

Sport Aviation Safety

FAA Safety Team

Presented to:

By:

Date:



Federal Aviation
Administration

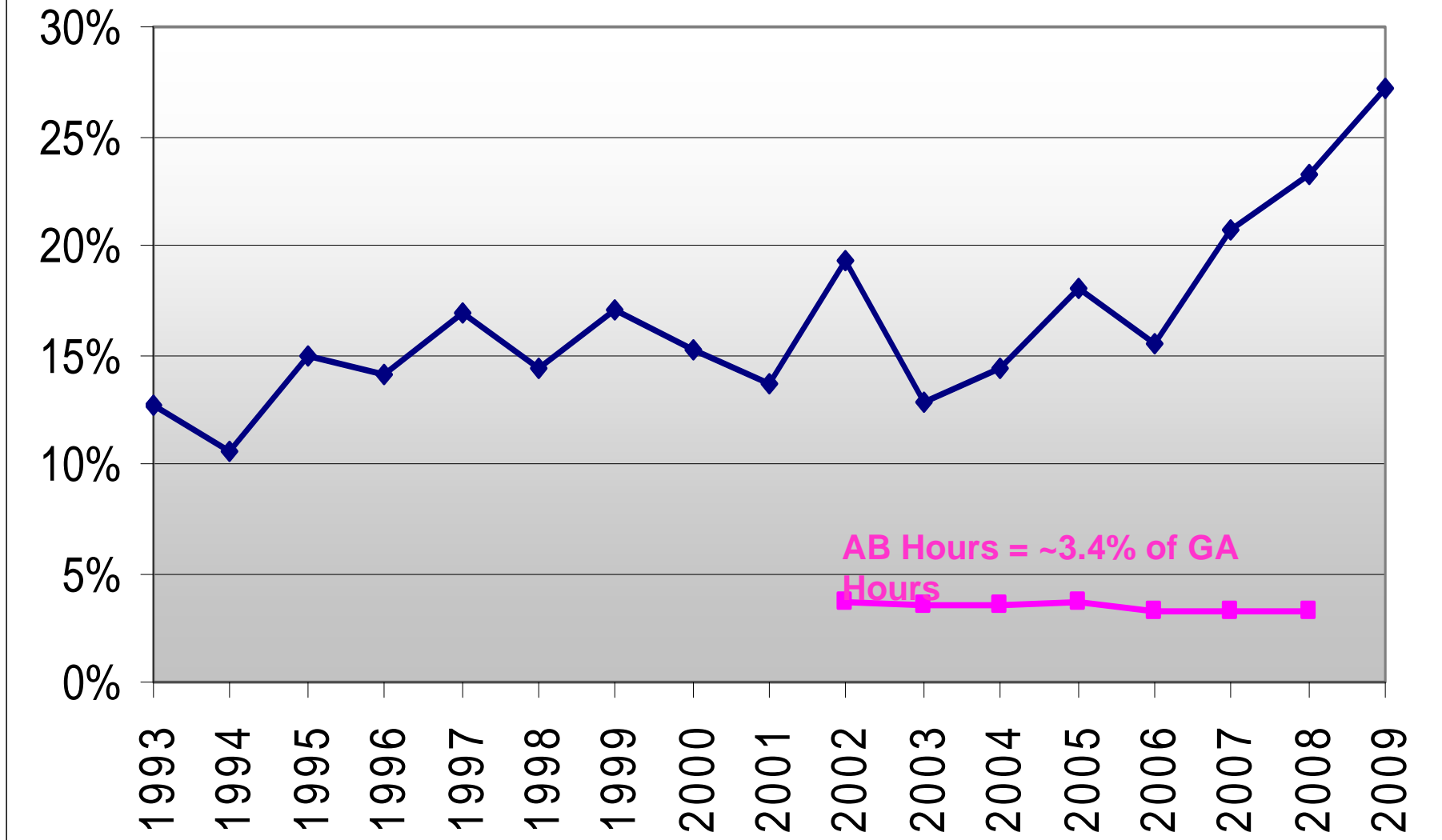


30,000+ Amateur Built Aircraft!

- Amateur-built aircraft population continues to grow by 4-6% per year.
- Amateur built fleet is now over 31,000 aircraft strong.
- This represents ~10% of the entire U.S. fleet of registered aircraft and over 10% of all *active* aircraft in the U.S.
- This is quite a performance when other segments of GA are contracting.

