NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, D.C. 20594

April 28, 1998

MATERIALS LABORATORY FACTUAL REPORT Report No. 98-078 Addendum 1

A. ACCIDENT

Place	: Monterey, California
Date	: October 13, 1997
Vehicle	: Experimental Long EZ, N555JD
NTSB No.	: LAX98-F-A008
Investigator	: George Petterson(LAX)

B. COMPONENTS EXAMINED

Two Long EZ's and one Varieze Airplanes

C. DETAILS OF THE EXAMINATION

Background

On April 15, 1998 the following people met at the Santa Paula Airport in Santa Paula, California. The purpose of the meeting was to establish the probable location of the components examined in Materials Laboratory Report 98-078.

Present At Meeting and Examination

George Petterson
Investigator in Charge for LAX98-F-A008
NTSB LAX field office

Michael L. Marx
Chief Technical Advisor (Metallurgy and Failure Analysis)
Metallurgist for Imperial Valve examination on LAX98-F-A008
NTSB-Headquarters, Washington D.C. 20594

Michael W. Melville
Vice President and General Manager Scaled Composites
Hanger 78, Mojave Airport
Mojave, California 93501-1663

Mr. Melville worked since about 1978 with Bert Rutan who was the designer of the Long EZ airplane. Mr. Melville's airplane, N26MS, was the second Long EZ built (dated 1980), which he had flown to the Santa Paula Airport that day and was available for examination (see figure 1 for side view of airplane). He also was involved with the building of the original prototype Long EZ airplane with Mr. Rutan.

Klaus Savier
Light Speed Engineering
P.O. Box 549
Santa Paula, California 93061

Mr. Savier had available two airplanes for viewing at the Santa Paula Airport; a Long EZ, N3260T and a Varieze, N57LG. Mr. Savier indicated that he flew the accident airplane for about 30 hours and had worked on the accident airplane for the prior owner Van Snow (before John Denver).

Eric Cobb
[redacted]
Santa Monica, California 90403

Eric Cobb indicated he shared a hanger with the prior owner, Van Snow, and had performed maintenance on the accident airplane. He also flew the accident airplane to the point where John Denver took control of the airplane and gave John a check ride.

Probable Location Points of Fuel Tank Selector Handle and Imperial Valve

Mr. Cobb indicated that the fuel selector handle was positioned on the forward side of the front slanted seat back (bulkhead), on the left side, and approximately just below the top of the vertical portion of the back. Mr. Cobb's finger in the left photograph of figure 3 indicates the approximate location of the handle. It was also established that the handle of the valve could be turned to the off, left tank, and right tank positions, as indicated by the labeled arrows in the right photograph of figure 3.

Mr. Mellville indicated that during his examination of the accident airplane wreckage that the Imperial fuel valve was attached to the inside left side wall of the fuselage approximately 8 inches forward of the engine compartment firewall at a position that was about 6 inches from the floor (above the landing gear carry through strut). The valve position would be behind the slanted portion of the passenger's seat back. Arrow "V" in figure 4 shows the approximate fore and aft position of the valve. The valve would have been mounted against the side wall (the wall containing the fuel level site gage arrowed "SG" in figure 4) at this approximate fore and aft position.

Probable Connection Path Between the Handle and Valve

The steel tube between the underside of the selector handle and the center of the universal joint measured 26 ½ inches and the distance along the aluminum tube between the center of the universal joint and the rivets on the valve stem was about 23 inches (taken from actual components). The steel tube was mounted perpendicular to the slanted portion of the pilot's seat back and the geometry showed that the aluminum tube would have to be oriented horizontally or nearly horizontally relative to the interior floor in the rear seat of the airplane. The position of the universal joint using these dimensions and approximate orientations was shown to be below the passenger armrest , arrowed "AR", and to the left of the passenger thigh rest arrowed "TS", in figure 4. Arrow "U" in this figure locates the approximate position of the universal joint as found by measurements. The aluminum rod was believed to be situated under the armrest and through the back slanted wall of the passenger's seat. Therefore, the aluminum rod, universal joint, and the aft few inches of the steel rod would be hidden from view under the passenger armrest. A side view cut away is presented in figure 5 to show the approximate position of the tubes relative to the armrest. This drawing was originally prepared by Mr. Melville and has some additional items added by the undersigned. As drawn, the steel rod is about the same length as the aluminum rod.

