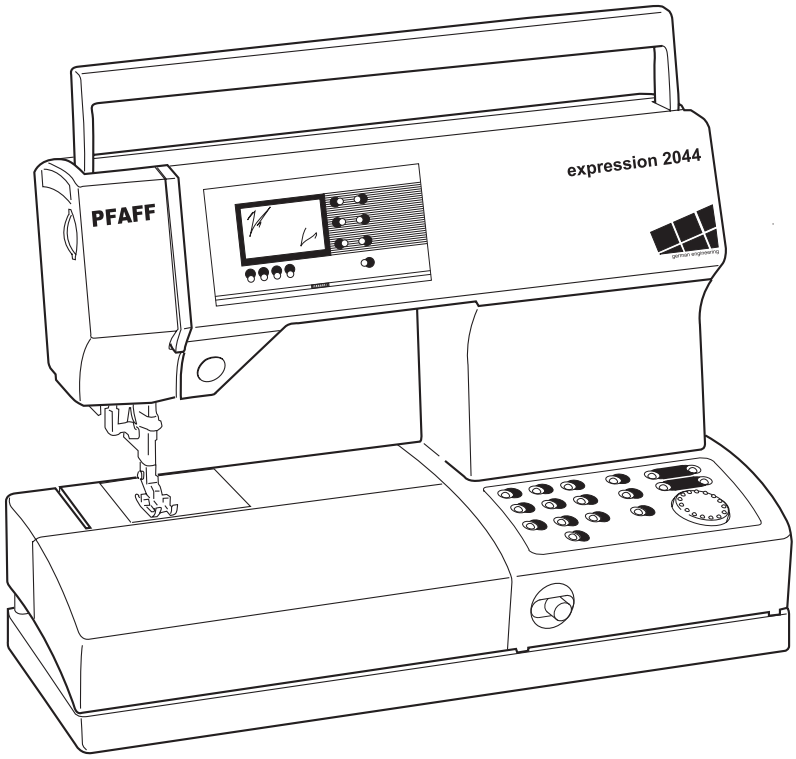
PFAFF

expression
2014, 2024, 2034, 2044

german engineering

Service Manual



1st edition November 2002

Leerseite

Safety test

Foreword

This service and repair manual is intended to assist you in carrying out all repairs to the machines quickly and correctly.
Adjustments should only be carried out if you find the actual settings deviating from the requirements described here.
When checking or adjusting a machine, please always proceed in the sequence specified. For easier reference every workstep is marked with a dot.
Differing worksteps are marked with a circle or square.
The indications "right", "left", "top", "bottom", "front" or "rear" always refer to the upright machine with its controls facing the operator.

When assembling dismantled machines, make approximate adjustments right in the course of work. This facilitates subsequent precise adjustments.

If not specified otherwise, the handwheel must always be turned to the front.

Always pull out the mains plug before making repairs to live parts or in their vicinity. An electrical safety test must be carried out after every repair, including mechanical ones. According to the German law on safe machine operation of June 24, 1958, VDE regulations apply as official rules in electrical engineering and as such are basic to electrical safety tests of technical devices.

The required electrical tests for appliances are set forth in Para. 4 of the Regulations for Repair, Modification and Testing of Used Electrical Devices (VDE 0701, edition 05.93). After every repair of electrical devices we manufacture, a test in accordance with VDE 0701 is obligatory.

Outside Germany, there are similar regulations in force, which are largely identical with the requirements of VDE 0701. For repairs of electrical devices, it is therefore by all means necessary to consult an expert.
For correct adjustment of the machines, the following gauges and tools are required:

Needle rise gauge	00-870136-01
Needle rise clamp	61-111600-35
Spacer	63-102600-18
Adjustment gauge for bobbin case position finger	61-111621-15
Presser foot gauge	63-114690-39
Pointer gauge	63-114690-23
Pin gauge	63-114690-09
Allen key 1.5 mm	07-433005-28
Combination spanner (wrench) 6.0 mm	07-433007-50
Torx screwdriver TX 1	07-434008-44
Torx screwdriver TX 15	07-434008-45
Torx screwdriver TX 20	07-434008-46
Torx screwdriver TX 25	07-434008-47
Circlip fitting tool 2.3 kz	07-437003-20
Circlip fitting tool 3.2 kz	07-437003-30
Circlip fitting tool 4.0 kz	07-437003-40
Circlip fitting tool 5.0 kz	07-437003-50
Circlip fitting tool 6.0 kz	07-437003-60
Circlip pliers A1	07-438000-50
Spring hook	07-437006-00

Subject to alterations in design and dimensions.

Notes on the sewing machine with regard to ambient conditions, treatment, cleaning and safety

Ambient conditions:

The recommended ranges are:

Ambient temperature -10° to 40°C (50° to 104°F)
Air humidity 20 % to 80 %

This machine is a high-quality electro-mechanical device. It is designed for household purposes and should always be supervised when in use.
Make sure that it is not subjected to:
dust, severe dampness, direct sunlight, static electricity, heat-producing objects, corrosive chemicals or liquids.
The machine must be used on a free surface, for ventilation purposes, which is both firm and even.

Treatment:

Always protect the machine against damage by hitting or dropping.

Cleaning:

Housing:

To clean the housing, use a dry, clean and soft cloth which is free of fluff. To remove any stubborn dirt, use a soft cloth with a neutral cleansing agent for plastic materials.
Please note!
Do not use any insecticides or chemical products such as petrol (gas) or thin chemicals for cleaning the housing.

Display:

If necessary, clean display with a soft cloth moistened with a little water.

Safety:

1. The machine must be put into operation according to the indications on the specification plate.
2. Do not place any objects in openings on the machine.
3. Do not use the sewing machine if:
   - there is visible damage,
   - its function is disturbed,
   - it is wet, e.g. with condensation.
4. Do not pull the mains plug out of the socket by its cord.
5. If this appliance is used for another purpose than that intended or if it is wrongly operated, we will not accept any liability for any damage caused.
6. To avoid the risk of electric shock, do not open the machine. There are no parts inside the machine which the user can repair. This is solely the responsibility of our qualified service staff.
7. Be sure to use only original PFAFF parts.

Specifications of the PFAFF expression 2014 - 2024

- Electronic free-arm, utility and fancy stitch sewing machine
- 8 bit processor with 1 Kbyte RAM and 32 Kbyte ROM
- Bobbin thread stitch width = 0 - 6 mm with 30 full steps
- Stitch length = 0 to 6 mm forwards and 0 to 6 mm reverse with a total of 30 full steps or 60 half steps in each direction
- A full step is 0.2 mm and a half step 0.1 mm
- Keys for stitch width, stitch length, pattern length and balance
- 13 different needle positions
- Mirroring key
- One 7.5° stepping motor for needle zigzag motion 30 V (contact current switching controller)
- One 7.5° stepping motor for feed control 30 V (contact current switching controller)
- 2-track synchronizer
- Electronically controlled needle "up" positioning
- Key for reverse sewing or for finishing a manual buttonhole
- Digital motor control with 950 r.p.m. max. speed
- Approx. 100 - 950 stitches per minute
- Several stitch-length-dependent reduced speeds in addition
- Numerical LCD
- Built-in test program
- When machine is blocked, the motor is switched off automatically after 1 - 2 secs. (Followed by approx. 4 secs. interruption before sewing process can be continued.)
- Machine: voltage change-over 115/230 V, 50 - 60 Hz
- Low-voltage motor
- High-ohm foot control (cold)
- FM radio and TV screened, approval marking; safety class II with CE, VL, CSA test markings
- Master switch for motor, electronics and sewing lamp
- Built-in sewing lamp 12 V/5 W
- Needle threader
- Pendulum-type needle bar frame.
- Transmission of drive from arm shaft to lower shaft by flat-toothed belt, transmission ratio 1:1
- Power input rating: 75 W when sewing at 950 r.p.m.
  27 W when stationary
- Lockstitch of types 301, 302, 303, 304, 305, 308 and all other variants obtainable by sideways needle movement or forwards and reverse control of the machine feed
- PFAFF horizontal double-rotating hook
- Link take-up
- Slide lever feed regulator for forwards and reverse stitch lengths
- Dual fabric feed on expression 2024
- Disengageable feed dog
- Drive from motor to handwheel by flat-toothed belt.
- Calotte metal bearings
- Oil for calotte metal bearings: BP Energol HLP 46 or HLP 80 No. 28-036550-09
- Oil for sewing hook: No. 91-129452-91

- clear workspace: 175, 110, 204 mm
- Machine height: 290 mm
- Baseplate dimensions: 402 x 175 mm / machine length 408 mm
  / machine length 187 mm
- Free-arm dimensions: 80, 49, 200 mm
- Housing and baseplate material: die-cast aluminium
- Machine weight without carrying case: 8.3 kg
- Needle system 130/705 H

- Additional needle system classifications:

Twin needle	Suffix = Zwi
Wing needle	Suffix = Wing
Twin hem stitching needle	Suffix = Zwi-Ho
Long needle eye	Suffix = N
Stretch needle	Suffix = PS
Denim needle	Suffix = J

- Possible needle points:

Small ball point	Suffix = SES
Medium ball point	Suffix = SUK
Large ball point	Suffix = SKF
Pointed cloth point	Suffix = J
Leather point right hand	Suffix = LR

Specifications of drive motor for the PFAFF expression 2014 - 2024

No. 92-330111-91	24 V =41 W	9300 r.p.m.

Specifications of the PFAFF expression 2034 - 2044

- Fully-electronic free-arm, utility and fancy stitch sewing machine
- 16 bit processor with 3 Kbyte RAM and 96 Kbyte ROM, 512 Byte EPROM
- Bobbin thread stitch width = 0 - 6 m with 30 full steps or 60 half steps
- Stitch length = 0 - 6 mm forwards and 0 - 6 mm backwards with a total of 30 full steps or 60 half steps in each direction
- A full step is 0.2 mm and a half step 0.1 mm
- Keys for stitch width, stitch length, pattern length and balance
- 13 different needle positions
- Mirroring key
- Info key
- One 7.5° stepping motor for needle zigzag motion 30 V (contact current switching controller)
- One 7.5° stepping motor for feed control 30 V (contact current switching controller)
- 3-track synchronizer
- Electronically controlled take-up lever "up" (needle "up" positioning) of needle "down" position with display
- Key with indicator for half speed (540 r.p.m)
- Key with indicator for tying off stitch patterns
- Key for reverse sewing or for finishing a manual buttonhole
- Digital motor control with 950 r.p.m max. speed
- Approx. 100 - 950 stitches per minute
- Several pattern-dependent reduced speeds in addition
- Numerical LCD, with graphics and a white background
- Built-in test program
- When machine is blocked, the motor is switched off automatically after 1 - 2 secs. (Followed by approx. 4 secs. interruption before sewing process can be continued.)
- Machine: voltage change-over 115/230 V, 50 - 60 Hz
- Low-voltage motor
- High-ohm foot control (cold)
- FM radio and TV screened, approval marking; safety class II with CE, VL, CSA test markings
- Master switch for motor, electronics and sewing lamp
- Glare-free built-in sewing lamp 12 V / 5 W
- Needle threader
- Bobbin thread monitor with LED on expression 2044
- Buttonhole guide
- Pendulum-type needle bar frame
- Transmission of drive from arm shaft to lower shaft by flat toothed belt, transmission ratio 1:1
- Power input rating: 75 W when sewing at 950 r.p.m.
  27 W when stationary
- Lockstitch of types 301, 302, 303, 304, 305, 308 and all other variants obtainable by sideways needle movement or forwards and reverse control of the machine feed
- PFAFF horizontal double-rotating hook (9 mm hook on model 2044)
- Link take-up
- Bobbin thread monitoring on model 2044

- Slide lever feed regulator for forwards and reverse stitch lengths
- Dual fabric feed
- Externally disengageable feed dog
- Drive from motor to handwheel by flat toothed belt
- Calotte metal bearings
- Oil for calotte metal bearings: BP Energol HLP 46 or HLP 80 No._28-036550-09
- Oil for sewing hook: No. 91-129452-91
- Clear workspace: 175, 110, 204 mm
- Machine height: 290 mm
- Baseplate dimensions: 402 x 175 mm / machine length 408 mm
  / machine width 187 mm
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- Housing and baseplate material: die-cast aluminium
- Machine weight without carrying case: 8.3 kg
- Needle system 130/705 H

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Leather point right hand	Suffix = LR

Specifications of drive motor for the PFAFF expression 2034 - 2044

Nr. 92-330111-91	24 V =41 W	9300 U/min

Dismantling the housing cover

Note: **Before adjusting or repairing the machine, make sure to dismantle the housing covers according to the adjustment and repair instructions.**

- Pull out the mains plug and the socket on the machine.
- Remove the needle and the presser foot shoe.
- Remove the detachable work support.
- Remove the top cover.
- Unscrew and remove the two torx screws of the housing insert.
- Remove the housing insert.
- Slightly raise both lugs 1 and remove the facing panel of the front housing panel by swiveling it downwards (fig. 1).
- Remove connection plug 2 (fig. 2) from the circuit board.

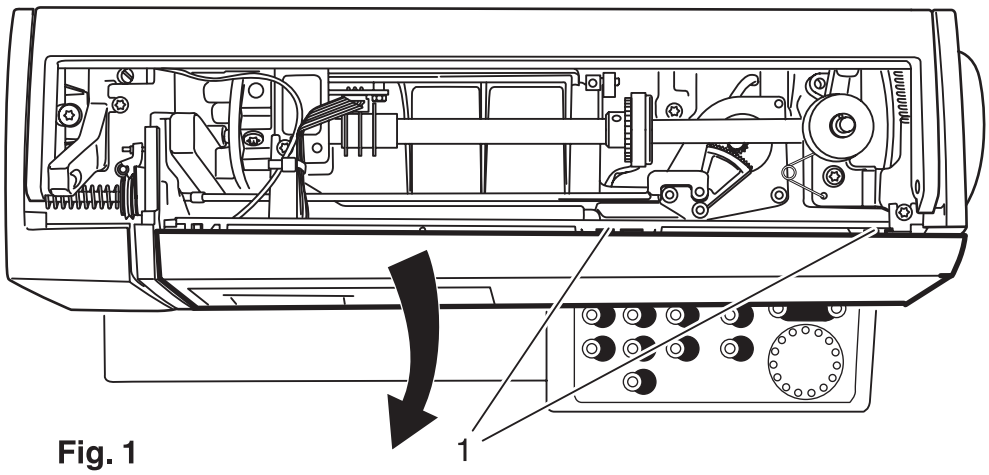


Fig. 1

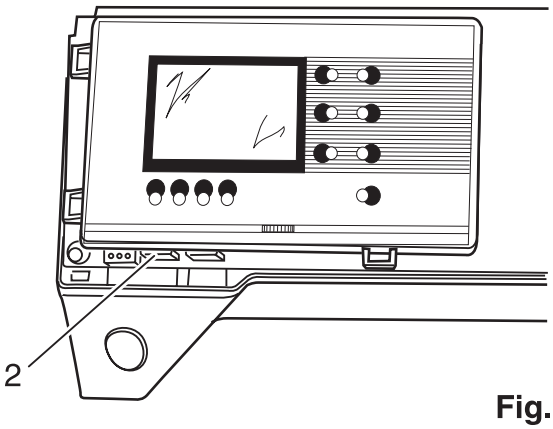


Fig. 2

- Loosen the torx screw on the face plate.
- Remove the complete face plate together with the sewing lamp and cable (fig. 3).
- Remove the carrying handle.
- Unscrew and remove the three fastening screws on the baseplate.
- Tilt the baseplate toward the front.
- Remove 12-wire flat cable 3 and motor cable 4 from the circuit board (fig. 4).

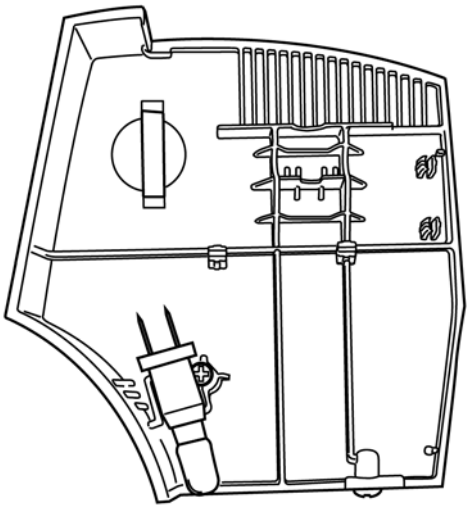


Fig. 3

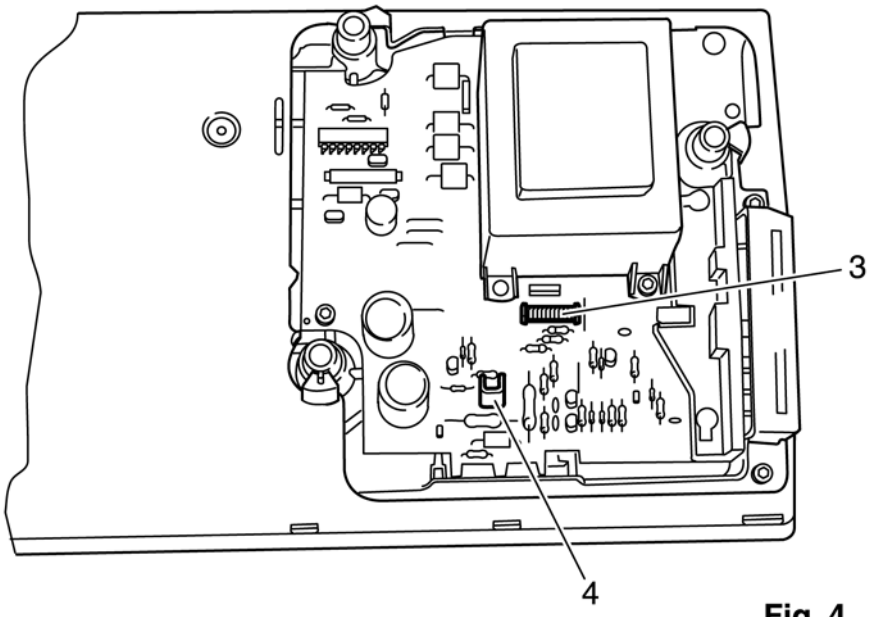


Fig. 4

- Unscrew and remove both fastening screws 5 on the free-arm cover (fig. 5).
- Put the feed drop mechanism in its normal working position.
- Using a small screwdriver, disengage both feed regulators 6.
- Open the cable clip.
- Remove connection plug 7 from the circuit board (fig. 6).
- Remove the free-arm lid carefully from the housing, to the left.

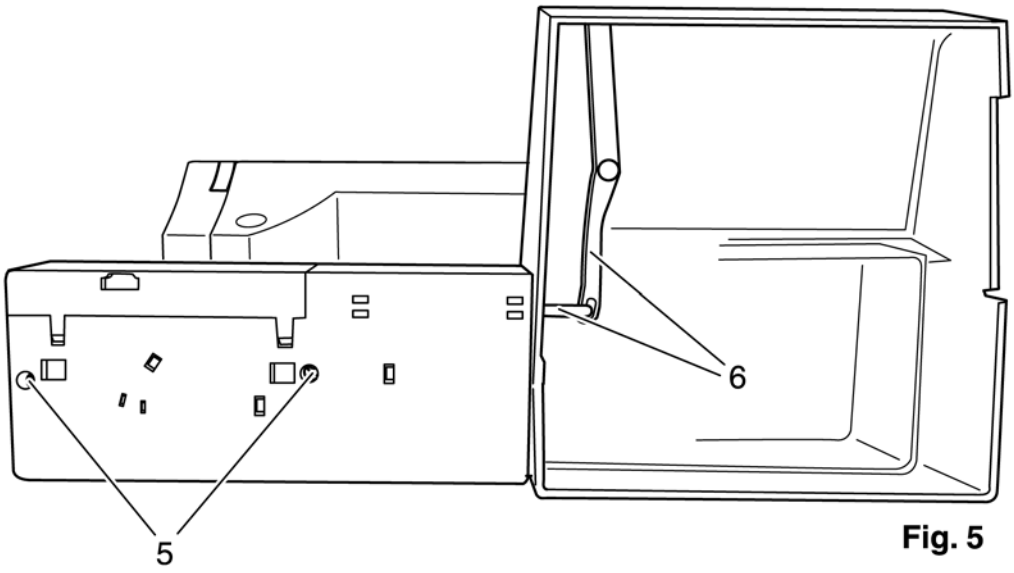


Fig. 5

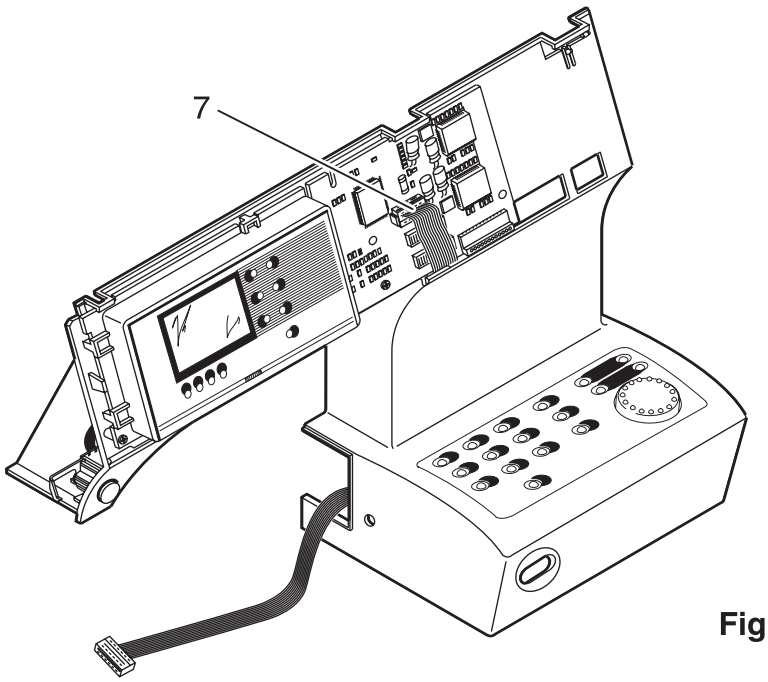


Fig. 6

- Remove the needle plate.
- Unscrew and remove both fastening screws 8 (fig. 7).
- Remove the free-arm cover.

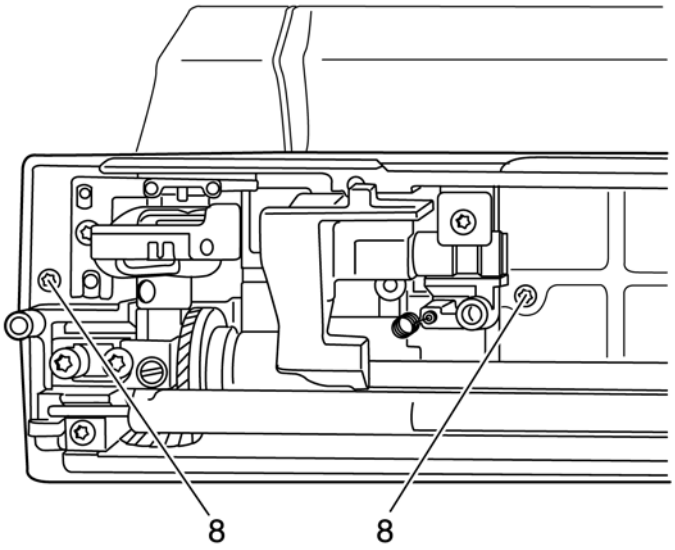


Fig. 7

- Loosen screw 9 on the stand cover (fig. 8).
- Remove the stand cover.

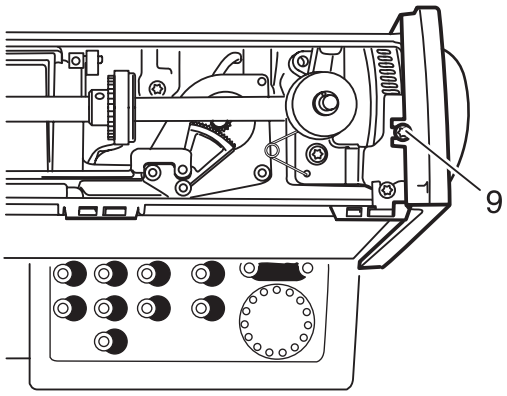


Fig. 8

- Remove fastening screws 10 and 11 on the rear housing shell (fig. 9 and 10).
- Open the catch connections on the inside of the arm by pressing with your thumb against the points indicated by the arrows (fig. 11).
- Remove the rear housing shell.

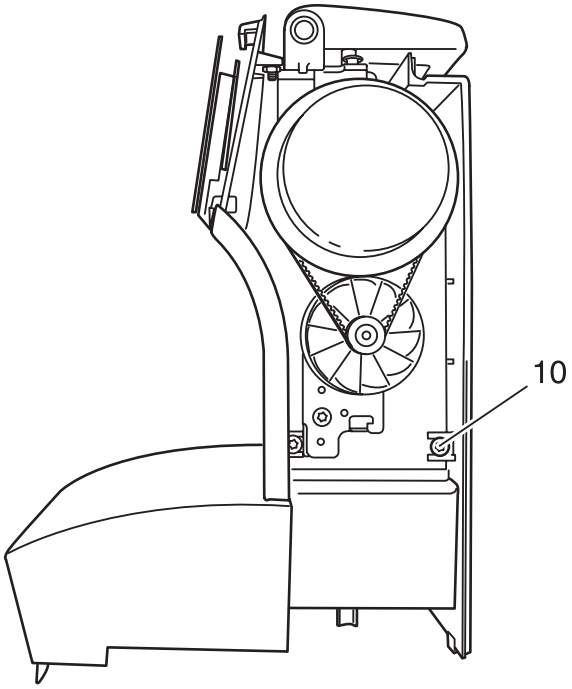


Fig. 9

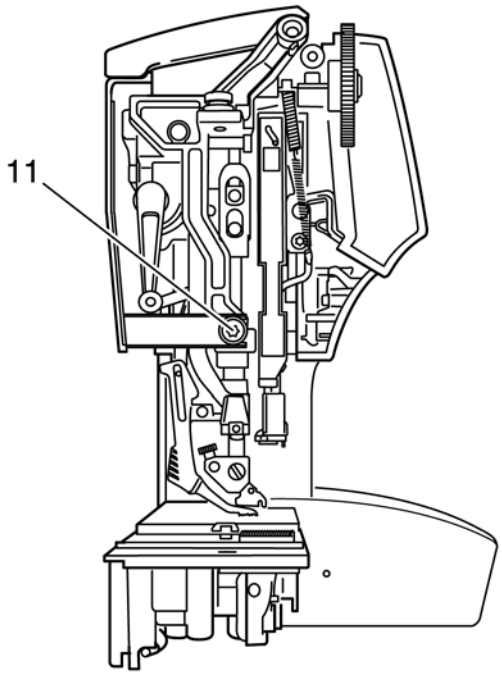


Fig. 10

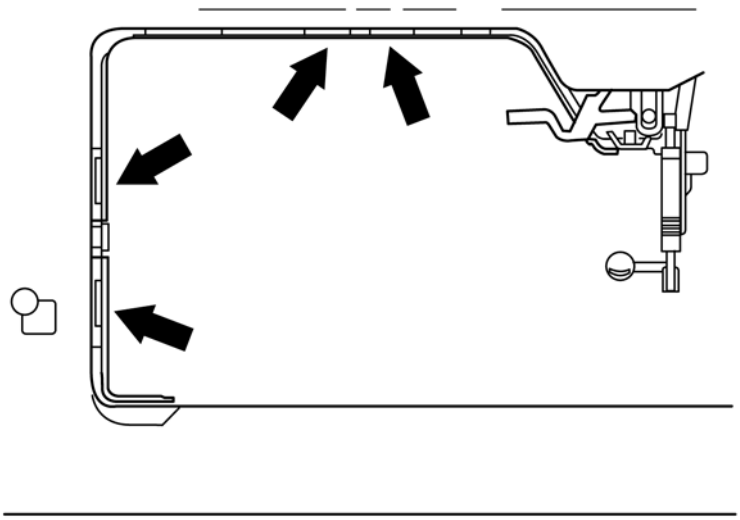


Fig. 11

- Remove the five connection plugs 12, 13, 14, 15 and 16 from the circuit board (fig. 12).
- Loosen fastening screws 17 and 18 (fig. 13) as well as fastening screw 19 (fig. 14).
- Remove the front housing shell carefully.

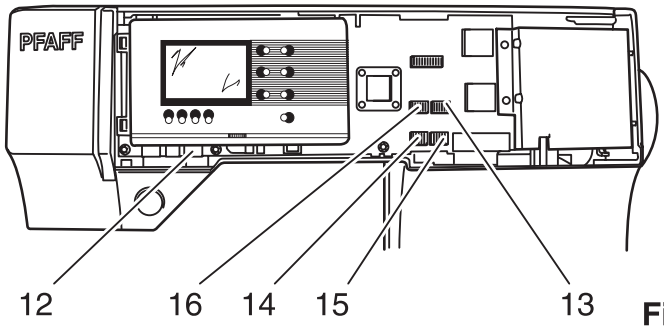


Fig. 12

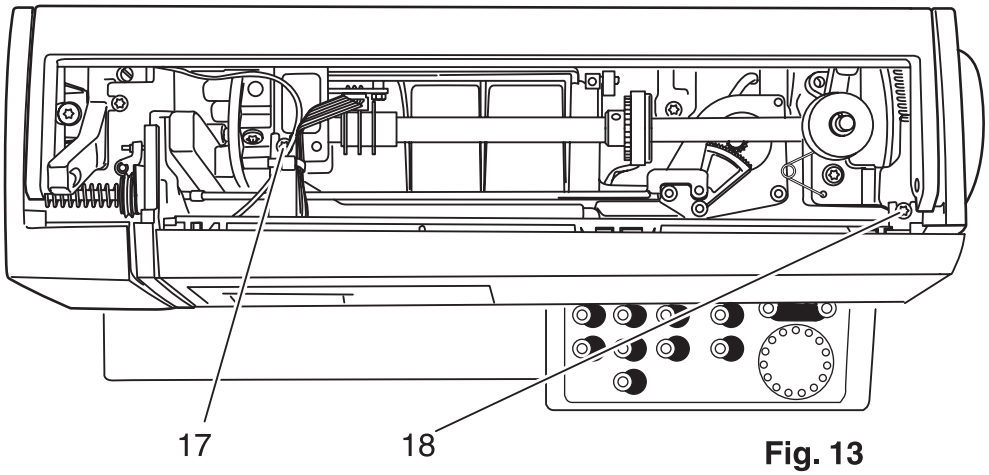


Fig. 13

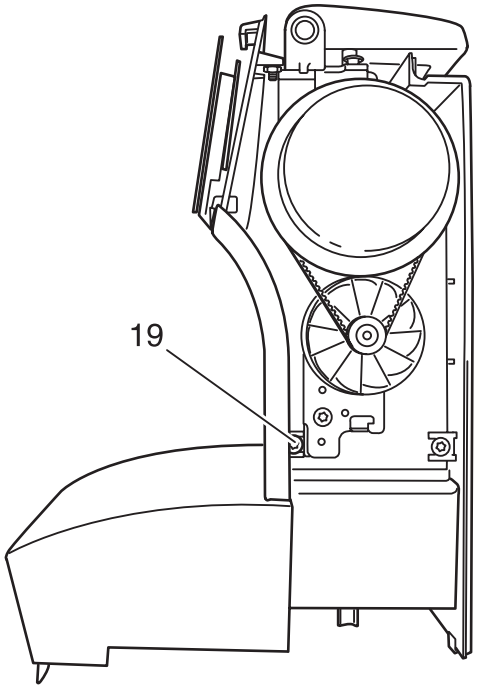


Fig. 14

- Remove buttonhole sensor's cable guide 20 (fig. 15).
- Remove the complete buttonhole sensor with the spring.

