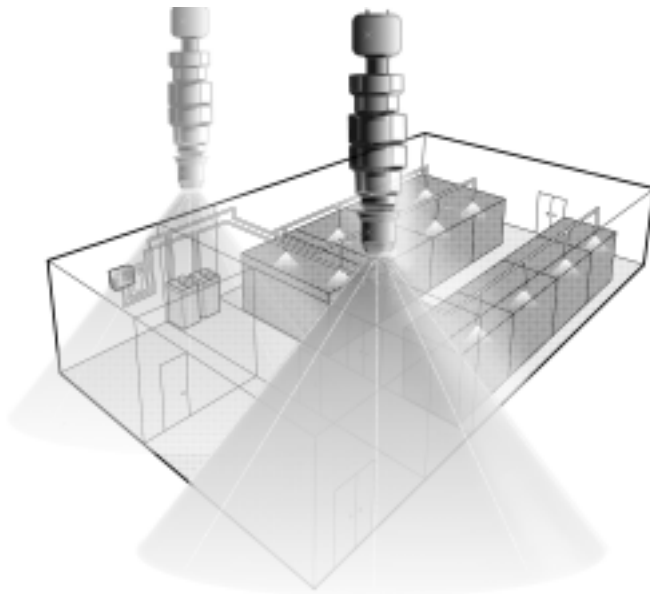


# Hatchery Disinfectant Manual

Installation  
Operation  
Maintenance  
Disinfectant Usage



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# Hatchery Disinfectant Manual

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## Table of Contents

Introduction .....	5
Component Layout .....	6
Electronic Controller Features .....	7
<b>1. Hatchery Sanitation</b>	
General .....	8
Disinfectants .....	8
<b>2. Installation</b>	
General .....	9
Location .....	10
Atomizer Positioning .....	12
Multi Stage Incubator .....	13
Common Wall Hatcher .....	13
PX Hatcher .....	14
Single Stage ACI Hatcher .....	15
Single Stage ACI Incubator .....	15
<b>3. Operations</b>	
General .....	16
Electronic Controller .....	16
<b>4. Programming</b>	
General .....	17
<b>5. Preventative and Corrective Maintenance</b>	
General .....	20
Filter Replacement .....	20
Atomizer (Mister) Inspection .....	21
Main Feed Line Test .....	21
<b>6. Disinfectant Usage</b>	
General .....	22
Properties of Disinfectants .....	22
Recommended Spray Intervals .....	23
Guidelines .....	23
<b>Appendix A: Parts List</b> .....	24
<b>Appendix B: Troubleshooting</b> .....	28
<b>Appendix C: Organisms and Surface Disinfectants</b>	
General .....	29
Bacterial Organisms .....	29
Viral Organisms .....	29
Fungal Organisms .....	29
Protozoal Organisms .....	29
Chemicals Used for Disinfecting .....	30
General .....	30
Cresols and Cresylic Acid .....	30
Phenols .....	30
Iodine .....	30
Chlorine .....	31
Quaternary Ammonium .....	31
<b>Glossary</b> .....	32

### List of Abbreviations

ABS	–	Thermoset (rigid) Plastic Material
GPH	–	Gallons per hour
LED	–	Light Emitting Diode
P/N	–	Part Number
PSI	–	Pounds per square inch
115VAC	–	Voltage Alternating Current



# Introduction

## General

---

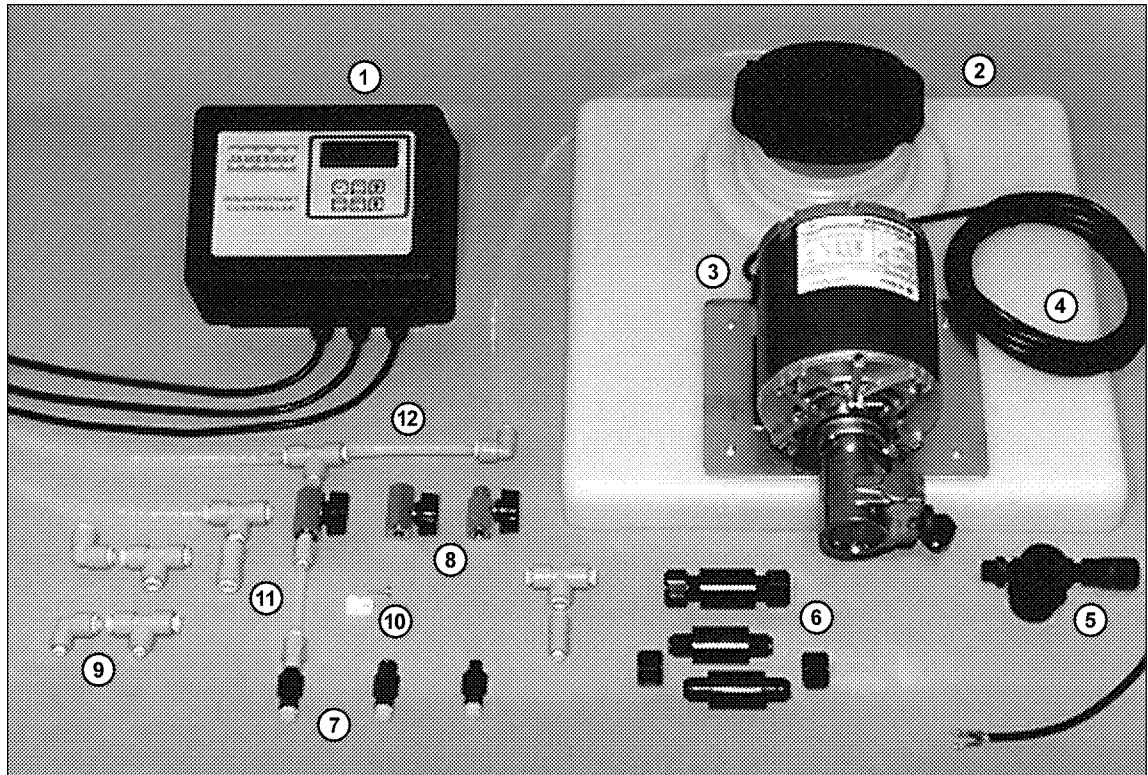
Jamesway's Hatchery Disinfectant System incorporates a programmable controller that regulates the dispersion of liquid chemical disinfectants used in Hatcheries.

The Electronic Disinfectant Controller has the capacity to program two independent zones for up to 30 days with automatic repeat cycling of a 2 to 30 day cycle for each zone. The following specifications highlight the operations of the controller and the features of the Hatchery Disinfectant System:

- The Electronic Controller is housed in a fire-retardant and splash-proof ABS plastic housing that has been designed for a wall mount installation. Liquid-tight connectors are used for external power and zone cable connections.
- A high intensity 16 x 2 digit LED display panel indicates time of day, day of zone cycle, and zone ON/OFF cycle setting.
- The design of the Electronic Controller's internal circuitry protects the unit from power surges, brown outs and power line noise. An internal systems diagnostics test is performed each time the unit is turned on. In the event of a power outage, power interruption, or when the controller is switched off, the internal long life lithium battery will retain the programmed settings.
- For extended periods of operation, a 55 gallon polyethylene dilution holding tank is used for each independently functioning zone.
- A non-corrosive diaphragm pump delivering 120 gph (2.0/min) at 125 psi is located on top of the dilution tank, operating only when a programmed signal is received from the Electronic Controller.
- Each zone can manage up to 50 atomizer units operating at 1.20 gph per atomizer, and dispersing disinfectant throughout the system at 125 psi.
- The Hatchery Disinfectant System can be installed and operated with any brand of incubator or hatcher.

