NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Washington, D.C. 20594

March 10, 1997

Flight Data Recorder

Addendum to Group Chairman's Factual Report
by Dennis R. Grossi

A. ACCIDENT

Location:	Near Monroe, Michigan
Date:	January 9, 1997
Time:	15:50 local standard time
Aircraft:	Embraer EMB-120; N265CA
NTSB Number:	DCA-97-MA-017

B. GROUP

Group Chairman:	Dennis R Grossi National Resource Specialist Flight Data Recorders National Transportation Safety Board
Member:	Joseph Bracken Staff Engineer Airline Pilots Association
Member:	Matt Jacobs EMB-120 Check Airman Comair
Member:	Decio Coelho Pullin Aerodynamics Group Manager Embraer
Member:	Steve Wade Pilot, Flight Operations Pratt and Whitney Canada
Member:	Francis Rock Aircraft Engineering Federal Aviation Administration
Member:	Stephen W. Josephson System/Advanced Controls Propulsion Engineering Hamilton Standard

C. SUMMARY

COMAIR flight 3272, operated as a 14 CFR Part 135 commuter passenger flight form Cincinnati Ohio to Detroit's Wayne Count Airport (DTW), crashed while on approach to runway 3R. There were 26 passengers and 3 crew onboard, none survived and the airplane was destroyed.

The airplane preceding COMAIR flight 3272 into DTW on the day of the accident was an A320, operated by America West as Flight 50. The FDR, an Allied Signal, Solid-State Universal Flight Data Recorder SSUFDR (s/n 6491), from this flight was brought to the Safety Board's laboratory in Washington, D.C. for readout and evaluation in an effort to obtain additional meteorological information.

The following is brief summary of the flight data recorder (FDR) information recorded during the descent and approach of America West Flight 50, into DTW on January 9, 1997:

- The FDR parameters recorded during descent and approach into DTW were consistent with normal operation.

- At the start of the descent from 12, 000 feet, the status of the parameters engine inlet anti-ice (left and right) changed from "Off" to "On", and did not change for the remainder of the flight. The computed static air temp (SAT)[1] values had increased to -13.7°C, at the time the engine inlet anti-ice status changed to "open".

- The status of the parameters left and right wing anti-ice, indicated an "open" condition for 77 seconds as the pressure altitude values decreased from 8,429 feet to 7,133 feet. During this period the SAT values increased from -7.9°to -7.0°C.

- At the start of the descent from level flight at 3,700 feet pressure altitude, the parameters wing anti-ice (left and right) changed from "closed" to "open" for 56 seconds. During this period the SAT increased from -5.2° to -4.4°C.

D. DETAILS OF INVESTIGATION

1. Description of Data

This model SSUFDR accepts serial bit stream data from a Digital Flight Data Acquisition Unit (DFDAU), in an ARINC 573/717[2] format at a rate of 64 12-bit words per second. The SSFDR uses solid-state technology as the recording medium. The recording is stored in a Crash Survivable Memory Unit (CSMU).

---

[1] All referenced SAT values were computed with a recovery factor of (K) of 1.0, unless otherwise noted. See section 3.b, of this report for more details.

[2] Flight Data Acquisition and Recording System Characteristic, Published by Aeronautical Radio, Inc.(ARINC), 2551 Riva Road, Annapolis, Maryland

The DFDAU provides a means of gathering, conditioning, and converting flight data parameters to digital data. The DFDAU provides a serial binary digital data stream to the DFDR at a rate of 768 bits/sec. A binary, or logical one, is represented by a voltage transition between clock transitions.

The DFDAU input signals are time division multiplexed, with parameter identification established by means of position or time slot addresses in the serial data stream output. This output is a continuous sequence of four second data frames. Each frame consists of four subframes of 64 12-bit words with the first word containing a unique 12-bit synchronization (sync) word identifying it as subframe 1,2,3 or 4. The data stream is "in sync" when successive sync words appear at the proper 64-word intervals. If the data stream is interrupted, sync words will not appear at the proper interval or sequence, and the time reference will be lost until the subframe pattern can be reestablished.

2. Examination of Recorder

The flight recorder was not damaged, and was in working order.

3. Readout and Evaluation

a. Readout

A transcription was accomplished using a standard Allied Signal ADRAS readout station. The transcribed data were process by the Safety Board's Recovery Analysis and Presentation System (RAPS) software, which converted the raw data to engineering units and produced a tabular printout and data plot. The data were reduced from the recorded decimal values (0 to 4095) to engineering units (e.g., feet, degrees, knots, etc.) by conversion algorithms obtained from the operator and airplane manufacturer.

b. Evaluation

An examination of the recovered data indicated that the recorder operated normally.

The parameter Total Air Temperature (TAT), the only indication of the atmosphere temperature recorded by this A320, was converted to Static Air Temperature (SAT) using the following conversion equation:

$$SAT_{(in\ degrees\ Kelvin)} = TAT_{(in\ degrees\ Kelvin)} / (1 + 0.2KM^2)$$

Where:

TAT = Total Air Temperature recorded by flight 50.

SAT = Static Air Temperature

K = Recovery Factor for A320 = 1.0 *(normal range .75 to .85)*

M = MACH Number

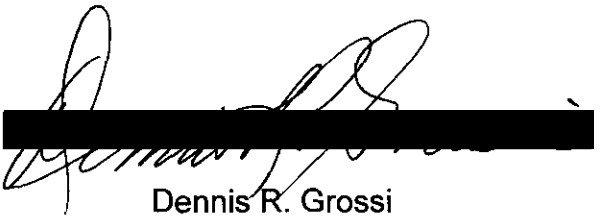
F. Data Printout

Attachment I contains a tabular printout of the following parameters recorded from the start of the descent at 31,000 feet through the landing at DTW:

Elapse Time	Latitude	Eng.1, Inlet Anti-Ice
Airspeed Computed	Longitude	Eng.2, Inlet Anti-Ice
MACH No.	Total Air Temp.	Wing Anti-Ice Left
Pressure Altitude	Static Air Temp. *(Computed)*	Wing Anti-Ice Right

G. Data Plot

Attachment II contains a plot of the same parameters listed in the tabular printout *plotted as a function of time.*



Dennis R. Grossi
National Resource Specialist Flight Data Recorders

Attachments: