Investigative Energy Audit
For
Unalakleet Courthouse & Store

Prepared For
City of Unalakleet

Prepared By
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ANTHC-DEHE
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PREFACE

The purpose of this report is to provide guidance in reducing facility operating costs and enhance the sustainability of this community. The report assess the current energy usage of the facility, provide options for reducing the amount of energy used, and evaluate the cost vs. benefit of each option.

Discussions of site specific concerns, financing options, general facility information, and an Energy Efficiency Action Plan are also included in this report.

ACKNOWLEDGMENTS

The Rural Energy Initiative gratefully acknowledges the assistance of Unalakleet Public Works Director Dwayne Johnson and Unalakleet City Manager Shannon Hough.
OVERVIEW

This report was prepared for the City of Unalakleet. The scope of the audit focused on Unalakleet Court House & Store and includes an analysis of building occupancy schedules, building shell, heating systems, heating and ventilations systems, domestic hot water, lighting, and other electrical loads. The Unalakleet Court House & Store was constructed in the 1980’s and is approximately 1,344 square feet. The building houses the court house and a small convenience store. Data was based on a site survey and interviews with the building manager and maintenance staff.

ENERGY BASELINE

Based on unsubsidized electricity and fuel oil prices in effect at the time of the audit, the total predicted energy costs are $5,706 per year. This includes $1,424 for unsubsidized electricity and $4,281 for #1 fuel oil.

The State of Alaska Power Cost Equalization (PCE) program provides a subsidy to rural communities across the state to lower electricity costs and make energy affordable in rural Alaska. In Unalakleet, the cost of electricity without PCE is $0.37/kWh and the cost of electricity with PCE is $0.17/kWh. With the PCE subsidy, the electric utility cost to the City of Unalakleet is $654 and the cost to the State of Alaska is $770.

Table 1 lists the predicted annual energy usage before and after the proposed retrofits for the Unalakleet Public Safety Building.

Table 1: Predicted Annual Energy Use for the Unalakleet Court House & Store

<table>
<thead>
<tr>
<th>Fuel Use</th>
<th>Existing Building</th>
<th>With Proposed Retrofits</th>
<th>Total Energy Savings</th>
<th>Total Cost Savings (subsidized)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>3,303 kWh</td>
<td>2,683 kWh</td>
<td>620 kWh</td>
<td>$105</td>
</tr>
<tr>
<td>#1 Oil</td>
<td>987 gallons</td>
<td>803 gallons</td>
<td>184 gallons</td>
<td>$799</td>
</tr>
</tbody>
</table>

PROPOSED ENERGY EFFICIENCY MEASURES (EEM)

Table 2 below summarizes the energy efficiency measures analyzed for the Unalakleet Public Safety Building. Listed are the estimates of the annual savings, installed costs, and two different financial measures of investment return. All costs assume that local labor will be used with no additional cost associated for travel or administrative tasks.
Table 2: Priority List – Energy Efficiency Measures

<table>
<thead>
<tr>
<th>Priority</th>
<th>Feature</th>
<th>Improvement Description</th>
<th>Annual Energy Savings</th>
<th>Installed Cost</th>
<th>Savings to Investment Ratio, SIR¹</th>
<th>Simple Payback (Years)²</th>
<th>CO₂ Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Setback Thermostat: Courthouse</td>
<td>Install a new programmable thermostat and implement an unoccupied temperature set back to 60 deg. F. in the Court House</td>
<td>$452</td>
<td>$1,000</td>
<td>6.09</td>
<td>2.2</td>
<td>2,178.7</td>
</tr>
<tr>
<td>High</td>
<td>Setback Thermostat: Store</td>
<td>Install a new programmable thermostat and implement an unoccupied temperature set back to 60 deg. F. in the store</td>
<td>$408</td>
<td>$1,000</td>
<td>5.49</td>
<td>2.5</td>
<td>1,964.2</td>
</tr>
<tr>
<td>Medium</td>
<td>Air Tightening</td>
<td>Add weather stripping around the entry doors to prevent air leakage.</td>
<td>$61</td>
<td>$500</td>
<td>1.13</td>
<td>8.2</td>
<td>293.3</td>
</tr>
<tr>
<td>Low</td>
<td>Lighting: Courthouse lights</td>
<td>Replace with new LED lighting and add an occupancy sensor</td>
<td>$106</td>
<td>$1,300</td>
<td>0.88</td>
<td>12.3</td>
<td>390.9</td>
</tr>
<tr>
<td>Low</td>
<td>Lighting: Store Lights</td>
<td>Replace with new LED lighting</td>
<td>$19</td>
<td>$320</td>
<td>0.65</td>
<td>16.7</td>
<td>70.8</td>
</tr>
<tr>
<td>Low</td>
<td>Lighting: Store Kitchen Lights</td>
<td>Replace with new LED lighting</td>
<td>$7</td>
<td>$240</td>
<td>0.32</td>
<td>33.4</td>
<td>26.5</td>
</tr>
<tr>
<td>Low</td>
<td>Lighting: Restroom Lights</td>
<td>Replace with new LED lighting</td>
<td>$1</td>
<td>$80</td>
<td>0.16</td>
<td>66.9</td>
<td>4.4</td>
</tr>
<tr>
<td>Low</td>
<td>Lighting: Closet Lights</td>
<td>Replace with new LED lighting</td>
<td>$0</td>
<td>$80</td>
<td>0.07</td>
<td>166.5</td>
<td>1.8</td>
</tr>
</tbody>
</table>

