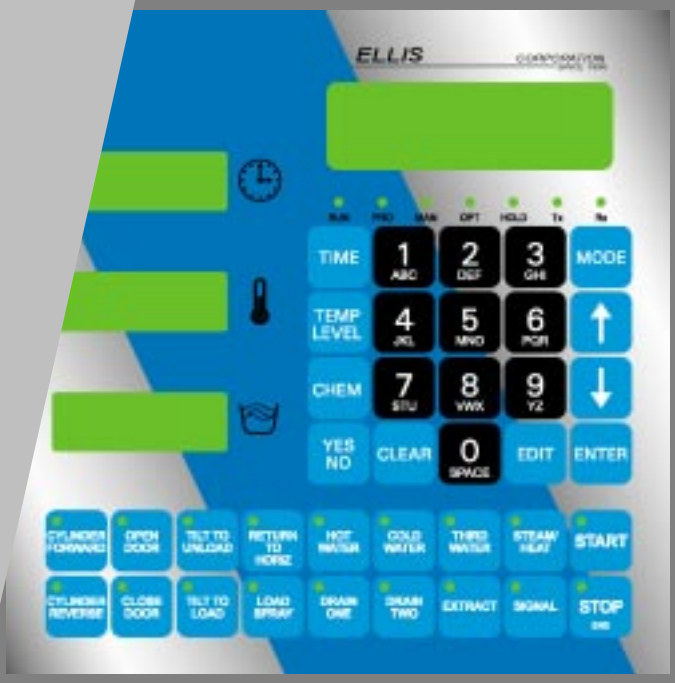
Ellis Intellitrol
Washer Control
Operation Manual

Revised 10/3/2002

Operation

Configuration

Troubleshooting



Ellis Intellitrol Washer Control

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Table of Contents

Hardware Specifications

Control/Display Unit

Microcontroller:	Z-180
RAM:	128k
ROM:	256k
Serial Port:	2 - RS-232/485 data rates up to 57,600 bps
Display:	4x20 character vacuum fluorescent displays, and 3 - 4-digit numeric LED displays
Status LEDs:	25
Keypad:	Sealed membrane, 38 keys

Software Features

Formulas:	96 formulas
Steps:	56 steps per formula
Step Time:	Time can be programmed from one second to 99 minutes and 99 seconds in one-second increments.
Water Temperature Control:	Water temperature can be programmed from 0ºF to 255ºF or 0ºC to 145ºC, in one-degree increments.
Water Level Control:	Water level can be programmed from 0" to 50" in .1" increments, or 0cm to 120 cm in 1cm increments.

Warranty

All products manufactured by Custom Control Systems Inc. (CCS), are warranted against defects in material and workmanship for two years from the date of purchase. Warranty is extended to the original purchaser only.

If a defect occurs, the product will be repaired, provided that inspection proves the claim, and that the purchaser give CCS written notice, or returns such defect within 30 days. Defective product shall be returned to the factory, freight prepaid, in original shipping package.

Custom Control Systems Inc. extends this warranty in lieu of any other warranties expressed or implied, and CCS neither assumes, nor authorizes any other person to assume for it, any other liability in connection with its equipment. Remedies provided in this warranty shall constitute the exclusive remedies available to the original purchaser, and all other warranties and damages, statutory or otherwise, are hereby expressly waived by the original purchaser.

Exclusions

1. This warranty is void if the equipment is not properly installed, operated, and serviced as specified by the factory or if the equipment is not operated under normal conditions and with competent help.

2. Parts subject to normal wear or damaged by corrosion or exposure to weather, are not covered under this warranty.

3. This warranty does not cover labor to replace defective parts.

4. Expenses for removal and replacement of defective parts are not assumed by CCS.

5. Any modification made to CCS equipment after shipment from the factory or replacement of parts with types or makes other than originally furnished with the equipment, voids this warranty, unless such change or replacement has been approved in writing by CCS.

6. This warranty does not include any liability for consequential or incidental damage attributable to failure of any part of the equipment.

7. Although sold by CCS, equipment manufactured by others which is not an integral part of a CCS control, is excluded from this warranty, but may be covered by a warranty of the other manufactures.

Replacement of Parts Under Warranty

Ordering Replacement Parts

When ordering replacement parts, furnish the following information:

1. Model number and serial number.
2. Part number, description and quantity.
3. Shipping instructions.

Returning Parts Under Warranty

All parts furnished under warranty will be invoiced by CCS. If we do not want the part to be returned for inspection, the invoice will show that the replacement part was furnished at no charge. If however, the part is to be returned for inspection and possible credit, the invoice will show the cost of the part, and credit will be issued upon receipt of the defective part provided:

1. The replaced parts must be returned to the factory, freight prepaid, within 30 days from the date of invoice.

2. Each part to be returned for credit and inspection must be tagged, showing name of customer, invoice number of replacement part, and a brief explanation of difficulty. *(Be more explicit than stating "N.G. or Defective".)* Pack parts carefully, to avoid damage in shipment.

3. The inspection must prove that the part was defective and had to be replaced.

4. Replacement parts will be shipped freight prepaid and the amount will be added to the invoice. If the returned part proves to be defective, the credit issued for the part will include minimum shipping charges incurred. No allowance will be made for air freight or express shipments.

5. Replacement parts which are returned unused are subject to a 25% restocking charge. Special made parts that are not normally stocked by CCS are not returnable for credit.

1. Run Mode/Idle

1.1 Active Keys

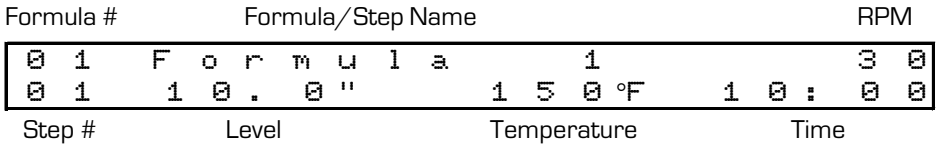
[0] - [9]	Used to enter formula number.
[UP ARROW]	Selects next formula.
[DOWN ARROW]	Selects previous formula.
[TEMP/ LEVEL]	Switches display between actual level, temperature and RPM and programmed values.
[MODE]	Changes operation mode.
[TIME]	Used to switch display between step, programmed, elapsed, or remaining time.
[START]	Used to start the formula at the selected step and enter Run Mode/Running.

1.2 Mode Select

When the processor is first powered up, it will be in the Run Mode. To change to any of the other modes (Program Mode, Manual Mode, Options Mode), press the [MODE] key. You may be required to enter a password to leave the Run Mode.

1.3 Displays

When the control first enters the Program Mode, the top line will show the formula name and number. The second line will show the step number, level, temperature, and time. The output status LEDs will show the outputs that are programmed to activate in the selected step.



1.4 Select Formula

Formulas can be selected by one of two methods:

1. Press the [UP ARROW] and [DOWN ARROW] keys to scroll through the available formulas. The formula number and name will appear on the top line with the step number, temperature, level and time appearing on the second line.

2. Press the numeric keypad ([0]-[9]) to enter the desired formula number (01=formula 1; 16=formula 16). The formula number and name will appear on the top line and the step number will appear on the second line. If a mistake is made, reenter the desired formula number.

NOTE: Formulas can only be selected after the current formula has run to the end step and the signal or stop buttons have been pressed. This feature can be bypassed if desired, see Step Advance option, Section 6.5.20.

1.5 Select Step

1. To scroll through the available STEPS in the selected formula, press [ENTER] then use [UP ARROW] or [DOWN ARROW] to scroll to the desired step. The step name will appear on the top line and the step number will appear on the second line.
2. Press [YES/NO] to return to FORMULA Selection.

NOTE: Selecting Steps is protected by an Option Setting, but can be unprotected if desired. See Step Advance option, Section 6.5.20.

1.6 Run a Formula

1. Select desired formula.
2. Press the [START] key. The control will start the washer, and will enter Run Mode/Running.

2. Run Mode/Running

2.1 Active Keys

[STOP] Used to stop the washer. The control will enter the Run Mode/Stopped mode.

[SIGNAL] Used to cancel the signal and resume processing the formula. If the formula has reached the end step, the control will enter Run Mode/Idle.

[TEMP/LEVEL] Used to switch display between actual inlet and outlet temperatures, programmed inlet and outlet temperatures, the programmed and actual temperature difference, and the set and actual modulating gas valve positions

[TIME] Used to switch display between programmed step time, formula remaining time, formula elapsed time, and step time remaining

2.2 Running Formula

The control will begin running the formula with the currently selected step. The step timer will be started when the step's other criteria is met.

2.2.1 Maintain Water Level Setting

A. Turn off water valves as soon as set point or greater level is reached.
B. Turn on water valves if after a specified period of time, the level is still below the set point. See fill delay option, Section 6.5.7.

2.2.2 Maintain Water Temperature Setting

A. Below Water Level
    1. Activate hot water if water temperature is below set point. (Hot water will be activated in addition to the programmed water, for example if cold water is programmed in the step both the hot and cold water will be activated but if hot water is programmed in the step then only hot water will be activated).
    2. Activate cold water if temperature is above set point. (Cold water will be activated in addition to the programmed water, for example if hot water is programmed in the step both the hot and cold water will be activated but if cold water is programmed in the step then only cold water will be activated.)
B. Above Water Level
    1. Turn on steam if temperature is below set point. (Steam will only be activated if it has been programmed into the step.)
    2. Turn off steam if temperature is above set point. (Steam will only be activated if it has been programmed into the step.)

2.2.3 Add Chemicals

A. Timed
    1. Turn on programmed chemical outputs if chemical timer is less than the programmed time.
    2. Turn off programmed chemical outputs when chemical timer is equal to the programmed time.

2.2.4 Step Timer

Function is started as soon as level, temperature and chemicals are satisfied. The step timer will continue to run until the timer reaches 00:00 or if the [STOP] key is pressed or an external timer hold input is detected. (Some option settings can affect when the step timer holds, and when it runs. See Options, Section 6.5 for more detail.)

3. Run Mode/Stopped

3.1 Active Keys

[MODE]	Used to Select Mode
[START]	Used to start the formula at the selected step and enter Run Mode/Running
[0] - [9]	Used to enter formula number
[UP ARROW]	Used to increment formula/step number
[DOWN ARROW]	Used to decrement formula/step number
[TIME]	Used to display Step, Programmed, Elapsed, or Remaining Time.
[TEMP/LEVEL]	Used to display Actual Level and Temperature or programmed values.

4. Program Mode

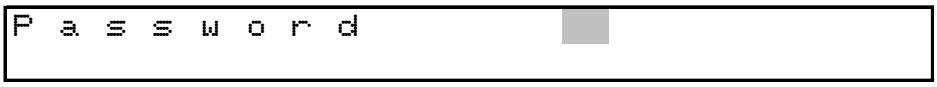
The Program Mode is used to program up to 96 formulas, with 56 steps within each formula. This section explains how to select and name formulas, program outputs, water level and temperature, time and chemicals. Steps can be inserted, deleted, and renamed.

4.1 Entering Program Mode

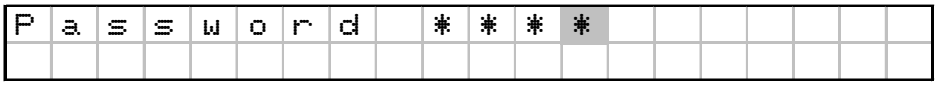
If the password feature has not been enabled, press the [MODE] key and proceed to step 4 below. Otherwise, start with step 1.

Note: the factory default password is 5000. To change the control password, see the Password entry under Options, section 6.5.15. This example assumes that the control has been set up with the factory default password. If your password is different, use it instead.

1. Press the [MODE] key.
   The top display will now read:



2. Press the 5, then the 0, then the 0, and then the 0.
   The top display will now read:



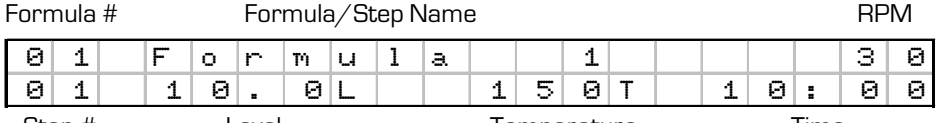
3. Press the [ENTER] key. The control will now be in the Program Mode, and the "PRO" light will be illuminated.

