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FAA Technical Center
Atlantic City International Airport
New Jersey, 08405

FAA Technical Center Enhanced Airport Security System Project

System Level Test Report

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March 1994

Draft Test Report

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16. Abstract This document discusses the system level testing that was conducted at Baltimore-Washington International Airport (BWI). These tests were divided into two distinct areas, the pier area and the working ramp area tests. The tests were further organized into two different basic threat modes, hijacking and bombing. In addition, the system level tests were designed to include other non-adversarial concurrent activities in different areas to stress the system. The System Level Test Report is divided into two parts; an unclassified report and a SECRET supplement. The unclassified sections discuss the test objectives, scope, methodology, and provides detailed descriptions of the individual test series conducted. The SECRET supplement provides the test results and their security implications in detail.			
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PREFACE

This document discusses the system level testing that was conducted at Baltimore-Washington International Airport (BWI). These tests were divided into two distinct areas, the pier area and the working ramp area tests. Each section of this document discusses the pier and working ramp area system level testing separately.

Additionally, this report is divided into two parts; an unclassified report and a SECRET supplement. The unclassified report discusses the test objectives, scope, methodology, and provides detailed descriptions of the individual test series conducted. The SECRET supplement provides the test results and their security implications in detail.

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 SYSTEM LEVEL TESTING OBJECTIVES.	1
1.2 ORGANIZATION OF SYSTEM LEVEL TESTS.	1
1.2.1 Pier System Level Test Organization.	1
1.2.2 WRA System Level Test Organization.	2
1.3 SCOPE OF SYSTEM LEVEL TESTING.	3
1.3.1 Pier Systems Level Testing Scope.	3
1.3.2 WRA Systems Level Testing Scope.	3
2. SYSTEM LEVEL TESTING DESCRIPTION.	4
2.1 SYSTEM LEVEL TESTING METHODOLOGY/APPROACH.	4
2.1.1 Pier System Level Test Methodology Approach.	4
2.1.2 WRA System Level Test Methodology Approach	5
2.2 SYSTEM LEVEL TESTING CONFIGURATION.	5
2.2.1 Pier Area Systems Test Configuration.	6
2.2.1.1 Pier Area Test Team.	6
2.2.1.2 Pier Area Test Equipment.	6
2.2.2 WRA Systems Test Configuration.	7
2.2.2.1 WRA Test Team.	7
2.2.2.2 WRA Test Equipment.	8
2.3 SYSTEM LEVEL TESTING DATA COLLECTION, REDUCTION AND ANALYSIS METHOD.	8
2.3.1 Pier System Level Test Method of Data Collection, Reduction and Analysis.	9
2.3.2 WRA System Level Test Method of Data Collection, Reduction and Analysis.	9

TABLE OF CONTENTS (Continued)

2.4 SUMMARY OF TEST CASES/RUNS PERFORMED.	10
2.4.1 Pier System Level Test Case Summary.	10
2.4.2 WRA System Level Test Case Summary.	10
3. RESULTS AND DISCUSSION.	15
3.1 RESULTS.	15
3.1.1 Pier System Level Test Results.	15
3.1.2 WRA System Level Test Results.	15
3.2 OPERATIONAL TEST RESULTS.	15
3.2.1 Pier System Level Operational Test Results.	15
3.2.1.1 Operational Test Effects.	15
3.2.1.2 Pier System Level Equipment.	16
3.2.1.3 Pier System Level Observations.	16
3.3 SYSTEM LEVEL TEST DISCUSSION.	16
4. CONCLUSIONS.	17
4.1 PIER SYSTEM LEVEL TEST CONCLUSIONS	17
4.2 WRA SYSTEM LEVEL TEST CONCLUSIONS	17
5. RECOMMENDATIONS.	18
5.1 PIER SYSTEM LEVEL RECOMMENDATIONS.	18
5.2 WRA SYSTEM LEVEL RECOMMENDATIONS.	19
6. REFERENCES.	20
APPENDIX A - PIER AREA TEST SETS	A - 1

LIST OF TABLES

Table 1. Pier System Level Testing Organization.	2
Table 2. WRA System Level Testing.	2
Table 3. Security Enhancements within each Project Area.	5
Table 4. Pier System Level Testing.	11
Table 5. WRA System Level Testing.	13
Table 6. Pier System Level Contraband Detection Ratios. (SECRET Supplement)	15
Table 7. Pier Enhanced Area Level Contraband Detection Ratios. (SECRET Supplement)	15
Table 8. WRA Zone 4 System Level Test Summary by Event Per Run. (SECRET Supplement)	15
Table 9. WRA Zone 4 System Level Test Summary by Event Per Run. (SECRET Supplement)	15
Table 10. WRA Zone 4 System Level Test Summary by Event Per Run. (SECRET Supplement)	15

LIST OF FIGURES

Figure 1. The RAIDS zones tested for WRA system level testing were zones 4
(vehicle portal), 9 and 14. 14

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LIST OF ABBREVIATIONS

ACSSP	Air Carrier Standard Security Plan	MDNG	Maryland National Guard
ASP	Airport Security Plan	MSP	Maryland State Police
AOA	Air Operations Area	MTFP	Maryland Toll Facilities Police
BMA	Baggage Make-up Area	MTP	Master Test Plan
BWI	Baltimore-Washington International Airport	OJT	On-the-Job-Training
CCTV	Closed Circuit Television	PSR	Private Screening Room
CFR	Code of Federal Regulations	RAIDS	Ramp Area Intrusion Detection System
EASSP	Enhanced Airport Security System Project	RFP	Response Force Personnel
FAA	Federal Aviation Administration	SOC	Security Operations Center
FAATC	Federal Aviation Administration Technical Center	SPM	Security Performance Monitor
IP	Image Processing System	TI	Test Inspector
IR	Infrared	TM	Test Manager
LTI	Lead Test Inspector	TRP	"Training Plan EASSP at BWI"
MAA	Maryland Aviation Administration	VCR	Video Cassette Recorder
MAG	(Walk-through) Metal Detector	VMD	Video Motion Detection
		WRA	Working Ramp Area

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EXECUTIVE SUMMARIES.

Pier Area System Level Testing focused on the effectiveness of the enhanced system configuration in detecting and preventing the introduction of contraband items into the sterile aircraft boarding area through the passenger screening point during other concurrent system activity designed to stress the system. The measure of system effectiveness was the difference in contraband detection rates between introduction attempts made with and without an additional, concurrent system activity. The enhanced system configuration incorporates a number of security enhancements in the equipment, procedures, and personnel resources employed at screening point B.

These test results strongly suggest that the addition of any unusual or time intensive activity at the screening point significantly decreases the contraband detection rate of the enhanced system configuration. The degree to which individual personnel performance variations, procedural inconsistency and test object differences influenced this decrease could not be determined without more specific testing.

Based on the test results, a number of specific recommendations are made to improve the security effectiveness of the enhanced system configuration during periods of increased activity. These recommendations include personnel staffing, training, and procedural changes. Recommendations are also presented for additional research and testing in the passenger screening area.