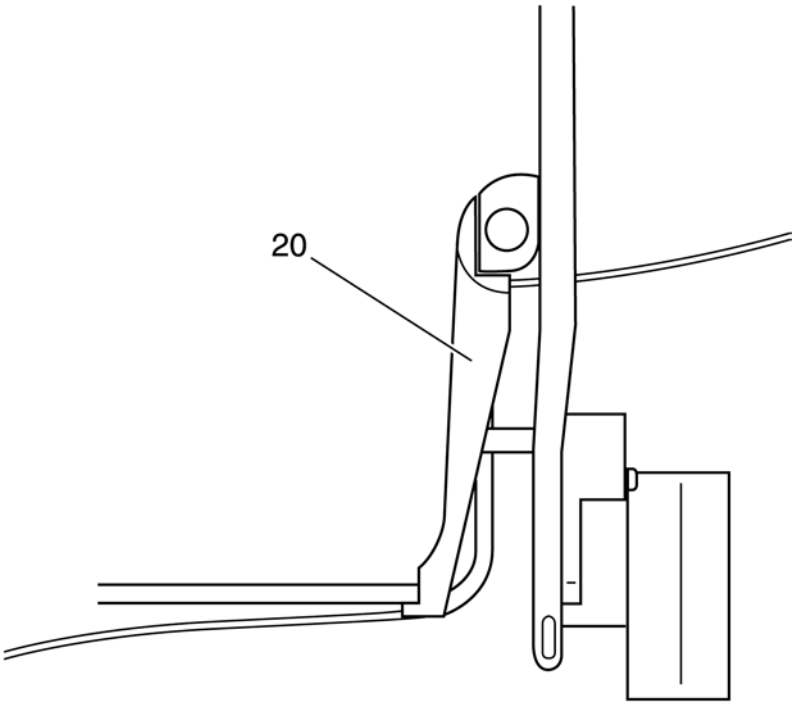


Fig. 15

Notes:

Feeding system

1. Adjustment of the flat-toothed belt tension

Requirement:

The flat-toothed belt must be so taut that the sewing hook has no play in its rotating direction, but it must be possible to turn the machine easily.

Adjustment:

- Loosen screw 1 (fig. 1).
- Re-position tensioning roller 2 with a screwdriver accordingly.
- Tighten screw 1.

Check:

- Check adjustment according to "Requirement".
- Press lightly against middle of flat-toothed belt.
  The belt must move 1 to 3 mm forwards.

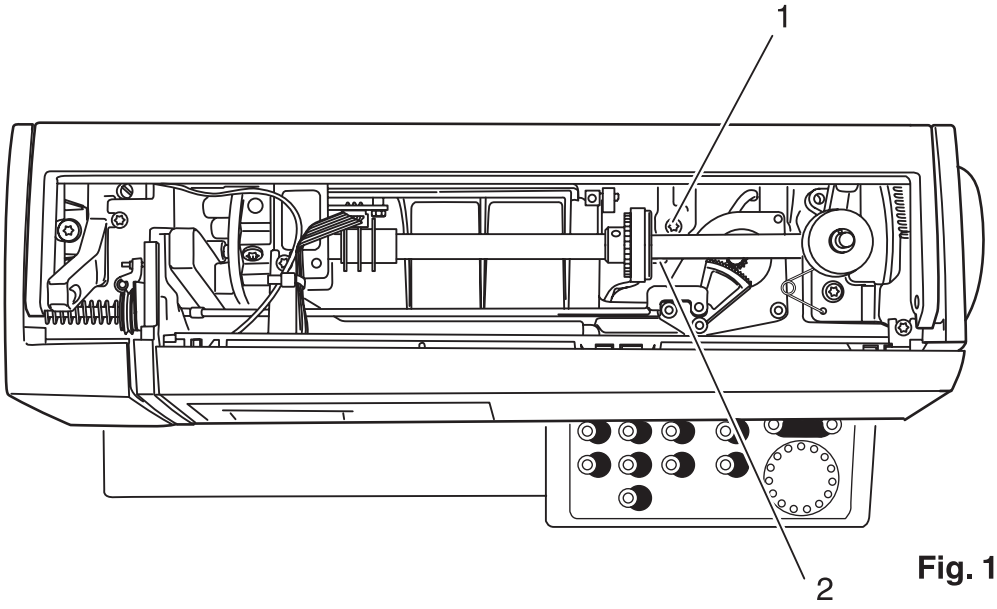


Fig. 1

2. Adjustment of feed dog in sideways direction for Pfaff expression 2014

Requirement:

The distance of the feed dog to the right and left edges of the feed slot must be equal (fig. 2).

Check:

- Carry out a visual check of the feed dog position.

Adjustment:

- Tilt the machine to the rear.
- Unhook spring 3 (fig. 3).
- Unscrew and remove screw 4.
- Turn the handwheel until the lobe of drive eccentric 5 is positioned at the rear.
- Fold feed regulator 6 downwards and remove this and link 7 from the connecting bar rod to the left.
- Remove slide block 8 with spring to the right.
- Unhook spring 9.
- Loosen screws 10 and 11.
- Re-position the driving shaft together with the two cylindrical pins 12 and 13 sideways without play until the feed dog is positioned in the middle of the feed slot.
- Tighten screw 10.
- The pressure of the right cylindrical pin must be 1 kg.
- Tighten screw 11.
- Remove the needle plate.
- Use your finger to pull the feed dog to the front, then release it.
- The complete feed driving shaft 14 must slide slowly to the rear.
- Loosen screw 15.
- Push slide lever shaft 16 complete with stepping motor 15 approx. 1 mm to the right.
- Push slide block 8 with spring onto the pin and install it in slide way 18 in the correct curve radius.
- Tighten screw 15 and check whether the slide block moves easily and without any play.
- Push link 7 complete with feed regulator 6 to the right onto the connecting bar pin.
- Fold feed regulator 6 to the rear and then upward over feed eccentric 5.
- Place screw 4 in clamping plate 21 and tighten it a little.

● Move stud 20 sideways until link 7 and connecting rod 19 still have some play and move easily.
● Tighten screw 4.
● Attach both springs 3 and 9.

Cross-check:

● The feed dog must now be positioned in the exact middle of the feed slot.

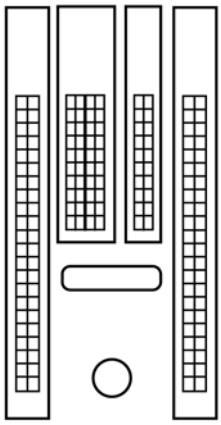


Fig. 2

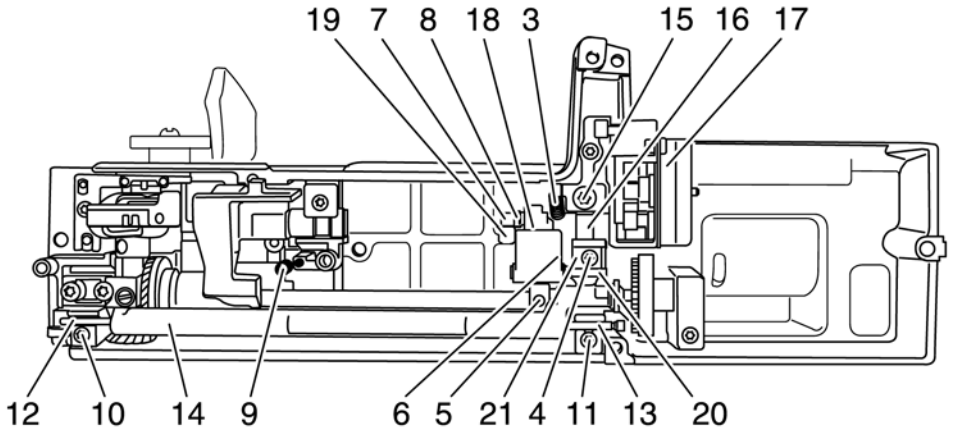


Fig. 3

2a. Adjustment of feed dog in sideways direction for Pfaff expression 2024, 2034 und 2044

Requirement:

The distance of the feed dog to the right and left edges of the feed slot must be equal (fig. 2).

Check:

- Carry out a visual check of the feed dog position.

Adjustment:

- Tilt the machine toward the rear.
- Unhook spring 3 (fig. 5).
- Unscrew and remove screw 4.
- Turn the handwheel until lobe of drive eccentric 5 is positioned at the rear.
- Fold feed regulator 6 downwards and remove this and link 7 from the connecting bar rod to the left.
- Remove slide block 8 with spring to the right.
- Loosen screw 22 (fig. 4).
- Pull out pin 23 to the right.
- Unhook spring 9.
- Loosen screws 10 and 11.
- Re-position the driving shaft together with the two cylindrical pins 12 and 13 sideways without play until the feed dog is positioned in the middle of the feed slot.
- Tighten screw 10.
- The pressure of the right cylindrical pin must be 1 kg.
- Tighten screw 11.
- Remove the needle plate.
- Use your finger to pull the feed dog to the front, then release it.
- The complete feed driving shaft 14 must slide slowly to the rear.
- Fit pin 23 without any play and tighten screw 22.
- Move the top feed lever assembly to the front and rear.
  The complete top feed lever assembly must move easily and without binding (if necessary remove cause of binding).
- Re-position crank pin 24 with pull rod 26 sideways until the complete top and bottom feed moves easily (fig. 6).
- Tighten screw 25 and check again whether the feed system moves freely.
- Loosen screw 15.
- Push slide lever shaft 16 complete with stepping motor 15 about 1 mm to the right.
- Push slide block 8 with spring onto the pin and install it in slide way 13 in the correct curve radius.

- Check whether the slide block can be moved easily, but without play or binding.
- Push slide lever shaft 16 complete with stepping motor 17 carefully to the left until there is a clearance of 0.05 mm between slide block 8 and connecting bar 19.
- Tighten screw 15 and check whether the slide block moves easily and without play.
- Push link 7 complete with feed regulator 6 to the right onto the connecting bar pin.
- Push feed regulator 6 to the rear, and then upward over feed eccentric 5.
- Position screw 4 in clamping plate 21 and tighten it a little.
- Move stud 20 sideways a little until link 7 and connecting rod 19 have a slight play and move easily.
- Tighten screw 4.
- Attach the two springs 3 and 9.

Cross-check:

- The feed dog must be in the exact center of the feed slot.

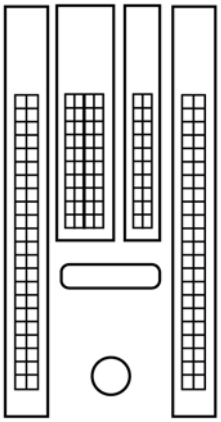


Fig. 2

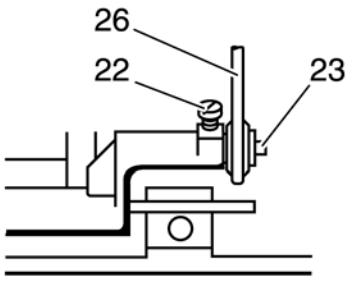


Fig. 4

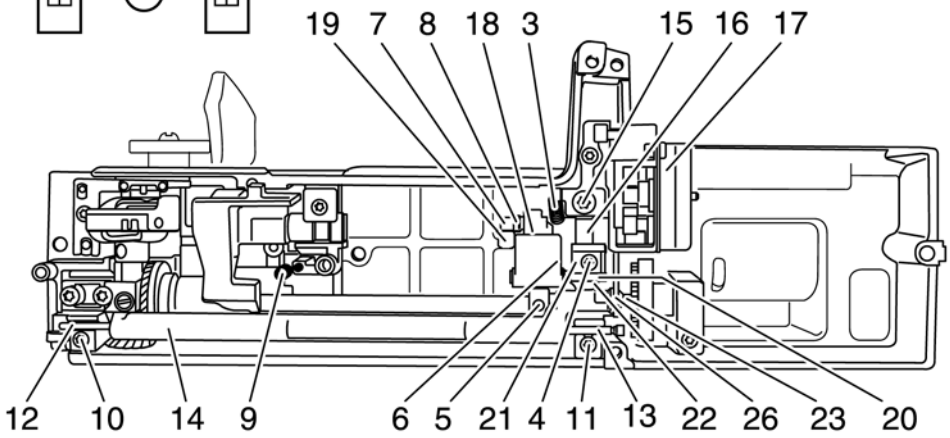


Fig. 5

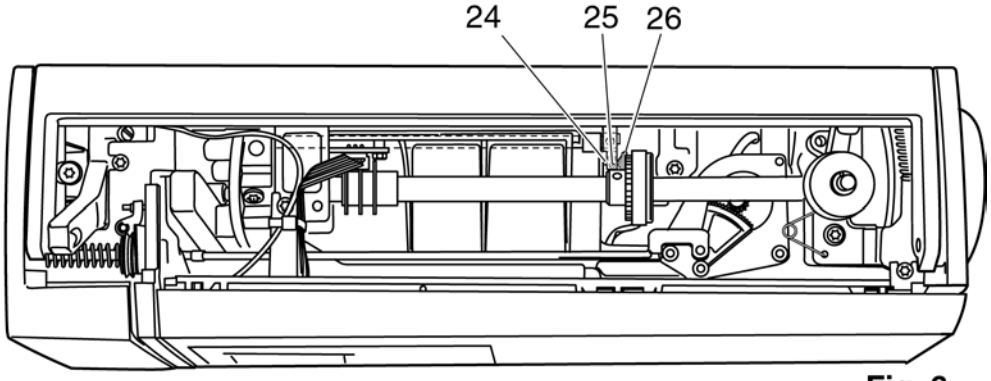


Fig. 6

3. Timing of feed motion

Operating sequence:

When the rising needle has left the fabric, the feed dog moves up above the needle plate.
The risen feed dog pushes the fabric to the rear. Shortly before the end of the feeding motion, the take-up lever is in its highest position (t.d.c).
At a stitch length setting of 6 mm the feed dog now pushes 0.7 mm more to the rear (after-feed movement).
After completing the feeding movement, the feed dog moves down under the needle plate surface and the needle enters the fabric.
Underneath the needle plate the feed dog moves back to its basic position.
Whenever the stepping motor changes the sewing direction from forward to reverse sewing, the feed dog must be positioned 0.3 - 0.35 mm below the needle plate surface on its way downward.

Requirement:

When the needle bar has moved 2 mm up from its lowest position (b.d.c), it must be possible to insert the two pins of pin gauge 63-114 690-09 simultaneously in the holes of the feeding eccentric and the stud (fig. 9).

Check:

- Remove the needle.
- Turn the handwheel to set the needle bar at its lowest position.
- Set the spacer (63-102 600-18) onto the needle bar and push it up against the needle bar frame.
- Push the needle-rise clamp (00-870 137-01) on the needle bar and tighten it lightly.
- Push the 2 mm feeler gauge (00-870 136-01) with its cutout on the needle bar above the needle-rise clamp.
- Loosen the needle-rise clamp and push the 2 mm feeler gauge up against the spacer.
- Tighten the milled screw of the needle-rise clamp (fig. 7).
- Turn the handwheel to and fro a little.
- If there is play at the feeler gauge, repeat this procedure.
- Remove the 2 mm feeler gauge.
- Turn the handwheel in sewing direction until the needle-rise clamp is up against the spacer (fig. 8).
- Tilt the machine over backwards.
- Hold the handwheel in this position while at the same time inserting the pin gauge in the holes of feeding eccentric 5 and stud 27 (fig. 9).

Timing:

- **I**f the adjustment is not correct, remove the needle-rise clamp.
- Loosen the three screws 29 in the lower flat-toothed-belt sprocket.
- Re-fit the needle-rise clamp and repeat the procedure as described in "Check" until the needle bar has moved upwards by 2 mm and the clamp is in contact with the spacer (fig. 8).
- Turn the long drive shaft 28 in sewing direction until it is possible to insert the pin gauge in both holes (fig. 9).
- Insert the pin gauge and tighten one of the screws 29.

Cross-check:

- Remove the pin gauge.
- Tighten all three screws 29 very firmly.
- Check again with the needle-rise gauge and the pin gauge as described under "Check".

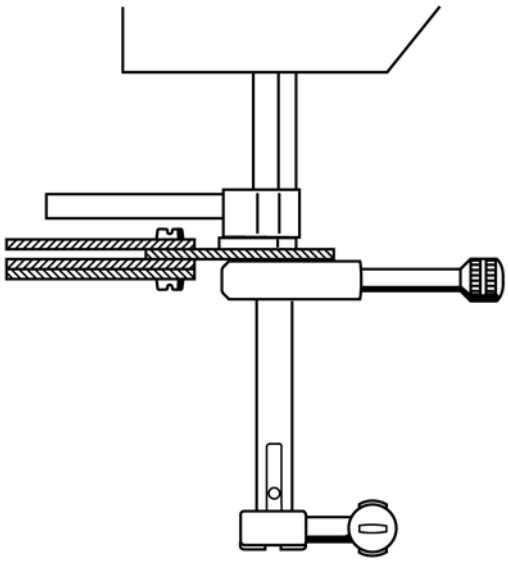


Fig. 7

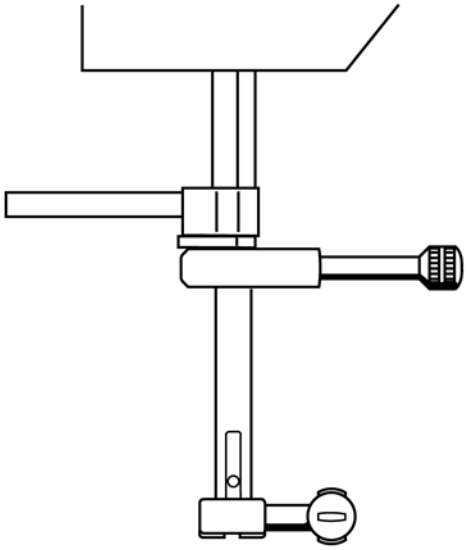


Fig. 8

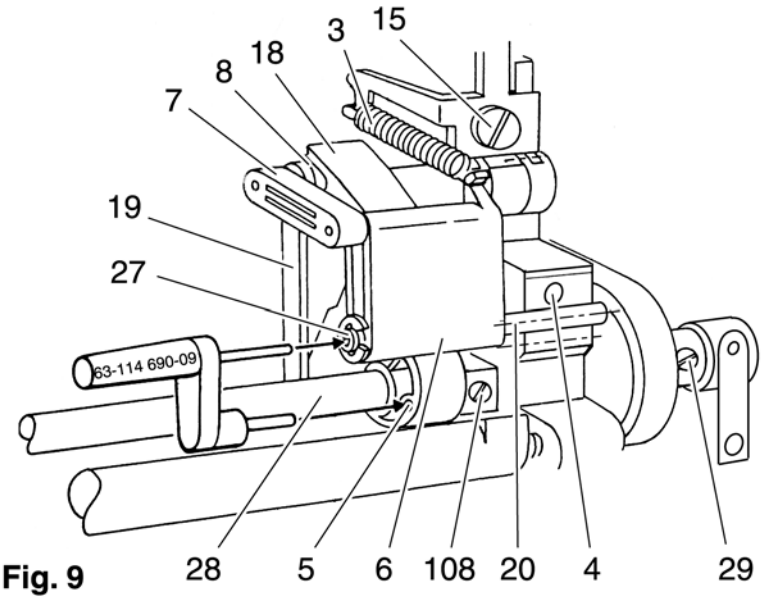


Fig. 9

4. Feed dog height

Requirement:

In the highest position of the feed dog, the points of its teeth must protrude above the needle plate surface by 0.85 - 0.9 mm. The tolerance must not remain under or exceed 0.85 to 0.9 mm (fig. 10).

Check:

- Remove the needle.
- Remove the presser foot.
- Switch on the master switch.
- Set stitch pattern "1" and stitch length "6.0".
- Place adjustment gauge (63-114 690-23) on the needle plate so that feeler lever 30 rests on the needle plate to the right of the cutout (fig. 11).
- Turn the hexagon with a 6 mm spanner (wrench) slightly until pointer 31 is exactly at "0".
- Move the gauge to the left to set feeler lever 30 on the feed dog (fig. 12).
- Turn the handwheel until pointer 31 has moved up to its highest position. The pointer must now point exactly at mark 0.9.

Adjustment:

- Leave the adjustment gauge on the needle plate.
- Remove baseplate and bobbin thread monitor, but leave all electrical connections in place.
- Turn the handwheel until the feed dog is in its highest working position.
- Loosen screw 32 by just 1/8 of a turn (fig. 13).
- Turn eccentric stud 33 until the eccentric is facing the rear part of the housing (basic position).
- Turn eccentric stud 33 counter-clockwise until pointer 31 is exactly at mark 0.9 (fig. 12).
- Tighten screw 32 (fig. 13).

Cross-check:

- Turn the handwheel until pointer 31 is in its highest position again.
  The pointer must now be at mark 0.9. (fig. 12).
- Lower the feed dog and check the function.

Fig. 10

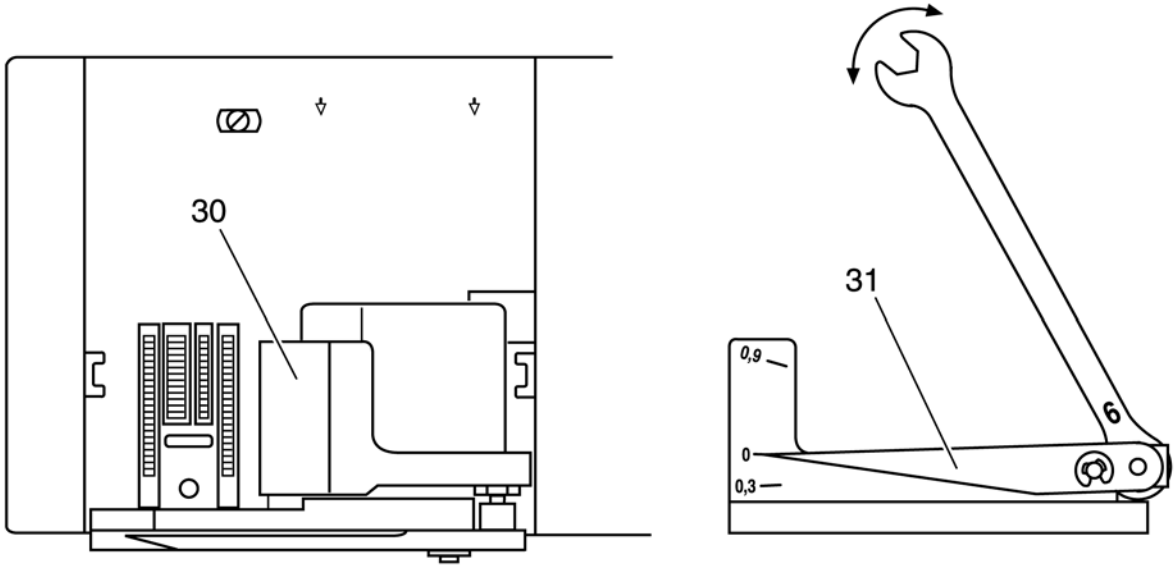


Fig. 11

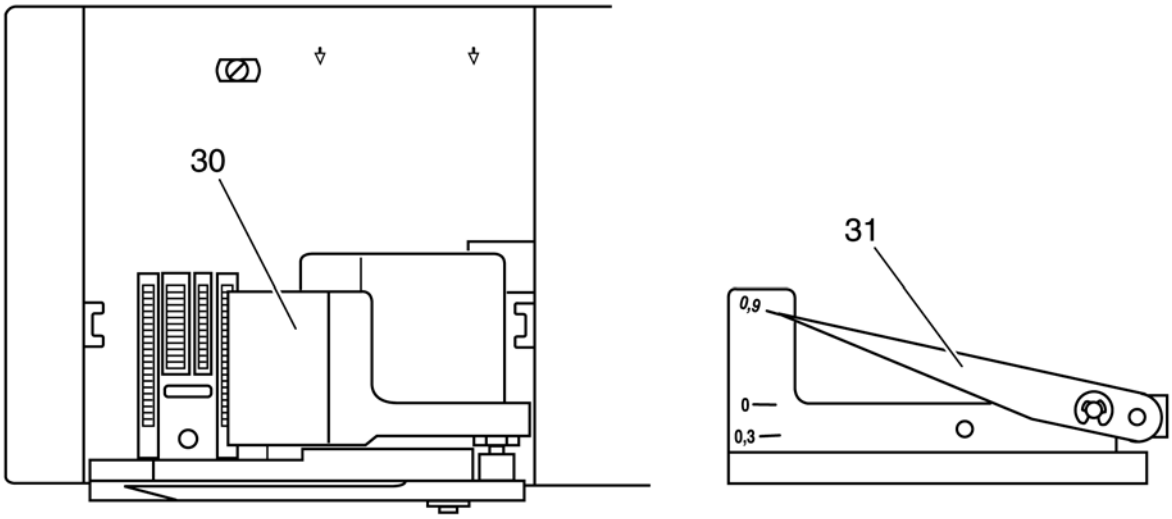


Fig. 12

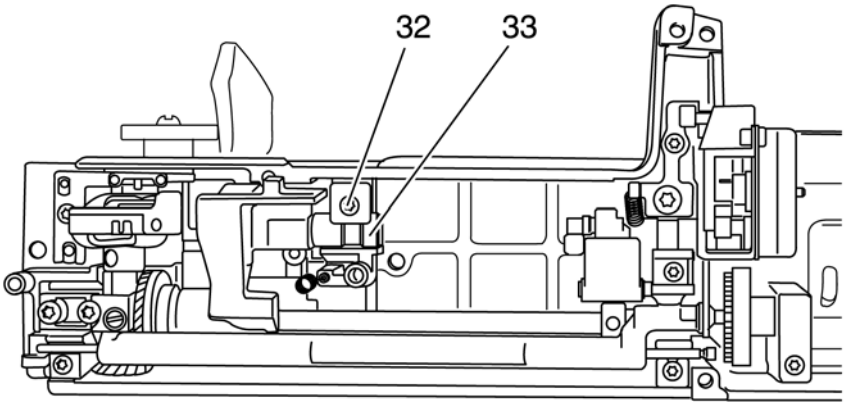


Fig. 13

5. Adjustment of synchronizer

Note:

The following machine positions or functions are controlled by the synchronizer:

1. A change of feeding direction
2. Sideways needle bar movement
3. Take-up lever/needle "up" positioning
4. Needle "down" positioning
   This adjustment must only be carried out when compelling reasons exist! It must be performed with maximum accuracy.

Requirement:

A change of feeding direction or stitch length must take place when the feed dog has moved below the needle plate surface by 0.3 ± 0.02 mm (fig. 14).

Check:

- Remove the needle.
- Remove the presser foot.
- Switch on the master switch.
- Set stitch pattern "01" and stitch length to approx. 0.5 mm.
- Set adjustment gauge (63-114 690-23) on the needle plate so that feeler lever 30 rests on the needle plate just right of the feed slots (fig. 15).
- Turn the hexagon with a 6 mm spanner (wrench) until pointer 31 is exactly at "0".
- Turn the handwheel a full rotation forwards, then keep on turning it until the feed dog (needle bar) is in its top position.
- Change the stitch length.
- Set the adjustment gauge with feeler lever 30 to the left on the feed dog (fig. 32).
- Turn the handwheel very slowly forwards until pointer 30 is at 0.3 (fig. 33). In this position the feed dog must make a visible and audible (switching) movement.

Fig. 14

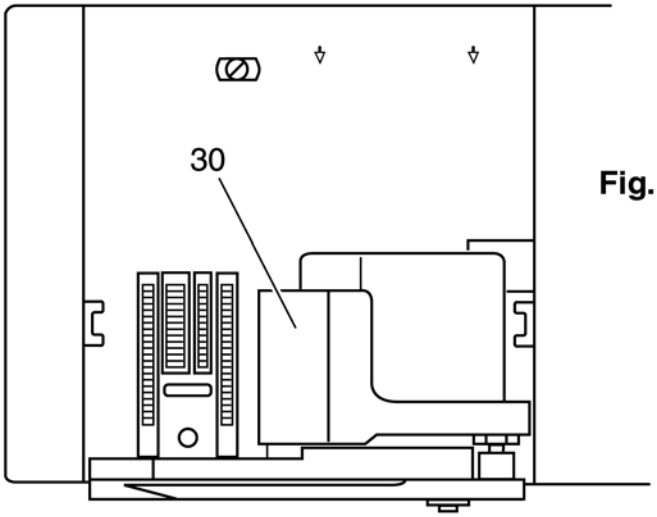
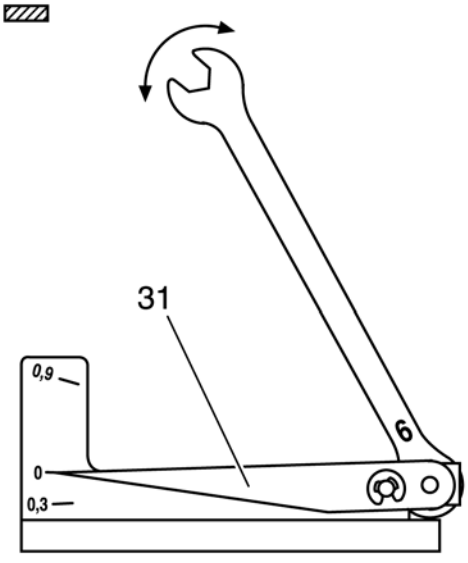


Fig. 15



Adjustment:

- Leave the adjustment gauge on the needle plate.
- Remove the top cover and the housing insert.
- Slightly loosen the fastening screw on control cam 32 (fig. 18).
- Set the stitch length to "0.5".
- Turn the handwheel a full rotation forwards, then keep on turning it until point 31 is at 0.3 (fig. 17).
- Set the stitch length to "00".
- Keep on turning control cam 32 until the stepping motor switches.
- Tighten the fastening screw on control cam 32 whilst ensuring that the cams of the control cam are in the middle of the circuit board guides (fig. 19).

Cross-check:

- Set the stitch length to "0.5".
- Turn the handwheel a full rotation forwards, then keep on turning it until the feed dog (needle bar) is at its highest position.
- Turn the handwheel very slowly forwards until the pointer is at 0.3 (fig. 17).
  In this position the feed dog must make a visible and audible movement (switching).

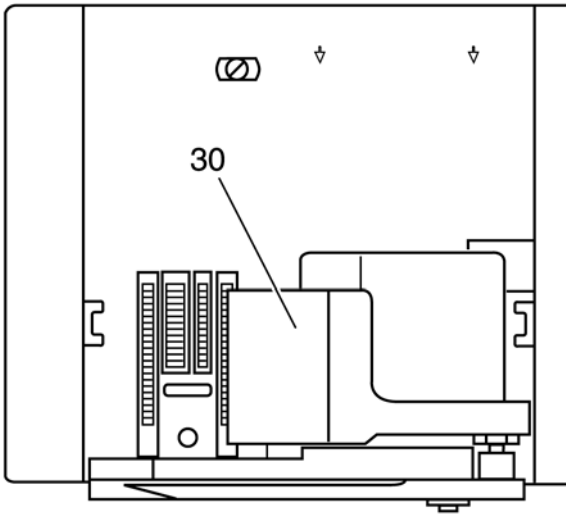


Fig. 16

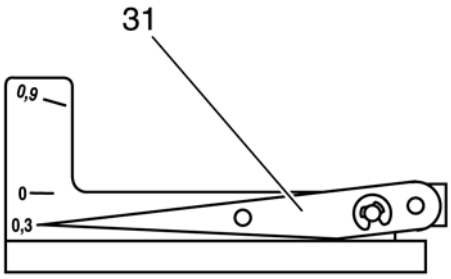


Fig. 17

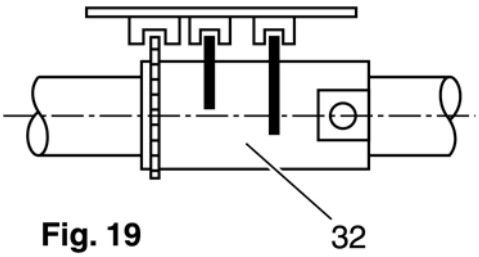


Fig. 19

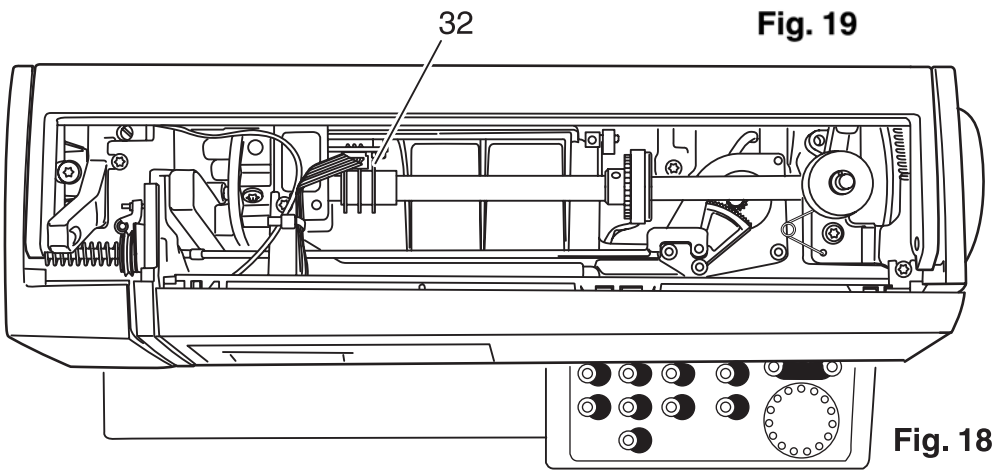


Fig. 18

6. Adjustment of presser foot height

Requirement:

With the presser bar lifter raised there must be a clearance of 8 mm between the needle plate and the sole of the zigzag foot.

