ILS Max

Installation and Operating Manual

TABLE OF CONTENTS

PREFACE

This manual describes how to install, set up, operate and maintain the ILS Max Laundry System. Although every effort has been made to ensure the accuracy of information conveyed in this document, no guarantee is made as to the accuracy or completeness of information contained herein.

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.

INTRODUCTION

CAUTION!

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

SYSTEM DESCRIPTION

ILS Max is a highly sophisticated and accurate dispensing system for laundry chemicals.

We refer to washer functions and system functions, even though these functions all reside within the pump box. System functions are things such as total chemical usage, pump running strips, and global information. Washer functions are reports and setups that refer to specific washers.

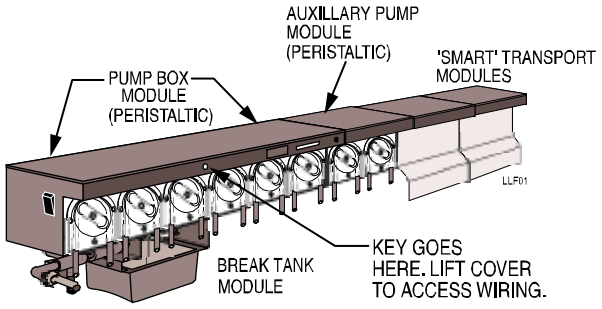


Figure 1. Pump Box and Related Components

The ILS Max System was designed to simplify the job of injecting liquid chemicals into virtually any washer. ILS Max reduces maintenance time, improves the accuracy of the chemical injection, increases safety and provides complete computer printouts of wash aisle activity. In addition, ILS Max provides status messages that inform the user about system conditions.

A new 3 GPM smart pump enhances system performance. It is recommended that all new installations or in-service diaphragm pump replacements use the new 3 GPM smart pump or upgrade kit.

NOTE

The ILS Max Tunnel system uses a 1.5 GPM smart pump

The system consists of four component groups:

- Main pump box (holds chemical metering pumps)
- Auxiliary chemical pump box(es) (for additional chemicals)
- Smart transport pump module(s) (One 3 GPM diaphragm pump per washer)
- Washer interface, trigger and formula select modules.

All pump related modules may be rail-mounted to a wall, and will connect end to end. Alternate mounting holes are provided for those applications where rail mounting may not be desirable.

Main Pump Box

The central component of the ILS Max System is the main pump box. One pump box, when combined with the appropriate peripheral devices, may service up to fifteen washers (maximum). The pump box may be mounted in a remote location, and will pump with 30 psi pressure from the washers (dependent on system pressure, up to 200 feet), and may be configured to have from six to 20 peristaltic chemical metering pumps. The maximum number of chemicals pumped is 10, but pumps can be paired to double the pump rate.

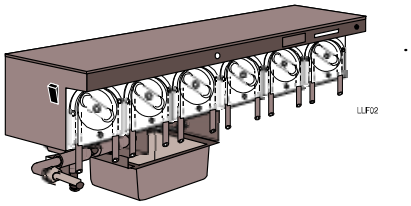


Figure 2. Pump Box with Break Tank and On/Off Switch

Installation Kit

Manifold components, proof-of-flow cell, in-line filter and manifold mounting hardware are all included in the installation kit. You must purchase one installation kit per installation. Also included in this kit is a transparent pipe section between the proof-of-flow cell and the inline filter which allows for easy detection of air leaks during troubleshooting.

Figure 2.1. Manifold Mounting Bracket

Figure 2.2. Main Pump Box Manifold Components

Auxiliary Pump Module

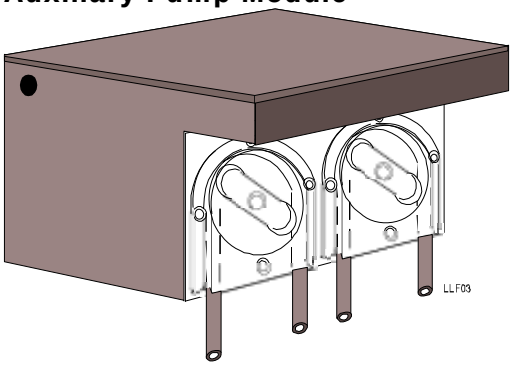


Figure 3. Auxiliary Pump Module

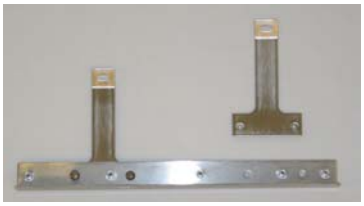


Figure 3.1. Auxiliary Pump Manifold Brackets

The auxiliary pump module is an add-on pump box consisting of two 3-gallon (11 liter) per minute peristaltic chemical pumps. Modules can be added as needed to increase the number of chemicals used by the system, or to increase the capacity of any one type of chemical being pumped. Up to seven additional modules are supported. Refer to Figure 3.

Included with the modules are 2 manifold sections and hardware necessary for proper installation.

Smart Transport Pump

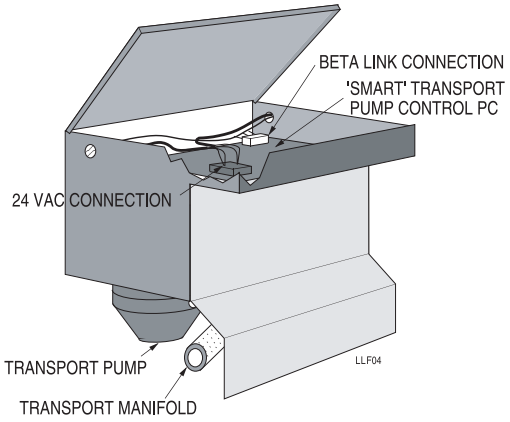


Figure 4. Smart Transport Module

Figure 4. Smart Transport Module Manifold Bracket

Figure 4. Proof-of-Flow, Inline Filter and Smart Transport Module Manifold Components

The smart pump transport module transports chemical from the manifold to the various washers. These modules come in two types; “Initial” and “Additional”. Initial smart pump modules have one 3 GPM (11 LPM) diaphragm transport pump. Additional smart pump modules have two 3 GPM (11 LPM) diaphragm transport pump. The initial module is placed in the first position to the right of the chemical pumps. The initial module allows sufficient space for the Proof-of-Flow cell and inline filter. The initial module comes with a wire harness. It is necessary to order one initial smart pump module for each installation (each ILS Max installation requires only one initial smart pump module).

Additional smart pump modules have two 3 GPM (11 LPM) diaphragm transport pumps and come with 2 middle manifold sections and a wire harness.

Installations require one smart transport pump per washer. When ordering smart transport pump modules you will need one initial module (for the first washer) and some number of additional modules (for 3, 5, 7, 9, 11, 13 or 15 washers). The ILS Max is capable of servicing washers in multiples of odd numbers: 1 to 15 washers.

OVERVIEW OF THE ILS MAX

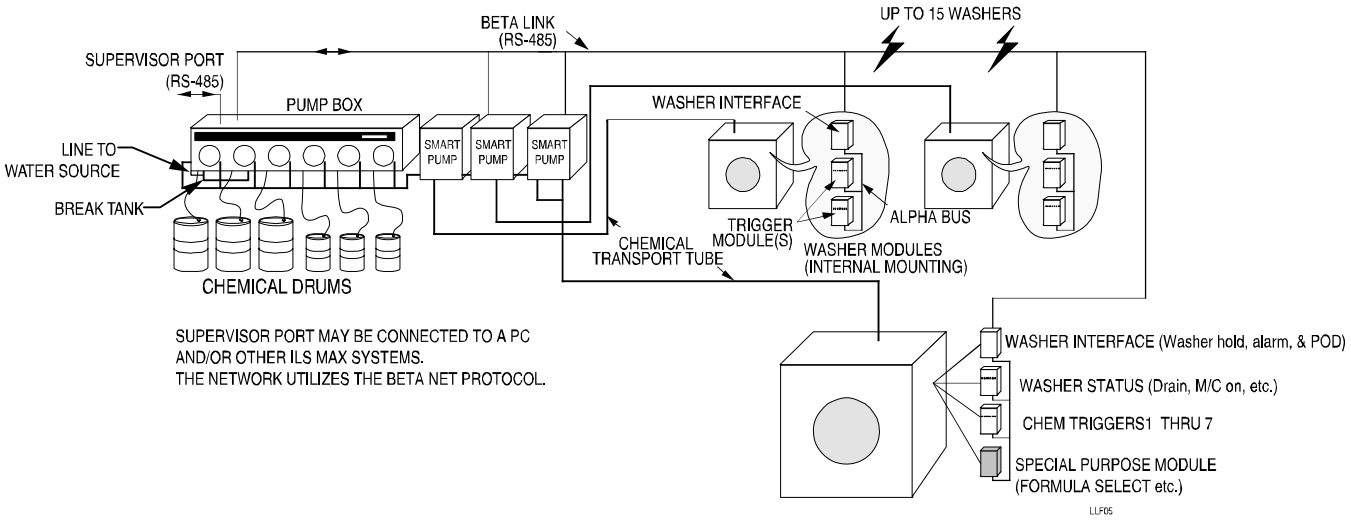


Figure 5. System Block Diagram

The smart transport pumps serve as the distribution node from the pump box to the individual washers. The smart pump modules receive control commands through the BetaLink communications link, and 24 VAC power from the main pump module. All wiring is accessed from the hinged top cover.

Original ILS Max's may have been installed using 1.5 GPM (6 liters/minute) diaphragm pumps. If an upgrade kit is installed, ensure that the original installation will support the additional flow (i.e., replacing one 1.5 GPM pump with a 3 GPM pump for a small washer).

When assembling the smart transport pump manifold section, use the left-threaded section for the first pump on the left, the middle sections for building the length of manifold necessary (depending on the number of transport pumps), and the right threaded section for the last transport pump on the far right. Connect the return line connector and return line.

Washer Interface Module

The washer interface modules are small box units that may be located inside of the various washers and provide bidirectional control and signaling between the washer and the pump box. All communication between the major elements within the system occurs on the BetaLink serial communications network. This is an RS-485 network. Communication between any washer interface module and its trigger modules is sent and received through the AlphaBus. An optional enclosure is available for external mounting of the washer modules to those washers that do not have sufficient internal space for the modules.

Washer Trigger Module

The chemical trigger modules have seven fully-isolated 24 to 240 VAC trigger inputs. The trigger inputs are connected to the module via a 14-pin connector. The AlphaBus connects to each interface module through a 4-pin Phoenix connector. One, two, or three trigger modules may be connected to the AlphaBus network, depending on the number of chemical triggers needed. The individual trigger modules are electronically differentiated via hard-wire program jumpers located on the Phoenix connector.

Formula Select Module

The formula select module provides a convenient means of expanding the formula capability of mechanical chart-type washer controls. This module allows the operator to select one of 16 different wash formulas. The module also provides classification information to the system. The pump box is the master computer for the ILS Max System. The elements of the ILS Max System are connected to and communicate with each other by an RS-485 computer link called the BetaLink.

Mixing the chemical with water gives ILS Max some unique capabilities. First, the water reduces the viscosity of the chemical so it can pump with 30 psi pressure (approximately 200 feet). The chemical is mixed with the water in the manifold at the pump box, and then pumped through the transport tube to the washers. Second, the water is used as a *flush* to clean the transport tube after each chemical delivery.

Chemical Feed Example

To fully understand the ILS Max System, one complete chemical feed is described below.

1. Ready and Polling—The ILS Max is always ready to respond to a chemical feed request from one of the washers. The pump box continually polls each washer interface module, monitoring system status and waiting for a chemical request.
2. Washer Chemical Request—When a washer has a chemical request, it flags the pump box via the trigger module/washer interface subsystem and issues a chemical request. Chemical supply triggers are wired from the washer to the trigger module.
3. Begin Feed Cycle—When the pump box accepts the chemical feed request, it calculates the amount of chemical requested based on the preprogrammed setup information for the requesting washer. At this point, a feed cycle has

begun and the pump box goes into action, beginning with the preflush.

4. Preflush—The inlet water solenoid is activated and the appropriate smart transport pump is turned on. Water flows through the transport system to the washer and is monitored by the flow meter to establish a flow base line.
5. Pump Chemical—If all systems check OK, and the washer status is satisfactory, drain closed and machine on, the preflush is complete and the peristaltic chemical pump starts. Based on the auto-calibration factor stored in the pump box memory, the peristaltic pump runs for the correct time to pump the requested chemical amount.
6. Reverse Pump—At the end of the chemical feed, the peristaltic 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 peristaltic 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 peristaltic pump is run in Auto-Prime mode. If, after 30 seconds, no chemical is detected by the POF, the Proof of Flow Failed error message is displayed. If chemical is detected during the 30 seconds, the correct amount of chemical is fed.
8. Verify Delivery of Chemical—As the peristaltic pump reverses, the chemical slug is pushed through the transport tube by clean water. At the washer, the chemical slug travels though the Proof of Delivery (POD) cell. The POD cell verifies the delivery of chemical and communicates this to the pump box via the washer interface.
9. Purge the Line—After all chemical passes through the POD, a five-second-post flush is used to purge the line.
10. Ready Again—If there are no additional chemical requests to this washer, the transport pump shuts off. ILS Max is ready and polling for another chemical feed.
11. 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 section of water.
12. Multiple Washers Requesting Chemical— ILS Max services one washer at a time. If two washers request chemical at the same time, ILS Max will queue the request and may put the second washer on hold if the delivery time to the second washer will exceed one minute (the normal setting). Hold until POD places the requesting washer on hold immediately upon receiving the chemical request. The amount of hold time for each washer is recorded in the pump box.
13. Error Messages to Operator—Throughout the feed cycle, ILS Max 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 LCD screen and the pump box alarm relay is set. The error messages give the operator instructions and/or corrective actions to take.

SPECIFICATIONS

Pump Box (Includes Break Tank Module)

Height	Width	Depth	Weight
52.1 cm	83.8 cm	27.9 cm	28.6 kg
20.5 in	33.0 in	11.0 in	63 lbs

Power Requirements

24 VAC at 20 Amperes, 50-60 Hertz

Water Supply

4 GPM (15 liters/minute) minimum, 50° F - 120° F. (10° - 49° C)

Auxiliary Pump Module

Height	Width	Depth	Weight
36.8 cm	27.9 cm	27.9 cm	12.7 kg
14.5 in	11.0 in	11.0 in	28 lbs

Power Requirements

PWM motor drive, supplied by pump box.

Smart Transport Module

Height	Width	Depth	Weight
36.8 cm	27.9 cm	27.9 cm	12.7 kg
14.5 in	11.0 in	11.0 in	28 lbs

Power Requirements

24 VAC at 6 Amperes, supplied by pump box.

Washer Interface Module

Height	Width	Depth	Weight
3.8 cm	17.2 cm	12.1 cm	0.454 kg
1.5 in	6.75 in	4.75 in	1 lb

Power Requirements

24 VAC at 0.2 Amperes, supplied by pump box.

Input Trigger

24-240 VAC only. Fully isolated.

Relay Output

Form C (SPDT) 220 VAC @ 5 Amperes, resistive.

Trigger Module

Height	Width	Depth	Weight
3.8 cm	17.2 cm	12.1 cm	0.454 kg
1.5 in	6.75 in	4.75 in	1 lb

Power Requirements

5 VDC supplied by washer interface.

Input Trigger

24-240 VAC or 24-120 VDC. Fully isolated.

Formula Select Module

Height	Width	Depth	Weight
3.8 cm	17.2 cm	12.1 cm	0.454 kg
1.5 in	6.75 in	4.75 in	1 lb

Power Requirements

5 VDC or 24 VAC

Step Down Transformer

Height	Width	Depth	Weight
20.3 cm	16.5 cm	12.7 cm	8.62 kg
8.0 in	6.5 in	5.0 in	19 lbs

Voltage

Input: 120-240 Tapped

Output: 24 V @ 20 Amperes

Trigger Timing Specifications

Because many of the signals from a washer may be noisy or intermittent, the software filters or debounces these signals in order to eliminate any false triggering or errant qualifiers. In order for certain signals from the washer to be recognized, the following requirements must be met.

Machine On

On/Off recognition, 2 seconds minimum state change.

Drain Signal (All Modes)

5 seconds minimum on time, 5 seconds minimum off time.

All Other Utilities

2 seconds minimum.

Chemical Triggers

Relay Mode

Minimum on time: 1/2 second

Minimum off time: 1/2 second

Resolution: 1 second. Signals from 1/2 to 1 3/8 seconds will be logged and interpreted as one second. Signals from 1 1/2 to 2 3/8 seconds will be treated as two seconds, and so on.

Formula and Automatic Modes

Chemical triggers: Minimum on 2 seconds, minimum off 45 seconds (minimum off 2 seconds when AFS enabled).

Formula select: Minimum on 2 seconds, minimum off 2 seconds

Strobe: Minimum on 5 seconds, minimum off 45 seconds (minimum off 5 seconds when AFS enabled).

AFS Formula Select Trigger

6 seconds (formula 1) to 122 seconds (formula 30) on time. Time must be accurate within ± 1/2 second.

Washer Trigger Timing Relationships

You must allow a minimum of two seconds after the F1-F4 formula select triggers are turned off before the next chemical call is made. You must allow a minimum of two seconds after the formula-select signals are asserted before a chemical call is made.

FEATURES

From Auto-Prime and self-calibration to full service diagnostics, ILS Max is a complete system that assures the accurate, reliable delivery of chemical to the wash aisle. The main features of ILS Max are summarized below.

Safety

ILS Max is an inherently safe system to operate and service. The water flush means that most of the time there is only water in the transport tube. Concentrated chemical is only present in the tube during feeds.

Proof of Flow (POF)

Proof of Flow (POF) verifies that chemical is being pumped. This ensures that chemical is actually being pumped when a pump is running, and that the pump is not running dry. The POF also allows for the Auto-Prime and Out-of-Chemical features (see below). Variable POF sensitivity allows use with chemicals of varying conductivity.

Proof of Delivery (POD)

Each washer network has a proof-of-delivery cell located at the washer. The POD verifies the delivery of the chemical to the washer and also allows for automatic calibration of washer transport times. POD may be disabled for special situations.

Auto-Calibration

The ILS Max System automatically calibrates the peristaltic chemical pumps. All chemical feeds are accurate to within +/- 5% or 20 milliliters. This feature ensures that all chemical deliveries are accurate over the life of the pump tube. Chemical feed amounts are entered in the desired volume units, not time. You may also select manual calibration for situations where automatic calibration is not appropriate.

Auto-Prime

Auto-Prime allows the system to tolerate air gaps in the feed line after a chemical drum is changed. Auto-Prime works in conjunction with the POF function.

Dual Speed Chemical Pumps for High Accuracy

The standard ILS Max is equipped with 3-liter per minute pumps. During feed requests for small chemical amounts, the pumps run at half speed to improve accuracy.

Automatic Reverse of Chemical Pump

After each chemical feed, the peristaltic 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. The reverse feature also eliminates the possibility of chemicals mixing with each other in the manifold. Automatic reverse may be disabled for use with certain chemicals.

Safe and Easy Pump Tube Changes

Pump tube changes on ILS Max are quick and safe. Due to the automatic reversing of the pump, there is no longer concentrated chemical in the pump tube. There is no chemical in the output side of the tube to create a hazardous condition. The system automatically primes itself at the beginning of the next feed request after the tube is replaced.

Worn Pump Tube Status Message

The Auto-Calibration feature of ILS Max allows the system to determine when the flow rate of the pump tube has dropped 50 percent. A status message is displayed at this time so that preventive maintenance can be performed. Therefore, failed pump tubes are no longer a worry.

Due to the Auto-Calibration feature, even though the pump flow rate has gone down over time, the correct amount of product is still being fed to the washer.

Out of Chemical Alarm
The Auto-Prime feature is used to determine when a chemical drum is empty. Auto-Prime will attempt to prime the chemical pump for 30 seconds. At the end of 30 seconds, if there is no chemical being pumped, the Proof of Flow Failure status message is displayed.

Multiple Washer Feed
ILS Max can serve up to 15 washers from one pump box. All chemicals travel through a transport tube dedicated to each washer. A water flush transports the chemical, leaving the tube clean after each delivery.

Data Logging
All the data logging features of the original dispenser system are incorporated in the ILS Max System. There are also additional logging features and management information not previously available. The system now has the capability of consolidated, system-wide report generation, and many new diagnostic reports.

Status & Error Messages
ILS Max has a wide range of feed status and error messages that keep the operator informed about current system performance. Status messages are informational, while error messages can activate the external alarm and alert the operator to problems such as an empty chemical drum. Alarm and hold outputs may also be configured to hold the washer bath timer should a feed fail, or the system lose power.

Ten Chemical Capabilities
The ILS Max System can dispense up to ten chemicals (six standard) with flow rates of three liters per minute (six liters/minute available by pairing pumps). With a conventional system, five washers with nine chemicals would mean 45 peristaltic pumps. ILS Max reduces this requirement to only nine pumps.

Remote Feed
ILS Max is designed to remote feed product up to 200 feet (61 meters), depending on system pressure. This is an important feature with new environmental controls coming into effect. The water flush and low-pressure delivery help ensure the safety of laundry personnel.

BetaLink Communication Link
Communication between the remote pump box and the various system elements is done via the BetaLink computer communication link. In addition to the transport tube, the five-wire BetaLink is the only connection between the pump box and other units. In addition, there is a separate communication port available (the supervisor network) at the pump box that allows for the interconnection of several ILS Max systems as well as a master computer. This capability is supported by an available communications software package.

Self Diagnostics
ILS Max has a system of built-in self-diagnostics. ILS Max continually monitors itself for system malfunction and immediately activates an alarm and displays an error message when a problem occurs. The status and error messages are logged in the pump box memory and reported in both the Pump Running Strip and Pump Stored Strip reports. These are powerful tools for diagnosing wash aisle problems.

Low Pressure Delivery
The normal operating pressure of the ILS Max System is under 30 psi. Delivery pressures will ultimately be a function of transport system length and the viscosity of the chemical delivered.

Water Flush
ILS Max flushes the transport tube with water after each chemical delivery. The water flush reduces chemical attack of components and reduces risk to laundry personnel.

Chemical Feeds Set in Volume Amounts
ILS Max chemical feed amounts are entered in volume amounts (ounce, liter, etc.), not pump run time. Volume units can be either US gallons/ounces or liters/milliliters.

Due to the Auto-Calibration feature, chemical amounts are accurate to within +/- 5% over the life of the pump tube. In relay mode, ILS Max automatically converts the time duration into a chemical amount. Even as the pump flow rate changes over time, the chemical amount delivered is still accurate.

Programmable Washer Trigger Channels (Formula Select)
This feature allows the user to program multiple (up to three) chemical pumps to be activated by a single trigger or combination of triggers, based on a selected formula. Up to 16 different formulas may be programmed. The formula selection may be accomplished by a separate module, by a timed pulse applied to a trigger input by the washer controller or by a combination of what used to be referred to as B and C time triggers that are controlled by the washer controller.

Hold Relay
Each of the washer interface modules has a hold relay feature that will put a washer bath timer on hold provided that such capability exists in the washer controller. (This would be the same as hold for level or hold for temperature.)

User-selectable washer-hold scenarios are provided. The normal hold function is **hold if delivery will be delayed > one minute**. In addition, **hold until delivered (POD)** is available. There is a feature that allows for controllers that require that hold be delayed until the end of the active chemical request. The various hold scenarios are selectable by washer network.

The total amount of hold time in an installation will depend on a number of factors, including;

- Number of washers serviced
- Chemical feed amounts
- Distance from pump box to washers
- Timing of wash formulas

To aid in account setup, the pump box strip chart supplies a complete listing of the hold time for each washer.

Automatic Transport Time Calculation
ILS Max automatically calculates the transport time for the chemical to flow from the pump box to each washer. This time is used in the POD system. The times are reported in the Pump Setup report.

Expanded Triggering Modes
ILS Max incorporates several new triggering capabilities and enhancements. Enhanced relay mode provides for calling up to

ten chemicals, in the relay mode, using only four supply triggers. In addition, the formula mode has been expanded to allow selection of up to 16 different formulas, either automatically via controller triggers, or by an available formula-select module.

Last Feed Retry

The system will remember the feed request until successful completion of the feed. Should a delivery error be detected, the system will set the alarm and hold relays. When the problem is corrected and the alarm is reset, the system can re-feed the questionable feed. This feature is enabled by the Hold on Alarm setting.

Feed Priority Selection

A new feature of ILS Max allows the user to select one of the ten chemicals as a high priority chemical. Requests for this chemical will be promoted to the top of the delivery request stack should other requests be waiting.

Also, if a long multiple-feed cluster is in process, the feed is broken between chemical injections, allowing the high-priority feed to be made, after which the interrupted feed resumes.

Hygiene Monitoring

ILS Max can optionally perform thermal hygiene monitoring of wash loads, setting an alarm if the wash was not hot enough for long enough to achieve proper hygiene. You can set up to 3 time and temperature criteria.

SYSTEM INSTALLATION

This section is a step-by-step guide to installing a new dispenser. Each task is briefly described. It contains information on:

- Site Survey
- Initial Inspection
- Installing the Components (quick checklist)
- Initial System Programming
- System Checkout Procedure

SITE SURVEY

The site survey should be completed prior to system installation. Refer to **Appendix B, Site Survey Guidelines** for additional site survey details. The information learned from the site survey helps ensure that the proper material and equipment are provided. Issues to be addressed by the site survey should include the number and size of wash wheels to be served and the chemical injection amounts. This will determine the basic configuration of the ILS Max System. In addition, the type of chemicals being pumped will determine the need for tempered or warm water flush.

A plan view of the wash aisle and proposed ILS Max location should be submitted. This drawing should include proposed location for the pump box, water and power connection locations and proposed routing of the transport system.

Unpacking the System

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 portions of the installation kit and accessory components are packed separately. Unpack all the cartons and verify contents of the shipment against the packing list and previously-completed site survey form for completeness of shipment.

Installing the Components (Quick Checklist)

The following is a brief, step-by-step guide to installing the ILS Max System. It assumes previous experience in ILS Max installation and is designed primarily as a checklist for the experienced installer. For detailed instructions, refer to **Full System Installation**.

Pump Box Installation

1. Assemble the break tank assembly to the pump box and connect the break tank harness to the Relay board connector, J8.
2. Secure mounting rails to the wall.
3. Place pump box, auxiliary pumps and smart pumps on rail.
4. Install break tank.
5. Assemble manifold components and manifold mounting brackets (see MANIFOLD AND POF CONNECTIONS later in this chapter).
6. Connect 24 VAC wiring harness and BetaLink cable to the various smart pump modules.
7. Connect chemical pump harness(es) according to the chemical configuration required by the site.
8. Install mixing valve if hot water is required.
9. Connect system to water supply.
10. Mount the external 24 VAC transformer in a convenient location.
11. Connect 24 VAC power from external transformer to the pump box 24 VAC input. (Do not apply power at this time).

Heavy gauge [19 x 0.30 mm (16 gauge) or larger] wire must be used.

12. Connect external alarm if required. Be sure to use a 2 amp slow blow fuse.
13. Measure cut and install uptake lines and pipes.

System Element Installation

1. Route and connect transport tube from each smart pump to the appropriate washer.
2. Route and connect BetaLink cable from pump box to all washer interface modules.
3. Set the smart pump address (washer#) for each transport pump.

Washer Module(s)

1. Connect the AlphaBus of the washer interface to the AlphaBus of the several trigger modules.
2. Install the address jumper for trigger module #2 (and 3 if used) or set select switch.

3. Connect trigger signals from trigger module #2 (and 3 if used) to the washer chemical supply signals.
4. Connect machine control signals (**Drain**, **Hot Water**, **Steam**, etc.) to trigger module #1 (if used). Otherwise, connect **Machine On** and **Drain** to the washer interface inputs.
5. Set the washer interface address switch to the washer number. This will be the washer network address. The smart pump that serves this washer must have the same address selected via the address switch on the smart pump control board.
6. If hygiene will be monitored, install a temperature sensor to the washer and connect it to the washer interface.
7. Complete a final visual checkout of all system connections and turn power on to the pump box. When powering up a new system, check the system component by component. This makes troubleshooting much easier.

Initial System Programming

The following is meant to be a brief outline of the checkout only. If the system fails to operate correctly after a step, refer to the appropriate section in this manual for additional information. Do not go on to the next step until the system is functioning correctly at the present step.

Turn on AC power. The screen should initialize and then display the System Checks OK message. If not OK, turn off and see **Diagnostics and Troubleshooting**.

Program System Setup

To program the system variables, those entries that apply to the entire system, simultaneously press the < and > keys three times to reach the password setup screen. (Refer to the chart located under the top cover of the pump box.) All menu and programming functions are circular and will repeat as you scroll through the selections.

Program the passwords as desired, then simultaneously press the < and > keys again to reach the pump setup menus. Once within the pump setup menus, use the Menu key to scroll through the various entry selections.

1. Set system clock to local time.
2. Enter account name.
3. Select units (metric/US).
4. Enter shift start times.
5. Enter hygiene criteria if required; otherwise leave default settings.
6. Enter chemical name and chemical cost for chemicals 1-10.
7. Set chemical priority for chemicals 1-10.
8. Set POF/POD threshold and on or off as required for chemicals 1-10.
9. Set pump speed; use auto unless special chemicals are used.
10. Enable or disable chemical pump backup for chemicals 1-10; disable backup only if a gelling chemical is used.
11. Set number of chemical pumps for chemicals 1-10; set “1” for single pumps, or “2” for tandem pumps.
12. Set water temperature for chemicals 1-10.
13. Select automatic or manual calibration for chemicals 1-10. Reset calibration to “0” if automatic; calibrate the pump if manual.
14. Enter flow meter constant. See tag on flow meter.
15. Reset pump tube life to 0 for pumps 1-10.
16. Reset pump motor life to 0 for pumps 1-10.
17. Reset transport pump life to 0 for pumps 1-15.
18. Reset flow meter life.
19. Set dispenser name, if desired.
20. Enter dispenser name and select language.

Program Washer Setup

Simultaneously press the < and > keys once more to enter the washer setup menus.

Washer Setup Programming

1. Set washer (network) number and select system type (normally smart pump).
2. Enter washer name.
3. Reset transport flowrate.
4. Reset transport time.
5. Set temperature offset to zero.
6. Enter optional cycle names (1-30), and enable or disable hygiene for each.
7. Enter optional cycle qualifier ID (1-30).
8. Select trigger mode (relay, formula or automatic). Enable or disable automatic formula selection.
9. Select washer signal logic (normal/reverse).
10. Set various feed amounts as required by the mode selected.
11. Select washer hold function type.
12. Enable washer running strip if desired.
13. Copy washer setup to another washer if desired.
14. Recheck the address switches of all washer interface modules.

System Checkout

1. Recheck all electrical connections.
2. Recheck all plumbing connections.
3. Verify proper washer# switch settings for the smart transport and washer interface modules.
4. Turn on water supply and check for leaks.
5. Test transport system.
    a) Enter the Washer Setup menu and select (turn on) a washer network.
    b) Enter Flow Meter Calibration menu.
    c) Run the selected transport pump to the washer.
    d) Verify flow is approximately 2.6 GPM (10 liters/minute).
    e) Check the transport system for leaks.
6. Call a chemical from the selected washer. The chemical should be one of the highly conductive products, such as an

alkali or built detergent (POF/POD must be on). Verify that:

a) The chemical was delivered to the proper washer

b) The transport time has been updated in the pump box.

c) The transport flowrate is close to 2.6 GPM (10 liters/minute)

7. Connect a printer to the pump box and initiate a Washer Running Strip report or enable the washer stored strip feature from the Washer Setup menu.
8. Run a dummy load through the washer.
9. If monitoring hygiene, measure the temperature of the main wash bath and adjust the temperature offset until the displayed washer temperature is the same.
10. Based on the wash formula used, verify that the appropriate chemicals were delivered. Verify the accuracy of the load identification.
11. Enable the next washer network and repeat the above procedure.
12. Run a copy of all the setup reports for your records.

FULL SYSTEM INSTALLATION

Pump Box/Break Tank Assembly

The pump box and the break tank are shipped separately and must be mated on site. The break tank is secured to the bottom left corner of the pump box for most applications. The break tank may be reverse mounted for mirror image pump box installations, where the pump box is expanded to the left.

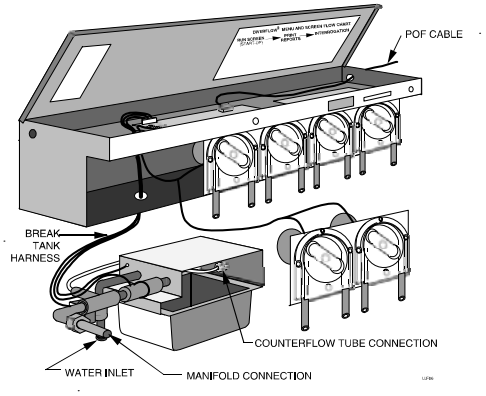


Figure 6. Break Tank to Pump Box Assembly

After securing the break tank to the pump box, install the 2 1/4 inch plastic hole bushing supplied in the installation kit, then push the break tank harness through the hole in the pump box and route the wires into the upper compartment of the pump box. Connect the break tank harness connector to the relay board, J8.

Pump Box Installation

Location

The pump box is designed for remote chemical feed and will pump with 30 psi pressure (approximately 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 programming and service, mount the pump box such that the screen is at eye level or slightly lower.

Mounting Rails to the Wall

The various ILS Max component boxes may be secured via the mounting rails provided in the installation kit. The rails are to be joined end to end. Allow adequate service clearances at both ends of the pump box.

Masonry Walls

If mounting on masonry or wood walls, the rails may be mounted directly to the wall. Secure with 1/4 -inch lag bolts or similar heavy-duty fasteners.

Sheetrock Walls or Irregular Surfaces

It is recommended that a 2-foot strip of 3/4-inch CDX plywood be used 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.

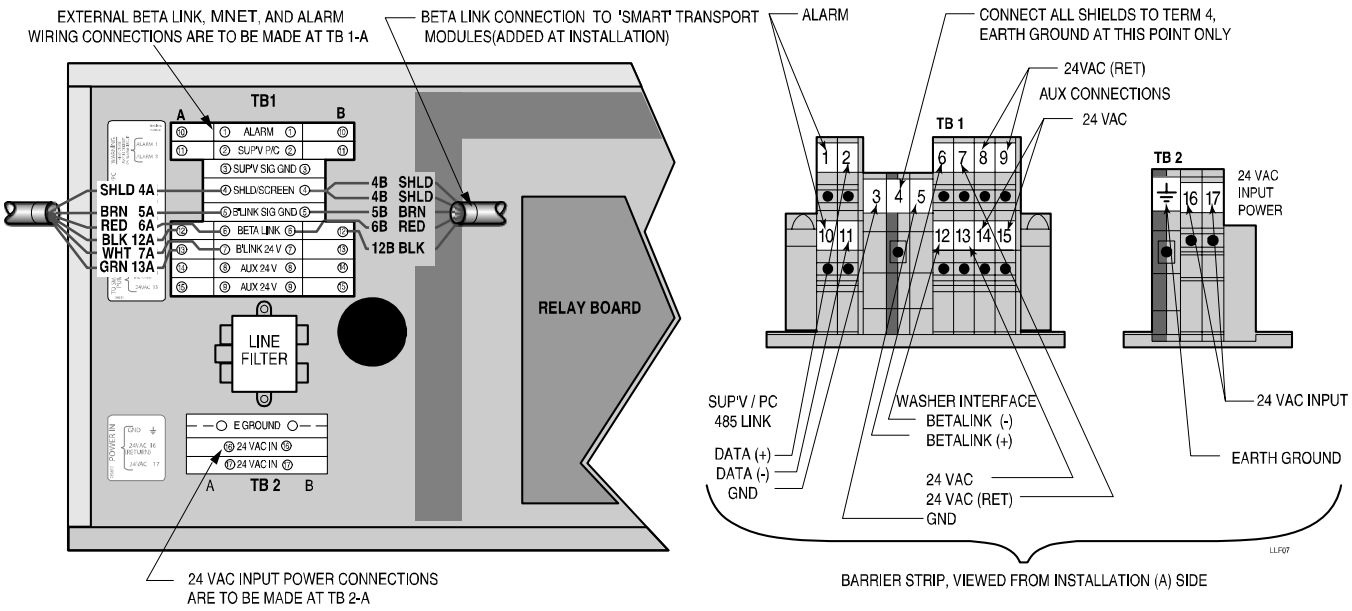


Figure 7. Pump Box Terminal Strip Connections

Mounting and Securing Pump Box Components

After securing the mounting rails, place the various pump box components on the rail in the order shown in Figure 1. Locate the auxiliary chemical pump modules, when used, to the right of the main pump box. Route the wiring harness, supplied with the modules, through the clearance hole in the top of the module and then to the main pump box relay board, J2. The connection point at J2 will determine the pump (chemical) number of the particular pump.

Install the smart transport modules at the right-hand end of the pump box. Mount the modules using the same mounting rail system used by the main pump box and the auxiliary chemical pump modules.

Secure each of the modules to the adjacent module to ensure proper alignment and provide for a secure installation.

Electric Power Connection

The pump box requires 24 Volts AC at 20 Amps. A separate 24 Volt step-down transformer is available. To avoid noise and reduce the possibility of inadvertent power interruption, it is recommended that power be provided via a separate non-interruptible branch circuit. Wiring should conform to all applicable code requirements.

If the transformer is hard-wired to the branch circuit, it is recommended that a local service disconnect switch be installed.

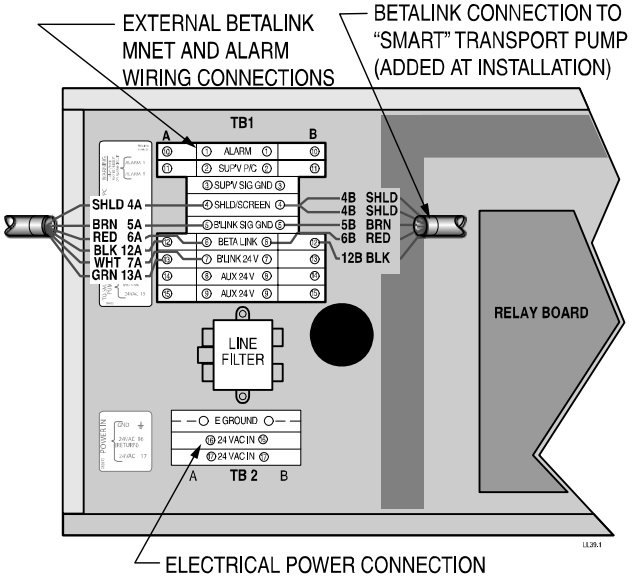


Figure 7a. Pump box terminal strip, electrical and BetaLink connections.

BetaLink Connection

The BetaLink is the communication link between the pump box and the other components of the ILS Max. All smart transport pumps and all washer interface modules are connected to the BetaLink communication bus. The various elements may be connected in any order or pattern, but the polarity of the connection must be observed, since the BetaLink is a polarized RS-485 communication system.

The BetaLink connections are located in the pump box. They are part of a terminal strip on the left side of the pump box. The

BetaLink connection points at TB1 and the relay board J7 & J8 are common and may be used interchangeably as necessary. The barrier strip has two connections for the BetaLink (+ and -), two for the 24 VAC power for the washer interface modules, one signal common and a shield (screen) connection. See Figure 7a.

CAUTION!

Be sure to provide strain relief for the cable where it passes through the ILS Max cabinet. The BetaLink may be routed in any sequence from the pump box to the various elements of the system.

CAUTION!

It is important to wire the BetaLink in accordance with the instructions, using only the wire specified. The shield must not be used as a current conductor (ground). The shield must be connected to chassis (earth) ground only at the pump box. The shields must be connected together at the various washer modules, but must not be grounded.

WARNING!

All external wiring must be routed in the cable channels provided. External wires must not be routed across any of the circuit boards in the pump box.

Internal wiring (BetaLink and 24 VAC) connecting to the transport pumps must be routed using the wiring channels provided.

External Alarm Connection

ILS Max provides a relay to trigger an external alarm. The alarm connection is made on the same barrier strip as the BetaLink. The pump box alarm is a form C relay that is normally on in non-alarm state, thus providing a "fail safe" configuration (that is, if the power to the pump box should fail, or any other failure occurs, the relay will switch). Power is not supplied by the alarm relay and must be provided by another source.

CAUTION!

The relay external supply voltage may not exceed 24 volts. Route the alarm wires directly from the terminal strip to the outside of the unit, being sure that the wires do not cross over any of the circuit boards.

CAUTION!

No fuse or other circuit protection is provided by the ILS Max circuit board. To protect the circuit board, as well as the external alarm device you must use a 2 amp, slow blow fuse.

NOTE

While it is possible to tap power for an external alarm device from the ILS Max 24 VAC power supply, this may subject the external device to electrical noise generated by the ILS Max system, as well as causing this noise to radiate to other equipment by the alarm wiring. Because of this, we recommend a separate 24 VAC power supply.

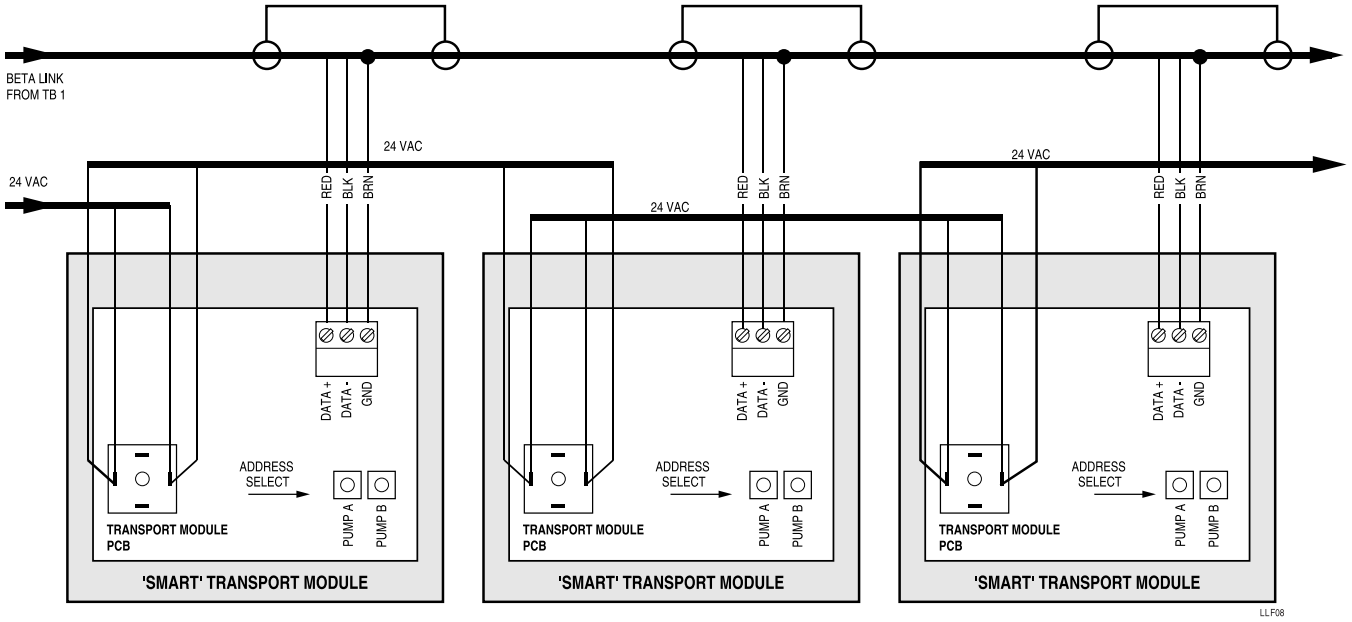


Figure 8. Transport Module Wiring

Transport Pump Connection

The pump box provides for the distribution of the 24 VAC power and the BetaLink signal to the transport pump assemblies. There is a cable assembly supplied with the pump box that will connect the 24 VAC to the first transport pump module. This cable is stored inside the grey, plastic wire raceway at the rear of the pump box. Remove the cover of the raceway to unfurl the cable. Connect the cable to the diode bridge located on the smart pump controller board as shown. The individual transport

modules each have a 24 VAC cable that is to be connected (daisy chained) to subsequent transport modules.

