high-rise threat

Various alternative approaches to the problem will be described. One, for example, involves vestibule approach to stairwells and elevators, the vestibules either being vented or pressurized. Another method involves pressurizing of the stairwells and elevator shafts. The principal objective of both these and other approaches is to avoid smoke transfer from one floor to another and keep the exit ways free of smoke so they can be used by building occupants or the firefighters.

Pressurization of the whole building and venting of the fire region will confine smoke to the area of the fire but it is, of course, essential that the fire region be correctly identified and the smoke and hot gases be exhausted to the exterior of the building. Division of a building vertically into two parts can be a very effective means of ensuring that one side of the building remains smoke free and various variations on this approach are possible.

Much of the data on which the Task Group based its decisions regarding smoke control was the product of Mr. Tamura's work on airflow patterns within buildings. In his earlier work he carried out computer studies using computer models and field tests to determine the air flow movement in a building.

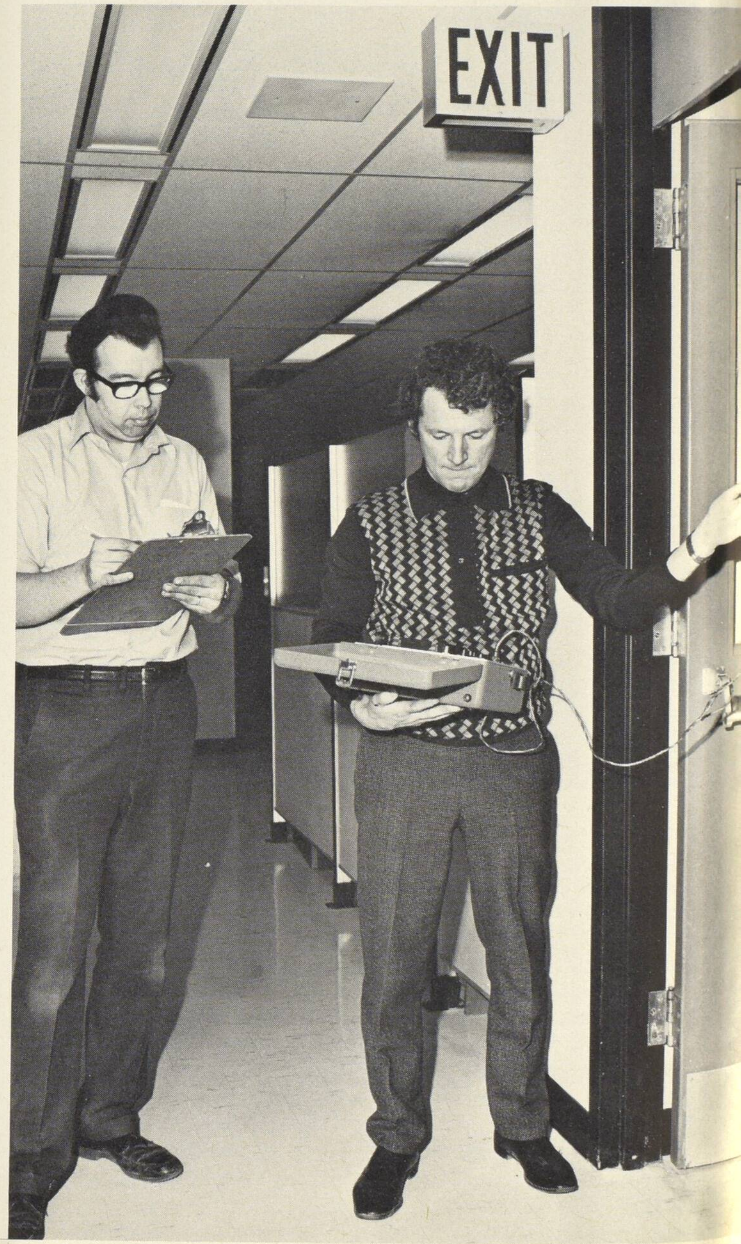
"I became involved with the Fire Section when it became apparent that my work was ideally suited for adaptation to smoke studies," Mr. Tamura says. "One part of our work then became the development of this computer program for predicting how much smoke will migrate through a building. The second part involves tests in modern high-rise buildings to determine the degree of resistance to air movement provided by walls and interior separations."

A study, using the computer program to assess the merits and disadvantages of operating air handling systems under summer and winter conditions, showed that, with certain modes of operation, smoke concentrations in critical areas are lower when the system is shut down. It was also found that smoke conditions can be markedly influenced by such factors as outdoor temperature and the breaking of windows on the fire floor.

"Our basic approach to smoke control has been to attempt to adjust or control the airflow pattern within a building so that smoke from a fire on one floor is prevented from contaminating other floors," Mr. Tamura says. "We try to keep smoke from entering stair shafts and elevator shafts while trying through such techniques as mechanical exhaust systems and smoke shafts to vent the smoke to the outside."

In experimental studies to determine the air tightness of elevator and stair shafts, a portable fan of 50,000 cubic feet per minute capacity is used. Buildings with special vertical shafts acting as smoke vents have been investigated as a means of checking theoretical predictions produced by computer studies.

Some idea of the widespread interest in the DBR smoke control program can be ascertained from the fact that the Center for Building Technology of the National Bureau of Standards in Washington is using the DBR computer program and has asked Mr. Tamura to assist that organization in the work. □ Arthur Mantell



R. G. Evans (right) and R.R. Jaekel of DBR employ a hot wire anemometer to measure air velocities at a door opening. In this exercise several doors in a pressurized stair shaft have been left open to simulate conditions of evacuation and fire fighting and rate of air flow from stair shaft to floor space is determined. • *MM. R.G. Evans (à droite) et R.R. Jaekel, de la Division des recherches en bâtiment utilisent un anémomètre à fil chaud pour mesurer la vitesse de l'air et, de ce fait, le débit s'échappant des cages d'escalier lorsqu'on ouvre leurs portes. Durant cette expérience plusieurs portes d'une cage d'escalier pressurisée sont ouvertes afin de simuler les conditions d'évacuation et de lutte contre l'incendie.*