# Component Layout

## Hatchery Disinfectant System

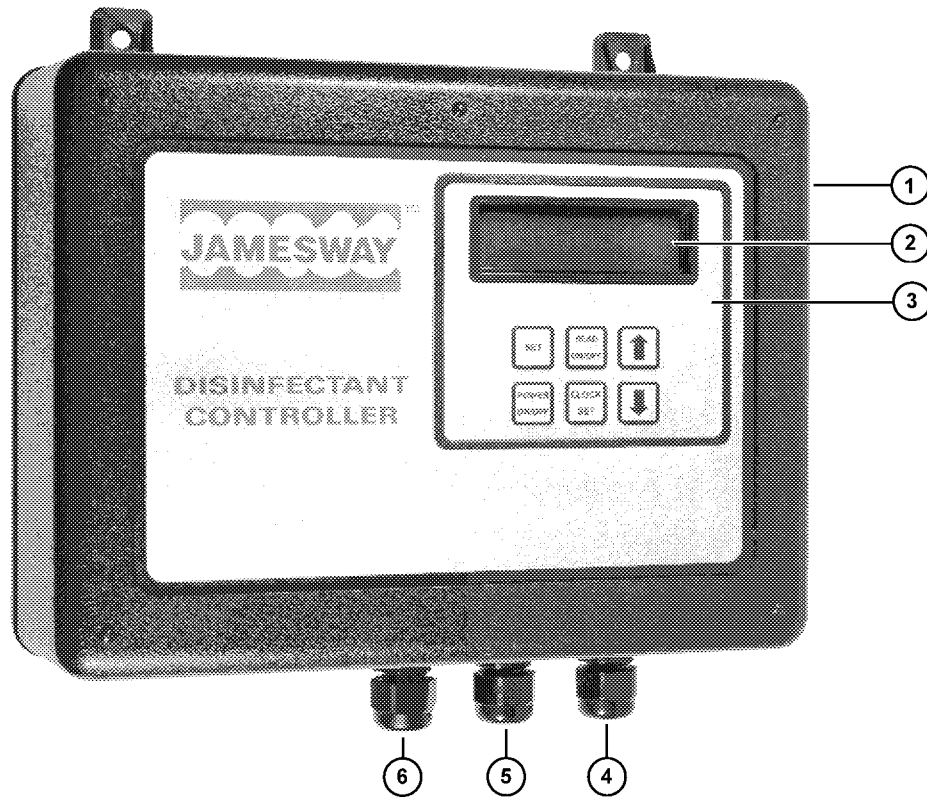


1. Electronic Programmable Controller (p/n JM-EC1301)
2. Dilution Tank, 55 gal. (p/n JM- PMH100, only tank lid shown)
3. Non-corrosive Pump (115V) 120 gph @ 125 psi (p/n JM-BP700-115)
4. Zone Control Cable (from pump)
5. In-line Filter (p/n JM-T111)
6. Liquid-tight Connectors (p/n RC200)
7. Atomizers (p/n JM-HP205-95C, Anti-Drip Misters)
8. Shut-off Valves (p/n JM-PMH106)
9. Quick-disconnect Fittings (Tee p/n JM-PMH143, Elbow JM-PMH144)
10. Wall Fasteners (1/4" p/n JM-PMH108, 3/8" JM-PMH138)
11. Flexible Tubing (1/4" p/n JM-T113, shut-off valve to atomizer)
12. Flexible Tubing (3/8" p/n JM-PMH200, main feed line)

*Figure 1: Component Layout – Hatchery Disinfectant System*

## Electronic Controller Features

---



1. Protective Housing (Fire Retardant ABS)
2. High Intensity LED Panel
3. Splash Proof Key Pad
4. Power Input Cable – 115/220VAC, 50/60Hz
5. Zone 2 Cable
6. Zone 1 Cable

*Figure 2: Electronic Controller Features*

# 1 Hatchery Sanitation

## General

---

A thorough sanitation program is critical to the maintenance of high hatchability and the production of healthy chicks. The use of disinfectants, as part of a routine sanitation program, will eliminate many of the disease producing microorganisms that negatively effect the chicks through the incubation and hatching cycles.

The Hatchery should be clean. Organic material should be kept to a minimum to ensure the surface disinfectants will effectively attack and destroy the microorganisms.

Note: Jamesway Incubator Company does not recommend the use of any particular chemical. Using this handbook as a guide, ask the manufacturers of the disinfectant solutions for recommendations on chemical usage for specific individual requirements.

## Disinfectants

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As a standard, all disinfectants used in a hatchery should possess the following characteristics:

- A proven effective germ killing agent
- Safe and non-toxic to humans and animals
- Able to penetrate small amounts of organic material and crevices
- Non-corroding and non-staining to hatchery machines
- Water soluble
- Odor free
- Readily available

Surface disinfectants exhibit different levels of effectiveness based on the type of microorganism present. The most common of these organisms can be grouped into four main categories: bacterial organisms, viral organisms, fungal organisms and protozoal organisms. Disinfectants should be acquired based on the application and intended use in specific areas of the hatchery, see Table 5 (page 22) for a list of disinfectants and their recommended usage.

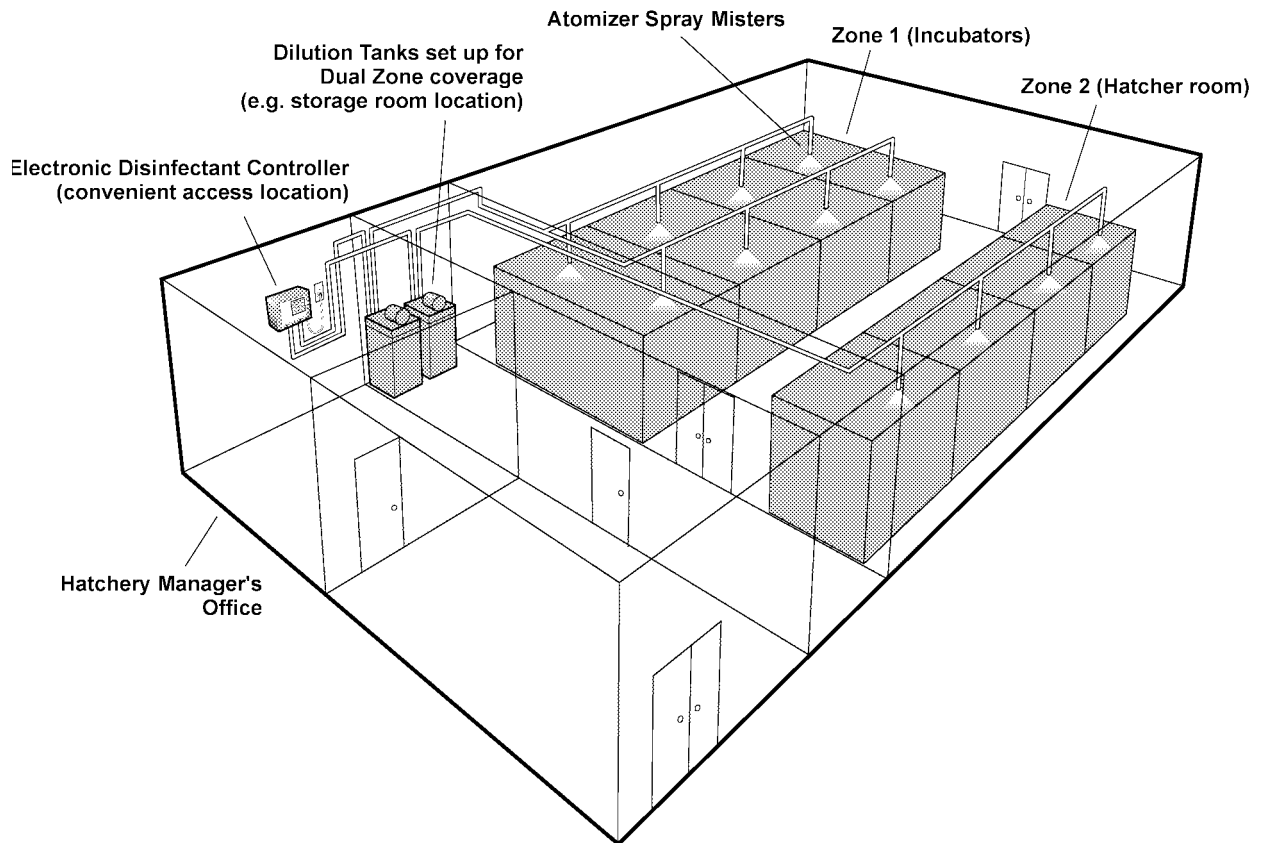
Note: For complete descriptions on disinfectants and types of organisms present in a hatchery, refer to Appendix 'C' of this comprehensive handbook.

Caution: If Fumigation is used to control bacterial contamination in a hatchery, strict guidelines (e.g., those set by the United States Occupational Safety and Health Administration) are to be observed. The *Commercial Chicken Production Manual* – 4th Edition, by Mack O. North and Donald D. Bell (published by Van Nostrand Reinhold, New York 1990), details the use of Formalin. It outlines precautions that should be followed by hatchery managers and personnel.

## 2 Installation

### General

The Hatchery Disinfectant System has been designed to adapt to various Hatchery Layouts, from small speciality hatcheries to large scale poultry producers. The Electronic Controller can be placed almost anywhere in the hatchery (e.g. the hatchery manager's office), and the dilution tanks can be isolated in a storage and/or mechanical/electrical room. The atomizer units are located inside the Incubator and Hatcher machines, but can also be situated in any section of the Hatchery where bacterial contamination is considered a problem. Figure 3 (below) illustrates a typical hatchery layout with Dual Zone coverage to the Incubator and Hatcher rooms. Additional controllers can be installed to operate more than two zones (see Figure 14 on page 21 for an example of a multiple zone layout).



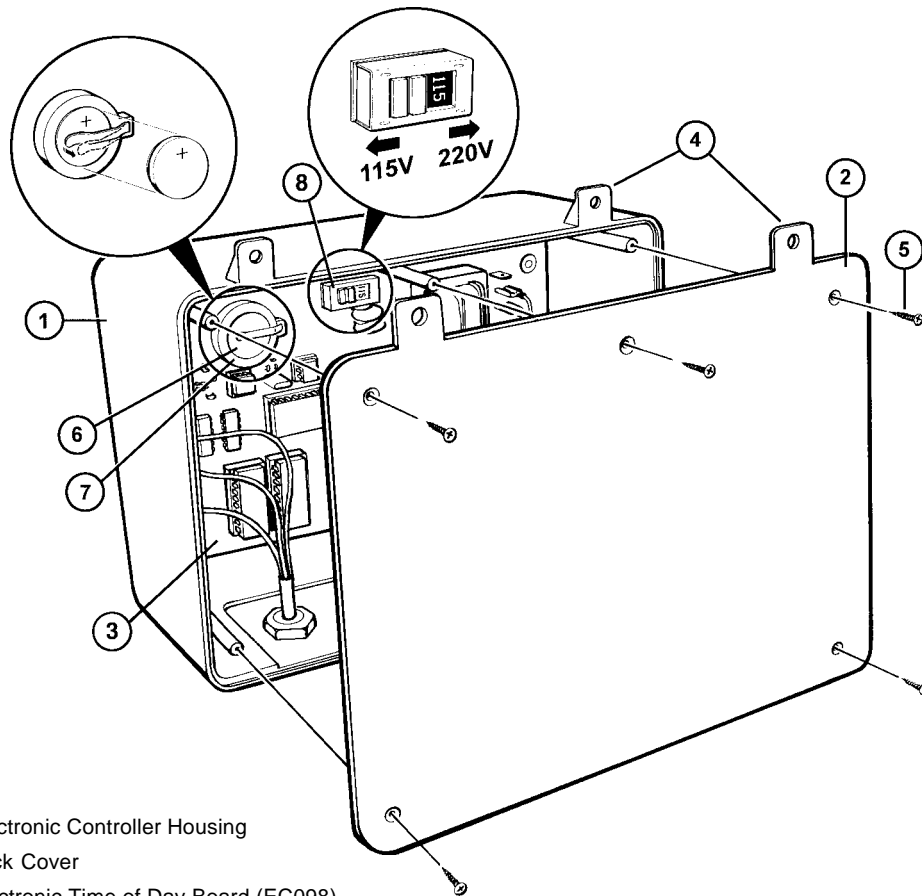
*Figure 3: Typical Hatchery Layout with Dual Zone Coverage (not to scale)*

