MEDICAL CERTIFICATES: REQUIREMENT AND DURATION 61.23

Requirement

First class ............... ATP
Second class ............ CPL
Third class .............. Student Pilot, PPL, Flight Instructor

Duration 61.23

<table>
<thead>
<tr>
<th></th>
<th>6 months</th>
<th>12 months</th>
<th>24 months</th>
<th>36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>ATP</td>
<td>CPL</td>
<td>PPL &gt; 40 years</td>
<td>PPL &lt; 40 years</td>
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<tr>
<td>Second</td>
<td>CPL</td>
<td>PPL &gt; 40 years</td>
<td>PPL &lt; 40 years</td>
<td></td>
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<tr>
<td>Third</td>
<td>PPL &gt; 40 years</td>
<td>PPL &lt; 40 years</td>
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When a class expires the medical automatically degrades to only have privileges of the next lower class. If you for example have a first class medical this will after 6 months still be a first class medical but only with second class privileges.
STUDENT PILOTS

Eligibility requirements for student pilots 61.83
- 16 years of age
- Read, speak, write, and understand the English

Application for a student pilot certificate 61.85
- A designated aviation medical examiner if applying for an FAA medical
- An examiner
- A Flight Standards District Office

Solo requirements for student pilots 61.87
- Written knowledge test (b)
- Pre-solo flight training (c)
- SPC endorsement (n)
- Logbook endorsement (n)

Solo night requirements for student pilots 61.87
- Flight training at night on night flying (o)
- Navigation training at night (o)
- Logbook endorsement for night (o)

Limitations on flight instructors authorizing solo flight 61.87
- Given training in the make and model in which the solo flight is to be flown (p)
- Determined the student is proficient in the maneuvers and procedures (p)
- Determined the student is proficient in the make and model to be flown (p)
- Ensured that the student certificate has been endorsed by an instructor (p)
- Endorsed the student logbook for the specific make and model aircraft to be flown (p)
- Training must be given by an instructor who is appropriately rated and current (p)

General limitations 61.89
- Carrying a passenger
- Carrying property for compensation or hire
- For compensation or hire
- In furtherance of a business
- On an international flight
- With a visibility of less than 3 SM during daylight hours or 5 SM at night
- When the flight cannot be made with visual reference to the surface
- In a manner contrary to any limitations placed in the pilot’s logbook
- May not act as a required pilot flight crewmember on any aircraft for which more than one pilot is required by the type certificate of the aircraft or regulations
Solo cross-country requirements for student pilots 61.93

Solo cross-country flight, or any flight greater than 25 nautical miles from the airport

Requirements
- Accomplished the pre-solo flight maneuvers and procedures (a)
- Comply with any limitations included in the instructor’s endorsement (a)
- Must have received and logged training for cross-country flight (g)
- Student pilot certificate endorsement (c)
- Logbook endorsement (c)
- Planning and preparation endorsement for each flight (c)

Instructor’s responsibilities
- Determine that the student’s cross-country planning is correct for the flight (d)
- Review current and forecast weather, must be VFR conditions (d)
- Determine that the student is proficient to conduct the flight safely (d)
- Determine that the student has the appropriate solo cross-country endorsement (d)
- Determine that the student’s solo flight endorsement is current (d)

Solo flights to another airport that is within 25 NM 61.93 (b) (1)

- Given the student pilot flight training at the other airport, and that training includes flight in both directions over the route, entering and exiting the traffic pattern, and takeoffs and landings at the other airport
- Logbook endorsement by the instructor who gave the training
- The student pilot has current solo flight endorsements
- The instructor has determined that the student pilot is proficient to make the flight
- The purpose of the flight is to practice takeoffs and landings at that other airport

Repeated specific solo cross-country flights to airport that is within 50 NM 61.93 (b) (2)

- Given training in both directions over the route, including entering and exiting the traffic patterns, takeoffs, and landings at the airports to be used
- Logbook endorsement by the instructor who gave the training
- The student pilot has current solo flight endorsements
- The student has current solo cross-country flight

