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1. General







The machine head is equipped with setting aids which make it possible to set the machine quickly and easily.

With the timing pin 1 and an adjustment disc 3 attached to the timing belt pulley of the arm shaft the sewing unit can be arrested in 5 setting positions.

Depending on the selected position 1 to 5 notches of the timing pin 1 are visible (2 = housing wall).

| A = 1 notch visible. | Adjustment disc to the arm shaft crank. |
|-------------------------------|--|
| B = 2 notches visible. | Thread take-up disc. |
| C = 3 notches visible. | Stroke and advance cam. |
| D = 4 notches visible. | Setting lower timing belt pulley. Looping stroke and needle bar height. |
| E = 5 notches visible. | Symmetry of looper motion. |

2. Setting the Machine Head

2.1 Arm Shaft Crank



The marking groove of the arm shaft crank and the slot ${\bf A}$ of the adjustment disc must be in line.



Caution Risk of Injury !

Turn off main switch before adjusting.

- Insert the timing pin 1 into the marking hole and let it catch in the marking groove of the arm shaft crank.
 Instead of the timing pin any other pin or a 5 mm spiral drill can be used.
- Check to see if, in this position, the timing pin 2 can be inserted into position A (1 notch visible).
 If not, the setting must be corrected.

Setting

- Remove the arm cover.
- Push the timing belt to the left on the upper timing belt pulley 3 and loosen the screws.
- Arrest the adjustment disc in position A (1 notch visible) with timing pin 2.
- Insert timing pin 1 into the marking hole and in let it catch in the marking groove of the arm shaft crank.
- Press the upper timing belt pulley 3 gently to the right against the timing pin 2.
 Tighten both screws.
- By turning the handwheel move the timing belt to the middle of the timing belt pulley again.
- Replace the arm cover.

2.2 Position of the Lower Timing Belt Pulley





The screws of the lower timing belt pulley should be in the position shown when the sewing unit is arrested in position D (4 notches visible).



Caution Risk of Injury !

- Arrest the machine head in position **D** (4 notches visible).
- With an incorrect setting of the screws first set the position of the upper timing belt pulley (see chapter 2.1).
- Remove the timing belt from the upper timing belt pulley.
- Turn the lower timing belt pulley until the screws are in the position shown.
- All following settings must be checked or reset.



2.3 Rocker Bolt and Left Lower Shaft Bearing



The clearance from the center of the needle to the start of the left lower shaft bearing should be soll 39.8 mm.

The clearance from the center of the needle to the end of the rocker bolt should be 38.8 mm.



Caution Risk of Injury !

Turn off main switch before adjusting.

- Remove the needle plate, thread trimmer, needle guard and hook with hook holder.
- Drain the oil from the hook drive housing and remove the hook drive housing.
- Place gauge 6 (Order no. 933 000735) on the needle plate support on the base plate and screw tight.
- By axially displacing the left lower shaft bearing 7 push it onto the gauge 6 (dimension 39.8 mm) and screw tight.
- Remove the housing cover from 1 and the oil pan from 5.
 Loosen the cams 3 and 4 and the sprocket 2.
- By axially displacing rocker bolt 8 push it onto the gauge 6 (dimension 38.8 mm) and screw tight.
- Tighten cams 3 and 4.
 Align the sprocket 2.
 If necessary also align the timing belt pulley sideways.
- Remount the hook drive housing and the other parts removed.

ATTENTION !

When remounting the setting notes in these service instructions are to be observed.

 Fill the hook drive housing with ESSO SP- NK 10 oil up to the upper mark on the viewing glass.

2.4 Hook Drive Housing





The needle tip point to the middle of the hook shaft. The hook shaft lower edge runs parallel to the bottom of the needle plate.

The clearance from the top of the needle plate support to the hook shaft lower edge is 50.5 mm.



- Remove the needle plate, thread trimmer, needle guard and hook with hook holder.
- Place gauge 1 (Order no. 933 000739k) on the needle plate support of the base plate and screw tight.
- Press hook shaft 3 onto the gauge and screw the hook housing tight with screw 2.
- Remount the other removed parts.

ATTENTION !

When remounting the setting notes in these service instructions are to be observed.



2.5 Inserting the Hook in the Hook Holder





The front of the hook should be at an angle of 89° 30' to edge 1 of the apparatus opening.



Caution Risk of Injury !

- Screw out screw 3 of the hook.
- Place gauge 2 (Order no. 933 000750) on the edge 1 and bring the hook into the correct position.
- Tighten screw 3 of the hook.



2.6 Looping Stroke and Needle Bar Height

2.6.1 Looping Stroke





The looping stroke is 3.5 mm.

This means that when the needle is raised 3.5 mm out of the lowest point by turning the handwheel in the direction of turn the hook tip must stand at the center of the needle.

This position must also be reached when, by turning the handwheel in the other direction, the needle rises 3.5 mm out of its lowest point.



Caution Risk of Injury !

- Arrest the machine head in position **D** (4 notches visible).
- Loosen screw 3.
- With the butt screws 1 and 2 set the position of the hook.
- Tighten screw 3.

2.6.2 Symmetry of Looper Motion



The symmetry of looper motion is set with the gauges 1 and 2 (Order no. 933 080192).



Caution Risk of Injury !

Turn off main switch before adjusting.

- Arrest the machine head in position **D** (4 notches visible).
- Attach the pointer 1 and angle 2 (see illustration).
 Align the pointer to the slit inb the angle.
- Pull out the timing pin and by turning the handwheel move the sewing unit to position E (5 notches visible) and arrest.
 The pointer 1 should have made a pendulum movement to the left and back to the slit again.

If not the loosen the fastening screws on the lower timing belt pulley 3.

By turning the lower shaft reduce the distance between the pointer and the slit by **half**.

Adjust angle 2 (slit to the pointer).

Repeat the setting until, in position **D** and position **E**, the pointer 1 stands directly above the slit.

2.6.3 Needle Bar Height





The height of the needle bar is correctly set when the hook eye lies at the needle center **and** the lower edge of the needle eye stands at the upper edge of the hook eye.

| \mathbf{A} | Caution Risk of Injury ! |
|--------------|--|
| | Turn off main switch before adjusting. |



- Screw off the head cover.
- Insert gauge 2 (Order no. 933 000755a) until its lays on in the needle bar and fasten
- Arrest the machine head in position **D** (4 notches visible).
- Set the needle bar as to height and tighten the needle bar fastening screw 1.





Setting the looping stroke can also be conducted with the setting block and the stroke tongue.



Caution Risk of Injury !

Turn off main switch before adjusting.

Prerequisite for the setting of the looping stroke with the stroke tongue is the correct setting of the needle bar height (see 2.6.3).

- Turn the handwheel until the needle is in the 1st position (UT).
- Attach the stroke tongue 1 and the setting block 2 as shown.
- Pull the stroke tongue away.
- Set the setting block tight by turning the handwheel.
- Set the hook with the butt screws (see 2.6.1).

Setting block Stroke tongue Order no. 223 000531 Order no. 223 000536k



With needle avoidance movement (ellipse width) is meant the movement, which the hook conducts in oder to pass in its movement from right to left behind the needle and from left to right in front of the needle.

The ellipse width is dependent on the needle system and the needle thickness.

The ellipse width is correctly set when with hook movement from right to left (see b) there is a clearance of 0.1 mm between hook tip and needle.

With hook movement from left to right (see a)the needle should, in the position shown, touch the back of the hook.

Calculation of the ellipse width:

| | | E = a + b + | 0,1 + x | |
|-----|------|---|--|---|
| E | [mm] | Ellipse wid | th | |
| а | [mm] | Needle thickness in the area of the furrow | | |
| b | [mm] | Hook thickness in the area of the thread guide hole at the hook tip | | |
| 0,1 | [mm] | Clearance between hook tip and needle with movement from right to left | | |
| х | [mm] | Quantity by greater needle thicknesses | | |
| | | x = 0 x = 0,1 x = 0,2 | for needle for needle for needle | es up to Nm 100 es up to Nm 120 es up to Nm 130 |

Example for a needle 934 Sin/ Nm 110

E = 0,7 + 1,4 + 0,1 + 0,1 = 2.3 mm

- a = 0,7 mm Ellipse width
- b = 1,4 mm Needle thickness in the area of the furrow
- 1,0 mm Clearance between hok point and needle x = 0,1 mm Quantity by greater needle thicknesses





Caution Risk of Injury !

Before measuring and setting turn the main switch off.

Measuring the ellipse width

- Attach gauge 1 with parts set 2 (Order no. 933 000743).
- By turning the handwheel set the lowest and the highest point.
 The difference must correspond to the ellipse width.
 If not then the ellipse width must be set again.

Setting the ellipse width

- Axially displace the lower shaft (see chapter 2.3). The ellipse width is changed by only half the amount that the lower shaft was displaced ! To the right: Ellipse width becomes smaller To the left: Ellipse width becomes greater
- Then set the advancing cams 4 and 5 on the lower shaft bearing tight again !
- Do not turn the advancing cams ! If so they must be set again. Realign sprocket 3.
- Do not turn the sprocket ! If so the thread take-up disc must be set again.
- Check the position of the retaining ring (see chapter 8.2) and the timing belt pulley in the axial direction.

2.8 Needle Guard





The needle guard 1 is to hinder a diversion of the needle into the path of the hook.



Caution Risk of Injury !

Turn off main switch before adjusting.

Preparation

- Remove the needle plate and feed dog.

1. Setting the Height

Move the needle guard 1 in the block 2.
 See a) .
 In the lowest needle position the upper half of the needle eye must remain free.

2. Setting the Position

 Align the needle block on the hook housing. See b).
 When the hook tip moves from right to left and reaches the needle then the needle tip should touch the needle guard.
 The hook must move behind the needle without touching it.
 When lowering the needle should not be diverted by the needle guard so that the loop formation is not impaired.



3. Differential Bottom Feed

3.1 Main Feed Dog



The bottom feed operates with 2 independently adjustable feed dogs arranged in tandem.

The advancing length of the main feed dog (right feed dog carrier) is determined by the position of the left guide shaft 3. It is set at the factory at an advance of 2,5 mm for the normal stitch length.

The differential feed dog can conduct a greater or equally great advance as the main feed dog. The amount of crimping is determined by the setting of the controls.

The different advancing lengths of the differential feed dog (left feed dog carrier) are set by the pneumatically operated step cylinder.

The stitch condensation at seam beginning and seam end is set with the step cylinder. It must be activated at the controls.



Caution Risk of Injury !

