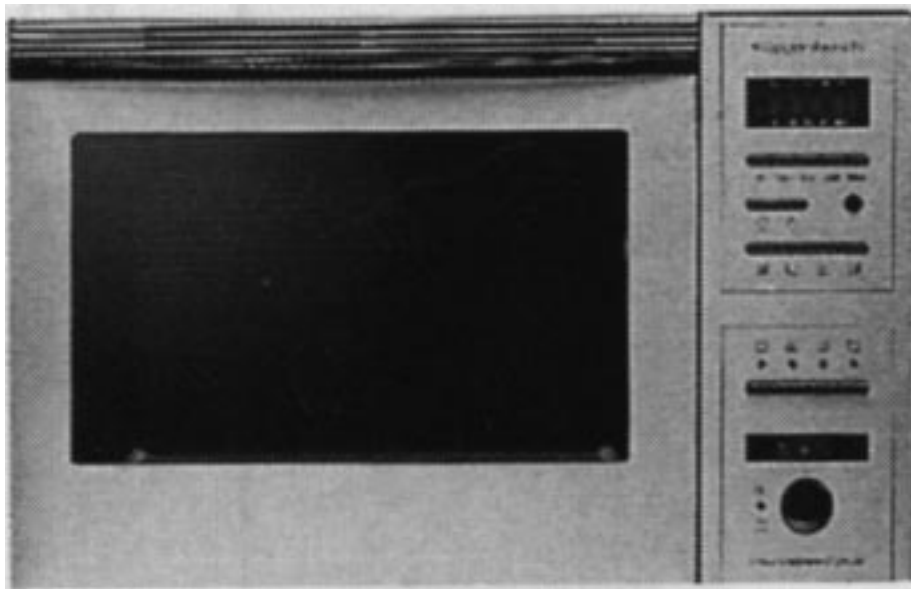


KÜPPERSBUSCH

After-Sales Service



Repair Manual
EMWK 870.0

VKS-H	Repair Manual EMWK 870.0		H4-70-02-01
Responsible: Rutz/Jakubaša	Fax: (0209) 401-743	Phone: (0209) 401-733	Date: 16.01.1997
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 Küppersbusch THE HEART OF A GOOD KITCHEN			

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I. FUNCTIONAL DESCRIPTION

1. Microwave

For principles on microwaves please refer to the booklet on microwave-fundamentals.

1.1 Transmission of microwave energy

Via the magnetron-antenna into the waveguide.

From the waveguide via the rotating antenna into the oven cavity.

2. Control of the microwave output

By primary side clocking of the timing relay.

2.1 Clock pulse periods

See training material.

3. Cooling system

3.1 The cooling fan sucks in cold air mainly via the groups of holes in the bottom plate and in the rear wall and conducts it over the components: mains supply terminal, high voltage transformer, high voltage diode, high voltage capacitor. The air which is emitted firstly circulates around the magnetron and then – taking the vapours with it – exits via the air outblow duct and the ventilation slits at the front.

3.2 A thermal cut-out at the magnetron switches the magnetron off when the temperature is excessively high, e.g. on fan failure.

3.3 Another thermal cut-out at the top of the oven cavity switches the oven heat/grill heat off, e.g. if the selected cooking time is too long or the oven regulator fails.

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4. Oven ventilation

- 4.1 In microwave operation the oven cavity remains relatively cool, so that the water which evaporates during cooking condenses on the oven walls. In order to avoid this as far as possible, during pure microwave operation part of the (preheated) cooling air from the magnetron is blown into the oven cavity via an air vent on the front right. This first demists the viewing panel and then forces a large proportion of the vapour upwards so that it is emitted via the vapour slits.
- 4.2 During baking, roasting and grilling, on the other hand, such a passage of air would greatly disturb the operations and lead to uneven browning. For this reason, there is an air vent control device which is activated when the oven regulator is turned on.

Setting of the oven regulator	Position of air vent
0-position as from 100 °C as from grill level II	completely open locked again slightly opened

4.3 Important note:

Before the casing is put on, it should be checked whether the cam plate/lever mechanism really does close the air vent completely (as from about operating setting 100 °C). This can also be checked after the appliance has been completely assembled and connected to the mains supply by adjusting the temperature to 100–150 °C and checking that no draught occurs at the ventilation slits (on the front right).

If the air vent is not air-tight the heating time of the oven increases dramatically, and cakes and roasts are browned unevenly.

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II. REPAIR TIPS

Attention: Be sure to observe the following instructions!

Removing or exchanging the following appliance components can present a risk to the service technician due to:

- voltages of over 250 V towards ground
 - casing and rear wall
(magnetron, high voltage transformer, high voltage capacitor and diode)
- a possible microwave leakage in the microwave sealing systems:
 - Door: immersed microwave screen with lambda/4-latch and capacitive shielding.
 - Viewing panel: finely meshed grid (expanded metal, rerolled rib mesh) fastened by 16 screws (contacted) to the door frame and the microwave screen.
 - Vapour slits: group of holes sealed against microwaves.
 - Lamp cavity: group of holes sealed against microwaves.
 - Grill heating elements
 - passage for sensor sheath tube: contact foil and capacitive shielding
 - Wave guide cavity/oven cavity: screw-fitting plate, metallic, polished (contact and capacitive effect).

