

**-- BROCHURE SUPPLEMENTS --  
-- Steam Duty Cycle Models: SF201, 201M --**

**-- Model SF201 Dual Slope Steam Duty Cycle Control --**

Duty cycle controls (Heat Timing Devices) have been around for over 50 years. In the past, owners have been dissatisfied their operation because: (1) *When the outdoor temperature was above 30 deg. F., Duty Cycle controls would “stair case” building temperatures, gradually adding more heat as the day went on. The SF201 has a second operating curve, which besides varying the ON time for each heating cycle with outdoor temperature, it varies the length of time the boiler is OFF in between heating cycles.* (2) It was nearly impossible for the operator to adjust meaningless dial scales. Now you can specifically set “time” and “temperature”. (3) The old technology couldn't provide the correct amount of night setback and morning boost and involved too many dial settings. A new mathematical model was developed eliminating the separate boost dial.

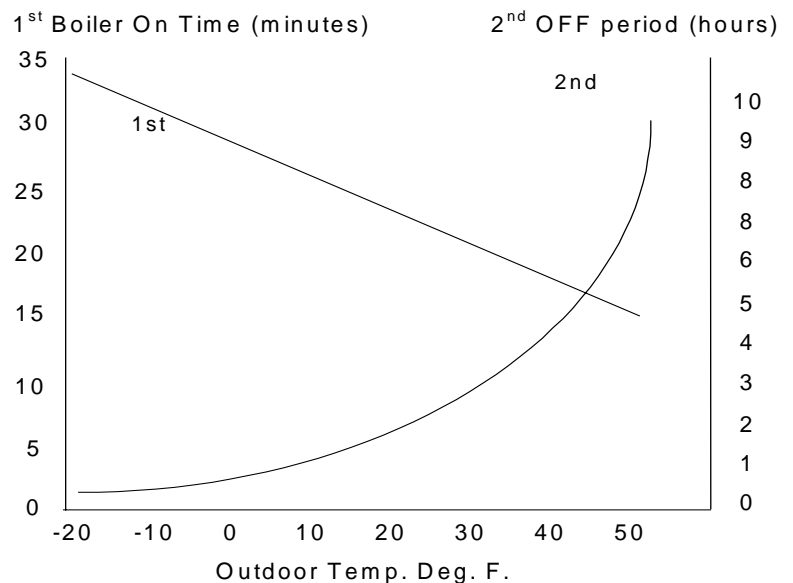
The SF201 considers many factors in calculating how long the boiler should run, and when is the correct start time. This is especially important before going into a set period change. A few of these factors are: (a) how long its been since the last heat cycle, (b) whether the boiler is presently ON or OFF, (c) did the outdoor temperature change in the middle of the delay period? Because sophisticated equations calculate how often and how long to run the boiler by measuring the outdoor temperature, and the return steam temperature, only five simple operator setpoints are necessary.

Only the SF201's computer program can: (A) Calculate both the heating cycle length and the length of the off period. (B) Performs a true correction for the night setback and morning boost temperatures with only one operator setting, the desired night setback measured in deg. F. (C) Intelligently integrate 1 or 2 room zone sensors which can provide data logging, and a worst case minimum and maximum indoor temperature limit.

How do the room zone sensors work? The operator can activate one or both room zone sensors from a DIP switch on the front panel. The desired room temperature setpoint will be compared to the average of the two zones. If the average zone temperature is below or above the range limit (typically +/-4 deg. F.), the boiler will immediately turn on or off respectively. This results in a “rescheduling” of subsequent time delays and heating cycles to account for the one time error.

How does setback work? Immediately after the time clock switches to night, an extra long time delay period (drop-off) allows room temperatures to drift towards the desired night temperature. The difference between the day and night operator setpoints determines the amount of increase in the drop-off and night delay periods. The contractor may calibrate night setback by adjusting the building heat loss factor in the system menu list. What about morning boost? Morning boost will lengthen the first morning heating cycle. The amount of the boost is equalized with the amount of the night setback.

Typical Dual Operating Curve Settings



**OPERATOR ADJUSTMENT**

## SET

Place OPERATOR switch in SET, press VIEW NEXT, then press (+) or (-) to increase or decrease setpoint.

