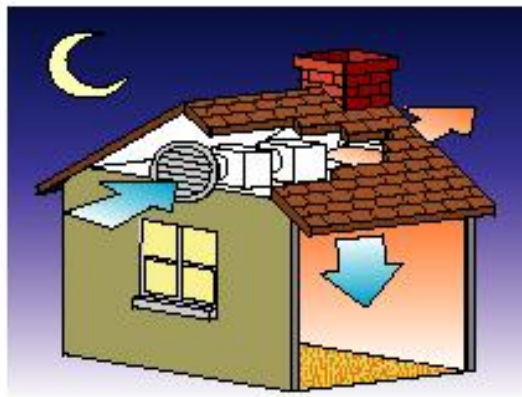




# ***NightBreeze***

## ***Gas Furnace***

**Heating, Ventilation, and Cooling System  
Serving one or two zones**



## **Owner's Manual**

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## System Description

### ***What is NightBreeze?***

The NightBreeze system was developed by researchers to eliminate the need for air conditioning in mild climates, ~~and~~ reduce the size of air conditioners in hotter climates, and to provide improved indoor air quality and comfort. By following these instructions carefully you can insure that you will experience the comfort and energy savings the system was designed to provide.

### ***How is the NightBreeze System Different?***

The NightBreeze system heats and cools your house just like any furnace-air conditioning system, by delivering warm or cool air through ducts to each room. Features that distinguish the NightBreeze from other systems include:

- An automatic damper that allows the house to be ventilated and cooled using filtered outside air, without the necessity to open windows
- A control system that anticipates hot weather and automatically ventilates your house with cool night air to provide optimal comfort while minimizing air conditioner energy use
- A quiet, efficient, variable speed blower that provides just the amount of airflow needed to meet heating and cooling needs
- A thermostat that offers either “Simple” or “Detailed” programming options.

### ***How Does Ventilation Cooling Work?***

On summer evenings in many areas of the country people open windows to ventilate their homes with outdoor air, both to obtain natural cooling and to remove stale air. The cool air absorbs heat from warm interior surfaces and furnishings. In the morning windows are closed and the cool surfaces absorb heat during the day, keeping the house cool and comfortable. Houses with more massive walls and floors store this “coolth” more effectively. The lower the temperature the house reaches at night, the more comfortable the house stays during the day.

Managing windows in this manner reduces the need for air conditioning and saves energy, but personal schedules and security concerns may interfere with using windows for ventilation. Also, there may not be sufficient outdoor breezes to adequately flush the house with cool air.

NightBreeze provides ventilation cooling automatically, eliminating the necessity of operating windows (though it is still good practice.) NightBreeze uses the heating/air conditioning system fan to bring in filtered outside air and flush out warm, stale indoor air.

The system also allows you to select the lowest temperature you want the house to reach overnight. As the weather becomes more mild, the system automatically decreases the amount of ventilation to prevent the house from being over-cooled.

### **What If I Still Need Air Conditioning?**

In addition to allowing you to set your lowest acceptable indoor temperature, you can set the highest temperature that you want the house to reach. The air conditioner (if you have one) will operate if the house rises above this high temperature setting. The special thermostat allows you to see whether the air conditioner is likely to operate, given your high and low temperature settings and current weather conditions.

### **How Does the Heating System Work?**

The furnace used with the NightBreeze system is a high efficiency, variable speed furnace that will help lower your utility bills and will operate more quietly than standard single-speed furnaces. Use of the furnace is no different than for standard systems. Set your preferred heating temperatures using either of the schedule options (simple or detailed) provided with the NightBreeze thermostat.

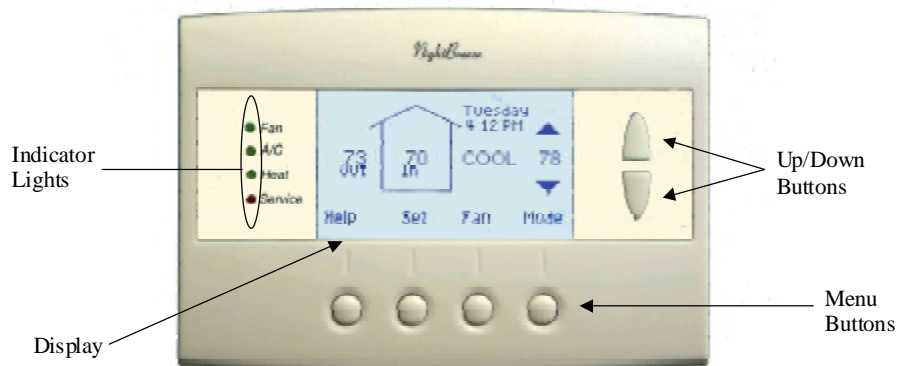
## **Using The Thermostat**

### **Understanding the Thermostat Buttons and Display**

There are four buttons along the bottom of the thermostat and two on the right of the display that are used to make temperature and other settings. The functions of these buttons are described by labels on the display. Referring to the picture below, the button on the bottom right sets the operating “mode” (Heating, Cooling, or Off). These labels may change, depending on what settings are being made. The two up/down buttons on the right side of the display are primarily used to adjust temperature settings, though they are also used for

setting the clock and temperature schedule schedules.

The thermostat has four indicator lights to the left of the display that indicate what the system is doing. The top (Fan) light is on when the fan is manually operated. The “A/C” light indicates the air conditioner is running, and the “Heat” light indicates the furnace is running. The red service light is illuminated when the filter needs changing, or when there is a system fault that should be checked by a qualified service technician. See the section on *Maintaining Your System* for more information about the Service light.



The number located inside the house icon on the display screen is the indoor temperature. The temperature to the left of the house is the outdoor temperature. A window in the house icon opens when it is cooler outdoors than indoors, indicating that windows can be opened to ventilate the house in summer. Day of the week and the current time are also shown in the upper right of the display.

Arrows appear on the screen to indicate if the system fan is running. Different arrows are used to indicate whether the fan is recirculating indoor air, or ventilating with outdoor air (see *Operating the Fan Manually* for examples).

A circular arrow inside the house icon indicates that the fan is recirculating indoor air, while a squiggly arrow indicates you are ventilating the house with outdoor air.

### **Operating Modes**

The NightBreeze thermostat has three operating “modes”: *Off*, *Cool*, and *Heat*. A *Vacation* mode is also available through the Advanced Settings menu. In *Cool* mode the system will provide ventilation cooling and air conditioning. In *Heat* mode the system will provide heating, and if desired, fresh air ventilation. In *Vacation* mode the system will provide both heating and cooling, if needed.

**OFF mode** is used to turn the system off (no heating, cooling, or ventilation) and to access clock settings.

**COOL mode** is used to maintain summer comfort, either by operating nighttime ventilation cooling only, or using ventilation cooling and air conditioning.

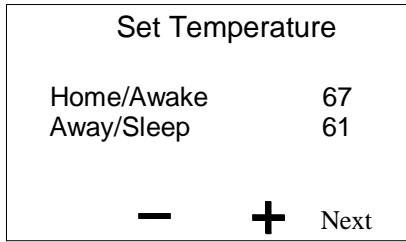
### **Programming Temperature Schedules**

You have a choice between *Simple* and *Detailed* options for programming heating and cooling temperature settings. The NightBreeze system is provided with both heating and cooling schedules set to *Simple*.

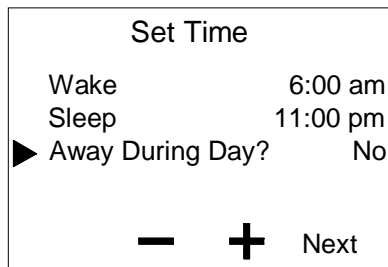
**Which programming option should I choose?** If you work Monday through Friday and need only two temperature settings, one while you are away or asleep, and one while you are at home, you should choose the *Simple* options for both heating and cooling. If you have a more complicated work schedule and/or want more than two programmed temperatures, use the *Detailed* schedule for heating and the *Simple* schedule for cooling. The *Detailed* cooling schedule is only recommended if you have a strong need to schedule indoor temperatures during the summer. The *Simple* cooling option will provide the greatest energy savings.

