Airworthiness Requirements

Objective

To understand the requirements and documents that proves that our airplane is airworthy, both from a legal perspective and a safety perspective.

Motivation

A pilot should be able to determine the airworthiness status of an airplane given the logbooks and maintenance records to determine if it is safe and legal to fly.

Overview

- Type certificates and airworthiness certificates
- ARROWS documents - in the plane
- AV1ATED checklist - maintain the plane
- Aircraft logbooks
- Aircraft equipment lists
- 91.205, required VFR equipment
- Kind of Equipment List (KOEL)
- Minimum Equipment List (MEL), 91.213
- Special Flight Permits
- Preventative Maintenance

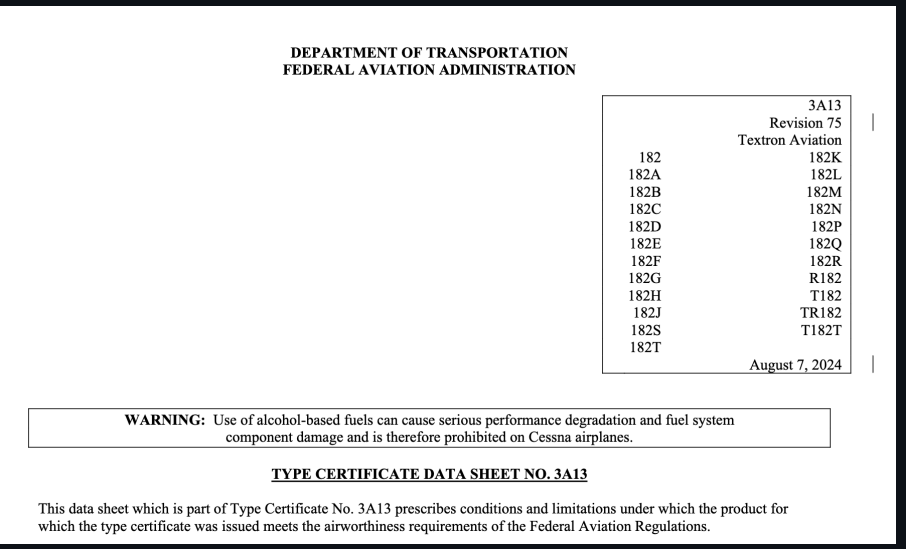
Airworthiness Definition

Airworthiness means the aircraft is legal to fly, meeting the airworthiness criteria defined by the FAA.

Who is responsible for determining airworthiness?

Per 91.7:

> The pilot in command of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight. The pilot in command shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur.



DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

	3A13
	Revision 75
	Textron Aviation
182	182K
182A	182L
182B	182M
182C	182N
182D	182P
182E	182Q
182F	182R
182G	R182
182H	T182
182J	TR182
182S	T182T
182T	
	August 7, 2024

WARNING: Use of alcohol-based fuels can cause serious performance degradation and fuel system component damage and is therefore prohibited on Cessna airplanes.

TYPE CERTIFICATE DATA SHEET NO. 3A13

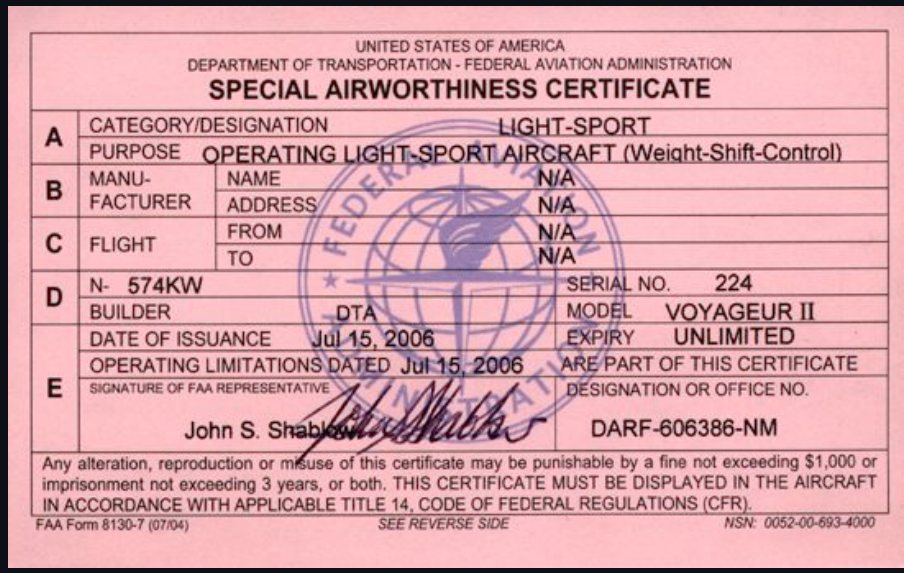
This data sheet which is part of Type Certificate No. 3A13 prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Aircraft Certification

- When an aircraft is designed it undergoes a certification process for the model being produced
- Following certification, the model receives a type certificate and authorization for production
- When that model of aircraft is manufactured they receive an airworthiness certificate
- Each type has a type certificate data sheet (TCDS), which includes various information about the type

Standard vs Special Airworthiness Certificate

- Standard Airworthiness Certificate: "Certified" aircraft
- Special Airworthiness Certificate, other types of aircraft:
  - Experimental
  - Restricted
  - Limited
  - Provisional
  - Light-Sport Aircraft (LSA)



UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

SPECIAL AIRWORTHINESS CERTIFICATE

A	CATEGORY/DESIGNATION	LIGHT-SPORT	
	PURPOSE	OPERATING LIGHT-SPORT AIRCRAFT (Weight-Shift-Control)	
B	MANU-FACTURER	NAME	N/A
		ADDRESS	N/A
C	FLIGHT	FROM	N/A
		TO	N/A
D	N- 574KW		SERIAL NO. 224
	BUILDER	DTA	MODEL VOYAGEUR II
E	DATE OF ISSUANCE	Jul 15, 2006	EXPIRY UNLIMITED
	OPERATING LIMITATIONS DATED	Jul 15, 2006	ARE PART OF THIS CERTIFICATE
	SIGNATURE OF FAA REPRESENTATIVE	John S. Shablow	DESIGNATION OR OFFICE NO. DARF-606386-NM

Any alteration, reproduction or misuse of this certificate may be punishable 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 TITLE 14, CODE OF FEDERAL REGULATIONS (CFR).

