

OPERATING & MAINTENANCE MANUAL

FLEX-O-MATIC

EXSM 350

471 1562-95/03
97.44

WARNING: ALL OPERATING AND MAINTENANCE PROCEDURES SHOWN ON THE NEXT PAGE OF THIS MANUAL MUST BE FOLLOWED DAILY FOR PROPER OPERATION OF YOUR WASCOMAT MACHINE.

PLEASE ENTER THE FOLLOWING INFORMATION AS IT APPEARS ON THE MACHINE(S) DATA PLATE(S).

MACHINE TYPE OR MODEL	
MACHINE SERIAL NUMBER(S)	
ELECTRICAL CHARACTERISTICS: _____ VOLTS, _____ PHASE, _____ HZ.	

MAKE CERTAIN TO KEEP THIS MANUAL IN A SECURE PLACE FOR FUTURE REFERENCE.



NOTICE TO: OWNERS, OPERATORS AND DEALERS OF WASCOMAT MACHINES

IMPROPER INSTALLATION AND INADEQUATE MAINTENANCE, POOR HOUSEKEEPING AND WILLFUL NEGLECT OR BYPASSING OF SAFETY DEVICES MAY RESULT IN SERIOUS ACCIDENTS OR INJURY. TO ASSURE THE SAFETY OF CUSTOMERS AND/OR OPERATORS OF YOUR MACHINE, THE FOLLOWING MAINTENANCE CHECKS MUST BE PERFORMED ON A DAILY BASIS.

1. Prior to operation of the machine, check to make certain that all operating instructions and warning signs are affixed to the machine and legible. (See the following page of this manual for description and location of the signs.) Missing or illegible ones must be replaced immediately. Be sure you have spare signs and labels available at all times. These can be obtained from your dealer or Wascomat.

2. Check the door safety interlock, as follows:

- (a) OPEN THE DOOR of the machine and attempt to start in the normal manner:

For FL and EX models, insert a program card, turn the starter knob to the Start position and place the ON-OFF switch in the ON position.

For HI-TEK microprocessor models, turn the key switch to the RUN position, choose a program and press the START button.

For SELECTA 28 models, select a wash program and press the Start button.

THE MACHINE(S) SHOULD NOT START !

- (b) CLOSE THE DOOR to start machine operation and, while it is operating, attempt to open the door without exerting extreme force on the door handle. The door should remain locked!

If the machine can start with the door open, or can continue to operate with the door unlocked, the door interlock is no longer operating properly. The machine must be placed out of order and the interlock immediately repaired or replaced. (See the door interlock section of the manual.)

3. DO NOT UNDER ANY CIRCUMSTANCES ATTEMPT TO BYPASS OR REWIRE ANY OF THE MACHINE SAFETY DEVICES AS THIS CAN RESULT IN SERIOUS ACCIDENTS.
4. **Be sure to keep the machine(s) in proper working order:** Follow **all** maintenance and safety procedures. Further information regarding machine safety, service and parts can be obtained from your dealer or from Wascomat through its Teletech Service Telephone - 516/371-0700.

All requests for assistance must include the model, serial number and electrical characteristics as they appear on the machine identification plate. Insert this information in the space provided on the previous page of this manual.

5. **WARNING:** DO NOT OPERATE MACHINE(S) WITH SAFETY DEVICES BYPASSED, REWIRED OR INOPERATIVE! DO NOT OPEN MACHINE DOOR UNTIL DRUM HAS STOPPED ROTATING!



SAFETY AND WARNINGS SIGNS

Replace If Missing Or Illegible

One or more of these signs must be affixed on each machine as indicated, when not included as part of the front instruction panel.

LOCATED ON THE OPERATING INSTRUCTION SIGN OF THE MACHINE:

CAUTION

1. Do not open washer door until cycle is completed, operating light is off, and wash cylinder has stopped rotating.
2. Do not tamper with the door safety switch or door lock.
3. Do not attempt to open door or place hands into washer to remove or add clothes during operation. This can cause serious injury.

PRECAUCION

1. No abra la puerta de la máquina lavadora sino hasta que la máquina haya terminado su ciclo, la luz operativa esté apagada y el cilindro de lavado haya completamente terminado de girar.
2. No interfiera o manipule el switch o la cerradura de la puerta.
3. No trate de abrir la puerta o meta las manos dentro de la máquina para meter o sacar ropa mientras la máquina está en operación, pues puede resultar seriamente herido.

MACHINE SHOULD NOT BE USED BY CHILDREN

LAS MÁQUINAS NO DEBEN SER USADAS POR NIÑOS

LOCATED AT THE REAR OF THE MACHINE:

INSTALLATION AND MAINTENANCE WARNINGS

1. This washing machine **MUST** be securely bolted to an uncovered concrete floor according to the installation instructions to reduce the risk of fire and to prevent serious injury, or damage to the machine.
2. If installed on a floor of combustible material the floor area below this machine must be covered by a metal sheet extending to the outer edges of the machine.
3. This washing machine **MUST** be connected to a dedicated electrical circuit to which no other lighting unit or general purpose receptacle is connected. Use copper conductor only.
4. This washing machine **MUST** be serviced and operated in compliance with manufacturer's instructions. **CHECK DOOR LOCKS EVERY DAY FOR PROPER OPERATION TO PREVENT INJURY OR DAMAGE. IF THE DOOR LOCK FAIL TO OPERATE PROPERLY, PLACE THE MACHINE OUT OF ORDER UNTIL THE PROBLEM IS CORRECTED.**
5. Disconnect power prior to any servicing of machine.
6. To remove the top panel for service on those models on which it is secured by screws at the rear, first remove the screws. Be certain to reinstall them when remounting the top panel. To remove the top panel for service on those models on which it is secured by one or two keylocks, use the keys originally shipped in the drum package. Be certain to relock after remounting the top panel.

MANUFACTURED BY WASCATOR
DISTRIBUTED BY WASCOMAT INWOOD, NEW YORK, USA

471 76 62 02-02

LOCATED ON THE DOOR:

If you need to order more safety or warning signs, call Wascomat's parts department at 516-371-2000, or call your local dealer.

WARNING !

NEVER USE FORCE ON HANDLE. FOR SAFETY REASON THE DOOR IS LOCKED A WHILE AFTER THE DRUM HAS STOPPED ROTATING.

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FLEX-O-MATIC EXSM 350

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The manufacturer reserves the right to make changes to design and material specifications.

Safety instructions

- The machine is designed for water washing only.
- The machine must not be used by children.
- All installation operations are to be carried out by qualified personnel. Licensed personnel are necessary for all electric power wiring.
- The interlock of the door must be checked daily for proper operation and must not be bypassed.
- All seepage in the system, due to faulty gaskets etc., must be repaired immediately.
- All service personnel must be fully familiar with the operating manual before attempting any repair or maintenance of the machine.
- The machine must not be sprayed with water, otherwise short circuiting may occur.
- Fabrics softener with volatile or inflammable fluids are not to be used in the machine.

Introduction

Fig. 1 The Flex-O-Matic solid mounted washer/extractor has been developed to cover the heavy duty requirements of hotels, motels, nursing homes, hospitals, professional laundries, restaurants, airlines, ships, schools, colleges and all on-premises laundries where flexibility and quick formula variation, coupled with high quality automatic washing, are required.

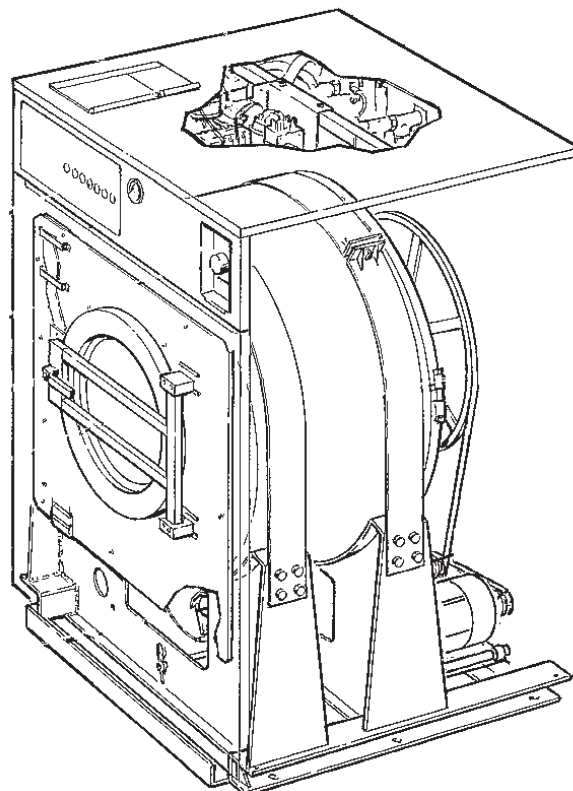
The card-programmed FL model allows for complete programming of water temperatures, water levels, wash and extraction periods and supply injections. The machine is designed for connection to hot and cold water supplies and may be used with free-standing powder or liquid supply injectors which can be activated by signals from the machine.

All parts of the machine which come into contact with the items being washed are made of heavy gauge surgical stainless steel, ensuring long life and lasting beauty, as well as full protection for no-iron fabrics. All electrical components are made accessible for servicing by simply removing the top panel.

This manual contains a technical description of the machine and instructions for its installation, operation and maintenance. Together with the wiring diagram which accompanies each individual machine it should be kept in a safe place for easy reference.

When ordering spare parts or contacting the manufacturer for any purpose always give the machine serial number, model, voltage and other electrical characteristics appearing on the nameplate at the rear of the machine.

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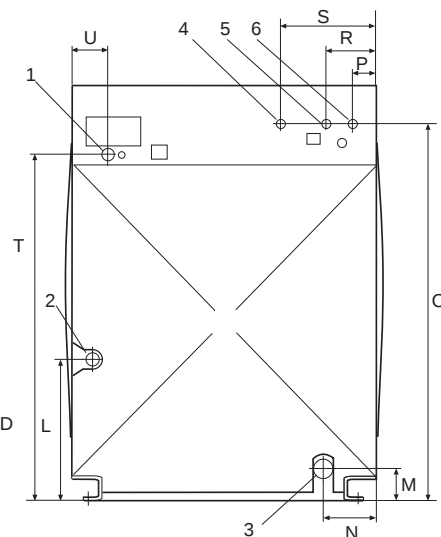
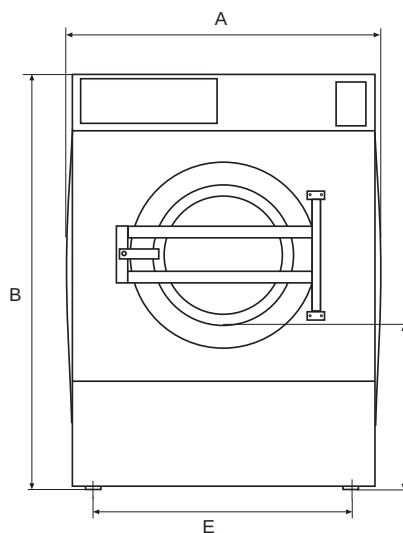
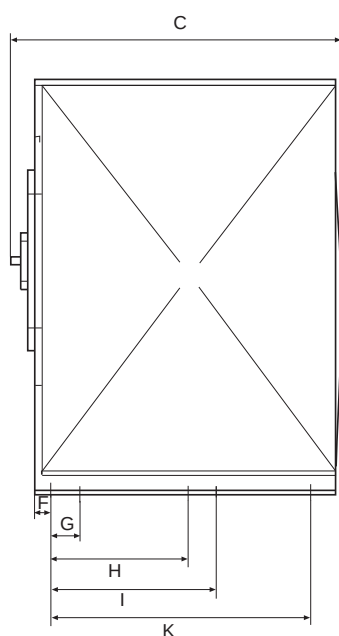


Technical data

Flex-O-Matic EXSM 350

Dry load capacity	up to	80 lbs
Overall dimensions	Width	1114 mm 43 7/8"
	Depth (at the top)	1121 mm 44 1/8"
	Height	1520 mm 59 7/8"
	Net weight	645 kg 1422 lbs
Max. floor load at extraction	±14 kN	±3147 lbs.force
Frequency (dynamic force)	10,8 Hz	
Crated Dimensions	Volume	2.4 m ³ 85 cu.ft
	Weight	662 kgs 1460 lbs
Inner drum	Diameter	920 mm 36 1/4"
	Depth	520 mm 20 1/2"
	Volume	350 litre 12.6 cu.ft.
Speed of rotation	Wash	40 r.p.m.
	Distribution	60 r.p.m.
	Extraction, low	325 r.p.m.
	Extraction, high	650 r.p.m.
G-factor	During wash	0.8
	During extrac., low	55
	During extrac., high	220
Motor speed	During wash	360 r.p.m.
	During distrib.	570 r.p.m.
	During extrac., low	1660 r.p.m.
	During extrac., high	3380 r.p.m.
Voltage requirements	208-240 V 3-Phase 60 Hz	
Rated power	Motor, wash	0.9 kW 1.2 HP
	Motor, distrib.	0.95 kW 1.3 HP
	Motor, extrac., low/high	4.5/4.8 kW
		6.0/6.4 HP
Overcurrent protection, motor	Three-phase	25 A
Water connections		
Recommended water pressure		2-6 kp/cm ² 25-85 psi
Hose connection, water	DN 25 mm	1"
Hose connection, steam		1/2"
Hose connection, drain	75 mm	3"

Outline and dimensions



2479

- 1 Electrical cable connection
- 2 Steam connection
- 3 Drain connection
- 4 Hot water connection
- 5 Hot water connection
- 6 Cold water connection

EXSM 350		
	mm	inches
A	1114	43 7/8"
B	1520	59 7/8"
C	1206	47 15/32"
D	597	23 1/2"
E	935	36 13/16"
F	66	2 5/8"
G	100	3 15/16"
H	490	19 19/64"
I	590	23 1/4"
K	930	36 5/8"
L	527	20 3/4"
M	120	4 3/4"
N	206	8 1/8"
O	1380	54 11/32"
P	89	3 1/2"
R	184	7 3/16"
S	354	13 15/16"
T	1270	50
U	125	4 15/16"

Installation

Machine foundation

For making the foundation, check with a professional engineer in order to calculate the foundation regarding dynamic and static forces.

The machines are designed to be bolted in position to a concrete floor or specially prepared concrete foundation. A template showing the size of the foundation and positioning of the foundation bolts is delivered with each machine.

For installation on an existing concrete floor, the floor must be at least 8" thick and of good quality. If the floor does not meet these requirements, then a 6-8" high concrete foundation should be made.

Follow the instructions below when making a concrete foundation:

- Fig. 2
1. Decide where to place the machine and consider maintenance requirements, i.e. determine a suitable distance from the rear of the foundation to the wall, and the distance from the foundation to the nearest side wall. The distance should be at least 16 and 2 inches, respectively.
 2. Break up the floor to a depth of at least 3 inches, making sure that the sides of the hole slope inwards - the bottom of the hole should be 5 inches longer than the upper length.
 3. Wet the hole well. Brush the bottom and sides with cement grout.
 4. Prepare a casing and fill with concrete to form foundation. Make sure the foundation is level.
 5. Use the template to position the foundation bolts correctly - bolts are to extend 1 1/2" above concrete.
- Fig. 4

Reinforcing ironrods A shall be used around the base. The ironrods shall be placed between the bolts and the edge of the foundation.

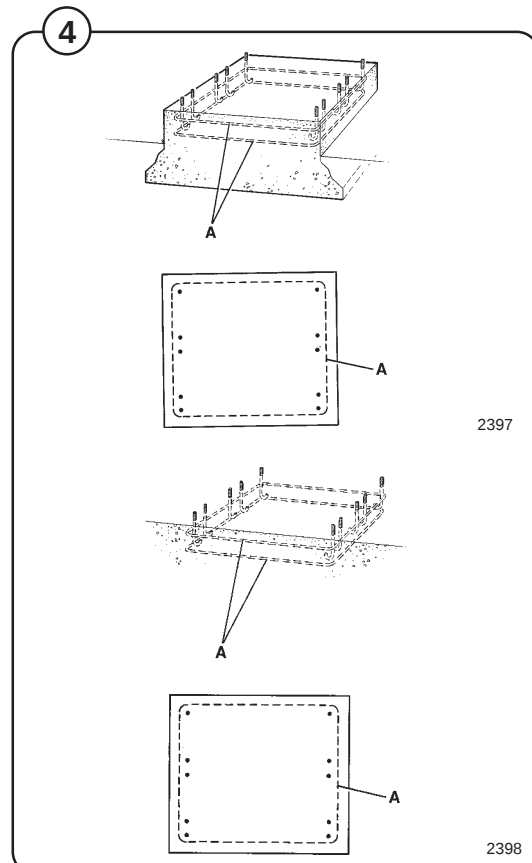
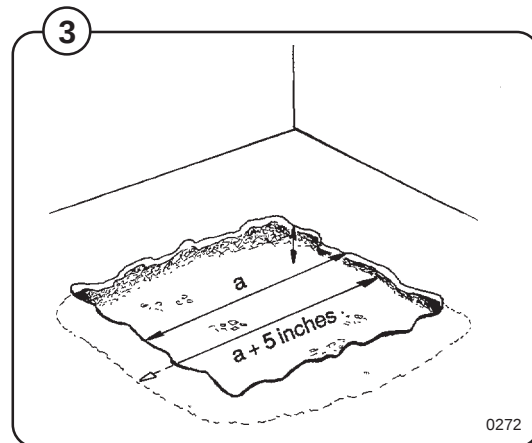
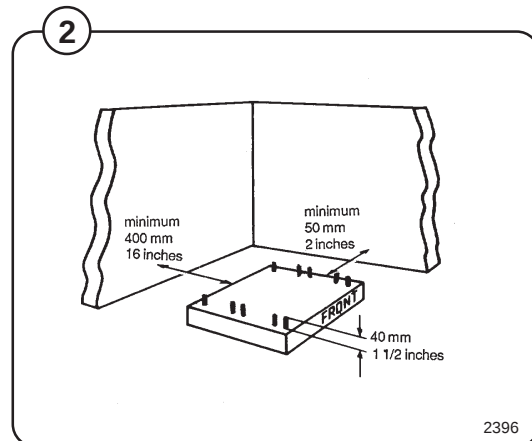
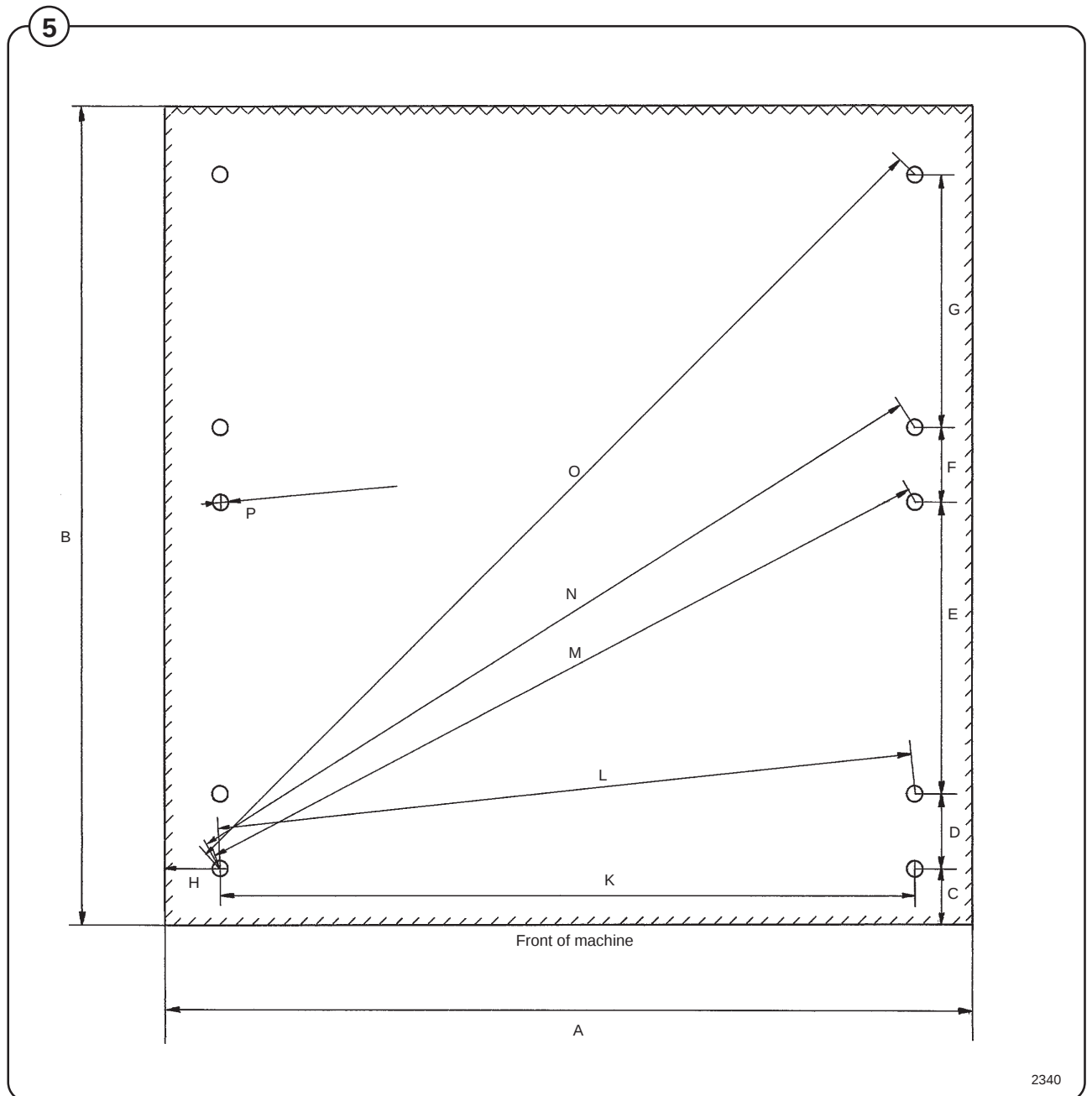


