

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

Log 1499

ISSUED: July 13, 1982

Forwarded to:
Honorable J. Lynn Helms
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-82-62 and -63

On July 9, 1982, a Pan American Boeing 727 (Flight 759) crashed into a residential area in Kenner, Louisiana, killing 145 persons on board the aircraft and 8 persons on the ground. The Safety Board's examination of the United Control Corporation (Sundstrand) V-557 cockpit voice recorder (CVR) from the aircraft has disclosed that the recording was of such poor quality that a complete readout may not be possible. The tape was in excellent physical condition, exhibiting no apparent fire damage or tearing. The Safety Board concludes that the poor quality of the tape is entirely a result of the recording process. The signal output on the cockpit area microphone (CAM) channel was below the minimum scale reading on the playback recorder's VU meter; that is, signal levels were commensurate with the equipment noise level. There were extraneous tones on the tape which were generated electronically in the recording system, the recording was distorted, and there were background conversations which apparently came from the machine's failure to erase previous conversation on the tape sufficiently. Fluctuations in tape speed (flutter and wow) were measured at 3.5 percent, nearly double the permissible value.

A number of electronic enhancement techniques have been used in an attempt to improve the quality of the CVR output; although these have helped to raise the signal-to-noise ratio somewhat, the signal is still far from clear.

On September 22, 1981, an Air Florida Airlines, Inc., DC-10-30CF sustained an uncontained failure of its right underwing engine (No. 3) during the takeoff roll at Miami International Airport, Miami, Florida. The engine failed at 90 knots indicated airspeed; the pilot rejected the takeoff and stopped the aircraft safely. 1/ During its investigation of the accident, the Safety Board was not able to read the V-557 CVR from the aircraft because the recording was distorted and the tape drive exhibited extremely poor speed control. Hence, no information at all could be obtained from the tape.

1/ For more detailed information read Aircraft Accident Report—"Air Florida Airlines, Inc., McDonnell-Douglas, Inc., DC-10-30CF, N101TV, Miami International Airport, Miami, Florida, September 22, 1981" (NTSB-AAP-82-3).

AAR-83-2

On February 16, 1982, a Reeve Aleutian Airways YS-11 crash landed on the ice in the Naknek River at King Salmon, Alaska. ^{2/} The Safety Board's investigation has found that the model V-557 CVR tape from this aircraft exhibited variations in tape speeds and a poor signal-to-noise ratio. The unstable tape speed made a frequency analysis of the engine sounds and air traffic control (ATC)/CVR time correlation impossible.

The Federal Aviation Administration (FAA) addressed similar problems with this recorder in 1978 in response to Safety Board Recommendations A-78-21 and -22, issued on April 13, 1978, which asked the FAA to "review the adequacy of current cockpit voice recorder preflight testing procedures to assure satisfactory system operation" and to "review the reliability of cockpit voice recorder units to assure that the mean time between failure is not excessive." The FAA replied on June 19, 1978, that it had "directed principal inspectors to reevaluate their assigned operators' CVR testing procedures to assure that the CVR testing procedures are satisfactory." FAA inspectors "were also directed to stress the need for operators to follow the CVR manufacturers' procedures and maintenance schedules. . . ." As a result of corrective actions in CVR maintenance programs, the FAA stated that it expected a substantially improved mean time between failures.

The V-557 recorder has a further history of problems. On August 22, 1967, the Safety Board issued recommendation SB-1-90 which called for review of United Control V-557 voice recorder "installation approvals granted to the operators. . . in order to ascertain that the CVR equipment as installed, meets the purpose for which it was designed."

This recommendation was made because a 1967 accident investigation "revealed an instance of cockpit voice recorder inadequacy which is the latest in a series of occurrences . . . the problem centers around the cockpit area microphone (CAM) channel on the United Control Corporation model V-557 voice recorders. Since December 15, 1966, our technicians have examined 15 [V-557] CVR units manufactured by this company." Nine of the 15 V-557's "evidenced either very weak or almost completely unintelligible CAM channels."

The FAA responded on March 25, 1968, that it was reviewing the "unsatisfactory installations" so that corrective action could be taken. Also, the manufacturer established a program to investigate "the advantages of incorporating an automatic gain control circuit to compensate for variables in the installations."

The Safety Board is concerned that the degraded quality of the recordings that it has found in recent investigations indicates that the maintenance practices for the model V-557 CVR have again degraded and that valuable accident information will continue to be lost in accidents involving aircraft equipped with this model CVR. Since the model V-557 is no longer being manufactured, the general population currently in the fleet is aging and in need of more frequent maintenance and repair. About 18 U.S. carriers are using these recorders, and there are an estimated 2,000 units either installed in various aircraft or available as spares.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

^{2/} Investigation in progress.

Initiate a program involving all U.S. operators using United Control Corporation (Sundstrand) V-557 cockpit voice recorders to randomly check a representative sample of these recorders in operational use to assure that they are operating within design specifications. If this inspection reveals significant problems with acceptability of recorded data, require the necessary changes in the carriers' maintenance programs to assure continued airworthiness of these recorders. (Class I, Urgent Action) (A-82-62)

After a specified period of not more than 2 years, require the removal of all United Control Corporation (Sundstrand) V-557 cockpit voice recorders and installation of suitable replacements. (Class II, Priority Action) (A-82-63)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations.


By Jim Burnett
Chairman