III.E. Airworthiness Requirements - FARS

References: 14 CFR part 91

Objectives
The student should exhibit knowledge of the elements regarding airworthiness requirements as necessary based on their respective PTS.

Elements
1. FAR 91.3 - Responsibility and Authority of the PIC
2. FAR 91.7 - Civil Aircraft Airworthiness
3. FAR 91.9 - Civil aircraft flight manual, marking, and placard requirements
4. FAR 91.203 - Civil Aircraft: Certifications Required
5. FAR 91.205 - Instrument and Equipment Requirements
6. FAR 91.213(d) - Inoperative Instrument and Equipment
7. FAR 91.400’s - Maintenance, Preventative Maintenance, and Alterations (Subpart E)
8. FAR 91.207 - Emergency Locator Transmitters (ELT)

Schedule
1. Discuss Objectives
2. Review material
3. Development
4. Conclusion

Equipment
1. White board and markers
2. References

IP’s Actions
1. Discuss lesson objectives
2. Present Lecture
3. Ask and Answer Questions
4. Assign homework

SP’s Actions
1. Participate in discussion
2. Take notes
3. Ask and respond to questions

Completion Standards
The lesson is complete when the student can explain, and when necessary locate, the elements and documents related to airworthiness requirements.
Instructors Notes:

Introduction:
Attention
Just as you would never scuba dive without your regulator operating properly or sky dive without the rip cord functioning, you should never fly an airplane without essential equipment working properly. Unlike in a car, we do not have the option to pull over to the side of the road in the case of a problem.

Overview
Review Objectives and Elements/Key ideas

What
Airworthiness requirements are the basis for deciding whether an aircraft is worthy of safe flight. They are requirements that must be met to ensure an aircraft is safe and legal to fly.

Why:
In order for an airplane to be airworthy certain documents must be on board and current, certain inspections must be completed, and certain instruments must be functioning, otherwise the airplane is unfit for flight and therefore un-airworthy or illegal to fly. An un-airworthy aircraft cannot be flown. Determining airworthiness can be very complex. This lesson is designed to provide a basis to make a decision regarding whether or not the airplane is airworthy.

How:
1. FAR 91.3 - Responsibility and Authority of the PIC
   A. The PIC is directly responsible for, and is the final authority as to, the operation of the plane
   B. In an in-flight emergency, the PIC may deviate from any rule of this part to the extent required
   C. Each PIC who deviates from a rule under paragraph (b) of this section shall, upon the request of the Administrator, send a written report of that deviation to the Administrator

2. FAR 91.7 - Civil Aircraft Airworthiness
   A. No person may operate a civil aircraft unless it is in an airworthy condition
      i. Airworthiness: Read the Airworthiness Certificate (Best definition of airworthiness)
         a. Authority and Basis for Issuance
            • States the aircraft must conform to the type certificate (TC says that the Arrow is an Arrow)
            a. The aircraft cannot be changed from its TC; must be in the condition it left the factory in
            1. The only way the airplane can be changed is with a supplemental type certificate
         b. Terms and Conditions
            • States that the aircraft must be maintained in accordance with the FARS
   B. The PIC of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight and shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur
      i. This is the only FAR which mentions a visual inspection, i.e. Condition for safe flight

3. FAR 91.9 - Civil aircraft flight manual, marking, and placard requirements
   A. No person may operate a U.S.-registered civil aircraft—
      i. For which an Airplane or Rotorcraft Flight Manual is required by §21.5 of this chapter unless there is available in the aircraft a current, approved Airplane or Rotorcraft Flight Manual or the manual provided for in §121.141(b); and
         a. The Weight and Balance is included in the AFM but is part of the TC and therefore required
II. E. Airworthiness Requirements - FARS

ii. For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof

B. 91.9 states that the AFM is required in the airplane for plane's registered after 1979
i. The AFM is not required for an airplane before 1979, unless the manufacturer submitted an AFM to the FAA, then it is required in the airplane
C. 91.9 also states that without the AFM, all placards, markings, etc must be in the aircraft

