# **Document History**

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# Safety

The following safety icons are used in this manual:

## Warning

Warnings alert qualified personnel working on BioChambers equipment that a given procedure may injure or kill. The warning appears before the dangerous step, as follows:



#### WARNING Electrical Hazard

Ensure power to circuit AB is disconnected before continuing.

## Caution

Cautions alert qualified personnel working on BioChambers equipment that a given procedure may damage equipment or tools. The caution appears before the risky step, as follows:



#### CAUTION

Prying open the BB Panel may keep the panel from fitting, and will mar the surface finish.

## Note

Notes provide extra information and appear as follows:

Note	To remove the panel, loosen each corner.
------	--

# Introduction

This section introduces the BioChambers VNet 4 software.

### **Main Screen**

Below is the home screen of BioChambers VNet 4 with an explanation of the features.



1. Home button

Accesses the home screen

2. Day and Time

Displays the day and time of the currently running schedule in BioChambers VNet 4

3. Schedule Line

Displays the current setpoints and readings of the BioChambers equipment

4. Real Time Readings

Displays the current readings of the BioChambers equipment

5. Home screen buttons

Used to access the features and functions of BioChambers VNet 4

6. Name and Status

Status and name of chamber

7. Access Level

Displays the security access level of the current BioChambers VNet 4 user

8. Connection button

Accesses the connection functions of BioChambers VNet 4

## **Opening BioChambers VNet 4**

BioChambers VNet 4 should open as soon as the chamber computer starts. If the software is not running follow this procedure:

- 1. Click on the **Start** button at the bottom left.
- 2. Click on the BioChambers VNet 4 shortcut.

## **Exiting BioChambers VNet 4**

To exit BioChambers VNet follow this procedure:

1. Click on the **Connection** button at the bottom right. The following window will appear:

J Connection	<b>×</b>
Currently connected to	: 10.192.70.200
Current user	: enconair
Current access level	9
Disconnect Logout Login RD Logoff Close	

2. Click on the **Disconnect** button. The following window will appear:

Username:	
Password:	
Controller IP:	
Connect	Quit

3. Click on the **Quit** button.

## **Users and Access Levels**

### Introduction

BioChambers VNet 4 allows for multiple users, each at their own access level. This gives access to only the features required for each type of user. There are 5 access levels to BioChambers VNet 4: Level 1, Level 3, Level 6, Level 8 and Level 9. BioChambers VNet 4 comes with 5 default users, one for each access level.

Username	Access Level	Password
level1	1	level1
researcher	3	researcher
admin	6	admin
service	8	-
enconair	9	-

\*Level 8 and 9 are reserved for BioChambers technicians

The higher the access level the more functions available to the user. Below is a list that details the functions accessible to each user level:

- Level 1 (all users)

0

- Alarms
  - View alarms only
- User manual
- Scheduling
  - View schedule only
  - Graphing & Logging
    - Chamber and alarm logs only
- Service
  - Statistics tab
  - Limits/Monitors tab
  - About tab
  - Defrosting tab
- Level 3 (researcher)
  - All Level 1 functions
  - Scheduling
    - Full access
- Level 6 (administrator)

- All Level 3 functions
- Alarms
  - Full access
- Graphing & Logging
  - Service logs
- Setup
  - General Settings tab
    - Details/Time tab
      - Equipment Details
      - Time Settings
    - Email tab
  - Chambers tab
    - One Four tab
      - General tab
        - General Settings
        - Startup Delay
        - Lamp Loft Settings
        - Limits tab
          - Setpoint Limits
        - CO2 Control tab
          - Disable CO2 Sensor checkbox
  - Logs tab
    - Logging Setup
  - Admin tab
- Level 8 (diagnostics)
  - All Level 6 functions
  - Setup
    - General Settings tab
      - Alarms tab
        - General Alarm Bypasses
    - Chambers tab
      - One Four tab
        - Alarms tab
          - Chamber Alarm Bypasses
    - Logs tab
      - Full access
    - Network tab
- Level 9 (super-administrator)
  - All functions

## Logging In

To access certain BioChambers VNet 4 functions the user must log in and obtain a higher access level. The following procedure explains how to log in as a different user:

1. Click the **Connection** button at the bottom right. The following window will appear:

J Connection			<b>X</b>	
C	urrently connected to:	10.192.70.200		
	Current user: Level1			
	Current access level:	1		
Disconnect	Logout	Login	Close	

2. Click the Login button. The following window will appear:

1	<b>x</b>
Username:	
Password:	
Login	Cancel

3. Click the textbox next to *Username*. The onscreen keyboard will appear:



4. Use the onscreen keyboard to enter the username and click Enter.

- 5. Click the textbox next to Password.
- 6. Use the onscreen keyboard to enter the password and click Enter.
- 7. Click on the **Login** button.

The log in process is complete. The access level can be verified by checking the *Access Level* on the home screen:



#### Logging out

When done using BioChambers VNet 4 a user should log out to prevent unauthorized individuals from using BioChambers VNet 4. The following procedure describes how to log out:

- 1. Click on the **Connection** button.
- 2. Click on the **Logout** button.

The log out process is complete. The logout can be verified by checking the *Access Level* on the home screen:



# Managing Users

An administrator can add, delete and modify users in BioChambers VNet 4. In order to access user management the user access level must at least Level 6.

## Adding a User

To add a user to BioChambers VNet 4 follow this procedure:

1. Click on the **Setup** button on the home screen. The following window will appear:

/ Setup				
General Settings Chambers Logs Admin				
Datails/Time				
Email				
	Unit Name: Chamber Name Unit Serial: 00X000			
	Researcher: BioChambers Contact Info: info@biochambers.com			
	Facility Name: BioChambers Board Serial: 69649			
	Time Settings			
	O Manual Set			
	Year: 2000 Month: 12 Day: 31			
	Hour: 23 Minute: 59 Second: 59			
	Server: 128.100.100.128 Port 123			
	Time Zone: (GMT-06:00) Central Time (US & Canada)			
	✓ Daylight Savings (+1 hour)			
	Okay Cancel			

2. Click on the Admin tab. The following window will appear:

🍠 Setup			<b>×</b>
General Settings Ch	ambers Logs Admin		
Username	Password	Access Level	Delete Llear
enconair	-	9	Delete Oser
admin	admin	6	
researcher	research	3	
Level1	level1	1	
service	-	8	
			Add/Modify User
			Username Password Access Level
			Upload to Controller
			Ukay Cancel

- 3. Click on the textbox below *Username*.
- 4. Use the onscreen keyboard to enter the desired username and click on the **Enter** button.
- 5. Click on the textbox below *Password*.
- 6. Use the onscreen keyboard to enter the desired password and click on the **Enter** button.
- 7. Click on the textbox below Access Level.
- 8. Use the onscreen number pad to enter the desired access level and click on the **Enter** button.

Note	You may only add users up to the access level
	you are currently logged in as.

- 9. Click on the Add/Modify User button.
- 10. Repeat for each user to be added.

11. When all desired users are added click on the **Upload to Controller** button.

## Deleting a User

To delete a user from BioChambers VNet 4 follow this procedure:

1. Navigate to the **Admin** tab as in above procedure. Click on the username to be deleted.

researcher	research	3
Level1	level1	1
service	-	8
delete	delete	1

2. Click on the **Delete User** button.

Note	You may only delete users up to the access level you are currently logged in as. The current user cannot be deleted.
	califiot de deleted.

- 3. Repeat for each user to be deleted.
- 4. When all desired users are deleted click on the **Upload to Controller** button.

### Modifying a User

To modify a user from BioChambers VNet 4 follow this procedure:

- 1. Navigate to the **Admin** tab as in above procedure.
- 2. Click on the username to be modified.
- 3. Click on the *Username*, *Password* and/or *Access Level* fields and make the desired modifications.
- 4. Click on the Add/Modify User button.

Note	You may only modify users up to the access
	level you are currently logged in as.

- 5. Repeat for each user to be modified.
- 6. When all desired users are modified click on the **Upload to Controller** button.

# Schedules

BioChambers VNet 4 uses schedules to control the parameters of the equipment. This section will cover all the schedule functions and examples on how to write schedules.

### **Schedule Functions**

All the schedule functions for BioChambers VNet 4 are located in the schedule screen. This can be found by clicking on the **Schedule** button on the home screen. When the schedule window is opened it will show the current schedule by default. Viewing the schedule requires Level 1 access while all other schedule functions require Level 3 access.

Chamber Name									
	av: 1	T	Femperature	Humidity	CO	2	Fluorescents	Halogens	Fan Speed
		Current	20.0°C	50.0	1%	353ppm			85%
	9:24:01	Setpoint	20.0°C	0.0	%	100ppm	///	· • • • • • •	85%
🔍 View C	Current Schedule	🛛 🏹 Edit a	Schedule	🤣 Swite	ch Schedule		Import Schedul	e(s) 🏦	Export Schedule(s)
			(	Schedule N	lame: test.s	sch			
Day	Time	Temperature	e Humio	dity	C02	Flu	orescents	Halogens	Fan Speed
1	00:00:00	20.0°	°C	0.0%	100p	pm	<u> ////</u>	ବନ୍ତୁ	85%
20.0				Schedu	 le Preview				
17.5 15.0 12.5 0 10.0									
5.0 2.5 0.0 1 0:00:00	1 2:00:00 1 4:00	0:00 1 6:00:00	1 8:00:00	1 10:00:00	1 12:00:00 Time	1 14:00:00	1 18:00:00 1 1	1 20:00:00 1 20:00:	00 1 22:00:00
Cham	Chamber Name								
Tuesday, April	, 08, 09:24:01							Access L	evel: 3 Connection

To return to the home screen click on the **Home** button.

