

CVR REPORTS
UAL 93 FLIGHT PROFILE.
NOT ON INVENTORY

NOTE: this material is
included within the
nondisclosure agreement
for Moussaoui-related
material reached between
the 9-11 Commission and
the Executive Branch.

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorders Division
Washington, D.C. 20594

April 30, 2002

Specialist's Factual Report of Investigation
Cockpit Voice Recorder

NTSB Number:
DCA01MA064

A. EVENT

Location: Arlington, Virginia
Date: September 11, 2001
Aircraft: B-757-200, N644AA
Operator: American Airlines

B. GROUP

N/A

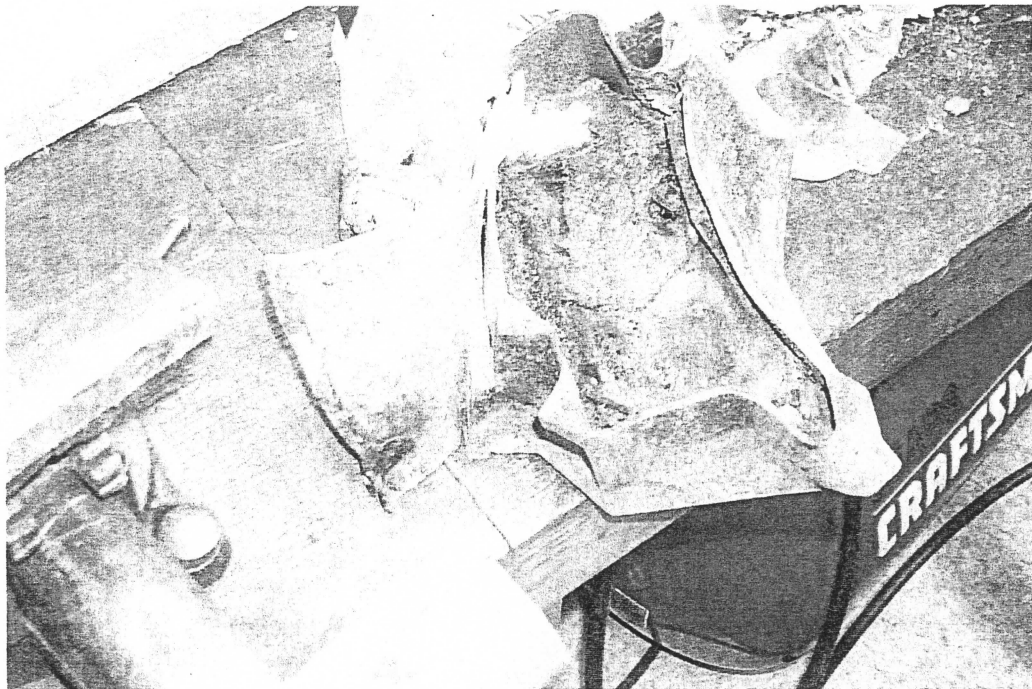
C. DETAILS OF INVESTIGATION

In support of the Federal Bureau of Investigation's (FBI's) investigation into the terrorist act of American Airlines Flight 77, which crashed into the Pentagon in Arlington, Virginia, on September 11, 2001, the NTSB Vehicle Recorders Division received an L-3 Communications, Fairchild Aviation Recorders model A-100A cockpit voice recorder (CVR) on September 14, 2001:

