DOCKET NO. SA-516

APPENDIX A

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, DC

TEST PLAN
MANPADS VISIBILITY TEST
APRIL 2000
(5 pages)

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1.0 PURPOSE

1.1 To determine the maximum distance at which a human observer is able to see a man portable air defense systems (MANPADS) surface-to-air missile (SAM), in flight by launching at least three MANPADS under known conditions.

1.2 To conduct the test under similar or better visibility conditions that those that prevailed on Long Island, New York, the evening of July 17, 1996, at the time of the Trans World Airlines (TWA) flight 800 accident, permitting generalization of the results to the TWA flight 800 investigation.

1.3 To obtain statements and other information from "perfect observers" at known distances from the launch point. ("Perfect observers" will know the direction of the MANPADS launch and will hear the launch countdown.)

1.4 To determine if evidence associated with any of the MANPADS launches is visible to nearby FAA or military radar facilities.

2.0 TEST OVERVIEW

2.1 The Short Range Air Defense (SHORAD) Project Office will sponsor a test at Eglin Air Force Base, Ft. Walton Beach, Florida, to document the visibility of a MANPADS using the Basic Stinger missile. Visibility, for the purpose of this test, refers to the ability to see and describe the launch and flight signatures at a given distance. Test planners believe that the visibility characteristics of the Basic Stinger missile are typical of modern MANPADS.

2.2 At least three Basic Stinger missiles will be expended in this effort. The missiles will come from PM SHORAD test assets, which have exceeded their shelf life. These missiles are reliable, but must be fired via a remote launcher (an Avenger Fire Unit via the Remote Control Unit).

2.3 Observer groups will be placed at locations every two miles from the launch point out to 12 miles. Each of the six groups will include one video camera operator, and two observers. No magnified optics (such as binoculars) will be used by observers at any location.

2.4 The observers will be told where to look, and they will hear the launch countdown via radio or cellular telephone. The event will be repeated for

three missiles, with about 3 minutes between firings. Safety Board staff will interview each observer and complete simple worksheets after each event.

3.0 LAUNCH CONDITIONS

3.1 The center of the apparent disk of the sun will be between 1.0 to 12.0 degrees below the horizon for all launches (tables produced from U.S. Naval Observatory data will be consulted for this information). This constraint necessitates a launch just before sunrise or just after sunset, but provides a launch window of about 30 minutes.

3.2 The meteorological observation that is in effect at Hurlburt Field (HRT) at the time all launches will be used to determine surface winds, visibility, sky condition, and any precipitation or obscurations.

3.2.1 There will be no precipitation (e.g., rain or drizzle) or obscurations to visibility (e.g., haze, fog, or mist).

3.2.2 Surface winds will be no greater than 20 knots.

3.2.3 Visibility will be 7 statue miles or greater.

3.2.4 The sky should be clear (no clouds); however, (1) one layer of a few clouds at or below 5,000 feet above ground level (AGL) is acceptable, and (2) one layer of scattered clouds at or above 8,000 feet AGL are acceptable.

3.3 Winds aloft (as measured at Eglin or forecast for Tallahassee [TLH]) may not be greater than 60 knots at any altitude up to and including 12,000 feet above mean sea level (MSL).

3.4 No launch will follow a previous launch by less than three minutes.

3.5 Any smoke trail from any previous launch(es) must have sufficiently cleared the area such that observers will not confuse the old trail with the smoke trail of the next launch.

4.0 OBSERVERS AND OBSERVER LOCATIONS

4.1 Each of the observers will have an uncorrected or corrected visual acuity of 20/25 or better and no known history of ocular pathology. Observers will be permitted to wear any eyewear they choose.

4.2 Cellular telephones or two-way radios will be used to facilitate communication between the observers and the Control Center.

4.3 There will be six groups of at least two observers each. The groups will be stationed along Santa Rosa Island at 2, 4, 6, 8, 10 and 12 nautical miles from the Control Center/Launch Point. Distance will be determined by a global positioning system (GPS) receiver using the precise positioning service (PPS).