Difficulty in Reaching Fuel Tank Selector Valve if on Left Seat Back

Figure 6 shows the difficulty a pilot would have in reaching the fuel tank selector handle if it were positioned as if in the accident airplane. In order to reach the valve handle the pilot would have to use his right hand as shown in figure 6. In doing so the pilot would have to take his right hand off the control stick (located by arrows "CS" in this figure) and rotate his body around to the approximate position shown.

Normal Position of Fuel Tank Selector Handle

Figure 7 shows views of the normal position of the fuel tank selector handle, which is between the pilot's legs and near the control stick.

Fuel Watch System

The accident airplane reportedly had a Fuel Watch system indicator as shown in figure 8 (verified by Mr. Cobb and Mr. Savier, who both flew the airplane). If the fuel was low the left indicator light shown arrowed in figure 8 should have been blinking. This light is relatively small and green in color.

[redacted]

Michael L. Marx
Chief Technical Advisor
Metallurgy & Failure Analysis

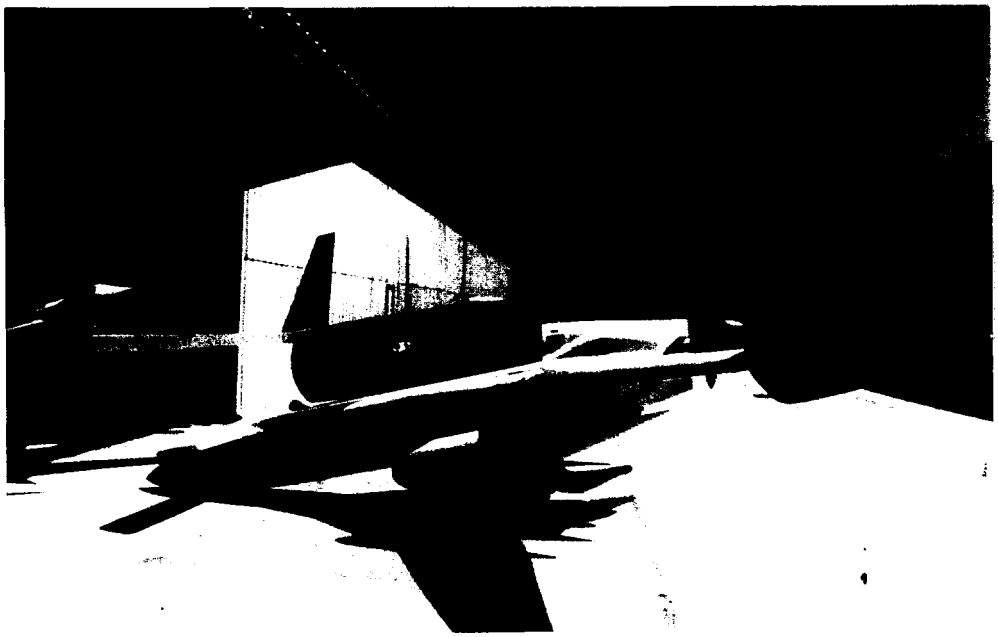


Figure 1. Side view of the reference Long EZ, N26MS.

