Firefighting aids, a faster method of tracing criminals, and a novel personal security device highlight technology transfers for better public safety.

5/077

dividends in safety

Few disasters are more devastating or more saddening than a raging forest fire. Even when no loss of life or property occurs, fire destroys an extremely valuable resource—the great trees of the American forests.

Over the years, while advances have been made in putting out fires—little has been done to predict them. "Knowing where a forest fire may occur and how it might act is almost as important as having the men and equipment to fight it," says William Innes, Jr., senior meteorologist for the California Division of Forestry (CDF).

Now such a capability exists that may fill a long standing need—an automatic system that sends fire prediction information from remote forest sites to central offices by satellite. Made up of sensors originally developed for space applications, and a combination of solar energy, wind energy, and commercial power, the ground element of the system is a tiny weather station that can be set up in hard-to-reach locations and left to operate automatically for a year or more without maintenance. The first working units were set up last year. By mid-1977 the CDF expects to have the initial complement of 25 working. Called automatic fire index stations, they were developed by NASA's Ames Research Center, in cooperation with the CDF, a division of California's Department of Conservation.

For years, CDF's fire prediction information came from daily fire-weather observations. Obviously, something more was needed. Innes explains: "More weather support is imperative. We need up-to-the-minute weather conditions to know when and where to send our attack forces to fires. Too many significant facts fall through the mesh when weather is sampled only once or twice a day."

Now, with the NASA system, the CDF gets fire weather data from the Geostationary Operational Environmental Satellite (GOES) every three hours at headquarters in Sacramento.

NASA-Ames built two prototypes and tested them within CDF forest areas before developing the final version—a relatively low cost system that weighs only 200 pounds, can be transported to the most remote forest areas by three people, and can be set up in one hour.

Each monitor has a weather sensor, a transmitter, and a power supply. The weather sensor obtains information on wind velocity and direction, solar radiation, relative humidity, and the moisture content of inflammable forest litter—pine needles, leaves, and grass, for example.

The transmitter can send sensor data to the satellite—operating at an altitude of more than 22,000 miles—using only 50 watts of power for short-burst transmissions. The transmitter is sealed in a waterproof can and buried within a two-inch-thick redwood container.

The station's power is provided by a rechargeable storage battery. In the operational test system, three different types of energy sources for recharging are being explored: solar panels, a windmill, and commercial gasoline powered generators.

Automated fire weather stations developed by NASA and now being used by the California Division of Forestry provide a means of predicting where a forest fire might occur. The stations employ aerospace sensors and a combination of solar energy, wind energy and commercial power. To avoid interference by trees and mountains, weather data is relayed by satellite from outlying stations to a central fire protection office.

s/o 77

95

96

The flow of weather data follows an elaborate path from the forest to CDF's Fire Protection Office. Because mountains and trees block direct line-of-sight transmissions, the weather information is routed first to the GOES satellite. GOES then retransmits the signals to a computer complex in Suitland, Md. where reports from each transmitting station are identified by a code number. The CDF data are then relayed by land line to Sacramento, where another computer translates the information into a form usable for prediction. The entire process takes less than 90 minutes, sometimes less than an hour.

From evaluation of the initial network of 25 stations, covering only one region of the California forest, CDF will be able to determine the improvement in fire-suppression operations and how much it would cost to operate and maintain a broad system covering the whole state. If the system proves itself, CDF envisions a statewide network providing data for the most effective use of fire fighting resources.

Coast Guard Firefighting Module

In another anti-fire application, NASA is working with the U.S. Coast Guard to develop a portable firefighting module for combating shipboard or dock fires. Lightweight and completely self-contained, the module can be helicopter-transported to a ship's deck or to dockside. In a compact package, it has everything needed for fire fighting: its own pump,

Videofile is used by a number of law enforcement agencies in the U.S. and Canada. It is a computerized pictorial record-keeping system offering high reliability and rapid retrieval of information. Key components of Videofile are derived from a videotape storage and retrieval system developed for NASA.