

# Spring 2005

Spring is the busiest time of year for many Argus customers. It's a time when you count on your control system more than ever to keep things on track.

Although your Argus system doesn't require much maintenance throughout the year, there are a few things you should check before the season gets fully underway. Ensure that the filters are cleaned on your aspirated sensor units, and that they are properly positioned in the crop. You should also check the physical override switches on all computer controlled relays to make sure they are set to automatic. Also, look for any programs on your Argus system that might have been set to Manual Off over the winter.

While you're at it, it's a good time to check your Event Recording and Data Recording channels to make sure everything is being monitored and recorded. Creating overview reports for each climate will save time later, and make it easier to get into the habit of regularly checking your recorded data.

It's important to make sure you have the proper alarms set up to catch any problems early. You should check to see that they are all enabled. It's also a good idea to test your alarm annunciation system now and then by triggering a 'test' alarm to confirm that everything is in order.

Here's wishing you a successful season!  
Sincerely,



Alec Mackenzie



## ARGUS ADVISOR

News for Argus Control System Owners

### Time for a Spring Tune-up?



During the spring and fall, your heating and cooling equipment can be at its most active. On days when it's raining one minute and sunny the next, you can see and hear all the activity: vents are opening or closing, shade systems are extending or retracting, exhaust fans are cycling on and off, and the greenhouse may be alternating between heating and cooling modes.

Rapidly changing weather can place a high demand on your equipment as your control system tries its best to maintain your targets. At such times you may question all this activity. Is it really necessary? In this article we'll discuss ways of evaluating equipment performance, and methods that can be used to tune your control programs to provide a balance between equipment wear and good climate control.

Your Argus system is capable of maintaining far tighter control targets than your equipment can deliver. Ideally, the control system should be permitted to operate each equipment system as often as is needed to meet the climate targets. However, this does not always agree with your equipment, since starting and stopping tends to cause more mechanical stress than continuous operation. Each equipment system has its own limitations, unique behavior, and responsiveness, so some sort of limit or 'detuning' settings are often required. Also, the more 'relaxed' your setpoint

thresholds, the less often the control system will need to cycle the equipment.

Lastly, there are natural process lags between the activation of an equipment system and the time the effect is delivered. Unless this is compensated for in the control response, equipment control oscillations can occur that will not only cause premature wear, but very poor climate results.

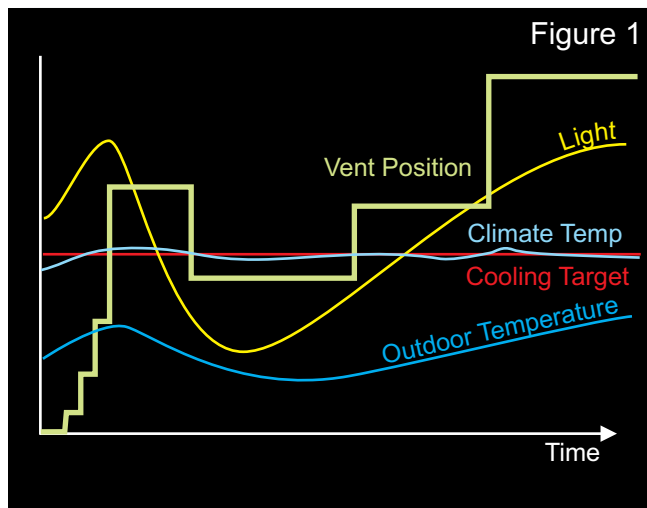
So how can you tell if your equipment control programs are properly tuned? As it turns out, spring and fall can be the best times to check. It often takes highly variable weather conditions to expose a tuning problem, days when the control system is correcting every few minutes for changing light levels, outdoor temperatures, or winds. If you've ever operated a greenhouse where the vents had to be opened and closed by hand, you know that these are the days when your control system really earns its money!

Although we'll focus on vent and shade control in this article, the same principle applies to other equipment control strategies. They all need to be configured to match the dynamics of your particular climate and the capabilities of your equipment.

## Vent Tuning

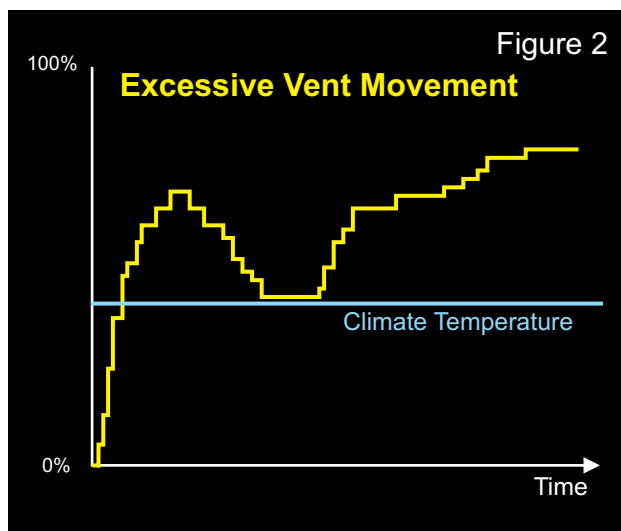
If your vents are opening as it gets sunnier and closing when the clouds move in, you likely have a reasonable response. If the vents seem to be moving in many tiny steps, you may be able to reduce the number of moves without sacrificing control. If the vents seem to be oscillating up and down without an obvious external reason, your system could be 'over-tuned'. This requires immediate attention since control oscillation can produce even more vent moves and upset the climate.

If you graph the recorded **Climate Temperatures** on a highly variable day and then compare them against the **Climate Cooling Target**, the **Outdoor Light Levels**, and the **Current Vent Position** you should see that reasonably accurate temperatures are being maintained despite rapidly changing conditions. You may also notice that the vents have changed position, perhaps many times an hour throughout the day. **Figure 1** shows the kind of movements you might see over an hour or so in changing light levels. Even though the outdoor temperature and light levels are changing, the climate temperature has remained stable.



### How can you tell if the vents are operating too often?

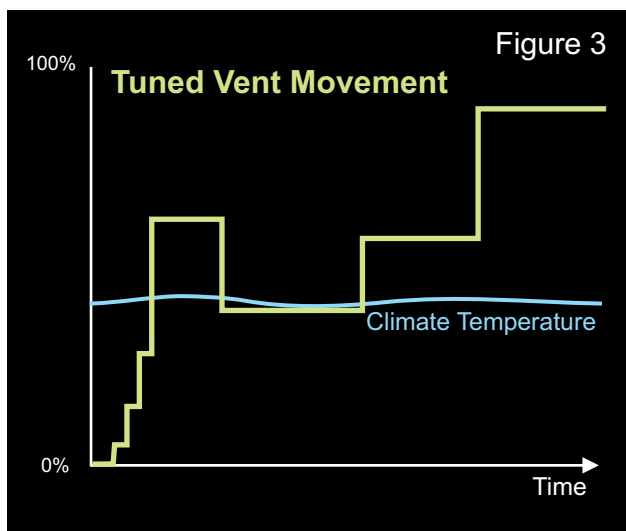
One symptom of possible overuse is when the vents seem to be moving in the same direction using many small steps as in **Figure 2**. Although micro-adjustments of the vent position can produce excellent climate temperature results, you may be able to reduce the number of vent moves that are required without a significant change in climate response. This can dramatically reduce the wear on your vent machinery.



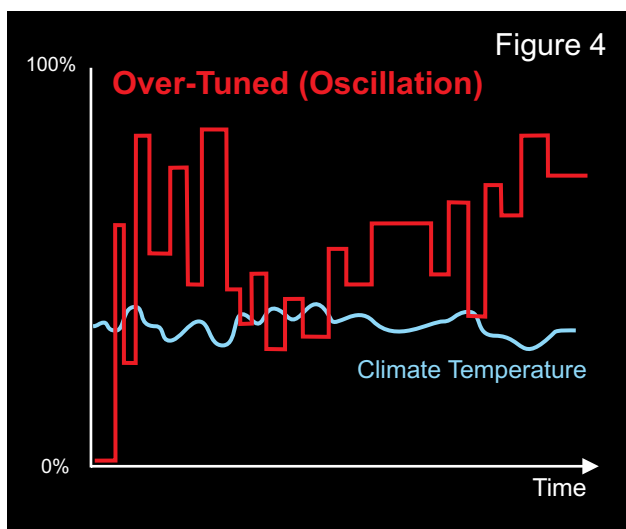
To minimize this type of staggered vent movement, each vent program contains a **Minimum Change Before Movement** setting. With this setting, you can define the relative amount of difference (in percent) that is required between the **Current Vent Position** and the **Desired Vent Position** before the vent will be moved. Small percentage values will result in more frequent vent movements. Larger values will

result in fewer but larger vent movements. Generally, the largest percentage value that does not force the process into oscillation is the best. For most passive roof vent systems the default value for this setting is 40% of the current position.

