# OPERATING & MAINTENANCE MANUAL

# EXSM 230 HI-TEK

471 1562-92/01
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 coin-operated models, insert the proper coins to start the machine.

   For manually operated models, place the ON-OFF switch in the ON position and press the Start switch.

   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.

**MACHINE SHOULD NOT BE USED BY CHILDREN**

**PRECAUCION**

1. No abra la puerta de la máquina lavadora sino hasta que la máquina haya terminado su ciclo, la luz operativa esté apaga da y el cilindro de lavado haya completamento terminado de girar.
2. No interferia 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 seriamento herido.

**LAS MÁQUINAS NO DEBEN SER USADAS POR NIÑOS**

**LOCATED AT THE REAR OF THE MACHINE:**

# INSTALLATION AND MAINTENANCE WARNINGS

1. **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.**
2. **This washing machine MUST be securely bolted to an uncovered concret floor according to the installation instructions to reduce the risk of fire and to prevent serious injury, or damage to the machine.**
3. **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.**
4. **Disconnect power prior to any servicing of machine.**
5. **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.**
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 ELECTROLUX-WASCATOR, LJUNGBY SWEDEN
DISTRIBUTED BY WASCOMAT OF AMERICA, INWOOD, NEW YOUR, USA
SOLD AND SERVICED BY INDEPENDENT WASCOMAT DEALERS
471 7662 02-01

## 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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## Contents



The manufacturer reservs 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 bypased.**
- **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 HI-TEK 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 microcomputor controlled HI-TEK 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 an 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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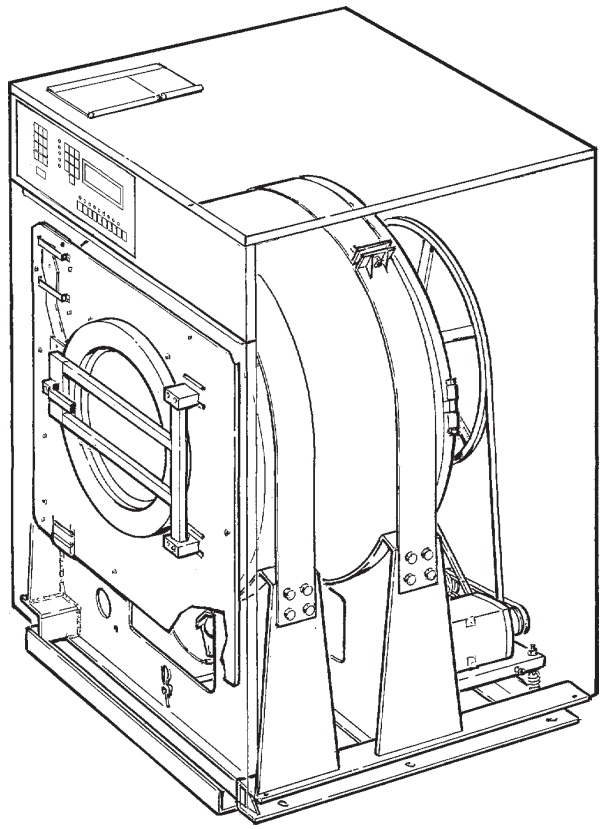

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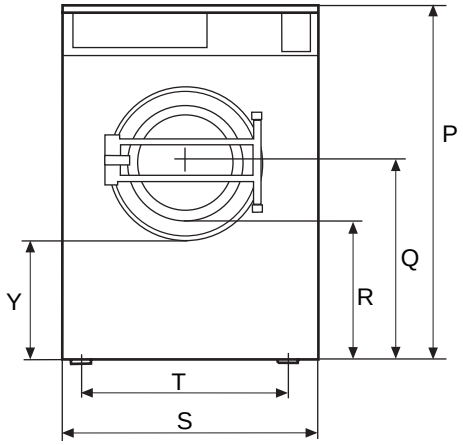
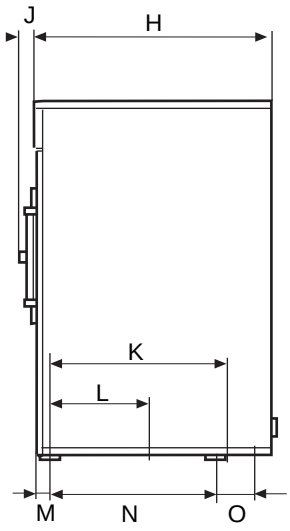
# Technical data

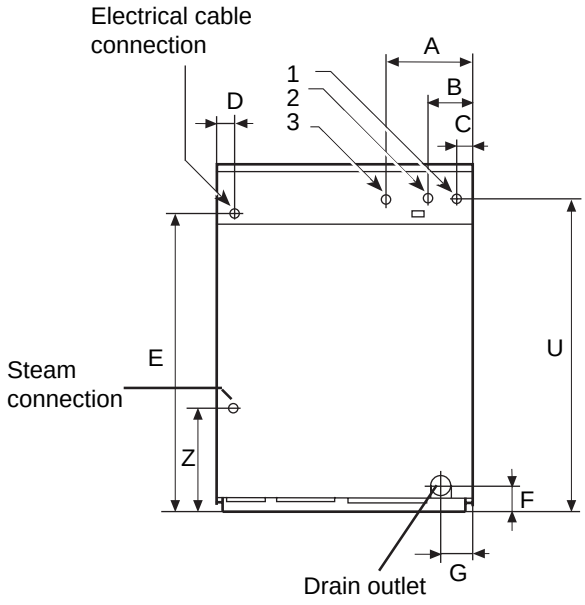
## EXSM 230 HI-TEK

| | | | |
|---|---|---|---|
| Dry load capacity | up to | 30 kg | 65 lbs |
| Overall dimensions | Width | 940 mm | 37" |
| | Depth (at the top) | 880 mm | 34 5/8" |
| | Height | 1405 mm | 55 5/16" |
| | Net weight | 420 kg | 925 lbs |
| Max. floor load at extraction | | 5,0±11.5 kN | 1200±2760 lbs.force |
| Frequency (dynamic force) | | 12 Hz | |
| Crated Dimensions | Volume | 1.85 $m^3$ | 65 cu.ft |
| | Weight | 445 kg | 980 lbs |
| Inner drum | Diameter | 830 mm | 32 11/16" |
| | Depth | 425 mm | 16 3/4" |
| | Volume | 230 litre | 8.12 cub.ft |
| Speed of rotation | Wash | | 41 r.p.m. |
| | Distribution | | 66 r.p.m. |
| | Extraction, low | | 345 r.p.m. |
| | Extraction, high | | 690 r.p.m. |
| G-factor | During wash | | 0.8 |
| | During extrac., low | | 55 |
| | During extrac., high | | 220 |
| Motor speed | During wash | | 365 r.p.m. |
| | During distrib. | | 585 r.p.m. |
| | During extrac., low | | 1650 r.p.m. |
| | During extrac., high | | 3350 r.p.m. |
| Voltage requirements | 208-240 V 3-Phase 60 Hz | | |
| Rated power | Motor, wash | | 0.4 kW<br>0.55 HP |
| | Motor, distrib. | | 0.5 kW<br>0.7 HP |
| | Motor, extrac., low/high | | 2.2/2.6 kW<br>3.0/3.5 HP |
| Overcurrent protection | Three-phase | | 20 A |
| Water connections | | | |
| Recommended water pressure | 2-6 $kp/cm^2$ | | 25-85 psi |
| Hose connection, water | 20 mm | | 3/4" |
| Hose connection, drain | 75 mm | | 3" |
| Hose connection, steam | | | 1/2" |

## Outline and dimensions




| EXSM 230 | | |
|---|---|---|
| | mm | inches |
| A | 315 | 12 13/32" |
| B | 155 | 6 7/64" |
| C | 50 | 2" |
| D | 55 | 2 5/32" |
| E | 1235 | 48 5/8" |
| F | 105 | 4 1/8" |
| G | 175 | 6 7/8" |
| H | 880 | 34 11/16" |
| J | 80 | 3 1/8" |
| K | 575 | 22 11/16" |
| L | 200 | 7 7/8" |
| M | 95 | 3 3/4" |
| N | 407 | 16 1/32" |
| O | 293 | 11 17/32" |
| P | 1405 | 55 5/16" |
| Q | 795 | 31 1/4" |
| R | 590 | 23 1/4' |
| S | 940 | 37" |
| T | 800 | 31 1/2" |
| U | 1305 | 51 3/8" |
| Y | 515 | 20 1/4" |
| Z | 320 | 12 1/2" |

Water inlets
1 cold water
2 hot water
3 hot water
4 steam connection

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# Installation

## Machine foundation

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.

Fig. (3) 2. Break up the floor to a depth of 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.

Fig. (4) 5. Use the template to position the foundation bolts correctly - bolts are to extend 1 1/2'' above concrete.

Reinforcing irons A shall be used around the base. The iron shall be placed between the bolts and the edge of the foundation. Consult a professional worker if necessary.

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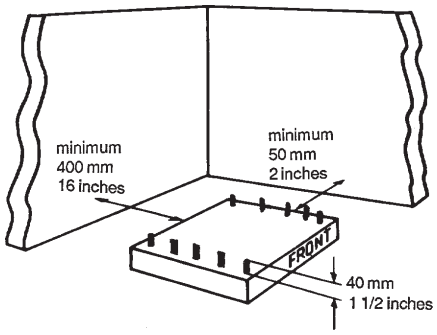


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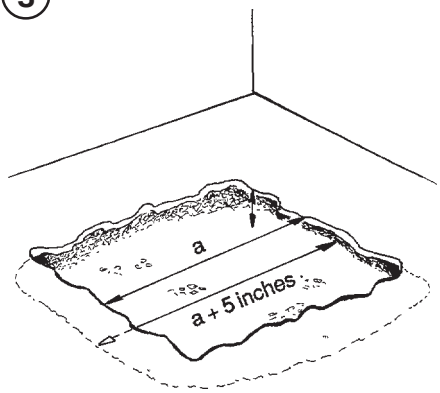


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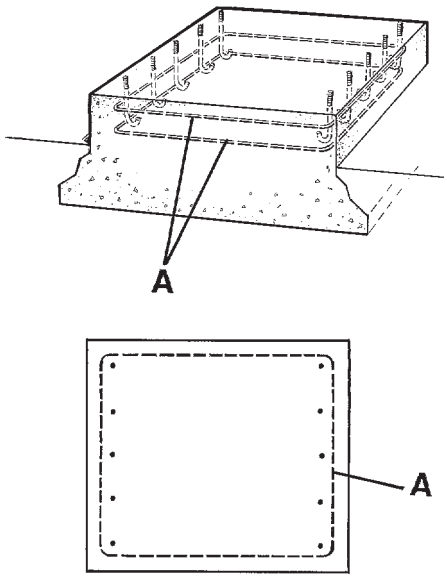


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**Fig. 5** Measurements for foundation in inches and (mm).

A 39 (990)
B 37 (940)
C 36 3/8 (925)
D 33 7/8 (860)
E 3 3/4 (95)
F 6 5/16 (160)
G 7 7/8 (200)
H 8 5/32 (207)
I 6 5/8 (168)
K 4 29/32 (125)
L 31 1/2 (800)
M 32 1/2 (825)
N 35 11/32 (898)
O 38 3/4 (985)
P 41 27/32 (1063)

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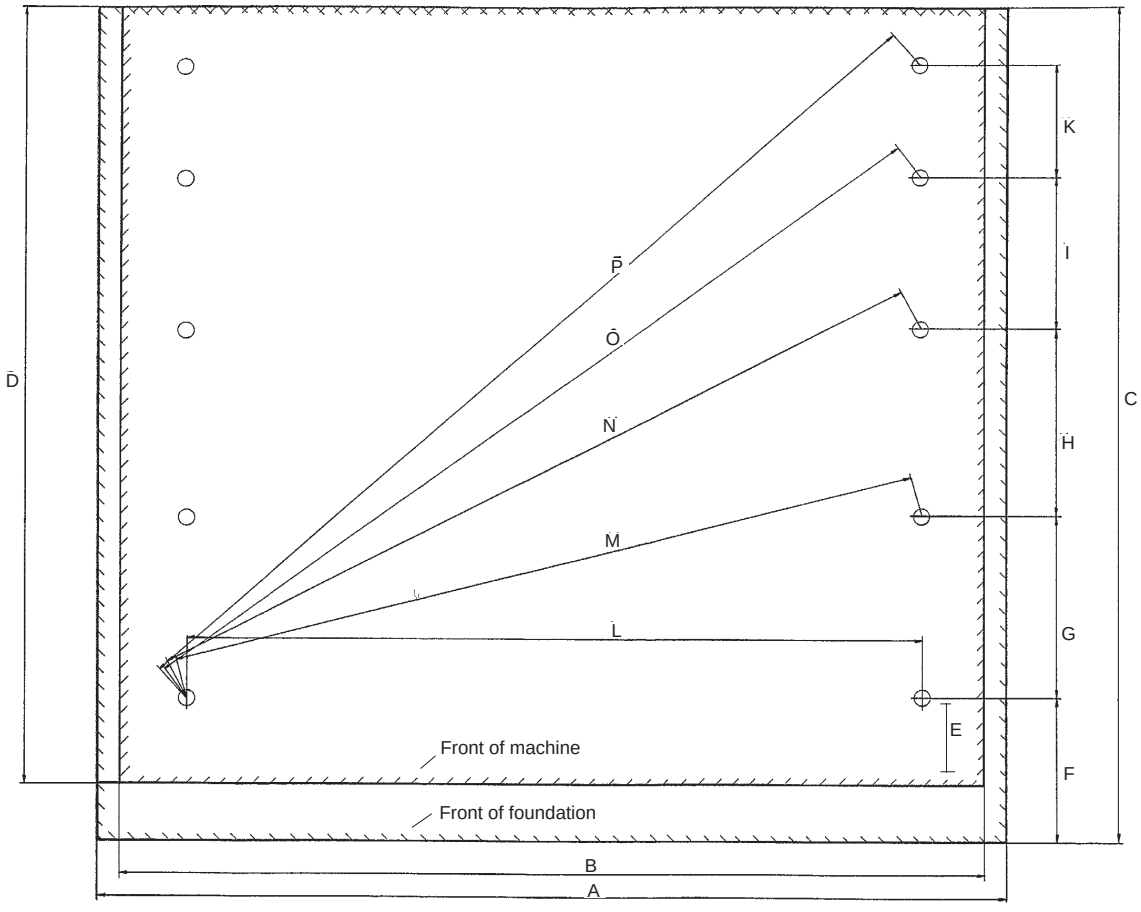


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## Mechanical installation

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.
- 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. 7

Fig. 8
- Place flat washers over the foundation bolts and secure the machine in position by tightening the self-locking nuts. See illustration below.

Fig. 9
- Tighten the nuts in sequence as shown.
- Check and tighten the nuts every week for the first month.

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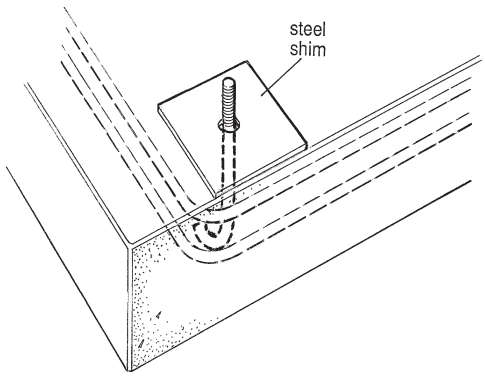


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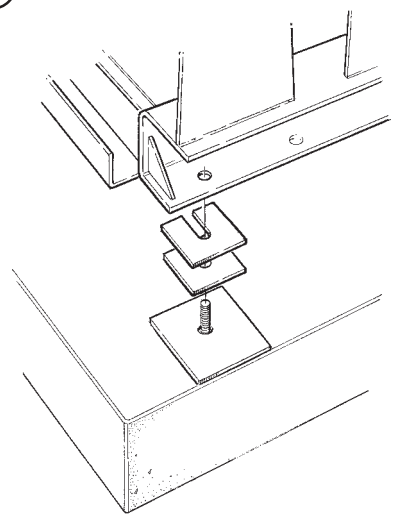

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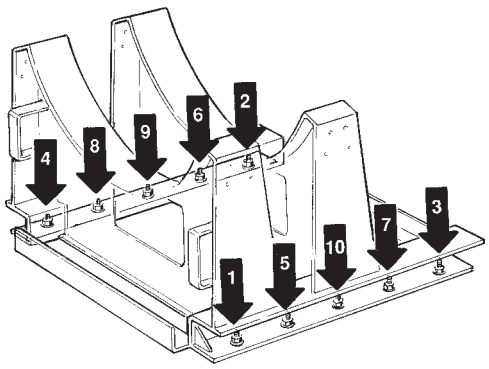


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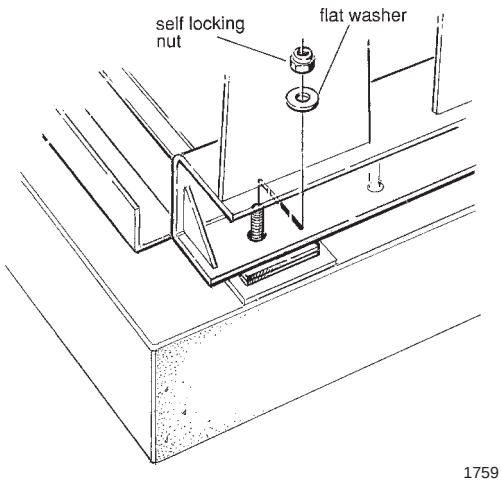


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## Electrical installation

Fig. 10 Although the machines are fitted with a thermal overload in the motor windings and a separate fuse 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 The machine is equipped with a control circuit transformer, mounted on the control unit and connected for 220 volt operation.
If your incomming voltage is below 210 volts move the wire connection to the 208 volt tab on the transformer. If it is above 230 volts move the wire to the 240 volt tab on the transformer.

Check the incoming power for a high voltage leg. If present, connect that line to L2 on the terminal block, a high voltage leg can be found by measuring the voltage between each leg and ground.

Fig. 12 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.

The smaller terminal block at the right is for connection of wires from external supply injection.

Fig. 13 To ensure proper operation the drum must rotate counter-clockwise (seen from the front) during extraction. If the drum rotates in the wrong direction the text "PHASE-OR DOOR LOCK-ERROR" will be seen in the display window. If this happens, interchange line L1 and L3 at the power connection terminal.

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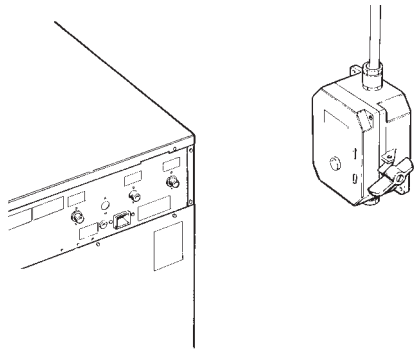

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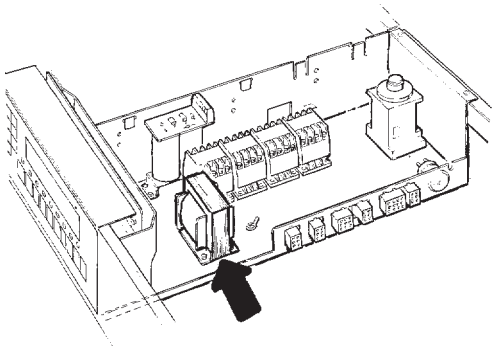

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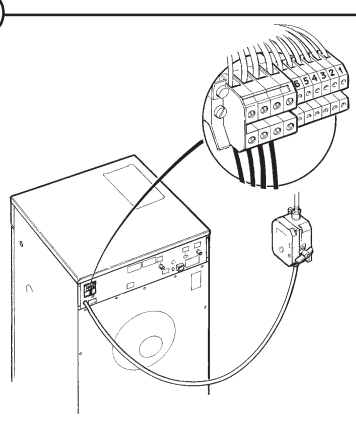

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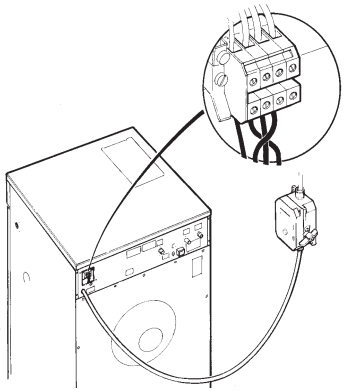

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## Water connection

> **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 hot and cold water connection.
- 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 3/4" 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.

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

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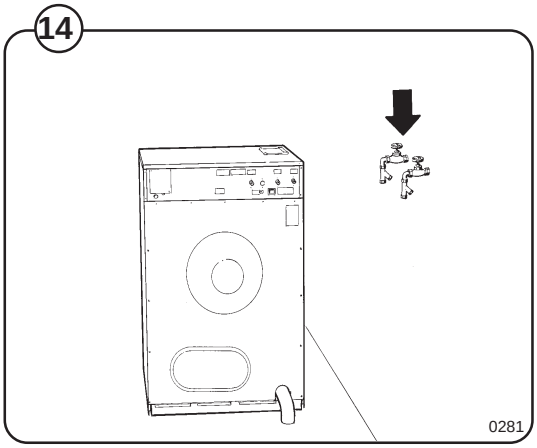


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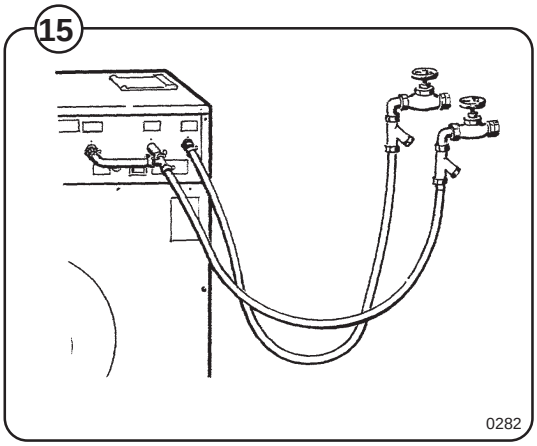


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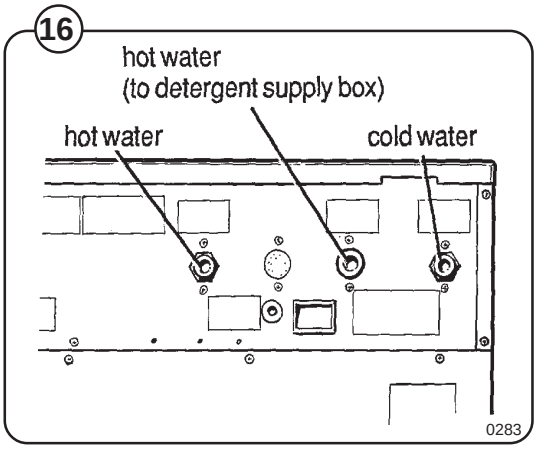


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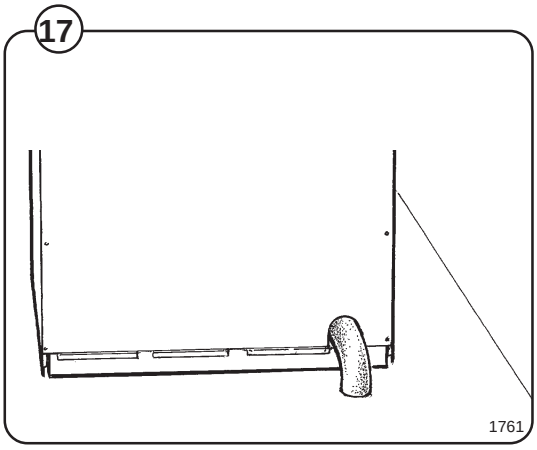


## Steam connection (optional steam heating)

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.

