Guardian II Pipeline Washer

Instruction Supplement

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Contents

Instructional Content and Purpose

This instruction packet aims to aid those responsible (outlined under "Responsibilities") for installing, operating, maintaining, troubleshooting, and servicing this product.

Procedural Guidelines

The Table of Contents lists the sections of this packet in the order that they should be read and procedures should be performed. Special safety messages—Danger, Warning, Caution—and notes have been provided, where needed, to aid individuals in following instructions and making decisions. Read these special messages, notes, and all instructions carefully before performing procedures and using the product/system to ensure proper results.

Responsibilities

Procedures in this instruction packet are to be performed according to applicable codes (state, local, and other) by the person(s) qualified (licensed, if applicable) to do so—that is

- high-voltage AC power wiring must be done by a qualified (licensed) electrician (according to NEC),
- other installation, major maintenance, and service work must be done by the dealer.
- product/system checkout and troubleshooting steps are to be performed by the dealer or technician.
- operation steps may be performed by the owner/operator once the dealer or technician has successfully finished the product/system checkout. The owner/operator is responsible for properly operating, maintaining, and monitoring the product/system to ensure that it works properly.

Close compliance with the procedures herein is essential for the owner to get maximum benefit from the product/system.

Disclaimers

No warranties are contained in this packet. The division of responsibilities, stated above, is a general reminder of those provisions in the applicable dealer contract and does not change any agreement between Bou-Matic and the dealer. Information in this packet is not all-inclusive and cannot cover all unique situations.

Introduction

Since the initial release of the Guardian II, there have been many software enhancements that are not documented in the Guardian II instructions. The purpose of these instructions is to let you know about some of the newer features that have been added since the release of the Guardian II.

At the time these instructions were written, the current version of software available for the Guardian II was 1.54. Options available in the Guardian II will vary depending on the software version installed in the Guardian II. To determine the software version installed in the Guardian II, look in the lower left-hand corner of the Guardian II display.

Software upgrades can be purchased from Bou-Matic. Contact the customer service department for information on software upgrades.

The instructions that follow will assume that you already have a good understanding of how to get around the menu system in the Guardian II and proper wiring of the auxiliary outputs and inputs. If you are unclear as to how to make changes or where to go to make a change, refer to the main instruction packet for the Guardian II.

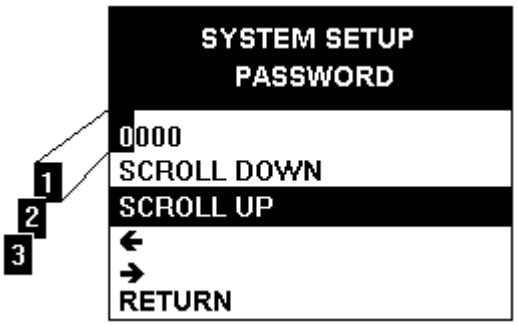
1. New Features

This section explains some of the new features of the Guardian II and some of the changes that have been made to other items.

1.1 Password For Setup

Password protection has been added to allow only qualified users to change the setup parameters for the Guardian II. The default password is "0000" which means that the protection has been disabled. Setting the password to anything other than "0000" will enable the password protection. Normally, to change the setup parameters it is necessary to press the select button 5 times. Now, if the password is enabled, the user will be asked for the password before the Guardian II will allow them to continue into the parameter setup. If the password has not been enabled, the user will still need to press the select button 5 times.

To change the password, from the main menu select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-SYSTEM SETUP-PASSWORD FOR SETUP. At this point you should see the following menu:



The password menu displays, with a factory-entered password, '0000",' in the top menu position. The first number of the password is highlighted and ready for change. Change the number by pressing the ↑ button until the cursor highlights either SCROLL UP or SCROLL DOWN (depending on the direction you want to move through the number list from the highlighted number). Press the ↵button until you get the number you want (for instance '3,' pressing 3 times as shown). Then, move the bar cursor to an arrow (→) and choose it to move the password cursor to the next number you want to change. Alternate between the 'scroll' and 'arrow' menu items until all numbers are as you want them. Move the bar cursor to RETURN and choose it to enter the password and exit the menu.

— Note ——————————————————————

If you forget what your password is, you will need to call Bou-Matic to get an alternate password. When you call in, please have the serial number of the Guardian II and the version number of software in the Guardian II. These two parameters will be needed to determine the alternate password.

1.2 Extra Water Delay

A delay has been added to prevent extra water from being dispensed into the sink until the delay time has been completed. When the water level in the sink has tripped the level switch in the Guardian II, the extra water delay begins, if there has been extra water entered for the phase. If there is no delay, the extra water begins immediately. If there is a delay, the water valves will stay off until the extra water delay has been completed.

To set the extra water delay, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-CONTROL VARIABLES-EXTRA WATER DELAY. Set the time as desired.

1.3 Date & Time Entry

A menu item has been added to the OPTIONS menu to allow the user to change the date and time. Having the menu option here allows a user to change the date and time without having to know the password and go through a series of menus to change it. This is especially useful if you are in a location where there are time changes during year.

1.4 Hot Acid Phase

A hot acid phase has been added to the list of phases that can be selected for the wash cycles. The hot acid phase has all the same characteristics as the acid phase. All setup parameters for the hot acid phase are completely separate from the acid phase.

During the setup of the various wash cycles, you will not be able to select an acid phase and a hot acid phase for the same wash cycle. If you have enabled the acid phase, you will not be able to select the hot acid phase. Also, if you have enabled the hot acid phase, you will not be able to enable the acid phase.