4. FAR 91.203 - Civil Aircraft: Certifications Required
A. Except as provided in §91.715, no person may operate a civil aircraft unless it has within it the following:
   i. An appropriate and current airworthiness certificate...
   ii. An effective U.S. registration certificate issued to its owner...
      a. It must be displayed at the cabin or cockpit entrance so that it is legible to passengers or crew

5. FAR 91.205 - Instrument and Equipment Requirements
A. The bare minimum instruments and equipment required for day/night VFR flight and IFR flight
   i. VFR - TOMATOFLAMES and FLAPS
   ii. IFR - GRABCARD

6. FAR 91.213(d) - Inoperative Instrument and Equipment
A. MEL
   i. An FAA approved listing of instruments/equipment that may be inoperable and remain airworthy
B. Without an MEL - 91.213(d)
   i. Follow the flow provided in AC 91-67
      a. Is it required by the aircrafts equipment list or the kinds of equipment list
      b. Is it required by the VFR-day type certificate requirements prescribed in the airworthiness certification requirements
      c. Is it required by an AD
      d. Is is required by FAR 91.205, 91.207, etc.
      e. If no, the inoperative equipment must be removed or deactivated and placarded as inoperative
      f. Finally, the PIC decides whether the equipment creates a hazard for the anticipated flight

7. FAR 91.400's - Maintenance, Preventative Maintenance, and Alterations (Subpart E)
A. FAR 91.401 - Applicability
   i. Rules governing maintenance, preventative maintenance, alterations of US registered civil aircraft
B. FAR 91.405 - Maintenance Required
   i. Each owner or operator of an aircraft—
      a. Shall have that aircraft inspected as prescribed in subpart E of this part and shall between required inspections, have discrepancies repaired as prescribed in part 43 of this chapter
      b. Shall ensure that maintenance personnel make appropriate entries in the aircraft maintenance records indicating the aircraft has been approved for return to service
      c. Shall have any inoperative instrument/equipment, permitted to be inoperative by §91.213(d)(2) of this part, repaired, replaced, removed, or inspected at the next required inspection
      d. When listed discrepancies include inoperative instruments or equipment, shall ensure that a placard has been installed as required by §43.11 of this chapter.
C. FAR 91.409 - Inspections
   i. Annual Inspection requirement
   ii. 100 hour inspection requirement, if for rent or for hire
D. FAR 91.411 - Altimeter system and Altitude Reporting Equipment Tests and Inspections  
   i. Static Pressure System and Altimeter tests required for IFR flight  
      a. Required every 24 calendar months  
E. FAR 91.413 - ATC Transponder Tests and Inspections  
   i. Transponder tests and inspections required  
      a. Required every 24 calendar months

8. FAR 91.207 - Emergency Locator Transmitters (ELT)  
   A. Inspection requirements  
      i. Every 12 calendar months  
   B. The batteries must be replaced (or recharged)  
      i. When the transmitter has been in use more than 1 cumulative hour  
      ii. When 50% of their useful life has expired

Conclusion:  
Through the FARS mentioned here, we find that the PIC is the final authority as to the safety of the flight.  
Airworthiness requires conforming to the type certificate, as well as the required maintenance and inspections.  
To be airworthy, the documents required onboard are the airworthiness certificate, the registration, operating  
limitations (AFM), as well as the weight and balance (part of the type certificate).  We have found the required  
equipment as well as the process for determining whether the airplane is airworthy in the case of inoperative  
equipment. Finally, the FARs provided the necessary inspections needed to maintain airworthiness.

PTS Requirements:  
To determine that the applicant exhibits instructional knowledge of the elements related to required  
airworthiness by describing:  
   1. Required instruments and equipment for day/night VFR.  
   2. Procedures and limitations for determining airworthiness of the airplane with inoperative instruments  
      and equipment without a minimum equipment list (MEL).  
   3. Requirements and procedures for obtaining a special flight permit.  
   4. Airworthiness directives, compliance records, maintenance/inspection requirements, and appropriate  
      records.  
   5. Procedures for deferring maintenance on aircraft without an approved MEL.
III.E. Airworthiness Requirements

References: 14 CFR part 91; AC 61-23/FAA-H-8083-25; AC 91-67; Sample Type Certificate; Sample MEL

Objectives

The student should exhibit knowledge of the elements regarding airworthiness requirements as necessary based on their respective PTS.

