NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594

June 16, 2005

ADDENDUM 2 TO THE SYSTEMS GROUP CHAIRMAN'S FACTUAL REPORT ADDITIONAL SYSTEMS DESCRIPTIVE INFORMATION

DCA05MA004

A. ACCIDENT

Location: Kirksville, Missouri

Date: October 19, 2004

Time: 1945 central daylight time (CDT)

Aircraft: British Aerospace Jetstream 32, N875JX
Corporate Airlines Flight 5966

B. SYSTEMS GROUP

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Air Accidents Investigation Branch
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C. SUMMARY:

On October 19, 2004, about 7:45 p.m. central daylight time (CDT), a British Aerospace Jetstream 32 twin-engine turboprop airplane, operating as American Connection flight 5966 (a feeder commuter for American Airlines), crashed during an instrument approach to the Kirksville Regional Airport in Kirksville, Missouri. The airplane carried 2 crewmembers and 13 passengers. The flight was being operated as a scheduled Part 121 airline flight. It departed from St. Louis, Missouri, about 6:45 p.m. and was destined for Kirksville.

The flight was being vectored by the Kansas City Air Route Traffic Control Center (ARTCC) for the Localizer Distance Measuring Equipment (LOC-DME) approach to runway 36 at Kirksville. The airplane was cleared to descend from 15,000 feet. The airplane crashed about 4 miles from the runway during the approach. Eleven of the 13 passengers and the 2 flight crewmembers were fatally injured. The two surviving passengers received serious injuries. The airplane was destroyed by impact and post-impact fire.

American Connection is owned and operated by Corporate Airlines, a commuter airline based in Smyrna, Tennessee.

D. DETAILS OF THE INVESTIGATION:

Additional information on the following systems is provided below.

1.0 Honeywell/Sundstrand Mk VI Ground Proximity Warning System (GPWS) Description

1.1 General

The GPWS provides both aural and visual alerts. Visual alerts and warnings are displayed on the GPWS indicators, which are located in the left and right instrument panels. Each panel has five lights with individual captions.

1.2 Excessive Descent Rate Alert/Warning (Mode 1)

There is an outer alert boundary and an inner warning boundary, as shown in Figure 1. Penetration of either boundary results in illumination of the GPWS alert

lamps on the indication unit. In addition, the outer alert boundary provides an aural warning of ‘sink rate’ every three seconds, and the inner warning boundary provides a continuous aural warning of ‘pull up’ with increased emphasis.

