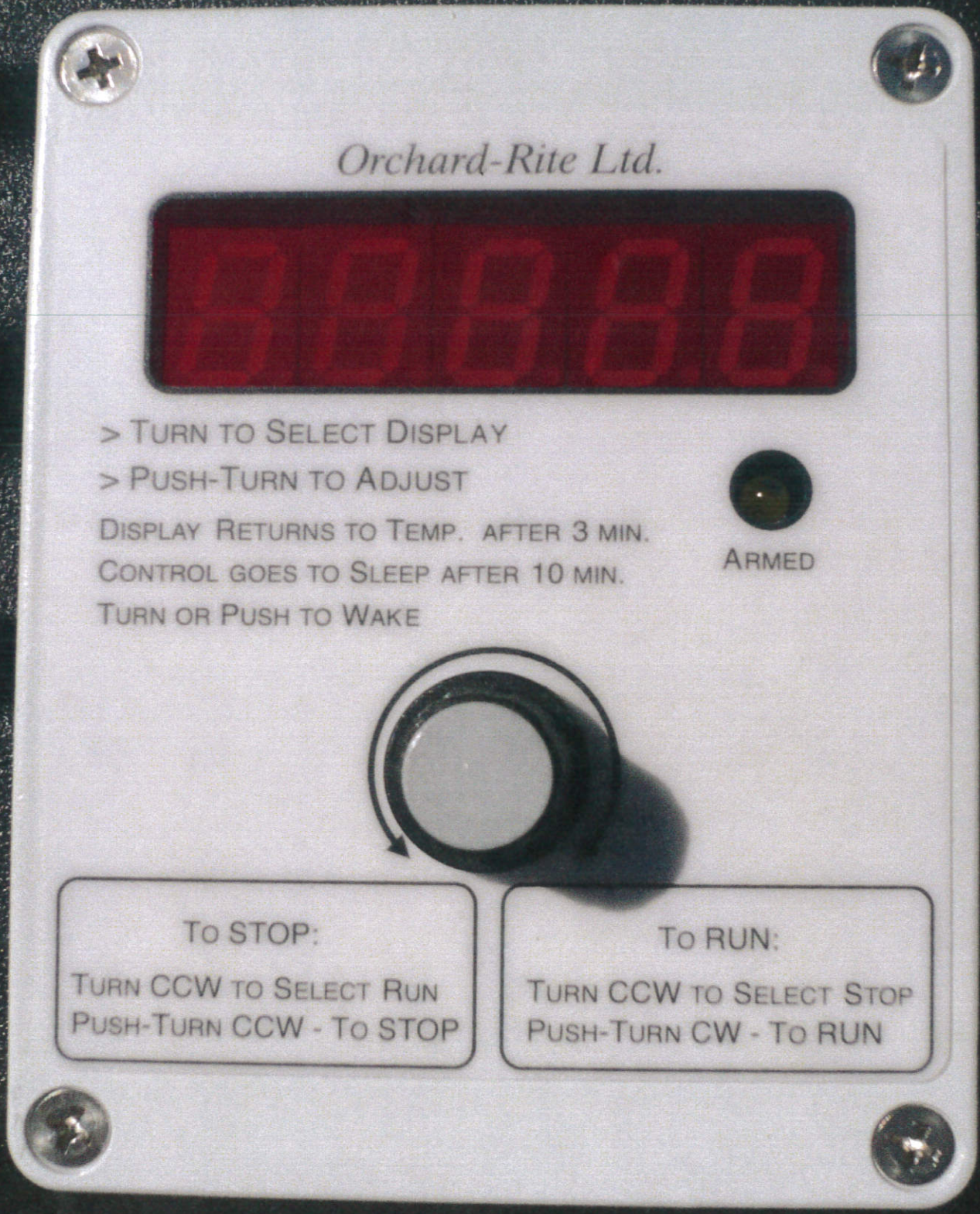
Auto-Start
Owner's Manual



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Orchard-Rite®

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Orchard-Rite® Auto-Start Owner's Manual

FOREWORD:

Orchard-Rite® designed and developed the Auto-Start system to improve the efficiency of operating your wind machine. The system is the most convenient and economical way to manage spring frosts and winter freezes. Pre-setting start and stop temperatures reduce fuel and labor costs. The Auto-Start system can be retrofitted to most makes and models of wind machines.

A temperature probe located inside of the protection area measures the ambient temperature in the orchard or growing field. The ambient temperature is continuously monitored by the Orchard-Rite® Auto-Start system. When the temperature drops to a pre-set level, the Auto-Start sounds an alarm before starting the wind machine. When the temperature rises to the pre-set shutdown temperature, the wind machine is automatically shut down by the Auto-Start system.

The Auto-Start option is a great convenience to growers, but it's more than a convenience. Orchard-Rite's Auto-Start system reduces labor and fuel costs by automatically starting and stopping the wind machine in a more efficient and timely manner.

THE ORCHARD-RITE MANAGEMENT

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INTRODUCTION:

This manual has been prepared to help familiarize you with the operation of the "Auto-Start" system hereinafter "A/S". The A/S is Orchard-Rite's automatic wind machine controller (Exhibit 1). Automatic controls were designed to assist the end user in starting and stopping engine driven wind machines. It should be noted **never** to use an automatically controlled wind machine as a stand alone, unmonitored, defense against frost.

CAUTION: If at any point the pre-start alarm begins to sound, the wind machine is about to start. Move your hands and all equipment away from all moving parts on the wind machine within ten (10) seconds. After the ten (10) seconds has elapsed, the wind machine should start. If you are not prepared to have the wind machine start, immediately turn the main power toggle switch, located on the front of the auto-start control panel, from "Automatic" to "Off".

POWERING UP THE AUTO-START CONTROLLER:

Before any adjustments can be made to the auto-start controller, the unit must be powered up and the display lit up. To power up the A/S controller, move the "Off/Automatic" toggle switch, located on the front of the A/S control panel, fully to the right and into the "Automatic" position. The display on the auto-start controller should then light up and be powered up.

CAUTION: Only use the "Off/Automatic" switch to shut the wind machine off if an emergency occurs. Shutting the wind machine off using this switch does not allow the wind machine to properly cool down prior to shutting down and could cause a violent reaction throughout the drivetrain. This can potentially damage your engine and or drivetrain. Additionally, the "Off/Automatic" switch **must** be placed into either the fully left ("Off") or fully right position ("Automatic"). **Never** operate the wind machine with the switch in the center neutral position. **In the center neutral position, the wind machine does not have low oil pressure protection from the Murphy system.**

WAKING THE AUTO-START FROM "POWER SAVER" MODE:

When the "Off/Automatic" switch is in "Automatic" mode and the display is not lit, the unit has gone into "Power Saver" mode. "Power Saver" mode is designed to save energy and extend battery life during long periods of inactivity. The A/S controller will automatically revert into a "Power Saver" mode whenever the controls have been inactive for ten (10) minutes. In "Power Saver" mode the A/S controller will continue to monitor the temperature and will start the wind machine when the temperature becomes critical; all other non-vital functions are shut down to save battery consumption. A good high amp hour battery should last at least three (3) weeks without recharging when the wind machine A/S controller is in "Automatic" ready mode and the wind machine A/S controller has dropped into the "Power Saver" mode.

To wake the controller from "Power Saver" mode and activate the display, push or turn the "Adjust" knob back and forth a few times. The display should light up and the A/S controller will now be fully "Awake" and ready. You can now view or adjust menu items as needed. The A/S controller will remain awake until it sees no activity for ten (10) minutes at which time it will return to "Power Saver" mode. If the A/S controller appears to be powered up but will not "wake up" check to be sure that the fuse leading to the "Off/Automatic" switch is not blown or that the battery is not dead. If the fuse is blown replace it and reset the A/S controller. If the battery is dead, charge or replace it, then reset the A/S controller.

UNDERSTANDING THE AUTO-START DISPLAY:

The A/S controller has a lighted display designed to be visible in both daylight and at night. As the "Adjust" knob is slowly rotated, a series of displays, or menu items, will appear. Each display item can either be adjusted or will display information about the operation of the A/S and wind machine. A symbol on the right of the display indicates which display is being viewed and a list on the side of the box explains what each symbol represents (see page 14). As the "Adjust" knob is rotated clock-wise, the display will scroll down through the list shown and rotating the "Adjust" knob counter-clockwise will scroll up through the list. After three (3) minutes without knob activity, the display will show the current ambient temperature at the probe (Exhibit 2).

