Private Pilot (ASEL) Ground School Course

Lesson 09 | Aircraft Documents and Maintenance

Chester County Aviation

Lesson Overview

Lesson Objectives:

- Develop an understanding of how to navigate standardized aircraft documents.
- Develop knowledge of required maintenance inspection on an airplane.
- Develop knowledge and understanding of how to handle inoperative equipment.

Lesson Completion Standards:

- Student demonstrates satisfactory knowledge of aircraft documents and maintenance by answering questions and actively participating in classroom discussions.
- Scores a minimum of 70% on quiz cover lessons 01-05.

Aircraft Documents

Aircraft Documents and Maintenance

FAR 91.203 Civil Aircraft: Certifications Required

- There are four items that must be on board the aircraft at all times when it's being operated
- Two are certification documents: the airworthiness certificate and the registration certificate
- The other two items are the airplane's operating limitations and its weight and balance information
- These last two items may be found in the approved Airplane Flight Manual (AFM) or in approved manual materials, markings and placards, or any combination thereof in the airplane

Aircraft Documents (MARROWS)

- M Minimum Equipment List
- A Airworthiness Certificate
- R Registration
- R Radio Certificate (FCC, required for international flights)
- O Operators Manual
- W Weight and Balance (current and specific to your airplane)
- S Supplements (Aircraft specific)

Minimum Equipment List (MEL)

- An MEL is an FAA approved document that allow select equipment to be inoperative and still allow operation
- All INOP equipment comes with limitations on ops.
- If one is approved, IT MUST BE FOLLOWED
- In accordance with ATA codes

Minimum Equipment List (MEL)

- Equipment must be repaired within the repair category time (FAR 135 and 121)
- Operational considerations must be followed.
 - Can be Pilots (O)
 - Can be Mechanics (M)
 - Can be Dispatchers (D)

AIRCRAFT:			SION N	NO: 1 PAGE NO:	
1 EVETEM	DED	DATE: 01/18/2002 30-5			
SEQUENCE NUMBERS	&	2. NUMBER INSTALLED			
ITEM			3. NU	JMBER REQUIRED FOR DISPATCH	
		3.5	3.3	4. REMARKS AND EXCEPTIONS	
30 ICE AND RAIN PROTECTION					
40-2 Windshield Heaters	ers 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	
	с	3	0	forecast icing conditions. (O) May be inoperative provided:	
	4	4		 b) and OAT along the route flown is +5 degrees C (41 degrees F) or higher 	

Airworthiness Certificate

- Issued for a specific aircraft at the time of manufacture
- Remains valid as long as the aircraft receives the required annual inspection by a licensed mechanic and meets other legal requirements
- Must be displayed at the cabin or cockpit entrance so it is legible to the passengers or crew



Registration Certificate

- 15	REGISTRATION NOT		
	CERTIFICATE OF AIRCRAFT	REGISTRATION	must be in the air-
	REGISTRATION MARKS N 322FT	AIRCRAFT SERIAL NO. 10021	crait when operated.
	DIAMOND AIRCRAFT INDUSTRIES ICAO Aircraft Address Code: 50673	DESIGNATION OF AIRCRAFT DA 20-A1 115	
	DIAMOND FINANCIAL INC 1209 ORANGE ST CORP TRUST CTR WILMINGTON, DE 19801		This certificate is issued for registra- tion purposes only and is not a certif- icate of title. The Federal Avia- tion Administration does not determine rights of ownership as between private persons.
	is certified that the above described	CORPORATION	0
153	remaninistration, United States of America, in acc 1958, and regulation dated December 7, 1944, and ATE OF ISSUE MAY	n entered on the register of the Feder ordance with the Convention on with the Federal Aviation Act	U.S. Department
100	Ac Form 8050-3(11/93) Supersedes Bravi	ADMINISTRATOR	Federal Aviation Administration
	previous editions		Fig. 50