The BetaLink connections are made by a shielded two-conductor cable that connects the three position Phoenix connector on the relay board to the right hand entry side of TB1.The BetaLink connection from the pump box TB1 to the first and subsequent transport modules may be made using the 22-gauge, five-conductor shielded wire used for other BetaLink connections. Clip off the unused green and white wires and follow the wiring convention shown above if you choose to use this wire.

The large black or brown power resistors on the smart pump circuit board (near the pump motor terminals) may become very hot during use. To prevent damage to the cables, do not allow them to touch these components. The plastic clips on the walls of the enclosure may be used to help route the cables.

Transport Pump Address Selection

Set the washer# address select switch to correspond to the washer interface address of the washer being served. Address 0 will disable the pump.

Auxiliary Chemical Pump Wiring

The auxiliary chemical pump modules, if used, are supplied with a cable to connect the pumps to the appropriate drive output from the relay board. All chemical pump configuration is accomplished by connecting the various chemical pump wires to the appropriate pump drive output at J2. The J2 connector is a 12-position Phoenix connector, with pins 1-10 providing outputs for chemicals 1-10, respectively. Pins 11 and 12 are the motor commons. Refer to the pump box schematic for pump wiring details.

Water Connection

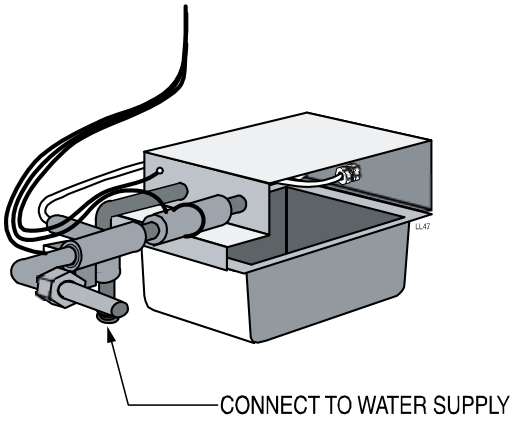


Figure 8a. Break tank with water supply connection

ILS Max requires a water supply with flow rate of at least four gallons/15 liters per minute. Inlet pressure should be between 20 and 70 psi (1.4 and 4.8 bar).

Normally, a cold water supply is all that is required. However, with some chemicals, a warm or tempered water flush may be required. Should a warm flush be required, a water-tempering valve should be used to provide the 40°C (104°F) heated water supply to the system. The water supply is connected to the hose fitting of the break tank module. Refer to Figure 6 for location.

Water Filter

No water filter is required for the ILS Max System. However, the 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 POD functions. Should these conditions exist, some water preconditioning may be required for optimum performance of the system.

Cold Water Flush

If a cold water flush is being used, connect the hose directly from the water supply.

Chemical Pump Assignment

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 one, detergent in position 2, and so on.

A possible exception to the above 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.

Chemical Uptake Lines

Drum Position

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

Avoid uptake lines longer than 16 feet. Lengths greater than 16 feet will prevent the system 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 use a section of 3/4-inch (or larger) PVC pipe for segments of the chemical uptake system. See **I/O Diagnostics (Advanced Troubleshooting)** for a method of manually priming a new system with large uptake lines.

A unique feature of the ILS Max System is that the pump box may be configured in either the left-hand or right-hand transport mode. This will allow for mirror image mounting of ILS Max Systems, thus reducing the chemical uptake run lengths.

Standpipes

The pump box installation kit contains a standpipe for each chemical pump. The standpipe is made of 3/4-inch PVC plastic and is long enough to be used in a 55-gallon (200 liter) drum. The standpipe may be cut to length for smaller drums if desired. Cuts should be made at an angle to prevent suction problems.

Tubing Size

The chemical uptake-suction tube should be 5/8-inch ID. Smaller diameter uptake tubing will reduce chemical pumping rates and may reduce pump tube life. Larger diameter tubing 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.

Transport Tube
The transport tubing should be polyflow 1/2-inch ID (5/8-inch OD) for all single transport pump (11-liter/min) configurations. This will ensure that the optimum transport velocity of five feet per second is maintained.

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

To install, run the transport tube from the appropriate smart transport pump to the appropriate washer. 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.

POD Cell Installation
Install the POD fitting (the PVC tee and POD cell assembly) near the end of the transport tube. Locate the POD cell as close as possible to the washer, at a level above the maximum water level in the washer. Feed the transport tube into the chemical supply hopper or connect it directly to the washer shell if such fittings are available. Take care that the injection point does not allow the chemical mixture to be injected directly onto the linen.

If placing tubing overhead in an area where people are present, consider running the tube through a solid one-inch or larger, rigid PVC pipe. The PVC pipe will provide a support for the polyflow tubing and form a safety barrier in the unlikely event the tube should be severed or fail.

MANIFOLD AND POF

Because the ILS Max System is modular, some application-specific configuration of the manifold system is necessary. The main pump box manifold assembly, the POF manifold assembly, an inline filter, a counter flow tee fitting and some bulk tubing are supplied in the installation kit. In addition, each of the optional auxiliary chemical pumps, as well as each of the smart transport pump assemblies, is provided with the necessary manifold components for installation. The manifold system should be connected after all of the various components are secured to the mounting rail.

Manifold Installation

You will first attach manifold brackets and then assemble the manifold in two sections, one for the peristaltic pumps and one for the transport pumps.

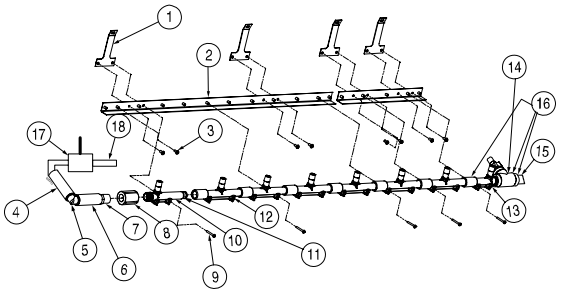


Figure 8.1. Flush Manifold, Peristaltic Pump Side

1. Use 5” gray PVC nipple (#18). between break tank flow meter and counterflow T (#17).
2. Assemble parts #4-#7 onto elbow from break tank as shown in drawing.
3. Attach manifold support bracket (#1) under the screws for main module pumps 2 and 5 (see Figure 8.3). Add long metal bracket (#2).
4. If using any auxiliary pump boxes, add extra manifold and support brackets as shown in Figure 8.1 to the right of #1 and #2. Attach two support brackets per aux box under the aux box’s cover screws, and then one aux box manifold bracket per aux box under the support brackets.

Make sure that each manifold section male end has two lubricated o-rings on it. Seal threaded connections with Teflon tape or pipe sealant such as Megalock.

5. Attach manifold brackets (#23) to transport modules (see Figure 8.3). Every other bracket attaches to two modules, connecting them together; hold the bracket over the screw holes and you will see the holes line up. The first bracket attaches to the right side of the initial pump module and then to the left-hand side of the next module.

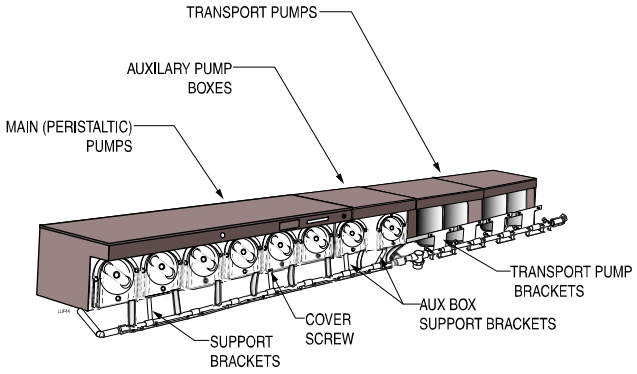


Figure 8.3. Complete Manifold Installation

6. Starting on the left side of the manifold, attach part #8 (threaded coupling-see Figure 8.1) between part #7 and part #10. This section should align with the first peristaltic pump on the main pump box.
7. Attach one manifold section (shown as part #12 in Figure 8.1) for all of the remaining peristaltic pumps, except for the last peristaltic pump. Fit the barb for each section up into the peristaltic pump tube extending down from the right side of the pump and hose clamp it into place. The last peristaltic pump will receive the part #13, which has a threaded section on the right side of the peristaltic pump manifold section.

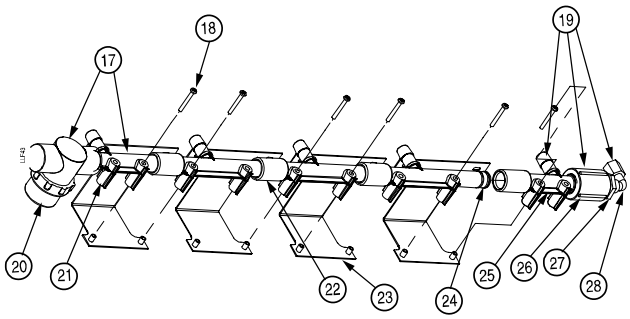


Figure 8.2. Flush Manifold, Transport Pump Side

8. To the threaded end of the peristaltic pump manifold section, add POF/filter assembly (parts #16 and 17), which includes #13, a section for the last peristaltic pump and first transport pump, as well as clear tube so you can see flow taking place and spot any bubbles from air leaks. Note that the conductivity cell #16 goes on first before attaching the filter to the right side.
9. Add one manifold section per transport pump.
10. Add one swivel to barb fitting for each transport pump.
11. Complete the manifold with the backflow assembly (part #19).
12. Connect the manifold to each transport pump using 1/2" ID clear PVC tubing and clamps to prevent air leaks.
13. Connect 1/4" counterflow tubing from the end of the manifold to the compression nut fitting on the side of the break tank bracket. Connect another tube from the other side of the break tank bracket to the T fitting at the beginning of the manifold.

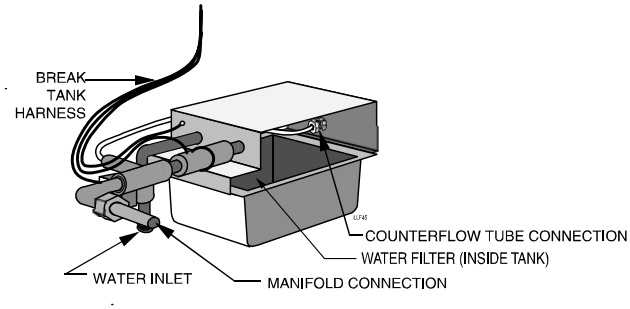


Figure 8.4. Connections through break tank.

NOTE

Break tank is code-compliant, providing more than a 1-inch (2.5 cm) air gap, so no NRV non-return valve-type backflow prevention is required on the water supply.

14. When the manifold is completely assembled, align the mounting holes over the posts on the mounting brackets and secure each section to the metal brackets with screws. Be careful not to over-tighten the screws as you could damage the plastic.

Wiring the POF Assembly

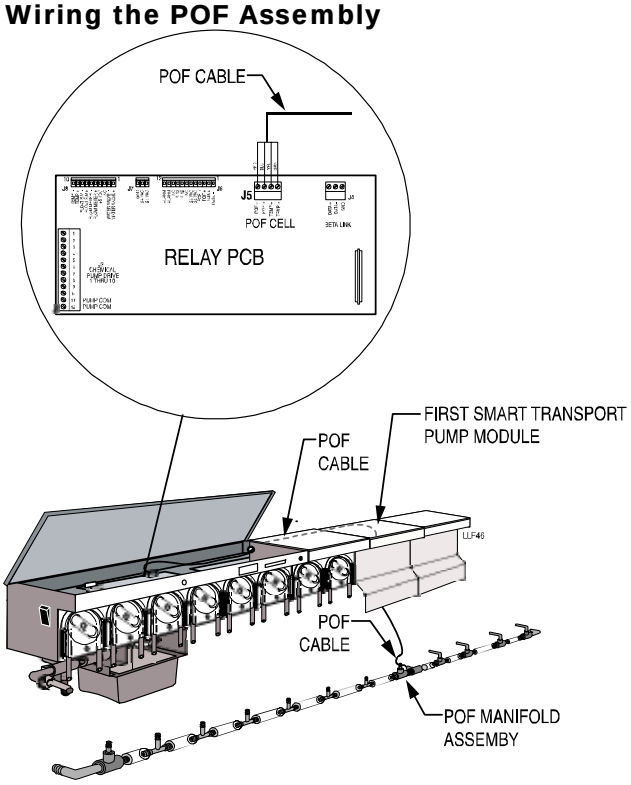


Figure 8.5. Wiring the POF Assembly

1. If necessary, strip the end of the POF cable so that the four colored wires are exposed.
2. Route the POF cable up through the motor wire hole in the first smart transport pump module as shown in Figure 8.5.
3. Route the wires along the wiring path at the rear of the pump box and connect the POF cable to the 4-position Phoenix connector (J5) located on the relay board.

WASHER INTERFACE AND TRIGGER MODULE

The washer interface module is the address node for the particular washer. The washer interface module also contains the circuitry for POD and optional washer temperature monitoring, alarm and hold relays, and two auxiliary trigger inputs. The washer interface also provides the communication interface between the pump box (BetaLink) and the trigger modules (AlphaBus).

The trigger modules provide the high voltage interface for the washer control (drain, water, etc.) and chemical supply triggers. The same type module is used for all trigger functions. The specific function of the module is selected via a program switch located near the AlphaBus connector.

Location

The trigger and interface modules are not sealed and should be located in an area not subjected to hose down or splashing. These modules must be mounted in an enclosure that restricts access to high voltage primary and secondary circuits (such as

those within the washer enclosure or in an external mounting enclosure).

Mounting Interface and Trigger Modules

The modules may be placed on the bottom of the washer's control cabinet, secured to the cabinet side walls with double-sided tape, velcro straps or any other practical method.

Formula Select Module

The formula select module includes an integral 15-foot (5 meter) AlphaBus cable. Secure the module to the washer in a location convenient to the operator. Connect the cable to the AlphaBus connector at either the washer interface module or any trigger module.

Washer Interface Connections

The BetaLink connection at the pump box provides the 24 VAC power and the RS-485 communication link to the washer interface module. The BetaLink connection is made via a five-position Phoenix connector. The interconnecting cable should be 22-gauge shielded wire. Connections for the POD cell, washer temperature probe, washer hold and local washer alarm are also made at the washer interface via Phoenix connectors.

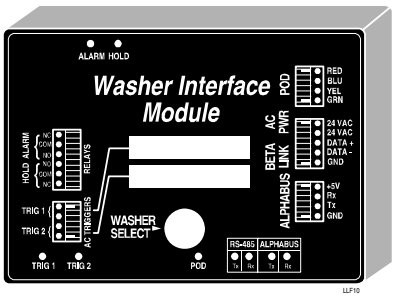


Figure 10. Washer Interface

The washer interface module also provides the address definition for the particular washer. Select the washer number via the 16-position switch accessible through the access hole in the cover of the module.

NOTE

Position 0 will disable (deselect) the washer and module.

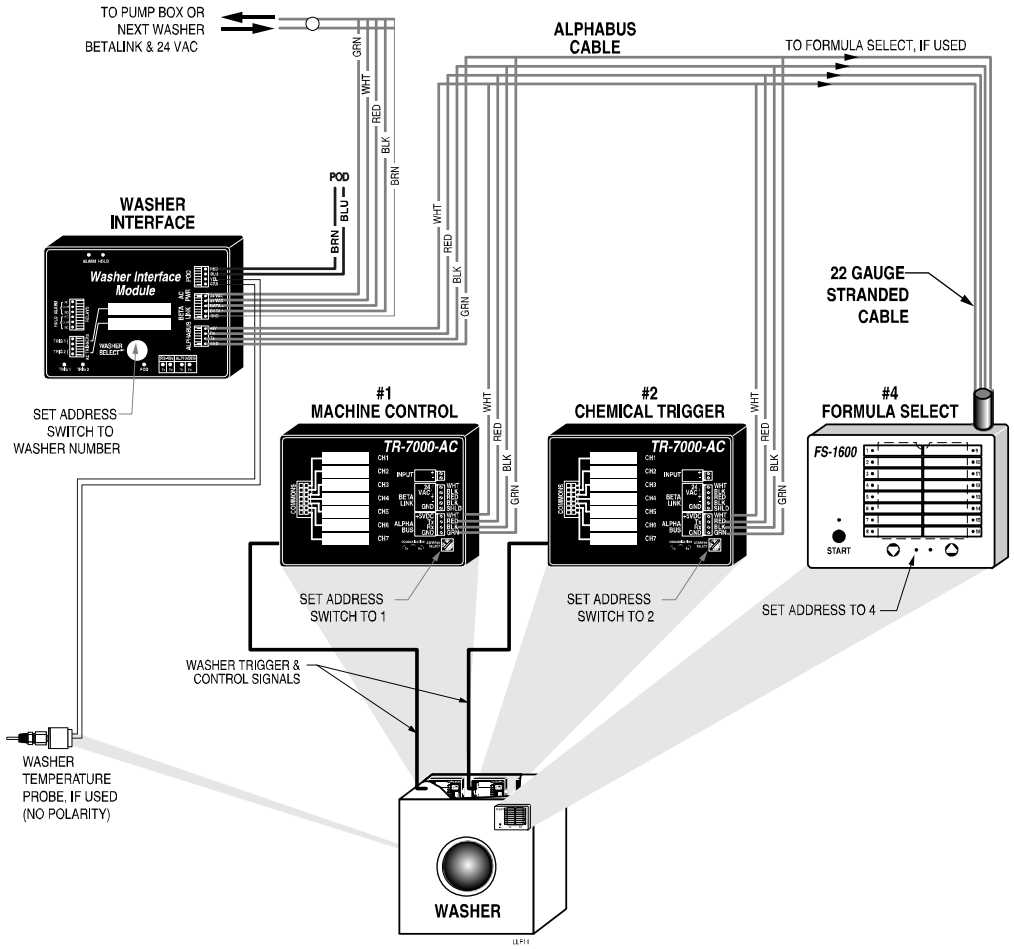


Figure 11. Washer Interface to Trigger Module Wiring

AlphaBus Connections
The AlphaBus connection is a four-wire power and communication link between the washer interface and the various trigger modules. This link consists of 5-Volt, ground, Transmit, and Receive. The connections are made via a four-position Phoenix type connector. The connections should be made with 22-gauge stranded wire as shown above.

FS-1600 AlphaBus Conversion
When used for basic ILS Max and ILS Max Tunnel systems, the Formula selector is connected to the AlphaBus. As supplied from the factory the module is configured for BetaLink applications and must be converted to the AlphaBus configuration BEFORE CONNECTING THE FS-1600 to the system.

Open the module by removing the six screws that secure the two halves of the module. Remove the cable connector from the BetaLink connector and reconnect it to the AlphaBus connector. Close the module and secure cover halves in place. The unit is now AlphaBus compatible. Connect the FS-1600 module to the washer interface module's AlphaBus connector as normal.

FS-1600 Address Selection
The FS-1600 has a programmable, multiple-address capability. Both basic ILS Max and ILS Max Tunnel applications require that the Formula Selector use address 4. After completing the system installation and connecting the module to the AlphaBus, program the address of the FS-1600 as follows:

1. Turn on system power (note that the green bus communication LED is blinking and one of the 16 red formula selection LEDs is on).
2. Simultaneously press and hold both the UP and DOWN arrows on the FS-1600. Continue to hold for approximately five seconds until one of the formula LEDs begins to blink (the blinking LED indicates that the module is in the Address Selection mode).
3. Press the UP or DOWN arrow until the Formula 4 LED is blinking (the blinking LED indicates the address of the module).
4. After approximately five seconds of no key pressing activity, the new address setting will be recorded, and the module will automatically revert to the normal operational mode (one of the Formula LEDs will now be on steady, indicating that the module is now in the normal Formula Selection mode).

The module address is held permanently in FS-1600's memory and need only be programmed during initial setup or upon replacement of the module. Loss of power or system shut down will not require re-programming of the address.

Should the module be connected mistakenly to the wrong bus structure, the internal fuse will provide protection for the FS-1600 circuitry.

POD Cell Connection
The Proof of Delivery (POD) cell for the washer is connected to a four-position Phoenix connector at the washer interface. Install the POD cell in the transport tube as close as practical to the chemical injection point. Route the POD cell cable to the washer interface and connect as indicated. Normally, POD probes have only two wires. If a four-wire probe is used, do not connect the yellow and green wires.

Washer Temperature Probe
If hygiene monitoring is to be performed, a wash water temperature probe must be connected to the YEL and GRN terminals of the POD connector (polarity is not important). To eliminate the need for modification of the washer, an adhesive-mounted temperature probe is available, which may be mounted to the outside of the washer shell. It must be located below the water line and in an area clear of moisture and moving parts. For the most accurate measurement, the probe should not be exposed to heat or air flow from nearby components. To compensate for heat loss through the washer shell, a measurement offset may be programmed. See the Washer Setup Programming section for details.

Washer Hold Relay
The washer hold relay is used to *hold* the wash formula when the pump box is busy servicing another washer and the wait time will be greater than one minute until the chemical feed will begin. The washer hold relay can also be set by an alarm condition, if so programmed in the washer setup. The washer hold relay does not have to be connected for the system to function.

The washer hold relay is a Form C, SPDT relay rated for 220 VAC @ 5 amps. See **Appendix A** for suggested wiring of the relay on different washer makes.

Local Washer Alarm
The local alarm on the washer interface module is triggered by a failure of the BetaLink communication to the washer, or failure to complete a requested chemical feed. All alarm relays in the ILS Max System are of the fail-safe configuration. This means that the relay is energized in the no alarm state, and any loss of power to the washer interface will cause the relay to change to the un-energized alarm state. If the alarm circuit is powered by a separate power source than the ILS Max System, a loss of power alarm occurs. The local alarm relay is a Form C, SPDT relay rated for 220 VAC @ 5 amps.

AC Triggers (Trig 1 & 2 on Washer Interface)
The TRIG 1 & 2 inputs of the washer interface module are auxiliary inputs to be used as **Machine On** and **Drain** respectively. These functions may be used if no trigger module # 1 is used (limited feature system) to provide feed interlock for **Machine On** and **Drain**.

Trigger Module Connection

The trigger modules used by ILS Max system may serve two different functions based on the application requirement.

- The chemical trigger function (modules 2 and 3).
- Washer status (**Machine on**, **Drain**, etc.) monitoring (module 1).

The function of the module is determined by how the module's address switch is set, as well as by what washer signals are connected to the module.

TR 7000 Trigger Module Address Selection

The ILS Max system requires that each trigger module have a unique "address" within the AlphaBus network. This is how the system can determine the source and type of signal reported by the module. The address corresponds to the "Module #" that is depicted in Figures 12, 13 and 14.

The address of the trigger module is selected by one of three methods, depending on the version of the trigger module you have.

Early versions of the trigger module, those with a six-position Phoenix connector, use a jumper wire connected from “GND” to the “Sel 1” or “Sel 2” to determine the address of the module. The following table shows the jumper, address and trigger function.

Address	Jumper	Module #	Function
1	None	1	“Washer Control”, Machine On, Drain, Water, Etc.
2	Sel 1	2	Supply trigger 1 - 7
3	Sel 2	3	Supply trigger 8 - 10
4	Sel 1+2	4	Formula Select

The next generations of modules use two “DIP” switches to select the address. These switches are located at the left end of the 4 position Alpha Bus Phoenix connector. Address and function conform to the table above.

The most recent version uses a 16-position rotary switch to select the address. Only addresses 1-4 are applicable for basic ILS Max and ILS Max Tunnel applications.

Although Address 4 is discussed, it is seldom used as a trigger module address. The Formula Select module uses Address 4.

Trigger Connection Harness

Two trigger harness types are available for connection to the various washer connection points. The solid-colored harness is intended for supply trigger applications. The colors correspond to the RETMA color code, as follows: BROWN=trigger 1, RED=trigger 2. The BLACK wire is the common (-) side of the trigger input. The commons may be tied together as necessary.

Chemical Trigger Signal Connection

There are seven trigger channels on each of the trigger modules. These inputs are electrically isolated from each other as well as isolated from the ILS Max circuit. They may be connected individually, or tied together using a common return. The input requirement for the triggers is 24-220 Volts AC or DC (DC signals are usable if polarity is observed [+] to trigger [-] to common). The trigger circuit draws approximately 3 mA.

Relay Mode

Relay mode trigger connections are a direct, non-programmable relationship between the trigger channel and a given chemical pump. Trigger channel #1 triggers chemical pump #1, and so on. To trigger more than one pump from the same trigger source, connect the appropriate trigger channels together.

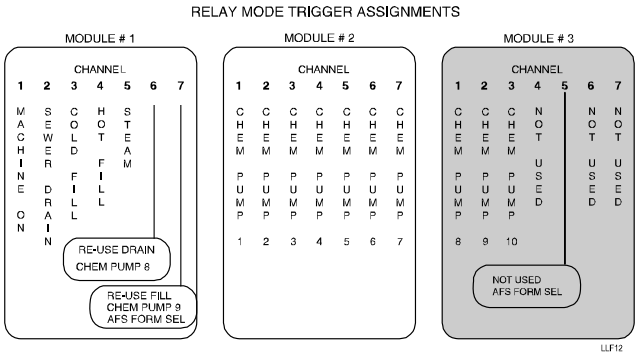


Figure 12. Relay Mode Trigger Assignments

Enhanced Relay Mode

The enhanced relay trigger mode is designed for use in situations where there are a limited number of chemical triggers available from a microprocessor controlled washer. This mode is a combination of the relay mode, using signal on time to determine amount of chemical, and enhanced mode, using combinations of triggers to select which chemical is pumped. In the enhanced relay trigger mode, chemical pumps are assigned using a 2 out of 4 code described below.

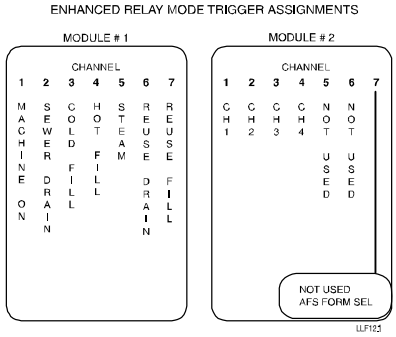


Figure 12.1. Enhanced Relay Mode Trigger Assignments

PUMP #	CH 1	CH 2	CH 3	CH 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
9	OFF	ON	OFF	ON
10	OFF	OFF	ON	ON

Trigger Module Assignments for Module # 1

Unlike the original equipment, the trigger versus pump relationship is non-programmable. The call rate is programmed just as in the standard relay mode, and all other relay mode features remain the same.

Formula Mode

Formula mode is typically used in conjunction with mechanical cycle timers. Chemical amounts are set by menu entries. Up to three fixed amounts may be delivered for each trigger signal received. 16 different alternate amounts may be dispensed by selecting one of 16 formulas, using any of three methods. One method uses the formula select signals found on module #3, another uses a formula select module as module #4. The third uses a timed signal applied to module #2, known as automatic formula selection (AFS).

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

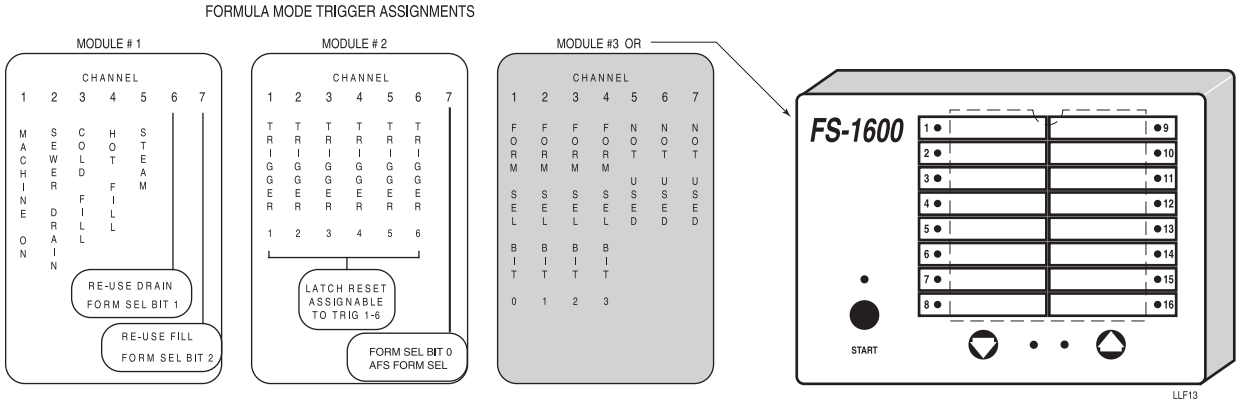


Figure 13. Formula Mode Trigger Assignments

Latched Mode Triggering

Latch mode triggering is a variation of formula mode triggering. All triggering setups and functions are the same except that any given trigger will only be recognized the first time it is activated. Subsequent trigger signals will be ignored until the latch-reset signal is applied (or the machine-on signal may perform this function). 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.

Automatic Mode (Enhanced) Triggering

What is Automatic Mode?

Both Formula and Relay modes use a single trigger to call for a chemical or chemicals. Automatic mode uses multiple signals, called “functions”, to request up to three chemicals.

On newer washers, you would program the washer to turn on the signals you want for the function in question. Five seconds after the first trigger comes on, the dispenser looks for trigger signals, and those that are on determine the function per the chart below.

Function	T1	T2	T3	T4	T5	T6
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

So, if trigger #2 (T2) comes on by itself, function #2 is called. If triggers 2 and 3 are present, function 4 is called. When a function is called, pumps programmed for that function will run.

You probably noticed trigger 1 (T1) isn’t used in the example above. T1 is reserved as a “strobe signal”. The triggering above is “strobeless”, without using T1. The triggering above assumes a newer washer, where the signals turn on when they are supposed to, so they are all on before the 5-second window elapses. On older, chart-controlled washers, the signals may not all come on within 5 seconds of one another. In this situation, we turn on the signals, and then we turn on the trigger 1 (T1) strobe signal. Five seconds after the strobe has been turned on, the system looks at which triggers are present and thereby determines which function is required. So, on older chart washers, the T1 strobe is turned on for each function, while on a newer washer the T1 strobe signal isn’t programmed.

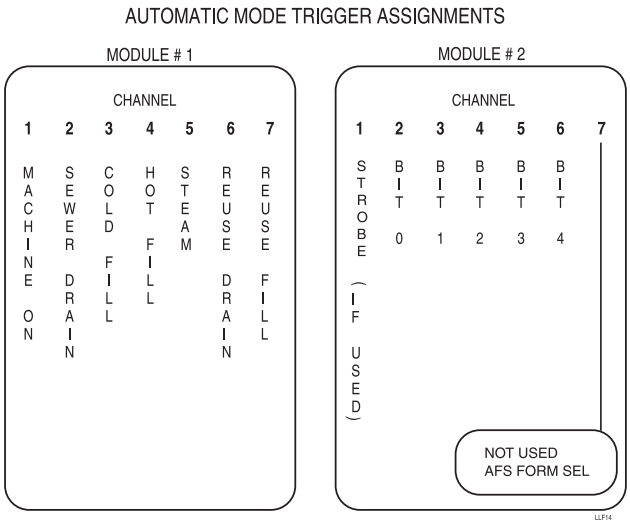


Figure 14. Automatic Mode Trigger Assignments

The chart below shows the signals for all 32 functions, with “----” indicating the signal stays off. Note function #1 is only available in strobe mode, since it has no triggers and needs strobe T1 to set the 5-second trigging window.

Function	T2	T3	T4	T5	T6
1	----	----	----	----	----
2	ON	----	----	----	----
3	----	ON	----	----	----
4	ON	ON	----	----	----
5	----	----	ON	----	----
6	ON	----	ON	----	----
7	----	ON	ON	----	----
8	ON	ON	ON	----	----
9	----	----	----	ON	----
10	ON	----	----	ON	----
11	----	ON	----	ON	----
12	ON	ON	----	ON	----
13	----	----	ON	ON	----
14	ON	----	ON	ON	----
15	----	ON	ON	ON	----
16	ON	ON	ON	ON	----
17	----	----	----	----	ON
18	ON	----	----	----	ON
19	----	ON	----	----	ON
20	ON	ON	----	----	ON
21	----	----	ON	----	ON
22	ON	----	ON	-----	ON
23	----	ON	ON	-----	ON
24	ON	ON	ON	-----	ON
25	----	----	----	ON	ON
26	ON	----	----	ON	ON
27	----	ON	----	ON	ON
28	ON	ON	----	ON	ON
29	----	----	ON	ON	ON
30	ON	----	ON	ON	ON
31	----	ON	ON	ON	ON
32	ON	ON	ON	ON	ON

Notes:

- While 32 functions are available per washer, most installers don't need nearly that many.
- If you only have three triggers, you can use functions 2-8 assuming you're in strobeless automatic mode such that T1 is not used;
- If you have only four triggers, you can use functions 2-16.
- If you have five triggers, you can use 31 functions.
- If you have 6 triggers, you can use either all 32 functions using one trigger as a strobe on an older machine, or use functions 2-32 + AFS.

How to use Automatic Mode

This section takes you through the steps needed to set up automatic mode. The first step is the same as what you would do for formula or relay modes.

Step 1. Make a Chart of Your Formulas

Formula Name	Prewash	Main Wash	Final Rinse
Color towel	X	Alk 5 oz, Det 6 oz, Peroxide 8 oz	Sour 2 oz, Soft 2 oz
Color sheets	X	Alk 5 oz, Det 6 oz, Peroxide 8 oz	Sour 2 oz, Soft 2 oz
Color tablecloth	Alk 5 oz, Det 6 oz	Alk 8 oz, Det 12 oz, Peroxide 15 oz	Sour 2 oz
White towel	X	Alk 5 oz, Det 6 oz, Peroxide 8 oz	Sour 2 oz, Soft 2 oz
White sheets	X	Alk 5 oz, Det 6 oz, Peroxide 8 oz	Sour 2 oz, Soft 2 oz
White tablecloth	Alk 8 oz, Det 10 oz	Detergent 10 oz, Bleach 8.5 oz	Sour 2 oz
New linen	X	Det 6 oz	X
Rewash	Alk 8 oz, Det 10 oz	Bleach 12 oz	X
Mop & Rag	Alk 8 oz, Det 10 oz	Alk 8 oz, Det 12 oz, Peroxide 15 oz	Sour 2 oz
Blankets	Alk 8 oz, Det 10 oz	Alk 5 oz, Det 6 oz, Peroxide 8 oz	Sour 2 oz, Soft 2 oz

Step 2. Make Similar Dose Sizes the Same for Easy Programming

For example, dose sizes within 0.5 oz of one another might be consolidated to one size, and function.

For example, in the chart below, if some doses were 4.5 oz of alkali and some 5 oz, standardize to 5.

Step 3. Make a Chart of Dose Functions

Function #			
2	Alkali 5 oz	Detergent 6 oz	
3	Alkali 5 oz	Detergent 6 oz	Hydrogen peroxide 8 oz
4	Alkali 8 oz	Detergent 10 oz	
5	Alkali 8 oz	Detergent 12 oz	Hydrogen peroxide 15 oz
6	Detergent 10 oz	Bleach 8.5 oz	
7	Bleach 12 oz		
8	Sour 2 oz	Softener 4 oz	
9	Softener 4 oz		
10	Sour 2 oz		
11	Detergent 6 oz		

The chart of dose functions is really just a list of the various chemical combinations used in all the formulas. Some, such as function 2 and 4, can be characterized as "prewash light soil" and "prewash heavy soil", and they would then be used across multiple formulas. Function #8, sour and softener, would similarly be used on a bunch of the formulas.

Step 4. Make a Chart Showing Which Functions Go with Which Formula

	Prewash	Main Wash	Final Rinse
Color towel	X	3	8
Color sheets	X	3	8
Color tablecloth	2	5	10
White towel	X	3	8
White sheets	X	3	8
White tablecloth	4	6	10
New linen	X	11	X
Rewash	4	7	X
Mop & Rag	4	5	10
Blankets	4	3	8

All we have had to do in the step above is write down the function numbers assigned to the chemical groups required, from our original formula sheet. Last, we look at which triggers need to be turned on to call these functions. By writing it down in chart form, it makes programming the washer faster.

Step 5. Program Washer

	Prewash	Main Wash	Final Rinse
Color towel	X	T3	T2, T3, & T4
Color sheets	X	T3	T2, T3, & T4
Color tablecloth	T2	T4	T2 & T5
White towel	X	T3	T2, T3, & T4
White sheets	X	T3	T2, T3, & T4
White tablecloth	T2 & T3	T2 & T4	T2 & T5
New linen	X	T3 & T5	X
Rewash	T2 & T3	T3 & T4	X
Mop & Rag	T2 & T3	T4	T2 & T5
Blankets	T2 & T3	T3	T2, T3, & T4

DATALOGGING

Datalogging: Formulas

Logging formulas works the same in all three modes.. Chemical usage is logged based on pump runtime and calibration rates. Formula counts are logged based on formulas being selected by either a FS1600 formula selector, an AFS (auto formula select) signal, or by programming load classification setups. When using formula mode with an FS1600 formula selector, the formula number chosen on the formula selector will be logged. When using formula mode without a formula selector, an AFS trigger must be used to set the formula number. In relay and automatic mode, no formula selector is used, so either AFS or load classification must be used for datalogging. Note, however, that only in the case of formula mode is AFS used to determine which chemicals will be dosed; in relay and automatic modes AFS and load classifications are only used for data purposes.

AFS

AFS, or automatic formula selection, uses a timed signal to determine which formula is going to be run. When the machine signal turns off, the formula is logged as complete.

To use AFS with formula mode or automatic mode, attach a trigger from the washer to the T7 input on TR7 #2. If in relay mode, attach a trigger from the washer to the TR7 #3 T5 input.

Formula #	T7 Ontime Required	
1	6 seconds	+/- 0.5 seconds
2	10 seconds	+/- 0.5 seconds
3	14 seconds	+/- 0.5 seconds
4	18 seconds	+/- 0.5 seconds
5	22 seconds	+/- 0.5 seconds
6	26 seconds	+/- 0.5 seconds
7	30 seconds	+/- 0.5 seconds
8	34 seconds	+/- 0.5 seconds
9	38 seconds	+/- 0.5 seconds
10	42 seconds	+/- 0.5 seconds
11	46 seconds	+/- 0.5 seconds
12	50 seconds	+/- 0.5 seconds
13	54 seconds	+/- 0.5 seconds
14	58 seconds	+/- 0.5 seconds
15	62 seconds	+/- 0.5 seconds
16	66 seconds	+/- 0.5 seconds
30	122 seconds	+/- 0.5 seconds

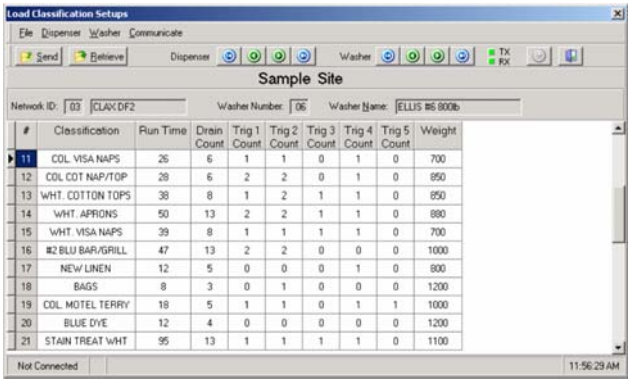
AFS signal on-time will then determine the formula logged, where formula number= trigger on-time of 2+4 x formula number, such that trigger on-time is per the chart above. When using AFS with formula or latched mode, the formula controls the type and amount of chemicals that will be fed as well as which load type is logged. When using AFS with the other modes, relay and automatic, the AFS only affects the load type that is logged.

AFS can be used up to formula #30 with automatic and relay modes, but only up to 16 with formula mode, because the dispenser only has 16 programmable formulas. If in formula mode, AFS will also determine which chemical formula is run, so before leaving the account, you should trigger formulas #1 and 16 to be sure the signal length supplied to the dispenser is selecting the correct formula number.

AFS is easier to understand and setup than load classification setups. However, because AFS requires an additional trigger, and needs the trigger length to vary by under 0.5 seconds, it may not be suitable for all installations.

Load Classification Setups

These criteria allow the system to categorize loads by formula number, based on trigger signals 1-5 that were present during the load, and the number of drains. In the automatic mode **Step 5. Program Washer** chart above, we see the trigger counts that would be programmed, along with the number of drains. We would program these as the load classification setups, as shown in the graphic below.



Note that run time and weight are put in as expected values, but are not used for identifying which load is in the washer. Only drain and trigger signal counts are used in load identification; weight is used for generating cost/kg or cost/lbs data, and run time is used to show when excess runtime occurs. Note also that T6 is not used for load classification setups.

In our load classification example above, the trigger & drain counts are different for each formula. I.e., each formula has a unique footprint, so the system can identify it and track loads. In our automatic mode programming example, however, Step 5 shows some loads receiving the same chemistry. If they have the same drains as well, our load classification setups would have no way to tell the difference between them.

If you're in *strobeless automatic* mode, you are not using T1 to call functions, and you could have it turn on for five seconds simply to differentiate between formulas which are otherwise the same as follows:

Step 5. Program Washer

	Formula log signal	Prewash	Main Wash	Final Rinse
Color towel		X	T3	T2, T3, & T4
Color sheets	T1	X	T3	T2, T3, & T4
Color tablecloth		T2	T4	T2 & T5
White towel		X	T3	T2, T3, & T4
White sheets	T1 + T1 (two times)	X	T3	T2, T3, & T4
White tablecloth		T2 & T3	T2 & T4	T2 & T5
New linen		X	T3 & T5	X
Rewash		T2 & T3	T3 & T4	X
Mop & Rag		T2 & T3	T4	T2 & T5
Blankets		T2 & T3	T3	T2, T3, & T4

Of course, if multiple formulas were otherwise the same, we could turn it on several times as shown in the "White sheets" Formula log signal cell above.

If you're in *strobe automatic mode*, as on an older chart controlled machine, T1 will be getting used with each function, so each function will have T1 occur with it. In this case, we can have T2 act as our differentiating trigger. As long as it doesn't occur with T1, it will be ignored since it won't call for a function without the strobe in strobe mode.

Step 5. Program Washer

	Formula log signal	Prewash	Main Wash	Final Rinse
Color towel		X	T1 & T3	T1, T2, T3, & T4
Color sheets	T2	X	T1 & T3	T1, T2, T3, & T4
Color tablecloth		T1 & T2	T1 & T4	T1, T2 & T5
White towel		X	T1 & T3	T1, T2, T3, & T4
White sheets	T2 twice, or T3	X	T1 & T3	T1, T2, T3, & T4
White tablecloth		T1, T2 & T3	T1, T2 & T4	T1, T2 & T5
New linen		X	T1, T3 & T5	X
Rewash		T1, T2 & T3	T1, T3 & T4	X
Mop & Rag		T1, T2 & T3	T1 & T4	T1, T2 & T5
Blankets		T1, T2 & T3	T1 & T3	T1, T2, T3, & T4

Washer Control Signal Connections (Module #1)

The principal washer cycle signal channels–**Cold Water**, **Hot Water**, **Drain**, and **Machine On**–are connected to the #1 trigger module, if required. These inputs are electrically identical to the chemical trigger inputs. They may be connected similarly to the chemical trigger channels.

In most cases, the signals described as follows may be derived from the voltage present across the indicated solenoid valve of the washer. The control harness provided has individual common wires to facilitate connection to individually-grounded solenoids or other signal sources.

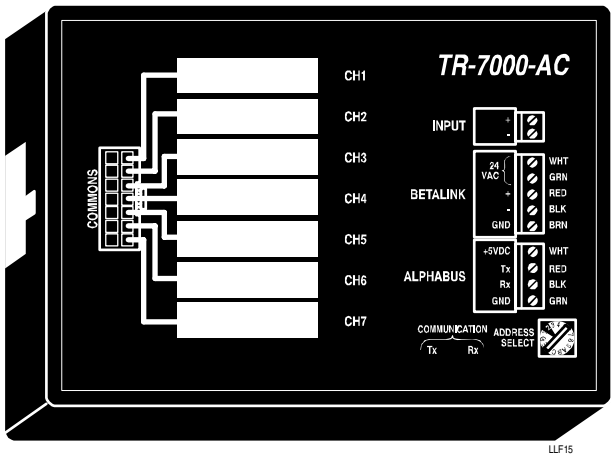


Figure 15. Washer Control Trigger Assignments

Machine On

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.

TECH NOTE

*ILS Max will not pump chemicals if there is not a valid **Machine On** signal.*

Drain

Some washers are equipped with two drain systems—reclaim drain and sewer drain. Input channel 2 is used for sewer or main drain, and optionally signal channel 6 is used for reuse drain if necessary.

NOTE

A chemical feed request will be ignored if the drain is open.

Cold Water

Connect the cold water fill signal to channel 3. Because the cold water signal may be used to monitor the actual time that the water valve is open, the connection should be made to a point in the washer circuit that accurately reflects the status of the valve.

Hot Water

Connect the hot water fill signal to channel 4. Because the hot water signal may be used to monitor the actual time that the water valve is open, the connection should be made to a point in the washer circuit that accurately reflects the status of the valve.

Steam

Connect the steam signal to trigger channel 5. Because the steam signal may be used to monitor the actual time that the steam valve is open, the connection should be made to a point in the

washer circuit that accurately reflects the status of the steam valve.

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

Verify the installation by exercising the individual functions. Observe that the appropriate trigger module LED is on.

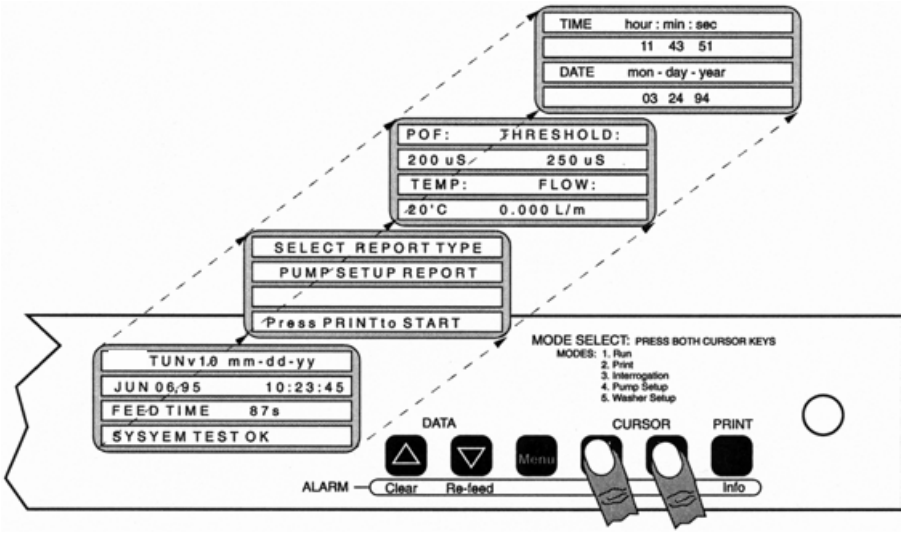
Limited Feature System (LFS)
It is possible to configure and install one or more washer networks of the ILS Max System with limited data logging features by not utilizing trigger module #1, the machine control module. In the LFS configuration, no cycle records will be available.

In the LFS configuration, the **Drain** and **Machine On** signals may be connected to the AC inputs of the washer interface module to provide the feed lockout feature of not feeding chemical to an open drain or a washer that is turned off. See **AC Trigger** above. If the **Drain** and **Machine On** signals are not desired, their feed lockout functions can be eliminated by programming the washer setup for reverse logic **Machine On** signal.

The LFS will continue to provide all other ILS Max features.

Using Pressure Switches
Using pressure switches is recommended only if the user is unable to find a signal source that is compatible with the ILS Max System (the **Machine On** signal is not continuous throughout the cycle).

Locate the appropriate drain, hot water, cold water, and steam (if required) control valve air lines. Cut into each air line and install a tee fitting. Connect the available branch of the tee to the appropriate pressure switch.



SETUP PROGRAMMING

All setup programming is done at the pump box. To prevent unauthorized access to the setups, the setup menus are not normally accessible. To enable access, you must use one of two methods.

SET UP ACCESS BY KEY

To gain access to the setup modes, insert the key and rotate it to the unlocked position. Press both CURSOR keys at the same time. The report-generation menu will appear. Press both of the CURSOR keys twice again. The password setup menu will appear. From this point the setup menus may be accessed as described in the following sections. When you are done entering setups, return the key to the locked position.

SET UP ACCESS BY PASSWORD

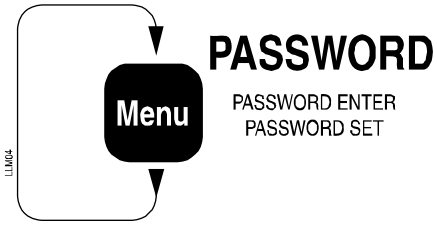
To gain access to the password-entry menu, press both of the CURSOR keys at the same time. The report-generation menu will appear. Press both of the CURSOR keys twice again. The password-entry menu will appear. Enter either the full-access password to allow the setups to be changed, or the limited-access password to allow the setups to be viewed but not changed. From this point the setup menus may be accessed as described in the following sections. Upon returning to the main run screen, password access is lost and the password must be re-entered to regain access.

NOTE

Display of alarm messages has a higher priority than display of the password-entry menu. Therefore, you will need to clear any displayed alarms before you can enter a password.

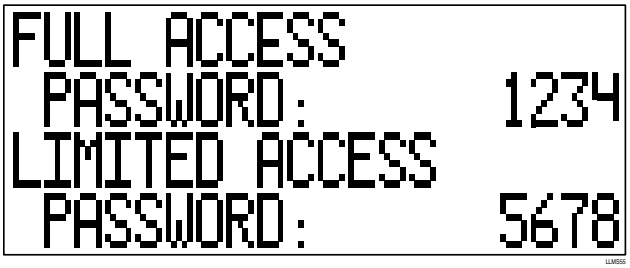
NOTE

A key is normally used during installation and servicing by the account representative. Password access is usually reserved for emergency problem diagnosis and service by laundry room personnel, where the limited-access password allows setups to be viewed with no risk of accidental alteration.



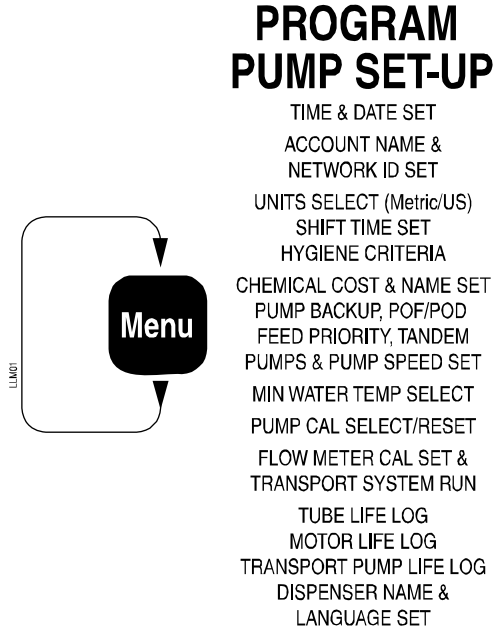
PASSWORD PROGRAMMING

If a key has been used to enable access to the setup modes, this menu will appear when the CURSOR keys have been pressed simultaneously three times. If the full access password has been used to enable access to the setup modes, this menu will appear when the MENU key is pressed following entry of the password. This menu may not be accessed when using the limited-access password.



Enter passwords as desired to enable full access (reading and changing is allowed) and limited access (only reading is allowed) to the setup data. The default for both following erasure of the setup memory is “0000” and for security reasons both should be changed to something else even if you plan to use only a key for access to the setup data.

If you forget the password, or if electrical noise or a hardware problem cause the password to be corrupted, a key may still be used to enable access to the setup modes.



SYSTEM SETUP PROGRAMMING

To access the pump setup mode from the password setup mode:

1. Press both CURSOR keys at the same time. The pump setup mode appears on the screen.
2. Use the MENU key to scroll forward through the various menus until the Date and Time menu appears.
3. Use the Print/Info key to scroll backwards through the menus.

The following sections describe the programming and entry of system data. Pump box setup information relates to the entire ILS Max System.

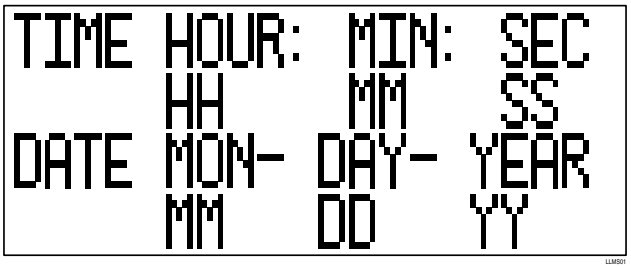
The ILS Max System is supplied from the factory with all memory cleared. Consequently, default values, including the message Account Name in the Account Name menu, are automatically used by the system. If the system has been previously programmed, or the RAM devices removed or the battery replaced, there may be erroneous data or setup information in the system. Refer to **Service & Maintenance** for instructions on clearing memory if necessary.

Language Select

If the ILS Max is set to a language you don't understand, you may wish to scroll to the Dispenser Name and Language Select menu first to select an appropriate language. From the Date and Time Set menu, press the Print/Info key once to reach this menu.

Date and Time Set

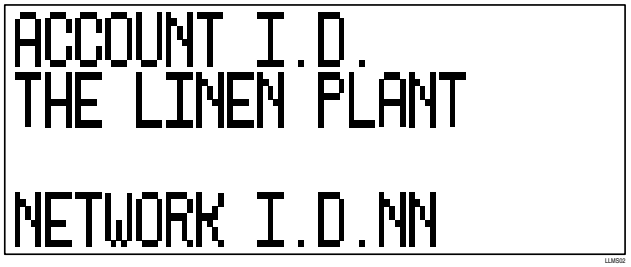
Use this menu to set the time and date.



If the system time or date is changed during the operation of any wash cycle (such as from Daylight to Standard time), the average turnaround time or excess time calculations may be in error. It is recommended that you reset the time or date when the wash aisle is idle to avoid this inconvenience.

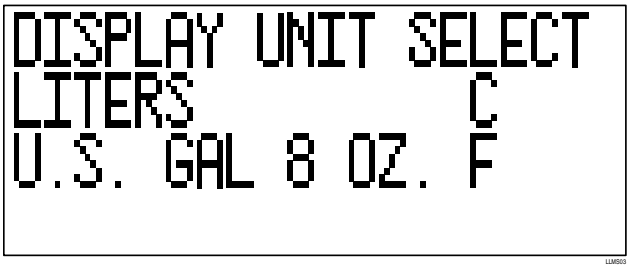
Account Name

Enter the name of the laundry here. The maximum size of the Account Name is twenty characters. If more than one ILS Max System is to be used, or if the system is to be connected to a supervisory computer, enter a unique network ID number (01-99).



Liquid Unit Selection

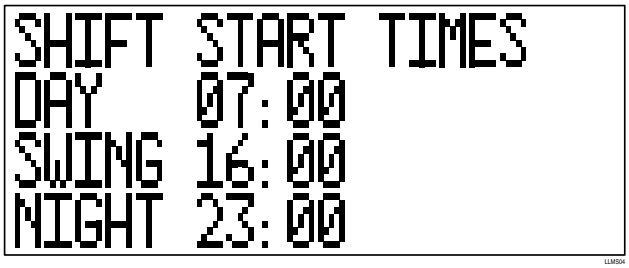
Use the Liquid Unit Select menu to select the type of volume units desired. The selected unit type will be flashing. There are two choices: liters and U.S. gallons/ounces.



While most of the liquid and temperature values displayed by the ILS Max are automatically converted when the measurement units are changed, the chemical cost per unit, the cycle load weight and the actual injection amounts are not. For this reason, the measurement units must be selected before entering these values and must not be changed later without re-entering the values.

All internal record keeping, calculations and dispensing of the ILS Max System are carried out in metric units. When the system is operated in 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 the accuracy of the system, as the reported amount is the result of rounding off the actual amount.

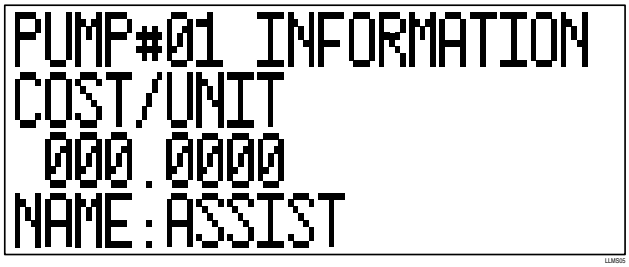
Shift Start Times



Set the three shift start times in this menu. These times are used in the pump box reports to arrange productivity and chemical usage. Time must be set in 24-hour format. The times must be in ascending order as shown.

Chemical Name and Cost Information

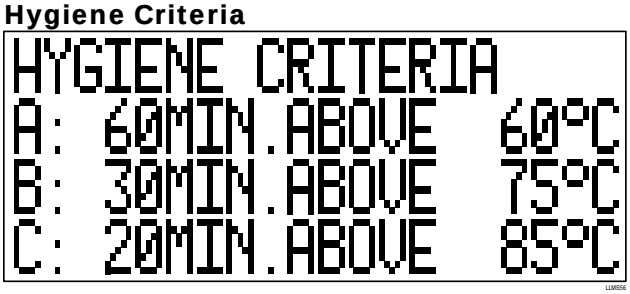
This menu is used to program the name of each chemical and its cost.



Select the pump number and then enter the chemical cost data and chemical name. Use unit cost of price/liter or price/gallon.

The cost per unit price is not automatically converted from metric to US units.

Hygiene Criteria



This menu is used to set the three pass/fail criteria used for thermal hygiene monitoring. If the temperature of the wash bath is above the set temperature for the set time for any of the three criteria, then thermal hygiene has been achieved for that wash load. Having three different criteria increases flexibility by allowing shorter wash baths at higher temperatures, or longer baths at lower temperatures. To disable one or more of the criteria, set its temperature to 99°C (210°F).

These criteria apply to all washers and all wash cycles for which hygiene monitoring has been enabled. If hygiene monitoring is not in use, the criteria need not be set.

Chemical Pump Backup, POF/POD, Feed Priority, Tandem Pumps and Pump Speed Selection

For most chemicals, backup of the chemical pump at the end of a feed should be enabled. This maximizes safety and pump tube life by pulling clear water back through the pump tube between each chemical feed. However, certain chemicals gel when they come in contact with this clear water for extended periods, causing clogging of the uptake line. When using such chemicals, backup of the chemical pump may be disabled.

Disabling backup of the chemical pump will leave a small amount of chemical in the pump outlet line following a chemical feed. Over time, this chemical will disperse into the manifold, mixing with other chemicals being fed. Chemicals for which backup needs to be disabled tend to be non-reactive, but this effect should be kept in mind when disabling backup of a chemical pump.

The POF/POD setting allows you to adjust the POF/POD thresholds (sensitivity) and also allows you to disable POF and POD if required. The first setting displayed is the POF threshold, while the second is the POD threshold.

You must disable (turn off) POF and POD for non-conductive chemicals such as hydrogen peroxide and mildewcides. This will prevent out-of-product alarms and possible overfeeding.

If both POF and POD are turned off, the auto-prime and out-of-chemical features will not be operable.

The LOW threshold setting (150 microsiemens above the flush water conductivity) is for use with low-conductivity chemicals such as softeners, anionic surfactants, starch and non-built detergents. This is the only setting available with older versions of the ILS Max software.

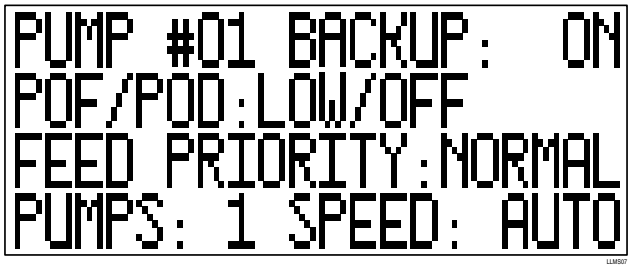
The MED threshold setting (5000 microsiemens above the flush water conductivity) is for use with chemicals in the mid-range of conductivity such as built detergents, sour/softener combinations and any other chemicals which are not quite as conductive as the high-conductivity products.

The HIGH threshold setting (30,000 microsiemens above the flush water conductivity) is for use with highly-conductive chemicals such as alkali, bleach, sour and some built detergents. It prevents trace amounts of these chemicals from being conductive enough to prevent out-of-product detection.

Because the chemical is more diluted, and therefore less conductive, by the time it reaches the POD cell the POD thresholds are lower than the POF thresholds. LOW is 150 microsiemens, MED is 500 microsiemens and HIGH is 3000 microsiemens.

If a chemical is marginally conductive such that it can be reliably detected by the POF cell, but not reliably detected by the time it reaches the POD cell at the washer (a situation signaled by POD failure errors, even though there was no POF error), then POD may be switched off while leaving POF active. ILS Max will still be able to auto-prime and detect out-of-chemical errors for such a chemical.

The conductivity/transport flowrate interrogation screen (see **Diagnostics and Troubleshooting**) may be used to aid in setting the POF/POD threshold. Watch the displayed POF conductivity and threshold during a feed of each chemical and set the threshold to ensure that the POF conductivity is well above the threshold when the chemical pump is running and is well below the threshold when it is off. Note that the LOW threshold is always used when no chemical is being fed.



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 as high priority. Selection of a given 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.

The number of pumps used to deliver a chemical may be set to "1" (the usual setting), "2" (if two pumps have been wired and plumbed in tandem to deliver chemical at a faster rate), or "Automatic" ("A"), where ILS Max attempts to automatically determine the number of pumps based on the current they draw when running. Because there is wide variation in a pump's current draw, depending on motor, tube and chemical in use, it is difficult to accurately determine the number of pumps automatically. Therefore, it is best to explicitly set this number.

This setting affects only the default pump calibration factor that ILS Max uses if automatic calibration fails during the first chemical delivery. Other aspects of tandem chemical pump operation (such as slowing the pumps to half speed if the transport pump is unable to keep up with the tandem pump flow rate), are always performed automatically, regardless of the setting.

The chemical pump speed select has four options: auto, half, slow and full speed. Each is described below.

Auto

The pump speed decision is made by the ILS Max based on internal criteria. The speed will be ether 200 or 100 RPM, based in part on the size of the chemical injection. This is the preferred mode of operation and should be used, except as noted below. This mode uses both the fast and slow calibration factors.

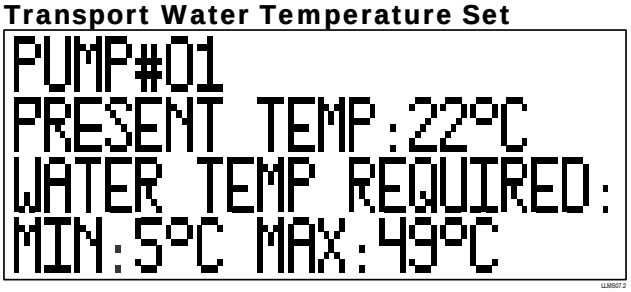
Half or Slow

This will force the pump to run at 100 or 50 RPM respectively, for all chemical feeds. The use of these speeds may be required if the chemical being pumped is unusually thick, has nonlinear flow characteristics, or exhibits other unusual hydraulic characteristics. This speed control may also be useful in controlling the dilution ratio if the product being pumped has a tendency to gel or thicken when mixed with water (high surfactant products). In the half and slow modes, the windup and backup parts of the feed are done at the selected speeds. Both speeds use the slow calibration factor.

Full Speed

The chemical pump will only run at full speed (200 RPM). Refer to the **Real Time Diagnostic Report** and **Auto Cal Status** for further information on the applicability of the manual pump speed control.

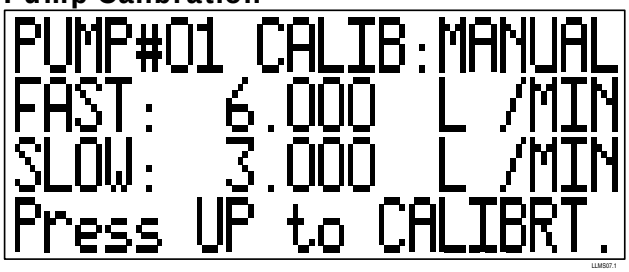
Transport Water Temperature Set



The system has the capability of determining the transport water temperature. The transport water temperature is critical when using certain chemicals. If warm transport water is required, the minimum transport temperature may be set here. Two minimum values are available: 5 and 24 degrees Celsius (41 and 75 degrees Fahrenheit).

If the present temperature displays as "– –", the temperature sensor in the POF probe is disconnected or faulty.

Pump Calibration



This menu displays the current flow rates for each of the chemical pumps (or pump pairs) and selects whether the calibration process occurs automatically or manually. There are

two pump calibrations, one used when the pump runs at a fast speed (200 RPM) and one used when it runs at half or slow speed (100 RPM and 50 RPM, respectively).

These calibrations have no relation to the setting used in the relay mode portion of the Washer Setup menu.

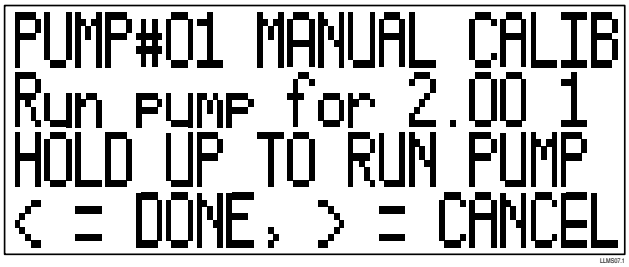
If set to Automatic, ILS Max automatically calibrates the flow rate of the chemical pumps as they run, and displays the current calibrations here. These calibrations will vary over time as ILS Max adjusts to variations in its operating conditions, such as the viscosity of the chemical and wear of the pump tube. Each of the calibrations may be reset to zero by pressing the > key until the desired calibration is highlighted, and the message Press UP to RESET appears. Pressing the ^ key will then zero the calibration, forcing ILS Max to recalibrate the pump during the next feed of this chemical. The calibrations should be reset when a pump or tube is changed, and may be reset when an error condition such as an air leak has caused the calibration to become inaccurate.

If set to Manual, ILS Max allows the user to manually calibrate the chemical pump. ILS Max will use this manual calibration exclusively, and will not attempt to automatically calibrate the pump. Manual calibration may be used when the dose size is too small to auto-calibrate, or when the characteristics of the chemical cause automatic calibration to be inaccurate. Manual calibration should be repeated periodically, as ILS Max will not automatically compensate as the pump tube wears. Because the automatic worn pump tube alert will not operate when manual calibration is in use, the pump tube will need to be more closely monitored for wear.

Calibration may be switched from automatic to manual at any time, in effect "freezing" the last automatic calibration. If you feel that the current automatic calibration is accurate this may prevent the need for performing a manual calibration, while still preventing inaccurate automatic calibration should conditions change in the future.

Manual Calibration

To manually calibrate a chemical pump, the wash aisle must be idle, and the pump to be calibrated must be primed. Press the > key until the desired calibration is highlighted, and the message Press UP to CALIBRT. appears. Press the ^ key, and the manual pump calibration menu will appear. For safety, while this menu is displayed ILS Max will reject all chemical feed requests.



Disconnect the outlet tube of the pump from the manifold. Place the end of the tube into a measuring container calibrated with the amount shown on the second line of the menu (which will vary with the pump speed and the US/metric measurement units setting).

Press the ^ key until the pump has dispensed the specified amount of chemical into the measuring container. You can start and stop the pump as required to "sneak up" on the correct amount.

Raw chemicals are present. Handle with care.

When you have pumped the correct amount, press the ∨ key briefly to pull the chemical back through the pump (this does not affect the calibration). Reconnect the outlet tube to the manifold, then press the < key to return to the calibration menu and display the result of the calibration. ILS Max does not reject feed requests while this menu is displayed, so you must reconnect the outlet tube before returning to this menu.

If you make a mistake in performing the calibration (such as pumping too much chemical), or just decide to keep the original calibration, you may reconnect the outlet tube to the manifold and then press the > key. You will return to the calibration menu, and the original calibration will still be present. This "cancel" key also provides a way of removing any water from the pump prior to performing the calibration—just press ^ to run the pump long enough to remove the water, then press > to cancel the calibration, and press ^ again to return to the manual calibration screen to perform the calibration for real.

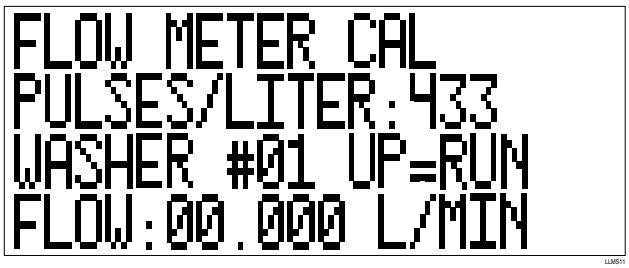
If you are manually calibrating chemical pumps that have been wired to run in tandem, you will need to disconnect the outlet tubes from both of the pumps, and feed them both into the measuring container. Use caution while doing this, to avoid chemical spills.

If you have selected slow speed (50 RPM) for the pump, the slow calibration will be performed at this speed. Otherwise it will be performed at half speed (100 RPM). For this reason, it is important to set the speed prior to performing the calibration. The fast calibration will always be performed at full speed (200 RPM). Both fast and slow calibrations should normally be performed, as ILS Max may switch to either speed depending on its operating conditions.

After calibrating one pump, you may proceed to calibrate any other pumps for which manual calibration has been specified. Be sure to thoroughly wash the measuring container between calibrating different chemicals.

Flow Meter Calibration Constant

The Flow Meter Calibration Constant menu is used to program the flow meter calibration constant. It is also used to manually run and test the transport system.



The flow meter calibration constant is programmed at the factory. The constant is stamped on the metal tag mounted on the flow meter. Check that the programmed number is the same as the number on the tag.

The calibration constant on the metal tag is in pulses per U.S. gallon. If metric units are being used, divide the constant by 3.78 to find the equivalent constant in pulses per liter. If the flow meter is replaced, it is necessary to reprogram the constant.

To test the individual transport systems, perform a manual flush. Only those washer networks that are on (selected in the Washer Setup menu) will display the Up=Run message. To begin the flush, select the desired washer and then push the ∧ key. To stop, press the ∨ key. The manual flush will automatically stop after two minutes. During the manual flush, water is sent to the selected washer.

NOTE

Before performing this test, verify the integrity of the Transport System. Only active networks will respond to manual flush commands.

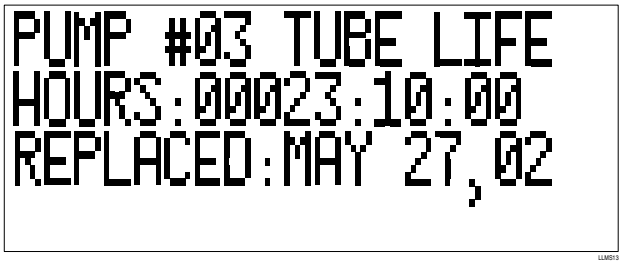
While the manual flush is in process, the screen will display the flow rate of the transport pump. The normal flow rate is about 10 liters per minute (2.6 GPM). If the flow rate drops below three liters per minute (0.75 GPM), the manual flush will stop automatically. If this occurs, consult the status message **Low Water Flow**.

NOTE

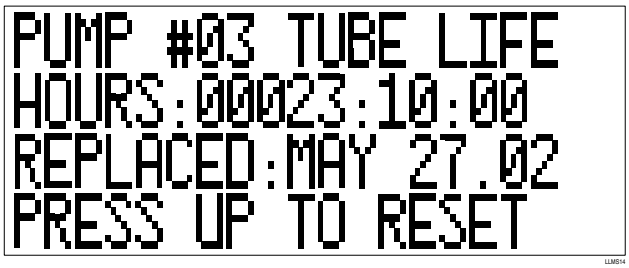
A manual flush may be performed even if the limited access password has been used to access the setups. This allows a user to perform a flush, with no risk of accidentally changing the flowmeter calibration or other setups.

Pump Tube Life Reset

The Pump Tube Life menu displays the total number of hours that the peristaltic pump tube has run and the date it was installed. It is also used to reset the time after a pump tube is changed.

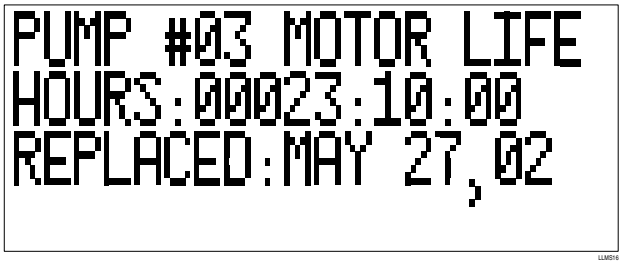


After a pump tube is changed, it is necessary to reset the time to zero. To do this, push the > key until PRESS UP TO RESET appears. Push the ∧ key to reset to zero.

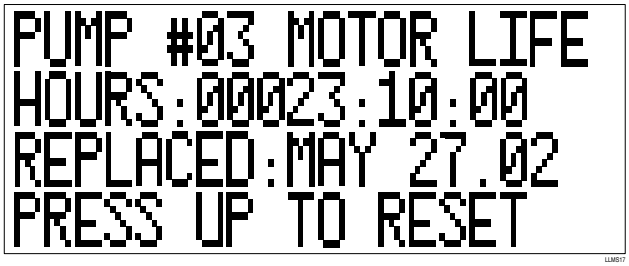


Pump Motor Life Reset

This menu displays the total number of hours that the peristaltic pump motor has been in service and the date it was changed. The “hours” can be reset to zero after a motor has been changed.



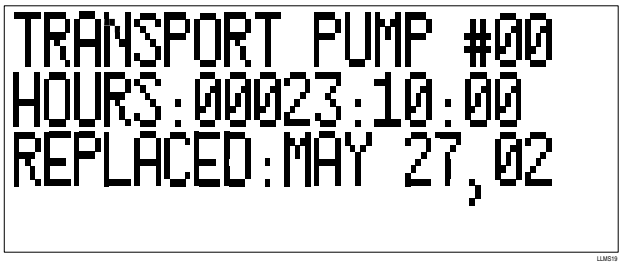
After changing a peristaltic pump motor, it is necessary to reset the motor life to zero. Push the > key until PRESS UP TO RESET appears.



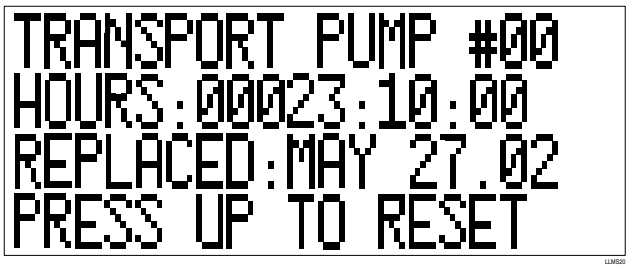
Push the ∧ key to reset. ILS Max will automatically insert the current date.

Transport Pump Life Reset

This menu displays the total number of hours that the various transport pumps have been in service and the date they were changed. The “hours” can be reset to zero after a pump has been changed.



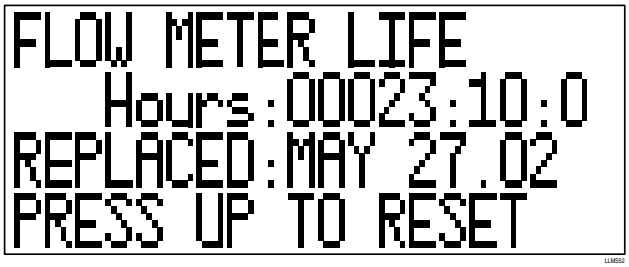
After changing a transport pump, reset the pump life to zero. Push the > key until PRESS UP TO RESET appears.



Push the ∧ key to reset. ILS Max will automatically insert the current date.

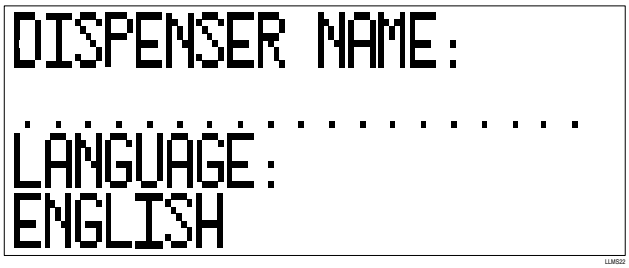
Flow Meter Life Reset

This menu displays the total number of hours that the flow meter has been in service and the date it was changed. The "hours" can be reset to "0" after the flow meter has been changed. Press the ^ key to reset. ILS Max will automatically insert the current date.



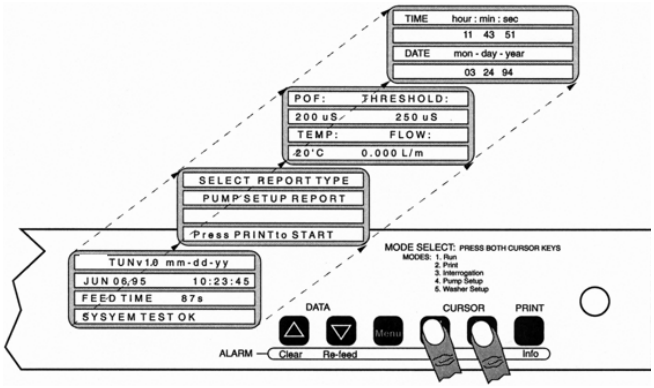
Dispenser Name and Language Select

You can program a proprietary system name (i.e. ILS Max), up to 20 characters long. The first ten characters of this text will appear as the system name on all ten of the reports generated by the system.



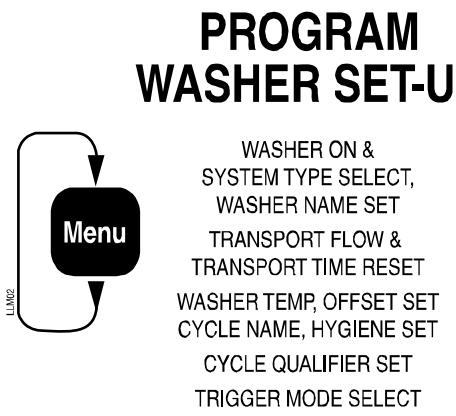
You may select the language the system will use in the screen displays and printed reports. You may switch between languages at any time.

WASHER SETUP PROGRAMMING



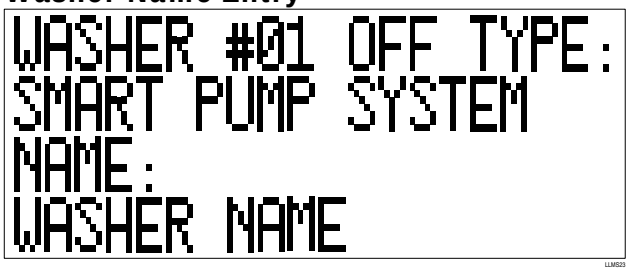
To access the washer setup mode from the pump setup mode:

1. Press both Cursor keys at the same time. The washer setup mode appears on the screen.
2. Use the Menu key to scroll forward through the various menus until the Network and System Select menu appears.
3. You can use the Print/Info key to scroll backwards through the menus.



The following section describes the programming and entry of washer data. This is washer setup information that is relative to the individual washer selected. As with all ILS Max menus, the Washer Setup menu selections shown above are circular. As you press the Menu key, the available selections are repeated.

Washer Network, System Type and Washer Name Entry



This menu is used to turn the washer networks on and off. Each washer interface module must have a unique, valid address within the ILS Max System, and must be turned on in order to receive chemical.

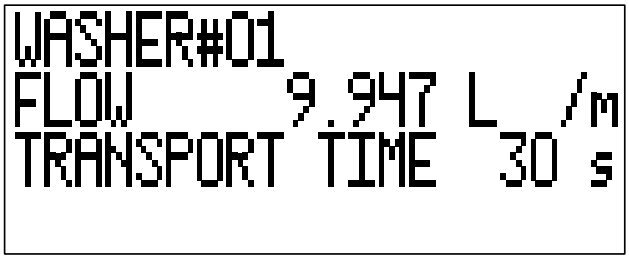
The ILS Max System can have from one to 15 washers. Each washer has an ID (network) number between 1 and 15. The ID number is programmed via a small rotary switch at each washer interface. Only washers connected to the BetaLink should be set to ON.

The washer system type must be selected from this menu. For most applications, the smart pump system is required. The integrated washer control configuration is for direct communication with the washer (no washer interface or trigger modules). The hybrid mode is similar to the integrated mode except that the system uses a washer interface module to perform POD functions. Washer system type may be mixed within the ILS Max System, with some washers in the normal smart pump mode and others configured as hybrid or integrated networks.

The washer name is an optional entry, and may be entered from this menu. The washer name may be up to 16 characters long.

Transport Flow Rate and Time

This screen allows you to view and reset the average transport flow rate to the indicated washer and to enter or clear the chemical transport time to the washer.



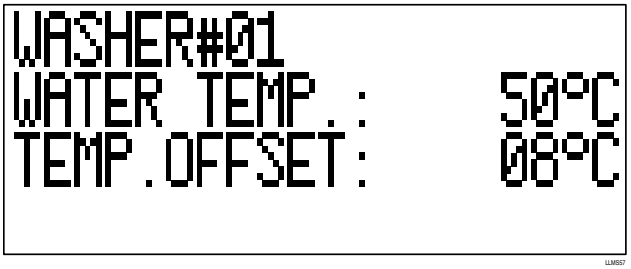
The flow is the long-term average flow rate of the transport pump while delivering chemical to the washer. It is heavily filtered and so will not be affected much by short-term flow variations such as delivery of an occasional large chemical dose that causes the flow rate to drop briefly. If it is not accurate (such as when an air leak, line blockage or faulty transport pump has been repaired), it may be reset by pressing the > key until the flow rate is highlighted and the message Press UP to RESET appears. Highlighting the “Press UP to reset” and then pressing ^ will reset the flow rate to “0”, forcing ILS Max to re-measure it during the next feed to this washer.

If this flow rate is unusually low due to transport pump or system problems, ILS Max may force the chemical pumps (especially tandem pumps) to slow speed to prevent them from pumping more chemical than the transport pump can deliver. The flow rate must be reset after such a problem is repaired or the chemical pumps will continue to run slow until the flow rate eventually corrects.

The transport time is a measure of how long the transport pump requires to deliver a chemical dose to the washer. It is calculated automatically during the first chemical feed to the washer. This is the normal and recommended method for transport time determination. Should you need to make small corrections or use a manually determined transport time, the time may be changed by pressing the > key until the blinking cursor is over one of the transport time digits, then using the ^ and ∨ keys to change the digit. The transport time may also be set to “0” by pressing the > key until the time is flashing and the message Press UP to RESET appears. Pressing ^ will reset the time to “0”, forcing ILS Max to re-measure it during the next feed to this washer.

Washer Temperature

If a washer water temperature probe has been attached (see **Full System Installation**), the wash water temperature is displayed here. If the temperature displays as “– –”, the temperature probe is disconnected or faulty.

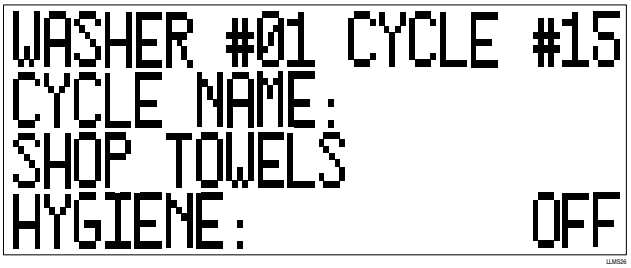


To compensate for heat loss through the washer shell when using a “stick-on” temperature probe, you may add an offset to the temperature measured by the probe. The offset should be adjusted until the displayed temperature matches the actual wash water temperature as measured by other means.

Because the heat loss increases with increasing water temperature, the offset adjustment should be made using actual hygiene water temperatures. It is normal for the temperature to read high when measuring cold water. This will not affect hygiene determination.

Cycle Name Entry / Hygiene Enable

Enter the wash cycle names for the load classifications to be run by the various washers from this menu. Up to 30 classifications may be programmed. The cycle (classification) name may be up to 16 characters long.



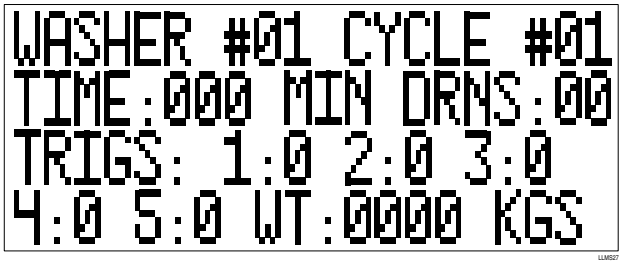
For each classification, thermal hygiene monitoring may be enabled (ON) or disabled (OFF).

Cycle Qualifier Entry

In order for the ILS Max System to distinguish one classification from another, it is necessary for each classification to have a unique signature or qualifier setting. The system identifies the various classifications by the total number of qualified drains and the number of trigger signals in each wash load. A qualified drain is any drain signal that is in excess of five seconds in duration, and has been preceded by a water fill signal.