Caution: microwave radiation!

Service technicians should not be exposed to microwave energy that can be emitted by the magnetron or another component which generates microwaves due to maloperation or faulty connection. All microwave input and output connections, waveguide, flanges and sealings must be tight and secure. The appliance should never be put into operation without a microwave absorbing load in the oven. Never look into an open waveguide or radiator when the appliance is in operation. After carrying out work around the door or antenna region, in the waveguide, after replacing the magnetron or exchanging parts which lead into the oven cavity through the oven walls, the appliance must be tested for microwave leakage with a suitable survey instrument.

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1. Switch panel

After folding down the complete switch panel, or after taking it apart further into shielding, control panel and control panel carrier all components in the panel area can be removed.

1.1 To fold out remove the ventilation grid and loosen the screw on the top right.

1.2 If the switch panel has to be removed completely, remove the appliance casing and pull out the rotation axis on the bottom plate.

1.3 Shielding inset

- Remove the components from the control panel carrier.
- Remove the control panel carrier from the switch panel.
- Hook out the shielding inset carefully.

2. Casing

To remove the following parts, the casing must be first removed:

- All microwave components and fuses
- Components of the air guide system
- Door safety switches, latch mechanism
- Temperature fuses
- Fan
- Rotating antenna
- Waveguide

2.1 Waveguide note

- To remove the wave guide disconnect the ridges at the perforation.
- Remove the fastening screws at the antenna support.
- Using the screws provided fix the replacement waveguide from above and from inside.

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3. Rear panel

To remove the following components, the rear panel must be first removed:

- Top heating element
- Bottom heating element
- Convection motor
(remove the deflector and fan blade from the front through the oven cavity)

Note: The fan blade has a lefthanded thread.

3.1 Mounting instructions for top heating element

When fitting the top heating element make absolutely sure that the mounting components are secured in the right order: oven wall – contact plate – flange clamp. The contact plate must be exchanged each time the top heating element is replaced (safeguard).

4. Front

The following components of the oven can be replaced from the front.

- Antenna (remove the casing in addition)
- Oven lamp cover (remove the oven top)

Note:

Follow the installation sequence.

From the top: sealing – glass (smooth side downwards) – flange.

- Catalytically coated oven top
(without removal of the top heating element)
- Oven sealing is secured at the corners of the oven.

5. Door region

The following components can be removed after the front glass panel has been removed by loosening the mounting screws.

- Handle
- Operator for the door switches
- Lambda latch
- Sealing
- Interior glass screen
- Shielding grid

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5.1 Shielding grid note

To prevent the oven viewing panel from misting over the shielding grid has to be sealed on both sides along the fastening holes with aluminium adhesive tape.

5.2 Installation note: Lambda latch

Center the lambda latch towards the oven before the screws are tightened, e.g. by using four cardboard strips, each approx. 1.5 mm thick, or with the inset from the microwave packing material.

5.3 Door frame, complete door

Two retention pins are supplied with the spare part "door frame" for arresting the door hinges.

Dismantling note

- Open the door
- Insert the pins supplied with the door frame into the holes of the two hinges, pull the door frame with hinges upwards out of the oven flange.

5.4 Door hinges

- The replacement door hinges are supplied in an arrested state (under tension).
- Additionally, two loose retention pins are supplied with each hinge.

5.4.1 Dismantling note

- Arrest both door hinges of the appliance with the pins supplied.
- Pull the door frame upwards out of the oven flange (see point 5.3.1).
- Unscrew the defective hinge from the door frame, making sure that the hinge is in an arrested state.

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<i>5.4.2 Installation note</i> Attach the replacement hinge to the door frame while it is in an arrested state. Do not tighten the screws completely (elongated holes) as the door has to be centred towards the oven. • Insert the door frame into the oven flange. • Open the door and remove the pins. • Close the door and centre towards the oven with 1.5 mm cardboard strips or with the inset from the microwave packing material. • Reopen the door and tighten the fastening screws of the hinges. 6. Possibilities for measuring and testing the microwave components Important note: Measurements should only be carried out on the components when the power cable has been disconnected. 6.1 Magnetron • Volume resistance between F and FA, disconnect the terminals. Set value: less than 1 ohm. • Check the insulating resistance between F and FA and the magnetron casing using an EHG-tester or a metra-tester. Set value: infinite. 6.2 High voltage diode • Measure the insulating resistance with an EHG-tester or a metra-tester. • Set value non-conducting direction: infinite. Conducting direction: full continuity. • Control voltage > 500 V. 6.3 High voltage transformer and -capacitor Please refer to the training booklet.			