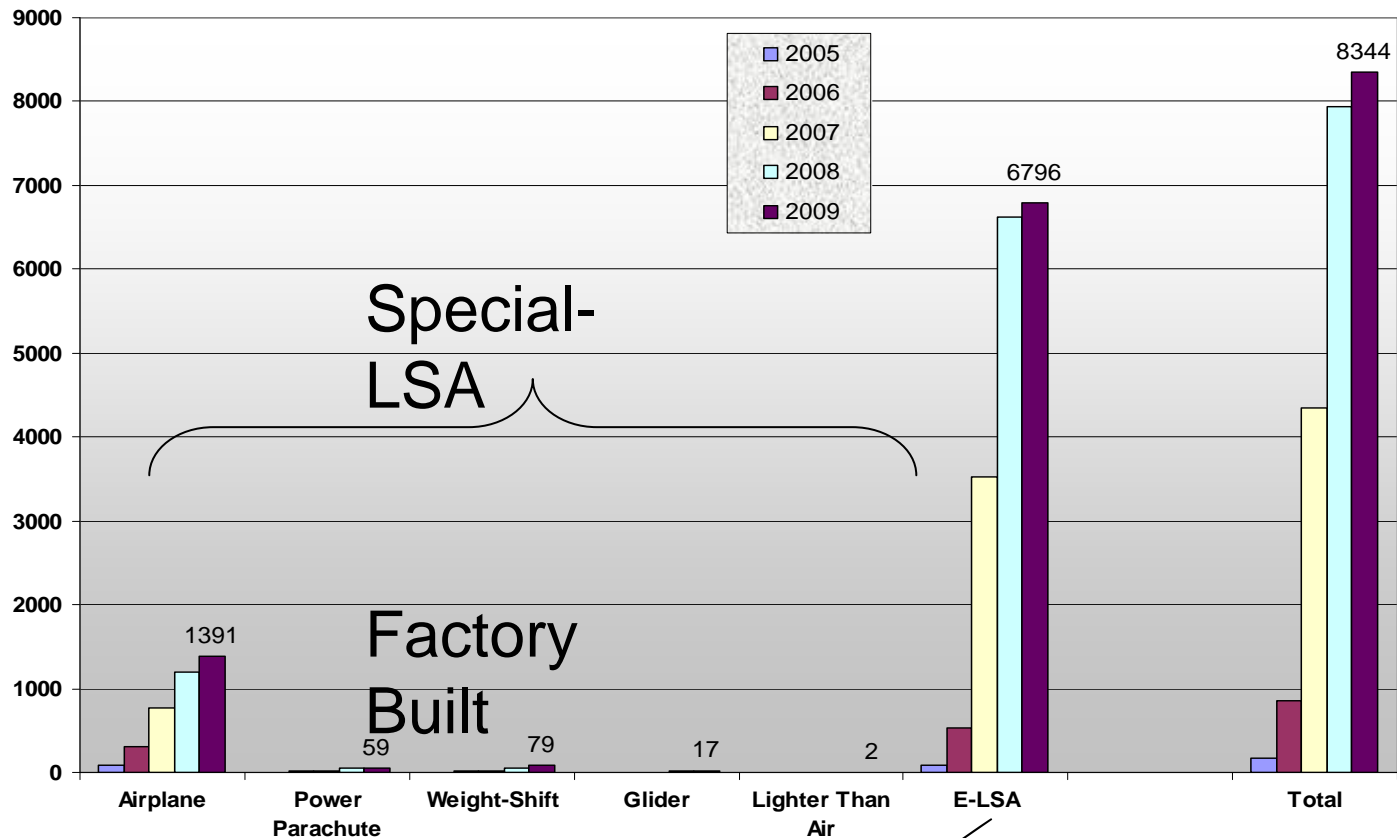


Amateur-Built Percentage of All GA Fatal Accidents



LSA Airworthiness Certificates

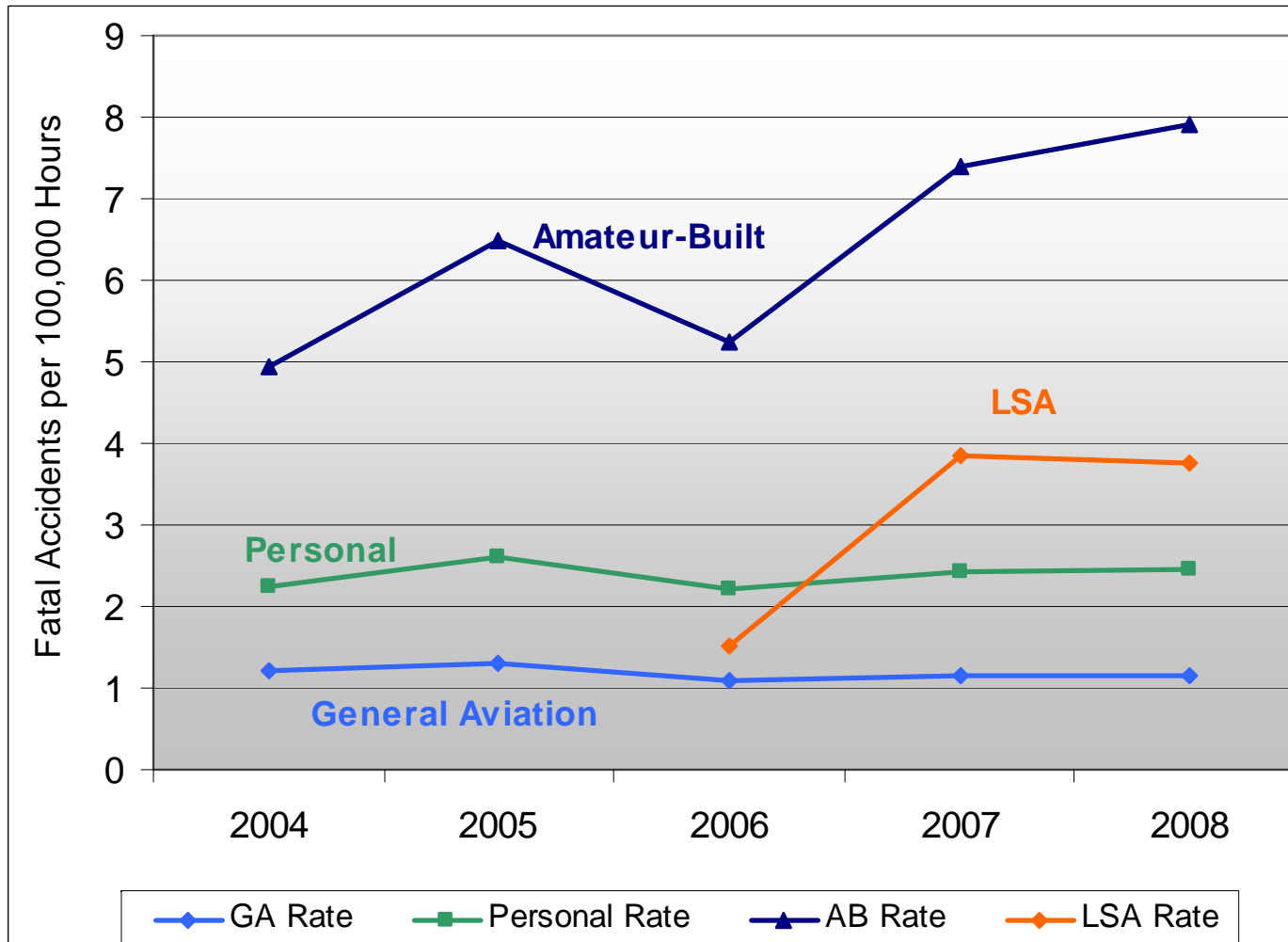
Cumulative Fleet Size



- Registered By Jan 31, 08 and Not Part 103
- Kit-Built
- Previously Issued Under 21.190 (S-LSA)



SP-LSA Fatal Accident Rates



Loss of Control

- **Skill based**
- **Training**
 - Transition training
- **Proficiency**
- **Managing your risk**
- **Mitigating**
- **Understand the aircraft's physical limitations**



Preflight

- **Weather briefing**
- **Density Altitude**
 - Convective weather
 - Gusty wind
 - Cross wind
- **Know your fuel burn and range**
- **Know your fuel situation at all times**
- **Weight and Loading**



Strip Suitability

- **Know your airfield.**
- **Operating off airports.**
- **Wire strikes – Powered Parachute.**
- **Aircraft that are operating in environments that are not airports are more likely to be involved in an accident.**



Lets look at some forms of Sport Aviation and talk about problem areas.

What can you do to promote “SAFE”
Safer
Aviation
For
Everyone





Sport Aviation Safety



Overview of light sport options

- 1. Experimental Amateur Built**
- 2. Other Experimental**
- 3. Light Sport Aircraft**
 - 1. Aircraft meeting the LSA Definition**
 - 2. Special Light Sport Aircraft (SLSA)**
 - 3. Experimental Light Sport Aircraft (ELSA)**
 - (a) Kit-LSA**
 - (b) Transitioned Ultra-lights**

What is a Sport Aircraft?



**An Experimental
Amateur Built
could be a Sport
Aircraft if!**



Not All Experimental aircraft are Amateur Built

14 CFR 21.191

1. Research and Development
2. Showing Compliance with Regulations
3. Crew Training
4. Exhibition
5. Air Racing
6. Market Surveys
7. Operating Amateur Built Aircraft



IAR 823

What is a Light-Sport Aircraft?



Airplane



**ELSA Transitioned
“Ultralightlike”
existing fleet**

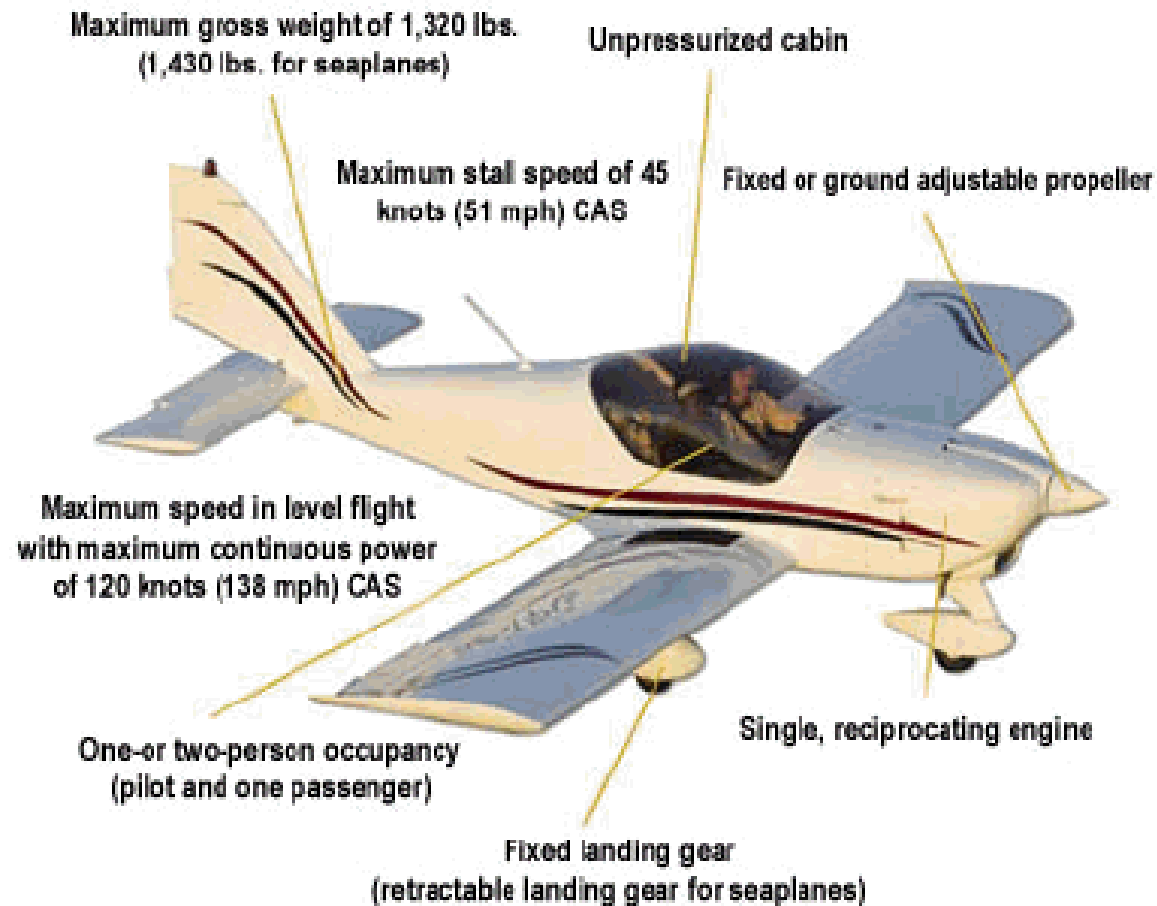
**Meets Definition of LSA
(Type Certificated or
Experimental)**



