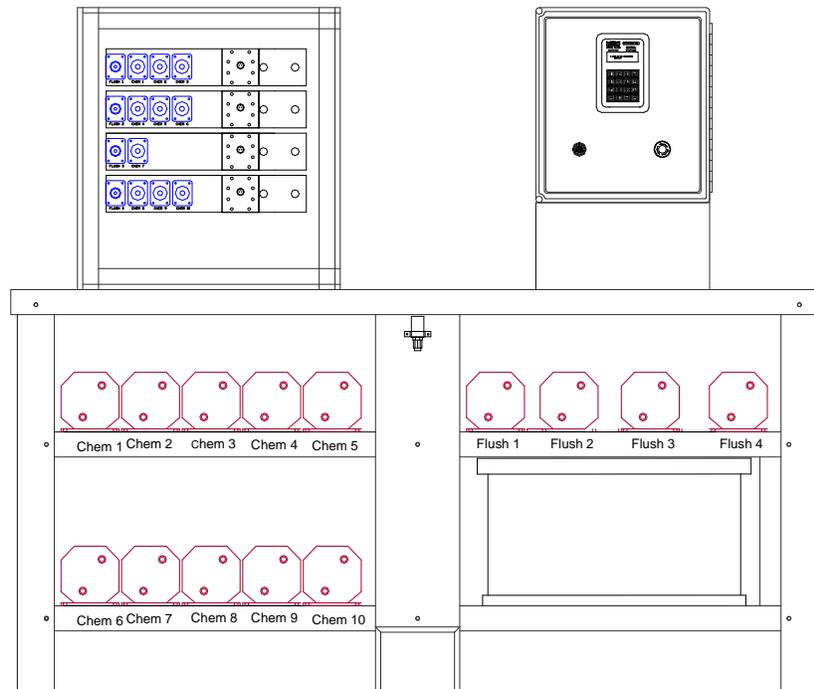


# SOFTROL

*Software & Control for Automation*



## CATALYST TUNNEL

### Installation and Operation Manual

Softrol Systems Inc.  
4867 N. Main St.  
Acworth, GA 30101  
(770) 974-2700

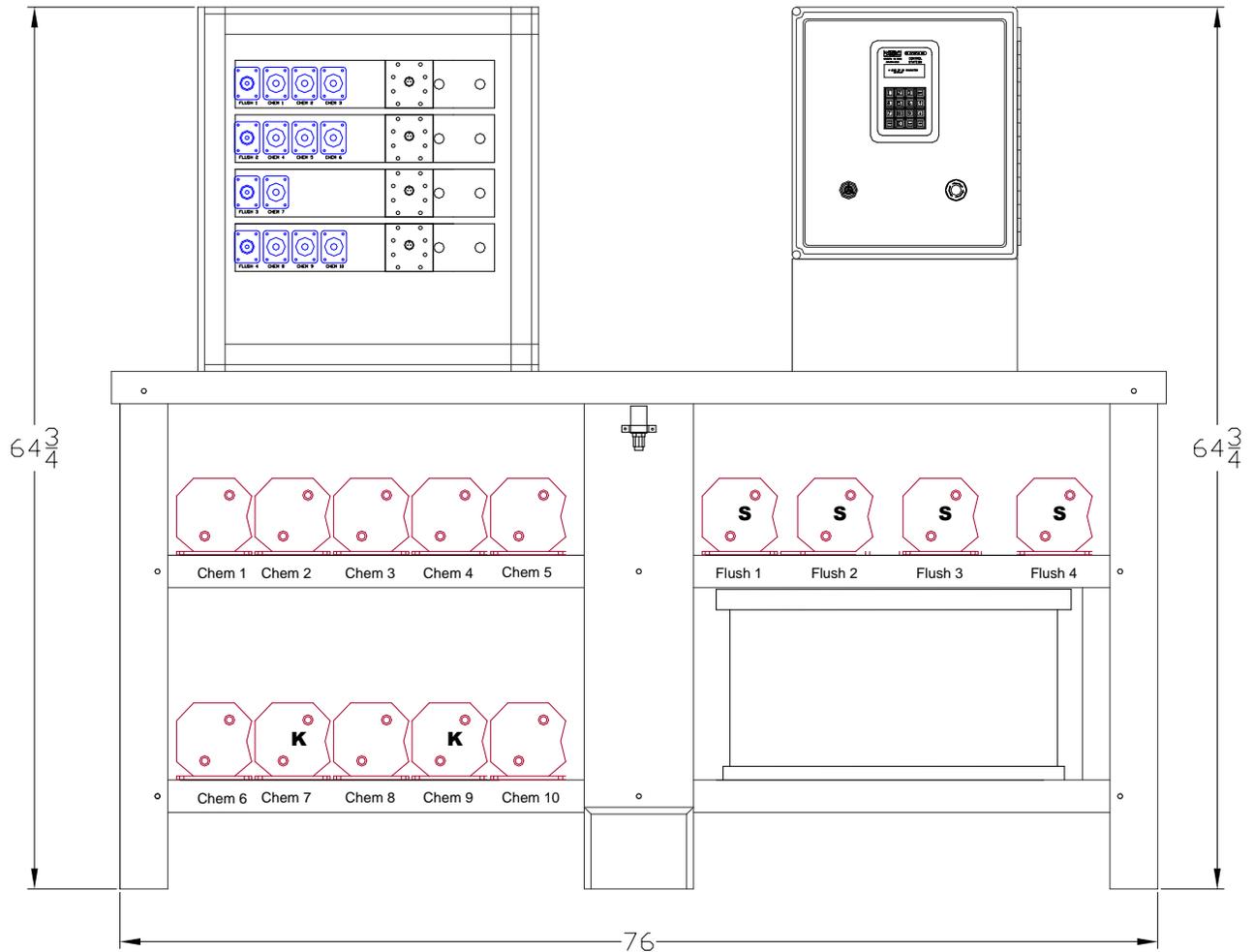


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CATALYST

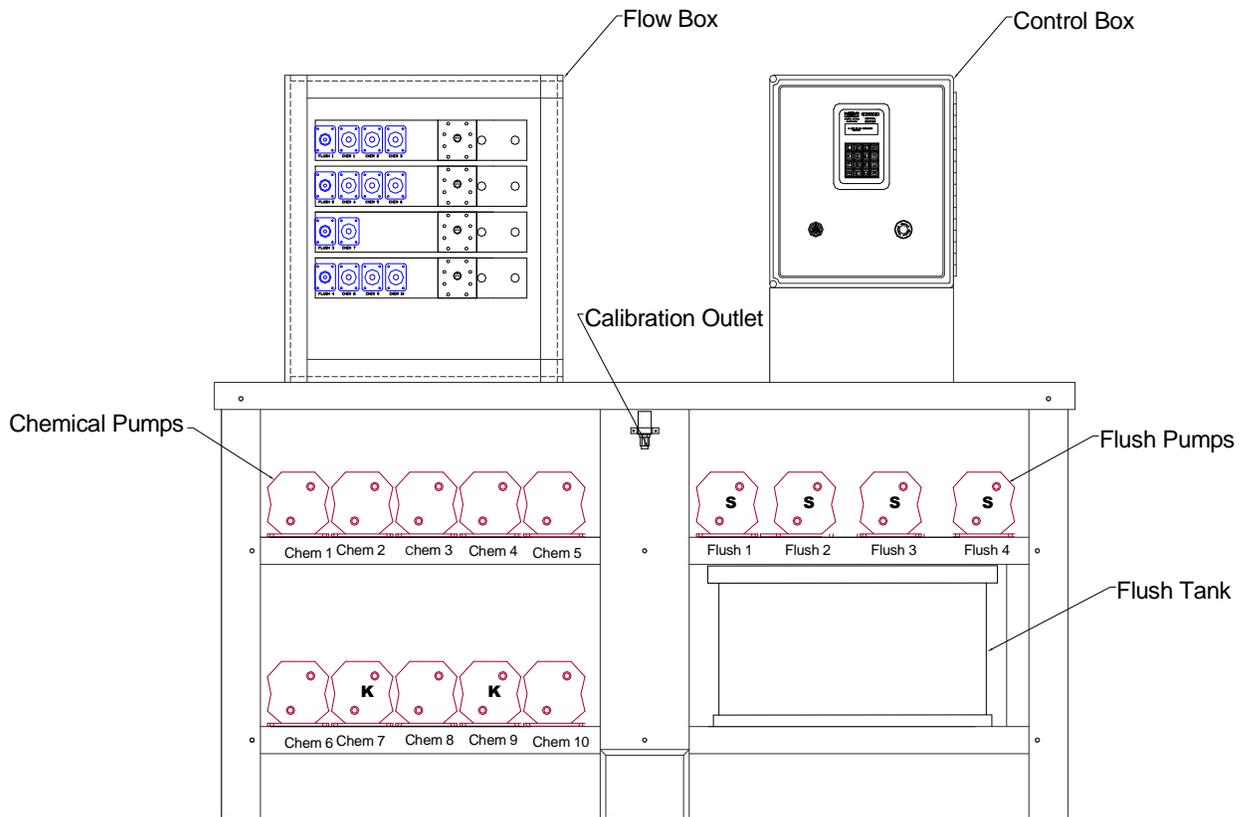


## 1. Introduction: The Catalyst Tunnel System

The Catalyst Tunnel System is a chemical metering and injection system that delivers liquid chemicals to multiple modules of a tunnel washer. The system is flexible and can be customized to serve up to eight modules with a possible sixteen chemicals.

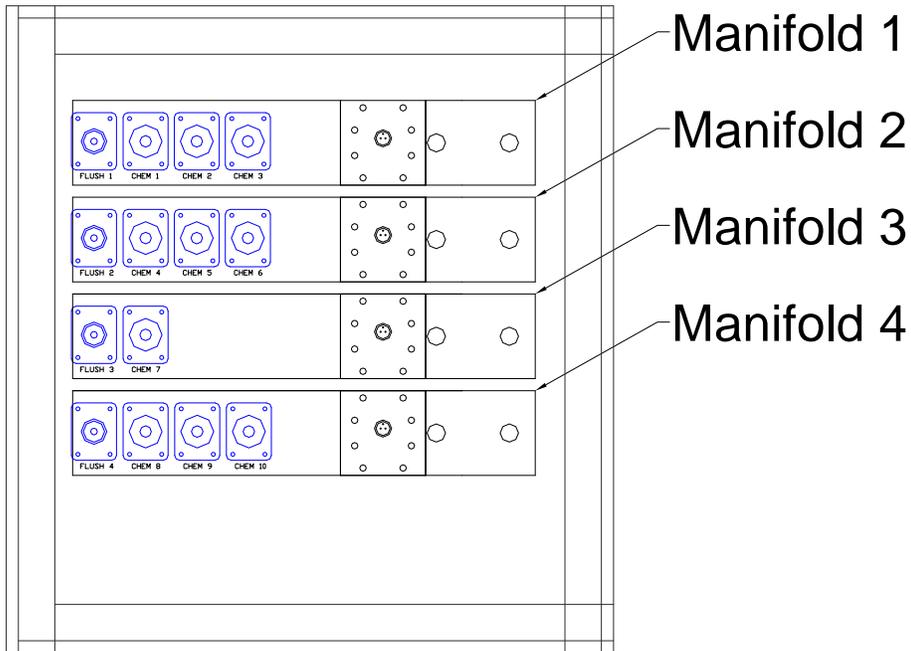
The Catalyst System offers precise chemical deliveries with consistent results. The system has the ability to interface with various types of controllers, and production data may be gathered for a variety of tunnel washers. Formula entry is simplified with a with the PulseNet PC software and all formulas are stored in the Catalyst Control. Individual flowmeters for each module insure accurate chemical delivery.