- Loosen the lock nut 2.
- Set screw 1.
 With a sewing speed of 2 800 min⁻¹ the transport distance should be 2.5 mm.
- Tighten lock nut 2.
- Conduct a sewing trial and check stitch length.



3.2 Differential Feed Dog and Step Cylinder



In the base setting (Additional width = 0) the differential feed dog is set at a stitch length of 2.5 mm by a sewing speed of 2 800 min⁻¹. The step cylinder is in the base position.



Caution Risk of Injury !

- Remove the step cylinder and insert gauge 1 (Order no. 935 054565).
 The cam bolt 1 in the upper eye of the gauge must be in its middle position. turn the screw slit so that it run parallel to the center line
- of the gauge.
 Set the stitch length. Loosen screw 3. Turn the guide accordingly. By a sewing speed of 2 800 min⁻¹ the transport distance should be 2.5 mm (synchronous to the main feed dog).
- Remove gauge 2 and insert step cylinder.
- Set additional width at the controls to 0 and conduct a sewing trial. Check the stitch length.
 If the stitch length is incorrect then set the cam belt 1 accordingly.
 - If the stitch length is incorrect then set the cam bolt 1 accorcingly.



The main feed dog 4 (right feed dog carrier) in the highest position should lie parallel 1.1 mm over the upper surface of the needle plate. The differential feed dog 3 (left feed dog carrier) in the highest position should lie parallel 1.5 mm over the upper surface of the needle plate.



Caution Risk of Injury !

- Loosen screws 1 and 2.
- Set the height of the feed dog carrier with the gauge(Order no. 935 054563).
- Tighten screws 1 and 2.

3.4 Feed Dogs Lengthwise



With a maximum additional width set at the controls the feed dogs should not hit each other and also not hit the needle plate.



Caution Risk of Injury !

- Loosen screws 1 and 2.
- Set the feed dogs lengthwise.
- Tighten screws 1 and 2.
 Screw 2 can only be reached from the outside through the hole in the base plate.

3.5 Advancing Movement of the Feed Dogs



The advancing movement of the feed dogs is determined by the position of the cams 1 and 2 on the lower shaft.

The setting of the advancing cams is made with gauge 3 (Order no. 933 000758).



Caution Risk of Injury !

- Arrest the machine head in position **C** (3 notches visible).
- Loosen the screws on advancing cam 1.
- Insert gauge 3 in the slit of the advancing cam.
- Turn the advancing cam in the direction of machine turn so that the edge of gauge 1 touches the stitch regulator guide 4.
- Tighten the screws on the advancing cam 1.
- Set advancing cam 2 as described above.
- Check to see that there is no relative movement made between the top feed foot and the differential feed dog during the transport process. If this is the case then the position of the advancing cams 1 and 2 must be corrected.
- Check stitch length (see 3.2).

3.6 Lift Movement of the Feed Dogs



The lift movement of the feed dogs is determined by the position of the cam 2 on the lower shaft.

The needle bar must have started a hole (fixed) in the material during the needle bar downward movement when the feed dogs are flush with the upper edge of the needle during their lift out of the needle plate.

If the feed dogs lower below the needle plate before the needle starts a hole in the material, the bunched crimping will slide out again and be lost.



Caution Risk of Injury !

Turn off main switch before adjusting.



- Arrest the machine head in position **C** (3 notches visible).
- Loosen both screws 1 on the lift cam 2.

Set the lift cam. When the differential feed dog is flush with the needle plate, the distance from the needle eye lower edge to the needle plate is 1 mm.

- Align the lift cam axially. The sprocket of the lift cam runs centered to the sprocket of the take-up lever disc.
- Check the position of the take-up lever disc and correct if necessary.

3.7 Stitch Condensation



The stitch condensation is set with the step cylinder. It must be activated at the controls via function **F3**.

The carrier 1 sets the stitch regulator guide 4 for the main feed dog at the correct stitch length by stitch condensation.



Caution Risk of Injury !

- At the controls set the value for crimping at 0.
- Loosen screw 2.
- Set carrier 1 tight with pin 3.
- Tighten screw 2.



The stitch length controlled lower thread take-up lever makes possible an automatic adaption of the lower thread quantity to each stitch

length. When the stitch length is altered the lower thread take-up lever activated appropriately by the lower guide shaft 2.

The setting values can be easily reproduced with the scale 3.



Caution Risk of Injury !

Turn off main switch before adjusting.

Base setting

By sewing units with a maximum stitch length of 4 mm:

- Push bolt 1 in the direction of the guide shaft until it touches.

By sewing units with a maximum stitch length of 6 mm:

- Set bolt 1 to the middle of the slot.



Setting the lower thread take-up lever

- Loosen screws 4.
- Set the thread guide according to the scale.
 0 = small thread quantity
 - 5 =large thread quantity

ATTENTION !

When setting a large thread quantity care should be taken that the lower thread does not jump off the take-up lever disc prematurely.

- Align the center of the thread guide hole 5 with the edge 7 of the carrier plate.
- Tighten screws 4.
 Sideways the thread guide is set with no play.
 If not then reset screw 6.



ATTENTION !

By extreme settings; e.g. shortest possible stitch length and largest possible thread quantity (elastic seam) care is to be taken that a sure stitch of the needle into the thread triangle can still be made.

By over-large lower thread quantities missing stitches can occur.

When, with the above mentioned settings, the stitch length is increased by a greater amount then the thread guide must be set back toward 0.

