OPERATING & MAINTENANCE MANUAL

EX-12 HI-TEK

EX-22 HI-TEK

From machine No. 91/6411- EX 12, 91/5875- EX 22

471 1562-62/01
95.38

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

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

471 76 62 02

LOCATED ON THE DOOR:

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

WARNING !

DO NOT ATTEMPT TO OPEN DOOR
UNTIL PROGRAM HAS FINISHED AND
DRUM HAS STOPPED ROTATING.

471 7651-17

Contents

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

Safety instructions

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

Introduction

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

The microcomputer controlled EX-HI-TEK model allows for complete programming of water temperatures, water levels, wash and extraction periods and supply injections.

The machines are free-swinging, i.e., the drum is moveable and spring suspended in relation to the frame. This minimises vibrations transferred to the frame thus simplifying installation, as no concrete base is required.

The high speed spin gives a G factor of approximately 300, providing very efficient water removal during the spin.

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 Wascomat 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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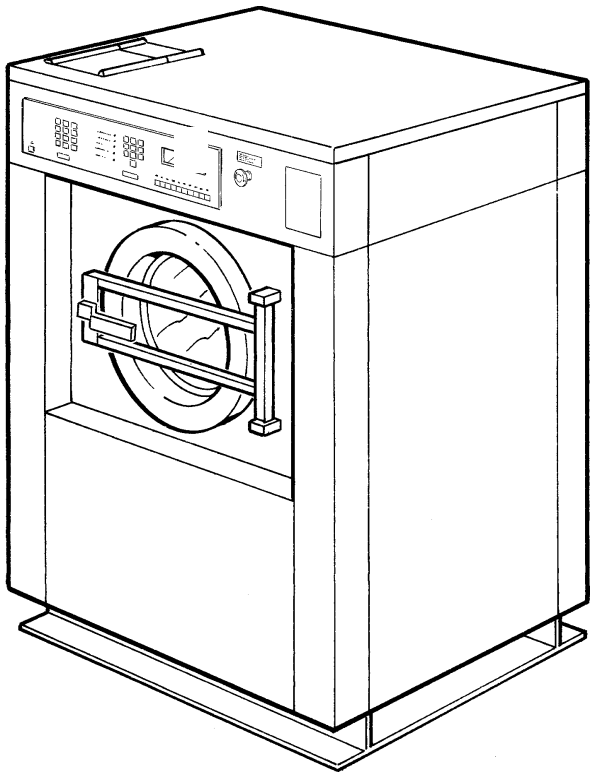

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Technical data

EX-12 HI-TEK

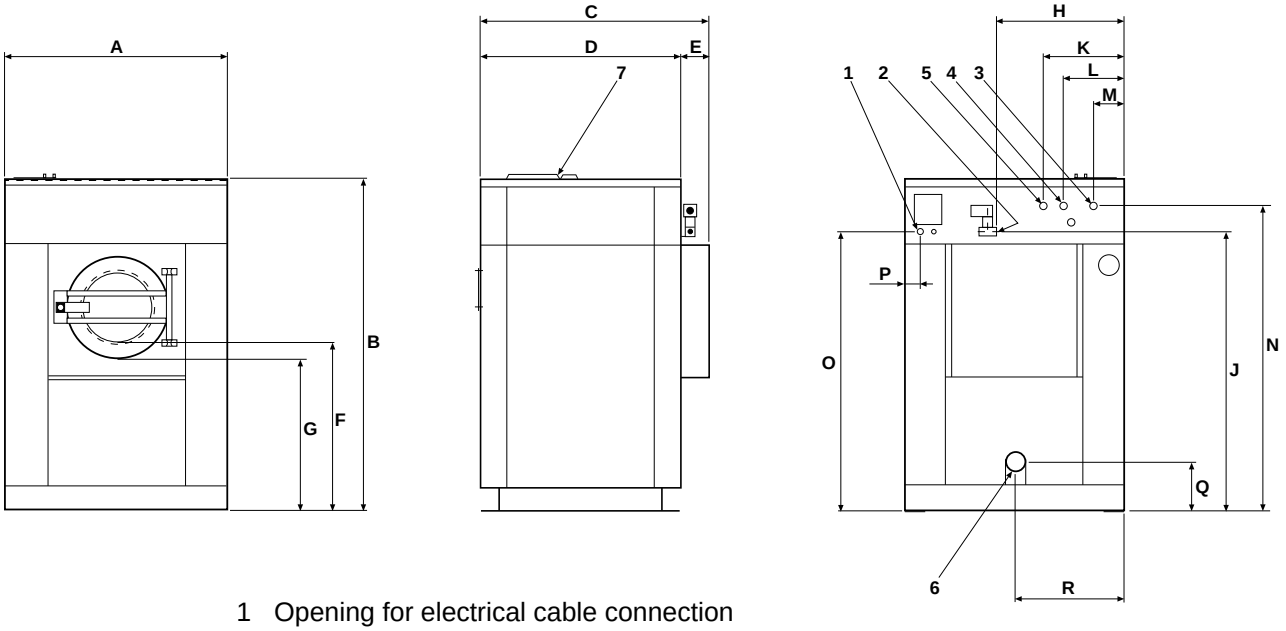
Dry load capacity	up to	13,5 kg	30 lbs
Overall dimensions	Width	870 mm	34 1/4''
	Depth	900 mm	35 15/16''
	Height	1302 mm	51 1/4''
	Net weight	290 kg	639 lbs
	Dyn.weight		120 lbs./sqft
Crated dimensions	Volume	1.25 m^3	44 cu.ft
	Weight	315 kg	695 lbs
Inner drum	Diameter	620 mm	24 7/16''
	Depth	412 mm	16 5/16''
	Volume	120 litre	4.4 cu.ft
Speed of rotation	Wash		48 r.p.m.
	Distribution		75 r.p.m
	Low extract		475 r.p.m.
	High extract		950 r.p.m.
G-factor	During wash		0.8
	During high extract		310
Motor speed	During wash		360 r.p.m.
	During high extract		3200 r.p.m.
Voltage requirements	Choice: 208-240 V 3-Phase 60 Hz 440 V 3-Phase 60 Hz		
Rated power	Motor, wash		250 W 0.35 HP
	Motor, extraction		1800 W 2.5 HP
Overcurrent protection	Three.-phase		15 A
Water connections			
Water pressure, max	10 kp/cm^2		142 psi
Recommended water pressure	2-6 kp/cm^2		25-85 psi
Hose connection, water	20 mm		3/4''
Hose connection, drain	75 mm		3''

EX 22 HI-TEK

Dry load capacity	up to	22.5 kg	50 lbs
Overall dimensions	Width	1000 mm	39 3/8''
	Depth	1102 mm	43 3/8''
	Height	1412 mm	55 9/16''
	Net weight	553 kg	1218 lbs
	Dyn.weight		157 lbs./sqft
Crated Dimensions	Volume	2.05 m^3	72.3 cu.ft
	Weight	588 kg	1295 lbs
Inner drum	Diameter	750 mm	29 1/2''
	Depth	500 mm	19 11/16''
	Volume	220 litre	7.8 cu.ft
Speed of rotation	Wash		45 r.p.m.
	Distribution		67 r.p.m.
	Low Extract		425 r.p.m.
	High Extract		850 r.p.m.
G-factor	During wash		0.8
	During High Extract		300
Motor speed	During wash		540 r.p.m.
	During High Extract		3200 r.p.m.
Voltage requirements	Choice: 208-240 V 3-Phase 60 Hz 440 V 3-Phase 60 Hz		
Rated power	Motor, wash		410 W 0.55 HP
	Motor, extraction		2600 W 3.5 HP
Overcurrent protection	Three-phase		20 A
Water connections			
Water pressure, max	10 kp/cm^2		142 psi
Recommended water pressure	2-6 kp/cm^2		25-85 psi
Hose connection, water	20 mm		3/4''
Hose connection, drain	75 mm		3''

Technical data

Outline and dimensions



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1 Opening for electrical cable connection
2 Steam connection (optional)
3 Cold water
4 Hot water
5 Hot water (only EX22)
6 Drain outlet
7 Soap box

	EX12		EX 22	
	mm	inches	mm	inches
A	870	34 1/4	1000	39 3/8
B	1302	51 1/4	1412	55 9/16
C	913	36	1102	43 3/8
D	792	31 3/16	906	35 3/32
E	121	4 3/4	196	7 3/4
F	625	24 5/8	630	24 13/16
G	570	22 1/2	560	22
H	480	18 15/16	610	24
J	1100	43 5/16	1210	47 5/8
K	–	–	320	12 5/8
L	240	9 1/2	240	9 1/2
M	120	4 3/4	120	4 3/4
N	1200	47 1/4	1310	51 9/16
O	1110	43 11/16	1220	48
P	85	3 11/32	85	3 11/32
Q	203	8	203	8
R	433	17	498	19 5/8

Installation

The machine is delivered with expansion bolts and other items packed inside the drum.

Shipping securities

Fig. 2 The machine is shipped with four large metal bracket bolted to the suspension legs, as well as a support between the pulley and the back plate.

Prior to installation, follow these steps:

- Unpack the machine.
- Fig. 3 Remove the lower front panel and the two rear panels.
- Remove the support from the pulley at the back of the machine.
- Remove both front brackets.
- Remove both rear brackets.

Placement

The machine should be installed close to a floor drain or open drain to make installation, use and service easier.

The following clearances are recommended for ease of installation and service:

- Fig. 4 At least 20 inches between the machine and the wall behind it.
- At least 2 inches on each side.

The floor must be able to support a static load of 790 lbs for the EX-12 and 1440 lbs for the EX-22.

The maximum impact load at extraction is 260 lbs force for the EX-12 and 480 lbs for the EX-22.

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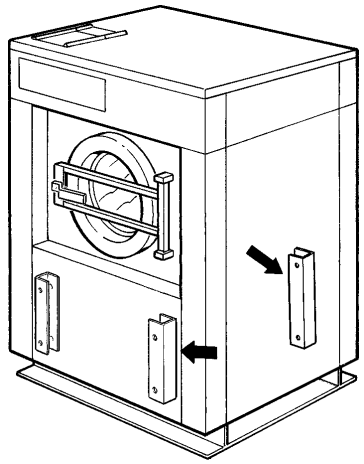

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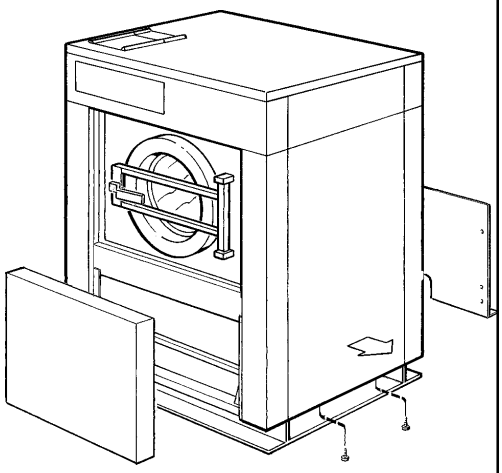

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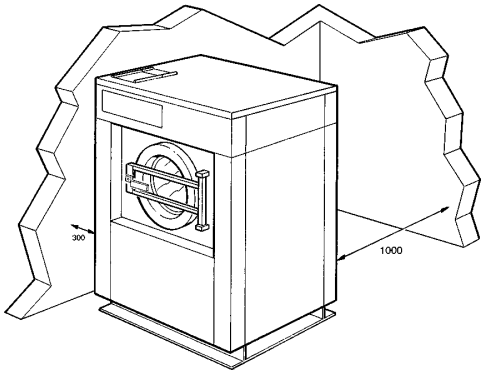

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Mechanical installation

Fig. 5
- Mark and drill two holes 3/8" in (8 mm) in diameter and approximately 3 1/2" in. (90 mm) deep according to the dimensions in figure 5.
- Place the machine in position. Never lift the machine by the door or handle.

Fig. 6
- Check that the machine is level and steady. Use stainless or galvanized washers between the machine and the floor.

Fig. 7
- Insert the expansion bolts supplied with the machine. Fit the washers and nuts.

It is of utmost importance that the machine is level, from side-to-side as well as front-to-rear. If the machine is not properly levelled, it may result in out-of-balance cutout without a real out-of-balance in the drum.

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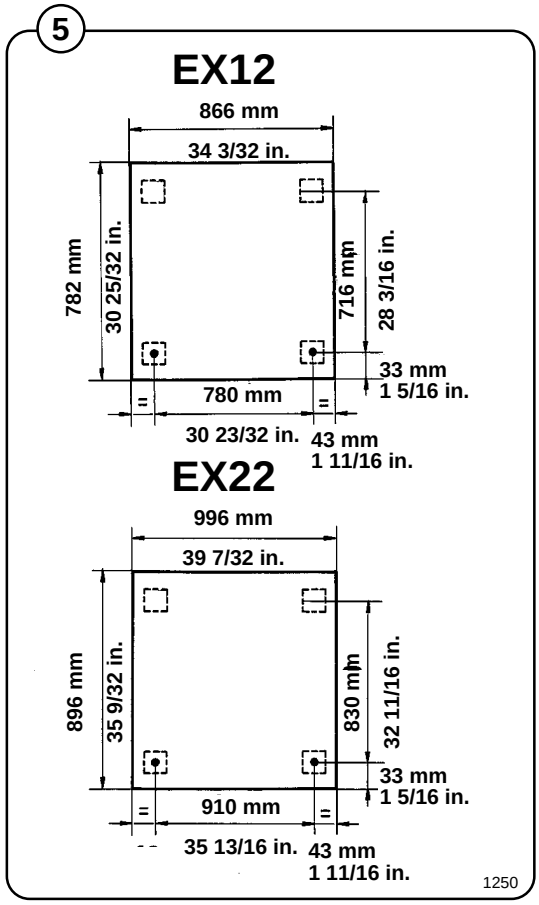

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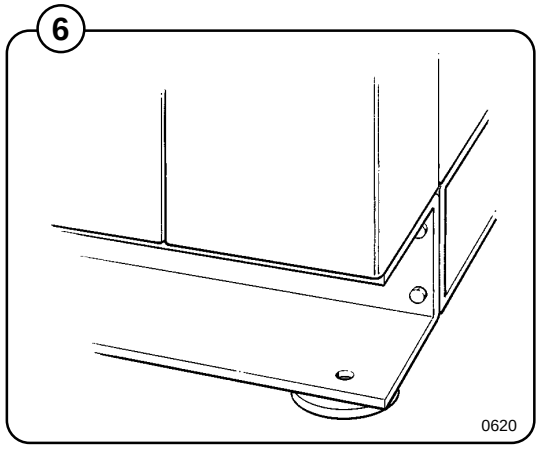

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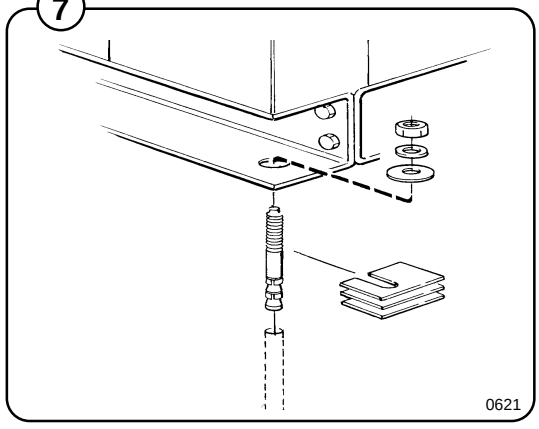

Electrical installation

Fig. 8 Although the machines are fitted with thermal overloads in the motor windings and separate fuses for the control circuit, a separate three-phase 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. 9 The machine is equipped with a control circuit transformer, mounted on the control unit and connected for 220 volt operation. If your incoming 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. Make certain it is not connected to the transformer.

Fig. 8 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.

To ensure proper operation the drum must rotate counter-clockwise (seen from the front) during extraction. If the drum rotates in the wrong direction interchange line L1 and L3 at the power connection terminal.

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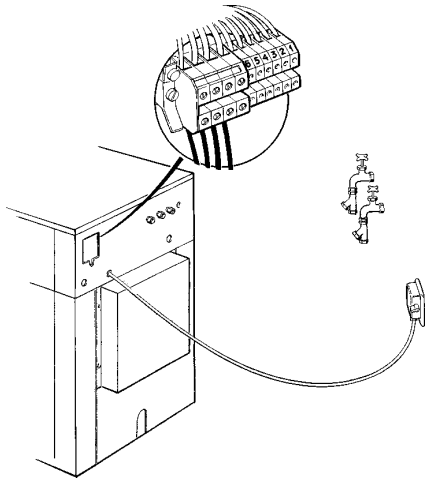

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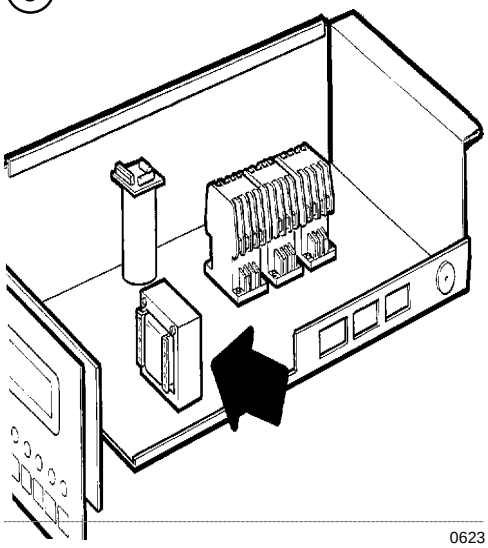

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Water connection

> **NOTE**
>
> **All plumbing must conform to national and local plumbing codes.**

Fig. (10) Incoming water lines do not require non-return valves, as the machine is already fitted with a siphon breaker. However, all incoming lines must be fitted with shut-off valves and strainers.

Fig. (11)
- Water inlets are labelled for hot and cold water connection.
- Flush the water system thoroughly and check that the strainer at the machine inlet is fitted correctly.

Fig. (12)
- 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. (13) Connect a 3'' (75 mm) flexible hose to the drain outlet of the machine.

The drain house 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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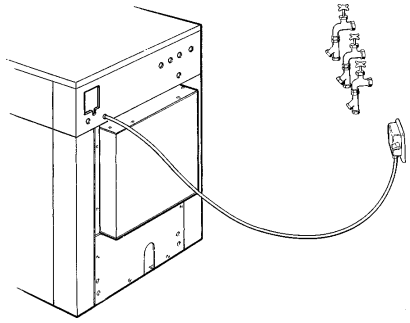

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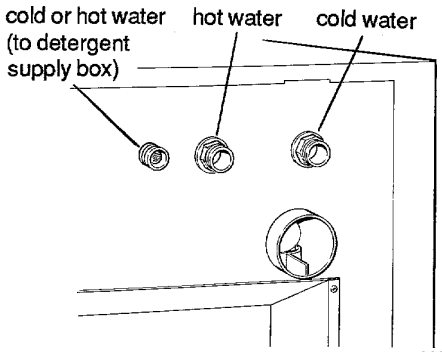

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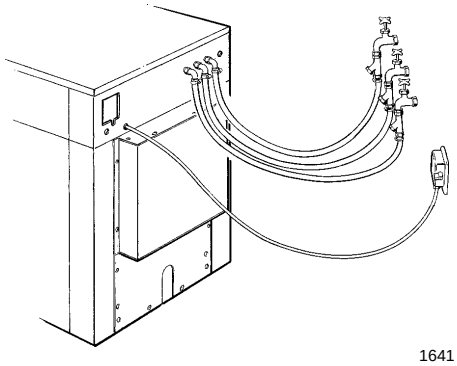

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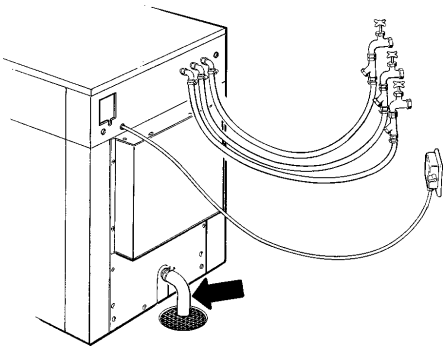

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Connection of external liquid supply

Remove cover and cover support over the soap box.

Fig. 14 Bend all the way back the metal plate in compartment 3.

Fig. 15 Pull the knobs up and forward.

Fig. 16

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

Note:

If the supply injector does not fit turn it around. You have it in backwards.