## The major components of the Catalyst Tunnel system



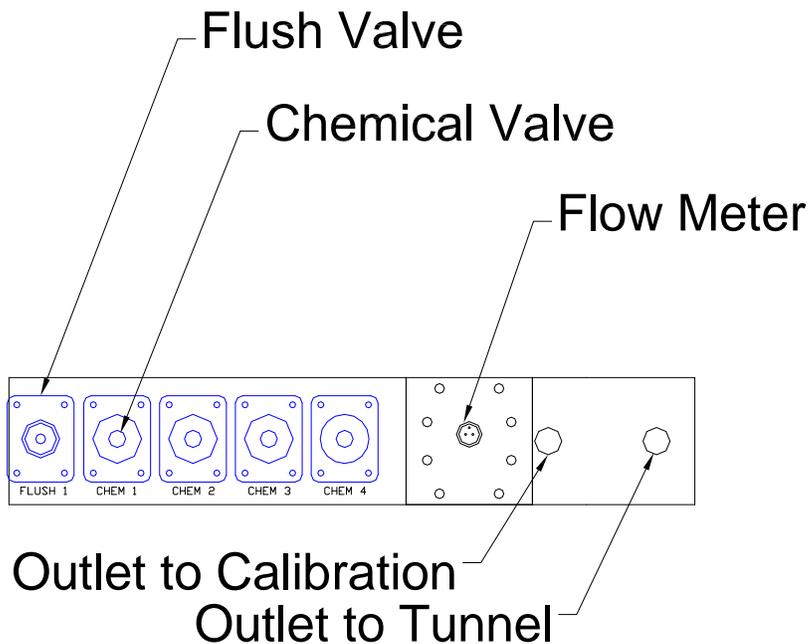
The Tunnel system can have up to 16 chemicals and 8 manifolds. The Tunnel LT system can have a maximum of 10 chemicals and 5 manifolds. If the system has more manifolds than the LT, then a separate flush tank and stand is necessary.

**Flow Box Detail**



Each Manifold is dedicated to a specific module. The system can have up to 8 individual manifolds. The manifold can have up to 4 chemicals.

**Chemical Manifold Detail**



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CATALYST

## 2. Catalyst Installation & Configuration

Several weeks prior to the installation, an on site survey should be conducted to determine the best location in the plant for the Catalyst system. Consideration should be given to the location of the chemicals in relation to the washroom and the length of the run from the chemical storage area to the washers. The shorter the length of the Catalyst to the machines, the faster the injection times will be. This is **very** important with the Catalyst Tunnel system. A plant layout with the proposed location for the Catalyst along with the list of chemical and typical injection amounts should be sent to Softrol when the system is ordered. Also include a list of machines and their controller types with the chemical output voltage. This will help ensure that the configuration and layout of the system is optimal.

Before beginning the installation, Softrol Systems recommends that plant personnel be familiar with the types of chemicals they will be working with and the potential hazards that are associated with the chemicals (this information must be supplied in the form of a Material Safety Data Sheet, or MSDS.)

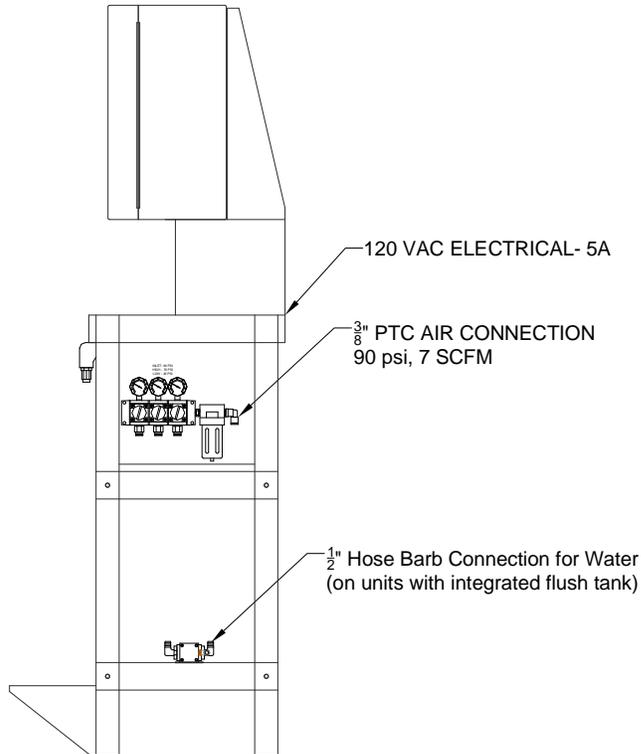
Softrol Systems also recommends that, at the very minimum, plant personnel be required to wear all protective equipment suggested in the MSDS. Extreme care should be taken when working with a pressurized chemical system. Ensure that all pressure has been removed from the system and that all power to the machine is turned off before undergoing maintenance.

### Injection Unit

Remove the equipment from the shipping packages. Check the system carefully to assure that no damage occurred in shipment. If any damage from shipment is apparent call Softrol Systems immediately at (770) 974-2700.

Clear the area in which it is to be placed. This should have already been determined in the Site Survey. Uncrate and stand the Catalyst Injection System in the position where it is to be located. Be careful in transporting the Catalyst- it **is** heavy.

## Utility Connections



Make the electrical and air connections as explained below.

### **Air Connections**

A 1/2" line of clean, dry air at 90 psi minimum is required for the system. The system uses about 7 SCFM maximum at 90 PSI. For multiple or redundant systems, the supply line should be upsized accordingly. The unit has a 3/8" OD flexible tubing connection. (Tubing not supplied)

### **Electrical Connections:**

The Catalyst requires 120 VAC at 5 Amps. The unit is supplied with a 15' US power cord. The Active Hub) also requires 120 VAC at 5 Amps. These circuits should be dedicated for the chemical system use only.

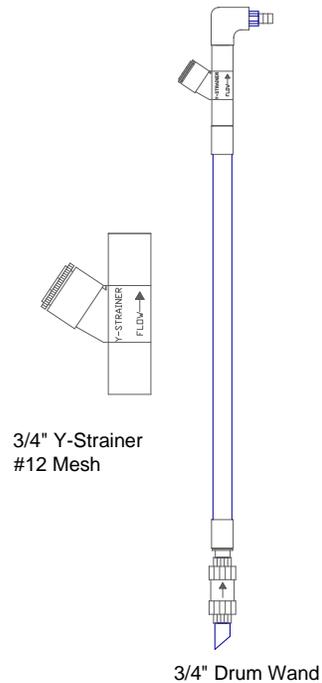
### **Water Connections:**

The Catalyst requires 5 GPM water at 70-110 deg. F. The unit has a 1/2" hose barb connection for the water supply. This is found on the Catalyst itself on units with an integrated flush tank. On units with a separate flush stand, this connection will be at the flush stand.

## Chemical Connections

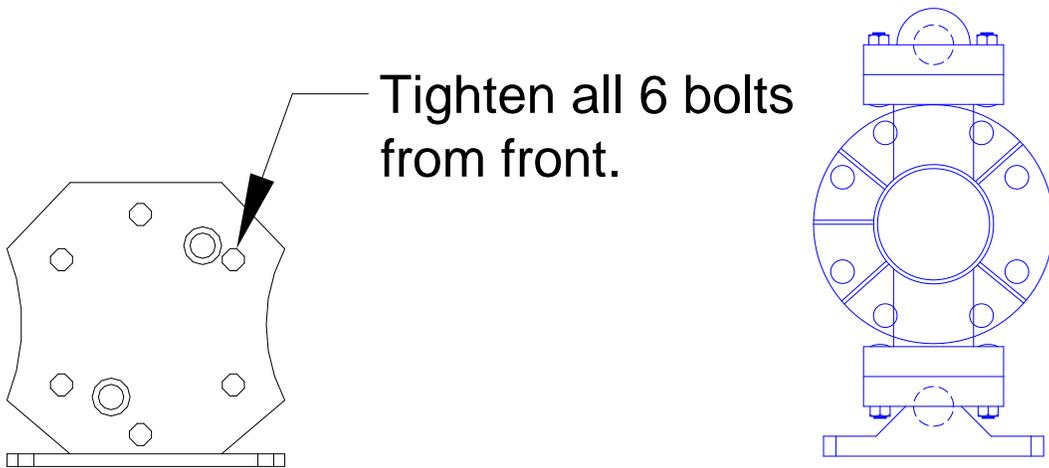
The chemical feed lines should be run from the source (Tank, Drum, Tote, etc...) and connected to the appropriate pump. The pump's inlet is at the bottom and the outlet (to the chemical valves) is at the top. On the inlet of the pump, use 1/2" tubing for the small pump and 3/4" tubing for the large pump. It might be necessary to use reinforced tubing on some of the inlets if chemical is being drawn a long distance and/or uphill.

The inlet lines to the pumps **must** have adequate strainers (#12 Mesh minimum). These may be incorporated with drum wands (available from Softrol) or can be piped inline. It is recommended that if the strainers are piped inline, a shutoff valve be located on either side as to allow for easier cleaning.



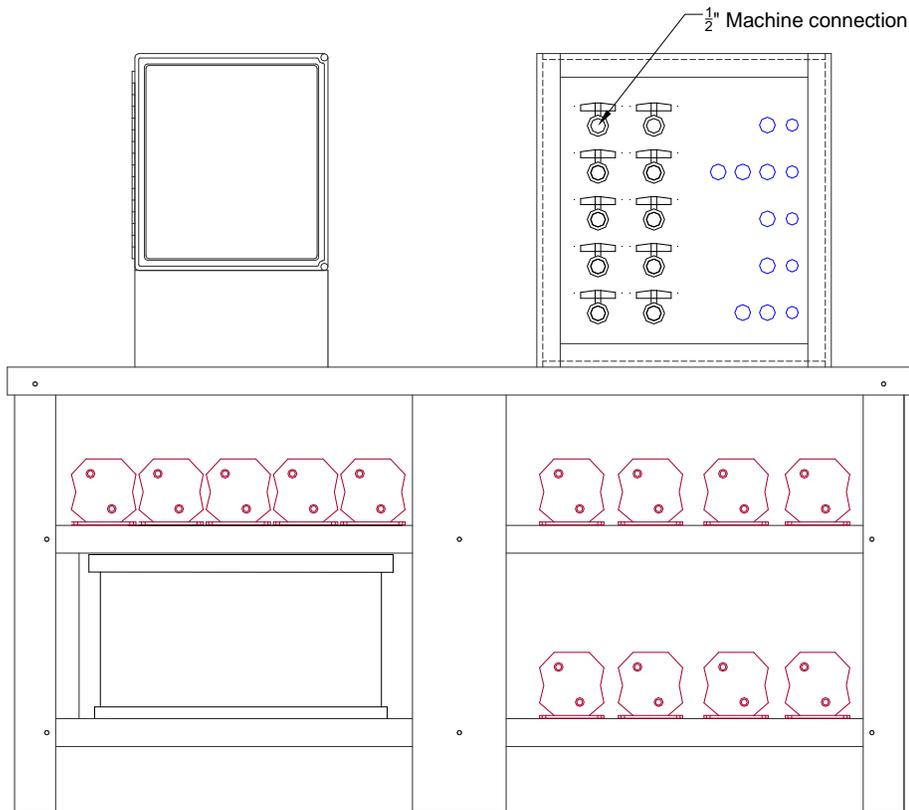
### Chemical Pumps

The chemical pumps should be tightened to the proper torque range before use. The proper torque is 70 in.-lbs.