**How do I select or change the programming option?** At the main screen, press **Menu**. Press the up/down buttons to scroll to *Advanced Settings* and press **Select**. Press the up/down buttons to select either *Heating Schedule* or *Cooling Schedule*. Press the +/- buttons to change the schedules to either *D* (Detailed) or *S* (Simple). Press **Done** twice to return to the main screen. See **Maintaining your System** for more information on the *Advanced Settings* menu.

**How do I set my preferred heating (winter) temperatures using the Simple programming option?** First press the **Mode** button until HEAT is displayed. Then press **Set**. The next screen will appear:



Use the up/down keys to select the temperature you want to change, and the +/- buttons to adjust the temperature. Press **Next** to set your schedule times and the following screen will appear.

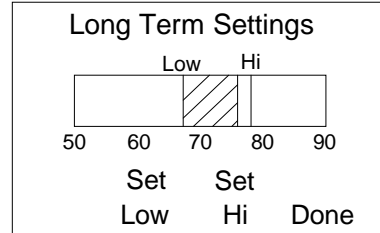


Again, use the up/down keys to select the time period and the +/- buttons to adjust the times. If you work during the day and want the temperature to be set back, select 'Yes' for *Away During Day?* using the +/- buttons. Press **Next** to return to the main screen.

Note: The Simple heating schedule sets the temperature back while you are away or asleep, and sets it up while you are home and/or awake. It also assumes you will be home during weekends.

***How do I set my preferred cooling (summer) temperatures using the Simple programming option?*** Press the **Mode** button until COOL is displayed. Then press **Set**. An image similar to the following will appear. The *Low* setting is the lowest temperature that you want the ventilation system to cool the house to. The *Hi* setting is the same as the air conditioner setting (if you have one), or the highest temperature you want the

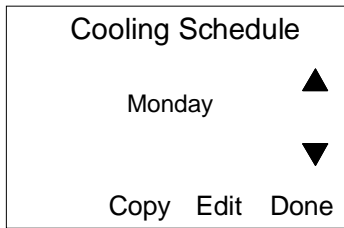
house to reach. The shaded bar in the middle represents the range of indoor temperatures you will be likely to experience, given the settings you have selected.



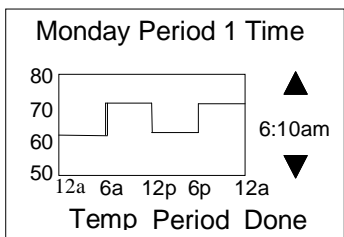
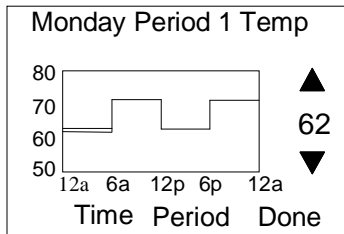
Press **Set Low** to modify the low temperature setting, and use the up/down keys to select your preferred low temperature. The lower you set this temperature, the less your air conditioner will be needed. A setting of 65°F is recommended. Press **Done**, then press **Set Hi** to select the temperature that you want your air conditioner to turn on, using the up/down keys to adjust the temperature. Press **Done** twice to return to the main screen. Your system will now combine ventilation and air conditioning to provide the comfort you have selected.

***How do I set my preferred heating or cooling temperatures using the Detailed programming option?*** If setting preferred cooling temperatures using the detailed programming option, Press the **Mode** button until COOL is displayed. Then press **Set**. Similar to the simple programming option, the *Low* setting is the lowest temperature that you want the ventilation system to cool the house to. The *Hi* setting is the same as the air conditioner setting, but with more options available than the simple programming option offers. Press **Set Low** to modify the low temperature setting, and use the up/down keys to

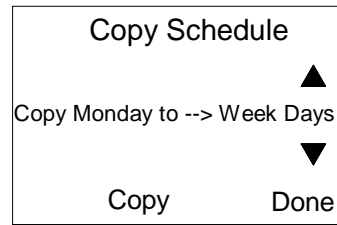
select your preferred low temperature.  
Press **Done**.



