



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 ventilation 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.

Annual Energy Costs by Fuel Type



ENERGY BASELINE

#1 Oil
Electricity

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

Predicted Annual Fuel Use				
Fuel Use	Existing Building	With Proposed Retrofits	Total Energy Savings	Total Cost Savings (subsidized)
Electricity	3,303 kWh	2,683 kWh	620 kWh	\$105
#1 Oil	987 gallons	803 gallons	184 gallons	\$799

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

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

Equipment	Rating (Watts)	Annual Usage (kWh)
Store Refrigerators (3)	57 per unit	1500
Store Computer	75	78
Courthouse Computer	75	78
Store TV	86	90

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.

APPENDICES

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.

Month	Heat Recovery Equivalent Use (gallons)	Electricity Use (kWh)
January	140	199
February	120	300
March	100	237
April	80	501
May	60	204
June	40	188
July	40	210
August	40	180
September	60	169
October	80	166
November	110	290
December	130	505

Appendix B – Energy Audit Report – Project Summary

ENERGY AUDIT REPORT – PROJECT SUMMARY	
General Project Information	
PROJECT INFORMATION	AUDITOR INFORMATION
Building: Unalakleet Courthouse & Store	Auditor Company: Company
Address: P.O. Box 28	Auditor Name: Kevin Ulrich, Martin Wortman
City: Unalakleet	Auditor Address: Auditor Address
Client Name: Dwayne Johnson	
Client Address:	Auditor Phone: (907) 729-3237
	Auditor FAX:
Client Phone: (907) 624-3531	Auditor Comment:
Client FAX:	
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

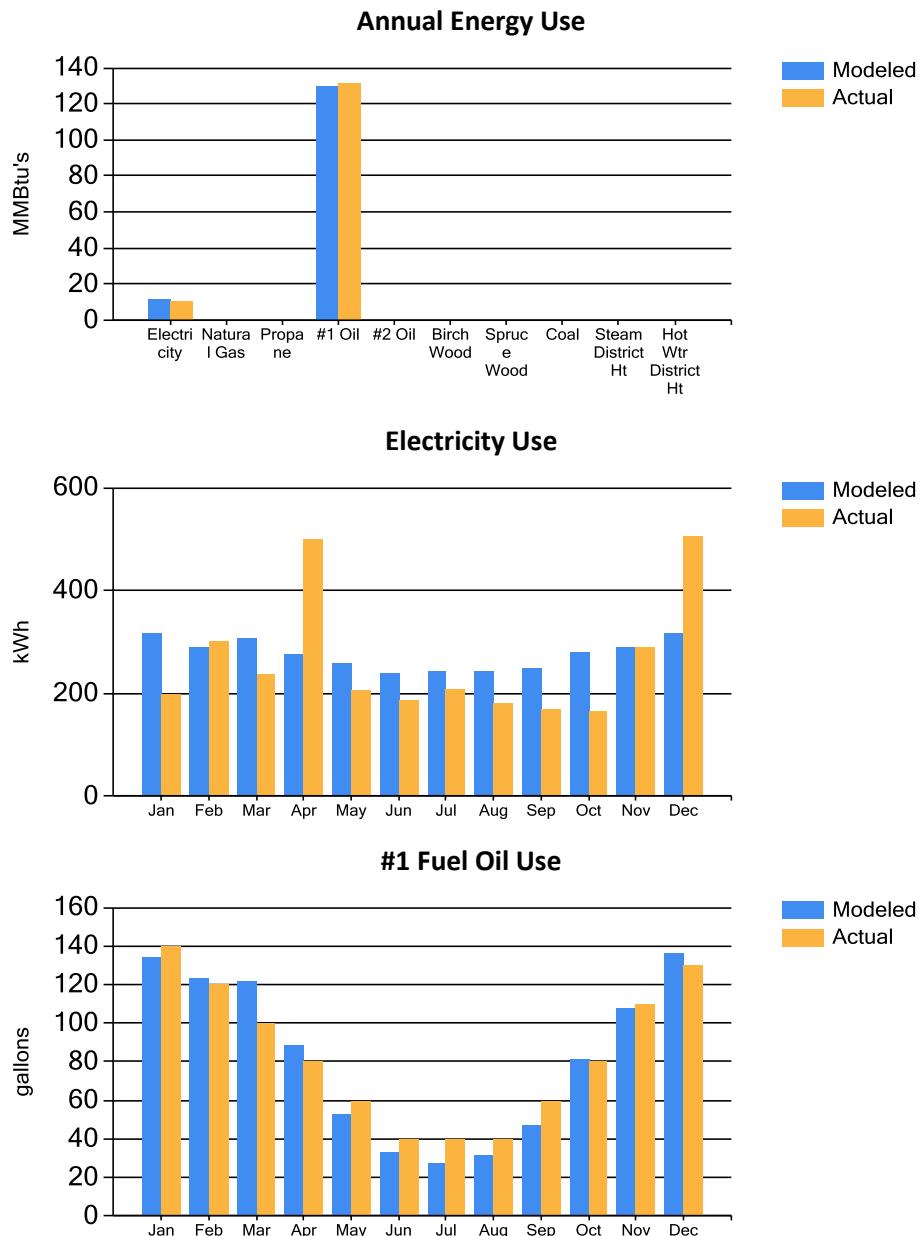
Annual Energy Cost Estimate						
Description	Space Heating	Lighting	Refrigeration	Other Electrical	Service Fees	Total Cost
Existing Building	\$262	\$397	\$625	\$103	\$48	\$1,434
With Proposed Retrofits	\$207	\$192	\$625	\$103	\$48	\$1,174
Savings	\$55	\$205	\$0	\$0	\$0	\$260