4.2 Active Keys

[UP ARROW]	Used to increment formula / step number
[DOWN ARROW]	Used to decrement formula / step number
[YES/NO]	Used to exit from step edit mode
[ENTER]	Used to save step
[EDIT]	Used to access special editing functions
[TEMP/LEVEL]	Used to enter level and temperature for the current step
[CHEM]	Used to enter Chemical injections for the current step
[TIME]	Used to enter time for the current step

4.3 Displays

When the control first enters the Program Mode, the top line will show the formula name and number. The second line will show the step number, level, temperature, and time. The output status LEDs will show the outputs that are programmed to activate in the selected step.



4.4 Select Formula

Select the formula number to be programmed or edited using the [UP ARROW] key to select the next formula number, or the [DOWN ARROW] key to select the previous formula number. Numeric keys can also be used to advance directly to desired formula number.

4.5 Edit Formula Name

The formula name is displayed to the right of the formula number. Press the [EDIT] key, and the display will read "Formula edit 1-Steps 2- Name". Press 2 to edit name. A flashing cursor will appear on first character of the formula name.

4.5.1 Active Keys

[CLEAR]	Used to clear the formula name
[ENTER]	Used to save the formula name, and exit formula name edit mode
[EDIT]	Used to enter the character set scrolling mode.
[1(ABC)] - [0(SPACE)].	Used to enter numbers and capital letters. The first depression will display the number, the second depression will display the first letter, the third depression will display the second letter and the fourth depression will display the third letter, then the cycle will repeat.
[UP ARROW]	Used to move the cursor one space to the right.
[DOWN ARROW]	Used to move the cursor one space to the left.

When editing is complete, press [ENTER] to save the new formula name. The display will read "Name saved".

4.6 Program/ Edit Formula Steps

1. Press [EDIT] key. Display will read "Formula edit 1-Steps 2-Name".

2. Press [1] to select steps.

3. To select the step number to be Programmed or Edited, use the [UP ARROW] key to move to the next step and the [DOWN ARROW] key to move to the previous step. The step name is shown on the top line.

4.7 Programming Outputs (Hot, Cold, Steam, Etc.)

Hot, Cold, Steam, Drain, Motor Forward, Motor Reverse, and Extract can all be selected with one key stroke when programming steps, using the two rows of keys at the bottom of the keypad.

1. To select the outputs to be activated in the step, press the keys with the desired output functions marked on them.

2. Proceed to programming water level and temperature for this step.

4.8 Programming Level and Temperature

When you first start programming a step on the washer control, it will automatically set the water level and water temperature on that step to zero. If the step you are programming requires a temperature or level, use the procedure below to add the settings you need.

1. Press [TEMP/LEVEL] key. Notice that the right most digit in the level field begins to flash. (The washer control uses the cursor to indicate that it is waiting for a number to be entered.)

2. Enter the required water level using the multifunction keys (numeric keypad). For example, if you require a water level of 13, press the [1] key, then the [3] key, then the [0] key. The display will now read 13.0, with the cursor flashing on the "0".

3. Once you have entered the water level needed for this step, press the [TEMP/LEVEL] key. The cursor will now begin to flash on the temperature display.

4. Enter the required water temperature, using the multifunction keys (numeric keypad). For example, if you require a water temperature of 145°, press the [1] key, then the [4] key and then the [5] key, The temperature display will now read "145" with the 5 flashing.

5. When the desired level and temperature has been selected press the [TEMP/LEVEL] key.

NOTE: If the wrong level or temperature has been selected, it is important to make sure that **the cursor is flashing** in either the level or the temperature field before making any change. After you have verified that the cursor is flashing in the correct field, press the [CLEAR] key and the field will change to "0". If the [CLEAR] key is pressed without any cursor flashing, the entire step will be erased, including any outputs or time that had been programmed.

4.9 Programming Time

If you need to program a time for the step you are editing:

1. Press the [TIME] key. Notice that the right most digit of the time display begins to flash. As with level and temperature, the flashing cursor is the control's way of requesting input from the user.

2. Enter the required time for this step by using the multifunction keys. For example, to program a step time of 1 minute and 30 seconds, press the [1] key, then the [3] key and then the [0] key. The time field will now read "01:30", with the 0 flashing.

3. When the desired time has been entered, press the [TIME] key and notice that the flashing cursor has turned off.

4.10 Programming the Step Name

If the default step name is acceptable, proceed to Section 4.11. If you wish to change or edit the step name use the following procedures:

1. Press the [EDIT] key, then select 1-Step name. A flashing cursor will appear in the top display.

2. The keys 0 - 9 also contain the alphabet. Under each number there are three letters. For example the number [1] key also contains the letters "ABC". The first time the key is pressed the number "1" will appear at the cursor location. The next time the key is pressed the letter "A" will replace it. The next time the key is pressed the letter "B" will replace it, then the letter "C" and then back to the number "1".

3. Use these keys to select the first letter of the step name.

4. Then press the [UP ARROW] key to move the cursor to the second letter position of the step name.

5. If a mistake is made, the [UP ARROW] and [DOWN ARROW] keys can be used to position the cursor over the desired letter to make a correction or the [CLEAR] key can be used to clear the entire step name.

6. Continue the above described method for programming the rest of the step name and the press [ENTER] to save the step name.

4.11 Programming Chemicals

When Chemicals or Supplies need to be entered or changed the following procedure must be used:
1. Press the [CHEM] key, The bottom line now reads the name of Chemical 1, with 0 and the unit of measure at the end of the display. Pressing [CHEM] repeatedly will cycle through the list of available chemical supplies. If chemicals have not been configured, see chemical name and calibration options, Section 6.4.

2. Once the proper chemical has been selected, enter the desired number of units, using the numeric keypad. Chemical units can be time, volume or weight. See chemical name and calibration options, Section 6.4.

3. Repeat steps 1 & 2 for all required chemicals for the current step.

4. When finished, press the [ENTER] key.

4.12 Saving a Step

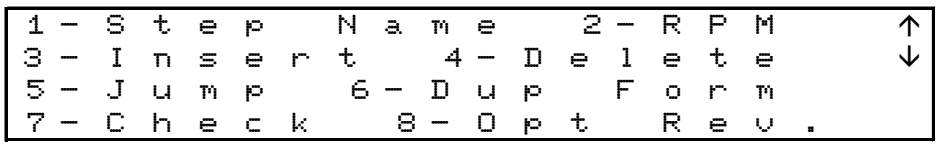
When you are finished working with a step, the step must be recorded into memory. To do this, press [ENTER]. The bottom display will show "Step Saved", then automatically advance to the next step.

4.13 End Step

When you have completed entering all required step for a formula, the last step **must** be an end step. Simply go to the next available step in your formula and the press [STOP] key. Display will read "** END **". Without this end step, the formula will cycle around to the beginning and repeat the entire formula again.

4.14 Programming Edit

The Programming Edit Function was developed specifically to allow the user to perform special programming tasks, such as inserting a step, deleting a step, jumping to a step, changing the step name or setting step options. The options: step name, RPM, insert, delete, jump, dup form, check, and opt rev. will appear on the display.



4.15.1 Edit Step Name

1. Select the step whose name you wish to change.

2. Press the [EDIT] key.

3. Press the [1] key. The display will show the current step, with a flashing cursor in the name display.

4. The multifunction keys 0 - 9 also contain the alphabet. Below each number there are three letters. For example, the [1] key also contains the letters "ABC". The first time the key is pressed, the number "1" will appear at the cursor location. The second time the key is pressed, the letter "A" will replace it. The third consecutive time the key is pressed, the letter "B" will replace it, then the letter "C", and then back to the number "1".

5. Using the multifunction keys, select the first letter of the step name. Press the [UP ARROW] key to move the cursor to the second position in the step name and proceed with the next letter.

6. If you wish to use a pre-programmed step name, enter the first letter of the pre-programmed name you want to use and press the [TIME] key. The first pre-programmed name that begins with that letter will appear on the top line of the top display. Press the [TIME] key again to get the second name that begins with that letter, and so on.

7. If you make a mistake, the [UP ARROW] and [DOWN ARROW] keys can be used to position the cursor over any of the letters in the step name to make a correction. The [CLEAR] key can be used to clear the entire step name.

8. Proceed with the method described above for programming the rest of the step name. When you are finished, press [ENTER] to save the step name. The bottom line of the top display will read "Name Saved".

4.15.2 Edit Step RPM

When you select "RPM", the control will ask whether you want to select your speed in RPM or in G Force. To select RPM, press [1], to select G Force, press [2].

1. If you selected RPM, the control will then display "New speed: ### RPM", and display the valid range of values for that type of step. Use the numeric keypad to enter the desired speed, then press [ENTER].
2. If you selected G Force, the control will then display "New speed: ###.# g", and display the valid range of values for that type of step. Use the numeric keypad to enter the desired speed, then press [ENTER].

4.15.3 Insert a Step

The new step being added will always be inserted **before** the selected step.

After you press the [3] key the contents of the following steps will be renumbered one higher. When the renumbering is complete, the bottom line of the top display will flash "Step Saved". You will now have a blank step, ready to be programmed. See Section 4.7 for programming step data.

4.15.4 Delete a Step

1. Select the step you wish to delete using the [RIGHT ARROW] or [LEFT ARROW] keys.

2. Press the [EDIT] key. The top line of the top display will now read "1-Ins, 2-Del", and the bottom line of the top display will read "3-Name, 4-Jump".

3. Press the [4] key.

4. Deletion is complete.

After the deletion is complete, the current step will have been removed from memory and will be replaced by the step that followed it. The washer control will automatically move all steps after the one you deleted down one step.

4.15.5 Jump / Go To

This feature is useful when you need to jump by several steps.

1. Press the [EDIT] key. The top display will now read "1-Ins, 2-Del", and the bottom display will read "3-Name, 4-Jump".

2. Press the [5] key. The display will read "Jump to Step", with a flashing cursor.

3. Using the numeric keypad, select the step you wish to go to. Press [ENTER] and notice that the step number has changed to the desired step.

4.15.6 Duplicate Formula

The duplicate formula option allows you to completely copy the contents of one wash formula to another wash formula. When you select this option, the control will display "Formula # to copy this formula to:" Use the numeric keypad to enter the formula number, then press [ENTER] to save it.

4.15.7 Check Step

This feature stops the washer at the end of the current step while running the formula and sounds the signal. The operator then has the option of programming additional run time for the step, or continuing on to the next step in the formula.

1. Press the [EDIT] key. The top display will now read "1-Ins, 2-Del", and the bottom display will read "3-Name, 4-Jump".

2. Press the [UP ARROW] key. The top display will now read "1-Check Step". If you are working with a dye machine control, "2-Optional Wash Spd" will also appear.

3. Press the [7] key to program or clear the check step option.

4. Press the [YES/NO] key to return to the program mode.

4.15.8 Optional Reversing

The Ellis washer control allows you to program different reversing rates on all steps of a formula. When you select this option, the control will display the forward, pause, and reverse times programmed for the current step. If these times are zero, the control will used the default times set in the options mode. To change them:

1. Press the [EDIT] key. The number to the right of "forward time" will start blinking.
2. Use the numeric keypad to enter the number of seconds the machine should run in the forward direction, then press the [ENTER] key.
3. The number to the right of "pause time" will start blinking; use the numeric keypad to enter the number of seconds that the machine should pause between directions and press [ENTER] again.
4. The number to the right of "reverse time" will start blinking; use the numeric keypad to enter the number of seconds the machine should run in reverse and press [ENTER].
5. If you want to remove the optional reversing times from a step, press the [CLEAR] key while in the optional reversing times section.

4.16 Exiting Program Mode

Press [MODE] to move from the Program Mode into the Manual Mode.
Press [MODE] again to move from the Manual Mode into the Options Mode.
Press [MODE] again to move from the Options Mode into the Run Mode.

5. Manual Mode

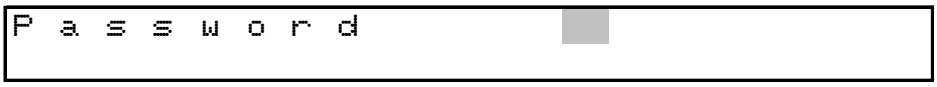
The Manual Mode is used to view the formula counters and hour meter and to check the raw values of the control system's analog channels.

5.1 Entering Manual Mode

If the password feature has not been enabled, press the [MODE] key and proceed to step 4 below. Otherwise, start with step 1.

