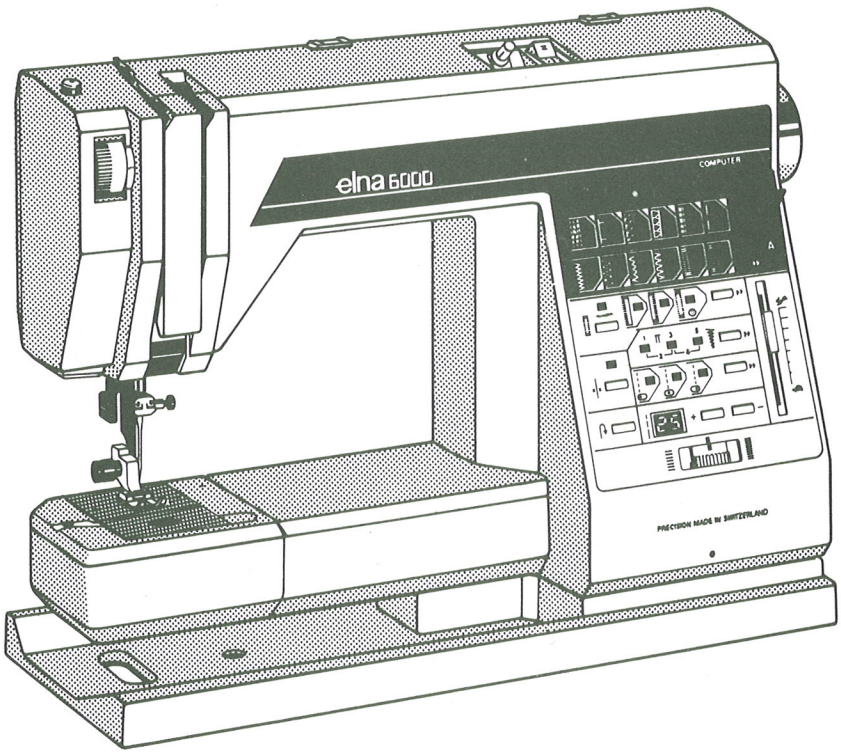
SERVICE MANUAL

489 962



elna 6000

COMPUTER

Tavaro s.a. Genève
Printed in Switzerland

TABLE OF CONTENTS

You have now entered the age of the computer, as far as the technology of the sewing machine is concerned. A combination of precision mechanical functions and the technology of the computer are described in this service manual in plain language that is easy to understand. In order to assimilate the knowledge of these functions, it is necessary to know something about the machine's conception.

The Elna 6000 computer is made up of a light metal alloy frame which is enclosed in 3 shells made of Polycarbonate. The frame holds 2 units of mechanical modules : one of them comprises the entire rotary hook and cloth feed aggregate, the other the whole of the needle bar and cloth presser bar mechanism.

The Elna 6000 computer is equipped with 4 low tension electric motors, namely : 2 step motors, one each for the needle swing and the feed functions, a main motor for driving the machine and a motor for the bobbin winding function; the latter also acts as a generator for regulating the speed of the machine.

A control circuit is also mounted on the frame, as well as a transformer unit, the latter comprising a power supply circuit.

You will encounter such terms as :

- LED = light emitting diode, used e.g. as a control light
- Digital display = numbers, letters, information symbols
- Step motor = motor which turns by steps in both directions
- Trimmer = adjustable resistor
- IC = integrated circuit - micro-processor

We have integrated a Test Program in the micro-processor controls, for checking the functions of the control circuit. This program has a very simple procedure, see pages B.

In the text of this Service Manual, the references and adjustments to be found on other pages are followed by ☐ indicating the No. of the adjustment or the page to refer to.

1. Never connect the machine to a different voltage than the one that is given on the specification plate. As a guide, you have the following :
   - on the 100 and 120 V machines, the main switch is white
   - on the 220 and 240 V machines, the main switch is black

2. To change the voltage of a machine, only the transformer unit needs to be exchanged.

3. For safety reasons, never perform any intervention on the power supply circuit without first having removed the mains lead from the machine !

4. Once the shells have been removed, immediately fit the protection/test plate 101'800, see page K2 .

5. In case a LED should be bent by accident, it is possible to reposition it. In such a case, make sure that the 2 wires do not touch each other.

6. When the machine is under current without the shells and laid on its back, you must absolutely avoid that metallic parts come into contact with the terminals of the main motor.

7. Before replacing the control circuit, please check it once again by means of the Test Program.

8. When replacing the control circuit, it is indispensable to return us the faulty unit in the box provided for this purpose.
   Please mention your remarks regarding any defects on a separate sheet and put it into the box.

9. Never plug in or run the machine, if the transistor heat sink is not seated properly and all the connections are made correctly, see G3 .

10. After replacing the control circuit, it is absolutely necessary to make the speed adjustments 20 , above all the adjustment 150 RPM.
    To do so, it is recommended to use the small screwdriver 101'590 with insulated blade, in order to avoid short-circuiting with the other elements of the control circuit.

11. When changing the sewing light bulb, it is indispensable to disconnect the machine, in order to avoid a short-circuit with the contacts, which would require changing the secondary fuse.

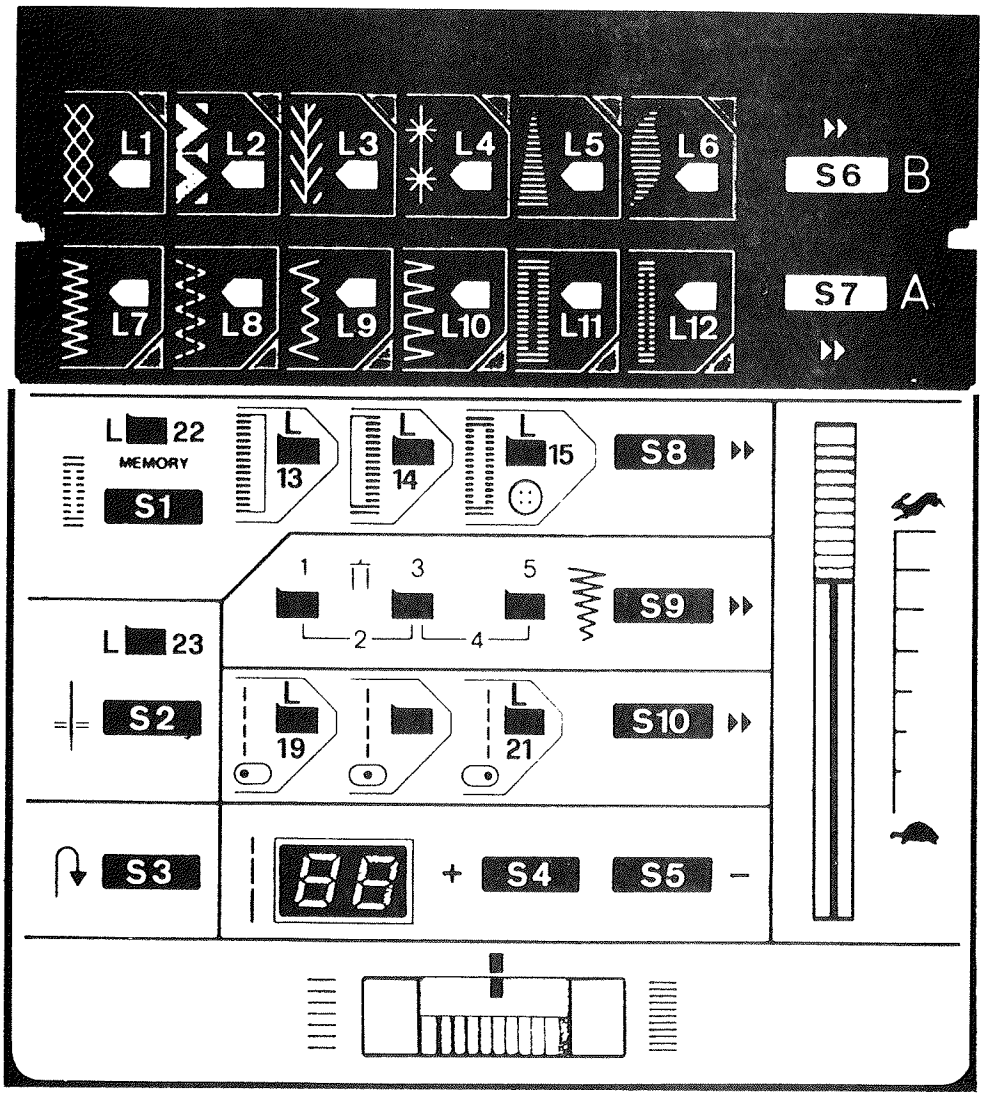
12. It is possible to display a machine in a show window, with all the LEDs and the digits "8.8" blinking, provided that the ambient temperature in the room does not exceed 35° C. For this purpose, the machine should be prepared according to the Test Program, points "0" and "1".

    However, a machine which is not connected to the mains can be displayed in an ambient temperature of as high as 70° C.

13. When dismantling the rotary hook (left turn screw !) or replacing it, the boring of the hook, its pinion as well as the 2 thread release cams must be lubricated with Renotac oil 458'180.

14. In case you change the thread take-up lever (loosening of the stop collar 418'040), make sure that the axial play of the upper shaft is indeed 0.2 mm. The adjustment of this play is done with the take-up lever in its lowest position, using the gauge 101'660. The same play of 0.2 mm is also adjusted on the lower shaft 470'520.

15. The former type of twin needles are not suitable for the models 5000 - 6000 - 7000. The new needles are orientated differently. They can be recognized by the black bridge.


L1
L2
L3
L4
L5
L6
S6
B
L7
L8
L9
L10
L11
L12
S7
A
L 22
MEMORY
S1
L 13
L 14
L 15
S8
1
3
5
2
4
S9
L 23
S2
L 19
L 21
S10
S3
+
S4
S5
−

"0" ACCESS TO THE PROGRAM

- Switch OFF the machine.
- Whilst pressing S1 and S6 simultaneously, switch ON the machine = the display indicates the version of the built-in control circuit; Example : "01" = first execution, "02" = second execution etc..
- If the display indicates "2.5" = sewing mode - start again.

  Note : After this access to the program, the tests "1" to "3" and "6" to "10" can be carried out either in the order given or independently by pressing the corresponding switch/number S1 to S10; S4 & S5 are used only as motor operating switches.

"1" TEST of LEDs and DISPLAY

- Press S1 = all the LEDs light up alternatively with the digits "8.8."

"2" KEY BUTTON TEST

- Press S2 = the LEDs go off and the display indicates "2. ".
- Press, in sequence or not, S1 to S9, = the digits "2.1" to "2.9" are displayed, the second digit indicating the number of the switch.
- Press S10 = "2.0" is displayed and you can leave this test.

"3" TEST of SENSORS

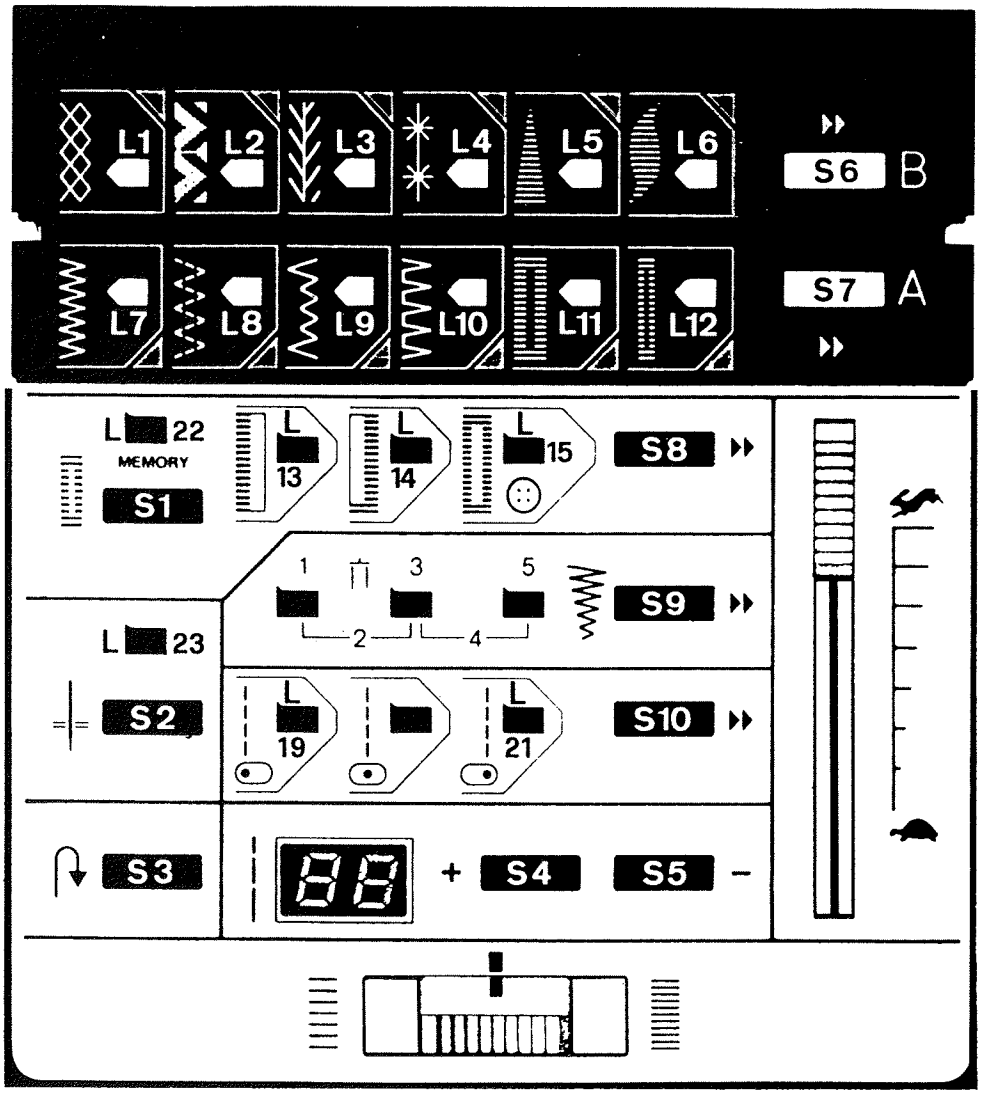
- Press S3 = the display indicates "3. ".
  By turning the flywheel, the LEDs L19 and L21 must go on and off, indicating the correct functioning of the photo-electric sensors.

"6" NEEDLE SWING TEST

- Press S6 = "6.0" is displayed and the needle swing step motor moves to its "zero" position (needle bar centered).

  Note : This operation, called "initialization", occurs every time the machine is switched ON normally with the needle bar raised but, the display indicates then "2.5".

- Press S5 briefly = "6.1" on the display and the needle swing motor shifts the needle bar one step "negative" - to the left.
  At the time of each pressure on S5 = from "6.2" to "6.9", the motor shifts the needle bar one step more, then should butt at the 10th = "6.b" is displayed and the button becomes inoperative.
- Center again the needle bar by pressing S6 = "6.0".
- By pressing S4 = "61" and the motor moves the needle bar to the right, up to "68" - the number of steps possible being 8.


L1
L2
L3
L4
L5
L6
S6
B
L7
L8
L9
L10
L11
L12
S7
A
L 22
MEMORY
S1
L 13
L 14
L 15
S8
1
3
5
2
4
S9
L 23
S2
L 19
L 21
S10
S3
+
S4
S5
–

"7" FEED TEST IN THE NORMAL ZONE

- Bring the feed dog, in its downwards motion, flush with the needle plate, then press S7 = "7.0" is displayed and the feed motor moves to its "0" position in the normal feed zone (1.2 - 5.0 mm).
  Note : This operation, called "initialization", occurs also in the sewing mode but, then only when the needle bar descends.
- Press S5 briefly = "7.1" on the display and the feed motor shifts the feed dog one step "negative" - towards the front.
  At the time of each pressure on S5 = from "7.2" to "7.9", the motor shifts the feed dog one step more, then should butt at the 10th = "7.b" appears and the button becomes inoperative.
- Reset the feed in its "0" position by pressing S7 = "7.0".
- By pressing S4 = "71" and the motor shifts the feed dog towards the rear, up to "78" - the number of steps possible being 8.

"8" FEED TEST IN THE FINE ZONE

- Press S8 = "8.0" and the feed motor moves to its "0" position in the fine feed range (0.2 - 0.8 mm).
  Then, same procedure as for test "7", but only 7 steps are possible.

"9" - "El-na" : By pressing on S9 = "El-na" blinks on the display.

"10" SPEED and FOOT CONTROL TEST

- Slide the speed control to "Hare" and press S10 = "10" is displayed and the LEDs L13 & L14 light up = machine stopped.

a) REVOLUTION COUNTER

- When the machine is running, the display will show the tens and the units of the number of RPM, whereas the LEDs L1 to L12 indicate the hundreds. As from 200 RPM, the number is rounded off to +/- 5.

b) FOOT CONTROL TEST alone : - Depress foot control = L23 lights up.

- While depressing the foot control, press S1 = L13 and L14 go out, L1 may light up and the machine runs between 90 to 110 RPM.
  When foot control is released = "10", L13 & L14 light up again.
- While depressing the foot control, press S2 = L1 - L7 and L15 light up and the machine runs at about 730 RPM. L15 = speeds over 150 RPM.
- While depressing the foot control, press S3 = L1 - L8 (L9) light up and the machine runs between 860 to 900 RPM. It can be stopped by pressing S4 or S5. Either L13 or L14 then lights up.

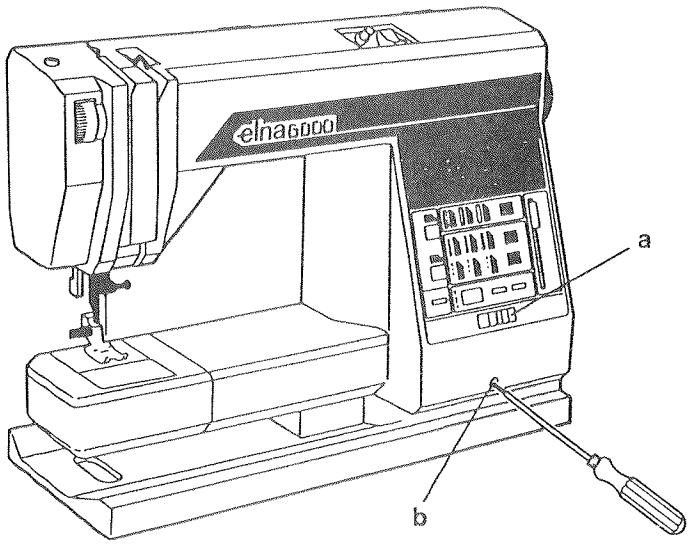
c) SAFETY CUT-OFF

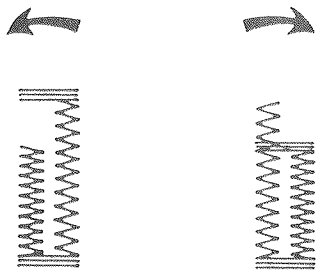
- By braking the flywheel = L22 lights up as soon as the current in the main motor exceeds about 5 amperes. If this overload lasts a few seconds, the motor current is cut off and "--" will be displayed.
  A few seconds after releasing the foot control, the former display reappears and the current supply for the main motor is reset.

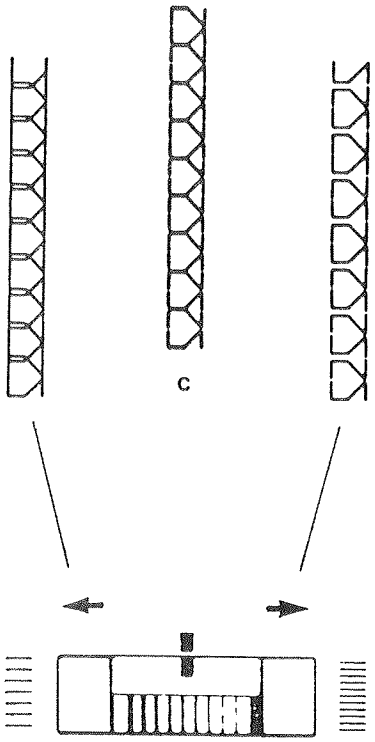
d) L15 - 150 R P M

- While depressing the foot control, press S2, then slowly reduce the speed = the LED L15 must light up as long as the machine is running above 150 RPM and must be out when it is running below 140 RPM.

  Note : If speeds are not within tolerance, perform adjustment 20 !







1. Select the wide, programmed buttonhole - which has the same number of stitches for each row.

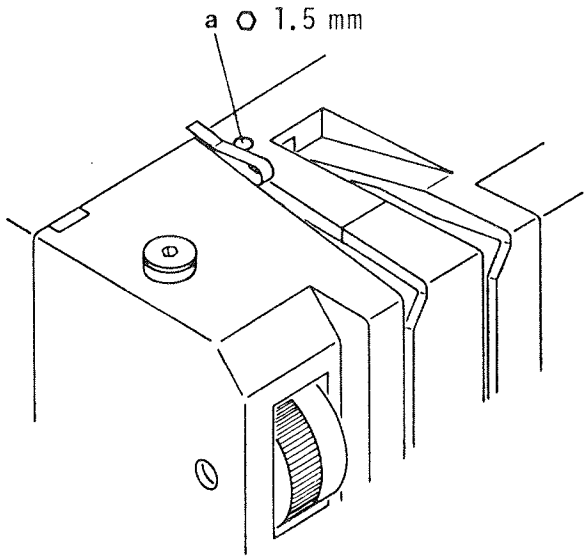
2. Fit the foot "U".

3. Center the fine adjustment slide "a" so that the markings are lined-up.

4. Sew a buttonhole and, depending on the result, turn the screw "b" slightly according to the drawing in order to obtain a well-balanced buttonhole. If the slide moves when turning the screw, reset it in the middle before the sewing test.

5. Sew the overlock stitch and, depending on the result, move the slide "a" to obtain a stitch pattern that corresponds to the drawing "c".

   Note : If it should not be possible to obtain a satisfactory result, proceed as per adjustment 13 , "Feed Balancing - Basic Adjustment".



Due to an erroneous selection of the stitch patterns, an untimely switching off of the main switch or any other source of disturbance, the needle bar could

A : remain in its uncoupled position or,

B : not uncouple at all.

Proceed then as follows :

A - 1. Switch OFF the main switch and pull the needle bar downwards, as far as it will go.

