

stationary.

- 15. In view of the absence of evasive action on the part of RW706 (i.e., no alteration of heading, climb profile or airspeed) it is logical to conclude that the crew did not sight BuNo458 in time to initiate such evasive action.
- 16. The pilot of the F-4B probably first observed the target of the DC-9 at about 8 to 10 seconds prior to collision, devoted the first portion of this brief period to assessing such cues as relative bearing, speed, and climb angle, and initiated a reflex evasive maneuver approximately 2 to 4 seconds prior to the collision.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the failure of both crews to see and avoid each other but recognizes that they had only marginal capability to detect, assess, and avoid the collision. Other causal factors include a very high closure rate, comingling of IFR and VFR traffic in an area where the limitation of the ATC system precludes effective separation of such traffic, and failure of the crew of BuNo458 to request radar advisory service, particularly considering the fact that they had an inoperable transponder.

3. RECOMMENDATIONS

As a result of this accident the National Transportation Safety Board recommends that the Administrator of the Federal Aviation Administration:

- 1. Install video tape at all FAA ATC radar displays, both terminal and en route for use as an investigation tool. (A-72-200)
- 2. Install an open "area" microphone at each terminal and center sector position to record all conversation at the control positions. (A-72-201)
- 3. Establish climb and descent corridors extending from the top of the TCA's to the base of APC, to remain in

effect until the base of APC has been lowered to the top of the TCA's. (A-72-202)

4. Establish more definitive procedures for the guidance of controller personnel in handling Code 7700 aircraft. (A-72-203)
5. Review radar performance monitoring procedures to assure that all radar facilities are capable of receiving Code 7700 transponder returns. (A-72-204)

The National Transportation Safety Board also recommended (A-71-52) that the FAA take the following action:

Coordinate with the Department of Defense, and, in areas where a large intermix of civil and military traffic exists, develop a program to insure that appropriate graphical depictions of airspace utilization and typical flow patterns are prominently displayed at all airports and operational bases for the benefit of all airspace users.

The Federal Aviation Administration responded, in a letter dated November 10, 1971, as follows:

"This is in response to your safety recommendation, A-71-52, issued 9 November 1971.

"Recommendation number 4 of our Near Midair Collision Report of July 1969 is similar to your recommendation.

"As a result of that recommendation we:

1. Developed a new Part 4 of the Airman's Information Manual in January 1970 (Graphic Notices and Supplemental Information). As graphics are made available, they are included in the semiannual Part 4 or are carried in the every 28-day Part 3, until they can be transferred to Part 4.
2. Developed various types of graphic displays of normal IFR and VFR routes.