ILS OPL

Installation and Operating Manual

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PREFACE

This manual describes how to install, set up, operate and maintain the ILS OPL Laundry Dispenser. It corresponds to version 3.00 of the ILS OPL internal software. Some features may be different or may be absent in older versions of the software. The software version number is displayed briefly when ILS OPL is first switched on, and also appears at the bottom of printed reports. Although every effort has been made to ensure the accuracy of information conveyed in this document, no guarantee is made. Material in this manual is subject to change without notice. Manual revisions will be made on an as needed basis. Special circumstances involving important design, operation or application information will be released via Equipment Technical Bulletins.

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INTRODUCTION

Do not pump solvents of any kind through this system without prior consultation with Technical Services.

ILS OPL was designed to simplify the job of injecting liquid chemicals into virtually any washer. The initial target application is the small to medium sized washer and accounts (machines in the 15 to 100 Kg range) in on-premise laundries.

ILS OPL (hereafter called the dispenser) is a state-of-the-art dispensing system designed to replace L-4000 and L-70000 equipment and target a similar market worldwide. It performs the same functions as the older systems and provides these enhancements:

- Streamlined, smaller footprint at the customer site
- Simplified washer trigger module (BetaLink) communication structure
- More efficient and accurate chemical dispensing
- Added features for logging and reporting load and chemical use statistics
- Multiple washer chemical delivery
- Flushed chemical capability
- Modern modular components
- Easier to install and maintain
- Flexibility for cost-effective expansion

EQUIPMENT OVERVIEW

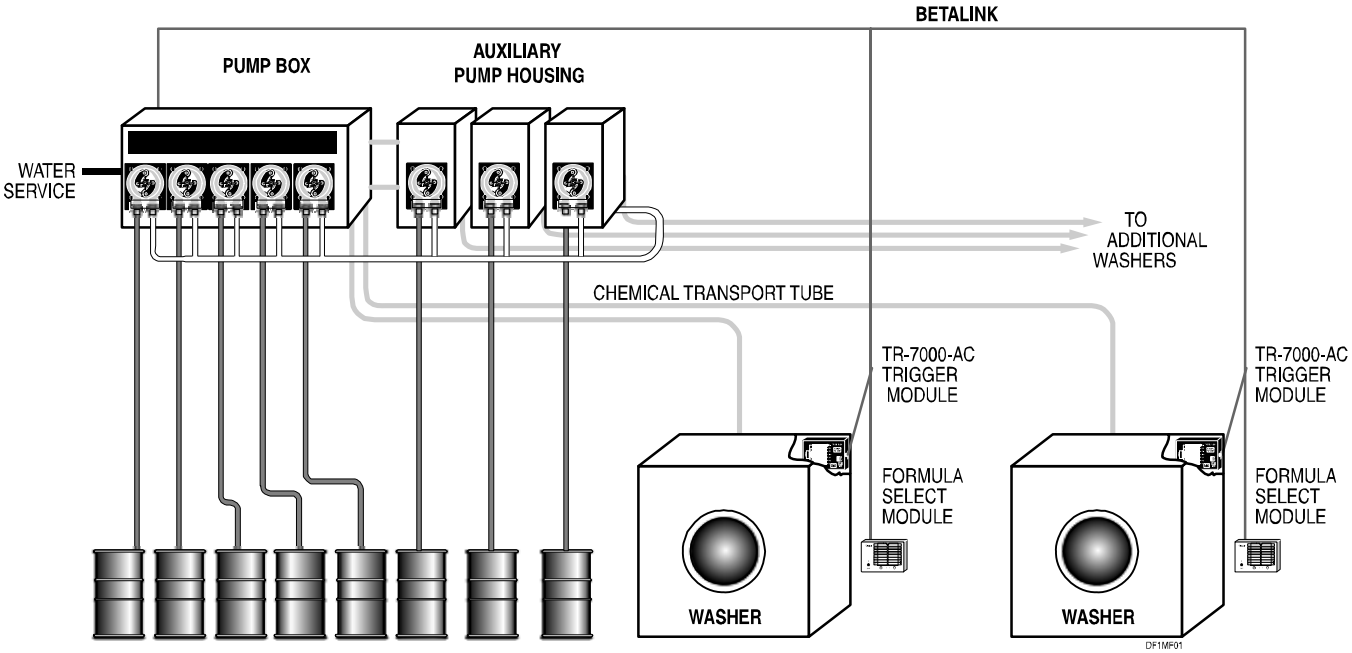

Figure 1. The Dispenser System

Pump Box

The Pump Box includes a break tank, four 0.6 liter/minute (20 ounce/minute) SnapHead chemical pumps and two transport pumps. This pump box is suitable for an account consisting of 4 chemicals and 2 washers. One additional chemical pump, and one additional transport pump may be added to increase capacity to 5 chemicals and 3 washers.

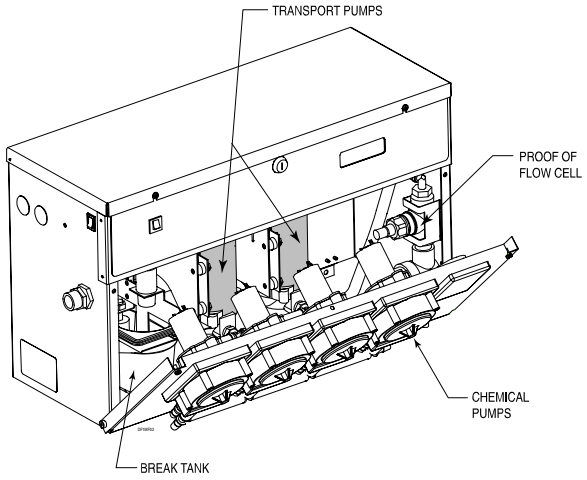

Figure 2. Pump Box

Auxiliary Pump Housing

Up to three Auxiliary Pump Housings may be connected to the Pump Box. Each housing can then be fitted with one chemical pump and/or one transport pump. This expansion option increases the number of chemicals which may be dispensed to a maximum of 8 and the number of washers which may be served to a maximum of 6.

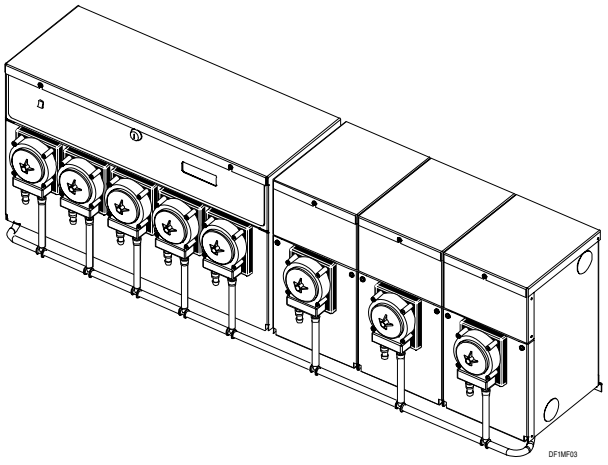

Figure 3. Pump Box and 3 Auxiliary Pump Housings

System Capacity

To visualize the capacity of one dispenser system, refer to **Table 1**. As you move down the left column and add additional equipment, the system capacity increases as shown in the last column. There is no requirement to add chemical pumps and transport pumps in equal numbers. A system could be configured to deliver eight chemicals to two washers, or four chemicals to six washers.

Equipment Option	Number of Pumps	System Capacity
Pump Box	4 chemical pumps 2 transport pumps	4 chemicals 2 washers
Add Inside Pump Box	1 chemical pump 1 transport pump	5 chemicals 3 washers
Add 1 Auxiliary Pump Housing	1 chemical pump 1 transport pump	6 chemicals 4 washers
Add 2nd Auxiliary Pump Housing	1 chemical pump 1 transport pump	7 chemicals 5 washers
Add 3rd Auxiliary Pump Housing	1 chemical pump 1 transport pump	8 chemicals 6 washers

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Table 1. Dispenser System Capacity

TR-7000-AC Trigger Module

The TR-7000-AC Trigger Module provides the signal interface between the washer trigger signals and the dispenser pump box. It provides high voltage signal isolation by converting the various washer signals to a low voltage (BetaLink) serial message.

The TR-7000-AC Trigger Module has 7 fully isolated 24 to 240 VAC trigger inputs. The trigger inputs are connected to the module via a 14-pin connector. A BetaLink cable connects to each TR-7000-AC through a 5-pin Phoenix connector.

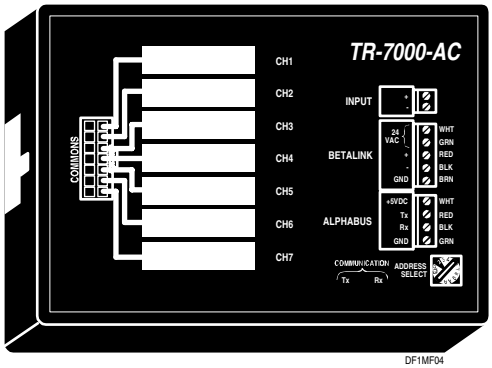

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Figure 4. TR-7000-AC Trigger Module

One or two TR-7000-AC Trigger Modules (mounted in a washer) may be connected to the BetaLink, depending on the number of chemical triggers needed and the amount of data logging desired. The individual trigger modules are electronically differentiated via their unique address switch setting.

RS-3000 Formula Select Module

The RS-3000 Formula Select Module provides a convenient means of expanding the formula capability of mechanical chart type washer controls. This module is mounted at the washer and allows the operator to select one of 16 different wash formulas. In addition, the module can provide a means of cycle identification.

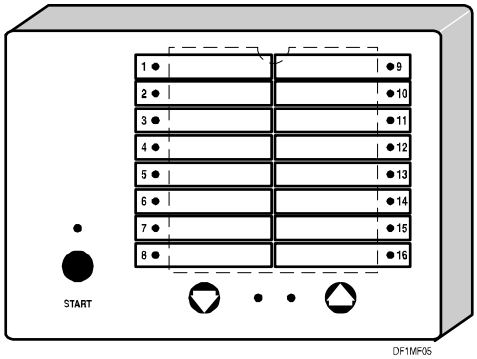

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Figure 5. RS-3000 Formula Select Module

FEATURES AND BENEFITS

Tables 2a and 2b highlights the dispenser features and benefits and describes its technology.

Feature	Benefit	Description
Multiple Washer Feed	• Reduced Feeder Cost • Flexible Equipment Configuration	One Pump Box (with Auxiliary Pump Housings) can serve up to 6 small to medium size washers with up to 8 chemicals. Chemical flow rate is 0.6 liters (20 ounces) per minute.
Water Flush	• Safety • Eliminates Post Dosing Dripping	The unit flushes the transport tube with water after each chemical delivery, which means that most of the time there is only water in the transport tube. Concentrated chemical is only present in the tube during feeds. This makes the system inherently safe to operate and service.
Remote Feed	• Remote Chemical Storage	Product may be fed from pumps up to approximately 60 meters (200 feet) distance from the washer, or 50 psi. This is an important feature for flexible design to accomodate new environmental controls.
Proof of Flow (POF)	• Peace of Mind • Depletion Alarm	The POF cell monitors conductivity in the manifold to ensure that chemical is being pumped and that all loads are dosed properly.
Auto-Calibration	• Accurate Chemical Delivery	The unit automatically calibrates chemical pumps and adjusts for squeeze tube wear. Even when pump flow rate drops over time (due to a worn pump tube), auto-calibration ensures that the correct amount of product is fed to the washer.
Auto-Prime	• No Missed Feeds	The chemical pumps automatically prime at the start of the next feed request after a chemical drum or feed tube is changed to correct for air gaps in the feed line. The transport pumps automatically prime if the manifold goes dry due to siphoning or water supply problems.
Dual-Speed Chemical Pumps	• Accurate Chemical Delivery	Dual-speed chemical pumps normally run at 0.6 liters (20 oz) per minute. May be run at a slower speed for increased accuracy with small doses, or when pumping thick chemicals.
Automatic Reverse	• Safety • Pump Tube Life • Eliminates Cross Contamination	Automatic reverse ensures that there is no concentrated chemical in the pump tube. After each chemical feed, the chemical pumps are reversed to pull water from the manifold back into the pump tube. This eliminates most chemical attack and improves the service life of the pump tube. This feature also eliminates the potential for chemicals to mix with each other in the manifold.
SnapHead Pump	• Safety • Easy Service	The SnapHead pump makes tube service very easy. The modular head can be removed and replaced as a cartridge.
Worn Pump Tube Message	• No Failed Pump Tubes • Less Service Time	A worn pump tube status message notifies you when the flow rate of the pump tube drops 50% (detected by auto-calibration). This is the time to replace the pump tube for preventive maintenance. If you heed this message, this feature eliminates failed pump tubes.
Low Pressure Transport	• Safe Chemical Delivery	Normal operating pressure is under 40 psi. Delivery pressures are a function of the transport system length and the viscosity of the product being delivered.
Chemical Feeds Set in Volume Amounts	• U.S. or Metric Measurement	Chemical feed amounts are entered in volume units (ounce, ml) and not pump run time.

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Table 2a. Dispenser Features

Feature	Benefit	Description
Formula Triggering	• Chemical Dosing Options Suitable for All Washer Types	Powerful triggering modes allow complete flexibility in formula creation. Complex injections can be triggered by single signals. Expands dosing capabilities for machines with limited trigger options.
Data Logging	• System Diagnosis Information • Management Use Information	Depending on the configuration, options include load counting, machine on time, turnaround and excess time, total chemical use, cycle identification and chemical use by classification.
Pre-Dose Classification Identification (PDCI)	• Simplified cycle logging	Coded chemical triggers allow the washer to identify wash classifications, for accurate cycle logging with no need for a formula selector module or a machine on signal.
Printed Reports	• System Diagnosis Records • Laundry Management Records	Complete printouts of wash aisle activity for management use, system setup, normal service and troubleshooting.
Status and Error Messages	• Uniform Quality • Improved Wash Aisle Performance	A wide range of status and error messages keep the operator informed of performance. Error messages can activate an alarm and alert the operator to problems such as an empty chemical drum.
Self Diagnostics	• Display of Alarm Conditions	The system continually monitors itself for malfunction and immediately activates an alarm and displays an error message if a problem occurs.
BetaLink	• Simple Installation	Communication between the remote pump box and the washer and trigger modules is via an RS-485 5-wire BetaLink communication line. This greatly simplifies wiring between the washers and pump box.
Feed Priority Setting	• Priority Chemical Delivery	One chemical can be high priority. Requests for this chemical are answered first should other requests be waiting. If a multiple-feed is in progress, it is interrupted between chemical injections to allow the high priority feed.

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Table 2b. Dispenser Features

CHEMICAL FEED CYCLE EXAMPLE

One chemical feed cycle is described below.

1. Ready and Polling—The system is always ready to respond to a chemical feed request from one of the washers. The pump box continually polls each washer trigger module, monitoring system status and waiting for a chemical request.
2. Washer Chemical Request—Chemical supply triggers are wired from the washer to the trigger module. When a washer has a chemical feed request, its trigger module issues the request to the pump box.
3. Begin Feed Cycle—When the pump box accepts the chemical feed request, it calculates the amount of chemical requested based on the setup information for the requesting washer. At this point, the pump box begins the feed cycle with the preflush.
4. Transport flow calibration—The break tank is filled to the upper limit. The transport pump is then turned on. The time that it takes to lower the water level to the low limit switch is measured. This determines the transport flow baseline.
   - The break tank is refilled.
   - The chemical pump is turned on. The flow rate is again measured by how long it takes to empty the break tank. The difference between the two measurements is computed as the chemical pump's flow rate.
5. Continue Feed—The remainder of the chemical is dispensed.
6. Reverse Pump—At the end of the chemical feed, the chemical pump reverses. This draws water back into the

chemical tube to reduce chemical attack on the pump tube and avoid mixing of chemical in the manifold.

7. Monitor Flow—While the chemical pump runs, the Proof of Flow (POF) cell monitors the conductivity in the manifold to determine if chemical is actually being pumped. If no chemical is detected, the chemical pump is run in Auto-prime mode. If, after thirty seconds, no chemical is detected by the POF, the Proof of Flow Failed error message is displayed on the pump box screen. If chemical is detected during the thirty seconds, the correct amount of chemical is fed.
8. Water Flush—The chemical is transported to the washer and the transport tube is flushed with water.
9. Ready Again—If there are no additional chemical requests to this washer, the transport pump shuts off. The dispenser is ready and polling for another chemical feed.
10. Multiple Chemical Requests from a Washer—If a washer requests two or more chemicals at the same time, they are sent through the transport tube separated by a section of water.
11. Multiple Washers Requesting Chemical—The dispenser serves one washer at a time. If two washers request chemical at the same time, the dispenser queues the request and will promote a priority request. All other feeds are handled first-in first-out (FIFO).
12. Error Messages—Throughout the feed cycle, the dispenser is continually monitoring itself. If, for any reason, it is not able to complete a chemical feed, an error message is displayed on the pump box screen and the pump box alarm relay is set. The error message tells the operator what corrective actions to take.

SPECIFICATIONS

OVERALL SYSTEM

Washers Served
Up to 6

Chemicals Delivered
Up to 8

Maximum Distance from Pump Box to Washer
50 psi (approximately 61 meters/200 feet)

Water Service
- 5 liters per minute (1.3 gallons per minute)
- Tempered water may be required for some applications.
- Inlet pressure between 0.7 and 5 bar (10 and 70 psi)

CHEMICAL PUMPS

Type
Peristaltic (dual roller, spring loaded rollers, self-priming and self-checking)

Capacity
0.6 liters per minute (20 ounces per minute)

Pump Squeeze Tube Material
Silicone

Uptake Tube Maximum Length
3 meters (10 feet)

TRANSPORT PUMPS

Type
Diaphragm

Capacity
2.0 liters per minute (0.53 gallons per minute) @ 50 psi

Ambient Operating Temperature
0° - 50 °C (32° - 120 °F)

ILS OPL PUMP BOX

Size	Height	Width	Depth	
	33.02	55.88	22.75	cm
	13.0	22.0	11.0	in

Enclosure
Type 304 stainless steel

Weight
16.3 Kg (36 lbs) with 5 chemical pumps and 3 transport pumps

Power Requirements
24 VAC @ 5.0 Amperes

AUXILIARY PUMP HOUSINGS

Size	Height	Width	Depth	
	33.02	17.78	22.75	cm
	13.0	7.0	11.0	in

Enclosure
Type 304 Stainless Steel

Weight
5.9 Kg (13 lbs)

Power Requirements
From Pump Box

TRANSFORMER

Size	Height	Width	Depth	
	18.8	15.6	10.8	cm
	7.38	6.13	4.25	in

Enclosure
Painted Steel

Weight
5.9 Kg (13 lbs)

Power Rating
0.15 KVA

Primary
120/240 VAC, 50/60 Hz

Secondary
24 VAC

TR-7000-AC TRIGGER MODULE

Size	Height	Width	Depth
	12.1	17.2	3.8 cm
	4.75	6.75	1.5 in

Enclosure
Molded Plastic

Weight
0.3 Kg (0.68 lbs)

Power Requirements
From BetaLink
24 VAC @ 0.05 Amps

From Triggers
24 to 240 VAC

Trigger Impedance
8.5 K ohms @ 60 Hz, 10.1 K ohms @ 50 Hz

RS-3000 FORMULA SELECT MODULE

Size	Height	Width	Depth
	12.1	17.2	3.8 cm
	4.75	7.75	1.5 in

Enclosure
Molded Plastic

Weight
0.28 Kg (0.6 lbs)

Power Requirements
From BetaLink
24 VAC @ 0.05 Amps

ACCOUNT PLANNING

This section gives you some tools in the form of tables to help you decide which dispenser components to order for your laundry accounts.

LAUNDRY SIZE/DISPENSER COMPONENTS

Use Table 3 to determine the equipment components to order depending on the size of the account (number of washers, number of chemicals) and the capabilities needed. This list does not include spares. Note that the shaded rows indicate the minimum required components for a single system.

Component	Provides	Catalog#	Notes
Pump Box	4 chemical pumps and 2 transport pumps	1207746	One additional chemical pump and one additional transport pump can be added inside the pump box
Transformer	Voltage Stepdown from 120/240 to 24 VAC	092066 (U.S.) 067260 (CE)	One per pump box
TR-7000-AC Trigger Module Kit	See Table 4 for washer system type options	093600	Minimum one per washer
Standpipe Assembly	Tube stiffener for suction tube inside chemical drum	093624	One per chemical
Transport Tubing	Tube that carries chemical from pump box to washer	041778	Length required depends on distance from washers to pump box
BetaLink Cable	5-wire cable that connects pump box to the RS-3000 Formula Select Module and the TR-7000-AC Trigger Module	094479	Length required depends on distance from washers to pump box
Chemical Supply Hose	Hose that carries chemical from the drums to the pumps	3/8” – 017256 1/2” – 041971	Length depends on no. of chemicals and distance from drums to pumps
RS-3000 Formula Select Module Kit	See Table 4 for washer system type options	094488	Optional
Mounting Bracket for TR-7000-AC Trigger Module	Stainless steel bracket that secures one or two TR-7000-AC Trigger Modules	059728	Optional
Auxiliary Pump Housing	Housing for auxiliary chemical and/or transport pumps for more than 3 washers or more than 5 chemicals	093245	3 maximum
Auxiliary Chemical Pump Kit	Additional chemicals beyond 4	093116	4 maximum
Auxiliary Transport Pump Kit	Additional washers beyond 2	097040	4 maximum

Table 3. Dispenser Components

WASHER PERFORMANCE

Use **Table 4** to determine the modules to order for each washer, depending on the chemical feed method and data logging desired (available only if the washer has equivalent signals). In the last column, the underlined term is the name of the washer system type you will set during washer setup. **Appendix A** and **Appendix B** describe chemical feed modes and the trigger functions available in each.

Chemical Feed Method	Data Logging Provided	Wash System Type (Modules to Order per Washer)
Relay Mode - up to 6 chemicals Enhanced Relay Mode - up to 8 chemicals Formula Mode - up to 10 alternate injection groups Automatic Mode - 32 functions	Load counting, machine on time, turnaround and excess time, total chemical use, limited cycle identification based only on trigger counts.	Basic (1 Trigger Module) One TR-7000-AC Trigger Module
PDCI Relay Mode - up to 8 chemicals PDCI Formula Mode - up to 30 formulas PDCI Automatic Mode - up to 31 functions	Load counting, machine on time, turnaround and excess time, chemical use by classification, total chemical use, full cycle identification, operator does not need to select the formula at the washer.	Basic (1 Trigger Module) One TR-7000-AC Trigger Module
Relay Mode - up to 6 chemicals Enhanced Relay Mode - up to 8 chemicals Formula Mode - up to 16 formulas Automatic Mode - 32 functions	Load counting, machine on time, turnaround and excess time, total chemical use, full cycle identification via the Formula Select Module	Basic + Formula Select One TR-7000-AC Trigger Module One Formula Select Module
Relay Mode - up to 8 chemicals Enhanced Relay Mode - up to 8 chemicals Formula Mode - up to 80 alternate injection groups Automatic Mode - 32 functions	Load counting, machine on time, turnaround and excess time, utility use monitoring, chemical use by classification, total chemical use, full cycle identification. Operator does not need to select the formula at the washer. Classification is identified by its unique signature of drains and chemical injections.	Expanded (2 Trigger Modules) Two TR-7000-AC Trigger Modules
PDCI Relay Mode - up to 8 chemicals PDCI Formula Mode - up to 30 formulas PDCI Automatic Mode - up to 31 functions	Load counting, machine on time, turnaround and excess time, utility use monitoring, chemical use by classification, total chemical use, full cycle identification, operator does not need to select the formula at the washer.	Expanded (2 Trigger Modules) Two TR-7000-AC Trigger Modules
Relay Mode - up to 8 chemicals Formula Mode - up to 16 formulas Automatic Mode - 32 functions	Load counting, machine on time, turnaround and excess time, utility use monitoring, chemical use by classification (classification logging in Relay or Formula Modes), total chemical use, full cycle identification via the Formula Select Module	Expanded + Formula Select Two TR-7000-AC Trigger Modules One Formula Select Module
ILS Max Emulation Mode: Relay Mode - up to 8 chemicals Formula Mode - up to 80 alternate injection groups Automatic Mode - 32 functions Washer Hold Relay, POD, local alarm relay, automatic transport timencalculatio	Load counting, machine on time, turnaround and excess time, utility use monitoring, chemical use by classification, total chemical use. Operator does not need to select the formula at the washer. Classification is identified by its unique signature of drains and chemical injections.	Washer Interface Two TR-7000-AC Trigger Modules Washer Interface Module
ILS Max Emulation Mode: PDCI Relay Mode - up to 8 chemicals PDCI Formula Mode - up to 30 formulas PDCI Automatic Mode - 31 functions Washer Hold Relay, POD, Local alarm relay, automatic transport time calculation.	Load counting, machine on time, turnaround and excess time, utility use monitoring, chemical use by classification, total chemical use. Operator does not need to select the formula at the washer.	Washer Interface Two TR-7000-AC Trigger Modules Washer Interface Module
ILS Max Emulation Mode: Relay Mode - up to 8 chemicals Formula Mode - up to 80 alternate injection groups, up to 16 formulas Automatic Mode - 32 functions Washer Hold Relay, POD, Local alarm relay, automatic transport time calculation	Load counting, machine on time, turnaround and excess time, utility use monitoring, chemical use by classification, classification logging in both relay and formula modes, total chemical use. Full cycle identification.	Washer Interface Two TR-7000-AC Trigger Modules Washer Interface Module One Formula Select Module

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Table 4. Washer Module Options

CHEMICAL COMPATIBILITY

Although the dispenser accommodates a wide variety of common and specialized laundry chemicals, there are several product types that are fundamentally incompatible with flushed type systems.

Any product that thickens or gels when mixed with water may not be usable. Depending on the degree of thickening, the use of warm flush water or low chemical pump speeds may allow these chemicals to be used. Products of this type are typically the nonionic surfactants, and non-built detergents with anionic and nonionic surfactants.

Petroleum and solvent-based products are not compatible with the materials used in the dispenser, and should not be used.

Products that have little or no conductivity may be used, but the POF and auto-prime functions will not work. Products such as hydrogen peroxide and mildewcide are among these types of chemicals. Please see the POF/POD discussion in **Pump Setup Mode** for more information.

EQUIPMENT INSTALLATION

UNPACK COMPONENTS

Inspect the shipping containers for signs of damage and report any damage to the carrier. All claims for apparent or concealed damage should be filed with the carrier.

Some accessory components are packed separately. Unpack all the cartons and verify the contents of the shipment against the packing list to be sure the shipment is complete.

INSTALL THE DISPENSER PUMP BOX

The dispenser Pump Box is designed for remote chemical feed and can be mounted up to 200 feet from the most distant washer serviced, with a maximum vertical rise of ten feet. Vertical rises greater than ten feet may require a reduction in the distance between the washer and pump box. Washers may also be located below the pump box provided that siphoning of the break tank does not occur. If siphoning does occur, a siphon breaker or spring type check valve must be used in each transport line.

Determine a location for the pump box where the chemical drums can be easily serviced. For ease of setup and service, mount the pump box such that the screen is at eye level or slightly higher if possible.

1. Secure the mounting rails to the wall. The 34-inch mounting rail is suitable for mounting any configuration of dispenser. You may wish to cut off the unused portion of the rail, or leave it extended for later expansion.

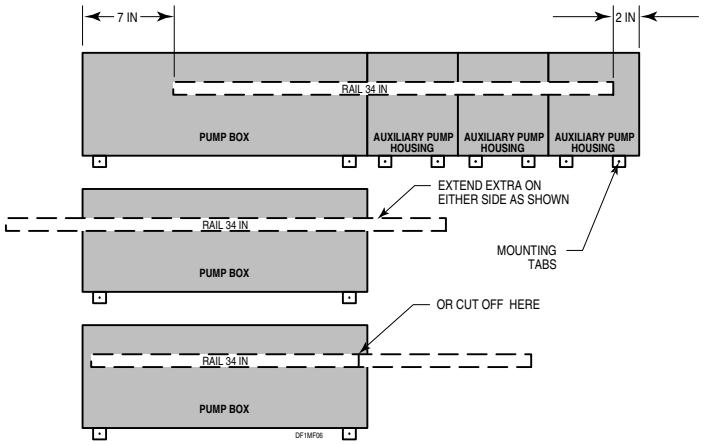


Figure 6. Mounting Rail Configurations

If you are installing on masonry or wood walls, mount the rails directly to the wall. Secure with $^{11}/_{14}$ inch lag bolts or similar heavy duty fasteners.

If you are installing on sheetrock walls or irregular surfaces, you should use a 2-foot strip of 3/4-inch CDX plywood as an intermediate mounting surface for the pump box components. Secure the plywood to the studs in at least six places with 1/4-inch or larger lag bolts or similar heavy duty fasteners. Secure the mounting rail(s) to the plywood.

2. Hang the pump box on the mounting rails. Use the mounting tabs at the bottom of the pump box to secure it to the rail and firmly in place.

NOTE *There is a front panel retaining screw located inside the enclosure, just below the lock. This screw must be retracted to allow the front panel to swing open.*

3. Connect the power transformer as follows:
   - Connect the transformer to the AC line as shown on the transformer label.
   - Connect the 24 VAC output from the transformer to the pump box (see **Figure 7**).
   - The pump box requires 24 Volts AC at 5 Amps, provided by the separate 24 Volt stepdown transformer. The transformer is suitable for 120 or 240 VAC, 50/60 Hz operation.

To avoid noise and reduce the possibility of inadvertent power interruption, you should provide power to the pump box from a dedicated, non-interruptible branch circuit. Wiring must conform to all applicable code requirements. If you hardwire the transformer to the branch circuit, you should install a local service disconnect switch.

4. Connect the POF cable to the POF connector. The cable is loose below the pump box and the connector is shipped plugged into the PCB at the lower leftmost corner (J16).
   - Feed the cable through the opening at the bottom of the pump box.

- Remove the connector and attach the 4 colored wires in the cable to the connector as follows:

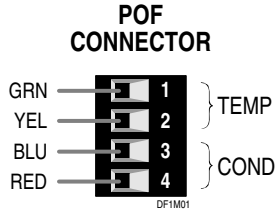
Green to 1

Yellow to 2

Blue to 3

Red to 4

Red and blue are conductivity; yellow and green are temperature.



- Reinsert the POF connector into J16 on the PCB.

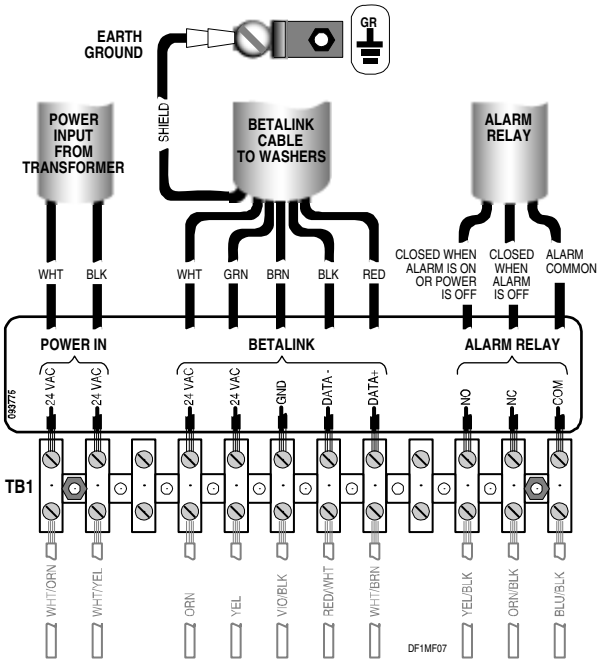


Figure 7. Pump Box Terminal Block Connections

5. Connect external alarm. The pump box includes a Form C relay that will trigger an external alarm. The relay coil is energized in the non-alarm state. If power to the pump box should fail, or any other failure occurs, the relay will switch and trigger the alarm. This provides a fail-safe power configuration.
   - Connect the alarm relay on the same barrier strip as the BetaLink (see **Figure 7**).
   - Provide power to the alarm relay from an external source.
6. Connect the manifold system after you have secured all pump box components to the mounting rail. This will make it easier to position the various components and to determine the proper cut lengths for the manifold tubing.

Each of the optional auxiliary chemical pumps, as well as each of the auxiliary transport pump assemblies, are provided with a modular segment of the manifold system. Some installation-specific configuration of the manifold may be necessary.

You must install the POF cell and filter assembly at the rightmost end of the last auxiliary pump housing (or the pump box if there are no auxiliary pump housings), and plumb it between the last chemical pump and the first transport pump.

INSTALL ONE ADDITIONAL CHEMICAL AND/OR TRANSPORT PUMP INSIDE PUMP BOX

For the addition of one chemical and/or one washer to the dispenser (so the system can dispense up to 5 chemicals to up to 3 washers), no auxiliary pump housing is required. The additional pump(s) are housed inside the pump box, as shown in **Figure 8**.