Operations in Class B airspace and at airports located within Class B airspace 61.95

- Received both ground and flight training on that specific Class B airspace or airport
- Logbook endorsement, dated within the preceding 90-days
- Must be endorsed for both airspace and airport if applicable
PRIVATE PILOTS

Eligibility requirements for private pilots  61.103

- 17 years of age
- Read, speak, write, and understand the English
- Logbook endorsement that the person is prepared for the required knowledge test
- Pass the required knowledge test
- Receive and log ground and flight training on areas of operation in 61.107
- Logbook endorsement that the person is prepared for the required practical test
- Pass the practical test

Aeronautical Experience - Private Pilot Helicopter (Initial) Requirements  61.109

40 hours total flight time, including

- 20 dual instruction
- 10 solo
- Both in areas of operation listed in 61.107(b)(3), in a helicopter
- That means only 30 hours must be in a helicopter

20 hours of dual instruction in a helicopter which must include

- 3 hours of cross country flight training;
- 3 hours of night flight training, which includes
  - 1 cross country flight over 50 NM total distance
  - 10 takeoffs and 10 landings in the traffic pattern to a full stop, at an airport
  - 3 hours flight training within 60 days preceding the practical test

10 hours of solo flight time in a helicopter which must include

- 3 hours of cross country time
- 1 solo cross country at least 75nm total distance, minimum landing at three points, one segment at least 25 NM straight line distance between starting and landing points
- 3 takeoffs and 3 landings in the traffic pattern to a full stop, at an airport with operating control tower

Aeronautical Experience - Private Pilot Helicopter (add-on) requirements  61.109

40 hours total flight time, including

- 20 dual instruction
- 10 solo
- Both in areas of operation listed in 61.107(b)(3), in a helicopter
- This means only 30 hours must be in a helicopter

30 hours of flight time in a helicopter is the minimum, but more will most likely be needed!
Private pilot privileges and limitations: Pilot in command

- May not act as PIC of an aircraft carrying passengers or property for compensation or hire
- May not pay less than the pro rata share of the expenses of a flight with passengers
- May for compensation or hire, act as PIC in connection with any business or employment if incidental to that business or employment and the aircraft does not carry passengers or property for compensation or hire
- May act as PIC in a passenger-carrying airlift sponsored by a charitable organization for which the passengers make a donation to the organization
- May be reimbursed for aircraft operating expenses that are directly related to search and location operations
- May demonstrate an aircraft in flight to a prospective buyer, if he is an aircraft salesman and has at least 200 hours flight time
- May act as a pilot in command of an aircraft towing a glider or un-powered ultralight vehicle
Eligibility requirements for commercial pilots 61.123

- 18 years of age
- Read, speak, write, and understand the English
- Logbook endorsement that the person is prepared for the required knowledge test
- Pass the required knowledge test
- Receive and log ground and flight training on areas of operation in 61.127
- Logbook endorsement that the person is prepared for the required practical test
- Pass the practical test
- Hold at least a private pilot certificate

Aeronautical Experience - Commercial Pilot Helicopter (initial) requirements 61.129

150 hours of flight time as a pilot

- At least 100 must be in powered aircraft, and
  - At least 50 must be in helicopters

100 hours of pilot-in command flight time, which includes at least

- 35 hours in helicopters
- 10 hours cross-country flight in helicopters

20 hours dual flight training in areas of operation listed in 61.127(b)(3), in a helicopter, including

- 10 hours of instrument training in an aircraft
- 1 (dual) day VFR cross country at least 2 hours, at least 50 NM straight line distance from point of departure
- 1 (dual) night VFR cross country at least 2 hours, at least 50 NM straight line distance from point of departure
- 3 hours flight training within 60 days preceding the practical test