| TOTAL    |                              |                                                                                         | $1,055                 | $4,520         | 3.01                              | 4.3                      | 4,930.6     |

FACILITY DESCRIPTION

Building Occupancy Schedules

The building is occupied from 3-7PM five days per week in the store and occupied periodically in the court house. The store is closed on Tuesdays and Wednesdays.

Building Shell

The exterior walls are 2x6 wood-framed panel construction.

The roof of the building is 2x6 wood-framed panel construction.

The building is constructed on an elevated pile foundation.

There are seven total windows in the building, each of which is approximately 39”*39” in dimension with wood frames and double-pane glass.
There are two entrances in the store part of the building and one in the courthouse part of the building. All doors are insulated metal with the store main entrance and the courthouse entrance having a half-lite window and the store kitchen entrance having no window.

**Heating Systems**

The heating systems used in the building are:

**Boiler 1**
- Fuel Type: #1 Oil
- Input Rating: 184,000 BTU/hr
- Steady State Efficiency: 78%
- Idle Loss: 0.5%
- Heat Distribution Type: Glycol
- Boiler Operation: All Year

**Boiler 2**
- Fuel Type: #1 Oil
- Input Rating: 184,000 BTU/hr
- Steady State Efficiency: 78%
- Idle Loss: 0.5%
- Heat Distribution Type: Water
- Boiler Operation: All Year

**Courthouse Electric Heater**
- Fuel Type: Electricity
- Input Rating: 0 BTU/hr
- Steady State Efficiency: 95%
- Idle Loss: 0%
- Heat Distribution Type: Air

**Space Heating Distribution Systems**

The building is heated by a baseboard distribution system with the heat provided by the hydronic system in the water plant building. The water plant is heated by a heat recovery system and two oil-fired boilers, which are connected to the courthouse heating distribution. Temperatures were set for 70 deg. F. There is also an electric space heater in the courthouse that is used during extreme cold conditions.

**Domestic Hot Water System**

Hot water is used in the store kitchen area in the restrooms. The water is heated by a hot water heater in the water plant building. The water plant has a Weil McLain hot water heater with 50 gallons of storage.
Heat Recovery Information

The building is heated by a heat recovery system that extracts heat from the power plant generator cooling loops and transports it to various buildings in the community. The heat recovery system delivers heat to the water treatment system in the water plant before getting tied in to the boiler system, which then heats the court house and store in addition to the rest of the water plant and garage space.

Lighting

There are a total of 19 light fixtures with two T8 4ft. fluorescent light bulbs in each fixture for a total of 38 light bulbs in the building. The lights use an estimated 952 kWh annually.

Other Electrical Loads

There is a variety of office equipment that is used during the day that use a small amount of energy throughout the year.

Major Equipment

Table 3: Major Electrical Equipment in the Unalakleet Court House & Store

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Rating (Watts)</th>
<th>Annual Usage (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store Refrigerators (3)</td>
<td>57 per unit</td>
<td>1500</td>
</tr>
<tr>
<td>Store Computer</td>
<td>75</td>
<td>78</td>
</tr>
<tr>
<td>Courthouse Computer</td>
<td>75</td>
<td>78</td>
</tr>
<tr>
<td>Store TV</td>
<td>86</td>
<td>90</td>
</tr>
</tbody>
</table>

PROJECT FINANCING

The total estimated cost of the recommended EEM’s $4,520. The payback for the implemented EEM’s is approximately 4.3 years. ANTHC is willing to assist the community with acquiring funds to complete the scope of work recommended in this energy audit.