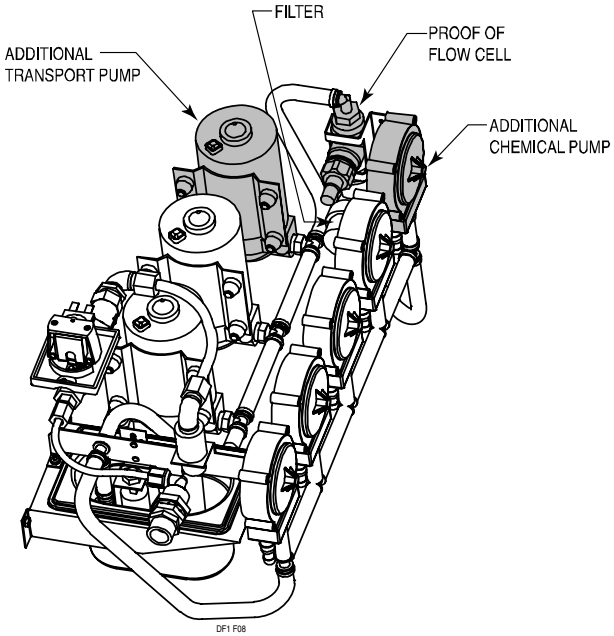


Figure 8. Additional Chemical Pump and Transport Pump (Inside Pump Box

To add either a single chemical and/or transport pump inside the pump box, do one or both of the following procedures.

Use plastic tie wraps to secure all tubing connections.

Add a Single Additional Chemical Pump

1. Remove the plastic filler plate that covers the number 5, rightmost pump position, and install the additional pump. (The pump provided in the kit includes a manifold section.)

2. Disconnect the existing manifold tube from the #4 pump output tee and connect the manifold section from the new pump (#5) to the #4 output tee fitting.
3. Unless auxiliary housings are to be installed, reconnect the tube from the filter to the output of the #5 pump. (You may wish to shorten the tube somewhat to provide for proper tube routing.)
4. If you are installing auxiliary housings, remove the POF cell and filter assembly from the pump box and reinstall it in the rightmost auxiliary housing.
5. Wires for the #5 pump are included in the pump box wiring harness. Connect the blue (common) wire to the lower terminal of the motor (marked with a red dot), and the white/brown wire to the upper motor terminal.

Add a Single Additional Transport Pump

The Auxiliary Transport Pump Kit includes the pump, mounting bracket, manifold tube and fittings.

1. If you have not already done so, open the dropdown front panel of the pump box.
2. Disconnect manifold tube from the right side of the inlet tee of pump #2.
3. Secure the pump and bracket assembly to the studs located on the back wall of the pump box using the provided hardware. You will need a long shaft 1/4" nut driver or 1/4" socket extension.
4. Connect the manifold tube from the new pump #3 to the inlet side of pump #2.
5. Unless auxiliary housings are to be installed, reconnect the tube from the POF cell to the inlet of the #3 pump. (You may wish to shorten the tube to provide for proper tube routing.)
6. If you are installing auxiliary pump housings, remove the POF cell and filter assembly from the pump box and reinstall it in the rightmost auxiliary housing.
7. Wires for the #3 pump are included in the pump box wiring harness. Connect the yellow wires to the transport pump leads. Connect the wire with the black stripe to the black transport pump lead.

INSTALL AUXILIARY PUMP HOUSING(S)

If your system requires more than 5 chemicals, or is serving more than 3 washers, you will need to install auxiliary pump housings to accommodate the additional pumps.

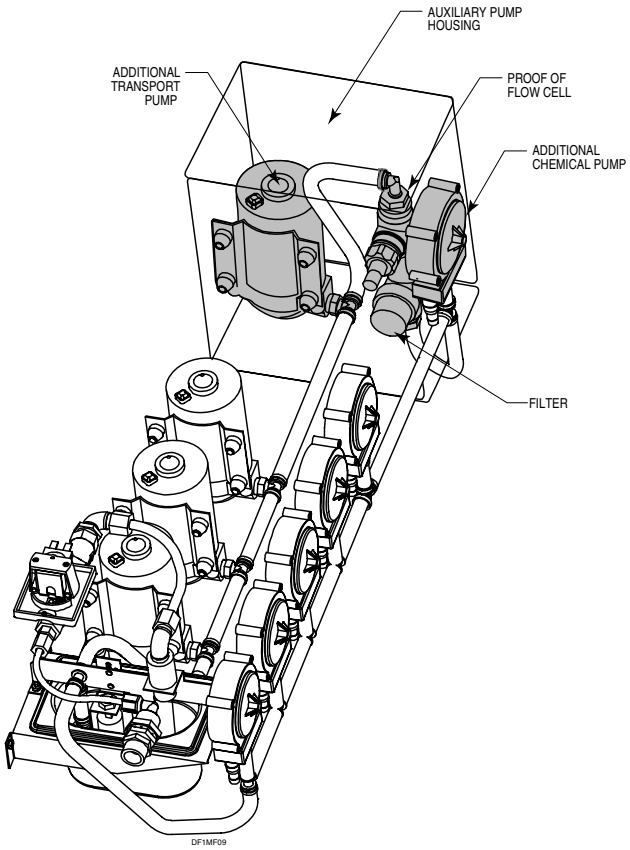


Figure 9. Additional Auxiliary Pump Housing (Next to Pump Box)

You may add up to three auxiliary pump housings (each of which can house one auxiliary chemical pump and/or one auxiliary transport pump).

The controls, wiring and electrical capacity in the pump box can accommodate these expansions.

NOTE *Use plastic tie wraps to secure all tubing connections.*

1. Remove the plugs on the auxiliary pump housing(s) (except the right side of the rightmost housing) and the right side of the pump box. Replace the plugs with bushings.
2. Hang the auxiliary pump housing(s) to the right of the pump box on the mounting rail and secure the lower edge with wall anchors.
3. Open all auxiliary pump housings. Starting with the rightmost auxiliary pump housing, thread the wire harnesses to the pump box through the top bushings of every auxiliary pump housing, working toward the left.
4. Plug the wire harnesses into the connectors on the upper right of the pump box's PCB. The connection point determines the pump number of the particular pump. Use the following connections depending on whether you are adding one, two or three auxiliary pump housings:

- Plug the rightmost harness into EXP 3.
- Plug the second harness (or last of two) into EXP 2.
- Plug the first (or only) harness into EXP 1.

Relocate POF Cell and Filter

1. If not done in a previous step, remove the POF cell and filter assembly from the pump box and reinstall it in the last (rightmost) auxiliary pump housing.
2. Route the POF cable through the bushings along with the motor wires.
3. Reconnect the cable to the POF connector, J16.

Plumb the Auxiliary Chemical Pump

1. Remove the plastic filler plate that covers the pump mounting hole.
2. Install the pump.
3. Connect the manifold section from the new pump to the output tee fitting of the previous pump.
4. If this is the last (rightmost) chemical pump, connect the filter inlet tube to the output of this pump.
5. Wires for the pump are included in the auxiliary pump housing wiring harness. Connect the blue (common) wire to the lower terminal of the motor (marked with a red dot), and the green wire to the upper motor terminal.

Plumb the Auxiliary Transport Pump

1. If not done in a previous step, remove the POF cell and filter assembly from the pump box and reinstall it in the rightmost auxiliary pump housing.
2. Route the POF cable through the bushings along with the motor wires.
3. Disconnect the manifold tube from the right side of the inlet tee of pump to the left of this position.
4. Secure the pump and bracket assembly to the three studs located on the back wall of the auxiliary pump housing.
5. Connect the manifold tube from the new pump to the inlet side of pump to the left.
6. If you are not installing more auxiliary pump housings, reconnect the tube from the POF cell to the inlet of the new pump.
7. Wires for the transport pump are included in the auxiliary pump housing wiring harness. Connect the green and the yellow wires to the transport pump leads. The yellow wire connects to the black transport pump lead.

CONNECT WATER SUPPLY

The dispenser requires a water supply with a flow rate of at least 5 liters (1.3 gallons) per minute. Inlet pressure should be between 0.7 and 5 bar (10 and 70 psi). It may be necessary to reduce the inlet pressure if excess splashing occurs at the break tank.

Normally a cold water supply (but not lower than 5 °C [41 °F]) is sufficient. However, with some chemicals, a warm or tempered water flush may be required. Should a warm flush be required, install a water tempering valve to provide a 40 °C (104 °F) heated water supply to the system.

Connect the water supply to the 3/4” threaded hose fitting at the pump box. Optionally, you can replace the 3/4” threaded fitting with the available barb fitting if needed for the water hose.

Water Filter

No water filter is required. However, the water supply should be relatively free of sediment or large particles. High water hardness or high TDS (total dissolved solids) may affect the performance of the POF and optional POD functions. Should these conditions exist, some water preconditioning may be required for optimum performance.

Extremely hard water may cause minerals to precipitate on the various elements of the transport system. This can include buildup in the manifold, transport pump head, and transport tube. If this problem persists, you should definitely use water preconditioning.

ASSIGN CHEMICALS TO PUMPS

There are no specific requirements for chemical assignment to a given pump. There is, however, a general convention that the chemicals be organized in a wash through finish left-to-right plan, with the alkali in position 1, detergent in position 2, and so on.

A possible exception may be the location of the sour pump. In extreme hard water situations, carbonates may precipitate out in the manifold below certain chemical pumps. To reduce the carbonate buildup, locate the sour pump at the number one position, thus allowing the acid to dissolve any buildups.

Refer to the discussion on compatible chemicals in Account Planning.

Chemical Uptake Lines

Drum Position

Place the chemical drums as close as possible to the pump box.

Avoid uptake lines longer than 3 meters (10 feet). Greater lengths will prevent the dispenser from fully auto-priming and reduce pump tube life.

To avoid confusion and reduce the possibility of misplacing replacement chemicals, arrange the chemical drums in the same order as the pump assignment.

Keep the uptake line as short as possible when used with the thicker products. This will help maximize pump tube life. If long runs are unavoidable, it may be necessary to utilize a section of 3/4-inch PVC pipe for segments of the chemical uptake system.

See **Advanced Troubleshooting** for a method of manually priming a new system with large uptake lines.

Standpipes

Optional tube stiffeners (standpipes) are recommended for each chemical. The standpipe is made of $^{3}/_{4}$ inch PVC plastic and is long enough to be used in a 205 liter (55 gallon) drum. The standpipe may be cut to length for smaller drums if

desired. Cuts should be made at an angle to prevent suction problems.

Also included in the standpipe kit are 2 bung caps suitable for use in 205 liter (55 gallon) drums, and 25 liter (5 gallon) pails.

1. Select the proper bung cap for your container. Measure and cut the standpipe to the proper length. (Refer to instructions provided in the standpipe kit to determine proper length.)
2. Slide the upper end of the pipe through the hole in the cap until the cap rests against the plastic tie stop.
3. Insert the chemical suction tube into the pipe until it protrudes from the bottom.
4. Secure the tube in place by tightening the hose clamp (do not over tighten).

Tubing Size

The chemical uptake suction tube should be 1/2-inch ID. Smaller diameters will reduce chemical pumping rates and may reduce pump tube life. Larger diameters may cause erroneous Out of Chemical alarms due to long priming times, but in some cases may be desirable if the chemical being pumped is particularly viscous.

INSTALL TRANSPORT TUBE TO WASHERS

The transport tube should be polyflow LDPE 3/8-inch OD (1/4-inch ID) for all transport lines. This will ensure that the optimum transport velocity is maintained.

NOTE *Use of other than specified tubing may result in impaired system performance.*

1. Run the transport tube from each transport pump to the washers.

   The leftmost transport pump in the pump box is #1, the next transport pump in line (left to right) is #2, and so on. Once connected, washers are numbered the same as their respective transport pumps. You must remember the washer numbers for the purpose of assigning washer module addresses and deciphering logged data and reports.
2. Arrange the tubing in a safe manner. Do not run tube above electrical connections and boxes. Provide adequate clearances near steam pipes and other hot surfaces. Consult local codes for exact requirements. Avoid sharp bends, as the tubing can kink.

INSTALL BETALINK

The BetaLink 5-wire cable provides power and communication throughout the dispenser. All the washers and washer modules are connected to the BetaLink and, via the BetaLink, to the pump box. You can connect the washers and modules in any sequence, but you must observe polarity since the BetaLink is a polarized RS-485 communication system.

1. Connect the BetaLink cable to the pump box terminal block (see **Figure 7**). Be sure to provide strain relief for the cable where it passes through the pump box.
2. Route the 22 gauge 5-conductor cable from the pump box to the closest washer. Ground the shield at the pump box. Provide sufficient BetaLink cable within the washer to allow for placement of the washer modules in convenient locations near their respective signal sources.
3. Route additional cable from this washer to subsequent washers in a chain.

NOTE *The actual routing may be either a serial chain, a star distribution, or a combination of the two. All components will be connected to the same signals.*

4. To make the BetaLink connections, see **Figure 10**. Also please refer to **Figure 7** for information on the location of the terminal block connections, and **Table 5** for washer module address assignments.

NOTE *For proper shielding, the cable shields should be connected together at each module, but should not be connected to any of the module terminals. The shield is connected to chassis ground only at the pump box.*

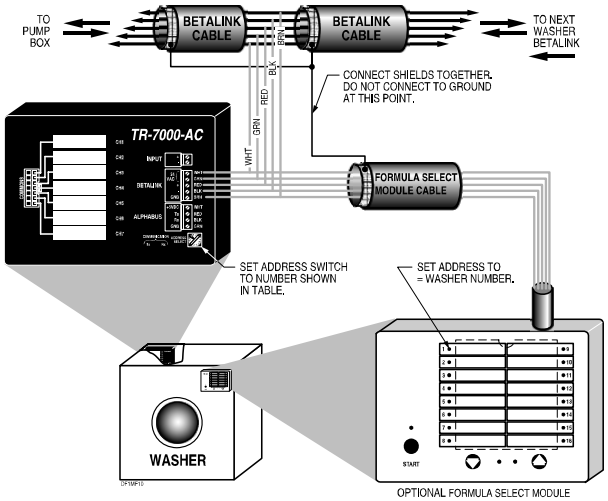


Figure 10. BetaLink Connections

INSTALL TR-7000-AC TRIGGER MODULE(S)

One TR-7000-AC Trigger Module is installed at each washer to provide a high-voltage interface for the chemical supply triggers.

An optional second TR-7000-AC at a washer expands ILS OPL's capabilities to include:

- Pumping more than 6 chemicals in the standard relay mode.
- More than one formula select bit.
- Monitoring of washer control signals such as drain, water fill and steam.

There are 7 trigger channels on the TR-7000-AC. These inputs are electrically isolated from each other and from the BetaLink.

The function of each of the triggers (channels 1-7) depends on the feed mode you select during setup. **Appendix A** and **Appendix B** list the trigger functions for each chemical feed mode.

The TR-7000-AC enclosures are not sealed, so they should be placed in an area not subjected to hose down or splashing. They are designed to be mounted within the washer control enclosure, if possible, but can be mounted externally if necessary.

1. Install the TR-7000-AC in the washer control cabinet by securing it to the cabinet side wall with double-sided tape, Velcro straps or optional bracket. Optionally, mount the TR-7000-AC externally using the NEMA enclosure.
2. Set each TR-7000-AC address using **Table 5**. Set the address with the 16-position switch located at one end of the TR-7000-AC. Rotate the switch until the proper address appears through the switch skirt. (Address 0 disables communication to the TR-7000-AC.)

NOTE *Each TR-7000-AC (and RS-3000) address must be unique.*

Washer Number	TR-7000-AC Trigger Module	Optional 2nd TR-7000-AC	Optional RS-3000 Formula Select Module
1	1	2	1
2	3	4	2
3	5	6	3
4	7	8	4
5	9	A	5
6	B	C	6

Table 5. Washer Module Address Assignment

3. Connect the primary TR-7000-AC (at each washer) to the washer's supply signal sources. Use the solid colored harness. The wire colors in the harness correspond to the RETMA color code, as follows:

   Black 0 (Common)

   Brown Trigger Channel 1

   Red Trigger Channel 2

   Orange Trigger Channel 3

   Yellow Trigger Channel 4

   Green Trigger Channel 5

   Blue Trigger Channel 6

   Violet Trigger Channel 7

   For additional information on how to make these connections, depending on the mode to be used, please refer to **Appendix A** and **Appendix B**.
4. Tie the commons together as necessary.
5. The following connection notes apply if you are going to be using the Formula Mode (see **Appendix A** and **Appendix B**) for this washer.

The dispenser can serve washers previously served by an L-4000E or L-70000. You can use the Interface Wiring Diagram Manual (IWDM) to find the triggers to connect to the TR-7000-AC for Formula Mode. However, follow the color code shown in **Figure 11** instead of using the terminal strip shown in the IWDM. Pairs 1-5 in **Figure 11** equate to the machine triggers in the IWDM.

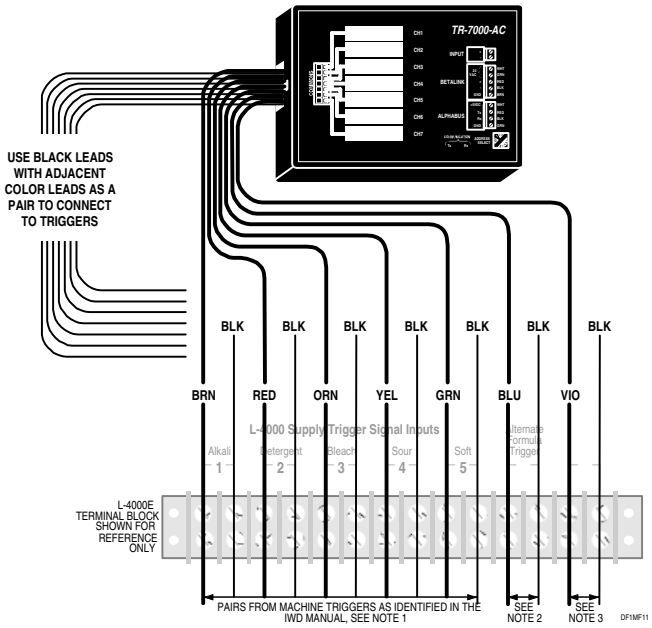


Figure 11. TR-7000-AC Wire Harness and L-4000 Equivalents (Formula Mode only)

Note 1 It is not necessary to hardwire two or three triggers together when using the dispenser because triggers can be assigned to any pump or pumps.

Note 2 If you use an alternate formula, connect the trigger switch to the blue and black pair.

Note 3 If you use a machine on signal, connect the washer source (which must be on without interruption during the entire wash cycle) to the violet and black pair.

6. If you are installing a second TR-7000-AC at a washer, use the striped cable harness and connect the washer supply signal sources as defined below, depending on which signals you are using. These signals may require isolated commons. The wires with the black stripe are the commons.

   Drain Some washers are equipped with two drain systems—reclaim drain and sewer drain. Trigger channel 1 (brown stripe wire) is used for sewer or main drain, and if required, trigger channel 6 (blue wire) is used for reuse drain. A chemical feed request is ignored if the drain is open. If the drain signal is not used, remember to set the drain polarity to Normal. See **Washer Setup Mode**.

Cold Water Connect the cold water fill valve signal trigger to channel 2 (red stripe wire). Because the cold water signal may be used to monitor the actual time that the water valve is open, make the connection to a point in the washer circuit that accurately reflects the status of the valve.

Hot Water Connect the hot water fill valve signal to trigger channel 3 (orange stripe wire). Because the hot water signal may be used to monitor the actual time that the water valve is open, make the connection to a point in the washer circuit that accurately reflects the status of the valve.

Steam Connect the steam valve signal to trigger channel 4 (yellow stripe wire). Because the steam signal may be used to monitor the actual time that the steam valve is open, make the connection to a point in the washer circuit that accurately reflects the status of the steam valve.

Reuse Fill Connect the reuse fill valve signal (if used) to channel 7 (violet stripe wire). Because the reuse water signal may be used to monitor the actual time that the water valve is open, make the connection to a point in the washer circuit that accurately reflects the status of the valve.

7. Verify the installation by exercising the individual functions. Observe that the appropriate TR-7000-AC LED is on.

INSTALL THE RS-3000 FORMULA SELECT MODULE

1. The RS-3000 includes an integral 5 meter (15 foot) BetaLink cable. Secure the module to the washer in a location convenient to the operator.

The RS-3000 is factory wired for BetaLink applications. For other uses, consult ***Appendix E****.*

2. Connect the cable from the RS-3000 to the washer's TR-7000-AC BetaLink Phoenix connector. Please refer to **Figure 10**.
3. Refer to **Table 5** to determine the address to use for this RS-3000.
4. Turn on electrical power to the pump box and set the RS-3000's address. The RS-3000 is supplied from the factory set at address 0 (formula 16), which disables communication to the module.

   To change the address, simultaneously press and hold the ▲ and ▼ keys until one of the formula LED's starts blinking (approximately 4 seconds). Now press either the ▲ or ▼ key until the LED corresponding to the desired address is blinking. After about 4 seconds of no key activity, the RS-3000 will accept the new address and revert to normal operation.

While you are changing its address, the RS-3000 cannot communicate with the pump box.

The address will be remembered even when the power is off.

POST INSTALLATION CHECKUP

After completing the equipment installation, perform the following procedure to check out the equipment prior to pump and washer setup.

Power Up and Check Equipment

1. Perform a visual check of all system connections.
2. Turn on electrical power to the pump box (you may have already done so in step 4). The LCD screen on the front panel should initialize and then display the following run screen:

3. Check each system component's function. If any part of the system fails to operate properly, refer to **Diagnosing Problems** to diagnose and fix the problem.

Pump Priming

The transport pumps may experience difficulty in priming following installation if they have dried out internally during storage and shipment. If the pumps are unable to prime when dry, one of the chemical pumps may be used to inject water into the manifold. This is best accomplished using the test screens described under **Advanced Troubleshooting**.

PUMP AND WASHER SETUP

This section of the manual describes:

Pump Setup

Configuration of the pump box during initial installation and whenever changes are necessary (such as changing chemical costs).

Washer Setup

Configuration of each washer during initial setup and when changes are necessary (such as wash formula changes).

When you have completed pump and washer setup, see the post setup checkout procedure in **System Checkout**.

SCREENS

Figure 12 illustrates the dispenser screens you use to control the system. This illustration is also located under the lid of the pump box.

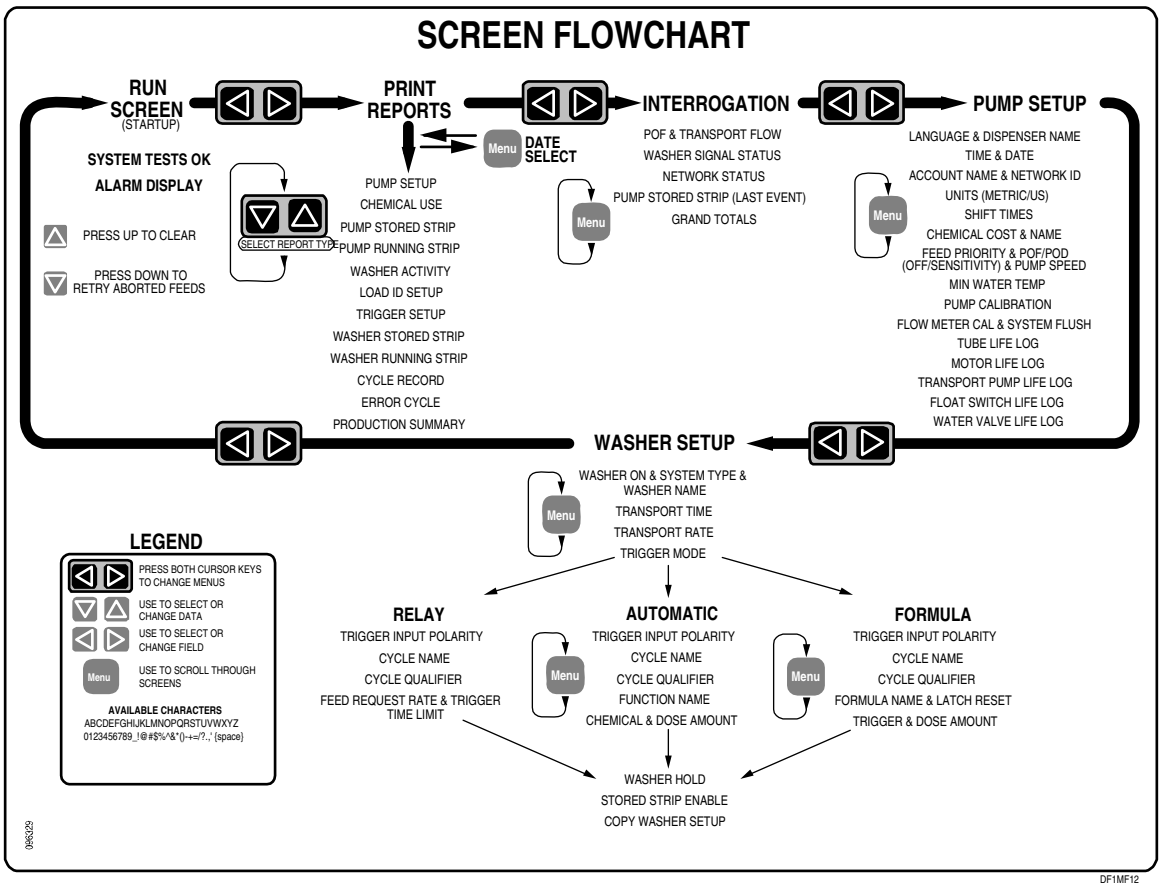


Figure 12. Screen Flowchart

FRONT PANEL

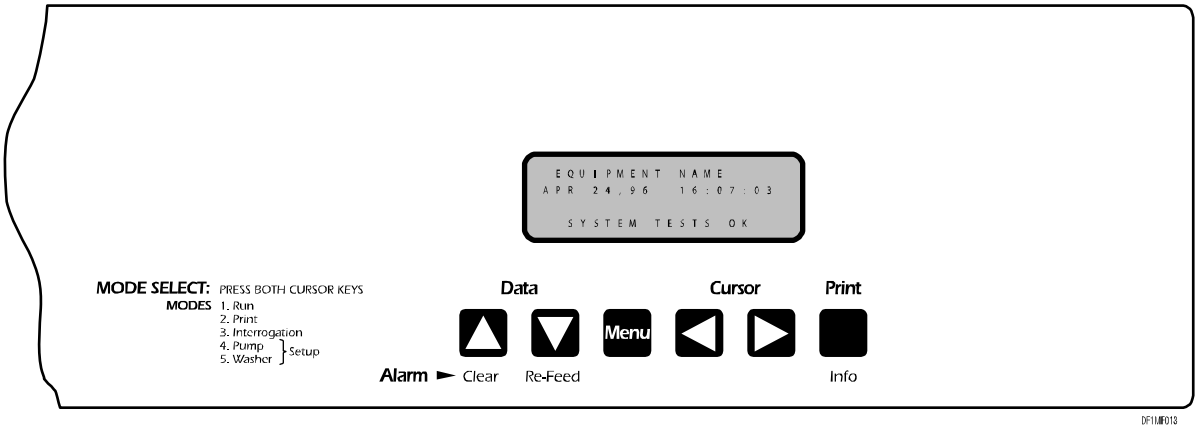


Figure 13. Pump Box Front Panel

The front panel of the Pump Box is illustrated in **Figure 13**. Notice the five modes. At power up, the following screens are the first that appear in each mode. After you access the print, interrogation and setup modes, the screen you were last using is displayed when you re-enter the mode.

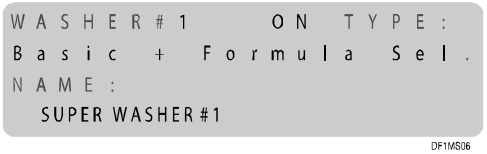
Run

Print

Interrogation

Pump Setup

Washer Setup



HOW TO ACCESS AND USE THE SCREENS

- To enter pump or washer setup mode from the run screen (normal operation), hold down the blue PROGRAM switch on the PCB and firmly press the ▲ and ▼ keys simultaneously. Each time you press these keys, you move to one of the five modes. If you do not press the PROGRAM switch, the setup modes are inaccessible, which restricts the ability to change setups to those with a key to the pump box.
- When in a mode, press the MENU key to scroll forward through the screens or press the PRINT/INFO key to scroll backward.
- To change the data in a screen, press the ◀ or ▶ key to move to a changeable field, and use the ▲ and ▼ keys to enter new data or toggle to desired settings.
- When entering alphanumeric information, the following shortcuts may be useful.

  If lowercase character is blinking, press ▲ once to clear the character. All uppercase character symbols and numbers may be cleared by pressing the ▲ and ▼ keys simultaneously.

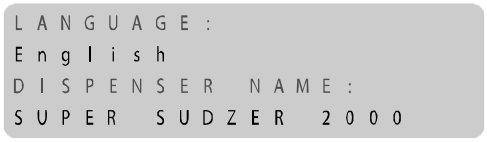
  Press and hold the ▲ or ▼ key to cause the selection to scroll, first at a one-character rate, then at a 3-character increment.
- You can continue to cycle through all the screens in the pump or washer setup mode until all the setup data is correct.
- When making setup changes, the changes are effective immediately. Changing setups may adversely affect a chemical delivery in progress, and so should only be done when the wash aisle is idle.
- When you are finished doing all pump and washer setup, redisplay the run screen.
- In illustrations of the screens in this manual, information that you may change is in bold type.

PUMP SETUP MODE

The dispenser is supplied from the factory with all memory cleared. However, if the system has been previously set up, the RAM devices removed or the battery replaced, erroneous setup information may exist. This will be evidenced by strange, nonsensical data and characters being displayed in some of the variable fields.

In this case, clear the memory before beginning pump setup (see Clear Memory in **Maintenance**).

Language and Dispenser Name



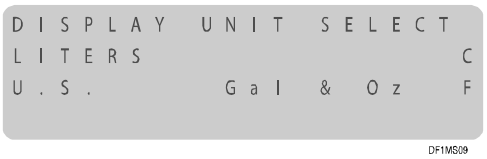
Select the language to be used for the screens and printed reports. Also enter a 1-20 character model name for this unit. This name is displayed on the run screen and at the top of the printed reports. The name will be automatically centered, so there is no need to add leading spaces.

The language selection is the first item in the first setup screen, making it easy to access even if set to a language you don't understand. Just turn the power off and on, then follow the directions under ***FRONT PANEL*** *to access this screen.*

Time and Date

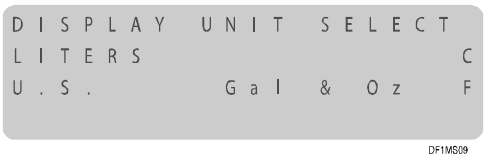
Use this screen to set the dispenser clock to the local time and today's date.

Account Name & Network ID



Enter a 1-20 character name for this laundry account. If the system is to be connected to a supervisory computer, enter a unique network ID number (01-99). Otherwise, set the network ID number to 00.

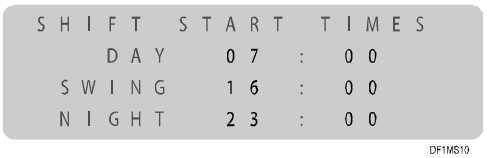
Unit Select



Select either liters or U.S. gallons/ounces as the volume unit of measurement (the current selection flashes). The temperature measurement units are changed automatically to correspond to the volume unit of measurement. All report and display data is presented in the currently selected unit of measurement.

All internal recordkeeping, calculations, and dispensing are carried out in metric units. If you set the system to U.S. units, all requests, entries and outputs are converted at the time of transmission or when displayed. For this reason, a 10 -ounce feed may be reported as 9.9 or 10.1 ounces. This does not affect accuracy.

Shift Start Times



Set the three shift start times. These times are used in reports to sort productivity and chemical usage data. You must set time in 24 hour format. Shift times must be sequenced in ascending order.

Chemical Name and Cost

For each chemical pump in the system, enter the chemical name and cost. Use unit cost of price/liter or price/gallon. Cost per unit is not automatically converted if you change the volume unit of measurement. Therefore, be sure that this data reflects your chosen unit of measurement.

POF Sensitivity, Feed Priority and Pump Speed

Use this screen to set up the Proof of Flow conductivity sensitivity, feed priority and delivery speed.

POF

Toggle between off, low, medium or high. This feature allows you to select a POF/POD threshold that is best suited for the chemical being pumped. Proper selection of this threshold will ensure optimum performance of the Proof of Flow out of chemical detection feature.

Use the OFF setting to disable the POF/POD function. You should disable POF/POD for nonconductive products such as hydrogen peroxide and mildewcides. When POF/POD is disabled, the auto-prime and out of chemical features do not work.

Use the LOW setting for low conductivity chemicals, such as softeners, anionic surfactants, starch, and non-built detergents. This setting provides a threshold 150 microseimens above the baseline conductivity.