OPERATING THE AUTO-START CONTROLS:

The single knob on the face of the A/S controller performs all the functions needed to operate and adjust the A/S controller. As explained above, the "Adjust" knob is used to either scroll through displays or is used to set new values of the currently displayed parameters for the A/S controller to operate under. Additionally, turning the "Adjust" knob scrolls the display through the listed menu items shown on the side of the box. Pushing and turning the "Adjust" knob at the same time adjusts the currently visible display. Three displays can be adjusted by the operator; the "Run/Stop" display, the "Start Temperature" display, and the "Temperature differential" display. The remaining displays are for information only.

CAUTION: It is always best to set the A/S controller into "Stop" mode before making any adjustments to the "Start Temperature" or the "Temperature Differential" settings. If, while making adjustments to the A/S controller, the warning alarm begins to sound before you are ready for the wind machine to start, either place the controller in "Stop" mode or immediately turn the "Off/Automatic" toggle switch to "Off".

To adjust any one of the three available displays that the operator can adjust, first scroll through the displays until the menu item that you wish to adjust is showing on the display. Now gently push the "Adjust" knob straight in, and then, while holding it in, turn it clockwise or counter-clockwise until the correct setting is displayed; then release the "Adjust" knob. Turning the "Adjust" knob counter-clockwise reduces the display setting, while turning clockwise increases the display setting.

SETTING THE STOP/RUN MODE:

To set the display in either "Stop" (Exhibit 3) or "Run" (Exhibit 4) mode, first turn the "Adjust" knob counter-clockwise until either "Stop" or "Run" is displayed indicating whichever mode the unit is currently in. Then push the "Adjust" knob in and turn it either clockwise to place it in the "Run" mode or counter-clockwise to place it in the "Stop" mode. When power is first applied to the A/S module, it will be set in whichever mode the unit was placed in when the power was turned off or disconnected. If you aren't prepared for the wind machine to start, be sure to place it in "Stop" mode immediately. In the "Stop" mode, the display will be active, and the settings can be adjusted, but the wind machine will not attempt to start or run. Setting the display to "Run" will activate the auto-start feature of the wind machine. **Be aware** that, when the controller is in "Heating" mode (See "Setting Differential" below for an explanation of the "Heating" and "Cooling" modes), if the ambient temperature is already below the set "Start" temperature when the "Run" mode is activated, the warning alarm will begin to sound immediately and in ten (10) seconds the wind machine will attempt to start.

In "Heating" mode, if the ambient temperature is above the set "Start" temperature when the controller is set into "Run" condition, the A/S controller will simply monitor the temperature until it drops to the set "Start" temperature and then will start and run. If the A/S controller is set into its "Cooling" mode, the A/S controller will perform backwards, starting the engine when the temperature is above the set "Start" temperature and shutting the engine down when the temperature is below the set "Start" temperature. If the wind machine is in "Run" mode and is already running in automatic but has not gone through its warm-up period (the engine has not throttled to full RPM), when the "Stop/Run"

display is switched to "Stop" the wind machine will shut down after a few seconds. If the wind machine has throttled to full throttle, then when the "Stop/Run" display is switched to "Stop" the wind machine will throttle down and go through its timed "Cool Down" before shutting off.

SETTING THE START TEMPERATURE:

The "Start" temperature ("S" at the left side of the display) is the operator set temperature below or above which the wind machine will attempt to start (Exhibit 5). Whether the wind machine tries to start above or below this temperature depends upon whether the wind machine is set for heating or cooling. (See "Setting the Differential" below for setting between heating or cooling mode.)

To adjust the "Start" temperature, first turn the knob clockwise or counter-clockwise until the current "Start" temperature is displayed ("S" at the left side of the display, the current starting temperature at the right of the display). While the "Start" temperature is displayed, push and hold in on the knob and then turn it counter-clockwise to lower the "Start" temperature set-point or clockwise to raise the "Start" set-point. When the desired "Start" temperature is set, release the knob and the setting should remain. Do not turn the power off to the auto-start controller for at least twenty (20) seconds or the setting may not lock into the A/S controller's memory and it will revert back to the old setting when the power is reapplied.