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III. MICROWAVE-COMPACT APPLIANCES

1. Appliance designation

1.1 Küppersbusch

EMWK 870.0 – Built-in appliances

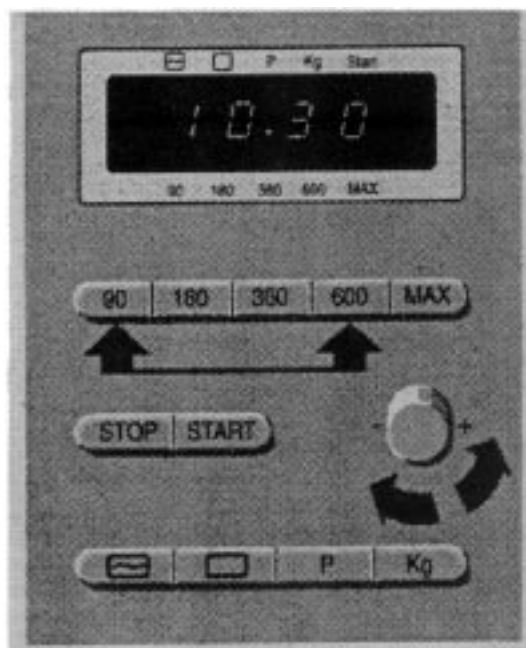
2. Product specifications

- Electronic control including program control
- 4 heating modes, each combinable with the microwave operation
- Short-stroke keys

3. Operating instructions

3.1 Setting the clock

1. Press keys 90 and 600 simultaneously.
2. Turn the adjusting knob until the correct time appears in the display.
3. To confirm press keys 90 and 600 again and the clock will start.



Küppersbusch

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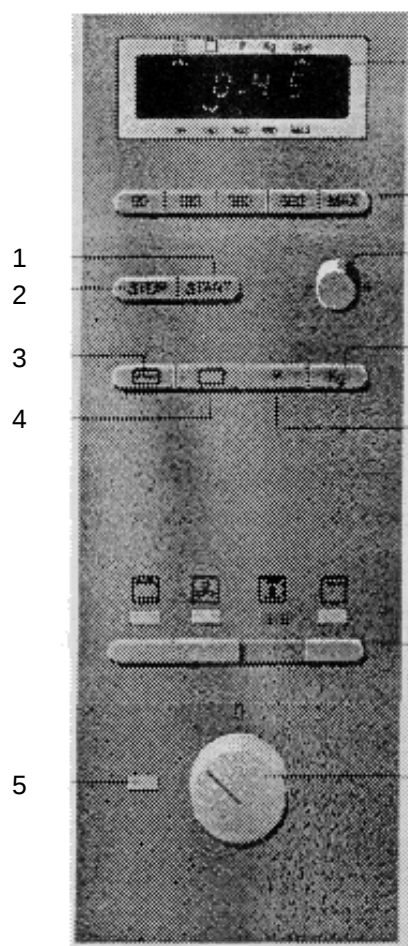
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3.2 How to fade out the time display

1. Press keys 90 and 600 simultaneously.
2. Turn the adjusting knob beyond 24.00 and then back to 0.00; the display will darken after a few seconds.

3.3 The control panel

Display, the arrow point to the corresponding symbol of the setting.

Microwave power level keys

Adjusting knob

Weight key

Programme key

Heating mode keys

Temperature selector

1. Start key
2. Stop key
3. Combined function key
4. Oven key
5. Temperature pilot lamp

3.4 Grilling mode

The grilling levels I (low), II (medium) and III (high) can be adjusted by varying the operating times (clocking), III corresponds to 100%.

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3.5 Important notes

3.5.1 Setting the cooking time using the timer

- Microwave MAX 30 minutes
- 600 W 1 hour
- 360, 180 and 90W, 1hour 30 minutes each
- Oven 4 hours

3.5.2 Opening the door while the appliance is in the automatic mode

If the oven door is opened while the appliance is operating, microwave generation and the oven functions will be interrupted. After the door has been closed, operations will continue; a renewed start is not required.

4. Technical description

The electronic circuit board serves to control the microwave unit and the automatic oven function. There is no automatic regulation of the oven temperature.

Five different keys are available to adjust the microwave power output. The activated power level is displayed by an arrow-shaped symbol. Up to three different power levels can be entered in succession. A rapid start function can be initiated by pressing the number keys 1 to 9. This means that the maximum power level can be entered directly for a cooking time of 1 to 9 minutes.

Use only to heat liquids!

4.1 Microwave power level control

The power level is controlled by primary clocking. The clocking times are determined by the control unit. The MAX-power is limited to 800W, a complete cycle lasts 24 seconds.

Power level	ON-time	OFF-time
MAX	24	0
600 W	20,6	3,4
360 W	13,1	10,9
180 W	7,8	16,2
90 W	4,9	19,1

For all ON-times the build-up time of the magnetron, which is 1.9 secs., has already been taken into account.

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4.2 Initial current limitation

To limit the initial current when the microwave mode is used, the high voltage transformer is operated briefly via the R21 resistor.

The relays serve the following functions:

- K2 closes after the start and opens at the end of the set time.
(fan motor and oven lamp)
- K6 closes simultaneously with K2.
(current limitation circuit arm)
- K7 closes 100 ms later than K6, another 100 ms later K6 is reopened, so that K6 and K7 are both closed at the same time.

This sequence is repeated each 24 sec.-cycle.

Also for each partial output selected.

The relays are part of the circuit board.

4.3 Delayed stop mechanism for fan (only in built-in appliances)

The delayed stop mechanism of the magnetron fan is steered and timed by the control unit. This means that the fan will continue to run when the microwave function has ceased.