Press **Set Hi**. The *Cooling Schedule* menu will appear. Press the up/down keys to select which day of the week's schedule you would like to modify, then Press **Edit**.



The day is divided into periods, and each period has a preferred temperature setting. Press **Period** to toggle between the different periods of the day. A period will flash once it is selected. Press the up/down keys to modify the preferred temperature for the given period. Press **Time** to edit the time in which the period will begin. Once the time is set, press **Done**.



Also included in the detailed scheduling is an option to copy schedules. Press the up/down keys to select which day of the week's schedule you would like to copy and press **Copy**. Press the up/down keys to select different days of the week, weekdays, weekends, or all days to copy the selected schedule to. Press **Copy** to copy the schedule, then press **Done**. Press **Done** twice more to return to the main screen.

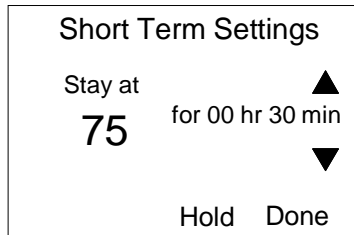
If setting preferred heating temperatures using the detailed programming option, Press the **Mode** button until HEAT is displayed. Then press **Set**. Press the up/down keys to select which day of the week's schedule you would like to modify, then Press **Edit**. A similar graph to that of the *Cooling* schedule (left) appears. Follow the same directions given for the *Cooling* schedule to edit the *Heating* schedule. Then press **Done**.

To copy schedules in heating, Press **Copy** and follow the directions for copying schedules in cooling. Then press **Done**. Press **Done** twice more to return to the main screen.

### Short Term Settings

This feature is for temporarily raising or lowering the indoor temperature if your *Long Term Settings* are not providing the level of comfort you want at the current time. To access the *Short Term Settings*

menu, Press the up/down buttons to change the temperature. Then press **Set**.

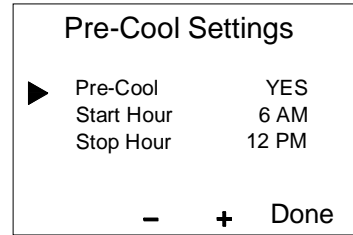


Press the up/down buttons to set the time interval to maintain the short term temperature setting (in intervals of 15 minutes). The temperature setting will be held for the amount of time specified in the *Short Term Settings* screen, after which the temperature setting will revert to the programmed schedule. You may also hold the short term setting for as long as you want by pressing the **Hold** button. This will return you to the main screen where *Hold* is displayed under the current mode. By pressing the **Cancel** button you can cancel the timed or held settings and revert back to the programmed temperature schedule.

### **Pre-Cool Settings**

The NightBreeze Pre-Cool option allows you to automatically pre-cool your home during off-peak hours when rates are lower, thereby minimizing on-peak energy use and lowering your overall utility bill. This feature effectively substitutes early morning air conditioner operation for afternoon operation, and is most useful in areas where ventilation cooling alone cannot prevent air conditioner use.

To enable the Pre-Cooling function, press the **Menu**. Press the up/down buttons to select *Pre Cooling*, then press **Select**. The following Pre-Cool Settings Screen should appear:

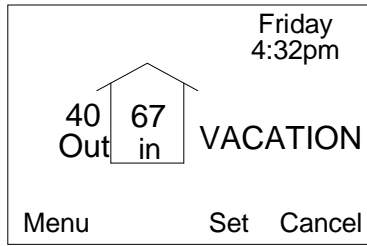


Press the up/down buttons to move the cursor to the *Pre-Cool* line. Use the +/- buttons to change to "Yes" or "No". Again, press the up/down along with the +/- buttons to change to the *Start Hour* and *Stop Hour* for Pre-Cooling. The Stop hour should correspond to the starting time of your utility's on-peak period. You may adjust the Start hour to achieve the desired amount of pre-cooling. Once you are done, press **Done** twice to return to the main screen.