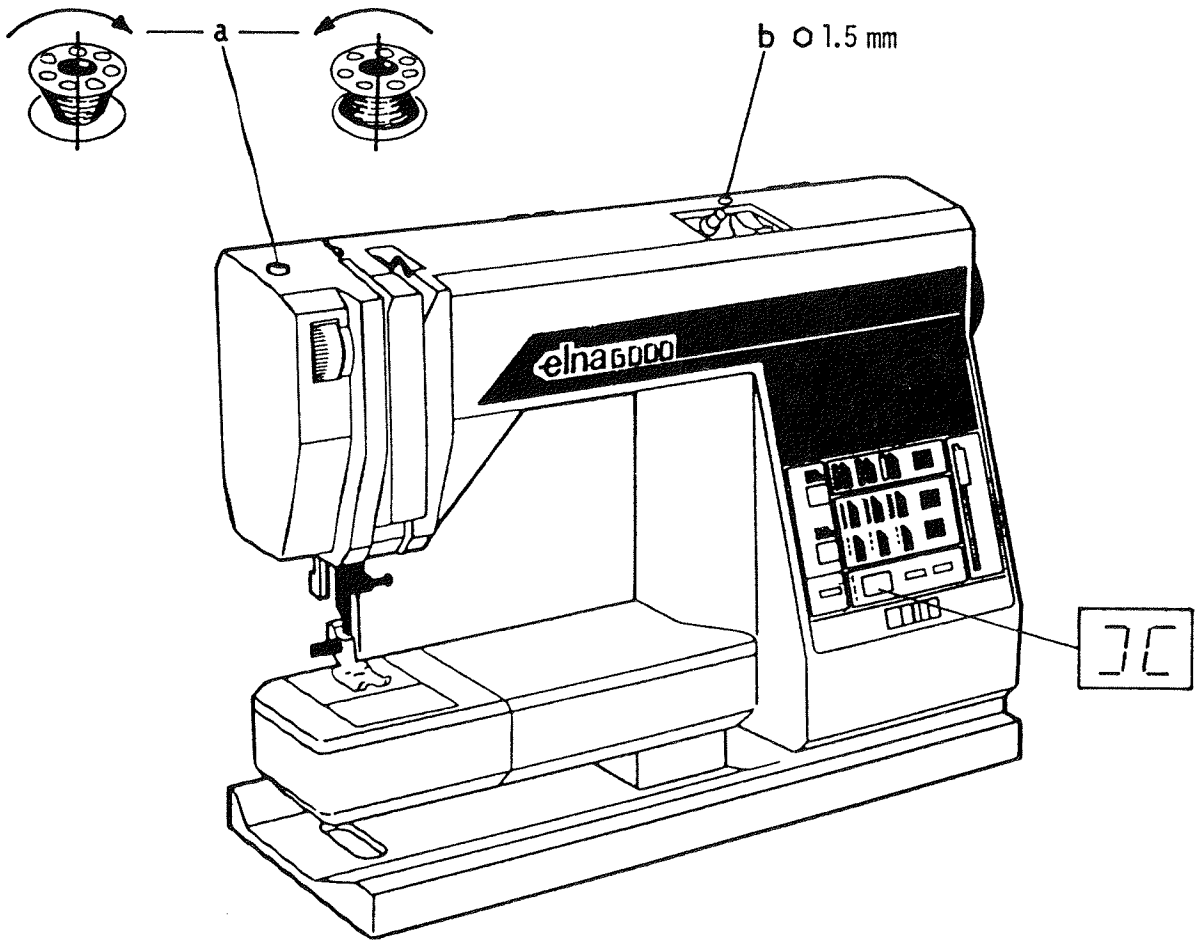
2. Switch the current ON and OFF twice.

B - 1. Select the basting stitch.

2. Run the machine at slow speed and, with the wrench 101'580, unscrew the screw "a" until the needle bar remains stationary in its highest position, then tighten the screw slowly until the needle bar descends and check to make sure that its descent coincides with every 4th feed motion.

3. Secure the functioning by a further half a turn of the screw and check also at high speed.

If the defects still remain, perform adjustment [21] - points 6 to 9.



EVEN WINDING

1. Tighten or unscrew "a" in order to obtain an even bobbin winding.

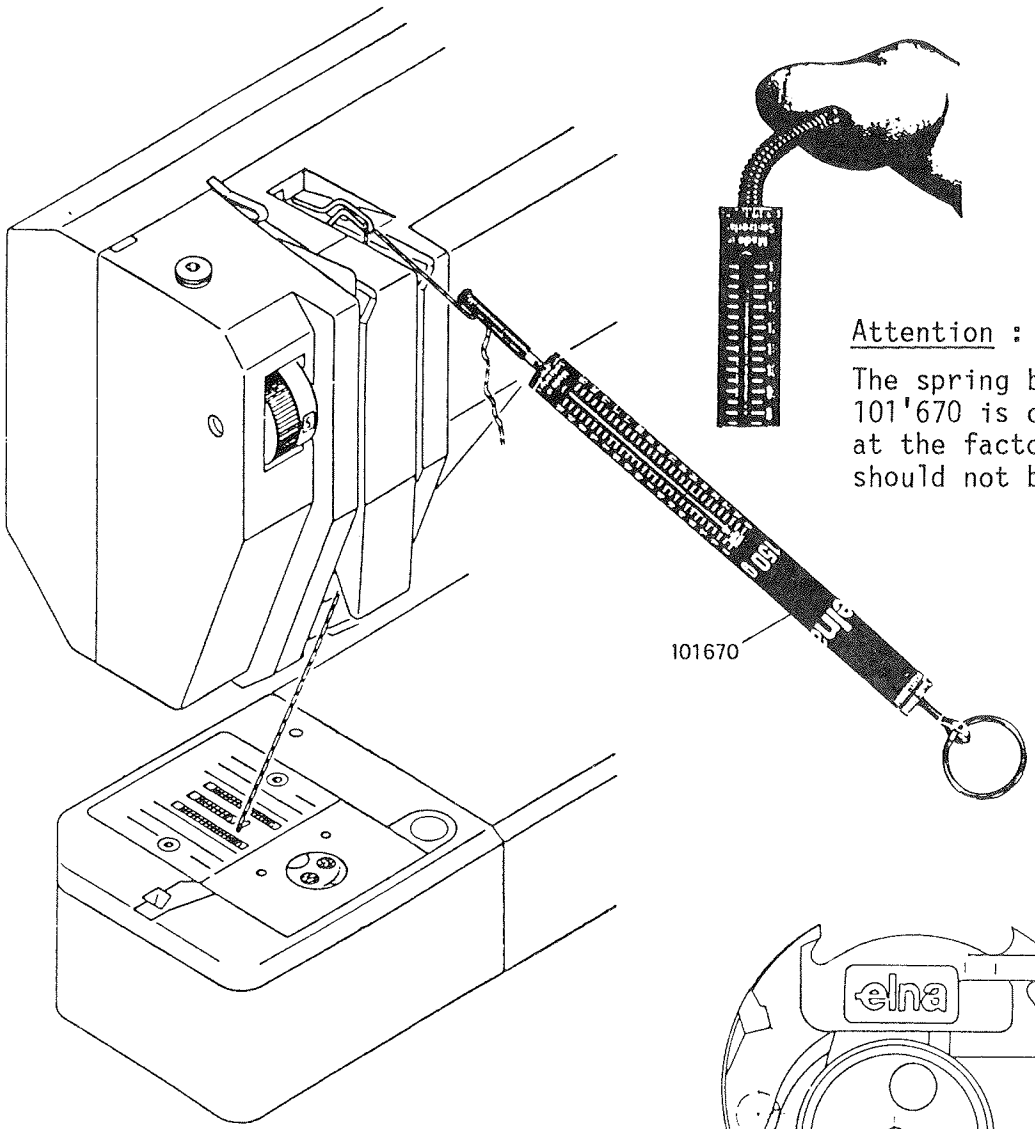
   Note : If the screw turns too freely, secure it with lacquer 802'950.

BOBBIN WINDER SWITCH

2. Switch the bobbin winder ON.

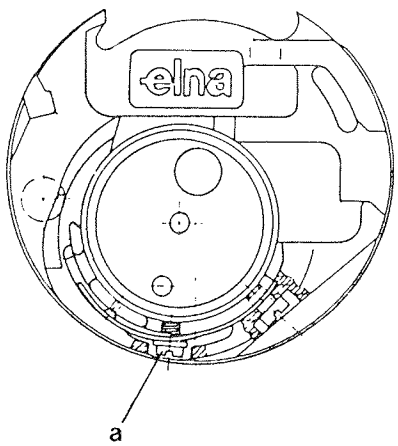
3. With the wrench 101'580, loosen screw "b" until the "bobbin winding" symbol disappears from the display, then/or tighten it slowly and without pressure until the symbol reappears.

4. Secure the functioning by a further full turn of the screw.



Attention :

The spring balance 101'670 is calibrated at the factory and should not be modified.

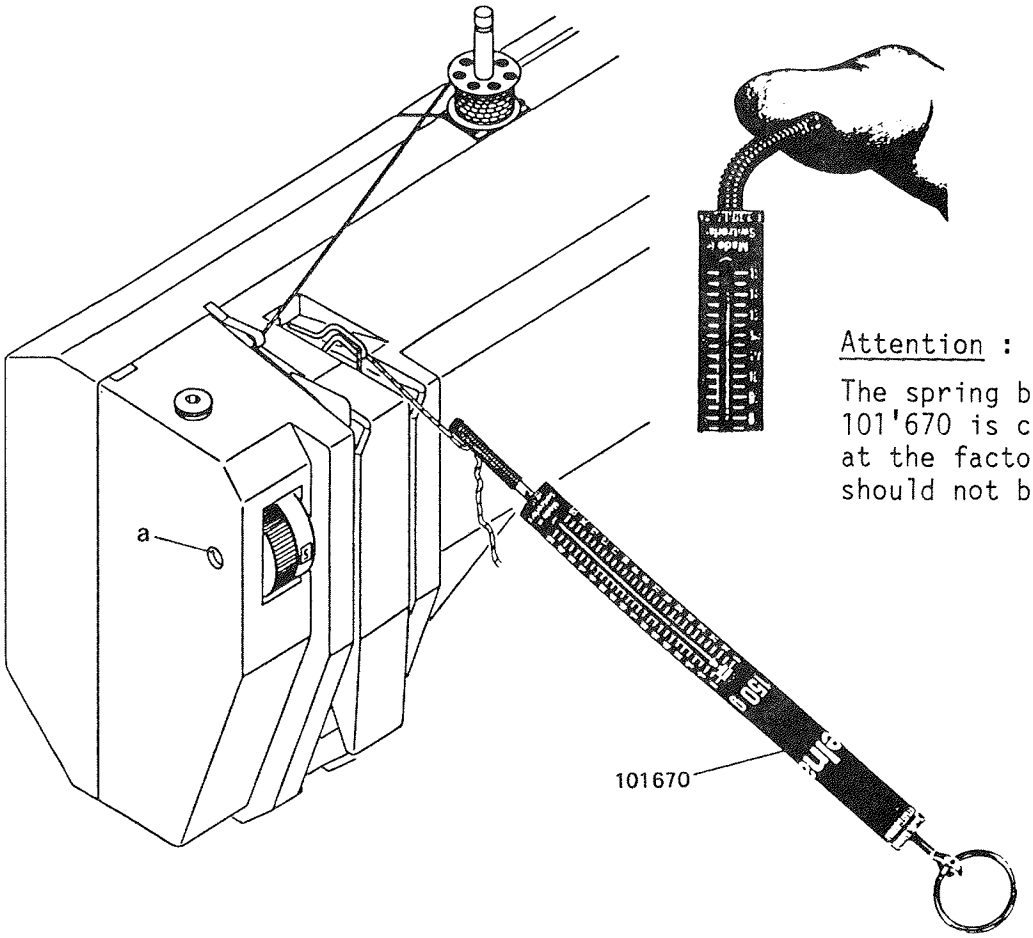


1. Use a full bobbin with embroidery thread No. 30 - 2 ply (60 - 2) and thread as per drawing, the thread passing underneath the feed dog.

2. Put the take-up lever in its highest position.

3. Adjust the screw "a" in order to obtain a tension of 30 - 40 g when pulling the spring balance slowly as illustrated.

   Note : In the event of irregular tension, check the condition of the needle plate, the sewing foot and the feed dog.



Attention :

The spring balance 101'670 is calibrated at the factory and should not be modified.

1. Set the tension wheel at "5".
2. Put the take-up lever in its highest position.
3. Place a bobbin with embroidery thread No. 30 - 2 ply (60 - 2) on a spool pin and thread as per drawing.
4. Adjust the slot screw "a" in order to get a tension of 130 - 140 g when pulling the spring balance slowly as illustrated.

First of all, please refer to the paragraph entitled "maintenance" in the instruction manual.
Given below are the most frequent disorders. In most cases, they can be remedied by checking the adjustments in the following order.

1. Skipped stitches

Check and adjust, if necessary :

- Needle clearance [2]
- Height of needle clamp [8]
- Hook timing [7]
- Position of needle plate [3]

If the fault has not been eliminated, check the further adjustments :

- Feed timing [6]
- Lower tension [15]
- Upper tension [16]
- Functioning of check spring [17]

2. No stitches stitched

You must first check the synchronization between upper and lower shaft (belt jumped over). To do so, bring the needle bar to its lowest position; the tip of the hook must then be at about "2 o'clock" and the feed dog fully retracted.
If these 3 positions do not correspond, carry out the following adjustments :

- Feed timing [6]
- Hook timing [7]
- Height of needle clamp [8]

3. Thread breakage

Before checking the adjustments, make sure that the thread and the needle are of the right quality. Also make sure that the threading is correct and that all the thread passages are okay. Quite often, an injury to the needle plate slot is the cause of thread breakage. If all these points are in order, check the following adjustments :

- Hook timing [7]
- Height and orientation of needle clamp [8]
- Position of needle plate [3]
- Upper tension [16]
- Lower tension [15]
- Needle clearance [2]
- Functioning of check spring [17]

4. Breakage of needle

It often happens that broken needles are the result of the following factors :

- The customer pulls on the fabric
- The stitch length that has been selected is too short, particularly when sewing over thicknesses.

It is wise, however, to check the following adjustments :

- Position of needle plate [3]
- Feed timing [6]
- Height of needle clamp [8]
- Stitch length

5. The stitch pattern does not correspond to the one selected

Initialize the machine twice. If the fault subsists, check the needle swing and the cloth feed by means of the "Test Program".

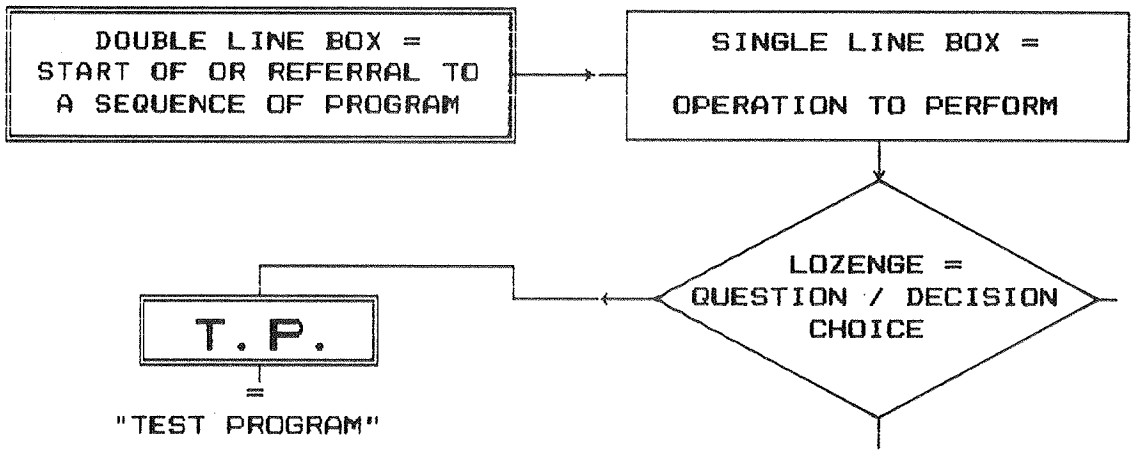
DIAGNOSTIC CHART ELNA 6000

PRELIMINARY CONDITIONS

- BEFORE UNDERTAKING THIS PLAN FOR THE DIAGNOSTIC OF ELECTRICAL-ELECTRONIC DISORDERS, IT IS UNDERSTOOD THAT THE POWER SUPPLY NETWORK IS FREE OF ANY DISTURBANCES AND CORRESPONDS TO THE NOMINAL VOLTAGE OF THE MACHINE. THE WALL PLUG, THE CORD SET, THE EXTENSION CORD ETC., MUST ALL BE IN GOOD CONDITION.

- AFTER DISMANTLING THE SHELLS, FIRST VERIFY THAT ALL THE WIRES OF THE CABLES ARE PROPERLY LODGED IN THEIR CONNECTOR PLUG (REMOVE THEIR CAPS).

SYMBOLS USED



IMPORTANT REMARKS

- SEE PAGES [G1] TO [G3] WHENEVER IT IS A MATTER OF MEASURES, EITHER OF RESISTANCES (Ω) OR OF VOLTAGES.

- WHEN MEASURING RESISTANCE (OHMS), IT IS INDISPENSABLE TO DISCONNECT THE MACHINE FROM THE POWER SUPPLY BY REMOVING THE CORD!

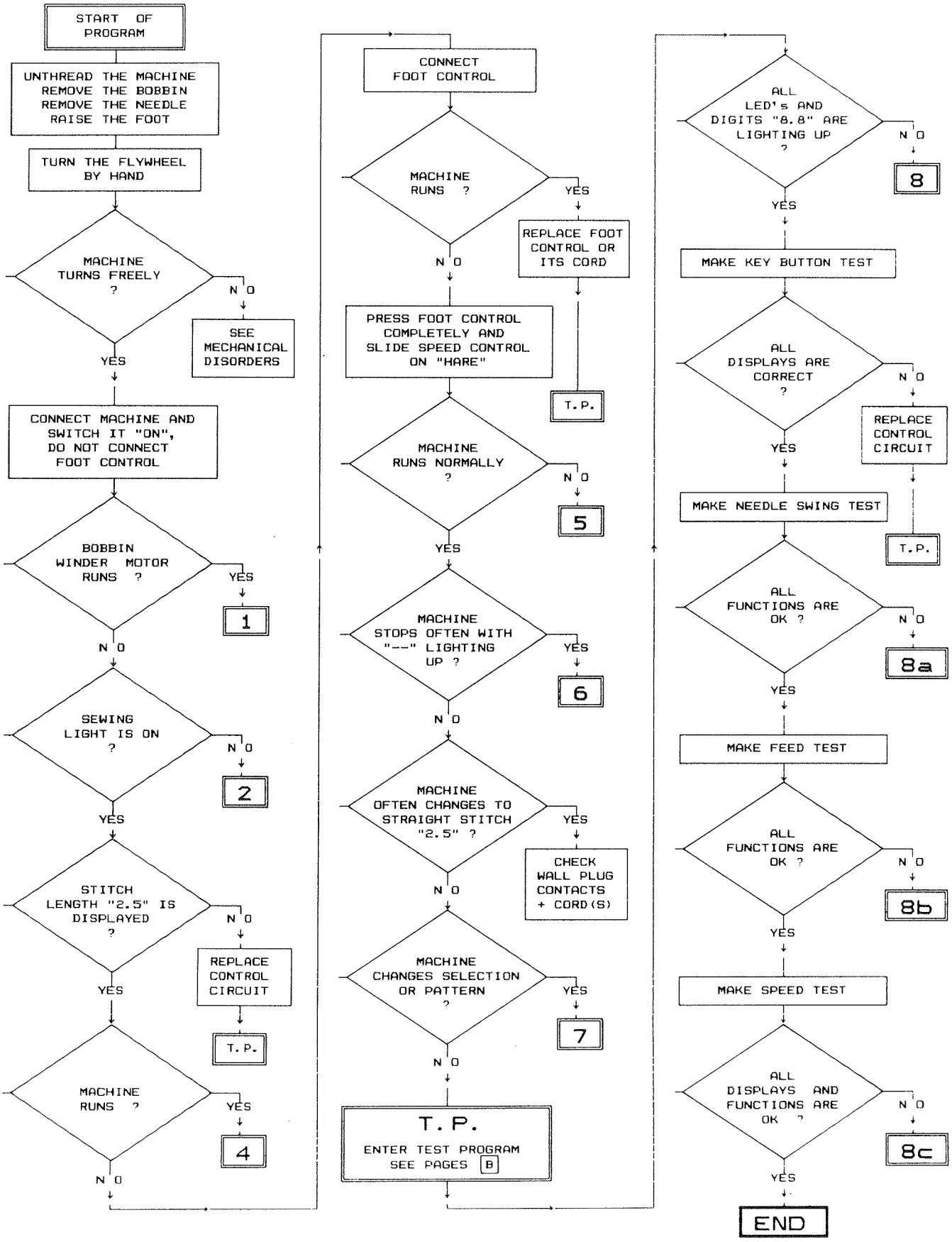
- WHEN MEASURING VOLTAGES, IT IS IMPERATIVE THAT THE BACK COVER OF THE TRANSFORMER UNIT IS PROPERLY IN PLACE AND SCREWED TIGHT!

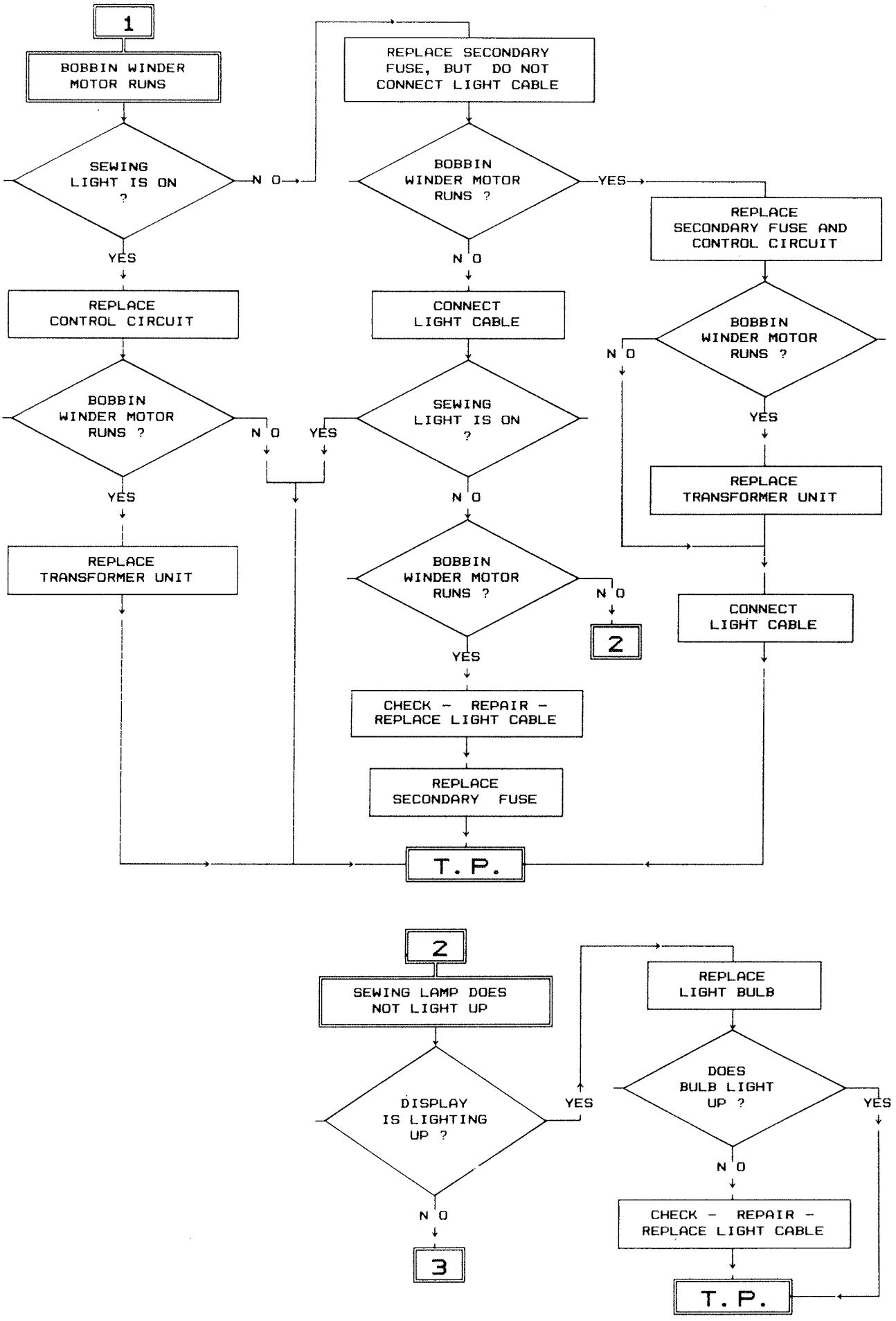
- THE OUTPUT VOLTAGES OF THE TRANSFORMER ARE DIRECT CURRENT (DC) EXCEPT FOR THE SEWING LIGHT, WHICH IS ALTERNATING CURRENT (AC).

