# TYPE 520: MULTIPLE THERMOSTAT CONTROLS

## General Description

The Multiple Thermostat Controls utility programs (Type520.exe and MultThermoSched.exe) and their companion component Type520 are used in conjunction with one another to define a set point schedule that changes based on a weekday, Saturday, and Sunday basis. A set point schedule consists of a heating set point and setback temperatures, a cooling set point and setup temperatures, and the hours during which they apply. While this documentation has been written using temperature set points as an example, it should be noted that there is nothing inherent about that MultThermoSched program that forces it to be used only for temperatures. It should also be noted that the difference between Type520 and Type514 is that Type520 allows for differing schedules during weekdays, on Saturdays and on Sundays while Type514 applies the same schedule regardless of the day of the week.

Two applications are provided: Type520.exe is a plugin for use with the TRNSYS Simulation Studio while MultThermoSched.exe is designed for use in distributable TRNSED applications. The first section of the Detailed Description here below provides the user with information on manipulating Type520.exe and MultThermoSched.exe since operationally they are identical. Type520.exe and MultThermoSched.exe differ only in the format of data that they pass to the program that called them. A second section describes the use of Type520 and Type520.exe within the TRNSYS Simulation Studio environment. The third section of the Detailed Description describes the application of MultThermoSched.exe in TRNSED distributable applications.

## Detailed Description

*1. Use of the Scheduler Programs*

At the top of the screen is the File menu which controls the selection of the file that will store the values and be read in by TRNSYS as well as the control of the program. The user can select “Open” from the menu to open an existing file, “Save” to save the current values to a file, or “Exit” to leave the program. Selecting the appropriate tab determines if the values are being input for the Weekday, Saturday, or Sunday set point schedule.

The two vertical bars on the screen shown in Figure 1 are used to set the times when the different set points are used, with heating being set on the left hand bar and the cooling on the right hand. The period when the set point temperature is used is set by the middle section of the bar (red part in heating and blue part in cooling). The sections at the top and bottom of the bar denote times when the setback (in heating) or setup (in cooling) temperatures are used. The sections of the bar are changed by grabbing the separation lines with the mouse and moving the lines to the desired time. When the mouse cursor is moved over a separation line so that it can be selected the cursor changes from the arrow ( ) to the pointing finger ( ). The line can then be moved by clicking and moving the mouse while holding the mouse button down. When selected the cursor will change to the closed hand ( ). While the separation lines are moving the time values on the right side of the bar will change to denote the time being set. Times can be set at 15 minute intervals.

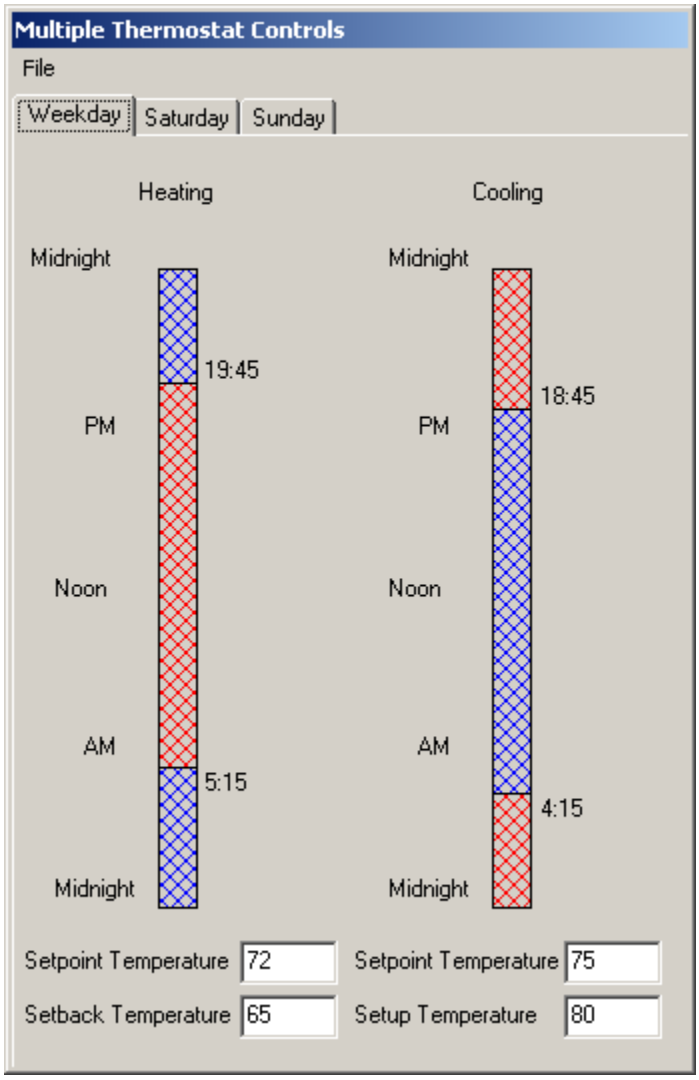



*Figure 1: Thermostat Control*

The heating set point and setback temperatures are set in the text boxes on the bottom left of the window and the cooling set point and setup temperature in the textboxes on the right bottom of the window.

