SERVICE MANUAL

FL160 – FL230

471 1553-53

Electrolux

Wascator

NOTICE TO SERVICE PERSONNEL

INSTALLATION

Improper installation of Wascomat laundry and wet cleaning equipment can result in personal injury and severe damage to the machine.

REFER INSTALLATION TO QUALIFIED PERSONNEL!

RISK OF ELECTRIC SHOCK

The equipment utilizes high Voltages. Disconnect electric power before servicing.
The use of proper service tools and techniques, and the use of proper repair procedures, is essential to the safety of service personnel and equipment users.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

RISK OF PERSONAL INJURY

This equipment contains moving parts, and some components that may have sharp edges. Improper or careless service procedures may result in serious injury to service personnel.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

ABOUT THIS MANUAL

This manual is intended to provide service guidance to qualified service personnel. Wascomat and its authorized dealers make no determination regarding the qualification of individuals requesting this service manual. The service provider assumes all risks inherent to the servicing of this equipment and any risks that arise as result of the lack of knowledge or ability of any person servicing this equipment.

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL!

NOTE:

Improper installation or servicing of Wascomat equipment will void the manufacturer's warranty!

General

Fig. 1

This series of washing machines with drum volumes of 160 and 230 litres has been developed to fullfill with requirements of functioning, reliability and simple maintenance. The series accommodates the differing capacities needed by laundries, hotels, motels, hospitals, ships etc.

The machines have the drum mounted rigidly in the frame and therefore need secure anchoring to the floor.

The machines are supplied with the heating option required by the client: heating by electricity, steam, gas or without heating, and they can be connected to a range of water supply combinations: cold, hot and/or cold hard water.

The machines are supplied prepared for external liquid supply.

The machines are available with two different types of programmer:

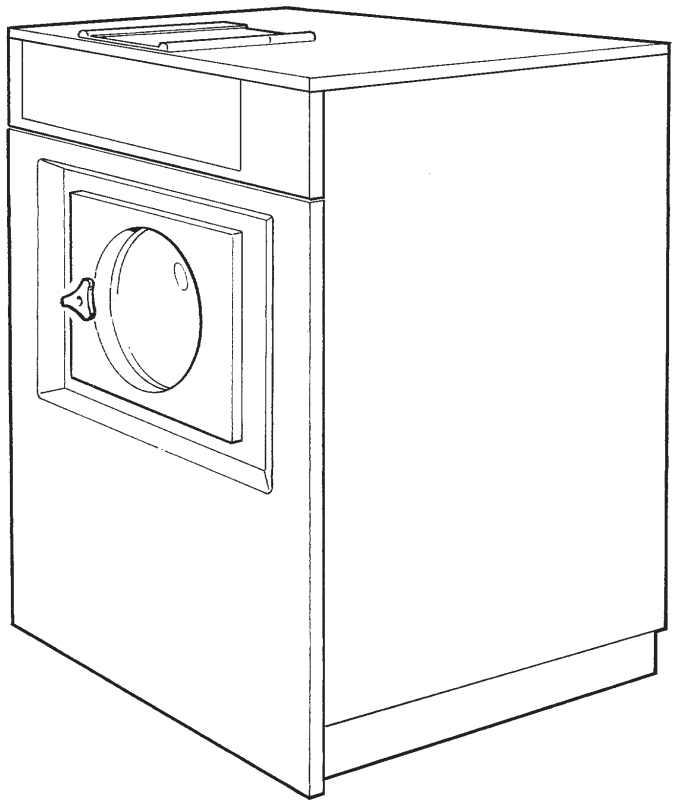
- A programmer which uses programmable cards.

  This makes it possible to adapt wash programs precisely on the basis of experience, textile type, degree of soiling etc. There are also control buttons for manual control of the washing process.

- A programmable electronic timer

  This is a programmer with nine preset wash programs and the ability to program and store up to 99 other of the user's own wash programs. A large display showing program information, statistics and error messages in plain language makes it easy for the user to enter his own programs. There are also control buttons for manual control of the washing process.

1



1418

Safety Regulations

- The machine is designed for water washing only.
- The machine must not be used by children.
- Installation and service work may only be carried out by qualified personnel.
- The machine's door lock may not be bypassed under any circumstances.
- System leakage, such as a worn door gasket, should be repaired immediately.
- Qualified personnel should study the relevant handbooks and service manuals before any repairs or service are done.
- This machine may not be sprayed with water.

	FL160	FL230
Dry weight capacity		
at filling factor 1:13	12,3 kg	17,7 kg
at filling factor 1:10	16 kg	23 kg
Drum volume	160 l	230 l
diameter	620 mm	700 mm
depth	520 mm	600 mm
Drum speed		
wash	52 r/min	45 r/min
spin	500 r/min	455 r/min
G-factor		
wash	0,9	0,8
spin	87	81
Dimensions		
width	745 mm	825 mm
depth	995 mm	1090 mm
height	1195 mm	1320 mm
Recommended service space		
side	250 mm	250 mm
rear	500 mm	500 mm
Min. space for moving machine during servicing		
side	50 mm	50 mm
rear	250 mm	250 mm
Weight		
net	202 kg	265 kg
gross, crate packed	220 kg	287 kg
gross, box packed	280 kg	352 kg
Transport volume		
crate packed	1,1 m^3	1,42 m^3
box packed	1,5 m^3	1,8 m^3
Max floor load during spin	2,4±4,8 kN	3,1±5,2 kN
Frequency (dynamic load)	8,5 Hz	8,5 Hz
Water valves		
connection	DN20 3/4"	DN20 3/4"
rec. water pressure	200-600 kPa	200-600 kPa
pressure limits	40-1000 kPa	40-1000 kPa
capacity at 300 kPa	27 l/min	100 l/min
Drain valves		
conn. outside diameter	75 mm	75 mm
capacity	160 l/min	160 l/min
Steam valve		
connection	DN15 1/2"	DN15 1/2"
rec. steam pressure	300-600 kPa	300-600 kPa
pressure limits	50-800 kPa	50-800 kPa

160 liters

Heating alternative	Voltage alternative	Total kW	Fuse A	Cable cross-section mm^2
No heating	208-240 V 1 AC 60 Hz	2,6	16	3 x 2,5
or	208-240 V 3 AC 60 Hz	2,6	10	4 x 1,5
Steam heating	230 V 3 AC 50 Hz	2,6	10	4 x 1,5
	400-440 V 3N AC 50 Hz	2,6	10	5 x 1,5
	415-440 V 3N AC 50 Hz	2,6	10	5 x 1,5
El 12,0 kW	230 V 3 AC 50 Hz	12,8	35	4 x 10
	400 V 3N AC 50 Hz	12,8	20	5 x 4
	415-440 V 3N AC 50 Hz	12,8	20	5 x 4

230 liter

Heating alternative	Voltage alternative	Total kW	Fuse A	Cable cross-section mm^2
No heating	208-240 V 3 AC 60 Hz	2,3	10	4 x 1,5
or	230 V 3 AC 50 Hz	2,3	10	4 x 1,5
Steam heating	400 V 3N AC 50 Hz	2,3	10	5 x 1,5
	415-440 V 3N AC 50 Hz	2,3	10	5 x 1,5
El 18,0 kW	208-240 V 3 AC 60 Hz	18,9	50	4 x 16
	230 V 3 AC 50 Hz	18,9	50	4 x 16
	400 V 3N AC 50 Hz	18,9	35	5 x 10
	415-440 V 3N AC 50 Hz	18,9	35	5 x 10

Fig. 1

The drum unit of the machine is rigidly mounted to the frame, which means that the machine must be bolted to the floor.

The shaft of the inner drum runs in the outer drum on two bearings at the rear and its leak-proofing is ensured by two neoprene radial seals.

The motor is mounted on a rubber-damped shaft under the drum. The motor's belt-tensioning device is also rubber-damped to prevent noise from being transferred from the machine frame to the building.

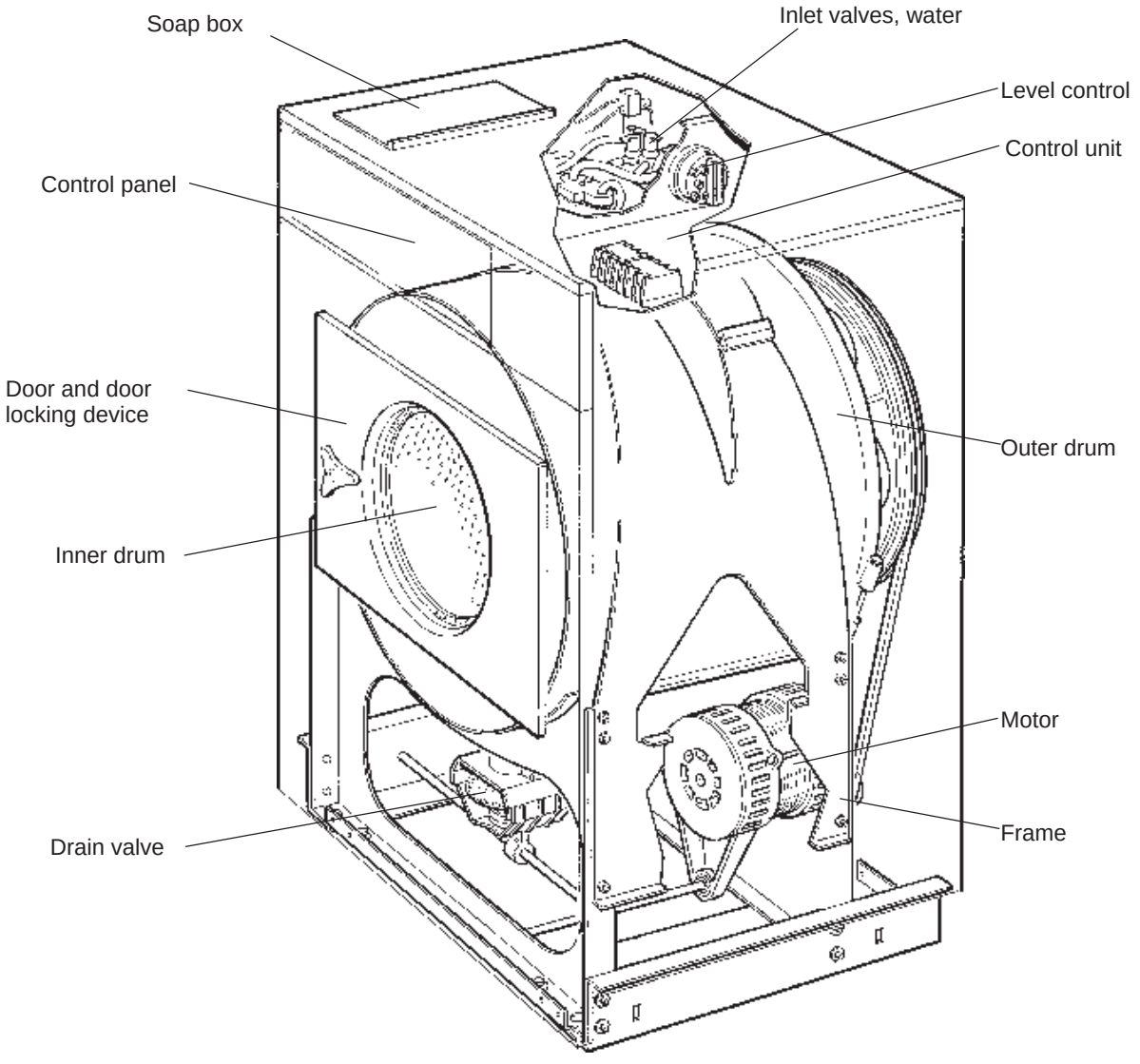
The drain valve is a membrane valve which is controlled with the help of the water pressure in the cold water connection.

The door is electrically locked when the machine is running.

Programmer, level control, thermostat, motor relays etc. are all located in the control unit, easily reached from the top of the machine.

The front panel can be ordered in a choice of finishes (galvanised/painted or stainless steel). The side panels are galvanised/painted, the rear panel is galvanised/unpainted an the top panel is stainless steel.

1



For proper and safe machine operation, the maintenance procedures described below should be followed.

Frequency of maintenance should be based on the machine's degree of use.

Daily

- Check door and safety lock:
  - Open the door and try to start machine. It should not start.
  - Close the door, start machine and try to open the door. It should not be possible to open the door.
  - Make sure the door does not leak.
  - Clean the door seal of any residual detergent.
- Check that the drain valve does not leak during operation.
- Clean detergent dispenser of any residual detergent.

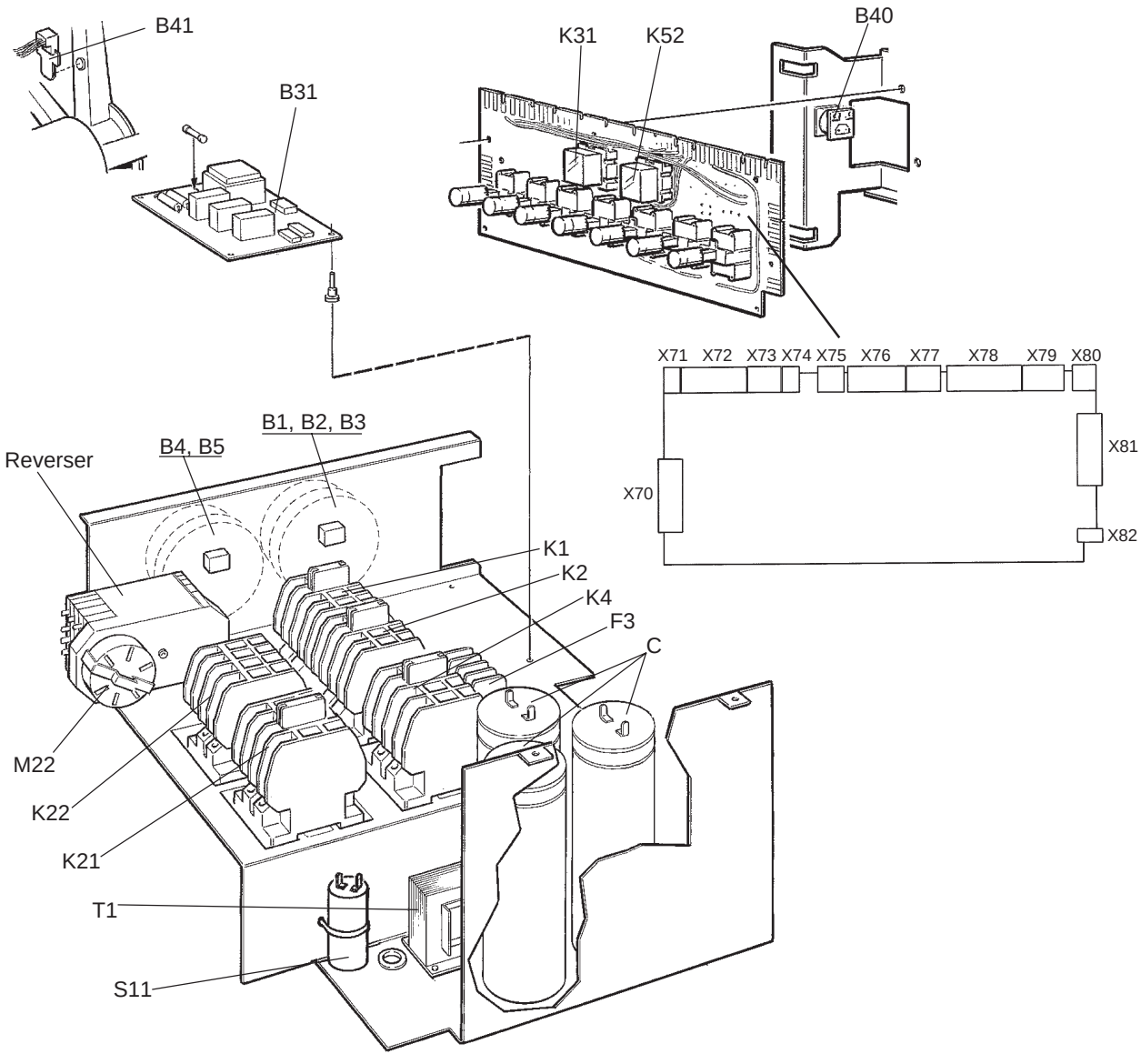
Every three months

- To check the safety lock security function in case of power failure:
  - Start the machine and allow it to operate at least one minute (so that the bimetal spring in the lock mechanism warms up). It should not be possible to open the door during this time.
  - Turn the main supply off. The drain valve should now open and any remaining water flushed out. The door should remain locked approx. 1 minute after the power cut-off.
- Check the machine drain and remove any lint.
- Inspect inside the machine (directly during washing to detect any possible leakage).
  - Turn the main supply off.
  - Remove top cover, rear and front protection panels.
  - Check that hose connections do not leak.
  - Check the V-belts, stretch or replace them when necessary (see Chapter 30. Motor).
  - Check that water odes not leak onto the foundation. Such leakage may indicate that the machine's radial packing needs to be replaced.
  - If heating takes an unusually tong time, check for lime deposits on the heating element. When necessary remove the deposits with a deliming agent.

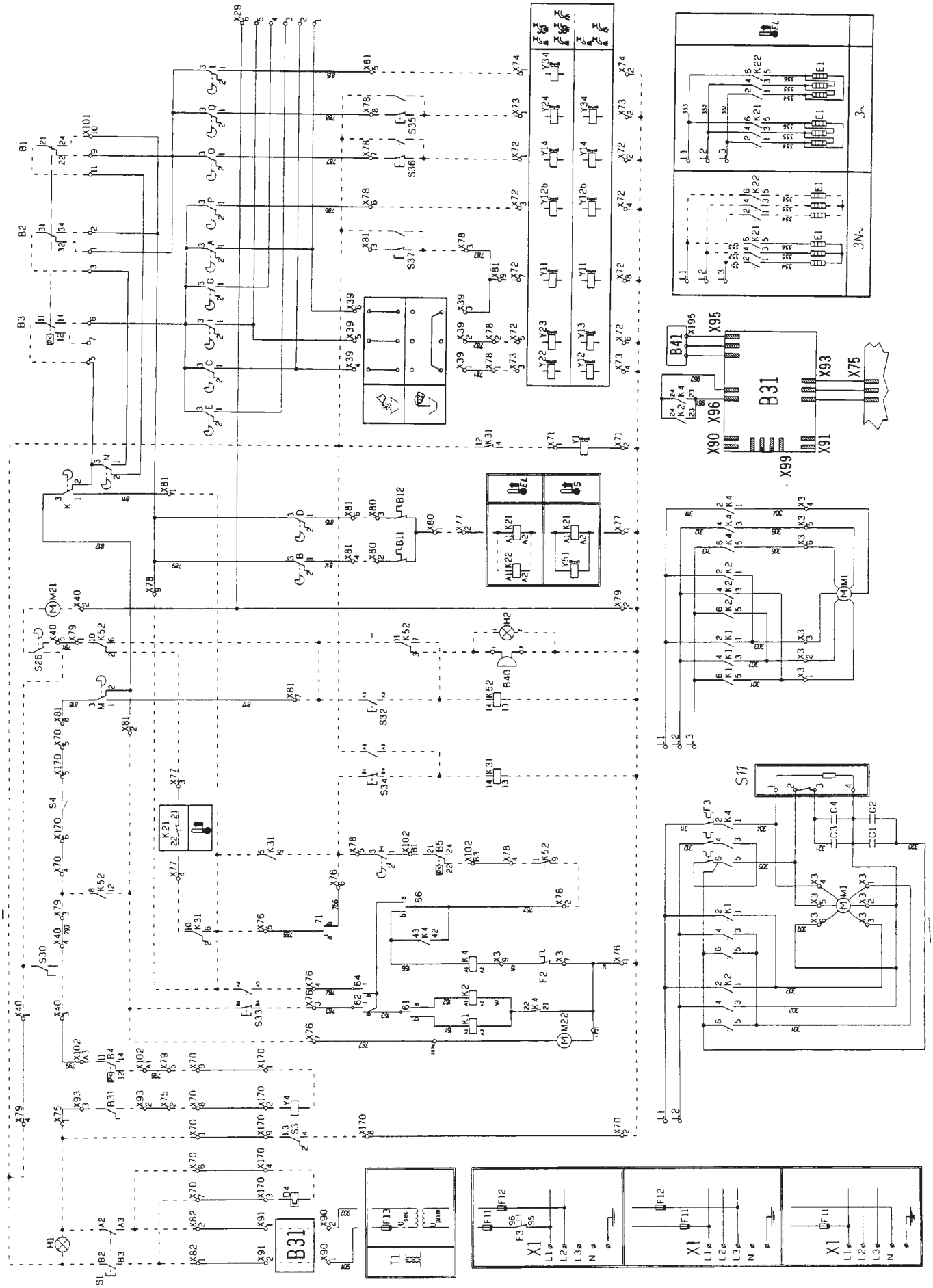
General

To facilitate fault-tracing in the electrical system, the circuit diagram has been divided up into separate function sequences, as follows:

1



Circuit diagram

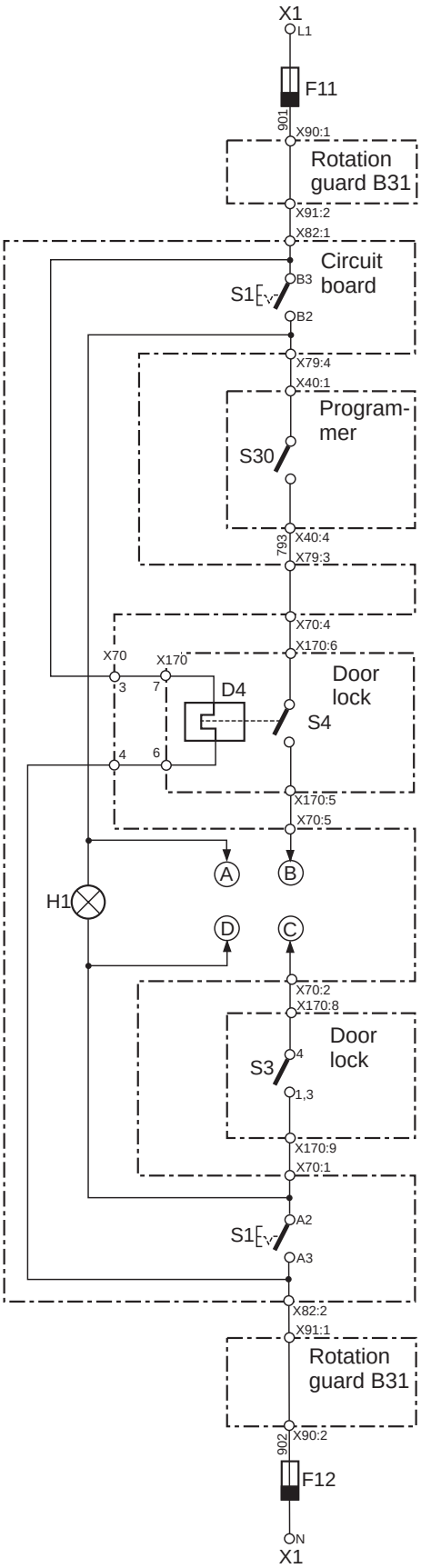


Power supply and start

Fig. 2 The door must be closed (which closes switch S3 (6)) and locked (which closes switch S4 (5)) before power will be supplied for the machine functions.