## Location

Plan the installation of the Hatchery Disinfectant System by first determining the number of rooms/areas within the hatchery that will require Atomizer Units. Plan to which zone each of the atomizers will be allocated. Calculate the number of atomizers (mistifiers) per incubator/hatcher machine and the exact location of the atomizer's positioning inside the cabinets. Refer to Figure 7 to 11 on pages 13, 14 and 15 for recommendations regarding the placement of the atomizers.

Locate the electronic controller in the appropriate hatchery room and install. Refer to Figure 4 and the following directions.

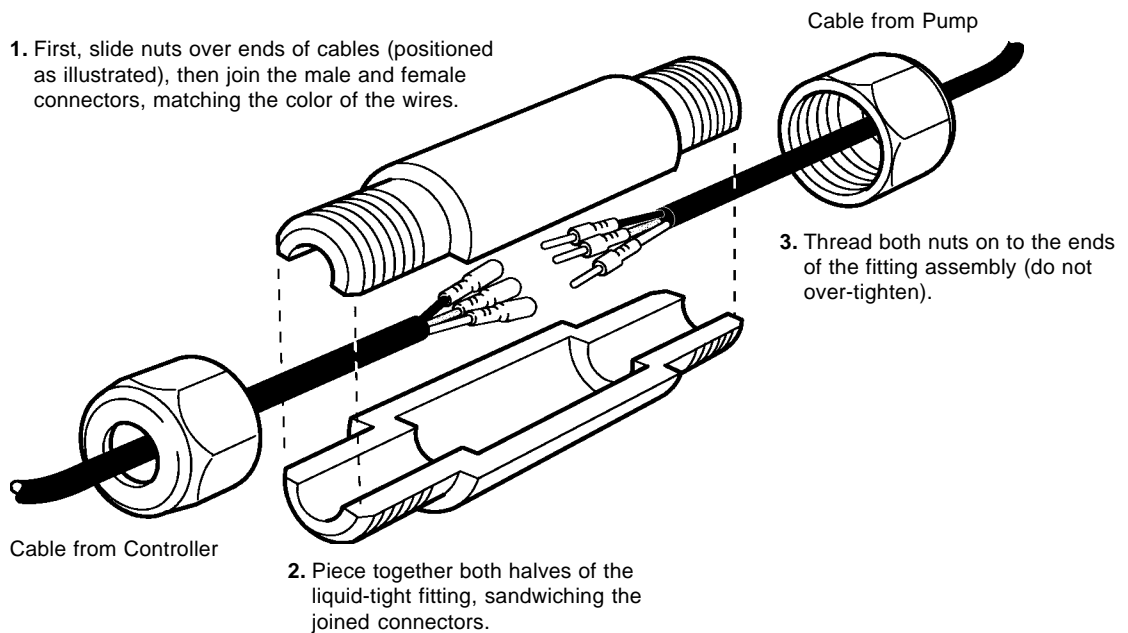
**Caution:** Ensure the unit is unplugged before attempting the Voltage Select procedure outlined on the following page.



1. Electronic Controller Housing
2. Back Cover
3. Electronic Time of Day Board (EC098)
4. Mounting Tabs
5. Self-tapping screws (quantity 5)
6. Lithium Battery
7. Battery Receptacle
8. Voltage Select switch (115/220V)

**Figure 4: Voltage Select Switch and Battery Replacement**

1. Check for 115 or 220 volt operation by accessing the Voltage Select switch (3) inside the controller housing (1). Separate the back cover (2) of the controller housing by removing the five self-tapping screws (5). Set the slide Voltage Select switch to the required 115 or 220 volt position and replace the back cover.
2. Mount the unit to a wall using two screws threaded through the mounting tabs (4) on the top surface of Electronic Controller Housing and into the wall. If mounting to a partition wall, locate wall braces and tap into them.
3. Establish the location of the dilution tanks. Wherever possible, avoid placing the dilution tanks a great distance from the atomizer zones. Connect the Electronic Controller to each electric pump on the dilution tanks as follows:
  - a) Route the pump wiring to the Electronic Controller observing standard hatchery safety precautions thus avoiding electrical shock hazards. It is recommended that electrical conduit be used to safely route the cabling between the controller and the dilution tank pump.
  - b) The cabling can be ordered in standard lengths of 25', 50', 75' and 100', and is supplied already connected to the pump (the open ends of the cables are fitted with crimped connectors). Place the liquid-tight connector over the two cables to be joined and connect the male and female cable connectors as illustrated in Figure 5 (below).



**Figure 5: Liquid-tight Connector for Cable Connection (RC200)**

## Atomizer Positioning

---

One Electronic Controller can manage up to 50 atomizer units per zone (two zones per controller). The pump on each dilution tank can distribute disinfectant solution through the system at 125 psi per zone. When installing the atomizer units please observe the following recommendations:

- Use the 3/8" tubing from the pump to all main feed tee fittings. Plan for pressure 'Test Point' locations within the system layout (see Figure 14 on page 21). At these locations, install a tee fitting with one end capped using a test plug fitting.
- If possible, avoid placing the atomizers units more than 10 feet apart from each other. For a 50 unit zone, observe a maximum 500' of 3/8" tubing.
- Use the 1/4" tubing from the shut-off valve (off the tee fitting) to the atomizer (mistifiers) inside the machines (see figure 7 on page 13).
- All shut-off valves should be positioned outside of the machines. This allows uninterrupted machine operation should the disinfectant system require shut-off of individual atomizer units (see figure 7 on page 13).

Avoid sharp bends in the routing of the 3/8" tubing. Minimal use of 90° elbow fittings is recommended. With the addition of each elbow, there is a corresponding drop in line pressure.

Cut the tubing to the required lengths using a utility knife. Use the supplied wall fasteners and attach the tubing to safe and secure wall mounting locations. It is recommended that two fasteners be used at each shut-off valve location (i.e. on both shut-off valve connectors to avoid a twisting motion when operating the shut-off valve).

Most of the tee fittings and couplers supplied are of the quick disconnect variety; simply insert the tubing fully into the coupler end and a leak proof seal is created (see figure 6 below).

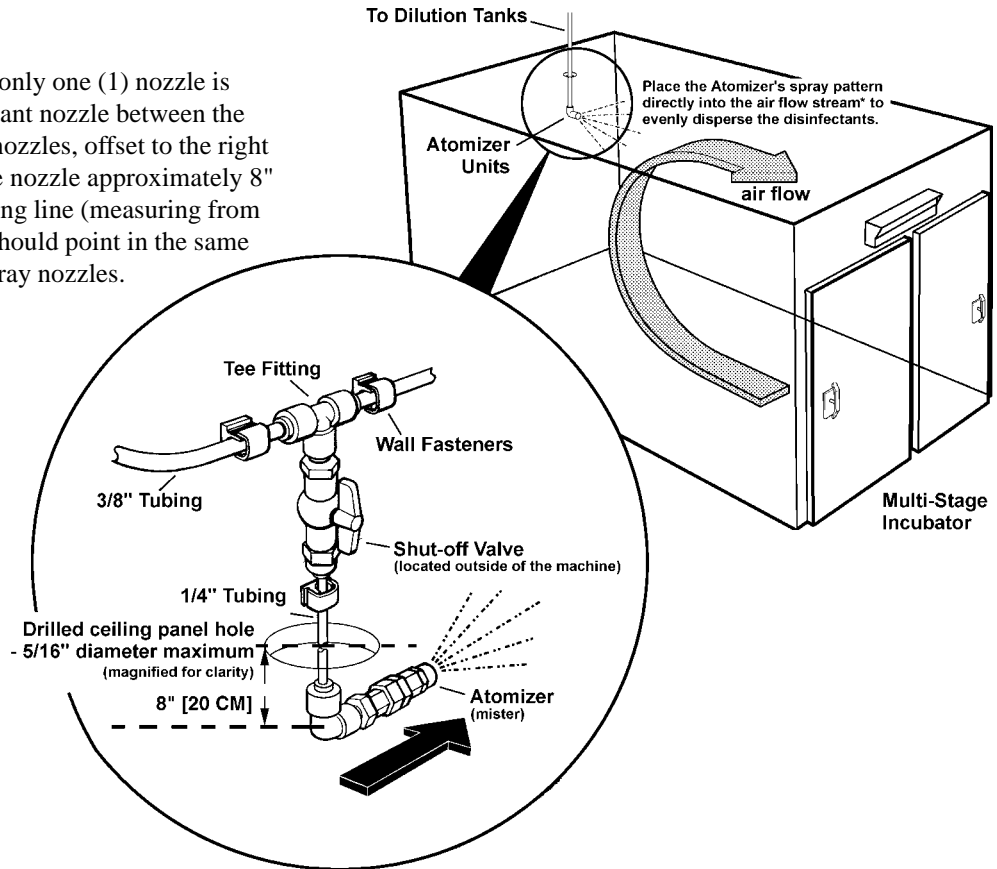


**Figure 6: Tubing to Fitting Connection**

# Atomizer Positioning

## Multi Stage Incubator

In the Multistage incubator only one (1) nozzle is required. Place the disinfectant nozzle between the two sets of humidity spray nozzles, offset to the right of the damper rod. Place the nozzle approximately 8" (20 cm) down from the ceiling line (measuring from the centre of the nozzle). It should point in the same direction as the humidity spray nozzles.