Building Benchmarks			
Description	EUI (kBtu/Sq.Ft.)	EUI/HDD (Btu/Sq.Ft./HDD)	ECI (\$/Sq.Ft.)
Existing Building	105.3	7.56	\$1.07
With Proposed Retrofits	85.7	6.16	\$0.87

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.

Average Energy Cost	
Description	Average Energy Cost
Electricity	\$ 0.37/kWh
#1 Oil	\$ 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

Energy Type	Building Fuel Use per Year	Site Energy Use per Year, kBtu	Source/Site Ratio	Source Energy Use per Year, kBtu
Electricity	3,303 kWh	11,274	3.340	37,655
#1 Oil	987 gallons	130,219	1.010	131,521
Total		141,493		169,176
BUILDING AREA			1,344	Square Feet
BUILDING SITE EUI			105	kBTU/Ft ² /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

Building Benchmarks			
Description	EUI (kBtu/Sq.Ft.)	EUI/HDD (Btu/Sq.Ft./HDD)	ECI (\$/Sq.Ft.)
Existing Building	105.3	7.56	\$1.07
With Proposed Retrofits	85.7	6.16	\$0.87

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

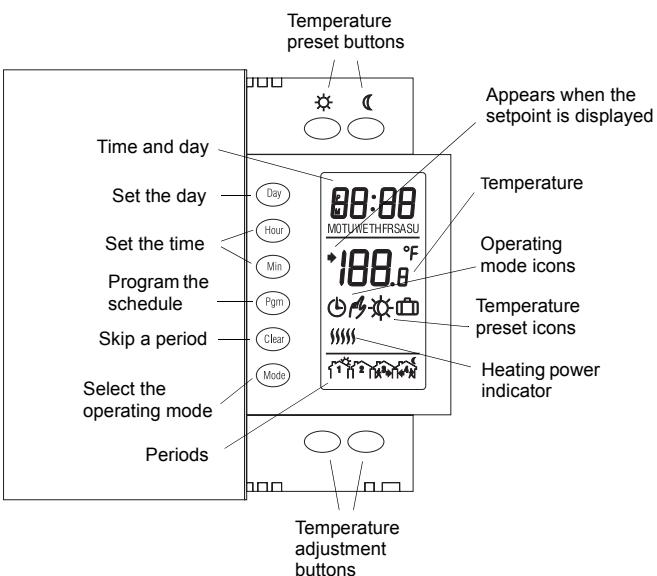
Table 6 & 7: Materials List and Cost Estimation for Unalakleet Court House & Store EEM's