There are several options for financing energy efficiency projects within the State of Alaska. These include the use of grants, loans, and other funding opportunities. Below is some information on potential funding opportunities.

Energy Efficiency Revolving Loan Program – This is a loan administered by the Alaska Housing Finance Corporation (AHFC) for use by any applicant who is also the owner of the building where the work will take place. It provides a loan for permanent energy-efficiency projects with a completion window of one year.

Sustainable Energy Transmission and Supply Program – This is a loan administered by the Alaska Energy Authority (AEA) for a government, business, or other organized body of people. It provides a loan for energy-efficiency or power transmission or distribution projects.
USDA-RD Communities Facilities Direct Loan & Grant Program - This is a loan or grant provided by the US Department of Agriculture – Rural Development (USDA-RD) for any essential community facility in a rural area. It provides a loan or grant to develop essential community facilities with upgrades or equipment for improvement.

MEASUREMENT AND VERIFICATION

The results of these recommended measures can be measured through the collection of energy use data through the monthly bills provided by the local electric utility and the local fuel oil supplier. Collecting data and performing a historical comparison is the simplest method of validating the energy and cost savings seen by the measures. Additionally, active remote monitoring systems are available that can collect and store data regarding energy and fuel usage. These systems allow the user to track the usage in real time and can be shared more easily with partners across the state.
Appendix A – Energy Billing Data

The table below shows the fuel and electricity data used during the energy modeling process to confirm the accuracy of the energy distribution. For the Unalakleet Court House and Store, the building is heated by a recovered heat system from the neighboring water treatment plant and there is no active monitoring of the heat specifically delivered for the courthouse. All heat recovery numbers are based on calculated estimates from the overall heat recovery data.

<table>
<thead>
<tr>
<th>Month</th>
<th>Heat Recovery Equivalent Use (gallons)</th>
<th>Electricity Use (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>140</td>
<td>199</td>
</tr>
<tr>
<td>February</td>
<td>120</td>
<td>300</td>
</tr>
<tr>
<td>March</td>
<td>100</td>
<td>237</td>
</tr>
<tr>
<td>April</td>
<td>80</td>
<td>501</td>
</tr>
<tr>
<td>May</td>
<td>60</td>
<td>204</td>
</tr>
<tr>
<td>June</td>
<td>40</td>
<td>188</td>
</tr>
<tr>
<td>July</td>
<td>40</td>
<td>210</td>
</tr>
<tr>
<td>August</td>
<td>40</td>
<td>180</td>
</tr>
<tr>
<td>September</td>
<td>60</td>
<td>169</td>
</tr>
<tr>
<td>October</td>
<td>80</td>
<td>166</td>
</tr>
<tr>
<td>November</td>
<td>110</td>
<td>290</td>
</tr>
<tr>
<td>December</td>
<td>130</td>
<td>505</td>
</tr>
</tbody>
</table>
Appendix B – Energy Audit Report – Project Summary

ENERGY AUDIT REPORT – PROJECT SUMMARY

General Project Information

<table>
<thead>
<tr>
<th>PROJECT INFORMATION</th>
<th>AUDITOR INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building: Unalakleet Courthouse &amp; Store</td>
<td>Auditor Company: Company</td>
</tr>
<tr>
<td>Address: P.O. Box 28</td>
<td>Auditor Name: Kevin Ulrich, Martin Wortman</td>
</tr>
<tr>
<td>City: Unalakleet</td>
<td>Auditor Address: Auditor Address</td>
</tr>
<tr>
<td>Client Name: Dwayne Johnson</td>
<td></td>
</tr>
<tr>
<td>Client Address:</td>
<td>Auditor Phone: (907) 729-3237</td>
</tr>
<tr>
<td>Client Phone: (907) 624-3531</td>
<td>Auditor FAX:</td>
</tr>
<tr>
<td>Client FAX:</td>
<td>Auditor Comment:</td>
</tr>
</tbody>
</table>