- Issued to the owner of the aircraft
- Valid for 3 years
- Need not be displayed, but must be in the aircraft

FCC Radio License

FED Re ATTN: RYAN B	UNITED STAT	ES OF AMERICA CATIONS COMM phone Operator	Permit
FCC Registration Numb	er (FRN):	0	
-	Special Condition	ons / Endorsements	
Grant Date	Effective Date	Print Date	Expiration Date
12.09.2017	12,09,2017	12-09-2017	2
12-09-2017	12-09-2017	12-07-2011	
File Number	Serial N	umber	Date of Birth
5			
		×.	
-	THIS LICENSE IS 1	NOT TRANSFERABLI	
	(Licensee	's Signature)	FCC 605-FRC - May 2007

- Issued to the owner of the aircraft
- Only needed for International operations

Pilots Operating Handbook (POH/PIM)

- Document developed by the aircraft manufacturer and contains general information about the make and model of the aircraft.
- The manual is not approved by the Federal Aviation Administration (FAA) and is not specific to an individual aircraft.
- The manual provides general information about the operation of an aircraft, is not kept current, and cannot be substituted for the AFM/POH.



DA40-180 DIAMOND STAR Information Manual



Approved Flight Manual (AFM)

- Document developed by the aircraft manufacturer and approved by the FAA.
- This book contains the information and instructions required to operate an aircraft safely.
- A pilot must comply with this information which is specific to a particular make and model of aircraft, usually by serial number



AFM and POH Contents

- Section 1: General
- Section 2: Limitations
- Section 3: Emergency Procedures
- Section 4: Normal Procedures
- Section 5: Performance
- Section 6: Weight and Balance
- Section 7: Systems Description
- Section 8: Handling, Service, and Maintenance
- Section 9: Supplements

Airplane Weight and Balance

- Must be specific to the airplane (Serial).
- Must include empty weight, CG, and Arm.
- Will be complete by a A&P or a approved FAR 145 Repair Station.
- Often found with POH/AFM



Airplane Supplements

- Anytime equipment that is installed that was not original from the manufacturer at the time of certification.
- User guide of installed equipment
- Example
 - Upgraded GPS
 - New Glass display
 - New Engine Monitor
- If Standard it is in the POH



Aircraft Maintenance Inspections

Aircraft Documents and Maintenance

FAR 91.403 Aircraft Maintenance: General

- Regulations place primary responsibility for maintaining an aircraft in an airworthy condition on the owner or operator
- The owner is the person who has legal title to the aircraft
- When an airplane is leased back to a flight school, the fixedbase operator is now the person legally responsible for maintaining that aircraft

Required Inspections (AV1ATE)

- A Annual Inspection / Airworthiness Directives (AD's)
- V VOR Check (every 30 days) (IFR Only)
- 1 100-Inspection hour (For Hire Only)
- A Altimeter/Static (Every 24 Calendar Months, IFR Only)
- T Transponder (Every 24 Calendar Months)
- E ELT (Every 12 Calendar Months)

FAR 91.409 Inspections - Annual

- An aircraft must have had an (annual) inspection within the preceding 12 calendar months by a qualified mechanic and been approved for return to service
- Required inspections and maintenance must be logged in the appropriate logbook(s)



VOR Check (IFR ONLY)

		"VOR has to	be checked every 30 day:	s"	
		VO	R test procedures		
VOT test signal (s	ee A/FD)	± 4° Ground check		see A/FD) ± 4°	
Dual VOR check		± 4º	Airborne check		± 6°
DATE	PL	ACE	ERBOR SIGNATURE		
			2		
	-			-	
			11 14 13 14		
	1				

- A VOR check must be accomplished every 30 days.
- Required only your IFR flight

FAR 91.409 Inspections – 100 Hour

- If you are carrying any person for hire, or if you are giving flight instruction for hire in an aircraft, that aircraft must have had an inspection within the preceding 100 hours of time in service
- The 100 inspection must be entered in the aircraft maintenance records