Working Ramp Area (WRA) System Level Testing was designed to evaluate the ability of the WRA security enhancements to detect and delay an adversary from hijacking or bombing an aircraft with passengers. In addition, these tests were designed to evaluate the system ability to assist the Security Operations Center (SOC) operator in assessing potential security situations and responding appropriately. Non-adversarial distractions were employed to stress the system. The measure of system effectiveness was the difference in the system ability to prevent an adversary from achieving the hijacking or bombing attempt measured during area level tests representing non-stress system capability compared to similar tests conducted with the stress factor introduced.

Based on analysis of the data recorded, there appears to be no significant difference between the security effectiveness from the area level to the system level. Although the SOC operator had to deal with multiple situations in approximately the same time period, there was little impact on the equipment or the ability of the SOC operator to respond properly.

1. INTRODUCTION. The Federal Aviation Administration Technical Center (FAATC) "Enhanced Airport Security System Project" was established as a Research and Development (R&D) project in 1988. The purpose of this project is to demonstrate the feasibility of an integrated systems approach to security in an airport environment. BWI was selected as the Category X operational airport at which to evaluate the advanced security concepts and equipment.

The approach used to identify the enhancements to the BWI security system began with a study of the existing security system in terms of its vulnerability to defined threat levels. The security system design philosophy was based upon identifying the needed improvements in adversary **detection**, adversary **delay**, situation **assessment**, and security force **response**. These principles were applied to an integrated systems approach to meeting the needs of airport security. One of the fundamental design concepts was to establish an enhanced sterile area to include the Working Ramp Area (WRA) along with the traditionally sterile pier area.

1.1 SYSTEM LEVEL TESTING OBJECTIVES. The objectives of the system level testing process are to evaluate the effect of the security enhancements in terms of:

- a. Quantifying the effectiveness of the security enhancements in the enhanced system configuration during singular and multiple system events. The measure of effectiveness being the difference in the ability of the enhanced system to detect either contraband introduction or adversary penetration attempts during singular and multiple events;
- b. Establishing and documenting the net changes in operational procedures implemented in the enhanced system; and,
- c. Obtaining measures which relate to the cost effectiveness of the security enhancements.

1.2 ORGANIZATION OF SYSTEM LEVEL TESTS. The systems level tests were conducted under two broad categories, Pier Systems Level and WRA Systems Level. The tests were further organized into two different basic threat modes, hijacking and bombing. In addition, the systems level tests were designed to include other non-adversarial concurrent activities in different areas to stress the system.

1.2.1 Pier System Level Test Organization. Both threat modes are similar in that either could be carried out in a similar manner. For example, an adversary could attempt to bypass metal detection because they have either a bomb or weapon concealed on their body with the intent to either bomb or hijack a flight respectively. In both cases, the adversary used the same tactic to covertly pass contraband through the screening point.

Generally, there were six types of test series conducted. Several of these test series satisfy both threat modes. Table 1 lists the Pier System Level Test Series conducted and which threat mode(s) were applicable to each individual test.

Table 1. Pier System Level Testing Organization.

THREAT MODE	TEST SERIES
Hijacking	(1) Concealed weapon in inspection tray.
Bombing or Hijacking	(2) Shielded weapon/bomb in carry-on.
Bombing or Hijacking	(3) Weapon/bomb in sealed box.
Hijack	(4) Weapon w/ disabled person.
Bombing	(5) Disassembled explosive w/ mock passenger and in carry-on.
Bombing	(6) Explosive in Electronic Item.

1.2.2 WRA System Level Test Organization. The WRA System Level Tests utilized three of the covert area level scenarios with other concurrent activities added in different areas to stress the system. Similar to the Pier Systems Tests, the WRA tests serve a dual purpose because either threat could be carried out in a similar manner.

All test runs conducted within each series were identical, unlike the pier systems tests. The mock adversary attempted to enter the WRA through the zones listed in Table 2.

Table 2. WRA System Level Testing.

THREAT MODE	TEST SERIES
Bombing or Hijacking	(1) Vehicle Portal (Zone 4).
Bombing or Hijacking	(2) Zone 9.
Bombing or Hijacking	(3) Zone 14.

1.3 SCOPE OF SYSTEM LEVEL TESTING. The systems level tests encompassed testing the integrated system, including all of the pier area enhancements and WRA enhancements together.

1.3.1 Pier Systems Level Testing Scope. The pier systems level testing covered all of the enhancements incorporated into screening point B and the pier B concourse. These enhancements are detailed later in paragraph 2.2.

1.3.2 WRA Systems Level Testing Scope. The WRA systems level testing encompassed the enhancements incorporated into air operations non-movement area around piers A and B, for the purpose of this project identified as the Ramp Area Intrusion Detection System (RAIDS), vehicle portal and ramp general duress (GD) alarms.

2. SYSTEM LEVEL TESTING DESCRIPTION. The System Level Test scenarios designed, directed actions to be taken that would cause situations which test system effectiveness including the ability to detect and report an intrusion to the Security Operations Center (SOC), communicate with the SOC and other areas, and take other actions as called for in the enhanced operational procedures. All tests were conducted in accordance with the "Master Test Plan" and the "Security Effectiveness Test Plan". As previously mentioned, the system level test scenarios included specifically planned non-adversarial events in other areas to stress the integrated design of the enhanced system.

2.1 SYSTEM LEVEL TESTING METHODOLOGY/APPROACH. The primary measure of security effectiveness is the overall success or failure of the adversary to achieve the target objective without being interrupted and/or intercepted. The adversary, for the purpose of these tests, acts alone (i.e. is not in collusion with anyone else), carries contraband and all necessary tools to reach the target (i.e. has not brought any tools and hidden them in or near the target prior to the strike attempt).

All of the tests were conducted covertly, during operational hours. However, the WRA tests were conducted during hours when there was little or no air carrier activity on the WRA. None of the tests were of a destructive nature.

2.1.1 Pier System Level Test Methodology Approach. The adversary was given a concealed test object, either in a bag or on their person, to carry through the screening point to the sterile concourse area. Non-adversarial distractions were created in a number of ways to test the screening point capability in the enhanced system configuration to detect an adversary while multiple or other unusual situations were occurring.

The contraband detection rates achieved under the system level test scenarios are compared with those achieved under the area level test scenarios which represent normal or non-stress system operations. The difference in these rates represents the degree to which the additional event designed to stress the system effected the ability of the enhanced system to operate effectively.

Volunteers from all air carriers serving BWI were used in both adversarial and non-adversarial roles. They were escorted to the FAATC BWI lab through routes other than the screening point. They were briefed on their role(s) for the test and what to do if an alarm was initiated or if the response force arrived. After completion of the test, each participant was de-briefed.

2.1.2 WRA System Level Test Methodology Approach. The adversarial goal, in each test, was to cross the assigned zone on foot and attempt to reach the target without being detected by the sensors, the SOC, or other airport personnel.