Check:

- Raise the presser bar lifter.
- Fit the zigzag foot.
- Lower the feed dog.
- Fully raise the presser bar lifter and hold it in this position.
- Insert the presser foot gauge (63-114 690-39) from behind under the zigzag foot and into the cutout of the needle plate (fig. 20).
- Lower the presser bar lifter to its normal position again.
  The zigzag foot must rest parallel and without play on the presser foot gauge.
  However the presser foot gauge must not lift the zigzag foot.
  the needle thread tension must be without play (fig. 21).

Adjustment:

- Loosen the three screws 34, 35 and 37 (fig. 21).
- Turn the zigzag foot with the presser bar lifter raised until it is parallel with the sides of the presser foot gauge.
- Use a screwdriver to press presser bar guide 36 firmly down.
- At the same time firmly tighten screw 35.

Cross-check:

- Press the presser bar lifter further upward and release it again.
  The zigzag foot must rest parallel and without play on the presser foot gauge.
  Needle thread tension release lever 33 must be without play. The presser bar lifter must be in its raised position.

Note:

The two screws 34 and 37 are not tightened until later when the top feed height is set.

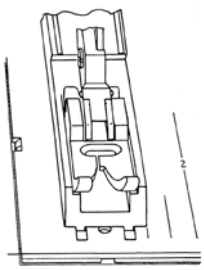


Fig. 20

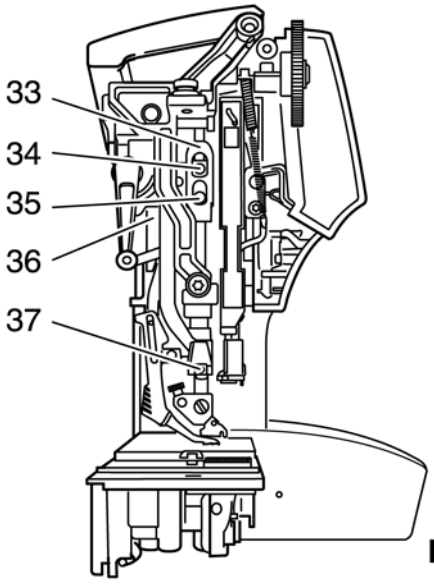


Fig. 21

7. Adjustment of top feed foot in sewing direction

Requirement:

The front edge of the top feed foot must be between the first and second tooth point of the center tooth row of the feed dog (fig. 22).

Check:

- Raise the presser bar lifter.
- Remove the complete presser foot.
- Set the stitch length to "6".
- Engage the top feed foot.
- Turn the handwheel until the rising feed dog is flush with the needle plate surface.
- Lower the presser bar lifter.
- Carry out a visual check.

Adjustment:

- Loosen screw 39 (fig. 23).
- Raise the presser bar lifter until the top feed foot is just resting on top of the feed dog.
- At the same time push the top feed dog to the front or to the rear until its front edge is between the first and second tooth point of the center tooth row.
- Lower the presser bar lifter.
- Tighten screw 39, making sure that driving shaft 38 has no play.

Cross-check:

- Check as described under "Check".

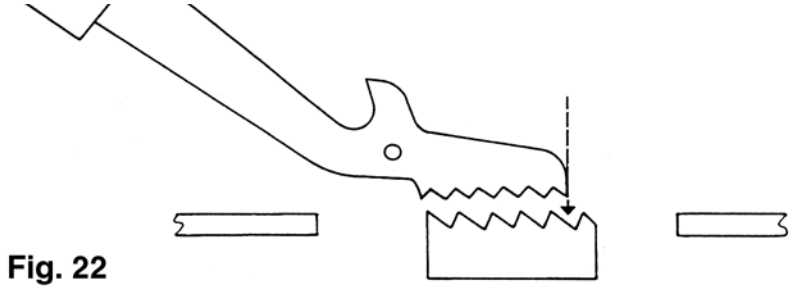


Fig. 22

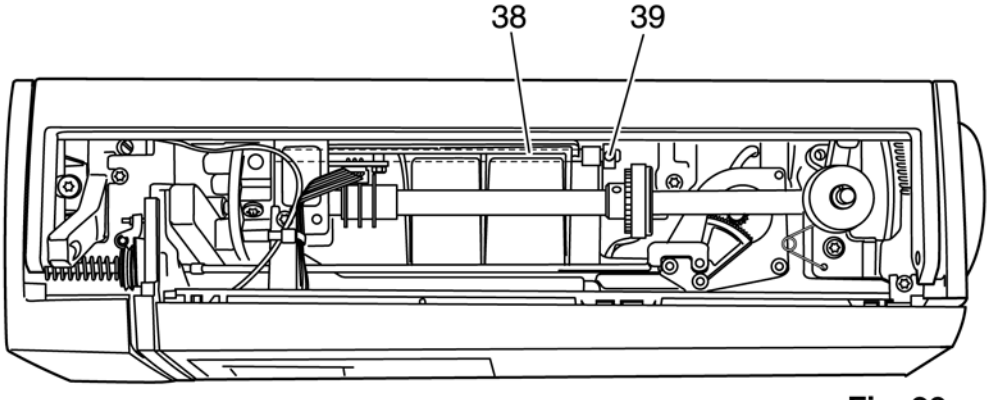


Fig. 23

8. Adjustment of top feed height

Requirement:

In its highest working position the top feed foot must be 2 mm higher than the lower edge of the zigzag foot sole (fig. 25).

Note:

This adjustment must only be carried out when the height of the presser bar is set correctly.

Check:

- Raise the presser bar lifter.
- Insert the zigzag foot sole.
- Engage the top feed.
- Turn the handwheel until the needle bar is in its lowest position.
  Caution: The handwheel must now no longer be turned!
- Lower the feed dog.
- Fully raise the presser bar lifter and hold it in this position.
- At the same time insert the presser foot gauge (63-114 690-39) from behind under the zigzag foot and into the cutouts of the needle plate.
- Lower the presser bar to its normal raised position.
- Press the top feed lightly downward.
- Check that the top feed foot rests only lightly on the presser foot gauge and has no play.

Adjustment:

- Loosen screws 34 and 37 (fig. 25).
- Push counter bearing 40 lightly downward until the top feed foot rests lightly on the presser foot gauge.
- Tighten screw 34 in this position.

Cross-check:

- Check for light resting and freedom of play of the top feed foot on the presser foot gauge as described under "Check".

Adjusting the guide piece

- Fully raise the presser bar lifter and hold it in this position.
- Remove the presser foot gauge.
- Lower the presser bar lifter to its raised position.
- Turn the handwheel until needle bar 44 is in its top position.
- Set guide piece 42 at a clearance of 0.2 mm from cross head 41 (fig. 24).
- Tighten screw 37.

Cross-check:

● Turn the handwheel and check for clearance of 0.2 mm.

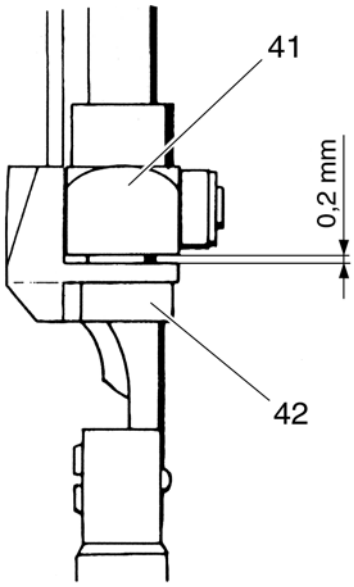


Fig. 24

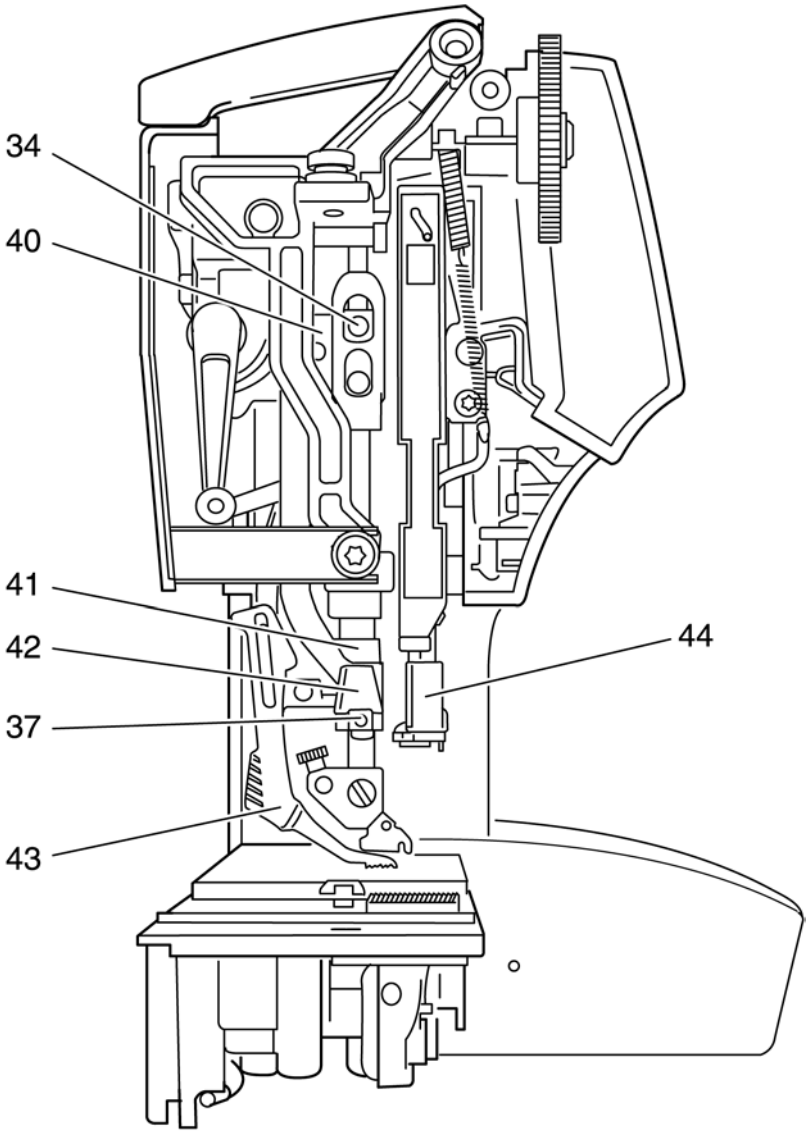


Fig. 25

Zigzag mechanism

9. Adjustment of needle in needle hole

Requirement:

At the straight stitch setting, the needle must be in the center of the needle hole (fig. 26).
The widest zigzag stitches must be the same distance from the left and right needle hole edges (fig 27.).

Check:

- Remove the presser foot.
- Insert a new needle.
- Select stitch pattern "01" for straight stitch.
- Turn the handwheel until the needle is in the needle hole.
- Carry out a visual check (fig. 26).
- Select stitch program "03" and a zigzag width of 6 mm.
- Turn the handwheel and check the left and right distance (fig. 27).

Adjustment:

- Select stitch pattern "01" for straight stitch.
- Loosen both screws 45 just a little (fig. 28).
- Push the complete stepping motor 46 to the left or to the right until the needle is centered (fig. 26).
- Tighten both screws 45.

Cross-check:

- Carry out as described under "Check".

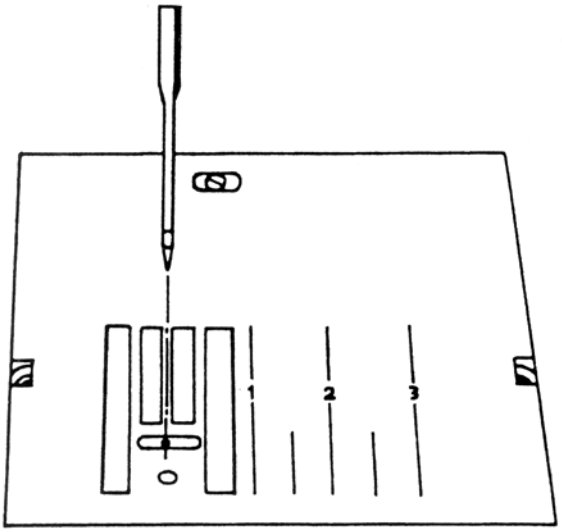


Fig. 26

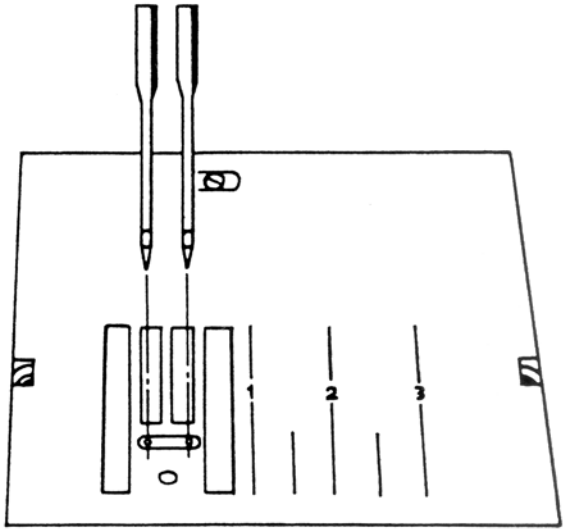


Fig. 27

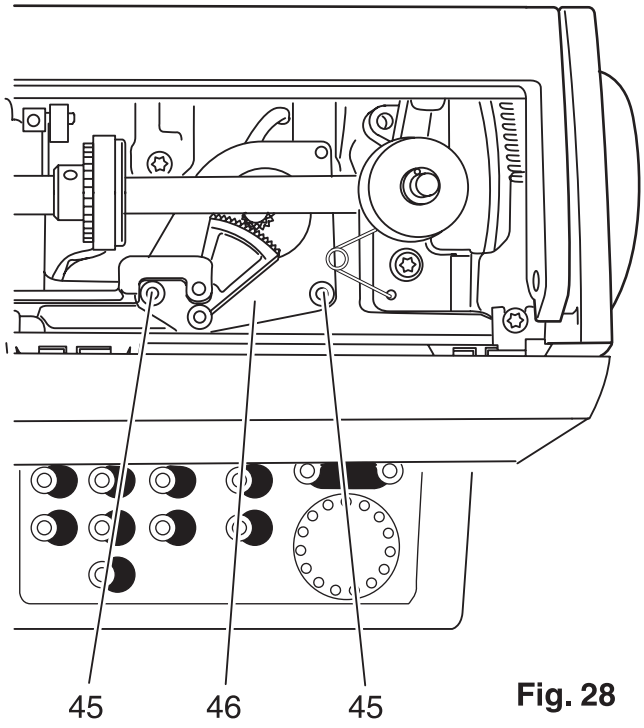


Fig. 28

Stitch forming parts (Hook)

Foreword:
The sewing hook adjustment consists basically of the three following adjustments:

Needle rise
Needle bar height
Hook-to-needle clearance

Needle rise:

The needle rise is the movement by which the needle must rise from its lowest position until a thread loop has formed on the side of the needle on which the scarf is located.
When the machine moves further, the looper point must enter the thread loop, widen it and guide it around the bobbin.

Needle bar height:

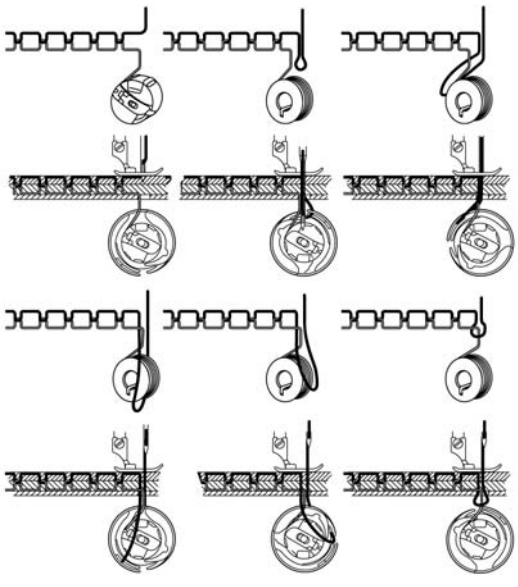
The needle bar height must be set in such a way that the sewing hook point can easily enter the thread loop above the needle eye at straight stitch and zigzag stitch settings.

Hook-to-needle clearance:

The distance of the sewing hook point from the needle must be as small as possible, so that the sewing hook point does not miss the thread loop.

The sequence of sewing hook adjustments is as follows:

1. Hook-to-needle clearance
2. Bevel gear setting
3. Needle rise
4. Needle bar height



10. Position of needle in needle hole in sewing direction

Requirement:

There must be a clearance of 0.2 mm between the back edge of the needle shank and the back edge of the needle hole in the needle plate (fig. 29).

Note:

Since system 130/705 H needles increases in size at the needle front side only, the point of an Nm 100 needle is positioned exactly in the middle of the needle hole (as seen in feeding direction), while the point of an Nm 80 needle is positioned slightly closer to the back edge of the hole.

Check:

- Insert a new needle of system 130/705 H in size Nm 100.
- Select stitch pattern "01" for straight stitch.
- Attach zigzag foot.
- Lower zigzag foot.
- Turn the handwheel until the needle is in its lowest position.
  The needle must now have the same distance to the front and rear edges of the needle hole in the foot and the needle plate.

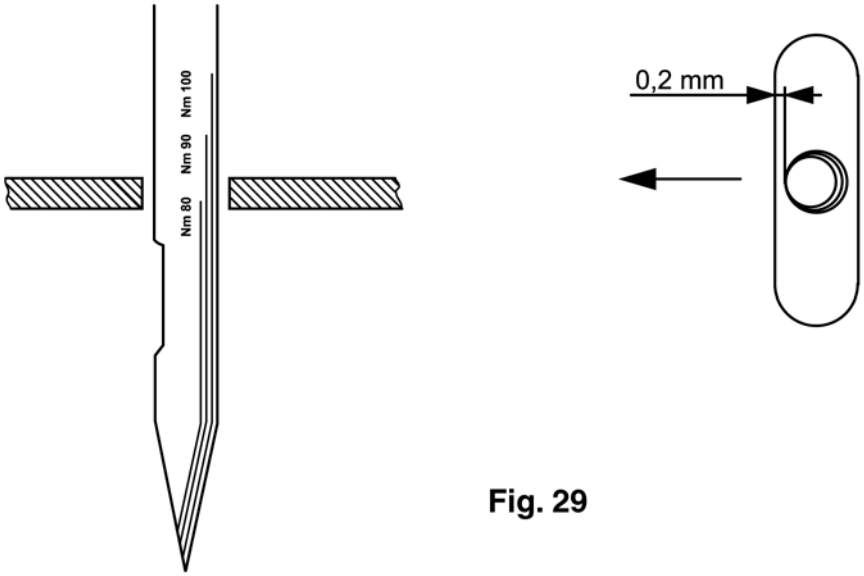


Fig. 29

Adjustment in relation to the presser foot:

- Loosen screw 47 (fig. 31).
- Move pin 48 together with collar and needle frame 49 to the front or the rear until the needle is exactly in the middle of the needle hole on the presser foot.
- Tighten screw 47.

Check:

- Turn the handwheel and bring the needle to its highest position.
- Place a piece of paper underneath the presser foot and lower the foot.
- Turn the handwheel and bring the needle to its lowest position.
- Its distance from the front and rear edges of the needle hole in the foot must be equal.
- Loosen the torx screw on the face plate.
- Remove the face plate.
- Remove Benzing circlip 51 on the needle bar frame (fig. 30).
- Disengage the connecting rod and the needle bar frame.
- Move the needle bar frame to the left and to the right.
  Important:
  The needle bar frame must move easily and without binding. If this is not the case, any binding must be removed.
- Re-engage the needle bar frame with the connecting rod.
- Mount Benzing circlip 51 (fig. 30).

Adjusting the needle plate:

- Turn the handwheel and bring the needle to its highest position.
- Remove the zigzag foot.
- Turn the handwheel and bring the needle to its lowest position.
- Turn adjustment eccentric 50 until the distance from the front and rear edges of the needle hole is equal (fig. 32).

Cross-check:

- Carry out a visual check at straight stitch and zigzag stitch settings.

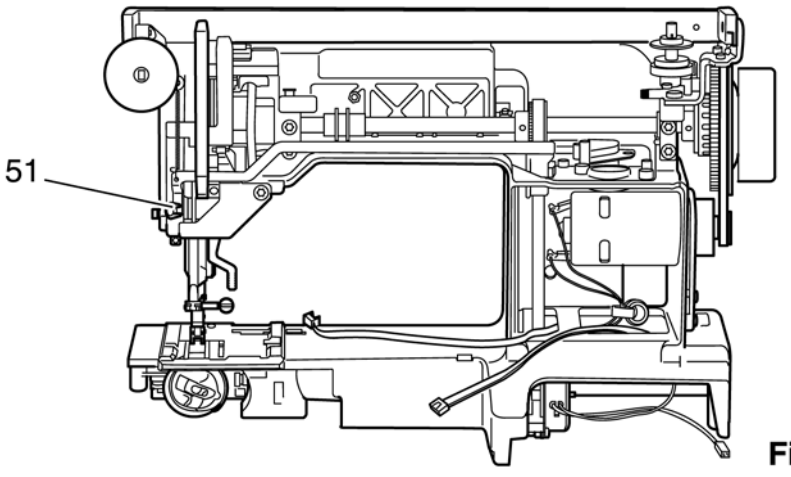


Fig. 30

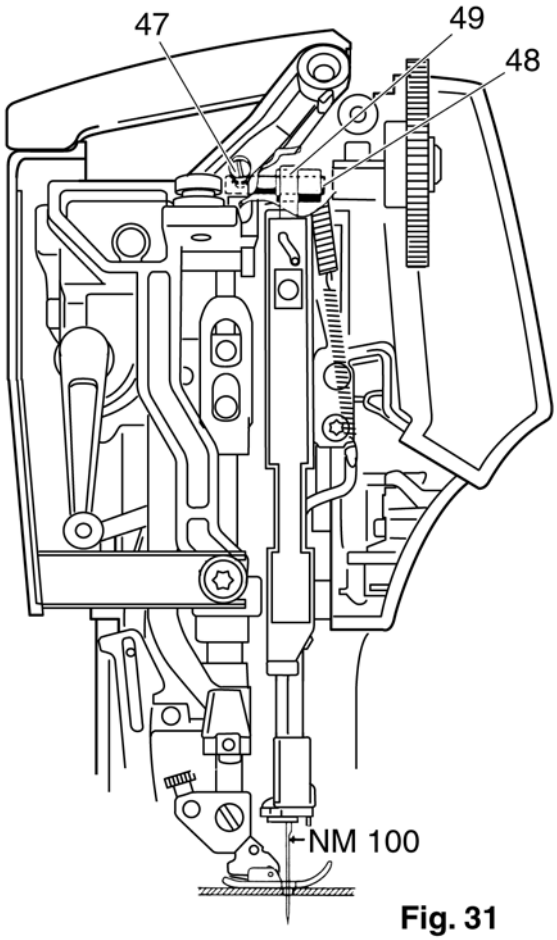


Fig. 31

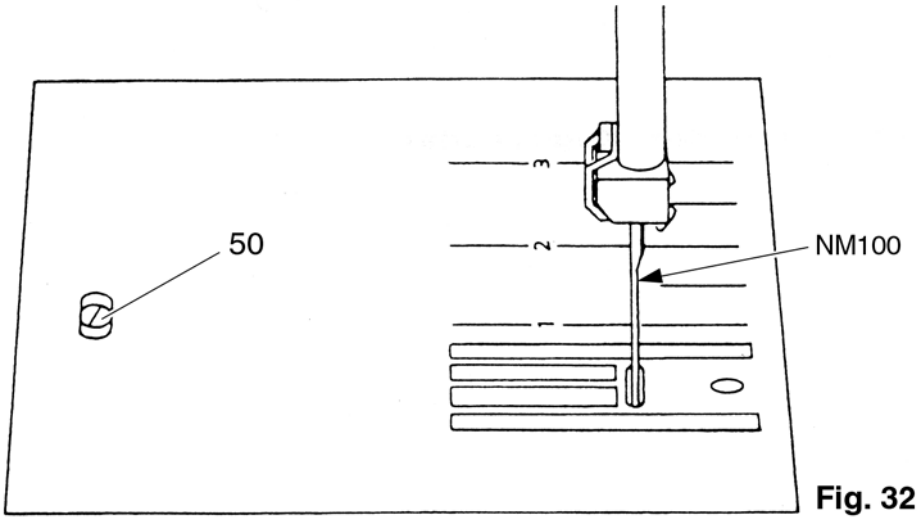


Fig. 32

11. Adjustment of hook-to-needle clearance

Requirement:
At the straight stitch setting the distance of the sewing hook point from the bottom of the scarf in the needle must be 0.05 mm (fig. 33). In the widest zigzag stitch, the sewing hook point must almost touch the needle.

Check:
- Remove the baseplate and the free-arm lid.
- Remove the needle.
- Remove the presser foot.
- Remove the bobbin case.
- Remove the bobbin case position finger.
- Move the bobbin case base so that the hook point is exposed.
- Insert a new needle system 130/705 H size Nm 80.
- Select straight stitch program "01".
- Turn the handwheel until the hook point is opposite the center line of the needle.
- Check the distance between hook point and needle scarf.
- Check the axial play of hook 52 to hook shaft bush 54 (fig. 34).

Adjustment:
- If the hook shaft has axial play, loosen the two screws 53.
- Press bevel gear 56 with the shaft to the front and push sewing hook 52 to the rear.
- Tighten the two screws 53.
- Loosen screw 57 in the lifting eccentric by 2 - 3 turns.
- Loosen screw 55 slightly.
- Turn the handwheel and the sewing hook until the hook point is opposite the middle of the needle scarf.
- Shift the sewing hook complete with hook shaft bush 54 until the distance of the sewing hook point to the bottom of the scarf in the needle is 0.05 mm.
- Tighten screw 55 on the narrow flat of the hook bush.

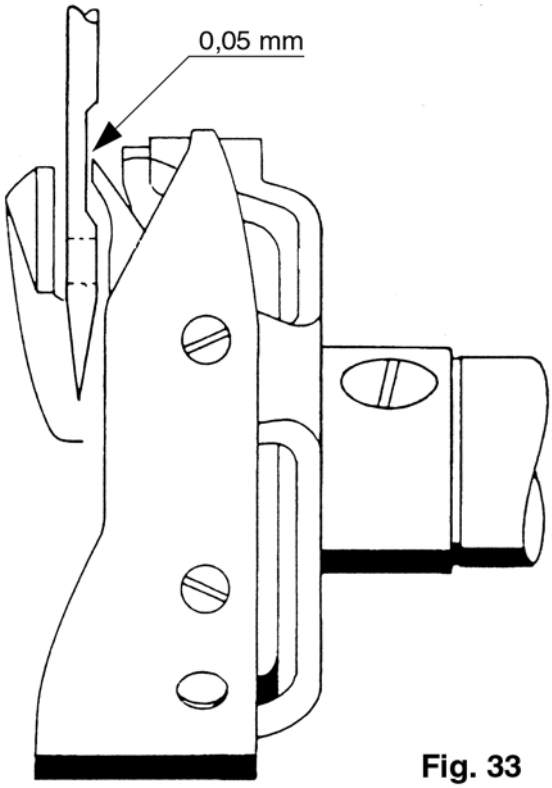


Fig. 33

Note:

The large flat of the hook shaft bush must face the right.

Cross-check:

- Check for free movement of the hook shaft.
- Check again the distance between the sewing hook point and the bottom of the needle scarf.

11a. Adjustment of bevel gears

Requirement:

The bevel gears must move freely and without play.

Adjustment:

- Push the bevel gear with the lifting eccentric to the left until it is in contact with bevel gear 56 and has no play.
- Tighten screw 57 on the surface of the drive shaft.

Check:

- As described under "Requirement".

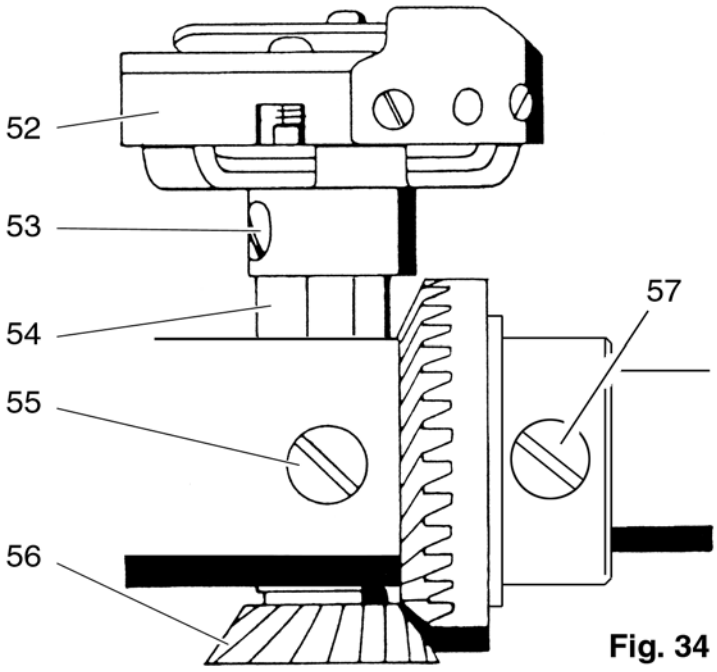


Fig. 34

12. Hook timing

Requirement:

When the needle bar has moved 2.2 mm upwards from its lowest position (with the machine set for straight stitch and center needle position), the sewing hook point must be exactly opposite the center line of the needle (fig. 36).

Check:

- Remove the presser foot and the needle plate.
- Select stitch pattern "01" for straight stitch.
- Bring the needle bar to its lowest position by turning the handwheel (fig. 35).
- Set the spacer (63-102 600-18) on top of the needle bar and push it upwards against the needle bar frame.
- Push the needle-rise clamp (61-111 600-35) on the needle bar and tighten it lightly.
- Push the 2.2 mm feeler gauge (00-870 136-01) with its cutout on the needle bar above the needle-rise clamp.
- Loosen the needle-rise clamp and push the 2.2 mm feeler gauge upwards against the spacer.
- Tighten the milled screw on the needle-rise clamp.
- Turn the handwheel back and forth a little.
- If there is any play on the feeler gauge, repeat this procedure.
- Remove the 2.2 mm feeler gauge.
- Turn the handwheel in sewing direction until the needle-rise clamp is in contact with the spacer (fig. 36).
  By this means the needle has moved upwards to the needle rise position of 2.2 mm.
  The hook point must now be exactly behind the center line of the needle.

Adjustment:

- If the setting is not correct, remove the needle-rise clamp.
- Loosen the two screws 53 (fig. 37).
- Re-fit the needle-rise clamp and repeat the operation as described under "Check", until the needle bar has moved 2.2 mm upwards and the needle-rise clamp is in contact with the spacer.
- Turn the hook until the hook point is exactly behind the center line of the needle.
- Press sewing hook 52 and bevel gear 56 together so that there is no play between them, and tighten one of screws 53.

Cross-check:

- Turn the handwheel a little backwards and then forwards until the needle-rise clamp rests on the spacer (fig. 36).
- The hook point must be exactly behind the center line of the needle.
- Remove the needle-rise clamp.
- Check that the hook shaft has no axial play.
- Tighten the two screws 53 very firmly.

