

FAILURE ANALYSIS AND CORRECTIVE ACTION REPORT

**Cessna 206
DEA Training Flight
Accident Number: CEN18LA382**

Prepared and Signed by: Jack Riley
Quality Manager

Chris Arnold
Engineer

19 MAR 19

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Revision History

Rev	By	Approved	Date	Revision Summary
-	E. Tolliver		3/19/19	Initial release

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	SCOPE.....	1
3.0	BACKGROUND.....	1
4.0	FAILURE ANALYSIS ACTIVITIES & FINDINGS.....	3
5.0	CONCLUSIONS.....	10
6.0	RECOMMENDATIONS.....	10

FIGURES

Figure 1 – Possible Crush Damage.....	3
Figure 2 – Possible Tampering.....	3
Figure 3 - Indication of Rubbing.....	4
Figure 4 – Button.....	5
Figure 5 – Inner Body of Top Cover.....	5
Figure 6 – Food Particulates.....	5
Figure 7 – Position Forward.....	6
Figure 8 – Normal Position.....	6
Figure 9 – Small Dimple in Spring.....	6
Figure 10 – Compression Spring.....	7
Figure 11 – Top View Down.....	7
Figure 12 – Bottom View Up.....	7
Figure 13 – Right View Down.....	8
Figure 14 – Left View Down.....	8
Figure 15 – Right Side Guide.....	8
Figure 16 – Spring Mounting.....	9
Figure 17 - Black rub marks along connector guide of the button.....	9
Figure 18 – Spring Guide.....	9

1.0 INTRODUCTION

On September the 19, 2018 A Cessna 206H airplane, Tail N247F, struck power lines after engine failure during an approach to Sugar Land Regional Airport (SGR) Sugar Land, Texas, with two pilots and one passenger on board. The two pilots sustained no injuries, the passenger sustained minor injuries.

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AmSafe Part Number: 3114-3-031-2396

2.0 SCOPE

This report contains the records of the failure analysis activities designed to determine the root cause of a reported incident of the seat belt "released" during a landing event. The request was made by NTSB investigator Craig Hatch by email on 11/30/2018. Note: This is a three-point restraint, only the Lower half of the belt articles were returned for evaluation.

3.0 BACKGROUND

3.1 PRODUCTION INFORMATION

The following product information involves the incident in question:

Description	Part Number	Serial Number	Date of MFG
Buckle Half	3114-2010312396	n/a	A0112
Connector Half	3114-2030312396	n/a	A0112

3.2 CHRONOLOGY OF EVENTS

The following is a chronology of events. Dates are approximate.

Date (2018)	Event
Sep 19	An accident occurred on a DEA training flight where the passenger sustained minor injuries after the plane had a loss of power incident. It's not clear from the NTSB report or email whether the passenger was the occupant with the "released" seat belt.
Nov 30	Craig Hatch of the NTSB contacted AmSafe to report the "Released" incident, and request investigation.
Dec 6	Seat belt unit arrived for examination.
March 1 2019	Unit disassembled at AmSafe

4.0 FAILURE ANALYSIS ACTIVITIES & FINDINGS

Note: Upon receipt of the system components, a visual examination of the buckle assembly was performed.

4.1 COMPONENT VISUAL EXAMINATION

Buckle Assembly

Visual inspection included examining the enclosure of the buckle assembly revealed some possible tampering and or crushing damage to the width of the Buckle housing. Of note were some deformation of the upper buckle housing on the right side and a possible tampering of the buckle housing.

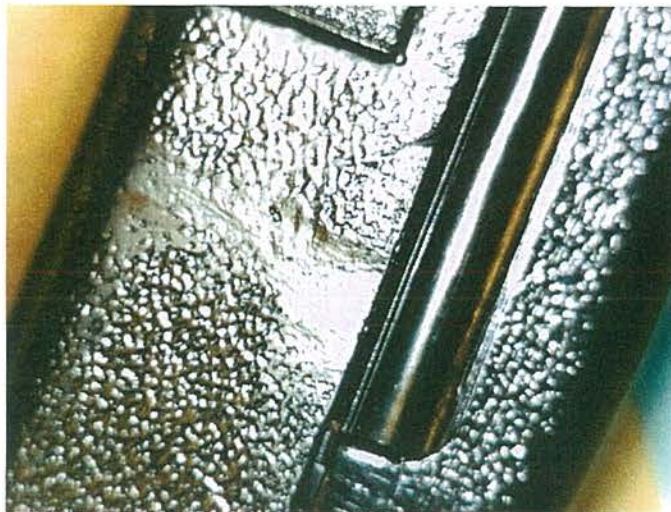


Figure 1 – Possible Crush Damage

Cut or Gash mark, possible tampering with the buckle cover to pry open cover.

