BERNINA

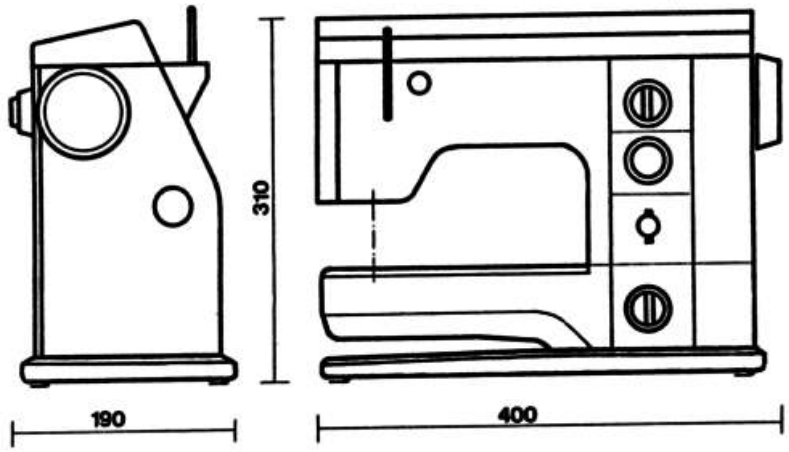
SERVICE - MANUAL
930

Provisional Edition 1981

FRITZ GEGAUF LTD., MANUFACTURERS OF BERNINA SEWING-MACHINES STECKBORN (TG) SWITZERLAND

TECHNICAL DATA

BERNINA record	Model 930	Zig-zag, plain and decorative stitch sewing machine with feed control and automatic buttonholer
BERNINA	Model 931	Zig-zag and plain stitch sewing machine with feed control and automatic buttonholer
BERNINA	Model 932	Zig-zag, plain and decorative stitch sewing machine with automatic buttonholer
BERNINA	Model 933	Zig-zag and plain stitch sewing machine with automatic buttonholer



Max. stitch width	4.5 mm
Stitch position adjustment	left - half -left - center half - right - right (L-C-R)
Max. forward stitch length	4 mm
Max. reverse stitch length	2 mm
Presser foot lift	7.5 mm
Passage space	105 x 205 mm
Size of baseplate	377 x 184 mm
Hook system	Central bobbin hook (CB), non-jamming
Bobbin capacity	75 m cotton yarn 60/3
Needle system	130/705 H
Needle movement	swinging needle bar
Thread take-up lever	Link take-up lever
Thread tension	upper thread tensioning incorporated in frame cover with thread drawing lever
Winder	automatic machine disconnection and self-releasing
Motor	Power: 90 W
Sewing light	Power: 15 W

Number of stitches	approx. 1100 stitches/min.
Weight of machine	11.75 kg
Weight with carrying case	approx. 15 kg
Lamp indication	LED 1o V
Multi-range switch	OFF and two speeds
Needle stop	mechanical (electrical)
Basting device	max. stitch length 24 mm. mechanical
Automatic long stitch	max. stitch length 8 mm, mechanical
Sewing-off needle	130/705 H, Nm 80
Needle deflection	
with lifting bar suspension	3 mm
needle plate upper edge	4.5 mm
at hook tip	4.63 mm
Needle bar lift	33.73 mm
Loop lift: left	1.6 mm
Hook return motion	2.3 mm
Hook travel	$22o^{0}$, 18', 30"
Rack travel	34.6 mm
Lifting crank radius	17.3 mm
Take-up lever travel	61 mm
Presser foot lift	7.5 mm
Darner lift	2.92 mm
Base circumference	240 mm
Machine dimensions:	
overall length	400 mm
overall width	190 mm
height over reel pin	330 mm

ADJUSTMENT OF MODELS 93o, 931, 932, 933

These adjustment instructions are intended to help you carry out minor repairs and adjustments.
The instructions lay no claim to completeness.
They are not suitable for a complete assembly or dismantling procedure.

IMPORTANT: To enable the work described to be performed correctly, the sewing machine must be in good mechanical condition: (running smoothly, properly oiled, etc.)

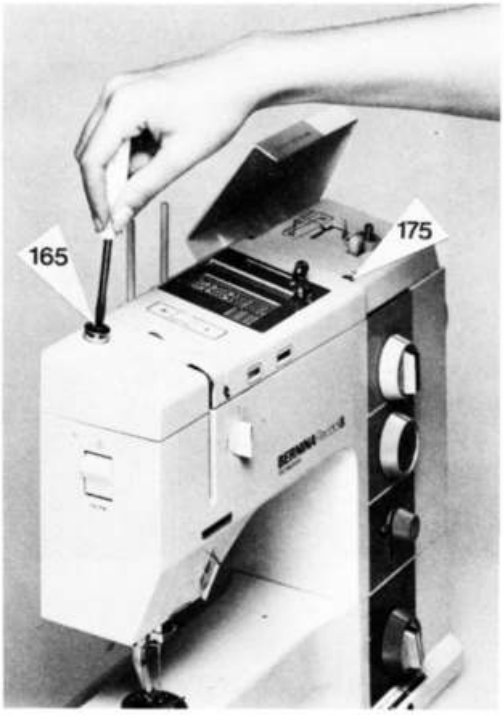
If the sequence of adjustments is observed, the machine will sew satisfactorily.

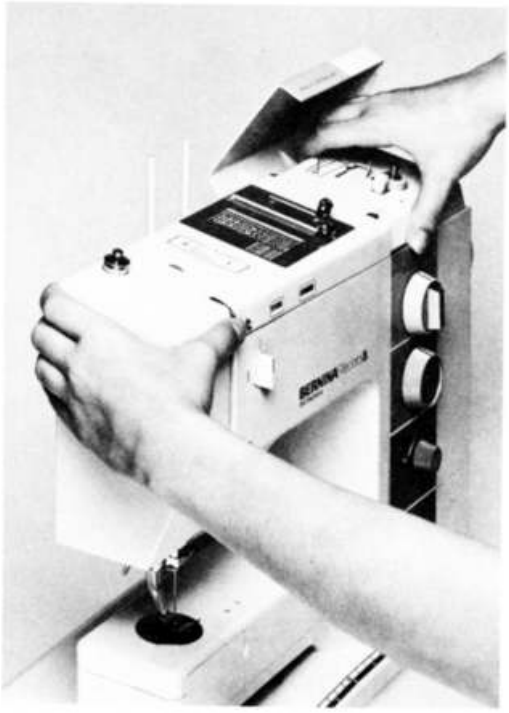
Dismantling covers

WARNING ! The electronic components operate with dangerous voltages. The mains plug must be withdrawn before making any adjustments to the machine!
Wait at least 3o seconds afterwards (capacitor discharge).

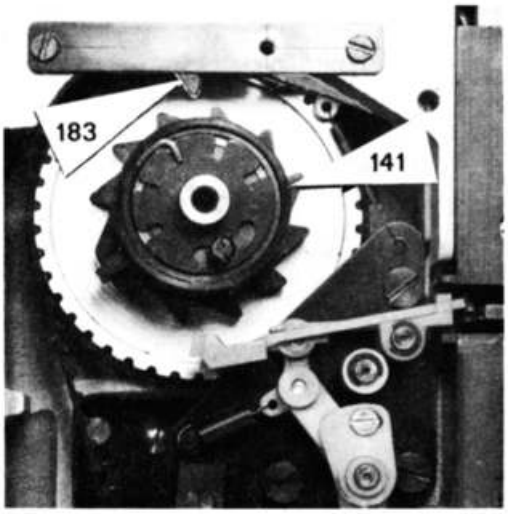
A) Dismantling top frame cover

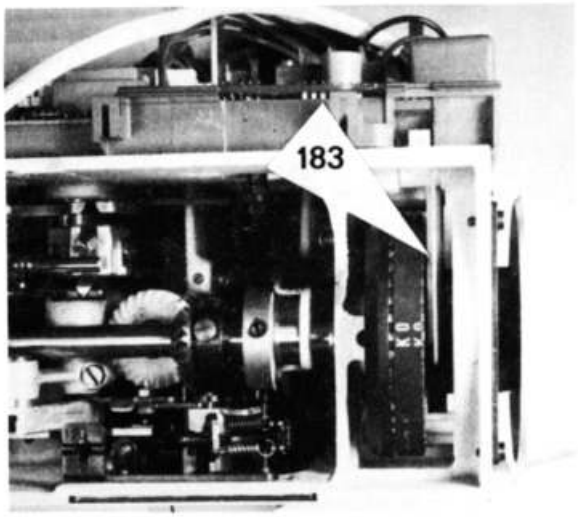
Screws 175 and 165 secure the top frame cover. Press screws down with screwdriver and turn half a rotation to right in the clockwise direction (bayonet fixing). The top frame cover can then be lifted off.





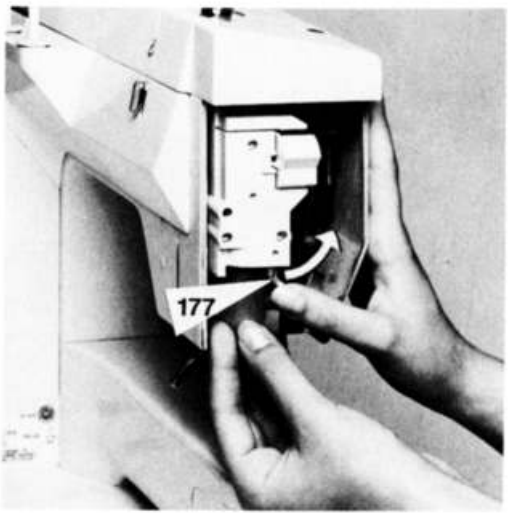
NOTE ! When the top frame cover is removed the locking lever 183 engages with the coupling sleeve 141 and blocks the machine. The blocking must be removed to carry out further adjustments.
Locking lever 183 must therefore be disengaged with a tool, e.g. screwdriver.





Removing the front cover

Press in the piston by 176 lightly with a small screwdriver and withdraw front cover forwards without tilting.

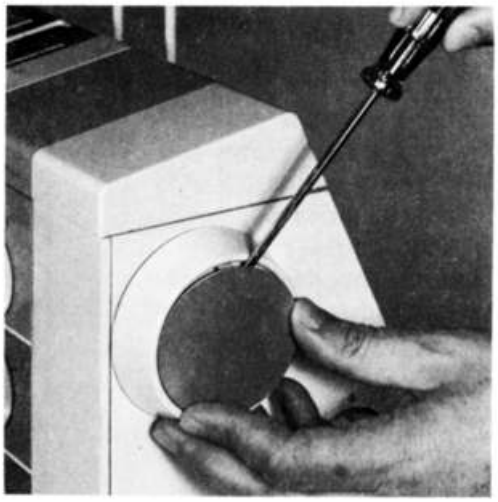


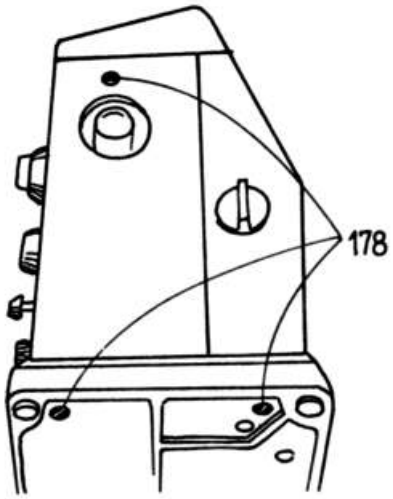
Changing the bulb

The lamp has a bayonet socket. A new bulb can only be fitted after folding the protective cover 177 in front of the lamp socket to the side.

Removing belt cover

Raise cover plate on handwheel with small screwdriver and remove.

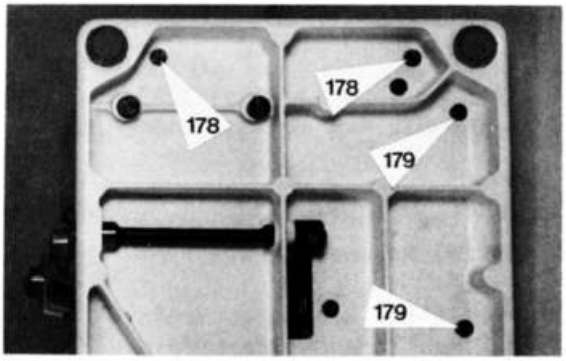


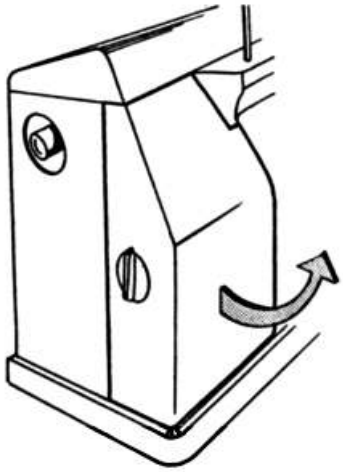


Release handwheel screw and remove handwheel.
Release cheese-head screws 178 (3 screws) and remove.
Remove belt cover.

Dismantling chassis cover

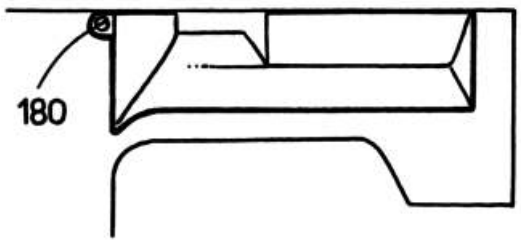
Remove screw 179 and swing out chassis cover in direction of arrow (see diagram). Take care with securing latches at top of cover.





Removing top frame cover

First remove front cover.
Remove securing spring between top frame wall and lamp socket with spring hook (No. 398 112 03). Remove screw 180 and draw out cover upwards over the bobbin holder pins.

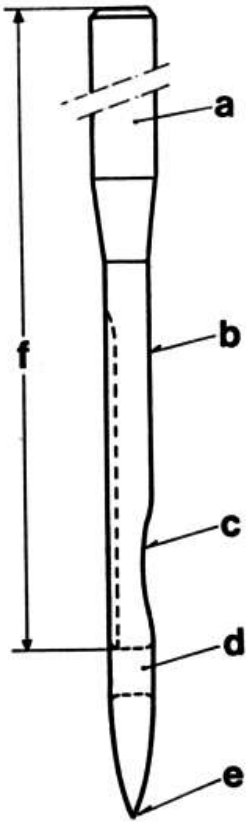


Assembly of the covers is performed in the opposite sequence.

THE NEEDLE

The needle is one of the most important items of sewing equipment. Its function is to pierce the material and to 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 work and reached its lowest point. The thread is drawn tight and lies in the long groove at the front. At the rear it lies in the short groove and higher up between the needle stem and the hole pierced in the fabric. If the needle rises slightly, the so-called loop lift, a 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 plunger 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 the Model 930.

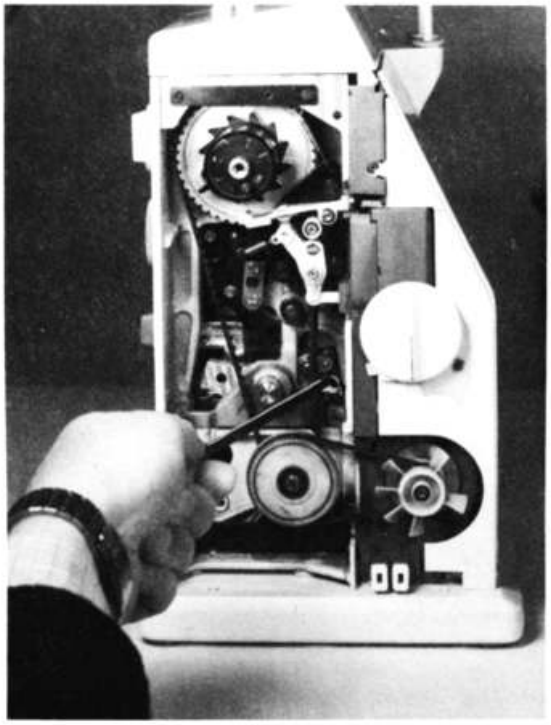
The needle size is measured in millimetres. Needle size "100" means a needle stem thickness = 1 mm (Needle mm) or Nm = 0.8mm dia.

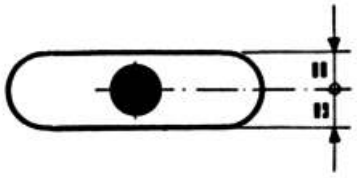
The needle must be firmly secured with the knurled screw on the needle holder. Tighten screw with special screwdriver.

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

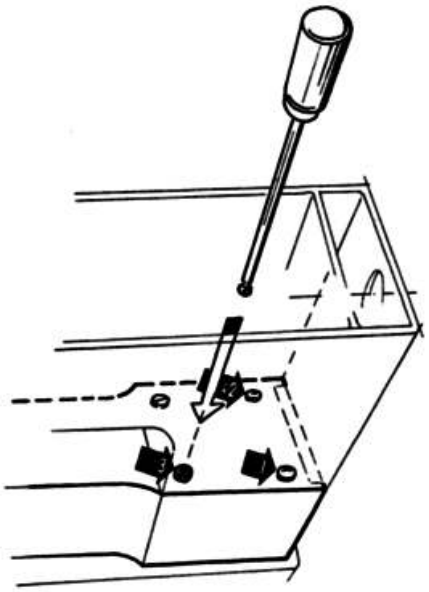
THE NEEDLE PLATE

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





If a correction has to be made, the belt cover must be removed on the handwheel side and three of the four frame fixing screws released (socket head screws with key SW 5). For this operation the special wrench No. 398 089 03 and the long socket head key are required.
Place top frame in desired position and re-tighten the three screws.

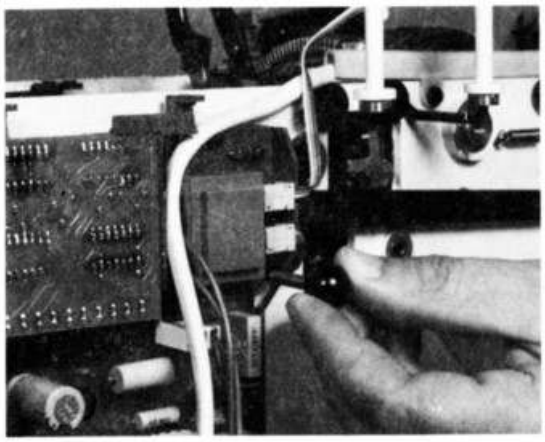


ADJUSTMENT of link and stitch position L-V2 L-C-V2 R-R

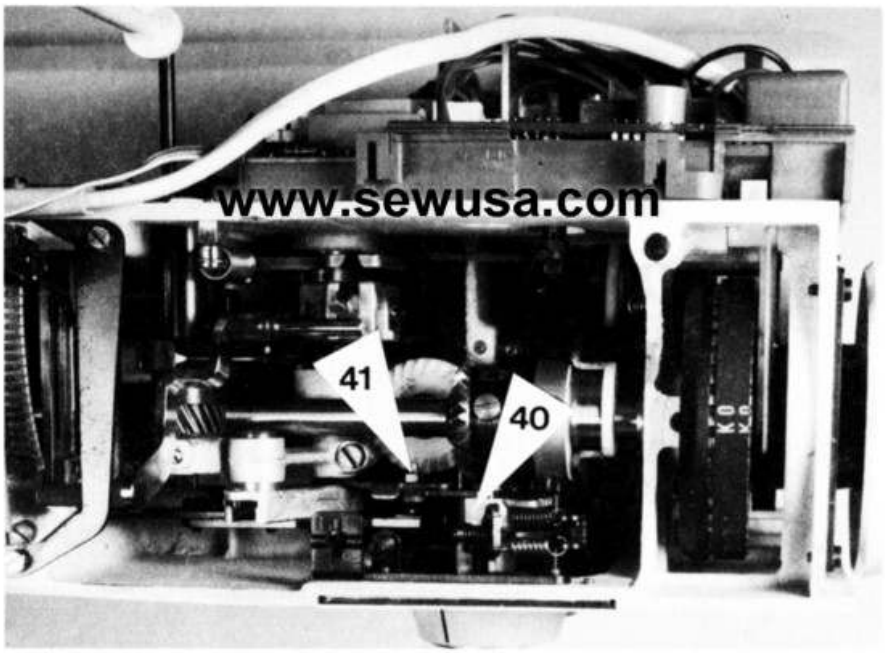
(Left - half-left - Center - half-right - Right)

Dismantle handwheel, belt cover, motor cover and rear top frame cover. The front of the link spindle is then accessible.

Place the special tool No. 398 001 04 through the hollow link spindle, while at the same time turning the LCR knob backwards and forwards until the conical tip of the tool engages in the hole of the link. This ensures that the link in its normal position pivots around the center of the link spindle.

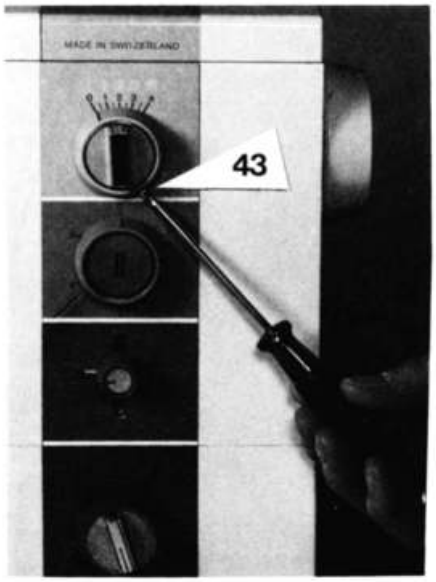


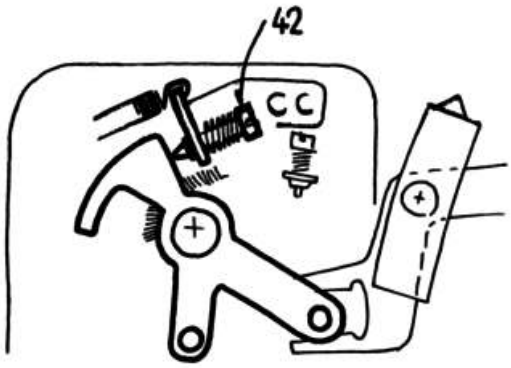
At the same time, the LCR locking lever 4o must be engaged in the center position. If not, the locknut and socket head screw 41 are released.
Set the locking lever to the prescribed position and retighten socket head screw with locknut. Remove tool.



REST POSITION OF NEEDLE

Turn stitch width knob fully left to the stop (0 position).
Start machine. The neddle swivel support must not make any sideways movement.
If it does move, correction is made as follows: turn right-hand screw 42 (with helical spring) to right or left until the needle swivel support makes no further sideways movement.