Design Data

| Building Area: 1,344 square feet | Design Space Heating Load: Design Loss at Space: 28,550 Btu/hour with Distribution Losses: 28,550 Btu/hour Plant Input Rating assuming 82.0% Plant Efficiency and 25% Safety Margin: 43,521 Btu/hour Note: Additional Capacity should be added for DHW and other plant loads, if served. |
| Typical Occupancy: 0 people | Design Indoor Temperature: 70 deg F (building average) |
| Actual City: Unalakleet | Design Outdoor Temperature: -34 deg F |
| Weather/Fuel City: Unalakleet | Heating Degree Days: 13,919 deg F-days |

Utility Information

| Electric Utility: Unalakleet Valley Electric Cooperative | Average Annual Cost/kWh: $0.37/kWh |

Annual Energy Cost Estimate

<table>
<thead>
<tr>
<th>Description</th>
<th>Space Heating</th>
<th>Lighting</th>
<th>Refrigeration</th>
<th>Other Electrical</th>
<th>Service Fees</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Building</td>
<td>$262</td>
<td>$397</td>
<td>$625</td>
<td>$103</td>
<td>$48</td>
<td>$1,434</td>
</tr>
<tr>
<td>With Proposed Retrofits</td>
<td>$207</td>
<td>$192</td>
<td>$625</td>
<td>$103</td>
<td>$48</td>
<td>$1,174</td>
</tr>
<tr>
<td>Savings</td>
<td>$55</td>
<td>$205</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$260</td>
</tr>
</tbody>
</table>

Building Benchmarks

<table>
<thead>
<tr>
<th>Description</th>
<th>EUI (kBtu/Sq.Ft.)</th>
<th>EUI/HDD (Btu/Sq.Ft./HDD)</th>
<th>ECI ($/Sq.Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Building</td>
<td>105.3</td>
<td>7.56</td>
<td>$1.07</td>
</tr>
<tr>
<td>With Proposed Retrofits</td>
<td>85.7</td>
<td>6.16</td>
<td>$0.87</td>
</tr>
</tbody>
</table>

EUI: Energy Use Intensity - The annual site energy consumption divided by the structure’s conditioned area.
EUI/HDD: Energy Use Intensity per Heating Degree Day.
ECI: Energy Cost Index - The total annual cost of energy divided by the square footage of the conditioned space in the building.
Appendix C – Actual Fuel Use versus Modeled Fuel Use

The graphs below show the modeled energy usage results of the energy audit process compared to the actual energy usage report data. The model was completed using AkWarm modeling software. The orange bars show actual fuel use, and the blue bars are AkWarm’s prediction of fuel use.
Appendix D - EUI Calculation Details

The Unalakleet Valley Electric Cooperative provides electricity to the residents of Unalakleet as well as to all commercial and public facilities.

The average cost for each type of fuel used in this building is shown below in Table 4. This figure includes all surcharges, subsidies, and utility customer charges:

Table 4: Energy Cost Rates for each Fuel Type.

<table>
<thead>
<tr>
<th>Description</th>
<th>Average Energy Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td></td>
</tr>
<tr>
<td>#1 Oil</td>
<td></td>
</tr>
</tbody>
</table>

$ 0.37/kWh
$ 4.34/gallons

Table 5 shows the calculated results for the building Energy Use Index (EUI), which determines the total energy usage for a type of building for comparison with other buildings of the same type. This allows the user to determine the relative energy use of a building in relation to others of the same type or use.

Table 5: EUI Building Calculations for the Unalakleet Courthouse & Store

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Building Fuel Use per Year</th>
<th>Site Energy Use per Year, kBtu</th>
<th>Source/Site Ratio</th>
<th>Source Energy Use per Year, kBtu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1 Oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

141,493
169,176

BUILDING AREA
1,344 Square Feet
BUILDING SITE EUI
105 kBTU/Ft²/Yr
BUILDING SOURCE EUI
126 kBTU/Ft²/Yr

* Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued March 2011.

Table 6 shows information on common energy use benchmarks used to characterize the efficiency of a building.

