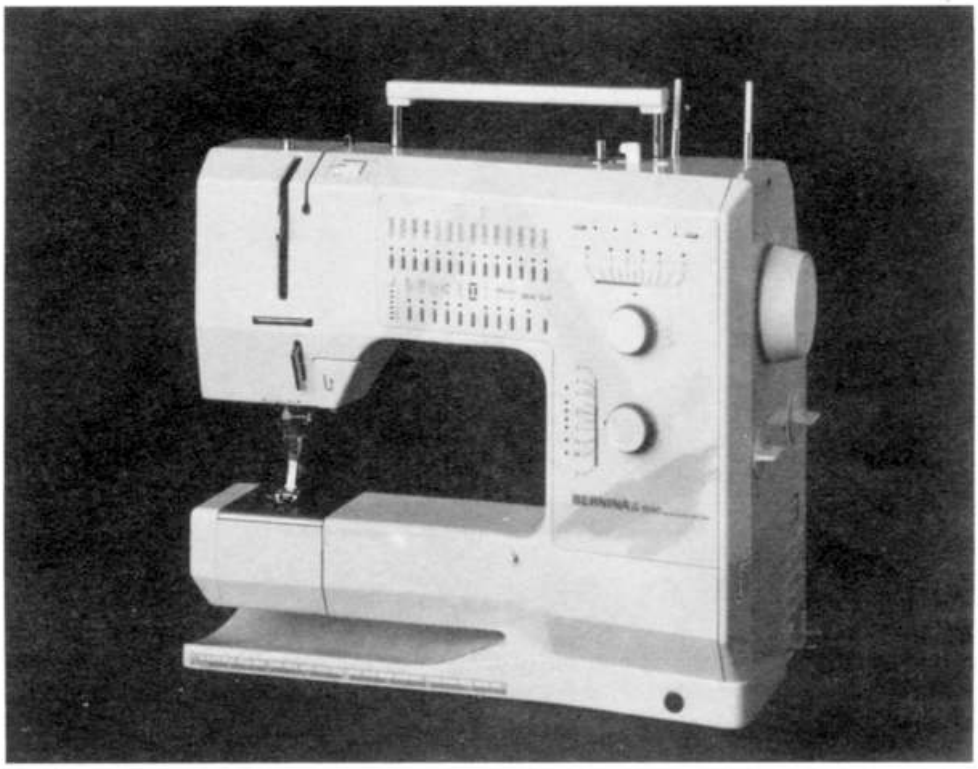


BERNINA®

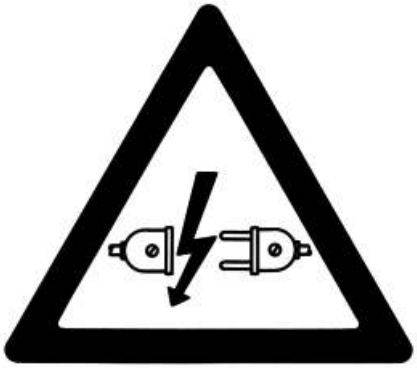
Service manual 1090

(Supplement to service manual 1130/20)

FRITZ GEGAUF LTD.
Manufacturers of BERNINA Sewing-Machines
8266 Steckborn Switzerland

90/5 GB 006.465.50.01

Safety Regulations



Attention

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 The mains plug must be withdrawn before making any adjustments to the machine.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

Impressum
Authers: *P. Kenyon*
T. Kalberer
Graphics: *F. Rapold*
Typeset and printed:
by Bodan AG, Kreuzlingen

Contents

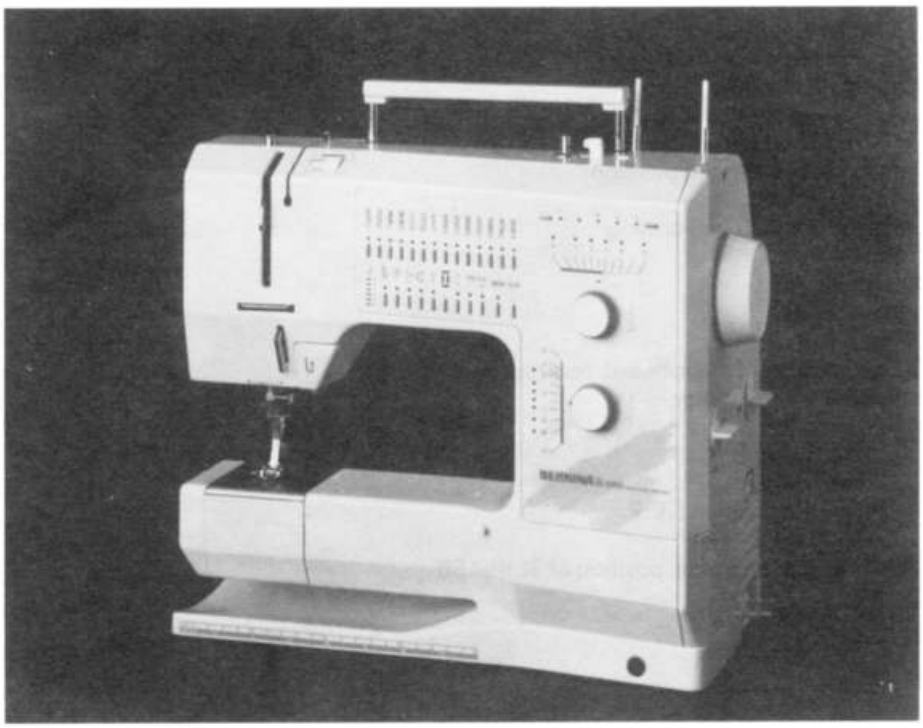
Important:

A comparison of the models 1090 and 1130 is not made as from a technical point of view, they are identical.

All gauges, instruments, adjustments etc, which are applicable to model 1130/1230 are also valid here. BERNINA has only changed the test programme which also simplifies things for you.

These instructions are to be used in conjunction with the service manual cl. 1130.

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



Technical data BERNINA model 1090

Stitch length max. forward 5 mm
max. reverse 5 mm
Increment 0–1 0,05 mm
1–3 0,1 mm
3–5 0,2 mm
Max. stitch width 5,5 mm
Increment 0,1 mm
Needle system 130/705 H
Adjusting needle 130/705 H/TCN
Hook system BERNINA CB = Central bobbin
Lowest point of needle bar = 0 degree
Presser foot height = 7,5 mm
Darning foot height = 0,5 mm

Automatic long stitch 10 mm/2:1
Working space 105×195 mm
Overall length 375 mm
Overall width 184 mm
Overall heigth 350 mm
Motor 90 W
No of stitches per/min. min.-max. 120–1050/min
reduced min.-max. 120–600/min
Sewing light: bulb 2×6 V/4 W
Weight 10,5 kg

Features and functions

Needle position 5
Zig-zag and stitch lenght (freely adjustable)
Automatic basis adjustments
Basic marking LED
LED display for stitch length and width, manually adjusted
LED display for presser foot
Upper needle stop (general)
Lower needle stop (general)
Needle positioning upper/lower with foot pedal
Permanent reverse sewing
Buttonhole 3 step
Automatic long stitch
Balance for forward and reverse feed
Clear switch

Single pattern
Mirror image
Stitch pattern extended, stitch density remains constant
2 needle limiter
Memory: Capacity 5 units
8 practical stitches without reverse motion
6 practical stitches with reverse motion
6 decorative stitches without reverse motion
8 decorative stitches with reverse motion
28 number of stitch patterns
LED control for programmed pattern
Main switch
Separate light switch
Speed control using the foot control

Description

The electronics of the model 1090 sewing machine is essentially located on three large printed circuit boards; the power print L-1230, the control print S-KAO and the display print A-KAO (compare to the block schematic diagram). The tasks of the 3 units correspond to the known functions of L-4200, S-4200 and A-4200 prints from the model 1130.