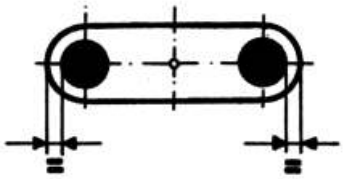




When the rest position of the needle is corrected, check whether the marking line on the stitch width knob coincides with the "0" on the scale.
If not set exactly, loosen screw 43 in the stitch width knob and set the two marks (knob and scale) in alignment.
Tighten screw 43.

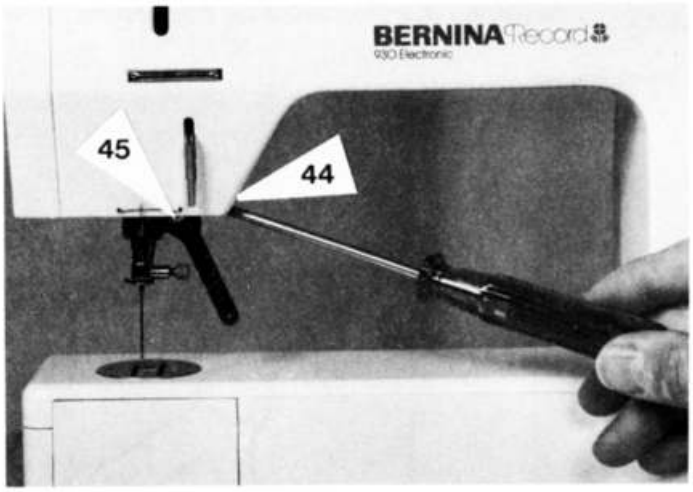
LATERAL NEEDLE MOVEMENT

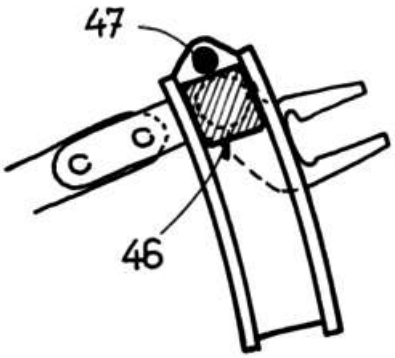
The needle must pierce through the center of the stitch hole when the mark on the LCR knob is vertical.
This can easily be checked by observing the needle while turning the LCR-knob from left to right.



The distance from the edge of the stitch hole must be the same in each case. If not, correct as follows:
Loosen screw 44 very slightly. Place special fork wrench No. 398 063 03 on the knurled eccentric bolt 45.
By turning slightly to right or left the needle can then be brought to the desired position. Tighten screw 44.

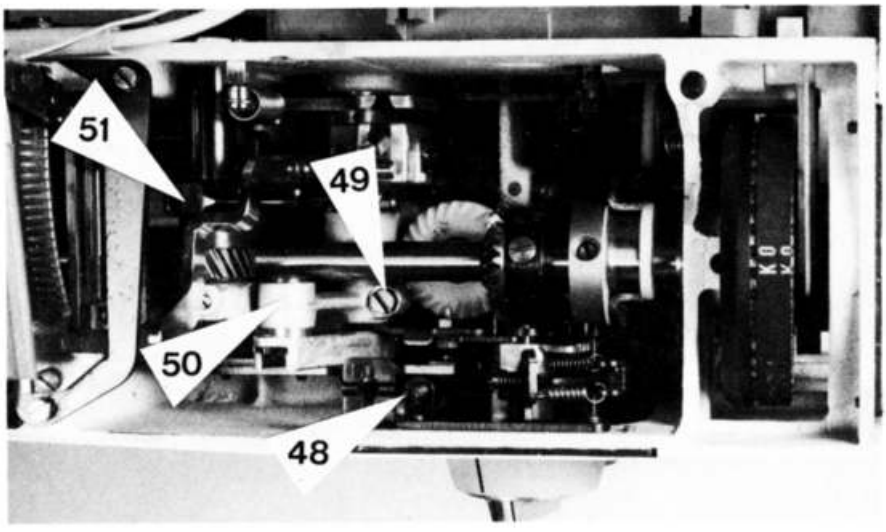
IMPORTANT : Ensure that there is no play between take-up lever link and swivel support when the eccentric is turned!



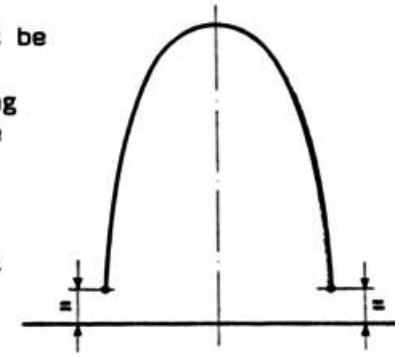


STITCH POSITION ON ZIG-ZAG

Turn stitch width knob to position 4 and observe whether the zig-zag link block 46 contacts the screw head stop 47. If not, the limiting screw 48 should be turned back until the link block reaches the stop. Turn handwheel and check whether left and right-hand penetration are equidistant from the edge of the stitch hole. If this is not the case, release clamping screw 49 of rocker arm 50 (on which the zig-zag link is suspended) and set needle to correct position. Tighten clamping screw.
The limiting screw is then set for maximum zig-zag width (approx. 4.5 mm).
Screw 48 is moved down until the distance from the edge of the stitch hole for right and left needle penetration is approx. 0.1 mm.



LATERAL MOTION OF NEEDLE DURING ZIG-ZAG SEWING



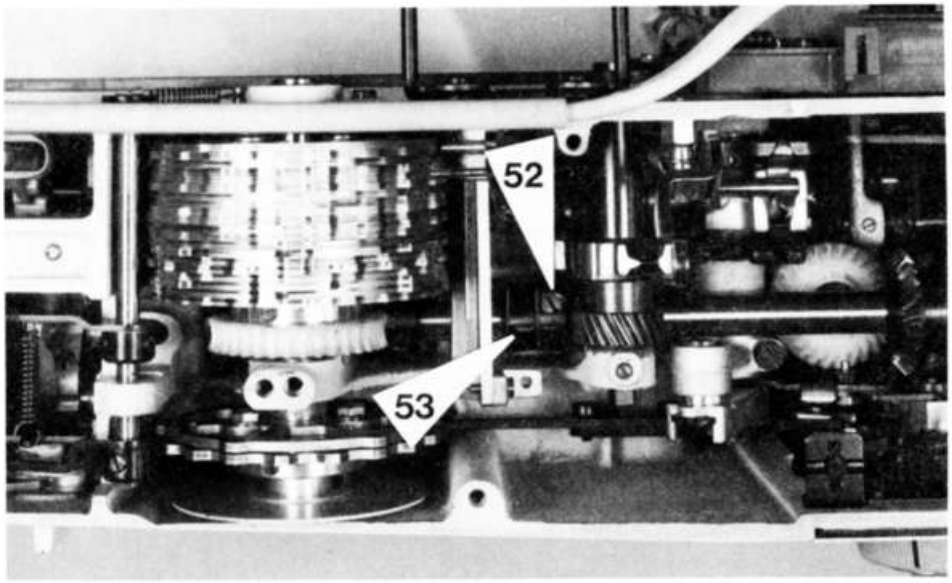
The sideways movement of the needle (parabola) must be exactly matched to the up and down motion.
It must only begin when the tip of the needle during the upwards motion is 7.5 mm above the needle plate and must be completed when the needle tip is again 7.5 mm above the needle plate during the downward motion.
The motion is derived from the zig-zag eccentric 51 running at half-speed (1:2).

Check:

Set LCR-knob to center.
Set needle to uppermost position by turning handwheel. If the stitch width knob is turned backwards and forwards between "0" and "4", the needle must remain stationary. If not, a correction must be made:

Loosen the two screws on worm wheel 52. Then using the screwdriver secure the worm wheel 52 now loose on the spindle, while pressing the setting ring 53 and turning the handwheel at the same time, until the correct setting is found. Tighten both screws on worm wheel 52.

IMPORTANT ! Ensure that no play exists between bearing and rocker arm 50 when the rocker arm is moved!



BASIC SETTING OF THE TRACER LIFTER STRAP

To ensure that the notched carrier has sufficient range of adjustment, the lifter strap65 must first be set to the correct position.
The following procedure should be adopted:

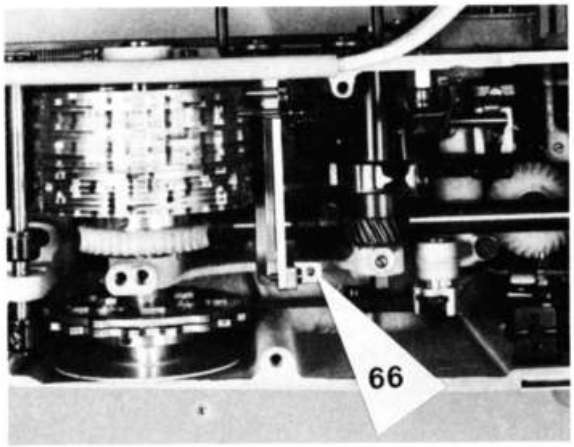
1. Release two fixing screws 66 + 66a.

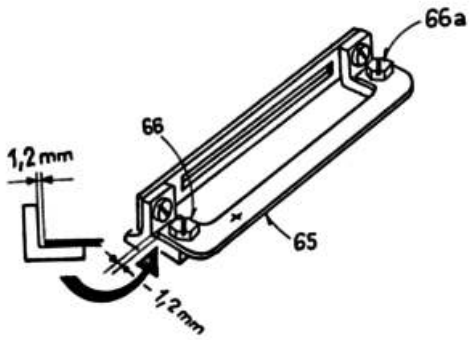
2. Insert distance gauge at front between cam control lever and lifting rail 65 and press the lifter strap slightly against the distance gauge (1.2 mm).

3. Tighten screw 66 slightly.

4. Repeat operations 2 + 3 on other side (back).

5. Tighten both screws 66 + 66a.





Setting notched carrier

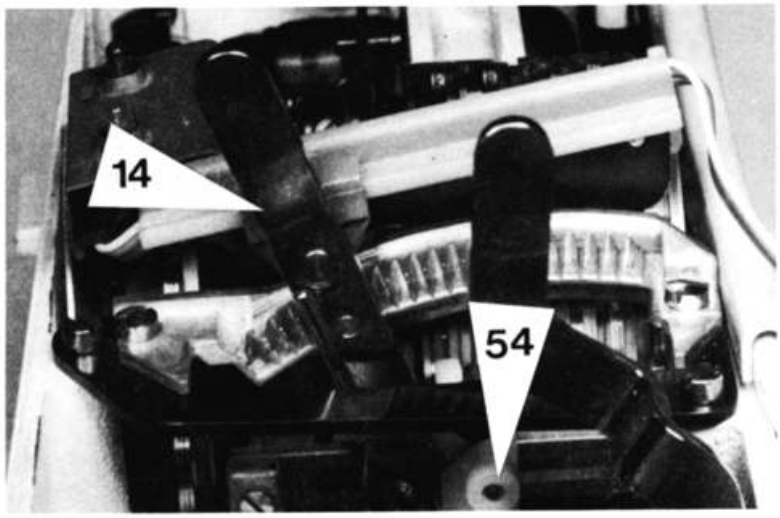
When setting the individual decorative stitches, scanner 54 is moved with selector lever 14 from one control cam to the other.

This is performed

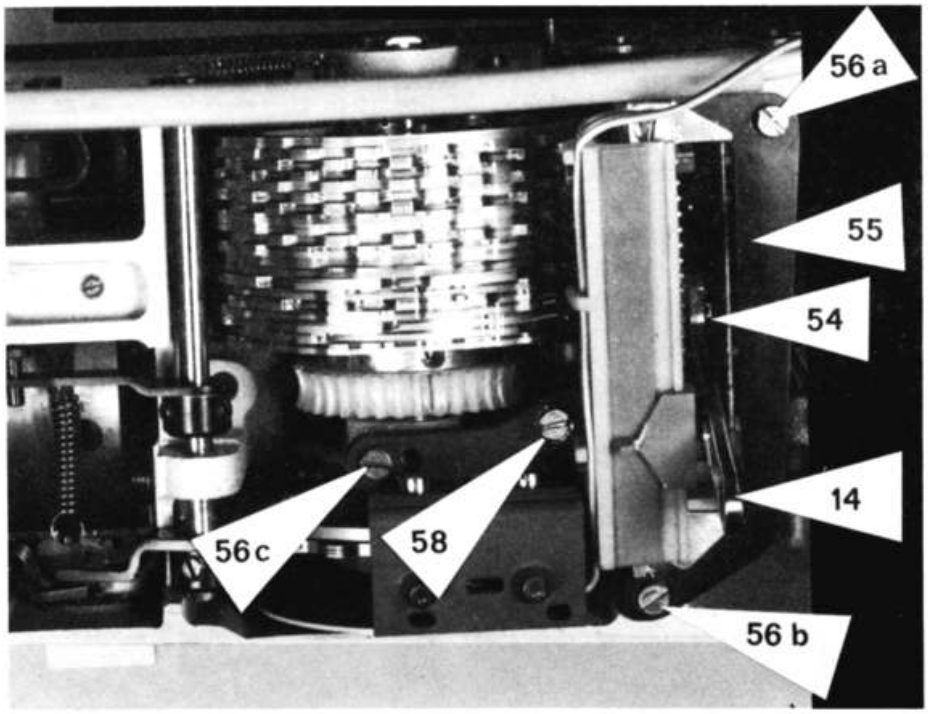
a) by raising the tracer

b) by moving the selector lever

During lifting, the notched carrier limits the selctor lever on the right.



The notched carrier must, therefore, be set so that the scanner 54 no longer contacts the control cam when moved. On the other hand, it must only be raised sufficiently for the needle still to penetrate in the stitch hole (far left).



If correction is necessary, the three screws 56a, b, c, must be loosened and the notched carrier 55 moved to the desired position. Tighten the three screws.

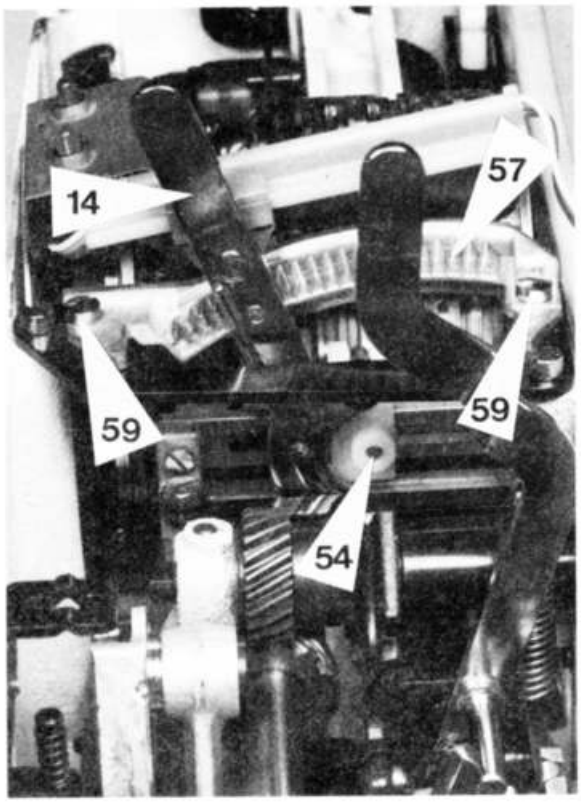
WARNING ! The LED indication must also be reset after adjusting the notched carrier !

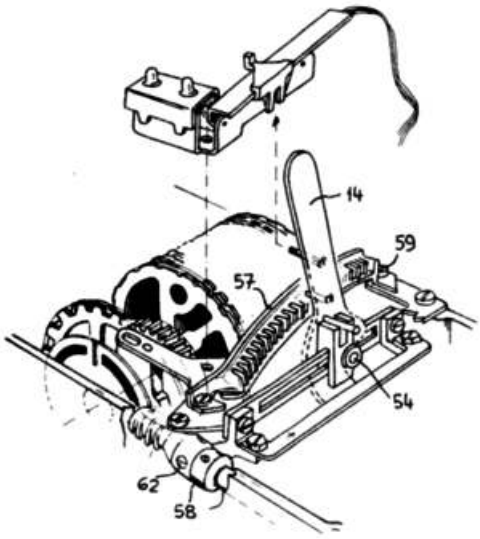
SETTING NOTCHED SEGMENT

The notched segment 57 holds the lever 14 in the selected position. The notches must be set laterally so that the scanner coincides with the cams.
In order to achieve this it is necessary to move the notched segment sideways, forwards or backwards depending on the deviation.

Best check for coincidence:
set selector lever to stitch no. 2 and 19.

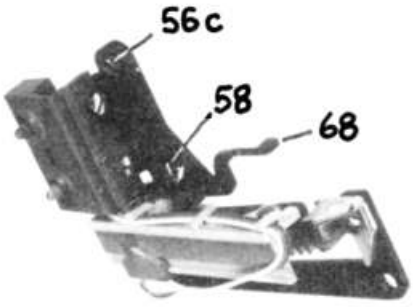
In the event of discrepancies, the two fixing screws 59 must be loosened and the notched segment 57 moved to the desired position. Tighten screw 59.





SUPPORT WITH GUIDE RAIL AND LED INDICATION FOR STITCH SELECTION

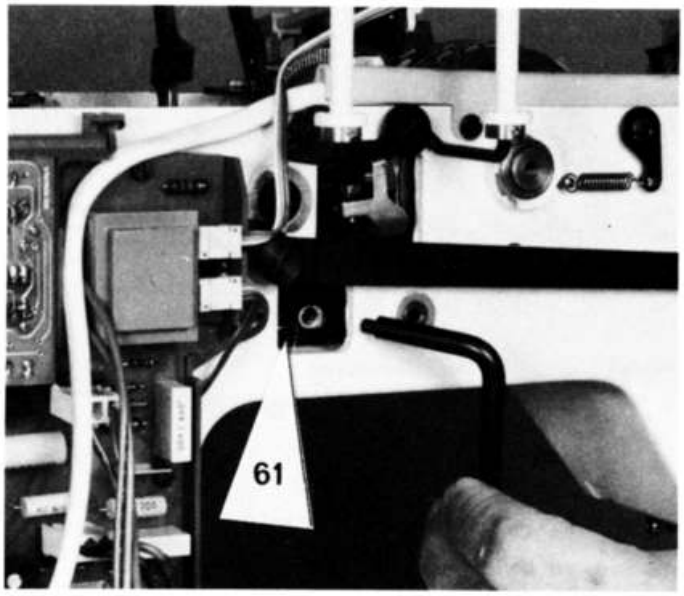
Loosen screws 56 c, 58 and move sideways so that the stitch indicator can slide freely from 0-20.
Tighten screws.

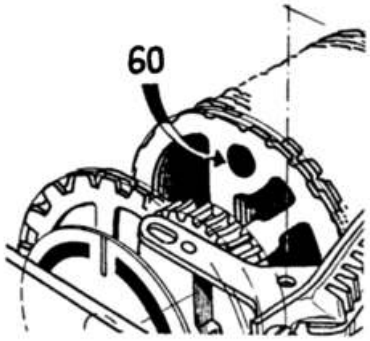


STITCH DISTRIBUTION WITH CAM CONTROL

Set changeover lever 15 to the rear to 1 - 20. Stitch control is then made by cams.
To check the stitch distribution select decorative stitch pattern 17 and turn the handwheel until the centering hole 60 of the cam is exactly over the center of the cam flange
The lateral needle displacement is greatest in this position.
Set stitch width knob to position 4. The lateral spacing from the edge of the stitch hole should then be the same to right and left.

Correcting stitch distribution:
Dismantle top frame cover. The cam control lever is in 2 parts connected by screw 61. Insert special spanner No. 398 067 03 in the existing hole next to screw 61. Then loosen screw 61 slightly. By turning the spanner to right or left the correct needle position can be set. Tighten screw 61.





LATERAL MOTION OF NEEDLE WITH CAM CONTROL

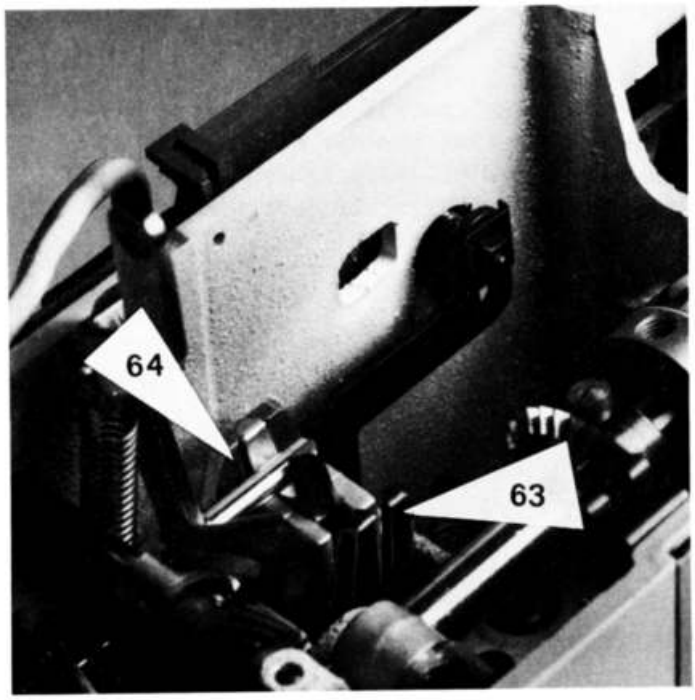
When the stitch control is from cams, the lateral needle motion (parabola) must be exactly the same as for zig-zag stitch.

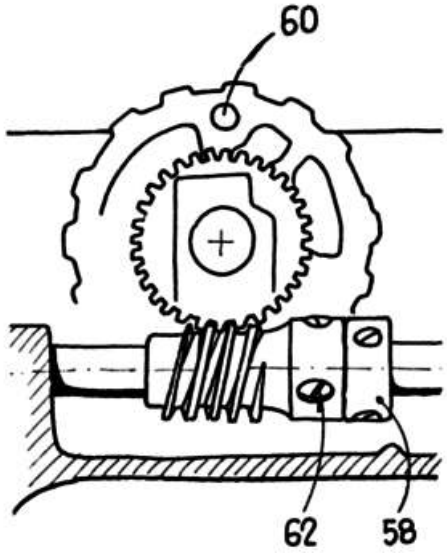
Check:
Set LCR-knob to center, changeover lever 15 to 1 - 20, selector lever 14 to stitch 17.
Turn handwheel until the centering hole 60 of the cams is exactly over center of cam flange (maximum stitch width). Then set needle exactly at uppermost position (reversing point)

If the stitch width knob is turned backwards and forwards between 0 and 4, the needle must remain stationary.

If not, loosen screws 62 on the worm wheel. Secure worm wheel with screwdriver and turn handwheel forwards or backwards until the correct setting is found (possibly several times). Tighten screws 62.

WARNING ! There must be no play between worm wheel and setting ring.