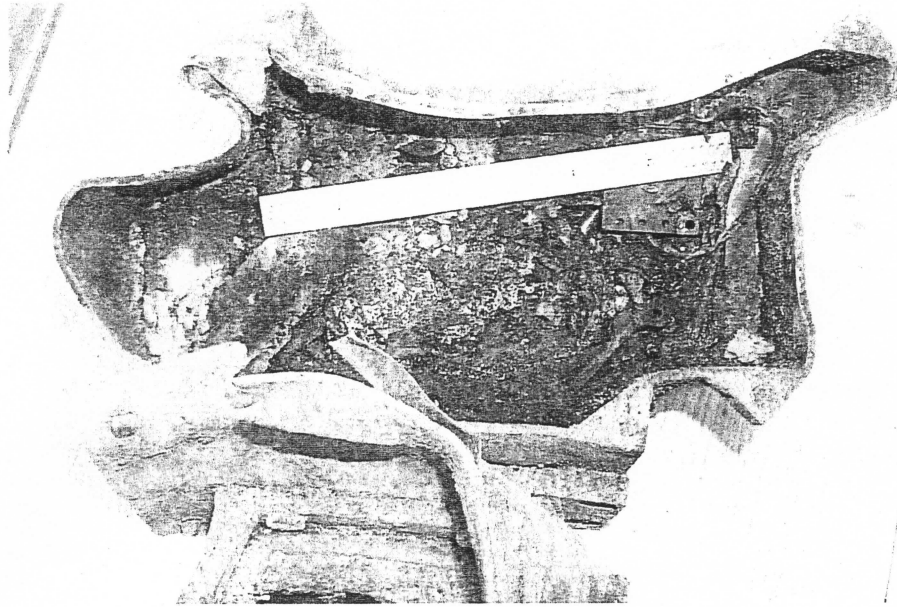
The CVR was examined upon receipt. The recorder displayed evidence of extensive impact, fire, and smoke damage. The outside cover had to be cut off of the unit to obtain access to the inside crash case and tape storage reel. (see picture #1) The crash case was extensively dented and damaged from the

impact. All five of the crash enclosure retaining bolts were broken flush with the top portion of the enclosure. The bottom portion of the crash case was found no longer attached to the upper portion of the enclosure. Fire and high temperatures extensively damaged the interior tape reel, fire protection and recording tape. (see pictures #2, #3). The majority of the recording tape was fused into a solid block of charred plastic. There were several loose pieces of charred recording tape found lying inside of the tape enclosure (see picture #4). No undamaged or usable segments of recording tape were found in the CVR recorder.

Picture #1 (exterior and upper crash case)



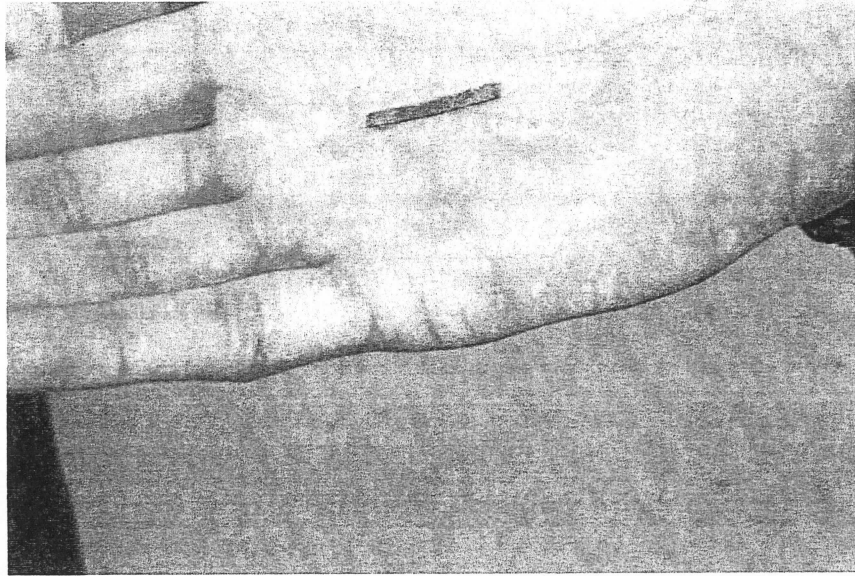
Picture #2 (upper crash case, with tape and reel assembly)



Picture #3 (tape and reel assembly)