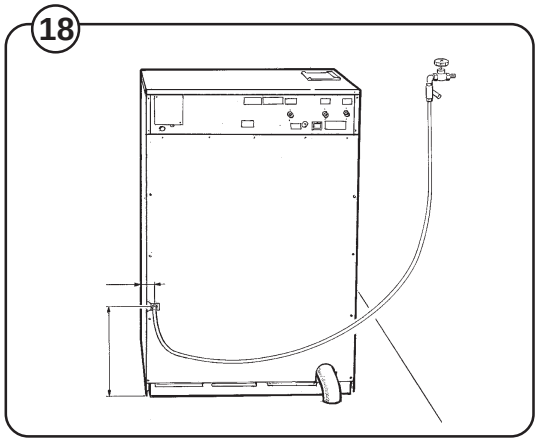
Conncection hoses should be of the quality required according to regulations in the country of use.

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

Steam pressure required:

- minimum: 50 kPa (0.5 kp/cm$^2$) (7 psi)
- maximum: 800 kPa (8 kp/cm$^2$) (113 psi)

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




## Connection of external liquid supply

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

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

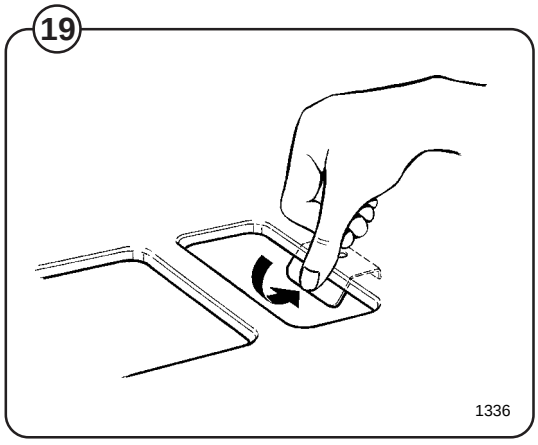
Pull the manifold knobs up and forward.

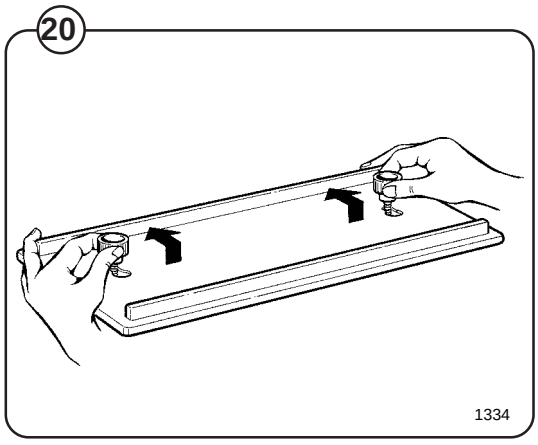
Fig. (19) 1. Loosen both knobs so that one side of the metal fingers underneath can slide under the top lid of the machine, within the supply box.

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.



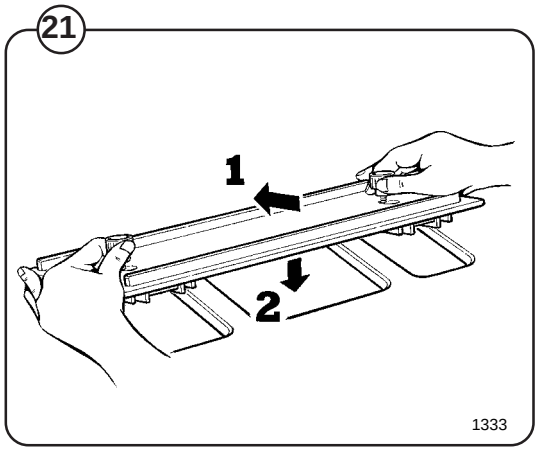



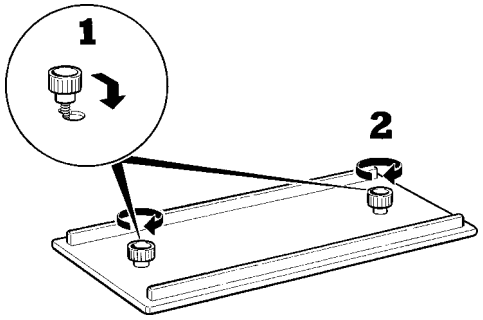
Fig. 22

1. Drop the knop into the larger opening in the supply injector 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 Ø1/3'' (8 mm).
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.

22

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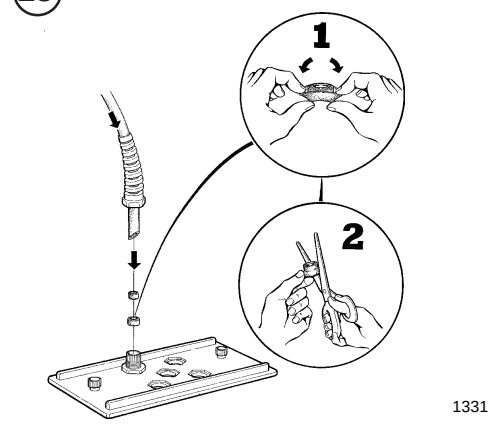


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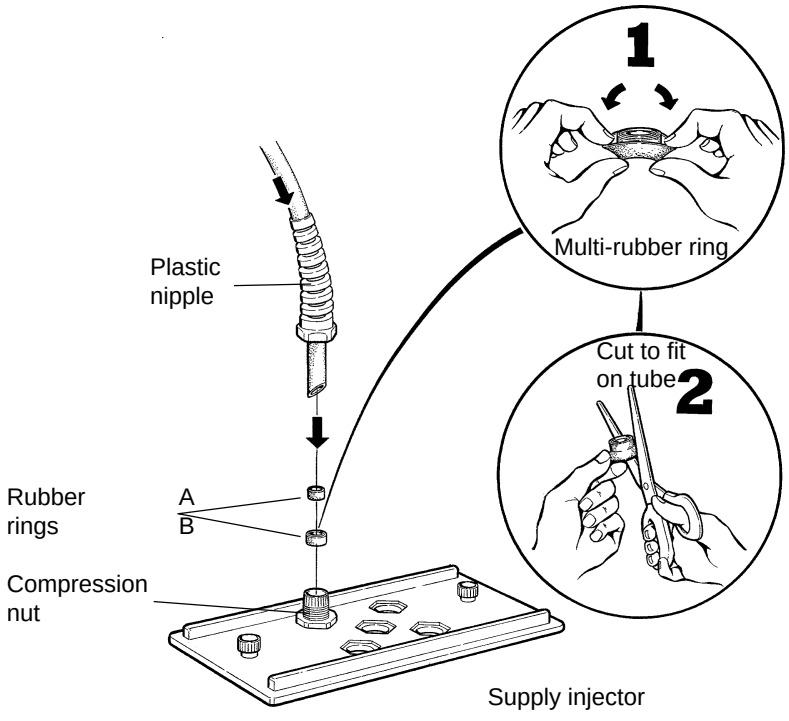


## Start-up and safety checklist

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:

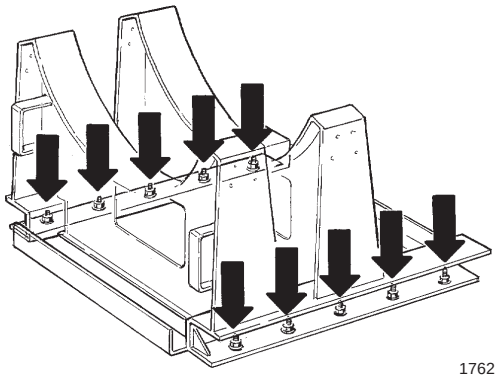
Fig. 26
- When washer loading door is open, the machine must not start. Verify this by attempting to start washer with door open.

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 <u>daily</u> in accordance with above procedure.**
**WARNING:**
**Before servicing Wascomat equipment, disconnect electrical power.**

24



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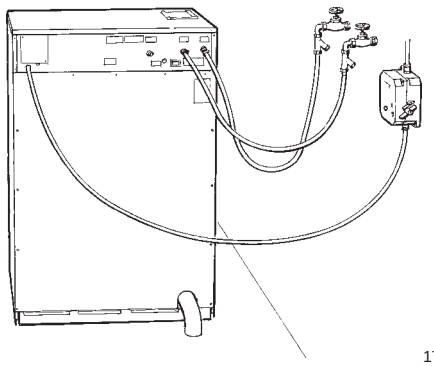

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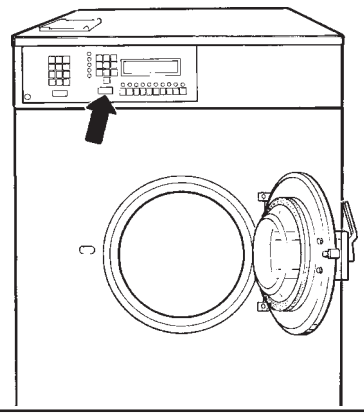

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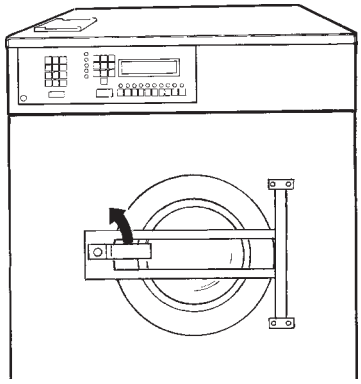

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# Safety rules

- **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 voltaile or inflammable fluids are not to be used in the machine.**

# General

The doorand the electronic timer with display and keyboard are fitted at the front of the machine.

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

## Main units

Fig. 28

1 Electronic timer with display and keyboard for operating the machine.

2 Door -with automatic locking device which remains locked throughout the different wash processes.

3 Detergent supply box - three compartments for automatic injection of powered detergents and fabric softener.

4 Inner cylinder - of stainless steel supported at the rear by two ballraces.

5 Outer drum - of stainless teel (18/8) securely attached to the frame.

6 Wash motor - for reversing wash action and distribution. Extraction motor - for high speed spin action.

7 Hot and cold water valves - program and level controlled solenoid valves for filling with water, and for flushdown of automatic detergent dispenser.

8 Drain valve - timer controlled valve for draining the machine of water.

9 Siphon breaker - to prevent water in the machine from re-entering the water supply system.

10 Control circuit - of plug in type, for time and temperature control of the different wash cycles.

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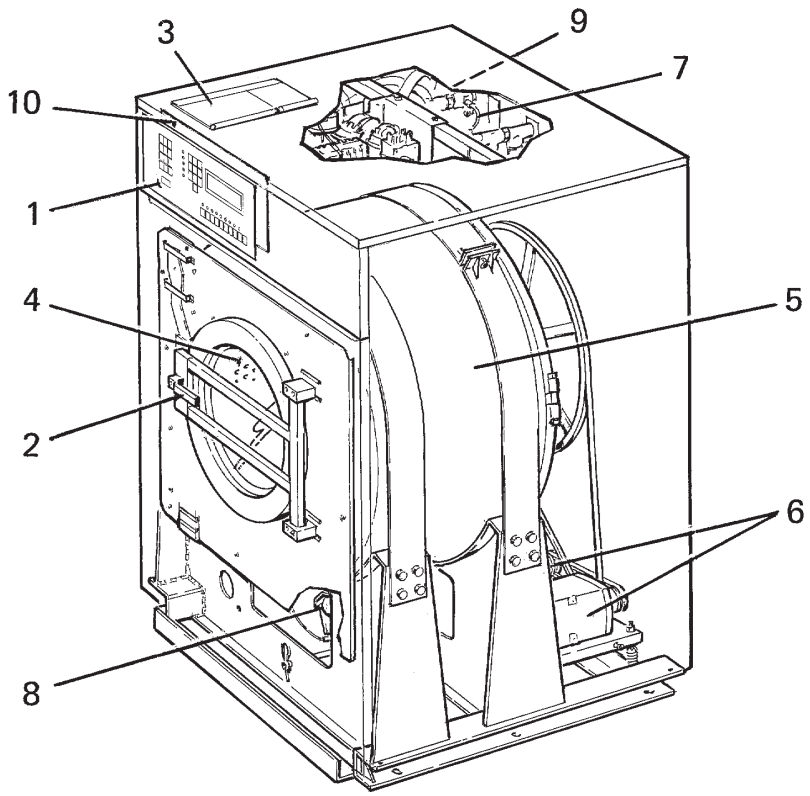


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# Machine construction

## Panels

The machines are equipped with a top panel made of stainless steel. The front panel is available in different colours or in stainless steel. The coloured panels are made of phosphatized steel plate. For servicing purposes, the panels can easily be removed.

## Outer shell

Fig. (29) 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.

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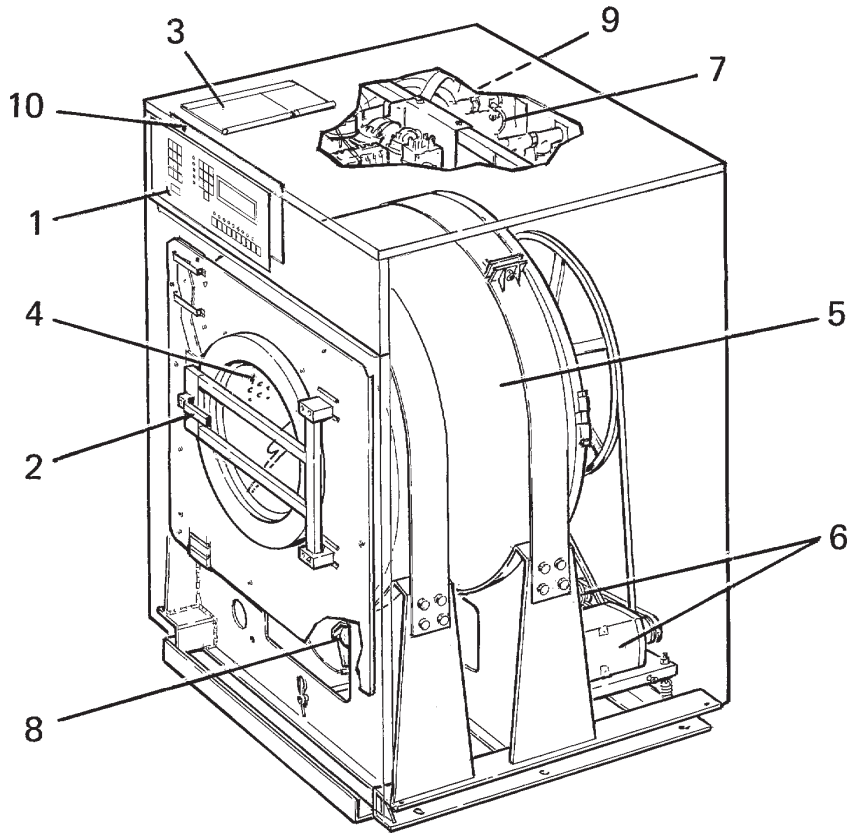


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## Back gable and bearing

Fig. 30 The back gable and the bearing trunnion housing are constructed of a webbed heavy casting for extra rigidity. The bearings are protected against infiltration of water by three neoprene seals. An intermediate safety outlet provides an escape 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 tight 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.

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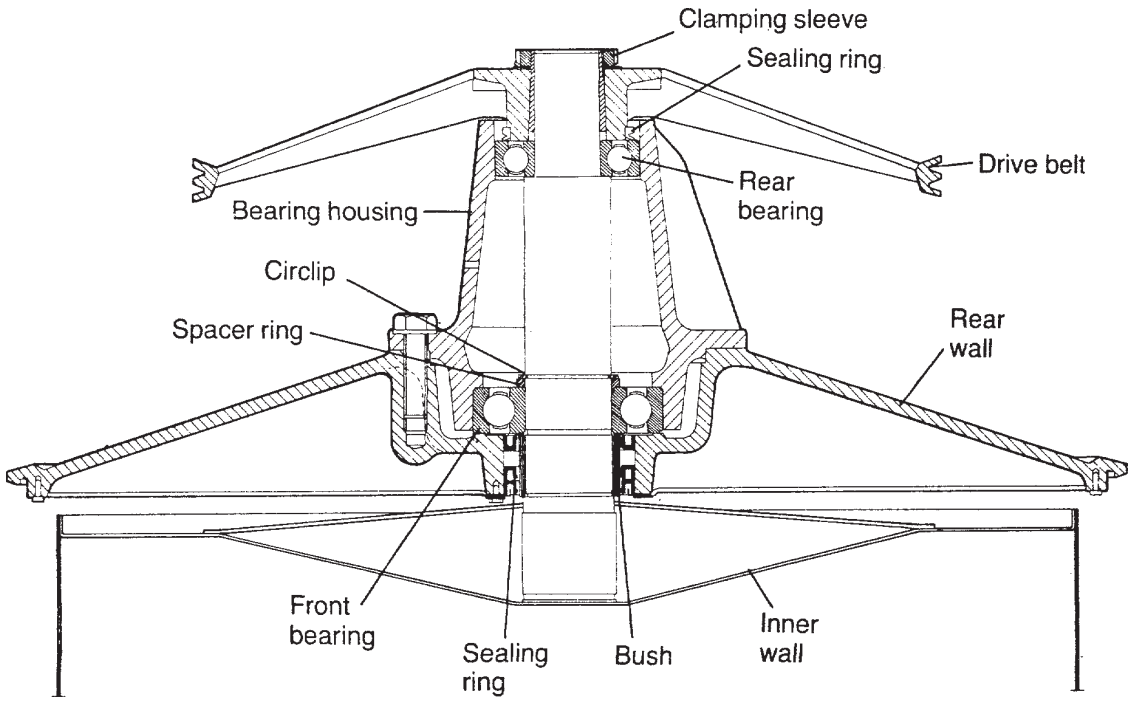
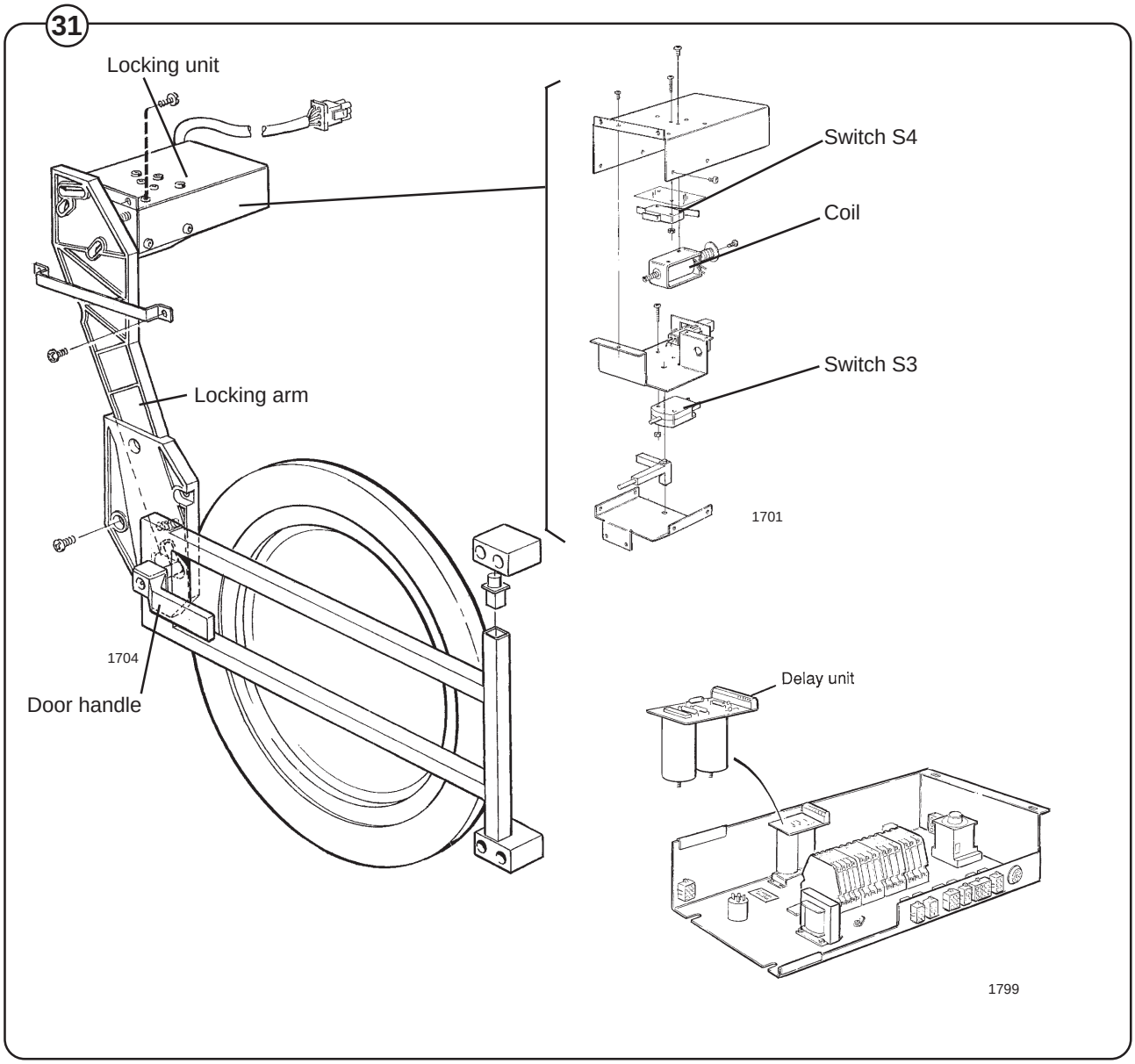


# Description

Fig. 31

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

- Locking unit
  The door locking unit is placed behind the front plate and under the detergent box. The unit consists of a coil, whose plunger locks the door, and two micro switches. Switch S3 indicates that the door is shut and switch S4 that the coil is activated.
- Delay unit
  The delay unit is mounted in the control unit. It consists of a circuit board with two capacitors and a time delay relay. The delay unit controls the time for the door locking after the program is finished or in case of electrical power loss.
- Locking arm
  The arm is placed between the door handle and the locking unit to extend the movement of the door handle to the locking unit.