Use the MEDIUM setting for chemicals in the mid range of conductivity, such as built detergents, sour/softener combinations and any other chemicals that are not quite as conductive as the high conductivity products. This setting provides a threshold 5,000 microseimens above the baseline.

Use the HIGH setting for highly conductive chemicals, such as alkali, bleach, sour, and some built detergents. This setting provides a threshold 30,000 microseimens above the baseline water conductivity.

To evaluate the performance and suitability of your selection, observe the performance of the conductivity function by viewing the POF Status/Flow Rate screen in interrogation mode. Observe this screen during a chemical feed to determine how close the chemical is to the detection threshold. For best results, the minimum conductivity reading during the feed should be at least 10% higher than the threshold setting for the particular chemical.

Feed Priority

Toggle between normal and high priority for this chemical pump. A single chemical may be designated as high priority. Requests for this chemical will be promoted to the top of the feed stack and will be serviced before any other pending requests. In addition, should a multiple chemical feed be in progress, that feed will be broken between the chemical feed segments, and the high priority feed made. All chemical requests associated with a high priority feed will be considered high priority. Selection of a chemical deselects any previously selected chemical. This feature is useful in situations where all washers may not have washer hold capabilities, or where time-critical chemicals are injected.

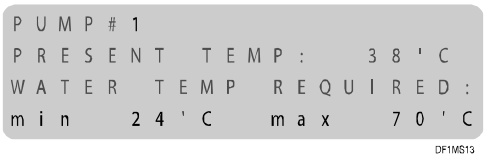
Speed Select

Toggle between slow and fast.

Slow - The chemical pump runs at a reduced speed. Use slow speed if the chemical is unusually thick, has nonlinear flow characteristics or exhibits other unusual hydraulic characteristics. If the chemical has a tendency to gel or thicken when mixed with water (high-surfactant products), this feature allows you to increase the mix ratio and thus reduce the gelling effect and the transport pressure. Slow speed may also be used to allow auto-calibration to occur for chemical doses too small to auto-calibrate at fast speed. As a guideline, use slow speed with doses smaller than 200 ml (6.5 oz).

Fast - The chemical pump runs at full speed (20 oz per minute).

Transport Water Temperature



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Transport water temperature is critical when using certain chemicals. If warm transport water is required, set the minimum transport temperature on this screen for the appropriate chemical pump. Toggle between minimum values of 5 °C and 24 °C (41 °F and 75 °F). In both cases, the maximum is 70 °C (158 °F). If the POF cell does not have a temperature sensor, the present temperature will be blank, and you cannot set the minimum temperature.

Chemical Pump Calibration

On a pump-by-pump basis, you can enable auto-calibration or force the system to use a fixed, manually-derived pump rate.

Auto Calibration

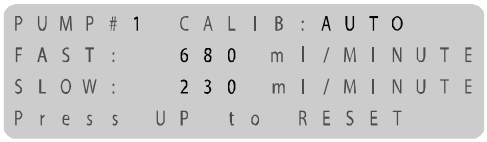
If you select AUTO, you do not need to do anything. You may wish to verify that the displayed values are either the default, or are reasonable values for the chemical being pumped. Pumps you set up as AUTO will, when possible, perform an automatic calibration procedure at the beginning of each feed.

The AUTO procedure will continuously update the pump rates shown on the calibration screen. This is the preferred mode of calibration, as it compensates for tube wear, product viscosity changes, suction head changes, and other factors that may affect the chemical pumping rate.

Manual Calibration

Manual calibration allows you to perform a manual calibration procedure on selected pumps. Selecting manual tells the dispenser not to update the historical pump calibration, but rather to use a manually-derived value. This method is recommended if there will never be an injection large enough for the dispenser to do auto-calibration. The minimum injection amount for auto-calibration is 6.5 oz if fast speed is selected and 3 oz if slow speed is selected.

View or Reset Calibration Values

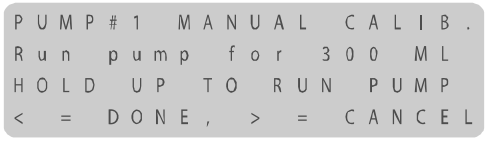


DF1MS14

To select the calibration mode for each chemical pump:

1. Use the ▲ and ▼ keys to set the pump number.
2. Press the ▶ key to move the cursor to the calibration mode field and use the ▲ and ▼ keys to toggle to AUTO or MANUAL.
3. If you select AUTO, this first screen only allows you to view the current historical pump calibration values, or reset the values to their default. To reset FAST and SLOW values, press ▶ to highlight the value and then press ▲ to reset. Then press the ▶ to go back to the pump field and select the next pump to calibrate, or the MENU key to display the next pump setup screen.
4. If you chose MANUAL, press the ▶ key. The message Press UP to CALIBRT appears on the screen. Press the ▲ key to display the manual calibration screen (see below).

Manual Chemical Pump Calibration



DF1MS15

This screen appears only when you are doing a manual chemical pump calibration. Perform the following procedure when the wash aisle is idle.

1. Select pump to be calibrated (and its speed) from the chemical pump calibration screen, then press the ▲ key to go to this screen. For safety, the dispenser rejects all feed requests while this screen is displayed.
2. Disconnect the chemical pump outlet tube from the manifold. Place the end of this tube into a measuring container large enough to hold the amount indicated on the screen.
3. Press and hold the ▲ key until the indicated amount of chemical has been pumped into the container. You can stop and start the pump as required to “sneak up” on the correct amount.

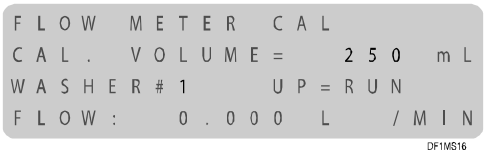
Raw chemicals are present. Handle with care.

4. When you have pumped the correct amount, press the ▼ key briefly to pull the chemical back through the pump.
5. Reconnect the outlet tube to the manifold.
6. Press the ▶ key to return to the chemical pump calibration screen and view the new calibration. The dispenser does not reject feed requests while this screen is displayed, so you must reconnect the chemical pump outlet tube before returning to this screen.

If you make a mistake during the manual calibration (you pump too much chemical), and you are still displaying the manual calibration screen, reconnect the chemical pump outlet tube to the manifold. Then press the ▶ key to discard the calibration and return to the chemical pump calibration screen.

You can repeat this process as required to calibrate all chemical pumps. Be sure to thoroughly wash the measuring container between calibrations.

Flow Meter Calibration & System Flush



DF1MS16

Use this screen to set the calibration volume or to manually run (flush) and test the transport system.

Set Flow Meter Calibration

The calibration volume is measured at the factory and printed on a tag mounted on the break tank bracket. Enter the number from the tag for the calibration volume.

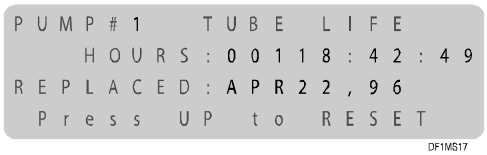
Manual Flush to Test Transport System

A washer must be enabled (using the washer on/off screen described in **Washer Setup Mode**) before you can do a manual flush. To test the transport system, perform a manual flush as follows:

1. Select the desired washer. UP=RUN appears on the screen.
2. Press ▶ until UP=RUN flashes.
3. Press ▲ to begin the flush. During the manual flush, water is sent to the selected washer.
4. The manual flush automatically stops after 2 minutes. To stop it earlier, press the ▼ key.

While a manual flush is in process, the screen displays the flow rate of the transport pump, updated 4 to 5 times per minute. The normal flow rate is about 2.0 liters per minute (0.53 GPM).

Pump Tube Life Reset



DF1MS17

This screen displays the elapsed time that a chemical pump tube has run (hours:minutes:seconds) and the date it was installed. You can reset the elapsed time to zero after you change a pump tube. To do so:

1. Select the pump.
2. Push the ▶ key until Press Up to Reset is flashing.
3. Push the ▲ key to reset to zero. The dispenser automatically inserts the current date.

Pump Motor Life Reset

DF1MS18

This screen displays the elapsed time that the chemical pump motor has been in service (hours:minutes:seconds) and the date it was changed. You can reset the elapsed time to zero after you change a motor. To do so:

1. Select the pump.
2. Push the ▶ key until Press Up to Reset is flashing.
3. Push the ▲ key to reset. The dispenser automatically inserts the current date.

Transport Pump Life

DF1MS19

This screen displays the elapsed time that the various transport pumps have been in service and the date they were changed. You can reset the elapsed time to zero after you change a transport pump. To do so:

1. Select the pump.
2. Push the ▶ key until Press Up to Reset is flashing.
3. Push the ▲ key to reset. The dispenser automatically inserts the current date.

Float Switch Life

This screen displays the life of the float switches and the date of their last replacement. The hi and lo numbers on the screen are the number of times the corresponding switch has changed states (off to on or on to off). The date is the service date. You can reset the float switch life to zero when you change one. To do so:

1. Push the ▶ key to select one of the switches (hi or lo). The selected switch flashes.
2. Push the ▲ key to reset life to zero and change the service date to today's date.

Water Valve Life

This screen displays the life of the inlet water valve and the date of its last replacement. Cycles is the number of off to on actuations of the valve since the last reset. The date is the service date. You can reset the time to zero when you change the inlet water valve. To do so:

Push the ▲ key to reset life to zero and change the service date to today's date.

WASHER SETUP MODE

Washer On/Off, Washer System Type and Washer Name

Use this screen to enable or disable communication to the individual washers, select a system type for each washer, and optionally assign a name to the washer.

1. Select the washer.
2. Toggle the washer on or off. Only washers that are on will be monitored by the pump box. Washers that are off will be ignored. Nonexistent washers must be off.
3. Select one of the following washer types. A different type may be used for each washer.

Basic (1 Trigger Module)	One TR-7000-AC Trigger Module.
Basic + Formula Select	One TR-7000-AC Trigger Module and an RS-3000 Formula Select Module.
Expanded (2 Trigger Modules)	Two TR-7000-AC Trigger Modules.
Expanded + Formula Select	Two TR-7000-AC Trigger Modules and an RS-3000 Formula Select Module.
Washer Interface	ILS Max emulation mode in which a Washer Interface module is used for communication and POD functions.

4. Optionally, enter a 1-16 character name for the washer.

Transport Time

Use this screen to set and clear the transport time to each washer.

The transport time is the amount of time it takes the dispenser to transport the chemical from the pump box to the washer. Having the correct transport time ensures that all pumped chemical gets into the washer.

If the washer type supports Proof of Delivery (POD), then the dispenser automatically measures the transport time and displays it on this screen. You can change this automatically-derived time if you think it is inaccurate. You may also reset the time to zero to cause the dispenser to re-measure the time.

If the washer type does not support POD, you must measure the transport time manually and enter the number on this screen.

Whether entered manually or automatically-derived, the displayed time will vary slightly over time as the dispenser adjusts to varying transport pump rates. If you copy one washer setup to another (see Copy Washer Setup), be aware that the transport time is not copied to the new setup. You must set up each washer individually. If there is no transport time set up, the dispenser uses the very long, default preflush and postflush times.

1. Select the transport pump.
2. Press ▶ or ◀ to select the digit to be changed, and use the ▲ or ▼ keys to change the value.
3. If the displayed time is other than zero, you may continue to press ▶ until Press UP to Reset appears. Then press ▲ to set the time to zero.

Transport Rate

This screen displays the average transport pump rate for each speed (slow and fast), and allows you to reset the rates to default values if desired. You should reset the rates after you change a transport pump or after major failures in the transport system.

1. Select the washer.
2. Press ▸ to select the rate field.
3. Press ▴ to reset the rate to its default.

Chemical Feed Mode

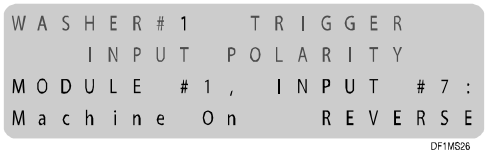
Use this screen to set a chemical feed mode for each washer. **Appendix A** and **Appendix B** provide detailed information about each mode. The mode you select determines which subsequent setup screens appear. Possible modes are:

Relay Mode	For microprocessor-controlled washers, requires 1 trigger signal per chemical.
Enhanced Relay Mode	Same as relay mode, for when you have more chemicals than available signals.
PDCI Relay Mode	Similar to enhanced relay mode, but also allows the washer to identify wash cycles and load types.
Formula Mode	For washers with chart or card controllers.
Latched Formula Mode	Same as formula mode but each trigger can occur only once per load.
Miele Formula Mode	For Miele washers.
PDCI Formula Mode	Similar to formula mode, but also allows the washer to identify wash cycles and load types.
Automatic Mode Strobed	For washers with chart or card controllers, to trigger up to 32 injection groups.
Automatic Mode Strobeless	For fixed-cycle microprocessor-controlled washers (rare), to trigger up to 32 injection groups.
PDCI Automatic Mode	Similar to strobeless automatic mode, but also allows the washer to identify wash cycles and load types. When you select this mode, another line appears so you can set the trigger filtering for use with either chart/card or microprocessor controlled washers.

Changing from one mode to another erases the previous mode settings for the selected washer. To leave this screen without making a mode change, press the MENU key.

Trigger Input Polarity

This screen appears for every chemical feed mode, although the choices differ depending on the mode.



Use this screen to select the signal logic (normal or reverse) for the washer status signals connected to the TR-7000-AC Trigger Module channels. The choices in the 4th line depend on the selection you make in the 3rd line.

If you have not connected a machine on signal and are not using a PDCI feed mode, you must set the machine on logic to reverse. (PDCI feed modes do not use the machine on signal, so the polarity setting is unused.) If you have not connected a drain signal, you must set the drain logic to normal.

The following chart lists the choices you can make. Module #1 refers to the primary TR-7000-AC. Module #2 refers to the second TR-7000-AC, if installed. Unless noted, the choices in Line 4 apply to all feed modes.

Trigger Input Polarity Setup Screen	
Line 3	**Line 4**
MODULE #1, INPUT #7	Machine On NORMAL Machine On REVERSE Machine On UNUSED (PDCI Modes Only)
MODULE #2, INPUT #1	Sewer Drain NORMAL Sewer Drain REVERSE
MODULE #2, INPUT #2	Cold Fill NORMAL Cold Fill REVERSE
MODULE #2, INPUT #3	Hot Fill NORMAL Hot Fill REVERSE
MODULE #2, INPUT #4	Steam NORMAL Steam REVERSE
MODULE #2, INPUT #6	Reuse Drain NORMAL Reuse Drain REVERSE Chemical #8 TRIGGER (Relay Mode Only) Formula Select Channel 2 (Formula Mode Only)
MODULE #2, INPUT #7	Reuse Fill NORMAL Reuse Fill REVERSE Formula Select Channel 3 (Formula Mode Only)

Table 6. Trigger Input Polarity Setup

1. Verify that the correct washer number is flashing in the 1st line.
2. Press the ▸ key to cause the 3rd line to flash.
3. Press the ▲ or ▼ keys to select your choice in the 3rd line.
4. Press the ▸ key to cause the 4th line to flash.
5. Press the ▲ or ▼ keys to select your choice in the 4th line.

Cycle Name

This screen appears for every chemical feed mode.

DF1MS27

Use this screen to set up to 30 possible cycle names (load classifications) for each washer. The cycle name may be 1-16 characters. Not needed if washer load identification is not required.

Cycle Qualifier

This screen appears for every chemical feed mode, although the choices differ depending on the mode.

DF1MS28

If a non-PDCI feed mode is selected, this screen appears as shown above. It is used to enter a unique qualifier for each wash classification. The dispenser uses this information to identify the wash cycle if it has no other way (such as an RS-3000) to do so. If cycle identification is not required, you can leave this screen unset. If an RS-3000 is being used to identify the cycles, you only need to set the time and weight.

In order for the dispenser to distinguish one classification from another, each classification must have a unique qualifier. The dispenser recognizes the classifications by the total number of trigger signals in each wash load, and if connected, the number of qualified drains. A qualified drain is any drain signal that is longer than 5 seconds and was preceded by a water fill signal.

NOTE *If you are not using the expanded triggering mode that monitors drain signals, you must leave the number of drains at zero (0).*

Trigger channels 1-5 on the first (per washer) TR-7000-AC Trigger Module are always cycle qualifiers, regardless of which pump they are set up to trigger.

The time entry is the nominal length of the cycle. It is used when calculating cycle excess times.

The weight entry is the nominal load weight. It is used when calculating chemical cost/weight. Unidentified loads will automatically default to the weight set into cycle type 30.

DF1MS29

If a PDCI feed mode is selected, there is no need for cycle qualifier information, so a simplified version of this screen appears as shown here. The time and weight entries are the same as described for non-PDCI feed mode. The add time field is used to adjust the measured cycle duration to compensate for washers that cannot generate the PDCI cycle start and cycle end codes at the precise start and end of the cycle, due to internal washer interlocks. The number you enter here will be added to the interval between PDCI cycle start and PDCI cycle end codes to determine the actual cycle duration.

Relay Mode

For a definition of relay and enhanced relay modes, please refer to **Appendix A**. For a definition of PDCI relay mode, refer to **Appendix B**.

Feed Request Rate and Time Limit

Use this screen to set the feed request rate (chemical volume per unit of trigger on time) and maximum trigger on time per load for each washer. Maximum trigger on time is from 1-999 seconds. If you enter 0, this feature is disabled, OFF is displayed and there is no maximum cutoff time. If you are not using a machine on signal or PDCI relay mode, you must disable this feature.

If the washer processor chemical trigger signal were to fail on, the dispenser will stop pumping chemical and will set the washer alarm when the maximum trigger on time is exceeded. Once the maximum time for any chemical is exceeded, the dispenser ignores any more requests for that chemical until the next wash cycle begins. Other chemical requests are processed as long as their respective maximums have not been exceeded.

The units/second entry assigns the amount of chemical that will be pumped for each second that the washer supply trigger signal is on **and should not be confused with the actual chemical pumping rate of the pump in the pump box**. For example, a 3 ounce/second rate entry with a 5 second trigger pulse will deliver 15 ounces of product. The call rate in metric units is from 0.010 liter/second to 0.990 liter/second in 10 milliliter increments. The call rate in U.S. units is from 00.1 ounce/second to 99.9 ounces/second in 0.1 ounce increments.

The units/second value used will be a function of the smallest chemical dose required for the particular washer. For example, if the smallest feed required is 4 ounces, a 4 ounce/second rate would be the largest rate usable because most processors cannot call signals in fractions of seconds. Also note that the rate entered will be the smallest increment of change that may be fed.

*If you choose rates less than the actual pumping rates, the pump will get ahead of the washer signal and have to **wait** before finishing the chemical feed. This will result in the pump starting and stopping during a feed.*

There is no trigger input debounce filter in relay mode. With a feed request rate of 2 ounces/second, a 1-second signal will deliver 2 ounces of chemical. Refer to Trigger Timing Limits in Appendix A and Appendix B.

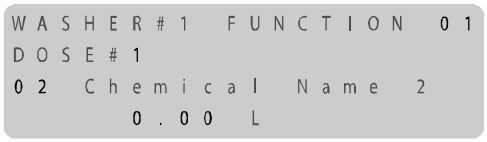
Automatic Mode

For a definition of automatic mode, please refer to **Appendix A**. For a definition of PDCI automatic mode, refer to **Appendix B**. To visualize how to set up automatic mode, print a Washer Trigger Setup report (see **Reports**) and use the report layout as a formula development worksheet.

Function Name

Use this screen to assign a name to each of the 32 possible function names. The term function describes a chemical injection group, such as Wash, Heavy Soil or Sour & Soft. Each function can have up to 3 dose amounts of any chemical you choose. The function name is optional, but will assist you in subsequent setup steps.

Chemical and Dose Amount



Use this screen to set the chemical type and amount for each feed function. You can create up to three separate chemical injections (chemical and amount) that will be fed upon activation of the function trigger pattern described in **Appendix A** and **Appendix B**. Enter the three separate injections for DOSE #1, #2 and #3.

Formula Mode

For a definition of formula mode, see **Appendix A**. For a definition of PDCI formula mode, see **Appendix B**. To visualize the formula mode setup, print a Washer Trigger Setup report (see **Reports**) and use the report layout as a worksheet.

Formula Name and Latch Reset

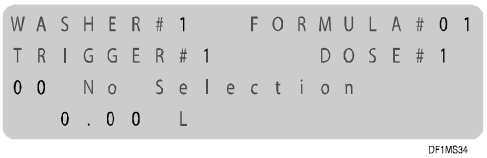
Use this screen to establish the formula names (classification) for each washer. You may assign an optional 1-16 character name to specific formulas. The formula name you enter here is used by the RS-3000 Formula Select Module, if installed.

It is the cycle name, not the formula name, that is used to identify wash loads in the printed cycle reports. To avoid confusion, the formula names and the cycle names should be the same.

In the latched formula mode and Miele formula mode, you can also select the latch reset trigger. You may use any of the five triggers to reset the latch, or the machine on signal can perform this function.

In PDCI formula mode, this screen does not appear. Since the cycle type and the formula are always the same in this mode, the cycle name is also used as the formula name.

Trigger and Dose Amount



Use this screen to set up to 3 separate chemical injections (chemical and amount) that will feed upon the activation of the specific trigger and formula select setting. Each trigger signal can have up to 3 dose amounts of any chemical you choose to specify. Enter the 3 separate injections on this screen (DOSE1, DOSE2 and DOSE3). Refer to **Appendix A** and **Appendix B** for the trigger patterns for formula selection. Note that PDCI formula mode allows up to 30 formulas, while the other formula modes allow up to 16.

Washer Hold

Use this screen to control the dispenser's washer hold function, which is available only in ILS Max emulation configurations. There are several washer hold options.

Normal

Activates the hold relay if the chemical delivery will be delayed because an earlier chemical request is being processed.

Hold Until POD

Activates the hold relay every time there is a chemical request, and releases the relay at the end of the chemical feed sequence (POD). Hold until POD may be useful as a delivery complete signal in some interactive washer control systems.

Hold on Alarm

Causes the hold relay to be set any time there is a chemical feed failure to the particular washer. This stops the washer timer until the error is corrected and allows the wash aisle operator to refeed using the last feed retry.

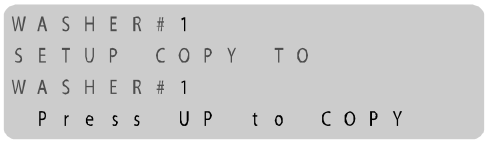
Enable Washer Stored Strip

Use this screen to activate the washer stored strip on a washer-by-washer basis. As long as it is active for a given washer, the stored strip records a historical record of all the washer's trigger signals. The dispenser can save a maximum of 1400 lines of events for all washers.

This feature is used for diagnosing trigger timing and relationship problems. The decision to enable or disable a particular washer stored strip will depend on your troubleshooting needs. If you are not experiencing problems with any particular washer, then you should enable all washers. This will provide a comprehensive, but relatively short record, of all the washer trigger signals. This is particularly helpful when setting up a new account.

Should you wish to diagnose problems associated with a particular washer, disable some (or all) of the other stored strips. This will allow a longer time period before the specific washer's stored strip record is overwritten in memory.

Copy Washer Setup



Use this screen to copy the washer setup information from one washer to another.

1. Select the source and target washer numbers.
2. Press the ▶ key until the Press Up to Copy message flashes.
3. Press and hold the ▲ key until the Copy Complete message appears.

The entire washer setup image, except transport time, is duplicated to the target washer. The copy function clears the transport time of the target washer.

Careful planning and layout of washer setups and formulas can make this a very useful tool for system setup. By progressively duplicating and editing washer setups, common information can be duplicated and then edited at the individual washers, thereby reducing much of the time needed for highly repetitive data entry.

Careful planning and a little creativity can save considerable time.

SYSTEM CHECKOUT

POST SETUP

To ensure that your setups work properly, perform the following procedure immediately after you complete pump and washer setup. For hints on programming the wash formulas at individual washers, see **Appendix C.**

Run a Test Load

1. Connect the printer to the pump box and have the running strip in operation during the wash load, or enable the washer stored strip functions.
2. During the wash, observe the washer status screen in the interrogation mode (see **Interrogation Mode** in this section) during the chemical feed. If connected, verify that there is a valid machine on signal and that the drain is closed.

3. Use the interrogation mode running strip screen to observe any chemical request activity.
4. If the feed information is displayed, ensure that the appropriate chemical and transport pump is running. Watch for the chemical to enter the washer. If there is no POD cell at the washer, you will need to measure the amount of time it takes the leading edge of the chemical dose to reach the washer, and enter this time in the transport time washer setup screen.
5. After the load is complete, check for status messages and check the Pump Running Strip report at the pump box. If the running strip has recorded the feeds and there are no error messages, then the system is functional. The washer is receiving chemical.
6. Repeat for all washers in the system.

Review Pump Setups

Review the Pump Setup report. There should be a transport time for each washer that is online. Confirm that the transport time recorded is realistic. Assume a transport velocity of 1 meter (3 feet) per second.

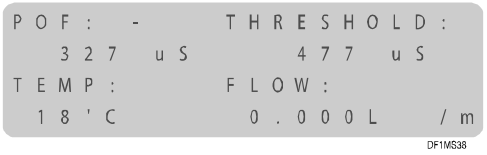
INTERROGATION MODE

The dispenser provides a wide variety of diagnostic tools for evaluating the performance of the system, and for troubleshooting setup problems and operational failures.

The interrogation mode allows you to view various analytical screens that display system performance in real time. To enter the interrogation mode from the run screen, simultaneously press the ◂ and ▸ keys twice. One of the screens shown below will appear. (Refer to the screen flowchart located under the top cover of the pump box.)

When you are finished viewing interrogation screens, simultaneously press the ◂ and ▸ keys until the run screen is displayed.

POF Status/Flow Rate



This screen displays the conductivity and temperature of the solution presently in the Proof of Flow (POF) cell, the POF conductivity threshold that the system has calculated, and the current flow rate. The THRESHOLD value will change during a chemical feed depending on the threshold setting of the chemical being pumped. When no chemical is being pumped, the lowest threshold setting is used. The minus (–) to the right of the POF in the top line changes to (+) when the POF conductivity exceeds the POF threshold, indicating that chemical is present.

This screen is used to evaluate your choice for POF threshold (LOW, MED or HIGH), as described in **Pump Setup Mode**. Observe this screen during a chemical feed to determine how close the chemical is to the detection threshold. For best results, the minimum conductivity reading during the feed should be at least 10% higher than the threshold setting for the particular chemical.

Temp indicates the current transport water temperature; if no temperature sensor is installed, the temperature is blank.

FLOW is the current transport flow rate. It is updated three to five times per minute when a transport pump is running.

Washer Status

This screen displays, washer by washer, the washer signal status as monitored by the TR-7000-AC Trigger Module(s) connected to the pump box. In this example, 1= indicates that TR-7000-AC module 1 is online, and all signals are off. Each dash (–) represents a trigger channel. The dash is replaced by a number when the trigger signal is present. If a second TR-7000-AC Trigger Module is present, it is indicated by a 2= field.

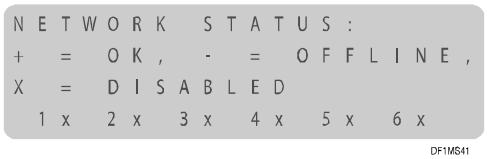
The bottom line of this screen shows the:

- Status of the Bleach Defeat control on TR-7000-AC Trigger Module #1 (off or on). This control is not presently used.
- Current formula selected by the RS-3000 Formula Select Module, if present (its 2-digit number)
- Status of the Sequence Start light (off or on) on the RS-3000. This control is not presently used.

ILS Max Emulation Systems

If the dispenser is connected to a Washer Interface Module, the top line of the washer status screen shows the status of the alarm and hold relays (+ = on, – = off). The second line shows the conductivity and temperature readings from the POD cell (+ = POD present, – = POD not present). POD readings are only valid during a chemical feed.

Network Status



This screen indicates the BetaLink communication status of the dispenser by showing which washers are enabled and/or responding. The (+) indicates that the washer is selected and responding. The minus (–) indicates that the particular washer has been enabled during setup but that one or more of the

modules at the washer is not communicating. An (x) indicates that the particular washer has not been enabled.

View Stored Strip/Running Strip

This screen displays the most recent event recorded by the dispenser. It is updated as events occur, so is a real time view of current status.

You can scroll through a stored list of past events using the ▲ and ▼ keys. The ▲ key scrolls forward in time and the ▼ key scrolls back in time. The events are stored in chronological order with the date and time displayed at the top line of the screen. The report period selection does not affect this feature. The entire stored strip is shown sequentially.

Press a key once to increment one record at a time, or hold the key down to scroll at high speed through the records. Pressing ◀ or ▶ or exiting and reentering this screen returns to the most current event, and returns the screen to the real time monitoring mode.

Grand Totals

This screen displays the grand total volumes for flush water and for each chemical. Press the ▲ or ▼ key to scroll through the choices. These amounts are for total volume pumped and are not resettable (except by a setup purge).

DIAGNOSTIC REPORTS

There are several reports that are helpful when troubleshooting the overall system or individual washers. The strip or event type reports have both a stored (logged in memory) and running (real time) version. The strip reports are chronological data logs of all system events or washer signals. The Pump Stored Strip report is always enabled. You may enable one or more Washer Stored Strip reports from the stored strip enable washer setup screen.

For more detailed explanations and illustrations of these reports, refer to **Reports**.

Pump Stored Strip Report

You can use the Pump Stored Strip report to analyze individual feeds to washers. It shows:

- When and how much chemical was requested and delivered.
- Each stage of the feed process.
- Other logged events including loss and establishment of system power, and aborted chemical feeds.

See **Error Messages** for a detailed list of error messages.

Washer Running Strip

The Washer Running Strip report is a real time diagnostic report that records all washer signals connected to the system (machine on, drain and all supply request signals). This report is very useful in determining the reliability and timing of washer signals that are used by the dispenser. The report also shows chemical use totals and load identity when the load is completed.

Washer Stored Strip

The Washer Stored Strip report is a logged version of the Washer Running Strip report. This feature must be enabled for each washer via the Washer Setup screen. This feature may be used for catching the “every once in a while” washer triggering or timing problem. It does not show chemical use totals or load ID.

STATUS MESSAGES

During normal operation, the following messages may appear on the run screen, on interrogation mode screens, and in Pump Stored Strip or Pump Running Strip reports. These messages are an indication of the current or most recent event the dispenser performed.

Message	Meaning
Cycle Start Cycle Stop	Using PDCI triggering, a washer has signaled the beginning or end of a wash cycle. The cycle type is included with the start message.
Cycle Start Ignored	A Cycle Start code was received while a cycle was already running. This is normal with some chart-driven washers which have multiple start points for some cycles.
Feed Request Fixed Dose Mode Feed Request Relay Mode Feed Request from Network	The dispenser is acknowledging a chemical feed request. Messages include requesting washer, amount and type of chemical.
Feed Request with Unknown Cycle Type	A feed request has been received in a PDCI triggering mode when no cycle is running. The request is honored anyway.
Proof of Flow Confirmed Proof of Flow Assumed Proof of Delivery Confirmed Proof of Delivery Assumed	Indicate normal feed and delivery events that occur during all chemical feeds. An assumed message indicates that the POF/POD feature is disabled for the indicated chemical, or that no POD cell is present.
Feed Retry, Manual	A feed retry after a feed error is the source of the chemical request. The operator has pressed the ▼ key to retry a failed feed and clear an alarm.
System Power On System Power Off	These messages indicate the date and time power was turned off or on to the dispenser pump box.
Washer Hold Set Washer Hold Released	These messages indicate when the specified washer was placed on hold or when the hold signal was released.
Auto Cal Status Manual Cal Status	Indicate when either manual or auto-calibration of a chemical pump has occurred.
Manual Memory Purge Logged Data Cleared (or) Setup Data Cleared	A memory purge occurred. Memory is purged at the factory before shipment. It may also be purged at installation by trained service personnel.
Error Reset	The operator reset a system error by pressing the ▲ or ▼ keys.
Manual Flush Started Manual Flush Stopped	Indicate when a manual transport flush occurs. The washer number is included in the message.
Washer Network Link Established	Indicates, at power up, that the selected washer networks are communicating with the pump box.
System Check OK	Normal status when power is turned on at the pump box.

Table 7. Status Messages

DIAGNOSING PROBLEMS

ALARMS

The dispenser continually monitors for correct system operation. If a problem occurs, an error message is displayed on the screen and logged in the Pump Stored Strip report. The alarm relay may also be triggered.

Be certain to correct the indicated problem before clearing the alarm. Clearing the alarm without correcting the reported problem may result in local or system performance degradation or missed chemical feeds.

The alarm display register will record up to 10 error messages on a first-in, first-out basis. These messages must be cleared individually. If the alarm is reset and the condition that caused the alarm has not been corrected, the alarm will be retriggered by the next feed request. The alarm may be cleared (reset) in two ways– clear alarm only or retry and clear, as described below.

