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MEMORANDUM FOR THE RECORD

SUBJECT: Comments on Accident Report

REFERENCE: Findings and Recommendations of Accident Board

1. Specific comments pertaining to the findings and recommendations of the Accident Investigation Board reporting on the accident of A-12 S/N 123, are as follows:

a. FINDINGS:

(1) Primary cause - do not concur. I agree that some form of blockage, probably solid ice, occurred in the total pressure port and gave the pilot erroneous indications that led to the eventual stall. However, the true cause for this accident was pilot error in that the pilot failed to take adequate corrective action in a deteriorating air speed situation and that he operated the aircraft in IFR conditions on a VFR clearance. As verified from information in the aerodynamics section of the accident report and Attachments 1 and 2, the application of full power to include after burner or positive flight control movement to obtain a definite nose down/dive condition at any time from roll-out of turn down to KEAS 101 would have been sufficient for recovery. In addition, the pilot could have taken necessary action to remain VFR which would have in all probability precluded the accident.

b. CONTRIBUTING CAUSES:

(1) Ref. a. - Concur. There can be no misunderstanding between briefing personnel and a pilot flying the mission. Instructions must be clearly stated by briefing

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personnel and thoroughly understood by the pilot before attempting to fly the mission.

(2) Ref. b. - Concur.

(3) Ref. c. - Concur, except that I feel this is part of the primary cause as stated above.

(4) Ref. d. - Concur.

(5) Ref. e. - Concur.

(6) Ref. f. - Do not concur. The F-101 aircraft was capable of providing chase support; the contributing cause, as pertains to the part the chase aircraft played in this accident, should be; "The F-101 aircraft chase procedures during a critical time of the A-12 flight were inadequate in that no concrete chase assistance was given to the aircraft when it experienced pitot static difficulty and the airspeed started bleeding down. "

(7) Ref. g. (added) - Supervisory error in that (1) chase aircraft duties and responsibilities were neither clearly defined or adequate; (2) the quality of the briefing was such that comments regarding weather were either misunderstood or misinterpreted by the pilot; and (3) pilots' actions indicate a lack of previous training in A-12 flight characteristics at speeds considerably below normal cruise.

(8) Ref. h. (added) - Calculated risk involved in this project where the operational capability follows along concurrently with the test program in a new vehicle of this type.

(9) Ref. I. (added) - Material failure in that the total pressure ports of the pitot system probably became blocked by ice giving the pilot erroneous readings on both the Triple Display and conventional airspeed indicators. This was followed by unplugging which caused rapid run-down of MACH and KEAS indications to correct readings, further confusing the pilot.

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c. NON-CONTRIBUTORY FINDINGS:

(1) Ref. a. - Concur.

(2) Ref. b. - Concur.

(3) Ref. c. - Concur.

(4) Ref. d. - Concur with the thought being put out here but do not concur that this statement is a finding. The phrase is written as a recommendation. It should be a contributing cause and state: "Pilot did not cross-check normal pitot static pressure instruments against his Triple Display Indicator when operating at other than design cruise speed."

(5) Ref. e. - Concur.

(6) Ref. f. - Concur.

(7) Ref. g. - Concur.

(8) Ref. h. - Concur.

(9) Ref. i. - Concur.

(10) Ref. j. - Concur.

(11) Ref. k. - Concur.

d. RECOMMENDATIONS:

(1) Recommendations for Primary Cause:

(a) Ref. a. - Concur.

(b) Ref. b. - Concur.

(2) Recommendations for Contributing Causes:

(a) Ref. a. - Concur with the additional provision that briefing procedures and briefing material be reviewed

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to insure that pilots and staff personnel alike understand their responsibilities in the conduct of briefings for A-12 missions.

(b) Ref. b. - Do not concur. The lack of a recommendation for this contributing cause is unacceptable. To prevent possible recurrence of another pilot getting into this situation, the Accident Board should have recommended that all A-12 pilots be rebriefed on all phases of this accident with particular emphasis on the operation of the MACH trim system and the part it played in leading to the eventual stall.

(c) Ref. c. - Do not concur. The lack of a recommendation for this contributing cause is also unacceptable. The pilot was in a deteriorating airspeed situation which called for after burner power and/or a definite nose down (10° dive) correction. All A-12 pilots should be rebriefed on slow speed flying characteristics of the aircraft with emphasis on the Drag/Thrust/Airspeed/ and SAS relationship under such conditions, and the proper corrective action to be taken in a decreasing airspeed situation. This information should also be incorporated into the training program for new pilots in initial/checkout training.

