

The National FAA Safety Team Presents

Hazards of Layering Multiple STCs

Presented to: IA Seminar
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Produced by:
The FAA Safety Promotion Program Office



Federal Aviation
Administration

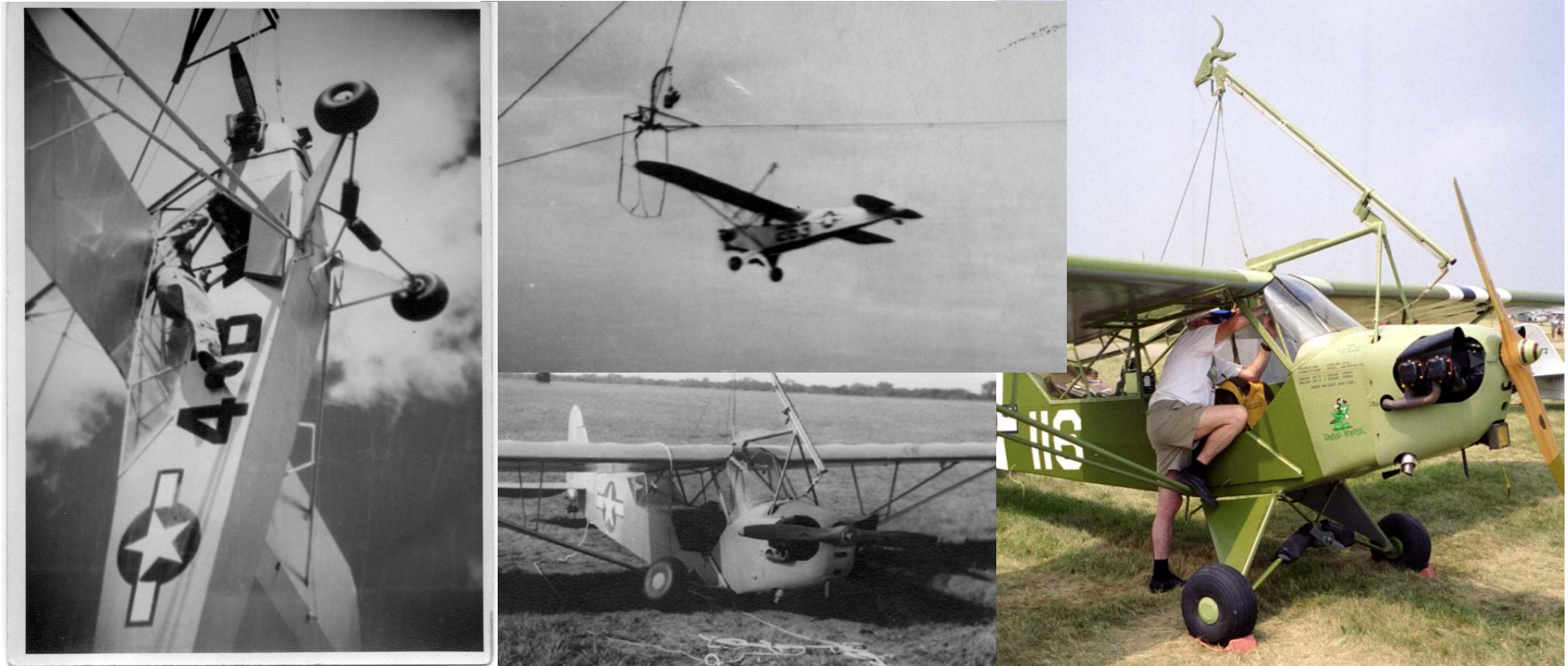


Welcome

- Exits
- Restrooms
- Emergency Evacuation
- Breaks
- Sponsor Acknowledgment
- Other information



People always seem to have a better idea



Special Mission...or not



FAA Form 8110-2

For STCs that are NOT “one-only”, include the following note:

“The installer must determine whether this design change is compatible with previously approved modifications.”