## Function

Fig. 32

When the door has been latched by the door handle, the locking arm is moved so that it activates the microswitch S3. Switch S4 in the locking unit 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 minutes) but at the same time limit the delay time after the program to about 35 seconds, the delay unit has a time delay relay and works as follow:

- The time delay relay motor K62 receives voltage even if the delay ON/OFF switch S1 is in the off position**.** This means that the contact of the time delay relay normally is in position 12-13 directly from the 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 kΩ 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 the time delay relay motor K62 is interrupted. The contact of the time relay switches 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 before the contact of the time delay relay goes back to position 12-13.

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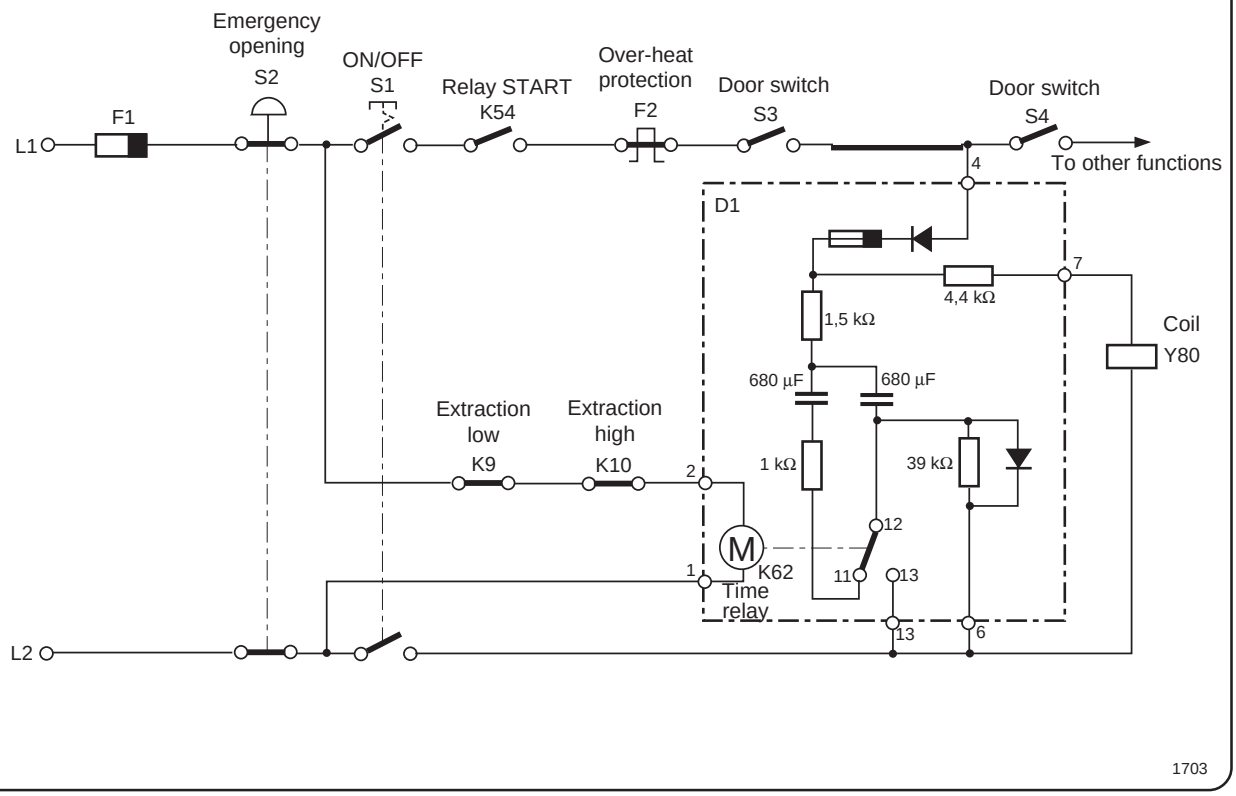

## Fault finding

**The coil does not lock the door when the START button is pushed.**

- Check that there is voltage to the coil 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 in closed position.

**The machine does not start although 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 and must never be bypassed. Therefore a faulty locking unit or delay unit may not be repaired. It must be changed for a new unit.**

## Control unit

Fig. 33 The control panel (1), mounted at the front, includes all components necessary for operating the machine, such as display window, control switches and a key-operated switch.

The printed circuit board (2) with the microprocessor electronic timer is mounted just behind the control panel.

Relays (3) and delay unit (4) are located at the top of the machine, easily accessible for service.

Electrical connections to the machine are made by quick-disconnect plugs.

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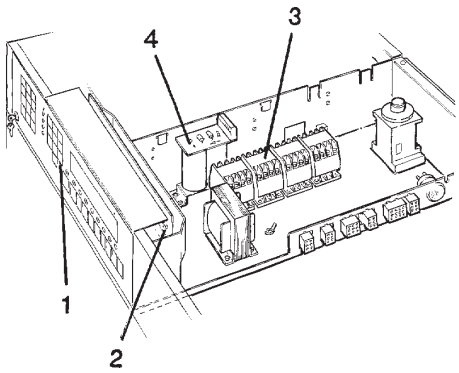


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# Relays

The Hi-TEK 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 switching back to low speed extraction if too high unbalance is indicated.

## Construction

Fig. (34) The body of the relay holding the stationary contacts is made of non conducting 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.

## 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.

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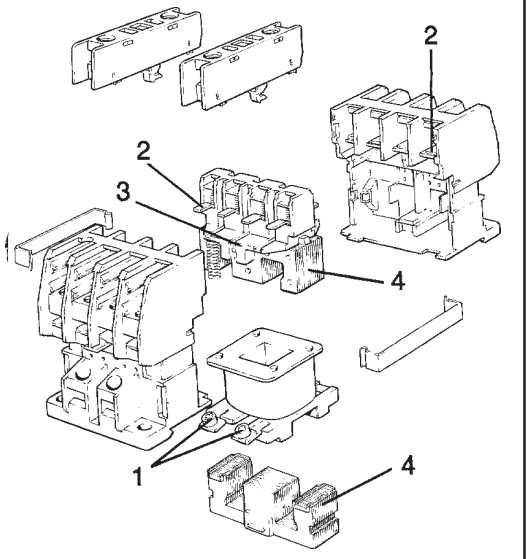


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# Drive motors

## Drive motor description

Fig. (35) 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 extract motor fixed to the bracket and the wash and distribution 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. 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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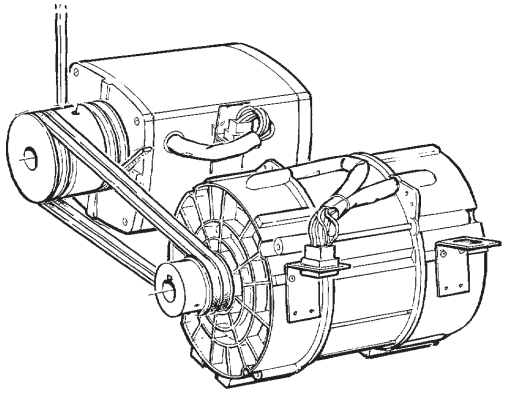

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## Drive motor function

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 speed. 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 word satisfactory at nominal voltage +10% – -15%.

## How to remove motors

Fig. (36) 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 fasting 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''.

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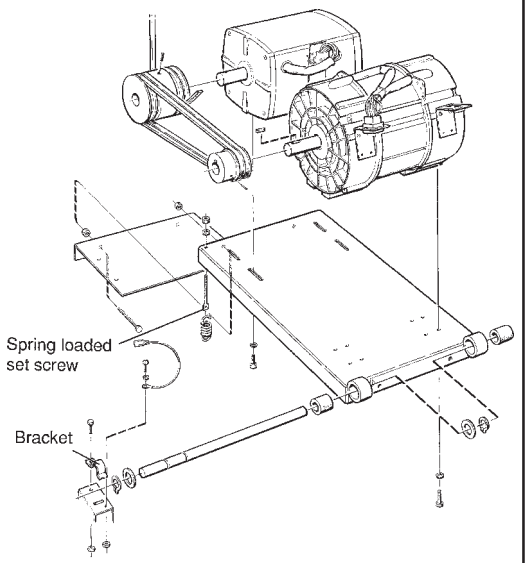


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## Motor connections

Fig. 37

**Wash/distribution motor:**
1, 2 and 3: wash speed (12-pole winding).
4, 5 and 6: distribution speed (8-pole winding).
7 and 9: motor overload protector.

**Extract motor:**
1, 2 and 3: extract speed (2-pole winding).
4, 5 and 6: extract speed (4-pole winding).
7 and 9: motor overload protector.

## Motor overload protector

The motor is equipped with two 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 local code.**

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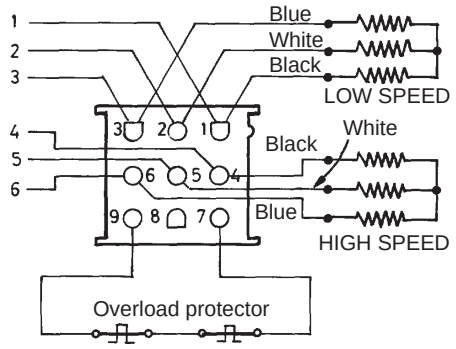


**Repair instructions**

Overheated motor, motor not running

- 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 coils on terminal.

Wash motor only runs at one of the speeds

- Check that the quick connection is correctly connected.
- Measure coils on plinth, as the fault can be caused by interruption in one of the coils.

Motor locks

- Breakdown of bearings - replace bearing or motor.

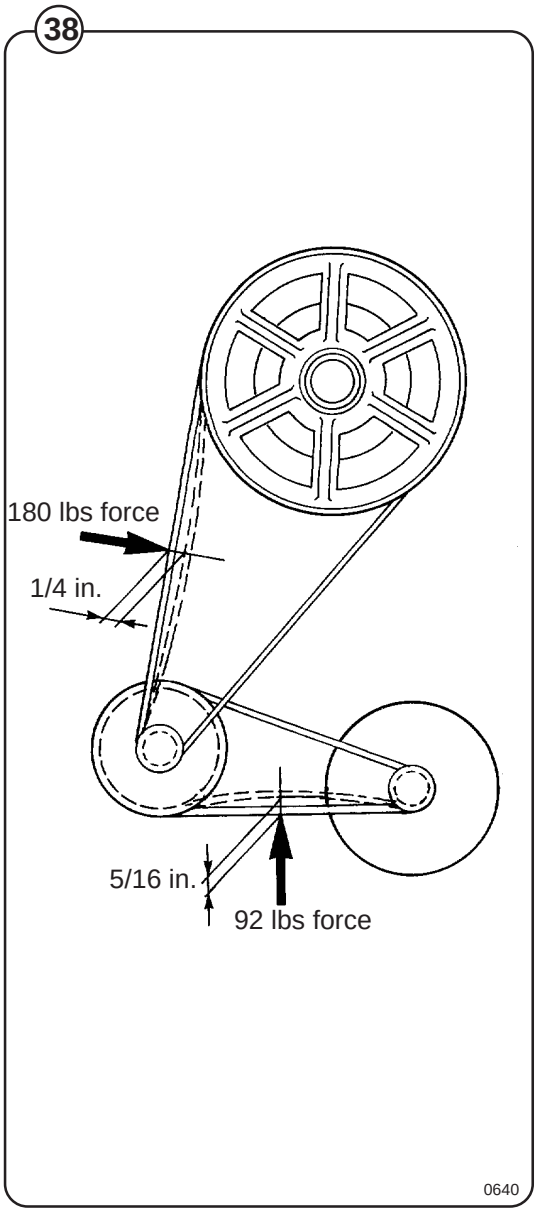
Motor does not turn

- Check belt tension.

Tensioning of the V-belt

Fig. 38

- 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.



# Supply injection valve

## Construction

Fig. (39) 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. (40) When the solenoid is energized, the spring-loaded plunger is drawn up and the pilot valve in the centre of the diaphragm open. 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.

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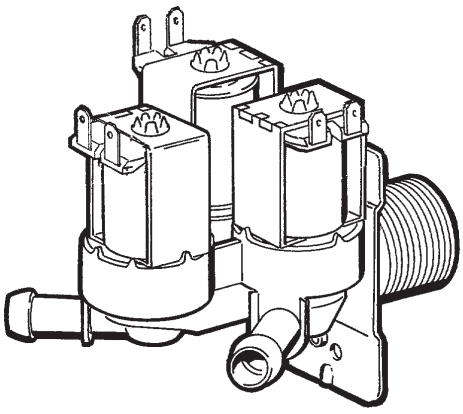

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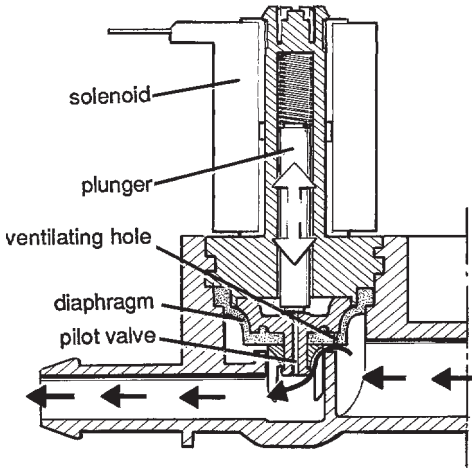


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## Repair instructions

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

Fig. (41) 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. (42)
- Pull the coil straight upwards. Use a screwdriver if necessary to carefully undo the coil.

Fig. (43)
- 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.

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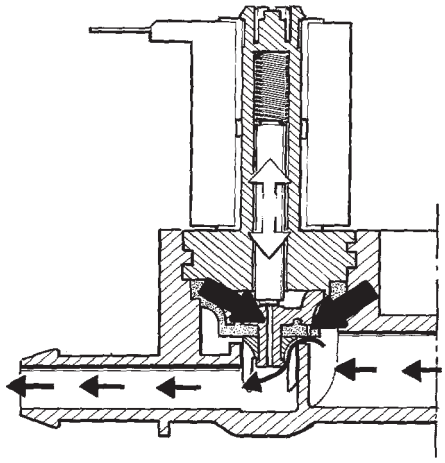

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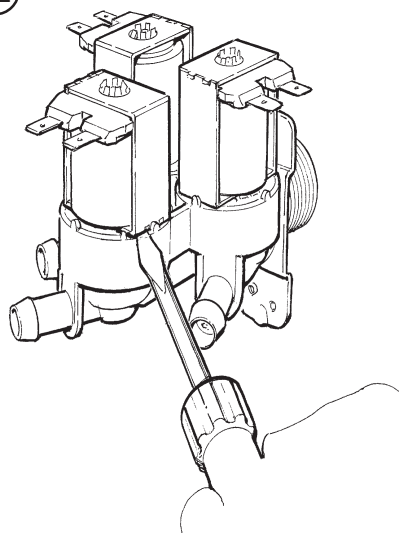

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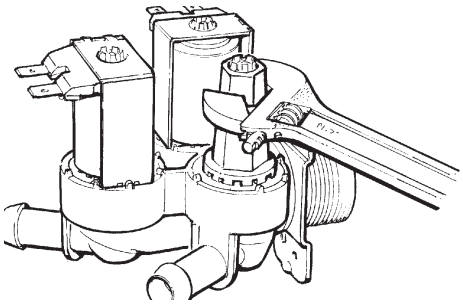

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# Inlet valve for EXSM 230 HI-TEK

Fig. 44 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. 45 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.**

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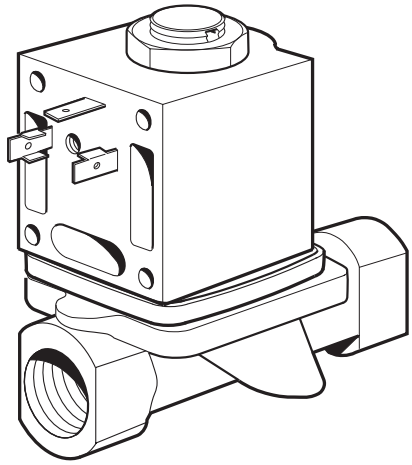

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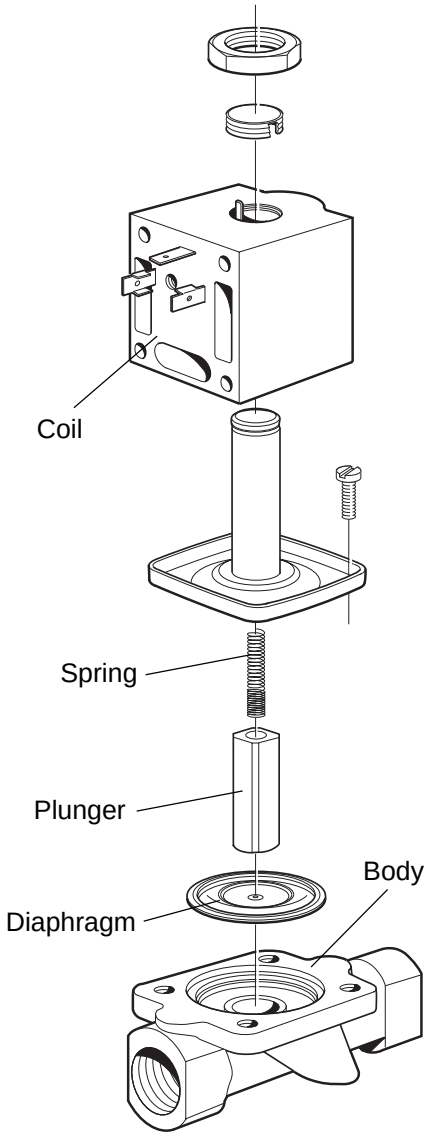


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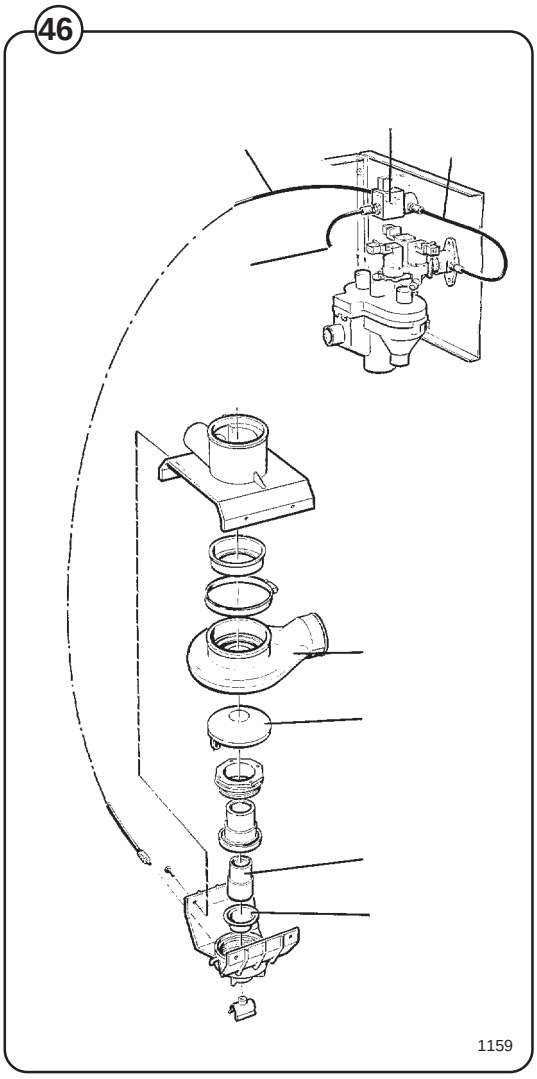
# Drain valve

## Description

Fig. (46) 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. 47 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:

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.

Compartment 2
This compartment is the main compartment for adding detergent to the wash .

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 for.

When using a top mount supply injector connection only compartment 2 will be utilized.

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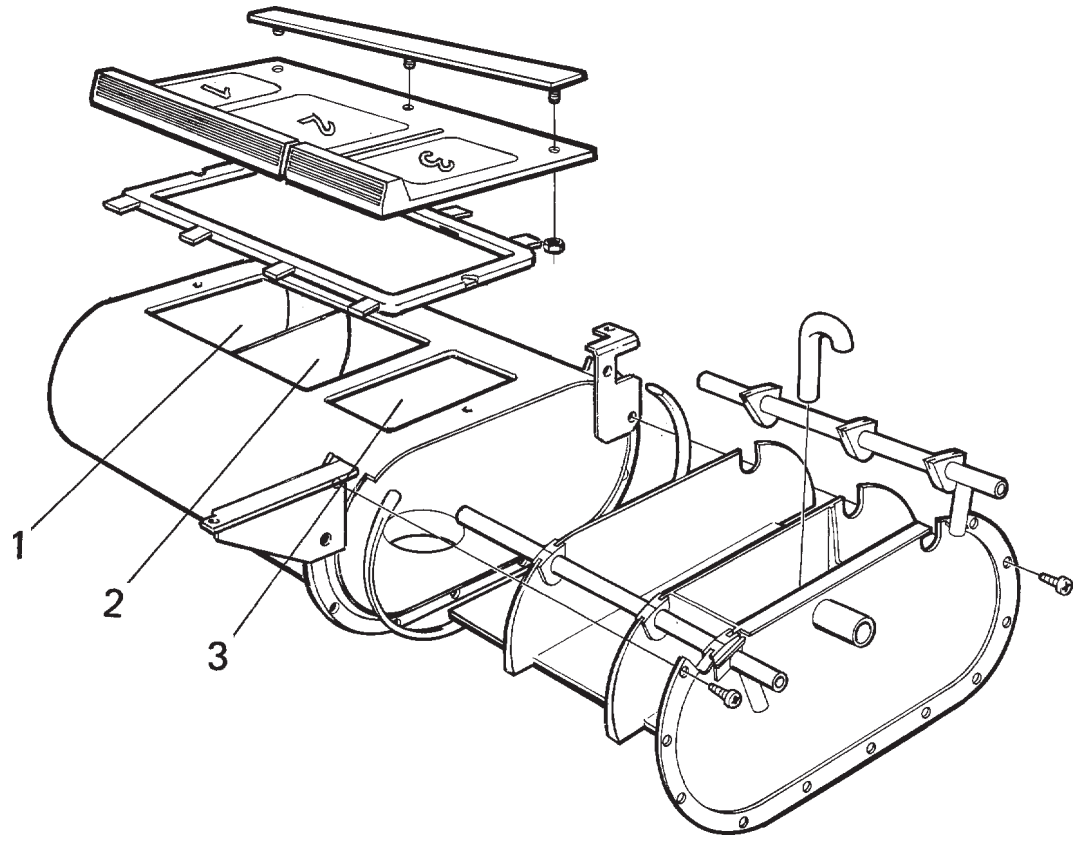


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# Procedure for use

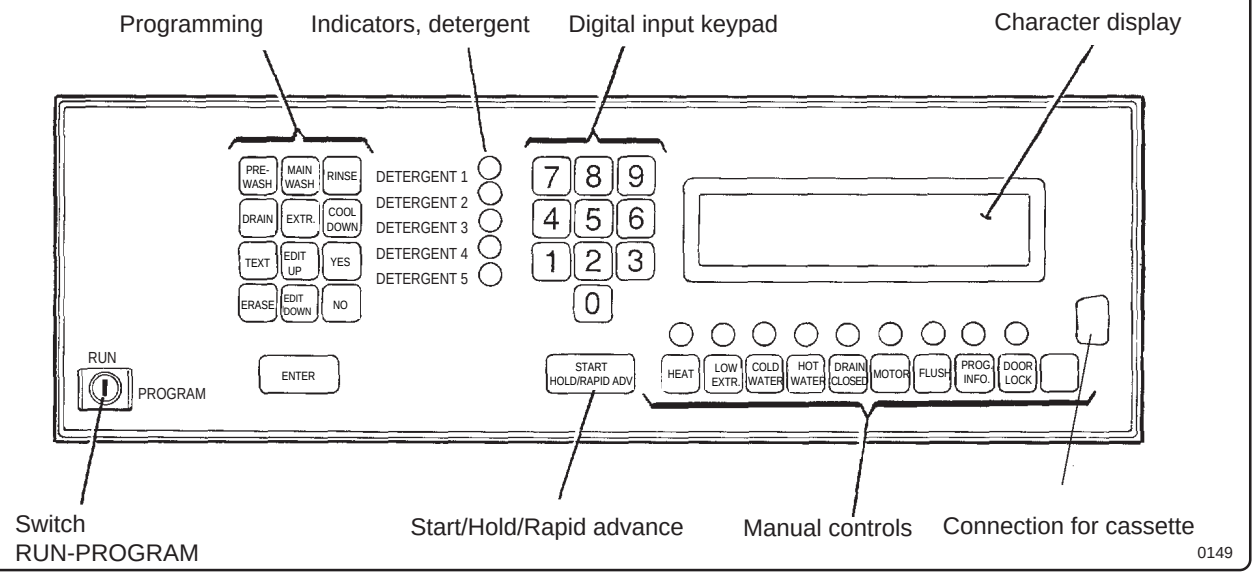
All operations, including the programming of new programs are carried out from the control panel on the front of the machine. During normal use, the programming keys to the left of the panel are inoperative.