The information entered on this screen provides the basis for the cycle identification and other washer performance data such as

wash cycle time and load weight. If the formula select module or automatic formula selection is being used, this information is not necessary because the system already knows the classification.

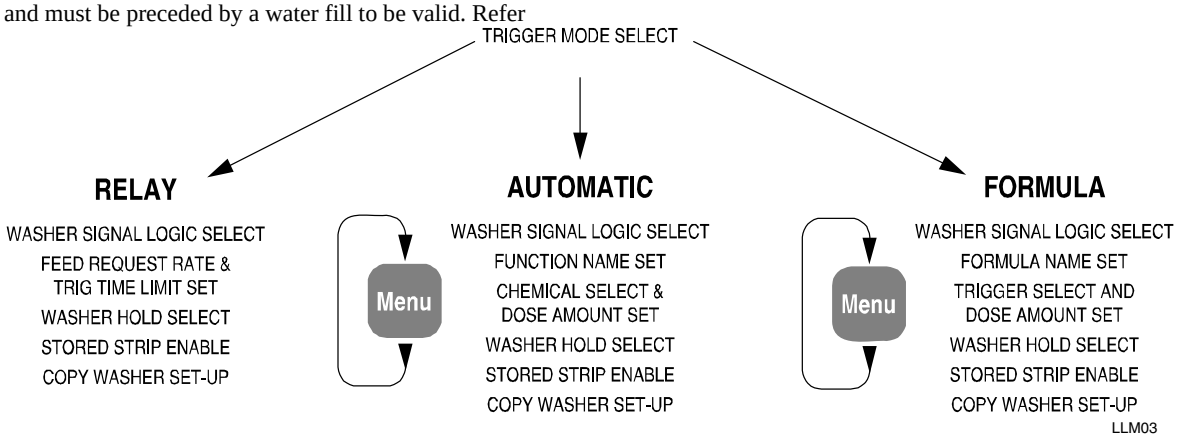


Trigger channels 1-5 on the chemical trigger module are always cycle qualifiers, regardless of which pump they are programmed to trigger. Remember that a drain must be over five seconds in duration and must be preceded by a water fill to be valid. Refer to the **Formula Development Form** at the back of this manual for assistance in developing trigger patterns.

The cycle identification information in the above two screens is optional, and is not required if washer load identification is not required (minimum feature system).

The weight entry is the number used by the system for calculation of chemical cost/weight. Unidentified loads will automatically default to the weight programmed into cycle type 30.

NOTE *The weight is not automatically converted from metric to U.S. units.*



Trigger Mode Select

Trigger Mode Select

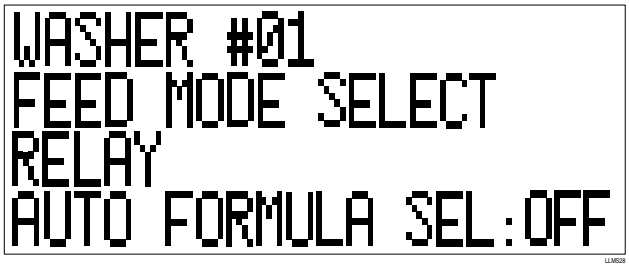
The Feed Mode Select menu is used to select the triggering mode that will be utilized by the individual washers. There are three primary trigger modes: relay mode, automatic trigger mode or formula mode. There is one subset mode for relay triggering, and there are two subset modes for automatic and formula modes. The selected mode determines which menus are subsequently displayed.

NOTE *Changing from one mode to another will erase the previous mode setting for the selected washer. To exit without change, press the > or < key or the Menu key.*

This menu also allows automatic formula selection (AFS) to be enabled or disabled. AFS may be used with any triggering mode.

Relay Mode Programming

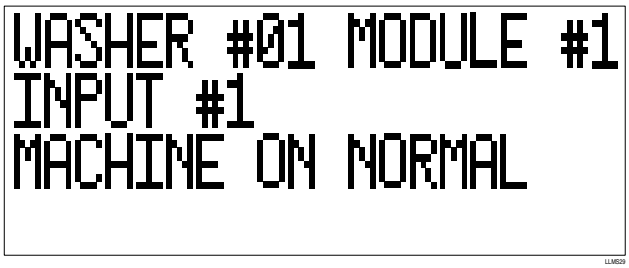
The relay mode screen is the default screen for previously un-programmed systems. Relay mode is the time duration mode used when the washer has a microprocessor capable of requesting individual chemicals based on the length of time a chemical supply signal is on.

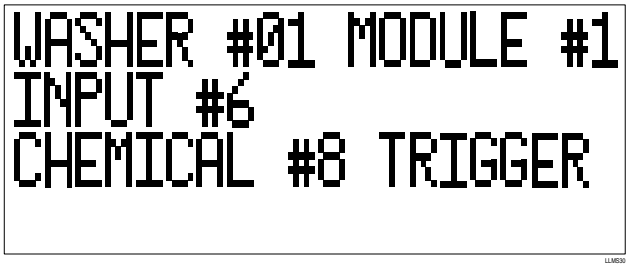


For washer controllers with limited supply output capability, the enhanced relay mode allows the use of encoded trigger inputs. As such, up to ten chemicals may be called using combinations of two out of four trigger signals. (See **System Installation** for trigger assignments). Automatic formula selection (or a formula select module) may be used to identify a wash cycle for logging purposes, but will not affect the chemical dispensed. If relay mode is selected, the following screens are available:

Washer Signal Logic Select

This series of screens allows you to select the signal logic (normal/ reverse) for the various washer status signals–**Drain**, **Machine On**, **Cold Water**, **Hot Water** and **Steam**. The functions are fixed in software. For example, Input #1 is always **Machine On**, Input #2 is **Drain**, and so on.



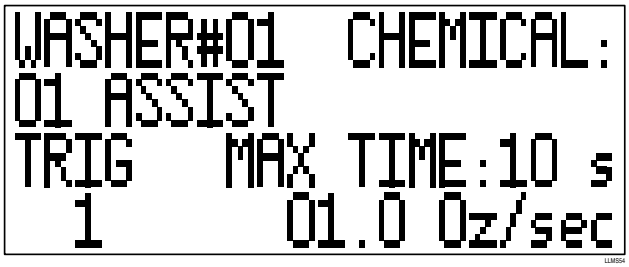


Inputs #6 and #7 (**Reuse Drain** and **Reuse Fill**) also have an alternate function of serving as chemical triggers 8 and 9, respectively. If AFS is enabled, the alternate function for input #7 is the formula select input rather than chemical trigger 9. Use the ∧ and ∨ keys to scroll through the various options.

Relay Mode Feed Request Rate

The next screen in the relay mode setup is the request rate and trigger time limit set.

The trigger time limit lets you program the maximum allowable **total trigger on time** per load for each washer. If the washer processor chemical trigger signal were to fail on, the system will stop pumping chemical and will set the washer alarm when the maximum chemical amount is exceeded. The maximum allowable trigger time is programmable from 1 to 999 seconds. If the amount entered is 0, this feature is disabled and there is no maximum amount cutoff. Once the maximum time for any chemical has been exceeded, the system will ignore any more requests for that chemical until the washer on signal is cycled. Other chemical requests will be 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 three-ounce/second rate entry with a five-second trigger pulse will deliver 15 ounces of product.) The call rate in the metric units is from 0.010 liter/second to 0.990 liter/second in ten-milliliter increments. The call rate in U.S. units is from 0.1 ounce/second to 99.9 ounces/second in 0.1-ounce increments.

The call rate is not automatically converted from metric to U.S. units.

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 four ounces, a four 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.

For washers over 200 pounds, or systems using ganged three-liter pumps, the setting should be two ounces/second (60 milliliters/second) or greater. For washers less than 200 pounds, a setting of one ounce/second or 30 milliliters/second should be adequate.

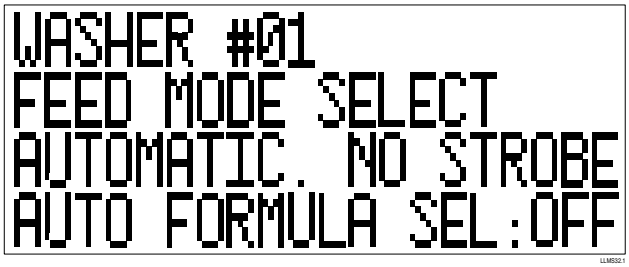
*If rates less than those recommended above are chosen, the pump may get ahead of the washer signal and have to **wait** before finishing the chemical feed. This will result in the pump starting and stopping during a feed.*

There is no two-second delay (debounce filter) in relay mode. With a feed request rate of two ounces/second, a one-second signal will deliver two ounces of chemical. Refer to **Trigger Timing Specifications**.

Automatic Mode Programming

The automatic mode is similar to the enhanced mode of the original equipment and is intended for use in situations where there are a limited number of chemical triggers. This mode has two submodes, strobe and strobeless. Chemical pump functions can be assigned using a standard binary coding method. Chemical feed routines, referred to as functions, are called by unique combinations of the various trigger channels.

Automatic formula selection (or a formula select module) may be used to identify a wash cycle for logging purposes, but will not affect the chemical dispensed.



The function name is used to identify a particular combination of triggers in a manner that is easily recognized as a distinct wash process step. There can be up to 31 distinct functions (steps). The function name is optional.

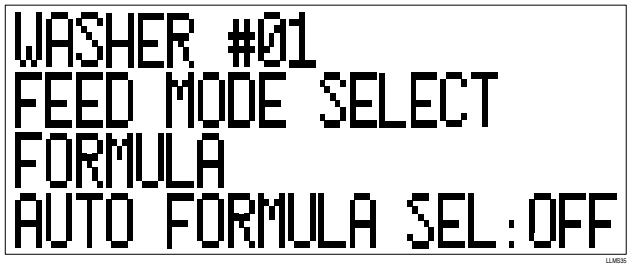
As in the formula mode, up to three distinct chemicals and amounts may be called by one function setting.

To better visualize the automatic mode setup and programming features, print a Washer Setup report and use the report layout as a formula development worksheet.

NOTE *The dose amounts are not automatically converted from metric to U.S. units.*

Formula Mode Programming

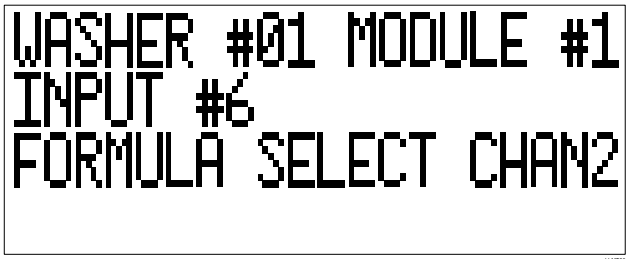
The formula mode is a more versatile version of the ABC (fixed dose) trigger mode utilized in earlier systems. In formula mode, you can dispense fixed quantities of up to three different chemicals based on a single supply request signal. Trigger channels 1 - 6 are available for formula mode supply triggers. The quantity and type of chemical called by this single supply signal may be altered according to the currently-selected formula.



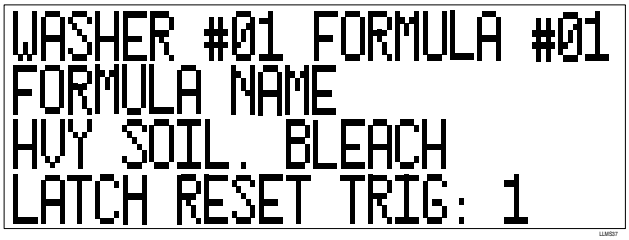
Up to 16 formulas may be selected using the four available formula select trigger inputs, the optional formula select module, or the formula select trigger if automatic formula selection is enabled.

The latched version of the formula mode operates the same, except that the chemical trigger request will only be accepted the first time the trigger is activated. Subsequent requests will be ignored until the latch-reset trigger (or optionally, the machine-on signal) is activated. This feature is useful in situations where the washer supply signals are often interrupted by the water fill signals, as is typical in smaller, fixed-program washers.

As in relay mode, the machine logic settings are the first to be set. It is important to note that inputs #6 and #7 (**Reuse Drain** and **Reuse Fill**) also have an alternate function of serving as formula select channels 2 and 3, respectively. The ∧ up and ∨ down keys are used to scroll through the various options. For additional information, please refer to **Trigger Module Connection** in **System Installation, Washer Trigger Setup Report** and **Washer Load ID Setup Report**.



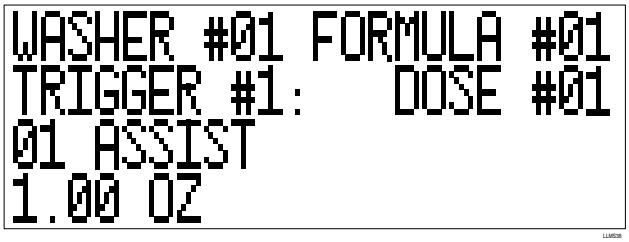
The formula name entry allows you to program specific names of the formulas called in this mode. The entry of formula names is optional, but its use may be helpful in organizing and reporting various functions.



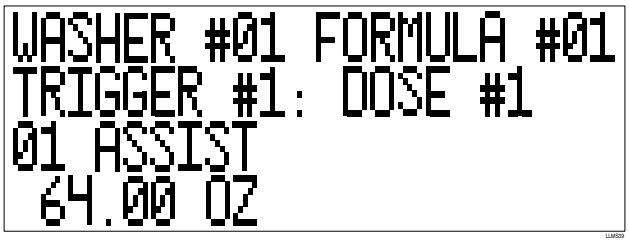
The formula name may be up to 16 characters in length.

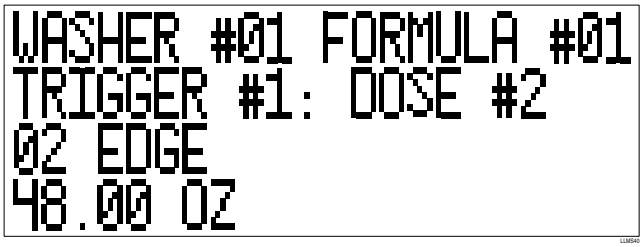
If latched formula mode is in use, you will be prompted to select a latch reset trigger. This may be any one of the supply triggers 1 – 6 (the trigger may request chemicals in addition to serving to reset the latch), or if set to 0 the machine on signal will clear the latch at the beginning and end of the wash cycle. The latch reset trigger is the same for all formulas.

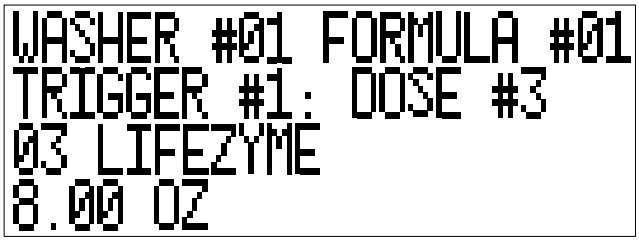
Enter the formula mode trigger and dose assignments on the next screen. The formula mode is very flexible and powerful. For detailed explanations and application assistance, please refer to the **Washer Trigger Setup** report, or the application notes in **Appendix A**.



Formula, on this screen, refers to the formula as determined by the formula select input trigger combinations (module 3, trigger 1-4), the formula select module switch settings, or the formula set using the AFS formula select trigger. Trigger refers to the supply trigger 1-6 (module 2). Dose refers to one of three possible chemical type and amount combinations that may be called by the selected supply trigger (refer to **Washer Trigger Setup** report). The following is an example of the setup required to supply three different chemicals in three independent amounts from one trigger signal.





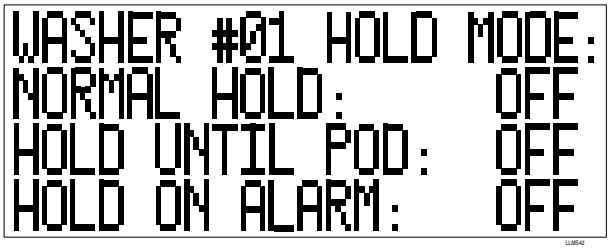


The available options for chemicals (line three above), are any of the chemicals 01-10, or option 00-No Selection.

To better visualize the formula mode setup, print a Washer Trigger Setup report and use the report layout as a formula development worksheet.

Washer Hold Mode Select

There are several washer hold scenarios available in the ILS Max System. In addition to the normal hold, which will activate the hold relay if the chemical delivery will be delayed more than one minute from the time of request, there is now a hold until POD routine. Hold until POD will activate the hold relay every time there is a chemical request, and release 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.

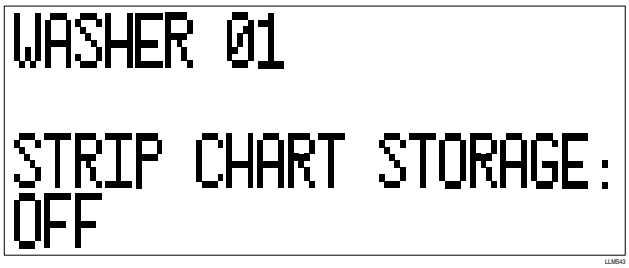
"Hold until POD" will still operate even if POF and/or POD functions are disabled.

The hold on alarm setting causes the hold relay to be set any time there is a chemical feed failure to the particular washer. This stops the washer program timer until the error is corrected and allows the wash aisle operator to refeed using the last feed retry (see **Messages and Alarm Reset** in **Diagnostics and Troubleshooting**).

Note that the alarm relay in the washer interface is configured as a fail-safe relay. As with the alarm in the main pump box, this relay is under power in the non-alarm condition. Therefore, loss of power to the system or washer interface, or an alarm condition, causes the relay to change state. Both the alarm and hold relays have a Form C contact configuration (SPDT) rated at 5 amps, 220 VAC.

Stored Strip Enable

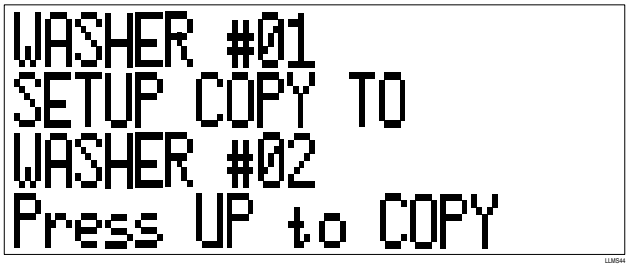
The Stored Strip Enable screens allow for the activation of a washer stored strip function on a by-washer basis. This feature creates a historical record of all washer trigger signals for as long as the feature is enabled, subject to the limitations of memory capacity. The system can store 1100 lines of events total for all washers, see **Diagnostics and Troubleshooting** for more information.



Unless there is a specific need to analyze a particular washer, the washer stored-strip feature should be disabled. This will leave more space in the memory area for washers that do need to be diagnosed in detail.

Copy Washer Setup

This feature allows you to copy the washer setup variables from one washer to another. To copy one washer setup (source washer shown on line one below) to another washer (target washer shown on line three below), select the source and target washer numbers using the following screen.



To copy, press the > key until the PRESS UP TO COPY message flashes. Press and hold the ^ key until the COPY COMPLETE message appears. The entire washer setup image, except transport time and washer temperature offset, 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 formula 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

After completing the system and washer setup outlined above, proceed to check out the operation of the system.

Run a test feed of conductive chemical to each washer in the system. This will establish a transport time. Note that with no transport time established and logged in memory, the system will preflush for approximately one minute before beginning the chemical feed.

Run a Test Load in the Washer

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 during the chemical feed. Verify that there is a valid machine on signal and that the drain is closed.
3. Use the interrogation mode running strip screen (see **Diagnostics and Troubleshooting**) 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.
5. If hygiene monitoring is enabled, observe the wash water temperature to ensure that it meets at least one of the programmed hygiene criteria. Because even a brief drop below the threshold temperature will cause a hygiene failure, the water should be slightly above the threshold temperature.
6. 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.
7. Repeat for all washers in the system.

Review the Pump Setup report. There should be a transport time logged for each washer that is online and has had a chemical feed. Confirm that the transport time recorded is realistic. Assume a transport velocity of five feet (1.5 meters) per second. Verify that the chemical pump calibration rates meet or exceed acceptable limits (90 ounces/minute for a single pump, 180 ounces/minute for a dual pump). Some pump rates will be less than those above if the chemical is particularly viscous.

DIAGNOSTICS AND TROUBLESHOOTING

The ILS Max System provides a wide variety of diagnostic tools for evaluating system performance, and for troubleshooting both setup problems and operational failures. Interrogation mode lets you view, via various screen displays, key operational conditions of the system. There are also several ILS Max reports that can be used for evaluating the system's performance, or to monitor certain operational characteristics of the washers.

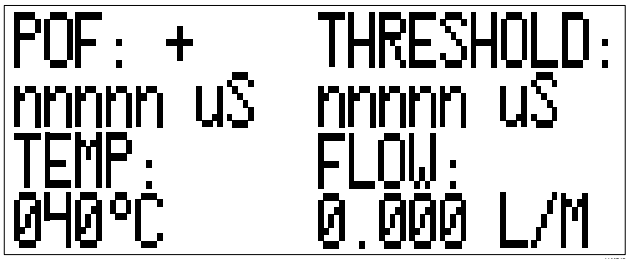
INTERROGATION MODE

The interrogation mode allows you to view various system analysis screens that display system performance in real time. To enter the interrogation mode from the run screen, simultaneously press the < and > keys twice. Refer to the screen flowchart located under the top cover of the pump box.

Conductivity/Transport Flow Rate

This screen allows real-time viewing of the state of the pump box POF cell and the transport flow rate. The POF reading is the current conductivity of the transport water. The threshold shows the POF conductivity threshold reference value (transport water conductivity) that will be used to determine POF. The threshold is automatically set at the start of each chemical feed based on clear-water conductivity and the threshold setting for the chemical being delivered. When no chemical is being delivered, the lowest threshold setting is used.

A "+" is shown if the POF conductivity is above the threshold; a "—" is shown if it is not.

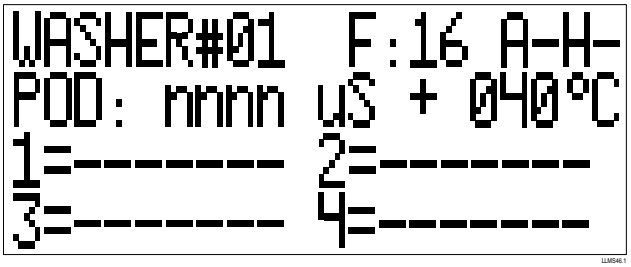


TEMP indicates the current transport water temperature and FLOW indicates the current transport flow rate.

Washer Status

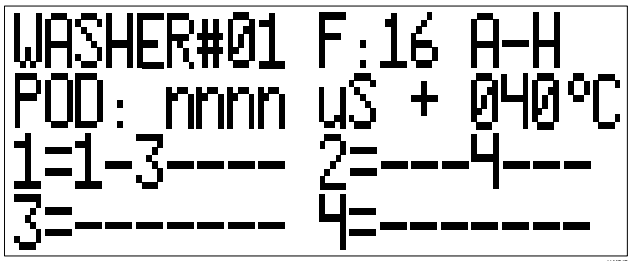
This screen displays the signal status as monitored by the washer interface and washer trigger modules, and indicates the status of the washer alarm and hold relays and the current conductivity of the POD cell. Only those trigger modules actually connected are displayed.

If a formula select module is present, the formula it has set is shown on the top line. If automatic formula selection is in use, the formula set using the formula select trigger is shown instead. If neither of these situations is true, the formula remains blank.



The alarm and hold status are indicated by the A and H symbols. A (-) indicates no alarm or hold and a (+) indicates the relay is set. The POD reading indicates the current conductivity of the POD cell. A "+" is shown if the conductivity is above the POD threshold; a "—" is shown if not. The temperature is the washer water temperature as measured by the washer temperature probe or is blank if no probe is connected. The states of the various washer signals monitored by the washer trigger modules are indicated in lines 3 and 4. The numbers indicate the module

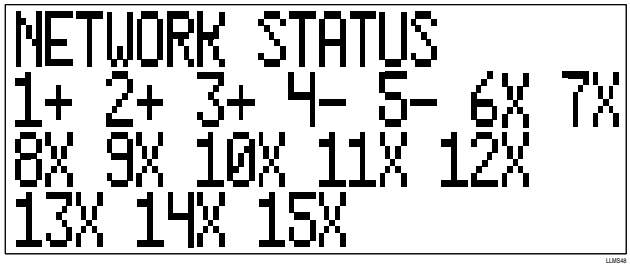
number and the (-) indicates the lack of a signal for the indicated channel.



Module 1 is the washer control module that monitors the **Machine On**, **Drain**, and various fill valves. The above example shows a **Machine On** signal, a **Cold Water** signal, and a supply trigger 4 signal. Note that only modules actually connected to the AlphaBus will be represented on the LCD screen. If module 1 is not present, the display reads Washer Off and Drain Valve Shut.

Network Status

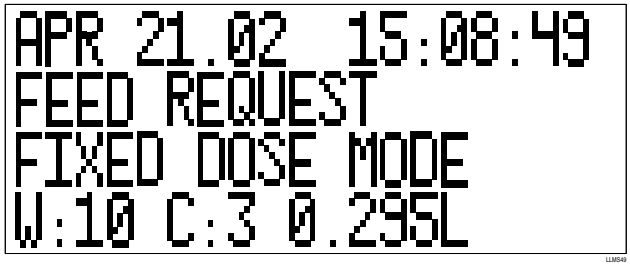
This screen indicates the BetaLink communication status of the ILS Max. The display shows which washer interface modules are activated and/or responding.



The (+) indicates that the washer interface is selected and responding. The (-) indicates that the particular interface has been enabled by the menu selection but the interface module is not communicating. The (x) indicates that the particular washer has not been enabled.

View Stored Strip / Running Strip

This screen shows the most recent entry to the running strip record. Since this screen is updated as system events occur, it is a real-time view of the current system status.



You may scroll through the entire stored strip file by 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. Exiting and re-entering this screen (or pressing the > key) always returns the display to the most current event and places the screen in the real time monitoring mode.

DIAGNOSTIC REPORTS

There are several reports that are intended primarily for diagnostics and for troubleshooting the ILS Max System, and may also be helpful in analyzing problems with 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, while the Washer Stored Strip report may be enabled from the Washer Setup menu.

Pump Stored Strip Report

The Pump Stored Strip report can be used to analyze individual feeds to washers. It shows:

- When and how much chemical was requested and delivered.
- Each stage of the feed process–feed request, POF and POD.
- 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 allows the recording of 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 ILS Max. The report also shows chemical-use totals and load identity when the load is completed (**Machine On** is off).

Washer Stored Strip

The Washer Stored Strip report is a logged version of the Washer Running Strip report above. This feature must be enabled for each washer via the Washer Setup menu. 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.

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

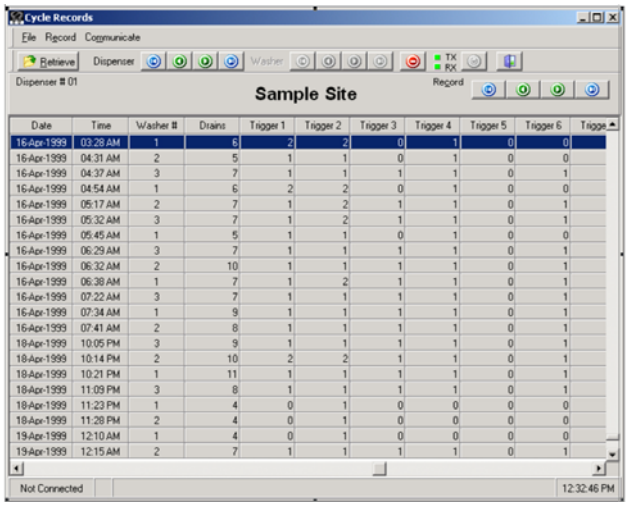
TROUBLESHOOTING LOAD CLASSIFICATION SETUPS

Generally load classification using automatic cycle indentification is reliable with newer washers. With older chart-control washers, however, flickering triggers can occur, resulting in the load not matching the identification criteria, such that it is logged as ‘Unidentified Load’. Another issue is when the washer is stopped for some reason and then restarted by the operator; the dispenser will see this as two short loads, again “Unidentified Loads.”

In an activity-based billing environment, we suggest you make agreement with the customer that these performance issues are due to the washer and operator, and that they be billed for partial or “Unidentified Loads.”

Alternately, you could use AFS, which sets the cycle at the beginning of the wash process, such that unidentified loads would not be recorded, but instead two loads would be recorded if they stopped the washer mid cycle and then resumed, because the formula is logged as complete when the washer on signal turns off.

To troubleshoot Unidentified Load records, the easiest tool to use is the Cycle Records Report. As shown below, it shows how many triggers and drains occurred, and you can then match this up against your programmed load classification setups to see if the drains or triggers were counted and programmed incorrectly.



ILS Max Cycle Records Report

INITIAL INSTALLATION AND TROUBLESHOOTING

This section describes problems that may be encountered when commissioning a new system.

Pump Box LCD Screen Is Off

1. Check main power to the step down transformer.
2. Check the output of the transformer for 24 VAC.
3. Check the circuit breaker and reset if necessary.
   a) If circuit breaker continues to trip, check system for short circuit in the 24 Volt distribution wiring.
   b) Check wiring to transport modules.
   c) Check wiring to washer interface modules (BetaLink).
4. Check ribbon cable connection from the Relay board to the Model 100 board.
5. Check ribbon cable connection from the LCD display to the Model 100 board.
6. Check DC voltages at Relay board.
7. Check DC voltages at Model 100 board.

Pump Box Screen Shows Bars

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

1. Verify that the EPROM (program memory chip) is installed properly (See **Component Replacement** in **Service and Maintenance**).
2. Check the ribbon cable to the LCD screen.

Washer(s) Not Receiving Chemical

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

One Washer Not Receiving Chemical

1. Verify that each washer interface has a unique address setting.
2. Verify that each smart transport pump has a corresponding address setting.
3. Verify that all of the appropriate washer addresses are enabled (Washer Setup menu).
4. Verify system type setting (usually smart pump) in the washer setup menu.
5. Verify that the **Machine On** and **Drain** logic settings (normal/ reverse) are appropriate for the particular washer.
6. Check the connections between the AlphaBus and each module.
7. Recheck the washer controller and trigger wiring. Observe that the appropriate trigger module LEDs illuminate when the chemical triggers are active.
8. Trigger time limit exceeded (relay mode only). Check washer setup.
9. No chemical amount programmed. Check washer setup.

All Washers Not Receiving Chemicals

If none of the washers are receiving chemical, the problem is most likely a system problem associated with the pump box or BetaLink.

1. Check BetaLink communication status (using interrogation screen).
2. Check 24 VAC supply to washer interface(s).
3. Verify network address (pump) setup.

Pump Fails to Auto-Prime

It is possible that a chemical pump will fail to auto-prime if there is excessive chemical supply tube length. 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 programmed on.

A chemical will not auto-prime if the POF feature is off. Turning off POD only will not disable auto-prime.

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 peristaltic pump(s).
4. Check for empty chemical drum.
5. Excessively long or large-diameter suction plumbing may require several attempts when starting a new system.

System Will Not Set Transport Time

Having an accurate transport time is critical to system performance. By knowing the transport time to a given washer, the system can determine when to start looking for the chemical to arrive at the wash wheel, and consequently, when to stop looking and declare a Proof of Delivery failure.

1. Verify that the POF and POD functions are enabled for the chemical being pumped. Check the POD connections at the washer interface module.
2. Check performance of the POD cell by shorting across the POD probe and observing the POD conductivity reading on the interrogation screen.
3. Ensure that enough conductive chemical is being pumped to register at the POD cell. You may need to select a lower POF/POD threshold setting.

Water Supply / Transport System Problems

Adequate transport water flow is essential for proper system performance. The system continuously monitors the transport water flow before, during, and after the peristaltic chemical pump(s) inject chemical(s) into the transport system for delivery to the washer. Refer to the table in **Error Messages**.

Water Supply Problem

No, or very low transport water flow will be indicated by the water supply problem message. This indicates that the system encountered a flow rate of less than .25 GPM (1 liter/minute) for three seconds, or the level switch in the break tank indicated the tank was empty.

Transport Pump Error

If the system transport flow rate drops below, or does not attain, a flow rate of 0.5 GPM (2 liters/min), the transport pump error message will be part of the error message displayed. This indicates that the transport flow rate has dropped below acceptable limits, but there is still an adequate water level in the break tank.

No Flow to All Washers

Check that the break tank has the proper water level. Normally, the tank is full to within one inch of the rim.

1. If break tank is empty, check for:
   a) Water source turned off.
   b) Stuck/misadjusted float valve.
   c) Solenoid valve inoperative/failed.
      I. Check valve.
      II. Check relay board solenoid drive.
2. If break tank is full, check for:
   a) Flow meter failure.
      I. Verify flow reading when transport pump running.
      II. Check wiring.
   b) Failed float switch. If the break tank fills with water but after three seconds the system again shuts off, check the float switch.
   c) Failed chemical pump tube. Check for cracks or leaks.
   d) Broken manifold. Check for cracks or leaks.

Diagnosing a Water Supply Problem

To diagnose a water supply problem alarm, enter the program pump setup mode and scroll to the Transport System Run menu. Select the transport pump/washer system desired and then use the ∧ key to begin a manual flush. If the appropriate transport pump does not start, verify that the transport pump has the proper address set on the PC board.

The manual flush mode will defer to an active feed request received by the pump box, even if a manual flush is in progress.

The ILS Max System will always attempt to run the transport pump in manual flush mode. If no water is flowing after three seconds, the transport pump will stop again. This will not trigger an alarm. The screen will continue to flash “Push Dn To Stop Pump”. This condition verifies that there is a water supply problem.

If this happens, press the ∨ key to stop the flush. This manual flush feature can be used to help further diagnose the problem.

To determine the cause of the water supply problem, see **Troubleshooting**.

No Flow to One Washer

1. If motor runs but there is no transport flow:
   a) Check for blocked transport system. Look for kinks or obstructions.
   b) Check for manifold suction leaks.
   c) Repair or replace transport pump head.
2. If motor does not run:
   a) Check whether transport module or washer interface is addressed properly.
   b) Check pump wiring.
   c) Check whether pump motor failed.
   d) Check motor drive circuit.

Communication Erratic

Check all BetaLink and 24 VAC supply connections to all washer interface modules.

Intermittent or Inconsistent Washer Trigger Signals

This is indicated on the washer status screen (interrogation mode) or by repeated AlphaBus error alarms. Check for duplicate or loose address jumper at AlphaBus connections on the affected washer.

Printed Circuit Board Failure

Excessive current draw can result in PCB failure:

- From a short to ground on the motor
- From a short to ground on the alarm relay

To prevent excessive current draw, use a 2 amp, slow blow fuse on the alarm relay.

MESSAGES AND ALARM RESET

The microprocessor is continually checking the system. If a problem is discovered, a message is displayed on the LCD screen, and an error message is logged in the Pump Stored Strip report. If the external alarm is wired to the system, it will 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 ten error messages on a first-in, last-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 again be triggered 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 on the keypad. This will turn off both the system and local washer alarms, and clear the LCD screen. Washer hold will be released if the hold on alarm feature is activated. The cleared message event will be logged in the Pump Stored Strip report.

Retry and Clear

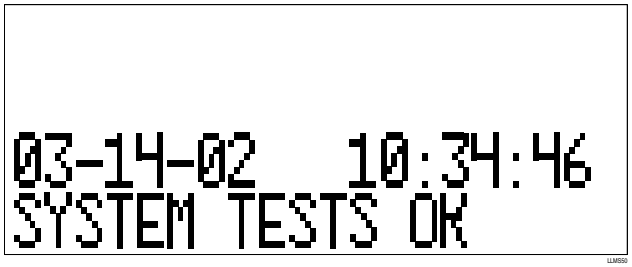
The Last Feed Retry feature allows you to tell the system to retry the last feed that had an error. If you determine by reviewing the error message that an injection was probably missed, press the ∨ key to cause the system to re-inject the missed feed. The error will be cleared and feed retry messages will be logged in the Pump Stored Strip report. The alarm will also be cleared if the feed is successful.

NORMAL OPERATION MESSAGES

During the course of normal operation, any combination of the following messages may appear on the LCD screen or be observed in the Pump Stored Strip or Pump Running Strip reports. These messages are an indication of the current or most recent event the system has performed.

Default System OK Message

The following is the default message, which is displayed on the LCD screen after the power up sequence when no alarm conditions exist. The current date and time are included.



Feed Event Messages

Feed event messages indicate various events that may occur during a normal chemical feed.

The following three messages indicate that the ILS Max has acknowledged a chemical feed request. The requesting washer, and the amount and type of chemical are also indicated on the screen.

Feed Request Fixed Dose Mode

Feed Request Relay Mode

Feed Request From Network

The following four messages indicate normal feed and delivery events that occur during all chemical feeds. The "assumed" message indicates that the POF and/or POD features are disabled for the indicated chemical.

Proof of Flow Confirmed

Proof of Flow Assumed

Proof of Delivery Confirmed

Proof of Delivery Assumed

The following message indicates that the 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.

Feed Retry, Manual

Other Normal Events

The following are operational messages that may appear from time to time in the pump strip reports, or be displayed as part of the various screen messages. The messages represent various external conditions or commands that have occurred, and indicate the date and time that the system power was turned off or on.

System On

System Off

When power is reapplied to the system, the following messages appear, indicating that the selected washer networks are in communication with the system.

Washer Network Link Established

W: n

The following messages indicate when a manual transport flush operation has occurred. The washer number will also be indicated.

Manual Flush Started

Manual Flush Stopped

The Washer Hold Set/Released messages indicate when the indicated washer was placed on hold or when the hold signal was released.

Washer Hold Set

Washer Hold Released

The hold may be the result of a normal hold (a hold condition brought on by the system determining that the feed will not occur within one minute of the feed request) or may be the result of a hold on alarm condition.

The following message indicates when any system error was reset by the operator (pressing the ∧ or ∨ key).

Error Reset Wash: 1

Chem

The following messages record the result of an automatic or manual chemical pump calibration. See **Calibration Status Messages** for more information about these messages.

Auto Cal Status

Manual Cal Status

The following message indicates that a new formula has been set using automatic formula selection (AFS). The newly-set formula appears in place of the chemical number.

Formula Set by AFS

The following message occurs when hygiene monitoring is enabled and a wash load has achieved hygiene.

Hygiene Verified

The following two messages may appear, particularly on newly installed system. These messages indicate that a memory operation has occurred.

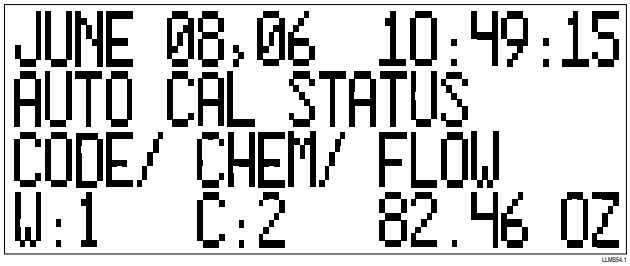
Manual Memory Purge: Logged Data Cleared

Manual Memory Purge: Setup Data Cleared

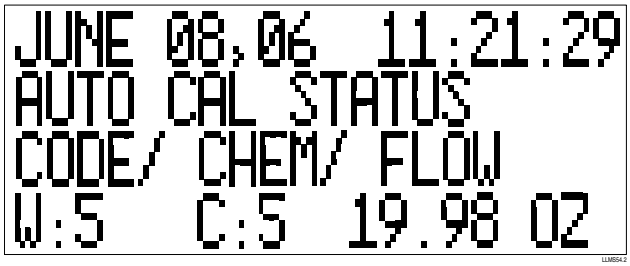
These clearing operations are normally performed at the factory just prior to shipment of the system, or may be selectively performed by trained service personnel at the time of installation.

CALIBRATION STATUS MESSAGES

Examples:



The top line indicates the date and time of the record. The second and third lines are the subject; in this example it's "auto cal status". The fourth line is the actual data. "W" represents the error code (note that it doesn't stand for "washer"), "C" is the chemical pump number and "Flow" is the volume.



This record documents the dose size, but the "W" code "5" tells us there is a problem with the break tank or water flow, showing us how this message can be used to troubleshoot.

The following are things to check for based on the Auto-Cal status code.

Automatic Calibration Error Code Chart

CODE ("W")	MEANING AND WHAT TO CHECK
#1	***Everything OK**. All calibration parameters are within normal limits. Nothing to check.*
#2	***Pre-flush (baseline) unstable.** During the pre-flush and the pre-flush extension, the flow was unstable (Q > 4%). This may be due to air leaks in the flush manifold or a partially full break tank. Shine a bright light through various portions of the manifold system to help isolate the source of air leaks.*
#3	***Chemical Feed Rate (delta) unstable.** During the chemical feed, the flow was unstable (Q > 6.5%). This may be due to air leaks in the connection from the chemical supply hose, or perhaps entrained gases collecting in the top of the supply tube.*
#4	***Cases 2 and 3 are both true.** All flow readings unstable. Check for air leaks in the manifold and supply hoses (as described above). May occur during the first feed of the day, or after a long period of inactivity.*
#5	***Low water level detected in the break tank,** as reported by the float switch. Check water supply for proper flow rate, verify free movement of the float valve ball.*
#6	***Negative flow value calculated.** Most often caused by nonlinear flow characteristics of the chemical being pumped. The chemical cannot be pumped at a high rate of flow through the chemical suction tube. Suggest changing the chemical pump rate from Auto to Half or Slow speed.*
#7	***Bad chemical pump**. Internal error check only.*

Manual Calibration Error Code Chart

CODE	MEANING AND WHAT TO DO
#1	*A successful fast speed calibration was performed.*
#2	*The chemical pump flow rate measured during a fast speed calibration was too high. The calibration should be repeated.*
#3	*The chemical pump flow rate measured during a fast speed calibration was too low. The calibration should be repeated.*
#4	*A successful slow speed calibration was performed.*
#5	*The chemical pump flow rate measured during a slow speed calibration was too high. The calibration should be repeated.*
#6	*The chemical pump flow rate measured during a slow speed calibration was too low. The calibration should be repeated.*

NOTE

Manual calibration error codes 2, 3, 5 and 6 are logged only when the result of the calibration is so far from the normal chemical pump flow rate that it must be restricted to prevent possible incorrect operation of the system. It is possible to perform highly inaccurate calibrations without generating one of these error codes; it is the user's responsibility to verify that the result of a manual calibration is accurate.

ERROR MESSAGES

The following is a list of all the ILS Max error messages that may appear on the LCD screen or in the Pump Stored Strip or Pump Running Strip reports. These messages indicate that some

abnormal condition exists, or that a chemical feed may not have been successfully completed.

By analyzing these messages, it is possible to troubleshoot many potential chemical injection problems. Some messages are dependent on the system configuration, and may not be applicable to all applications.

As many of the messages are similar, it is important to accurately note the exact text used in the message. This will be of immense help when seeking telephone assistance for troubleshooting.

Proof of Flow / Delivery 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 system 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:
    a) Pump tube is worn and unable to pump chemical at a high enough rate.
    b) Proof of Flow cell is dirty and unable to detect chemical.
    c) Chemical conductivity is too low or the feed amount is too small to be detected by Proof of Flow cell.