IMPORTANT !

Cam control lever and zig-zag fork must run in synchronism.

The following must be observed when correcting or checking:

- Stich width knob to 4
- Changeover lever to 1-20
- Selector lever to stitch 17
- Run machine until the maximum stitch width is reached (centering hole 60 on top)

Lever and zig-zag fork must then run in synchronism.

If the zig-zag fork 63 moves in the opposite direction, the worm wheel 52 must be turned through one complete revolution (360^0). Loosen the two screws on the worm wheel for this purpose and again check the lateral motion of the needle with zig-zag stitch.

TRACER SUPPORT FOR STRAIGHT- AND ZIG-ZAG STITCH

Check the support as follows:
- selector lever 14 to position 0
- LCR-knob to center

If the stitch width knob is then turned from 0-4, the needle must remain stationary.
If not, correct as follows:
if the needle moves to the left when the stitch width knob is turned from 0 - 4, the tracer support 68 must be set left, if the needle moves right the tracer support should also be moved right.

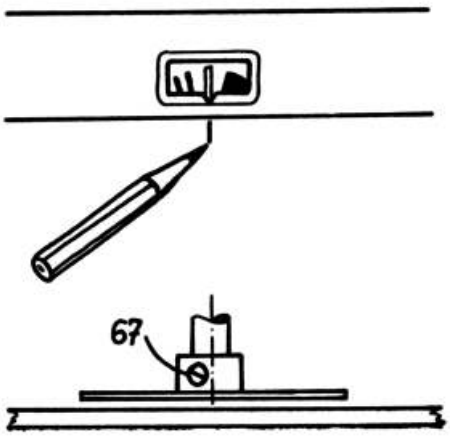
ADJUSTING THE PATTERN (REPEAT) INDICATOR

If the red mark of the pattern indicator no longer coincides with the mark on the inspection window, resetting must be performed:

- selector lever 14 to stitch 18
- changeover lever 15 to 1 - 20
- stitch width 4
- no presser foot, no thread.

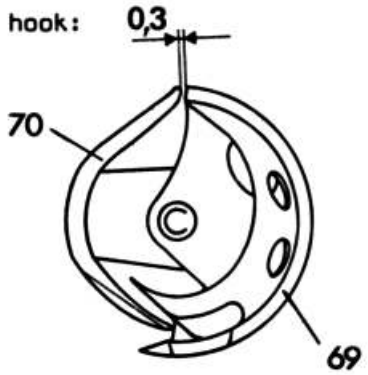
Mark with a pencil below the notch of the window on the frame. Remove top frame cover. Start machine and observe needle motion. The red mark should coincide with the mark on the top frame cover when the needle performs the jump from maximum zig-zag deflection left to the center. The needle stop position should also be reached at this instant.
If this is not the case, the screw 67 of the pattern indicator should be loosened and the red line made to coincide with the pencil mark on the top frame. Tighten screw 67.

WARNING ! Ensure spacing between pattern indicator disc and top frame wall !



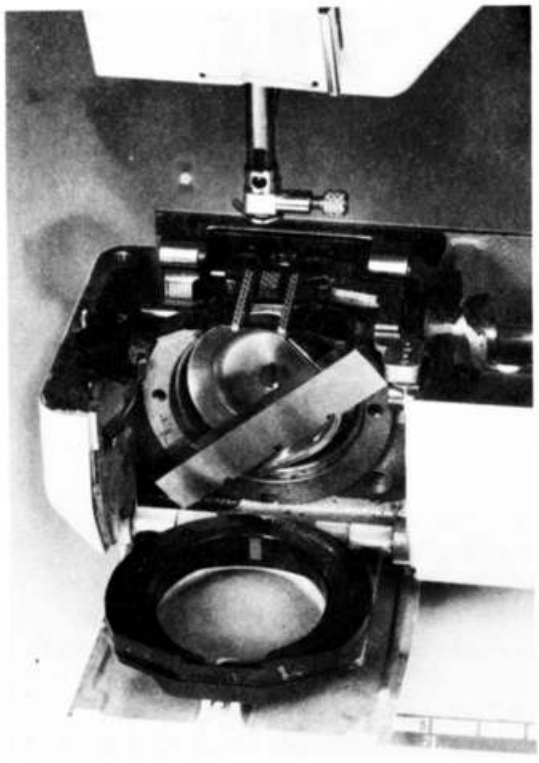
ADJUSTING THE HOOK (CB-Hook = Central Bobbin hook)

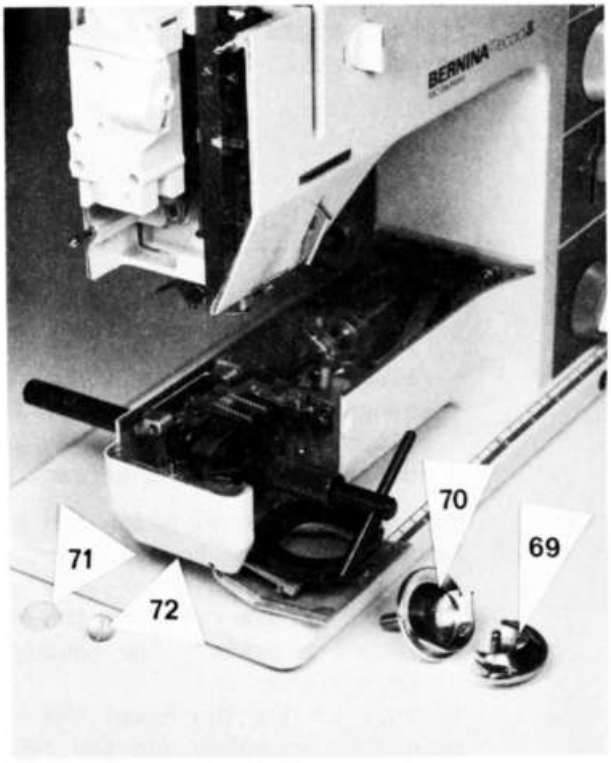
Use a straight needle without fail for adjusting the hook:



Thread passage

There must be play of 0.3 mm between hook 69 and hook drive 70 for the thread passage. Check with gauge 398 022 02.
If the spacing is too large or too small, the short stem of the hook drive should be set with the aligning spanner No. 398 020 03 a little inwards or outwards.





Position of driver in hook race

The hook driver should be 0.15 mm behind the front edge of the hook race.
If a correction is necessary to hook drive - needle, the bearing bush of the hook race must be shifted. Dismantle protective cap 71 and screw 72 at the rear of the free-arm and remove the hook driver. Insert tool No. 398 049 04 from the rear of the free-arm through the hook race bore and fit the pin. Turn the tool nut against the face of the hook race until it makes contact.
The bush can be moved to the rear by turning the knob clockwise.
If correction has to be made forwards, the tool should be inserted from the hinged cover side (i.e. from the front).

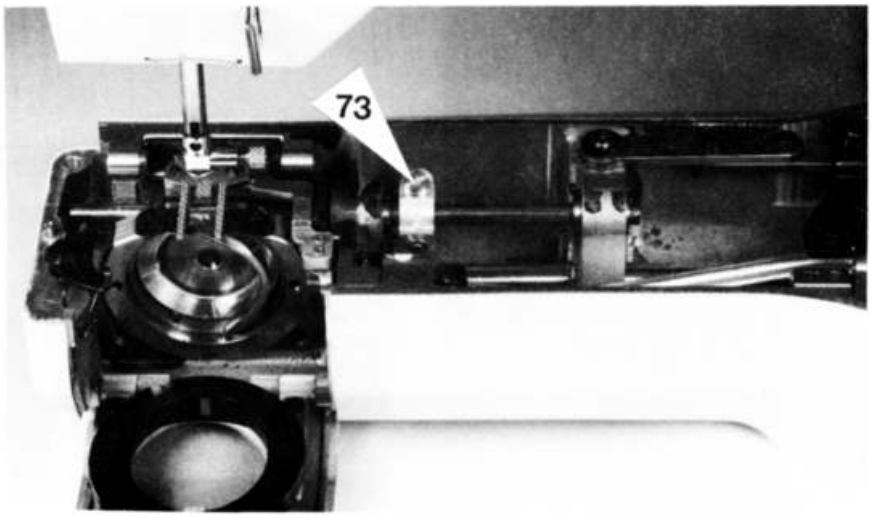
Setting the return motion

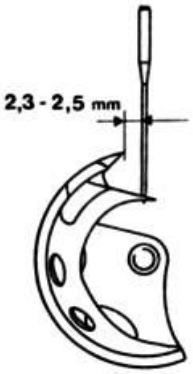
Two settings may be necessary:

1. Correction following inaccurate adjustment

Use a good needle Nm 80 for adjustment.
- stitch position setting = left
- stitch width 0

Set rack to front dead point.
To ensure that the rack position is not altered radially when the rack is displaced, the clamping piece No. 398 005 04 (75) should be mounted on the rack in such a way that the screw lies on the edge of the free-arm. Loosen screw 73 of rack dog.
Axial displacement of rack to left = greater return motion
to right = smaller return motion





The spacing is correct when the distance between tip of hook and left-hand edge of needle is 2.3 - 2.5 mm.
Tighten screw 73.

2. Setting the return motion after dismantling the rack

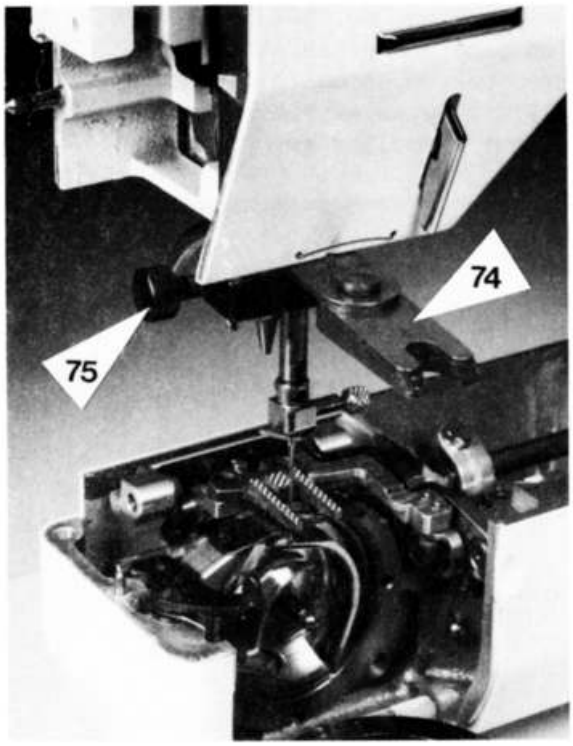
Loosen screw 73 and set rack dog to front dead point. Set rack approx. 3 mm from base wall and turn the teeth to the horizontal position (insert hook drive for this purpose). Tighten rack dog, remove hook drive again and set dog approx. centrally between the two rack bearings.
Insert the hook drive in the race so that the thread outlet side (short shank) lies slightly below the left-hand bore in the hook race.
The remaining adjustment is made as described in point 1.

Loop lift

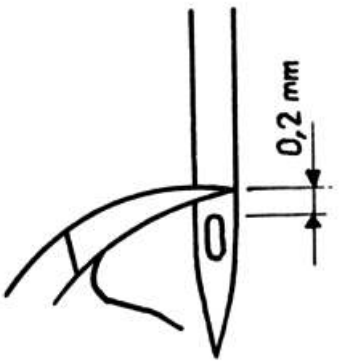
The loop lift is the path traversed by the needle bar during the upwards motion from the lowest point until the hook tip is flush with the right-hand edge of the needle behind the needle.

Model 930: loop lift = 1.6 mm

The loop lift is set on left-hand stitch (loop lift gauge No. 398 008 04)

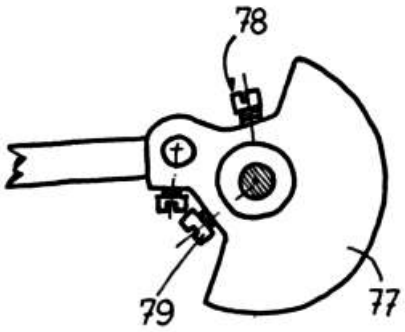


Set needle bar to lowest position. Place clamping piece 75 around the needle bar. Insert loop lift gauge 74 between swivel support and clamping piece and tighten screw of clamping piece.
Remove gauge 74 and raise needle bar to the stop by turning the handwheel in direction of running (counter-clockwise).
In this position the hook tip must be at the same level as the right-hand edge of the needle.



If correction is necessary, remove the circlip 76 from the lift-fork bolt and swing out the connecting strap.

Then by turning the lift crank 77 the hook can be set with the hook drive so that the hook tip is flush with the right-hand edge of the needle. Then tighten screw 78 and check setting.
Remove clamping piece and turn lift crank until the screw can be reached. Screw 79 is a pointed screw and should only be tightened, therefore, when the required setting is obtained.

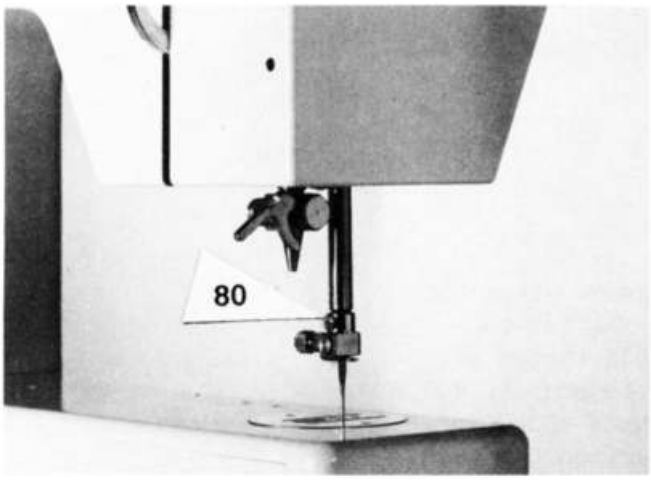


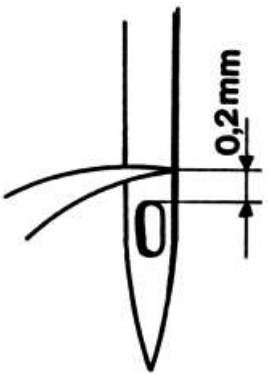
WARNING : When tightening the screw the lift crank must not be pushed down on the vertical spindle, in order to prevent play between crank and vertical spindle.

Then re-connect strap 76 and fit circlip.

Needle height

Exchange stop screw 80. The final needle height is determined after setting the loop lift.
The needle should pierce on right-hand stitch. After the loop lift is completed, the lower edge of the hook tip should be approx. 0.2 mm above the upper edge of the eye of the needle.



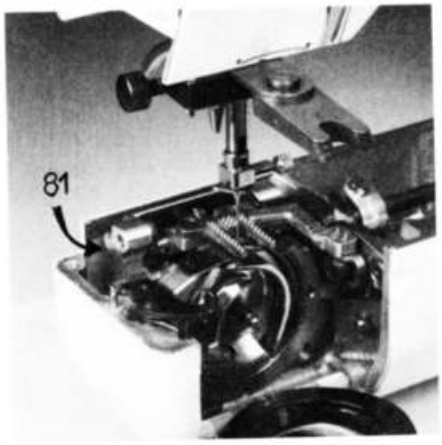


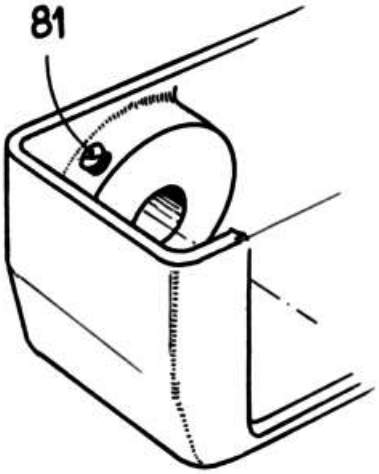
To correct, the stop screw 80 must be exchanged as required. This is available in three different diameters, each varying by 0.7 mm.

Part No. 203 506 83 = screw dia. 1.0 mm
203 507 63 = screw dia. 1.7 mm
203 508 53 = screw dia. 2.4 mm

Lateral hook adjustment

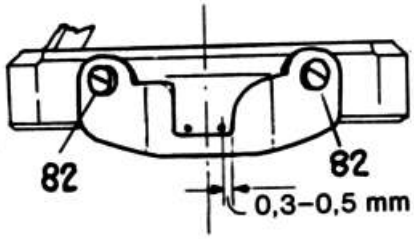
Check and adjust only with the center needle position.
The lateral spacing between needle and hook should be 0.05 mm in the fluting. If this is greater, the result will be skipped stitches, if too small the tip of the hook may be damaged.
Correction: by shifting the hook race.
Loosen screw 81. The hook race can then be moved forwards or backwards depending on whether the needle spacing must be increased or decreased. Tighten screw 81 after setting correctly.
WARNING ! The distance of the needle from the hook drive is exactly the same as that between needle and hook!





Thread guide plate

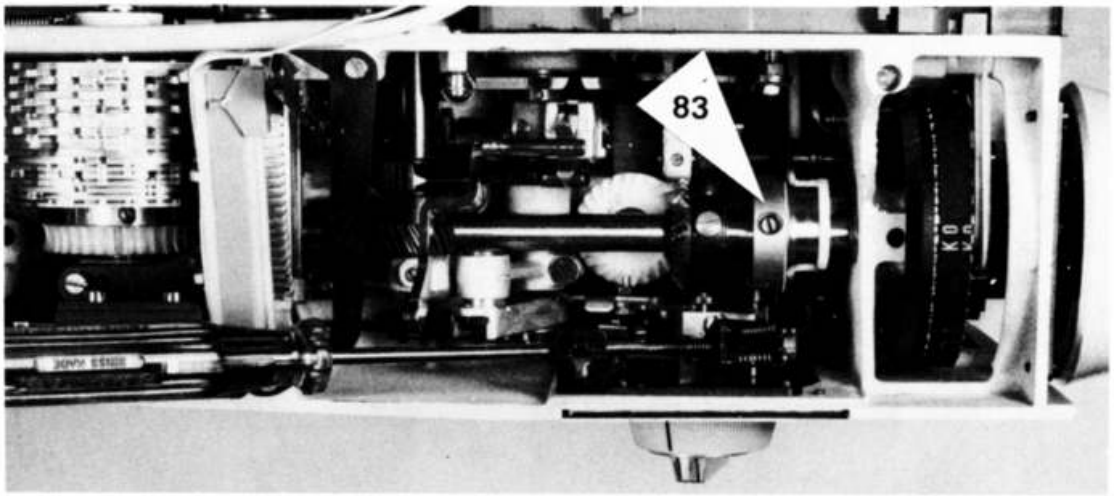
The thread guide plate is situated above the hook race. The lateral needle spacing from the thread guide plate opening should be approx. 0.3 - 0.5 mm on the right-hand side for maximum zig-zag deflection. In case of discrepancies, loosen the two screws 82 and set the thread guide plate to the correct position as illustrated.



ADJUSTING THE FEED-DOG

Feed-dog advance

The feed-dog eccentric has only one fixing screw. This must be set exactly on the face of the upper spindle. It must be ensured that the advance eccentric 83 is set axially so that the stich setting fork is indeed controlled but not jammed.

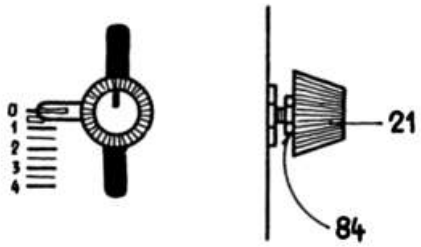


Feed-dog lift

The lift eccentric is firmly connected to the lift crank. This means: when the return motion and loop lift are set, the motion of the feed-dog is also correct.

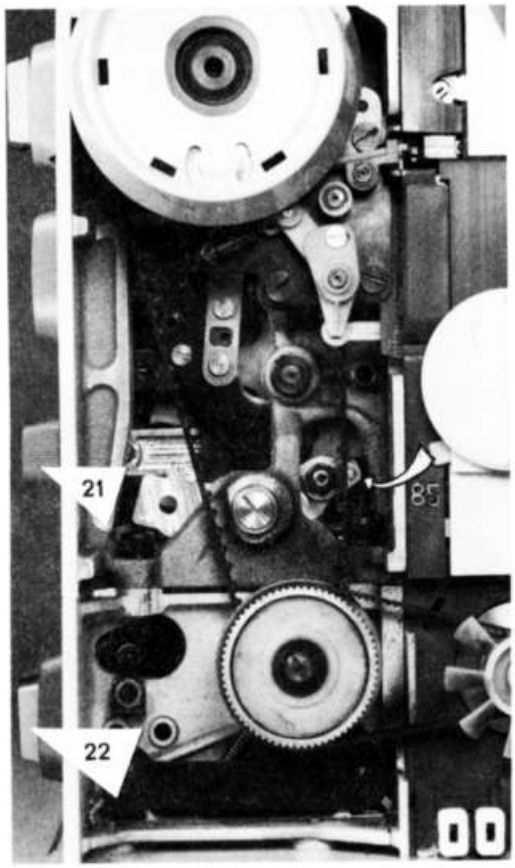
a) Setting the stitch length knob

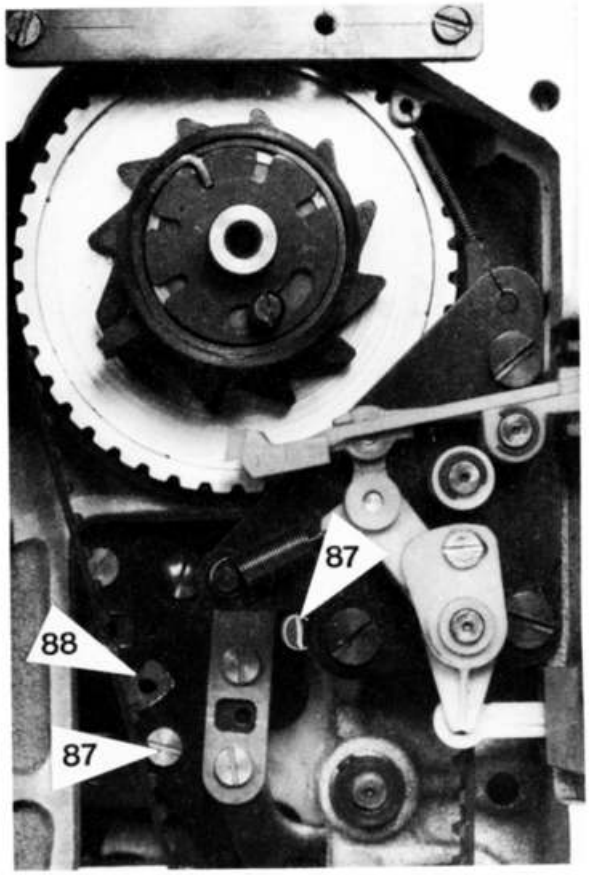
Turn stitch length knob 21 to the right to the stop. The mark on the front of knob 21 must be at the top.
In the event of discrepancies, loosen the hex. nut 84 behind the knob and turn knob to proper position.
Tighten nut 84.
WARNING ! The stitch length knob must not turn from the zero position.



b) Setting stitch length stop

The displacement arrow must coincide with the "0" on the stitch length scale.
If correction is necessary, loosen the two screws 85. Then move the stitch length knob with displacement arrow (stop) so that these coincide with the scale. Tighten screws 85.
(Refer also to drawing in "Buttonhole device")





c) Zero position of stitch setting link

The feed-dog must not move when the machine is running.
Correct as follows:
-Stitch length knob 21 to 0
-Handle knob 22 to red
Loosen the two screws 87 and move lever 88 to the corresponding zero position using the eccentric spanner No. 398 091 03.
Tighten screws 87.

d) Position of feed-dog in needle plate

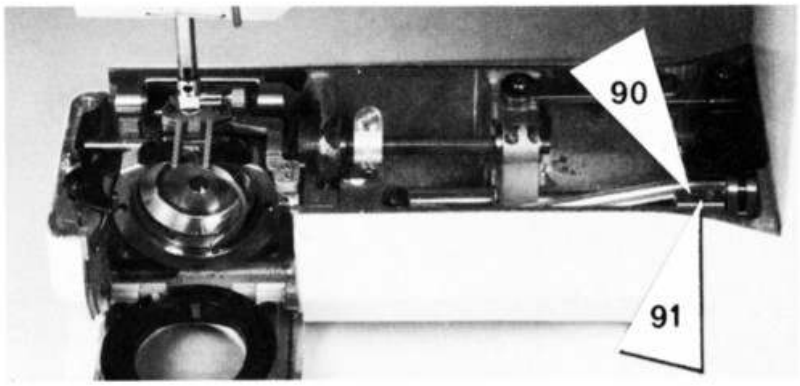
The feed-dog must be free to move in the needle plate.