#### **View Current Schedule**

When the schedule window is opened it will display the current schedule by default. The current schedule can be displayed at any time by clicking the **View Current Schedule** button.

#### **Editing a Schedule**

To create a schedule or edit an existing schedule click on the **Edit a Schedule** button. This will open edit mode.



1. New Entry

Used to edit the various variables of the schedule. To edit a variable simply click on the field to be changed.

2. Delete Entry button

Used to delete a selected schedule line from the schedule.

3. Add Entry To Schedule button

Used to add the schedule line from the New Entry area into the schedule.

#### 4. Repeat Entry button

Used to repeat a selected schedule line in the schedule.

5. Schedule Lines

Shows the schedule lines.

6. Schedule Preview

Shows a preview of the schedule temperature in a graph as well as the current schedule time within the schedule.

7. Save button

Used to save the schedule. If the schedule has no name it will do a Save As operation.

8. Save As button

Used to save the schedule under a new name.

9. Delete Schedule(s) button

Used to delete schedules from the controller memory. Must have access level 6 to use.

#### 10. Schedule Options button

Used to set options for this schedule.

Examples of how to use these functions to create common schedules are at the end of this section.

#### **Schedule Options**

BioChambers VNet 4 scheduling has many features, some of which must be accessed in the schedule options. Below is a description of each of these features. Examples of how to write schedules using these features is described in the Schedule Examples section.

Schedule Options	x
Schedule Options	Astronomical Clock Settings
Ramp Temperature         Ramp Humidity         Ramp CO2         Ramp Lights         Max Temperature:       0.0 °C         Min Temperature:       0.0 °C         Use Manual Limits	<ul> <li>Bank 1, Max at Midday: 0 %</li> <li>Bank 2, Max at Midday: 0 %</li> <li>Bank 3, Max at Midday: 0 %</li> <li>Bank 4, Max at Midday: 0 %</li> <li>Latitude: 0.0 °</li> </ul>
Manual High Limit: 0.0 °C Manual Low Limit: 0.0 °C Irrigation Fill Time: 0 s Irrigation Soak Time: 0 s	Longitude: 0.0 ° Sun Rise/Set Duration: 0 hrs Time Offset: 0 hrs
Okay	Cancel

Note	Schedule options work on a per schedule basis. Changing the schedule, will change the schedule options.
------	---

#### Ramping

BioChambers VNet 4 schedules can be programmed to ramp setpoints from one value to another over a period of time. For example if a schedule has 2 schedule lines, one with 20°C at 8:00am and another with 25°C at 12:00pm, the temperature setpoint would ramp up from 20°C to 25° between 8:00am and 12:00pm. Conversely between 12:00pm and 8:00am the next day the temperature would ramp down from 25°C to 20°C.

Note	Not all variables can be ramped. Non-dimmable
	lamp banks, for example, will not be ramped with
	the Ramp Dimmers function. Fan speed also cannot
	be ramped.

#### **Manual Limits**

BioChambers VNet 4 uses smart limits to ensure the control is functioning within set parameters. A description of how smart limits function is found in Appendix 1.

In addition to smart limits, manual limits can be used by activating them in the schedule options. By activating the manual limits, the chamber will use these limits in addition to the smart limits in determining whether or not to turn the chamber off based on the temperature in the chamber.

#### Irrigation

BioChambers VNet 4 can be configured to use scheduled irrigation. If so an irrigation column will be in the schedule. Using the schedule options the irrigation fill and soak times can be set in the schedule options.

The irrigation fill time is the amount of time the irrigation solenoid will be active, putting liquid into the chamber. This may be the only setting required for certain equipment. Other equipment uses a drain or siphon to allow soak time before draining the water from the chamber. The soak time can be adjusted in the schedule options as well.

#### The Astronomical Clock

BioChambers VNet schedules can be programmed to use an astronomical clock to control lighting. The goal of this feature is to simulate sunrise and sunset anywhere in the world, from day to day.

The astronomical clock uses the specified location and the schedule clock to simulate real sunrise and sunset times.

- Latitude/Longitude
  - The location you wish to simulate. Enter values in decimal form up to 2 decimal places. Northern and eastern hemispheres are positive values while southern and western hemispheres are negative.

- Sun rise/set duration
  - Used to specify the amount of time (in hours) that the schedule should take to ramp from full darkness to full brightness. A zero setting will turn on the lights to maximum specified intensity at sunrise and off at sunset without ramping.
- Time Offset
  - Used to move the sunrise/sunset times to a more convenient time of day. For example you could move a 6:00am sunrise to 10:00am by entering a value of 4 hours.
- Max at Midday
  - Controls the light intensity during the day period. The values you enter here depend on the type of lighting system.

Lighting	Behavior	Example
System		
Control	Control lighting uses both the	Schedule setpoint = 500µmol
(µmol)	maximum lamps settings and the	Maximum Lamps = 50%
	schedule setpoint to determine the	@ 50% sunrise,
	lighting setpoint throughout the day.	setpoint = 125µmol
Dimmable	Dimmable lighting uses the	Maximum Lamps = 50%
(%)	maximum lamps settings to	@ 50% sunrise, setpoint = 25%
	determine the lighting setpoint	
	throughout the day.	
Non-	Non-dimmable lighting uses the	Maximum Lamps = 100%
dimmable, 4	maximum lamps settings to	@ 13% sunrise, 1/4 levels
Levels	determine the lighting setpoint	@ 38% sunrise, 2/4 levels
	throughout the day.	@ 63% sunrise, 3/4 levels
		@ 78% sunrise, 4/4 levels
Non-	Non-dimmable lighting uses the	Maximum Lamps = 75%
dimmable, 3	maximum lamps settings to	@ 17% sunrise, 1/3 levels
Levels	determine the lighting setpoint	@ 50% sunrise, 2/3 levels
	throughout the day.	@ 84% sunrise, 3/3 levels
	Do not set Maximum Lamps > 75%.	
Non-	Non-dimmable lighting uses the	Maximum Lamps = 50%
dimmable, 2	maximum lamps settings to	@ 25% sunrise, 1/2 levels
Levels	determine the lighting setpoint	@ 75% sunrise, 2/2 levels
	throughout the day.	
	Do not set Maximum Lamps > 50%.	
Non-	Non-dimmable lighting uses the	Maximum Lamps = 25%

dimmable, 1	maximum lamps settings to	@ 50% sunrise, 1/1 levels
Level	determine the lighting setpoint	
	throughout the day.	
	Do not set Maximum Lamps > 25%.	

- Bank 1-4 checkbox
  - Used to specify whether the astronomical clock is enabled or disabled for this lamp bank.

When the schedule is running, the astronomical clock settings can be viewed for information on sunrise and sunset.



An example of writing and running an astronomical clock schedule is given in the Schedule Examples section.

## **Switching Schedules**

The following procedure explains how to switch from the currently running schedule to an existing schedule in BioChambers VNet 4.

1. Click on the **Switch Schedule** button. The following window will appear:

-	Select File Name	-		×
	Filename	Size Date	Time Clus	
l	22C16hrs.sch	127 04/08/	14 09:20:48 161	
	25C16hrs.sch	127 04/08/	14 09:20:54 162	
	bake.sch	127 04/08/	14 09:20:34 160	Okay
	default.sch	127 04/08/	14 09:20:12 159	
				Cancel

2. Click on the schedule to be run.

(	/ Select File Name			×
	Filename	Size Date Time	Clus	
	22C16hrs.sch	127 04/08/14 09:2	0:48 161	
	25C16hrs.sch	127 04/08/14 09:2	0:54 162	
	bake.sch	127 04/08/14 09:2	0:34 160	Okay
	default.sch	127 04/08/14 09:2	0:12 159	
				Cancel

3. Click on the **Okay** button. The following window will appear:



After approximately two seconds the loading window will close and the new schedule will be running.

## **Importing a Schedule**

The following procedure explains how to import a schedule into BioChambers VNet 4. This process is useful for running backed up schedules or transferring schedules from one piece of BioChambers equipment to another.

1. Click on the **Import Schedule(s)** button. The following window will appear:

🥖 Upload			×
Look In: 👔	Documents 💌		
Chedules	3		
File Name:			
Files of Type:	Schedule files only		<b>•</b>
		Upl <u>o</u> ad	Cancel

Note	This screen may appear different depending on the
	system.

- 2. Navigate to where the desired schedule file is saved.
- 3. Click on the desired schedule file.

🥖 Upload		X
Look In: 📋	Schedules	
22C16hrs	sch	
25C16hrs	.sch	
bake.sch		
File Name:	22C16hrs.sch	
Files of Tupe:		
Files of Type.		<b>_</b>
		Upload Cancel

4. Click the **Upload** button.

The schedule file has been imported into BioChambers VNet 4. The file can be edited or ran using the **Edit a Schedule** and **Switch Schedule** functions.

Note	Schedules may behave differently from one
	BioChambers unit to another. After importing,
	always edit the schedule before running it to correct any unwanted behavior.

## **Exporting a Schedule**

The following process explains how to export a schedule from BioChambers VNet 4. This process is useful for backing up schedules or transferring schedules from one piece of BioChambers equipment to another.

1. Click on the **Export Schedule** button. The following window will appear:

/ Select File Name		×
Filename	Size Date Time Clus	
22C16hrs.sch	127 04/08/14 09:25:47 161	
25C16hrs.sch	127 04/08/14 09:20:54 162	
bake.sch	127 04/08/14 09:20:34 160	Okay
default.sch	127 04/08/14 09:20:12 159	
		Cancel

- 2. Click on the desired schedule file.
- 3. Click the **Okay** button. The following window will appear:

🛓 Save		X	
Look In: 📋	Documents		
Chedule:	5		
File Name:	22C16hrs.sch		
Files of Type:	All Files	•	
		Save Cancel	)

Note	This screen may appear different depending on the
	System.

- 4. Navigate to where the selected file is to be saved.
- 5. Click the **Save** button.

The schedule file has been exported. Using the **Import Schedule** function this schedule can now be transferred to another piece of equipment or retrieved as a back-up.

#### **Schedule Examples**

#### **Single-Line Schedule**

A single-line schedule will maintain one setpoint indefinitely.

1. Click on the **Edit a Schedule** button. The following window will appear:



- 2. Click on the **New** button. The schedule window will enter editing mode with an empty schedule loaded.
- 3. Click on the **Temperature** field in the *New Entry* area. The following onscreen keypad will appear:



4. Enter "25.0" and click on the **Enter** button. The value of 25.0°C is entered into the *New Entry* line.

Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed
1	00:00:00	25.0°C	0.0%	0ppm	////	9999	85%

5. Repeat the process to set the humidity to 50%RH and the CO<sub>2</sub> to 200ppm if applicable.

Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed
1	00:00:00	25.0°C	50.0%	200ppm	////	9999	85%

6. Click on the **Fluorescent** field. This field's name will depend on the type of BioChambers equipment the schedule is for. The following onscreen keypad will appear:



7. Click on all the **On/Off** buttons.



- 8. Click on the **Enter** button. The value is entered into the *New Entry* line.
- 9. Click on the **Incandescent** field and repeat the process to all incandescent lamps on.

Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed
1	00:00:00	25.0°C	50.0%	200ppm	1111	<u> </u>	85%

10. Click on the **Add Entry To Schedule** button. The new entry will be added to the schedule.

🥖 Char	mber Nar	ne	1.00		-			1000		_	
		av: 1		Temperature	Humidity	/	CO2	Flu	orescents	Halogens	Fan Speed
		40.00.00	Current	20.0°C	50	0.0%	353ppr	n			85%
		10:32:09	Setpoint	20.0°C	0.	.0%	100ppr	n ,	////	9999	85%
Q	View	Current Schedul	e 🛛 📝 Edit	a Schedule	🥏 Sw	vitch Sche	dule	占 Impo	rt Schedule(s	) 🔒 E	(port Schedule(s)
					Ne	ew Entry					
Day		Time	Temperat	ure Hun	nidity	C02		Fluoresce	ents Ha	alogens	Fan Speed
	1	00:00	:00 25.	0°C	50.0%	2	00ppm			<u> </u>	85%
	Delete I	Entry		4	Add Ent	try To S	chedule	,			C Repeat Entry
					Sche	dule Nam	e:				
Day		Time	Temperat	ure Hun	nidity	C02		Fluoresce	ents Ha	alogens	Fan Speed
	1	00:00	:00 25.	0°C	50.0%	2	00ppm			<b>2222</b>	85%
					Sched	 Jule Previ	ew				,
	25										
	20										
ې پ	15										
	10										
	5										
1	0 <del> </del> 1 0:00:00	i 1 2:00:00 1	4:00:00 1 6:00:0	0 18:00:00	1 10:00:00	1 12:00:0 Time	0 1 14:00:	00 1 16:	00:00 1 18:00	):00 1 20:00:00	1 22:00:00
	Save		Delete Sch	edule(c)							Schedule Options
	Jave										
	Char	mber Name	•								
Tueso	day, Apr	il, 08, 10:32:09								Access Lev	vel: 9 Connection

11. Click on the **Save** button. The following window will appear:

×
kay
ancel

- 12. Click on the textbox at the top and use the onscreen board to type in "single.sch".
- 13. On the onscreen keyboard click on the Enter button.
- 14. Click on the **Okay** button. The following window will appear:



15. Click on the **No** button.

Note	Clicking on the <b>Yes</b> button will switch to this schedule once saved.
	schedule once saved.

The schedule is complete. This schedule will run 25°C, 50%RH and 200ppm CO2 concentration with all lights indefinitely.

#### Single-Day, Multi-Line Schedule

A single-day, multi-line schedule will maintain multiple setpoints throughout the day. After the day is complete the schedule will repeat.

1. Click on the **Edit a Schedule** button. The following window will appear:



- 2. Click on the **New** button. The schedule window will enter editing mode with an empty schedule loaded.
- 3. Click on the **Time** field in the *New Entry* area. The following keypad will appear:



4. Enter "80000" and click on the **Enter** button. The value of 8:00:00 is entered into the *New Entry* line.

Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed
1	08:00:00	20.0°C	0.0%	0ppm	////	9999	85%

- 5. Repeat the process to set the temperature to  $25.0^{\circ}$ C, the humidity to 50%RH, the CO<sub>2</sub> to 200ppm (if applicable) and to set all lights on.
- 6. Click on the **Add Entry To Schedule** button. The new entry will be added to the schedule.

🥖 Char	mber l	Name	contract frame									C	_ 0 <mark>_ X</mark>
		Dav:			Temperature	.   F	Humidity	CO2		Fluorescents	Halogens	Fan	Speed
				Current	20.0°C	2	50.0%	353pp	om				85%
		10:	38:16	Setpoint	20.0°C	5	0.0%	100pp	om	1111	9999		85%
Q	Vie	ew Curre	ent Schedule	🛛 📝 Edit	a Schedule		🛷 Switch Sch	edule	占 In	nport Schedule(s	) 🔒 E	xport Sc	hedule(s)
							New Entry						
Day			Time	Temperat	ture H	lumidity	C02		Fluor	rescents Ha	logens	Fan Sr	peed
	1		08:00:0	00 25.	.0°C	50.	.0%	200ppm	1		0000		85%
	Delet	te Entry			ł	🔓 Adı	d Entry To s	Schedul	e			C R	epeat Entry
			Í				Schedule Nan	ie:					
Day			Time	Temperat	ture H	lumidity	C02		Fluor	rescents Ha	logens	Fan S	peed
	1		08:00:0	00 25.	.0°C	50.	.0%	200ppm	L	////	<u> </u>		85%
							Schedule Prev	view					
	26												
	15												
9.	10												
	5												
	1 0:00:00 1 2:00:00 1 4:00:00 1 8:00:00 1 8:00:00 1 10:00:00 1 12:00:00 1 14:00:00 1 18:00:00 1 18:00:00 1 22:00:00 Time												
	Save       Image: Control of the second												
	Ch	ambe	er Name										
Tueso	Tuesday, April, 08, 10:38:16 Connection												

- 7. Click on the **Time** field in the *New Entry* area. Enter "160000" and click on the **Enter** button. The value of 16:00:00 (4:00pm) is entered into the *New Entry* line.
- 8. Continue modifying the values in the *New Entry* area to set the temperature to 20.0°C, the humidity to 50%RH, the CO<sub>2</sub> to 200ppm and to set all lights off.

Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed
1	16:00:00	20.0°C	50.0%	200ppm	////	9999	85%

9. Click on the **Add Entry To Schedule** button. The new entry will be added to the schedule.

🥖 Cha	amber l	Name	contact the													
		Day:				Tempera	ture	Humidity	,	CO2		Fluorescents	Halo	gens	Fa	an Speed
					Current	20.	0°C	50	.0%	353p	opm					85%
		10:3	39:49	1	Setpoint	20.	0°C	0.	.0%	100p	pm	1111	9	1999		85%
	🖁 Vie	w Curre	nt Schedu	le	🛛 📝 Edit a	a Schedu	ıle	🤣 Sw	vitch Sche	dule	🕹 Ir	mport Schedule	(s)	🔒 Ex	port S	Schedule(s)
								Ne	ew Entry							
Day			Time		Temperati	ure	Humidit	y	C02		Fluor	rescents	Halogen	S	Fan	Speed
	1		16:00	0:00	20.	0°C	5	0.0%	2	200ppm	4			199		85%
	Delet	te Entry	]				占 Add Entry To Schedule			le				Ċ	Repeat Entry	
								Sche	dule Nam	e:						
Day			Time		Temperati	ure	Humidit	y	C02		Fluor	rescents	Halogen	S	Fan	Speed
	1		08:00	00:00	25.0	0°C	5	0.0%	2	200ppm		////	29	200		85%
	1		16:00	00:00	20.0	0°C	5	0.0%	2	200ppm	,	////		299		85%
	25							Sched	lule Prev	iew						
	20															
	15															
9	10															
	5															
	1 0.0000 12:00:00 14:00:00 16:00:00 16:00:00 110:00:00 112:00:00 114:00:00 116:00:00 118:00:00 120:00:00 122:00:00 Time															
	Save Save As Delete Schedule(s)															
	Chamber Name															
Tues	day, A	April, 08,	10:39:50										A	ccess Lev	rel: 9	Connection

10. Click on the **Save** button.

11. Save the schedule as "DayNight.sch".

The schedule is complete. Between the hours of 8:00am and 4:00pm the first schedule line will be run. Between the hours of 4:00pm and 8:00am the second schedule line will be run. This day will repeat indefinitely.

