



## HEAT TRANSFER RESEARCH

In support of its telecommunications equipment manufacturing activities, Western Electric Company operates the Western Electric Research Center at Princeton, New Jersey, which conducts research in such areas as chemical processes, organic material processes, lasers, optics and thermal energy. The researcher pictured is engaged in the latter work; he is a member of the Center's thermal engineering section, which studies heat transfer processes to develop new manufacturing applications or improve existing applications. In the course of this work, the Center employs a COSMIC computer program called RAVFAC, for Radiation View Factor Program; it is used in analyses of high temperature processing.

There are more than 100 steps involved in manufacturing semiconductor wafers. A number of them involve temperatures of more than 1,000 degrees Centigrade. In one step being studied, the silicon wafers are placed in an apparatus that must produce uniform temperature gradients throughout the thickness of the wafer; if the gradients are not sufficiently uniform, circuits produced near the edges of the wafers are not usable. The RAVFAC program helps assess proposed new designs by calculating heat transfer to determine whether temperature gradients vary from wafer edge to center. Research Center engineers report that RAVFAC is a powerful analysis tool that offers ease of computing heat transfer data; they estimate that it saved several man-months that would have been required to develop a new program.