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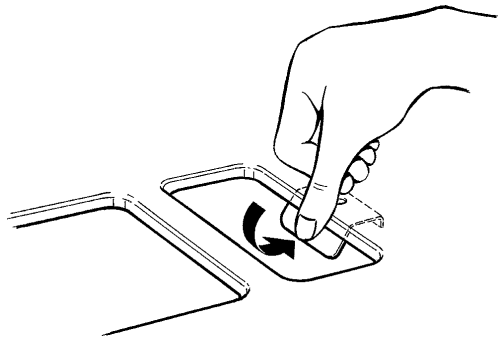

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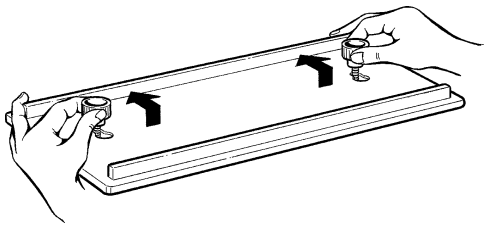

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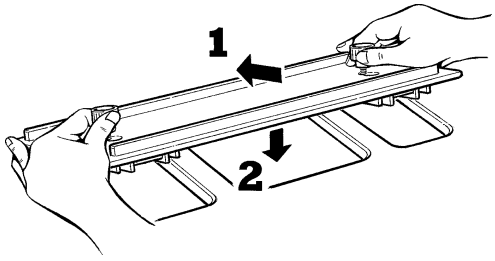

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Installation

Fig. 17

1. Drop the knob 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. 18

1. Stretch the multi-rubber ring B and select the correct size ring which will fit snuggly on the chemical tube you are using. Ring A is used for tubes with Ø 1/3" (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 trough the plastic nipple. Run the tube trough 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.

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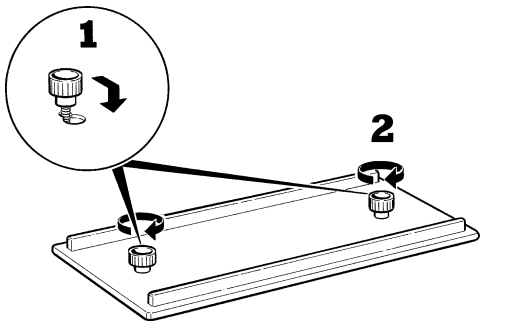

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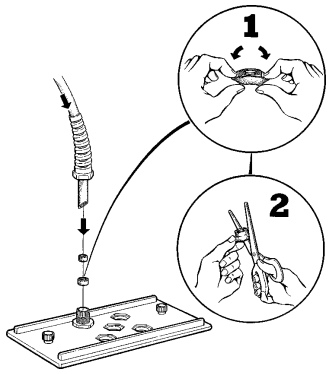

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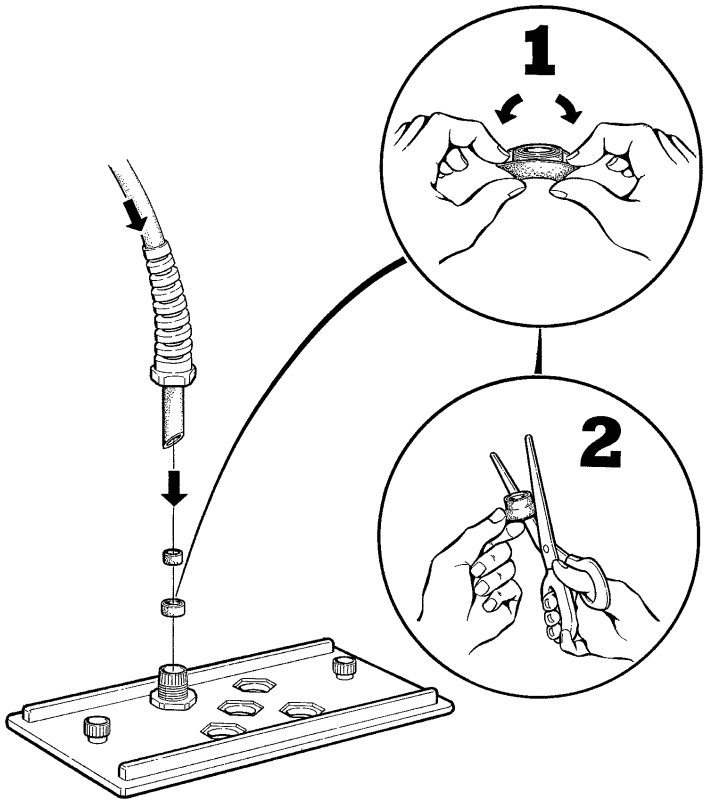

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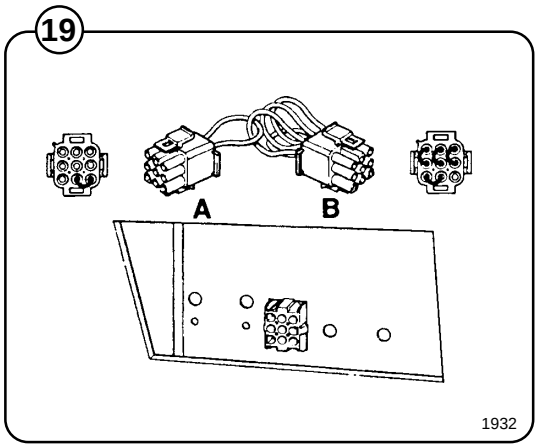
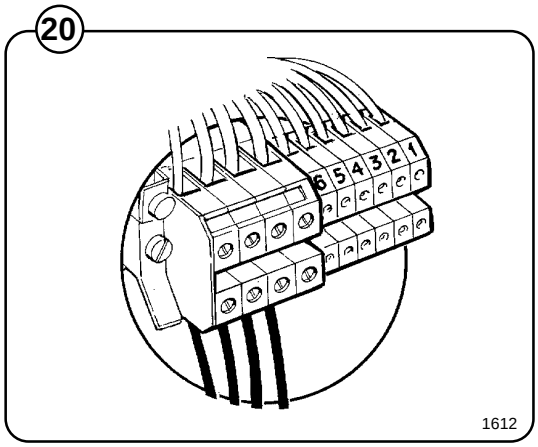
Electrical connection

Fig. 19 At the rear side of the control unit are two quick connectors. When the machine is delivered connector A is connected. When using powder supply, change to connector B.



Pump connection

Fig. 20 To the right of the incoming power terminal connection block is the connection for pumps. Depending on the number of pumps to be connected, they shall be connected from 1-5 and C (common) on resp. connection. The pumps obtain signals from the electronic timer.



Instruction for setting timing on electro-lube oil dispensing

Fig. 21 Pry off the switch panel cap with a screwdriver.

- Under the cap are the switches for time setting.

Fig. 22

- Set the "Light" and "12M" dip switches to the "On" position. Make certain all other switches are in "Off" position.

Fig. 23

- The light will start flashing after a few minutes and will continue to flash every 15th to 20th seconds as long as the dispencer is in operation.

Fig. 24

- The decal shown below should be affixed at the front of the machine and updated as required.

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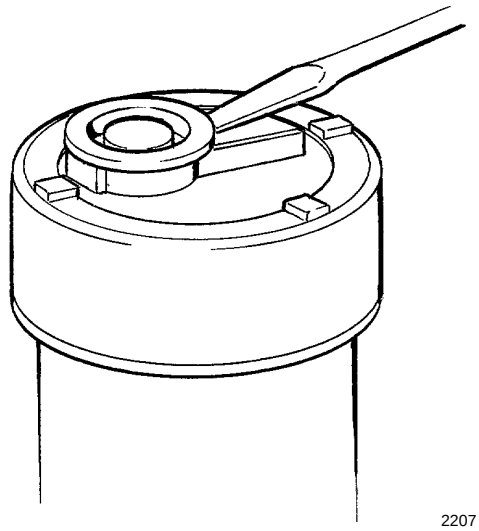

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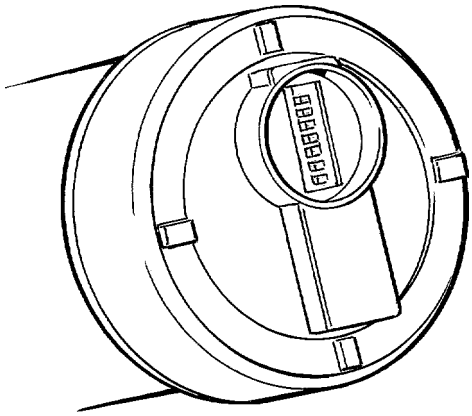

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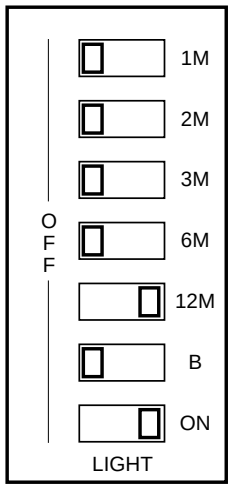
IMPORTANT NOTICE

This machine is equipped with an automatic oiler, located at the right rear of the machine, which keeps it lubricated for long bearing and seal life.
The amount of oil in the container is sufficient for approximately one year's lubrication. It is of utmost importance that the oiler does not become empty. Therefore we recommend that the rear panel to be removed and a visual inspection to be made on a bimonthly basis. When the oil reaches a low level, the cannister must be replaced with a new one available from Wascomat as Part No. 827601.

Date Last Replaced	Date Last Replaced

23



2733

Start-up and safety checklist

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

Fig. (25)

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

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

Fig. (26)

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

Fig. (27)

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

IMPORTANT:

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

WARNING:

Before servicing Wascomat equipment, disconnect electrical power.

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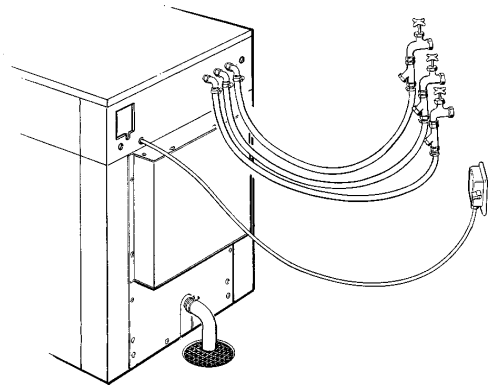

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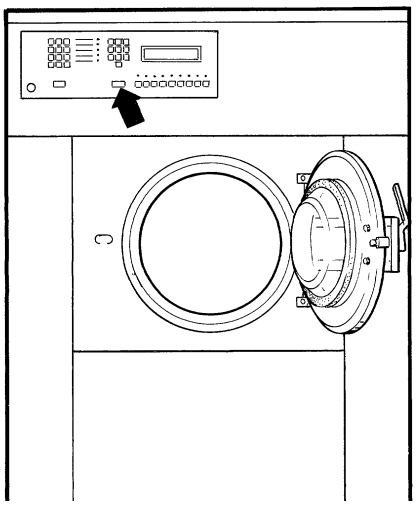

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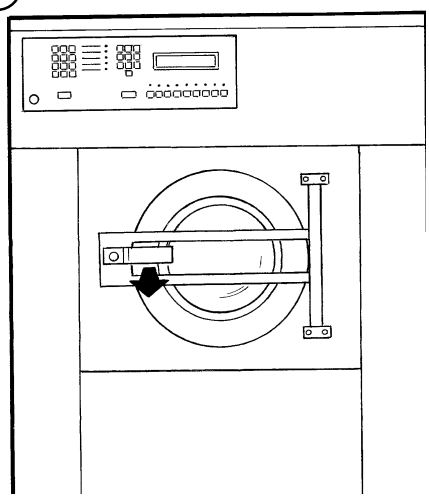


1639

Function control check-out list

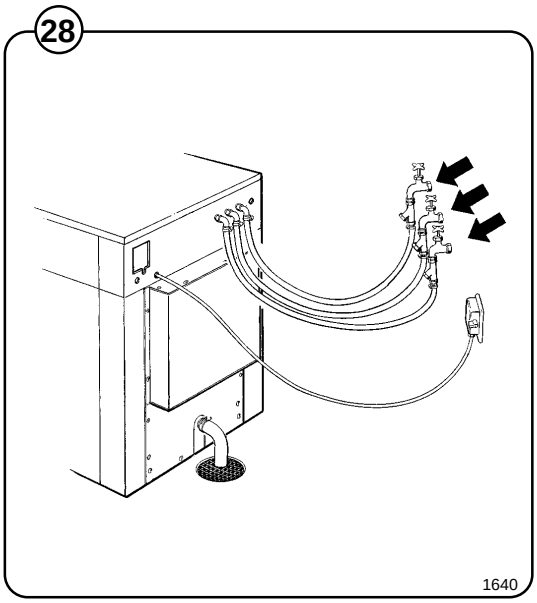
In the machine cylinder, you will find the warranty registration card, a copy of the warranty policy and other pertinent material.

The warranty card should be completed and sent to Wascomat. All other items should be placed in a safe place for future reference.

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

1. Check the incoming power for proper voltage, phase and cycles.
2. Open manual shut-off valves to the machine.
3. Turn on electric power.
4. Check the door safety interlock as detailed on page 9 of this manual.
5. Run through a complete cycle, checking for water temperature, drain operation and the extract function. For operating instructions, see the section marked ''Procedure''.

Fig. 28



NOTE

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

Safety rules

- **This 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.**
- **This machine must not be sprayed with water, otherwise short circuiting may occur.**
- **Fabric softeners with volatile or inflammable fluids are not to be used in this machine.**

General

Fig. 29 This machine is a free-swinging model i.e. the outer drum and motor bridge are suspended in the machine chassis via a spring suspension with a strong spring in each corner of the machine. Each spring has a shock absorber which dampens the movement of the machine.

The inner drum is driven by two motors via a V-belt: one motor for washing and distribution speed and one for extract speed. The inner drum is mounted in the outer drum with two heavy duty bearings at the back plate and is sealed with two V-rings.

The two motors are suspended underneath on a motor support with a belt tensioning device. The motors are mechanically coupled to each other with V-belts. During wash and distribution speed the spin motor transmits power to the drum, through a clutch arrangement.

The water inlet and drain are both situated under the outer drum. This improves the flow during filling and prevents water vapour from entering the detergent compartment.

The robust square door is locked with a handle which is interlocked by a safety device when the machine is running.

The manual push buttons and card programmed control 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.

The machine housing consists of hot-dip galvanised, painted steel plates and stainless steel sheets, painted on the front and sides. It has a stainless door (and front, on request).

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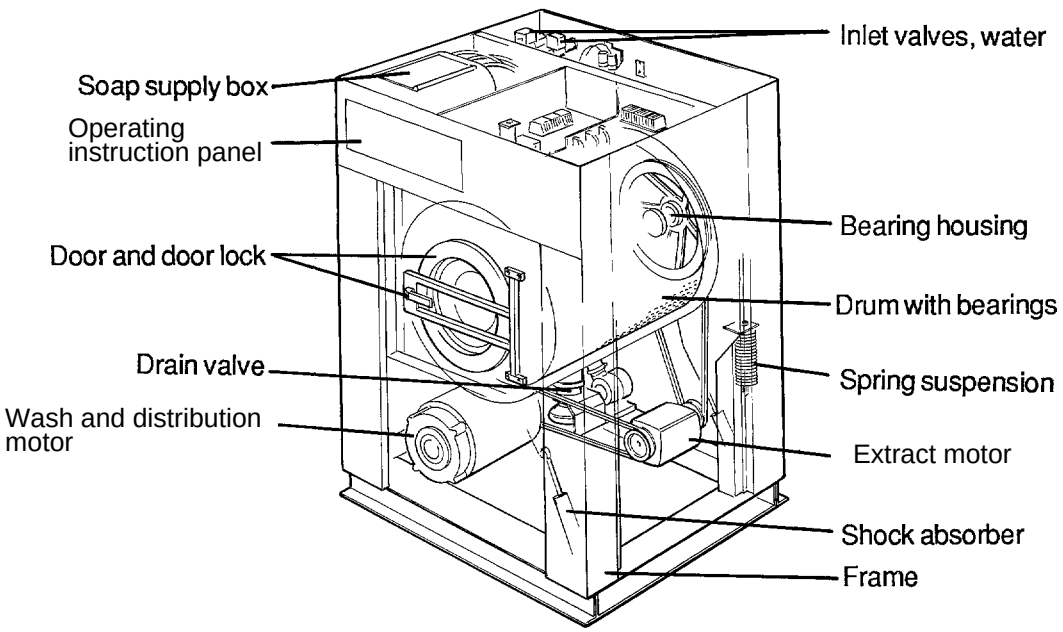

1617

Frame

Description

Fig. 30 The frame is constructed on the free-swinging principle, i.e. the washing drum is freely and resiliently suspended in the fixed frame.

The entire frame is constructed of U-shaped iron beams forming a stable and torsionally rigid structure.

The suspension device for the drum unit and motors consists of four posts, one in each corner, each with a robust spring to which the washing drum supports are attached. In order to prevent excessively great vibrations which can be caused by imbalance in the drum, a shock absorber is fitted between the drum and frame by each spring. (The EX 12 model has twin shock absorbers at the front.)

Repair instructions

If the out-of-balance cutout is repeatedly triggered

- Check the shock absorbers, replace them if required. Note that the shock absorbers should be fitted with the plunger rod upwards.
- Check the attachment of the springs:
  - the spring is attached by a bolt from above: Check that it has been properly tightened down.

The entire spring unit should be replaced in spring replacement.

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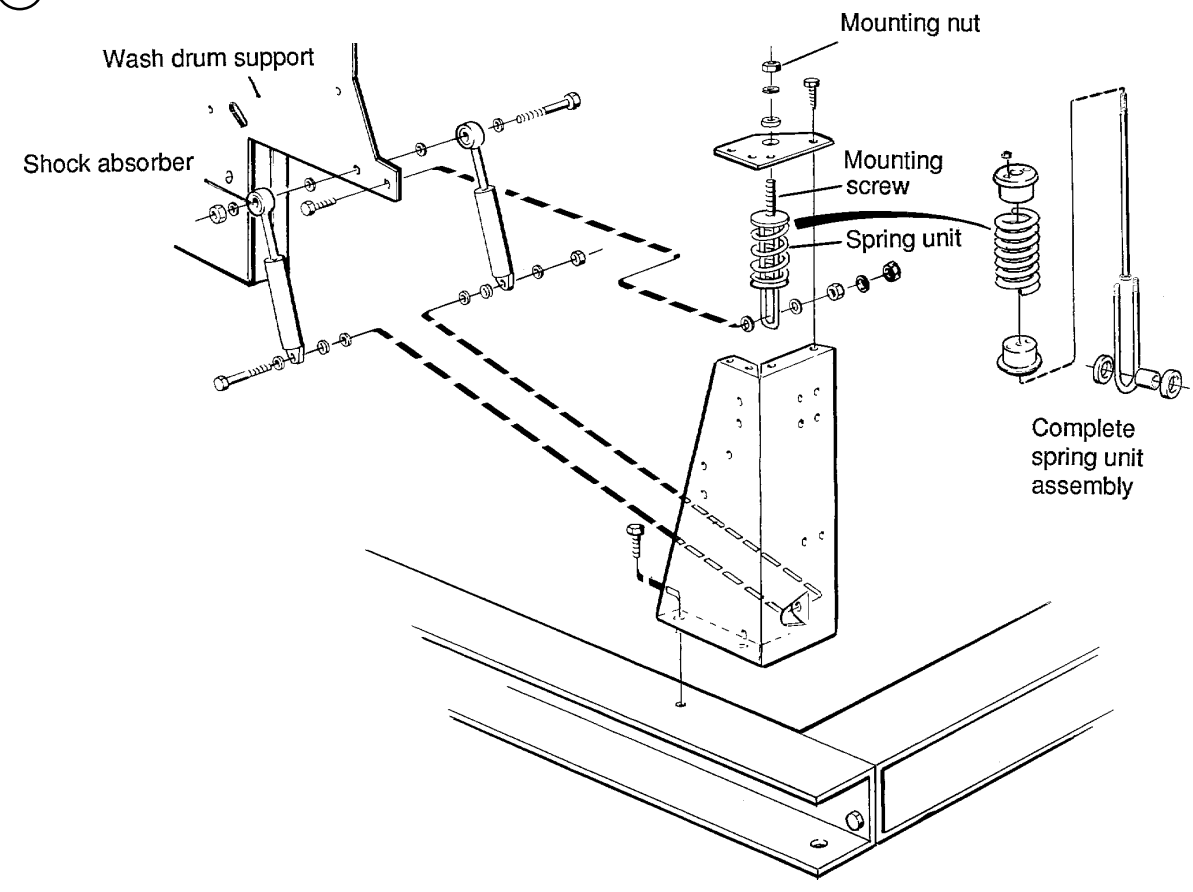

Drum with bearings

Description

Fig. (31) The inner drum is journalled to the outer drum by two robust bearings in a bearing housing which is bolted to the rear plate. The bearing unit supports the drum without any support being needed at the front. Shaft seals of the V-type, as well as O-rings, seal against leakage.

The space between the bearings is packed with grease during assembly. No additional grease is required.