\*The humidity spray nozzles are generally located in the air stream; placing the Atomizers in the same vicinity will optimize their positioning.

Figure 7: Atomizer Placement in the Multistage Incubator

## Common Wall Hatcher

In Common Wall Hatcher, place the one (1) nozzle as close to the top humidity nozzle as possible. It should point directly at the centre of the fan. The shut off valve should be placed on the roof, towards the back wall.

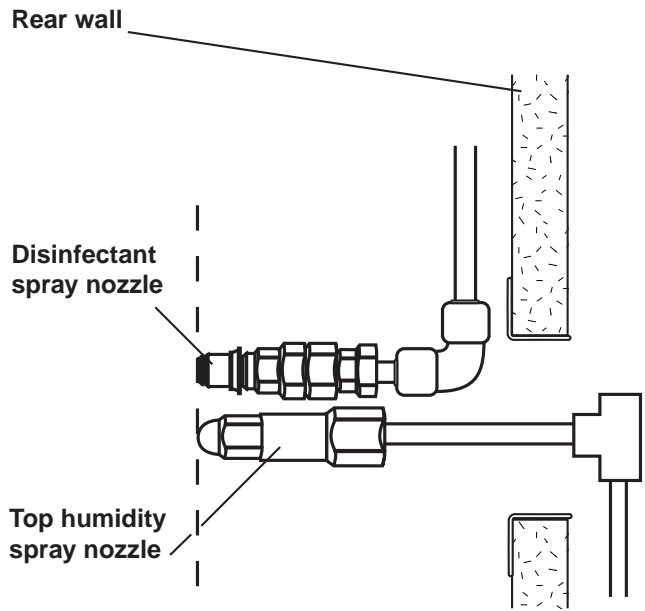


Figure 8: Atomizer Placement in the Common Wall Hatcher

## Atomizer Positioning

### In the PX Hatcher

The PX Hatcher requires two nozzles, one on either side of the intake duct. The nozzle on the right of the duct must be located 33.25" (84.5 cm) down from the roof. The centre of the nozzle must be 0.50" (1.3 cm) away from the duct and 0.625" (1.6 cm) back (towards the rear of the cabinet) from the corner of the duct.

The nozzle on the left of the duct must be located 38.25" (97.2 cm) down from the roof. The centre of the nozzle must be 0.50" (1.3 cm) away from the duct and 0.625" (1.6 cm) back (towards the rear of the cabinet) from the corner of the duct.

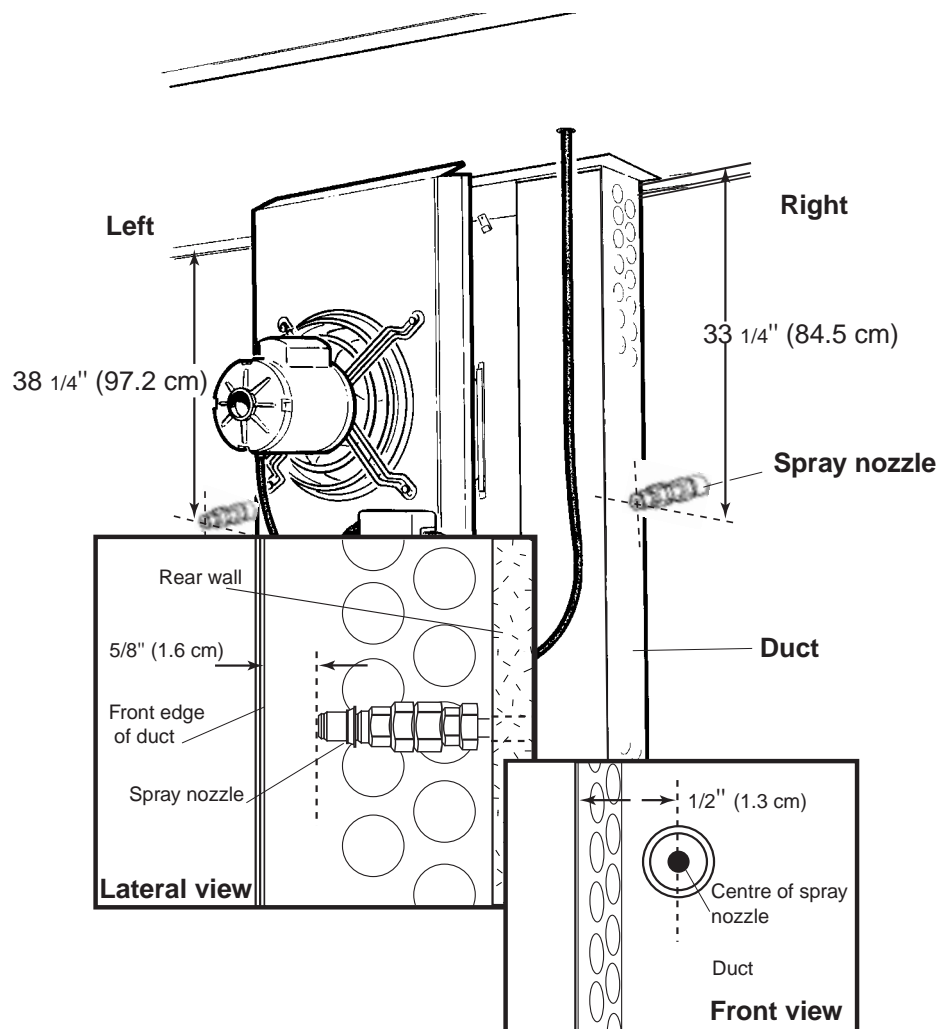
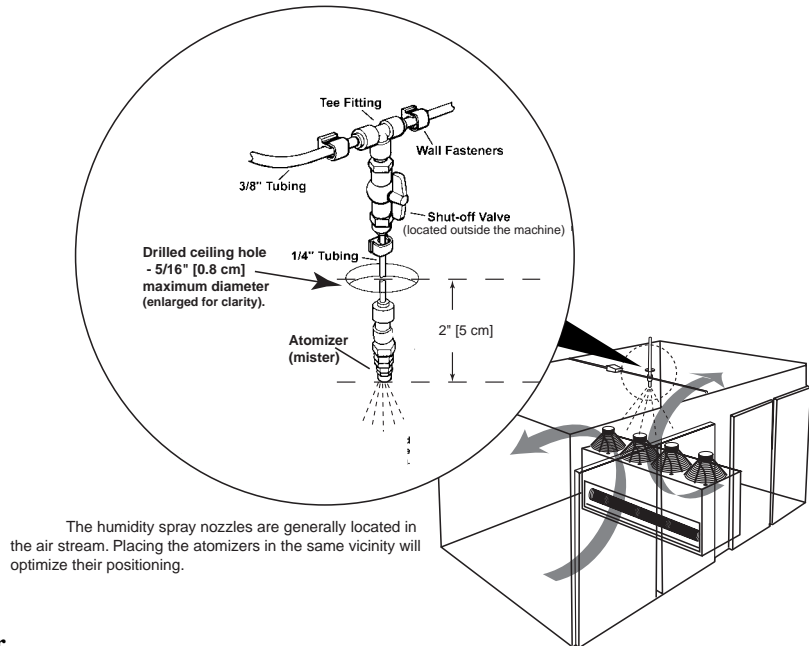


Figure 9: Atomizer Placement in the PX Hatcher

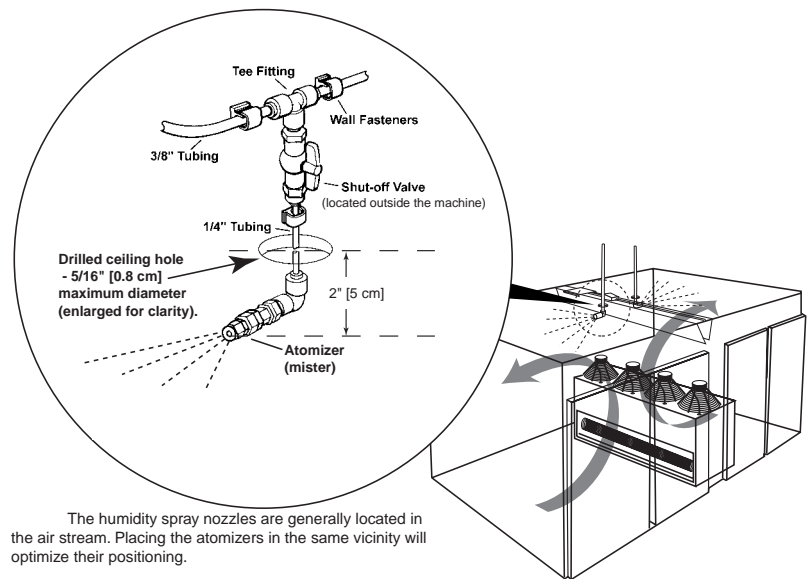
# Atomizer Positioning



## Single Stage ACI Hatcher

In the hatcher, only one (1) nozzle is required. It should be centered above the fan and placed approximately 2" (5 cm) from the ceiling line. The spray should be directed down towards the centre of the fan.