## Machine Connections

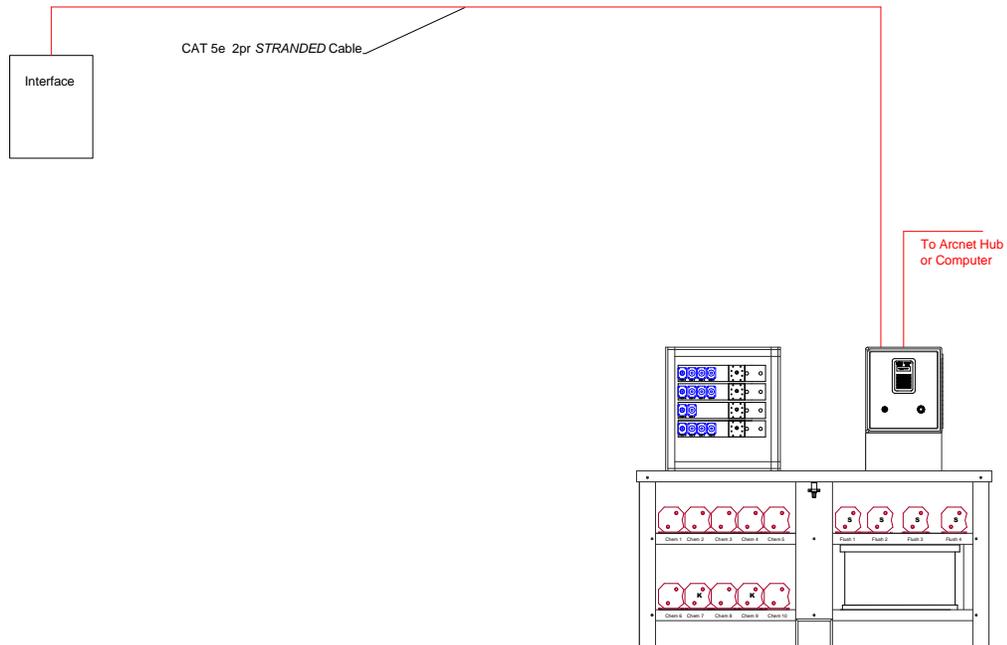
The Catalyst Tunnel System has 1/2" hose barb for the machine delivery lines. A minimum of 5' of tubing should be used even if the machine lines are hard piped. The distance to the tunnel should be kept to a minimum (<200'). This will require less water to flush the chemical. Also, the vertical run should be less than 20'



## Drain Connection

There is one drain connection for the Catalyst Tunnel System with a 1/2 " NPT connection. This is a gravity fed drain from the flowbox area as well as overflow from the flush tank..

## *Installation: ArcNet Network*



- The ArcNet cable is run as a bus system with the lines from the interface to the Catalyst.
- If there is a single tunnel in the plant, then a hub will not be used.
- The maximum number of nodes (machines, interface, computer, or Catalyst) on the line is 10.
- The last node on each end of the line should have a 93-ohm terminator.
- The cable should be installed to avoid coming in close contact with high voltage lines (do not attach cable to incoming power to a machine) and variable speed drives for motors. If you must cross a high voltage line, run the communication cable perpendicular to it.

The arcnet layout varies with each plant, but a typical layout is as shown above:

## Configuration: Injection Controller

The Catalyst machine setups tailor the operation to suit individual preferences and applications. These parameters are global meaning they effect all formulas. Some of these parameters (AutoChem Flush, for example) can also be set on the machine and override the global parameters and only effect the current injection. Use the following sequence to set up the user programmable features.

From the “Waiting for Chemical Injection Request!” display, enter a valid level 7 password (please refer to Passwords).

1=Setup      2=Program  
3=Maint.     4=Calib.  
5=Totals     6=Clock  
Selection?   0=exit

Select 1=Setups

1=Watchdogs/Setups  
2=Chemical Setups  
3=Comp. Formula #'s

Select 1=Watchdogs/Setups

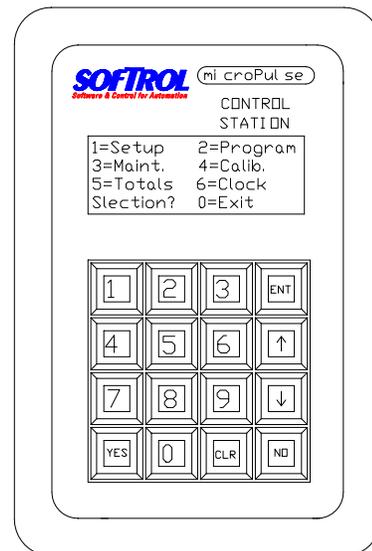
1=Machine Setup  
2=Maintenance Setup  
3=Clear Ram Vocabs  
4=Passwords      0=exit

Select 1=Machine Setup

The current setting is shown on the display. The Programmable Functions section describes all of the questions in detail.

Note: Use the [YES] or [NO] keys and the numbers on the keypad to change the answer to the setup questions. Some questions require the operator to enter a value.

- Press the [ENT] key to accept the answer.



- Press only the [ENT] key to accept the default or keep the previously programmed value.
- You cannot go backwards through the questions. If you need to change the answer to a previous question, press the [ENT] key to accept the current values to the remaining questions then restart the procedure.
- Press the [CLR] key to clear the numeric value of the current question.

After all setups are complete pressing the [CLR] key will accept the changes. The MicroPulse does not store any of the changes in memory until the last setup question is answered and the [CLR] key is pressed. If the power is lost during the setup procedure, the changes will not take effect.

- **AutoChem Flush**

This setup answered in seconds is the minimum amount of time the Catalyst will flush the system with water after each chemical injection. **Typically 15 Sec.**

- **Chems 9-12 Auto**

If answered YES, the Catalyst will turn on the chemical outputs for chemicals 9 through 12. Answer No if the Catalyst will process with automatic chemicals 1 thru 8 only.

- **Chems 13-16 Auto**

If answered YES, the Catalyst will turn on the chemical outputs for chemicals 13 through 16. Answer No if the Catalyst will process with automatic chemicals 1 thru 12 only.

- **Flow Sensors**

This setup tells the Catalyst to use the flow sensor input. **Typically YES**

- **Chemical Watchdog**

This is the time in mm:ss for the maximum chemical injection. **Typically 45 Sec.**

- **Signal Mute Time**

This is the time in mm:ss the user defines how long a signal will be ignored when pressing the CLR key. **Typically 5:00**

- **ID of Tunnel Washer**

This setup informs the Catalyst the ArcNet networking ID of the tunnel (interface) washer interface to be serviced. **Typically 201-204**

- **Sensor 1 Setups**

**Sensor Assignment** - This is the module number that the manifold is plumbed to.

**Flush Between Chemicals**- This is the amount of time the Catalyst will flush between chemicals.

**Flush After Chemicals**- This is the amount of time that the Catalyst will flush the manifold after of the chemicals on this manifold have been injected.

- **Sensor 2 Setups**

**Sensor Assignment** - This is the module number that the manifold is plumbed to.

**Flush Between Chemicals**- This is the amount of time the Catalyst will flush between chemicals.

**Flush After Chemicals**- This is the amount of time that the Catalyst will flush the manifold after of the chemicals on this manifold have been injected.

- **Sensor 3 Setups**

**Sensor Assignment** - This is the module number that the manifold is plumbed to. *If this is set to 0 then the sensor is not used and the following questions will not appear.*

**Flush Between Chemicals**- This is the amount of time the Catalyst will flush between chemicals.

**Flush After Chemicals**- This is the amount of time that the Catalyst will flush the manifold after of the chemicals on this manifold have been injected.

*The setups repeat until sensor 8. If the sensor assignment is 0 then the sensor is unused and remaining questions for that sensor will not appear.*

**#2 Chemical setups**- After selecting Watchdogs/Setups from the menu, you can select #2 for Chemical setups. This is typically configured on the computer under Edit chemical assignments. See section 5.

**Chemical name**- This is the name of the chemical.

**Chemical Units**- This is the units which the chemical is metered. These must be given a name in the Vocab section first.

**Sensor #-** This tells the Catalyst which sensor the chemical is assigned to. If the sensor # is 0, then the chemical is not used.

**#3 Comp. Formula #'s**- This allows for manual entry of the formulas that are in the tunnel washer. This typically only needs to be entered on start-up.

The screen will display-

Current Formula #

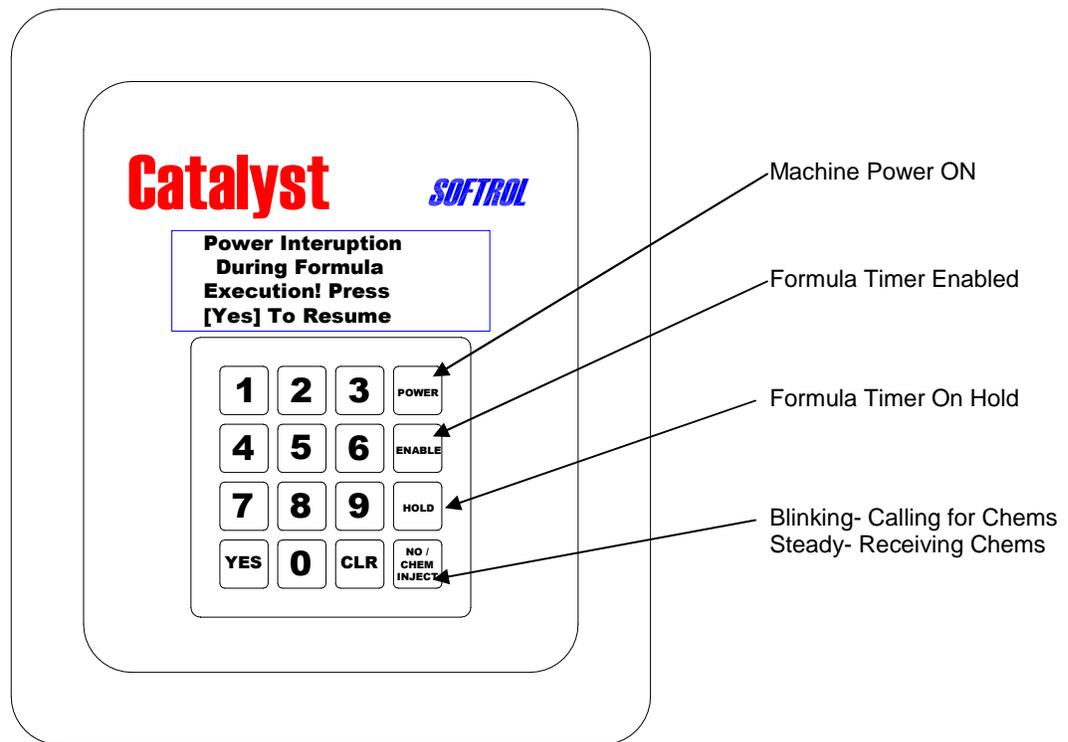
Compartment #1

Key in Formula #

Enter= Accept No= Exit

Key in the formula number and press Enter to accept the formula number and go to the next compartment. **There are 20 compartments. Each compartment must have a valid formula #. It cannot =0**

## Configuration: Machine Interface



The tunnel interface detects the binary code from the tunnel to determine the formula that is currently being run. The interface keeps a queue of 20 formulas and transmits them to the tunnel Catalyst when the tunnel transfers. The interface will prevent the tunnel from transferring until the chemicals have been received.

At start-up, the interface needs to have the current tunnel formulas entered into the memory. To do this:

Press 777777.- This will take the interface to the entry screen and will place the tunnel on hold.

Use the UP arrow to scroll to the compartment to be edited. Press ENT to edit the formula. Once the formula is changed to the desired number, press ENT to save. There cannot be any formula zeros in the interface. This will cause the system to alarm. If this happens, enter in the password 77777 and change the zero formula.

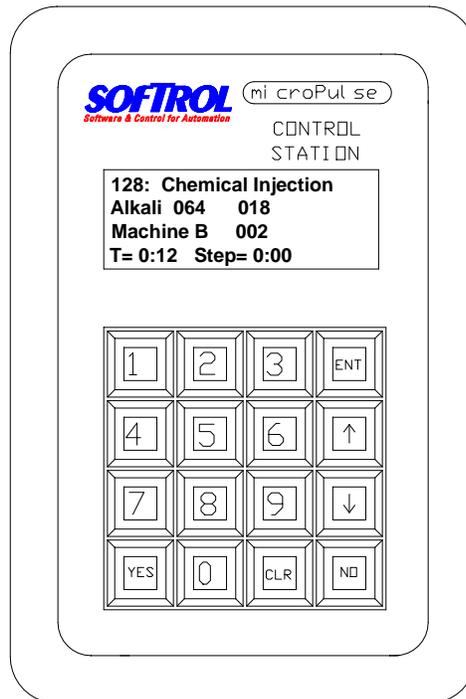
O will exit and return the interface to operation.

During setup, all 20 compartments of the interface will need to have valid formulas.

