

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594



September 18, 2017

MATERIALS LABORATORY FACTUAL REPORT

Report No. 17-071

A. ACCIDENT INFORMATION

Place : Daytona Beach, Florida
Date : February 24, 2017
Vehicle : Cirrus SR20
NTSB No. : ERA17LA113
Investigator : Millicent Hill, AS-ERA

B. COMPONENTS EXAMINED

Rocket lanyards and incremental bridle from the Cirrus Airframe Parachute System (CAPS).

C. DETAILS OF THE EXAMINATION

An overall view of the submitted components is shown in figure 1. The rocket lanyards were fractured approximately 50 inches from the eye ends of the lanyards, locations on the lanyards adjacent to Nicopress stop sleeves attached to the cable in the rocket pickup collar assembly. Fracture features of the lanyard cable showed necking and chisel features of individual wires and splaying of the fractured ends, features consistent with overstress fracture. The incremental bridle was fully extended with all the energy absorption stitches fractured.¹

Two lengths of cable were cut from each fractured lanyard for fabrication of four tension test specimens. An eye was fabricated at each end of each test specimen by looping the cable around a thimble and securing the loop with a Nicopress sleeve. The loaded lengths between the Nicopress sleeves in the test specimens was 9.973 inches, 10.789 inches, 10.825 inches, and 11.451 inches.

Test specimens were sent to Lehigh Testing Laboratories in New Castle, Delaware, for tension testing. Test specimens fractured at peak loads of 1,133 pounds, 1,108 pounds, 1,113 pounds, and 1,117 pounds. The two specimens with the lowest peak tensile loads fractured in the center section of the cable, and the other specimens fractured adjacent to the sleeve. More information including load versus displacement curves are presented in the test report included in Appendix A. For reference, the

¹ The incremental bridle is folded and stitched together during manufacture. The stitches are designed to fracture during deployment to absorb energy from the velocity difference between the rocket and the parachute bag during the deployment sequence. During a normal CAPS deployment, some stitches in the incremental bridle remain intact.

specified minimum cable strength as listed in Military Standard MIL-DTL-83420N dated March 1, 2016, is 920 pounds.²