1.5 Detergent, Acid, and Sanitizer Sensors

These inputs have been added for possible future use. These inputs are disabled by default.

To enable or disable these inputs, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-SENSORS. From this menu select DETERGENT SENSOR, ACID SENSOR, and SANITIZER SENSOR and set to YES or NO.

1.6 Timer 4

A Timer 4 option has been added to the list of available options for the auxiliary outputs. Timer 4 will function after any one of the chemical pumps has finished dispensing and there are no other chemical pumps running. Once a pump finishes dispensing, a start delay for Timer 4 is enabled. Once the start delay is finished, Timer 4 turns on and runs for the amount of time set by the user. While the Timer 4 start delay or run time are active, no chemicals will be dispensed. This timer output is useful for turning on a water valve that can be used to clear chemicals from a line after they have been dispensed.

To set one of the auxiliary outputs to Timer 4, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-AUXILIARY OUTPUTS. Once there, select the auxiliary output that you would like to set as the Timer 4 output. Once selected, select Timer 4 from the list of available outputs. You may need to select MORE from any one of the output menus to find the list of available timer outputs.

To change the start delay and on time for Timer 4, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-TIMERS-TIMER 4. Then select either TIMER 4 START DELAY or TIMER 4 ON TIME from the menu. Set either time as desired.

See the timing tables at the end of these instructions for details on the timing of the Timer 4 output.

1.7 Timer 5

A Timer 5 option has been added to the list of available options for the auxiliary outputs. Timer 5 will function after the start delay time is complete and will stay on for the set on time or when the second water rinse phase has ended, whichever comes first.

To set one of the auxiliary outputs to Timer 5, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-AUXILIARY OUTPUTS. Once there, select the auxiliary output that you would like to set as the Timer 5 output. Once selected, select Timer 5 from the list of available outputs. You may need to select MORE from any one of the output menus to find the list of available timer outputs.

To change the delay from start and on time for Timer 5, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-TIMERS-TIMER 5. Then select either START DELAY or ON TIME from the menu. Set either time as desired.

See the timing tables at the end of these instructions for details on the timing of the Timer 5 output.

1.8 Timer 6

A Timer 6 option has been added to the list of available options for the auxiliary outputs. Timer 6 will function after the start delay time is complete and will stay on for the set on time or when the acid phase has ended, whichever comes first.

To set one of the auxiliary outputs to Timer 6, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-AUXILIARY OUTPUTS. Once there, select the auxiliary output that you would like to set as the Timer 6 output. Once selected, select Timer 6 from the list of available outputs. You may need to select MORE

from any one of the output menus to find the list of available timer outputs.
To change the delay from start and on time for Timer 6, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-TIMERS-TIMER 6. Then select either START DELAY or ON TIME from the menu. Set either time as desired.
See the timing tables at the end of these instructions for details on the timing of the Timer 6 output.

[1.9] Automatic Sanitize After Wash

An option has been added to allow the Guardian II to automatically begin a sanitize phase after a wash cycle has been completed. If the Guardian II has ended a wash cycle prematurely, the automatic sanitize will not be started. This option is useful where there is little time between milkings and the milking start times vary.
To enable the automatic sanitize after wash option, select OPTIONS-PARAMETERS (5x or correct password)-PHASE SETUP-SANITIZE PHASES-SANITIZE PHASE-SANITIZE AFTER WASH? Select YES or NO to enable or disable the automatic sanitize after wash option.

[1.10] Milk Pump Run %

— Note ————————————————————
Ensure all electricity, including that to the Master Control Panel, is OFF at the power panel before installing or servicing this product/system.

— WARNING ————————————————————
High voltage will be present at the electrical module once electricity is applied. To avoid electrical shock, do not apply AC power until all wires have been connected, and do not contact any current-carrying wire or metal inside the AC power panel and control.

— WARNING ————————————————————
The auxiliary input labeled “Sanitizer Flow Sensor” is looking for a switch closure. Connecting any type of current carrying device across this input may cause damage to the Guardian II.

— Note ————————————————————
If you are using this option, the auxiliary input labeled “Sanitizer Flow Sensor” will not be able to be used for any other function.

The Milk Pump Run % is used during the detergent phase circulation mode to help determine if the water is circulating properly through the system. During a normal circulation mode, the milk pump should have run a certain percentage of time based on the total circulation time of the detergent phase. If the percentage of on time of the milk pump is not higher than the Milk Pump Run % value, an error message is displayed at the end of the wash cycle.
To set up the Guardian II to use this option, two things need to be done. First, a relay contact must be connected in parallel to J15 and J18, the connections for the auxiliary input labeled “Sanitizer Flow Sensor”. The coil of the relay needs to be connected in parallel with the milk pump. When the milk pump is turned on, the relay is energized, closing the contacts across the auxiliary input.
Once the connections have been made, you will need to set the Milk Pump Run % value. Setting it to a 0 will disable this option. To set the Milk Pump Run % value, select OPTIONS-PARAMETERS (5x or correct password)-PHASE SETUP-WASH PHASES-DETERGENT PHASE-MILK PUMP RUN %. Set the value as desired.