10 hours of solo flight in a helicopter, including

- 1 (solo) cross country flight with landings at minimum of 3 points, with one segment consisting of at least 50 NM from the original point of departure
- 5 hours night VFR with 10 takeoffs and 10 landings, each landing involving a flight in the traffic pattern
- This aeronautical experience cannot be earned during the student pilot level - Reference: FREQUENTLY ASKED QUESTIONS 14 CFR, PART 61, Q&A-234
Aeronautical Experience - Commercial Pilot Helicopter (add-on) requirements

150 hours of flight time as a pilot

- At least 100 must be in powered aircraft, and
- At least 50 must be in helicopters

This can also include all dual flights with an instructor in which the applicant was not flying as PIC, assuming the student was already a certificated pilot at the time - for example, when the certificated pilot was flying the helicopter with the instructor acting as PIC

Such logged flight time can contribute to the 150, 100, and 50-hour requirements

100 hours of pilot-in-command flight time, which includes at least

- 35 hours in helicopters
- 10 hours cross-country flight in helicopters

20 hours dual flight training in areas of operation listed in 61.127(b)(3), which includes

- 10 hours of instrument training in an aircraft
- 1 (day) day VFR cross country at least 2 hours, at least 50 NM straight line distance from point of departure
- 1 (night) night VFR cross country at least 2 hours, at least 50 NM straight line distance from point of departure
- 3 hours flight training within 60 days preceding the practical test

- 10 hours of solo flight in a helicopter, including
  - 1 (solo) cross country flight with landings at minimum of 3 points, with one segment consisting of at least 50 NM from the original point of departure
  - 5 hours night VFR with 10 takeoffs and 10 landings, each landing involving a flight in the traffic pattern

- Holders of CPL(A)’s seeking an add-on helicopter rating will likely meet the 100 hours of PIC requirement, so the 35 PIC and 10 cross-country PIC in helicopters is the focal point

- Take the example of a CPL(A) with a single-engine airplane rating seeking a CPL(H) add-on

- Meeting the 20 dual and 10 solo requirements, plus the 35 PIC and 10 cross-country PIC time requirement means that all PIC requirements must be fulfilled with solo flight time

- The disadvantage here is that the applicant will gain little in practical experience and knowledge with 35 hours of solo operation prior to the practical test

- The applicant will be unable to practice emergency operations without an instructor aboard, and as such will just be boring holes in the sky and burning fuel to meet the requirement

- By meeting the PPL requirements (20 dual and 10 solo) and earning a PPL, the remaining 25 hours can be flown as PIC with dual instruction, which may be a better training investment
Commercial pilot privileges and limitations  61.133

- May act as PIC of an aircraft carrying persons or property for compensation or hire, provided the pilot is qualified in accordance with this part and with the applicable parts that apply for the operation
- May act as PIC of an aircraft for compensation or hire, provided the pilot is qualified in accordance with this part and with the applicable parts that apply for the operation

What operations can be done under part 91?  119.1

Except for operations when common carriage is not involved conducted with airplanes having a passenger-seat configuration of 20 seats or more, excluding any required crewmember seat, or a payload capacity of 6,000 pounds or more, this part does not apply to:

6 - Flights within 25 statute-miles radius, with maximum of 2 passengers, in day VFR, Part 91 aircraft, 72-hour notification to FSDO, no cargo, all flights approved by FAA, maximum of 6 flight pr. calendar year. (7)

F - Ferry or training flights (3)
I - Instruction (1)
N - Non-stop sightseeing, within 25 statute-miles radius (2)
E - Emergency mail service (9)

P - Parachute operations, within 25 statute-miles radius (6)
E - Elections (10)
A - Aerial work operations* (4)
S - Sling load operations, part 133 (8)

* Aerial Work Operations

F - Fire fighting (iv)
A - Aerial photography (iii)
B - Banner towing (ii)

C - Crop dusting, seeding, spraying and bird chasing (i)
H - Helicopter operation in construction or repair work (v)
Q -
P - Power line or pipeline patrol (vi)
Common carriage

1. Holding out of willingness to (Advertising)
2. Transport persons or property
3. From place to place
4. For compensation

Private carriage

1. Not holding out
2. For one or several selected customers

Common versus private carriage

A customer wants a photo flight

- Private pilot
- Private carriage
- Can be operated under Part 91
- Part 119 exemptions apply
- Part 135 may apply
FLIGHT INSTRUCTORS

Flight instructor certificate 61.3

1. A person who holds a flight instructor certificate issued under this part must have that certificate, or other documentation acceptable to the Administrator, in that person’s physical possession or readily accessible in the aircraft when exercising the privileges of that flight instructor certificate.

