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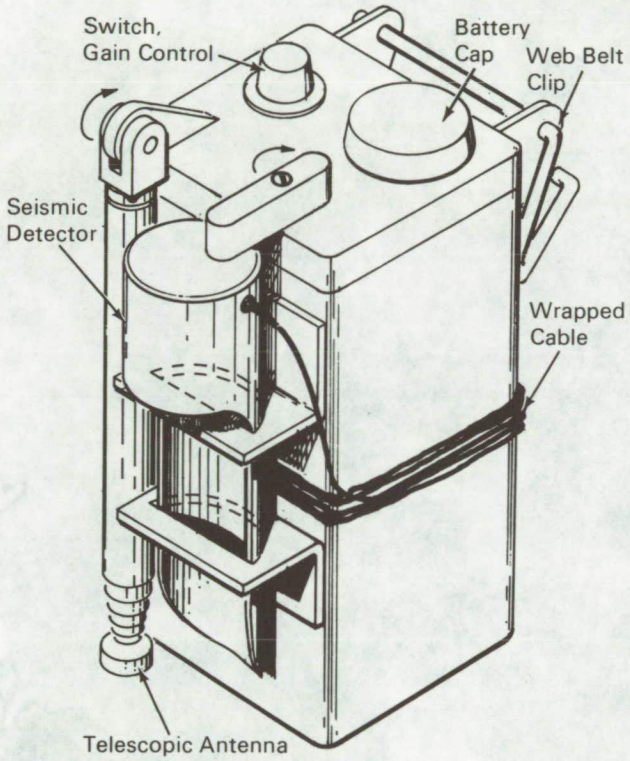
NASA TECH BRIEF

Intruder Detection System



The problem:

Develop a small, rugged, battery-operated system, capable of detecting the presence of intruders, which transmits information to a portable receiving station on the number or kind of intruders and their speed of movement.

The solution:

Utilize one or more commercially available, moving-coil geophones to detect the seismic disturbances caused by intruders. The seismic disturbances sensed by each geophone are converted into electrical signals, amplified, and transmitted to a remote radio receiver which provides the listener with an aural signal of disturbances caused by the motions of the intruder.

How it's done:

The basic intruder detection system is comprised of two units; the intruder detector and the portable FM radio receiver. The intruder detector (see fig.) consists of a seismic detector, of the type commonly used in oil exploration work, connected by a 10- to 20-foot cable to an electronics package which is enclosed within a watertight container. The geophone is potted within a stainless steel tube; one end of the tube is sharpened so that it can be implanted vertically into the ground.

When an intruder moves within range (up to 80 meters) of the seismic sensor, the moving coil vibrates mechanically at its natural frequency; the amplitude and duration of the vibration depend on the intensity of the footstep impluse and the damping factor of the seismic detector. The vibration of the moving coil sensor generates a voltage impulse proportional to the velocity of its mechanical motion, and this low-level signal voltage is amplified.

The amplifier gain is selected to permit detection of disturbances above the ambient seismic background noise and at the highest sensitivity permitted by local soil characteristics. The amplified voltage is detected and integrated. A pulse amplifier triggers the rf oscillator and the audiofrequency voltage-controlled multivibrator (VCO), and their frequencies remain constant until the voltage pulse starts to decay. The exponential voltage decay varies both the frequency of the rf oscillator and the VCO multivibrator. The CW-FM pulse from the rf oscillator is further amplitude-modulated by the VCO voltage within the rf power ampli-

(continued overleaf)

fier and then transmitted to a remote FM radio receiver.

The FM radio will emit a single tone burst for each footstep of a slow-walking intruder; a running intruder will cause production of a continuous tone, with audible periodic variations of background noise indicating each footstep.

Notes:

1. The system has potential for use in building and grounds security, law enforcement, and wild life research.
2. Requests for further information may be directed to:

   Technology Utilization Officer
   Ames Research Center
   Moffett Field, California 94035
   Reference: TSP70-10638

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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(ARC-10097)