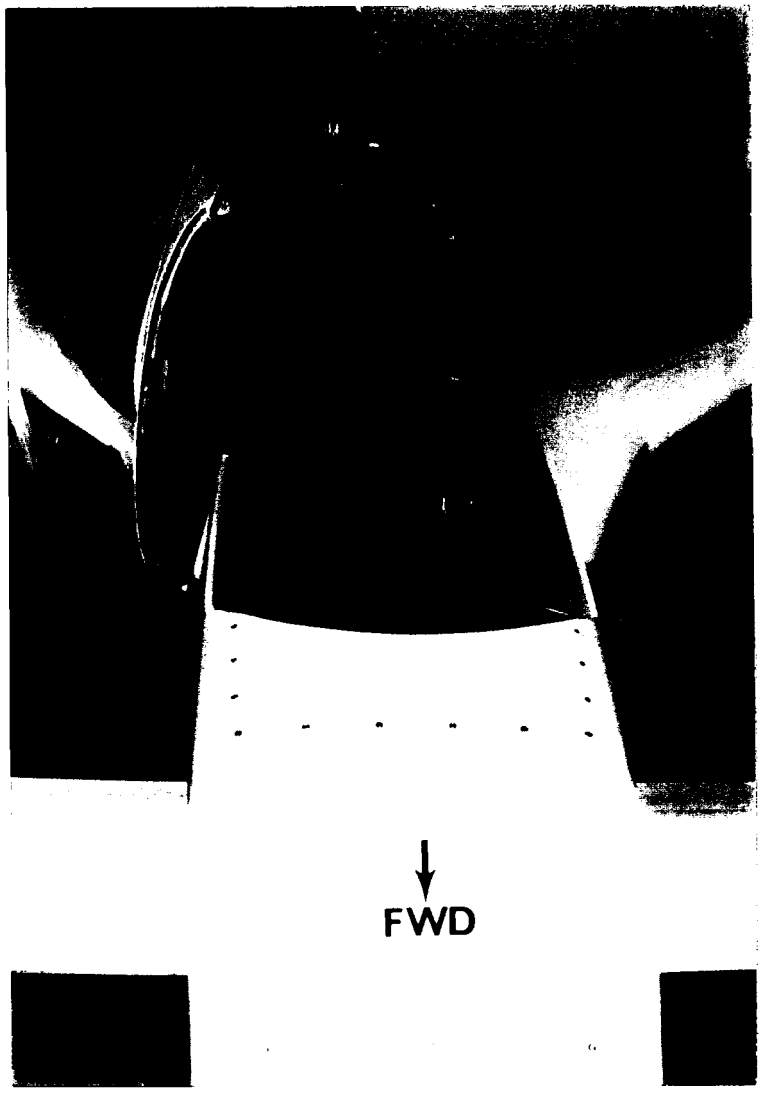


Figure 2. View looking down and aft on the Long EZ, N3260T used for reference figures in figures 3 and 4.