Matthew R. Fox, Ph.D.
Senior Materials Engineer

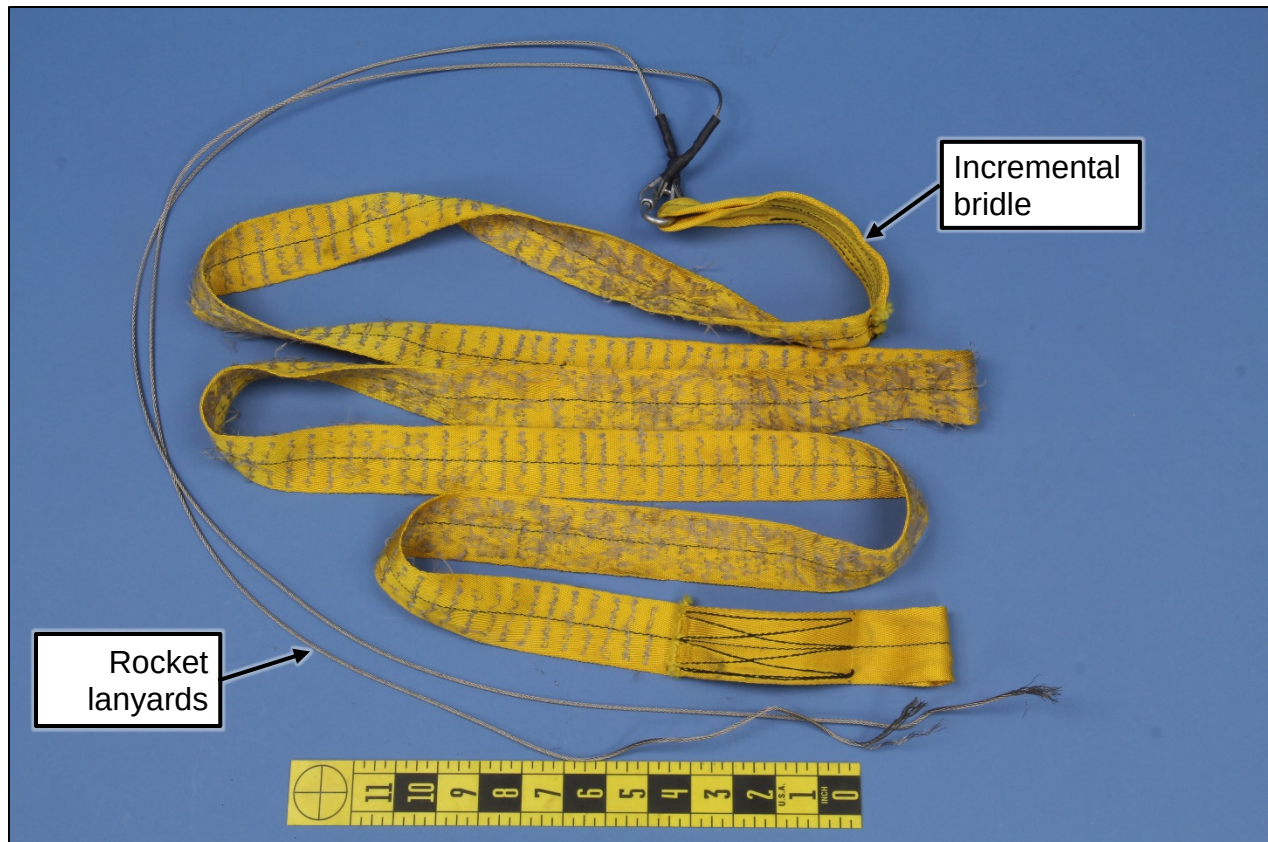


Figure 1. Overall view of the rocket lanyards and incremental bridle.

² Specimens tested in accordance with Military Standard MIL-DTL-83420N are to have a minimum total length of 24 inches and a loaded length of at least 10 inches. While the specimens tested for this report had a loaded length that exceeded the minimum requirement in 3 of the 4 specimens, the total length of the specimens was approximately $\frac{1}{2}$ the minimum total specimen length specified in the standard.

Appendix A: Lanyard Cable Tension Tests



Lehigh Testing Laboratories, Inc.

A Subsidiary of THE MMR GROUP, INC.

308 WEST BASIN ROAD • P.O. BOX 903 • NEW CASTLE, DE 19720
(302) 328-0500 • FAX (302) 328-0417



TEST REPORT

NATIONAL TRANSPORTATION SAFETY BOARD
ATTENTION: MATTHEW FOX
490 L'ENFANT PLAZA EAST
WASHINGTON, DC 20594

DATE: September 6, 2017
PO NO: **VERBAL**
LEHIGH NO: **A-36-16**
Samples 1, 2, 3 & 4
PAGE: 1 of 1

SAMPLE DESIGNATION: (4) SAMPLES: CABLE SPECIMENS MARKED:

- (1) 9.973"
- (2) 10.789"
- (3) 10.825"
- (4) 11.451"

PULL TEST (Per ASTM E8-16a as applicable)

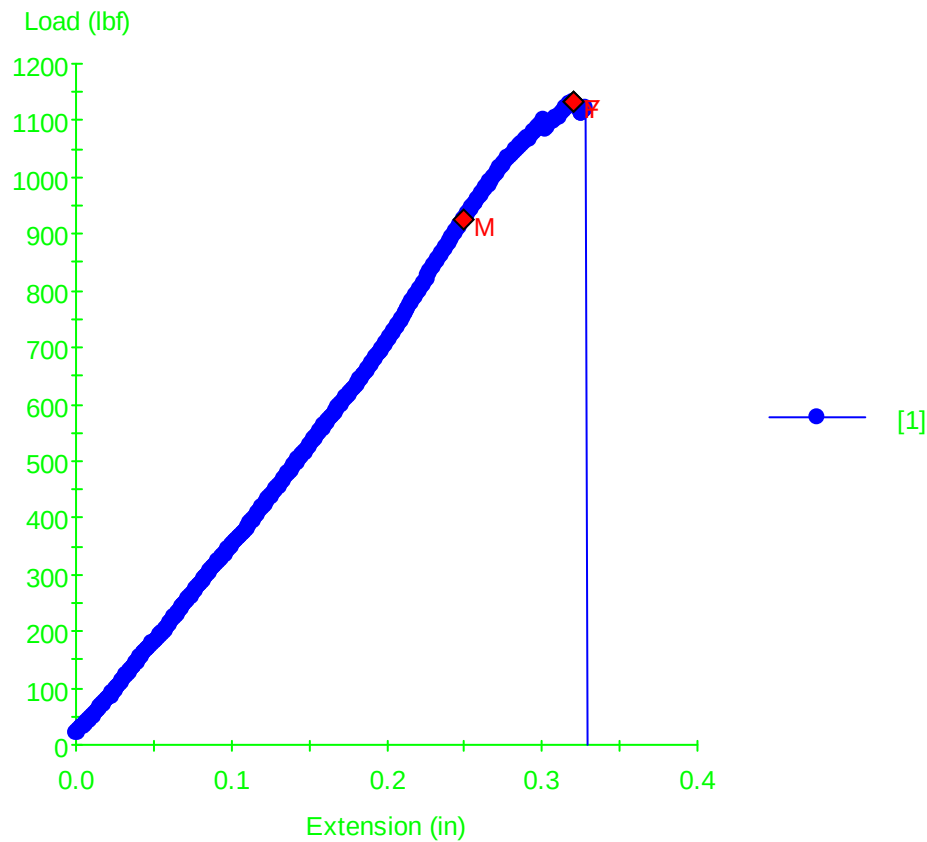
	#1	#2
	<u>9.973"</u>	<u>10.789"</u>
Peak Load (lbs):	1,133	1,108
Comments:	Wire Broke Right Below Clamp	Wire Broke In Center Section
	#3	#4
	<u>10.825"</u>	<u>11.451"</u>
Peak Load (lbs):	1,113	1,117
Comments:	Wire Broke In Center Section	Wire Broke Right Below Clamp

