

[REDACTED]

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**From:** Stuart Fraenkel [REDACTED] >  
**Sent:** Tuesday, August 7, 2018 1:14 PM  
**To:** Correspondence  
**Cc:** 'Irving Feldkamp III'; Anthony Tarricone; 'Brian J. Alexander ([REDACTED])'; Nicole Andersen  
**Subject:** Petition for Reconsideration - 49 CFR 845.41 - March 22, 2009 Pilatus PC-12/45, N128CM

Dear Executive Secretariat,

Thank you for allowing us the opportunity to communicate with the NTSB via this platform (see attached letter authorizing us to contact the NTSB).

As you are aware, on behalf of certain interested parties, we submitted a Petition for Reconsideration on June 21, 2017.

Thank you for your acknowledgement of receipt (attached hereto).

On July 19, 2018, we submitted a PPT Supplement for the NTSB's consideration (an overview of the materials previously presented).

We are merely verifying that you received the cover letter (attached) and the PPT (attached as a PDF).

We understand how busy the NTSB is and appreciate the time and effort that goes into a thorough review.

Best regards, Stuart R. Fraenkel

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## National Transportation Safety Board

Washington, DC 20594 | [www.nts.gov](http://www.nts.gov)

OFFICE OF THE MANAGING DIRECTOR

July 18, 2017

Nelson and Fraenkel, LLP  
707 Wilshire Boulevard  
Suite 3600  
Los Angeles, CA 90017  
Ref: Crash of Pilatus PC-12/45 N128CM

Dear Ms. Nelson:

The National Transportation Safety Board (NTSB) acknowledges receipt of your June 30, 2017, letter regarding the Board's findings in the investigation of the March 22, 2009 accident involving the loss of control while maneuvering, Pilatus PC-12/45, N128CM. Thank you for your interest in the investigation. As you may know, the NTSB uses a transparent process in reaching conclusions about the causes of the accidents it investigates; as part of this culture of transparency, we allow parties to an investigation, or other interested persons or organizations, to petition for reconsideration or modification of the Board's findings or probable cause.

We will review your correspondence, including all attached documents, in accordance with 49 *Code of Federal Regulations* §845.41. As you may be aware, parties to the investigation may file comments within 90 days of your service upon them of a copy of your submission. At that time, the Board will begin its review and issue a decision. Please note that we may only consider requests as petitions when they demonstrate the discovery of new evidence or show that the Board's findings are erroneous. Should you decide to withdraw your request, please send a letter or e-mail to my attention requesting the withdrawal.

If you wish to correspond electronically concerning your request, you may do so at the following e-mail address: [correspondence@nts.gov](mailto:correspondence@nts.gov). If your submission includes attachments that exceed 10 megabytes, please e-mail us at the same address for instructions. To avoid confusion, please do not submit both an electronic copy and a hard copy of the same information.

Sincerely,

A black rectangular box redacting the signature of Candi R. Bing.

Candi R. Bing  
Executive Secretariat

# CRASH OF PILATUS PC-12/45 N128CM

June 30, 2017 Petition for Reconsideration of the  
NTSB's Findings & Determination of Probable Cause

Supplemental Presentation  
Dated: June 29, 2018



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## **New Findings for the Crash of Pilatus PC-12/45 N128CM**

- Left fuel booster pump housing was ***discovered and examined after NTSB completed their investigation*** and released their final crash report
- The ***left Fuel Boost Pump contained mechanical defects*** that caused it to fail
- The non-functioning ***left Fuel Boost Pump caused fuel imbalance***
- The ***Central Advisory & Warning System (CAWS) incorporated a design flaw*** that violates FARs 23.1305 & 23.1332 for not using red warnings to indicate Low Fuel Pressure
- ***CAWS falsely displayed the Fuel Booster Pumps as green***
- ***CAWS was defectively programmed with a time delay*** that prevented Low Fuel Pressure warning
- ***An updated PC-12/47E Aircraft Flight Manual (AFM) was published a year before the crash*** advising pilots to ***land “as soon as possible”*** once the green PUMP lights begin cycling. This version of ***the AFM was not distributed to owners/operators of older PC-12 aircraft (i.e. the subject aircraft)***