[1.11] Air Injector Option

An Air Injector option has been added to the list of available options for the auxiliary outputs. By setting one of the auxiliary outputs to this function and setting the air injector on time and off time, the auxiliary output can be used to control an air injector.
To set one of the auxiliary outputs as an air injector, select OPTIONS-PARAMETERS (5x or correct password)-MISCELLANEOUS-INPUTS/OUTPUTS-AUXILIARY OUTPUTS. Once there, select the auxiliary output that you would like to set up as the Air Injector. Once selected, select AIR INJECTOR from the list of available outputs. You may need to select MORE from any one of the output menus to find the air injector option.
To change the on time and off time for the air injector output, select OPTIONS-PARAMETERS (5x or correct password) -MISCELLANEOUS-INPUTS/OUTPUTS-AIR INJECTOR. Then select either ON TIME or OFF TIME from the menu. Set either time as desired.

[1.12] Detergent and Sanitizer Pump Run Times

The detergent pump and sanitizer pump were originally set up to not run at the same time. Due to time restraints, it has become necessary to allow both pumps to run at the same time. Now, when detergent and sanitizer are needed, one pump will turn on, and 5 seconds later, the other pump will turn on. The only time they will not run at the same time is when the

detergent sensor is the only sensor that is enabled. For more information on the flow sensor inputs, see the section labeled Detergent, Acid, and Sanitizer Sensors.

1.13 Extra Chemical Delay

A time delay has been added to delay any extra chemicals from being added to the sink after the vacuum pump has started. This time delay is the same for every chemical.

Once the sink is filled and the vacuum pump starts, the time delay begins. Any chemical that has been set up as extra chemical will not be added until the time delay has been completed.

To change the extra chemical time delay, select OPTIONS-PARAMTERS (5x or correct password)-MISCELLANEOUS-CONTROL VARIABLES-PUMP DELAYS-EXTRA CHEMICAL DELAY. Set the delay time as desired.

2. *Answers to Common Questions*

This section will help clear up some of the questions that have come up since the release of the Guardian II.

2.1 Disabling Automatic Sanitize Times

To disable an automatic sanitize time, the time must be set to "99:99". Setting the time to "00:00" does not disable the sanitize time. If the Guardian II has an automatic sanitize time of "00:00", a sanitize will be started when the Guardian II reaches midnight.

When you are setting the automatic sanitize time hours, set it to "99" by scrolling past "23". The next number you will see is "99". Once you set the hours to "99", the minutes will automatically be set to "99" when you press the ↤button.

2.2 Diverting At the End of Circulation

To help reduce the amount of time needed for draining and drying during the detergent and acid phases, the Guardian II can be set to divert to a drain near the end of each circulation phase. To set this up, follow these instructions:

1. Set either the Auxiliary 3 output or the Auxiliary 6 output to Timer 3.
2. If you are using Auxiliary 3, connect J24 to J44. If you are using Auxiliary 6, connect J35 to J44.
3. If you are using Auxiliary 3, connect J25 to one side of the diverter coil. If you are using Auxiliary 6, connect J35 to one side of the diverter. This side of the diverter coil would normally go to J44.
4. Set all of the drain times and air dry times the same for every phase. For example reasons only, let's assume the drain time is set to 2 minutes and the air dry time is set to 1 minute.
5. Set the Timer 3 start delay and on time to the drain time plus the air dry time plus the time we want to divert at the end of the circulation mode. If we want to divert 2 minutes before the end of the circulation mode, set the Timer 3 start delay and on time to 5 minutes (Drain Time (2) + Dry Time (1) + 2 min). Now, 2 minutes prior to the end of the circulation mode, Auxiliary 3, which has been set to Timer 3, will turn on and open the connection to the diverter valve, diverting water to the drain.

2.3 Setting the Next Wash Cycle

The menu option for setting the next wash cycle will allow you to scroll through the list of up to five available wash cycles. Only the wash cycles with phases enabled will be selectable from the list.

When a wash cycle is complete, the next consecutive wash cycle will be set as the next cycle unless it does not have any phases enabled. If the next consecutive wash cycle does not have any phases enabled, the next wash cycle will be cycle 1. For example, if wash cycle 1 has just completed and wash cycle 2 does not have any phases enabled, the control will automatically set the next wash cycle to cycle 1, even if there are phases enabled for wash cycles 3, 4, or 5.

2.4 Start Delays and End Delays of Timers

This section will explain when start times and end times are started for the various timers.

Timer 1 Delay From Start

The delay from start begins at the start of filling for each phase.

Timer 1 Delay From End

The delay from end is determined by using the air dry time, drain time, and circulation time. Timer 1 may turn off at different times during each of the phases depending on the drain, air dry, and circulation times for each phase.

Timer 2 Delay From Start

The delay from start begins at the beginning of the filling for the first water rinse.

Timer 2 Delay From End

The delay from end is determined by using the air dry, drain, and circulation times of the detergent phase.

Timer 3 Delay From End

The delay from end is determined by using the air dry, drain, and circulation times for each phase. Timer 3 may turn on at different times during each phase depending on the settings for the air dry, drain, and circulation times.

Timer 3 On Time

The on time starts when the delay from end is complete. Timer 3 will stay on for this period of time or until the phase ends.

Timer 4 Start Delay

The start delay begins after a chemical pump has turned off and no other pumps are running. Once the start delay begins, no other pumps can run until Timer 4 has completed it's start delay and on time.

Timer 4 On Time

The on time begins after the start delay is complete.

Timer 5 Start Delay

The start delay begins from the start of the circulation mode of the detergent phase.

Timer 5 On Time

The on time starts when the start delay is complete. Timer 5 will stay on until the on time is complete or the second water rinse phase has ended.