LOBGOOK ENTRY OF 100 HR. IN	ISPECTION
1w AD 82-27-8 P+A3	
entre Caliper Replaced Hobbs	<u>,]+</u>
itch, Replaced AIR filter.	
INSPECTED IN ACCORDANCE WITH A JOOLR	
NAME ADE T. Crauge Sto. ALP 546067	7387
PATE 09-26-95 TAC TIME 7756	
6-57	© Rod Machado's Private Pilot Handbod

FAR 91.411 Altimeter/Pitot-Static Inspection (IFR ONLY)

- Must have been tested and inspected within the preceding 24 calendar months
- Required for IFR flight
- Completion of this inspection is shown in the aircraft logbook



FAR 91.413 ATC Transponder Tests and Inspections

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- Must have been tested and inspected within the preceding 24 calendar months
- Completion of this inspection is shown in the aircraft logbook

TRANSPONDER INSPECTION ENTRY

A.D.C./S.D.C.BLD. ENC. SN INSPECTOR WESTERN AVIONNES, INC. F.A.A. YH3R997L	CERTIFIED ALTIMETER(S) AN REQUIRED BY F.A.R. 91.411 N APPENDIX E TO 20000 A.T.C. TRANSPONDER TESTS 91.413 ACCOMPLISHED I.A APPENDIX F. V LT. ALT. SN#1 RT. ALT. SN#1	ND STATIC SYSTEMS I.A.W. F.A.R. PART 43, FEET. PERFORMED B REQUIRED BY F.A.R. A.W. F.A.R. PART 43, N.O.# 50266 IXPDR SN 14779 1779 1779
WESTERN AVIONNES, INC. F.A.A. YH3R997L	RT. ALT. SN #	2XPDR SNA
	WESTERN AVIONNES, INC.	F.A.A. YH3R997L © Rod N

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andbool

FAR 91.207 ELT Inspection

- Must have been tested and inspected within the preceding 12 calendar months
- Completion of this inspection is shown in the aircraft logbook
- Battery must be replaced when:
 - Battery <50%
 - > 1 hour of cumulative use



Often with annual

FAR 91.407 Operations After Maintenance, Preventive Maintenance, Rebuilding Or Alteration

 No person may operate any aircraft that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless it has been approved for return to service by a qualified mechanic and a maintenance record entry is made in the aircraft's logbooks

FAR 91.407

• Major alteration or Repair Entry

MAJOR ALTERATION	
DR REPAIR	DESCRIPTION OF INSPECTIONS, TESTS, REPAIRS AND ALTERATIONS ENTRIES MUST BE ENDORSED WITH NAME, RATING AND CERTIFICATE NUMBER OF MECHANIC OR REPAIR FACILITY. (SEE BACK PAGES FOR OTHER SPECIFIC ENTRIES.)
ENTRY	REPLACED ENGINE MOUNT, RUDDER CONTROL CABLES, CARB HEAT CONTROL CABLE, RUDDER HORN, RUDDER CABLE PULLEYS, REAR FUSELAGE DULKHOAD Phy 85615-002. RE SCALED NOSE STRUT & SCRVICED. ADMISTED CABLE TEADLONS AND ANGLES I/A/W TOMPHONK SCAVICE MANUAL. REPLACED LANDING LIGHT BULD. SCR. & ULKANE SS2808801A
	SERVICEABLE Component identified on back of this tag was ed in accordance with current regulations of the ministration and is approved for return to service. the repair are on file at this repair station under COR Rod Machado's
6-55	Private Pilot Handbook

FAR Part 43 – Preventive Maintenance

- Allows airplane owners to do specific preventive maintenance tasks on their airplanes
- A private pilot or higher can do things like changing sparkplugs, replenishing hydraulic fluid, and servicing landing gear and wheel bearings
- If you're doing preventive maintenance on your airplane, you're required to complete specific paperwork
- This entry must include the signature, certificate number and kind of certificate held by the person approving the work
- A description of the work must be entered in the aircraft maintenance records