#### **Create a Ramping Schedule**

- 1. Click on the **Edit a Schedule** button.
- 2. Use the same process as the previous example to create a singleday, two-line schedule. Use the same parameters as above for these two schedule lines. Wait to save the schedule until the end of this example.

- 3. Click on the **Schedule Options** button.
- 4. Click on the **Ramp Temperature** checkbox.

Schedule Options	×	
Schedule Options	Astronomical Clock Settings	
Ramp Temperature	Bank 1, Max at Midday: 0%	
Ramp CO2	Bank 2, Max at Midday: 0 %	
Ramp Lights	Bank 3, Max at Midday: 0 %	
Max Temperature: 0.0 °C Min Temperature: 0.0 °C	Bank 4, Max at Midday: 0 %	
Use Manual Limits	Latitude: 0.0 °	
Manual High Limit: 0.0 °C	Longitude: 0.0 °	
Manual Low Limit: 0.0 °C	Sun Rise/Set Duration: 0 hrs	
Irrigation Fill Time: 0 s	Time Offset: 0 hrs	
Irrigation Soak Time: 0 s		
Okay	Cancel	

5. Click on the **Okay** button. The schedule will change to a temperature ramping schedule.

🕖 Chamb	oer Name	5 O O #								- C X
	Dav:			Temperature	Humidity	CO	2	Fluorescents	Halogens	Fan Speed
			Current	nt 20.0°C		0%	353ppm			85%
	11:	12:11	Setpoint	20.0°C	0.0	)%	100ppm	////	9999	85%
	🔍 View Current Schedule 🛛 🎢 Edit a Schedule 🖉 🖗 Switch Schedule 🛛 🕌 Import Schedule(s) 🔒 Export Schedule(s)									ort Schedule(s)
					Nev	w Entry				)
Day		Time	Temperate	ure Hum	nidity	C02	Fluc	orescents Ha	alogens	Fan Speed
	1	08:00:00	25.	0°C	50.0%	200p	opm	////	<b>0000</b>	85%
De	elete Entry			4	Add Entr	y To Sch	nedule			C Repeat Entry
					Sched	ule Name:				
Day		Time	Temperate	ure Hum	nidity	C02	Fluc	prescents Ha	alogens	Fan Speed
	1	08:00:00	25.	0°C	50.0%	200p	opm	////	<b>0000</b>	85%
	1	16:00:00 20.0°C		0°C	50.0% 200pp		pm ////		<b>9999</b>	85%
25					Schedu	Ile Preview				
20										
15										
ပ 10										
5										
0										
10:		2:00:00 1 4:0	3:00 1 8:00:00	1 8:00:00		Time		1 16:00:00 1 18:00	1 20:00:00	1 22:00:00
Save As     Delete Schedule(s)										
0	Chamber Name									
Tuesda	y, April, 08	, 11:12:12							Access Leve	I: 9 Connection

Notice the schedule preview graph. This is how the temperature setpoint will change throughout the day.

- 6. Click on the **Save** button.
- 7. Save the schedule as "DayNightRamp.sch".

The schedule is complete. Between the hours of 8:00am and 4:00pm the temperature will ramp from 25°C to 20°C with the lights on. Between the hours of 4:00pm and 8:00am the temperature will ramp from 20°C to 25°C with the lights off. This day will repeat indefinitely.

#### **Multi-Day Schedule**

A multi-day schedule will maintain multiple setpoints over many days. After the final day is complete the schedule will repeat.

- 1. Click on the Edit a Schedule button.
- 2. Use the same process as the previous example to create a singleday, two-line schedule. Use the same parameters as above for these

two schedule lines. Wait to save the schedule until the end of this example.

3. Use the same process above to create two more schedule lines with the following parameters:

Line 3: Day (2), Time (7:30:00), Temperature (23.0°C), Humidity (50%RH), CO<sub>2</sub> (200ppm), Lights (all on)

Line 4: Day (2), Time (16:30:00), Temperature (19.0°C), Humidity (50%RH), CO<sub>2</sub> (200ppm), Lights (all off)

/ Chamb	per Name	uniter has								
		v: 1	Те	emperature	Humidity	cc	)2	Fluorescents	Halogens	Fan Speed
	Current 20.0		20.0°C	50.	.0%	353ppm			85%	
	1(	D:41:28	Setpoint	20.0°C	0.0	0%	100ppm	////	9999	85%
Q	View Cu	irrent Schedule	🛛 📝 Edit a S	chedule	🥏 Swi	itch Schedul	e 🛃 I	mport Schedule(s	s) 🔒 Ex	port Schedule(s)
					Ne	w Entry				
Day	ay Time Temperature		Humi	dity	C02	Flue	prescents H	alogens	Fan Speed	
	2	16:30:00	19.0°	C	50.0%	200	ppm	////	<b>????</b>	85%
De	elete Ent	try		4	占 Add Entry To Schedule				[	C Repeat Entry
					Sched	lule Name:				
Day		Time	Temperature	Humi	dity	C02	Flue	prescents H	alogens	Fan Speed
	1	08:00:00	25.0°0	0	50.0%	200	ppm	////	<b>~~~</b>	85%
	1	16:00:00	20.0°0	C	50.0%	200	ppm	////	<b>9999</b>	85%
	2	07:30:00	23.0°	C	50.0%	200	ppm	1111	<u> </u>	85%
	2	16:30:00	19.0°	C	50.0%	50.0% 200ppm		////	<b>????</b>	85%
					Sched	ule Preview	1			
25										
20										
ျ မ										
10										
5										
1 0:	:00:00	14:00:00 18:00	):00 1 12:00:00	1 16:00:00	1 20:00:00	2 0:00:00 Time	; 2 4:00:00	2 8:00:00 2 12:0	0:00 2 16:00:00	2 20:00:00
🔳 Sa	Save Save As Delete Schedule(s)									
	Chamber Name									
Tuesday	y, April,	08, 10:41:28							Access Lev	el: 9 Connection

- 4. Click on the **Save** button.
- 5. Save the schedule as "2Day.sch".

The schedule is complete. The schedule will run as follows:

Time Period	Schedule Line
Day 1, 12:00am to 8:00am	Schedule Line #4
Day 1, 8:00am to 4:00pm	Schedule Line #1
Day 1, 4:00pm to Day 2, 7:30am	Schedule Line #2
Day 2, 7:30am to 4:30pm	Schedule Line #3
--------------------------	------------------
Day 2, 4:30pm to 12:00am	Schedule Line #4

After the last schedule day the schedule will repeat from first schedule day.

#### **Creating an Astronomical Clock Schedule**

- 1. Click on the **Edit a Schedule** button.
- 2. Create a single-day, two-line schedule. Wait to save the schedule until the end of this example.
- 3. Select the first schedule line.

			Schedu	le Name:			
Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed
1	08:00:00	25.0°C	50.0%	200ppm	////	<u></u>	85%
1	16:00:00	20.0°C	50.0%	200ppm	////	9999	85%

4. Click on the **Repeat Entry** button. The following window will appear:

1	
Repeat selected entry every	b days, 0, hours 0 minutes, 0 seconds
for 0 days,	0 , hours 0 minutes, 0 seconds
Okay	Cancel

- 5. Under "Repeat selected line every" set the number of *Days* to 1.
- 6. Under "For" set the number of *Days* to 365.
- 7. Click on the **OK** button. The schedule preview will appear as follows:

			Schedu	ile Name:			
Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed
1	08:00:00	25.0°C	50.0%	200ppm	[[[]]	<u> </u>	85%
1	16:00:00	20.0°C	50.0%	200ppm	////	9999	85%
2	08:00:00	25.0°C	50.0%	200ppm	1111	<u> </u>	85%
3	08:00:00	25.0°C	50.0%	200ppm		<b>~~~</b>	85%
4	08:00:00	25.0°C	50.0%	200ppm	1111	<u> </u>	85%

8. Select the second schedule line and repeat the same process. The schedule preview will appear as follows:

			Sched	ule Name:				
Day	Time	Temperature	Humidity	C02	Fluorescents	Halogens	Fan Speed	
1	08:00:00	25.0°C	50.0%	200ppm	////	<u> </u>	85%	
1	16:00:00	20.0°C	50.0%	200ppm	////	<b>????</b>	85%	
2	08:00:00	25.0°C	50.0%	200ppm	1111	<u> </u>	85%	
2	16:00:00	20.0°C	50.0%	200ppm	////	<b>????</b>	85%	
3	08:00:00	25.0°C	50.0%	200ppm	1111	<u> </u>	85%	V

The schedule now contains two lines for each day of the year. Each schedule day has a day and night temperature. For more precise control you may wish to have three or more schedule lines for each day.

9. Click on the **Schedule Options** button. The following window will appear:

Schedule Options			x
Schedule Options	Astronomical Clock Settings	;	
Ramp Temperature	Bank 1, Max at Midday:	0	%
Ramp CO2	Bank 2, Max at Midday:	0	%
Ramp Lights	Bank 3, Max at Midday:	0	%
Min Temperature: 0.0 °C	Bank 4, Max at Midday:	0	%
Use Manual Limits	Latitude:	0.0	•
Manual High Limit: 0.0 °C	Longitude:	0.0	•
Manual Low Limit: 0.0 °C	Sun Rise/Set Duration:	0	hrs
Irrigation Fill Time: 0 s	Time Offset:	0	hrs
Irrigation Soak Time: 0 s			
Okay	Cancel		

- 10. Use the onscreen keyboard to enter the latitude, longitude, duration, offset and maximums for the schedule.
- 11. Click on the **Bank 1** and **Bank 2** checkbox.