If you have checked all the above conditions and the problem persists with a particular chemical, it is likely that the conductivity of the chemical is too low. If this is the case, then the POF feature for that chemical should be disabled in the pump box setup program.

The POF error may also initially be the result of an excessively long uptake tube. The 30-second timer elapsed before the uptake line was primed.

Proof of Delivery Failure

The POD failure message indicates that the system was unable to detect a sufficient conductivity change in the POD cell at the washer within the allotted time (transport time plus 30%). The difference between the failure message above 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.

Sometimes a chemical will be conductive enough in the POF cell to convince ILS Max that it should be detectable in the POD cell, but in fact the chemical can not reliably be detected, leading to spurious POD failure messages and alarms. To prevent these alarms while maintaining the auto-prime and out-of-chemical functions that POF provides, the POD function may be disabled while leaving the POF function active.

Proof of Delivery Not Detected

The Not Detected message indicates that the chemical was marginally conductive at the POF cell and the system was unable to detect a sufficient conductivity change in the POD cell at the washer within the allotted time (transport time plus 30%). This condition is not necessarily critical, as the system has already proven 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 system has detected some condition that was inconsistent with chemical delivery requirements.

Although the following 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 and no alarm is set.

Feed Rejected: Request Amount = 0

The following three error messages indicate that the washer status has changed since the system accepted the chemical request. The system 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

Feed Rejected: Washer Not Selected

The term "washer off" refers to the signal used by the system to determine that a wash cycle is in progress. This signal may in fact be a reverse logic signal. See ***Setup Programming*** *for further information about washer on/off signals.*

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 Washer Not Selected message is applicable only to washers/system interfaces of the hybrid or the integrated washer control type. This message indicates that a chemical has been requested for a washer that has not been enabled in the setup programming.

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

Feed Rejected: Data Link Erratic

The following valve error message is applicable only to special systems that use the three-way valve/DLE configuration, or smart valve systems.

Feed Rejected: Valve Error

The following message is applicable only to hybrid and integrated type systems. It indicates that the system was unable to recognize the content of a network message.

Feed Rejected: Bad Request Format

To prevent a chemical pump from unexpectedly activating while disconnected from the manifold during a manual pump calibration, ILS Max rejects all chemical feed requests while the manual pump calibration screen is displayed.

Feed Rejected: Pump Box Offline

Transport and Supply Problems

Because ILS Max uses a water flush to transport the chemical and clean the transport tube, it will not feed chemicals without transport water flow. The following table provides a quick overview that illustrates the relationships of the various transport and water supply error conditions.

FEED/ MESSAGE	WATER SUPPLY PROBLEM	TRANSPORT PUMP ERROR	RETRY FEED
FEED REJECTED – error occurred before chemical feed was started	Flow rate is below 1 liter/minute (0.25 GPM) and break tank is empty.	Flow rate is below 2 liters/minute (0.5 GPM) and break tank is full	The chemical injection pump was never started. Press the down arrow key to re-feed and clear the alarm
FEED ABORTED – error occurred during chemical feed	Flow rate is below 1 liter/minute (0.25 GPM) and break tank is empty.	Flow rate is below 2 liter/minute (0.5 GPM) and break tank is full.	Use your best judgement as to whether the proper amount of chemical was injected. Observe the wash liquor to determine if a full amount was injected.
DELIVERY – error occurred after the chemical feed was completed	Flow rate is below 1 liter/minute (0.25 GPM) and break tank is empty.	Flow rate is below 2 liter/minute (0.5 GPM) and break tank is full.	The proper amount has been injected into the transport system. The system will try to flush if at all possible

The following message indicates that during the preflush, the transport water flow fell below, or was unable to obtain a 0.5 GPM (two liters per minute) rate but the break tank level switch indicated a proper level in the tank. This may indicate a problem with the transport pump, excessive air in the suction side of the transport system, or possibly a blockage of the transport tube. This problem may also be the result of a periodic drop in supply water pressure brought about by high washer demand.

Feed Rejected: Transport Pump Error

The following message indicates that during the preflush, the level switch in the break tank indicated that the tank was empty. Check the inlet water supply, valves or anything that may be interrupting the flow of water to the system.

Feed Rejected: Water Supply Problem

The following message indicates that the transport water temperature was below the limits set in the system setup for the particular chemical. Check that the hot or tempered water supplies are on. If this error occurs during morning startup, it may be that several feed attempts will be required to purge cold water from the supply lines. If the problem persists, check for an open or shorted temperature sensor in the POF cell.

Feed Rejected: Low Water Temp

The following message indicates that the transport water temperature was above the maximum safe operating limits set by the system (150°F). Check that the tempering valve is set and operating properly. If the water temperature appears to be within proper limits, check for an open or shorted temperature sensor in the POF cell.

Feed Rejected: High Water Temp

Feed Aborted Messages

Feed aborted messages indicate that the chemical feed was started. The system then detected some condition that was inconsistent with proper chemical delivery requirements and ceased pumping chemical. In this case, the system will attempt to continue to flush any remaining chemical to the appropriate washer.

The following message indicates that during the chemical feed, the level switch in the break tank indicated that the tank was empty, and the transport flow rate was below 0.25 GPM (one liter per minute). Check the inlet water supply, valves, or anything that may be interrupting the flow of water to the system.

Feed Aborted: Water Supply Problem

The following message indicates that during the chemical feed, the transport water flow fell below a 0.5 GPM (two liters per minute) rate for more than 30 seconds, but the break tank level switch indicated a proper level in the tank. This may indicate a problem with the transport pump, excessive air in the suction side of the transport system, or possibly a blockage of the transport tube. Check injection manifold connections and pinch tubes for leaks.

Feed Aborted: Transport Pump Error

The following message indicates that the system detected an abnormal condition in the peristaltic pump motor. Check the pump wiring and connections for an open circuit.

Feed Aborted: Chemical Pump Error

Delivery Errors

A delivery error is defined as a transport or water supply error that occurs after the chemical pumping sequence is completed, but before the chemical has been delivered to the washer. As with the feed aborted errors above, the system will attempt to complete the delivery by continuing to flush the transport line.

The following message indicates that after the chemical feed, the transport water flow fell below a 0.5 GPM (two liters per minute) rate for more than 30 seconds, but the break tank level

switch indicated a proper level in the tank. This may indicate a problem with the transport pump, excessive air in the suction side of the transport system or possibly a blockage of the transport tube.

Delivery: Transport Pump Error

The following message indicates that after the chemical feed, the level switch in the break tank indicated that the tank was empty, and the transport flow rate was below 0.25 GPM (0.5 liters per minute). Check the inlet water supply, valves, or anything that may be interrupting the flow of water to the system.

Delivery: Water Supply Problem

General System Operation Errors

Other error messages may be encountered from time to time.

The following message indicates that a wash load did not satisfy any of the programmed hygiene criteria. This may be because the wash water temperature was too low or because the wash cycle was interrupted, causing it to be too short. This message may also be caused by a loss of communications with the washer interface or a by a "stick-on" washer temperature probe that has come loose.

Hygiene Failed

The following is a maintenance warning. The system 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 system accuracy has been compromised, as the auto-calibration feature is still ensuring accurate chemical metering, see **Service and Maintenance** 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 in the Pump Setup menu. It is necessary to do this because this establishes a new baseline reference for the worn tube calculation.

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 system 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 file in the ILS Max System. See **Setup Programming** for more details. Also verify the proper performance of the washer controller supply outputs.

Relay Mode Trigger Time Limit Exceeded

The system is in constant communication with the washer interface, monitoring the washer status and looking for the POD event. The following message indicates that the system has lost, or cannot establish, communication with the washer interface. Check the integrity of all BetaNet connections to the various washer interfaces.

Washer Network Link Lost

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

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

I/O DIAGNOSTICS

The following describes the advanced troubleshooting capability of ILS Max. This is an offline procedure, that is, ILS Max will not be dispensing chemicals. This diagnostic allows the technician to control or monitor various individual inputs or outputs of the system, free of any interlocking or filtering.

These procedures should only be used by experienced technical personnel, as all of the normal functional and procedural lockouts are disabled.

To access the eight different diagnostic screens available:

1. Turn off power to the system.
2. Press and hold Menu key and turn on power to system.
3. Continue to press Menu key until the first diagnostic screen appears.
4. Press the Menu key to advance from one screen to the next. The screens are made to cycle and will repeat. The test screen number, 1-8, is shown in the upper right corner of each screen.

To return to the normal operating mode, turn off the power, wait five seconds, and then apply power. The default startup screen should now be visible.

Screen # 1: Chemical Pump Control

This screen is used to control the individual chemical pump drives. The selected pump remains on, in the direction selected, as long as the appropriate key is pressed. 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 break tank, manifold and transport system.

Screen # 2: Pump Box Outputs

This screen provides individual control of the flush relay (not used in ILS Max), the alarm relay and the water inlet solenoid valve.

Screen # 3: POF (A-D Converter) Readings

This screen monitors the state of the A-D converter relative to the state of the POF and flow meter circuits.

Screen # 4: Smart Pump Control
This screen provides individual control of the smart transport pumps, and monitors the flow rate of the selected pump.

Screen # 5: Washer Interface Output Control
This screen provides individual control of the POD light, and hold and alarm relays of the selected washer interface.

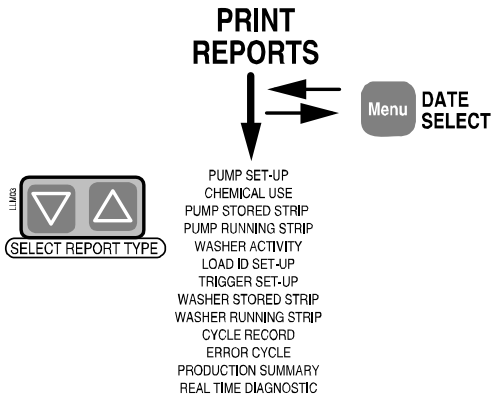
Screen # 6: Washer Interface Input Read
This screen monitors the state of the two trigger inputs, and the POD cell and washer temperature probe of the selected washer interface.

Screen # 7: AlphaBus Status
This screen displays the trigger status of all trigger modules connected to the selected washer interface AlphaBus (similar to interrogation mode screen).

Screen # 8: Serial Port Test
This screen provides a means of exercising the serial port of the Model 100 board. The transmit output may be set to 0 or 1 via this screen.

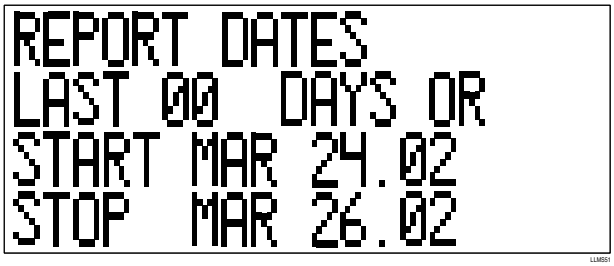
REPORTS
ILS Max produces a range of reports that provide management information, troubleshooting and diagnostics, and system setup information. The 13 report formats available are:

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



GENERATING REPORTS
To generate reports from the pump box with the briefcase printer, proceed as follows:

1. Plug the printer cable into the pump box printer port and into the printer data input plug.
2. Turn the printer power switch on. Make sure the printer is online and 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 before entering the report type displays screen.
3. Press the ∧ and ∨ keys to select the type of report desired.
4. Press the Menu key to select the report period. This may be done at any time from any report screen.



5. Press the Print key to start printing a report. When all printing is complete, unplug the printer cable from the system. To halt printing at any time, press 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 programming functions are available while the printer is active. When desired, or when printing is complete, just return to the Print menu and turn off the print function.

PUMP SETUP REPORT

The Pump Setup report is a hard copy report of the setup information programmed into ILS Max. It contains the present peristaltic pump calibrations, as well as the service life and replacement date for the pump tubes, pump motors, and transport pump. Washer transport times are also printed.

A Pump Setup report should be printed at each service call or whenever program variables are changed.

SYSTEM SETUP REPORT

ACCOUNT: THE LAUNDRY This report generated: AUG 12,93 07:16:08
NETWORK I.D. # 01 Last report generated: AUG 02,93 08:46:01

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

CHEMICAL PUMP INFORMATION:

#	NAME	#	COST / Gallon	PUMP CALIBRATION Ounces/minute		TUBE LIFE/ SERVICE DATE	MOTOR LIFE/ SERVICE DATE	POF/ POD	MIN TMP
1	ASSIST	2	3.4567	A 215.42	101.76	11 HOURS MAY 26,93	11 HOURS MAY 26,93	MED/ MED	41F
2	EDGE	2	7.6543	M 185.23	93.68	8 HOURS MAY 26,93	8 HOURS MAY 26,93	HI / HI	75F
3	BLEACH	1	0.7567	A 95.03	43.68	6 HOURS MAY 26,93	6 HOURS MAY 26,93	LOW/ OFF	41F
4	TRIAX	1	7.8901	A 105.23	50.66	5 HOURS MAY 26,93	5 HOURS MAY 26,93	OFF/ OFF	41F
5	LAUNCH	1	6.9870	A 100.38	50.66	6 HOURS MAY 26,93	6 HOURS MAY 26,93	LOW/ LOW	41F
6	VALID II	1	11.4567	A 85.23	42.08	2 HOURS MAY 26,93	2 HOURS MAY 26,93	LOW/ LOW	41F
7	EMPHASIZE	1	10.4672	A 90.13	45.00	2 HOURS MAY 26,93	2 HOURS MAY 26,93	MED/ MED	41F
8	KATHON	1	35.4672	A 94.75	48.90	1 HOURS MAY 26,93	1 HOURS MAY 26,93	OFF/ OFF	41F
9	Chem # 9 Name	A	0.0000	Backup Disabled A 0.00	0.00	0 HOURS MAY 26,93	0 HOURS MAY 26,93	LOW/ LOW	41F
10	Chem # 10 Name	A	0.0000	A 0.00	0.00	0 HOURS MAY 26,93	0 HOURS MAY 26,93	LOW/ LOW	41F

WASHER INFORMATION:

#	STATUS	TRANSPORT TIME (sec)	#	TRANSPORT PUMP RATE (G/min)	LIFE (hours)	SERVICE DATE	SYSTEM TYPE	TEMP. OFFSET
1	On	11	1	1.43	41	MAY 26,93	Smart Pump	9'F
2	On	8	2	3.03	38	MAY 26,93	Smart Pump	0'F
3	On	10	2	2.83	16	MAY 26,93	Smart Pump	0'F
4	On	7	1	1.53	21	MAY 26,93	Smart Pump	0'F
5	On	8	1	1.34	30	MAY 26,93	Smart Pump	12'F
6	On	14	1	1.23	45	MAY 26,93	Smart Pump	8'F
7	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F
8	On	26	1	1.12	52	MAY 26,93	Smart Pump	0'F
9	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F
10	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F
11	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F
12	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F
13	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F
14	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F
15	Off	0	0	0.00	0	MAY 26,93	Smart Pump	0'F

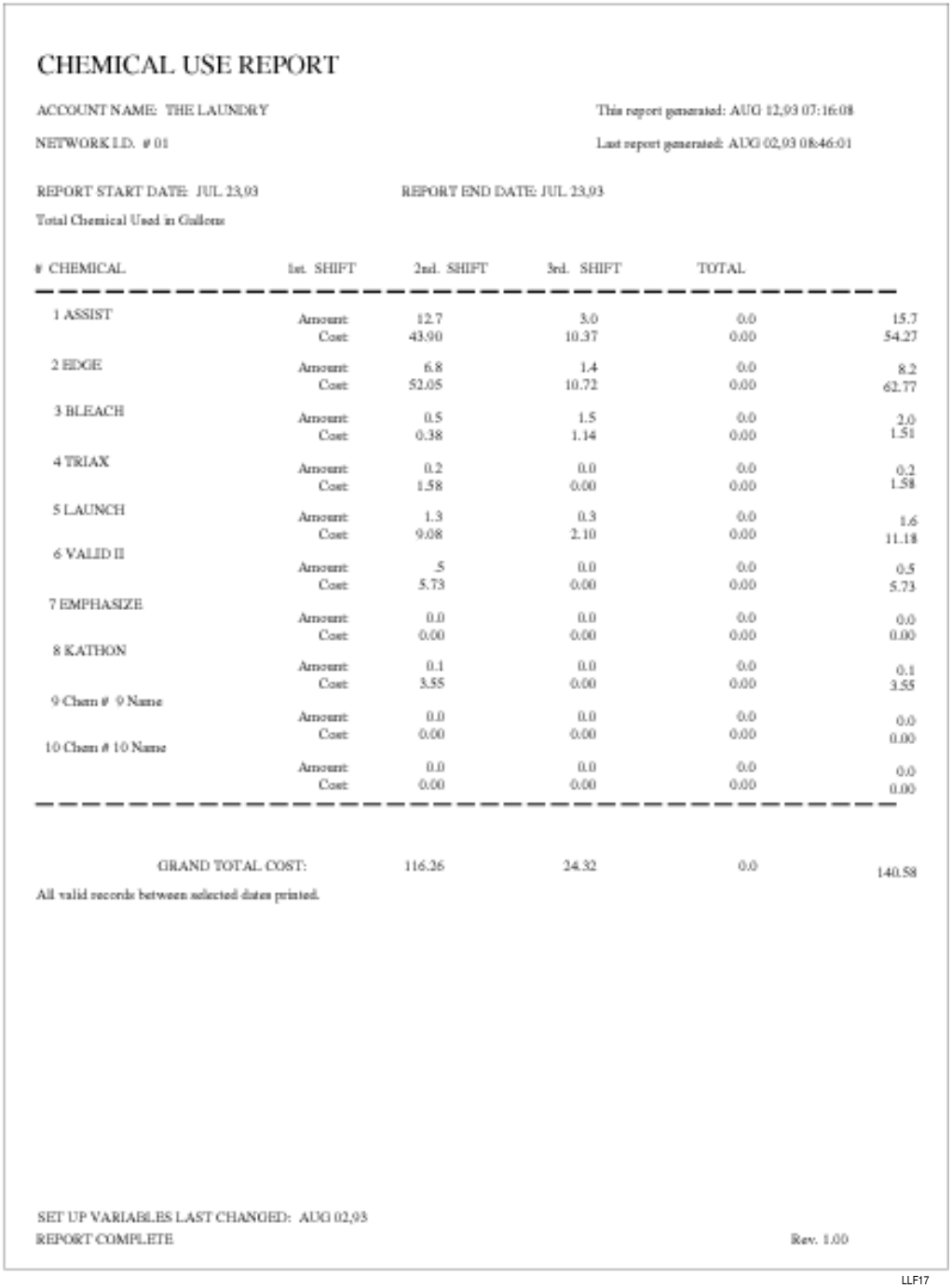
HYGIENE CRITERIA (minutes above temp.) A: 60/140'F B: 30/170'F C: 20/185'F
FLOW METER CALIBRATION: 1612 PULSES / Gallon SERVICE DATE: MAY 26,93
FLUSH WATER CONDUCTIVITY REFERENCE: 347 Micromhos CURRENT TEMP: 68'F

SET UP VARIABLES LAST CHANGED: AUG 02,93
REPORT COMPLETE Rev. 2.20

Figure 16. Pump Setup Report

CHEMICAL USE REPORT

The Chemical Use report gives the total amount of chemical pumped by ILS Max during the report period. The memory storage capacity for chemical use totals (for selected period) is the last 2790 wash cycles. The usage is broken down to shifts and period totals.



CHEMICAL USE REPORT

ACCOUNT NAME: THE LAUNDRY
This report generated: AUG 12,93 07:16:08

NETWORK I.D. # 01
Last report generated: AUG 02,93 08:46:01

REPORT START DATE: JUL 23,93
REPORT END DATE: JUL 23,93

Total Chemical Used in Gallons

# CHEMICAL		1st. SHIFT	2nd. SHIFT	3rd. SHIFT	TOTAL
1 ASSIST	Amount:	12.7	3.0	0.0	15.7
	Cost:	43.90	10.37	0.00	54.27
2 EDGE	Amount:	6.8	1.4	0.0	8.2
	Cost:	52.05	10.72	0.00	62.77
3 BLEACH	Amount:	0.5	1.5	0.0	2.0
	Cost:	0.38	1.14	0.00	1.51
4 TRIAX	Amount:	0.2	0.0	0.0	0.2
	Cost:	1.58	0.00	0.00	1.58
5 LAUNCH	Amount:	1.3	0.3	0.0	1.6
	Cost:	9.08	2.10	0.00	11.18
6 VALID II	Amount:	.5	0.0	0.0	0.5
	Cost:	5.73	0.00	0.00	5.73
7 EMPHASIZE	Amount:	0.0	0.0	0.0	0.0
	Cost:	0.00	0.00	0.00	0.00
8 KATHON	Amount:	0.1	0.0	0.0	0.1
	Cost:	3.55	0.00	0.00	3.55
9 Chem # 9 Name	Amount:	0.0	0.0	0.0	0.0
	Cost:	0.00	0.00	0.00	0.00
10 Chem # 10 Name	Amount:	0.0	0.0	0.0	0.0
	Cost:	0.00	0.00	0.00	0.00
GRAND TOTAL COST:		116.26	24.32	0.0	140.58

All valid records between selected dates printed.

SET UP VARIABLES LAST CHANGED: AUG 02,93
REPORT COMPLETE
Rev. 1.00

LLF17

Figure 17. Chemical Use Report

PUMP STORED STRIP & PUMP RUNNING STRIP REPORTS

The Pump Stored Strip report is a chronological log of all ILS Max pump box activity for the period selected or the last 2450 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.

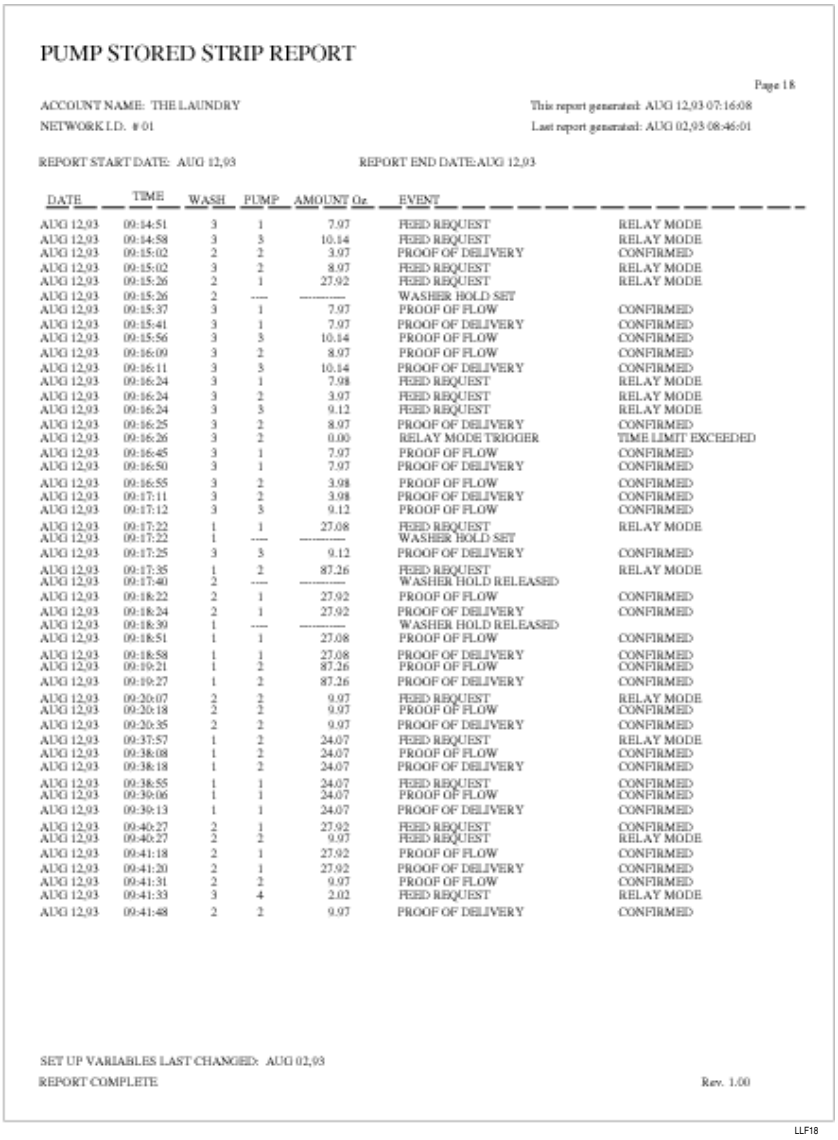
The Pump Running Strip report is a real-time version of the Pump Stored Strip report. Events are transmitted to the printer as they occur.

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 one of the arrow keys to scroll up or down (holding the key down increases the speed of the scroll). 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).

During a typical feed, first the feed request is logged, then the Auto-Cal status is logged. POF and POD are each then logged with a time stamp. Any error messages that occurred are also logged. Please see the **Real Time Diagnostic Report** for more information about the Auto-Cal status messages.

The Pump Stored Strip report contains messages that further describe system events. Refer to **Error Messages** for a complete definition of errors.



PUMP STORED STRIP REPORT

Page 18

ACCOUNT NAME: THE LAUNDRY
NETWORK I.D. # 01

This report generated: AUG 12,93 07:16:08
Last report generated: AUG 02,93 08:46:01

REPORT START DATE: AUG 12,93 REPORT END DATE: AUG 12,93

DATE	TIME	WASH	PUMP	AMOUNT Oz.	EVENT	
AUG 12,93	09:14:51	3	1	7.97	FEED REQUEST	RELAY MODE
AUG 12,93	09:14:58	3	3	10.14	FEED REQUEST	RELAY MODE
AUG 12,93	09:15:02	2	2	3.97	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:15:02	3	2	8.97	FEED REQUEST	RELAY MODE
AUG 12,93	09:15:26	2	1	27.92	FEED REQUEST	RELAY MODE
AUG 12,93	09:15:26	2	---	----------	WASHER HOLD SET	
AUG 12,93	09:15:37	3	1	7.97	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:15:41	3	1	7.97	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:15:56	3	3	10.14	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:16:00	3	2	8.97	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:16:11	3	3	10.14	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:16:24	3	1	7.98	FEED REQUEST	RELAY MODE
AUG 12,93	09:16:24	3	2	3.97	FEED REQUEST	RELAY MODE
AUG 12,93	09:16:24	3	3	9.12	FEED REQUEST	RELAY MODE
AUG 12,93	09:16:25	3	2	8.97	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:16:26	3	2	0.00	RELAY MODE TRIGGER	TIME LIMIT EXCEEDED
AUG 12,93	09:16:45	3	1	7.97	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:16:50	3	1	7.97	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:16:55	3	2	3.98	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:17:11	3	2	3.98	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:17:12	3	3	9.12	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:17:22	1	1	27.08	FEED REQUEST	RELAY MODE
AUG 12,93	09:17:22	1	---	----------	WASHER HOLD SET	
AUG 12,93	09:17:25	3	3	9.12	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:17:35	1	2	87.26	FEED REQUEST	RELAY MODE
AUG 12,93	09:17:40	2	---	----------	WASHER HOLD RELEASED	
AUG 12,93	09:18:22	2	1	27.92	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:18:24	2	1	27.92	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:18:39	1	---	----------	WASHER HOLD RELEASED	
AUG 12,93	09:18:51	1	1	27.08	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:18:58	1	1	27.08	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:19:21	1	2	87.26	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:19:27	1	2	87.26	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:20:07	2	2	9.97	FEED REQUEST	RELAY MODE
AUG 12,93	09:20:18	2	2	9.97	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:20:35	2	2	9.97	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:37:57	1	2	24.07	FEED REQUEST	RELAY MODE
AUG 12,93	09:38:08	1	2	24.07	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:38:18	1	2	24.07	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:38:55	1	1	24.07	FEED REQUEST	CONFIRMED
AUG 12,93	09:39:06	1	1	24.07	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:39:13	1	1	24.07	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:40:27	2	1	27.92	FEED REQUEST	CONFIRMED
AUG 12,93	09:40:27	2	2	9.97	FEED REQUEST	RELAY MODE
AUG 12,93	09:41:18	2	1	27.92	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:41:20	2	1	27.92	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:41:31	2	2	9.97	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:41:33	3	4	2.02	FEED REQUEST	RELAY MODE
AUG 12,93	09:41:48	2	2	9.97	PROOF OF DELIVERY	CONFIRMED

SET UP VARIABLES LAST CHANGED: AUG 02,93
REPORT COMPLETE

Rev. 1.00

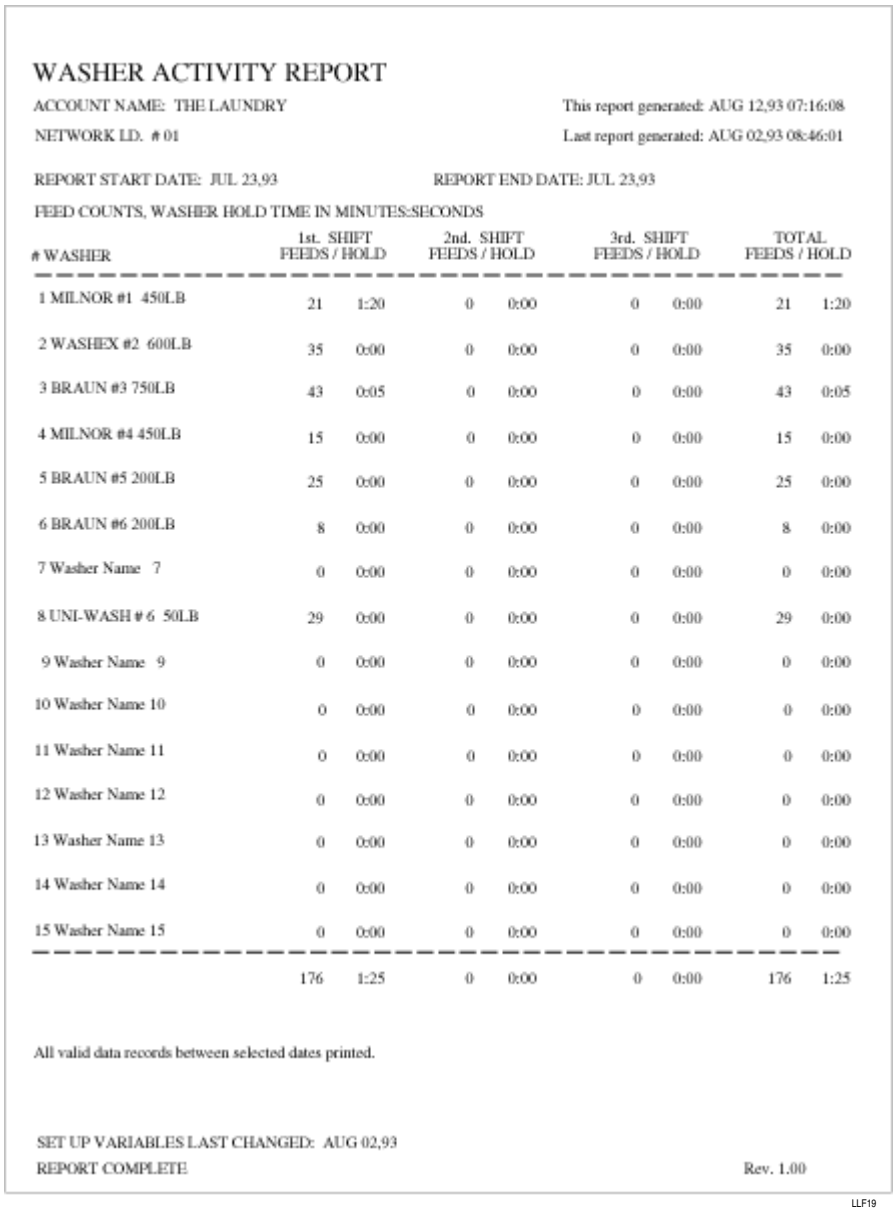
LLF18

Figure 18. Pump Stored Strip Report

WASHER ACTIVITY REPORT

The Washer Activity report gives information on the efficiency of ILS Max. It tells how many chemical feeds each washer received, as well as the total *hold time* for each washer. The hold time is the total amount of time that a washer had to wait more than one minute to receive chemical. The memory storage capacity for this data (for the selected period) is the last 2790 wash cycles.

This information is valuable when determining the number of washers an ILS Max System can efficiently service.



WASHER ACTIVITY REPORT

ACCOUNT NAME: THE LAUNDRY
This report generated: AUG 12,93 07:16:08
NETWORK LD. # 01
Last report generated: AUG 02,93 08:46:01

REPORT START DATE: JUL 23,93
REPORT END DATE: JUL 23,93

FEED COUNTS, WASHER HOLD TIME IN MINUTES:SECONDS

# WASHER	1st. SHIFT FEEDS	/ HOLD	2nd. SHIFT FEEDS	/ HOLD	3rd. SHIFT FEEDS	/ HOLD	TOTAL FEEDS	/ HOLD
1 MILNOR #1 450LB	21	1:20	0	0:00	0	0:00	21	1:20
2 WASHEX #2 600LB	35	0:00	0	0:00	0	0:00	35	0:00
3 BRAUN #3 750LB	43	0:05	0	0:00	0	0:00	43	0:05
4 MILNOR #4 450LB	15	0:00	0	0:00	0	0:00	15	0:00
5 BRAUN #5 200LB	25	0:00	0	0:00	0	0:00	25	0:00
6 BRAUN #6 200LB	8	0:00	0	0:00	0	0:00	8	0:00
7 Washer Name 7	0	0:00	0	0:00	0	0:00	0	0:00
8 UNI-WASH # 6 50LB	29	0:00	0	0:00	0	0:00	29	0:00
9 Washer Name 9	0	0:00	0	0:00	0	0:00	0	0:00
10 Washer Name 10	0	0:00	0	0:00	0	0:00	0	0:00
11 Washer Name 11	0	0:00	0	0:00	0	0:00	0	0:00
12 Washer Name 12	0	0:00	0	0:00	0	0:00	0	0:00
13 Washer Name 13	0	0:00	0	0:00	0	0:00	0	0:00
14 Washer Name 14	0	0:00	0	0:00	0	0:00	0	0:00
15 Washer Name 15	0	0:00	0	0:00	0	0:00	0	0:00
	176	1:25	0	0:00	0	0:00	176	1:25

All valid data records between selected dates printed.

SET UP VARIABLES LAST CHANGED: AUG 02,93
REPORT COMPLETE
Rev. 1.00

LLF19

Figure 19. Washer Activity Report

WASHER LOAD ID SETUP REPORT

This report is the primary washer setup report. It shows all of the wash load classification names and qualifiers (number of drains and triggers 1-5), load run times and load weights.

This information is used by the system to identify the wash load based on a match of the qualifiers entered here, and those events that occurred during the wash load.

The machine time entry forms the basis for the excess run time calculation shown by the various washer reports. The weight entry is used as part of the cost calculations.

The report also shows the machine control logic settings (normal/reverse) and the hygiene monitoring ON/OFF setting for each classification.

WASHER LOAD ID SETUP REPORT

ACCOUNT: THE LAUNDRY — This report generated: AUG 12,93 07:16:08
NETWORK I.D. # 01 — Last report generated: AUG 02,93 08:46:01

WASHER # 1 MILNOR #1 450LB

#	NAME	DRAINS	TRIG 1	TRIG 2	TRIG 3	TRIG 4	TRIG 5	TIME (time in minutes)	WEIGHT (weight in Pounds)	HYGIENE
1	HEAVY SOIL	10	2	2	0	0	1	58	400	On
2	PANTS	7	1	1	0	0	1	38	450	On
3	SHOP TOWELS	15	2	2	0	0	0	75	450	Off
4	STAIN TREAT	8	2	2	1	1	1	87	425	On
5	MATS	6	1	0	0	0	0	28	475	Off
6	CRT, BLUE	9	2	1	1	0	1	70	450	Off
7	BAR MOPS	14	3	2	1	1	1	88	450	Off
8	CRT, WHITE	10	2	1	0	1	1	75	450	Off
9	Cycle Name 09	0	0	0	0	0	0	0	0	Off
10	Cycle Name 10	0	0	0	0	0	0	0	0	Off
11	Cycle Name 11	0	0	0	0	0	0	0	0	Off
12	Cycle Name 12	0	0	0	0	0	0	0	0	Off
13	Cycle Name 13	0	0	0	0	0	0	0	0	Off
14	Cycle Name 14	0	0	0	0	0	0	0	0	Off
15	Cycle Name 15	0	0	0	0	0	0	0	0	Off
16	Cycle Name 16	0	0	0	0	0	0	0	0	Off
17	Cycle Name 17	0	0	0	0	0	0	0	0	Off
18	Cycle Name 18	0	0	0	0	0	0	0	0	Off
19	Cycle Name 19	0	0	0	0	0	0	0	0	Off
20	Cycle Name 20	0	0	0	0	0	0	0	0	Off
21	Cycle Name 21	0	0	0	0	0	0	0	0	Off
22	Cycle Name 22	0	0	0	0	0	0	0	0	Off
23	Cycle Name 23	0	0	0	0	0	0	0	0	Off
24	Cycle Name 24	0	0	0	0	0	0	0	0	Off
25	Cycle Name 25	0	0	0	0	0	0	0	0	Off
26	Cycle Name 26	0	0	0	0	0	0	0	0	Off
27	Cycle Name 27	0	0	0	0	0	0	0	0	Off
28	Cycle Name 28	0	0	0	0	0	0	0	0	Off
29	Cycle Name 29	0	0	0	0	0	0	0	0	Off
30	Cycle Name 30	0	0	0	0	0	0	0	0	Off

TRIGGER MODE: AFS RELAY

MODULE 1 SIGNAL LOGIC OPTIONS

1	MACHINE ON:	REVERSE
2	SEWER DRAIN:	NORMAL
3	COLD FILL:	NORMAL
4	HOT FILL:	NORMAL
5	STEAM:	NORMAL
6	REUSE DRAIN:	NORMAL
7	REUSE FILL:	NORMAL

SET UP VARIABLES LAST CHANGED: AUG 02,93
REPORT COMPLETE — Rev. 2.20

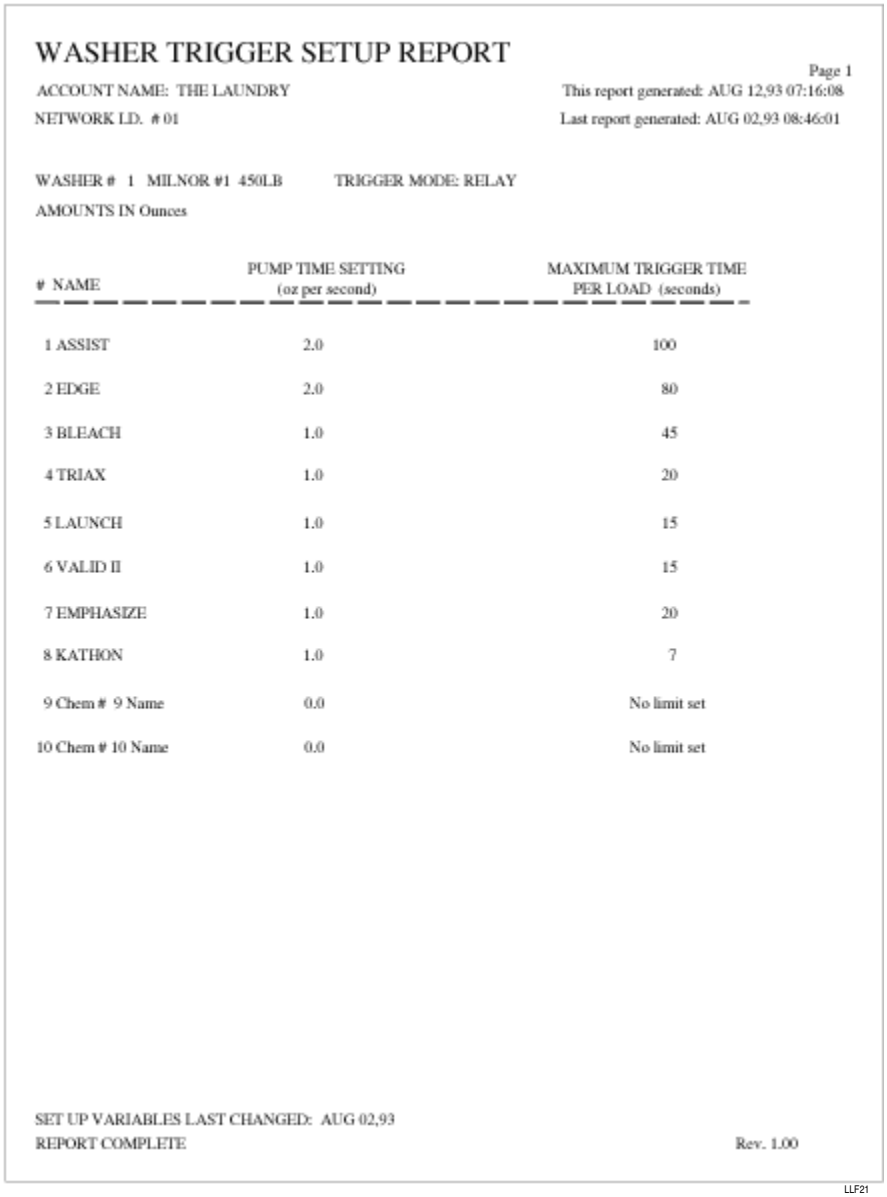
Figure 20. Washer Load ID Setup Report

WASHER TRIGGER SETUP REPORT

The Washer Trigger Setup report shows the trigger configuration and setup for the washer. The report format will vary depending on the trigger mode setting (relay, automatic or formula). The report indicates the call rate or injection amounts, depending on the trigger mode.

The relay mode version of the washer setup report shows the call rate of the various chemical pumps, as well as the maximum trigger time setting.

The call rate is the amount of chemical that will be dispensed by the pump for each second of trigger on time (refer to **Setup Programming**).