FAR 91.407 Operations After Maintenance, Preventive Maintenance, Rebuilding Or Alteration

- No person may carry another person (other than crewmembers) in an aircraft that has been maintained, rebuilt or altered in a manner that may have appreciably changed its flight characteristics, or substantially affected its operation in flight, unless the following is done:
- An appropriately rated pilot with at least a private pilot certificate must fly the aircraft, make an operational check of the maintenance performed or alteration made, and log the flight in the aircraft records

FAR 91.417 Maintenance Records

- Each registered owner or operator of an aircraft is required to keep records of aircraft maintenance
- Records contain the annual inspection, the 100-hour inspection, major alterations or repairs, and the completion of other required maintenance

FAR 91.407

- Airplanes have airframe, engine and propeller logbooks
- These are the maintenance records where the required inspections and return to service statements are logged



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Airworthiness Directive

- When a particular mechanical problem occurs with an aircraft, the FAA may issue an AD
- This is sent to the owner or operator of the aircraft
- It's the owner or operator's responsibility to provide the maintenance required by that AD
- When the mechanic completes this maintenance, an entry is made in the aircraft logbooks identifying the AD as having been complied with
- AD's MUST BE COMPLIED WITH

Airworthiness Directive



- Current AD's can be found on the FAA website.
- Compliance for your airplane can be found in the Airplanes Logbook.
- Just a recall for an airplane

Required Equipment

Aircraft Documents and Maintenance

FAR 91.205 Instrument and Equipment Requirements: VFR Day

- Airspeed indicator
- Altimeter
- Magnetic direction indicator
- Tachometer for each engine
- Oil pressure gauge for each engine using pressure system
- Temperature gauge for each liquid-cooled engine
- Oil temperature gauge for each air-cooled engine
- Manifold pressure gauge for each altitude engine
- Fuel gauge indicating the quantity of fuel in each tank

FAR 91.205 Instrument and Equipment Requirements: VFR Day

- Landing gear position indicator, if the aircraft has a retractable landing gear
- For small civil airplanes certificated 1996, an approved aviation red or aviation white anti-collision light system
- If the aircraft is operated for hire over water and beyond power-off gliding distance from shore, approved flotation gear readily available to each occupant and at least one pyrotechnic signaling device
- An approved safety belt with an approved metal-to-metal latching device for each occupant two years of age or older
- For small civil airplanes manufactured after 1978, an approved shoulder harness for each front seat

VFR Day



VFR – Day A-TOMATO-FLAMES

- A Altimeter
- T Tachometer
- O Oil Temperature Gauge
- M Manifold Pressure Gauge (If applicable)
- A Airspeed Indicator
- T Temperature Gauge (For each liquid cooled engine)
- O Oil Pressure Gauge
- F Fuel Gauges
- L Landing Gear Position Indicator (If applicable)
- A Anti Collision Lights (For aircraft manufactured after March 11, 1996)
- M Magnetic Compass
- E ELT
- S Seat Belts

FAR 91.205 Instrument and Equipment Requirements: VFR Night

- The instruments and equipment previously specified for day VFR flight
- Approved position lights
- An approved aviation red or aviation white anti-collision light system
- If the aircraft is operated for hire, one electric landing light
- An adequate source of electrical energy for all installed electrical and radio equipment
- One spare set of fuses, or three spare fuses of each kind required, that are accessible to the pilot in flight

VFR Night



VFR – Night FLAPS

- F Fuses
- L Landing Light
- A Anti Collision Lights
- P Position Lights
- S Source of Power

Inoperative Equipment

Aircraft Documents and Maintenance

FAR 91.213 Inoperative Instruments and Equipment

- All installed equipment must be operative in accordance with the original type certificate.
- Items may be INOP so long as they are not required by any of the following:
 - M Minimum Equipment List (MEL)
 - K Kinds of Operations Equipment List (KOEL)
 - A Airworthiness Directives (AD's)
 - T Type Certificate Data Sheet (TCDS)
 - 9 91.205

