Southwest Airlines
Burbank, CA
March 5, 2000
DCA00MA030

National Transportation Safety Board
Washington, DC

Attachment 5

NTSB Materials Laboratory Factual Report

5 pages

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594

September 7, 2000

MATERIALS LABORATORY FACTUAL REPORT Report No. 00-118

A. ACCIDENT

Place	: Burbank, California
Date	: March 5, 2000
Vehicle	: Boeing 737-300
NTSB No.	: DCA00-M-A030
Investigator	: Mark George, AS-60

B. COMPONENTS EXAMINED

Inboard rail and separated bracket, inboard arm assembly and exemplar outboard arm assembly, all from the forward attendant seat.

C. DETAILS OF THE EXAMINATION

An overall view of the inboard rail and separated bracket from the forward attendant seat is shown in figure 1, as received. Figure 2 illustrates a view of the inboard (arrow "1") and exemplar outboard (arrow "2") arm assemblies as well as the exemplar bracket from the outboard rail.

The bracket from the inboard rail fractured through the hole for the arm attachment bolt at the location denoted by arrow "s" in figure 1. The largest piece of the bracket, shown by arrow "a" in this figure, was still fastened to the rail with two bolts. Arrow "b" in figure 1 indicates the broken off small pieces of the bracket. Examination of the fracture faces on the pieces of the separated bracket with the aid of a low power binocular microscope revealed that all contained features typical of overstress separations.

The bolts that attach the inboard and outboard arms to their respective brackets arms are indicated by arrows "c1" and "c2", respectively, in figure 2. Visual examination revealed that the hole for the arm attachment bolt in the exemplar bracket from the outboard rail still contained a bushing. This bushing is denoted by arrow "d2" in figure 2. The bushing from the hole in the bracket from the inboard rail was found intact (unbroken) on the attachment bolt of the corresponding arm (at location "c1" in figure 2). A close up view of the attachment end on the inboard arm is shown in figure 3 with arrow "d1" denoting the bushing.

The bracket in the inboard rail was loose when moved by hand. Applying torque to the two bolts attaching this bracket to the rail revealed that both bolts were also loose and would easily turn.

Figure 4 depicts a view of the fracture area in the bracket and the surrounding portion of the rail. As can be seen in this figure, the rail had a hole in the area where the bracket was connected to the arm, apparently to provide the clearance for the nut and threaded end of the arm attaching bolt. This hole is denoted by arrow "h" in figure 4. The examination revealed that the aft side (towards the seat back) of the hole contained a long term wear mark, at the location indicated by arrow "m" in figure 4. A close up view of the end face on the bolt attaching the arm to the bracket is shown in figure 5. The nut tightening this bolt (see arrows "n" in figures 3 and 5) is secured on the bolt by a cotter pin (see arrows "p" in both figures). A magnified examination revealed that one end on the counter pin (see arrow "p1" in figure 5) was cut and that the other end (see arrow "p2") was flattened and contained numerous score marks, typical of wear damage

Jean Bernstein
Senior Metallurgist

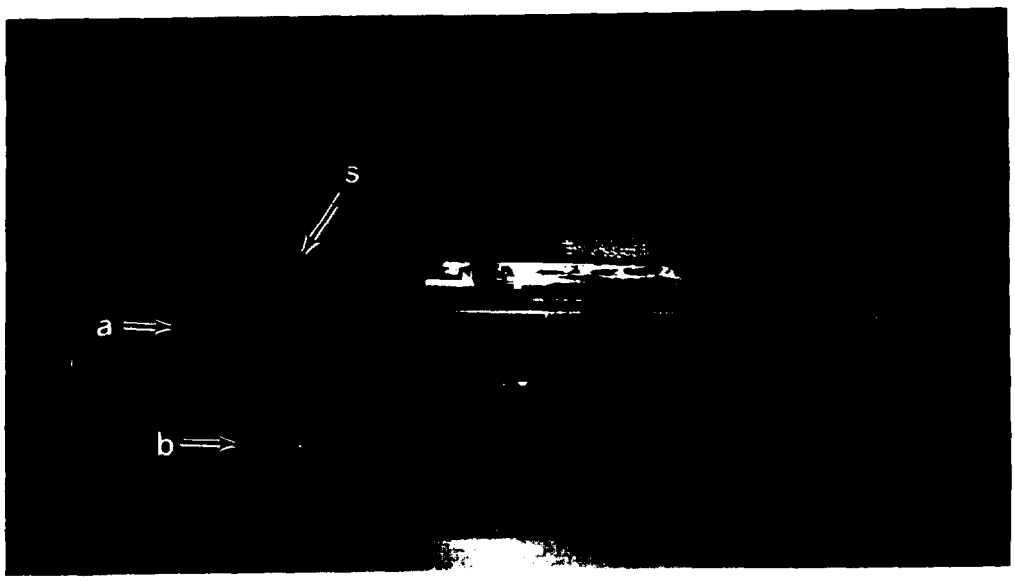

Figure 1. Overall view of the inboard rail and separated bracket from the forward attendant seat. Arrow "a" denotes the largest piece of the bracket, arrow "b" a group of smaller pieces. The location of the separation is indicated by arrow "s".

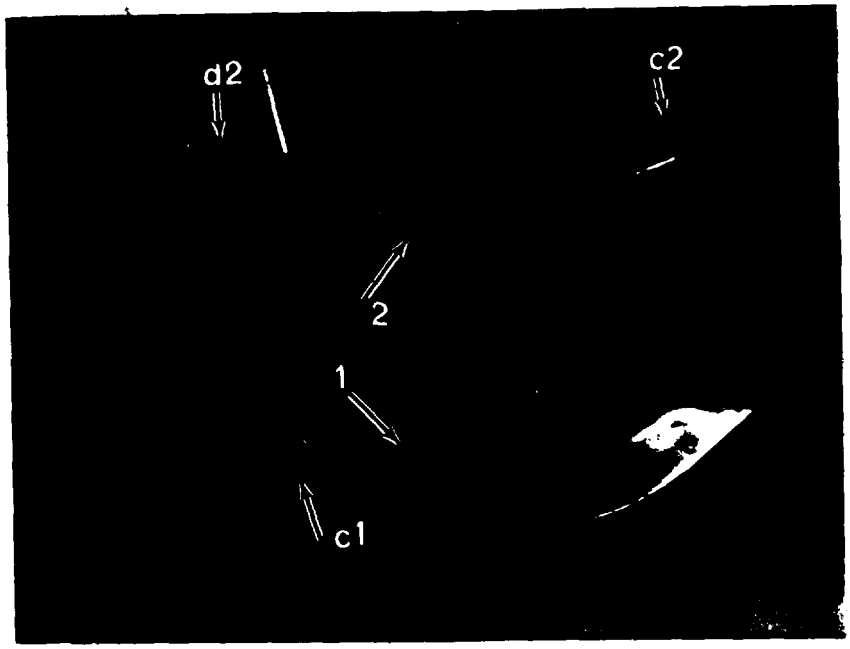

Figure 2. As received view of the inboard arm (arrow "1") and exemplar outboard arm (arrow "2"). Arrows "c1" and "c2" denote the arm-to-bracket attachment bolts. Arrow "d2" indicates the bushing in the bracket from the outboard rail

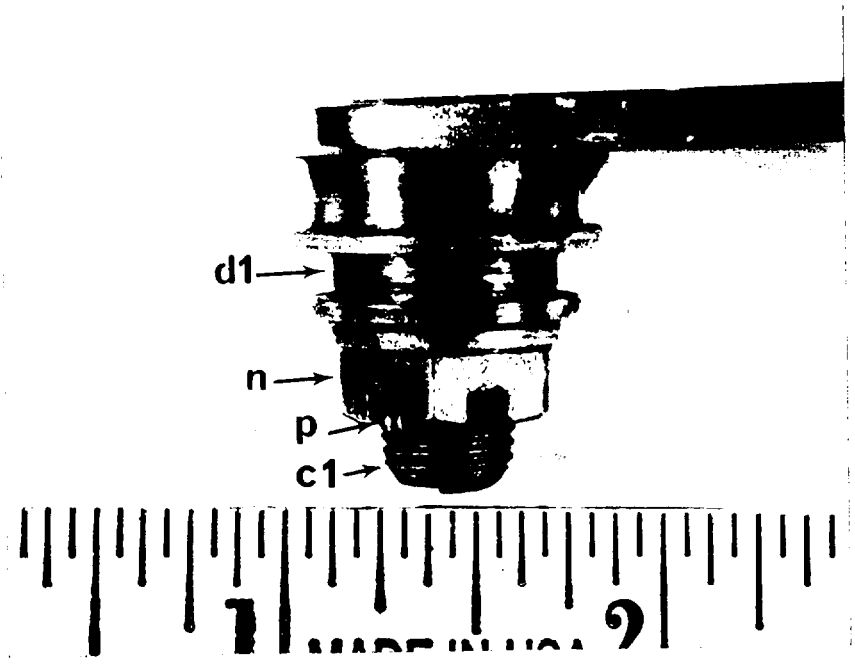

Figure 3. A close up view of the attachment end on the inboard arm showing the bushing by arrow "d1".