A jumping-off of the lower thread in the area X of the thread take-up disc could otherwise result.

The lower thread would not, as necessary, be pulled back through the thread take-up disc during the hook return movement.



5. Take-up Lever Disc





When the hook starts its return movement from left to right, the take-up lever disc 1 should touch the thread and pull it back.



Caution Risk of Injury !

Turn off main switch before adjusting.

1



- Arrest the sewing unit in position **B** (2 notches visible).
- Turn the take-up lever disc so that it lies 5 mm above the carrier plate.
 The position can be checked with the gauge (Order no. 933)
 - The position can be checked with the gauge (Order no. 933 000740).

6. Top Feed



The top feed is executed as a so-called "light stroke" top feed.

Top transport foot 4 and pressure foot 3 have seperate suspensions and springs. Independent of the pressure of the feed foot the desired lighter seating pressure for the pressure foot can be set.

This makes an effective working in of the upper additional width possible.

The light stroke is the motion that the pressure foot can conduct upwards by low seating pressure before the pressure foot holder 2 hits block 1 and the additional spring pressure of the presser bar is added.

6.1 Height of the Transport Foot



5 6 7

8 9

10 11



If the pressure foot 3 lies on the needle plate then the clearance between the block 2 and the underside of the pressure foot holder 1 is 0.2 mm.

When the feed dogs are in the highest position then the transport foot 4 must lay parallel onto the feed dog.





- Screw out pressurescrews 5, 6 and 7. All the pressure of the top feed device is released. Screw 5 (threaded pin) is in the screw 6.
- Check the pressure foot holder 1 for ease of movement.
- Set the glide guide 13, and thus the transport foot 4, tight by tightening the screw 14.
 Check ease of movement after loosening bracket 12.
- Lower the feed dogs by turning the handwheel.
- Loosen screw 10.
- By sliding the presser bar 8 set a clearance of 0.2 mm between the pressure foot holder 1 and block 2.
- Seat guide block 9 on the support angle 11.
- Align the transportfoot 4 centered to the pressure foot 3.
- Tighten screw 10.
- The setting of the pressure screws 5, 6 and 7 is described in chapter 6.2.



6.2 Pressure Setting for the Top Feed





Through spring pressure and seating of the **guide block** 5 on the support angle 6, the block 7 with the top feed foot is held in the lower position.

The correct pressure setting of the **transport foot** is necessary for optimal material transport. Excess pressure hinders the working in of additional width and can cause damage to sensitive materials.

The seating pressure on the **pressure foot** is to be set so that the pressure foot sole of the feed dog movement occurs even at the highest sewing speed.



Caution Risk of Injury !

Turn off main switch before adjusting.

Spring pressure on the guide block

 The pressure is correctly set when the clearance between the upper edge of the regulator screw 2 and the machine arm is 19 mm.

Pressure increase:Turn screw 2 clockwisePressure decrease:Turn screw 2 counter-clockwise

Seating pressure of the pressure foot

 The pressure is correctly set when the threaded pin 1 is flush with the upper edge of the presser bar 4.

Pressure increase:Screw threaded pin 1 deeperPressure decrease:Screw threaded pin 1 shallower

Pressure of the transport foot

 The pressure is correctly set when the clearance between upper edge of the regulator screw 3 and the machine arm is 17 mm.

Pressure increase:Turn screw 3 clockwisePressure decrease:Turn screw 3 counter-clockwise



6.3 Lift Level Alteration for the Top Feed System



The sewing unit is equipped with an adjustable lift level for the top feed system. This effects optimal transport results for smooth sewing and with crimping work by thin as well as thick materials.



Caution Risk of Injury ! Turn off main switch before adjusting.

 Set the setting wheel 1.
 With medium weight material the transport foot lie parallel and on the material lying under the sewing feet along the whole length.

The seamstress set the level of the complete top feed system to a new material thickness with setting wheel 1.

6.4 Advancing Movement of the Top Feed



To bunch additional width the top feed and the differential feed dog (left feed dog carrier) must together be set larger than the main feed dog (right feed dog carrier). The length changes are effected by the step cylinder. Setting occurs with the keys on the controls.

By length changes the stitch regulator guide is slewed by the step cylinder and thus the stitch length of the main feed dog changed. Via the clamping hub and lever the stitch regulator guide for the top feed is changed at the same time.



Caution Risk of Injury !

Turn off main switch before adjusting.

In order to achieve a synchronized resetting of the stitch lengths of the differential feed dog (left feed dog carrier) and of the top feed the following settings must be made:

Transport length of the top feed foot

- Set the bottom Feed correctly (see chapter 3.).
- Replace the step cylinder with gauge 1 or set the controls to an additional width of "0".
- Loosen screw 4.
- Place gauge 5 on the pin of the clamping hub 3.
- Turn the clamping hub so that the lower edge of the gauge 5 is flush with the lower edge of the block 2.
- Tighten screw 4.
- Remove the arm cover.
- Loosen screw 7.
- Set clamping hub 6 on the stitch regulator guide synchronized to the bottom Feed.
 Stitch length 2.5 mm at 2 800 min⁻¹.
- Tighten screw 7.
- Attach the arm cover.

6.5 Transport Foot Lengthwise





Even with the greatest additional width activated when sewing the top feed foot should not strike the pressure foot sole. Therefore with the greatest additional width there must also be a minimum clearance of 0.8 mm set between the top feed foot and the pressure foot sole.