The inner drum shaft is continuous, and the V-belt pulley is attached to the protruding journal by an adapter sleeve.

The outer drum end plate consists of two parts, the inner and outer end plates which are bolted to the bearing housing with through bolts. NOTE: The inner and outer end plates must not be taken apart when the bearings are replaced.

The outer drum and rear plate are held together by 3 straps.

The outer drum is connected to its resilient suspension by four supports, bolted to the end plates. It is important that these supports are not loosened from the rear plate during repairs.

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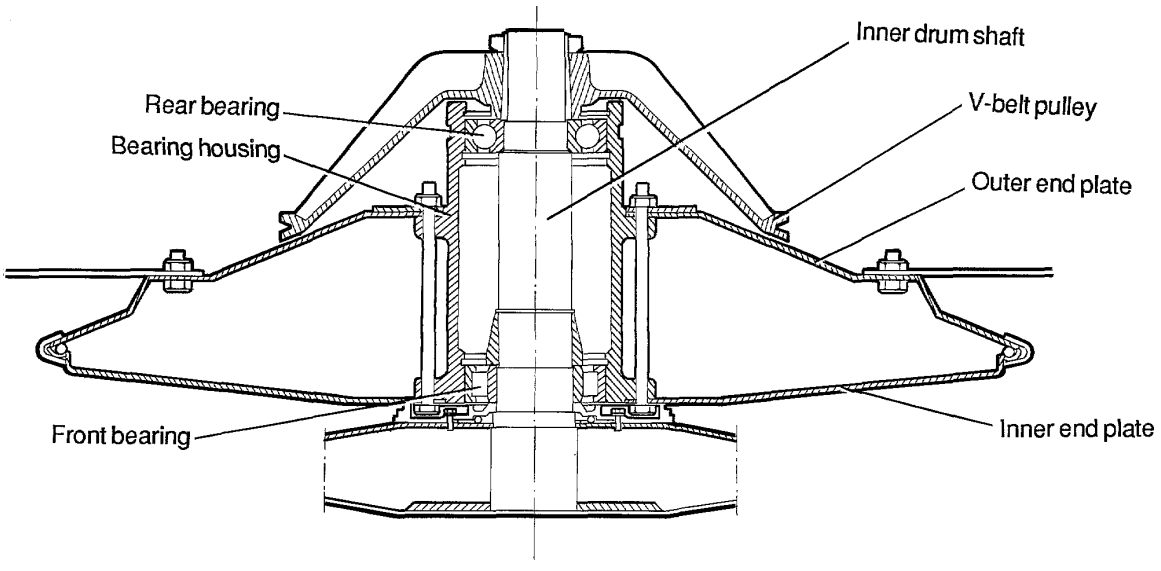


0635

Safety locking device

Description

Fig. 32 The machine safety locking device includes a safety interlock system which prevents personal injury through the following precautions:

- The machine cannot be started until the door is shut.
- The door is automatically locked when the machine starts.
- It is not possible to open the door until 2-3 minutes have elapsed after the washing program has ended. This ensures that the drum is motionless when the door is opened.

Repair instructions

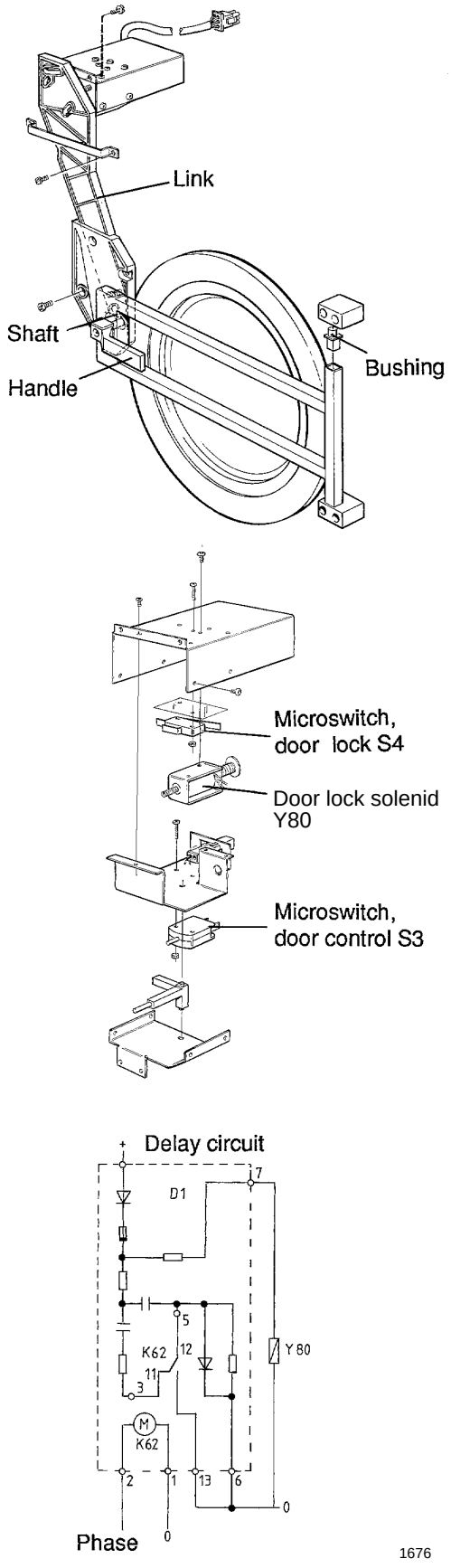
It the coil does not lock the door:

- Check that the coil is receiving 100-110 V DC voltage. Measure the coil to determine if there is an interruption.
- Check that the armature of the coil is not stuck.
- If necessary, replace the entire coil.

Other possible faults:

- Faulty microswitch.
- Faulty delay circuit.
- Moving parts jammed.
- Handle not in locking position.

32



Function

If the machine has not been energised within the last three minutes, the door will remain unlocked. When the machine is energised the door will be locked if a program is activated or if the drum is rotating. Upon completion of a program the door will be unlocked automatically as soon as the drum has stopped rotating.

If the power supply is cut to a machine which was energised the door will remain locked for three minutes, after which time it will be unlocked automatically.

Fig. 33 The diagram below shows how the delay unit works.

When the machine is energised the delay unit is fed phase and neutral on X194:5 and X194:4 respectively. The door lock coil Y80 is then fed phase (via a normally closed relay contact) and neutral from X194:3. The relay coil acts on two conditions – that the drum is at a standstill and an "open" signal from the programmer circuit board:

- One side of the relay coil receives a zero potential signal when the rotation guard short-circuits X193:1 and 2.
- The other side of the relay coil is supplied with phase from the programmer circuit board ("open" signal).

Both of these conditions must be fulfilled for the door to be unlocked.

In the event of a power cut the capacitor will discharge via the relay and the door lock solenoid. In this way the door lock solenoid continues to operate for three minutes, after which the door is unlocked automatically.

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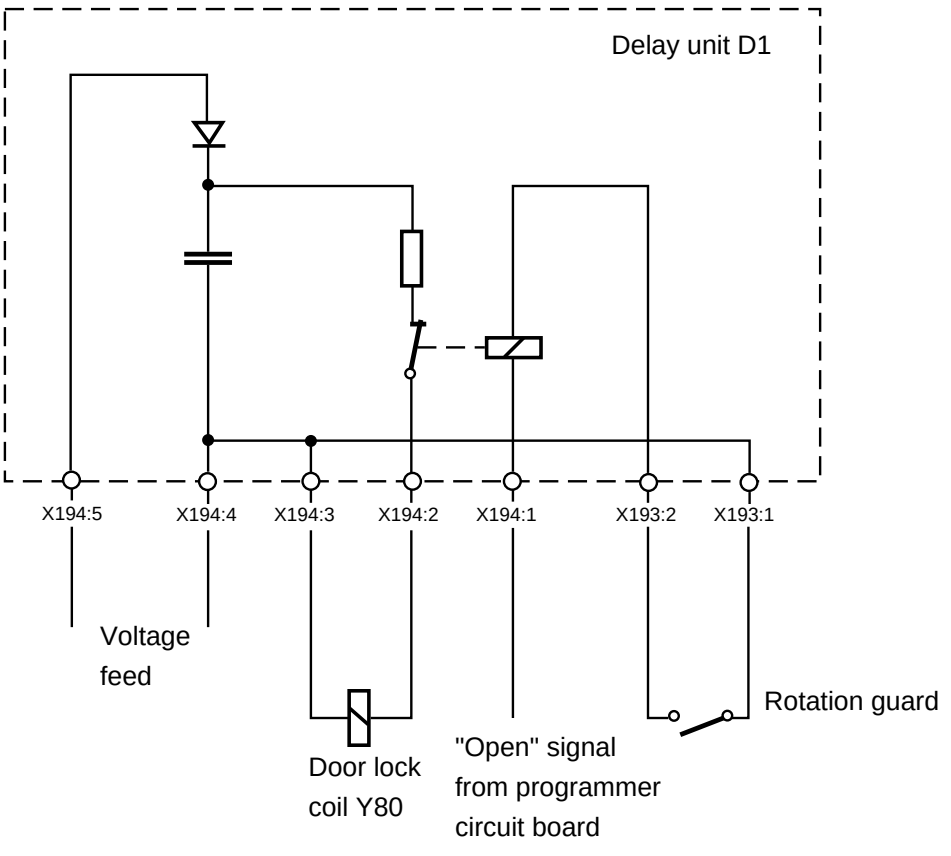


Fault location

Door does not unlock

Conditions: wash program ended and drum at a standstill.

Measure the voltage between the following points:

1. **X93:2 - X93:3** Should be 0 V DC. If the voltage is 220 V AC, check the rotation guard.
2. **X193:1 - X193:2** Should be 0 V DC. If the voltage is 220 V AC, check the rotation guard and the cables between rotation guard and delay unit.
3. **X194:1 - X194:4** Should be 220 V AC. If not, the "open" signal from the programmer circuit board is absent. Check pcb and cables between pcb and delay unit.

If the door is still locked, replace the delay unit.

Door does not lock

Conditions: door closed and wash program activated.

Measure the voltage between the following points.

1. **X194:1 - X194:4** Should be 0 V AC. If the voltage is 220 V AC, the programmer circuit board will constantly send the "open" signal. Check pcb and cables between pcb and delay unit.
2. **X194:2 - X194:3** Should be 200 V DC.
   – If there is no voltage, replace the delay unit.
   – If this voltage is present, check the door lock coil and its cables.

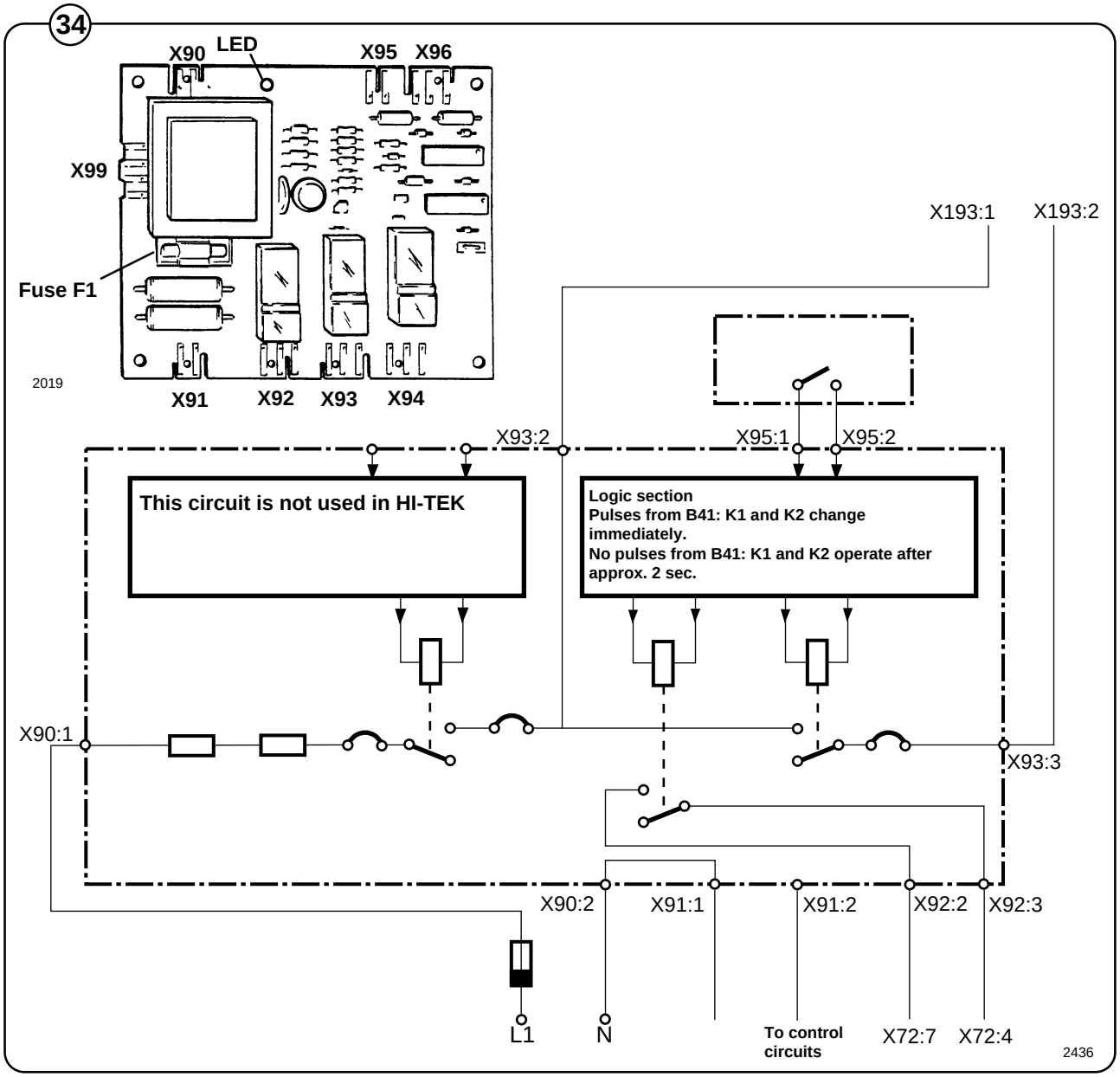
Rotation guard

Description

Fig. (34) The rotation guard checks that the machine is completely at a standstill before the door can be opened. When the drum has been at a standstill for approx. two seconds the solenoid in the door lock is deactivated and the lock can be opened (provided that the machine has been emptied of water and the programmer has reset). The rotation guard also checks that the drum is revolving when the wash or extraction relays are operating.

The rotation guard consists of a circuit board in the automatic control unit and a sensor in a holder on the machine rear. There is a magnet on two of the spokes of the pulley. Each time a magnet passes the sensor, a contact closes inside the sensor and it relays a pulse to the rotation guard.

When the machine is at a standstill the rotation guard relays K1 and K2 are closed, which means that the delay unit and the HI-TEK receive confirmation that the drum is not moving, i.e. the rotation guard and the HI-TEK allow door opening.



Control unit

Fig. 35 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 microprocessed 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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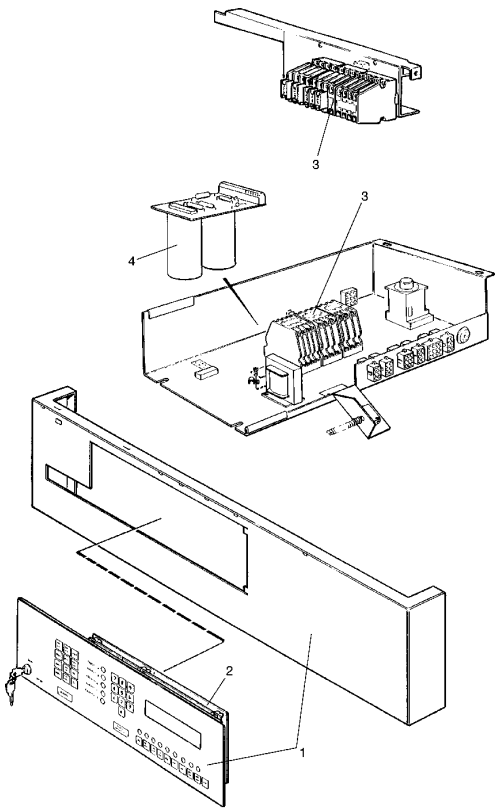


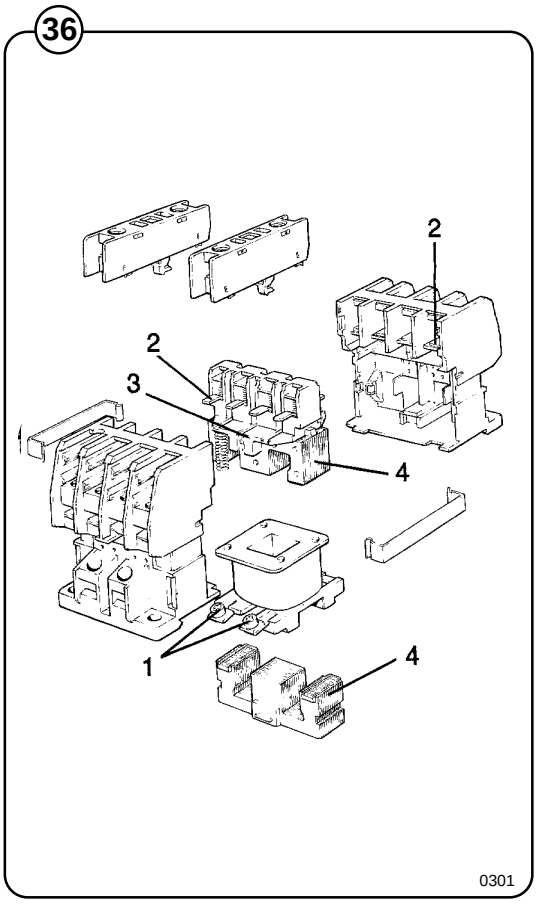
3310

Relays

The HI-Tek models employ six relays. The relays control:

Fig. 36

- the reversing wash action of the wash motor (2 relays)
- the distribution action of the wash motor
- the extraction motor (3 relays)



Construction

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

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

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

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 (4) moves freely. Always replace burnt or pitted contacts (2)... do not reuse contacts.

Drive motors

Description

Fig. (37) Both motors, one for wash and distribution and one for extraction, are installed on the same motor bridge. The motors drive the drum and are mechanically connected to each other by V-belts. On the EX 22 there is also an electromechanical clutch. The motors rotate at each others' speed during the wash speed, distribution speed and low extraction speed.

During high extraction speed the speed control on the EX 22 gives a signal to the electromechanical clutch. This disconnects the motors from each other mechanically. The wash motor now rotates at distribution speed and the extract motor at high speed.

On the EX 12 the power supply to the wash motor is disconnected by the speed control.

On the motor bridge there are belt tensioning devices. The extract motor is screwed to a mobile plate which moves via oblong holes in the motor bridge. This is used to tension the belt drive between the motors. It is possible to tilt the entire motor bridge with the use of the oblong holes on the wash motor side. This is used to tension the V-belt up the wash drum.

Fig. (38) The motors are equipped with thermal protectors which are placed in the stator coil. In the case of overheating in the motors, i.e. if the temperature exceeds 130°, the protector contacts cut the power to the motor relays.

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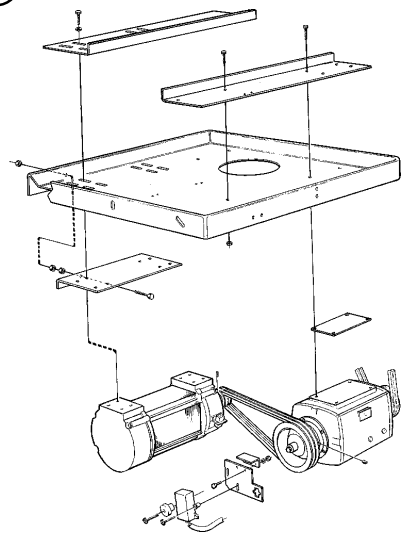

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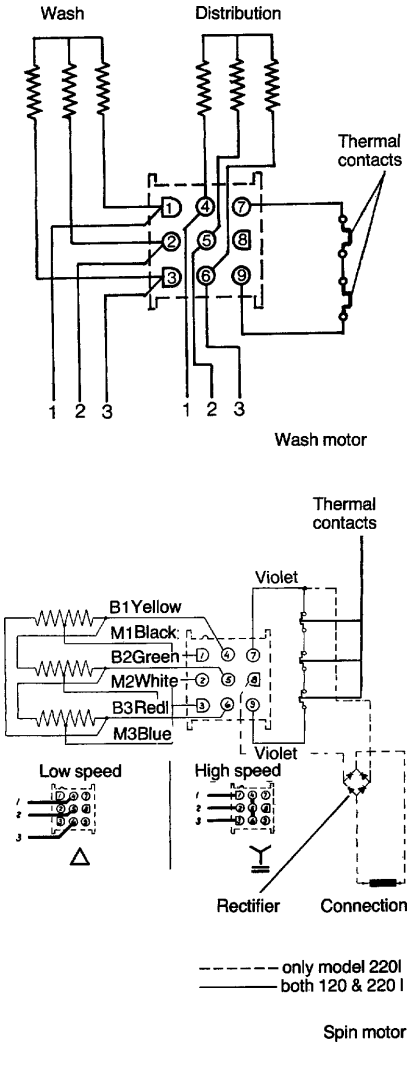

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Repair instructions

Overheated motor, motor not running

- Wait till motor has cooled down. Motor thermal protection is automatically reset after approx. 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. 39

- 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.