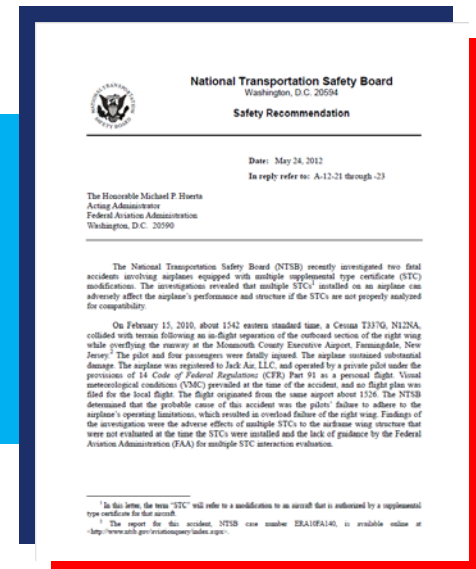
The image shows the FAA Form 8110-2, Supplemental Type Certificate. The form is titled "Supplemental Type Certificate" and includes the FAA logo. It contains fields for "Number:", "This certificate issued to:", "Original Product - Type Certificate Number:", "Make:", "Model:", "Description of Type Design Change:", "Limitations and Conditions:", "Date of Application:", "Date Reissued:", "Date of Issuance:", "Date Amended:", "By Direction of the Administrator", "Signature", and "Title". A red border highlights the form. At the bottom, there is a disclaimer: "Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both. This certificate may be transferred or made available to third persons by licensing agreements in accordance with 14 CFR 21.47. Possession of this Supplemental Type Certificate (STC) document by persons other than the STC holder does not constitute rights to the design data nor to alter an aircraft, aircraft engine, or propeller. The STC's supporting documentation (drawings, instructions, specifications, flight manual supplements, etc.) is the property of the STC holder. An STC holder who allows a person to use the STC to alter an aircraft, aircraft engine, or propeller must provide that person with written permission acceptable to the FAA. (Ref. 14 CFR 21.120)." and "Page 1 of 1".



3 NTSB Safety Recommendations

- Three NTSB Safety Recommendations Issued by the Board on May 24, 2012
- A-12-21 through A-12-23

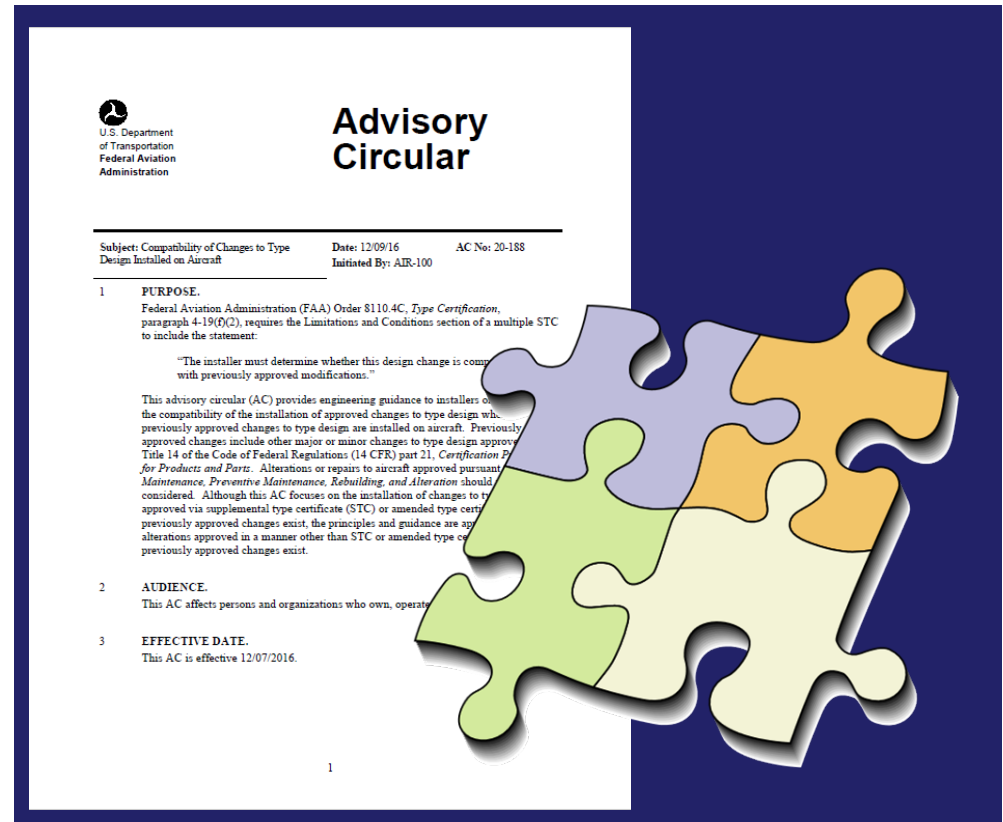
Educate
Evaluate
Document



AC 20-188

Compatibility of Changes to Type Design Installed on Aircraft

1. List of Installations that Might be Incompatible (Sec 4.2)
2. Guidance for the Owner/Operator (Sec 5)
3. Installer Responsibilities (Sec 6)
4. How to Resolve Non-compatible Modifications (Sec 7)



Beech Baron N28MR 2 Fatalities



•Image



“...Might be Incompatible...”

- **Baron accident**

- “Throw-over” control yoke
- Low altitude / low airspeed flight instruction
- V_{mca} – minimum control speed
- Vortex generators to reduce V_{mca}
- Engine power & prop changed
- Engine nose cowlings changed
- Winglets installed
- Interaction of wing and power changes



Cessna 337 N12NA 5 Fatalities



Outboard Section of the Left Wing Separated and found on the Runway



Overall View of Fuselage and Cockpit Damage



“...Might be Incompatible...”