Results are for information only.

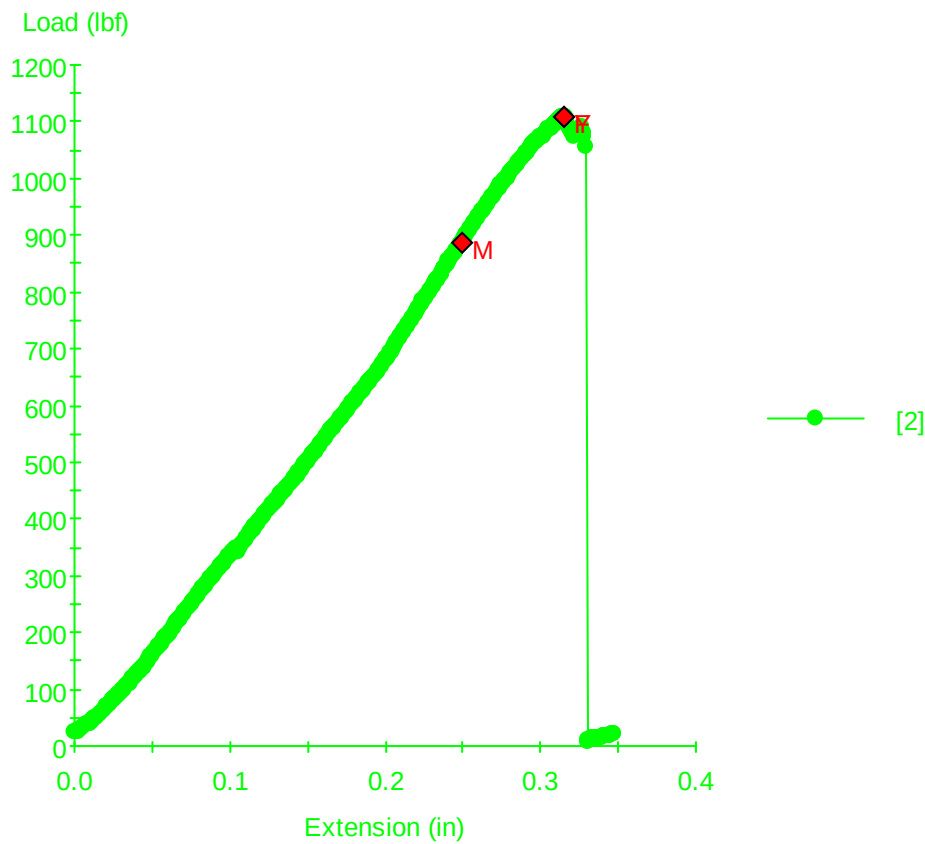
Lehigh Testing Laboratories, Inc.