L-1230 power print

The L-1230 power print is mounted above the motor on the rear side of sewing machine. The circuit components on the L-4200 have the following functions:

- *Motor control:*
  The main motor control operates with the mains voltage. The main motor is a DC motor with pulse-width modulated speed control. The closed loop control circuit on the small R-4200 print is located on the power print.
  All circuit components for the motor control operate at dangerous voltage levels.
  The safety regulations must be adhered to.

- *Power supply:*
  Generates the following D.C. voltages:
  - 30V for the step motors
  - 5V for the logic circuitry on the S-KAO and A-KAO prints
  - 6V for the sewing light
  - 30V for the bobbin winder motor

  Components are protected from overload, in the case of faults, by a fuse F150. If a fuse blows only original replacement fuses, with the correct rating may be used.

A-KAO display print

The display section is mounted directly behind the operating control panel. The display and operating control elements are soldered onto the L-shaped printed circuit.

A time multiplex control allows the numerous LEDs and control elements to be connected to the open loop control on the S-KAO control print using only 21 connection lines.

S-KAO control print

The complete sewing machine control is located on the S-KAO control print. The S-KAO control print is located on the A-KAO print from the rear.

The most important control element is the microcomputer, and the power drive for the step motors. A new feature over model 1130 is that the bobbin winder motor is also controlled by the microprocessor. The bobbin winder motor speed can now be controlled from the foot control.

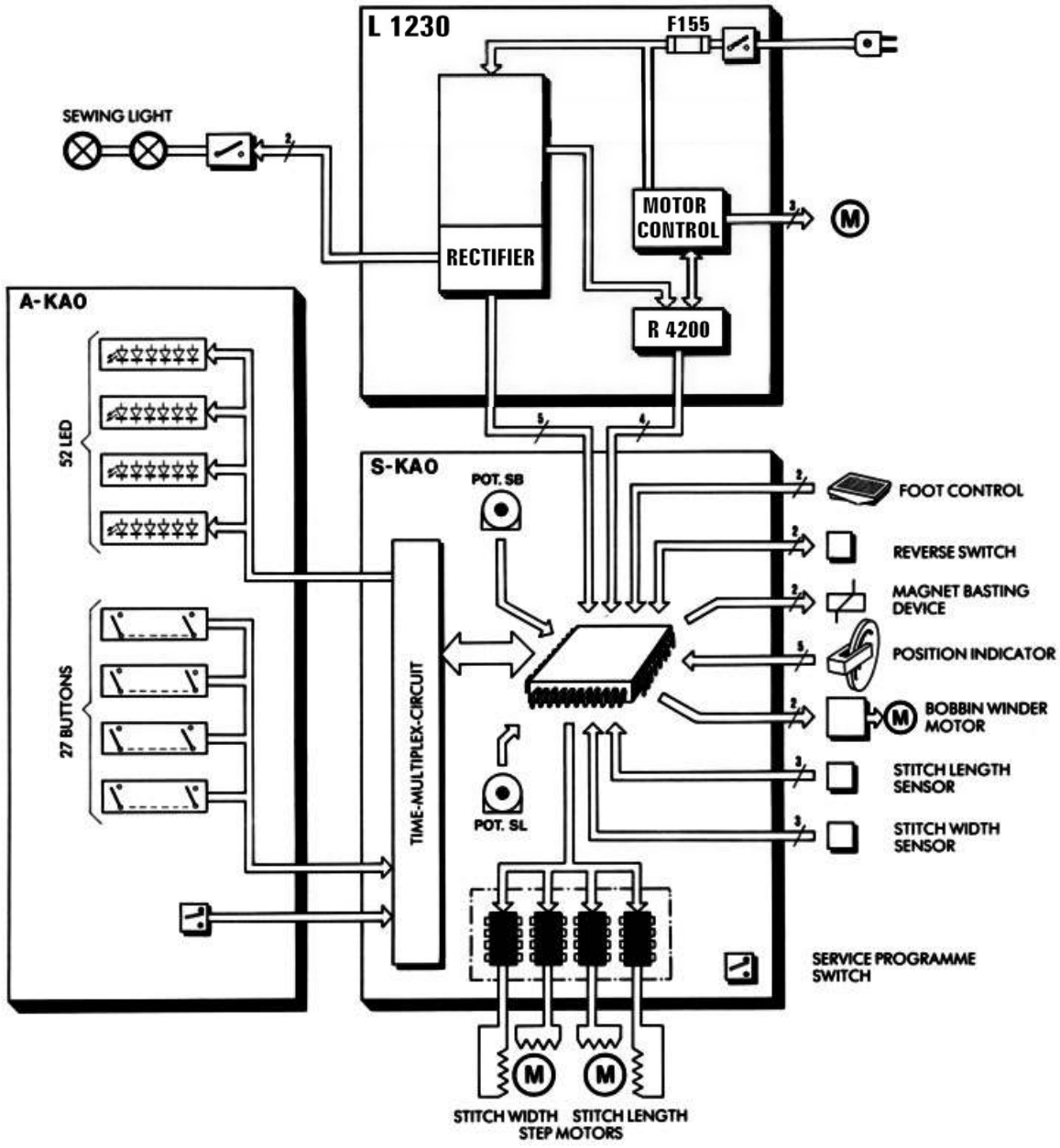
The S220 service switch on print S-KAO is a service aid. This switch has two positions: normal sewing operation, and service position. In the service position, several buttons and diodes on the display panel are assigned other functions. This allows the service technician to execute necessary adjustment and testing functions using the display panel (refer to the special section service programme). The service switch must always be set into the sewing position for normal sewing operations.

The microcomputer on print S-KAO receives an analog signal from the foot control, which it then converts into a digital signal and transmits to print R-4200 as setpoint for the motor speed. The R-4200 print controls the motor speed to the speed specified by the S-print, using a setpoint – actual value comparison. When the foot control is released, the setpoint goes to zero, the brake is actuated from the microcomputer on the S-print via the R-4200 print, and the motor is rapidly braked.