If switch S1 (3) (7) closes and the programmer knob is turned from 0 to 1 so that switch S30 (4) closes, Point (B) will be energised. The machine will now start, provided a programmed card has been inserted into the programmer.

2



(1) F11 Fuse

(2) B31 Rotation guard

(3) S1 ON/OFF switch

(4) S30 Switch, programmer

(5) S4 Switch, door lock

Ⓐ Ⓑ Ⓒ Ⓓ : Power supply to other function sequences

(6) S3 Switch, door

(7) S1 ON/OFF switch

(8) B31 Rotation guard

(9) F12 Fuse

1957

Restart

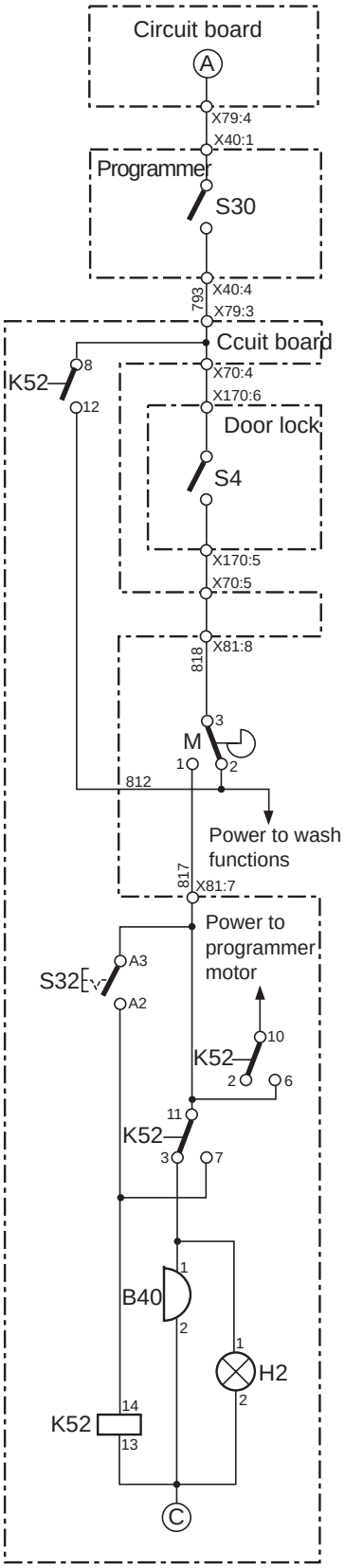
Fig. 3 Use rib M, stop (4), on the program card to programme a stop in the program sequence, for example to dispense detergent. This function is also used when the wash is finished.

When rib M (4) has been programmed, the programmer switch changes from position 2-3 to 1-3. This supplies power to buzzer B40 (8) and lamp H2 (9), and at the same time cuts power to the washing functions and programmer motor (the drain remains closed, however).

Relay coil K52 (10) is energised by pressing switch S32 (5) and is locked via K52:11-7 (7). The power supply to the buzzer and the lamp is also cut now. K52:6-10 (6) closes to supply power to the programmer. K52:8-12 (2) closes to supply power to the wash functions again, and the wash cycle continues.

When the program card has been advanced far enough for rib M not to be programmed any longer (switch M will change to position 2-3), the lock on K52 (10) releases.

3



Ⓐ : Power supply, see "Power supply and start" diagram

(1) S30 Switch, programmer

(2) K52 Relay, restart

(3) S4 Switch, door lock

(4) Programmer rib M Stop

(5) S32 Switch, restart

(6) K52Relay, restart

(7) K52 Relay, restart

(8) B40 Buzzer

(9) H2 Lamp, restart

(10) K52Relay, restart

Ⓒ : Power supply, see "Power supply and start" diagram

1958

Door lock

Fig. 4

Delay unit D4 (6) has a bimetallic spring which, when heated, locks the door, provided that door lock coil Y4 (7) is not activated. When Y4 is activated the door can be opened immediately even if the bimetallic spring has been heated. The delay unit is activated even when ON/OFF switches (2) (10) are off. The bimetal takes at least two minutes to cool.

For the machine's wash functions to be supplied with power, both S3 (8) and S4 (5) must be closed. S3 (8) closes when the door is shut. S4 (5) closes when the door is locked, i.e. when door lock coil Y4 (7) is no longer activated.

When switch S30 (3) in the programmer is turned, the power to coil Y4 (7) is cut and the door locks. At the same time S4 (5) is energised and closes when the door locks. All wash functions are now supplied with power and the machine can start working.

Before the door can be opened again, the following conditions have to be met:

- The drum has to be at a standstill.

  Rotation guard B31 (9) cuts the power as soon as the drum begins to rotate, and does not close again until the drum is completely at a standstill.

- The water must have emptied from the drum.

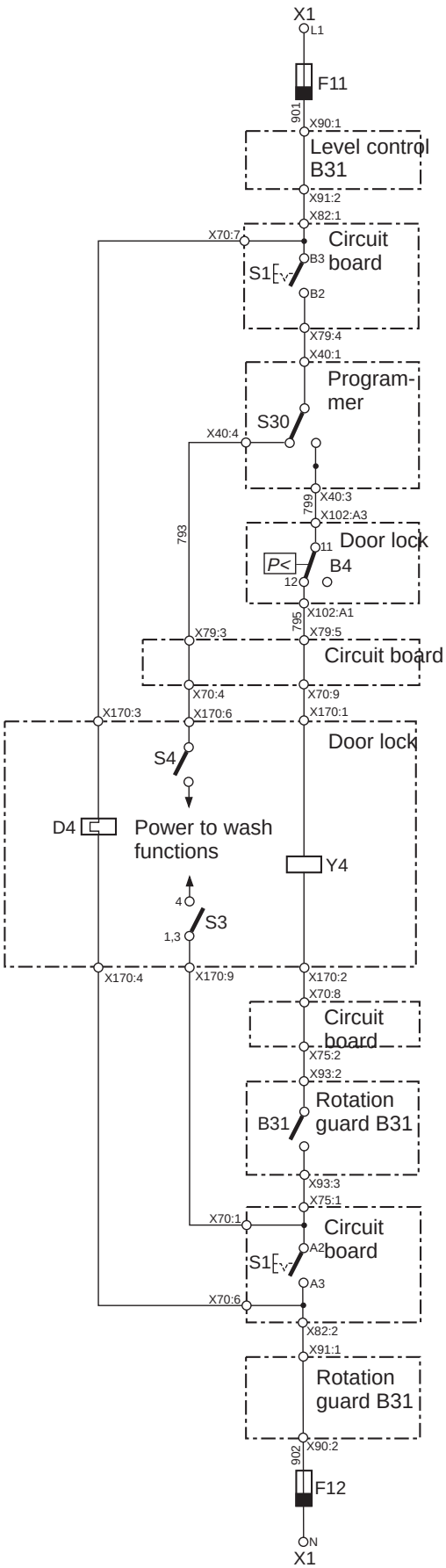
  Level control B4 (4) will not close until the water has emptied.

- The programmer switch S30 (3) must be turned to the OFF position.

When these conditions have been met, door lock coil Y4 (7) will be supplied with power and the door can be opened.

If the mains power supply should be cut the delay unit will keep the door locked for at least 2 minutes so that the drum has time to stop and the water to empty before it becomes possible to open the door.

4



(1) F11 Fuse

(2) S1 ON/OFF switch

(3) S30 Switch, programmer

(4) B4 Level control, door lock

(5) S4 Switch, door lock

(6) D4 Delay unit, door lock

(7) Y4 Door lock coil, open

(8) S3 Switch, door lock

(9) B31 Rotation gurad

(10) S1 ON/OFF switch

(11) F12 Fuse

1959

Water filling

Fig. 5 The following conditions must be met before any of water valves Y14 (10), Y24 (11) or Y34 (12) will be energised:

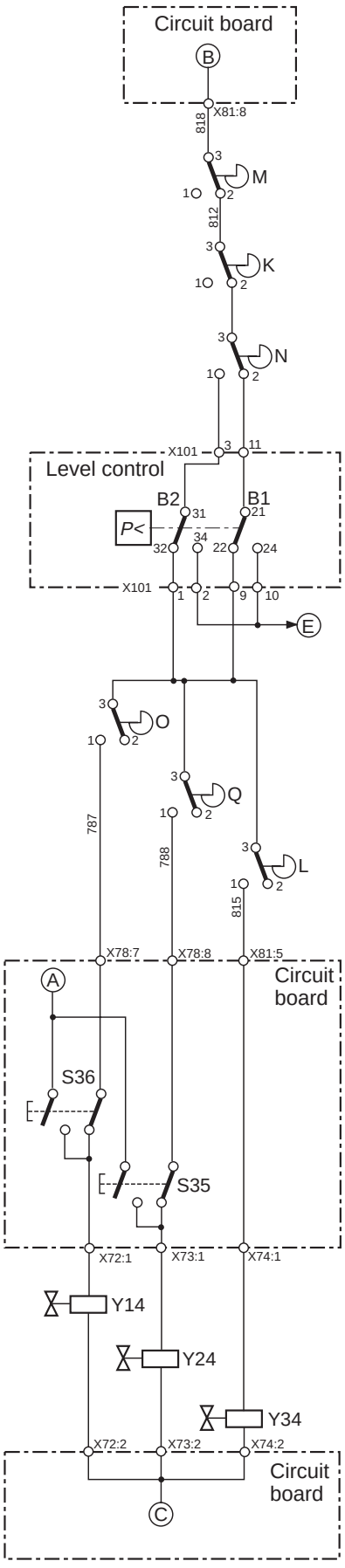
- Rib M, stop (1) must not be programmed.
- Rib K, drain (3) must not be programmed.
- The water level must not exceed low or high level.

  Level control B1 (4) has a switching contact, 21-22, which switches at low level, and level control B2 (4) has a switching contact, 31-32, which switches at high level. Which of these contacts activates the water valves depends on whether rib N, high level (3), is programmed or not.

If the conditions above are met, the water valves can be controlled by programming rib O (5), rib Q (6) and rib L (7).

Water valves Y14 (10) and Y24 (11) can, however, be controlled manually by means of switches S36 (8) and S35 (9) on the machine control panel, regardless of the position of the level controls.

5



Ⓑ : Power supply, see "Power supply and start" diagram

(1) Programmer rib M, stop

(2) Programmer rib K, drain

(3) Programmer rib N, high level

(4) B2 Level control, high
B1 Level control, low

E = power supply to other function sequences

(5) Programmer rib O
valve - cold water

(6) Programmer rib Q
valve - hot water/hard water

(7) Programmer rib L
valve - hard water

Ⓐ = Power supply, see "Power supply and start" diagram

(8) S36 Switch
valve - cold water

(9) S35 Switch
valve - hot water/hard water

(10) valve - cold water

(11) valve - hot water

(12) valve - hard water

Ⓒ : Power supply, see "Power supply and start" diagram

1960

Detergent supply and cool-down

Fig. 6

The machine has three built-in detergent compartments. A total of five valves in an external detergent supply can also be controlled via connector X29. For the valves to be controlled, the following conditions must be met:

- Rib M, stop (1) must not be programmed.
- Rib K, drain (2) must not be programmed.
- The water in the machine must have reached a certain level so that level control B3 (3) will have tripped. This means that water filling must take place via one of the valves, as described in the previous chapter, at the same time as or before detergent supply.

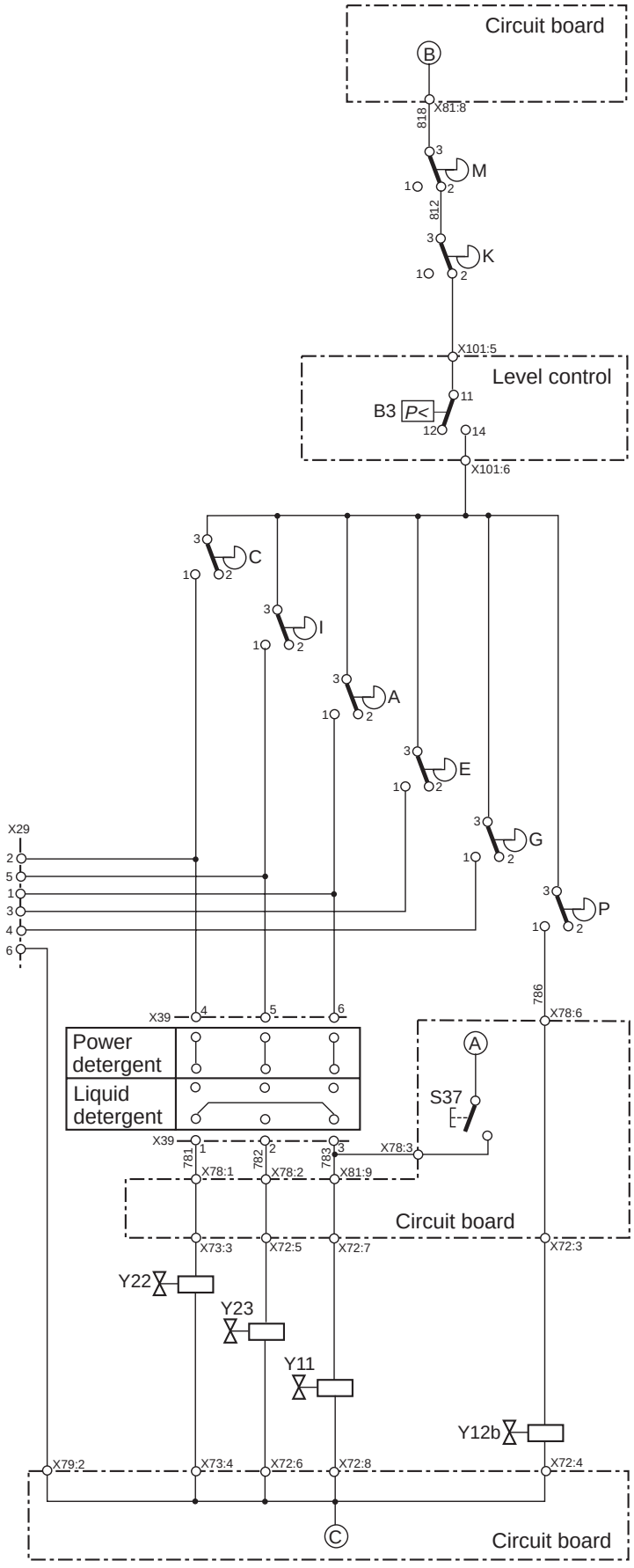
If these conditions are met, the water valves can be controlled by programming rib C (4), rib I (5), rib A (6). Using rib E (7) and rib G (8), a further two valves can be controlled in an external detergent supply.

Rib P (9) controls valve Y12b (14), which is used for the cool-down function. Rib P is also used for flushing liquid detergent.

Water valve Y11 (13) can also be controlled manually via switch S37 (10) on the machine control panel.

By installing straps at connector X39 the machine can be adapted for the use of liquid detergent. When liquid detergent is used, power is not supplied from the programmer to the valves. Flushing is done through compartments 1 and 2 simultaneously when switch S37 (10) on the machine control panel is depressed.

6



Ⓑ : Power supply, see "Power supply and start" diagram

(1) Programmer, rib M, stop

(2) Programmer, rib K, drain

(3) B3 Level control, detergent valves

(4) Programmer rib C
Valve, compartment 2, cold water/ hot water

(5) Programmer rib I
Valve, compartment 3, cold water

(6) Programmer rib A
Valve, compartment 1, cold water

(7) Programmer rib E
External supply 3

(8) Programmer rib G
External supply 4

(9) Programmer rib P
Cool-down

Ⓐ = Power supply, see "Power supply and start" diagram

(10) S37 Switch
valve, compartment 1, cold water

(11) Y22 Valve compartment 2, hot water

(12) Y23 Valve compartment 3, hot water
(13) Y11 Valve compartment 1, cold water

(14) Y12b Valve compartment 2, cool-down

Ⓒ : Power supply, see "Power supply and start" diagram

1961

Heating

Fig. 7

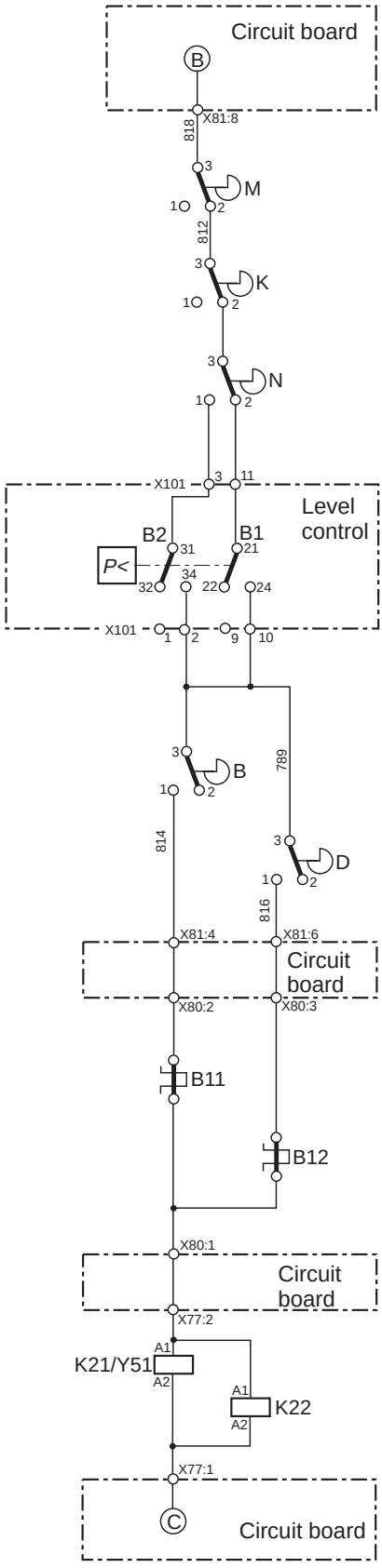
The following conditions must be met for relay K21/valve Y51 to be energised:

- Rib M, stop (1) must not be programmed.
- Rib K, drain (2) must not be programmed.
- The drum must be filled with water to the correct level.

Level control B1 (4) has a closing contact, 21-23 for low water level, and level control B2 (4) has a closing contact, 31-33 for high water level. Which of these is active is determined by whether rib N (5) is programmed or not.

If these conditions are met, heating can be controlled by programming rib B (5) and rib D (6). Power supply to the heating relays (9) (10) is via two thermostats B11 (7) and B12 (8). The thermostat settings can be adjusted on the front panel of the machine.

7



Ⓑ : Power supply, see "Power supply and start" diagram

(1) Programmer, rib M, stop

(2) Programmer, rib K, drain

(3) Programmer, rib N, high level

(4) B2 Level control high
B1 Level control low

(5) Programmer, rib B, temp. 1

(6) Programmer, rib D, temp. 2

(7) B11 Thermostat 1

(8) B12 Thermostat 2

(9) K21/V51 Relay heat/valve steam

(10) K22 Relay heat

Ⓒ = Power supply, see "Power supply and start"diagram

1962

Wash speed

Fig. 9 Relay K1 (6) connects the wash speed windings of the wash motor. Relay K2 (7) also connects the motor windings but so that the motor operates in the opposite direction compared with K1.

The following conditions must be met for the relay coils to be energised:

- Rib M, stop (1) must not be programmed.
- The motor must not be working at extraction speed.

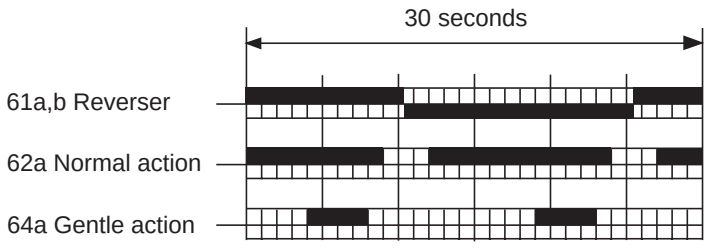
  If it is, K4:21-22 (8) will cut out the supply to the relay coils.

If rib M has not been programmed, reverser motor M22 (9) starts. Reversing contact 61 (5) is used to switch the wash motor's direction of rotation (K1 and K2 are connected alternately).

Fig. 8 Reversing contacts 62 (4) for normal wash and 64 (3) for gentle action control the rotation/pause intervals. Switch S33 7(2) on the machine front is used to determine which of the two reversing contacts will control activation of the relays. If S33 is set at the gentle action position, the water level must have been reached before wash speed will be allowed (point E in the diagram, see function diagram for "Water filling").