Fig. 48

The control panel comprises the following:

- a display window with four lines each of 40 characters. This shows the relevant program information, the programming instructions, error messages etc.
- there are press button controls for:
  - start/hold/rapid advance
  - blocking high speed spin during automatic washing
  - manual washing (motor, filling with water, flushing down detergent, heating and draining)
  - programming new programs
  - figure values (program selection/programming)
- key switch for switching between the normal position and the programming position.
- indicators for dispensing supplies.

48



## Preparation

- Sort the wash according to the washing instructions on the garment labels. Check that there are no foreign objects in the garments. Pull up zipper fasteners.
- Open the washing machine door, check that the drum is empty, insert the wash goods and close the door.

## Automatic washing

The manual controls can be used during automatic washing.

### Program selection

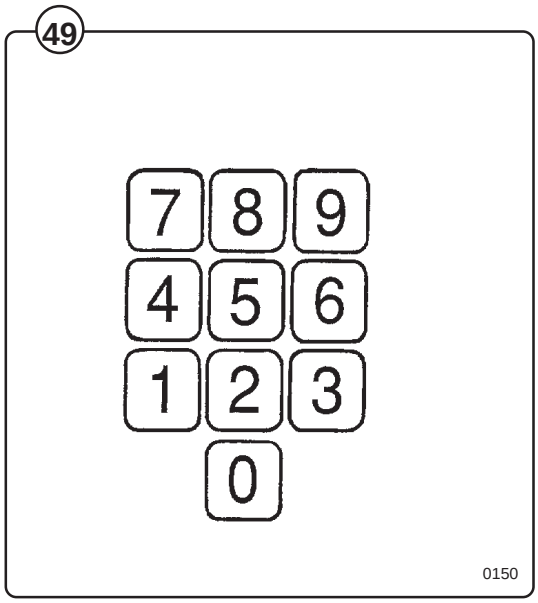
When supplied, the machine is provided with a number of standard programs (program numbers 01-09). Program numbers 10-99 are intended for your own programs (refer to the separate programming appendix).

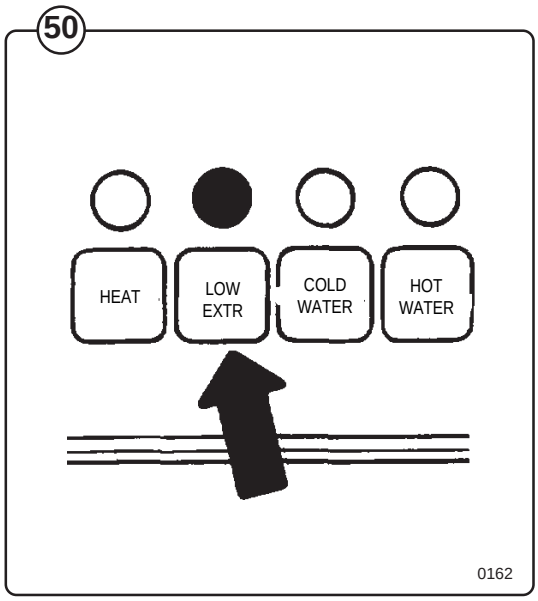
Fig. 49

- Select a program number by entering <u>two digits</u> with the digit keys. Note that program numbers 01-09 must also be entered as two digits (e.g. **0 3**).
- A number that has been entered incorrectly can be changed by entering the correct number directly after the incorrect one.

Fig. 50

If only low extraction is required, enter **LOW EXTR.**



## Program information

Fig. (51) When a program has been selected and **PROG. INFO.** is pressed, further information about the program is shown in the display window's bottom lines.

### Measuring the detergent

Fig. (52) Four lights on the panel indicate which detergent compartments will be used or supply signals provided during washing. Will be lit when specific detergent compartment is used or supply signals provided.

Fig. (53) If the machine's system for powder detergent is used: meter the detergent and any additives according to the lamp indication.

### Indicator lights

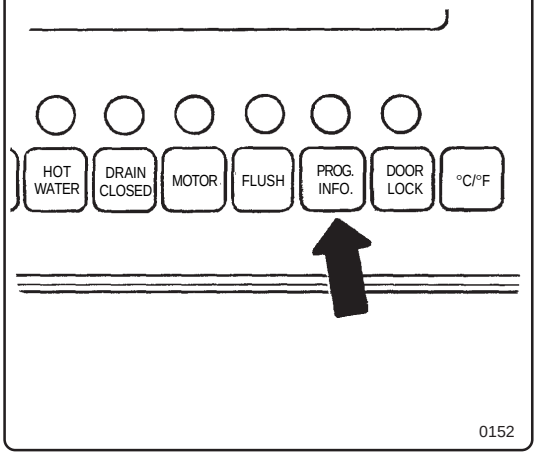
The indicator lights vary according to the type of machine:

- Light 1 flushing in compartment 1.
- Light 2 flushing in compartment 2.
- Light 3 flushing in compartmente 3.

Light 4 lights when the spray system is in use.

Light 5 lights when reduced drum speed is in use.

51

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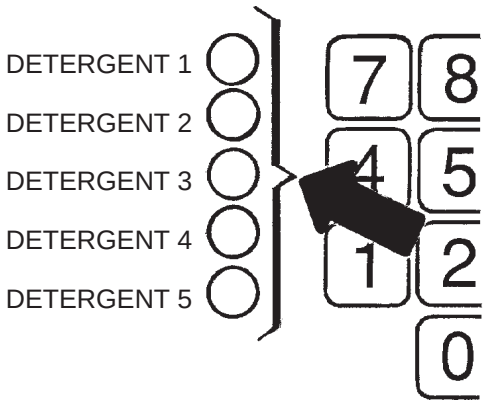
52

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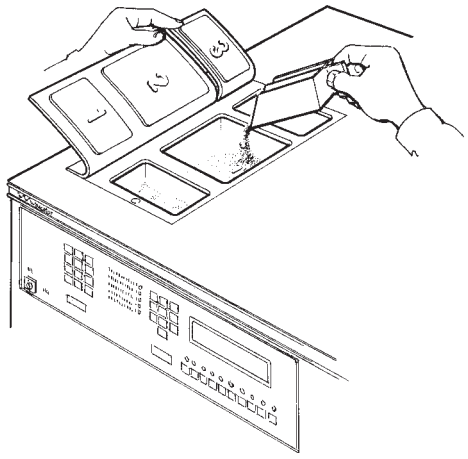
53



0154

## Starting the program

Fig. 54 Fig. 55

Press **START/HOLD/RAPID ADV.** button**.** The wash cycle will commence and the display window will display wash information as shown in the figure below.

## Temporary stop

Fig. 54

- Press **START/HOLD/RAPID ADV..** All active functions (motor, filling with water and heating) are switched off. The drain will remain closed and the door locked.

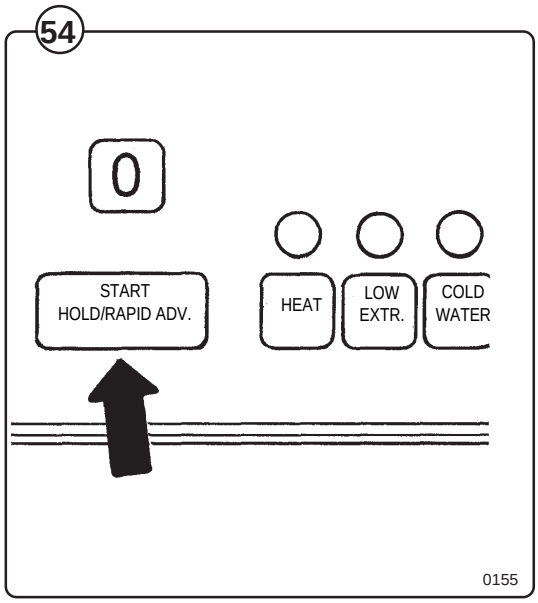
Fig. 54

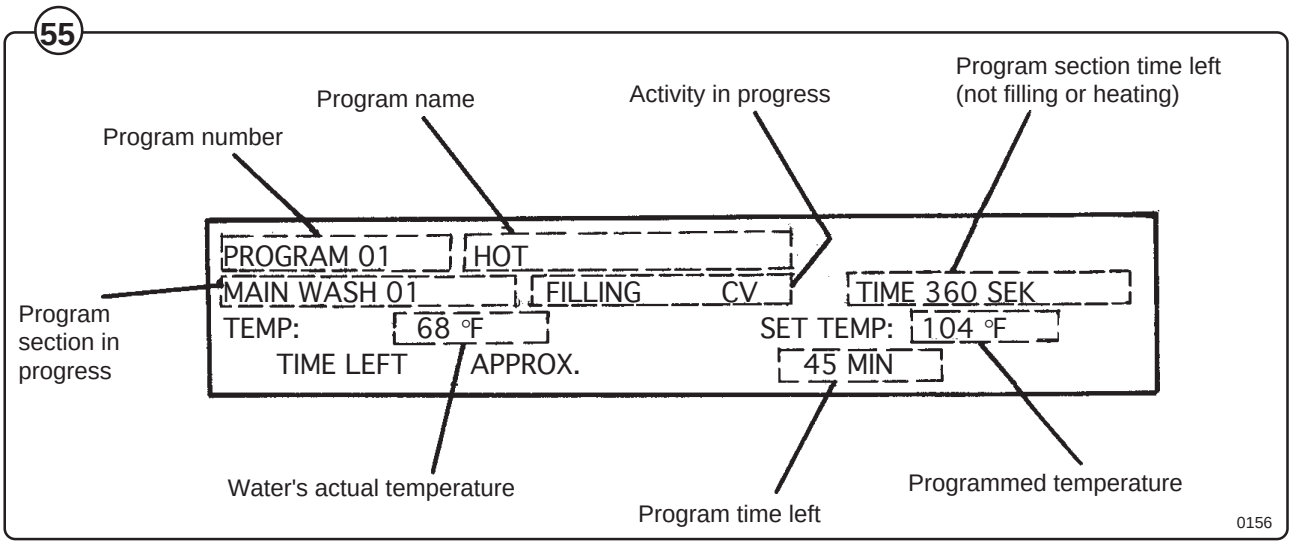
- The program is restarted by pressing **START/ HOLD/RAPID ADV.** again, and starts from the position where it had stopped. There is one exception; if a pause was made during a spin cycle, the program will continue with the program section after the spin cycle.

## Fast forward

Fig. 54

- Press **START/HOLD/RAPID ADV.** and keep the button pressed. After 1.5 seconds, the different program sections will be fast forwarded at a rate of one section per second.
- Program sections which are longer that 300 seconds (5 minutes) are however divided into several steps for fast forwarding. At each step the time is reduced by 300 seconds.



## Programmed stop

Fig. (56) If there is a programmed stop in the program, the machine stops and a buzzer sounds. The buzzer is switched off by pressing **START/ HOLD/RAPID ADV.** The program is restarted by pressing the button again.

## Tumble drying after the program is completed

Fig. (57) If **DOOR LOCK** and **MOTOR** are pressed before starting or while a program is operating, the drum will continue to rotate after the program is completed. The drum is stopped again by pressing **MOTOR** again. Press **DOOR LOCK,** when the extraction is finished and the drum has come to a complete stop.

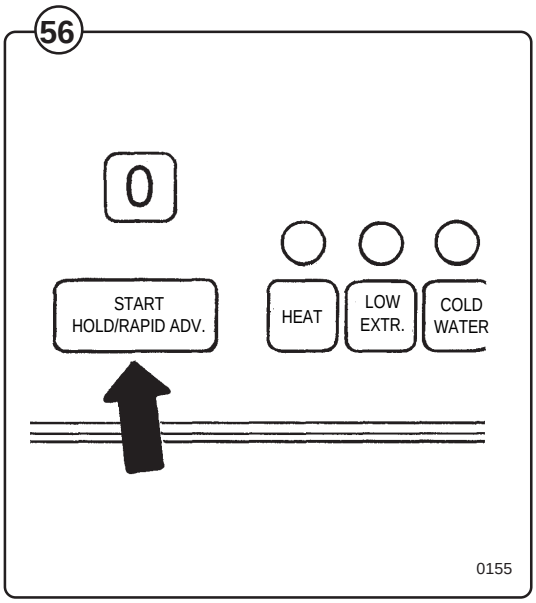
## Finishing off

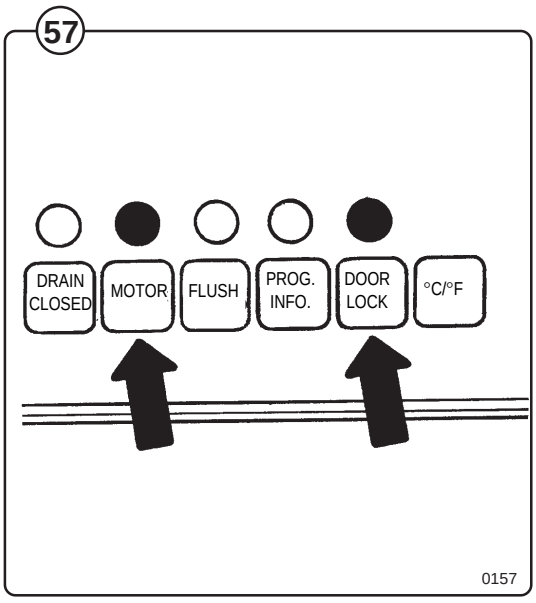
When the wash is completed, a buzzer may sound if this function is programmed.

Open the door and take out the wash.

## After use

Switch off all manual buttons so that all indicator lights above the buttons are off.



## Manual washing

- The indicator lamps above the control buttons indicate that the function is active. **COLD WATER, HOT WATER** and **FLUSH** must be kept pressed to remain active. Other control buttons change function (ON-OFF) each time they are pressed.

Fig. 58
- Lock the door by pressing **DOOR LOCK** (the lamp above the shall light up). Note that the door must be locked for other manual operations to be possible.

Fig. 59
- The wash motor is started and operates with a reversing action when the **MOTOR** button is pressed.

Fig. 60
- Water is filled with **COLD WATER** and **HOT WATER. FLUSH** is used to wash down detergent from compartment 1 (pre-wash) or detergent valve 1.

Fig. 61
- On machines equipped with steam or electric heating the wash water is heated by pressing HEAT.

When **HEAT** is pushed in, the character display shoows:

```
          **MANUAL HEATING OFF**
TEMP 25°C              FINAL TEMP°C
SELECT TEMPERATURE. PUSH START
```

Indicate desired temperature by using the key board. Push **START** to begin the heating. The display will now show:

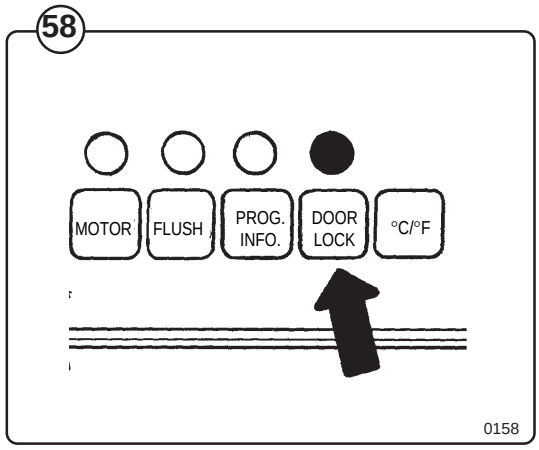
```
**MANUAL HEAING ON**
TEMP 25°C                  FINAL TEMP 60°C
HEAT SHUT-OFF: PUSH HEAT
```

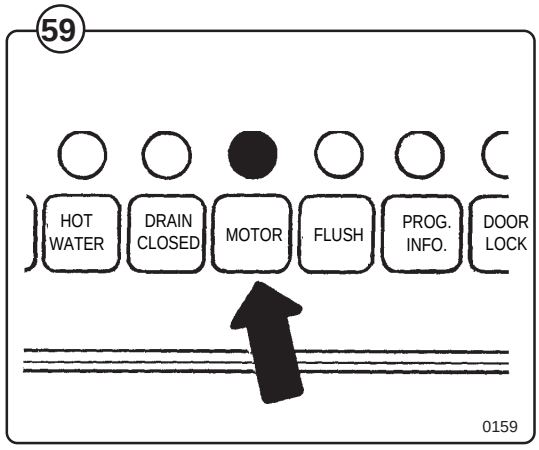
If a new heating temperature is desired, push **HEAT** to shut off heat. A new cycle can now be selected. The first line in the display will show whether the heat is turned on or off.

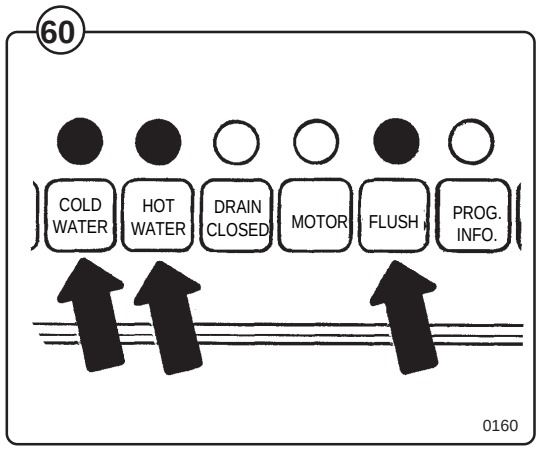
When the programmed temperature is reached, the heat turns off automatically.

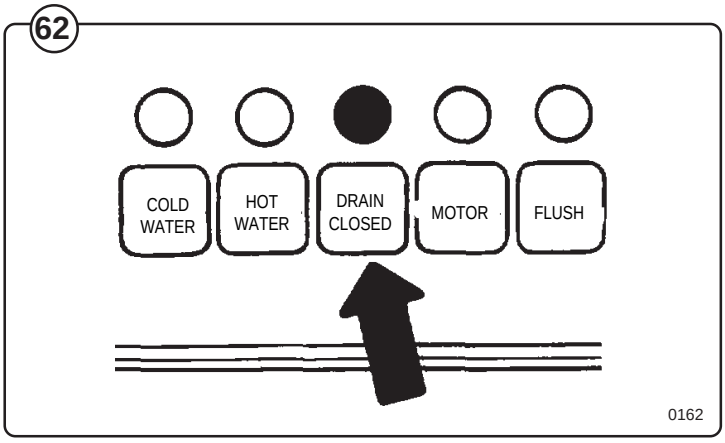
Note that there is no temperature limit or indication of the temperature during manual washing. Heating is discontinued however at 208°F (98°C).

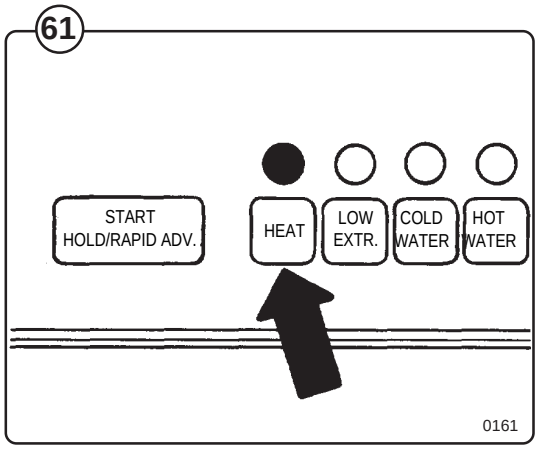
Fig. 62
- The drain valve is operated with **DRAIN.** The valve is closed when the light is on.



Extract cycle

For safety reasons, there is no manual button for the extract cycle. There are two choices if extracting is required during manual operation:

- 1. Select one of the standard programs and fast forward to the "Extract" cycle.
- 2. Program your own program by draining and extracting for the required time.

Remember the following when programming: Let the drain valve be open for at least 30 seconds before starting the spin cycle and program for distribution speed during the drain sequence.

Finishing off

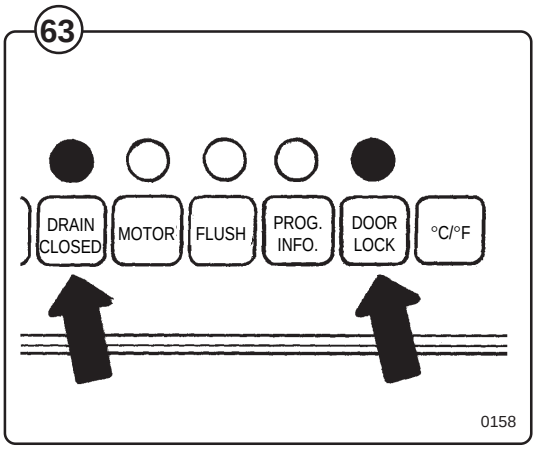
Fig. 63
- Switch off the activated function so that all control lamps above the controls go out.