Timer 6 Start Delay

The start delay begins from the start of the circulation mode of the acid phase.

Timer 6 On Time

The on time starts when the start delay is complete. Timer 6 will stay on until the on time is complete or the acid phase has ended.

2.5 Washing By Time

— Note ————————————————————

Ensure all electricity, including that to the Master Control Panel, is OFF at the power panel before installing or servicing this product/system.

— WARNING ————————————————————

High voltage will be present at the electrical module once electricity is applied. To avoid electrical shock, do not apply AC power until all wires have been connected, and do not contact any current-carrying wire or metal inside the AC power panel and control.

With the Guardian II, a system can be washed by time, rather than by monitoring a fill switch and temperature sensor. To set this up, follow these instructions:

1. Disable the temperature sensor input. If the temperature sensor is disabled, both the hot and cold water will be turned on for the first water rinse and hot acid phases, the hot water will be turned on for the detergent phase, and all other phases will use cold water only.
2. Disconnect the fill switch from J4 and J5.
3. Set Auxiliary 1 to the Timer 1 function.
4. Set the Timer 1 delay from start to the desired amount of time needed for filling.
5. Set the Timer 1 delay from end to 15 seconds.
6. Connect J4 to J20 and J5 to J21.

When a wash cycle is started, Auxiliary 1 will be open. The system will begin filling until the Timer 1 delay from start is done, at which time the Auxiliary 1 relay closes, simulating the activation of the fill switch. The remainder of the phase is completed. Fifteen seconds from the end of the phase, the amount of time for the Timer 1 delay from end, Auxiliary 1 will open back up, getting ready for the next phase.

3. *Recommended Phase Settings*

As the Guardian II has continued to grow over the years, so has our knowledge on cleaning. In this section you will find some of the recommended phase settings for washing a system. Please remember that these settings are only recommended settings and will vary from one dairy to the next. Settings will vary depending on water conditions, brand of chemicals used, and many other factors. These settings will not be the same for every dairy.

First Water Rinse Phase

- The fill temperature should be set at 110°-135°F (43°-57°C) or as close to 130°F (54°C) as possible, without running out of hot water for the detergent phase. Do not set below 110°F (43°C).
- Set the amount of extra water to 0.
- Set the circulation time for 1 minute longer than it takes for the water to be emptied from the wash vat.
- Set the drain time so that the receiver and plate cooler drain by the time the vacuum pump starts during the detergent phase. If there is a long fill time, a shorted drain time can be used.
- Set the air dry time to 0. The air dry is accomplished by setting the circulation time 1 minute longer than it takes to empty the wash vat.

Detergent Phase

- Set the fill temperature at the optimum output temperature for the water heater. This should be around 170°F (76°C). Setting the temperature higher than 180°F (82°C) is not recommended.
- Set the fill alarm temperature at 160°F (71°C) minimum. If you have to set this lower than 150°F

(66°C) to prevent error messages, the hot water system is inadequate and must be corrected to achieve proper cleaning.

- Set the circulation stop temperature at 115°-120°F (46°-49°C). If you have to set this lower to prevent error messages, the hot water system is inadequate and must be corrected to achieve proper cleaning.
- Add enough extra water to prevent any accidental air admission during circulation. The amount of water must be calculated for proper chemical concentration.
- Set the detergent amount based on the manufacturer's recommendations for water hardness, iron, system size, etc. See the Bou-Matic Cleaning Guidelines to determine chlorine and alkalinity levels. If the diverter delay is used, it may be best to add most of the detergent as extra detergent.
- Set the chlorine amount based on the manufacturer's recommendations for water hardness, iron, system size, etc. See the Bou-Matic Cleaning Guidelines to determine chlorine and alkalinity levels. If the diverter delay is used, it may be best to add most of the chlorine as extra chlorine.
- Set the circulation time to 10 minutes or as long as needed to obtain a minimum of 20 slugs without reaching the circulation stop temperature. Do not set below 7 minutes.
- Set the circulation minimum time to 7 minutes. This amount of time is generally needed for a proper wash cycle of claws and meters.
- Set the circulation alarm time to 1 minute less then the circulation time, but never less then the circulation minimum time. The purpose of this alarm time is to know when a circulation mode is stopped early. If there are frequent alarms, there is a hot water or system problem. These problems need to be corrected for a proper cleaning to take place.
- Set the divert delay 15 – 25 seconds longer than the total time it takes from the start of circulation until the water begins returning to the diverter. More time may be necessary for larger systems. To set this setting correctly, it will be necessary to monitor the amount of time it takes from the time the circulation mode begins until the water returns back to the diverter.
- Set the drain time to 1-2 minutes or as long as necessary to have the system drained before the air dry mode begins.
- Set the air dry time so that most of the water is evacuated from the system before it shuts down. A setting of 1-2 minutes is usually adequate. Diverting at the end of the circulation mode can help reduce the time needed for the drain and air dry modes. See section 2.2, Diverting at the End of Circulation.

Second Water Rinse Phase

- If this phase is required, set it the same as the First Water Rinse Phase. Cold water may be used for this phase.