Clear Alarm Only

To reset the alarm, press the ▲ key. This will turn off both the dispenser and local washer (if present) alarms, and clear the screen. Washer hold on alarm will be released if the hold on alarm feature is activated. The alarm-cleared event is logged in the Pump Stored Strip report.

Retry and Clear

This feature may be used only if the dispenser is holding the washer because of the error. Otherwise, feed retry is disabled to prevent inappropriate feeds.

The Last Feed Retry feature allows you to tell the dispenser to retry the last feed that had an error. If you determine, by reviewing the error message, that an injection was probably missed, press the ▼ key to cause the dispenser to reinject the missed feed. The washer hold will be released; the alarm will be cleared; and hold release, alarm cleared and feed retry messages will be logged in the Pump Stored Strip report.

TROUBLESHOOTING

This section lists common problem symptoms and how to recover.

Pump Box LCD Screen Is Off

1. Check main power to the stepdown transformer.
2. Check the output of the transformer for 24 VAC.
3. Check the power switch and circuit breaker. Reset the breaker if necessary.
   - If the circuit breaker continues to trip, check system for a short circuit in the 24 Volt distribution wiring.
   - Check wiring to washer modules (BetaLink).
4. Check cable connections at the PCB.
5. Check ribbon cable connection from the LCD display to the PCB.
6. Check DC voltages at the PCB.

Pump Box Screen Shows Bars

If the screen displays two lines of solid blocks, then the dispenser is not booting (starting up) properly.

1. Verify that the EPROM memory chip is installed properly on the PCB (see **Replacements**).
2. Check the ribbon cable to the LCD screen.

Washer(s) Not Receiving Chemical

If the dispenser appears to power up properly but is not pumping chemicals to one or more washers, check the following.

One Washer Not Receiving Chemical

1. At the washer, verify that each washer module has the correct address setting.
2. Verify that the washer is enabled. Check washer setup.
3. Verify washer system type. Check washer setup.
4. Verify that the machine on and drain logic settings (normal/reverse) are appropriate for the particular washer. Remember, if you have not connected a machine on signal at this washer, you must set the washer's trigger input polarity to reverse logic, except when using PDCI triggering modes (see **Washer Setup Mode**).
5. Check the BetaLink connections between the pump box and each washer module.
6. Recheck the washer controller and trigger wiring. Observe that the appropriate trigger module LEDs illuminate when the chemical triggers are active.
7. Trigger time limit exceeded (relay mode only). Check washer setup.
8. No established chemical amount. Check washer setup.

All Washers Not Receiving Chemicals

If none of the washers are receiving chemical, a pump box or BetaLink problem may exist.

1. Check BetaLink communication status (using Network Status interrogation screen).
2. Check 24 VAC supply to washer modules.
3. Check washer system type setup.

Pump Fails to Auto-Prime

It is possible that a chemical pump will fail to auto-prime if the chemical supply tube is too long. If the pump fails the first time, it is best to wait for a second chemical call. If the pump fails to auto-prime again:

1. Check to see that POF for the pump is set on.

A chemical pump will not auto-prime if the POF feature is off.

2. Check for air or air leaks in the uptake lines.
3. Check for air leaks in the fittings from the break tank to the chemical pump(s).
4. Check for empty chemical drum.
5. Too long a length or too large a diameter chemical supply tube may require several prime attempts when starting a new system.
6. Pumps running at slow speed take longer to prime than pumps running at fast speed.

Water Supply/Transport System Problems

Adequate transport water flow is essential for proper system performance. The dispenser continuously monitors the transport water flow before, during, and after the chemical pumps inject chemical into the transport system for delivery to the washer.

Transport System Problem

A low transport flow rate problem is indicated by the message **Transport System Error**. This indicates that the level in the break tank did not go from the upper to lower level (float switch setpoints) within the specified maximum time. If the inflow to the break tank is too low, the message may also say **Water Supply Problem**.

1. Check that the transport pump is operating and that there are no flow restrictions in the transport tubing.
2. Check the manifold filter. Clean if necessary.
3. Check for air leaks in the suction side of the transport pump.
4. Check the entire manifold for suction leaks.

No Flow to All Washers

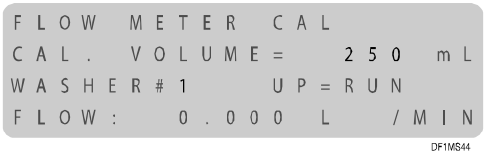
The level of water in the break tank varies during operation. However, it should not go below the lower float switch.

1. If break tank is empty, check for:
   - Water source turned off.
   - Stuck/misadjusted float switch.
   - Solenoid valve inoperative/failed.
     - Check solenoid valve.
     - Check filter built in to the solenoid valve.
     - Check circuit board connections and solenoid drive.
2. If break tank is full, check for:

- Stuck/misadjusted float switch.
- Failed chemical pump tube. Check for cracks or leaks.
- Clogged manifold filter. Check and Clean if necessary
- Broken manifold. Check for cracks or leaks.

Diagnosing a Water Supply Problem Alarm

1. You can run the transport pump and break tank manually using the following pump setup mode screen:



2. To test the transport system, perform a manual flush. Select the desired washer, press ▶ to cause UP=RUN to flash, then press ▲.
3. To stop the flush, press the ▼ key.
4. If water flows into the break tank and the tank fills to the upper level within 15 seconds, then all elements upstream of the tank (solenoid valve and external water source) are OK and the problem is most likely with the transport pump.
5. If there is no water flow:
   - Check the electrical connections to the solenoid valve.
   - Check the operation of the solenoid valve.
   - Check the external water source.
6. If there is very low water flow into the tank:
   - Check the inlet filter of the solenoid valve.
   - Check the inlet water supply pressure.

No Flow to One Washer

1. If motor runs but there is no transport flow:
   - Check for blocked transport system. Look for kinks or obstructions.
   - Check for manifold suction leaks.
   - Repair or replace transport pump head.
2. If motor does not run:
   - Check pump wiring.
   - Check whether pump motor failed.
   - Check motor drive circuit.

Communication Errors

This is indicated on the washer status interrogation screen or by repeated Communication Link error alarms. Check for duplicate module addresses or loose BetaLink connections on the affected washer.

ERROR MESSAGES

Table 8 lists the dispenser error messages that may appear on the screen or in the Pump Stored Strip or Pump Running Strip reports. These messages indicate an abnormal condition, or that a chemical feed may not have been successfully completed.

By analyzing these messages, you can troubleshoot many chemical injection problems. Some messages are dependent on the dispenser configuration, and may not apply to all accounts. Additional information on these error conditions is provided after the table.

Help Information on Error Messages

Each time an error message is displayed, you can press the Print/Info key to see a help screen relevant to the error condition. Press Print/Info again to scroll through additional help screens (if any) associated with the error.

After you take the appropriate corrective action, you can press ▲ to clear the error message, or ▼ to clear the error message and retry the feed.

Message	Meaning	Action Required
Proof of Flow Failure	Chemical not detected at pump box	Check supply drums for chemical level. Check suction tube, uptake hose and pump tube for air leaks and blockage.
Proof of Delivery Failed	Chemical not detected at washer. Applies only to ILS Max emulation systems.	Check transport tube for leaks or breaks. Check POD cell for air. Clean POD cell.
Relay Mode Trigger Time Limited Exceeded	Too much chemical requested.	Check washer control and washer setup.
Feed Rejected High Water Temperature	Water temperature is > 150°F or 70°C.	Check cold water supply and temperature valve setting.
Delivery: Transport System Error	Transport system flow rate below limits after a chemical feed.	Check transport tube for air leaks and blockage. Check the manifold filter and transport pump.
Delivery: Water Supply Problem	Transport water flow failed or the break tank is empty after a chemical feed.	Check break tank, water supply pressure, float switches, inlet valve and filter.
Feed Rejected Pump Box Offline	The pump box will not feed chemicals during a manual chemical pump calibration.	Do not perform a manual calibration while the wash aisle is active.
Feed Rejected Washer Drain Open	Drain status has changed.	Check washer setup drain polarity.
Feed Rejected Washer Off	Washer status has changed.	Check washer setup machine on polarity.
Feed Rejected Washer Not Selected	Network error.	Check pump setup.
Feed Rejected Data Link Erratic	Unreliable communication to washer	Check BetaLink cable and washer module connections.
Feed Rejected Transport Pump Error	Pump did not run, or current is too high.	Check pump motor, PCB, wiring and connections.
Feed Rejected Transport System Error	Transport system flow rate is below limits prior to a chemical feed.	Check the transport tube for blockage or air leaks.
Feed Rejected Unknown Formula	A chemical request has been received in PDCI formula mode, but the dispenser doesn't know what type of cycle is running.	Check washer setup. May be caused by operator error or power outage.
Feed Rejected Low Water Temperature	The water supply is too cold for the selected chemical.	Check the hot water supply temperature valve setting and temperature probe at POF.
Feed Rejected Water Supply Problem	Transport water flow failed or the break tank is empty during a chemical feed.	Check the break tank, water supply pressure, float switches, inlet valve, filter, transport pump, motors and chemical pumps.
Feed Aborted Water Supply Problem	Transport water flow failed or the break tank is empty during a chemical feed.	Check the break tank, water supply pressure, float switches, inlet valve and filter.
Feed Aborted Transport System Error	Transport system flow rate below limits during chemical feed.	Check transport tube for blockage or air leaks. Check manifold filter and transport pump.
Feed Aborted Chemical Pump Error	Pump did not run, or current is too high.	Check pump motor, PC board, wiring and connections.
Worn Chemical Pump Tube	Caution only.	Replace pinch tube and reset date changed.
Washer Network Link Lost	Unable to communicate with washer.	Check BetaLink wires, remote modules, connections, network and setup.
Incompatible Setup Data Format	Bad PCB backup battery or connection to batteries altered.	Check battery voltage. If under 3.2 volts, replace. Ensure good connections at battery holder. Also refer to ETB #14360. You will need to perform a setup and logger purge to reset error.

Table 8. Error Messages

Proof of Flow Messages

The three most common error messages are:

Proof of Flow Failure
Proof of Delivery Failure
Proof of Delivery Not Detected

Proof of Flow Failure

The Proof of Flow failure message indicates that the dispenser was unable to detect the presence of chemical during a feed. The most common reason for this alarm is an out of chemical condition. Check the following components:

1. Check the chemical drum for adequate chemical supply.
2. Check the standpipe to be sure that the end is immersed in chemical.
3. Check the uptake hose and standpipe for obvious leaks.
4. If the uptake line is full of chemical, there are additional possible causes for this failure:
    - Pump tube is worn and unable to pump chemical at a high enough rate.
    - Proof of Flow cell is dirty and unable to detect chemical.
    - Chemical conductivity is too low or the feed amount is too small to be detected by POF cell.

If you have checked all of these conditions and the problem persists with a particular chemical, it is likely that the conductivity of the chemical is too low. If the POF threshold for that chemical is medium or high, lower it by one level. If the POF threshold is low, disable the POF feature by setting the threshold to OFF. See **Pump Setup Mode**.

The POF error may also initially be the result of an excessively long uptake tube. The 30-second timer (fast speed) or 60-second timer (slow speed) elapsed before the uptake line was primed.

Proof of Delivery Failure

This message appears only in ILS Max emulation systems. It indicates that the dispenser was unable to detect a sufficient conductivity change in the POD cell at the washer. The difference between the failure message and the Not Detected message is that the failure term indicates that the chemical was highly conductive and under normal circumstances should have been detectable by the POD system. This condition will set the alarm.

Proof of Delivery Not Detected

This message appears only in ILS Max emulation systems. It indicates that the chemical was marginally conductive at the POF cell and the dispenser was unable to detect a sufficient conductivity change in the POD cell at the washer. This condition is not necessarily critical, as the dispenser has already proved there was chemical injected (POF) and has verified that there is transport flow. This is an advisory message; no alarm is set.

Feed Rejected Messages

Feed rejected messages indicate that the feed was not started. The dispenser has detected some condition that was inconsistent with chemical delivery requirements.

Feed Rejected: Request Amount = 0

Although the message does not indicate a true error, it may indicate that a setup problem exists. Check the injection amounts in the washer formula mode setup. This is an advisory message; no alarm is set.

The following error messages indicate that the washer status has changed since the dispenser accepted the chemical request. The dispenser will not deliver chemical to a washer with an open drain, or to a washer that is off.

Feed Rejected: Washer Drain Open
Feed Rejected: Washer Off

The term washer off refers to the signal used by the dispenser to determine that a wash cycle is in progress. This signal may in fact be a reverse logic signal.

If the problems persist, check the washer setup to verify that the logic settings have not been altered. Also check the integrity of all washer trigger signals.

The dispenser is in constant communication with the washer modules, monitoring the washer status during the feed sequence. The following message indicates that the dispenser could not properly communicate with the washer modules to determine the washer status just prior to commencing a feed. Check the integrity of all BetaLink connections to the various washer modules. Because it is a common installation practice to daisy chain the BetaLink cable from one washer to another, be sure to check all intervening connections.

Feed Rejected: Data Link Erratic

General System Operation Errors

Other error messages may be encountered from time to time.

The following is a maintenance warning. The dispenser has determined that the indicated chemical pump's pumping rate has fallen below 50% of its initial starting rate. The pinch tube should be replaced as soon as practical to optimize system performance. This does not mean that the dispenser accuracy has been compromised, as the auto-calibration feature is still ensuring accurate chemical metering. (See **Replacements** for tube replacement procedures.)

*Before changing the pump tubes, check the chemical uptake system for blockages such as a pinched or kinked hose. After changing a pump tube, be sure to reset the pump tube life and pump calibration (see **Pump Setup Mode**). It is necessary to do this because this establishes a new baseline reference for the worn tube calculation.*

Selecting manual calibration of the chemical pump will prevent the worn tube feature from functioning.

Worn Chemical Pump Tube

The following message appears in relay mode only and states that the indicated chemical trigger has exceeded the maximum trigger time programmed in the washer setup file. The dispenser will not deliver any more of this particular chemical to this particular wash load. Check the wash formulation in the washer controller, and trigger time setting in the washer setup. Also verify the proper performance of the washer controller supply outputs.

Relay Mode Trigger Time Limit Exceeded

The dispenser is in constant communication with the washer modules, monitoring the washer status. The following message indicates that the dispenser has lost, or cannot establish, communication with at least one of the washer modules. Check the integrity of all BetaLink connections to the various washer modules.

As it is a common installation practice to daisy chain the BetaLink cable from one washer to another, check all intervening connections as well as the indicated washer.

Check that only the desired washers are enabled in the setup, and verify the proper address settings of the washer interface module.

Washer Network Link Lost

ADVANCED TROUBLESHOOTING

This procedure must be done only when the dispenser is not dispensing chemicals. It allows you to initiate and monitor various individual inputs or outputs free of any interactive controls.

Only experienced technical personnel should use this procedure since you are not automatically prevented (as in other modes) from doing harm to the dispenser .

To access the test screens:

1. Turn off electrical power to the pump box.
2. Hold down the blue PROGRAM switch on the PCB as you turn on electrical power to the pump box. Continue to hold the switch until the first test screen appears.
3. Use the MENU key to cycle through the screens, which are numbered in the upper right corner (1 through 8).
4. To exit this testing mode, turn off electrical power, wait for 5 seconds, then reapply power. The run screen will appear.

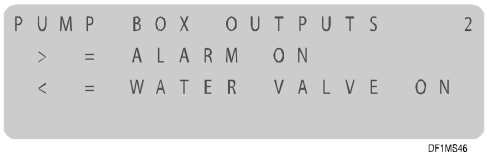
Screen # 1: Chemical Pump Control

Use this screen to control the individual chemical pump drives. SPD is the pump motor's speed and CURNT is the pump motor's current, both in arbitrary units. Typical speeds are 80-90 at fast, and 20-30 at slow. Typical currents under light load conditions are 5-15 at fast, and 2-6 at slow.

The selected pump remains on, in the direction selected, as long as you hold down the appropriate key. This function may be useful in manual priming of unusually long or large chemical supply hoses.

Use caution when running the pumps in this mode, as the transport system is not running. As such, once the pump is primed, further running of the chemical pump may cause concentrated chemical to be pumped into the manifold and transport system.

Screen # 2: Pump Box Outputs

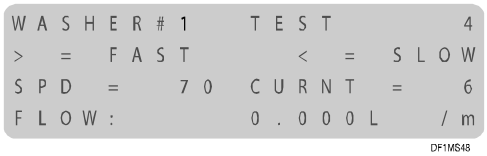


Use this screen to individually control the alarm relay and the water inlet solenoid valve.

Screen # 3: Pump Box Inputs

Use this screen to monitor the state of the pump box inputs. POF and TEMP are the readings from the POF cell. WATER LEVEL measures the water level in the break tank (low, ok or high) and may be used to check operation of the float switches. FLOW INPUT is not used.

Screen # 4: Transport Pump Control

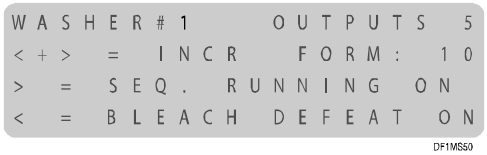


This screen controls the individual transport pumps. The selected pump runs at the selected speed as long as you hold down the ▸ or ◂ key. The break tank operates to provide water.

FLOW is the current flow rate, updated 3 to 5 times per minute. SPD is the pump motor's speed, and CURNT is the pump motor's current, both in arbitrary units. Typical speeds are 35-45 at fast, and 25-35 at slow. Typical currents under light load conditions are 4-6 at fast, and 2-4 at slow. Pressing both ▸ and ◂ keys runs the selected pump at an extra-fast speed, which may be useful when priming the pump.

Screen # 5: Washer Output Control

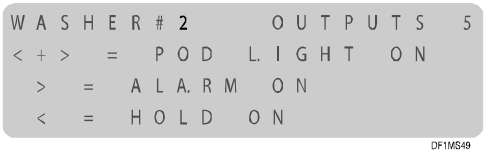
This screen varies depending on whether the selected washer is connected to a ILS Max emulation system.



- Use the screen to control the washer modules as follows: Press ▸ and ◂ to increment formula set on RS-3000. Current formula is shown.
- Press ▸ to turn the sequence running light on (RS-3000).

- Press ◄ to turn the bleach defeat light on (first TR-7000-AC)

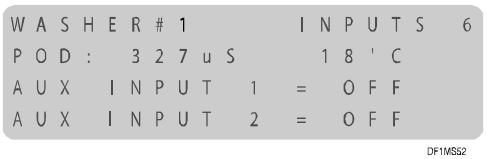
ILS Max Emulation



Use the screen to control the Washer Interface Module as follows:

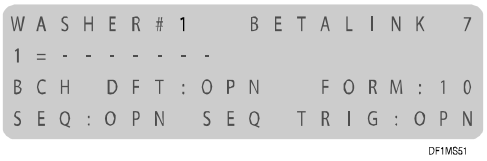
- Press ► and ◄ to turn the POD light on.
- Press ► to turn the alarm relay on.
- Press ◄ to turn the hold relay on.

Screen # 6: Washer Interface Input Read



For ILS Max emulation systems only. Use this screen to monitor the state of the two trigger inputs, and the POD cell of the selected washer interface.

Screen # 7: Washer Module Input Read



Use this screen to view the trigger status of all modules connected to the selected washer. The top line at the right displays BETALINK or ALPHABUS, depending on the type of trigger modules in use.

1= or 2= is the status of the trigger inputs on the TR-7000-AC Trigger Modules (1 or 2).

BCH DFT is the status of the bleach defeat input on the TR-7000-AC.

FORM is the current formula on the RS-3000 Formula Select Module.

SEQ is the status of the start button on the RS-3000.

SEQ TRIG is the status of the trigger input on the RS-3000 (unused).

Screen # 8: Serial Port Test

Use this screen to exercise the serial ports of the PCB. You can set the transmit output of the selected port to 0 or 1. NETWORK toggles between the network port and the printer port.

REPORTS

The dispenser produces a range of reports that provide management, maintenance and troubleshooting information. The available reports are:

- Pump (System) Setup
- Chemical Use
- Pump Stored Strip
- Pump Running Strip
- Washer Activity
- Washer Load ID Setup
- Washer Trigger Setup
- Washer Stored Strip
- Washer Running Strip
- Washer Cycle Record
- Washer Error Cycle
- Washer Production Summary

REPORTS MODE

To print reports from the pump box with the briefcase printer:

1. Plug the printer cable into the pump box printer port on the PCB inside the pump box, and into the printer data input plug.
2. Turn the printer power switch on. Make sure the printer is online and press form feed until the paper is at the top of a page. If the online light is off, press the On Line switch on the printer.
3. Simultaneously press the ▲ and ▼ keys until you see:

4. To set the report period, press the MENU key. This may be done at any time from any report screen. You can report on the last 01 to 99 days as shown in the top screen below, or you can set the days to 00 and set starting and ending dates, as shown in the bottom screen below.

5. To print a report, display the report type screen and press the PRINT key to start printing the report. When the printing is complete, unplug the printer cable from the system. You can halt printing while it is occurring by pressing the Print key.

It is possible to exit the print screen while the print mode is still active (for example, while printing a Washer Running Strip report). To do so, press the ◄ and ► keys to advance to the next mode (interrogation). All menu and setup functions are available while the printer is active. When desired, or when printing is complete, return to the Print menu and turn off the print function.

SYSTEM SETUP REPORT

This report is a hard copy of setup information. It contains present chemical pump calibrations, service life and replacement date for the pump tubes, pump motors, and transport pump, washer flow rates and transport times. Print this report at each service call or whenever you change setups.

SYSTEM SETUP REPORT

ACCOUNT: ACME Laundry
NETWORK I.D. # 01

This report generated: SEP 03,97 13:40:02
Last report generated: AUG 28,97 13:37:38

SHIFT START TIMES: 1st. SHIFT: 07:00 2nd. SHIFT: 16:30 3rd. SHIFT: 23:59

CHEMICAL PUMP INFORMATION:

#	NAME	COST / Liter	PUMP CALIBRATION Liters/minute*			TUBE LIFE/ SERVICE DATE	MOTOR LIFE/ SERVICE DATE	POF POD	MIN TMP
1	Detergent	2.6000	0.535	0.230	A	1 HOURS AUG 27,97	1 HOURS AUG 27,97	High	5C
2	Builder	2.0700	0.548	0.230	A	1 HOURS AUG 27,97	1 HOURS AUG 27,97	Med	24C
3	Bleach	0.2500	0.626	0.230	M	0 HOURS AUG 27,97	0 HOURS AUG 27,97	High	5C
4	Sour	2.3400	0.680	0.204	A	1 HOURS AUG 27,97	1 HOURS AUG 27,97	Low	5C
5	Softener	3.4100	0.680	0.239	A	0 HOURS AUG 27,97	0 HOURS AUG 27,97	Off	5C
6	Mildewcide	2.7800	0.637	0.230	A	0 HOURS AUG 27,97	0 HOURS AUG 27,97	Low	5C
7	Chemical Name 7	0.0000	0.680	0.230	A	0 HOURS AUG 27,97	0 HOURS AUG 27,97	Low	5C
8	Chemical Name 8	0.0000	0.680	0.230	A	0 HOURS AUG 27,97	0 HOURS AUG 27,97	Low	5C

* M = Manually Calibrated, A = Automatically Calibrated

WASHER INFORMATION:

#	STATUS	TRANSPORT TIME (sec)	TRANSPORT PUMP RATES (L/min)		LIFE (hours)	SERVICE DATE	SYSTEM TYPE
1	On	13	2.12	1.48	5	AUG 27,97	Expanded
2	On	17	1.93	1.29	5	AUG 27,97	Expanded
3	On	19	2.20	1.48	5	AUG 27,97	Expanded
4	Off	0	1.80	1.20	0	AUG 27,97	Basic
5	Off	0	1.80	1.20	0	AUG 27,97	Basic
6	Off	0	1.80	1.20	0	AUG 27,97	Basic

FLOW CALIBRATION VOLUME: 243 mL

FLUSH WATER CONDUCTIVITY REFERENCE: 374 Micromhos CURRENT TEMP: 27'C

PART	LIFE (cycles)	SERVICE DATE
HIGH LEVEL FLOAT SWITCH	9008	AUG 27,97
LOW LEVEL FLOAT SWITCH	5604	AUG 27,97
WATER VALVE	3543	AUG 27,97

SET UP VARIABLES LAST CHANGED: AUG 27,97
REPORT COMPLETE

Figure 14. System Setup Report

CHEMICAL USE REPORT

This report gives the total amount of chemical pumped by the dispenser during the report period. The memory storage capacity for chemical use totals is the last 3100 wash cycles. Usage is shown in shift and period totals.

CHEMICAL USE REPORT

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 15:25:18
NETWORK I.D. # 01 — Last report generated: AUG 28,97 15:23:34

REPORT START DATE: AUG 21,97 REPORT END DATE: AUG 28,97

Total Chemical Use in Liters

#	CHEMICAL		1st SHIFT	2nd SHIFT	3rd SHIFT	TOTAL
1	Detergent	Amount:	39.6	3.2	2.2	45.0
		Cost:	102.96	8.32	5.72	117.00
2	Builder	Amount:	51.3	3.5	3.1	57.9
		Cost:	106.19	7.25	6.42	119.86
3	Bleach	Amount:	23.2	1.1	0.7	25.0
		Cost:	5.80	0.28	0.18	6.26
4	Sour	Amount:	9.2	0.4	0.6	10.2
		Cost:	21.53	0.94	1.40	23.87
5	Softener	Amount:	11.2	0.7	0.3	12.2
		Cost:	38.19	2.39	1.02	41.60
6	Mildewcide	Amount:	3.5	0.0	0.9	4.4
		Cost:	9.73	0.00	2.50	12.23
7	Chemical Name 7	Amount:	0.0	0.0	0.0	0.0
		Cost:	0.00	0.00	0.00	0.00
8	Chemical Name 8	Amount:	0.0	0.0	0.0	0.0
		Cost:	0.00	0.00	0.00	0.00
	GRAND TOTAL COST:		284.40	19.18	17.24	320.82

All valid data records between selected dates printed.

SET UP VARIABLES LAST CHANGED: AUG 28,97
REPORT COMPLETE

Figure 15. Chemical Use Report

PUMP STORED STRIP REPORT

The Pump Stored Strip report is a chronological log of all pump box activity for the period selected or the last 2700 records. This is a very helpful diagnostic tool for reconstructing wash aisle feed events. This is the same information that is presented by the interrogation mode stored strip screen.

To select the report start point, press the Menu key. The screen displays a section of the Pump Stored Strip report. Select the desired starting point by pressing ▲ or ▼ to scroll up or down (holding the key down increases the speed of the scroll, and pressing ◀ or ▶ returns to the most recent event). Press Menu again to exit the Date Select mode, and then press Print.

The Pump Stored Strip report records every feed request and all subsequent information about that feed, as well as a complete record of system status. This will include such things as BetaLink status, water flow problems, and loss and establishment of line power to the pump box (with the appropriate date and time stamp).

PUMP STORED STRIP REPORT

Page 1

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 13:35:06
NETWORK I.D. # 01 — Last report generated: AUG 28,97 13:34:34

DATE	TIME	WASH	PUMP	AMOUNT L	EVENT	
AUG 27,97	06:57:57	1	4	0.060	PROOF OF FLOW	CONFIRMED
AUG 27,97	06:58:32	1	5	0.060	FEED REJECTED:	WASHER DRAIN OPEN
AUG 27,97	06:58:32	1	4	0.060	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:01:57	3	--	------	CYCLE STOP	
AUG 27,97	07:07:41	1	--	------	CYCLE STOP	
AUG 27,97	07:12:46	3	--	------	CYCLE STOP	
AUG 27,97	07:12:48	2	4	0.030	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:12:48	2	5	0.030	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:13:24	2	4	0.030	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:14:05	2	5	0.030	PROOF OF FLOW	ASSUMED
AUG 27,97	07:14:22	2	4	0.030	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:14:22	2	5	0.030	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:15:55	1	Error Reset:		FEED REJECTED:	WASHER DRAIN OPEN
AUG 27,97	07:18:59	3	4	0.000	CYCLE START	C: = Cycle Type
AUG 27,97	07:20:08	3	1	0.120	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:20:08	3	2	0.210	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:20:08	3	3	0.100	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:20:40	1	1	0.473	Auto Cal Status	Code Chem Flow
AUG 27,97	07:20:41	3	1	0.120	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:21:25	1	2	0.527	Auto Cal Status	Code Chem Flow
AUG 27,97	07:21:36	3	2	0.210	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:22:11	3	3	0.100	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:22:28	3	1	0.100	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:22:28	3	2	0.210	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:22:28	3	3	0.100	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:23:49	2	--	------	CYCLE STOP	
AUG 27,97	07:36:40	2	3	0.000	CYCLE START	C: = Cycle Type
AUG 27,97	07:37:30	3	4	0.030	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:37:30	3	5	0.030	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:37:57	3	4	0.030	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:38:34	3	5	0.030	PROOF OF FLOW	ASSUMED
AUG 27,97	07:38:52	3	4	0.030	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:38:52	3	5	0.030	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:39:44	2	2	0.000	CYCLE START IGNORED	C: = Cycle Type
AUG 27,97	07:41:07	2	1	0.090	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:41:07	2	2	0.120	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:41:36	2	1	0.090	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:42:03	1	4	0.000	CYCLE START	C: = Cycle Type
AUG 27,97	07:42:11	2	2	0.120	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:42:26	2	1	0.090	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:42:26	2	2	0.090	PROOF OF DELIVERY	ASSUMED
AUG 27,97	07:43:15	1	1	0.210	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:43:15	1	2	0.350	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:43:15	1	3	0.240	FEED REQUEST	FIXED DOSE MODE
AUG 27,97	07:43:45	1	1	0.580	Auto Cal Status	Code Chem Flow
AUG 27,97	07:43:57	1	1	0.210	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:44:32	1	2	0.618	Auto Cal Status	Code Chem Flow
AUG 27,97	07:44:58	1	2	0.350	PROOF OF FLOW	CONFIRMED
AUG 27,97	07:45:35	1	3	0.559	Auto Cal Status	Code Chem Flow
AUG 27,97	07:45:47	1	3	0.240	PROOF OF FLOW	CONFIRMED

. . . Continued on next page . . .

DF1MF16

Figure 16. Pump Stored Strip Report

PUMP RUNNING STRIP REPORT

This is a real time version of the Pump Stored Strip. Pump events are printed as they occur. This is useful when tracking pump box activity while the wash aisle runs.

```
                    PUMP  RUNNING  STRIP  REPORT
                                                                        Page  1
ACCOUNT: ACME Laundry                    This report generated: AUG 27,97 14:47:06
NETWORK I.D. # 01                        Last report generated: AUG 27,97 14:46:34

  DATE      TIME     WASH PUMP AMOUNT L    EVENT
-------------------------------------------------------------------------------
AUG 27,97 14:48:00     1    2    0.533     Auto Cal Status      Code Chem   Flow
AUG 27,97 14:48:13     3    2    0.210     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 14:48:46     3    3    0.100     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 14:49:01     3    1    0.120     PROOF OF DELIVERY    ASSUMED
AUG 27,97 14:49:01     3    2    0.210     PROOF OF DELIVERY    ASSUMED
AUG 27,97 14:49:01     3    3    0.100     PROOF OF DELIVERY    ASSUMED
AUG 27,97 14:52:56     1    6    0.000     CYCLE START IGNORED C: = Cycle Type
AUG 27,97 14:53:37     2    3    0.090     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 14:54:06     2    3    0.090     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 14:54:21     2    3    0.090     PROOF OF DELIVERY    ASSUMED
AUG 27,97 14:55:33     1    4    0.060     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 14:55:33     1    5    0.150     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 14:56:14     1    4    0.218     Auto Cal Status      Code Chem   Flow
AUG 27,97 14:56:15     1    4    0.060     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 14:57:10     1    5    0.221     Auto Cal Status      Code Chem   Flow
AUG 27,97 14:57:37     1    5    0.150     PROOF  OF  FLOW      ASSUMED
AUG 27,97 14:57:50     1    4    0.060     PROOF OF DELIVERY    ASSUMED
AUG 27,97 14:57:50     1    5    0.150     PROOF OF DELIVERY    ASSUMED
AUG 27,97 15:04:23     3    4    0.030     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 15:04:23     3    5    0.030     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 15:04:30     2    6    0.000     CYCLE START IGNORED C: = Cycle Type
AUG 27,97 15:04:51     3    4    0.030     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 15:05:30     3    5    0.030     PROOF  OF  FLOW      ASSUMED
AUG 27,97 15:05:48     3    4    0.030     PROOF OF DELIVERY    ASSUMED
AUG 27,97 15:05:48     3    5    0.030     PROOF OF DELIVERY    ASSUMED
AUG 27,97 15:07:54     2    4    0.030     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 15:07:54     2    5    0.060     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 15:08:30     2    4    0.030     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 15:09:15     1   --   ------     CYCLE STOP
AUG 27,97 15:09:19     1    5    0.244     Auto Cal Status      Code Chem   Flow
AUG 27,97 15:09:19     2    5    0.060     PROOF  OF  FLOW      ASSUMED
AUG 27,97 15:09:37     2    4    0.030     PROOF OF DELIVERY    ASSUMED
AUG 27,97 15:09:37     2    5    0.060     PROOF OF DELIVERY    ASSUMED
AUG 27,97 15:15:16     3   --   ------     CYCLE STOP
AUG 27,97 15:18:56     2   --   ------     CYCLE STOP
AUG 27,97 15:24:39     3    5    0.000     CYCLE START          C: = Cycle Type
AUG 27,97 15:26:38     3    3    0.000     CYCLE START IGNORED C: = Cycle Type
AUG 27,97 15:29:26     3    2    0.000     CYCLE START IGNORED C: = Cycle Type
AUG 27,97 15:31:02     3    1    0.300     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 15:31:02     3    2    0.240     FEED REQUEST         FIXED DOSE MODE
AUG 27,97 15:31:09     2    8    0.000     CYCLE START          C: = Cycle Type
AUG 27,97 15:31:31     1    1    0.625     Auto Cal Status      Code Chem   Flow
AUG 27,97 15:31:49     3    1    0.300     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 15:32:22     1    2    0.549     Auto Cal Status      Code Chem   Flow
AUG 27,97 15:32:37     3    2    0.240     PROOF  OF  FLOW      CONFIRMED
AUG 27,97 15:32:52     3    1    0.300     PROOF OF DELIVERY    ASSUMED
AUG 27,97 15:32:52     3    2    0.240     PROOF OF DELIVERY    ASSUMED
AUG 27,97 15:34:06     2    5    0.000     CYCLE START IGNORED C: = Cycle Type
AUG 27,97 15:36:03     2    3    0.000     CYCLE START IGNORED C: = Cycle Type
AUG 27,97 15:39:06     2    2    0.000     CYCLE START IGNORED C: = Cycle Type
SET UP VARIABLES LAST CHANGED AUG 26,97
REPORT TERMINATED MANUALLY
```

Figure 17. Pump Running Strip Report

WASHER ACTIVITY REPORT

This report gives information on efficiency — how many chemical feeds each washer received and total hold time for each washer if the washer supports holds. Memory capacity for this data is the last 3100 wash cycles. This information is valuable for deciding how many washers the dispenser can efficiently service.