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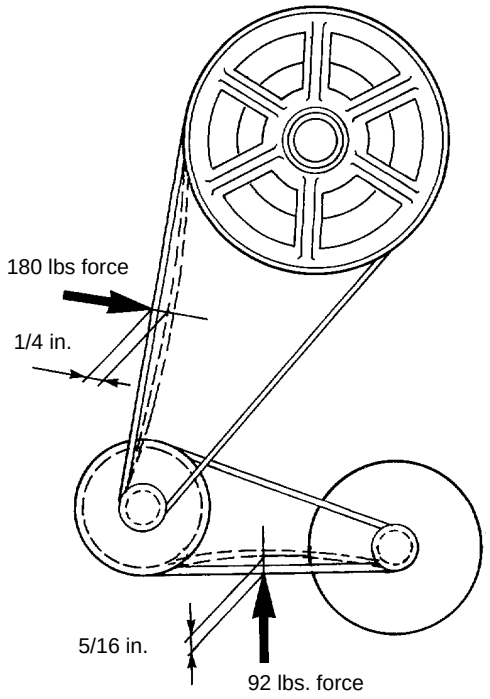

Supply injection valve

Construction

Fig. (40) This valve has a single-inlet with 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. (41) When the solenoid is energized, the spring-loaded plunger is drawn up and the pilot valve in the center 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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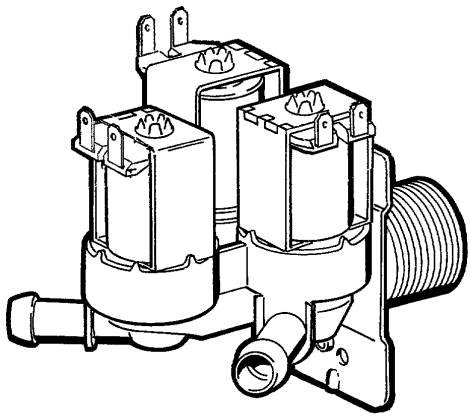

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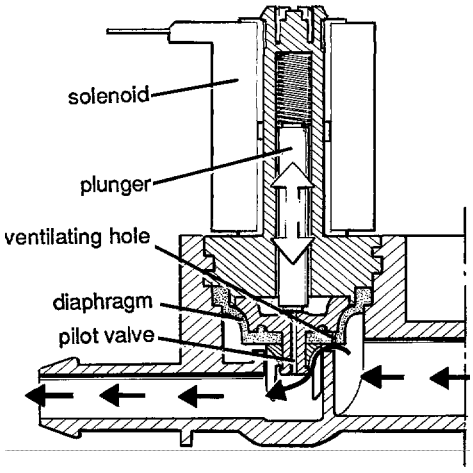

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Repair instructions

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

Fig. (42) 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. (43)
- Pull the coil stright upwards. Use a screwdriver if necessary to carefully undo the coil.

Fig. (44)
- 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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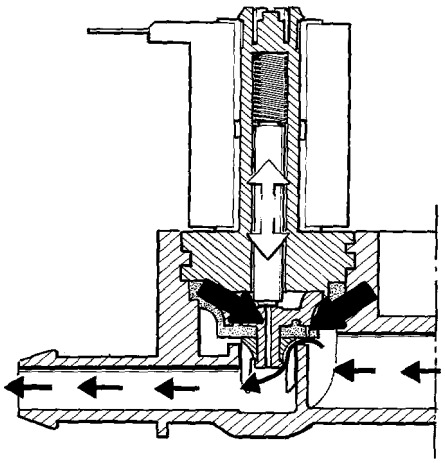

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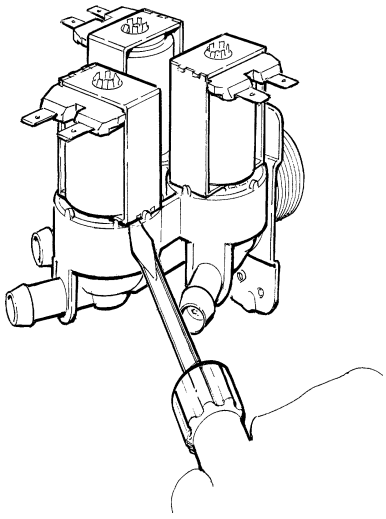

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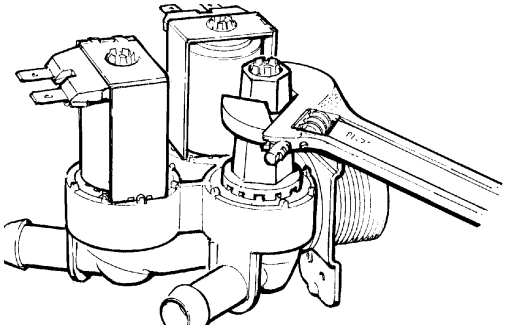

0310

Inlet valve EX 22

Fig. 45 The water inlets have brass bodies with a larger cross section of the outlet in order to acheive a shorter filling time for the machine.

Construction

The valve housing is made of pressed brass. The spring-loaded plunger is made of stainless steel and located at its lower end is a rubber gasket for the pilot valve.

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.

Clean out

At water temperatures of more than 60°C/140°F, the lime deposits are heavily increased. This can cause function problems due to blocking up the equalizing orifice of the valve.

Fig. 45 The fault can be eliminated by cleaning the equalizing orifice (marked A).

Fig. 46 If there are much deposits the orifice can be changed from 0.5 mm to 0.8 mm. The screwhead of the orifice is marked with 1 ring for the size of 0.5 mm and 2 rings for the size of 0.8 mm.

Clean the orifice as follows:

1. Shut off the main supply.
2. Unscrew the orifice
3. Clean the hole in the orifice carefully with a pin or similar not thicker than 0.5 resp. 0.8 mm. Fig. 47
4. Mount the orifice, be careful with sealing and tighten.
5. Open the main supply.

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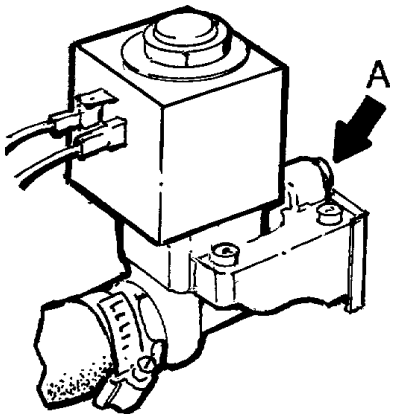

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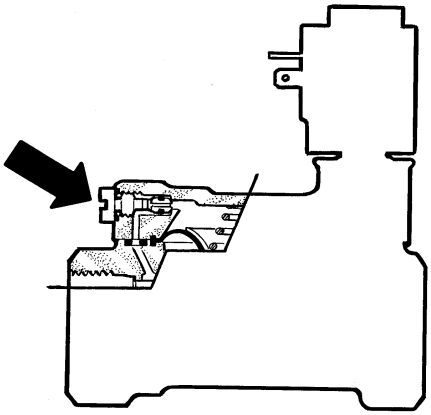

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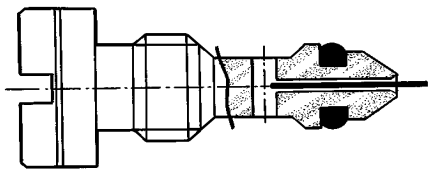


0369

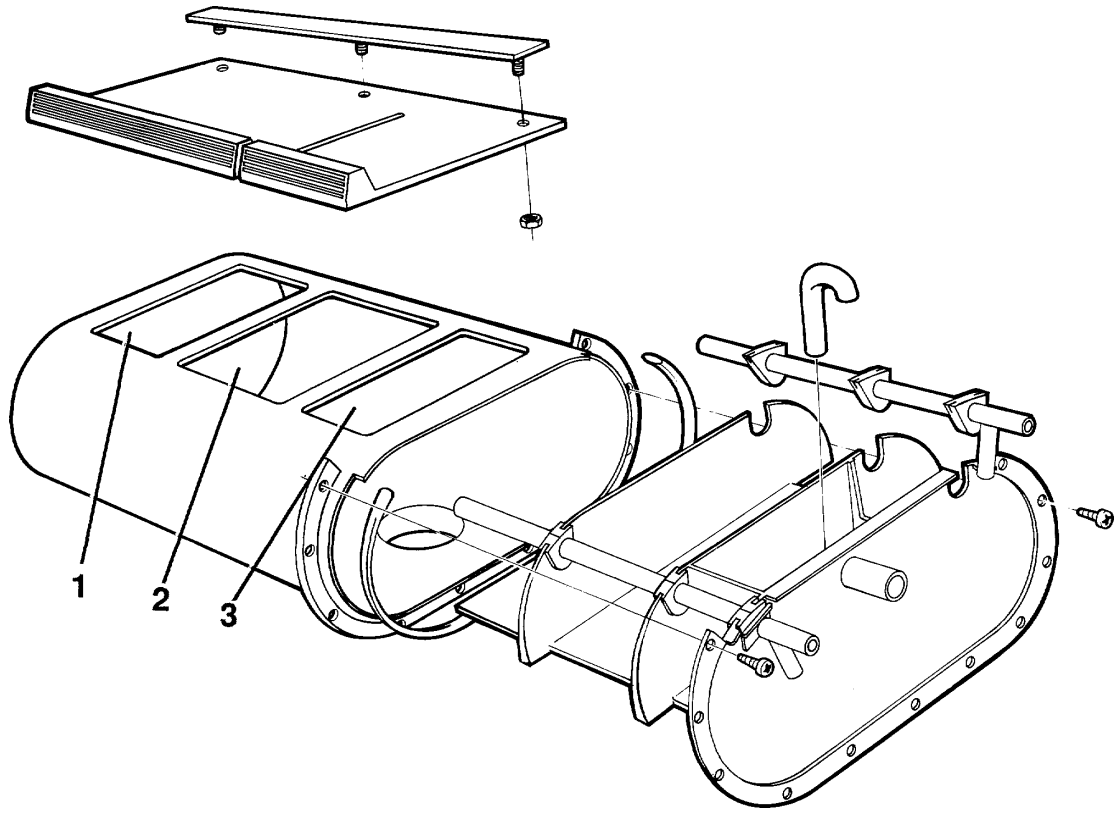
Soap supply box

Fig. 48 The three-compartment soap supply box is located at the top of the machine. Viewed from the front, the compartments are marked with figures 1, 2 and 3.

Compartment 1 and 2 are used for adding detergent directly to the wash. Compartment 3 is used for adding fabric softener. All three compartments can be programmed individually.

For liquid supplies compartment 2 is only used together with a top mounted supply injector connection. See page 9 for details and installation instructions.

48

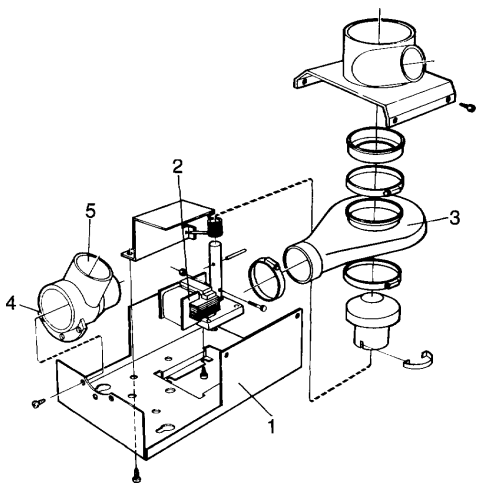


Drain valve

Description

Fig. 49 The drain valve consists of a bracket (1), on which are mounted the motor and gear (2) and diaphragm (3). The rubber diaphragm is resistant to a water temperature up to 100°C (212•F). The installation of a lint trap is not necessary. The machine is equipped with an overflow, which bypasses the drain valve. The drain can be cleaned by removing the drain connection (4) outside of the machine or by removing the rubber diaphragm (3). The motor and gear assembly is covered by a plate and provided with quick-disconnect electrical connections. The stator coil is constructed for continuous operation.

49



0313

Operation

The drain valve is normally open, i.e. the motor does not close the valve until it receives current via a contact of the timer. As soon as the current is cut, the shaft turns and opens the diaphragm of the valve. This also permits the machine to drain, in the event of power failure. The overflow hose (5) leads excess water or suds directly to the waste line, in the event of failure in the inlet valves or level control.

Trouble-shooting

If the valve does not open or close properly:

1. Check that the shaft is moving freely.
2. Check that the diaphragm is not obstructed.
3. Check the coil for continuity.

Clean out

Periodic cleaning of the valve is recommended, depending upon how often the machines are used, as well as the type of wash handled most frequently.

General

Fig. 50

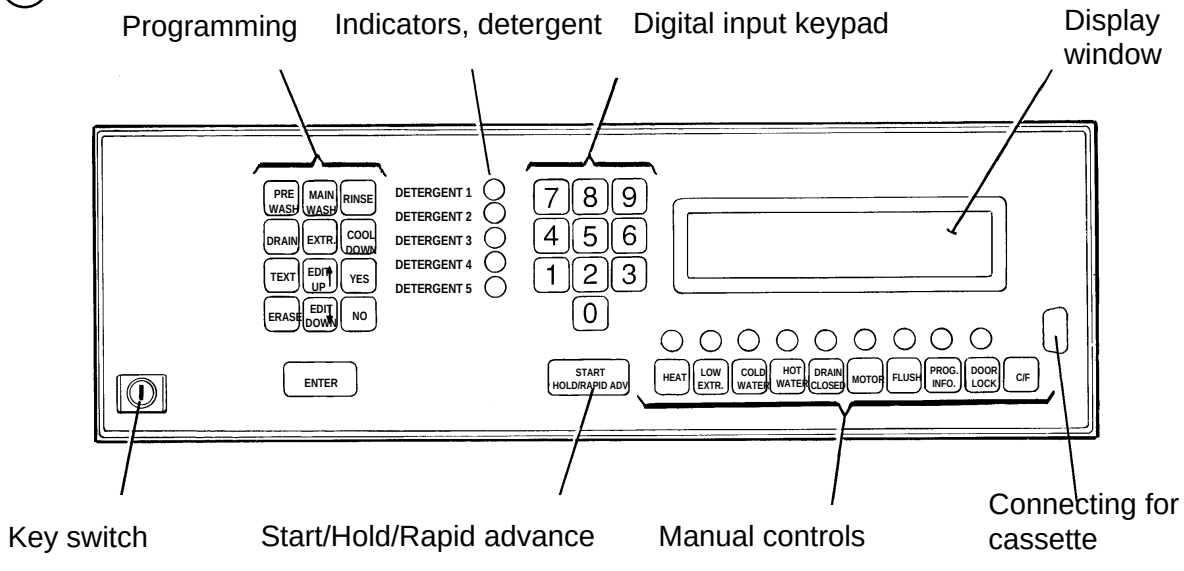
The washing machine's program operation is controlled by a microcomputer and the wash programs are stored in an electronic memory. Program controls are very exact and the wash programs can be easily adapted to the end user's individual requirements.

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 which is used to switch the machine to the programming position.
- 13 push 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 steps are controlled with the aid of questions and selections.

50



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. 51

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:

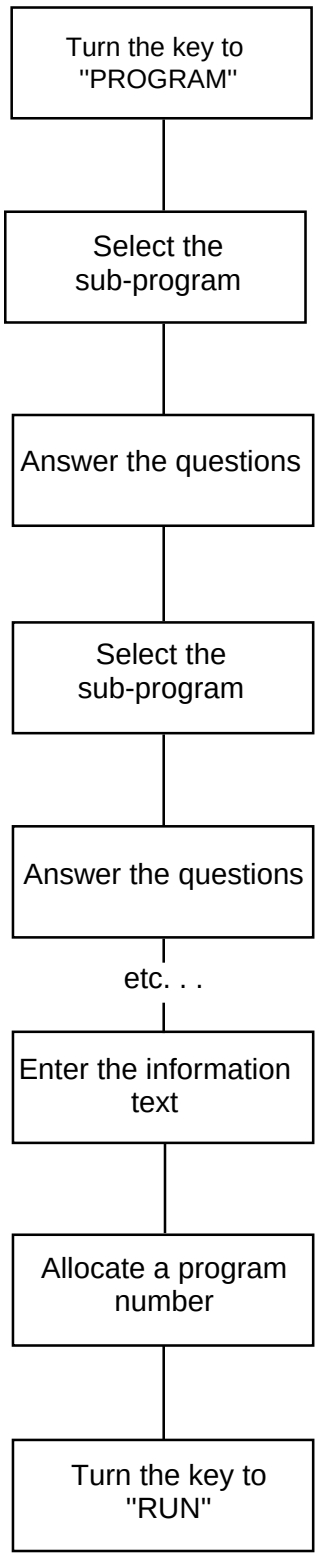
- Pre-wash 1, Drain 1
- Main wash 1, Cool down 1, Drain 2
- Rinsing 1, Drain 3, Extract 1
- Rinsing 2, Drain 4
- Rinsing 3, Drain 5, Extract 2.

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.

51

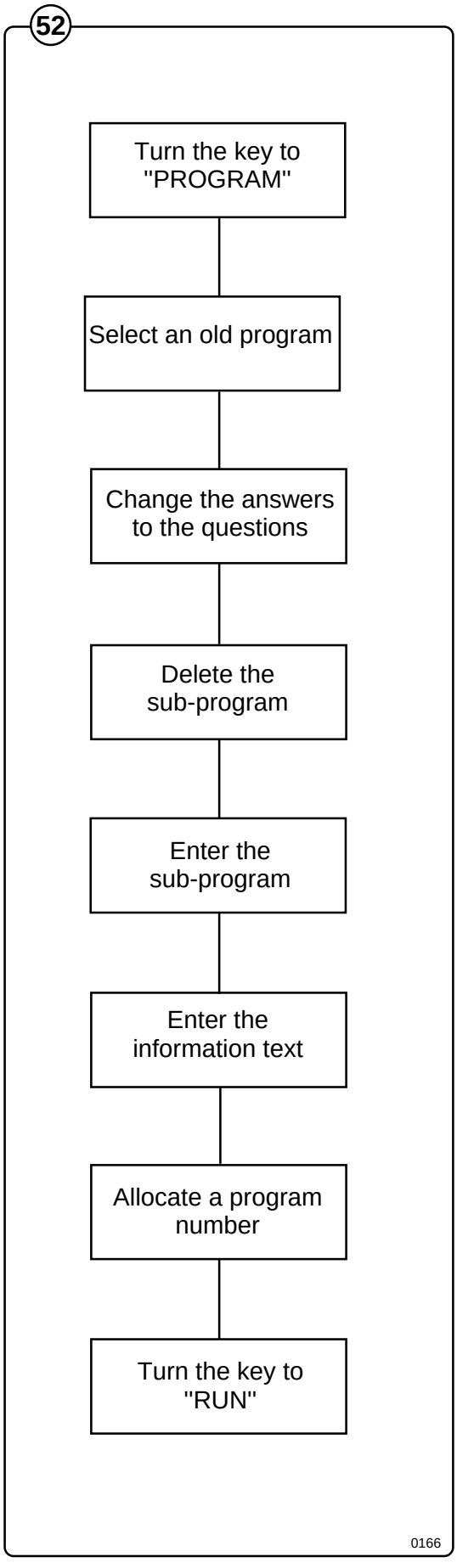


0165

Using and old program as a background

Fig. 52 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. (53) 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

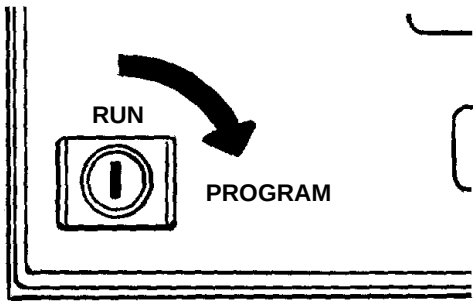
Fig. (54) An important principle when programming is that all commands (such as the choice of sub-program, answers to questions, text input) must be followed by **ENTER.**

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

EDIT UP and EDIT DOWN

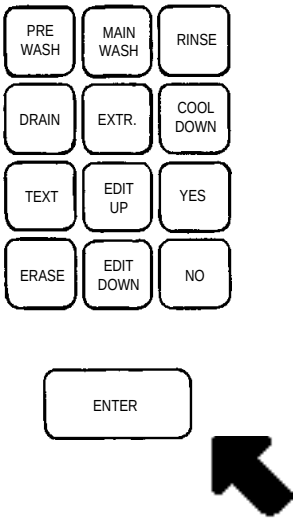
Fig. (55) The **EDIT UP** and **EDIT DOWN** buttons are used to go backwards or forwards in the program without its being affected, e.g. to go through the questions in a sub-program. The buttons are also used to enter program text (see under the heading ''Entering text'').