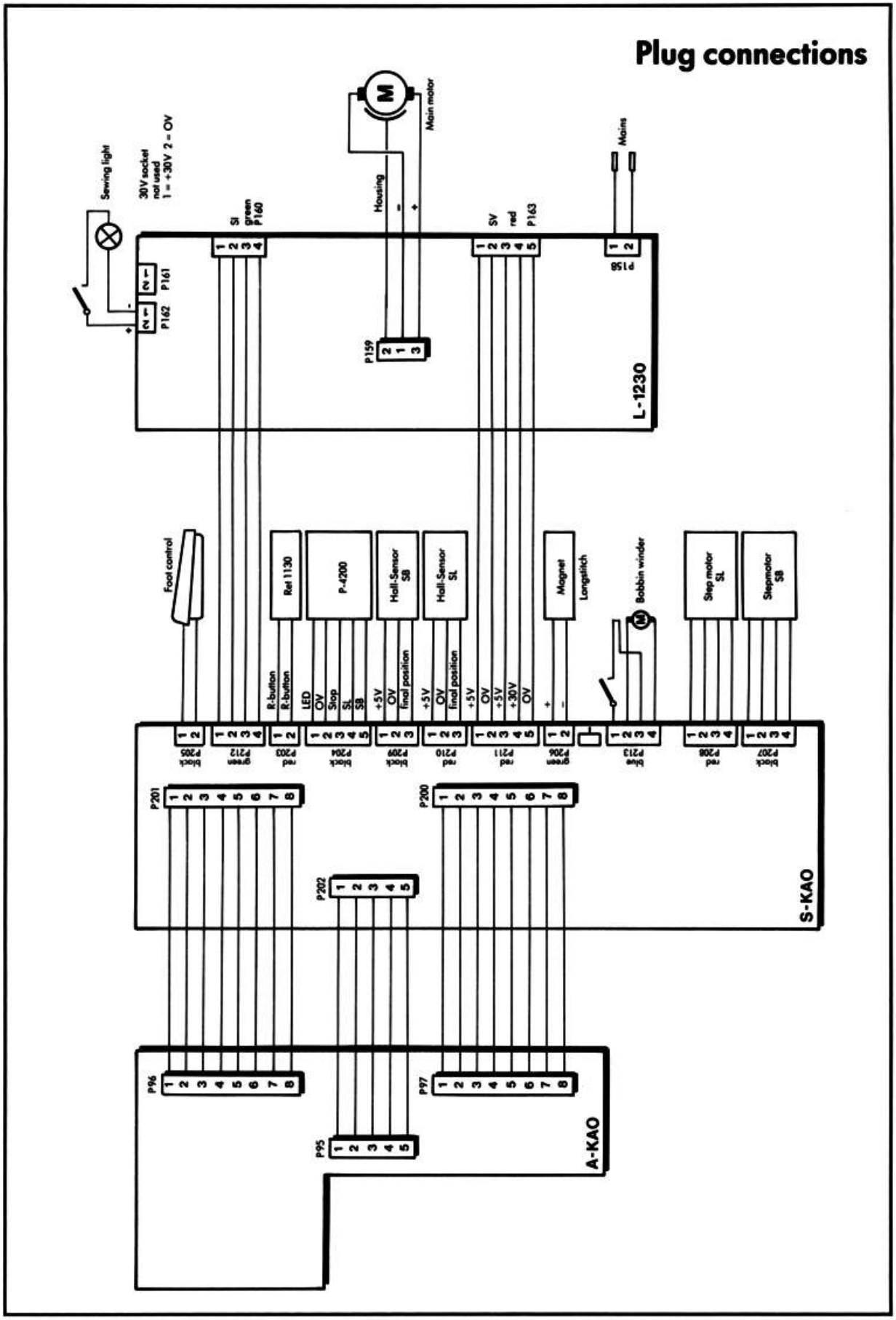
Signal transfer between the S-KAO and R-4200 print is realised using a 4-pole cable. Signal transfer is realised through an opto-coupler providing electrical isolation and thus eliminating dangerous voltage levels from the foot control and the S-KAO control print.

The step motors are in random positions when sewing machine is switched on. Random values can also be in the microcomputer control memory. In order to have a defined state, the step motors are rotated into their calibrated position by a microcomputer command, and the position value is set to zero in the microcomputer memory. This starting state allows the selection and sewing of any stitch programme.