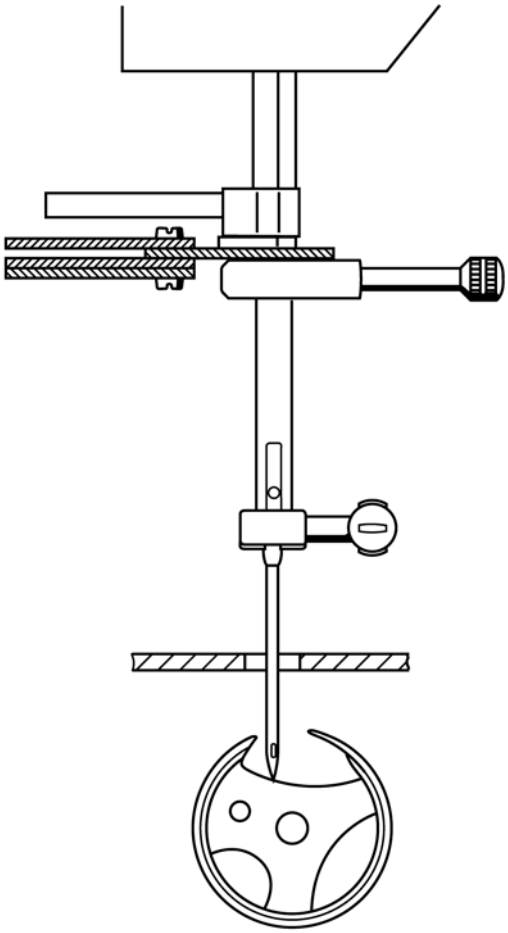


Fig. 35

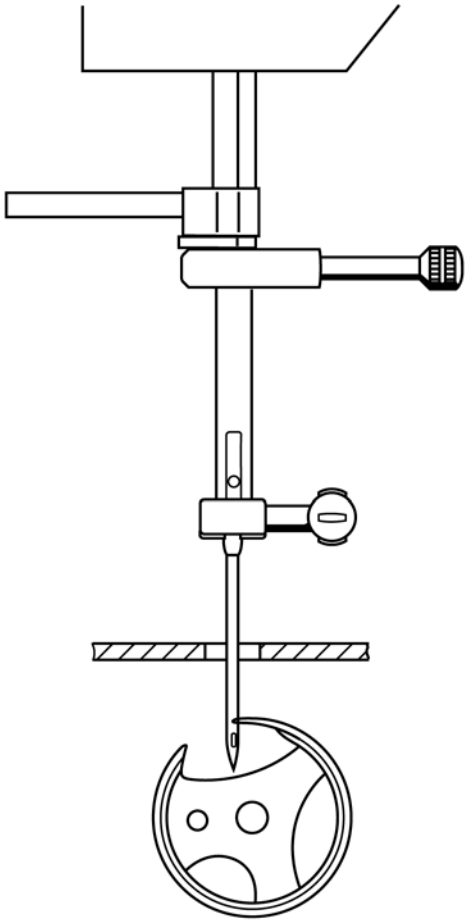


Fig. 36

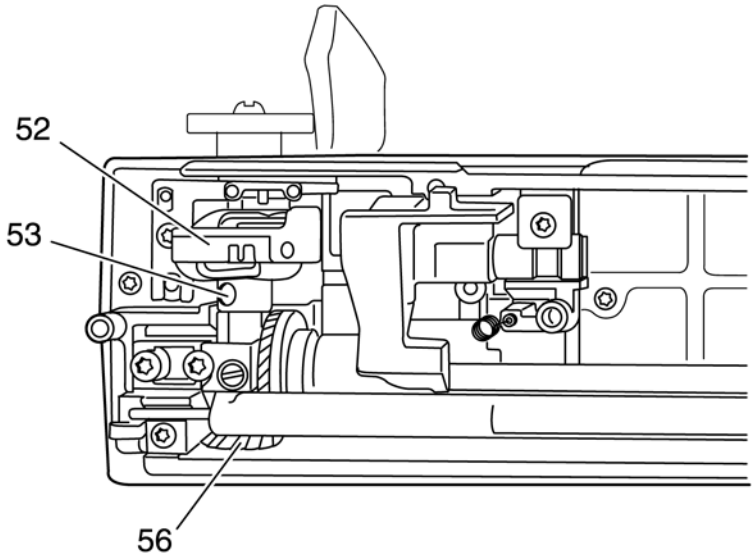


Fig. 37

13. Adjustment of needle bar height

This machine has a transverse double-rotating hook.
On the right zigzag penetration, the sewing hook reaches the needle a little earlier and at the left penetration a little later than at the center penetration. Thus the looper point is positioned slightly higher above the needle-eye for the right zigzag penetration than for the left zigzag penetration (fig. 38).

Requirement:

The distance between the top edge of the needle eye and the lower edge of the sewing hook point must be 0.5 mm at the widest left zigzag penetration (fig. 39).

Check:

- Select stitch program "03" and the widest zigzag width of 6 mm.
- Turn the handwheel until the needle rises at the left zigzag stitch and the sewing hook point is exactly behind the center line of the needle.
  The distance between the top edge of the needle eye and the bottom edge of the hook point must be 0.5 mm.

Adjustment:

- Loosen screw 58 just a little (fig. 40).
- Shift needle bar 59 in height, without twisting it, until the clearance of 0.5 mm is set.
- Tighten screw 58 securely.

Cross-check:

- Check the clearance of 0.5 mm.
  The needle holder must face exactly square to the right.

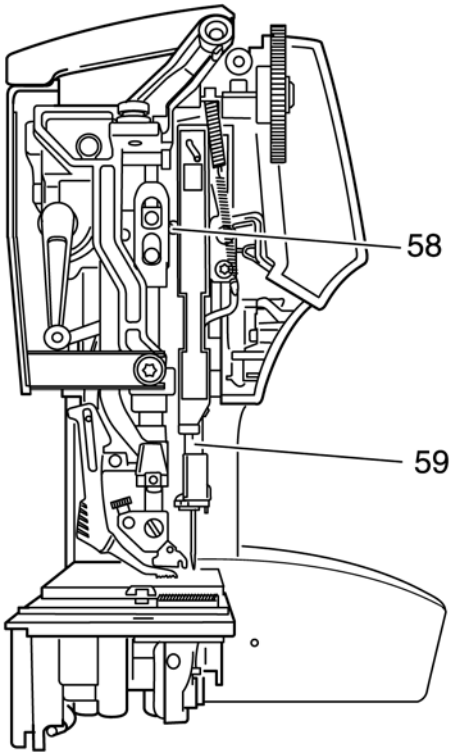


Fig. 40

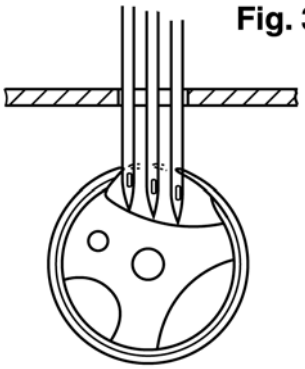


Fig. 38

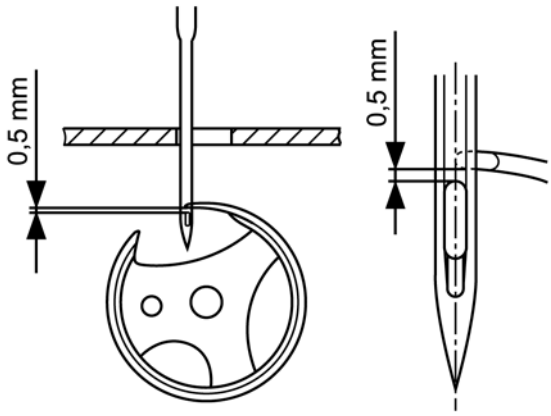


Fig. 39

14. Adjustment of bobbin case position finger

Requirement:

The clearance between the position finger and the bottom of the groove in the bobbin case base must be 0.7 mm (fig. 41).

Check:

- It must be possible to insert the clearance gauge (61-111 621-15) with ease but without play between the position finger and the bottom of the groove in the bobbin case base.

Adjustment:

- Loosen screw 60.
- Insert the clearance gauge.
- Press position finger bracket 61 against the clearance gauge at an angle of 90 degrees.
- Tighten screw 60.

Cross-check:

- As described under "Check".

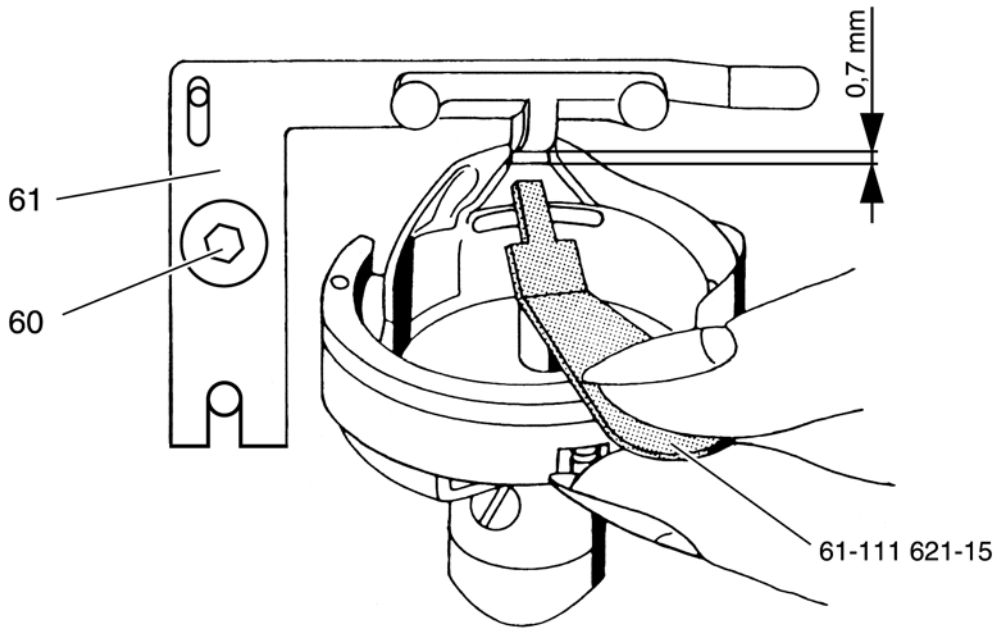


Fig. 41

Stitching off

15. Adjustment of needle threader

Requirement:

With the threader key pushed fully down, prong 62 must pass through in the center between the top and bottom edge of the needle eye of a needle size Nm 70 (fig. 42).

Check:

- Insert a new needle system 130/705 H, size Nm 70.
- Switch on the machine (stitch program 01).
- Set the machine at top needle position by briefly pressing the foot control.
- Push threader key 63 fully down.
- Carry out a visual and functional test.

Height adjustment:

- Loosen the screw on the face cover and remove face cover.
- Press threader key 63 fully down and hold it in this position (fig. 44).
- Loosen allen screw 66 by only a 1/4 of a turn (fig. 43).
- Push the complete threader bar frame 67 either upwards or downwards until prong 62 has the same clearance to the top and bottom edge of the needle eye (fig. 42).
- Tighten allen screw 66 in this position (fig. 43).

Cross-check 1:

- Using threader key 63, move the needle threader up and down.
  Whilst doing so, carry out a visual check of the prong height.
- When the threader key is pushed down, pin 64 must pass completely through the diagonal guide slot and rest on the upper end.

Lateral adjustment:

- Using threader key 63, place threader prong 62 at the front in the needle eye.
- Loosen screw 65 by only 1/8 of a turn (fig. 44).
- Push the threader bar frame either to the left or right until the prong is in the exact middle of the needle eye.
- Tighten screw 65.

Cross-check 2:

- Activate threader key 63.
  Whilst doing so, carry out a visual check of the lateral position of the prong.

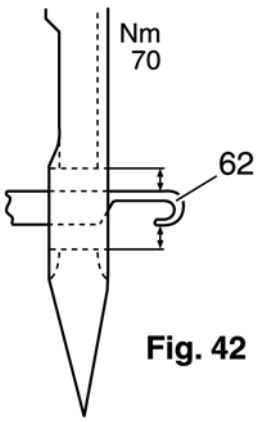


Fig. 42

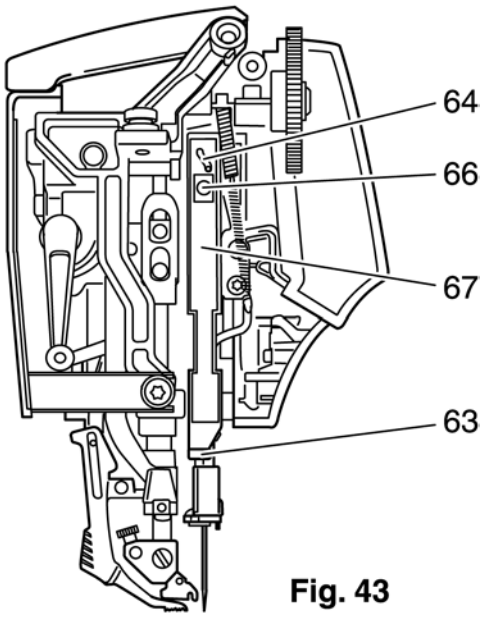


Fig. 43

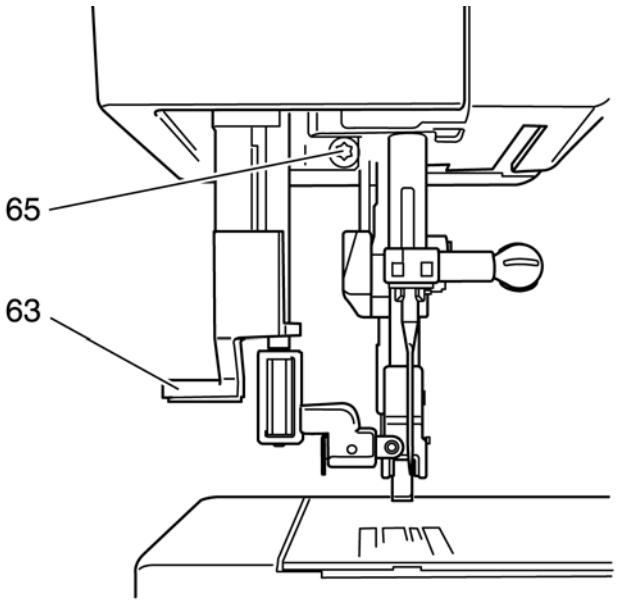


Fig. 44

16. Adjustment of bobbin winder stop

Requirement:

The bobbin winder must stop when the thread has reached a level of 1 mm below the bobbin rim.

Check:

● Wind a bobbin and check that the winder stops as required.

Adjustment:

● Loosen screw 68 (fig. 45).
● Position stop 69 to the left for less thread and to right for more thread.
● Tighten screw 68.

Cross-check:

● Wind a bobbin and check that the winder stops as required.

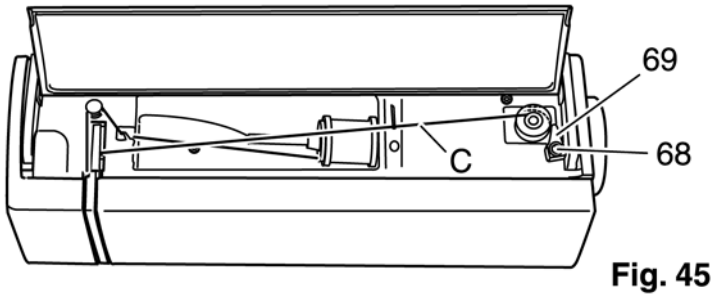


Fig. 45

17. Adjustment of bobbin thread tension

Requirement:

The force required for pulling cotton thread 50/2 or synthetic fiber thread 100/3 off the bobbin must be approximately 25 - 30 g.

Check:

- When a threaded bobbin case hangs on its thread, it must not slide downwards by its own weight.
- With a sharp upward movement of the hand, the thread must run off gradually (fig. 46).
- There must not be any thread waste under the tension spring.
- The tension spring must rest evenly and parallel on the bobbin case.

Adjustment:

Loosen the knurled screw a little and turn it in again until a resistance is felt when the thread is pulled off.

Check:

- Carry out as described under "Check"

Note:

- Once the bobbin thread tension has been set correctly, tension adjustments must be made only to the needle thread tension.

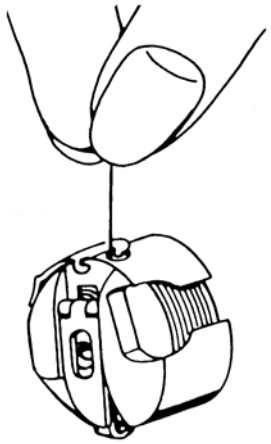


Fig. 46

18. Adjustment of needle thread tension

Requirement:

Within the adjusting range from 3 to 5, the interlacing of the needle thread and the bobbin thread (cotton thread 50/2 or synthetic fiber thread 100/3) must take place approximately in the middle of the fabric in straight and zigzag stitch setting (fig. 47 and fig. 50).

Check:

- Set the needle thread tension at "5".
- Set stitch pattern "03" for zigzag and the stitch width at "6.0".
- Set the stitch length at "2.0".
- Place a piece of fabric under the zigzag foot and sew.
- Select stitch pattern "01" for straight stitch and set the stitch length at "2.5".
- Sew with straight stitch.

Adjustment:

- First turn milled nut 57 fully to the left (fig. 51).
- Set zigzag stitch "03", stitch width "6.0", and stitch length "2.0".
- Sew with zigzag stitch.
- At the same time turn the milled nut gradually in clockwise direction, until the knot is formed in the center of the fabric (fig. 47).

Cross-check:

- Sew with straight stitch and zigzag stitch as described under "Check".

Fig. 47

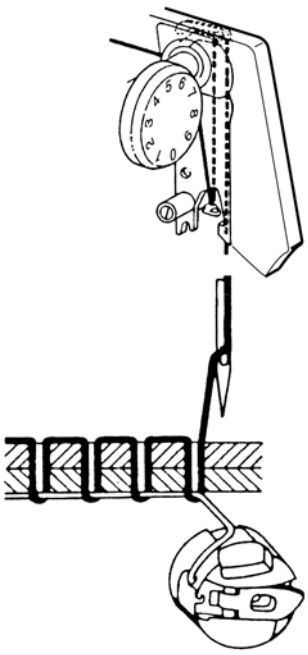


Fig. 48

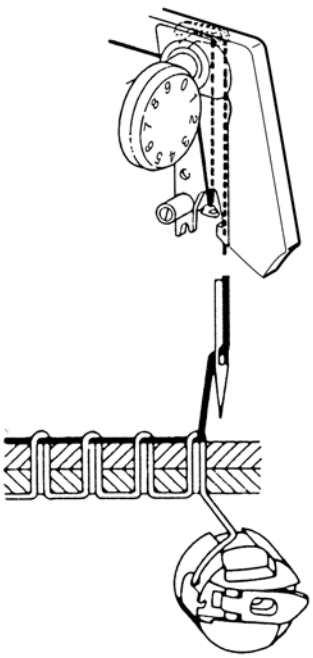


Fig. 49

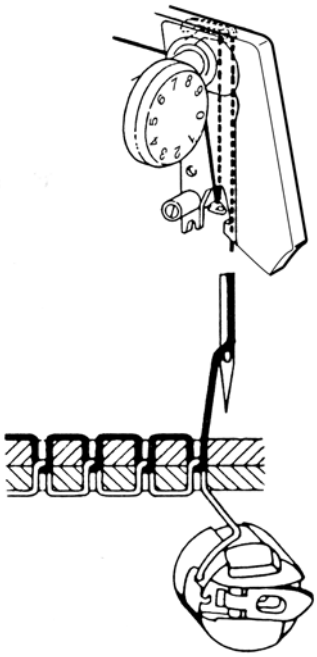


Fig. 50

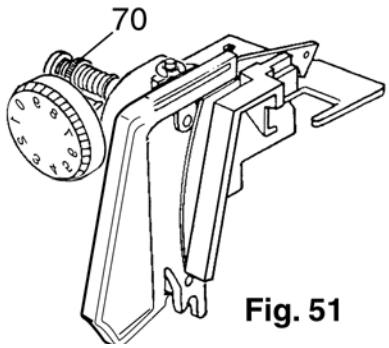


Fig. 51

19. Adjustment of thread check spring stroke

The tread check spring prevents the descending needle from piercing the slack needle thread. The needle thread is slackened by the descending take-up lever.

Requirement:

Thread check spring 144 must keep the needle thread taut at least until the needle point enters the fabric (Fig. 51a).The thread check spring must release the needle thread as soon as the lower edge of the needle eye enters the fabric.

Check:

- Select stitch pattern "for" straight stitch.
- Set the stitch length at "6.0".
- Place two pieces of fabric under the sewing foot.
- Sew a few of stitches.
- Turn the handwheel and determine the end of the tread check spring stoke. Correct slackening of the needle thread takes place when it enters the needle eye not tautly but in a loose curve.

Adjustment:

- Loosen screw 142.
- Turn thread check spring stop sleeve 143 until thread check spring 144 is in the correct position.
- Tighten screw 142.

Cross-check:

- Sew a few stitches and check as described under "Check".

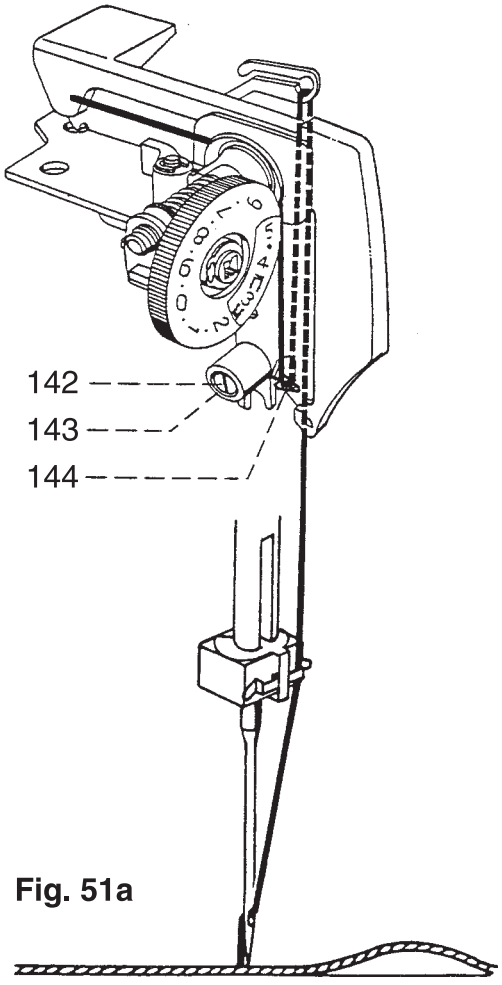


Fig. 51a

Notes:

20. Adjustment of equal forward and reverse stitch length for Pfaff expression 2014 / 2024

(for all forward and reverse controlled stitch patterns)

Requirement:

Adjusting program 95 must be sewn as a rectangle (fig. 52) and not be sewn from the machine as a rhombus (fig. 53 or fig. 54).
Linen buttonhole, stitch pattern "09", must be sewn by the machine symmetrically (fig. 55.)
In this case the machine must be at operating temperature, i.e. switch-on time 10 - 15 minutes.

Check:

- Switch off the machine.
- Turn on the machine by pressing key "0" and the master switch.
- The display shows adjusting program "95".
- Place a piece of fabric under fancy stitch foot "2".
- Sew adjusting program "95" (fig. 52).

Preliminary adjustment:

- If a rhombus was sewn as seen in fig. 53, turn the adjusting eccentric just 2 - 4 degrees in direction "A" using a screwdriver, as shown in fig. 58.
  If a rhombus was sewn as seen in fig. 54, turn the adjusting eccentric just 2 - 4 degrees in direction "B" using a screwdriver, as shown in fig. 58.

Cross-check:

- Sew adjusting program "95" and check.
- Select adjusting program "09", linen buttonhole, and sew.
- Check the symmetry of the linen buttonhole.

Precise adjustment:

- If the buttonhole bartack does not close exactly on the position where the front buttonhole seam starts (fig. 55), proceed as follows:
- If the linen buttonhole was sewn as seen in fig. 56, turn the adjusting eccentric 1 - 2 degrees in direction "A" using a screwdriver, as shown in fig. 58.
  If the linen buttonhole was sewn as seen in fig. 57, turn the adjusting eccentric 1 - 2 degrees in direction "B" using a screwdriver as shown in fig. 58.

Cross-check:

- Select stitch program "09" (linen buttonhole).
- Place a piece of fabric under buttonhole foot "5".
- Sew stitch program "09".
  The bartack must cover the start of the right buttonhole seam (fig. 55).

Note:

If very different sewing threads or difficult fabrics are used, buttonholes, utility stitches or fancy stitches may be sewn with shifts in the pattern design.
To correct this, the customer can adjust the balance.
On top of that, the length of the reverse buttonhole seam can be programmed.

Prog. 95

Fig. 52 **Fig. 53** **Fig. 54**

Prog. 09

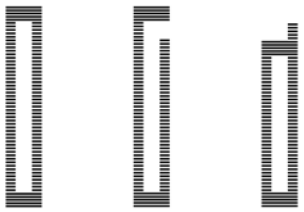


Fig. 55 **Fig. 56** **Fig. 57**

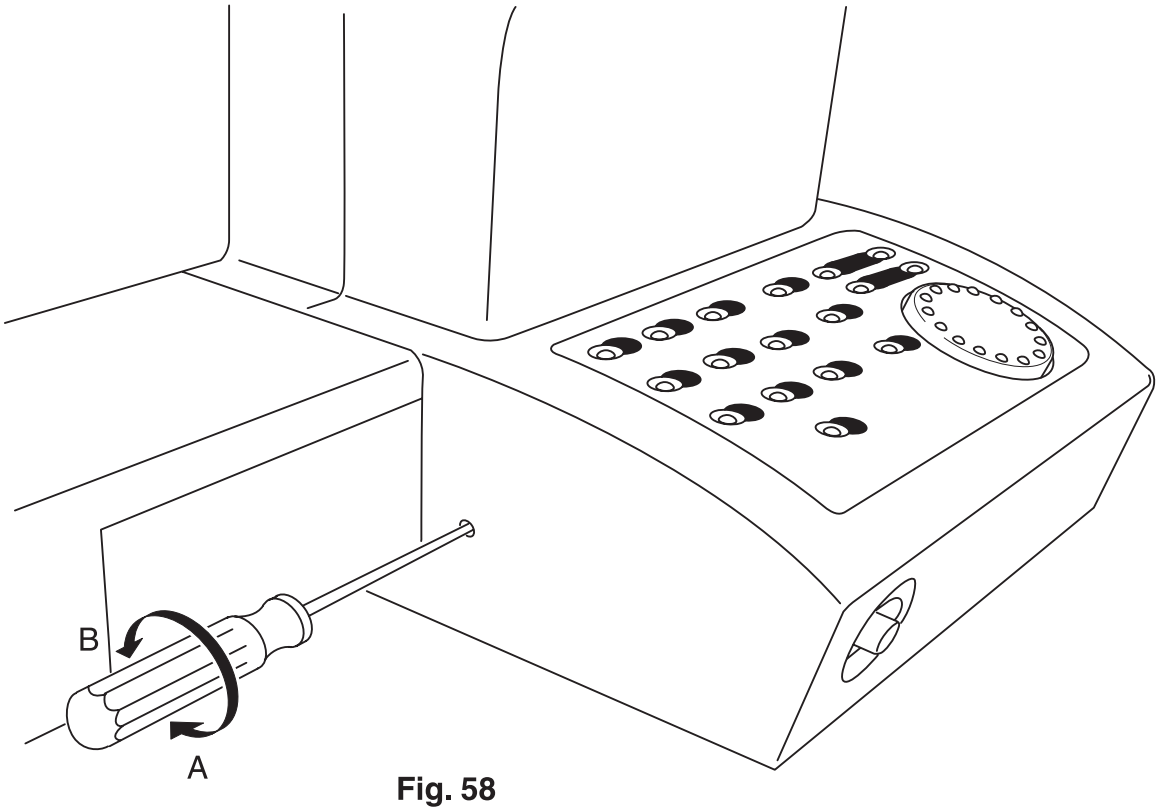


Fig. 58

21. Adjustment of equal forward and reverse stitch length for Pfaff expression 2034 / 2044

(for all forward and reverse controlled stitch patterns)

Requirement:

Letters B, D, G, H sewn in succession must measure 34.5 +/- 0.5 mm and must not be distorted (fig. 62).
To this end the machine must be at operating temperature, i.e. switch-on time 10 - 15 minutes.

Check:

- Switch off the machine.
- Turn on the machine by pressing key "0" and the master switch simultaneously.
- The display shows adjusting program "95".
- Place a piece of fabric under fancy stitch foot "2".
- Sew adjusting program "95" (fig. 59).

Preliminary adjustment:

- If a rhombus was sewn as seen in fig. 60, turn adjusting eccentric just 2 - 4 degrees in direction "A" as shown in fig. 64.
  If a rhombus was sewn as seen in fig. 61, turn adjusting eccentric just 2 - 4 degrees in direction "B", as shown in fig. 64.

Cross-check:

- Sew adjusting program "95" and check.
- On model 2034, select adjusting program "96" (BDGH) by pressing the program selection key (fig. 65).
- On model 2044, select adjusting program "96" (BDGH) by turning the program selection key (fig 66).
- By sewing, check the length 34.5 +/- 0.5 mm.

Precise adjustment:

- If the letters are distorted and longer than 35 mm, turn the adjusting eccentric with a screwdriver only one degree in direction "B" according to fig 64.
  If the letters are distorted and shorter than 34 mm, turn the adjusting eccentric with a screwdriver only one degree in direction "A" according to fig. 64.

Cross-check:

- Select stitch program "09" (linen buttonhole).
- Place a piece of fabric underneath buttonhole foot "5".
- Sew stitch program "09".
  The buttonhole bartack must cover the right buttonhole seam (fig. 63).

Note:

If very different sewing threads or difficult fabrics are used, buttonholes, utility stitches or fancy stitches may be sewn with shifts in the pattern design. To correct this, the customer can adjust the balance.
On top of that, the length of the buttonhole reverse seam can be programmed.

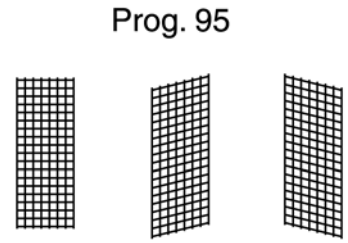


Fig. 59 Fig. 60 Fig. 61

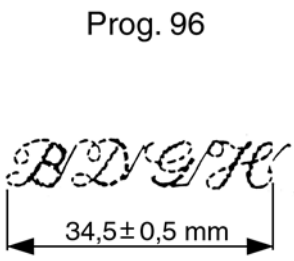


Fig. 62

Fig. 63

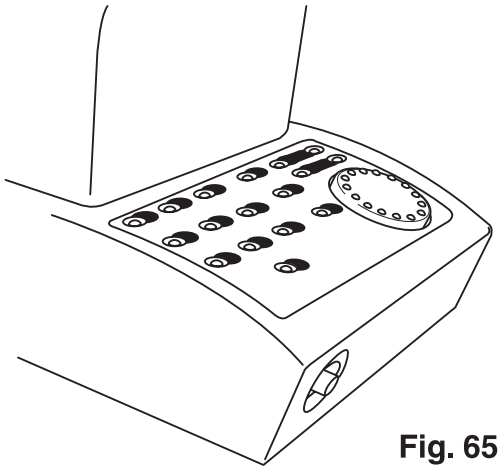


Fig. 65

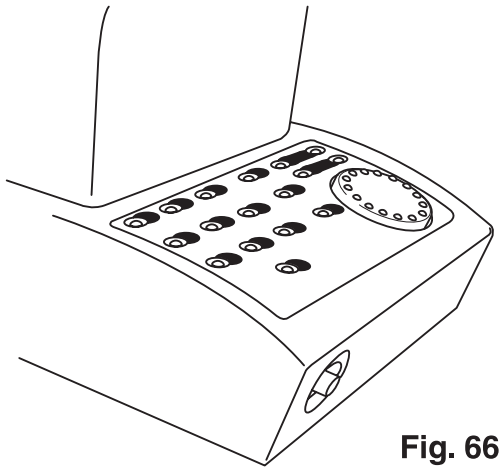


Fig. 66

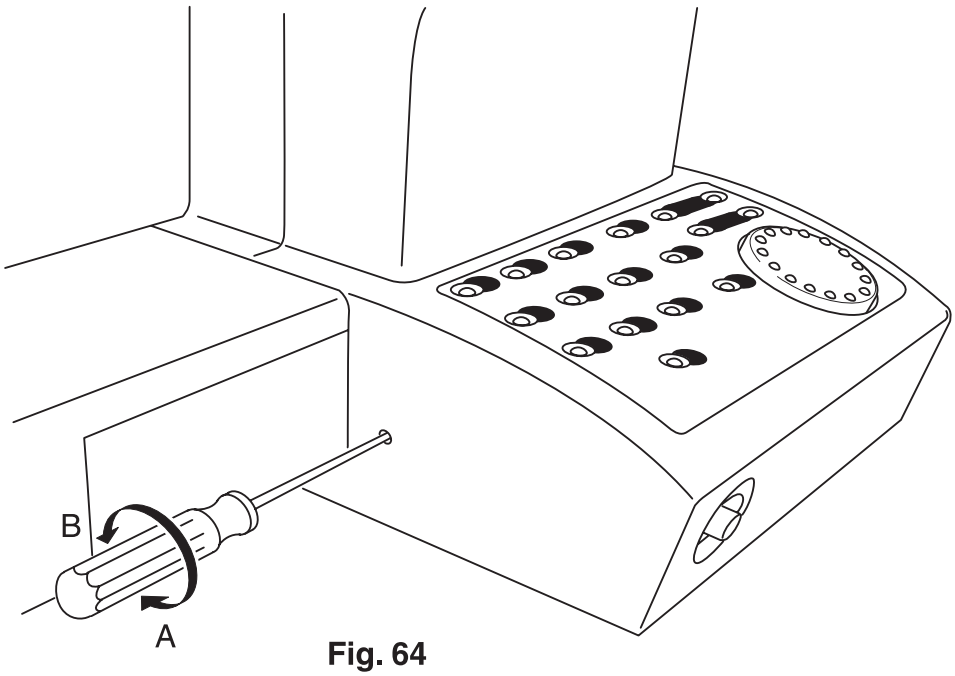


Fig. 64

22. Making up a sewing sample

When all sewing checks are completed and the machine sews perfectly, a sewing sample is to be made. This sewing sample should contain the most important stitch patterns, which can be sewn on a repaired machine (fig. 67).
If the customer has special requirements, these should appear on a separate sewing sample.