Schedule Options	×	J
Schedule Options	Astronomical Clock Settings	
Ramp Temperature         Ramp Humidity         Ramp CO2         Ramp Lights         Max Temperature:       0.0         Win Temperature:       0.0         Use Manual Limits         Manual High Limit:       0.0         Manual Low Limit:       0.0         Irrigation Fill Time:       0         s	<ul> <li>✓ Bank 1, Max at Midday: 100 %</li> <li>✓ Bank 2, Max at Midday: 100 %</li> <li>○ Bank 3, Max at Midday: 0 %</li> <li>○ Bank 4, Max at Midday: 0 %</li> <li>Latitude: 50 °</li> <li>Longitude: 90 °</li> <li>Sun Rise/Set Duration: 1 hrs</li> <li>Time Offset: 0 hrs</li> </ul>	
Okay	Cancel	

12. Click on the **OK** button.

13. Save the schedule as "astro.sch".

The schedule is complete. This type of schedule will control the lighting using the astronomical clock settings and the schedule day and time. The non-lighting variables are unaffected. Below is how to run an astronomical clock schedule.

- 14. Run the schedule using the Switch Schedule function.
- 15. When running the schedule the following window will appear:

Schedule Start Time	m. 200a	- 11	111	×
When would	you like to start t	he schedule?	)	
◯ By Numerical Day:	• E	By Calendar D	Day:	
	January V			1970
	Sun Mon T	ue Wed Th	u Fri	Sat
		1	2	3
1	4 5	8 7 8	9	10
		13 14 15	5 18	17
	18 19 2	20 21 22	2 23	24
	25 28 2	27 28 29	30	31
				Okay

- 16. Click on the **By Calendar Day** radio button.
- 17. Use the date chooser to select which day of the year to being the schedule.
- 18. Click on the **OK** button.

BioChambers VNet 4 will calculate the correct numerical day of the year (1-365) automatically and start the schedule on the line with that day value.

## Alarms

BioChambers VNet 4 has a sophisticated alarm system that assists in diagnostic work and prevents damage to the equipment or research. Each alarm is assigned a priority as follows:

- Priority 0 Informational alarms that do not affect equipment operation.
- Priority 1 Cautionary alarms. The chamber is still running but continuous cautionary alarms are a concern.
- Priority 2 or Higher Critical alarms that will shut the chamber down.

The octagonal light on the **Name and Status** tab will change color to indicate the general alarm condition of the chamber:

State	Color	Description
Clear	Green	The chamber is running with no alarms higher than Priority 0
		and any previous alarms have been cleared by an administrator.
Cautionary	Yellow	The chamber is running but has one or both of the following:
		- Active Priority 1 alarms
		- Inactive Priority 1 or higher alarms that have not been cleared
Critical	Red	The chamber is off due to an active Priority 2 or higher alarm.

A list of recent and currently active alarms can be viewed by clicking on the **Alarms** button on the home screen.

🥑 Alarr	ns	hedule	🕈 Ala	-	<b>x</b>
Time		Source	Alarm	Priority	State
Apr, 0	8, 11:18:36	Chamber Name	Suction Pressure Alarm	2	Active
Alarm	Clea Description:	r and Reset All		Close	
	-		-		-

Note	Access Level 6 is required in order to clear and reset the alarms.
	the alarms.

Alarm history can also be viewed using the Logs and Graphing functions.

If a problem persists please contact BioChambers:

Telephone: 204-589-8900

Toll Free: 800-361-7778

Email: <a href="mailto:service@biochambers.com">service@biochambers.com</a>

### Logs and Graphing

BioChambers VNet 4 has sophisticated logging that allows researchers to download and view the operating variables of the experiment. BioChambers VNet 4 has two main methods for viewing and retrieving this data. The Graph will display the logged data graphically and the Logs will display the logged data in tabular form.

Access to logged data is as follows:

- Level 1 (all users)
  - Chamber and alarm logs
- Level 6
  - All Level 1 functions
  - Portions of the service logs used for diagnostics
- Level 9
  - All level 6 functions
  - Full service log

#### Graphing

The BioChambers VNet 4 Graph function allows users to view logged data in graphical form within the software. The following exercise will go through the various functions and features of BioChambers VNet Graphing 4.



# 1. Click on the **Graph** button on the home screen. The following window will appear:

2. Click on the **Graph Setup** button. The following window will appear:

🥑 Graph Setup
Plot 1 Plot 2 Plot 3 Plot 4
<ul> <li>Temperature Reading</li> <li>Temperature Setpoint</li> <li>Humidity Reading</li> <li>Humidity Setpoint</li> <li>Light Setpoint 1</li> <li>Light Setpoint 2</li> <li>Light Setpoint 3</li> <li>Alarms</li> </ul>
First Axis Units: C Second Axis Units: -
Okay

The Graph Setup is used to choose what variables are graphed on each plot.

3. Choose Light 1 Setpoint from the list.

🥑 Graph Setup
Plot 1 Plot 2 Plot 3 Plot 4
✓ Temperature Reading
Temperature Setpoint Humidity Reading
Humidity Setpoint
Light Setpoint 2
First Axis Units: C Second Axis Units: Levels
Okay

Notice how some of the options are now unavailable. This is because two units have been assigned to the graph, degrees Celsius and Levels. Therefore it is not possible to add any other variables that do not share these units.

/ FXC-19 13C002							
	Dav: 4		Temperature	Humidity	Top Canopy	Fan Speed	
	40.00.00	Current	40.0°C	26.8%		85%	
	10:29:09	Setpoint	40.0°C	90.0%		85%	
40.0						4.00	
10.0						- 3.75	
37.5						- 3.50	
35.0						· 3.25	
32.5						- 3.00	
30.0						· 2.75	
27.5						· 2.50	
27.0						- 2.25	
O 25.0						2.00 8	
22.5						- 1.75	
20.0						- 1.25	
17.5						1.00	
15.0 -						- 0.75	
15.5						· 0.50	
12.5						- 0.25	
10.0						0.00	
	Apr-06 00:00 Apr-06	01:00 Apr-06 02:00 Apr-06 03	1:00 Apr-06 04:00 Apr-06 05:0 Time	D Apr-06 06:00 Apr-06 07:00	Apr-06 08:00 Apr-06 09:00 A	Арг-06 10:00 Арг-06 11:00	
		— Temp	erature Reading — Tempera	ature Setpoint — Light Setpo	int 1		
Graph	Rang	ge (Y-axis): Auto	+			Download Logs	
Setup	Dom	ain (X-axis): 12 Hours	+ -			Graph Options	
FX	C-19 13C00	)2					
Tuesday, A	pril, 08, 10:29:10				Acces	s Level: 1 Connection	

4. Click on the **Okay** button.

Notice that the right vertical axis correspond the Light Setpoint series and uses *Levels* for its unit. The left vertical axis corresponds to the Temperature series and uses °C for its unit.

- 5. Click on the **Graph Setup** button.
- 6. Click on the **Plot 2** tab.
- 7. Click on the **Humidity Reading** and **Humidity Setpoint** checkboxes.
- 8. Click on the **Okay** button.

Day:         4         Temperature         Humidity         Top Canopy         Fan           10:34:24         Current         40.0°C         26.8%              40         Setpoint         40.0°C         90.0%         ////2             40	Speed 85% 85% - 4.0 - 3.5 - 3.0
Current         40.0°C         26.8%           10:34:24         Setpoint         40.0°C         90.0%           40         35         30	85% 85% -3.5 -3.0
10:34:24 Setpoint 40.0°C 90.0%	85% - 4.0 - 3.5 - 3.0
	- 4.0 - 3.5 - 3.0
35 30 U 25	- 3.5 - 3.0
30 - O 25	- 3.0
	- 2.5
	2.0 99 
	- 1.5
15	- 1.0
	- 0.5
	0.0
70	
* <sup>60</sup>	
50 -	
40	
Apr-06 00:00 Apr-06 01:00 Apr-06 02:00 Apr-06 03:00 Apr-06 04:00 Apr-06 05:00 Apr-06 06:00 Apr-06 07:00 Apr-06 08:00 Apr-06 09:00 Apr-06 1 Time	10:00 Apr-06 11:00
— Temperature Reading — Temperature Setpoint — Light Setpoint 1 — Humidity Reading — Humidity Setpoint	
Graph Range (Y-axis): Auto + -	Download Logs
Setup Domain (X-axis): 12 Hours + -	Graph Options
FXC-19 13C002	
Tuesday, April, 08, 10:34:24 Access Leve	el: 1 Connection

A second plot has been added.

There are three buttons right of the *Range (Y-axis)* label.

- Auto
  - Attempts to fit all data in the graph
- +
- Decreases the range, causing the graph to zoom in
- -
- Increases the range, causing the graph to zoom out
- 9. Click on the +, and **Auto** buttons to get a feel for how they operate.
- 10. Click on the combo box next to the *Domain* label. The following list will appear:

12 Hours	
1 Hour	
6 Hours	
12 Hours	
1 Day	
5 Days	
7 Days	
30 Days	

This list allows the user to specify the automatic horizontal axis range. The + and – buttons next to this combo box can be used to manually expand and contact the horizontal axis.

