THE UTILITY COMPONENT LIBRARY (GENERAL DESCRIPTIONS)

TYPE 501: GROUND TEMPERATURE PROFILE

This subroutine models the vertical temperature distribution of the ground given the mean ground surface temperature for the year, the amplitude of the ground surface temperature for the year, the time difference between the beginning of the calendar year and the occurrence of the minimum surface temperature, and the thermal diffusivity of the soil. These values may be found in a variety of sources including the ASHRAE Handbooks (refer to soil temperature).

TYPE 571: INFILTRATION TO A CONDITIONED ZONE

ASHRAE long recommended the use of a semi empirical model for the calculation of infiltration to a conditioned zone. The so called K1, K2, K3 method is considered to be less rigorous than the calculation of infiltration based upon dynamic wind pressure, buoyancy forces and envelope characteristics. However, the more rigorous model requires extensive knowledge of parameters whose values are difficult to measure without a blower door test and the K1, K2, K3 model remains an accurate method for obtaining quick computation of infiltration.

TYPE 572: EQUIPMENT FOULING

This component can be used to degrade and reset the performance of other components over the course of a simulation. For example, as a solar thermal collector sits on a roof, dust and pollen accumulate on its glass cover, degrading its performance until it rains or until it is washed. The component calculates a “fouling factor” for equipment as a function of time. Cleanings can be scheduled, at which time the fouling percentage is set back to zero The model also allows for the equipment to self-clean at a user specified rate with the input of a control signal.

TYPE 573: OUTPUT DEVICE FOR AVERAGE DAY OF EACH MONTH

This component creates the hourly profile for the average day of each simulated month and for two alternatives (inputs). The profiles are stored in a user defined output file, which is perhaps best viewed as a 2-D Area Chart in TRNSPREAD (the TRNSYS spreadsheet program) or Microsoft Excel.

TYPE 574: ASHRAE OCCUPANCY LOADS

The ASHRAE Handbook of Fundamentals lists typical latent and sensible loads for occupancy based on the activity level of the occupants. This component takes, as parameters, the number of different people types and their associated activity level, and as inputs the number of people at each of these activity levels. The outputs from this component are the latent and sensible loads for the building (totals and per activity).

TYPE 575: SKY TEMPERATURE

This subroutine calculates an effective sky temperature based on the dew point temperature, the station pressure, the fraction of opaque cloud cover, and the emissivity of the clouds. The correlation is based on equations developed in “Characteristics of Infrared Sky Radiation in the U.S.A.” (Berdahl, 1984). Such calculated sky temperatures are most commonly used in the calculation of radiation losses from structures and solar collectors.

TYPE 576: TWO DIMENSIONAL BIN SORTER

This component calculates the number of hours during the simulation in which the two inputs fall within user-specified bins. The user must provide the number of bins for each of the inputs and the minimum and maximum values for the bins. The model will then sort the inputs into these bins; producing a 2-D grid upon completion. The outputs from this model are written to a user-specified file.

TYPE 577: RANDOM NUMBER GENERATOR DRAWN FROM UNIFORM DISTRIBUTION

This model generates a random number drawn from a uniform distribution based on user-supplied values of an initial seed, minimum and maximum function values.

TYPE 578: RANDOM NUMBER GENERATOR DRAWN FROM NORMAL DISTRIBUTION

This model generates a random number drawn from a normal distribution based on user-supplied values of an initial seed, mean and standard deviation.

TYPE 579: NESTED FORCING FUNCTION

The nested forcing function eliminates the multiple TYPE 14 forcing functions and numerous equations needed to set the schedule for an input that changes throughout the year. This forcing function allows the user to "tier" the forcing functions such that the schedule of the tertiary function depends on the value of the secondary and primary forcing functions.

TYPE 580: PARAMETRIC TABLE OUTPUT PRINTER

The parametric table output printer prints specified results at the very end of a simulation to an assigned data file. Information can be *appended* instead of simply written to the output file such that the results from a parametric table analysis can be quickly viewed and compared. A time and date stamp is also appended to each set of results so that the user knows exactly when and from which input file the results were generated.

TYPE 581: MULTI DIMENSIONAL DATA INTERPOLATION

A generalized adaptation of Type42, this component can be used to model the performance of generic equipment or as a device to interpolate data in up to a four dimensions.

TYPE 582: LIFE CYCLE COST ANALYSIS

One of the most common measures of engineering economics is the life cycle cost of a system and one method of calculating the life cycle cost is referred to as the P1 P2 method. The idea of the method is that the life cycle cost of a purchase option or alternative is calculated based on two economic indicators. The first (P1) is the ratio of the life cycle fuel cost to the first year fuel cost. A low value of P1 indicates that immediate fuel costs are high and that consequently, potential immediate fuel savings are important. The second indicator (P2) is the ratio of life cycle expenditures incurred as a result of the investment to the investment amount. A high value of P2 indicates that the investment has a low first cost but higher costs over the life of the equipment. This component operates in one of two modes. It can either calculate P1 and P2 based on a set of simple economic indicators, or it can accept values of P1 and P2 directly. In both modes, the component calculates the life cycle cost for up to ten system alternatives. More alternatives may be added by modifying a single parameter in the Fortran code and recompiling. The model then compares each alternative to a user designated comparison system.

TYPE 584: OUT OF SET POINT WATCHER

When operating in temperature level control, it is a fairly common occurrence for the temperature of a zone to exceed the cooling set point temperature or to be below the heating set point temperature. Type584 watches temperature conditions, records and (if desired) prints information on the time, duration and extent to which the set points were exceeded. While most often, this component is used in building applications, there is nothing inherent to it about buildings. Type584 may equally well be used in other situations in which a watched variable (mass flow rate, relative humidity, power, etc.) is intended to be maintained within an allowable range but may at times exceed that range.