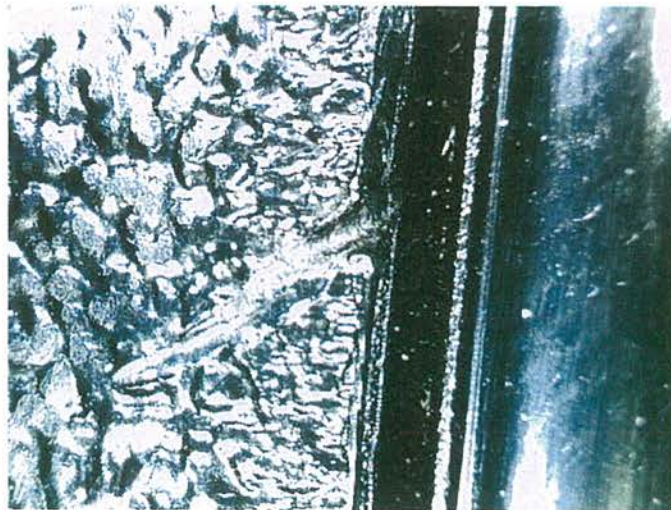


Figure 2 – Possible Tampering

Evidence of Rubbing within the buckle enclosure along the inner top right side.



Figure 3 - Indication of Rubbing

4.2 COMPONENT TESTING

4.2.1 LATCHING

Performed a standard latch check, inserted connector into the buckle half until it bottomed out. This caused the red push button to fully engage and rise to about .014" above the buckle housing into its normal buckled state. At this point the connector is secure and cannot be "released" by simply pulling the connector by hand.

During review of the supplied video titled "belt.wmv" it is noted that during the test, the buckle push button is not fully engaged and it appears that the connector was not fully inserted during testing.

An attempt was made to recreate the conditions shown in the video, by slowly engaging the connector into the buckle assembly we were able to recreate the actions in the video. While slowly engaging the connector we were able to partially engage the pawl, with the bush button not fully engaged and sitting about .082" within the buckle enclosure.

At this point it was possible to forcefully extract the connector half from the buckle assembly by hand.

4.3 DISASSEMBLY

Unit disassembled to examine inner components and cavity for FOD. The following video shows the process of opening the assembly for review. This was performed with Chris Arnold, Eric Tolliver and Kelly May at AmSafe. ([img_0240.mov](#)) file shows the removal of the top cover while ([img_0245.mov](#)) shows the removal of the lower cover.

Upon opening and removal of the top half of the buckle cover, it was noted that the button and the cover showed signs of rubbing and abrasion between the two components. Also noted was food particulates of up to .070" in diameter were found within the cavity.

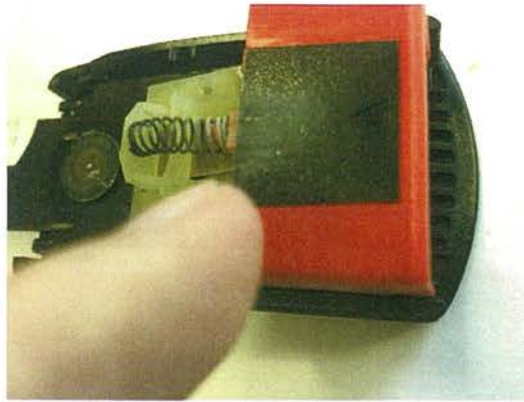


Figure 4 – Button



Figure 5 – Inner Body of Top Cover



Figure 6 – Food Particulates

It was noted after the removal of the top cover that the Flat Spring guide was partially moved forward out of its retaining tracks. Upon close examination of the removal video, this was likely caused by the screwdriver impacting the rear of the component during disassembly. The unit was tested with a connector half and noted to operate properly in that forward position. A side-by-side comparison to a new version of the same product shows the moved component (Figure 7) and the normal seating (Figure 8).