11. Choose some of the horizontal axis buttons to get a feel for how they operate.

The |<, <<, <, >, >> and >| buttons are used to move back and forth on the horizontal axis.

- |<
- Moves to the oldest logged data
- <<
  - Moves to the older data by one half of the current horizontal axis
- <
- Moves to the older data by one sixth of the current horizontal axis
- >
- Moves to the newer data by one sixth of the current horizontal axis
- \_ >>
- Moves to the newer data by one half of the current horizontal axis
- >|
- Moves to the newest logged data

The navigation buttons will not allow viewing beyond the newest logged data.

- 12. Click on the horizontal axis movement buttons to get a feel for how they operate.
- 13. Click on the **Download Logs** button. The following window will appear:



This window allows a user to download the logged data from the controller into BioChambers VNet 4. This may be required to get older logged data than is currently visible or if the logged data has not already been downloaded.

The Main Logs contain control variables like temperature, humidity and lighting at a rate set by the chamber administrator. The Service Logs contain control variables like temperature, humidity and lighting but at a different rate, set by a service technician. In addition the Service Logs contain information about refrigeration and limit sensors. The Alarm Logs contain a record of alarms, indicating the time and whether or not the alarm is active or inactive.

14. Click on the **Main log** button. The following window will appear:



Click on the **Full log** button will download the full log file and clicking on the **Newest Entries** button will download only the most recent data.

Note	Downloading only the newest entries maybe preferred in some cases. Depending on the logging options the full log file may be quite large and take a long time to download
	long time to download.

- 15. Click on the **X** button to cancel.
- 16. Click on the **Graph Options** button. The following window will appear:

Graph Options
Graph Options
Print Properties Cancel

17. Click on the **Properties** button. The following window will appear:

Char	rt Properties		<b>×</b>
	Title Plot	Other	
	General:		
	Show Title:		
	Text:	Title	
	Font:	SansSerif.bold, 12	Select
	Color:		Select
			DK Cancel
			Cancel

Graph settings such as background color can be changed from here. Changing the background color to white makes the graph easier to read when printed.

Chart Properties	_	2007	100.00	×
Title       Plot       Other         Combined_Domain_X       Domain Axis       Apple         General:       Outline stroke:       Outline paint:         Background paint       Background paint	YPlot: Dearance	•	Select Select Select	
Orientation:			Vertical 🔻	ncel

18. Click on the **Plot** tab. The following window will appear:

- 19. Click on the **Appearance** tab.
- 20. Click on the **Select** button next to *Background paint*. A color chooser will appear.
- 21. Choose white and click on the **Okay** button.
- 22. Click on the **OK** button.

The graph should now appear as follows:

/ FXC-19 1	3C002					
	Dav: 4		Temperature	Humidity	Top Canopy	Fan Speed
	45.00.00	Current	30.0°C	25.3%		85%
	15:02:32	Setpoint	30.0°C	0.0%	///?	85%
40 35 30 25 20 15 10 90 80 70 80 50 40 30 Graph Setup	Apr-00 00:00 Apr-00 01:0 — T Range I Domain (C-19 13C002	Setpoint D Apr-06 02:00 Apr-06 03: emperature Reading — T (Y-axis): Auto 1 (X-axis): 12 Hours	30.0°C	0.0%	Apr06 08:00 Apr06 09:00 ading — Humidity Setpoint > >> >> >>	85% 4.0 3.5 3.0 2.5 2.0 5 1.5 10 0.5 0.0 0.0 Apr-06 11:00 Download Logs Graph Options
Tuesday,	April, 08, 15:02:32				Acces	ss Level: 1 Connection

- 23. Click on the Graph Options button.
- 24. Click on the **Print** button. A Java print dialog will appear. From here you can select the appropriate print options and print the graph.

### Logs

The BioChambers VNet 4 Logs function allows users to view logged data in tabular form. The following exercise will go through the various functions and features of BioChambers VNet 4 Logs.

1. Click on the Logs button on the home screen. The following window will appear:

Dav:	4		Temperature	Humidity	T	op Canopy	Fan Speed
		Current	30.0°C	25.7	7%		85%
- 15:1	4:01	Setpoint	30.0°C	0.0	1%	///2	85%
me	Temperature Read	Temperature Setp	Humidity Reading	Humidity Setpoint	Light Setpoin	t 1 Light Setpoint 2	Light Setpoint 3
:00:09 08-Apr-2	10.0C	10.1C	67.7%	90.0%	1111	0000	0000
:02:39 08-Apr-2	11.3C	11.9C	73.2%	90.0%	1111	0000	0000
0:05:09 08-Apr-2	13.3C	13.8C	79.7%	90.0%	1111	0000	0000
0:07:39 08-Apr-2	15.2C	15.7C	85.2%	90.0%	1111	0000	0000
0:10:09 08-Apr-2	17.0C	17.5C	85.4%	90.0%	1111	0000	0000
0:12:39 08-Apr-2	18.9C	19.4C	82.9%	90.0%	1111	0000	0000
0:15:09 08-Apr-2	20.7C	21.2C	80.7%	90.0%	1111	0000	0000
0:17:39 08-Apr-2	22.5C	23.1C	79.4%	90.0%	1111	0000	0000
0:20:09 08-Apr-2	24.3C	24.9C	80.2%	90.0%	1111	0000	0000
0:22:39 08-Apr-2	26.1C	26.8C	80.5%	90.0%	1111	0000	0000
0:25:09 08-Apr-2	28.0C	28.6C	78.5%	90.0%	1111	0000	0000
0:27:39 08-Apr-2	29.8C	30.5C	75.3%	90.0%	1111	0000	0000
0:30:09 08-Apr-2	31.6C	32.3C	72.0%	90.0%	1111	0000	0000
0:32:39 08-Apr-2	33.5C	34.2C	67.7%	90.0%	1111	0000	0000
0:35:09 08-Apr-2	35.3C	36.0C	63.3%	90.0%	1111	0000	0000
0:37:39 08-Apr-2	37.1C	37.9C	58.6%	90.0%	1111	0000	0000
0:40:09 08-Apr-2	38.9C	40.0C	54.9%	90.0%	1111	0000	0000
0:42:39 08-Apr-2	39.9C	40.0C	52.3%	90.0%	1111	0000	0000
0:45:09 08-Apr-2	40.0C	40.0C	51.8%	90.0%	1111	0000	0000
0:47:39 08-Apr-2	40.1C	40.0C	51.6%	90.0%	1111	0000	0000
0:50:09 08-Apr-2	40.0C	40.0C	51.4%	90.0%	1111	0000	0000
0:52:39 08-Apr-2	40.1C	40.0C	51.5%	90.0%	1111	0000	0000
0:55:09 08-Apr-2	40.0C	40.0C	51.7%	90.0%	1111	0000	0000
0:57:39 08-Apr-2	40.0C	40.0C	51.6%	90.0%	1111	0000	0000
1:00:09 08-Apr-2	40.0C	40.0C	51.8%	90.0%	1111	0000	0000
1:02:39 08-Apr-2	40.0C	40.0C	51.7%	90.0%	1111	0000	0000
1:05:09 08-Apr-2	40.0C	40.0C	51.7%	90.0%	1111	0000	0000
1:07:39 08-Apr-2	40.0C	40.0C	51.8%	90.0%	1111	0000	0000
1:10:09 08-Apr-2	40.0C	40.0C	51.7%	90.0%	1111	0000	0000
	40.00	40.00	F4 00/	00.00/	****	0000	
Main Log From:	Apr 8, 2014					Emotion 5	Emeration of the
	4==0.0044	Refresh				Export Date Rang	Export inactive Lo

- 2. Click on the Main Log radio button.
- 3. Select the date range you wish to view by using the date chooser buttons. The table will refresh when a new date range is chosen. You can also force a refresh by hitting the **Refresh** button.

Note	If no data appears after selecting a new date range or clicking the <b>Refresh</b> button there may be no data available for the specified data range. Be sure to
	download the complete log files as described in the Graph section to ensure all data is available.

4. Click on the **Export Date Range** button. The following window will appear:

🛓 Save		=		x
Look In:	Documents	•		
Chedules	3			
File Name:	log.csv			
Files of Type:				•
			Save	ancel

5. Choose a location and file name for the exported data.

BioChambers VNet 4 exports in a .csv format that can be opened by most spreadsheet programs and text editors.

If you have changed the name of the log file (see Logs in the Setup section) and wish to export data contained in older log files you may do so by clicking on the **Export Inactive Logs** button.

## Service

The *Service* window in BioChambers VNet provides data that is useful for maintenance and diagnostics. Through this feature users can view information on the smart limits, sensor inputs and control outputs. Click on the **Service** button on the home screen to open the *Service* window.



The **Limits/Monitors** tab contains most of the limits and control information of BioChambers VNet and is particularly useful for diagnostics. There is more information on the limits in Appendix 1.

1. High/Low Limit and Safety

Displays the values of the calculated limits along with the respective sensor readings

2. Refrigeration Monitors

Displays sensor readings in the refrigeration system

3. Panel Temperature

Displays the temperature inside the electrical panel

4. Control Outputs

Displays the controllers calculated output values

5. Astronomical Clock

Displays the astronomical clock status

The **Statistics** tab contains a number of counters and values useful for general maintenance.

