2.2 Conclusions

a. Findings

1. The crew was qualified and certificated for the operation.

2. The aircraft was certificated and maintained in accordance with applicable regulations.

3. About 36 sec. before the initial explosion, the flightcrew pulled the N_1 tachometer circuit breakers to determine how this disconnection would affect the automatic throttle system's operation. The system circuitry is such that with these circuit breakers pulled, the autothrottle system's N_1 limiting authority is cancelled.

4. If the N_1 circuit breaker were disengaged with the autothrottle system in use, the throttle could advance beyond normal authority limits.

5. The flightcrew was, in effect, performing an untested failure analysis on the autothrottle system.

6. At the time of the failure, the three engines were operating at a power setting above that specified for normal operation, but below the approved maximum continuous operating limits of the engines.

7. There was no evidence of any failure or malfunction within the engine which would have caused the fan disintegration.

8. Thirty-two of the 38 fan blades exited in a forward direction out of their fan disk slots.

9. The damage to the No. 3 engine which resulted from the rubbing of the fan blade tips and the exiting of the fan blades was similar to the damage found in the two test-cell engine failures, the triggering mechanism of which was interaction between the fan rotor and the fan case during resonance between the two at a multiwave, vibratory mode.

10. A portion of the inlet duct inner liner was missing from the duct. A piece of this liner was found lodged against the fan outlet guide vanes.

11. Fragments of the No. 3 engine fan assembly penetrated the fuselage, the Nos. 1 and 3 engine nacelles, and the right wing area. A cabin window was struck by a fragment and separated from the aircraft.

12. As a result of the loss of a cabin window and cabin decompression, a passenger was forced out of the window and was lost.

13. Damage to the wiring in the No. 3 engine nacelle caused a partial electrical power loss which affected various aircraft systems.

14. Electrical power could have been restored to all systems through completion of the emergency checklist procedures.