*Figure 10: Atomizer Placement in the Single Stage Hatcher*



## Single Stage ACI Incubators

In ACI incubators, two (2) nozzles are required. They should be centered laterally and each placed slightly to the outside of the central duct. Each should be placed approximately 2" (5cm) from the ceiling line. Each spray nozzle should be directed out, towards the centre of its lateral wall.

*Figure 11: Atomizer Placement in the Single Stage Incubator*

# 3 Operation

## General

---

Once the atomizers have been installed, the cable routing completed, and the dilution tanks filled with disinfectant solution, the system can be programmed for automatic operation.

## Electronic Controller

---

As previously mentioned, the Electronic Controller can be programmed to operate and control two independent zones. The programming is entered using the keypad on the front panel of the controller, which activates the menu-based display (refer to figure 2 on page 7 for a detailed description of the features). The Controller has the capacity to program each of the two zones for up to 30 days, with automatic repeat cycling of a 2 to 30 day cycle.

**Note:** In the event of power failure, outages, interruptions or when switched off, the internal clock and program are retained by the long life lithium battery cell. This cell is located inside the controller (refer to figure 4 on page 10 for replacement instructions).

Plug the unit's electrical cord into a wall outlet (two or three prong receptacle, as available). Press the POWER ON/OFF switch on the keypad.

On initial power up, the LED panel will display the following information:

```
JAMESWAY
next message:  VERSION 1.09
next:         DISINFECTANT
              CONTROLLER
```

**Note:** If an error message appears at start up, refer to Appendix B for troubleshooting.

The Controller will then go into operation *if* there is a program already in memory. The unit will then display the following:

```
3:30:15 PM
1 OFF      4 ON
Zone 1 is in the first day
of its program and the
output is OFF.      Zone 2 is in the fourth day
of its program and the
output is ON.
```

# 4 Programming

## General

Table 1 (below) details step-by-step keypad instructions on programming the Electronic Disinfectant Controller for automated operation.

POWER ON/OFF			
Press Key	Display	Function	Notes
POWER ON/OFF	XX:XX:XX A M CONTROL OFF	Controller will turn OFF output relays	
POWER ON/OFF	XX:XX:XX A M 1 OFF 2 OFF or (1 0 N 2 0 N)	Controller enters the operation mode (if the unit has a stored program, see Table 2 for programming)	Turning the controller ON will also activate an ON cycle for both zones.
CLOCK SET			
CLOCK SET	SET HOURS XX:XX:00 A M	Press the up or down arrow key to change the hour reading	
CLOCK SET	SET MINUTES XX:XX:00 A M	Press the up or down arrow key to change the one minute reading	
CLOCK SET		Controller enters operation mode	If the CLOCK SET key is not pressed at this time, the controller will enter operation mode after a 20 second delay.

*Table 1: Power ON/OFF and Clock Set Key Functions*

Note: If all days are the same, program one day only. If only one zone is to be used, install a simulated program in the second zone – this will ensure proper functioning of the controller.

Note: A pause of more than 20 seconds in the programming procedure will auto-matically initiate the operation mode of the controller.

<b>PROGRAMMING</b>			
<b>Press Key</b>	<b>Display</b>	<b>Function</b>	<b>Notes</b>
SET	ENTER PROGRAM? PRESS YES↑NO↓	If the up (YES) arrow is pressed, the controller enters PROGRAMMING mode. If the down arrow (NO) is pressed or no action is taken within 10 seconds, the controller returns to normal operation.	Use this step to avoid accidental program changes.
<b>ZONE PROGRAMMING</b>			
SET	ENTER ZONE ZONE 1	Press the up arrow to revert to the other zone (as required).	Press SET to lock in Zone.
<b>START/STOP TIMES</b>			
SET	ENTER START TIME XX:XX:00 AM	The HOUR digits will flash initially. Press the up arrow to advance the HOUR reading from 1:00 through 12:00 a.m. or p.m.	The digits can be advanced one at a time by briefly pressing the up or down arrow keys. The reading can also be advanced rapidly by pressing and holding one of the arrow keys.
SET	ENTER START TIME 11:XX:00 AM	The MINUTES digits will flash initially. Press the up or down arrow to advance the MINUTES reading from 00 through 59 minutes.	The SECONDS are not programmable for the START/STOP times.
SET	ENTER STOP TIME XX:XX:00 AM	The HOUR digits will flash initially. Press the up arrow to advance the HOUR reading from 1:00 through 12:00 a.m. or p.m.	
SET	ENTER STOP TIME 11:XX:01 AM	The MINUTES digits will flash initially. Press the up or down arrow to advance the MINUTES reading from 00 through 59 minutes.	If the STOP time is earlier than the START time, the program will START on a given day and will STOP on the following day. The day shown on the display will remain as it is past midnight, and will switch to the next day after the programmed STOP time.
<b>TIME ON/TIME OFF</b>			
SET	ENTER TIME ON ON: 0 SECONDS	Press the up or down arrow key to change the SECONDS reading from 000 through 999.	As the arrow key is pressed and held, the SECONDS digits will advance (or back up) slowly at first, then move at a higher rate.
SET	ENTER TIME OFF OFF:XX HRXX MIN	The HOUR digits will flash initially. Press the up or down arrow key to change the setting.	To eliminate or skip a day, set the TIME ON to 0.
SET	ENTER TIME OFF OFF:XX HRXX MIN	The MINUTES digits will flash initially. Press the up or down arrow to advance the MINUTES reading from 00 through 59 minutes.	The digits can be advanced one at a time by briefly pressing the up or down arrow keys. The reading can also be advanced rapidly by pressing and holding one of the arrow keys (applies to all settings).
SET	DAY 2 SAME AS DAY 1? YES↑NO↓	See next step.	
YES ↑	DAY 3 SAME AS DAY 2? YES↑NO↓	As these program steps are repeated for subsequent days, the unit continues to advance to the next day until the down arrow (NO) is pressed. See next step.	
NO ↓	END OF PROGRAM? PRESS YES↑NO↓	See next step.	
YES ↑			The controller enters into normal operation and any previous program for this zone is erased. The other zone may be programmed at this time by repeating the first PROGRAMMING step (above).
NO ↓		The programming will continue with the next day in the sequence e.g. step 4 in this sequence.	Programming can continue for a maximum of 30 days entered.

Table 2: Programming the Controller

<b>REVIEW PROGRAM</b>			
<b>Press Key</b>	<b>Display</b>	<b>Function</b>	<b>Notes</b>
READ ON/OFF	PROGRAM REVIEW ZONE 1 DAY 01  READ START TIME 8:15:00 AM  READ STOP TIME 3:20:00 PM  READ TIME ON ON: 999 SECONDS  READ TIME OFF OFF:XX HR XX MIN  PROGRAM REVIEW ZONE 1 DAY 02  READ START TIME 9:30:00 AM  READ STOP TIME 4:15:00 PM  READ TIME ON ON: 10 SECONDS  READ TIME OFF OFF:XX HR XX MIN  and so on through the entire program...	The display steps through the program currently in memory until the READ ON/OFF key is pressed again.	Press the up arrow key to accelerate the program review, and the down arrow key to move backward.
READ ON/OFF		Stops the review process, and the controller enters into operation mode once again.	The Controller will automatically enter the operation mode when the entire review program process is completed.

**Table 3: Review Program Function**

# 5 Preventative and Corrective Maintenance

## General

Maintenance on the Disinfectant System will be limited to preventative and corrective procedures. Any component (e.g. the non corrosive pump) requiring extensive repair, should be sent to Jamesway for repair or replacement.

The lithium battery cell should be replaced on a regular basis (every 2 years) to prevent program loss. Refer to Figure 4 on page 10 for the location of the battery cell.

## Filter Replacement

Locate the Filter Element (attached to the front of the electric pump). Disconnect the couplers and remove it from the main feed line. Refer to Figure 12.