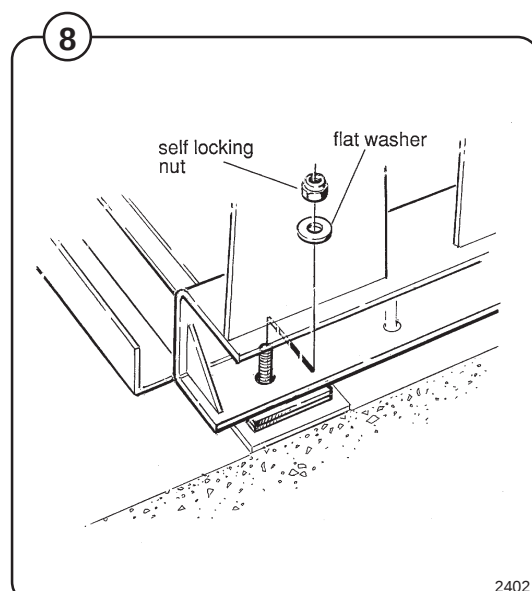
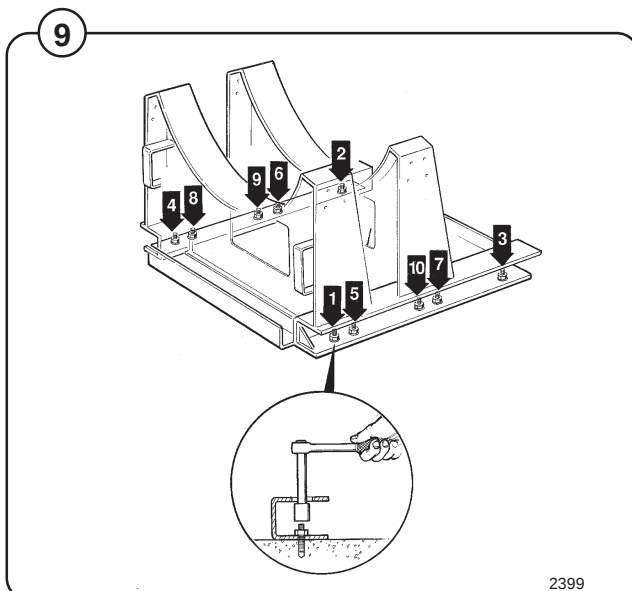
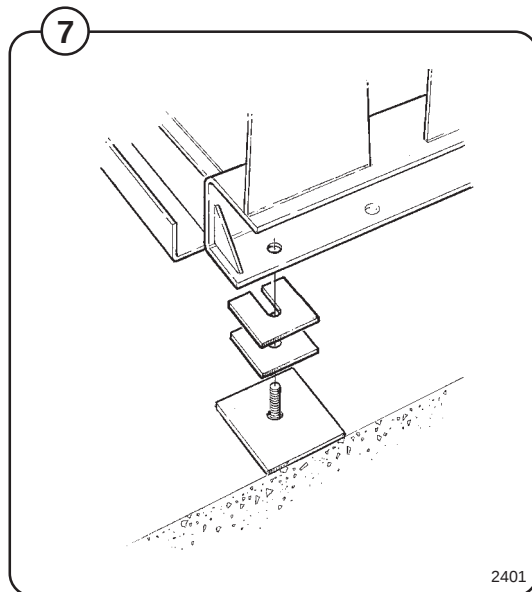
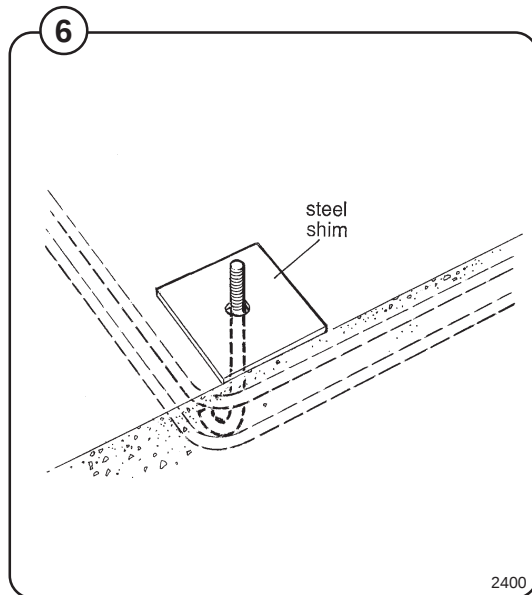
Fig. 5 Measurements for foundation in inches and (mm).

⑤ A 42 29/32" (1090)	H 3" (77)
B 43 15/64"	K 36 13/16" (935)
C 3" (75)	L 37 1/64" (940)
D 3 15/16" (100)	M 41 9/16" (1056)
E 15 23/64" (390)	N 43 17/32" (1106)
F 3 15/16" (100)	O 51 59/64" (1319)
G 13 25/64" (340)	P 7/8" (22)



Mechanical installation

- Fig. 6
- Place wide steel shims on the concrete foundation over the bolts.
 - Lift the machine and lower it in position. Never use the door or the door handle to lift or lower the machine.
- Fig. 7
- Check that the machine is level front-to-rear and side-to-side and standing firmly on the ten supporting points. Spacing washers must be mounted if one or more of these points is not resting against the floor/foundation.
- Fig. 8
- Place flat washers over the foundation bolts and secure the machine in position by tightening the self-locking nuts, with a torque of 20 kpm.
- Torque for the nuts (M16) should be 145 ft lbs.
- Fig. 9
- Tighten the nuts in sequence as shown.
 - Check and tighten the nuts every week for the first month.



Electrical installation

Fig. 10 Although the machines are fitted with thermal overloads in the motor windings and separate fuses for the control circuit, a separate three-phase common-trip circuit breaker must be installed for all three-phase machines.

For proper overcurrent protection, check the data plate at the rear of the machine. Also consult local electrical code for special requirements.

Fig. 11 Connect L1, L2, L3 and ground wires according to the markings of the terminal block. The cable is to hang in a large loose loop, supported by the clip of the terminal block. After installation, do the following:

Check the incoming power for a high voltage leg. If present, connect that line to L2 on the terminal block.

Fig. 12 Start the machine and check that the drum rotates in the proper direction during extraction, i.e. counter-clockwise when seen from the front. If the drum rotates in the wrong direction interchange line L1 and L3 at the power connection terminal.

Connection for signals to external liquid supply injector

Fig. 13 On the right side of the terminal connection is the connection for signals. Depending on the number of pumps to be connected, they shall be connected from 1–5 and C (Common) on resp. connection. The signal wires can take max. 0,5 A total output load.

The pumps obtain 220V signals from the program card via the connections.

Rib A controls connection 1

Rib C controls connection 2

Rib E controls connection 3

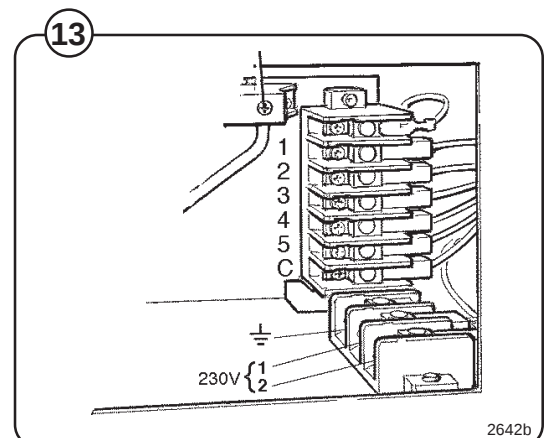
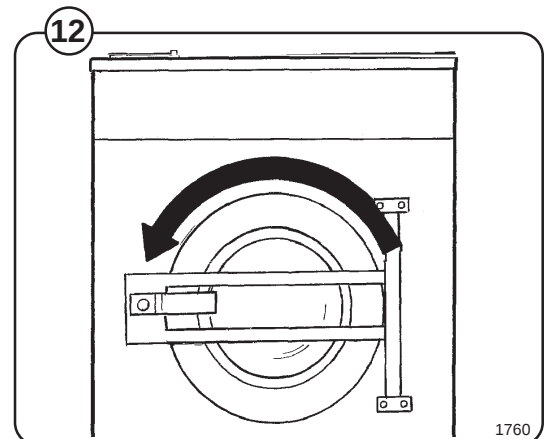
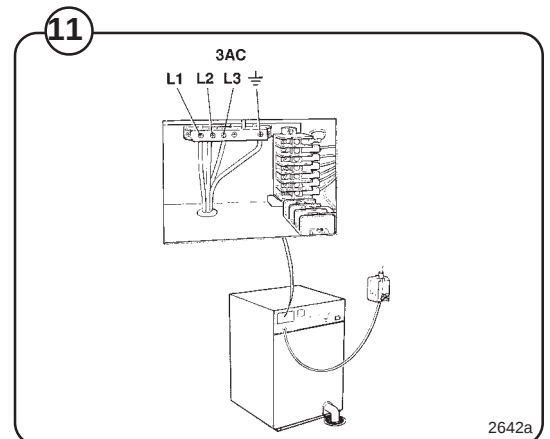
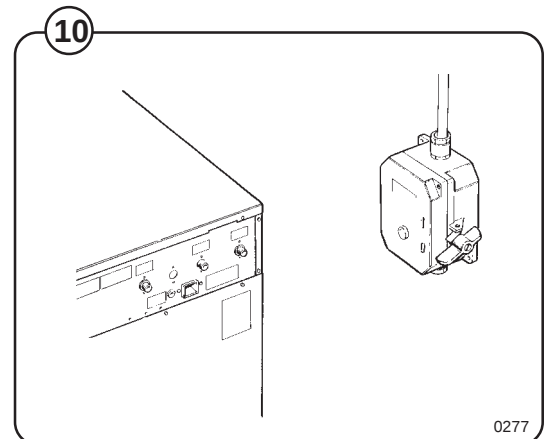
Rib G controls connection 4

Rib I controls connection 5

NOTE

Remember that it is only a signal which is obtained from the machine to the pumps and not time controlling.

From the smaller connection block a power feed of max 6A output load can be obtained.



Water connection

NOTE

All plumbing must conform to national and local plumbing codes.

Fig. 14 Incoming water lines do not require non-return or back-suction valves, as the machine is already fitted with a siphon breaker. However, all incoming lines must be fitted with shut-off valves.

Fig. 15

- Water inlets are labelled for connection of hot and cold water hoses.
- Flush the water system thoroughly and check that the filter at the machine inlet is fitted correctly.

Fig. 16

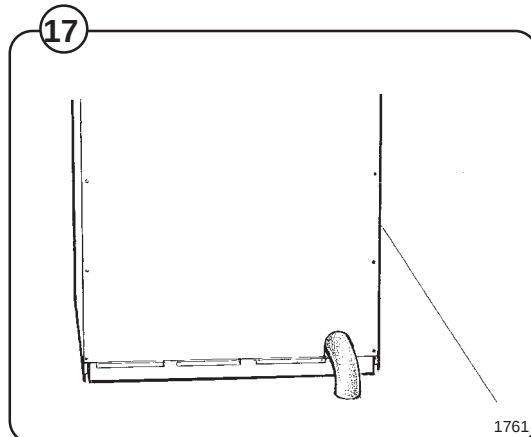
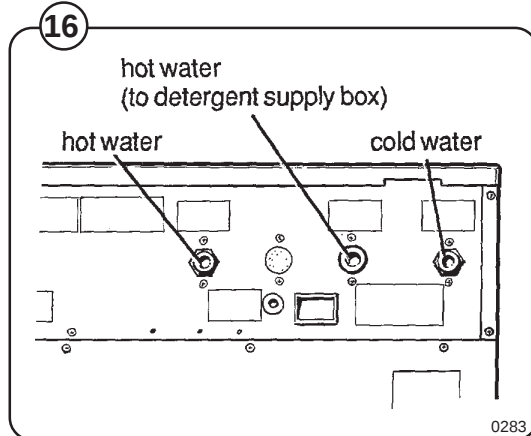
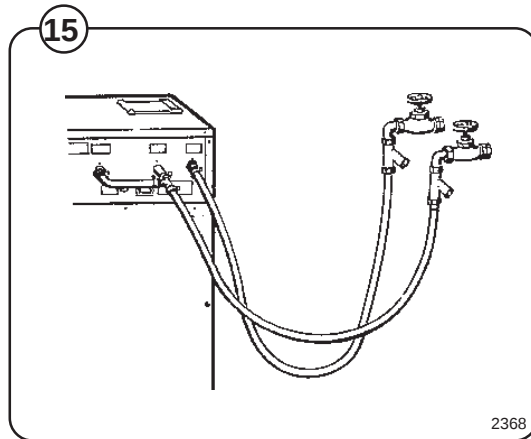
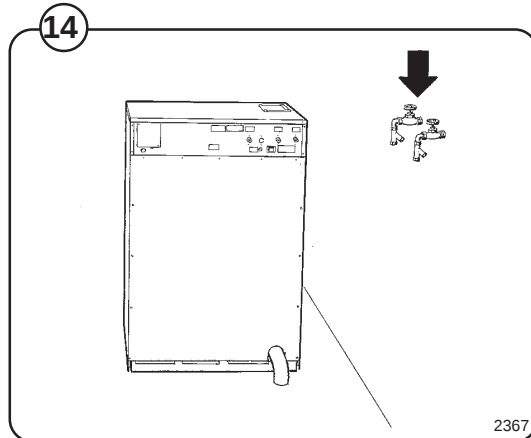
- Connect the machine to the water mains with 1" reinforced rubber hosing not to exceed 6 ft in length. Hang the hosing in a large loop. Do not use rigid piping.

Drain connection

Fig. 17 Connect a 3" (75 mm) flexible hose to the drain outlet of the machine.

The drain hose must not have any sharp bends and must slope from the machine to assure proper drainage. The outlet must open freely to the main drains or a 6-inch minimum PVC drain line.

Do not reduce the size of the drain connection from the machine to the waste line.



Steam connection

Fig. 18 The steam inlet pipe must be fitted with a manual cut-off valve in order to facilitate installation and service operations.

Attach the filter supplied with the machine to the manual cut-off valve.

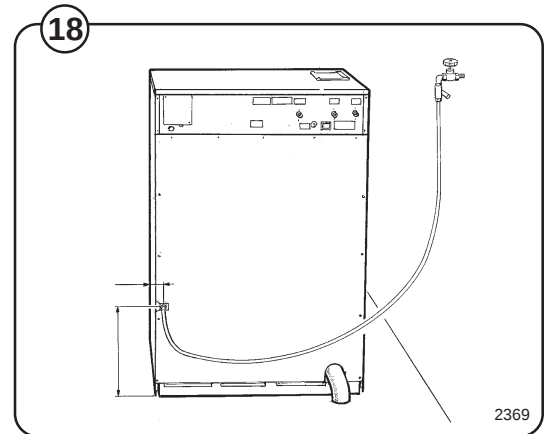
Connection hoses should be of the quality required according to regulations in the country of use.

Connections size at filter: DN 15 (1/2").

Steam pressure required:

- minimum: 50 kPa (0.5 kp/cm²) (7 psi)
- maximum: 800 kPa (8 kp/cm²) (113 psi)

Check there are no sharp angles or bends in the connection hose.



Connection of top-mount manifold for connection of external liquid supplies

Remove the cover and cover support from over the soap box.

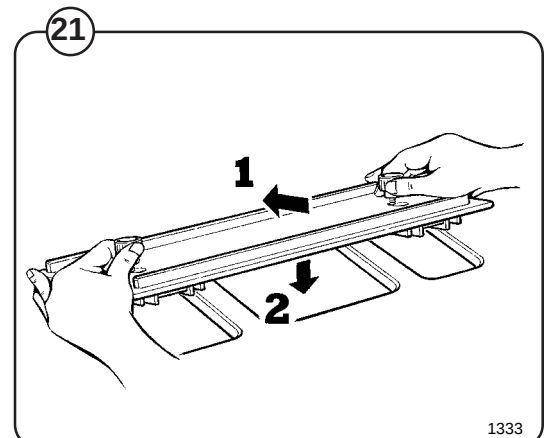
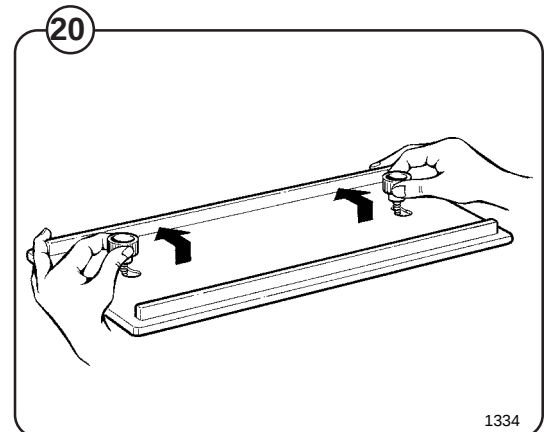
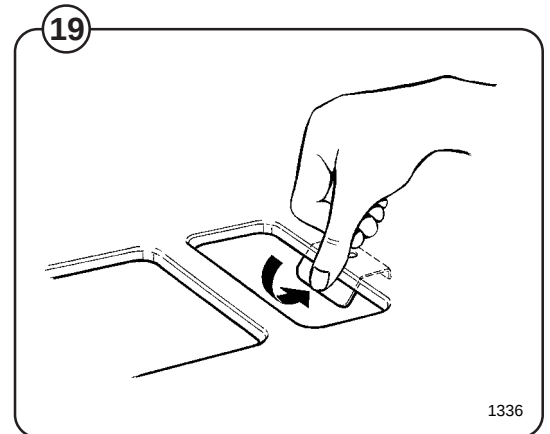
Bend all the way back the metal plate in compartment 3.

Pull the manifold knobs up and forward.

Fig. 19 1. Loosen both knobs so that one side of the metal fingers underneath can slide under the top lid of the machine, within the supply box.

Fig. 20 2. Fit the supply manifold into the supply box so that both sides are held securely in places by the metal fingers.

Fig. 21 **Note:**
If the supply manifold does not fit, turn it around. You have it in backwards.



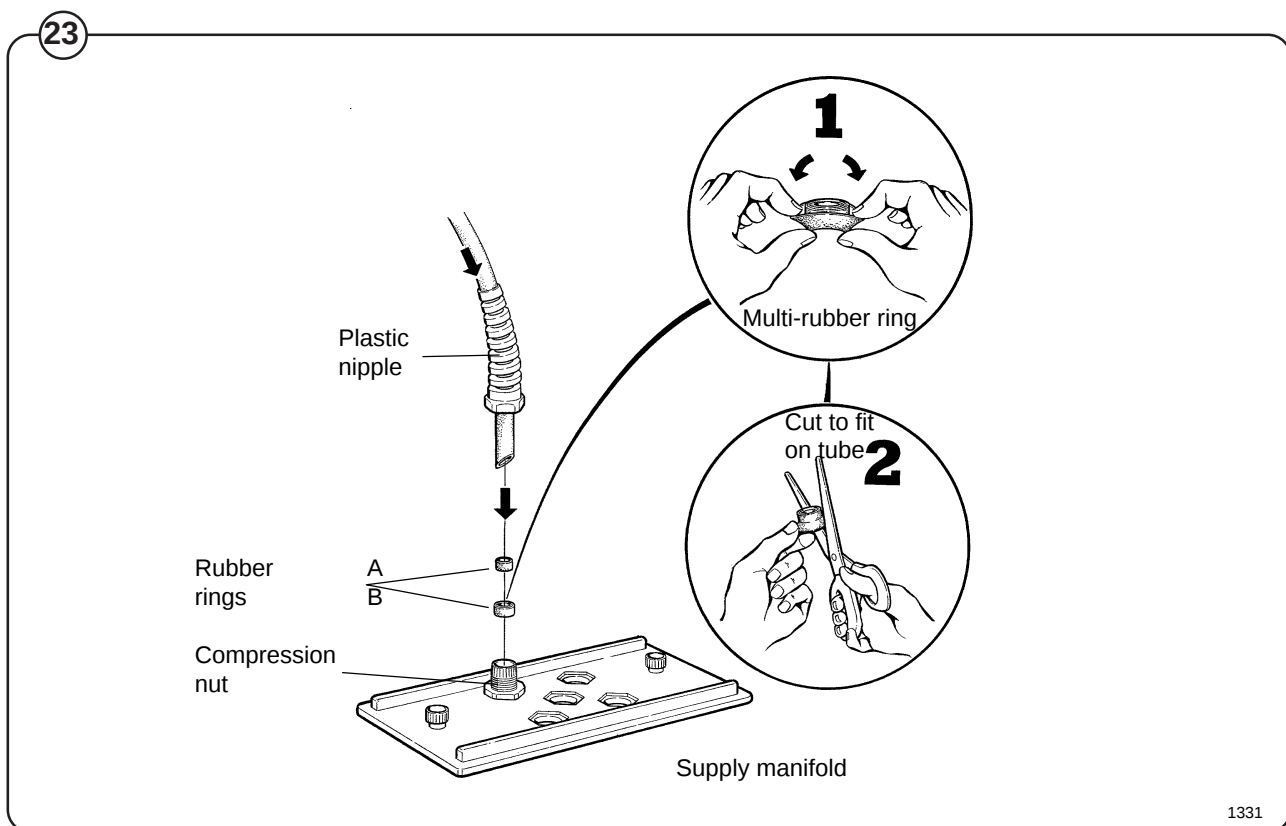
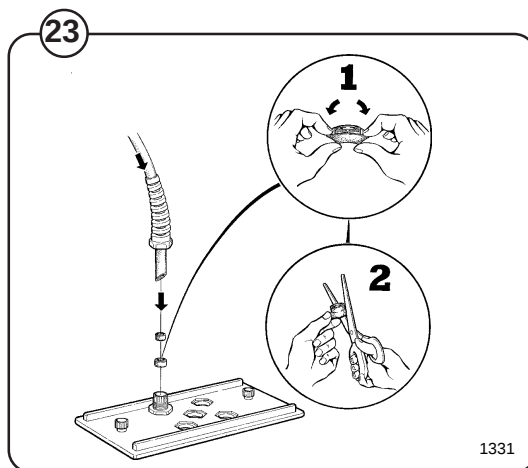
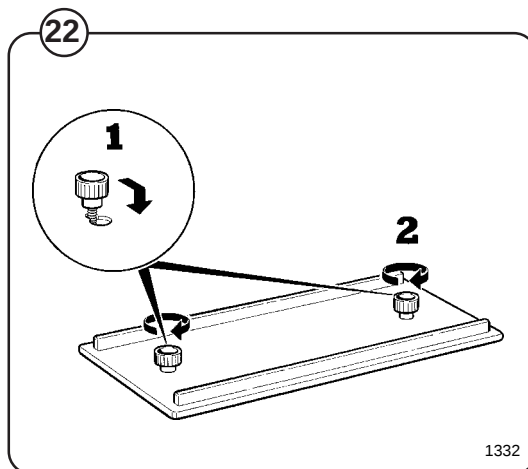
Installation

Fig. 22 1. Drop the knob into the larger opening in the supply manifold lid.