Table 6: Building Benchmarks for the Unalakleet Courthouse & Store

<table>
<thead>
<tr>
<th>Building Benchmarks</th>
<th>EUI (kBtu/Sq.Ft.)</th>
<th>EUI/HDD (Btu/Sq.Ft./HDD)</th>
<th>ECI ($/Sq.Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Building</td>
<td>105.3</td>
<td>7.56</td>
<td>$1.07</td>
</tr>
<tr>
<td>With Proposed Retrofits</td>
<td>85.7</td>
<td>6.16</td>
<td>$0.87</td>
</tr>
</tbody>
</table>

EUI: Energy Use Intensity - The annual site energy consumption divided by the structure’s conditioned area.
EUI/HDD: Energy Use Intensity per Heating Degree Day.
ECI: Energy Cost Index - The total annual cost of energy divided by the square footage of the conditioned space in the building.
Appendix E – Materials List and Labor Estimation

Table 6 & 7: Materials List and Cost Estimation for Unalakleet Court House & Store EEM’s

<table>
<thead>
<tr>
<th>Energy Retrofit</th>
<th>Required Materials</th>
<th>Quantity</th>
<th>Cost per Item</th>
<th>Total Materials Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setback Thermostat</td>
<td>Programmable Thermostat</td>
<td>2</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>Weather Stripping around doors</td>
<td>Weather Stripping</td>
<td>2</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>LED Lighting</td>
<td>T8 LED Equivalent 4 ft.</td>
<td>38</td>
<td>15</td>
<td>570</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>3592</td>
</tr>
<tr>
<td>Travel</td>
<td>2620</td>
</tr>
<tr>
<td>Materials</td>
<td>910</td>
</tr>
<tr>
<td>Freight</td>
<td>137</td>
</tr>
<tr>
<td>Indirect</td>
<td>726</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$7985</strong></td>
</tr>
</tbody>
</table>

It should be noted that the energy audit cost information in Table 2 does not consider travel or indirect costs. These would only be added if outside labor is used to perform the tasks.
Appendix F – Materials Specifications
This programmable thermostat can be used to control an electric heating system such as an electric baseboard heater, a radiant ceiling, a radiant floor, aconvector, etc.

The thermostat cannot be used under the following conditions:

- The resistive load is greater than 16.7 A
- The resistive load is less than 2 A
- The system is driven by a contactor or relay (inductive load)
- The system is a central heating system

SUPPLIED PARTS:
- One (1) thermostat
- Two (2) 6-32 screws
- Two (2) solderless connectors

TURN OFF POWER TO THE HEATING SYSTEM AT THE MAIN POWER PANEL TO AVOID ELECTRICAL SHOCK. THE INSTALLATION MUST BE PERFORMED BY AN ELECTRICIAN.

- All cables and connections must conform to the local electrical code.
- Special CO/ALR solderless connectors must be used when connecting with aluminum conductors.
- Install the thermostat onto an electrical box.
- Install the thermostat about 5 feet high, on an inside wall facing the heater.
- Avoid locations where there are air drafts (such as the top of a staircase or an air outlet), dead air spots (such as behind a door), or direct sunlight.
- Do not install the thermostat on a wall that conceals chimney or stove pipes.
- The thermostat wires are not polarized; either wire can be connected to the load or to the power supply.

NOTE: Always keep the thermostat's vents clean and unobstructed.

1. Connect the thermostat wires to the line wires and to the load wires using solderless connectors for copper wires.

2. Push any excess wire back into the electrical box.

3. Return power to heating system.

NOTE: If necessary, before re-installing the front component, configure the thermostat (see section 3).
3 Configuration

The configuration switches are on the back of the thermostat. The factory settings are indicated by the gray cells in the following table.

<table>
<thead>
<tr>
<th>Switch (SW)</th>
<th>Configuration</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1</td>
<td>Early Start</td>
<td>On</td>
</tr>
<tr>
<td>SW2</td>
<td>Temperature / time format</td>
<td>°C / 24-hour</td>
</tr>
<tr>
<td>SW3</td>
<td>Cycle length</td>
<td>15 seconds</td>
</tr>
<tr>
<td>SW4</td>
<td>Not used</td>
<td>-</td>
</tr>
</tbody>
</table>

a. Early Start can be used in Automatic mode only. When this function is enabled, the thermostat calculates the optimal time to start heating in order to obtain the desired temperature by the set time. The thermostat re-assesses the start time daily based on the previous day’s performance.

b. If you change the temperature display format, the preset temperatures (*, ℃, and °C) will return to their default settings.

c. 15-second cycles should be selected in most cases as it provides better temperature control. 15-minute cycles must be selected if you have a fan-equipped heater or if 15-second cycles causes light flickering (especially in rural regions).

4 Power-up

Upon power-up, the thermostat is in manual mode (）、and displays the actual (ambient) temperature.