53



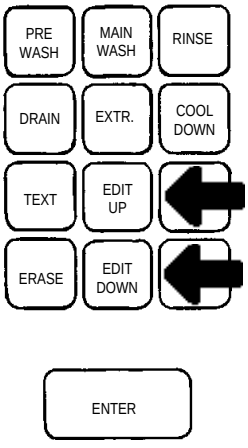
0167

54



0168

55



0169

Erase

Fig. (56) 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. (57)
- 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''.

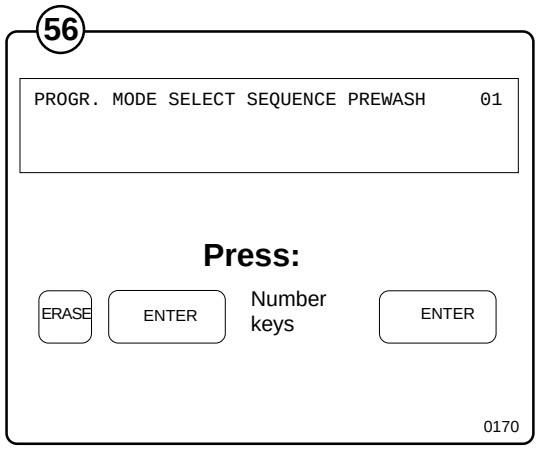
Fig. (58)
- Deleting characters when entering text.

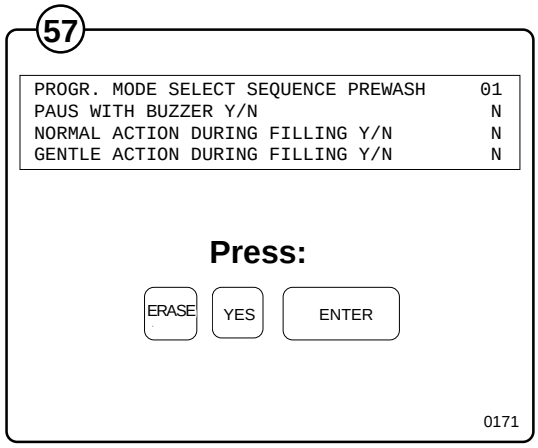
  To delete individual characters when programming text, press **ERASE**. The last character you entered will disappear. (see under the heading ''TEXT'').

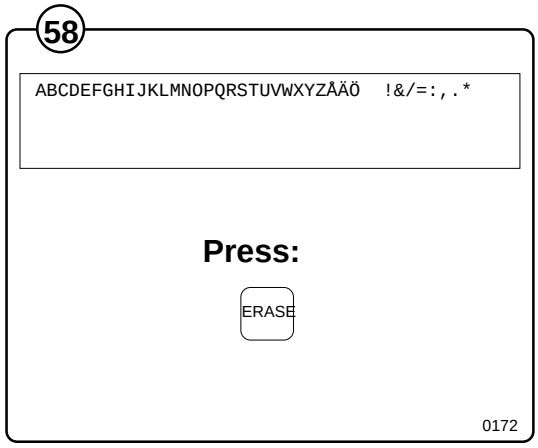
Selecting sub-programs

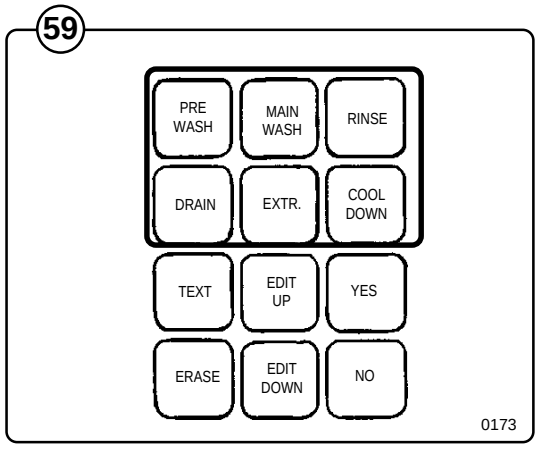
Fig. (59) Press buttons **PRE WASH, MAIN WASH, RINSE, DRAIN, EXTR**. and **COOL DOWN** designate different sub-programs and can be used to construct complete wash programs.

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. 60 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. 61 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:

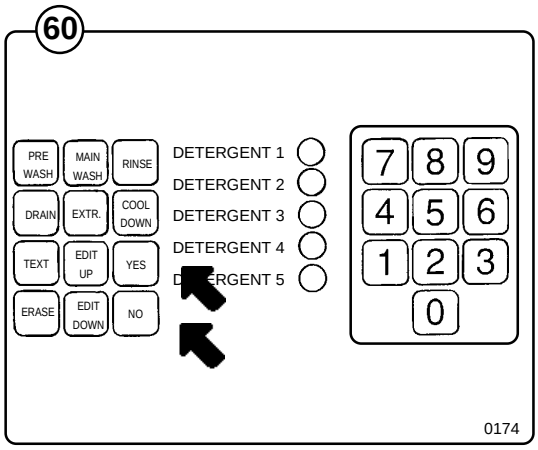
- Press **TEXT** when the display window displays ''PROG. MODE SELECT SEQUENCE''. Press **ENTER.**

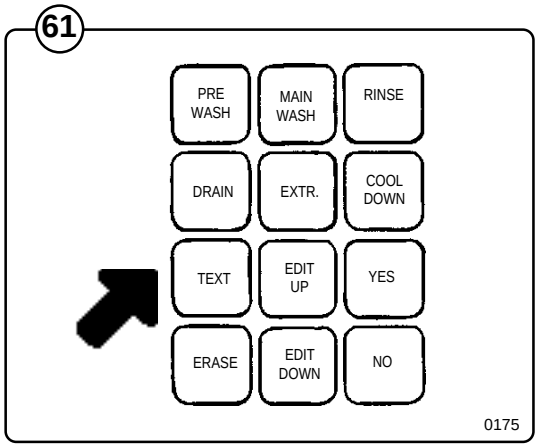
Fig. 62

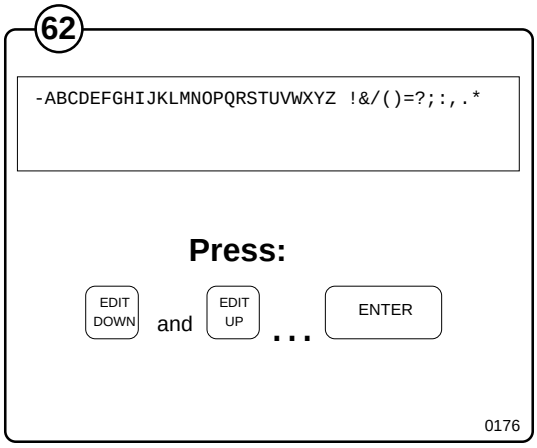
- The alphabet is then displayed together with a number of special characters in the display window. By using the **EDIT UP** and **EDIT DOWN** keys, the cursor (the flashing square) can be moved along the character line.
- The first character of the text is entered by pressing **ENTER** when the cursor 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.

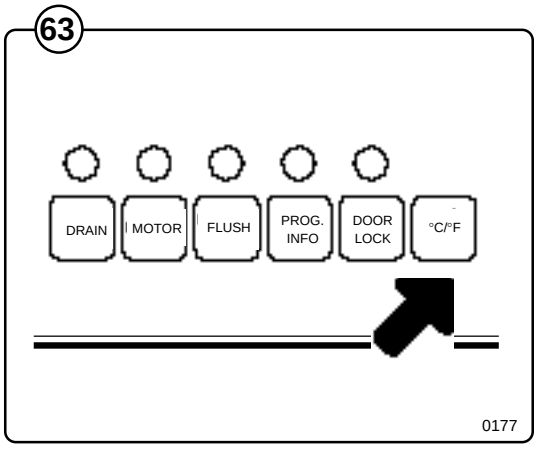
°C/°F

Fig. 63 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. (64) Turn the key to the **PROGRAM** position. The first character will then be displayed in the display window.

Select ''New program''

Fig. (65) Answer **NO** to the question ''DO YOU WANT AN OLD PROG. AS BACKGROUND?''. Press **ENTER**.

Select sub-program

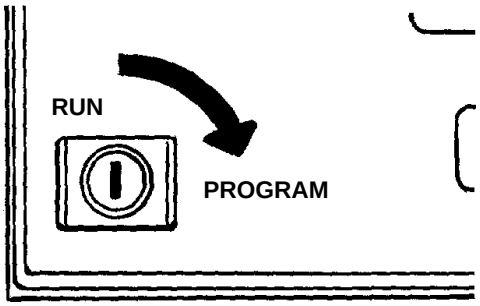
Fig. (66) Select one of the following: **PRE WASH, MAIN WASH, RINSE, DRAIN, EXTR, COOL DOWN, TEXT** or **ERASE**. Press **ENTER** immediately after the first selection is pressed.

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.

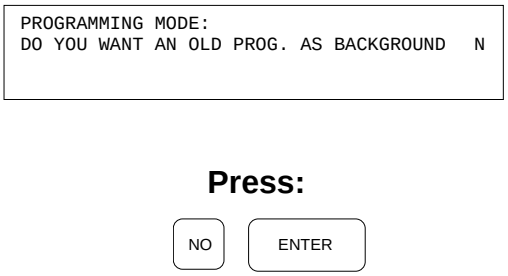
If **ERASE** is pressed, an entire program can be deleted.

64



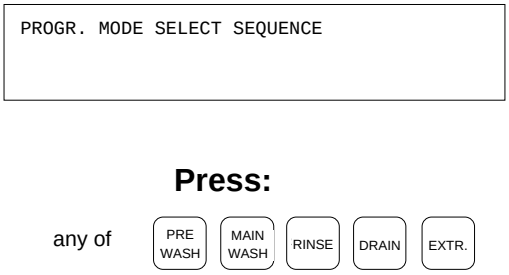
0167

65



0178

66

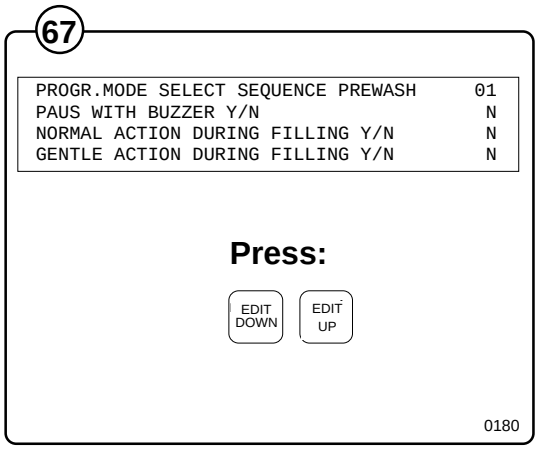


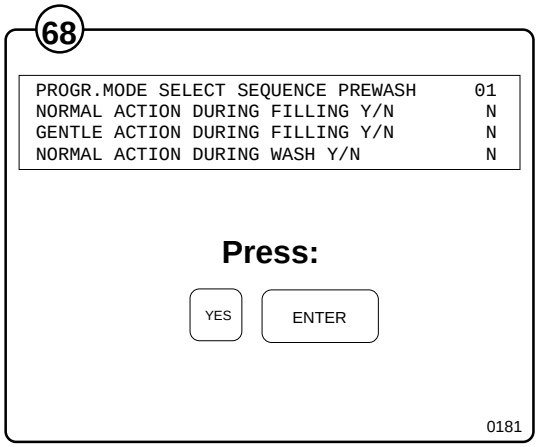
0179

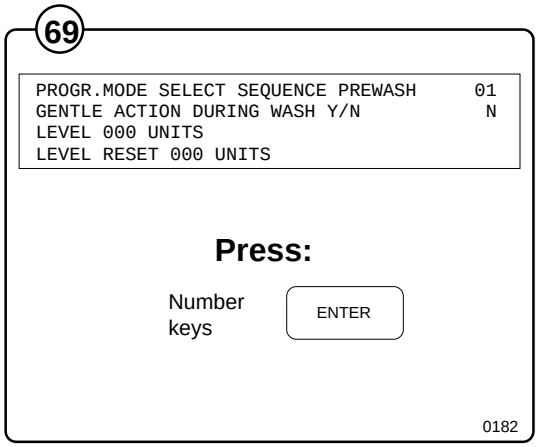
Answering questions

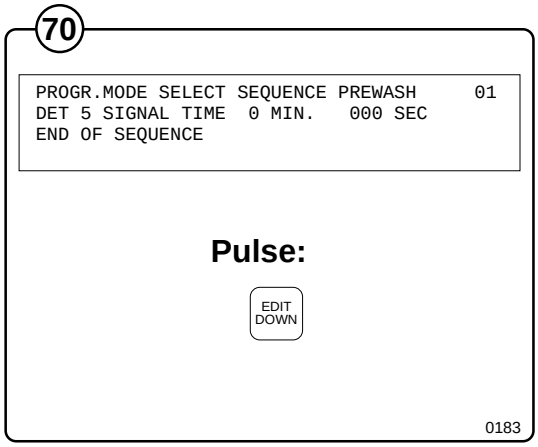
The general principle for answering questions is the same for all sub-programs:

- 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. (Fig. 67)
- 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. (Fig. 68)
- Questions which are answered with a number are pre-programmed to O. Use the number keys and press **ENTER** when the number is correct. (Fig. 69)
- 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. 70)









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. (71) 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. (72) 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. (73) 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. (74) The table shows the recommended values for the relevant machines.

71

```
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

72

```
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

73

```
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

74

Machines with fixed drums

Model	Level (units) Low	High
FL 125	40	80
FL 185	40	80
FL 244	45	90
S 150	40	80
S 230	45	90

Free-swinging machines

Model	Level (units) Low	High
EX 12	145	175
EX 22	160	195
EX 80	85	150
EX 100	140	220
EX 200	100	220

Refilling

Fig. (75) 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.

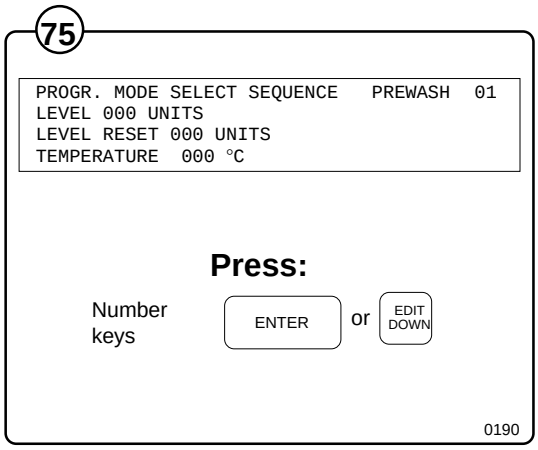
Temperature

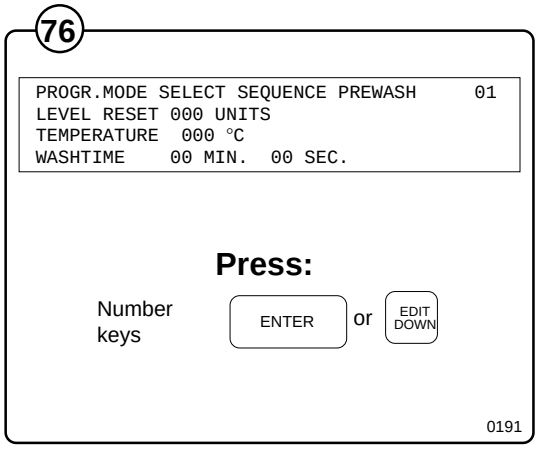
Fig. (76) The water temperature can be programmed either in °C or °F. Use the °C/°F button to change between scales (note that the change is not displayed until the next change in the display window is made).

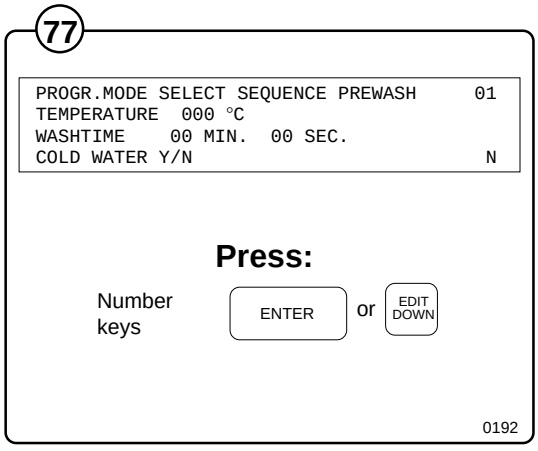
Temperatures can be selected within the range of 32-212°F (0-100°C) in stages of 1°.

Time

Fig. (77) 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.







Water filling

Flg. 78

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.

Supply injector

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

Fig. 79

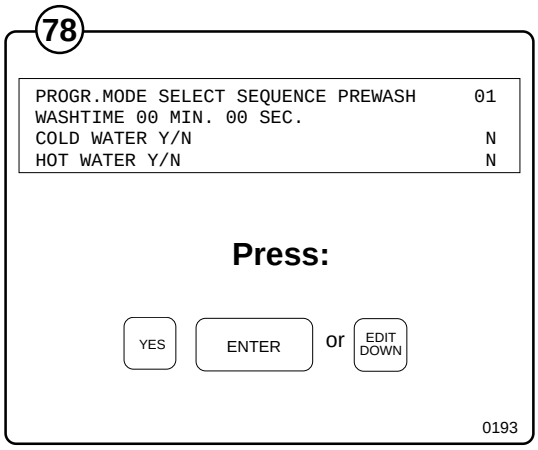
- 1. By answering YES to the first five questions, the respective supply injector valve will be open all the time water filling is in progress.

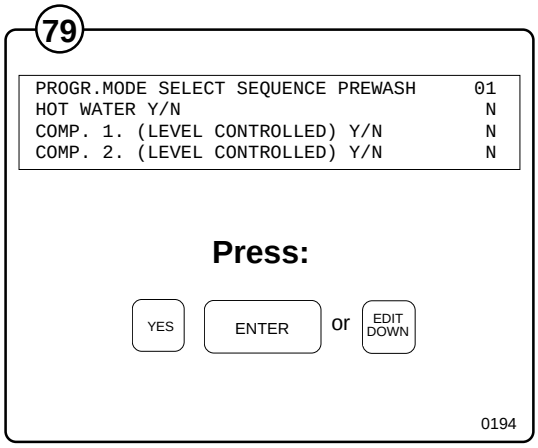
Fig. 80

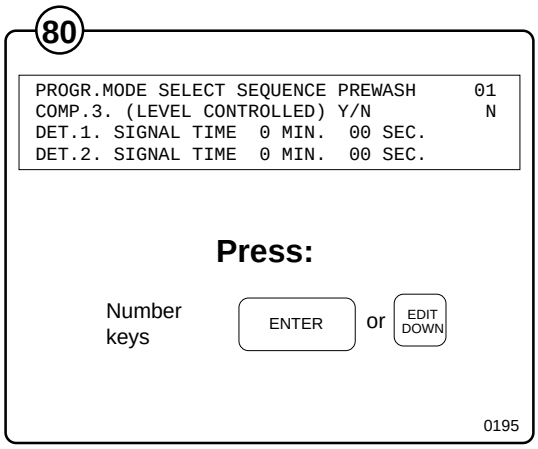
- 2. By stating the times for the last five questions, the respective supply injector valve will open for the pre-programmed time. The valves will start to open when water is filled.

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. 81 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. 82 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. 83 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. 84 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).

81

```
PROGR.MODE SELECT SEQUENCE DRAIN      01

PAUSE WITH BUZZER Y/N                  N
NORMAL ACTION Y/N                      N
```

Press:

YES | ENTER | or | EDIT DOWN

0196

82

```
PROGR.MODE SELECT SEQUENCE DRAIN      01
PAUSE WITH BUZZER Y/N                  N
NORMAL ACTION Y/N                      N
GENTLE ACTION Y/N                      N
```

Press:

YES | ENTER | or | EDIT DOWN

0197

83

```
PROGR.MODE SELECT SEQUENCE DRAIN      01
DISTRIBUTION Y/N                       N
DRAIN 1 Y/N                            N
DRAIN 2 Y/N                            N
```

Press:

YES | ENTER | or | EDIT DOWN

0198

84