Extensive briefings were provided for these tests to all participants. Maps of the RAIDS area and photographs of the zones were used to clearly define the path that the adversary was to follow. Following a night of testing, extensive de-briefing was conducted to capture additional information and to ensure future test credibility.

2.2 SYSTEM LEVEL TESTING CONFIGURATION. The Enhanced Airport Security System Project (EASSP) utilizes an approach to airport security design which clearly delineates geographic areas of the airport based on personnel access and functions performed. For this project, two distinct areas are defined: the Sterile Pier Area, and the WRA. Table 3 identifies the security enhancements in these two major areas.

The equipment configuration for each major area are described below. Throughout all tests, test team members (excluding the adversary and non-test personnel) wore a blue wind breaker and white cap, both with FAA Technical Center clearly printed on them.

Table 3. Security Enhancements within each Project Area.

MAIN PROJECT AREA	ENHANCEMENTS
Pier Area	Enhanced screening point B.
	Enhanced Pier Alert and Pier Duress for piers A and B (including Pier Duress Lockdown features).
	General Duress Alarm added to the Baggage Makeup Area (BMA), Delta ticket counter and the gate B-5/6 check-in podium.
	Alarm indicator beacons in the main terminal enhanced.
	Enhanced security communications.
	Enhanced operational procedures.
WRA	RAIDS.
	Vehicle Portal at Gate A.
	General Duress Alarm added at the end of each loading bridge on pier B (and locations previously noted in pier area).
	SOC.
	Enhanced security communications.
	Enhanced operational procedures.

2.2.1 Pier Area Systems Test Configuration. The pier area systems tests used FAATC support contractor personnel acting as test controllers and air carrier employee volunteers acting as adversaries and distractions.

2.2.1.1 Pier Area Test Team. The tests were conducted by four person teams. The following list describes each of the test team members and their associated responsibilities.

- a. **Test Manager (TM)** - Managed the test team and controlled the test activity.
- b. **Lead Test Inspector (LTI)** - Supervised the adversary and other non-test personnel including briefing and de-briefing these individuals and recording all briefing information.
- c. **Test Inspector (TI)** - Observed and recorded events at the specific test site and coordinated test activities with the responsible law enforcement agencies.
- d. **Adversary and Other Non-Test Personnel** - Performed the actions in the various test scenarios.

2.2.1.2 Pier Area Test Equipment. The test items used in the various test scenarios were either standard FAA test objects or FAATC test objects for this specific project. The use of standard FAA test objects was avoided as much as possible due to screener familiarity. The designated test objects used were inoperative handguns, toy guns, (similar in size and weight to their real counterparts), and simulated explosive devices. All test objects were appropriately wrapped and labelled as FAA test objects prior to any actual test use. The choice of test object was based largely on realism, availability and scenario requirements.

Test sets were developed for use in the various test scenarios to minimize differences in object orientation, construction, and packaging. Each test set identified the specific test object, its packaging or masking materials, and gave specific instructions as to its placement in containers and/or luggage. The Test sets used are identified with accompanying photographs in Appendix A.

Other additional test equipment was used to conduct the Pier Systems Level tests. This equipment included secure radios, video cassette recorders and cameras in the SOC and at the screening point. The radios were used to provide discreet communications between the TM, LTI and TI during the testing. The video recorders were used to record activities on the WRA, in the SOC, and at the screening point. One recorder was used to record x-ray images of the Test sets.

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The VCR at the SOC was also used to record adversary and distraction volunteers activities as seen using Closed-Circuit Television (CCTV) equipment in the screening point.

2.2.2 WRA Systems Test Configuration. Tests were conducted using FAATC support contractor personnel and Maryland National Guard (MDNG) troops. The MDNG participants acted as both adversaries and various test controllers.

2.2.2.1 WRA Test Team. The tests were conducted by nine person teams. The following list describes each of the test team members and their associated responsibilities.

- a. **TM** - Managed the test team and controlled the test activity.
- b. **LTI** - Supervised the adversary and other non-test personnel. Just prior to the initiation of each test, the LTI coordinated test activities with the responsible law enforcement agencies. During the tests, the LTI recorded events as they were reported over the radio from other test participants.
- c. **SOC Recorder TI** - Observed and recorded events and SOC operator actions at the SOC.
- d. **Zone Controller TI** - Observed and recorded events and actions of the adversary, Response Force Personnel (RFP) and airport personnel at the designated zone.
- e. **RFP Headquarters TI** - Observed and recorded events, actions, and radio transmissions of the RFP dispatcher from the airport police headquarters.
- f. **Two (2) RFP Patrol TI** - These individuals rode in the RFP patrol cars with the officers and observed and recorded RFP response activity.
- g. **SOC Operator** - Operated the SOC according to written procedures without specific knowledge of the testing activity taking place.
- h. **Adversary and Other Non-Test Personnel** - Performed the actions in the various test scenarios.

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2.2.2.2 WRA Test Equipment. The test items used in the various test scenarios consisted of the adversary carrying a knapsack and sometimes climbing gear. The knapsack was filled with non-threatening materials of a sufficient size and weight to simulate containment of a weapon or an explosive device. The red tag was used by the adversary to mark the door of the loading bridge if he was not caught by the police or stopped by airport employees. This tag signified a successful hijacking or bombing attempt. The climbing gear was used to assist the adversary in climbing over the perimeter fencing. They did not carry their climbing gear through the WRA; it was left at the fence.

Other additional test equipment was used to conduct the WRA Systems Level Tests. These were the secure radios, VCRs in the SOC and protective clothing. The radios were used to provide discreet communications between the TM, LTI, TIs and adversary during the testing. The VCR from the SOC was also used to record adversary and distraction volunteers activities in RAIDS zones where CCTV coverage was available. Protective clothing was provided to adversaries to ensure their personal safety while performing their role.

2.3 SYSTEM LEVEL TESTING DATA COLLECTION, REDUCTION AND ANALYSIS METHOD. Data collection requirements were identified for each specific test in the test plans.

The reduction of the test data included calculations across test data to determine numbers such as the average time between test events, percentages of adversary interruption. Further test data analysis yielded information such as the appropriateness of established quantitative goals. Data reduction and analysis were performed during and after the test period.

In addition to the direct test data evaluation, a second type of evaluation conducted was the system operation not directly related to any given test. This type of evaluation included:

- a. Collection of nuisance alarm data for a given sensor;
- b. Collection of information regarding maintenance of security equipment; and,
- c. Observations and collection of data regarding airport and air carrier operations.

2.3.1 Pier System Level Test Method of Data Collection, Reduction and Analysis. During testing, the following data collection methods were used to ensure accuracy:

- a. Quadruplex video recording of all screening point tests;
- b. Video recording of x-ray images taken during tests;
- c. Automatic alarm recording and printed information at the SOC;
- d. Manual time event recording by the LTI and TI; and
- e. Post-test debriefings conducted with the adversary and other non-test personnel.