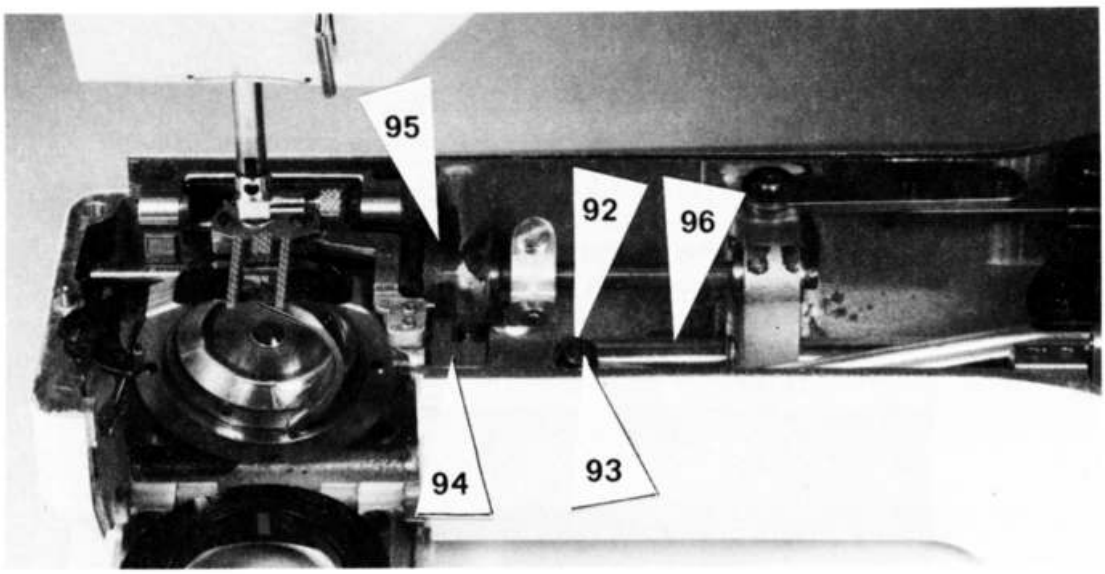
Correct as follows:
- Loosen both screws 89
- The feed-dog can then be moved sideways and lenthwise.
- Set stitch length knob to 3, average out the feed-dog-needle plate spacing in the longitudinal direction.
- Tighten the two screws 89.

e) Feed-dog height

The tips of the feed-dog teeth should project 0.9 mm over the upper edge of the needle plate at the highest position. The correct setting should be checked with gauge 398 024 03.

Set Sewing/Darning knob to "Sewing". Place adjustment gauge with the notch on the needle plate (1 mm at front, o.9 mm at rear). Set the longest stitch (4 mm). The feed-dog height can then be checked.
If correction is necessary, loosen the two screws 90 of the half-coupling 91. The latter can then be turned forwards and backwards and the feed-dog is raised or lowered. Tighten screws 90 and check lateral play of half-coupling. Fit needle plate and check the dimensions again with the setting gauge.





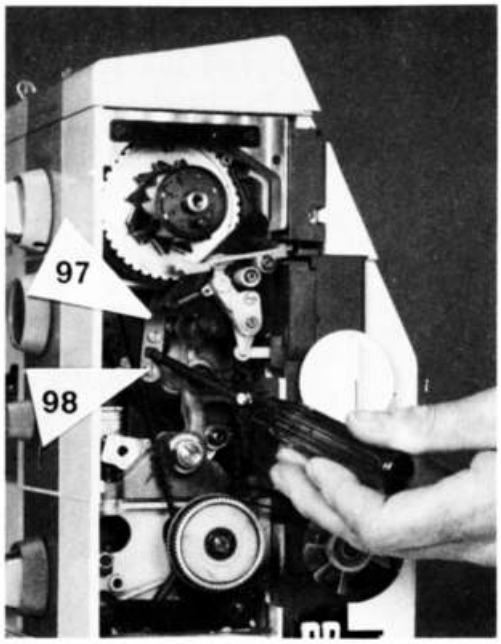
f) Depth limit stop for feed-dog

The adjusting ring 92 acts as a limit stop for the feed-dog at its lowest position.
The lowest point of the feed-dog should be limited so that it cannot touch the thread guide plate under any circumstances.
Nor must the lift lever 94 lie on the rack base 95.
Correction:
Set Sewing/Darning knob to "Darning". There should still be approx. 0.2 mm play before the stop.
If not, loosen screw 93 and turn setting ring radially and fix in the prescribed position.
WARNING ! No axial play on lift spindle 96.

g) Zero feed position

- Stich length knob to 0
- Run machine

Feed-dog must then make practically no feed motion.
If correction is necessary, loosen the two screws 98 of the connecting strap 97 slightly and adjust the strap using the eccentric spanner No. 398 091 03.
Tighten both screws 98.

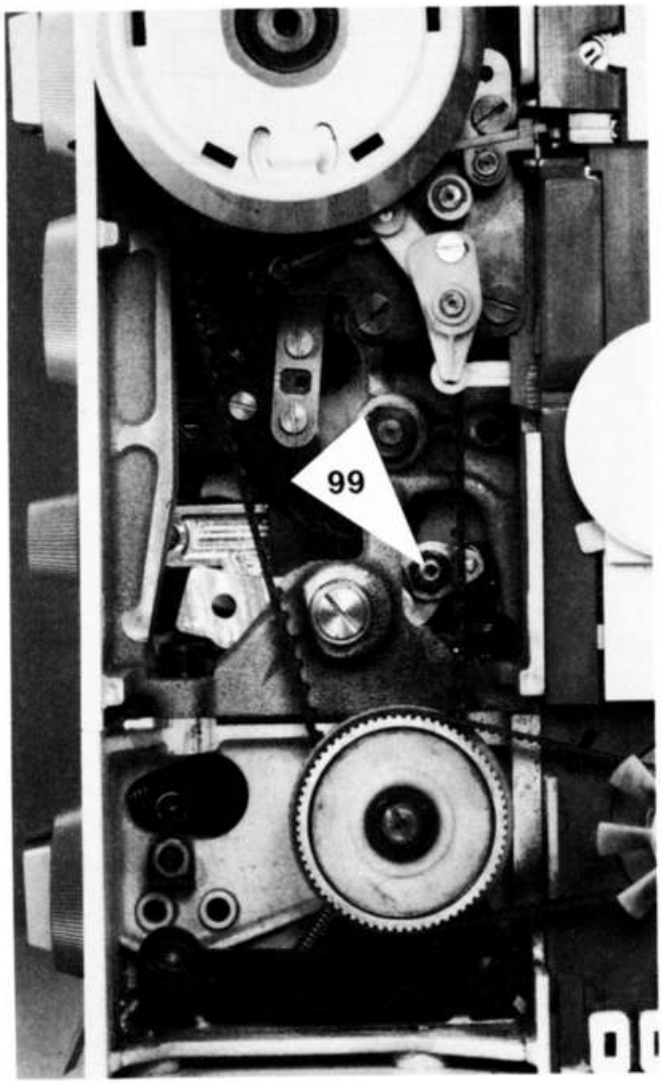


h) Adjusting stitch length of feed-dog control

The stitch pattern must be closed, i.e. the stitch length must be the same for forwards and reverse feed, so that the needle pierces in the previously made holes during the reverse feed stitches.

Correction:
- Stitch length 3 mm
- Knob 22 to red
- Changeover lever to 1-20
- Selector lever to stitch 1
- Stitch width knob to 4

Allow machine to run slowly and observe needle penetration. The second reverse stitch must coincide exactly with the fourth forwards stitch.
Check with paper insert between material, without thread.
Correction:
Alter stitch length suitably by turning tracer 99 with Allen key size 2.5 and socket spanner size 8. After loosening the hex. nut, the tracer can be turned as required with the Allen key.



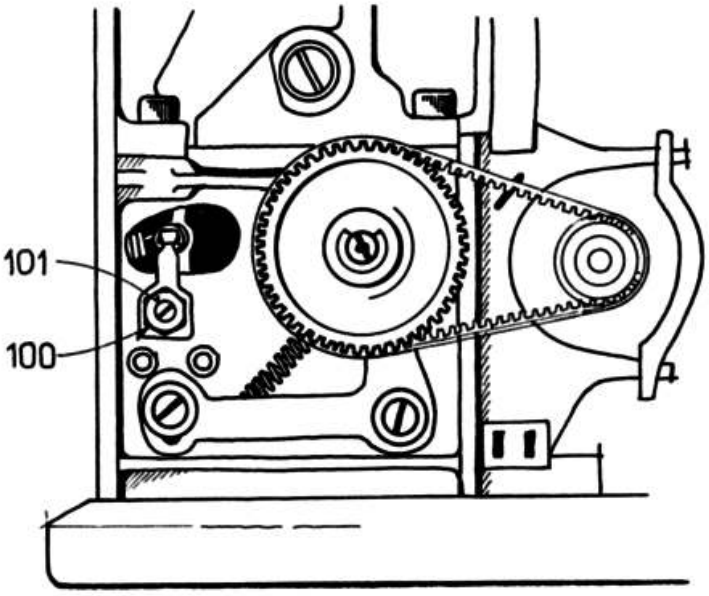
Twisting tracer to right:

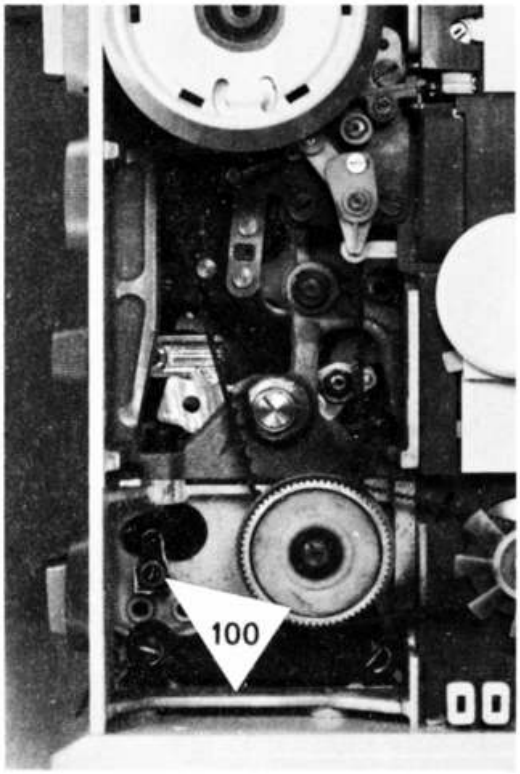
Forwards stitch is longer, reverse stitch shorter.

i) Position of scanner with reverse feed disconnected

When the knob 22 is at green, the adjusting link scanner must not touch the reverse feed cam.
The spacing between scanner and cam must be approx. 0.05 mm.

Correction:
Loosen lock-nut 100 and twist the stop screw 101 the required amount. Tighten lock-nut and check scanner spacing on stitch length 4 again.



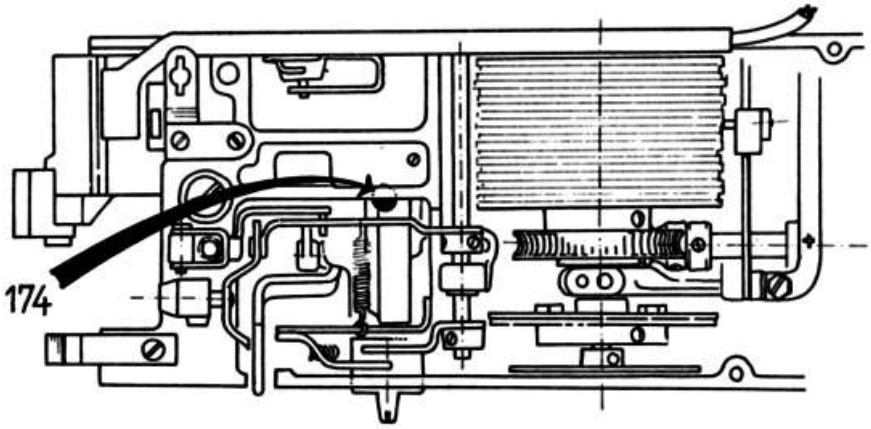


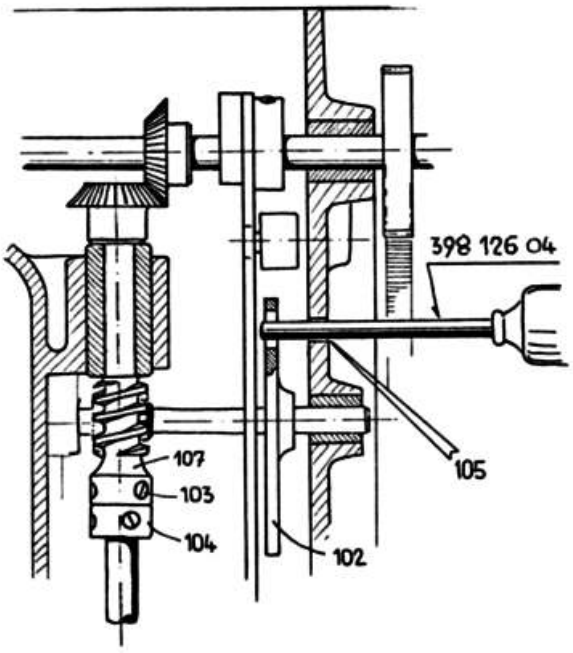
Basic setting of feed-dog control cam and needle bar control cam (cam set)

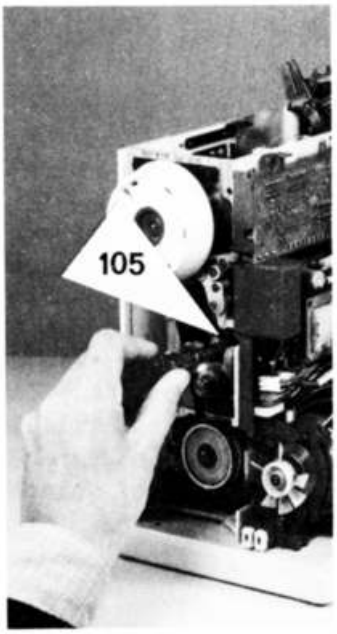
The two control cams must be mutually adapted. They must run in synchronism.
This basic setting is achieved by marking (positioning) with special tools.

1. Positioning of feed-dog control cam 102

   Loosen fixing screws 103 for worm wheel. If axial play is present, move worm wheel upwards and eliminate play with adjusting ring 104 (running fit)
   Tighten screws (adjusting ring)
   Mark feed-dog control cam with the tool in position hole 105.
   Turn handwheel (in direction of rotation) for this purpose until the fixing screw 174 of the rotor is half covered by the stem of the top frame.
   Tighten screws 103 of worm 107.

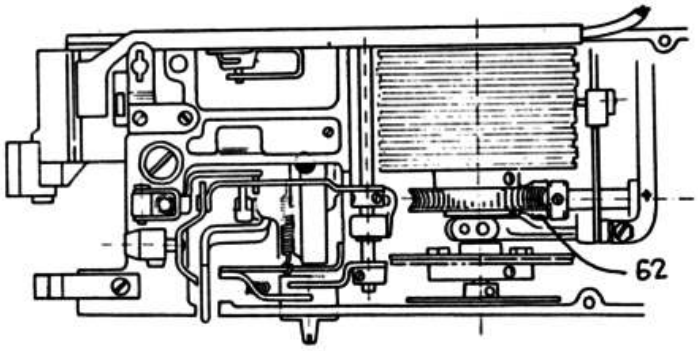




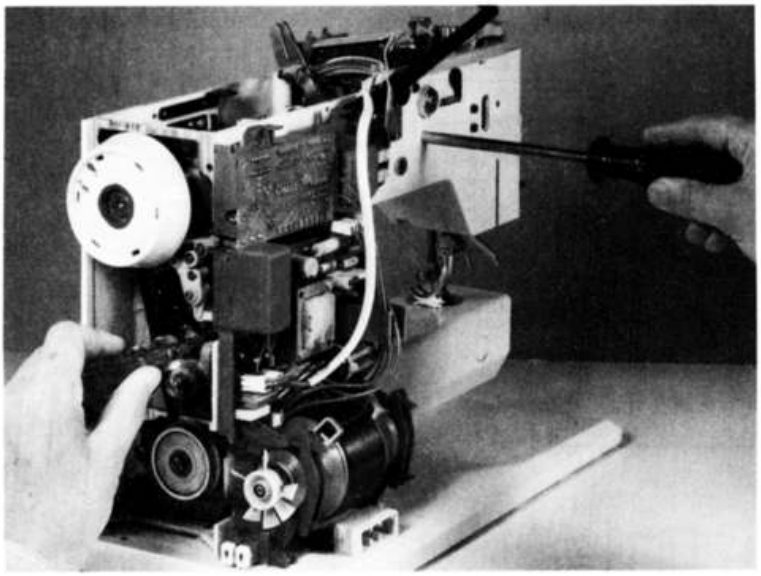


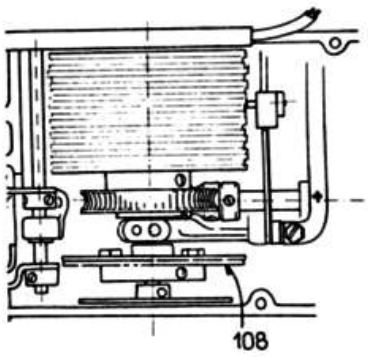
2. Fitting and adjusting the cam set

- Loosen fixing screws 62 of worm.



- Mark the already adjusted feed-dog control cam
- Insert cam set so that the marking holes are aligned
- Introduce cam set spindle provisionally
- Turn cam set as far as necessary and insert tool
- Turn worm until one of the three fixing screws 62 is accessible and tighten this screw
- Move adjusting ring against worm and secure.

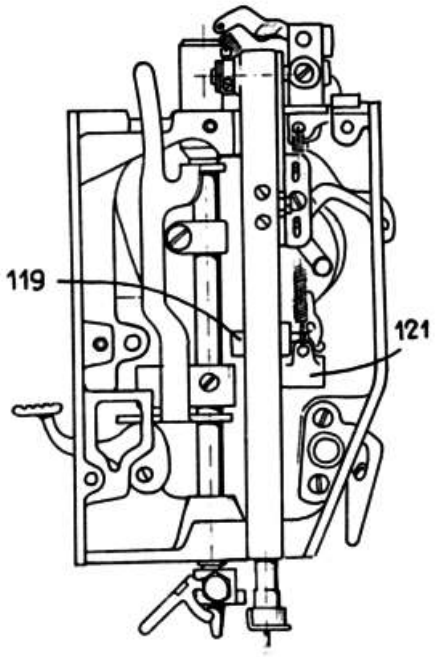


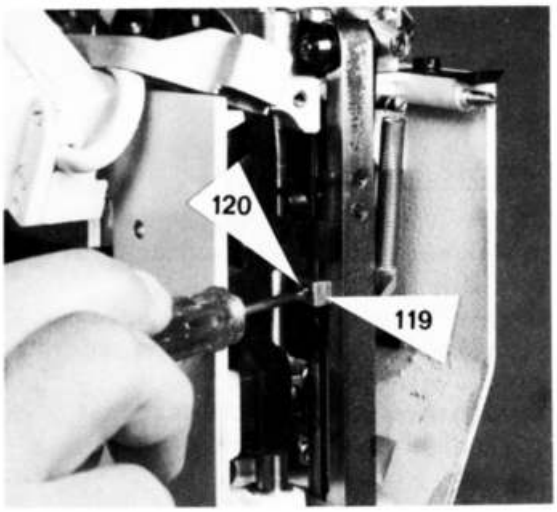


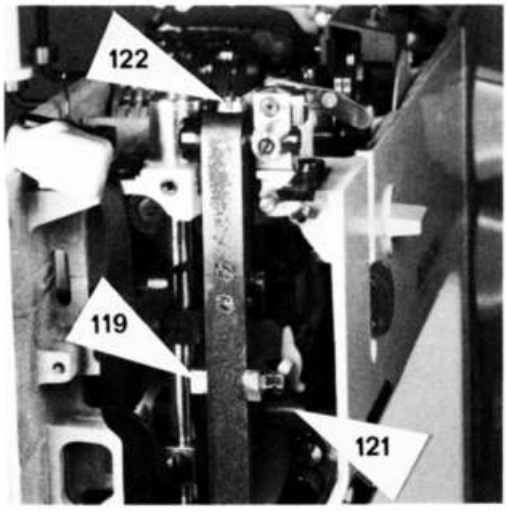
- Remove both auxiliary tools
- Place control cam for basting device and pattern repeat indicator on cam set spindle.
- Insert spindle as far as stop and adjust axial play by moving basting device control cam set 108. Set the first screw on the flat in the direction of rotation.
- Move the still loose cam set slightly to the rear (remove radial play) and secure the first screw on the flat. Bring the spindle to the correct position for this purpose by turning.

a) Needle bar guide

The spacing between the needle bar guide 119 and hinge bolt 121 should be 0.5 - 0.8 mm.
If correction is necessary, loosen screw 120 on the needle bar guide. Set needle bar guide to the proper position and tighten screw.
WARNING ! Following this adjustment turn the needle bar slightly to right and left (remove guide play) and check whether the coupling bolt can latch in smoothly. If necessary, loosen screw 120 again and adjust needle bar guide as required.