```
PROGR.MODE SELECT SEQUENCE DRAIN      01
DISTRIBUTION Y/N                       N
TIME 00 MIN. 00 SEC.
END OF SEQUENCE
```

Press:

Number keys | ENTER

0199

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. 85 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.

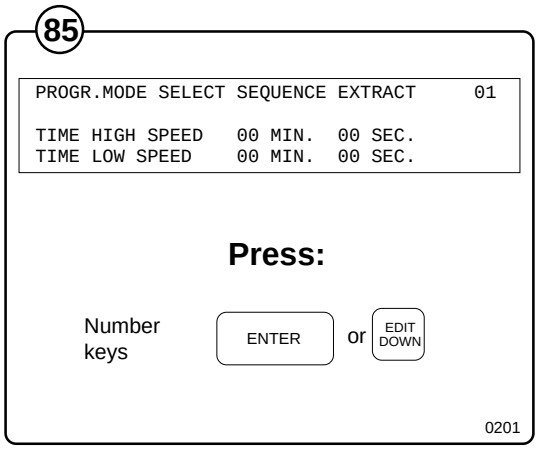
Programming complete

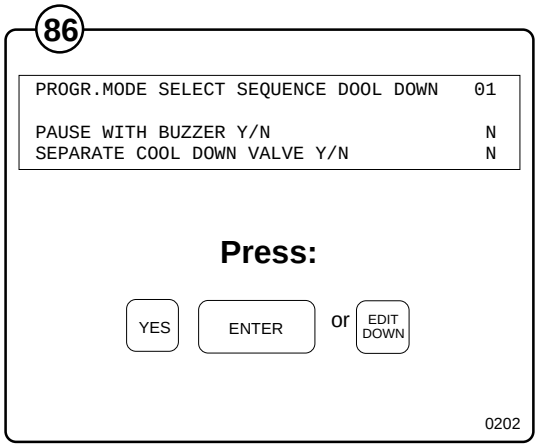
- When ''END OF SEQUENCE'' appears on the third line of the display window and all questions are answered, press **EDIT DOWN**.
- Answer NO to the question ''END PROG. SESSION Y/N?'' if there are more sub-programs to be answered. Answer YES if the sub-program is the last in the completed program. The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

Cooling

Pause with signal

Fig. 86 If the question is answered with YES, the machine will stop before the sub-program starts and a buzzer will sound.





Special cooling valve

Flg. (87) Answer YES is there is a separate water valve use for cooling. If the answer is NO, the standard cold water inlet is used.

Gentle action

Fig. (88) 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. (89) 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. (90) 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.

87

```
PROGR.MODE SELECT SEQUENCE COOL DOWN   01
PAUSE WITH BUZZER Y/N                   N
SEPARATE COOL DOWN VALVE Y/N            N
GENTLE ACTION Y/N                       N
```

Press:

YES ENTER or EDIT DOWN

0203

88

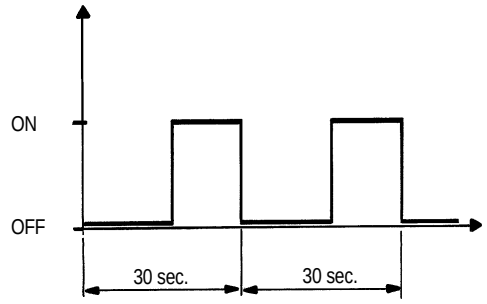
```
PROGR.MODE SELECT SEQUENCE COOL DOWN   01
SEPARATE COOL DOWN VALVE Y/N            N
GENTLE ACTION Y/N                       N
ON TIME 212-158°F (100-70°C)   000 SEC..
```

Press:

YES ENTER or EDIT DOWN

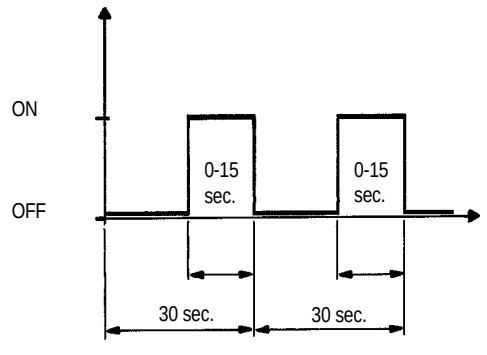
0204

89



0205

90



0206

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:

Fig. 91

- 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.
- 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. 92

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

Fast cool down

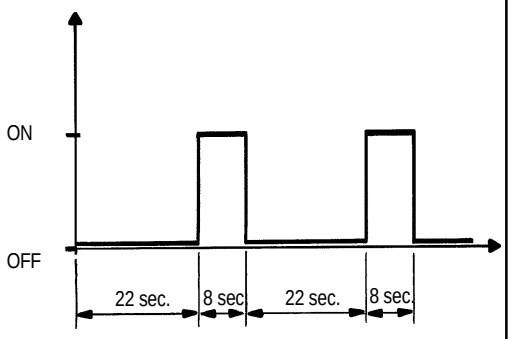
Fig. 93

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

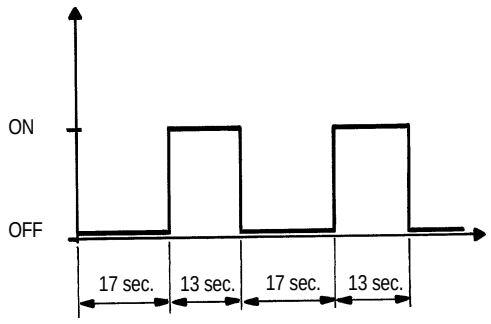
- When ''END OF SEQUENCE'' appears on the third line of the display window and all questions are answered, press **EDIT DOWN**.
- Answer NO to the question ''END PROG: SESSION Y/N? if there are more sub-programs to be answered. Answer YES if the sub-program is the last in the completed program. The continue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

91



0207

92



0208

93

```
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. (94)

- 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. (95)

- 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. (96)

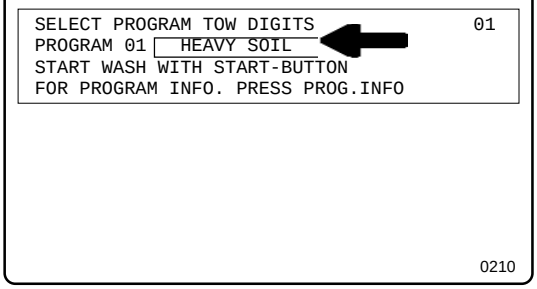
- When a sub-program has been programmed, ''END PROG. SESSION Y/N?'' appears. Answer NO when more sub-programs are wanted.

  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

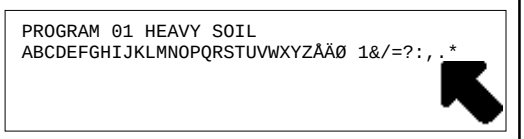
Fig. (97) If the question is answered with YES, the washing machine stops after the wash program is complete and a buzzer sounds.

94



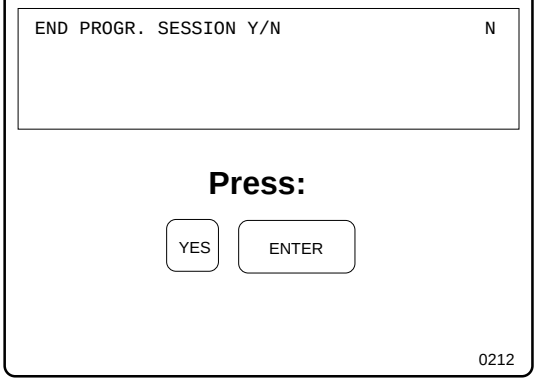
0210

95



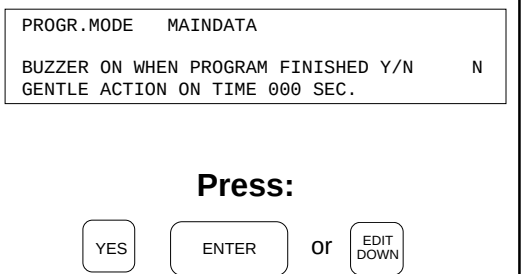
0211

96



0212

97



0213

Times for normal action and gentle action

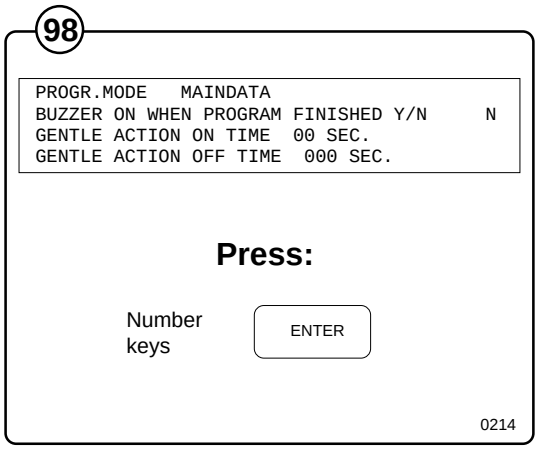
Fig. 98 The times for rotating and stationary drum during normal and gentle action can be programmed. All times can be selected within the range of 0-30 seconds with 1 second intervals.

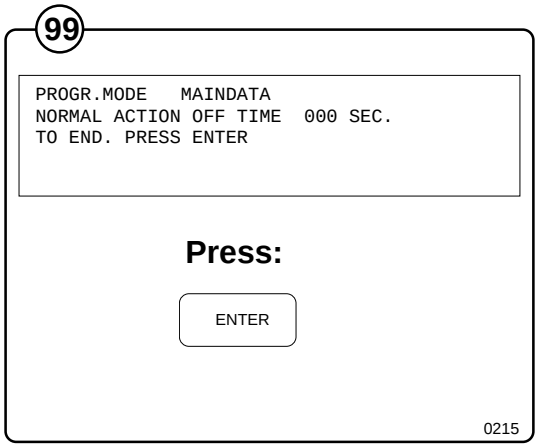
Fig. 99 Press **ENTER** when ''TO END. PRESS ENTER'' is displayed in the display window.

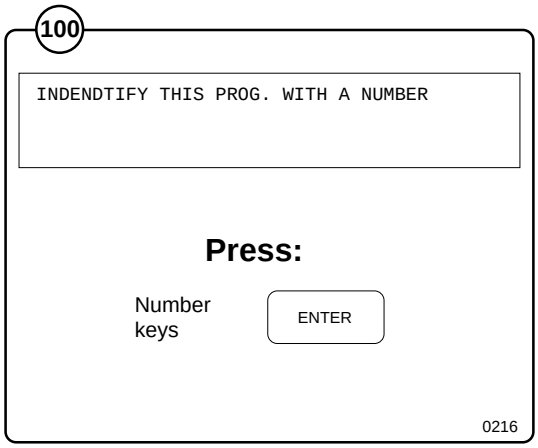
Entering the program number

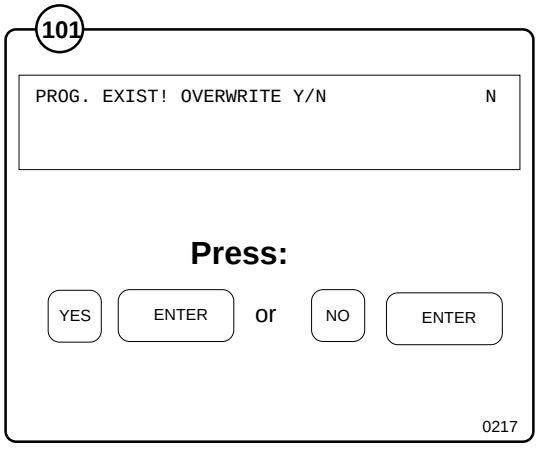
Fig. 100 Enter a two-digit number and press **ENTER**. Note that the numbers 01-09 are reserved for factory programs.

Fig. 101 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. 102 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.

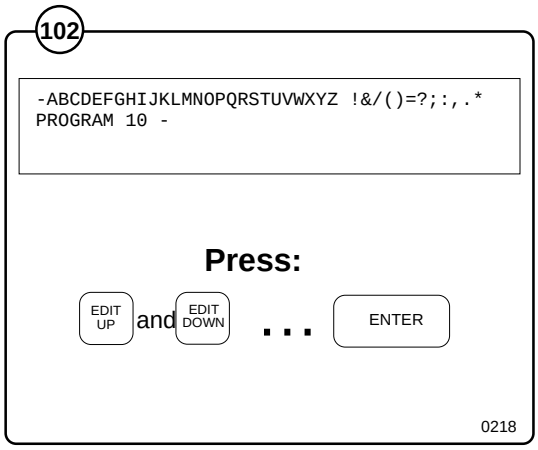
The way in which text is entered described under the heading ''TEXT'' earlier in the manual.

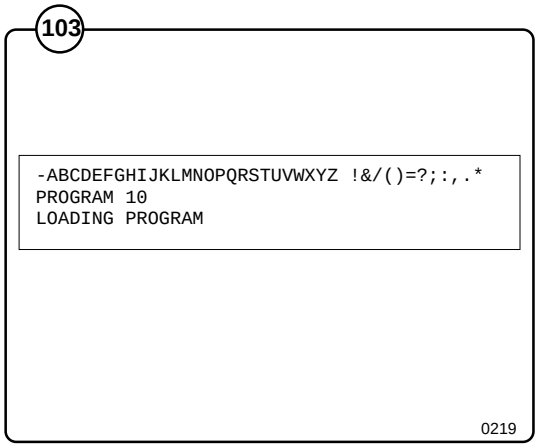
Saving programs

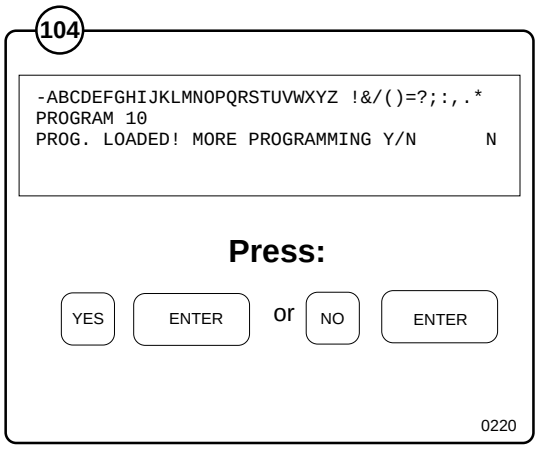
Fig. 103 When the program has been given a name, the program is saved in the program memory.

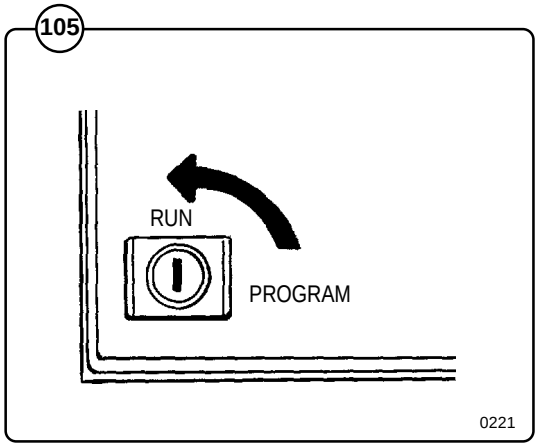
Fig. 104 You are then asked if further programs are to be programmed. Press **YES** and **ENTER** if this is the case.

Fig. 105 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. 106 Turn the key to the **PROGRAM** position. The first question will now be displayed in the display window.

Select an old program

Fig. 107 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

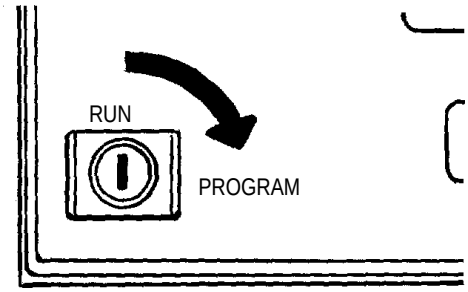
Fig. 108 To rapidly reach the module in the wash program that is to be altered you can rapid advance through the program module-by-module by keeping the **EDIT DOWN** button continuously depressed.

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. 109 Depress **ENTER** once.

106



0167

107

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

Press:

YES | ENTER | Number keys | ENTER

0222

108

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

Press:

EDIT DOWN

0223

109

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

Press:

ENTER

0224

Fig. 110 The cursor will appear on the first line of this sub-program.

Fig. 111 Use **EDIT UP** and **EDIT DOWN** to move within the sub-program to reach the line(s) to be altered.

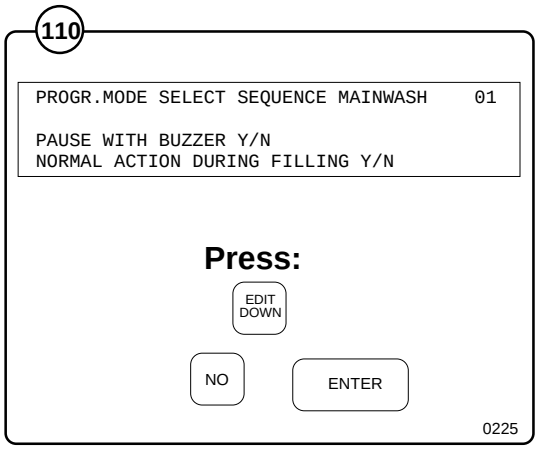
NOTE

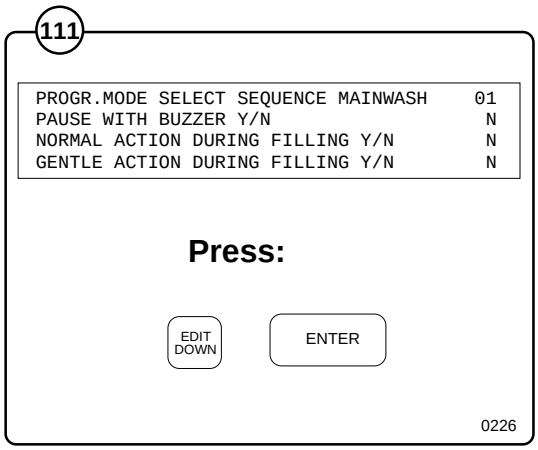
ENTER is to be used only as an acknowledgement when sub-questions are to be altered. Use buttons EDIT UP and EDIT DOWN to move around within the program.

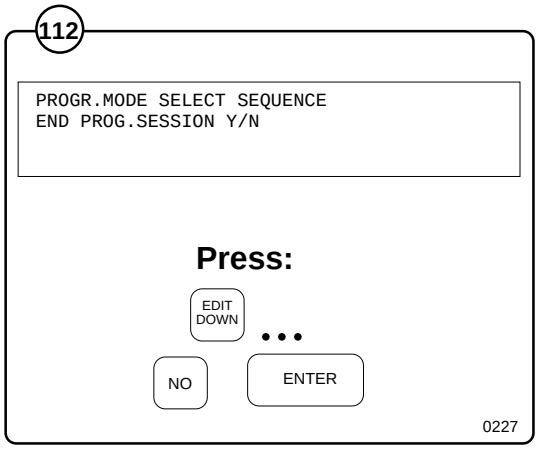
Fig. 112 When changes have been made to the module and you reach its last line, the ''END PROGR. SESSION Y/N'' query will appear. Enter **NO** if you wish to continue making changes to any other module and press **ENTER**.

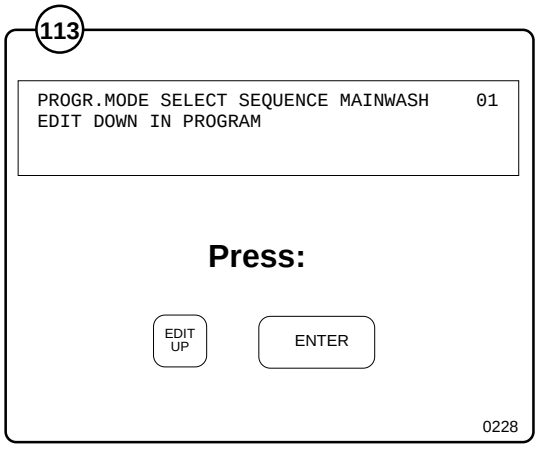
Fig. 113 To move to another module use **EDIT U**P or **EDIT DOWN** buttons and continue as described above.

(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

Fig. 114 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. 115 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. 116 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'').

Fig. 117 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.

114

```
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

115

```
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

116

```
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

117

```
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. 118 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.