The video recordings, alarm print-outs and LTI/TI notes were reviewed, coordinated, collated, and identified with individual test runs to ensure accurate event sequencing and timing.

The initial data analysis focused on the security effectiveness of specific test runs conducted. These results are then compared to the enhanced area level test results to determine the impact of additional non-adversarial distractions on contraband detection effectiveness.

2.3.2 WRA System Level Test Method of Data Collection, Reduction and Analysis. During the testing, the following data collection methods were used to ensure accuracy:

- a. Automatic alarm recording and printed information at the SOC;
- b. Quadruplex video recording of four selected CCTV cameras in the RAIDS area (Cameras selected depended on the specific test conducted);
- c. Manual time event recording by the LTI, the TM and all TIs; and
- d. Extensive pre- and post-test debriefings conducted to combine the perspective of all test participants.

Data reduction was performed on the video recorded data and all test team member notes to accurately establish event times within a given run. For example, the times for the following events were derived:

- a. Intruder entry into the RAIDS area;

- b. Sensor alarm is triggered at the SOC;
- c. SOC operator completes assessment by initiating communications with the RFP and possibly a pier duress;
- d. SOC operator completes communications task with the RFP;
- e. RFP dispatches a response unit to investigate the situation; and
- f. Adversary is either detected or successfully achieved target objective.

Analysis of the test data within a test series focused on comparing intruder interception and timeline data at the systems level to the enhanced area level test cases. Timeline analysis was performed to determine the time duration between critical events and the consistency of these durations across the repetitive runs within each case. Significant discrepancies in durations within a test cast (across runs) were investigated and explanations determined.

2.4 SUMMARY OF TEST CASES/RUNS PERFORMED.

2.4.1 Pier System Level Test Case Summary. The basic intent of the Pier System Level Tests was to attempt to penetrate the screening point with the adversary carrying either a weapon or a simulated explosive device through screening point B with all enhanced equipment and personnel procedures in use. This contraband introduction attempt was made concurrently with another distinctive system event designed to stress enhanced system operation. The test series and distractions used are listed in Table 4.

2.4.2 WRA System Level Test Case Summary. The basic intent of the WRA System Level Tests was to attempt to penetrate the WRA with the adversary carrying simulated contraband through a pre-designated RAIDS zone across the WRA (on a pre-designated path) to an inactive loading bridge with all enhanced equipment and personnel procedures in use. Other non-adversarial situations were designed into each test to stress the system. The test series and distractions used are listed in Table 5. Figure 1 is a map of the RAIDS zones used by the test team.

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Table 4. Pier System Level Testing.

TEST SERIES	SPECIFIC TEST	DISTRACTION
(1) Concealed weapon in inspection tray: (Run 1)	Handgun in sunglass case.	Mock passenger repeatedly triggers walk through metal detector (MAG).
(Run 2)	Small automatic in cargo receipt pad.	Mock passenger repeatedly triggers MAG.
(Run 3)	Small automatic in watertight bag in a large soda cup.	Inspector visible to screening point pretending to perform other duties.
(2) Shielded weapon/bomb in carry-on: (Run 1)	Lead block in first aid kit in duffle bag.	Simulated FAA/carrier Test, using a standard FAA test article without shielding.
(Run 2)	Simulated time bomb packed with steel wool in a circular metal box inside a carry-on bag.	Known inspector carrying suspect box.
(Run 3)	Simulated time bomb packed with steel wool in a circular metal box inside a carry-on bag.	Exit revolving door alarms.
(3) Weapon/bomb in sealed box: (Run 1)	Weapon in sealed copy toner cartridge in sealed box	Decline bag inspection.
(Run 2)	Bomb in bottle and gift wrapped...in a carry-on bag.	Tool box inspection.
(Run 3)	Metal gift (first aid kit) gift wrapped in a carry-on bag.	Simulated FAA/carrier Test, using a standard FAA test article without shielding.
(Run 4)	Bomb in bottle, gift wrapped.	Simulated FAA/carrier Test, using a standard FAA test article without shielding.

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Table 4. Pier System Level Testing. Continued

TEST SERIES	SPECIFIC TEST	DISTRACTION
(4) Weapon with disabled person: (Run 1)	Left arm in sling with handgun wrapped in gauze.	Simulated FAA/carrier Test, using standard FAA test article without shielding.
(Run 2)	Handgun on seat of wheelchair.	Service person carrying tools and a computer.
(Run 3)	Handgun under seat of mock passenger.	Box inspection.
(5) Disassembled explosive with mock passenger and in carry-on: (Run 1)	Mock passenger carrying charge with other bomb components in carry-on bag.	Computer inspection.
(Run 2)	Mock passenger carrying charge with other bomb components in carry-on bag.	Inspection of a suspect box.
(Run 3)	Mock passenger carrying charge with other bomb components in carry-on bag.	Mock passenger repeatedly triggering MAGs.
(6) Explosive in Electronic Item: (Run 1)	Explosive in computer.	Actual Air carrier test, using a standard FAA test article without shielding.
(Run 2)	Explosive in computer.	Bag inspection declination.
(Run 3)	Explosive in camera.	Exit revolving door alarms.

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Table 5. WRA System Level Testing.

TEST SERIES	SPECIFIC TEST	DISTRACTION
(1) Zone 4, (Vehicle Portal)	Adversary attempts to enter the WRA by following a vehicle through the portal. (3 runs)	Distraction caused at the revolving doors, causing a nuisance alarm at the SOC.
(2) Zone 9	Adversary attempts to enter the WRA at zone 9. (4 Runs)	Distraction is an emergency vehicle through vehicle portal (requiring the SOC operator to hold both gates open and watch the portal area).
(3) Zone 14	Adversary attempts to enter the WRA through zone 14. (3 Runs)	Distraction is a vehicle broken down in zone 10 (between Infrared (IR) towers) creating a nuisance alarm at the SOC.