Caution Risk of Injury !

- Loosen the threaded pin 1.
 The threaded pin 1 can be reached through the opening 3.
- Adjust cam 2.
 The minimum clearance between top feed foot and the pressure foot sole should be 0.8 mm with the maximum additional width set.
- Tighten threaded pin 1.

6.6 Lift Movement for the Transport Foot



The lift movement of the transport foot is to be set so that the transport foot only rises from the needle plate when the needle eye lower edge stands 1 mm above the needle plate.



Caution Risk of Injury !

Turn off main switch before adjusting.



Pre-setting

- Lower the transport foot and bring the forward feed dog into the highest position.
- Loosen screw 6 and adjust the angle lever 5.
 Set a clearance of 1.5 mm between the roller 1 and the leg 2 of the glide guide.
- Tighten screw 5.



Lift movement

- Remove plug 4 at the back of the arm.
- Loosen the threaded pins 3 of the advancing cam.
 The threaded pins are only accessable through the opening at the back of the arm.
- Turn the upper arm shaft.
 The transport foot may only rise from the needle plate when the needle eye lower edge stands 1 mm above the needle plate.
- Tighten the threaded pins 3 of the advancing cam.
- Insert plug 4.

ATTENTION !

An addition look at the advancing cam is possible with the arm cover removed.

6.7 Stopping Angle for the Transport Foot



The stopping angle 2 limits the lowest position of the transport foot movement when the pressure foot is raised. It raises the transport foot 4 during the lift.



Caution Risk of Injury !

- Remove the needle and pressure foot.
- Remove the forward feed dog.
- By turning the handwheel bring the transport foot 4 into the lowest position.
- Loosen screws 1 and 3.
- Set the pressure foot.
 Between the needle plate and the transport foot 4 set a clearance of 0.05 mm (a 0.05 mm thick sheet of paper should be able to be pulled through with a little dragging).
- Tighten screws 1 and 3.
- Reinsert the forward feed dog. Check feed dog height and, if necessary, correct (see chapter 3.3).

7. Pressure Foot Lift Stroke



The pressure foot lift stroke is set at a stroke height of 6 to 7 mm.



Caution Risk of Injury !

Turn off main switch before adjusting.

Pre-setting

The needle bar must be in the high position and the synchronizer must be set correctly.

Setting

- Set both nuts 3 on the cylinder bar.
 With the pressure foot lying on the needle plate there should be a clearance of 1 mm set between the lift angle 2 and guide block 1.
- Loosen lock nut 5.
- Set the stop screw 4.
 Stroke height 6...7 mm.
- Tighten lock nut 5.



8. Thread Trimmer

8.1 Retaining Ring



At the seam end the thread cutting device is switched on.

After stepping back on the pedal up to the stop the cylinder is operated by a solenoid valve. The hooked knife is moved out of its clamping and cutting position to the left.

After ventilation of the solenoid valve the hooked knife with the upper and lower thread moves back in the clamping and cutting position to the right again (see illustration). Hereby the threads are clamped under the clamping plate 2 and cut at the counter knife 1.

During the cutting process the lower thread behind the hook and the rear thread of the upper thread loop must be caught by the tip of the moving knife.

ATTENTION !

The cutting process can only occur with the needle bar positioned high. Only in this position does the retaining ring 5 release the movement of the retaining pin 4 to the right.



Caution Risk of Injury !

- Arrest the machine head in position **B** (2 notches visible).
- Loosen the screws of the retaining ring 5.
- Set the retaining ring.
 The retaining pin 4 should be at the center of the milled section.
 The clearance between the retaining pin and the face of the retaining ring is 0.5 mm.
- Tighten the screws of the retaining ring 5.

8.2 Cutting Pressure and Thread Gripper Plate



The setting of the thread trimmer occurs with it removed from the unit.



Caution Risk of Injury !

Before removing the thread trimmer turn the main switch off.

- Remove the thread trimmer.
- Loosen screws 1.
- Align the tip of the movable hooked knife 4 to the lower edge of the fixed knife 3 (see circle).
- Tighten screws 1.
- Conduct a cutting trial with thread.
 If a clean cut is not achieved, check the knife for sharpness or insert a new sharp knife.
- Loosen the lock nut on the pressure screw 5.
 By screwing in the pressure screw 5 a little set the movable hooked knife 4 to cut.
 Check the hooked knife for ease of movement !
 Tighten the lock nut again.
- Set the thread gripper plate 2.
 The thread gripper plate 2 shold the trimmed thread end lightly clamped for a secure seam beginning.
 A clamping plate set too tightly can cause bunching at the seam beginning.

ATTENTION !

In the illustration the clamping plate is turned to the side in order to give a better view of the position of the hooked knife. In the correct position it is exactly over the fixed knife 3.

- Under the knife there is a second clamping plate as height compensation for the knife. This must always be present!
- Check to see if the lower thread and the rear thread of the upper thread loop caught by the hooked knife (see illustration on page 33) !
- Install the thread trimmer.

8.3 Left End Position of the Hooked Knife





In the left end position of the hooked knife the knife plate should not hit the table top.

The cutting position for the needle thread and the gripping position for the hook thread are to be set.



Caution Risk of Injury !

Turn off main switch before adjusting.

