

# Overview

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The destruction of Pan Am Flight 103 at 31 000 ft over Lockerbie, Scotland on 21 Dec. 1988 focused attention on the Civil Aviation Security system. This tragedy emphasized the need for the development of equipment and procedures to detect explosive devices carried on passengers, in carryon and checked baggage and, in cargo. In fact, among the recommendations of the President's Commission on Aviation Security and Terrorism was that the Federal Aviation Administration "should launch a top priority research and development program that will detect small amounts of plastic explosives, operationally at airports." Progress is being made not only in the explosive detection area but also in the improvement of the operation of the metal detectors and imaging X-ray systems that all air travelers are familiar with and are used at the present time to inspect passengers and carryon baggage.

This Special Technical Publication has been published as a result of the 1990 Symposium on Access Security Screening: Challenges and Solutions for the 1990s held in New Orleans, Louisiana, in an effort to discuss state-of-the-art technologies and procedures, new research and development programs, as well as developments in the international community. The symposium is an outgrowth of efforts of ASTM Subcommittee F12.60 on Controlled Access Security Search and Screening Equipment. The symposium was cosponsored by ASTM Subcommittee C26.12 on Safeguard Applications.

Because of the increased sophistication of terrorists, the challenge is the development of efficient and effective detection technologies to thwart the terrorist threat. While the actual amount of explosives for detection is classified, suffice it to say that the scenario is a difficult one and is being vigorously pursued. In addition to the explosive detection technology improvements as a result of more stringent detection requirements, imaging X-ray and weapon detectors are undergoing major improvements in detection capability as well as a drastic reduction of the false alarm rate.

The collection of papers published in this volume have been grouped in three categories: weapon detection systems, explosive detection systems, and imaging X-ray systems.

## Weapon Detection Systems

The papers in this category discuss weapon detection technology as well as its use in specific applications such as airports and nuclear plants. In addition, improvements and enhanced capabilities for these detectors are presented along with a discussion on how to integrate the weapon detectors into the overall security system. This section also includes an indication of some of the problems encountered in the actual deployment of these devices in different operating environments.

## Explosive Detection Systems

The Pan Am 103 disaster emphasized the need to develop systems to detect explosive devices using various techniques. Those specifically reviewed in this section are: thermal neutron analysis (TNA) and vapor. In the middle 1980s, research and development efforts were

accelerated and TNA was developed with a prototype being built and tested. In response to the Pan Am tragedy, several more TNA systems were built and deployed at several airports. A discussion is presented on the experience in using the TNA in an operational environment including some of the problems encountered.

The discussion of explosive vapor detection includes a review of the transport of explosive vapor molecules and the difficulty in detecting a hidden explosive device. This paper also discusses a system for the detection of explosives on people (walk-through) as well as a portable system (EGIS) that can be used to inspect packages, lockers, automobiles, and so forth. A laboratory prototype of the walk-through system has been built and tested both in the laboratory and at an airport with the results of this testing given. Sampling techniques and detector selectivity are also discussed.

### **Imaging X-Ray Systems**

These presentations discuss a technology that has been in use, at least in U.S. airports, since the early 1970s. However, many improvements have been made since then such as enhanced X-ray systems that some believe are capable of detecting explosives. These are discussed. The concern of many travellers and indeed professional photographers is that their film will be damaged when it is processed through the imaging X-ray systems in use at airports. The paper on compatibility of X-ray security screening and photographic film is intended as a guide to assist one in determining if suspicions or allegations of film damage when they are exposed to imaging X-ray systems are valid.

In addition to these papers, a presentation was given to discuss the European view of the terrorist problem and how this problem is coordinated among the different countries. In addition, the role of the International Civil Aviation Organization (ICAO) is discussed. ICAO has become the focal point for the development of aviation security programs on the international level, and the coordination process with its 162 member states is given.

The symposium was chaired by Mr. Karl-Heinz Hemmer of the Federal Republic of Germany and cochaired by Mr. Joseph Blank, President of AVSEC, Inc.

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