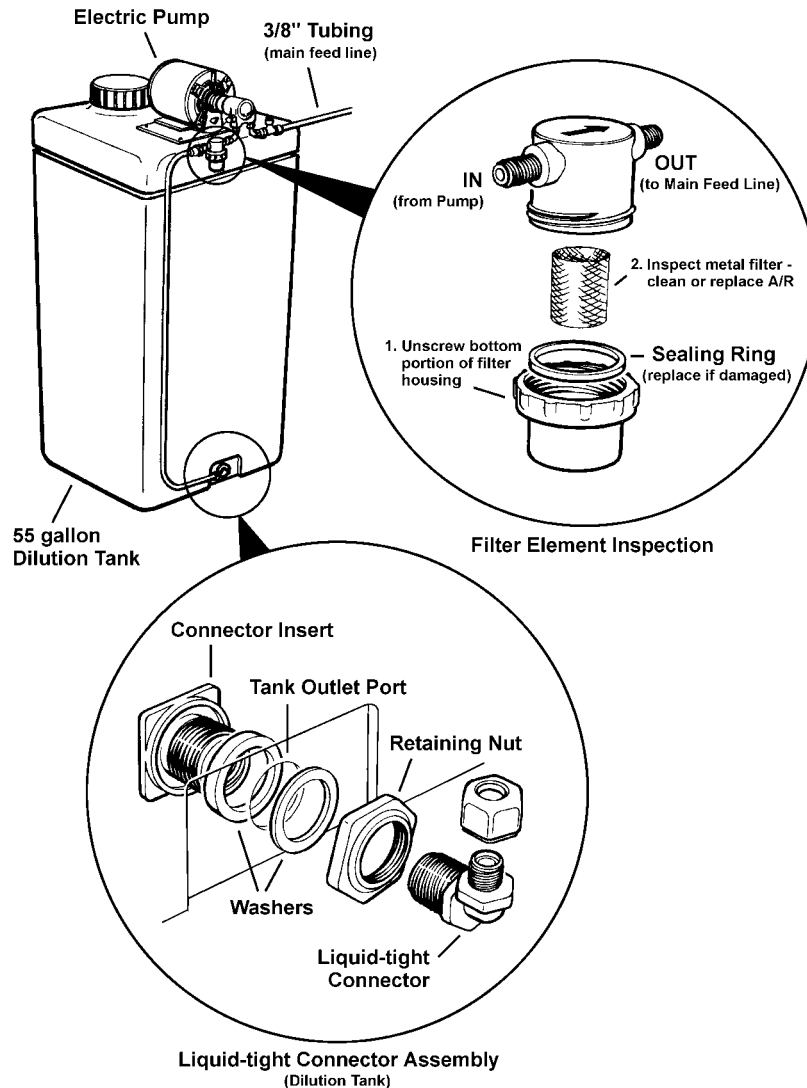


Figure 12: Dilution Tank Filter Inspection

## Atomizer (Mister) Inspection

Inspect the atomizer units on a regular basis. With the system operating, check that the misters are spraying evenly and consistently. Also check that the misters are not dripping when the system is inactive. If the atomizers are not functioning properly in either condition, the atomizer unit can be disassembled, inspected and cleaned. Refer to Figure 13. If the internal components are found to be worn or damaged, replace with a new atomizer unit. Refer to Appendix A for parts ordering information.

## Main Feed Line Test

Inspect the 3/8" main feed line periodically for obstructions, cracks and/or kinks in the clear tubing. Replace as necessary.

Test the pressure rating of the system by checking the main feed line at test point intervals as determined in Figure 14. For a system with 50 Atomizers per zone, a pressure gauge should record 125 psi readings (+10 psi) consistently at all test point locations.

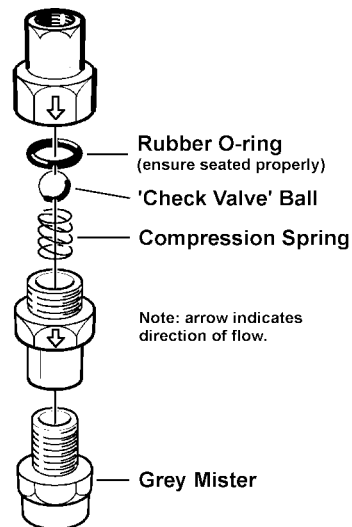


Figure 13 (right): Atomizer Unit Inspection

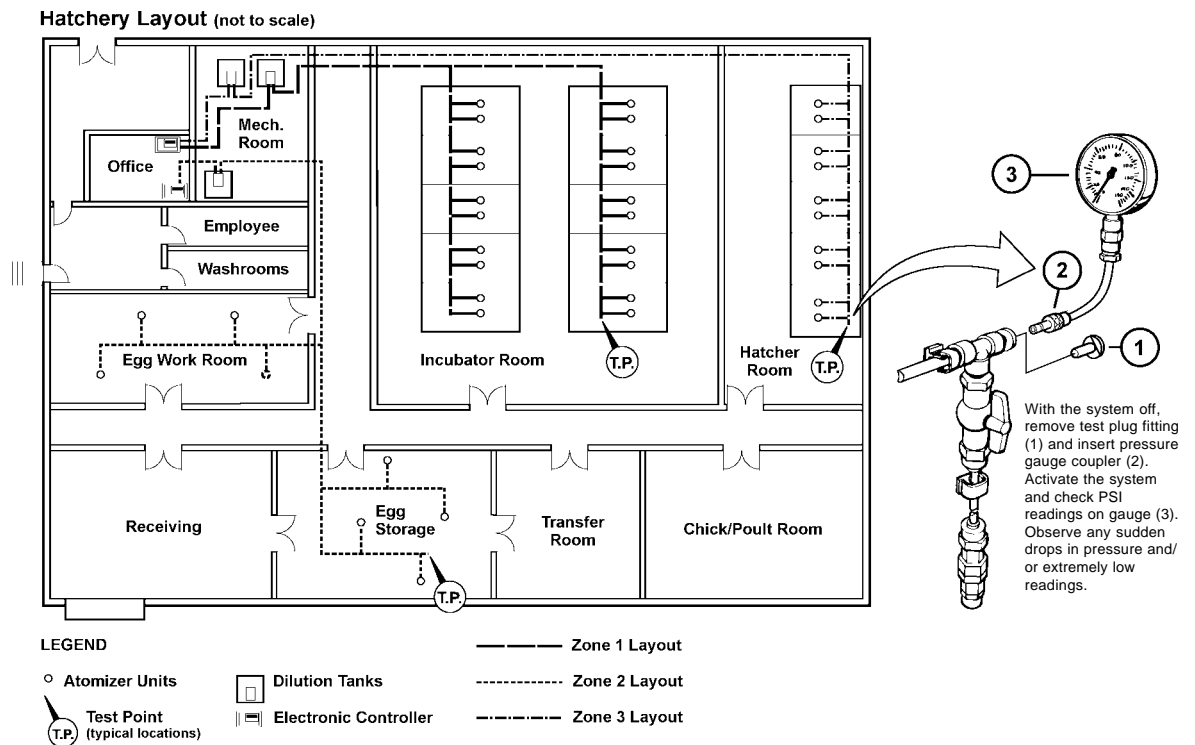


Figure 14: Test Point Locations and Multiple Zone Layout (sample)

# 6 Disinfectant Usage

## General

Numerous chemicals are used as surface disinfectants. All exhibit varying properties. As a result, there are many factors that effect the potency and effective usage of these disinfectants in a controlled hatchery environment. Tables 4 and 5 offer suggestions on a number of chemicals that have been used effectively, and to which areas of the hatchery they can be utilized.

## Properties of Disinfectants

The following table illustrates six groups of surface disinfectants and their effectiveness in killing various disease producing microorganisms.

PROPERTIES OF DISINFECTANTS						
Property	Chlorine	Iodine	Phenol	Quaternary Ammonium compounds	Formaldehyde (37% by wt.)	multi component oxidation cpd. **
Bactericidal	+	+	+	+	+	+
Bacteriostatic	-	-	+	+	+	+
Fungicidal	-	+	+	+ -	+	+
Virucidal	+	+ -	+	+	+	+
Toxicity	+	-	+	-	+	-
Activity with Organic Matter *						

Table 4: Properties of Disinfectants\*

Table 5 (below): indicates the effectiveness of surface disinfectants when used in various locations and applications within a hatchery.

HATCHERY USE OF DISINFECTANTS						
Area Use	Chlorine	Iodine	Phenol	Quaternary Ammonium compounds	Formaldehyde (37% by wt.)	multi component oxidation cpd. **
Hatchery Equipment	+	+	+	+	+ -	+
Water Disinfection	+	+	-	+	-	+
Personnel	+	+	-	+	-	+
Egg Washing	+	-	-	+	+	+
Floor	-	-	+	+	+	+
Foot Baths	-	-	+	+	-	+
Rooms	+ -	+	+ -	+	+	+

Data Source for both tables: modified from Agriculture Canada, Hatchery Sanitation, 1978 and <http://www.anteqint.com>

Table 5: Hatchery Use of Disinfectants

- \* Number of + indicates degree of affinity for organic matter and the corresponding loss of disinfecting action
- + Indicates a positive property (level of association)
- Indicates a negative property
- + - Indicates limited activity
- \*\* Virkon

## Recommended Spray Intervals

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The amount of solution required will vary with different disinfectant manufacturers. Refer to the manufacturer's recommended usage of the product based on hourly discharge quantities. The following example is to be used *only* as a guide:

- Space-Saver Incubator: 1800 ft<sup>3</sup> Volume
- Disinfectant Solution: Chlorine Dioxide ('Bose' Product)
- Mixture with water: 2% (non-activated)
- Number of Atomizer units per machine: 2
- Set controller program: 15 seconds of spray every 1 hour (for one Atomizer per machine, set at 30 seconds of spray per hour)

## Guidelines

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1. The least amount of disinfectant solution sprayed into the machines the less effect the solution will have on humidity levels. Shorter blasts of solution is recommended.
2. If 2 fluid ounces (1/8 of a pint) of solution is to be used every hour, a full 55 gallon dilution tank will last 73 days before refilling. Chlorine Dioxide has a shelf life of approximately 6 months.
3. The Atomizer units are capable of dispersing a maximum of 8 fluid ounces (1/2 pint) of solution every 3 minutes.