2. Tighten securely. Do not overtighten! Do not use pliers or other tools to tighten the knobs!

Fig. 23 1. Stretch the multi-rubber ring B and select the correct size ring which will fit snugly on the chemical tube you are using. Ring A is used for tubes with 5/16" diam.

2. Use scissors or a razor to carefully cut out the proper size rubber ring. Wrap the rubber ring around each tube after threading each tube through the plastic nipple. Run the tube through the compression nut to the bottom of the compartment. Cut the end of the tube at an angle. Hand tighten the plastic nipple on to the compression nut.



Start-up and safety checklist

Before initial start-up of a Wascomat washer-extractor, the following safety checks must be performed:

- Fig. 24
- Make sure the machine is properly bolted to the floor.
- Fig. 25
- Make sure that all electrical and plumbing connections have been made in accordance with applicable local codes.
 - Use only flexible water fill and drain hoses of the proper length to avoid sags and kinks.
 - Make sure the machine is properly grounded electrically.

Before the machine is operated, the door safety interlock must be checked for proper operation as follows:

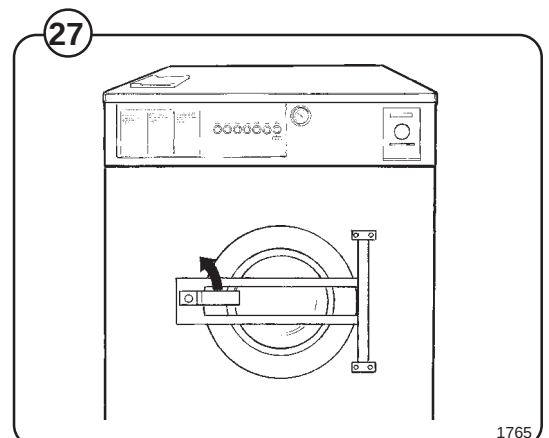
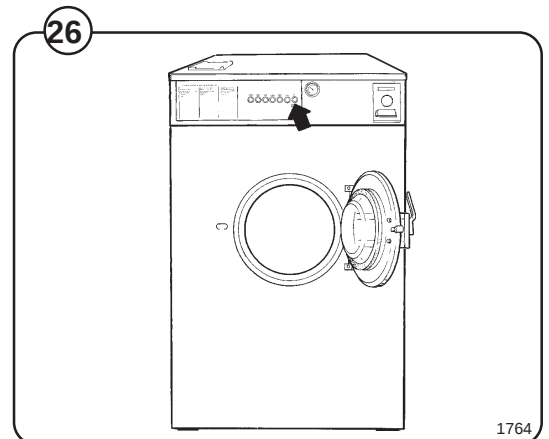
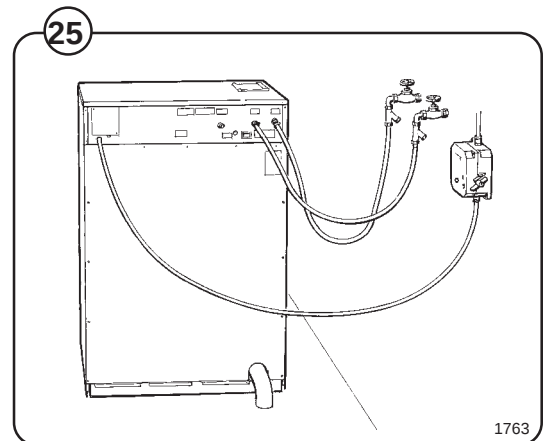
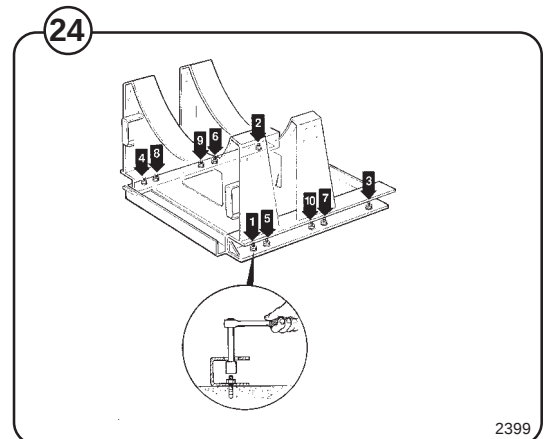
- Fig. 26
- When washer loading door is open, the machine must not start. Verify this by attempting to start washer with door open.
- Fig. 27
- When washer is in operation, the loading door is locked and cannot be opened. Verify this by attempting to open the loading door when the machine is operating. If necessary, consult this manual for proper operation of the door lock and door safety interlock or call a qualified serviceman.

IMPORTANT:

Door safety interlock must be checked daily in accordance with above procedure.

WARNING:

Before servicing Wascomat equipment, disconnect electrical power.



Function control check-out list

In the machine cylinder, you will find the warranty registration card, a copy of the warranty policy, the bolt hole template and other pertinent material. The warranty card should be completed and sent to Wascomat. All other items should be placed in a safe place for future reference.

The machine should be cleaned when the installation is completed, and checked out as detailed below without loading the machine with fabrics:

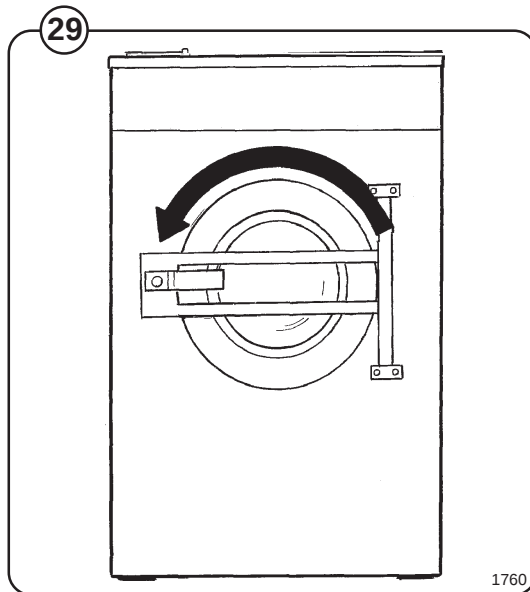
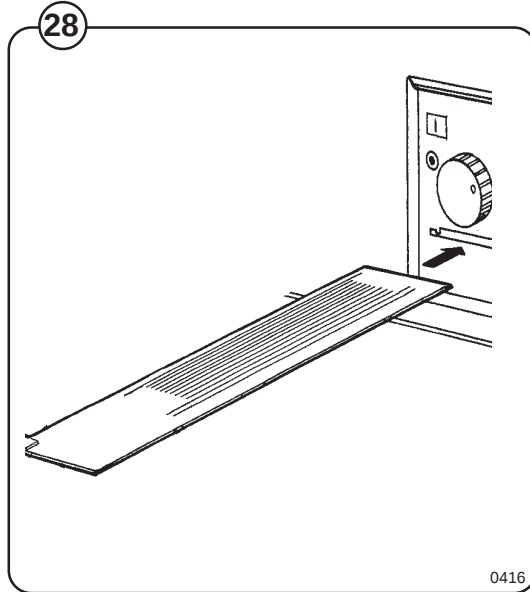
1. Check the incoming power for proper voltage, phase and cycles.
2. Open manual shut-off valves to the machine.
3. Turn on electric power.
4. Check the door safety interlock as detailed on page 11 of this manual.
5. Push the ON-OFF switch to the "ON" position. Turn the programmer knob clockwise and insert the formula card. Start the machine by now turning the programmer knob counter clockwise.
6. Run through a complete cycle, checking for water temperature and drain operation as cut on the card.
7. Machine must spin in a counter-clockwise direction, as seen from the front, during extraction. If it does not, reverse lines L1 and L3.

Fig.

(28)

Fig.

(29)



NOTE

All machines are factory tested prior to shipment. Occasionally, some residual water may be found when the machine is installed.

Safety rules

- The machine is designed for water washing only.
- Machines must not be used by children.
- All installation operations are to be carried out by qualified personnel. Licensed personnel are necessary for all electric power wiring.
- The interlock of the door must be checked daily for proper operation and must not be bypassed.
- All seepage in the system, due to faulty gaskets etc., must be repaired immediately.
- All service personnel must be fully familiar with the operating manual before attempting any repair or maintenance of the machine.
- The machine must not be sprayed with water, otherwise short circuiting may occur.
- Fabrics softener with volatile or inflammable fluids are not to be used in the machine.

General

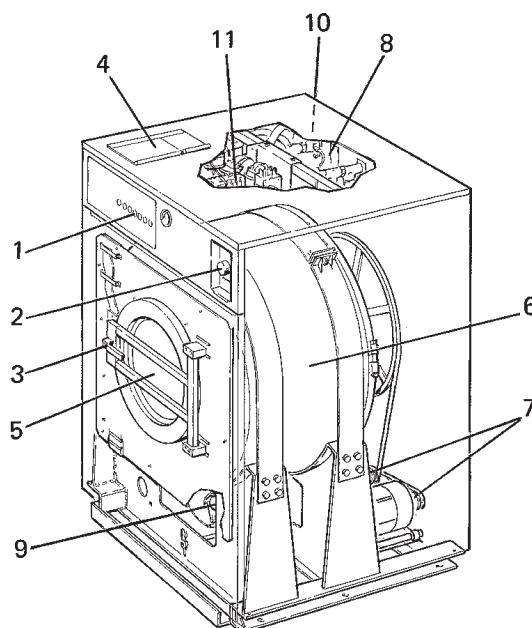
The door, card programmer, thermometer, thermostat (if heated), control lights and manual switches are fitted at the front of the machine.

All control and indicating components, i.e. relays, level control, etc are assembled under the top cover, easily accessible from the top of the machine for ease of servicing.

Main units

- Fig. 30
- 1 ON-OFF and manual operating buttons - to start the machine and operate it manually.
 - 2 Card programmer for operating machine through individually programmed cycles.
 - 3 Door - with automatic locking device which remains locked throughout the different wash processes.
 - 4 Detergent supply box - three compartments for automatic injection of powdered detergents and fabric softener.
 - 5 Inner cylinder - of stainless steel supported at the rear by two ballraces.
 - 6 Outer drum - of stainless steel (18/8) securely attached to the frame.
 - 7 Wash motor - for reversing wash action and distribution. Extraction motor - for low and high spin action.
 - 8 Hot and cold water valves - program and level controlled solenoid valves for filling with water, and for flushdown of detergent supply box.
 - 9 Drain valve - timer controlled valve for draining the machine of water.
 - 10 Siphon breaker - to prevent water in the machine from re-entering the water supply system.
 - 11 Control circuit - of plug in type, for time and temperature control of the different wash cycles.

30



Machine construction

Panels

The machines are equipped with a top panel and front panel made of stainless steel. For servicing purposes, the panels can easily be removed.

Outer shell

Fig. 31 The outer shell is made of heavy gauge surgical steel and is attached to a heavy duty, rigid head casting (back gable).

The whole assembly is mounted on a heavy gauge fabricated steel base, hot-dip galvanized for long life and corrosion resistance.

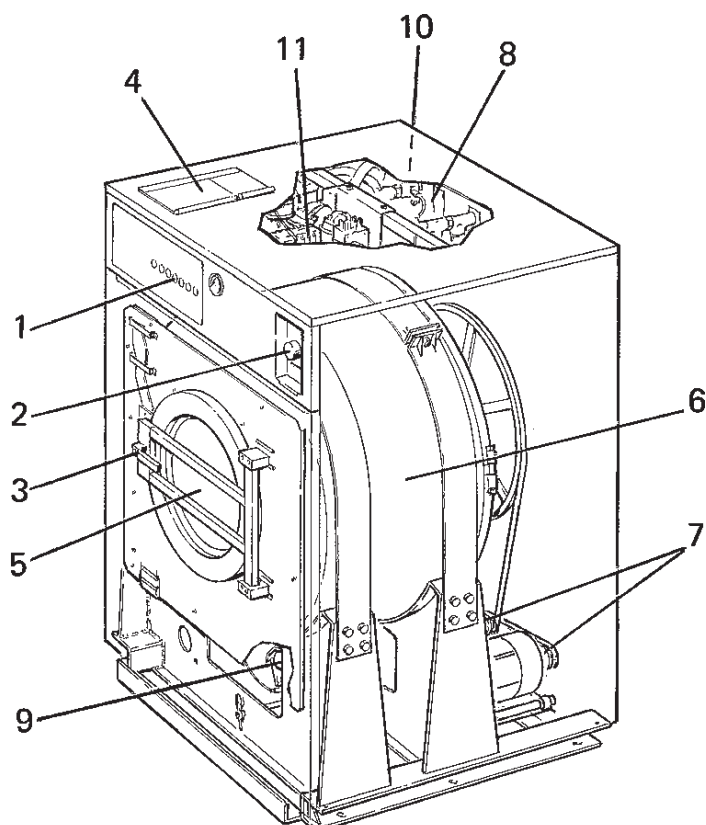
Inner cylinder

The inner cylinder is made of perforated surgical stainless steel. It is equipped with three lifting ribs and has highly-polished side sheets and back with maximum embossed perforated area to assure high flow of water and supplies through fabrics.

Scientifically correct ratio of cylinder diameter and depth assures maximum washing action.

The shaft is electrically welded to the reinforced back of the cylinder. A specially designed chromeplated sleeve bushing protects the seals from wear.

31

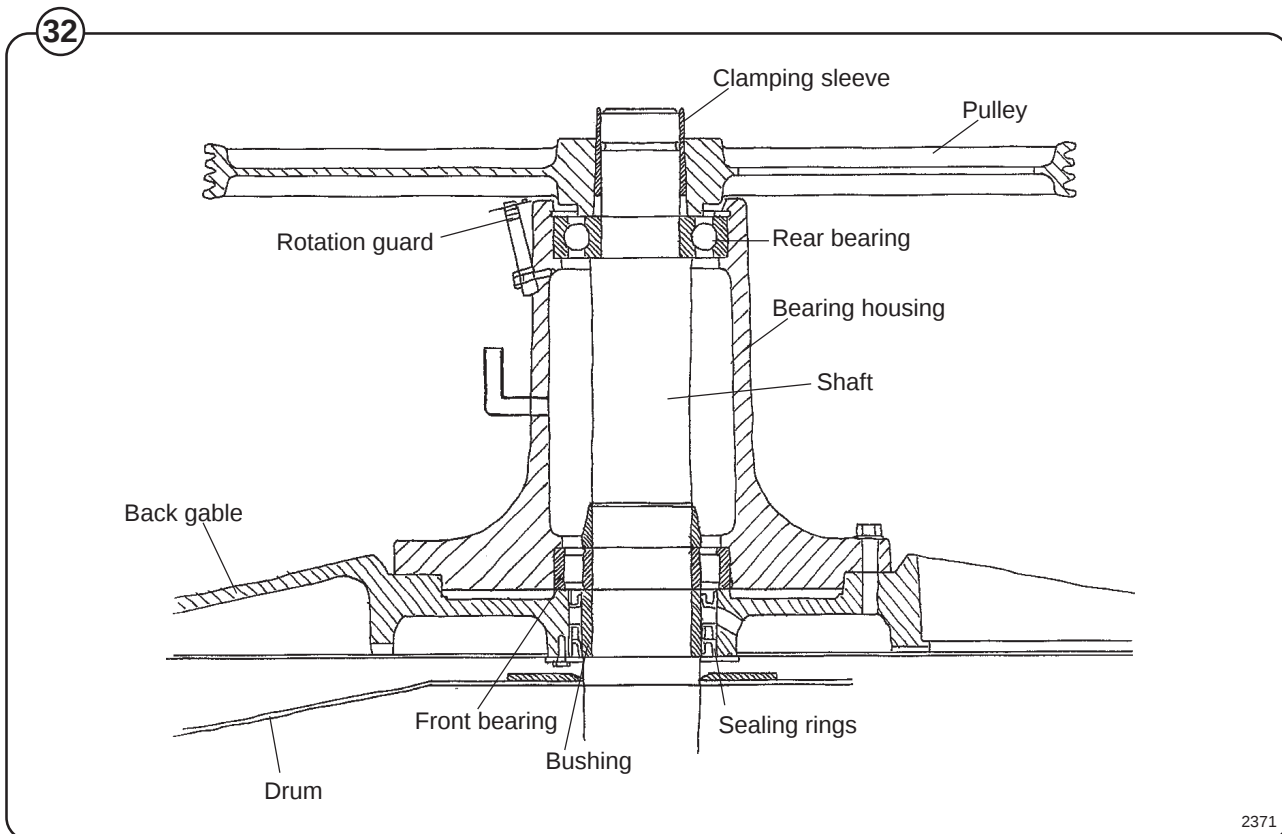


Back gable and bearing

Fig. 32 The back gable and the bearing trunnion housing are constructed of a webbed heavy casting for extra rigidity. The bearings are protected against filtration of water by three seals. An intermediate safety outlet provides an escapement for any possible condensation.

The seals are mounted on a chrome-plated, noncorrosive, specially hardened sleeve bushing that is mounted on the drive shaft to prevent wear of the seals and shaft. The main bearing is fitted machinetight into the bearing trunnion housing. A nut is tightened on the shaft to prevent the cylinder from moving in and out.

The extension of the bearing trunnion housing supports the rear bearing holding the shaft. A grease seal is mounted to prevent escape of grease. The bearings are permanently lubricated and need no maintenance.



Control unit

Fig. 33 All major components for operating the machine, such as card programmer (3) the thermometer (4) and push-buttons (5) are mounted on the control panel (1) at the front of the machine.

Components such as relays and reversing timer are mounted in the control unit (2) located at the top of the machine, easily accessible for service after removing the top panel.

The control unit is mounted in the machine with 4 screws. Connections to the machine are made by quick-disconnect plugs. Two thermostats (14) are supplied for heated machines.

Manual operating switches

Switches with following functions are mounted on the control panel:

Programmer switch

The black knob (6) on the card programmer acts as a main switch for starting and stopping the machine when washing with a pre-cut formula card. See chapter "Operating instructions".

ON-OFF switch with signal light (7)

This switch must be in "On" position with the built-in signal light indicating that there is power to the machine before the machine can be operated including normal door opening.

Re-start switch with signal light (8)

is used to re-start the programmer after the buzzer has sounded and the programmer stopped.

Gentle action switch (9)

is used to obtain a gentle wash action when washing delicate garments. The drum rotates 3 seconds in one direction, stops for 12 seconds and then operates again for 3 seconds in the opposite direction.

33

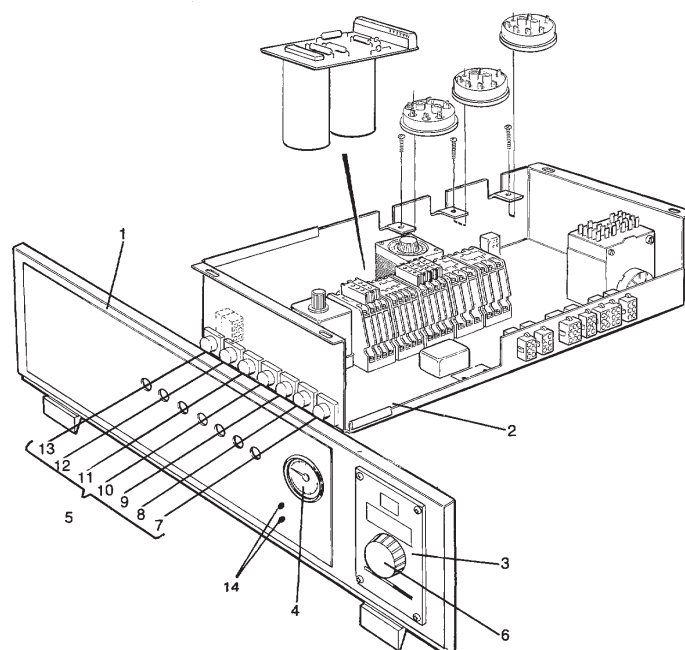


Fig. **Drain switch (10)**
 (34) For manual operation of the drain valve.

Hot water switch (11) and cold water switch (12)

are for manual operation of the inlet valves as marked. When the machine operates automatically via the programmer, the push-buttons may be used to raise the water level, by adding water.