Note: the factory default password is 5500. To change the control password, see the Password entry under Options, section 6.5.25. This example assumes that the control has been set up with the factory default password. If your password is different, use it instead.

1. Press the [MODE] key.
   The top display will now read:



2. Press the 5, then the 5, then the 0, and then the 0.
   The top display will now read:

3. Press the [ENTER] key. The control will now be in the Program Mode, and the "PRO" light will be illuminated.

4. Press [MODE] again. The control will now be in the Manual Mode, and the "MAN" light will be illuminated.

5.2 Active Keys

[MODE] Used to exit the Manual Mode and enter the Options Mode

[EDIT] Used to review the hour meter and formula counters

5.3 Displays

When first entering the Manual Mode the top line will show "Manual Mode". The second line will show the current water temperature and level. The bottom display shows the current uncorrected analog input and high-speed counter values.

5.4 Reviewing the Hour Meter and Formula Counters

1. Press the [EDIT] key. The review hour meter/formula count section of the Manual Mode will be entered. The top line of the top display will read "Hour meter" and the bottom line of the top display will read hours and minutes of run time.

2. Press the [UP ARROW] key. The top display will read "01 {formula name}" and the bottom display will read: Load XX, Total XXXX. {Load Count, if not reset, will count 255 loads and then roll over and start at zero again. Total Count, regardless of resets, will count to 65,535 loads and then roll over and start at zero.

3. Press [UP ARROW], to advance to the next formula for review.

4. Press the [STOP] key to exit the review hour meter/formula count section and return to the Manual Mode.

NOTE: Formulas will only be displayed if they have been previously run. The total counter will not be reset.

5.5 Resetting Formula Counters

1. Press the [EDIT] key to enter the review hour meter/formula count section. The top display will read "Hour meter" and the bottom display will read Load XX, Total XXXX.

2. Press the [CLEAR] key. The display will read "Clear Daily Counters: No". Press the [YES/NO] key to change the "No" to "Yes".

3. Press [ENTER] to finalize reset of Load Counters for all formulas.

4. Press the [STOP] key to exit the review hour meter/formula count section and return to the Manual Mode.

5.6 Exiting Manual Mode

Press [MODE] to exit the Manual Mode and go into the Options Mode.
Press [MODE] again to exit the Options Mode and return to the Run Mode.

6. Options Mode

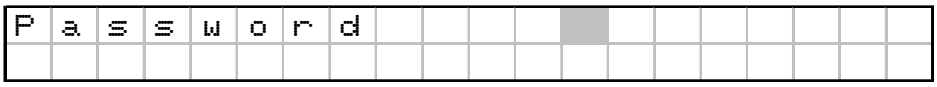
The Options Mode is used to configure the washer control's various option settings and to access the technical configuration mode and the communication functions.

6.1 Entering Options Mode

If the password feature has not been enabled, press the [MODE] key and proceed to step 4 below. Otherwise, start with step 1.

Note: the factory default password is 5500. To change the control password, see the Password entry under Options, section 6.5.25. This example assumes that the control has been set up with the factory default password. If your password is different, use it instead.

1. Press the [MODE] key.
   The top display will now read:



2. Press the 5, then the 5, then the 0, and then the 0.
   The top display will now read:

3. Press the [ENTER] key. The control will now be in the Program Mode, and the "PRO" light will be illuminated.

4. Press [MODE] again. The control will now be in the Manual Mode, and the "MAN" light will be illuminated.

5. Press [MODE] again. The control will now be in the Options Mode, and the "OPT" light will be illuminated.

6.2 Active Keys

[UP ARROW]	Used to go to the next option
[DOWN ARROW]	Used to go to the previous option
[EDIT]	Used to edit option values
[CLEAR]	Used to reset the option value. Use only when cursor is flashing on an option value.
[ENTER]	Used to save the changed option value.
[MODE]	Used to exit the Options Mode and enter Run Mode.
[1] - [0]	Used to enter numeric option values.
[YES/NO]	Used to toggle from NO to YES in the Options Mode.

6.3 Displays

When first entering the Options Mode the display will show the option that was selected the last time the Options Mode was used.

6.4 Chemical Name and Calibration Settings

Press [CHEM] key to program chemical names and calibration settings.

6.4.1 Chemical Name

Press [UP ARROW], to select chemical name to be edited. Press the [TIME] key to begin to edit. Using the multifunction keys, program desired name. Press [ENTER] to save change and the cursor will automatically advance to the Unit of Measure field.

6.4.2 Unit of Measure

Is a 2 character field, representing the unit of measure to be injected. The unit of measure can be programmed in one of two ways. Press [UP ARROW] or [DOWN ARROW] keys to scroll through a pre-programmed list, or use the multifunction keys to program desired characters. Press [ENTER] to save.

6.4.3 Calibration Time/Volume

To calibrate chemical output so that 1 unit equals 1 second of output time, set both calibration time and volume to 1. Press [EDIT], to enter time, and the press [ENTER] to enter volume. Press [ENTER] to save and advance to Chemical Rule. For more information, consult a Factory Authorized Technician.

6.4.4 Chemical Rule

The following settings will apply:
0 - inject after temperature
1 - inject before temperature
2 - Bleach inject after temperature and **never** steam with bleach in water.
Select the desired value. Press [ENTER] to save and advance to Injection Group.

6.4.5 Injection Group

The following settings will apply:
0 - Chemicals will inject simultaneously.
1 - Chemicals will inject individually.
Select the desired value. Press [ENTER] to save.
For programming the next chemical, press [UP ARROW] and repeat from step 1. Or press [YES/NO] to return to the Options Mode.

6.4.6 Flush Type

On machines with a flush valve configured in the Chemical I/O Assignments (section 7.5), the following settings apply:
0 - After injection only - the control will turn on the output corresponding to the flush valve configured in the Chemical I/O Assignments for the number of seconds specified in the flush time setting starting when the chemical valve output is shut off.
1 - Both during and after the injection - the control will turn on the flush valve output at the same time it turns on the chemical valve output, and leave it on for the number of seconds specified in the flush time setting after the chemical valve output is shut off.

6.4.7 Flush Time

On machines with a flush valve configured in the Chemical I/O Assignments (section 7.5), enter the time in seconds that the flush valve should remain open after the chemical has been injected.

6.4.8 Maximum Wait Time

On Chemicals that are manually added to the machine, enter the time in seconds that the washer control should wait for the operator to manually add the chemical and restart the washer. If this time is exceeded, the washer control will display an error.

6.5 Option Settings

6.5.1 Motor On

Enter the time for the wash motor run time. The valid range for this field is from 1 second to 4 minutes and 15 seconds. The default for this field is 20 seconds.

6.5.2 Motor Off

Enter the time for the wash motor pause. The valid range for this field is from 0 seconds to 12.5 seconds, the smallest unit of change is .05 seconds. The default for this field is 10 seconds.

6.5.3 Default Wash RPM

The default wash RPM is used to set the standard wash speed for the machine. It can be overridden in individual wash steps, if necessary, by programming a different speed on the step in question. The valid range for this setting is 16-3.

6.5.4 Default Drain RPM

The default drain RPM is used to set the standard rotational speed for drain steps. It can be overridden in individual drain steps, if necessary, by programming a different speed on the step in question. The valid range for this setting is 16-32 RPM.

6.5.5 Default Spin Drain RPM

The default spin drain RPM is used to set the standard spin drain speed for the machine. It can be overridden in individual spin drain steps, if necessary, by programming a different speed on the step in question. The valid range for this setting is 75-100 RPM.

6.5.6 Default Low Extract RPM

The default low extract RPM is used to set the speed for low extract steps. It can be overridden in individual extract steps, if necessary, by programming a different speed on the step in question. The valid range for this setting is 275-550 RPM.

6.5.7 Default Med. Extract RPM

The default medium extract RPM is used to set the speed for medium extract steps. It can be overridden in individual extract steps, if necessary, by programming a different speed on the step in question. The valid range for this setting is 275-550 RPM.

6.5.8 Default High Extract RPM

The default high extract RPM is used to set the speed for high extract steps. It can be overridden in individual extract steps, if necessary, by programming a different speed on the step in question. The valid range for this setting is 275-550 RPM.

6.5.9 Steam Level

Enter the minimum water level required before the steam valve is allowed to open. The valid range for this field is 2.0 to 10.0 inches, the smallest unit of change is .1 inches. The default for this field is 3.0 inches. Setting this field to zero will require the programmed water level to be satisfied before the steam valve is opened. This field will not appear unless the machine has been configured with a steam output, consult a Factory Authorized Technician to setup the steam output.

6.5.10 Low Level

If the machine is equipped with a low level output, enter the water level required before the low level output will turn off. This feature is required on machine that must disable the door open if there is water in the machine. The valid range for this field is 1.0 to 20.0 inches, the smallest unit of change is .1 inches. This field will not appear unless the machine has been configured with a low level output, consult a Factory Authorized Technician if this feature is required.

6.5.11 Signal On

Enter the on time for the signal output. The valid range for this field is .1 seconds to 10 seconds, the smallest unit of change is .05 seconds. The default for this field is .5 seconds. If a mechanical bell is connected, this field can be changed to 10 seconds and the next field, signal off time, can be changed to zero seconds, this will cause the signal to ring the bell continuously.

6.5.12 Signal Off

Enter the off time for the signal output. The valid range for this field is 0 seconds to 10 seconds, the smallest unit of change is .05 seconds. The default for this field is .5 seconds. Changing this field to zero will cause the signal to ring without any pulsing.

6.5.13 Fill Delay

Enter the time for level to stay below set point before water values will turn on to satisfy water level set point. The valid range for this field is 1 second to 60 seconds, the smallest unit of change is 1 second. The default for this field is 5 seconds. (This setting helps to dampen the effects of the bouncing water level in the washer.)

6.5.14 Water Level Offset

Enter the water level adjustment offset. The valid range for this field is zero to 9.9 inches, and the smallest unit of change is .1 inches. The default for this field is 2.0 inches. The value of this option will be subtracted from the highest level (25.5 inches), for a new maximum programmable level. By using the default of 2.0 inches, the programmable water level range is 0 to 23.5 inches. Do not change this field to compensate for errors in the water level readings.

6.4.15 Display Brightness

Enter the number from the following chart to set the display brightness.

2- Dim (25%)
5- Medium Dim (50%)
7- Medium Bright (75%) (Default setting)
1- Bright (100%)

Changes to this field will take effect immediately.

6.5.16 Fill Timeout

Enter the time in minutes and seconds for the maximum allowable time for any water fill. The default for this field is 5:00 minutes. The valid range for this field is zero to 25 minutes, the smallest unit of change is 15 seconds. This may cause some confusion if the user tries to set the time-out to 1:10 minutes, the washer control will round this entry to 1:15 minutes. This field must be used for proper control operation.

6.5.17 Temperature Timeout

Enter the time in minutes and seconds for the maximum allowable time for the steam valve to remain open. The default for this field is 10:00 minutes. The valid range for this field is zero to 25 minutes, the smallest unit of change is 15 seconds. This may cause some confusion if the user tries to set the time-out to 4:10 minutes, the washer control will round this entry to 4:15 minutes. Setting this field must be used for proper control operation.

6.5.18 Unbalance Refill Water Level

Enter the water level to refill the machine with after an extract unbalance. The default for this field is 3 inches. The valid range for this field is 0 to 10 inches, and the smallest unit of change is 1 inch. Setting this field to zero will cause the washer control to backup in the formula to the previous fill step and use the water level programmed for that step. To disable this feature and cause the washer control to remain in the extract step after an unbalance condition enter a level of 25.5 inches. This field will not appear if the machine has not be configured with an extract, consult a Factory Authorized Technician to setup the extract outputs.

6.5.19 Unbalance Refill Water

This option determines the type of water used to refill the machine as part of the balancing sequence. Set this option to 1 to use hot water, 2 to use cold, and 3 to use water from the reuse tank. The default for this option is 2.

6.5.20 Step Advance

Press [ON/OFF] key, to toggle between YES (enabled) or NO (disabled). If this feature is enabled, it will allow the operator to change steps during a formula, or to start a formula on a step other than step one. If this feature is disabled the step can still be changed if the machine has a supervisor key option. If the supervisor key option has not been configured consult a Factory Authorized Technician to setup this option.