On activation of the K2 relay the fan (M1) will continue to run for another five minutes, if the microwave function has just been in operation:

- At MAX-power level for at least 3 minutes or
- At power levels 600W and 360W for at least 5 minutes or in combination mode under the above conditions.

The delayed stop mechanism is also activated without any time restriction, when the appliance has been in conventional operation. The period of time that the fan continues to run is determined by the temperature regulator (N13).

The oven lamp remains on as long as the delayed stop is being executed. The delayed stop mechanism is necessary to remove moisture and to reduce the temperature of the oven when the appliance has ceased to operate.

Otherwise adjacent pieces of furniture could be damaged.

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4.4 Technical data

- High voltage transformer

Primary winding	0 – 3 ohms
Secondary winding	80 – 120 ohms
Filament winding	< 1 ohm

- High voltage capacitor

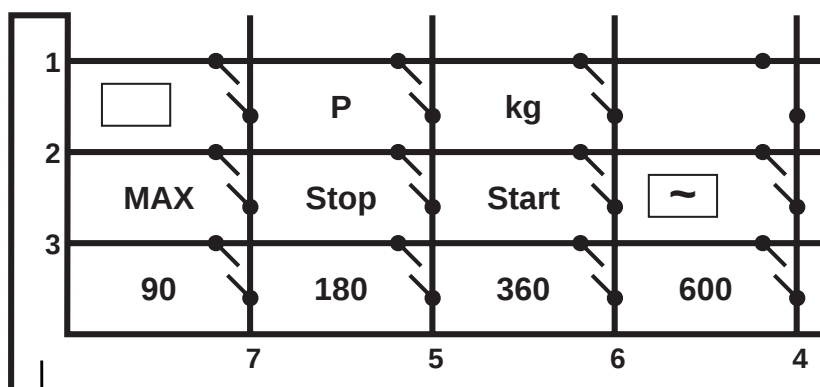
Capacity	1.24 μ F
Resistance	0 – 9 Mohms rising

- Safety switches

F3	Safety switch (relay control)	6,8 mm
F4:	Short-circuit switch	10,8 mm
F5:	Monitored switch	6,8 mm
F6:	Safety switch	10,8 mm

The adjustment values refer to the OFF-mode.

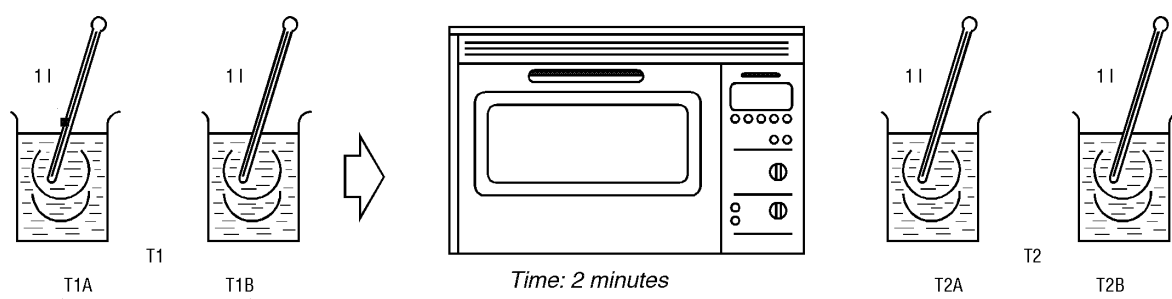
4.5 Keyboard layout



Terminal markings at the circuit board plug

5. Repair instructions

5.1 Measurement of the microwave power output



- Measure the average starting temperature. (Stir the water!)
- Heat at MAX-power level for 2 minutes.
- Measure the average final temperature. (Stir the water!)
- Calculate the difference in temperature.
- Calculate the power output from the following formula:

Difference in temperature x factor 70 + supplementary factor (100W)

The set value must be in the range of the given power output $\pm 10\%$.

5.2 Installation of the top heating element

Install the mounting components in the specified sequence. The contact spring must be replaced each time the top heating element is exchanged (carry out the microwave leakage test !)

5.3 Removal of the oven door

After the oven door has been opened the retention pins must be inserted in the holes, then the door is closed until a blocking point is reached. The complete door can be unhinged by overcoming the resistance. The door is installed in the reverse sequence.

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5.4 Time display is incorrect

The frequency of the mains supply is the time base for the clock. In Europe this is standardized at 50 Hz.

If fluctuations occur, e.g. a lower frequency of 49.9 Hz, this may cause the clock to lose up to 20 minutes in 24 hours.

However, this has no impact on the functions and on the program sequence.

5.5 Initial current limitation is defective

If the initial current limitation is defective, the fuse can sometimes be triggered (depending on the time the appliance is switched on in relation to the sinus wave). This can blow the appliance when it is switched on.

The following repair steps must be carried out:

1. Check the fuses, 16A L or B-automatic fuses are required.
2. Check the limiter resistance including cables.
3. Test the relay contacts K6 and K7.

If no fault is detected, then it is to be traced in the drive region of the relays. The drive takes place by means of a processor located on the control module. The control unit must be replaced.

5.6 Time or microwave operating time cannot be adjusted

The time adjustment is operated by a bit generator, which is separated from the control modul, and thus represents an exchangeable spare part.

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5.7 Test programme for after sales service technicians

5.7.1 Start test programme:

Access is only possible by pressing the RESET-key (clock blinks) and when the operating keys are in 0-position.

Press the following key combination within 5 secs.: 1 x 90, 2 x 180, 3 x 360 W

5.7.2 Running the test programme

After starting the test programme all segments, arrows and LEDs light up.

Open the door, then close it again.

All segments, symbols and LED's go out.

The decimal point in the time display blinks once every second for the entire duration of the following test.

When a random key is pressed a response is given as shown in the table.

Key	Display	Outlet	Remarks
90	Arrow	K2	
180	Arrow	K4	
360	Arrow	K6	
600	Arrow	K7	
MAX	Arrow	—	
Bit generator	**	—	
Oven + M-W	Arrow	—	
Oven	Arrow	—	
Start	Arrow	K6/K7	M-W-Start
Stop	—	Buzzer	*
Program	Arrow	—	
Weight	88.88	—	

* The buzzer is heard once for approx. 1 sec.

** If the bit generator rotates continuously, the display changes as follows during one cycle: 80.00/08.00/00.80/00.08

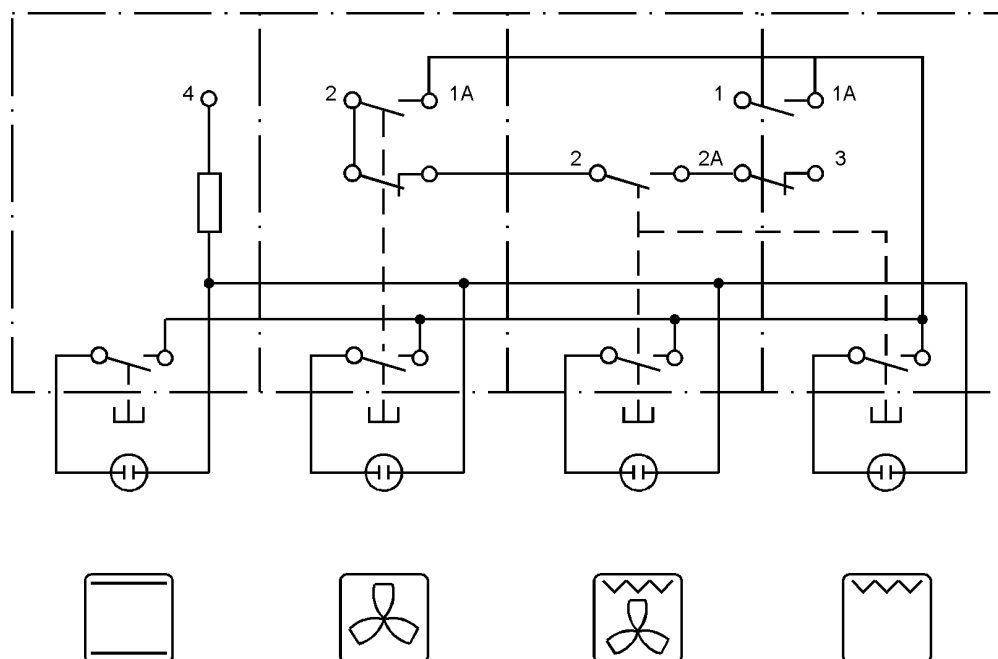
5.7.3 Ending the test program

The clock goes into the RESET-mode after 20 secs. if no key is pressed.

6. Circuit diagrams

Diagram

Selection switch



Functions of the contacts

1A - 1	By-passes lower heating element E13 in switch setting  and 
1A - 2	Convection motor M3 in switch setting 
2A - 2	Convection motor M3 in switch setting  (clocked in an alternating sequence with grill heating element E16 via oven regulator N8)
2A - 3	Separates lower heating element E12 and oven temperature pilot lamp H9 in switch settings  and 