Left end position

- Bring the needle bar in the high position.
- Unhook the tension spring 4.
- Manually move the knife operating bar 1 to the right.
 The knife plate should hit the table top.
- Set the stop 3 to lever 5 and screw tight.
- Hook the tension spring 4 in again.

Cutting and gripping position

- Bring the needle bar in its high position.
- Unhook the tension spring 4.
- Loosen screws 2 and set the hooked knife to the left.
 Move the knife operating bar 1 by hand.
 During travel to the left end position the lower thread and the thread of the upper thread loop lying at the back of the hook should jump in front of the tip of the hooked knife.
- Align the hooked knife sideways and tighten screws 2.
 Move the knife operating bar 1 by hand.
 With the smallest and the greatest stitch length the hooked knife should lead only the lower thread and the thread of the upper thread loop lying at the back of the hook to the counter knife.
- Hook tension spring 4 in again.

8.4 Right End Position of the Hooked Knife



The right end position of the hooked knife is the clamping and cutting position for the lower thread.



Caution Risk of Injury !

Turn off main switch before adjusting.

Right end position

- Bring the needle bar in its high position.
- Unhook the tension spring 7.
- Manually move the knife operating bar 4 to the left.
 The cutting edge of the hooked knife should move approx. 1 mm beyond the cutting edge of the counter knife. This is the case when the tip of the gripping hook (see pos.3 on page 33) is seen just beyond the edge of the thread gripper plate.
- Set the stop 6 to the lever 8 and screw tight.
- Hook tension spring 8 in again.

Setting angle 5

 In the right end position the knife operating bar 4 the clearance between the cap nut 3 and the angle 5 should be approx. 1 mm.

Setting the ball head 1

- Loosen screws 2.
- Set the ball head 1 so deep in the groove of the knife holder that it does not hit the edge of the groove by knife movement.
- Tighten screws 2.

9. Puller for the Hook Thread





During the movement of the knife operating bar up to its right end position so much hook thread must be pulled forward that the hook thread gripped by the hooked knife can be loosely lead against the clamping plate and counter knife. This avoids breakage of the hook thread before reaching the thread gripper plate.

The drawn off thread quantity is set correctly when, after the cutting procedure is completed, the thread hangs loose in a slight S-shape between the hook and thread drawing wire.

If too much hook thread is drawn forward then the hook thread clamped by the thread trimmer lies uncontrolled behind the hook at the start of the seam. Flawless thread triangles cannot be formed and missing stitches result.



Caution Risk of Injury !

1

- Bring the needle bar in its high position.
- Loosen nut 5.
- Press the knife operating bar 6 to the right until it touches.
- Set the operating plate 7.
 With the machine head tilted back the puller 3 should be vertical.
- Tighten nut 5.
- Set the clearance between wire bow 4 and puller 3 at 1 mm. This hinders the puller going beyond its end position and drawing threads forward uncontrolled.
- Loosen screw 2 and set the drawing wire 1.
 After the cutting procedure is completed the thread hang loose in a slight S-shape between the hook and thread drawing wire.
- Tighten screw 2.

10. Tension release



Simultaneously with the beginn of the thread cutting procedure the thread release slide 1 opens the upper and lower thread tension . The thread release slide 1, in the idle position of the thread cutting device, should lie approx. 0.5 mm in front of the tension discs.



Caution Risk of Injury !

- Set the thread cutting device according to chapter 8.1.
- Loosen screw 2.
- Slide the tension bar so that there is a clearance between the claws and the tension release of 0.5 mm.
- Tighten screw 2.

11. Puller for the Needle Thread



The drawn-forward, tension-free upper thread improves the sure stitch formation at the next seam beginning.

The thread puller plate 2 sets the length of the pull-off.



Caution Risk of Injury !

Turn off main switch before adjusting.

- Loosen screws 1.
- Set the thread puller plate 2.
- Tighten screws 1.
- Through trial sewing operate the thread puller mechanically. Turn the handwheel slowly in the direction of machine turn and check the quantity of drawn forward upper thread.

ATTENTION !

A too large quantity of upper thread can cause missing stitches at the seam beginning.

12. Thread Guide on the Machine Arm



When the thread lever 1 is in the upper dead center, then the thread holes of the thread guide 3 and the thread lever should build a horizontal line.



Caution Risk of Injury !

- Loosen screw 2
- Set thread lever 3.
- Tighten screw 2.





13. Service Settings at the Electrical Components

Controls concept for the Class 550-12-12

The following explanations and setting notes are important as a basis for the understanding of the unit.

Service work on the electrical components is not possible without this knowledge.

Individual controls are coupled with one another.

The chain stitch machine head cl. 935-940-6 is powered by an Efka sewing drive 1 of the newest type.

This drive generates, per stitch, a count signal, which is directed, via an intermediate control (= interface) 2 to the monitor control 3.

At the same time this interface serves as distributor for all electrical signals.

In the monitor control a program procedure has been entered which simultaneously with the individual steps switches the solenoid valves for crimping values or controls a tape feed unit **4** with tape pull-off unit **5**.

The successive switching of the steps occurs via the count signal of the Efka sewing drive.

Coupled current supplies:

The monitor controls require, for the CPU and the screen, a 5V or 12V current, both of which are generated by the built-in 230V mains connection.

The tape pull-off unit $\mathbf{5}$, the interface $\mathbf{2}$ and the inputs/outputs of the monitor controls $\mathbf{3}$ (and thus the tape feed unit $\mathbf{4}$) are all supplied by the 24V current of the Efka drive.





