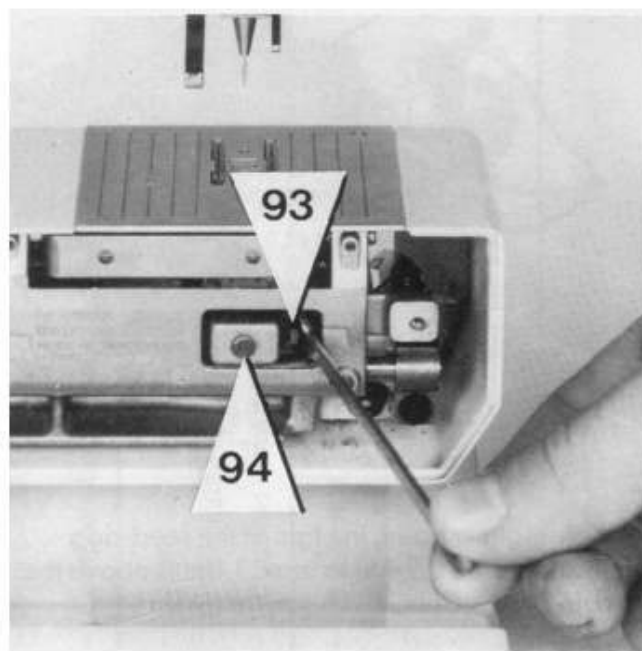
25. Checking the position of driver in hook race



The hook driver (89) should be 0,1 mm – 0,15 mm behind the front edge of the hook race.

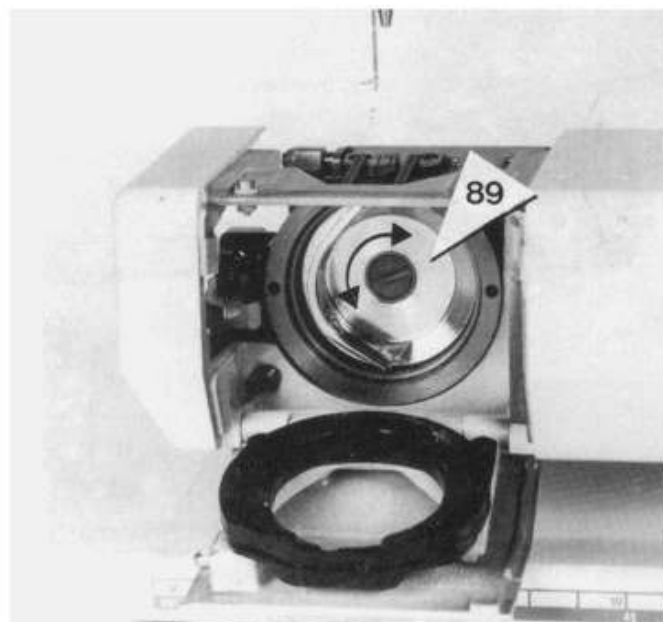
Correction

- Loosen hexagon head screw (93) of the driver shaft.
- Push the complete driver (89) into the prescribed position.
- Tighten hexagon head screw (93) (being careful that it sits on the flat).



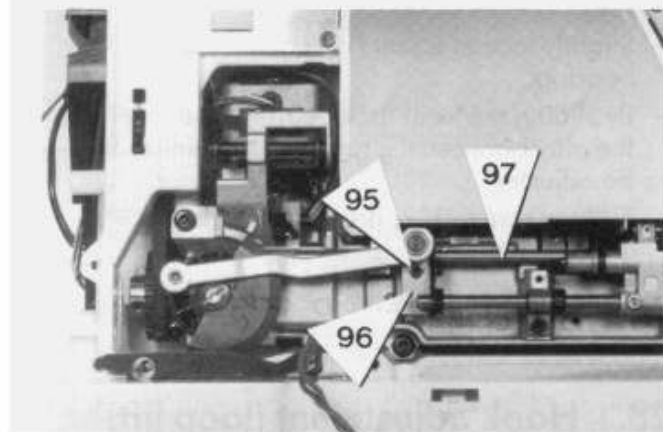
26. Checking radial play of the driver

- Bring the rack to its furthest right-hand position.
- By radial movement of the hook driver (89), check the play between the rack and the pinion.
- The driver (89) should have no radial play.



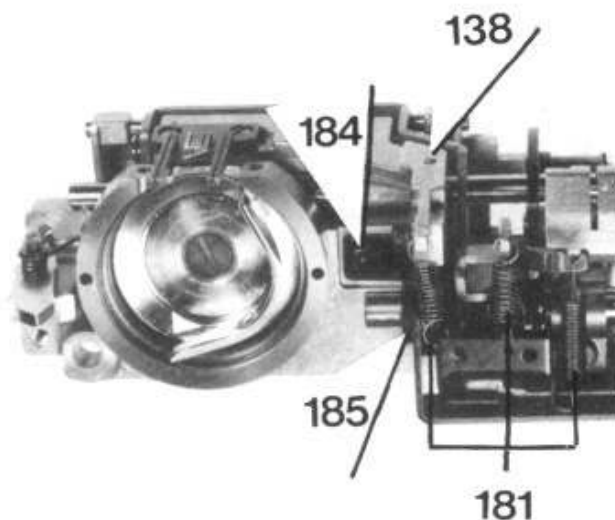
Note for small corrections

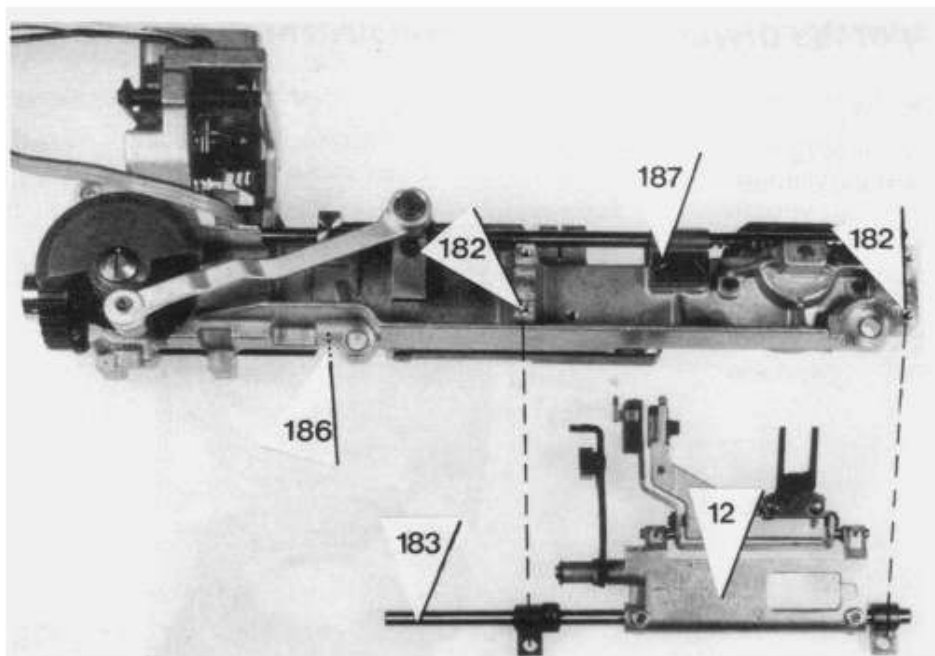
- Loosen fixing screw (95) of the rack carrier (96).
 - By radially turning rack (97) take out the play.
 - Tighten screw (95) on the rack carrier (96).
 - Check smoothness of running.
- [For large corrections see section (27)].



27. Adjustment of play between rack and toothed gear

- Disengage tension spring (181).
- Remove bearing fixing screw (182) of feed-dog advance shaft (183).
- Remove feed-dog advance shaft (183), feed-dog advance fork (12) and the complete feed-dog support.
- Loosen nut (184) (push feed-dog lifter cam to the side).





- Loosen fixing screw (186) of the rear rack bearing.
- Slightly loosen screw (187) of the front rack bearing.
- By sliding the front rack bearing (in the height), the play between the rack and the pinion can be adjusted.
- Tighten screw (187) (front bearing).
- Tighten nut (184).
- Tighten screw (186) (rear bearing).

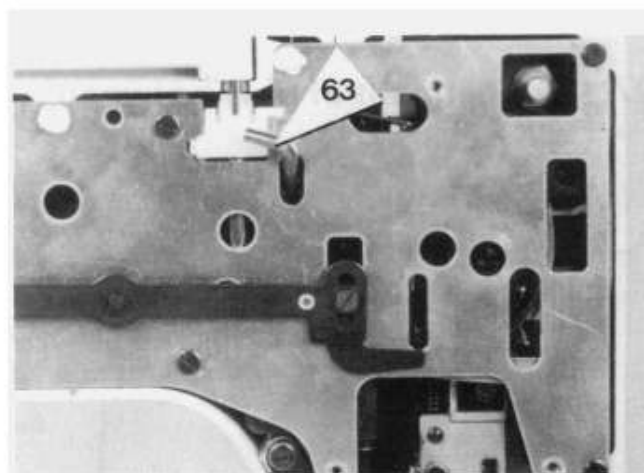
Important: Smooth running of the rack through the axial bearing should be observed.

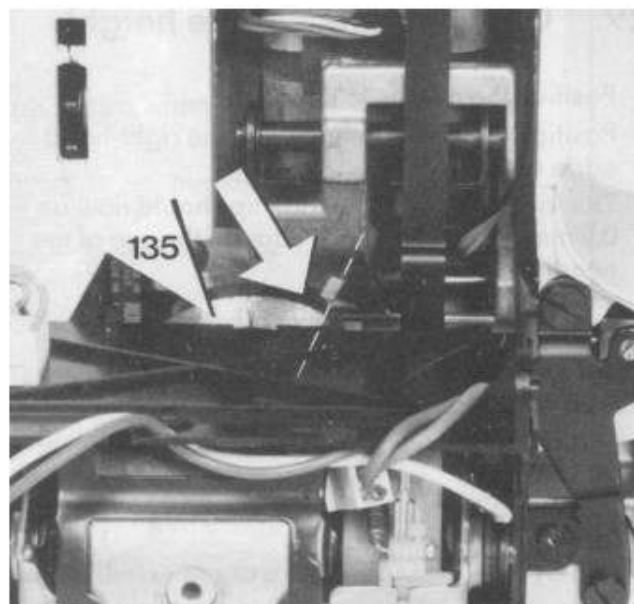
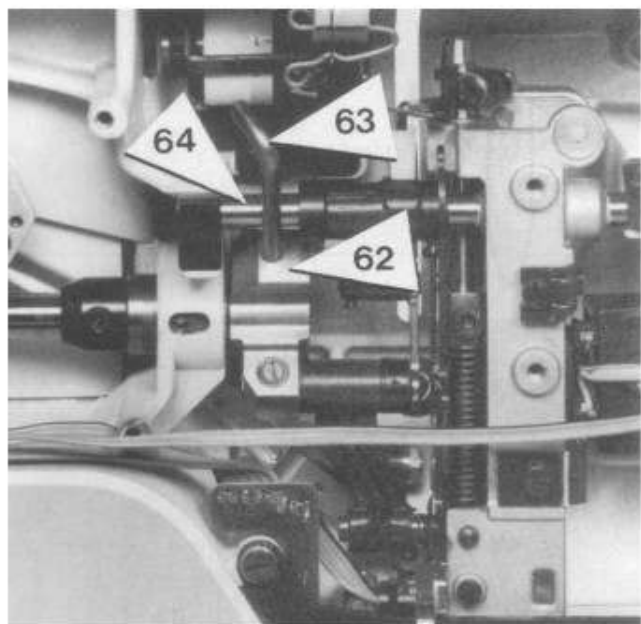
- Assemble and secure feed-dog advance shaft (183) with bearing and screw (182), feed-dog advance fork (12) and complete feed-dog support (check feed-dog advance shaft for smoothness of running).
- Place the sliding block in the stitch length crank.
- Attach tension spring (181).
- Adjust depth limit with screw (138) (section 47).

28. Hook adjustment (loop lift)

Operation undertaken only without the whole chassis.

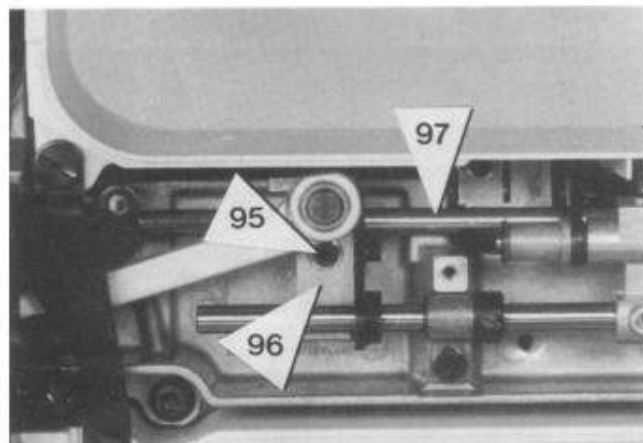
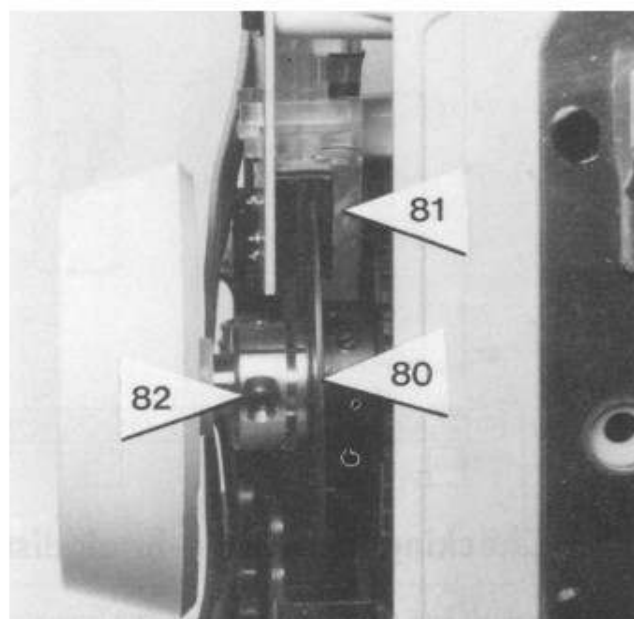
- Connect the machine to the special D. C. adaptor.
- Adjust the needle position to the right (using the largest zig-zag width).
- Pin the balance piece (62) of the needle drive. Turn the handwheel in the direction of rotation until it reaches the stop (64) (head frame shaft), [(33) degrees].
- Hook drive crank (135) should be in line with the marked point on the carrier. The hook tip must be flush with the right-hand edge of the needle.





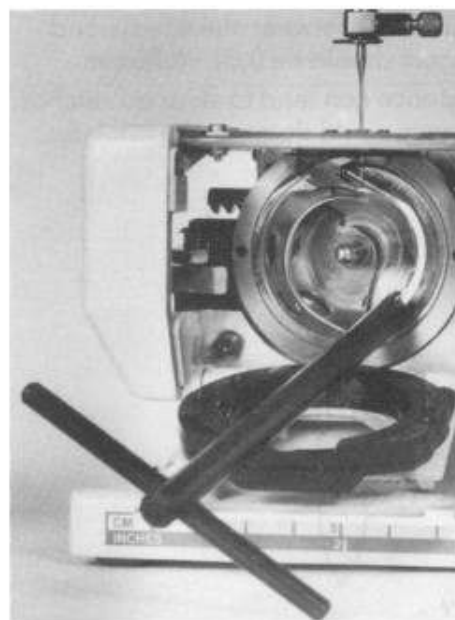
Correction: Hook drive crank.

- Pin the balance piece (62) of the needle drive with pin (63) (4 mm). Turn handwheel until it reaches the stop (64) (head frame shaft), (33 degrees).
- Loosen screw (82) of the handwheel flange and advance the hook drive crank (135) until the marked lines match up (see sketch).
- Check the sideways position of the synchronization disc (80) in the position indicator (81)
- Tighten screw (82).



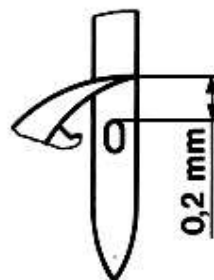
Correction needle-hook tip

- Loosen screw (95) of the rack dog (96).
- Adjust the rack (97) until the hook tip is flush with the right-hand edge of the needle.
- Tighten screw (95).
- Final adjustment of synchronization disc (section 21).



29. Checking the needle height

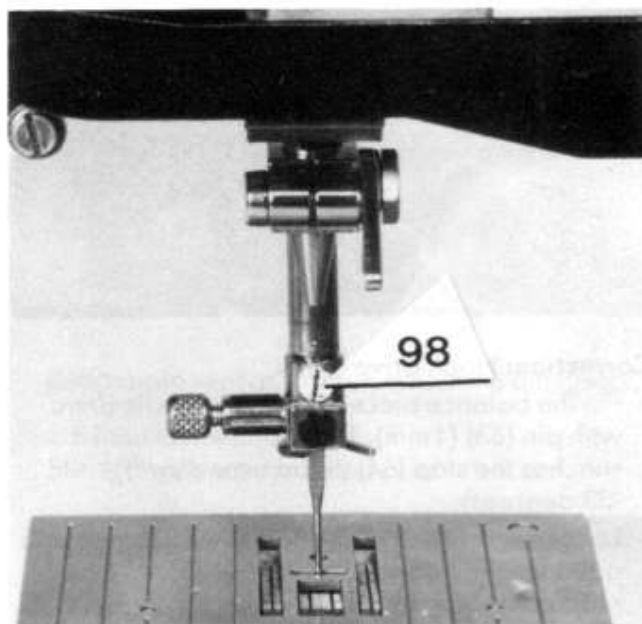
- Position the needle to the right.
- Position the hook tip flush with the right-hand edge of the needle.
- The lower edge of the hook tip should now be 0,2 mm above the upper edge of the eye of the needle.



Correction

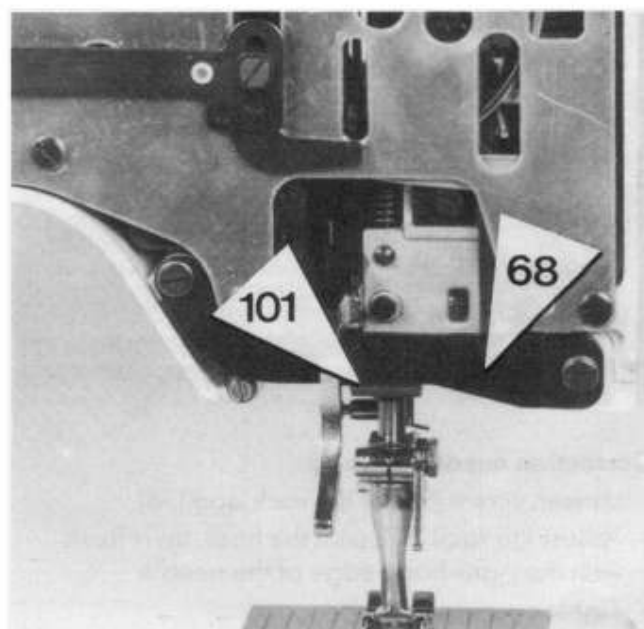
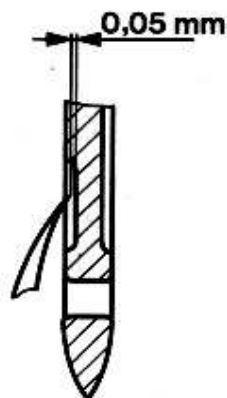
The stop screw (98) must be replaced when necessary. It is available in various diameters.