WASHER ACTIVITY REPORT

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 14:04:11
NETWORK I.D. # 01 — Last report generated: AUG 28,97 13:49:40

REPORT START DATE: AUG 21,97 REPORT END DATE: AUG 28,97

TRIGGER COUNTS, WASHER HOLD TIME IN MINUTES:SECONDS

#	WASHER	1st SHIFT TRIGS	1st SHIFT HOLD	2nd SHIFT TRIGS	2nd SHIFT HOLD	3rd SHIFT TRIGS	3rd SHIFT HOLD	TOTAL TRIGS	TOTAL HOLD
1	Washer #1	363	--:--	10	--:--	19	--:--	392	--:--
2	Washer #2	305	0:00	16	0:00	19	0:00	340	0:00
3	Washer #3	489	--:--	38	--:--	16	--:--	543	--:--
4	Washer Name 4	0	--:--	0	--:--	0	--:--	0	--:--
5	Washer Name 5	0	--:--	0	--:--	0	--:--	0	--:--
6	Washer Name 6	0	--:--	0	--:--	0	--:--	0	--:--
GRAND TOTAL		1157	0:00	64	0:00	54	0:00	1275	0:00

SET UP VARIABLES LAST CHANGED: AUG 28,97
REPORT COMPLETE

DF1MF18

Figure 18. Washer Activity Report

WASHER LOAD ID SETUP REPORT

This report is the primary washer setup report. It shows all of the classification (wash cycle) names, and other cycle-related information. The data reported changes when the washer is utilizing a PDCI triggering mode.

In non-PDCI modes, the report shows the cycle qualification drain and trigger counts. The dispenser uses this information to identify wash loads based on a match of the qualifiers, and those events that occurred during a load. This information is not required in PDCI modes, and so is not listed.

In all trigger modes, the cycle time forms the basis for the excess run time calculation in washer reports, and weight is used as part of the cost calculations. The machine control logic settings (normal/reverse) are also shown.

In PDCI modes, the cycle-add time is listed. It is used to adjust the measured cycle duration to equal the actual cycle duration.

WASHER LOAD ID SETUP REPORT

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 15:38:01
NETWORK I.D. # 01 — Last report generated: AUG 28,97 15:33:41

WASHER # 2 Washer #2 — (time in minutes) (weight in Kilos)

#	NAME	DRAINS	TRIG 1	TRIG 2	TRIG 3	TRIG 4	TRIG 5	TIME	WEIGHT
1	Colored T/L	3	1	0	2	0	0	33	20
2	Terry	4	2	2	2	0	0	39	20
3	White T/L	5	2	3	2	0	0	42	20
4	Sheets	3	1	0	1	0	0	32	20
5	Rags	5	4	3	2	0	0	44	20
6	Starch	2	1	0	1	0	0	16	20
7	Spreads	3	1	0	1	0	0	18	20
8	Reject	6	4	4	3	0	0	46	20
9	Cycle Name 9	0	0	0	0	0	0	0	0
10	Cycle Name 10	0	0	0	0	0	0	0	0
11	Cycle Name 11	0	0	0	0	0	0	0	0
12	Cycle Name 12	0	0	0	0	0	0	0	0
13	Cycle Name 13	0	0	0	0	0	0	0	0
14	Cycle Name 14	0	0	0	0	0	0	0	0
15	Cycle Name 15	0	0	0	0	0	0	0	0
16	Cycle Name 16	0	0	0	0	0	0	0	0
17	Cycle Name 17	0	0	0	0	0	0	0	0
18	Cycle Name 18	0	0	0	0	0	0	0	0
19	Cycle Name 19	0	0	0	0	0	0	0	0
20	Cycle Name 20	0	0	0	0	0	0	0	0
21	Cycle Name 21	0	0	0	0	0	0	0	0
22	Cycle Name 22	0	0	0	0	0	0	0	0
23	Cycle Name 23	0	0	0	0	0	0	0	0
24	Cycle Name 24	0	0	0	0	0	0	0	0
25	Cycle Name 25	0	0	0	0	0	0	0	0
26	Cycle Name 26	0	0	0	0	0	0	0	0
27	Cycle Name 27	0	0	0	0	0	0	0	0
28	Cycle Name 28	0	0	0	0	0	0	0	0
29	Cycle Name 29	0	0	0	0	0	0	0	0
30	Cycle Name 30	0	0	0	0	0	0	0	0

TRIGGER MODE: FORMULA

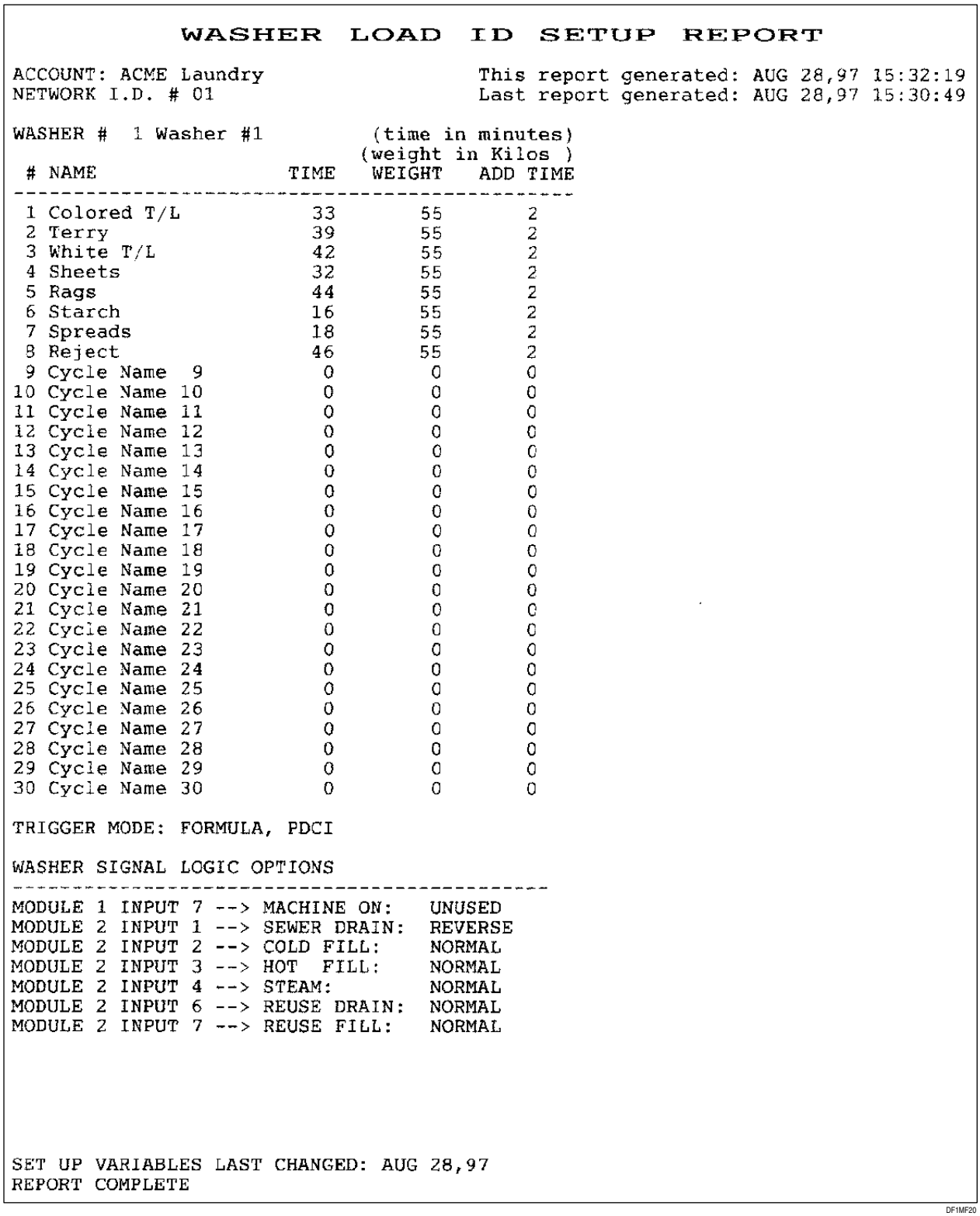
WASHER SIGNAL LOGIC OPTIONS

MODULE 1 INPUT 7 --> MACHINE ON: NORMAL
MODULE 2 INPUT 1 --> SEWER DRAIN: REVERSE
MODULE 2 INPUT 2 --> COLD FILL: NORMAL
MODULE 2 INPUT 3 --> HOT FILL: NORMAL
MODULE 2 INPUT 4 --> STEAM: NORMAL
MODULE 2 INPUT 6 --> REUSE DRAIN: NORMAL
MODULE 2 INPUT 7 --> REUSE FILL: NORMAL

SET UP VARIABLES LAST CHANGED: AUG 28,97
REPORT COMPLETE

DF1MF19

Figure 19. Washer Load ID Setup Report - Non-PDCI Triggering Mode



WASHER LOAD ID SETUP REPORT

ACCOUNT: ACME Laundry
NETWORK I.D. # 01

This report generated: AUG 28,97 15:32:19
Last report generated: AUG 28,97 15:30:49

WASHER # 1 Washer #1

#	NAME	TIME (time in minutes)	WEIGHT (weight in Kilos)	ADD TIME
1	Colored T/L	33	55	2
2	Terry	39	55	2
3	White T/L	42	55	2
4	Sheets	32	55	2
5	Rags	44	55	2
6	Starch	16	55	2
7	Spreads	18	55	2
8	Reject	46	55	2
9	Cycle Name 9	0	0	0
10	Cycle Name 10	0	0	0
11	Cycle Name 11	0	0	0
12	Cycle Name 12	0	0	0
13	Cycle Name 13	0	0	0
14	Cycle Name 14	0	0	0
15	Cycle Name 15	0	0	0
16	Cycle Name 16	0	0	0
17	Cycle Name 17	0	0	0
18	Cycle Name 18	0	0	0
19	Cycle Name 19	0	0	0
20	Cycle Name 20	0	0	0
21	Cycle Name 21	0	0	0
22	Cycle Name 22	0	0	0
23	Cycle Name 23	0	0	0
24	Cycle Name 24	0	0	0
25	Cycle Name 25	0	0	0
26	Cycle Name 26	0	0	0
27	Cycle Name 27	0	0	0
28	Cycle Name 28	0	0	0
29	Cycle Name 29	0	0	0
30	Cycle Name 30	0	0	0

TRIGGER MODE: FORMULA, PDCI

WASHER SIGNAL LOGIC OPTIONS

MODULE 1 INPUT 7 -->	MACHINE ON:	UNUSED
MODULE 2 INPUT 1 -->	SEWER DRAIN:	REVERSE
MODULE 2 INPUT 2 -->	COLD FILL:	NORMAL
MODULE 2 INPUT 3 -->	HOT FILL:	NORMAL
MODULE 2 INPUT 4 -->	STEAM:	NORMAL
MODULE 2 INPUT 6 -->	REUSE DRAIN:	NORMAL
MODULE 2 INPUT 7 -->	REUSE FILL:	NORMAL

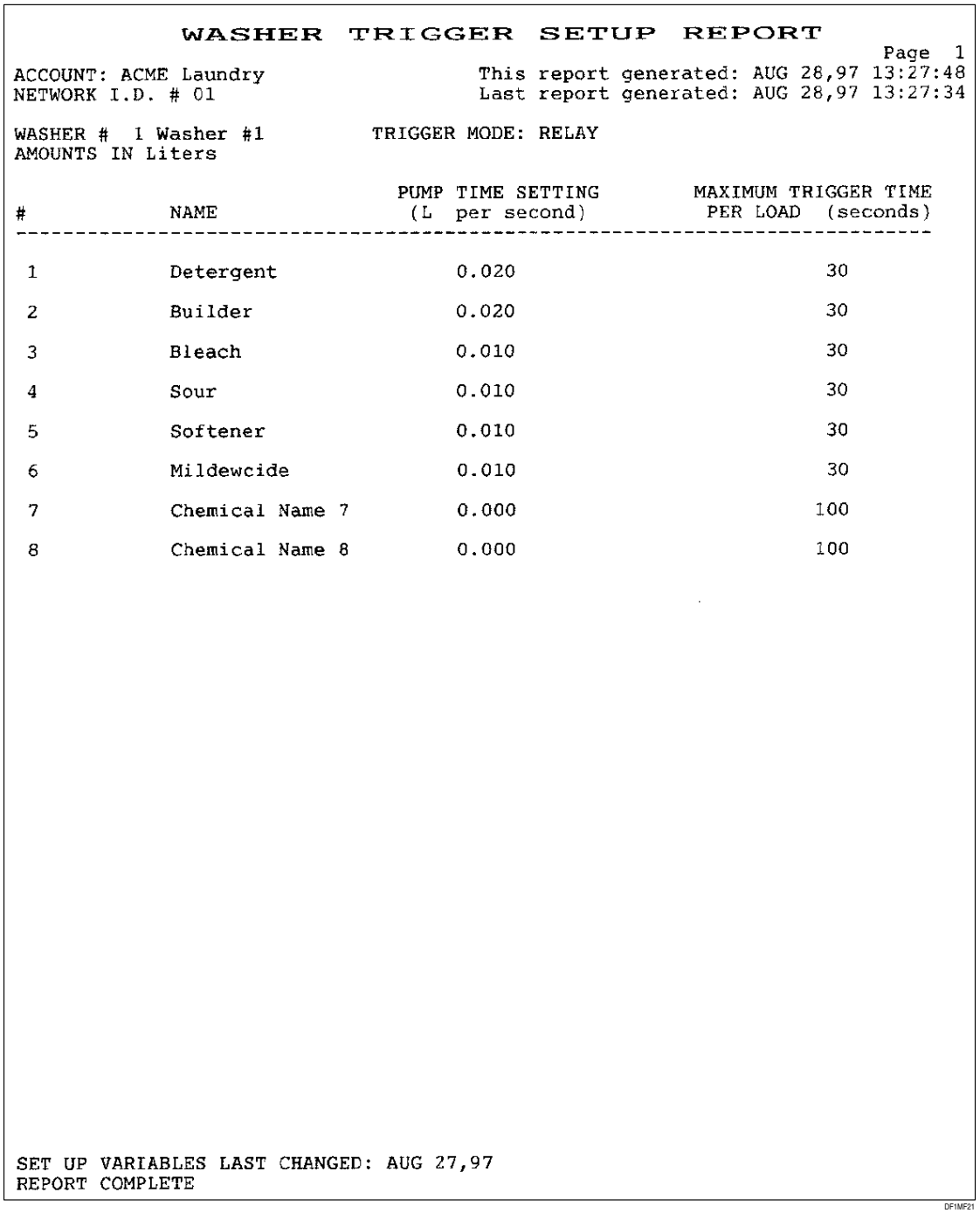
SET UP VARIABLES LAST CHANGED: AUG 28,97
REPORT COMPLETE

DF1MF20

Figure 20. Washer Load ID Setup Report - PDCI Triggering Mode

WASHER TRIGGER SETUP REPORT

This report shows a washer's trigger configuration and setup. The data varies depending on trigger mode setting (relay, automatic or formula). The report shows call rate or injection amounts, depending on trigger mode. The relay mode version shows call rate of the chemical pumps, and maximum trigger time setting. Call rate is the amount of chemical that will be dispensed by the pump for each second of trigger on time.



WASHER TRIGGER SETUP REPORT

Page 1

ACCOUNT: ACME Laundry
NETWORK I.D. # 01

This report generated: AUG 28,97 13:27:48
Last report generated: AUG 28,97 13:27:34

WASHER # 1 Washer #1 TRIGGER MODE: RELAY
AMOUNTS IN Liters

#	NAME	PUMP TIME SETTING (L per second)	MAXIMUM TRIGGER TIME PER LOAD (seconds)
1	Detergent	0.020	30
2	Builder	0.020	30
3	Bleach	0.010	30
4	Sour	0.010	30
5	Softener	0.010	30
6	Mildewcide	0.010	30
7	Chemical Name 7	0.000	100
8	Chemical Name 8	0.000	100

SET UP VARIABLES LAST CHANGED: AUG 27,97
REPORT COMPLETE

DF1MF21

Figure 21. Washer Trigger Setup Report (Relay Mode

Both the formula and the automatic mode Washer Trigger Setup reports show the dispensing matrix that the system will follow in response to a given trigger pattern. There are 30 formulas available in PDCI formula mode (report requires four pages), and 16 formulas in the other formula modes (report requires two pages).

WASHER TRIGGER SETUP REPORT

Page 1

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 15:39:39
NETWORK I.D. # 01 — Last report generated: AUG 28,97 15:38:01

WASHER # 2 Washer #2 — TRIGGER MODE: FORMULA, PDCI
AMOUNTS IN Liters

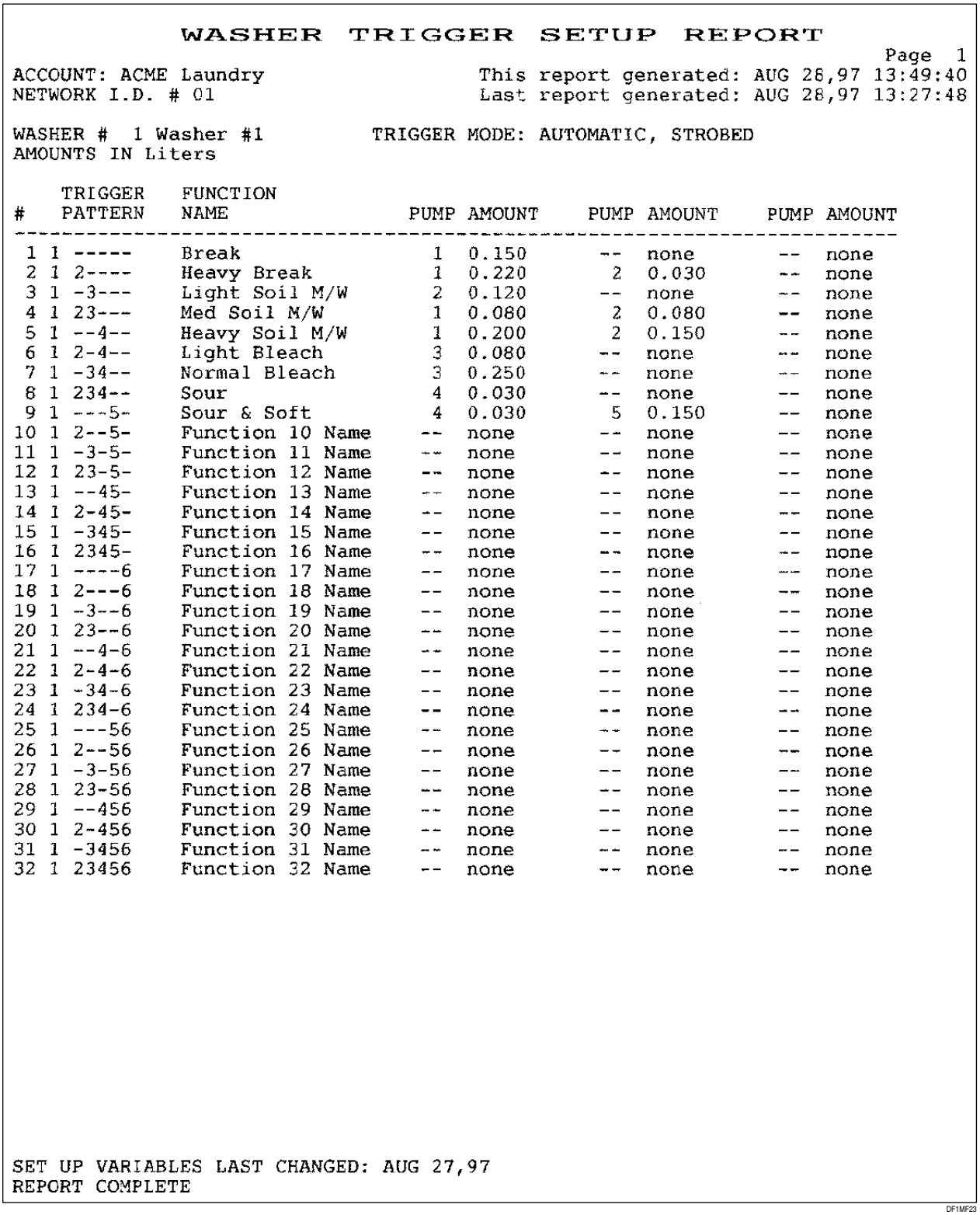
TRIGGER 1 (1----) PUMP / AMT	TRIGGER 2 (-2---) PUMP / AMT	TRIGGER 3 (12---) PUMP / AMT	TRIGGER 4 (--3--) PUMP / AMT	TRIGGER 5 (1-3--) PUMP / AMT
FORMULA # 1 Colored T/L				
1 0.060	-- none	-- none	4 0.040	-- none
2 0.080	-- none	-- none	6 0.080	-- none
-- none	-- none	-- none	-- none	-- none
FORMULA # 2 Terry				
1 0.080	-- none	3 0.060	4 0.020	-- none
2 0.080	-- none	-- none	5 0.040	-- none
-- none	-- none	-- none	-- none	-- none
FORMULA # 3 White T/L				
1 0.060	-- none	3 0.060	4 0.040	-- none
2 0.080	-- none	-- none	6 0.080	-- none
-- none	-- none	-- none	-- none	-- none
FORMULA # 4 Sheets				
1 0.080	-- none	-- none	4 0.020	-- none
2 0.140	-- none	-- none	5 0.020	-- none
3 0.070	-- none	-- none	-- none	-- none
FORMULA # 5 Rags				
1 0.200	-- none	3 0.080	4 0.020	-- none
2 0.160	-- none	-- none	-- none	-- none
-- none	-- none	-- none	-- none	-- none
FORMULA # 6 Starch				
-- none	-- none	-- none	4 0.040	-- none
-- none	-- none	-- none	6 0.080	-- none
-- none	-- none	-- none	-- none	-- none
FORMULA # 7 Spreads				
2 0.060	-- none	-- none	4 0.020	-- none
-- none	-- none	-- none	5 0.020	-- none
-- none	-- none	-- none	-- none	-- none
FORMULA # 8 Reject				
1 0.300	-- none	3 0.050	4 0.020	-- none
2 0.300	-- none	-- none	5 0.040	-- none
-- none	-- none	-- none	-- none	-- none

. . . Continued on next page . . .

DF1MF22

Figure 22. Washer Trigger Setup Report (Formula Mode)

Automatic mode has 32 functions available.



WASHER TRIGGER SETUP REPORT

Page 1

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 13:49:40
NETWORK I.D. # 01 — Last report generated: AUG 28,97 13:27:48

WASHER # 1 Washer #1 — TRIGGER MODE: AUTOMATIC, STROBED
AMOUNTS IN Liters

#	TRIGGER PATTERN	FUNCTION NAME	PUMP	AMOUNT	PUMP	AMOUNT	PUMP	AMOUNT
1	1 -----	Break	1	0.150	--	none	--	none
2	1 2----	Heavy Break	1	0.220	2	0.030	--	none
3	1 -3---	Light Soil M/W	2	0.120	--	none	--	none
4	1 23---	Med Soil M/W	1	0.080	2	0.080	--	none
5	1 --4--	Heavy Soil M/W	1	0.200	2	0.150	--	none
6	1 2-4--	Light Bleach	3	0.080	--	none	--	none
7	1 -34--	Normal Bleach	3	0.250	--	none	--	none
8	1 234--	Sour	4	0.030	--	none	--	none
9	1 ---5-	Sour & Soft	4	0.030	5	0.150	--	none
10	1 2--5-	Function 10 Name	--	none	--	none	--	none
11	1 -3-5-	Function 11 Name	--	none	--	none	--	none
12	1 23-5-	Function 12 Name	--	none	--	none	--	none
13	1 --45-	Function 13 Name	--	none	--	none	--	none
14	1 2-45-	Function 14 Name	--	none	--	none	--	none
15	1 -345-	Function 15 Name	--	none	--	none	--	none
16	1 2345-	Function 16 Name	--	none	--	none	--	none
17	1 ----6	Function 17 Name	--	none	--	none	--	none
18	1 2---6	Function 18 Name	--	none	--	none	--	none
19	1 -3--6	Function 19 Name	--	none	--	none	--	none
20	1 23--6	Function 20 Name	--	none	--	none	--	none
21	1 --4-6	Function 21 Name	--	none	--	none	--	none
22	1 2-4-6	Function 22 Name	--	none	--	none	--	none
23	1 -34-6	Function 23 Name	--	none	--	none	--	none
24	1 234-6	Function 24 Name	--	none	--	none	--	none
25	1 ---56	Function 25 Name	--	none	--	none	--	none
26	1 2--56	Function 26 Name	--	none	--	none	--	none
27	1 -3-56	Function 27 Name	--	none	--	none	--	none
28	1 23-56	Function 28 Name	--	none	--	none	--	none
29	1 --456	Function 29 Name	--	none	--	none	--	none
30	1 2-456	Function 30 Name	--	none	--	none	--	none
31	1 -3456	Function 31 Name	--	none	--	none	--	none
32	1 23456	Function 32 Name	--	none	--	none	--	none

SET UP VARIABLES LAST CHANGED: AUG 27,97
REPORT COMPLETE

DF1MF23

Figure 23. Washer Trigger Setup (Automatic Mode)

WASHER RUNNING STRIP REPORT

This report is a diagnostic tool for verifying status and timing of the washer and chemical trigger signals. Each time a channel changes state, the report logs the event. This report is also useful to diagnose washer problems such as leaking drain valves (indicated by repeated water fills during a bath) or low water temperature (indicated by excessive steaming).

When this report is started while a wash cycle is running, all events from the beginning of the cycle to the present time will be printed before real time printing begins. At the conclusion of a cycle, a line of asterisks is printed, followed by a cycle summary. Input changes that occur between cycles are not shown.

The Hold and Alarm columns reflect the status of the Washer Interface Module in a ILS Max emulation system. Alarm does not reflect the status of the alarm relay in the pump box. The Accum Trig. column is on in PDCI triggering modes while triggers are being accumulated. When the accumulation process ends, another line is printed with Accum Trig. off, and with the composite accumulated trigger code. It is the trigger code, at this time, that is seen by the feed triggering logic.

```
                    WASHER  RUNNING  STRIP  REPORT
                                                                        Page  1
ACCOUNT: ACME Laundry                    This report generated: AUG 27,97 14:35:54
NETWORK I.D. # 01                        Last report generated: AUG 27,97 14:32:49

WASHER #  1 Washer #1

CYCLE START: AUG 27,97 14:37:09

                CYCLE  WASH                                  ACCUM Module 1 Trigs:        Module 2 Trigs:
TIME             TIME   ON   DRAIN COLD  HOT   STEAM R-DRN R-FIL TRIG. 1   2   3   4   5   ST  NA  NA  NA     HOLD ALARM
-------------------------------------------------------------------------------------------------------------------------
AUG 27 14:37:09   0:00   On    --    --    --    --    --    --    --   --  --  On  --  --  On  --  --  --       --   --
AUG 27 14:37:41   0:32   On    --    --    --    --    --    --    On   On  --  --  --  --  --  --  --  --       --   --
AUG 27 14:38:22   1:13   On    --    --    --    --    --    --    On   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:38:26   1:17   On    --    --    --    --    --    --    --   On  --  --  --  --  --  --  --  --       --   --
AUG 27 14:45:49   8:40   On    On    --    --    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:46:29   9:20   On    On    --    On    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:46:33   9:24   On    --    --    On    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:46:44   9:35   On    --    --    --    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:49:04  11:55   On    On    --    --    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:49:49  12:40   On    On    --    On    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:49:52  12:43   On    --    --    On    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:50:08  12:59   On    --    --    --    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:52:22  15:13   On    On    --    --    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:52:36  15:27   On    On    --    --    --    --    --    On   --  --  On  --  --  --  --  --  --       --   --
AUG 27 14:53:08  15:59   On    On    On    --    --    --    --    On   --  --  On  --  --  --  --  --  --       --   --
AUG 27 14:53:10  16:01   On    --    On    --    --    --    --    On   --  --  On  --  --  --  --  --  --       --   --
AUG 27 14:53:17  16:08   On    --    --    --    --    --    --    On   --  --  On  --  --  --  --  --  --       --   --
AUG 27 14:53:30  16:21   On    --    --    --    --    --    --    On   --  --  --  --  --  --  --  --  --       --   --
AUG 27 14:53:35  16:26   On    --    --    --    --    --    --    --   --  --  Or  --  --  --  --  --  --       --   --
AUG 27 14:56:38  19:29   On    On    --    --    --    --    --    --   --  --  --  --  --  --  --  --  --       --   --
AUG 27 15:05:47  28:38   On    On    --    --    --    --    --    On   --  --  --  --  --  On  --  --  --       --   --
AUG 27 15:06:27  29:18   On    On    --    --    --    --    --    On   --  --  --  --  --  --  --  --  --       --   --
AUG 27 15:06:31  29:22   --    On    --    --    --    --    --    --   --  --  --  --  --  On  --  --  --       --   --
*************************************************************************
*** END OF CYCLE ***

CYCLE TYPE = # 4 Sheets              QUALIFIED DRAINS:  3   WEIGHT:   55 Kilos

CHEMICAL USE          Liters         Trigger Count          UTILITY USE   Seconds
---------------------------          -------------          -------------------
 1 Detergent           0.150          1           1         COLD                9
 2 Builder             0.250          2           0         HOT                34
 3 Bleach              0.150          3           1         STEAM               0
 4 Sour                0.040          4           0         REUSE               0
 5 Softener            0.040          5           0
 6 Mildewcide          0.000          6           1
 7 Chemical Name 7     0.000          7           0
 8 Chemical Name 8     0.000          8           0




SET UP VARIABLES LAST CHANGED: AUG 27,97
REPORT COMPLETE
```

DF1MF24

Figure 24. Washer Running Strip Report

WASHER STORED STRIP REPORT

This report is a logged version of the Washer Running Strip. The logging feature must be enabled in washer setup. This allows you to diagnose multiple washers at the same time, or have the stored strip running during normal operation of the wash aisle to catch a “once in a while” event. The report can include 1400 lines of events for all washers. Therefore, with fewer washers enabled for logging, more records can be captured per washer.

Unlike the running strip report, the stored strip report does report events that occurred between wash cycles. This includes the accumulation of the cycle start code in PDCI triggering modes. These between cycle events may be recognized by the blank cycle time. This report does not generate cycle summary information.