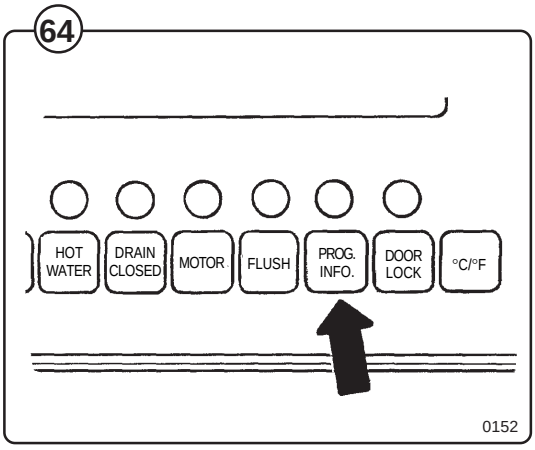
## Program statistics

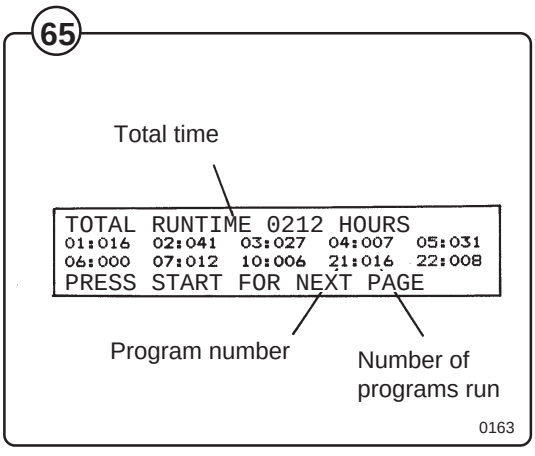
Fig. 64
- By selecting program number 00 and pressing **PROG. INFO,** the character display shows program statistics.

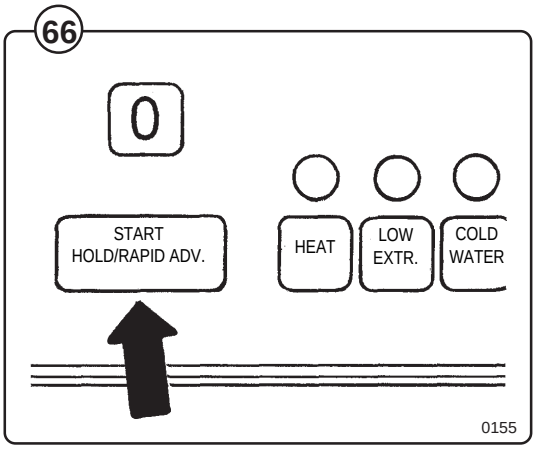
Fig. 65
- The machine's operating time in hours is displayed first followed by the number of programs operated for the different programs. New programs are brought forward by repeatedly pressing **START/HOLD/ RAPID ADV.**

Fig. 66
- Press **PROG. INFO** once again to get back to the normal position.



## General

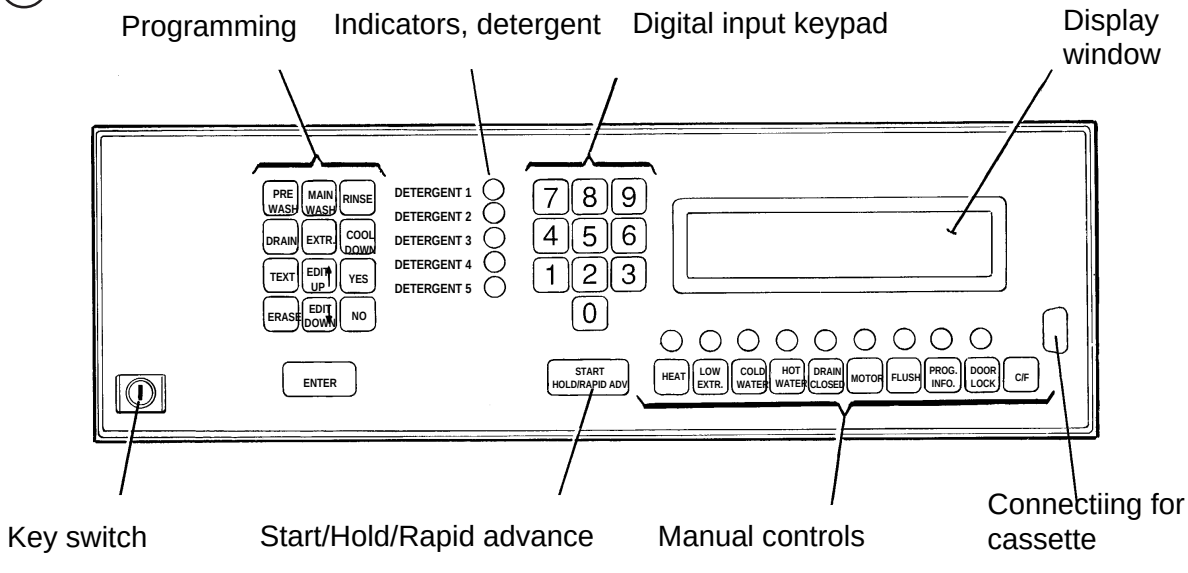
Fig. 67 The washing machine's program operation is controlled by a microcomputer and the wash programs are stored in an electronic memory. Program controls are very exact and the wash programs can be easily adapted to the end user's individual requirements.

The machine is supplied with a number of fixed basic programs which cannot be deleted or modified. However, they can be used as a background for programming end user programs. It is also possible to compose entirely new programs. 90 such programs can be stored in the program unit's memory.

The following parts of the control panel are used when programming:

- the key switch is used to switch the machine to the programming position.
- 13 press button switches which are used only for programming.
- the numeric keys which are used to enter different program data
- °C/°F press button to select the temperature scale (°Celsius/°Fahrenheit)
- display window where the programming is controlled with the aid of questions and selections.

67



# Programming - general description

Programming can be divided into two programming principles: Programming a new program or using an old program as a background.

## Programming a completely new program

Fig. 68

The wash program is constructed by selecting different sub-programs with the buttons on the panel. These sub-programs, when stored after each other, form the complete final wash program. Sub-programs can be selected in an optional sequence.

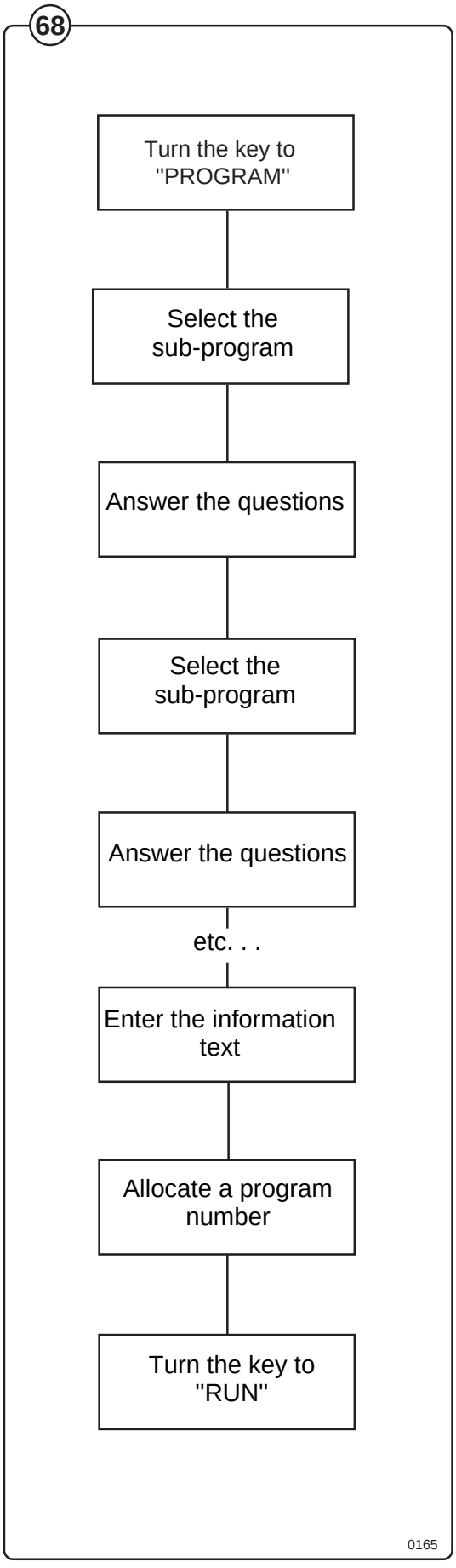
A program can, for example, be built up in the following way:

- Pre-wash 1, Drain 1
- Main wash 1, Cool down 1, Drain 2
- Rinsing 1, Drain 3, Extract 1
- Rinsing 2, Drain 4
- Rinsing 3, Drain 5, Extract 2.

When programming, a number of questions must be answered for each sub-program. The questions are answered with the **YES, NO** buttons and the number keys.

When all sub-programs are programmed, any questions which apply to the whole program must be answered. AN explanatory text can also be entered (this is displayed when **PROG.INFO.** is pressed after selection a program).

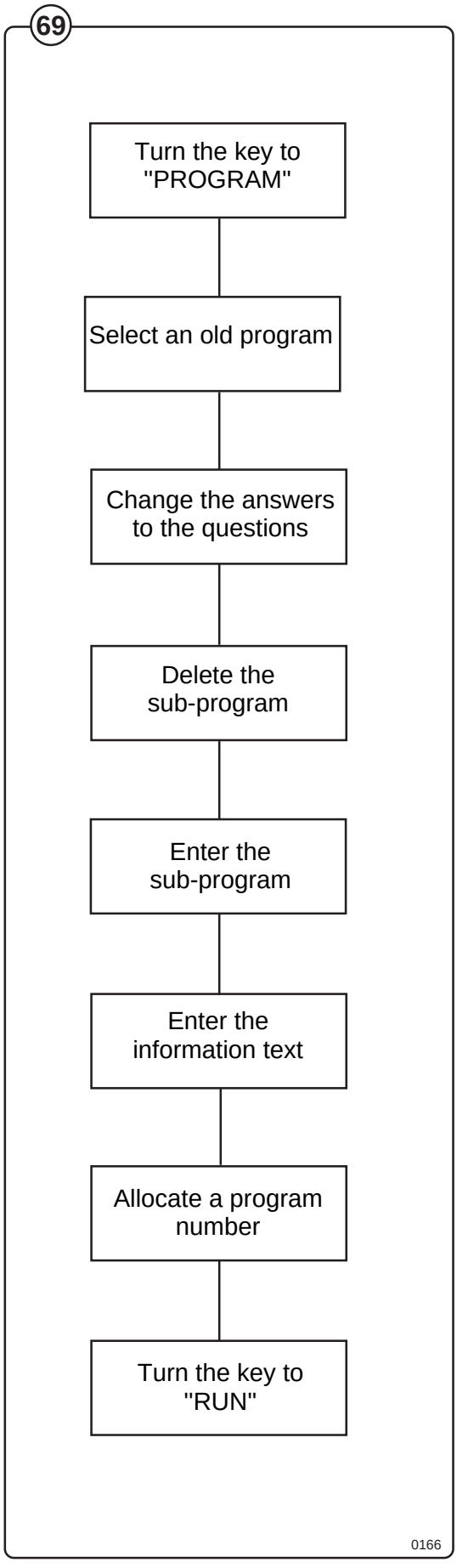
The last thing to be done is to store the program in the program memory under a vacant program number.



## Using and old program as a background

Fig. 69 In this operation, an old program is selected as a background for the new one. The answers to the questions and the written texts can be changed to create a new program. Furthermore, sub-programs can be erased and new sub-programs entered in optional positions.

When the changes are complete, the new program is entered under a vacant program number. The program which was ''borrowed'' at the start of the programming is retained unchanged under its old program number.



# Controls

## The key switch

Fig. 70 Turn the switch to the **PROGRAM** position if the wash program is to be programmed or changed.

If for any reason you wish to discontinue programming and start again, turn the switch to the **RUN** position and then back to **PROGRAM** again. Any programming that you have done so far will be deleted but other programs already stored will not be affected.

## ENTER

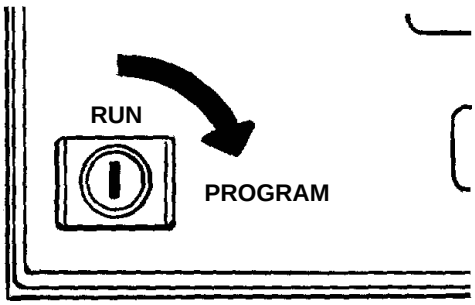
Fig. 71 An important principle when programming is that all commands (such as the choice of sub-program, answers to questions, text input) must be followed by **ENTER.**

The command can always be changed or deleted before **ENTER** is pressed.

## EDIT UP and EDIT DOWN

Fig. 72 The **EDIT UP** and **EDIT DOWN** buttons are used to go backwards or forwards in the program without its being affected, e.g. to go through the questions in a sub-program. The buttons are also used to enter program text (see under the heading ''Entering text'').

70

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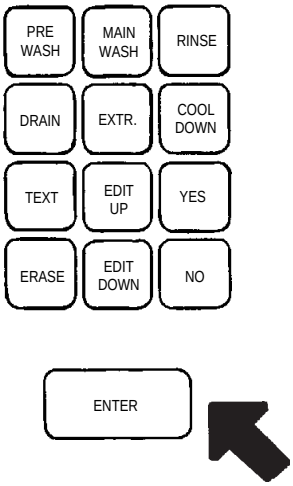


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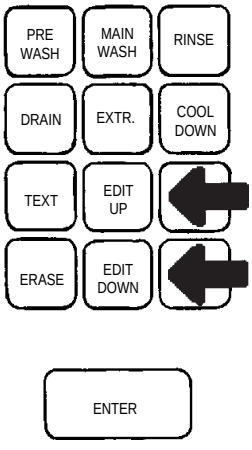



0169

## Erase

Fig. 73

This button can be used in three different ways:

- Deleting a complete program.

Press **ERASE** when the display window displays the adjacent text.

A warning text will then be displayed. Press **ENTER**, enter the program number with the number keys and press **ENTER** again.

Fig. 74

- Deleting a section of a program.

  Move forwards or backwards in the program by using **EDIT UP** or **EDIT DOWN** so that you reach the program section to be deleted. See under the heading ''Looking through the program''. Press **ERASE**.

  Answer **YES** and **ENTER** to the question ''ERASE THIS MODULE''.

Fig. 75

- Deleting characters when entering text.

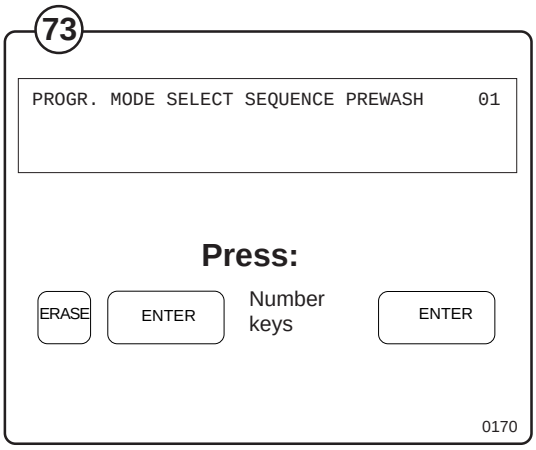
  To delete individual characters when programming text, press **ERASE**. The last character you entered will disappear. (see under the heading ''TEXT'').

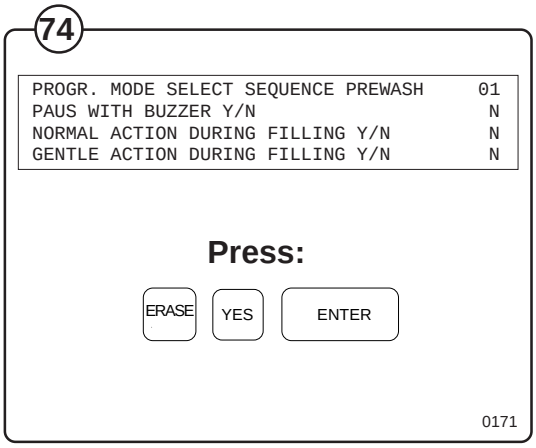
## Selecting sub-programs

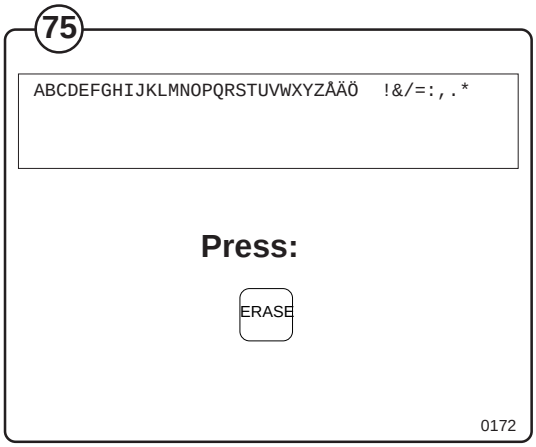
Fig. 76

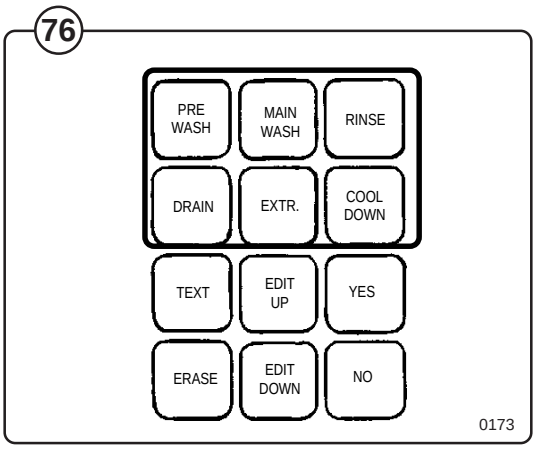
Press buttons **PRE WASH, MAIN WASH, RINSE, DRAIN, EXTR**. and **COOL DOWN** designate different sub-programs and can be used to construct complete wash programs.

When necessary, the same sub-program can be used several times in the same wash program. Each sub-program is allocated its own number (e.g. RINSE 01, RINSE 02 etc.) so that the different sections can be easily identified.



## YES, NO, number keys

Fig. (77) These keys are used to answer the different questions which are found under each sub-program. All answers must be followed by pressing **ENTER** for the answer to be registered.

## TEXT

Fig. (78) The key for **TEXT** is used for entering the explanatory text which is displayed when **PROG.INFO**. is pressed after that a program is selected.

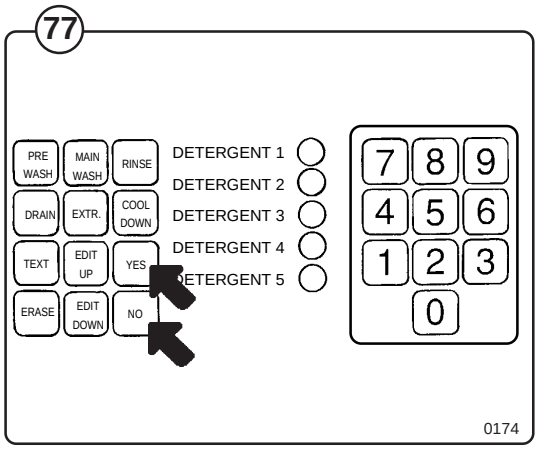
Proceed as follows:

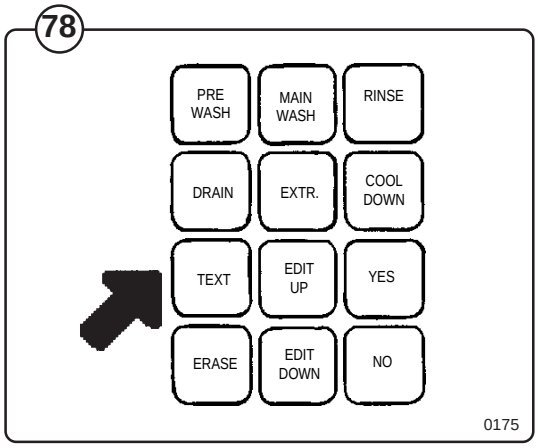
- Press **TEXT** when the display window displays ''PROG. MODE SELECT SEQUENCE''. Press **ENTER.**

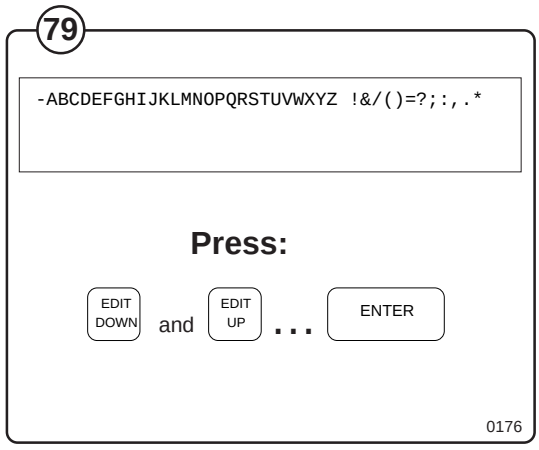
Fig. (79)
- The alphabet is then displayed together with a number of special characters in the display window. By using the **EDIT UP** and **EDIT DOWN** keys, the cursor (the flashing square) can be moved along the character line.
- The first character of the text is entered by pressing **ENTER** when the cursor is in the correct position. Move the cursor to the next character and press **ENTER** again.
- An incorrectly entered character can be deleted by entering **ERASE**.
- When the text is complete, move the cursor to the arrow marker to the far left and press **ENTER**. The display window will then revert to the position for selecting a sub-program.

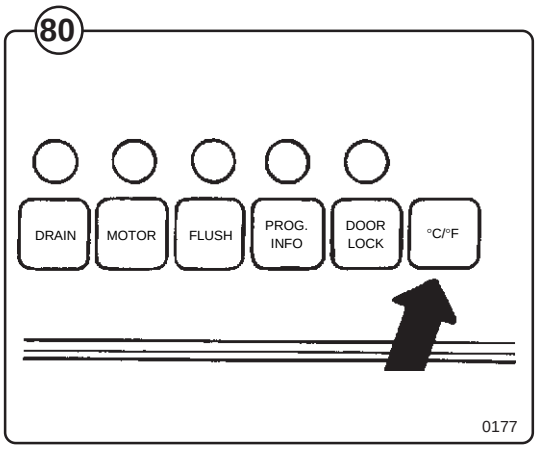
## °C/°F

Fig. (80) The temperature range required can be selected by pressing °**C/**°**F**. The button has an alteration function.



# Programming a new program

**If you make a mistake or get stuck, there is always a final resort:**

**Turn the key to the RUN position and then to PROGRAM again. Any programming you have carried out so far will be lost but other programs will not be affected.**

## Turn the key

Fig. 81 Turn the key to the **PROGRAM** position. The first character will then be displayed in the display window.

## Select ''New program''

Fig. 82 Answer **NO** to the question ''DO YOU WANT AN OLD PROG. AS BACKGROUND?''. Press **ENTER**.