The following is a sewing sample from the PFAFF expression 2044

Stitch program	No.	Stitch width	Stitch length or pattern length	Presser foot no.
1 Straight stitch	01		2.5	Zigzag foot "0"
2 Zigzag stitch	03	6.0	2.0	Zigzag foot "0"
3 Honeycomb stitch	19	6.0	2.0	Zigzag foot "0"
4 Linen buttonhole	09	4.5	1	Buttonhole foot "5"
5 Fancy stitch	56	6.0	0.30	Fancy stitch foot "2"

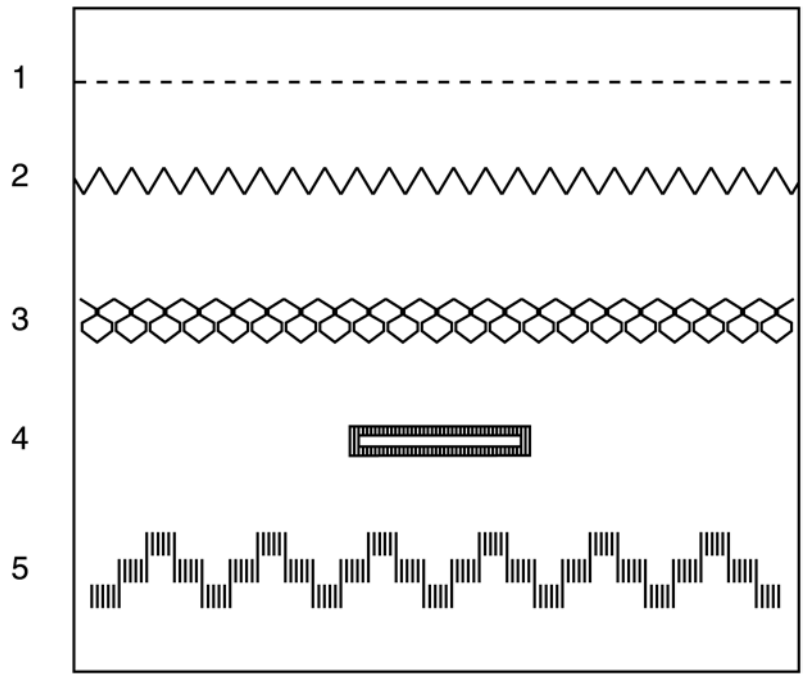


Fig. 67

Repair Instructions

23. Dismantling and assembling the needle thread tension

Removal:

- Remove the needle thread tension.
- Press the two plastic noses 70 together and remove tension dial 71 (fig. 66).
- Remove spring disc 72.
- Turn milled nut 73 out of guide 74.
- Remove guide 74.
- Remove milled nut 73 and pressure-spring 75.
- Pull out or knock out cemented stud 76 complete with pressure piece 77 and the three tension discs 78, 79 and 80.

Fitting:

- Insert tension stud 76 with the three tension discs 78, 79 and 90 and the pressure piece 77.
- Cement the tension stud into the mounting plate with Onmivit-Rapid.
- Push pressure-spring 75 and milled nut 73 onto tension stud.
- Insert guide 74 with its right side and fully screw in milled nut 73.
- Push on tension dial 71 making sure that the guide nose is in contact with the outer surface of the curve.
- Install the needle thread tension.
- Set the needle thread tension according to section 18.

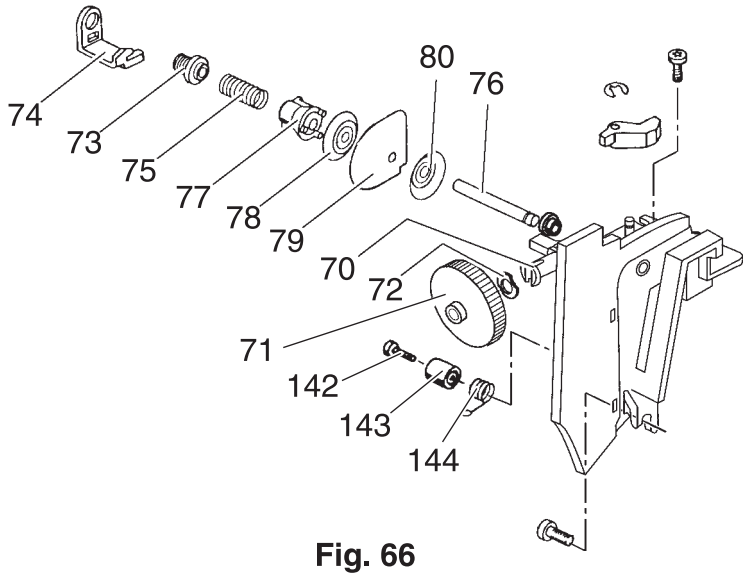


Fig. 66

24. Changing the torsion spring in handwheel

Dismantling the handwheel

- Remove stand cover in accordance with the instructions for dismantling the housing.
- Turn the handwheel until the handwheel cutout is facing upward (fig. 67).
- Push lug 81 to the rear using a screwdriver.
- Pull off the handwheel from the arm shaft to the right.
- Tilt the machine to the rear.
- Place a rag underneath the arm shaft.
- Punch out tapered notch pin 82 using a punch from the arm shaft.
- Remove spring washer 83.
- Loosen motor-mounting fastening screw 84 (fig. 68).
- Push the motor mounting up slightly.
- Remove the motor's flat toothed belt 85.
- Remove sprocket 86, bushing 87, torsion spring 88 and spring washer 89 (fig. 67).

Fitting the handwheel

- Push spring washer 89 onto the arm shaft.
- Insert torsion spring 88 into bushing 87.
- Attach bushing 87 together with torsion spring 88 onto the arm shaft.
- Press sprocket 86 onto the arm shaft.
- Push lockwasher 83 onto the arm shaft.
- Fit the motor's flat-toothed belt 85.
- Tighten the motor's flat-toothed belt 85 in accordance with section 31, tightening fastening screw 84 very securely at the same time (fig. 68).
- Tilt back the machine and place a rag underneath the arm shaft.
- Punch tapered notch pin 82, so that its sides have the same distance to the arm shaft.
- Push the handwheel onto the arm shaft, so that lug 81 locks in place above tapered notch pin 82 (fig. 67).
- Attach the stand cover, the housing insert as well as the top cover.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

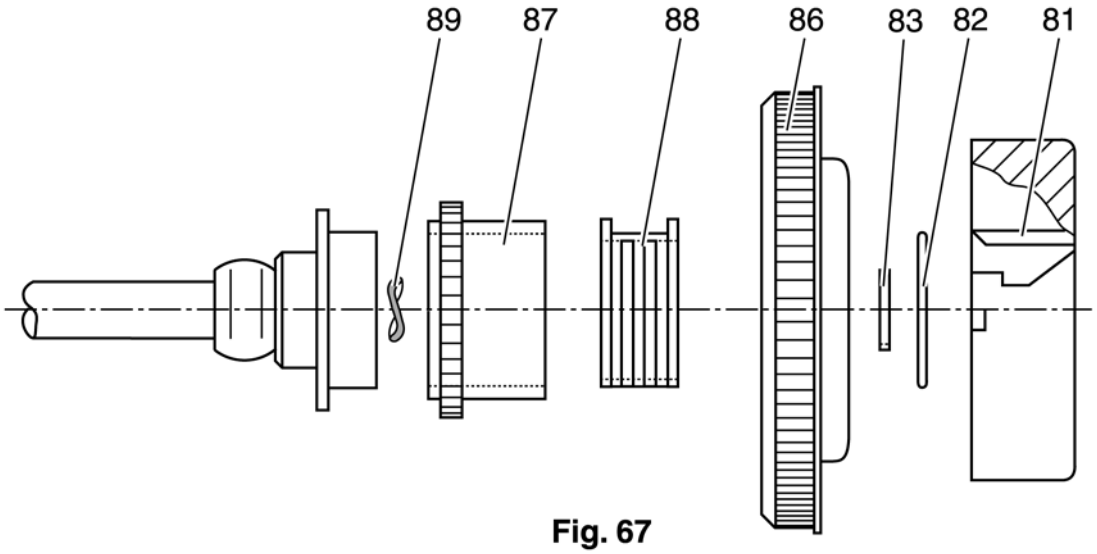


Fig. 67

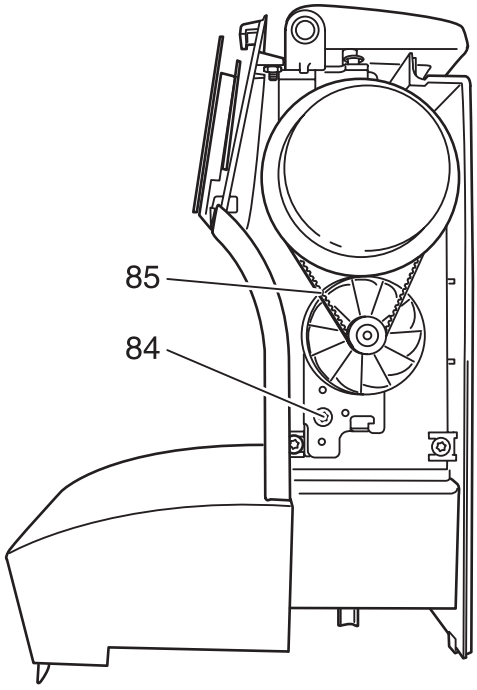


Fig. 68

25. Dismantling and assembling the sewing hook

Removal:

- Remove the needle.
- Unscrew the presser foot.
- Remove the bobbin case.
- Unscrew the bobbin case position finger.
- Take out the three screws with springs from behind (fig. 69).
- Remove the bobbin case base with sewing hook gib (fig. 70).
- Turn the sewing hook gib to the left or to the right out of the bobbin case base (fig. 71).
- Clean the sewing hook, bobbin case base and hook gib.

Fitting:

- Turn the handwheel until the opening of the sewing hook faces to the left (fig. 72).
- Turn the sewing hook gib to the left into the bobbin case base (fig. 73.).
- Insert the bobbin case base complete with sewing hook gib into the sewing hook (fig. 74).
- Fasten the sewing hook gib from behind with three screws with springs (fig. 69).
- Screw on and adjust the bobbin case position finger.

26. Cleaning and oiling the machine

Note:

The machine is equipped with oil-soaked calotte bearings and is therefore maintenance-free for the user.
Only the sewing hook should be lubricated once in a while with normal sewing machine oil.
After repair work, the mechanic should oil the machine with BP Energol HLP 46 or HLP 80 and the sewing hook with normal sewing machine oil.
Calotte bearings or parts must not be cleaned with gasoline, petroleum, kerosene, thinners, trichlorethylene etc.
Dirty or clogged calotte bearings or parts may only be cleaned mechanically by brushing them off.
They are then to be oiled with BP Energol HLP 46 or HLP 80.

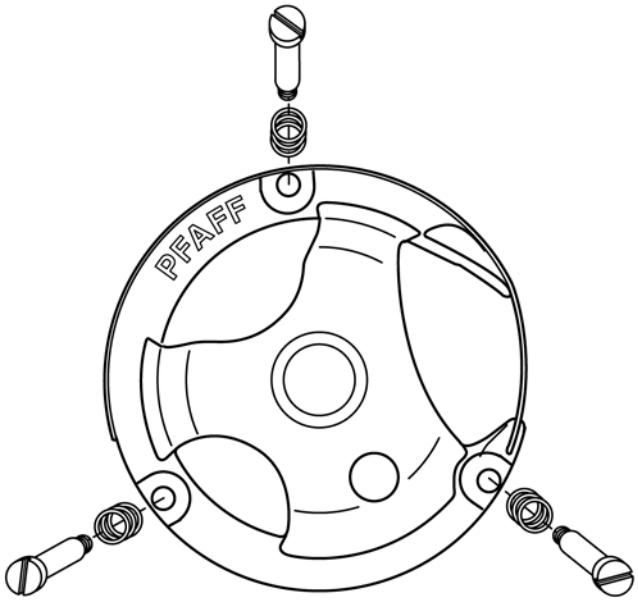


Fig. 69

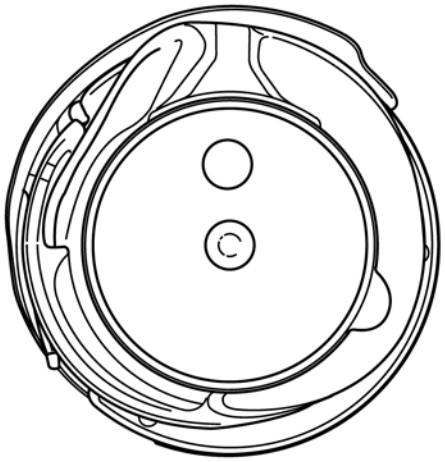


Fig. 70

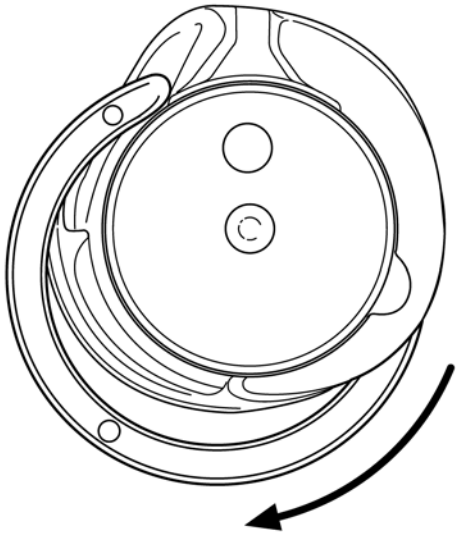


Fig. 71

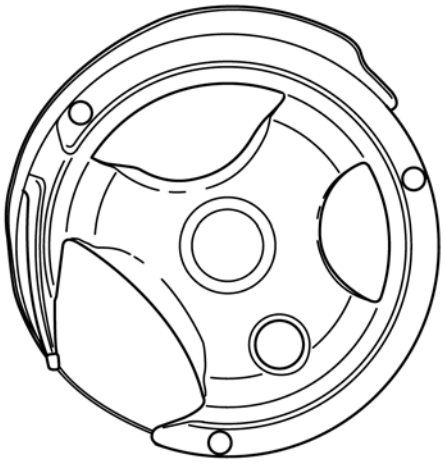


Fig. 72

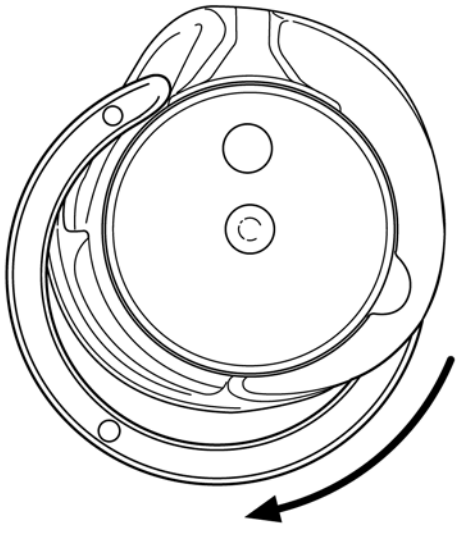


Fig. 73

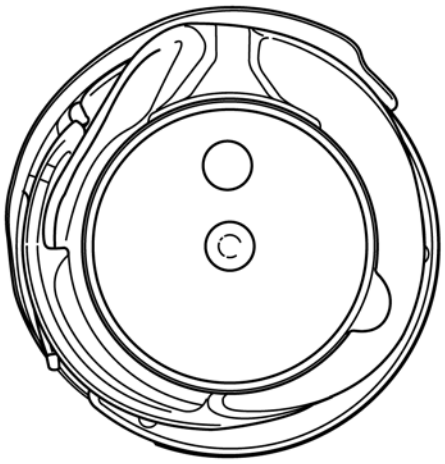


Fig. 74

27. Changing the flat-toothed belt

Removal:

- Remove the housing in accordance with the adjustment and repair instructions.
- Turn the handwheel until the lobe of feed eccentric 5 is positioned at the rear.
- Loosen fastening screw 1 of tensioning roller 2 (fig. 75).
- Tilt the machine to the rear.
- Unscrew and remove fastening screw 90 of clamping plate 91 on the lower right calotte bearing (fig. 76).
- Remove the clamping plate.
- Slip off flat-toothed belt 98 from the upper and lower belt wheels 93 and 94.
- Lift complete hook driving shaft 28 out of the lower right calotte bearing 92 as far as it will go.
- Pull the flat toothed belt between calotte 95 and calotte bearing 92.
- Disconnect tension spring 96 on needle bar frame 44 (fig. 75).
- Remove lockwasher 51 on the needle bar frame.
- Remove circlip 97 on zigzag stepping motor 46.
- Dismantle the complete connecting rod 99.
- Loosen screw 100 on needle bar crank 101 (fig. 75).
- Unscrew and remove both clamping plate screws 102.
- Dismantle both clamping plates 103.
- Lift the needle bar with the crank as far out as possible from calotte bearings 104 and 105.
- Hold the needle bar crank firmly. At the same time move needle bar 106 to the right until both parts are disengaged.
- Dismantle the complete needle bar.
- Remove the flat-toothed belt from the housing to the top.

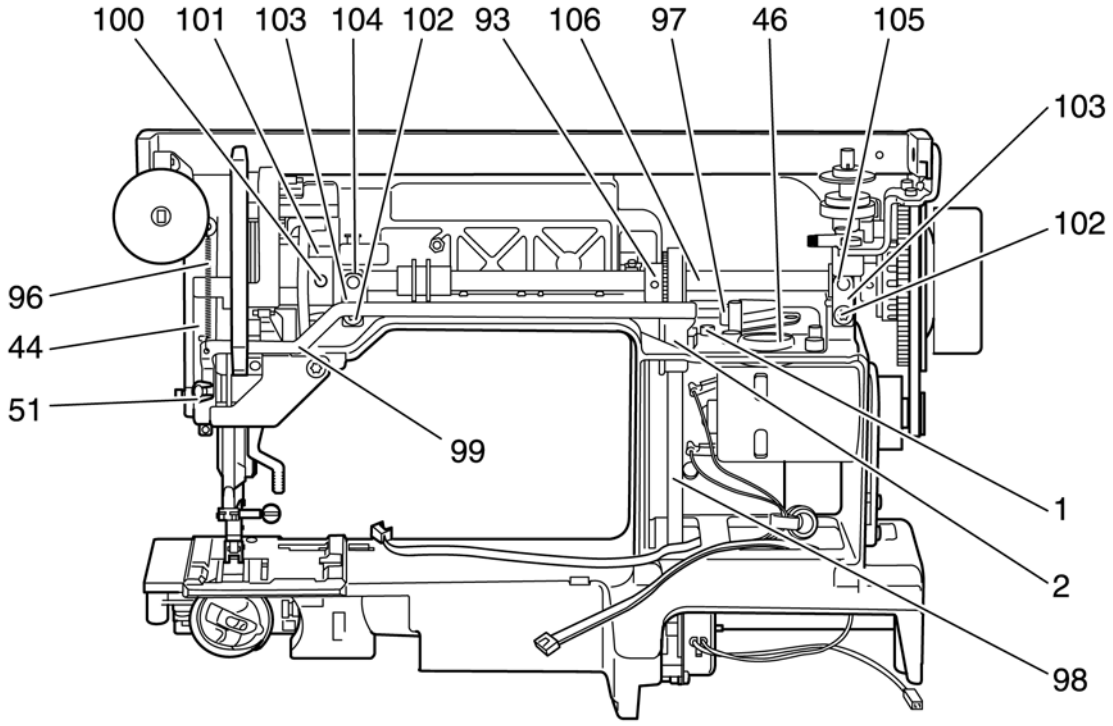

100
101
103
104
102
93
106
97
46
105
103
102
96
44
51
99
1
2
98

Fig. 75

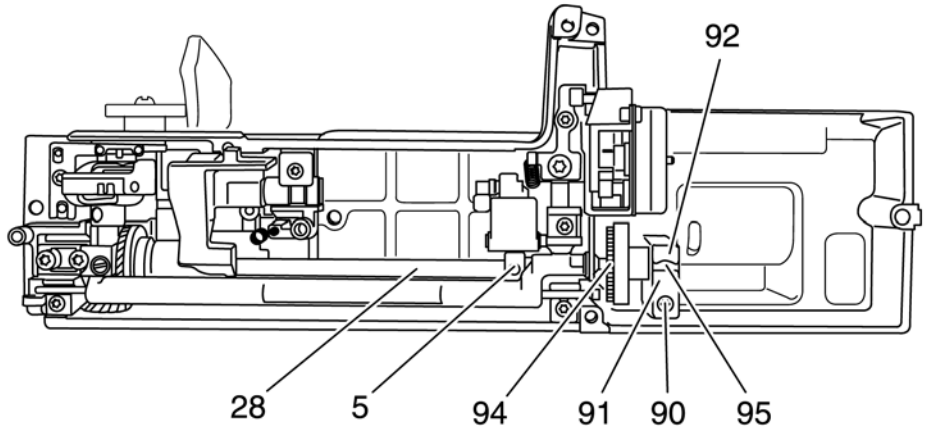

92
28
5
94
91
90
95

Fig. 76

Fitting:

- Lift complete hook driving shaft 28 out of the lower right calotte bearing 92 as far as it will go (fig. 78).
- Pull the flat toothed belt between calotte 95 and calotte bearing 92.
- Place hook driving shaft 28 together with calotte 95 in the lower right calotte bearing 92 exactly.
- Fit clamping plate 91 and fasten with screw 90.
- Pull flat-toothed belt 98, which is in the inner housing, upwards.
- Feed arm shaft 106 from the right into the housing (fig. 77).
- Place flat-toothed belt 98 over arm shaft 106.
- Feed arm shaft 106 into needle bar crank 101.
- Insert arm shaft 106 into calotte bearings 104 and 105.
- Fit clamping plates 103 and fasten with screws 102.
- Check for free movement of arm shaft, if necessary establish the free movement.
- Place flat-toothed belt 98 onto the upper and lower sprockets 93 and 94.
- Set the flat-toothed belt's tension according to section 1.
- Turn the handwheel until the fastening screw of the synchronizer control cam 32 faces downwards (fig. 79).
- At the same time pin 107 on the upper sprocket faces upwards.
- Press needle bar crank 101 against the calotte of the left calotte bearing 104. At the same time tighten screw 100 on needle bar crank 101.
- Check for free movement of the arm shaft, if necessary establish it.
- Attach connecting rod 99 (fig. 77).
- Mount lockwasher 51 onto the needle bar frame.
- Attach pull-spring 96.
- Attach circlip 97 to the zigzag stepping motor.
- Attach connection plugs 7, 12, 13, 14, 15 and 16 to the circuit board on the front housing shell.
- Mount the front housing shell and fasten with torx screws 17, 18 and 19.
- Mount the rear housing shell and fasten with torx screws 10 and 11.
- Mount the stand cover and fasten with torx screws 5.
- Attach the needle plate.
- Attach connection plugs 3 and 4 to the circuit board on the baseplate.
- Locate the baseplate, the freearm lid with bobbin thread monitor and the buttonhole sensor to the right next to the machine.

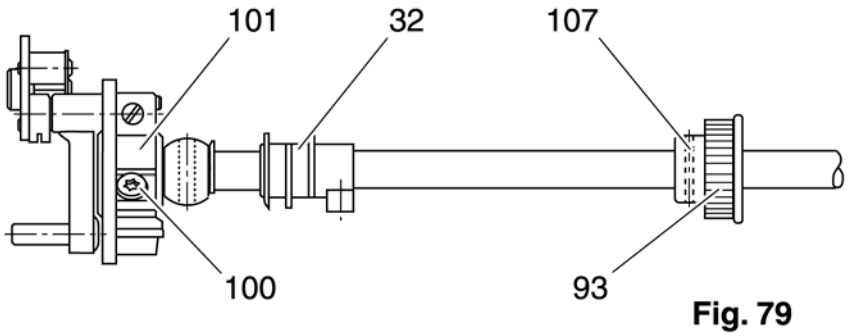


Fig. 79

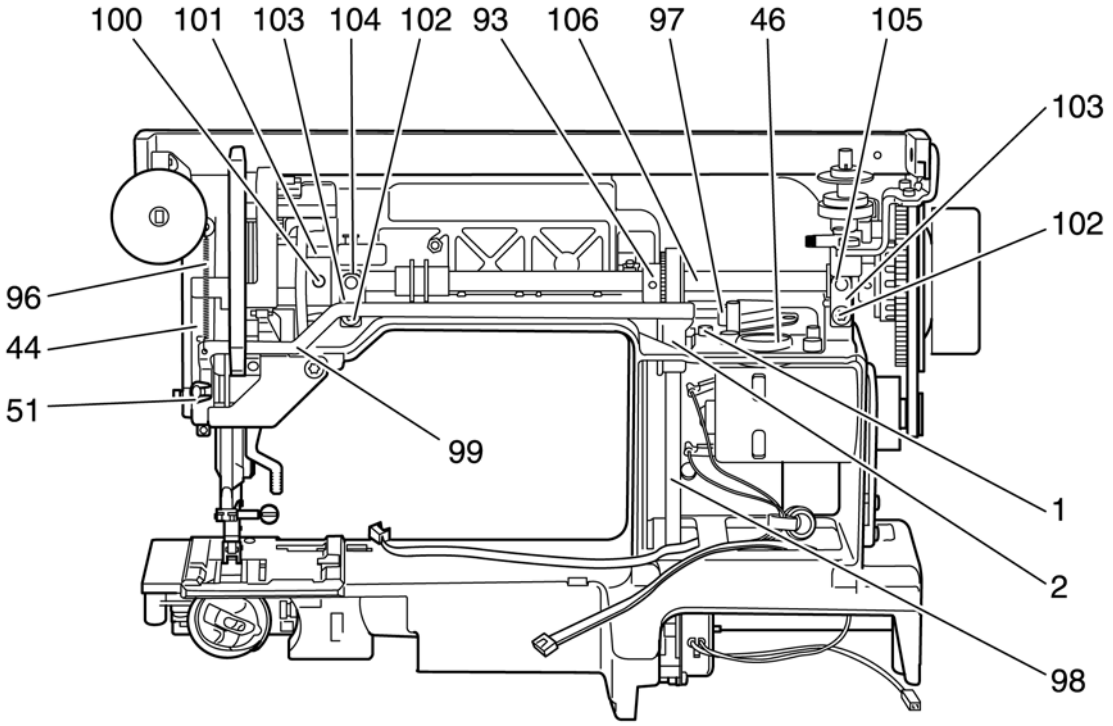

100
101
103
104
102
93
106
97
46
105
103
102
96
44
51
99
1
2
98

Fig. 77

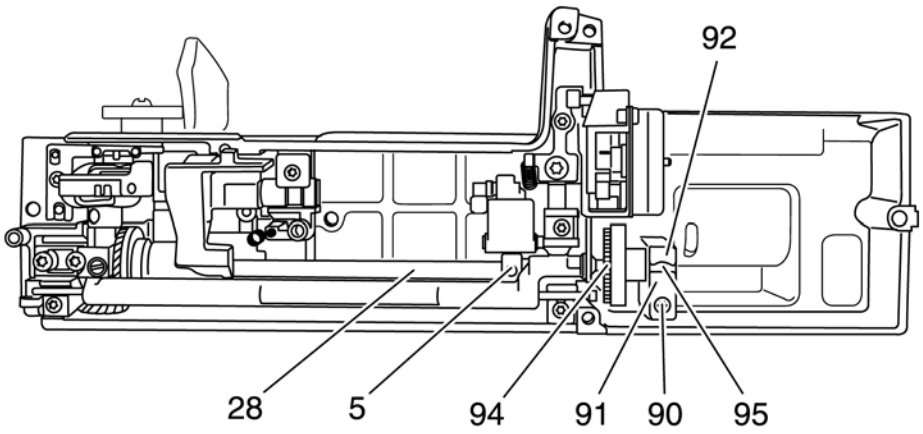

92
28
5
94
91
90
95

Fig. 78

Adjusting the machine:

- Tilt the machine towards the rear.
- Disconnect spring 3 (fig. 80).
- Unscrew and remove screw 4.
- Turn the handwheel until the lobe of feed eccentric 5 is at the rear.
- Fold feed regulator 6 downward and remove it with link 7 to the left from feed bar pin.
- Check that the slide block can be moved easily without play or binding into the slotted lever. If necessary, adjust according to section 2 a.
- Fold feed regulator 6 to the rear and then upward over feed eccentric 5.
- Insert screw 4 into clamping plate 21 and tighten just a little.
- Push pin 20 to the side until lever 7 and driving bar 19 still have a little play and move easily.
- Tighten screw 4.
- Attach spring 3.
- Loosen the three screws 29 in the lower flat-toothed belt sprocket 94.
- Bring the needle bar to its lowest position by turning the handwheel.
- Fit spacer (63-102 600-18) on the needle bar and push up against the needle bar frame.
- Push needle rise clamp (61-111 600-35) on the needle bar.
- Push 2 mm feeler gauge (00-870 136-01) with its cutout on the needle bar above the needle rise clamp.
- Loosen the needle rise clamp and push the 2 mm feeler gauge upward against the spacer.
- Tighten the milled screw on the needle rise clamp.
- Turn the handwheel back and forth. If there is any play at the feeler gauge, repeat this procedure.
- Remove the 2 mm feeler gauge.
- Turn the handwheel in the normal direction until the needle rise clamp rests on the spacer.
- Hold the handwheel at this position.
- Turn hook driving shaft 28 in the normal direction until the pin gauge can be inserted in the hole of feed eccentric 5 and pins 27 (fig. 80).
- Insert the pin gauge and tighten one of the screws 29.
- Remove the pin gauge, needle rise clamp and the spacer and tighten all three screws 29.

Note:

On having tightened the screws 29, there must not be any play between the lower flat-toothed belt sprocket 92 and calotte 95.

- Check section 4 "Adjustment of the feed dog height".
- Carry out section 5 "Adjustment of the synchronizer".
- Carry out section 12 "Sewing hook timing".
- Insert the buttonhole sensor.
- Attach the free-arm cover and fasten with both fastening screws 5.
- Bring the feed-dog lowering mechanism to the normal working position.

- Fold the baseplate towards the machine.
- Attach the cable clip.
- Fasten the baseplate on the housing with the three fastening screws.
- Attach the face plate.
- Attach connection plug 2 onto the circuit board of the front housing shell.
- Install the sewing lamp cable.
- Mount the facing panel of the front housing panel.
- Insert the housing insert and fasten with the torx screws.
- Attach the top cover.
- The following points must be checked and adjusted:
- Section 17 "Adjustment of bobbin thread tension"
- Section 18 "Adjustment of needle thread tension"
- Section 20 "Adjustment of equal forward and reverse stitch length"
- An electrical safety test must be carried out in accordance with VDE 0701 using the testing appliance Metrawatt 5013.