WASHER TRIGGER SETUP REPORT

Page 1

ACCOUNT NAME: THE LAUNDRY
This report generated: AUG 12,93 07:16:08

NETWORK I.D. # 01
Last report generated: AUG 02,93 08:46:01

WASHER # 1 MILNOR #1 450LB TRIGGER MODE: RELAY

AMOUNTS IN Ounces

#	NAME	PUMP TIME SETTING (oz per second)	MAXIMUM TRIGGER TIME PER LOAD (seconds)
1	ASSIST	2.0	100
2	EDGE	2.0	80
3	BLEACH	1.0	45
4	TRIAX	1.0	20
5	LAUNCH	1.0	15
6	VALID II	1.0	15
7	EMPHASIZE	1.0	20
8	KATHON	1.0	7
9	Chem # 9 Name	0.0	No limit set
10	Chem # 10 Name	0.0	No limit set

SET UP VARIABLES LAST CHANGED: AUG 02,93

REPORT COMPLETE

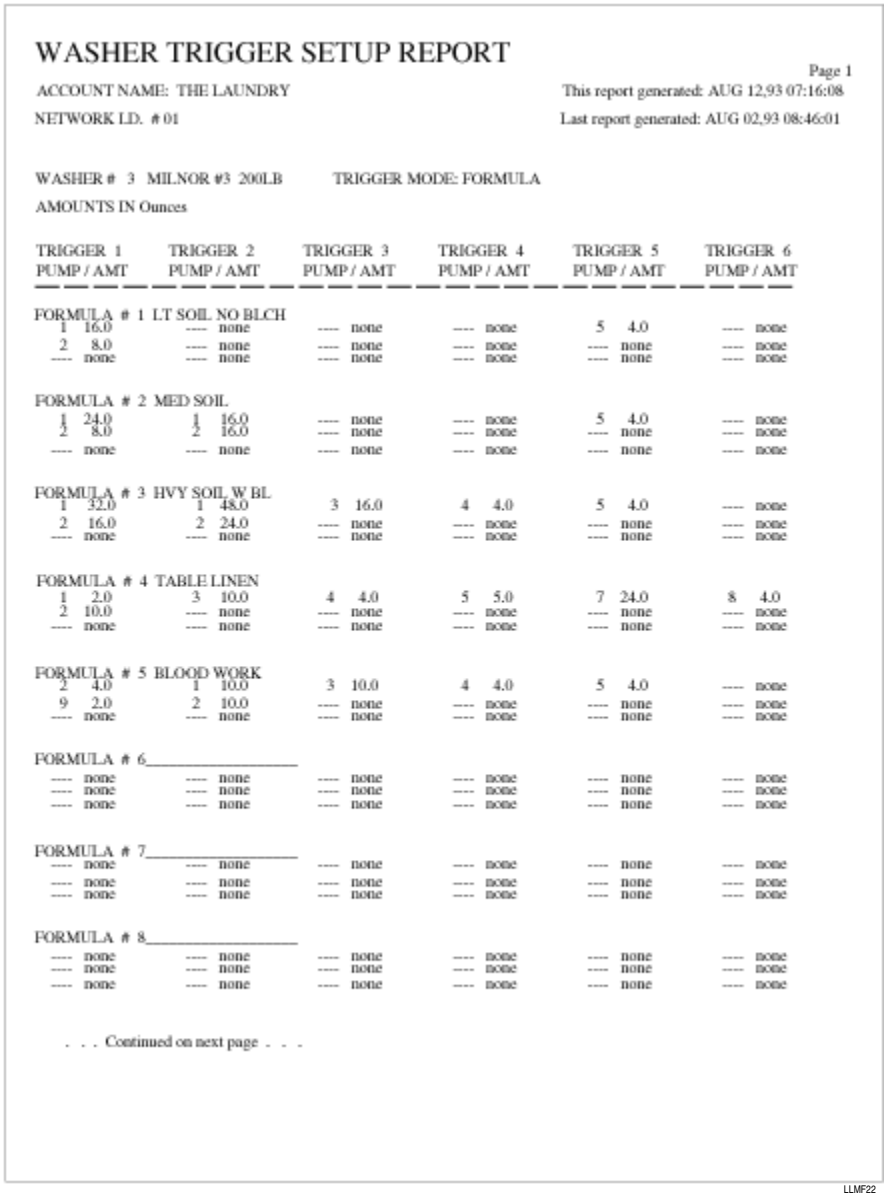
Rev. 1.00

LLF21

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 16 formulas available in formula mode (page 2 is identical and shows the remaining eight formulas).

Automatic mode has 32 functions available.



WASHER TRIGGER SETUP REPORT

Page 1

ACCOUNT NAME: THE LAUNDRY
This report generated: AUG 12,93 07:16:08

NETWORK LD. # 01
Last report generated: AUG 02,93 08:46:01

WASHER # 3 MILNOR #3 200LB TRIGGER MODE: FORMULA

AMOUNTS IN Ounces

TRIGGER 1 PUMP / AMT	TRIGGER 2 PUMP / AMT	TRIGGER 3 PUMP / AMT	TRIGGER 4 PUMP / AMT	TRIGGER 5 PUMP / AMT	TRIGGER 6 PUMP / AMT
FORMULA # 1 LT SOIL NO BLCH					
1 16.0	---- none	---- none	---- none	5 4.0	---- none
2 8.0	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
FORMULA # 2 MED SOIL					
1 24.0	1 16.0	---- none	---- none	5 4.0	---- none
2 8.0	2 16.0	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
FORMULA # 3 HVY SOIL W BL					
1 32.0	1 48.0	3 16.0	4 4.0	5 4.0	---- none
2 16.0	2 24.0	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
FORMULA # 4 TABLE LINEN					
1 2.0	3 10.0	4 4.0	5 5.0	7 24.0	8 4.0
2 10.0	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
FORMULA # 5 BLOOD WORK					
2 4.0	1 10.0	3 10.0	4 4.0	5 4.0	---- none
9 2.0	2 10.0	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
FORMULA # 6_____					
---- none	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
FORMULA # 7_____					
---- none	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
FORMULA # 8_____					
---- none	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none
---- none	---- none	---- none	---- none	---- none	---- none

. . . Continued on next page . . .

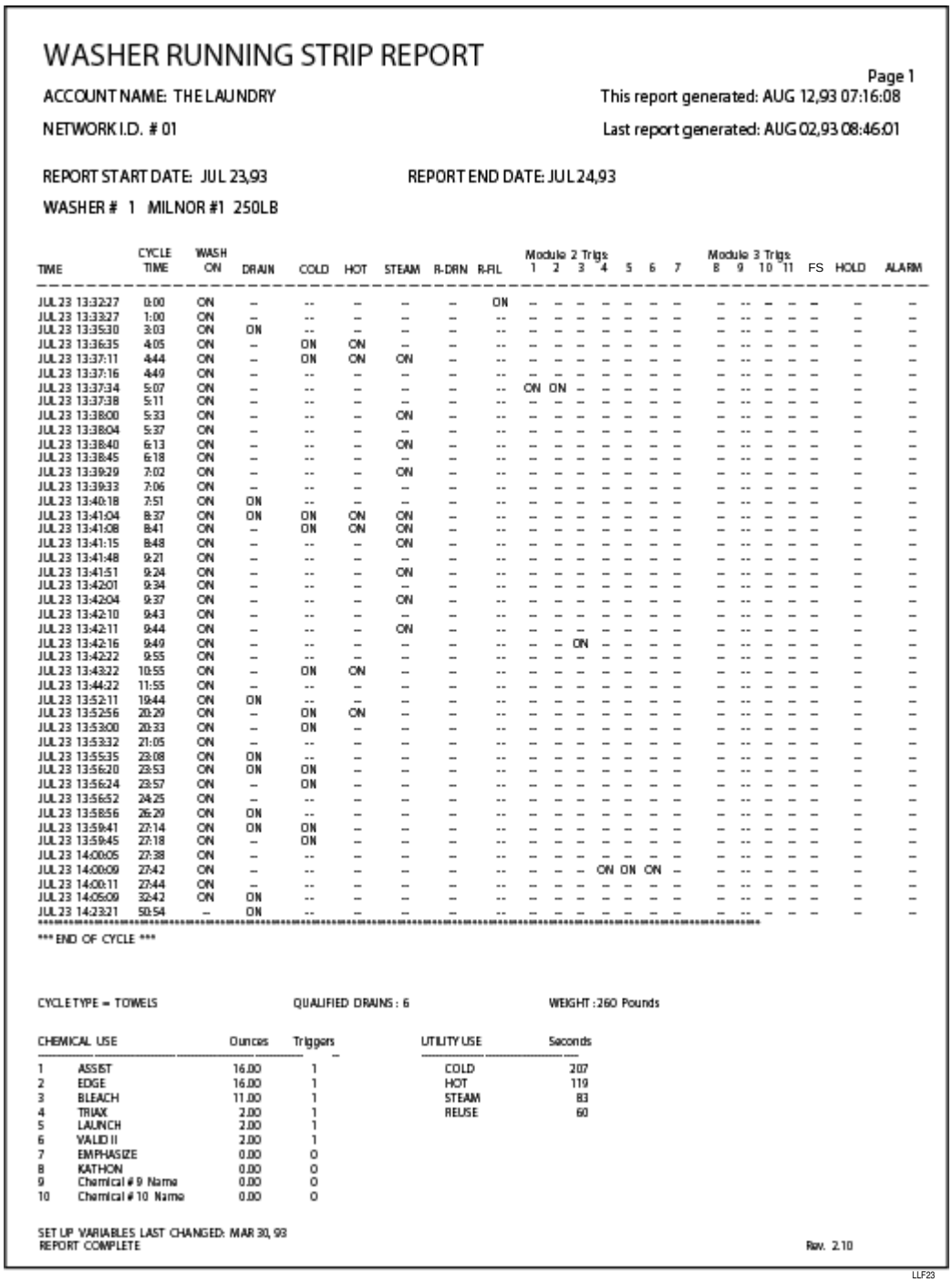
LLMF22

Figure 22. Washer Trigger Setup Report (Formula Mode)

WASHER RUNNING STRIP REPORT

The Washer Running Strip report is a diagnostic tool used primarily to verify the status and timing of the washer trigger and chemical trigger signals received by the system. Each time a channel changes state, the report logs the event.

This report may also be useful in diagnosing and identifying washer operational problems such as leaking drain valves (indicated by repeated water fills during a bath) or low water temperature (indicated by excessive steaming). This report may be run real time from the report screen or a stored version may be recalled.



WASHER RUNNING STRIP REPORT

Page 1

ACCOUNT NAME: THE LAUNDRY

This report generated: AUG 12,93 07:16:08

NETWORK I.D. # 01

Last report generated: AUG 02,93 08:46:01

REPORT START DATE: JUL 23,93

REPORT END DATE: JUL 24,93

WASHER # 1 MILNOR #1 250LB

TIME	CYCLE TIME	WASH ON	DRAIN	COLD	HOT	STEAM	R-DRN	R-FIL	Module 2 Trigs 1	2	3	4	5	6	7	Module 3 Trigs 8	9	10	11	FS	HOLD	ALARM
JUL 23 13:32:27	0:00	ON	–	--	–	–	–	ON	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:33:27	1:00	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:35:30	3:03	ON	ON	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:36:35	4:05	ON	–	ON	ON	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:37:11	4:44	ON	–	ON	ON	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:37:16	4:49	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:37:34	5:07	ON	–	--	–	–	–	--	ON	ON	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:37:38	5:11	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:38:00	5:33	ON	–	--	–	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:38:04	5:37	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:38:40	6:13	ON	–	--	–	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:38:45	6:18	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:39:29	7:02	ON	–	--	–	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:39:33	7:06	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:40:18	7:51	ON	ON	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:41:04	8:37	ON	ON	ON	ON	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:41:08	8:41	ON	–	ON	ON	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:41:15	8:48	ON	–	--	–	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:41:48	9:21	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:41:51	9:24	ON	–	--	–	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:42:01	9:34	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:42:04	9:37	ON	–	--	–	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:42:10	9:43	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:42:11	9:44	ON	–	--	–	ON	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:42:16	9:49	ON	–	--	–	–	–	--	–	–	–	ON	–	–	–	–	--	–	–	–	–	–
JUL 23 13:42:22	9:55	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:43:22	10:55	ON	–	ON	ON	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:44:22	11:55	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:52:11	19:44	ON	ON	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:52:56	20:29	ON	–	ON	ON	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:53:00	20:33	ON	–	ON	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:53:32	21:05	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:55:35	23:08	ON	ON	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:56:20	23:53	ON	ON	ON	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:56:24	23:57	ON	–	ON	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:56:52	24:25	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:58:56	26:29	ON	ON	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:59:41	27:14	ON	ON	ON	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 13:59:45	27:18	ON	–	ON	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 14:00:05	27:38	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 14:00:09	27:42	ON	–	--	–	–	–	--	–	–	–	ON	ON	ON	–	–	--	–	–	–	–	–
JUL 23 14:00:11	27:44	ON	–	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 14:05:09	32:42	ON	ON	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–
JUL 23 14:23:21	50:54	–	ON	--	–	–	–	--	–	–	–	–	–	–	–	–	--	–	–	–	–	–

*** END OF CYCLE ***

CYCLE TYPE = TOWELS

QUALIFIED DRAINS : 6

WEIGHT : 260 Pounds

	CHEMICAL USE	Ounces	Triggers
1	ASSIST	16.00	1
2	EDGE	16.00	1
3	BLEACH	11.00	1
4	TRIAX	2.00	1
5	LAUNCH	2.00	1
6	VALID II	2.00	1
7	EMPHASIZE	0.00	0
8	KATHON	0.00	0
9	Chemical # 9 Name	0.00	0
10	Chemical # 10 Name	0.00	0

UTILITY USE	Seconds
COLD	207
HOT	119
STEAM	83
REUSE	60

SET UP VARIABLES LAST CHANGED: MAR 30, 93
REPORT COMPLETE

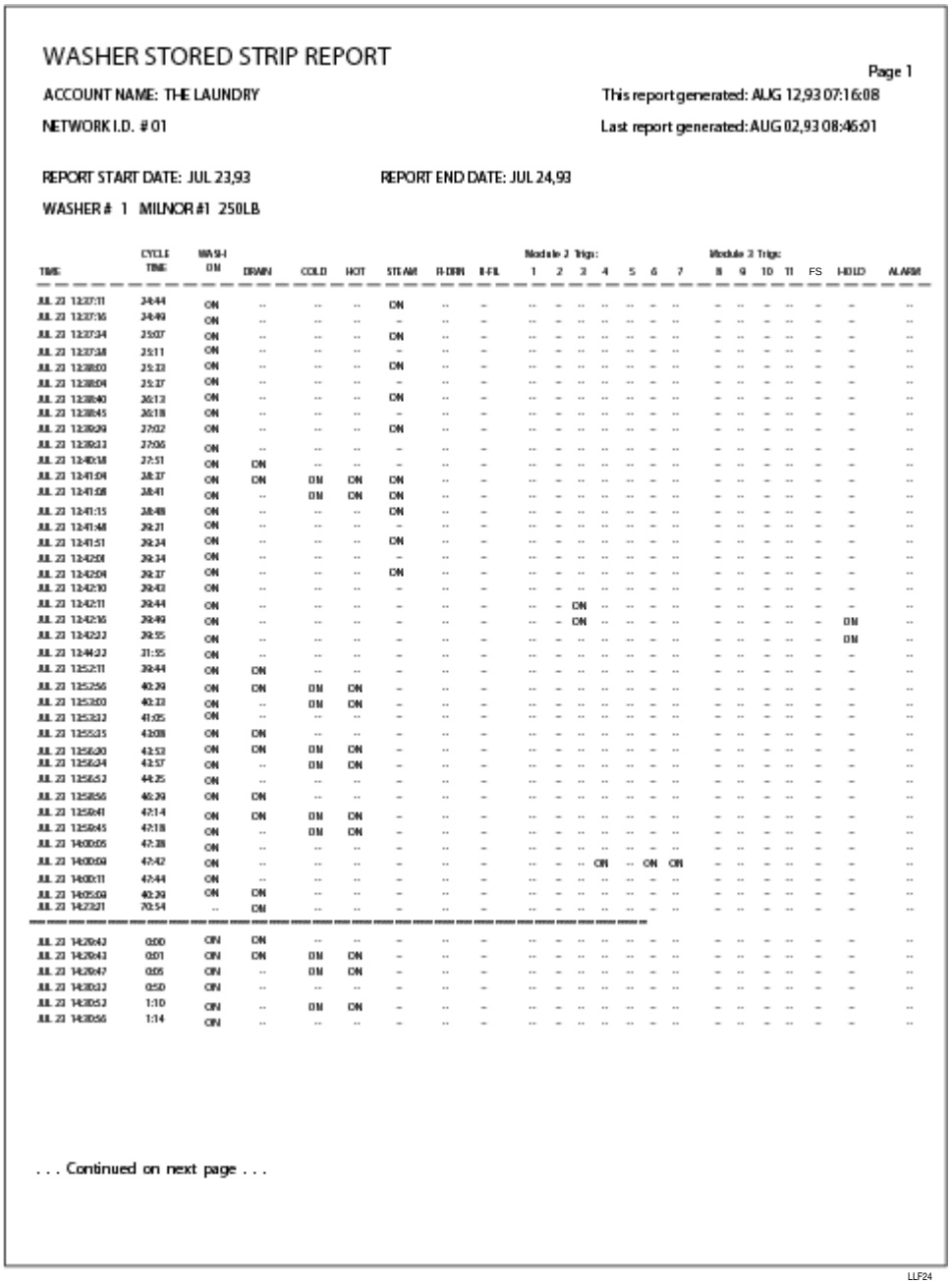
Rev. 2.10

LLF23

Figure 23. Washer Running Strip Report

WASHER STORED STRIP REPORT

The Washer Stored Strip report is a logged version of the Washer Running Strip report. The logging feature must be enabled from within the Washer Setup menu. The washer stored strip feature allows you to perform multiple washer diagnostics at the same time, or to have the stored strip running during normal operation of the wash aisle to catch a “once in a while” event. The system will store 1100 lines of events. This number of events is for all washers, so the fewer washers with this feature enabled, the longer that individual washer’s record can be.



WASHER STORED STRIP REPORT

Page 1

ACCOUNT NAME: THE LAUNDRY

This report generated: AUG 12,93 07:16:08

NETWORK I.D. # 01

Last report generated: AUG 02,93 08:46:01

REPORT START DATE: JUL 23,93

REPORT END DATE: JUL 24,93

WASHER # 1 MILNOR #1 250LB

TIME	CYCLE TIME	WASH ON	DRAIN	COLD	HOT	STEAM	H-DRN	H-FIL	Module 2 Trigs: 1	2	3	4	5	6	7	Module 3 Trigs: 8	9	10	11	FS	HOLD	ALARM
JUL 23 12:37:11	24:44	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:37:16	24:49	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:37:34	25:07	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:37:38	25:11	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:38:03	25:33	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:38:04	25:37	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:38:40	26:13	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:38:45	26:18	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:39:29	27:02	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:39:33	27:06	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:40:18	27:51	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:41:04	28:37	ON	ON	ON	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:41:08	28:41	ON	--	ON	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:41:15	28:48	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:41:48	29:21	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:41:51	29:24	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:42:01	29:34	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:42:04	29:37	ON	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:42:10	29:43	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:42:11	29:44	ON	--	--	--	--	--	--	--	--	ON	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:42:16	29:49	ON	--	--	--	--	--	--	--	--	ON	--	--	--	--	--	--	--	--	--	ON	--
JUL 23 12:42:23	29:55	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	ON	--
JUL 23 12:44:23	31:55	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:52:11	39:44	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:52:56	40:29	ON	ON	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:53:00	40:33	ON	--	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:53:33	41:05	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:55:15	42:08	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:56:20	43:13	ON	ON	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:56:24	43:17	ON	--	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:56:53	44:25	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:58:56	46:29	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:59:41	47:14	ON	ON	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 12:59:45	47:18	ON	--	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:00:05	47:38	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:00:59	47:42	ON	--	--	--	--	--	--	--	--	--	ON	--	ON	ON	--	--	--	--	--	--	--
JUL 23 14:00:11	47:44	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:05:59	48:29	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:23:21	70:54	--	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:26:42	0:00	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:26:43	0:01	ON	ON	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:26:47	0:05	ON	--	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:30:33	0:50	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:30:53	1:10	ON	--	ON	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JUL 23 14:30:56	1:14	ON	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

. . . Continued on next page . . .

LLF24

Figure 24. Washer Stored Strip Report

WASHER CYCLE RECORD REPORT

The Washer Cycle Record report is a representation of all the valid cycle data stored in the system 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 2790 cycles maximum for all washers served.

The cycle record may be printed for any or all cycle classifications or all washers during the selected time period. It is a valuable historical document for evaluation of wash aisle and machine performance, as well as for verifying chemical injections for the 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** and water fill. Also, any cycle with a chemical injection will be reported, regardless of cycle length or number of drains. The (*) in the column between cycle start time and cycle name indicates that there was a chemical feed irregularity in the load or that hygiene failed (use the Washer Error Cycle Report for more details).

WASHER CYCLE RECORD REPORT

Page 1

ACCOUNT NAME: THE LAUNDRY

This report generated: AUG 12,93 07:16:08

NETWORK I.D. # 01

Last report generated: AUG 02,93 08:46:01

REPORT START DATE: JUL 23,93

REPORT END DATE: JUL 24,93

WASHER # 1 MILNOR #1 450LB

CYCLE TYPE: ALL CYCLE TYPES

CYCLE START	WASH		CYCLE NAME	RUN TIME	QUALIFIERS D	1	2	3	4	5	CHEMICAL USE (Ounces) 1	2	3	4	5	6	7	8	9	10	UTILITY ON TIME (s) COLD	HOT	STEAM	REUSE
JUL 23 07:33	01		HEAVY SOIL	63:53	10	2	2	0	0	1	111.3	63.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	171	362	58	0
JUL 23 09:10	01		PANTS	40:40	7	1	1	0	0	1	24.0	21.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	159	220	75	0
JUL 23 10:01	01		HEAVY SOIL	60:04	10	2	2	0	0	1	111.3	63.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	171	362	51	0
JUL 23 11:55	01		HEAVY SOIL	61:56	10	2	2	0	0	1	111.3	63.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	181	348	50	0
JUL 23 13:25	01		PANTS	40:44	7	1	1	0	0	1	24.0	21.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	159	220	103	0
JUL 23 14:31	01		BLOOD WORK	70:28	12	3	2	1	1	1	124.0	60.1	31.9	15.9	9.1	0.0	0.0	0.0	0.0	0.0	248	264	70	0
JUL 23 16:11	01		STAIN TREAT	90:52	8	2	2	1	1	1	89.9	60.1	64.1	15.9	9.1	0.0	0.0	0.0	0.0	0.0	189	256	90	0
JUL 24 08:03	01		UNIDENTIFIABLE	11:08	1	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20	0	0	0
JUL 24 08:23	01		PANTS	40:40	7	1	1	0	0	1	24.0	21.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	159	220	96	0
JUL 24 09:35	01		HEAVY SOIL	70:54	10	2	2	0	0	1	111.3	63.1	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	201	342	65	0
JUL 24 11:13	01	*	SHOP TOWELS	80:18	15	2	2	0	0	0	100.0	60.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	168	324	253	0
JUL 24 13:50	01		SHOP TOWELS	74:10	15	2	2	0	0	0	124.0	60.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	109	301	213	0
JUL 24 15:15	01		BLOOD WORK	65:18	12	3	2	1	1	1	124.0	60.1	31.9	15.9	9.1	0.0	0.0	0.0	0.0	0.0	284	246	72	0

All valid data records between selected dates printed.

SET UP VARIABLES LAST CHANGED: AUG 02,93

REPORT COMPLETE

Rev. 1.00

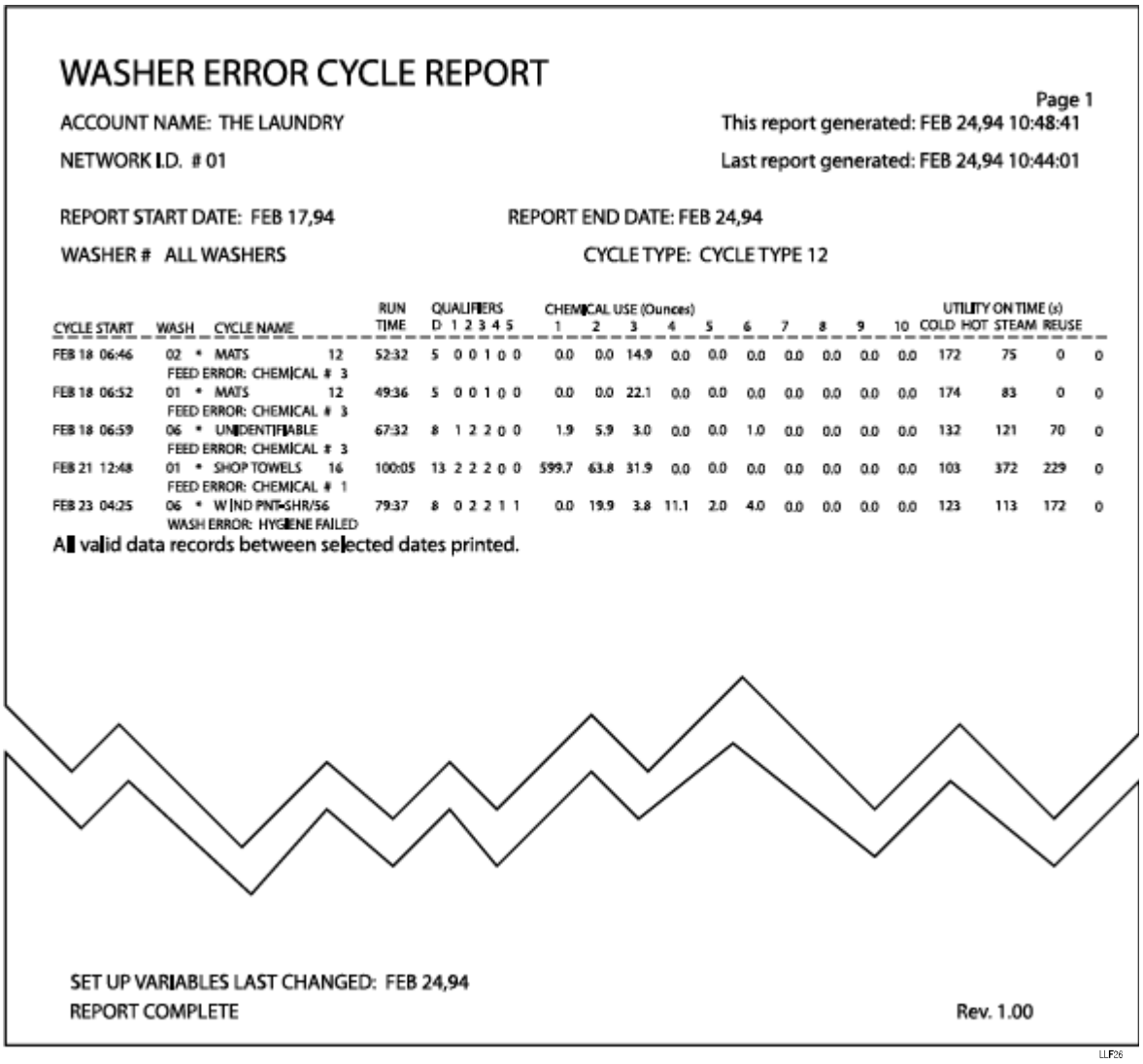
LLF25

Figure 25. Washer Cycle Record Report (All Cycles)

WASHER ERROR CYCLE

The Washer Error Cycle report is a variation of the Washer Cycle Record report. This report lists all cycles that had an error in the feed within the specified date range, and reports which chemical feed had the error. Hygiene failures are also reported.

The notation of a feed error does not necessarily mean that the chemical was or was not delivered, but only that the system detected something abnormal about the reported feed. Reference should be made back to the various stored strip reports for analysis and troubleshooting.



WASHER ERROR CYCLE REPORT

Page 1

ACCOUNT NAME: THE LAUNDRY

This report generated: FEB 24,94 10:48:41

NETWORK I.D. # 01

Last report generated: FEB 24,94 10:44:01

REPORT START DATE: FEB 17,94

REPORT END DATE: FEB 24,94

WASHER # ALL WASHERS

CYCLE TYPE: CYCLE TYPE 12

CYCLE START	WASH	CYCLE NAME		RUN TIME	QUALIFIERS D 1 2 3 4 5	CHEMICAL USE (Ounces) 1	2	3	4	5	6	7	8	9	10	UTILITY ON TIME (s) COLD	HOT	STEAM	REUSE
FEB 18 06:46	02 *	MATS	12	52:32	5 0 0 1 0 0	0.0	0.0	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	172	75	0	0
	FEED ERROR: CHEMICAL # 3																		
FEB 18 06:52	01 *	MATS	12	49:36	5 0 0 1 0 0	0.0	0.0	22.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	174	83	0	0
	FEED ERROR: CHEMICAL # 3																		
FEB 18 06:59	06 *	UNIDENTIFIABLE		67:32	8 1 2 2 0 0	1.9	5.9	3.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	132	121	70	0
	FEED ERROR: CHEMICAL # 3																		
FEB 21 12:48	01 *	SHOP TOWELS	16	100:05	13 2 2 2 0 0	599.7	63.8	31.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	103	372	229	0
	FEED ERROR: CHEMICAL # 1																		
FEB 23 04:25	06 *	WIND PNT-SHR/56		79:37	8 0 2 2 1 1	0.0	19.9	3.8	11.1	2.0	4.0	0.0	0.0	0.0	0.0	123	113	172	0
	WASH ERROR: HYGIENE FAILED																		

All valid data records between selected dates printed.

SET UP VARIABLES LAST CHANGED: FEB 24,94

REPORT COMPLETE

Rev. 1.00

LLF26

Figure 26. Washer Error Cycle Report

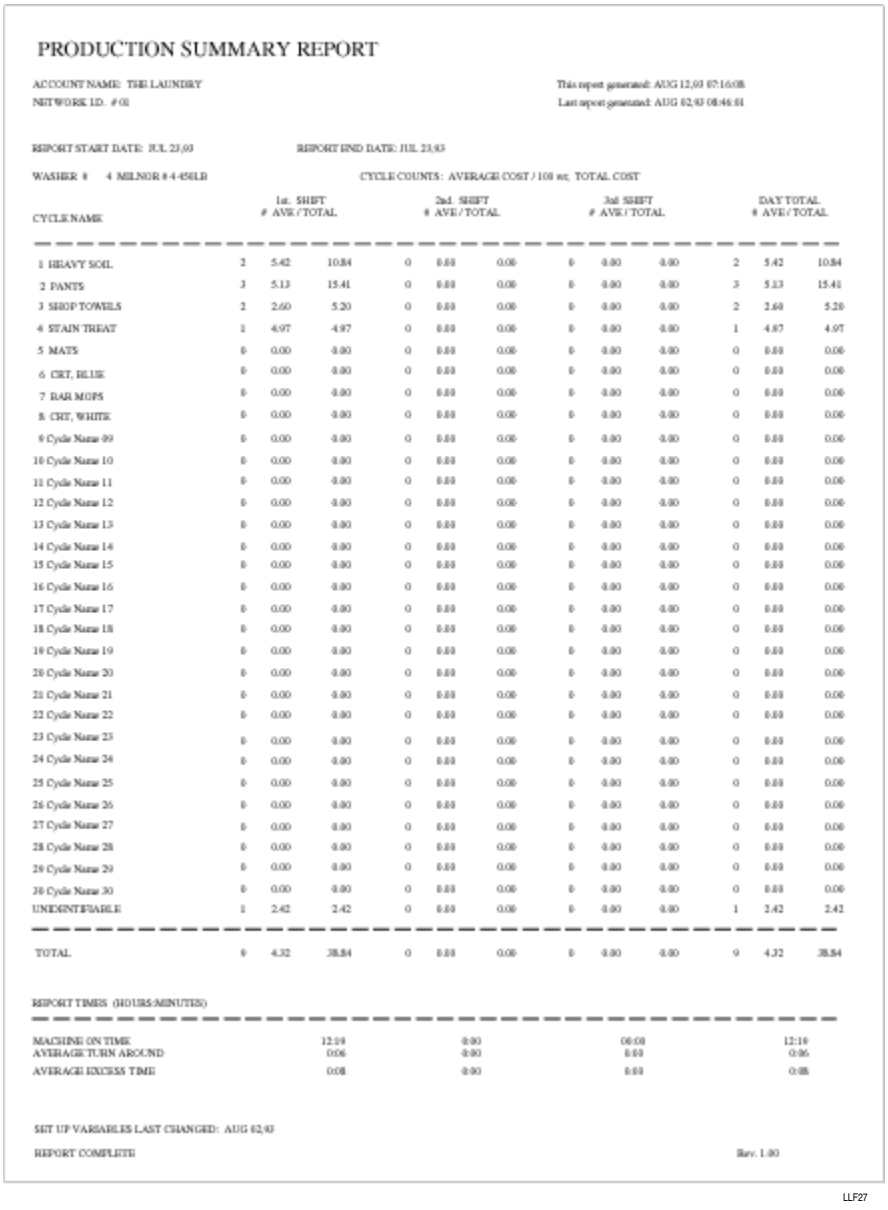
WASHER PRODUCTION SUMMARY

The Washer Production Summary report provides summary data of load count and average chemical cost (cwt) by classification or by washer. When an individual washer is selected, the totals are by classification, by shift.

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.

The weight used to calculate the cost per 100 weight for the unidentified loads is the weight of classification #30.

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



PRODUCTION SUMMARY REPORT

ACCOUNT NAME: THE LAUNDRY
NETWORK I.D. # 01

This report generated: AUG 12,03 07:16:08
Last report generated: AUG 02,03 08:46:01

REPORT START DATE: JUL 23,03 REPORT END DATE: JUL 23,03

WASHER # 4 MILNOR # 4 45SLB CYCLE COUNTS: AVERAGE COST / 100 wt. TOTAL COST

CYCLE NAME	1st. SHIFT #	AVE / TOTAL		2nd. SHIFT #	AVE / TOTAL		3rd SHIFT #	AVE / TOTAL		DAY TOTAL #	AVE / TOTAL	
1 HEAVY SOIL	2	5.42	10.84	0	0.00	0.00	0	0.00	0.00	2	5.42	10.84
2 PANTS	3	5.13	15.41	0	0.00	0.00	0	0.00	0.00	3	5.13	15.41
3 SHOP TOWELS	2	2.60	5.20	0	0.00	0.00	0	0.00	0.00	2	2.60	5.20
4 STAIN TREAT	1	4.97	4.97	0	0.00	0.00	0	0.00	0.00	1	4.97	4.97
5 MATS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
6 CRT, BLUE	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
7 BAR MOPS	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
8 CRT, WHITE	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
9 Cycle Name 09	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
10 Cycle Name 10	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
11 Cycle Name 11	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
12 Cycle Name 12	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
13 Cycle Name 13	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
14 Cycle Name 14	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
15 Cycle Name 15	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
16 Cycle Name 16	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
17 Cycle Name 17	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
18 Cycle Name 18	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
19 Cycle Name 19	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
20 Cycle Name 20	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
21 Cycle Name 21	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
22 Cycle Name 22	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
23 Cycle Name 23	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
24 Cycle Name 24	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
25 Cycle Name 25	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
26 Cycle Name 26	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
27 Cycle Name 27	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
28 Cycle Name 28	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
29 Cycle Name 29	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
30 Cycle Name 30	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
UNIDENTIFIABLE	1	2.42	2.42	0	0.00	0.00	0	0.00	0.00	1	2.42	2.42
TOTAL	9	4.32	38.84	0	0.00	0.00	0	0.00	0.00	9	4.32	38.84

REPORT TIMES (HOURS:MINUTES)

MACHINE ON TIME	12:19	0:00	00:00	12:19
AVERAGE TURN AROUND	0:06	0:00	0:00	0:06
AVERAGE EXCESS TIME	0:08	0:00	0:00	0:08

SET UP VARIABLES LAST CHANGED: AUG 02,03

REPORT COMPLETE

Rev. 1.00

LLF27

Figure 27. Production Summary Report (By Washer)

PRODUCTION SUMMARY REPORT

ACCOUNT NAME: THE LAUNDRY
NETWORK I.D. # 01

This report generated: AUG 12,93 07:16:08
Last report generated: AUG 02,93 08:46:01

REPORT START DATE: JUL 23,93 REPORT END DATE: JUL 23,93

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

WASHER NAME	1st. SHIFT #	AVE	TOTAL	2nd. SHIFT #	AVE	TOTAL	3rd SHIFT #	AVE	TOTAL	DAY TOTAL #	AVE	TOTAL
1 MILNOR #1 450LB	5	2.80	56.04	0	0.00	0.00	0	0.00	0.00	5	2.80	56.04
2 WASHEX #2 600LB	9	3.85	34.67	0	0.00	0.00	0	0.00	0.00	9	3.85	34.67
3 BRAUN #3 750LB	9	4.24	38.20	0	0.00	0.00	0	0.00	0.00	9	4.24	38.20
4 MILNOR #4 450LB	2	2.42	19.36	0	0.00	0.00	0	0.00	0.00	2	2.42	19.36
5 BRAUN #5 200LB	5	1.34	20.23	0	0.00	0.00	0	0.00	0.00	5	1.34	20.23
6 BRAUN #6 200LB	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
7 Washer Name 7	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
8 Washer Name 8	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
9 Washer Name 9	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
10 Washer Name 10	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
11 Washer Name 11	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
12 Washer Name 12	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
13 Washer Name 13	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
14 Washer Name 14	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
15 Washer Name 15	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00
TOTAL	30	2.76	168.53	0	0.00	0.00	0	0.00	0.00	30	2.76	168.53

REPORT TIMES (HOURS:MINUTES)

MACHINE ON TIME	37:59	0:00	00:00	37:59
AVERAGE TURN AROUND	0:08	0:00	0:00	0:08
AVERAGE EXCESS TIME	0:11	0:00	0:00	0:11

SET UP VARIABLES LAST CHANGED: AUG 02,93

REPORT COMPLETE Rev. 1.00

LLF28

Figure 28. Production Summary Report (All Washers)

REAL TIME DIAGNOSTIC REPORT

The Real Time Diagnostic report provides a listing of some of the flow and conductivity values observed and used by the ILS Max System when the system is performing a feed and auto-calibration procedure. This report is useful when analyzing the Auto-Cal Status message reported by the Pump Stored Strip and Pump Running Strip reports.

Data in this report is printed as events occur during a feed. The report consists of six columns of numbers, each column representing a reading or value used by the ILS Max. The readings are reported at 1/2-second intervals throughout the feed being monitored, but the ILS Max System actually makes readings every 1/4-second. As such, any attempt to accomplish a manual approximation of the ILS Max calculation may not match results printed by the report.

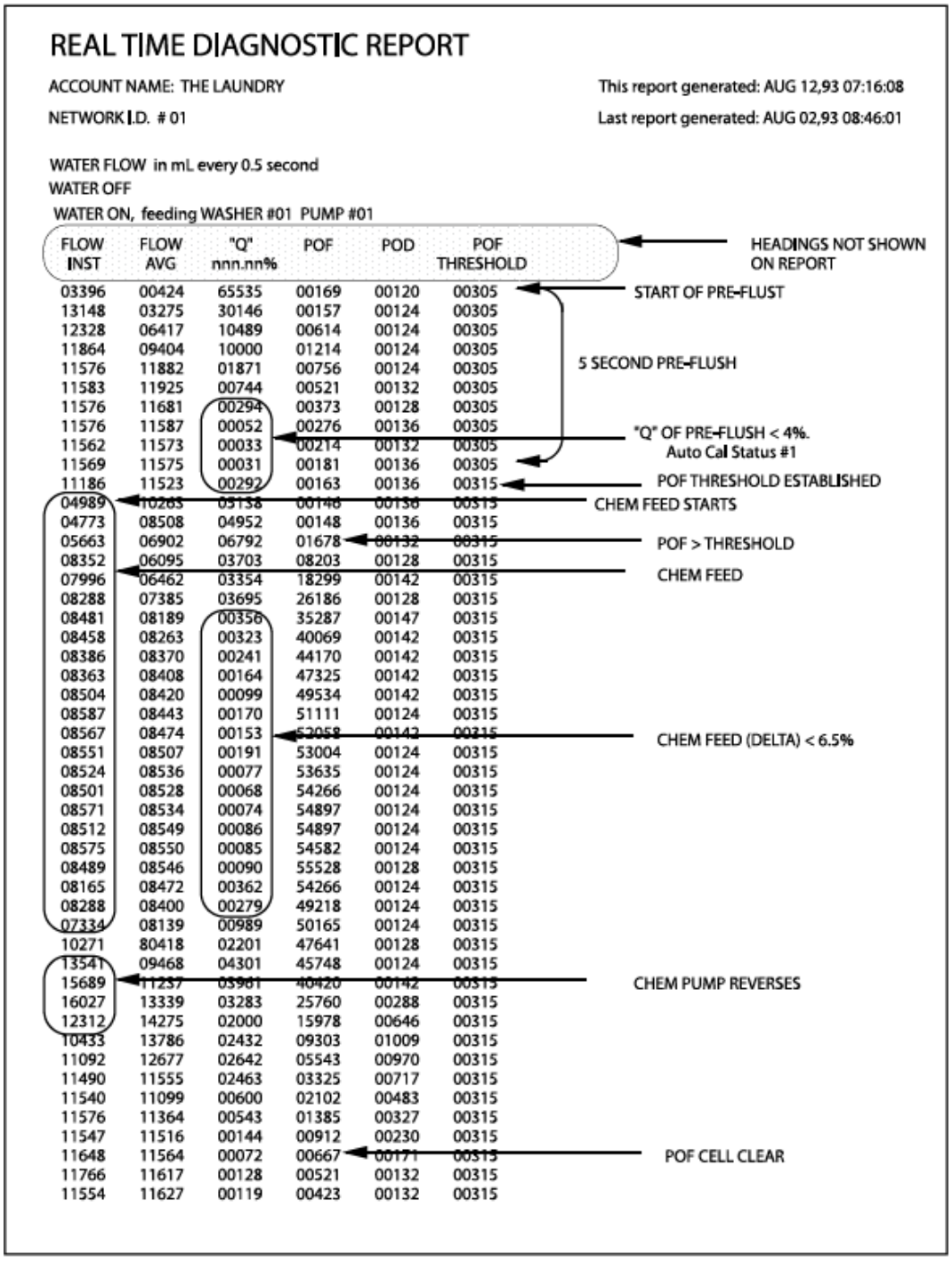


Figure 29. Real Time Diagnostic Report

The columns of numbers in the Real Time Diagnostic report represent the following:

1. Instantaneous flow rate, in milliliters, as reported by the flow meter.

All flow rates will be in milliliters regardless of the units setting (U.S. or metric) of the system. This diagnostic is used primarily for analysis of the calibration process early in the feed sequence. As such, data reported for long feed cycles may have gaps due to print buffer overflow. This should not be considered an error.

2. Average flow rate of the last eight instantaneous flow readings.
3. The quality or stability of the flow reading as a percentage. Used to determine the probability that the calibration is accurate, and that the flow readings are not affected by air or other factors. Value is in % x 100.
4. Current POF reading in µsiemens.
5. Current POD reading in µsiemens.
6. Current POF threshold in µsiemens. The value the ILS Max uses to determine that there is POF.

Figure 30 is a graphical representation of feed data that would be reported by a Real Time Diagnostic report. This example illustrates the Q boundaries as they relate to preflush and chemical feed portions of a feed.

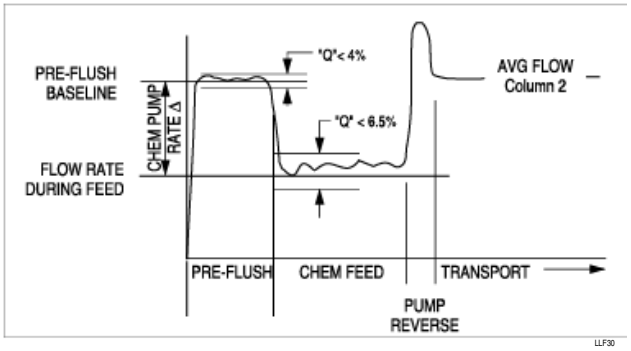


Figure 30. Flow Rate Calibration

Interpreting the Calibration Status Messages

The determination of the Auto-Cal Status, as shown in the following segment of the Pump Stored Strip report, is in most cases based on the value of Q (Column 3 of the Real Time Diagnostic report).