2. No person other than the holder of a flight instructor certificate issued under this part with the appropriate rating on that certificate may

   i. Give training required to qualify a person for solo flight and solo cross-country flight.
   ii. Endorse an applicant for a
       A. Pilot certificate or rating issued under this part
       B. Flight instructor certificate or rating issued under this part
       C. Ground instructor certificate or rating issued under this part
   iii. Endorse a pilot logbook to show training given
   iv. Endorse a student pilot certificate and logbook for solo operating privileges

Certificates and ratings issued under this part 61.5

The following certificates are issued under this part to an applicant who satisfactorily accomplishes the training and certification requirements for the certificate sought:

1. Pilot certificates
   i. Student pilot
   ii. Sport pilot
   iii. Recreational pilot
   iv. Private pilot
   v. Commercial pilot
   vi. Airline transport pilot
2. Flight instructor certificates
3. Ground instructor certificates

Medical certificates for Flight Instructors

61.23 states that you must hold at least a third-class medical certificate when exercising the privileges of a flight instructor certificate. But since we need a commercial license to get the flight instructor certificate and when working as a CFI getting paid to do so, we are exercising the privileges of 119.1 (e) (1) and (3), Student instruction and Training Flights, and thereby we must hold at least a second-class medical certificate because we are exercising the privileges of a commercial pilot certificate.
Flight instructor records

a. Sign the logbook of each person to whom flight or ground training has been given

b. Maintain a record in a logbook or a separate document that contains the following

   a. Logbook or student pilot certificate endorsed for solo flight privileges
      - The name of each person
      - The date of the endorsement

   b. Knowledge or practical test
      - The name of each person
      - The kind of test
      - The date
      - The results

c. Retain the records required by this section for at least 3 years

Flight instructor privileges

A person who holds a flight instructor certificate is authorized within the limitations of that person’s flight instructor certificate and ratings to give training and endorsements that are required for, and relate to:

1. A student pilot certificate
2. A pilot certificate
3. A flight instructor certificate
4. A ground instructor certificate
5. An aircraft rating
6. An instrument rating
7. A flight review, operating privilege, or recency of experience requirement of this part
8. A practical test
9. A knowledge test
Flight instructor limitations and qualifications 61.195

(a) Hours of training
In any 24-consecutive-hour period, a flight instructor may not conduct more than 8 hours of flight training.

(b) Aircraft ratings
A flight instructor may not conduct flight training in any aircraft for which the flight instructor does not hold
1. A pilot certificate and flight instructor certificate with the category and class rating
2. If appropriate, a type rating

(c) Instrument Rating
A flight instructor who provides instrument flight training for the issuance of an instrument rating or a type rating not limited to VFR must hold an instrument rating on his or her flight instructor certificate and pilot certificate that is appropriate to the category and class of aircraft in which instrument training is being provided

(d) Limitations on endorsements
1. Student pilot’s certificate or logbook for solo flight privileges, unless he has
   i. Given that student the flight training required for solo flight privileges
   ii. Determined that the student is prepared to conduct the flight safely under known circumstances, subject to any limitations listed in the student’s logbook that the instructor considers necessary for the safety of the flight

2. Student pilot’s certificate and logbook for a solo cross-country flight, unless he has
determined the student’s flight preparation, planning, equipment, and proposed procedures are adequate for the proposed flight under the existing conditions and within any limitations listed in the logbook that the instructor considers necessary for the safety of the flight

3. Student pilot’s certificate and logbook for solo flight in a Class B airspace area or at an airport within Class B airspace unless that flight instructor has
   i. Given that student ground and flight training in that Class B airspace or at that airport
   ii. Determined that the student is proficient to operate the aircraft safely