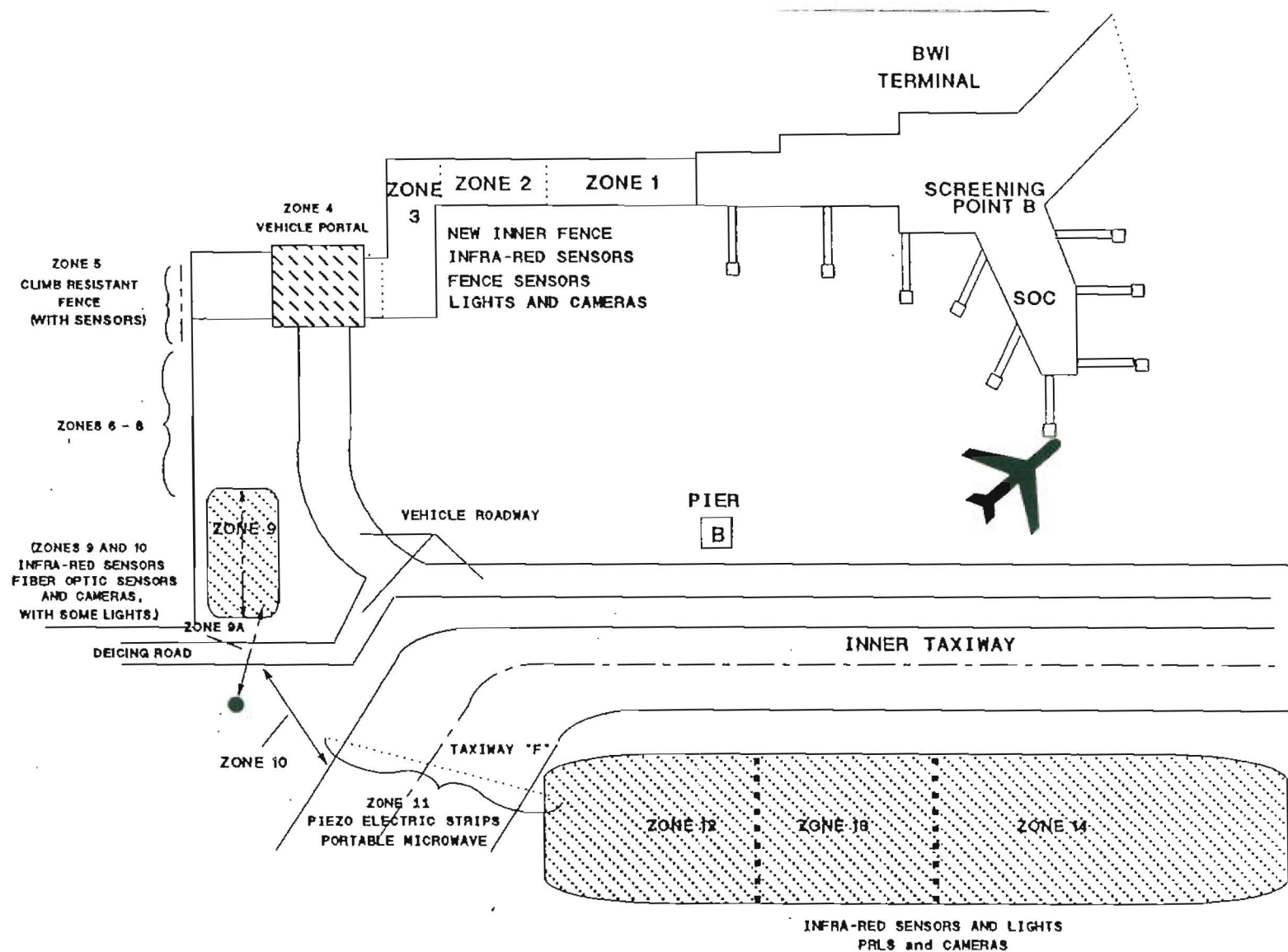


Figure 1. The RAIDS zones tested for WRA system level testing were zones 4 (vehicle portal), 9 and 14.

3. RESULTS AND DISCUSSION. Section 3. is provided in the System Level Test Report SECRET supplement.

3.1 RESULTS. The information contained in all of section 3.1 is provided in the classified supplement to this report. This includes the tables in various sections of 3.1, also noted below.

3.1.1 Pier System Level Test Results.

Table 6. Pier System Level Contraband Detection Ratios. (SECRET Supplement)

Table 7. Pier Enhanced Area Level Contraband Detection Ratios. (SECRET Supplement)

3.1.2 WRA System Level Test Results.

Table 8. WRA Zone 4 System Level Test Summary by Event Per Run. (SECRET Supplement)

Table 9. WRA Zone 4 System Level Test Summary by Event Per Run. (SECRET Supplement)

Table 10. WRA Zone 4 System Level Test Summary by Event Per Run. (SECRET Supplement)

3.2 OPERATIONAL TEST RESULTS.

3.2.1 Pier System Level Operational Test Results.

3.2.1.1 Operational Test Effects. This section discusses the operational impact of the enhanced system configuration on passenger screening and general airport operations. Since these tests are generally expanded versions of the area level pier tests, many of the operational observations are common to both test series. The discussion of those common operational impact areas is not reiterated in this report and may be found in the pier area level test report. Those common areas include the system impact on screening point staffing and operations, passenger flow due to enhanced x-ray and metal detection activity, and inspection of disabled persons using the Private Screening Room (PSR).

The difference in contraband detection rates in the tests suggest that the level of screening point staffing is too low to operate the screening point at the optimum contraband detection level at all times. They could also suggest that current staff are not being utilized efficiently. This inefficiency could result from poor group coordination and or individual task confusion.

3.2.1.2 Pier System Level Equipment. The various pieces of equipment used in the enhanced system configuration are discussed in terms of their effectiveness, reliability, and user friendliness as reflected during the test periods. Since these tests are generally expanded versions of the pier area level tests, many of the equipment observations are common to both test series. The discussion of those common equipment areas is not reiterated in this report and may be found in the pier area level report. Those common equipment enhancements discussed were the performance of the color x-ray with an Image Processing (IP) system, the Security Performance Monitoring (SPM) equipment, the intercom equipment, the secondary MAG and the PSR. All of the previously referenced enhanced equipment operated reliably throughout the test period.

3.2.1.3 Pier System Level Observations. During the test period, one air carrier unannounced operational effectiveness test of the screening point personnel was observed. The air carrier placed a standard FAA test object, a simulated time bomb, in a completely empty duffel bag. The uniformed representative then walked into the screening point and placed the duffel bag on the x-ray belt for inspection. There was minimal passenger screening activity at the time. The x-ray operator stopped the bag and triggered the appropriate pier alarm. When asked about the test bag being totally empty, the carrier representative explained that it was company guidance not to clutter the test object in any way. If this test procedure is generally followed by other air carriers when performing their daily operational effectiveness tests, the usefulness of such tests as a quality assurance measurement for individual air carriers or for improvement of aviation security in general is severely limited.

3.3 SYSTEM LEVEL TEST DISCUSSION. The information contained in all of section 3.3 is provided in the classified supplement to this report.

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"Draft" - March 30, 1994

4. CONCLUSIONS. All of section 4. is provided in the System Level Test Report SECRET supplement.

4.1 PIER SYSTEM LEVEL TEST CONCLUSIONS.

4.2 WRA SYSTEM LEVEL TEST CONCLUSIONS.

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5. RECOMMENDATIONS.

5.1 PIER SYSTEM LEVEL RECOMMENDATIONS. Based on the discussion and conclusions stated in the SECRET supplement to this report, the following recommendations are made to improve pier security:

Conduct remedial training for passenger screeners on physical inspection procedures, particularly relating to disabled people and items in inspection bins.

Develop more effective and practical physical inspection methods and procedures for inspecting disabled individuals.

Establish more specific procedures for inspecting articles left in the inspection bins to decrease inconsistency among screeners and improve their effectiveness.

Develop more varied, realistic test objects and standard testing protocols for screening point operational tests.