Part. No.	screw diameter
– 203 508 53	2,40 mm
– 203 509 53	1,45 mm
– 203 510 63	1,95 mm
– 203 511 83	2,85 mm



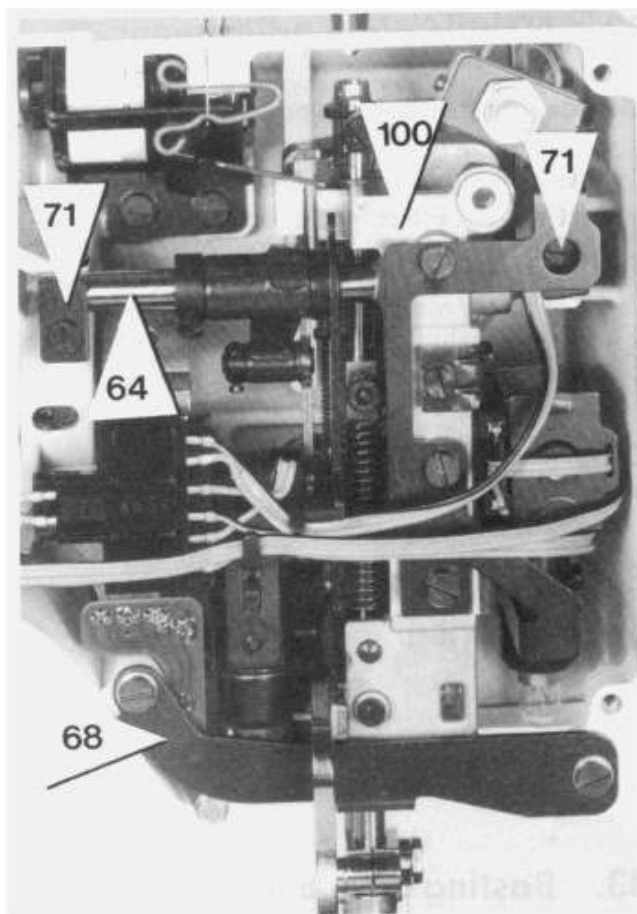
30. Checking the needle-hook distance without needle plate

- Only adjust and check when the needle is positioned in the middle.
- The lateral distance between the needle and hook in the scarf should be 0,01–0,05 mm.
- A greater distance can lead to skipped stitches. A lesser distance could damage the hook tip.



Correction without needle plate

- ~~Very slightly loosen clamps (71) of the head frame (100) so that it can be moved, but the shaft (64) in the prism is still well guided.~~
- Lightly loosen hexagon head screw 6 mm (101) on the securing strap (68).
- Set needle to the hook tip at 0,01 – 0,05 mm.
- Tighten screw (101) and ~~clamp securing screws (71).~~

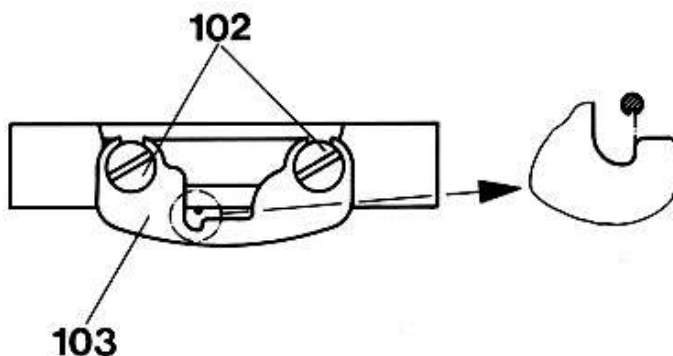


31. Checking the thread guide plate position

- Position the needle to the left.
- The right-hand edge of the needle groove should correspond with the right-hand relief edge of the thread guide plate (see sketch).

Correction

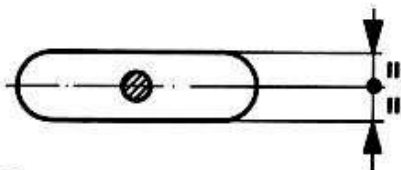
- Loosen both fixing screws (102).
- Position the thread guide plate (103) in the direction of material feed, so that there is a distance of 0,7 – 1,0 mm between the front edge of the needle and the thread guide plate (103) (left and right).
- Hereby observing the lateral position of the thread guide plate (103) (as described above).
- Tighten both screws (102).



32. Needle plate adjustment

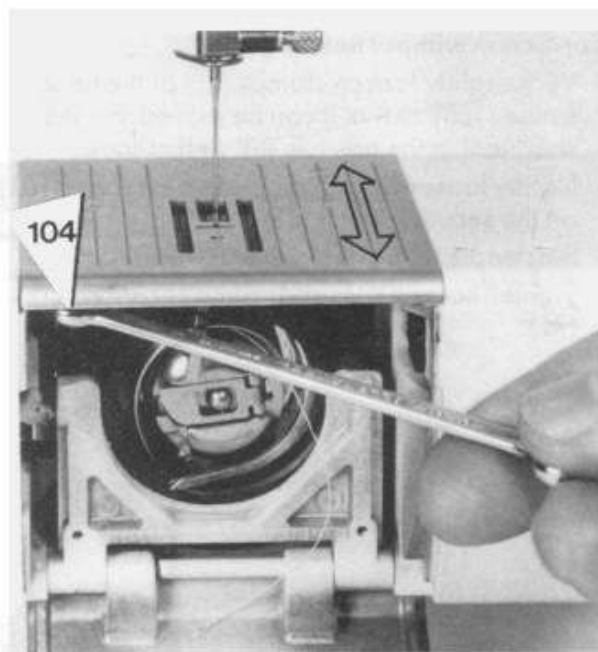
Checking the needle plate position

- Insert needle Nm (90).
- The needle must penetrate at the center of the stitch hole as seen in the direction of the material feed.



Correction

- Loosen the nut of lock-bolt (104) (underneath the needle plate).
- Place the needle plate in the prescribed position.
- Tighten nut (104).



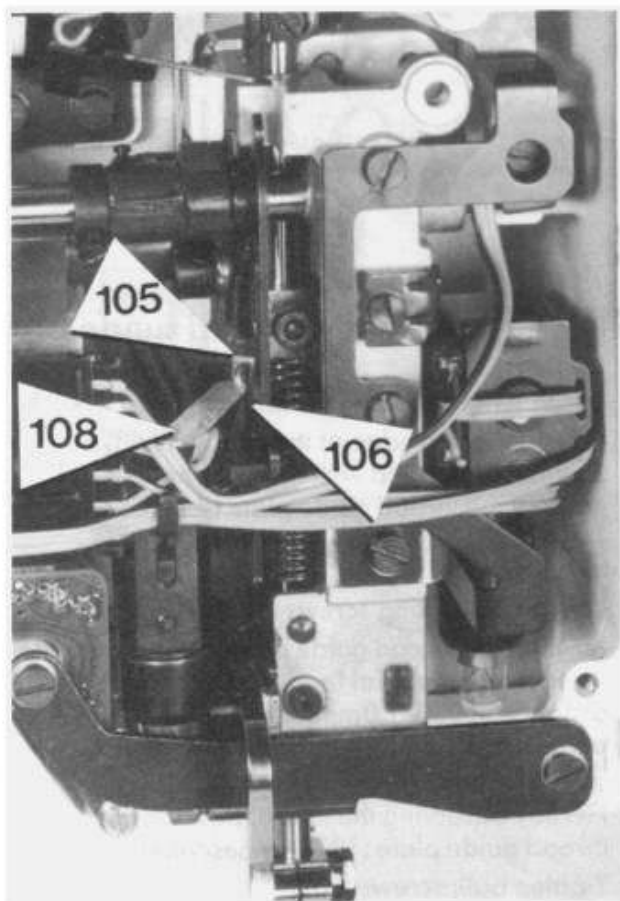
33. Basting device and automatic long stitch

Checking the needle bar guide

Uncouple the needle bar by hand. By turning the needle bar to the right and left establish the amount of guide play, and whether the coupling pin can latch in smoothly.

Correction

- Remove rigidity plate.
- Place needle bar to its top dead center.
- There should be a play of 0,5 mm between the needle bar guide (105) and the carrier (106).
- Loosen needle bar guide (105).
- Engage needle bar (107) in coupling pin.
- Middle out any play from the needle bar (107) inside the coupling pin.
- Place distance gauge (108) between needle bar carrier (106) and needle bar guide (105).
- Using a screwdriver press the needle bar guide against the gauge.
- Tighten screw of the needle bar guide (observe the distance 0,5 mm).
- Check that it functions. (The latch for uncoupling is visible through the slit for the thread take-up lever.)

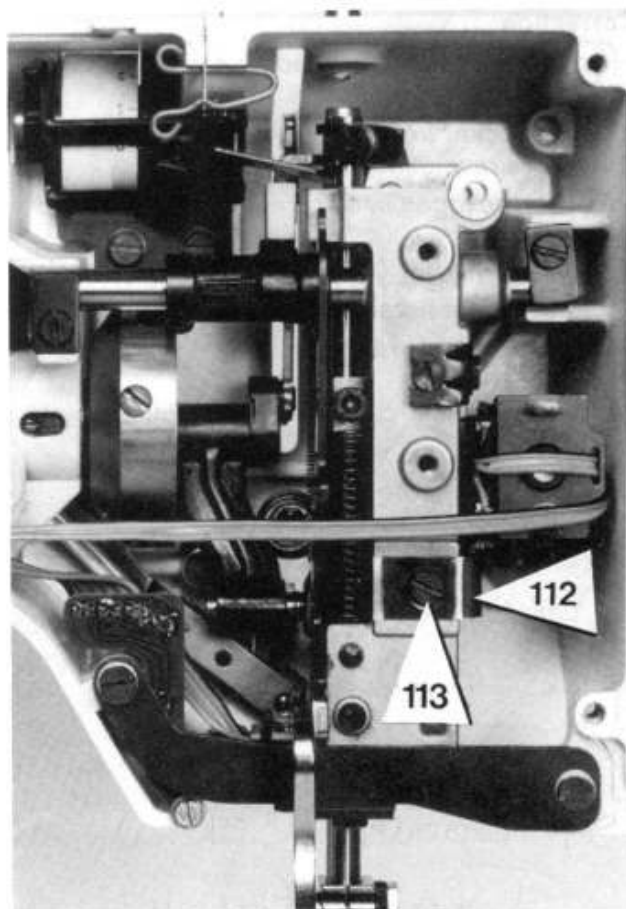
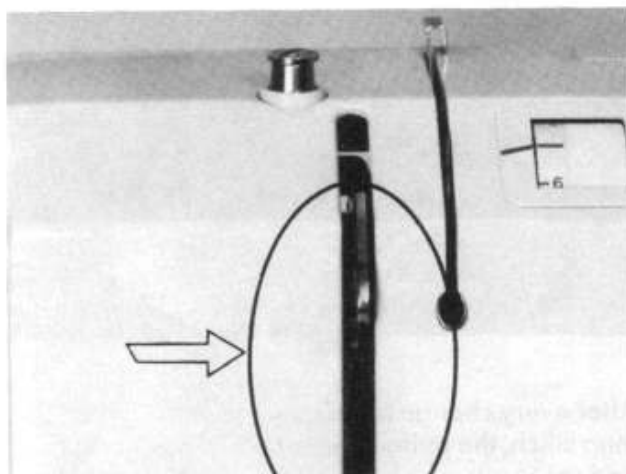
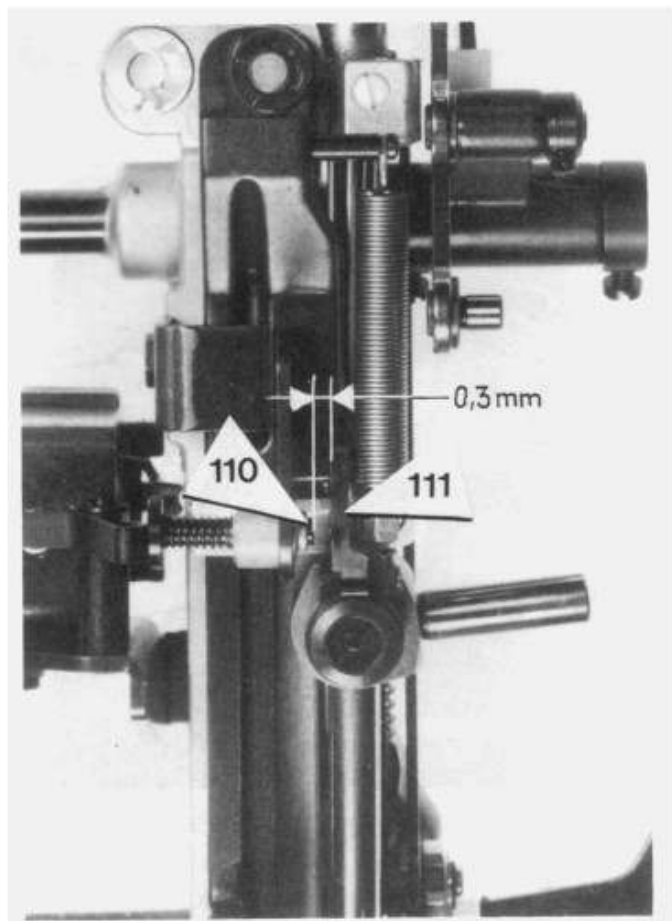


34. Checking basic adjustment of release pin of the latch

- Position the needle to the left.
- Press the button for automatic long stitch.
- Turn the handwheel until the release pin (110) is on the left.
- There should now be a distance of approx. 0,3 mm between the release pin (110) and the left-hand edge of the latch (111).
(Visible through the thread take-up lever slit.)

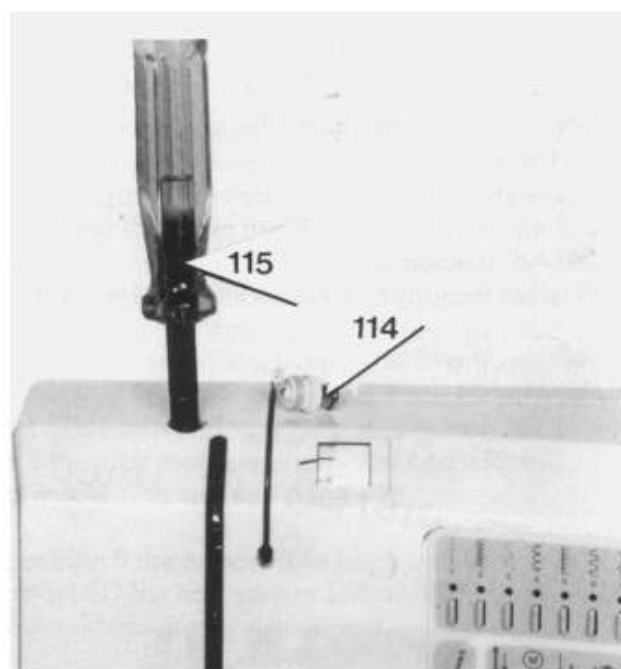
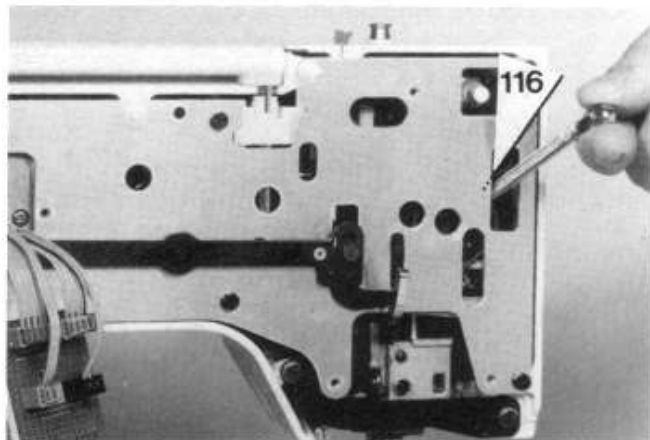
Correction

- Loosen screw (113) of the magnet support (112).
- Move magnet support (112) accordingly left or right.
- Tighten screw (113).
- Check correct operation.



35. Checking the instant of decoupling

- Position needle to the left.
- Press the button for automatic long stitch.
- Now the needle bar should only decouple approx. 12 degrees before reaching top dead center.

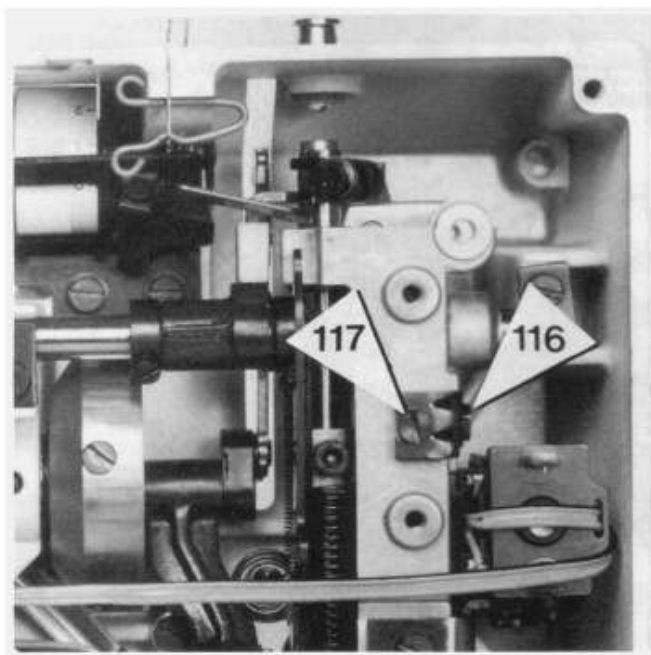


After every change or adjustment of the automatic long stitch, the puffer sleeve should be checked and set.

