NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

July 21, 2000

Systems Group Chairman's Factual Report Addendum Regarding the Documentation of the Servovalve Input Linkages

DCA-00-MA-006

A. ACCIDENT

Operator:	EgyptAir
Location:	60 Miles Southeast of Nantucket Island (N40.20, W69.45)
Date:	October 31, 1999
Time:	0148 EST
Airplane:	Boeing 767-366ER, SU-GAP

B. SYSTEMS GROUP

Chairman: Scott Warren
NTSB
Washington, D.C.

Member: Gregg Nesemeier
NTSB
Seattle, Washington

Member: Rick Krantz
Boeing
Seattle, Washington

Member: Randy Fehlhaber
Boeing
Seattle, Washington

Member: Hani S. Mahmoud
EgyptAir
Cairo, Egypt

Member: Michael Marx
Consultant for Egyptian Civil Aviation Authority
Springfield, Virginia

C. SUMMARY

About 0150 eastern standard time (EST), on October 31, 1999, a Boeing 767-366ER, SU-GAP, operated by EgyptAir, as flight 990, crashed into the Atlantic Ocean about 60 miles south of Nantucket, MA. EgyptAir flight 990 was being operated under the provisions of Egyptian Civil Aviation Regulations Part 121 and United States Title 14 Code of Federal Regulations Part 129 as a scheduled, international flight from John F. Kennedy Airport (JFK), New York, New York to Cairo International Airport in Cairo, Egypt. The flight departed JFK about 0122 EST, with 4 flightcrew members, 10 flight attendants, and 203 passengers on board. There were no survivors. The airplane was destroyed by impact forces. Floating debris from the aircraft was recovered on the morning of October 31, 1999.

During the ground tests conducted by the systems group on April 20, 2000, in Seattle, Washington (documented in the systems group chairman's factual report addendum regarding the ground and simulation testing), two modified elevator power control actuators (PCA) were used to produce a multiple failure jam condition on one elevator surface. Prior to those tests, each modified PCA was partially disassembled, and the input linkages for the servovalves were photographed. After the tests, the PCA's were again disassembled, on May 31, 2000, and the same components of the PCA's were photographed.

During the teardown activities of the elevator PCA's from the accident aircraft (documented in the systems group chairman's factual report addendum regarding teardown of selected longitudinal control system components), on April 17-20, 2000, the input linkages to the PCA servovalves were photographed.

D. DETAILS OF THE INVESTIGATION

During the ground tests conducted by the systems group on April 20, 2000, in Seattle, Washington (documented in the systems group chairman's factual report addendum regarding the ground and simulation testing), two modified elevator power control actuators (PCA) were used to produce a multiple failure jam condition on one elevator surface. These units were modified by the manufacturer, Parker Aerospace of Irvine, California, to insure that the slide of the servovalve in each PCA would remain in an elevator trailing edge down position regardless of pilot input. Prior to those tests, the PCA's were partially disassembled, and the input linkages for the servovalves were

photographed. The tests were conducted as documented in the previously mentioned addendum, and then the PCA's were removed from the test aircraft. On May 31, 2000, the PCA's were again disassembled, and the same components of the PCA's were photographed. The components that were photographed are shown in the exploded view of the servovalve contained in Appendix A. Overall photographs of examples of these components are also shown in Appendix A. The photographs of the servovalve input linkages components from the modified PCA's used in the ground tests, both before and after the tests, are shown in Appendix B.

During the teardown activities of the elevator PCA's from the accident aircraft (documented in the systems group chairman's factual report addendum regarding teardown of selected longitudinal control system components), on April 17-20, 2000, the input linkages to the PCA servovalves were photographed. The photographs are contained in Appendix C (note that some of the captions in the photos themselves are incorrect – the captions at the bottom of each page of photos are correct).

[redacted]

Scott Warren
Aerospace Engineer
SW for S. Dell
8/1/00