# The Reasons to Modify and Correct the NTSB Report

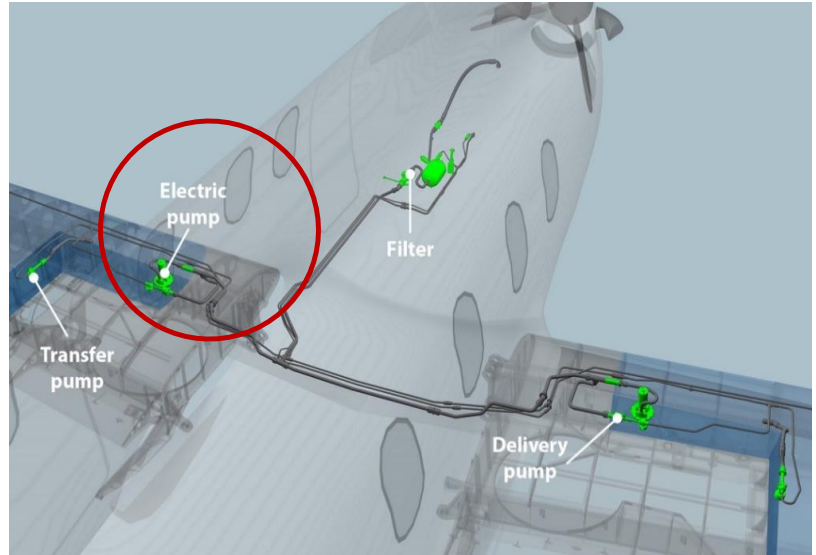
1. **New physical evidence – components of the left fuel booster pump** were located and examined after NTSB completed its investigation and released the final report
2. Inspection *after* the NTSB Final Report revealed the **failure of the left fuel booster pump**
3. Failure of the left fuel booster pump caused an **uncorrectable fuel imbalance**
4. Research *after* the NTSB Final Report revealed a **programming flaw** in Central Advisory and Warning System (CAWS)
5. Research *after* the NTSB Final Report revealed **intended changes to the Aircraft Flight Manual (AFM)** that should and could have been incorporated prior to the crash
6. Research *after* the NTSB Final Report revealed documented history of fuel issues on the Pilatus PC-12
7. Due to the deficiencies in the AFM and CAWS, the **Pilot was not warned of problems** during the flight

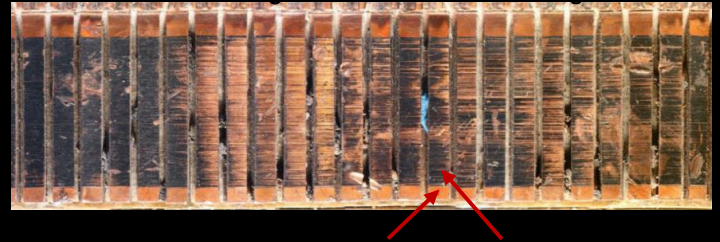
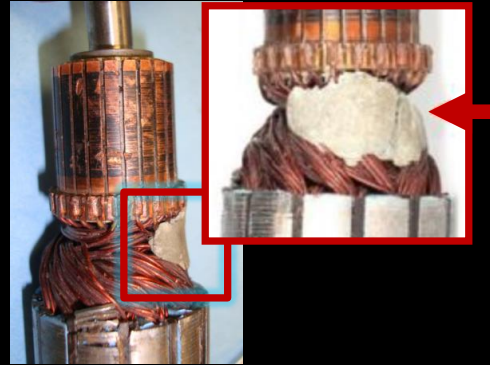
1. New physical evidence – components of the left fuel booster pump were located and examined after NTSB completed its investigation and released the final report



# The PC-12 Fuel System Explained

- For over a 30 years, Pilatus knew the fuel system was prone to icing
- The PC-12 fuel system does not meet FAR 23.95(c) specifications and therefore FSII (Prist) is required for all flights operating below 0 degrees
- The fuel filter is incapable of functioning in freezing temperatures without FSII (Prist) and provokes a persistent Low Fuel Pressure condition
- To overcome low fuel pressure, and to avoid creating an imbalance, the aircraft requires Fuel Booster Pumps (FBPs) in each wing's collector tank
- The FBPs are supposed to balance the fuel b/w the left and the right wing fuel tanks when needed