WASHER STORED STRIP REPORT

Page 1

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 13:41:45
NETWORK I.D. # 01 — Last report generated: AUG 28,97 13:40:27

REPORT START DATE: AUG 27,97 REPORT END DATE: AUG 28,97

WASHER # 1 Washer #1

TIME	CYCLE TIME	WASH ON	DRAIN	COLD	HOT	STEAM	R-DRN	R-FIL	ACCUM TRIG.	Module 1 Trigs: 1	2	3	4	5	ST	Module 2 Trigs: NA	NA	NA	HOLD	ALARM
AUG 27 15:55:21	-:--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 15:56:19	-:--	--	--	--	--	--	--	--	On	--	--	On	--	--	--	--	--	--	--	--
AUG 27 15:56:30	-:--	--	--	--	--	--	--	--	On	--	--	On	--	--	On	--	--	--	--	--
AUG 27 15:56:58	-:--	--	--	--	--	--	--	--	On	--	--	--	--	--	On	--	--	--	--	--
AUG 27 15:57:09	-:--	--	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--	--
AUG 27 15:57:14	0:00	On	--	--	--	--	--	--	--	--	--	On	--	--	On	--	--	--	--	--
AUG 27 15:57:47	0:33	On	--	--	--	--	--	--	On	On	--	--	--	--	--	--	--	--	--	--
AUG 27 15:58:19	1:05	On	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--	--
AUG 27 15:58:24	1:10	On	--	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--
AUG 27 16:05:25	8:11	On	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:06:31	9:17	On	On	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:06:33	9:19	On	--	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:07:06	9:52	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:07:14	10:00	On	--	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:07:19	10:05	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:09:06	11:52	On	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:10:13	12:59	On	On	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:10:15	13:01	On	--	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:10:48	13:34	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:12:40	15:26	On	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:13:22	16:08	On	On	--	--	--	--	--	On	--	--	On	--	--	--	--	--	--	--	--
AUG 27 16:13:39	16:25	On	On	On	--	--	--	--	On	--	--	On	--	--	--	--	--	--	--	--
AUG 27 16:13:41	16:27	On	--	On	--	--	--	--	On	--	--	On	--	--	--	--	--	--	--	--
AUG 27 16:14:31	17:17	On	--	--	--	--	--	--	On	--	--	On	--	--	--	--	--	--	--	--
AUG 27 16:14:53	17:39	On	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:14:58	17:44	On	--	--	--	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--
AUG 27 16:17:32	20:18	On	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:25:18	28:04	On	On	--	--	--	--	--	On	--	--	--	--	--	On	--	--	--	--	--
AUG 27 16:25:53	28:39	On	On	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--	--
AUG 27 16:25:58	28:44	--	On	--	--	--	--	--	--	--	--	--	--	--	On	--	--	--	--	--
**********																				
AUG 28 06:40:26	-:--	--	On	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 28 06:40:28	-:--	--	--	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 28 06:41:45	-:--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 28 06:42:58	-:--	--	--	--	--	--	--	--	On	--	--	On	--	--	--	--	--	--	--	--
AUG 28 06:43:09	-:--	--	--	--	--	--	--	--	On	--	--	On	--	--	On	--	--	--	--	--
AUG 28 06:43:38	-:--	--	--	--	--	--	--	--	On	--	--	--	--	--	On	--	--	--	--	--
AUG 28 06:43:48	-:--	--	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--	--
AUG 28 06:43:53	0:00	On	--	--	--	--	--	--	--	--	--	On	--	--	On	--	--	--	--	--
AUG 28 06:44:25	0:32	On	--	--	--	--	--	--	On	On	--	--	--	--	--	--	--	--	--	--
AUG 28 06:44:56	1:03	On	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--	--
AUG 28 06:45:01	1:08	On	--	--	--	--	--	--	--	On	--	--	--	--	--	--	--	--	--	--
AUG 28 06:52:04	8:11	On	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 28 06:53:09	9:16	On	On	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AUG 28 06:53:11	9:18	On	--	--	On	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

. . . Continued on next page . . .

DF1MF25

Figure 25. Washer Stored Strip Report

WASHER CYCLE RECORD REPORT

This report is a representation of all valid cycle data stored in memory on the performance of the individual washers. All other historical reports are based on the information contained in this file. This record is a total of 3100 cycles maximum for all washers served. You can print the cycle record for any or all cycle classifications, or all washers, during the selected time period. This is a valuable historical document for evaluation of wash aisle and machine performance as well as verifying chemical injections for individual loads. Unidentifiable loads may be diagnosed and resolved, usually by combining with adjacent unidentified loads, as they are usually the result of broken or interrupted cycles (that is, an extract imbalance or addition of dry chemical).

The chemical usage may be 0 even though a qualifier trigger is shown. This may be the result of a 0 amount being called (check the setup report) or an aborted chemical feed (feed rejected because drain was open or the Machine On signal was off) or the channel was not assigned. Check the pump and washer running strip reports for detailed analysis.

For a cycle to be recorded, it must be a valid cycle—at least five minutes in duration, with a qualified drain. However, any cycle with a chemical injection will be reported, regardless of cycle length. The (*) in the column between cycle start time and cycle name indicates that there was a chemical feed irregularity in the load.

WASHER CYCLE RECORD REPORT

Page 1

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 15:44:53
NETWORK I.D. # 01 — Last report generated: AUG 28,97 15:44:39

REPORT START DATE: AUG 22,97 REPORT END DATE: AUG 28,97

WASHER # ALL WASHERS CYCLE TYPE: ALL CYCLE TYPES

CYCLE START	WASH	CYCLE NAME	RUN TIME	QUALIFIERS D 1 2 3 4 5	CHEMICAL USE (Liters) 1	2	3	4	5	6	7	8	UTILITY ON TIME (s) COLD	HOT	STEAM	REUSE
AUG 22 06:54	01	Sheets	34:40	7 2 2 1 1 1	0.41	0.47	0.80	0.11	0.00	0.23	0.00	0.00	57	94	0	0
AUG 22 06:59	03	Colored T/L	31:07	0 1 0 2 0 0	0.11	0.20	0.10	0.02	0.02	0.00	0.00	0.00	0	0	0	0
AUG 22 07:03	02	White T/L	35:46	7 2 0 1 1 1	0.17	0.23	0.08	0.05	0.00	0.11	0.00	0.00	172	218	0	0
AUG 22 07:42	01	Colored T/L	30:18	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	49	58	0	0
AUG 22 07:44	02	White T/L	35:43	7 2 0 1 1 1	0.17	0.23	0.08	0.05	0.00	0.11	0.00	0.00	168	215	0	0
AUG 22 08:23	02	Reject	34:19	7 2 0 1 1 1	0.88	0.88	0.07	0.02	0.05	0.00	0.00	0.00	164	232	0	0
AUG 22 08:25	03	Terry	36:40	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 22 08:43	01	Colored T/L	33:40	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	52	59	0	0
AUG 22 08:57	02	White T/L	35:13	7 2 0 1 1 1	0.17	0.23	0.08	0.05	0.00	0.11	0.00	0.00	124	179	0	0
AUG 22 09:11	03	Terry	36:43	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 22 09:35	01	Colored T/L	33:27	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	53	57	0	0
AUG 22 09:52	02	Terry	42:11	6 1 0 1 1 1	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	108	180	0	0
AUG 22 09:59	03	Terry	36:13	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 22 10:48	01	Colored T/L	29:51	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	49	56	0	0
AUG 22 10:54	03	Terry	36:06	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 22 11:05	02	Reject	46:58	8 2 0 1 1 1	0.88	0.88	0.07	0.02	0.05	0.00	0.00	0.00	162	213	0	0
AUG 22 11:41	03	Terry	36:13	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 22 11:27	01	Colored T/L	51:20	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	50	56	0	0
AUG 22 12:19	02	Sheets	34:40	7 2 0 1 1 1	0.23	0.29	0.00	0.05	0.00	0.11	0.00	0.00	164	202	0	0
AUG 22 12:26	01	Colored T/L	33:25	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	50	58	0	0
AUG 22 12:52	03	Starch	13:54	0 0 0 1 0 0	0.00	0.00	0.00	0.05	0.00	0.11	0.00	0.00	0	0	0	0
AUG 22 12:56	02	Reject	40:49	8 2 0 1 1 1	0.88	0.88	0.07	0.02	0.05	0.00	0.00	0.00	168	209	0	0
AUG 22 13:08	01	Terry	45:13	8 2 2 1 1 1	0.41	0.41	0.14	0.05	0.14	0.00	0.00	0.00	60	78	0	0
AUG 22 13:32	03	Terry	35:37	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 22 13:44	02	Sheets	35:09	7 2 0 1 1 1	0.23	0.29	0.00	0.05	0.00	0.11	0.00	0.00	164	199	0	0
AUG 22 14:30	02	Sheets	19:53	1 0 0 0 0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	108	0	0	0
AUG 22 14:40	03	Spreads	15:11	0 1 0 1 0 0	0.00	0.08	0.00	0.02	0.02	0.00	0.00	0.00	0	0	0	0
AUG 22 14:44	01	Terry	31:53	5 1 1 1 1 1	0.20	0.20	0.14	0.05	0.14	0.00	0.00	0.00	52	58	0	0
AUG 22 14:49	02	Terry	31:02	5 1 0 0 1 1	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	98	162	0	0
AUG 22 15:18	03	Terry	36:50	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 22 15:24	01	Colored T/L	31:44	5 1 1 1 1 1	0.20	0.20	0.14	0.05	0.14	0.00	0.00	0.00	51	59	0	0
AUG 23 07:04	03	Colored T/L	39:54	0 1 0 2 0 0	0.11	0.20	0.10	0.02	0.02	0.00	0.00	0.00	0	0	0	0
AUG 23 07:01	02 *	Sheets	35:45	7 2 0 1 1 1	0.23	0.29	0.00	0.00	0.00	0.00	0.00	0.00	169	226	0	0
AUG 23 07:22	01	Terry	44:39	8 2 2 1 1 1	0.41	0.41	0.14	0.05	0.14	0.00	0.00	0.00	60	79	0	0
AUG 23 07:44	02	White T/L	35:13	7 2 0 1 1 1	0.17	0.23	0.08	0.05	0.00	0.11	0.00	0.00	157	205	0	0
AUG 23 07:50	03	Terry	36:34	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 23 08:20	02	Reject	18:14	3 2 0 1 0 0	0.88	0.88	0.07	0.00	0.00	0.00	0.00	0.00	48	149	0	0
AUG 23 08:15	01	Colored T/L	30:27	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	49	57	0	0
AUG 23 08:39	03	Spreads	15:48	0 1 0 1 0 0	0.00	0.08	0.00	0.02	0.02	0.00	0.00	0.00	0	0	0	0
AUG 23 08:39	02	White T/L	34:55	7 2 0 1 1 1	0.17	0.23	0.08	0.05	0.00	0.11	0.00	0.00	112	151	0	0
AUG 23 08:55	01	Colored T/L	30:20	5 1 1 1 1 1	0.20	0.35	0.23	0.05	0.05	0.00	0.00	0.00	49	56	0	0
AUG 23 09:08	03	Terry	36:00	0 2 2 2 0 0	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	0	0	0	0
AUG 23 09:17	02	Terry	31:03	5 1 0 1 1 1	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	102	169	0	0
AUG 23 09:39	01	Terry	51:01	8 2 2 1 1 1	0.41	0.41	0.14	0.05	0.14	0.00	0.00	0.00	62	81	0	0
AUG 23 09:53	02	Terry	42:16	6 1 0 1 1 1	0.11	0.11	0.08	0.02	0.05	0.00	0.00	0.00	111	170	0	0

. . . Continued on next page . . .

DF1MF26

Figure 26. Washer Cycle Record Report (All Cycles

WASHER ERROR CYCLE REPORT

A variation of the Washer Cycle Record, this report lists cycles that had an error in the feed within the specified date range, and reports which chemical feed had the error. An error does not indicate whether chemical was delivered, just that the dispenser detected something abnormal about the reported feed. Refer to the stored strips for analysis and troubleshooting.

```
                    WASHER  ERROR  CYCLE  REPORT
                                                                        Page  1
ACCOUNT: ACME Laundry                    This report generated: AUG 28,97 15:46:57
NETWORK I.D. # 01                        Last report generated: AUG 28,97 15:44:53

REPORT START DATE: AUG 21,97      REPORT END DATE: AUG 28,97

WASHER #     ALL WASHERS          CYCLE TYPE: ALL CYCLE TYPES

                                RUN   QUALIFIERS     CHEMICAL USE (Liters)                    UTILITY ON TIME (s)
CYCLE START  WASH  CYCLE NAME   TIME  D 1 2 3 4 5    1    2    3    4    5    6    7    8  COLD HOT STEAM REUSE
-------------------------------------------------------------------------------------------------------------
AUG 21 07:06  01 * Colored T/L  29:50  5 1 1 1 1 1  0.20 0.35 0.23 0.00 0.00 0.00 0.00 0.00   52  60    0    0
          FEED ERROR: CHEMICAL #  4,  5
AUG 21 07:48  02 * White T/L    34:35  7 2 0 1 1 1  0.17 0.23 0.08 0.08 0.00 0.11 0.00 0.00  121 187    0    0
          FEED ERROR: CHEMICAL #  5
AUG 21 11:05  02 * Terry        32:05  5 1 0 1 1 1  0.11 0.11 0.08 0.02 0.00 0.00 0.00 0.00  113 187    0    0
          FEED ERROR: CHEMICAL #  5
AUG 21 15:34  02 * Terry         9:41  1 0 0 0 1 1  0.00 0.11 0.00 0.02 0.00 0.00 0.00 0.00   24   0    0    0
          FEED ERROR: CHEMICAL #  5
AUG 23 07:01  02 * Sheets       35:45  7 2 0 1 1 1  0.23 0.29 0.00 0.00 0.00 0.00 0.00 0.00  169 226    0    0
          FEED ERROR: CHEMICAL #  4,  6
AUG 24 13:07  01 * Colored T/L  30:35  5 1 1 1 1 1  0.20 0.35 0.23 0.00 0.00 0.00 0.00 0.00   50  58    0    0
          FEED ERROR: CHEMICAL #  4,  5
AUG 25 16:05  02 * Reject       47:02  8 2 0 1 1 1  0.75 0.44 0.07 0.02 0.05 0.00 0.00 0.00  170 176    0    0
          FEED ERROR: CHEMICAL #  1,  2
AUG 26 15:39  02 * Colored T/L  12:49  1 1 0 0 0 0  0.11 0.20 0.00 0.00 0.00 0.00 0.00 0.00    0  76    0    0
          FEED ERROR: CHEMICAL #  3
AUG 27 09:59  01 * Terry        41:15  6 1 1 1 1 1  0.20 0.20 0.14 0.00 0.00 0.00 0.00 0.00   51  72    0    0
          FEED ERROR: CHEMICAL #  4,  5
AUG 27 12:04  03 * Spreads      18:13  3 1 0 1 0 0  0.00 0.08 0.00 0.00 0.00 0.00 0.00 0.00  221   0    0    0
          FEED ERROR: CHEMICAL #  4,  5
All valid data records between selected dates printed.

SET UP VARIABLES LAST CHANGED: AUG 28,97
REPORT COMPLETE
```

DF1MF27

Figure 27. Washer Error Cycle Report

WASHER PRODUCTION SUMMARY REPORT

This report provides summary data of load count and average chemical cost (per 100 lb or 100 Kg) by classification or by washer. When an individual washer is selected, the totals are by classification, by shift. The weight used to calculate the cost per 100 weight for unidentified loads is the weight of classification #30. The report also provides washer efficiency data such as total machine on time, average turnaround time and average excess time. Excess time is the time in excess of the cycle run time programmed in the cycle ID setup. Large excess times are usually the result of excessive steam up times or long water fill times. The average turnaround time is calculated on a per shift basis. Load changes that occur across a shift boundary are not used in the calculation.

PRODUCTION SUMMARY REPORT

ACCOUNT: ACME Laundry — This report generated: AUG 28,97 15:49:40
NETWORK I.D. # 01 — Last report generated: AUG 28,97 15:48:34

REPORT START DATE: AUG 21,97 REPORT END DATE: AUG 28,97

WASHER # 2 Washer #2 CYCLE COUNTS; AVERAGE COST/100wt; TOTAL COSTS

	1st SHIFT			2nd SHIFT			3rd SHIFT			DAY TOTAL		
CYCLE TYPE	#	AVE /	TOTAL	#	AVE /	TOTAL	#	AVE /	TOTAL	#	AVE /	TOTAL
Colored T/L	12	0.07	10.45	0	0.00	0.00	0	0.00	0.00	12	0.07	10.45
Terry	36	0.06	30.14	1	0.02	0.26	2	0.09	2.23	39	0.06	32.65
White T/L	11	0.11	15.84	0	0.00	0.00	0	0.00	0.00	11	0.11	15.84
Sheets	11	0.10	14.58	0	0.00	0.00	3	0.09	3.37	14	0.10	17.95
Rags	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Starch	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Spreads	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Reject	9	0.30	33.58	4	0.23	11.49	0	0.00	0.00	13	0.28	45.08
Cycle Name 9	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 10	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 11	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 12	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 13	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 14	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 15	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 16	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 17	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 18	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 19	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 20	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 21	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 22	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 23	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 24	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 25	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 26	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 27	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 28	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 29	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Cycle Name 30	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
UNIDENTIFIABLE	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
TOTAL	79	0.10	104.61	5	0.19	11.76	5	0.09	5.61	89	0.11	121.98

REPORT TIMES (HOURS:MINUTES)

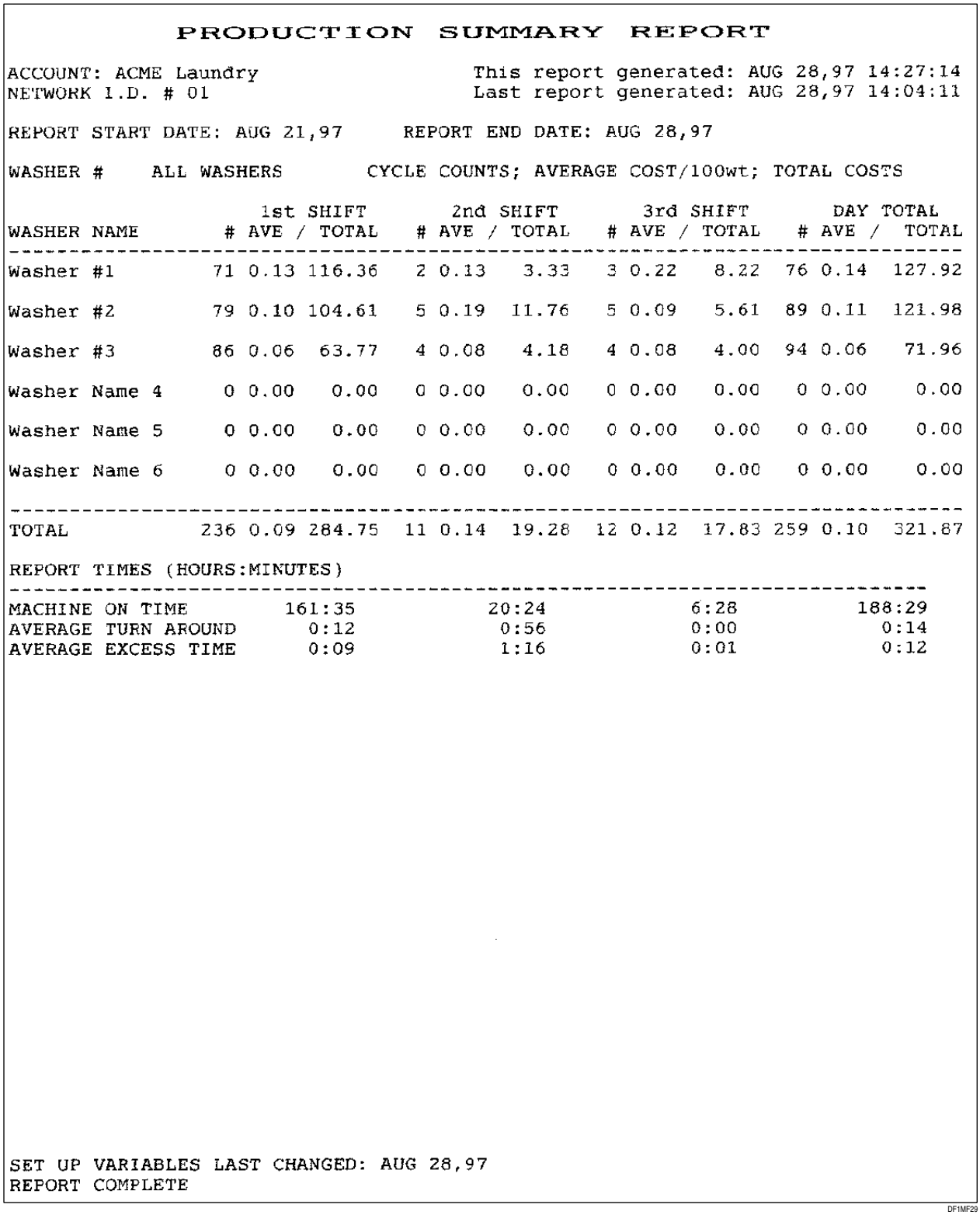
MACHINE ON TIME	47:18	2:56	2:37	52:51
AVERAGE TURN AROUND	0:09	0:44	0:00	0:10
AVERAGE EXCESS TIME	0:01	0:00	0:01	0:01

SET UP VARIABLES LAST CHANGED: AUG 28,97
REPORT COMPLETE

DF1MF28

Figure 28. Production Summary Report (By Washer

When All Washers is selected, the totals are for all classifications run by washer, by shift.



PRODUCTION SUMMARY REPORT

ACCOUNT: ACME Laundry
NETWORK I.D. # 01

This report generated: AUG 28,97 14:27:14
Last report generated: AUG 28,97 14:04:11

REPORT START DATE: AUG 21,97 REPORT END DATE: AUG 28,97

WASHER # ALL WASHERS CYCLE COUNTS; AVERAGE COST/100wt; TOTAL COSTS

WASHER NAME	1st SHIFT #	AVE	TOTAL	2nd SHIFT #	AVE	TOTAL	3rd SHIFT #	AVE	TOTAL	DAY TOTAL #	AVE	TOTAL
Washer #1	71	0.13	116.36	2	0.13	3.33	3	0.22	8.22	76	0.14	127.92
Washer #2	79	0.10	104.61	5	0.19	11.76	5	0.09	5.61	89	0.11	121.98
Washer #3	86	0.06	63.77	4	0.08	4.18	4	0.08	4.00	94	0.06	71.96
Washer Name 4	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Washer Name 5	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
Washer Name 6	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
TOTAL	236	0.09	284.75	11	0.14	19.28	12	0.12	17.83	259	0.10	321.87

REPORT TIMES (HOURS:MINUTES)

MACHINE ON TIME	161:35	20:24	6:28	188:29
AVERAGE TURN AROUND	0:12	0:56	0:00	0:14
AVERAGE EXCESS TIME	0:09	1:16	0:01	0:12

SET UP VARIABLES LAST CHANGED: AUG 28,97
REPORT COMPLETE

DF1MF29

Figure 29. Production Summary Report (All Washers)

MAINTENANCE

REPLACEMENTS

Always disconnect power to the pump box before beginning service. The system can trigger automatically and cause severe injury if the power is not disconnected.

PCB

When servicing or replacing the PCB, use extreme caution to prevent shorting the RAM devices. These devices are under power at all times, even with the board completely removed from the system, since they have battery backup power.

Do not place the PCB on any conductive surface, such as the lid of the adjacent auxiliary pump modules or a metal workbench. Failure to observe this caution may result in the loss of all stored data, and possibly result in destruction of the PCB.

Tools Required

- Phillips head screwdriver

Procedure

1. Turn off electrical power to the pump box.
2. Loosen the 2 screws that fasten top lid.
3. Unlock and open top lid.
4. Remove connectors from PCB locations J4, J5, J6, J8, J9, J10, J16. Remove connectors from PCB locations J1, J2, J3, and J11, if applicable.
5. Remove 14 conductor LCD ribbon cable from PCB connector J19.
6. Remove 7-conductor keypad ribbon cable from PCB connector J18.
7. Remove the 7 PCB mounting screws and 7 lock washers.
8. Lift PCB assembly out of the enclosure.
9. Reinstall new PCB assembly in the reverse order.
10. Turn on electrical power to the pump box.

Do not replace the battery located on the PCB. To do so will result in the loss of all setup and logged data.

LCD Display

Tools Required

- Phillips head screwdriver
- 3/16 in nut driver

Procedure

1. Turn off electrical power to the pump box.
2. Loosen the 2 screws that fasten top lid.
3. Unlock and open top lid.
4. Remove the 4 2-56 LCD mounting nuts.
5. Unplug cable and remove LCD display.
6. Reinstall in the reverse order.
7. Turn on electrical power to the pump box.

When reinstalling LCD display, ensure that the four standoffs remain on the LCD mounting studs.

PROM (Software)

At times, a new PROM (Programmable Read-Only Memory) with updated software will be issued for the pump box.

Tools Required

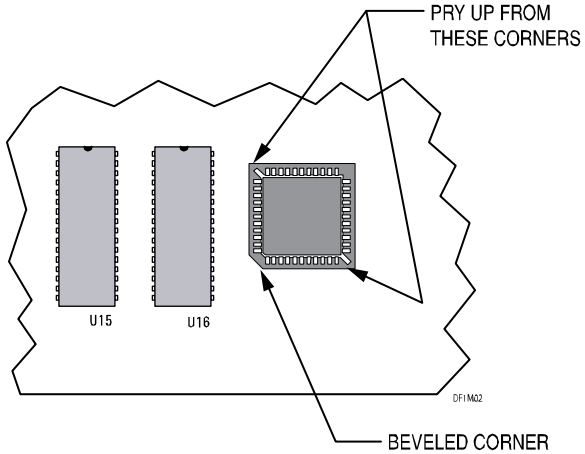
- Phillips head screwdriver
- Integrated circuit (IC) removal tool (PLCC style)

Procedure

1. Turn off electrical power to the pump box.
2. Loosen the 2 screws that fasten top lid.
3. Unlock and open top lid.
4. Locate the PROM socket on the PCB.

Older versions of the PCB have the PROM socket oriented differently. Verify the location of the beveled corner of the socket before proceeding.

5. To remove the PROM IC from the socket, insert the IC removal tool into the space at the upper left and lower right corners of the socket and lift the IC out of the socket. If you don't have an IC removal tool, you can push the PROM out of its socket by pushing with a small rod from the back side of the PCB. Exercise caution when removing the device, as the pins may be easily bent.
6. Place the new PROM, illustrated below, in socket with the bevel in the lower left corner. Check that the pins align properly and press in firmly to seat the PROM.



7. Turn on electrical power to the pump box.
8. After replacing the PROM with a newer version, it may be necessary to clear the setup memory and/or the logged data memory. A warning screen will inform you if this is

the case. If this screen appears, follow the clear memory procedure under **Service**.

Keypad

The keypad is a non-repairable assembly. If the keypad is defective, the front label assembly must be replaced. The label is in two parts. The spacer contains the keypad. The overlay covers the spacer, and contains the screen window.

Tools Required

- 7/16 inch open-end wrench
- 7/8 inch open-end wrench

Procedure

1. Turn off electrical power to the pump box.
2. Loosen the 2 screws that fasten top lid.
3. Unlock and open top lid.
4. Remove the catch from the lock, then remove the lock.
5. Unplug the wires from the circuit breaker and remove it.
6. Disconnect the keypad ribbon cable from the PCB.
7. Peel the old label/keypad assembly from the unit. Heat from a hair dryer might make this easier.
8. Clean off any residual adhesive from the enclosure.
9. Peel protective backing from the new spacer/keypad.
10. Feed the keypad ribbon cable through the cutout in the panel. Be certain that the cable is aligned in the center of the lower notch.
11. Check the alignment of the circuit breaker, lock and mounting screen holes as you press the spacer in place.
12. Reconnect the ribbon cable to the PCB at connector J19.
13. Replace the lock and catch.
14. Peel protective backing from the overlay.
15. Carefully align the overlay to the spacer, using the lock and the screen window as guides. Press the overlay into place.
16. Replace and reconnect the circuit breaker.

Chemical Pump Cartridge

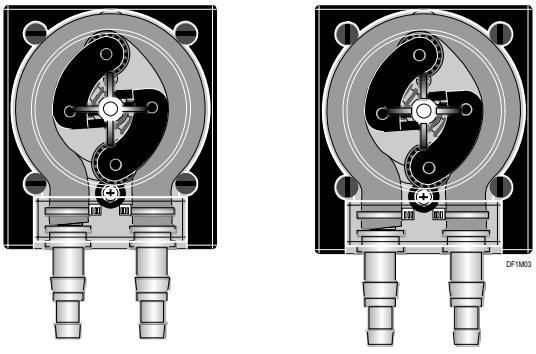
Tools Required

- Wire cutters
- Tie wraps

Procedure

Wear adequate protective clothing such as gloves and glasses.

1. Turn off electrical power to the pump box.
2. Remove the pump cartridge from the motor housing by twisting the 4 snap pin tabs in the corners of the cartridge to horizontal (released), as shown in the following illustration.



Released Locked

3. Cut tie wraps, remove the supply and feed lines from the old pump and connect them to the new pump.
4. Align and engage the pump drive spline with the motor gear by rotating the roller assembly until the cartridge is seated in the face plate recess.
5. Lock the pump cartridge in the motor housing by twisting the 4 snap pin tabs to vertical (locked), as illustrated.
6. Hold the cartridge vertically in the face plate recess and press the pin tabs back until you hear a distinct click.
7. Turn on electrical power to the pump box.
8. Reset the pump tube life via the setup screen.

Chemical Pump Squeeze Tubing

The dispenser displays a Worn Chemical Pump Tube error message when the flow rate from the chemical pump is less than 50% of its original value. You should replace the tube when this occurs.

Tools Required

- Wire cutters
- Tie wraps

Procedure

Wear adequate protective clothing such as gloves and glasses.

1. Turn off electrical power to the pump box.
2. Remove the chemical pump cartridge from the motor housing by twisting the 4 snap pins in the corners of the cartridge.
3. Pull the adapter fittings rearward until they clear the cartridge.
4. Pull the roller assembly rearward to release the pump squeeze tubing.
5. Cut the tie wraps holding the pump squeeze tubing to the adapter fittings and pull the tubing from the fittings.
6. Replace the pump squeeze tubing.
7. Push the adapters onto the ends of the tubing and secure with tie wraps. Make certain that the buckles of the tie wraps are both facing the same direction. This will keep the tube from twisting in the cartridge.

8. Press the 2 adapter fittings into the cartridge so the tie wrap buckles face the center of the pump. The tube must not be twisted inside the assembly.
9. Push the roller assembly onto the cartridge shaft by compressing the springs of the upper roller arm.
10. Turn the 4 snap pin tabs on the chemical pump cartridge to vertical.
11. Hold the cartridge vertically in the face plate recess and press the pin tabs back until you hear a distinct click.
12. Turn on electrical power to the pump box.
13. Reset the pump tube life via the setup screen.

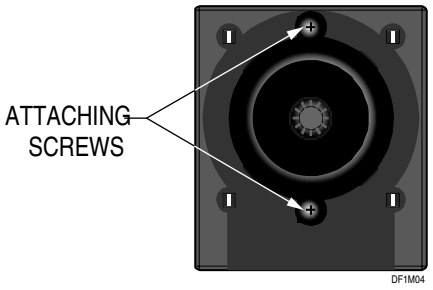
Pump Motor/Gear Box Assembly

Tools Required

- Phillips head screwdriver

Procedure

1. Turn off electrical power to the pump box.
2. Turn the 4 snap pins on pump cartridge assembly 90 degrees left or right and remove pump cartridge assembly from unit. Suction and discharge hoses need not be removed. Support the cartridge as required.



3. Remove the three screws that fasten front door. (One screw is inside the top enclosure, beneath the lock. It does not need to be completely removed.)
4. Open the front door (it will hang open).
5. Remove the 2 motor wire connectors from motor contacts for the pump motor/gear box to be replaced. Note polarity.
6. Swing front door up and hold the door and pump motor while unscrewing the 2 motor mounting plate screws from the front of the unit. See illustration above.
7. Note the orientation of the red dot on the pump motor. Remove pump motor/gearbox assembly and motor mounting plate from unit.
8. Reinstall in the reverse order.

NOTE

If the spline for the spinner in pump cartridge assembly is not aligned properly with the spline for pump gearbox assembly the snap pins will not seat properly upon reinstallation.

9. Turn on electrical power to the pump box.
10. Reset the pump motor life via the setup screen.

Transport Pump

Transport pumps may be individually replaced or repaired in place. You must replace the entire pump if the motor does not turn.