## *2. Implementation of Type520.exe and the Type520 Component in the Simulation Studio*

Type520.exe is a Simulation Studio plugin. Plugins offer an alternative method for entering parameters and inputs. Once Type520 has been placed in a Studio project, double click the component as you normally would to enter its parameter and input initial values. The window that pops up should look like that shown in Figure 2. Clicking the icon in the lower left hand corer of the window will launch Type520.exe, allowing you to set the appropriate schedule.

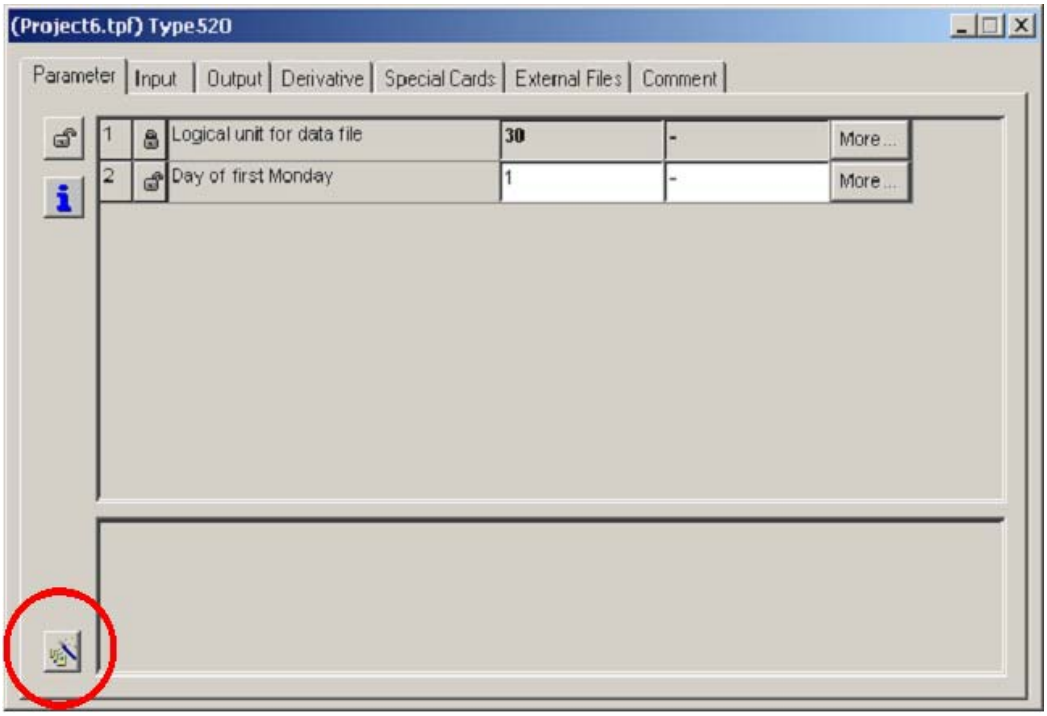



**Figure 2: Data Entry when a Plugin is Available**

*3. Implementation of MultThermoSched.exe and the Type520 Component in TRNSED*

While TRNSED is a powerful tool for taking user supplied data and inserting it into the appropriate spot in a TRNSYS simulation input file, for some types of data, TRNSED's built in syntax can be cumbersome for the end user. For example, if the TRNSED programmer wishes to allow the end user to enter a heating or cooling set point schedule, s/he is limited to using groups controlled by a radio buttons, or to adding enough sequential numerical value fields into the TRNSED interface to accommodate the entire schedule. Type520 and its companion program (MultThermoSched.exe) offer an alternative; the TRNSED programmer can provide the end user with a clickable button in the TRNSED interface. When the end user clicks that button, the MultThermoSched application is launched and the end user can set up heating and cooling set points, heating setback tand cooling set up temperatures and the times during which these are active using a dedicated graphical interface. The following example shows a possible implementation in TRNSED. Please refer to the TRNSED/TRNEdit manual for more information regarding the syntax used.

Figure 3 shows what the TRNSED end user might see in this example's implementation of Type520. The text and button in the figure below are contained in a bitmap image called HtCl.bmp.