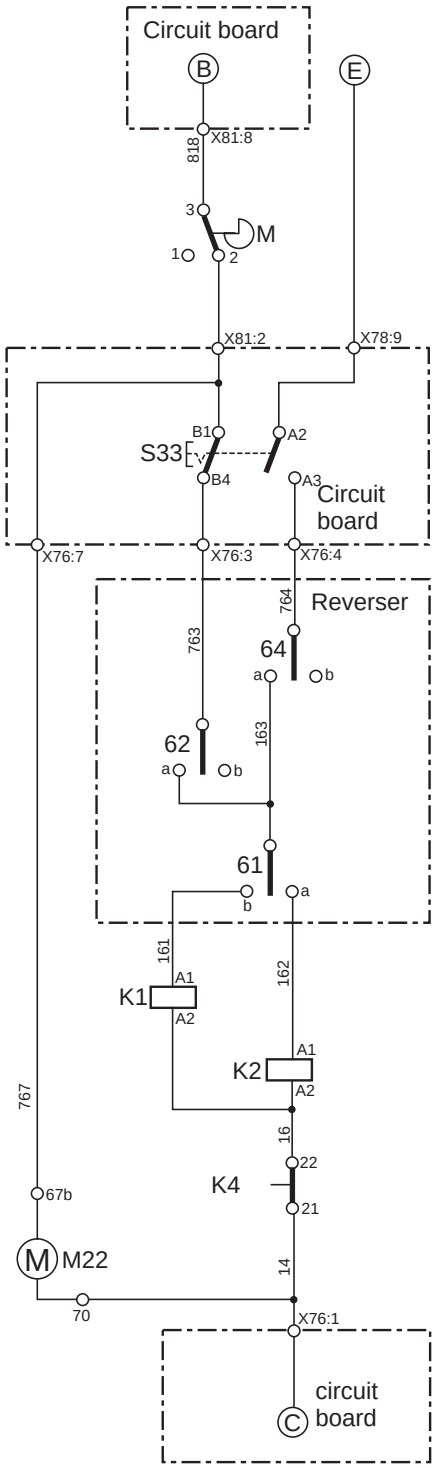
8

Reverser diagram



1964

9



Ⓑ : Power supply, see "Power supply and start" diagram
Ⓔ : Power supply from function sequence "Water filling"

(1) Programmer, rib M, stop

(2) S33 Switch, gentle action

(3) Reversing contact 64, gentle action

(4) Reversing contact 62, normal action

(5) Reversing contact 61, reversing

(6) K1 Relay, wash

(7) K2 Relay, wash

(8) K4 Relay, extraction

(9) M22 Reverser, motor

Ⓒ = Power supply, see "Power supply and start" diagram

1963

Drain

Fig. (11) Relay K31 (6) controls the drain valve. The following conditions must be met for relay K31 to be energised:

- Rib M, stop (1) must not be programmed.
- Rib K, drain (2) must be programmed.

Fig. (10) The circuit board has been prepared for machines with distribution speed. This is designed so that the machine will run at distribution speed when the drain opens. Here reversing contact 71b (3) is used to synchronise connection of the motor windings for distribution speed.

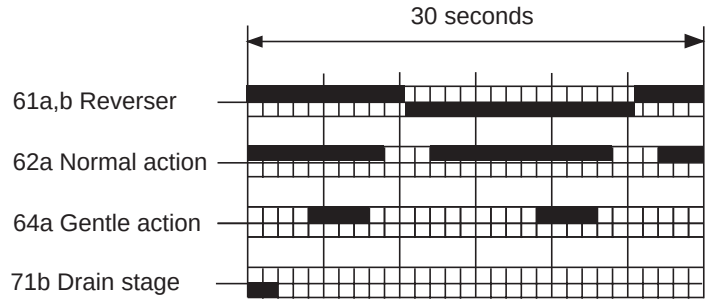
This machine series does not have distribution speed, but, even so, the function is connected, and works as follows:

- When rib K (2) has been programmed and reversing contact 71b (3) closes, relay coil K31 (6) is energised. K31:5-9 (4) now closes and causes K31 to lock when reversing contact 71b releases.
- When K31 is energised, K31:4-12 (7) releases, and drain valve Y1 (8) opens.

The drain valve can also be controlled manually via switch S34 (5).

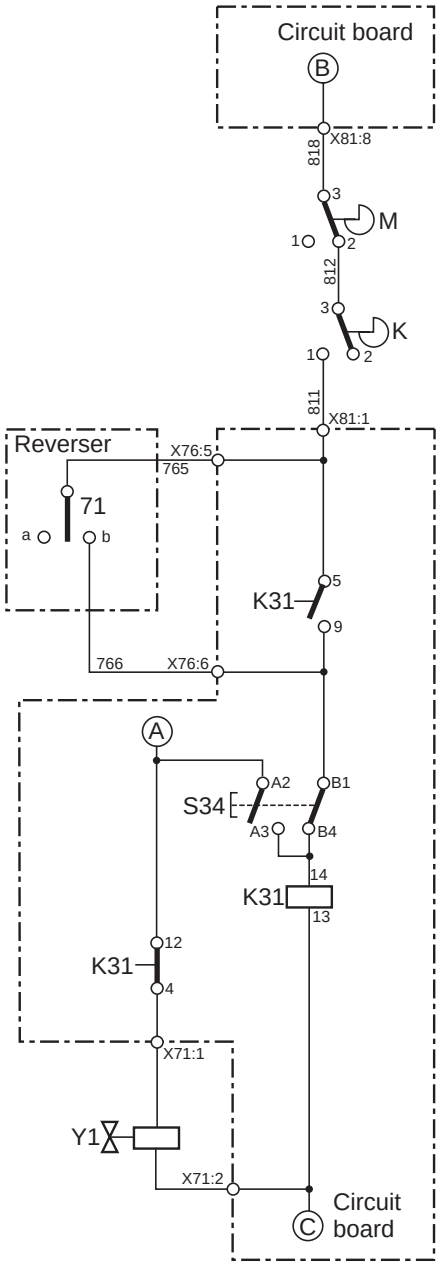
(10)

Reverser diagram



1966

11



Ⓑ : Power supply, see "Power supply and start" diagram

(1) Programmer, rib M, stop

(2) Programmer, rib K, drain

(3) Reversing contact 71, drain stage

(4) K31 Relay, drain

Ⓐ : Power supply, see "Power supply and start" diagram

(5) S34 Switch, drain

(6) K31 Relay, drain

(7) K31 Relay, drain

(8) Y1 Valve, drain

Ⓒ = Power supply, see "Power supply and start" diagram

1965

Extraction

Fig. 13 Relay K4 (10) controls connection of the motor's extraction windings. The following conditions must be met before relay K4 will be energised:

- Rib M, stop (1) must not be programmed.
- Rib K, drain (2) must be programmed and the drain valve open. The drain will not open until reversing contact 71b (3) closes (see function sequence diagram "Drain").
- Rib H, extraction (5) must be programmed.
- There must be no water left in the machine. If there is, level control B5 (6) will release.
- The restart function of the machine must not be activated - if it is, K52:1-9 (7) will release.

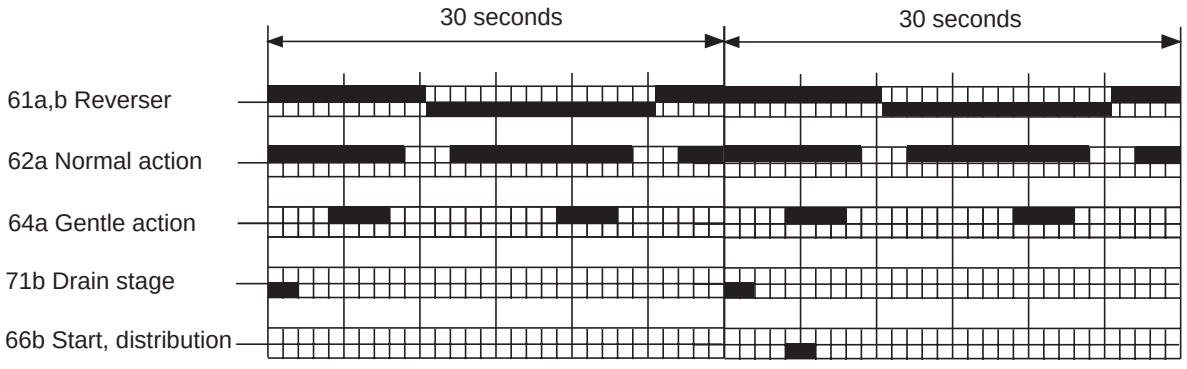
Fig. 12 If these conditions are met, relay K4 (10) will be supplied with power when reversing contact 66b (8) closes. This reversing contact closes when the motor is operating at wash speed and in the same direction as when extracting.

When reversing contact 66b closes, K4:42-43 (9) locks relay K4.

If the water level in the drum is very high, the drain time may be longer than 35 seconds. This means that the next time that 66b closes will be 95 seconds later. This means that the extraction time will not be controlled precisely. If rib H is programmed for less than 2 min. the actual extraction time may be either ≈30 sec. or ≈90 sec.

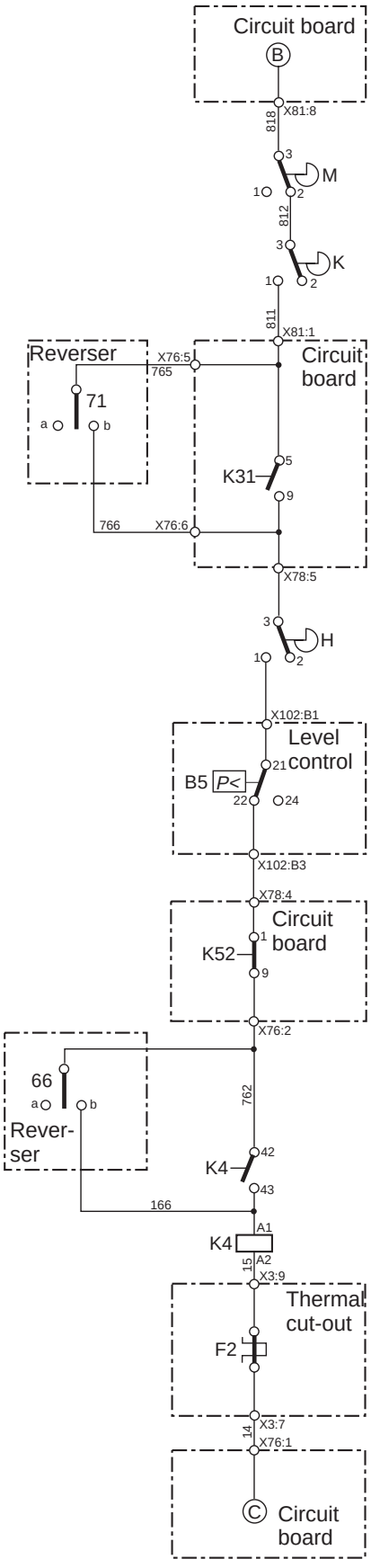
12

Reverser diagram



1968

13



(B) : Power supply, see "Power supply and start" diagram

(1) Programmer, rib M, stop

(2) Programmer, rib K, drain

(3) Reversing contact 71, drain stage

(4) K31 Relay, drain

(5) Programmer, rib H, extraction

(6) B5 Level control, extraction

(7) K52 Relay, restart

(8) Reversing contact 66, tumbling

(9) K4 Relay, extraction

(10) K4 Relay, extraction

(11) F2 Thermal, cut-out wash motor

(C) = Power supply, see "Power supply and start" diagram

1967

Programmer advance

Fig. 14 The programmer stops at three stages in the wash cycle: when the machine is filling with water, during heating, and from the point when rib K, drain, changes to position 1-3 until the drain actually opens.

For the programmer to start, rib M, stop (1) must not be programmed.

This is what happens at each stage in the wash cycle:

- When the machine is filling with water

  The programmer motor (9) is at a standstill because both of the level relays' (4) switching contacts are in their left-hand position. When the right level has been reached (depending on how rib N (3) has been programmed) the level relay's contact switches and the programmer motor is energised again.

- Heating

  During heating, K21:21-22 (6) cuts the power to the programmer motor.

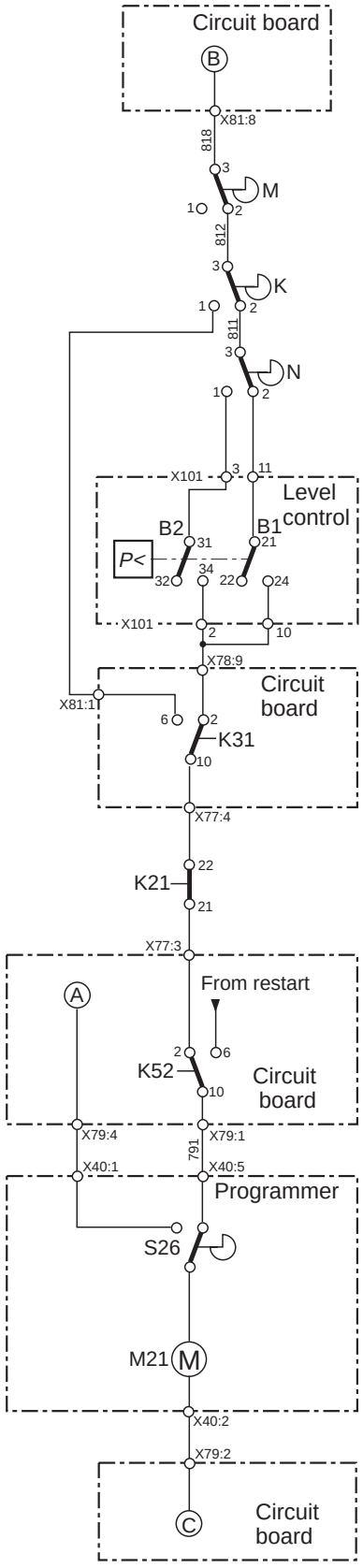
- Waiting to drain

  Activation of the drain is controlled by a contact in the reverser (see the function sequence diagram for "Drain"). The time from the point when rib K (2) switches to position 1-3 until drain relay K31 operates will be 30 seconds at the longest. During this time K31:10-6-2 (5) will be in position 10-2 and the programmer will not be energised. When the drain relay operates, the relay contact switches to position 10-6 and the motor will once again be supplied with power.

  Please note that when the drain has been activated the programmer motor will run even if the level controls have switched over to their left-hand position.

The programmer has a stepping switch S26 (8) which switches to its left-hand position at the instant that the programmer advances to the next stage. This means that the programmer will not come to a standstill while advancing, which could otherwise happen at the point when the various contacts within the programmer are switching position.

14



Ⓑ : Power supply, see "Power supply and start" diagram

(1) Programmer, rib M, stop

(2) Programmer, rib K, drain

(3) Programmer, rib N, high level

(4) B2 Level control, high
B1 Level control, low

(5) K31 Relay, drain

(6) K21 Relay, heating

(7) K52 Relay, restart

(8) S26 Programmer, step advance

(9) M21 Programmer motor

Ⓒ = Power supply, see "Power supply and start" diagram

1969

Machines with card programmer

Fig. 1

K1 Relay, wash speed

K2 Relay, wash speed

K4 Relay, extraction speed

K21 Relay, heating (gas and electric)

K22 Relay, heating (only for electric)

K31 Relay, drain

K52 Relay, restart

B1 Level control, high

B2 Level control, low

B3 Level control, detergent valves

B4 Level control, door lock

B5 Level control, extraction

B31 Rotation gurad - detects that the drum has stopped before the door can be opened. It also checks that the drum is actually rotating while the motor is operating.

B40 Buzzer

B41 Pulse generator for rotation guard

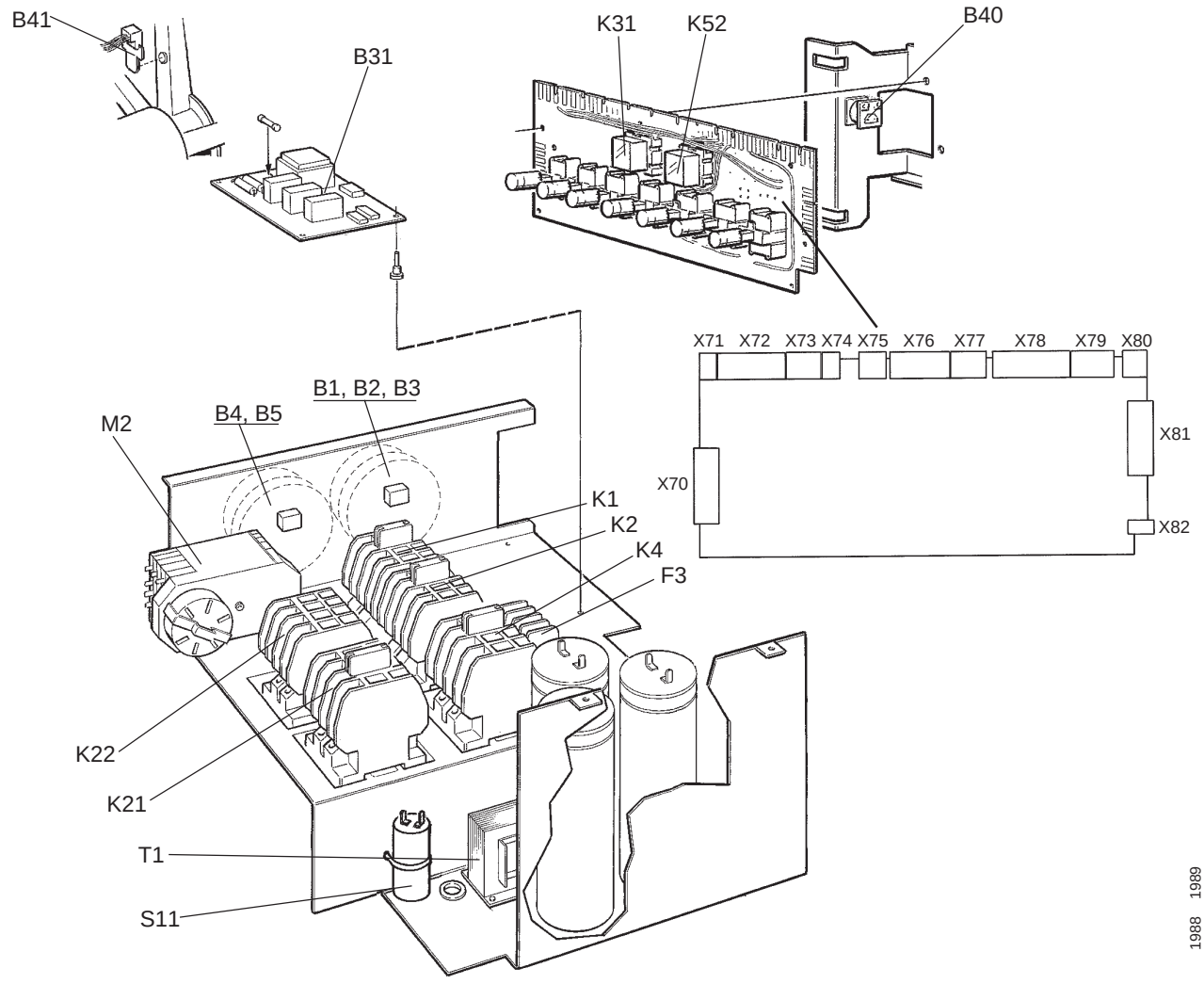
M2 Reverser - controls reversing of motor, also relation between rotation time/pause time. Controls switching in of extraction so that the motor is rotating in correct direction before extraction switched in.

T1 Transformer - provides power supply for the electronics unit. Switchable for different mains valtages: 100 V, 208 V, 220 V and 240 V.

F3 Overload protection, wash motor.

S11 Start relay, wash motor. Monitors current and automatically switches out the start capacitors when the curren falls below a certain level.

1



Machines with electronic timer

Fig. 2

K1 Relay, wash speed

K2 Relay, wash speed

K4 Relay, extraction speed

K21 Relay, heating (gas and electric)

K22 Relay, heating (only for electric)

K31 Relay, drain

B31 Rotation gurad - detects that the drum has stopped before the door can be opened. It also checks that the drum is actually rotating while the motor is operating.

B40 Buzzer

B41 Pulse generator for rotation guard

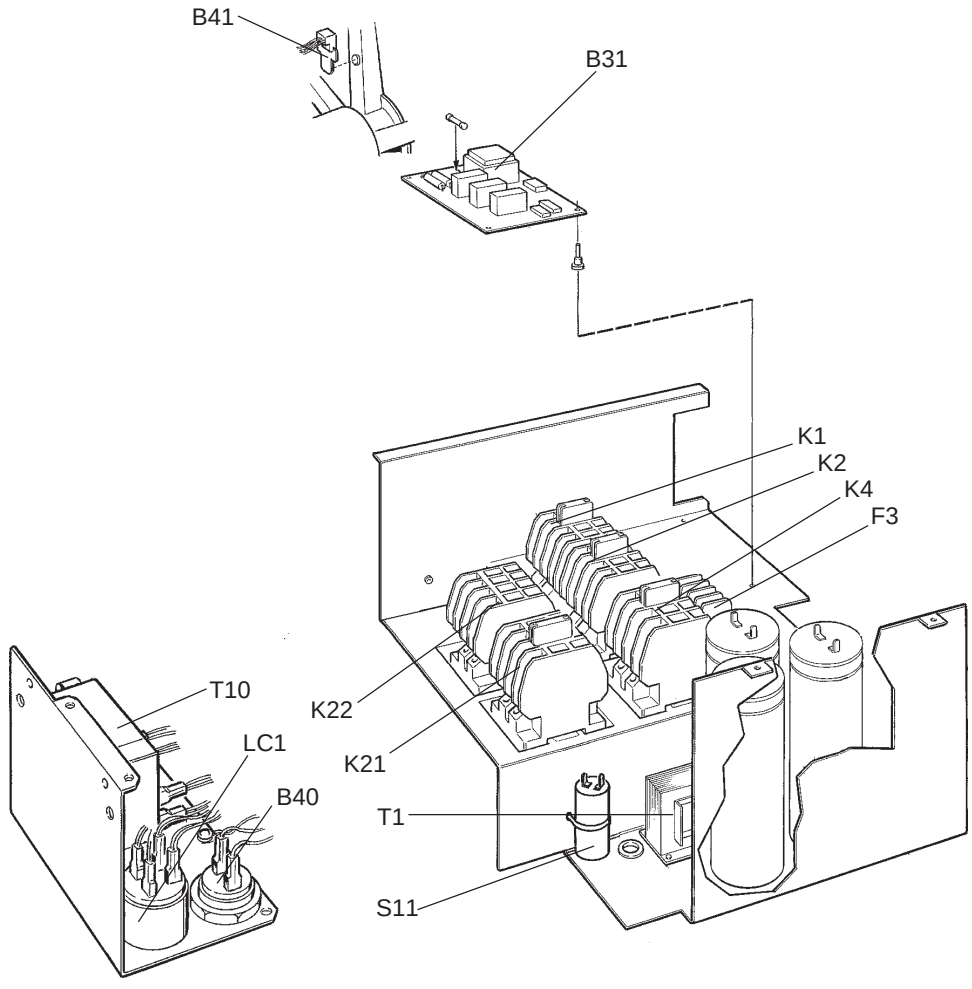
T1 Transformer

T10 Transformer - provides power supply for the electronics unit. Switchable for different mains voltages: 100 V, 208 V, 220 V and 240 V.