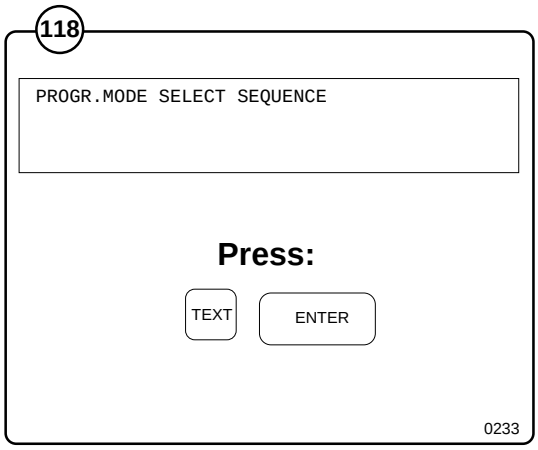
Fig. 119 The old text can be deleted with **ERASE**. Ifs the old text is to be partially altered, the text is deleted up to where the change is to be made and then rewritten.

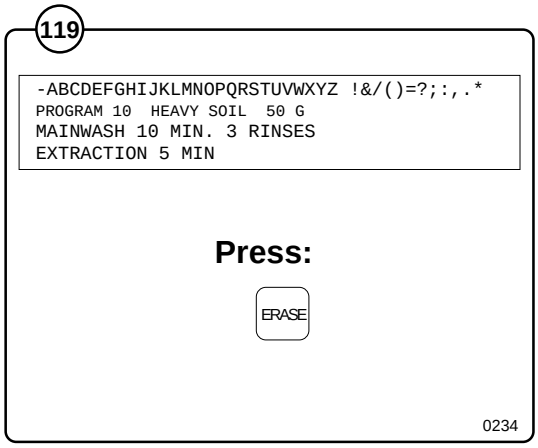
Refer to heading ''TEXT'' earlier in the manual when entering text.

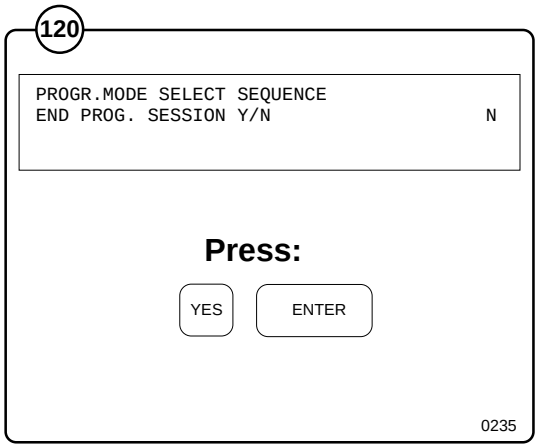
Completing the programming

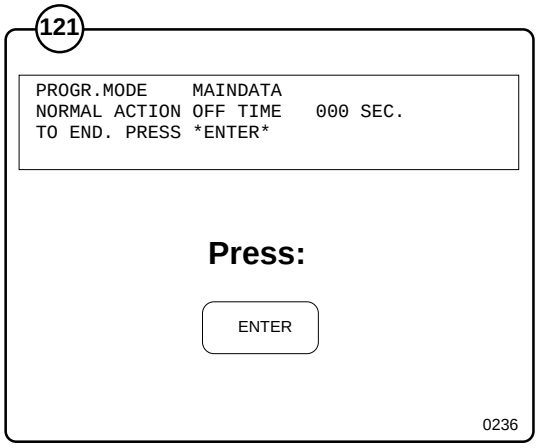
Fig. 120 Come out of the program you are in at the moment (see ''Looking through the program''). Answer YES to the question ''END PROGRAM. SESSION Y/N?''

Fig. 121 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.









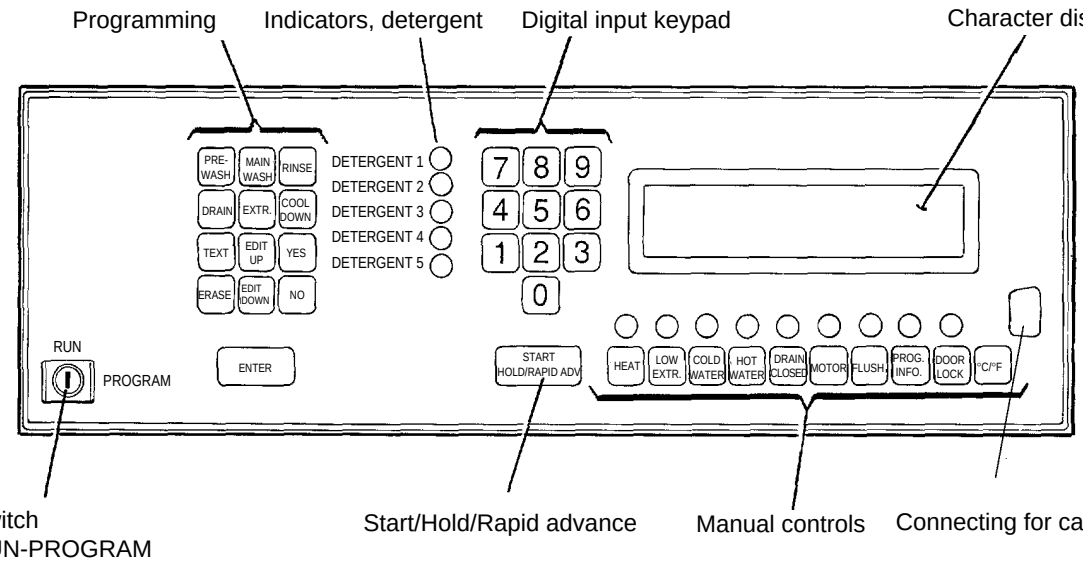
Procedure for use

All operations, including the programming of new wash 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. (122) 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 push 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 operating position and the programming position.
- indicators for supplies.

(122)



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).

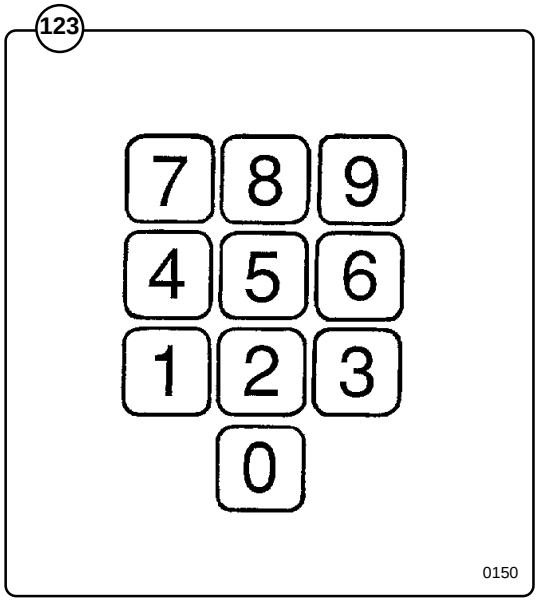


Fig. 123

- Select a program number by entering two digits 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.

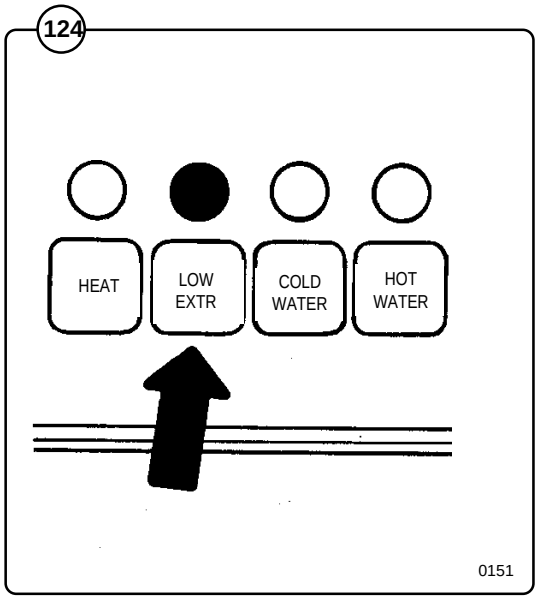


Fig. 124

If only slow spin is required, enter **LOW EXTR.**

Program information

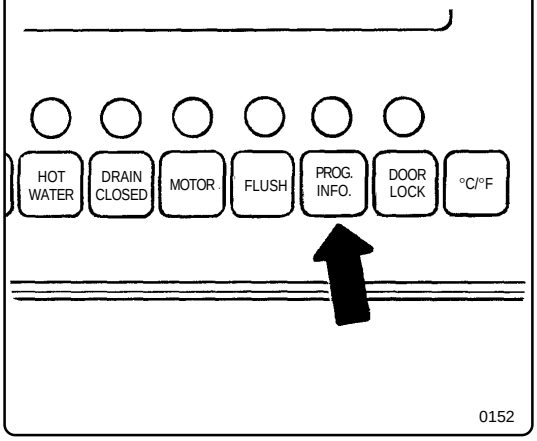
Fig. 125 When a program has been selected and **PROG. INFO.** is pressed, further information about the program is shown in the display window's bottom lines.

Measuring the detergent

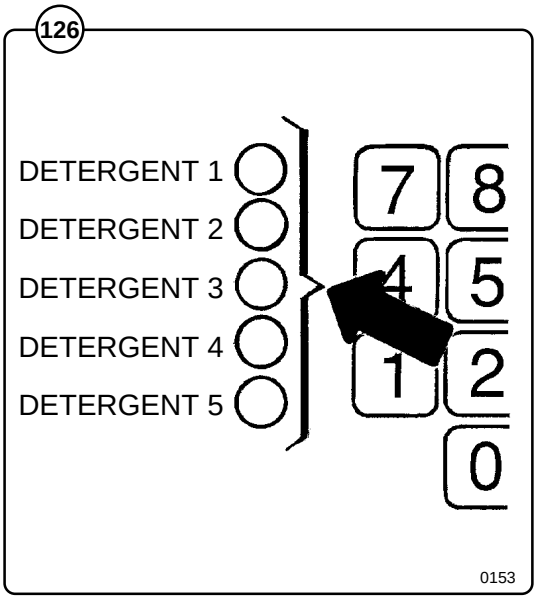
Fig. 126 Five lights on the panel indicate which detergent compartments will be used, or supply signals provided during washing. Will be lit when specific detergent compartment is used, or signal provided.

Fig. 127 If the machine's system for powder detergent is used: meter the detergent and any additives according to the lamp indication.

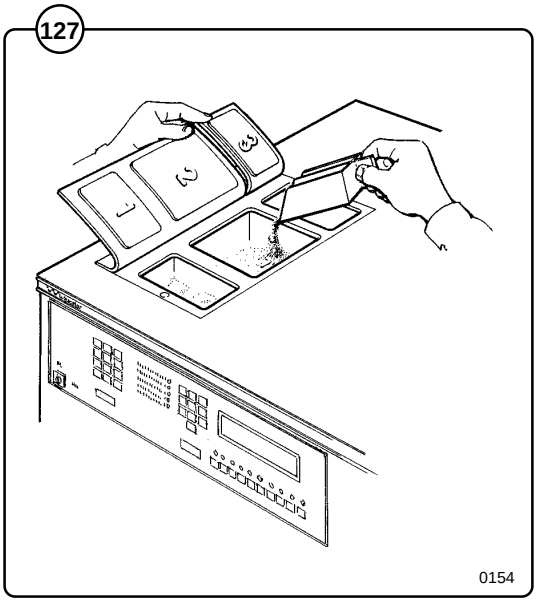
125



126



127



Starting the program

Fig. 128 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. Fig. 129

Temporary stop

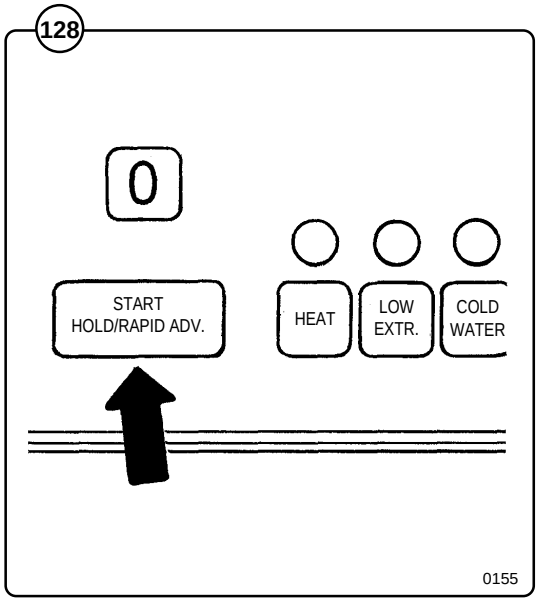
Fig. 128
- Press **START/HOLD/RAPID ADV..** All active functions (motor, filling with water and heating) are switched off. The drain will remain closed and the door locked.

Fig. 128
- 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.

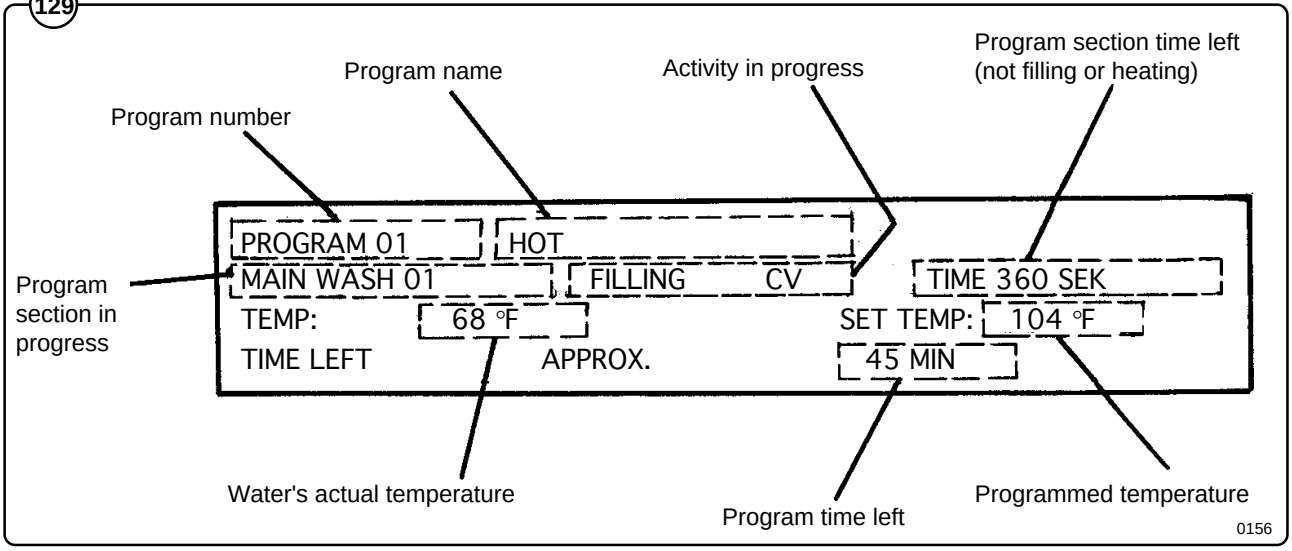
Fast forward

Fig. 128
- 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.

128



129



Programmed stop

Fig. (130) 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

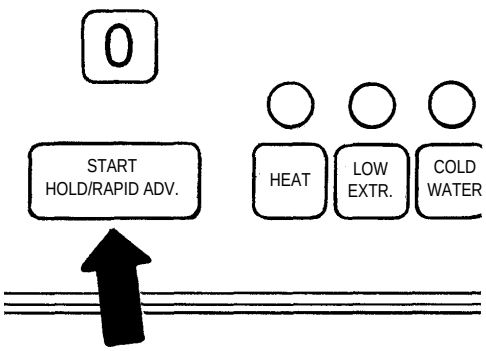
Fig. (131) If **DOOR LOCK** and **MOTOR** are pressed before starting or while a program is operating, the drum will continue to rotate after the program is completed. The drum is stopped again by pressing **MOTOR** again. Then press **DOOR LOCK.** The door can then be opened after 30 seconds.

Finishing off

When the wash is completed, the door is locked for 30 seconds. A buzzer may sound if this function is programmed.

Open the door and take out the wash.

130



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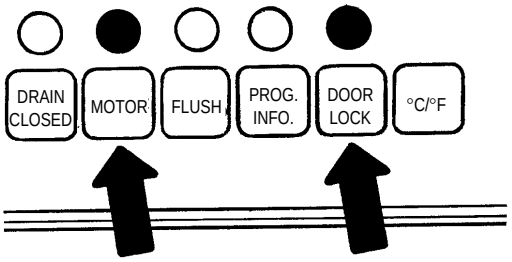

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Manual washing

- The 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 each time they are pressed.

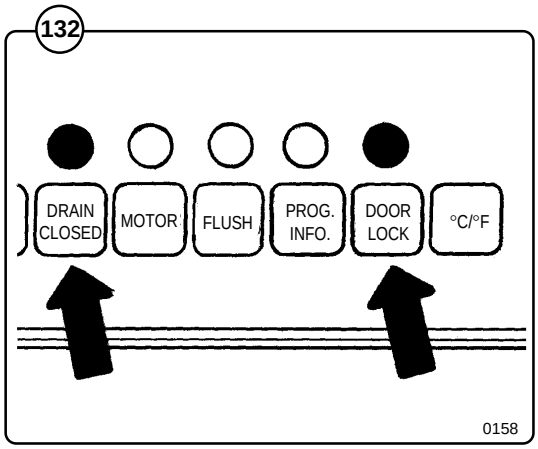
Fig. 132
- Lock the door by pressing **DOOR LOCK** (the lamp above the shall light up). Note that the door must be locked for other manual operation to be possible.

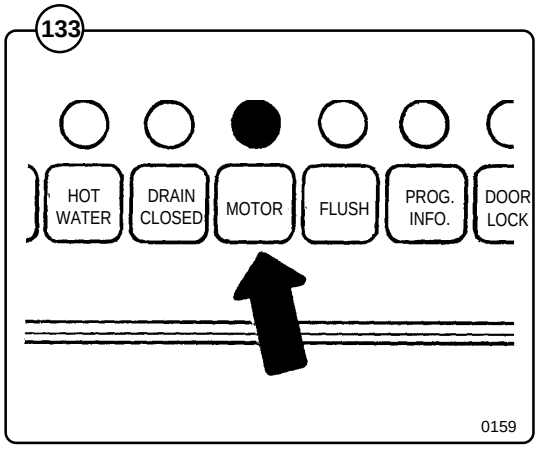
Fig. 133
- The wash motor is started and operates with a reversing action with the **MOTOR** button.

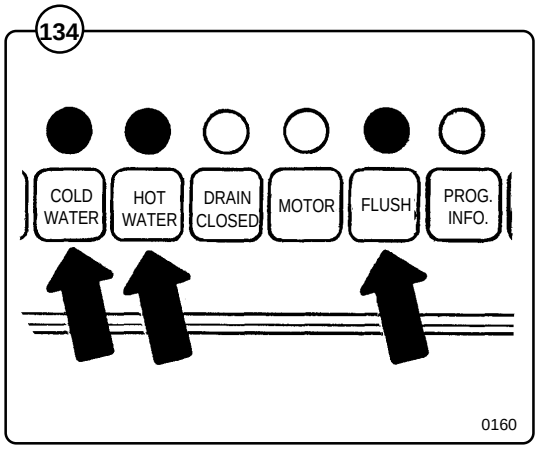
Fig. 134
- Water is filled with **COLD WATER** and **HOT WATER. FLUSH** is used to wash down detergent from compartment 1 (pre-wash) or detergent valve 1.

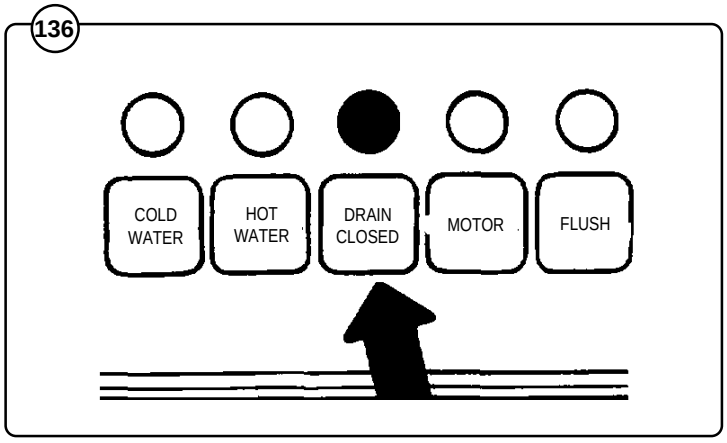
Fig. 135
- The wash water is heated by pressing HEAT. Note that there is no temperature limit or indication of the temperature during manual washing. Heating is discontinued however at 208°F (98°C).