Kevin M. Sexton

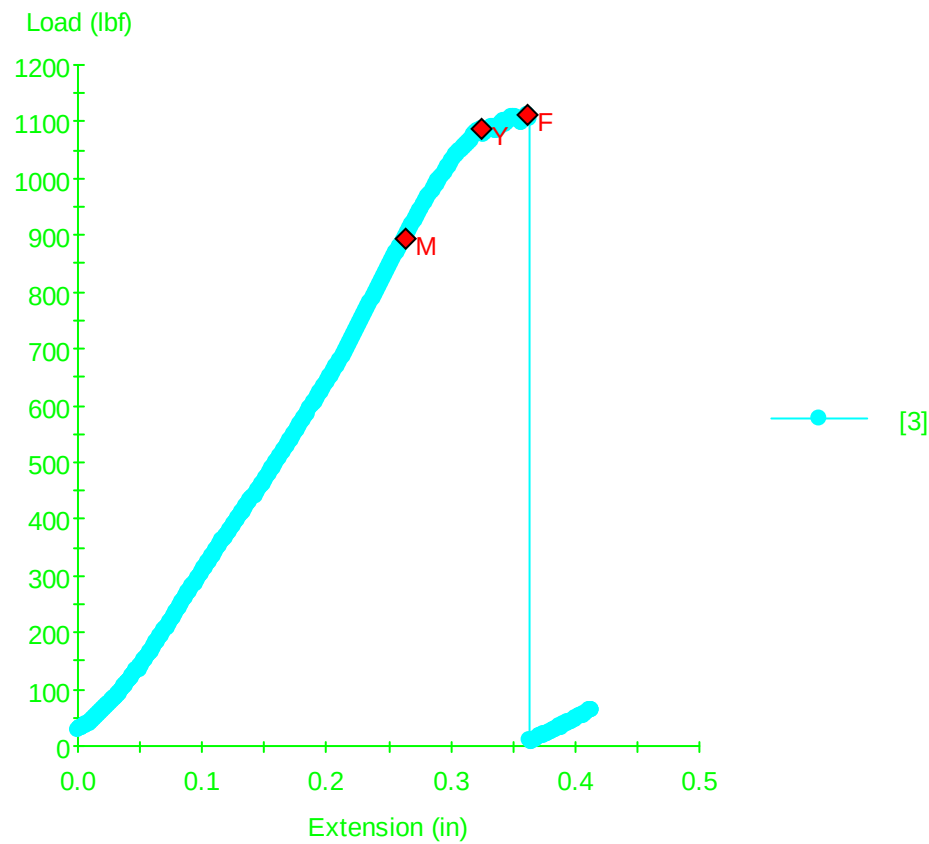
Kevin M. Sexton, Mechanical Testing Technician



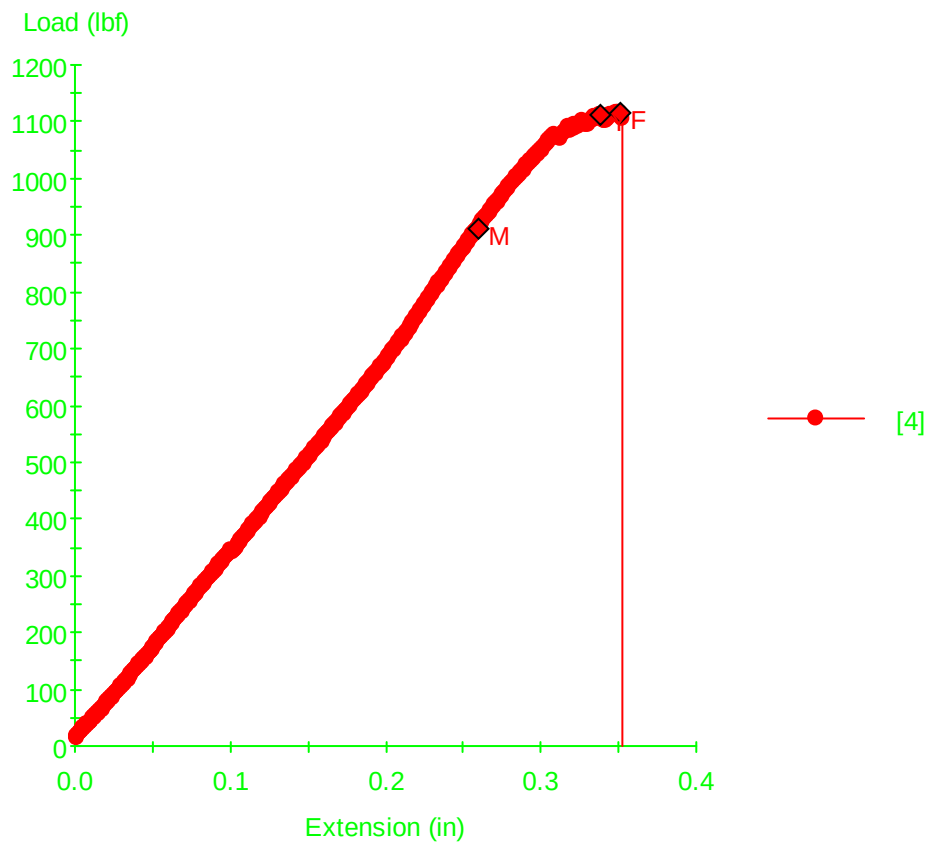
(1) 9.973"



(2) 10.789"



(3) 10.825"



(4) 11.451"