Correction

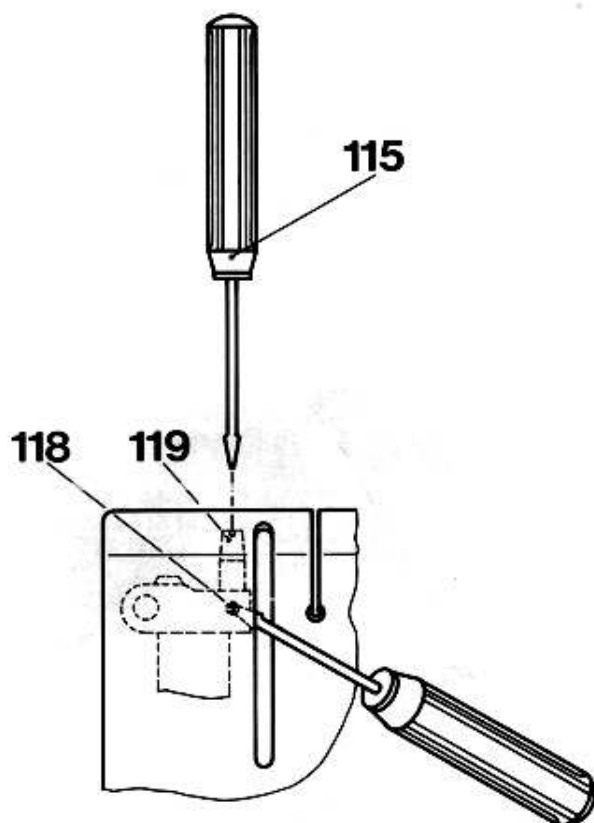
- Screw out the bobbin winding pre-tensioner (114).
- Using socket wrench (115) screw out the puffer by three revolutions.
- Loosen hexagon head screw (116) in the head frame.
- Turn adjusting screw (117) accordingly. (The release pin is hereby adjusted.)
- Tighten screw (116).

Note: Turning anti-clockwise the coupling point will be earlier.



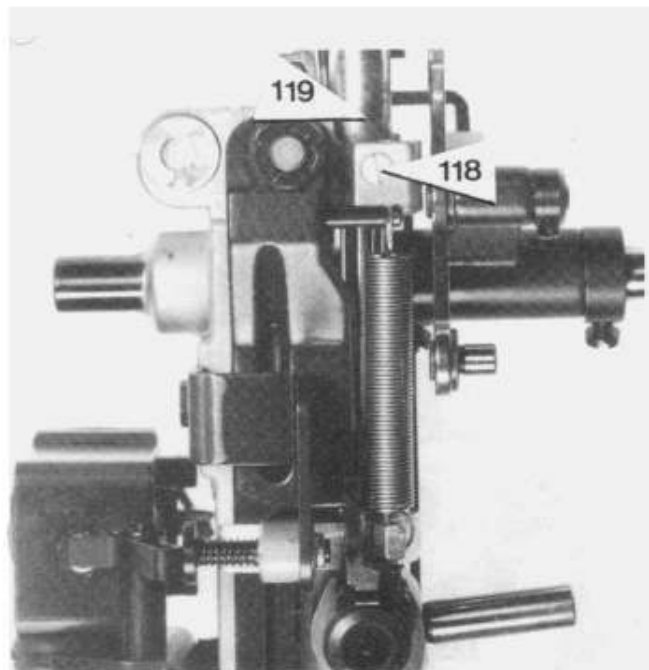
36. Checking the puffer position

- Position the needle to the right.
- Press the button for automatic long stitch.
- Uncouple needle bar and push it twice by hand into the puffer.
- Run the machine with a max. speed of 1050 U/min. After a few turns the needle bar should become engaged.



Correction

- Screw out the bobbin pre-tensioner (114).
- Loosen plastic screw (118).
- Using socket wrench (115) screw out the puffer (119) by three revolutions (to the left).
- Position the needle to the left (straight stitch).



- Press button for automatic long stitch and run the machine slowly. Using socket wrench (115) slowly screw down (to the right) puffer (119) slowly. Using socket wrench (115) slowly screw down (to the right) puffer (119), until the needle bar is able once again to couple.
- Tighten plastic screw (118).
- Fit bobbin pre-tensioner (114).

Checking

See checking!

37. Basic adjustment to the knee lifter lever

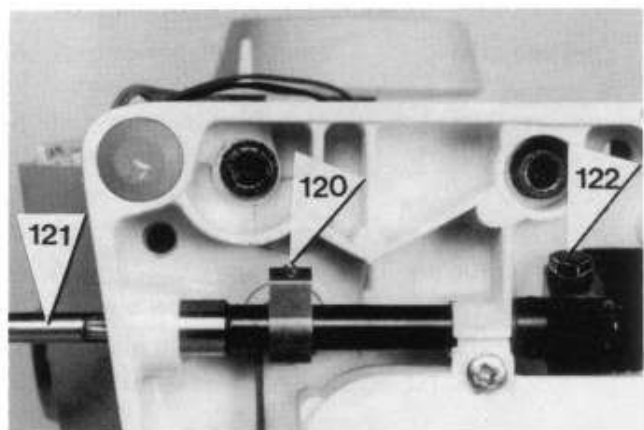
The end of the knee lever should be vertical under the edge of the free arm end.

Knee lifter lever adjustment

The knee lifter lever can be adapted to suit each individual customer.

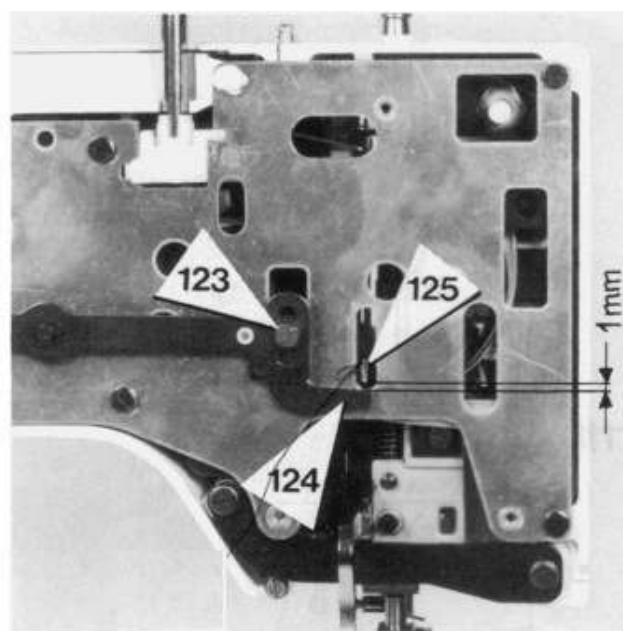
Correction of knee lifter position

- Loosen screw (120) to the feed-dog drop unit.
- Insert knee lifter lever (121).
- Loosen hexagon head screw (122) of the clamp.
- Bring the knee lifter lever to the convenient position.
- Tighten hexagon head screw (122).



Adjustment of the lifter lever release mechanism (without chassis cover)

- Lower presser foot.
- Loosen screw (123).
- Move stop (124) until it is about 1 mm off the thread tension release catch (125).
- Tighten screw (123).

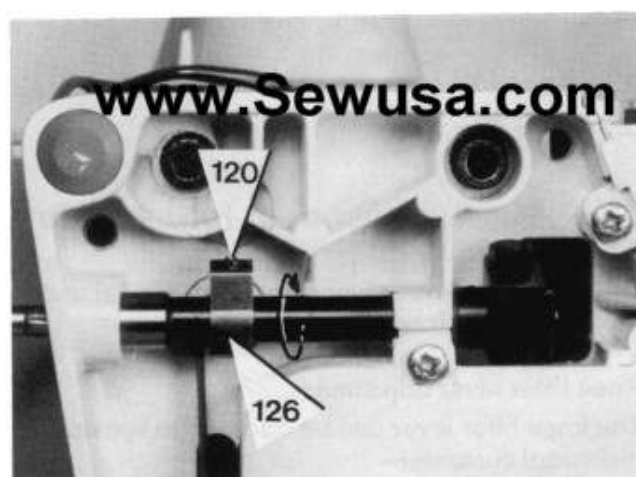


38. Checking the lowering of the feed-dog

- Turn the handwheel until the feed-dog is in its highest position.
- Operate the knee lifter lever.
- After raising the presser foot (approx. 4 mm above the needle plate) the feed-dog should lower.

Correction

- Turn the handwheel until the feed-dog is in its highest position.
- Tighten securing piece (126) of the disengaging lever in the direction of the arrow.
- Tighten screw (120).



39. Lower thread tension

For testing use synthetic thread No. 100/3 ply, white, left twist. This thread is contained in the bobbin case of every new machine. The lower thread tension is checked with the movable setting weight No. 398 118 040. The bobbin case is placed in the weight gauge just as in the hook.

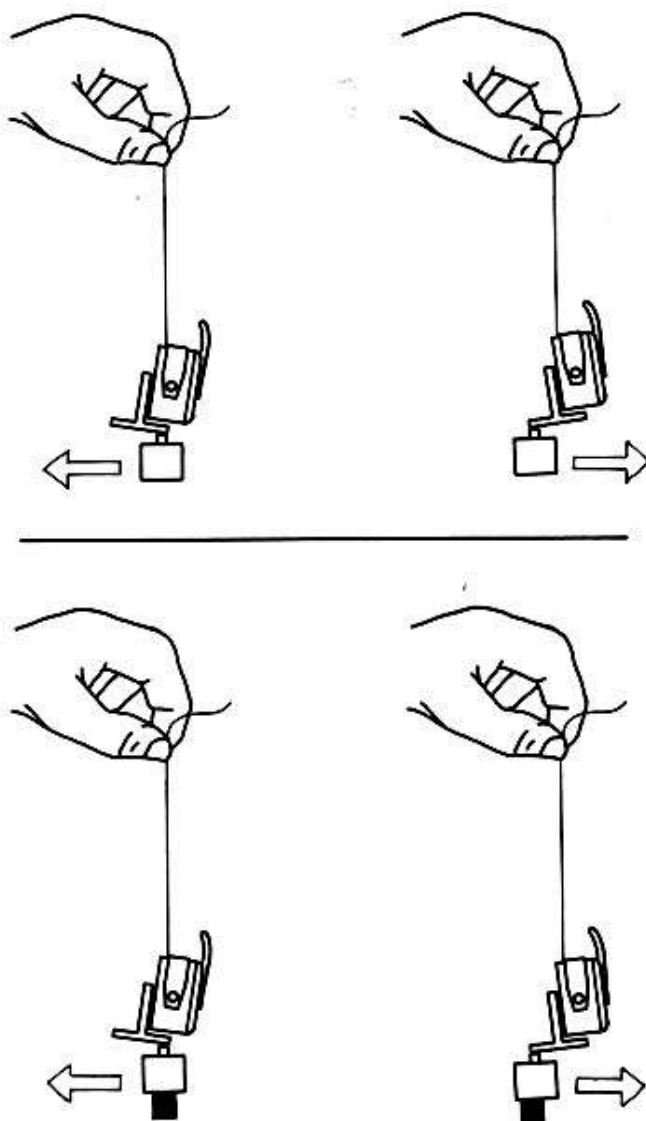
Checking

Hold the free end of the thread and suspend the bobbin case with the movable setting weight (without any additional weight). The bobbin case must not move downwards. After attaching an additional weight (5 grammes) the thread should move downwards (speed 1 m/2–4 sec.). If you test with darning thread the speed should be 1 m/25 sec. Regulation of the lower thread tension is made with the bobbin case adjusting screw and a small screwdriver.

Turning left = weaker

Turning right = stronger

In order to check the spring condition completely, the tension set should be checked with the weight on the left and the right side. (Adjust the tension spring when necessary).



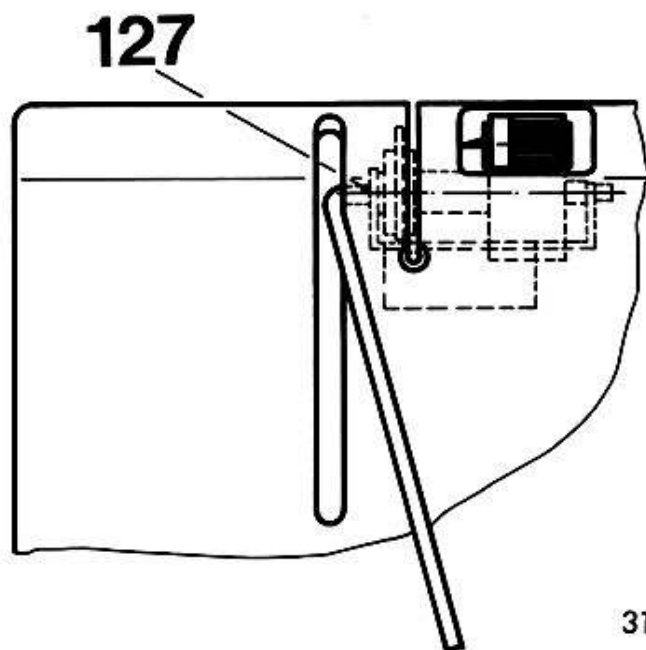
40. Basic adjustment of the upper thread tension

Checking

- Use synthetic thread No. 100/3 ply above and below.
- Test bobbin case with prescribed weight.
- Line up the red mark on the adjusting dial with the mark on the housing.
- Trial run with the desired stitch.

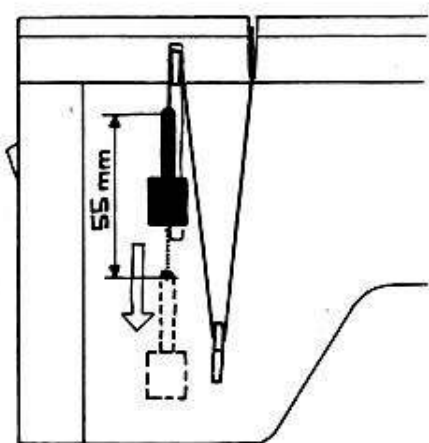
Correction

- By turning the thread tensioning spindle (127) the basic adjustment can be made.
- Using 1,5 mm allen key (shortened) through the thread take-up lever slit, turn thread tensioning spindle accordingly.
- (Turn anti-clockwise for less, turn clockwise for more tension.)



Adjustment of the upper thread tension with a weight

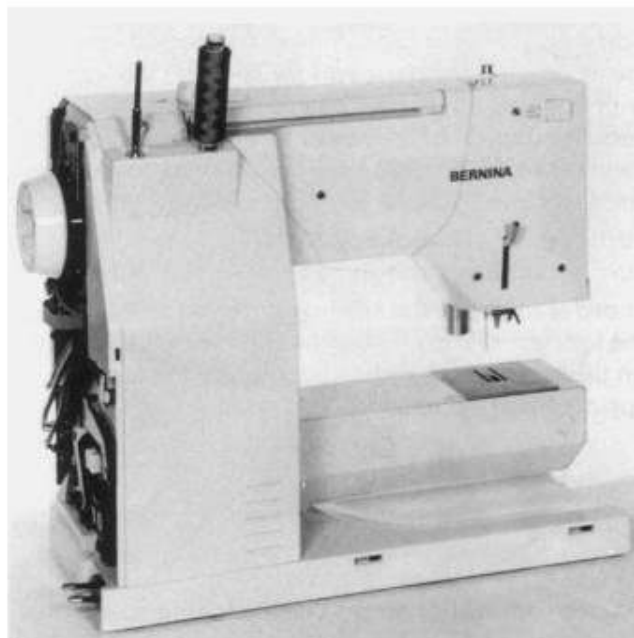
- Test thread 120/2 ply.
- Thread machine up including thread take-up lever.
- Position the thread take-up lever with needle bar at its highest point.
- Lower presser foot.
- Line up the red mark on the adjusting dial with the mark on the housing.
- Attach the upper thread tension weight of 85 grammes.
- Draw approx. 30 cm of thread off the bobbin.
- The thread tension weight should hang and not move.



- Only when an additional weight of 8 grammes is attached should the thread be drawn very slowly.

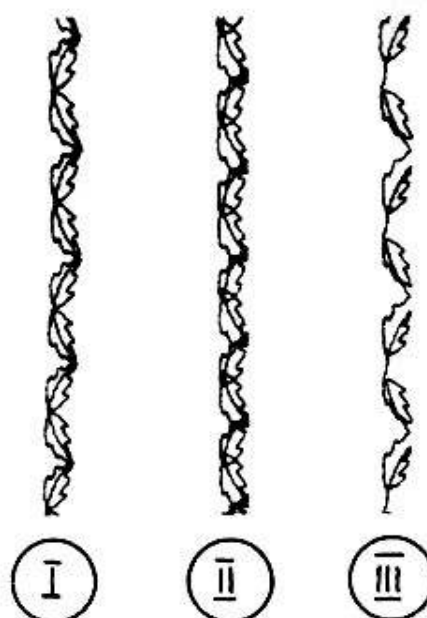
Correction

- Adjustment is made by turning the thread tensioning spindle (127).
- Using 2,5 mm allen key (shortened) through the thread take-up lever slit, turn thread tensioning spindle accordingly.
- Turn anti-clockwise for less, turn clockwise for more tension.



41. Checking the forward and reverse feed equalization

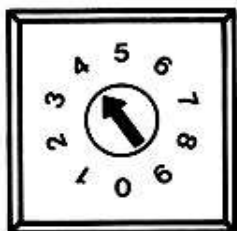
- Press stitch selector button No. 32. (Press stitch selector button 10 with model 1120.)
- Use sewing thread 100/3 ply and cotton-cretonne material double.
- The stitch pattern must be complete for the whole speed range.



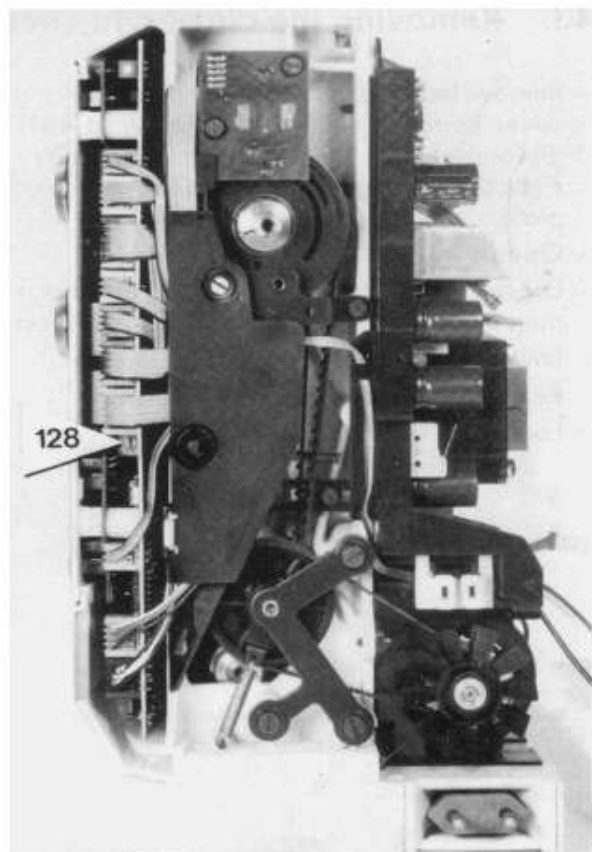
I = correct
II = too short
III = too long

Correction

- Adjust coding switch (128) (S-print) as required between 0–7 (normal position 4).



Note: Adjustment towards 0 shortens the stitch pattern. Adjustment towards 7 lengthens the stitch pattern. When equalization cannot be achieved with this method of adjustment, check the zero position of the stitch length crank (section 52).



