DOCKET NO: SA-510

EXHIBIT NO: 9AD

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

BOEING CORRESPONDENCE REGARDING BRITISH AIRWAYS B-747 INCIDENT

BOEING COMMERCIAL AIRPLANE GROUP

AIR SAFETY INVESTIGATION

FAX LEAD SHEET

TO:	Greg Phillips	FROM:	Dennis Rodrigues
FAX:		FAX:	(206) 655-8533
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Date: 1/24/94 Time: 3:45 Pages: L + 8

PROPRIETARY

Greg

Regarding our discussion on the BAB elevator problem:

I found correspondence on the KLM event Stuart Culling mentioned in his fax. Here are pages ① → ③ on that event.

I am also including the 20 questions and our answers to date on those questions

Regards
Dennis

(2)

/ATTN (747S) W A STAUFENBERG MZ250 04-ER AIRLINE SUPPORT MGR

BAB-LHR-94-0007TE 4 JAN 94
ATA 2731-00 MODEL 747-400 10 JAN 94 H
REPORTED LOSS OF ELEVATOR CONTROL DURING GEAR RETRACTION
REF /A/ BAB-LHR-93-1734RE
AIRPLANE HOURS/CYCLES
RT494/NLY

PROPRIETARY

BAB ADVISE THEY HAVE RECEIVED INFORMATION FROM SWISS AIR REFERENCING AN ALMOST IDENTICAL PCP DUAL SERVO TANDEM VALVE BEING STUCK. IT QUOTES:

- IN 1990 KLM HAD A SIMILAR PROBLEM ON ONE APL
- INVESTIGATION ON THE APL REVEALED THE RH INBD ELEVATOR PCP TO OVERSHOOT THRU ITS NEUTRAL.
- SHOP INVESTIGATION REVEALED
  - UNIT DOES NOT CENTER TO NEUTRAL WITHOUT INPUT
  - UNIT MOVES ON EITHER TO MAX IN OR MAX OUT
  - HIGH FRICTION ON INPUT LEVER, SO AFTER INPUT, THE UNIT OVERSHOT THE NEUTRAL POSITION
  - DISASSEMBLY OF THE PCP REVEALED THE LAP ASSY, P/N 93610-5005, OF DUAL SERVO TANDEM VALVE BEING STUCK

ACTION:
PLEASE COMMENT ON FINDINGS OF THIS INCIDENT, ACTION TAKEN SINCE THE INCIDENT IF ANY AND COMMENT ON SIMILARITY WITH CURRENT BAB INCIDENT.

ROOT/HAMILTON BOEING CUSTOMER SERVICES REP LONDON HEATHROW

FSE-BOECOM TUE 01/04/94 15:43:26

BOESEA-DDS004-00036-01/04/94-1544Z

(3)(2)

BFS LHR BAB
ATTN M. HAMILTON - CUSTOMER SERVICES DIVISION

BAB-LHR-94-0064RE 17 JAN 94 **PROPRIETARY**
ATA 2731-00 MODEL 747-400
REPORTED LOSS OF ELEVATOR CONTROL DURING GEAR RETRACTION
REF /A/ BAB-LHR-94-0007TE /C/
/B/ BAB-LHR-94-0021RE
/C/ BAB-LHR-93-1680TE
/D/ 747 ISAR 90-10-2731-20
AIRPLANE HOURS/CYCLES
RT494

REF A ASKS FOR BOEING COMMENTS ON FINDINGS FROM A JAMMED OUTBOARD ELEVATOR PCP PREVIOUSLY EXPERIENCED BY KLM.

WE BELIEVE THE KLM EVENT MENTIONED BY SWISS AIR OCCURRED IN 1990, AND IS DESCRIBED IN DETAIL IN REF D ISAR. THE REASON FOR REMOVAL FROM THE AFFECTED AIRPLANE WAS AIRPLANE PORPOISING. FROM INITIAL BENCH TESTING, KLM FIRST BELIEVED THE JAM TO BE CAUSED BY A LAP MISMATCH IN THE SERVO. HOWEVER, IN FURTHER TESTING, KLM FOUND THAT A FOREIGN STEEL OBJECT IN THE BARREL ACTUALLY CAUSED THE JAM. THE ORIGIN OF THE OBJECT WAS NEVER DETERMINED.