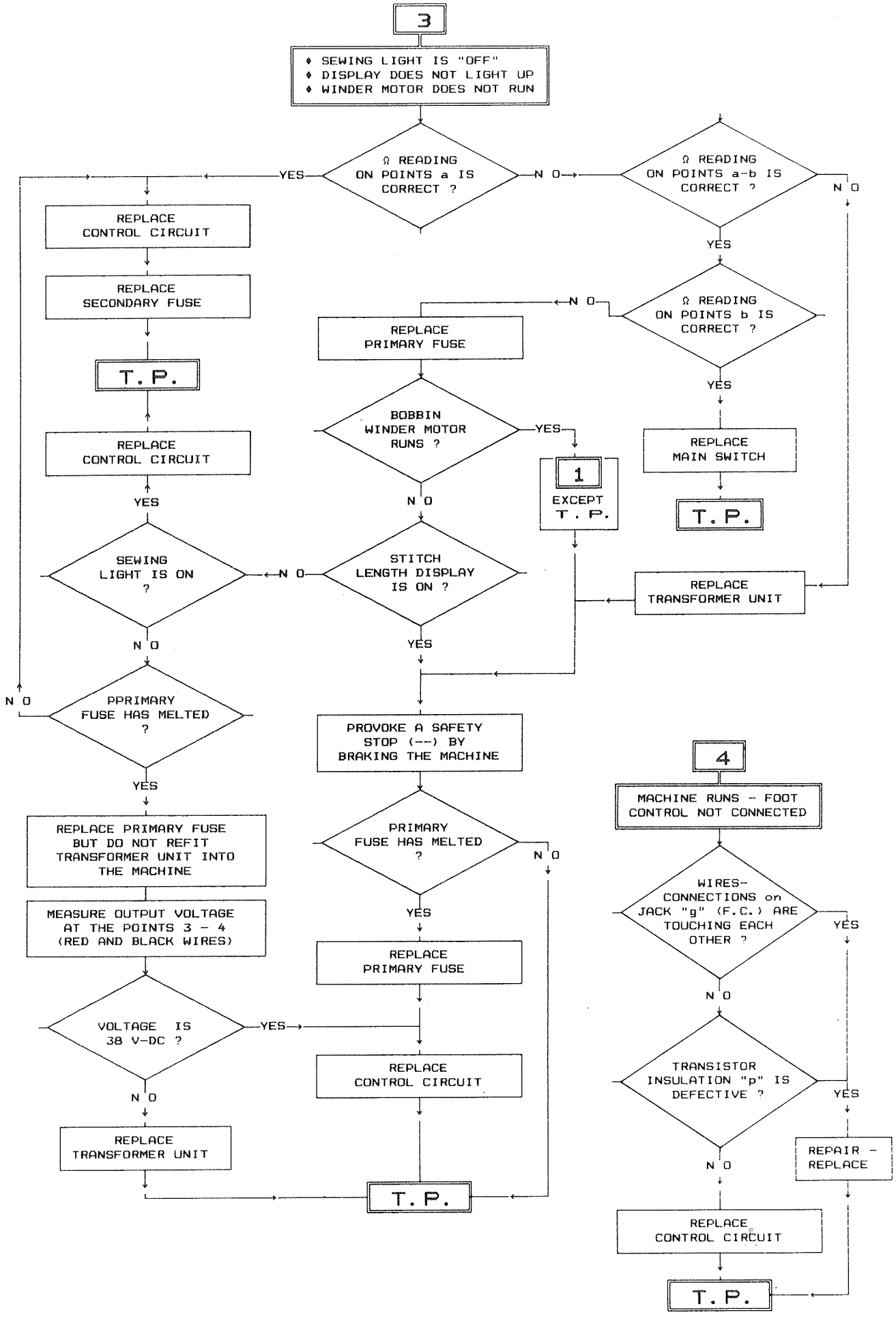
- AFTER A REPLACEMENT OF THE CONTROL CIRCUIT, THE MAIN MOTOR OR THE BOBBIN WINDER, IT IS MANDATORY TO CARRY OUT ADJUSTMENT No. [20] ! IN THE CASE OF THE CONTROL CIRCUIT OR THE TRANSFORMER, IN ADDITION, THE "TEST PROGRAM" (T.P.) HAS TO BE PERFORMED.

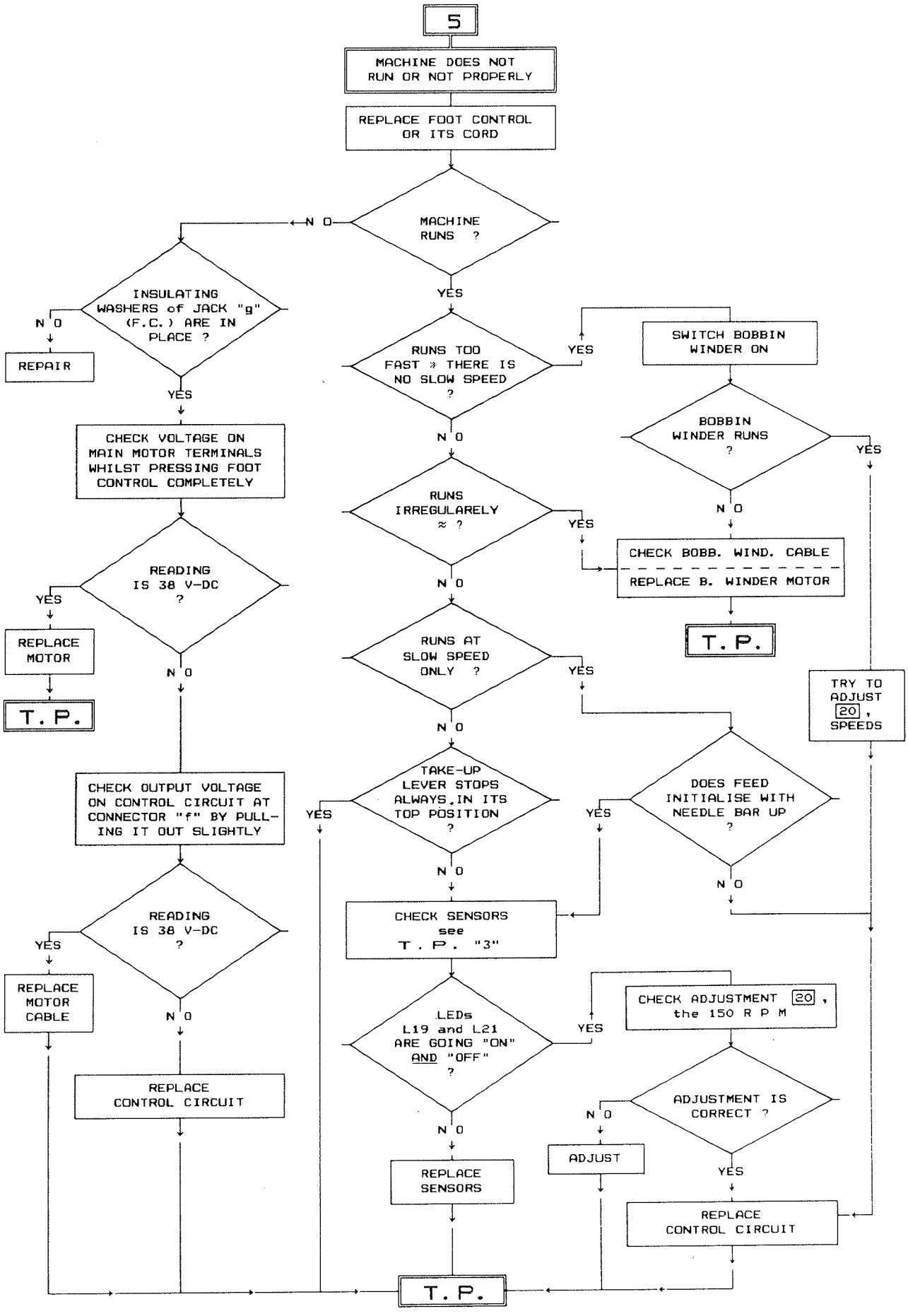
- WHEN YOU REPLACE ANY FUSES, MAKE SURE THEY ARE OF THE CORRECT RATING AND TYPE.

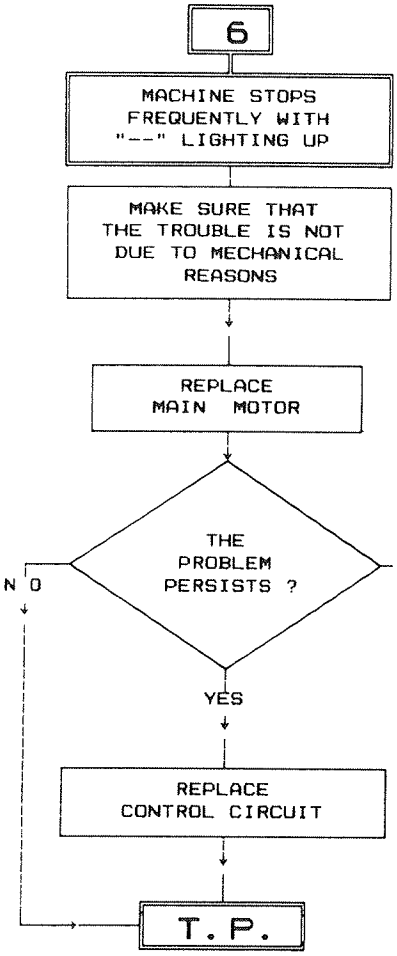
MAIN CHART

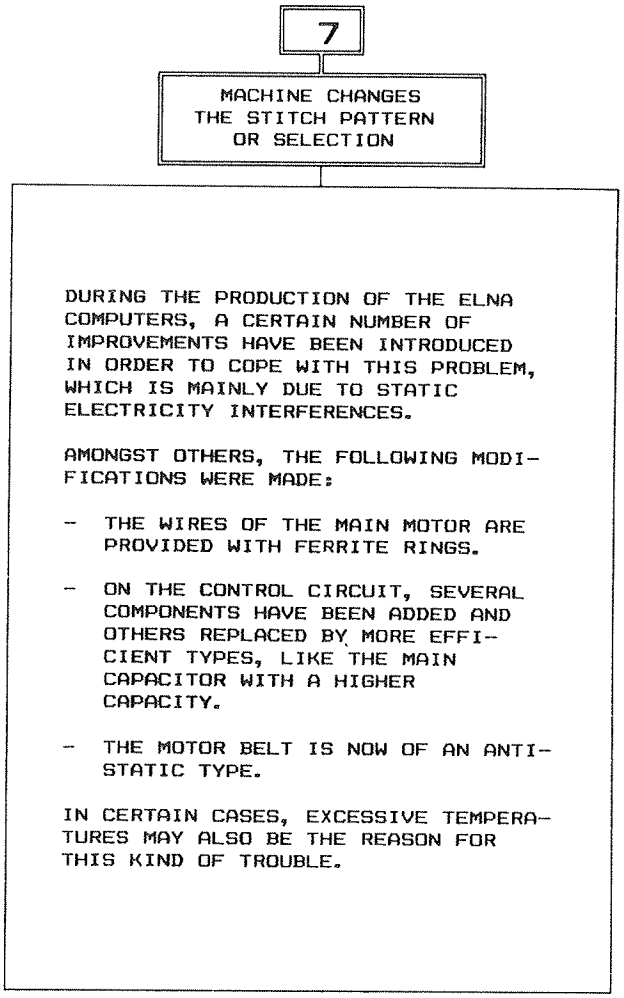

START OF PROGRAM
UNTHREAD THE MACHINE
REMOVE THE BOBBIN
REMOVE THE NEEDLE
RAISE THE FOOT
TURN THE FLYWHEEL BY HAND
MACHINE TURNS FREELY ?
NO
SEE MECHANICAL DISORDERS
YES
CONNECT MACHINE AND SWITCH IT "ON", DO NOT CONNECT FOOT CONTROL
BOBBIN WINDER MOTOR RUNS ?
YES
1
NO
SEWING LIGHT IS ON ?
NO
2
YES
STITCH LENGTH "2.5" IS DISPLAYED ?
NO
REPLACE CONTROL CIRCUIT
T.P.
YES
MACHINE RUNS ?
YES
4
NO
CONNECT FOOT CONTROL
MACHINE RUNS ?
YES
REPLACE FOOT CONTROL OR ITS CORD
T.P.
NO
PRESS FOOT CONTROL COMPLETELY AND SLIDE SPEED CONTROL ON "HARE"
MACHINE RUNS NORMALLY ?
NO
5
YES
MACHINE STOPS OFTEN WITH "--" LIGHTING UP ?
YES
6
NO
MACHINE OFTEN CHANGES TO STRAIGHT STITCH "2.5" ?
YES
CHECK WALL PLUG CONTACTS + CORD(S)
NO
MACHINE CHANGES SELECTION OR PATTERN ?
YES
7
NO
T.P.
ENTER TEST PROGRAM
SEE PAGES B
ALL LED's AND DIGITS "8.8" ARE LIGHTING UP ?
NO
8
YES
MAKE KEY BUTTON TEST
ALL DISPLAYS ARE CORRECT ?
NO
REPLACE CONTROL CIRCUIT
T.P.
YES
MAKE NEEDLE SWING TEST
ALL FUNCTIONS ARE OK ?
NO
8a
YES
MAKE FEED TEST
ALL FUNCTIONS ARE OK ?
NO
8b
YES
MAKE SPEED TEST
ALL DISPLAYS AND FUNCTIONS ARE OK ?
NO
8c
YES
END

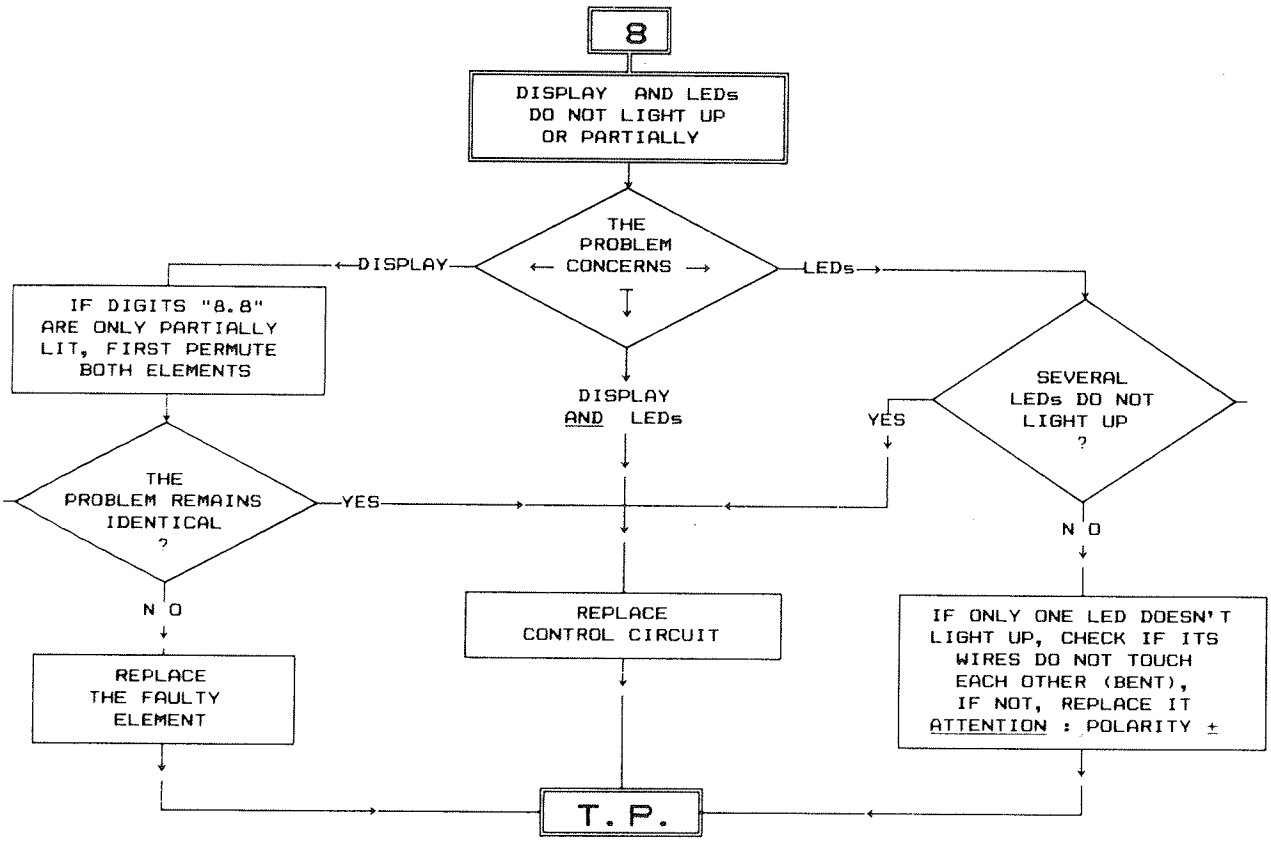

1
BOBBIN WINDER MOTOR RUNS
SEWING LIGHT IS ON ?
NO
YES
REPLACE CONTROL CIRCUIT
BOBBIN WINDER MOTOR RUNS ?
NO
YES
REPLACE TRANSFORMER UNIT
REPLACE SECONDARY FUSE, BUT DO NOT CONNECT LIGHT CABLE
BOBBIN WINDER MOTOR RUNS ?
YES
NO
CONNECT LIGHT CABLE
SEWING LIGHT IS ON ?
YES
NO
BOBBIN WINDER MOTOR RUNS ?
NO
YES
2
CHECK - REPAIR - REPLACE LIGHT CABLE
REPLACE SECONDARY FUSE
T.P.
REPLACE SECONDARY FUSE AND CONTROL CIRCUIT
BOBBIN WINDER MOTOR RUNS ?
NO
YES
REPLACE TRANSFORMER UNIT
CONNECT LIGHT CABLE
2
SEWING LAMP DOES NOT LIGHT UP
DISPLAY IS LIGHTING UP ?
YES
NO
3
REPLACE LIGHT BULB
DOES BULB LIGHT UP ?
YES
NO
CHECK - REPAIR - REPLACE LIGHT CABLE
T.P.

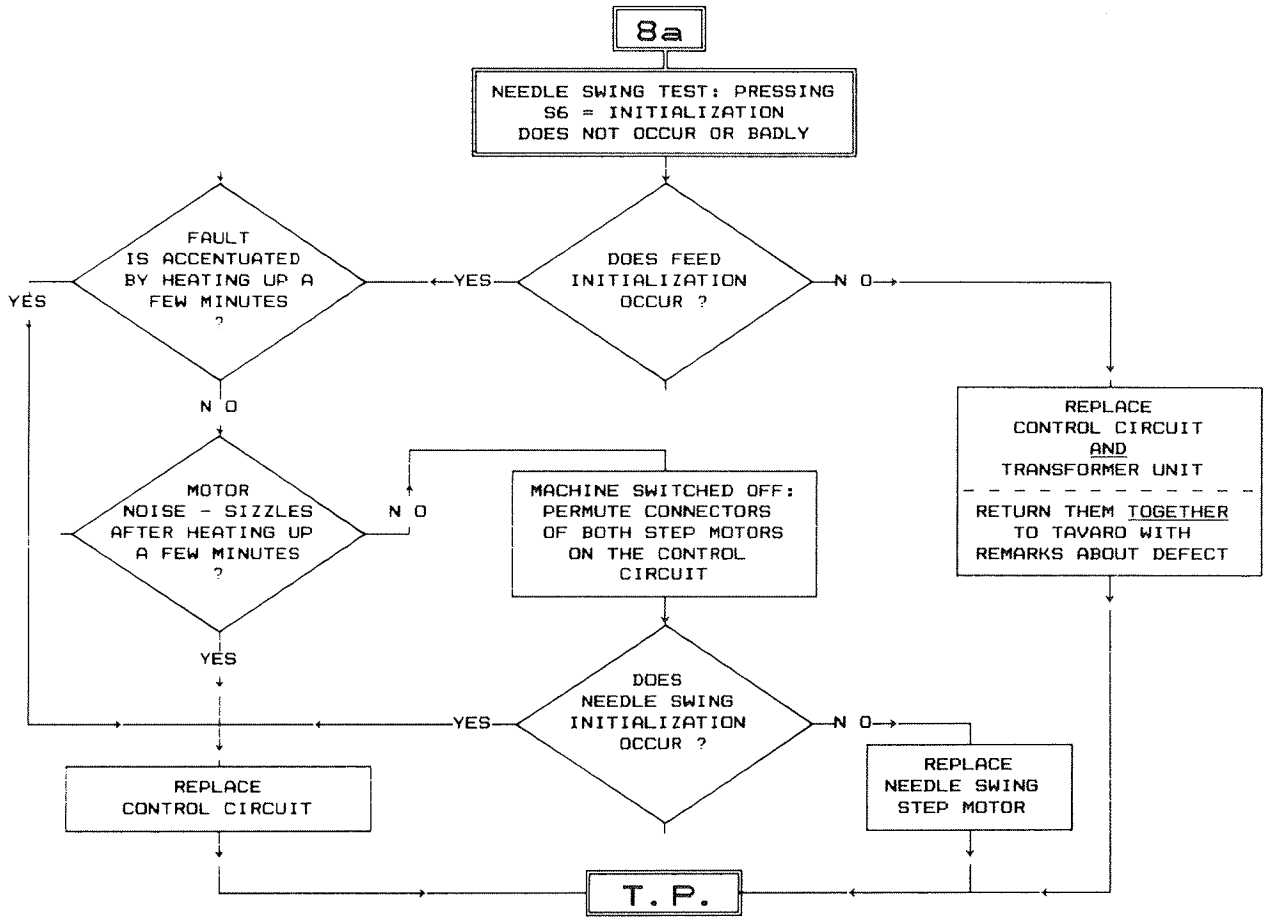

3
♦ SEWING LIGHT IS "OFF"
♦ DISPLAY DOES NOT LIGHT UP
♦ WINDER MOTOR DOES NOT RUN
Ω READING ON POINTS a IS CORRECT ?
YES
NO
Ω READING ON POINTS a-b IS CORRECT ?
NO
YES
Ω READING ON POINTS b IS CORRECT ?
NO
YES
REPLACE CONTROL CIRCUIT
REPLACE SECONDARY FUSE
T. P.
REPLACE CONTROL CIRCUIT
REPLACE PRIMARY FUSE
BOBBIN WINDER MOTOR RUNS ?
YES
NO
1
EXCEPT T. P.
REPLACE MAIN SWITCH
T. P.
REPLACE TRANSFORMER UNIT
SEWING LIGHT IS ON ?
NO
YES
NO
STITCH LENGTH DISPLAY IS ON ?
YES
NO
PPRIMARY FUSE HAS MELTED ?
YES
NO
PROVOKE A SAFETY STOP (--) BY BRAKING THE MACHINE
REPLACE PRIMARY FUSE BUT DO NOT REFIT TRANSFORMER UNIT INTO THE MACHINE
MEASURE OUTPUT VOLTAGE AT THE POINTS 3 - 4 (RED AND BLACK WIRES)
PRIMARY FUSE HAS MELTED ?
YES
NO
REPLACE PRIMARY FUSE
VOLTAGE IS 38 V-DC ?
YES
NO
REPLACE CONTROL CIRCUIT
REPLACE TRANSFORMER UNIT
T. P.
4
MACHINE RUNS - FOOT CONTROL NOT CONNECTED
WIRES-CONNECTIONS on JACK "g" (F.C.) ARE TOUCHING EACH OTHER ?
YES
NO
TRANSISTOR INSULATION "p" IS DEFECTIVE ?
YES
NO
REPAIR - REPLACE
REPLACE CONTROL CIRCUIT
T. P.