1. Press the Hour and Min buttons to set the thermostat’s clock.
2. Press the Day button to set the day.

5 Temperature Setting

Setpoint

The thermostat normally displays the actual temperature. To view the setpoint, press the  or  button briefly. The setpoint will appear for the next 5 seconds.

To change the setpoint, press the  or  button until the desired temperature is displayed. To scroll faster, hold the button.

Using a preset temperature

The thermostat has 3 preset temperatures:

- Comfort temperature （）
- Economy temperature （）
- Vacation temperature （）

<table>
<thead>
<tr>
<th>Icon</th>
<th>Intended use</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>（）</td>
<td>Comfort (when at home)</td>
<td>21°C (70°F)</td>
</tr>
<tr>
<td>（）</td>
<td>Economy (when asleep or away from home)</td>
<td>16.5°C (62°F)</td>
</tr>
<tr>
<td>（）</td>
<td>Vacation (during prolonged absence)</td>
<td>10°C (50°F)</td>
</tr>
</tbody>
</table>

- To use the Comfort or Economy temperature, press the （） or （） button respectively. The corresponding icon will be displayed.
- To use the Vacation temperature, press both （） and （） buttons simultaneously. The （） icon will be displayed.

Storing a preset temperature

To store the Comfort or Economy temperature:

1. Set the desired temperature using the  or  button. Press and hold the appropriate button （） or （） for approximately 3 seconds until the （） icon is displayed. Press the Mode button.

To store the Vacation temperature:

1. Set the desired temperature using the  or  button. Press and hold both （） and （） buttons simultaneously for approximately 3 seconds until the （） icon is displayed. Press the Mode button.

6 Operating Modes

○ Automatic - The temperature is set according to the programmed schedule. To place the thermostat in this mode, press Mode until （） is displayed. The icons of the current period and preset temperature are also displayed.

Temporary Bypass: If you modify the setpoint (by pressing the 、 or  button when the thermostat is in automatic mode, the new setpoint will be used until the end of the current period. When the next period starts, the temperature set for that period becomes the new setpoint.

◆ Manual - The programmed schedule is not used. The temperature must be set manually. To place the thermostat in this mode:

1. Press Mode until （） is displayed.
2. Set the temperature using the 、 or  button.

7 Schedule

The schedule consists of 4 periods per day which represents a typical weekday. You can program the thermostat to skip the periods that do not apply to your situation. For example, you can skip periods 2 and 3 for the weekend.

To modify the schedule:

1. Press Pgm to access the programming mode. Period 1 is selected.
2. Press Day to select the day to program (hold for 3 seconds to select the entire week).
3. Press Hour and Min to set the start time of the selected period, or press Clear if you want to skip the period （） is displayed.
4. Press Pgm to select another period, or press Day to select another day. Then repeat step 3.
Press Mode to exit the programming mode.

**NOTE:** If no button is pressed for 60 seconds, the thermostat will automatically exit the programming mode.

### Power Outage

During a power outage, the settings are stored in memory. However, only the thermostat's clock must be re-adjusted if the power failure lasts more than 2 hours. When power comes back, the thermostat will return to the operating mode that was active prior to the power failure.

### Troubleshooting

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermostat is hot.</td>
<td>This condition is normal. Under normal operation, the thermostat housing can reach a temperature between 35°C (95°F) and 40°C (104°F).</td>
</tr>
<tr>
<td>Heater is always On.</td>
<td>The thermostat has not been correctly wired.</td>
</tr>
<tr>
<td>Thermostat indicates that heating is On, but the heater is not On.</td>
<td>The thermostat has not been correctly wired.</td>
</tr>
<tr>
<td>Wrong temperature is displayed.</td>
<td>The thermostat is exposed to air draft. Eliminate the draft. The sticker on the thermostat's screen has not been removed.</td>
</tr>
<tr>
<td>Wrong time is displayed.</td>
<td>The thermostat was without power for more than 2 hours.</td>
</tr>
<tr>
<td>Temperature does not change according to the programmed schedule.</td>
<td>Check that the thermostat is in Automatic mode. Check the schedule and clock settings.</td>
</tr>
<tr>
<td>Display disappears and reappears after a few minutes.</td>
<td>The thermal protection device on the heater is open. This can happen after a power failure or if the heater is obstructed by furniture or curtains.</td>
</tr>
<tr>
<td>Display looks faded when heating is activated</td>
<td>The heating system is less than the required minimum load. This thermostat cannot be used below that rating.</td>
</tr>
</tbody>
</table>