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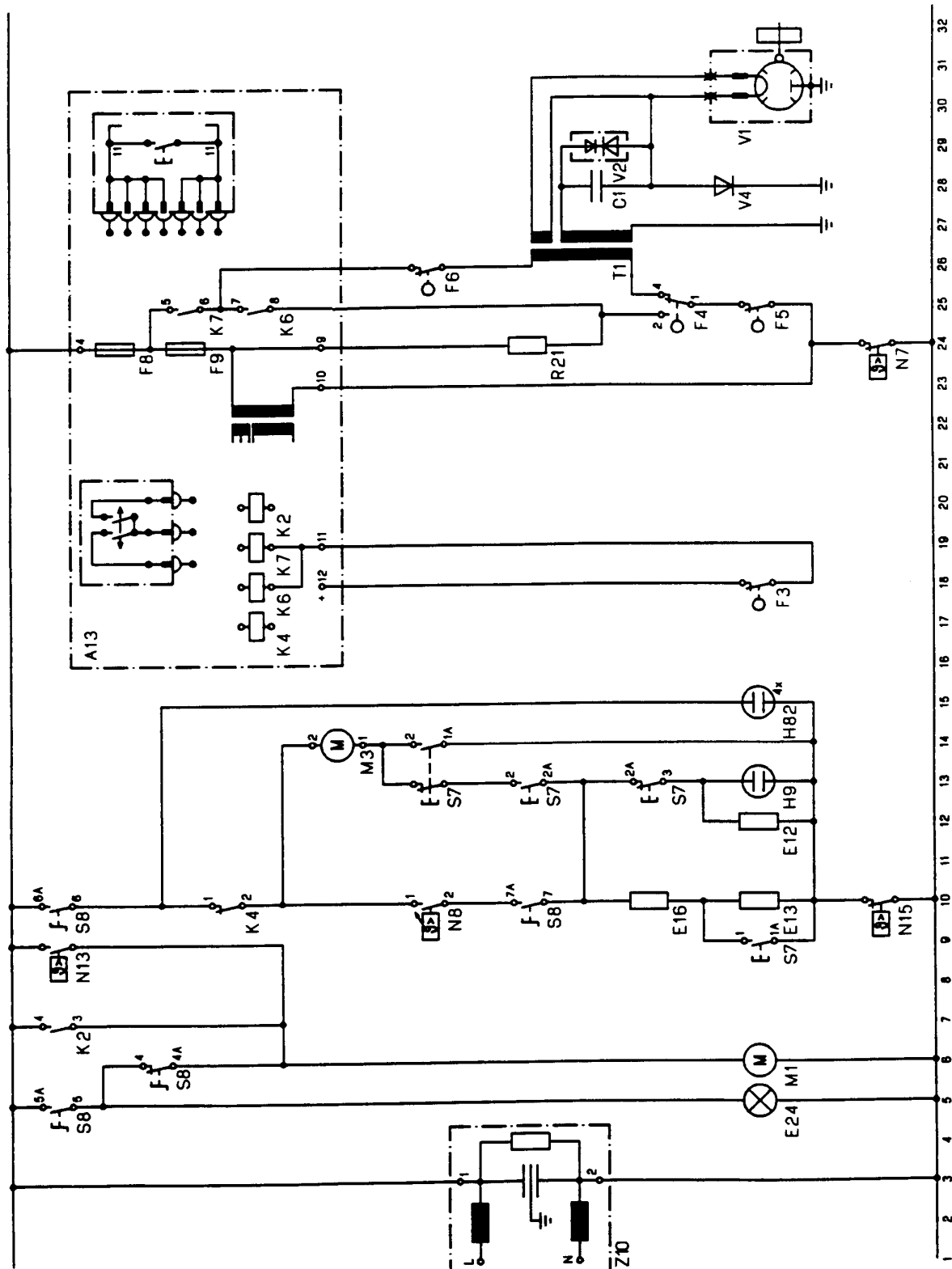
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Switch setting	0		50 ... 250 °C		Functions of the contacts
7  7A					Disconnects the oven heating element in switch setting 
6  6A					Disconnects the oven from the mains
5  5A					Oven lamp E24 and cooling fan motor M1
4  4A					Disconnects the cooling fan motor M1 in switch setting 
3 3A					
2 2A					

Note:
Connection 5A-6A not
with CH-variants
having 2N ~

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Path of the current

A13 Electronic control
C1 High voltage capacitor

E12 Lower heating element 467 W/225 V *)
E13 Lower heating element 433 W/79 V *)
E16 Grill heating element 1900 W/225 V *)
E24 Oven lamp 40 W

F3 Safety switch
F4 Safety switch
F5 Safety switch
F6 Safety switch
F8 Fuse 10 A
F9 Fuse 1,25 A

H9 Oven temperature control lamp
H82 Display, temperature setting
K2 Output relay
K4 Output relay
K6 Current limiting relay
K7 Timing pulse relay

M1 Cooling fan motor
M3 Convection motor

N7 Temperature limiter
N8 Oven regulator
N13 Cooling fan regulator
N15 Temperature limiter