SLSA

What is a Light-Sport Aircraft? (LSA)

Light-Sport aircraft are small, simple, low-performance, low energy, aircraft limited to:



What is a Light-Sport Aircraft?



**Lighter-
than-air**



Gyroplane

Glider

What is a Light-Sport Aircraft?

TWO NEW CLASSES



**Weight-Shift-Control
(Trikes)**



**Powered
Parachute**

What is **NOT** a Light-Sport Aircraft?

Part 103 Ultralight (powered/unpowered)

- Hanglider
- Paraglider
- Training exemption holders



- Multiengine aircraft
- Powered lift
- Helicopters
- Complex aircraft
- Retractable gear (except water operations or Glider)
- Controllable pitch propeller



Numbers

GA Aircraft

230,000

2176 Fatal accidents since 2005

.9% / 1.1%

SLSA Aircraft Certified 1715

ELSA Aircraft Certified 7086

8801

66 Fatal accidents since 2005

.74%

Amateur Built Aircraft

33,000

393 Fatal accidents since 2005

1.2%

Sport Pilot Privileges and Limitations

- **No night flight**
- **Below 10,000 MSL**
- **Below 2000 AGL**
- **VFR Day**
- **No compensation or hire**
- **Must not be in furtherance of a business**



Transition Training for Pilots...

...is Very Important

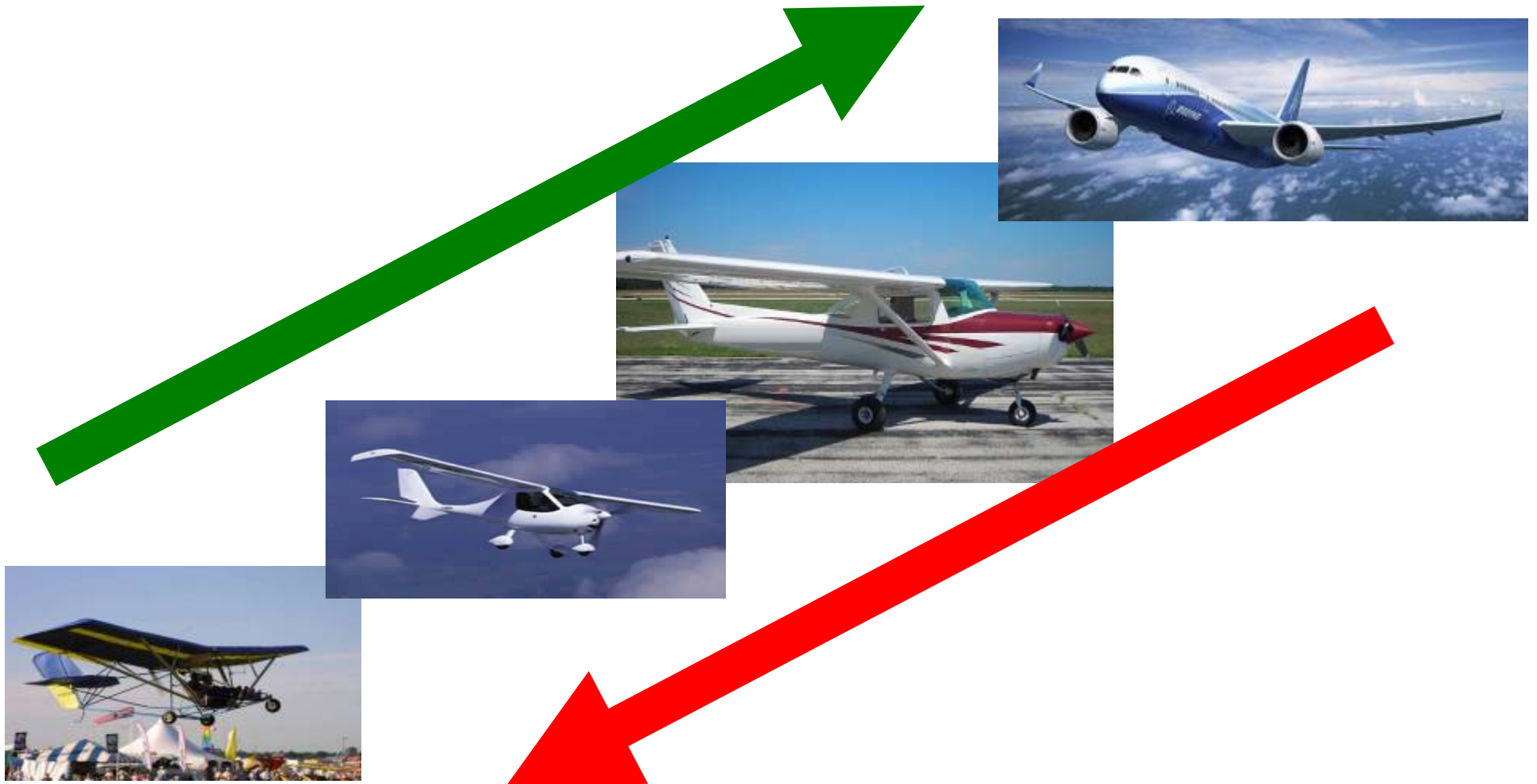


152 "Heavy"

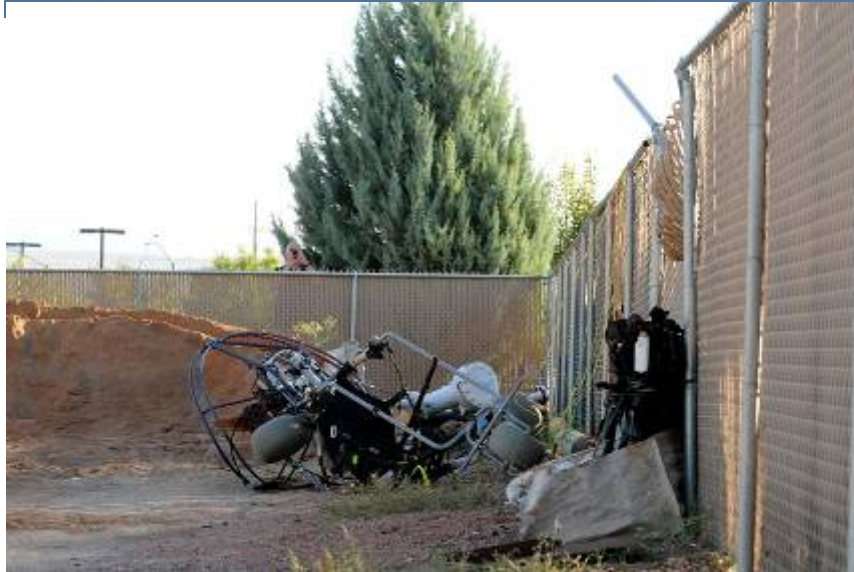
Light-Sport/Sport Pilot Accident Matrix		Std-SP Eligible	AB-SP Eligible	S-LSA	E-LSA	Totals:
Pilot Rating & Medical	Recreation+ CL3+ (Rated Pilot)	Std	Std	12	3	15
	Recreation+ DL (Operating Privileges of Sport Pilot)	4	13	2	5	24
	Sport Pilot for Aircraft being operated (may hold other ratings)	1	4	5	7	17
	Student / Solo Privileges				2	2
	Pilot Not Rated by Certificate or Aircraft being operated		2		6	8
Totals:		5	19	19	23	66