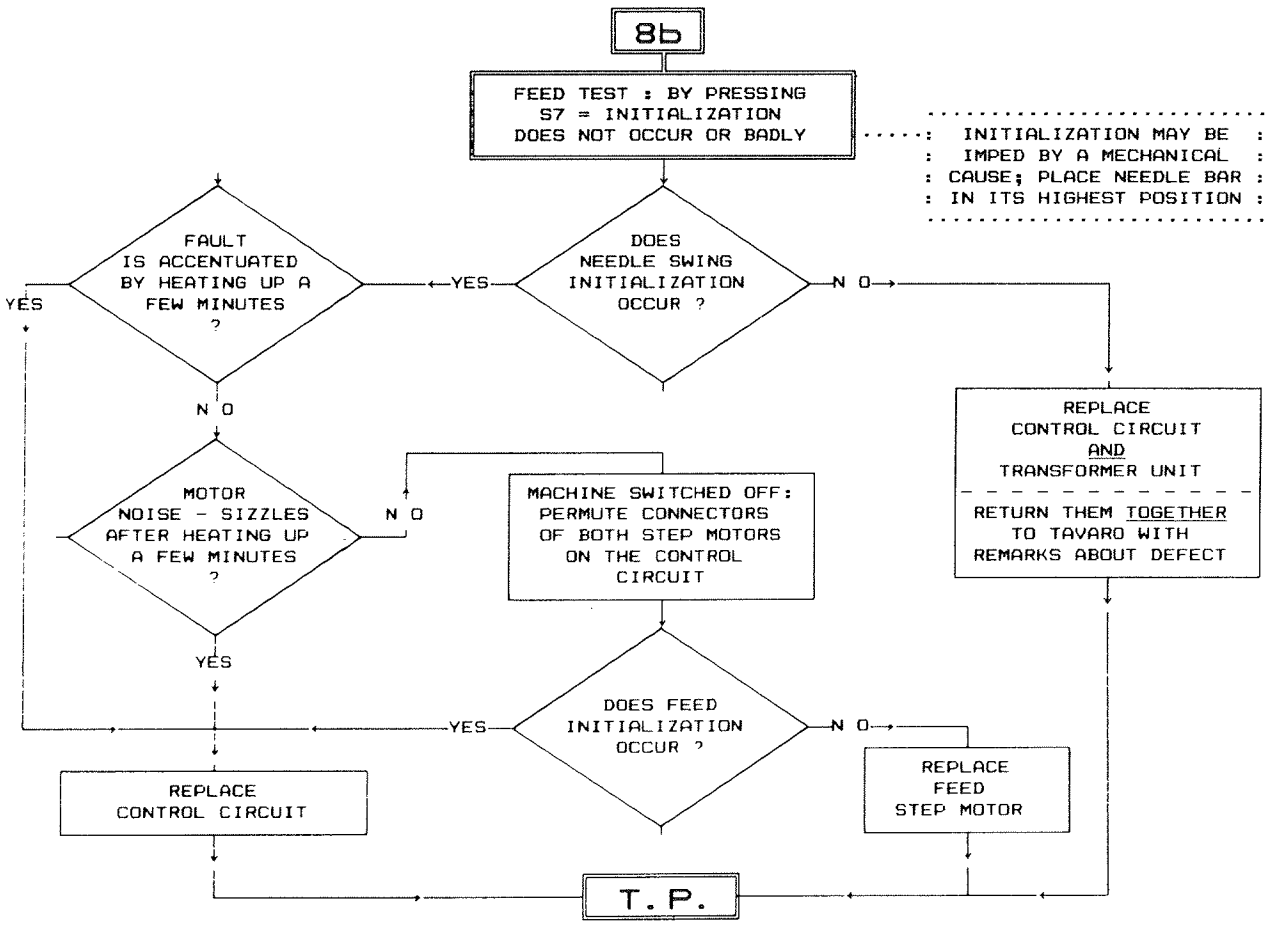

5
MACHINE DOES NOT RUN OR NOT PROPERLY
REPLACE FOOT CONTROL OR ITS CORD
MACHINE RUNS ?
NO
YES
INSULATING WASHERS of JACK "g" (F.C.) ARE IN PLACE ?
NO
REPAIR
YES
CHECK VOLTAGE ON MAIN MOTOR TERMINALS WHILST PRESSING FOOT CONTROL COMPLETELY
READING IS 38 V-DC ?
YES
REPLACE MOTOR
T. P.
NO
CHECK OUTPUT VOLTAGE ON CONTROL CIRCUIT AT CONNECTOR "f" BY PULLING IT OUT SLIGHTLY
READING IS 38 V-DC ?
YES
REPLACE MOTOR CABLE
NO
REPLACE CONTROL CIRCUIT
RUNS TOO FAST ; THERE IS NO SLOW SPEED ?
YES
SWITCH BOBBIN WINDER ON
BOBBIN WINDER RUNS ?
YES
NO
CHECK BOBB. WIND. CABLE
REPLACE B. WINDER MOTOR
T. P.
NO
RUNS IRREGULARELY ≈ ?
YES
NO
RUNS AT SLOW SPEED ONLY ?
YES
TRY TO ADJUST 20 , SPEEDS
NO
TAKE-UP LEVER STOPS ALWAYS IN ITS TOP POSITION ?
YES
NO
DOES FEED INITIALISE WITH NEEDLE BAR UP ?
YES
NO
CHECK SENSORS see T. P. "3"
LEDs L19 and L21 ARE GOING "ON" AND "OFF" ?
YES
NO
REPLACE SENSORS
CHECK ADJUSTMENT 20 , the 150 R P M
ADJUSTMENT IS CORRECT ?
NO
ADJUST
YES
REPLACE CONTROL CIRCUIT
T. P.

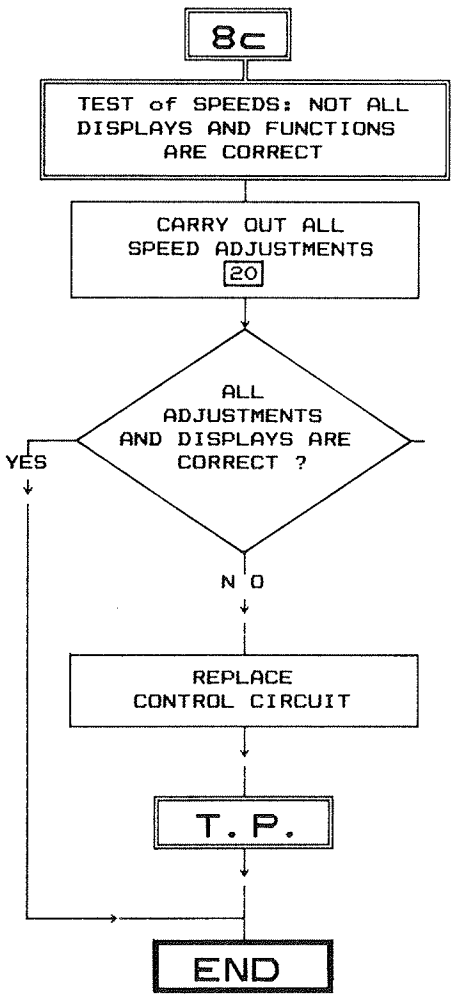

6
MACHINE STOPS FREQUENTLY WITH "--" LIGHTING UP
MAKE SURE THAT THE TROUBLE IS NOT DUE TO MECHANICAL REASONS
REPLACE MAIN MOTOR
THE PROBLEM PERSISTS ?
NO
YES
REPLACE CONTROL CIRCUIT
T.P.

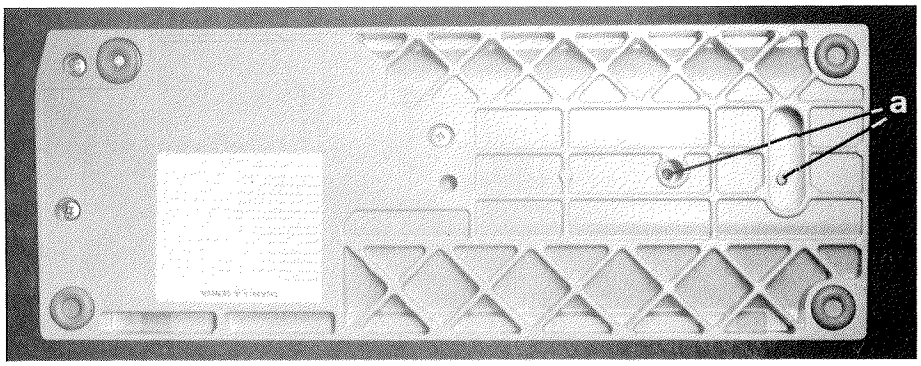

7
MACHINE CHANGES THE STITCH PATTERN OR SELECTION
DURING THE PRODUCTION OF THE ELNA COMPUTERS, A CERTAIN NUMBER OF IMPROVEMENTS HAVE BEEN INTRODUCED IN ORDER TO COPE WITH THIS PROBLEM, WHICH IS MAINLY DUE TO STATIC ELECTRICITY INTERFERENCES.
AMONGST OTHERS, THE FOLLOWING MODIFICATIONS WERE MADE:
- THE WIRES OF THE MAIN MOTOR ARE PROVIDED WITH FERRITE RINGS.
- ON THE CONTROL CIRCUIT, SEVERAL COMPONENTS HAVE BEEN ADDED AND OTHERS REPLACED BY MORE EFFICIENT TYPES, LIKE THE MAIN CAPACITOR WITH A HIGHER CAPACITY.
- THE MOTOR BELT IS NOW OF AN ANTISTATIC TYPE.
IN CERTAIN CASES, EXCESSIVE TEMPERATURES MAY ALSO BE THE REASON FOR THIS KIND OF TROUBLE.


8
DISPLAY AND LEDs DO NOT LIGHT UP OR PARTIALLY
THE PROBLEM ← CONCERNS →
DISPLAY
LEDs
IF DIGITS "8.8" ARE ONLY PARTIALLY LIT, FIRST PERMUTE BOTH ELEMENTS
DISPLAY AND LEDs
SEVERAL LEDs DO NOT LIGHT UP ?
YES
NO
THE PROBLEM REMAINS IDENTICAL ?
YES
NO
REPLACE THE FAULTY ELEMENT
REPLACE CONTROL CIRCUIT
IF ONLY ONE LED DOESN'T LIGHT UP, CHECK IF ITS WIRES DO NOT TOUCH EACH OTHER (BENT), IF NOT, REPLACE IT
ATTENTION : POLARITY ±
T.P.


8a
NEEDLE SWING TEST: PRESSING S6 = INITIALIZATION DOES NOT OCCUR OR BADLY
DOES FEED INITIALIZATION OCCUR ?
YES
NO
FAULT IS ACCENTUATED BY HEATING UP A FEW MINUTES ?
YES
NO
REPLACE CONTROL CIRCUIT AND TRANSFORMER UNIT
RETURN THEM TOGETHER TO TAVARO WITH REMARKS ABOUT DEFECT
MOTOR NOISE - SIZZLES AFTER HEATING UP A FEW MINUTES ?
NO
YES
MACHINE SWITCHED OFF: PERMUTE CONNECTORS OF BOTH STEP MOTORS ON THE CONTROL CIRCUIT
DOES NEEDLE SWING INITIALIZATION OCCUR ?
YES
NO
REPLACE CONTROL CIRCUIT
REPLACE NEEDLE SWING STEP MOTOR
T.P.

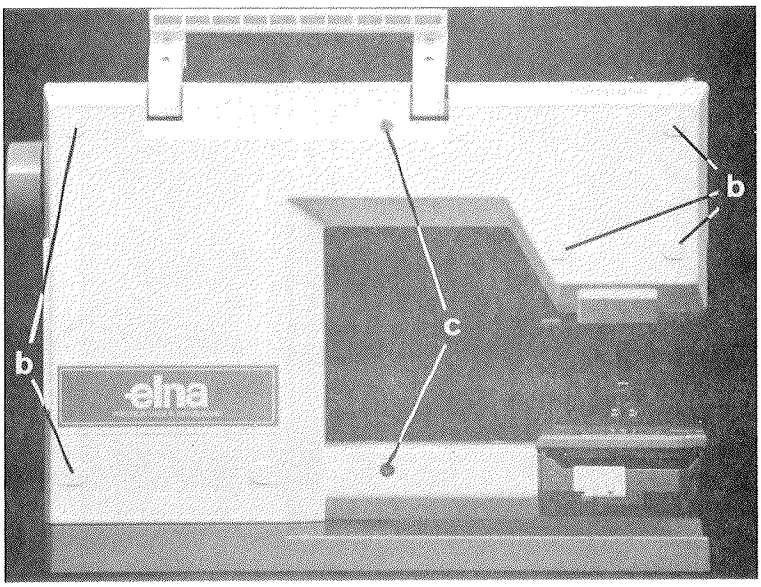

8b
FEED TEST : BY PRESSING S7 = INITIALIZATION DOES NOT OCCUR OR BADLY
INITIALIZATION MAY BE IMPED BY A MECHANICAL CAUSE; PLACE NEEDLE BAR IN ITS HIGHEST POSITION
DOES NEEDLE SWING INITIALIZATION OCCUR ?
YES
NO
FAULT IS ACCENTUATED BY HEATING UP A FEW MINUTES ?
YES
NO
REPLACE CONTROL CIRCUIT AND TRANSFORMER UNIT
RETURN THEM TOGETHER TO TAVARO WITH REMARKS ABOUT DEFECT
MOTOR NOISE - SIZZLES AFTER HEATING UP A FEW MINUTES ?
NO
YES
MACHINE SWITCHED OFF: PERMUTE CONNECTORS OF BOTH STEP MOTORS ON THE CONTROL CIRCUIT
DOES FEED INITIALIZATION OCCUR ?
YES
NO
REPLACE CONTROL CIRCUIT
REPLACE FEED STEP MOTOR
T.P.


8c
TEST of SPEEDS: NOT ALL DISPLAYS AND FUNCTIONS ARE CORRECT
CARRY OUT ALL SPEED ADJUSTMENTS
20
ALL ADJUSTMENTS AND DISPLAYS ARE CORRECT ?
YES
NO
REPLACE CONTROL CIRCUIT
T.P.
END



1. Lower Cover

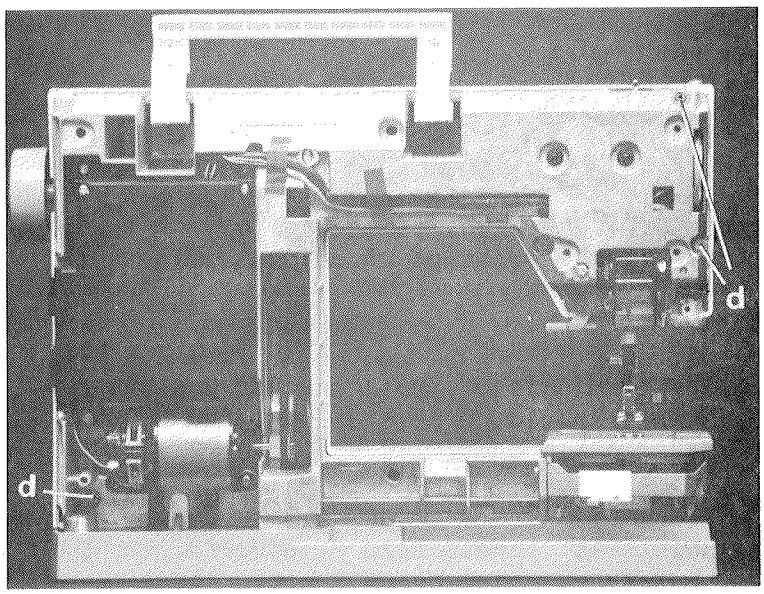
Lay machine on its back and remove the cover by unscrewing the two screws "a" through the base.



2. Rear Shell

With a small screwdriver, remove the 5 screw covers "b" and unscrew the 5 screws, as well as the 2 screws "c".

Remove the rear shell by pivoting it around the edges of the main switch and the connector base.



3. Front Shell

Put the take-up lever in its highest position.

Unscrew the 3 screws "d" M4x12 and remove the front shell.

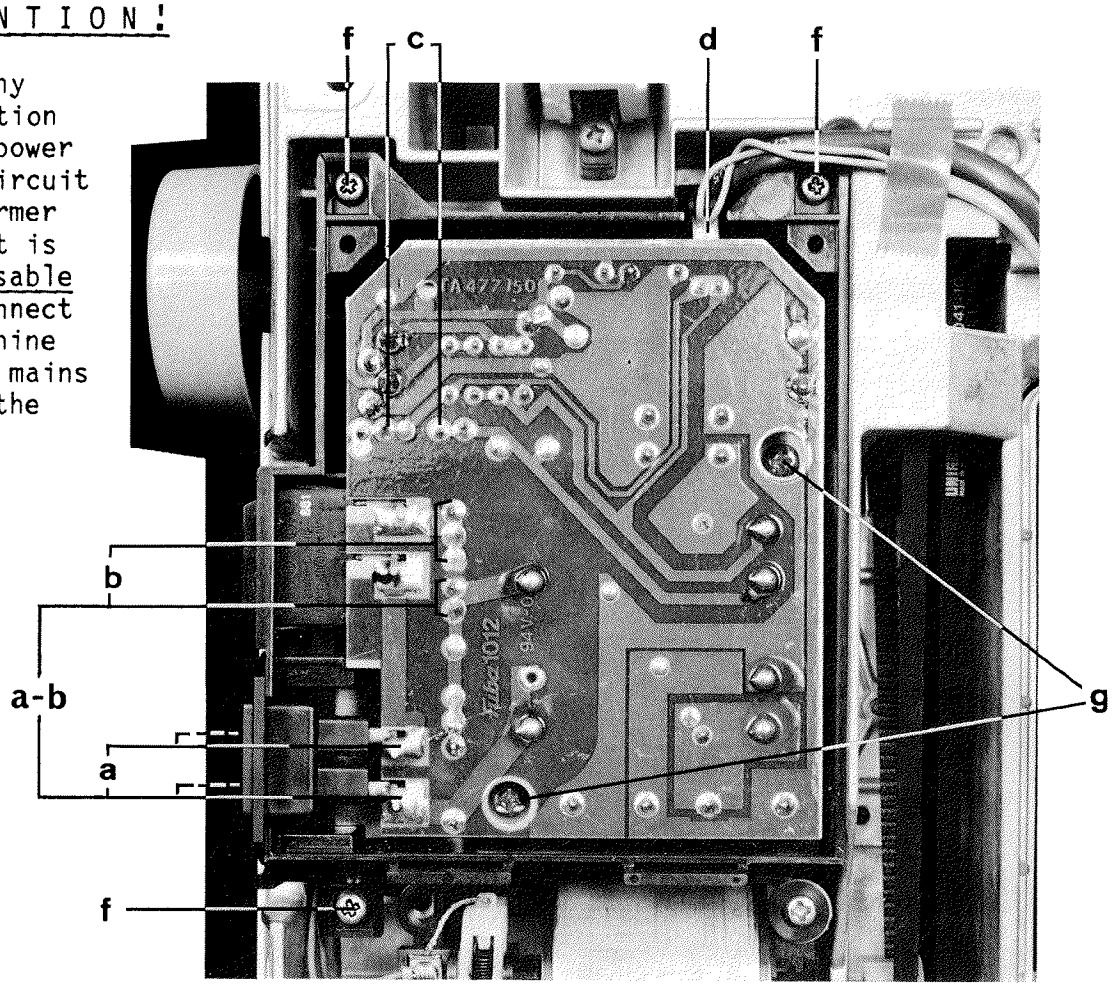
Fit the protection/test plate 101'800.

Note : When re-fitting the front shell, observe the following points;

a. The upper tension wheel must be in its place.
b. Put take-up lever in its highest position and lower the foot.
c. Couple the fork of the speed reducer slide with the spur of the variable resistor (set both at the lowest position).
d. Engage the spur of the fine adjustment slide in the tooth rack.
e. Check the alignment of the LEDs by means of the Test program.

A T T E N T I O N !

Before any intervention on the power supply circuit (transformer unit), it is indispensable to disconnect the machine from the mains (unplug the cord) !



F U S E S

After having unscrewed the back cover of the transformer housing, it is possible to check the state of the 2 fuses, by means of an ohmmeter.

Primary Fuse F1

Connect the ohmmeter directly to the terminals of the connector base, or to the points "a", where the resistance should be 18 - 23 ohms for 220 V, with the machine switched ON. (120 V = 5 - 6 ohms, 240 V = 23 - 29 ohms)

In this case, the primary circuit and the fuse are in order.

The fuse alone is checked at the points "b" (press hard - lacquer). If the fuse is in order - 0 ohm - but the machine doesn't work, check whether the resistance at the points "a-b" is of the above values. If yes, replace the switch. If no, replace the transformer.

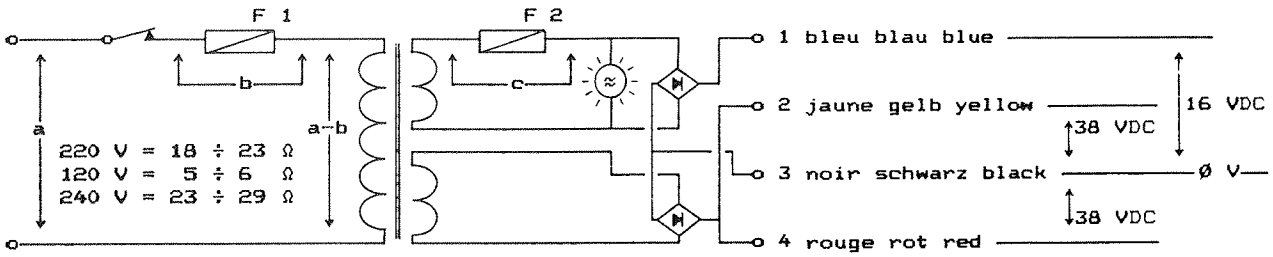
Secondary Fuse F2

If the fuse is in order, the resistance at the points "c" is about 0.5 ohm, but infinite if it has melted.

Note : It is possible to replace this fuse through the opening in the transformer housing, on the side of the components.

TO REPLACE THE FUSES

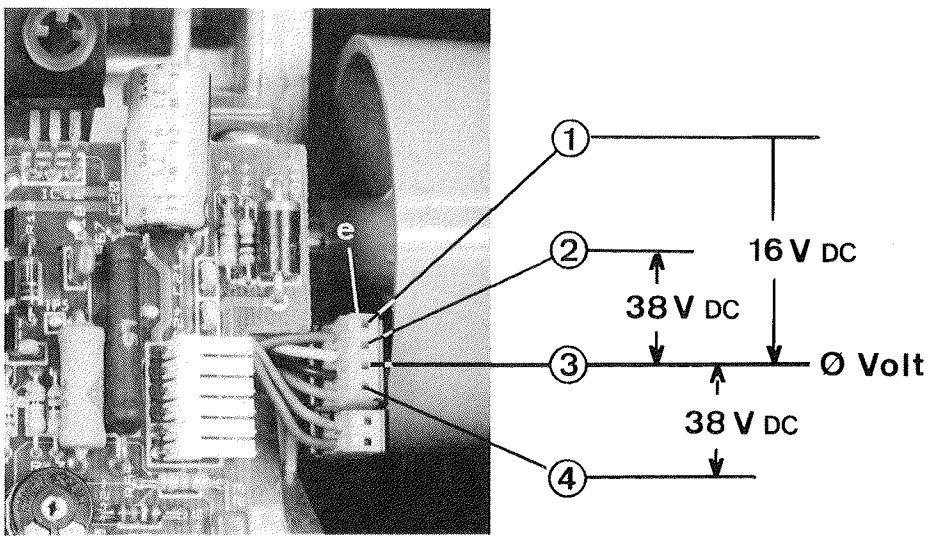
1. Disconnect the sewing light lead "d".
2. Disconnect the connector "e" from the control circuit, see below.
3. Unscrew the 3 screws "f" on the transformer housing and remove the latter, taking care with the lead and its connector.
4. Unscrew the appliance plug.
5. Unsolder the clips of the switch.
   Note : These clips 434'130 are to be changed and, when you resolder them, bending their lugs to an angle of 45° will be sufficient. Be careful not to cause any buckling of the circuit.
6. Unscrew the 2 screws "g" of the transformer and remove it from the box.