42. Automatic buttonholing foot

(Potentiometer equalization)

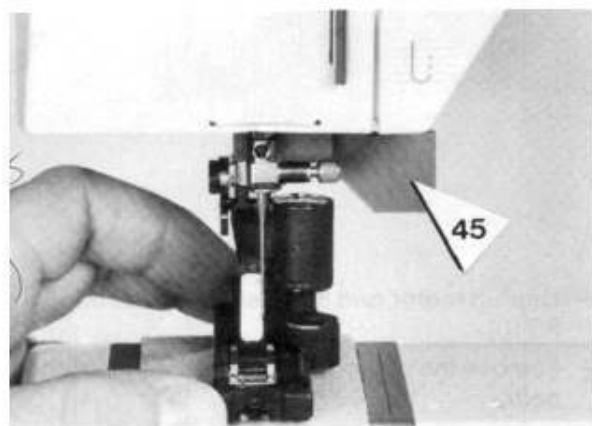
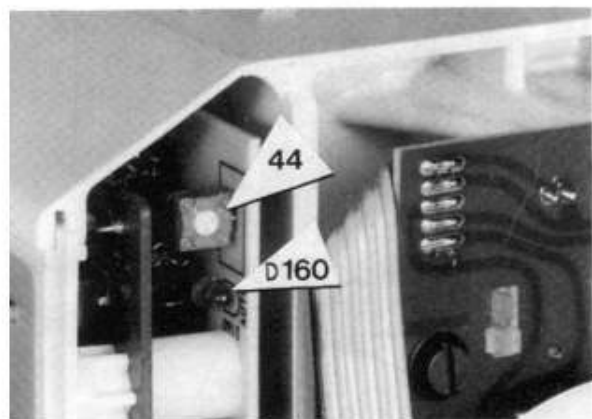
Checking procedure

- With slow even movements of the foot carriage and the attached filter between sender and optic, diode D 160 (S-print) must flash at regular intervals.

Correction

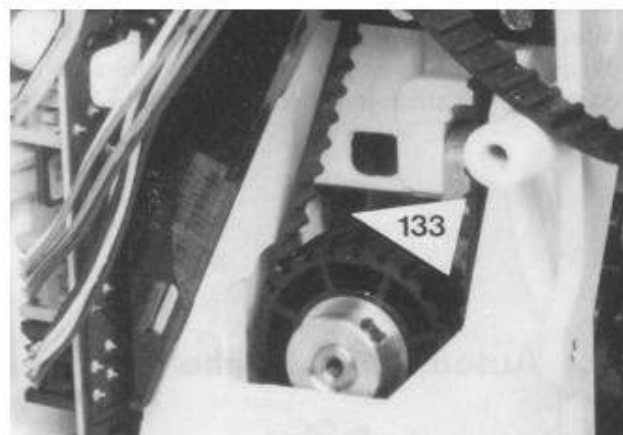
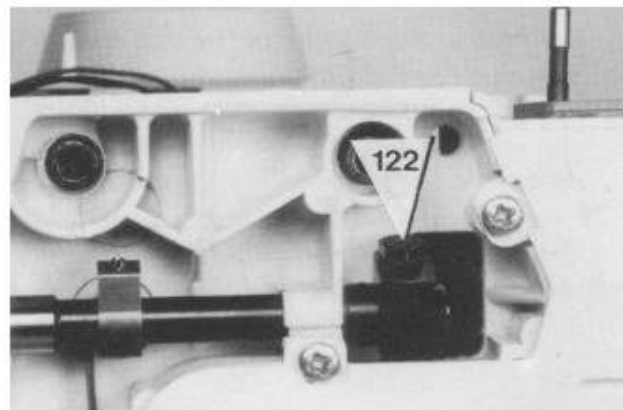
- Lower feed-dog.
- Press clear button twice.
- Press buttonholer button.
- Attach automatic buttonholer foot.
- Lower presser foot bar.
- Place adjusting filter (45) between sender and optic.
- With a small screwdriver, turn the buttonhole sensor on potentiometer R767 on print S-4200 until the control LED «AUTO» lights up continuously, then turn back slowly, at the same time move the foot carriage until the LED just starts to flash.

Note: In order to allow the foot carriage to be moved easily, two smooth pieces of material should be placed between the needle plate and the foot carriage. (Alternatively use knee lever or lifter lever to weaken the pressure of the material presser bar.)

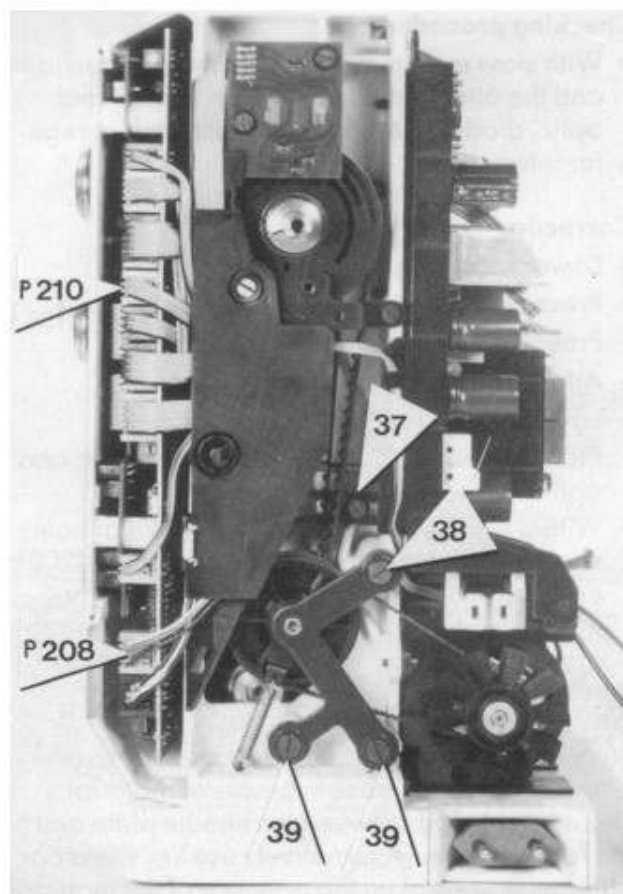
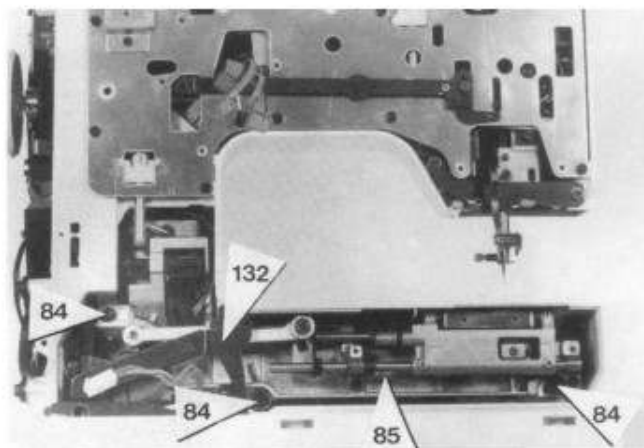


43. Removing the carrier, to check outside of the machine

- Remove belt and chassis covers, free-arm cover, complete chassis, securing strap (131), disconnect knee lifter lever (circlip), rigidity plate (35), strengthening plate (132) and needle plate.
- Open hook cover (remove hook).
- Loosen hexagon head screw (122) of the clamping piece (knee lifter pin) and slide out lever.
- Lower feed-dog.
- Remove stepped pulley (39) (3 screws).
- Loosen belt tensioner (37).



- Disengage latch (133) of feed-dog lowerer (also set sewing/darning knob to sewing).
- Remove 3 allen screws (84).



- Unplug motor and hall-sensor (P 208 and P 210).
- Remove the complete carrier (85) (uncouple belt).

44. Reassemble in the reverse order

Notes on reassembling:

1. Position the balance piece of the needle drive and using the handwheel turn to the stop position (head frame shaft).
2. Replace carrier and bring the hook drive into the loop lift position (section 28).
3. Fit toothed belt.
4. Remount 3 securing screws (84) of carrier (85).
5. Engage connecting straps of feed-dog drop unit into latch (133).
6. Fit needle plate.
7. Lateral position of the support in the needle plate (section 22).
8. Feed-dog height (section 23).
9. Fit stepped pulley (engage short and long drive belts).
11. Fit strengthening plate (132).
12. Fit rigidity plate (35).
13. Hook position-loop lift (section 29 see under correction).

45. Position of the feed-dog and synchronization of base shaft and hook drive using special gauge (4)

- a. Bevel gear
- b. Feed-dog parallelism, thrust fork position and height.

Checking the hook drive

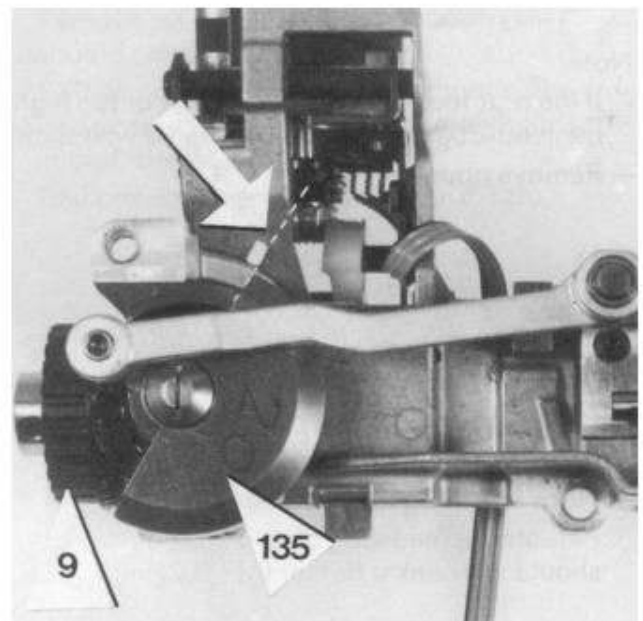
- Remove thread guide plate (103), fixing screws (102) and driver (198).
- Slide special gauge (4) onto the driver shaft and turn bevel gear (9) (base shaft) until the flat is positioned into the gauge.
- Now the crank of the hook drive (135) must correspond to the mark on the support (see photo).

Correction

- Loosen bevel gear (9) screw.
- Lightly press bevel gear (9), and by turning the crank of the hook drive (135) bring it into position.
- Tighten bevel gear screw.

Checking

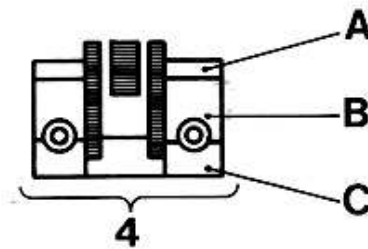
Remove gauge (4) and check the meshing of the bevel gear teeth by turning.



46. Checking the feed-dog

- Slide special gauge (4) onto the drive spindle and turn bevel gear (9) (base shaft) until the flat is positioned into the gauge.

Now the feed-dog is guided in the gauge, and the sideways position of the advance fork is given (possibly needs correcting). The feed-dog height is correct when the feed-dog tips correspond with the check point on the gauge (see sketch).



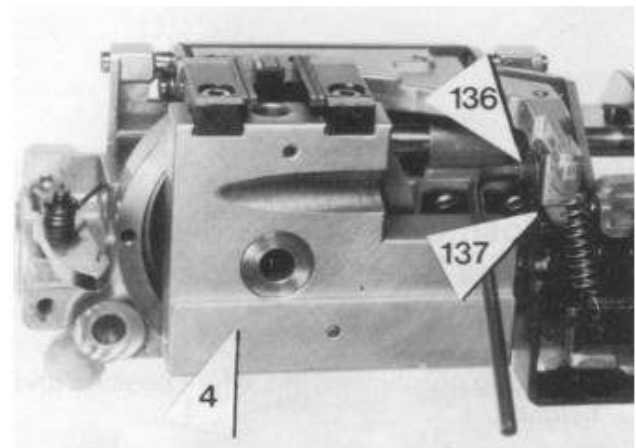
A = Zahnspitzen min. 0,1 mm höher als die Lehre
B = Zahnspitzen mit Lehre bündig (max.)
C = Zahnspitzen spürbar

Correction of the feed-dog height

- Loosen screw (136).
- Move adjusting plate (137) of the feed-dog support accordingly.
- Tighten screw (136).

Note:

- If the rear feed-dog tips lie too low or too high the feed-dog height must be leveled with shims.
- Remove gauge (4).

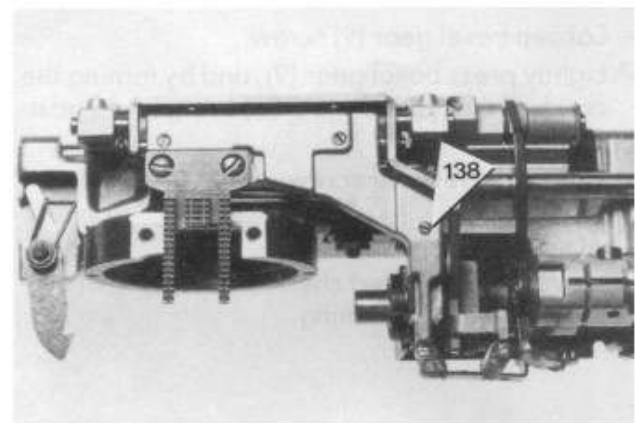


47. Checking depth limit stop

- Place feed-dog to its lowest position.
- Actuate the feed-dog drop unit. The feed-dog should now sink a further 0,1 – 0,2 mm.

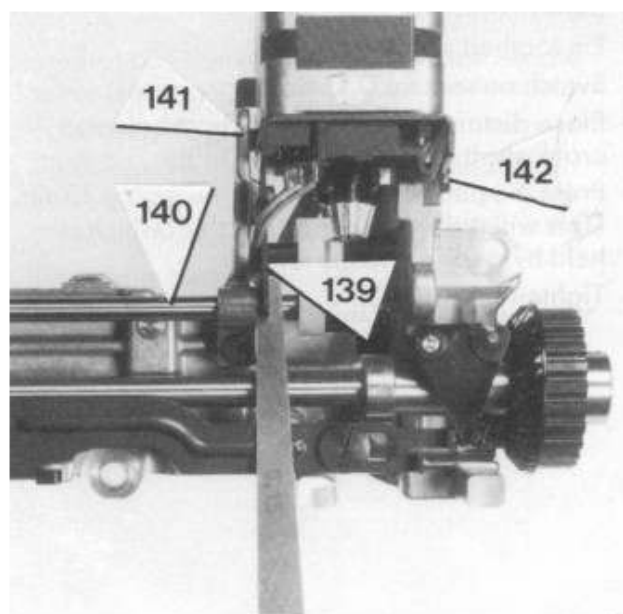
Correction

- Adjustment to the prescribed depth is done by turning screw (138) in the feed-dog support. Check for correct operation.



48. Checking motor support position to crank shaft

- Place feeler gauge 0,15 mm between motor support (139) and crank shaft (140). The gauge should be tight fitting but still able to move.



Correction

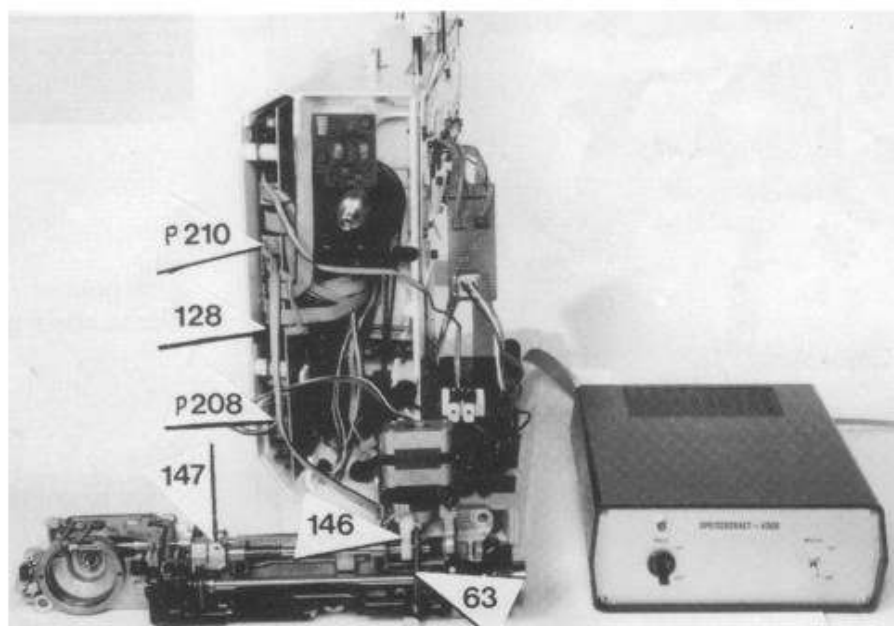
- Loosen 2 screws (141) and (142) of motor support (139).
- Place feeler gauge 0,15 mm between motor support and crank shaft (140).
- Press the support (139) against the gauge.
- First tighten screw (141) and then (142).

49. Adjustment of motor for stitch length

Check the motor position (transport) and the positions of the toothed pulley, toothed segment, magnet support and crank shaft.

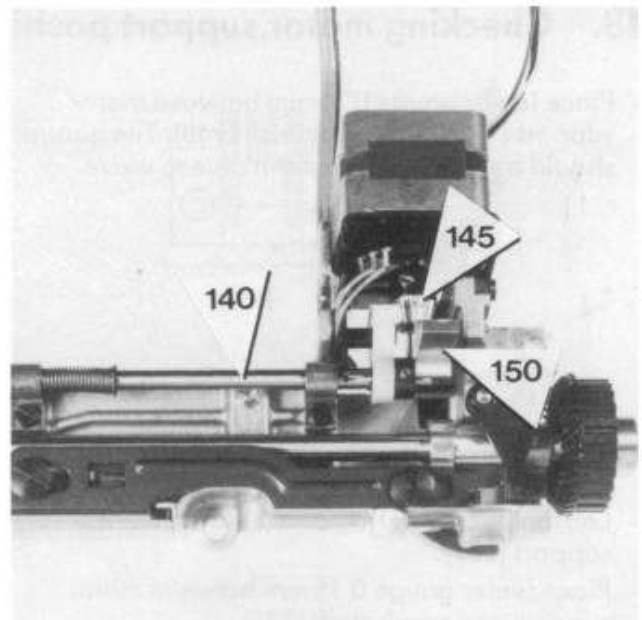
Preparation for checking.

- Connect the motor plug to pos. P 208.
- Connect the hall-sensor to pos. P 210.
- Place coding switch (128) to pos. 8.
- Pin the zero position of the stitch setting link (147) on the toothed segment (146).
- Remove pin (163) [segment position (146) should now not be changed].
- Switch mains to special D. C. adaptor. The pinned position on toothed segment should correspond, check.
- Disconnect electrical connection P 155.