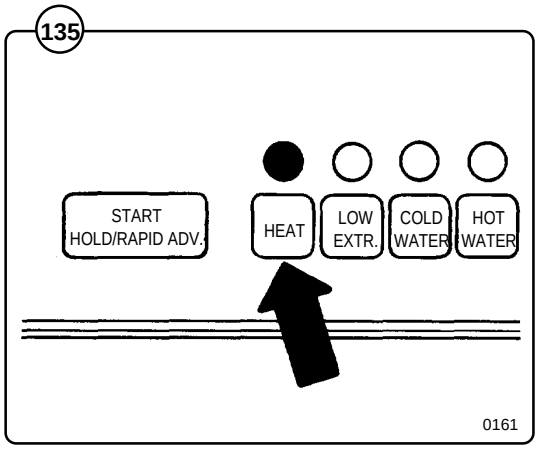
Fig. 136
- The drain valve is operated with **DRAIN.** The valve is closed when the light is on.











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. 137

- Switch off the activated function so that all control lamps above the controls go out. The door can be opened after 30 seconds.

Program statistics

Fig. 138

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

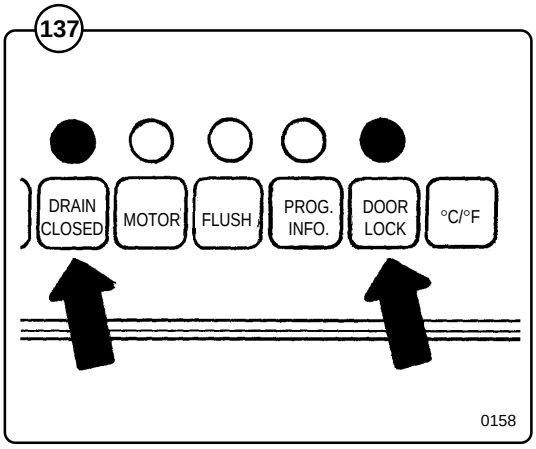
Fig. 139

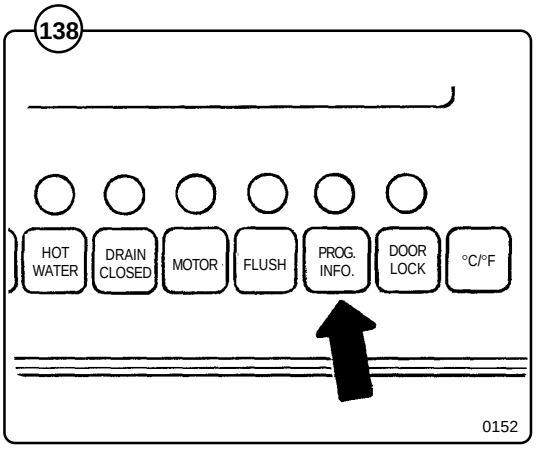
Fig. 140

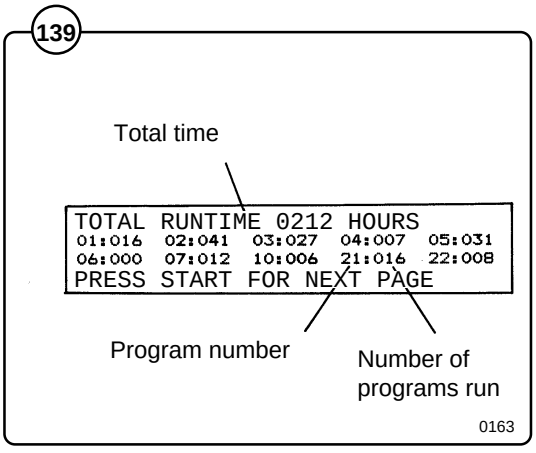
- The machine's operating time in hours is displayed first followed by the number of programs operated for the different programs. New programs are brought forward by repeatedly pressing **START/HOLD/ RAPID ADV.**

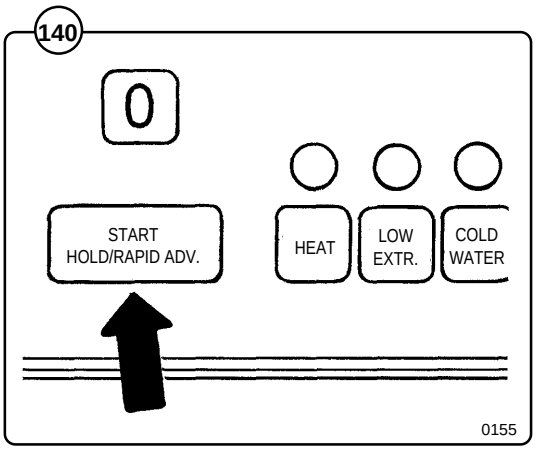
Fig. 138

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









Maintenance

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

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

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

Daily

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

Fig. 141

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

Weekly

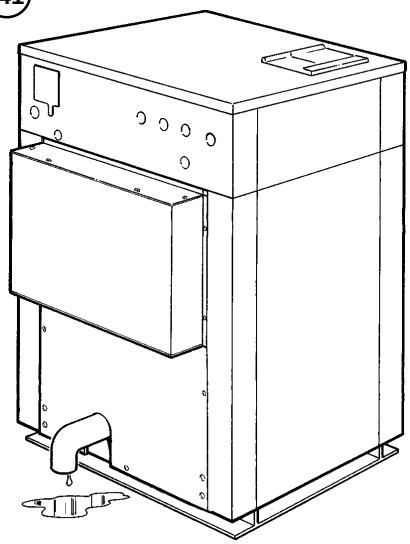
- Remove hose from drain connection and clean inside drain valve.

Every three months

Fig. 142

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

141



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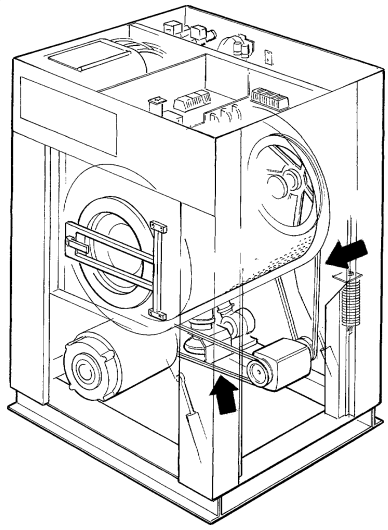

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Service information

Fig. 143 The machine's electrical power connection cable shall 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.

143

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.

Trouble-shooting

If machine does not start

Fig. 144

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

B Check door safety switches.

C Check glass cartridge fuses.

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

If water does not drain

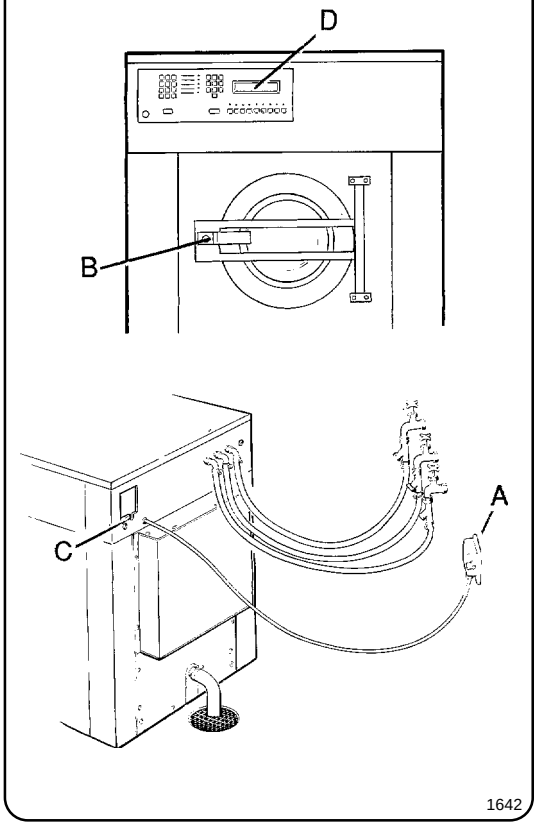
Fig. 145

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

B Check drain valve and solenoid for proper operation.

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.

144



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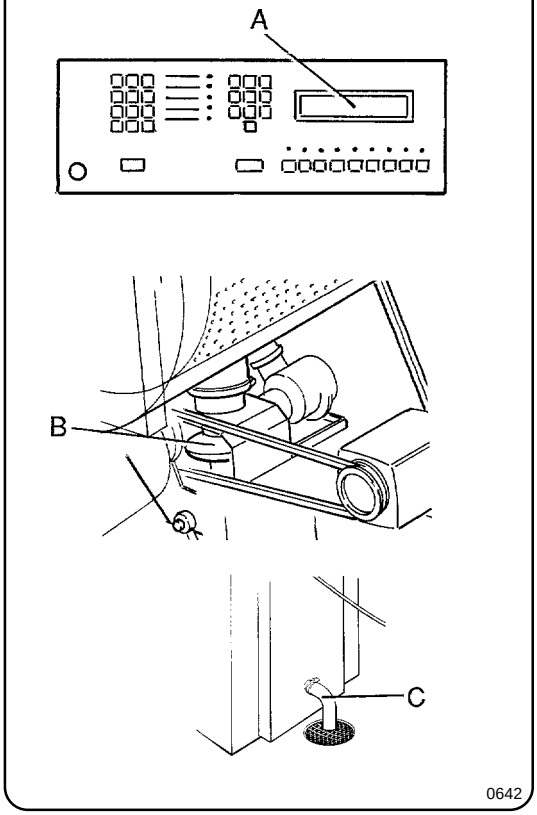

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If machine does not extract

Fig. 146

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

B Check extract relays and relay coils for proper operation.

If motor does not operate at wash speed

Fig. 147

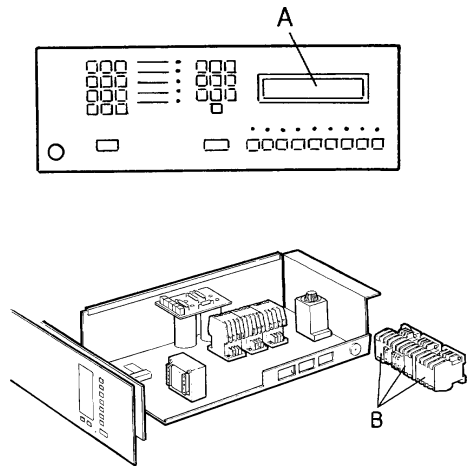
A Check for fault indication on display (see under the heading "Service Information").

B Check wash relays.

C Check motors and V-belts.

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

146



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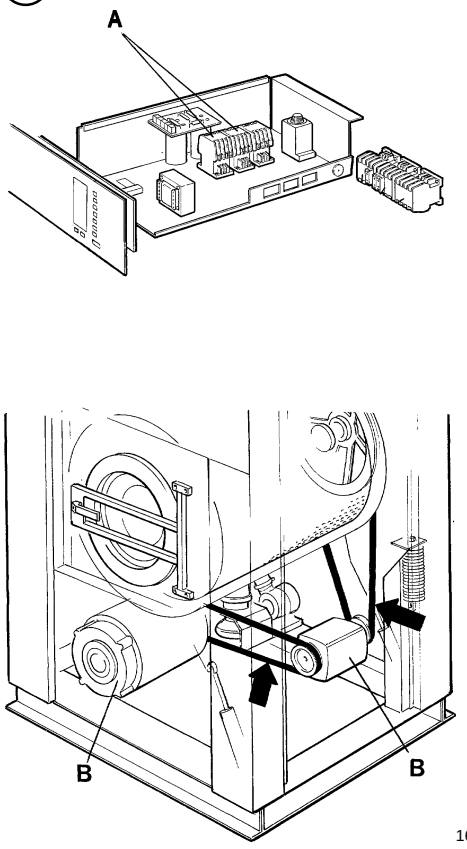

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If machine runs slowly on wash speed or there is a slapping or thumping noise

Fig. 148 A Replace V-belts

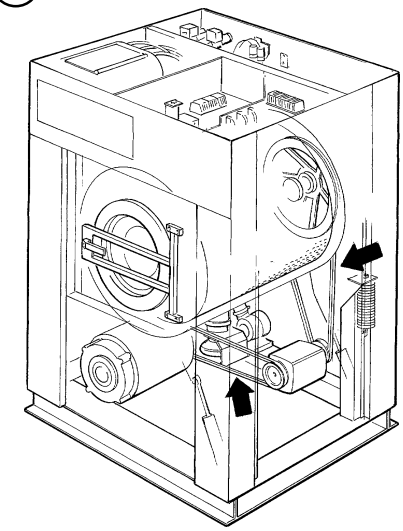
If a metallic noise can be heard at rear of machine

Fig. 149 A Tighten lock screw on pulley on motor shaft.

If the door is leaking

Fig. 150 A Check door gasket. If gasket is in good condition, check the tension between door gasket and door frame and adjust.

148



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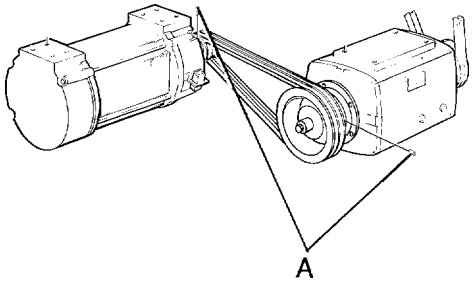

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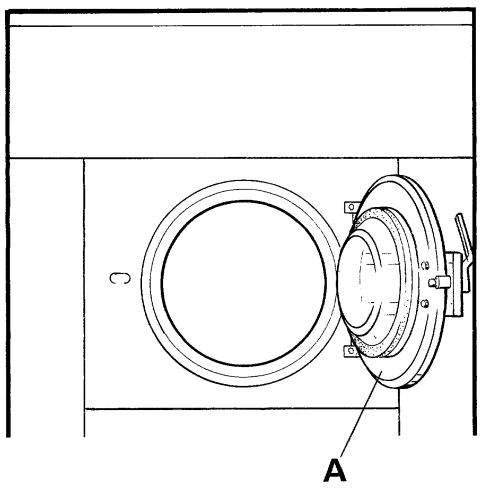

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If there is leaking around the glass

Fig. 151

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

Replace door gasket if worn.

If water does not enter the machine

Fig. 152

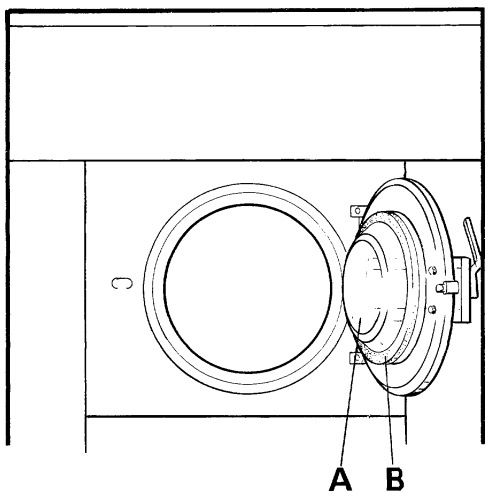
A Check for fault indication on display (see under the heading "Service Information").

B Check the value coils on inlet valves.

C Check wires leading to electric coils.

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

151



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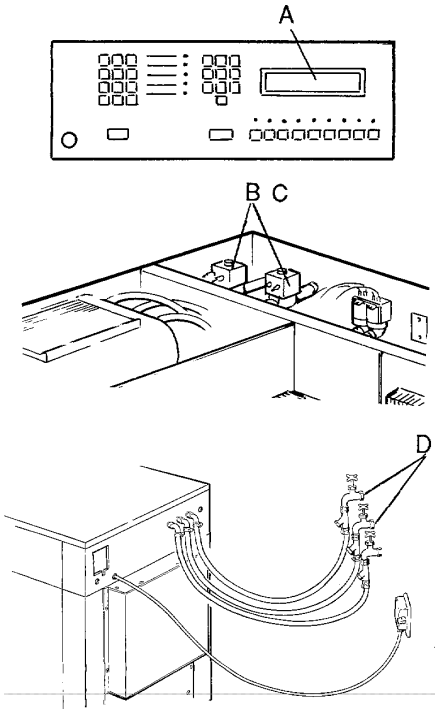

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If water continues to fill without stopping

Fig. 153

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.

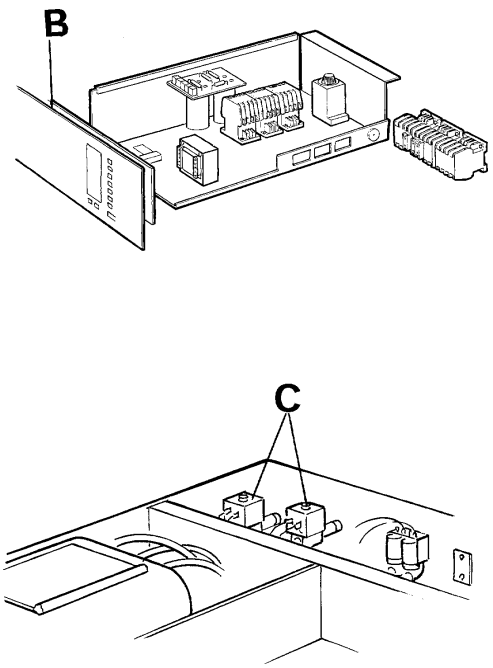
If water continues to flow without filling machine

Fig. 154

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

B Check seating of drain valve.

153



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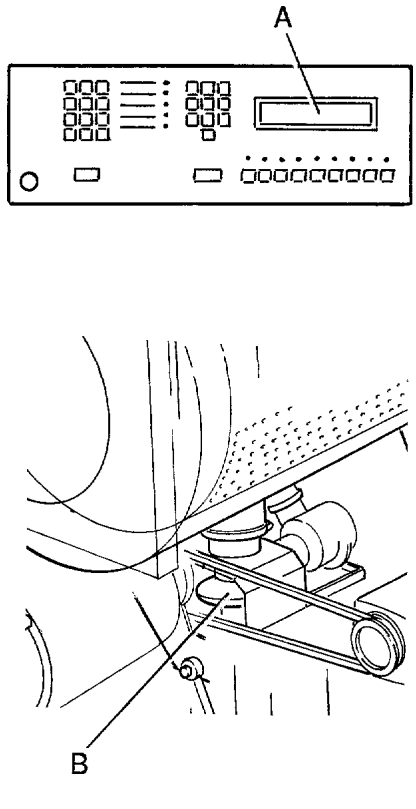

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If machine vibrates excessively

Fig. 155

A Check the out-of-balance detector switch.

B Check the shock absorbers and the springs of the drum suspension.

If safety fuse blows at the beginning of the cycle

Fig. 156

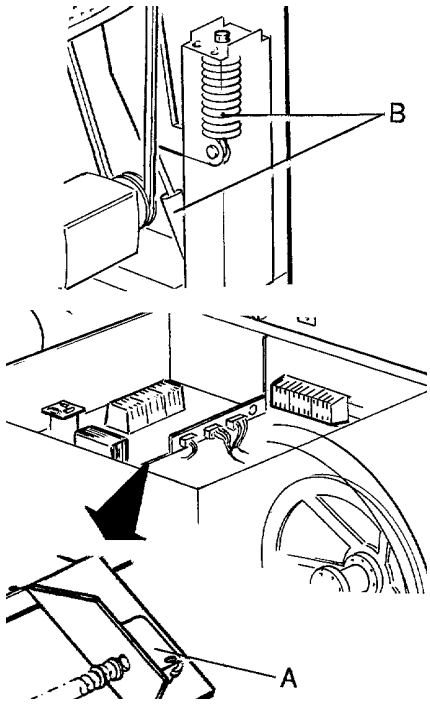
A Replace fuse.

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

NOTE

The electronic timer has a built in service program that can be useful when troubleshooting. Contact service personnel for further information.

155



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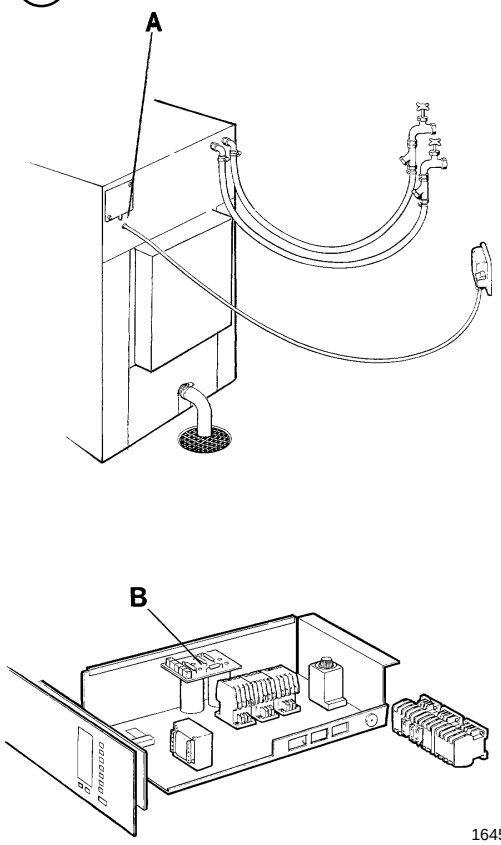

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