6.5.21 Temperature Offset

Enter the temperature adjustment offset. The valid ranges for this field are -127 to +127 degrees, and the smallest unit of change is 1 degree. The default for this field is 0 degrees. To change the sign (+/-) of this field, press [ON/OFF] key. Changing this field will effect the overall range of temperature sensing. Any number entered less than zero will be subtracted from the top of the temperature range (255 degrees), for a new maximum programmable temperature. Any number greater than zero will effectively be the lowest programmable temperature.

6.5.22 Password

Enter the password required for entry to the program, manual and options modes. The factory default for this field is 5000. It is recommended that the user change this field. If this field is set to 0 the password feature will be disabled. The operator may also enter the program and options modes with the use of the supervisor key, if this feature has been configured. If the supervisor key feature has not been configured consult a Factory Authorized Technician to setup the feature.

6.5.23 Communication Unit ID

Enter the unit identification number for the communications network. The default for this field is zero, which will disable the communications network features. Care MUST be taken to ensure that no two controls have the same communication identification number, if this happens communication error will occur on both machines.

6.5.24 Chirp Time

Enter the on time for the key chirp output. The valid range for this field is .05 seconds to .95 second, the smallest unit of change is .05 seconds. The default for this field is .10 seconds. This feature may be disabled by setting this field to zero.

6.5.25 Default Drain Time

Enter the time in minutes and seconds for the default time. This time will appear when programming a drain or drain two step. The default drain time can be overridden when programming a drain step.

6.5.26 Minimum Chemical Water Level

Enter the level of water required for any Chemical injection. This is to prevent Chemicals from being injected into a wash load without enough water to dilute the Chemical. Setting this field to zero will require the programmed water level to be satisfied before the Chemicals will be injected.

6.5.27 Level Filter

Enter the water level filtering constant. Valid Range: 3-10. This number is used to determine the amount of change between readings on the water level display. When set to 3, for example, the reading is only allowed to change by 33% (1/3) from reading to reading. If set to 4, the reading is allowed to change by 25% (1/4) from reading to reading. The higher the number, the smoother the display, but the slower the response to an actual change.

6.5.28 Temperature Filter

Enter the water temperature filtering constant. Valid Range: 3-10. This number is used to determine the amount of change between readings on the water level display. When set to 3, for example, the reading is only allowed to change by 33% (1/3) from reading to reading. If set to 4, the reading is allowed to change by 25% (1/4) from reading to reading. The higher the number, the smoother the display, but the slower the response to an actual change.

6.5.29 Communication Speed

Used to set the baud rate of the washer control's on board serial port. If no value is entered, the port defaults to 19,200 baud.

Valid settings:
- 96 - 9600 baud
- 192 - 19,200 baud
- 200 - maximum port rate (available only to facilities using ComLink (CL-1000)).

6.5.30 Poly-Rinse (Cooldown) Temperature Timeout

Enter the time in minutes and seconds for the maximum allowable time for the machine to cool down when the Poly-Rinse valve is open. The default for this field is 10:00 minutes. The valid range for this field is zero to 25 minutes, the smallest unit of change is 15 seconds. This may cause some confusion if the user tries to set the time-out to 4:10 minutes, the washer control will round this entry to 4:15 minutes. Setting this field must be used for proper control operation on machines equipped with Poly-Rinse.

6.5.31 Level Multiplier

The level multiplier option is used to select the range of the washer control's water level input. The valid settings for this field are:

1- 0-25.5 inches, 0.1 inch resolution
2- 0-51 inches, 0.2 inch resolution

6.5.32 Metric Measurements

The Metric Measurements option allows the user to switch the control between English system measurements (levels in inches, temperatures in ºF) and Metric measurements (levels in centimeters, temperatures in ºC).

6.5.33 Overflow Level

The Overflow Level option is used to set the water level at which the washer control will force the drain open to prevent the machine from overflowing. Setting this field to 0 disables this feature.

6.5.34 Chemical System Timeout

This is the maximum amount of time that the washer will wait to receive delivery of chemicals from the chemical system. The default for this field is 10 minutes.

6.5.35 A/D Converter Resolution

This is used to set the resolution of the analog to digital converter used in the I/O unit to ensure proper level and temperature display. The default for this field is 8.

6.5.36 Water Level Analog Input

This option is used to select the analog input channel used to provide the water level reading. The default for this setting is 8.

6.5.37 Water Temperature Analog Input

This option is used to select the analog input channel used to provide the water temperature reading. The default for this setting is 7.

6.5.38 Machine Cylinder Diameter

The machine's cylinder diameter in inches. This option is used to calculate the G-Force to RPM conversion for rotational speeds. The default for this option is 66.

6.5.39 I/O Unit Type

This is used to set the type of I/O unit connected to the control. If set to 0, the control has an IO-5500 attached. If set to 1, the control has an IO-2500 attached.

6.5.40 Manual Buttons Operational

This option is used to enable the manual operation buttons in the run mode. When enabled, the operator may manually operate the following functions: hot water, cold water, third water, steam, waste drain, and drain two. If the control is in the manual mode, the operator can also manually operate motor forward and reverse and low and high extract.

6.5.41 Maximum Temperature

This option is used to set the high temperature alarm temperature. The default for this field is 175°F.

6.5.42 Network Configuration

The Network Configuration options are used to set communication addresses for the control.

1. **Control IP Address** - the IP network address of the control. If set to 0.0.0.0, the control will not be able to communicate over the network.
2. **Chemical System** - the IP network address of the chemical system. Leave set to 0.0.0.0 if you are not using a CCS chemical system connected to ethernet.
3. **Reporting System** - the IP network address of the reporting system computer. Leave set to 0.0.0.0 if you are not using a CCS reporting system.

6.5.43 Purge Unused Operation Names

The washer control has 96 pre-programmed step names, which cannot be edited or erased. It also has the ability to store 127 user programmed step names. When a step is programmed with a custom name, one of the locations is consumed. If at any time, a step with a custom name is deleted, the custom name remains in memory. Purge all unused custom step names when memory is full or as desired, by pressing [EXIT], then [ENTER].

6.5.44 Set Up Service Alerts

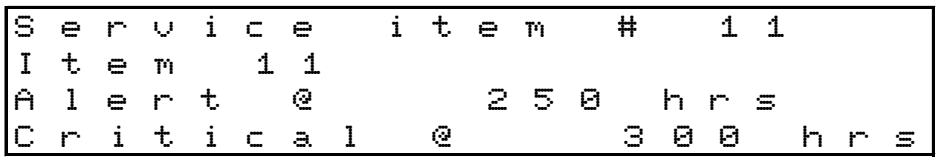
Press [EDIT] and enter the password (2007) and press [ENTER]. There are four sections in the service alerts, which are accessed by pressing the [EDIT] button:

1. **Reset service alerts**

S	e	r	v	i	c	e		i	t	e	m		#		1	1		
I	t	e	m		1	1												
D	u	e		a	t	:		1	6	3	0	9		h	r	s		
C	u	r	r	e	n	t	l	y	:		1	1	4	5	2		h	r	s

This tells the control that the maintenance has been performed, and sets a new "due" time for the item. The reset service alerts section displays the service alert name, the next number of hours that the item is due at, and the current number of hours of operation. Use the [UP ARROW] and [DOWN ARROW] keys to select the alert you wish to reset. To reset the alert, press the [CLEAR] key when displaying the item you wish to reset. When finished, press the [STOP] key to exit.

2. Edit service alerts



This section edits service alert names and time intervals. To select the service alert you would like to edit, use the [UP ARROW] and [DOWN ARROW] keys. When the control is displaying the alert you wish to edit, press the [EDIT] key. The cursor will begin flashing on the first letter of the service alert name. Use the alphanumeric keys to enter the service alert name you wish to use, then press [ENTER]. The cursor will then flash on the "Alert @" number. Use the alphanumeric keys to enter the number of hours you want between alarms for this service item, and press [ENTER]. The cursor will then flash on the "Critical @" number. Use the alphanumeric keys to enter the number of hours you want to allow before the alert becomes critical - i.e., prevents the machine from running. Press [ENTER] when you are finished. Press [STOP] to exit from this section.

3. Erase all service alerts

This provides a convenient way to erase all service alert settings. When you select this function, the control will ask, "Are you absolutely positive you want to clear service items?" Use the [YES/NO] key to select, then press [ENTER]. If you selected [YES], the control will clear all of your service items.

4. Edit service alert options

This provides access to the various service alert options.

a. **Enable service items** - activates/deactivates the service alerts.

6.5.45 Clear Formulas

Press [EDIT], enter the password (2428), then press [CLEAR] to clear formulas from the washer control. **This will erase all programmed formulas!** This will not reset the Chemical names or calibration information. See the following paragraph for clearing the Chemicals.

6.5.46 Clear Chemicals

Press [EDIT], enter the password (2428), then press [CLEAR] to reset all user programmable fields to the default values for the chemical Chemicals. After they are cleared, the user may review and modify fields by pressing the [CHEM] key. This will erase the Chemical calibration for timed Chemicals, so the data must be reentered or the Chemicals calibrated before any formulas are run.

6.5.47 Set Up Chemical Calibration

See section 6.4, Chemical Setup and Calibration.

6.5.48 Factory Options

This option is for use by Factory Authorized Technicians only. See Section 7.

6.6 Exiting Options Mode

Press [MODE] to exit from the Options Mode and into the Run Mode.

7. Technical Configuration Mode

This section provides the information that controls proper setup and operations of your washer. **Only Qualified Service Personnel should change I/O assignments, since the safe operation of the washer may be affected. Failure to fully understand this data may result in the improper operation of the washer and the washer control. Incorrect setup may result in washer malfunction, which could result in personal injury, dismemberment or death. Custom Control Systems Inc. assumes no responsibility for improper use or setup of this unit. Contact a Factory Authorized Service Technician to establish correct setup procedures.**

Up to 48 input channels and 72 output relays are available on the PC-5950. The PC-5950 will accept up to 32 input channels and 48 output relays. Configuration settings are described below. Again, it is critical to understand the overall effect to the washer before any changes are made.

7.1 Entering Technical Configuration Mode

If the password feature has not been enabled, press the [MODE] key and proceed to step 4 below. Otherwise, start with step 1.

Note: the factory default password is 5500. To change the control password, see the Password entry under Options, section 6.5.25. This example assumes that the control has been set up with the factory default password. If your password is different, use it instead.

1. Press the [MODE] key.
   The top display will now read:

2. Press the 5, then the 5, then the 0, and then the 0.
   The top display will now read:

3. Press the [ENTER] key. The control will now be in the Program Mode, and the "PRO" light will be illuminated.

4. Press [MODE] again. The control will now be in the Manual Mode, and the "MAN" light will be illuminated.

5. Press [MODE] again. The control will now be in the Options Mode, and the "OPT" light will be illuminated.

6. Press the [DOWN ARROW] key until the display reads "Factory Options". Press [EDIT] key and enter password 1206.

7. The display will now read "I/O Assignments". Proceed with Section 7.3.
   When in Configuration Mode, the [UP ARROW] Key will scroll through the following:
   - I/O Assignments
   - Multi I/O Assignments
   - Chemical I/O Assignments
   - Clear Formula and Hour Counters
   - I/O Unit Type
   - Edit PLC Register Values
   - Machine Configuration
   - Machine Output Diagnostics
   - Clear Entire Memory

7.2 Active Keys

[UP ARROW]	Used to increment I/O Assignment
[DOWN ARROW]	Used to decrement I/O Assignment
[EDIT]	Used to edit values
[CLEAR]	Used to clear value. Use only when cursor is flashing on value
[ENTER]	Used to complete entry and save data
[MODE]	Used to exit Options Mode and enter Run Mode
[1] - [9]	Used to enter numeric values.
[YES/NO]	Used to EXIT the editing function.

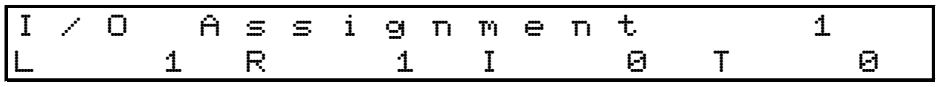
7.3 Configuring I/O Assignments

To configure the I/O Assignments:

1. Select I/O Assignments, press [EDIT], to begin configuring.

2. Use the [UP ARROW] and [DOWN ARROW] keys to scroll through each I/O, or, using the numeric keypad, enter the number of the I/O Assignment you wish to jump to.

3. Press the [EDIT] key, to edit LED, Output, Input, Type. The cursor will flash on the "I" location to enable editing of the LED Number.