### 3. Getting Started

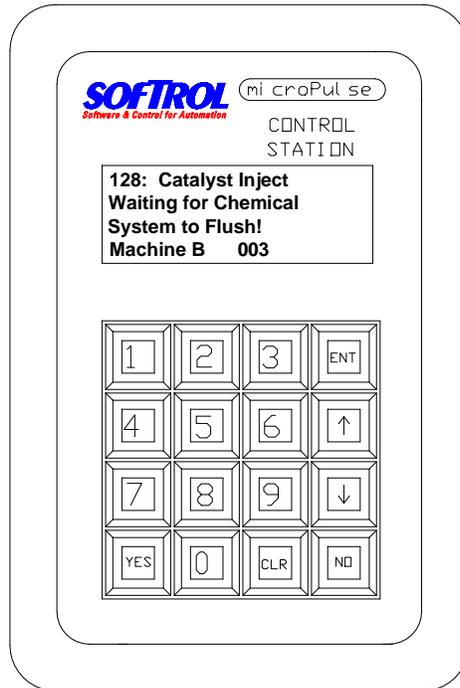
#### Injection Controller

While an injection formula is running, the LCD will show the name and number of the formula, the current step and line number, the selected machine, the total time elapsed (T), and the step time as shown below:

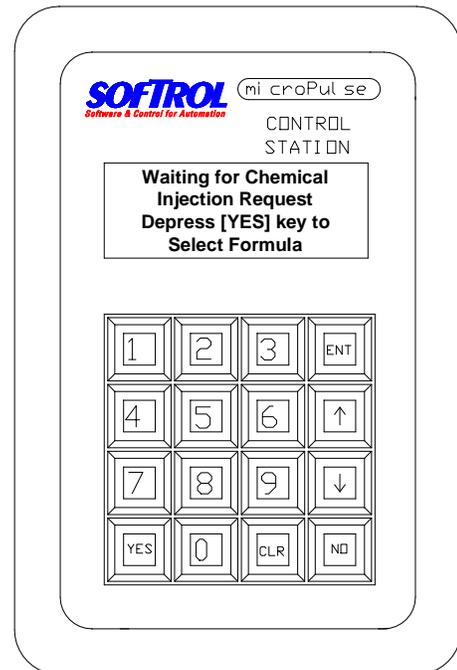
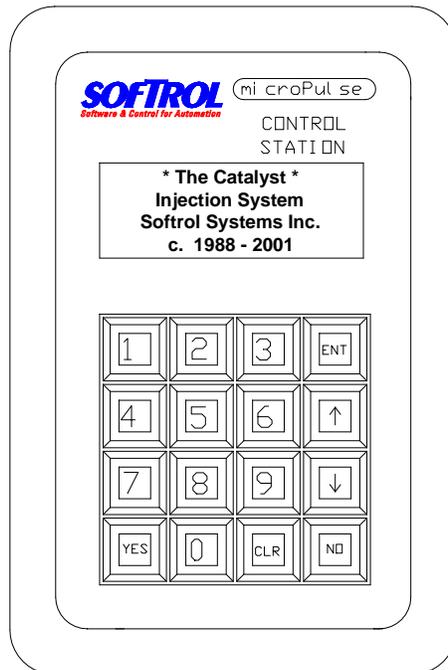


After the injection is completed the system will be flushed with water.

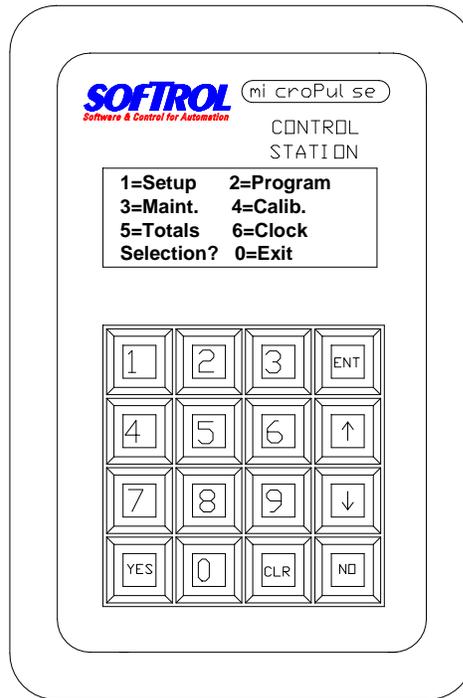
The LCD will display:



While the controller is idle, and waits for an injection request the LCD alternates between the two displays below:



## The Main Menu



To access the Main Menu you must enter a password. The Injection Controller is shipped from the manufacturing facility with 8 pre-programmed passwords. Each password consists of 6 digits that correspond to each password level. For example:

Level 1 = 111111  
 Level 2 = 222222  
 Level 3 = 333333  
 Level 4 = 444444  
 only)

Level 5 = 555555  
 Level 6 = 666666  
 Level 7 = 777777  
 Level 8 = 888888 (freezes the timer)

These passwords should be changed (see below) and customized for each level. There can only be one password assigned to each level for a total of eight passwords. To determine which password level is needed for access to each function see the following table:

Action	Password Level
Manual Chemical Injection	No Password
Cancel Signal	Levels 4-7
Cancel Steps	Levels 1-7
Access Totals	Levels 2-7
Calibrate	Levels 3-7
Set Clock	Levels 3-7
Cancel Maintenance Watchdogs	Levels 4-7
<b>Setups</b>	<b>Levels 6-7</b>
Program Formulas	Levels 6-7
Freeze Timers	Level 8

### To Edit/Change Passwords at the Controller

Input the Level 6 or 7 password to access the Main Menu  
 Press the [1] key 1=Setup  
 Press the [1] key 1=Watch Dogs/Setup  
 The LCD screen displays:

1=Machine Setup  
 2=Maintenance Setup  
 3=Clear Ram Vocabs  
 4=Passwords 0=Exit

Press the [4] key 4=Passwords  
 The LCD screen displays:

Level # 1  
 Password =111111  
 Use arrows to scroll  
 ENTER=Accept NO=Exit

Use the arrows to scroll to the password level desired. Enter the six-digit password for this level.

Press the [ENT] key to accept.  
 Use the arrow keys to scroll to another password level if desired  
 Press the [NO] key to exit

### Disabling the System

The system can be placed in the disabled mode. This will allow for maintenance and calibration without the machines calling for chemical. From the main screen:

- Press the [NO] & [ENT] keys at the simultaneously to **DISABLE** the system.
- Hold down the [ENT] key and then press the [YES] key to **ENABLE** the system.

### Downloading Chemical Names

Once the system has been installed and the network connections have been established, the chemical names and check formulas can be downloaded from the PulseNet computer. See section 5 for more details on configuring PulseNet. The names and formulas will be downloaded when a Group Formula Update for the Catalyst Group is preformed. Once this is accomplished, it will be easier to calibrate and prime the system.

## Priming the System

To check the Chemical Output Valves (Priming the System)  
At the Injection Controller screen:

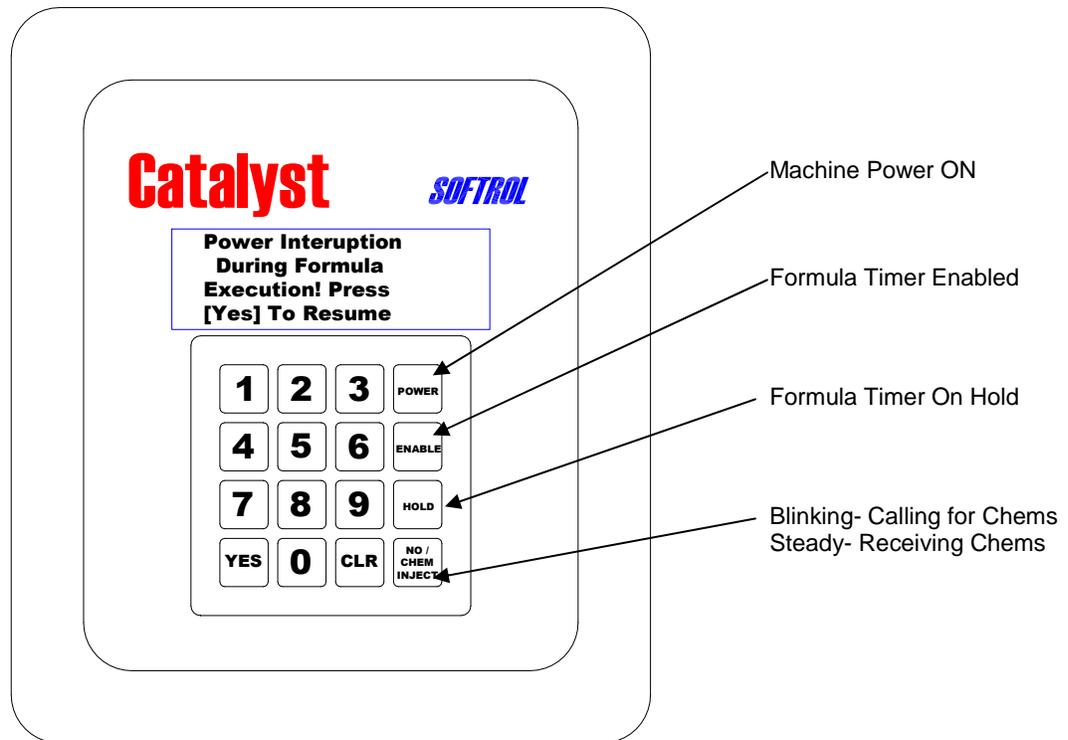
Waiting for Chemical  
Injection Request!

- Enter the Level 7 password (factory default: 777777).
- Press the [3] key for Maintenance at the Main Menu.
- Select #1 for manual outputs.
- *Open the calibration port in back of the machine. Close the machine port on the back of the machine.*
- Press the [1] key for Chemicals.
- Use the arrows to scroll to the chemical to be checked.
- Press and hold the [YES] key to turn on the chemical's delivery valve and pump. Releasing the [YES] key turns off the valve and pump.
- Use the Stroke Limiting adjustment nut to adjust the flow through the valve. Low flow = .5 to 1 gpm, High flow = 1—3 gpm.
- Press the [CLR] + [Manifold #] keys to flush the system between each chemical injection.
- Repeat this procedure for each chemical. Press the [0] key to exit.

## Key Strokes for the Tunnel Catalyst

<b>CLR + ENT</b>	=	Flush all Manifolds
<b>1 + CLR</b>	=	Flush Manifold 1
<b>2 + CLR</b>	=	Flush Manifold 2
<b>3 + CLR</b>	=	Flush Manifold 3
<b>4 + CLR</b>	=	Flush Manifold 4
<b>5 + CLR</b>	=	Flush Manifold 5
<b>6 + CLR</b>	=	Flush Manifold 6
<b>7 + CLR</b>	=	Flush Manifold 7
<b>8 + CLR</b>	=	Flush Manifold 8
<b>NO + ENT</b>	=	Disable the Catalyst
<b>YES + ENT</b>	=	Enable the Catalyst

## Interface Operation



The interface does not require much manual interference for normal operation. When the tunnel transfers, a binary signal is detected by the interface. This signal corresponds to the goods that have entered module

1. The interface keeps the last 20 formulas in queue. When a new formula is received, the interface transmits the list of 20 formulas to the Catalyst. Manual input is limited to manually changing the formulas.

The yellow power button indicates that the tunnel is powered and capable of producing. If the light is off, then the interface will display : Tunnel Off-line And the interface will have the hold output on. The timer will not accrue at this time, so if the tunnel is stopped for an extended time, the avg. transfer time will not be distorted.