TO CHECK THE OUTPUT VOLTAGE OF THE TRANSFORMER

Disconnect the connector "e" from the control circuit.

Using a voltmeter for direct current (DC scale), measure the static voltage of the transformer.



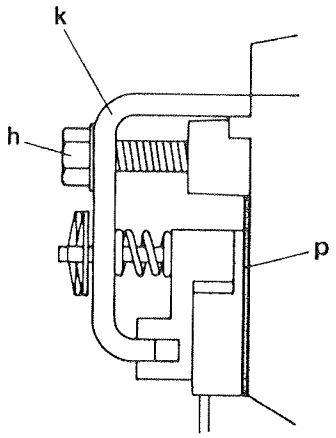
Note :

The sewing light voltage is 12 V AC

Tolerances :

For 16 V : ± 1.5 V
For 38 V : ± 4 V

REMOVAL OF THE CONTROL CIRCUIT



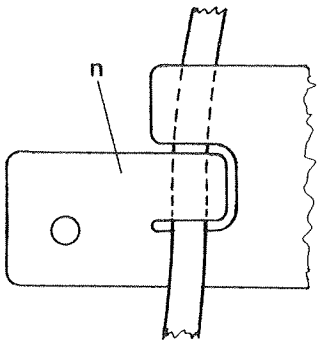
1. Disconnect the connectors "a" to "f".
2. Unscrew the connector "g".
3. Unscrew the screw "h" and remove the clamp "k".
4. Unscrew the screws "m".
5. Slide the circuit downwards and remove it.

When RE-FITTING, observe the following points:

a. Lay down machine and pass feed motor cable as shown underneath the circuit insulator "n".

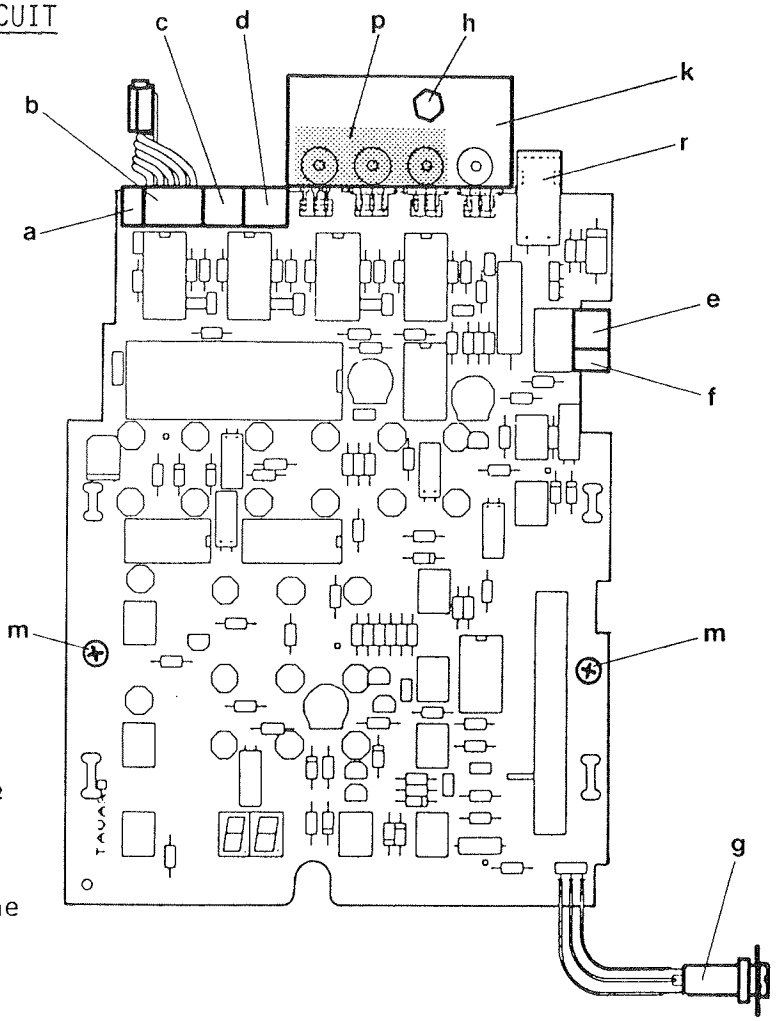
b. Place insulating strap "p" (in good condition) so that the 3 left transistors are well insulated.

c. Align the heat sink "k" with the rim on the frame and tighten it with the screw "h". If all 4 transistors are seated properly, there must be a gap of about 1 mm between the heat sink and the 3 self-locking rings on the right and about 2 mm on the left one.



CONNECTIONS OF THE CONTROL CIRCUIT

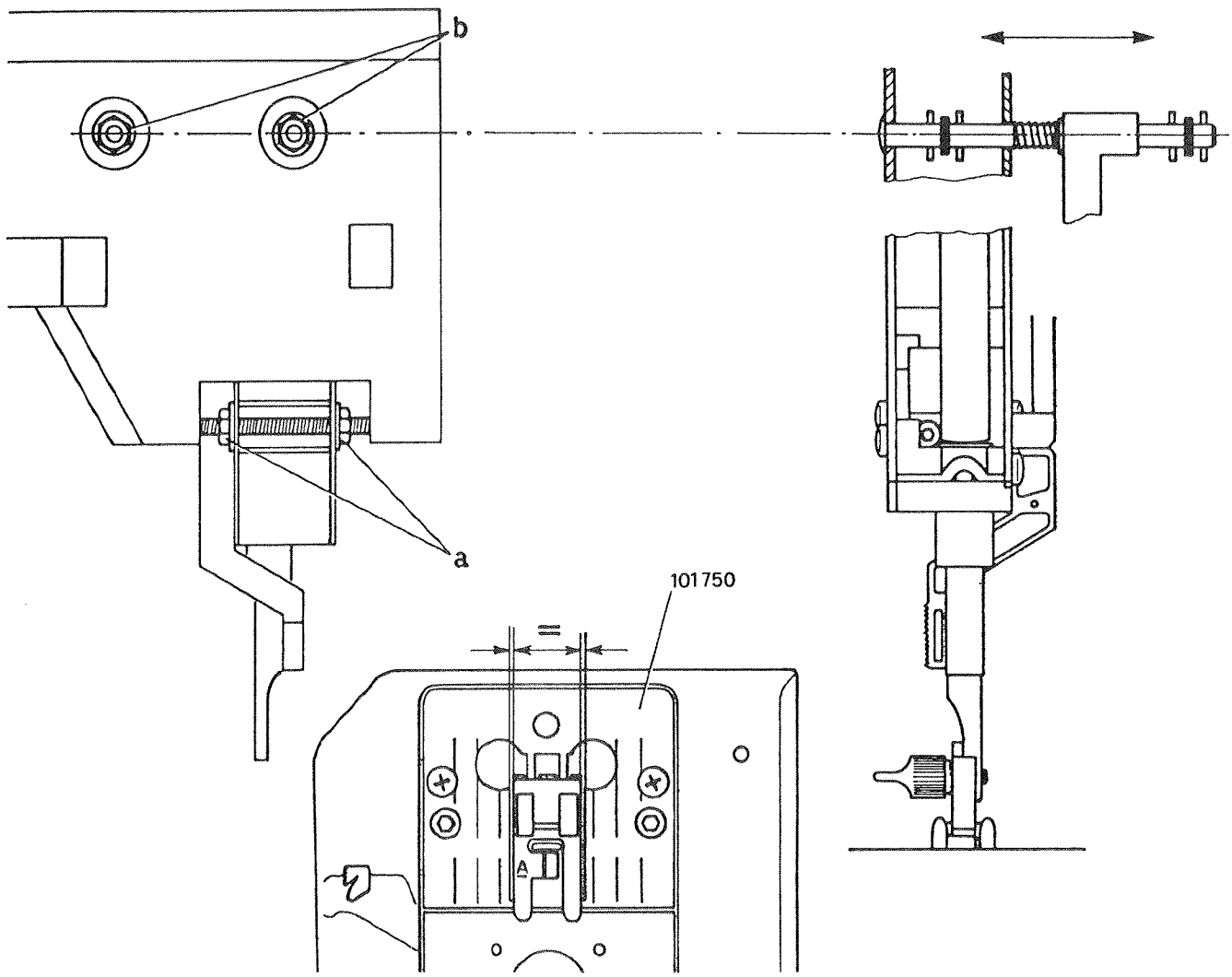
a – Bobbin winder motor
b – Sensors
c – Needle swing motor
d – Feed motor
e – Transformer
f – Main motor
g – Foot control jack



Notes :

You must absolutely avoid crossing the connectors "e" and "f", which would require replacement of the primary fuse and/or the control circuit.

When fitting the foot control jack "g", make sure to place the insulation rings correctly.



CHECK

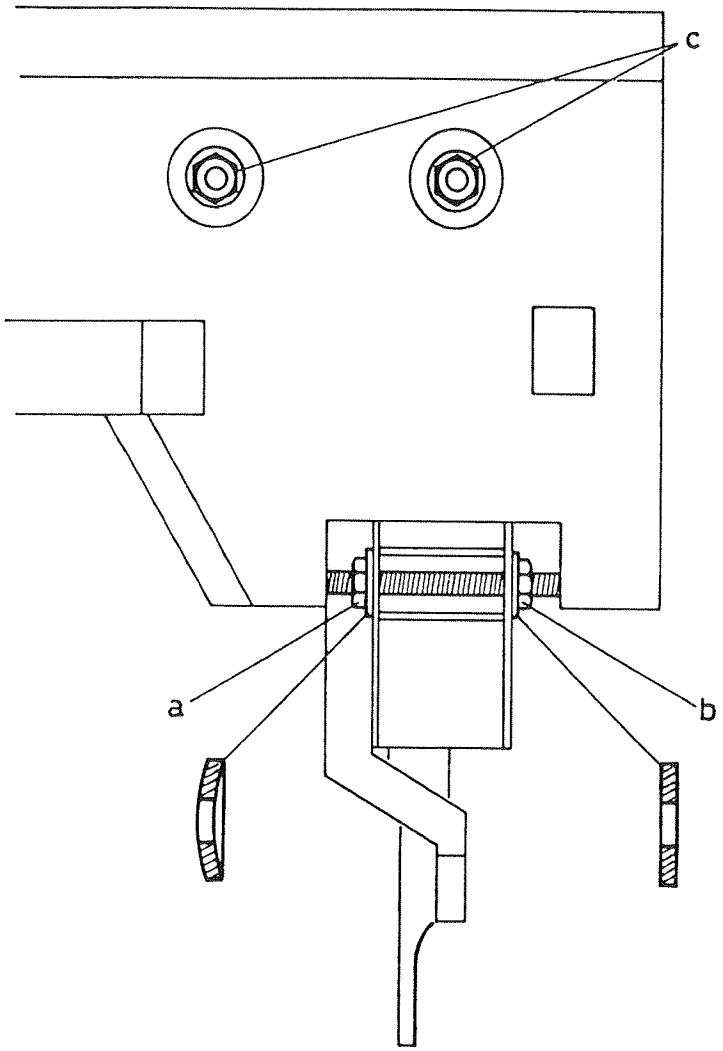
1. The metal foot A must be centered in relation to the needle plate.

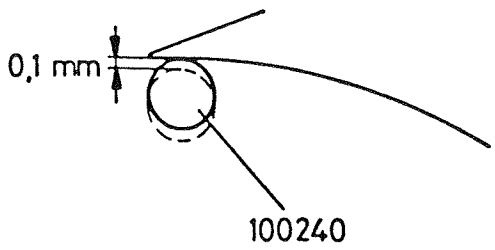
   Note : In the event of a poor alignment of the foot with the needle plate, verify the right-angle positioning of the presser bar [9].

ADJUSTMENT

- Check Position of needle plate [3] A
- Remove lower cover and shells

2. Bring take-up lever to its lowest position.
3. Replace the needle plate by the gauge 101'750.
4. Loosen the feed cover a bit, push it to the rear, in order to center it and to square it, then retighten the cover.
5. Loosen both nuts "a" by 2 to 3 turns.
6. Loosen the 2 nuts "b" just enough, so that you can shift the head block laterally to make its position tally with point 1.
7. Without tightening them, turn both nuts "a" so that they rest against the head block frame and then adjust Needle clearance [2].





CHECK

- Remove needle plate and bobbin case

1. Select centered straight stitch and fit the gauge 100'240.
2. The point of the hook must graze the gauge 100'240 without bending it by more than 0.1 mm.

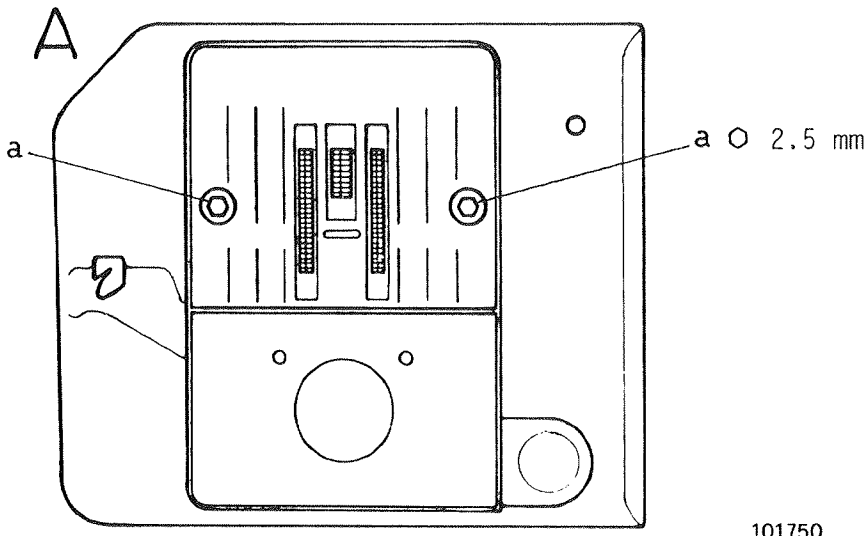
ADJUSTMENT

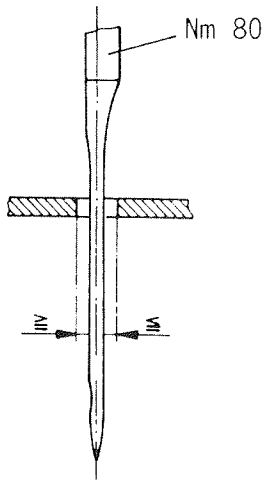
- Remove lower cover and rear shell

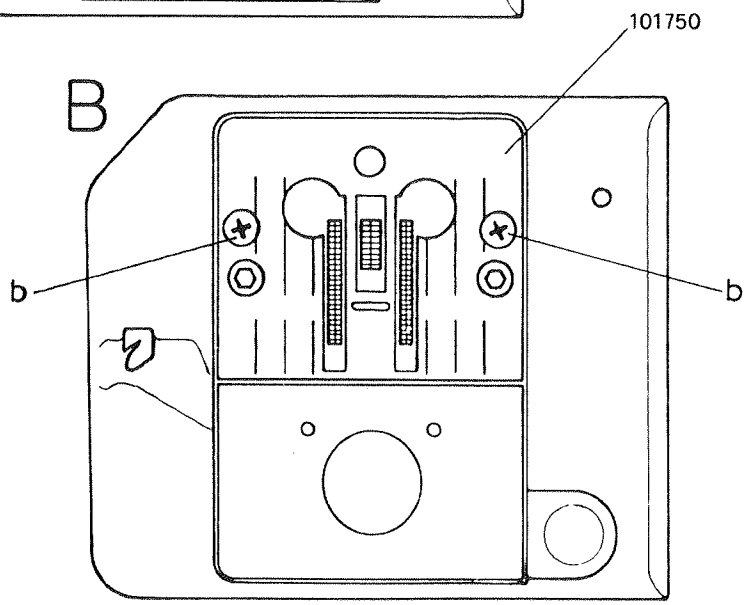
3. Loosen the nuts "a" and "b".
4. Slightly loosen the nuts "c" and pivot the head block so that its position corresponds to point 2.

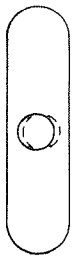
   Note : If the needle clearance needs only be corrected a little, it is not necessary to loosen the nuts "c".

5. Alternately and progressively tighten the nuts "a" and "b" so as to keep the head block centered [1].
6. Tighten the nuts "c" and check the adjustment.
7. Check the Position of needle plate [3] B.









ADJUSTMENT A

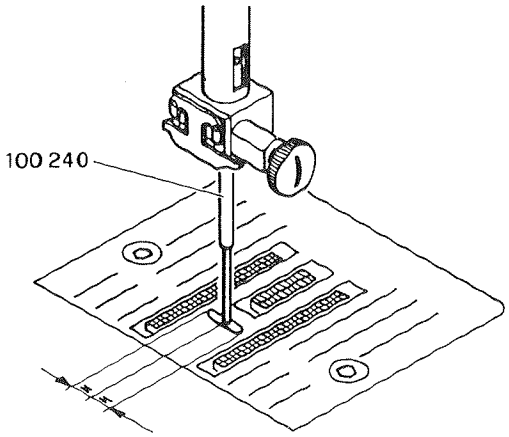
1. Do not loosen the screws "a" unless absolutely necessary. If this should be the case, position the needle plate to obtain an even gap between its edges and the feed cover.
2. Make sure that the needle plate can be removed easily. If necessary, tighten the screws "a" completely, then loosen them by 1/4 turn.

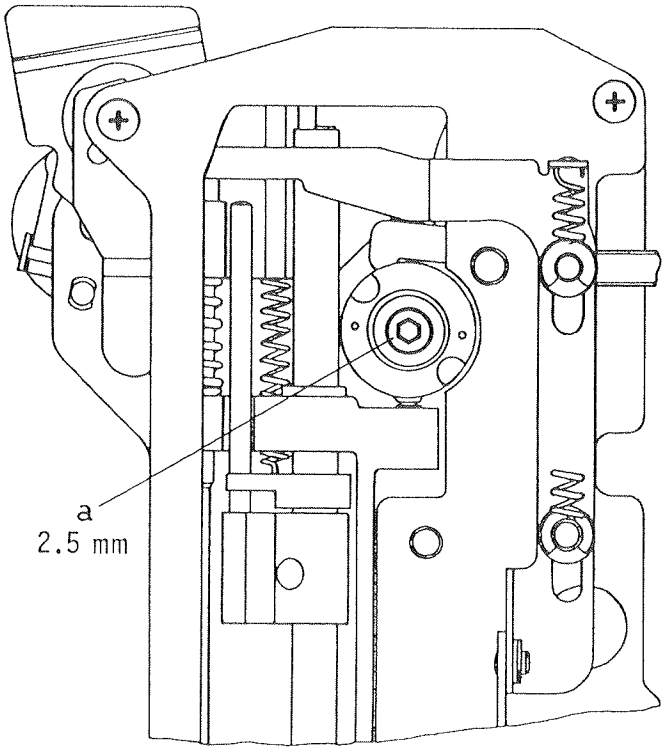
ADJUSTMENT B

- Check Needle clearance [2]
- Use a new needle, size Nm 80

3. Select centered straight stitch.
4. Replace the needle plate by the gauge 101'750.
5. Loosen the screws "b" slightly and shift the feed cover so that the needle is centered or a little bit to the front of the slot, keeping the feed cover at a right angle to the free arm.

Note : The position of the needle changes, depending on the size of the needle.





CHECK

1. Fit the gauge 100'240.

2. Set the machine for Test Program, then press S6 twice = "6.0" and needle swing motor moves to its "0" position.

3. Check whether the gauge is properly centered in the needle plate slot.

   Note : If it is only slightly off center, this can be corrected by moving the feed cover, without changing the Position of needle plate [3].

ADJUSTMENT

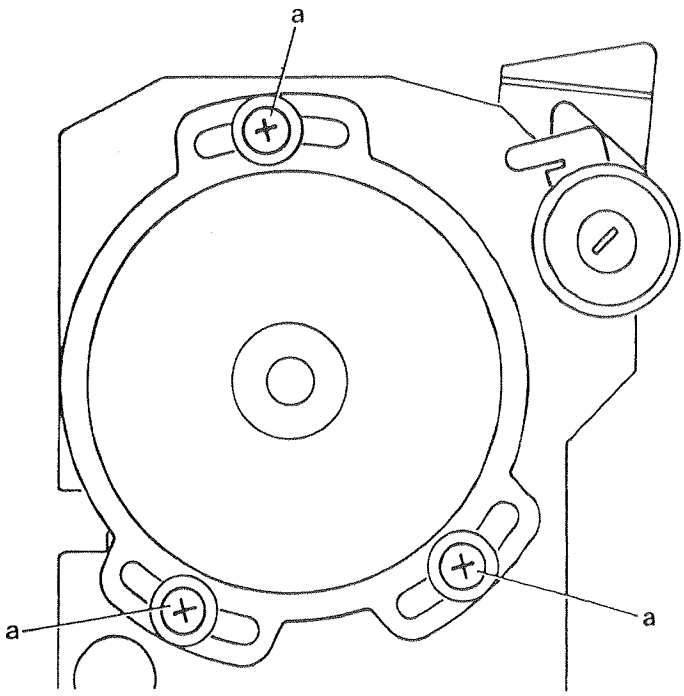
- Check Centering of head block [1]
- Remove lower cover and shells

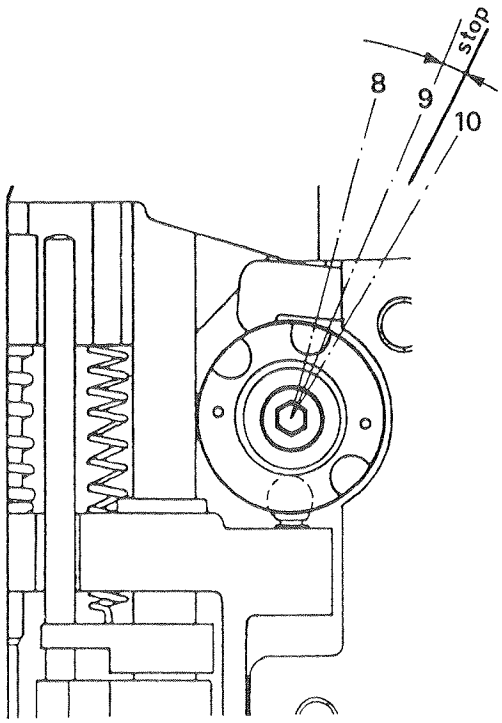
4. Carry out operations 1 and 2 again.

5. Loosen or tighten the needle cam screw "a", in order to shift the gauge to the right or to the left, respectively.

   Notes - This screw being self-locking, the cam will turn with it. When adjusting to the right (loosening), hold the cam to avoid that it turns into the uncoupling zone.
   - Should this screw turn too freely, replace it.
   - Make sure that the cam presses well against the screw "a".
   - The distance between the cam and the flange of the head block should be about 1 mm at the pre-setting.