4. Logbook of a recreational pilot, unless that flight instructor has
   i. Given that pilot the ground and flight training required by this part
   ii. Determined that the recreational pilot is proficient to operate the aircraft safely

5. Logbook of a pilot for a flight review, unless that instructor has conducted a review of that pilot in accordance with the requirements of §61.56(a) of this part

6. Logbook of a pilot for an instrument proficiency check, unless that instructor has tested that pilot in accordance with the requirements of §61.57(d) of this part
(e) Training in an aircraft that requires a type rating
A flight instructor may not give flight training in an aircraft that requires the pilot in command to hold a type rating unless the flight instructor holds a type rating for that aircraft on his or her pilot certificate.

(f) Training received in a multiengine airplane, a helicopter, or a powered-lift
A flight instructor may not give training required for the issuance of a certificate or rating in a multiengine airplane, a helicopter, or a powered-lift unless that flight instructor has at least 5 flight hours of pilot-in-command time in the specific make and model of multiengine airplane, helicopter, or powered-lift, as appropriate.

(g) Position in aircraft and required pilot stations for providing flight training

1. A flight instructor must perform all training from in an aircraft that complies with the requirements of §91.109 of this chapter.

2. A flight instructor who provides flight training for a pilot certificate or rating issued under this part must provide that flight training in an aircraft that meets the following requirements:
   i. The aircraft must have at least two pilot stations and be of the same category, class, and type, if appropriate, that applies to the pilot certificate or rating sought.
   ii. For single-place aircraft, the pre-solo flight training must have been provided in an aircraft that has two pilot stations and is of the same category, class, and type, if appropriate.
(h) Qualifications of the flight instructor for training first-time flight instructor applicants

1. The ground training provided to an initial applicant for a flight instructor certificate must be given by an authorized instructor who
   a. Holds a current ground or flight instructor certificate with the appropriate rating, has held that certificate for at least 24 months, and has given at least 40 hours of ground training; or
   b. Holds a current ground or flight instructor certificate with the appropriate rating, and has given at least 100 hours of ground training in an FAA-approved course

2. Except for an instructor who meets the requirements of paragraph (h)(3)(ii) of this section, a flight instructor who provides training to an initial applicant for a flight instructor certificate must
   a. Meet the eligibility requirements prescribed in §61.183 of this part
   b. Hold the appropriate flight instructor certificate and rating
   c. Have held a flight instructor certificate for at least 24 months
   d. For training in preparation for an airplane, rotorcraft, or powered-lift rating, have given at least 200 hours of flight training as a flight instructor

3. A flight instructor who serves as a flight instructor in an FAA-approved course for the issuance of a flight instructor rating must hold a current flight instructor certificate with the appropriate rating and pass the required initial and recurrent flight instructor proficiency tests, in accordance with the requirements of the part under which the FAA-approved course is conducted, and must
   a. Meet the requirements of paragraph (h)(2) of this section; or
   b. Have trained and endorsed at least five applicants for a practical test for a pilot certificate, flight instructor certificate, ground instructor certificate, or an additional rating, and at least 80 percent of those applicants passed that test on their first attempt; and
      A. Given at least 400 hours of flight training as a flight instructor for training in an airplane, a rotorcraft, or for a powered-lift rating

(i) Prohibition against self-endorsements
A flight instructor shall not make any self-endorsement for a certificate, rating, flight review, authorization, operating privilege, practical test, or knowledge test that is required by this part.