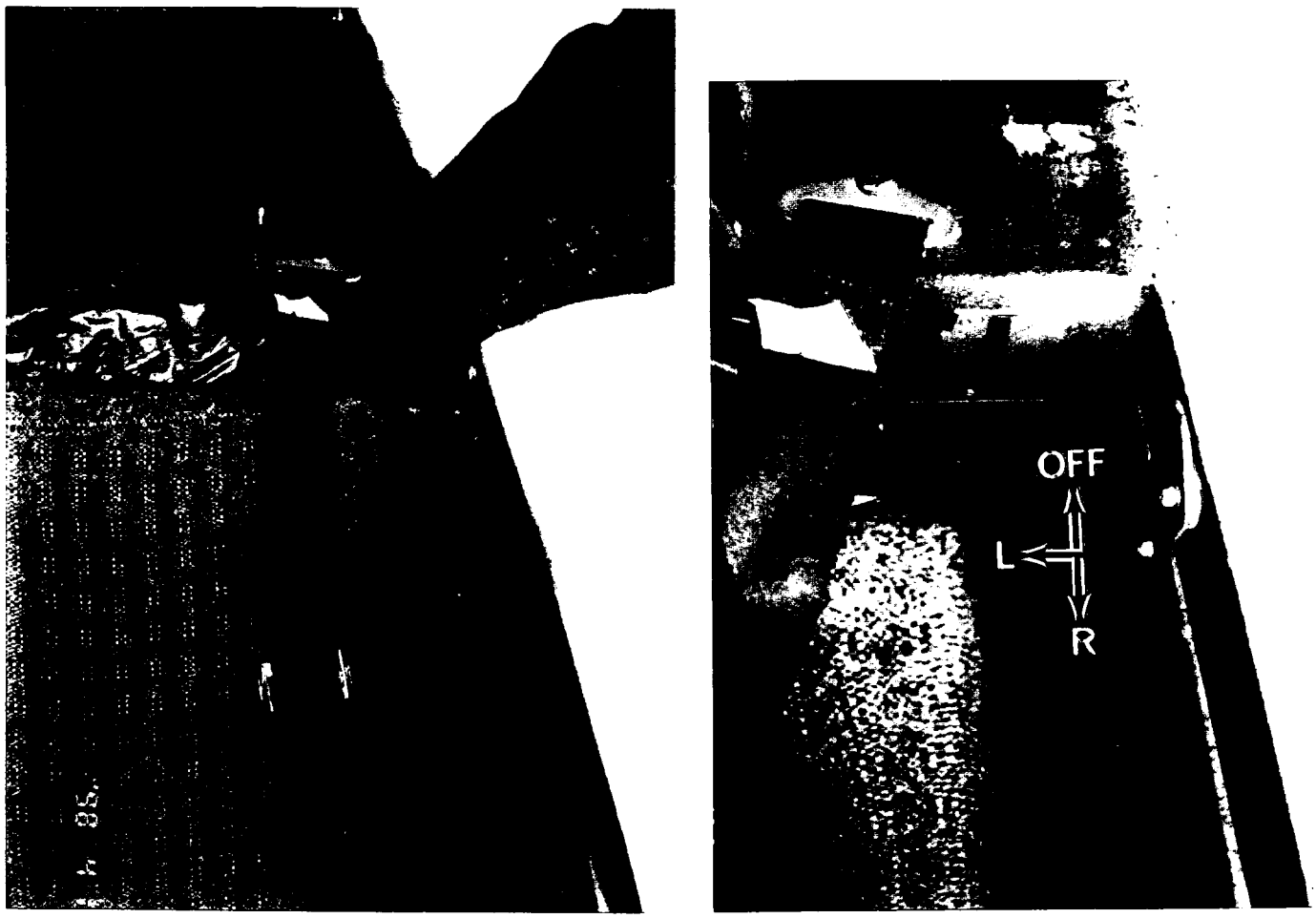
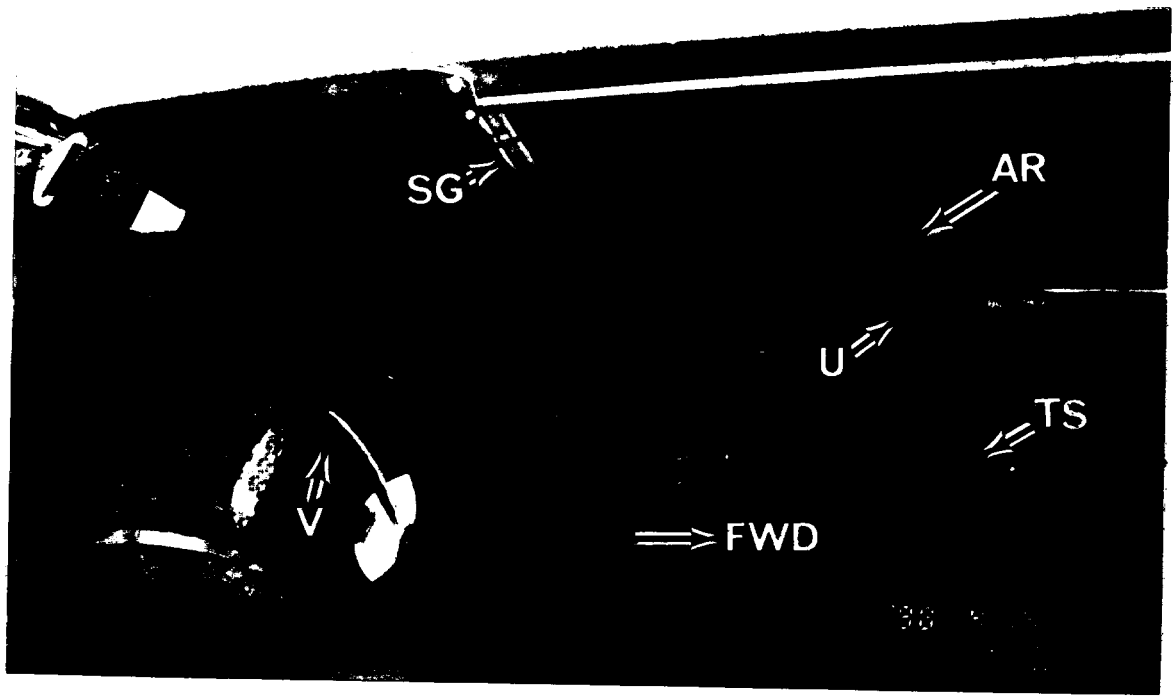


Figure 3. Views looking down and aft on left side of pilot's seat back showing approximate position of the fuel tank selector valve (location pointed to by finger in left photograph). The right photograph shows a closer view of the same area with arrows locating in the positions simulating the selector handle in the off, left tank "L", and right tank "R" positions.