(d) Ref. d. - Concur.

(e) Ref. e. - Concur.

(f) Ref. f. - Do not concur. Recommendation as written is not inclusive enough. The review of chase support should include a thorough review of existing chase aircraft SOP's, chase pilot responsibilities, etc., to insure that any departure from the briefed mission conduct or format is immediately detected and reported by the chase aircraft.

e. RECOMMENDATIONS ON NON-CONTRIBUTING FINDINGS:

(1) Ref. a. - Concur. In addition, the necessity for conducting factual, understandable and concise briefings must be re-emphasized to staff personnel.

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- (2) Ref. b. - Concur.
- (3) Ref. c. - Concur.
- (4) Ref. d. - Concur.
- (5) Ref. e. - Concur.
- (6) Ref. f. - Concur.
- (7) Ref. g. - Concur.
- (8) Ref. h. - Concur.
- (9) Ref. i. - Concur.
- (10) Ref. j. - Concur.

(11) Ref. k. - (added) - Normal and emergency procedures should be revised to incorporate appropriate corrective action for the pilot who finds himself in this situation.

(12) Ref. l. - (added) - That an A-12 flight simulator be purchased and put into operation at  at the earliest opportunity so that pilots can be more realistically trained in A-12 flight characteristics and emergency procedures.

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1. Primary Cause: The primary cause of this accident was materiel failure in that the total pressure ports of the pitot system probably became blocked by ice, which gave the pilot false increased airspeed and Mach readings on both the TDI and conventional indicated airspeed system, this was followed by unplugging which caused rapid rundown of Mach and KEAS back to correct readings at approximately 160 KEAS, further confusing the pilot. NOTE: This pitot heating system was designed and qualified in accordance with MIL-P-25632A.

2. Contributing Causes:

a. The pilot failed to comply with briefing instructions that he abort this mission if he encountered IFR conditions and/or any undercast that would prevent visual observations for the INS and V/H sensor.

b. The Mach Trim subsystem of the AFCS, receiving the same erroneous Mach signals as the TDI, added nose up trim to the aircraft, thus further increasing the angle of attack and increasing the rate of airspeed bleed off which led to the stall.

c. Pilot failed to take adequate corrective action after evaluation of instrument readings.

d. Weather contributed to this accident in that pitot icing most probably occurred when flying thru visible moisture just prior to the turn at Wendover, and instrument conditions existed during the final phase of flight.

e. There is no alternate pitot-static source which the pilot could have used to check instrument readings.

f. The F-101B aircraft was unable to provide chase support during the critical time the A-12 was experiencing pitot-static difficulty and airspeed was bleeding down, due to the wide margin in sub-sonic flight performance between the two aircraft.

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3. Non-contributory Findings:

a. Although this aircraft was designed for a relatively unexplored flight envelop, there were no provisions for an inflight recorder. A crash resistant flight recorder would have been invaluable in re-constructing this accident.

b. A direct reading angle of attack indicator if available to the pilot during this situation, would have provided him with a positive indication of his true angle of attack and the approaching stall condition.

c. Electrical distribution of AC power is unsatisfactory in that there is no back up for inverter failure.

d. When operating on the TDI, at other than design cruise speed, cross checking of normal pressure indicators should be emphasized.

e. Pilot did not follow check list on engine start this flight.

f. The left main parachute canopy release lock could not be released by pilot after touch down.

g. Seat cushion was lost during ejection. Loss of the seat cushion itself is not hazardous, but ordinarily the seat cushion is a compact-light weight sleeping bag needed for cold weather survival.

h. Personal oxygen hoses were pulled loose from under parachute leg straps. At ejection these lines pull from beneath the leg straps and could cause damage to the suit.

i. No warning device is incorporated into the triple display indicator.

j. No hypoxia warning device (a suitable cockpit gauge with red light/ or horn is available) is installed in this type aircraft.

k. Sabotage was not a contributing factor in this accident.

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RECOMMENDATIONS

1. Recommendations for Primary Cause:

a. Further testing and/or evaluation of the A-12 pitot static system for adequacy of heating and wiring reliability, with appropriate modifications if indicated, be accomplished prior to releasing the aircraft from its present VFR restrictions.

b. A study to determine the feasibility of the installation of an alternate pitot source and a cockpit warning device to indicate pitot heat failure should be accomplished as soon as possible. If this study indicates the practicability of these installations they should be accomplished prior to release from VFR restrictions.