Detergent flushing switch (13)

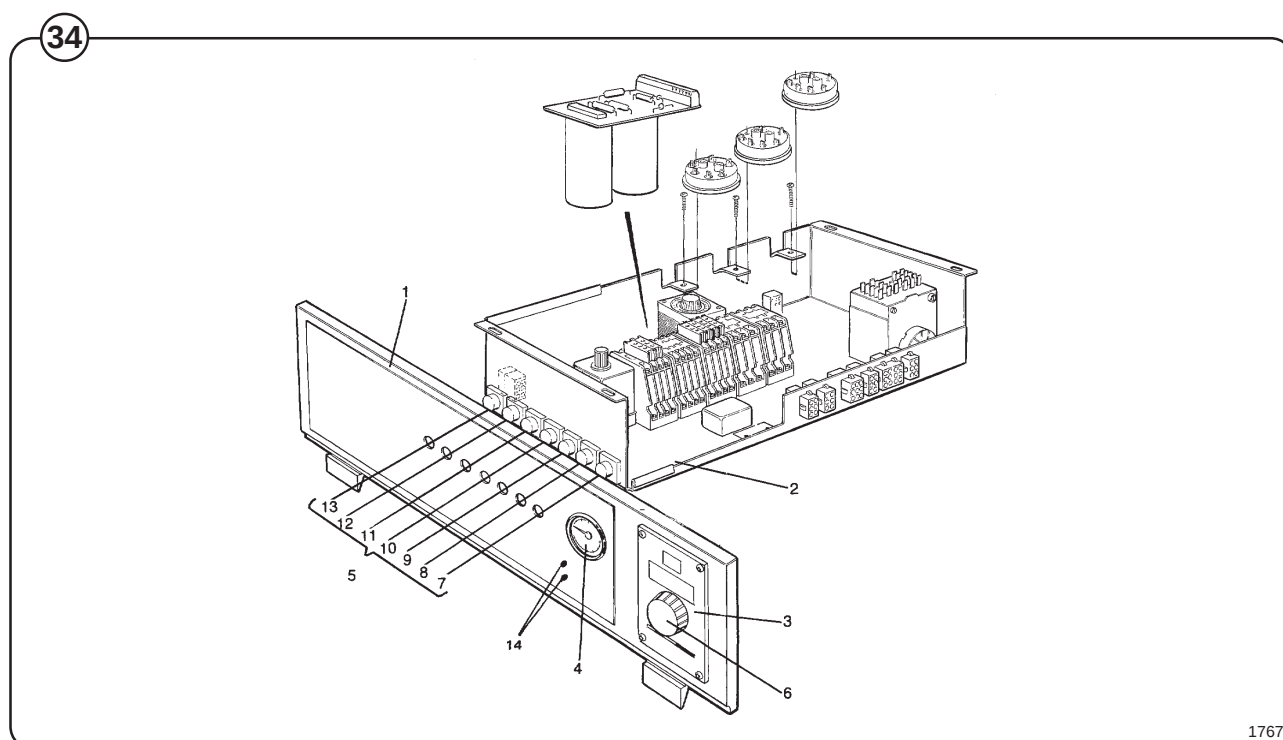
is for manual flushing of detergent from Compartment 1.

Thermostats (14), if heated

Two thermostats controlling two temperatures.

Buzzer and signal light

The buzzer and the yellow signal light (8) are controlled by rib M and may be programmed to call the attention of the attendant to the machine, at any time during the cycle to add supplies or unload. To re-start the machine after adding supplies, press the re-start button.



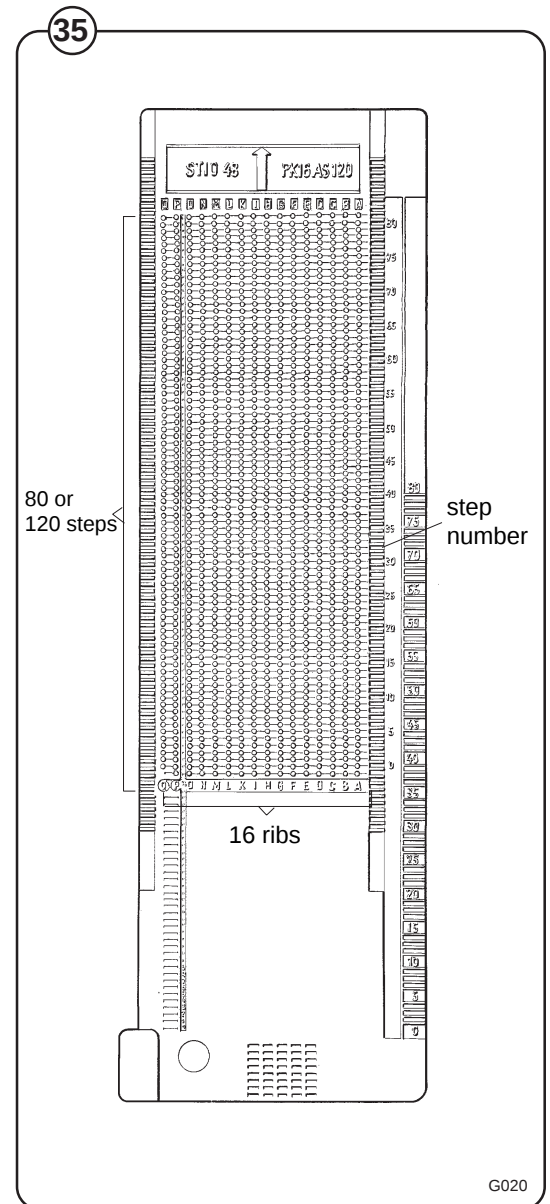
Card programmer

The EXSM 350 FL-machine is equipped with a 16 track automatic card programmer.

Program cards

Fig. 35 The automatic washing process is controlled by the plastic program card which is inserted into the programmer. Any number of cards may be cut to follow the formulas established by your chemical supplier for washing, rinsing and extracting needs.

Each card has sixteen ribs, consisting of small pegs marked A-Q. Each rib controls one wash function. A step-scale is inscribed on the card so that a formula of up to 80 steps may be put out on the card. The programmer advances the card one peg every 30 seconds, providing a maximum program time of 40 minutes on a standard card. Longer cards with 120 steps (60 minutes) are available.



G020

As the card proceeds through the cycle a missing peg in one of the ribs closes the circuit of the corresponding micro-switch in the programmer and activates that particular function.

Never cut the formula without first laying it out on the card. Mark the pegs to be eliminated and then carefully re-check it against your formula plan.

Fig.
36

Cutting the pegs from the card is accomplished with a special pair of cutters, delivered with the machine, or by using a 1/4 inch chisel. To insure fault-less programmer operation, it is important that the pegs be cut off cleanly and completely.

Note that the programmer stops during water fill and heating (on heated machines). It starts advancing again when the water level (or pre-set temperature) has been reached.

The water inlet valves and the drain valve are electrically interlocked and cannot open simultaneously. This simplifies the card cutting. For example, if hot water is required for two or more consecutive fillings (two washes and a rinse), the hot water rib may be cut for the entire length of these three fillings, including drain time. When the drain valve opens and the water level drops, the water inlet valves will not open as they are interlocked with the drain. The moment the drain valve closes, the required water inlet valve opens immediately.

The programmer motor which drives the mechanism is activated only if a water level has been satisfied or the drain valve is open. During the water fill, the programmer will not advance the formula card until sufficient water has been admitted to satisfy the programmed water level (low or high). The machine will achieve the proper water level regardless of variations in water pressure. During the drain period, the programmer motor is energized through a separate relay to keep the programmer advancing the card. If you call for a buzzer signal (Rib M) when the machine is empty of water, be sure the drain (Rib K) is cut to energize the drain valve. The programmer will thus continue to advance the card until it reaches the buzzer signal or stop position.

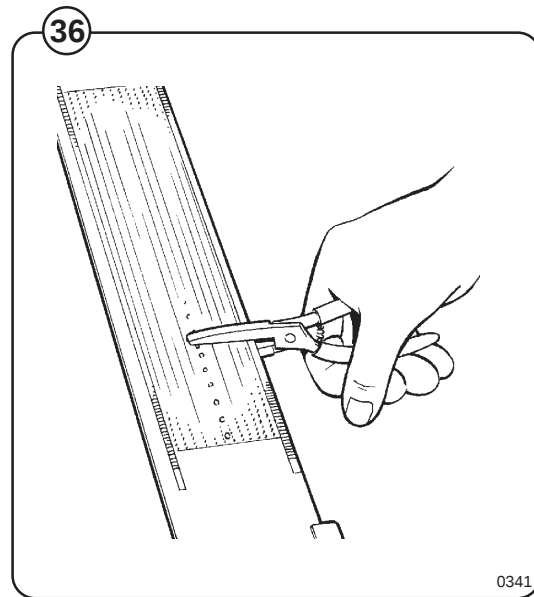


Fig. 37 Gentle action. This feature is standard on all FL's. You select this feature by pressing the manually operated switch on the front of the control panel. It is ideal for blankets, draperies, slipcovers, and all fragile materials where reduced mechanical action is desirable. The washer will function as follows:

- A During washing and rinsing, the tumbling action of the basket will be 3 seconds clockwise and stop for 12 seconds. Direction will reverse and run 3 seconds counter-clockwise and stop for 12 seconds. This procedure will continue, resulting in a reduction in mechanical action.

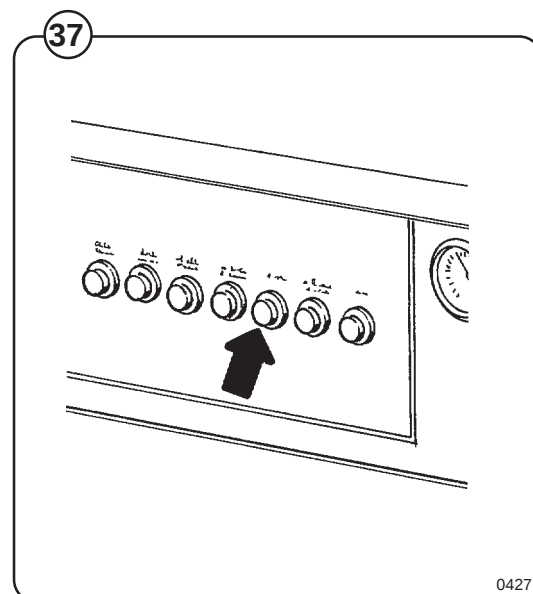
Programming, when using powder supplies

Rib function description:

- A- Flushing detergent from compartment 1. Programmed for 30 seconds together with water filling. If the water pressure is low, detergent supply should occur after water filling. Detergent supply can not be programmed before water filling. If external liquid supply is used, signal is given to terminal 1 at the rear connection block.
- B- If heated, thermostat 1.
- C- Flushing detergent from compartment 2. Programmed for 30 seconds together with water filling. If the water pressure is low, detergent supply should occur after water filling. Detergent supply can not be programmed before water filling. (*If external liquid supply is used, signal is given to terminal 2 at the rear connection block).
- D- If heated, thermostat 2.
- E- If external liquid supply is used, signal is given to terminal 3 at the rear connection block.
- **F- If external liquid supply is used, signal is given to terminal 2 at the rear connection block.
- G- If external liquid supply is used, signal is given to terminal 4 at the rear connection block.
- H- Extraction. **Important:** Drain must be cut for 60 seconds before extraction and during entire extract cycle.

* Up to machine No. 96/196.

** From machine No. 96/197.



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Card programming

- I- Flushing softener from compartment 3. Programmed for 30 seconds together with water filling. If the water pressure is low, detergent supply should occur after water filling. Detergent supply can not be programmed before water filling. If external liquid supply is used, signal is given to terminal 5 at the rear connection block.
- K- Drain. Cut for 60 second duration.
- L- High speed extraction. Cut together with H if high speed is desired. Uncut for low speed extraction.
- M- STOP and buzzer. Programmed if a signal is desired after completed wash or when it is desirable to stop in mid-cycle for some reason.
- N- High water level. Will provide low level when not cut.
- O- Cold water filling. Programmed for entire function period. EXAMPLE: Prewash 2 minutes - cold water programmed for two minutes.
- P- Cool down 3-4°C/min. Programmed directly after main wash without an intervening drain period. If external liquid supply is used, P should be cut for flushing of comp. 2 with each signal.
- Q- Hot water filling. Programmed for entire function period.

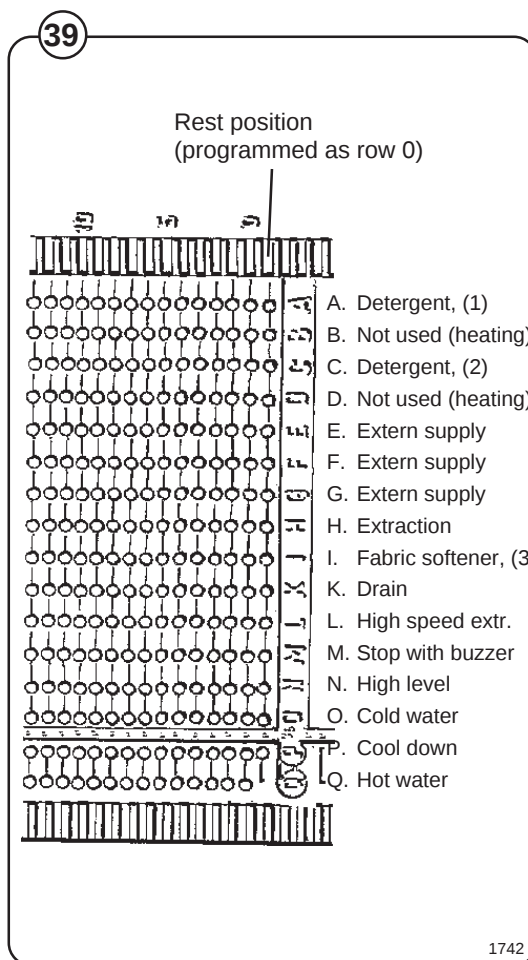
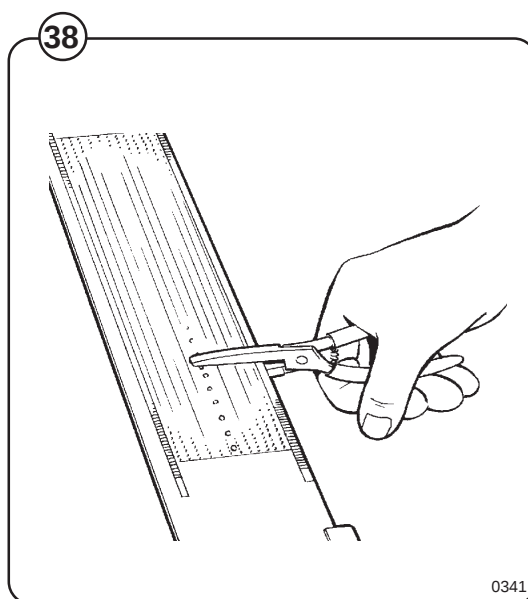
The following must be observed when programming:

Fig. 38 Each peg on the program card equals 30 seconds. (The time unit can be changed to 60 seconds.) To ensure reliable operation, make sure that the entire peg is removed.

Fig. 39 The program begins with step 0. Cut the peg before 0 in the same way as 0 to ensure a correct program start even though the card may be pushed to far into the controls.

When programming Filling (rib marked O - cold water and/or Q - hot water, the program controls stop and start again when the level check provide a pulse to indicate that the level has been reached in the drum.

The last pegs that have been cut away (e.g. peg 12) in a program phase determine which peg is to be removed in the subsequent stage.



When Cool down is programmed (rib P) the machine is filled with cold water. The amount of time chosen depends on the temperature desired. The cooling rate is approximately 3-4°C/min.

Fig.
(40)

Programming Extraction (rib marked H) shall always be preceded by Drain (rib marked K). This shall also be programmed during the entire extract cycle.

Programming Stop with signal (rib marked M) can be carried out several times during the same wash program. When the program comes to Stop, a buzzer sounds and the machine stops. Press **RESTART** to restart the machine.

RESTART may not be used without having a program card inserted in the machine.

Use ribs C, I, A, E and G for signals when connecting external supply dispensing equipment.

Programming example

A card which is programmed for normal soiled was as follows:

Pre-wash

Fig.
(41)

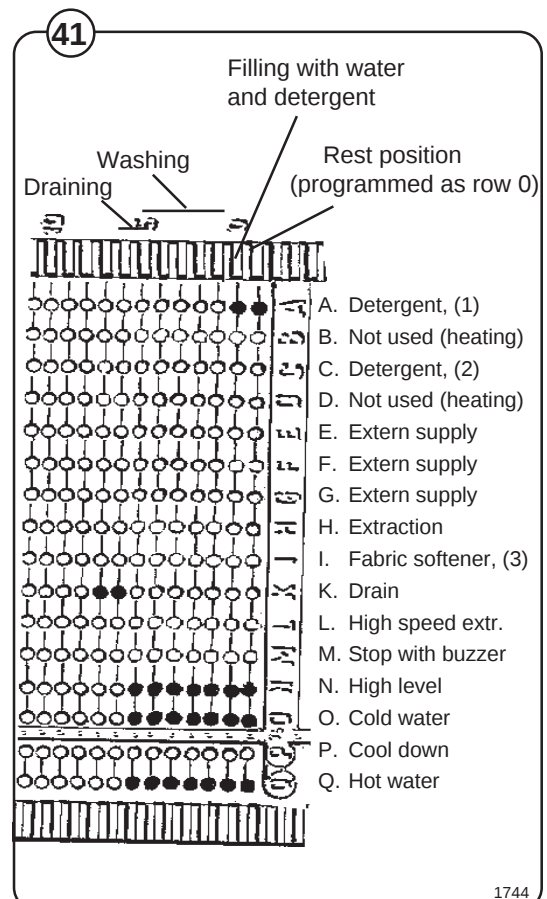
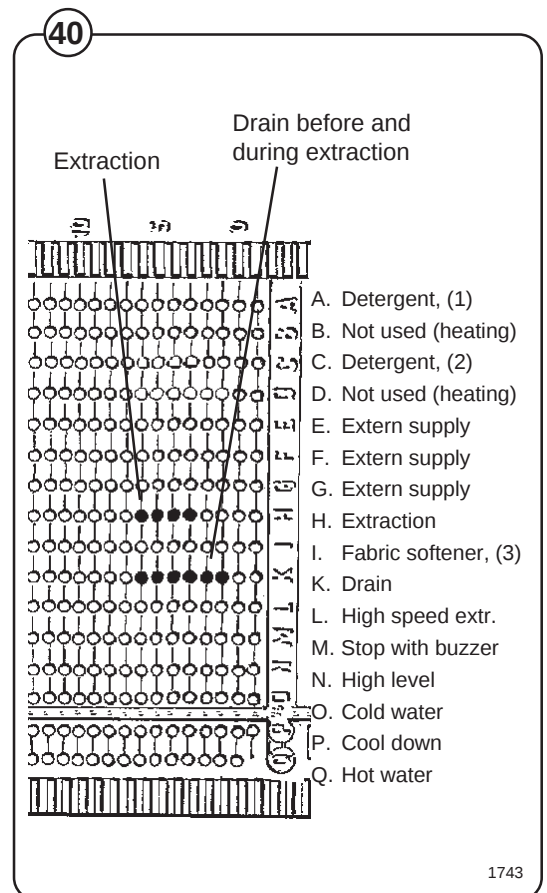
The pre-wash lasts for approximately 3 minutes (peg nos. 0 to 6) and begins with Filling with cold water and hot water to a high water level and dispensing of detergent from compartment 1 (peg no. 0 in ribs N, A, O and Q cut away).

Ribs N, A, O and Q are cut at peg no. 1 as a safety measure to ensure that the wash cycle is correct even though the program card may be pushed too far into the program controls.

The programmer stops the card at peg no. 0 until the water level is reached. The running time once the water level and required temperature are reached is 2 minutes (peg nos. 1-5 cut away in ribs N, O and Q).

Ribs B, I and Q are cut away for the entire prewash to ensure that the temperature and water level are maintained during the entire wash sequence. It is usually necessary to top up with water since the dry wash goods soak up a certain amount.

The pre-wash is concluded with Drain for one minute (peg nos. 5 and 6 in rib K cut away).



Main wash

Fig. 42 The main wash lasts for approximately 8 minutes and begins by filling with hot water and dispensing detergent from compartment 2 (peg no. 8 in rib C cut away).

The programmer stops the card at peg no. 8 until the water level is reached.

Rib Q is cut away for the entire main wash to ensure that the water level is maintained during the entire wash procedure. The running time once the required level has been reached is 6 minutes (peg nos. 8-23 removed from rib Q).

The main wash is concluded with Drain for one minute (peg nos. 24 and 25 in rib D removed).

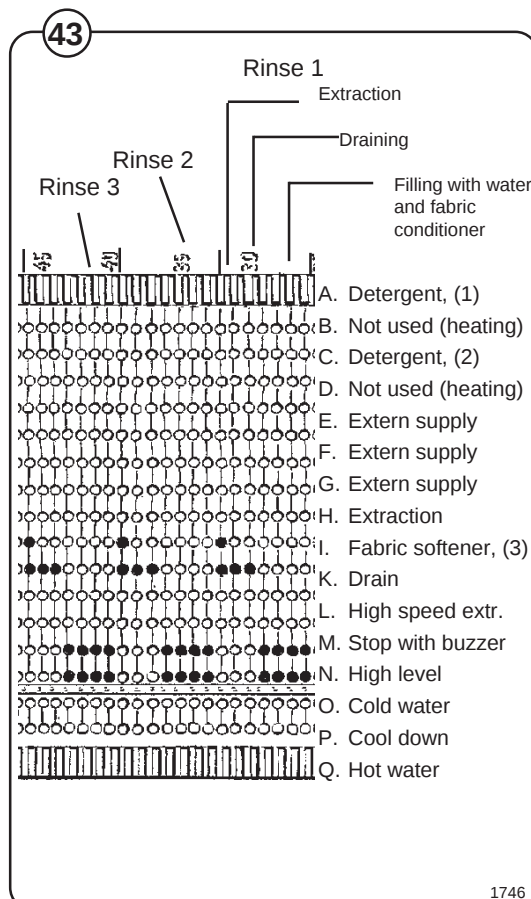
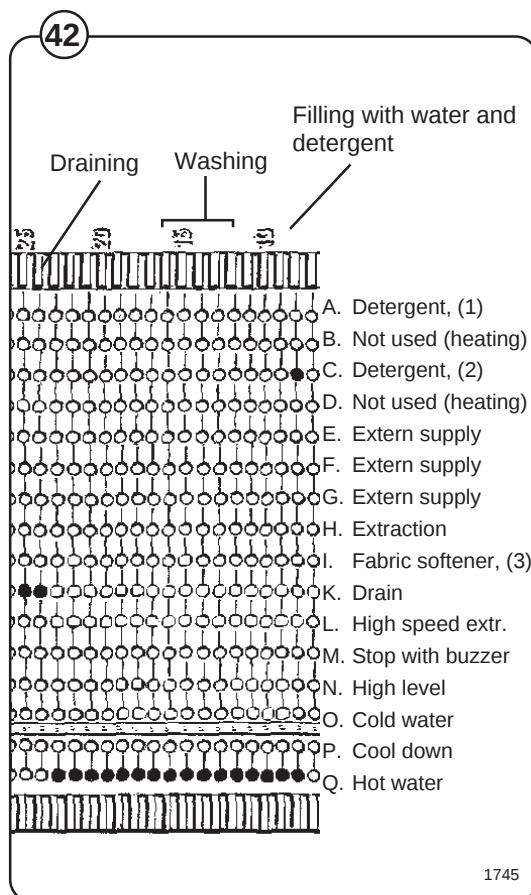
Rinse cycles 1-3

Fig. 43 Rinse cycles 1-3 each last for approximately 2 minutes and are identical. The following describes rinse cycle 1. The rinse cycle begins with Filling with cold water to high level (peg nos. 26-29 in ribs N and Q are cut away).