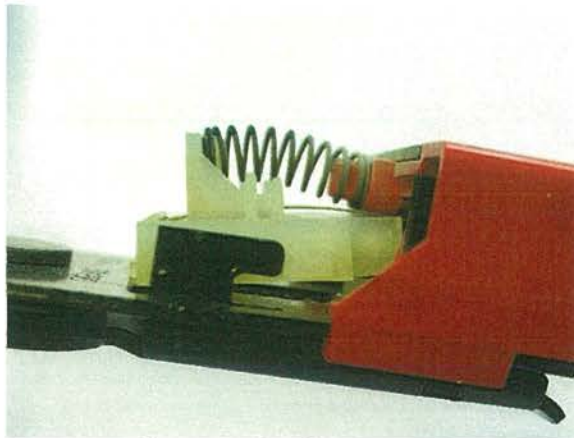


Figure 7 – Position Forward

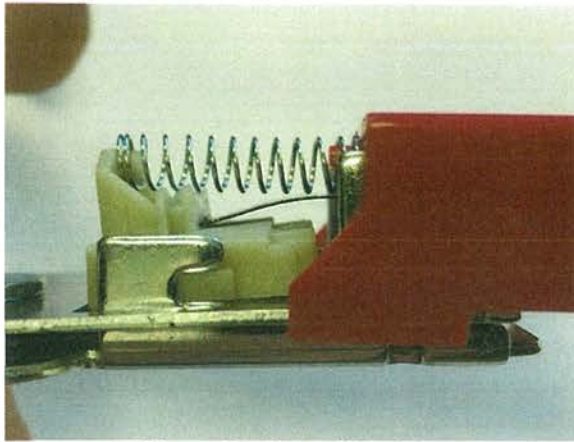


Figure 8 – Normal Position

The internal button and spring assemblies were then removed in the third video ([img_0255.mov](#)). During this removal, it was noted that the Flat spring has a small indentation (Figure 9) not seen on components normally. The compression spring is in print (Figure 10). The main body of the buckle, once the springs and button were removed, has no anomalies noted (Figure 11), (Figure 12), (Figure 13) and (Figure 14).

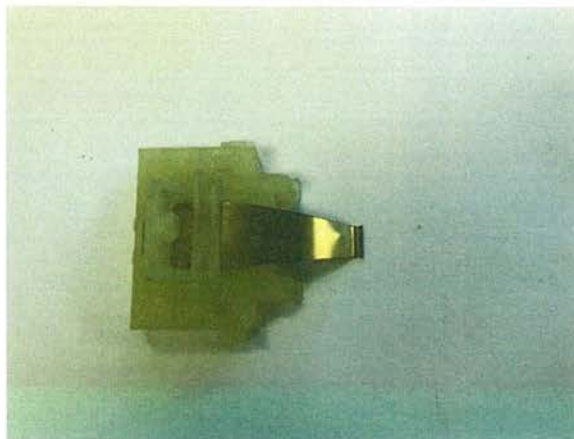


Figure 9 – Small Dimple in Spring



Figure 10 – Compression Spring



Figure 11 – Top View Down

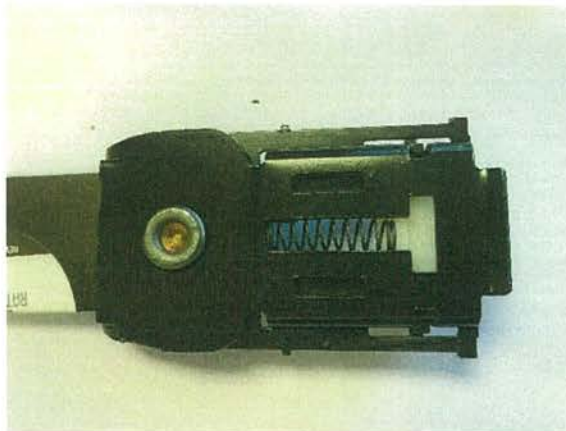


Figure 12 – Bottom View Up.