Correction

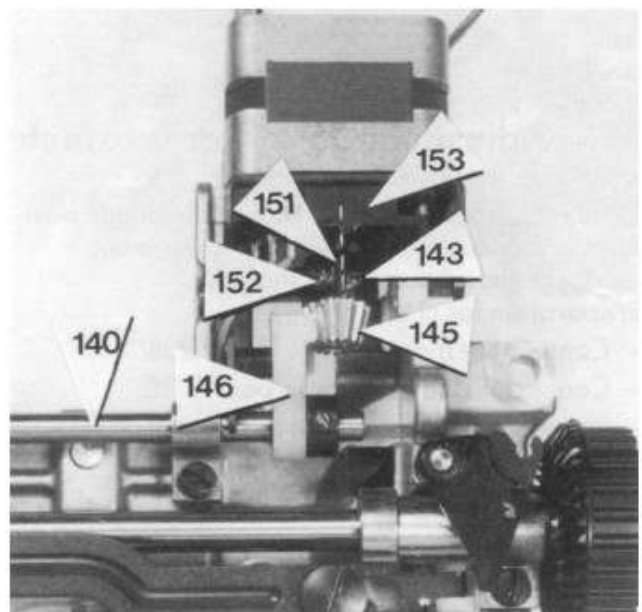
- Loosen 2 screws (143) and (144) of toothed pulley (145).
- Pin toothed segment.
- Switch on special D. C. adaptor.
- Place distance gauge (150) 13mm between crank shaft (140) and pinion (145).
- Press the pinion (145) against the gauge 13mm. (This will push the connecting shaft which is held by a spring, to the left.)
- Tighten screw (143).



Important

After this adjustment the edge of the magnet support (151), that lies between screw (152) and grub screw (143), must correspond with the edge of the sensor support (153) (see figure). If this is not the case, then readjust the meshing of the teeth accordingly.

- Switch off special D. C. adaptor.
- Remove pin (63).
- Tighten 2 screws (144) of toothed pulley.



50. Checking distance of 0,3 mm between magnet support and hall-sensor

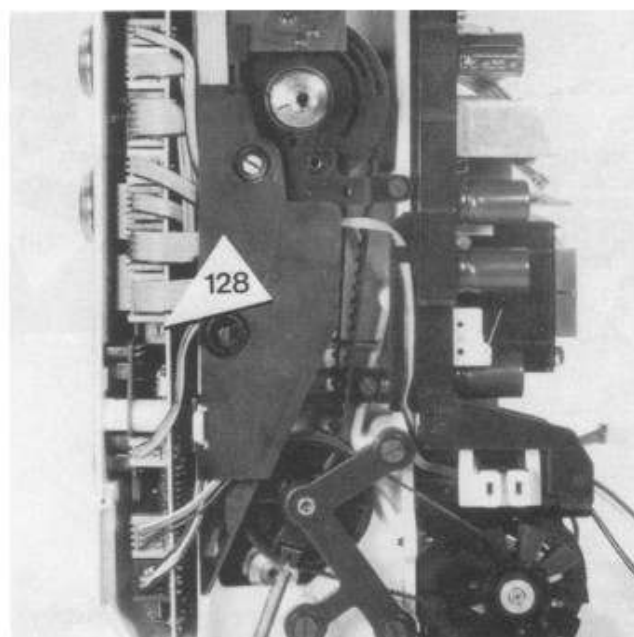
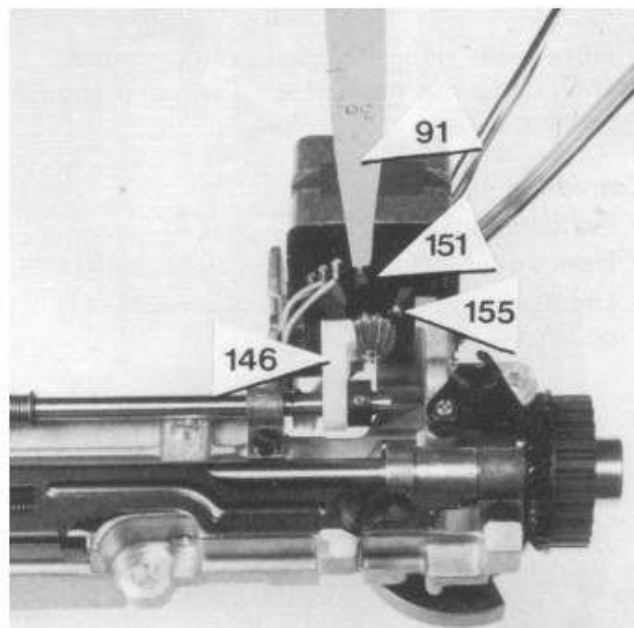
- Turn the magnet support (151) into such a position, that the distance gauge 0,3 can be placed.

Correction

- Locate distance gauge 91/0,3 mm.
- Loosen screw (155).
- Lightly press the magnet support onto distance gauge (91).
- Tighten screw (155).

Checking

- Place coding switch (128) to pos. 4.
- Switch on special D. C. adaptor.
- Switch the stitch length to 0 with the stitch length adjustment knob.
- Hall-sensor and motor must be connected with the machine.
- Turn the handwheel until the motor is positioned, now the bores (toothed segment) must correspond.
- Place coding switch (128) to pos. 9. The toothed segment must not touch the left or right movement limiter.
- Bring coding switch (128) to its basic pos. 4.
- Switch off special D. C. adaptor.

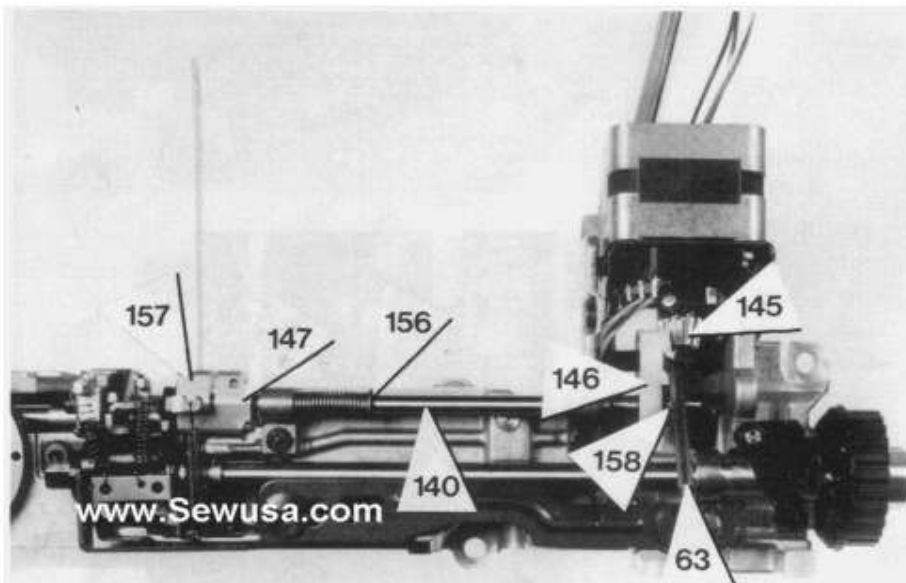


51. Checking the axial play in the stitch length crank and axial pressure on the toothed segment

- Place feeler gauge 0,15 mm between crank (147) and crank block (157). The gauge should be able to slide.

Correction

- Pin toothed segment (146).
- Remove circlip (156) from the crank shaft (140).
- Locate gauge 0,15 mm between crank (147) and crank block (157).
- Loosen screw (158) of the toothed segment.
- Push the crank shaft (140) left up to the stop, at the same time pressing the toothed segment (146) into the pinion ensuring no play.
- Tighten screw (158) onto the flat of the crank shaft.
- Remove feeler gauge 0,15 mm and pin (63).
- Place tension spring to the left and relocate the circlip.

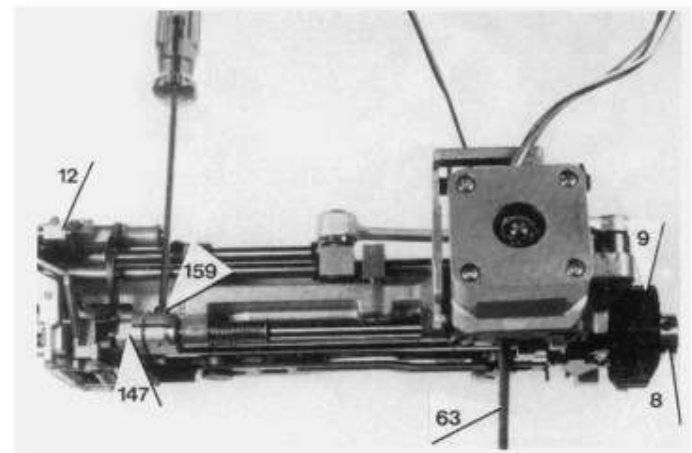


52. Checking the zero position of the stitch length crank

- Pin toothed segment (146).
- When turning base shaft (8), the advance fork (12) should make no feed motion.

Correction

- Loosen allen screw (159) 2,5 mm.
- Press the crank (147) to the right against the stop.
- Turn bevel gear (9) by hand and adjust the crank (147) so that the advance fork (12) does not move anymore.
- Tighten allen screw (159).
- Remove pin (63).



53. Checking the zig-zag stepping motor, zero equalization

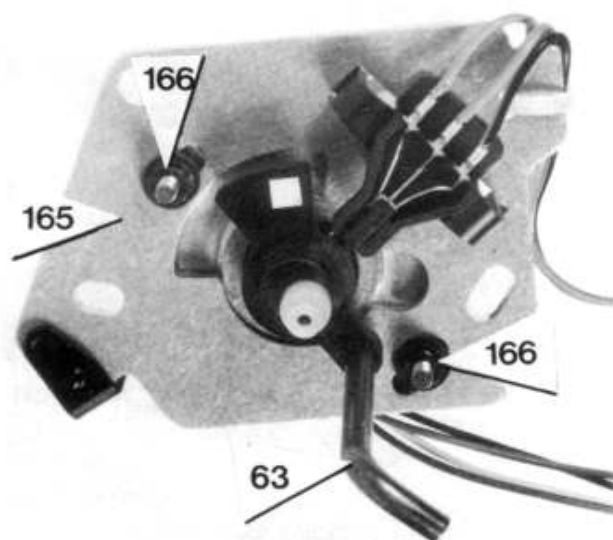
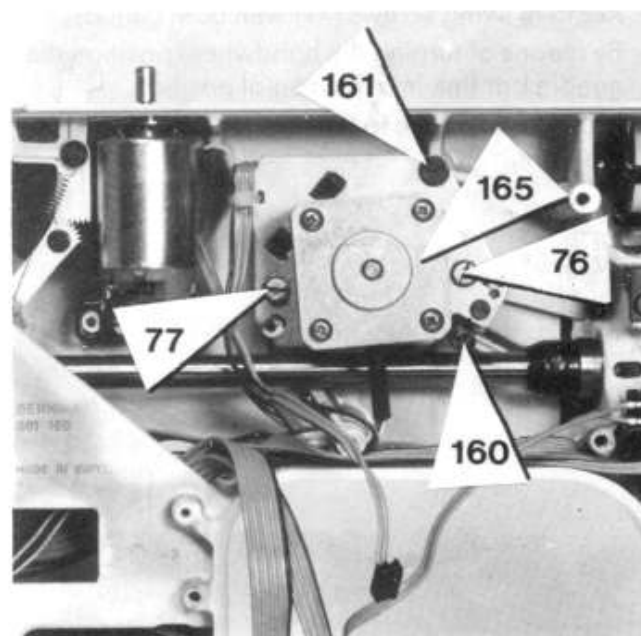
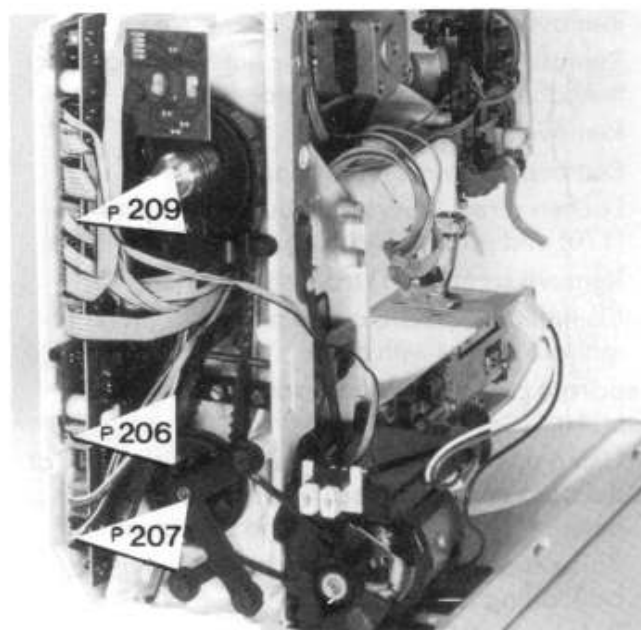
Removal of motor

- Disconnect plugs P 207/P 209 from S-print.
- Disengage tensioning spring (160) of tension bar.
- Remove screws (161)/(162)/(163).
- Connect motor (165) and hall-sensor to S-print P 207/P 209.
- Place coding switch (128) to pos. 8.
- Connect special D. C. adaptor (section 3).
- Position magnet support with pin (63).
- Remove bolt (63).
- Switch on special D. C. adaptor.

Check that the magnet support has been positioned by pin (63).

Correction

- Loosen 2 lock nuts (166) 5,5 mm.
- Pin magnet support with support plate.
- Tighten nuts (166).
- Remove pin (63).
- Place coding switch (128) to pos. 9.
The magnet support must not touch the left or right movement limiter.
- Switch off special D. C. adaptor.
- Place coding switch (128) to pos. 4.
- Fit zig-zag stepping motor (165).
- Adjust stich distribution (section 20).

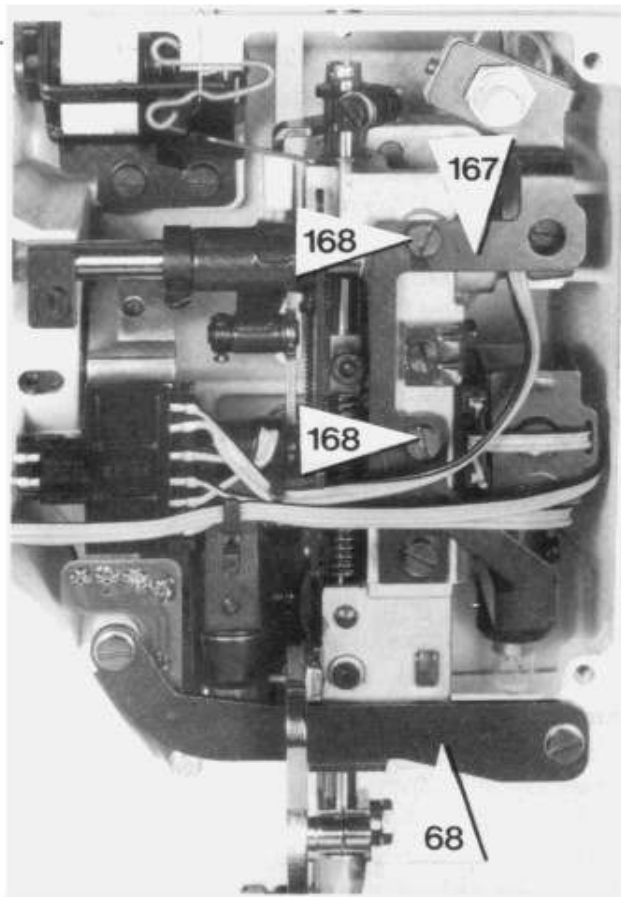


54. Removal of head frame

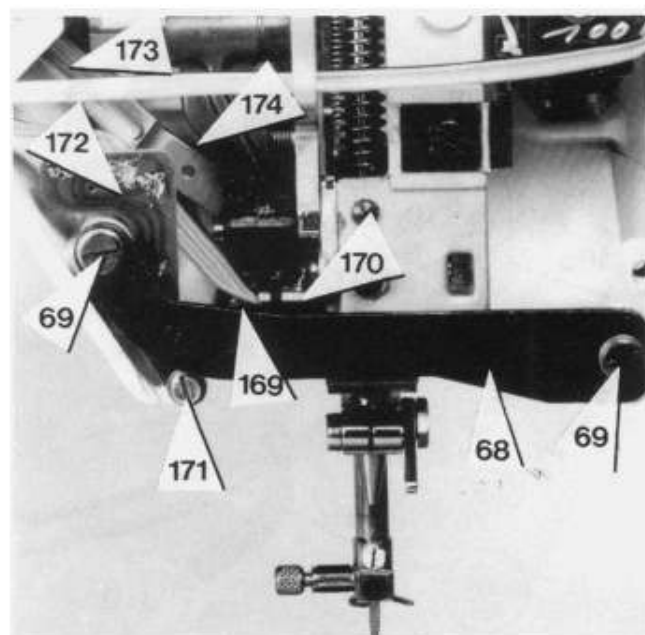
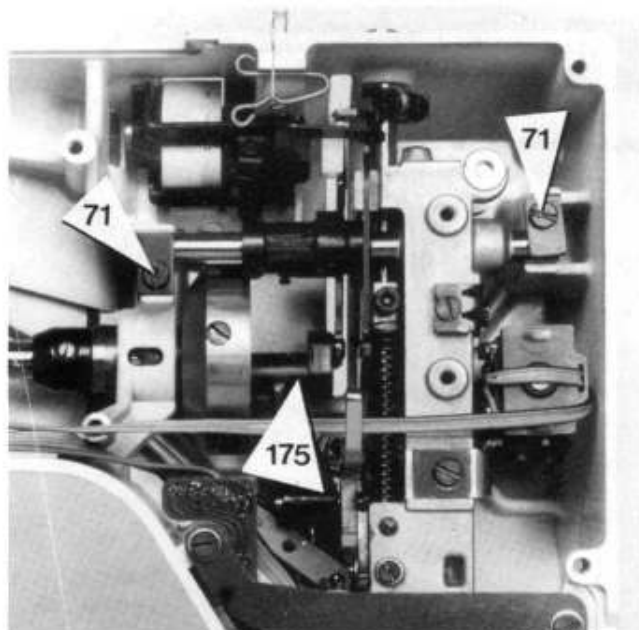
- Remove presser foot and needle.
- Remove rigidity plate (35).
- Release plug P 206 from S-print and disconnect the cable from the lamp holder.
- Remove 2 screws (168).
- Remove complete lamp support (167).
- Loosen screw (169) of the buttonhole sensor (170) and remove by tilting upwards.
- Remove screw (171) from return print (172).
- Completely remove return print (172) and buttonhole sensor with cable.

Separate connecting strap from needle bar support.

- Using a screwdriver turn the flat spring (174) at the back of the connecting strap until the connection is separated (ball and socket joint).
- Raise connecting strap, but be careful of the ball falling out.
- Remove both screws (69) from strengthening strap (68) on head frame.
- Remove fixing screws (71) with both clamps.
- By means of turning the handwheel position the needle bar link in a horizontal position.
- Move head frame to the rear and take out to the right.



To re-assemble the head frame follow the reverse order to what is described above. The now necessary adjustment of the thread take-up lever position, lateral hook distance and presser foot position are described in section (57).