The programmer stops the card at peg 26 until the water level is reached. The running time once the water level is reached is 2 minutes.

The rinse cycle is concluded with Drain for 1.5 minutes and with extraction for the last 30 seconds (peg nos. 30-32 in rib K and peg no. 32 in rib H removed).

Rib K must always be programmed parallel with rib H to achieve the extraction cycle. Since extraction must not be operated with the drum filled with water, rib K (Drain) is programmed 2 pegs earlier that the extraction cycle to drain the water before the extraction cycle starts. The machine also has a level guard to ensure that the extraction cycle cannot start while there is water in the drum.



Rinse cycle 4

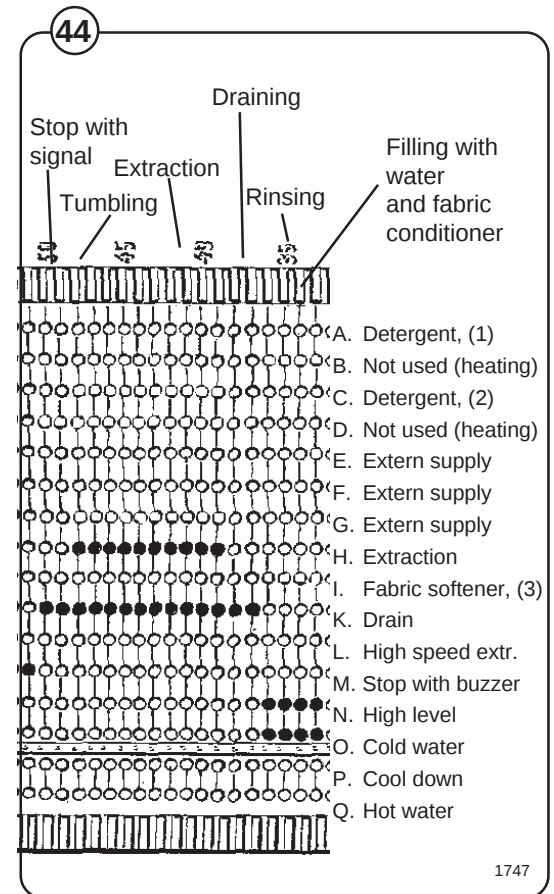
Fig. 44 Rinse cycle 4 lasts for 8 minutes and begins with Filling water to high water level and dispensing of fabric conditioner from compartment 3 (peg no. 33 in ribs N, I and O removed).

The programmer stops the card at peg 33 until the water level has been reached. The running time once the water level has been reached is 2 minutes (peg nos. 33 to 36 in ribs N and O cut away).

Rinse cycle 4 is concluded with Drain for 6 minutes (peg nos. 37-50 in rib K cut away). When Drain has been in operation for 1 minute, the extraction cycle starts and lasts for 5 minutes (peg nos. 29-48 removed from rib H).

Ending the program

The washing process is completed by removing peg no. 51 from rib M (stop with signal). The stop is indicated by a buzzer and the yellow indicator light in the **RESTART** button coming on.



Replacement and adjustment of micro switches

Fig. 45 After removing the two wire connection sockets at the top of the programmer, remove the two screws holding back the black cover plate over the microswitches and the plate (A). Turn the knob. Lift up the defective microswitch and replace it by a new one. Mount the cover plate.

A special test card is used to check and correct the adjustment of the card programmer microswitches.

Coloured dots indicate various positions on the card.

Please follow the instructions shown below when using this testcard to adjust the programmer microswitches:

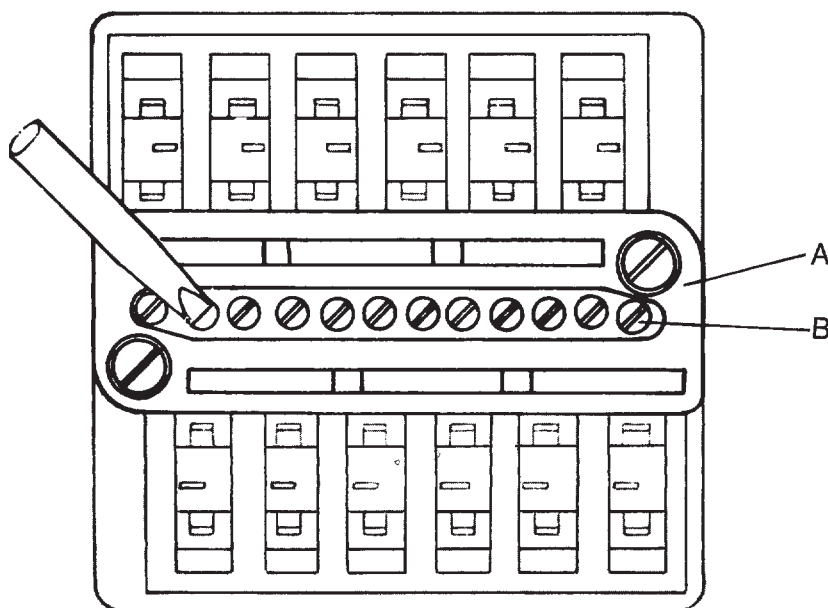
1. Turn the knob fully clockwise and insert the card into the programmer with the track side up and the unnumbered side first, until the green dot one card is even with the front edge of the programmer.
2. Turn the knob fully counter-clockwise and push the card in until the blue dot is even with the front edge of the programmer.

Check that all microswitches make contact between the blue and white dot. Readjust if necessary by using a thin screwdriver on the individual adjustment screws.

3. Slide the card out until the green dot is even with the front edge. Check that no switches have switched contact to this pint. Adjust if necessary.
4. Slide the card further out until the blue dot is even with front edge. Check that all microswitches have now switched over. Readjust if necessary.

This procedure should be repeated at least twice to make certain that the switches are all properly adjusted.

45



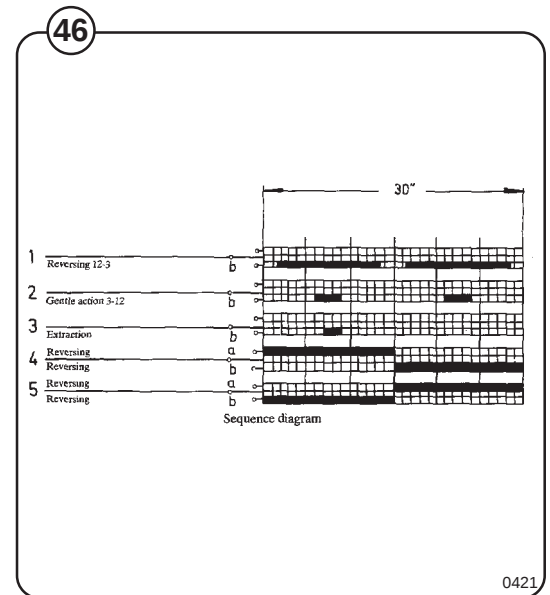
A. Cover plate
B. Microswitch adjustment screws

Reverser

Construction of reverser

Fig. 46 The reversing switch unit consists of a camshaft (6) and a contact bank (5) with two alternating sets of contacts and three sets of opening contact all made of silver. The cam shaft is driven by a synchronous motor (2) via an escapement (1). The gears are made of durable plastic to ensure a long life. The contact bank is made of plastic (Melamin) resistant to current.

The reversing switch is assembled by means of a mounting pin (8) and three spacer pins (7), which automatically give the correct distances. To replace the contact bank, only the mounting pin and one spacer pin need to be removed.

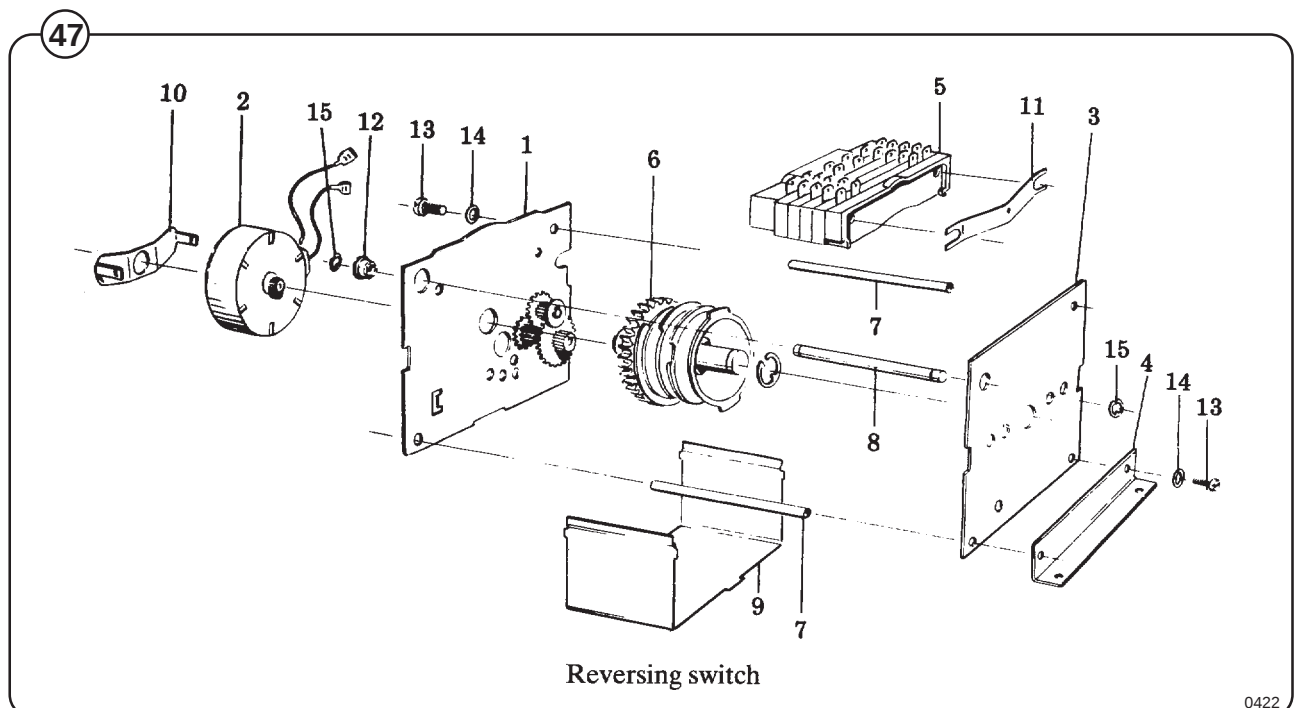


Operation of reverser

During reversing, the drive motor is without current to avoid burning contacts in the reversing switch. This is achieved by energizing the wash motor relay via contact 1b or 2b, by cutting out the current 1 1/2 seconds before contacts 4 and 5 change over and not engaging the wash motor relay until 1 1/2 seconds after changeover. See sequence diagram. Normal reversing action 12/3, gentle action 3/12 seconds.

Fig.

47



Relays

The FL model employs seven relays. The relays control:

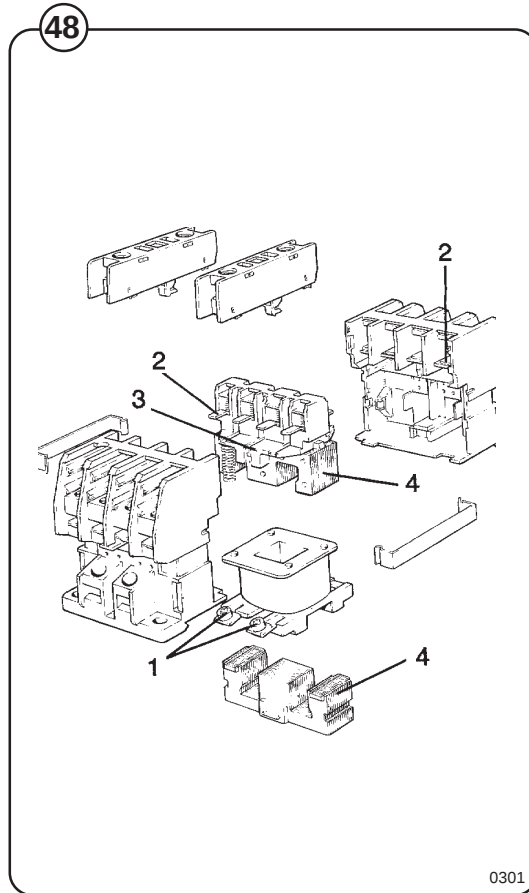
- the wash windings of the wash motor
- the distribution windings of the wash motor
- the extraction motor
- the drain cycle
- the restart after a programmed stop
- the switching back to low speed extraction if too high unbalance is indicated.

Construction

Fig. 48 The body of the relay holding the stationary contacts is made of current-resistant plastic. A solenoid and a contact bank hold the moving contacts. The contacts are spring-loaded to assure the correct contact pressure.

The relay is constructed for continuous operation, whether mounted horizontally or vertically.

Screw-type terminals provide perfect connections even when one or two wires have different diameters.



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Operation

When the solenoid is energized, the two halves of the magnet core are drawn together, pulling down the moving contacts, thus making or breaking the circuit. When the current cuts out, springs force the contact bank into its original position, thus closing or opening the circuits.

Trouble shooting

If the relay fails to operate despite power to the coil, turn off the power and check the solenoid by measuring the resistance across the terminals (1).

If the relay hums when power is applied, this indicates either a break in the insulator holding the moving contacts at the axle where it holds the top half of core (3) or a rusty core (4), which can be cleaned.

Make sure that the moving contact assembly moves freely. Always replace burnt or pitted contacts (2) ... do not reuse contacts.

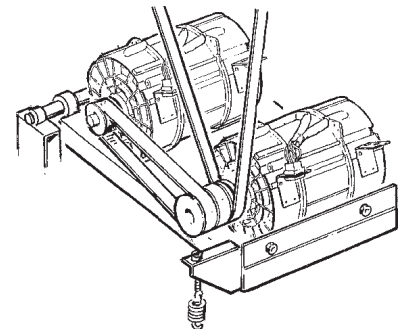
Drive motors

Drive motor description

Fig. 49 The four-speed operation of the wash cylinder is achieved by two motors. One 2-speed motor for wash speed (12-pole drive) and distribution speed (8-pole drive) and one 2-speed motor for extraction speeds (4-pole drive, low speed and 2-pole, high speed). The motors are mounted on a motor bracket with the wash and distribution motor fixed to the bracket and the extract motor in slots which allow adjusting the distance between the two motors for proper belt tension by adjusting screws. For silent operation the motor bracket is mounted to the base of the machine by rubber bushings. Correct tension to the main belt, between the cylinder and the extract motor, is obtained by the weight of the motors and the motor bracket and by the spring loaded set screw.

Drive motor construction

The motor consists of stator, rotor and end-shields with ball-bearings. The stator and the rotor consists of plates, insulated from each other and welded together. The stator is provided with slots in which the 8-pole and 12-pole resp. the 2- and 4-pole windings are wound. The windings are impregnated with a temperature-resistant sound-insulating resin varnish according to class B. The end-shields are die-cast. The ball bearings are permanently lubricated.



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Drive motor function

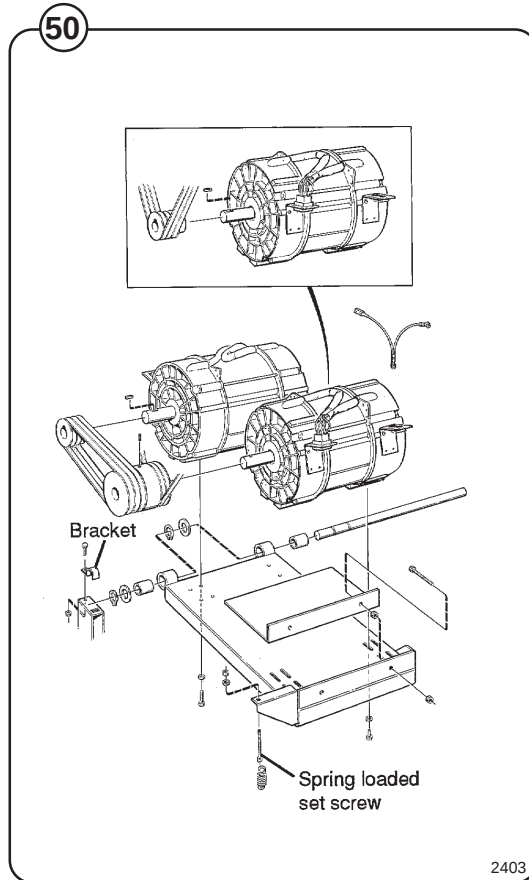
When the stator winding is charged, a magnetic field will occur, which in turn will rotate the motor at a fixed RPM depending upon the number of poles in the winding. The 12-pole winding gives the wash speed and the 8-pole winding in the same motor gives the distribution speed. The separate 4/2-pole motor gives the extraction speeds. When operating with load, the speed deviates slightly from the synchronous (no-load) speed. This difference is called the slip and is usually expressed as a percentage of the synchronous speed. The motors will work satisfactory at nominal voltage +10% – -15%.

How to remove motors

Fig. 50 Loosen the spring loaded set screw. Lift the motor unit and detach the V-belts. Dismount the bracket holding the motor hinge shaft. Lift out the motor bracket with motors mounted. Loosen the mounting screws of the extract motor and the set screws. Lift off the V-belts. Now remove the mounting screws for each motor.

How to mount motors

Place the motors on the table or bench with the mounting holes upwards. Mount the mounting bracket to the wash/distribution motor. Position the other motor and fasten the mounting screws. Mount the V-belts. Tighten the belts. Mount the bracket with motors in the machine in the opposite way as outlined above in "How to remove motors".



Motor connections

Fig. Wash/distribution motor

51

Fig. Extract motor

52

Motor overload protector

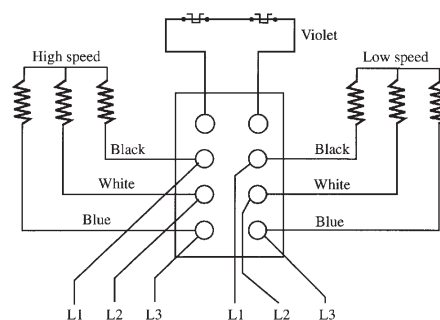
Each motor is equipped with self-resetting, thermal overload protectors, situated one in each winding of the stator. The protectors are connected in series and will trip at a temperature of 120°C (248°F). In the event the protectors fail but the motor remains otherwise undamaged, an overload protector may be mounted in the control unit of the machine. Before making such installation check to ascertain that the windings are not damaged.

NOTE

Before connecting a separate overload protector consult the Wascomat Telettech Service.

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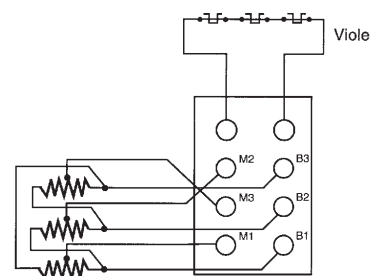
Thermal Overload protector



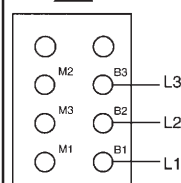
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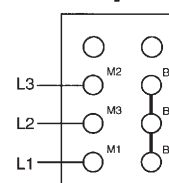
Thermal Overload protector



Low speed



High speed



51b

Repair instructions

Motor not running due to overheating

- Wait till motor has cooled down. Motor thermal protectors are automatically reset after appr. 30 minutes. Restart.
- Possible cause of motor protector releasing repeatedly could be oversensitivity of thermal protector.

Very noisy motor

- Breakdown of bearings – replace bearings or motor.

Motor running slowly

- The motor is probably running on two phases – measure voltage at output of relay and at connection block.

Wash motor only runs at one of the speeds

- Check that the quick connection is correctly connected.
- Check that correct relay is being energized.

Motor locks

- Breakdown of bearings – replace bearing or motor.

Motor does not turn

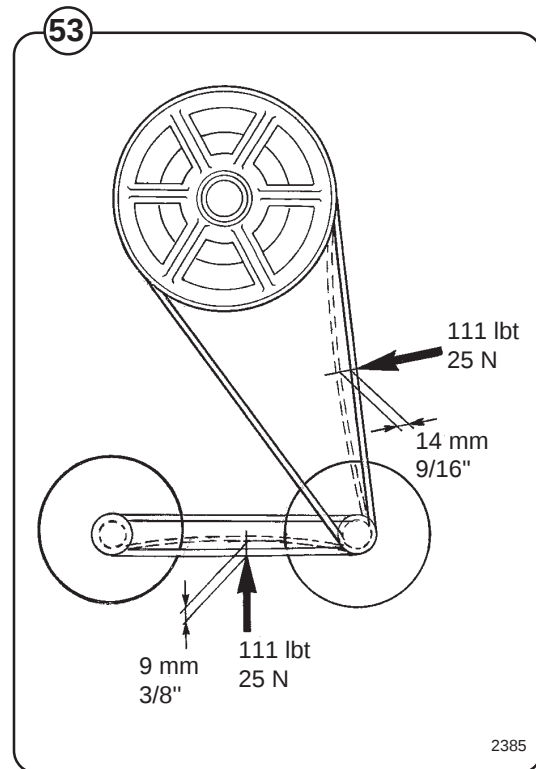
- Check electrical power to motor.