Tools Required

- Phillips head screwdriver
- 3/8 in nut driver
- 1/4 in nut driver
- Wire cutters
- Tie wraps
- 7/8 in open-end wrench
- 11/16 in open-end wrench
- 9/16 in open-end wrench
- Pipe thread sealant

Procedure

1. Turn off electrical power to the pump box.
2. Remove the three screws that fasten front door. (One screw is inside the top enclosure, beneath the lock. It does not need to be completely removed.)
3. Open the front door (it will hang open).
4. Disconnect transport pump wire connectors. Note polarity.
5. Disconnect hose on transport pump output (to washers) by loosening tube fitting on elbow. (If the tube fitting cannot be removed by hand, use a 7/8 in open-end wrench to loosen the tube fitting.)
6. Cut tie wraps and remove tubing from tee on inlet side of transport pump.
7. Remove the three 6-32 nuts from transport pump mounting bracket.
8. Remove transport pump and transport pump mounting bracket from unit.
9. Place transport pump and transport pump mounting bracket on bench and remove the four 10-32 mounting nuts.
10. Remove tube fittings (tee and elbow) from transport pump.
11. Apply pipe sealant to tube fitting threads.
12. Install tube fittings in new transport pump.
13. Reinstall in the reverse order from step 10. The 10-32 nuts that hold the pump to the bracket should only be tightened until the stud is level with the top of the nut.
14. Turn on electrical power to the pump box.
15. Reset the pump life via the setup screen.

Transport Pump Head

Although repair kits are available for the pump valve assembly, it is recommended that you replace the entire pump head. This will expedite repair of the system and allow it to be returned to service more quickly. Replacement of the pump head can be completed in the following manner if necessary.

Tools Required

- Phillips head screwdriver
- Wire cutters
- Tie wraps
- 7/8 in open-end wrench
- 11/16 in open-end wrench
- 9/16 in open-end wrench
- Pipe thread sealant

Procedure

1. Disconnect power to the pump box.
2. Disconnect the manifold and transport fittings.
3. Remove the screws securing transport pump head.
4. Remove pump head by sliding down from motor.
5. Transfer fittings to the new pump head. Use thread sealant.
6. Slide pump head up onto pump motor.
7. Reconnect manifold and transport tubes.
8. Run the transport pump and check all fittings for leaks.
9. Reset the pump life via the setup screen.

Float Switch Assembly

Tools Required

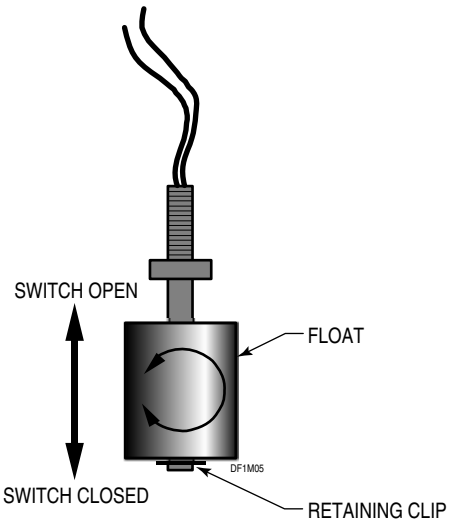
- Phillips head screwdriver
- 1/4 in nut driver
- 7/8 in open-end wrench
- 9/16 in open-end wrench
- Wire cutters
- Wire strippers
- Wire crimper
- 1/4 inch male quick disconnect crimp lugs

Procedure

NOTE

If you replace either float switch in the break tank, you must recalibrate the break tank. See Calibrate Break Tank in this section.

1. Turn off supply water to the pump box.
2. Empty the break tank.
3. Turn off electrical power to the pump box.
4. Remove the three screws that fasten front door. (One screw is inside the top enclosure, beneath the lock. It does not need to be completely removed.)
5. Open the front door (it will hang open).
6. Disconnect the 4 float switch wires. Note orientation from harness:
    - White/Orange wire to high-level float switch.
    - White/Yellow wire to low level float switch.
    - White wires are common.
7. Loosen tube-fitting nut for water inlet to the break tank and remove tube from fitting mounted on hanger bracket. (If the tube fitting cannot be removed by hand, use a 7/8 in open-end wrench to loosen the tube fitting.)
8. Remove the two 6-32 break tank mounting bracket nuts.
9. Pull break tank assembly forward. It is not necessary to disconnect the two tubes attached to the assembly.
10. Remove the two 6-32 float switch hanger bracket nuts. (Nuts face up from top of assembly.)
11. Loosen and remove black plastic nut that fastens float switch. Float switch can then be removed.
12. Obtain new float switch and trim wires to the following lengths:
    - High-level float switch - 5 inches from top of float switch
    - Low-level float switch - 6 inches from top of float switch
13. Strip wire end 1/8 inch.
14. Crimp 1/4 inch male quick disconnects to each wire.
15. Verify that the switch output is closed when the blue float is in the low position. If not, remove the retaining clip from the switch shaft and reverse the blue float end for end. This will reverse the polarity of the switch output.



FLOAT SWITCH POLARITY

16. Reinstall float switch and tighten black plastic nut.
17. Reinstall break tank in the reverse order from step 10.
18. Turn on electrical power to the pump box.
19. Reset the float switch life via the setup screen.

POF Probe

Tools Required

- Phillips head screwdriver

Procedure

You can remove the POF cell for cleaning or replacement using the following procedure, whether the POF cell is installed in the pump box or auxiliary pump housing.

1. Turn off electrical power to the pump box.
2. Loosen the 2 screws that fasten top lid.
3. Unlock and open top lid.
4. Remove the three screws that fasten front door (One screw is inside the top enclosure, beneath the lock. It does not need to be completely removed).
5. Open the front door (it will hang open).
6. Loosen the blue retaining nut and withdraw the probe from the tee fitting. Take care not to misplace the D shaped gasket.
7. If you are replacing the probe, disconnect the POF cable connector J16 at the PCB. Pull the cable through the clearance hole.
8. Clean or replace probe as necessary.
9. Reinsert the probe into the tee fitting and hand tighten the nut. Remember to check for the gasket.
10. Reconnect the probe cable to the PCB.
11. Turn on electrical power to the pump box.
12. Run the transport system to check for leaks.
13. Secure the front panel.

Solenoid Valve/Flow Regulator

Tools Required

- Phillips head screwdriver
- 5/8 in open-end wrench
- 7/8 in open-end wrench

Procedure

1. Turn off electrical power to the pump box.
2. Turn off supply water to the pump box. Relieve pressure from the line.
3. Loosen the 2 screws that fasten top lid.
4. Unlock and open top lid.
5. Remove connector from PCB Assembly (J6).
6. Remove the 2 wire connectors attached to solenoid valve (purple wires).
7. Remove the three screws that fasten front door (One screw is inside the top enclosure, beneath the lock. It does not need to be completely removed).
8. Open the front door (it will hang open).
9. Reach through to the two tube fittings attached to the solenoid valve/flow regulator assembly and remove by hand (If the tube fittings cannot be removed by hand, use a 5/8 in or 7/8in open-end wrench to loosen the tube fittings).
10. If present, remove the short lengths of tubing located between the retaining tabs and body of the solenoid valve. Depress the black retaining tabs on the top portion of the solenoid valve, then remove valve and regulator through bottom portion of the unit.
11. Reinstall in the reverse order.
12. Turn on supply water to the pump box.
13. Turn on electrical power to the pump box.
14. Reset the valve life via the setup screen.

SERVICE

Change or Transport Random Access Memory (RAM)

All of the system setup information, as well as all logged data, is stored in two RAM devices. Some RAM models have internal batteries that allow them to be moved from one PCB to another, thus preserving the stored data.

For standard systems, the RAM backup battery is located on the PC board and removal of the RAM will cause loss of all logged and setup data. Units supplied with nonvolatile RAM will have a jumper bar across the NOV position of J14. The jumper will be across the STD position for standard units.

Use caution when removing and replacing the RAM to ensure that all of the device pins are straight and properly aligned. Take care not to damage the pins. When attempting to change or transport RAMs, use extreme caution since they are static sensitive.

There are two RAM devices on each PCB. When transferring the devices, make certain that they are reinserted in the proper location in the new PCB.

Clear Memory

RAM is normally cleared prior to shipment from the factory. Although you may change the setup information, you may also reset all setups to the factory defaults by a special procedure described below. Historical data (chemical use, cycle data and stored strip data) can only be cleared using the special procedure described below.

Use the following procedures with extreme caution. The entire dispenser memory content is vulnerable.

When purging both setup and logged data, always perform the setup purge first.

Clear Setup Data

1. Turn off power to the pump box.
2. Press and hold the blue button on the PCB.
3. While continuing to press the blue button, press and hold the ▲ and ▼ keys and turn on the dispenser.
4. Watch for the purge confirmation message on the LCD screen. The purge process takes several seconds, and the message passes very quickly. This returns all setup data to its default values.

Clear Logged Data

1. Turn off power to the pump box.
2. Press and hold the blue button switch on the PCB.

3. While continuing to press the blue switch, press and hold the ◂ and ▸ keys and turn on the dispenser.
4. Watch for the purge confirmation message on the LCD screen. The purge process takes several seconds and the message passes very quickly. All logged data is now purged.

Manifold Filter

Tools Required

- Phillips head screwdriver

Procedure

1. Turn off electrical power to the pump box.
2. Loosen the 2 screws that fasten top lid.
3. Unlock and open top lid.
4. Remove the three screws that fasten front door (One screw is inside the top enclosure, beneath the lock. It does not need to be completely removed).
5. Open the front door (it will hang open).
6. Unscrew and remove the filter cap, by hand.
7. Remove the filter screen and rinse if necessary.
8. Replace the filter screen and reinstall the cap. Tighten by hand.
9. Turn on electrical power to the pump box.
10. Run the transport system to check for leaks and to purge the air from the filter.
11. Secure the front panel.

POF Probe

1. Turn off electrical power to the pump box.
2. Open the front door (it will hang open).
3. Unscrew the retaining nut that holds the POF probe in the POF cell.
4. Remove the probe from the cell. Be certain not to lose or damage the probe gasket.
5. Clean the cell probes with a fine abrasive and rinse with clear water.
6. Reinstall in the reverse order. Tighten the retaining nut to only hand tight.

Calibrate Break Tank

If you replace the break tank, alter the settings of the float switches, or replace one or both float switches, you must recalibrate the break tank. There are two procedures you may choose from to calibrate the break tank. The second procedure is the most accurate, but is harder to perform.

For the result to be useful, the measurements must be made accurately. If you do not have the equipment required for accurate measurement, it is better to use the default calibration volume of 250 milliliters.

Tools Required

- A calibrated measuring container of at least 300 milliliter capacity (for procedure 1) or 2.5 liter capacity (for procedure 2)
- 7/8 inch open-end wrench

Procedure 1 - Volume Measurement

During this procedure, the wash aisle must be idle.

1. Restart the dispenser in the test mode (see **Advanced Troubleshooting**). Scroll to test screen #3. The third line, Water Level, is the indication of the state of the float switches.
2. If it is not empty, drain the water from the break tank. Test screen #3 should indicate LOW for Water Level.
3. Slowly fill the break tank until the Water Level reading just changes to OK. This indicates the switch point of the low-level float switch.
4. Add and carefully measure to the nearest five milliliters the amount of water that it takes to just change the Water Level reading from OK to HIGH. This indicates the switch point of the upper float switch. The measured amount is the CAL VOLUME. Record this amount on the break tank calibration tag.
5. Restart dispenser in normal run mode.
6. Go to pump setup mode and scroll to the Flow Meter Calibration screen. Enter the new CAL VOLUME amount.

Procedure 2 - Direct Flow Measurement

During this procedure, the wash aisle must be idle. Chemical requests may interfere with the process.

1. Disconnect any one of the transport tubes at the discharge side of the transport pump. You may wish to connect a short section of transport tube to the outlet of the transport pump that will conveniently reach to the measuring container.
2. Go to pump setup mode and scroll to the Flow Meter Calibration screen. Select the pump whose output has been disconnected.
3. Place the measuring container under the disconnected transport pump. Run the pump briefly to clear any air that may be in the manifold. Discard the collected water.
4. Start and run the transport pump for exactly 1 minute, collecting the water in the container. Measure the volume of water (to the nearest 50 milliliters) at the end of the 1-minute run.
5. While capturing the water flow from the pump, write down the flow readings on the screen each time a new reading appears (This happens just as the water valve opens. Listen for the click of the solenoid valve). There will typically be four readings in 60 seconds.
6. Calculate the average of all readings taken.

7. Calculate the correction factor as follows. Divide the amount measured in step 4 by the average calculated in step 6. The result should be very close to 1.
8. Multiply the correction factor by the CAL VOLUME shown in the pump setup screen. The result is the new CAL VOLUME. Enter this new value in the setup screen and record it on the break tank tag.

Solenoid Valve

Tools Required

- Phillips head screwdriver
- 5/8 inch open-end wrench

Procedure

1. Remove the solenoid valve as described in **Replacements**.
2. Remove the filter access plug from the valve. Remove and clean the filter screen if necessary. Replace the filter and plug.
3. Reinstall the water solenoid valve by reversing the removal procedure.

APPENDIX A. FEED MODES & TR-7000-AC TRIGGERS

This appendix:

- Defines each non-PDCI chemical feed mode, which you specify during washer setup.
- Shows the trigger assignments that are used by the TR-7000-AC Trigger Module for each feed mode.
- Lists the trigger timing limitations imposed by each feed mode.

The PDCI chemical feed modes are covered in Appendix B.

RELAY MODE

Relay mode is for microprocessor-controlled washers. The washer controller delivers a signal of specified time to the dispenser, which converts the duration of the signal into a chemical feed amount. Requires one trigger for each chemical. Relay mode trigger connections are not programmable. Trigger channel #1 triggers chemical pump #1, trigger channel #2 triggers chemical pump #2, and so on.

Trigger channels 1-6 are for pumps 1-6 as needed. Trigger channel 7 is reserved for the machine on signal. If the account requires more than 6 chemicals, you must add the second TR-7000-AC or use Enhanced Relay Mode.

The TR-7000-AC channels equate to the trigger functions listed in **Table 9**.

First TR-7000-AC		Second TR-7000-AC (Optional)	
Trigger Channel	**Function**	**Trigger Channel**	**Function**
1	Chemical Pump 1	1	Sewer Drain
2	Chemical Pump 2	2	Cold Fill
3	Chemical Pump 3	3	Hot Fill
4	Chemical Pump 4	4	Steam
5	Chemical Pump 5	5	Chemical Pump 7
6	Chemical Pump 6	6	Reuse Drain or Chemical Pump 8
7	Machine On	7	Reuse Fill

Table 9. Relay Mode TR-7000-AC Trigger Assignments

ENHANCED RELAY MODE

Enhanced Relay Mode is similar to Relay Mode and is for situations where there are a limited number of chemical triggers available from a microprocessor-controlled washer (you have more chemicals than available signals). Like Relay Mode, signal on time determines the amount of chemical. Unlike Relay Mode, combinations of triggers can select which chemical is pumped.

The TR-7000-AC trigger channels equate to the washer functions listed in **Table 10**.

First TR-7000-AC		Second TR-7000-AC (Optional)	
Channel	**Trigger Assignment**	**Channel**	**Trigger Assignment**
1	See Chemical Pump Triggers Table	1	Sewer Drain*
2	See Chemical Pump Triggers Table	2	Cold Fill
3	See Chemical Pump Triggers Table	3	Hot Fill
4	See Chemical Pump Triggers Table	4	Steam
5	Unused	5	Unused
6	Sewer Drain**	6	Reuse Drain
7	Machine On	7	Reuse Fill
*This input is used if a second TR-7000-AC is connected **This input is used only if a single TR-7000-AC is connected.			

Table 10. Enhanced Relay Mode TR-7000-AC Trigger Assignments

In Enhanced Relay Mode, the TR-7000-AC triggers equate to the washer function listed in **Table 11**.

Chemical Pump Number	Trig Channel 1	Trig Channel 2	Trig Channel 3	Trig Channel 4
1	**ON**	OFF	OFF	OFF
2	OFF	**ON**	OFF	OFF
3	OFF	OFF	**ON**	OFF
4	OFF	OFF	OFF	**ON**
5	**ON**	**ON**	OFF	OFF
6	**ON**	OFF	**ON**	OFF
7	**ON**	OFF	OFF	**ON**
8	OFF	**ON**	**ON**	OFF

Table 11. Enhanced Relay Mode, TR-7000-AC Trigger Assignments

FORMULA MODE

Formula Mode is for washers with chart or card controllers. Chemical dosing is chosen automatically (from the washer) or manually (via RS-3000 Formula Select Module). A supply trigger can occur more than once per load.

Formula mode is typically used in conjunction with mechanical cycle timers. Chemical amounts are established in setup screens. Trigger channels 1-5 are used as supply triggers. Channel 6 may be used as a formula select signal, providing an alternate formula selection. Up to three fixed amounts may be delivered for each trigger signal received.

You can increase the number of alternate formulas to 16 by installing an RS-3000 Formula Select Module or using the formula select trigger signals F1-F4, respectively. F2 through F4 are available only with a second TR-7000-AC.

One or more of the F1-F4 formula select signals may be automatically triggered by alternate formula tracks cut in the wash formula card (functions as an expanded B and C time trigger).

TR-7000-AC Trigger Assignments to Formula Mode			
First TR-7000-AC		Second TR-7000-AC (optional)	
Trigger Channel	**Function**	**Trigger Channel**	**Function**
1	Up to 3 chemical pumps	1	Sewer Drain
2	Up to 3 chemical pumps	2	Cold Fill
3	Up to 3 chemical pumps	3	Hot Fill
4	Up to 3 chemical pumps	4	Steam
5	Up to 3 chemical pumps	5	Formula Select Bit 2
6	Formula Select Bit 1	6	Reuse Drain or Formula Select Bit 3
7	Machine On	7	Reuse Fill or Formula Select Bit 4.
In Latched Formula Mode, you can assign the latch reset signal to Triggers 1-5 or Machine On.			

Table 12. Formula Mode TR-7000-AC Trigger Assignments

In formula mode, there is a 45-second qualifier between successive allowable washer triggers on the same channel. A valid signal must be a minimum 2 second duration. A new signal will not be accepted if it occurs less than 45 seconds after the previous signal has ended. Refer to **Trigger Timing Limits** for more detailed information.

LATCHED FORMULA MODE

Latched Formula Mode is the same as formula mode but each trigger can only occur once per load. Subsequent trigger signals are ignored until the latch-reset signal is applied, or Machine On is detected. The latch-reset signal may also call chemicals. This mode may be useful in situations where the supply signal is periodically interrupted because of water level change, etc.

MIELE FORMULA MODE

Miele formula mode is the same as latched formula mode except that trigger #2 also latches out trigger #1, even if trigger #1 has not occurred.

AUTOMATIC MODE (STROBED/STROBELESS)

This mode provides the capability of triggering one of 32 different functions. A function can be considered an injection group (for example, alkali and detergent form a main wash function). A function can consist of a group of up to 3 different chemicals.

Automatic Mode, Strobeless is for fixed cycle microprocessor washers. Chemical triggers are encoded. This type of washer is rare.

Automatic Mode, Strobed is for washers with chart or card controllers. Chemical triggers are encoded. In Strobed mode, channel 1 is used as a strobe or read signal, while channels 2-6 are used as binary encoded chemical inputs.

The chemical trigger inputs (2-6) will not be read until the strobe (channel 1) is activated for at least 10 seconds. This eliminates the need for all of the chemical triggers from the controller to activate simultaneously (the card need not be cut precisely).

If the washer controller has only four triggers available, then it will only be possible to call eight functions (channels 2, 3, and 4 for pump control and channel 1 for strobe).

First TR-7000-AC		Second TR-7000-AC (optional)	
Trigger Channel	**Function**	**Trigger Channel**	**Function**
1	Strobe (if used)	1	Sewer Drain
2	See Table 11	2	Cold Fill
3	See Table 11	3	Hot Fill
4	See Table 11	4	Steam
5	See Table 11	5	Unused
6	See Table 11	6	Reuse Drain
7	Machine On	7	Reuse Fill

Table 13. Automatic Mode TR-7000-AC Trigger Assignments

A function is called based on the unique trigger pattern of the 5 trigger inputs (Channels 2-6). **Table 14** shows the possible trigger patterns.

Function	Trig Channel 2	Trig Channel 3	Trig Channel 4	Trig Channel 5	Trig Channel 6
1	OFF	OFF	OFF	OFF	OFF
2	ON	OFF	OFF	OFF	OFF
3	OFF	ON	OFF	OFF	OFF
4	ON	ON	OFF	OFF	OFF
5	OFF	OFF	ON	OFF	OFF
6	ON	OFF	ON	OFF	OFF
7	OFF	ON	ON	OFF	OFF
8	ON	ON	ON	OFF	OFF
9	OFF	OFF	OFF	ON	OFF
10	ON	OFF	OFF	ON	OFF
11	OFF	ON	OFF	ON	OFF
12	ON	ON	OFF	ON	OFF
13	OFF	OFF	ON	ON	OFF
14	ON	OFF	ON	ON	OFF
15	OFF	ON	ON	ON	OFF
16	ON	ON	ON	ON	OFF
17	OFF	OFF	OFF	OFF	ON
18	ON	OFF	OFF	OFF	ON
19	OFF	ON	OFF	OFF	ON
20	ON	ON	OFF	OFF	ON
21	OFF	OFF	ON	OFF	ON
22	ON	OFF	ON	OFF	ON
23	OFF	ON	ON	OFF	ON
24	ON	ON	ON	OFF	ON
25	OFF	OFF	OFF	ON	ON
26	ON	OFF	OFF	ON	ON
27	OFF	ON	OFF	ON	ON
28	ON	ON	OFF	ON	ON
29	OFF	OFF	ON	ON	ON
30	ON	OFF	ON	ON	ON
31	OFF	ON	ON	ON	ON
32	ON	ON	ON	ON	ON

Table 14. Automatic Mode Trigger Patterns

MACHINE ON SIGNAL

Use of the Machine On signal is optional, and the system will pump chemicals without it. However, much of the data presented in the management information reports relies on the machine on information. Wash aisle efficiency data such as total machine on time, turnaround time, and excess time cannot be determined without a machine on signal.

In all of the above modes, the machine on signal may be connected to trigger channel 7.

Connect the Machine On signal to the door latch or other appropriate signal. To ensure proper cycle identification, the Machine On signal must be wired to remain uninterrupted for the entire machine cycle.

If a Machine On signal is not connected, the Machine On signal must be set up for reverse logic. This will cause the

machine on input to appear to be on all the time. See **Washer Setup Mode**.

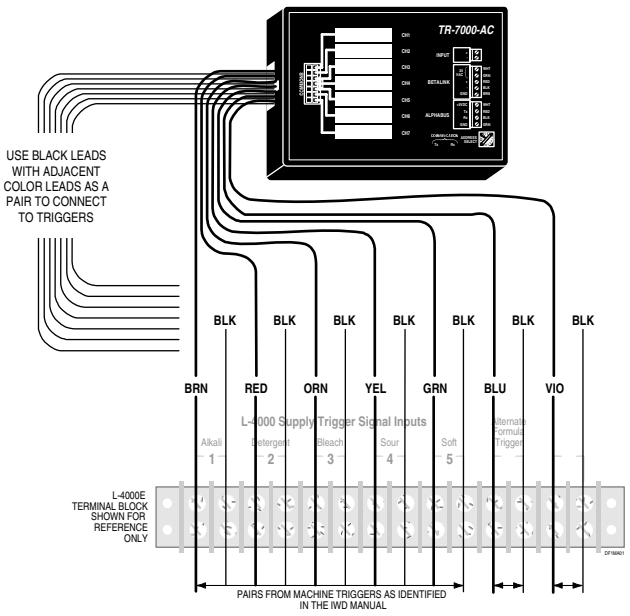
TRIGGER TIMING LIMITS

Table 15 lists the timing limitations which must be considered when programming the wash wheel. For more information, see **Appendix B, C, F, G** and **Table 21**.

Note that all patterns must first be returned to the off state for 1 second before the next trigger pattern is called by the washer.

Signal and Trigger Timing Limits		
Signal	Mode	Time
Machine On Signal	All Modes	2-second minimum state change for on/off recognition
Drain Signal(s)	All Modes	5-second minimum on/off time
Utility Signals	All Modes	2-second minimum on/off time
Chemical Triggers	Relay Mode & Enhanced Relay Mode	1/2-second minimum on/off time. 1-second resolution. Signals from 1/2 to 3/8 seconds are logged and interpreted as 1-second; signals from 1-1/2 to 2-3/8 seconds are treated as 2 seconds, and so on.
Chemical Triggers	Formula Mode & Automatic Mode	2 seconds minimum on time. 45 seconds minimum off time.
Formula Select Triggers	Formula Mode	2-second minimum on/off time.
Strobe	Automatic Mode	5 seconds minimum on time. 45 seconds minimum off time.
Washer Triggers	Formula Mode & Automatic Mode	2-second minimum is required between when F1-F4 formula select triggers are turned off and the next chemical request. 2-second minimum is required when formula select signals are asserted and the next chemical request.

Table 15. Trigger Timing Limits



APPENDIX B. PRE-DOSE CLASSIFICATION IDENTIFICATION

This appendix covers the PDCI chemical feed modes, and some of the special considerations that are required when using these modes. This appendix:

- Describes the accumulating trigger method utilized by the PDCI feed modes.
- Defines the control codes used by the PDCI feed modes to track and identify wash cycles.
- Defines each PDCI chemical feed mode, which you specify during washer setup.
- Shows the trigger assignments used by the TR-7000-AC Trigger Module for each feed mode.
- Lists the trigger timing limitations imposed by each feed mode.

INTRODUCTION TO PDCI

Pre-Dose Classification Identification is a method of encoding triggers that allows a programmable washer to signal the start, type, and end of wash cycles, as well as to request chemicals. Using PDCI eliminates the need for an RS-3000 Formula Select Module in order to identify wash loads, and also eliminates the need to locate a reliable machine on signal in order to track wash cycles.

ACCUMULATING TRIGGERS

PDCI triggering modes use a method of collecting triggers known as accumulating triggers. This method allows trigger codes that are made up of multiple triggers to be accumulated one trigger at a time. The advantage of this method is that even those washer controllers that can activate only one or two trigger outputs at a time can generate any possible trigger code.

Only the PDCI control triggers (inputs 1 to 6 on the first TR-7000-AC Trigger Module connected to each washer) accumulate. When one of these triggers first appears, accumulation begins (the Accum Trig. column on the Washer Strip reports turns on). During the accumulation period the original trigger may disappear, and other triggers may also come and go. As long as the gap between triggers is less than 5 seconds, accumulation continues. Accumulation ends when all of the triggers are off for more than 5 seconds (plus the trigger qualification delay). When accumulation ends, the sum of all of the triggers that appeared during the accumulation period is presented to the trigger decoding logic as if the triggers had all occurred at the same time. This is recorded on the Washer Strip reports as the first line after the Accum Trig. column turns off.

It is not necessary for triggers to be accumulated one at a time. All of the desired triggers may be applied simultaneously if the washer controller supports this. Even if applied simultaneously, the triggers are not recognized until 5 seconds after they all turn off. Other triggers, such as utility fill and drain, have no effect on the trigger accumulation process. Trigger 7 on the first TR-7000-AC (the machine on trigger for non-PDCI trigger modes) is unused in PDCI modes, and need not be connected.

First TR-7000-AC		**Second TR-7000-AC (optional)**	
Trigger Channel	Function	Trigger Channel	Function
1	PDCI Control Trigger	1	Sewer Drain
2	PDCI Control Trigger	2	Cold Fill
3	PDCI Control Trigger	3	Hot Fill
4	PDCI Control Trigger	4	Steam
5	PDCI Control Trigger	5	Unused
6	PDCI Control Trigger	6	Reuse Drain
7	Unused	7	Reuse Fill

Table 16. PDCI Mode TR-7000-AC Trigger Assignments

PDCI CONTROL CODES

Trigger 6 is the PDCI control strobe. When this trigger is present as part of an accumulated trigger code, the code is interpreted as a control code, indicating the start or end of a wash cycle. If one or more of triggers 1 to 5 is present along with trigger 6, then triggers 1 to 5 identify the cycle being started, as detailed in **Table 17**. If triggers 1 to 5 are all off, then the cycle is being ended.

If trigger 6 is not present as part of an accumulated trigger code, then the code is interpreted as a chemical feed request, and is decoded according to the PDCI triggering mode in use-see
Table 17 for details.

Meaning of Control Code	Trig Channel 1	Trig Channel 2	Trig Channel 3	Trig Channel 4	Trig Channel 5	Trig Channel 6
End of (Any) Cycle	OFF	OFF	OFF	OFF	OFF	ON
Start of Cycle 1	ON	OFF	OFF	OFF	OFF	ON
Start of Cycle 2	OFF	ON	OFF	OFF	OFF	ON
Start of Cycle 3	ON	ON	OFF	OFF	OFF	ON
Start of Cycle 4	OFF	OFF	ON	OFF	OFF	ON
Start of Cycle 5	ON	OFF	ON	OFF	OFF	ON
Start of Cycle 6	OFF	ON	ON	OFF	OFF	ON
Start of Cycle 7	ON	ON	ON	OFF	OFF	ON
Start of Cycle 8	OFF	OFF	OFF	ON	OFF	ON
Start of Cycle 9	ON	OFF	OFF	ON	OFF	ON
Start of Cycle 10	OFF	ON	OFF	ON	OFF	ON
Start of Cycle 11	ON	ON	OFF	ON	OFF	ON
Start of Cycle 12	OFF	OFF	ON	ON	OFF	ON
Start of Cycle 13	ON	OFF	ON	ON	OFF	ON
Start of Cycle 14	OFF	ON	ON	ON	OFF	ON
Start of Cycle 15	ON	ON	ON	ON	OFF	ON
Start of Cycle 16	OFF	OFF	OFF	OFF	ON	ON
Start of Cycle 17	ON	OFF	OFF	OFF	ON	ON
Start of Cycle 18	OFF	ON	OFF	OFF	ON	ON
Start of Cycle 19	ON	ON	OFF	OFF	ON	ON
Start of Cycle 20	OFF	OFF	ON	OFF	ON	ON
Start of Cycle 21	ON	OFF	ON	OFF	ON	ON
Start of Cycle 22	OFF	ON	ON	OFF	ON	ON
Start of Cycle 23	ON	ON	ON	OFF	ON	ON
Start of Cycle 24	OFF	OFF	OFF	ON	ON	ON
Start of Cycle 25	ON	OFF	OFF	ON	ON	ON
Start of Cycle 26	OFF	ON	OFF	ON	ON	ON
Start of Cycle 27	ON	ON	OFF	ON	ON	ON
Start of Cycle 28	OFF	OFF	ON	ON	ON	ON
Start of Cycle 29	ON	OFF	ON	ON	ON	ON
Start of Cycle 30	OFF	ON	ON	ON	ON	ON
Ignored	ON	ON	ON	ON	ON	ON

Table 17. PDCI Control Codes

PDCI RELAY MODE

PDCI Relay Mode uses coded triggers to request the desired chemical. The code is entered using the PDCI control triggers as shown in **Table 18**. The amount of chemical requested is controlled by the washer.

In cases where all of the triggers appear and disappear simultaneously, the amount of chemical requested depends on the length of time that the triggers are present. In cases where a feed code is being accumulated one trigger at a time, the amount of chemical requested depends on the total amount of time that

any trigger is on. Periods of time where all triggers are off do not affect the requested amount.

To clarify this: Suppose trigger 1 appears for five seconds, then disappears. Three seconds later, trigger 3 appears for six seconds, then disappears. Then five seconds elapses with no triggers present. In this case a request for 11 seconds (five seconds of trigger 1, plus six seconds of trigger 3) worth of chemical 5 (trigger 1 plus trigger 3 = chemical 5) will be generated.

Because of the use of accumulating triggers, the requested feed will not begin until the end of the chemical request, five seconds after the triggers disappear. This delay should be kept in mind when making lengthy chemical requests.

PDCI Relay Mode will process chemical feed requests even when no wash cycle is running. This is done so that if the pump box should miss the start of the cycle for some reason, it will still deliver the requested chemicals, and only the logging of the cycle will be affected.

Meaning of Feed Code	Trig Channel 1	Trig Channel 2	Trig Channel 3	Trig Channel 4	Trig Channel 5	Trig Channel 6
Request Chemical 1	ON	OFF	OFF	OFF	OFF	OFF
Request Chemical 2	OFF	ON	OFF	OFF	OFF	OFF
Request Chemical 3	ON	ON	OFF	OFF	OFF	OFF
Request Chemical 4	OFF	OFF	ON	OFF	OFF	OFF
Request Chemical 5	ON	OFF	ON	OFF	OFF	OFF
Request Chemical 6	OFF	ON	ON	OFF	OFF	OFF
Request Chemical 7	ON	ON	ON	OFF	OFF	OFF
Request Chemical 8	OFF	OFF	OFF	ON	OFF	OFF
All other codes (with trigger channel 6 OFF) are unused.						

Table 18. PDCI Relay Feed Codes

PDCI FORMULA MODE

In PDCI Formula Mode the washer can generate up to five formula triggers, using the PDCI control triggers as shown in **Table 19**. Up to three chemical doses may be delivered for each formula trigger. The doses may vary depending on which cycle type (formula) the washer is running.

Note that the formula triggers are coded, not single triggers as with the non- PDCI formula modes. Because of this, it is not possible to generate multiple formula triggers simultaneously.