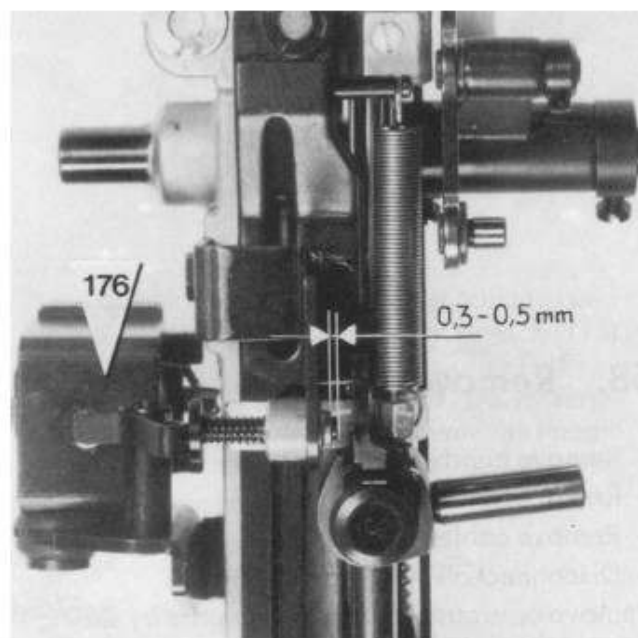
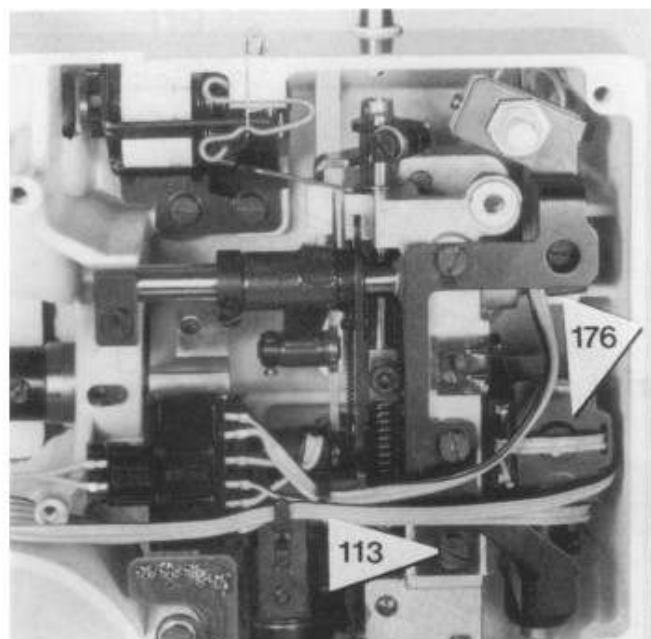


55. Notes on reassembling

1. Turn handwheel and crank (175) to the rear (horizontal).
2. Lower presser foot bar.
3. Replace needle bar carrier and thread take-up lever.
4. Place the complete head frame in the V-grooves provided.
5. a) Fit 2 screws (71) with clamps (provisionally tighten);
b) insert 2 crews (69) in strengthening plate (prov. tighten).
6. Replace ball and close connecting strap connection.
7. Assemble the return print (172) and buttonhole sensor (170) completely.
8. Assemble lamp support (167) completely.
9. Make adjustments (sections 57).

56. Changing magnet of basting device

- Remove head frame (section 54).
- Loosen screw (113).
- Position basting device magnet (176) on 0 position, so that the releasing pin protrudes about 0,3–0,5 mm over the guide bush.



57. Adjustments that must be made after removal and reinstallation of certain parts

Rigidity plate

1. Needle-hook distance (section 30).
2. Needle plate position (section 32).

Head frame

1. Check presser foot fixation and height (sections 15/16).
2. Height of darning foot (section 17).
3. Position of presser foot crosswise to sewing direction (section 18).
4. Lateral distribution of the thread take-up lever (section 19).
5. Assemble the rigidity plate.
6. Stitch position by zig-zag stitch (section 20).
7. Needle-hook distance (section 30).
8. Thread guide plate (section 31).
9. Needle plate position (section 32).
10. Lifter lever release (section 37).

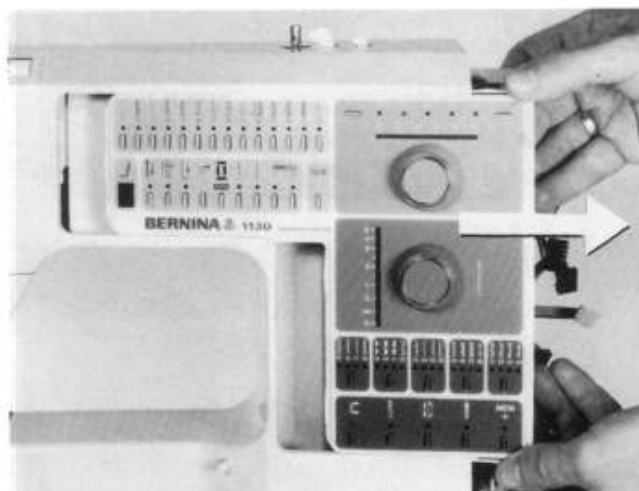
Carrier

1. Position of feed-dog sideways in the needle plate (section 22).
2. Height of feed-dog (section 23).
3. Belt tension-hook drive (section 11).
4. Hook adjustment-loop lift (33 degrees) (section 28).
5. Adjustment of synchronization disc (section 21).
6. Check stitch distribution (section 20).
7. Hook adjustment (section 28).
8. Height of needle (section 29).
9. Needle-hook distance (section 30).
10. Thread guide plate (section 31).
11. Needle plate adjustment (section 32).

58. Removal of S-print and operating print

- Remove handwheel.
- Remove belt cover.
- Remove cable cover (30).
- Disconnect all 10 plugs on S-print.

Remove operating chassis and S-print by sliding them to the right.



59. Replacement of S-print

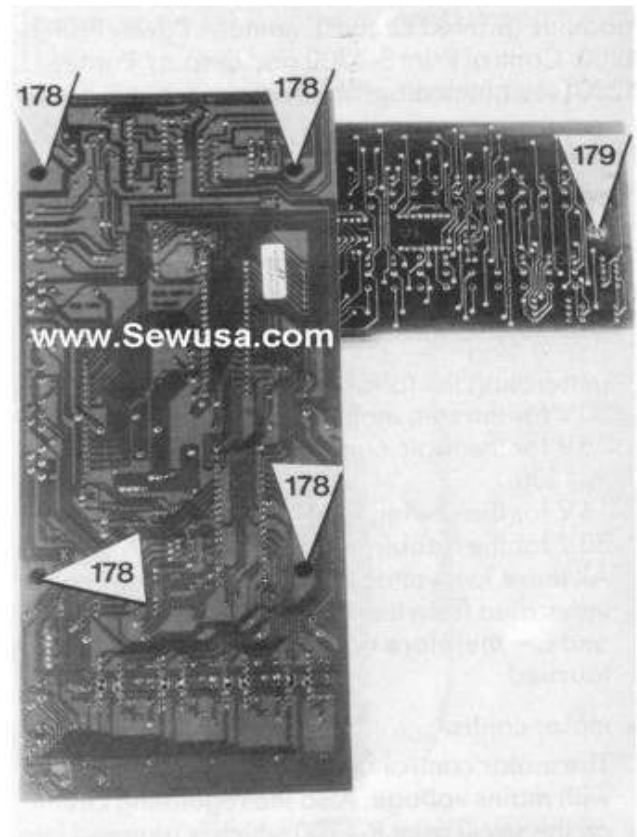
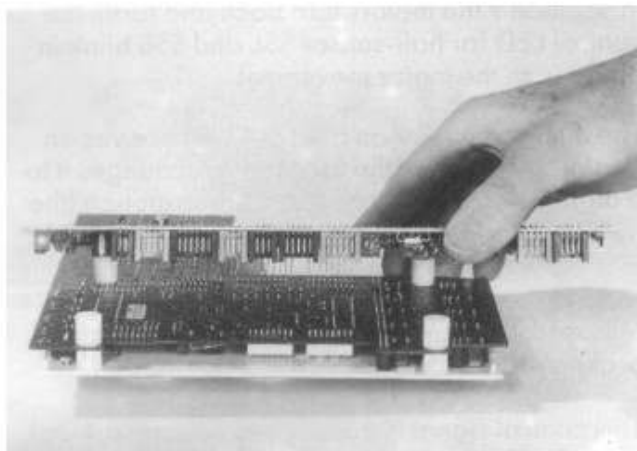
- Remove 4 screws (178).
- Separate S-print without damaging the edges of the operating print (connecting pins).

Reverse this procedure for assembly.

Note: Correctly position the plug connections of S-print to operating print, connect both prints together by pressing parallel.

Adjustment of coding switch

The replacement S-print must be set to the previous S-print position.



60. Replacement of display print

- Remove S-print.
- Remove screw (179).
- Separate display print from operating chassis.

61. Assembly of operating chassis-display print and S-print

- Slide the display print over the 4 guide pins of the operating chassis.
- Tighten screw (179).
- Slide 4 sleeve spacers over the guide pins.
- Correctly position plug connections of S-print to display print, and connect both prints together by pressing parallel.
- Tighten 4 screws (178).
- Slide the complete operating chassis into machine housing.
- Connect (plug connections) to S-print see electronic manual, part 62.3.

62.0 Description of Electronic Part

The electronic part of the Model 1130 sewing machine is basically contained in three main modules (printed circuits), namely: Power Print L-4200, Control Print S-4200 and Display Print A-4200 (see block diagram).

Power Print L-4200

Power print L-4200 is mounted at the rear of the sewing machine, above the motor.

The circuits of L-4200 perform the following functions:

- power supply:
generating the following D.C. voltages:
30 V for the step motors
5 V for the logic on print S-4200 and print A-4200
6 V for the sewing light
30 V for the bobbin winder
All these low voltage circuits are galvanically separated from the mains by the transformer and are therefore not dangerous if accidentally touched.

- motor control:
The motor control for the main motor works with mains voltage. Also the regulating circuit on the small print R-4200 which is plugged into L-4200. All circuits for the motor control operate with dangerous voltages. Safety regulations must be observed (see page 53).

In case of a malfunction, three fuses (F 150, F 151 and F 152) protect the parts against overload. If a fuse blows, only original replacement fuses, with the correct current rating, may be used.

Display print A-4200

The display print is fitted directly behind the operating panel. The display and operating elements are soldered onto the L-shaped printed circuit board. A time multiplex circuit makes it possible to connect the many LEDs and operating elements to the control circuitry of print S-4200 using only 24 connections.

Control print S-4200

The control for the whole sewing machine to be found on print S-4200 which is connected to the display print A-4200. The most important components are the 2 microcomputers and the power-drive for the step motors. There are some LEDs and a switch for a test program for easy diagnosis in case of malfunction.

Light-Emitting Diodes (LEDs)

AUTO:

indicates that the optical measuring system in the fully automatic buttonhole is working properly.

SL, SB, STOP:

indicate the function of the position indicator.

SSL, SSB:

indicate the function of the sensors for the reference point stitch length or stitch width.

The switch S 220 on print S-4200 is a «service help». This test switch has 10 positions 0–9. At first the feed should be mechanically roughly adjusted, and then the fine adjustment can be made with the help of the electrical feed adjustment (positions 0–7). Positions 8 and 9 are for adjustment and fault finding for the step motor. In position 8 the step motor is energized and is at full step mode. (For use see page 41).

In position 9 the motors turn back and forth: the control LED for hall-sensor SSL and SSB blink in phase with the motor movement.

The microcomputer on print S-4200 receives an analog signal from the foot control, changes it to a digital signal, then passes this information (the required motor speed) on to print R-4200. The electric brake is released. The main motor accelerates to the desired speed. If the foot control is released, the signal returns to zero, the electric brake switches on and the motor is stopped.

This control signal is transmitted through a 4-pol. cable from print S-4200 to print L-4200.

When switching the sewing machine on, the spindle of the step motor can be in any position. The memory of the microcomputer control on print S-4200 can also be at any value.

An eccentric with a permanent magnet is pressed onto the spindle of the step motor. A magnet-sensitive sensor, the *hall-sensor* indicates when the magnet is in zero position.

The control sends out impulses, so as to turn the spindle towards the zero position.

When the zero position is reached, the sensor of the microcomputer control sends out a zero impulse, whereby the control ceases to produce any more impulses. At the same time this position value is given into the memory of the microcomputer and set at zero. With the next control impulse the eccentric will turn again. With every step of the motor the position of the spindle is updated in the memory. Test of the synchronization is given when both LEDs, SSL and SSB, light up for a short time when the sewing machine is switched on.

With the aid of the *position indicator* the microcomputer control recognises the position of the main shaft.

Three light interrupters are built into the position indicator. The light source of all three beams is a light diode emitting invisible infra-red light.

With these three light interruptures, three concentric slits in the slotted disc are sensed. When the light can pass through one of these slits, the light receiver gives a signal to the microcomputer control.

One of the three light interruptures gives the signal to the motor for adjusting the sideways movement of the needle. The corresponding slit only allows light to pass through when the needle is no longer in the fabric.

The two remaining light interruptures of the position indicator are for the synchronization of the stepping motor for stitch length and for the needle stop, up/down.

The function of these light beams can be checked on the control LEDs SL, SB and stop on print S-4200.

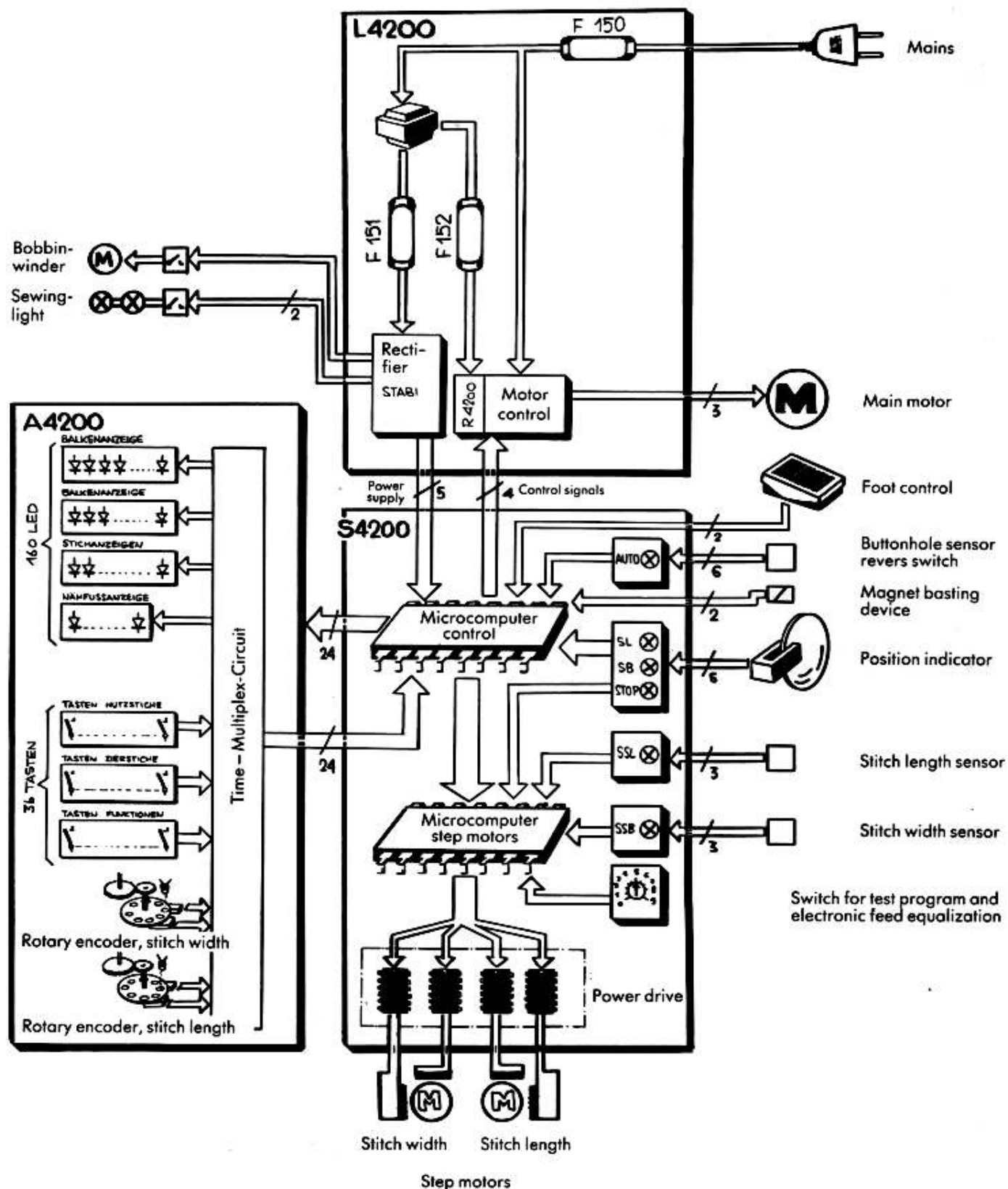
With the aid of knobs the *stitch length* and the *stitch width* can be altered. By turning the knobs a perforated disc is moved via a gear. A light source emits infrared light on two light-sensitive sensors. When adjusting the stitch length or stitch width, the perforated disc turns, breaking the light beam. Depending on the position of the disc the light beam activates the sensors, which causes an impulse that the microcomputer can identify. The signals are counted in the memory. Turn to the right and the impulses are added, turn to the left and they are subtracted, and the appropriate number of light diodes register on the bar graph.

Thanks to the automatic buttonholer, once a single buttonhole has been sewn and programmed, the machine can then automatically produce any desired number of buttonholes of the same size.