Drum does not turn

- Check belt tension.

Tensioning of the V-belt

- Fig. 53
- Belt between the wash motor and extract motor
 - release and adjust backing plate to correct belt tension according to illustration. Fasten plate.
 - Belt between extract motor and drum
 - remove screws for the attachment of motor bridge at extract motor side, lower motor bridge to correct belt tension according to illustration and fasten bridge.



Water level controls

Fig. 54 One double-level pressure switch is used to control the correct water levels during various cycles of the washing program.

A second level control is installed on the machines to prevent the machine from going into extraction until a sufficient amount of water has been drained.

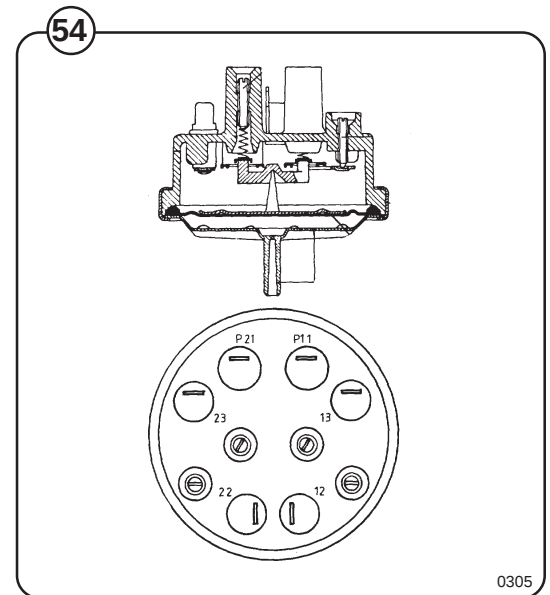
A third level control is installed to prevent flushing down the soap supply box before a low level is reached.

Adjustment

All pressure switches are factory-calibrated to meet specific requirements. The trip level for any one pressure switch can be changed only within narrow limits because each trip range requires a different set of springs.

Water level

As a guide for checking the level control for proper functioning, the low level should be at the bottom of the door glass, and the high level approximately three inches above it.



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Supply injection valve

Construction

Fig. 55 The valve has a single-inlet with either one, two or three outlets, each with its own solenoid coil.

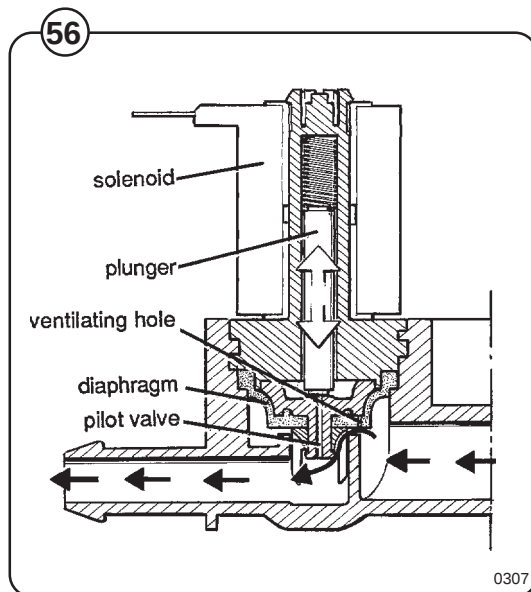
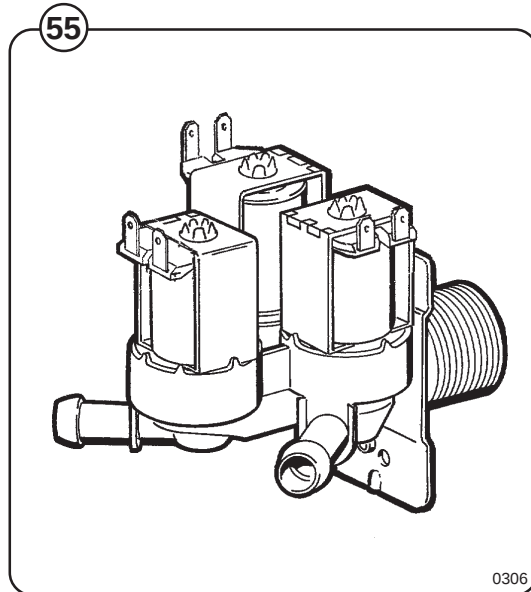
The body is made of heat-resistant polyamid plastic and the solenoids encased in water-tight plastic. The electrical connector terminals are spade lugs.

A filter screen on the inlet side prevents dirt from entering the valve. Flow restrictors can be placed at either the inlet or any of the outlets.

Operation

Fig. 56 When the solenoid is energized, the spring-loaded plunger is drawn up and the pilot valve in the centre of the diaphragm opens. Because of the difference in diameter between the pilot valve opening and the ventilating hole in the diaphragm, the pressure above the diaphragm drops to a point where the admission pressure below the diaphragm can lift the diaphragm, thus opening the valve.

When the current to the solenoid is cut off, the plunger spring will press the plunger against the pilot opening of the diaphragm. The pressure above the diaphragm then rises to correspond to the water inlet pressure and the pressure of the spring will close the valve.



Repair instructions

Limescale can block the hole in the valve diaphragm and interfere with the function of the valve.

Fig. 57 It is therefore advisable to dismantle and clean the valve at certain regular intervals. The frequency depends on operating conditions and the level of contamination in the water.

If the valve does not open

- Check that power is supplied to the coil.
- Check the coil with an instrument to determine whether there is a break or a short circuit.
- Dismantle the valve (see below) and check the openings in the valve diaphragm.
- Check the inlet strainer and clean as required.
- Undo the coil and clean the surfaces of the magnetic core.

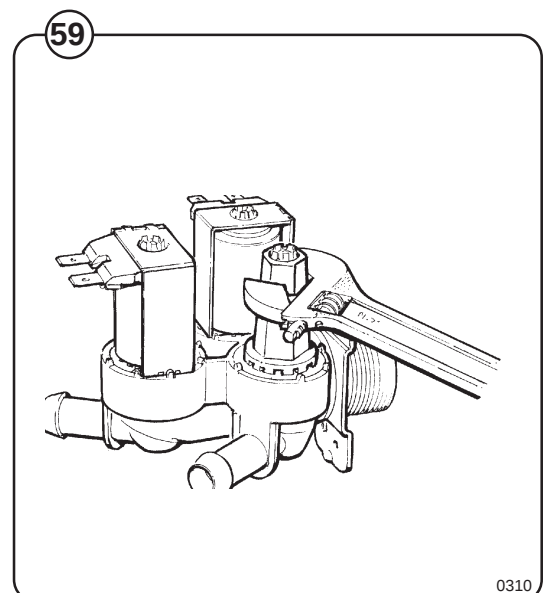
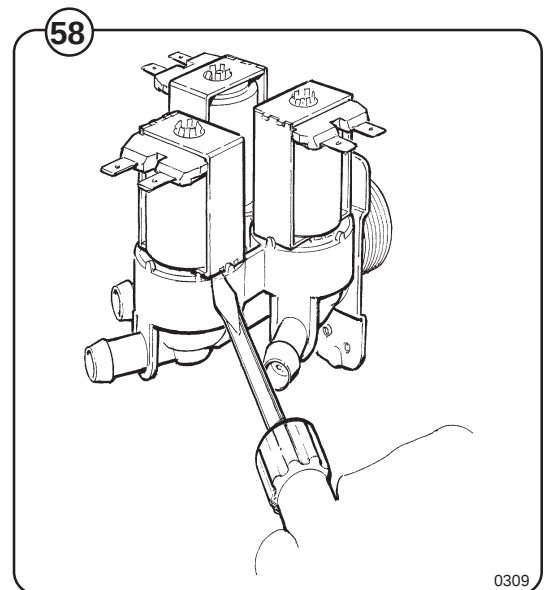
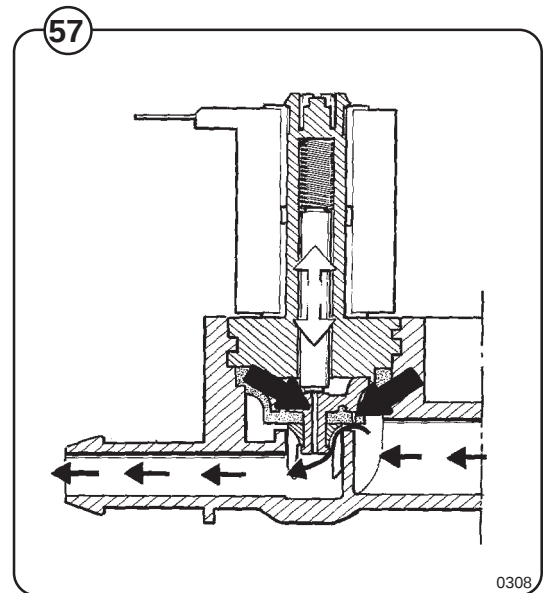
If the valve does not close

- Check that the coil is not live. The valve is normally closed when the magnet is not energised.
- Check the return spring.
- Check the diaphragm (pilot pressure opening).

Dismantling the valve.

Fig. 58 • Pull the coil straight upwards. Use a screwdriver if necessary to carefully undo the coil.

Fig. 59 • Use the tool supplied (attached to one of the hoses when the machine is delivered) to open the valve housing. Slide the tool over the protruding plastic sleeve to that the pegs on the tool engage the corresponding sockets in the valve housing.
• Use a spanner or a pair of pliers and unscrew the upper part of the valve housing.



Inlet valve for FLEX-O-MATIC EXSM 350

Fig. 60 The water inlets have brass bodies with larger cross section of the outlet in order to achieve a shorter filling time for the machine.

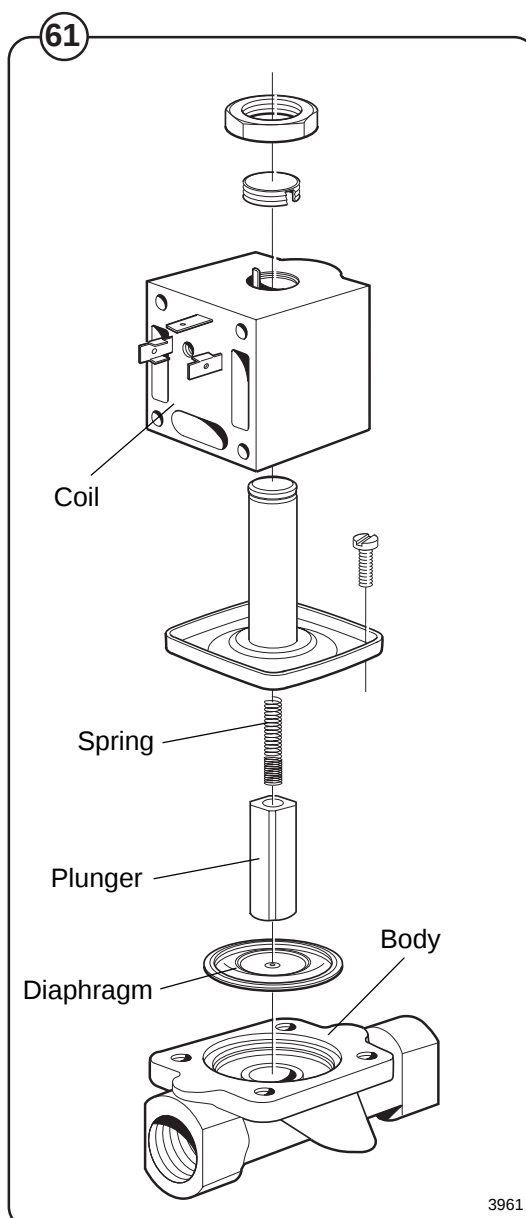
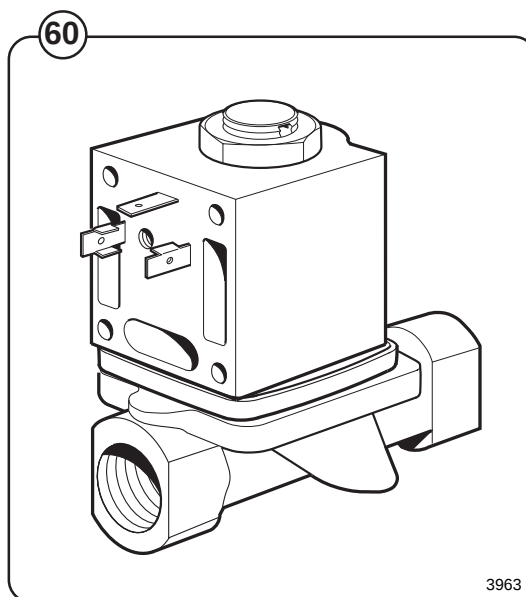
Construction

Fig. 61 The valve housing is made of pressed brass. The spring-loaded plunger is made of stainless steel and located at its lower end.

Operation

The valve is automatically operated by means of a rubber diaphragm and a pilot valve in exactly the same way as the supply injector valve.

NOTE: To strip, clean, re-assemble and troubleshoot the inlet valve, follow the instructions outlined for the supply injector valve.



Drain valve

Description

Fig. 62 The drain valve is operated by using the pressure in the cold water intake. A tube (1) is connected between the cold water intake and a solenoid valve (2). When the solenoid valve is activated, it opens and allows water to flow into the feeder tube (3). The water presses up a piston (4), which uses the pressure lid (5) to close the drain valve rubber membrane. When the solenoid valve cuts out, the water pressure and the springs (7) on the lid push the piston back, allowing the water to pass the solenoid valve and drain out via the return tube (8).

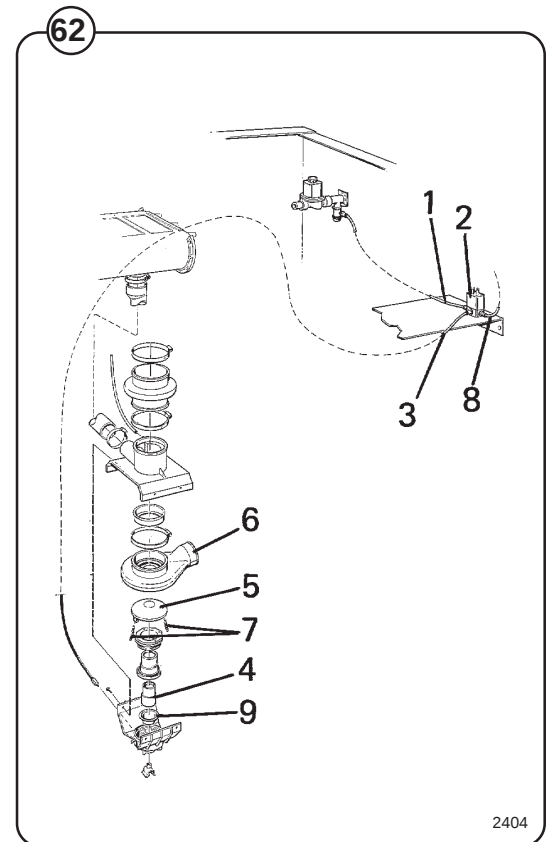
Trouble shooting

If the drain valve doesn't close:

- Check that the solenoid valve (2) receives electricity.
- Check that the solenoid valve and the tubes are clear by:
 - removing the drain hose (3).
 - Check that water exits the hose when the valve is activated.
- Check that the diaphragm (9) is undamaged.

If the drain valve doesn't open:

- Check that the return tube (8) is open.
- Check that the piston (4) doesn't seize.



Soap supply box

Fig. 63 The three-compartment soap supply box is located at the top of the machine. Viewed from the front, the compartments marked with figures 1, 2 and 3 are used as follows:

For powder supplies:

Compartment 1

This compartment is used for adding detergent directly to the wash at the beginning of a cycle or at any time during the cycle when extra supplies are required, controlled by rib A on the formula card.

Compartment 2

This compartment is the main compartment for adding detergent to the wash when called for by Rib C on the formula card.

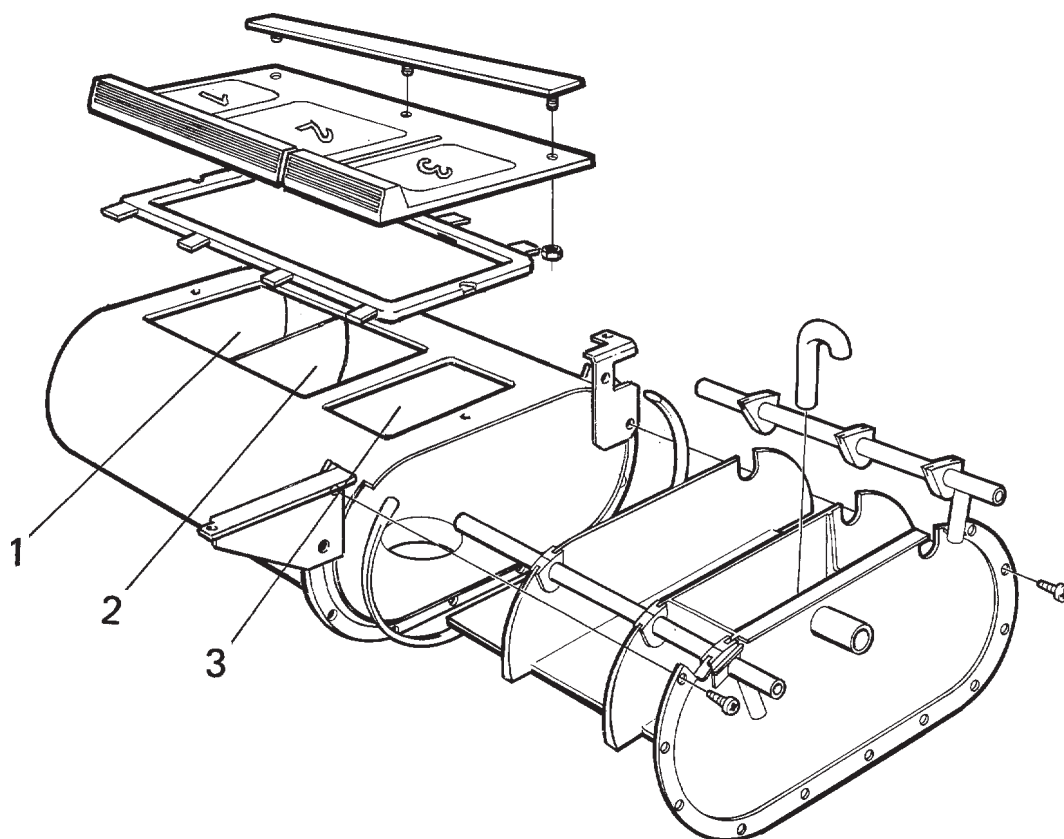
Compartment 3

The small compartment is used for adding fabric softener. The fabric softener is flushed down with water by overflowing when the injection of fabric softener is called by rib I on the formula card.

For liquid supply with top mount supply connection:

All supplies are injected through compartment 2. Flushdown is controlled by rib P.

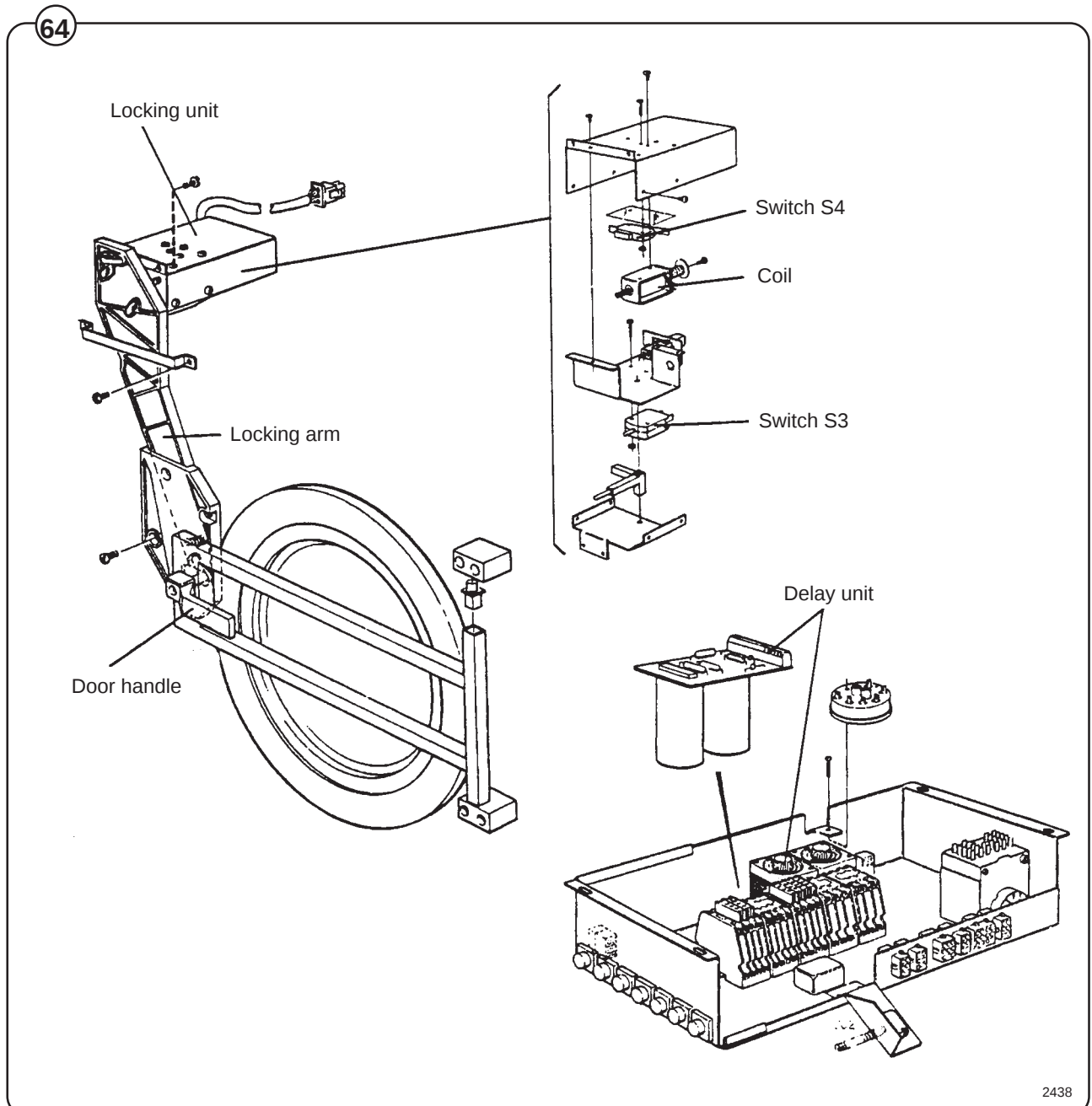
63



Door and safety locking system

The door safety locking device consists of the following main parts:

- Fig. 64
- Locking unit. The door locking unit is placed behind the front plate and under the detergent box. The unit consist of a coil, which blocks the door, and two micro switches. Switch S3 indicates that the door is locked and switch S4 that the coil is activated.
 - Delay unit. The delay unit is mounted in the control unit. It consists of a printed board with two capacitors and a time relay. The dealy unit controls the time for the door locking after the program is finished or in case of electrical cut out.
 - Locking arm. The arm is placed between the door handle and the locking unit and transfer the movement from the door handle to the locking unit.