4. Record your machine's I/O Assignment information the chart provided in Appendix C.

7.3.1 Hot Water

LED: Enter the number corresponding to the hot water LED. The default for this field is 1.
Relay: Enter the output number corresponding to the hot water relay. The default for this field is 1.
Input: Enter the input number corresponding to the hot water flow meter. There is no default for this field.
Type: This field is not currently used.

7.3.2 Cold Water

LED: Enter the number corresponding to the cold water LED. The default for this field is 2.
Relay: Enter the output number corresponding to the cold water relay. The default for this field is 2.
Input: Enter the input number corresponding to the cold water flow meter.
Type: This field is not currently used.

7.3.3 Steam

LED: Enter the number corresponding to the steam LED. The default for this field is 4. This field should be set to zero on machines that do not use steam.
Relay: Enter the output number corresponding the steam valve relay. The default for this field is 3. This field should be set to zero on machines that do not use steam.
Input: This field is not currently used.
Type: This field is not currently used.

7.3.4 Drain

LED: Enter the number corresponding to the drain LED. The default for this field is 5.

Relay: Enter the number corresponding to the drain valve relay. The default for this field is 4. On machines that require that the drain be powered to close, this field should be changed to 104.

Input: This field is not currently used.

Type: This field is not currently used.

7.3.5 Unassigned

7.3.6 Third water

LED: Enter the number corresponding to the third water LED. The default for this field is 3. Machines that do not have a water reuse system should change this field to zero.

Relay: Enter the output number corresponding to the third water Chemical relay. There is no default for this field.

Input: Enter the input number corresponding to the third water tank lower limit switch. The washer control assumes that a normally closed contact means that third water is available. To use a normally open contact add 100 to the input number.

Type: This field is not currently used.

7.3.7 Drain two

LED: Enter the number corresponding to the drain two LED. The default for this field is 6. Machines that do not have a third water system should change this field to zero.

Relay: Enter the output number corresponding to the drain two relay. There is no default for this field.

Input: Enter the input number corresponding to the third water tank upper limit switch. There is not default for this field. The washer control assumes that a normally closed contact means that third water tank is full. To use a normally open contact add 100 to the input number.

Type: This field is not currently used.

7.3.8 Motor Forward

LED: Enter the number corresponding to the motor forward LED. The default for this field is 10.

Relay: Enter the number corresponding to the motor forward starter relay. The default for this field is 9.

Input: Enter the number corresponding to the jog forward input. There is no default for this field.

Type: This field is not currently used.

7.3.9 Motor Reverse

LED: Enter the number corresponding to the motor reverse LED. The default for this field is 11.

Relay: Enter the number corresponding to the motor reverse start relay. The default for this field is 10.

Input: Enter the number corresponding to the jog reverse input. There is no default for this field.

Type: This field is not currently used.

7.3.10 Unassigned

7.3.11 Low Extract

LED: Enter the number corresponding to the low extract LED. The default for this field is 8.

Relay: Enter the number corresponding to the low extract motor starter relay. There is no default for this field. This output will be energized whenever the washer control wishes to run the low extract motor.

Input: Enter the number corresponding to the Low Extract motor overload. There is no default for this field. The washer control assumes that a contact between this input and the input common means that a low extract motor overload has occurred.

Type: This field is not currently used

7.3.12 High Extract

LED: Enter the number corresponding to the high extract LED. The default for this field is 7. Machines that do not have high extract cycles should change this field to zero.

Relay: Enter the number corresponding to the high extract starter relay. There is no default for this field.

Input: Enter the number corresponding to the High Extract motor overload. There is no default for this field. The washer control assumes that a contact between this input and the input common means that a high extract motor overload has occurred.

Type: This field is not currently used.

7.3.13 Signal

LED: Enter the number corresponding to the signal LED. The default for this field is 9. This field should not be changed zero, although the signal will still operate there will be no visual indication on the washer control

Relay: Enter the number corresponding to the signal relay. The default for this field is 8. If the piezo signal output from the back of the washer control is used this field may be changed to zero. Additional fields in the options list should also be reviewed for setting the signal on and signal off times.

Input: Enter the number corresponding to the signal input. This input is normally floating high, connecting this input to the input common will acknowledge the signal.

Type:
- 0: The chirp output will sent to the CPU output and the relay output.
- 1: The chirp output will not be sent to the signal relay output.
- 2: The chirp output will not be sent to the signal relay output. The washer control will leave the signal relay output on solid when signalling an error, and will pulse the signal relay output when signalling at the end of a wash formula.

7.3.14 Unassigned

7.3.15 Unassigned

7.3.16 Unassigned

7.3.17 Unassigned

7.3.18 Unassigned

7.3.19 Unassigned

7.3.20 Unassigned

7.3.21 Auxiliary 1

LED: Enter the number corresponding to the auxiliary output LED. There is no default for this field.

Relay: Enter the number corresponding to the auxiliary output relay. There is no default for this field.

Input: This field is not currently used.

Type:
- 0: This output will turn off if the washer control is stopped while running a formula.
- 1: This output will remain on if the washer control is stopped while running a formula.

7.3.22 Auxiliary 2

Refer to the I/O assignment for auxiliary 1.

7.3.23 Auxiliary 3

Refer to the I/O assignment for auxiliary 1.

7.3.24 Auxiliary 4

Refer to the I/O assignment for auxiliary 1.

7.3.25 Unassigned

7.3.26 Unassigned

7.3.27 Unassigned

7.3.28 Unassigned

7.3.29 Start

LED: Enter the number corresponding to the Run Mode led. The default for this field is 29.

Relay: Enter the number corresponding to the start output. There is no default for this field.

Input: Enter the number corresponding to the external start switch. The default for this field is 4. The washer control expects to see a connection between this input and the input common to start the currently displayed formula.

Type: 0: Will turn the relay on whenever the washer control is running a formula, and will turn the relay off whenever the formula is stopped.

1: Will pulse the Start relay for 1 second when the machine is started and pulse the Stop relay for 1 second when the machine is stopped.

2: Will turn the Start relay on whenever the washer control is running a formula, and will turn the relay off whenever the formula is stopped. The Stop relay is turned on when the machine is ready to be started. The Start relay pulses whenever the signal is running.

3: Will pulse the Start relay and the hydraulic pump relay for 1 second when the machine is started.

7.3.30 Stop

LED: Enter the number corresponding to the Program Mode LED. The default for this field is 30.

Relay: Enter the number corresponding to the stop output. There is no default for this field.

Input: Enter the number corresponding to the external stop switch. The default for this field is 5. The washer control expects to see a connection between this input and the input common to stop the formula and turn off all active outputs. See the I/O assignments for the auxiliary 1-4 outputs, these outputs are controlled by the type field.

Type: 1: Will use the falling edge of the Start input as the external stop input.

7.3.31 Formula Up

LED: Enter the number corresponding to the Manual Mode LED. The default for this field is 31.

Relay: This field is not currently used.

Input: Enter the number corresponding to the external formula up selector switch. There is no default for this field.

Type: 1: Will prevent the Formula Up/Down, Start and Signal keys on the membrane keypad from working while the control is in the Run Mode.

7.3.32 Formula Down

LED: Enter the number corresponding to the Options Mode LED. The default for this field is 32.

Relay: This field is not currently used.

Input: Enter the number corresponding to the external formula down selector switch. There is no default for this field.

Type: This field is not currently used.

7.3.33 Hold

LED: Enter the number corresponding to the hold LED. The default for this field is 33. This field should not be set to zero, there are many reasons why the washer control may place a formula on hold. Please refer to the help key in the run section of this manual.

Relay: Enter the number corresponding to the hold output. There is no default for this field. If an output number is entered, the output will turn on whenever the washer control enters a hold state.

Input: Enter the number corresponding to the external hold input. The default for this field is 3. The washer control expects to see a connection between this input and the input common to place the formula timer on hold. The external hold input will stop an extract step from beginning but will not halt the timer once the extract step has begun.

Type: This field is not currently used.

7.3.34 Communication

LED: Enter the number corresponding to the communication LED. The default for this field is 34.

Relay: This field is not currently used.

Input: This field is not currently used.

Type: This field is not currently used.

7.3.35 Unassigned

7.3.36 Unassigned

7.3.37 Unassigned

7.3.38 Unassigned

7.3.39 Unassigned

7.3.40 Unassigned

7.3.41 Unassigned

7.3.42 Unassigned

7.3.43 Unassigned

7.3.44 Unassigned

7.3.45 Unassigned

7.3.46 Wash Position

LED: This field is not currently used.

Relay: This field is not currently used.

Input: There is currently no default for this field. (see type)

Type: This field is not currently used.

7.3.47 Unassigned

7.3.48 Load Position

LED: This field is not currently used.
Relay: This field is not currently used.
Input: See type under Wash Position.
Type: This field is not currently used.

7.3.49 Unassigned

7.3.50 Unload Position

LED: This field is not currently used.
Relay: This field is not currently used.
Input: See type under Wash Position.
Type: This field is not currently used.

7.3.51 Unassigned

7.3.52 Unassigned

7.3.53 Unassigned

7.3.54 Door Open

LED: This field is not currently used.
Relay: This field is not currently used.
Input: Enter the number corresponding to the door open switch contact. There is no default for this field. The washer control expects to see a contact between this input and the input common to mean that the door is fully opened.
Type: This field is not currently used.

7.3.55 Unassigned

7.3.56 Door Closed

LED: This field is not currently used.
Relay: This field is not currently used.
Input: Enter the number corresponding to the door closed switch contact. There is no default for this field. The washer control expects to see a contact between this input and the input common to mean that the door is fully closed.
Type: 0: Allows the machine to jog if the machine's door is open.
1: Will not allow the machine to jog unless the door is closed.

7.3.57 Unassigned

7.3.58 Raise (Open) Door

LED: This field is not currently used.
Relay: Enter the number corresponding to the door raise relay. There is no default for this field.
Input: Enter the number corresponding to the raise door switch contact. There is no default for this field. The washer control expects to see a contact between this input and the input common to mean that the door should be raised. On machines configured with a Type 3 door latch, the raise door input is connected to the machine's door latch release switch.
Type: This field is not currently used.

7.3.59 Lower (Close) Door

LED: This field is not currently used.

Relay: Enter the number corresponding to the door lower relay. There is no default for this field.

Input: Enter the number corresponding to the lower door switch contact. There is no default for this field. The washer control expects to see a contact between this input and the input common to mean that the door should be lowered.

Type: Determines whether the machine should be returned to the no-tilt position before closing the door.

- 0: On machines equipped with a load/run/unload tilt selector switch, when tilted back (in the load position) the washer control will close the door of the machine before lowering into the run position.
- 1: On machines equipped with a load/run/unload tilt selector switch, when tilted back (in the load position) the washer control will lower the machine back to the run position before closing the door.

7.3.60 Unassigned

7.3.61 Unassigned

7.3.62 Unassigned

7.3.63 Unassigned

7.3.64 Unassigned

7.3.65 Unassigned

7.3.66 Unassigned

7.3.67 Unassigned

7.3.68 Unassigned

7.3.69 Chute Spray

LED: This field is not currently used.

Relay: Enter the number corresponding to the chute spray relay contact. There is currently no default for this field. If the machine is not equipped with a chute spray switch, the chute spray output will be energized when the machine is tilted to the load position, the door is open, the chute is down, and the operator has pressed the tilt function button. If the machine is equipped with a chute spray switch, the chute spray output will be energized when the machine is tilted to the load position, the door is open, the chute is down, and the operator has energized the chute spray switch

Input: Enter the number corresponding to the chute spray switch input contact. The washer control expects contact between this input and the input common to mean that it should energize the chute spray.

Type: This field is not currently used.

7.4 Multi Relay Assignments

The washer control, under normal conditions, only assigns one relay output per logical output-for example, it will only activate one relay on the I/O unit to engage or disengage the brake. Multi Relay Assignments become necessary when you are in a situation where you need to activate or deactivate more than one output to properly control the machine. The washer control allows as many as four relay outputs to be assigned to each Multi Relay Assignment.

7.4.1 Configuring Multi Relay Assignments

Setting up a Multi Relay is a two stage process. First, you must figure out which I/O Assignment corresponds to the function you need to control. Then, you need to decide which relay outputs you need to control, and whether they need to be normally open or normally closed.

Caution: Be very careful that you do not assign a relay output in both the Multi Relay Assignments and the regular I/O Assignments. If you do assign an output in more than one place, the control will behave unpredictably.