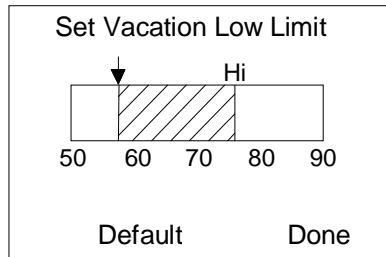
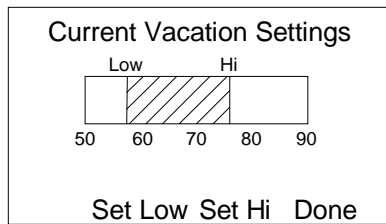
The NightBreeze system automatically determines the temperature to which the house should be cooled to reduce on-peak electric use, and varies this temperature depending on weather conditions, up to the cooling temperature that you have set.

### **Vacation Mode**

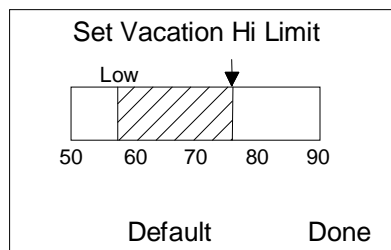
*Vacation Mode* is used to set upper and lower temperature limits while you are away for extended periods of time. In this mode the thermostat will use the ventilation system, air conditioner, and heater as needed to maintain indoor temperatures within the selected limits. Wider settings (for example 55° low and 85° high) may completely eliminate furnace and air conditioner use, and will result in lower energy costs.



To use vacation mode, Press the **Menu** button. Press the up/down buttons to scroll to *Vacation*, then press **Select**. This will return you to the main screen where VACATION is displayed.



Press **Set** to access the *Current Vacation Settings*. Press **Set Low**, then press the up/down buttons to set the lower temperature limit. If you wish to use the default settings, press **Default**. Once the temperature has been set, press **Done**.

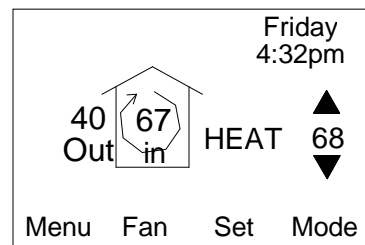


Now press **Set Hi**, then press the up/down buttons to set the upper

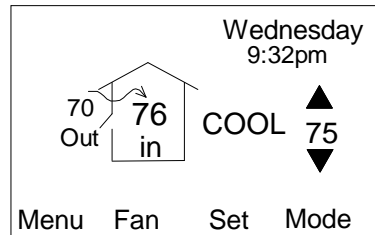
temperature limit. If you wish to use the default settings, press **Default**. Once the temperature has been set, press **Done**. Press **Done** again to return to the main screen.

### Operating the Fan Manually

Normally the fan operates automatically, and only while the system is ventilating, heating, or cooling. However, you may manually turn on the fan from any operating mode except VACATION.



Press the **Fan** button. If you press the button once, a circular arrow inside the house icon will blink, indicating that the fan is recirculating indoor air.



If you press the fan button a second time, a squiggly arrow will appear, indicating you are ventilating the house with outdoor air.

Pressing the fan button a third time will revert to automatic fan operation, or after one hour the fan will return to automatic operation by itself.

Note that these arrow symbols appear any time the fan is operating, but the arrows only blink if the fan has been turned on manually.

Manual fan operation may be useful if you want to remove indoor odors, or just mix indoor air. The fan consumes energy, so routine manual operation of the fan is not recommended.

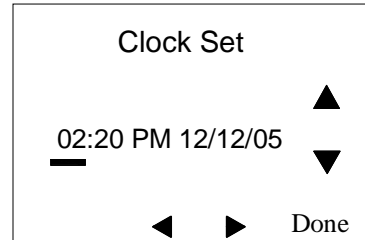
### **Winter Ventilation**

To keep indoor air fresh, the fan and damper will operate while the thermostat is set to heating mode to ventilate your house with a small volume of outside air each hour. This volume of air is set by your installer using the *Technician Settings* feature of the thermostat. Advanced settings are described in a later section of this manual.