Acid Phase

- Set the fill temperature at 110°-130°F (43°-54°C). About 110°F (43°C) is adequate for good results. Higher temperatures and acid levels may be desirable where high levels of iron or water hardness are present. Higher temperatures increase the chemical activity and help prevent iron or other mineral build-ups. Lower temperatures than 110°F (43°C) may result in fats being solidified in the wash system.
- Set the fill alarm temperature at 70°F (21°C) to deactivate the alarm. This alarm is only needed in special circumstances.
- Set the circulation stop temperature to the same setting as the fill alarm temperature.
- Set the amount of extra water to a setting that prevents accidental air admission during circulation.
- If the diverter delay is used, it may be best to add most of the acid as extra acid. A small amount of acid should be added before the circulation begins. Set the acid amount to achieve an ending pH of 3 – 4, except when silicates are present in the water supply. If this is the case, you may need to leave the pH around 5 - 6.
- Set the circulation time at 4 – 5 minutes.
- Set the circulation minimum time to 0. This is only needed in special circumstances.
- Set the divert delay 15 – 25 seconds longer than the total time it takes from the start of circulation until the water begins returning to the diverter. More time may be necessary for larger systems. To set this setting correctly, it will be necessary to monitor the amount of time it takes from the time the circulation mode begins until the water returns back to the diverter.
- Set the drain time for 0. There is normally enough time for the system to drain at the end of the cycle.
- Set the air dry time so that most of the water is evacuated from the system before it shuts down. A setting of 1-2 minutes is usually adequate. Diverting at the end of the circulation mode can help reduce the time needed for the drain and air dry modes. See section 2.2, Diverting at the End of Circulation.

Third Water Rinse Phase

- If this phase is required, set it the same as the First Water Rinse Phase. Cold water may be used for this phase.

Sanitize Phase

- Set the fill temperature at 100°F (38°C). Using higher temperatures could result in corrosion of equipment or rapid loss of chlorine.
- Set the amount of extra water to a setting that prevents accidental air admission during circulation.
- If the diverter delay is used, it may be best to add most of the sanitizer as extra sanitizer. A small amount of sanitizer should be added before the circulation begins.
- Set the circulation time at 3:30 or long enough to assure there has been at least 2 minutes of circulation with the sanitizer.
- Set the divert delay 15 – 25 seconds longer than the total time it takes from the start of circulation until the water begins returning to the diverter. More time may be necessary for larger systems. To set this setting correctly, it will be necessary to monitor the amount of time it takes from the time the circulation mode begins until the water returns back to the diverter.
- Set the drain time for 0. This is normally not needed.
- Set the air dry time so that most of the water is evacuated from the system before it shuts down. A setting of 1-2 minutes is usually adequate. Diverting at the end of the circulation mode can help reduce the time needed for the drain and air dry modes. See section 2.2, Diverting at the End of Circulation.

Sanitize Water Rinse Phase

- If this phase is required, set it the same as the First Water Rinse Phase. Cold water may be used for this phase.

4. The "Super Saver" Wash Cycle

— WARNING ————————————————

Please check with cleaning regulations before making any of the possible changes. Also, if the following changes are made, you must observe the cleanliness of the system to make sure the changes are working properly. Reducing the cycle time may lead to other problems. The following settings will vary from on dairy to the next depending on many factors.

As dairies grow larger, the time between milkings decreases, and having enough time to run a good wash cycle is reduced. To help reduce the amount of time to complete a wash cycle, you may want to follow these setup procedures. Please remember, you must observe the wash cycle and continue to monitor the cleanliness of the system after making these changes. Cutting down on time may lead to other problems if the system is not set up properly. The following settings will vary depending on water quality and temperature, length of pipeline, and many other factors. Use these settings with caution.

First Water Rinse Phase

- If cleaning regulations allow, disable this phase from the wash cycle.

Detergent Phase

- Set the fill temperature at 150°–180°F (66°-82°C). Although this temperature is higher than normally recommended, the temperature of the water will be reduced for the first few slugs sent through the pipeline.
- Set the fill alarm temperature at 140°F (60°C) minimum. If you have to set this lower to prevent error messages, the hot water system is inadequate and must be corrected to achieve proper cleaning.
- Set the circulation stop temperature at 115°-120°F (46°-49°C). If you have to set this lower to prevent error messages, the hot water system is inadequate and must be corrected to achieve proper cleaning.
- The amount of extra water depends on how much water is sent to the drain until it is visibly clear. Please note that you will need to monitor how long it takes from the start of circulation until the water becomes clear. Also, record the temperature of the water when it becomes clear. Add enough extra water to prevent any accidental air admission during circulation. The amount of water must be calculated for proper chemical concentration.
- If the diverter delay is used, it may be best to add most of the detergent as extra detergent. A small amount of detergent should be added before the circulation begins. Set the detergent amount based on the manufacturer's recommendations for water hardness, iron, system size, etc. See the Bou-Matic Cleaning Guidelines to determine chlorine and alkalinity levels.
- If the diverter delay is used, it may be best to add most of the chlorine as extra chlorine. A small amount of chlorine should be added before the circulation begins. Set the chlorine amount based on the manufacturer's recommendations for water hardness, iron, system size, etc. See the Bou-Matic Cleaning Guidelines to determine chlorine and alkalinity levels.
- Set the circulation time to obtain a minimum of 20 slugs plus the amount of time that the water is sent to a drain before it becomes visibly clear.
- Set the circulation minimum time to 7 minutes plus the divert delay time. This amount of time is generally needed for a proper wash cycle.
- Set the circulation alarm time to 1 minute less then the circulation time, but never less then the circulation minimum time. The purpose of this alarm time is to know when a circulation mode is stopped early. If there are frequent alarms, there is a hot water or system problem. These problems need to be corrected for a proper cleaning to take place.