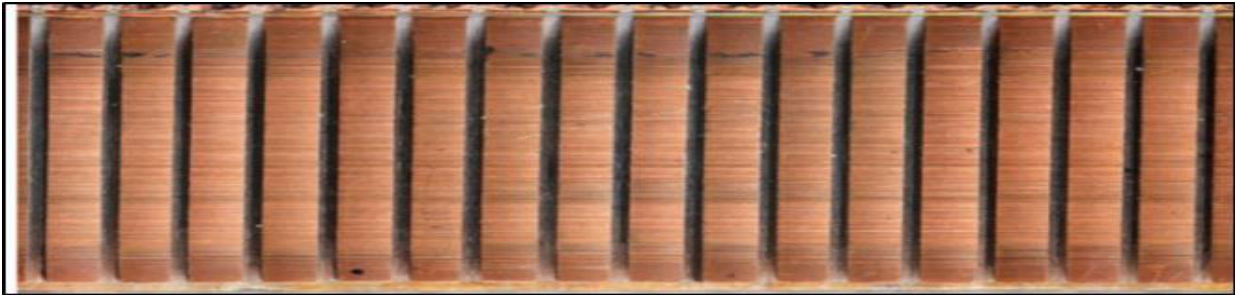




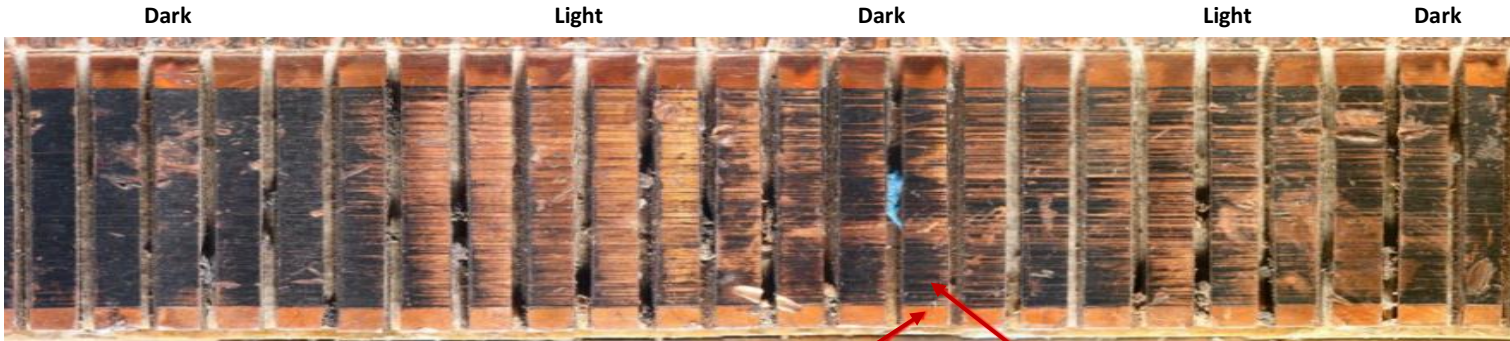
*Left Boost Pump suffered a mechanical failure*

# Wear markings on a Normal v. Defective FBP Motor

Normal wear on motor shows homogeneous color and banding:



Abnormal wear on the subject motor shows varying light and dark patterns:



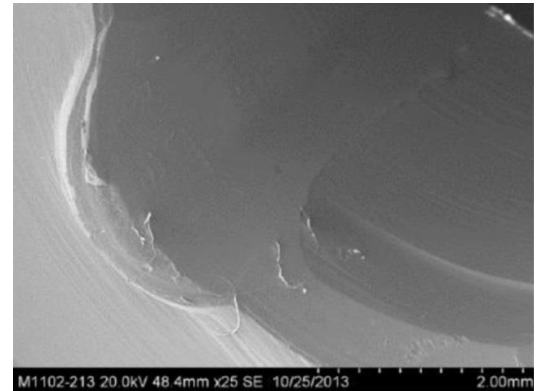
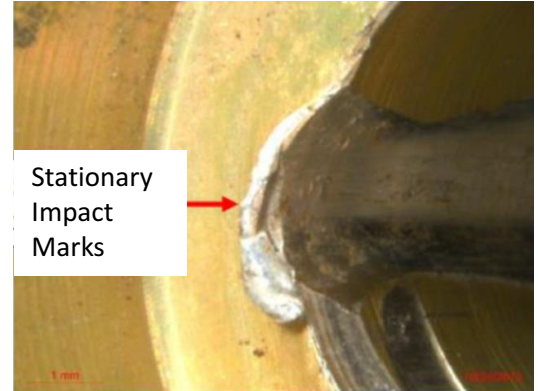
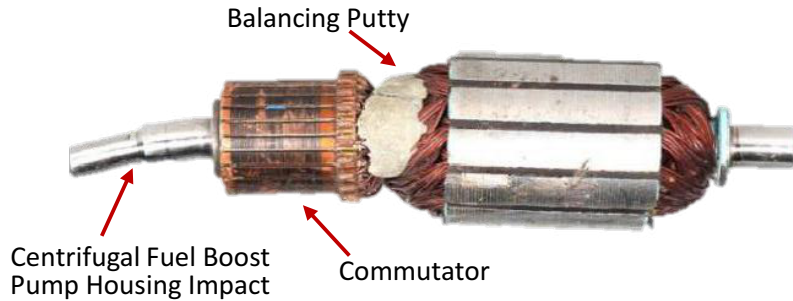
Stitch Composite – Subject Left Armature Commutator