(j) Additional qualifications required to give training in Category II or Category III operations
A flight instructor may not give training in Category II or Category III operations unless the flight instructor has been trained and tested in Category II or Category III operations, pursuant to §61.67 or §61.68 of this part, as applicable
Renewal of a CFI certificate that is not expired 61.197

1. Passing a practical test
   a. For a rating listed on current flight instructor certificate
   b. An additional flight instructor rating - 61.191

2. Presenting to FAA Flight Standards Inspector
   a. 24 calendar months, records showing
      i. Endorsed 5 students
      ii. 80% passed first attempt
   b. 24 calendar months, records showing you have served as a
      i. Company check pilot
      ii. Chief flight instructor
      iii. Company check airman
      iv. 121 or 135 Flight instructor
      v. Regular evaluating of pilots
   c. 3 calendar months, Graduation certificate from
      i. Approved flight instructor refresher course, Ground
      ii. Approved flight instructor refresher course, Flight
      iii. Combination of both

Expiration month of a renewed certificate 61.197

1. The month of renewal

2. The month of expiration of current certificate, provided
   a. Renewal requirements within preceding 3 calendar months
   b. Refresher course within preceding 3 calendar months

Practical test in simulator 61.197

1. Practical test in simulator or flight training device
   a. Approved course at 142 training center
AIRCRAFT CERTIFICATES

A - Airworthiness certificate 91.203
R - Registration certificate 91.203
R - Radio Station License [Only if operated outside US]
O - Operating limitations [FAA-approved POH, placards and instrument markings] 91.9
W - Weight and balance

CIVIL AIRCRAFT: CERTIFICATIONS REQUIRED 91.203

No person may operate a civil aircraft unless it has within it:

- An appropriate and current Airworthiness Certificate or a Special Flight Permit [91.715]
- An effective US Registration Certificate issued to the owner or the second duplicate copy of the Aircraft Registration Application, colored pink
- For operation with a fuel tank within the passenger or cargo compartments a copy of the Form 337 authorizing that installation

Airworthiness Certificate is tied to the aircraft does not expire. Block 6 on the Airworthiness Certificate states the term for the continued validity of it.

For an aircraft to be airworthy it must conform to the type certificate or a properly altered condition carried out as specified by AD, SB or STC and it is in condition for safe flight.

Special flight permit may be issued for an aircraft that may not currently meet applicable airworthiness requirements, but is capable of safe flight, for the following purposes:

1. Flying aircraft to a point for repairs, alterations, maintenance, or storage
2. Delivering new aircraft to the base of a purchaser or to a storage point
3. Conducting production flight tests
4. Evacuating an aircraft from impending danger
5. Conducting customer demonstration flights in new production aircraft that have passed or completed production flight tests
6. Excess weight operations
7. The special flight permit does not authorize flight over a country other than the United States without permission of that country

The process for obtaining a special flight permit is highly dependent on your circumstances. You should contact your local FAA Flight Standards District Office (FSDO) or Manufacturing Inspection District Office (MIDO) to determine the requirements for your particular circumstances.

Registration Certificate is tied to the owner and does not expire.

Temporary registration certificates are pink and only valid for 90 days.
Owner’s responsibility

The owner of the aircraft is responsible for maintaining it in an airworthy condition. This includes necessary inspections, compliance with airworthiness directives, life-limited parts on the aircraft and engine changed and the type certificate changed as required. Also the owner must ensure that any inoperative equipment and instruments are repaired during inspections and that the maintenance personnel make the appropriate entries in the aircraft maintenance logbook.

Pilot’s responsibility

No person must operate a civil aircraft unless it is in an airworthy condition. The pilot in command is responsible for determining weather that aircraft is in condition for safe flight. The pilot in command shall discontinue the flight when un-airworthy mechanical, electrical, or structural conditions occur.

Mechanics responsibility

When a mechanic signs off a 100 hour or a holder of an inspection authorization (IA) signs off an annual the responsibility for the aircraft ends when the aircraft leaves the hangar, it is no longer in his care. The mechanic is certifying that the aircraft is airworthy at that moment in time. The mechanic is held responsible for any maintenance, repair alteration SB or AD done to the aircraft up until the date on the airworthiness certificate. The mechanic who signs off an annual or a 100-hour inspection accepts responsibility for the past airworthiness and not the future. A mechanic is responsible for any work on an aircraft other than an inspection until such time when the work is inspected or repaired again.
OPERATING LIMITS, PLACARDS AND INSTRUMENT MARKINGS

Civil aircraft flight manual, markings, and placard requirements 91.9

No person may operate a civil aircraft without complying with the operating limitations specified in the approved Rotorcraft Flight Manual, markings, and placards, or as otherwise prescribed by the certificating authority of the country of registry.