GOSSELIN/RFM/BILL STAUFENBERG
CUSTOMER SERVICES DIVISION
BOEINGAIR M-7240 04-ER 01/17/94 2102

(4) (3)

Report No. 90-10
May 24, 1990

90-10-2731-20 (747) PITCH OSCILLATIONS (PORPOISING) DUE TO INBOARD ELEVATOR POWER CONTROL PACKAGE (PCP)

(Original ISAR 90-03, dated 1 Feb 90) PROPRIETARY

An operator reported that an airplane experienced pitch oscillations (porpoising) during cruise. The oscillations were approximately 60 feet every 5 seconds at an airspeed of 300 knots. The operator further reported that there were no oscillations at 200 knots. The oscillations occurred in both manual control and with the autopilot engaged. The number one hydraulic system was shut off, and the oscillations were reduced to approximately 35 feet every 5 seconds.

Both the feel computer and feel actuator were replaced, but the oscillations continued. The right inboard elevator power control package was removed, and the following was reported:

- The output would drift to either a full retract or extend position.
- The input arm moved with high friction.
- After an input, the unit seemed to cycle around the neutral position.
- The PCP was disassembled and it was determined that the dual tandem servo valve assembly was stuck.

There have been two previous reports of pitch oscillations. In both cases, the oscillation was traced to the inadvertent introduction of de-icing fluid into the hydraulic system during servicing. It was suggested that the operator inspect the servo valve assembly for evidence of corrosion. It was further recommended that the applicable hydraulic systems be sampled and tested for moisture content.

The operator reported that no corrosion was found in the servo valve assembly. Results of hydraulic fluid analysis from the subject airplane were within normal range: System 1 - 0.25 percent H{sub-script}2{end subscript}O, System 2 - 0.24 percent H{sub-script}2{end subscript}O. The unit was returned to the vendor for further evaluation. Under investigation.

ACTION TAKEN:

Further investigation by the operator revealed a foreign steel object within the barrel of the PCP. The brass gland within the PCP was severely damaged, contaminating the valve assembly. The valve assembly was forwarded to Parker for further examination, and Parker confirmed that the unit was extremely contaminated with brass particles. The valve assembly is being overhauled by Parker and returned to the operator. The origin of the foreign object could not be determined. We will continue to monitor service experience for similar occurrences.

(5)
(4)

BFS LHR BAB
ATTN M. HAMILTON - CUSTOMER SERVICES DIVISION

BAB-LHR-94-0019RE 10 JAN 94
ATA 2731-00 MODEL 747-400 31 JAN 94 H 18 JAN 94 F
REPORTED LOSS OF ELEVATOR CONTROL DURING GEAR RETRACTION
REF /A/ BAB-LHR-93-2070TE /C/
/B/ BAB-LHR-93-2077TE /C/
/C/ BAB-LHR-93-2097RE
/D/ BAB-LHR-93-2084TE
/E/ BAB-LHR-93-2047RE
/F/ BAB-LHR-93-1680TE

PROPRIETARY

AIRPLANE HOURS/CYCLES
RT494

INQUIRIES FROM REFS A AND B ARE REPEATED BELOW, WITH BOEING RESPONSE FOLLOWING EACH:

1. CAN BOEING INCLUDE IN A RESEND OF REF E/ REPORT SIMULATION ANALYSIS OF THE SIGNIFICANCE OF THE FDR ROLL, STABILIZER, WINDSHEAR AND WAKE TURBULENCE PARAMETERS AS REPORTED.

REPLY:
AT PRESENT, THE SIMULATION OF THE EVENT HAS BEEN UNSUCCESSFUL, POSSIBLY BECAUSE OF TRANSITION FACTORS OF GROUND EFFECTS AND POSSIBLY WINDSHEAR. THE NEXT ATTEMPT TO RUN THE MODIFIED SIMULATION WILL BE THE END OF THIS MONTH.

2. IF BOEING FEELS THAT THE FDR DATA IS SUSPECT, CAN A STATEMENT BE MADE TO SHOW WHAT CONDITIONS WOULD BE REQUIRED TO PRODUCE THE RECORDED FIGURES, IE: ASSUME DATA IS CORRECT. BAB HAVE VERIFIED DATA IS CORRECT ON ACMS BUT THEY PLAN TO PHYSICALLY MEASURE ELEVATOR MOVEMENT AND COMPARE WITH EICAS/FDR. BAB WILL ADVISE RESULTS. BAB ALSO POINT OUT THAT FULL AND FREE PRE TAKEOFF CHECKS WERE SATISFACTORY AND THE FDR SHOWS THE ELEVATOR MOVEMENT FROM POSITION +15 TO -25.