## Select sub-program

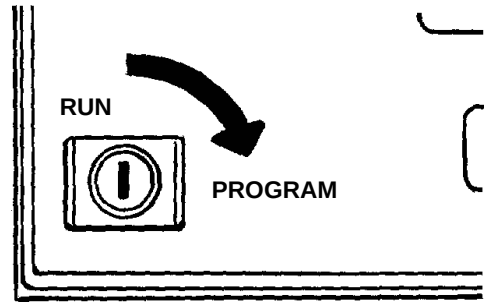
Fig. 83 Select one of the following: **PRE WASH, MAIN WASH, RINSE, DRAIN, EXTR, COOL DOWN, TEXT** or **ERASE**. Press **ENTER** immediately after the first selection is pressed.

The different sub-programs are selected with the first keys listed where a number of questions are answered.

**TEXT** is used to program the information text to be displayed when **PROG. INFO**. is pressed after that a program is selected.

If **ERASE** is pressed, an entire program can be deleted.

81

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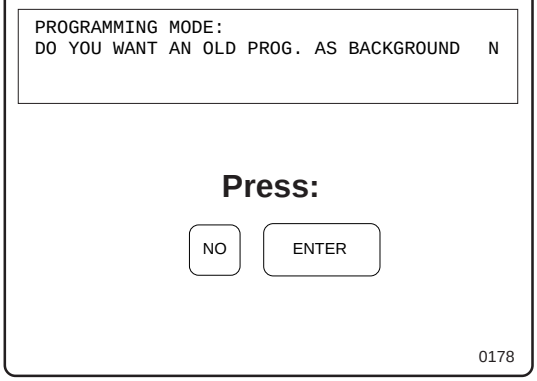
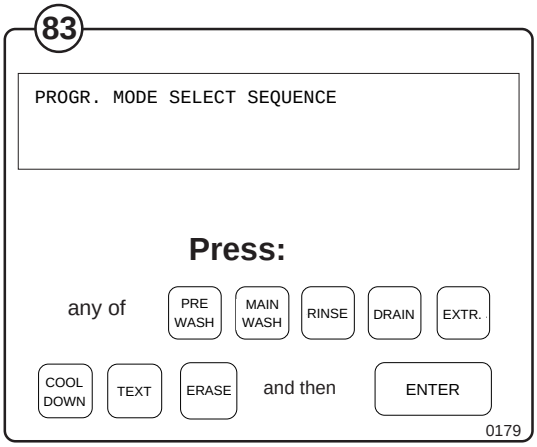



0178

83




0179

## Answering questions

The general principle for answering questions is the same for all sub-programs:

- The cursor (the flashing square) is always to the right of line three in the display window. This means that it is the question on line three that is to be answered.
- The list of questions can be moved up or down in the display window with the **EDIT UP** and **EDIT DOWN** buttons.
- Begin by answering the questions from the top. You may need to press **EDIT UP** once to answer the first question.
- Questions which are answered with either YES or NO are pre-programmed to NO. To answer YES, press **YES** and then **ENTER**. The **NO** button can be used to correct an incorrect YES answer. Each time **ENTER** is pressed, the next question will appear so that it can be answered.
- Questions which are answered with a number are pre-programmed to O. Use the number keys and press **ENTER** when the number is correct.
- When ''END OF SEQUENCE'' appears on the third line in the display window, and all questions are answered, press **EDIT DOWN**. A new sub-program can now be selected.

Fig. 84

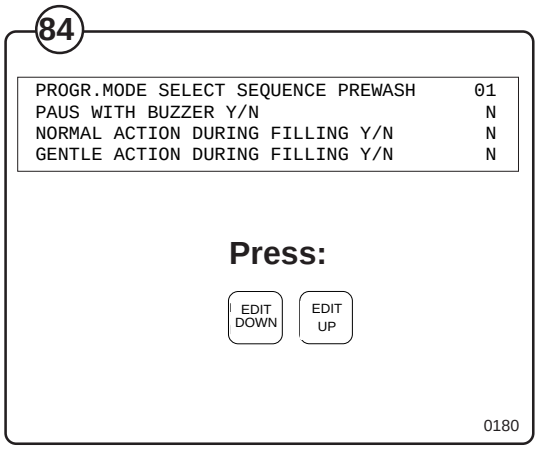



Fig. 85

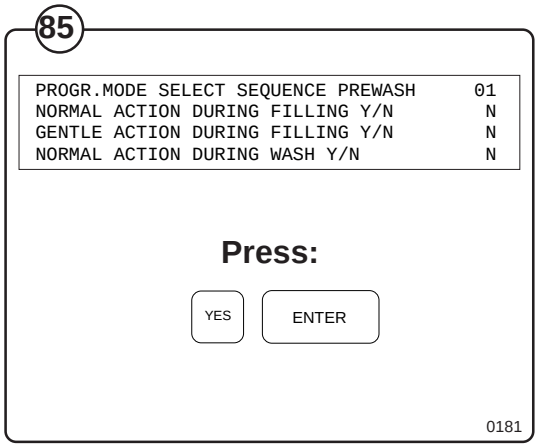



Fig. 86

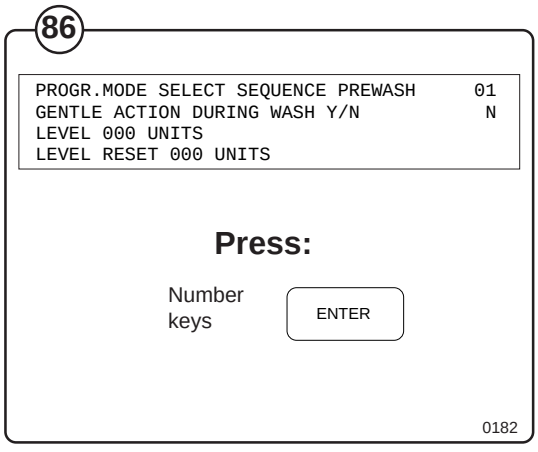
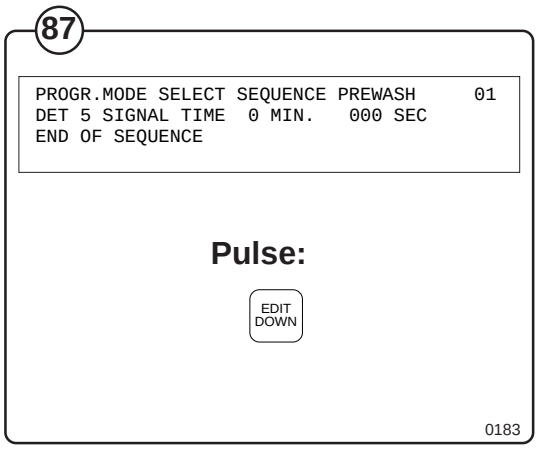



Fig. 87



The following is a summary of the different questions that can appear under the different buttons.

> **NOTE:**
>
> **The question which are described do no apply to all machines. On certain types of machines, some of the values are programmed as standard values and need therefore not be answered.**

### Pre wash, main wash, rinsing

The questions in these three sub-programs are identical.

#### Pause with signal

Fig. 88 If the question is answered with YES, the machine stops before the sub-program is started and a buzzer sounds.

#### Normal action/gentle action

Fig. 89 Select the action while filling, heating and washing. One of the alternatives under each sequence shall be answered with YES, NO to all six questions will result in a stationary drum.

#### Level

Fig. 90 The water level can be programmed according to 255 scale divisions (units). Level 255 corresponds to a pressure of 600 mm wc. This means that the values for normal and high level can vary between different sizes of machines.

Fig. 91 The table shows the recommended values for the relevant machines.

88

```
PROGR.MODE SELECT SEQUENCE  PREWASH    01
PAUS WITH BUZZER Y/N                    N
NORMAL ACTION DURING FILLING Y/N        N
```

**Press:**

YES | ENTER | or | EDIT DOWN

0184

89

```
PROGR.MODE SELECT SEQUENCE  PREWASH    01
PAUS WITH BUZZER Y/N                    N
NORMAL ACTION DURING FILLING Y/N        N
GENTLE ACTION DURING FILLING Y/N
```

**Press:**

YES | ENTER | or | EDIT DOWN

0185

90

```
PROGR.MODE SELECT SEQUENCE   PREWASH   01
GENTLE ACTION DURING WASH Y/N           N
LEVEL 000 UNITS
LEVEL RESET 000 UNITS
```

**Press:**

Number keys | ENTER | or | EDIT DOWN

0188

91

| Drum volume (litres) | Level (units) Low | High |
|---|---|---|
| 150 | 40 | 80 |
| 230 | 45 | 90 |

## Refilling

Fig. (92) LEVEL RESET is value which regulates at which level water is to be refilled if the water level sinks while a wash is in progress.

Example:

The following values are programmed:

- Level: 130 units
- Level reset: 10 units

This means that:

- Water is filled to level 130 at the beginning of the sub-program. If the water level sinks below level 120 (130-10) during the course of the program, the water level is refilled to level 130.
- Select a level between 0-255. Values greater than the level value mean that no water will be added.
- The recommend value is 20 units.

## Temperature

Fig. (93) The water temperature can be programmed either in °C or °F. Use the °C/°F button to change between scales (note that the change is not displayed until the next change in the display window is made).

Temperatures can be selected within the range of 32-212°F (0-100°C) in stages of 1°.

## Time

Fig. (94) A sub-program can be timed in stages of 10 seconds. The longest time that can be programmed is 41 min. 40 sec (2500 seconds). The time does not include the time for water filling or heating.

92

```
PROGR. MODE SELECT SEQUENCE   PREWASH  01
LEVEL 000 UNITS
LEVEL RESET 000 UNITS
TEMPERATURE  000 °C
```

**Press:**

Number keys — ENTER or EDIT DOWN

0190

93

```
PROGR.MODE SELECT SEQUENCE PREWASH     01
LEVEL RESET 000 UNITS
TEMPERATURE  000 °C
WASHTIME    00 MIN.  00 SEC.
```

**Press:**

Number keys — ENTER or EDIT DOWN

0191

94

```
PROGR.MODE SELECT SEQUENCE PREWASH     01
TEMPERATURE  000 °C
WASHTIME    00 MIN.  00 SEC.
COLD WATER Y/N                          N
```

**Press:**

Number keys — ENTER or EDIT DOWN

0192

## Water filling

Flg. 95 One or several water valves can be selected.

If you decide to use hot and cold water, both valves will be open while filling is in progress. The hot water valve will be automatically closed if the pre-set temperature is exceeded. The valve will open again if the temperature drops below the pre-set value.

If only hot water is chosen, the cold water valve automatically opens if the programmed temperature i exceeded. (Entered in new units on program memory, edition 2 beginning 91.05.10)

## Supply injector

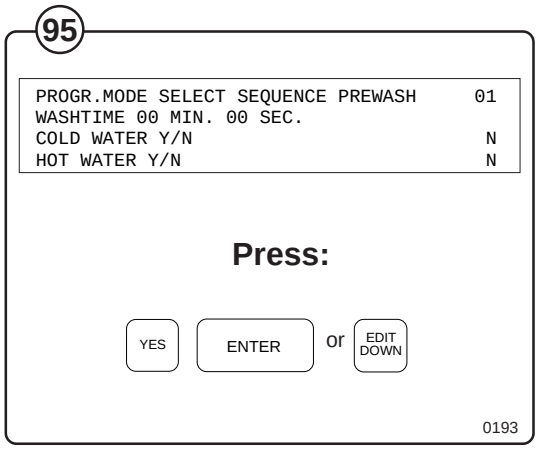
Fig. 96 The supply injector valves can be controlled in two different ways. Select one of the methods for each activated valve:

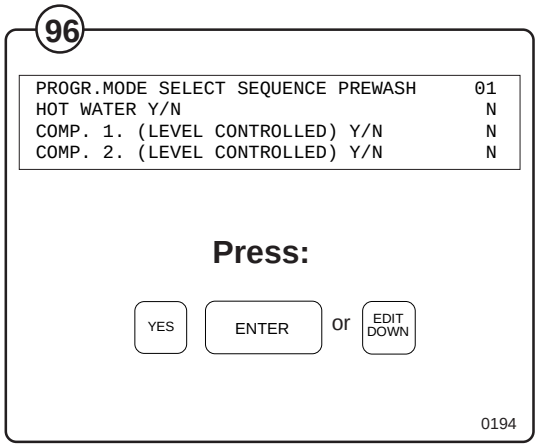
Fig. 97

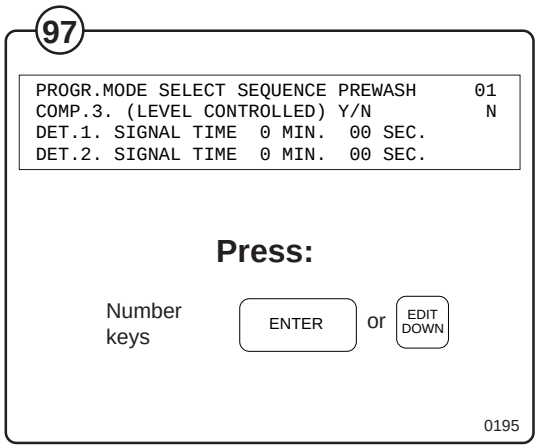
- 1. By answering YES to the first five questions, the respective supply injector valve will be open all the time water filling is in progress.
- 2. By stating the times for the last five questions, the respective supply injector valve will open for the pre-programmed time. The valves will start to open when water is filled.

## Programming complete

- When ''END OF SEQUENCE'' appears on the third line of the display window and all questions are answered, press **EDIT DOWN**.
- Answer NO to the question ''END PROG. SESSION Y/N?'' if there are more sub-programs to be answered. Answer YES if the sub-program is the last in the completed program The continue under the heading ''Looking through the program''..



## Drain

### Pause with signal

Fig. 98 If the question is answered with YES, the washing machine will stop before the sub-program starts and a buzzer will sound.

### Normal action/gentle action/distribution

Fig. 99 Select the method of working while draining. Distribution action is used before a spin cycle so that garments are equally distributed around the drum.

NO to all three questions will cause the drum to be stationary.

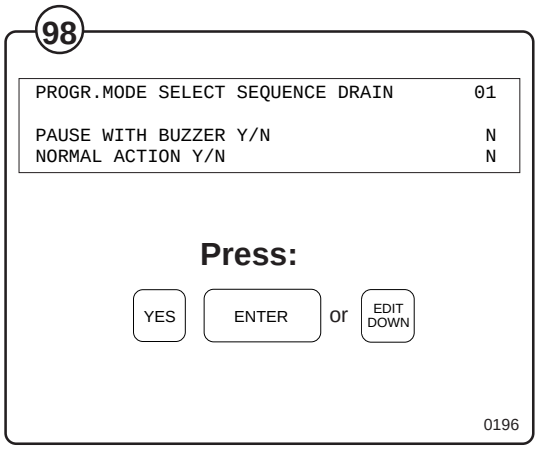
### Drain 1/Drain 2

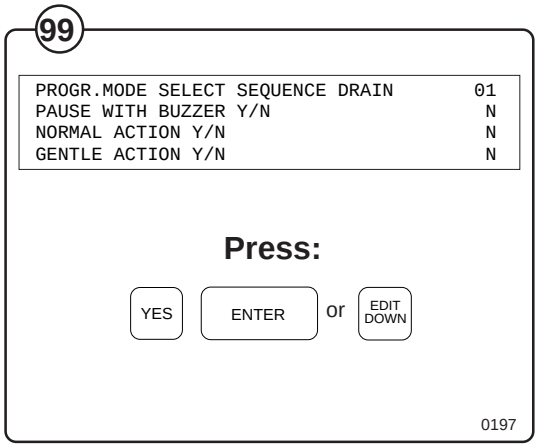
Fig. 100 These two questions need to be asked if the machine is fitted with an additional drain valve (e.g.) for recycling the rinse water). This determines the route the drain water takes.

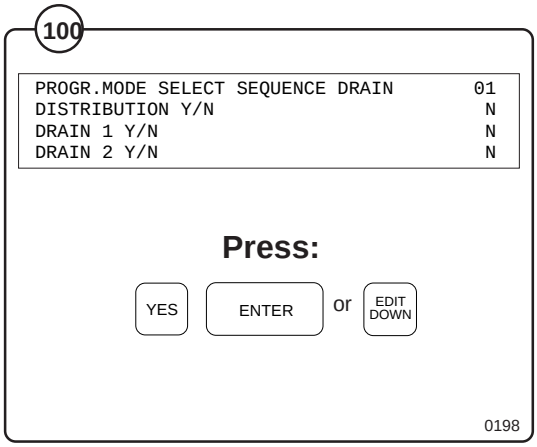
The machine's own drain valve opens automatically during the drain function.

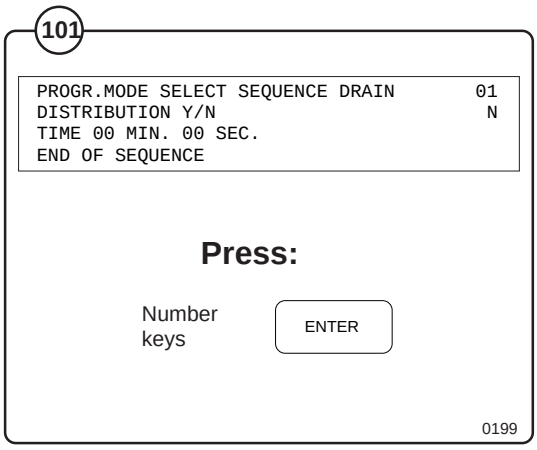
### Time

Fig. 101 The emptying time can be programmed in stages of 10 seconds. The longest time that can be programmed is 41 minutes 40 seconds (2500 seconds).



Programming complete

- When ''END OF SEQUENCE'' appears on the third line of the display window and all questions are answered, press **EDIT DOWN**.
- Answer NO to the question ''END PROG. SESSION Y/N?'' if there are more sub-programs to be answered. Answer YES if the sub-program is the last in the completed program. The continue under the heading ''Looking through the program''.

## Extract cycle

Extract cycle times

**Fig.** (102) The time can be programmed in stages of 10 seconds. The longest time that can be programmed is 41 minutes 40 seconds (2500 seconds) for high and low speed extracting.

If both extract speeds are selected, the low speed will precede the high speed extracting.

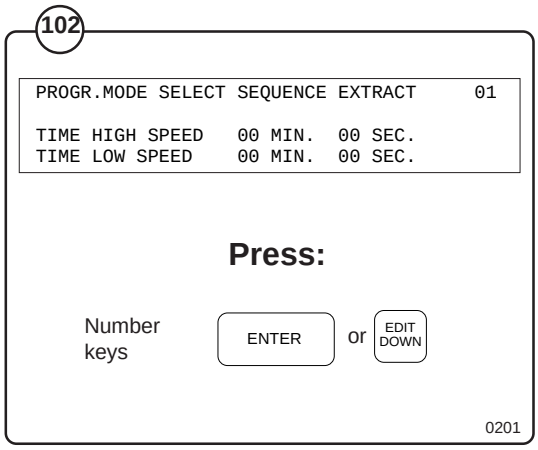
Programming complete

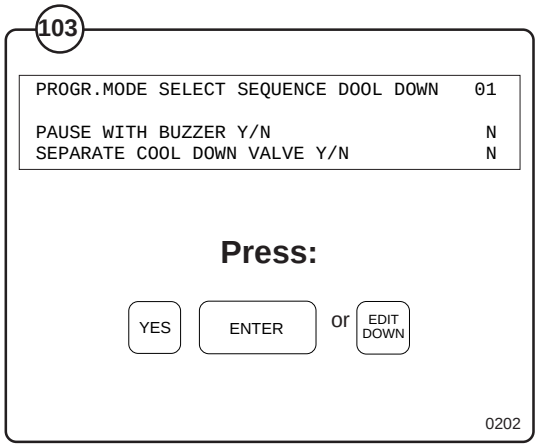
- When ''END OF SEQUENCE'' appears on the third line of the display window and all questions are answered, press **EDIT DOWN**.
- Answer NO to the question ''END PROG. SESSION Y/N?'' if there are more sub-programs to be answered. Answer YES if the sub-program is the last in the completed program. The continue under the heading ''Looking through the program''.

## Cooling

Pause with signal

**Fig.** (103) If the question is answered with YES, the machine will stop before the sub-program starts and a buzzer will sound.



## Gentle action

Fig. 104 Answer YES if the machine is to operate on gentle action during cooling. The machine will operate on normal action if the answer is NO.

## Times

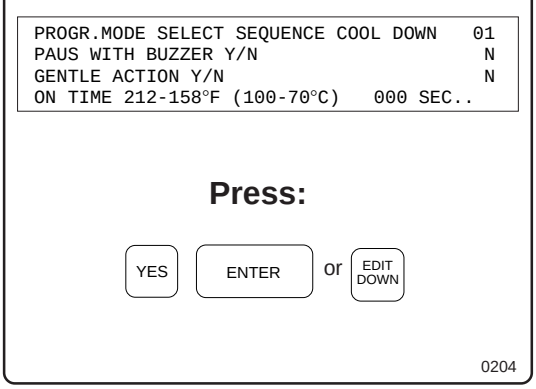
Fig. 105 Cold water is supplied in stages by the water valve opening and closing according to a particular pattern. The time for an opening or closing sequence is 30 seconds. This time is permanently programmed and cannot be changed. All that can be programmed is the ratio between open and closed valve.

Fig. 106 The time the valve i open (ON time) can be programmed separately between 1 and 15 seconds. The valve is closed during the remaining time up to 30 seconds. The ON time is programmed separately within two temperature ranges: 212-158°F (100-70°C) and 158°F (70°C) — final temperature.

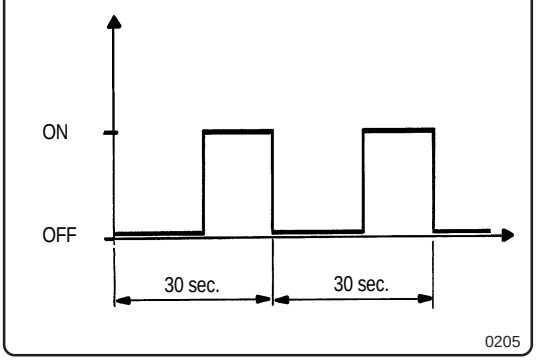
The rate of temperature reduction is monitored within the 212-158°F (100-70°C) range. If the ON time is selected so that the water temperature in the drum decreases by more than 7°F (4°C)/ minute, the valve is closed so that this value is not exceeded.

The final temperature can between 77-140°F (25-60°C) be programmed.