F3 Overload protection, wash motor.

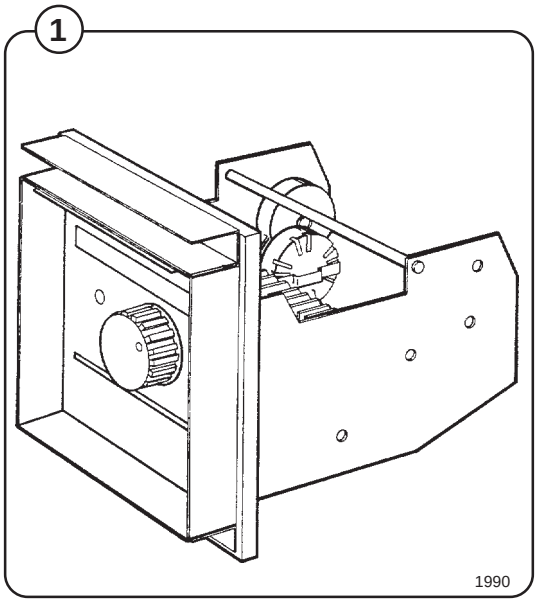
S11 Start relay, wash motor. Monitors current and automatically switches out the start capacitors when the curren falls below a certain level.

2



Description

Fig. (1) The card programmer controls machine functions such as filling of water, drain, spin etc. The card programmed has a row of microswitches (16) which sense the absence of pegs in the tracks on a programmed card. The card programmed has a motor which advances the programmed card one step (one peg) each 30 seconds. During the filling of water and heating the advance of the card is stopped to the relevant function is completed and the correct water level and the temperature selected on the thermostat have been reached. The advance of the card continues when the functions are completed.



Repair instructions

- Check that the synchronised motor of the card programmed is operating (see chapter 12).
  - Set switch ON/OFF in position ON.
  - Close the door.
  - Insert a programmed card to a position where drain has been programmed and turn the knob of the programmer to position I.
  - Wait until the drain valve has opened, can take up to 30 seconds.

  Now the synchronised motor have received power.

Fig. (2)
- Check that the support rollers are clean and that the track followers between the card and the microswitches are clean and run smoothly. (The card can often leave detergent on the support rollers and track followers).

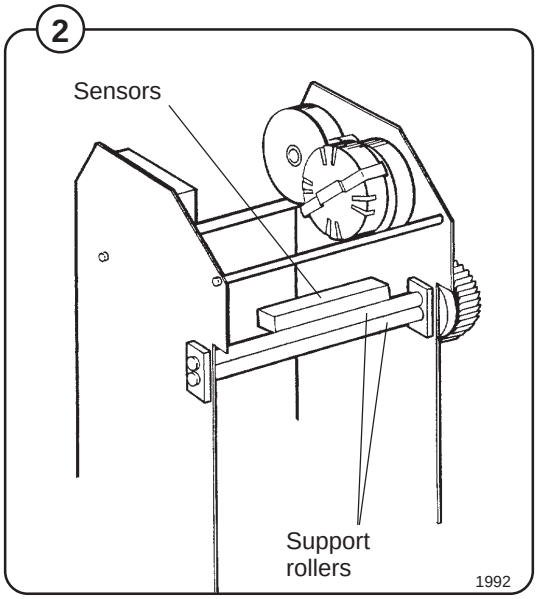


Fig. 3 If the synchronised motor receives power but the motor is not running:

- Remove the clamp which holds the motor and check that the output shaft of the motor revolves. (A fully synchronous motor can only rotate in one direction).
- If the motor functions, change the driving gear.

Fig. 4 To check the microswitches:

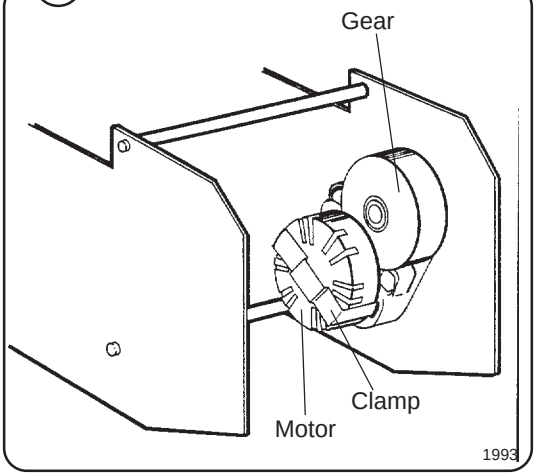
(A special test card is available to adjust and check the microswitches. The card is inserted in the automatic card device with the coloured area facing up and on the right. Use the edge of the opening as an indication line.)

1. Turn the automatic card device dial to position 0.
2. Insert the card.
3. Turn the automatic card device dial to position 1.
4. Slowly push the card out and in and check that all the microswitches switch off (within the two areas on the card). It is advisable to use a buzzer for this check.

Fig. 5

5. If any of the microswitches need to be changed/ adjusted, remove the two screws which hold the black protecting plate and remove the protecting plate. If necessary, replace faulty microswitches.
6. When carrying out adjustments the test card shall be inserted so that the white are on the card is situated at the edge of the opening of the device. Using the screw, adjust the microswitch so that the screw switches to the ON position.
7. Repeat point 4 in order to check that the switch is in the correct position.

3



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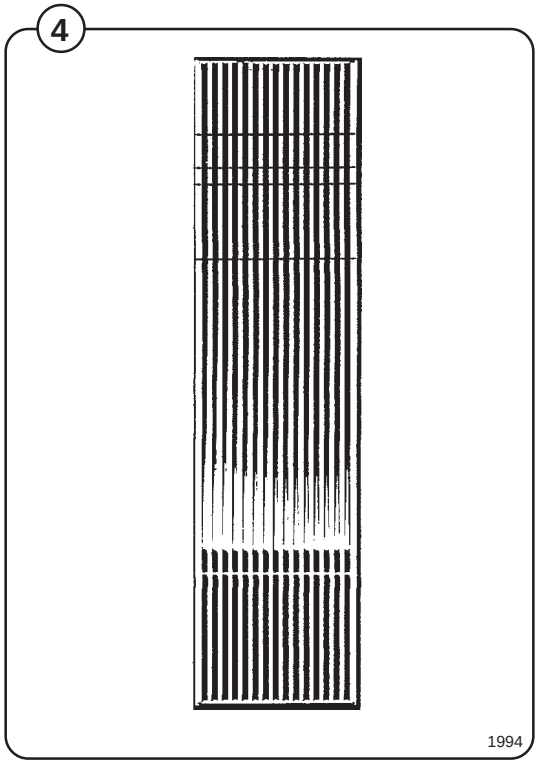

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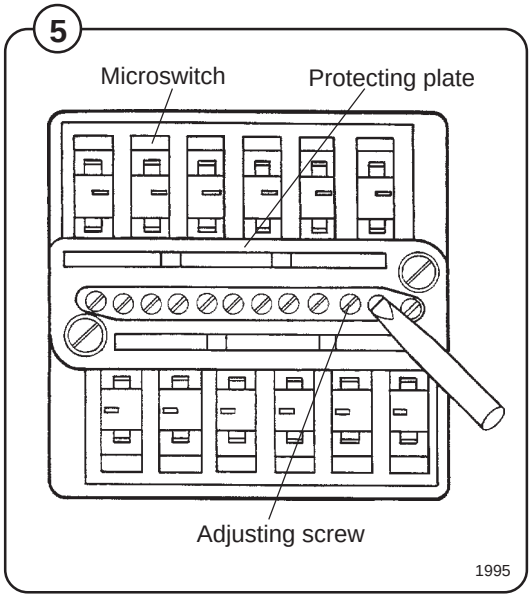


Description

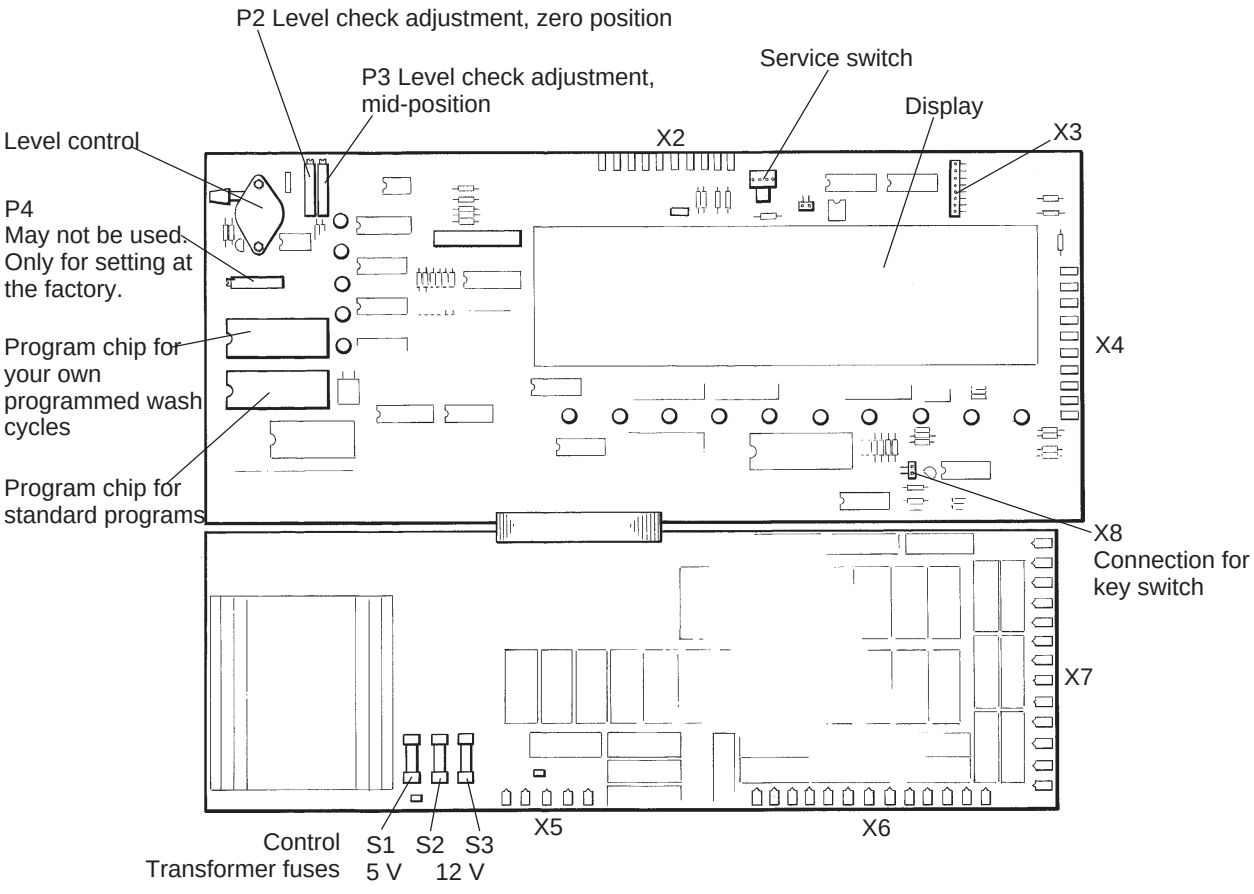
Fig. 6 The programmer is electronic and is made up of two circuit boards, the control board with microprocessors and program memory, and the relay board with relays and interference suppression circuits. The programmer has the following outputs and inputs:

- Outputs which, via relays, control the various functions of the machine such as water fill, drain, spin etc.
- Outputs which control the information that is to appear on the display.
- Inputs that detect keystrokes from the keyboard.
- Inputs that give information about the status of the washing machine from, for example, thermostat sensors, level detectors, out-of-balance detectors, door lock and speed switch.

The programmer is controlled by the instructions stored in the program memory. The memory is in the form of two memory chips (see diagram below):

- The lower chip, which contains memory information that cannot be changed, contains instructions about operation, service program, relay control, sensing of inputs etc. It also contains the standard programs supplied with the machine on delivery.
- The upper memory chip stores programs created by the customer. The content of this memory can easily be changed by erasing unwanted programs and creating new ones.

6



Repair Instructions

A faulty electronic unit must be replaced, not repaired.

Removing the circuit board

Fig. 7

- Unplug the board connectors and the tube to the level detector (see diagram below).
- Unscrew the 6 screws that secure the board.
- Unplug the connector from the keyswitch and the ribbon cable from the control panel.

Changing the memory chip for user programs

Fig. 8

If the control board has to be replaced, the program chip containing programs created by the user may be moved to the new board, provided the chip is not faulty.

Carefully remove the chip from its socket and transfer it to the new board.

Important

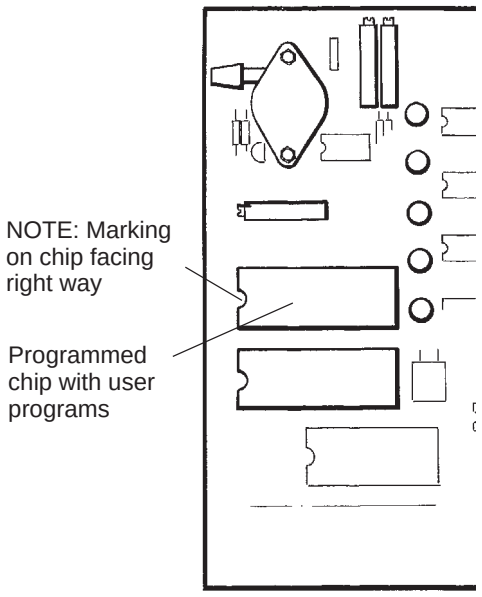
The memory chip must be installed the right way round in accordance with the markings on the chip and the socket.
Carefully check that the legs of the chip really go down into the socket and that they are not turned or damaged.

Check that the programs in the transferred memory chip can now be selected with the new circuit board.

Check that the programs statistics are correct (by selecting program number **00** and pressing **PROG INFO**). The statistics display must not show the characters?\>, only numbers.

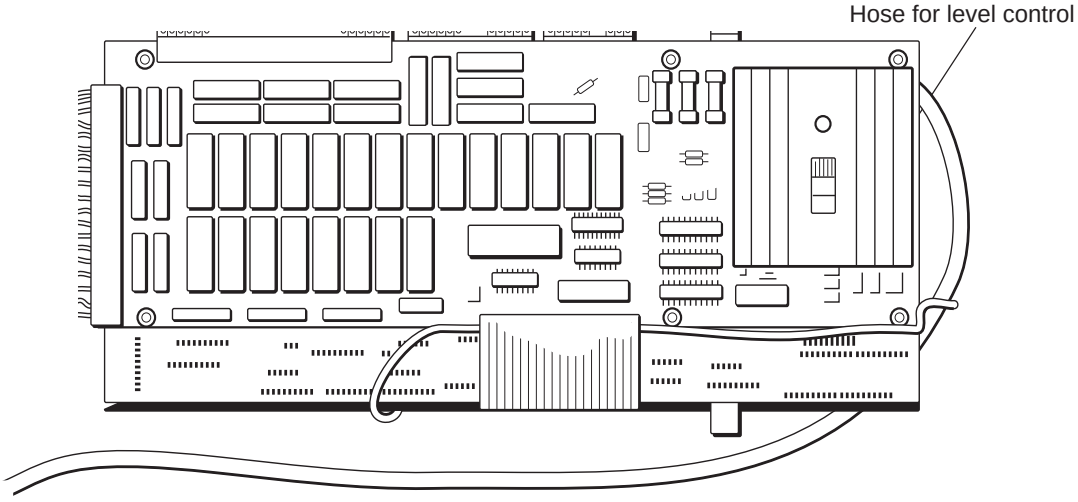
If any of the above does not work, the original memory supplied with the new board must be installed and the wash programs will have to be reprogrammed.

7



1848

8



1379

Installing the circuit board

Fig. 9

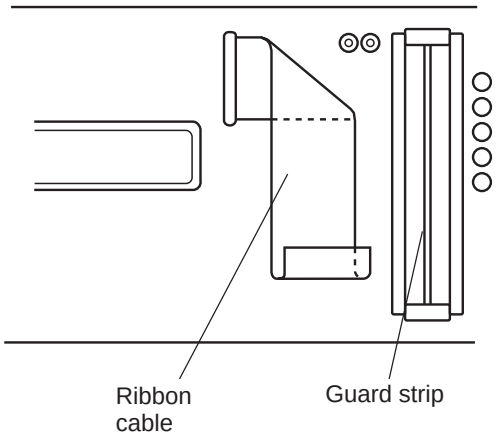
- Plug in the connectors from the keyswitch and the ribbon cable. Note that the ribbon cable must be folded as shown in order to be plugged in the right way round.
- Check that the guard strip between the board and the control panel (see sketch) is in position.
- Secure the board with the 6 screws and put back the board connectors and the tube to the level detector.

Removing the control panel and circuit board

Fig. 10

- Unplug the board connectors and the tube to the level detector.
- Remove the two metal clips by pulling them straight upwards.
- Pull the unit forward and outward so that the two metal tongues unlatch from the fixing eyelets.

9



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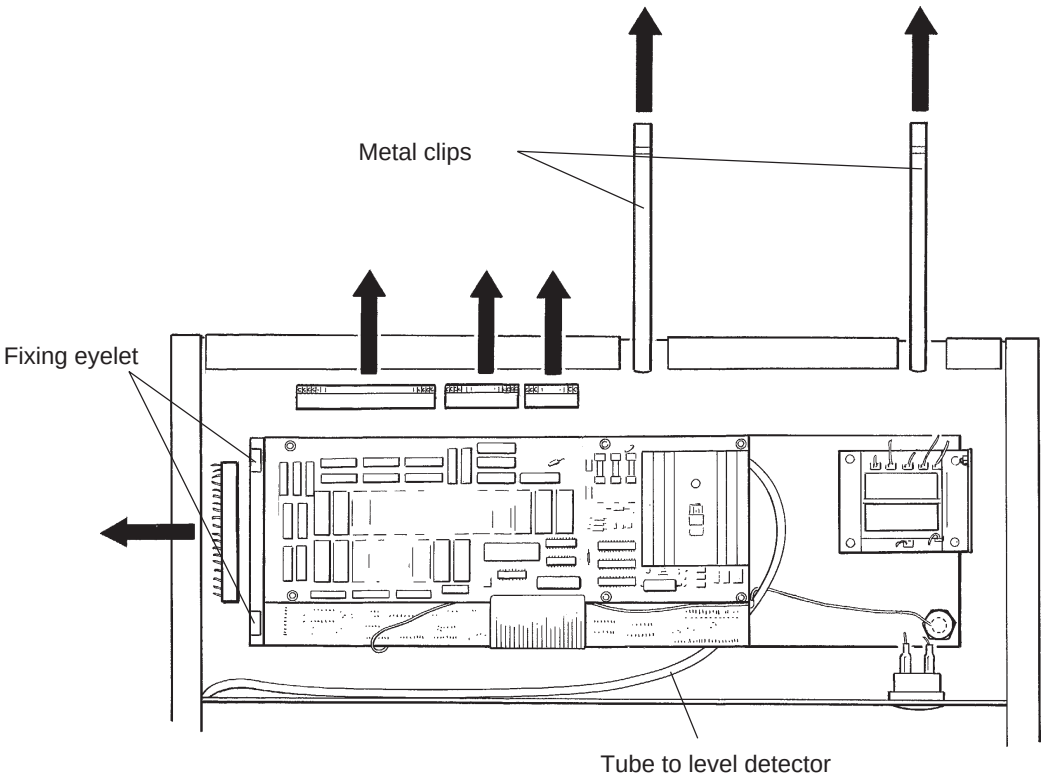
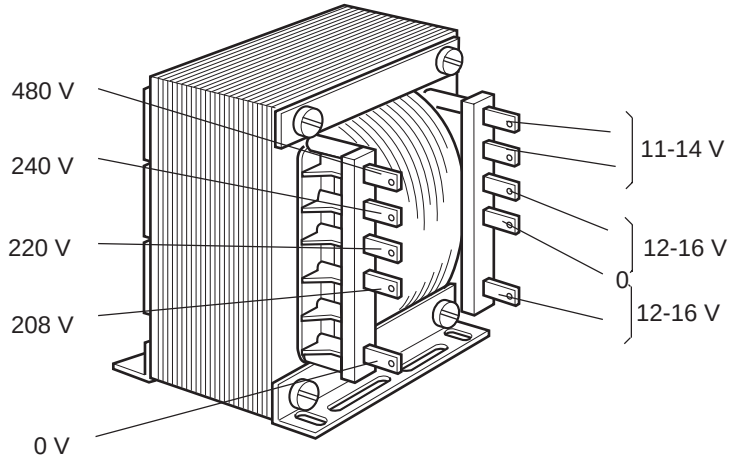


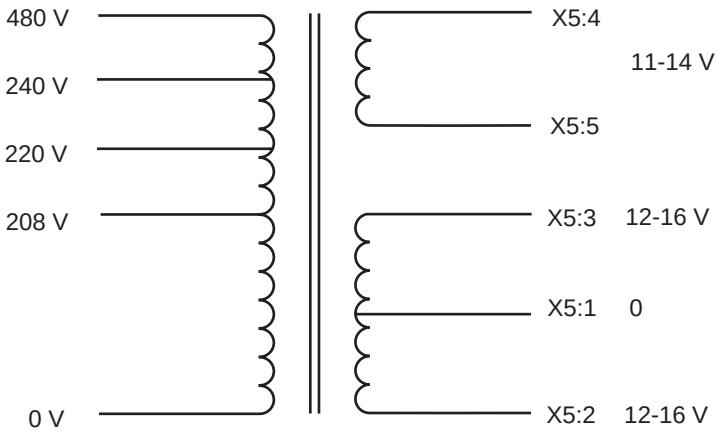
1378

Control transformer

Fig. 11 On the primary side of the control transformer there are four terminals for 208, 220, 240 and 480 volt, and a neutral terminal. There are two secondary windings, one of which has a centre tap. The secondary voltages are 11-14 volt and 2x12-16 volt. The diagram of the transformer is given below. On the secondary side there are references to the second board terminal numbers for the control voltages.