Develop a more effective training and proficiency testing program for screening personnel. This program should include the use of more realistic test objects and focus on x-ray image recognition of such objects and their component parts.

Conduct a study to identify key x-ray image identification characteristics used by screeners to recognize weapons and bombs. Identify technological enhancements and personnel training methods that will ensure screener ability to recognize these signatory contraband characteristics.

Evaluate the current staffing practices and deployment of passenger screening personnel in the enhanced system configuration to determine the actions necessary to mitigate the loss of contraband detection effectiveness during multiple tasks.

Develop a quality assurance program and accurately evaluate screening point effectiveness on a regular basis. The results could be provided to the FAA, air carriers and contract screening company officers to enable them to improve both their training efforts and screener proficiency.

Require hand-held metal detectors to be operationally checked prior to each use in addition to the Air Carrier Standard Security Program (ACSSP) daily operational check requirement.

Incorporate a low level battery annunciator in the hand-held metal detectors. This would help ensure that the maximum effectiveness of the detectors is achieved at all times.

Develop hand-held metal detectors with increased specificity and range.

Develop wheelchairs with non-metallic frames and wheels. The use of non-metallic frames and wheels would permit passenger and chair to proceed through the MAG in a normal fashion improving both security screening and passenger flow.

5.2 WRA SYSTEM LEVEL RECOMMENDATIONS. Section 5.2. is provided in the System Level Test Report SECRET supplement.

6. REFERENCES.

Code of Federal Regulations (CFR) Part 107, "Airport Security" March 29, 1979, (as amended).

CFR Part 108, "Airplane Operator Security". December 12, 1986. (as amended).

FAA Office of Civil Aviation Security "ACSSP (baseline document)".

FAA Technical Center - "Master Test Plan (MTP): EASSP at BWI", Aviation Security Research and Development Division, Final Plan. 1/93.

FAA Technical Center - Number DOT/FAA/CT-93/19, "Training Plan (TRP), EASSP at BWI", Aviation Security Research and Development Division. 7/93.

FAA Technical Center - Aviation Security Research and Development Division, "Security Effectiveness Test Plan", DRAFT. 7/14/93.

FAA Technical Center - Number DOT/FAA/CT-93/45, "Screening Point Procedures", Aviation Security Research and Development Division. 9/93 (as amended).

FAA Technical Center - Number DOT/FAA/CT-93/46, "Vehicle Portal Procedures", Aviation Security Research and Development Division. 9/93.

FAA Technical Center - Number DOT/FAA/CT-93/47, "Revolving Door Procedures", Aviation Security Research and Development Division. 9/93.

FAA Technical Center - Number DOT/FAA/CT-93/58, "General Duress Procedures", Aviation Security Research and Development Division. 10/93.

FAA Technical Center - Number DOT/FAA/CT-93/73, "Communications Procedures" Aviation Security Research and Development Division. 12/93.

FAA Technical Center - Number DOT/FAA/CT-93/82, "Image Processing Procedures", Aviation Security Research and Development Division. 12/93.

FAA Technical Center - Number DOT/FAA/CT-93/83, "Security Operations Center Procedures", Aviation Security Research and Development Division. 12/93.

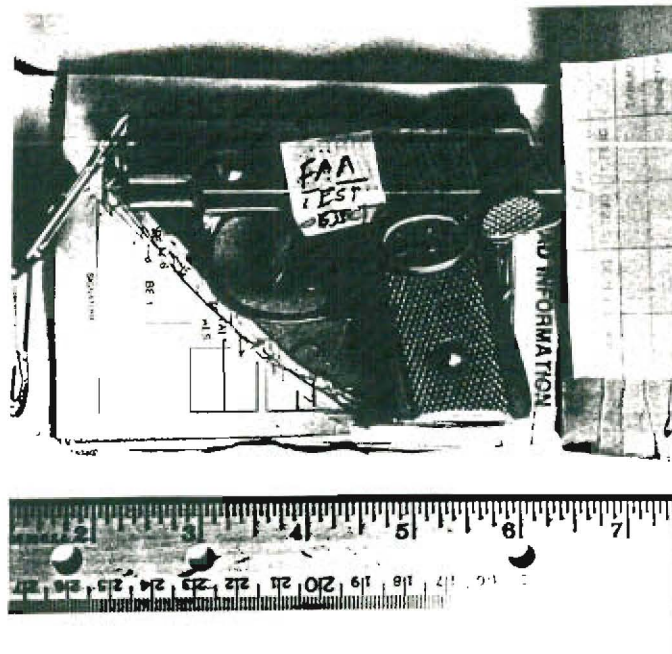
FAA Technical Center - Number DOT/FAA/CT-94/DRAFT, "Pier Area Level Test Report", Aviation Security Research and Development Division. 2/94.

FAA Technical Center - Number DOT/FAA/CT-94/DRAFT, "Working Ramp Area Level Test Report", Aviation Security Research and Development Division. 2/94.

Maryland Aviation Administration, "Airport Security Program (ASP) at BWI". (current).

APPENDIX A - PIER AREA TEST SETS. The test sets used are pictured and described in this appendix. Test items are grouped by inspection method or procedure tested. All test objects were appropriately wrapped and labeled as FAATC test objects prior to any actual test use.

TEST SET 1 - ARTICLE IN INSPECTION BIN:

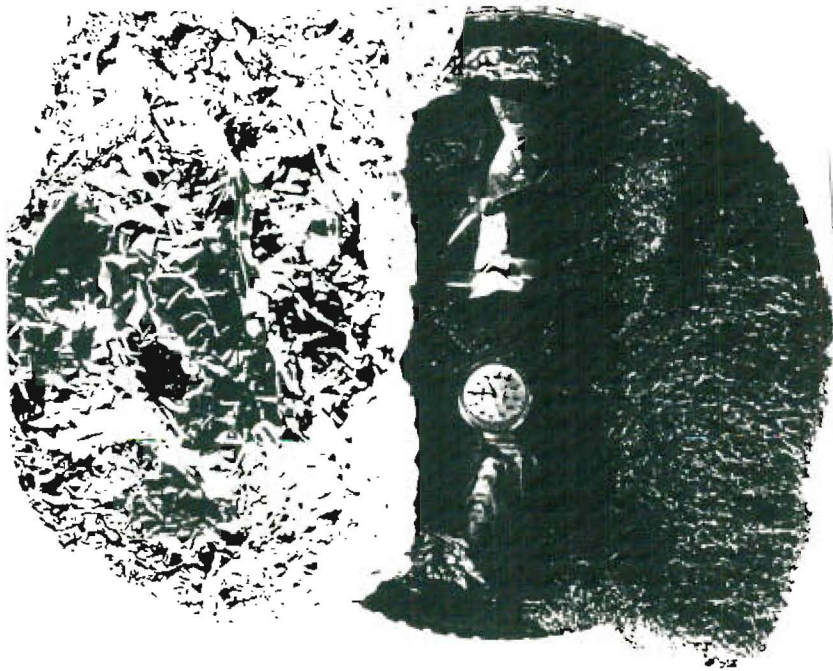


Test Set 1 - Toy metal handgun, shown concealed in a cargo receipt pad. This item was also concealed in a sunglass case and in a waterproof bag inside a filled drink container.