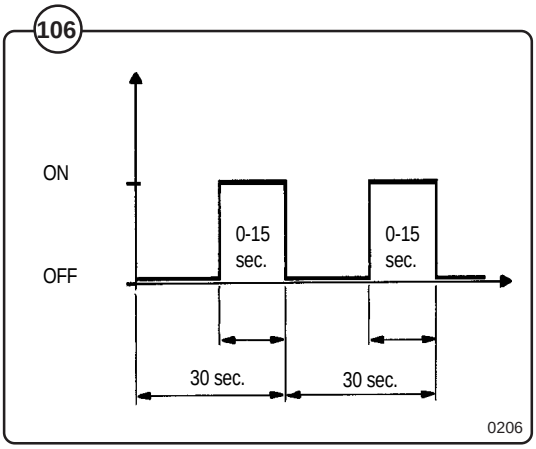
104




105




106



Example:

- ON TIME 212-158°F (100-70°C) 8 seconds.
- ON TIME 158°F (70°C) - END 13 seconds.
- END TEMP. 113°F (45°C).
- Wash temperature 194°F (90°C).

The following takes place:

- When the water in the drum reaches 194-158°F (90-70°C), the water valve is ON 8 seconds, OFF 22 seconds, ON 8 seconds, OFF 22 seconds etc. providing the temperature in the drum does not decrease by more than 7°F (4°C)/minute.

Fig. 107

- When the water in the drum is 158-113°F (70-45°C), the water valve i ON 13 seconds, OFF 17 seconds, ON 13 seconds, OFF 17 seconds etc.

Fig. 108

- When the temperature has reached 113°F (45°C), cooling is discontinued and the next sub-program commences.

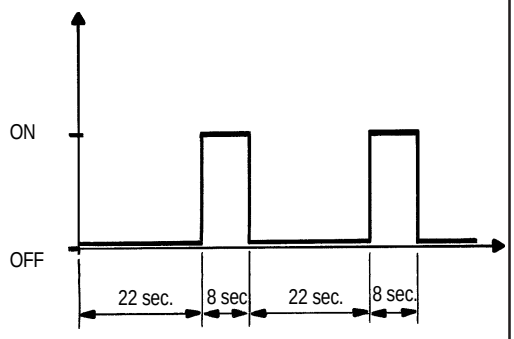
## Fast cool down

Fig. 109 Fast cool down takes place if cool down is selected and END TEMP is set to 0. The water level is raised to the level set by the factory as the high level without the cold water valve being shut off.

## Programming complete

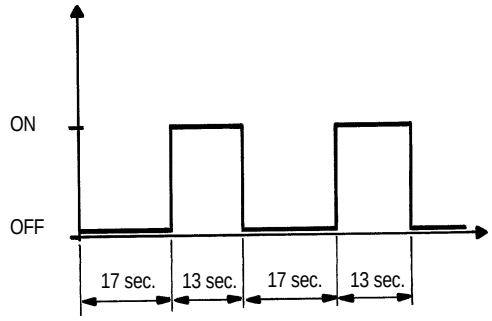
- When ''END OF SEQUENCE'' appears on the third line of the display window and all questions are answered, press **EDIT DOWN**.
- Answer NO to the question ''END PROG: SESSION Y/N? if there are more sub-programs to be answered. Answer YES if the sub-program is the last in the completed program. The continue under the heading ''Looking through the program''.

107




0207

108




0208

109

```
PROGR.MODE SELECT SEQUENCE COOL DOWN   01
ON TIME 212-158 °F (100-70 °C)     000 SEC.
ON TIME 158 °F-END (70 °C)         000 SEC.
END-TEMP    000 °F
```

**Pulse:**

EDIT DOWN EDIT DOWN ▪ ▪ ▪

0209

## Text

Each program can be provided with two types of informative text:

Fig. 110

- 1. A program name which is always displayed when the program is selected when washing. This text is programmed when the program number i selected. See under the heading ''Program names'' later on in the manual.

Fig. 111

- 2. Informative text which can comprise 120 characters (3 lines in the display window). This text is displayed when PROG.INFO is pressed after the program is selected.

  This text can be programmed by pressing TEXT when the display window displays ''PROG. MODE SELECT SEQUENCE''.

The procedure for this is described under the heading ''TEXT'' earlier in this manual.

## End questions

Fig. 112

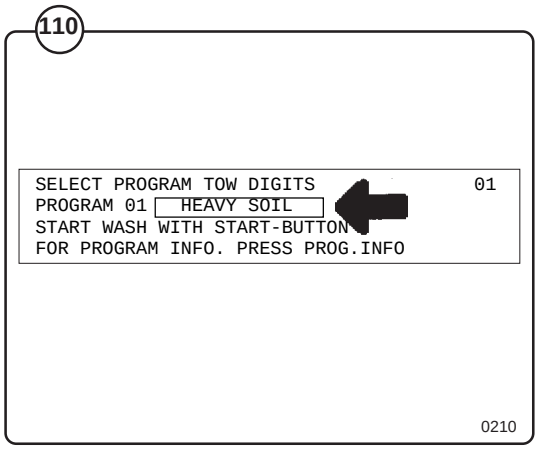
- When a sub-program has been programmed, ''END PROG. SESSION Y/N?'' appears. Answer NO when more sub-programs are wanted.

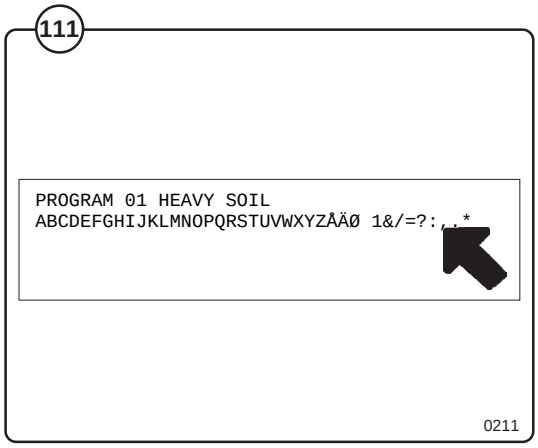
  Answer YES when the programming of sub-programs is to be finished. The end questions will then appear on the display.

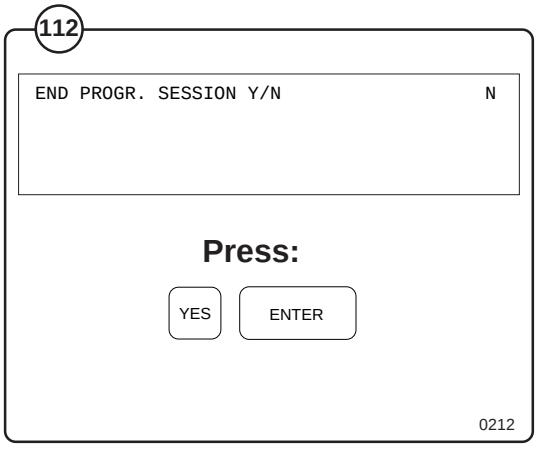
### Signal at the end of the program

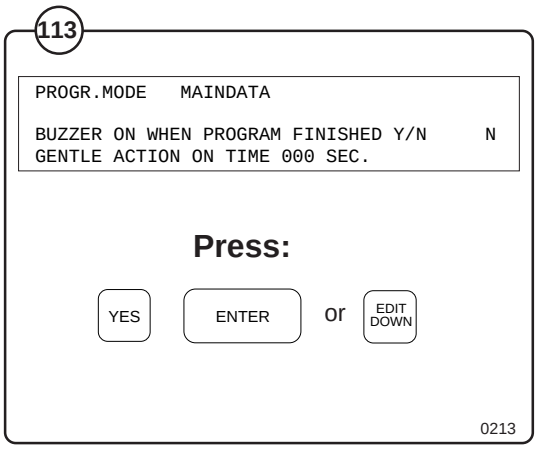
Fig. 113

If the question is answered with YES, the washing machine stops after the wash program is complete and a buzzer sounds.



Times for normal action and gentle action

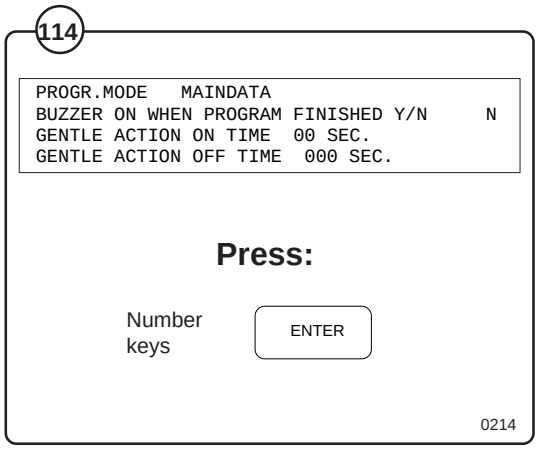
Fig. 114 The times for rotating and stationary drum during normal and gentle action can be programmed. All times can be selected within the range of 0-30 seconds with 1 second intervals.

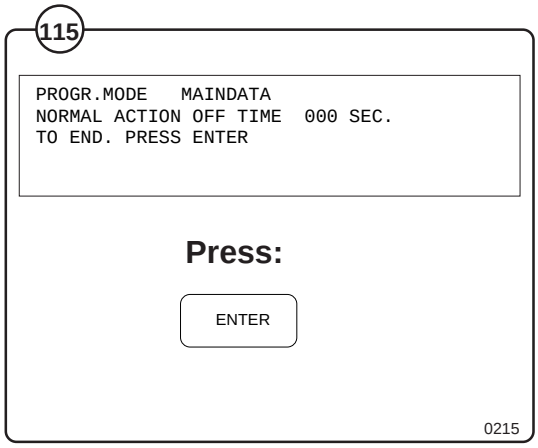
Fig. 115 Press **ENTER** when ''TO END. PRESS ENTER'' is displayed in the display window.

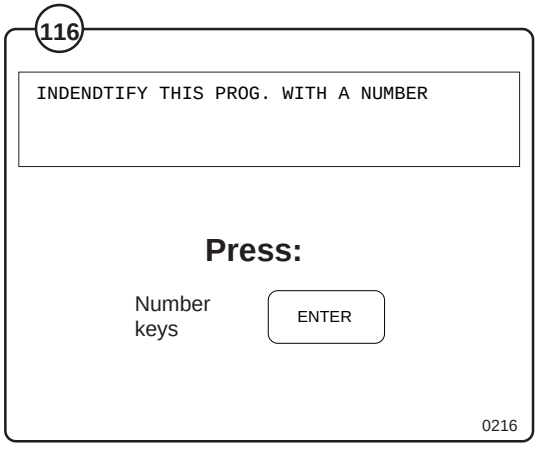
## Entering the program number

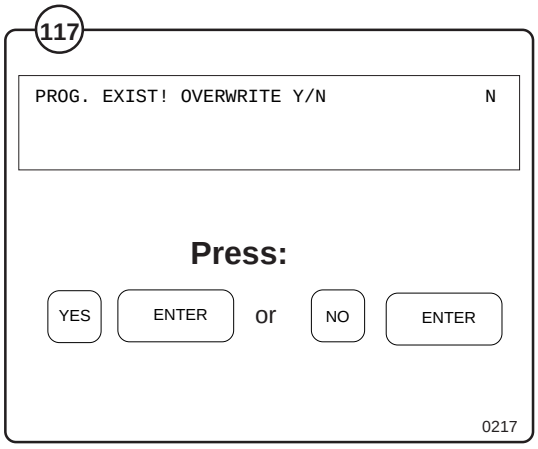
Fig. 116 Enter a two-digit number and press **ENTER**. Note that the numbers 01-09 are reserved for factory programs.

Fig. 117 If the program number selected is already in use, there is the option of either deleting the old program (not applicable to factory programs) or selecting a new program number.



## Program names

Fig. 118 You can now give the program a name which will be displayed when the program is selected during washing. The text can be up to 29 characters long.

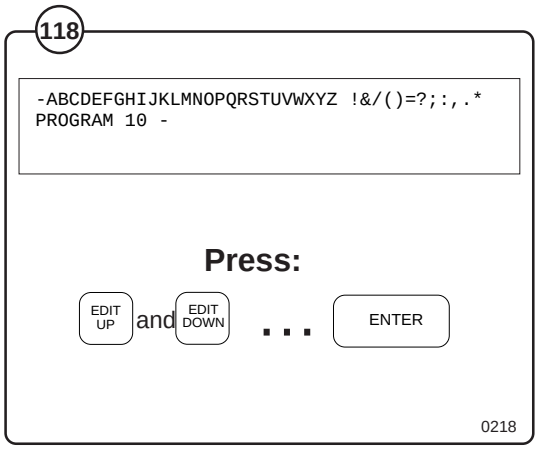
The way in which text is entered described under the heading ''TEXT'' earlier in the manual.

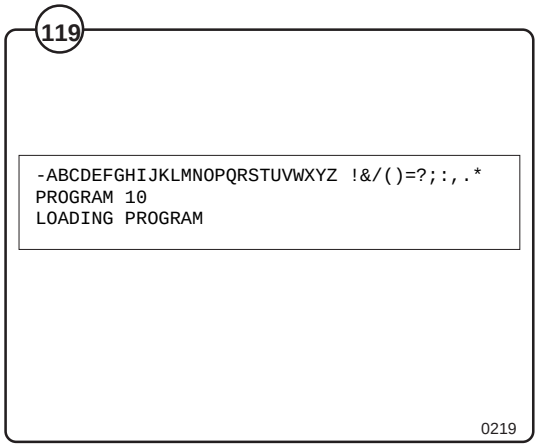
## Saving programs

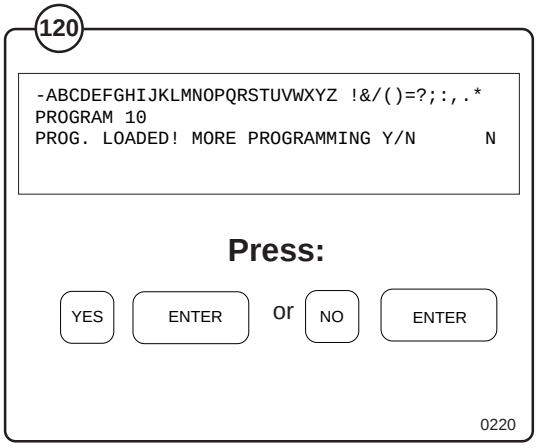
Fig. 119 When the program has been given a name, the program is saved in the program memory.

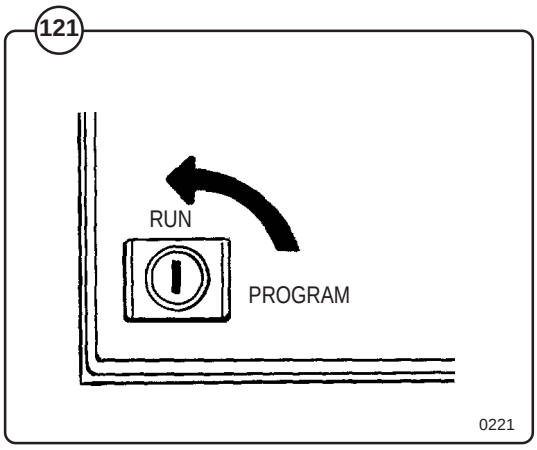
Fig. 120 You are then asked if further programs are to be programmed. Press **YES** and **ENTER** if this is the case.

Fig. 121 If you do not wish to program more programs, turn the key switch to **RUN**.



# Starting from a previously saved program

**If you make a mistake or get stuck, there is always a final resort:**

**Turn the key to the RUN position and then to PROGRAM again. Any programming you may have carried out so far will be lost but other programs will not be affected.**

## Turn the key

Fig. 122 Turn the key to the **PROGRAM** position. The first question will now be displayed in the display window.

## Select an old program

Fig. 123 Answer YES to the question ''DO YOU WANT AN OLD PROGR. AS BACKGROUND?''. Press **ENTER**.

Enter the number of the old program to be used. (NOTE TWO digits) and press **ENTER**.

## Looking through the program

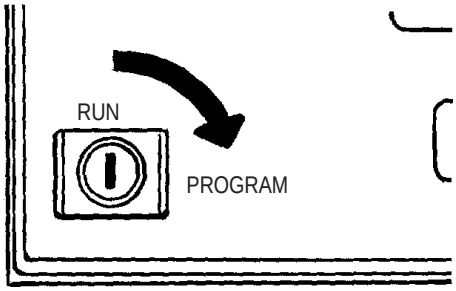
Fig. 124 To rapidly reach the module in the wash program that is to be altered you can rapid advance through the program module-by-module by keeping the **EDIT DOWN** button continuously depressed.

To scan backwards through the program use the button **EDIT UP** instead. On the right of the window there is an indicator which shows where you are in the wash program.

Release the button when you get to the module to be altered.

Fig. 125 Depress **ENTER** once.

122




0167

123

```
PROGRAMMING MODE
DO YOU WANT AN OLD PROG. AS BACKGROUND? N
```

**Press:**

YES | ENTER | Number keys | ENTER

0222

124

```
PROGR.MODE SELECT SEQUENCE PREWASH     01
EDIT DOWN IN PROGRAM
```

**Press:**

EDIT DOWN

0223

125

```
PROGR.MODE SELECT SEQUENCE MAINWASH    01
EDIT DOWN IN PROGRAM
```

**Press:**

ENTER

0224

Fig. 126 The cursor will appear on the first line of this sub-program.

Fig. 127 Use **EDIT UP** and **EDIT DOWN** to move within the sub-program to reach the line(s) to be altered.

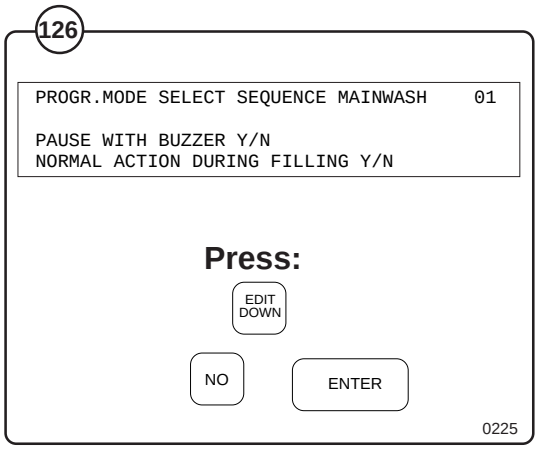
## NOTE

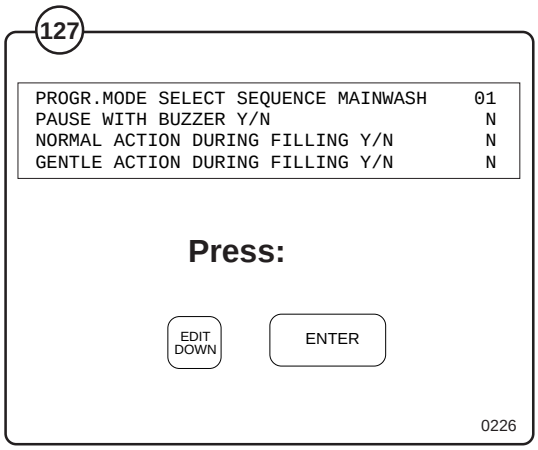
**ENTER is to be used only as an acknowledgement when sub-questions are to be altered. Use buttons EDIT UP and EDIT DOWN to move around within the program.**

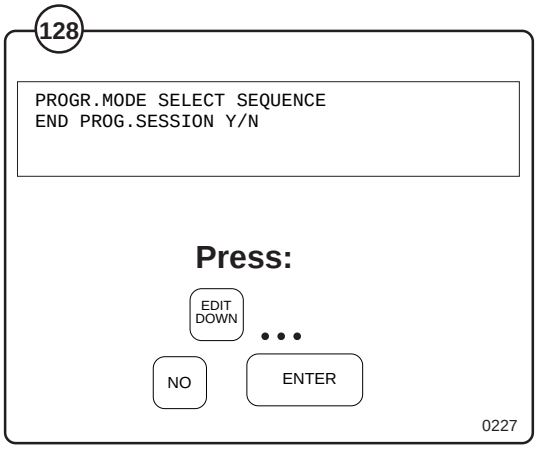
Fig. 128 When changes have been made to the module and you reach its last line, the ''END PROGR. SESSION Y/N'' query will appear. Enter **NO** if you wish to continue making changes to any other module and press **ENTER**.

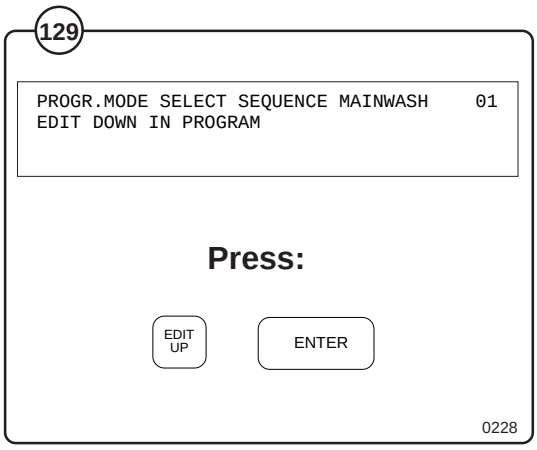
Fig. 129 To move to another module use **EDIT U**P or **EDIT DOWN** buttons and continue as described above.

(Depress and keep down).



## NOTE

**Use only EDIT UP and EDIT DOWN for looking through the program. ENTER shall only be used for making changes in the program.**

### Making changes to the program

Flg. 130 Use **EDIT UP** and **EDIT DOWN** so that the question to be changed is on the third line in the display window. The cursor (the flashing square) is on the far left of line three.

Comments on the different questions are found in the section ''Programming a new program'' earlier in the manual.

Fig. 131 Enter the new answer with **YES**, **NO** or the number keys. Then press **ENTER**.

### Deleting sub-programs

It is possible to delete complete sub-programs. Go to the sub-program to be deleted (see the section ''Looking through the program''). Press **ERASE**.

Fig. 132 Answer **YES** and **ENTER** to the question ''ERASE THIS MODULE Y/N?'' when you want the whole sub-program erased.

### Adding sub-programs

You can also add new sub-programs anywhere in the program.

Go to the position between two sub-programs (see the section ''Looking through the program'').

Flg. 133 Press one of the following keys: **PRE WASH, MAIN WASH, RINSE, DRAIN, EXTR**. or **COOL DOWN**. Then press **ENTER**. The new module is now inserted between the other two modules and the questions can be answered in the normal manner.

130

```
PROGR. MODE SELECT SEQUENCE PREWASH    01
PAUS WITH BUZZER Y/N                    Y
NORMAL ACTION DURING FILLING Y/N        Y
GENTLE ACTION DURING FILLING Y/N        N
```

**Press:**

EDIT DOWN | EDIT UP | ...