4.4 The sun will be behind the observers at launch time. If the launch is conducted at dawn, the observers should be located East of the launch point. If the launch is conducted at dusk, the observers should be located West of the launch point.

5.0 LAUNCH PARAMETERS

5.1 Up to four Basic Stinger missiles will be launched via remote control from an Avenger launch platform.

5.2 Launch direction will be to the South.

5.3 A seventy degree launch elevation will be used.

5.4 High visibility contingency: An NTSB observer will be positioned at the most distant observer station for the first firing. If the launch is observable to this observer or any of the other observers at this station, this observer group will be repositioned to farther distances.

6.0 DATA ACQUISITION REQUIREMENTS:

6.1 Launch position latitude and longitude as measured by a GPS receiver using the PPS.

6.2 Launch angle.

6.3 Missile firing times (±1 minute).

6.4 Missile flight time and/or altitude (launch/self-destruct interval) for each firing (hand held stopwatch).

6.5 Launch site video (1 video tape, all firings).

6.6 Observer site video (six tapes, all firings).

6.7 Observer worksheets will be completed on instructions from the control center after each firing. These worksheets will contain several yes/no or multiple choice items, plus space to record in observers own words information about their observations for each firing. Worksheets will not require more than about one minute to complete.

6.8 Recorded radar data will be requested by the NTSB from nearby FAA facilities for a period that includes fifteen minutes before the first firing through fifteen minutes after the last firing.

7.0 HARDWARE/PERSONNEL REQUIREMENTS/RESPONSIBLE OFFICE:

7.1 Four Basic Stinger Missiles (3 primary; 1 spare) and handling personnel. [PM SHORAD]

7.2 Avenger launch platform and operator personnel. [PM SHORAD]

7.3 Seven video cameras (all need to be approximately the same type and format with similar lenses).

7.4 One video operator and at least two observers at each of the six observer locations (18 personnel).

7.5 Range Safety.

7.6 Pre-Test/Post-Test Meeting Room.

8.0 APPROXIMATE TIMELINE

8.0 On the test day, observer personnel will arrive on site at 1400. An All Hands meeting will be held from 1400 to 1600 to lay out the test scenario.

8.1 All Hands will be on station 30 minutes before the launch window opens.

8.2 The launch windows opens at about 1924.

8.2 The test will consist of nine countdowns. The first countdown will be followed by a flare launch. There will be four countdowns after which a missile will be launched, and there will be four countdowns after which nothing will be launched (control launches).

8.3 The launch window closes at about 2018.

9.0 SAFETY

9.1 The Basic Stinger missiles for this test have exceeded their shelf life and cannot be shoulder fired; however, the missiles are safe to handle and fire from approved remote launchers by PM SHORAD personnel.

9.2 For the launches, the missiles will be fired at a very high launch angle (about 70 degrees). This presents some unusual launcher problems (e.g., back blast damage) and air clearance (up to 28,000 feet AGL), but the

downrange distance is very short. Additionally, the missiles will be fired ballisticly with no target and associated target debris.

9.3 The missile self-destruct will occur about 17 seconds into each flight, so very little debris will fall from the sky. The worst case scenario would be a failure in the self-destruct mechanism allowing the entire missile to return to earth. In this scenario, the missile will most likely break apart and sink upon impact with the water. No impact explosion would be expected. The self-destruct fuse has a better than 99% reliability.

9.4 PM SHORAD may choose to "disconnect" the guidance from one, two or all of the missiles. This simple procedure grounds the guidance commands, causing the wings to lock at zero. If the guidance is not disconnected, the missile may spiral in flight, causing a slight loss in performance. Either configuration will follow the predicted flight path and is safe to fire.

10.0 SCHEDULE

10.1 The NTSB would like to complete this test no later than May 30, 2000. The test is tentatively scheduled for April 26, 2000. The backup schedule will be week of May 1, 2000.

10.2 Hardware will be pre-staged for schedule flexibility. A preliminary decision to proceed/postpone will be made 36 to 48 hours in advance, but this decision to proceed may have to be reversed if weather conditions may deteriorate below the required launch conditions. Travel plans will have to be flexible.