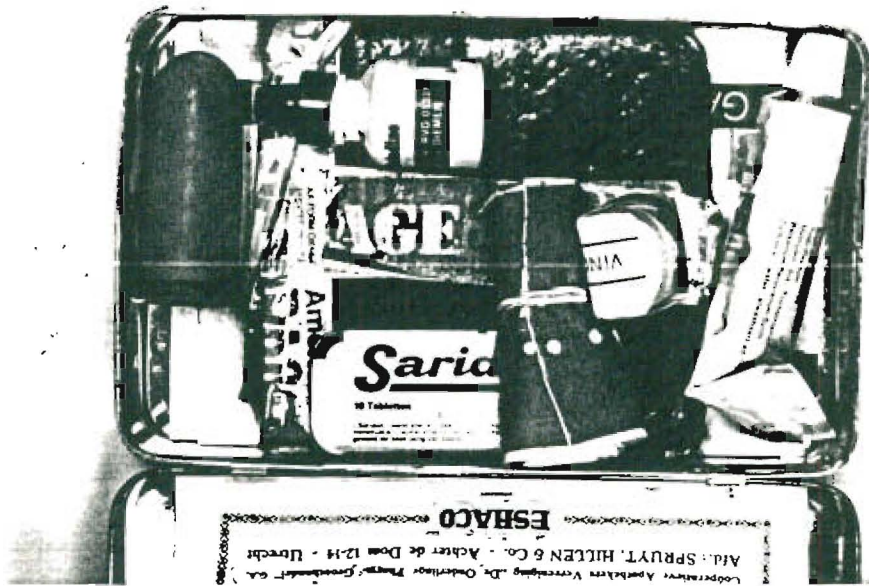
TEST SERIES 2 - SHIELDED WEAPON OR BOMB IN CARRY-ON BAG:

All test sets were gift wrapped and placed in carry on bags during tests. The test sets employed in this series were fabricated using the following items:

- One (1) stick (8"x 2") of clear plastic (simulated explosive charge);
- One (1) wrist watch (timing device);
- One (1) 9 volt battery (power source);
- One (1) simulated blasting cap assembled wiring (initiator);
- One (1) FAATC opaque test object;
- Steel wool; and
- Assorted metal containers.



Test Set 2A - Simulated time bomb concealed in circular metal container.



Test Set 2B - FAATC opaque test object concealed in metal first aid kit.

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"Draft" - March 30, 1994

TEST SERIES 3 - WEAPON/BOMB IN SEALED BOX:

All test sets were gift wrapped and placed in carry on bags during tests. The test sets employed in this series were fabricated using the following items:

- One (1) stick (8"x 2") of clear plastic (simulated explosive charge);
- One (1) wrist watch (timing device);
- One (1) 9 volt battery (power source);
- One (1) simulated blasting cap assembled wiring (initiator);
- One (1) FAATC opaque test object; and
- One (1) disabled revolver.

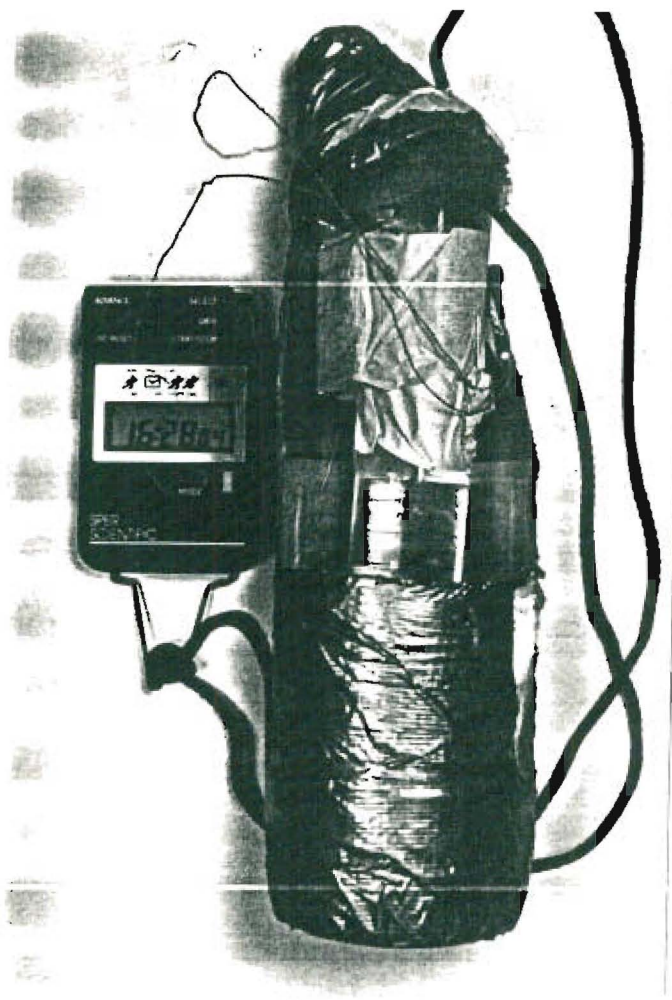


Test Set 3A - Disabled .38 caliber revolver hidden behind a copy cartridge inside a sealed box labeled with a warning not to expose cartridge to light.

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Test Set 3B - Simulated time bomb concealed in an empty 2 liter plastic bottle.

Test Set 3C - FAATC opaque test object concealed in metal first aid kit (refer to photograph under Test Series 2).

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"Draft" - March 30, 1994

TEST SERIES 4 - CONCEALED WEAPON ON A DISABLED PERSON:

Test Set 4A - Disabled .38 caliber revolver, positioned under adversary seated in wheelchair (refer to photograph under Test Series 3).



Test Set 4B - Disabled GLOCK 17 automatic handgun, positioned under adversary seated in wheelchair.