6. Check the adjustment by pressing S6 again twice.





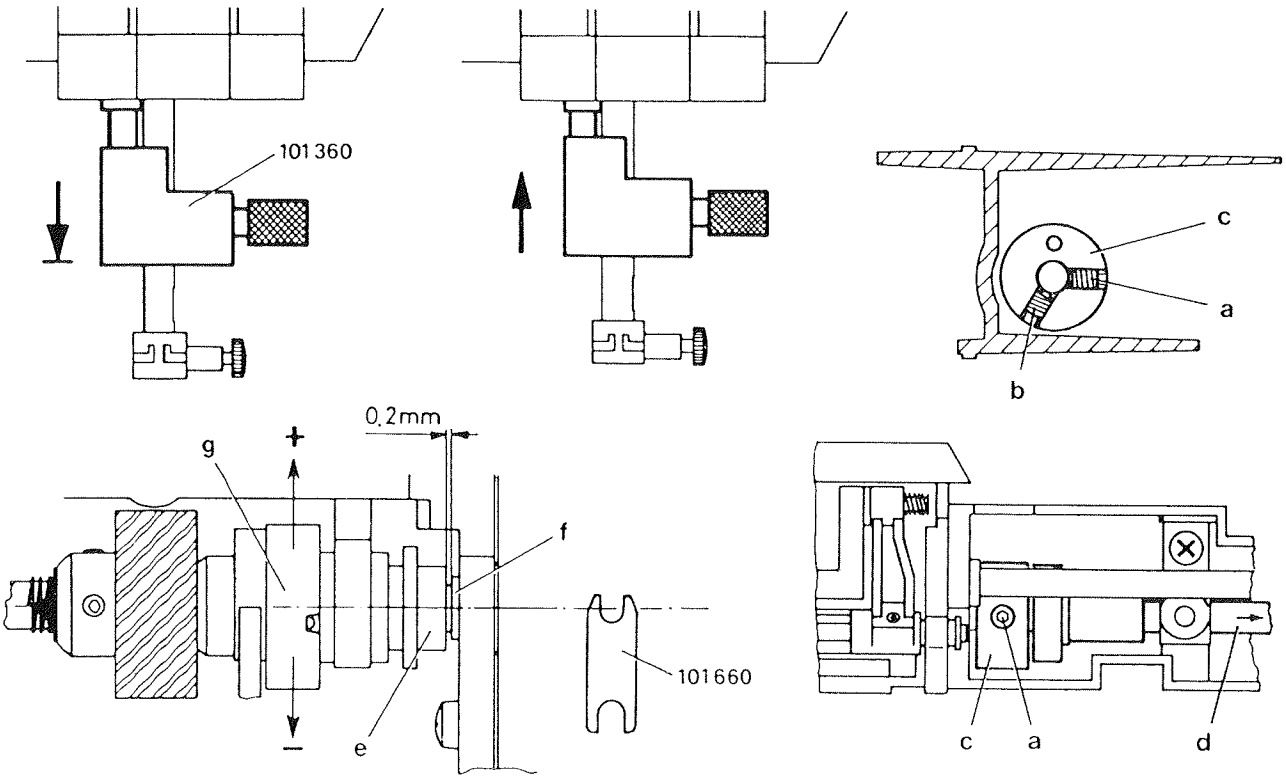
CHECK

1. Set the machine for Test Program, then press S6 twice = "6.0" and the step motor turns to its "0" position.
2. Press 9 times S5 = "6.1" to "6.9" and the needle bar moves to the left. At the 10th step = the motor-cam must butt and "6.b" is displayed.

ADJUSTMENT

- Remove lower cover and shells
- Remove head block and connect motor

3. Loosen slightly the 3 screws "a" so that the motor can be rotated only with a certain friction, then rotate it counter-clockwise as far as it will go.
4. Set the machine for Test Program and press S6 twice = "6.0" and the motor moves to its "0" position.
5. Turn the motor clockwise as far as it will go.
6. Press S5 9 times = "6.1" to "6.9" and the motor does 9 steps.
7. Watch the needle swing cam and turn the motor counter-clockwise again, but only until the cam stops.
8. Tighten the screws "a" in this position and check the adjustment : The rotation of the cam at the 9th step must be full but not exceed half a step at the 10th.
9. After re-fitting the head block, check the Needle centering [4].

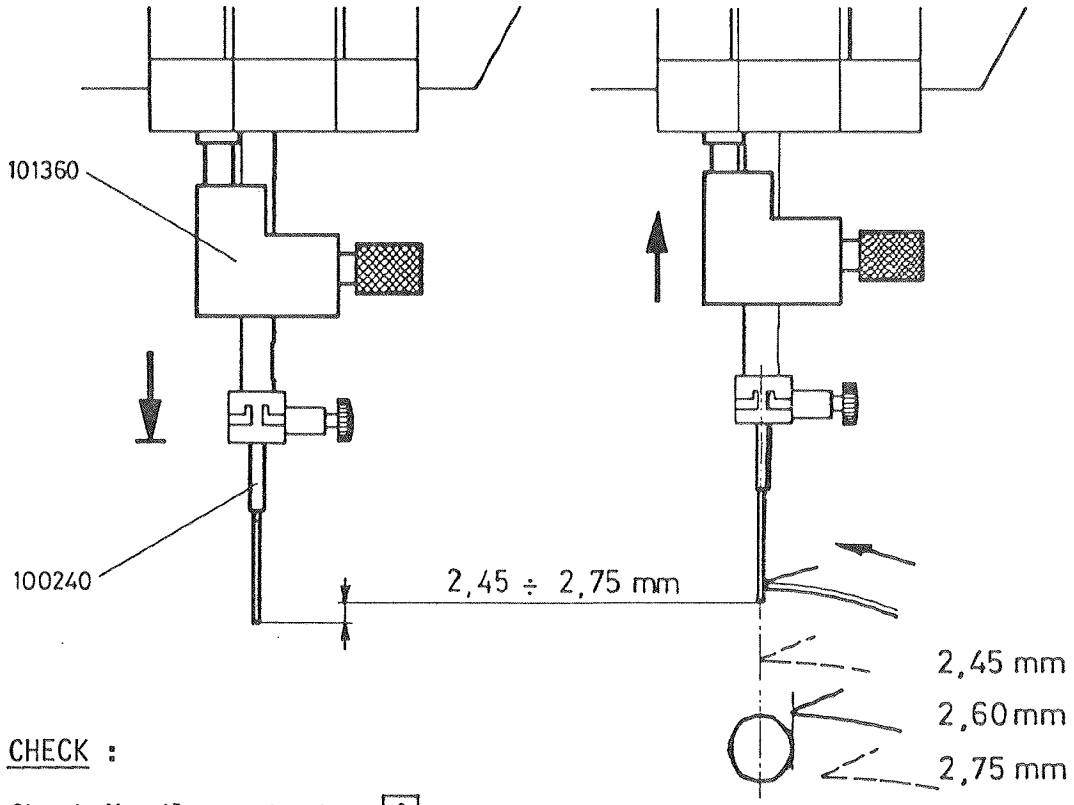


CHECK

1. Select the straight stitch, length "5.0" and run the machine for at least 2 revolutions.
2. Center the fine adjustment slide and place the take-up lever exactly at its highest position.
3. Check whether the feed dog still advances 0.90 - 1.10 mm when turning the flywheel in the sewing direction.

ADJUSTMENT

- Remove lower cover, shells and base
4. Loosen the screws "a" and "b" of the driver "c".
5. Place centered needle bar at its lowest position and fit gauge 101'360, in contact with the cradle support.
6. Turn the flywheel slowly in the sewing direction, until the gauge butts. Should then the screw "a" be inaccessible, remove the left belt from the lower shaft pinion and orientate the shaft "d" as shown above.
7. By pushing the hook shaft to the left, insert the gauge 101'660 (0.2 mm) between the cam "e" and the bushing "f".
8. By positioning the groove of cam "g" in its lowest position (centered), the feed timing corresponds to about 1.10 mm. To increase or decrease the feed timing, turn the cam "g" as illustrated.
9. Check the axial play (0.2 mm) of the lower shaft "d", then push the shaft and the driver "c" to the right and thighten the screw "a".
10. Remove the gauges, tighten screw "b" and adjust Hook timing [7].



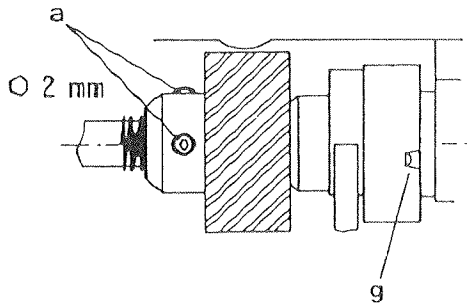
CHECK :

- Check Needle centering [4]
- Remove needle plate and bobbin case

1. Fit gauge 100'240 and place needle bar at its lowest position.

2. Fit the gauge 101'360 in contact with the cradle support, then turn the flywheel slowly forwards until the gauge butts.

3. The point of the hook must be in a position that corresponds to a timing of 2.45 - 2.75 mm.



ADJUSTMENT :

- Lay the machine on its back
- Remove the lower cover (possibly the base)

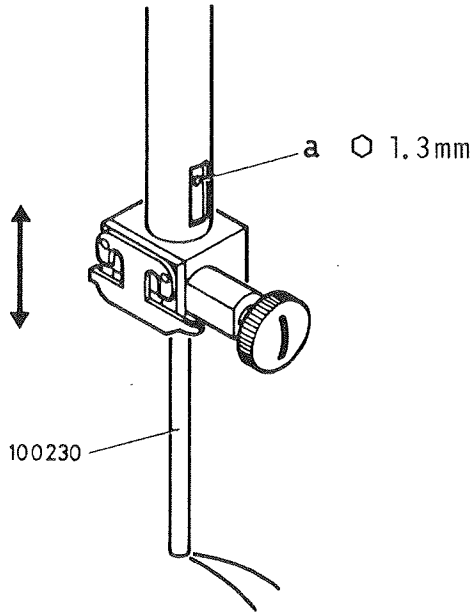
4. Loosen both screws "a" on the hook pinion.

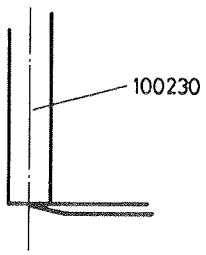
5. Carry out the operations 1 and 2 again and check the position of the notch on the cam "g", point 8 of the Feed timing [6]. If it is not correct, adjust it first.

6. Turn the hook so that its point is positioned as illustrated and tighten one of the screws "a".

7. Turn the flywheel slightly backwards, then forwards again (gear play) and check the position of the point of the hook again.

8. Tighten both screws "a" and adjust the Height of needle clamp [8].





CHECK

- Check Needle centering [4]
- Remove needle plate (and bobbin case)

1. Fit the gauge 100'230.

2. By turning the flywheel forwards, the point of the hook should just graze the gauge 100'230.

   Attention : Do not turn the flywheel backwards, in order not to bend the point of the hook !

ADJUSTMENT

- Check Hook timing [7]

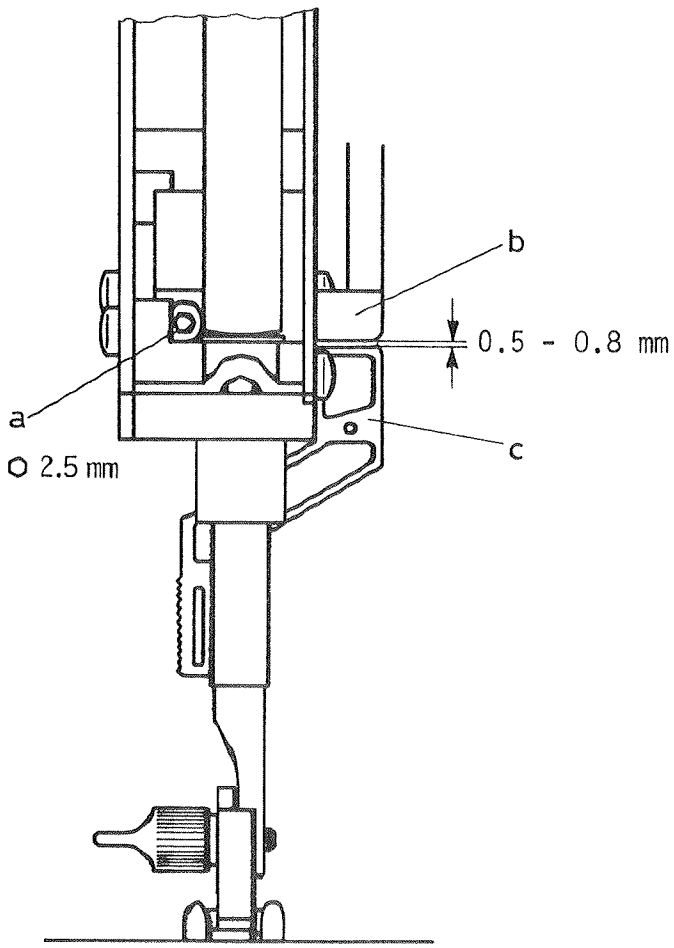
3. Fit the gauge 100'230 again.

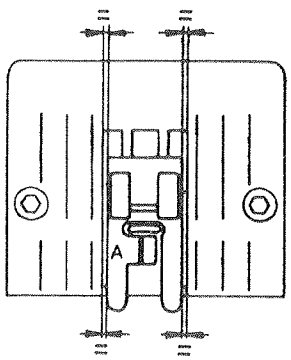
4. Loosen screw "a" and fix the needle clamp lightly, as far up as possible.

5. Make one turn of the hook in the sewing direction and set its point at "12 o'clock".

6. Loosen screw "a" and lower the needle clamp so that the gauge rests on the point of the hook.

7. Orientate the needle clamp parallel to the free arm and tighten the screw "a", then re-check according to point 2.





- Remove lower cover and shells

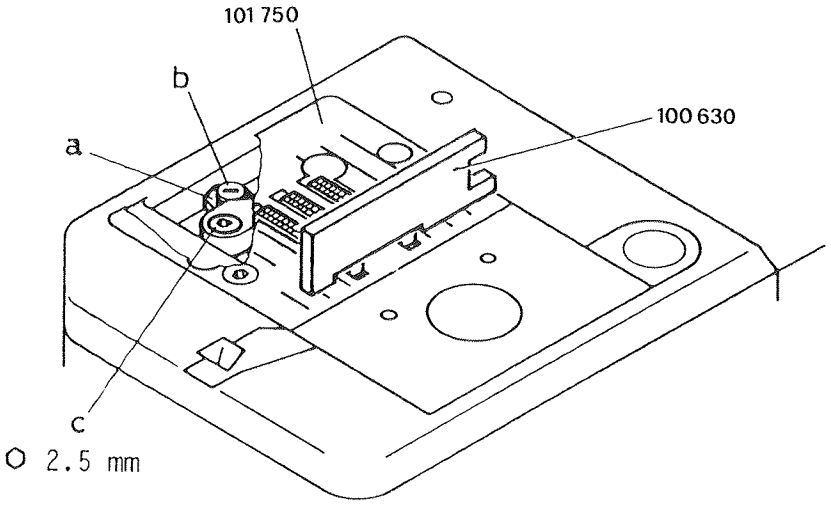
1. Lower the cloth presser bar equipped with the metal sole A and drop the feed dog underneath the needle plate.

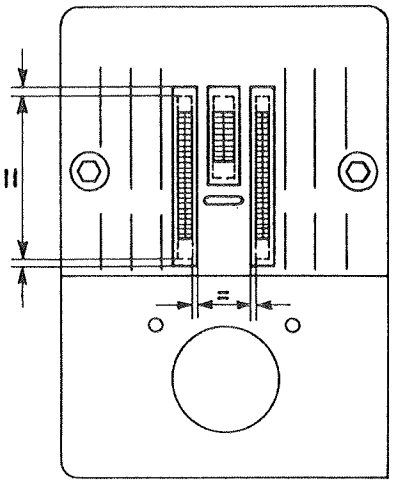
2. Loosen screw "a" and orientate the cloth presser bar by aligning the sole in relation to the needle plate.

3. Adjust a clearance of 0.5 - 0.8 mm between the guide "b" and lever "c", then tighten the screw "a".

   Note : By tightening the screw, the cloth presser bar will "turn" a little.

4. Check the alignment of the sole and the clearance between the guide "b" and the lever "c".





H E I G H T

CHECK

1. In its highest position, the front of the feed dog must graze the gauge 100'630.

ADJUSTMENT

2. Replace the needle plate by the gauge 101'750.
3. Loosen the nut "a" and adjust the height with the screw "b".
4. Tighten the nut "a" and re-check.

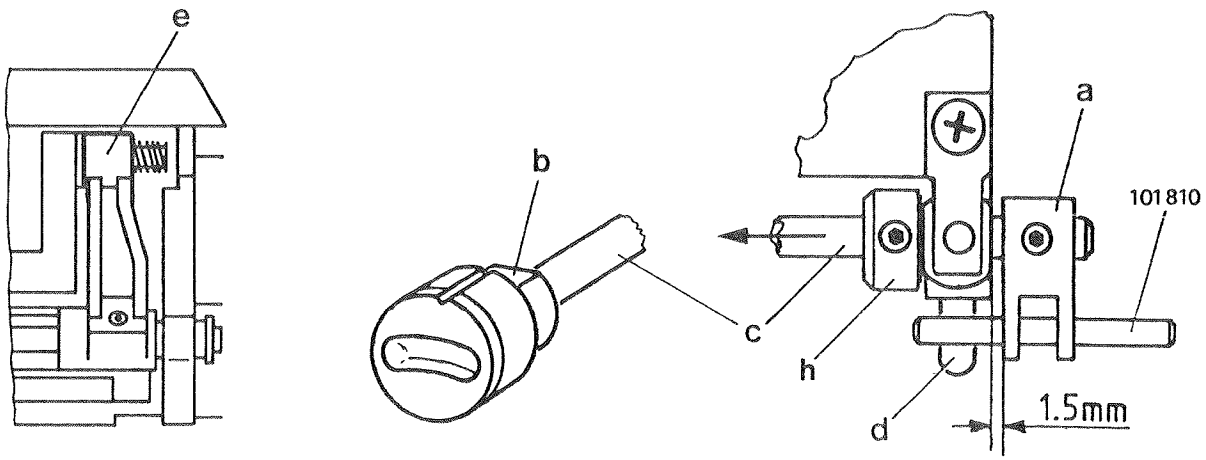
P O S I T I O N

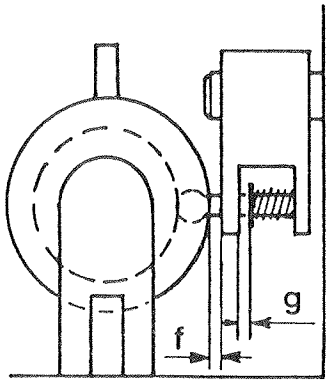
CHECK

1. Select the straight stitch, length "5.0" and run the machine for at least 2 revolutions.
2. At the end of each stroke, back and forth, the feed dog should be approximately at an even distance from the needle plate. Laterally, it should be centered and aligned in relation to the slots of the needle plate.

ADJUSTMENT

3. Replace the needle plate by the gauge 101'750.
4. Loosen the 2 screws "c" slightly and position the feed dog according to point 2.
5. Tighten both screws "c", refit the needle plate and check the adjustments.





<u>As far as possible, never unscrew the oscillating link "a", because its angular position determines the mechanical "0" point of the feed shaft</u>

- Remove lower cover and shells
- Lay the machine on its back
- Remove machine base

1. Remove the snap-ring, the swivel-joint and the spring from the oscillating link "a".

2. Orientate the feed shaft "c" with the flat "b" of the driver towards the top of the free arm and engage it into the feed mechanism, then fix the bushing.

3. Whilst pushing the shaft "c" to the left, move the stop collar "h" against the bushing and tighten it.

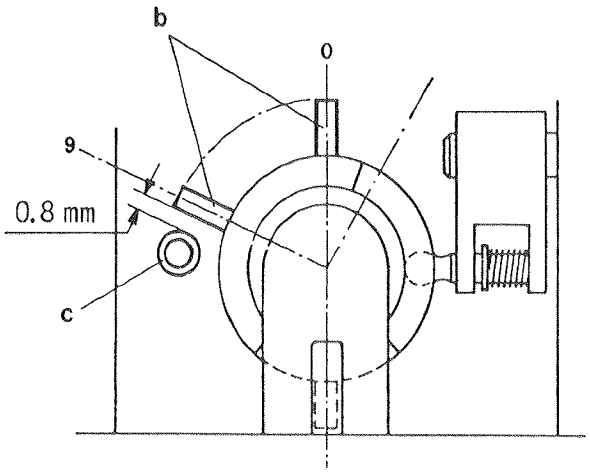
4. Make sure the shaft "c" oscillates freely and without any axial play.

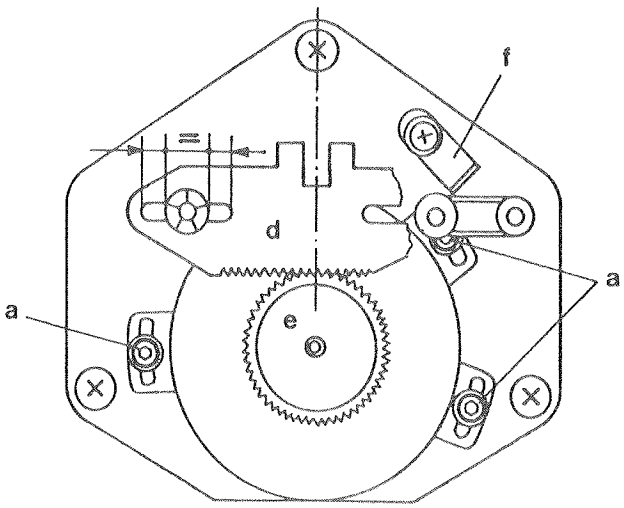
5. Insert pin 101'810 into the 2 holes of the oscillating link "a" and rest its left end against the boss "d" on the frame.

6. Whilst running the machine, position the feed shaft "c" angularly so that the portion "e" of the feed dog lever no longer moves, then tighten the screw of the oscillating link "a", the latter being at 1.5 mm from the bushing and its pin touching the boss "d".

7. Remove pin 101'810 and reassemble spring, swivel-joint and snap-ring.

8. Refit the feed motor-cam unit and position it so that the play "f" and the play "g" between the oscillating link "a" and the cam, respectively the snap-ring, are fairly equal.





CHECK

1. Raise the foot and set the machine for Test Program.
2. Press S7 twice = "7.0" and the feed motor moves to its "0" position.
3. Bring the feed dog in its downward motion flush with the needle plate and observe its shifting towards you while pressing 9 times on S5 = "7.1" to "7.9" and the feed motor does 9 steps, then must butt at the 10th = "7.b".

ADJUSTMENT

- Remove lower cover and shells
- Place needle bar at its highest position

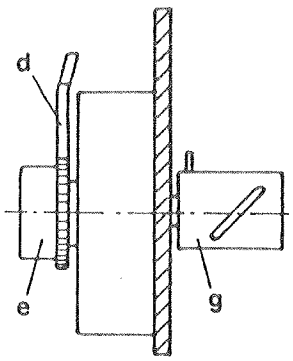
4. Loosen slightly the 3 screws "a" and turn the motor clockwise as far as it will go.
5. Set the machine for Test Program, then press S7 twice = "7.0" and the motor moves to its "0" position.
6. Turn motor counter-clockwise until pin "b" is within "12 and 1 o'clock".
7. Press S5 9 times = "7.1" to "7.9" and the motor does 9 steps.
8. Turn the motor again clockwise until there is a gap of 0.8 mm between the pin "b" and the stop "c".
9. Tighten the 3 screws "a" and re-check points 2 and 3.