“At our airport 100% of all the general aviation-trained pilots who have attempted to fly light sport aircraft without transitional training have damaged their aircraft. “
 -Carol and Brian Carpenter

Transition Training for Pilots







Accident Examples



Fuel exhaustion

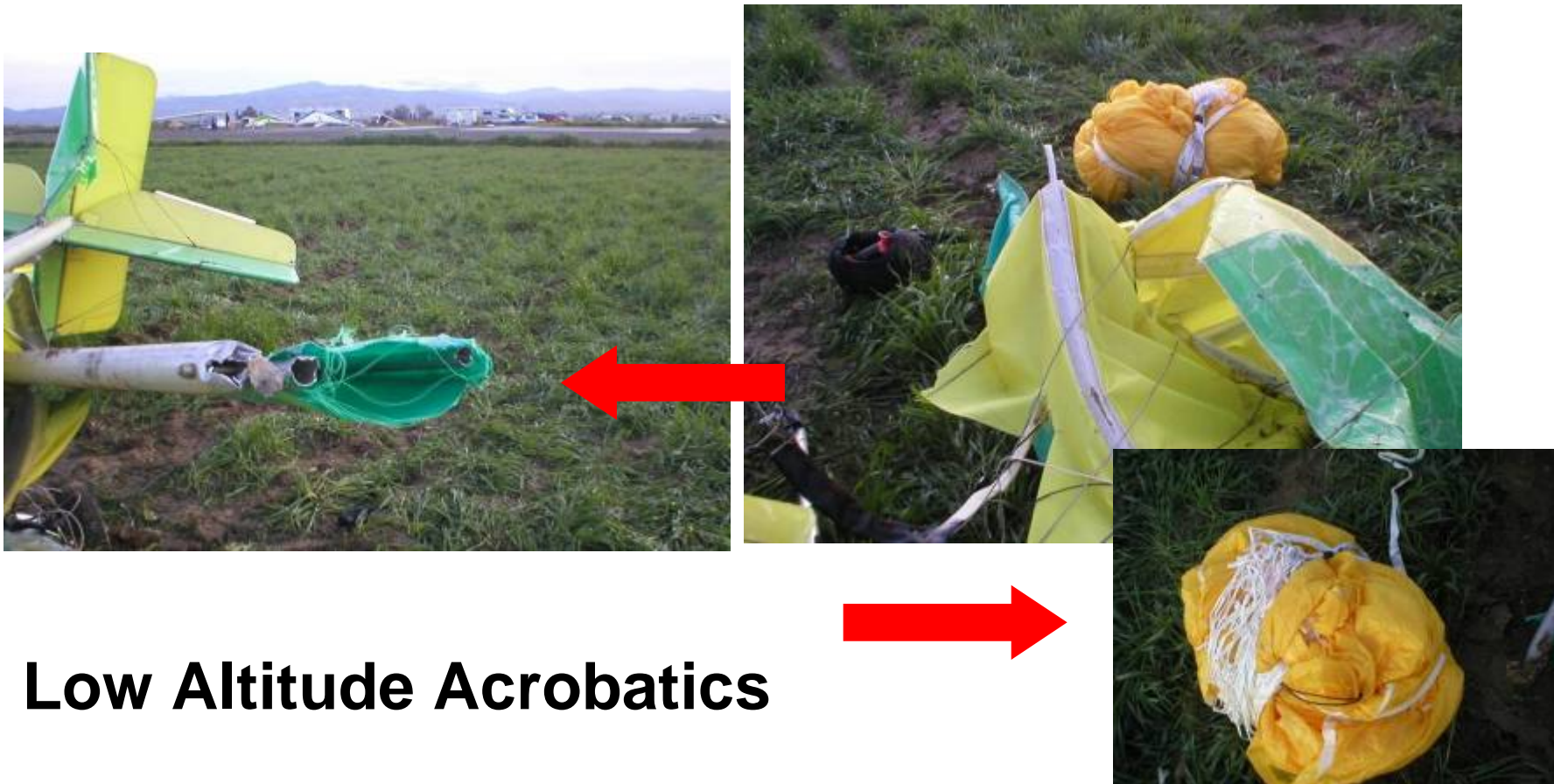
**Powered para-glider landed
in Valley Forge State Park**

ELT 14 CFR §91.411

Emergency Locator Transmitters are not required in many cases



Emergency Parachutes Don't Always Work



Low Altitude Acrobatics

Accident Examples

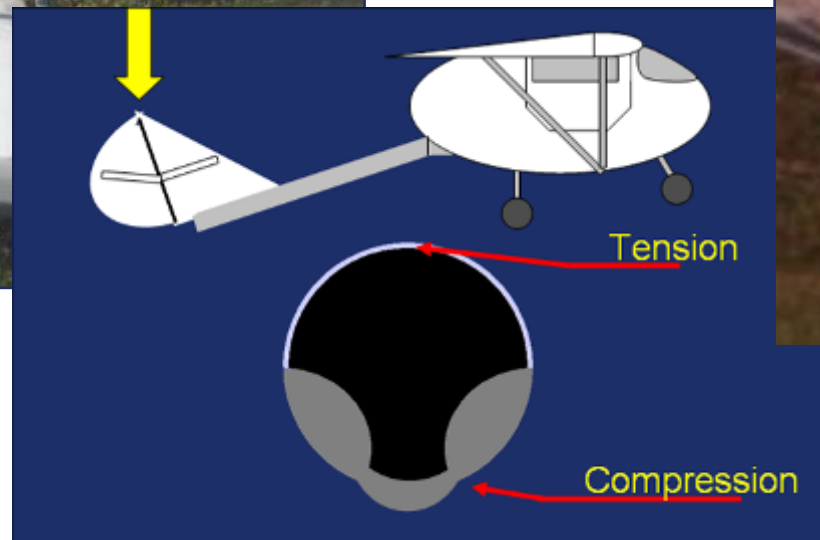


Weight and Loading

This is a new flight instructor who had not flown with another person on board. He misjudged the vehicle's climb performance with the extra weight of a passenger.

Accident Examples

Weight and Loading



Accident Examples

Entire aircraft was designed to weigh less than 254 lbs.

IFR panel weighs ?