Brush Non-Contact

Brush Contact

# Forensic Evidence: Left Booth Pump – No Rotation at Impact

- The Left Boost Pump shaft hole shows static, non-rotational contact damage
- Damage was caused by impact of one of the armature shaft flats with the hole
- Microscope photos confirm the impact marks are stationary



***Left Boost Pump***  
***NO ROTATION = NO OPERATION***

***Right Boost Pump was operating at the time of impact***

1

Despite the alleged, intended safeguards for a **Low Fuel Pressure** condition, the *pilot received no caution or warning of a failed Fuel Booster Pump*

## 2. Fuel Imbalance Caused by the Failed Left Boost Pump

# Fuel Imbalance Caused by the Failed Left Boost Pump

- If a Fuel Boost Pump fails when its function is required (i.e. a foreseeable icing event), the system design will cause an increasing fuel imbalance in the opposite wing which is uncorrectable, resulting in a dangerous asymmetric fuel imbalance that is beyond the design characteristic of the airplane.

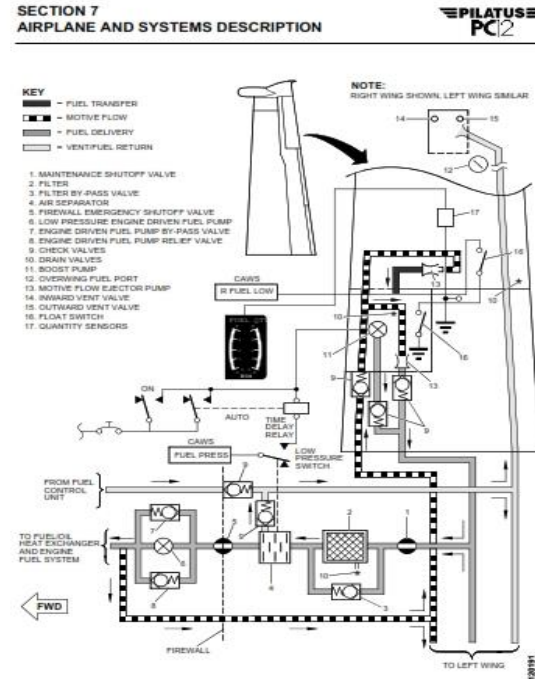


Figure 7-12. Fuel System  
(Sheet 1 of 4)



# Fuel Imbalance Caused by the Failed Left Boost Pump

## *Cause*

- The aircraft had a fuel icing issue during the flight.
- The Low Fuel Pressure situation automatically activated both FBPs; but only the right FBP was operational; the left FBP had **FAILED**.
- Each FBP can independently maintain fuel pressure.
- The Automatic Balancing System (ABS) requires TWO operational pumps; but only the right FBP was operational; the left FBP had **FAILED**.
- There is **no redundancy** for the Fuel Balancing System **and no warning** for a failed FBP.

## *Result*

- This caused a blocked filter and Low Fuel Pressure situation.
- The left FBP was not pumping fuel.
- Only the right FBP was pumping fuel through the system.
- The right, operational, FBP temporarily and repeatedly relieved Low Fuel Pressure so no “low pressure” warning signs occurred.
- The right FBP was pumping fuel to both sides of the plane; but because the left FBP had failed, no fuel was being used from the left side, which just kept filling up.
- The left-heavy fuel imbalance was *uncorrectable* and the pilot was not warned of this situation.