- Set the divert delay to 10 – 15 seconds more than it takes for the water to become visibly clear at the beginning of the circulation mode. More time may be necessary for larger systems. To set this setting correctly, it will be necessary to monitor the amount of time it takes from the time the circulation mode begins until the water returning back becomes visibly clear.
- Set up the system to divert a couple of minutes prior to the end of the circulation mode, but only after a minimum of 20 slugs has been attained. See section 2.2, Diverting At the End of Circulation.
- Set the drain time to 1 minute or as long as necessary to have the system drained before the acid phase begins.
- Set the air dry time to 0.

Second Water Rinse Phase

- If cleaning regulations allow, disable this phase from the wash cycle.

Acid Phase

- Set the fill temperature at 110°-130°F (43°-54°C). Higher temperatures and acid levels may be desirable where high levels of iron or water hardness are present. Higher temperatures increase the chemical activity and help prevent iron or other mineral build-ups.
- Set the fill alarm temperature at 90°F (32°C) to deactivate the alarm. This alarm is only needed in special circumstances.
- Set the circulation stop temperature to the same setting as the fill alarm temperature.
- Set the amount of extra water to a setting that prevents accidental air admission during circulation.
- All of the acid used in this phase should be added as extra acid. Set the acid amount to achieve an ending pH of 3 – 4, except when silicates are present in the water supply. If this is the case, you may need to leave the pH around 5 - 6.
- Set the circulation time at 4 – 5 minutes.
- Set the circulation minimum time to 0. This is only needed in special circumstances.
- Set the divert delay to 1 minute less than the circulation time. A longer delay may be needed for larger systems.
- Set the drain time for 0.
- Set the air dry time to 0.

Third Water Rinse Phase

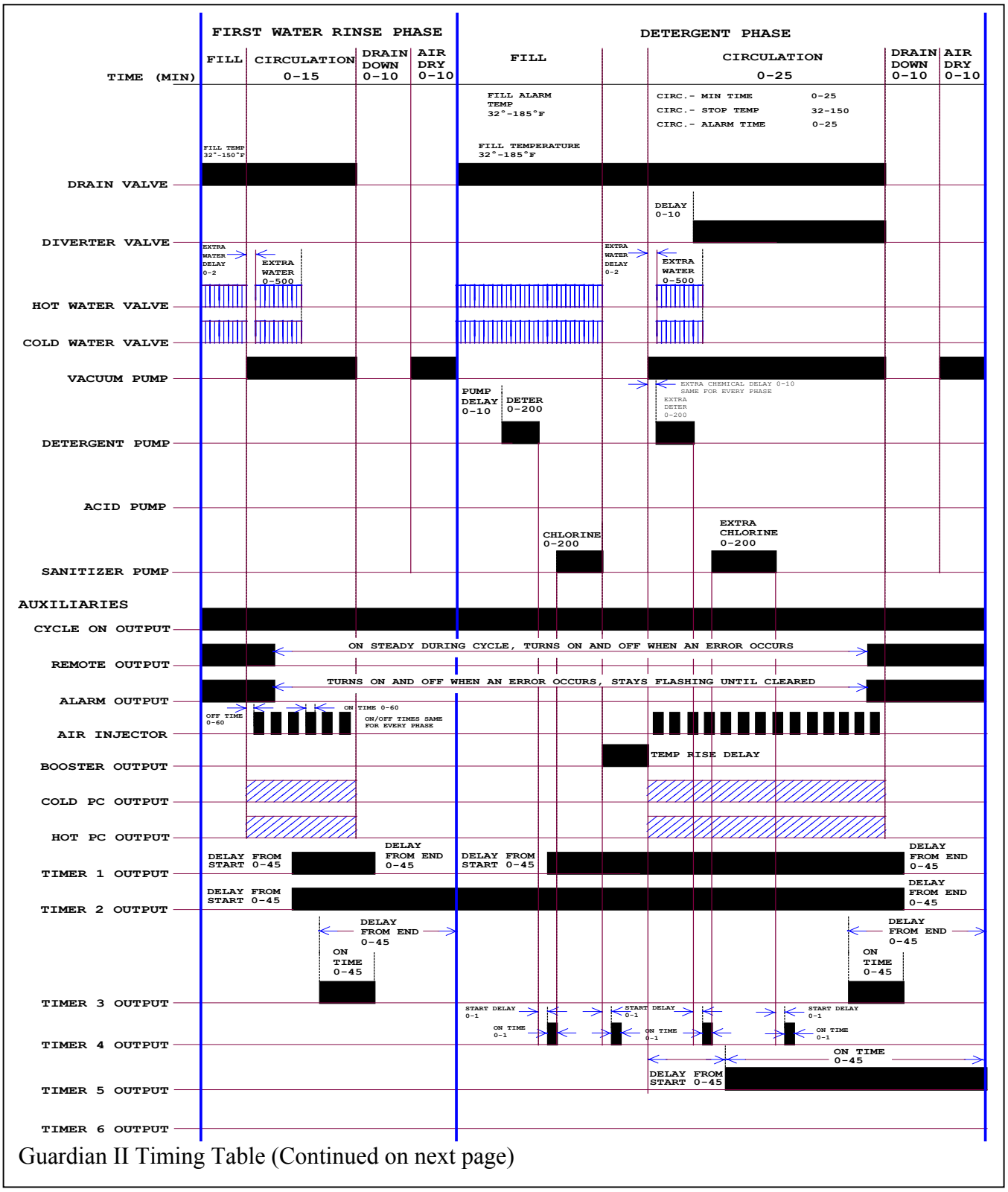
- If cleaning regulations allow, disable this phase from the wash cycle.