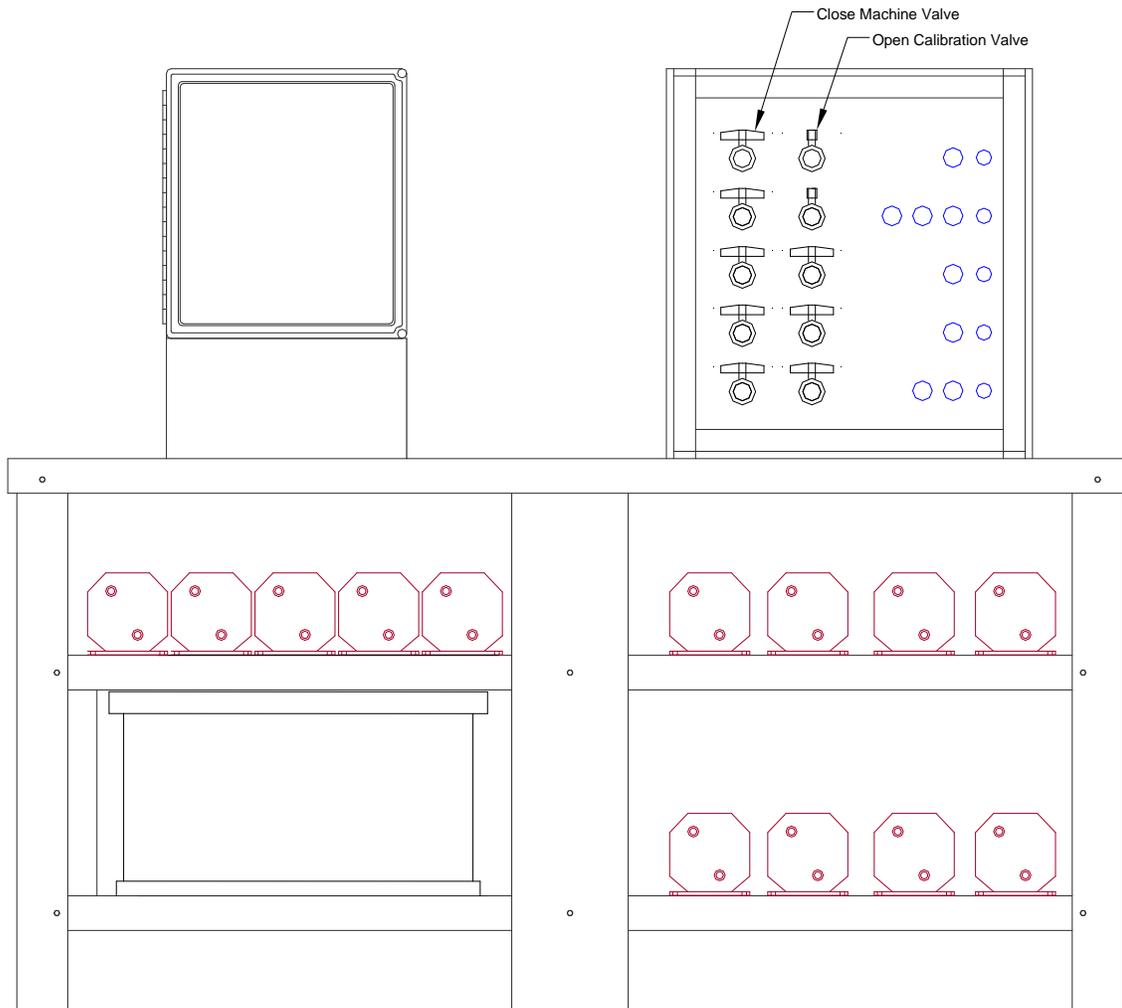
The green enable button indicates that the tunnel is able to transfer. The red hold button indicates that the tunnel is prevented from transferring.



## 4. Calibration

Calibration of chemicals with the Injection Controller is done on a per chemical basis. This allows you to have extremely accurate injections of chemicals with a wide range of varying specific gravity and viscosity. The flow properties of a heavy, viscous surfactant will be quite different from those of a low viscosity acid.

**Softrol Systems recommends that plant personnel become very familiar with the types of chemicals they will be handling and the potential hazards that are associated with each chemical. This information is contained in the MSDS (Material Safety Data Sheet) supplied by the chemical vendors. Softrol Systems also recommends that, at the very minimum, plant personnel be required to wear all protective equipment recommended in the MSDS.**



Rear View

## Flow Meter Based Calibration

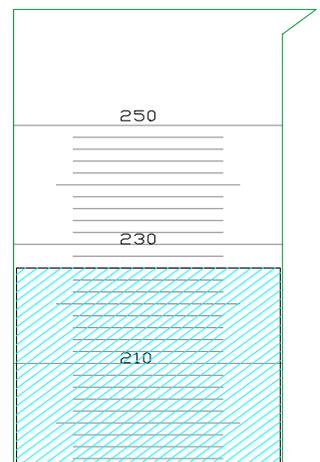
To calibrate chemicals using the flow meter, please do the following:

Note- For most tunnel injections <8 oz. use the small (250mL) graduated cylinder for calibration.

1. At the Waiting for Chemical Injection screen on the Injection Controller disable the system by pressing [No] & [ENT]. This will prevent the system from receiving chemical requests from machines.
2. Open the calibration valve on the back of the Flowbox. Open the valve at the end of the calibration line and place the graduated cylinder underneath it.
3. Press [CLR] + [Manifold #] to flush the system. Make sure the system is thoroughly flushed. Empty and dry the cylinder.
4. Enter the Level 7 password to access the Main Menu.
5. Press [4] 4=Calib.
6. Press [1] 1=Calibrate Chems.
7. Use the [↑] and [↓] arrows to scroll through the available chemical numbers until the chemical to be calibrated is displayed on line 1 of the LCD display.
8. Press the [ENT] key to select that chemical.
9. Select [1] for flow sensor calibrations.
10. Press and **hold** the [YES] key to dispense chemical. This will stop when the [YES] key is released.
11. If the small graduated cylinder is used, dispense about 200 mL. If the large cylinder is used, dispense 500-1000 mL.
12. The Catalyst screen will display the counts from the flowmeter. These should be about 18-30 counts per oz.
13. Close the valve at the end of the calibration line. Place the graduated cylinder on a level surface and accurately read the amount of chemical in the graduated cylinder.

The small cylinder has graduations in 2 ml increments. To convert ml to Oz., divide by 29.57. Be sure to measure the chemical only and not foam. This will result in more accurate injections.

Example  $226 \text{ ml} / 29.57 = 7.6 \text{ Oz.}$



14. Press [ENT] to accept the counts. The controller will display a suggested amount based on the previous calibration. Press [CLR] and enter in the new amount. Enter the amount to the tenths place. Example- 8 Oz. = 8.0
15. Press [ENT]. The Catalyst will display:

Save Calibration As

1= Initial 2= H-Factor

3= Update 4= V-Factor

0= Discard and Exit

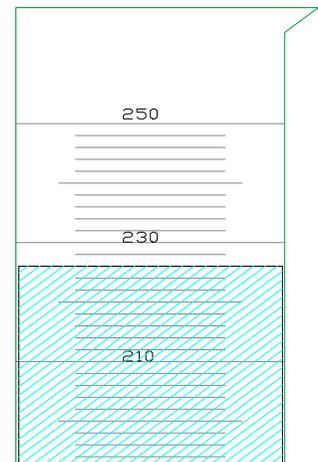
16. Select [1] to store the calibration as the initial calibration. This is very important, if it is not done, the calibration will be lost.
17. The controller will then return to the calibration menu.
18. Press and hold [CLR] & [Manifold #] to flush the manifold for 5 seconds.

**H-Factor Calibrations-** This is used for greater accuracy for small dispense amounts (<6 Oz.). If you do wish to do a H-Factor calibration, skip to step 27.

19. Select [1] for calibrate chemicals.
20. Select the same chemical as previously calibrated.
21. Select #1 for Flow sensor calibration.
22. Place the 250 ml graduated cylinder under the calibration port.
23. Press and hold [YES] to dispense 200-220 ml. (it will contain mostly water)

The small graduated cylinder is marked in 2 ml graduations. Accurately read the amount and divide by 29.57 to convert to Oz.

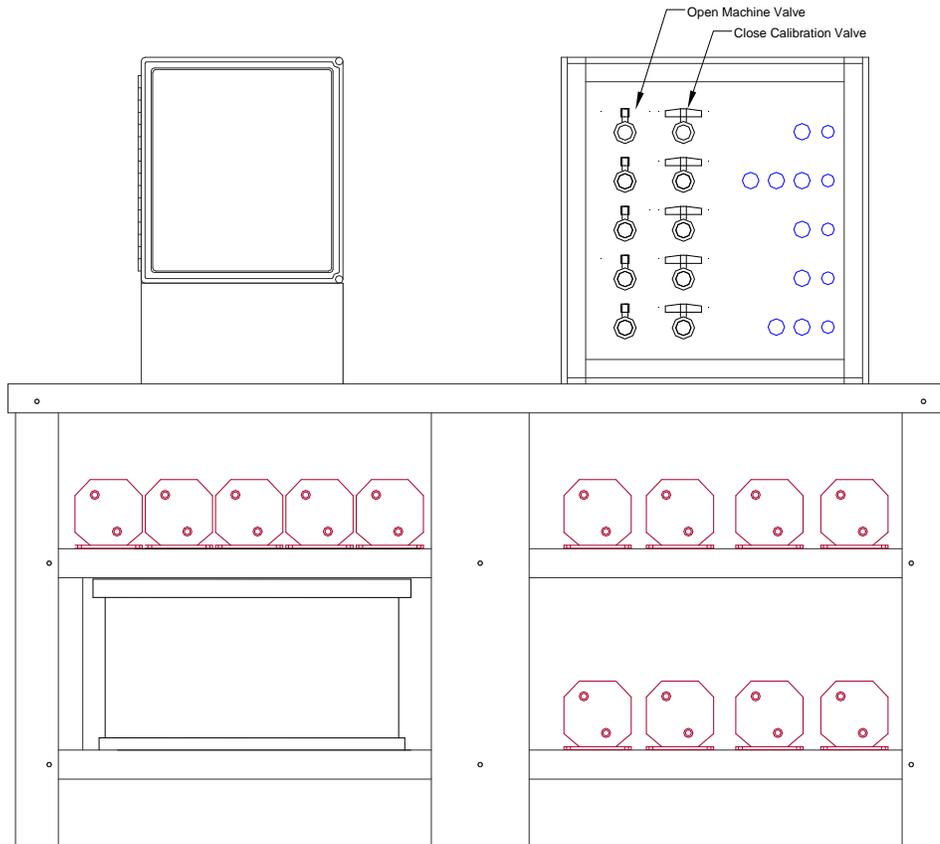
Example  $226 \text{ ml} / 29.57 = 7.6 \text{ Oz.}$



24. Press [ENT] to accept the counts.

25. Enter in the amount dispensed. It should be slightly more than the suggested amount. If the amounts differ by more than 1 oz. then it might be necessary to recalibrate.
26. Select #2 H-Factor.
27. Flush the system by the same procedure in step 17
28. Press 0 to exit to the main menu.
29. Close the Calibration valve on the back of the unit. Open the machine valve.
30. Enable the system by holding down the [ENT] key and pressing [YES]

Once you are finished with the calibration, be sure to thoroughly flush the calibration port.



Rear View

## Calibration Errors-

- 0 cannot be entered in for a Calibration.
- If No counts or low counts (>1 per second) are detected, the Catalyst will alarm with a Minimum Frequency Error. If this occurs, press No to exit and check the flow rate as well as the response from the meter.

## Checking the Calibration

**WARNING: DO NOT USE THE CALIBRATION ROUTINE TO CHECK CALIBRATION ACCURACY OR THE CALIBRATION WILL BE ALTERED. INSTEAD, PROGRAM A CALIBRATION TEST FORMULA.**

After the chemical is calibrated, it is preferable to run a calibration check formula. These are the formulas that are stored on the Catalyst itself. These formulas should correspond to the chemical number starting with formula #100. For example, formula #101 checks chemical #1. If chemical #1 is Alkali, formula #101 should be called Check Alkali and when run, it will dispense the requested amount of Alkali.

