

Inventions for the blind

It's been 25 years since James Swail — freshly graduated from McGill University's Faculty of Science — joined the National Research Council of Canada. His aim — to make a personal contribution in the struggle of blind people to achieve an independent way of life.

In the two decades since Jim Swail joined the Instrument Section of NRC's Radio and Electrical Engineering Division, he has produced about 100 instruments and devices for increasing the mobility and job skills of the sightless.

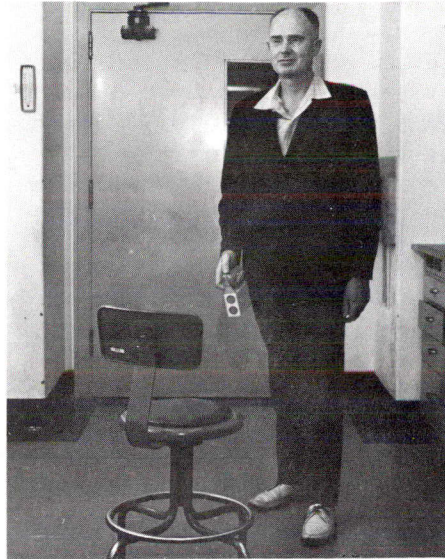
In the process he has gone a long way to demonstrate, by personal example, how to live and work creatively despite such a handicap. For Jim Swail has been blind since the age of four. His university days were difficult. He took his notes in Braille and relied on fellow students to read to him. The tape-recorder and many other electronic devices now in use by the blind were non-existent in the early 1940s.

During his first five years with NRC, Mr. Swail developed special electronic equipment to help him conduct his own research. There followed a steady and continuing stream of mechanical and electronic devices. Some, like the Braille thermometer for a blind man to measure the melting-point of type metal in a print-shop and special meters that enabled a blind radio announcer to be licensed to monitor all the functions of a broadcast station, were designed to help one specific person surmount one specific obstacle. Others have universal application. The most recent is an ultrasonic obstacle detector for the blind.

Obstacle detector

This instrument is Swail's approach to the blind man's problem of how to navigate in restricted areas without the customary long white cane or the seeing-eye dog, today's principal navigational aids. There are certain situations where both the cane and the dog become, in Jim's words, "socially unacceptable".

The device is essentially a simple radar unit using inexpensive transducers similar to those used in the television industry for remote control of television channel-switching. It is



James Swail demonstrates his ultrasonic obstacle detector in office corridor.

packaged in a pocket-sized plastic carrying-case with integral handle.

Its power is derived from built-in rechargeable batteries. The device generates 40 kHz or 70 kHz transmitted as two-millisecond pulses in a narrow beam at a pulse-repetition rate of 10 a second. The receiver unit is turned on immediately after the determination of the pulse. A range switch mounted on the handle selects the length of time the receiver remains on after each pulse.

The ranges have been set at four, seven and 15 feet and the receiver

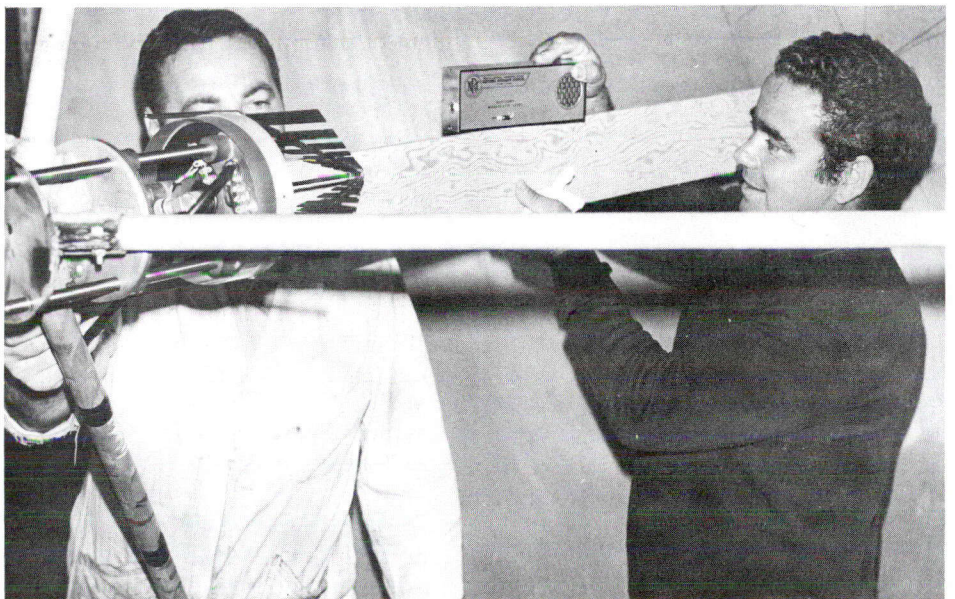
unit will respond to targets within the selected range. If a reflected pulse is received within the above chosen ranges, a monostable circuit is fired. This in turn drives a solenoid-operated tactile stimulator, a rod which vibrates through a hole in the unit's handle and against the forefinger of the operator. The distance to a target can be estimated by altering the range control until the indication ceases. Target direction is determined by scanning.

The device has its limitations. The beam width (8 degrees) and the pulse rate of 10 per second means that scanning cannot proceed as swiftly as would be desired. Too fast a scan and the object is missed. Certain objects such as corners around doors give disproportionately high ultrasonic reflection, confusing the operator as to target locations. Consequently, Mr. Swail expects operators will have to undergo a short period of training if a high degree of effectiveness is desired.

Other inventions

Other Swail-engineered instruments include:

A photoelectric sensor for detecting light sources. One pencil-sized version allows blind personnel to operate telephone switchboards. When a line comes into use a light goes on and the operator can locate the line by scanning with the sensor. Another use includes detecting the presence of print on a page.



An auditory machinist's level developed by James Swail, which emits

a high-pitched tone unless the instrument is level.