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NATIONAL TRANSPORTATION SAFETY BOARD
DEPARTMENT OF TRANSPORTATION
WASHINGTON, D.C. 20591

REC 10 1968

Honorable David D. Thomas
Acting Administrator
Federal Aviation Administration
Department of Transportation
800 Independence Avenue, S. W.
Washington, D. C. 20590

Dear Mr. Thomas:

Our recent investigation of the Northeast Airlines, Inc., FH-227C, N-380NE accident, near Hanover, New Hampshire, on October 25, 1968, has disclosed several areas where improvements to aviation safety are needed.

Our investigation has indicated that the possibility exists that the Northeast accident flight experienced false indications of station passage while making a VOR approach for landing at the Lebanon Airport. This possibility is predicated, in part, on flightcrew statements from Northeast Airlines, Trans East Airlines, and operators of general aircraft in the Lebanon area. In addition, numerous flight checks conducted during our investigation, using FAA airborne monitoring equipment, revealed that there were several areas of course interference. One area was at a point between the accident site and a commercial TV Station WHED, 3.8 miles east-northeast of the Lebanon VOR; the other area was 8 to 10 miles east-northeast of the VOR Station, the area where the normal procedure turn inbound is conducted during an instrument approach to the Lebanon Airport. The tests revealed full or partial deflections of the CDI indicators, partial rotation of the RMI's, and some softening of the To-From indicators; however, there was no full reversal of the To-From indicators during any of the flight tests. The flight tests did indicate that the greatest CDI deflections, RMI rotation, and To-From indicator softening occurred to the Wilcox Electric Company Model 806A airborne receivers used by Northeast Airlines.

The use of ground radio frequency interference monitoring equipment disclosed that a direct signal from the Lebanon VOR was detected in the areas where the greatest deviations of the airborne equipment were noted.

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During this period, the ground monitoring equipment detected no radio signals from any other radio facility. However, our investigation has revealed instances of radio frequency interference from stations remote from the Lebanon-Hanover areas affecting local radio and law enforcement communication facilities.

1. Signal Interference Effects on the Lebanon VOR Facility

From the fact that the reports from flightcrews concerning the VOR Station deviations do not occur on a regular basis, we would conclude that some radio frequency signals or co-channeling may exist from outside of the Lebanon-Hanover area and these signals do have an effect on the Lebanon VOR signal. We would, therefore, recommend that the FAA conduct long term radio frequency monitoring of the Lebanon VOR area for signal interference.

2. Need For Additional Navigation Facilities at Lebanon

An additional concern to the Board is the use of a single navigational facility for instrument approaches when the facility is subject to environmental factors similar to those which appear to exist at the Lebanon VOR.

We understand that your long range air navigation modernization program provides for the installation of additional navigation aids as well as the upgrading of existing facilities.

Recognizing that there are many airports served by single navigational aids for instrument approaches, the Board recommends that priority consideration be given to the installation of dual navigational facilities at those locations where a single facility could exhibit characteristics of the type found during our investigation of the Lebanon accident.

3. Operating Characteristics of the Wilcox Model 806A Navigation Receiver

The flight tests conducted during our investigation have indicated that the Wilcox Model 806A Receiver is more sensitive to reflected signals and possible frequency interference than navigational receivers of other manufacturers, and this sensitivity can have an effect on the airborne navigation equipment.

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The board recommends that a review be made of the design concept of the Wilcox Model 806A Receiver and its compatibility with other airborne instrumentation and ground station navigational equipment to assure standards of airworthiness. Furthermore, the facts disclosed during our investigation of this accident indicate to us that this compatibility problem may be general in nature and that consideration should be given to reviewing all pertinent standards for compatibility of ground and airborne navigation components.

4. Reporting of Incidents

During the investigation, it was disclosed that prior to the accident a Northeast flightcrew had experienced a false indication of station passage while making an approach to the Lebanon Airport. In this incident, the crew was completing the procedure turn inbound when the CDI needle fluctuated, and the To-From indicators went from "To" to "From," indicating station passage. With these indications, the crew started a descent from 2,800 feet. Upon reaching 2,000 feet, the crew then noticed that the To-From indicators had reversed, indicating a "To." The Captain observed the nearness of the terrain through breaks in the overcast and immediately applied power and climbed back to a safe altitude. This incident was reported to the local FAA maintenance technician who initiated a routine check of the facility which uncovered no irregularity. However, he did not, nor was he required to by your current procedures as we understand them, report this occurrence to any central unit within your organization.

Other Northeast Airlines flightcrews have reported to us that they have experienced previous indications of station signal difficulties. Their reports indicated that full scale CDI deflections and partial rotation of the RMI's have been observed prior to reaching the Lebanon VOR and, in some cases, when they are 5 to 10 miles north of the station.

Our investigation disclosed that there is no evidence to indicate that any of these incidents were reported to the Company for dissemination among their pilots or that they were brought to the attention of the assigned FAA air carrier operation inspectors. We are of the opinion that, had these incidents been reported to proper authorities, a strong possibility exists that the October 25 accident would not have occurred.

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We recognize that operational incident reporting is a matter which has received considerable industry attention in past years and that the various proposals suggested have received only limited acceptance. However, until operational performance recorders are installed and regularly monitored, some type of operational reporting system should be devised so that the industry can capture and utilize the hazard warning potential of incidents such as the ones discussed above. In this regard, we believe that the FAA should provide the leadership in developing and implementing an industrywide operational incident reporting system for the interim period. In moving toward this objective, we would hope that you would give early attention to insuring a wider dissemination of existing operational incident data among the elements of your organization.

In connection with the Board's accident prevention responsibilities, our staff is reviewing the general availability and methods of collection of operational incident data within the industry. As this review progresses, we will forward to your staff information of possible interest to you.

5. Positive Station Passage, VOR Instrument Approaches

Our final recommendation concerns the reemphasis of what cockpit indications constitute positive station passage during a VOR instrument approach. The Board is well aware of the warnings to pilots on positive station passage as outlined in the Airmen's Information Manual; however, our investigation at Northeast Airlines and other operators indicated that pilots have different concepts as to what indications constitute true station passage. Some pilots related to our investigators that deflections of the CDI needle were indicative of station passage. Others stated that the rotation of the RMI indicators was indication of station passage; whereas, others did state that they relied on the To-From indicators for positive station passage.

Due to the conflicting opinions by pilots as to what indication should be used to identify positive station passage, we recommend that an Advisory Circular, or similar type bulletin, be issued reemphasizing positive station passage indications.

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The areas of our concern were discussed in general with personnel from the Flight Standards Service and Systems Maintenance Service by our Bureau of Aviation Safety staff.

Please feel free to contact us if further information is desired.

Sincerely yours,

Original signed by

Joseph J. O'Connell, Jr.

Joseph J. O'Connell, Jr.
Chairman