### Technical Specifications

- **Power:** 120/240 VAC, 50/60 Hz
- **Minimum load:** 2 A (resistive only)
  - 500 W @ 240 VAC
  - 250 W @ 120 VAC
- **Maximum load:** 16.7 A (resistive only)
  - 2000 W @ 120 VAC
  - 4000 W @ 240 VAC
- **Display range:** 0°C to 60°C (32°F to 140°F)
- **Display resolution:** 0.5°C (1°F)
- **Setpoint range:** 5°C to 30°C (40°F to 86°F)
- **Setpoint interval:** 0.5°C (1°F)
- **Storage:** -20°C to 50°C (-4°F to 120°F)
- **Approval:** c UL us

### Warranty

Aube warrants this product, excluding battery, to be free from defects in the workmanship or materials, under normal use and service, for a period of three (3) years from the date of purchase by the consumer. If at any time during the warranty period the product is determined to be defective or malfunctions, Aube shall repair or replace it (at Aube’s option).

If the product is defective,

(i) return it, with a bill of sale or other dated proof of purchase, to the place from which you purchased it, or

(ii) contact Aube. Aube will make the determination whether the product should be returned, or whether a replacement product can be sent to you.

This warranty does not cover removal or reinstallation costs. This warranty shall not apply if it is shown by Aube that the defect or malfunction was caused by damage which occurred while the product was in the possession of a consumer.

Aube’s sole responsibility shall be to repair or replace the product within the terms stated above. AUBE SHALL NOT BE LIABLE FOR ANY LOSS OR DAMAGE OF ANY KIND, INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING, DIRECTLY OR INDIRECTLY, FROM ANY BREACH OF ANY WARRANTY, EXPRESS OR IMPLIED, OR ANY OTHER FAILURE OF THIS PRODUCT. Some provinces and states do not allow the exclusion or limitation of incidental or consequential damages, so this limitation may not apply to you.

THIS WARRANTY IS THE ONLY EXPRESS WARRANTY AUBE MAKES ON THIS PRODUCT. THE DURATION OF ANY IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IS HEREBY LIMITED TO THE THREE-YEAR DURATION OF THIS WARRANTY. Some provinces and states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

This warranty gives you specific legal rights, and you may have other rights which vary from province or state to another.

### Customer Assistance

If you have any questions about the product installation or operation, or concerning the warranty, contact us at:

705 Montrichard
Saint-Jean-sur-Richelieu, Quebec
J2X 5K8
Canada

Tel.: (450) 358-4600
Toll-free: 1-800-831-AUBE
Fax: (450) 358-4650
Email: aube.service@honeywell.com

For more information on our products, go to www.aubetech.com

As an ENERGY STAR® partner, Aube Technologies has determined that this product meets the ENERGY STAR guidelines for energy efficiency.
Programming Made Even Easier

Do you want to spend less time installing and setting up thermostats?

The new 9701i2 makes installation even easier with our new Setup Wizard. The Setup Wizard allows you to spend 50% less time setting up the thermostat over competitive models. Plus everything is in plain language so there are no complicated codes or button combinations to memorize.

We've also made programming even easier for your customers. Menus are easier to navigate. We've even added additional convenience features such as Automated Time adjustment for Daylight Saving Time, along with new indoor air quality reminders.

The new 9701i2 is so user friendly, it sets a higher standard in efficiency and simplicity for programmable thermostats. It is truly programming made even easier.

Robertshaw - Simply the Right Choice™

Features and Benefits

- **Set-up Wizard**
  - Helps speed through the installation process with step-by-step setup and programming instructions.

- **Trilingual Display Option**
  - Set to your customers' language of choice – English, Spanish or French

- **Convenient Displays**
  - View a full day of programming at once for quick review or easy adjustment.

- **Contractor ID Feature**
  - Set it yourself or custom order with your information pre loaded. Your name and phone number remind your customers when service is needed.

- **Daylight Saving Time Adjustment**
  - Automatically adjusts to correct time regardless of seasonal changes.

- **Adjustable Backlighting**
  - Choose to have backlighting on at all times or only when programming. You can also adjust the brightness and contrast for improved readability.

- **Time of Day Zoning**
  - When coupled with a remote sensor (part #9020i), you can control the temperature in remote locations given different scheduled events.

- **Three Levels of Security**
  - Secure protection against unwanted changes to the programming menus, temperature or set-up functions with your own 4-digit PIN.

