



PAMTRAK

Personnel and Material Tracking System

TECHNOLOGY

PAMTRAK is an automated monitoring system that prevents the theft or diversion of nuclear materials. To accomplish this, it tracks the movement and location of personnel and material within a facility.

Typical PAMTRAK applications are to detect unauthorized access in restricted areas and to enforce constant monitoring of containers or other objects in restricted areas by tracking the movement of personnel and material and monitoring the attributes of material (weight, temperature, and radiation).

Description

PAMTRAK is used to protect sensitive items by combining badges, weight and motion detectors, video cameras, bar code readers and tags with a control computer. (Figure 1). This system reports attempts to steal or divert sensitive material.

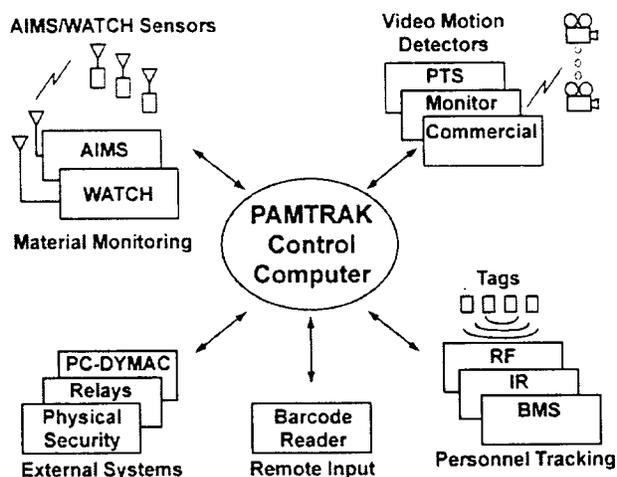


Figure 1. Systems connected to the PAMTRAK control computer that monitor material and personnel within a facility.

The PAMTRAK control computer provides the core for collecting, analyzing and displaying sensor data. The computer evaluates the reports of data against a list of security rules. If any reported condition violates the rules, the computer reports an alarm.

PAMTRAK contains a flexible, customizable and extensible system that is relatively inexpensive for sites to install and maintain. A site can use any subsystem or combination of subsystems that PAMTRAK supports. As a result, the system is installed in many different sites with widely varying requirements without having to modify the software.

PAMTRAK allows nuclear material storage sites to decrease costs by significantly reducing the number of manual physical inventories. Another advantage of the reduction of inventories is the reduction of personnel radiation exposure.

Technical Details

Material Monitoring

- **Wireless Alarm Transmission of Container Handling (WATCH):** Small electronic devices containing motion sensors transmit status messages by radio frequency (RF). These devices provide location and containment attributes for material.
- **Authenticated Item Monitoring System (AIMS):** A system of sensors similar to WATCH, but with the added feature of signal authentication to reduce the possibility of counterfeit messages.
- **Versa Tag:** An RF subsystem using tags (Versa Tags) and interrogators. A Versa Tag can accept up to four sensor inputs including weight, temperature, and gamma radiation.

Video Motion Detection

- **Material Monitoring Image Processing System (MMIPS):** MMIPS uses several cameras placed at various angles to view protected material. MMIPS only reports movement within the detection range, but ignores movement around that same range. This allows workers to move among and around the material.
- **Image Verification System (IVS):** A video motion detection system designed to monitor inactive storage vaults.
- **TSI 20/20:** A commercial video motion detection system which is internationally used in static areas such as inactive vaults. It can adapt to lighting changes and shadows so that it does not generate any false alarms.

Personnel Tracking

- **Radio frequency (RF) tags:** RF antenna pairs installed in various locations throughout a facility detect the movement of personnel wearing battery-powered tags and report their locations to the control computer.
- **Infrared (IR) tags:** Tags that emit infrared signals are worn by personnel in the facility. The signals are detected by infrared receivers mounted on the ceiling.

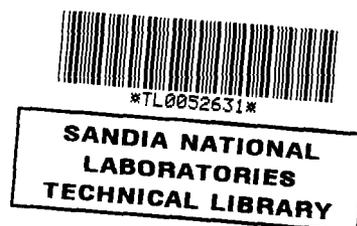
Bar Code Readers

Bar code readers are used to verify inventory of materials and to identify personnel for access to a facility. With the bar code reader, an authorized user can temporarily disable material movement alarms during inventory, movement or inspection.

External Communications

PAMTRAK communicates with other systems for greater system integration. This provides options for alarm set ups for physical security, (exterior and interior sensors and entry control devices), and relays, (signals to other systems).

Availability



Applications

In 1996, PAMTRAK became a part of the Argonne Unified System (ARGUS) at Argonne National Laboratories-West. This system is used for Material Control and Accounting (MC&A) in the Fuel Manufacturing Facility (FMF).

PAMTRAK is used to track, apply and remove the material monitoring WATCHs. The WATCHs are stored in the storage vault and are attached directly to storage containers that contain nuclear material. Part of the test and evaluation is to demonstrate the WATCH as a Tamper Indicating Device (TID).

The Savannah River Site (SRS) in 1996 installed PAMTRAK, in conjunction with Rand Tec Versa Tags, to monitor a storage area in the K-Reactor. PAMTRAK communicates directly with the Versa Tag system.

Credits

PAMTRAK was developed by Sandia National Laboratories and supported by the U. S. Department of Energy.

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More Information

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