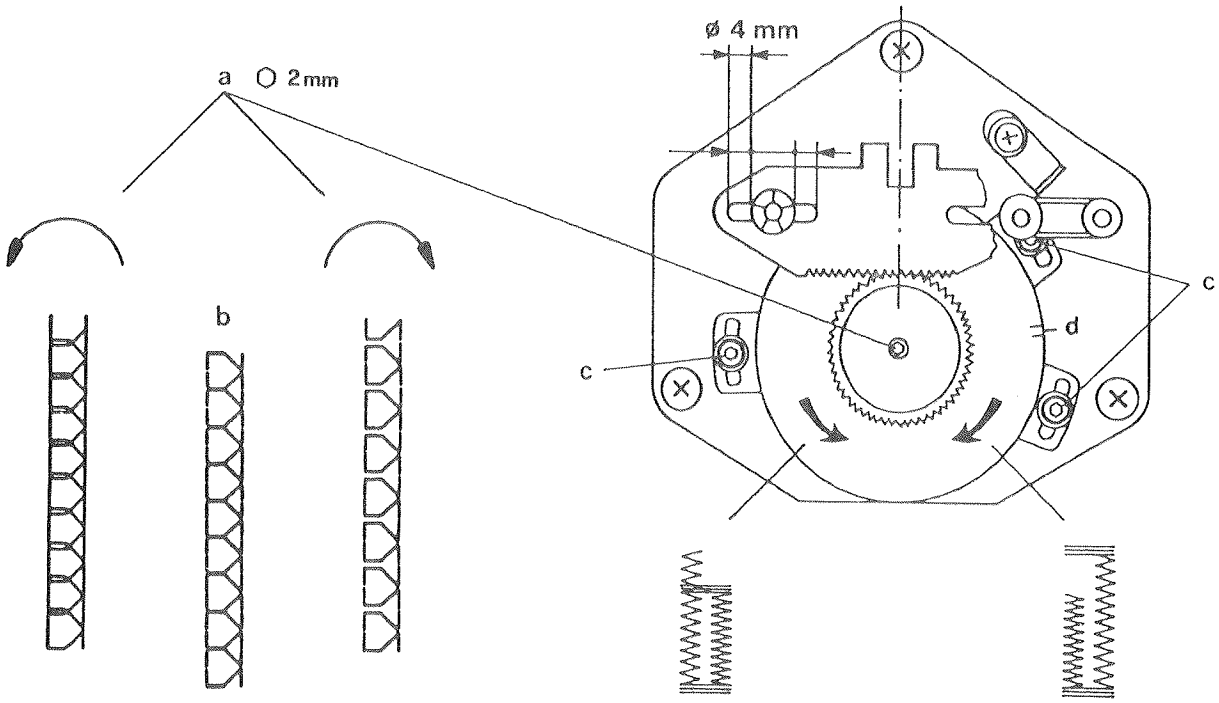
Notes :

With the tooth rack "d" centered, there must be a gap of 1.5 mm between the inner face of the pinion "e" and the motor (thickness of the needle plate).

Adjust the stop "f" so that there is a slight gear play between the tooth rack and the pinion.

The distance between the feed cam "g" and the motor flange must be 0.90 to 1.0 mm at the pre-setting.





- Remove lower cover and shells

1. In order to place the tooth rack in its central position, insert a ø 4 mm pin, or the small end of the edge screwdriver lever 100'140, in the extreme left slot of the tooth rack and push both to the right, against the self-locking ring.
   This position has to be maintained until the end of the adjustment.

2. Thread the machine, sew the overlock stitch and adjust the screw "a" so that the stitch pattern corresponds to the drawing "b".
   Should the screw turn too freely (self-locking), replace it.

3. Sew the programmed buttonhole and, depending on the result, turn the motor very little according to the drawing above.

   Notes - Before slightly loosening the screws "c", watch the position of the motor in relation with the markings "d".

   - At this stage (by turning the motor), it is not yet a matter of obtaining a balanced buttonhole. Continue as follows :

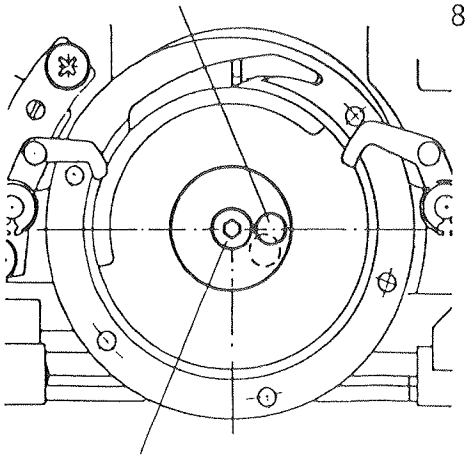
4. Tighten the three screws "c".

5. Sew the overclock stitch and re-adjust screw "a" so that the stitch pattern again corresponds to the drawing "b".

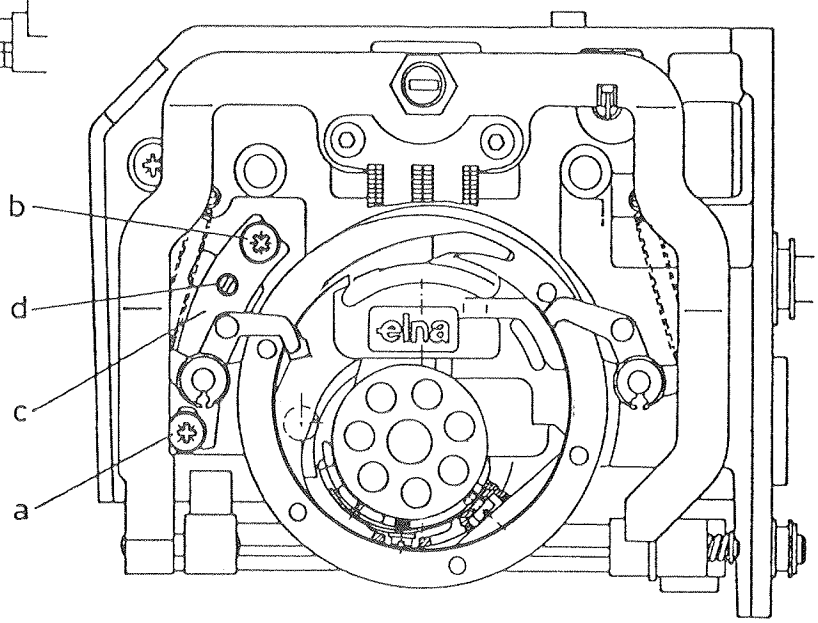
6. Sew another buttonhole and, if the 2 rows are not balanced, perform the adjustment over again from point 3.

   Note : After refitting the shells, this adjustment may need to be adapted to the fine adjustment markings, as per C1 .

Position of magnet between 3 and 4 o'clock
(If 2nd magnet present, position it between 8 and 9 o'clock)



Left-turn screw 2 mm



CHECK

1. At fast and slow speed, the bobbin case should not move and the noise level should be at a minimum.

2. Remove the bobbin case and check the correct position of the magnet between 3 and 4 o'clock. If two magnets are present, orientate the second between 8 and 9 o'clock.

ADJUSTMENT

- Remove needle, foot and needle plate
- Unscrew feed cover

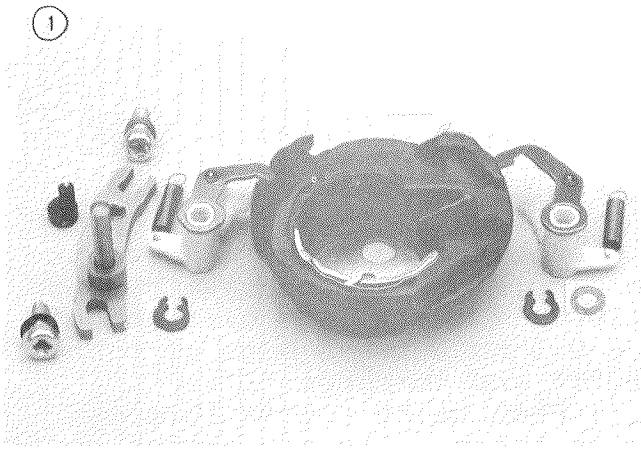
3. Slightly loosen the screws "a" and "b" in such a manner that the lever support "c" can be moved with friction by means of the eccentric "d".

4. Set the machine for Test Program and press S7 = "7.0" - "zero" feed.

5. Adjust the eccentric "d" so that the escapement operates with a minimum of noise , both at fast and at slow speeds.

6. Tighten first screw "a", then "b".

Note : By tightening these 2 screws, the noise level may increase; if that is the case, repeat the adjustment.

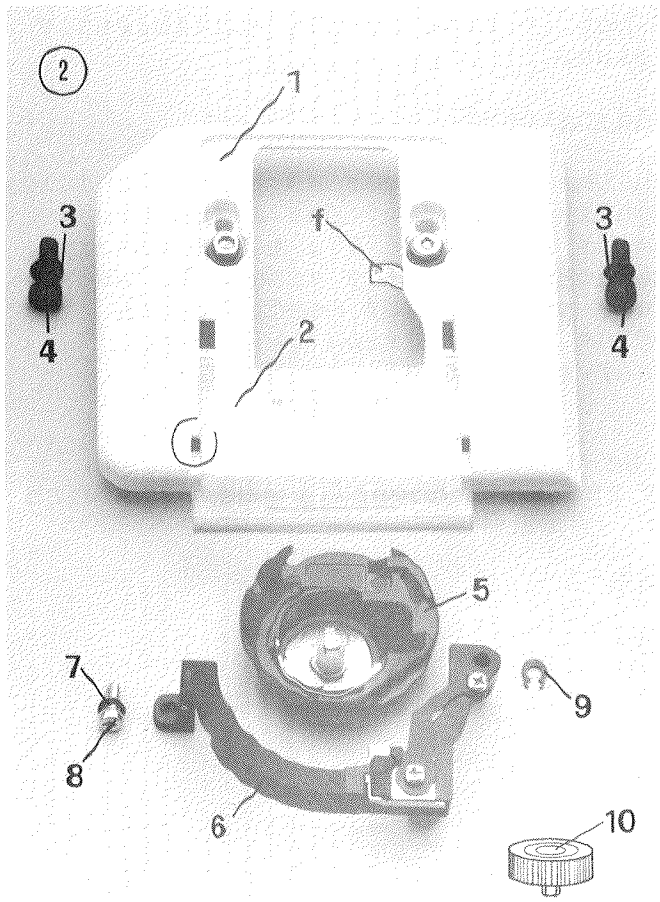


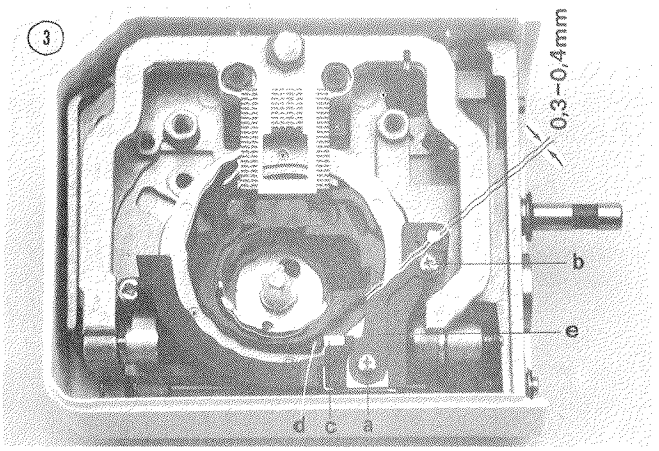
A. DISMANTLING Fig. 1

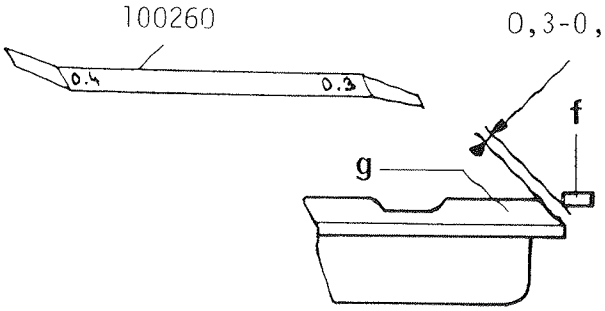
1. Remove free arm and feed covers.
2. Remove all parts shown in Fig. 1.
N.B.: Any hook with an upper ring made of bronze-beryllium can be re-used - even if the escapement ramps are worn - as long as it turns without wobbling and there is not too much play between the bobbin case and hook ring.
Remove any remains of thread and fabric from and around the hook.

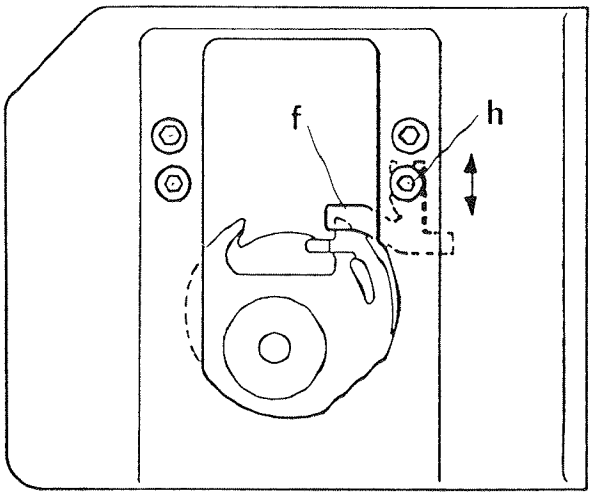
B. RE-FITTING Fig. 2 and 3

1. Put the fixed escapement support (6) on the right escapement axle.
2. Re-use one of the screws (8) with its washer (7), and attach the support (6).
3. Put a 3 mm circlip (9) on the centering axle and press it downwards to eliminate any axial play.
4. Put the new bobbin case (5) in place.
Loosen slightly screws "a" and "b".
Push stop "c" against the edge of the escapement support (6) and tighten slightly screw "a".
Move bobbin case beak "d" against stop "c", then adjust positioner "e" to obtain a distance of 0.3 to 0.4 mm between the latter and the bobbin case (Fig. 3). Tighten screws "b" and "a".
5. Check the lower thread tension as described in the service manual but without first fitting the feed cover.
6. Fit the new feed cover (1) using allen screws (4) and washers (3).
Tighten the screws with allen wrench 426'660 (10), or slightly with an elbowed wrench.
N.B.: The retainer "f" avoids lifting of the bobbin case, during sewing. It is set at the factory and should not need any adjustment. However, if the needle plate has to be adjusted, the distance between the retainer and the bobbin case must be checked according to adjustment (C).
7. Fit the needle plate and new hook cover (2).
8. Check and, if necessary, correct adjustments [1], [4] and [10] of the service manual.
9. Make a sewing test.









C. BOBBIN CASE RETAINER "f"

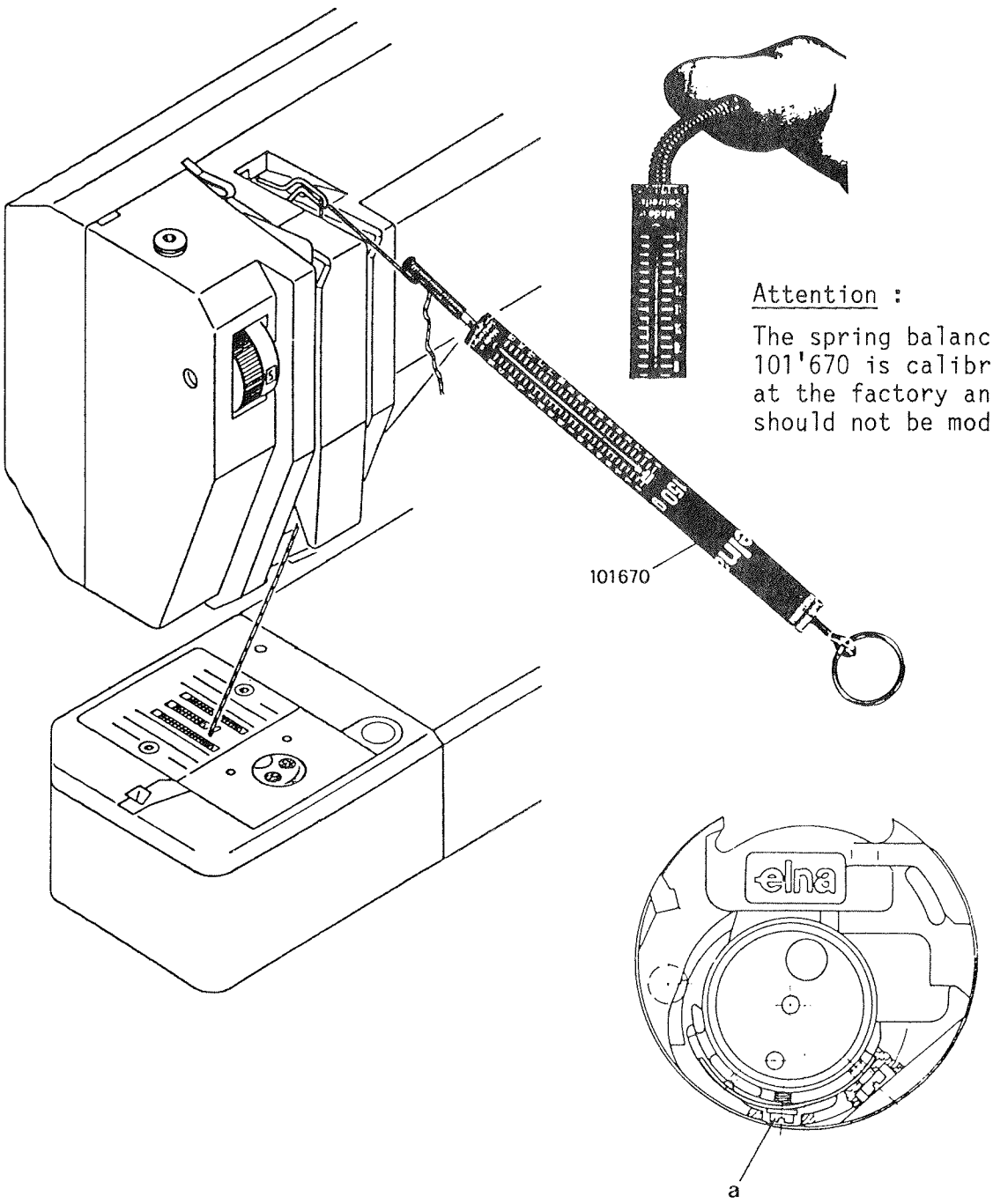
1. Check

Bring bobbin case beak "d" against stop "c" (Fig. 3). Check with gauge 100'260, if there is a distance of 0.3 - 0.5 mm between edge of bobbin case "g" and retainer "f".
N.B. : When using coarse threads, such as braids, the escapement could be perturbed with a smaller distance and if it is larger than tolerance the bobbin case is not sufficiently retained.

2. Adjustment

With the feed cover in place, unscrew slightly screw "h" and adjust position of retainer "f", as necessary. Re-tighten slightly screw "h" and adjust position of needle plate according to paragraph (A), page 3 , of service manual.

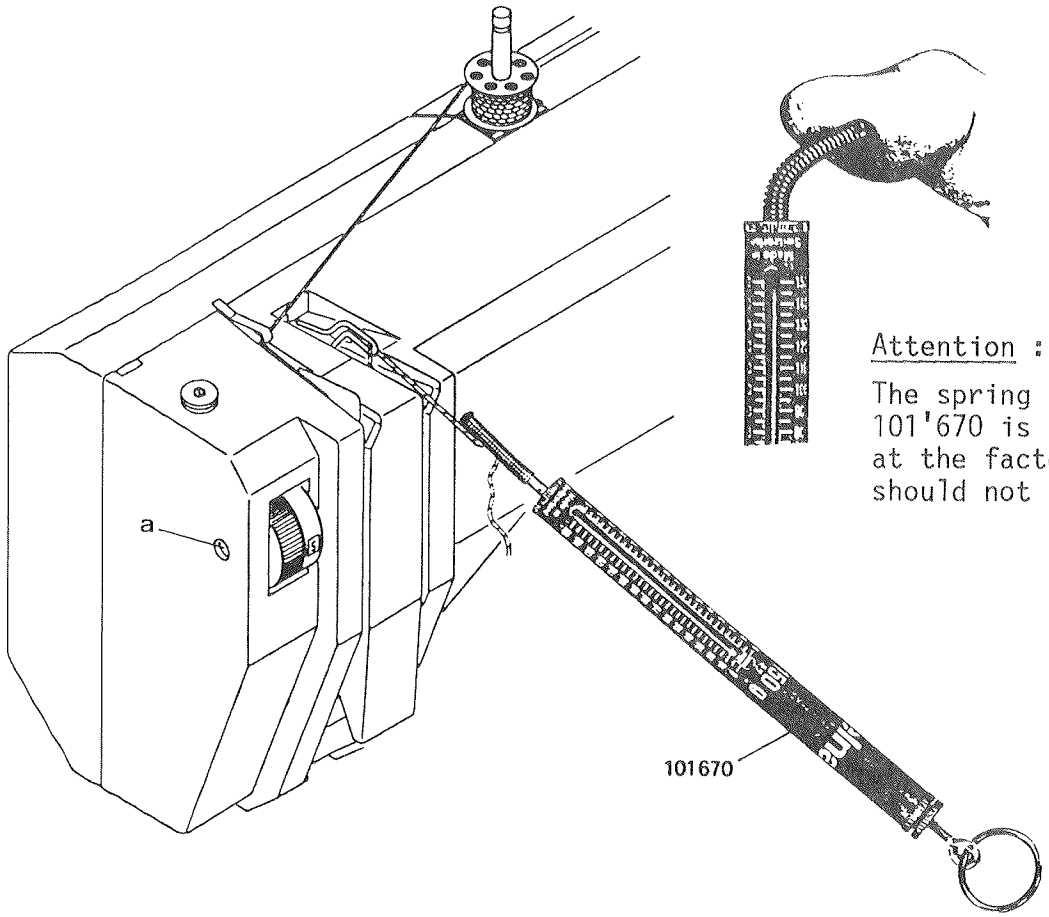
N.B.: The new bobbin case can also be used on machines with free thread escapement, as long as the feed cover is equipped with a pivoting lever.



Attention :

The spring balance 101'670 is calibrated at the factory and should not be modified.

1. Use a full bobbin with embroidery thread No. 30 - 2 ply (60 - 2) and thread as per drawing, the thread passing underneath the feed dog.
2. Put the take-up lever in its highest position.
3. Adjust the screw "a" in order to obtain a tension of 30 - 40 g when pulling the spring balance slowly as illustrated.

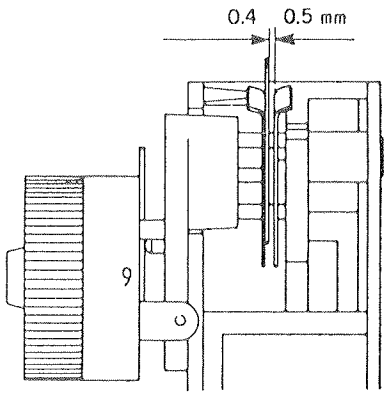


Attention :

The spring balance 101'670 is calibrated at the factory and should not be modified.