11





1105

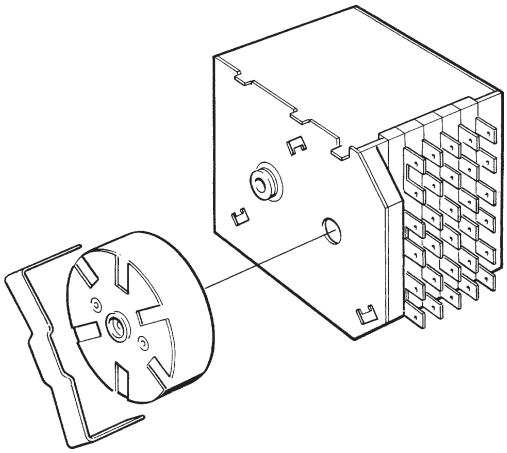
Description

Fig. 1

Fig. 2

The reversing and gentle action of the machine are controlled by the reverser. This contains a reversing cylinder with permanent cams which actuate the making and breaking contacts. The reversing cylinder is driven by a synchronised motor which rotates once in 3 minutes.

1



1996

Repair instructions

Checking the reverser motor

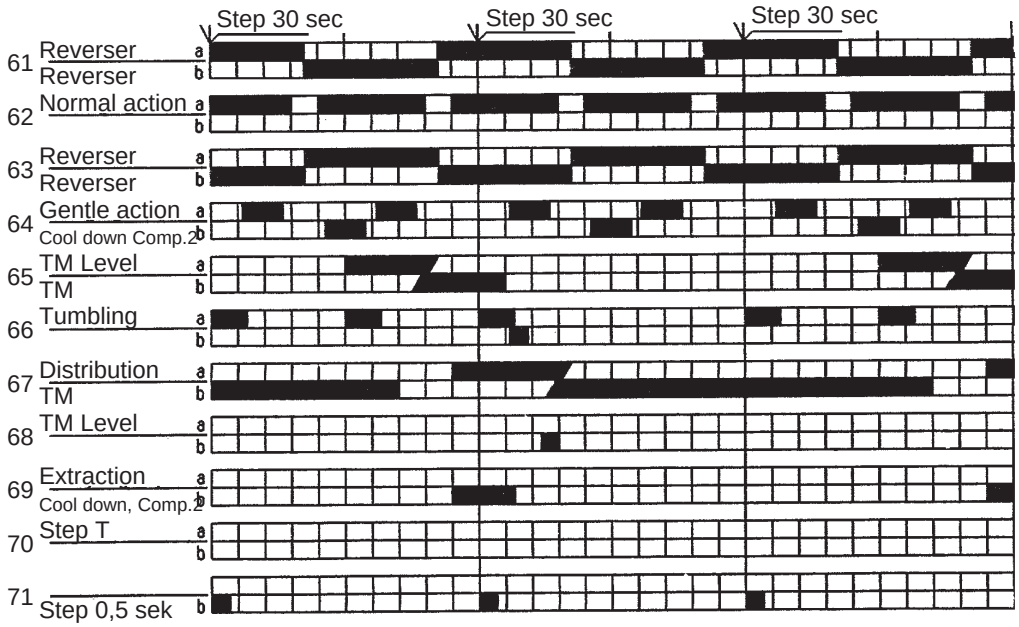
A complete motor can only rotate in one direction. If the reverser motor is live but the motor is not running, replace the motor

- remove the clamp which holds the motor.
- Mark up the push ones of the motor connections and remove them.
- Replace the motor with a new one. Check that the cogs enter the reverser correctly.
- Connect the cables and put back the clamp.

If the motor runs but the reverser cylinder does not advance, change the entire reverser as this has an internal fault.

No other measures are recommended for the reverser.

2



2002

Description

Flg. 1

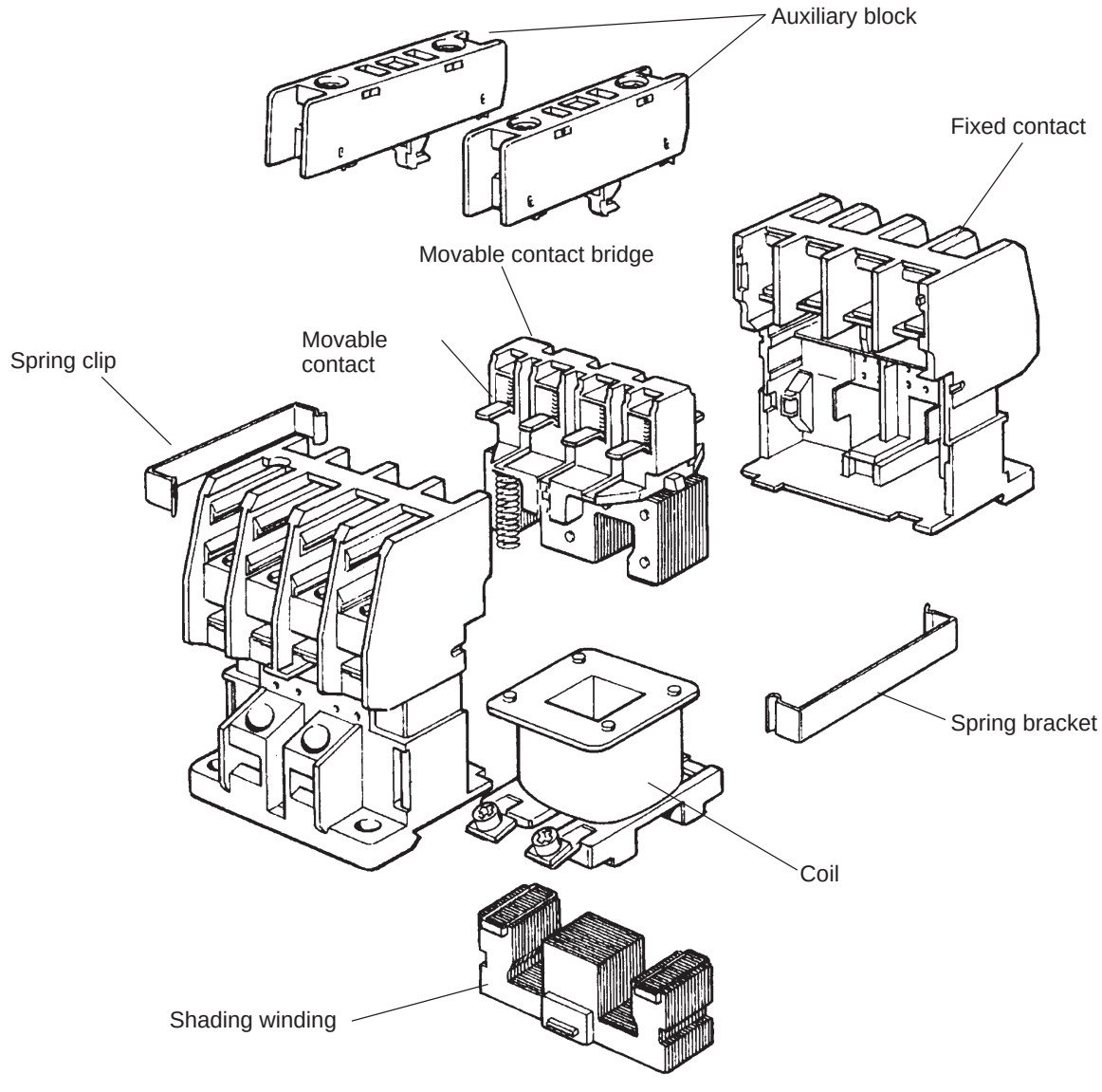
Each relay consists of:

- A casing in two halves, containing six normally-open and/or normally-closed contacts. The two halves are held together by spring clips.
- A moving contact carrier containing moving contacts.
- A solenoid, with coil and core.
- (Optionally) an auxiliary contact block, for increasing the number of contacts.

The magnetic core is split, with the upper part, which caries the moving contact block, being spring-secured.

The fixed, lower portion of the core carries shading windings which modify the phase of the flux through the core so that it never reduces to zero, elimination 50/60 Hz hum.

1



Relay repairs

The relay does not open or close

- Check that the coil is energised. If so, check its continuity. If the coil is open-circuited, replace it as follows:
  - Remove the auxiliary top contact block as described below under Replacement of Auxiliary Contact Block.
  - Undo the connector and remove it. NB: The wires to the contacts do not need to be removed.
  - Prise off the spring clips and carefully separate the two halves of the main relay block. Be careful not to allow the moving contacts to spring out.
  - Remove the connections to the coil and replace the coil.
  - Before re-assembly, check that the surfaces of the magnetic core are clean and undamaged. Re-assemble and reposition the connector.

Loud hum from the relay

- Unscrew and disassemble the relay as described above.
- Check that the shading windings are undamaged - damaged shading windings will result in considerable hum. If the windings are damaged, replace the entire relay.
- Check that there are no foreign particles adhering to the contact surfaces of the core. If necessary, carefully clean the surfaces with fine emery cloth.

Relay is sticking

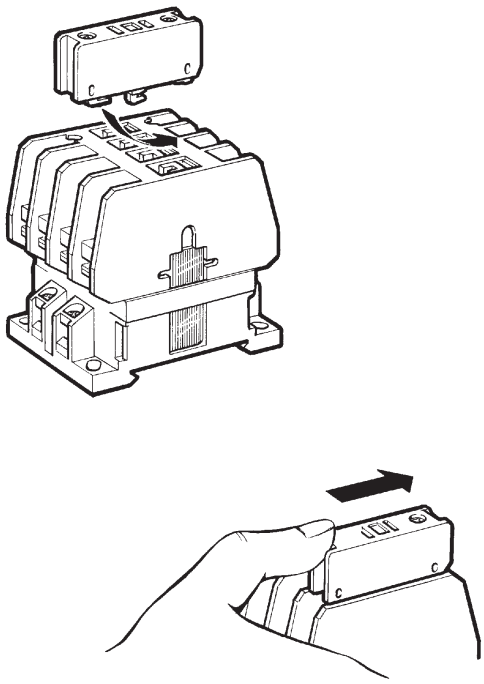
- Remove and disassemble the relay as described above.
- Check that the coil does not have any sharp edges or flash that are/is preventing free movement of the moving part of the core. Rub off any sharp edges or flash if necessary.
- Check that the moving contact carrier can move freely in the relay casing, and that the moving contacts are correctly located in their housings.
- If the above control and adjustments does not help, change relay.

Replacement of the auxiliary contact block

Fig. (2)

- Remove the auxiliary contact block as follows:
  - Using one finger, press the rear edge of the auxiliary contact block forwards and upwards until the block disengages. (The rear edge is that which is marked HN01/HN10: see diagram.)
- Fit the auxiliary contact block as follows:
  - Position the auxiliary contact block on the body of the relay so that the black tab of the auxiliary contact block locates in the pole clips and the red tab locates in the recess in the moving contact lbock (see diagram).
  - Press the auxiliary contact block backwards until its rear edge drops doen and clips into position.
- Check that the auxiliary contact block is operating properly, as follows:
  - Press and release the red/green pin in the middle of the auxiliary relay block, and check that the moving contact carrier moves freely without binding.

2



0940

Description

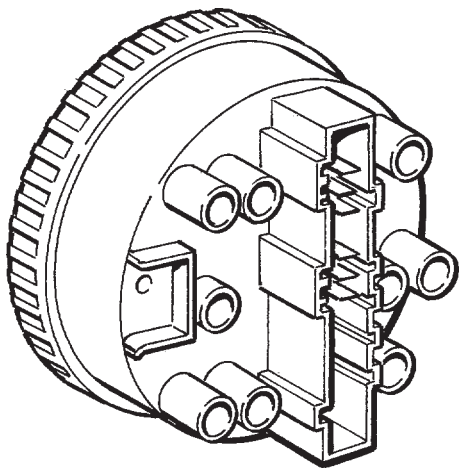
Fig. 1

The level switch is a pressure sensor controlling two different drum water levels by sensing air pressure in a hose connected to the drum's bottom. When the water rises in the drum and hose, the air in the hose compresses and, at two preset pressure levels (shut-off levels), two different alternating contacts in the pressure sensor are activated.

Fig. 2

When the water drains from the drum, the contacts switch back to original position, but now at lower water levels than was required to activate the contacts when the drum was being filled. These levels are called minimum levels. If the water level during washing falls below the minimum level, water will be added until the shut-off level is again reached.

1



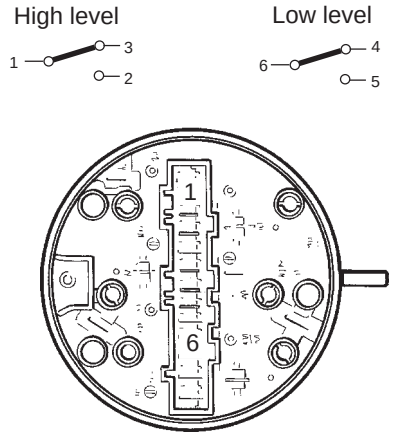
1198

Control and fault tracing

All level sensors are factory-set for the various machines. As a rule, this setting should not be changed. For that reason, the level controls are sealed with enamel paint.

A faulty level switch can not be repaired and should be replaced.

2



1417

IMPORTANT!

The machine guarantee ceases to be valid if the level sensor is tampered with.

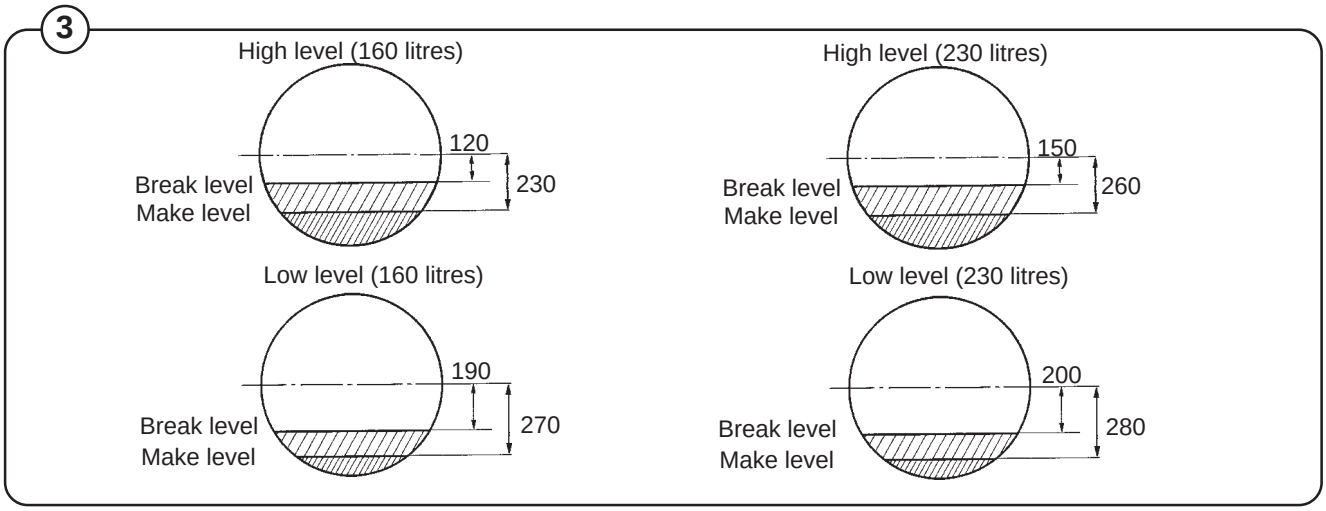
Water level check

Fig. 3

Start the machine and select a standard program. Check low water level for prewash and main wash according to the illustration. Advance the program using the **START** button and check high water level for rinsing.

Water level is too high

- Check that the hose connecting the level switch and the drain valve is not obstructed. When necessary and when the machine is empty of water, clean the hose by disconnecting it from the level switch and blowing air through it.
- Check the hose for holes which can be caused by the hose rubbing against the pulley.
- Overfilling can also be caused by burnt contacts in the level switch. If this is the case, replace the level switch.



Machine does not fill with water

- Check the level switch function by:
  - connecting a meter between the contact pins
  - disconnect the hose from the drain valve
  - blow air carefully through the hose and monitor the meter contact functions.
- Insufficient water filling can also be caused by burnt contacts in the level switch. If this is the case, replace the level switch.

Replacing the level switch

- Blow through the hose to clean it before the new level switch is installed.
- There may not be water in the machine during installation.

Adjustment of level switch

The machine guarantee ceases to be valid if the level switch sealant is broken without manufacturer permission. After adjustments are made, the sensor should be resealed.

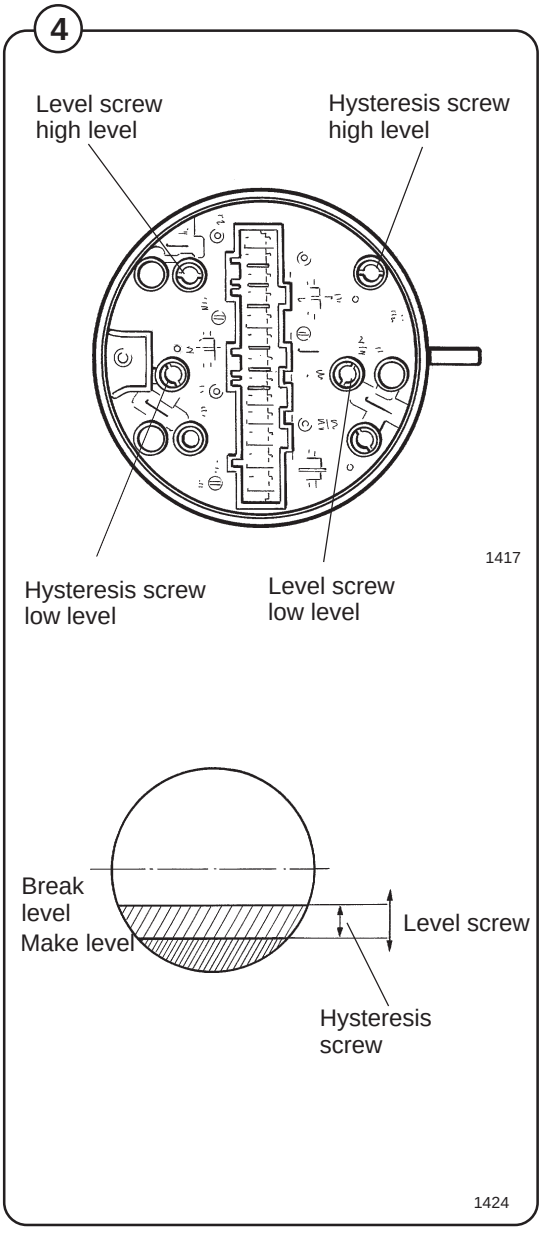
The level sensor has two adjustment screws for high water level and two for low level. For each level, the screws have the following functions:

Fig. 4

- level screw
  raise (clockwise adjustment) or lower transition point for both minimum and shut-off level.

  Make sure that these screws are not turned too far counter-clockwise or else the springs under the screws will loosen and the level sensor will become nonfunctional.
- hysteresis screw
  increase (clockwise adjustment) or decrease the distance between the minimum level and the shut-off level. The shut-off level is not changed during this adjustment.

Always adjust the shut-off level first using the level screw and then adjust the minimum level using the hysteresis screw.



Calibrating the level detector

Fig. 5 The level detector is at the left-hand end of the circuit board. Both zero level and mid position must be calibrated. Potentiometers P2 and P3 are used for these adjustments.

IMPORTANT!

Do not adjust potentiometer P4. It is used for factory adjustments only.

Adjust the zero level before the mid level.