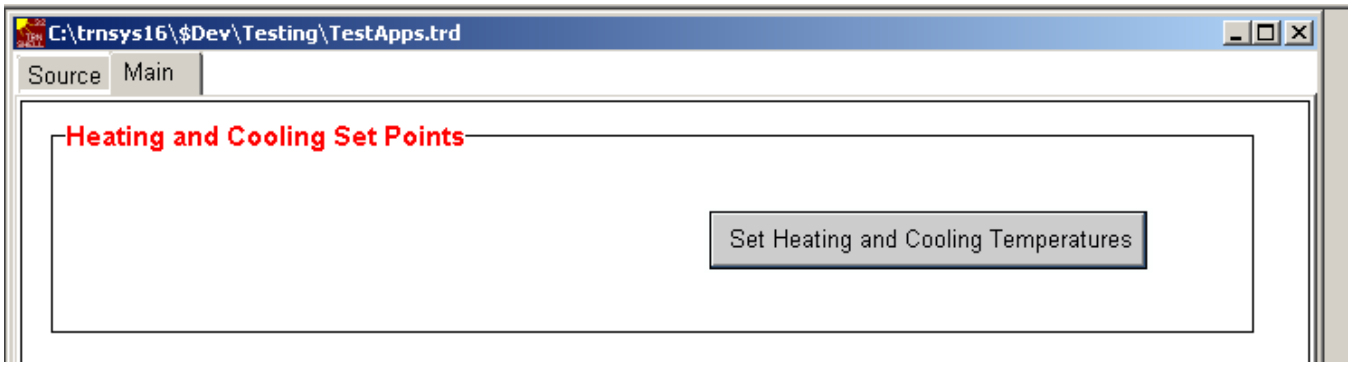



**Figure 3: A Clickable Button in TRNSED. Clicking the button launches the MultThermoSched.exe Application**

The TRNSED source required to create Figure 3 is as follows:

```
*|[HeatCoolDisplay|Heating and Cooling Set Points
*|<APPLINK4> \trnsys16\images\HtCl.bmp file=\trnsys16\AppsDat\T520dat.mts RIGHT
ASSIGN "\trnsys16\AppsDat\T520dat.mts"  26
*|]

UNIT 35 TYPE 520 - HEATING/COOLING SET POINT SCHEDULER (MULTTHERMOSCHED.EXE)
PARAMETERS 2
26          !logical unit of data file
1           !day of the week on which the simulations starts
```

In the above, the <APPLINK4> keyword takes three arguments. The first argument is the location of the clickable bitmap image that will be displayed in TRNSED view. When clicked, the executable program associated with APPLINK4 (in this case MultThermoSched.exe) will be launched and will load the file indicated by the second argument. In this case, it is the *.mts file that contains the schedule data. The third argument is a justification (LEFT, RIGHT, or CENTER) for the bitmap image.

The only other thing that the TRNSED programmer must do in order to implement the clickable button is to make sure that APPLINK4 in the TRNEdit File: Setup Menu is directed to MultThermoSched.exe. The Link Tab might be set as follows:

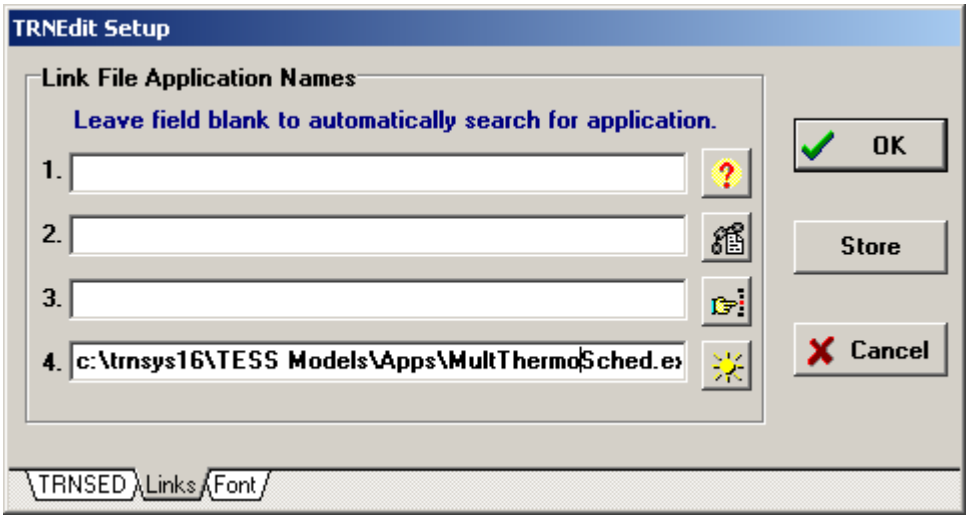



**Figure 4: The TRNEdit Links Setup**

When the end user clicks on the button in the TRNSED display, c:\trnsys16\Tess Models\Apps\MultThermoSched.exe is launched with either the file “c:\trnsys16\AppDat\T520dat.mts.” Once the user has made and saved their changes to the slider values, MultThermoSched records those changes in the appropriate .mts file. Later in the TRNSED input file, the same files are ASSIGNed to logical unit numbers. The data file is read by Type520 during the simulation and the Type outputs appropriate values of the heating or cooling set points for each hour of the simulation.