UPPER TENSION

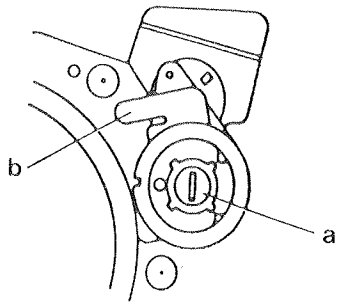
1. Set the tension wheel at "5" and put the take-up lever in its highest position.
2. Place a bobbin with embroidery thread No. 30 - 2 ply (60 - 2) on a spool pin and thread as per drawing.
3. Adjust the slot screw "a" in order to get a tension of 130 - 140 g when pulling the spring balance slowly as illustrated.



RELEASE

CHECK

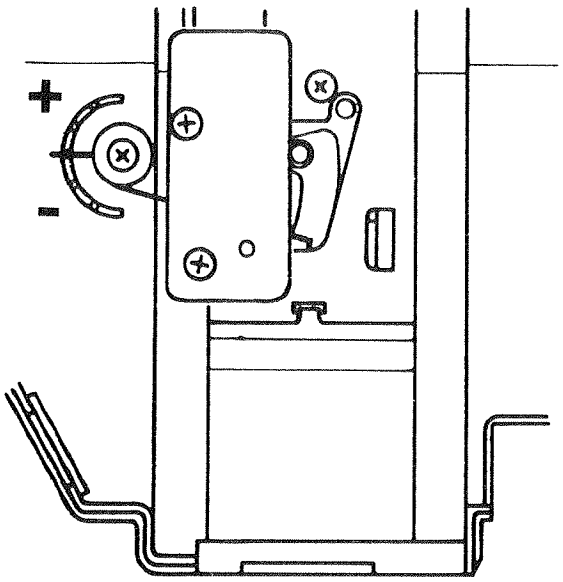
1. Turn the tension wheel to "9" and raise the presser bar lever.
2. Check with a feeler gauge whether there is a clearance of 0.4 - 0.5 mm between the discs.



ADJUSTMENT

- Remove lower cover and shells

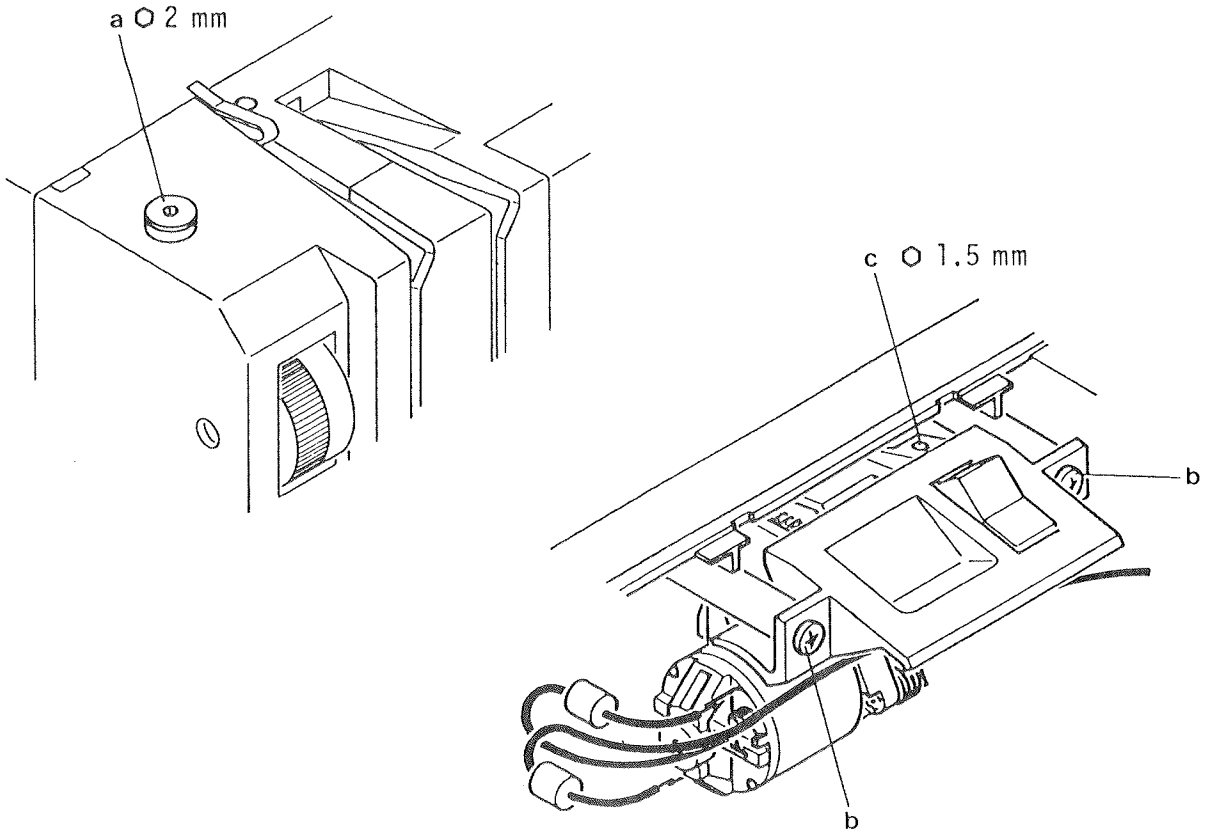
3. Use pliers to bend only the very end of the tension lever "b" taking care not to distort the rest of the part.



The check spring is generally attached in the central notch.

The initial tension should be about 20 g.

In order to decrease or increase this inital tension, change the attaching notch accordingly.



EVEN WINDING

1. Tighten or unscrew "a" in order to obtain an even bobbin winding.

   Note : If the screw turns too freely, secure it with lacquer 802'950.

POSITIONING of BOBBIN WINDER

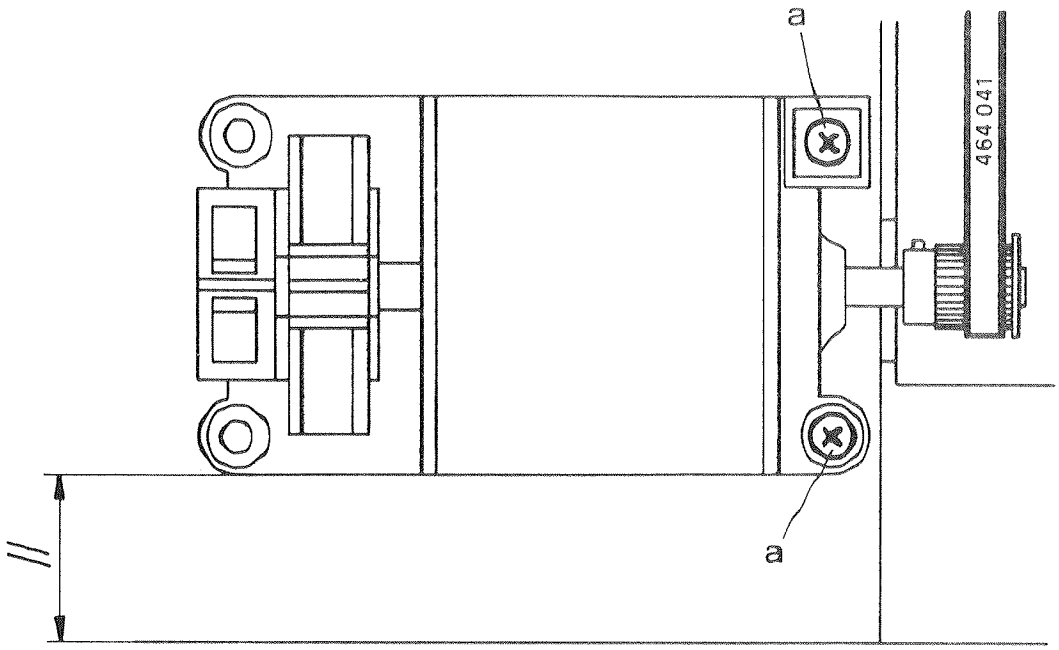
- Remove lower cover and shells

2. Loosen the 2 screws "b".
3. Whilst running the machine, position the bobbin winder support in such a way that, after tightening, there is a minimum of noise at slow as well as at high speed.
4. Adjust the following point, then check even winding.

BOBBIN WINDER SWITCH

5. Switch the bobbin winder ON.
6. Loosen the screw "c" until the "bobbin winding" symbol disappears from the display, then/or tighten it slowly and without pressure until the symbol reappears.
7. Secure the functioning by a further full turn of the screw.

   Note : If the screw turns too freely, replace it.



Notes - When the belt tension is too slack, it will cause noise and, when it is too tight, it will slow down the machine.

- Do not cross over the motor belt with the drive shaft belt.

CHECK

- Remove lower cover and rear shell

1. The motor belt tension should be similar to that of the belt on the drive shafts.

ADJUSTMENT

2. Loosen the screws "a".

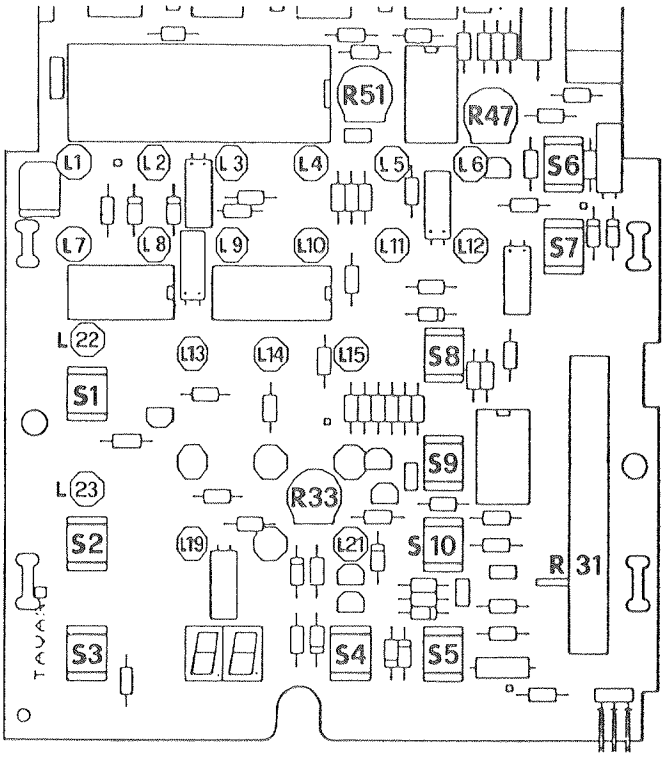
3. Push the motor slightly downwards, align it horizontally with the frame and tighten one of both screws "a".

4. Whilst running the machine, pivot the motor so that the belt runs lightly away from the shoulder of the motor pinion and tighten the second screw.

5. Check the tension according to point 1, then block both screws "a".

Notes - After a replacement of the motor, check speed adjustments 20.

- The motor terminals must be orientated towards the exterior.



- Remove lower cover and shells
- Use foot control supplied with the machine

1. Push the speed control slide of R31 all the way up.
2. Enter the Test Program, then press S10 = "10", L13 and L14 light up. These LEDs turn off when the machine is running. Meaning of the other LEDs and the display : L1 to L12 indicate the hundreds of RPM and the diplay shows the tens and units. L15, see below. L23 lights up at the following step.
3. Important for all adjustments : always press foot control completely.

MAXIMUM SPEED

4. Press S3 = L1 - L8 (and L9) light up and the machine must run between 860 - 900 rpm; if not, adjust with the trimmer R47.

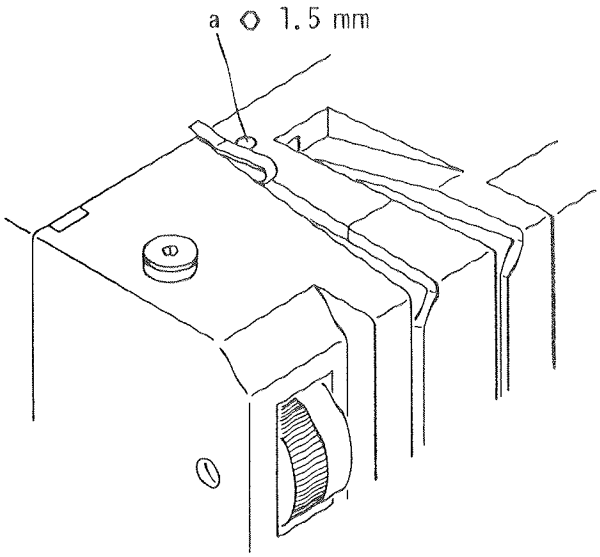
MINIMUM SPEED

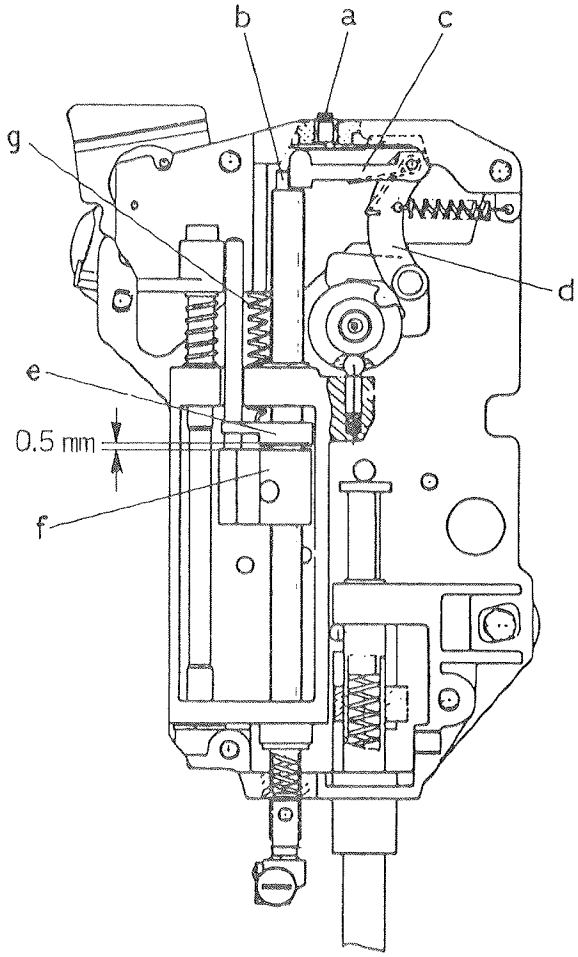
5. Press S1 = (L1 lights up and) the machine must run between 90 - 110 rpm; if not, adjust with the trimmer R33.

   Note ! Since the adjustment of one speed affects the other, it is necessary to readjust the previous speed.

150 RPM - LED L15

6. Press S2 = L1 - L7 and L15 light up and machine runs at about 730 rpm.
7. Set the speed control R31 so that the machine runs at 150 rpm.
8. Turn the trimmer R51 until the LED L15 goes off, then/or turn it in the opposite direction up to the point where it lights up. Therefore, this LED must be OFF when the machine runs at less than 140 rpm, but ON when it is running at more than 150 rpm !





CHECK

1. Select the basting stitch.
2. At slow speed, check to see whether the feed dog moves 4 times per stitch.

ADJUSTMENT

3. Run the machine at slow speed and loosen the screw "a" until the needle bar remains stationary in its highest position.
4. Tighten the screw "a" slowly, until the needle bar descends, and check to see whether it descends every 4th feed dog movement.
5. Secure this function by turning the screw "a" half a turn further, then check the funtioning also at high speed.

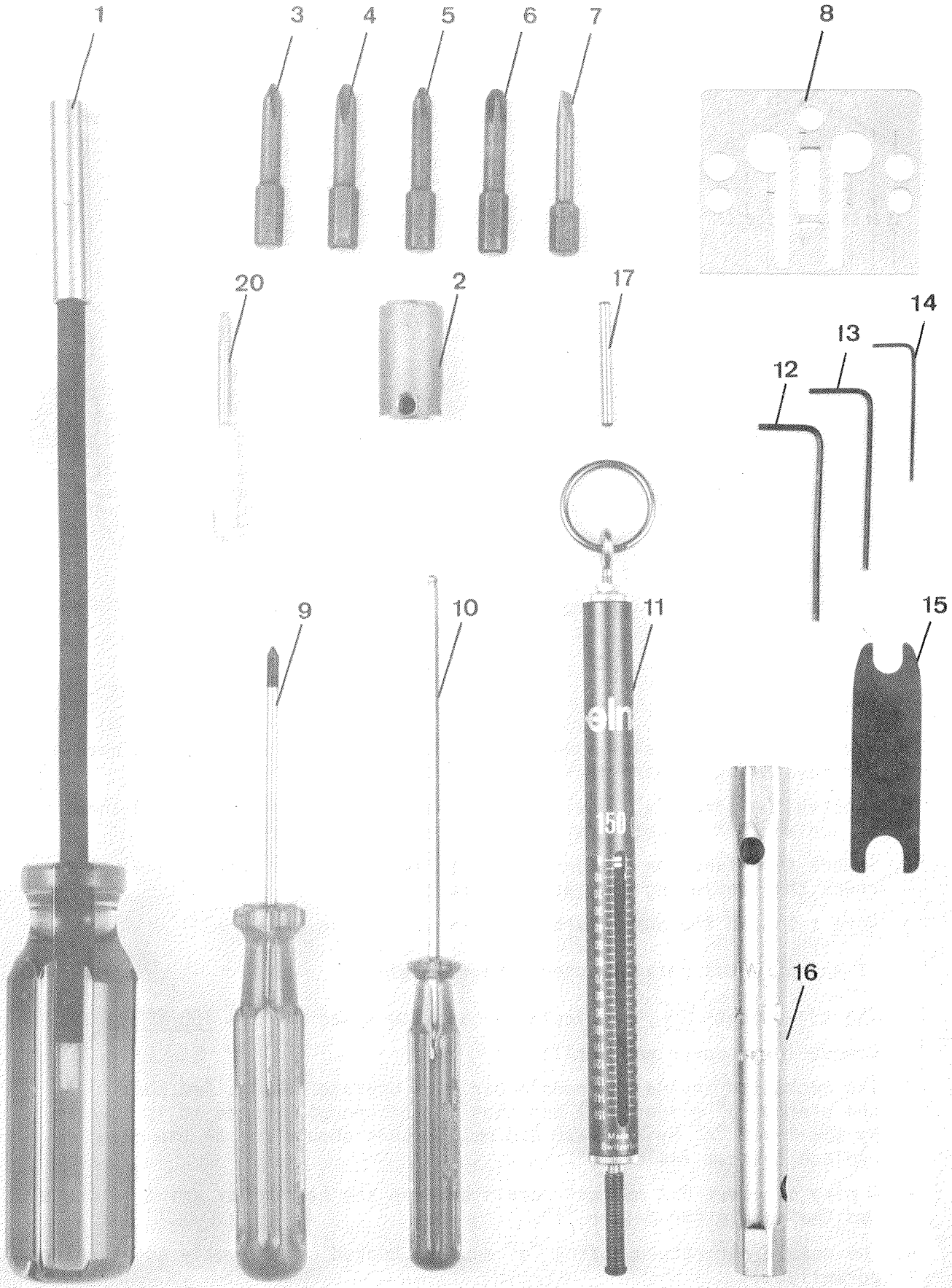
   Note : Should the screw turn too freely, replace it.

   If any problems persist, check the following :

6. The adjustment 20 , particularly the slow speed and the 150 RPM.

- Remove lower cover and shells

7. The mechanism inside the needle bar must operate freely. See that the piston "b" glides well and that in the uncoupled mode it is covered by the lever "c" by at least 0.3 mm. If this should not be the case, replace the cam feeler "d".
8. A play of about 0.5 mm must remain between the needle bar drive guide "e" and the needle bar driver "f".
9. The needle bar return spring "g" must be hooked on correctly and function normally.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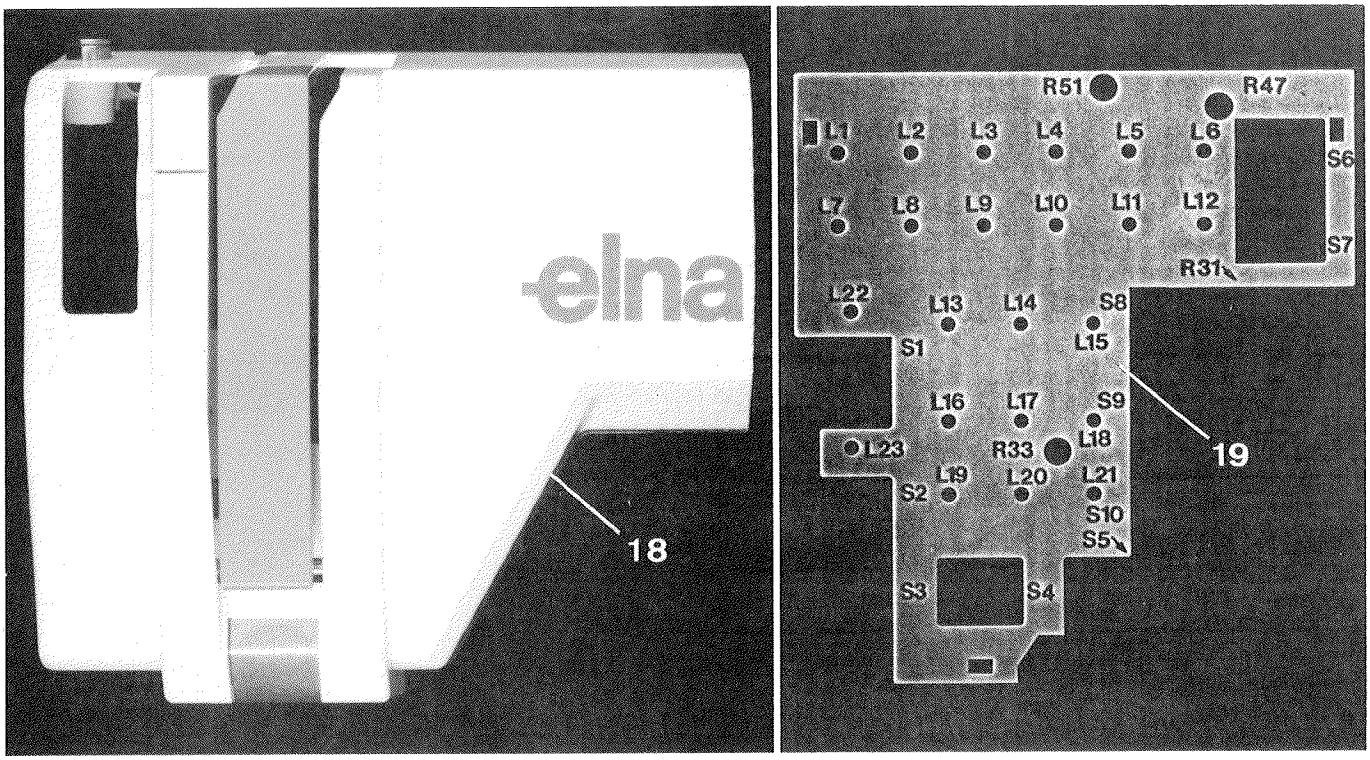

1.	100'785	Magnetic screwdriver	11.	101'670	Thread tension spring balance 150 g
2.	101'680	Magnetic blade holder	12.	101'580	Allen wrench 1.5 mm
3.	101'730	Screwdriver blade Phillips 1	13.	101'610	Allen wrench 1.3 mm
4.	101'710	Screwdriver blade Phillips 2	14.	101'600	Allen wrench 0.9 mm
5.	101'690	Screwdriver blade Pozidriv 1	15.	101'660	Shim 0.2 mm
6.	101'700	Screwdriver blade Pozidriv 2	16.	101'620	Tubular box wrench 8x10 mm
7.	101'720	Screwdriver blade 4.5 mm	17.	101'810	Adjustment pin
8.	101'750	Adjustment needle plate	18.	101'770	Adjustment casing
9.	101'650	Phillips screwdriver 0	19.	101'800	Protection/Test plate 5/6000
10.	101'640	Hexagonal screw-driver 2.5 mm	20.	101'590	Insulated screwdriver