

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



WPR23LA340

MATERIALS LABORATORY

Factual Addendum 23-092B

March 5, 2024

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A. ACCIDENT INFORMATION

Location: Bullhead City, Arizona
Date: September 5, 2023
Vehicle: Rutan Long EZ, N58JB
Investigator: Zoë Keliher, AS-WPR

B. COMPONENTS EXAMINED

Nose landing gear actuator ball screw assembly.

C. EXAMINATION PARTICIPANTS

Specialist Matthew R. Fox, Ph.D.
NTSB
Washington, DC

D. DETAILS OF THE EXAMINATION

This addendum provides supplemental information to the examination of the extension tube that was presented in NTSB Materials Laboratory Factual Report 23-092. Views of the lower surface of the extension tube at its forward end are shown in figure 1. A plunger extended from the forward end of the extension tube as shown in figure 1. According to engineering drawings for the EZ-Noselift NL1-12 actuator, movement of the plunger into the extension tube is resisted by a spring housed within the extension tube. The rotational position of the plunger relative to the extension tube was held by an alignment screw that was screwed into the lower side of the extension tube, engaging with a keyway slot in the side of the plunger.

As shown in figure 1, within approximately 1.194 inches from the forward end of the extension tube, the right side of the keyway slot in the plunger was deformed and damaged with material that was lipped radially outward (unlabeled bracket in the upper image in figure 1). Within approximately 0.394 inch from the forward end of the extension tube, the deformed material at the right side of the keyway appeared flattened (see unlabeled bracket in the lower image in figure 1).

The center of the alignment screw was located approximately 0.156 inch aft of the extension tube forward end, and a step change in diameter of the plunger was located 1.327 inches forward of the extension tube. By calculation, if the center of the alignment screw was aligned with the lower forward end of the damage on the right side of the keyway slot, the plunger would be compressed 1.350 inches into the extension tube, and the lower forward end of the extension tube would extend 0.023 inch beyond the change in diameter of the plunger. Disturbed metal was observed on the right and left sides of the extension tube at the forward end.

The extension tube was placed in a press, and axial force was applied to the plunger. Movement of the plunger was noted, and the application of force was discontinued after the plunger was displaced by about 1/8 inch. No force measurements were taken during the test of plunger movement.

Submitted by:

Matthew R. Fox, Ph.D.
Chief Technical Advisor - Materials

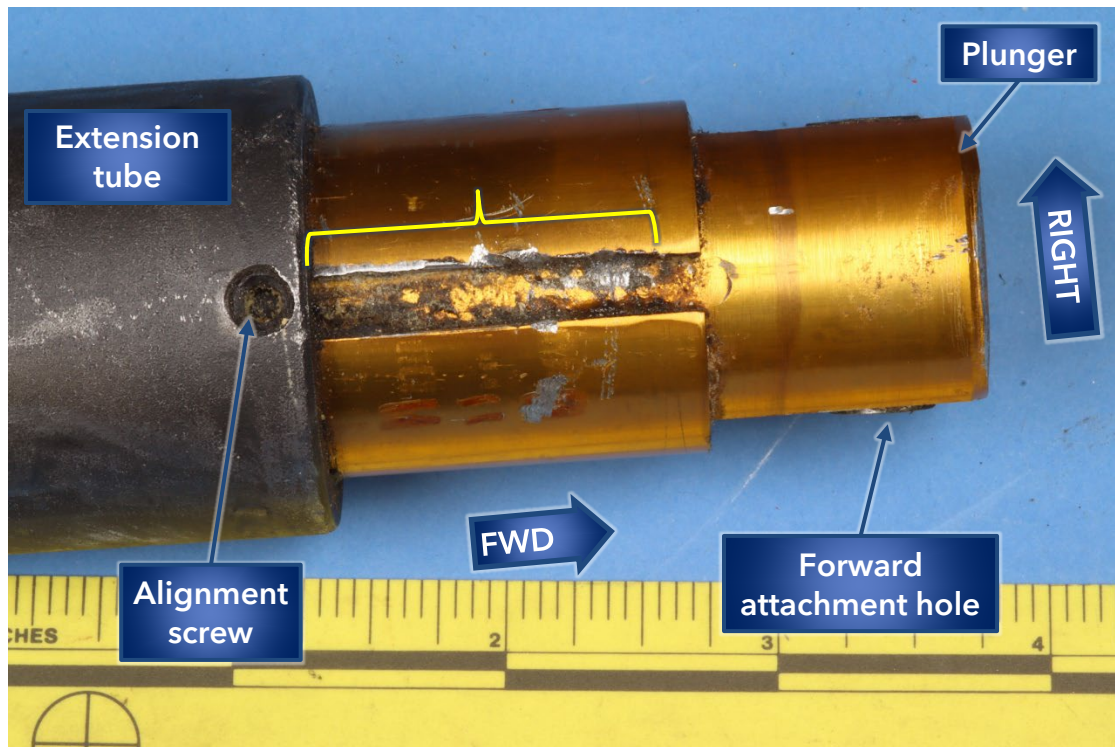


Figure 1. Close views of the lower side of the plunger at the lower forward end of the extension tube. An unlabeled bracket in the upper image indicates contact damage at the right side of the keyway for the plunger consistent with contact with the alignment screw. An unlabeled bracket in the lower image indicates an area where the raised lip at the deformed edge of the keyway was flattened.