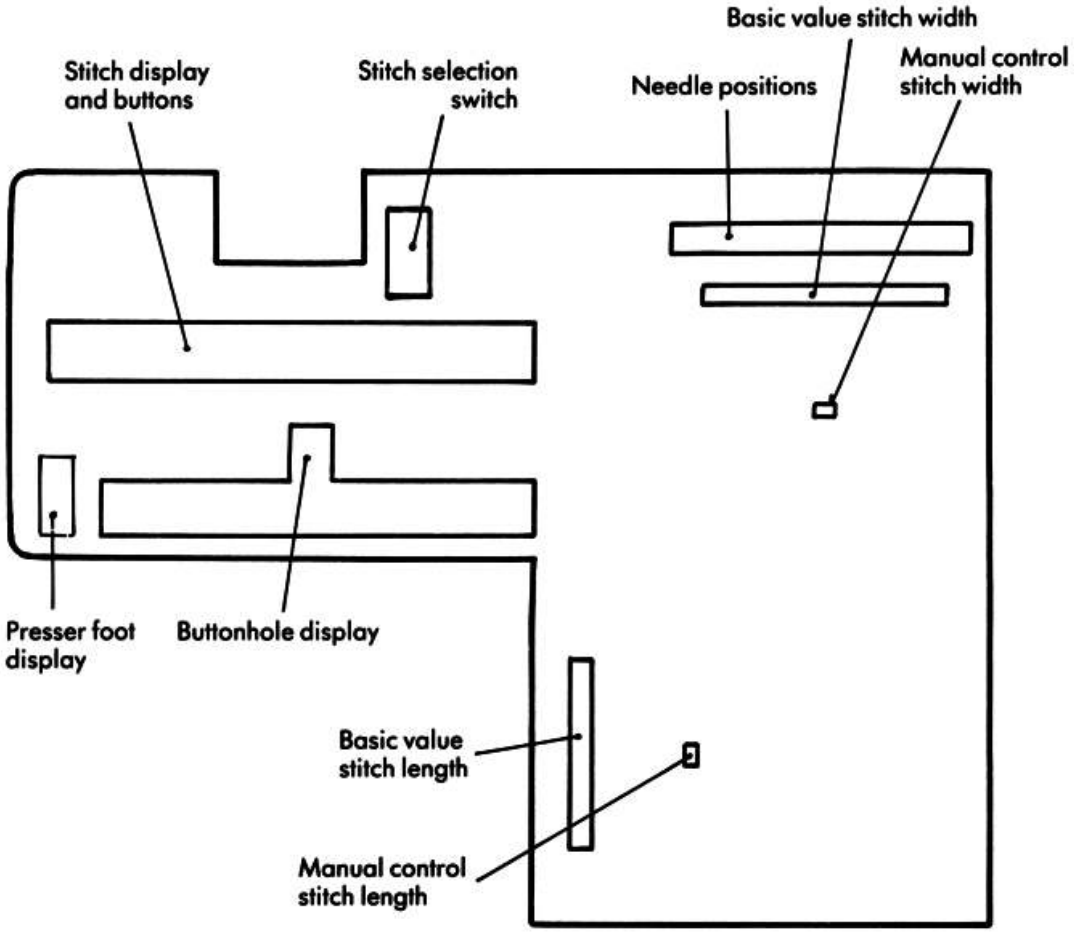
Model 1090 block schematic



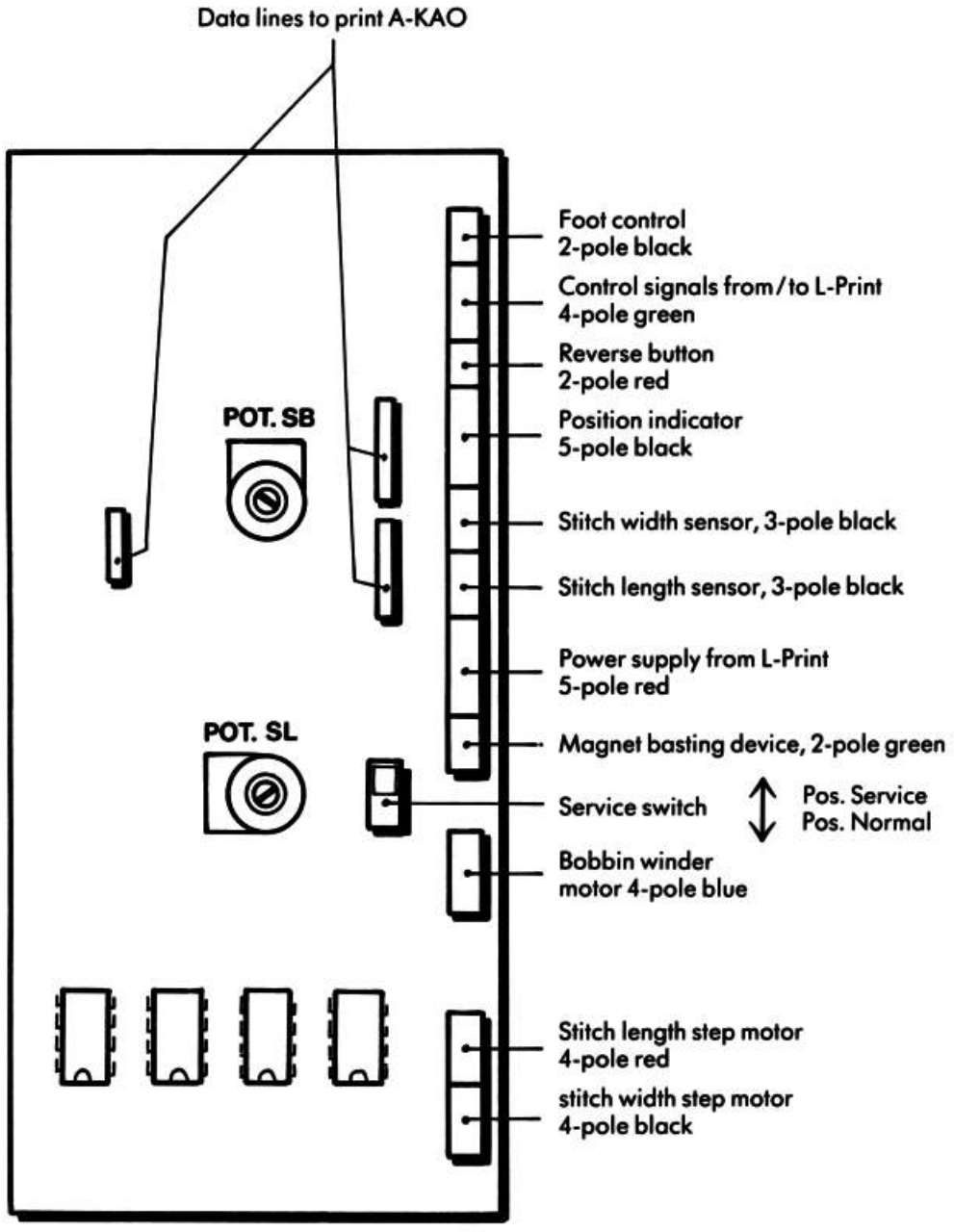
Plug connections



Print A-KAO


Basic value stitch width
Manual control stitch width
Stitch display and buttons
Stitch selection switch
Needle positions
Presser foot display
Buttonhole display
Basic value stitch length
Manual control stitch length

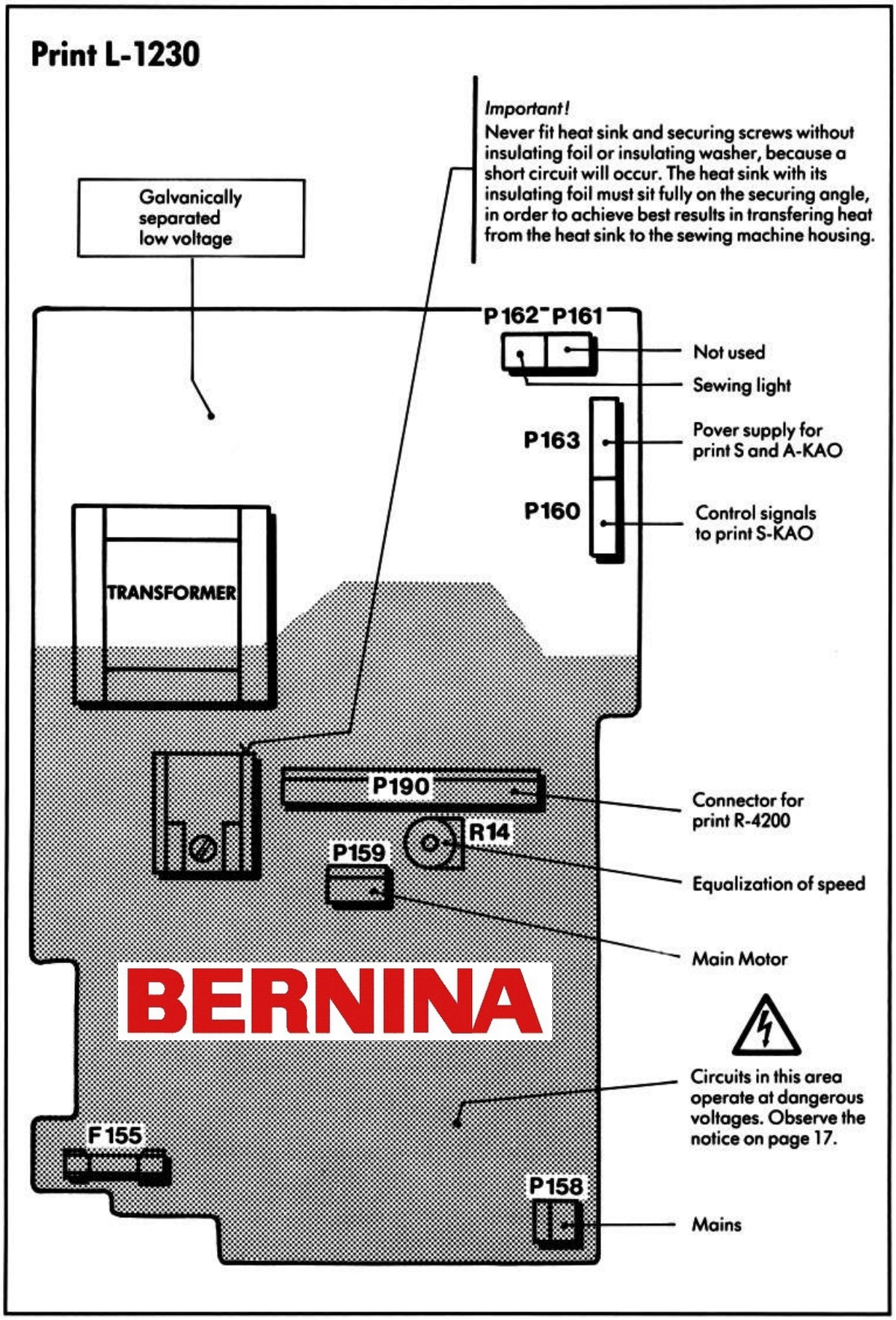
S-KAO Print



Warning!

If print S-KAO has to be replaced, forward/reverse feed equalization with max. and min. position of the SB and SL Potentiometers must be carried out.

Print L-1230


Important!
Never fit heat sink and securing screws without insulating foil or insulating washer, because a short circuit will occur. The heat sink with its insulating foil must sit fully on the securing angle, in order to achieve best results in transfering heat from the heat sink to the sewing machine housing.
Galvanically separated low voltage
P162 P161
Not used
Sewing light
P163
Pover supply for print S and A-KAO
P160
Control signals to print S-KAO
TRANSFORMER
P190
Connector for print R-4200
R14
P159
Equalization of speed
Main Motor
BERNINA
Circuits in this area operate at dangerous voltages. Observe the notice on page 17.
F 155
P158
Mains

Diagnostic instructions

- As opposed to model 1130, model 1090 is equipped with a service programme. The service programme is essentially designed for test and adjustment tasks.
- The diagnostic instructions should be adhered to for repair work. Reference should be made to the service programme for adjustment and equalization tasks.

Warning of dangerous voltage levels

Mains voltage (refer to print L-1230)

Circuit components on the L-1230 power print, the main motor and the cable drum, carry dangerous voltage levels. For your own safety, print L-1230 should only be touched after about 30 seconds after the mains voltage has been switched off, which is the time required by the capacitors to discharge after the mains plug has been removed.

Warning:

The sewing machine may only be connected to the mains supply when the chassis cover or the auxiliary cover is mounted. Work may only be carried out on the L-1230 print, main motor and cable drum when the mains plug has been withdrawn from the mains supply.

Electrically isolated low voltages
(refer to print L-1230)

Several circuit components on the L-1230 print operate with electrically isolated low voltages (40 V or less). With the exception of the power print L-1230, the main motor and the cable drum, the other modules also operate with electrically isolated low voltages!
There is no danger involved in touching these components during operation.

Warning!

