The SNAP-27 generator being developed under AEC Contract No. AT-30-1-3535 served as the basis for developing the parametric model. The PbTe couple design was modeled after the present SNAP-27 design and is shown in Figure 1. All dimensions and weights used to calculate thermopile weight are scaled from this reference design. Thermopile weight was taken to be a function only of the number of couples required to produce a given power level at a given voltage and hot and cold junction temperatures and the weight of each thermocouple and associated thermopile structure. Thermocouple size was limited to dimensions which are state-of-the-art.

The SiGe model was generated from a design prepared with thermoelement construction methods, similar to those used on the 250 watt generator study under AEC Contract No. AT-20-2-2048 which was prepared in conjunction with RCA/Harrison, manufacturers of SiGe models. Figure 2 is representative of this design. The RTG conceptual design is illustrated in Figure 3.

The logic of the optimization procedure is as follows: An initial thermocouple axial length is selected. A capsule is selected which has a cylindrical length equal to that of the thermopile. The fuel is located in an annular region with a void volume of at least 45%.

Ellipsoidal dome ends are used on the capsule, the length of each of these ends being three-eighths of the cylinder diameter. Capsule weight includes fuel, clad, fuel liner, an allowance for miscellaneous capsule hardware, plus the weight of the spacers. The spacers are required since the fuel capsule is divided into individually sealed compartments. Fuel capsule compartmenting is necessary to avoid release of fuel on impact when high aspect ratio capsules are used. The spacers were used to keep the aspect ratio (L/D) of each compartment below 6.0. A check was included on the maximum temperature reached by the fuel. For the present study, a maximum allowable temperature for the inner fuel liner of 2000$^{o}$F was used. If this temperature were exceeded then the fuel distribution was changed in such a way that the temperature rise through the fuel and fuel capsule would be reduced.

Having set the thermopile and fuel capsule configurations the fin geometry was selected which had the minimum weight for the given heat rejection capability. This was done by