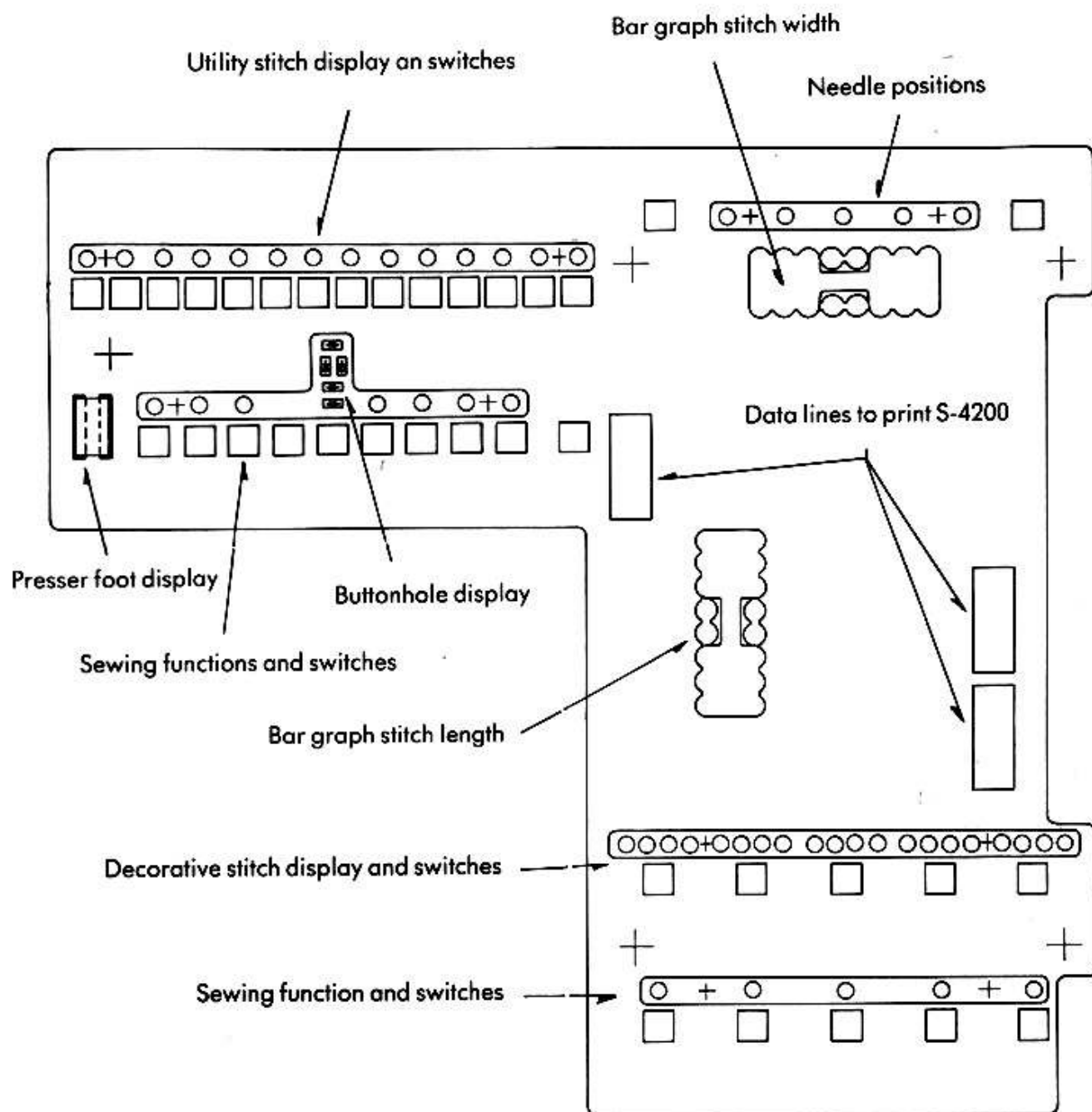
The material is guided precisely by the slider of the buttonhole foot. By means of mechanical gear, the carriage drives a prism, which rotates when the carriage moves lengthways.

The prism is constantly lit by a light diode, emitting invisible infra-red light. Depending on the position of the reflector, infrared light is reflected, and received by a light sensor. Every light impulse corresponds to a small movement of the buttonhole carriage. The light impulses are changed into electrical signals in the sensor. The microcomputer control counts the signals and can measure the length of the bead of the buttonhole. The control LED «AUTO» on print S-4200 indicates optically (by blinking) how many signals are received by the microcomputer control for the measurement of the length.

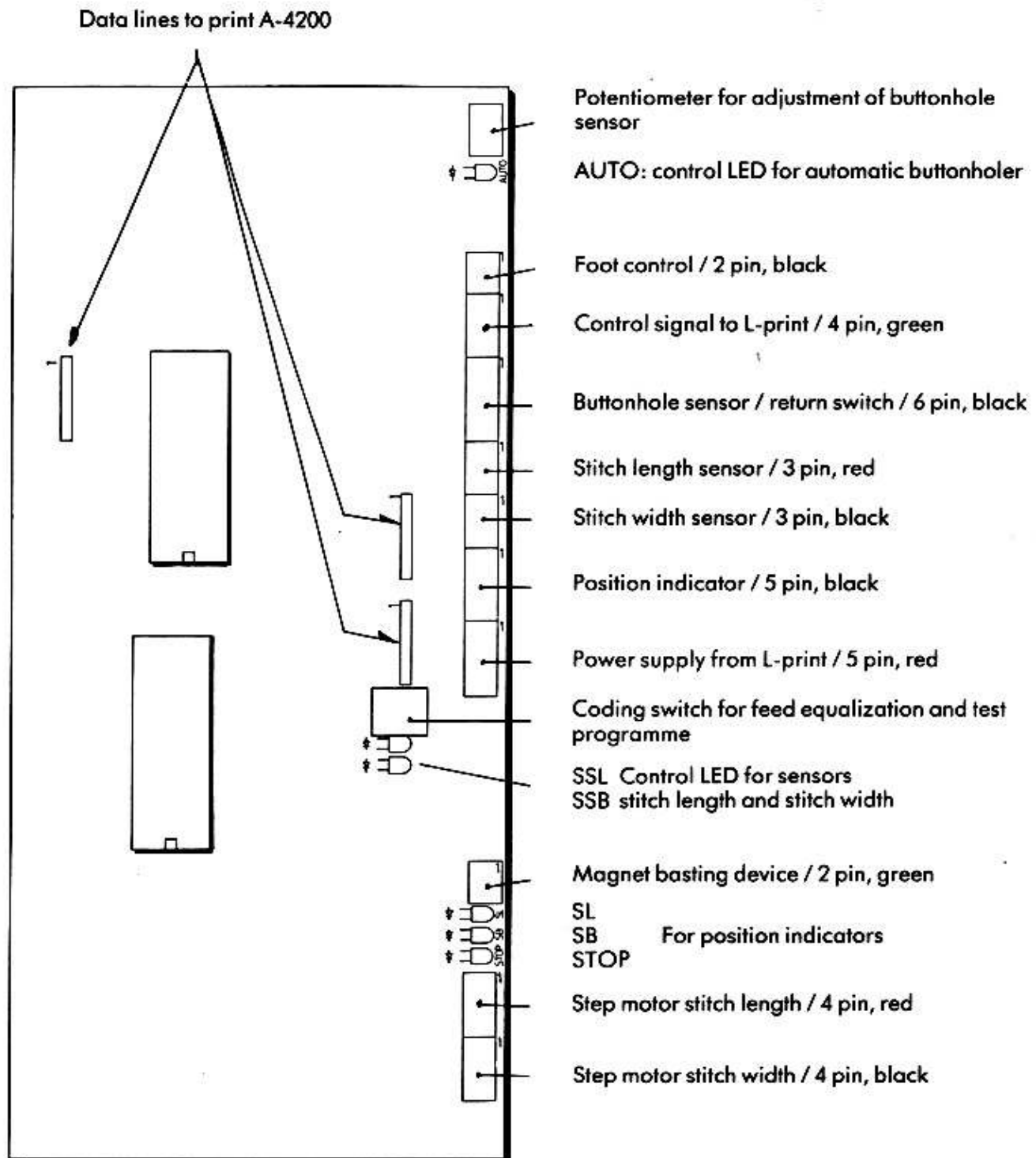
62.1 Block diagram model 1130



£2.2 Print A-4200



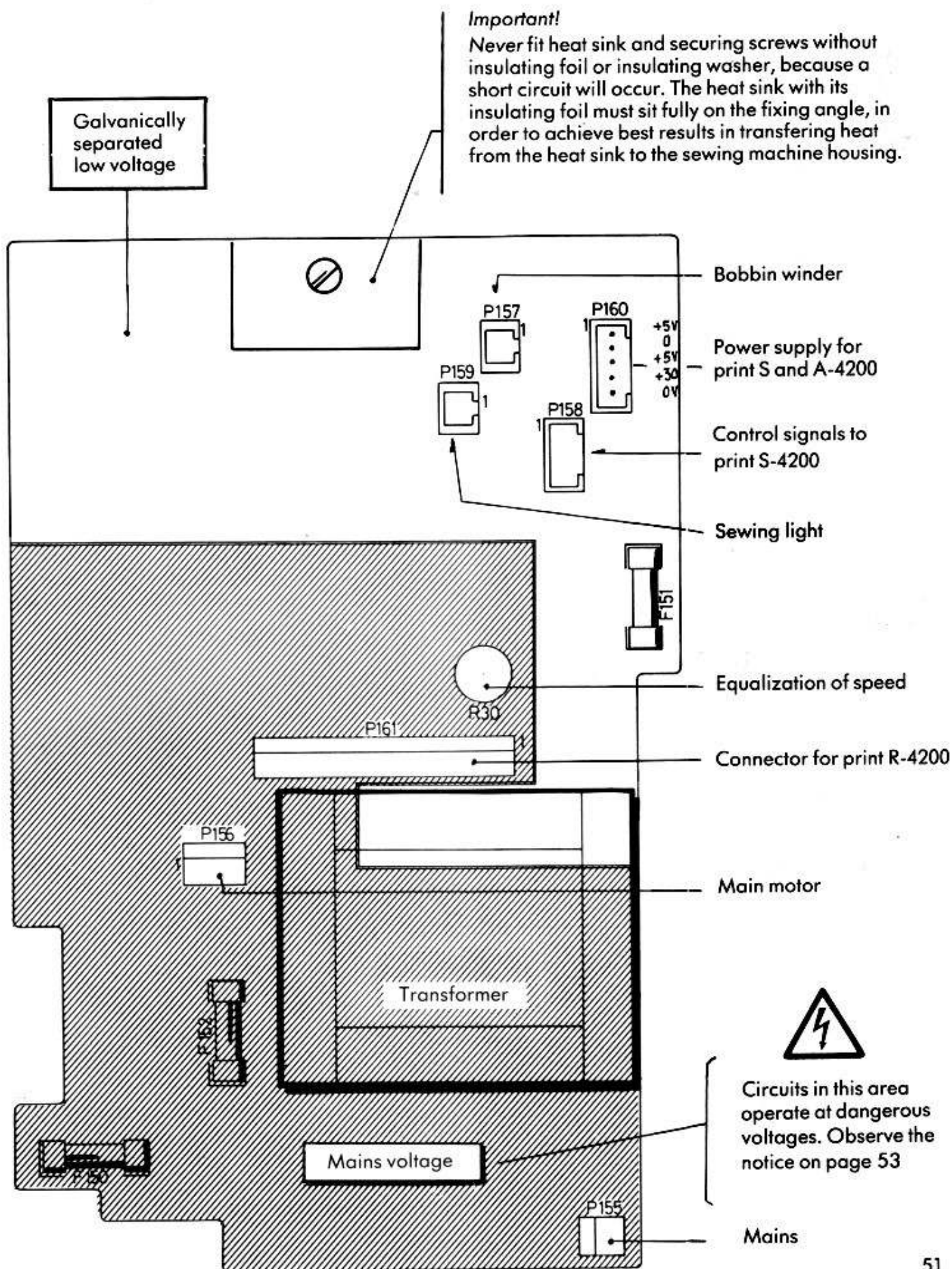
62.3 Print S-4200



Important!

If print S-4200 has to be changed, the coding switch has to be put in the same position as on the old print and the buttonhole sensor adjusted.

64.4 Print L-4200



63 Diagnosis instructions

Repair procedure

1. With the aid of the «*diagnosis instructions*» the defective parts can be isolated.
2. In the TEST instructions, test and measurement procedures are described that lead clearly to discovering which modules are faulty.
3. The *electronic function test* instructions are used after a repair has been completed. To be certain that the sewing machine now works properly it is advisable to carry out the function test.

Warning

The sewing machine may only be connected to the mains if the chassis cover or the safety cover is fitted.

Print L-4200, main motor and cable drum may only be worked on when the machine is *unplugged*.



Danger high level voltage!

Mains voltage

(see print L-4200)

Circuits on the power print L-4200, the main motor and the cord drum operate at dangerous voltages. As some capacitors discharge approx. 30 seconds after pulling out the mains plug, you should wait this long before touching print L-4200.



Dangerous Voltages

Galvanically separated low voltage

(see print L-4200)

Some circuits on print L-4200 operate at galvanically separated low voltage (30V or less). Except for the power prints L-4200, the main motor and the cord reel all other parts operate at galvanically separated low voltage. It is therefore not dangerous to touch any of these parts while the machine is running.



Protection of electrical components against electrostatic discharges

If two insulating materials (e.g. shoe sole and floor) rub together there can be a build-up of static electricity. Should this be discharged through electronic components these can be seriously damaged. One of the most effective ways of conducting these charges away is by earthing, and this can be guaranteed by using purpose-built work places fitted with appropriate protective equipment.

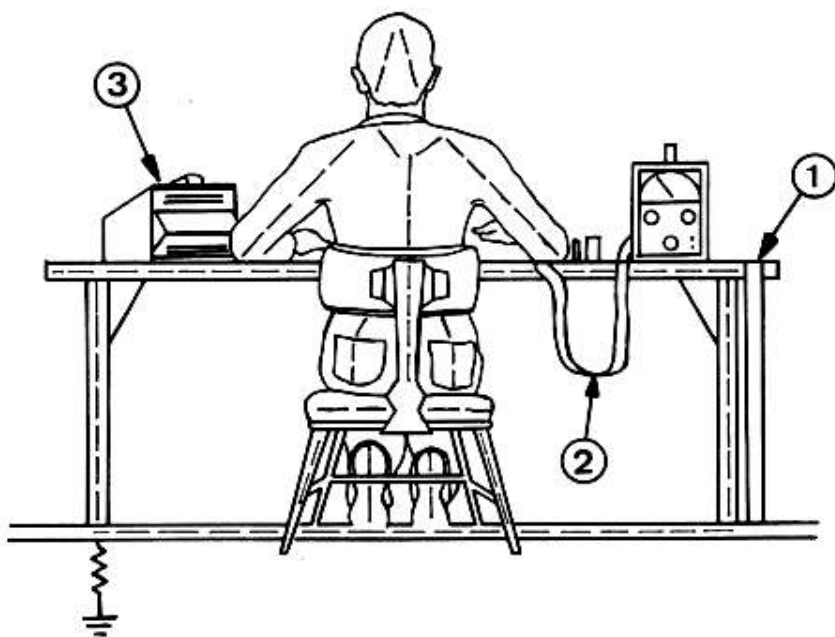
1. A bench suitable for working with components in today's electronic industry has a surface that does not allow the build-up of static electricity. On the one hand the surface should be conductive so that electrostatic charges can be conducted away, but on the other hand it

should have enough resistance to prevent short-circuiting and earthing of parts laid out on the bench.

2. By wearing a wristband that is connected to the bench surface, static electricity can be conducted away from service personnel. For safety reasons a resistance of approx. $1\text{ M}\Omega$ has to be connected in series with the conductive wristband.
3. Electronic parts may only be dispatched in their original packaging.



Antistatic work place



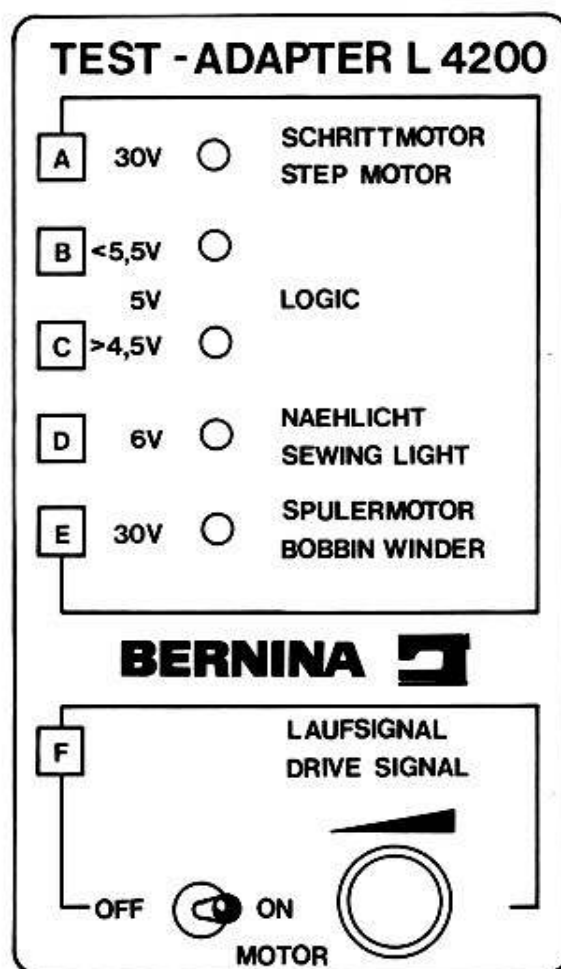
Symptom	Possible fault in	Repair instructions
Display panel and sewing light, not lighting Bobbin winder and main motor don't run	<ul style="list-style-type: none"> Print L-4200 Mains cord 	<ul style="list-style-type: none"> Test 1 Test 3
Main motor doesn't run but all other functions in working order	<ul style="list-style-type: none"> Print L-4200 Print S-4200 Foot control Connection of print S-4200 to print L-4200 Connection of print S-4200 to foot control plug Main motor 	<ul style="list-style-type: none"> Test 1 Change print S-4200 and do buttonhole adjustment, test 11 Change foot control possibly test 8 Test 2 Test 4 Check leads on motor. Change motor.
Bobbin winder doesn't function	<ul style="list-style-type: none"> Print L-4200 Complete bobbin winder 	<ul style="list-style-type: none"> Test 1 Change the complete bobbin, winder.
Sewing light doesn't function	<ul style="list-style-type: none"> Bulbs Print L-4200 Complete lamp holder 	<ul style="list-style-type: none"> Change bulbs Test 1 Test 6
Step motors doesn't position	<ul style="list-style-type: none"> Step motor, print S-4200 Connection of print S-4200 to print L-4200 	<ul style="list-style-type: none"> Test 7 Test 2
LED on front panel doesn't light, pushing button still guarantees function	<ul style="list-style-type: none"> Print A-4200 	<ul style="list-style-type: none"> Change print A-4200