R21 Resistance 30 ohms

S7 Selection switch
S8 Oven switch

T1 High voltage transformer

V1 Magnetron
V2 Protective diode
V4 High voltage diode

Z10 Noise filter

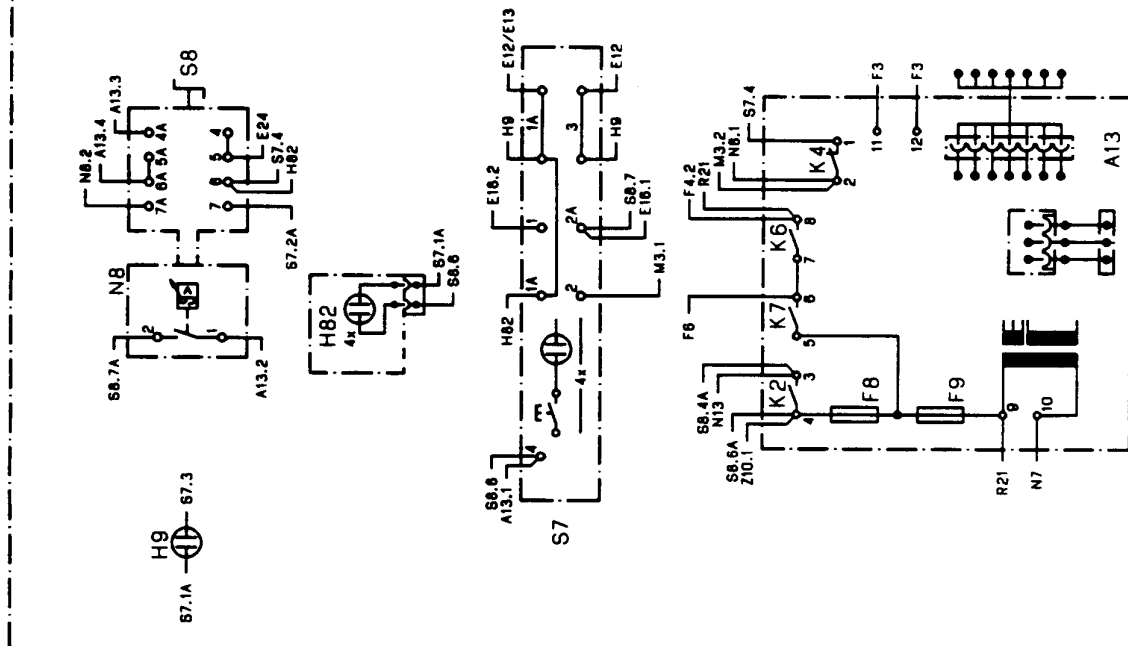
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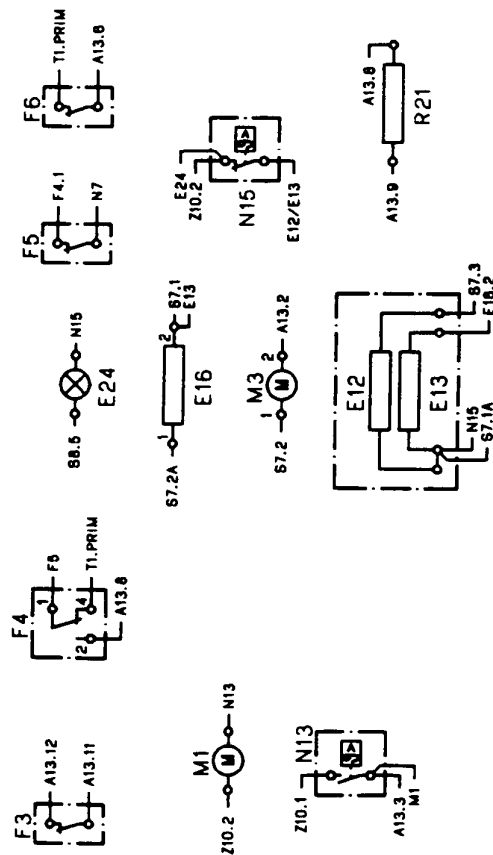
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Diagram: 120-41866-001
Diagram: 120-41725-001
Safety switch with door closed

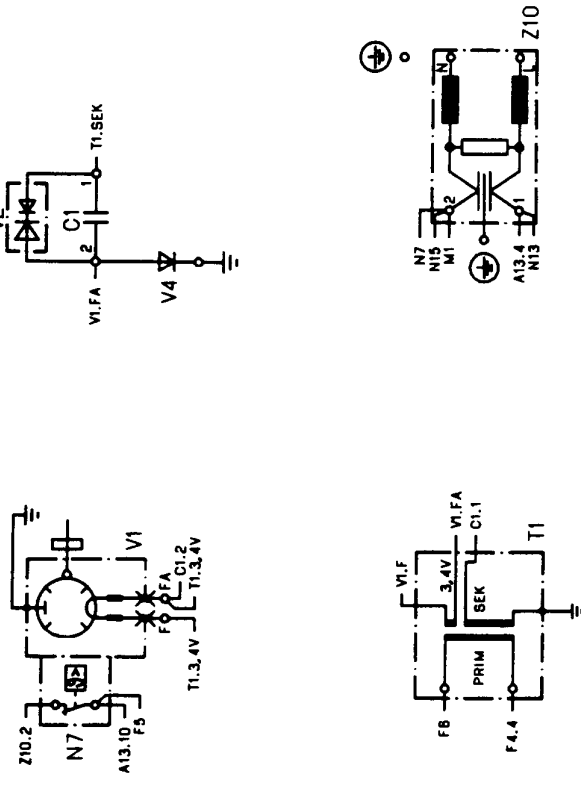
Switch panel unfolded Front view



Rear view



Side view from the right



A13	Electronic control
C1	High voltage capacitor
E12	Lower heating element 467 W/225 V *)
E13	Lower heating element 433 W/79 V *)
E16	Grill heating element 1900 W/225 V *)
E24	Oven lamp 40 W
F3	Safety switch
F4	Safety switch
F5	Safety switch
F6	Safety switch
F8	Fuse 10 A
F9	Fuse 1,25 A
H9	Oven temperature control lamp
H82	Display, temperature setting
K2	Output relay
K4	Output relay
K6	Current limiting relay
K7	Timing pulse relay
M1	Cooling fan motor
M3	Convection motor
N7	Temperature limiter
N8	Oven regulator
N13	Cooling fan regulator
N15	Temperature limiter
R21	Resistance 30 ohms
S7	Selection switch
S8	Oven switch
T1	High voltage transformer
V1	Magnetron
V2	Protective diode
V4	High voltage diode
Z10	Noise filter