Figure 4. Two views showing the interior of the passenger's compartment on the reference airplane N3260T after the seat cushions were removed. Top view is looking aft and down and bottom photograph is looking left and down. Arrow "SG" locates the fuel level site gage for the left fuel tank.



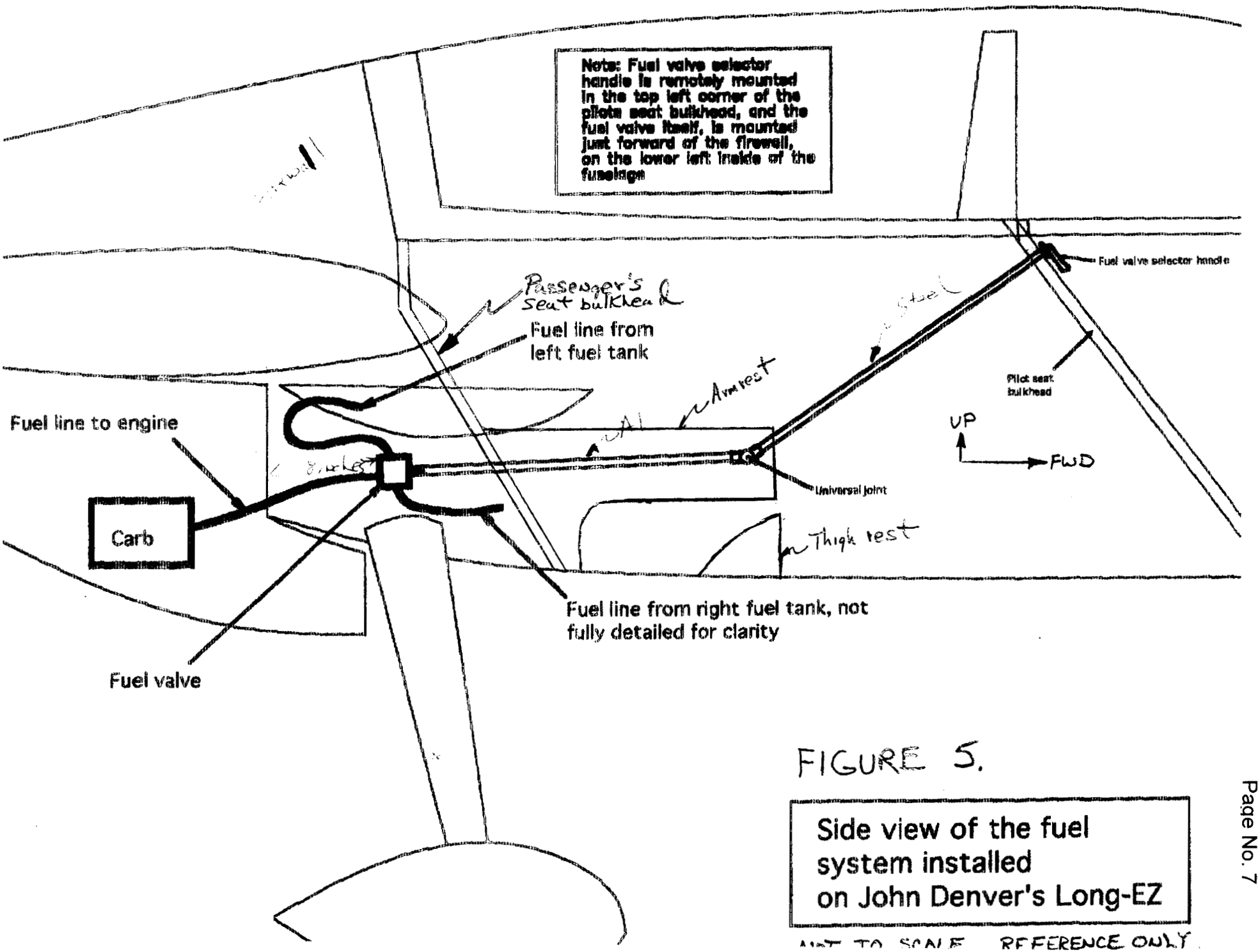


FIGURE 5.