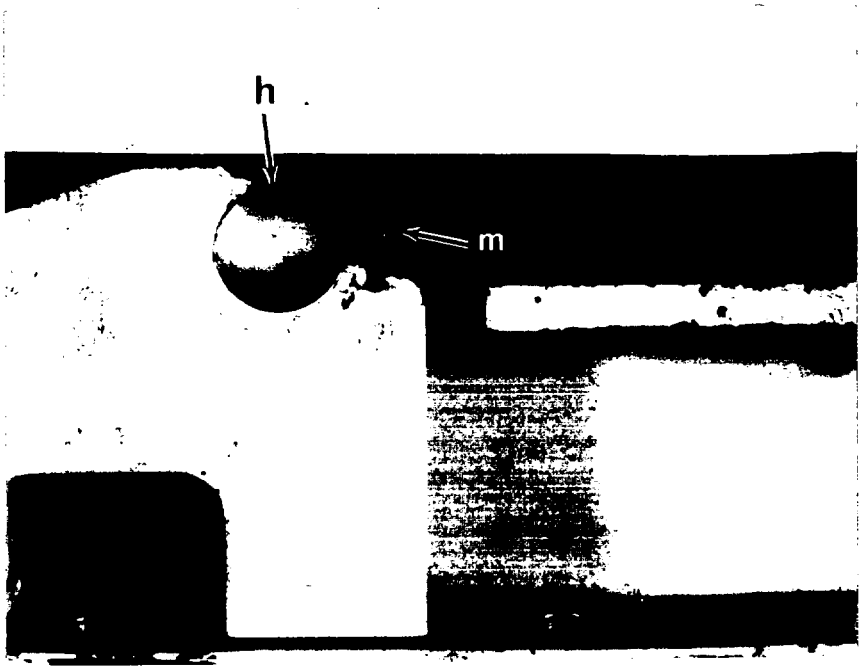

Figure 4. Close up view of the fracture area in the bracket from the inboard rail. Arrow "h" denotes a hole in the rail. A wear mark is indicated by arrow "m". Magnification 1X.

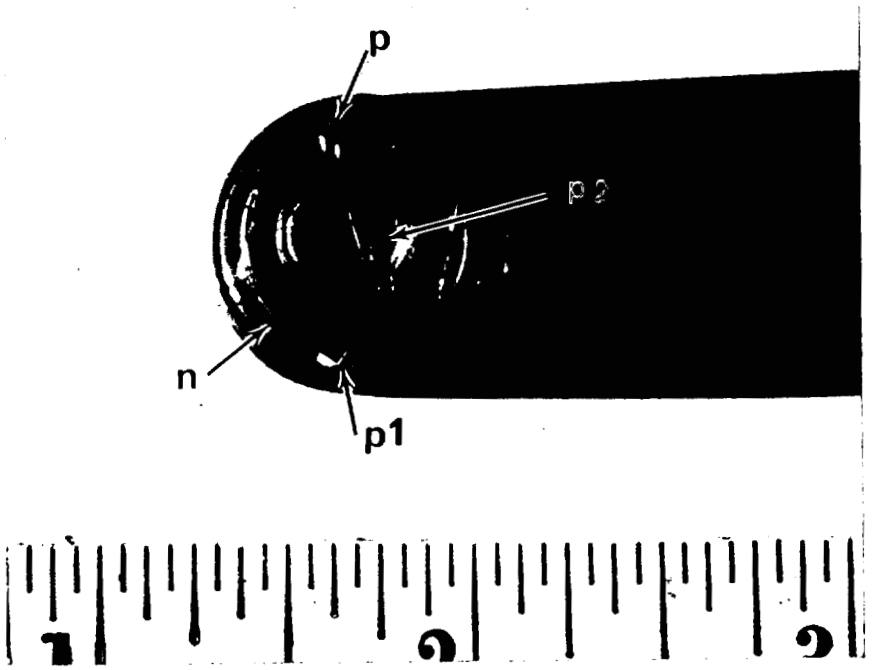

Figure 5. The end face on the bolt attaching the inboard arm to the bracket.