### *Check Formula example:*

```
:001 Check Alkali  
:002   Set Chemical Flush = 0  
:003   Add 0 oz of Alkali 1  
:004   Run Time 0:00  
:005   END FORMULA
```

To run the check formula, do the following:

1. At the Waiting for Chemical Injection screen on the Injection Controller – disable the system by pressing [No] & [ENT]. This will prevent the system from receiving chemical requests from machines.
2. Open the calibration port and place the graduated cylinder underneath it.
3. Press [YES] and then enter in the formula number. Press [ENT] to begin.
4. The controller will then ask you to key in the desired amount.
5. Then press [YES] to begin the dispensing of the chemical.
6. The controller will display the desired amount as well as the received amount. The received amount should be counting up to the desired amount.
7. Once the injection is complete, measure the amount of chemical that has been dispensed.
8. To determine the amount of error, subtract the measured amount received from the amount desired. Divide this number by the amount desired and then multiply by 100. This will give you the percentage error

<b>Example-</b>	<b>Desired 64 Oz</b>	<b>Received 62 Oz</b>
	<b>64-62=2</b>	<b>2/64=.03125</b>
	<b>.03125 X 100 =</b>	<b>3.125 % error</b>

If any calibrations are outside the desired tolerance (normally 1%-5%), recalibrate the chemical. Taking a painstaking approach to the calibration procedure will pay off later with extremely accurate chemical injections. By contrast, a poorly executed calibration routine will result in inaccurate and possibly costly chemical injections.

Flush the system when finished by the procedure described in the calibration section and press [ENT] & [YES] to enable the Catalyst to resume pumping.

**ML to Oz. Conversion Table**

ML	OZ	ML	Oz	ML	OZ	ML	OZ	ML	OZ	ML	OZ
50	1.7	140	4.7			660	22.3	1110	37.5	1560	52.8
52	1.8	142	4.8	230	7.8	670	22.7	1120	37.9	1570	53.1
54	1.8	144	4.9	240	8.1	680	23.0	1130	38.2	1580	53.4
56	1.9	146	4.9	250	8.5	690	23.3	1140	38.6	1590	53.8
58	2.0	148	5.0	260	8.8	700	23.7	1150	38.9	1600	54.1
60	2.0	150	5.1	270	9.1	710	24.0	1160	39.2	1610	54.4
62	2.1	152	5.1	280	9.5	720	24.3	1170	39.6	1620	54.8
64	2.2	154	5.2	290	9.8	730	24.7	1180	39.9	1630	55.1
66	2.2	156	5.3	300	10.1	740	25.0	1190	40.2	1640	55.5
68	2.3	158	5.3	310	10.5	750	25.4	1200	40.6	1650	55.8
70	2.4	160	5.4	320	10.8	760	25.7	1210	40.9	1660	56.1
72	2.4	162	5.5	330	11.2	770	26.0	1220	41.3	1670	56.5
74	2.5	164	5.5	340	11.5	780	26.4	1230	41.6	1680	56.8
76	2.6	166	5.6	350	11.8	790	26.7	1240	41.9	1690	57.2
78	2.6	168	5.7	360	12.2	800	27.1	1250	42.3	1700	57.5
80	2.7	170	5.7	370	12.5	810	27.4	1260	42.6	1710	57.8
82	2.8	172	5.8	380	12.9	820	27.7	1270	42.9	1720	58.2
84	2.8	174	5.9	390	13.2	830	28.1	1280	43.3	1730	58.5
86	2.9	176	6.0	400	13.5	840	28.4	1290	43.6	1740	58.8
88	3.0	178	6.0	410	13.9	850	28.7	1300	44.0	1750	59.2
90	3.0	180	6.1	420	14.2	860	29.1	1310	44.3	1760	59.5
92	3.1	182	6.2	430	14.5	870	29.4	1320	44.6	1770	59.9
94	3.2	184	6.2	440	14.9	880	29.8	1330	45.0	1780	60.2
96	3.2	186	6.3	450	15.2	890	30.1	1340	45.3	1790	60.5
98	3.3	188	6.4	460	15.6	900	30.4	1350	45.7	1800	60.9
100	3.4	190	6.4	470	15.9	910	30.8	1360	46.0	1810	61.2
102	3.4	192	6.5	480	16.2	920	31.1	1370	46.3	1820	61.5
104	3.5	194	6.6	490	16.6	930	31.5	1380	46.7	1830	61.9
106	3.6	196	6.6	500	16.9	940	31.8	1390	47.0	1840	62.2
108	3.7	198	6.7	510	17.2	950	32.1	1400	47.3	1850	62.6
110	3.7	200	6.8	520	17.6	960	32.5	1410	47.7	1860	62.9
112	3.8	202	6.8	530	17.9	970	32.8	1420	48.0	1870	63.2
114	3.9	204	6.9	540	18.3	980	33.1	1430	48.4	1880	63.6
116	3.9	206	7.0	550	18.6	990	33.5	1440	48.7	1890	63.9
118	4.0	208	7.0	560	18.9	1000	33.8	1450	49.0	1900	64.3
120	4.1	210	7.1	570	19.3	1010	34.2	1460	49.4	1910	64.6
122	4.1	212	7.2	580	19.6	1020	34.5	1470	49.7	1920	64.9
124	4.2	214	7.2	590	20.0	1030	34.8	1480	50.1	1930	65.3
126	4.3	216	7.3	600	20.3	1040	35.2	1490	50.4	1940	65.6
128	4.3	218	7.4	610	20.6	1050	35.5	1500	50.7	1950	65.9
130	4.4	220	7.4	620	21.0	1060	35.8	1510	51.1	1960	66.3
132	4.5	222	7.5	630	21.3	1070	36.2	1520	51.4	1970	66.6
134	4.5	224	7.6	640	21.6	1080	36.5	1530	51.7	1980	67.0
136	4.6	226	7.6	650	22.0	1090	36.9	1540	52.1	1990	67.3
138	4.7	228	7.7			1100	37.2	1550	52.4	2000	67.6

## 5. Configuring PulseNet

The Catalyst Chemical System comes standard with the PulseNet Catalyst Plus Module. This software can be used to easily program formulas, monitor the system, and generate production and consumption reports. Before the software can be used properly, it must be configured to meet the plant specifications. The manual for the PulseNet software has specific details on how to set-up the software for your plant. The key items for setup can be found in the PulseNet manual and start on page 15. They are as follows:

- **Configure Plant Location-** This needs to be completed for the reports.

**Configure Plant Location**

Plant Name: Tropical Island Liner

Address: 1490 Bay Street

City/State/Zip: St. Thomas, USVI

Plant ID #: 1

- **Configure Ports-** This should already be done if the computer was received from Softrol. If not, this will need to be completed per the PulseNet manual.
- **Configure Groups-** There will be a group for each tunnel Catalyst. The controller must be selected as Catalyst Plus Tunnel Podium.

**Configure Groups**

Num	Group
1	Milnor Tunnel

Name: [ ] Add: [ ] Delete: [ ]

Members: 1, 2

Formulas: 128, 512

Network: 1

Off-line

**WARNING - Delete groups will cause machine omissions in summarizing previous periods**

Controller Type | File

American Pioneer Platinum Plus Dryer	PPD_ENG
American Pioneer Platinum Plus Washer	PPW_ENG
Belt	BLT_ENG
Catalyst Plus Podium	CPP_ENG
Catalyst Plus Podium (Español)	CPP_ESP
Catalyst Plus Podium (Français)	CPP_FRA
Catalyst Plus Tunnel Podium	CPT_ENG
Catalyst Plus Tunnel Podium (Español)	CPT_ESP

Edit Slave Shuttles

Preview [ ] [ ] [ ]

- **Configure Supply Inventory Data-** This will need to be entered to have chemical totals reports. The units are the units that the bulk chemical is

delivered in. This will most likely be in Gal. Then the cost would be entered in cost per gallon. This will give the Plant Chemical totals report in Gallons, not ounces. (If the units of measurement on the Catalyst are Oz.)

**Configure Supply Inventory Data**

Num	SupplyName	Unit	Cost/Unit
1	Bleach	Gal.	1.1600
2	Antichlor	Gal.	6.0500
3	Sour	Gal.	8.2300
4	Alkali	Gal.	4.8000
5	Detergent	Gal.	9.9500
6	Chemical Supply #6	?Unit?	
7	Chemical Supply #7	?Unit?	
8	Chemical Supply #8	?Unit?	
9	Chemical Supply #9	?Unit?	

Name      Unit      Cost/Unit





- **Configure Plant Utility Data-** This is generally not used in a Catalyst only plant. Please refer to the PulseNet Manual if this option is desired.
- **Configure Classification-** This can be done for the plant production report. Each formula can be assigned to a classification for convenience in reporting.

**Configure Supply Inventory Data**

Num	SupplyName	Unit	Cost/Unit
1	Bleach	Gal.	1.1600
2	Antichlor	Gal.	6.0500
3	Sour	Gal.	8.2300
4	Alkali	Gal.	4.8000
5	Detergent	Gal.	9.9500
6	Chemical Supply #6	?Unit?	
7	Chemical Supply #7	?Unit?	
8	Chemical Supply #8	?Unit?	
9	Chemical Supply #9	?Unit?	

Name      Unit      Cost/Unit





Now we get into the group setups. These should be done for the first group and then can be copied into each of the other groups.

- **Edit Vocab Files-** The only Vocab that needs to be created is under chemical units and is unit 001. This will be set to whatever units that you will be calibrating in- most likely Oz.
- **Edit Chemical Assignments-** This setup is very important for proper operation of the system. In this screen, the name of the chemical is created as well as the units it is measured in, the sensor it is assigned to, and the units per pound if it is to be used with ratiometric processing. Also, the chemical supply is identified and corresponding amount is entered.

Note: Most likely, the bulk units are in gallons while the calibrated units are in ounces. Then the amount of gallons per ounce would be entered as .007812. See page 22 of the PulseNet manual for examples.

### Edit Chemical Assignments- Tunnel

Group #1: Milnor Tunnel

Num	Name	Unit	Cost/Unit	Units/Lb.	Sensor
1	Alkali-2	Oz.	0.0000	0.00	1
2	Det.-2	Oz.	0.0000	0.00	1
3	Peroxide-2	Oz.	0.0000	0.00	1
4	Alkali-3	Oz.	0.0000	0.00	2
5	Det.-3	Oz.	0.0000	0.00	2
6	Peroxide-3	Oz.	0.0000	0.00	2
7	Bleach	Oz.	0.0000	0.00	3
8	A/C- 16	Oz.	0.0000	0.00	4
9	Sour- 16	Oz.	0.0000	0.00	4

Name

Oz.

Units/Lb.

Sensor

Each Oz. of Bleach contains

Supply	BulkUnit	Ratio
Bleach	Gal.	0.007812

Add

Edit

Delete

Import

ID

Once this page is completed, save it and then change the Group ID to another group. Now import the data from the first group into the new group and save. Repeat this until all of the groups have been completed.

Finally, enter the system defaults Menu and set the RSR to have an automatic time. You will need to enter in the time the RSR will occur. This should be at the end of a shift or the end of the day.

**Note: The machines/interfaces and the computer need to be powered on to communicate to the totals to the computer.**

Also, check the box to also upload history. This will allow the plant history reports to be viewed for specified time periods.

PulseNet is a very powerful software tool and has many features. The above information is just the basic amount that needs to be entered to have the system function properly.

## 6. Programming from PulseNet

The Tunnel Catalyst Chemical System comes standard with the PulseNet Catalyst Plus Module. This software can be used to easily program formulas, monitor the system, and generate production and consumption reports.

One of the best features of PulseNet is the ease with which formulas can be programmed. We will show you how to program a few simple formulas in order to get you started quickly and painlessly. There are many details involved in programming a formula. These are covered fully in the PulseNet User's Manual included with this installation. We will only use the basic programming tools on this tutorial.

**Chemical Injection Formula Editor**

File Edit Tunnel Utilities Misc Help

Chem 12 13 14  
01 02 03 04

No Assay Load: 0:00 Unload: 0:00 AuCh: 0

**0001: Bath Mats-Wht**

0002: Add 2 Oz. of Det.-2  
 0003: Add 6 Oz. of Alkali-3  
 0004: Add 15 Oz. of Bleach  
 0005: Add 2 Oz. of A/C- 16  
 0006: Add 3 Oz. of Soft- 16  
 0007: Add 2 Oz. of Sour- 16  
 0008: Run Time 0:00 001/0000:00  
 0009: END OF FORMULA

Group #1: Milnor Tunnel  
 Class: Unassigned  
 Yield: 0 Lbs. Count: 0  
 1,620 bytes free CWT: 0.00

Formula #5, Bath Mats-Wht  
 MANAGER 07-12-2006 15:53  
 Estimated Run Time: 0:00  
 Empirical Run Time: 1:24

## Programming an Injection Formula

At the main screen of PCIM, click on Group. Select Edit Formulas to bring up the editing screen.