FAA Form 8130-7 (07/04) SEE REVERSE SIDE NSN: 0052-00-693-4000

Supplemental Type Certificates - Changes to Original Designs

- Used for major modifications to an existing certified aircraft
- Requires engineering work to prove the safety of the aircraft following the change
- Examples:
  - Retrofit avionics and autopilots
  - Different engines or propellers
  - After-market turbochargers

What documents do we need to legally fly?

ARROW:

1. **A**irworthiness certificate: Displayed where passengers can see it
2. **R**egistration certificate: State and local
3. **R**adio station license from FCC, for flight outside the U.S.
4. **O**perating Limitations: AFM/POH, placards, markings
5. **W**eight and balance information: Latest measurements
6. **S**erial number data plate

A - Airworthiness Certificates

- Issued with the airframe when it was manufactured
- No expiration date: Good as long as the aircraft is maintained in an airworthy condition
- Required per 91.203(a)

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION—FEDERAL AVIATION ADMINISTRATION
STANDARD AIRWORTHINESS CERTIFICATE

1. NATIONALITY AND REGISTRATION MARKS	2. MANUFACTURER AND MODEL	3. AIRCRAFT SERIAL NUMBER	4. CATEGORY
N2017E	Cessna T182	18268183	Normal

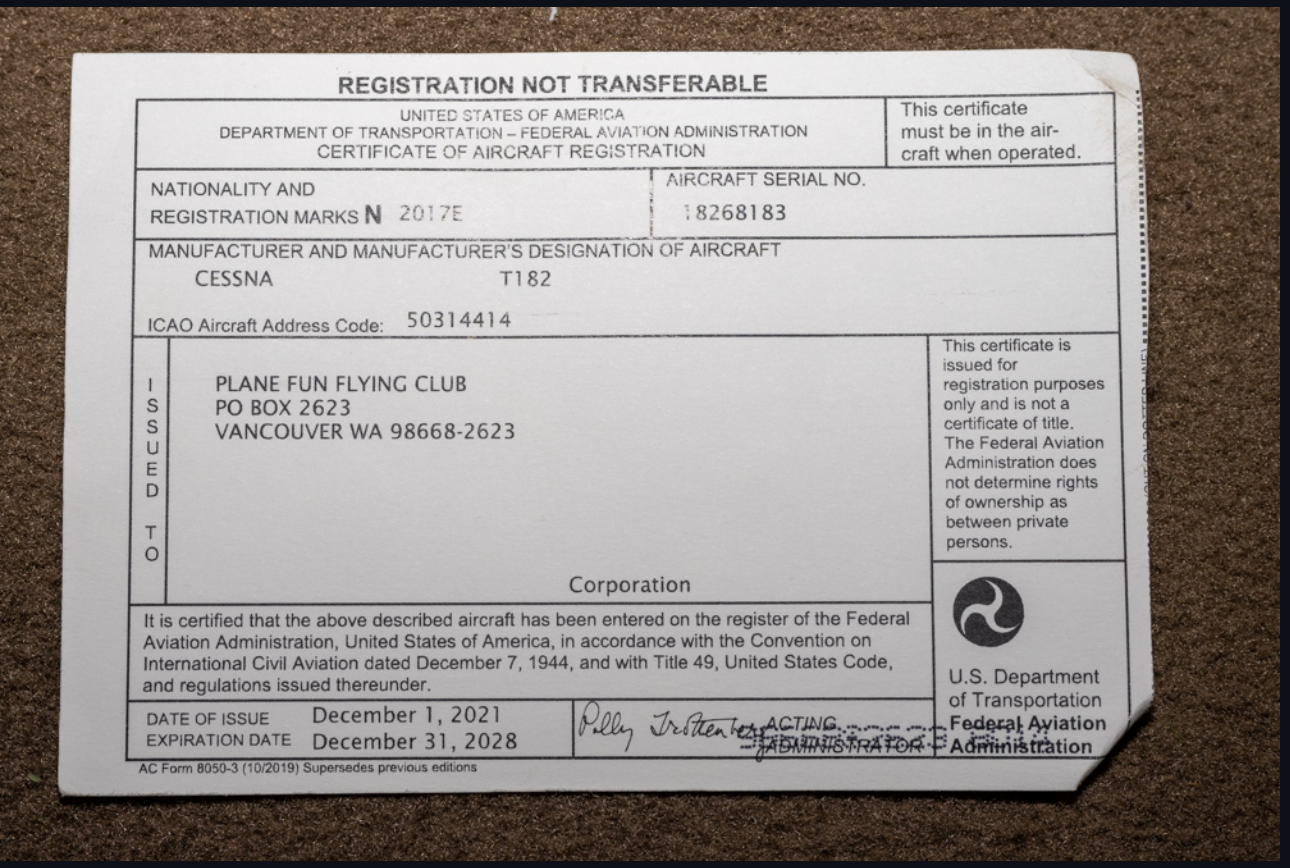
5. AUTHORITY AND BASIS FOR ISSUANCE
This airworthiness certificate is issued pursuant to the Federal Aviation Act of 1958 and certifies that, as of the date of issuance, the aircraft to which issued has been inspected and found to conform to the type certificate therefor, to be in condition for safe operation, and has been shown to meet the requirements of the applicable comprehensive and detailed airworthiness code as provided by Annex 8 to the Convention on International Civil Aviation, except as noted herein.
Exceptions:
None

6. TERMS AND CONDITIONS
Unless sooner surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator, this airworthiness certificate is effective as long as the maintenance, preventative maintenance, and alterations are performed in accordance with Parts 21, 43, and 91 of the Federal Aviation Regulations, as appropriate, and the aircraft is registered in the United States.
Cessna Aircraft Co., Wichita, Kansas
Delegation Option Manufacturer, CE-1

DATE OF ISSUANCE	FAA REPRESENTATIVE	DESIGNATION NUMBER
3-9-82	By William F. Denny	DOA-PC4

Any alteration, reproduction, or misuse of this certificate may be punishable 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.

AA Form 8100-2 (7-67) FORMERLY FAA FORM 1362 ☆ U.S. Government Printing Office — 1976-675-526



REGISTRATION NOT TRANSFERABLE

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION – FEDERAL AVIATION ADMINISTRATION
CERTIFICATE OF AIRCRAFT REGISTRATION

This certificate must be in the aircraft when operated.

NATIONALITY AND REGISTRATION MARKS N 2017E

AIRCRAFT SERIAL NO. 18268183

MANUFACTURER AND MANUFACTURER'S DESIGNATION OF AIRCRAFT
CESSNA T182

ICAO Aircraft Address Code: 50314414

ISSUED TO
PLANE FUN FLYING CLUB
PO BOX 2623
VANCOUVER WA 98668-2623
Corporation

This certificate is issued for registration purposes only and is not a certificate of title. The Federal Aviation Administration does not determine rights of ownership as between private persons.

It is certified that the above described aircraft has been entered on the register of the Federal Aviation Administration, United States of America, in accordance with the Convention on International Civil Aviation dated December 7, 1944, and with Title 49, United States Code, and regulations issued thereunder.

DATE OF ISSUE December 1, 2021
EXPIRATION DATE December 31, 2028

Billy Trostenberg ACTING ADMINISTRATOR

U.S. Department of Transportation
Federal Aviation Administration

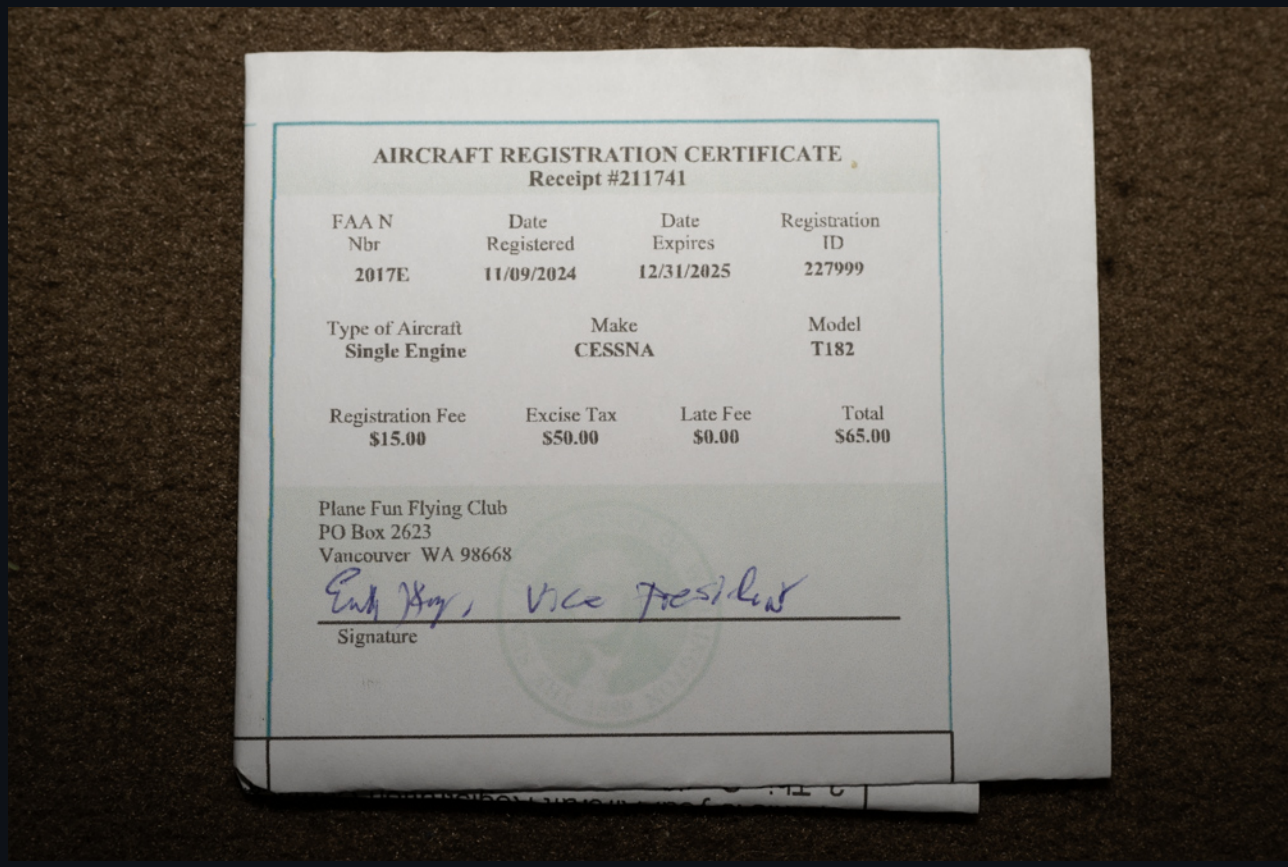
AC Form 8050-3 (10/2019) Supersedes previous editions

R - Registration Certificate

- Federal aircraft registration for a given N-number
- Good for 3 years from issuance (47.31)
- Required per 91.203(a)

R - State Registration Certificate

- Some states require their own registration certificate
- Varies between states



AIRCRAFT REGISTRATION CERTIFICATE
Receipt #211741

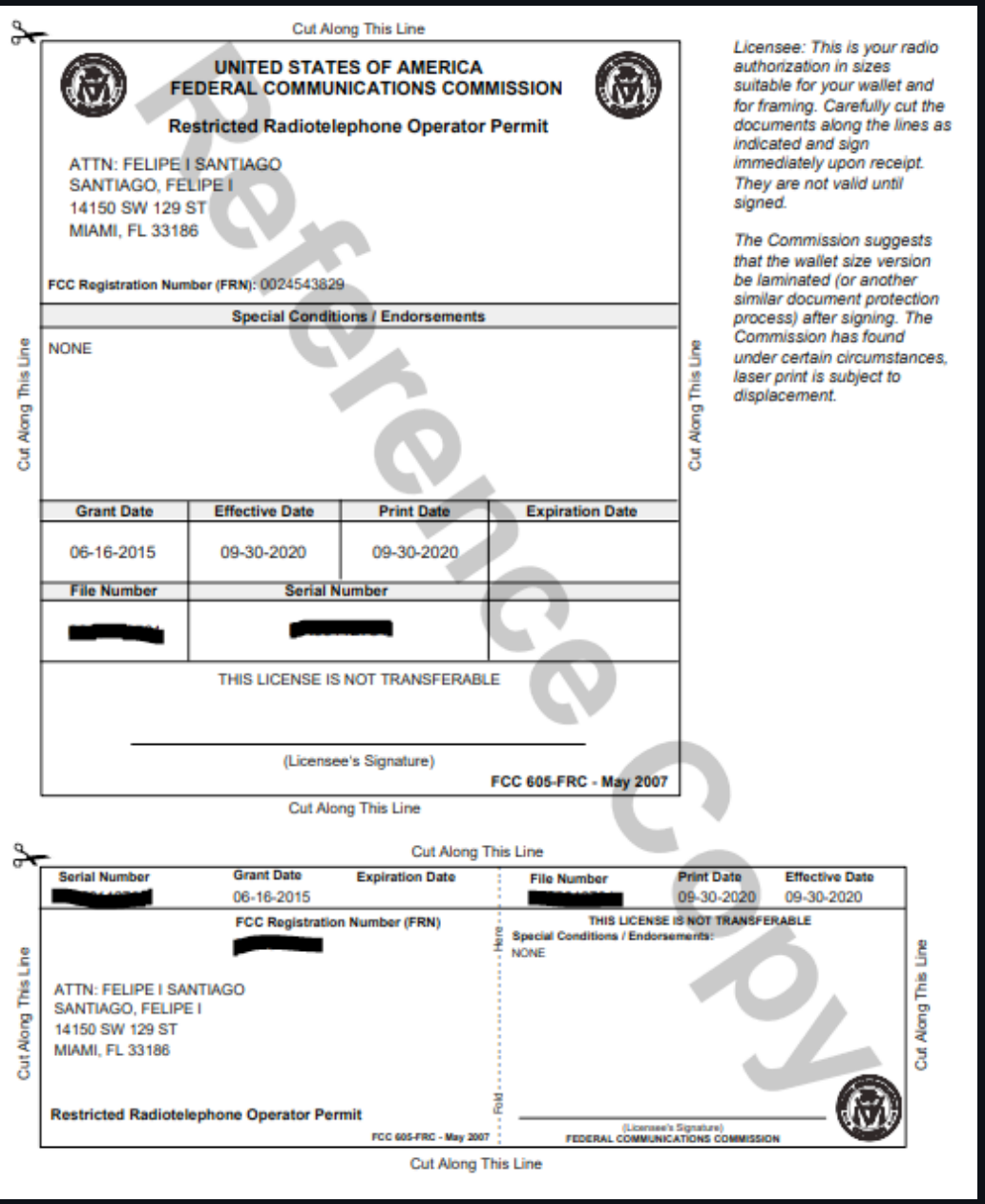
FAA N Nbr	Date Registered	Date Expires	Registration ID
2017E	11/09/2024	12/31/2025	227999

Type of Aircraft	Make	Model
Single Engine	CESSNA	T182

Registration Fee	Excise Tax	Late Fee	Total
$15.00	$50.00	$0.00	$65.00

Plane Fun Flying Club
PO Box 2623
Vancouver WA 98668

Signature



Cut Along This Line

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

Restricted Radiotelephone Operator Permit

ATTN: FELIPE I SANTIAGO
SANTIAGO, FELIPE I
14150 SW 129 ST
MIAMI, FL 33186

FCC Registration Number (FRN): 0024543829

Licensee: This is your radio authorization in sizes suitable for your wallet and for framing. Carefully cut the documents along the lines as indicated and sign immediately upon receipt. They are not valid until signed.

The Commission suggests that the wallet size version be laminated (or another similar document protection process) after signing. The Commission has found under certain circumstances, laser print is subject to displacement.

Cut Along This Line

Special Conditions / Endorsements

NONE

Cut Along This Line

Grant Date	Effective Date	Print Date	Expiration Date
06-16-2015	09-30-2020	09-30-2020	

File Number	Serial Number	
[redacted]	[redacted]	

THIS LICENSE IS NOT TRANSFERABLE

(Licensee's Signature)

FCC 605-FRC - May 2007

Cut Along This Line

Cut Along This Line

Serial Number	Grant Date	Expiration Date	File Number	Print Date	Effective Date
[redacted]	06-16-2015		[redacted]	09-30-2020	09-30-2020

FCC Registration Number (FRN)

[redacted]

ATTN: FELIPE I SANTIAGO
SANTIAGO, FELIPE I
14150 SW 129 ST
MIAMI, FL 33186

Restricted Radiotelephone Operator Permit

FCC 605-FRC - May 2007

Fold Here

THIS LICENSE IS NOT TRANSFERABLE
Special Conditions / Endorsements:
NONE

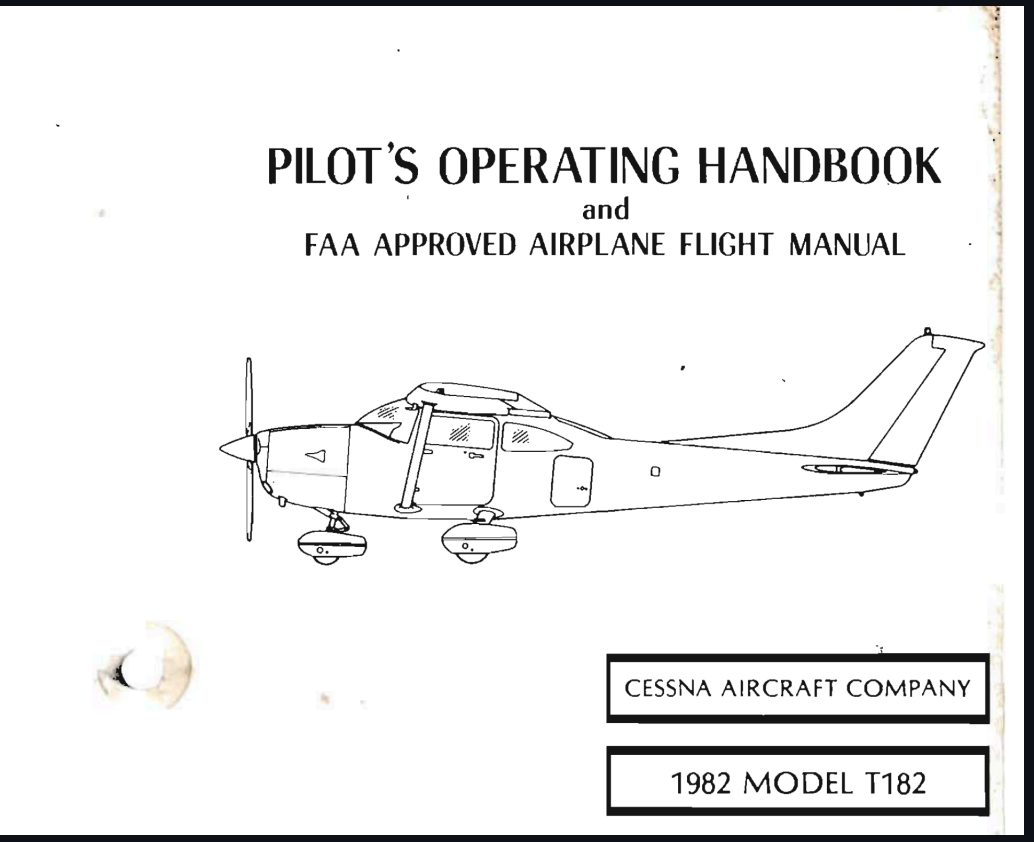
(Licensee's Signature)
FEDERAL COMMUNICATIONS COMMISSION

Cut Along This Line

Cut Along This Line

R - Radio Station License - FCC

- Required for flights outside the U.S.
- 87.18



O - Operating Limitations / Approved Flight Manual

- Aircraft produced since 1979 should have an approved flight manual (AFM)
- These are standardized into common chapters (general, limitation, performance)
- Limitation are in conjunction with placards in the aircraft
- Standardized by 21.5

W - Weight and Balance

- Current weight and balance information including:
  - Latest empty weight
  - Latest empty moment
  - Latest empty CG location (inches aft of datum)

S - Serial Number and External Data Plate

- Required per 45.11(a)

Airworthiness Checklist

1. **A**nnual inspection
2. **V**OR test
3. **1**00-hour inspection
4. **A**ltimeter/pitot-static inspection
5. **T**ransponder inspection
6. **E**LT
7. **D**irectives - Airworthiness directives and life-limited parts

A - Annual Inspection - Every 12 months

- Required per 91.409
- Check of the aircraft systems by an authorized mechanic
- Details of work in Part 43 Appendix D
- Airframe, propeller, and engine have separate annuals (usually done at the same time)

V - VOR test - IFR flight only - Every 30 days

- 91.171
- Only required for IFR flight
- Check of the accuracy of the VOR receiver
- Can be done by a pilot

1 - 100-hour inspection - Compensation or hire - Every 100 hours

- 91.409(b)
- Required for airplanes flying for hire, or for flight instruction if the instructor is providing the aircraft
- Can be exceeded by 10 hours, to relocate to a location where the inspection can be done
- Good for 24 months, to the end of the month
- Tachometer time (not Hobbs time)
- Same inspection as annual, details in Part 43 Appendix D

A - Altimeter/Pitot-Static

IFR flight only - 24 months

- Required per 91.411
- Ensure the accuracy of the altimeter, airspeed indictor, VSI
- Only needed for IFR flight

T - Transponder - 24 months

- Required per 91.413
- Tests the operation of the transponder radio
- Often done concurrently with the pitot-static test

E - ELT - 12 months

- Required per 91.207
- Inspection of the ELT, including
  - Installation
  - Battery corrosion
  - Operation of the crash sensor
  - Signal from the antenna

E - ELT - Battery Requirements

The battery for an ELT must be replaced (or recharged) after:

- 1 hour of cumulative use
- When 50% of its useful life has been consumed
  - Batteries are rated for a certain lifespan (2-year battery, etc.)
- This is separate from the ELT test

D - Airworthiness Directives

- Airworthiness directives are legally-required mandates made by the FAA to correct an unsafe condition in a product
- Used to correct deficiencies after an airplane has been certified
- Can require a one-time fix or inspection
- May require a recurring inspection
- Two types:
  - Emergency issue: Addressing a urgent, safety-of-flight issue
    - Example: 737 MAX groundings
  - Normal issue: Less urgent, usually requires compliance within a specified period

Example A.D.

Details

AD Number:
98-16-04

Document Type:
AD Final Rules

Docket Number:
97-CE-14-AD

Subject Heading:
Airworthiness Directives; Cessna Models 180, 182, and 185 Series Airplanes

Subject:
Inspect Angle Stiffener Along Lower Spar Cap

Status:
Current

Compliance: Required within the next 50 hours time-in-service (TIS) after the effective date of this AD, unless already accomplished.

To prevent wing failure during flight caused by the absence of an angle stiffener, which could cause loss of control of the airplane, accomplish the following:

(a) Inspect inside the left and right wings, aft of the spar, closest to where the strut connects to the wing, for an angle stiffener along the lower spar cap between Wing Station (W.S.) 90 and W.S. 110 in accordance with Part A of the Accomplishment Instructions of Air Research Technology, Inc. (ART) Service Bulletin (SB) No. SB-1-96, Issue 1, dated April 11, 1996.

(b) If an angle stiffener is not installed, prior to further flight, install a stainless steel reinforcement strap on the underside of each wing, along the spar at W.S. 100.50 in accordance with Part B of the Accomplishment Instructions of ART SB No. SB-1-96, Issue 1, dated April 11, 1996.

D - Life-Limited Parts

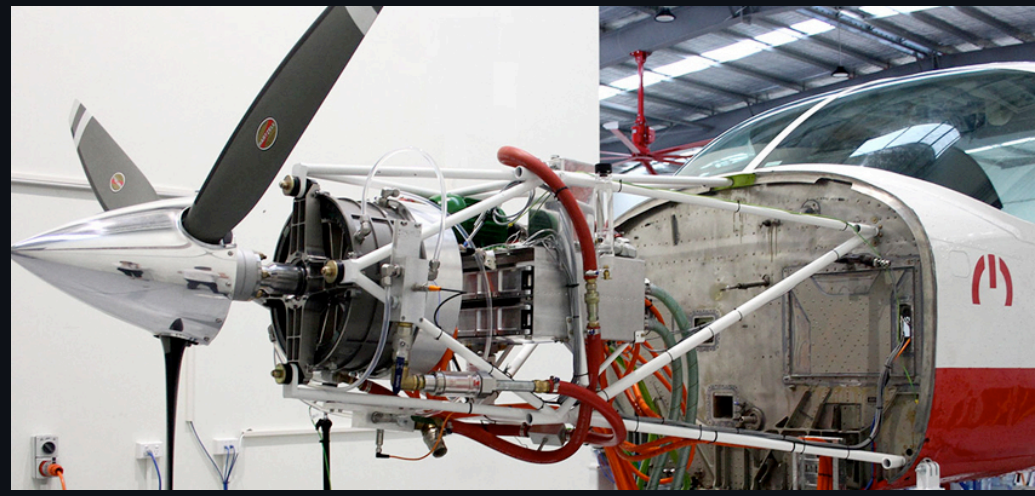
- Parts that have a fixed lifetime and must be replaced at some interval in the life of an aircraft
- Life-limited parts may be required per the original type certificate or an AD
  - Listed in the type certificate data sheet
- Examples: Helicopter rotor blades, turbine fan blades
- Less common on light airplanes

Service Bulletins (S.B.'s)

- Service bulletins are issued by the manufacturer
- Describe recommended inspections or maintenance
- Not regulatory
- Some SB's are labelled as "Mandatory Service Bulletins", which usually affect flight safety
- A.D.'s often start as service bulletins

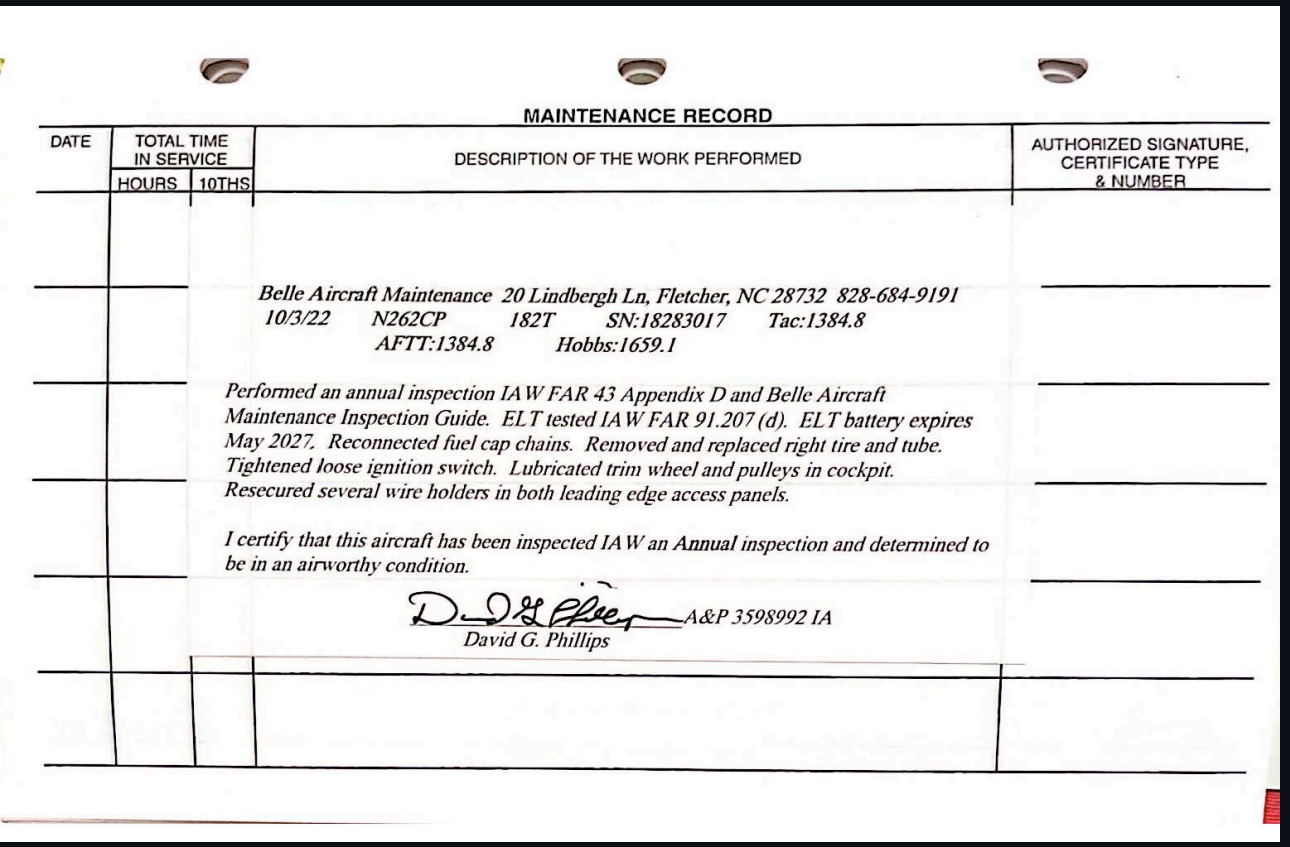
Time Between Overhauls (TBO)

- Aircraft engines have recommended hours between engine overhauls
- An engine overhaul usually requires a replacement or rebuild
- TBOs for reciprocating engines are around 1,200 to 2,000 hours
- Specific aircraft will list the time since major overhaul (SMOH)
- Not required for Part 91 operators



Airworthiness Checklist Review

1. **A**nnual inspection - 12 month
2. **V**OR test - 30 days
3. **1**00-hour inspection - 100 hours
4. **A**ltimeter/pitot-static inspection - 24 months
5. **T**ransponder inspection - 24 months
6. **E**LT - 12 months, plus battery requirements
7. **D**irectives - ADs/Life-limited parts - As needed



MAINTENANCE RECORD

DATE	TOTAL TIME IN SERVICE HOURS	TOTAL TIME IN SERVICE 10THS	DESCRIPTION OF THE WORK PERFORMED	AUTHORIZED SIGNATURE, CERTIFICATE TYPE & NUMBER
			Belle Aircraft Maintenance 20 Lindbergh Ln, Fletcher, NC 28732 828-684-9191 *10/3/22 N262CP 182T SN:18283017 Tac:1384.8* *AFTT:1384.8 Hobbs:1659.1* *Performed an annual inspection IA W FAR 43 Appendix D and Belle Aircraft Maintenance Inspection Guide. ELT tested IA W FAR 91.207 (d). ELT battery expires May 2027. Reconnected fuel cap chains. Removed and replaced right tire and tube. Tightened loose ignition switch. Lubricated trim wheel and pulleys in cockpit. Resecured several wire holders in both leading edge access panels.* *I certify that this aircraft has been inspected IA W an Annual inspection and determined to be in an airworthy condition.* *A&P 3598992 IA* *David G. Phillips*	

Aircraft Logbooks

- Often broken down into separate logbooks for airframe, propeller, engine, and sometimes avionics
- A&P: Airframe and powerplant mechanic
- I.A.: Inspection authorization, an A&P allowed to sign-off annuals

Required Equipment

- What equipment is required to be in the airplane?
- What do we do if we find equipment that's inoperative?

Required Equipment - Day VFR

91.205(b) - ATOMATOFLAMES

- **A**ltimeter
- **T**achometer
- **O**il pressure gauge
- **M**anifold pressure gauge
- **A**irspeed indicator
- **T**emperature gauge
  - For each liquid-cooled engine
- **O**il temperature gauge
- **F**uel gauge for each tank
- **L**anding gear position indicator
- **A**nti-collision lights
- **M**agnetic compass
- **E**LT
- **S**eat belts

Required Equipment - Night VFR

- All the day VFR required equipment (ATOMATOFLAMES), plus
- 91.205(c) - FLAPS
  - **F**uses
  - **L**anding light (if flown for hire)
  - **A**nti-collision lights - beacon or strobes
  - **P**osition lights / nav lights - red and green
  - **S**ource of power

Inoperative Equipment

- Under 14 CFR, all installed equipment must be operational prior to a flight
- If a piece of equipment is not operational we can:
  - Fix the piece of equipment
  - Defer maintenance of the item, for some items

Equipment We Have to Fix (91.213(d)(2))

- Those required for specific operations by Part 91, including:
  - Day VFR equipment 91.205(b) - ATOMATOFLAMES
  - Night VFR equipment 91.205(c) - FLAPS
- Those required per the Kinds of Operations Equipment List (KOEL), if present
- Those required by an AD to be operative

Cirrus Design
SR22

Section 2
Limitations

System, Instrument, and/or Equipment	Kinds of Operation				Remarks, Notes, and/or Exceptions
	VFR Day	VFR Nt.	IFR Day	IFR Nt.	
Ice & Rain Protection					
Alternate Engine Air Induction System	1	1	1	1	
Alternate Static Air Source	1	1	1	1	
Pitot Heater	—	—	1	1	
Landing Gear					
Wheel Pants	—	—	—	—	May be removed.
Lights					
Anticollision Lights	2	2	2	2	
Instrument Lights	—	❖	—	❖	❖-Must be operative.
Navigation Lights	—	2	—	2	
Landing Light	—	1	—	1	For hire operations.

Kinds of Operation Equipment List

- Define what is required for the kind of operation being performed
  - Day
  - Night
  - IFR
  - VFR

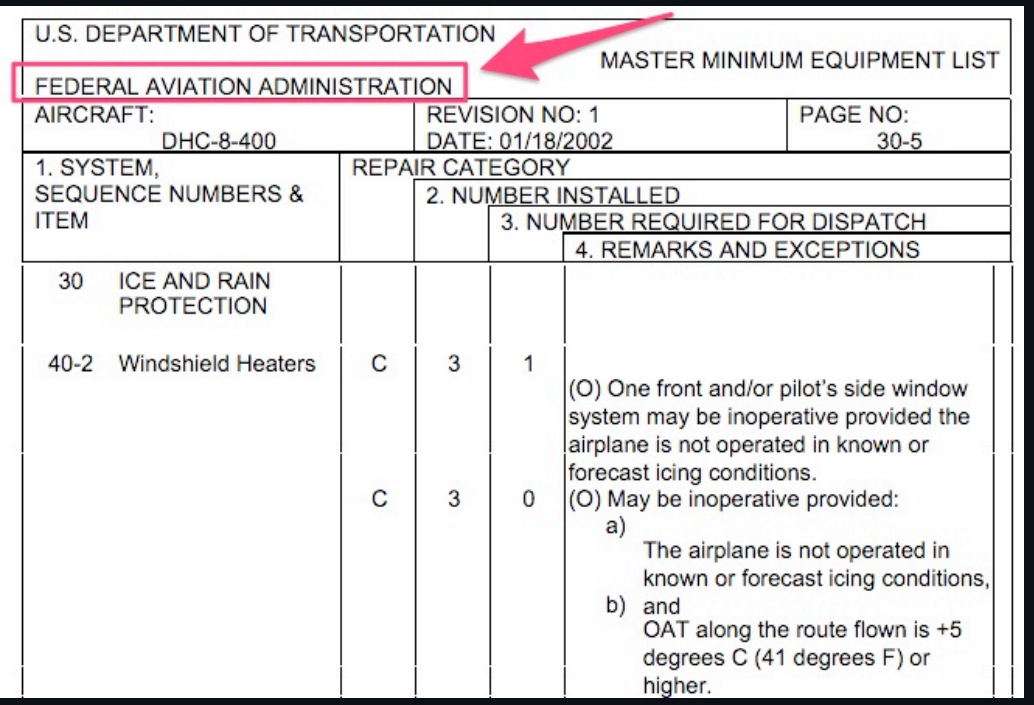
Deferral of Maintenance (91.213(d)(3))

If we deem the system is not required, we can:

- Remove it, or deactivated
- Placard it as inoperative

If the deactivation requires a mechanic, then it will need to be done by a mechanic and logged appropriately.

Note: Removal of equipment may change the W&B of the airplane.



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
MASTER MINIMUM EQUIPMENT LIST

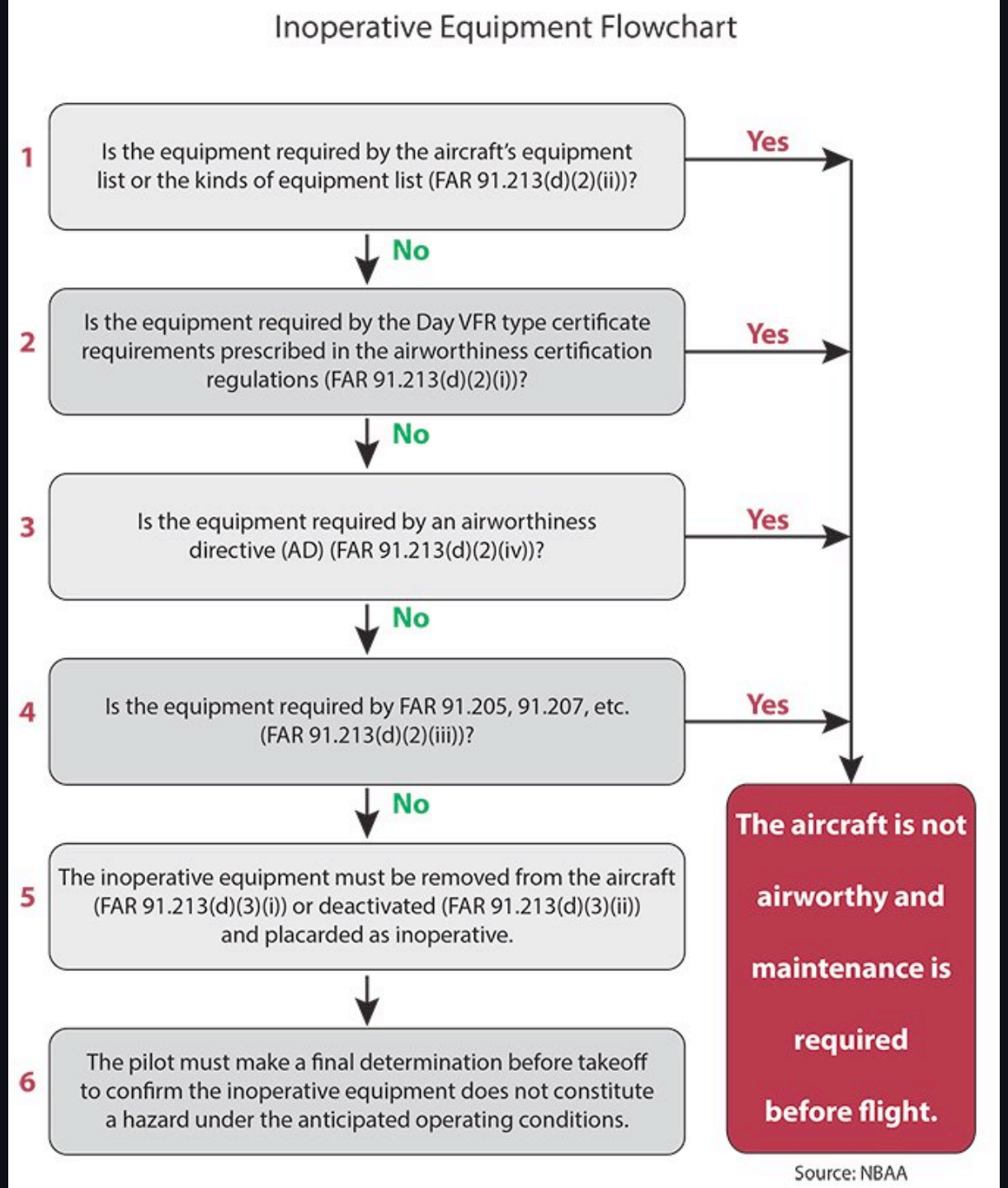
AIRCRAFT: DHC-8-400	REVISION NO: 1 DATE: 01/18/2002	PAGE NO: 30-5

1. SYSTEM, SEQUENCE NUMBERS & ITEM	REPAIR CATEGORY	2. NUMBER INSTALLED	3. NUMBER REQUIRED FOR DISPATCH	4. REMARKS AND EXCEPTIONS
30 ICE AND RAIN PROTECTION				
40-2 Windshield Heaters	C	3	1	(O) One front and/or pilot's side window system may be inoperative provided the airplane is not operated in known or forecast icing conditions.
	C	3	0	(O) May be inoperative provided: a) The airplane is not operated in known or forecast icing conditions, and b) OAT along the route flown is +5 degrees C (41 degrees F) or higher.

Minimum Equipment List

If our aircraft has a minimum equipment list, refer to the list

- Gives specific instruction on what can be inoperative
- Inoperative equipment must be dealt with per the MEL (can't use the previous process)
- Master MELs (MMELs) are publish by the manufacturer
    - Operators can then create their own MEL for a specific aircraft



Non-MEL Aircraft Flow Chart

Special Flight Permits

- What happens if we need to move the airplane to make repairs while it's not airworthy?
- A Special Flight Permit allows for a specific flight
- Can requested from the local Flight Standards District Office (FSDO)
- May require an A&P to determine the safety of flight
- Reasons for a permit:
  - To fly to base where repairs, alterations, or maintenance can be done
  - Delivering or exporting an aircraft
  - Evacuating an aircraft from an area of impending danger
  - Allow an overweight aircraft to fly beyond its normal range over water

Preventative Maintenance

- As a private pilot, you are permitted to do some maintenance tasks on your airplane
- Permitted tasks are listed in Part 43 Appendix A
  - Remove, install, and repair landing gear tires
  - Service landing gear wheel bearings
  - Replenish hydraulic fluid
  - Replace safety belt
  - Replace bulbs, reflectors, and lenses of lights
  - Replace or clean spark plugs
  - Replace and service batteries
  - Replace hose connections, except hydraulic connection

Logging of Preventative Maintenance

Pilots who perform preventive maintenance must make an entry in the maintenance record:

Include the following information:

1. A description of the work, such as “changed oil (Shell Aero-50) at 2,345 hours”
    - Should be logged "in accordance with" a maintenance document
2. The date of completion of the work performed
3. The pilot’s name, signature, certificate number, and type of certificate held

Summary

- Airworthiness certificate - Valid as long as the aircraft is airworthy
- ARROW documents - Documents the airplane needs to legally fly
- AV1ATED checklist - Required inspections
- Aircraft logbooks - Where we record maintenance performed
- 91.205, required VFR equipment
- Aircraft equipment lists
  - Kind of Equipment List (KOEL)
  - Minimum Equipment List (MEL), 91.213
- Special flight permits - used to get to a shop
- Preventative Maintenance - stuff we can do ourselves

Knowledge Check

You find an airplane with fuel gauge inoperative. Can you fly it?

What if we need to fly the airplane to another airport to get it fixed?

Knowledge Check

Can a private pilot do an oil change?

What about a student pilot?

Knowledge Check

Does a flight school's 172's need a 100-hour inspection?

What about a flying club?

Knowledge Check

Do you need a landing light to fly for flight instruction?