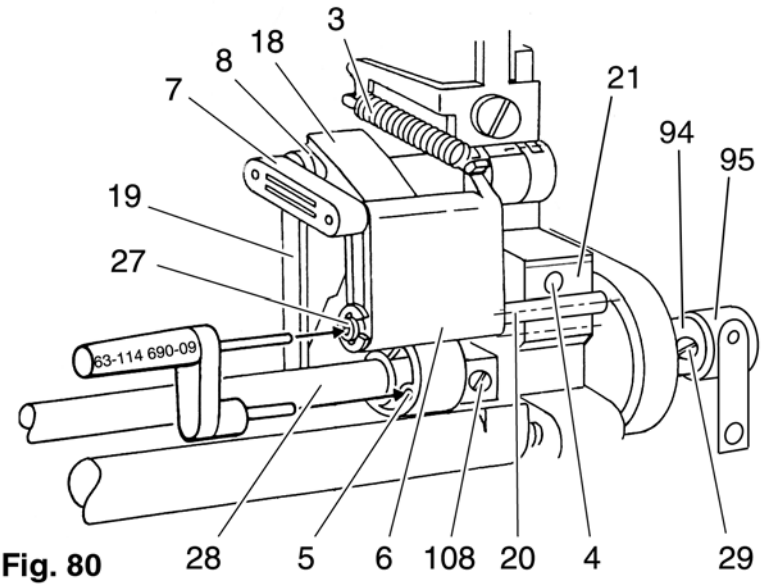


Fig. 80

28. Changing the bevel gears

Note:

Always change bevel gears in pairs.

Removal:

- Remove the mains plug of the machine.
- Remove the detachable work support.
- Unscrew and remove the three fastening screws of the baseplate.
- Remove both connection plugs 3 and 4 from the circuit board.
- Unscrew and remove both fastening screws 5 on the free-arm cover.
- Bring the feed-dog lowering mechanism to the normal working position.
- Using a small screwdriver, disengage both feed regulators 6.
- Remove the free-arm cover carefully from the housing to the left and place it aside the machine.
- Remove the needle plate.
- Remove the buttonhole sensor and place it aside the machine.
- Dismantle feed-dog lowering mechanism 107 (fig. 81).
- Disconnect both pull-springs 3 and 9.
- Unscrew and remove screw 60 of the bobbin case position finger 61.
- Remove the bobbin case position finger.
- Turn the handwheel until the lobe of feed eccentric 5 is at the rear.
- Unscrew and remove screw 4 and clamping plate 21.
- Fold feed regulator 6 downwards and remove it with link 7 to left from the driving bar pin.
- Loosen the three screw 29 on the lower flat-toothed belt sprocket 94.
- Unscrew and remove screw 108 of feed eccentric 5.
- Unscrew and remove screw 57 of lifting eccentric 109.
- Move hook driving shaft 28 as far as possible to the right.
- Loosen screw 22 and remove pin 23.
- Unscrew and remove screw 10 of clamping plate 110.
- Remove the left cylindrical pin 12.
- Unscrew and remove both fastening screws 111 of the hook bearing.
- Pull feeding stroke shaft 14 slightly downwards and dismantle the complete sewing hook together with lifting eccentric 109.
- Loosen both screw 53 of the sewing hook (fig. 82).
- Pull the small hook driving shaft with bevel gear 56 downwards to remove.

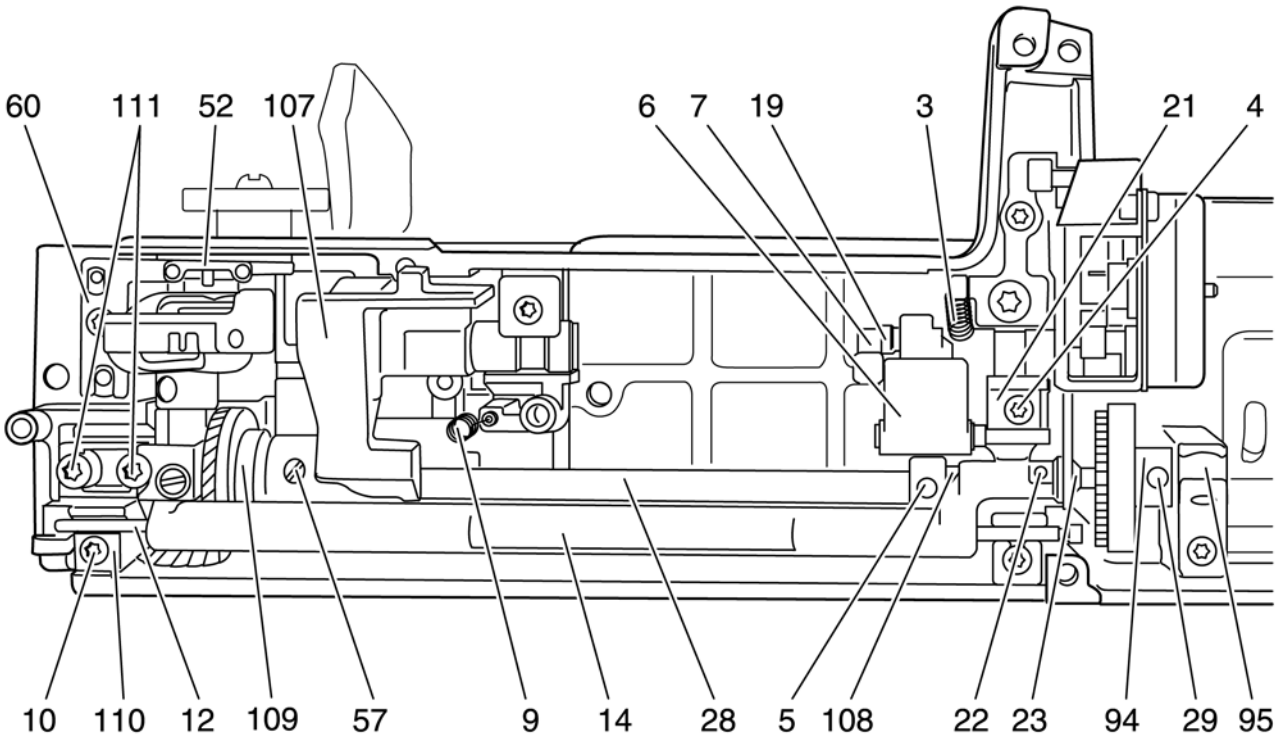

60
111
52
107
6
7
19
3
21
4
10
110
12
109
57
9
14
28
5
108
22
23
94
29
95

Fig. 83

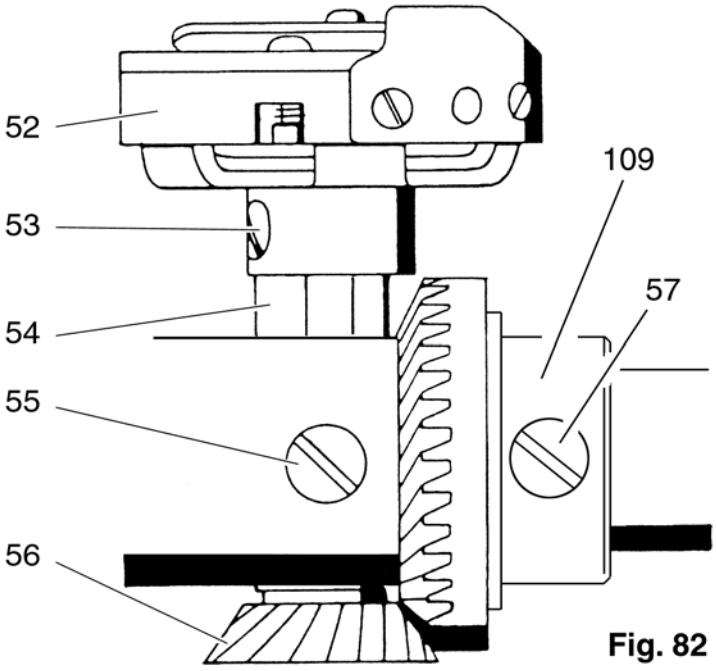

52
53
54
55
56
109
57

Fig. 82

Fitting:

- Insert the new hook driving shaft with bevel gear 56 in the sewing hook bearing (fig. 82).
- Mount sewing hook 52 with the plastic disk on the sewing hook bearing and set it.
- Fasten the sewing hook bearing using both screws 111 (fig. 83).
  Note that the sewing hook bearing is fastened parallel to the housing.
- Push the hook driving shaft to the left until circlip 112 rests against the lower right calotte bearing 92.
- Place the hole of lifting eccentric 109 above the surface of hook driving shaft 28.
- Swivel in screw 57 of lifting eccentric 109 and fasten slightly.
- Press lower flat-toothed belt socket 94 to the right against calotte bearing 92.
  At the same time tighten one of screws 29.
- Check that the hook driving shaft has zero play and moves free of binding.
- Tighten all three screws 29 of the lower flat-toothed belt socket.
- Slightly loosen screw 57. Push the bevel gear and lifting eccentric 109 to the left until it rests on bevel gear 56 without any play.
- Tighten screw 57 on the surface of hook driving shaft 28 (fig. 83).
- Screw in dog-point screw 108 into feed eccentric 5 or the hook driving shaft.

Note:

Dog-point screw 108 must always protrude from feed eccentric 5 on the opposite side of screw 57 in lifting eccentric 109.

- Insert cylindrical pin 12 and fasten with the clamping plate.
- Adjust the feed driving shaft according to section 2a.
- Fit pin 23 with the washer situated to the left of the pull rod without any play.
- Tighten screw 22.
- Pull the feed dog to the front.

Important:

The complete feed driving shaft with top feed must slide slowly to the rear.

- Fit slide block 8 with the spring on the pin and insert into slide was in the correct curve radius.
- Check that the slide block can be moved easily without play or binding in the slide way.
- Push link 7 complete with feed regulator 6 to the right onto the connecting bar pin.
- Turn feed regulator 6 to the rear and then over feed eccentric 5 from the top.
- Insert screw 4 with clamping plate 21 and tighten slightly.
- Shift stud 20 laterally until link 7 and connecting bar 19 only have a slight play and are freely movable.
- Tighten screw 4.
- Fit spring 3.
- Fit the feed dog lowering mechanism.

- Attach spring 9.
- Set the base plate against the machine.
- Mount both connection plugs 3 and 4 on the circuit board.

Now the following adjustments are to be carried out:

- Section 3: Timing of the feed motion
- Section 4: Adjustment of feed dog height
- Section 5: Adjustment of synchronizer
- Section 11: Adjustment of hook-to-needle clearance
- Section 12: Hook timing
- Section 13: Adjustment of needle bar height
- Section 14: Adjustment of bobbin case position finger
- Install cable.
- Insert the buttonhole sensor.
- Attach the free-arm cover and secure with both fastening screws 5.
- Bring the feed dog lowering mechanism to its normal working position.
- Engage both feed regulators 6.
- Attach the cable clip.
- Secure the base plate with the three fastening screws to the housing.

Now the following adjustments are to be checked or carried out:

- Section 17: Adjustment of bobbin thread tension
- Section 18: Adjustment of needle thread tension
- After a running-in time of approx. 10 min. - Section 21: Adjustment of equal forward and reverse stitch length.
- Use testing appliance ABB Metrawatt M 5013 to carry out an electrical safety test according to VDE 0701.

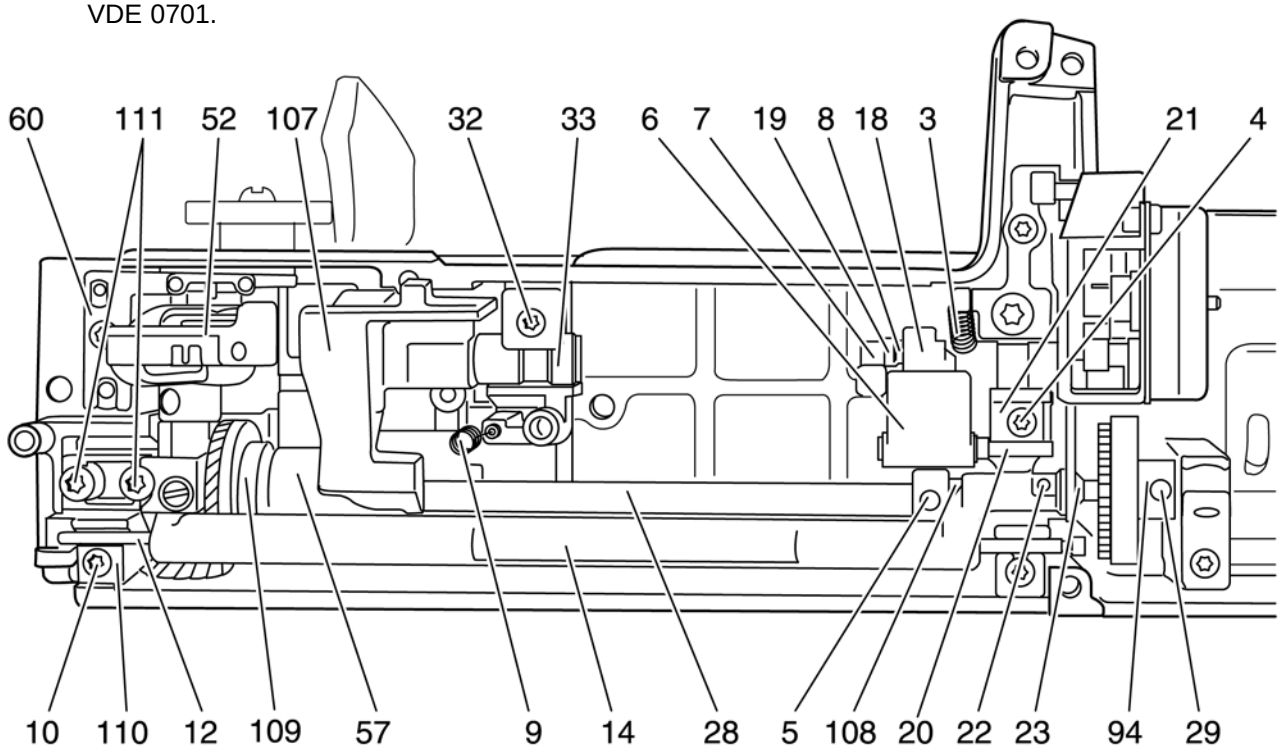


Fig. 83

29. Changing the base circuit board

Note:

The base circuit board is only exchanged as a complete unit.

Removal:

- Remove the mains lead from the mains socket and from the machine.
- Remove the detachable work support.
- Unscrew and remove the three fastening screws on the base plate.
- Tilt the base plate to the front.
- Remove the connection plug of twelve-wire flat cable 3 as well as the connection plug of motor cable 4 from the circuit board (fig. 84).

Fitting:

- Set the new base plate complete against the machine.
- Mount both connection plugs 3 and 4 on the circuit board.
- Fold the base plate against the machine and secure it with the three screws.
- After a running-in time of 10 - 15 min. check the adjustment of equal forward and reverse stitch length in accordance with section 21 of the service manual.
- Carry out an electrical safety test according to VDE 0701 using testing appliance Metrawatt 5013.

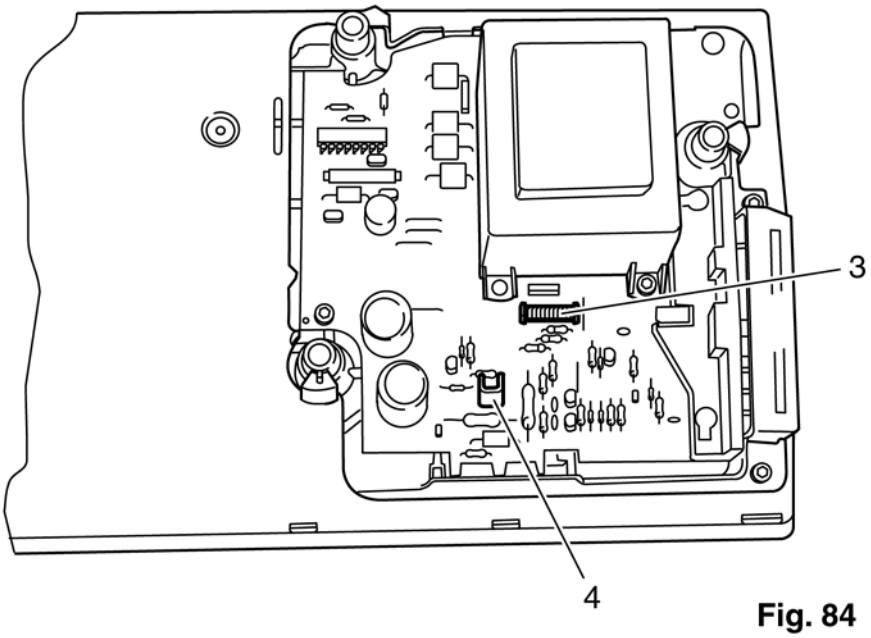


Fig. 84

30. Changing the upper circuit board on front housing panel

Removal:

- Remove the mains lead from the mains socket and from the machine.
- the detachable work support.
- Remove the folding cover.
- Unscrew and remove both torx screws of the housing insert.
- Remove the housing insert.
- Raise both lugs 1 slightly and remove the facing panel of the front housing panel in the direction of the arrow (fig. 85).
- Remove connection plugs 2, 7, 12, 13, 14, 15, 16, 112 and 113 from the circuit board (fig. 86).
- Unscrew and remove screws 114, 115 and 116.
- Remove the complete circuit board.

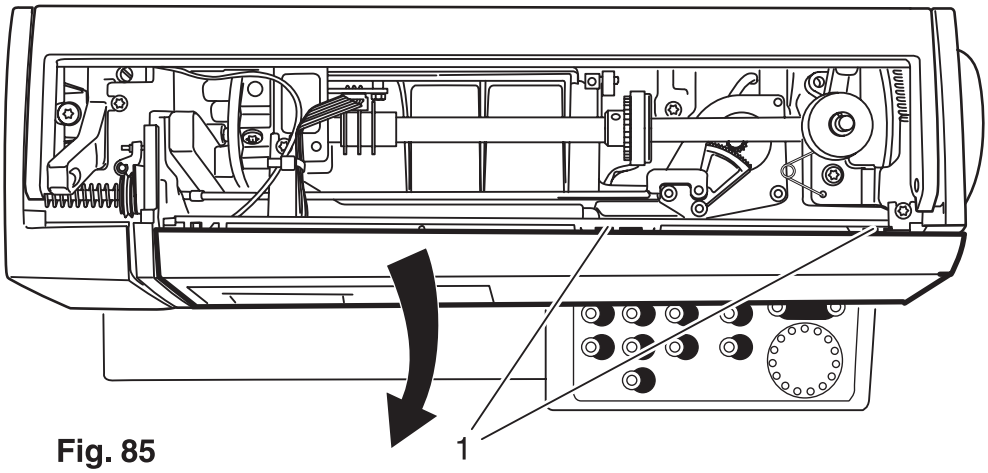


Fig. 85

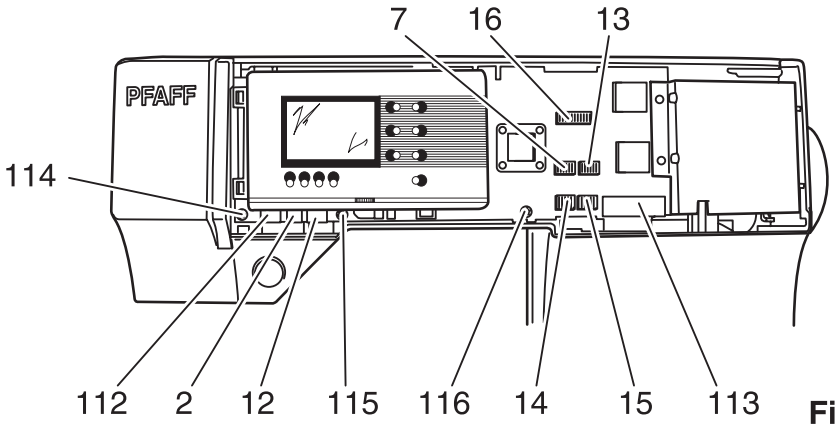


Fig. 86

Fitting:

- Place the circuit board on the front housing panel.
- Secure the circuit board with screws 114, 115 and 116 (fig. 86).
- Mount connection plugs 2, 7, 12, 13, 14, 15, 16, 112 and 113 onto the circuit board.
- Mount the facing panel onto the front housing panel, making sure that both lugs 1 lock into place (fig. 87).
- Attach the housing insert and secure with both torx screws.
- Attach the folding cover.
- After a running-in time of 10 - 15 min. check the adjustment of equal forward and reverse stitch length in accordance with section 21 of the service manual.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

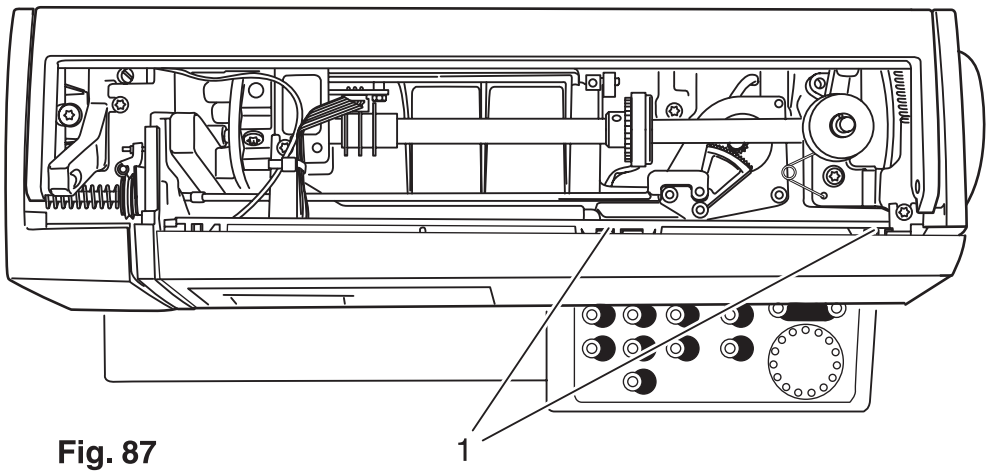


Fig. 87

31. Changing the control board with keys

Removal:

- Remove the mains lead from the mains socket and from the machine.
- Remove the detachable work support.
- Remove the folding cover.
- Unscrew and remove both torx screws of the housing insert.
- Remove the housing insert.
- Raise both lugs 1 slightly and remove the facing panel of the front housing panel in the direction of the arrow (fig. 88).
- Raise both lugs 116 and 117 up and down slightly (fig. 89).
- Push complete control board 118 slightly to the left until the control board can be removed from the circuit board.

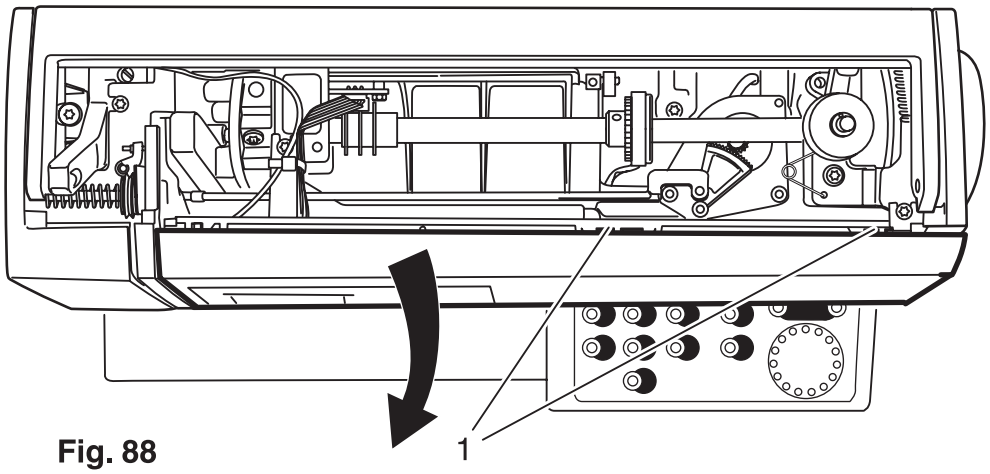


Fig. 88

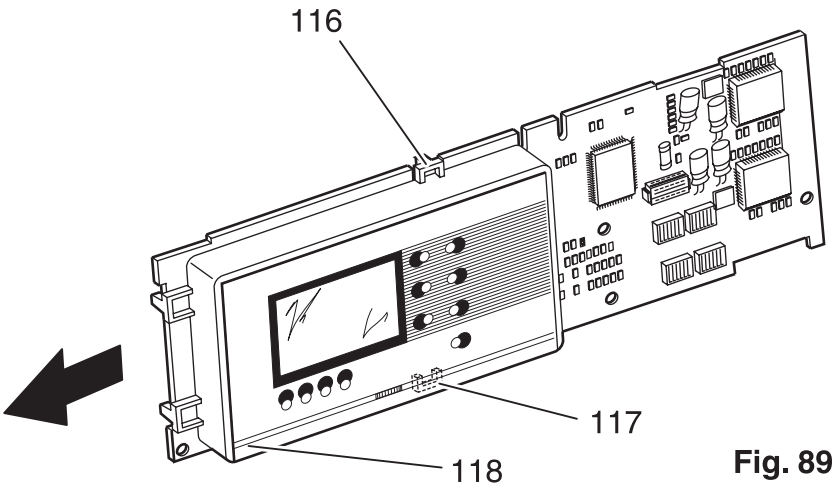


Fig. 89

Fitting:

- Mount the control board with keys onto the circuit board whilst making sure that all four lugs 116, 117, 119 and 120 lock in completely behind the circuit board (fig. 90).
- Mount the facing panel onto the front housing panel and make sure that both lugs 1 lock fully into place (fig. 91).
- Attach the housing insert and secure with both torx screws.
- Attach the folding cover.
- Carry out a functional test for all keys.
- After a running-in time of 10 - 15 min. check the adjustment of equal forward and reverse stitch length according to section 21 of this service manual.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

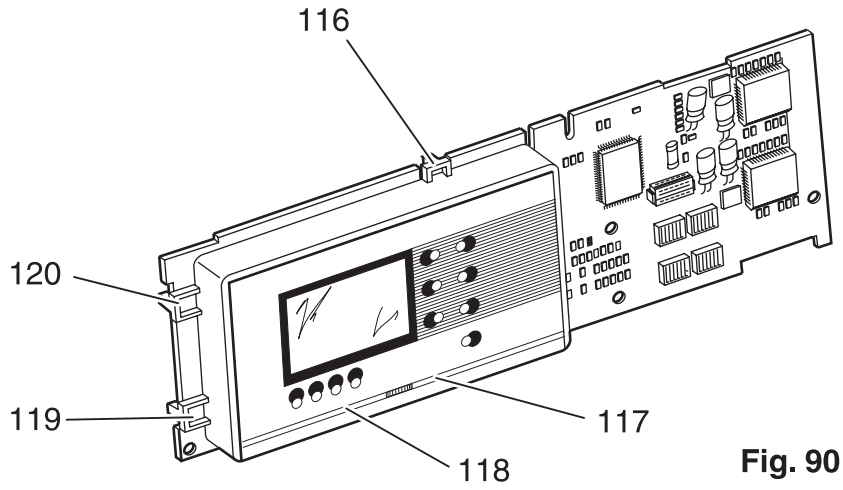


Fig. 90

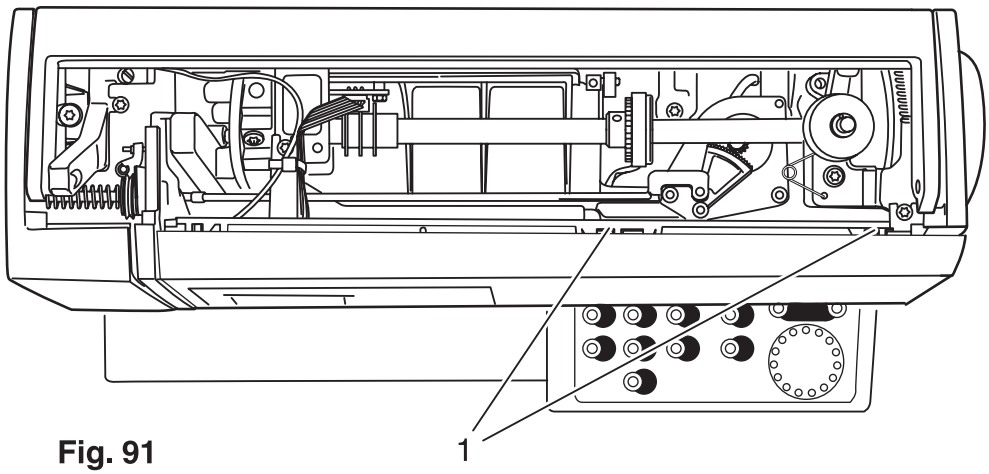


Fig. 91

32. Changing the key-pair panel

Removal:

- Remove the housing according to the service manual.
- Remove connection plug 113 from the circuit board (fig. 92).
- Unscrew and remove the five fastening screws 121 (fig. 93).
- Remove the complete circuit board together with the key-pair panel and the keys from the front housing panel.