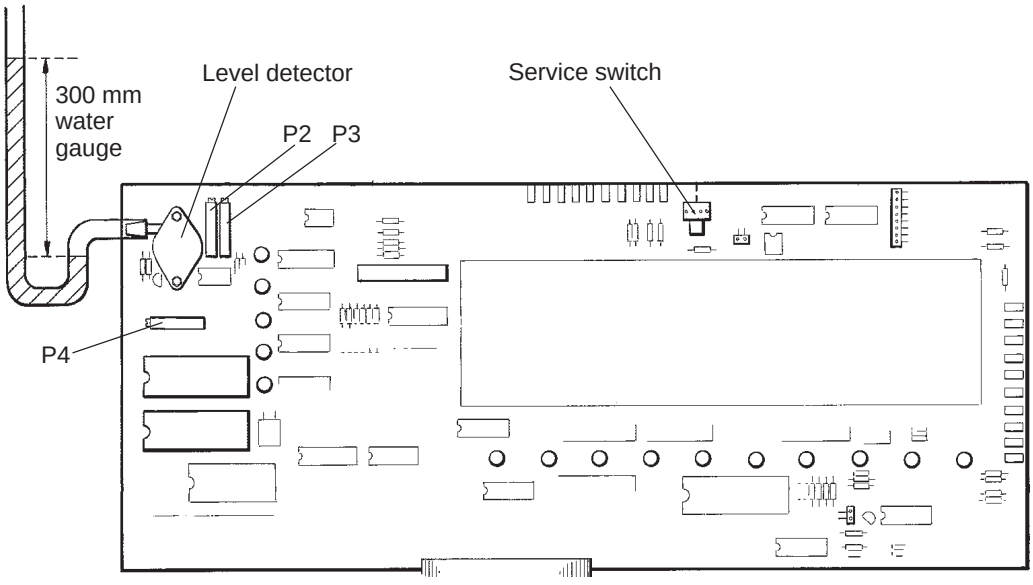
Zero level adjustment

- Make sure there is no water in the drum.
- Set the service switch to position 4, Service program.
- Disconnect the tube from the level detector.
- Read off the level on the display (bottom row, left). The reading must be between 0 and 4.
- If necessary, adjust with potentiometer P2.

Mid-level adjustment

- Connect a pressure of 300 mm water gauge to the level detector. See example below.
- Read off the level on the display (bottom row). The reading must be between 125-128.
- If necessary, adjust with potentiometer P3.

5



1850

Setting the water level

This is the procedure for determining how many "units" are needed to reach a given water level in the drum (so that this value can be entered in the wash program):

- The key on the control panel of the machine must be in the **WASH** position. Set the service switch to position 4, Service program.
- Press **0, 1** and **START**. This activates the cold water valve and the level detector. (To activate the hot water valve, press **0, 2** and **START**. The following text appears on the display:

```
SERVICE PROGRAM  CHOOSE FUNCTION 001
COLD WATER
**ON**  LEVEL:1>XXX  2>XXX  3>XXX
LEVEL XXX  TEMP. XXX°C
```

Level **1**, **2** and **3** show the manufacturer's recommended figures for level 1 (Empty), level 2 (Low) and Level 3 (High) for this model. **Level 1** (Empty) is used by the microprocessor as a limit value for opening the door, switching on heating elements (if any) and starting the spin. **LEVEL 1** cannot be reprogrammed and is shown as a reference only.

The reading at **LEVEL** on the bottom line of the display increases as the water level rises in the drum. When the desired level is reached, press **START** again to shut the water valve. The water level can now be read off on the bottom line.

The **TEMP.** indicator shows the inlet temperature of the water. On the basis of this figure the programmer can determine exactly the inlet temperature of the water when choosing **COLD WATER** or **HOT WATER.** If the model in question does not have built-in heating elements or steam heating, the highest possible water temperature is determined by the inlet temperature of the hot water (which may be very much lower than the outlet temperature from a water heater unit because of losses in pipes).

Description

Fig. 1 The thermostat monitors the temperature during the programme cycle. The relays of the heating element are actuated by make and break contacts.

The thermostat sensor is located at the bottom of the outer drum to the right of the heating element. A gas-filled cable (capillary tube) goes from the sensor to the thermostat, which is located at the front of the machine. The temperature of the water determines the expansion of the gas and thus the actuation of the thermostat contacts. When the input signal has reached the value selected on the different thermostat contacts, the relevant contacts are activated. The appropriate contact selection is controlled by the programmed card in the flat-card automat.

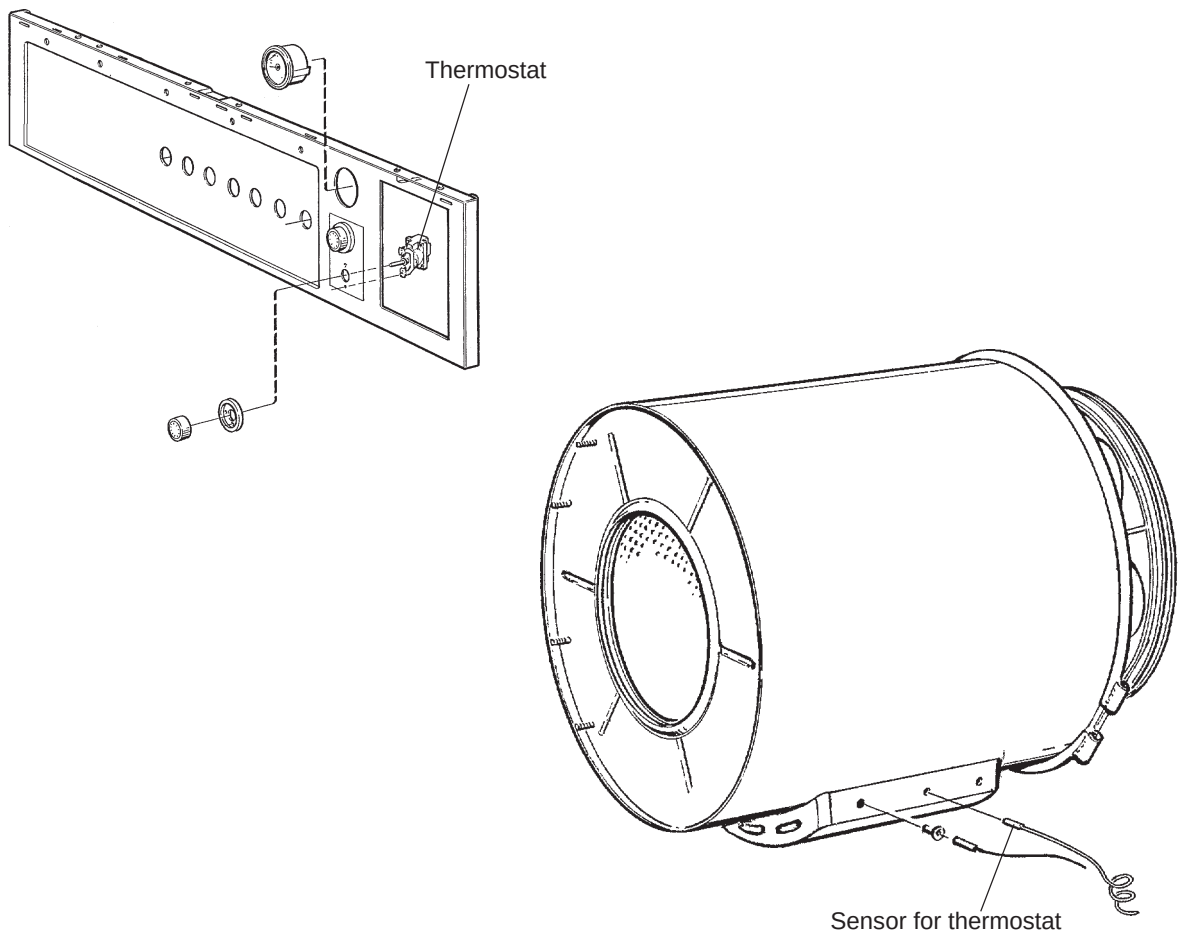
Repair instructions

Thermostats should be replaced, as repair is not recommended.

Overheating

- Replace the thermostat. Take care not to damage the capillary tube. Install the new tube in the same way as the old one.
- To dismantle the sensor bult, remove the front plate.
- Change over the pins from the old to the new thermostat one at a time so as not to confuse the connection cables.

1



Door

Fig. 1 The door is mounted on a special anchor plate which sits on the machine's outer drum. The door glass is fitted in the door with only a door seal which also is tightly fit directly against the outer drum when the door is closed. The glass is not glued-coated making it easy to replace.

Door seal leakage

Fig. 2 If the seal is not torn or damaged in some other way, the cause of the leakage could be decreased elasticity of the seal. Place a 4-7 mm sized O-ring around the entire seal in the seal slit (see illustration).

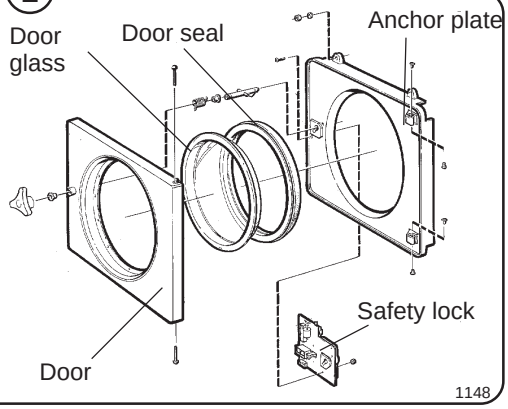
If the leakage persists, change the seal.

Safety lock

Fig. 3 The safety lock is mounted on a circuit card with a contact for quick connection. The following is on the circuit card:

- the lock plate against which the safety lock knob locks the door.
- the microswitch which indicates that the door is closed.
- a lock unit which keeps the door from opening when the machine is in operation. This unit consists of:
  - a double functioning solenoid
  - a delay unit with a bimetal spring
  - a lock bolt which can be controlled by both the solenoid and the delay unit.
  - a catch which keeps the lock bolt from locking when the door is open. The catch also controls a microswitch.

1



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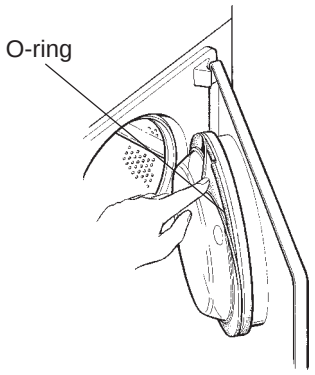

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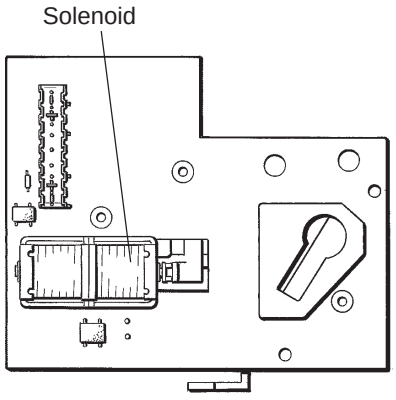
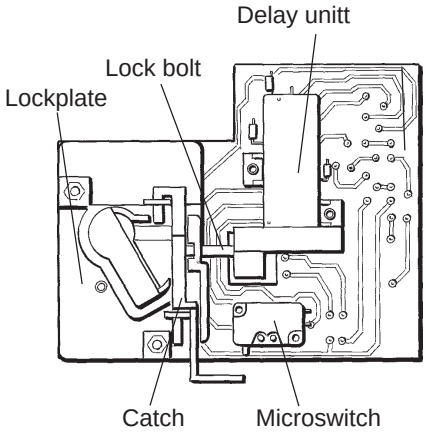




Function

When the door is closed, the microswitch trips and indicates to the timer that the door is closed.

When the machine starts, the solenoid locks the lock knob by drawing the lock bolt into closed position. A microswitch in the delay unit is controlled by the lock bolt and indicates that the lock bolt is in closed position. Only when this signal is received does the drum start to rotate and water begin to fill the drum.

When the wash program is completed, the solenoid releases the lock bolt and the safety lock can be opened without any delay. The solenoid remains energized for approx. two minutes so that the bimetal spring in the delay unit can cool-down and not re-lock the door when the solenoid de-energizes.

If a power failure occurs during a wash cycle, the delay unit keeps the door locked for approx. two minutes allowing the drum to stop rotating and the water to drain (the drain valve opens automatically in the case of a power failure).

Fault tracing

If the solenoid does not lock the door:

- Check that there is voltage reaching the right coil in the solenoid. Measure the voltage supply to the coil to check for possible power failure.
- Check that the lock bolt runs smoothly (the door must be closed) and that the solenoid plunger does not jam.

The door remains locked longer than approx. two minutes:

- Check that there is voltage to the left coil in the magnet. Measure the voltage supply to the coil to check for possible power failure.

Other possible reasons for faults:

- Faulty microswitch
- Faulty switch in delay unit

N.B!

The safety lock is an important safety component and may not be repaired. In case of faulty functioning, the entire safety lock should be replaced.

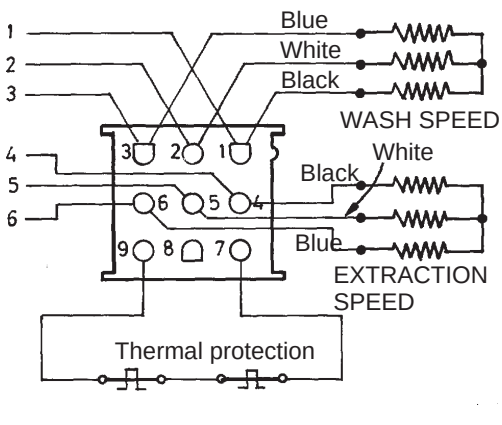
Description

Fig. (2) The motor is mounted on a shaft under the drum and drives the drum with the help of a V-belt. To lessen the motor noise and vibrations, both the shaft and the motor shaft attachment are rubber-cushioned.

A tensioner mounted between the motor and outer drum is also rubber-cushioned at the motor attachment. The electrical connection is engaged with quick connector.

Fig. (1) The motor has two different windings; one 18-pole for wash speed and one 2-pole for spin speed. In addition it has two thermal protection, one in each winding, which disconnect at a temperature of 130°C.

1



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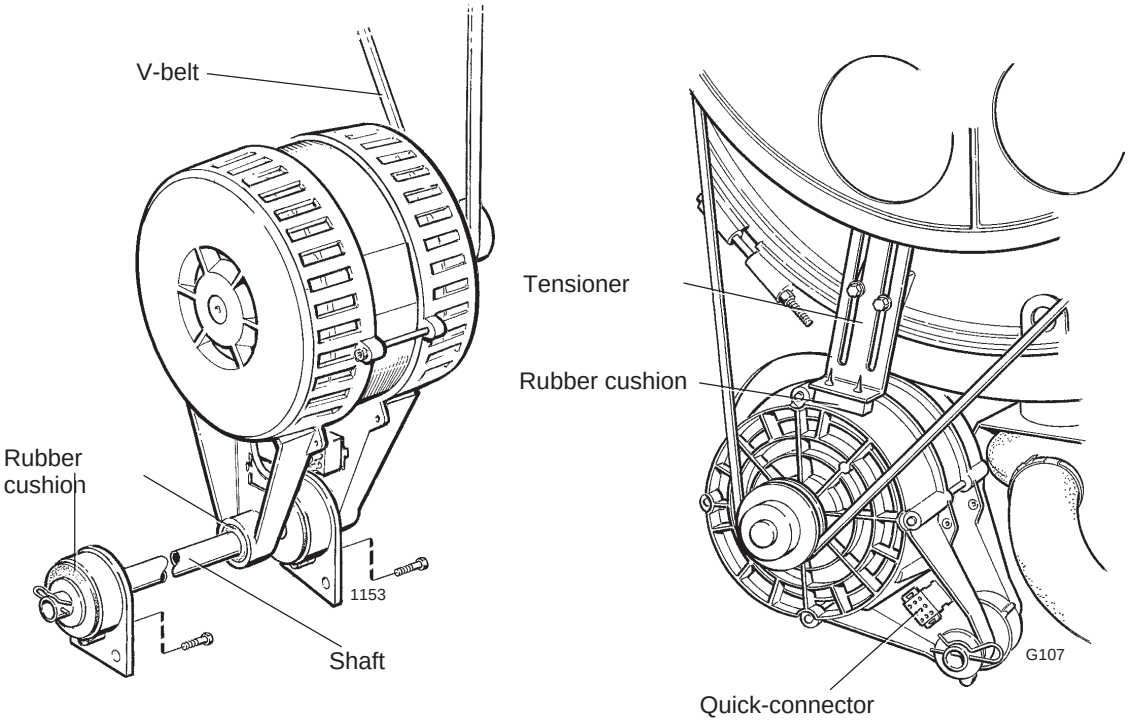


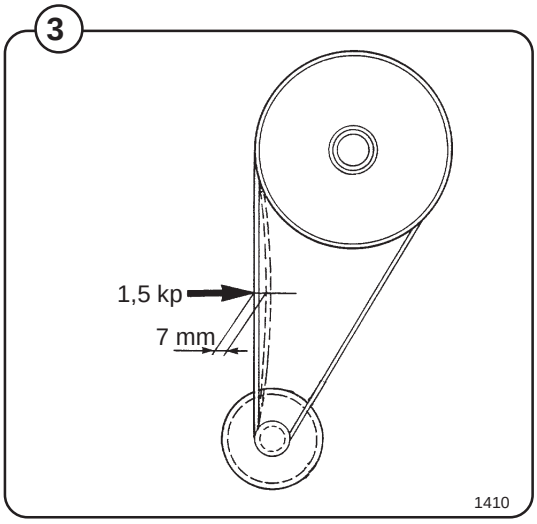
Belt tension

Fig. 3

During the initial operation period (the first 24-48 operational hours) the belt tension decreases relatively quickly due to the belt adjusting itself to its correct position on the wheel track.

After the initial operation period, check the belt tension if necessary.

Always inspect the belt tension when performing machine inspection and maintenance.



Fault tracing

Motor does not operate

- Check that there is voltage supply the motor. When the relays are energized, measure the voltage supply at relay K1:1, 3 and 5 for wash speed and at relay K4:1, 3 and 5 for spin speed. Check the quick connector to the motor.
- Check the motor windings using an ohmmeter for possible short circuits or power failure.
- Check that the motor shaft rotates properly. If it does not, there is probably a faulty motor bearing. Replace the motor or bearings.
- If the motor feels unusually hot after the stop, the motor thermal protection has probably shut off. Inspect the machine for the cause of the overloading. Check that the motor and drum rotate easily.

  The motor protection is reset automatically after the motor has cooled-down for approx. 30 minutes. Start the machine and listen for possible dissonance.

  If the motor protection shuts off repeatedly, there may be a short circuit or a faulty motor or drum bearing.

Motor runs slowly

The motor is probably only running on two phases (applies to three phase machines).

- Check that the voltage supply to the motor is correct.
- Remove the quick connector and check for open motor windings or a short circuit.

Motor is very noisy or stalls

- Faulty bearings — replace the motor or bearing (for motor replacement, see below).

Removing the motor

Fig. 4

1 Remove the drain valve from the shaft by lifting it up.

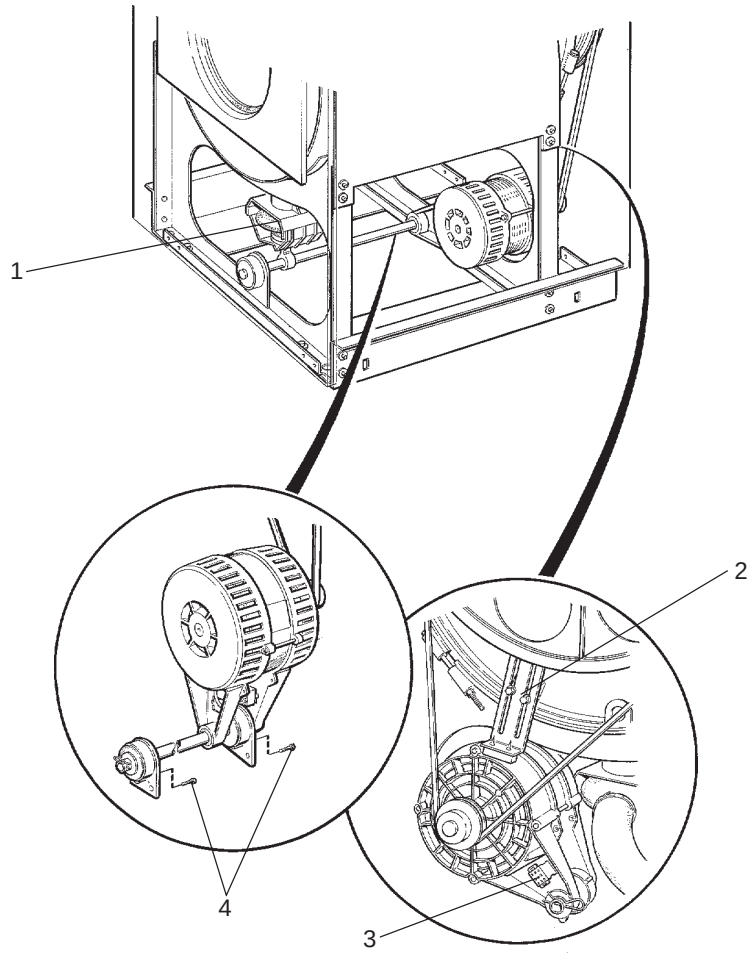
2 Remove the tensioner.

3 Remove the quick connector to the motor.

4 Unscrew the two screws which hold the shaft in place. Pull the shaft towards the front of the machine so that the bracket guide pins release.