## Appendix A: Parts List

Part	Description*	Part Number	Quantity
-	Hatchery Disinfectant System (based on a 10 Atomizer unit installation kit, 115 volt operation)	JH010-115	ref.
1	Electronic Controller	EC130	1
2	Connector, Liquid-tight	RC200	1
3	Pump, 115V	BP700-115	1
4	Tank, 55 Gallon	PMH100	1
5	Filter, In-Line	T111	1
6	Connector, 3/8" x 1/4" FPT	PMH137	1
7	Fitting, Elbow - 3/8" Tube x 3/8" MPT	PMH103	1
8	Bushing, 3/8" x 1/4" Reducing	BP703	1
9	Fitting, Elbow - Tank Supply	PMH111	1
10	Fitting, Elbow - 3/8" x 1/4" Tube	PMH144	5
11	Fitting, Elbow - 3/8" x 3/8" Tube	PMH145	10
12	Tubing, 1/4" - 50 ft.	T113	1
13	Valve, Shut Off	PMH106	10
14	Tubing, 3/8" -200 ft.	PMH200	1
15	Clamp, 3/8"	PMH138	25
16	Fitting, Tee - 3/8" x 3/8" x 1/4" Tube	PMH143	10
(16)	Fitting, Tee - 3/8" x 3/8" x 3/8" Tube	PMH142	2
17	Clamp, 13/16"	PMH107	25
18	Screw	UCS17	50
19	Clamp, 1/4"	PMH108	25
20	Valve, Check with Grey Mister	HP205-95C	12
21	Gauge, Pressure	UCS107	1
22	Adapter, 1/4" Tube x 1/8" MPT	PMH130	1
23	Fitting, cap plug	PMH154	a/r
24	Connector, Shut off valve	PMH105	20
25	Fitting, 1/4" Tube x 1/8" MPT	PMH148	12
(25)	Fitting, Elbow - 1/4" Tube x 1/8" MPT	PMH147	12
26	Extension cord w/bullet connectors, 25'	RC025	ref.

\*Refer to illustration on following page.

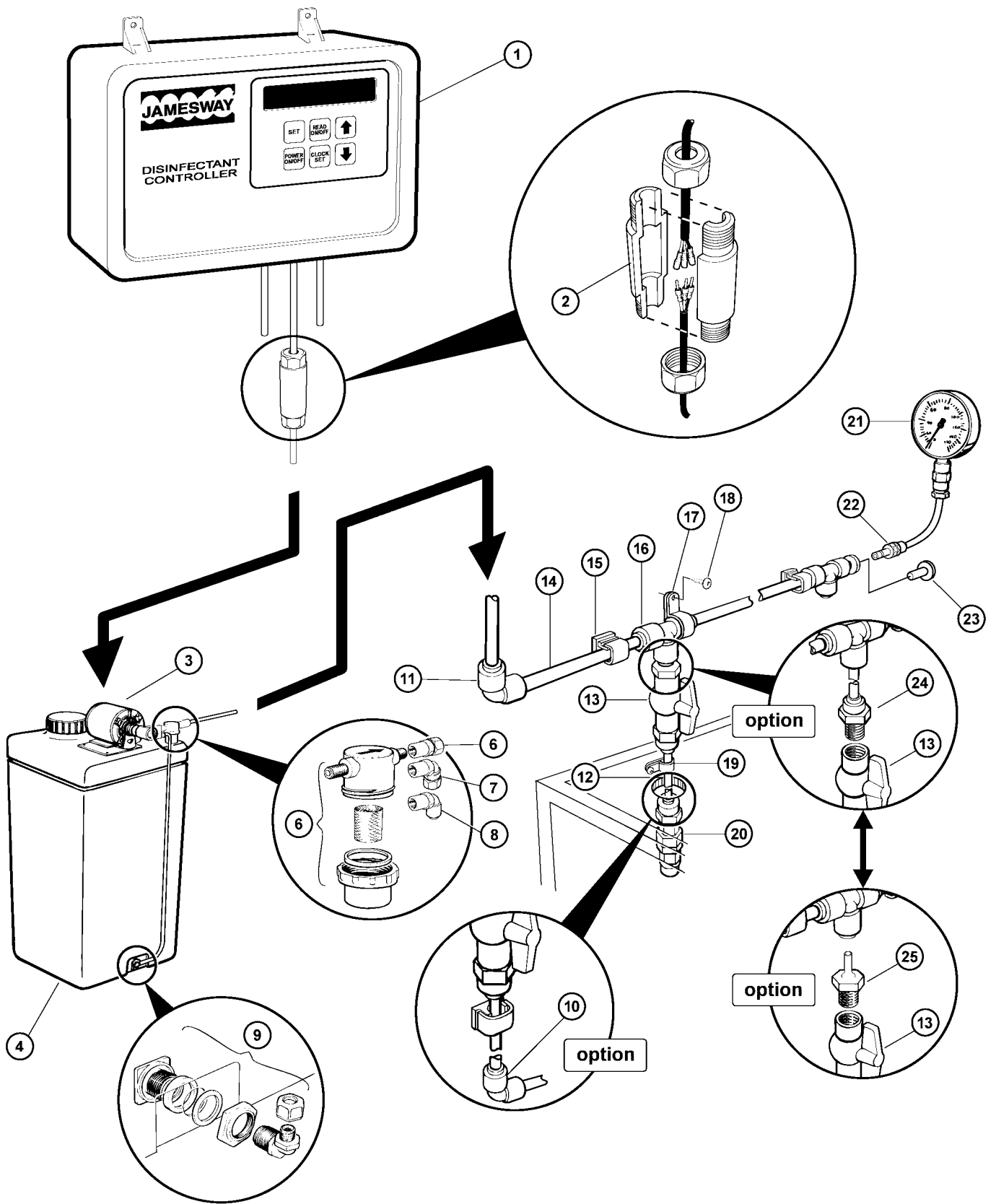


Figure A-1: Exploded parts diagram – Hachery Disinfectant System

## Hatchery Disinfectant System – Atomizer Unit Installation Kit

(Based on the total number of atomizers required for all machines)

Kit Description	Part Number	Quantity Ordered
10 Atomizer Unit Accessory Kit – 115V operation	JH010-115	
10 Atomizer Unit Accessory Kit – 220V operation	JH010-220	
20 Atomizer Unit Accessory Kit – 115V operation	JH020-115	
20 Atomizer Unit Accessory Kit – 220V operation	JH020-220	
50 Atomizer Unit Accessory Kit – 115V operation	JH050-115	
50 Atomizer Unit Accessory Kit – 220V operation	JH050-220	
100 Atomizer Unit Accessory Kit – 115V operation	JH100-115	
100 Atomizer Unit Accessory Kit – 220V operation	JH100-220	

Part Description	Part Number	Quantity included per Kit			
		10 unit	20 unit	50 unit	100 unit
<i>(included in all Kits – quantity change only)</i>					
Electronic Controller (115V, 60Hz)	EC130	1	1	1	1
Electronic Controller (220V, 50Hz)	EC230	1	1	1	1
Liquid-tight Connector Housing with nuts	RC200	1	1	1	2
Pump (115V, 60Hz)	BP700-115	1	1	1	2
Pump (220V, 50Hz)	BP700-220	1	1	1	2
Polyethylene Tank – 55gal (210 L)	PMH100	1	1	1	2
Elbow Fitting (Tank supply)	PMH111	1	1	1	2
Inline Filter	T111	1	1	1	2
3/8" x 1/4" FPT Connector	PMH137	1	1	1	2
3/8" x 1/4" Reducing Bushing	BP703	1	1	1	2
3/8" Tube x 1/4" MPT Elbow Fitting	PMH103	1	1	1	2
Pressure Gauge	UCS107	1	1	1	1
1/4" Tube x 3/8" MPT	PMH130	1	1	1	1
1/4" Tubing – 50 feet (15.2 m)	T113	1	2	2	4
3/8" Tubing – 200 feet (61 m)	PMH200	1	2	2	4
3/8" x 3/8" x 3/8" Tube Tee	PMH142	2	5	15	30
3/8" x 3/8" x 1/4" Tube Tee	PMH143	10	20	50	100
3/8" x 1/4" Tube Elbow	PMH144	5	10	25	50
1/8" MPT x 1/4" Valve Connector	PMH105	20	40	100	200
Shut-off Valve	PMH106	10	20	52	105
13/16" Clamp	PMH107	25	50	100	200
1/4" Clamp	PMH108	25	50	75	100
Self-tapping Screw	UCS17	50	100	200	500
3/8" Clamp	PMH138	25	50	75	175
FPT Check Valve with Grey Mister (atomizer)	HP205-95C	12	22	55	110
3/8" x 3/8" Tube Elbow	PMH145	10	20	50	105
1/4" Tube x 1/8" MPT Elbow	PMH147	12	22	55	110
1/4" Tube Stem x 1/8" MPT	PMH148	10	20	50	105

<b>Options extra to standard Kit</b>	<b>Part Number</b>	<b>Quantity</b>	<b>Quantity Ordered</b>
Electronic Disinfectant Controller (115V, 60 Hz)	EC130	1	
Electronic Disinfectant Controller (220V, 50 Hz)	EC230	1	
Liquid-tight Connector Housing with nuts	RC200	1	
Pump (115V, 60Hz)	BP700-115	1	
Pump (220V, 50Hz)	BP700-220	1	
Polyethylene Tank – 55 gal (210 L)	PMH100	1	
FPT Check Valve with Grey Mister (atomizer)	HP205-95C	1	
Inline Filter	T111	1	
3/8" x 1/4" FPT Connector	PMH137	1	
Shut-off Valve	PMH106	1	
Cap Plug Fitting (required for Pressure Gauge test points)	PMH154	1	
25' (7.6 m) Extension Cord with bullet connectors	RC025	1	
50' (15.2 m) Extension Cord with bullet connectors	RC050	1	
75' (22.8 m) Extension Cord with bullet connectors	RC075	1	
100' (30.5 m) Extension Cord with bullet connectors	RC100	1	

## Appendix B: Troubleshooting

### Electronic Controller

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When the Electronic Controller detects an internal diagnostic problem, the LED panel will display an error message. The following table represents a selection of these error messages, and the proper corrective actions to be taken.