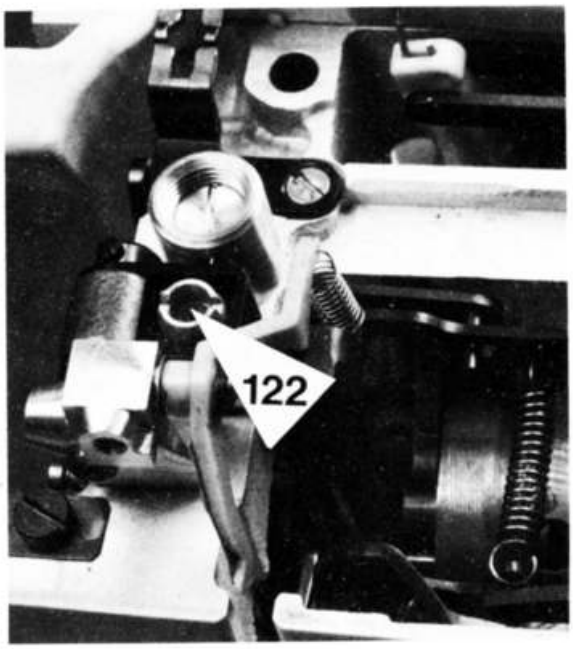
b) Needle bar cushioner

The needle bar cushioner 122 is used to adjust the height of the decoupled needle bar.
This ensures that coupling and decoupling take place silently and satisfactorily.

Adjustment:

- Stitch width knob to 0
- Changeover lever 24 vertical
- Allow machine to run slowly
- Set cushioner sleeve 122 up or down (turn) until a soft click can be heard.

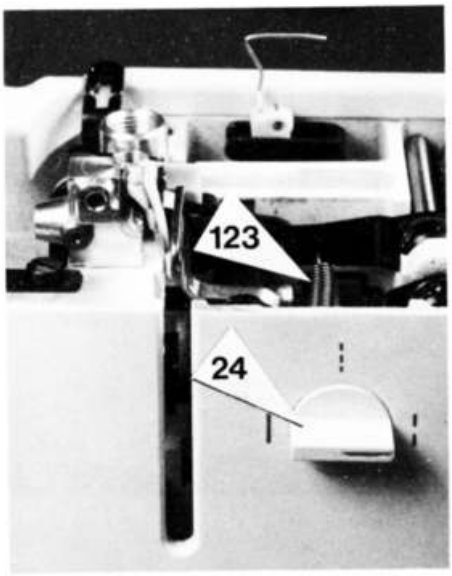
Following every alteration or adjustment to the basting device, we recommend that the buffer sleeve be checked and set.

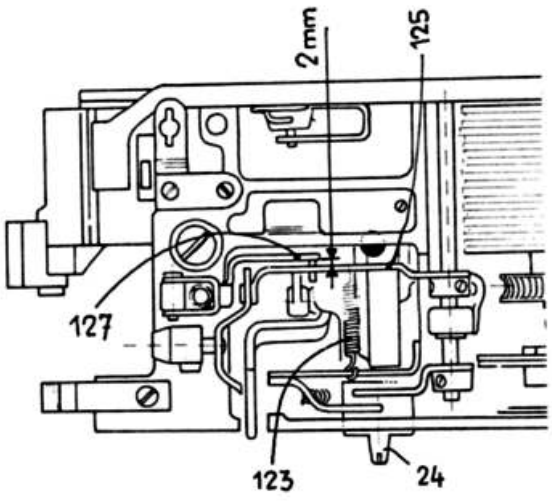


c) Control lever

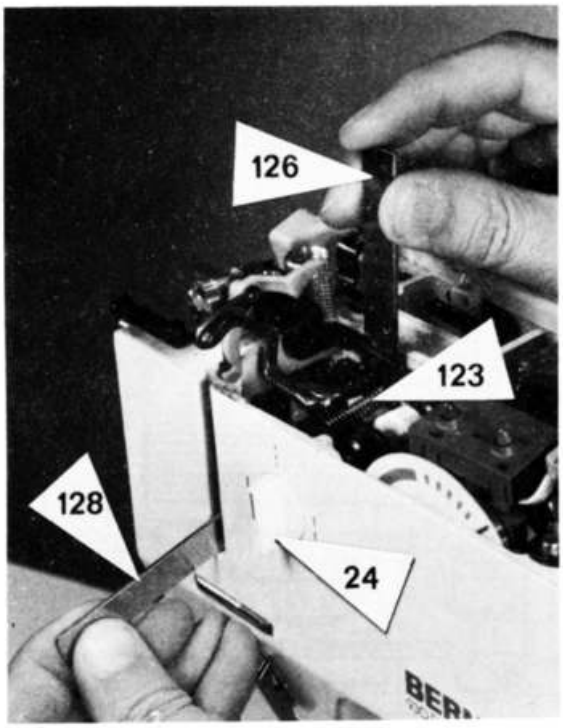
When the changeover knob 24 is vertical, the spacing between transmission lever 125 and control lever 127 should be approx. 2 mm.
The spacing between the end screw on the needle bar link crank and the shift lever should be approx. 1.3 mm.
Correction:

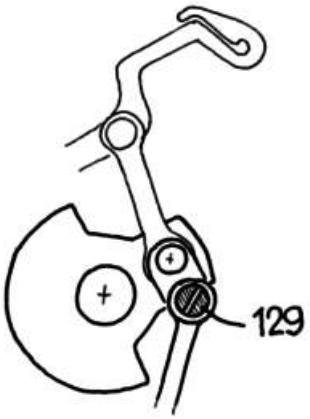
- Set changeover knob 24 vertical
- Disengage tension spring 123

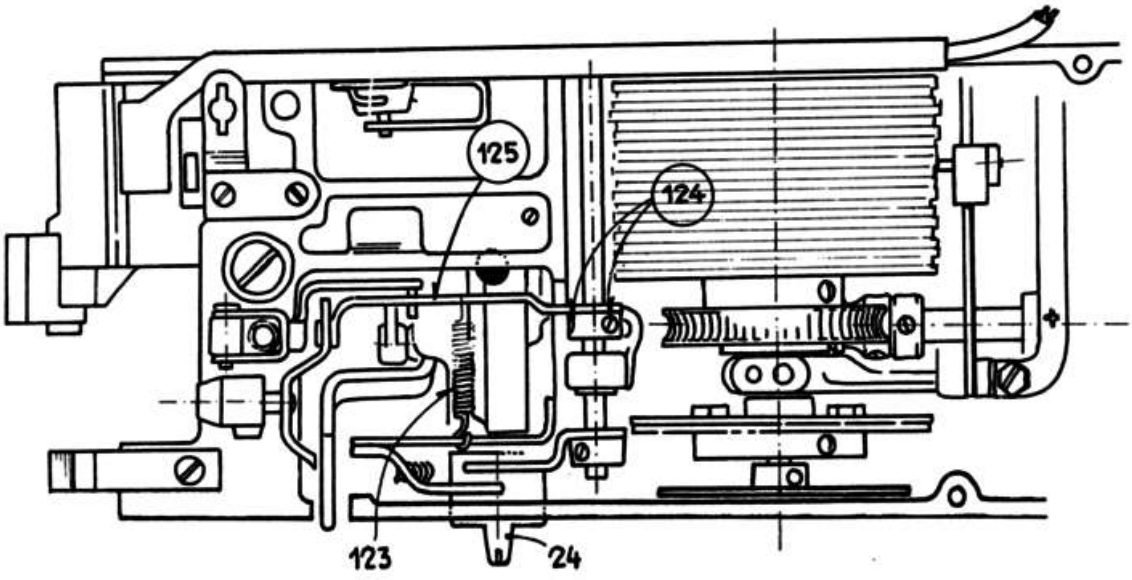




Loosen the two screws 124 on the transmission lever 125.
Turn handwheel until the tip of the needle is flush with the needle plate (on downward motion).
Place distance gauge 126 (1.8 mm) between the transmission lever 125 and control lever 127 and attach to guide bolt.
Place distance gauge 128 (1.3 mm) between end screw 129 and shift lever and clamp by raising the distance gauge 128.
Tighten the two screws 124 on transmission lever 125.
Attach tension spring 123.



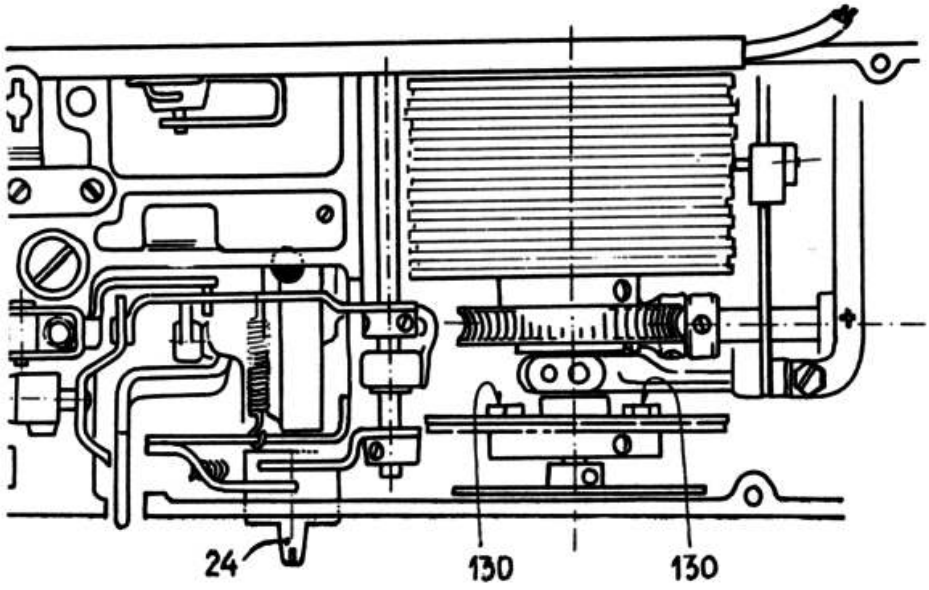


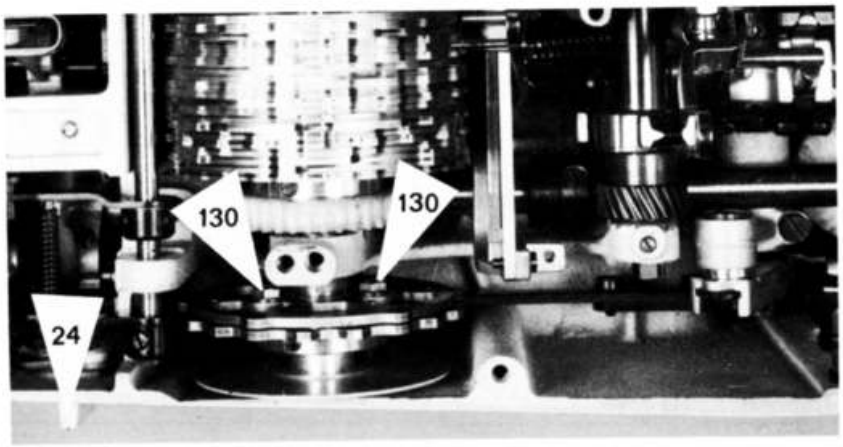


d) Control cam

The shift lever motion (to right) must be completed when the hinge bolt is at the highest point. This is the instant when the tracer reaches the highest point on the cam.

Correction:
- Stitch width knob 18 to 0
- Changeover knob 24 to the right (automatic long stitch)
- Release the two cam fixing screws 130
- Turn handwheel until decoupled, one of the screws 130 for fixing the cams must be accessible at the same time
- Turn handwheel until the hinge bolt is at top dead center
- Turn cam in direction of motion until the tracer has reached the highest point on the cam as it rises
- Tighten the two screws 130



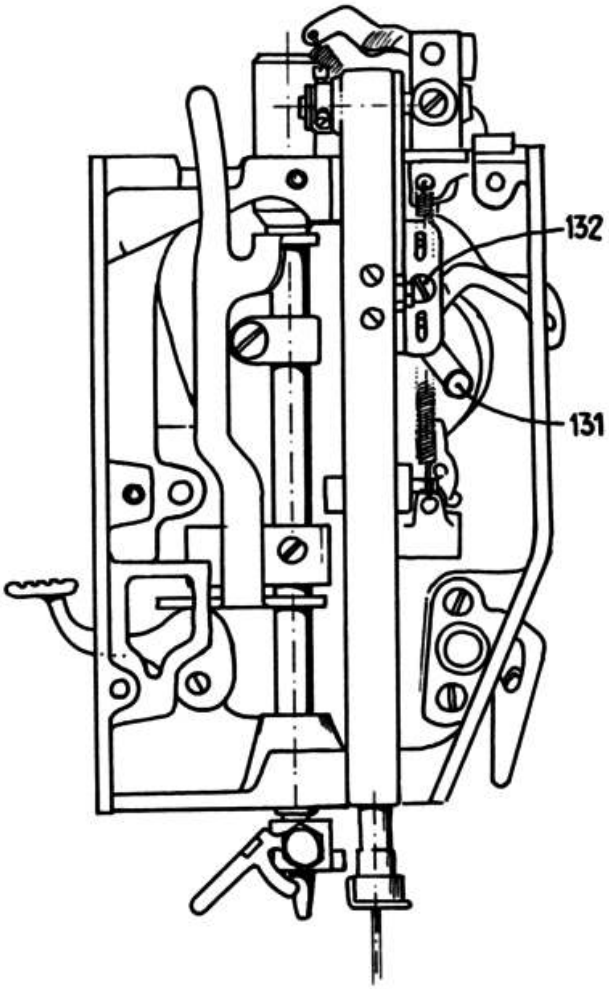


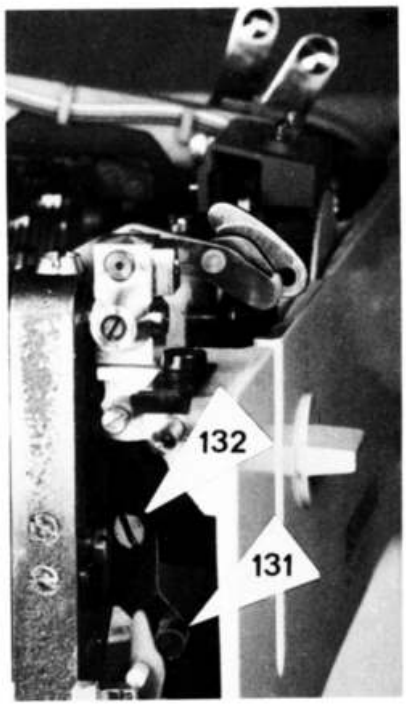
e) Instant of decoupling (clutch lever)

The needle bar must only be decoupled shortly before reaching top dead center.

Correction:
- LCR-knob 19 to left
- Stitch width knob 18 to 0
- Changeover knob 24 to the right (automatic long stitch)
- Clutch lever 131 can be adjusted in height
- Loosen screw 132 only slightly and move shift lever right up
- Set needle bar to top dead center and turn handwheel back 4° - 8°. In this position, move shift lever down far enough to ensure decoupling.

Check:
- The needle bar must not make any jerky motion upwards after decoupling
- At the top dead center position of the needle bar check whether decoupling has completely taken place. In this case the needle bar can easily be moved approx. 2 mm downwards.





f) Thread catcher lever

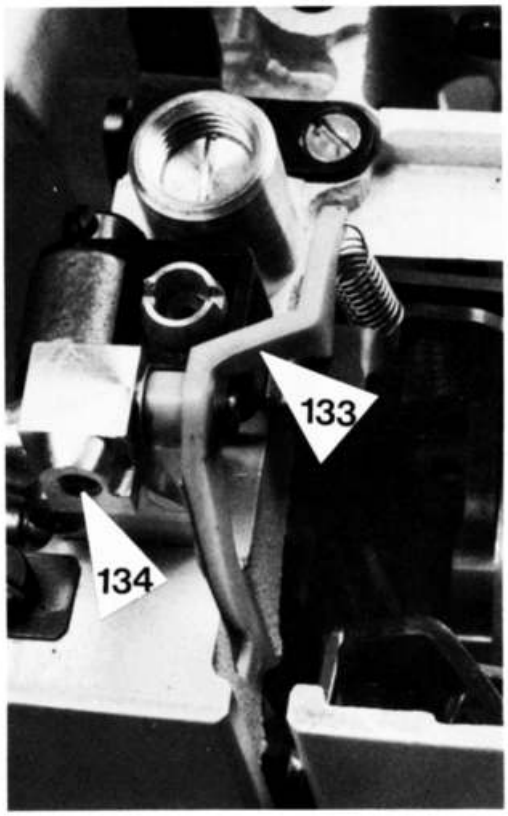
The thread catcher lever should be set laterally so that it lightly touches the take-up lever.

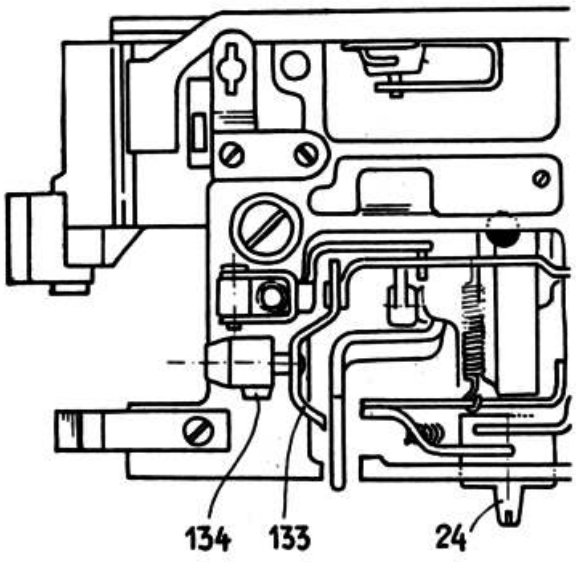
Correction:
- Changeover knob 24 to right (automatic long stitch)
- Loosen screw 134 and adjust lateral position of thread catching lever as required
- Tighten screw 134

Checking position of thread catcher lever with respect to take-up lever eye:
- Changeover knob 24 to right (automatic long stitch)
  The take-up lever eye must not be covered more than 1/4 by the thread catching lever when the latter is at the working position, at its most forward point, and flush with the take-up lever eye (take-up lever upward motion).

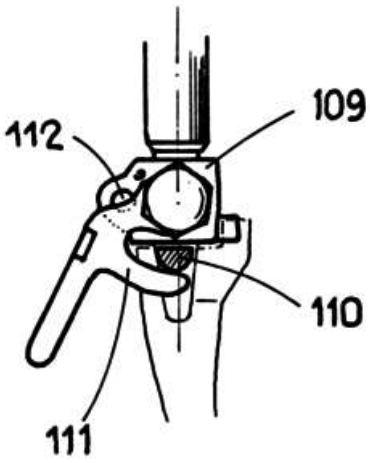
Correction:
Check prescribed spacings:
1.8 mm between transmission lever and control lever
1.3 mm between end screw and shift lever

If there is no setting error, the supporting surface of the thread catching lever must be aligned (bent) until the position of the thread catching lever is correct with respect to the thread eye.
Finally check needle bar cushioner again, see point b).





PRESSER FOOT BAR



a) Adjustment of presser foot fixing

The height of the clamp 109 should be set so that the tension cam 110 of the presser foot is approximately at the center of the clamping surface of lever 111.

Correction:
Loosen screw 112 and set clamp to the correct position.
WARNING ! The clamp 109 must not be twisted

b) Presser foot adjustment

Lower feed-dog, raise lifter lever 113 and attach normal presser foot.
Place feeler gauge No. 398 013 13 (height 7.5 mm) under the presser foot on the needle plate. In this position the material presser foot bar guide 114 must lie on the lifter lever 113.

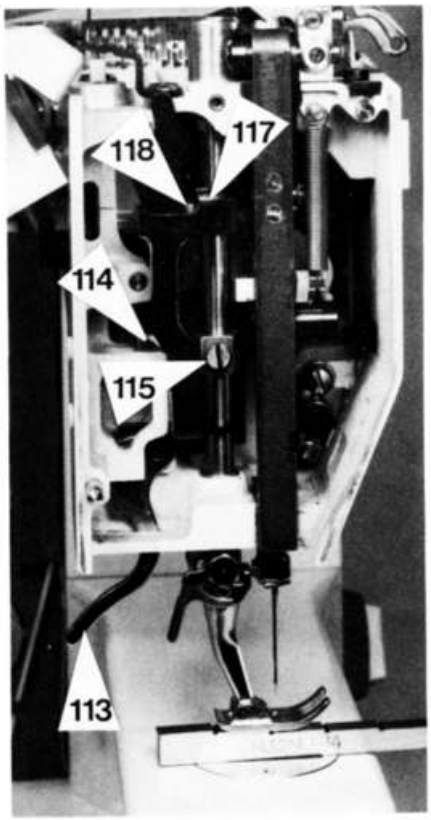
Correction:
Loosen screw 115 and set material bar guide 114 to the correct position.
Check whether the presser foot sole runs parallel to the needle plate slot.

c) Setting the darning device

- Remove presser foot
- Fit darning foot
- Lower feed-dog
- Place spacer (10 mm) under the darning foot shank and lower presser foot bar.
- Turn handwheel until the fixing screw of the swivel piece 116 points vertically upwards
- Loosen presser foot bar dog 117 and move it down until it lies on the darning lever.
- Tighten screw 118

WARNING ! Do not twist presser foot bar dog

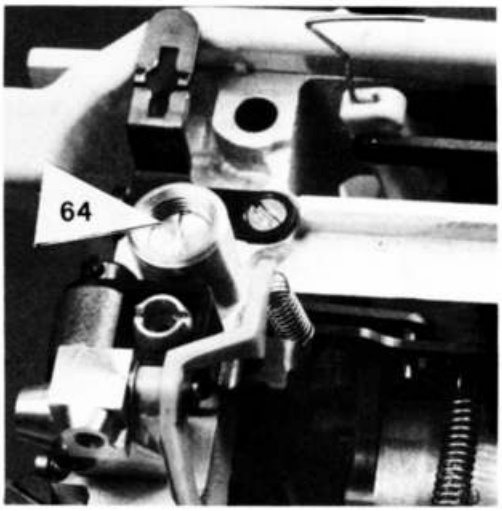
If set correctly, the distance between darning foot sole and needle plate is 0.5 mm.



d) Regulating the presser foot pressure

The presser foot pressure can be regulated with screw 164.