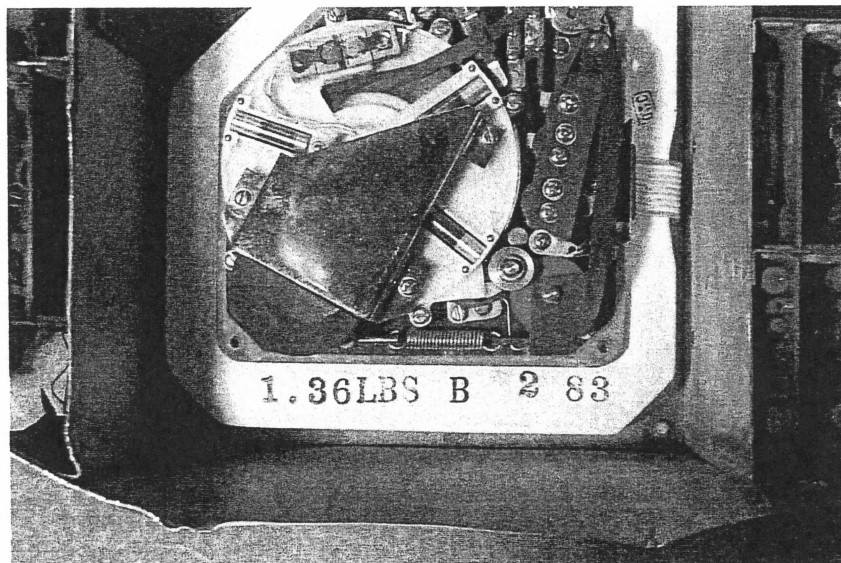


Picture #4 (tape fragment, burned)



Picture #5 illustrates what an undamaged identical model Fairchild A-100A CVR tape and reel assembly would look like.

Picture #5 (identical undamaged Fairchild A-100A CVR tape transport)



James R. Cash
Electronics Engineer

United Airlines Flight 93 – Flight Profile

The following profile of United Airlines Flight 93 is based on data from the flight data recorder (FDR) recovered from the crash site, as well as radar data obtained from the Federal Aviation Administration's Air Route Traffic Control Centers and the U.S. Air Force 84th Radar Evaluation Squadron. Figure 1 shows the flight path of the aircraft from take off at Newark, NJ to the crash site near Johnstown, PA. Figure 2 shows the aircraft's altitude profile for the 1 hour and 21 minute duration of the flight.

United flight 93 departed Newark, NJ at 8:42 am (point A in Figures 1 and 2) and reached its assigned cruising altitude of 35,000 feet at about 9:02 am (B). The flight appears normal until a brief descent of about 600 feet starting at 9:28 (C). The words "get out of here" and sounds of a struggle were recorded on the air traffic control radio at FAA's Cleveland Center facility at this time. The Cockpit Voice Recorder (CVR) onboard the airplane began providing sounds from the cockpit at approximately 9:32. At 9:34 (D) the airplane starts to climb from 35,000 feet, and shortly thereafter begins a left turn to the southeast. The airplane maintained a maximum altitude of 41,000 feet for about 2 minutes and then started descending at about 9:39 (E). Radar stations stopped receiving transponder returns from UAL93 at approximately 9:41.

There was a brief interruption in the descent at 9:46 (F) as the airplane climbed from 19,000 feet to 20,500 feet before resuming its descent. At about 9:57 the airplane started a left turn to the east. Just before 9:59 (G) the airplane was at 5,000 feet when about 2 minutes of rapid, full left and right control wheel inputs resulted in multiple 30 degree rolls to the left and right. From approximately 10:00 to 10:02 (H) there were four distinct control column inputs that caused the airplane to pitch nose-up (climb) and nose-down (dive) aggressively. During this time the airplane climbed to about 10,000 feet while turning to the right. The airplane then pitched nose-down and rolled to the right in response to flight control inputs, and impacted the ground at about 490 knots (563 mph) in a 40 degree nose-down, inverted attitude. The time of impact was 10:03:11.