- **Auto Changeover**
  - Automatically adjusts between heating and cooling cycles to maintain optimal comfort.

- **Worry-Free Memory Storage**
  - Even during power outages, the thermostat maintains set point and programmed parameters.

- **Adjustable Temperature Offset**
  - Change the displayed temperature from the actual sensed temperature.

- **Adjustable Temperature Differential**
  - Maintains optimal customer comfort.

- **Intermittent Fan**
  - Maintains optimal air filtration and circulation with minimal energy use.

An ISO 9001 – 2008 Certified Company
California Title 24 Compliant
**Technical Specifications**

**Electrical Rating**
24 Volt AC (18-30 VAC)
1 amp maximum load per terminal (relay outputs)
3 amp total maximum load (all terminals combined)

**Temperature Control Range**
45˚ - 90˚F (7˚ - 32˚C)

**Accuracy**
+/-1.0˚F (+/-0.5˚C)

**Power Source**
24 VAC

**Auto Changeover Deadband**
Selectable 2˚ to 8˚F

**Temporary Temperature Override**
3 hour maximum or next setpoint

**Remote Sensor Capable**
1 indoor and 1 outdoor sensor

**System Configurations**
Single-stage gas, oil or electric heating/cooling systems and single stage heat pump

**Terminations**
R, W1, Y1, B, O, G, C, IS, O

**Shipping Specifications**

<table>
<thead>
<tr>
<th>Indiv. Ctn. Dim.:</th>
<th>6.625&quot; x 4.25&quot; x 1.625&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Ctn. Qty.:</td>
<td>6</td>
</tr>
<tr>
<td>Master Ctn. Dim.:</td>
<td>.9 25&quot; x 5.625&quot; x 7.5&quot;</td>
</tr>
<tr>
<td>Master Ctn. Cu. Ft.:</td>
<td>.23</td>
</tr>
<tr>
<td>Master Ctn. Wt.:</td>
<td>3.5 lbs.</td>
</tr>
<tr>
<td>Max. Pallet Qty.:</td>
<td>1260</td>
</tr>
<tr>
<td>Max. Pallet Wt.:</td>
<td>785 lbs.</td>
</tr>
</tbody>
</table>

**Replacement Chart**

<table>
<thead>
<tr>
<th>Item 9020i and 9025i Remote Sensors</th>
<th>Indiv. Ctn. Dim.: 2.625&quot; x 1.5025&quot; x 4.4375&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Ctn. Qty.: 6</td>
<td>Master Ctn. Dim.: 6.25&quot; x 5.625&quot; x 7.5&quot;</td>
</tr>
<tr>
<td>Master Ctn. Cu. Ft.: .23</td>
<td>Master Ctn. Wt.: 3.5 lbs.</td>
</tr>
<tr>
<td>Max. Pallet Qty.: 1260</td>
<td>Max. Pallet Wt.: 785 lbs.</td>
</tr>
</tbody>
</table>

**Patent Information**

This product is covered by one or more of the following U.S. patents. Foreign patent rights may be pending.

4967382
5803357
6502758
7000849
D301207
D462940

**Optional Sensors:**
- 9020i: REMOTE INDOOR
- 9025i: REMOTE OUTDOOR

**For Technical Service**
Telephone 1.800.445.8299
Facsimile 1.630.260.7294
Invensys Controls
©2009 Invensys Controls
**DESCRIPTION**

**Specifications**

**Performance Specifications**

- **Replacement for:** T6 or T12 4 foot fluorescent tube
- **Brightness (lumens):** 2000
- **Color Temperature:** 4000K | 5000K
- **Color Accuracy (CRI):** 80
- **Dimensions:** 1.02” X 47.2”
- **Power Consumption:** 18 watts
- **Voltage:** 120-277 Volts
- **Dimmable:** No

**Dimensions / Additional Data**

- **Certifications:** UL, DesignLights (DLC)
- **Product/Order Code:** 4000K - 18T8P-4F-40K-BYP  
  5000K - 18T8P-4F-50K-BYP

**Lifespan / Cost To Run**

- **Projected Life:** 50,000 Hrs
- **Yearly Energy Cost:** 3 Hrs/day @ .11 kWh
  $2.17

**Warranty**

- **5 Year Thinklux Lighting Limited Warranty**
  EARTHLED PRODUCT PROTECTION PLAN IS AVAILABLE