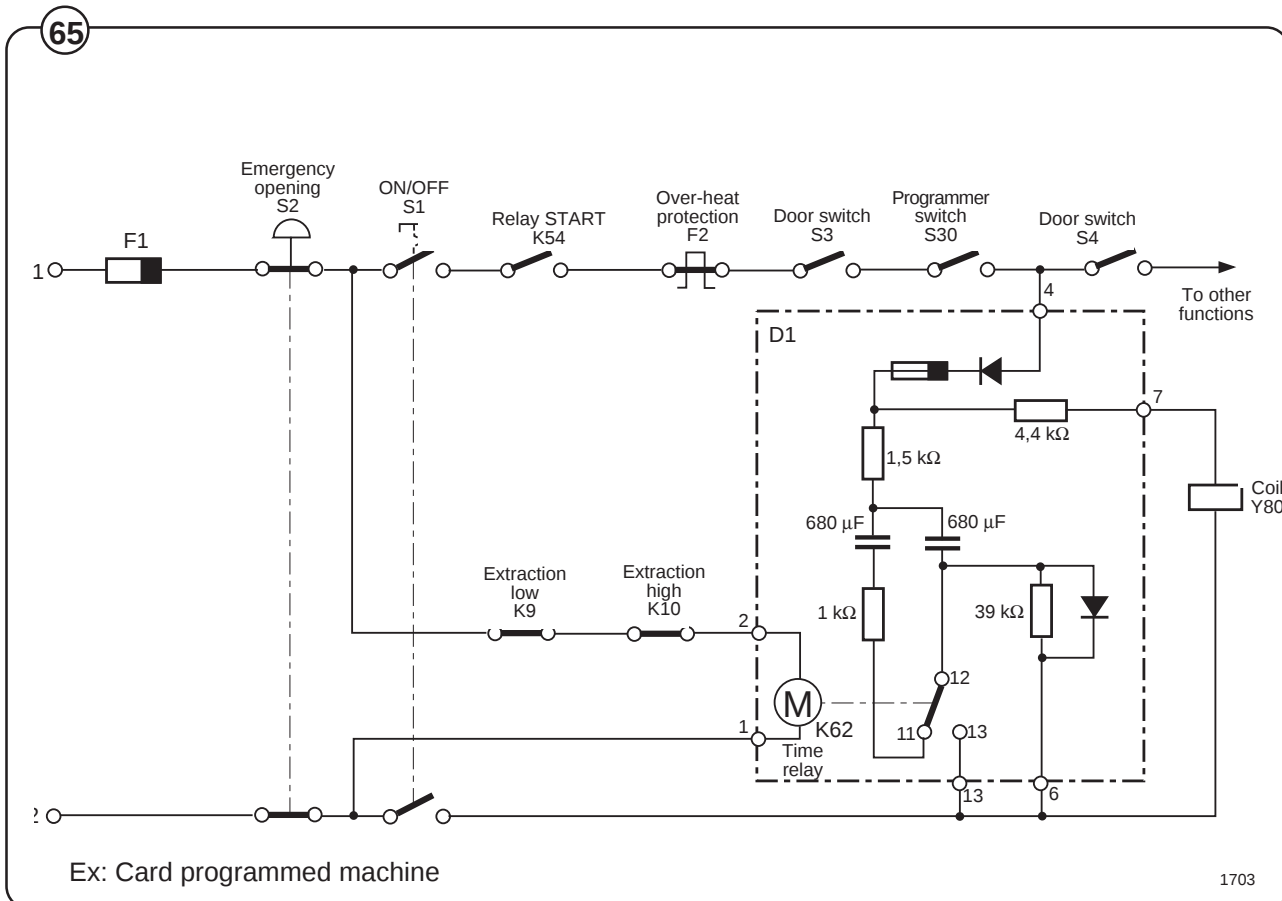


Function

Fig. 65 When the door has been locked by the door handle, the locking arm is turned and activating the microswitch S3 in the locking unit. When the programmer knob is turned to position I, switch S30 is closed, the delay unit receives voltage and the coil is locking the door. And then switch S4 is closed and the program can start.

In order to prevent the door from being opened directly after the final extraction (roll out time can be about 2-3 minutes) but at the same time limit the delay time after the program to about 35 seconds, the delay unit has a time relay and works as follow:

- The time relay motor K62 receives voltage even if the ON/OFF switch S1 is in position OFF. This means that the contact of the time relay normally is in position 12-13 directly form start and when the drum is rotating with wash or distribution speed. During this circumstance one of the capacitors is disconnected and at the same time the 39 k Ω resistance is short circuited. The door can now be opened 35 seconds after a power cut out or when the programmer knob is turned to 0.
- At extraction relay K9 or K10 is activated and the voltage to time relay motor K62 is interrupted. The contact of the tie relay switch over to position 11-12 and the delay unit now keeps the door locked about 3-3,5 min. when the programmer knob is turned to 0 or a power cut off. After the extraction it takes two minutes (120 l machine) resp. three minutes (220 l machine) before the contact of the time relay go back to position 12-13.



Fault finding

The coil does not lock the door when programmer knob is turned to I.

- Check that lamp in the red push button is lightning. If not, check that the emergency opening is not activated.
- Check that the coil is receiving voltage and that the plunger can move freely. Check with a ohm-meter for interruption in the coil.
- Check that the delay unit receives voltage.
- Check that switch S3 in the locking unit is activated when the door is closed and door handle is closed position.

The machine does not start in spite that the door is locked by the coil.

- Check that switch S4 is closed when the coil is activated.

Repairing

The door lock is an important safety device. Therefore a faulty locking unit or delay unit may not be repaired. It shall be changed for a new unit.

Rotation guard

Fig. 66 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.

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.

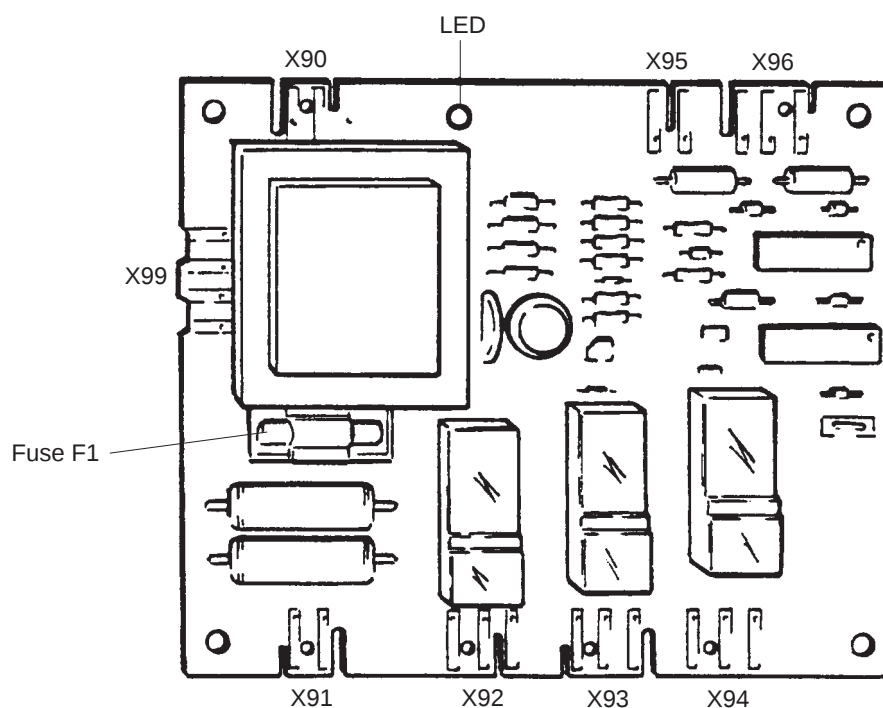
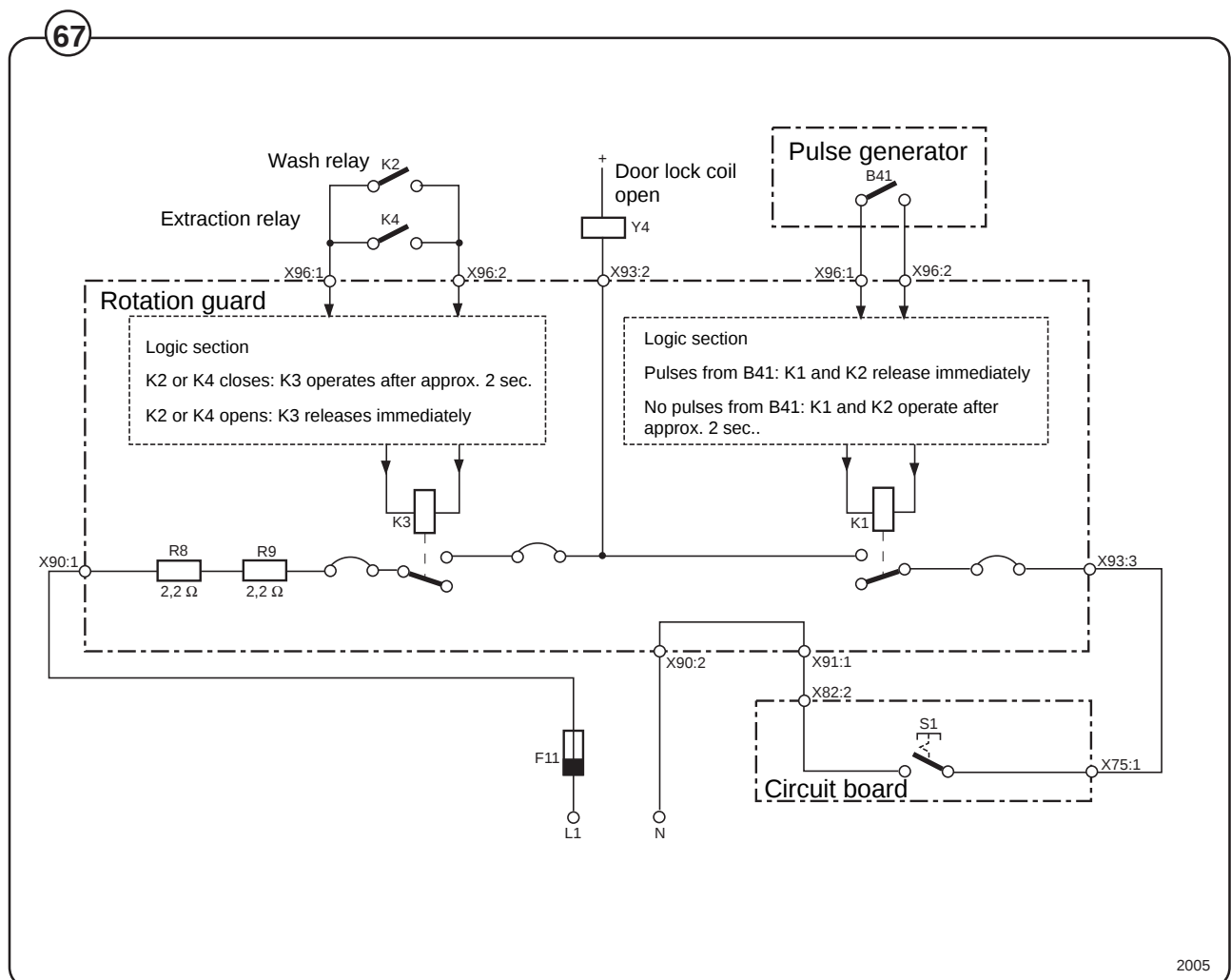


Fig. 67 When the machine has halted, the rotation guard relay K1 closes which means that the door lock coil Y4 will be energised and the door can be opened. Since the wash and extraction relays are not closed, relay K3 is not energised.

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.



Manual operation

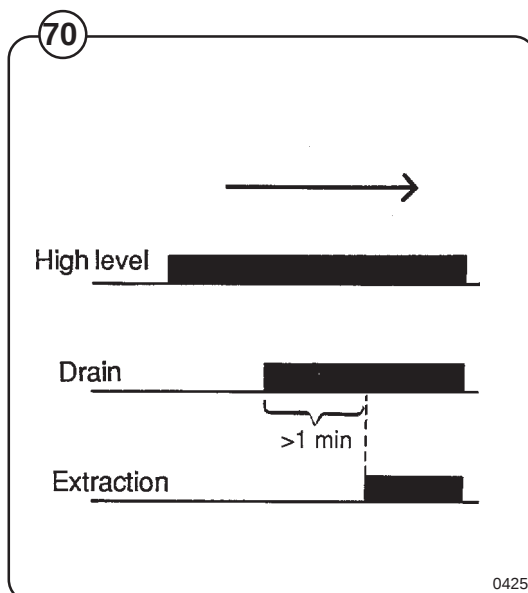
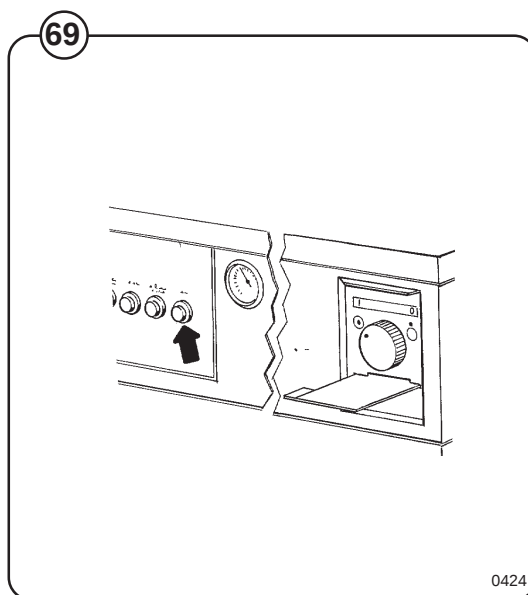
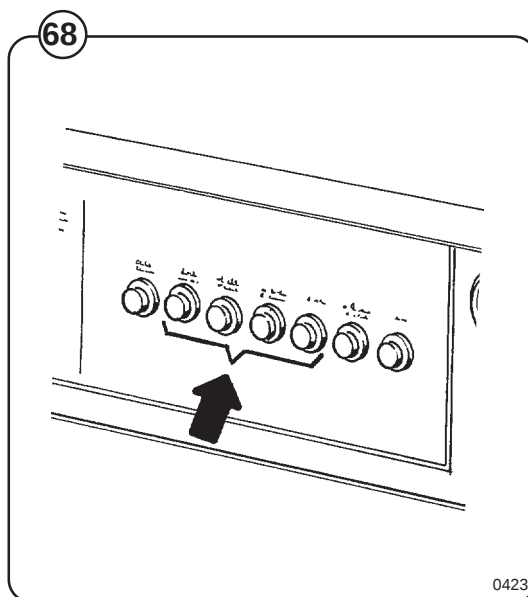
Fig. 68 1. When the machine is manually operated, the push button switches control the hot and cold water inlets, the gentle action cycle and the drain valve. A blank formula card must be inserted for the machine to operate. Since there is no manual switch for extraction, the formula card must be programmed for this as well as for draining prior to and during extraction. The buzzer signal at the end of the cycle must also be programmed.

Fig. 69 2. To activate the motor, the on-off switch must be in the "On" position and the formula card inserted into the programmer approximately three quarters of the card length so as not to engage the programmed portion of the card. The machine will then operate at wash speed (with reversing action) giving you full manual washing operation.

Fig. 70 3. It is important that the machine does not go into extraction with a basket full of water. For this reason, do not rely on manual operation to accomplish the necessary drain just before the extraction cycle. Each peg represents 30 seconds of time. Start at the zero end of the card and cut Rib K for drain to begin one minute prior to extraction, during extraction and to terminate one minute after your extraction cycle ceases. It is also suggested that the buzzer Rib M be cut immediately prior to the closing of the drain valve to signal the attendant that the cycle has ended.

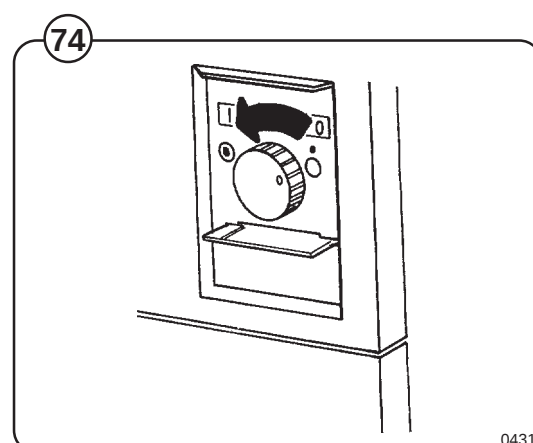
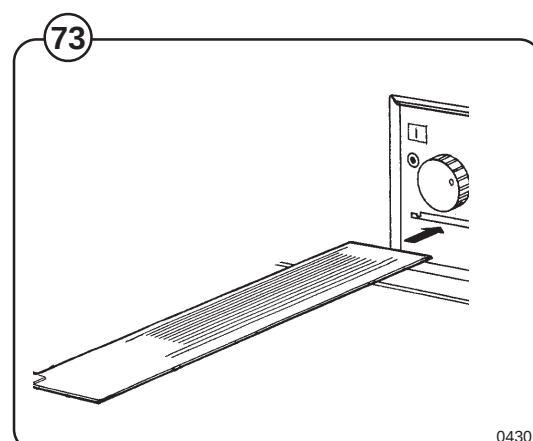
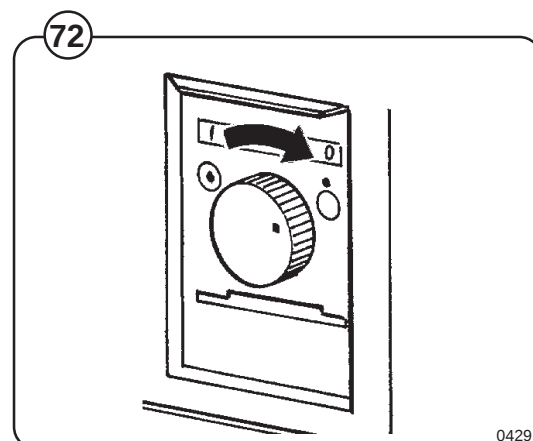
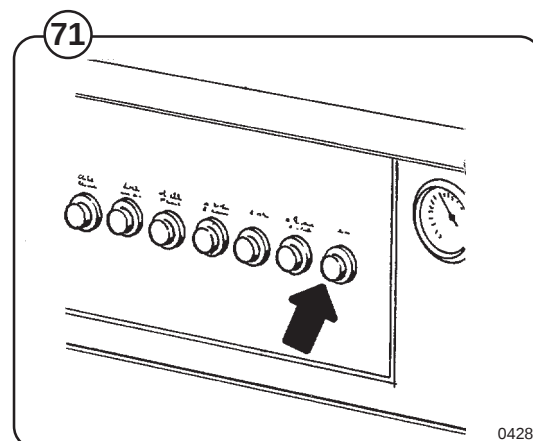
4. To accomplish extraction during manual operation, you must cut extraction Rib H to fall within the draining procedure as outlined. Extraction may be programmed for a period of three, four or five minutes, depending upon the length of extraction normally required.

5. This manual operation program card enables the operator to fill, drain and to operate the gentle action cycle, if desired, manually. When the extraction cycle is desired the program card is pushed completely into the programmer, thus engaging the beginning of the drain valve cut. The machine will then automatically drain, extract and sound the buzzer upon completion.



Start the wash

- Open shut-off valves for hot and cold water.
- Fig. 71 • Turn on electric power and push the "On-Off" switch on the machine to "On".
- Fig. 72 • Turn the black knob clockwise until white dot on knob points to small circle with black dot above.
- Fig. 73 • Insert a pre-cut formula card in the programmer -the ribs facing upwards - and push the card all the way into the programmer.
- Fig. 74 • Turn the black knob counter-clockwise until white dot on knob points to small circle with black dot in centre.



After the wash

- When the buzzer sounds, the cycle is completed.
- Fig. 72 • Turn off the machine by turning the black knob of programmer clockwise until white dot on knob points to small circle with black dot above, and then opening the door after the drum has stopped rotating.



The locking device will not unlock if the ON-OFF switch is in OFF-position.



- After opening the door turn the "On-Off" switch on the machine to the "Off" position.
- Leave the door open after use to allow moisture to evaporate.

Maintenance

Preventive maintenance has been reduced to a minimum by the careful design of reliable components and material.

However, the following measures should be taken at regular intervals and in proportion to the hours of service.

IMPORTANT!

Make certain that all electrical power to the machine is shut off before removing top or rear panels.