Weight and Loading



Carburetor Icing.... It happens






Pilot Operating Instructions

- **Airplanes must have the following sections:**
 - General Information
 - Airplane and System Descriptions
 - Operating Limitations
 - Weight and Balance Information
 - Performance
 - Emergency Procedures
 - Aircraft Ground Handling and Servicing
 - Required Placards and Markings

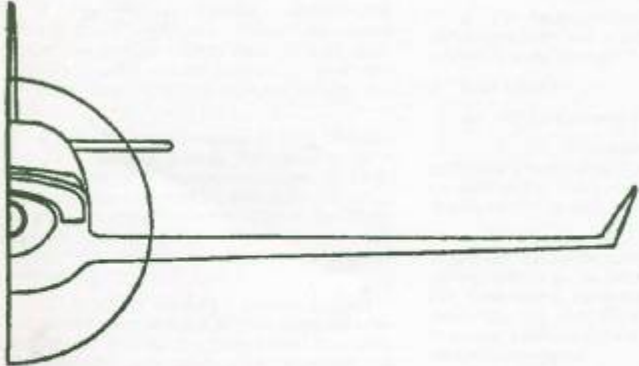


 U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

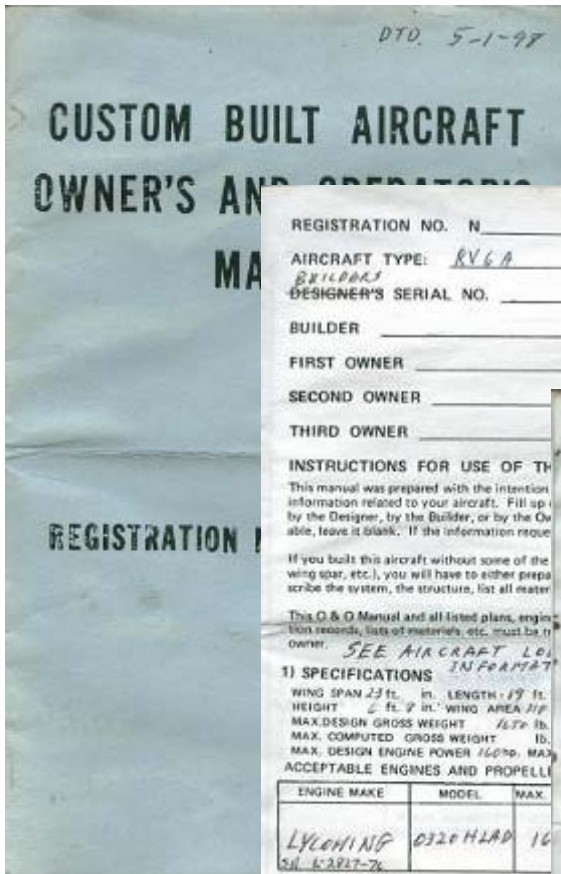
DATE: 5/24/95
AC NO: 90-89A

AMATEUR-BUILT AIRCRAFT AND ULTRALIGHT FLIGHT TESTING HANDBOOK



Initiated by: AFS-340





DTG. 5-1-98

**CUSTOM BUILT AIRCRAFT
OWNER'S AND OPERATOR'S MANUAL**

REGISTRATION NO. N _____

AIRCRAFT TYPE: RV6A

DESIGNER'S SERIAL NO. _____

BUILDER _____


FIRST OWNER _____

SECOND OWNER _____

THIRD OWNER _____

DATE OF FLIGHT OR TRANSFER		
DAY	MONTH	YEAR
7	5	98

2) AIRCRAFT DESCRIPTION



INSTRUCTIONS FOR USE OF THIS MANUAL
This manual was prepared with the intention of providing information related to your aircraft. Fill up the blank spaces by the Designer, by the Builder, or by the Owner. If the information requested is not available, leave it blank. If the information requested is not applicable, leave it blank. If the information requested is not applicable, leave it blank.

If you built this aircraft without some of the original parts (e.g., wing spar, etc.), you will have to either prepare a description of the system, the structure, list all materials used, and the location of the parts, or refer to the original plans and drawings. This O & O Manual and all listed plans, engine specifications, lists of materials, etc. must be furnished to the owner.

SEE AIRCRAFT LOG FOR INFORMATION

1) SPECIFICATIONS

WING SPAN 23 ft. in. LENGTH 19 ft. in.
HEIGHT 6 ft. 2 in. WING AREA 116 sq. ft.
MAX. DESIGN GROSS WEIGHT 1670 lb.
MAX. COMPUTED GROSS WEIGHT 1670 lb.
MAX. DESIGN ENGINE POWER 160 hp. MAX. ACCEPTABLE ENGINES AND PROPELLERS

ENGINE MAKE	MODEL	MAX. HP
LYCOMING	O320H1AD	160


PROPELLER MAKE _____ MODEL _____

CONTROLS TRAVEL

ELEVATOR 30° UP 20° DOWN
RUDDER 35° RIGHT 35° LEFT
AILERON 30° UP 13° DOWN
FLAPS 40° Down

Copyright © 1976

2) AIRCRAFT DESCRIPTION



SEE VANS RV6A CONSTRUCTION MANUAL AND DRAWING 1-64 FOR COMPLETE DETAILS

PASTE HERE A DESCRIPTION OF YOUR AIRPLANE SUPPLIED BY THE DESIGNER

5) OPERATING LIMITATIONS

a) - AIRSPEEDS (IAS) - ISee FAR 23.335

STALLING SPEED _____
MAX FLAP OPERATING SPEED _____
MAX MANEUVERING SPEED _____
MAX GEAR EXTENDED SPEED _____
MAX STRUCTURAL CRUISING SPEED _____
MAX DESIGN SPEED _____
NEVER EXCEED SPEED _____
MAX AIR BRAKES OPERATING SPEED _____

b) LOAD FACTORS - at a gross weight of _____
This aircraft is designed to sustain: _____

c) ENGINE OPERATION AT SEA LEVEL

TACHOMETER - Normal Operating _____
Maximum Allowable _____
OIL TEMP - Normal Operating _____
Maximum Allowable _____
OIL PRESSURE - Minimum Idling _____
35° Normal Operating _____
Maximum Allowable _____
CYL. HEAD TEMP. - Normal Operating _____
Maximum Allowable _____

d) AUTHORIZED MANEUVERS
This aircraft is not designed for AEROBATICS. The listed maneuvers are authorized with a gross weight of 1375 lbs. Center of Gravity (C.G.) at max. aft _____ % MAC.

6) PERFORMANCE @ Sea Level and Standard Atmosphere

STALL: Flaps up 35°

TAKE OFF DISTANCE - from hard surface runway, Flaps up, no wind.
Ground run: _____ ft. Total to clear 50 ft. obstacle _____ ft.

LANDING DISTANCE - on hard surface runway, Flaps @ 30°, no wind.
Ground roll: _____ ft. Total to clear 50 ft. obstacle _____ ft.

MAX RATE OF CLIMB @ _____ mph (IAS): _____ ft / min.

CRUISE SPEED @ 2400 rpm: 172 mph (IAS)

RANGE @ 2400 rpm: _____ gal. Fuel: _____ miles

SERVICE CEILING (Climb: 100 ft/min.): _____ ft.



Qualt 200 Sonoma, CA 11/06/2010



Qualt 200 Sonoma, CA 11/06/2010



Qualt 200 Sonoma, CA 11/06/2010



Qualt 200 Sonoma, CA 11/06/2010

DEPARTMENT OF TRANSPORTATION		UNITED STATES OF AMERICA DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION SPECIAL AIRWORTHINESS CERTIFICATE		ADMINISTRATION	
SPECIAL		A CATEGORY/DESIGNATION EXPERIMENTAL PURPOSE OPERATING AMATEUR BUILT AIRCRAFT		CATE	
A	CATEGORY / PURPOSE	B NAME/ MANUFACTURER NAME N/A ADDRESS N/A FROM N/A TO N/A SUBJECT TO PARA D (2) REVERSE SIDE			
B	MANUFACTURER	D IN- BUILDER SERIAL NO. MODEL			
C	FLIGHT	E DATE OF ISSUANCE 02-09-09 EXPIRY 02-16-09			
D	N-BUILDER	OPERATING LIMITATIONS DATED 02-16-09 ARE A PART OF THIS CERTIFICATE			
E	DATE OF ISSUANCE	SIGNATURE OF FAA REPRESENTATIVE DESIGNATION OR OFFICE NO.			
	OPERATING	ANY ALTERATION, REPRODUCTION OR FALSIFICATION OF THIS CERTIFICATE MAY BE PENALIZED BY A FINE NOT EXCEEDING \$1,000 OR IMPRISONMENT NOT EXCEEDING 3 YEARS, OR BOTH. THIS CERTIFICATE MUST BE DISPLAYED IN THE AIRCRAFT IN ACCORDANCE WITH APPLICABLE FEDERAL AVIATION REGULATIONS.			
	SIGNATURE	757			
	SIGNATURE	1. No person may operate this aircraft for other than the purpose of operating Amateur-Built aircraft to accomplish the flight test outlined in the applicant's letter dated <u>02-16-09</u> describing compliance with FAR 21.193. The program letter must be made available to the pilot-in-command of the aircraft. All amateur-built operations shall be conducted in accordance with applicable air traffic and general operating rules of FAR Part 91, and additional limitations herein presented under the provisions of FAR 91.319.			
	SIGNATURE	2. The initial 40 hours of flight shall be conducted within the geographical area described as follows:			
	SIGNATURE	3. Except for takeoffs and landings from the _____ no person may operate this aircraft over densely populated areas or in congested airways.			
	SIGNATURE	4. This aircraft is to be operated under VFR, day only.			
	SIGNATURE	5. Unless prohibited by design, aerobatics are permitted in the assigned flight test area. All aerobatics are to be conducted under provisions of FAR 91.303.			
	SIGNATURE	6. No person may be carried in this aircraft during flight unless that person is required for the purpose of the flight.			
	SIGNATURE	7. The FAA certificating office must be notified and their response received in writing prior to flying this aircraft after incorporating a major change as defined by FAR 21.93.			
	SIGNATURE	8. The operator of this aircraft shall notify the air traffic control tower of the experimental nature of this aircraft when operating into or out of airports with operating air traffic control towers.			
	SIGNATURE	9. The pilot-in-command of this aircraft must, as applicable, hold an appropriate category / class rating, have an aircraft type rating, or have a flight instructor's logbook endorsement; and possess a "Letter of Authorization" issued by the FAA.			
	SIGNATURE	Page 1 of 2			
	SIGNATURE	FAA FORM 8130-7			
	SIGNATURE	OR IMPRISONMENT NOT FEDERAL AVIATION			
	SIGNATURE	E REVERSE SIDE			