Factory setting = 1400 grams at lowest presser foot position on thin material (single-ply cretonne)

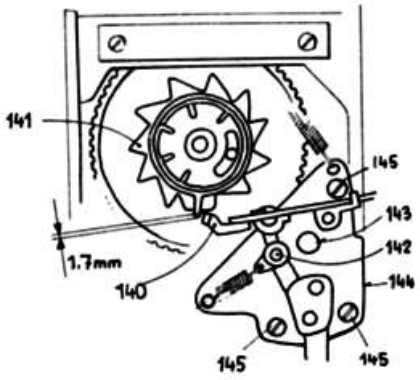


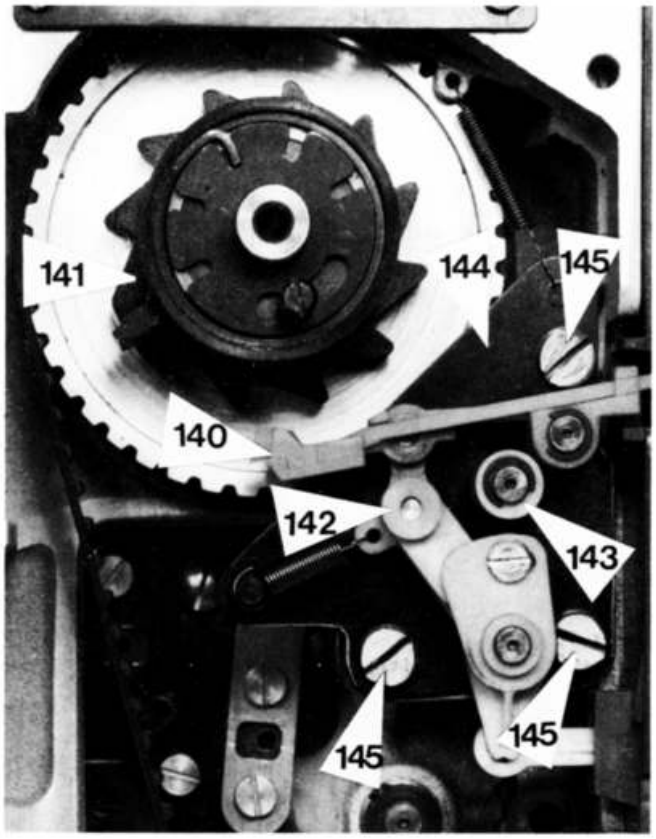
NEEDLE STOP DEVICE

When the machine is stopped, the needle bar and take-up lever are moved automatically to the upper position.

1. Setting the bearing plate

In the working position the latch 140 should engage approx. 1.7 mm in the stop of the coupling sleeve 141. Press toggle lever 142 on stop 143. Turn top spindle in direction of rotation until the coupling sleeve is against the latch. If correction is necessary, the bearing plate 144 must be moved as required. Loosen the three fixing screws 145, set bearing plate to prescribed position and tighten screws 145.

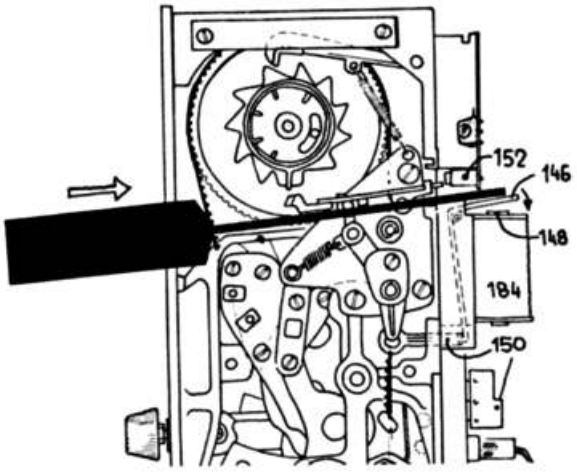


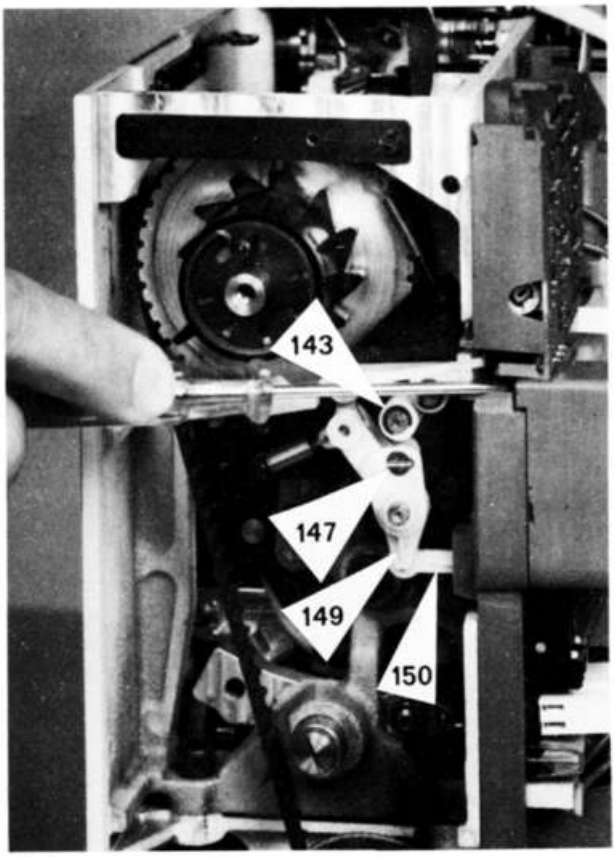


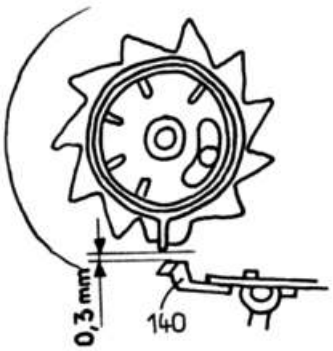
2. Setting the latch lift

When the hinged armature 146 of the magnet is closed, the toggle lever 142 should reach the stop 143. (Check with a 0.1 mm gauge or a strip of paper in between.)
When the magnet has released the hinged armature, the latch 140 should be approx. 0.3 mm below the stop of the coupling sleeve 141.

Correction:
Loosen connecting screw 147. Place the toggle lever 142 against the stop 143 while at the same time pressing the hinged armature 146 lightly against the magnet core 148. Press magnet 184 and tighten connecting screw 147.
Check: as described above.

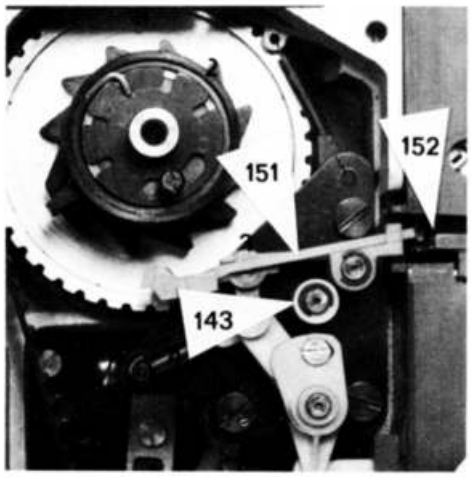






3. Switch operation

Check or adjust as follows:
Press toggle lever 142 to stop 143 and move disconnecting bar 151 to the right, until it is flush with the latch.
In this position switch 152 must have been operated.
WARNING ! Spacing between switch lever and switch housing 0.5 - 1 mm !
Otherwise adjust switch lever (bend).

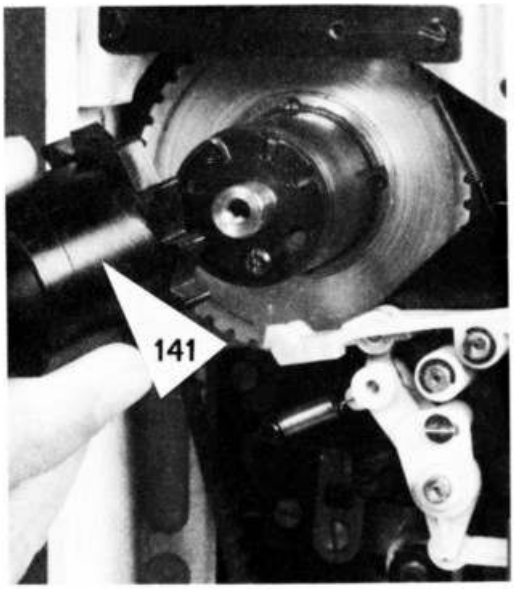


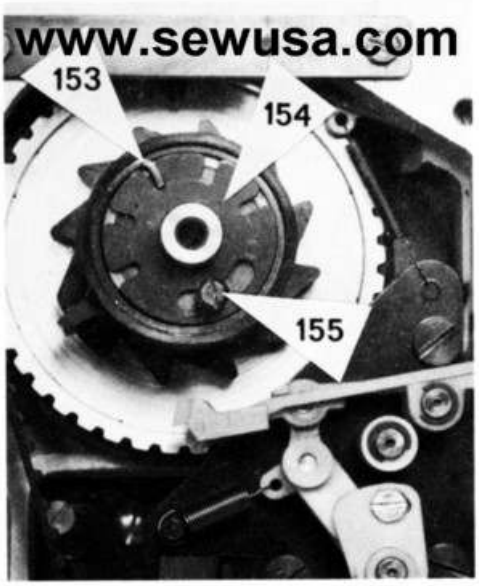
4. Positioning the needle

The stop position of the needle is first set roughly by attaching spring 153 in the setting ring 154 (5 stages) ▪ center position. It is then set exactly using shank screw 155.

Adjustment:
- Lower feed-dog
- LCR knob to center
- Attach darning foot
- Lifter lever down
- Re-fit handwheel.

Allow machine to run. Stop from full speed. Set lifter lever up. The tip of the needle must not be below the presser foot sole. Ensure at the same time that the take-up lever is approximately at the highest position.
If the prescribed positions of needle and take-up lever are not yet right, correct as follows:
- Remove sleeve 141
- Alter spring position in setting ring 154



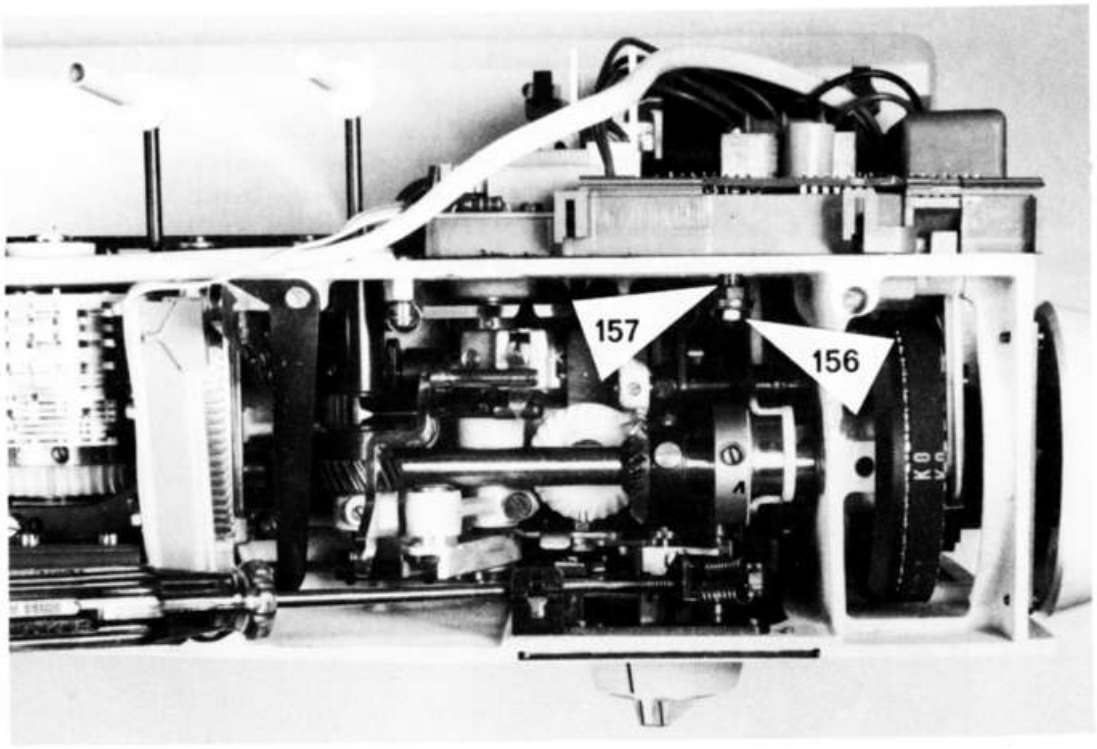


Then repeat stop test. If the prescribed needle stop position is approximately reached, the setting ring 154 can be turned to any position after loosening shank screw 155 until the final needle stop position is reached. Tighten shank screw 155 firmly. Finally check the needle stop position at various speeds.

WARNING ! The needle stop test must only be carried out with handwheel fitted.
Otherwise the coupling spring could detach and get damaged.

ADAPTING THE PRESSER FOOT LIFTER

Loosen nut 156 with hexagonal ring spanner.
The presser foot lifter can be adjusted to the optimum position by moving the connecting bolt 157 up or down.
Tighten nut 156.

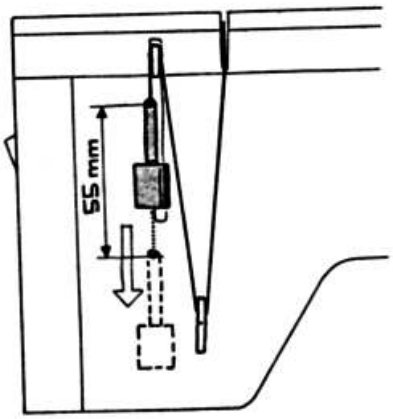


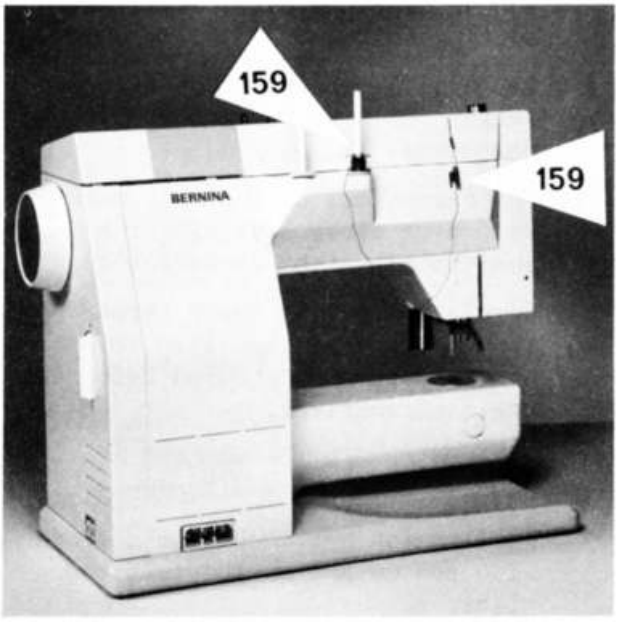
UPPER THREAD TENSION

Check and adjust the upper thread tension with the setting weight No. 398 080 04.

- Thread No. 60, 3-ply, white, left-twist
  (This thread is in the bobbin case of every new machine.)
- Place bobbin on the front reel pin
- Set take-up lever to uppermost position and thread as far as take-up lever

WARNING ! Lay thread to the right of the thread tension disc





Draw approx. 30 cm thread off the bobbin so that the thread hangs loosely between reel pin 158 and diverting eye 159. Suspend weight from the thread and note the speed of take-off.
The thread is correctly tensioned when the weight draws the thread very slowly.
The permissible take-off speed is 55 mm in 30 seconds = length of take-up lever slot, see sketch.

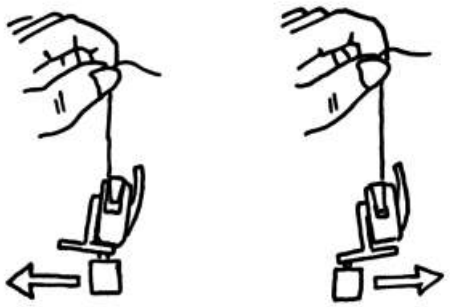
Correction:

1. Reduce the tension by turning the regulating screw for the thread tension towards -, until the weight moves well. The thread between reel pin and diverting eye must be slack.
2. Increase the tension by turning the regulating screw towards + until the take-off speed reaches 55 mm in 30 secs.
3. Adjust the thread tension indication corresponding to the marking on the frame cover. The scale must be as close as possible to the wall, but must not touch it.

LOWER THREAD TENSION

For testing use thread No. 60, 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.
The bobbin case is placed in the weight gauge just as in the hook.

Check:
Hold the free end of the thread and suspend the bobbin case with setting weight.

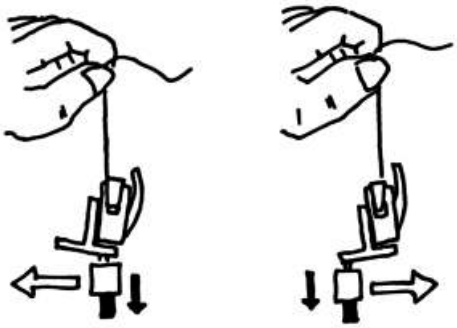


The bobbin case with the attached weight (19.5 gm) must not move downwards.

The thread may only slowly move downwards after attaching the 5 gm additional weight magnetically.

Regulation of the lower thread tension is performed with the bobbin case spring screw using the small screwdriver.

Turning left = weaker
right = stronger

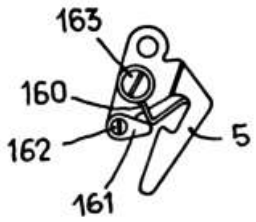


The tension set should be checked with the weight on the left and right.

The upper thread tension must be adapted to the lower thread tension.

SETTING THE THREAD REGULATOR

The thread regulator spring 160 must contact the limiter 161 when the eye of the needle (downward motion) is flush with the needle plate.
The stop 161 can be set by turning screw 162.



The tension of the regulator spring 160 is also important.
It is correct when the needle thread is held tight by spring 160 during the downward motion of the take-up lever.
The tension can be increased or decreased by turning screw 163 to left or right.

ADJUSTMENT OF AUTOMATIC BUTTONHOLER

Set buttonhole knob to 0
Turn-in stitch length knob 21 to the stop.

a) Position of stitch length knob 21

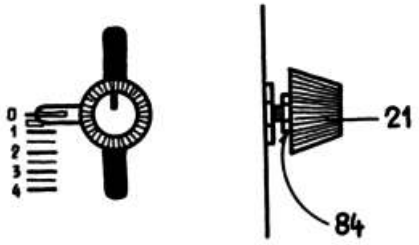
The mark on the front of the knob 21 must be at the top. In the event of discrepancy, loosen hex. nut 84 behind the knob and turn knob to correct position.

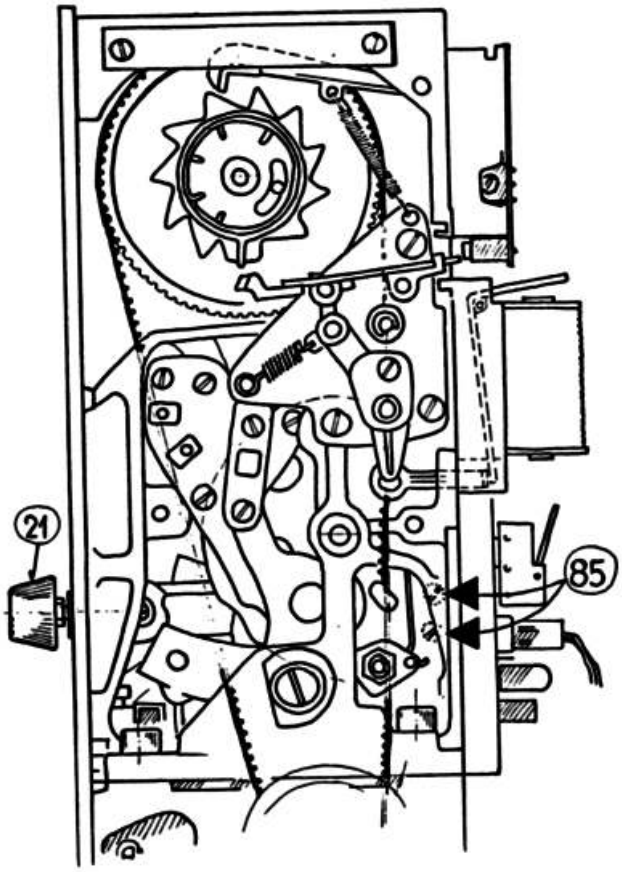
WARNING ! Spacing between sliding arrow and nut must be at least 2 mm. The stitch length knob must not turn out of the zero position.

b) Setting stitch length stop

The sliding arrow must coincide with the 0 on the stitch length scale.

Correction:
Loosen the two screws 85. The stitch length knob 21 with sliding arrow (stop) can then be moved so that the sliding arrow coincides with the scale. Tighten the two screws 85.





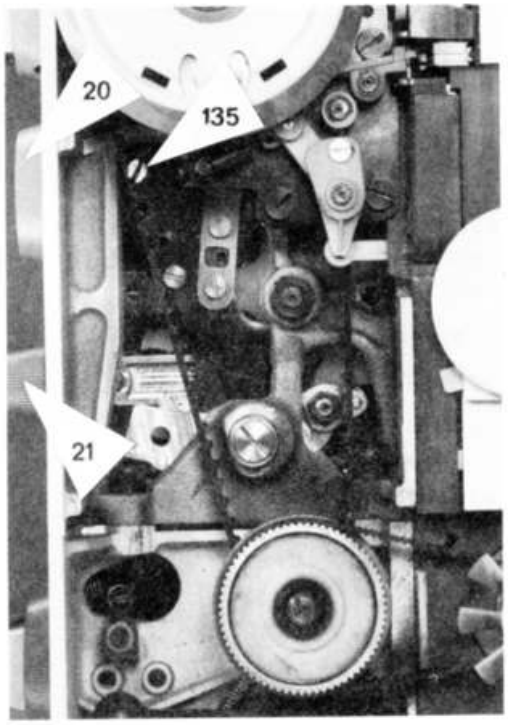
c) Setting the bar tack density

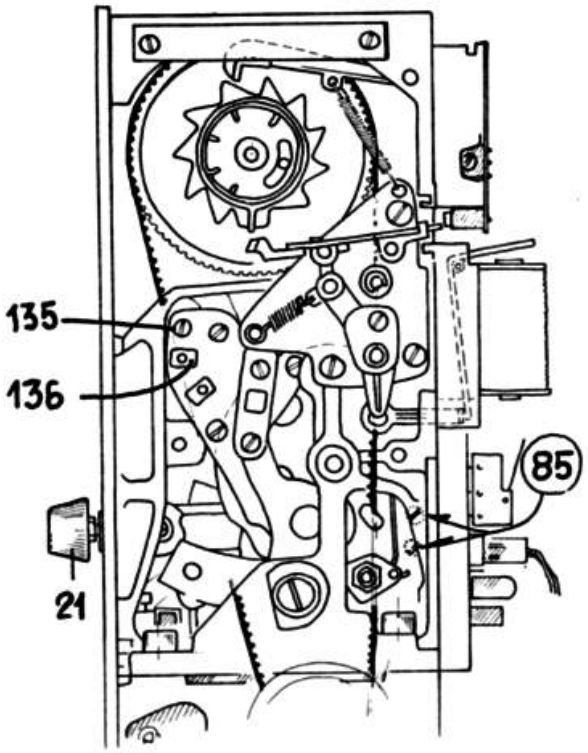
The material feed must be zero when sewing the bar tack. A minimum feed in the direction of reverse stitch is permissible.