Because the chemical doses may vary depending on the cycle type that is running, the dispenser will not honor formula triggers that arrive while it thinks that no cycle is running. Such formula triggers will cause an error to be logged, and will activate an alarm if one is connected.

Meaning of Feed Code	Trig Channel 1	Trig Channel 2	Trig Channel 3	Trig Channel 4	Trig Channel 5	Trig Channel 6
Formula Trigger 1	ON	OFF	OFF	OFF	OFF	OFF
Formula Trigger 2	OFF	ON	OFF	OFF	OFF	OFF
Formula Trigger 3	ON	ON	OFF	OFF	OFF	OFF
Formula Trigger 4	OFF	OFF	ON	OFF	OFF	OFF
Formula Trigger 5	ON	OFF	ON	OFF	OFF	OFF
All other codes (with trigger channel 6 OFF) are unused.						

Table 19. PDCI Formula Feed Codes

PDCI AUTOMATIC MODE

PDCI Automatic Mode allows the triggering of up to 31 different functions, using the PDCI control triggers as shown in **Table 20**. Up to three chemical doses may be delivered for each function.

PDCI Automatic Mode will process chemical feed requests even when no wash cycle is running. This is done so that if the pump box should miss the start of the cycle for some reason, it will still deliver the requested chemicals, and only the logging of the cycle will be affected.

Meaning of Feed Code	Trig Channel 1	Trig Channel 2	Trig Channel 3	Trig Channel 4	Trig Channel 5	Trig Channel 6
Call Function 1	ON	OFF	OFF	OFF	OFF	OFF
Call Function 2	OFF	ON	OFF	OFF	OFF	OFF
Call Function 3	ON	ON	OFF	OFF	OFF	OFF
Call Function 4	OFF	OFF	ON	OFF	OFF	OFF
Call Function 5	ON	OFF	ON	OFF	OFF	OFF
Call Function 6	OFF	ON	ON	OFF	OFF	OFF
Call Function 7	ON	ON	ON	OFF	OFF	OFF
Call Function 8	OFF	OFF	OFF	ON	OFF	OFF
Call Function 9	ON	OFF	OFF	ON	OFF	OFF
Call Function 10	OFF	ON	OFF	ON	OFF	OFF
Call Function 11	ON	ON	OFF	ON	OFF	OFF
Call Function 12	OFF	OFF	ON	ON	OFF	OFF
Call Function 13	ON	OFF	ON	ON	OFF	OFF
Call Function 14	OFF	ON	ON	ON	OFF	OFF
Call Function 15	ON	ON	ON	ON	OFF	OFF
Call Function 16	OFF	OFF	OFF	OFF	ON	OFF
Call Function 17	ON	OFF	OFF	OFF	ON	OFF
Call Function 18	OFF	ON	OFF	OFF	ON	OFF
Call Function 19	ON	ON	OFF	OFF	ON	OFF
Call Function 20	OFF	OFF	ON	OFF	ON	OFF
Call Function 21	ON	OFF	ON	OFF	ON	OFF
Call Function 22	OFF	ON	ON	OFF	ON	OFF
Call Function 23	ON	ON	ON	OFF	ON	OFF
Call Function 24	OFF	OFF	OFF	ON	ON	OFF
Call Function 25	ON	OFF	OFF	ON	ON	OFF
Call Function 26	OFF	ON	OFF	ON	ON	OFF
Call Function 27	ON	ON	OFF	ON	ON	OFF
Call Function 28	OFF	OFF	ON	ON	ON	OFF
Call Function 29	ON	OFF	ON	ON	ON	OFF
Call Function 30	OFF	ON	ON	ON	ON	OFF
Call Function 31	ON	ON	ON	ON	ON	OFF

Table 20. PDCI Automatic Feed Codes

TRIGGER TIMING LIMITS

Table 21 lists the timing limitations which must be considered when programming the wash wheel. PDCI Relay Mode is designed for use with microprocessor controlled washers, and so has no filtering of the trigger inputs. PDCI Formula mode is designed for use with chart or card driven controllers, and so has substantial trigger filtering. PDCI Automatic mode has switchable trigger filtering, for use with either type of controller.

Signal	Mode	Time
Drain Signal(s)	All Modes	5-second minimum on/off time
Utility Signals	All Modes	2-second minimum on/off time
PDCI Control Triggers	PDCI Relay Mode	1/2-second minimum on/off time. 1-second resolution. Signals from 1/2 to 1 3/8 seconds are logged and interpreted as 1 second; signals from 1-1/2 to 2-3/8 seconds are treated as 2 seconds, and so on.
PDCI Control Triggers	PDCI Formula Mode	5-second minimum on time 20-second minimum off time
PDCI Control Triggers	PDCI Automatic, Chart	5-second minimum on time 20-second minimum off time
PDCI Control Triggers	PDCI Automatic, Micro	1/2-second minimum on/off time
PDCI End of Accumulation Delay	All Modes	All triggers off for 5 seconds beyond end of qualification time

Table 21. PDCI Trigger Timing Limits

OPERATION WITH FEWER TRIGGERS

Six programmable triggers are required to make full use of PDCI triggering. However, fewer triggers may be used if some reduction in functionality is acceptable. **Table 22** summarizes the possibilities.

When using only five triggers, connect triggers 1 through 4, and trigger 6. Leave trigger input 5 unconnected. When using only four triggers, connect triggers 1 through 3, and trigger 6. Leave trigger inputs 4 and 5 unconnected.

Capability	4 Triggers	5 Triggers	6 Triggers
Number of cycles that may be identified	7	15	30
Number of chemicals in PDCI Relay Mode	7	8	8
Number of supply triggers in PDCI Formula Mode	5	5	5
Number of functions in PDCI Automatic Mode	7	15	31

Table 22. PDCI Capabilities With Reduced Triggers

APPENDIX C. PROGRAMMING THE WASH WHEEL

The following is a general guide to connecting the washer supply triggers to the TR-7000-AC trigger module inputs. This information is of a general nature since it is not practical to detail every washer.

COMMON (RETURN) CONNECTIONS

The TR-7000-AC provides for isolated common or return circuits for each of the 7 trigger channels. In most cases, the washer supply signals all have a single common and you can tie these trigger commons together. The most frequent exception to this is in washer control schemes that lock out certain, but not all, supply triggers until the proper water level has been reached. You may need to connect an individual common to each portion of such a circuit.

MICROPROCESSOR-CONTROLLED WASHERS

Relay Mode

If the washer is microprocessor-controlled, you will most likely be operating in the relay mode. The normal relay mode requires one trigger signal per chemical. Trigger channel 1 controls pump 1, channel 2 pump 2, and so on. Connect trigger channel 1 (brown wire) to supply signal 1, channel 2 (red) to supply 2, and so on, up to and including channel 6 to supply 6.

If your account uses more than six chemicals, you must use a second trigger module for chemical pumps 7 and 8. Connect trigger channel 5 of the second trigger module to supply signal 7 and channel 6 to supply signal 8.

In most cases, you may tie all the common (black) wires together and connect them to the supply common signal. Consult the washer schematic or IWD for exact connections.

If you have more chemicals than supply triggers, you will need to use Enhanced Relay Mode.

Enhanced Relay Mode

Enhanced relay mode serves accounts where the washer microprocessor has fewer supply triggers than you have chemicals. The chemical amount is still controlled by the length of time the supply signal is on, but the chemical pump selection is controlled by the combination of supply triggers (see **Table 11**).

Connect supply signal 1 to trigger channel 1 (brown), signal 2 to channel 2, signal 3 to channel 3, and signal 4 to channel 4. These four signals are all that are required to pump up to 8 different chemicals. Refer to **Washer Setup Mode**.

PDCI Relay Mode

PDCI relay mode operates much like enhanced relay mode, but it offers the additional advantage of PDCI operation. The combination of supply triggers applied determines which chemical is selected, and the duration of the signals determines the amount requested. Accumulating triggers are used, so the feed will not begin until all of the supply signals turn off.

Connect supply signal 1 to trigger channel 1 (brown wire), signal 2 (red) to channel 2, and so on up to and including signal 6 to channel 6. Supply signal 5 need not be connected if 15 different cycle types are adequate; all eight chemicals are still available in this case. Supply signals 4 and 5 need not be connected if seven different cycle types are adequate; seven chemicals are available in this case.

Formula Mode

This mode of triggering is intended for use when the washer is controlled by a mechanical chart or card control. The relationship of supply triggers to chemical pumps and injection amounts is controlled entirely by how you connect the washer signals to the TR-7000-AC Trigger Module.

If you are using an RS-3000 formula select module for this washer, connect the TR-7000-AC Trigger channel 1 (brown wire) to supply signal 1, channel 2 (red) to supply 2, and so on up to and including channel 5 to supply 5 (if available).

If you are <u>not</u> using the RS-3000, and you wish to select alternate injection amounts (formulas) automatically, you may connect up to four other available supply triggers to the formula select inputs. These four inputs can be used to select 16 different chemical injection formulas for each of the five supply triggers (see **Table 12** and **Washer Setup Mode**).

PDCI Formula Mode

PDCI formula mode is similar to conventional formula mode, but it offers the additional advantage of PDCI operation. The five individual “formula triggers” of conventional formula mode are replaced with coded combinations of supply triggers 1 through 3. Accumulating triggers are used, so the feed will not begin until all of the supply signals turn off.

Connect supply signal 1 to trigger channel 1 (brown wire), signal 2 (red) to channel 2, and so on up to and including signal 6 to channel 6. Supply signal 5 need not be connected if 15 different cycle types are adequate; all five formula triggers are still available in this case. Supply signals 4 and 5 need not be connected if seven different cycle types are adequate; all five formula triggers are still available in this case.

Automatic Mode

Automatic mode can be used for both mechanical and microprocessor controller applications. The strobed mode is for mechanical controls, and the strobeless mode is used in microprocessor applications. In both cases, up to 5 trigger signals are used to create individual patterns. Each unique pattern calls a chemical injection function. This function can contain up to 3 different chemicals, each with its own amount (referred to as dose in the washer setup screens).

Connect the washer supply signals 1 through 5 to trigger channels 2 through 6, respectively. You can use fewer channels for fewer functions.

If you are using the strobed mode, connect an unused supply trigger to trigger channel 1. This signal will be the strobe (read) signal. The strobe signal is used so that the other signals need not be activated exactly simultaneously, a difficult requirement in mechanical controls (strobeless mode does not use this signal, but instead generates its own read signal five seconds after any of the other trigger channels are turned on).

PDCI Automatic Mode

PDCI automatic mode is similar to strobeless automatic mode, but it offers the additional advantage of PDCI operation. It may be used with either mechanical chart/card or microprocessor driven controllers. Accumulating triggers are used, so the feed will not begin until all of the supply signals turn off.

Connect supply signal 1 to trigger channel 1 (brown wire), signal 2 (red) to channel 2, and so on up to and including signal 6 to channel 6. Supply signal 5 need not be connected if 15 different cycle types and 15 chemical injection functions are adequate. Supply signals 4 and 5 need not be connected if seven different cycle types and seven chemical injection functions are adequate.

Machine On Connection

Trigger channel 7 of the primary trigger module is dedicated to the machine on function for all non-PDCI triggering modes. In PDCI modes, this input is unused, and may be left unconnected.

Connect the violet wire to a signal that most closely represents when the washer is actually running a load. In many cases, this signal may utilize, or be referenced to, a different common than the supply triggers described under **PDCI Automatic Mode**. For this reason, you may need to connect the specific common wire associated with the machine on channel 7. This common is the black wire connected to the pin just below the violet wire.

PDCI MODES

In the three PDCI feed modes the trigger inputs perform the additional function of tracking and identifying wash cycles, besides their usual job of requesting chemicals. This additional function requires some extra thought when programming the washer.

For accurate cycle timing, the cycle start/identification and cycle end codes should be programmed to occur as close to the actual start and end of the wash cycle as possible. Some washers may have interlocks that prevent chemical triggers when there is no water in the washer, which prevents accurate cycle timing. The dispenser can compensate for this by means of the “add time” setting (refer to **Washer Setup Mode**).

Chart driven washers often use the same chart for several different wash formulas, using a formula selector module to determine which formula is being run. This can be accommodated when using PDCI triggering by “stacking” several different cycle start codes together at the beginning of the chart, with a minute or two between them. The dispenser will log the first such cycle start code it detects, and will ignore those following it.

Ideally (if there’s room for it), a PDCI cycle end code would be programmed prior to each cycle start code (except when start codes are “stacked”, as explained in the previous paragraph). This end code forces an end to any cycle that might be left running if the controller (particularly a mechanical controller) is “jumped ahead” to start a new cycle before the previous cycle has completely ended.

RELAY MODE/ENHANCED RELAY MODE WASHER CONNECTIONS

If you are using relay mode, the only consideration is that the signals be a minimum of 1 second in duration. Any and all signals may be activated as required by your wash process. If you are using a drain signal, the supply requests must not occur when the drain is open.

If you are using enhanced relay mode, the supplies must be called by individual steps of the wash process. To use this mode, you must be able to program the washer to activate two supply triggers at the same time. After each supply request, all of the triggers must be off for a minimum of 2 seconds before the next chemical request.

Enhanced Relay Mode Example

1. Fill
2. Supply 1 - The supply trigger is on for chemical 1 (for example, DET).
3. Short step (or other no-op)
4. Supply 2 - The supply trigger is on for chemical 2 (for example, ALK).
5. Wash
6. Rinse
7. Other baths
8. Supply 1 & 2 - This decodes as supply trigger on for chemical 5 (for example, SOUR).
9. Short step (or other no-op)
10. Supply 1 & 3 - This decodes as supply trigger on for chemical 6 (for example, SOFT).
11. Other steps

Once a trigger pattern has been established (the one or two signals have been on for 1 second or more) any change in the pattern will be interpreted as the end of the request. This is to prevent the code from changing and a wrong chemical from being called should a single output signal fail during a feed request.

CARD AND CHART CONTROLLED WASHERS

Formula Mode

The minimum on time for a formula mode trigger is 2 seconds. Also remember that a second trigger (on the same channel) will be ignored if it happens within 45 seconds of the end of the previous signal. As with all other triggering modes, do not begin the supply request until after the drain is closed (this requirement does not apply to formula select bits). Formula select bits (alternate formula tracks) should be cut to begin prior to, and continue into, the supply request cut.

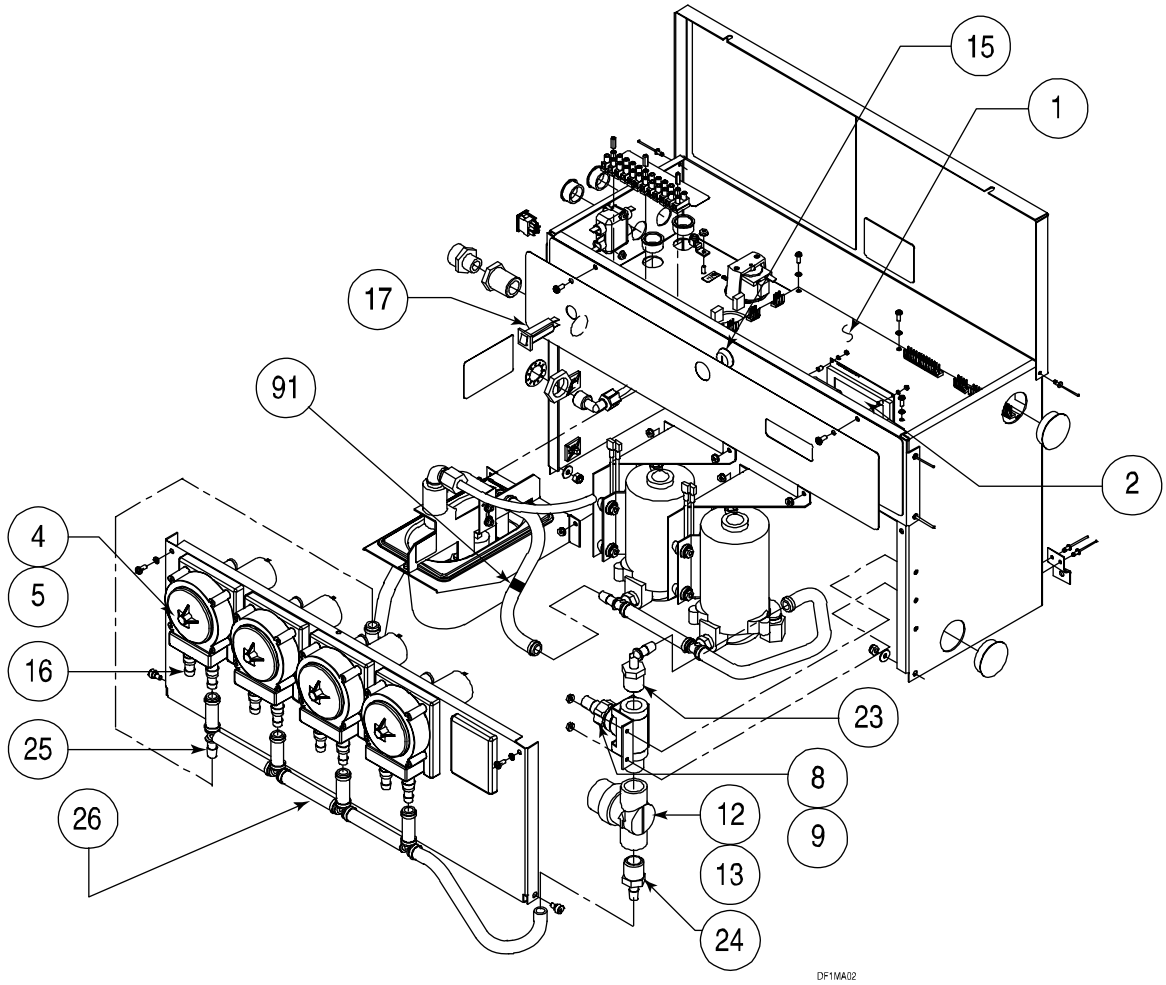
Automatic Strobed Mode

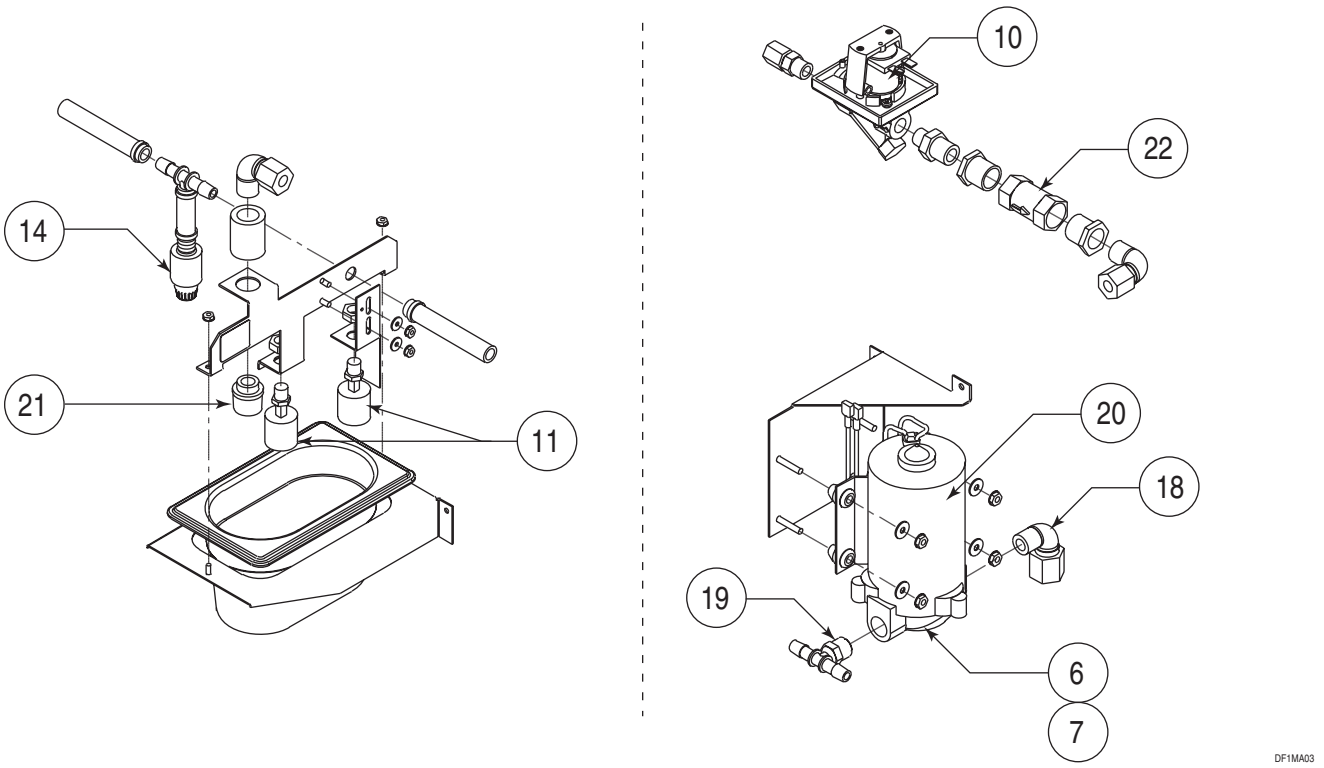
Automatic mode trigger signals have the same 2 seconds on, 45 seconds off requirement as the formula mode triggers. Cut the function request pattern first, followed by the strobe cut. Allow enough time (5 to 15 seconds) between the beginning of the function cuts and the strobe cut to compensate for any timing irregularities caused by switch or finger misalignment.

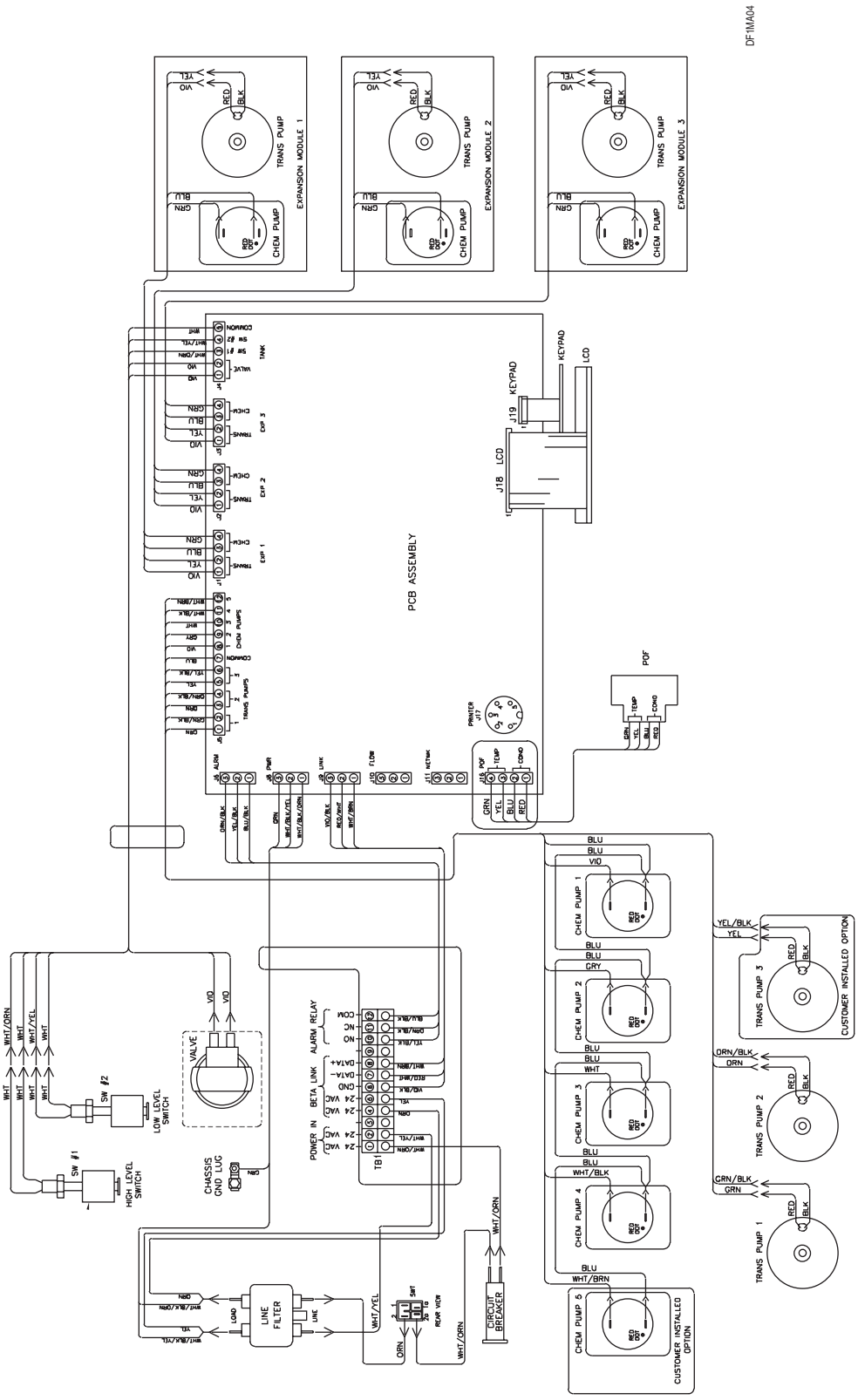
APPENDIX D. ASSEMBLY DRAWINGS

PARTS LIST & ASSEMBLY DRAWINGS

Seq #	ITEM #	DESCRIPTION
1	096908	PCB, ILS OPL, MK3
2	093734	LCD Display, (with cable)
3	093126	TR7000AC Trigger Module only (not shown)
4	093489	Chemical Pump Cartridge, Silicone Tube, (includes 056921)
5	056921	Pump Tube, (Silicone)
6	096802	Pump Head Kit, 3° Viton valve, (includes 096803)
7	096803	Valve Kit, Viton
8	099905	Proof of Flow Cell
9	067530	Seals for POF/POD cell (Pkg 10)
10	099309	Solenoid valve
11	042595	Float Switch
12	096093	Strainer, (Filter assembly)
13	096177	Strainer element, 20 mesh
14	027580	Foot Valve,& Strainer
15	043533	Key
16	093492	Pump Insert, Barbed Fitting
17	091972	Circuit Breaker, 5 amp
18	091974	Fitting, Elbow, 3/8 MPT x 3/8 Tube
19	091505	Fitting, T, 3/8 MPT x 3/8 Barb
20	096800	Diaphragm Pump, 3°, Viton valve
21	097073	Aerator
22	091016	Flow Regulator, 3 gpm
23	091502	Fitting, elbow, 1/2 MPT x 3/8 Barb
24	091501	Fitting, Straight, 1/2 MPT x 3/8 Barb
25	091506	Fitting, “T”, 3/8 Barb
26	093717	Bulk Silicone tubing, 3/8” ID
91	093723	Flow Restrictor




14
21
11
10
22
20
18
19
6
7
DF1MA03


DF1MA04
EXPANSION MODULE 1
EXPANSION MODULE 2
EXPANSION MODULE 3
TRANS PUMP
CHEM PUMP
PCB ASSEMBLY
KEYPAD
LCD
J19 KEYPAD
J18 LCD
PDF
PRINTER J17
VALVE
SW #1
HIGH LEVEL SWITCH
SW #2
LOW LEVEL SWITCH
CHASSIS GND LUG
POWER IN
BETA LINK
ALARM RELAY
TB1
LINE FILTER
CIRCUIT BREAKER
CHEM PUMP 1
CHEM PUMP 2
CHEM PUMP 3
CHEM PUMP 4
CHEM PUMP 5
CUSTOMER INSTALLED OPTION
TRANS PUMP 1
TRANS PUMP 2
TRANS PUMP 3

APPENDIX E. ILS MAX EMULATION

With the addition of a Washer Interface Module (See **Table 23**) and a POD cell, the system may be configured to provide the same proof of delivery, local alarm and washer hold features offered by ILS Max.

To enable ILS Max emulation, set the washer system type to Washer Interface (See **Washer Setup Mode**). All washer and pump setup screens will operate the same as with other washer system types, except that some options that are disabled with other systems (such as washer hold) are now enabled.

When used with a Washer Interface Module, the TR-7000 Trigger Modules and RS-3000 Formula Select Module are connected to the Washer Interface Module using the AlphaBus, and the Washer Interface is connected to the pump box using the BetaLink. See **Figure 30** for an illustration of the wiring connections.

Before connecting the RS-3000 to the AlphaBus, you must open the RS-3000 and move the internal connector from the BetaLink (rightmost) position to the AlphaBus (leftmost) position. Failure to do so may damage the RS-3000.

The trigger and utility monitor connections in ILS Max emulation mode are the same as in other ILS OPL operating modes. All of the normal trigger modes, including PDCI triggering, are available. See **Appendix A** and **Appendix B** for details on trigger module wiring and trigger modes.

Component	Provides	Catalog No	Notes
Washer Interface Module Kit	See washer module options in Table 4.	056684	One required per washer
TR-7000-AC Trigger Module Kit	See washer module options in Table 4.	093600*	One module minimum per washer
RS-3000 Formula Select Module Kit	See washer module options in Table 4.	094488	One per washer. Optional

*For washers using DC supply-trigger voltage, use TR-7000 code #059011 (pair with cable).

Table 23. ILS Max Emulation

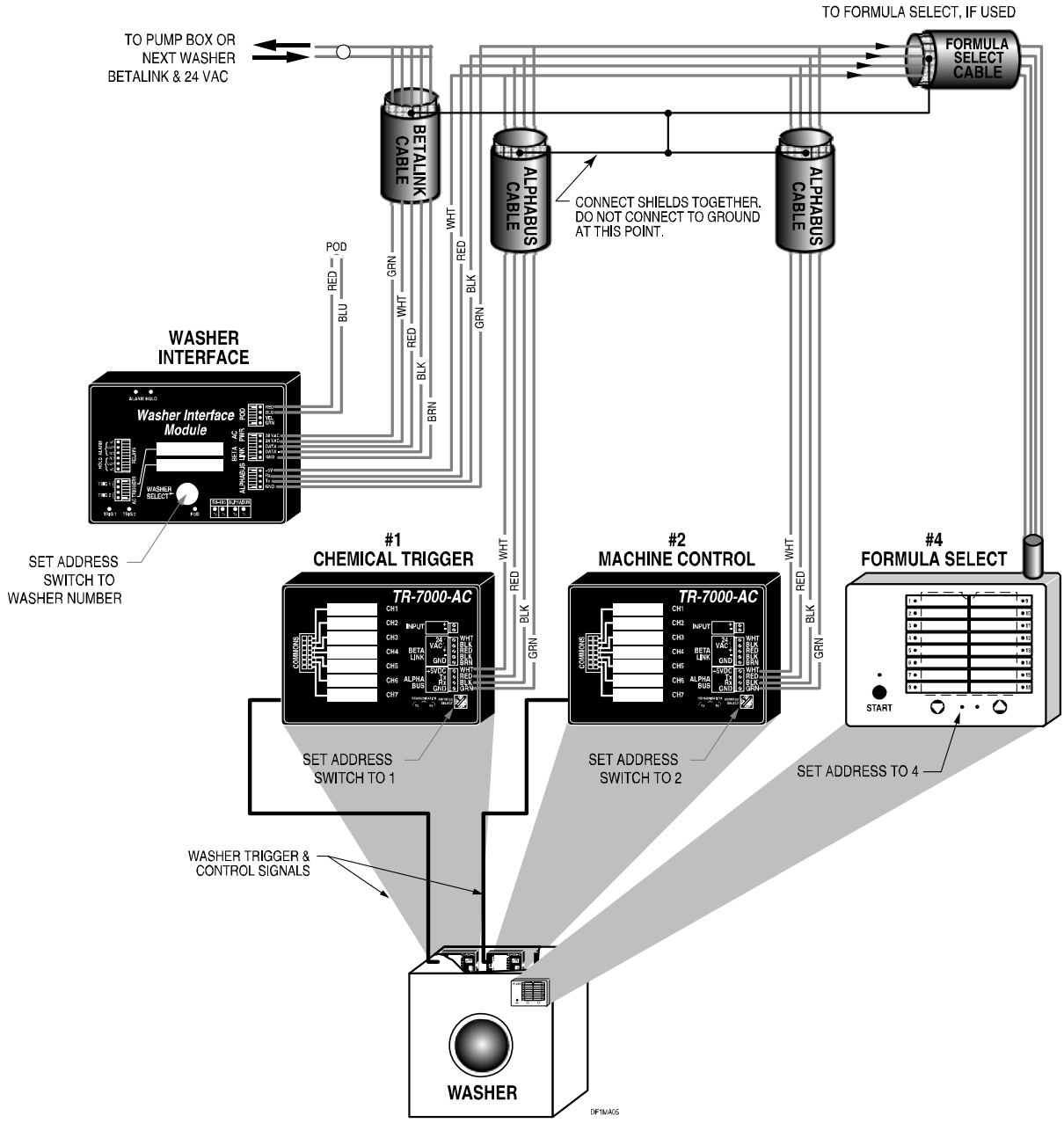


Figure 30. ILS Max Emulation Wiring

NOTES

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