Skymaster accident

- **Interaction of**
 - STOL kit
 - Leading edge cuffs
 - Stall fences
 - Wing extensions with fuel tanks
 - Winglets
- **Wing skin fatigue cracks**
- **Outboard right wing separated in flight**



Other Compatibility Guidance

- Besides AC 20-188 “Compatibility of Changes to Type Design Installed on Aircraft” ...



AC 43.9-1G, Instructions for Completion of FAA Form 337

- New Revision published on Nov. 1, 2019
- Adds 3rd purpose highlighting compatibility

6.1 Purpose of FAA Form 337. The form serves three main purposes:

1. To provide aircraft owners and operators with a record of major repairs and major alterations indicating the details and approvals;
2. To provide the FAA with a copy of the form for inclusion in the aircraft records at the FAA Aircraft Registration Branch; and
3. To document and record compatibility assessment conducted by the installer in accordance with the Form 337 NOTICE header block located above Item 8 – Description of Work Accomplished.



FAA Form 337

NOTICE

*Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. **An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.***

NOTICE <i>Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.</i>							
8. Description of Work Accomplished (If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.) <table border="1"><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>Nationality and Registration Mark</td><td>Date</td></tr></table>						Nationality and Registration Mark	Date
Nationality and Registration Mark	Date						



FAA Form 337, Item 8

- **Clearly document how the installer determined compatibility and interaction between the new modification and previously installed modifications on the same aircraft**
- **Item 8 should record the compatibility assessment to show that installation of the new modification (e.g., STC) will not create a safety issue or noncompliant condition when combined with existing modifications**
- **AC 20-188, Section 4.2 provides examples of combinations of installations which may result in compatibility issues**
- **AC 20-188 Section 6. outlines the Installers Responsibilities for assessing compatibility**
 - When the compatibility assessment exceeds installer's capability, installer should enlist engineering support (e.g. STC holder or appropriately rated DER) to assist in making the determination



Other Related Documents

- [Anchorage ACO flyer, How Do I Determine Supplemental Type Certificate \(STC\) Compatibility?](#)
- **Aircraft Owners and Pilots Association (AOPA)** article “[Layering STCs: Understanding and Managing the Risks.](#) November 21, 2013
- **FAA Safety Briefing** - May/June 2014 article [Beware the Frankenplane! The Hidden Dangers of Layering STCs](#)



Transport Canada

Transport Canada Airworthiness Notices - B045, Edition 1 - 15 May 1998

The screenshot shows the Transport Canada website interface. At the top, there is a header with the Canadian flag, the text "Government of Canada / Gouvernement du Canada", and navigation links for "Canada.ca", "Services", "Departments", and "Français". Below this is a blue banner with the "Transport Canada" logo and a large red maple leaf. A search bar is located on the right side of the banner. Below the banner is a navigation menu with tabs for "Aviation", "Marine", "Rail", "Road", "Dangerous goods", "Security", "Resources", and "Regions". Under the "Aviation" tab, there is a sub-menu with links for "Home", "Air Transportation", "Aircraft", "Aircraft Maintenance and Manufacturing", "Regulatory Requirements and References", and "Airworthiness Notices". The "Airworthiness Notices" link is selected, leading to the page "Airwothiness Notices - B045, Edition 1 - 15 May 1998". On the left side of the page, there is a sidebar with a tree structure under "Air Transportation", including "Airports and Aerodromes", "Aircraft", and "National Aircraft Certification". The main content area displays the title "Airwothiness Notices - B045, Edition 1 - 15 May 1998" and the subtitle "Compatibility of Multiple Modifications". Below the subtitle, the "Purpose" is stated: "The purpose of this notice is to remind aircraft owners, operators and". On the right side of the page, there is a blue box labeled "Operational Airworthiness" with a link to "Standards Branch".

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Airwothiness Notices - B045, Edition 1 - 15 May 1998

Air Transportation

- Airports and Aerodromes
- Aircraft
 - National Aircraft Certification

Airwothiness Notices - B045, Edition 1 - 15 May 1998

Compatibility of Multiple Modifications

Purpose

The purpose of this notice is to remind aircraft owners, operators and

Operational Airworthiness

[Standards Branch](#)



What Can You Do?

- **AC 20-188 meant to be a starting point to create awareness**
 - Expected to evolve over time
 - Add cases/information as available
- **Submit feedback form in AC if you have a recommendation**



Questions?

Section Manager:

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Proficiency and Peace of Mind

- Fly regularly with your CFI
- Perfect Practice
- Document in WINGS



Thank you for attending

- You are vital members of our GA safety community