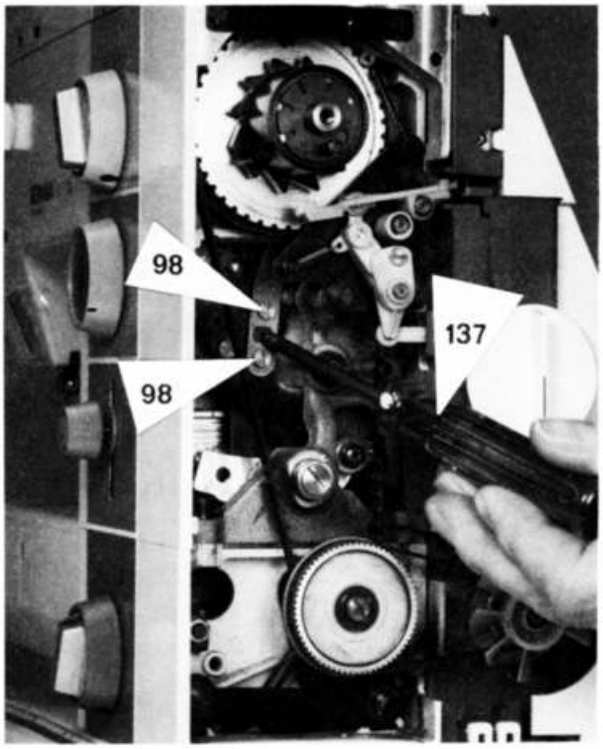
Correction:
- Remove belt cover
- Set buttonhole knob 20 to 2
- Open stitch length knob 21 half a revolution from the zero position. The mark on the front of the knob is now underneath.
- Loosen screw 135 slightly
- Set dog 136 with eccentric spanner 137
- Check material feed
- Tighten screw 135
- Check bar tack density again with buttonhole position 2 and 4.

d) Setting the reverse bead (stitch density)

The reverse bead must be adapted to the forward bead. The pattern indicator is used to count the stitches (36 stitches per revolution).





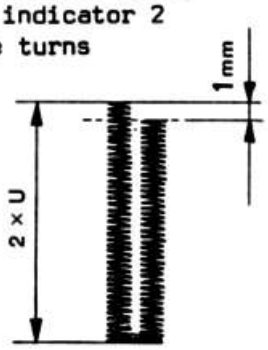


Forward bead

Buttonhole knob to 1,
pattern indicator 2
complete turns

Reverse bead

Buttonhole knob to 3,
pattern indicator 2
complete turns



Measure difference in length between forward and reverse beads. They should both be the same length. It is permissible for the reverse bead to be 1 mm shorter.

Correction:
Loosen the two screws 98 of the strap connector very slightly. The stitch density is altered by shortening or lengthening the strap with the eccentric spanner No. 398 091 03.

Shorten strap = Stitch density of reverse bead reduced,
i.e. the 2nd bead is made longer

Tighten both screws.
Sew buttonhole again.

WARNING ! 1 mm difference in bead length requires a correction of only 1/100 mm to the link. Only a very slight turn may be made with the eccentric spanner.

- Thread No. 100, 3-ply, right-twist
  or
  darning thread No. 100, 2-ply, right-twist
- Thread bobbin case thread in the additional tension device
- Needle system 130/705 H (neither blunt nor bent)

e) Checking the width of bar tack and bead

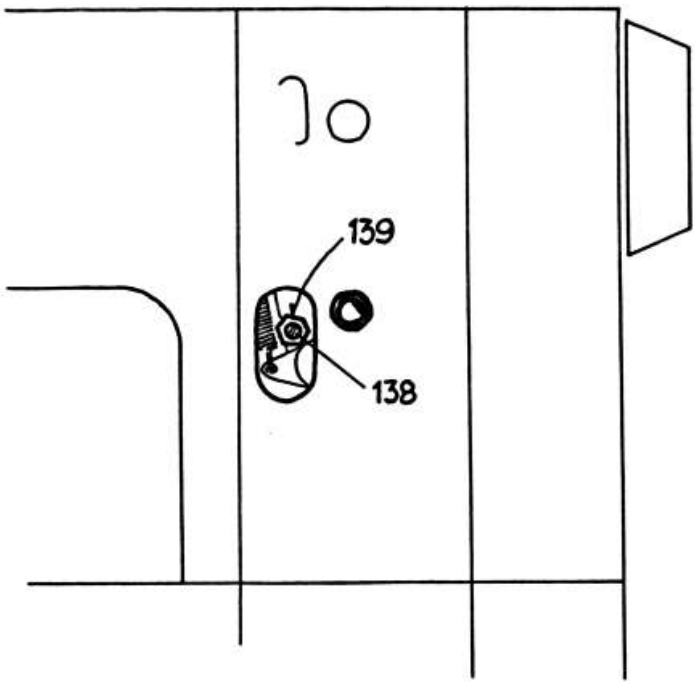
Theoretical sizes: bar tack width = 4.27 mm
bead width = 1.91 mm
cut gap = 0.45 mm

Correcting cut gap:
Cut gap and bead width cannot be adjusted independently

- Buttonhole knob to 1
- Dismantle knob and scale plate of buttonhole device
- Loosen lock-nut 139 on zig-zag changeover lever
- Set cut gap and bead width by turning eccentric bolt 138
- Tighten lock-nut 139.

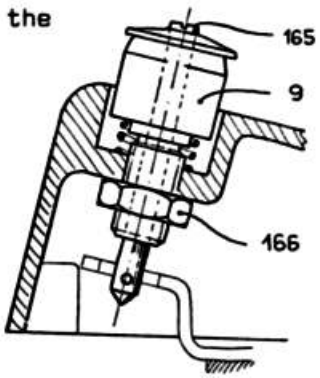
After adjustment check the position of the stitch width knob (mark must be at 0). Loosen screw if necessary and move knob to correct position.
See "Adjusting the feed-dog", para. h.

WARNING ! Check feed control forwards and reverse.



BOBBIN WINDING DEVICE

The thread should be wound evenly with pre-tension and the bobbin should be correctly filled.

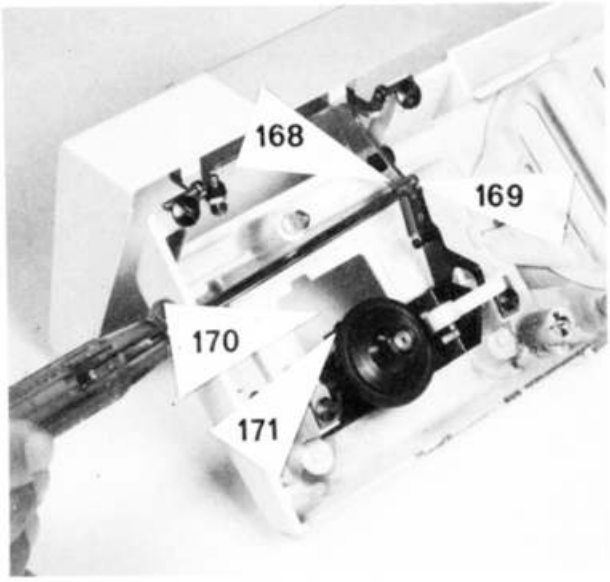


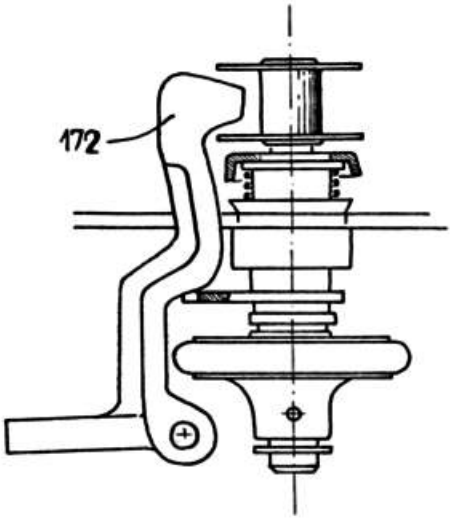
Correction: pre-tensioner

The pre-tensioner 9 should be set flush in height with tightening bolt 165.
Loosen lock-nut 166, adjust pre-tensioner sleeve and tighten lock-nut.

Correction: one-sided winding

Loosen lock-nut 168 on eccentric bolt 169 slightly. Turn eccentric bolt sufficiently and tighten lock-nut.
It is easier to adjust the eccentric bolt 169 when the cover 170 is removed. Loosen screw 171 for this purpose.



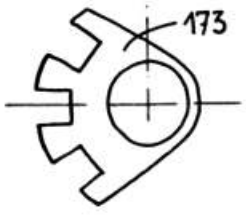


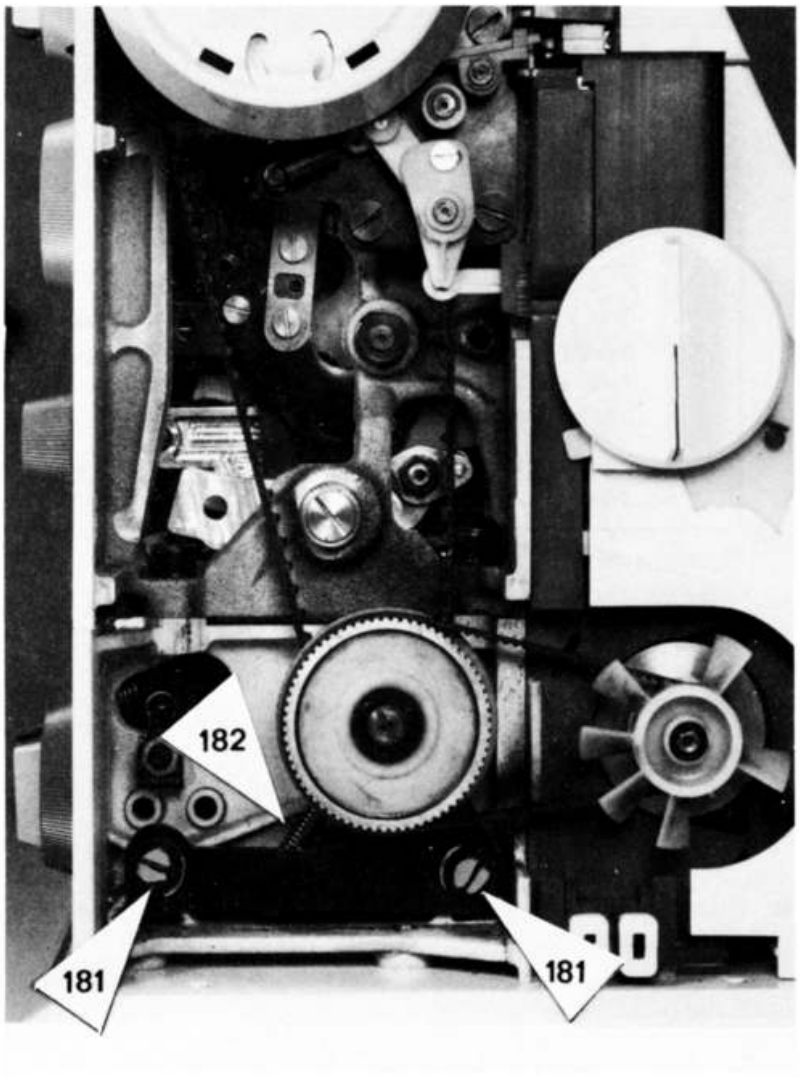
Correction: filling the bobbin

Bobbin insufficiently filled:

- Close winder cover
- Remove top frame cover
- Draw back releasing lever 172
- Turn setting disc 173 clockwise until releasing lever 172 engages in next slot.

Bobbin too full:
- Turn setting disc 173 counter-clockwise.





Toothed belts are used to transmit the motor power to the machine.

No. 305 247 03 toothed belt long, size 7.9 x 462.3 mm
No. 305 248 03 toothed belt short, " 6.35 x 223.5 mm

The combination of d.c. motor and toothed belt reduces the noise of the drive to a minimum.

Re-tensioning the toothed belt

Loosen screws 181. Turn handwheel backwards and forwards several times, tighten both screws.
Spring 182 draws the gearing into the correct position and thus produces the belt tension.

ELECTRICAL AND ELECTRONIC EQUIPMENT

W A R N I N G !

The machine must be disconnected from the power supply by withdrawing the plug from the socket before carrying out repairs or servicing work.

Then wait a further 30 seconds before removing the covers (capacitor discharge).

Motor output power: 50 W
Sewing light: 15 W

D.C. motor

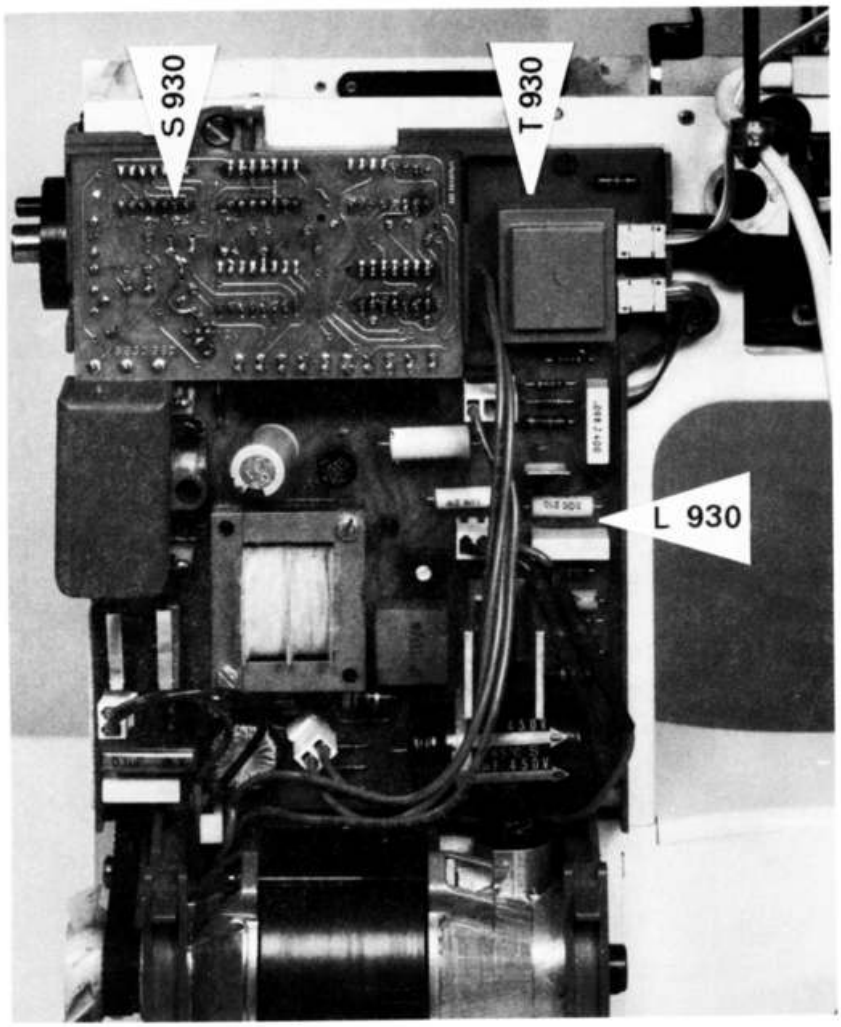
- Less power consumption for the same output power
- Better speed regulation

Electronic system

- Controls the speed depending on the load
- High penetrating power even at low speed

Needle stop device

Operates independently of instantaneous machine speed.



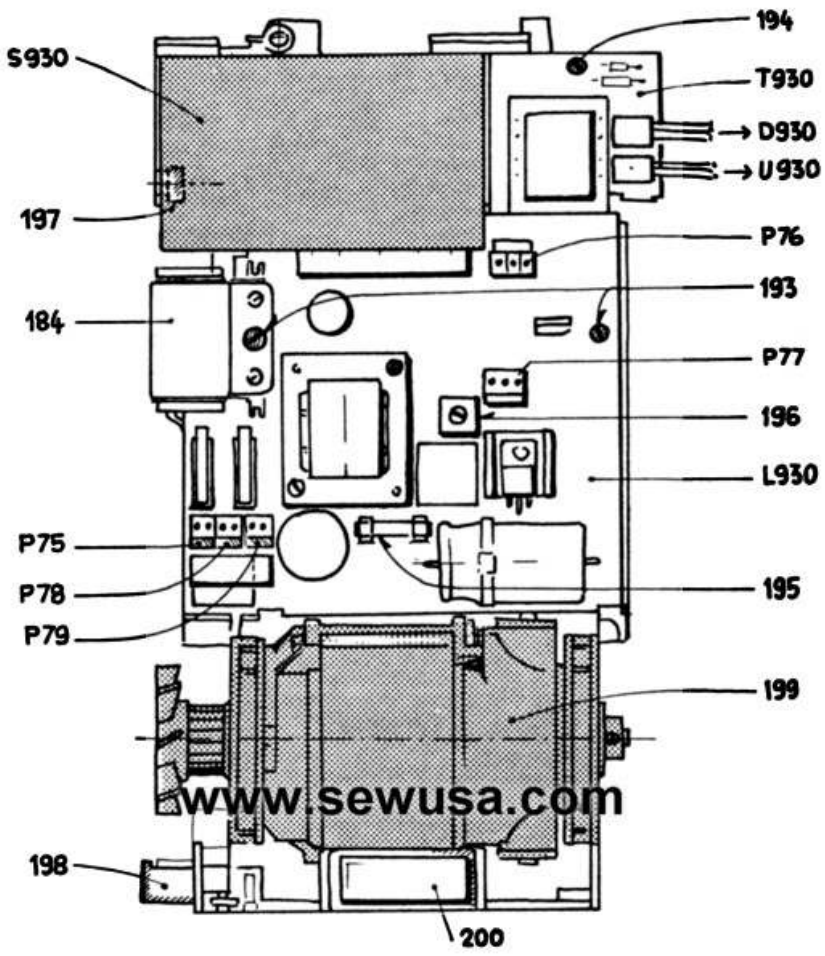
Construction of electronic system

Printed circuit board L 930 = power circuit
Printed circuit board S 930 = regulating circuit
Printed circuit board T 930 = transformer circuit

Exchanging the printed circuit boards

PCB L 930

- Dismantle belt cover, chassis cover and handwheel
- Withdraw plug connectors P 75 to P 79
- Loosen fixing screws for L 930, including magnet cover cap
- Tilt printed circuit board combination L 930 / S 930 and lift out
- Withdraw PCB S 930 from PCB L 930 (plug connector) and insert new PCB L 930.



Insert printed circuit board combination and attach needle stop lever in hinged armature of the magnet, fit cover cap and secure.
Tighten fixing screws 193 on L 930.
Provide plug connectors as follows:

- Plug-in P 77 (3-pin) with snap connector underneath
- Plug-in P 76 (3-pin coded) with snap connector on top
- Insert PCB T 930 in P 79 (2-pin) with snap connector underneath
- Connect sewing light plug to P 78 (2-pin), snap connector underneath
- Connect mains supply to P 75 (2-pin), snap connector underneath
- Fit chassis cover and handwheel before the function check

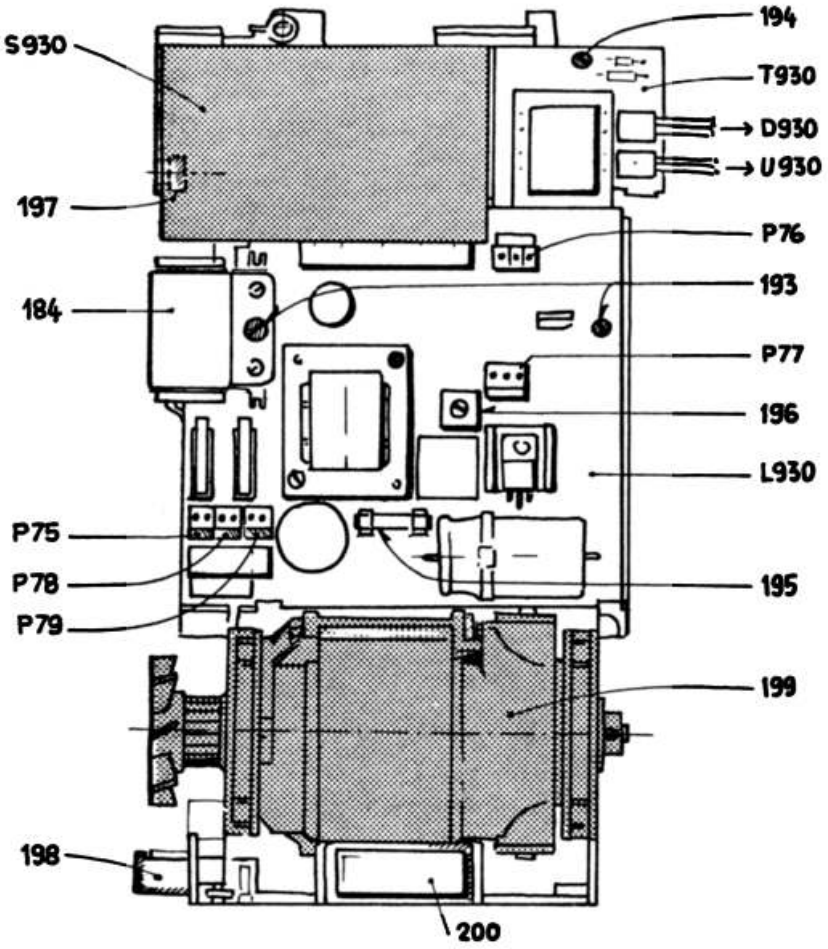
Check:
- speed
- needle stop function
- LED-indication
- sewing light

PCB S 930

Exchanged in the same way as PCB L 930.