### **Setting the Clock**

The NightBreeze thermostat has a permanent battery that retains clock time through power outages up to several

hours. If you want to change the time, for example to adjust for daylight savings time, press the **Mode** button mode button until OFF mode is displayed. Then press the **Clock** button.



Use the left and right arrow buttons to position the cursor (underline) under the hours, minutes, day, month, or year. Use the up/down buttons to modify the time or date. Press **Done** when you have finished, and then press **Mode** to return to your preferred operating mode.

## Operating Recommendations

### ***Summer Operation***

By allowing your house to cool off as much as possible at night you will reduce the amount of air conditioning you will need. The following tips will help you to save energy and stay comfortable:

- Set the low limit temperature to 65° or lower
- Set the high limit temperature to 80°
- Open windows when convenient to assist fan ventilation (but only when the window is open on the thermostat house icon)
- Minimize the use of short-term temperature settings
- Use window coverings to block out the sun during the day

### ***Winter Operation***

The following tips will also help you stay warm and comfortable during the winter months:

- Use lower temperature settings for periods when the house is not occupied
- Keep your windows closed and let the system provide fresh air ventilation
- Minimize use of short-term temperature settings
- Use window coverings to keep heat in at night, and open them to allow in heat from the sun during the day

### ***Spring and Fall***

Turn off the system and let the house coast, using windows for ventilation when needed.

## Maintaining Your System

### Changing the Filter

The NightBreeze filter cleans outdoor air that is used to ventilate the house, as well as indoor air that is recirculated. As a result it may require more frequent changing than you are accustomed to. A dirty filter will not appreciably reduce the rate of air delivery to your house, but it will cause the fan to work harder and will increase your energy bill.

For best results, change your filter every 3 months. If you live in an area with a large amount airborne dust or pollens you should inspect the filter monthly and replace it as needed.

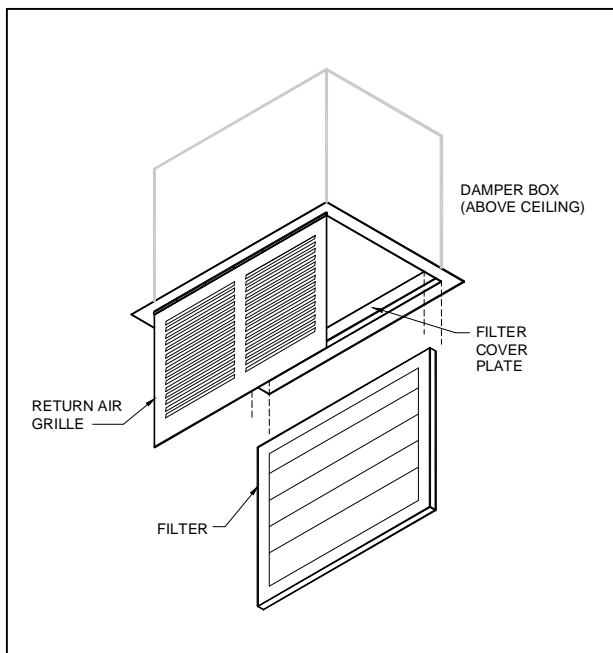
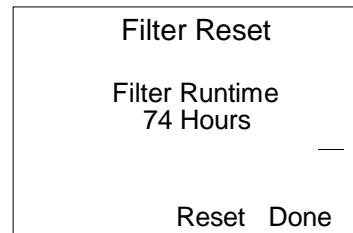
The recommended filter for NightBreeze is the 3M Filtrete 1000 or 1250. Filter dimensions are 20" x 30" x 1".

To access the filter, locate your ceiling return air grille. Rotate the two fasteners located on the rim of the grille opposite the hinge (turn counterclockwise), and allow the grille to swing down. Then rotate the two retaining clips holding the

filter cover plate in place and open the cover. Carefully withdraw the filter, install the recommended replacement, and close the filter cover and grille.