Example Configuration: For the sake of example, let us say that your machine has a brake that is disengaged when the current is on, and engaged when current is off. This machine also has a special clutch that has to be disengaged when the brake is engaged, and engaged when the brake is disengaged. We'll assume that you plan to use output 10 on the relay unit for the brake, and output 11 for the clutch.
The first step would be to go into the factory options section and edit I/O Assignment 27, which controls the brake inputs and outputs. In the "relay" field, enter the number "201," which tells the control to use the Multi Relay Assignment #201 for the brake outputs. Exit the I/O Assignment editing section, and enter the Multi Relay Assignment section. In the first field of Multi Relay 201, enter the number "110." This tells the control that we want output 10 to be "on" when the brake is disengaged, and "off" when it's engaged. In the second field of Multi Relay 201, enter the number "11," which tells the control that you want to use relay 11, and the output is on when the clutch is engaged.

7.5 Chemical Supply I/O Assignments

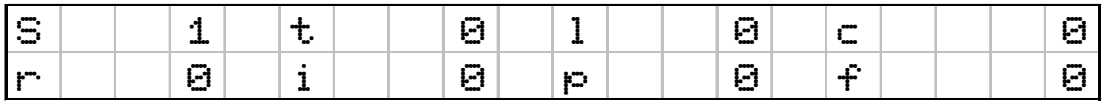
The PC-5950's Chemical Supply I/O Assignments are used to set up the control for use with a chemical injection system. The washer control supports timed chemical injections, flowmetered chemical injections, and manual (signalled) injections.

7.5.1 Configuring Chemical I/O Assignment

1. Select Chemical I/O Assignments, press [EDIT] to begin configuring.

2. Press [UP ARROW] key, to scroll through each Chemical I/O or by using the numeric keypad, enter the desired Chemical I/O number that you wish to jump to.

3. Press the [EDIT] key to edit Type of Chemical, LED Number, Chemical Value Relay, Reset Relay, Flowmeter Input, Pump Relay and Flush Valve Relay. See Figure below. The cursor will flash on "t" location, to enable editing of Chemical Type.



S: Chemical Number currently displayed. You may configure up to 16 Chemicals.

t: Type of Chemical. Enter a value from the following:
0: Not installed
1: Signalled Chemical
2: Timed injection
3: Flowmetered Chemical
4: CCS Chemical Injection System Chemical

l: LED Number. Enter the number corresponding to the Chemical LED. Most common settings for chemical Chemicals 1 to 8, are LED numbers 17 to 24 respectively. The LED for a given Chemical will be on solid on steps where the Chemical is programmed, and will flash when the control is actually injecting the Chemical.

c: Chemical Valve Relay. Enter the number corresponding to the chemical valve output. There is no default for this field. The chemical valve is the output that is activated to inject the chemical, i.e., the peristaltic pump on a pump rack.

r: Reset Prescaler Relay. Enter the number corresponding to the pre-scaler reset output. There is no default for this field. This field is used to reset the prescaler for the Chemical flowmeter prior to each injection of this Chemical.

i: Flowmeter Input. Enter the number corresponding to the flowmeter input. There is no default for this field. The flowmeter input is connected to the individual flowmeter used to measure the quantity of chemical being injected.

p: Pump Relay. Enter the number corresponding to the pump relay output. There is no default for this field. If this feature is used, please remember to setup the pump on time in the Chemical configuration, Section 6.4. The pump relay will be activated for the number of seconds set in the pump time setting prior to the activation of the chemical valve relay. (So if you have a 10 second pump time programmed, this output will be on for 10 seconds before the chemical valve relay turns on. It then remains on until the end of the injection.)

f: Flush Valve Relay. Enter the number corresponding to the flush value output. There is no default for this field. If this feature is used, please remember to setup the flush type and time in the Chemical configuration, Section 6.4. If the Chemical is configured to flush during and after injection (flush type 1), this output will be activated as soon as the chemical valve output is activated. Otherwise, it will turn on after the chemical valve output is deactivated. In both cases, the flush valve output will stay on after the chemical is injected for the amount of time specified in the flush time setting (see Section 6.4).

4. Use the [UP ARROW] and [DOWN ARROW] keys to move to the next or previous fields (respectively) in the current Chemical I/O Assignment.

5. Record your specific Chemical I/O Assignments on provided chart, See Appendix D.

7.6 Clearing Formula and Hour Counters

This function will clear all formula counters and the hour meter (see section 5). To clear:

1. Press [EDIT] key.
2. Press [YES/NO] key, to select YES to enable clearing.
3. Press [ENTER] to process.

7.7 I/O Unit Type

The I/O Unit Type option is used to tell the control what type of I/O Unit is connected to the direct I/O interface on J8. Use a setting of zero if connected to an IO-5500, a setting of one if connected to an IO-2500, and a setting of two if connected to an IO-2550.

7.8 Edit PLC Register Values

The Edit PLC Register Values section is available only on controls installed on Ellis Open-Pocket washer/extractors with an Allen-Bradley PLC.

7.8.1 Jog FWD

The Jog FWD setting configures the forward jog speed (in RPM).

7.8.2 Jog REV

The Jog REV setting configures the reverse jog speed (in RPM).\

7.8.3 Load Speed

The Load Speed setting configures the speed (in RPM) that the basket should rotate when the machines is being loaded.

7.8.4 Unload FWD

The Unload FWD setting configures the forward jog speed (in RPM) used when unloading the machine.

7.8.5 Unload REV

The Unload REV setting configures the reverse jog speed (in RPM) used when unloading the machine.

7.8.6 Wash FWD Speed

Sets the default forward wash speed (in RPM) for the machine.

7.8.7 Wash REV Speed

Sets the default reverse wash speed (in RPM) for the machine.

7.8.8 Spin Drain

Sets the default spin drain speed (in RPM) for the machine.

7.8.9 Balance Start Speed

Sets the speed at which the PLC attempts to determine if the machine is balanced prior to extract.

7.8.10 Extract 1st Stage

Sets the first speed that the PLC will accelerate the machine to in an extract step.

7.8.11 Extract Offset

Sets the correction factor for extract speeds.

7.8.12 Out of Balance

Sets the variation in hydraulic pressure that indicates an unbalance situation.

7.9 Machine Configuration (Open Pocket with Allen-Bradley PLC)

7.9.1 Enable Auto Mode

Enables or disables automatic loading and unloading.

7.9.2 Auto tilt to load

Allows the machine to automatically tilt to the load position.

7.9.3 Auto tilt to unload

Allows the machine to automatically tilt to the unload position.

7.9.4 Auto door

Allows the machine to automatically open and close the door.

7.9.5 Door during loading

Tells the machine whether it should continue to rotate the basket while closing the door while loading.

7.9.6 Auto rotate unload

Tells the machine whether it should automatically start an unloading sequence when it reaches the unload position.

7.9.7 Hopper installed

Tells the machine whether a loading hopper is installed on this machine.

7.9.8 Auto rotate load

Tells the machine whether is should automaitcally start a loading sequence when it reaches the load position.

7.9.9 Door during unload

Tells the machine whether it should start rotating the basket to unload before opening the door.

7.9.10 Alt messages

Enables the alternate messages.

7.10 Machine Configuration (Sideloader with CCS Ellis Washer Control)

7.10.1 Unlock Delay

This setting represents the amount of time that the control will wait after it sees the "frame locked" inputs go away before it will start lifting the machine for extract. A higher number here means a longer delay.

7.10.2 Extract Raise Delay

The amount of time that the control will continue to inflate an airbag after the photoeye turns off to indicate that the air mount is raised.

7.10.3 Minimum Extract Speed

Sets the slowest allowable speed for an extract step. If the washer control is programmed to use a speed lower than this in an extract step, the control will use this speed instead.

7.10.4 Extract Lower Delay

Sets the amount of time the control will wait after it sees the "cradle down" switches before it closes the air vents on the air mounts after extract.

7.10.5 Max analog output in extract

Sets the maximum analog output (0-4096) that is allowable during an extract step.

7.10.6 Emergency extract deceleration rate

Sets the deceleration rate in engineering units per 20 ms for emergency stops.

7.10.7 Wash speed ramp rate

Sets the acceleration/deceleration ramp rate for wash steps in RPM/second.

7.10.8 Spin drain speed ramp rate

Sets the acceleration/deceleration ramp rate for spin drain steps in RPM/second.

7.10.9 Default wash speed

Sets the default wash speed in RPM.

7.10.10 Default spin drain speed

Sets the default spin drain speed in RPM.

7.10.11 Default low extract speed

Sets the default low extract speed in RPM.

7.10.12 Default medium extract speed

Sets the default medium extract speed in RPM.

7.10.13 Default high extract speed

Sets the default high extract speed in RPM.

7.10.14 Default wash forward time
Sets the default wash forward rotation time in seconds.

7.10.15 Default wash reverse time
Sets the default wash reverse rotation time in seconds.

7.10.16 Default pause time
Sets the default pause time in seconds.

7.10.17 XPort release speed
Sets the speed at which the control will deactivate the XPort output when accelerating to extract speed.

7.10.18 Extract initial analog
Sets the value in engineering units that will be written to the D/A converter after the XPort is released.

7.10.19 Ext initial accel target
Sets the speed in RPM that the control will wait for after releasing the XPort before it starts to increase the analog output voltage.

7.10.20 Extract accel analog increment
Sets the number of engineering units the analog output will be increased by every second while accelerating to extract.

7.10.21 Extract spd correct increment
Sets the number of engineering units the analog output will be increased or decreased by once the control has achieved extract speed to correct deviation from the programmed extract speed.

7.10.22 Extract decel ramp increment
Sets the number of engineering units that the analog output will decrease by each time interval when decelerating from extract.

7.10.23 Extract decel ramp interval
Sets the amount of time between decreases in the analog output.

7.10.24 Extract acceleration anticipate
Sets the number of RPM below the programmed RPM the control will stop increasing the analog output to allow the hydraulic drive system to catch up.

7.10.25 Wash speed analog increment
Sets the number of engineering units by which the control will increase or decrease the analog output to correct deviation from wash speed.

7.10.26 Wash speed analog increment limit
Sets a limit on the number of engineering units that can be added to or subtracted from the analog output value when automatically correcting the wash speed.

7.10.27 Extract emergency hard decel rate
Sets the number of engineering units the control will subtract from the analog output value every 20ms when making an emergency stop from extract.

7.10.28 Forward wash speed positive bias
Sets the number of engineering units to be added to the analog output when running forward.

7.10.29 Forward wash speed negative bias

Sets the number of engineering units to be subtracted from the analog output value when running forward.

7.10.30 Reverse wash speed positive bias

Sets the number of engineering units to be added to the analog output when running reverse.

7.10.31 Reverse wash speed negative bias

Sets the number of engineering units to be subtracted from the analog output when running reverse.

7.10.32 Spin drain positive bias

Sets the number of engineering units to be added to the analog output when running in spin drain.

7.10.33 Spin drain negative bias

Sets the number of engineering units to be subtracted from the analog output when running in spin drain.

7.10.34 Initial lock pin analog output

Sets the number of engineering units that the analog output will initially run at when locking the cylinder.

7.10.35 Lock pin decrement delay

Sets the amount of time the control waits after it decreases the analog output while locking the cylinder before changing the output again.

7.10.36 Lock pin increment delay

Sets the amount of time the control waits after it increases the analog output while locking the cylinder before changing the output again.

7.10.37 Lock pin decrement amount

Sets the number of engineering units that the control will decrease the analog output by when the rotational speed is above 3 RPM while locking the cylinder.

7.10.38 Lock pin increment amount

Sets the number of engineering units that the control will increase the analog output by when the rotational speed is below 3 RPM while locking the cylinder.

7.11 Machine Diagnostics (Open Pocket with Allen-Bradley PLC)

When you first enter the diagnostic mode, the control will display the following options:

```
Select category:
 1 - Chemical outputs
 2 - Waters & drains
 3 - Machine outputs
```

Press the number on the keypad corresponding to the group of outputs you wish to test.

7.11.1 Chemical Outputs

The chemical outputs section allows you to activate and deactivate the individual chemical outputs for testing the chemical system interface. Use the [UP ARROW] and [DOWN ARROW] keys to select the chemical output you wish to test, then use the [YES/NO] key to turn that relay on or off. Press the [STOP] key when finished.