0229

131

```
PROGR.MODE SELECT SEQUENCE PREWASH     01
NORMAL ACTION DURING FILLING Y/N        N
GENTLE ACTION DURING FILLING Y/N        N
NORMAL ACTION DURING FILLING Y/N        Y
```

**Press:**

Number keys or YES or NO

and ENTER

0230

132

```
PROGR.MODE SELECT SEQUENCE DRAIN       01
PAUS WITH BUZZER Y/N                    N
NORMAL ACTION Y/N                       Y
ERASE THIS MODULE Y/N                   N
```

**Press:**

ERASE | YES | ENTER

0231

133

```
PROGR.MODE SELECT SEQUENCE
```

**Press:**

any of PRE WASH | MAIN WASH | RINSE | DRAIN | EXTR. | COOL DOWN

followed by ENTER

0232

## Altering text

The text that is displayed when a program is selected and **PROG.INFO** is pressed can be altered.

Fig. 134 Go to the position between two sub-programs (see the section ''Looking through the program''). Press **TEXT** and **ENTER**. Any text that might have been programmed in the old program is displayed.

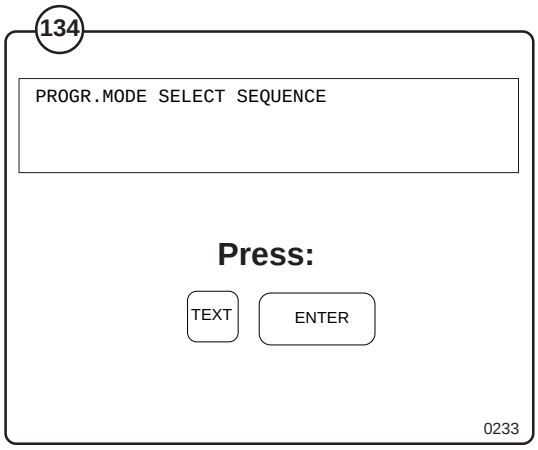
Fig. 135 The old text can be deleted with **ERASE**. Ifs the old text is to be partially altered, the text is deleted up to where the change is to be made and then rewritten.

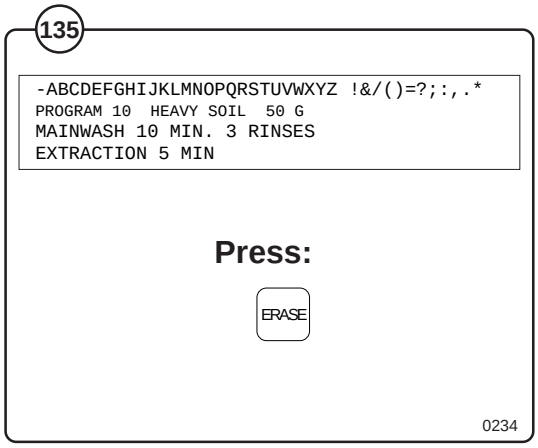
Refer to heading ''TEXT'' earlier in the manual when entering text.

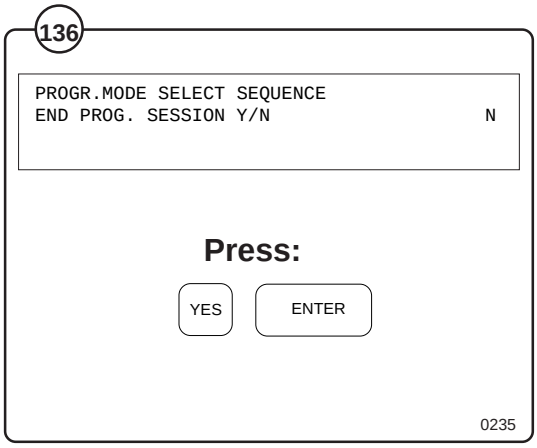
## Completing the programming

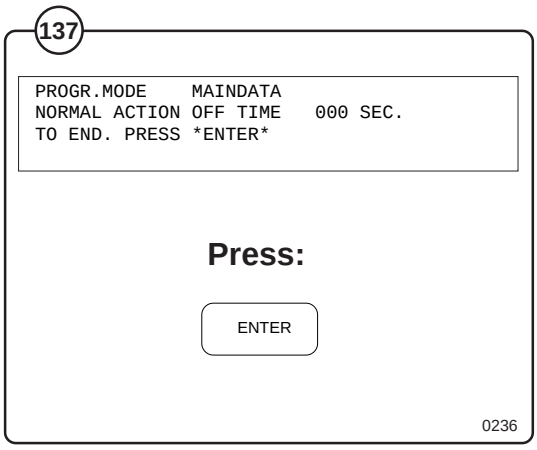
Fig. 136 Come out of the program you are in at the moment (see ''Looking through the program''). Answer YES to the question ''END PROGRAM. SESSION Y/N?''

Fig. 137 The questions displayed now apply to the entire program. Check and answer the questions in the same way as before. Press **ENTER** when ''TO END, PRESS ENTER'' is displayed in the display window. The last stages in the programming are identical to those under the headings ''Entering the program number'', ''Program names'' and ''Saving programs'' earlier in the manual.



# Service information

Fig. 138

The machine's electrical power connection cable must be provided with a safety ground to avoid breakdowns in the machine's electronic program controls. If interference problems do occur, check first that the machine is properly grounded.

The machine's operation in terms of safety and function is continuously monitored by the program unit. To facilitate troubleshooting, the display window indicates in clear text what may have caused the fault or why a particular function cannot be operated. The following table shows the different texts and what action to take.

138

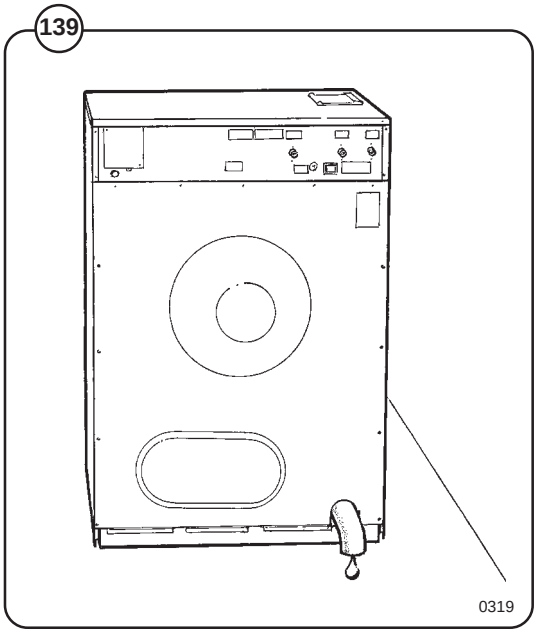
| Text in the display window | Fault/Action |
|---|---|
| NO WATER.CHECK INLET! | Check that the water taps are open and that water reaches the machine. |
| WATER LEFT | Incorrect programming (the water cannot be drained within the programmed time). Drain blocked. |
| OPEN CIRCUIT IN TEMP-SENSOR | Contact service personnel. |
| THE DOOR IS OPEN | Check that the door is locked. If it is, switch off the power supply. Lock the door again. Switch on the power supply. If the fault persists contact the service personnel. |
| HIGH TEMPERATURE | Switch off the power supply. Contact the service personnel. |
| NO HEAT | Check the machine's fuses. If the fault persists contact the service personnel. |
| LOW OIL-LEVEL (only certain machines) | Replenish the oil in the container for the lubricating system for the shaft bearing. |
| PHASE-OR DOORLOCK-ERROR | When installing: Disconnect the power supply. Change two phases in the machine's connection terminal block. When operating the machine: Check the machine fuses. If these are serviceable contact the service personnel and ask them to check the door lock. |
| ERROR IN VOLTAGE (only certain machines) | The voltage supply to the machine is too low or too high. |
| SWITCH FOR UNBALANCE DETECTION IS ON | Check that the machine's unbalance switch is serviceable and correctly installed. |
| WATER IN MACHINE | Water in the machine when starting. Check that the drain is not blocked. |

# Maintenance

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

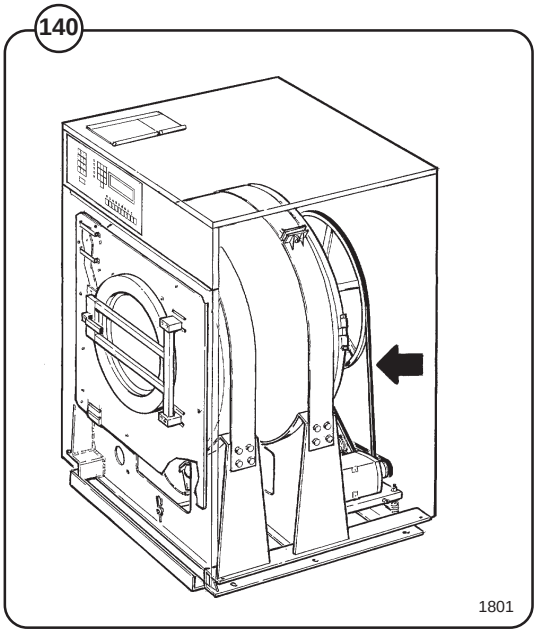
However, the following measures should be taken at regular intervals and in proportion to the hours of service.

**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.
- Check that the drain valve does not leak and that it opens properly. Fig. 139
- 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

- Remove the cover plates of the machine and check that the V-belt of the wash motor is undamaged and correctly tensioned. Fig. 140
- 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.

## If machine does not start

Fig. 141

A Check circuit breaker in the power feed line to the machine.

B Check door safety switches.

C Check glass cartridge fuse.

D Check electrical auxiliary contact on extract relay.

E Check for fault indication on display (see under the heading "Service information").'

## If water does not drain

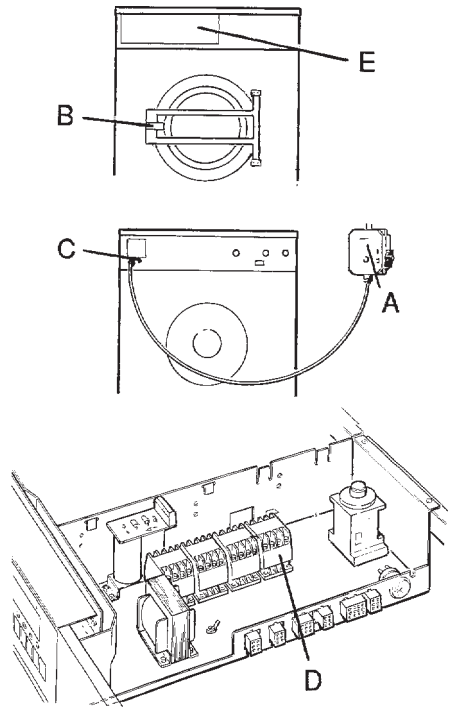
Fig. 142

A Check for fault indication on display (see under the heading "Service information").

B Check drain valve and solenoid for proper operation.

C Disconnect drain hose connected to drain line. If full flow of water comes out, the problem is in the main waste line. If water flow is slow, the problem is accumulation of foreign materials between drain valve and shell outlet of machine. Clean valve body of any foreign objects found.

141

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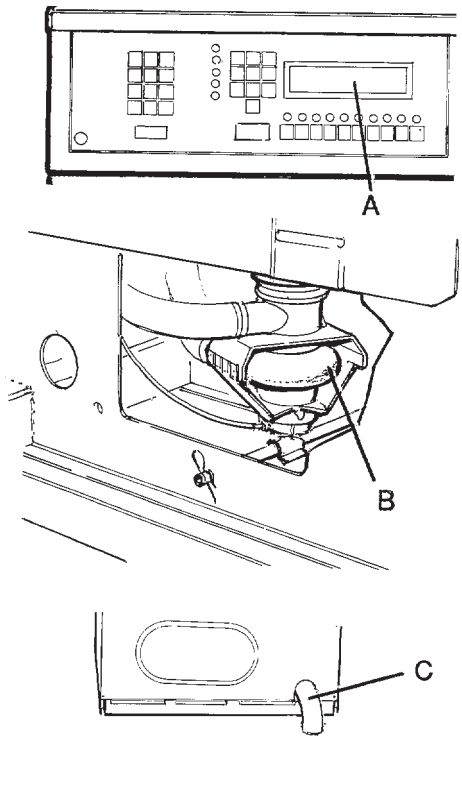



1808

## If machine does not extract

Fig. 143

A Check for fault indication on display (see under the heading "Service Information").

B Check extract relay and relay coil for proper operation.

## If motor does not operate at wash speed.

Fig. 144

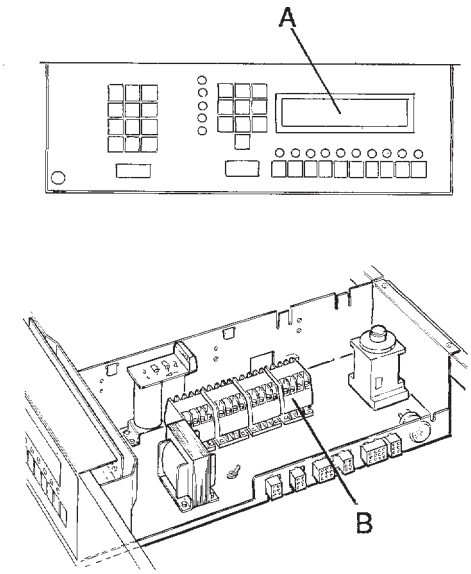
A Check for fault indication on display (see under the heading "Service Information").

B Check wash relays.

C Check motors and V-belts.

D Review procedures outlined under section "If machine does not start" above.

143

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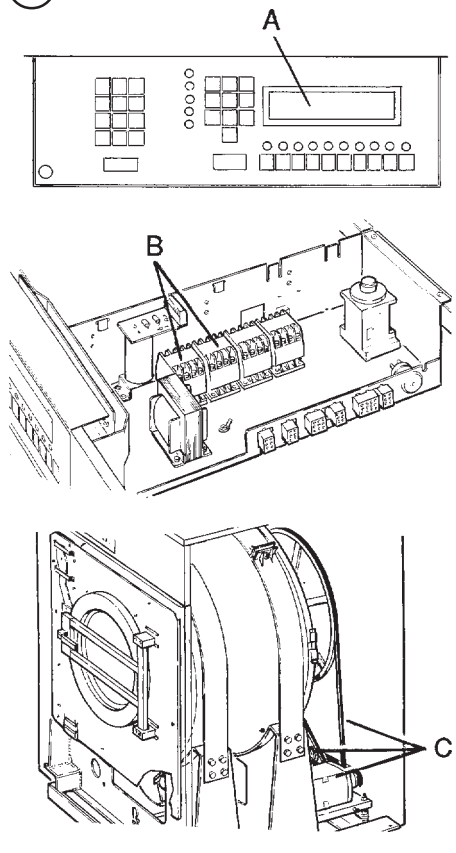



1811

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

Fig. 145 Replace V-belts.

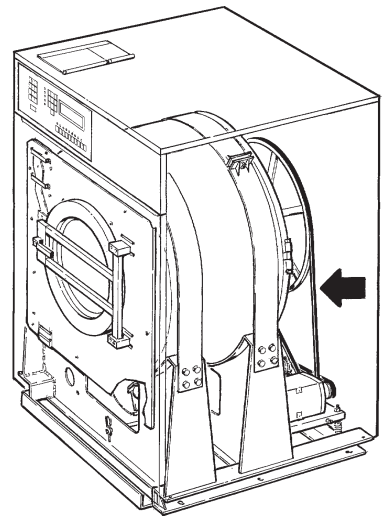
**If a metallic noise can be heard at rear of machine:**

Fig. 146 Tighten pulley on motor shaft.

**If the door is leaking:**

Fig. 147 Check door gasket. If gasket is in good condition check the tension, between door gasket and door frame and adjust.

145



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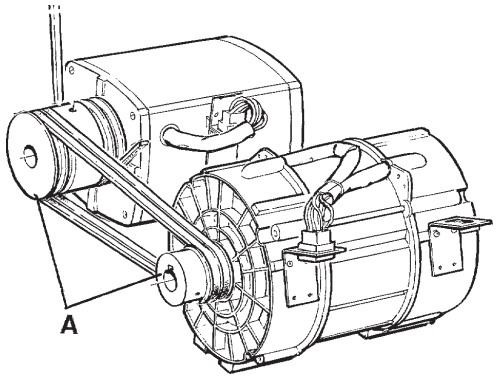


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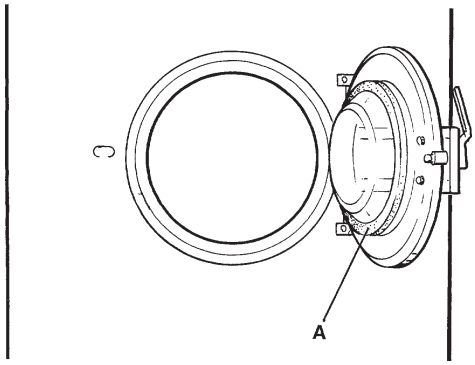


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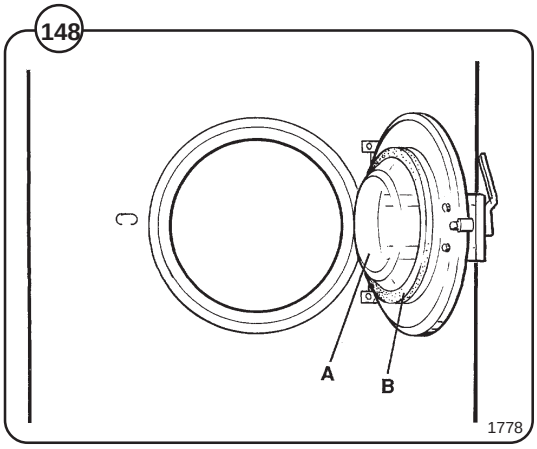
### If there is leaking around the glass.

Fig. 148

A Re-cement glass in door gasket, if worn.

B Replace door gasket if worn.



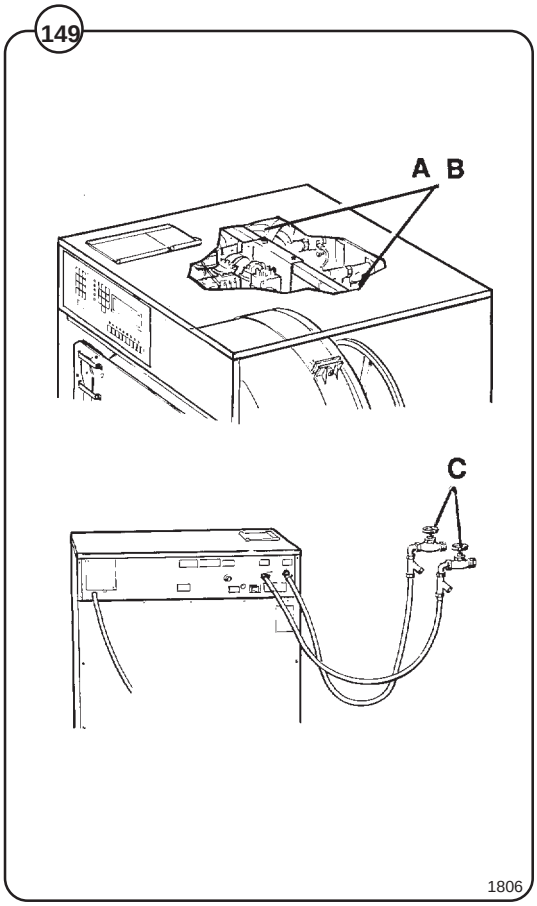

### If water does not enter the machine.

Fig. 149

A Check the value coils on inlet valves.

B Check vires leading to electric coils.

C Be sure manual shut-off valves are in open position.



### If water continues to fill without stopping.

Fig. 150

A Check for incorrect programming.

B Check hose attached to level control unit on the printed circuit board.

C 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.

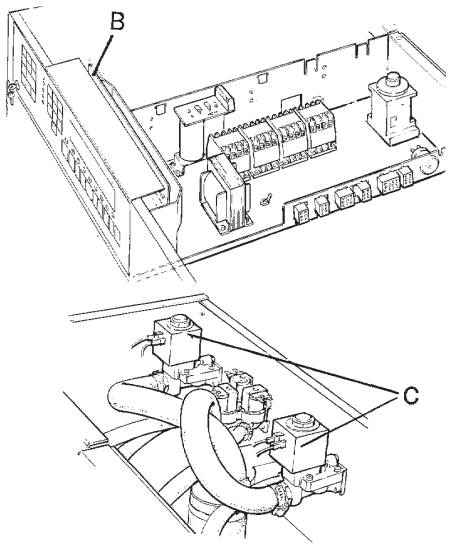
### If water continues to flow without filling machine.

Fig. 151

A Check for fault indication on display (see under the heading "Service information").

B Check seating of drain valve.

150

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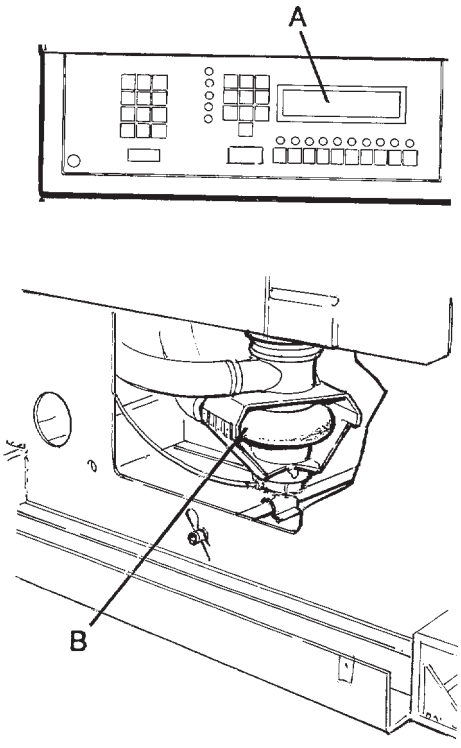



1813

### If machine vibrates excessively:

Fig. 152

A Tighten mounting bolts.

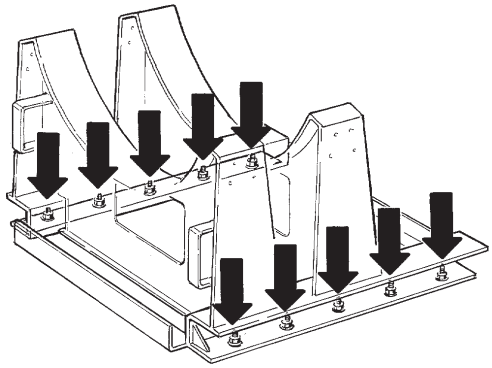
### If safety fuse blows at the beginning of the cycle:

Fig. 153

A Replace fuse.

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

152



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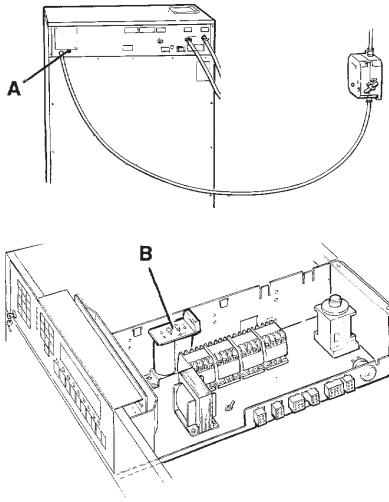


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