The following should be additionally observed when carrying out repair and adjustment work:

- Changing from the service programme to normal operation, and vice versa is only possible after changing the position of the service switch on the S-KAO print, and briefly switching off the mains voltage.
- The following adjustments should be made each time a S-KAO print is replaced:

Forward/reverse feed:	Service programme 6
Setting min. and max. position:	Service programme 3

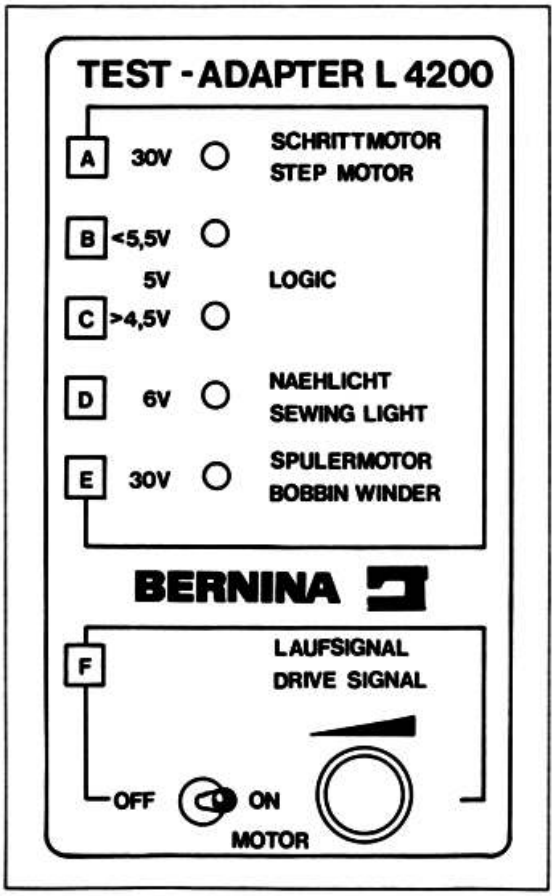
- Switch off the mains voltage before touching and replacing the R-print.

Test adaptor L-4200

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

- When all LEDs A to E ligth up, then the power supply for:
  - the step motors
  - the logic circuit
  - the sewing light

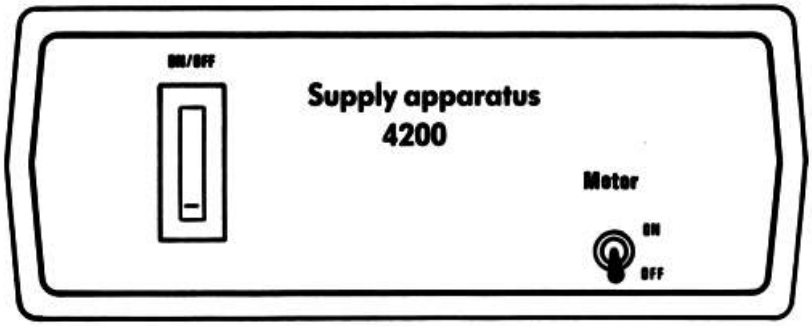
  is correct. Bobbin winder motor, LED E, *cannot* be tested.
- If only LED B doesn't light up, then the voltage for the logic is too high (more than 5,5 V).
- If only LED C doesn't light up, then voltage for the logic is too low (less than 4,5 V).
- When the motor switch is in the «on» position, the electric brake is released, the motor receives the desired value and will run at the set speed. LED F for the drive signal *must* be lit. Speed regulation is made by turning the potentiometer.
- When the motor switch is placed in the «off» position the signal returns to zero, and the electric brake should engage. The motor slows down to a stop. LED F *must* go out.



Power supply 4200

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

The power supply is useful when a mechanical adjustment is to be made, for which the rigidity plate with print L-1230 has to be removed.



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

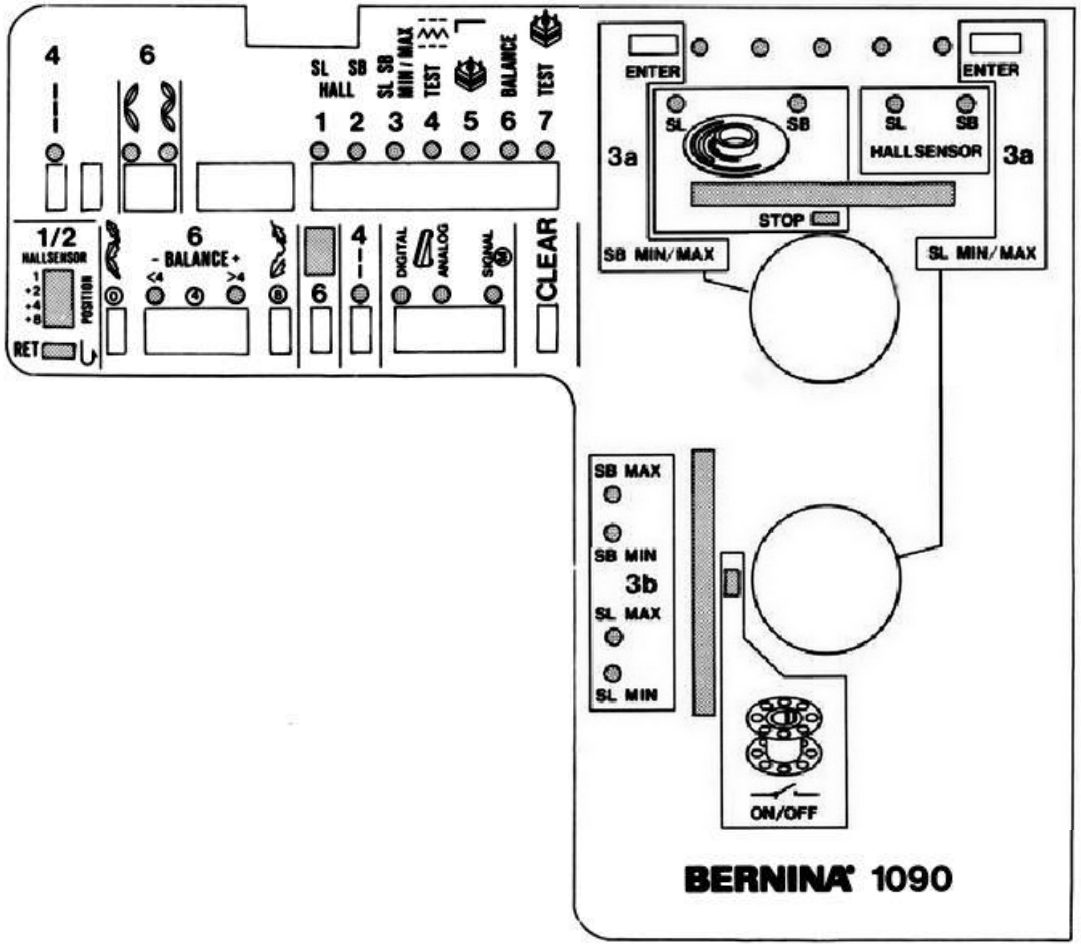
Motor switch «on», the main motor will rotate slowly.

Adaptor print with cord ist pluggable.

There is a 400 mA fuse at the rear.

Important cl. 1090:
The connection for the bobbin winder motor is not used.

SERVICE-PANEL



Test-Programmes with Service-Panel

← Test-Programmes →		What is to be tested	Test	Manual 1230 page	See also service manual 1130
Buttons 1–7 Service-Programmes	1	Hall sensor position for stitch length	H_2	28	Page 64 a (see also BERNINA Information No. 78)
	2	Hall sensor position for stitch width	H_2	28	
	3	* Setting min. and max. position of SB and SL	R	37	
	4	Sewing of	Q	36	
	5	Pinning position for step motors SL and SB	I	29	Section 49, resp. 53 pages 37 + 41
	6	Forward-reverse feed equalization	O	34	Section 41, pages 32 + 33
	7	Step motor / Hall sensors	H_1	27	Page 64
	8	Digital / analog foot control	L	31	
	9	Drive signal	B	21	Page 58
	10	Ret button	N	33	
	11	Position indicator / P-print	F	25	Page 62
	12	Bobbin winder motor switch	P	35	

* This test must be carried out **whenever** the control chassis has been disassembled and reassembled.