7.11.2 Waters/Drains

The waters/drains section allows you to test the following solenoids:
Hot water
Cold water
Reuse (3rd) water
Drain
Reuse (2nd) drain
Steam
Load flush
Cooldown
Use the [UP ARROW] and [DOWN ARROW] keys to select the output you wish to test, then use the [YES/NO] key to turn that relay on or off. Press the [STOP] key when finished.

7.11.3 Machine Outputs

The machine outputs section allows you to test the air bags, the alarm horn and the motion horn. Use the [UP ARROW] and [DOWN ARROW] keys to select the output you wish to test, then use the [YES/NO] key to turn that relay on or off. Press the [STOP] key when finished.

7.12 Machine Diagnostics (Side Loader with CCS control)

The machine diagnostics section gives you access to the status of the control's inputs, the control's outputs, and provides a convenient way to test certain machine functions. Use the [UP ARROW] and [DOWN ARROW] keys to select the type of diagnostic you wish to perform, then press [EDIT] to access it. Use the [STOP] key to exit.

7.12.1 Verify machine input operation

Verify machine input operation provides a way to check the status of all of the machine's inputs. Use the [UP ARROW] and [DOWN ARROW] keys to select the input you wish to check the status of. Press [STOP] when finished.

7.12.2 Test machine outputs

The test machine outputs section allows you to activate or deactivate each relay on the control individually. Use the [UP ARROW] and [DOWN ARROW] keys to select the relay you wish to operate. Use the [YES/NO] key to switch the output on or off. Press [STOP] when finished. **NOTICE: when using the test machine outputs function, the operator has direct control over the machine functions. The control is not providing any safeties. Exercise extreme caution when using this function.**

7.12.3 Machine test and maintenance

The machine test and maintenance function allows the user to operate various machine functions with the machine's safeties intact. Use the [UP ARROW] and [DOWN ARROW] keys to select the function you wish to test, then press [EDIT] to begin testing.

Run hydraulic pump to cool fluid provides a way to run the machine's hydraulic pump to cool the hydraulic fluid.

Retract lock cylinder retracts the cylinder lock pin

Extend lock cylinder extends the cylinder lock pin with the hydraulic pump running to set the locking pressure.

Unconditional door and tilt control lets you open the door, close the door, tilt the casing to the load position and return to the run position regardless of temperature or level. **NOTICE:** this mode bypasses machine safeties, and should be used only for troubleshooting or setup.

Lift machine on air bags retracts the frame lock pins and raises the machine on its air bags like it would when going into extract.

Jog machine can be used to turn the basket and test the analog output from the control.

Prime bearing lubrication system automatically cycles the drain valve output.

7.13 Clearing Entire Memory

This function will clear all configurations, settings, formulas, and steps previously programmed in to the washer control. Be absolutely certain you want to clear the entire unit of all configurations and programming before proceeding.

To clear entire memory:

1. Press [EDIT] key.
2. Press [YES/NO] key, to select YES to enable clearing.
3. Press [ENTER] to process.
4. Clearing is complete.

7.14 Exit Technical Configuration

Press [YES/NO] key, then press [MODE] to return to the Run Mode.

8. Error Messages and Troubleshooting

8.1 Error Messages

The washer control has been designed to detect many fault conditions and alert machine operators when they occur to simplify troubleshooting and promote safe operation of the equipment. Some of the error messages and the suggested troubleshooting method for those errors follows.

Note: The washer control allows the user to invert the operation of its inputs and relay contacts. In the relay and input fields of the washer control's I/O Assignment settings, any field that has a number above 100 is considered to be inverted. For example, if the relay field is set to 110, it means that relay 10 has been configured to operate as a normally closed relay instead of a normally open relay.

8.1.1 Change Oil Filter

Explanation: Some washers equipped with hydraulic pumps have a switch that indicates that the hydraulic oil filter needs to be replaced. If the washer control sees an input from this switch, it will display the Change Oil Filer error.

Troubleshooting: Check the hydraulic oil filter and replace if necessary.
Check the Oil Filter I/O Assignment (Section 7.3.82) input field. If the contacts on the oil filter switch close when the filter needs replacement, this field should not be inverted. If the contacts on the oil filter switch open when the filter needs replacement, this field should be inverted.

8.1.2 Door Closed Switch Damaged

Explanation: The washer control has the ability to monitor both the normally open (Door Closed I/O Assignment, Section 7.3.56) and the normally closed (Invert Door Closed I/O Assignment, Section 7.3.57) contacts on the door closed limit switch. If the washer control does not see the inputs from these switches in opposite states (the normally open contact's input on and the normally closed contact's input off when the door is closed, for example), it will display this error.

Troubleshooting: Check the door limit switch for proper adjustment and alignment.
Check the door limit switch contacts for proper operation.
Ensure that the correct inputs are assigned in the input fields of the Door Closed and Invert Door Closed I/O Assignments. The Door Closed input field should be configured for the switch that closes when the door is closed and opens when the door is not closed. The Invert Door Closed input field should be configured for the switch that opens when the door is closed and closes when the door is not closed. The input fields for these I/O Assignments should not be inverted.

8.1.3 Door Closed Switch Failure

Explanation: The washer control monitors the state of its door closed input while running a formula. If the washer control does not see an input from the door closed switch while it is running a formula, it will display this error.

Troubleshooting: Check the door closed switch for proper adjustment and alignment.
Check the door limit or proximity switch for proper operation.
Ensure that the input field of the Door Closed I/O Assignment (Section 7.3.56) has been assigned correctly.

8.1.4 Door Latch Timeout

Explanation: The washer control has an input for a door latched limit or proximity switch. If the washer control does not see an input from this switch within five seconds of engaging the door latch, or does not see this input go away within five seconds of releasing the door latch, it will display this error.

Troubleshooting: Check the door latch for proper operation.
Check the door latch limit or proximity switch for adjustment and alignment.
Check the door latch limit or proximity switch for proper operation.
Ensure that the machine has adequate pressure from the plant air system.
Ensure that the input field of the Door Latch I/O Assignment (Section 7.3.61) is configured correctly. If the switch closes when the door latch is applied, this input should not be inverted. If the switch opens when the door latch is applied, this field should be inverted.
Ensure that the output field of the Door Latch I/O Assignment (Section 7.3.61) is configured correctly. If the latch is applied when power is applied, this field should be inverted. If the latch is released when power is applied, this field should not be inverted.

8.1.5 Door Not Fully Open

Explanation: On unloading washers, if the machine is tiled forward in the unload position and the door stops making contact with the door open (Section 7.3.54) limit switch, the washer control will display this error.

Troubleshooting: Check that the door is not drifting off of the limit switch when the machine is tilted forward.
Check the limit switch for proper alignment and adjustment.
Check the limit switch contacts for proper operation.

8.1.6 Door Open Switch Damaged

Explanation: The washer control has the ability to monitor both the normally open (Door Open I/O Assignment, Section 7.3.54) and the normally closed (Invert Door Open I/O Assignment, Section 7.3.55) contacts on the door closed limit switch. If the washer control does not see the inputs from these switches in opposite states (the normally open contact's input on and the normally closed contact's input off when the door is closed, for example), it will display this error.

Troubleshooting: Check the door limit switch for proper adjustment and alignment.
Check the door limit switch contacts for proper operation.
Ensure that the correct inputs are assigned in the input fields of the Door Open and Invert Door Open I/O Assignments. The Door Open input field should be configured for the switch that closes when the door is open and opens when the door is closed. The Invert Door Open input field should be configured for the switch that opens when the door is open and closes when the door is closed. The input fields for these I/O Assignments should not be inverted.

8.1.7 Door Open Switch Failure

Explanation: The washer control monitors the state of its door open input while running a formula. If the washer control sees an input from the door open switch while it is running a formula, it will display this error.

Troubleshooting: Check the door open switch for proper adjustment and alignment.
Check the door limit or proximity switch for proper operation.
Ensure that the input field of the Door Open I/O Assignment (Section 7.3.54) has been assigned correctly.

8.1.8 Door Seal Timeout

Explanation: The washer control has an input for a door sealed switch. If the washer control does not see an input from this switch within five seconds of engaging the door seal, or does not see this input go away within five seconds of releasing the door seal, it will display this error.

Troubleshooting: Check the door seal for proper operation.
Check the door seal switch for adjustment and alignment.
Check the door seal switch for proper operation.
Ensure that the machine has adequate pressure from the plant air system.
Ensure that the input field of the Door Seal I/O Assignment (Section 7.3.62) is configured correctly. If the switch closes when the door seal is applied, this input should not be inverted. If the switch opens when the door seal is applied, this field should be inverted.
Ensure that the output field of the Door Seal I/O Assignment (Section 7.3.62) is configured correctly. If the seal is applied when power is applied, this field should not be inverted. If the seal is released when power is applied, this field should be inverted.

8.1.9 Door Switch Failure

Explanation: The washer control checks the Door Closed (Section 7.3.56) and Door Open (Section 7.3.54) inputs to ensure that they are not both on at the same time. If the washer control does see both inputs (indicating that the door is open and closed at the same time) it will display this error.

Troubleshooting: Check the door closed and open limit or proximity switches for proper alignment and adjustment.
Check the door closed and open limit or proximity switches for proper operation.

8.1.10 Formula Memory Failure

Explanation: The washer control uses a check value on each formula to keep track of changes and ensure that its memory has not been damaged. Each time the washer control is powered on, and each time the user starts a formula, it recalculates the check value to make sure it agrees with the check value calculated the last time the formula was edited. If the check values do not match, the washer control will display this error.

Troubleshooting: To clear a formula memory error, go into the Program Mode and select the formula that caused the error using the procedures in Section 4. Use the [LEFT ARROW] and [RIGHT ARROW] keys to check the formula contents to ensure that the formula is correct. If the formula is correct, select the formula's End Step and press the [STOP] key to correct the formula's check value. If you are encountering frequent formula memory failures, contact Custom Control Systems.

8.1.11 Front Up/Down Switch Failure

Explanation: The washer control monitors the status of the front up (Raise Front I/O Assignment, Section 7.3.64) and front down (Lower Front I/O Assignment, Section 7.3.65) inputs. If it sees both inputs (indicating that the machine is up and down at the same time) it displays this error.

Troubleshooting: Check the front up and front down switches for proper alignment and operation.

8.1.12 Hydraulic Oil Temp. Too High

Explanation: The washer control has an input for a hydraulic oil temperature switch (Hot Oil I/O Assignment, Section 81). If the washer control sees this input, it will display this message.

Troubleshooting: Check the hydraulic oil temperature switch for proper operation. If the switch has been tripped, wait for the oil temperature to cool down.

8.1.13 Hydraulic Pump Overload Tripped

Explanation: The washer control has lost its input from the hydraulic pump motor overload heater. (Most motor overloads use normally-closed contacts, so the input will be on when the motor has **not** overloaded.) The hydraulic pump overload is the input for the Hydraulic Pump I/O Assignment (Section 7.3.37).

Troubleshooting: Check the motor overload heater for the hydraulic pump motor and reset the overload if necessary.
Check the Hydraulic Pump I/O Assignment and make sure that it is configured correctly. If the motor overload heater uses normally closed contacts, the input field for the Hydraulic Pump I/O Assignment should be inverted. If the motor overload heater uses normally open contacts, the input field should not be inverted. If this field is set to zero and you encounter this error, contact Custom Control Systems.

8.1.14 I/O Assignment Memory Failure

Explanation: The washer control uses a check value on the I/O Assignments to keep track of changes and ensure that its memory has not been damaged. Each time the washer control is powered on, and each time the user starts a formula, it recalculates the check value to make sure it agrees with the check value calculated the last time the I/O Assignments were edited. If the check values do not match, the washer control will display this error.

Troubleshooting: To clear an I/O Assignment memory failure, follow the instructions in Section 6 for entering the Options Mode, and the instructions in Section 7 for getting into Factory Options. Double-check your I/O Assignments against your machine's drawing to ensure that they are all correct. If you spot any errors, correct them following the procedure in Section 7.3. If the I/O Assignments appear to be correct, follow the procedure in Section 7.3 to reenter I/O Assignment 1 and press the [EXIT] key. You will need to power the washer control down and back up once you have finished.

8.1.15 Load Position Switch Damaged

Explanation: The washer control has the ability to monitor both the normally open (Load Position I/O Assignment, Section 7.3.48) and the normally closed (Invert Load Position I/O Assignment, Section 7.3.49) contacts on the load position limit switch. If the washer control does not see the inputs from these switches in opposite states (the normally open contact's input on and the normally closed contact's input off when the machine is tilted to the load position, for example), it will display this error.

