

STRUCTURAL LOADS PRELIMINARY RESULTS

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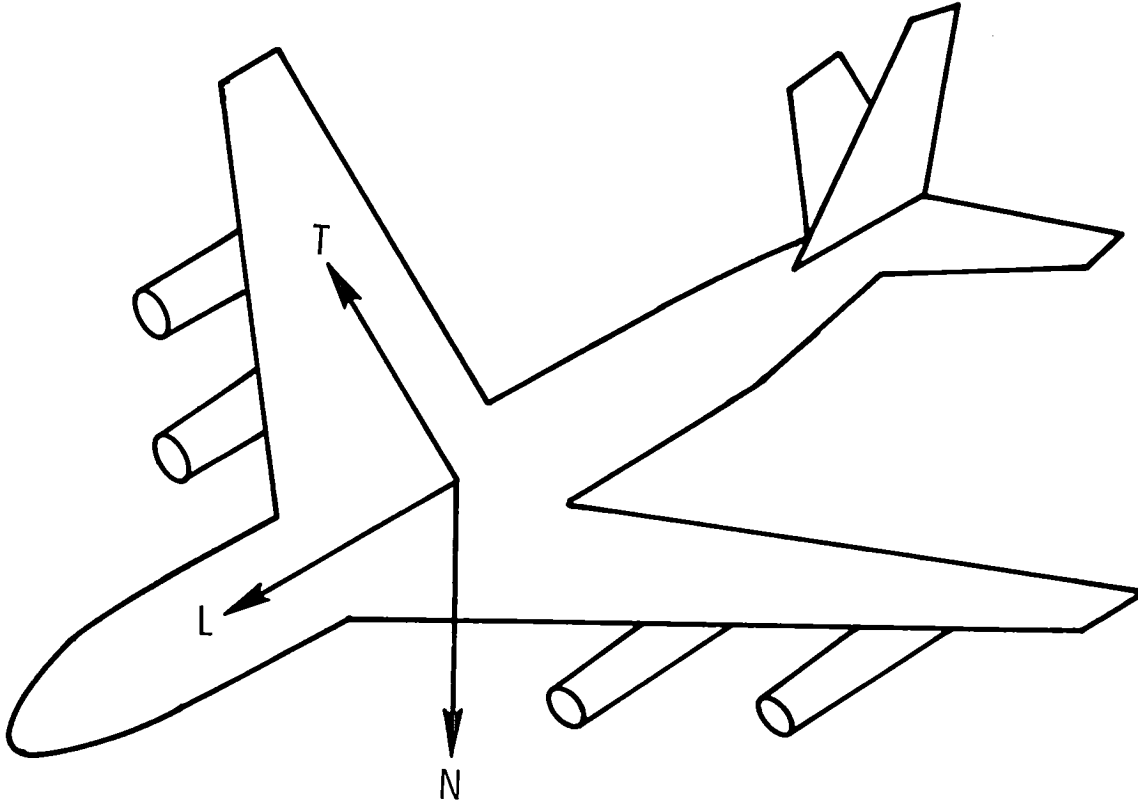
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STRUCTURAL LOADS PRELIMINARY RESULTS

Results from the initial impact in the Crash Impact Demonstration will be presented here. The results are preliminary as the data is still being analyzed and may change slightly after the analysis.