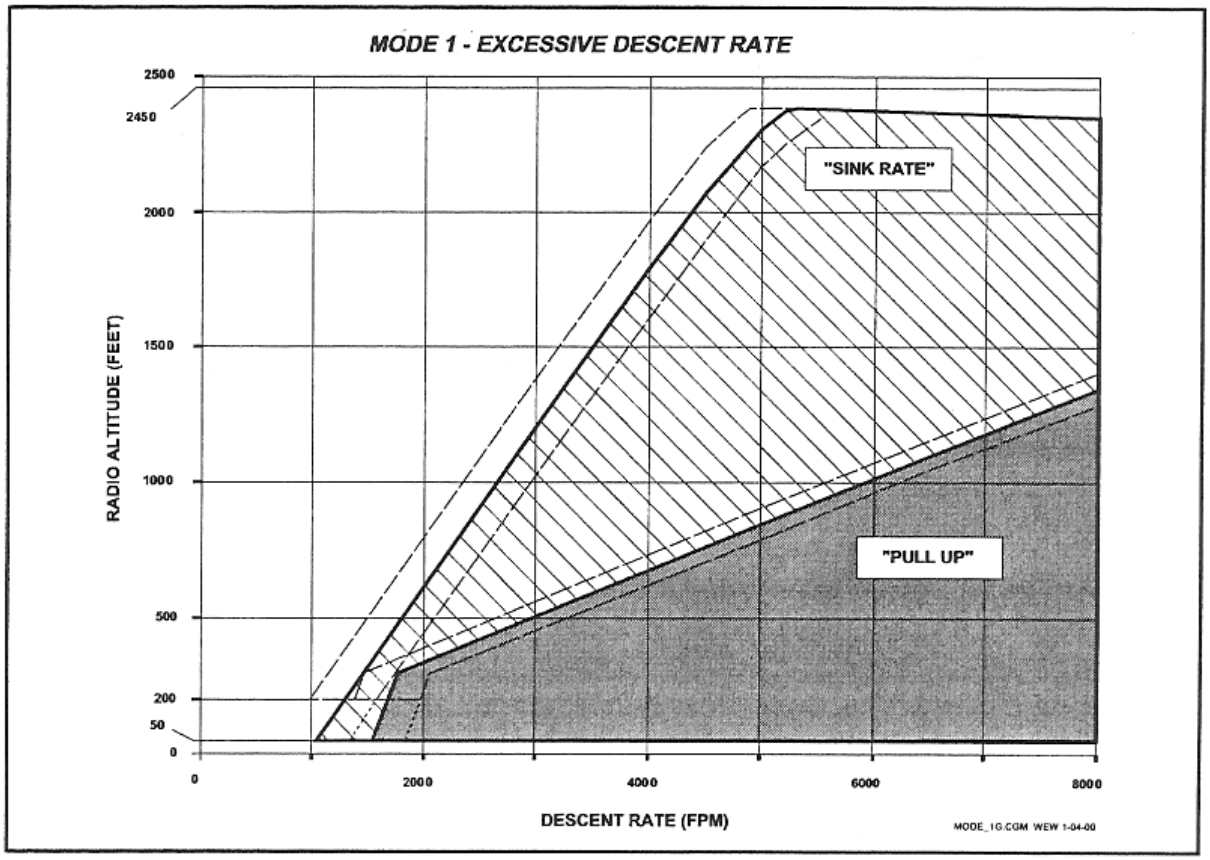

Figure 1 – GPWS Mode 1 Clearance Alert Envelope

2.0 Flight Director System Description

The flight director system provides computed steering commands to the pilot. The system consists of the following components: FZ-500 flight director computer; a flight director mode selector; a flight director mode indicator; a normal accelerometer; and an altitude/airspeed sensor.

The FZ-500 flight director computer monitors vertical and directional gyro data, altitude and airspeed data, radio navigational data, and manual commands from the horizontal situation indicator (HSI). This information is computed and displayed for flight path guidance.

The flight director mode selector consists of a row of illuminating pushbuttons, containing the lateral and vertical mode selectors. Some of the pushbuttons include dual-condition light assemblies, which illuminate amber for armed conditions, and green for

captured conditions. When more than one lateral or vertical mode is selected, the flight director automatically arms and captures the sub-mode.

Pitot and static pneumatic inputs to the altitude/airspeed sensor generate electrical signals of airspeed, vertical speed errors to the flight director system for altitude hold, vertical speed (VS) hold, and indicated air speed (IAS) hold modes.

The flight director mode indicator contains annunciators which indicate the various flight director functions.

The normal accelerometer provides a vertical acceleration signal which is used by the flight director computer to improve vertical stability.

The mode switches mounted on the flight director mode selector have the following functions: Heading (HDG); Navigation (NAV); Back Course (BC); Approach (APR); VHF Omni Range (VOR); Altitude (ALT); and Vertical Speed (VS).

HDG (Heading select) provides smooth capture and tracking of aircraft headings as selected on the HSI. Heading error gains are programmed as a function of true airspeed to provide smooth turn coordination in all flight conditions.

NAV (Navigation radio) provides lateral control for VHF Omni-directional radio Range (VOR) en-route navigation or localizer navigation, depending on the receiver frequency selected.

APR (ILS Approach) mode arms the flight director for automatic localizer and glideslope capture and control when the navigation receiver is tuned to an ILS frequency. In this mode the flight director computer gain programming is switched by a middle marker signal.

BC (back Course approach) provides back course localizer control.

VOR APR (VOR Approach) selects VOR mode with gains optimized for a VOR approach.

ALT (Altitude hold) provides control to the reference altitude existing when the mode is selected.

VS and IAS air data hold modes are selected by pressing the corresponding pushbutton. Selecting one of these modes maintains the vertical speed or airspeed existing at the time of selections.

3.0 Stall Warning System Description

Lift transducers are mounted in the left and right wing leading edges. Each lift transducer unit has a small vane attached to one end of an armature lever protruding from the unit mounting flange into the airstream, through the wing leading edge under-surface. The other end of the armature lever supports a core which is positioned by movement of the vane. The lever assembly pivots on a shaft and is balanced by a cast weight, to which the vane is attached. A flat coil spring connected to the shaft holds the lever in the null position until it is moved by the airstream.

The vane operated lift transducer in each wing provides continuous output signals to its related Signal Summing Unit (SSU). Forward movement of the vane to the STALL WARNING position causes the SSU to generate a shaker output signal. This signal initiates operation of the related stick shaker and dual warning unit, alerting pilots to a developing stall condition. If the wing angle of attack increases sufficiently, the vane will move forward to the STALL IDENT position. At this point, the two related stall ident lamps will illuminate to identify the stalling wing. Simultaneously, the related solenoid in the stick pusher unit is energized. The stick pusher unit will not operate until both the left and right pusher unit solenoids are energized.