SETTING THE DIFFERENTIAL:

The "Differential" is the temperature separation, in degrees, between where the A/S controller begins to start the wind machine and where it begins to shut the wind machine down. A temperature "Differential" is important to keep the wind machine running constantly through a critical period. Otherwise, each time the temperature warms slightly, the wind machine will shut down. Setting too low of a "Differential" will cause the wind machine to constantly start and shut down. Setting too high of a "Differential" will cause the wind machine to run too long after the temperature rises above critical, wasting fuel. A two (2) to three (3) degree "Differential" seems to be the most common setting.

To set the temperature "Differential", rotate the "Adjust" knob until the current temperature "Differential" is displayed. ("dH" or "dC" shown at left of the display, current "Differential" setting at the right of the display; Exhibit 6 and 7.) Push and hold in on the "Adjust" knob then turn to adjust the display to the desired temperature "Differential". Turning the "Adjust" knob clockwise will increase the "Differential", counter-clockwise will decrease the "Differential".

When the "Differential" is adjusted below zero, the A/S controller is set in the cooling mode. The left of the display will read "dC" and the right will display a negative number. In this mode, the wind machine will begin to start any time the ambient temperature rises above the set "Start" temperature and the wind machine will continue to run until the ambient temperature drops to below the "Start" temperature minus the "Differential". If the "Differential is three (3) the wind machine will shut off when the ambient temperature drops three (3) degrees below the "Start" temperature. When the "Differential" is adjusted to greater than zero, the controller goes into "Heating" mode and will begin to

activate the wind machine any time the ambient temperature drops below the set "Start" temperature. The display will read "dH" on the left and the number on the right will be a positive number. In this mode the wind machine will remain active until the ambient temperature rises to whatever the current set "Differential" is above the current "Start" temperature. If the "Start" temperature is currently set to 32° F and the "Differential" is 3° F, the wind machine will begin to shut down when the ambient temperature reaches 35° F.

FINAL CHECK LIST OF AUTOMATIC RUN CONDITIONS:

With the "Start" Temperature and the Temperature "Differential" set, a final check should be made to ensure that everything is set for the wind machine to run automatically. The following conditions **must** be met for the wind machine to function in automatic mode:

1. The fuel is turned **on**.
2. The manual ignition switch is turned **off**.
3. The manual throttle is pushed all the way in and is locked in position.
4. The Murphy reset button on the top right of the panel is pushed in and is latched.
5. The "Off/Automatic" switch is in automatic.
6. The "Start" temperature has been set.
7. The temperature "Differential" has been set.

NOTE: Be sure to check the above conditions each time the controller is activated for actual operation.

SETTING THE CONTROLLER TO AUTOMATIC MODE:

Only when all of the above conditions are met is it time to turn the "Stop/Run" display to "Run" mode. When the controller is in the "Run" mode, a white "Armed" light will begin to flash in the face of the box indicating that it is ready to start whenever the set conditions are met. If at this point, the ambient temperature is above the set "Start" temperature, and the unit is in "Heating" mode, the controller will merely wait for a low temperature signal from the temperature sensor. The display may go into "Power Save" mode while it is waiting, but the "Armed" light will continue to flash and the unit will remain fully operational. If however, the ambient temperature is below the set start temperature, the controller will wait only a few seconds and then initiate a start sequence beginning with an alarm followed by an engine crank attempt. **The operator must be very careful when working around automatic wind machines. The operator needs to make sure that he/she is clear of all moving parts whenever the "Run" mode is activated.**

MISCELLANEOUS INFORMATION:

TEMPERATURE SENSOR:

The temperature sensor (Exhibit 8) should be located at least 50 feet away from, but no more than 250 feet from the wind machine, and should be mounted between 36 inches to 48 inches above ground level. The temperature sensor should be protected from direct sunlight and chemicals. When hooking the temperature sensor to the A/S controller, be aware that the temperature sensor connection is directionally sensitive. The red wire on the temperature sensor must be hooked to the terminal with the red wire coming from the A/S controller. Make sure to take basic farming activities into account when placing your temperature sensor and the temperature sensor cable into your growing field.