Key Elements

1. CFR 91.205 – Required Instruments
2. CFR 91.213(d) – Deferral without MEL
3. Required Inspections

Elements

1. Airworthiness without an MEL
2. Airworthiness with an MEL
3. Obtaining a Special Flight Permit
4. Appropriate Record Keeping

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IP’s Actions

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Introduction:
Attention
Just as you would never scuba dive without your regulator operating properly or sky dive without the rip cord functioning, you should never fly an airplane without essential equipment working properly.

Overview
Review Objectives and Elements/Key ideas

What
Airworthiness requirements are the basis for deciding whether an aircraft is worthy of safe flight. They are what must be met to ensure an aircraft is safe and therefore legal to fly.

Why:
In order for an airplane to be airworthy certain documents must be on board and current, certain inspections must be completed, and certain instruments must be functioning, otherwise the airplane is unfit for flight and therefore un-airworthy or illegal to fly. An un-airworthy aircraft cannot be flown.

How:
1. Airworthiness without an MEL (Required Instruments and Equipment)
   A. Widely used by most pilots due to the simplicity and minimal paperwork
   B. When inoperative equipment is found prior to flight, decide whether to:
      i. Cancel the flight
      ii. Obtain maintenance prior to the flight, or
      iii. *Defer the item or equipment - 91.213(d)
         a. In order to defer the item or equipment, it must not be required by the following documents (discussed in part C.i, ii, iii, iv):
            iv. If the item is not required it can be deferred
               a. Inoperative equipment is deactivated (or removed) and placarded INOPERATIVE
                  • Any necessary maintenance must be accomplished by certified maintenance personal
                  • The item/equipment must be placarded INOPERATIVE
   C. Required Equipment - 91.213(d)
      i. 14 CFR 91.205: Required Instruments and Equipment for Day and Night VFR Flight
         a. Visual-Flight Rules (Day), The following instruments and equipment are required:
            • Remember: TOMATO FFLAMES
            • Tachometer for each engine
            • Oil pressure gauge for each engine
            • Manifold pressure gauge for each altitude engine
            • Airspeed Indicator
            • Temperature gauge for each liquid-cooled engine
            • Oil temperature gauge for each air-cooled engine
            • Fuel gauge indicating the quantity of fuel in each tank
            • Flotation gear (if operated for hire over water beyond power-off glide distance from shore)
            • Landing gear position indicator
            • Altimeter
II. Airworthiness Requirements

- Magnetic compass
- Emergency Locator Transmitter
- Safety belts/Shoulder Harnesses

b. Visual-Flight Rules (Night), The following instruments and equipment are required:
- All Instruments and equipment needed for VFR day flight are required, as well as:
- Remember: FLAPS
- Fuses (if required)
- Landing Light (Electric)
- Anti Collision Lights
- Position Lights
- Source of electricity for all installed electrical and radio equipment

ii. Kinds of Equipment List and Equipment List
a. Kinds of Equipment List
- Lists the manufacturer required equipment based on the type of flight intended
- Located in Chapter 2 of the aircraft POH
b. Equipment List
- Furnished with the aircraft is an equipment list that specifies all the required equipment approved for installation in the aircraft. The weight and arm of each item is included on the list, and all equipment installed when the aircraft left the factory is checked
- It is usually found in the weight and balance data

iii. Type Certificate
a. Definition
- The Type Certificate Data Sheet (TCDS) is a formal description of the aircraft, engine or propeller. It lists limitations and information required for type certification including airspeed limits, weight limits, thrust limitations, etc.
b. Can be found on the FAA Website (Search for TCDS, then find your specific aircraft)

iv. Airworthiness Directives
a. Definition
- The means used to notify aircraft owners and other interested persons of unsafe conditions and to specify the conditions under which the product may continue to be operated
- Similar to a recall on a car
b. ADs may be divided into two categories:
- Those of an emergency nature requiring immediate compliance prop to further flight
- Those of a less urgent nature requiring compliance within a specific period of time
c. ADs are regulatory in nature and shall be complied with unless a specific exemption is granted
d. It is the aircraft owner/operator’s responsibility to ensure compliance with all pertinent ADs
- If an AD is not complied with by the designated date/time period the aircraft is not airworthy and may not be flown
e. Compliance Records
- 14 CFR part 91.417 requires a record to be maintained showing the status of applicable ADs.
a. For ready reference, many aircraft owners have a chronological listing of the pertinent ADs in the back of their aircraft, engine, and propeller maintenance records
III.E. Airworthiness Requirements

Inoperative Equipment Decision Sequence

During the preflight inspection, the pilot recognizes inoperative instruments or equipment.

1. Is the equipment required by the Equipment List or Kinds of Equipment list in the AFM?
   - NO
   - YES The aircraft is unairworthy and maintenance is required

2. Is the equipment required by the aircraft’s type certificate?
   - NO
   - YES The aircraft is unairworthy and maintenance is required

3. Is the equipment required by an Airworthiness Directive (AD)?
   - NO
   - YES The aircraft is unairworthy and maintenance is required

4. Is the equipment required by the FAR required Day/Night equipment (above)?
   - NO
   - YES The aircraft is unairworthy and maintenance is required

The aircraft is airworthy. The inoperative equipment must be removed or deactivated and placarded as inoperative.

The pilot must make the decision that the aircraft is still safe for flight.

D. Required Inspections

i. 14 CFR part 91 places primary responsibility on the owner/operator of an for maintaining an aircraft in an airworthy condition
   a. After aircraft inspections have been made and defects repaired the PIC is responsible for determining whether the aircraft is in condition for safe flight

ii. Inspections: Remember AV1ATE
   a. Annual Inspection
      - Any reciprocating-engine powered or single-engine-turbojet/turbo-propeller powered small aircraft (less than 12,500 pounds) flown for business or pleasure and not flown for compensation or hire is required to be inspected at least annually
      - Must be done by an airframe and powerplant mechanic (A&P) who holds an Inspection Authorization (IA)
      - An aircraft overdue for an annual inspection may be operated under a Special Flight Permit for the purpose of flying the aircraft to a location where the inspection can be performed
      - All applicable ADs that are due must be complied with
      - An annual inspection may be substituted for a required 100 hr inspection
   b. VOR
      - The VOR must have been checked within the preceding 30 days. A record must be kept in a bound logbook (IFR Requirement)
   c. 100 Hour Inspection
      - All aircraft under 12,500 lbs (except for turbo powered), used to carry passengers for hire or, used for flight instruction for hire, must have received a 100-hour inspection
      - The inspection must be performed by an FAA certificated A&P mechanic, and appropriately rated FAA certificated repair station, or by the aircraft manufacturer
         a. No IA necessary (like for the annual)
      - An annual inspection may be substituted for a required 100 hr inspection
III.E. Airworthiness Requirements

- The 100-hr limit may be exceeded by not more than 10 hours while en route to reach a place where the inspection can be done
  a. The excess time used must be included in computing the next 100 hours of time in service

d. Altimeter/Pitot Static Inspection
- 91.411 requires that the altimeter, encoding altimeter, and related system be tested and inspected in the preceding 24 months before operated in controlled airspace under instrument flight rules
- 91.411 The pitot/static system must be checked within the preceding 24 calendar months. A record must be kept in the aircraft logbook (IFR Requirement)

e. Transponder Inspection
- 91.413 requires that before a transponder can be used under 14 CFR part 91, section 91.125(a), it shall be tested and inspected within the preceding 24 months

f. ELT Inspection
- If operations require an ELT it must be inspected every 12 calendar months

E. Required Documents
- Remember ARROW
  a. Airworthiness
  b. Registration
  c. Radio Operators License (if international)
  d. Operating Limitations (POH)
  e. Weight and Balance (specific to the aircraft tail number)

2. Airworthiness with an MEL
A. An MEL is a precise listing of instruments, equipment, and procedures that allows an aircraft to be operated with inoperative equipment
  i. Basically combines FAR 91.205, Kinds of Equipment List, Ads and Type Certificate into one authoritative document
  ii. Considered to be a supplemental type certificate and therefore becomes the authority to operate that aircraft in a condition other than originally type certificated
  iii. An MEL must be requested from the FAA
  iv. The FAA approved MEL includes only those items of equipment which may be inoperative and yet maintain an acceptable level of safety based on conditions and limitations

B. Required Equipment
  i. If equipment or an instrument is found to be broken the pilot would refer directly to the MEL as to whether it is required for the type of flight
  ii. EX: If the position lights were discovered inoperative prior to a daytime flight, the pilot would make an entry in the maintenance record
    a. The item is then either repaired or deferred in accordance with the MEL
      • If the MEL states that position lights are not necessary for a daytime flight then the aircraft is airworthy, the pilot would follow the instructions in the MEL regarding the position lights (e.g. pull the circuit breaker/do not use the lights, etc) and the flight may continue
      • If it were a night flight and the MEL requires the position lights then the aircraft is not airworthy and the flight may not continue until repairs are made
  iii. Should a component fail that is not listed in the MEL as deferrable (tachometer, flaps, stall warning device, etc) then repairs are required to be performed prior to departure
  iv. If maintenance parts are not available at your location, a special flight permit can be obtained

C. Required Inspections
II. E. Airworthiness Requirements

3. Obtaining a Special Flight Permit
   A. A Special Flight Permit is an authorization that may be issued for an aircraft that may not currently meet applicable airworthiness requirements, but is safe for a specific flight.
   B. Issued for the following reasons:
      i. Flying an aircraft to a base where repairs, alterations or maintenance are to be performed
      ii. Delivering or exporting an aircraft
      iii. Production flight testing new production aircraft
      iv. Evacuating aircraft from areas of impending danger
      v. Conducting customer demonstration flights
      vi. To allow the operation of an overweight aircraft for flight beyond its normal range where adequate landing facilities or fuel is not available.
   C. Obtaining a Special Flight Permit
      i. If a special flight permit is needed, assistance and the necessary forms may be obtained from the local FSDO or Designated Airworthiness Representative (DAR)

4. Appropriate Record Keeping (CFR 91.417)
   A. The 100-Hour/Annual inspection as well as the inspections required for instruments and equipment necessary for legal VFR/IFR flight are located in the aircraft and engine logbooks
   B. Removing/Installing equipment not on the Equipment List
      i. The AMT must change the weight and balance record to indicate the new empty weight and EWCG, and the equipment list is revised to show which equipment is actually installed
   C. Repairs and Alterations
      i. Major
         a. 14 CFR part 43, Appendix A: Major alterations shall be approved for return to service on FAA form 337, Major Repairs and Major Alterations, by an appropriately rated certificated repair station, an FAA certificated A&P mechanic holding an Inspection Authorization, or a representative of the Administrator
         ii. Minor
             a. May be approved for return to service with a proper entry in the maintenance records by an FAA certificated A&P mechanic or an appropriately certificated repair station

Conclusion:
Brief review of each main point
The requirements and precautions mandated by the FAA are necessary to ensure the aircraft is in a safe condition for flight not only for legal reasons, but also for the safety of those onboard.

PTS Requirements:
To determine that the applicant exhibits instructional knowledge of the elements related to required airworthiness by describing:
   1. Required instruments and equipment for day/night VFR.
   2. Procedures and limitations for determining airworthiness of the airplane with inoperative instruments and equipment without a minimum equipment list (MEL).
   3. Requirements and procedures for obtaining a special flight permit.
   4. Airworthiness directives, compliance records, maintenance/inspection requirements, and appropriate records.
III.E. Airworthiness Requirements

5. Procedures for deferring maintenance on aircraft without an approved MEL.