ELECTRONIC CONTROLLER		
Message on Display Panel	Condition	Action
JAMESWAY VERSION 1.09	This message always appears upon initial power-up. The current version of the software installed in the Controller is displayed. This message is also displayed immediately following a power outage.	No action is required, as the Controller will enter into operation within 10 seconds.
SET CLOCK BAD TIME	Indicates that the lithium battery cell is powerless.	Replace the battery inside the Controller unit (refer to Figure 4 on page 10) and reprogram the clock (refer to Table 2 on page 16).
ENTER PROGRAM CHECK BATTERY	This message appears after the clock has been reprogrammed.	The complete desired program must now be entered (refer to Table 1 on page 15).

*Table T6: Troubleshooting Internal Diagnostics Messages*

# Appendix C: Organisms and Surface Disinfectants

*Note: The following unabridged text (pages 27 to 29) is taken directly from the Commercial Chicken Production Manual – 4th Edition (147-151), by Mack O. North and Donald D. Bell, published by Van Nostrand Reinhold, New York 1993.*

## General

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Surface disinfectants differ in their action according to the type of organism involved.

### **Bacterial organisms**

Most surface disinfectants are bactericidal (kill), but some chemicals only disrupt the life cycle of the bacterium (bacteriostatic). A large number will suppress the growth of gram-positive bacteria, while others will inactivate the gram-negative. A disinfectant can be bactericidal at one concentration and bacteriostatic at lower levels.

### **Viral organisms**

Viruses pose a special problem for a surface disinfectant inasmuch as viruses are inanimate until housed in the host cell. Most disinfectants only partially inactivate them. To inactivate a virus, the agent must disrupt the non-nucleic acid protein coat around the nucleic acid (gene material) contents. When only the coat, and not the contents, of the virus is destroyed, the viral nucleic acid can enter the host cell and become reactivated.

### **Fungal Organisms**

Surface disinfectants having fungicidal or fungistatic properties for use in hatcheries or on poultry farms must be capable of destroying or inactivating the fungal spores. But the fungus organism is difficult to destroy, and most fungicides only poison the fungus rather than destroy the fungal cells.

### **Protozoal organisms**

Some, but not all, protozoal parasites spend part of their life cycle outside the host. Sanitizers effective against such organisms therefore must make their attack during the quiescent life stages, which in themselves vary and generally represent the most resistant phase of the organisms' lives.

There are few surface disinfectants specific for protozoal organisms affecting poultry. Even though several chemical compounds are applicable, their concentrations and cost make them unacceptable.

# Chemicals Used for Disinfecting

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## General

The chemicals used for surface disinfecting are many and their values are highly variable. Sanitizers may be grouped according to their base ingredient, but there are many things that affect their potency, all of which must be understood to cause the disinfectant to produce normal effectiveness.

## Cresols and Cresylic Acid

Cresols and cresylic acid are liquid yellow or brown coal tar derivatives. They have a strong odor, irritate the skin, and turn milky when water is added, but they have excellent germicidal action. Many types are available; some are used in conjunction with a detergent. Their odor may injure day-old chicks. They are effective against gram-positive and gram-negative bacteria, most fungi, and some viruses. They are compatible with anionics (charged ionic compounds) but not with nonionics, and work best in an acid pH. They have greater use in the poultry house than in the hatchery. Cresol, also called methyl phenol ( $C_6H_4CH_3OH$ ), may be used for disinfecting floors or room surface areas, equipment, and footbaths.

## Phenols

Phenols are also coal tar derivatives with a base of carbolic acid ( $C_6H_5OH$ ). Synthetic related compounds also fall in this category. Phenols have a characteristic odor, turn milky in the presence of water, and are effective germicides. The most common types used as disinfectants are the synthetic arylphenols, the simple alkylphenols, the halogenated phenols, and the nitrophenols.

Most phenols are not compatible with the nonionic (neither anionic or cationic, but produce neutral colloidal properties) surfactants and should not be used with them. They are compatible with anionics (charged ionic compounds) and are more active in an alkaline pH because of their greater solubility. Their action is rapid. Such disinfectants are effective against fungi, gram-positive and gram-negative bacteria, but not effective against bacterial spores. They will control some viruses. In high concentration, phenols act as a protoplasmic poison, penetrating and disrupting the cell wall and precipitating the cell proteins, but in low concentrations only the essential enzyme systems of the cell are disrupted. Synthetic phenols may be used for egg dipping, hatchery and equipment sanitation, and footbaths.

**Phenol coefficient.** This may be defined as the ratio of killing power of a disinfectant to the killing power of pure phenol. It is used to compare the efficiency of disinfectants, using phenol as the base. But the intricacies of the laboratory comparison are many; the test must be regulated and conducted carefully.

## Iodine

Iodine compounds are available as iodophors, which are combinations of elemental iodine and an organic solubilizing agent, usually a nonionic surface action agent that is soluble in water. The compounds react only with nucleic acid of the cell contents. They are good disinfectants in an acid situation (pH of 2.0 to 4.0), but activity diminishes in an alkaline pH and in the presence of organic material. They are effective against gram positive and gram-negative bacteria, attacking the nucleic acid of the organisms. Iodophors are also effective against fungi and some viruses.

## Chlorine

Chlorine is an effective constituent of certain disinfectants. Included are the powder forms of sodium or calcium hypochlorite combined with hydrated trisodium phosphate, liquids containing sodium hypochlorites and organic chloramines.

Chlorine compounds are good disinfectants when free chlorine is available in abundance (200 to 300 ppm). When elemental chlorine or hypochlorites are added to water they produce hypochlorous acid (HOCl), which produces the bactericidal action. But in the presence of organic material the chlorine combines with the organic material to form stable compounds, and therefore reduces the free chlorine in solution.

Chlorine is effective against bacteria and fungi, and when coming from hypochlorites it attacks both the protein coat and the nucleic acids of viruses. Bound chlorines, as in chloramines, have poor activity. Chlorine solutions are much more active in acid solutions than in alkaline, and in a warm rather than in a cold mixture. Sodium hypochlorite is very active, but its disinfecting life is short. In contrast, calcium hypochlorite is less active, but its disinfecting quality persists for a long period. Chlorine compounds are somewhat irritating to the skin and corrosive to metal.

*Caution: The use of quaternary ammonium compounds on poultry farms has met with resistance in some countries because of the injurious effects on human beings when foods are involved. It should be withdrawn five days before the birds are marketed.*

## Quaternary Ammonium

These compounds are cationic (have positively charged ions), odorless, clear, generally non-irritating, have a deodorizing and detergent action, and are quite effective as surface disinfectants. The most common is alkyl dimethyl benzyl ammonium chloride. Quaternary ammonium compounds are extremely water soluble, but cannot be used in soapy solutions or where there is a residue of soap or anionic detergent. Their germicidal properties are reduced in the presence of organic material.

These chemicals are effective against gram-positive organisms, moderately effective against gram-negative, and will control some fungi and some viruses. Their effectiveness is increased by the addition of sodium carbonate inasmuch as this increases the alkalinity of the solution, and are quite effective in mild acid carriers and with hard waters. A solution of 500 ppm quaternary ammonium, 200 ppm, EDTA (ethylene diamine tetraacetic acid) and sodium carbonate added to adjust the pH to about 8.0 (about 200 ppm) is an excellent hatchery disinfectant. It may be used on floors, walls, and incubator trays.

*End of unabridged text.*

## Glossary

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**Atomizer:** A complete unit comprises one liquid tight connector, one check valve fitting and one atomizing grey mister.

**Brown outs:** A partial power outage (not a full black out).

**Microorganism:** *(unabridged text from Commercial Chicken Production Manual, page 746)*

Microorganisms constitute a large group of living cells that complete their life cycle in their minute state; they do not form conglomerates of cells as are found in the higher forms of life.

Most such cells remain in a single form, although they may align themselves with other similar cells to form long filaments or chains. Being living organisms, their function is similar to that of higher organisms; they digest and assimilate food, and excrete waste products.

As do higher forms of life, they necessarily must fight for survival. Being small, they have been provided by nature with a survival potential through their ability to reproduce in extremely large numbers. These large numbers mean that dissemination is great; most microorganisms are abundant everywhere.

Some microorganisms are necessary to complete various reactions required to sustain the complex forms of life. Others are pathogenic; they produce certain reactions that are detrimental to the higher forms, among which is the chicken.

The organisms producing diseases in chickens are too small to be seen with the naked eye; a microscope must be used. All such organisms are not similar in structure, size, chemical composition, mode of nutrition, or in the manner in which they attack their host. In the main such organisms may be divided into four classes: (1) bacteria, (2) viruses, (3) protozoa, and (4) fungi. Although the organisms within each of these groups are similar in many respects, most may be identified only by using intricate laboratory techniques.

*End of unabridged text.*