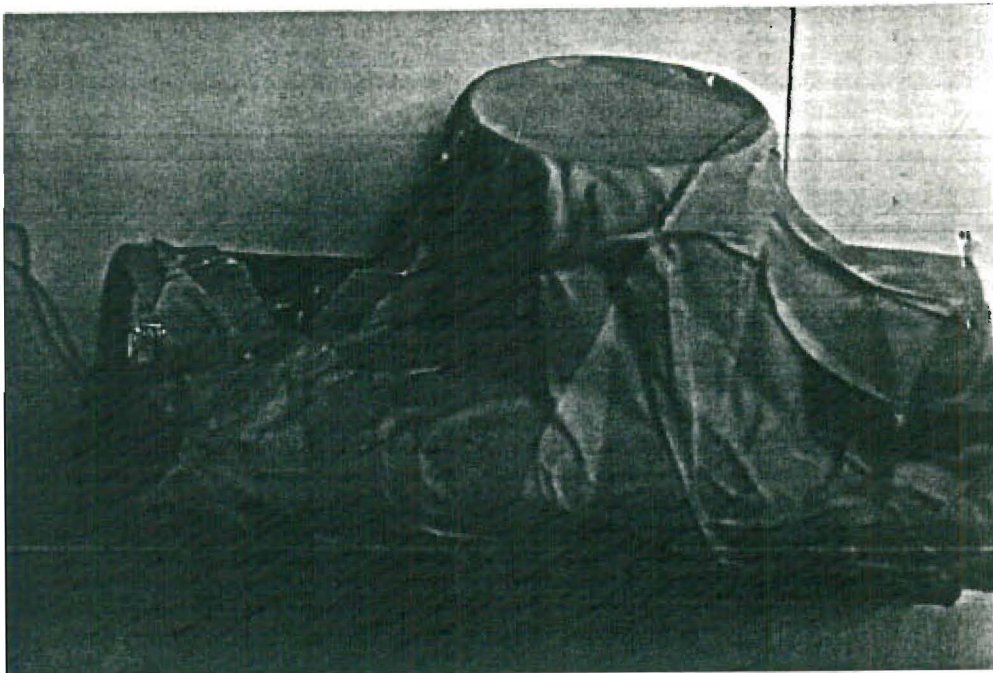
Test Set 4C - Small metal handgun, shown pictured in Test Series 1.

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TEST SERIES 5 - DISASSEMBLED EXPLOSIVE CARRIED BY PASSENGER:

The individual components, except the simulated charge, were placed separately in a carry-on bag. The adversary carried the simulated explosive charge through the MAG. Because it is difficult to discern the individual components in the picture, they are described as follows:

- One (1) small block of wood (simulated explosive charge);
- One (1) 3" alarm clock (timing device);
- One (1) 9 volt battery (power source); and
- One (1) simulated blasting cap and assembled wiring (initiator).



Test Set 5 - Simulated time bomb carried, disassembled, (shown assembled).

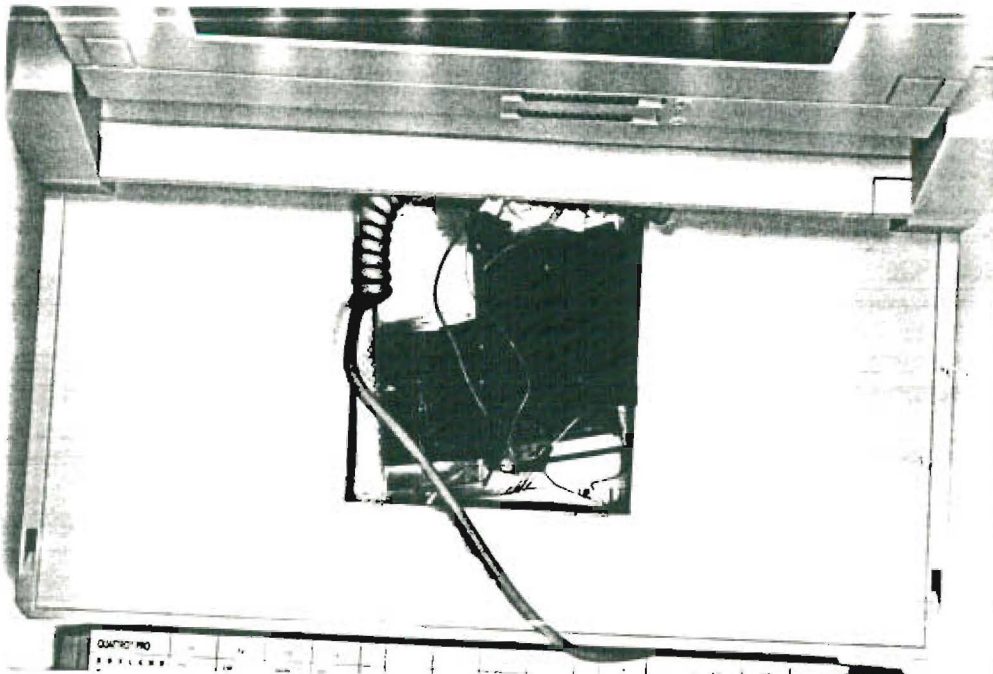
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"Draft" - March 30, 1994

TEST SERIES 6 - EXPLOSIVE DEVICE CONCEALED IN AN ELECTRONIC ITEM:

The simulated time bomb fabricated for this test series consisted of:

- One (1) small block of modelling clay (simulated explosive charge);
- One (1) wrist watch (timing device);
- One (1) Nine (9) volt battery (power source); and
- One (1) simulated blasting cap and assembled wiring (initiator).

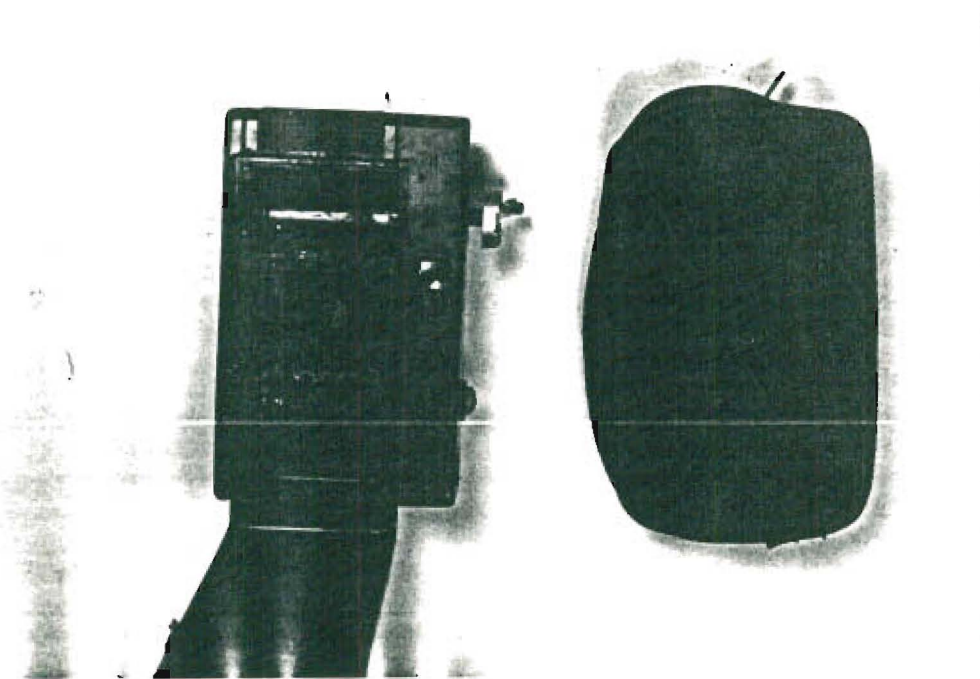


Test Set 6A - Portable computer with the simulated time bomb hidden in the battery compartment.

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"Draft" - March 30, 1994



Test Set 6B - Camera with simulated time bomb hidden inside the empty camera.

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