Energy Retrofit	Required Materials	Quantity	Cost per Item	Total Materials Cost
Setback Thermostat	Programmable Thermostat	2	150	300
Weather Stripping around doors	Weather Stripping	2	20	40
LED Lighting	T8 LED Equivalent 4 ft.	38	15	570

Category	Cost (\$)
Labor	3592
Travel	2620
Materials	910
Freight	137
Indirect	726
Total	\$7985

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



1 Description

This programmable thermostat can be used to control an electric heating system such as an electric baseboard heater, a radiant ceiling, a radiant floor, a convector, 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

2 Installation

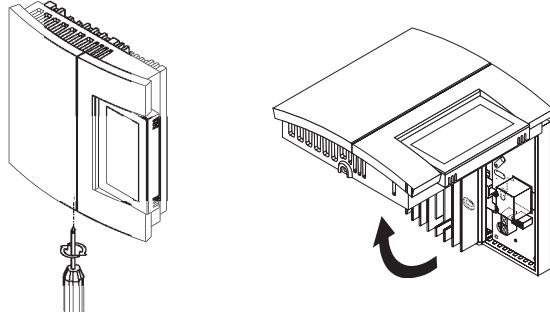
TURN OFF POWER TO THE HEATING SYSTEM AT THE MAIN POWER PANEL TO AVOID ELECTRICAL SHOCK.

THE INSTALLATION MUST BE PERFORMED BY AN ELECTRICIAN.

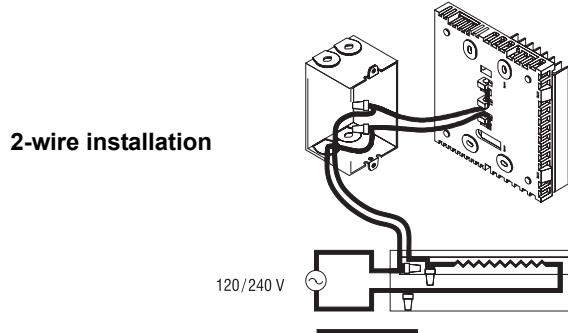
- ▶ All cables and connections must conform to the local electrical code.
- ▶ Special CO/ALR solderless connectors must be used when connecting with aluminum conductors.
- ▶ Install the thermostat onto an electrical box.
- ▶ Install the thermostat about 5 feet high, on an inside wall facing the heater.
- ▶ 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.

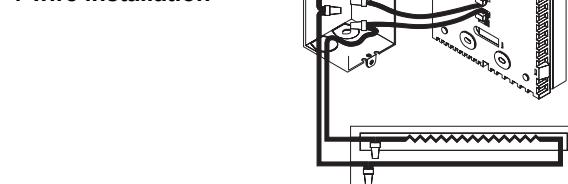
①



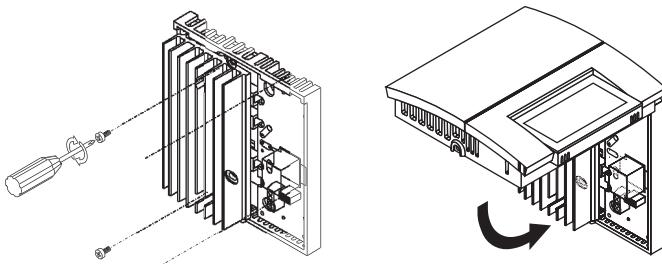
- ② Connect the thermostat wires to the line wires and to the load wires using solderless connectors for copper wires.



4-wire installation



- ③ Push any excess wire back into the electrical box.

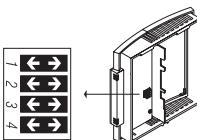


NOTE: If necessary, before re-installing the front component, configure the thermostat (see section 3).