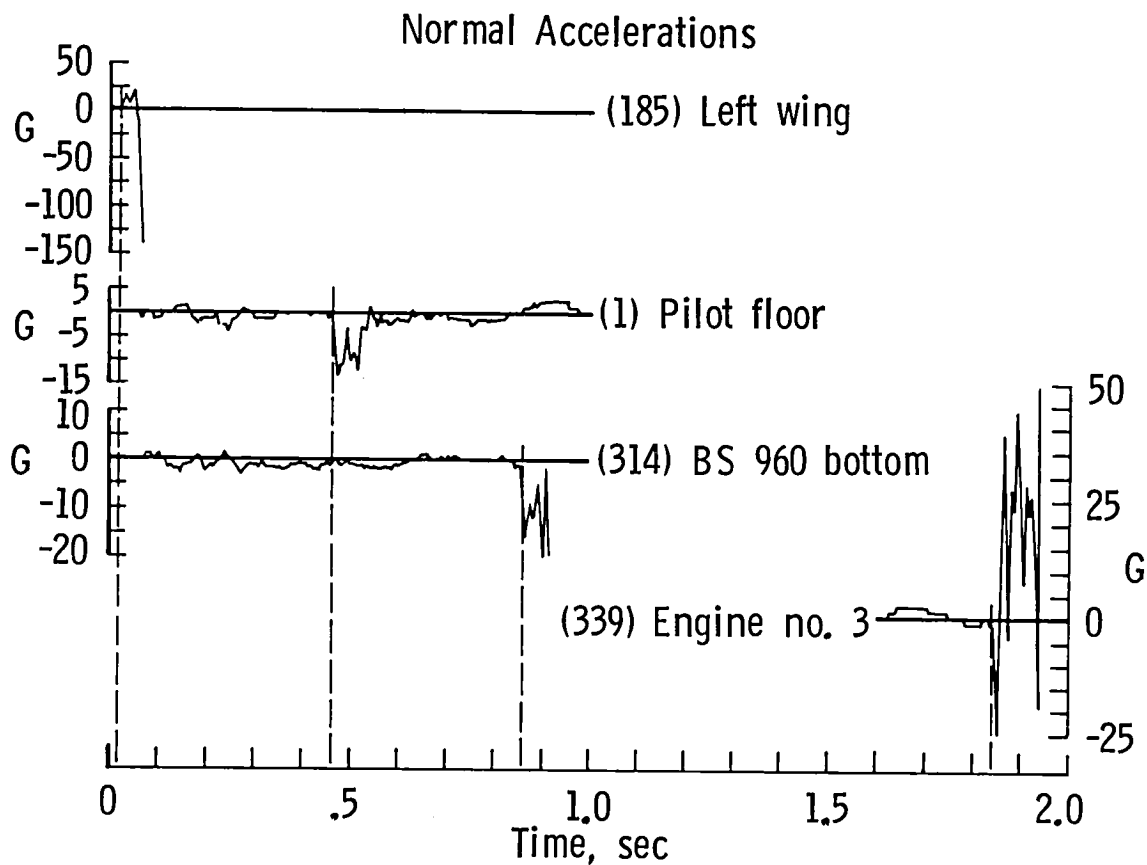
AIRCRAFT COORDINATE SYSTEM

The polarity of the accelerations is determined by the aircraft coordinate system. In the coordinate system selected, the normal acceleration is positive in the downward direction. The longitudinal acceleration is positive in the forward direction and the transverse acceleration is positive to the right.