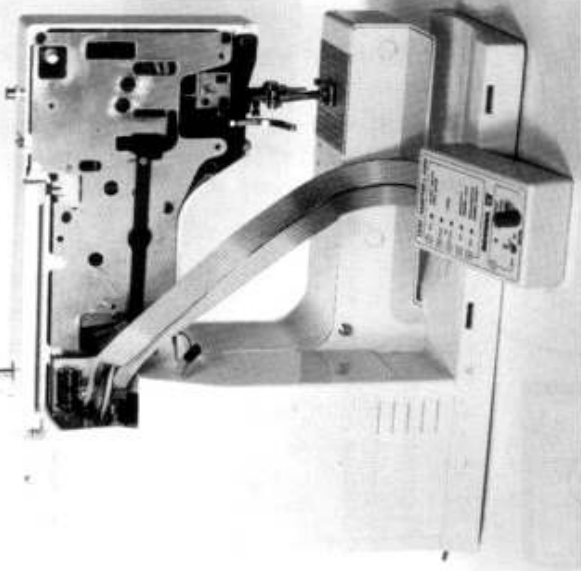
The desired function doesn't operate when pushing a button	<ul style="list-style-type: none"> – Print A-4200 	<ul style="list-style-type: none"> – Change print A-4200. If malfunction still occurs, connect old print A-4200 to new print S-4200. – Test 11
Automatic buttonholer doesn't function	<ul style="list-style-type: none"> – Buttonhole foot – Print S-4200 – Print Ret-4200 	<ul style="list-style-type: none"> – Test 11 – Test 11 – Test 11
Basting device doesn't function	<ul style="list-style-type: none"> – Print S-4200 – Basting device magnet – Print P-4200 	<ul style="list-style-type: none"> – Change print S-4200 then adjust buttonholer. – Test 11 – Replace magnet (note adjustment instructions) – Test 5
Reverse button doesn't function	<ul style="list-style-type: none"> – Print S-4200 – Print Ret-4200 	<ul style="list-style-type: none"> – Change print S-4200 then equalize buttonholer. – Test 11 – Test 10
Irregular stitch length or stitch width	<ul style="list-style-type: none"> – Step motor 	<ul style="list-style-type: none"> – Test 7
Bar graphs do not react to stitch length or stitch width adjustment	<ul style="list-style-type: none"> – Rotary encoder on operating chassis – Print A-4200 	<ul style="list-style-type: none"> – Check mechanic and optic part of the rotary encoder – Change print A-4200
Main motor rotates at starting speed when the foot control is completely depressed, then stops after about 5 seconds	<ul style="list-style-type: none"> – Print P-4200 – Print S-4200 	<ul style="list-style-type: none"> – Test switch S220 on the wrong position. – Test 5 – Change print S-4200 then adjust buttonholer. – Test 11
No upper or lower needle stop, stopping in any position	<ul style="list-style-type: none"> – Print P-4200 – Print S-4200 – Print L-4200 	<ul style="list-style-type: none"> – Test 5 – Change print S-4200 then adjust buttonholer. – Test 11 – Test 1

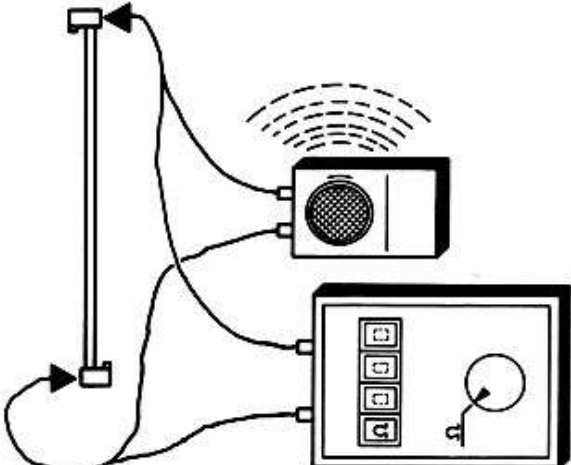
Test adaptor L-4200

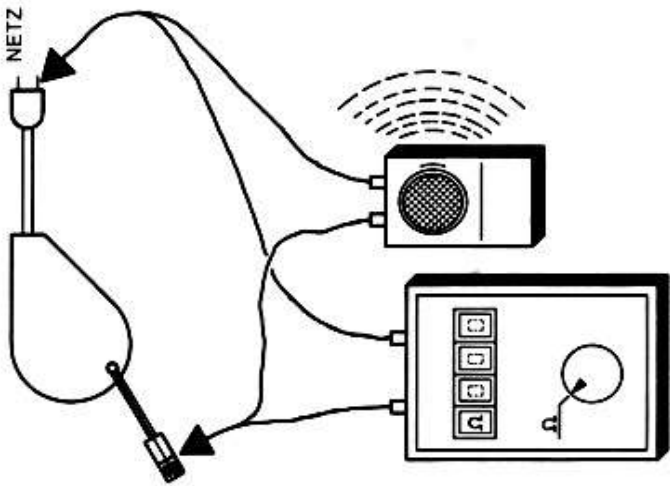
The power supply for electrical parts which are connected to print L-4200 and the main motor control are checked with the aid of the test adaptor.

- a) When all LEDs A to E light up, then the power supply for:
 - the step motors
 - the logic circuit
 - the sewing light
 - the bobbin winderis correct.
- b) If only LED B doesn't light up, then the voltage for the logic is too high (more than 5,5V).
- c) If only LED C doesn't light up, then the voltage for the logic is too low (less than 4,5V).
- d) When the motor switch is in the «on» position, the electric brake is released, the motor receives the desired value and will run at the set speed. LED F for the drive signal must be lit. Speed regulation is made by turning the potentiometer.
- e) When the motor switch is placed in the «off» position the signal returns to zero, and the electric brake should engage. The motor slows down to a stop. LED F must go out.



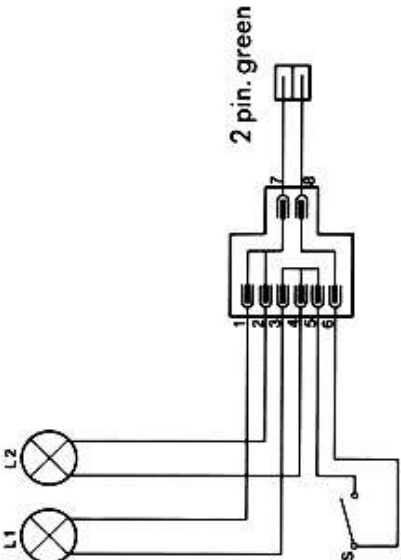
What is to be tested	What to adjust	Normal condition
<p>Print L-4200</p>	<p>Mains off</p> <ul style="list-style-type: none"> - Fit safety cover - Connect test adaptor instead the sewing light, bobbin winder, connecting cord to print S-4200 (4 pol. green, control signal), connecting cord to print S-4200 (5 pol. red, supply) - Place the adaptor in its «off» position. <p>Switch on mains</p> <ul style="list-style-type: none"> - Motor switch in its «on» position - Motor switch in its «off» position 	 <ul style="list-style-type: none"> - LEDs A to E light up - Motor turns. LED F lights. Speed of motor can be regulated with potentiometer. - Motor slows down to stop. LED F goes out.
<p>Important: If there is a fault, test a new print L-4200 with the old print R-4200 and carry out above test. If the fault persists, change print R-4200 and test again. If that does not resolve the problem change both prints.</p> <p>Warning: To avoid further trouble caused by faulty print S-4200, carry out test 9 when print L-4200 has to be changed.</p>		
<p>Test 1</p>		

What is to be tested	What to adjust	Normal condition
<p>Connection of print S-4200 to print L-4200:</p> <ul style="list-style-type: none"> – Flat cord 5 pol, red connectors – Flat cord 4 pol, green connectors 	<ul style="list-style-type: none"> – Take out mains plug. a) Disconnect connectors from print L- and S-4200 b) Check on the upper side of the connectors with a circuit tester or ohmmeter that each wire is continuous. c) Test every wire as described in b). 	 <ul style="list-style-type: none"> – High pitched tone! Cord ok. – Ohmmeter shows a small resistance, cord ok.
<p>Important:</p> <p>If there is no high pitched tone, or the display of the ohmmeter wavers or shows infinite resistance, then the cord is defective. Replace connection.</p>		
<p>Test 2</p>		

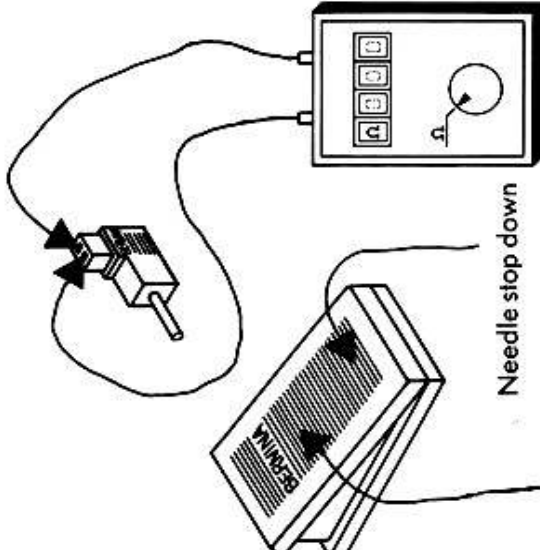
What is to be tested	What to adjust	Normal condition
<p>Mains cord (cord reel)</p>	<ul style="list-style-type: none"> – Take out mains plug. a) Disconnect mains plug at P155 on print L-4200. b) Connect one end of the tester to the plug, then test every wire to check that a circuit can be made. 	<div data-bbox="227 210 893 693">  </div> <ul style="list-style-type: none"> – High pitched tone! Cord ok. – Ohmmeter shows a small resistance, cord ok.
<p>Important: If there is no high pitched tone, or the display of the ohmmeter wavers or shows infinite resistance, then the cord is defective. Replace cord reel.</p>		
<p>Test ③</p>		

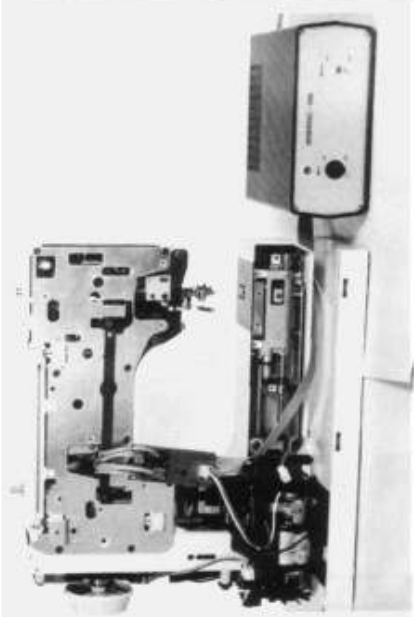
What is to be tested	What to adjust	Normal condition
<p>Connection of print S-4200 to foot control plug.</p>	<ul style="list-style-type: none"> - Take out mains plug. a) Remove 2 pin black, foot control plug from print S-4200. b) On the upper connection side of the print check with the circuit maker or ohmmeter that a circuit can be made between these and the foot control plug. c) Both connections on foot control plug have to be tested as described above. 	<div data-bbox="240 218 943 688"> </div> <ul style="list-style-type: none"> — High pitched tone! Cord ok. — Ohmmeter shows a small resistance, cord ok.
<p>Important: If there is no high pitched tone, or the display of the ohmmeter wavers or shows infinite resistance, then the cord is defective. Replace cord.</p>		
<p>Test 4</p>		

What is to be tested	What to adjust	Normal condition																		
Print P-4200	<ul style="list-style-type: none"> - Mains switch on. a) Using handwheel bring the needle to its zero position. (needle lowest position). b) Turn the handwheel forwards and check against the table on the right. 	<ul style="list-style-type: none"> - LED SL, SB and STOP on print S-4200 are off <table border="1" data-bbox="373 210 649 693"> <thead> <tr> <th>LED SL</th><th>LED SB</th><th>LED STOP</th></tr> </thead> <tbody> <tr> <td>on</td><td>on</td><td>off</td></tr> <tr> <td>on</td><td>on</td><td>on</td></tr> <tr> <td>on</td><td>off</td><td>on</td></tr> <tr> <td>off</td><td>off</td><td>on</td></tr> <tr> <td>off</td><td>off</td><td>off</td></tr> </tbody> </table> <p style="text-align: center;">↓</p>	LED SL	LED SB	LED STOP	on	on	off	on	on	on	on	off	on	off	off	on	off	off	off
LED SL	LED SB	LED STOP																		
on	on	off																		
on	on	on																		
on	off	on																		
off	off	on																		
off	off	off																		
Important: If the print does not perform as per the table repeat test a) and b) using a new print. If there are still discrepancies then put back the old print and replace print S-4200.																				
Test 5																				

What is to be tested	What to adjust	Normal condition
Lamp holder	<p>— Mains switch on.</p> <p>a) Switch on sewing light.</p>	<p>— Sewing light burns.</p> 
<p>Important:</p> <p>If the sewing light doesn't function and both bulbs are intact, then the connections from L1, L2 and S to the plug can be checked with the circuit tester or ohmmeter.</p>		
Test 6		

What is to be tested	What to adjust	Normal condition
Step motor, print S-4200	Set S 220 on print S-4200 in position 9. (Test programme for step motors) 1. Observe the feed-dog and needle bar, both must move.	Step motors turn back and forth.
	1. If the step motors do not turn, the fault can be in the motor or the print S-4200. By swapping the connections between the motor and the hall-sensor (P 208 with P 207 and P 210 with P 209) the faulty elements can be identified.	
Hall-sensor	– S 220 in position 9	– Control LEDs for the hall-sensors on print S-4200, should flash in phase with the movement of the step motor.
	2. If the LEDs do not flash the fault can be in the hall-sensor, the mechanical part or the step motor. Remove defective motor (see page 49–54).	
	– Connect the removed motor and hall-sensor to print S-4200, and energize using the supply apparatus 4200. – Manually slide a magnet over the hall-sensor and watch the control LED for hall-sensors.	LED must light up 3.
	3. If the LED doesn't light, replace the hall-sensor and adjust the step motor, by equalizing to zero (pages 49–54).	
	Important: After the repair is completed, place S 220 on print S-4200 in its original position (0–7).	
Test 7		

What is to be tested	What to adjust	Normal condition
Foot control	<p>Connect the multimeter to the foot control, and switch to the range ohms.</p> <p>a) Foot control not depressed.</p> <p>b) Depress the foot control at the rear (needle stop down).</p> <p>c) Depress the foot control slowly at the front.</p>	 <p>– Reading «infinite»</p> <p>Needle stop down</p> <p>Running of main motor</p> <p>– Reading 10k Ω</p> <p>– Reading varies from 4 to 0k Ω</p>
<p>Important:</p> <p>If the foot control is defective, open the foot control cover. Carry out tests a), b) and c) on both contacts. If these give correct readings, replace the cord reel.</p>		
Test 8		

What is to be tested	What to adjust	Normal condition
<p>Print A-4200 Print S-4200</p>	<p>Mains off.</p> <ul style="list-style-type: none"> – Connect the special power supply to the sewing light, the bobbin winder, main motor, connection cord to print S-4200 (4 pol. green, control signal), connection cord to print S-4200 (5 pol. red, supply). – Mains switch in its «on» position. – Set test switch S 220 on print S-4200 to position 9. – Check the control panel. 	 <ul style="list-style-type: none"> – Red LED lights up. – Control LEDs for the hall-sensors on print S-4200 flash in phase with the movement of the step motor. – Bar graphs can be adjusted.
<p>Important: If the display panel doesn't light or the step motors do not turn, change print S-4200 and repeat the test. If fault persists, change print A-4200.</p>		
<p>Test 9</p>		

Power supply 4200

The power supply 4200 delivers current for the logic of print A-4200 and print S-4200, the step motors, the sewing light and the bobbin winder. So that the whole machine can work with a safe low voltage, the main motor receives 30 V for safety reasons.

The power supply is useful when a mechanical adjustment is to be made, for which the rigidity plate with print L-4200 has to be removed.




When the mains switch is «on» the light indicates that the appliance is working. With the switch in the «off» position, the appliance is turned off.



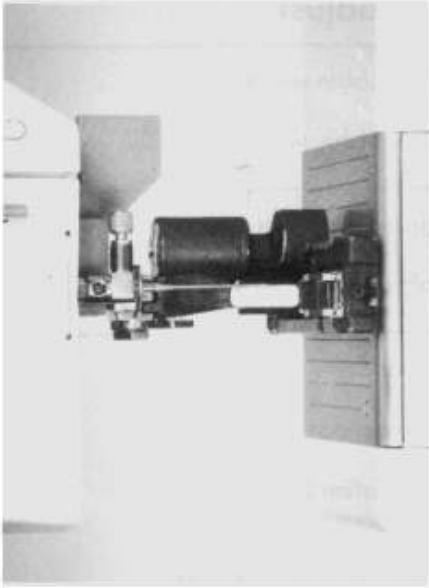
Motor switch «on», the main motor will rotate slowly.



Adaptor print with cord is pluggable.

There is a 400 mA fuse at the rear.

What is to be tested	What to adjust	Normal condition
Print Ret-4200	Mains switch on. – Depress foot control. – Depress foot control and reverse button.	– Material moves forwards. – Material moves backwards until reverse button is released.
Important: If the normal condition is not achieved, insert a new print and test again. If the fault persists replace the old print. If a new print is used equalize the buttonholer. Test 11		
Test 10		

What is to be tested	What to adjust	Normal condition
<ul style="list-style-type: none"> – Print S-4200 – Print Ret-4200 – Buttonhole foot 	<p>a) Adjustment of buttonhole automatic</p> <ul style="list-style-type: none"> – Fit buttonhole foot – Lower feed-dog – Lower presser foot – Clip the filter from the right hand side on the presser foot bar. Slide it to its highest position until you hear it click into place. – With a small screwdriver, screw back the buttonhole sensor on potentiometer R 67 on print S-4200 until the control LED «AUTO» lights up continuously, then turn back the potentiometer and slide the carriage of the buttonhole foot until. <p>b) Sewing a buttonhole</p> <ul style="list-style-type: none"> – Press the button for automatic buttonholer – Depress foot control – Release foot control. 	<p>– LED just starts to flash. Potentiometer should under no circumstances be screwed too far.</p> <p>lights up — </p> <p>AUTO</p> <p>– Sews the first bead.</p>
Test ⑩		

	What to adjust	Normal condition
	<ul style="list-style-type: none"> – Press button for automatic buttonholer. – Depress foot control. 	<div data-bbox="235 436 391 695">  <p>light up</p> <p>AUTO</p> </div> <ul style="list-style-type: none"> – Sews the first bar tack, then the second bead. – LED changes to <div data-bbox="553 436 709 695">  <p>light up</p> <p>AUTO</p> </div> <ul style="list-style-type: none"> – Sews second bar tack, does securing stitches and stops sewing. – Machine is back to starting position.
<p>Important: Change faulty elements. After replacement of print S-4200 coding switch S 220 should be set to the same position as on the old print.</p>		<div data-bbox="881 111 1307 695">  </div> <p>Fitted adjusting filter.</p>
<p>Test ⑩</p>		

What to adjust	Normal condition
Switch on <i>bobbin winder</i> Switch off <i>bobbin winder</i>	Bobbin winder runs Bobbin winder stops
Switch on <i>sewing light</i> Switch off <i>sewing light</i>	Sewing light comes on Sewing light goes out
Main motor Fully depress foot control Stop from fastest speed Press foot control backwards.	Speed of sewing machine 1050 rpm Motor brakes, thread take-up lever is in its highest position Machine positions in lower needle position
Reverse button Sew forwards Press reverse button Release reverse button	Transport forward Transport reverse Transport forward
Basting device magnet Sew using basting device Sew using automatic long stitch	Every sixth stitch is sewn Every second stitch is sewn
Sew using automatic buttonholer	Forward bead is the same length as the return bead LED «AUTO» lights up 
Stich 1, depress foot control for a short time Stich 1, press lower needle stop button  Depress foot control for a short time	Upper needle stop LED lights up Lower needle stop

What to adjust	Normal condition
<i>Rotary encoder</i> Adjust the stitch width and stitch length with the knobs Turn to the right Turn to the left	Bar graph on the display increase Bar graph on the display decrease
To check the electrical transport equalization, sew using stitch 28	Sewn patterns must be closed
Press all function buttons and check LEDs	All LEDs should light up
Press all stitch selection buttons one after the other.	The respective LED should light up.