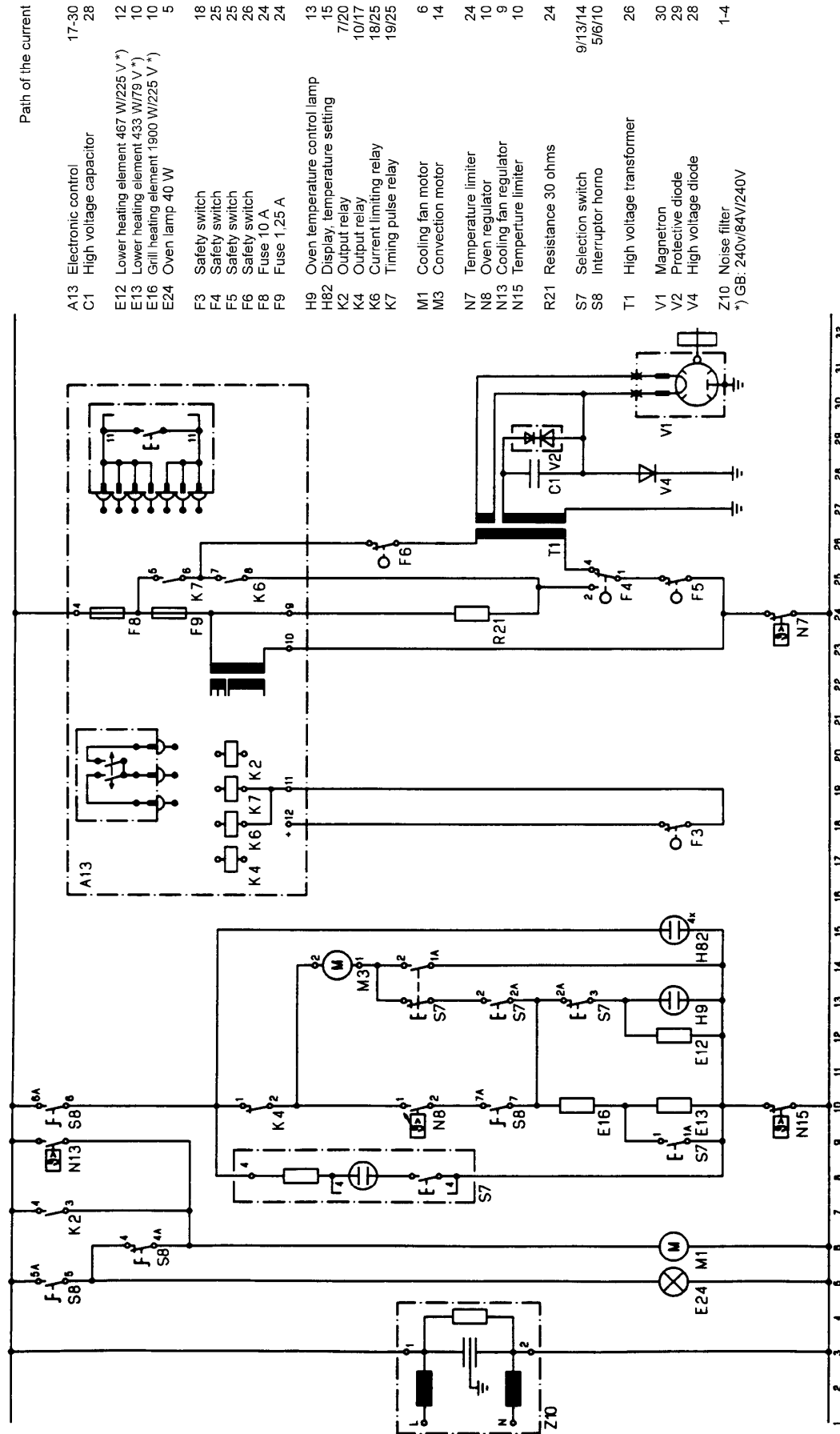
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Path of the current



- A13 Electronic control
- C1 High voltage capacitor
- E12 Lower heating element 467 W/225 V *)
- E13 Lower heating element 433 W/75 V *)
- E16 Grill heating element 1900 W/225 V *)
- E24 Oven lamp 40 W
- F3 Safety switch
- F4 Safety switch
- F5 Safety switch
- F6 Safety switch
- F8 Fuse 10 A
- F9 Fuse 1,25 A
- H9 Oven temperature control lamp
- H82 Display, temperature setting
- K2 Output relay
- K4 Output relay
- K6 Current limiting relay
- K7 Timing pulse relay
- M1 Cooling fan motor
- M3 Convection motor
- N7 Temperature limiter
- N8 Oven regulator
- N13 Cooling fan regulator
- N15 Temperature limiter
- R21 Resistance 30 ohms
- S7 Selection switch
- S8 Interruptor horn
- T1 High voltage transformer
- V1 Magnetron
- V2 Protective diode
- V4 High voltage diode
- Z10 Noise filter

*) GB: 240V/84V/240V

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Diagram: 120-41866-001

Diagram: 120-41725-001

Safety switch with door closed