Click on File on the menu then select Open Formula.

A list of Formulas will be displayed. For this example, select 001 Unassigned to select formula 1.

The editing window will display two lines. One line will be the unedited formula name and the other with END FORMULA instruction.

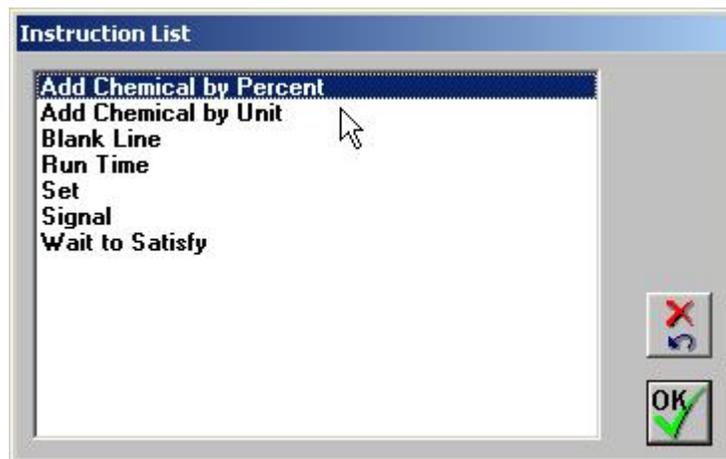
Click on the first line and press <Enter>.

Input the name of the formula. In this case input Hot Wash.

The display will show the edited name.

Move the cursor to the END FORMULA line and press the <Insert> key.

A window with icons for all the available instructions will be displayed. The set of instructions displayed will vary according to the type of controller used. For the correct instruction list, the controller type should be set to Catalyst Plus Tunnel podium on the configure groups menu.



The most common instruction used on the Tunnel Catalyst is the Add Chemical by Unit. To create a formula simply insert this instruction, select the appropriate chemical and enter in the desired amount.. Do this for all the chemicals that the goods should receive throughout the tunnel. The last instruction should always be RUN 0:00

**Example formula-**

The screenshot shows the 'Chemical Injection Formula Editor' window. The main area contains a list of formula steps:

```

0001: Hand Towels-Wht
0002: Add 3 Oz. of Alkali-2
0003: Add 2 Oz. of Det.-2
0004: Add 6 Oz. of Alkali-3
0005: Add 3 Oz. of Det.-3
0006: Add 15 Oz. of Bleach
0007: Add 2 Oz. of A/C- 16
0008: Add 3 Oz. of Soft- 16
0009: Add 2 Oz. of Sour- 16
0010: Run Time 0:00
0011: END OF FORMULA
    
```

Summary statistics at the bottom of the window:

<p><b>Group #1: Milnor Tunnel</b>                  Class: Unassigned                  Yield: 0 Lbs.                  1,614 bytes free</p>	<p><b>Formula #4, Hand Towels-Wht</b>                  MANAGER 10-12-2006 11:02                  Estimated Run Time: 0:00                  Empirical Run Time: 1:24</p>
---	---

## Programming the Injection Controller

Only calibration test formulas should be programmed for the injection controller. These formulas will be used to test the accuracy of chemical calibrations. Chemical units should be set to 0. When the formula is ran the controller will prompt for a unit input.

A typical test formula is shown below.

```
:0001  Check Alkali  
:0002      Set Chemical Flush = 0  
:0003      Add 0 Oz of Alkali  
:0004      Wait to Satisfy  
:0005      Run Time 0:00  
:0006  END FORMULA
```

Go ahead and program the formula by yourself. If you run into problems take another look at the other formula examples. Refer to the PulseNet User's Manual for additional information.

## 7. Programming the Tunnel

The tunnel is programmed to give a binary code when the goods first enter the tunnel. The programming will depend on the wiring, but the configuration below is the most typical.

Chem	Binary Signal
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	Latch/Tunnel Transfer

The binary code (chems 1-7) should be programmed for 10 seconds and the latch (chem 8) should be programmed for 5 seconds. All the signals should be configured to start at the same time. Once the latch turns off, the interface will read the binary formula. The interface will then send the 20 formulas in the Tunnel to the Catalyst for the injection.



## 8. Maintenance / Troubleshooting

The Catalyst Chemical system will require periodic maintenance. Doing a few simple procedures can dramatically increase the life of the chemical system. The following is a suggested maintenance plan. Due to site-specific conditions, the intervals may need to be changed.

### 1<sup>st</sup> Week

- Re-torque all chemical pumps.
- Carefully inspect all connections for signs of chemical or water leaks. If any leaks are found, fix them immediately.
- Check calibration of the chemicals.
- Tighten all hose clamps.
- Check the water temperature- it should be 80-110 degrees F.

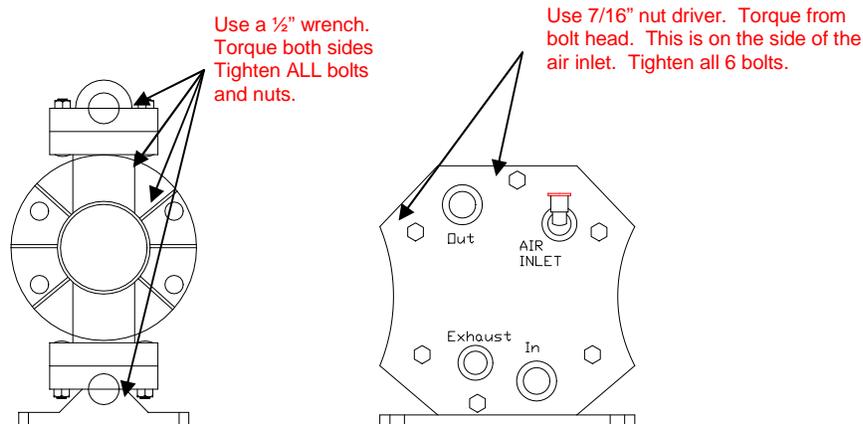
### Weekly-

- Check the strainers on the chemical lines for blockage.
- Check air filters; drain if necessary.
- Clean system by wiping down with a damp cloth. Use air to blow off the pump section.

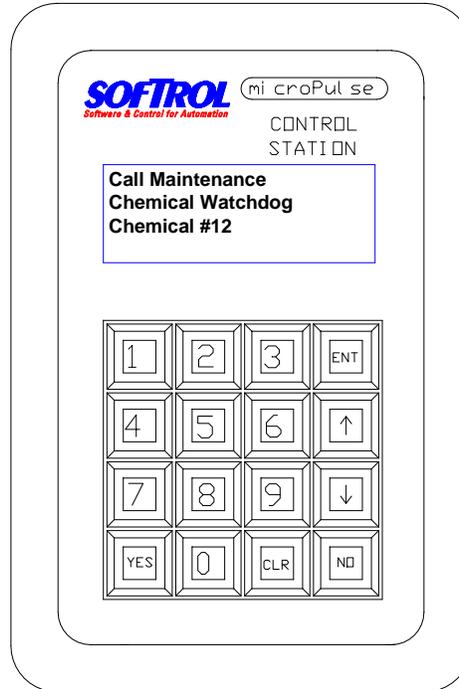
### Monthly-

- Check the torque on the pumps.
- Inspect the system for leaks.
- Check Calibrations.
- Tighten hose clamps

### Torque on pumps:



## Catalyst Alarms



The Catalyst can have 4 different alarms while running. They are:

- Power Interrupted During Formula.** This happens when the power is lost to the processor while running a formula. Press the YES button to resume the formula.
- Low Air Pressure.** This happens when the air pressure drops below 65 psi during a chemical injection. Once the air pressure is above 65 psi, pressing the YES button will resume the formula. The Catalyst will display low air pressure, but will not alarm if it is not running a formula.
- Chemical Watchdog.** This alarm occurs when the flow meter senses that it is out of chemical, sensor is jammed, or the injection took too long. Use the password to reset this error. If the system is out of chemical and needs to be primed, holding the YES button will allow pump to turn on and ignore the watchdog. Release the YES button when the pump is primed. See the next section for more details.
- Sensor Flush.** This is similar to the Chemical watchdog, however, it occurs during the metered flush after the injection. This should be corrected the same as a chemical watchdog.

**Power Interruption  
During Formula  
Execution! Press  
[YES] to Continue**

**128: Chemical Injection  
Alkali 005 000  
Low Air Pressure !!**

**Call Maintenance !!!  
Chem watchdog  
Chemical #1  
Chemical #2**

**Call Maintenance  
Sensor Flush Watchdog  
Sensor #1**

- **Flush Water Tank Not at Minimum Level.** This message will be displayed when the water level in the flush tank is not at the minimum level needed to start an injection. This message will only display and not alarm when the system is enabled. If the system is enabled and this condition exists, the system will display the message and continue to fill the tank for 1 minute before sounding the alarm. The injection cannot start until this has been corrected. To silence the alarm, disable the Catalyst by pressing No & Ent and correct the problem. The input for flush tank low is S7-04 and turns on when the tank level is low.
- **Current Calibrations Do not Match Slot 5.** The Catalyst will check the calibration value in the REM K-4 and compare it to the value held in the memory card in slot 5; if they do not match, an alarm will occur and the system will display this message. This problem will occur when either the memory card (Flowmem- Slot 5) or processor memory card (REM K4- Proc Slot) is replaced. If the Flowmem is replaced, the calibrations will need to be copied **to** Slot 5. If the REM K4 is replaced, the calibrations will need to be copied **from** Slot 5. To copy the calibrations, do the following:
  - Enter in the level 7 password.
  - Select 2 for Program.
  - Select 5 for Copy.
  - Select 3 for Copy Calibrations.
  - Select 1 to copy the Calibrations **to** Slot 5.

*Or*

  - Select 2 to copy the Calibrations **from** Slot 5.
  - The controller will prompt you to enter in a password. Enter the level 7 password. The controller will return to the main menu.
  - Exit the menu and the controller should return to the waiting for formula state.
  - The chemicals can also be re-calibrated to eliminate this error.

If the memory card has been replaced, you will also need to send a Group Formula Update from PulseNet. This should be done for the Catalyst group.

If this error occurs and no cards have been replaced in the controller, then it is likely that the calibrations on the processor RAM have been corrupted. Follow the same procedure and copy the calibrations **from** Slot 5.

- **Invalid memory copy.** This occurs when the Catalyst reads a invalid formula number of a 0 formula from the interface. To fix this problem, enter the main menu on the Catalyst and select 1- Setup. Select 3- Compartment formulas and change the 0 or invalid formula to a valid formula. You will also need to change the formula on the interface. Check the programming of the tunnel for errors.

## How to clear a chemical watchdog on the Catalyst

The Catalyst will alarm with a chemical watchdog when the injection takes too long or when the controller does not register any pulses from the flow meter. If the controller encounters these faults, it will alarm and display the watchdog with the chemical number. Do the following:

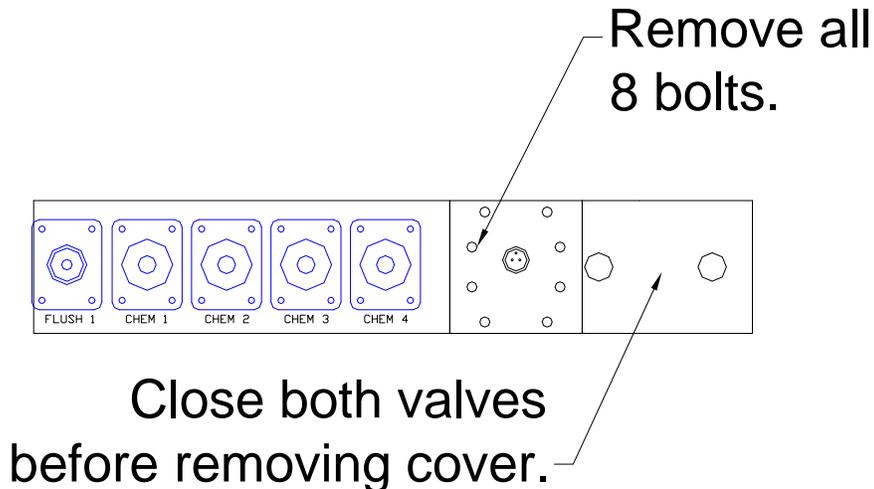
- 1- Check chemical level replace if necessary
- 2- Press CLR
- 3- Press 777777
- 4- Press Yes to restart chemical injection

If system alarms again

Flush system by pressing the manifold # & CLR then enter in 777777 and retry the injection.