5 Remove the motor from the shaft. Use soap solution if the rubber bushings are resistant.

4



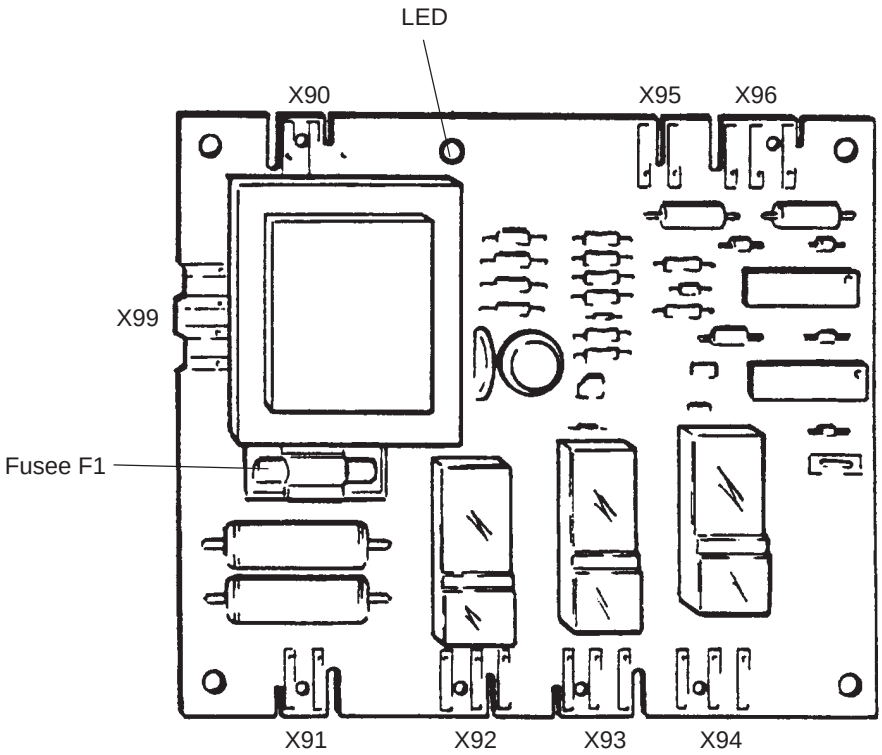
Description

The rotation guard checks that the drum is completely at a standstill before the door can be opened. When the drum has been still for approx. 2 seconds the coil in the door lock is activated and the lock can be opened (providing the water has emptied and the programmer has reset). This guard also checks that the drum is actually rotating when the wash or extraction relays are operating.

Fig. 1 The rotation guard consists of a circuit board located in the automatic unit and a pulse generator mounted in a holder on the rear of the machine. There is a magnet on one of the spokes of the belt pulley. Each time this magnet passes the pulse generator, a contact within the pulse generator closes and a pulse is sent to the rotation guard.

The rotation guard exists in two versions, one for machines with an auxiliary transformer, the other for machines without. The two differ in the way that certain straps on the circuit board are arranged. Also, the version for machines with transformer has an LED which indicates error status on the board. The two versions are described on the pages which follow.

1



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Rotation guard for machines with auxiliary transformer

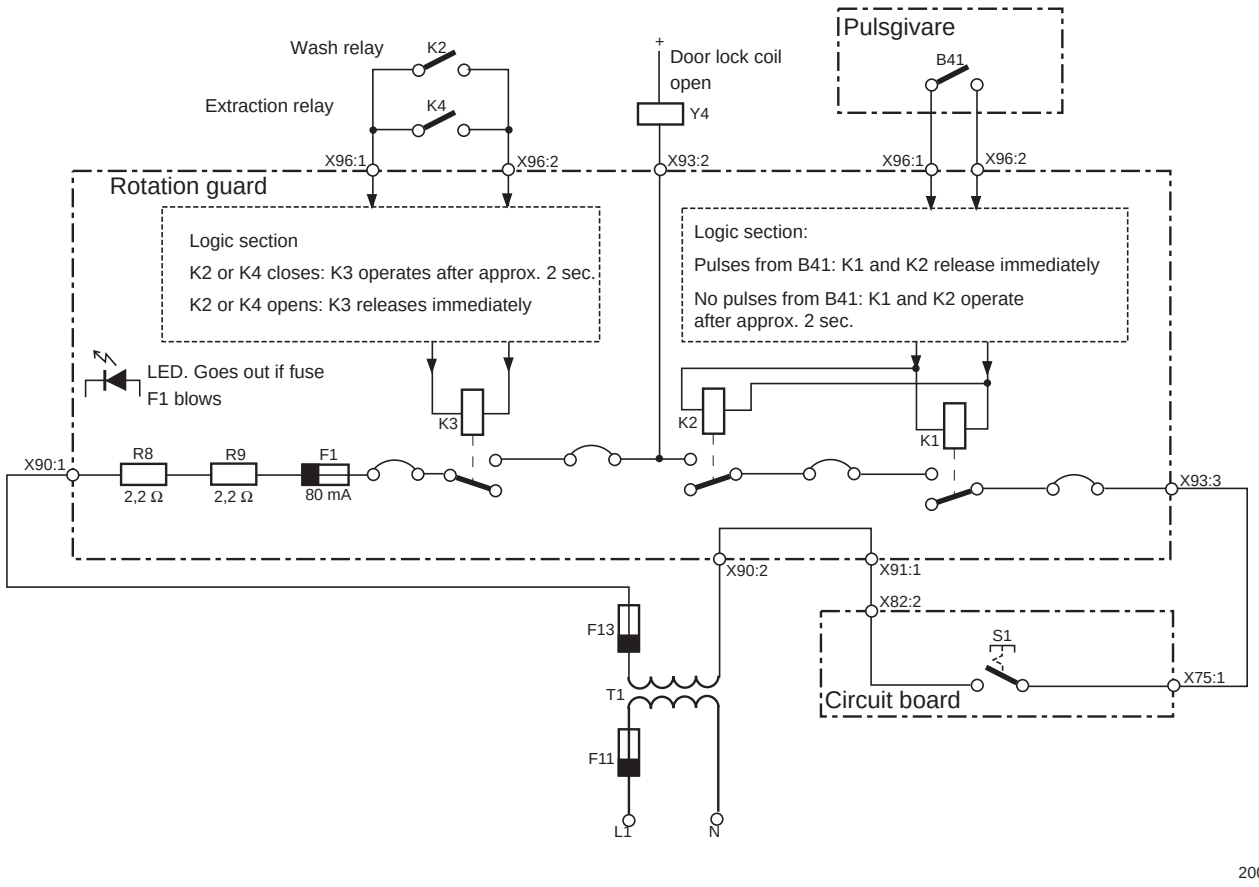
Fig. 2

When the machine has halted, rotation guard relays K1 and K2 are closed which means that the door lock coil Y4 will be energised and the door can be opened. Since the wash and extraction relays are not closed, relay K3 is not energised.

When the machine starts and pulses are received from the pulse generator, relays K1 and K2 will switch immediately and it will not be possible to open the door. K1 and K2 are connected in series for safety. Even if one of the relays ''burns'' and does not release, it will still not be possible to open the door. Since the machine's wash or extraction relay is energized, relay K3 closes after a delay of approx. 2 seconds.

The rotation guard also checks that the drive belt has not broken. It works as follows: relay K3 is closed when the machine is working. If the belt breaks, the drum stops and the pulse generator stops transmitting pulses After 2 seconds relays K1 and K2 close. When this happens the circuit between the two poles of transformer T1 is closed. The current increases so that fuse F1 blows and the LED on the board goes out. It will not be possible to open the door now.

2



Rotation guard for machines without auxiliary transformer

Fig. 3

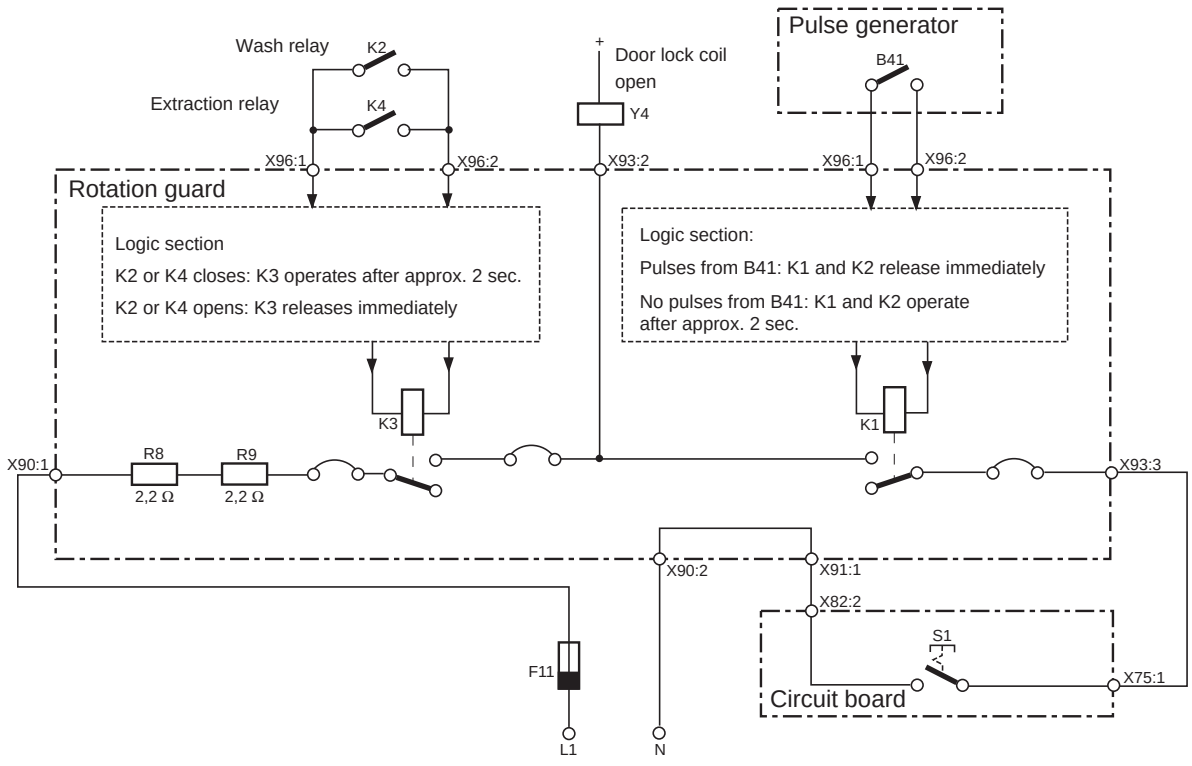
When the machine has halted, the rotation guard relay K1 is closed which means that the door lock coil Y4 will be energised and the door can be opened. Since the wash and extraction relays are not closed, relay K3 is not energised.

When the machine starts and pulses are received from the pulse generator, relay K1 will switch immediately and it will not be possible to open the door. Since the machine's wash or extraction relay is energised, relay K3 closes after a delay of approx. 2 seconds.

The rotation guard also checks that the drive belt has not broken. It works as follows: relay K3 is closed when the machine is working. If the belt breaks, the drum stops and the pulse generator stops transmitting pulses.

After 2 seconds relay K1 closes. When this happens the circuit between phase (L1) and neutral (N) closes. The current increases so that main fuse F11 blows. The machine stops and the door remains locked until the bimetallic strip in the delay unit has cooled.

3



Data

Max. capacity fully open	outlet	160 l/min.
	inlet	20 l/min.
Working range, water pressure		0,5-10 bar
Number of outlets		1, 2, 3 or 4

Description

Fig. 1 The valve is electromagnetically operated and has a rubber diaphragm as its opening and closing element. The valve utilises the water supply pressure when opening and closing.

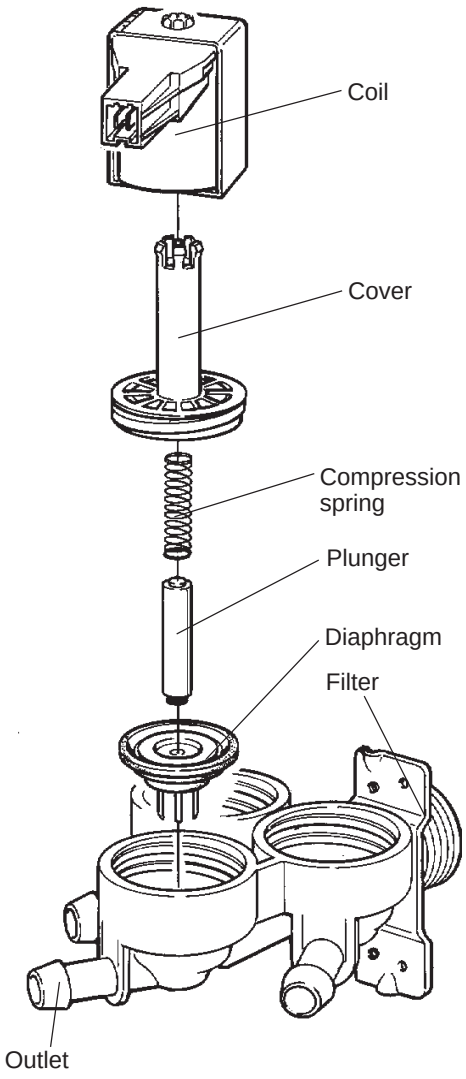
Fig. 2 When the valve coil is de-energized, the valve is closed. The water pressure builds up over the diaphragm through the diaphragm pilot pressure opening and holds the valve closed.

When the coil is energized, the plunger is pushed up and the water pressure above the diaphragm can be relieved through the pressure balancing canal to the valve outlet. At that point, the water pressure in the flow pipe can lift the diaphragm, allowing the valve to open.

There is a close-meshed filter which filters polutants in the inlet pipe. The filter is easily removable for cleaning.

In the outlet, a throttle adjusts the water flow to the machine requirements.

1



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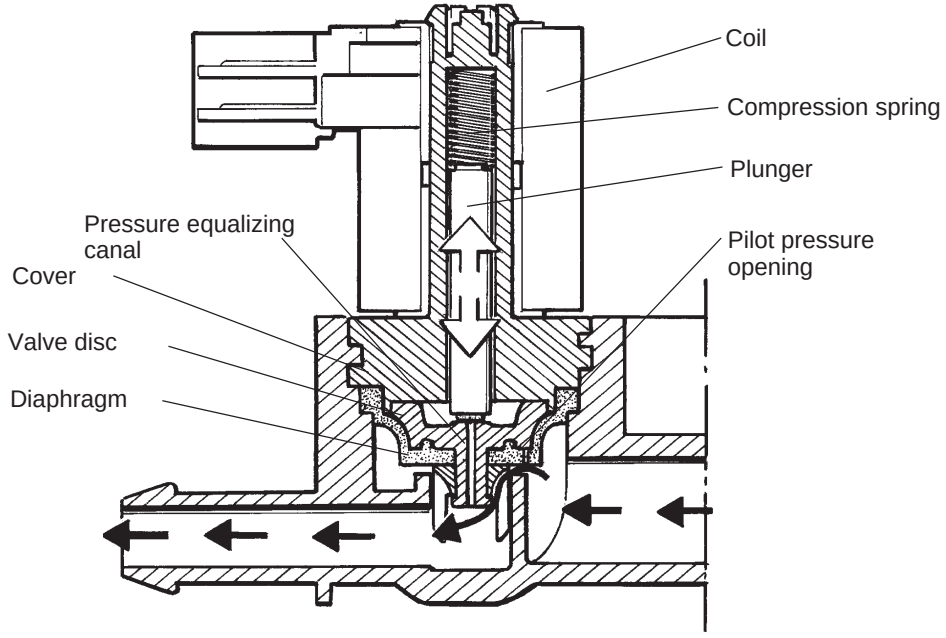


Repair instructions

Lime deposits can block the valve diaphragm hole and prevent the valve from functioning properly.

It is therefore a good idea to take apart and clean the valve regularly depending on operation conditions and the degree of polutants and lime content present in the water.

Valve does not open

- Check that there is voltage supply to the coil.
- Measure the voltage supply to the coil to check for a possible power failure or short circuit.
- Take apart the valve and check the valve diaphragm openings.
- Check the inlet filter and clean it when necessary.
- Remove the coil and clean the coil core surfaces.

Valve does not close

- Check that there is no voltage across the coil. Normally the valve is closed when the coil is not energized.
- Check the return spring.
- Check the diaphragm (pilot pressure opening).

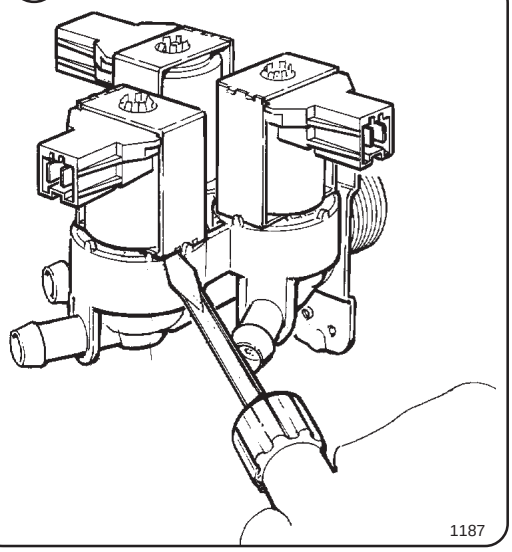
Dismantling of the valve

Fig. (3) 1. Carefully pry off the valve coil using a screw driver.

Fig. (4) 2. Turn and lift the valve cover using a special tool and a wrench. (The special tool is attached to one of the machine's water hoses upon delivery.)

Fig. (5)

3



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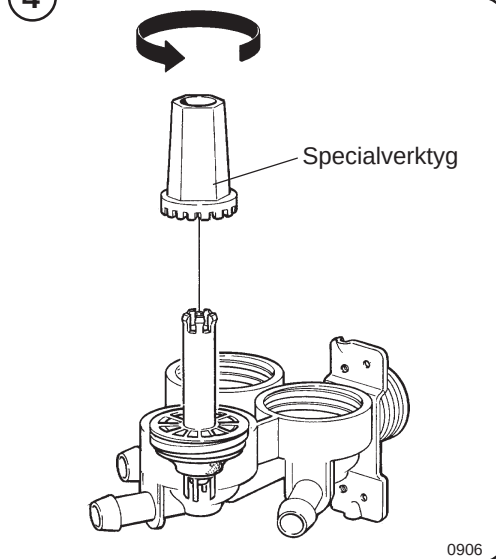

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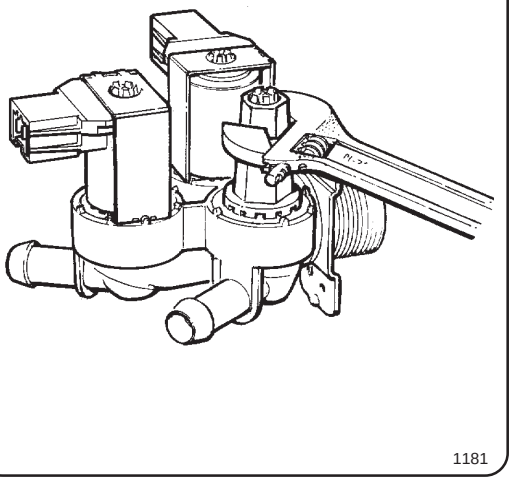

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Data

Capacity at 300 kPa	300 litres/min
Operating limits	40-1000 kPa

Description

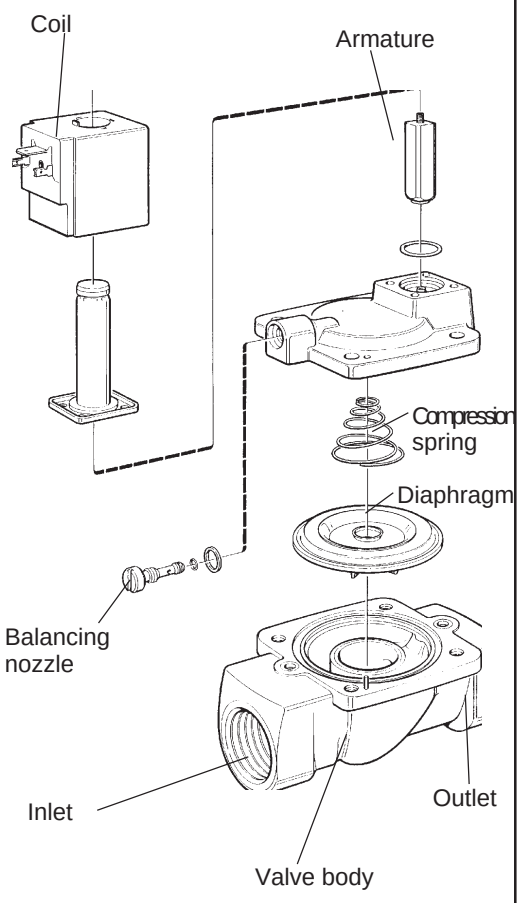
Fig. 6 The valve is electromagnetically operated and has a rubber diaphragm as its opening and closing element. The valve utilises the water pressure when opening and closing.

Fig. 7 When the electromagnetic is de-energised, the valve is closed.

The water pressure acts through the pilot pressure opening on the top of the rubber diaphragm. Because the water pressure is acting on a relatively larger area on the top of the diaphragm than on the bottom (part of the underside of the diaphragm is in contact with the outlet of the valve, where there is no pressure) the water pressure from below is insufficient to lift the diaphragm, so that the diaphragm forms a seal against the valve seat.

When the magnet is energised, the opening from the top of the diaphragm to the outlet of the valve is opened. Since the diameter of this opening is greater than that of the pilot opening, the diameter of which is limited by the balancing nozzle, the pressure on the top of the diaphragm falls. The water pressure on the bottom on the diaphragm can then lift the diaphragm and open the valve.