Danger high level voltage!

Mains voltage (see print L-1230)

Circuits on the power print L-1230, the main motor and the cord drum operate at dangerous voltages. As some capacitors discharge approx. 30 seconds after pulling out the mains plug, you should wait this long before touching print L-1230.

Test-programm model 1090 (service operation)

1. Test-programme start

- Remove belt cover (service instructions model 1130, section 6).
- Set service switch on the S-print into service position (refer to Fig. S-KAO, page 10).
- Switch-on sewing machine/D.C. mains adaptor unit. The sewing machine is now in service programme no. 7 (step motors), move to and from with an acustical noise.
- Push clear button (min. 2 sec.).
- Mount service panel.

  The sewing machine is now in the initial state of the service operation. The individual test programmes 1 to 7 can be selected from this state. The initial state can be selected by depressing the clear button.
- Testprogramme no. 3 can only be left after all 4 values have been memorized.

The following sensor signals can now be checked:

- Position indicator/P-print (test 5 model 1130).
- Foot control digital and analog (new).
- Drive signal (partially covered in test 1, test adaptor model 1130).
- Ret button (new).
- Adjust buttonholer potentiometer (partially section 42 model 1130).

Termination of the test-programme

- Switch off the sewing machine/D.C. mains adapter.
- Bring the service switch on the S-print into the normal position.

  The sewing machine can now be operated normally.

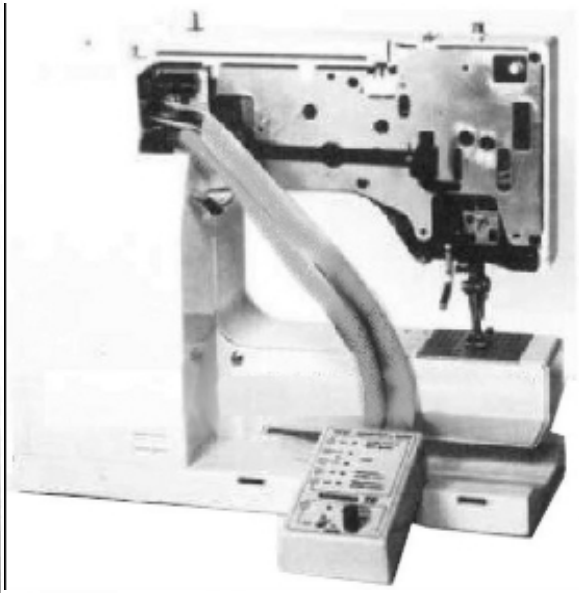
Attention:

When changeing from normal operation – Service operation – normal operation.

- Bring the service switch into the desired position.
- Switch mains adapter off and then on again.

Fault	Possible fault on	Repair instructions
Display panel and sewing light not illuminated Main motor not running Machine «dead»	– L-1230 print – Mains cable	– Test A, resp. M – Test D
Main motor does not rotate other functions OK	– L-1230 print – R-4200 print – S-KAO print – Foot control – Connection between S-KAO and L-1230 prints – Connection between S-KAO print and foot control – Main motor	– Test A, resp. M – Replace R-4200 print after switching off mains voltage – Replace S-KAO print – Check control, replace bobbin winder motor foot control, if nec. test K, L – Test C – Test E – Check motor cable and plug Replace motor
Bobbin winder motor does not function, other functions OK	– S-KAO print – Bobbin winder	– Test P – Replace print S-KAO – Replace complete bobbin winder
Sewing light does not function	– Lamps – Lamp holder – Print L-1230	– Replace lamps – Test G – Test A
Step motors do not position	– Step motor print S-KAO – Connection between S-KAO and L-1230 prints	– Test H_1, H_2 – Test C
Front panel LED does not illuminate, however selected function is executed when button depressed	Print A-KAO	– Replace print A-KAO

Fault	Possible fault on	Repair instructions
Selected functions not executed when button depressed	– Print A-KAO	– Replace print A-KAO, if malfunction still occurs, replace print S-KAO. Test with new S-KAO, print and old A-KAO print.
Long stitch device does not function	– Print S-KAO – Long stitch device magnet	– Replace print S-KAO – Replace magnet and adjust
Reverse button does not function	– Print S-KAO – Print Ret-KAO	– Start service test programme, depress reverse button, LED RET must illuminate, if not: replace print S-KAO or if nec. Ret print.
Irregular stitch width or length	– Step motor	– Test H_1, H_2
Main motor stops after 5 seconds	– Print P-4200 – Print S-KAO	– Test F – Replace print S-KAO
No needle stop	– Print P-4200 – Print S-KAO – Print L-1230	– Test F – Replace print S-KAO – Test A
Stitch pattern no. 27 is to short or to long	– Feed equalization	– Service-programme no. 6

What is to be tested	What to adjust	Normal condition
Print L-1230 See also directive in Test M	Switch off mains supply – Fit safety cover – Connect test adaptor L-4200 instead of the sewing light (2-pole, green), connect connecting cable to print S-KAO (4-pole green, control signals) and connecting cable to print S-KAO (5-pole red, supply). – Set the switch on the «off» position. Switch on mains supply – Motor switch to «on» position (see also test B) – Motor switch to «off» position	 – LEDs A to D illuminate – Motor rotates. LED F illuminated. Speed can be controlled by the potentiometer. – Motor brakes. LED F no longer illuminated

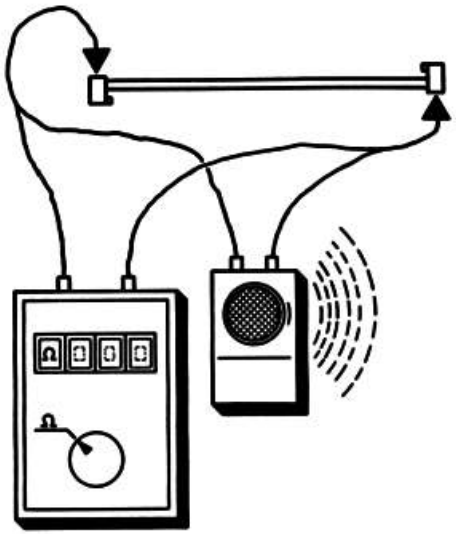
Important:

- When no lights A–D illuminate carry ont test D mains cord.
- Replace print L-1230 if one or several of the LEDs A to D do not illuminate. Before going further, test the new L-print using test 9 to determine whether the L-print failure was subsequent to failure of the S-KAO or A-KAO prints. If this is the case, then these faults should first be eliminated.
- Replace print R-4200 if the voltages A–D are available but the motor still does not run. Subsequently replace print L-1230 if the motor still does not run.

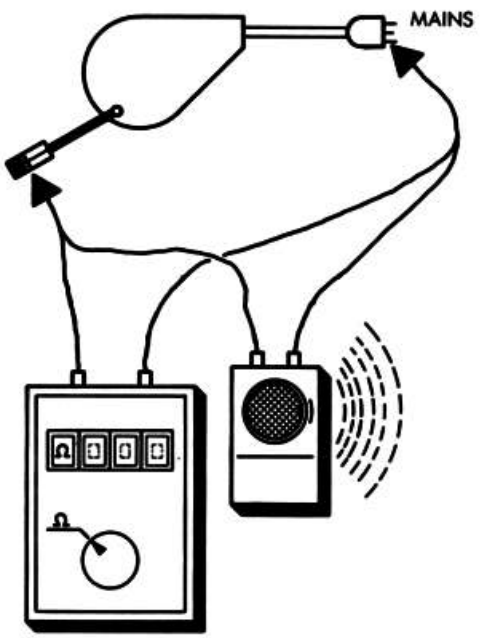
What is to be tested	What to adjust	Normal condition
Print L-1230/R-4200	– Initial state of service operation (page 17) – Select test 4 (sewing-off) – Depress foot control	– The LED «signal» is illuminated, the motor rotates.