Minimum Equipment List (MEL)

- As previously discussed
- USE IT IF YOU HAVE IT
- Otherwise skip this step

Kinds of Operations Equipment List (KOEL)

- Document that specifics equipment installed in an aircraft that is specific to kinds of operations a specific piece of equipment may be required for.
- The KOEL is used as part of the process of determining if an aircraft with inoperative equipment is airworthy.
- The KOEL is typically published by the aircraft manufacturer as part of the Limitations section of the Airplane Flight Manual (AFM) or Pilot's Operating Handbook (POH).
- Not all aircraft have them

Airworthiness Directives (AD's)

- As previously discussed
- Ensure you comply with all AD's

Type Certificate Data Sheet (TCDS)

- The TCDS is a formal description of the aircraft, engine or propeller.
- It lists equipment, limitations, and information required for type certification including airspeed limits, weight limits, thrust limitations, etc.
- Require understanding of FAR 43 to read. Often not used by pilots to determined required equipment.
- Can be found on the FAA's website.

91.205

- As previously discussed
- ATOMATOFLAMES
- FLAPS
- What if it is not required? **Deactivate it and Label it INOP**
- What do we do if it is required but can't fix it?

Special Ferry Permit

- Special Airworthiness Certificate authorizing operation of an aircraft that does not currently meet applicable airworthiness requirements but is safe for a specific flight.
- Before the permit is issued, an FAA inspector may personally inspect the aircraft or require it to be inspected by an FAA-certificated A&P mechanic or an appropriately certificated repair station to determine its safety for the intended flight.
- Obtained by a mechanic through the local FSDO

Decision Making With INOP Equipment

- A determination is made by a pilot, who is certificated and appropriately rated under part 61 of this chapter, or by a person, who is certificated and appropriately rated to perform maintenance on the aircraft, that the inoperative instrument or equipment does not constitute a hazard to the aircraft.
- What is a hazard?

How often does the transponder inspection need to be completed?

- A. 12 calendar months
- B. 6 calendar months
- C. 24 calendar months
- D. 100-hour inspection

How often does the transponder inspection need to be completed?

- A. 12 calendar months
- B. 6 calendar months
- C. 24 calendar months
- D. 100-hour inspection

How often does the ELT inspection need to be completed?

- A. 12 calendar months
- B. 6 calendar months
- C. 24 calendar months
- D. 100-hour inspection

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- A. 12 calendar months
- B. 6 calendar months
- C. 24 calendar months
- D. 100-hour inspection

If the landing light is inoperative, is the airplane legal to be flown during day VFR?

- A. True
- B. False

If the landing light is inoperative, is the airplane legal to be flown during day VFR?

A. True

B. False

Which of the following documents are not required to be in the airplane?

- A. Weight and Balance
- B. Supplements
- C. Airworthiness
- D. Annual Inspection

Which of the following documents are not required to be in the airplane?

- A. Weight and Balance
- B. Supplements
- C. Airworthiness
- D. Annual Inspection

What section in the POH would you find more information on the systems descriptions?

- A. Section One
- B. Section Five
- C. Section Seven
- D. Section Three

What section in the POH would you find more information on the systems descriptions?

- A. Section One
- B. Section Five
- C. Section Seven
- D. Section Three

Airworthiness Directives are like recalls for a car?

- A. True
- B. False

Airworthiness Directives are like recalls for a car?

- A. True
- B. False

What FAR handles Inoperative Equipment?

- A. 61.205
- B. 61.213
- C. 91.205
- D. 91.213

What FAR handles Inoperative Equipment?

A. 61.205
B. 61.213
C. 91.205
D. 91.213

If an MEL is approved, must it be followed?

- A. Yes
- B. No

If an MEL is approved, must it be followed?

- A. Yes
- B. No