C.I.D. SEQUENCE OF EVENTS

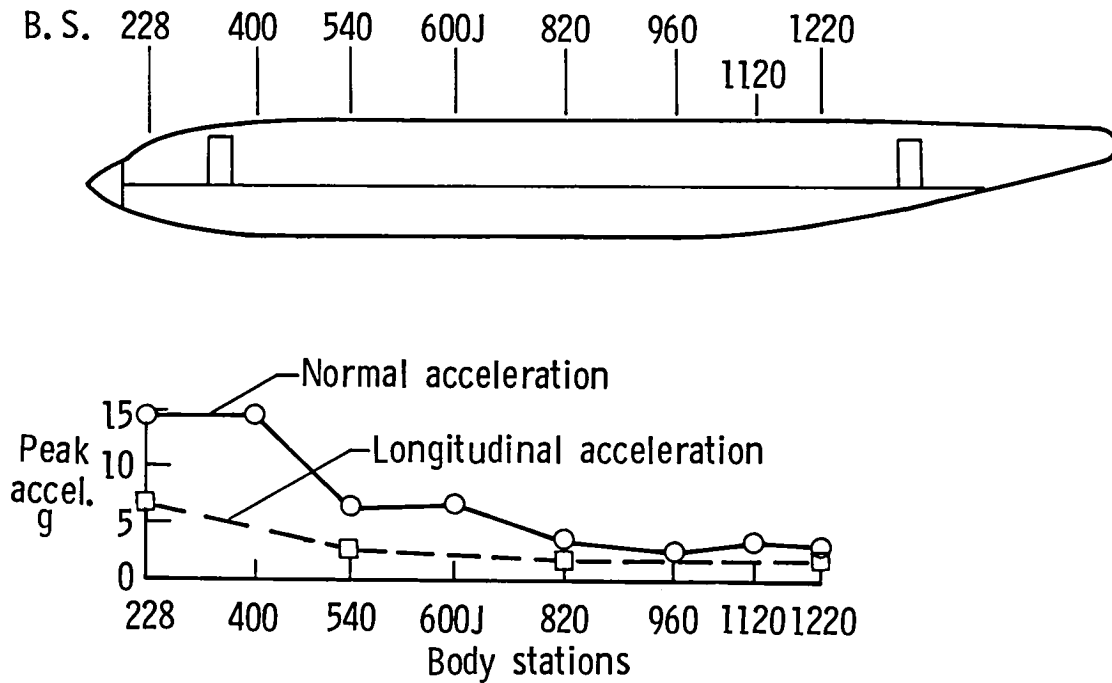
The sequence of events during the impact of the airplane to the ground started with the left wing touching the ground at 9 hr 22 min 11.02 sec in a -12 degree roll. As the airplane continued its descent it pitched down about 3 degrees and the forward cabin at Body Station 380 hit the ground at 11.46 sec. The airplane continued to slide and to rotate downward and the bottom of the fuselage at Body Station 960 hit the ground at 11.86 sec. Sliding continued and the airplane yawed to the left until engine #3 hit the wing cutters at 12.843 sec. The airplane stopped moving at 9 hr 22 min 21 sec.



FLOOR ACCELERATION PEAKS DISTRIBUTION

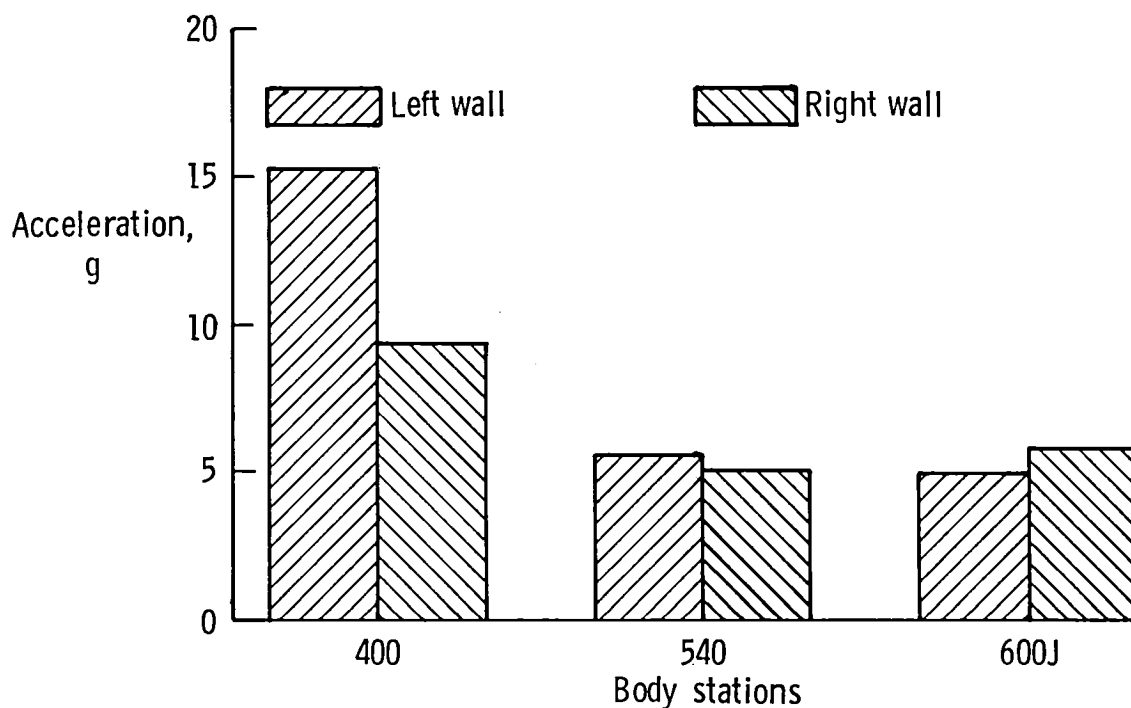
The distribution of acceleration peaks in the normal direction from front to rear of the fuselage shows higher accelerations at the front of the airplane diminishing toward the rear. Under the pilot seat and at Body Station 400 acceleration peaks of 14 g were recorded. Body Station 380 was the area of the fuselage's initial contact with the ground due to the 3 degree pitch down of the airplane. The normal accelerations decrease to 6 and 7 g's in Body Stations 540 and 600J respectively and continue to decrease to less than 5 g toward the rear of the airplane.

The longitudinal accelerations follow a similar pattern: higher at the front of the airplane (6 g) where the fuselage initial impact with the ground occurred and diminishing toward the rear (2 g).



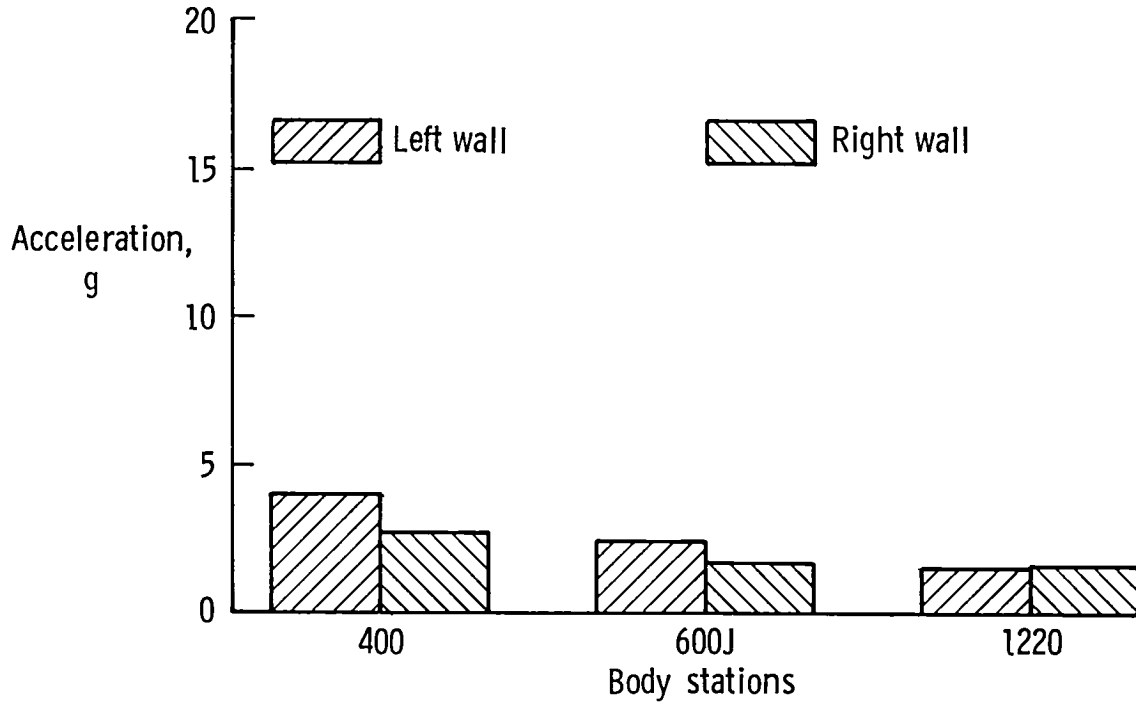
C.I.D. VERTICAL FLOOR ACCELERATION

The left side of the airplane forward of Body Station 540 experienced higher accelerations than the right side. At Body Station 540 and rearward the difference in acceleration between left and right sides is about +1 g. The magnitude of the accelerations seemed to vary with the contact position of the fuselage with the ground. The airplane had a negative roll (left) and the fuselage impacted pitched down. At this time the acceleration on the left side at the point of impact is higher. As the fuselage continues to pivot down and rotate to the right the difference in acceleration between right and left sides becomes smaller.



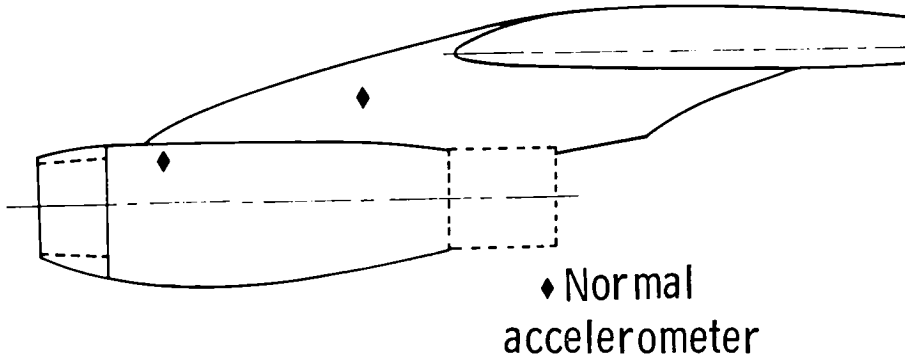
C.I.D. LONGITUDINAL FLOOR ACCELERATION

Similar to the pattern of the vertical accelerations, the longitudinal accelerations are also higher on the left side toward the front of the fuselage with the difference between left and right values diminishing toward the rear.



INBOARD NACELLE AND STRUT

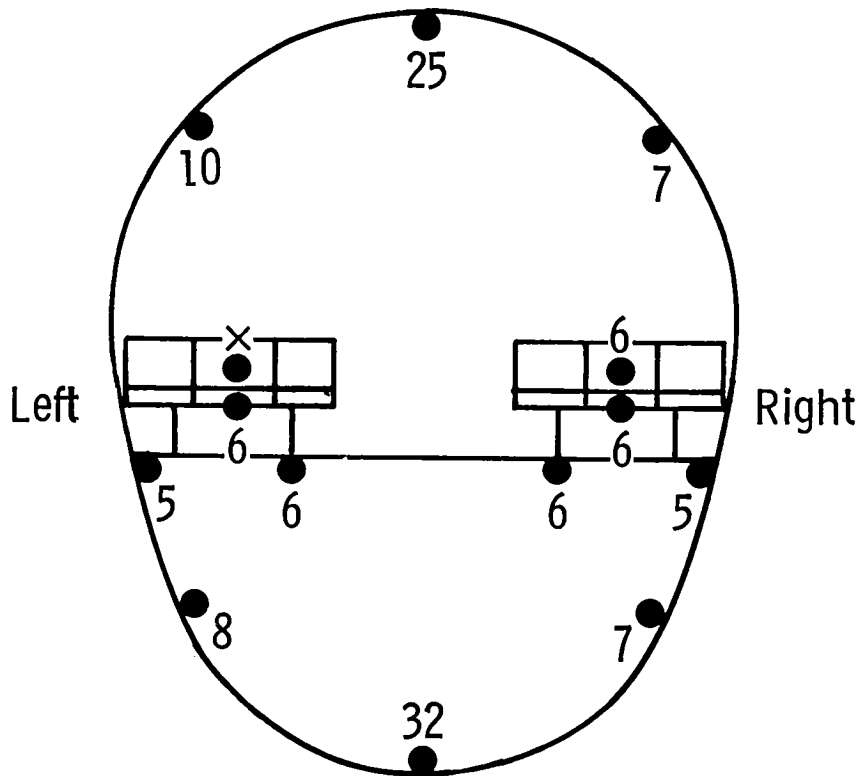
On the left wing an acceleration peak of 36 g was obtained toward the front of the inboard pylon and 150 g in the rear of the pylon. On the right wing an acceleration peak of 5 g was obtained toward the front of the inboard pylon and 29 g in the rear of the pylon.