5. *New Error Messages*

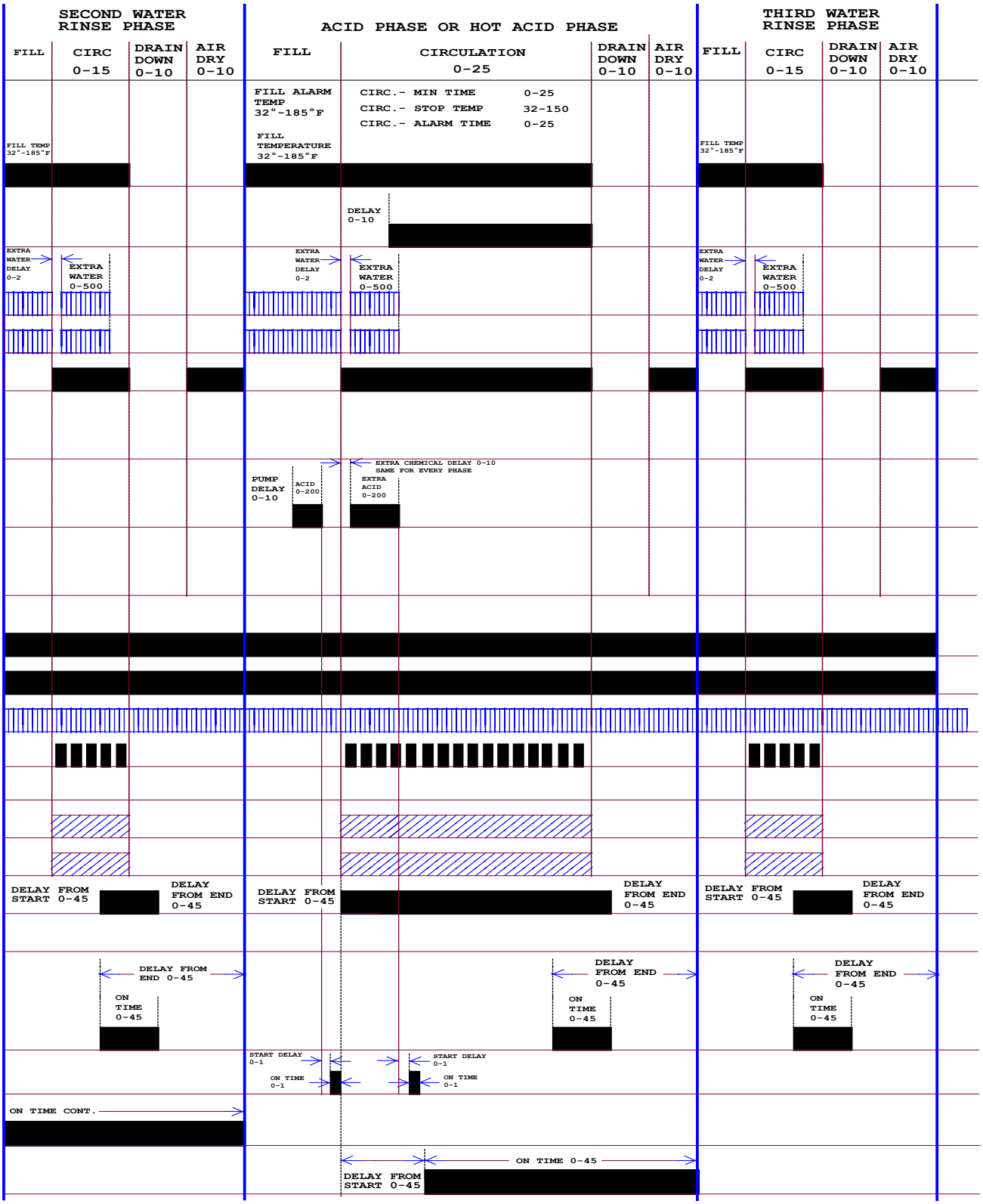
Table 2 Error Messages

Symptom	Possible Cause	Action
DETERGENT FLOW ERROR CHECK DETERGENT	1. Detergent sensor input enabled.	1. Disable detergent sensor input.
SANITIZER FLOW ERROR CHECK DETERGENT	1. Sanitizer sensor input enabled.	1. Disable sanitizer sensor input.
ACID FLOW ERROR CHECK DETERGENT	1. Acid sensor input enabled.	1. Disable acid sensor input.
CIRCULATION ERROR MILK PUMP RUN %	1. The milk pump run percent is enabled, but is not used. 2. The milk pump run percent value is set too high. 3. The milk pump did not run for the required time.	1. Disable the milk pump run percent by setting it to zero. 2. Adjust the milk pump run percent to a lower value. 3. Check the circulation of water during the wash cycle.