Flight limitations POH 2-3

1. IFR prohibited
2. Night only when landing, position, instrument and anti-collision lights are operable
3. Night is limited to VFR conditions
4. Solo flight from right seat only
5. Takeoff/Landing - 8,000 ft density altitude
6. En route - 10,000 ft density altitude
7. Doors off - \(V_{ne}\) is 90 knots
8. If passenger seat is not occupied secure or remove seat belts and seat cushions
9. Avoid using carburetor heat during hover and ground operations

Placards POH 2-4

1. This helicopter must be operated in compliance with the operating limitations specified in the FAA approved Rotorcraft Flight Manual
2. \(V_{ne}\) chart
3. 600 lbs max gross in cabin. See Rotorcraft Flight Manual for Weight and Balance procedure
4. No storage between seats
5. No smoking
6. 20 lbs max gross weight in glove box
Operating limitations

- Engine RPM - Rotor engaged  2530-2700
- Engine RPM - Maintenance action  > 2900

- Engine RPM - Rotor disengaged  1200-1600
- Engine RPM - Maintenance action  > 2000

- Rotor RPM - Engine on  442-471
- Rotor RPM - Engine off  390-504

- Minimum fuel grade  100/130 or 100LL

- Oil Pressure  55-95 PSI (Max 115)
- Oil Temperature  100°-245° F

- Cylinder head temperature - Green  230°-450° F
- Cylinder head temperature - Yellow  450°-500° F
- Cylinder head temperature - Red  500° F

- Carburetor Temperature - Yellow  -15° to +5° C

- \( V_{ne} \) - Doors on  94 knots
- \( V_{ne} \) - Doors off  90 knots
WEIGHT AND BALANCE DATA AND EQUIPMENT LIST

Civil aircraft flight manual, markings, and placard requirements 91.9

No person may operate a civil aircraft without complying with the operating limitations specified in the approved Rotorcraft Flight Manual, markings, and placards, or as otherwise prescribed by the certificating authority of the country of registry.

Weight and balance

All flights must be conducted as described above and this includes that the weight and balance has been calculated and found to be within limits. The weight and balance data can be found in the Rotorcraft Flight Manual, it is recalculated when any piece of equipment, passenger of cargo is removed, added or moved. The flight manual contains the lateral and longitudinal arm and the basic empty weight.

Remember you can add/remove optional equipment from the Equipment List in order to help getting the centre of gravity within limits.

REQUIRED INSTRUMENTS AND EQUIPMENT 91.205

No person may operate a powered civil aircraft unless that aircraft contains the instruments and equipment for that type of operation and those instruments and items is in operable condition.

Day VFR 91.205

S - Seatbelt
O - Oil pressure gauge - Engine
F - Fuel gauge
A - Altimeter
T - Tachometer - Engine
A - Airspeed indicator
C - Compass
O - Oil temperature gauge - Engine
S - Shoulder harness
**Night VFR**  
91.205 + POH 2-3

Same as for Day VFR plus;

- **P** - Position lights
- **A** - Anti-collision lights
- **L** - Landing light
- **I** - Instrument lights (POH)
- **S** - Source of energy
- **S** - Spare fuses

**Required Equipment List**  
91.9 + RFM

The Rotorcraft Flight Manual also states that the following instruments and equipment must be installed and in working condition.