**Note:** Insure the filter is installed in the vertical slot of the damper box. The filter should not be installed horizontally above the grille, as it will not filter outdoor air in this position.

Once you have replaced the filter, you can access the *Filter Reset* menu by first pressing the **Menu** button. Use the up/down buttons to select the *Filter Reset* option, then press **Select**.



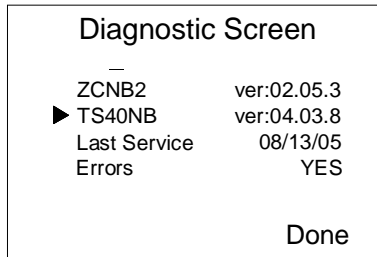
The screen gives an indication as to how long the filter has been running since it was installed. To reset this for the new filter, press the **Reset** button, and the runtime will be reset to "0 Hours". Then press **Done** twice to return to the main screen.

### Service Light & Diagnostic Screen

The red service light identifies when service or filter changes are required, and provides a warning notification if there is a failure of system components. The purpose of the Diagnostic Screen is to provide detailed information for you and your service technician about the nature of the service need.

If the red service light remains on after you have cleared the filter replacement warning as described in the *Changing the Filter Section* under **Maintaining Your System**, do the following:

From the main screen, Press the **Menu** button. Use the up/down buttons until *Diagnostic Screen* is selected, then press **Select**.



The following screen will appear. If the service light is on, the screen will display “Errors: Yes”. Press the up/down buttons to scroll to the next page and view the diagnostic categories, which are listed in the following table below:

Menu Item	Response
Schedule Service	YES or NO
Filter Service	YES or NO
Vent Delta Temp	OK or Error
Leaving Air Temp	OK or Error
Zone Temp	OK or Error
Outside Temp	OK or Error

Make a note of whatever errors are indicated and contact your service technician with this information. Also note both the *ZCNB2* and *TS40NB* versions at the top of the *Diagnostic Screen* and the model number of the furnace. Press **Done** when you have finished to return to the main screen.

### Other Maintenance

Besides changing the filter, no other routine maintenance is required.

However, you should:

- Keep the outside air intake clear of leaves and other debris
- Take precautions to avoid damage to the outdoor temperature sensor (located near the outside air intake)
- Keep your water heater in good operating condition, since it is the source of heat for the NightBreeze

### Advanced Control Settings

The Advanced Settings menu is used to select user preferences such as the appearance of the display, the temperature schedule type (simple or detailed), how the schedules are used by different zone thermostats, and the length of time the fan will run when the fan button is pressed.

You can select how long selected menus are displayed by the thermostat before the screen reverts to the main menu.

You can also choose how long the screen will remain illuminated after you have pressed a button.

Use of the Advanced Settings menu to select the temperature schedule type (Simple or Detailed) is described

**Operating Modes** under *Using the Thermostat*.

**IMPORTANT NOTE:** If your system includes two zones (two thermostats), temperature schedules must be separately programmed at each thermostat. However, by changing the default value for Synchronize Zones in the Advanced Settings menu to YES, whatever schedule you program in one thermostat will automatically transfer to the other thermostat.

The table below describes the items included in the *Advanced Settings* menu, and lists the “default” settings and the available range of settings.

Menu Item	Description	Default Value	Setting Range
Screen Time-out	Idle seconds before screen reverts to home screen	30	0 to 90 by 10s
Back Light Time-out	Idle seconds before back light turns off	30	0 to 90 by 10s
Heating Schedule	Heating schedule type	Simple	Simple, Detailed
Cooling Schedule	Cooling schedule type	Simple	Simple, Detailed
Synchronize Zones	Synchronize zone schedules	Yes	Yes, No
Man Fan Time	Length of time fan will run when the <i>Fan</i> button is pressed, hours	0.5	0 to 4

To access the *Advanced Settings* menu, press the **Menu** button. Press the up/down buttons until *Advanced Settings* is selected, then press **Select**. Using the up/down buttons, point to the desired menu item and modify its setting using the +/- buttons. When you are finished, press **Done** twice to return to the main screen.