Figure 1. UA-93 Radar Ground Track

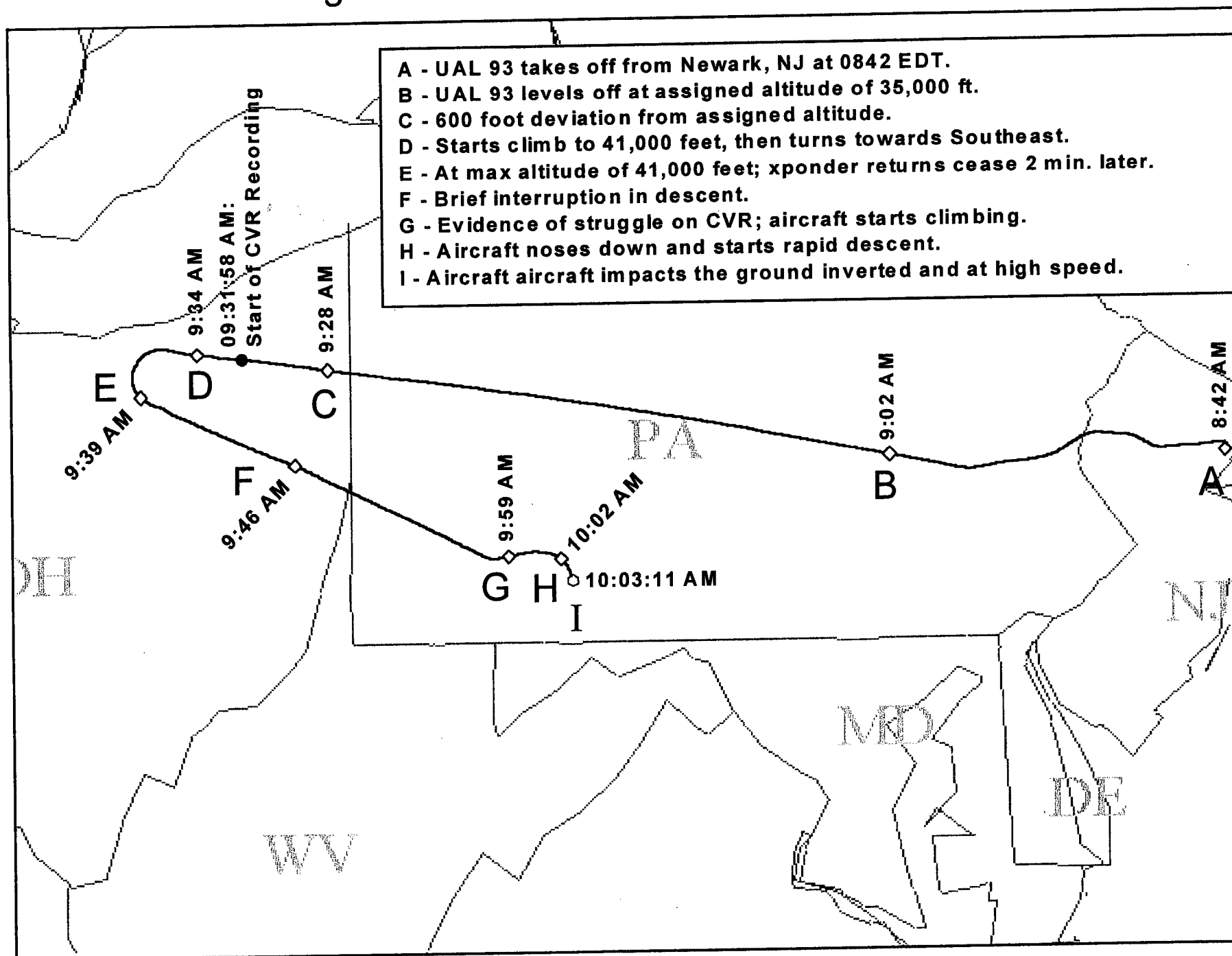


Figure 2. UA-93 Altitude Profile