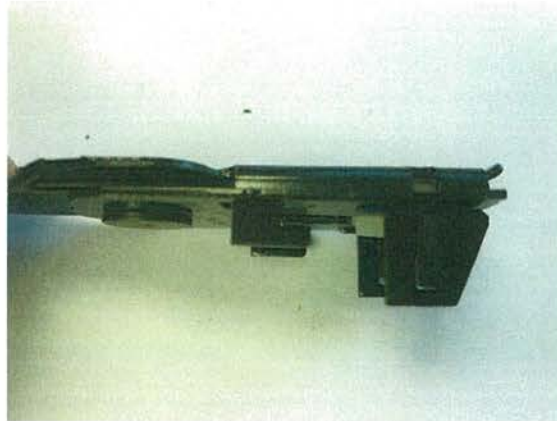


Figure 13 – Right View Down

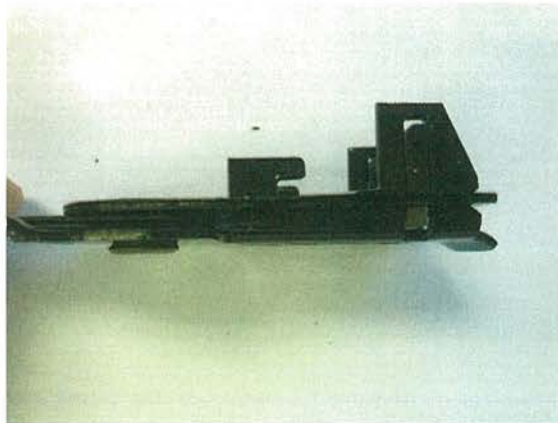


Figure 14 – Left View Down

Dust from Abrasion internally within the unit was noted around the spring mount for the push button as well as along the inner right side guide under the push button and along the portion where the connector slides into the buckle as shown in (Figure 15) (Figure 16) and (Figure 17).

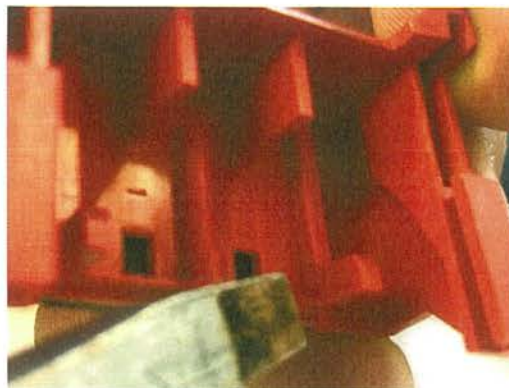


Figure 15 – Right Side Guide

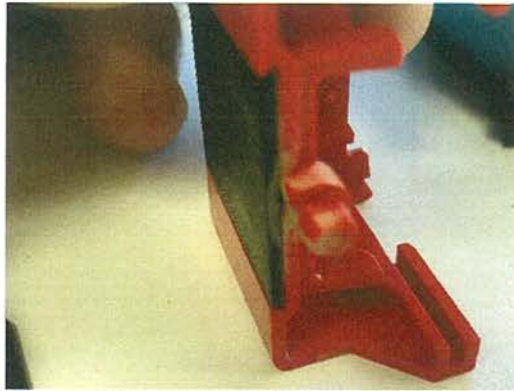


Figure 16 – Spring Mounting

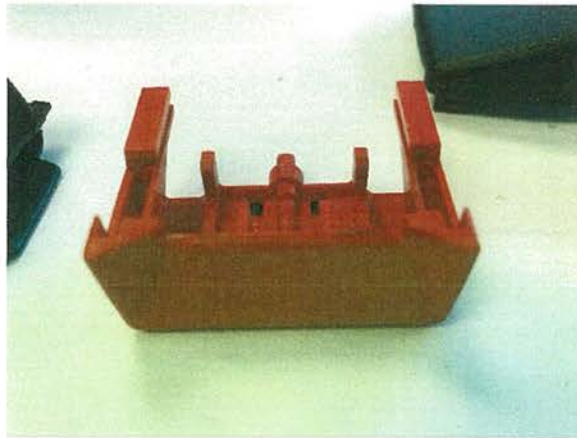


Figure 17 - Black rub marks along connector guide of the button.

The spring guide was then removed from the assembly in video ([img_0278.mov](#)) and the guide was removed. No issues were noted with the guide shown in (Figure 18).



Figure 18 – Spring Guide

5.0 CONCLUSIONS

The failure analysis activities and findings indicate that the system assemblies housing may have taken some crushing damage, which in turn has created drag on the push button assembly, allowing a partial connection to be made with the pawl, but not full engagement.

Testing has shown that this only occurs when attempting to lightly engage the connector into the buckle assembly.

When buckling in a normal use manner with the buckle positioned across the lower left hand side of the torso the connector was engaging 100% each time.

Abrasion was shown in the inner half of the top and side buckle covers as well as along the push button, indication that the unit may have been smashed or restricted at some point.

6.0 RECOMMENDATIONS

Recommendations are as follows:

- None