2. Recommendations for Contributing Causes:

a. The necessity of strict adherence to briefing instructions should be stressed with all pilots.

b. None.

c. None.

d. All A12 flights should be restricted to VFR conditions until the pitot-static system has adequately been modified as outlined above.

e. An alternate pitot-static source should be installed in A12 type aircraft to provide pilot the opportunity to switch to this source to check his instruments should they appear strange at any time.

f. The problem of chase support of the A12 aircraft should be reviewed to determine the changing requirements from here forward and to suggest changes in the type or types of chase aircraft should such be required.



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3. Recommendations on Non-contributory Findings:

- a. A crash resistant flight recorder should be installed in A12 type aircraft for all test and training missions.
- b. A direct reading angle of attack indicator should be developed for this aircraft capable of operation throughout the flight envelope.
- c. A spare inverter should be provided with switching provisions to any one of the three primary inverters.
- d. Pilot training should emphasize that when operating at other than design cruise speed cross checking of the normal pitot-static indicators is required.
- e. Pilot training will emphasize the importance of following the check list.
- f. Evaluate the present parachute canopy release for the purpose of making improvements which will make the release more compatible with the parachute and full pressure suit.
- g. A nylon lanyard should be attached to the seat cushion to prevent its loss during ejection.
- h. Provide a hose restraint to prevent flaying of oxygen hoses during ejection.
- i. Evaluate, and if feasible, incorporate a self monitoring warning device for the TDI.
- j. Provide a hypoxia warning device to monitor pilots' oxygen supply system.

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The above findings and recommendations were drafted and approved by

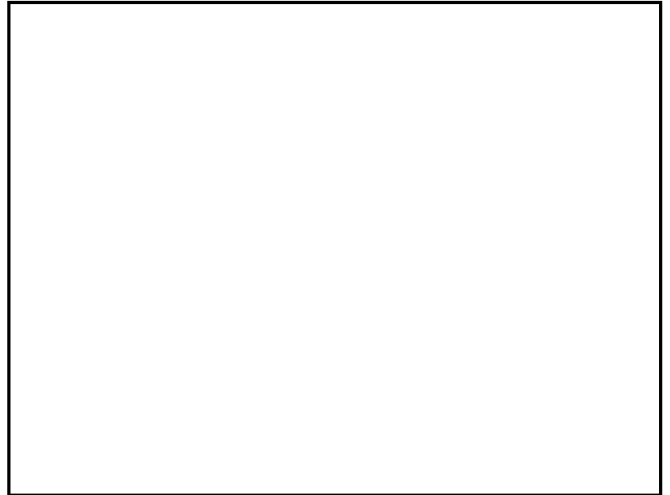
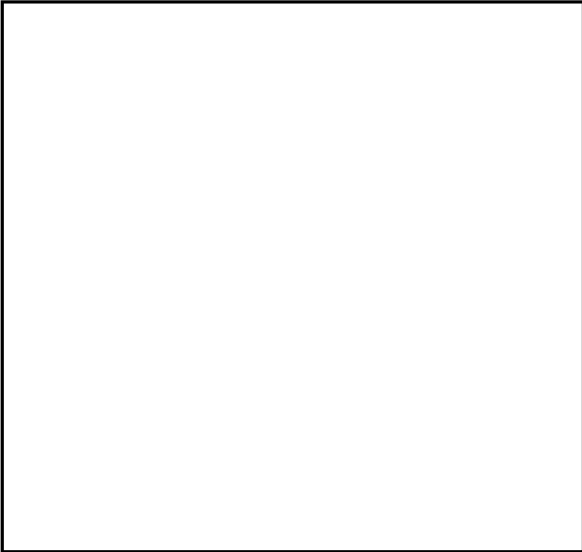
the following members of the board.

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CHARLES E. WIMBERLY  
Colonel, USAF  
Board President

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6. A light system will be installed to indicate when current is flowing in the pitot tube deicing system. It will be de-activated at  $M = 1.5$ .
7. The recommendations in the accident report having to do with personnel equipment will be put into effect, but I do not believe we should change the main parachute canopy release lock.
8. We will expedite the revision to the seat ejection system to allow the seat to be jettisoned in spite of a failure of the canopy arming system.

Sincerely,

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