If the system continues to alarm, check the flowmeter gears. If the gears are not turning when the manifold is flushed, then they are possibly blocked. See the next section to disassemble the flow meter.

## Flowmeter Disassembly

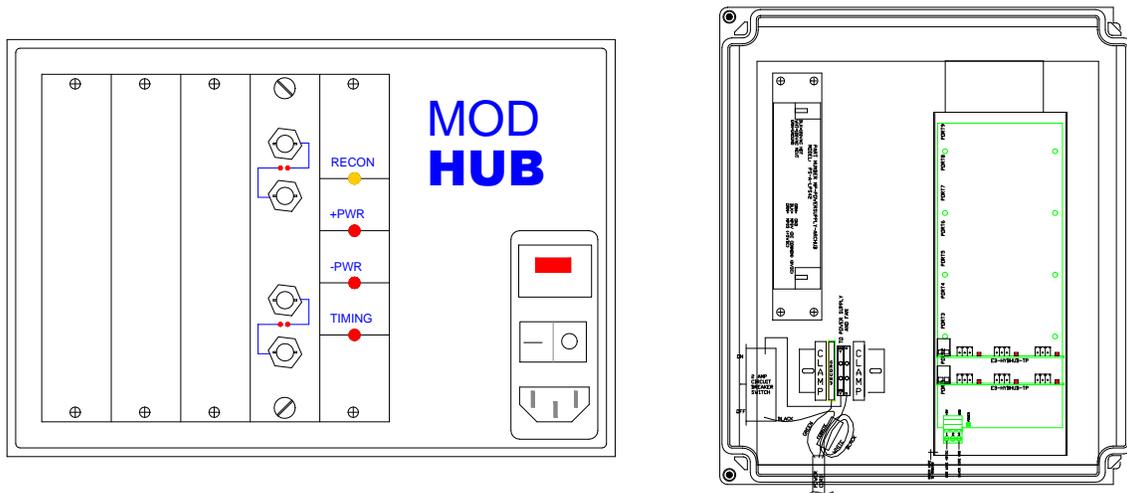


If the flowmeter becomes clogged with debris and cannot be cleared by back flushing, it will be necessary to disassemble and clean the flowmeter. To disassemble the meter, do the following:

- Press and hold [MANIFOLD #] & [CLR] for 20 seconds to flush the manifold with water.
- Place several rags or towels under the meter. (The manifold will be full of water)
- Close both the calibration valve and the machine valve (located on the back of the system) for the manifold.
- Press the **Emergency Stop Button**.
- Remove the cable that attaches to the cover of the flowmeter.
- Remove the 8 bolts that hold the cover in place.
- Carefully remove the cover from the manifold. Use a screwdriver to pry it loose if necessary.
- Remove the gears from the meter. Remove any debris that may be blocking them.
- Replace the gears. **Make sure the magnets on the gears face the front of the flowmeter.** The gears should turn freely when in place.
- Replace the O-ring with a new one. Replace the cover. Tighten the bolts in a staggered manner. The bolts should only be finger tight (10-12 in.-lbs.)
- Attach the cable. Release the **Emergency Stop Button**.
- Restart the system and check flowmeter to make sure it is functioning properly.

**The O-ring should be checked whenever the cover is removed.**

## ArcNet Communications



**All of the communications involved with the Catalyst are run on an ArcNet network. ArcNet is an industrial, high-speed network designed to be rugged and trouble free. The network can be run on RG-62 Coaxial cable, Cat 5 twisted pair, or fiber optic cables. Most all of the Catalyst installations now use Cat 5 Twisted pair cable and is attached to the controller with Phoenix connectors.**

All the chemical requests from the machines and interfaces to the Catalyst are transmitted over this network. If the network is not functioning properly, the delivery of chemicals can be impeded. The network is typically laid out in a bus fashion with an active hub. If it is a single Catalyst, the hub card will be located in the controller in slot 8. If there are multiple Catalysts, or the system is older, an active hub will be used. The illustration above depicts a Mod Hub on the left (for older, coax networks) and an Arc hub on the right. (Usually twisted pair) For more information on the layout of the network, please see section 2:10 of Installation and Configuration.

### Troubleshooting the network:

The active hub (Pictured above) is the central piece of equipment that brings the all of the branches of the network together. In normal operation, the yellow RECON light should be off. If this light is on steady or blinking, then there may be a problem with the network. If this light blinks occasionally (once every 100 seconds), then the network should be OK as this is the normal reconfiguration of ArcNet. The ArcHub does not have this light- All the red LEDs should be on steady. If you suspect a problem with the Network try the following:

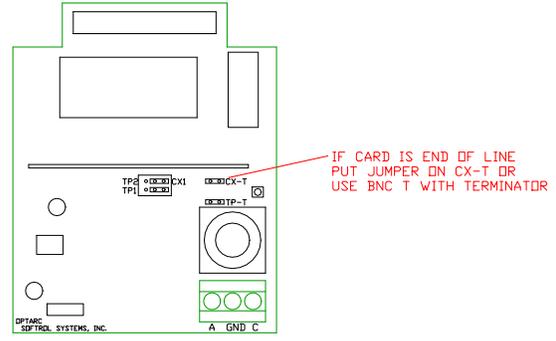
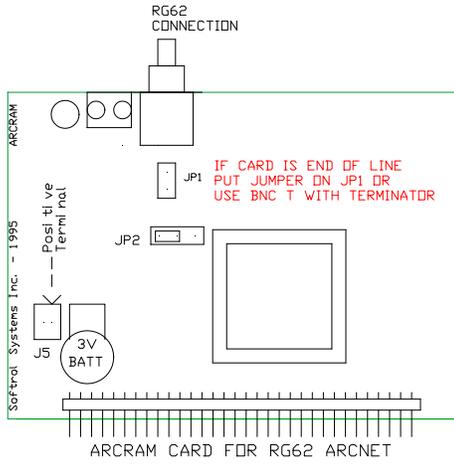
Communications can be verified from the Pulsenet computer by bringing up the multiple display feature. If the front panel displays of all the machines that are turned on are shown, then it is likely that communications are OK.

**If there is a problem with communications, remove one of the lines from the Hub. If the hub continues to Reconfigure, plug that line back in an unplug another. Repeat this process until the network is stable. You can then recheck communications at the computer to see which machines are causing the trouble.**

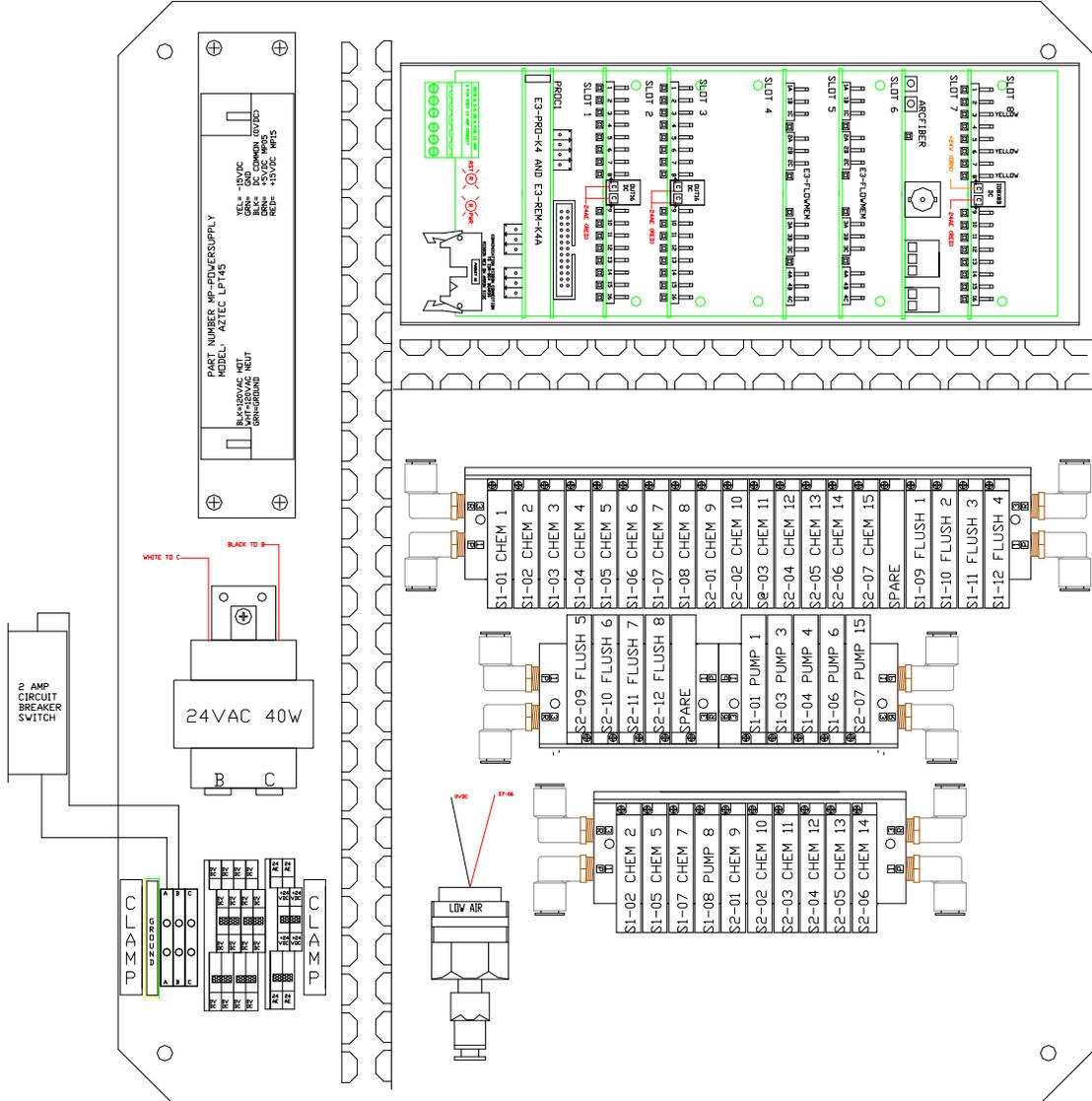
Once the line that is causing the problems is identified, the machine can usually be identified by the process of elimination. To do this, plug the line back into the hub and remove the tee from the first machine (or node) on that line. Check to see if communications are restored. Repeat this process until offending machine or the end of the line is reached.

Things that can cause network trouble:

- Duplicate IDs.- Each node must have a unique ID from 1 to 255. The ID is usually set in the machine setup menu. The exception is the ArcFiber card and the CataPulse interface which is used with the K4 Processor. This card has a set of 8 dip switches that determine the ID.
- Terminating Jumper- Only the last machine on the line should be terminated. This terminator can be either a jumper on the card, or a BNC terminator connected to the other side of a tee. It **should not** have both. The computer must have a tee and terminator if it is at the end of the line. (it does not have terminating capability) If twisted pair is used, then the terminating jumpers must be used at the end of the line.
- Un-terminated Line- This will cause the network to reset. This can be a card at the end of the line that does not have a terminator, or when the cable is damaged or cut.
- CX / TP Jumper- The ArcNet cards can be configured for either Coax or twisted pair communications. For the Coax networks, the jumpers should be on the CX side. For Refer to the parts manual for exact jumper positions.
- Faulty ArcNet Card- Due to excessive noise on the line, ArcNet cards can be damaged and cause the network to fail. If this is the case, try to locate the source of electrical noise and correct it. Some sources of electronic noise are:
  - Cables run too close to power wires. If you must cross a power line, the cable should be run perpendicular to the line.
  - Poorly grounded controllers and machines.
  - Cables run too close to Variable Speed Drives.



# Typical Electrical Layout



Card Cage