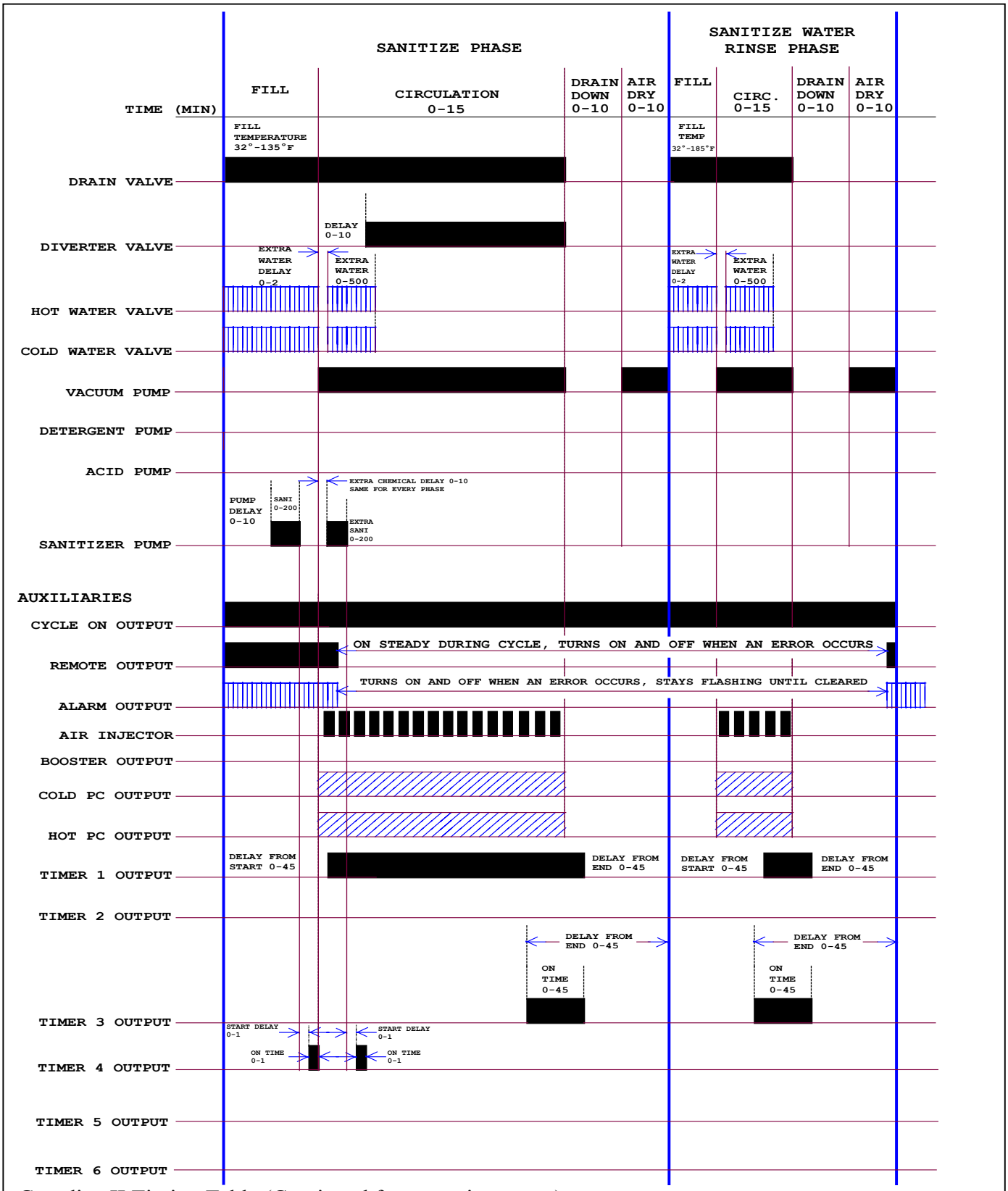
6. *Timing Tables*



Guardian II Timing Table (Continued on next page)



Guardian II Timing Table (Continued from previous page and continued on next page)



Guardian II Timing Table (Continued from previous page)

Guardian II Settings

Dairy Name: Date :

Phase/ Portion	Original Setting	New Setting	Phase/ Portion	Original Setting	New Setting
First Water Rinse Phase			**Hot Acid Phase**		
Fill Temperature			Fill Temperature		
Extra Water			Fill Alarm Temperature		
Circulation Time			Circulation Stop Temperature		
Drain Time			Extra Water		
Air Dry Time			Acid Amount		
Detergent Phase			Extra Acid		
Fill Temperature			Circulation Time		
Fill Alarm Temperature			Circulation Minimum Time		
Circulation Stop Temperature			Circulation Alarm Time		
Extra Water			Divert Delay Time		
Detergent Amount			Drain Time		
Extra Detergent			Air Dry Time		
Chlorine Amount			**Third Water Rinse Phase**		
Extra Chlorine			Fill Temperature		
Circulation Time			Extra Water		
Circulation Minimum Time			Circulation Time		
Circulation Alarm Time			Drain Time		
Divert Delay Time			Air Dry Time		
Drain Time			**Sanitize Phase**		
Air Dry Time			Fill Temperature		
SecondWaterRinse Phase			Extra Water		
Fill Temperature			Sanitizer Amount		
Extra Water			Extra Sanitizer Amount		
Circulation Time			Circulation Time		
Drain Time			Divert Delay Time		
Air Dry Time			Drain Time		
Acid Phase			Air Dry Time		
Fill Temperature			**Sanitize Water Rinse Phase**		
Fill Alarm Temperature			Fill Temperature		
Circulation Stop Temperature			Extra Water		
Extra Water			Circulation Time		
Acid Amount			Drain Time		
Extra Acid			Air Dry Time		
Circulation Time					
Circulation Minimum Time					
Circulation Alarm Time					
Divert Delay					
Drain Time					
Air Dry Time					

Sink Capacity : _____

Extra Chemical Delay: _____

Chemical Pumps

	Calibration	**Time Delay**
Detergent		
Acid		

Notes: _____