Repair instructions: – If the LED «signal» M is not illuminated:
A test should be conducted with a new R-print and the old L-print. If still faulty, then replace L-print and repeat test. If still faulty, replace S-print, and if necessary check the cable connection L-/S-print (refer to test C, page 22).

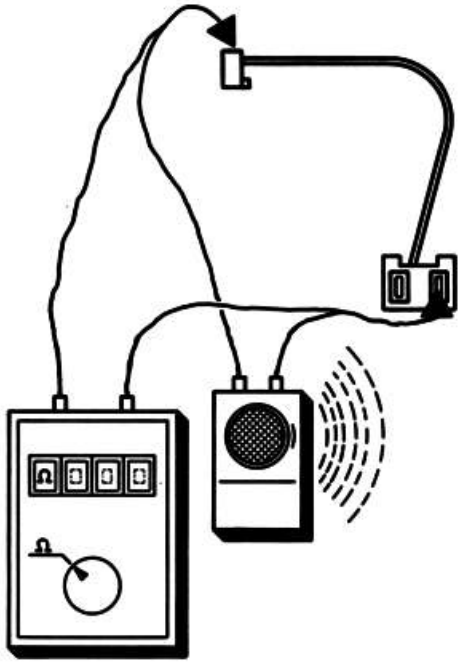
Test C

What is to be tested	What to adjust	Normal condition
Connection of print S-KAO to print L-1230. Flat cord 5 pol, red connectors Flat cord 4 pol, green connectors	– Take out mains plug. a) Disconnect connectors from print L-1230 and S-KAO b) Check on the upper side of the connectors with a circuit tester or ohmmeter that each wire is continuous. c) Test every wire as described in b).	 – High pitched tone! Cord ok. – Ohmmeter shows a small resistance, cord ok.

Important: If there is no high pitched tone, or the display of the ohmmeter wavers or shows infinite resistance, then the cord is defective. Replace connection.

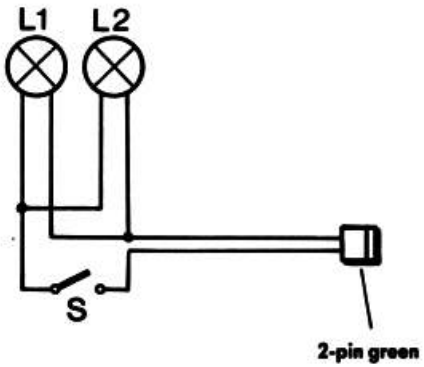
What is to be tested	What to adjust	Normal condition
Mains cord (cord reel)	– Take out mains plug. a) Disconnect in a plug at P158 on print L-1230. b) Connect one end of the tester to the plug, then test every wire to check that a circuit can be made.	 – Hith pitched tone! Cord ok. – Ohmmeter shows a small resistance, cord ok!

Important: If there is no high pitched tone, or the display of the ohmmeter wavers of shows infinite resitance, then the cord is defective. Replace cord reel.

What is to be tested	What to adjust	Normal condition
Connection of print S-KAO to foot control plug.	– Take out mains plug. a) Remove 2 pin black, foot control plug from print S-KAO. b) On the upper connection side of the print check with the circuit maker or ohmmeter that a circuit can be made between these and the foot control plug. c) Both connections on foot control plug have to be tested as described above.	 – Hith pitched tone! Cord ok. – Ohmmeter shows a small resistance, cord ok.

Important: If there is no high pitched tone, or the display of the ohmmeter wavers or shows infinite resistance, then the cord is defective. Replace cord.

What is to be tested	What to adjust	Normal condition
Print P-4200	– Initial state of service operation (page 17) a) Using the handwheel bring needle to lowest position. b) Rotate handwheel forwards and check table to the right *Important:* If the print does not function as required per the table, then repeat tests a) and b) using a new print. If there are still discrepancies then refit the old print, replace print S-KAO, and repeat tests a) and b).	– LEDs SL, SB and stop not illuminated on the service panel LED SL / LED SB / LED STOP on / on / off on / on / on on / off / on off / off / on off / off / off

What is to be tested	What to adjust	Normal condition
Lamp holder	– Mains switch on. a) Switch on sewing light.	– Sewing light burns. 

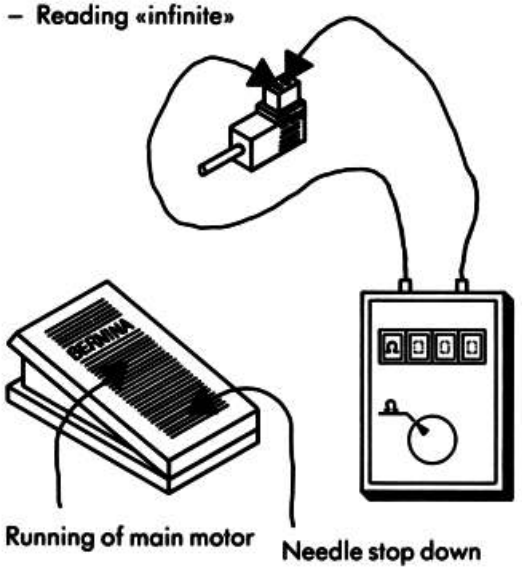
Important: If the sewing light doesn't function and both bulbs are intact, then the connections from L1, L2 and S to the plug can be checked with the circuit tester or ohmmeter.
The switch S can be tested by putting the test probes in the plug openings, and by switching on and off there must be continuity and blockage in the circuit. To be sure, the same test must be made with the 2-pin green plug.
L1 and L2 can be testes for continuity on the plug openings. Faulty parts must be exchanged.

What is to be tested	What to adjust	Normal condition
Step motors, print S-KAO	– Initials tate of service operation (page 17) – Select service test programme 7	– Step motors rotate back and forth, feed dog and needle bar must move
If a step motor does not rotate, then the fault can either lie with the step motor, or print S-KAO. The faulty components can be identified by swapping the connections (plug P208 with P207, step motors.		
Hall sensors	– Initial state of service operation (page 17) Select service test programme 7 – Select service test programme 1 SL and 2 SB for Hall sensor position check (test H2 page 28).	– LEDs for the Hall sensors on the service panel should flash at the same frequency as the stepping motor motion
If the check LED of the Hall sensors does not flash, then the fault can lie in the Hall sensor, the mechanical part or the step motor. Replace defective step motor (see manual 1130, pages 35 to 41).		
	– Connect the removed motor and Hall sensor to print S-KAO and energize with the 4200 supply unit. – Manually slide magnet over the Hall sensor. – Select service test programme 1 for SL step motor. – Select service test programme 2 for SB step motor.	– LED SL must illuminate – LED SB must illuminate
If the LED does not illuminate, replace the Hall sensor and adjust the step motor to its zero position (service test programme 6, see test O).		

What is to be tested	What to adjust	Normal condition
Position Hall sensor S.L.	Initial state of service operation (page 17) Service programme no. 1	The Hall sensor position for stitch length is displayed as a binary number in the «Hall sensor position» field. The value must lie between 2 min. and 14 max. 1. Example: 1 ☐ 2 ■ 4 ☐ 8 ■ illuminated 2+8=10 → it's ok 2. Example: 1 ■ 2 ■ 4 ■ 8 ■ illuminated 1+2+4+8=15 → not ok
Position Hall sensor S.B.	Service programme no. 2	Same procedure as above, the value must lie between 1 min. and 7 max.

Repair guide: If the values cannot e reached then the pinion and the magnet support must be replaced. (The freeness of movement in the mechanics must be checked.)

