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Subject: OSCILLATIONS ABOUT THE ROLL AND YAW AXIS ON

ATTN H SUMNER - BOEING REP

FRM STA 617 NEX 075 NIXTON WASH 17 DEC 1986 510 PMPST IMH

1986 /C/

ATA 2700-00 MODEL 737-300

OSCILLATIONS ABOUT THE ROLL AND YAW AXIS ON AIRPLANE

REF /A/ 218TR DTD 27 OCT 86 /C/

/B/ 232RR DTD 24 NOV 86 /C/

/Q/ 245RR DTD 8 DEC 86

/D/ 265TR DTD 21 NOV 86

/E/ 186RR DTD 28 OCT 86

WE HAVE COMPLETED OUR INVESTIGATION OF THE REFERENCE /A/ REPORTED OSCILLATIONS ABOUT THE ROLL AND YAW AXIS ON AIRPLANE

DURING LANDING APPROACH TO OCT 86.

OUR ANALYSIS OF THE FLIGHT DATA RECORDER /FDR/ TRACES CMA THE FLIGHT CREW REPORT CMA THE MAINTENANCE AND IRREGULARITY REPORTS AND THE ASSOCIATED TELEXES HAVE DISCLOSED THAT THE OSCILLATIONS RESULTED FROM THE RELEASE OF THE RUDDER PEDALS AND DURING THE FIRST APPROACH CMA A CYCLING OF THE RUDDER PEDALS JUST PRIOR TO RELEASE.

THE REPORTED TENDENCY OF THE AIRPLANE TO ROLL TO THE RIGHT WAS CAUSED BY THE RUDDER PEDAL INPUT SHOWN ON THE FDR TRACES. INPUT TO THE RUDDER WAS IN A DIRECTION TO CAUSE A RIGHT ROLL. THE TENDENCY TO ROLL RIGHT WAS COUNTERED BY ALERT WHEEL INPUT WHICH INCREASED AS THE RUDDER INPUT INCREASED. THIS OCCURRED DURING BOTH APPROACHES.

THE RUDDER PEDAL INPUT UNCONTROLLED CMA WOULD HAVE CAUSED THE AIRPLANE TO ROLL TO THE RIGHT. LEFT CONTROL WHEEL WAS APPLIED TO MAINTAIN THE DESIRED BANK ANGLE. ON BOTH APPROACHES THE RUDDER PEDAL INCREASED TO NEAR FULL DEFLECTION. HOWEVER CMA PEDAL FORCE WERE NOT AVAILABLE ON THE FDR TRACES TO CONFIRM THAT THE PEDAL WAS COMMANDED BY THE FLIGHT CREW. ALTHOUGH CMA IN BOTH CASES CMA THE RUDDER PEDAL INPUT RETURNED TO NEAR ZERO TOO RAPIDLY TO BE A RUDDER TRIM INPUT. ADDITIONALLY CMA THE KNOWN FAILURE MODES OF THE RUDDER/RUDDER TRIM SYSTEM WOULD NOT CAUSE THE INPUT SHOWN ON THE FDR TRACES.

THE LIGHT AIRFRAME PLOTTER REPORTED BY THE FLIGHT CREW MAY HAVE BEEN CAUSED BY THE SPOILER DEFLECTION ASSOCIATED WITH THE WHEEL INPUT. THE REPORTED VIBRATION WAS NOT EVIDENT ON THE FDR ACCELERATION TRACES. HOWEVER CMA POOR RESOLUTION OF THE PARAMETERS MAY HAVE MASKED THE EFFECT.

A REVIEW OF A SIMULATOR/S RESPONSE TO THE FDR TRACES HAS DISCLOSED THAT THE RESPONSE OF THE SIMULATOR COMPARED FAVORABLY WITH THE RESPONSE OF THE AIRPLANE FROM THE FDR TRACES. FURTHERMORE CMA THE SIMULATOR ANALYSIS OF THE FDR TRACES INDICATES THAT THE AIRPLANE RESPONDED NORMALLY TO THE RECORDED CONTROL COLUMN CMA RUDDER PEDAL AND AILERON CONTROL WHEEL INPUTS.

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