Occasional Auto-Cal values of 2, 3, or 4 are to be considered normal, and are generally caused by small amounts of entrained air migrating to the top of the chemical supply hoses (This is particularly common with hydrogen peroxide). Auto-Cal status code #3 would be typical of this condition. If the incidence becomes excessive, further investigation is warranted.

PUMP STORED STRIP REPORT

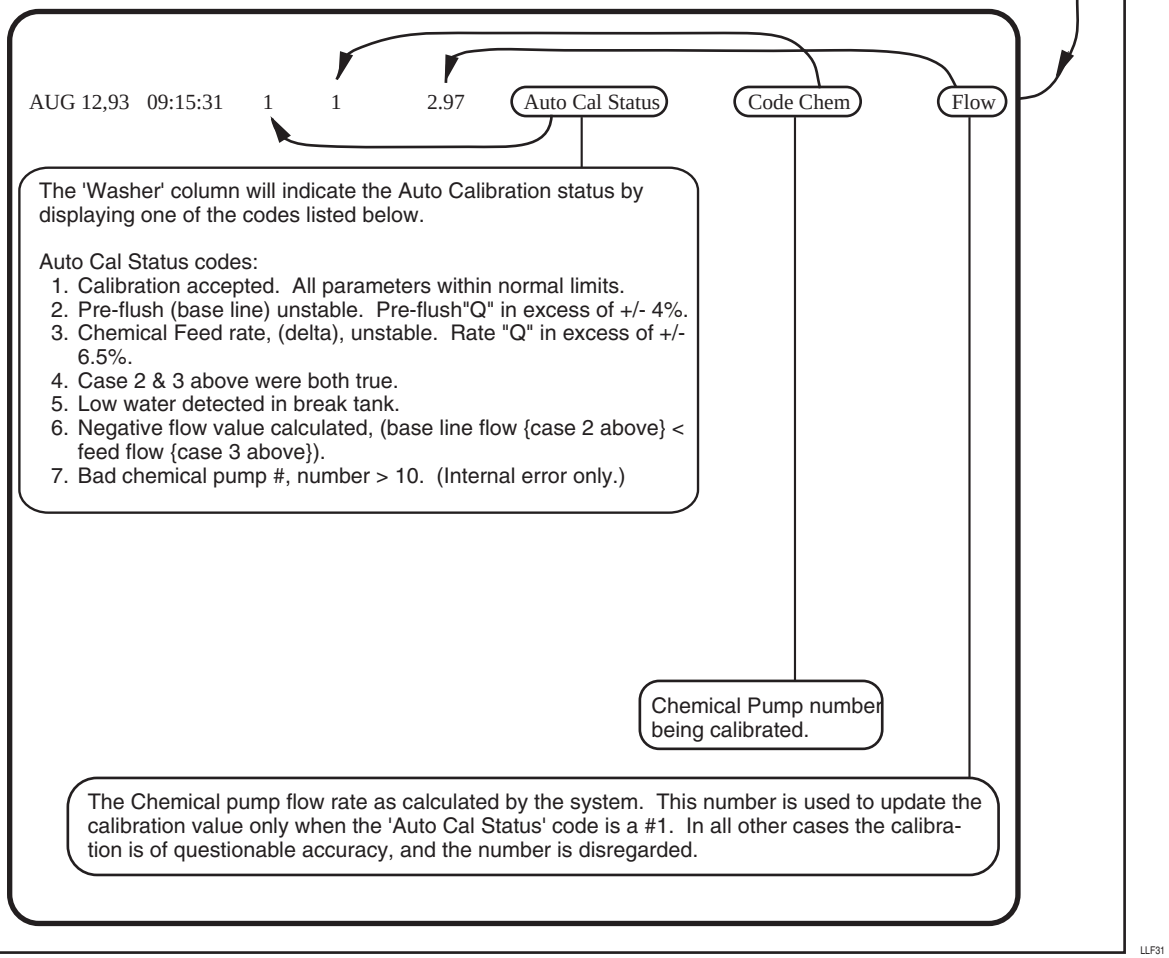
Page 18

ACCOUNT NAME: THE LAUNDRY
NETWORK I.D. # 01

This report generated: AUG 12,93 07:16:08
Last report generated: AUG 02,93 08:46:01

REPORT START DATE: AUG 12,93 REPORT END DATE:AUG 12,93

DATE	TIME	WASH	PUMP	AMOUNT Oz	EVENT	
AUG 12,93	09:14:51	3	1	7.97	FEED REQUEST	RELAY MODE
AUG 12,93	09:14:58	3	3	10.14	FEED REQUEST	RELAY MODE
AUG 12,93	09:15:02	2	2	3.97	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:15:02	3	2	8.97	FEED REQUEST	RELAY MODE
AUG 12,93	09:15:26	2	1	27.92	FEED REQUEST	RELAY MODE
AUG 12,93	09:15:26	2	----	----------	WASHER HOLD SET	
AUG 12,93	09:15:31	1	1	2.97	Auto Cal Status	Code Chem Flow
AUG 12,93	09:15:37	3	1	7.97	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:15:41	3	1	7.97	PROOF OF DELIVERY	CONFIRMED
AUG 12,93	09:15:50	1	3	3.09	Auto Cal Status	Code Chem Flow
AUG 12,93	09:15:56	3	3	10.14	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:16:06	6	3	40.96	Auto Cal Status	Code Chem Flow
AUG 12,93	09:16:09	3	2	8.97	PROOF OF FLOW	CONFIRMED
AUG 12,93	09:16:11	3	3	10.14	PROOF OF DELIVERY	CONFIRMED



LLF31

Figure 31. Pump Stored Strip Report with Chemical Codes

The following are things to check for based on the Auto-Cal status code (refer to Figure 31).

CODE	MEANING AND WHAT TO CHECK
#1	*All calibration parameters are within normal limits. Nothing to check.*
#2	*During the preflush, and the preflush extension, the flow was unstable (Q > 4%). This may be due to air leaks in the flush manifold, or perhaps a partially full break tank. Shine a bright light through various portions of the manifold system to help isolate the source of air leaks.*
#3	*During the chemical feed, the flow was unstable (Q > 6.5%). This may be due to air leaks in the connection from the chemical supply hose, or perhaps entrained gases collecting in the top of the supply tube.*
#4	*All flow readings unstable. Check for air leaks in the manifold and supply hoses (as described above). May occur during the first feed of the day, or after a long period of inactivity.*
#5	*Low water level detected in the break tank, as reported by the float switch. Check water supply for proper flow rate, verify free movement of the float valve ball.*
#6	*Most often caused by nonlinear flow characteristics of the chemical being pumped. The chemical cannot be pumped at a high rate of flow through the chemical suction tube. Suggest changing the chemical pump rate from Auto to Half or Slow speed.*
#7	*Internal error check only.*

The result of a manual calibration is also logged. Since these codes are different than those used when logging an automatic calibration, they are listed here for reference. As with automatic calibration, the logged flow rate is that calculated by the system during the calibration.

CODE	MEANING AND WHAT TO DO
#1	*A successful fast speed calibration was performed.*
#2	*The chemical pump flow rate measured during a fast speed calibration was too high. The calibration should be repeated.*
#3	*The chemical pump flow rate measured during a fast speed calibration was too low. The calibration should be repeated.*
#4	*A successful slow speed calibration was performed.*
#5	*The chemical pump flow rate measured during a slow speed calibration was too high. The calibration should be repeated.*
#6	*The chemical pump flow rate measured during a slow speed calibration was too low. The calibration should be repeated.*

Manual calibration error codes 2, 3, 5 and 6 are logged only when the result of the calibration is so far from the normal chemical pump flow rate that it must be restricted to prevent possible incorrect operation of the system. It is possible to perform highly inaccurate calibrations without generating one of these error codes; it is the user's responsibility to verify that the result of a manual calibration is accurate.

SERVICE AND MAINTENANCE

The ILS Max has a modular architecture and open design to facilitate easy and rapid replacement of all critical components in the system. Complete modules or major subassemblies usually can be replaced in less than 1/2 hour.

COMPONENT REPLACEMENT

*ILS Max is an automatic system. **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.*

Relay Board Replacement

If the system has an alarm circuit powered by a separate branch circuit, power may still be present within the pump box or at the relay board, even when power to the pump box is disconnected. Disconnect all power to all elements of the system before servicing.

1. Disconnect power to pump box.
2. Disconnect all connections to the relay board.
3. Remove the six mounting screws.
4. Remove the old relay board and insert the new board.
5. Insert the six mounting screws. Reconnect all connections to the board. Note the tab on the ribbon cable/hole plugs, and locking ramps on the harness housings. Reconnect power to the pump box.

Model 100 Board Replacement

When servicing or replacing the Model 100 board, extreme caution should be used to prevent shorting of the battery backed RAM devices. These devices are under power at all times, even with the board completely removed from the system. DO NOT PLACE THE MODEL 100 BOARD ON ANY CONDUCTIVE SURFACE, such as the lid of the adjacent pump modules or a metal work bench. Failure to observe this caution may result in the loss of all stored data, and possible destruction of the Model 100 board.

1. Disconnect power to pump box.
2. Disconnect keypad, printer port harness and ribbon connectors.

3. Remove the six mounting screws.
4. Remove the old Model 100 board.
5. Exchange RAM with new board if required (see instructions below).

RAM is the memory for the system, which contains all setup information and the cycle records. Use caution when removing and replacing the RAM to ensure that all of the device pins are straight and properly aligned. Do not replace the battery located on the board. Doing so will result in the loss of all programmed and historical data.

6. Install the new Model 100 board, reversing steps above.
7. Power up and observe system.

Pump Box Model 100 Board EPROM Change (Software)

At times, a new EPROM with updated software will be issued for the pump box. To install the new EPROM, follow the steps below to exchange the EPROM.

1. Turn off power to the system.

DO NOT LEAVE THE PRINTER PLUGGED IN TO THE SYSTEM WHILE CHANGING THE EPROM. The printer provides an alternate power source to the board, even though the system power is turned off.

2. Open the top cover.
3. Locate the EPROM socket on Model 100 board

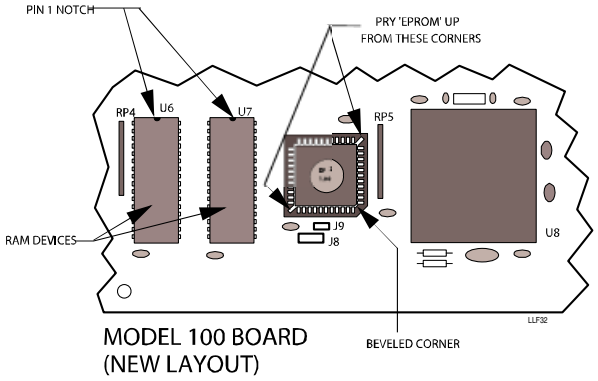


Figure 32. EPROM and EPROM Replacement

4. Remove EPROM from socket. Insert a long pointed object into the space at the upper right and lower left corners of the socket to pry the IC out of the socket. Exercise caution when removing the device, as the pins may be easily bent.
5. Place new EPROM in socket with the bevel in the lower right corner. Check that the pins align properly and press in firmly to seat the EPROM.

Changing or Transporting RAM (Data and Setup Memory)

All of the system setup information, as well as all logged data, is stored in two battery backed-up RAM (Random Access Memory) memory devices. Some models of this device have internal batteries that allow the devices to be moved from one Model 100 board to another, thus preserving the stored data they contain.

When attempting to change or transport these devices, extreme caution must be used, as these devices are static sensitive. Care must also be taken not to damage the pins when removing or reinserting the devices.

There are two RAM devices on each Model 100 board. When transferring the devices, make certain that they are reinserted in the proper location in the new board.

Smart Pump EPROM Change (Software)

At times, a new EPROM with updated software will be issued for the smart pump. To install the new EPROM, follow the steps below to exchange the EPROM.

1. Turn off power to the system.
2. Open the top cover of the transport pump module(s).
3. Locate EPROM socket on the smart pump drive board.
4. Remove EPROM from socket. Insert a long pointed object into the space at the upper right and lower left corners of the socket to pry the IC out of the socket. Exercise caution when removing the device, as the pins may be easily bent.
5. Place new EPROM in socket with the notch in the upper left corner.

Washer Interface Software Change

The program for the washer interface resides within the module's microprocessor. To change the washer interface software:

1. Turn off power to the system.
2. Remove the washer interface module from the washer or other mounting.
3. Remove the six screws securing the two halves of the plastic enclosure.
4. Locate processor socket on the interface board.
5. Remove the processor from socket. Insert a long pointed object into the space at the upper right and lower left corners of the socket to pry the IC out of the socket. Exercise caution when removing the device, as the pins may be easily bent.
6. Place new processor in socket with the notch in the upper left corner.
7. Reassemble the module and reinstall.

Clearing the Memory

RAM memory is normally cleared prior to shipment from the factory. Although the setup information may always be changed by the user via the various setup screens, the setups may also be cleared (reset) to the factory defaults by a special procedure.

The historical data (chemical use, cycle data and stored strip data) cannot be altered by any normal means, but may also be cleared (erased) by a special procedure.

The following procedures should be used with extreme caution, as the entire ILS Max memory content is vulnerable.

Clear All Setup Data (Leave Logged Data)

1. Turn off power to ILS Max.
2. Press and hold ∧ and ∨ keys and turn on power to the system.
3. Continue to press both keys until purge is indicated.

A record of the setup data being cleared will be logged in the stored strip record.

Clear All Logged (Historical) Data Only (Leave Setups)

1. Turn off power to ILS Max.
2. Press and hold the < and > keys and turn on power
3. Continue to press both keys until purge is indicated.

A record of the logged data being cleared will be logged in the stored strip record. At this point, there is no other logged data in the stored strip record so, in effect, this is the starting point for all future records.

KEYPAD REPLACEMENT

The keypad is a non-repairable assembly. If the keypad is defective, the front label assembly must be replaced.

PERISTALTIC PUMP TUBE REPLACEMENT

ILS Max has a Worn Tube Alarm status message which will be displayed when the flow rate of the pump tube is less than 50% of it's original value. Tubes should be replaced when this occurs.

The ILS Max peristaltic pumps are equipped with special tube adaptors on the uptake side. It is important to always use these adaptors.

1. Disconnect power to the pump box.
2. Disconnect the chemical uptake tube from the pump fitting, allowing the chemical to drain back into the storage drum.
3. Disconnect pump tube from manifold. The easiest method is to cut the tube with a knife.
4. Remove four screws from pump cover.
5. Remove pump cover. Use caution and make sure the uptake tube connector bushing does not come out of the pump housing.

The tube connector has a flat surface on one side. Be certain that this flat surface is properly aligned with the left side of the pump housing.

1. While uptake tube and connector are still in the housing, remove pump tube.
2. Slide new pump tube onto uptake tube connector and then into housing.
3. Be sure tube is against pump housing outer wall.
4. Replace pump cover and screws.
5. Again, check that pump tube is not pulled from outer edge of housing.
6. Cut tube to length and slip onto manifold.
7. Secure tube to manifold with clamp or plastic tie wrap.
8. Reset the Tube Life total via the setup screen.
9. Reset the pump calibration if using automatic calibration or recalibrate the pump if using manual calibration.

PERISTALTIC PUMP MOTOR/GEARBOX REPLACEMENT

A peristaltic pump motor/gearbox can be replaced by removing the front pump plate.

1. Disconnect power to the pump box.

If motor replacement is attempted without disconnecting power to the pump box, and one of the motor wires shorts to the metal enclosure, the relay board may be damaged.

2. Remove the screws securing the pump panel and gently pull out on the bottom of the panel. When the alignment pins are free of the chassis, the panel will drop down.
3. Remove motor wires from gearbox (note color codes).
4. Remove pump tube (see **Pump Tube Replacement**).
5. Unscrew four screws from rear pump housing.
6. Remove motor/gearbox assembly though top of cabinet.
7. Install new motor by reversing the above steps (take care to replace motor wires by color coded locations).
8. Reset the Pump Life total via the setup screen.

TRANSPORT PUMP TROUBLESHOOTING

If a failure of the transport pump has occurred, the status message Transport Pump Error is displayed.

Transport Pump Error status can also be caused by other problems. Refer to ***Diagnostics and Troubleshooting*** *for more details.*

If the pump motor does not run, check the LED indicators located on the smart pump PC board. The left LED indicates drive for the left diaphragm pump; the right LED is the right pump drive. If the LED is not on when the pump is supposed to be running, verify the address switch setting is correct. If the address is correct and the LED does not light, replace the PC board.

If the pump runs, but there is no water flow, check the manifold for air leaks. Air in the system will cause low or no water flow.

TRANSPORT PUMP REPLACEMENT

The transport pumps may be individually replaced, or repaired in place if desired. If the motor does not turn, the entire pump must be replaced.

1. Disconnect power to the pump box.
2. Remove the transport module front panel cover.

3. Disconnect the manifold fittings and motor drive wires.
4. Loosen and remove the four screws securing the pump to the mounting bracket (Removal of the entire motor mounting bracket may provide easier access to the motor mounting hardware).
5. Remove and replace the defective motor.
6. Reassemble in reverse order.
7. Run the transport pump and check all fittings for leaks.
8. Reset the Pump Life total via the setup screen.

PUMP HEAD REPLACEMENT

Although repair kits are available for the diaphragm pump, it is recommended that the entire pump be replaced with a new or rebuilt pump. 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.

1. Disconnect power to the pump box.
2. Remove the transport module front panel cover.
3. Disconnect the manifold fittings.
4. Remove screws securing transport pump head.
5. Remove pump head by sliding down from motor.
6. Replace the valve and seal assembly with the new part.
7. Reassemble the pump head.
8. Slide pump head up into pump motor.
9. Reverse above steps.
10. Run the transport pump and check all fittings for leaks.
11. Reset the Pump Life total via the setup screen.

PROOF OF FLOW CELL SERVICE

The POF cell is mounted in a tee fitting located at the output side of the manifold. The cell is removed by unscrewing the blue retaining nut and withdrawing the cell. Do not misplace the O-ring seal. Clean the cell probes with a fine abrasive and rinse with clear water. Reinsert the cell in the tee and tighten the retaining nut.

The temperature compensating thermistor of the POF cell is connected across the green and yellow wires of the cable. The resistance of the thermistor is approximately 30K ohms at 25°C (77°F) (The probe resistance is linear, from 100K ohms at 0°C (32°F) to 2K ohms at 100°C (212°F).

BREAK TANK MODULE REMOVAL

The entire break tank module may be removed from the pump box for service access if necessary.

1. Turn off the water supply to the system.
2. Remove the manifold cover section to provide access to the break tank.
3. Remove the break tank by sliding it slightly sideways and freeing the lip of the tank from the support bracket. Clean tank of debris if necessary.
4. Disconnect the break tank module harness at the relay board, J3. Feed the harness down through the clearance hole. (For ease of reassembly, connect a messenger wire or string to the harness before pulling the harness through the pump box chassis.)
5. Remove the four screws securing the break tank frame to the pump box. Support the assembly in order to not damage the wiring.

REPLACING FLOAT SWITCH

Please note that when you are replacing the float switch (code #042595) you will need to reverse the float when installing it in an ILS Max system. To reverse the float, follow these instructions.

1. Pull plastic clip off the bottom of the float switch.
2. Remove the float, turn it upside-down and then replace it.
3. Replace plastic clip.

FLOAT VALVE SERVICE

The float valve is most easily serviced by first removing the break tank assembly for the main pump box.

1. Turn off the water supply to the system.
2. Remove the break tank.
3. Remove the four screws securing the break tank frame to the pump box. Support the assembly in order to not damage the wiring.
4. Disassemble the water inlet piping and remove the float valve from the frame.
5. Reassemble in reverse order. Use appropriate thread sealing for all fittings.
6. Adjust the float arm for a water level in the break tank approximately one inch from the tank rim. The arm is generally straight for this setting.

FLOW METER REMOVAL

You may replace the flow meter without removing the break tank from the pump box.

1. Turn water off to the system.
2. Disconnect power to pump box.
3. Remove the manifold cover section to provide access to the break tank.
4. Disconnect wires from the flow meter.
5. Disconnect the manifold fitting and counter flow tube.
6. Remove the counter flow tee and flow meter as a unit.
7. Remove/replace flow meter. Make note of the flow calibration number stamped on the metal tag attached to the new flow meter.
8. Reconnect the manifold fittings. Use appropriate thread sealing for all fittings.
9. Remember to reprogram the calibration factor of the new flow meter in the Pump Box Setup menu.

Use caution when screwing fittings into new flow meter. Excessive force will crack the flow meter body.

10. Run a transport pump and check all fittings for leaks.

WATER SOLENOID SERVICE

The water solenoid is designed to prevent water from accidentally overfilling the break tank when the ILS Max is not feeding chemicals. In addition to the water solenoid, there is a mechanical float valve in the break tank and an electric float switch at the bottom of the tank. The mechanical valve modulates the flow of water into the break tank and would make the system functional if it worked alone. The electric switch is used to detect a low water condition.

During normal operation, if the mechanical float valve is working correctly, it is not possible to detect a faulty water solenoid valve. A faulty water solenoid will not close after the chemical feed is finished.

Solenoid Valve Replacement

1. Disconnect power to the pump box.
2. Disconnect water supply connections.
3. Disconnect the square black DIN connector from the solenoid valve.
4. Remove and replace solenoid valve.
5. Reassemble and reinstall.

PROOF OF DELIVERY CELL SERVICE

1. The POD cell is mounted in a tee fitting located at the washer.
2. Remove the cell by unscrewing the blue retaining nut and withdrawing the cell. Do not misplace the O-ring seal.
3. Clean the cell probes with a fine abrasive and rinse with clear water.
4. Reinsert the cell in the tee and tighten the retaining nut.

APPENDIX A. APPLICATION NOTES

WASHER HOLD

General Description

The washer hold feature is accomplished via a Form C (SPDT) relay located within the washer interface module. The relay contacts are rated at 5 Amperes/240 VAC. The relay is activated whenever it is determined by the pump box computer that a chemical delivery to a given washer will not be accomplished within one minute.

Card Reader Application

For a typical card reader type machine controller, the formula card drive motor would be connected through the normally closed contacts of the hold relay. As such, the formula card would not be advanced during a hold condition.

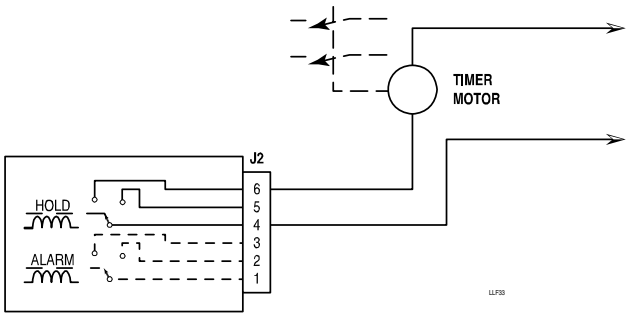


Figure 33. Card Reader Controller Wiring

Shown above is a typical wiring configuration for interrupting the timer motor to hold the washer.

Microprocessor Applications

Although, in systems using microprocessor controllers, the hookup may vary depending on the particular processor utilized, there are generally two wiring methods recommended to accomplish the desired result:

1. If the processor has an input dedicated to a hold or other cycle delay feature, connection to this input in accordance with the manufacturer's instructions is all that should be required. See **Dedicated Inputs** for specific manufacturer's recommendations.
2. If the processor has no input dedicated for a hold or other cycle delay feature, then it will be necessary to manipulate various signals to "fool" the processor into a hold state. This may usually be accomplished by interrupting the level signal to force the processor into a "wait" state while it is waiting for the washer to fill. In conjunction with the interruption of the level signal, it will be necessary to interrupt the drive signals to the hot and cold water valves, and the reclaim supply valve, if used (refer to **Generic Wiring Solutions**).

Following are some examples of possible hold wiring configurations.

DEDICATED INPUTS

Washex

The Washex processor may be held by interrupting the coil circuit of the PTR (program timer relay). As long as the PTR circuit is held open, the program timer will not advance.

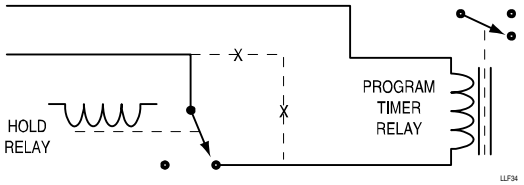


Figure 34. Washex Program Timer Relay Hold.

Automatic Control Systems (ACS)

ACS controllers are equipped with a Remote Hold feature that will place the washer on hold when a contact closure is provided across the remote hold inputs. Note that all of the output signals will remain in the state they were in at the time the hold was

activated. For this reason, ILS Max will not place the washer on hold until after the chemical triggers have deactivated.

Milnor

Milnor provides an option called Chemsave that consists of one relay output (Chemical Injection desired) and two inputs (Halt Bath Time and Halt Chemical Injection).

Halt Bath time may be used to stop the bath counter from counting down, thus allowing ILS Max to take the required time for chemical injection.

Intraspec

Not available.

American Process 85

A wiring change to the Run/Manual switch is required to place the processor timer on hold. The switch provides 12 VDC to the Run/Prog/Man functions. The yellow wire is program mode, the grey wire is manual mode, and the black wire is the common connection.

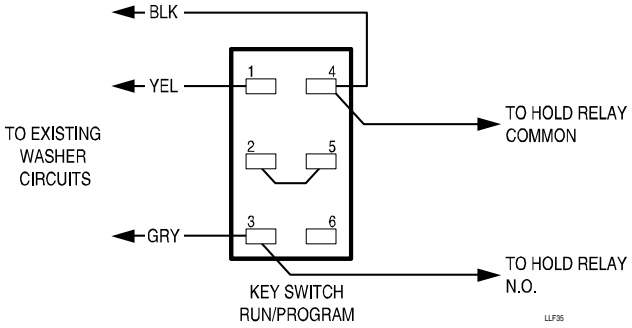


Figure 35. American Run/Manual Switch Wiring

American Pioneer 2000

Consult the manufacturer for information on special software and input location.

March Systems

March Systems controllers may be placed on hold by applying 24 Volt (or 110/220) to the Chemical Hold input of the injector connector (Re: Pin 16). The common for this signal is Pin 14 for 24 Volt and Pin 13 for 110 Volt operation.

Braun

Braun machines may be placed on hold by grounding the TDIS (timer disable) terminal (2) on the main motherboard to the ground terminal (5). This will stop the bath timer but all other outputs will continue to be operable.

Generic Solution (When All Else Fails)

Figure 36 is a wiring configuration for forcing a hold condition by interrupting the water level control and the water inlet solenoid valve circuits. Depending on the exact wiring configuration of the washer, it may be possible to utilize a single pole relay to interrupt the common to the level switch and the solenoid valves.

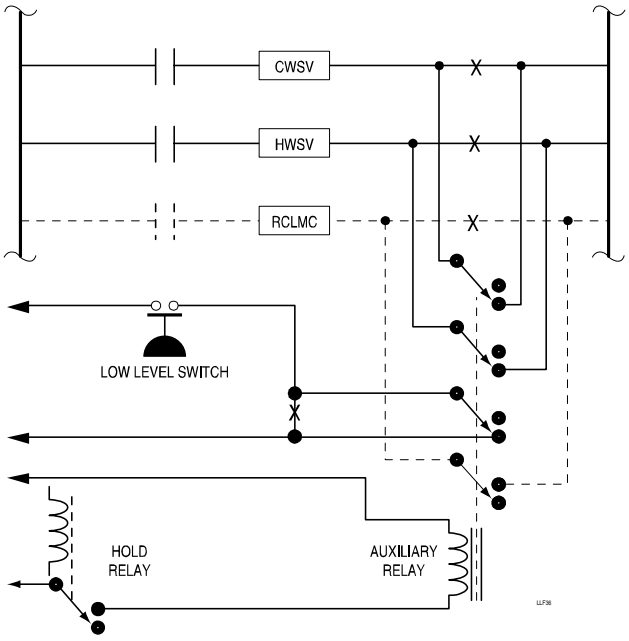


Figure 36. Generic Wiring Configuration

SPECIAL TRIGGER CONNECTIONS

March Systems (Ally) Controller, Chemical Trigger Connections

The chemical trigger module may be connected to a March controller by using the March circuits as a current sinking switch. To do this, connect one leg of the 24 VAC output to the (+) terminals of the trigger input and the other leg of the 24 VAC output to the Chemical Ground pin of the March chemical trigger connector.

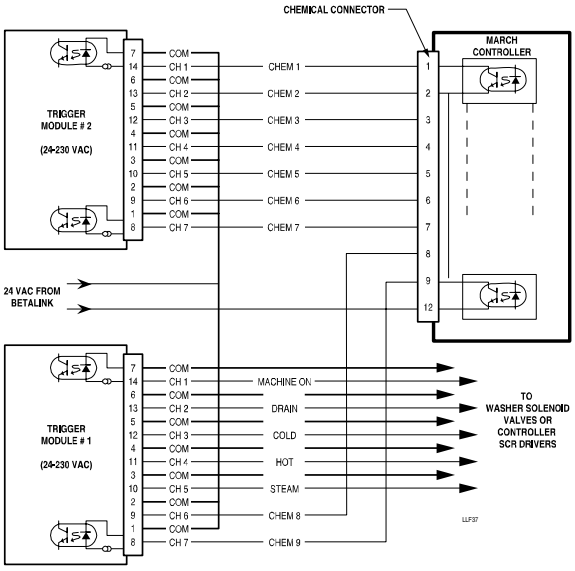


Figure 37. March System Connections

Connect the chemical trigger signals to the appropriate pins of the chemical connector. Note that proper polarity must be observed. The March circuits must be connected to the (–) negative trigger input.

The machine control connections may be made in the normal manner, typically across the appropriate solenoid at the washer.

Low Voltage (12VDC) Triggers

The following application note describes a method for providing a trigger signal to the trigger module board from the American Laundry Machinery Inc., Process 85 microprocessor-controlled washer.

The signals available from the processor output board are 12 VDC drives to the various solenoids and relays. The drive for these elements is derived from standard commercially available opto isolated modules. These modules are configured as emitter-follower circuits driving the various loads.

In order to provide the 24 Volt signal necessary to drive the chemical and machine control trigger circuits, a 12 VDC power supply is used to provide a 12 Volt offset to the signals. The result is a signal of +12 to +24 Volts impressed across the trigger input. The trigger has an 18 Volt switching threshold and will therefore be able to detect the various washer signals.

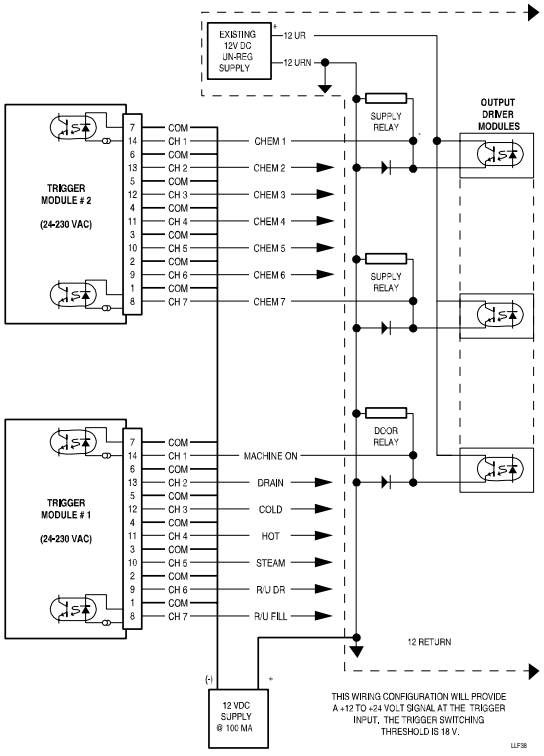


Figure 38. Low Voltage Trigger Connections

The above mentioned offset power supply should be capable of at least 100 milliamps.

HYGIENE MONITORING

A brief description of how ILS Max monitors hygiene may assist in setting up and using this feature.

ILS Max monitors only thermal hygiene, confirming that the temperature of the wash bath is hot enough for long enough to satisfy the hygiene criteria. Error conditions such as running out of chemical during the wash cycle do not cause hygiene to fail.

ILS Max uses the machine-on signal to know when a wash cycle begins and ends. This means that a valid machine-on signal must be available in order to monitor hygiene. When the machine-on signal turns on, the hygiene status for that wash cycle is cleared. As the wash cycle runs, ILS Max monitors the wash water temperature. If the temperature exceeds any of the three hygiene criteria temperatures continuously for the corresponding hygiene time, hygiene has been achieved for that wash load. If the wash water temperature drops below the hygiene criteria temperature even briefly prior to achieving hygiene, any time accumulated up to that point is lost and timing will start over at zero if the temperature rises again. However, once hygiene has been achieved it cannot be revoked, even if the temperature drops.

Having three sets of time and temperature criteria increases flexibility. The higher the temperature, the shorter the time needs to be to achieve hygiene. If for some reason the wash water is not hot enough to achieve hygiene in the shortest period of time, it may still be hot enough to achieve hygiene using a lower temperature for a longer period of time.

The final hygiene pass-or-fail determination is made when the machine-on signal turns off, signaling the end of the wash cycle. If hygiene monitoring is enabled for the selected wash classification, a “hygiene verified” or “hygiene failed” event will be logged. If hygiene fails, an alarm will occur, allowing corrective action (such as a rewash) to be taken. If hygiene monitoring is disabled for the selected classification (including unidentified loads), then no action is taken.

If communication with the washer interface module is lost or if the washer temperature probe becomes open or shorted, the system will act as if the wash temperature was below all of the hygiene criteria temperatures. If the problem is not corrected in time, this will cause hygiene to fail.

To prevent false alarms due to loading or unloading of the washer or setting of the washer program, hygiene monitoring is not performed on wash cycles that are less than five minutes long and which have no water fills, drains or chemical injections.

APPENDIX B. SITE SURVEY GUIDELINES

The unit provides a large degree of flexibility in equipment configuration. In order to take advantage of this flexibility and derive the best performance-to-cost ratio, an accurate site survey and well-thought-out equipment list is essential. Although the system may be configured from as few as one washer, to as many as 15 washers, economics on the small end and system loading (hold times) on the large end will dictate more practical limits.

Key factors to consider when configuring a system installation include:

- Number of washers (determines number of smart transport pumps).
- Washer size (affects chemical injection size or number of chemical pumps, and the number of transport pumps).
- Soil load (affects chemical injection size or number of chemical pumps, and the number of transport pumps).
- Number of chemicals (total number of chemical pumps).
- Distance from pump box to washers (transport time).

- Washer controller type (number and type of triggers).
- Number of wash formula required (formula select modules required).
- Type of reports needed (number of trigger modules).

NUMBER OF SYSTEMS REQUIRED

The first consideration is how busy the pump box will be. This is a function of several factors. The number and size of washers, as well as soil load are the main determinants to number of systems (pump boxes) required for the entire site.

There are no rules for determining a system configuration, but practical experience suggests a goal that all feeds to individual washers should be accomplished in under three minutes. In heavy soil commercial applications, experience has shown that one pump box will adequately serve up to five 400-pound wash wheels.

Another consideration is whether the washer controllers can be placed on hold. If the washers may be held, then it is more feasible to have more washers serviced by one pump box.

TRANSPORT & CHEMICAL PUMP REQUIREMENTS

If the soil loading is heavy, with the resultant large four liter (>128 ounce) feeds of detergent and alkali, the paired six-liter/minute chemical pump configuration should be used.

WASH FORMULA / TRIGGER CONSIDERATIONS

If the washers are configured with contemporary microprocessor controllers, then the triggering configurations are simple and straightforward. In this case, the formulation is controlled entirely by the washer, and chemical triggering is on a one-for-one basis.

If the washers are configured with mechanical controllers, then the number of triggers and the formula selection requirements need to be considered. For most applications, two seven-channel trigger modules (supplied as one kit including harness) are sufficient. Refer to System Installation for more trigger module installation details.

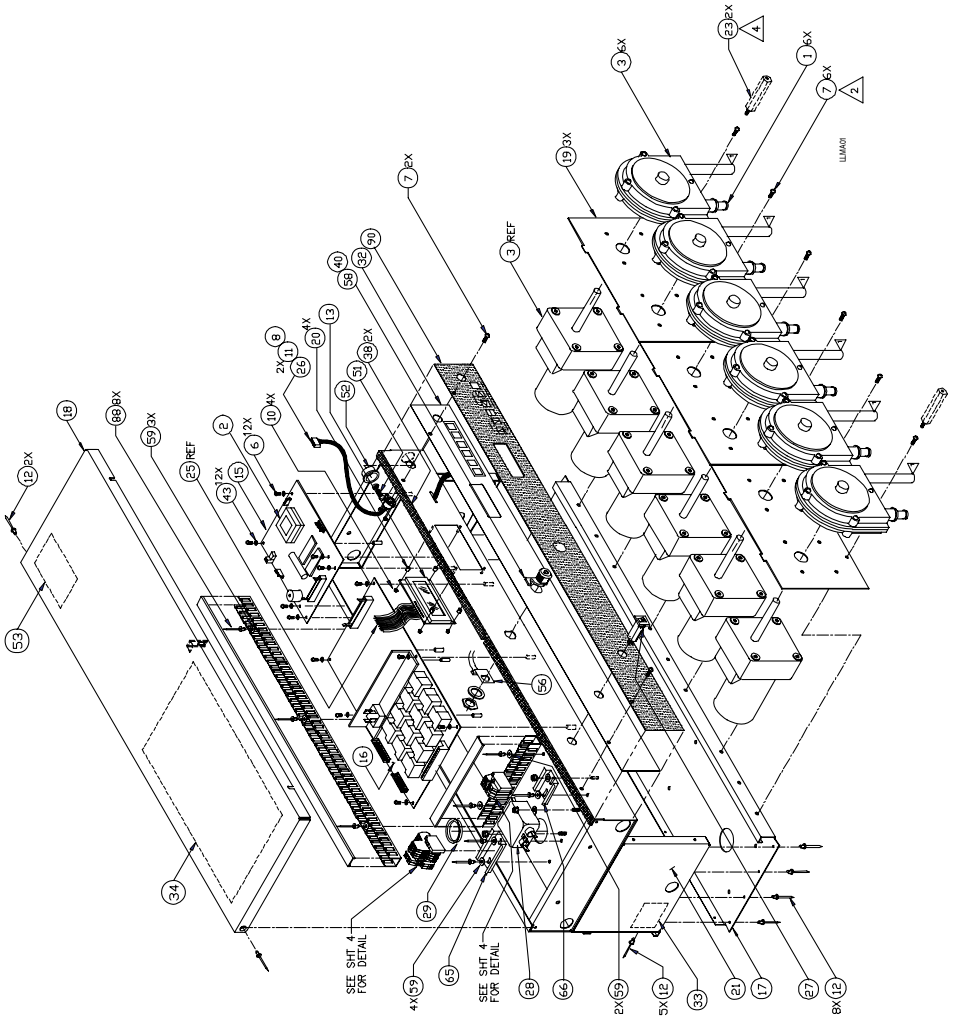
APPENDIX C. PARTS LIST & DRAWINGS

MAIN PUMP MODULE

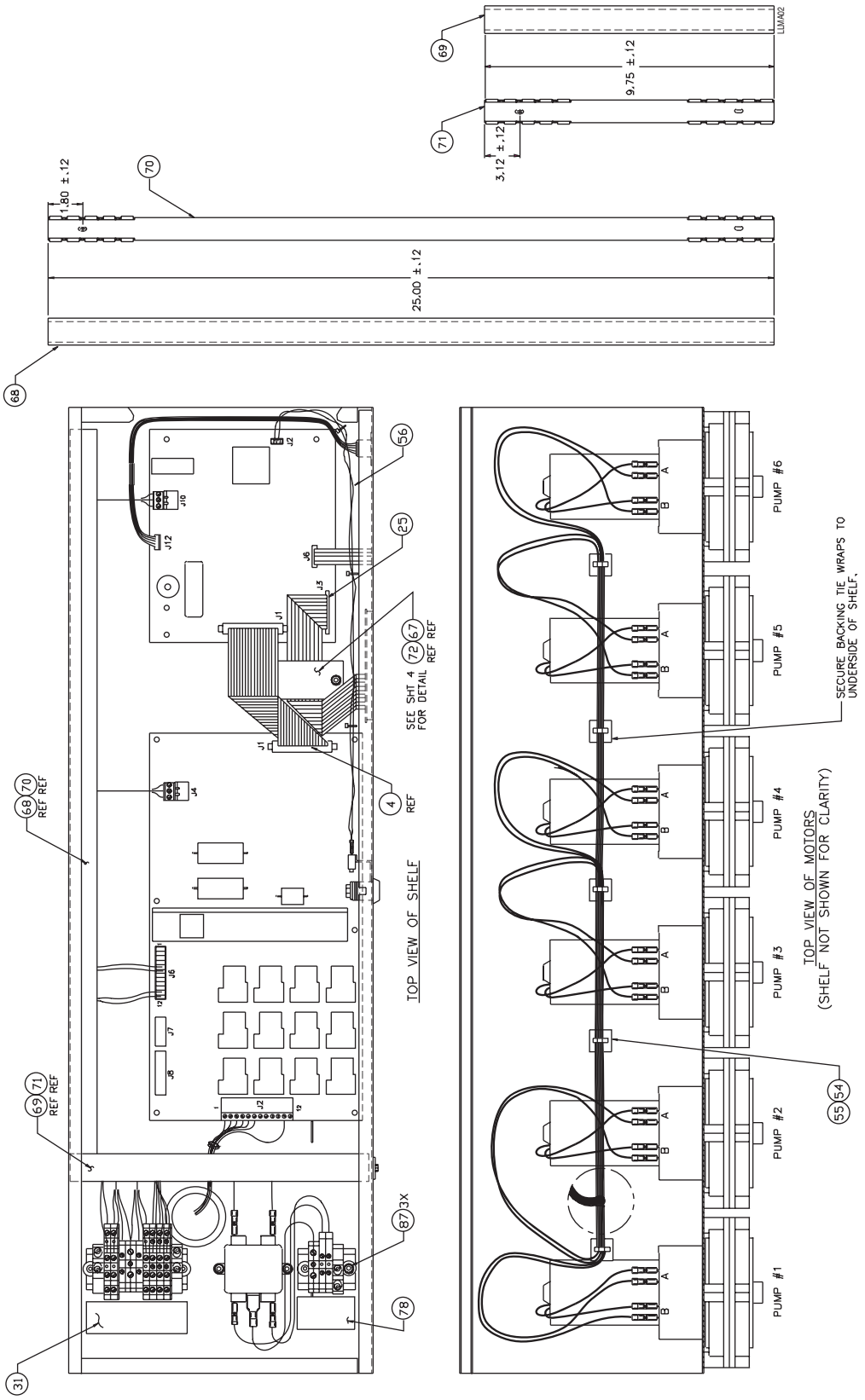
Reference Main Pump Module drawing in this Appendix with the descriptions below.