6



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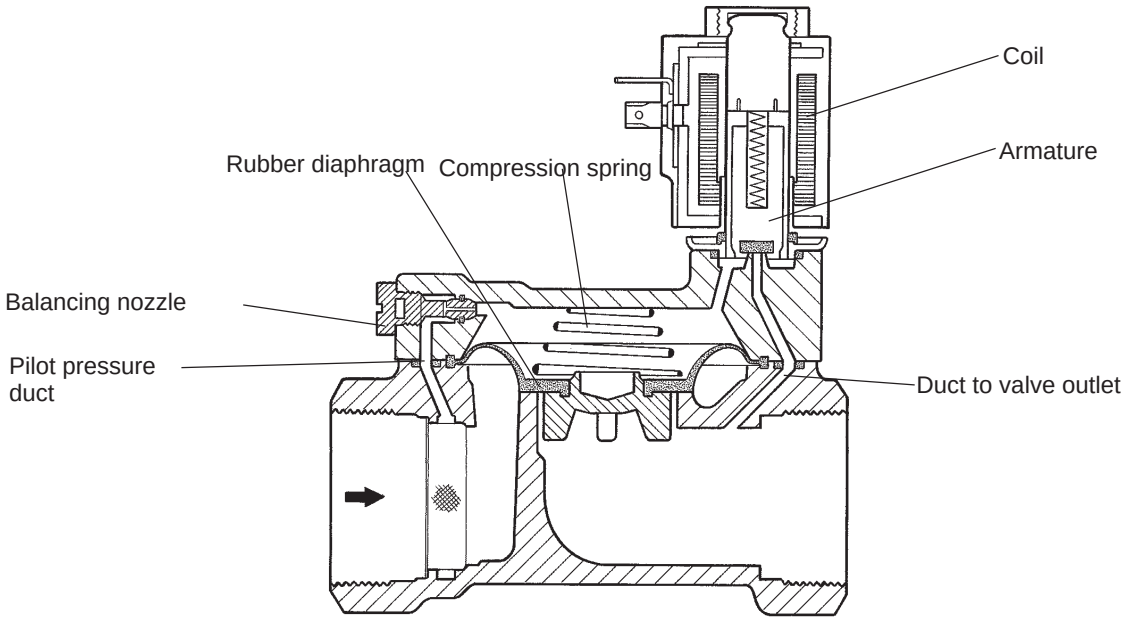


Repair instruction

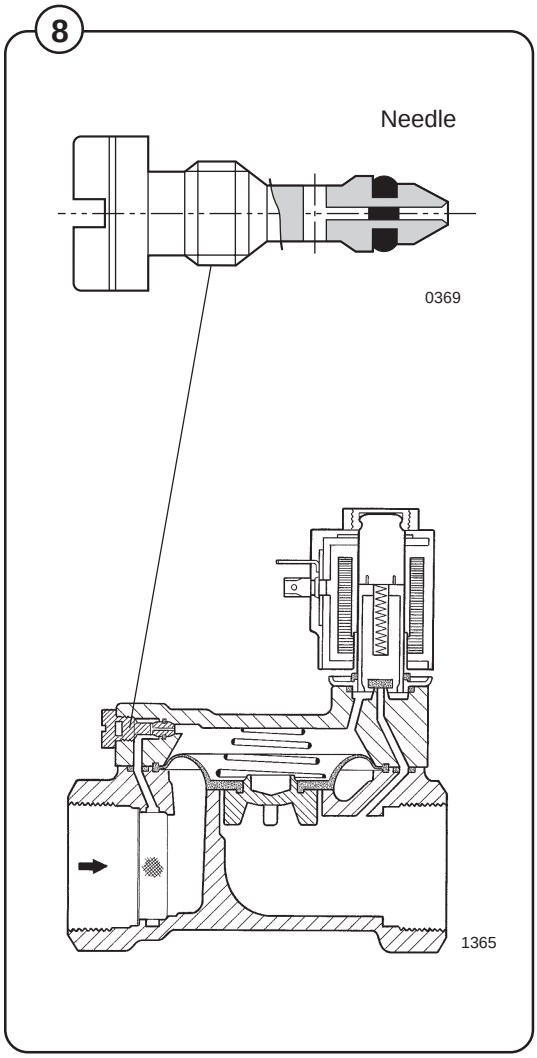
Valve operation gradually gets worse

Hot water with high lime content may cause scale deposits in the balancing nozzle of the valve. Clean the nozzle as follows:

- Shut off the water.
- Unscrew the nozzle and clean it with a needle or similar. A nozzle marked with one ring around the head of the screw has a bore diameter of 0.5 mm and a nozzle with two rings has a bore diameter of 0.8 mm. The diameter of the needle used to clean the nozzle must not be greater than the bore diameter.
- Re-fit the nozzle.
- Turn on the water, check operation and check for leaks.
- If this does not help, check that the inlet filter of the pilot channel is not blocked.

Where the water is very hard, i.e. contains a high lime content, it is recommended that the 0.5 mm nozzle should be replaced with a 0.8 mm nozzle.

Fig. 8



Valve does not open

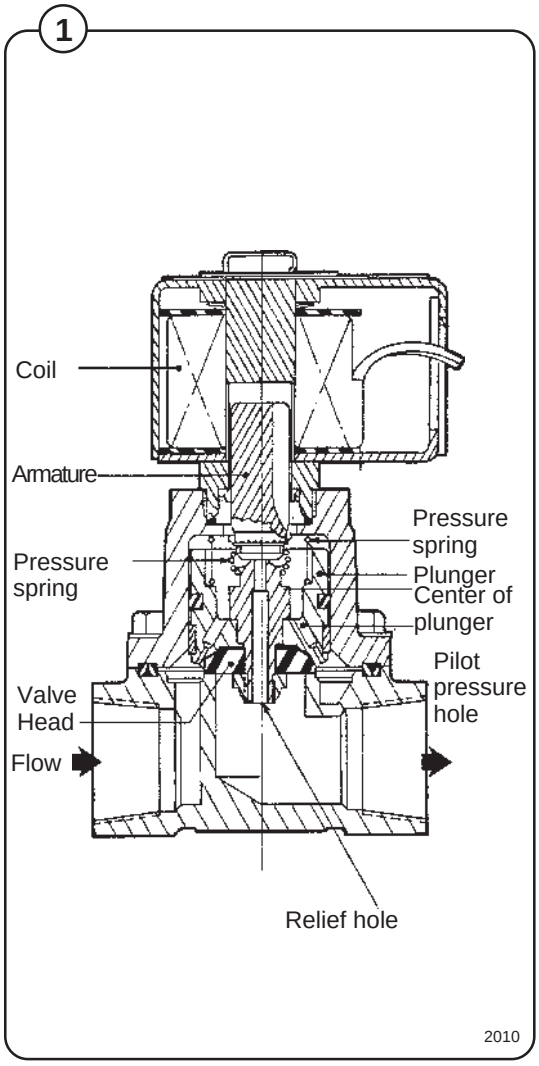
- Check for voltage at coil.
- Measure the resistance of the coil to check for short circuit or open circuit.
- Dismantle the valve and check that the armature is not binding. If necessary, clean to remove scale, particularly in the ducts of the valve between the top and bottom of the diaphragm.
- Remove the coil and clean the metal surfaces of the magnet core.

Valve does not close

- Check that there is no voltage across the coil. Normally the valve is closed when the coil is de-energised.
- Dismantle the valve and check the armature return spring and check that the armature is not binding. If necessary, remove limescale deposit, particularly in the ducts of the valve between the top and bottom of the diaphragm.
- Check the balancing nozzle in accordance with the instructions under the heading "Valve function gradually gets worse".

Description

Fig. 1



The steam valve is operated electromagnetically and has a plunger with a valve head as opening and closing element.

The valve utilises the steam pressure for opening and closing. In a closed position the electromagnet is unactivated and the relief hole in the centre of the plunger is closed by the armature through its pressure spring. The plunger pressure spring moves the plunger and valve head against the valve seat.

By means of a pilot-pressure hole in the plunger the steam pressure forces the plunger and valve head against the valve seat with a force proportional to the steam pressure. The valve closes.

When the valve is to open the magnet is energised, the armature lift and exposes the relief hole in the centre of the plunger. When the overpressure on the upper side of the plunger is gone, the steam pressure in the supply line can lift the plunger and valve head, and the valve opens.

Repair instructions

It is vital to the operation of the steam valve that the pilot pressure and relief holes are clean and unobstructed.

For this reason, the valve should be taken apart and cleaned at specific intervals which depend on operating conditions and the purity of the steam.

The valve refuses to open.

- Check that the coil is energised.
- Take measurements at the coil in order to look for break of short circuit.
- Take the valve apart and check the openings in the valve head and plunger centre.

The valve refuses to close

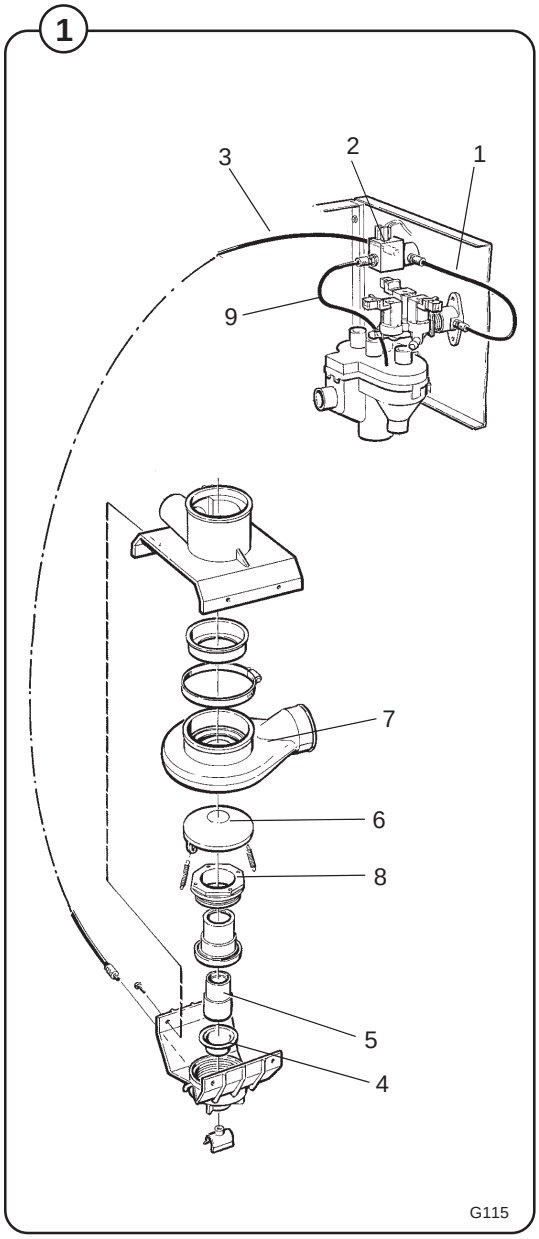
- Check that the coil is de-energised. The valve is normally closed when the magnet is unactivated.
- Check the return spring.
- Check the diaphragm.

Description

Fig. 1

The drain valve utilises the water pressure in the cold water inlet to close the valve. A hose (1) connects the water inlet and the control valve (2). When the control valve is activated, it opens and allows water to pass through the supply main (3) which is connected to the drain valve. The water pushes up a rubber diaphragm (4) and a piston (5) by means of a pressure plate (6) which closes the rubber diaphragm (7) on the valve.

When the control valve shuts off the water pressure leading to the drain valve, the springs (8) pull back the piston. The return water passes through the control valve to the drain via the return hose and is drained (9).



Fault tracing

Drain valve does not close

Check that:

- there is voltage supply to the control valve (2).
- hoses and control valve are not blocked. This is done by disconnecting the supply main (3) to the drain valve and activating the control valve.
- the rubber diaphragm (4) is ok.
- the piston (5) is not jammed.

Drain valve does not open

Check that:

- the return hose (9) is not blocked.
- the piston (5) is not jammed.

Description

Fig. 1

The detergent container has three compartments

- Compartment 1 for detergent (prewash)
- Compartment 2 for detergent (main wash)
- Compartment 3 for conditioner

The container is fitted with n ozzles coupled to the inlet valves. These ensures that the detergent dissolves properly in the water, as well as flushing the container clean.

A water-filling line runs from the bottom of the container down to the drain valve riser. This ensures a favourable flow to the washing, while also stopping any fumes from the detergent solution from rising up into the detergent container.

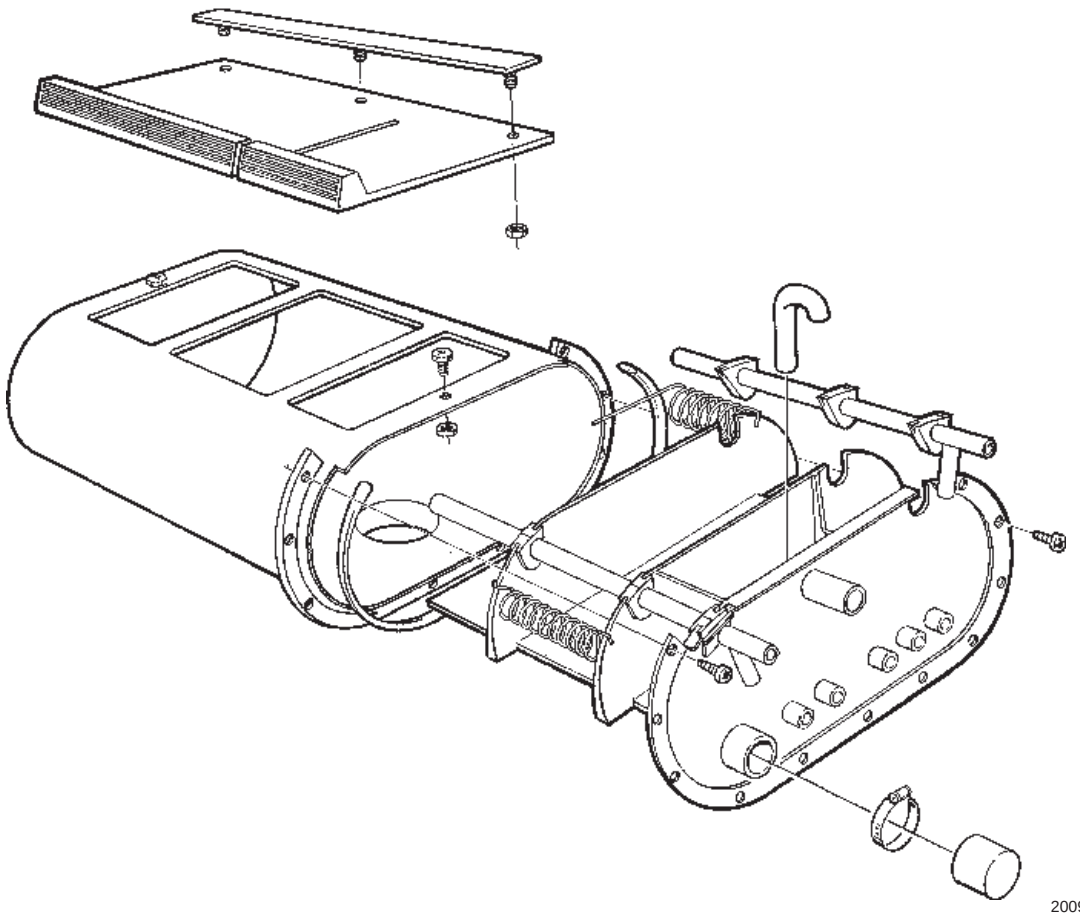
The lid of the container is made of rubber, has a simple and robust design, and is bolted to the top panel of the machine.

A siphon device in the fabric conditioner compartment makes sure that it is completely emptied, and that no conditioner remains behind.

Repair instructions

When replacing the container, holes should be drilled for the connections on the nozzles according to the connection alternative chosen.

1



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Description

Fig. 1 The three machine elements are located at the bottom of the outer drum and are accessible from the front of the machine. They are switched on by a heating contactor (K21) which is controlled by the timer, level sensor and thermostat.

Fig. 2

Fault tracing

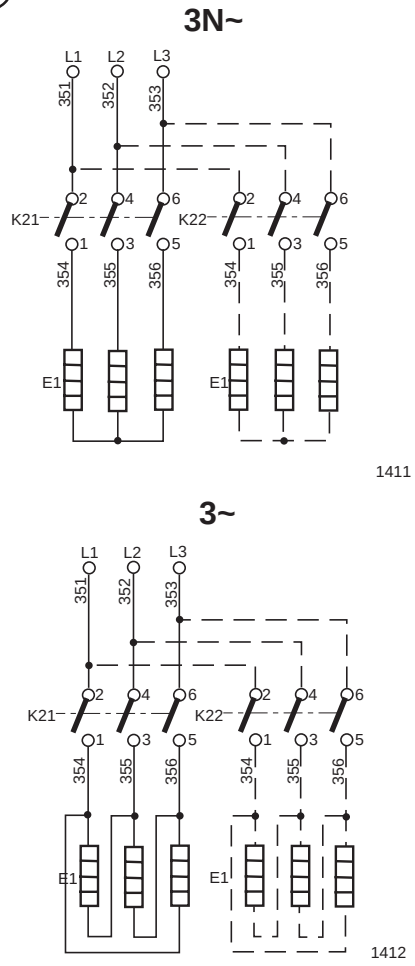
Warm up time is unusually long

- Use a multimeter to check whether any of the elements is burnt out. To access the elements, remove the front panel of the machine.
- Lime deposits can reduce the output of the elements. Remove the deposits when necessary. Use the deliming agent in accordance with supplier instructions.

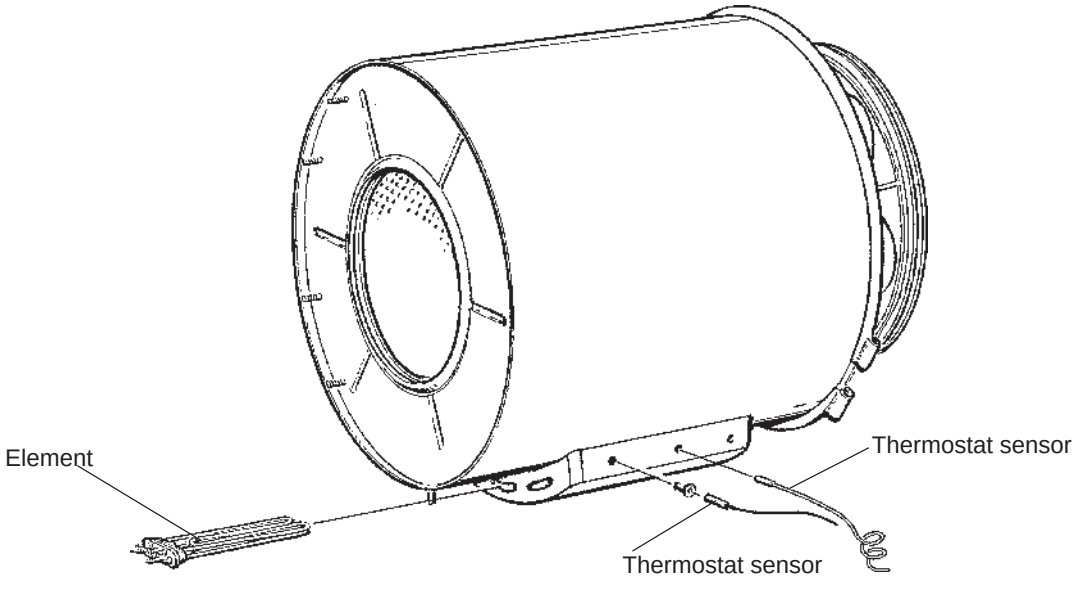
Replacing the element

- Shut-off the main switch and make sure that there is no electrical supply to the machine.
- Note the positions of the connections and disconnect those connections to the element.
- On the element, unscrew the nut on the middle screw and turn the screw a quarter turn counter-clockwise. The dolly on the inner side of the element is turned at the same time allowing the element to be disconnected.
- Place the new element in position, turn the screw a quarter turn clockwise and tighten the nut. Restore connections to the element.
- Fill the machine and check that there is no leakage at the element.

1



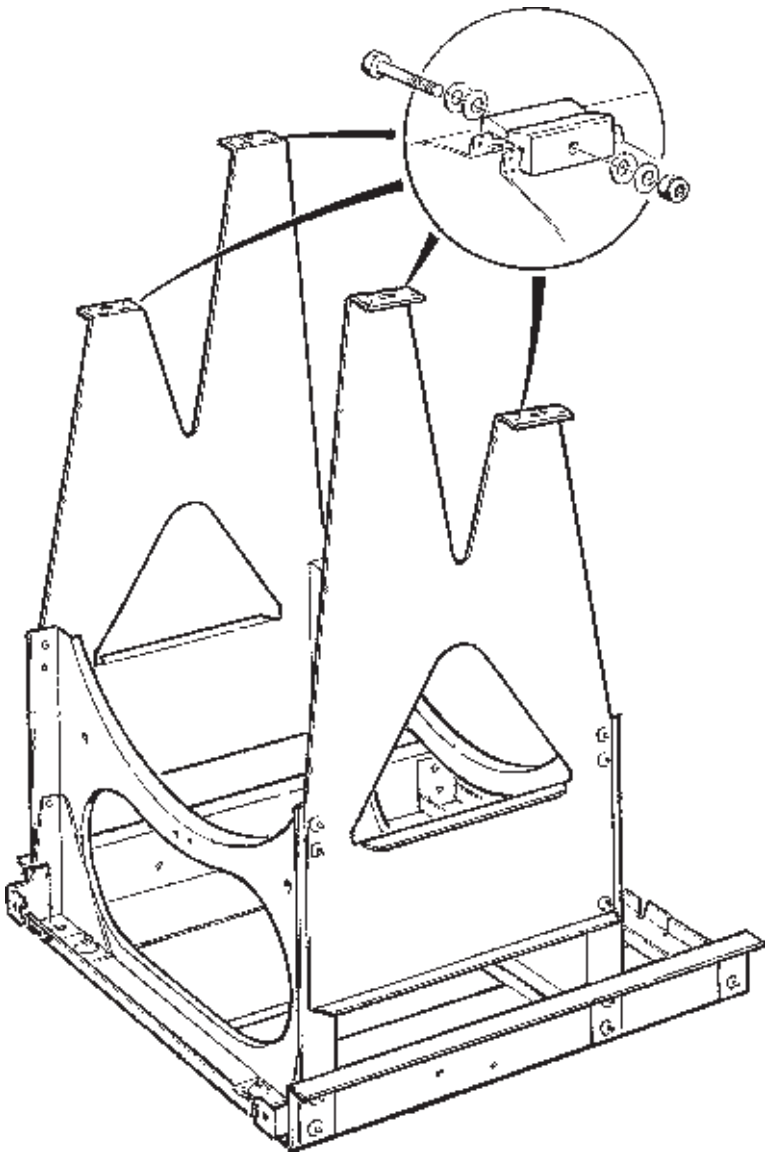
2



Description

Fig. 1 The frame is constructed of flanged plates for stability and torsional rigidity. The drum is mounted directly on the frame without shock-absorbing mechanisms. For this reason, the frame should be stably installed on a underlying foundation (see installation instructions). The drum is mounted in the frame surrounded by a steel plate which is riveted to the frame.

1



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