



At upper left is the Michromonitor™ M500 Universal Gas Analyzer, a portable system intended for field and laboratory use, operable by unskilled operators with little or no technical training. Heart of the system is a series of miniature modules, each of which is a complete gas chromatograph, an instrument that separates a gaseous mixture into its components, then measures the concentrations of each gas in the mixture.

Manufactured by Microsensor Technology Inc. (MTI), Fremont, California the system has a broad range of applications, such as environmental analysis, monitoring work areas for gas leaks or volatile chemical spills, industrial safety and hygiene, stack gas monitoring for compliance with pollution laws, analyz-

ing industrial process gases, food processing, and identifying gases produced during energy exploration. The photos illustrate a special application by the U.S. Coast Guard, working in cooperation with the National Oceanic and Atmospheric Administration, for identification of unknown substances in public areas that might be hazardous. At left, two emergency team members of the Alameda (California) Coast Guard Station unload the Michromonitor from their response truck. At right, wearing safety gear, they are using the system to investigate a barrel that has washed up on the shoreline of San Francisco Bay. The Michromonitor identifies components of compounds in the barrel—or escaping from the barrel—and determines whether it is safe to handle and dispose of the barrel.

The miniaturized gas chromatograph technology on which the system is based originated in a NASA planetary research program. In the early 1970s, NASA was developing instrumentation for two automated Viking Landers destined to land on Mars and conduct extensive photographic and soil sampling research, in-

cluding an effort to detect life on the Red Planet. One of the instruments planned was a gas chromatograph. Such systems were then in wide industrial and laboratory use, but they were generally very bulky units. NASA wanted an extremely sophisticated system capable of detecting respiratory gases given off by Martian microbes—if they existed—but the system also had to be very small and lightweight to fit in a spacecraft packed with other instrumentation for life detection, soil analysis and atmospheric sampling.

Ames Research Center designed such a miniature chromatograph and Stanford University built flight units for the Viking Landers. As things turned out, however, the system never went to Mars; the device had not been developed in time. But the technology interested the National Institute for Occupational Safety and Health (NIOSH), which was looking for a portable means of detecting toxic gas leaks in industrial environments. NIOSH funded further development of the Ames/Stanford gas chromatograph system. Subsequently, three Stanford researchers who had worked



on the project left the university to form MTI for commercial application of the technology.

Anyone can use the Michromonitor after a few minutes instruction. The operator uses a pushbutton keyboard to select one to 10 gases for analysis, then touches a START button. The microcomputer automates the entire analysis cy-

cle, calculating and displaying the gas concentrations. The system consists of a sensing wand connected to a computerized analyzer that measures gas concentrations as small as one part per million. The Michromonitor is programmed to identify as many as 100 different gases and it runs through a 10-gas cycle in 45 seconds. Then the operator pushes the DISPLAY button and the results of each analysis—identity of

gas, its concentration in parts per million or percentage, the time of analysis—appear in the system's display window. ▲

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