Side view of the fuel system installed on John Denver's Long-EZ

NOT TO SCALE REFERENCE ONLY

Figure 6. Two views showing the difficulty in reaching the fuel selector valve handle if positioned as if on the accident airplane. The control stick is indicated by arrow "CS".

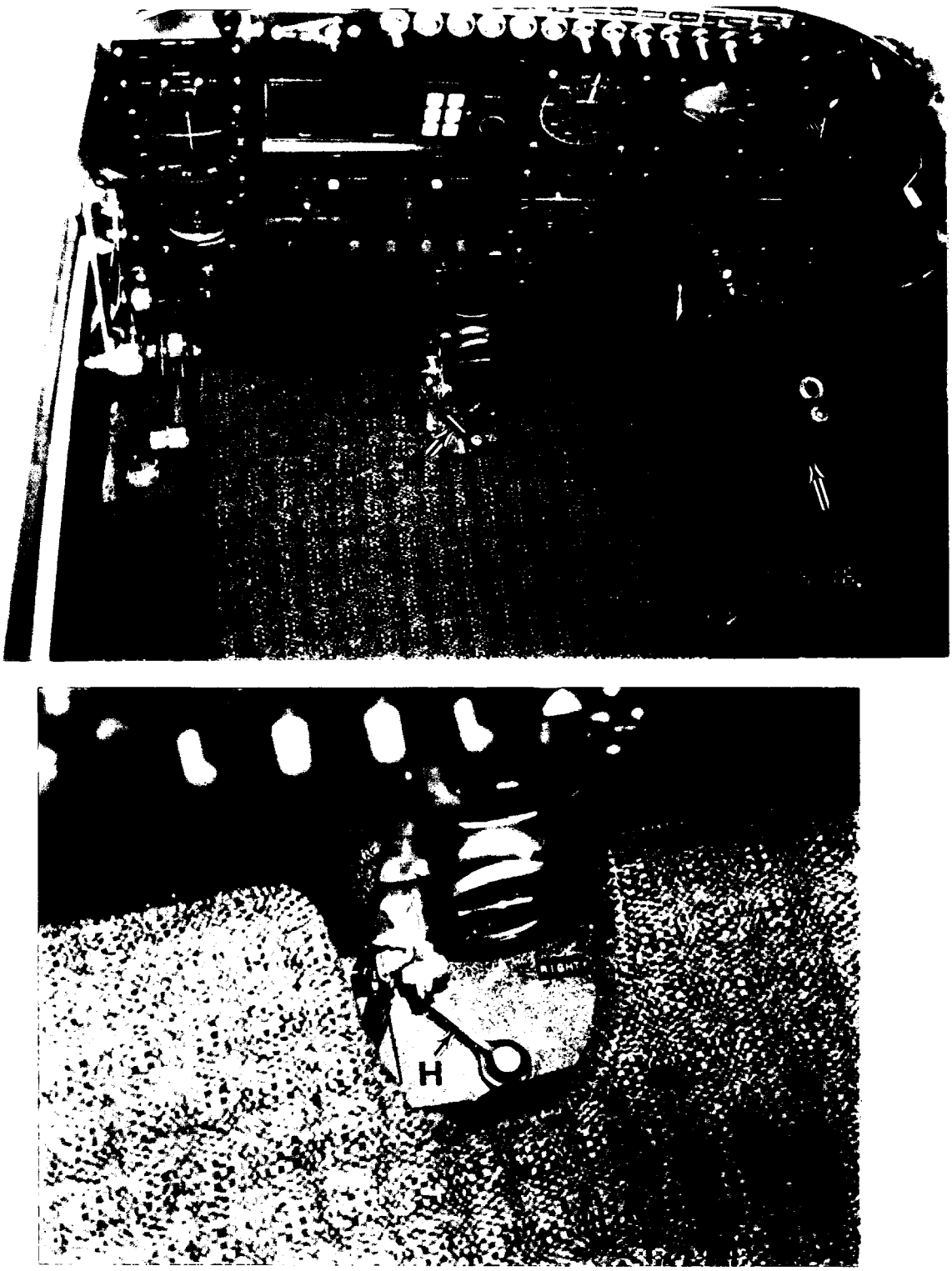


Figure 7. Views looking down and forward on the reference airplane showing the normal position of the fuel tank selector handle (arrow "H"). Arrow "CS" locates control stick.