- ④ Return power to heating system.

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.



SW1	Early Start ^a	Off	On
SW2	Temperature / time format ^b	°C / 24-hour	°F / 12-hour
SW3	Cycle length ^c	15 seconds	15 minutes
SW4	Not used	-	-

- 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 🛌) 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 🛌

Icon	Intended use	Factory setting
☀	Comfort (when at home)	21°C (70°F)
⚡	Economy (when asleep or away from home)	16.5°C (62°F)
🎄	Vacation (during prolonged absence)	10°C (50°F)

- 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:

Set the desired temperature using the ▲ or ▼ button. Press and hold the appropriate button (☀ or ⚡) for approximately 3 seconds until the corresponding icon is displayed. Press the **Mode** button.

To store the Vacation temperature:

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.

Period	Description	Associated temperature preset
☀	Wake	☀
🌙	Leave	🌙
🌙	Return	☀
🌙	Sleep	🌙

The Comfort (☀) temperature is used in periods 1 and 3 and the Economy (🌙) temperature is used in periods 2 and 4. For example, when the period changes from 1 to 2, the setpoint automatically changes from Comfort setting (☀) to Economy setting (🌙).

You can have a different program for each day of the week; i.e., each period can start at different time for each day of the week. The thermostat has been programmed with the following schedule.

Period	Setting	MO	TU	WE	TH	FR	SA	SU
☀	☀	6:00 AM						
🌙	🌙	8:00 AM	--:--	--:--				
🌙	☀	6:00 PM	--:--	--:--				
🌙	🌙	10:00 PM						

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.

5 Press **Mode** to exit the programming mode.

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

8 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.

9 Troubleshooting

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

10 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

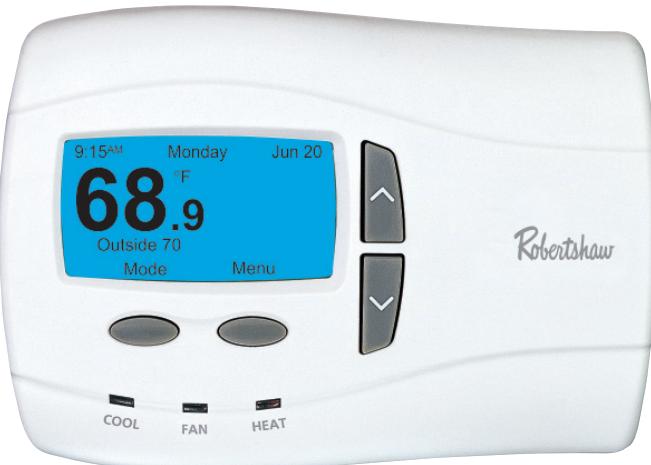
Email: aube.service@honeywell.com

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.

Robertshaw®



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™*

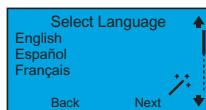
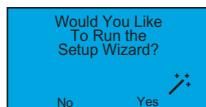
9701i2

