Tech Tip #15

Load Control Strategy

The way the demand controller controls loads is called the **load control strategy.** In one sentence, it is the definition of each load's importance in relation to all other loads being controlled by the system.

The sequence in which loads are shed is critical. **A good load control strategy is the single most important factor that will make or break a demand control application.**

Many of the early demand controllers did not have built-in features for changing or customizing the load control strategy, which led to poor control and reduced comfort. Today's Energy Sentry controllers are a great improvement over the old because of the flexibility provided by advanced microcomputer technology. The user is able to program a **customized** load control strategy that works best for the home's architecture, the heating and cooling equipment, the loads under control, the electric use in the household, and most of all, his or her lifestyle.

Generally, there are three load control strategies: priority (fixed), rotating or combination.

Fixed Priority Strategy

Priority strategy sheds the least important loads first and the most important last. The last load shed is the first to be restored. The priority strategy has the advantage of keeping high-priority rooms (such as the family room and dining room) at the desired temperature while low-priority areas (such as the basement or utility room) are allowed to experience small temperatures drops during peak demand periods.

Fixed Priority Strategy
Heat Pump/Air Conditioner Home

Priority	Shed Sequence	Load	Demand
1 (highest)	Last Load Shed	Dryer (heating element only)	5.5 KW
2	7th	Compressor #1	3.0 - 7.0 KW
3	6th	Compressor #2	3.0 - 7.0 KW
4	5th	Water Heater	4.5 KW
5	4th	Strip Heat #1 (electric furnace)	5.0 KW
6	3rd	Strip Heat #2 (electric furnace)	5.0 KW
7	2nd	Strip Heat #3 (electric furnace	5.0 KW
8	1st Load Shed	Strip Heat #4 (electric furnace)	5.0 KW

NOTES:

Compressor is not shed when outside temperature is below 30°F (When outside thermostat is installed.) Compressor cannot be restarted for at least five minutes after it is shed. This delay is for compressor protection.

When the rate of total power consumption is projected to exceed the demand limit (dL) setting, the controller looks for the lowest priority load in the assigned priority of all the loads that can be shed, and sheds it. If necessary, more loads are shed in ascending priority order to keep the average demand below the **dL** setting.

In controllers with eight relays, up to eight circuits are turned on and off. Priority Level 1 has the highest priority ¬ last off, first on. Priority Level 8 has the lowest priority ¬ first off, last on. The on/off decision is made and carried out every minute. In controllers with 16 control points, Level 16 is the lowest priority.

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In fixed priority strategy, load control can sometimes be enhanced by assigning on-times or off-times of up to 20 minutes each to certain loads. This is particularly useful for controlling heat pump and air conditioning compressors, which require time-delay protection.

Rotate Strategy

The rotating sequence provides for an equal distribution of power to all controlled loads. This may be desirable where all rooms are occupied and require an equal share of power. Rotating strategy works best in electric baseboard-heated homes where there is **NO** water heater and dryer to control.

Rotation is particularly useful when you have several heating loads and want to make sure no load stays off for too long at a time. Since the reduction in demand is shared by several loads, the desired comfort level is maintained throughout the home.

In controllers with eight relays, all eight circuits are assigned an equal priority. Loads are turned off and on sequentially every minute, as needed, to maintain demand below the limit. At the beginning of each one-minute interval, the first load previously turned off is turned on. The controller's microcomputer keeps track of which load has been off longest and will restore it first when it is able. The microcomputer continues to shed or restore loads as necessary to maintain the demand limit setting and provide all loads with essentially equal operating time. This is the standard pattern.

Unlike with fixed priority strategy, minimum on and off times are usually not required, but you may assign them if desired.

Combination Fixed/Rotate Strategy Baseboard-Heated Home

Priority	Shed Sequence	Load	Demand
1 (highest)	Last Load Shed	Dryer (heating element only)	5.5 KW
2	2nd	Water Heater	4.5 KW
3 (lowest)*	1st*	Living Room Heat	3.5 KW
3 (lowest)*	1st*	Basement Heat	4.0 KW
3 (lowest)*	1st*	Entry Heat	1.5 KW
3 (lowest)*	1st*	Bedroom Heat	2.0 KW
3 (lowest)*	1st*	Bedroom Heat	2.0 KW
3 (lowest)*	1st*	Family Room Heat	3.0 KW

*NOTES: With the rotating Strategy, the shedding sequence begins with the load that has been restored the longest. When all #3 priority loads are shed, the #2 priority load is shed next. The #1 Priority load is shed last, if necessary.

Combination Load Strategies

This is the most versatile and powerful strategy because so many combinations are possible. For example, groups of rotating loads can be programmed with or without fixed priority loads. The sample shows one combination. This combination is recommended for electric baseboard homes and has proven to provide superior results in that application.