🖌 Service		x		
Limits/Monitors Statistics Defrosting	About Debug			
Days Since Calibration (Click to Reset)	Lamp Hours (Click to Reset)			
	Top Canopy Second Canopy Thrid Canopy Light 3			
Temperature: 116.32	Level 1: 1409.65			
	Level 2: 1296.61			
Humidity: 116.32	Level 3: 1003.45			
	Level 4: 1296.95			
Schedule Statistics				
Schedule Name: 6day.sch				
Schedule Runtime: 5.90 days				
Max Temperat 0.70 °C				
Min Temperature: 9.88 °C				
	Max Humidity: 95.1 %			
	Min Humidity: 14.1 %			

1. Time Since Last Calibration

Contains counters that can be used to monitor the amount of time that has passed since a sensor has been checked. Click on a counter to reset it.

#### 2. Lamp Runtime

Contains counters that are used to track the number of hours a set of lamps has been on and can assist in a lamp replacement schedule. Click on a counter to reset it.

Note	You must have Level 6 access in order to reset the
	counters.

3. Schedule Statistics

Contains information about the current schedule

The **About** tab contains information about the BioChambers VNet 4 software. It contains information such as the software version and other data which is helpful for diagnostics.



The **Defrost** tab contains information about BioChambers VNet 4 defrosting system. These readings will be blank if your chamber is not equipped with a defrost system.

	🖌 Service					<b></b>
	Limits/Monitors Statistics Def	frosting A	bout Debug			
ľ						
l						
L				٦		
L	D	)efrosting:	OFF			
1	Def	frost Clock:	0:00			
	C	SD Stage:	-1	Next Stage		
		Circuit #	Temperatur	e Solenoid Output		
		1	0.0°C	OFF	Heater 1: OFF	
		2	0.0°C	OFF	Heater 2: OFF	
		3	0.0°C	OFF		
		4	0.0°C	OFF		
		5	0.0°C	OFF		
		6	0.0°C	OFF		
		7		OFF		
	Defro	ost Exit Tem	p: 0.0°C			
	Satu	iration Temp	p: 0.0°C			
	Defro	ost Pressur	e: Opsi			
L						

# Setup

BioChambers VNet 4 is universal software for all BioChambers equipment and is custom configured for each chamber. All of the needed configurations are accessible by clicking on the **Setup** button. The following exercise goes through all the features available to a Level 6 user. Click on the **Setup** button on the home screen to open the *Setup* window.

🥖 Setup	
General Setti	ngs Chambers Logs Admin
Details/Time	Equipment Details
Email	
	Unit Name: FXC-19 13C002 المنافع (ial: 13C002
	Researcher: BioChambers Con 1 ct ) fo: ronnie@biochambers.com
	Facility Name: BioChambers Board Serial: 911025
	Time Settings
	O Manual Set
	Year: 2000 Month: 12 Day: 31
	Time: Hour: 23 M 59 Second: 59 Refresh
	Automatic
	Server: 128.100.100.128 Port: 123
	Time Zone: (GMT-06:00) Central Time (US & Canada)
	Daylight Savings (+1 hour)
	Okay

The **General Settings** tab contains information and settings specific to a given piece of equipment.

1. Equipment Details

Contains detailed information about this equipment.

2. Time Settings

The real time clock on the BioChambers VNet 4 controller can be set two ways. One, manually by setting the time and setting it. Two, by configuring the controller to connect to a specified time server over the internet.

The **Email** tab contains settings that allow the BioChambers VNet 4 controller to use a networked email server to send emails when alarms become active or inactive.

🥖 Setup	Delpare	4075		E 75	_	11/14	×
General Settin	ngs Chambers Logs Admin						
Details/Time							
Email							
		Enabled SMTP Server: Max Frequency:	10.192.70.10	Port:	25		
		Chamber Email:	13C002@bioc	- hambers.com	1		
	Email List						
			Addresses	3			Priorities
	Add ronnie@biochambe	rs.com					0
						Okay	Cancel

The **Chambers** tab contains settings for chambers one through four. More information on multi-chamber configuration can be found in Appendix 2.

The **General** tab contains general settings for the chamber.

🥑 Setup	Import 40.0°C With	×		
Gene	al Settings Chambers Logs Admin			
One	General Limits CO2 Control			
Two	General Settings	Startup Delay		
Three				
Four	Chamber Name: FXC-19 13C002 Alarm Loop Type: VNet 2 Chamber Type: Full 1 Robot Type: Robot I mg V Max Restarts: 5	Compress Lights Del 2 10 s		
	Lamp Loft Settings			
	Master Chamber: 1 Temperature: 0.0 °C			
		Okay Cancel		

1. General Settings

From here the chamber name can be changed. Other settings are reserved for BioChambers technicians.

2. Startup Delay

The chamber startup delay can be adjusted here for the compressor and lights separately.

3. Lamp Loft Settings

If this chamber is configured as a lamp loft (see Appendix 2), the lamp loft schedule settings can be adjusted here.

The **Limits** tab contains settings for setpoint limits. Setpoint limits are bypassed by default and must be activated before using these settings.

🥑 Setup	Televel	475	
Gener	al Settings Chambers Logs Admin		
One	General Limits CO2 Control		
Two			
Three		Setpoint Limits	
Four		Temperature Limit:	5.0 °C
		Temperature Warning:	5.0 °C
		Temperature Hysteresis:	2.0 °C
		Humidity Limit:	10.0 %
		Humidity Warning:	10.0 %
		Humidity Hysteresis:	5.0 %
		Carbon Dioxide Limit:	100 ppm
		Carbon Dioxide Warning:	100 ppm
		Carbon Dioxide Hysteresis:	50 ppm
		Lighting Limit:	100 uMole
		Lighting Warning:	100 uMole
		Lighting Hysteresis:	50 uMole
		Setpoint Bypass Time:	600 s
			Okay Cancel

The **CO2 Control** tab contains settings for a chamber with carbon dioxide control.

/ Setup	4075		X
General Settings Chambers Logs Admin			
One General Limits CO2 Control			
Two			
Three			
Four			
	Calibration Life:	0	days
	Туре:	Disabled 💌	
	Crossing Delay:	30.0	S
	Ambient CO2:	1	ppm
	Close at or below:	3.99	*C
	Scrubber Fan on at:	45	%
	U Disabl	e CO2 Sensor	
II			Okay Cancel

Checking the **Disable CO2 Sensor** checkbox will power off the CO2 sensor and disable CO2 functionality in the chamber after the **Okay** button has been clicked.

The **Logs** tab contains settings for name, rate and length of the log file.

🥖 Setup		
General Setting	Chambers Logs Admin	
Chamber Logs	Logging Setup	
	Log File Name: main.log Log Rate: 150 s Log Length: 175.0 days Size: 1.8 Mb	
	Logging Options	
		J
	Okay	

## **Appendix 1 – Smart Limits**

Smart Limits is a built-in feature for BioChambers VNet. These temperature limits are calculated based on the highest and lowest setpoint temperatures in the currently running schedule. The Smart Limits will monitor the temperature sensors inside the equipment and ensure that the control is functioning within set parameters.



The BioChambers VNet limits can be seen in the **Limits/Monitors** tab of the *Service* window.

- Limit Sensor
  - The limit sensor is located next to the main chamber temperature sensor and is typically in an aspirated sensor box inside the plant growth area. The reading

from this sensor is compared to the calculated limit values and will take action if the temperature drifts outside of the boundaries. This sensor provides the first line of defense against a system failure.

- High Warning BioChambers VNet 4 will generate a priority 1 alarm if the limit sensor reading rises above this value. The green indicator line will turn yellow.
- High Limit BioChambers VNet 4 will generate a priority 2 alarm if the limit sensor reading rises above this value. The equipment will turn off and the indicator line will turn red.
- Low Warning BioChambers VNet 4 will generate a priority 1 alarm if the limit sensor reading falls below this value. The green indicator line will turn yellow.
- Low Limit BioChambers VNet 4 will generate a priority 2 alarm if the limit sensor reading falls below this value. The equipment will turn off and the indicator line will turn red.
- Safety Sensor
  - The safety sensor is usually located above the lamp canopy inside the plant growth area. The reading from this sensor is compared to the calculated safety values and will take action if the temperature drifts outside of the boundaries. This sensor provides the second line of defense against a system failure.
    - Safety Warning BioChambers VNet 4 will generate a priority 1 alarm if the safety sensor reading rises above this value. The green indicator line will turn yellow.
    - Safety Limit BioChambers VNet will 4 generate a priority 2 alarm if the safety sensor reading rises above this value. The equipment will turn off and the indicator line will turn red.
- Limit Bypass Time
  - On a start-up the Smart Limits will automatically be bypassed for a given period of time to allow the equipment time to reach its setpoint temperature. A

value of 0:00 indicates that the Smart Limits are no longer bypassed.

# Appendix 2 – Multi-Chamber

BioChambers VNet 4 can control up to 4 virtual chambers from the same controller. In some cases this is used to control a lamp loft environment, a separately controlled area where the chamber lighting is. In other cases, equipment is built with two separate controlled environments. These chambers are independent of one another in many ways. An example of a two chamber system is an SPC-7-2H which has an upper and lower chamber, but only one controller.