1	HEAT DUTY CYCLE	@ -20F Outdoors	{:40} {maximum is :59}
2	MANUAL RESET (advance to the next ON or OFF cycle)		{NO}
3	OUTDOOR CUTOFF TEMP		{56}
4	HEAT CYCLE LENGTH	@ +60F Outdoors	{Auto}
5	DESIRED DAY TEMPERATURE		{72}
6	DESIRED NIGHT TEMPERATURE		{68}

1 HEAT DUTY CYCLE -- **This is the main heat adjustment.** (a) Sets the Heat Cycle Length or ON cycle in minutes at the -20F outdoor reference point along a “first curve” which calculates Heat Cycle Lengths at all other outdoor temperatures. (b) Indirectly determines the *Heat Time Delay* or OFF delay in minutes at the -20F outdoor reference point along a “second curve” which calculates *Heat Time Delays* at all other outdoor temperatures. The *Heat Time Delay* at -20F outdoors = (60 - Heat Duty Cycle).

2 IMMEDIATE RESET -- Pressing the + or - Key when reading screen 1 of SET menu causes an immediate reset of the ON cycle or OFF delay period.

3 OUTDOOR CUTOFF -- (a) Stops the boiler above the outdoor setpoint. (b) Lowering the outdoor setpoint proportionally increases *Heat Time Delays* between 45 to 60F outdoors (changes shape of *Heat Time Delay* curve).

4 HEAT CYCLE LENGTH -- The ON cycle in minutes at the +60F outdoor reference point along a “first curve” which calculates Heat Cycle Lengths at any outdoor temperature.

5,6 DAY and NIGHT setpoints -- (a) Determine Night Setback. (b) Set the min. and max. range for indoor zone sensors. If during the Day period, the indoor temperatures become greater or less than the Day setpoint by typically +/- 4 F., an immediate reset of the ON cycle or OFF delay occurs.

## READ

Place the OPERATOR slide switch in READ. Press the VIEW NEXT. The READ menu will display the outdoor temp., the return steam temp., and the two optional indoor zone sensors.

## RUN

**(1) Displays countdown shows how much time remains until (a) the end of the heating cycle, or (b) the end of OFF delay period.** (2) the initial length of the OFF delay period, (3) the initial length of the ON cycle period, (4) output relays and day/night period status, (5) total boiler runtime during the last 24 hrs., (6) total boiler runtime during the previous 24 hr. period, (7) indoor zone sensor data logging for the last 2 hrs. in six 20 minute measurements, (8-11) data logging for the last 48 hrs. Data logs read oldest first (upper left) and most recent measurement last (lower right). Each reading is the average of multiple readings over the measurement period (Also see SYSTEM: Screens 4 and 5). The 4 fault LED's indicate conditions where an outdoor, water, or indoor zone sensor is reading out of range *or is defective*.

## SET PERIOD OPERATION:

Drop-off Begins when the Setback Timer switches from Day to Night. To increase the length of the drop-off period, increase the amount of night setback.

Night Begins after the end of the heat cycle following drop-off. Increasing the amount of night setback does two things: (1) increases the length of the drop-off period. (2) Increases the night *off cycle period*.

Boost You cannot singularly adjust the length of boost period. Factors determining the length of the boost period are: (1) the duty cycle, (2) the building heat loss factor, (3) the amount of night setback, and (4) the present outdoor temperature. (5) Moment in time when the Setback Timer changes from Night to Day.

**SYSTEM INITIAL SETUP:** (Press the + plus and - minus keys together).

1.	RETURN STEAM SETPOINT	(starts heat cycle timing)	{120}
2.	ZONE AUTO RESET	(indoor zone sensor +/- range)	{4}
3.	VACUUM PUMP DELAY	(turn on lead, turn off lag)	{:30}
4.	DATA LOGGING ITEMS 1-7	(changes length of RUN menu)	{1-7}
5.	ZONELOG APT. # 1-2	(selects data log apartment)	{1}
6.	BLDG. HEAT LOSS DEG/HR	(calibrates night setback dial)	{6}