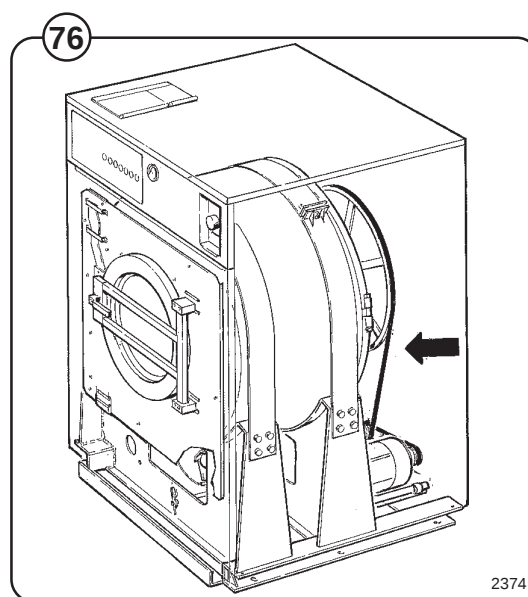
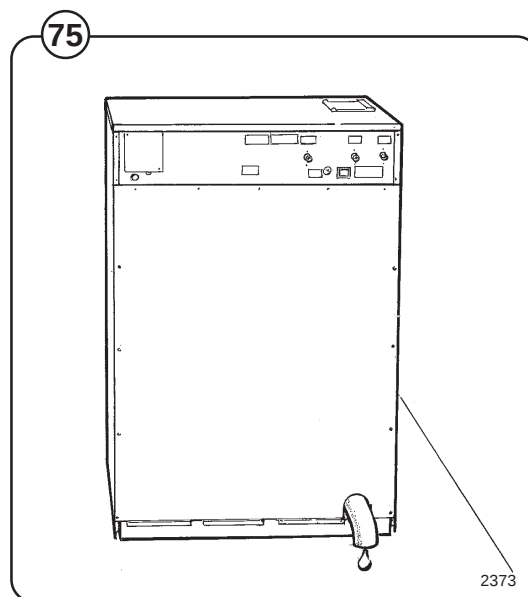
Daily

- Check the door lock and interlock before starting operations.
- The soap supply box should be cleaned at the end of each working day as follows:
 - Use a spatula to scrape loose any detergent which may have stuck on the inside of the dispenser.
 - Flush the loosened detergent with warm water.
 - Wipe dry and leave lid open.

Fig.

(75)

- Check that the drain valve does not leak and that it opens properly.
- Check that the door does not leak. Clean residual detergent and foreign matter from the door gasket.
- Wipe the outside of the machine.
- When the machine is not in use, leave door slightly open to allow moisture to evaporate.



Weekly

- Remove hose from drain connection and clean inside drain valve.

Every three months

Fig.

(76)

- Remove the cover plates of the machine and check that the V-belt of the wash motor is undamaged and correctly tensioned.
- Check that all tubing, piping and connections are free from leaks.
- Wipe and clean the inside of the machine, making sure that the control components are protected from moisture and dirt during the cleaning operation.

The purpose of the trouble-shooting guide is to facilitate the location and correction of the most common machine problems.

Before the top panel is removed, power to the machine is to be switched off at the main source or at the separate circuit breaker.

At each trouble-shooting attempt, the plug in connectors on the control panel should be moved in and out in order to eliminate improper contact due to faulty connection.

Please note that this guide does not include all possibilities, but only those most likely to cause the symptoms listed.

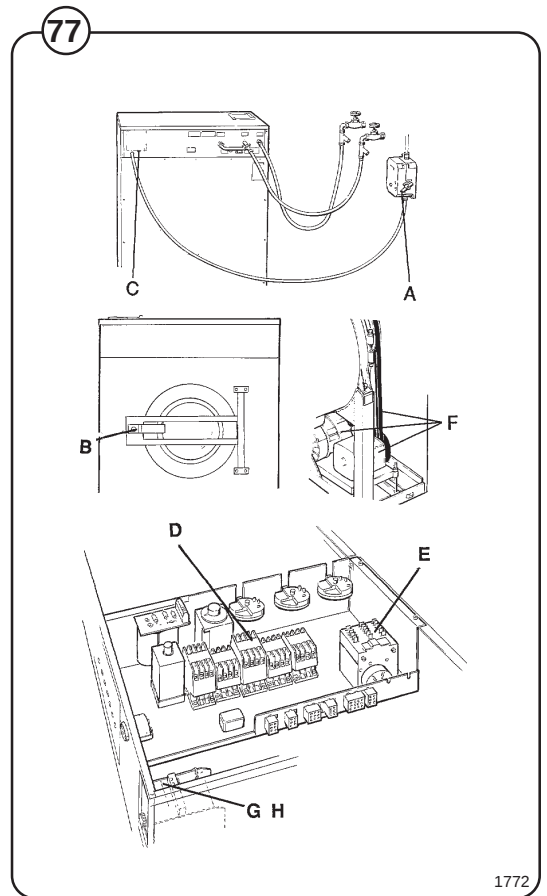
In trouble-shooting electrical problems, always make certain to have the proper electrical schematic or wiring diagram at hand. Test for power using a V-O-M or similiar meter on the AC voltage scale. Test for continuity with all electrical power off.

If machine does not start:

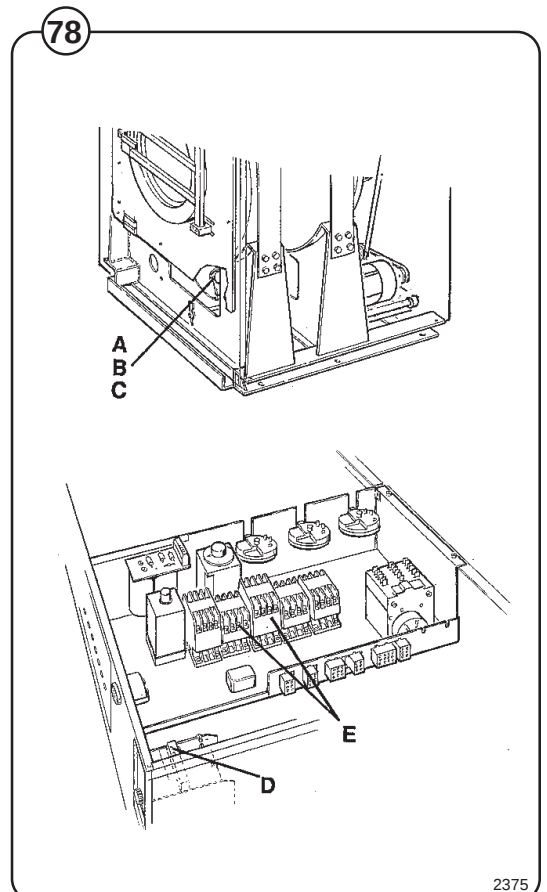
- Fig. 77
- A Check the circuit breaker in the power feed line to the machine.
 - B Check door safety switches.
 - C Check glass cartridge fuses.
 - D Check electrical auxiliary contact on extract relay.
 - E Check reversing switch.
 - F Check the V-belt and motor.
 - G Check programmer switch M.
 - H Check start switch on side of programmer.

If water does not drain:

- Fig. 78
- A Check drain valve and solenoid for proper operation.
 - B Disconnect drain hose connected to drain line. If full flow of water comes out, the problems is in the main waste line. If water flow is slow, the problem is the accumulation of foreign materials between drain valve and shell outlet of machine.
 - C Clean valve body of any foreign objects found.
 - D Check programmer switch K.
 - E Check drain relay.



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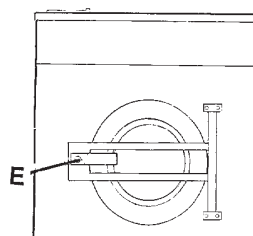
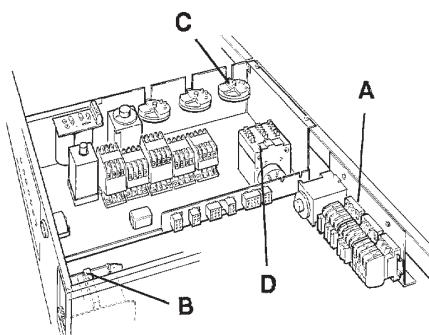
If machine does not extract:

- Fig. 79
- A Check extract relays and relay coil for proper operation.
 - B Check programmer switch H.
 - C Check the extract safety level control.
 - D Check the reversing switch.
 - E Check the door lock.
 - F Check all the drain items of Section "If water does not drain" above.

If motor does not operate at wash speed:

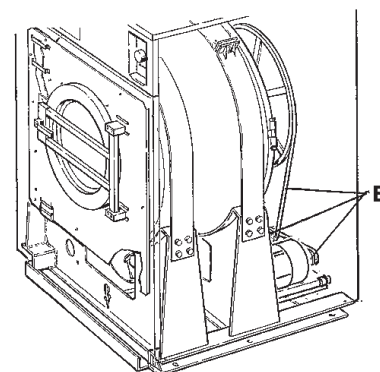
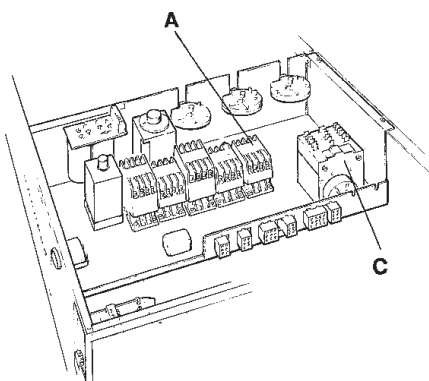
- Fig. 80
- A Check wash relay.
 - B Check motor and V-belt.
 - C Check reversing mechanism.
 - D Review procedures outlined under Section "If machine does not start" above.

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If machine runs slowly on wash speed or there is a slapping or thumping noise:

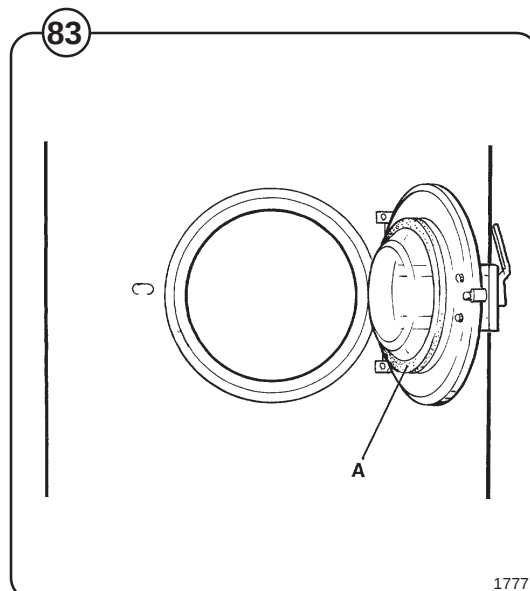
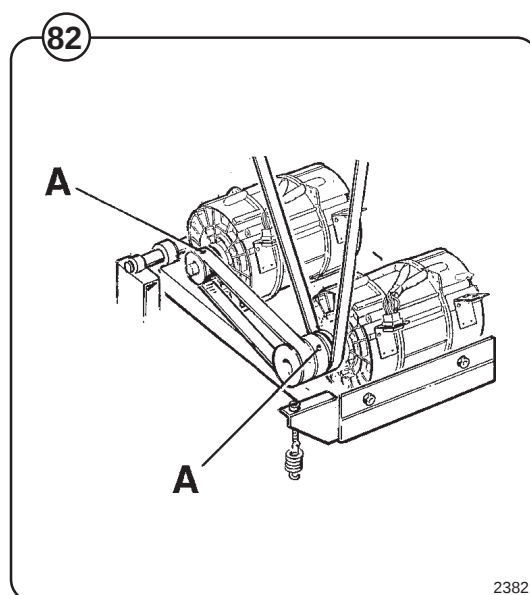
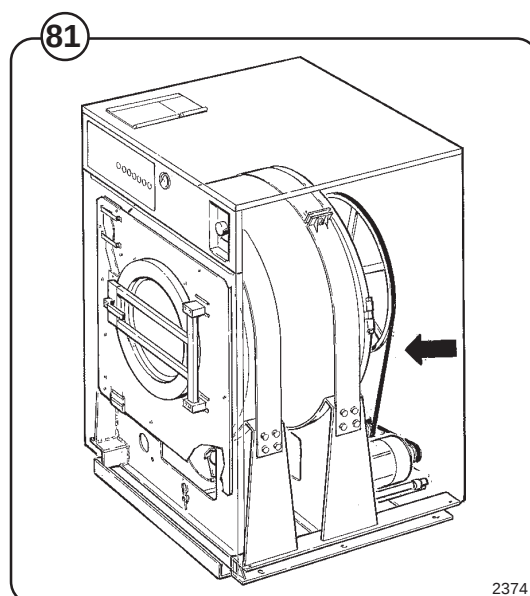
Fig. 81 Replace V-belts.

If a metallic noise can be heard at rear of machine:

Fig. 82 Tighten pulley on motor shaft.

If the door is leaking:

Fig. 83 Check door gasket. If gasket is in good condition check the tension, between door gasket and door frame and adjust.



If there is leaking around glass:

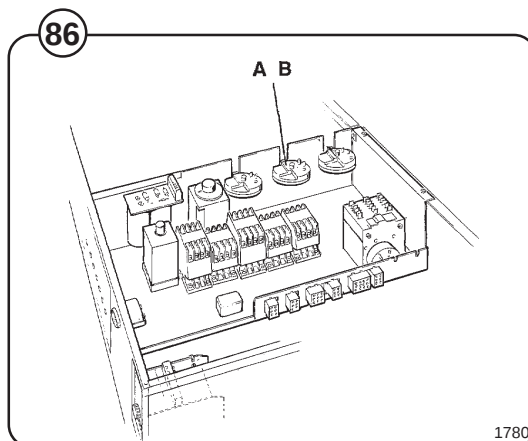
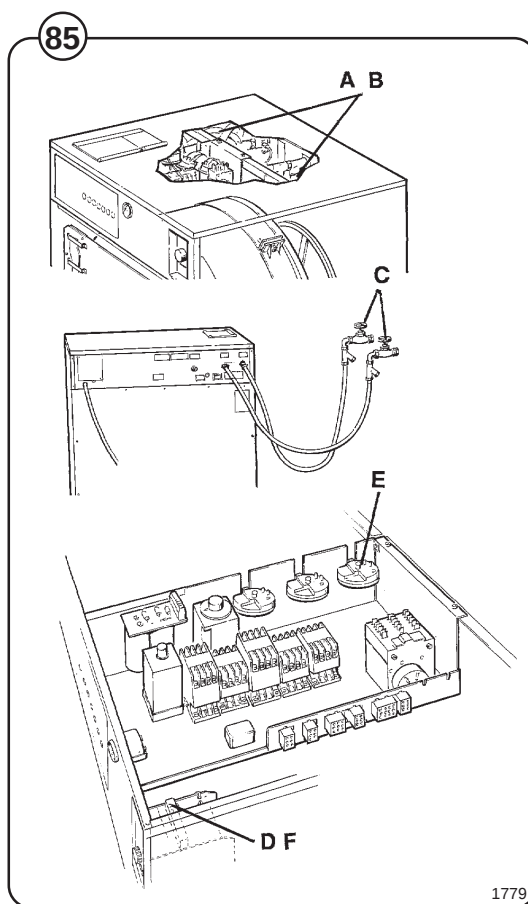
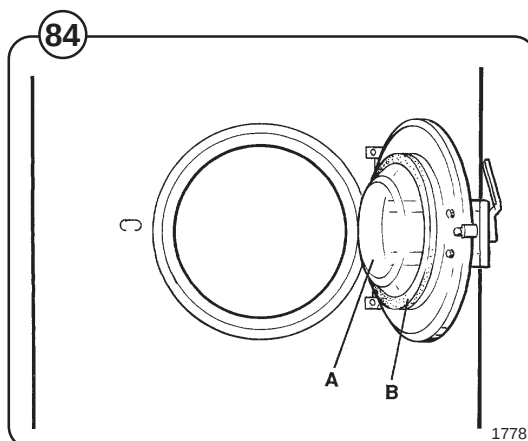
- Fig. 84
- A Re-cement glass in door gasket, if worn.
 - B Replace door gasket if worn.

If water does not enter machine:

- Fig. 85
- A Check the coils on inlet valves.
 - B Check wires leading to coils.
 - C Be sure manual shut-off valves are in open position.
 - D Check contacts on programmer.
 - E Check water level switch and plastic tubing.
 - F Check programmer switches K, N, O and Q.

If water continues to fill without stopping and programmer DOES NOT advance.

- Fig. 86
- A Check water level control.
 - B Check that air trap chamber is not plugged and that plastic tube has no air leaks.



If water continues to flow without stopping and programmer DOES advance:

Fig. 87 A Check inlet valves for dirt underneath the valve diaphragm. To localize, shut off power. If water continues to flow, inlet valves have foreign material in them and should be thoroughly cleaned.

B Check level controls.

If water continues to flow without filling machine:

Fig. 88 A Check seating of drain valve.

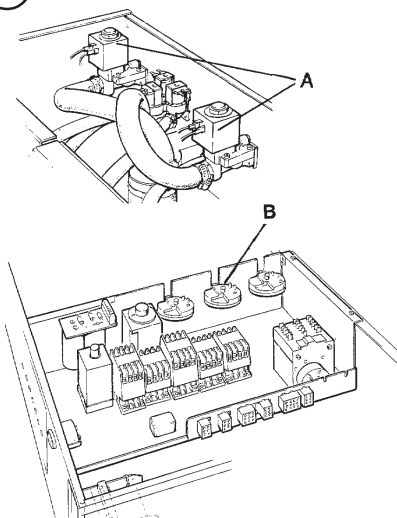
Programmer does not advance:

Fig. 89 A Check synchronous motor on programmer.

B Check water level control, air trap chamber and plastic tubing leading to same.

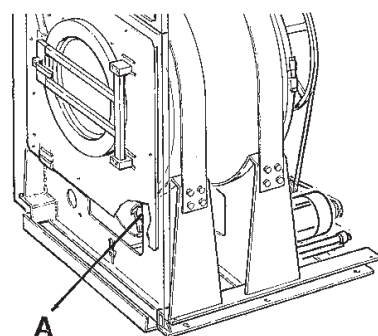
C Check for leak in drain valve which should prevent machine from reaching its pre-set water level in order to energize the programmer.

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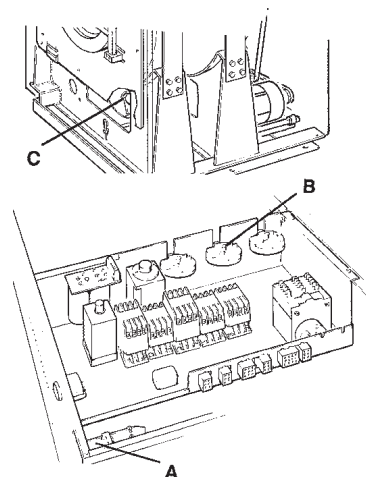
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If machine does not reverse:

Fig. A Check reversing mechanism.

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If machine vibrates excessively:

Fig. A Tighten mounting bolts.

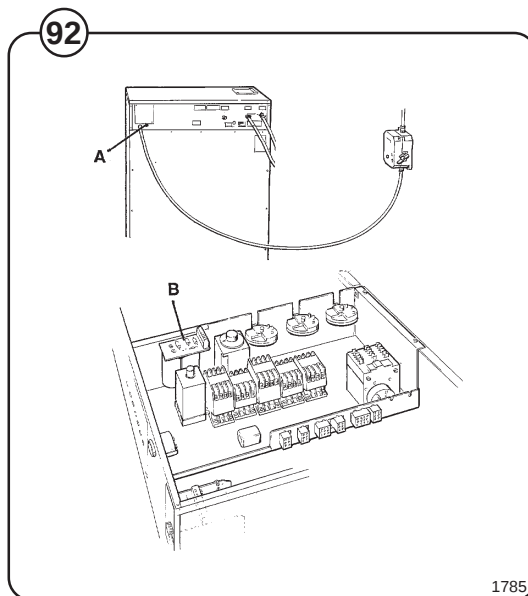
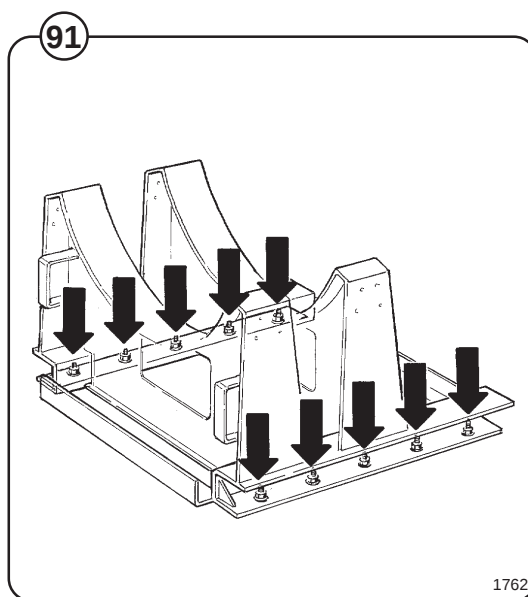
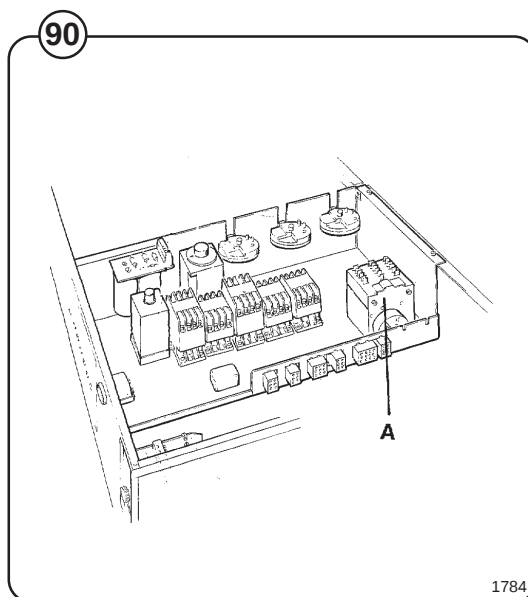
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If either safety fuse blows at the beginning of the cycle:

Fig. A Replace fuse.

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B Disconnect wires leading to the delay circuit of the door lock. Replace fuse and start. If the machine now works, replace delay circuit.



If machine vibrates excessively.

Fig. A Check the out-of-balance detector switch.

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