### **Barriered Chambers**

Barriered equipment has a second chamber called a lamp loft. The second chamber will appear as a new tab, next to the main chamber.



To switch to the lamp loft, click on the **Lamp Loft** tab.



There are several things to note about the lamp loft. Firstly the lamp loft does not have a lighting system, all lighting is controlled by the main chamber schedule. However, if the lamp loft is not running (red status) then the lights will not be on in the chamber. Secondly is that the lamp loft **Schedule** button is disabled. To change the lamp loft temperature setpoint follow this procedure:

- 1. Log in as n Access Level 6 user
- 2. Click on the **Setup** button on the home screen
- 3. Click on the Chambers tab
- 4. Click on the **Two** tab. The *Setup* window should appear as follows:

🥑 Setup	Temporet		3.45	×		
Gene	General Settings Chambers Logs Admin					
One	General Limits CO2 Control					
Two	General Settings			Startup Delay		
Three						
Four	1					
	Chamber Name:	Lamp Loft				
	Alarm Loop Type:	VNet 2				
	Chamber Type:	Lamp Loft		Compressor Delay: 25 s		
	Robot Type:	Robot Warning 🔻		Lights Delay: 0 s		
	Max Restarts:	5				
	L					
	Lamp Loft Settings					
	Master Chamber: 1 💌					
	Fan Speed: 85 %					
	Temperatur	re: 25.0 °C				
	Lamp Lot	ft Energy Saving				
	Okay Cancel					

5. The lamp loft is using the fan speed and temperature from the *Lamp Loft Settings*. These settings can be adjusted here and saved by clicking the **Okay** button.

### **Multi-Chambers**

Multi-Chamber equipment has more than one control environment, but has only one controller. In this mode the two chambers act mostly independently. As in the barriered chamber, switching control between the multiple virtual chambers is done by clicking on the chamber tabs.



# **Appendix 3 – BioChambers VNet on Your PC**

BioChambers VNet 4 can be installed on a desktop computer to allow remote control of BioChambers equipment from your office or remotely over the internet. In this case BioChambers VNet 4 will run in windowed mode like your other applications instead of using up the entire screen. The following functions will operate differently:

- The onscreen keyboard will not appear. You will use your regular keyboard instead.
- The number pad on a keyboard can be used with the onscreen keypad in the schedule window.

Keyboard Button	Onscreen Keypad Function
0-9	0-9 (1-4 will toggle the four individual levels for lamp banks)
*	>
/	<
Enter	Enter
Backspace	Clear
-	+/-
Esc	Close
# **Appendix 4 – BioChambers VNet Viewer**

BioChambers VNet Viewer can be used to manage multiple pieces of equipment from one computer. The following exercise will go through the features of the BioChambers VNet Viewer.

1. Double-click on the **VNet Viewer** icon to start the program. The following window will appear:

BioChambers VNet Viewer		
File Chambers Settings		
GC-20-BDAF-1		
GC-20-BDAF-LT-2		
GC-20-BDAF-LT-3		
GC-20-BDAF-4		
BoChambers		
	INOTE	

Note	The <i>Equipment List</i> on the left will appear different than shown, depending on the equipment in your facility
	facility.

2. Click on the first entry in the *Equipment List* on the left and drag it into the *Status Pane* on the right. This will load the entry and connect to the BioChambers equipment.

GC-20-BDAF-1	Status: 🔘 🧕	Chamber status is (	cautionary. Main C	hamber:		Launch Ap	plet 💌 Expand	
	Temperature	Humidity	C02	Metal Halide	HP Sodium	Dimmer	Fan Speed	
Actual	27.1°C	49.7%	407ppm			404uMole	85%	
Setpoint	27.0°C	50.0%	400ppm	000	000	400uMole	85%	

This view shows the current alarm status of the equipment as well as the current readings and setpoints of the equipment.

3. Click on the **Expand** button.

GC-20-BDAF-1 Status: Chamber status is cautionary. Main Chamber:						Launch Applet 🔻		Expand			
	Temperature	Humidity	C02 Metal Halid		Halide	HP Sodium		Dimr	Dimmer		eed
Actual	27.0°C	50.6%	412ppm					404uMole		8	35%
Setpoint	27.0°C	50.0%	400ppm	000		000		40	400uMole		35%
Chamber Sensors					Refrigeratio	on Sen	sors				
Limit Sensor:	27.0°C Safety	Sensor: 26.7°C			Suction Pre	ssure:	84.8PSI	Head P	ressure:	219.9PSI	
Panel Temperature: 31.1°C					Outlet Tmp	r:	30.5°C	Head T	mpr:	61.0°C	
					Inlet Tmpr:		19.6°C	Suction	Tmpr:	23.2°C	
Chamber Information					Lamp Loft						
Chamber Name:	0	C-20-BDAF-1			Status:	(	$\bigcirc$				
Board IP:	142.150.10.119	Connection IP: 14	2.150.10.119		Temperatu	re: 20	.0°C Set	point:	20.0°C		
Chamber Serial:	10G001 E	Board Version:	2.9.8		Limit Sens	or: 19	.7°C Far	Speed:	85%		
					Saftey Sens	sor: 20	.0°C				

This view provides more detailed information about the equipment including all temperature sensor readings, refrigeration sensors, identification information and lamp loft information (if equipped).

4. Click on the **Expand** button again.



This view shows only the status of the equipment. This view takes less space in the *Status Pane* and is helpful when viewing many pieces of equipment simultaneously.

5. Click on the combo box next to the **Expand** button.



The **Launch Applet** selection will launch the BioChambers VNet applet in windowed mode. The **Unload** selection will remove the equipment from the *Status Pane*. The **Reload** selection will reload the equipment and attempt to re-establish a connection.

6. Click on the Chambers menu at the top left-hand corner



- Load All

• Loads all equipment from the *Equipment List* into the *Status Pane*.

- Unload All
  - Removes all equipment from the *Status Pane*.
- Collapse All

• Collapses all equipment in the *Status Pane* into status only view.

- Expand All
  - Expands all equipment in the *Status Pane* by one view.
- Sort by Name

• Sorts all equipment in the *Status Pane* into alphabetical order.

• Sort by Status

• Sorts all equipment in the *Status Pane* by status from red (critical) at the top to green (clear) at the bottom.

• Unconnected equipment in the *Status Pane* will appear at the bottom.

7. Click on the **Settings** menu at the top left-hand corner.



## - Change Configuration

• Changes the configuration of the equipment in the BioChambers VNet Viewer.

### - Export Configuration

- Creates a backup of the configuration.
- $\circ$   $\,$  Can be used to transfer the configuration from one computer to another.

### - Import Configuration

• Imports a previously backed up configuration.

### - Exaggerated Alarm Colors

- Toggles exaggerated alarm colors on and off.
- 8. Click on the **Change Configuration** menu option. The following window will appear:

Configuration Setup	×
GC-20-BDAF-1	Add Chambers Misc. Settings
GC-20-BDAF-L	
GC-20-BDAF-L	
GC-20-BDAF-4	
	Chamber/Folder Name: Controller: VNet  IP Address: Add Remove Edit
	Save & Exit

This window is where the *Equipment List* and all parameters are configured. We will now add a new piece of equipment to the list.

9. Click on the first entry in the list. This entry will be used as the parent for the new piece of equipment and will be changed into a folder. The information from the entry will be displayed:



- 10. Change the Chamber/Folder Name to "Test Chamber".
- 11. Change the *IP address* to "0.0.0.0".
- 12. Click on the **Add** button.



"Test Chamber" has been added to the *Equipment List*. Since the first entry was selected before the **Add** button was clicked, it was chosen to be the parent folder for "Test Chamber".

13. Click and drag "Test Chamber" to the end of the list.

C-20-BDAF-1
C-20-BDAF-LT-2
C-20-BDAF-LT-3
C-20-BDAF-4
🞦 Test Chamber

Notice how "Test Chamber" was taken out of the parent folder "GC-20-BDAF-1" and the parent folder has reverted from a folder back to a chamber entry because it no longer has any child entries.

- 14. Click on Test Chamber.
- 15. Change the Chamber/Folder Name to "Test2 Chamber".
- 16. Click on the **Edit** button.



The **Edit** button will alter the information of the selected element in the list. This operation changed "Test Chamber" to "Test2 Chamber".

17. Click on "Test2 Chamber".

18. Click on the **Remove** button.

GC-20-BDAF-1
GC-20-BDAF-LT-2
GC-20-BDAF-LT-3
GC-20-BDAF-4

The **Remove** button removes an entry from the list.

19. Click on the **Misc. Settings** tab.



- Exaggerate Alarm Colors

 $\circ$   $\:$  Selected by default the first time Biochambers VNet Viewer starts

- Autologin When Launching Applet

• If selected, BioChambers VNet Viewer will automatically login at access level 1 whenever **Launch Applet** is selected on an entry in the Status Pane

• If not selected you will be prompted for a username and password before BioChambers VNet will connect to the equipment

- Refresh rate of statuses
  - The refresh rate at which the equipment is polled
- Default User Name for Applet
  - The username that will automatically be loaded when launching BioChambers VNet
- Font Size
  - The font size used in the Status Pane

20. Click on the red **X** button in the top right-hand corner to exit the *Configuration Setup* window without saving changes.

OR

21. Click on the **Save & Exit** button to save your changes and then exit the *Configuration Setup* window.

This completes the BioChambers VNet Viewer exercise.