**1** Despite the alleged, intended safeguards for a **Low Fuel Pressure** condition, the *pilot received no caution or warning of a failed Fuel Booster Pump*

**2** There is *no redundancy for the Fuel Balancing System*

### 3. Programming Flaw in the Central Advisory and Warning System (CAWS) In Violation of the Federal Aviation Regulation (FAR)

a) **Red** , for warning lights  
*(lights indicating a hazard which  
may require immediate corrective  
action)*

b) **Amber** , for caution  
lights  
*(lights indicating the possible  
need for future corrective  
action)*

c) **Green** , for safe operation  
lights

**FAR § 23.1305:** requires certain indicators for emergency conditions involving aircraft powerplants. It requires turbine engines to be equipped with a **warning means** for Low Fuel Pressure – fuel pressure below 2psi.

# Pilatus PC-12 “CAWS” Panel (Central Advisory & Warning System)

The Central Advisory and Warning System (CAWS) contains:

RED WARNINGS which require immediate action.

AMBER CAUTIONS which advise that a system is not functioning or is an alert to a precautionary situation.

GREEN ADVISORIES which indicate a system is functioning.

Whenever a CAWS red or amber caption illuminates, the MASTER WARNING or CAUTION will illuminate. A voice callout will also be given with all red annunciations and an aural gong will sound with all amber annunciations.



# The PC-12 Low Fuel Pressure light violates FAR 1305

**FAR § 23.1305:** requires certain indicators for emergency conditions involving aircraft powerplants. It requires turbine engines to be equipped with a **warning means** for Low Fuel Pressure – fuel pressure below 2psi.

The PC-12 Low Fuel Pressure light is not **red**, but **amber**:



# Pilatus Description of Low Fuel Pressure Indicators

PC-12 AFM Sec 7-105:

A caution light is amber and indicates a condition that requires a pilots attention but not an immediate reaction. It is accompanied by the master CAUTION light coming on and an aural gong will sound.

FUEL FILTER BLOCKED or  
PRESSURE DROPS BELOW 2 PSI

**FUEL PRESS**

+

**MASTER CAUTION**

+

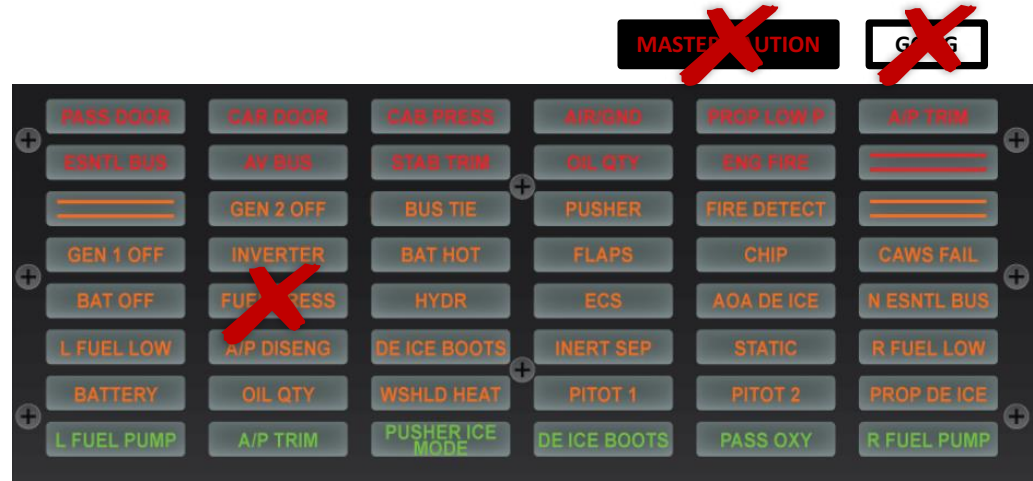
**"GONG"**

**MASTER CAUTION**



- Blocked Fuel Filter →
  - Low Fuel Pressure Condition →
    - Boost Pumps Activated →
      - Pressure Restored
- Blocked Fuel Filter Continues →
  - Cycle Repeats...