Adaptions:

Sewing machine, sewing drive, interface, monitor controls, tape feed and tape pull-off unit are all universal components which must be adapted for use with cl. 550-12-12.

- 1 Sewing drive: Adaption of parameters necessary.
- 2 Interface: Adaption of control functions via switches on the integrated circuit board.
- **3 Monitor controls**, no service settings possible, but programming for the special requirements of cl. 550-12-12 necessary.
- 4 No electrical adaptions at the tape feed unit.
- **5** The transport speed of the **tape pull-off unites** must be adapted to the sewing speed.

13.1 Sewing Drive (1) Efka DC 1600, DA 82GV, Eprom Stand 3209



Why are special adaptions necessary here?

<u>Example:</u> This drive is actually designed for the saddle stitch machine N291. With cl. 550-12-12 the thread cutting for the chain stitch machine cl. 935-940-6 is generated with the thread wiper signal. For this the signal must be extended and the switching of the foot lift delayed.

Adaptions are necessary at the following points:

- Timing of the chain stitch trimmer
- Tape insertion unit, assuring function timing of the foot lift and speed reduction during insertion and cutting.
- Adapting the maximum rpm to the speed of the tape advancer.



For the **entering of parameters** a control panel V720 or V730 is required.

| Nr. 111 | to 3000 | (4000) | = | n max. |
|---------|---------|--------|---|---------------------------------|
| Nr. 117 | to 1000 | (2000) | = | DB 2000 (stroke adjustment rpm) |
| Nr. 153 | to 3 | (1) | = | brake cycling at idle |
| Nr. 201 | to 200 | (80) | = | delay FL at pedal -1 |
| Nr. 202 | to 200 | (120) | = | start delay from FL |
| Nr. 205 | to 200 | (100) | = | thread wiper time |
| Nr. 206 | to 350 | (30) | = | delay FW end up to FL on |
| Nr. 283 | to 2 | (1) | = | function run interlock |

To be changed are: (old values in brackets)

After the above parameter changes beginning and end bartacks are to be switched off and FA and FW switched on at the control panel.

After setting the switches (keys) and the parameters the pedal must be stepped forward once for sewing and then stepped back for thread cutting. Only then are the altered parameters in memory. Now the machine should be turned off in order to pull off the Efka control panel. This avoids accidental key operation on the Efka control panel which could confuse the program procedure.

The following explanations are necessary only in special cases with cl. 550-12-12.

But they also apply to various Autoselect drives in the DA Programm: 4P720V, A50K01, DA820V, A50S01 and DA82GV.

Autoselect means that the motor control, via a resistor in the machine head, recognizes the machine head type and sets its functions and parameter values accordingly.

The purpose of the Autoselect is to reduce the number of controls and / or to be able to automatically optimally operate different types of machine heads with one basic control.

The recognition of the machine head via the Autoselect resistor occurs every time the mains is turned on. As long as the controls find no other resistor the functions and parameter set remain constant.

With **cl. 550-12-12** the Autoselect resistor is on the interface circuit board.

Because of the 100 Ω resistor the Efka drive "recognizes" a machine head N291 and adapts its parameter set to it. For the chain stitch machine head 934 of class 550-12-12 the parameter changes described above are thus necessary.

If the parameters were accidently changed to an undefined status there are only 2 possibilities for correcting this:

- Check all parameters according to the Efka parameter list and correct as required.
- Special control panel entry (not described in any Efka operating instructions.). With the following command sequence the control are reset to the original values:
 With the mains "on" press key "P" on the control panel, then tap in "5913", then press key "E" twice, then press key "+" and finally key "E" again.

Then, as described above, the 8 parameters for cl. 500-12-12 must be changed.

13.2 Interface (2)

The interface consists of a circuit board which conducts the electrical distribution and at the same time contains electrical adaptions and interlocks.



Interface circuit board, View of soldering side, as installed

Via the the distributor the various controls are interconnected and their signals sent "mixed" to the individual components. The assignments in the plug connectors allow for the use of this interface with similar machine distributions.

The electronics are designed to be equally multifaceted. For example, a cl. 219 with additional width controls can be attached because the required timing alterations for bartacking and MW signals are already been built in.

For the cl. 550-12-12 described here only a small part of these electronics are used.

The switching-over of the functions is made with small "hook" switches on the circuit board.

Because further applications for these controls have not yet been realised, only switch positions for cl. 550-12-12 were able to be established.



Monitor controls with 2 30-pin plug connections



General:

There are no hardware adaptions for these controls. For the programming special instructions are available. Thus, here only relationships not dealt with there will be explained.

These controls are for use with cl. 550-12-12 as well as cl. 550-16-6.

Only cl. 550-12-12 requires the full hardware extension with two 30-pin plug connectors.

Controls with only one 30-pin plug connector (supplied up to approx. Mid-1993) thus function only with cl. 550-16-6.

Hardware:

These controls are designed as universal controls with a max. of 24 inputs, 1 quick count input and a max. of 24 outputs. Additionally, a V24 interface (here for screen display) and a 32K memory card are built in.

In the current development phase 12 inputs and 24 outputs are assigned.

All inputs are designed + switching for 24V, all outputs for 0.5A, max. 40V, 0 switching.

Originally a multiple application use was intended for these controls. For this an extension circuit board is planned which can be executed machine-specific.