REPLY:
THIS ITEM IS UNDER INVESTIGATION.

3. WHAT IS THE SIGNIFICANCE OF THE CROSSFLOW SUBASSEMBLY TEST LIMIT OF 200 PSI. WHAT DETERIORATION HAS TAKEN PLACE TO ALLOW A UNIT OF 3220 HRS LIFE TO GET TO 225 PSI. WHAT WOULD BE THE EFFECT ON UNIT/APL OPERATION IF THIS PARAMETER DETERIORATED FURTHER, TO SAY 500 PSI. THIS IS A NON-DETECTABLE DETERIORATION, THERE IS NO APL CHECK WHICH CAN BE DONE.

REPLY:
OUR INDICATIONS ARE THAT THE DELTA PRESSURE MISMATCH IMPROVES WITH TIME IF EROSION OCCURS. THE RESIDUAL DELTA PRESSURE OBTAINABLE ALSO RELATES TO THE SYSTEM-TO-SYSTEM MISMATCH ALLOWABLE IN NORMAL (NON-JAMMED) OPERATION.

(6) (5)

4. WHAT IN SERVICE MONITORING IS RECOMMENDED TO CONTROL THE CROSS FLOW DETERIORATION.

PROPRIETARY

REPLY:
NO ACTION IS NECESSARY DUE TO THE ACTUAL IMPROVEMENT OVER TIME DESCRIBED IN ITEM 3 ABOVE.

5. DURING THE INITIAL TESTING, WHEN THE CROSS FLOW TEST RESULT WAS DETERMINED TO BE 225 PSI, WHY WAS THE NEXT SUBASSEMBLY TEST NOT ACTIONED TO DETERMINE REASON FOR THE DISCREPANCY.

REPLY:
THE 225 PSI WAS NOT CONSIDERED A DISCREPANCY PERTINENT TO THE INVESTIGATION, AS OPERATOR TECHNIQUE PLAYS A LARGE PART IN THE RESULT. THE DERIVATION OF THE 200 PSI REQUIREMENT IS BEING INVESTIGATED. A REVIEW OF THE ACCEPTANCE TEST PROCEDURE SHOWS THAT THE TEST ACCOMMODATES REDUCED FLOW BENCH CAPACITY AND DOES NOT NECESSARILY REFLECT FULL STOP CROSS FLOW, ONLY THAT THE 200 PSI IS ACHIEVABLE. TEST EQUIPMENT ACCURACY WAS +/-25 PSI.

6. CAN BOEING DOCUMENT REASONS FOR LACK OF MARKINGS ON PRIMARY/ SECONDARY SLIDES. THIS ASSUMES BOEING MAINTAINS THAT A JAM CAUSED THE INCIDENT.

REPLY:
MICROSCOPIC MARKS ON THE SLIDE AND SLEEVE PARTS ARE TYPICAL OF THOSE SEEN ON IN-SERVICE PARTS. INTENTIONAL VALVE JAM/CHIP SHEAR TESTS PREVIOUSLY DONE AT BOEING WITH NITRALOY SLIDES AND 52100 SLEEVES WITH VARIOUS CONTAMINANT MATERIALS SHOWED NO MARKS WITH CHROME OR HARD MATERIALS, BUT SHOWED A SMEAR WITH SOFT MATERIALS SUCH AS LOCKWIRE ON BOTH SURFACES. OTHER CAUSES IN-SERVICE WERE DUE TO GLYCOL/WATER CONTAMINATION, WHICH CAUSES HEAVY RUST DEPOSITS (WHICH WERE NOT EVIDENT IN THIS CASE).

7. CAN BOEING COMMENT ON ALL POSSIBLE FAILURE MODES. BAB BELIEVE THAT THE JAM DETAILED IN THE SYNOPSIS IS NOT THE ONLY POSSIBLE CAUSE. EG: HAS BOEING CONSIDERED PCP INPUT LINKAGE JAMMING EXTERNAL TO THE PCP, ITEM 5 OHM 27-30-09 PG 1005/1006.