***This cycle occurred 307 times  
without lighting the  
Fuel Pressure warning light***



- Because of a ***programmed time-delay, Low Fuel Pressure cautions will not occur*** unless the condition exists for more than 0.3 second
- Fuel Boost Pumps are designed to clear a low pressure condition in less than 0.3 second
- Therefore, ***cautions were never displayed*** even though there were ***307 low pressure conditions*** on the accident flight





## SECTION 7 AIRPLANE AND SYSTEMS DESCRIPTION



### OPERATION

During normal operation with the engine running, fuel is transferred from the wings to the engine by a motive flow system. Fuel under pressure from the low pressure engine driven pump is returned to the wings to provide motive flow through the transfer ejector pump and the delivery ejector pump. The transfer ejector pump transfers fuel from the wing tank to the collector tank. The left and right wing delivery ejector pumps transfer fuel to a common manifold. Fuel then flows through the maintenance shutoff valve and the fuel filter. The fuel filter incorporates a bypass valve in case the filter becomes blocked, and a spring loaded drain valve. Fuel is then directed into the air separator. The air separator passes air in the fuel system to the vent return line and incorporates the fuel low pressure switch. The fuel then passes through the firewall shutoff valve to the low pressure engine driven fuel pump. The firewall shutoff valve is mechanically connected to the FUEL EMERG SHUT-OFF handle in the cockpit. The low pressure engine driven fuel pump includes a pressure relief valve that maintains a fuel pump outlet pressure of 43.5 psi (3 bar). A bypass valve allows for fuel flow around the engine driven fuel pump in the event of a fuel pump failure.

An electric boost pump, located within each collector tank, provides fuel pressure during engine start and is used to maintain system pressure when required. Each boost pump LH and RH is controlled by a two position (ON or AUTO) switch located on the FUEL PUMPS section of the overhead panel. When the switch is pressed the system toggles between AUTO and ON. **An arrow symbol in the switch is illuminated to show which selection is made. When set to ON, the boost pump will operate continuously and a green LFUEL PUMP or RFUEL PUMP caption on the CAWS is illuminated. This indicates that the applicable fuel boost pumps are operating. With the switch set to AUTO (the normal operating setting), the boost pump will operate automatically whenever fuel system pressure falls below 2 psi (0.14 bar). The boost pump will shut-off automatically 10 seconds after the fuel system pressure reaches 2.5 psi (0.24 bar). A boost pump is capable of supplying the engine in case the low pressure pump fails.**

***The PC-12 has no caution or warning when a Boost Pump fails***

- 1** Despite the alleged, intended safeguards for a **Low Fuel Pressure** condition, the *pilot received no caution or warning of a failed Fuel Booster Pump*
- 2** There is *no redundancy for the Fuel Balancing System*
- 3** The PC-12 violates the FARs that require a *red warning light* for *Low Fuel Pressure*

## 4. Changes to the Aircraft Flight Manual (AFM) After the Crash

*There were 307 low fuel pressure incidents on the fatal flight*

**FUEL PRESS** *CAWS never appeared – No alarm signaled the pilot*

*Low Fuel Pressure  
indicators  
cycling green PUMP  
possible  
land as soon as*

*No older PC-12/45 aircraft received the  
updated AFM Emergency Procedures  
Until after the fatal flight*

**3.16 FUEL SYSTEM**

**3.16.1 FUEL PRESSURE LOW**

Indication: - CAS CAUTION - Fuel Pressure Low, or  
- MFD Fuel Window – Both green PUMP indications cycling on and off every 10 seconds

- |                       |                                     |
|-----------------------|-------------------------------------|
| 1. Power              | Reduce to minimum to sustain flight |
| 2. FUEL PUMP switches | ON                                  |
| 3. Fuel state         | Monitor                             |

If there are 2 segments or more difference between the left and right:

- |                                    |         |
|------------------------------------|---------|
| 4. FUEL PUMP switch (emptier side) | AUTO    |
| 5. Fuel state                      | Monitor |

When fuel balanced:

- |                       |                       |
|-----------------------|-----------------------|
| 6. FUEL PUMP switches | ON                    |
| 7. Aircraft           | Descend to warmer air |

**NOTE**

A possible cause is the fuel filter blocked with ice crystals.