PCB T 930

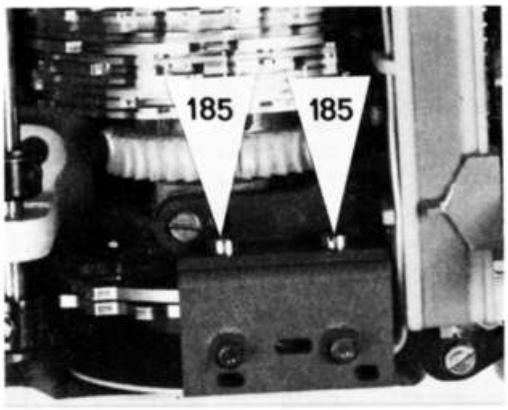
- Remove top frame cover
- Remove belt cover, chassis cover and frame cover
- Witdraw plug connection P 79
- Withdraw connecting leads to D 930 and U 930
- Loosen fixing screw to T 930 (194)
- Tilt PCB T 930 and lift out
- Fit new PCB T 930 in opposite sequence.



195 = fine-wire fuse
196 = potentiometer A
197 = potentiometer B
198 = foot control unit connection
199 = motor
200 = mains cable socket

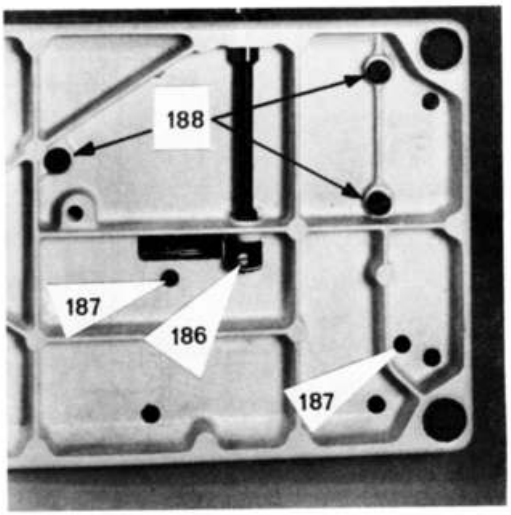
PCB D 930

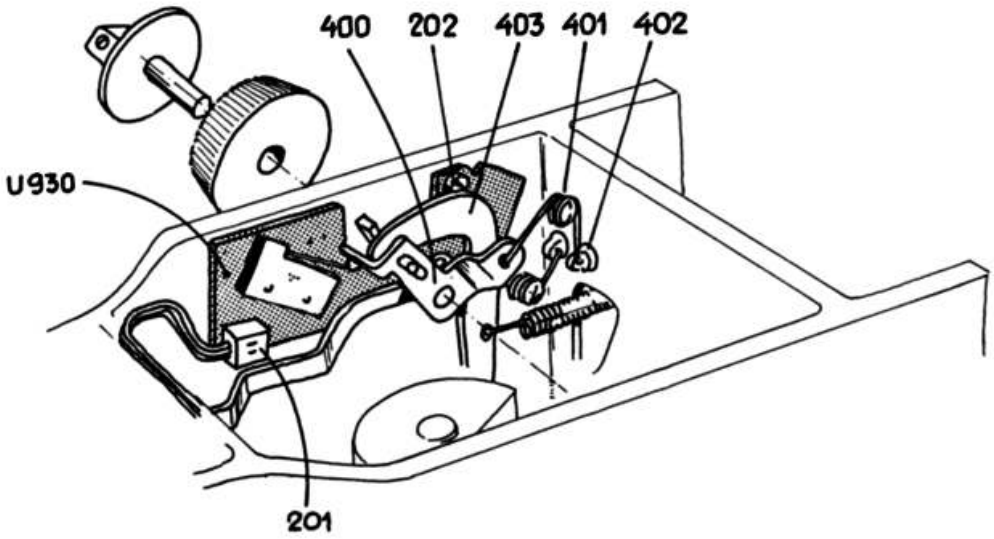
- Remove top frame cover
- Remove belt cover, chassis cover and frame cover
- Loosen the two fixing screws 185
- Withdraw the diode PCB D 930 complete
- Withdraw connecting lead D 930 from T 930
- Fit new diode PCB in opposite sequence.



PCB U 930

- Remove belt cover and chassis cover
- Loosen lifter screw 186 and remove spindle
- Loosen screws 187 and three baseplate fixing screws 188
- Lower feed-dog
- Loosen changeover lever 400, remove knob
- Withdraw spring 401 with spring holder 402
- Loosen screw on Sewing/Darning knob
- Remove outer Seeger circlip ring on bearing bush
- Remove circlip on bearing bolt



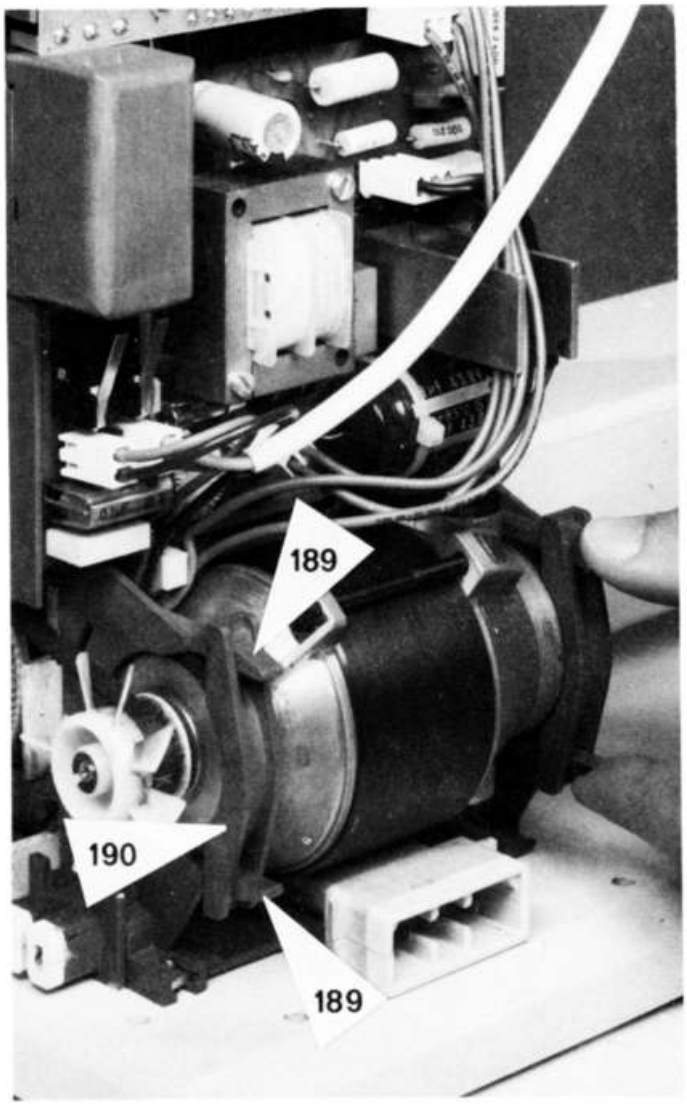


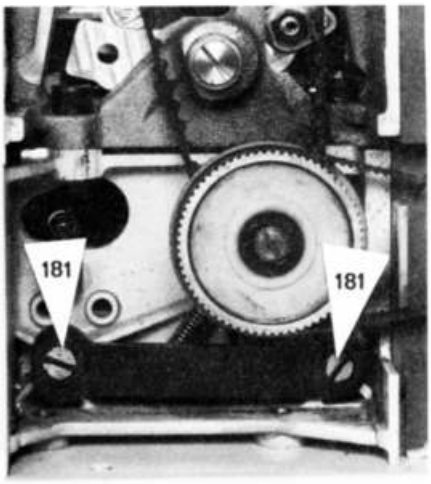
- Set back disconnecting lever 403
- Remove PCB U 930
- Remove screw 202 to PCB U 930
- WARNING: Remove spacing disc between base wall and PCB
- Remove short toothed belt
- Remove complete chassis
- Remove securing clips to flat strip cable
- Release plug connection U 930 on PCB T 930
- Exchange PCB U 930
- Fit new PCB U 930 in opposite sequence

Check: additional actuator of electrical switch must not be pressed down to its housing, but must switch reliably.

DISMANTLING THE MOTOR

- Remove belt cover and chassis cover
- Withdraw plug connection P 77
- Slacken toothed belt by loosening the two fixing screws 181 for the stepped pulley bearing plate





- Squeeze snap 189 to motor securing clamps and remove clamps 190
- Turn motor slightly clockwise (as seen from pulley side) and lift out

Changing the brushes

- Bend up brush strap
- Remove brushes (residual length 4 mm)
- Fit new brushes (No. 323 784 03)
- Close brush sleeve
- Refit motor in opposite sequence.

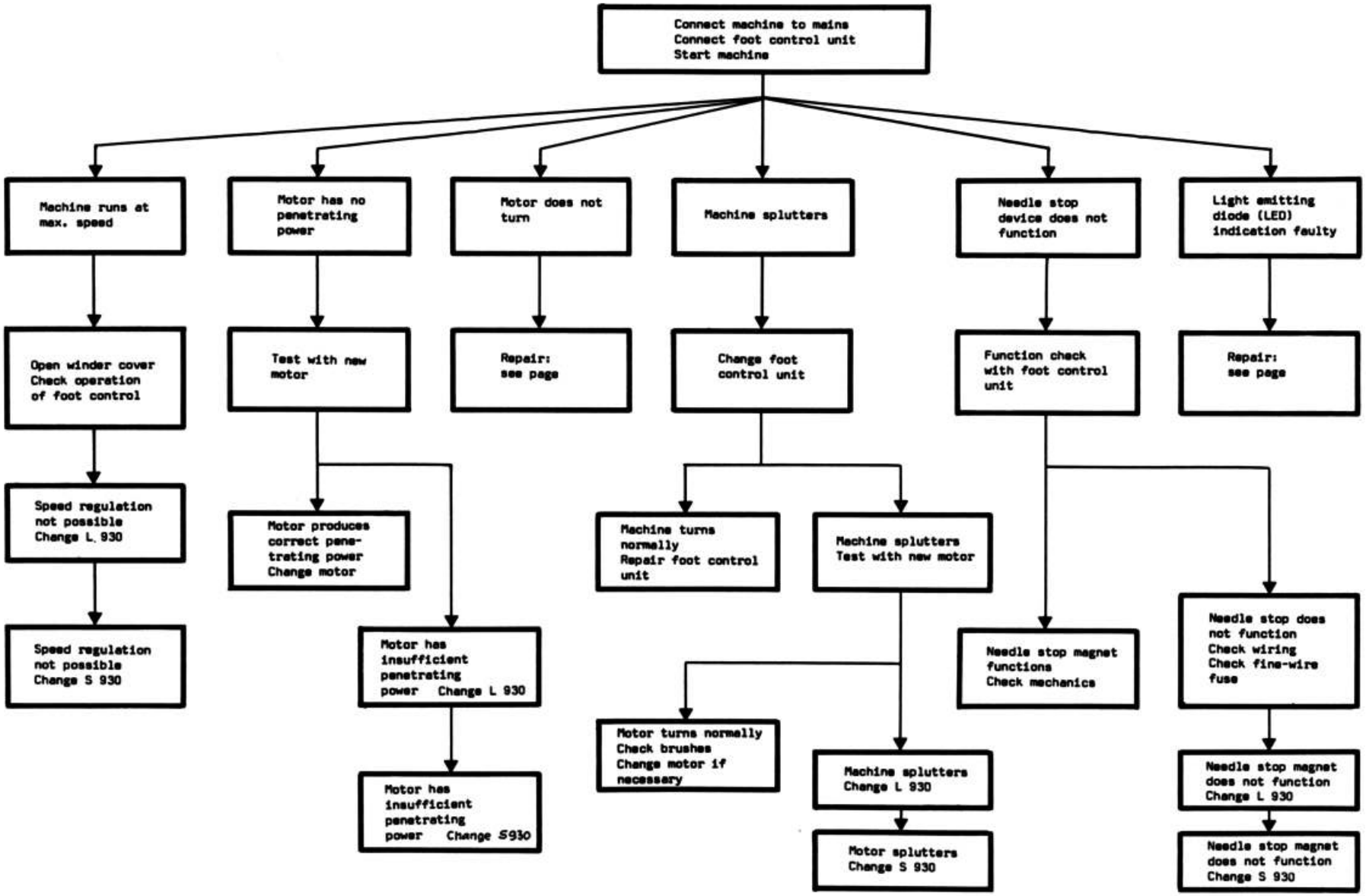
ELECTRICAL ADJUSTMENTS TO PRINTED CIRCUIT BOARD (PCB)

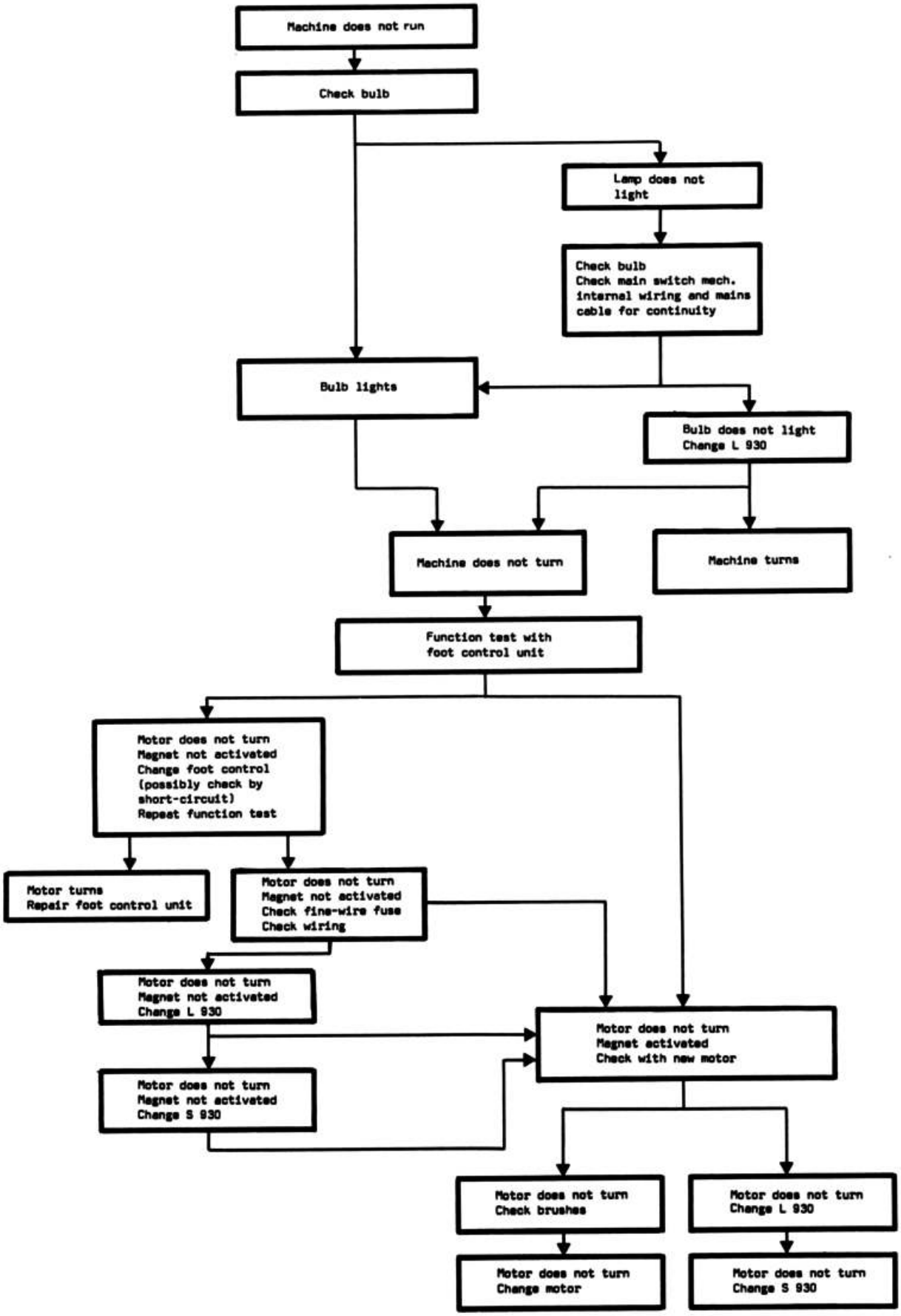
The printed circuit boards are adjusted by the manufacturer and the potentiometers are secured with shellac to prevent their movement.
In the normal way, no speed adjustment is required following exchange of PCBs S 930 or L 930.

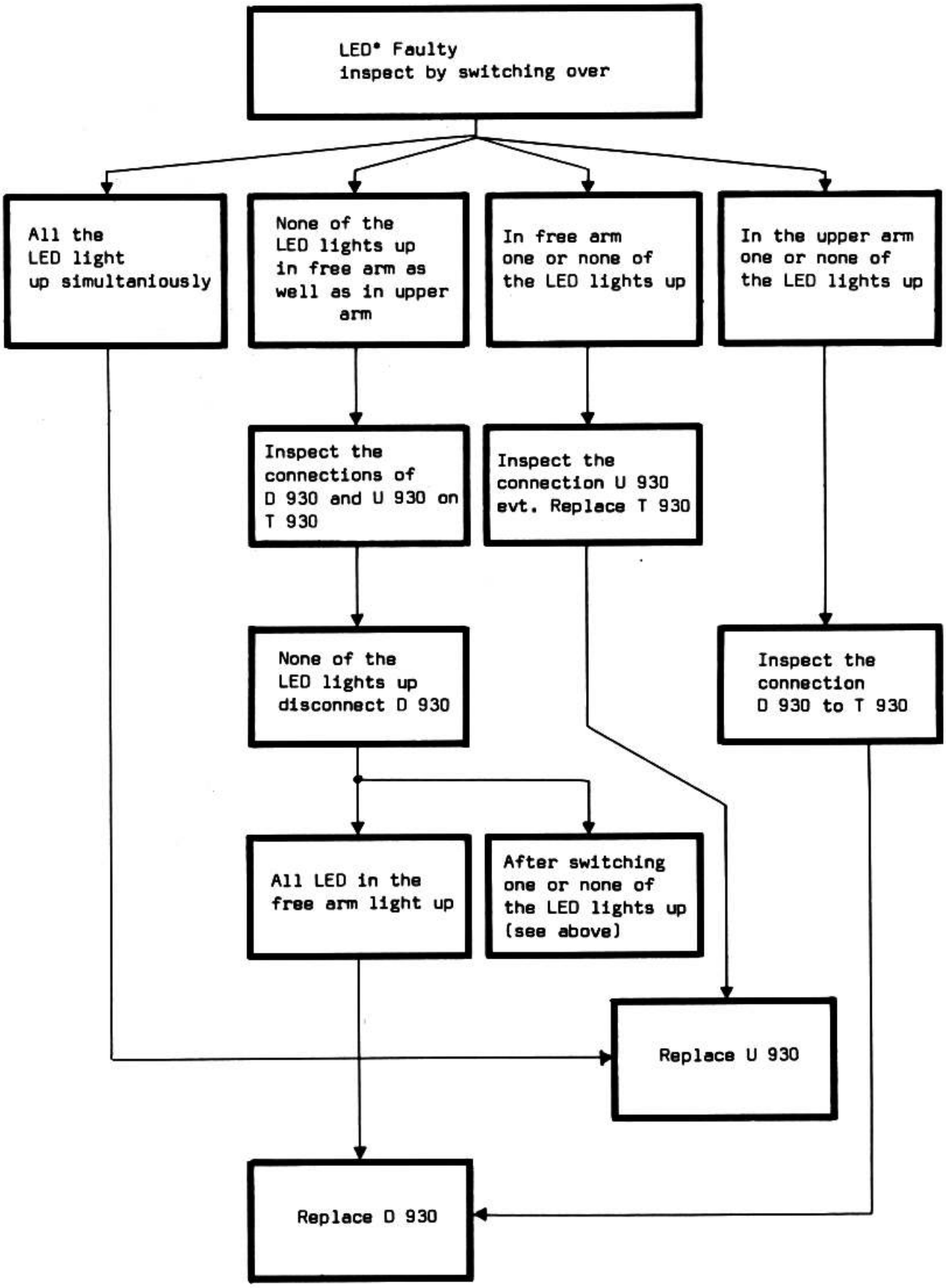
If suitable equipment is available for measuring the speed, the procedure is as follows:

- Remove belt cover and chassis cover
- Fit special cover and handwheel
- Connect foot control unit and mains plug
- Switch on machine and main switch to ●
- Press foot control right down
- Setting the upper speed: potentiometer A on PCB L 930, point of measurement e.g. handwheel, n= 1050 rpm
- Operate foot control so that machine runs at slowest speed
- Setting the lower speed: potentiometer B on PCB S 930, point of measurement e.g. handwheel, n - 150 rpm
- Main switch to ◓
- Speed control:
  Foot control pressed right down, n= 600 rpm
  Operate foot control so that machine runs at slowest speed
  N - 120 rpm (handwheel)
- Secure all potentiometers with shellac to prevent turning.

Subject to modifications to text and illustrations.


Connect machine to mains
Connect foot control unit
Start machine
Machine runs at max. speed
Motor has no penetrating power
Motor does not turn
Machine splutters
Needle stop device does not function
Light emitting diode (LED) indication faulty
Open winder cover
Check operation of foot control
Test with new motor
Repair: see page
Change foot control unit
Function check with foot control unit
Repair: see page
Speed regulation not possible
Change L 930
Motor produces correct penetrating power
Change motor
Machine turns normally
Repair foot control unit
Machine splutters
Test with new motor
Needle stop magnet functions
Check mechanics
Needle stop does not function
Check wiring
Check fine-wire fuse
Speed regulation not possible
Change S 930
Motor has insufficient penetrating power Change L 930
Motor has insufficient penetrating power Change S930
Motor turns normally
Check brushes
Change motor if necessary
Machine splutters
Change L 930
Motor splutters
Change S 930
Needle stop magnet does not function
Change L 930
Needle stop magnet does not function
Change S 930


Machine does not run
Check bulb
Lamp does not light
Check bulb
Check main switch mech. internal wiring and mains cable for continuity
Bulb lights
Bulb does not light
Change L 930
Machine does not turn
Machine turns
Function test with foot control unit
Motor does not turn
Magnet not activated
Change foot control
(possibly check by short-circuit)
Repeat function test
Motor turns
Repair foot control unit
Motor does not turn
Magnet not activated
Check fine-wire fuse
Check wiring
Motor does not turn
Magnet not activated
Change L 930
Motor does not turn
Magnet not activated
Change S 930
Motor does not turn
Magnet activated
Check with new motor
Motor does not turn
Check brushes
Motor does not turn
Change motor
Motor does not turn
Change L 930
Motor does not turn
Change S 930



* Light emitting diode.