**DELUXE
PROGRAMMABLE
THERMOSTAT**



Menu Driven Display 1 Heat / 1 Cool

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



5 Year Limited Warranty

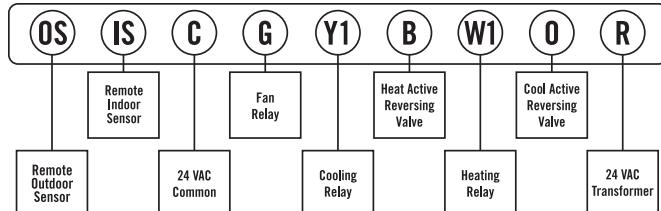
24V AC POWERED

Robertshaw®

9701i2

**DELUXE
PROGRAMMABLE
THERMOSTAT**

Terminal Designations



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, OS

Shipping Specifications

Indiv. Ctn. Dim.: 6.625" x 4.25" x 1.625"	Item 9020i and 9025i Remote Sensors
Master Ctn. Qty.: 6	Indiv. Ctn. Dim.: 2.625" x 1.5625" x 4.4375"
Master Ctn. Dim.: 9.25" x 5.625 x 7.5"	Master Ctn. Qty.: 6
Master Ctn. Cu. Ft.: .23	Master Ctn. Dim.: 5.625" x 5.125" x 5.125"
Master Ctn. Wt.: 3.5 lbs.	Master Ctn. Cu. Ft.: .09
Max. Pallet Qty.: 1260	Master Ctn. Wt.: .78 lbs.
Max. Pallet Wt.: 785 lbs.	

Replacement Chart

9701i2	
Braeburn®	5000
Honeywell	TH8110U1003
White-Rodgers	1F95-1271, 1F90-51, 1F90-71, 1F90-371, 1F97-51, 1F97-71, 1F97-371
Carrier	TC-PAC, TC-PHP, P274-1100, P374-1100, P474-1100
Lux	PSPA711

Verify specific application requirements before substitution.

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

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Optional Sensors:
9020i REMOTE INDOOR
9025i REMOTE OUTDOOR

Feature Comparison

	Invensys i2-Series	Honeywell Vision Pro	Carrier Infinity	White-Rodgers 1F97-371
Menu Driven (Ease of Programming)	X			
Installation Wizard	X			
Displays Complete Program	X			
Adjustable Backlighting	X			
Cooling System Monitor	X			
Heating System Monitor	X			
Multi-Language	X			
1/2 Degree Resolution	X			
Time of Day Zoning	X			
5/2 Program	X			X
24 Hour Programming	X			X
7-Day Programming	X	X	X	
Large Display	X	X	X	
Adjustable Timed Override/Hold	X	X		
Automatic Daylight Saving Time Adjustment	X	X		
Adjustable Temperature Limits	X	X		
High/Low Balance Points	X	X		
LED Status Indicators	X	X		
Adjustable Differential	X	X		
Adjustable Compressor Short Cycle Protection	X	X		
Adjustable Residual Cooling	X	X		
Fossil Fuel Kit required on HP units	No	No	Yes	Yes
Battery Free Memory Retention	X		X	
Manual Override	X	X	X	X
Resume	X	X	X	X
Auto Changeover	X	X	X	X
Gas/Electric	X	X	X	X
Single Stage Heat Pump Compatible	X	X	X	X
Line Powered	X	X	X	X
Programmable Fan	X	X	X	X
Intermittent Fan	X		X	
°F and °C	X	X	X	X
12 or 24 Hour	X	X		X
Air Filter Monitor	X	X	X	X
Humidifier Pad Monitor	X	X	X	
UV Light Monitor	X	X	X	
Vacation Setting	X	X	X	X
O & B Terminals	X	X	Partial	X
Events per day	2, 4, 6	4	4	2, 4
Remote Outdoor Sensor	X	Combo	X	X
Remote Indoor Sensor	X		X	X
Energy Efficient Recovery	X	X	X	X
Pre-set Program	X	X	X	X
Hidden Service Level	X	X	X	
Security Key Pad	X			X
Temperature Recalibration	X	X	X	
Customizable Contractor ID	X			Factory Only

www.RobertshawTstats.com
www.InvensysControls.com
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LED T8 | T12

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[DESCRIPTION](#)

[SPECIFICATIONS](#)

[REVIEWS](#)

EarthLED Total Product Insight

PERFORMANCE SPECIFICATIONS

REPLACEMENT FOR:	T8 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 - 18WT8P-4F-40K-BYP 5000K - 18WT8P-4F-50K-BYP

LIFESPAN / COST TO RUN

PROJECTED LIFE: @3 HRS/DAY	50,000 HRS
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YEARLY ENERGY COST: 3 HRS/DAY @ .11 KWH	\$2.17
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5 YEAR THINKLUX LIGHTING LIMITED WARRANTY
EARTHLED PRODUCT PROTECTION PLAN IS AVAILABLE