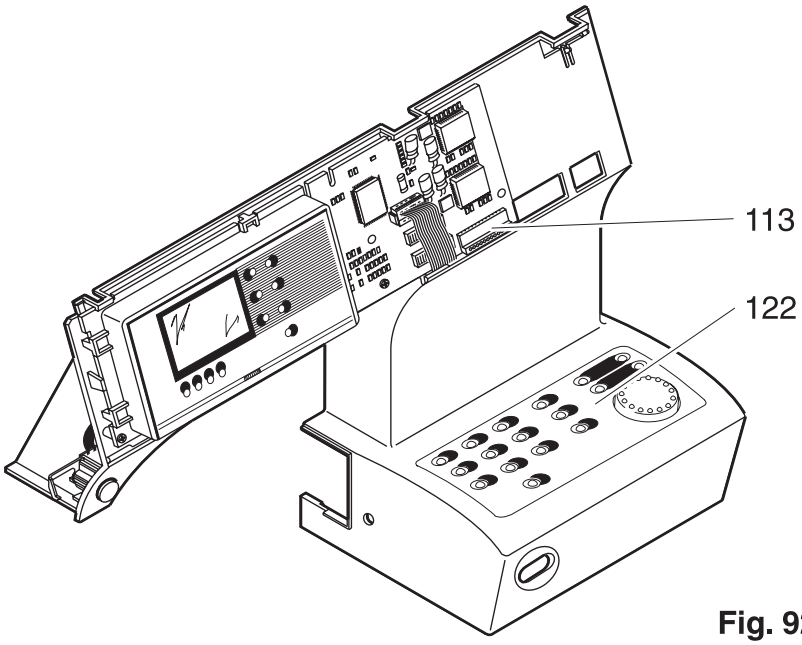


Fig. 92

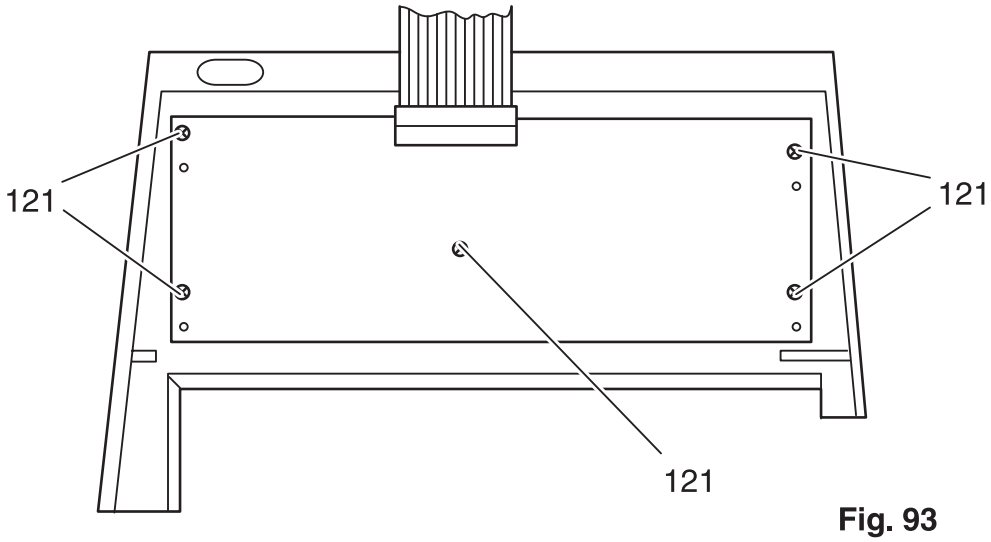


Fig. 93

Fitting:

- Attach the circuit board complete with key pair panel 122 and the keys onto the front housing panel (fig. 95).
- Secure the circuit board with the five fastening screws 121 (Fig. 94).
- Mount connection plug 113 on the circuit board on the front housing panel (fig. 95).
- Fit the complete housing according to the service manual.
- Carry out a functional test for all keys.
- After a running-in time of 10 - 15 min. check the adjustment of equal forward and reverse stitch length according to section 21 of this service manual.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

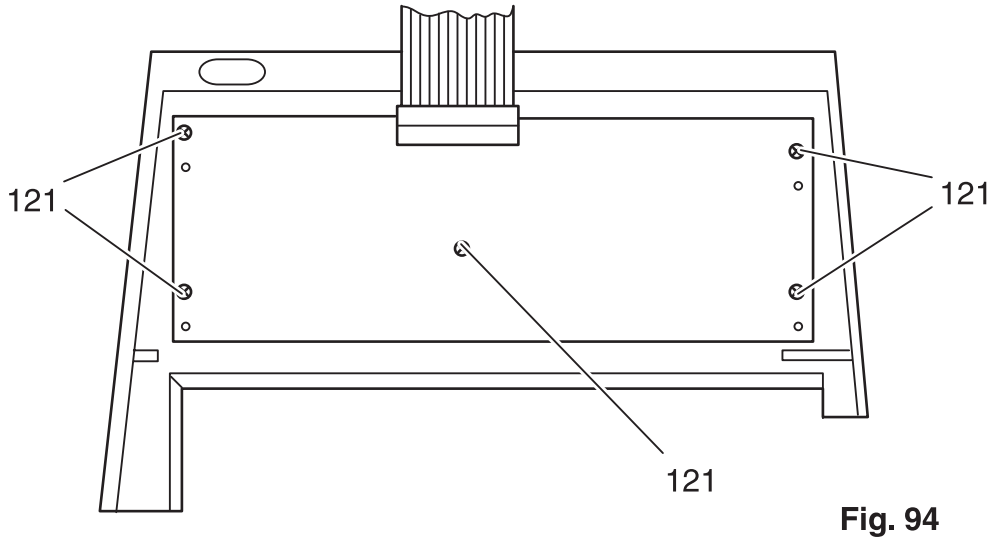


Fig. 94

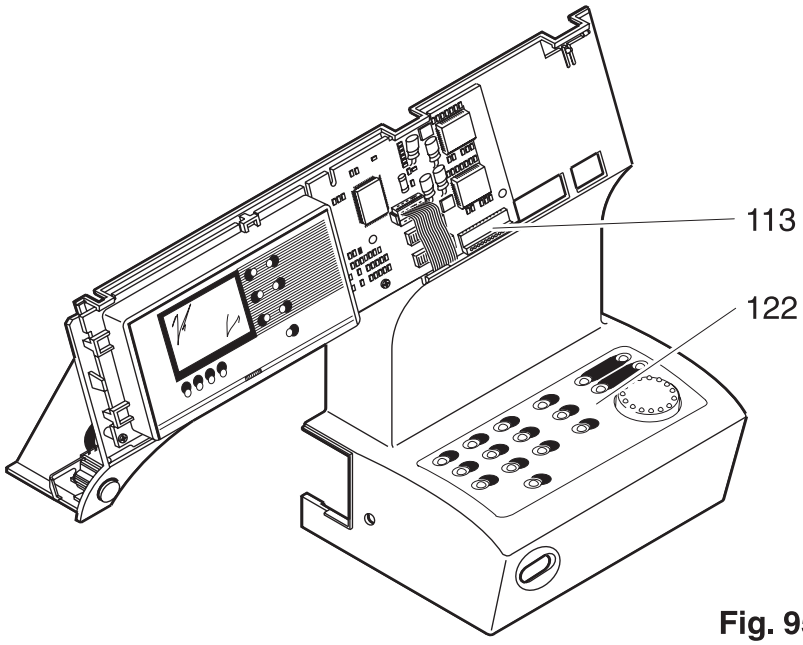


Fig. 95

33. Changing the synchronizer circuit board

Removal:

- Remove the mains lead from the mains socket and from the machine.
- Remove the detachable work support.
- Remove the folding cover.
- Unscrew and remove both torx screws of the housing insert.
- Remove the housing insert.
- Remove connection plug 12 from the circuit board on the front housing panel (fig. 96).
- Unscrew and remove fastening screw 123 on circuit board 124 using the torx offset screwdriver TX 15 (fig. 97).
- Unscrew and remove screw 17 on the housing (fig. 98).
- Raise the front housing panel slightly and pull the circuit board's power cable through cable tie 125.
- Remove the complete circuit board 124.

Fitting:

- Secure circuit board 124 to the housing with fastening screw 123, using the torx offset screwdriver TX 15 (fig. 97).
  Make sure that the circuit board is positioned as such, so that the cams of control cam 32 are positio ned in the middle of the circuit board guides (fig. 99).
- Pull the power cable of circuit board 124 through cable tie 125.
- Secure the cable with cable tie 125 on the bar of the front housing panel (fig. 98).
- Tighten fastening screw 17.
- Mount connection plug 12 onto the circuit board on the front housing panel (fig. 96).
- Adjust the synchronizer in accordance with section 5.
- Attach the housing insert and secure with both torx screws.
- Attach the folding cover.
- After a running-in time of 10 - 15 min. check the adjustment of equal forward and reverse stitch length according to section 21 of this service manual.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

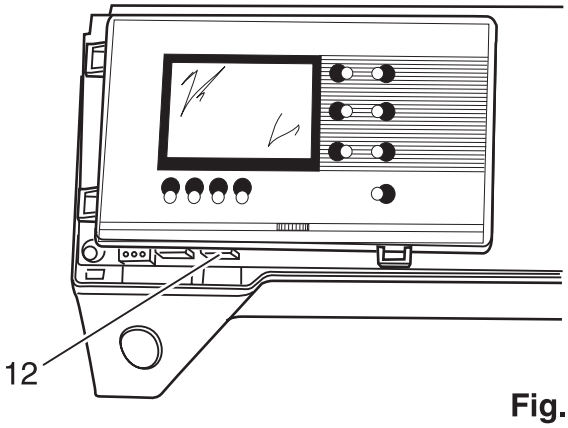


Fig. 96

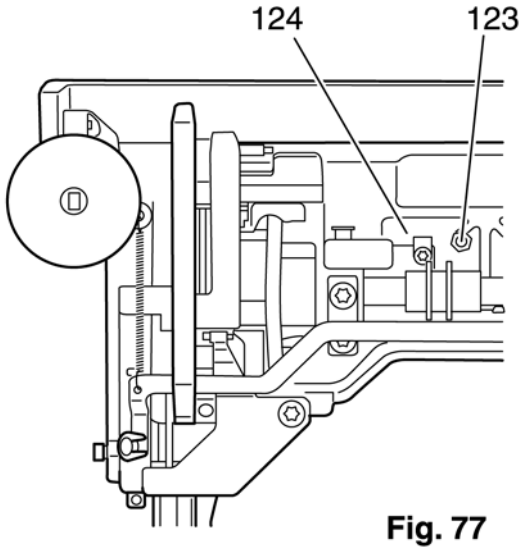


Fig. 77

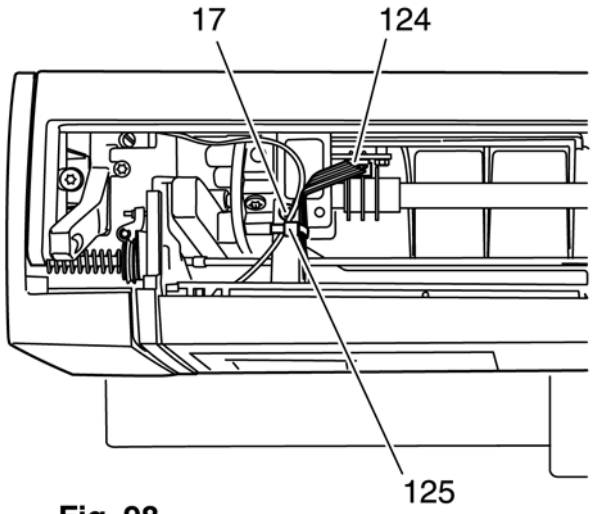


Fig. 98

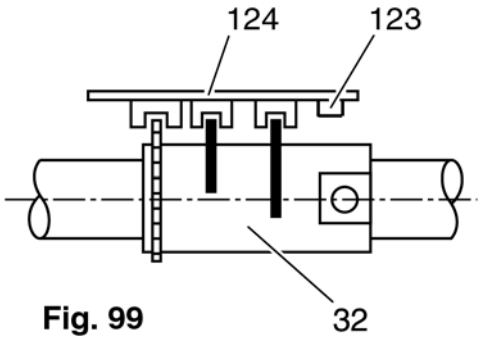


Fig. 99

34. Changing the motor

Note:

The motor is only exchanged complete.

Removal:

- Remove the mains lead from the mains socket and the machine.
- Clap the carrying handle up.
- Loosen fastening screw 9 on the stand cover (fig. 100).
- Remove stand cover.
- Unscrew and remove fastening screw 84 (fig. 101).
- Remove flat-toothed belt 85.
- Remove the motor from the housing to the right.
- Remove both of the motor's power cables (fig. 102).

Fitting:

- Place flat-toothed belt on the handwheel (fig. 101).
- Attach both power cables, paying attention to the plus signs (fig. 102).
- Insert the motor and place the motor pinion in toothed belt 85 (fig. 101).
- Tighten fastening screw 84 slightly.
- Adjust the toothed-belt tension by moving the motor.
- Tighten fastening screw 84.
- Insert the mains lead and trial-run the machine.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

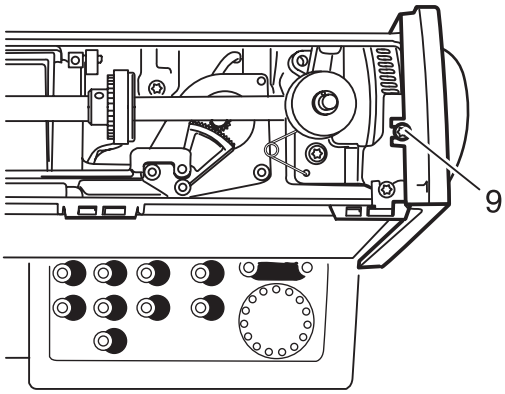


Fig. 100

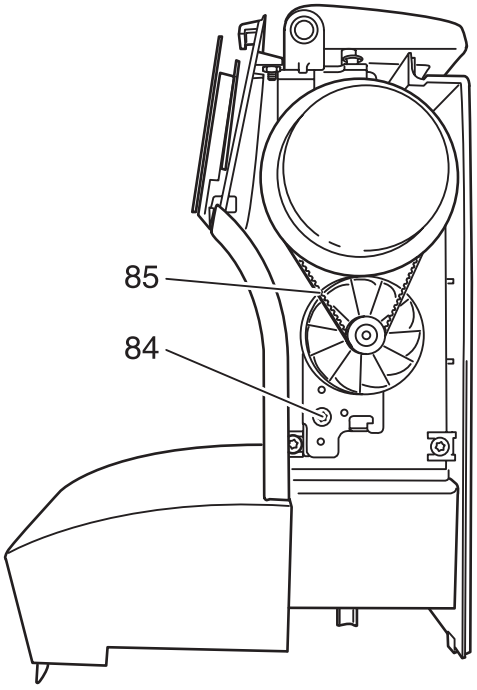


Fig. 101

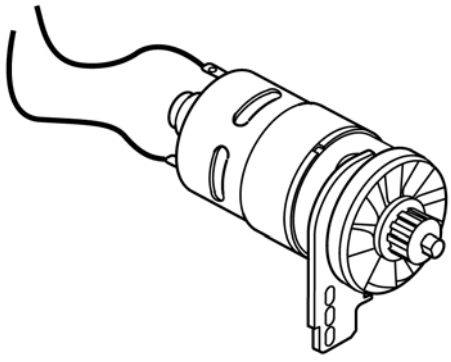


Fig. 102

35. Changing the cable in the foot control

Removal:

- Lift rubber strip 126 and pull it out with its three feet (fig. 103).
- Pull out the two plugs 127.
- Unscrew and remove the four Philips screws 128.
- Remove housing cover 129.
- Remove the rectangular pedal 130 with guide 131 and take out contact spring 136.
- Disconnect the right pressure spring 132.
- Disconnect the right cable 133 with the contact eyelet (fig. 104).
- Press out or pull out demented resistor track 134 (20-K?-potentiometer) upwards with a screwdriver or a pair of pliers.
- Remove cable 135.

Fitting:

- Insert cable 135 in the housing.
- Insert the soldered resistor track 134 fully downwards into the guide and secure it with some adhesive.
- Push the soldered contact eyelet 133 onto the right guide pin.
- Place both cables in the respective guide grooves.
- Place contact spring 136 on the guide pin in the larger right section of pedal 130.
- Push pressure spring 132 onto the same guide pin.
- Turn pedal 130 around and push the right spring 132 on the right guide pin of the housing and the left spring 137 on the left guide pin in pedal 130.
- First press the pedal a little to the right and then downwards in such a way that contact spring 136 is on the right-hand side of resistor track 134 and not bent.
- Press the pedal further down, as far as it will go; at the same time insert guide 131 in its two open bearings.
- Hold pedal 130 in this position; at the same time replace housing cover 129 and press it firmly on the housing (fig. 103).
- Insert and tighten the four Philips screws.
- Insert rubber strip 126 and the two plugs 127.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

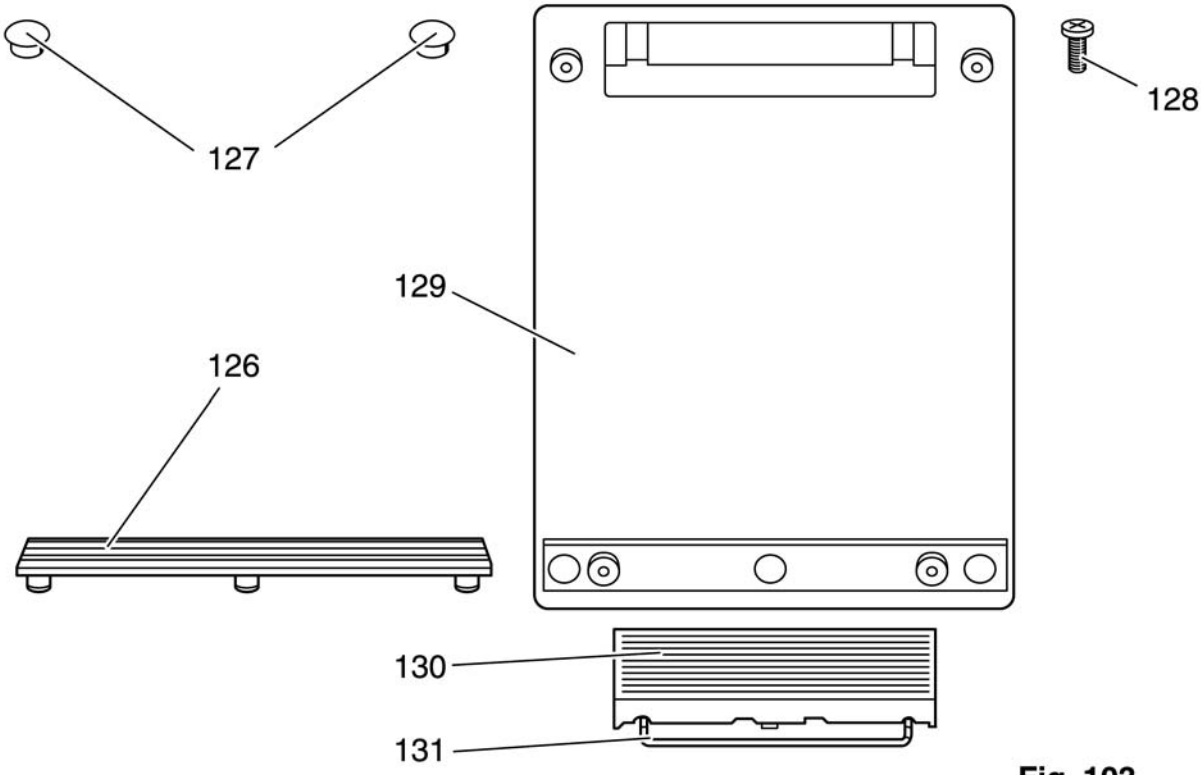


Fig. 103

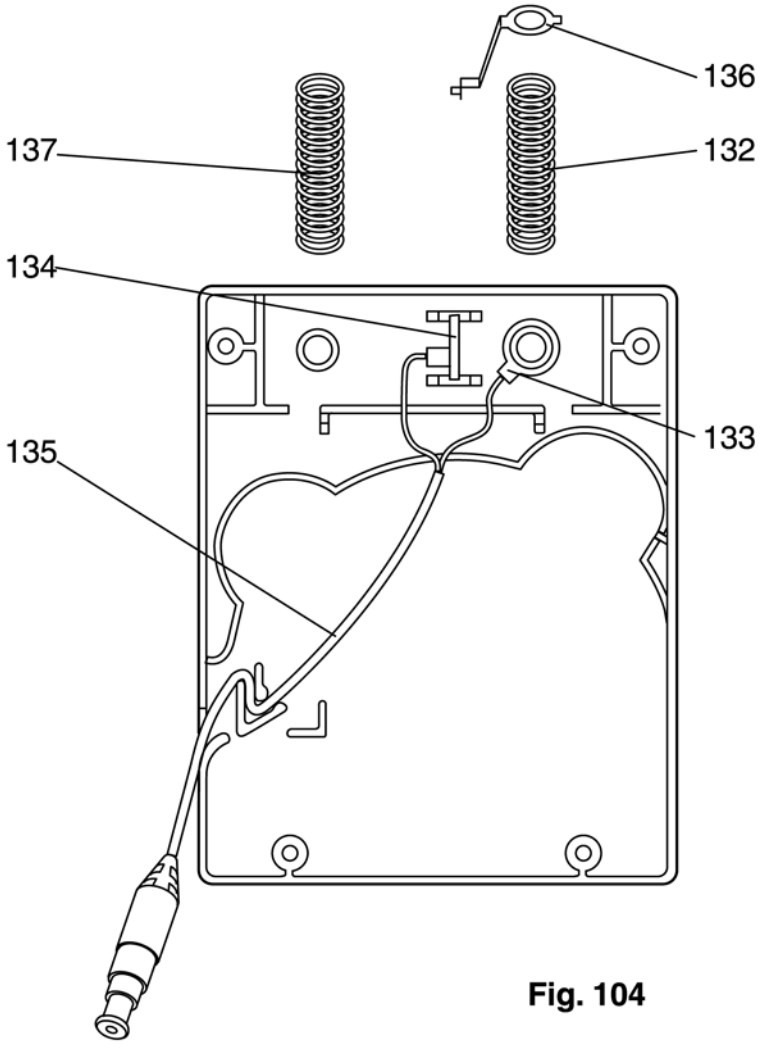


Fig. 104

36. Changing the top stepping motor

Note:

The stepping motor for sideways needle bar movement is only exchanged complete.
Removal:

- Remove mains lead.
- Remove detachable work support.
- Remove the housing according to the service manual.
- Remove circlip 97 on zigzag stepping motor 46 (fig. 105).
- Disengage connecting rod 99 and the tooth segment of zigzag stepping motor 46.
- Unscrew and remove both fastening screws 45.
- Lift zigzag stepping motor 46 upwards out of the retainer in the direction of the arm shaft.
- Remove the zigzag stepping motor to the front, out of the housing.

Fitting:

- Install zigzag stepping motor 46 in the housing.
- Pull power cable downward.
- Insert and tighten both fastening screws 45 (fig. 106).
- Insert the pin of connecting rod 99 in the hole of the tooth segment.
- Attach circlip 97.
- Mount the housing according to the service manual.

Note:

Having exchanged the zigzag stepping motor for sideways needle movement, adjustment of the needle in the needle hole, section 9 must be repeated.

- Carry out a check of all functions.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

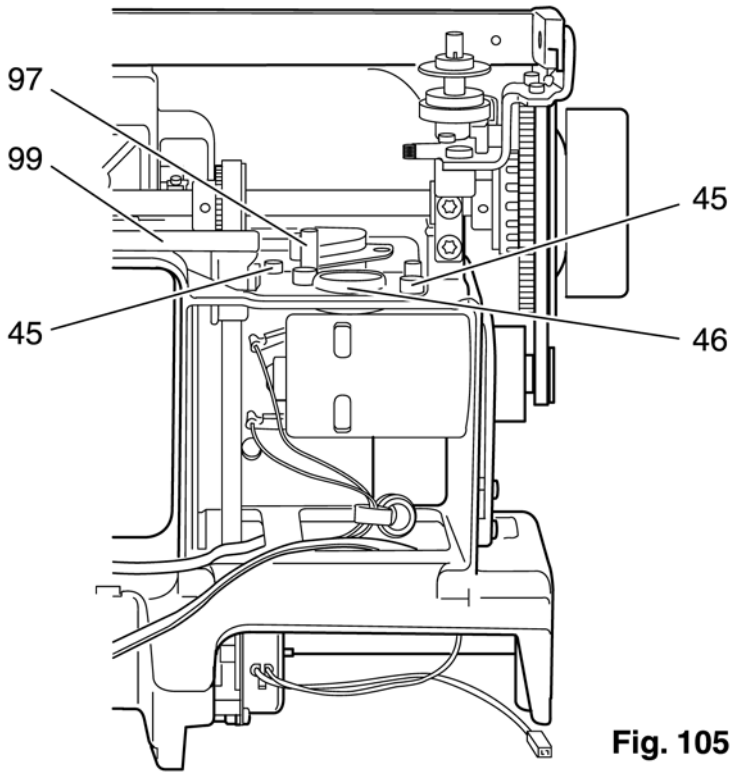


Fig. 105

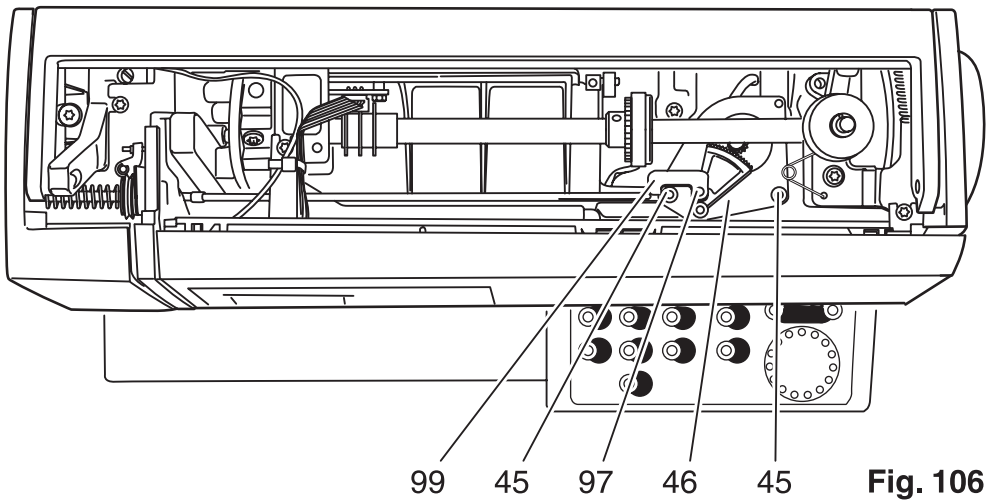


Fig. 106

37. Changing the lower stepping motor

Note:

The feed stepping motor is only exchanged complete.

Removal:

- Remove the machine's power plug.
- Remove the detachable work support.
- Remove the housing according to the service manual.
- Remove tension spring 3 (fig. 107).
- Unscrew and remove fastening screw 4.
- Remove clamping plate 21.
- Turn the handwheel until the lobe of feed eccentric 5 is positioned at the rear.
- Fold feed regulator 6 downwards and remove this and link 7 from the connecting bar rod to the left.
- Remove slide block 8 with the spring to the right.
- Unscrew and remove both screws 15 of the stepping motor.
- Remove the complete stepping motor 17.

Fitting:

- Insert feed stepping motor 17 complete with the bracket (fig. 107).
- Insert and slightly tighten upper fastening screw 15.
- Insert and slightly tighten clamp spring 137 with the lower screw 15.
- Push slide block 8 with spring onto the bolt and set it in the guide slot in the correct curve radius. Check that the slide block moves freely, but without play or binding, in the guide slot.
- Push guide lever 16 complete with stepping motor 17 carefully to the left, until there is a clearance of 0.05 mm between the slide block 8 and the connecting bar 19.
- Tighten screws 15 and check that the slide block moves freely, but without play.
- Push link 7 complete with feed regulator 6 to the right onto the connecting bar pin.
- Insert fastening screw 4 in clamping plate 21 and tighten it a little.
- Shift fulcrum stud 20 laterally so that link 7 and connecting bar 19 still have a slight play and can move freely.
- Tighten screw 4.
- Attach tension spring 3.
- Mount the housing according to the service manual.
- After a running-in time of 10 - 15 min. check the adjustment of equal forward and reverse stitch length according to section 21 of this service manual.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metra-watt 5013.

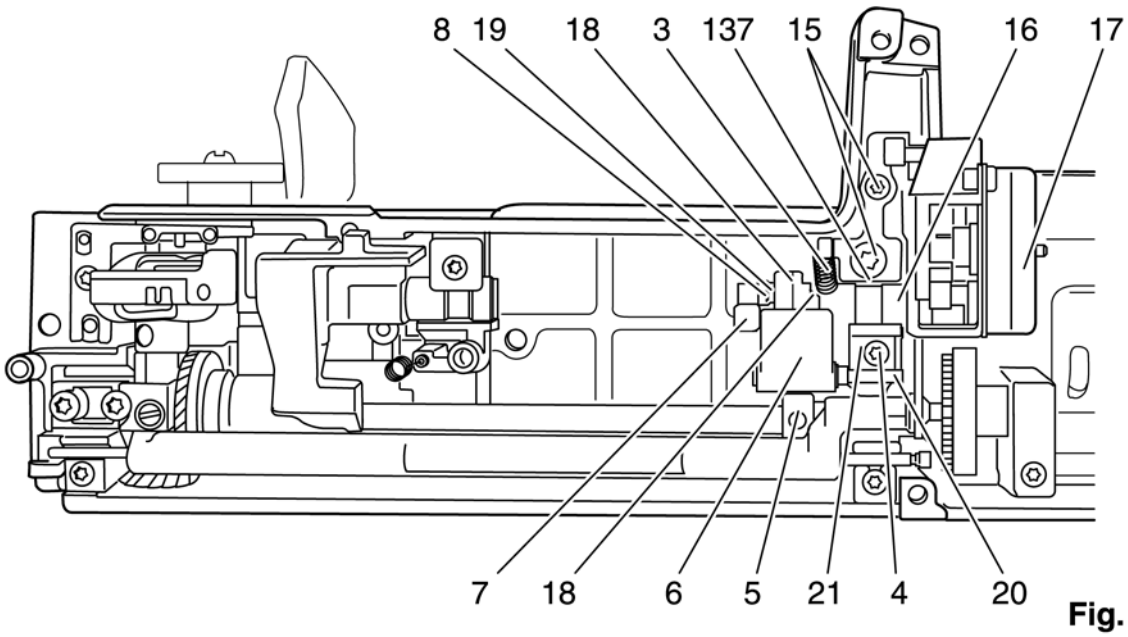


Fig. 107

38. Changing the buttonhole sensor

Note:

The buttonhole sensor is only exchanged complete.
Removal:

- Remove the machine's mains lead.
- Remove the needle and presser foot.
- Remove the folding cover.
- Unscrew and remove both torx screws from the housing insert.
- Remove the housing insert.
- Raise both lugs 1 slightly and remove the facing panel of the front housing panel.
- Place the machine on its back.
- Unscrew and remove the three screws in the base plate.
- Tilt the base plate to the front and remove both connection plugs 3 and 4 from the circuit board (fig. 108).
- Unscrew and remove both screws 5 from the free-arm cover (fig. 109).
- Bring the feed-dog lowering mechanism into its normal working position.
- Disengage both feed regulators 6 using a small screwdriver (fig. 109).
- Remove the cable clip.
- Remove connection plug 16 from the circuit board of the front housing panel and pull the cable downward (fig. 110).
- Remove the free-arm cover from the housing to the left.
- Remove connection plug 13 from the circuit board of the front housing panel and pull the cable downward (fig. 110).
- Remove cable guide 20 (fig. 109).
- Dismantle buttonhole sensor 138 complete with the spring.

Fitting:

- Install buttonhole sensor 138 complete with the spring.
- Insert the cable with cable guide 20 in the housing.
- Turn the machine upside down.
- Place the cable, using a spring hook, between the motor and the housing wall.
- Mount connection plug 13 on the circuit board of the front housing panel (fig. 110).
- Put the machine in its working position.
- Mount the free-arm cover carefully and secure with both fastening screws 5.
- Bring the feed-dog lowering mechanism into its normal working position.
- Engage both feed regulators 6 (fig. 109).
- Turn the machine upside down.
- Place the cable, using a spring hook, between the motor and the housing.
- Mount connection plug 16 on the circuit board of the front housing panel (fig. 109).
- Attach the cable clip.
- Mount both connection plugs 3 and 4 on the circuit board of the base plate (fig. 108).

- Fold the base plate to the machine and secure with the three fastening screws.
- Mount the facing panel onto the front housing panel.
- Insert the housing insert and secure with both torx screws.
- Attach the folding cover.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metrawatt 5013.

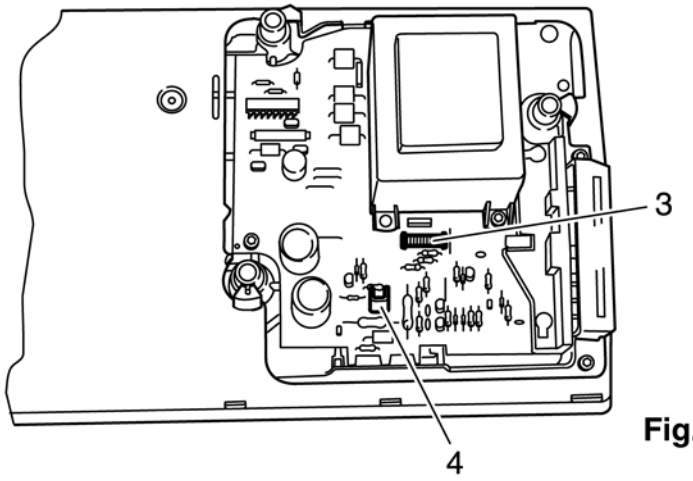


Fig. 108

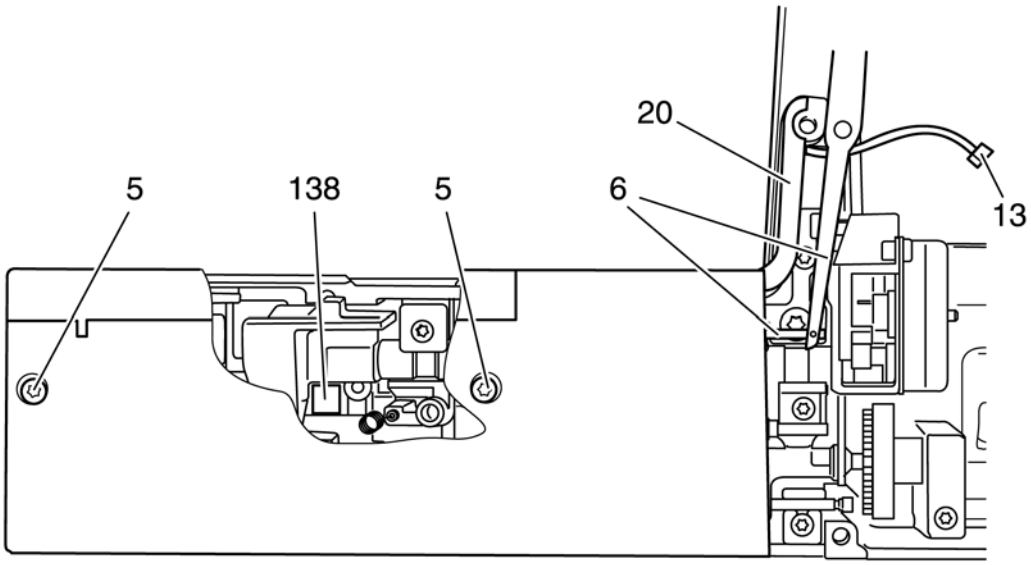


Fig. 109

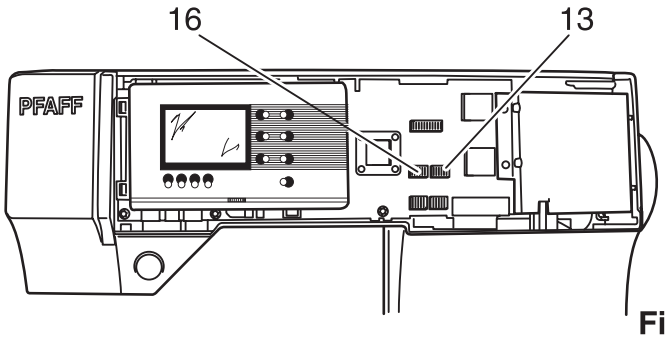


Fig. 110

39. Changing the thread monitor with free-arm cover on model 2044

Note:

The thread monitor is only exchanged complete with the free-arm cover.