**Figure 3** demonstrates how the vents will behave after the proper movement limits have been applied.



Another symptom of overactive vents is when they are frequently changing direction or 'oscillating'. You can see this in **Figure 4**.



This is caused by fluctuations in the **Desired Ventilation** as calculated in the **Ventilation Tuning** section of the **Climate Control Settings** for each controlled climate. These settings control how aggressively the **Desired Ventilation** values are changed. If they are too responsive, the **Desired**

**Ventilation** percentage will change too rapidly, and the vents will appear to be oscillating or 'hunting' up and down for the correct position. On the other hand, if the **Desired Ventilation** is not responsive enough, vent movements will tend to be too sluggish, resulting in significant over or under-shooting of your climate targets.

There are many settings for adjusting heating and ventilation tuning on the Climate Control Settings screens for each climate. **You should never try to adjust these by yourself, since small changes can produce very large (and undesirable) results. Always call Argus.**

## Shade Systems

During the daytime, shade systems limit the amount of radiant energy that can reach your crop. This can be particularly critical for unrooted cuttings and young seedlings. On partly cloudy days, your shade curtains can be very active, depending on your threshold settings. Also, since it can take several minutes to fully extend and retract the curtains, the conditions may have already changed by the time the curtain gets to its next position!



The Argus shade program contains several settings to limit the amount of curtain moves. This can help avoid premature wear to the shade mechanism and the curtain fabric. You can set light threshold settings and independent delay times for both extending and retracting the curtains. For example, if your crop can be damaged by even a few minutes of strong sunlight, you may want to use a very low light threshold setting that will only retract the curtains under extended low light periods and close them n at

again at the first sign of increased light levels. You can also use a long delay time before retracting the curtains, to make sure that the sun is not just hiding behind a small cloud.

For extending the curtains, use a very short delay time or none at all to make sure that they will cover the crop as quickly as possible when needed. This will help provide a balance between responsive control to protect your crop, and unnecessary movements for temporary changes in light levels.

## Sensible Targets

As we mentioned earlier, your Argus system is capable of reacting to changing conditions far faster than your equipment can respond. Therefore, it is always necessary to match the degree of control responsiveness to the capabilities of your equipment, and the needs of your crop.

**The easiest way to prevent premature equipment wear is to avoid needlessly tight control targets.**

Finally, frequent equipment movement is not always a bad thing. Sometimes the prevailing conditions require it. If it's sunny one minute and hailing the next, don't be surprised if you see a lot of activity.

## The Importance of Monitoring

Standing in the greenhouse, you can observe equipment activity, but you can't always tell what's causing it. This can make it difficult to distinguish an equipment tuning problem from normal operation. Your Argus system is equipped with ample data and event recording capabilities to fully monitor the changing conditions inside and outside the greenhouse. You can also monitor the status of all your climate control equipment, and the actions that are taken by the control system itself. With these tools you can monitor the effectiveness of your control setup, detect potential problems, and strike a balance between good control, optimal energy use, and reduced equipment wear.

Generally, the goal is to move the equipment as seldom as possible while still maintaining your targets. If there seems to be a lot of activity without an apparent reason, you may have a tuning problem. Keep in mind that there can be several other reasons for apparent over-working of equipment including improper sensor placement, incorrect vent movement timing and proportioning values, and many other factors along the control chain. Responsiveness tuning is just one of them. If you do notice what appears to be a tuning problem, you should call Argus. We'll examine your recorded data and your current settings and make changes as required.

### Trade Show Dates for 2005:

July 9-13th  
**OFA 2005 Short Course & Trade Show**  
Location: Greater Columbus Convention Center - Columbus, Ohio  
[www.ofa.org](http://www.ofa.org)  
See us at Booth 1021

Oct 5 & 6th  
**Canadian Greenhouse Conference**  
Location: International Center  
Mississauga, Ontario,  
[www.canadiangreenhouseconference.com](http://www.canadiangreenhouseconference.com)  
See us at Booth 460

Nov 2-5th  
**International Hortifair**  
Location: Amsterdam RAI  
Amsterdam, The Netherlands  
[www.hortifair.nl](http://www.hortifair.nl)



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