SPECIAL LIGHT SPORT AIRCRAFT



MAINTENANCE

Maintenance Training for A&P's

- Transition training
- Just as important for mechanics as pilots
- **Part 65 applies**



SLSA MAINTENANCE

- **Sec. 65.85**
Airframe rating; additional privileges
- **[(b) A certificated mechanic with an airframe rating can approve and return to service an airframe, or any related part or appliance, of an aircraft with a special airworthiness certificate in the light-sport category after performing and inspecting a major repair or major alteration for products that are not produced under an FAA approval **provided the work was performed in accordance with instructions developed by the manufacturer** or a person acceptable to the FAA.]**

SLSA MAINTENANCE

- **Sec. 65.87**
Powerplant rating; additional privileges.
- **[(b) A certificated mechanic with a powerplant rating can approve and return to service a powerplant or propeller, or any related part or appliance, of an aircraft with a special airworthiness certificate in the light-sport category after performing and inspecting a major repair or major alteration for products that are not produced under an FAA approval, **provided the work was performed in accordance with instructions developed by the manufacturer** or a person acceptable to the FAA.]**

Maintenance Manuals

Contains information such as:

- Ground test.
- Level check of liquids.
- Re-torque cylinder head nuts.
- Re-torque of exhaust manifold screws.
- Checking of the rewind starter rope.
- Rewind starter dismantling.
- Rewind starter reassembly.



Keep the engine running

- **Preflight –**
 - Good preflight planning
 - Good preflight inspections
- **Don't tinker with your prop**
 - Use factory settings
- **Carburetor –**
 - Use factory settings
- **Old fuel – Auto fuel Shelf life of 90 days, Avgas 120 days.**



**Intake socket backward
Type 503**



**Over tight
Wrong clamps**



**Intake socket cracks
and over tight 2 stroke**



**Intake socket cracks
2 stroke**

Cold/Heat Seizure

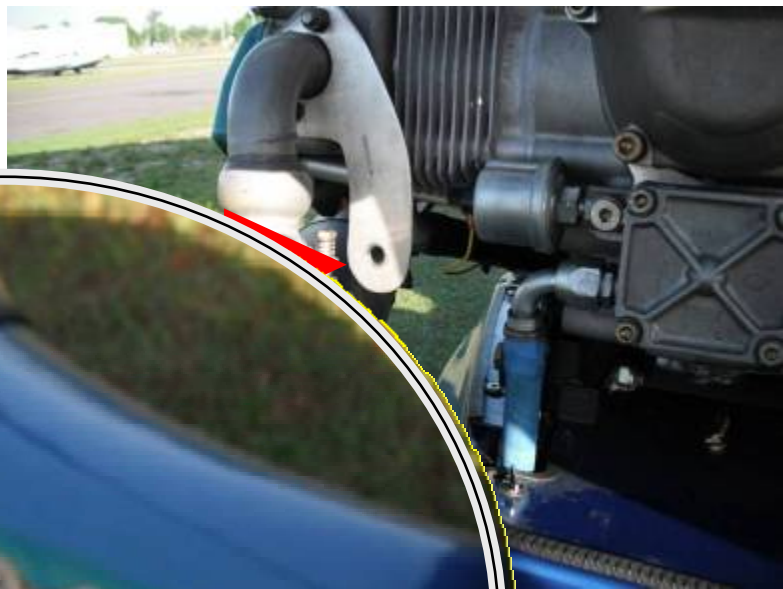


**Cold seizure on Rotax 582
intake side of the piston.**



**Cold seizure on exhaust side
(PTO) of the piston.**

Photo's courtesy of
[Greensky Adventures](#)



Missing Muffler Support Band

Effects of Detonation



Apollo Monsoon

Life Limited Parts

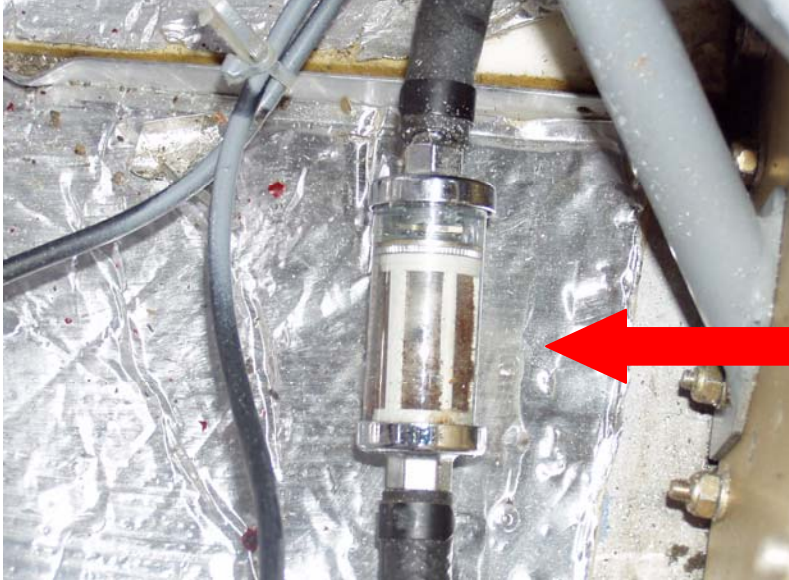
“Pit Pin”

2.3.5 Component Replacement Schedule

Airframe	Lifespan	
Whole Hang block Assembly – including hang bolt	On condition	n/a
Hang Bolt (x1)	100 H	1 year
All nuts and bolts of mast/pylon	On condition	n/a
All brackets like the compression strut securing brackets etc.	On condition	n/a
Front suspension bolts/nuts		
Rear suspension securing bolts to base tube (x4)		
Rear axle bracket to landing gear securing bolts (x8)	On condition	
Rear axle to axle bracket securing bolt (x4 – 2 per axle)	or 600 H	6 years
Front Fork Shock Absorbers	On condition	n/a
All airframe ball-joints, bolts and nuts	On condition	n/a
Brake lines	On condition	n/a
Mast/Pylon	1000 hours	n/a
Tires	On condition	6 years
Seatbelts	On condition	5 years
Flush and bleed the brakes using correct tool and DOT 4 fluid from a sealed container for Delta Jet and Automatic Transmission Fluid (ATF aka 5606 milspec) for Monsoon	If brakes start to feel spongy	4 years
All rear suspension components (landing gear)	1500 H	
	On condition for trike carriage and every 1500 for wing tubing skeleton and sail	
Metal Airframe components		
Wing Cables	As needed on condition or 950 hours or 8 years	



Good Design

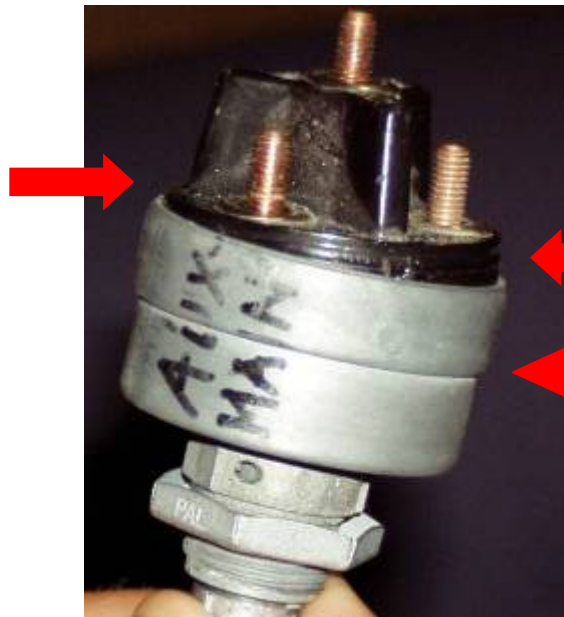
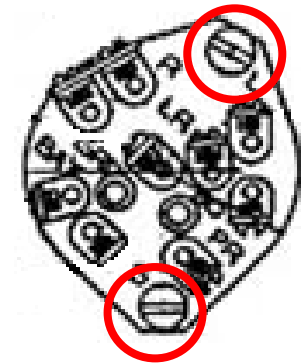


Good 

Not so Good 



Good Design



Good



Not so Good



Good Workmanship



Good Workmanship



RANS S-15

Loose Ballast Bag

Good Workmanship



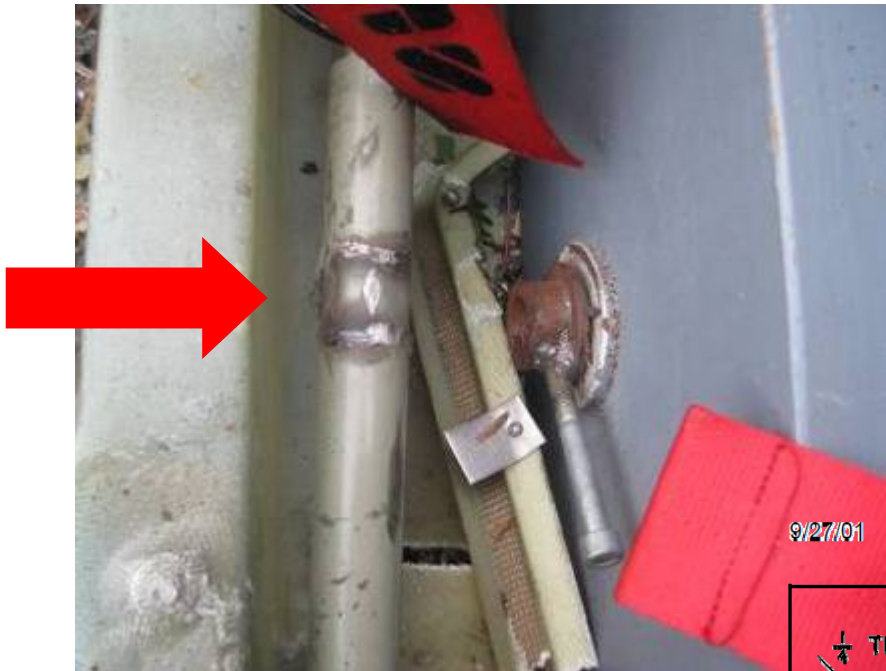
Chaffing Fuel Line

Too Much RTV



Qualt 200 Sonoma, CA 11/06/2010

Search the Web AC43.13-1B



9/27/01

AC 43.13-1B CHG 1

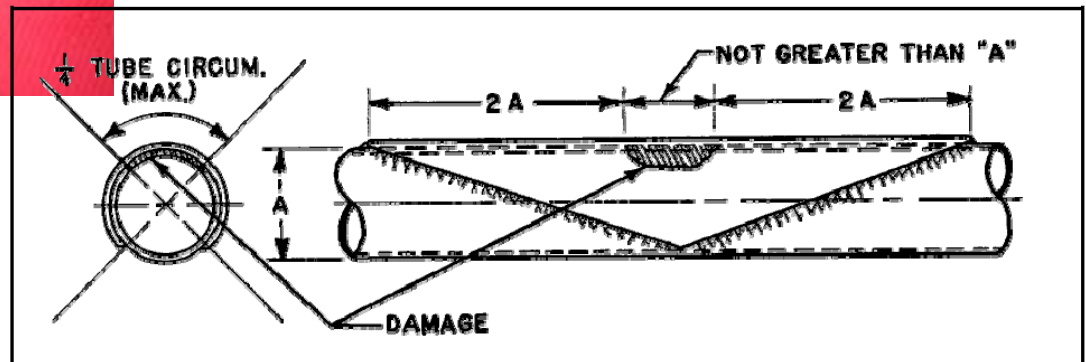


FIGURE 4-36. Welded patch repair.

Good Workmanship

“I inspected the wing and I could not believe what I saw. The wing was hardly glued together with only 25% of the joints bonded.”

-Engineering Consultant



Experimental Amateur Built Aircraft

- **Issued for: Operating an aircraft the major portion of which has been fabricated and assembled by persons who undertook the construction project solely for their own education or recreation.**
 - An amateur-builder's original design
 - Purchased plans
 - Manufactured kits



Flight Testing

- **Flight test programs serve two purpose:**
 - Ensure aircraft has been adequately tested and determined to be safe within aircraft's flight envelope
 - Flight test data is used to develop accurate and complete Aircraft Flight Manual and to establish emergency procedures.

Flight testing and First Flight, or second, third,

- **90% of the accidents occur on the first flight.**
- **Unfortunately, most of these accidents happen to second or third owners.**
- **The main cause of experimental airplane fatal accidents is pilot performance particularly in the transition phase to an unfamiliar airplane.**

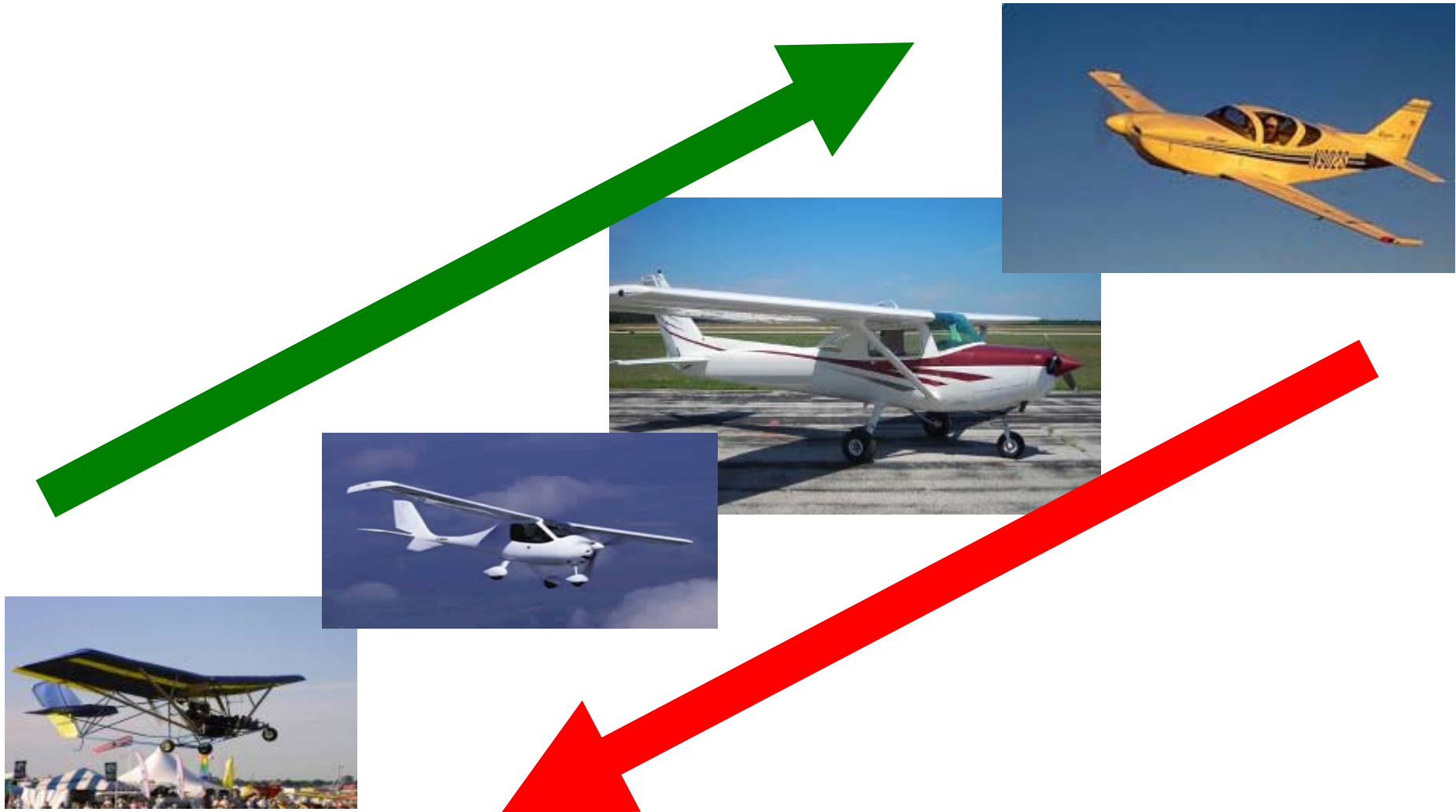


Transitioning to a new airplane

- **Even if a pilot is experienced and knowledgeable, transitioning to a new airplane can still be challenging.**
- **This is especially true in Experimental airplanes, as system design, switches, controls, operation and indications may be different.**



Transition Training for Pilots



EAA Flight Advisor program



The Spirit of Aviation™



AVIATION INTERESTS | PROGRAMS | NEWS & EVENTS | MULTIMEDIA | SUPPORT EAA | MEMBER SERVICES | OSHKOSH 365 | COMMUNITY

EAA Flight Advisors

The EAA Flight Advisor program helps with everything from finding the right instructor and planning a first flight to determining the types of additional training needed. More than 500 flight advisors counsel members considering purchasing an aircraft, preparing for flight in a newly built or restored aircraft, or looking to transition to a high performance or unfamiliar aircraft. Only EAA Members can take advantage of the complimentary services of a Flight Advisor.

You're at that point in your homebuilding project when a second set of eyes looking over your work sure would be comforting. I can hear the questions in your mind:

Did I really do this right? Does that look right?

It doesn't matter whether you've just finished your wing rib jig or made the first glass layups, if you're feeling insecure, there's folks around to help.

People who've been there and done that, people who know the marvels of the aviation world, such as your new Stumpfire Belchwing, like the back of their hand. People who can pat you on the back and say, "No, seriously, it looks fine," or say, "Have you considered doing it over?" This is a vehicle in which you're going to defy gravity; it's obviously better to be safe than sorry.

Additional Information

[Find A Flight Advisor](#)

[Become A Flight Advisor](#)

[Safety Wire Newsletter](#)



HOMEBUILDERS HOME

PROGRAMS

AIRCRAFT FAQs

EAA VIDEO PLAYER

ARTICLES

KITS & PLANS

SPORTAIR WORKSHOPS



EAA Technical Counselor Program



The Spirit of Aviation™



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EAA Technical Counselors

EAA Technical Counselors are experienced airplane builders, restorers, and mechanics who volunteer their time to visit other EAA members who are in the process of building or restoring their own aircraft. The goal of the Technical Counselor Program is to help EAA members present a "zero defect" aircraft at its final inspection by the FAA.

You're at that point in your homebuilding project when a second set of eyes looking over your work sure would be comforting. I can hear the questions in your mind:

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What you need is an EAA Technical Counselor! These folks are experienced, volunteer advisors who want to share their knowledge and expertise with you.

Find A Tech Counselor

Select a Geographic Location

or

Chapter Number:

Additional Information

[Advanced Search](#)

[Become A Tech Counselor \(.pdf\)](#)

[Submit A Report](#)

[Safety Wire Newsletter](#)



Even the best of aircraft can experience problems

- **Case Study. EAA Grand Champion aircraft experienced engine power loss to second owner.**



Even the best of aircraft can experience problems

- While the construction of this air filter box looks good it is missing something.



Even the best of aircraft can experience problems

- Normally there is some form of screen/retainer behind the filter to prevent it from being ingested into the engine.



 Search Search

Courses

FAA S

Featured C

Earn WINGS or / one of our fe
• Line Up and

• Working Hea
Protecting You

• WINGS - Pilc
NEW Course!

AMT Awards

The AMT Award
AMTs and emp
advantage of ir
training by issu
training receive

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On

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9/8/98

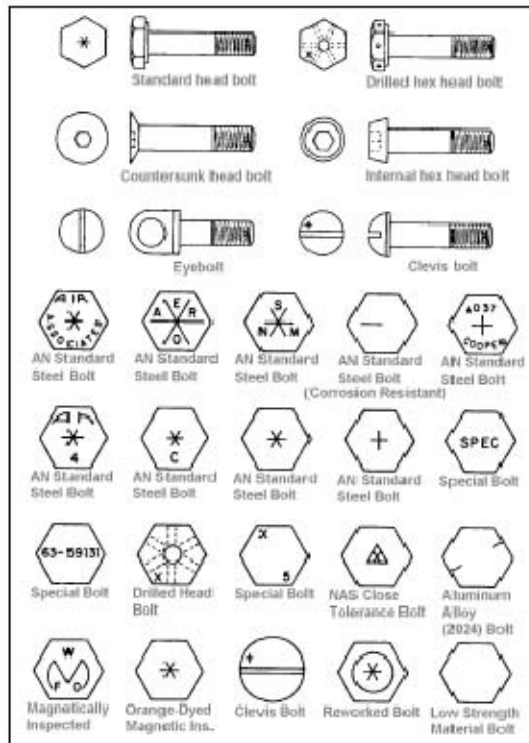


FIGURE 7-1. Typical aircraft bolt markings.

identification. In the case of plate nuts, if

of 0.0006 inch for a 5/8 inch bolt. Bolt holes should be flush to the surface, and free of debris to provide full bearing surface for the bolt head and nut. In the event of over-sized or elongated holes in structural members, reaming or drilling the hole to accept the next larger bolt size may be permissible. Care should be taken to ensure items, such as edge distance, clearance, and structural integrity are maintained. Consult the manufacturer's structural repair manual, the manufacturer's engineering department, or the FAA before drilling or reaming any bolt hole in a critical structural member.

7-40. TORQUES. The importance of correct torque application cannot be overemphasized. Undertorque can result in unnecessary wear of nuts and bolts, as well as the parts they secure. Overtorque can cause failure of a bolt or nut from overstressing the threaded areas. Uneven or additional loads that are applied to the assembly may result in wear or premature failure. The following are a few simple, but important procedures, that should be followed to ensure that correct torque is applied.

the FAASTeam

 Search

Help

est



THANK YOU FOR YOUR KIND ATTENTION

Light Sport Aviation Branch AFS-610

- Mailing Address

Light Sport Aviation Branch AFS-610
PO Box 25082
Oklahoma City OK, 73125

- Phone Number

405-954-6400

- WEB Address

<http://www.faa.gov>
Search for light sport branch

- EMAIL:

afs610comments@faa.gov



Your FAASTeam Program Manager

- Can support your questions. Your local FPM can be located through www.FAASafety.gov in the directory link.

***Thank your and
remember safety***



Lets not meet by accident!