- |                       |      |
|-----------------------|------|
| 8. FUEL PUMP switches | AUTO |
|-----------------------|------|

If failure conditions remain:

- |                       |    |
|-----------------------|----|
| 9. FUEL PUMP switches | ON |
| 10. Aircraft          |    |

Land as soon as possible.  
If possible always retain glide capability, to the selected airfield in case of total engine failure

END

- 1** Despite the alleged, intended safeguards for a **Low Fuel Pressure** condition, the *pilot received no caution or warning of a failed Fuel Booster Pump*
- 2** There is *no redundancy for the Fuel Balancing System*
- 3** The Federal Regulations require a *red warning light* for *Low Fuel Pressures*
- 4** The revised AFM Emergency Procedures *were known to Pilatus before the crash*

## 5. New Evidence – Documented History of Fuel Issues on the Pilatus PC-12

## Pilatus misled the NTSB during the crash investigation

- It failed to disclose the KNOWN history of fuel icing in the PC-12, including:
  - documented failures of the fuel system due to icing
  - an abandoned program to incorporate a fuel heater in the early 2000s
- It diverted attention away from the pump failure, and directed attention towards unrelated issues.
- Pilatus asserted that a failure of both a Fuel Boost Pump and the Auto Balancing System was improbable
  - Pilatus failed to acknowledge that the two failures are intimately related
  - Pilatus failed to acknowledge that fuel icing could initiate both failures
- The NTSB report, under Pilatus' analysis, determined icing occurred on the accident flight
- Icing was only peripheral to the real issues which included a failed FBP and defectively designed fuel system and warning system.



- 1 Despite the alleged, intended safeguards for a **Low Fuel Pressure** condition, the *pilot received no caution or warning of a failed Fuel Booster Pump*
- 2 There is *no redundancy for the Fuel Balancing System*
- 3 The Federal Regulations require a *red warning light* for *Low Fuel Pressures*
- 4 The revised AFM Emergency Procedures *were known to Pilatus before the crash*
- 5 Pilatus was aware of the *defects in the PC-12* for years before the crash, but *did not issue a recall to correct or update with an alternative workaround*

## 6. Pilot Not Warned of Problems



There were no cautions or warnings of a **Low Fuel Pressure** condition



There were no cautions or warnings of a **Fuel Boost Pump Failure**



There were **false indications** of Fuel Boost Pump operation



There was no indication of an **Auto Balancing System Failure**



The **AFM Emergency Procedure** did not call for immediate landing

Documents previously undisclosed by Pilatus reveal numerous other defects and failures of the PC-12 fuel system, warning system, and Aircraft Flight Manual.

After review and analysis of this newly submitted evidence — including both physical evidence and documents not previously disclosed by Pilatus — **the NTSB will undoubtedly agree that its original findings were erroneous due to the unavailability of critical evidence** during their initial investigation.

**We therefore urge the NTSB to revise their published findings and conclusions based on its fresh review of all relevant evidence, including the evidence previously unavailable to the Board.**

July 19, 2018

**To: Robert L. Sumwalt, Chairman**  
**National Transportation Safety Board**  
490 L'Enfant Plaza  
Washington D.C. 20594

**Cc: Federal Aviation Administration**  
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**Hartzell Propeller, Inc.**  
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**Re: Crash of Pilatus PC-12/45 N128CM Report No. NTSB/AAR-11/05 PB2011-910405**  
***Supplement to June 2017 NTSB Petition for Reconsideration***

Dear Chairman Sumwalt,

On June 21, 2017, we submitted a Petition for Reconsideration and Modification of the National Transportation Safety Board's Findings and Determination of the Probable Cause for the Crash of Pilatus PC-12/45 N128CM ("the Petition"). The Petition was submitted on behalf of myself and the other parents and grandparents of the 13 passengers who were killed in the crash on March 22, 2009.

We appreciate the consideration being given to the Petition and are eagerly awaiting feedback and hoping for a positive outcome. We consider this a matter of grave importance that continually threatens the safety of flight for all pilots and passengers of PC-12 aircraft in service.

As a supplement to the Petition, we are hereby providing a summarized PowerPoint presentation of the main issues involved in the Petition. We hope you find this useful to your review.

Pursuant to 49 C.F.R. 845.41(b), we are serving a copy of the enclosed supplement on all parties to the NTSB investigation as identified on page 92 of the NTSB Final Report, which is attached as Appendix 1 to the Petition.

Robert L. Sumwalt, Chairman  
NTSB  
Page 2

If you have any other questions concerning the Petition, please do not hesitate to contact Anthony Tarricone at [REDACTED] or Stuart Fraenkel and Nicole Andersen at [REDACTED]

Sincerely,

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Irving Feldkamp III