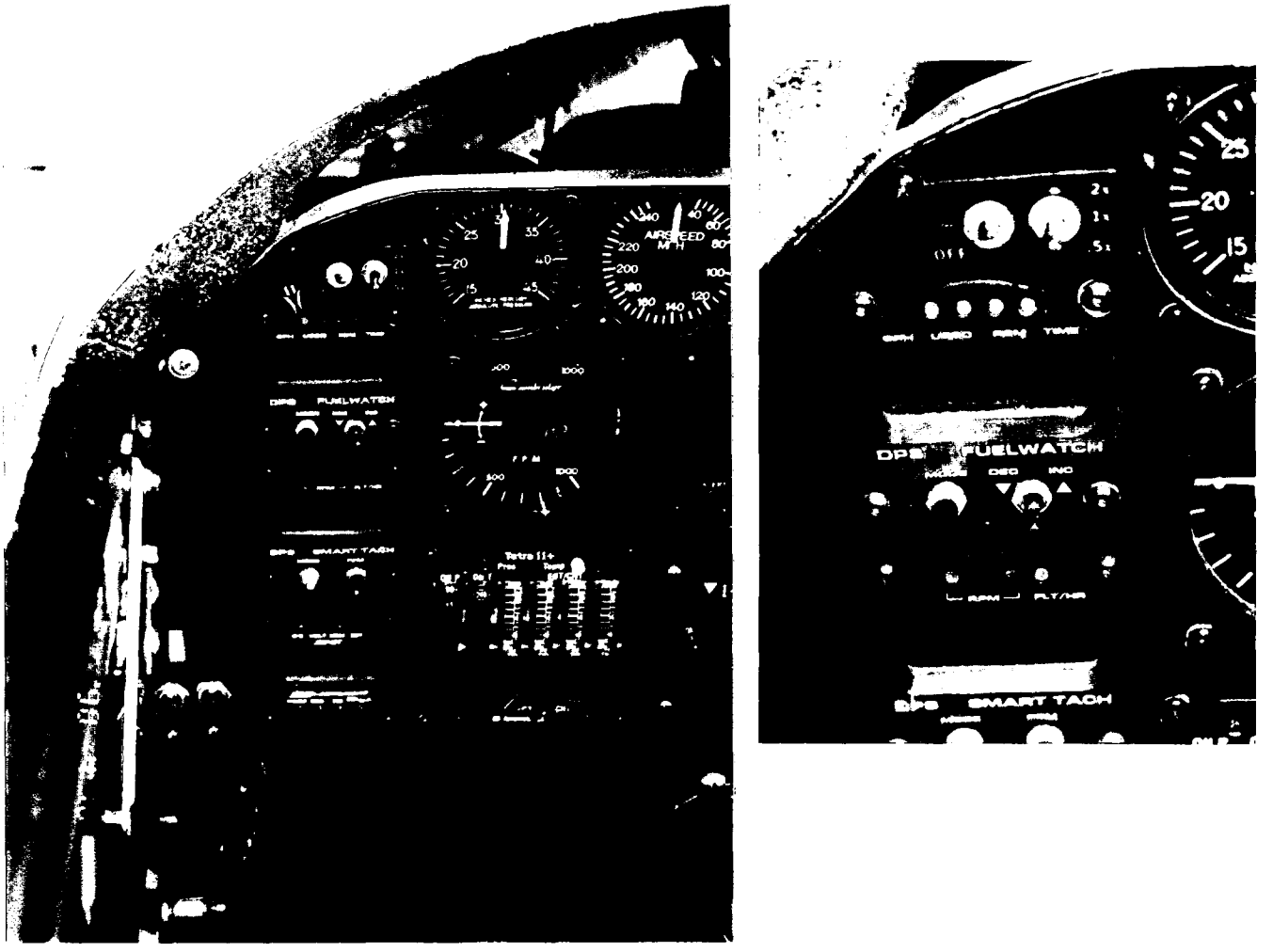


Figure 8. Two view of the reference Varieze, N57LG, instrument panel showing the "FUEL WATCH" system that was similarly installed on the accident airplane. Arrow indicates small green light which should have been blinking on the accident flight. In right enlarged view on right, the mode is selected to the REM position indicating the amount of fuel remaining (9.3 gallons).