Here a "plug circuit board" with two 30-pin plug connectors appropriate for the classes 550-16-6 and 550-12-12 is built in. Further, the inputs and outputs were appropriately distributed and electrical adaptions made for the control signals "Run Interlock" and "Seam End (=FA).

Software:

Corresponding to the development process from a special 550-16-6 control to a combination control 550-16-6 / 550-12-12 the software is also built up.

The software contains 2 functionally different systems:

 a) The original concept for the sleeve attachment machine 550-16-6. Here, parallel to the steps, programmable additional widths (crimping values) or functions with appropriate current display are given out. For the successive switching of the step multiple outputs are available.
 These functions (with adapted graphics) are also used with

These functions (with adapted graphics) are also used with 550-12-12.

b) An independent sequence control for the tape feed unit for the cl. 550-12-12. The insertion and cutting of the tape are to be activated by 2 programable functions (F1 and F2).
 All control signals for this tape feed unit lie on the second 30-pin plug connector.





Only in part freely programmable

The input and output signals of the 200-3 controls are still partially electronically linked at the interface. Thus, for example, with 1.7 mm short stitching, all stages of the multi-position cylinder are switched on or with (planned) multi-width application smooth sewing is automatically selected for bartacking or stitch condensation.

These and other linkages led to having the usually freely programmable outputs assigned fixed functions in this control combination cl. 550-12-12.

| F-numbers | Function of the corresponding output in the individual steps | Remarks | | |
|-----------|--|--|--|--|
| F1 | Signal-Tape advance | These signals also start the operation of bthe tape | | |
| F2 | Signal-Tape cutting | advancing mechanism via the software. | | |
| F3 | freely programmable | | | |
| F4 | SR 2000 | "SR 2000" is a control input of the Efka sewing drive which enables the reduced maximum number of revolutions to be switched on. Heer the number of revolutions is reduced to 1000 via parameter 117. F4 is necessary to hold the position of the sewn-on tape independent of the number of current sewing revolutions. | | |
| KW 1/2 | Programmable crimping values | Electronically generated binary crimping values which are decoded by a pneumatic 5-setting multi-position cylinder | | |
| KW 1 | | and issued as decimal lengths. All outputs are programmable and can be switched by direct | | |
| KW 2 | | key operation. | | |
| KW 4 | | | | |
| KW 8 | | | | |
| *) F 5.1 | Stitch length at 1.7mm | Here all KW values are switched on via the interface. | | |
| F 5.2 | freely programmable | | | |
| F 5.4 | Release light barrier | This lets the light barrier be switched active as desired | | |
| | (currently not used) | Example: Light barrier only switched on at the 3rd corner. | | |
| F 5.8 | freely programmable | | | |
| F 6.1 | Block beginning bartacking | The changeover S2 at the interface establishes that the | | |
| F 6.2 | (currently not used) | bartacking is blocked via F 6.1 and F 6.2. If S2 is opened, however, both outputs are freely programmable. | | |
| F 6.4 | FA | This signal is transmitted to the control input "Seam End" o | | |
| | (currently not used) | (function same as pedal to the back.) | | |
| F 6.8 | freely programmable | | | |
| | | | | |

*) = The transporter is mechanically set to a stitch length of 2.5 mm.

The 6-setting multi-position cylinder mechanically effects the pre-switched differential transport and generates, depending on position, the different crimping values. Here 5 stages are used. Zero corresponds to smooth sewing. Here the first 5 stages are run out, whereby the differential transport also stands at a stitch length of 2.5 mm. By switching in a further cylinder a changeover to 1.7 mm smooth sewing is possible. For this the 6th stage of the multi-position cylinder is switched on through **F 5.1** and, at the same time, the remaining 5 stages (independent of their positions) are also switched on through the interface hardware. The now completely extended multi-position cylinder thus generates a stitch length of 1.7 mm. Through a loose mechanical coupling which is only activated with the 6th stage the (stitch length) transporter is also drawn to 1.7 mm.



It is an independently working unit only requiring a 24V current supply for operation.

Function:

With cl. 550-12-12 the edge binding should have no pre-tension during feed. This is only possible if the edge binding is drawn off of a loosely hanging loop when being sewn on.

The controls of the tape pull-off unit must thus effect that there is a sufficient loose tape reserve available at all times.

For this the tape loop must be scanned. Because of the thin and narrow tape an indirect scanning had to be chosen.

When falling below a pre-determined remaining length the tape being run off raises a light metal roller. This lift is registered by a sensor. This switches on the advancing motor of the tape pull-off unit for a certain period.



Adaptions:

As soon as the sensor registers the raised roller the advancing motor is switched on for an adjustable period with an adjustable rpm. The speed is set at the factory for about 90% of the maximum rpm. The period for the tape advance is set at the unit.

With maximum rpm (via parameter 117 on the Efka drive limited to 3000 rpm) and greatest desired stitch length a check is made if for this greatest tape pull-off speed the tape loop is still large enough. If not the time must be increased.

Problem area

The advancing length has (see above) been firmly set. By chance the advancing motor can be switched on just at the end of the tape being sewn, that is, during cutting. Because the advancing length is set for maximum tape pull-off there would now be a much too large tape reserve, that is, a loop hanging too low. The signal "Tape Cut" is sent from the tape feed unit to the electronics as a control signal. This reduces the time for a running advancing motor by about 50%. For this the 3rd (green) wire is required.