BATTERY LIFE

Be sure that your wind machine has a fresh, strong battery. The A/S was designed to use very little power when it is operating, but if a wind machine is going to be idle for long periods of time, longer than two (2) to three (3) weeks, it is best to turn the "Off/Automatic" switch to "Off". There is no power draw on the battery when the switch is in this position.

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MANUAL/AUTO SEPARATION

When the "Off/Automatic" switch is in the "Off" position, the wind machine runs completely independent of the automatic controller. If you experience a problem with your A/S unit, switch the unit to the "Off" position and operate the wind machine manually. Subsequently call and report your problem to your local dealer. **See your wind machine owner's manual for instructions for running your wind machine in manual mode.**

CONTACT INFORMATION:

Please contact you local Orchard-Rite® dealer with any questions you might have regarding the A/S features. For the most current contact information please visit our web site at:

www.orchard-rite.com

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AUTO-START
DISPLAY SYMBOLS

StOP / run

A / o =	Ambient Temperature
S =	Start Temperature
dH =	Differential Temperature
HU =	Heat Up Duration
Cd =	Cool Down Duration
OF =	Temperature Offset
I =	Inputs Status
O =	Outputs Status
r =	Engine RPM
AS =	Wind Speed
B =	Battery Voltage
= =	Software Version

In ECU Mode Only:

Cl =	Coolant Temperature
Op =	Oil Pressure
0.0 =	Hours

Exhibit 1

Exhibit 2

Exhibit 3

Exhibit 4

Exhibit 5

Exhibit 6

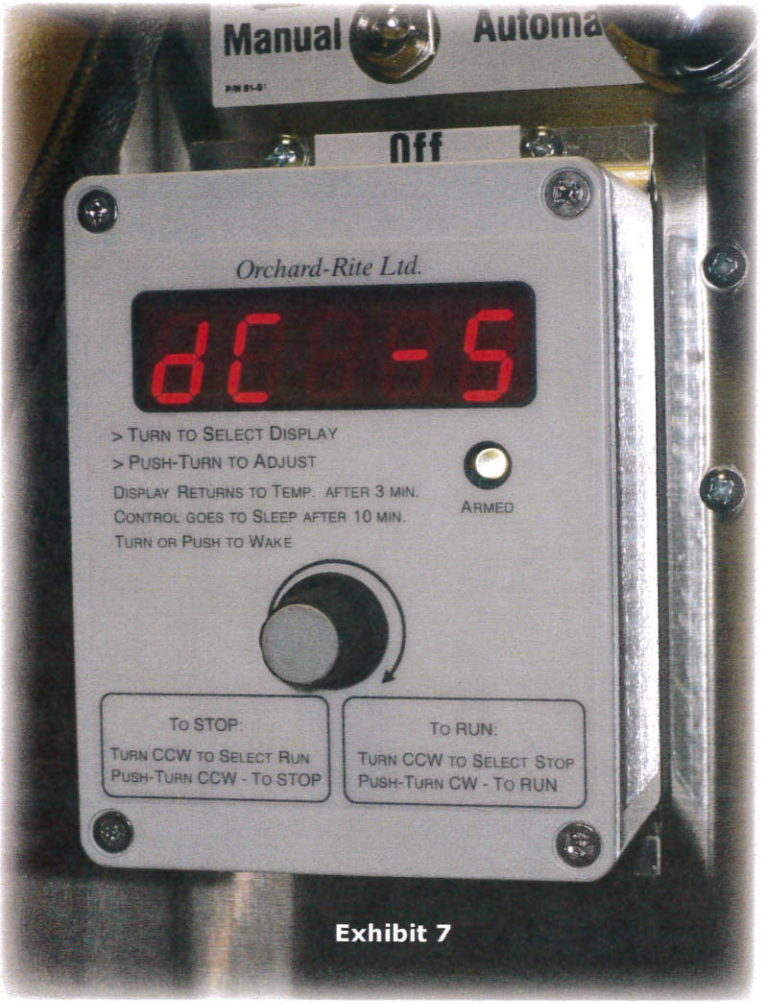

Exhibit 7

Exhibit 8