Seq #	Description	Code#
1	INSERT,PMP,50 OZ,1/2-5/8B	1206377
2	LOCK,PS/A,D-6300 SERIES	037059
3	PUMP PS/A,19VDC/200,.375ID,SIL	037086
4	RIBBON CABLE,34,26GA,8	057459
13	LCD WITH JUMPER	1206665
15	PCB,ASSY,MODEL 100	058492
16	PCB ASSY,RELAY,24V	058938
19	PLATE,PERI PMP	1203060
20	SPACER,#2X3/16,ALUM	050046
23	STANDOFF,M-F,5/16 HEX, 8-32X2-5/8 *	050710
25	CABLE,14,12,JMPR	087336
26	HARNESS,DIN PLG, DIN-MLX	057419
27	CIRCUIT BREAKER,SP, 250VAC,15AMP,50/60	051267
28	LINE FILTER,PWR,RFI, 20AMP,CHAS	051283
29	BUSHING,2.25OD,PLSTC,BLK	051284
30	STNDOFF,1/4HEX,6-32X3/8,ALUM	041191
31	LABEL,TB,14P,24VAC	057577
32	LABEL,CVR,SPCR,ILS Max	069433
34	LABEL,INSTR,OPER	1204993
35	CABLE,2,16GA,STRD	051373
36	TERMINAL 250X032 FMALE 16/14 STRIP	032359
38	GASKET,.12X.50X17.00	041263
40	LOCK,CAM,52954	037224
43	WASHER,LK,E/TTH,#6	041129
44	COVER,MANF,6 PMP	050899
45	RAIL,MTG,34,SST	050579
47	HARNESS,24V ALM	093767
48	HARNESS,MOT	056567
51	SCREW,PH PNH,10-32X1/2	040987
52	BUSHING,7/8OD,PLSTC,BLK	041248

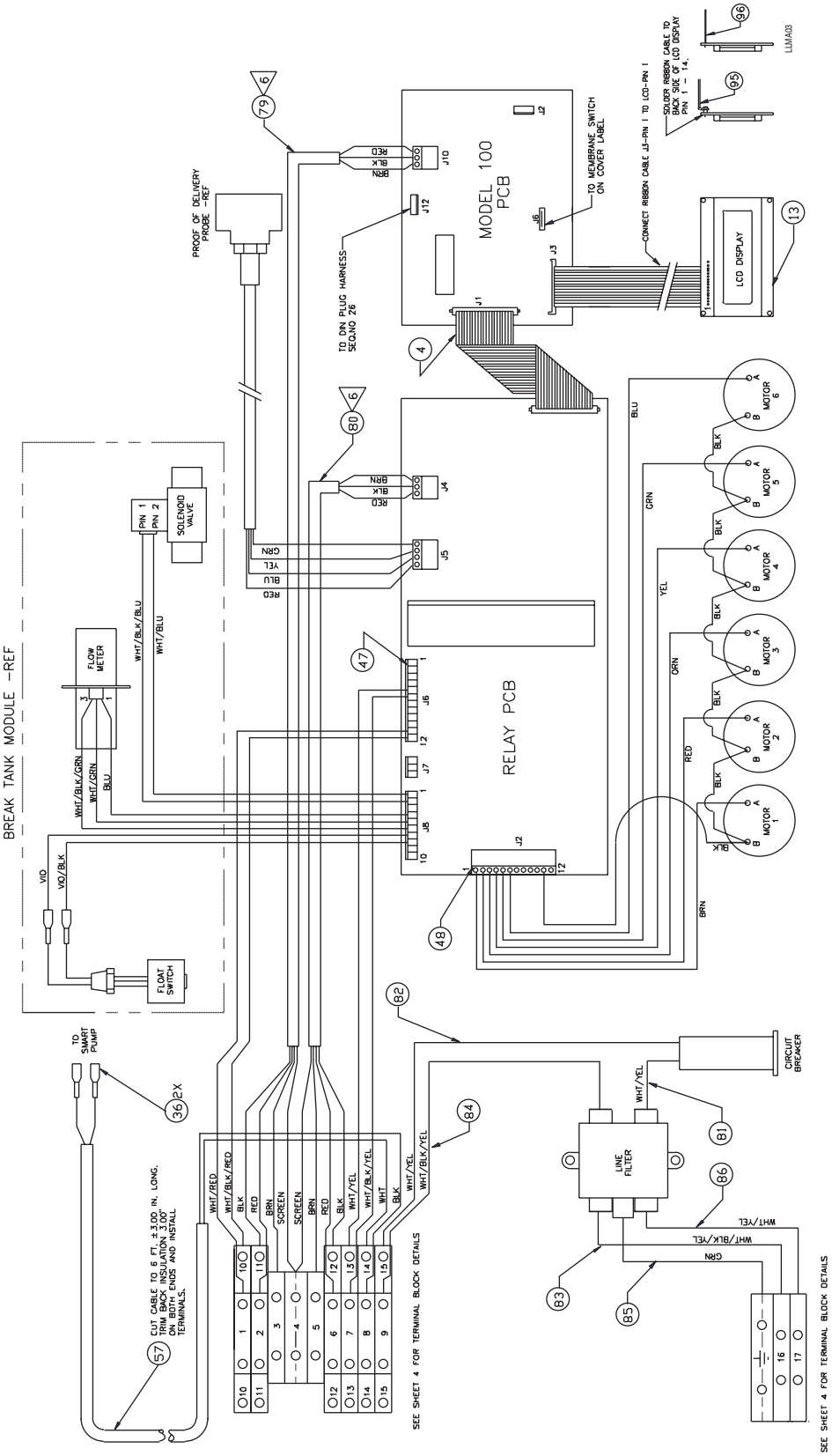
MAIN PUMP MODULE



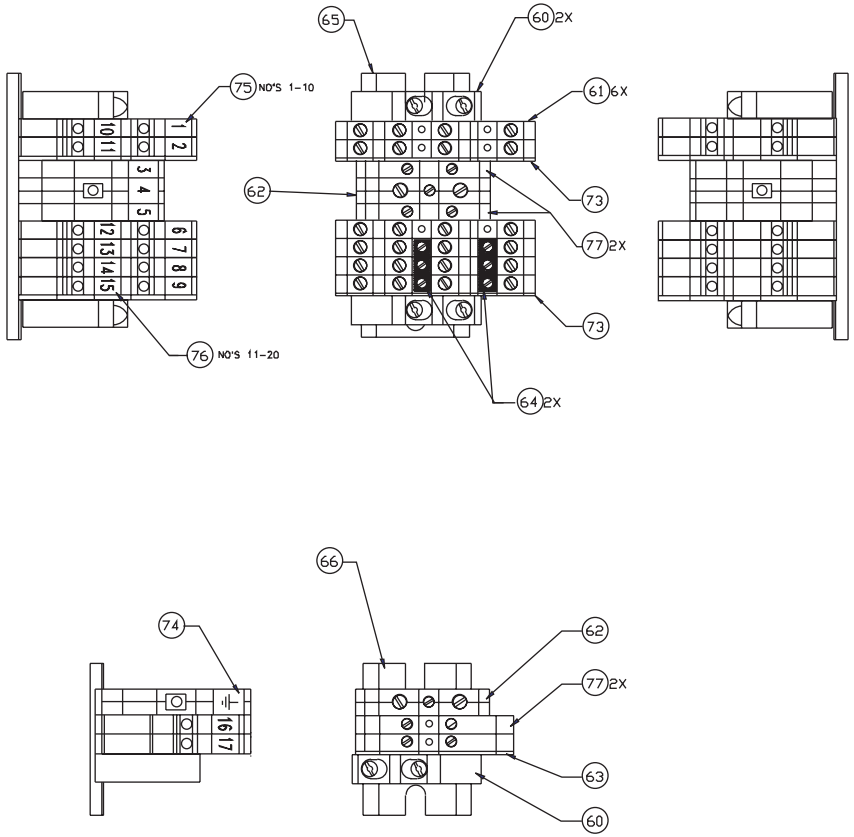
MAIN PUMP MODULE



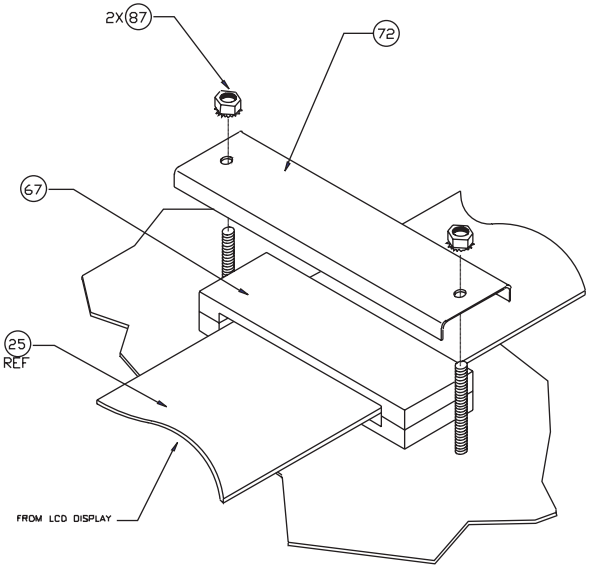
MAIN PUMP MODULE



MAIN PUMP MODULE



TERMINAL BLOCK DETAIL



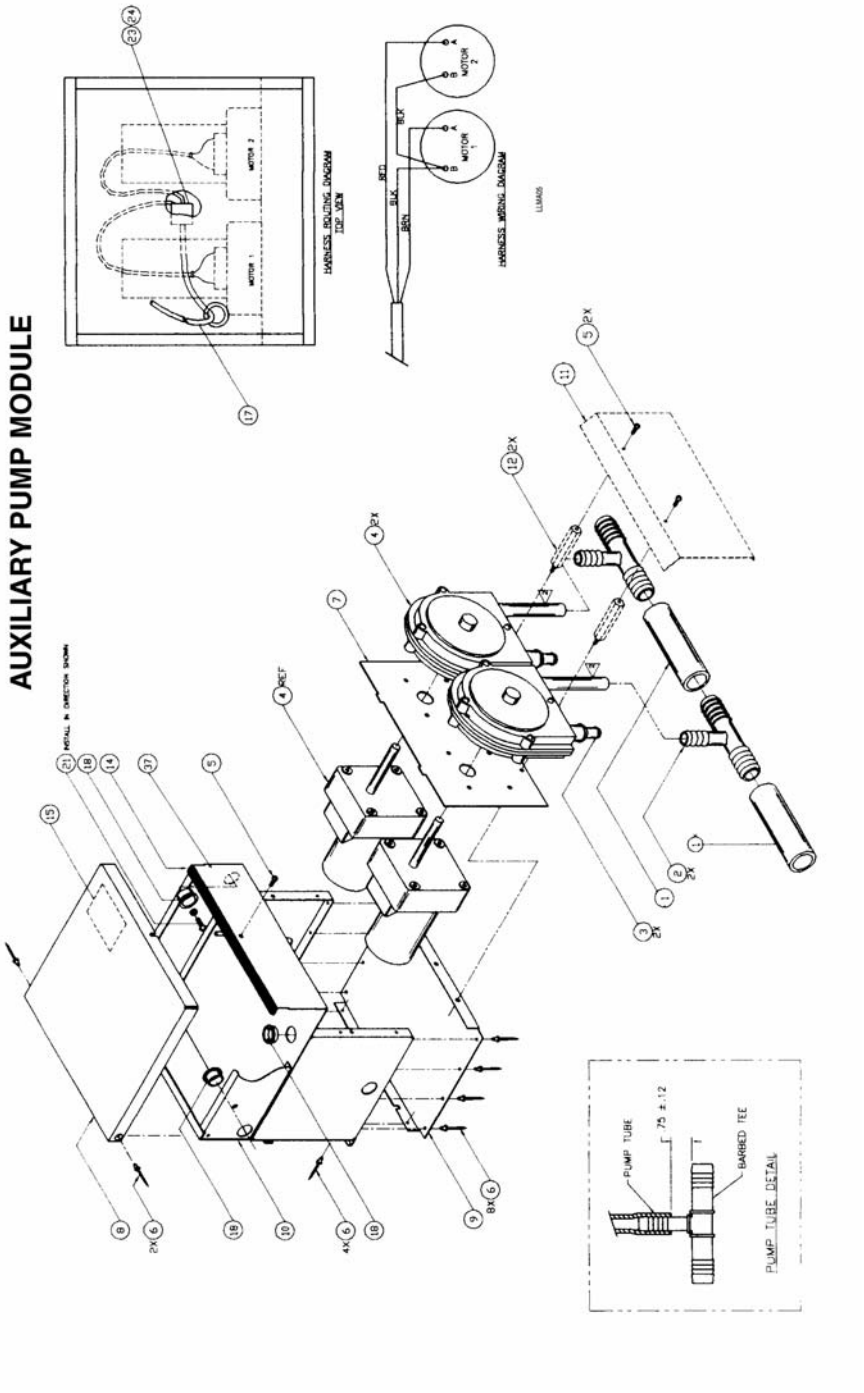
FERRITE MOUNTING DETAIL

LLMA04

AUXILIARY PUMP MODULE

Reference Auxiliary Pump Module drawing in this Appendix with the descriptions below.

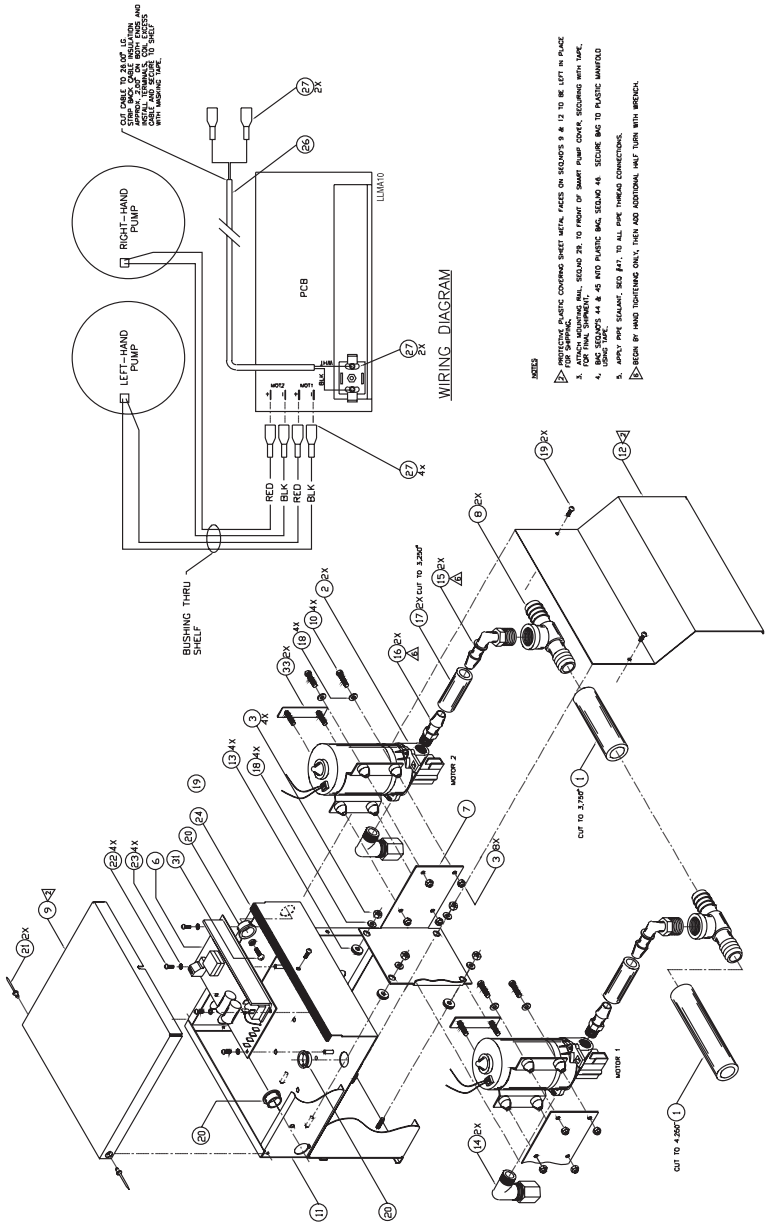
Seq #	Description	Code#
2	HFTG,TEE,RDC,3/4BX1/2B,PVC	035517
3	INSERT,PMP,50 OZ,1/2-5/8B	1206377
4	PMP PS/A,19VDC/200,.375ID,SIL	037086
7	PLATE,PERI PMP	1203060
11	COVER,MANF,2 PMP	050657
12	STANDOFF,M-F,5/16 HEX, 8-32X2-5/8 *	050710
16	RAIL,MTG,12,SST	050705
17	HARNESS,AUX PMP MDL	056603
18	BUSHING,7/8OD,PLSTC,BLK	041248



1.5 GPM (5.5 LPM) SMART PUMP MODULE

Reference 1.5 GPM (5.5 LPM) Smart Pump Module drawing in this Appendix with the descriptions below.

Seq #	Description	Code#
1	TUBING,BU,SIL,.75IDX 1.00OD,TRANSL	No longer available
2	PUMP,DIAPHRAM, 3.0 GPM, 24VDC,3/8FPT	096801
6	PCB ASSY,SMRT PMP,24V	056798
7	BRACKET,MTG,PMP, TRNSPRT MDL	No longer available
8	HOSEFITTG,TEE,3/4BX 3/4BX1/2FPT.PVC	No longer available
12	COVER,FRNT,SLPD,SST,SMT PMP	050658
13	GROMET,1/4IDX5/8OD,RBR	050696
14	TFTG,ELB,VP,1/2TX3/8MPT,OG,	051154
15	HOSEFITTING,ELB,1/2BX 1/2MPT,PPLYN	051301
16	HOSEFITTING,STR,1/2BX 3/8MPT,PPLYN	051302
17	TUB,BU,SIL,.50IDX.87OD, TRANSL	No longer available
20	BUSHING,7/8OD,PLSTC,BLK	041248
26	CABLE,2,16GA,STRD	095700
27	TERMINAL 250X032 FMALE 16/14 STRIP	032359
29	RAIL,MTG,12,SST	050705
33	BRACKET,STUD,SST	056738



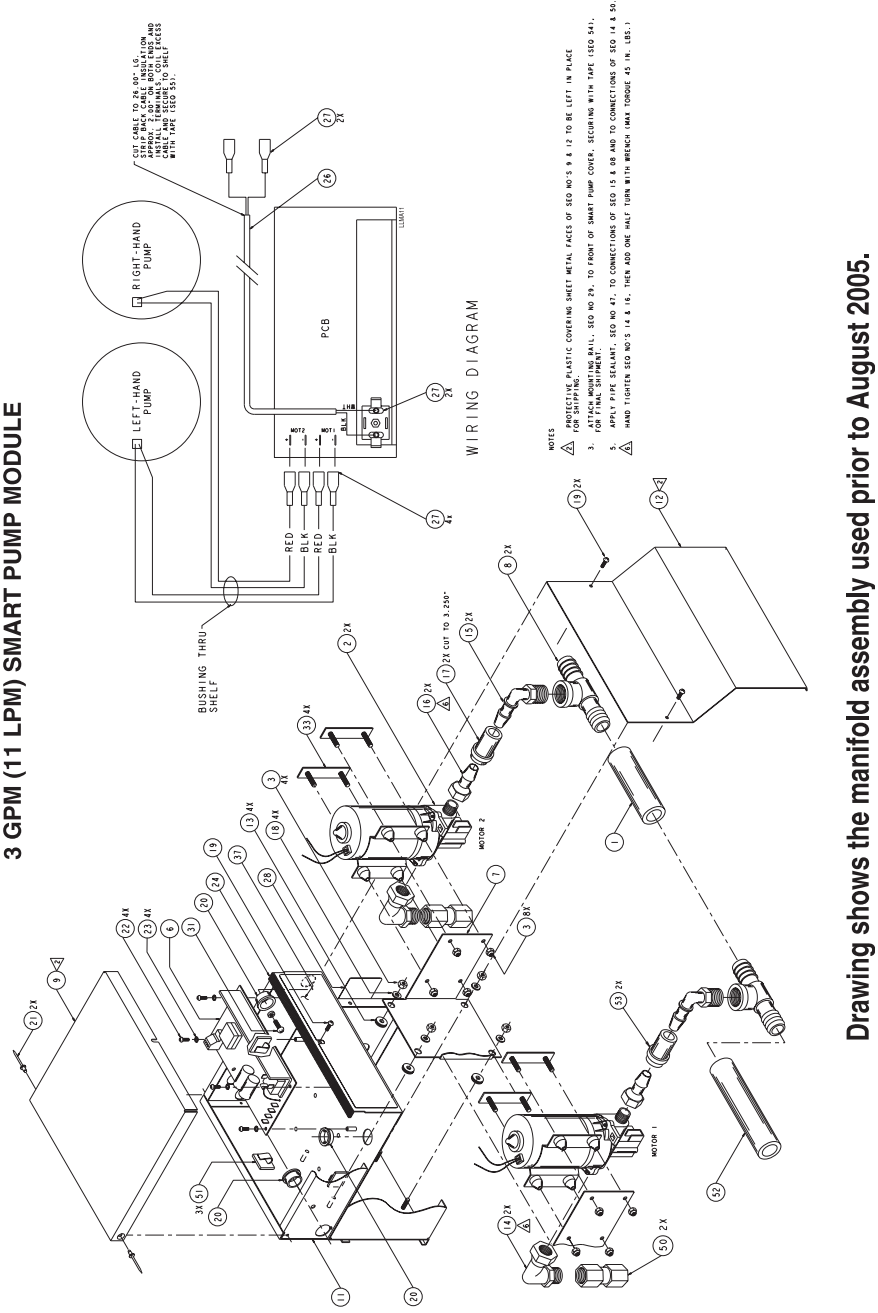
1.5 GPM (5.5 LPM) SMART PUMP MODULE

Drawing shows the manifold assembly components used prior to August 2005.

3 GPM (11 LPM) SMART PUMP MODULE

Reference 3 GPM (11 LPM) Smart Pump Module drawing in this Appendix with the descriptions below.

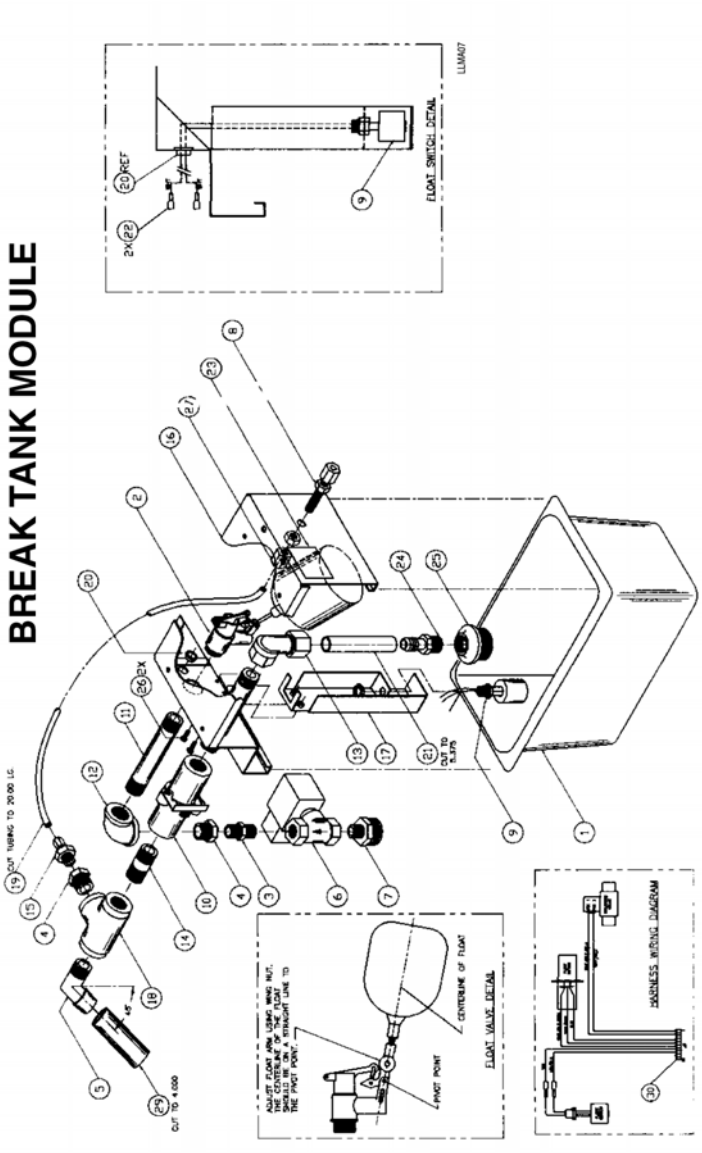
Seq #	Description	Code#
1	TUBE,BU,SIL,.75IDX1 OD,TRANSL	055702
2	PUMP,DIAPHRM,3.0 GPM,24VDC 3/8FPT	069947
6	PCB ASSY,SMRT PMP,24V	1200049
7	BRACKT,MTG,PMP, TRNSPT MDL	No longer available
8	HSEFITG,TEE,3/4BX3/4B 1/2FPT PVC	No longer available
12	COVER,FRNT,SLPD,SST,SMT PMP	050658
13	GROMET,1/4IDX5/8OD,RBR	050696
14	PFTG,ELB,SHURFL,SWIV,1/2FPTX	097806
15	HFTG,ELB,1/2BX1/2MPT,PPLYN	051301
16	HFTG,STR,SHURFL,SWIV,1/2FPTX	069946
17	TUBE,BU,SIL,.50IDX.87OS,TRANS	055703
20	BUSHING,7/8OD,PLSTC,BLK	041248
26	CABLE,2.16GA,STRD	051373
27	TERMINAL 250X032 FMALE 16/14 STRIP	032359
29	RAIL,MTG,12,SST	050705
33	BRACKET,STUD,SST	056738
50	TFTG,STR,VP,5/8TX1/2FPT,PG	057040



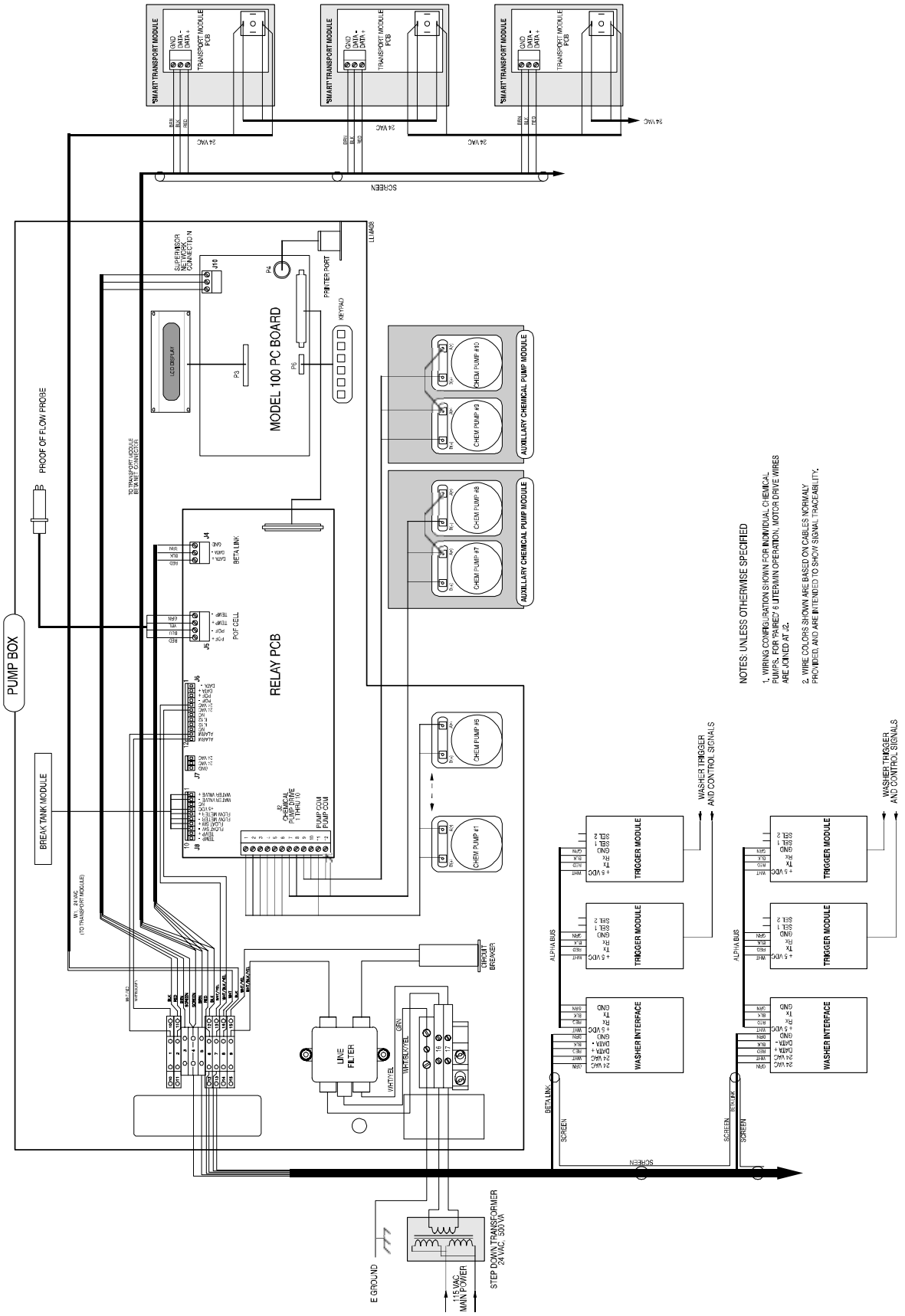
BREAK TANK MODULE

Reference Break Tank Module drawing in this Appendix with the descriptions below.

Seq #	Description	Code#
1	BREAK TANK,SST,ILS Max	036346
2	VALVE ASSY,FLT,1/2FPT,BRZ	098980
4	PFTG,BSHG,1/2X3/8,BRS	040149
5	HFTG,ELB,3/4BX1/2MPT,PPLYN	055706
6	VALVE,SOL,2W,3/8FPT,24VDC,BRS	041923
7	HFTG,STR,3/4MNPSHX3/8MPT	041973
8	TFTG,BHD,VP,1/4T,.255ID	042000
9	SWITCH,SPST,FLT,ON/OFF, PNL,1A/125*	042595
10	FLOW METER,.50-5GPM, 1/2FPT,PPLYN	043969
11	PFTG,NIP,1/2X4,BRS	033229
12	PFTG,ELB,1/2,BRS	No longer available
13	TFTG,ELB,VP,5/8TX1/2FPT,PG	050597
14	PFTG,NIP,1/2XCLOSE,PPLYN	1200158
15	TFTG,STR,VP,1/4TX3/8MPT,OG	092216
16	HGR ASSY,BRK TANK MDL	056790
17	BRACKET,FLT SW,BRK TK	056694
18	PFTG,TEE,1/2FPT,PVC	041957
19	TUBING,BU,LDPE,.250OD,WHT	041772
20	BUSHING,1/2	041228
21	TUBING,BU,LDPE,.50IDX 625OD,NAT	041966
22	TERMINAL,CRP,18-22,QDC, 1/4F,INSUL	050537
24	HFTG,STR,1/2BX1/2MPT,PPLYN	055707
25	STR,50MSH,1/2FPT,PVC,1.80OD	1205642
27	TFTG,NUT,VP,1/4T,0G	092213
29	TUBING,BU,SIL,.75IDX 1.00OD,TRANSL	055702
30	HARNESS,BRK TK	056568



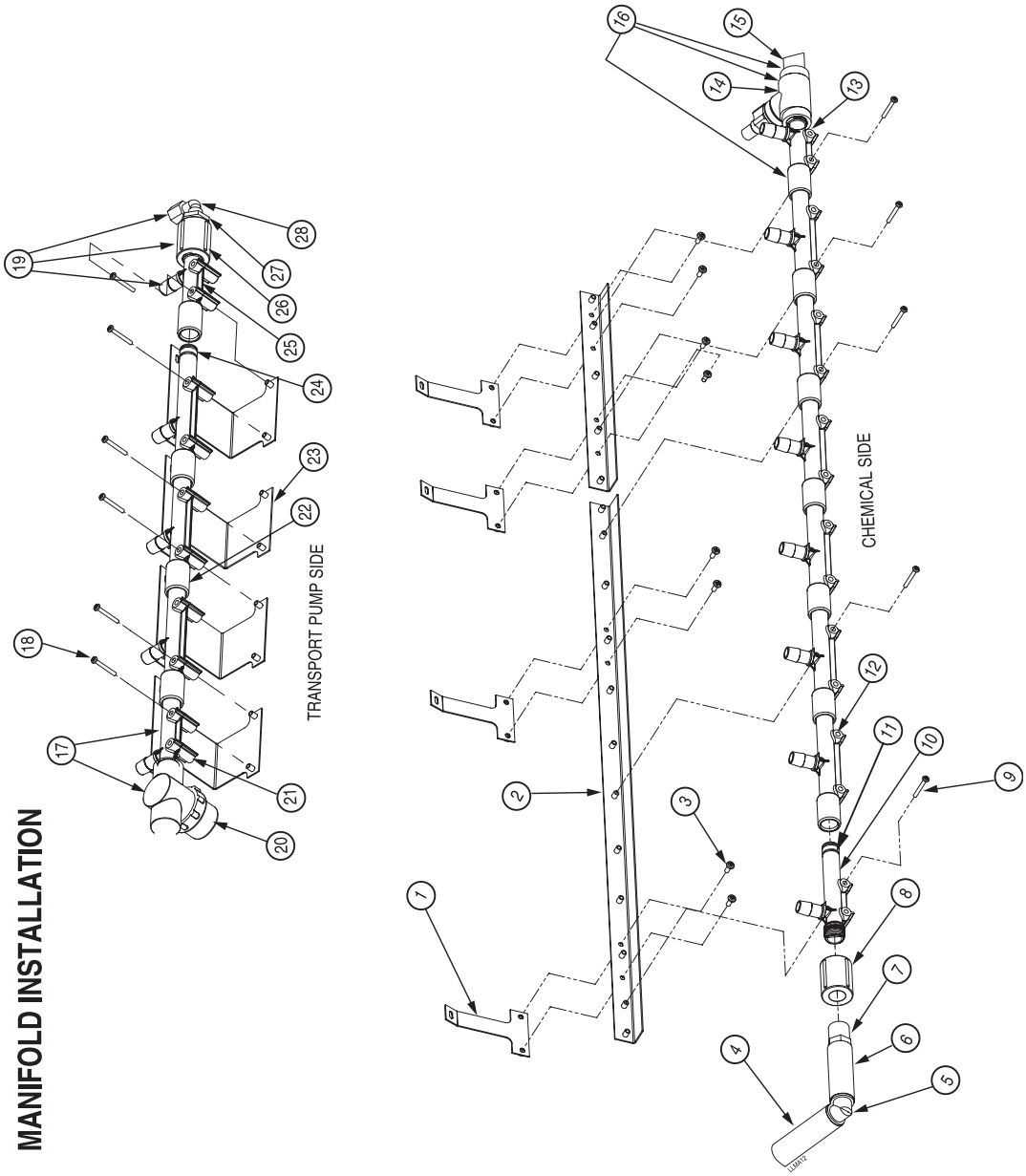
SYSTEM INTERCONNECT



MANIFOLD

Reference Manifold Installation drawing in this Appendix with the descriptions below.

Seq #	Description	Code#
1	BRACKET,CHEM,MANF SUPPORT	1205729
2	BRACKET, MANIFOLD	1205732
3	SCR,PH,PNH,8-32X3/8	026131
4	TBG,BU,PVC,3/4IDX10D,CLR 3-1/4 LONG	026929
5	HFTG,ELB,3/4BX3/4B	1205811
6	TBG,BU,SIL,.75IDX.125W	055702
7	HFTG,STR,3/4BX1/2MPT	055705
8, 26	PFTG,CPLR,1/2,PVC	1205794
9, 18	SCR,PH,PNH,6-32X1-1/8	1205785
11, 24	O-RING,2 PER MANIFOLD SECT	1205790
10, 13	MANIFOLD INLET	1205792
12, 22	MANIFOLD TEE	1205793
14	PROBE ASSEMBLY	099905
15	PFTG,NIPPLE	1205789
16, 17	POF/FILTER SUB-ASSY	1205783
19	BACKFLOW ASSEMBLY	1205889
20	STR,INLINE	096093
21, 25	MANIFOLD OUTLET	1205791
23	BRKT,TRANSPORT,MANIFOLD	1205787
27	PFTG,BSHG,,1/4FPTX1/2MPT,PVC	041931
28	TFTG,ELB,VP,1/4TX1/4MPT	041793



MANIFOLD INSTALLATION

FORMULA DEVELOPMENT FORMS

The following forms are used for developing formulas for the four modes of operation: Fixed Dose, Automatic, Relay, and Relay Enhanced.

FORMULA DEVELOPMENT SHEET

AUTOMATIC MODE

Trigger	Signal Source / Description
Strobe	
2	
3	
4	
5	
6	

Bath or Operation	Time	Temp	Level	Drain	Injection Dose 1	Injection Dose 2	Injection Dose 3	Trigger S	2	3	4	5	6
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						
					Chem:___ Amt:___	Chem:___ Amt:___	Chem:___ Amt:___						

Washer:______ Load Weight:______

Classification:______ Total time:______ Drain total:______ Trigger Totals: 1:___, 2:___, 3:___, 4:___, 5:___

LLFORM01

FORMULA DEVELOPMENT SHEET

Relay Enhanced Mode

Bath or Operation	Time	Temp	Level	Drain	Chem 1 /Sec.	Trig 1	Chem 2 /Sec.	Trig 2	Chem 3 /Sec.	Trig 3	Chem 4 /Sec.	Trig 4	Chem 5 /Sec.	Trig 1	Trig 2	Chem 6 /Sec.	Trig 1	Trig 3	Chem 7 /Sec.	Trig 1	Trig 4	Chem 8 /Sec.	Trig 2	Trig 3	Chem 9 /Sec.	Trig 2	Trig 4	Chem 10 /Sec.	Trig 3	Trig 4

Washer:_____ Load Weight:_____

Classification:_____ Total time:_____ Drain total:_____ Trigger Totals: 1:___, 2:___, 3:___, 4:___, 5:___

LLFORM02

FORMULA DEVELOPMENT SHEET

Relay Mode

Bath or Operation	Time	Temp	Level	Drain	Chem 1	Trig 1 /Sec.	Chem 2	Trig 2 /Sec.	Chem 3	Trig 3 /Sec.	Chem 4	Trig 4 /Sec.	Chem 5	Trig 5 /Sec.	Chem 6	Trig 6 /Sec.	Chem 7	Trig 7 /Sec.	Chem 8	Trig 8 /Sec.	Chem 9	Trig 9 /Sec.	Chem 10	Trig 10 /Sec.

Washer:_____ Load Weight:_____

Classification:_____ Total time:_____ Drain total:_____ Trigger Totals: 1:___, 2:___, 3:___, 4:___, 5:___

LLFORM03

FORMULA DEVELOPMENT SHEET

FIXED DOSE (FORMULA) MODE

Bath or Operation	Time	Temp	Level	Drain	Injection			Trigger						Select			
					Dose 1	Dose 2	Dose 3	1	2	3	4	5	6	1	2	3	4
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										
					Chem: ____ Amt: ____	Chem: ____ Amt: ____	Chem: ____ Amt: ____										

Trigger	Signal Source / Description
1	
2	
3	
4	
5	
6	
Select	
1	
2	
3	
4	

Washer:____________________ Load Weight:__________

Classification:__________________ Total time:_____ Drain total:_____ Trigger Totals: 1:___, 2:___, 3:___, 4:___, 5:___

LLFORM04

WASHER INTERFACE MODULE CONNECTION FORM

Washer # Washer Model_____

MODULE CONNECTOR	CABLE	FUNCTION	WASHER CONNECTION	REMARKS
P3-1		HOLD NC		
P3-3		HOLD NO		
P3-2		HOLD COM		
P3-4		ALARM NC		
P3-6		ALARM NO		
P3-5		ALARM COM		
P1-1	RED	POD (+)	Not Applicable	
P1-2	BLU	POD (-)	Not Applicable	
P1-3	YEL	POD TEMP	Not Applicable	NOT USED
P1-4	GRN	POD TEMP	Not Applicable	NOT USED
P5-1		M/C ON		OPTIONAL
P5-2		M/C ON		OPTIONAL
P5-3		DRAIN		OPTIONAL
P5-4		DRAIN		OPTIONAL
P2-1	WHT	ALPHABUS +5V	Not Applicable	
P2-2	BLK	ALPHABUS RX	Not Applicable	
P2-3	RED	ALPHABUS TX	Not Applicable	
P2-4	GRN	ALPHABUS GND	Not Applicable	
P4-1	GRN	BETA LINK 24V	Not Applicable	
P4-2	WHT	BETA LINK 24 V	Not Applicable	
P4-3	RED	BETA LINK +	Not Applicable	TRANSMIT
P4-4	BLK	BETA LINK -	Not Applicable	RECEIVE
P4-5	BRN	BETA LINK GND	TR7000AC ONLY	SIGNAL GND
P4-6	SHIELD	BETA LINK SHLD	Not Applicable	OPTIONAL

WASHER TRIGGER WIRING

Washer # Washer Model_____

CHEMICAL TRIGGER MODULE WIRING (module #2)					
PIN	**CH**	**WIRE COLOR**	**CHEMICAL**	**WASHER CONNECTION**	**REMARKS**
14	CH1	BRN	CHEM_____		
13	CH2	RED	CHEM_____		
12	CH3	ORN	CHEM_____		
11	CH4	YEL	CHEM_____		
10	CH5	GRN	CHEM_____		
9	CH6	BLU	CHEM_____		
8	CH7	VIO	CHEM_____FORMULA “0”		
1-7		BLK	COMMON		

CHEMICAL TRIGGER MODULE WIRING (module #1)					
PIN	**CH**	**WIRE COLOR**	**CHEMICAL**	**WASHER CONNECTION**	**REMARKS**
14	MC	WHT/BRN	MACHINE ON		
7		WHT/BRN/BLK	MACHINE ON		
13	DR	WHT/RED	DRAIN		
6		WHT/RED/BLK	DRAIN		
12	CW	WHT/ORN	COLD WATER		
5		WHT/ORN/BLK	COLD WATER		
11	HW	WHT/YEL	HOT WATER		
4		WHT/YEL/BLK	HOT WATER		
10	ST	WHT/GRN	STEAM		
3		WHT/GRN/BLK	STEAM		
9	RDR	WHT/BLU	RE-USE DRAIN, FORMULA “1”, OR CHEM 8		
2		WHT/BLU/BLK	RDR COMMON		
8	RW	WHT/VIO	RE-USE WATER, FORMULA “2”, OR CHEM 9		
1		WHT/VIO/BLK	RW COMMON		

Beta Technology
2841 Mission Street
Santa Cruz • CA
U.S.A. • 95060-2142

TEL • 831 • 426 • 0882
TEL • 800 • 858 • 2382
FAX • 838 • 423 • 4573
FAX • 800 • 221 • 8416
http://www.beta-technology.com
sales@beta-technology.com

Beta Technology is ISO 9001 Certified