REPLY:
THE ONLY OTHER POSSIBLE, BUT NOT PROBABLE, JAM THAT COULD RESULT IN THE CROSS FLOW WOULD BE INTERFERENCE/JAMMING BETWEEN THE PRIMARY VALVE INPUT SHAFT AND STRUCTURE DOWNSTREAM OF THE OVERRIDE BUNGEES. A JAM AT ANY OTHER LOCATION WOULD JAM THE ENTIRE ELEVATOR INPUT SYSTEM. A JAM OF PRIMARY LINK TO SECONDARY LINK WITH A RELATIVE DISPLACEMENT IS NOT POSSIBLE BECAUSE THERE IS NO RELATIVE MOTION BETWEEN THE PRIMARY AND SECONDARY VALVE LINKAGE UNLESS A JAM IN THE VALVE SLIDE OCCURS. THE LOST MOTION BETWEEN PRIMARY AND SECONDARY OCCURS AT THE SECONDARY VALVE LINK CONNECTION WHICH HAS A +/- 0.04 INCH GAP.

8. CAN BOEING PROVIDE GRAPHICAL DATA TO SHOW EFFECTS OF AIR LOADS ON A HARDOVER OR SIMILAR INCIDENT IN CRUISE.

(7)(6)

REPLY:
WE ARE STILL REVIEWING THIS ITEM.

9. CAN BOEING PROVIDE GRAPHICAL DATA TO SHOW THE EFFECTS ON ELEVATOR MOVEMENT FOR BOTH NOSE UP AND NOSE DOWN OF AIR LOADS AT LOW SPEED, IE: TAKEOFF AND AT HIGH SPEED, IE: CRUISE.

REPLY:
UNDER INVESTIGATION.

PROPRIETARY

10. CAN BOEING PROVIDE PCP HYDRAULIC SYSTEM FLOW SCHEMATICS FOR ALL OPERATION MODES.

REPLY:
WE WOULD LIKE CLARIFICATION OF THIS INQUIRY. PLEASE CONFIRM BAB WANT AN INTERNAL FLOW SCHEMATIC FOR A SINGLE PCP DURING NEUTRAL, EXTEND AND RETRACT MODES.

11. HAS THE JAM FAILURE MECHANISM, DESCRIBED IN THIS REPORT, BEEN EVALUATED IN THE RECTIFICATION WORK FOR THE 737 RUDDER PCP. IF NOT, WILL IT NOW BE DONE.

REPLY:
BOEING DOES NOT UNDERSTAND HOW 737 RECTIFICATION RELATES TO THIS EVENT. THIS ITEM IS STILL UNDER REVIEW.

12. CAN BOEING PROVIDE GRAPHICAL DATA FOR AUTOPILOT HARDOVER ON THE ELEVATORS, FOR BOTH NOSE UP/NOSE DOWN AT HIGH AND LOW SPEEDS.

REPLY:
UNDER INVESTIGATION.

13. WHAT WOULD BE THE EFFECT ON ELEVATOR CONTROL IF THIS FAILURE TOOK PLACE WITH AUTOPILOT DISENGAGED IN CRUISE (M = 0.85).

REPLY:
UNDER INVESTIGATION.

14. CAN BOEING PROVIDE FAILURE ANALYSIS DETAILS FOR ELEVATOR HARDOVER AT TAKE OFF AND 0.85 CRUISE.

REPLY:
UNDER INVESTIGATION.

15. AAIB QUERY THE FOLLOWING DESIGN PHILOSOPHIES.

A. WHAT IS THE REASONING BEHIND CHANGING FROM 747 CLASSIC CROSS-SHIP SLAVING OF ELEVATORS TO -400 SAME SIDE PAIR SLAVING.

