Solar-Powered Cooler and Heater for an Automobile Interior

Thermoelectric devices and fans would run on solar power.

Marshall Space Flight Center, Alabama

The apparatus would include a solar photovoltaic panel mounted on the roof and a panellike assembly mounted in a window opening. The window-mounted assembly (see figure) would include a stack of thermoelectric devices sandwiched between two heat sinks. A fan would circulate interior air over one heat sink. Another fan would circulate exterior air over the other heat sink. The fans and the thermoelectric devices would be powered by the solar photovoltaic panel. By means of a double-pole, double-throw switch, the panel voltage fed to the thermoelectric stack would be set to the desired polarity: For cooling operation, the chosen polarity would be one in which the thermoelectric devices transport heat from the inside heat sink to the outside one; for heating operation, the opposite polarity would be chosen.

Because thermoelectric devices are more efficient in heating than in cooling, this apparatus would be more effective as a heater than as a cooler. However, if the apparatus were to include means to circulate air between the outside and the inside without opening the windows, then its effectiveness as a cooler in a hot, sunny location would be increased.

This work was done by Christopher W. Anderson of Lockheed Martin Space Operations for Kennedy Space Center. Further information is contained in a TSP (see page 1). KSC-12528