Removal:

- Remove the machine's mains lead.
- Remove the needle and presser foot.
- Remove the folding cover.
- Unscrew and remove both torx screws of the housing insert.
- Remove the housing insert.
- Raise both lugs 1 slightly and remove the facing panel of the front housing panel.
- Place the machine on its back.
- Unscrew and remove the three screws in the base plate.
- Tilt the bast to the front and remove both connection plugs 3 and 4 (fig. 111).
- Unscrew and remove both fastening screws 5 of the free-arm cover (fig. 112).
- Bring the feed-dog lowering mechanism into its normal working position.
- Disengage both feed regulators 6 using a small screwdriver (fig. 112).
- Remove the cable clip.
- Remove connection plug 16 from the circuit board of the front housing panel and pull the cable downward (fig. 113).
- Remove the free-arm cover with the thread monitor from the housing to the left.

Fitting:

- Install the new free-arm cover with thread monitor and secure with both fastening screws 5 (fig. 112).
- Bring the feed-dog lowering mechanism into its normal working position.
- Engage both feed regulators 6 (fig. 112).
- Place the cable, using a spring hook, between the motor and the housing.
- Mount connection plug 16 onto the circuit board of the front housing panel (fig. 113).
- Attach the cable clip.
- Mount both connection plugs 3 and 4 onto the circuit board of the base plate (fig. 111).
- Fold the base plate to the machine and secure with the three fastening screws.
- Mount the facing panel onto the front housing panel.
- Insert the housing insert and secure with both torx screws.
- Attach the folding cover.
- Attach the mains lead.
- Carry out a test of the thread monitor with an empty and a full bobbin.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metra-watt 5013.

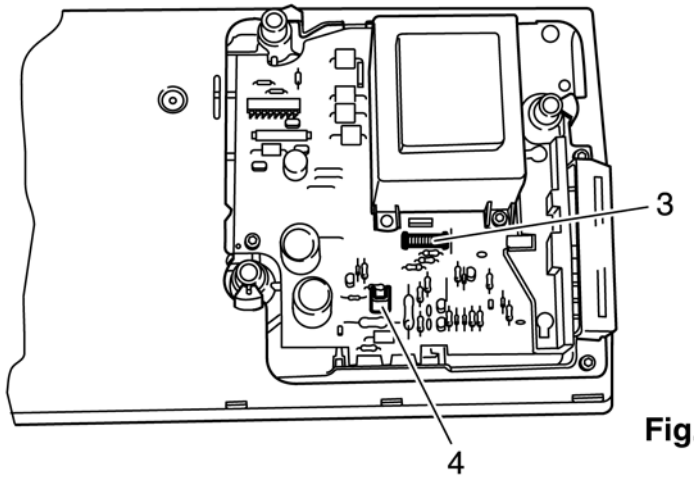


Fig. 111

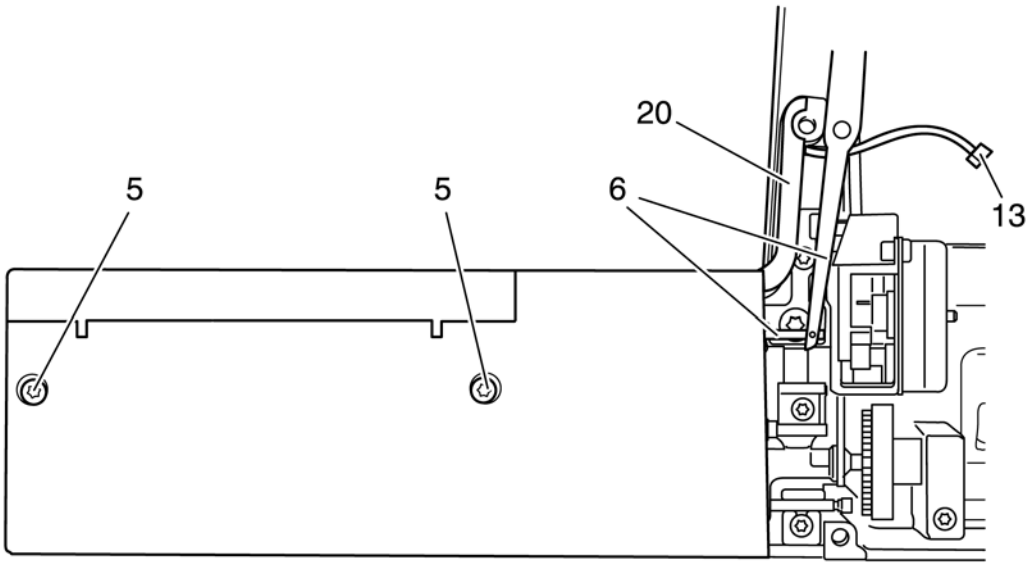


Fig. 112

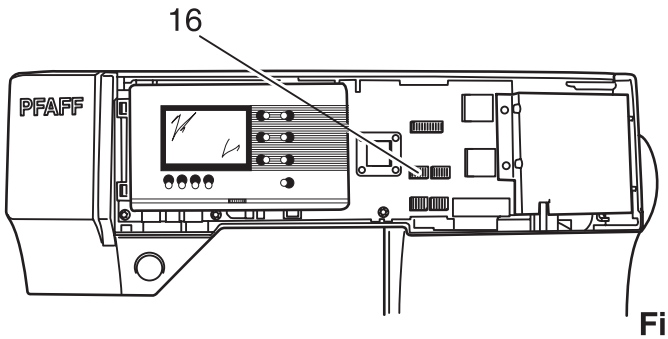


Fig. 113

40. Changing the needle threader

Note:

The needle threader is only exchanged complete with the threader bar frame.

Removal:

- Remove the machine's mains lead.
- Remove the needle and the presser foot.
- Presser threader key 63 down completely and keep it pressed (fig. 114).
- Using a small screwdriver, raise bracket 139 of threader bar frame 140 slightly.
- Remove the complete threader bar frame downward from threader bar 141.

Fitting:

- Push the new threader bar frame together with the needle threader on to the threader bar, until bracket 139 clicks back into place.

Cross-check:

- Insert a new needle Nm 70.
- Move the needle threader up and down by pressing threader key 63.
- Carry out a visual check of the position of the needle-threader prong in the needle eye.
  If necessary, readjust the position according to section 16 of the service manual.
- Carry out an electrical safety test in accordance with VDE 0701 using testing appliance Metra-watt 5013.

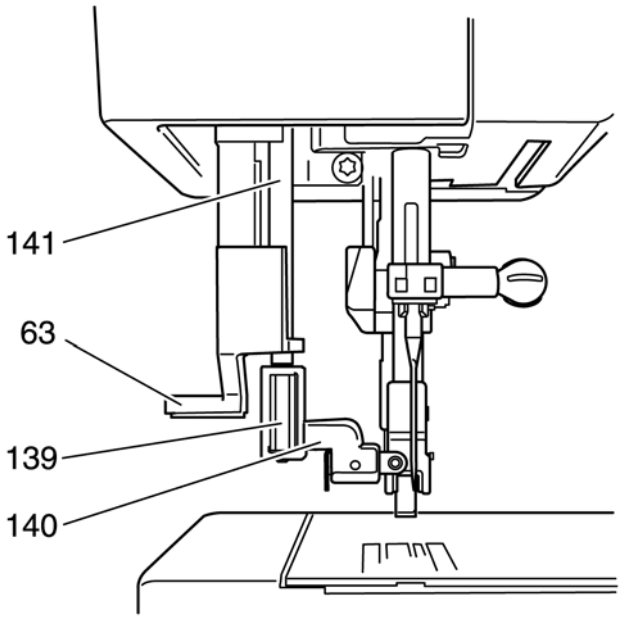


Fig. 114

41. Self-test, foreword

The self-test provides the mechanic with a simple and quick means of checking the machine.

Sequential faults are not detected.

Faults are only detected if the machine is mechanically in order.

The self-test is carried out sequentially; changing the test sequence is not possible. However, the program can be stopped any time by switching the machine off.

If a fault occurs, the test is interrupted.

Generally an error in the corresponding test phase is indicated on the display with "ER". ("ER" = Error)

In some test steps an additional visual check must be carried out.

In some cases the operator has to carry out actions at the machine within a certain time span **(see column "Remarks")**, as otherwise the test program will consider a fault.

In this case "ER" will appear on the display.

The test should then be repeated for reasons of safety.

If no fault occurs during the test, the machine will display "OK". To change back to a sewing program, the machine must be turned off and then back on again.

42. Self-test model 2014 and 2024

Step no.	Display / Function Sewing machine	Visual Check / action at machine	Nominal machine display	Remarks
1		Machine without needle Master switch off		
2		Press pattern mirroring key and actuate master switch at the same time.	TE	After releasing both keys, you have to wait for a period of 3 secs. which is shown on the display. If no display use faultfinding chart.
3		Visual check: All indicator elements must flash 5 times	All indicator elements flash	Visual check negative: change respective subassembly. If one of the modules returns an error, "ER" will appear on the display and the following tests will be skipped.
4	KY (keytest) 0=sewing on buttons 1=straight stitch 2=stretch triplestraight stitch 3=zigzag stitch 4=elastic stitch 5=blind stitch 6=elastic blind stitch 7=overlock stitch 8=faggoting stitch 9=buttonhole 10=prog. sel. key left 11=prog. sel. key right 12=stitch width - 13=stitch width + 14=stitch length 15=stitch length + 16=correction - 17=correction + 18=reverse key	Actuate the key shown	The next key to be actuated is shown	A time span of approx. 12 secs is planned for each key actuation.If the key is not pressed within this time span, the next key to be actuated is displayed and the non-actuation of the key is registered as an error and displayed at the end of the program.

	19=pattern mirror			
5	SM (stepping motors test)	Visual check: Both stepping motors rotate through the stroke 5 times	5 4 3 2 1	According to the standard, both stepping motors rotate through the stroke 5 times alternately, no error must occur.
6	FC (foot control test)	Press foot control slowly as far as it will go twice.	max. 92	92 If control is not actuated, the width display is empty. If control is actuated, the width display will show the standardized foot control reading. If control is not actuated during the period of reading, an error will be displayed.
7	PT (Synchronizer test)	Turn handwheel two revolutions evenly to the front	Pos. up ↑ Stop up ↑ Pos. down ↓ Intermediate pos. --	Pos. up: The width arrow "up" is displayed. Stop up: The width arrow "up" and the decimal point are displayed Pos. down: The width arrow "down" is displaed Intermediate position: The hyphen is displayed
8	MT (motor test)	Actuate the foot control	Actual reading: max. 85 Desired reading: 85	If the control is not actuated, the width display is empty. If the control is actuated, the width display shows the standardized rpm (actual reading = e.m.f.) and the length display shows the standardized desired reading.

				If control is not actuated during the period of reading, or the r.p.m. are too low, an error will be displayed. The program stops after 12 secs and the motor stops.
9	OK	Test completed	OK	The program can only be exited by switching off machine.

43. Table for self-test model 2034

Before you start the self-test, the mains lead and the foot control should be connected, the buttonhole guide should be fully inserted and the bobbin case should be removed.

When turning the machine on, the "mirroring" key must be actuated. The program can only be exited be turning off the machine.
The machine will display "G.M. PFAFF AG TEST".

Step no.	Display / function Sewing machine	Visual Check / action at machine	Nominal machine display	Remarks
1		Machine without needle Master switch off		
2	G.M. PFAFF AG TEST	Actuate master switch and mirroring key at the same time	G.M. PFAFF AG TEST	After releasing the key you have to wait for a period of approx. 3 secs, which is shown on the display. If no message appears, use fault-finding chart.
3	DISPLAY	Visual check: All indicator elements must flash 4 times.	All indicator elements flash	Visual check negative: change respective subassembly.
4	KEYBOARD (Key test) 0=sewing on buttons 1=straight stitch 2=stretch triple-straight stitch 3=zigzag stitch 4=elastic stitch 5=blind stitch 6=elastic blind stitch 7=overlock stitch 8=faggoting stitch 9=buttonhole 10=pattern sequence 11=cursor left 12=cursor right 13=block monograms	Actuate the key shown	The next key to be actuated is shown. If all keys have been recognized by the machine, the message "OK" will appear. If a key has not been recognized, the message "ERROR" will appear.	A time span of approx. 12 secs is planned for each key actuation. If the key is not pressed within this time span, the next key to be actuated is displayed and the nonactuation of the key is registered as an error and displayed at the end of the program.

	14=store pattern sequence 15=clear 16=prog. sel. key left 17=prog. sel. key right 18=stitch width - 19=stitch width + 20=stitch length - 21=stitch length + 22=correction - 23=correction + 24=info 25=pattern mirroring 26=slow 27=needle lowered 28=sewing off 29=reverse sewing key			
5	Stepping motor (stepping motor test)	Visual check: Both stepping motors rotate through the stroke 5 times	5 4 3 2 1	According to the standard, both stepping motors rotate through the stroke 5 times alternately, no error must occur.
6	Foot control (foot control test)	Press foot control slowly as far as it will go twice.	from "0" - "85" Message: "OK" or "ERROR"	If control is not actuated, the width display is empty. If control is actuated, the width display will show the standardized foot control reading. The display value must count from 0 - 85. If this isn't the case, the foot control is faulty. If control is not actuated during the period of reading, an error will be registered.
7	Pos. Detector (Synchronizer test)	Turn the handwheel evenly to the front	Display appears in field for pattern display	If all signals are recognized, the message "OKAY" will appear in the display. If a signal has not been

				recognized, „ERROR“ will appear in the display.
8	Buttonhole sensor (buttonhole sensor test)	Remove buttonhole guide	from "1" to "95"	Display appears in field for length display.
9	Main motor (motor test)	Actuate foot control	actual reading: max. 85 desired reading: 85 If the comparison of the actual to the desired reading is all right, "OKAY" will appear in the display	If control is not actuated, the width display field is empty. If the control is actuated, the width display shows the standardized rpm (actual reading = e.m.f.) and the length display shows the standardized desired reading. If control is not actuated during the period of reading, or the r.p.m. are too low, a error will be displayed. The program stops after 12 secs and the motor stops.
10	OKAY	Test completed	OKAY	The program can only be exited by turning off the machine.

44. Table for self-test model 2044

Before you start the self-test, the mains lead and the foot control should be connected, the buttonhole guide should be fully inserted and the bobbin case should be removed.

When turning the machine on, the "mirroring" key must be actuated. The program can only be exited be turning off the machine.
The machine will display "G.M. PFAFF AG TEST".

Step no.	Display / function Sewing machine	Visual Check / action at machine	Nominal machine display	Remarks
1		Machine without needle Master		
2	G.M. PFAFF AG TEST	Actuate master switch and mirroring key at the same time	G.M. PFAFF AG TEST	After releasing the key you have to wait for a period of approx. 3 secs, which is shown on the display. If no message appears, use fault-finding chart.
3	DISPLAY	Visual check: All indicator elements must flash 4 times.	All indicator elements flash	Visual check negative: change respective subassembly.
4	KEYBOARD (Key test) 0=sewing on buttons 1=straight stitch 2=stretch triple-straight stitch 3=zigzag stitch 4=elastic stitch 5=blind stitch 6=elastic blind stitch 7=overlock stitch 8=faggoting stitch 9=buttonhole 10=pattern sequence 11=cursor left 12=cursor right 13=block monograms	Actuate the key shown	The next key to be actuated is shown If all keys have been recognized by the machine, the message "OK" will appear. If a key has not been recognized, the message "ERROR" will appear	A time span of approx. 12 secs is planned for each key actuation. If the key is not pressed within this time span, the next key to be actuated is displayed and the nonactuation of the key is registered as an error and displayed at the end of the program.

	14=store pattern sequence 15=clear 16=monograms italics 17=stitch width - 18=stitch width + 19=stitch length - 20=stitch length + 21=correction - 22=correction + 23=info 24=pattern mirroring 25=slow sewing 26=needle lowered 27=sewing off 28=reverse sewing key			
5	DIAL turn left and right (program selection key test)	Turn dial to the left and the to the right	"50" in monogram window	Counts backwards and the forwards.
6	Stepping Motor (stepping motor test)	Visual check: Both stepping motors rotate through the stroke 5 times	5 4 3 2 1	According to the standard, both stepping motors rotate through the stroke 5 times alternately, no error must occur.
7	Foot control (foot control test)	Press foot control slowly as far as it will go twice.	from "0" - "85" Message: "OK" or "ERROR"	If control is not actuated, the width display is empty. If control is actuated, the width display will show the standardized foot control reading. The display value must count from 0 - 85. If this isn't the case, the foot control is faulty. If control is not actuated during the period of reading, an error will be registered.

8	Pos. Detector (Synchronizer test)	Turn the handwheel evenly to the front	Display appears in field for pattern display	If all signals are recognized, the message "OKAY" will appear in the display. If a signal has not been recognized, "ERROR" will appear in the display.
9	Buttonhole sensor (buttonhole sensor test)	Remove buttonhole guide	from "1" to "95"	Display appears in field for length display.
10	Bobbin sensor open hook cover (bobbin monitor test)	Open the free-arm cover and actuate foot control	3 2 1 „OKAY“	Main motor runs
11	Bobbin sensor	Close free-arm cover and actuate foot control		
12	Main motor (motor test)	Actuate foot control	actual reading: max. 85 desired reading: 85 If the comparison of the actual to the desired reading is all right, "OKAY" will appear in the display	If control is not actuated, the width display field is empty. If the control is actuated, the width display shows the standardized rpm (actual reading = e.m.f.) and the length display shows the standardized desired reading. If control is not actuated during the period of reading, or the r.p.m. are too low, a error will be displayed. The program stops after 12 secs and the motor stops.
13	OKAY	Test completed	OKAY	The program can only be exited by turning off the machine.

45. Fault table for electrical parts 2044

Fault	1st replacement pt.	2nd replacement pt.	3rd replacement pt.	4th replacement pt.	5th replacement pt.
Machine is switched on, but does not run when foot con-troll is actuated.	mains lead	foot control	power pack/ (base plate)	upper circuit board	motor
Machines runs continuously onits own after a brief switch-on time.	foot control	power pack/ (base plate)	upper circuit board		
Figures do not light up or flicker on display field	upper circuit board	power pack/ (base plate)			
Zigzag stepping motor runs continuously or needle bar moves continuously to and fro	base circuit board/ upper circuit board	zigzag stepping motor	keyboard	synchronizer	
Feed stepping motor runs continuously or the feed dog moves continuously to and fro	base circuit board/ upper circuit board	feed stepping motor	keyboard	synchronizer	
Machine starts running at top speed, then stops again.	upper circuit board	Exchange synchronizer and then adjust	power pack		

Fault	1st replacement pt.	2nd replacement pt.	3rd replacement pt.	4th replacement pt.	5th replacement pt.
Feed out of step (straight stitch sewn with long curves)	Slide block jams or has too much play	feed stepping motor	upper circuit board / lower circuit board		
Zigzag movement of needle out of step (straight stitch sewn)	Needle bar frame jams or is loose	zigzag stepping motor	upper circuit board / lower circuit board		
Take-up lever top position and needle down position	adjust synchronizer	exchange synchronizer	upper circuit board / lower circuit board		
Speed control (faster or slower)	foot control	lower circuit board (power pack)	upper circuit board	main motor	
Sewing lamp does not light up	Change sewing lamp	power pack	upper circuit board		

Safety test

46. Electrical safety test

According to the German law of safe machine operation of 24th June 1986, the VDE-regulations are regarded as the official rules in electronics and are the basis for the regulations for testing electrical safety of technical devices.
The required electrical tests are established in the regulations for repair, modification and testing of used electrical appliances (VDE 0701 issue 10.86) par. 4.
We are obliged to perform a test in accordance with VDE 0701 on every electrical appliance after repair.
In European foreign countries, there are similar regulations in force which are largely identical with the requirements of the VDE 0701.

47. Electrical safety test with ABB Metrawatt M 5013

I Mains voltage test: Volt = V

- For all following tests insert plug of ABB Metrawatt M 5013 in the grounded mains socket (fig. 115).
- Set knob for measuring range at "250 V" (fig. 115). If there is mains voltage, the LCD shows the respective value (230 V +/- 10%).
- Touch contact field, which is located a bit to the right just below the knob for the measuring range, with your finger, thus checking the ground lead of the mains. Signal lamp "PE" just above the contact field will light up only in case the ground lead is out of order.
- Insert plug of sewing machine into the mains socket of ABB Metrawatt M 5013.
- Run the machine.
- Meter reading: 230 V +/- 10%
- Measuring appliance M 5013 can only be used with mains voltages from 207 V to 253 V (230 V +/- 10%).

II Appliance current test: Ampere = A

- Plug of sewing machine remains in mains socket.
- Set knob for the measuring range at 16 A (fig. 116).
- Run the machine.
- Meter reading: 0.5 A maximum.

III Insulation resistance: M Ohm = M

- Insert plug of sewing machine in tester socket.
- Use clamp to attach test lead of testing appliance M 5013 to presser bar.
- Set knob for measuring range at "20 M Ohm" (fig. 117).
- Meter reading: minimum 2 M Ohm
- With meter readings higher than 20 M Ohm, appliance M 5013 displays the figure 1! In these cases, the remark "Insulation resistance higher than 20 M Ohm" must be recorded in the testing certificate.

IV Stray current: Milliampere = mA

- Sewing machine plug remains in tester socket.
- Use clamp to attach test lead of testing appliance M 5013 to presser bar.
- Set knob for measuring range at "20 mA" (fig. 118).
- Meter reading: maximum 0.50 mA.

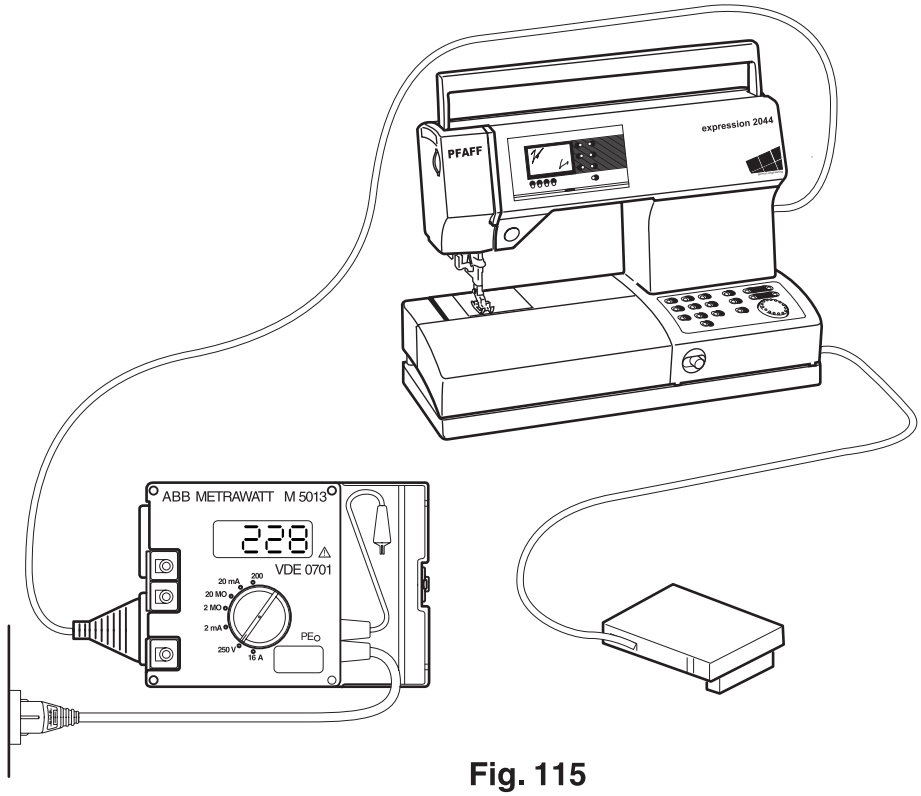


Fig. 115

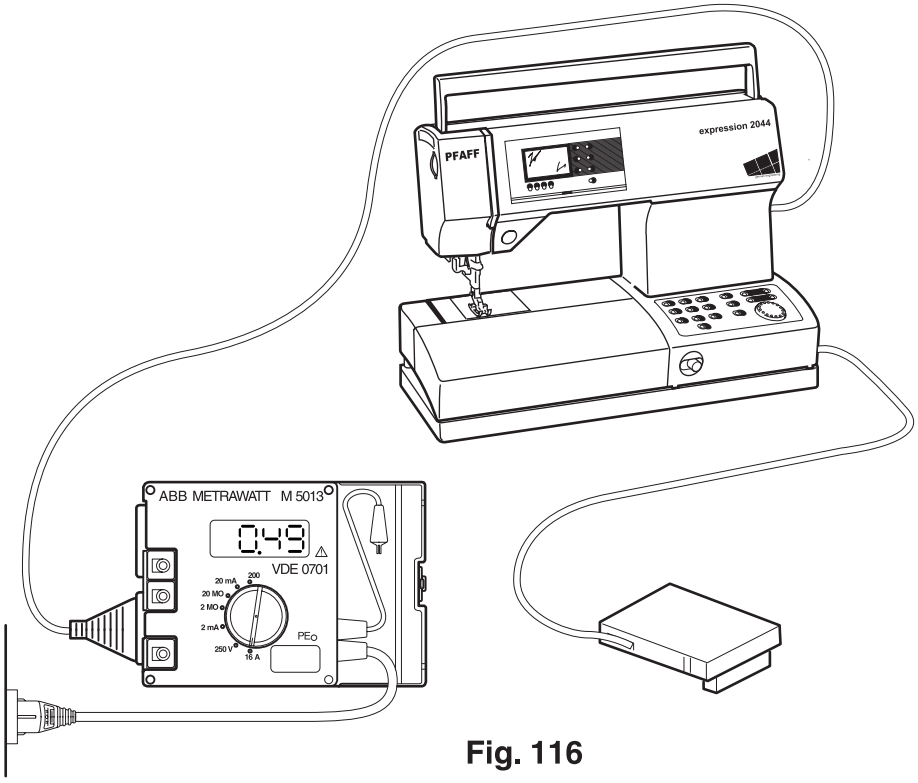


Fig. 116

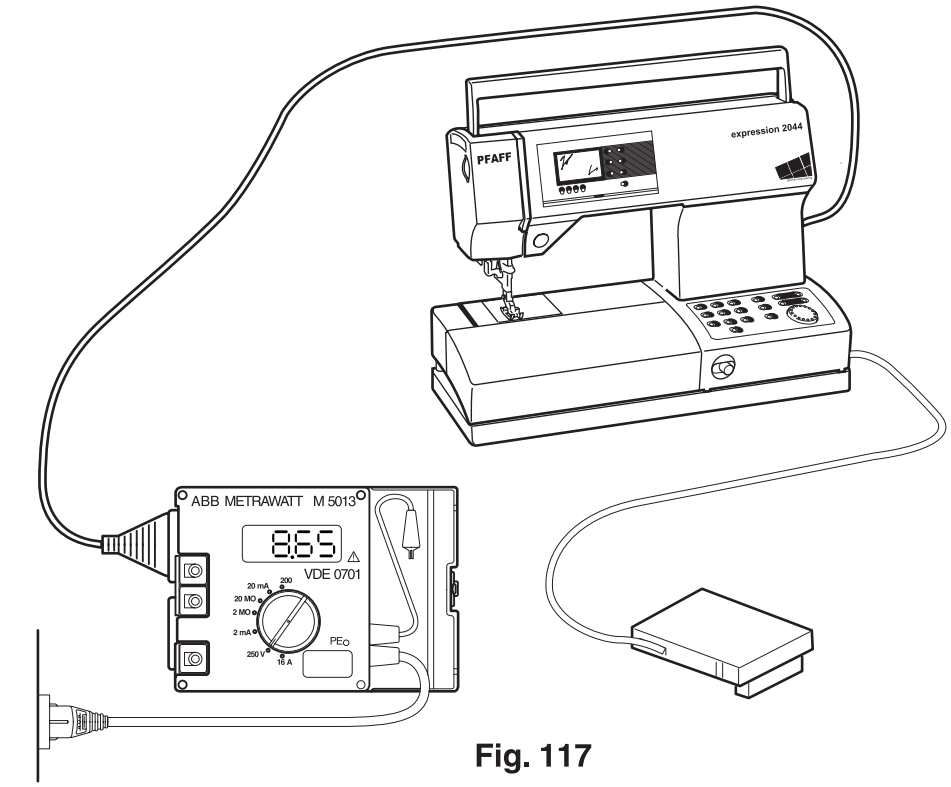


Fig. 117

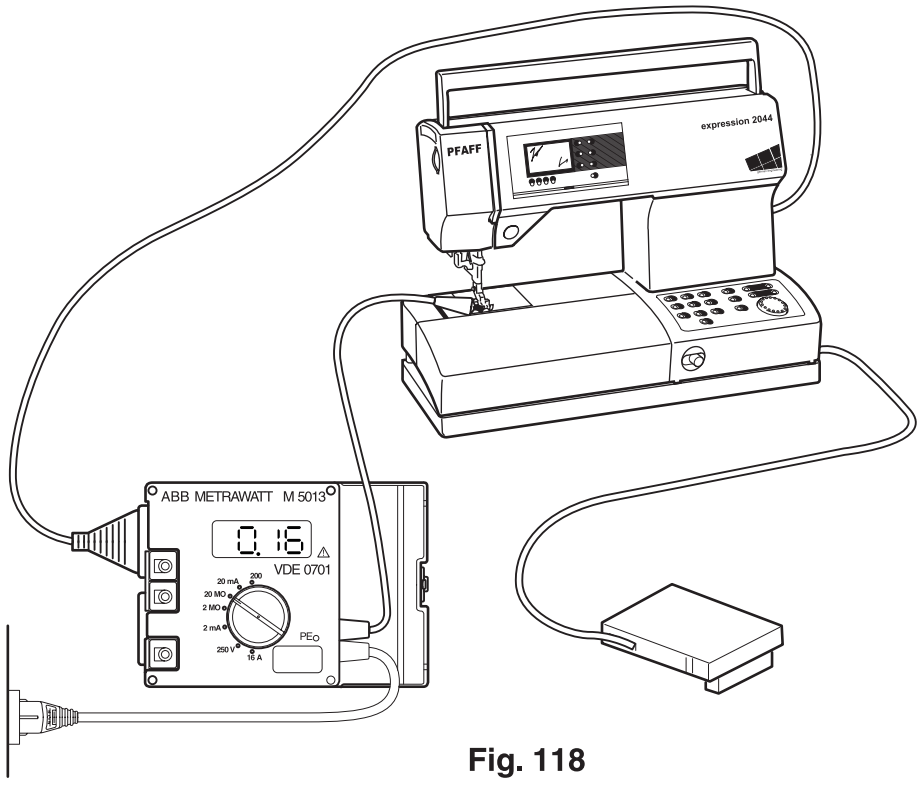


Fig. 118

48. Measures required in case of inadmissible test readings

As to I If one of the 4 test functions is a failure, the ground mains socket is defective. Inform the landlord.

As to II If the current consumption deviates considerably from the indicated value, although the machine does not bind, the motor is defective and must be exchanged.

As to III If the insulation resistance drops below the required value, the defective components must be found by systematic checking and must be repaired or replaced.

As to IV Here, the components with inadmissably high leakage current must also be found by systematic checking and must be repaired.

Karlsruhe-Durlach, 24th May 2002
PH/HTS

Notes:

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