B. IS THERE A REASON WHY FOUR INDEPENDENT PCP INPUTS ARE NOT USED.

PROPRIETARY

C. CAN BOEING PROVIDE FAILURE ANALYSIS DATA FOR REVISED SLAVING DESIGN.

REPLY:
A. CROSS SLAVING OF INBOARD TO OUTBOARD ELEVATORS ON 747 CLASSIC AIRPLANES WAS CHANGED WHEN THE 747-400 WAS DESIGNED, TO ALLOW FOR TAIL FUEL CAPABILITY. THE ORIGINAL SLAVING WAS INTENDED TO MINIMIZE TAIL TORSIONAL LOADS WITH TWO HYDRAULIC SYSTEMS FAILED. THE INITIAL LOADS TESTING ON THE AIRPLANE SHOWED THE NEED TO STRENGTHEN THE TAIL FOR OTHER REASONS (STABILIZER HINGE REACTION, OUTBOARD ELEVATOR HALF-BOOST FUNCTION, CABLE STRETCH LIMIT FOR INBOARD ELEVATOR, ETC.). AS A RESULT, A MORE OPTIMUM CONTROL SYSTEM WAS DEVELOPED FOR THE 747-400. BETTER OVERALL SURFACE RESOLUTION, HAVING ONLY TWO HYDRAULIC SYSTEMS IN EACH SIDE, AND MINIMIZATION OF FAILURE MODES RESULTED.

B. FOUR INDEPENDENT PCP INPUTS WERE CONSIDERED, BUT WOULD HAVE ADDED TOO MUCH SYSTEM FRICTION.

C. THE FMEA DATA FOR THE REVISED SLAVING DESIGN CAN BE OBTAINED FROM THE CAA (ROGER CHRISTMAS).

16. IF, AS STATED, THE JAM IS DUE TO FOREIGN OBJECT, BAB ASSUME THAT THE LAST CHANCE FILTER ON THE PCP WOULD PREVENT DEBRIS ENTERING THE PCP FROM THE APL SYSTEM FLUID. HENCE THE DEBRIS MUST HAVE ORIGINATED FROM THE PCP. WHERE HAD IT ORIGINATED.

REPLY:
ANY DEBRIS THAT MAY HAVE CAUSED THE JAM PROBABLY ORIGINATED FROM WITHIN THE PCP, BUT REGRETABLY WAS NOT RECOVERED.

17. WAS THIS TYPE OF FAILURE CONSIDERED IN ORIGINAL FMEA. IF IT WAS NOT WHAT EFFECT DOES THIS NOW HAVE.

REPLY:
THIS FAILURE WAS CONSIDERED IN THE ORIGINAL FMEA BUT THE NUMERICAL DETAILS WERE NOT INCLUDED IN THE DOCUMENT.

18. CAN BOEING CONFIRM THAT 225 PSI IS INDEED THE CORRECT VALUE TO BE USED IN ANALYSIS. THE FIGURE OF 225/2 WAS MENTIONED BUT THIS SEEMS INCORRECT.

REPLY:
225 PSI IS CORRECT AS SHOWN BELOW FROM THE TEST DATA:

A1 (FORWARD PISTON PRESSURE AREA) + A2 (AFT PISTON PRESSURE AREA) = 2A = 16.16 SQUARE INCHES
C1 (PRESSURE FORWARD OF FORWARD PISTON) = 850 PSI
C2 (PRESSURE AFT OF FORWARD PISTON) = 1000 PSI
C3 (PRESSURE FORWARD OF AFT PISTON) = 750 PSI
C4 (PRESSURE AFT OF AFT PISTON) = 825 PSI
CE (EXTEND PRESSURE) = (850 + 750) = 1600 PSI

(9) (8)

CR (RETRACT PRESSURE) = (1000 + 825) = 1825 PSI

C1 + C2 SHOULD BE EQUAL TO C3 +C4, +/-200 PSI (PARKER CMM CROSS FLOW TEST PARAGRAPH K.27, PAGE 161)
(850 + 750) - (1000 + 825) = 225 PSI

PROPRIETARY

ACTUATOR THRUST = (C2 - C1)A1 + (C4 - C3)A2, OR

2A(CE - CR AVERAGE) : 225/2

19. PCP FILTER (INLET) CONDITION. WHAT WAS IT.

REPLY:
NOTHING SIGNIFICANT WAS FOUND IN THE PCP INLET FILTER OR SYSTEM RETURN FILTER.

20. CAN BOEING MAKE A STATEMENT AS TO THE OPERATION OF THE PCP DURING SUBJECT INCIDENT. WAS THE ELEVATOR POWERED TO THE DOWN POSITION UNDER PRIMARY OR SECONDARY FLOW. PLEASE SHOW HOW THE ANSWER WAS DETERMINED.