Troubleshooting: Check the load position switch for proper adjustment and alignment.
Check the load position switch contacts for proper operation.
Ensure that the correct inputs are assigned in the input fields of the Load Position and Invert Load Position I/O Assignments. The Load Position input field should be configured for the switch that closes when the machine is tilted to the load position. The Invert Door Open input field should be configured for the switch that opens when the machine is not tilted to the load position. The input fields for these I/O Assignments should not be inverted.

8.1.16 Load Position Switch Failure

Explanation: The washer control monitors the state of its load position switch input while running a formula. If the washer control does sees an input from the load position switch while it is running a formula, it will display this error.

Troubleshooting: Check the load position switch for proper adjustment and alignment.
Check the load position switch for proper operation.
Ensure that the input field of the Load Position I/O Assignment (Section 7.3.48) has been assigned correctly.

8.1.17 Machine Unbalanced

Explanation: The washer control has an input for a machine unbalanced switch on washer-extractors. The washer control will display this error when it gets an input from this switch.

Troubleshooting: Ensure that the machine is loaded evenly.
Check the unbalance switch for proper adjustment and operation.
Ensure that the Unbalance I/O Assignment (Section 7.3.25) is configured properly.

8.1.18 Motor Overload Tripped

Explanation: The washer control has lost its input from the motor overload heater. (Most motor overloads use normally-closed contacts, so the input will be on when the motor has **not** overloaded.) The motor overload is the input for the Motor Overload I/O Assignment (Section 7.3.36).

Troubleshooting: Check the motor overload heater and reset the overload if necessary.
Check the Motor Overload I/O Assignment and make sure that it is configured correctly. If the motor overload heater uses normally closed contacts, the input field for the Motor Overload I/O Assignment should be inverted. If the motor overload heater uses normally open contacts, the input field should not be inverted. If this field is set to zero and you encounter this error, contact Custom Control Systems.

8.1.19 Options Memory Failure

Explanation: The washer control uses a check value on the Options to keep track of changes and ensure that its memory has not been damaged. Each time the washer control is powered on, and each time the user starts a formula, it recalculates the check value to make sure it agrees with the check value calculated the last time the Options were edited. If the check values do not match, the washer control will display this error.

Troubleshooting: To clear an Options memory failure, follow the instructions in Section 6 for entering the Options Mode. Double-check your Option settings against your machine's drawing to ensure that they are all correct. If you spot any errors, correct them following the procedure in Section 6.5. If the Options appear to be correct, follow the procedure in Section 6.5 to reenter any option and press the [EXIT] key. You will need to power the washer control down and back up once you have finished.

8.1.20 Rear Up/Down Switch Failure

Explanation: The washer control monitors the status of the rear up (Raise Rear I/O Assignment, Section 7.3.62) and rear down (Lower Rear I/O Assignment, Section 7.3.63) inputs. If it sees both inputs (indicating that the machine is up and down at the same time) it displays this error.

Troubleshooting: Check the rear up and rear down switches for proper alignment and operation.

8.1.21 RPM Limit Exceeded

Explanation: On machines equipped with an RPM encoder, the washer control can detect when the machine's rotational speed has become too high. If the machine's measured RPM is higher than the RPM limit set in the Options Mode (Section 6.5.49) the washer control will display this error.

Troubleshooting: Check the RPM encoder or proximity switch for proper adjustment and operation.
Check the RPM Limit option for proper configuration.
Check the RPM I/O Assignment (Section 7.3.41) for proper configuration.

8.1.22 Chemical Malfunction

Explanation: The washer control allows the user to set a time limit for manually added chemical Chemicals. If this time limit is exceeded, the washer control will display this error.

Troubleshooting: Check the Maximum Wait Time (Section 6.4.8) for proper configuration.
Ensure that the operator has added the necessary chemical and has restarted the machine.
Check the Chemical I/O Assignments (Section 7.5) for proper configuration.

8.1.23 Temperature Timeout

Explanation: The washer control allows the user to set a water temperature time-out. Whenever the washer control opens the steam valve to bring the temperature of the water in the washer up to the programmed water temperature, it runs a timer to ensure that it does not take too long to bring the water up to temperature. If the time taken to bring the water up to the programmed temperature is longer than the Temperature Timeout Option (Section 6.5.26) the washer control will display this error.

Troubleshooting: Check the washer's steam valve for proper operation.
Ensure that the washer's steam cutoff valve is open.
Ensure that the plant has proper steam pressure.
Ensure that the Temperature Timeout option is properly configured.
Ensure that the Steam I/O Assignment (Section 7.3.3) is properly configured.

8.1.24 Unload Position Switch Damaged

Explanation: The washer control has the ability to monitor both the normally open (Unload Position I/O Assignment, Section 7.3.50) and the normally closed (Invert Unload Position I/O Assignment, Section 7.3.51) contacts on the load position limit switch. If the washer control does not see the inputs from these switches in opposite states (the normally open contact's input on and the normally closed contact's input off when the machine is tilted to the load position, for example), it will display this error.

Troubleshooting: Check the unload position switch for proper adjustment and alignment.
Check the unload position switch contacts for proper operation.
Ensure that the correct inputs are assigned in the input fields of the Unload Position and Invert Unload Position I/O Assignments. The Unload Position input field should be configured for the switch that closes when the machine is tilted to the unload position. The Invert Unload Position input field should be configured for the switch that closes when the machine is not tilted to the unload position. The input fields for these I/O Assignments should not be inverted.

8.1.25 Unload Position Switch Failure

Explanation: The washer control monitors the state of its unload position input while running a formula. If the washer control sees an input from the unload position switch while it is running a formula, it will display this error.

Troubleshooting: Check the unload position switch for proper adjustment and alignment.
Check the unload position switch for proper operation.
Ensure that the input field of the Unload Position I/O Assignment (Section 7.3.50) has been assigned correctly.

8.1.26 Unload Side Door Opened

Explanation: The washer control monitors the door closed switches on both sides of Anti-Cross Contamination machines. If the washer control has released the door latch on the load side, and the door on the unload side is opened, it will display this error.

Troubleshooting: Check the door closed switches on the load an unload sides of the machine.
Check the door clamps on the load and unload sides of the machine for proper adjustment and operation.
Ensure that the Door Closed (Section 7.3.56) I/O Assignment is properly configured.

8.1.27 Vibration Switch Tripped

Explanation: The washer control monitors an input from a machine vibration switch. If the washer control sees an input from the vibration switch, it will display this error.

Troubleshooting: Check to see if the machine has been vibrating excessively.
Check the vibration switch for proper adjustment and operation.
Ensure that the Vibration Switch I/O Assignment (Section 7.3.85) is configured correctly.

8.1.28 Wash Position Switch Damaged

Explanation: The washer control has the ability to monitor both the normally open (Wash Position I/O Assignment, Section 7.3.46) and the normally closed (Invert Wash Position I/O Assignment, Section 7.3.47) contacts on the wash position limit switch. If the washer control does not see the inputs from these switches in opposite states (the normally open contact's input on and the normally closed contact's input off when the machine is tilted to the wash position, for example), it will display this error.

Troubleshooting: Check the wash position switch for proper adjustment and alignment.
Check the wash position switch contacts for proper operation.
Ensure that the correct inputs are assigned in the input fields of the Wash Position and Invert Wash Position I/O Assignments. The Wash Position input field should be configured for the switch that closes when the machine is tilted to the wash position. The Invert Wash Position input field should be configured for the switch that closes when the machine is not tilted to the wash position. The input fields for these I/O Assignments should not be inverted.

8.1.29 Wash Position Switch Failure

Explanation: The washer control monitors the state of its wash position input while running a formula. If the washer control does not see an input from the wash position switch while it is running a formula, it will display this error.

Troubleshooting: Check the wash position switch for proper adjustment and alignment.
Check the wash position switch for proper operation.
Ensure that the input field of the Wash Position I/O Assignment (Section 7.3.46) has been assigned correctly.

8.1.30 Water Level Fill Timeout

Explanation: The washer control allows the user to set a water level fill time-out. Whenever the washer control opens the water valves to bring the water level in the washer up to the programmed water level, it runs a timer to ensure that it does not take too long to bring the water up to level. If the time taken to bring the water up to the programmed level is longer than the Fill Timeout option (Section 6.5.25) the washer control will display this error.

Troubleshooting: Check the washer's water valves for proper operation.
Ensure that the washer's water cutoff valves are open.
Ensure that the plant has proper water pressure.
Ensure that the Fill Timeout option is properly configured.
Ensure that the Hot Water (Section 7.3.1) and Cold Water (Section 7.3.2) I/O Assignments are properly configured.

Appendix A

Character Set

Provided below, is a partial list of the available characters used in programming formula and step names. To access this list, you must be programming or editing a formula or step name. Press the [UP or DOWN ARROW] keys to scroll through the set of characters.

See Edit Formula Name, Section 4.5, and Editing Step Name, Section 4.15.1, for more details.

! " # $ % & ' ( ) * + , - . /

0 1 2 3 4 5 6 7 8 9 : ; < = > ? @

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

[\ ] ^ _ `

a b c d e f g h i j k l m n o p q r s t u v w x y z

{ | } ~

Appendix B

Pre-Programmed Step Names

The PC-5000 has provided a data base of Pre-Programmed Step Names. This file cannot be edited or erased, however, can be added to at any time, simply by entering a new step name. To access this list, see Programming Step Name, Section 4.7.

A
AC Rinse
Acid Bath

B
Bleach
Bleach / Suds
Bleach / Break
Break
Break / Bleach

C
C-Over / Suds
Carryover
Coast
Cold Flush
Cold Rinse
Cool Down

D
De-Hair
Drain
Drain / Still
Drain > Sewer
Drain One Way
Drain Revsing
Drain / Hi Ext
Drain L+H Ext
Drain / Lo Ext
Dye

E
Enzyme Flush
Extract

F
Fill
Fill Temp
Fill / Level / Temp
Final Extract
Fluff
Flush

G
Gentle Wash

H
Hi-Extract
High Extract
Hot Flush
Hot Rinse

I
Int Extract

L
Level
Level / Temp
Lo-Extract
Lo / Hi Extract
Low Extract

M
Mildewcide

N
No Rotation

O
Oil Treatment
Oxalic Bath

P
Pause
Poly-Rinse

R
Raise Level
Drain two
Reuse Fill
Reuse Flush
Reuse One Way
Reuse Rinse
Third water
Rinse
Rinse Part 1
Rinse Part 2

S
Shakeout
Signal
Softener
Sour
Sour / Dye
Sour / Soft
Sour / Starch
Sour Bath
Sour / Star / Mil
Special Drain
Split Flush
Split Rinse
Starch
Starch / Mildew
Start
Steam
Stop
Strip
Suds
Suds / Bleach
Suds 1
Suds 2

T
Temperature
Treatment
Tumble

W
Warm Flush
Warm Rinse
Wash One Way

Appendix C
I/O Assignments

Number	Description	LED	Relay	Input	Type
1	Hot Water				
2	Cold Water				
3	Steam				
4	Drain				
5					
6	Third Water				
7	Drain Two				
8	Motor Forward				
9	Motor Reverse				
10					
11					
12					
13	Signal				
14					
15					
16					
17					
18					
19					
20					
21	Aux 1				
22	Aux 2				
23	Aux 3				
24	Aux 4				
25					
26					
27					
28					
29	Start				
30	Stop				
31	Formula Up				
32	Formula Down				
33	Hold				
34	Communications				
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46	Wash Position				
47					
48	Load Position				

Number	Description	LED	Relay	Input	Type
49					
50	Unload Position				
51					
52					
53					
54	Door Open				
55					
56	Door Closed				
57					
58	Raise Door				
59	Lower Door				
60					
61					
62	Raise Rear				
63	Lower Rear				
64					
65					
66					
67					
68					
69	Chute Spray				
70					
71					
72					
73					
74					
75					
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77					
78					
79					
80					
81					
82					
83					
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98					
99					
100					

Appendix D

Multi I/O Assignment Chart

Number	Description	A	B	C	D
201					
202					
203					
204					
205					
206					
207					
208					
209					
210					
211					
212					
213					
214					
215					
216					

Supply I/O Assignment Chart

Number	Supply Name	Type	LED	Relay	Reset	Flowmeter	Pump	Flush
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

Index

M

O

W