BODY STATION 540

This is a cross section of the instrumented frame at Body Station 540. The values shown are normal acceleration peaks recorded at those locations to determine the transmission of pulses from the ground up. Peak accelerations obtained were 32 g at the bottom, 7 - 10 g at the subfloor and upper wall, 6 g at the floor, and 25 g at the roof of the fuselage. On the seat frame and dummy pelvis, an acceleration of 6 g was obtained.

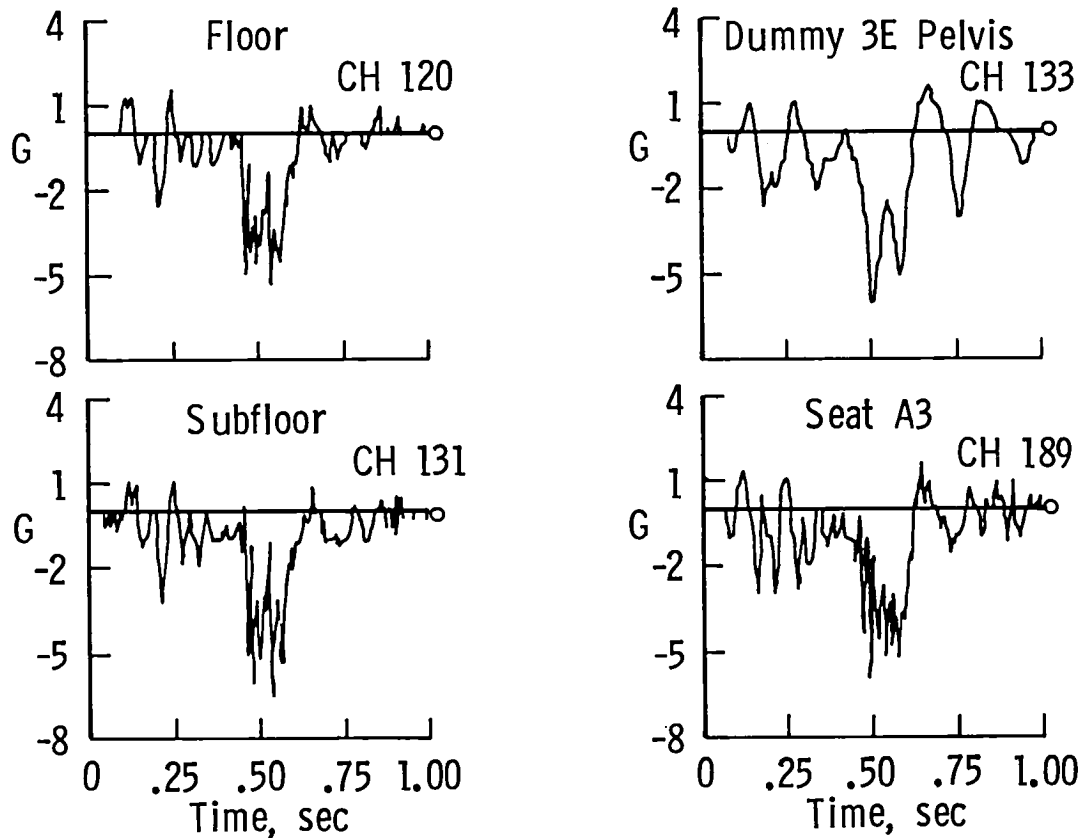
Normal Acceleration Peaks



BODY STATION 540: NORMAL ACCELERATIONS

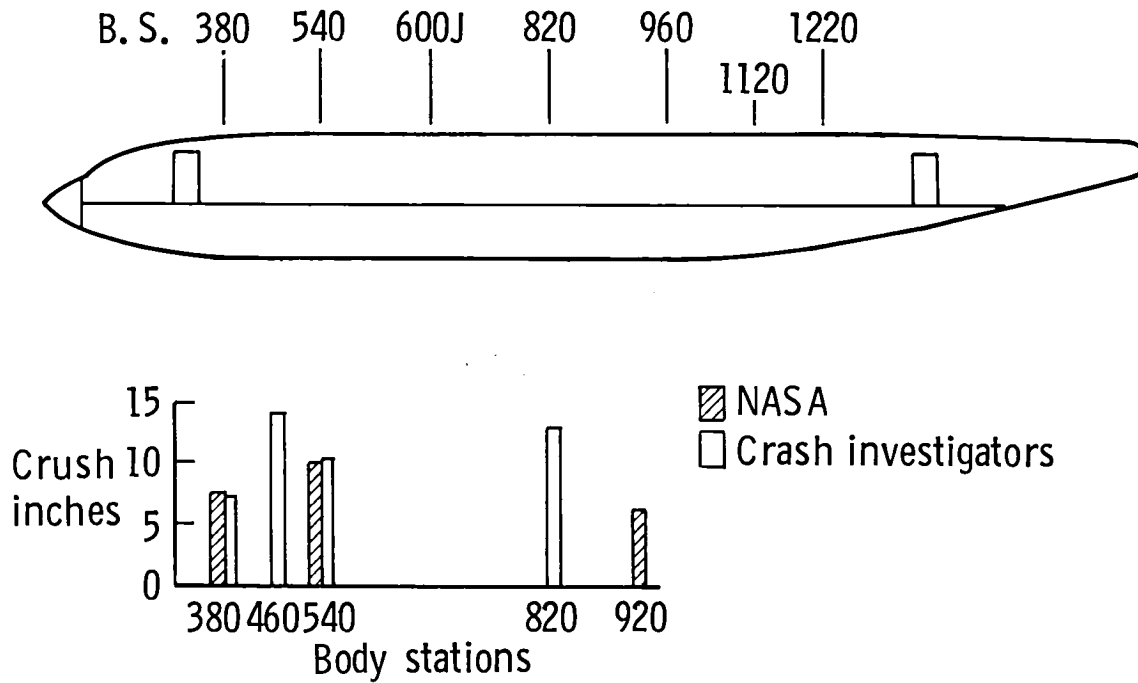
These acceleration time histories were measured on the right side of frame #2 at Body Station 540. The subfloor trace shows acceleration peaks of 7 g. At the floor-wall intersection the acceleration is 5 g. The acceleration on the seat frame is 6 g and at the dummy pelvis the acceleration is 6 g.

Normal Accelerations



FUSELAGE CRUSH (PRELIMINARY)

A NASA team and a crash investigators team measured the crush of the fuselage bottom. The crush measured by the NASA team was 7" at Body Station 380, 10" at Body Station 540, and 7" at Body Station 920. The crush measured by the crash investigators team was 7" at Body Station 380, 14" at Body Station 460, 10" at Body Station 540, and 13" at Body Station 820. Both teams had good agreement in the crush measurements at Body Station 380 and Body Station 540. At the other body stations measurements were made by only one team.



SUMMARY

From a total of 351 instrumentation channels, 341 channels (97%) were in operation during the initial impact of the airplane. Both NASA seats, the energy absorbing seat and the standard seat, maintained their integrity during the impact. The floor accelerations at the seat locations were lower than the accelerations required for the energy absorbers to stroke; consequently, the energy absorbing seat did not stroke. The two seats remained firm in place during the crash and no seat attachment failures were observed. Due to the low accelerations experienced during the crash, both seats performed as standard seats. In the airplane structure, the accelerations were higher at both the point of impact as was shown in the left wing and at the forward end of the fuselage. The accelerations on the floor were higher toward the front than toward the rear and the floor accelerations on the left side were higher than on the right side at the front of the fuselage, but toward the rear they evened out.

- 341 channels in operation during initial impact
- Both NASA seats maintained their integrity
- No seat stroking was observed
- No seat attachment failures
- Accelerations higher at point of impact
- Front floor accelerations higher
- Left floor accelerations higher