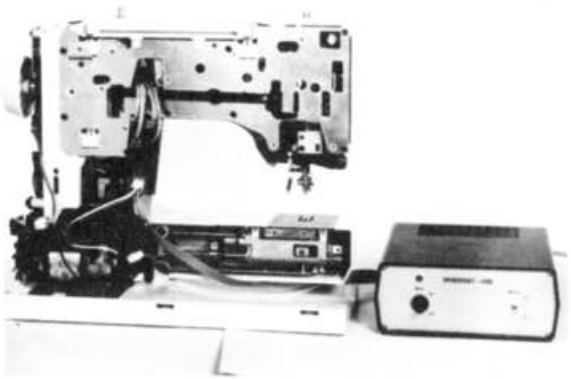
What is to be tested	What to adjust	Normal condition
Pinning position of step motors: refer to section 49, or 53 model 1130 (pages 41 and 37).	– Initial state of service operation (page 17) – Select service test programme 5	– The step motors are activated to the step position for pinning.

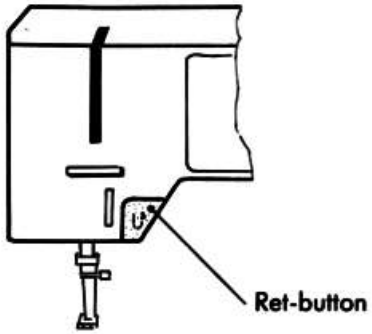
What is to be tested	What to adjust	Normal condition
Foot control	When a fault in the foot control is suspected, first carry out test L. Connect the multimeter to the foot control, and switch to the range ohms. a) Foot control not depressed.	– Reading «infinite» 
	b) Depress the foot control at the rear (needle stop down).	– Reading 10 k Ω
	c) Depress the foot control slowly at the front.	– Reading varies rom 4 to 0 k Ω

Important:
If the foot control is defective, open the foot control cover. Carry out tests a), b) and c) on both contacts. If these give correct readings, replace the cord reel.
If a fault persists, then change the regulater housing.

What is to be tested	What to adjust	Normal condition
Foot control digital/analog:	– Start service-programme – Connect foot control to the machine. – Depress slowly forwards.	– LEDs «analog and digital» are illuminated.

Repair instructions: – The s-print should be replaced if only the «analog or digital» LED is illuminated.
– The foot control is defective if neither of the LEDs is illuminated (regulater or cable).

What is to be tested	What to adjust	Normal condition
Print A-KAO Print S-KAO	Switch mains supply off – Connect up the 4200 supply unit to the sewing light, main motor, connecting cable to print S-KAO (4-pole green, control signals), the connecting cable to print S-KAO (5-pole red, supply). – Switch-on supply unit. – Check display panel – Start service programme (page 17). Select service test programme 7.	 – For every button pressed, the matching LED will light up. – When an alteration in stitch length or stitch width (from basis value) is made, the matching LED display (SB/SL) «manual-alteration» must light up. – Step motors rotate back and forth. Check LEDs SL and SB flash at the same frequency as stepping motor motion.
	– Motor switch «on»	– Motor runs
Important: Print S-KAO must be replaced, and the test repeated if the display panel is not illuminated, or if step motors do not rotate. Replace print A-KAO if faults occur on the display panel. – If the motor doesn't run, exchange the motor.		*Directive:* If the above tests all function with the mains device, then the fault can only be in the L-print. See test A.

What is to be tested	What to adjust	Normal condition
Ret-Button (Reverse button)	– Initial state of service operation (page 17) – Depress ret-button  	– LED «Ret» is illuminated

Repair instructions:

- LED «Ret» is not illuminated:
- A check should first be made as to whether the switch is being actuated. If this is not the case, then the switch activater should be mechanically adjusted (travel increased) until the switch is actuated. The following procedure shold be followed if the LED «Ret» is still not illuminated.
- Remove the P203 2-pole red plug connection at the S-print.
- Connect new Ret-print.
- Manually actuate the switch, LED «Ret» illuminates.
- Replace Ret-print.

What is to be tested	What to adjust	Normal condition
Equalization of the forward/reverse feed. *Directive:* First of all the zero pos. of the stitch length crank must be checked (see chapter 2, page 40 Service-Manual cl. 1130).	– Initial state of service operation (page 17) – Select Test-programme no. 6, in this programme – The stitch no. 23 or no. 27 and the buttonhole are active. The forward/ reverse feed can now be equalized with the + and – buttons during sewing, and at full speed. – The neutral position is at value 4. The selected value is only then stored, when the clear button is actuated. (Normal value lies between 2 and 6). – BALANCE + 0 <4 4 >4 8 ○ ○ ○ ○ ○ LED 0: Value 0 → Reverse feed is longest LED <4: Value 1–3 LED 4: Value 4 → Neutral setting LED >4: Value 5–7 LED 8: Value 8 → Vorward feed is longest	– The stitch pattern must be correct at all speeds.

What is to be tested	What to adjust	Normal condition
– Bobbin winder motor switch – Control of winder motor	Switch on winder motor	LED «winder» lights up Speed of winder must be able to be regulated.

What is to be tested	What to adjust	Normal condition
Sewing off: The stitch length, width, LMR and the automatic long stitch (not the basting stitch).	– Initial state of service operation (page 17). – Select-service-programme 4.	– The machine can now be sewn-off. L.C.R. Straight stitch Stitch length and stitch width can be adjusted Long stitch

Note:
If the normal condition ist not achieved then test M must be carried out first.

What is to be tested	What to adjust	Normal condition
– Setting min. and max. position of stitch width and stitch length	– Initial state of service-programme (page 17). – Select test-programme no. 3. 1. Turn stitch width knob to max. (5,5 mm) press ENTER-button (SB) to memorize. 2. Turn stitch width knob to min. (0 mm) press ENTER-button (SB) to memorize. 3. Turn stitch length knob to max. (5 mm) press ENTER-button (SL) to memorize. 4. Turn stitch length knob to min. (0 mm) press ENTER-button (SL) to memorize. – All 4 values are memorized.	– The LED SB MAX will light up in field 3 b. – The LED SB MIN will light up in field 3 b. – The LED SL MAX will light up in field 3 b. – The LED SL MIN will light up in field 3 b. – Service-programme in its initial state.
The test-programme can only be left when all 4 values have been memorized.	The order of the steps 1–4 is immaterial.	If an LED doesn't light up although a value has been memorized. This means that the knob is not at a minimum or maximum value.

What to adjust	Normal condition
Switch on *bobbin winder*	Bobbin winder runs
Switch off *bobbin winder*	Bobbin winder stops
Switch on *sewing light*	Sewing light comes on
Switch off *sewing light*	Sewing light goes out
Main motor	
Fully depress foot control	Speed of sewing machine 1050 rpm
Stop from fastest speed	Motor brakes,thread take-up lever is in its highest position
Press foot control backwards	Machine positions in lower needle position
Reverse button	Transport forward
Sew forwards	Transport reverse
Press reverse button	Transport forward
Release reverse button	
Longstitch device magnet	
Sew using automatic long stitch	Every second stitch is sewn
Depress foot control for a short time	Upper needle stop
Press lower needle stop button	LED lights up
	
Depress foot control for a short time	Lower needle stop

Function-tests electronic

What to adjust	Normal condition
Adjust the stitch width and stitch length with the knobs Select another stitch	Appropriate LED display (SB / SL manual adjustment) must light up. Both LED displays do not light up
To check the electrical transport equalization, sew using stitch 28	Sewn patterns must be closed
Press all function buttons and check LEDs	All LED's should light up
Press all stitch selection buttons.	The respective LED should light up. Basic values of stitch width and stitch length are displayed (LED)

Appendix

Assembly of the operating chassis/A-Print and S-Print

– Turn the two potentiometers for stitch length (SL) and stitch width (SB) until both arrows are face to face (see drawing).

– Turn the operating knob for stitch length (SL) in the minimum position «0».

– Turn the operating knob for stitch width (SB) in the maximum position «5».

– Position the connection pins of the S-Print to the A-Print, and press together.

– Secure with the 4 securing screws.