REPLY:
THE ELEVATOR WAS PROBABLY POWERED TO DOWN BY A COMBINATION OF PRIMARY AND SECONDARY FLOW. IN CROSS FLOW, OIL IS GOING FROM SUPPLY PRESSURE TO RETRACT (DOWN) CYLINDER(S) THROUGH THE PRIMARY TO RETURN, AND FROM SUPPLY PRESSURE TO EXTEND (UP) CYLINDERS THROUGH THE SECONDARY. THIS IS BASED ON THE FACT THAT JUST PRIOR TO THE HARDOVER, THE INBOARD ELEVATORS WERE GOING DOWN AT A RATE LESS THAN THAT NECESSARY TO MOVE THE SECONDARY AS WELL.

WE WILL ATTEMPT TO PROVIDE FURTHER INFORMATION BY 31 JAN 94 ON THE ABOVE ITEMS WHICH WE DEFERRED. PLEASE CONFIRM OUR UNDERSTANDING OF ITEM 10 BY 18 JAN 94.

GOSSELIN/RHM/BILL STAUFENBERG
CUSTOMER SERVICES DIVISION
BOEINGAIR M-7250 04-EF 01/10/94 1944

(10)

PREPARED FOR: HowardL

DATE: 14-Nov-94 09:47am PAGE: 1

View Message

Message Number:	Action File Name:	Due Date:
BAB-LHR-94-2000RE	BAB-LHR-94-1868TE	

Model: 747-400 ATA: 2731-00

Subject: REPORTED LOSS OF ELEVATOR CONTROL DURING GEAR RETRACTION

BAB-LHR-94-2000RE 10 NOV 94
ATA 2731-00 MODEL 747-400
REPORTED LOSS OF ELEVATOR CONTROL DURING GEAR RETRACTION
REF /A/ BAB-LHR-94-1868TE /C/
/B/ BAB-LHR-94-1856RE
AIRPLANE HOURS/CYCLES
G-BNLD

PROPRIETARY

THE REFERENCE A MESSAGE ASKED BOEING TO RESPOND TO THREE ITEMS REGARDING THE SUBJECT INVESTIGATION:

1. BAB UNDERSTAND THE SUBJECT INCIDENT COULD ONLY OCCUR DURING GEAR RETRACTION DUE TO THE RETURN PRESSURE OF APPROX 240 PSI. YET BOTH BOEING AND THE CAA HAVE VERBALLY INDICATED THAT GEAR EXTENSION COULD CAUSE A HIGH ENOUGH RETURN LINE SURGE TO BE EFFECTIVE ON THE ELEVATOR SERVO. BAB ASK IF THIS IS TRUE.

REPLY: THAT IS CORRECT. GEAR EXTENSION CAN ALSO PROVIDE THE REQUIRED SYSTEM 4 RETURN PRESSURE TO CONTRIBUTE TO THE SUBJECT EVENT.

2. IF GEAR EXTENSION IS A FACTOR, WHAT ARE NORMAL RETURN PSI VALUES.

REPLY: SYSTEM 4 RETURN PRESSURE OF APPROXIMATELY 250 PSI DURING WING GEAR TRANSIT WOULD BE TYPICAL.

3. PER REF B TELEX, PLEASE PROVIDE REVISED PROBABILITY DATA, TAKING INTO ACCOUNT GEAR EXTENSION, IF APPLICABLE, AND ALSO TAKING INTO ACCOUNT OCCURRENCES OF GEAR RETRACTION AND EXTENSION ABOVE 220 KTS.

REPLY: BOEING BELIEVES THAT A PROBABILITY OF OCCURRENCE CANNOT BE REASONABLY ASSIGNED TO THIS EVENT. THAT IS BECAUSE A SPECIFIC PILOT INPUT TO THE ELEVATOR CONTROL SYSTEM, TIMED IN RELATION TO GEAR RETRACTION OR EXTENSION, IS REQUIRED. THERE IS NO REASONABLE WAY OF ASSIGNING A PROBABILITY TO THIS. SECOND, BOEING DOES NOT RECEIVE FEEDBACK REGARDING GEAR RETRACTION AND EXTENSION ABOVE 220 KNOTS, SO THERE IS NO REASONABLE WAY OF ASSIGNING A PROBABILITY TO THAT, EITHER.

ANDERSON/MABIE/BILL STAUFENBERG
CUSTOMER SERVICES DIVISION
BOEINGAIR M-7250 04-ER

10 NOV 94 2203