**300 CB**

- **M** - Manifold pressure gauge
- **A** - Ammeter
- **R** - Rotor tachometer
- **C** - Cylinder head temperature *
- **C** - Carburetor temperature gauge
- **O** - Outside air temperature gauge
- **W** - Warning lights

**300 CBi**

- **F** - Fuel pressure gauge
- **A** - Ammeter
- **R** - Rotor tachometer
- **M** - Manifold pressure gauge
- **C** - Cylinder head temperature *
- **O** - Outside air temperature gauge
- **W** - Warning lights

The required equipment list is found in the Rotorcraft Flight Manual and is made up as part of the certification of the helicopter type - Part 27

* Cylinder head temperature is not in the RFH, nor in 91.205 but in 27.1305. All carbureted engines must have a cylinder head temperature gauge.
AD’S, COMPLIANCE RECORDS, MAINTENANCE AND APPROPRIATE RECORDS

Maintenance records  91.417

Each registered owner or operator shall keep records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, progressive, and other required or approved inspections, as appropriate, for each aircraft, and each engine, propeller, rotor, and appliance of an aircraft.

The 3 C’s  
Chronological  Inspections and checks
Compliance  AD and SB compliance
Components  Time limited parts

Abbreviations  
H.M.  Maintenance Hub
Eng. T.T.  Engine Total Time
S.M.O.H.  Since Major Overhaul

Duration  Based on calendar months or maintenance hub hours

Annual inspection  91.409

No person may operate an aircraft unless, within the preceding 12 calendar months, it has had an annual inspection. This inspection can’t be over flown without a Special Flight Permit

100 hour inspection  91.409

No person may operate an aircraft carrying any person for hire, and no person may give flight instruction for hire in an aircraft, which that person provides, unless within the preceding 100 hours of time in service the aircraft has received an annual or 100-hour inspection.

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

Progressive maintenance  91.409

Used mainly on larger aircraft that would require weeks of downtime to do the annual inspection at once. Instead the operator can design a progressive maintenance schedule where the annual inspections is broken down in sections and completed throughout the year. The frequency and detail of the progressive inspection shall provide for the complete inspection of the aircraft within each 12 calendar months. The program must be approved by your local FSDO.
Life limited parts

Some parts have a life limit. They can only be used for a predetermined amount of hours after which they must be replaced and destroyed no matter what condition they might be found to be. An aircraft cannot be flown with a life-limited part out of time.

Transponder

Transponder 91.411 + 91.413

The ATC transponder has to have been tested within the preceding 24 calendar months. The transponder check is normally in the start of the airframe log.

Airworthiness directive

AD’s are mandatory and they must be complied with by FAR, any AD is an amendment to Part 39 and therefore law. They are issued when an unsafe condition is likely to exist or develop in other products of the same type design. An AD must not be over flown. The helicopter has to be transported be car to a repair station.

Service bulletin

A Service Bulletin is similar to an AD but is issued by the manufacturer, not the FAA. Many SB’s grow up to be AD’s. SB’s are optional to comply with Part 91 operators but are mandatory for Part 135 operations. Most insurance companies require compliance with SB’s.

Form 337

A form used for all major alterations of an aircraft. The work has to be in compliance with the manual for the STC approved part or a field inspection will have to be carried out.

Supplemental type certificate

A Supplemental Type Certificate (STC) is a document issued by the Federal Aviation Administration approving a product (aircraft, engine, or propeller) alteration. It is the manufactures permanent approval of a part to be installed on all aircraft of the same type.

Field inspection

If you design and produce a new add-on for, or make your own alteration of your aircraft you need to have this inspected and approved by the FAA. This is done by filling out a Form 337 and having an inspector perform a field inspection.
Preventive maintenance

The term preventive maintenance refers to simple or minor preservation operations and/or the replacement of small standard parts not involving complex assembly. FAR Part 43, Appendix A, contains a list of all preventive maintenance items. Qualified mechanics or certified pilots, excluding student and recreational pilots, may perform preventive maintenance on any aircraft owned or operated by them that are not used in air carrier service and approve the aircraft for return to service.
ATTENTION - Florida, nasty weather and changing fast

MOTIVATION - After PPL you will make the final decision to go or not go. By getting interested in weather and studying weather sources and comparing it to real time weather we can learn to read weather conditions and clouds ourselves, so that we know what to expect

OBJECTIVE - To make the student aware of the importance of checking weather sources, how to read them and where to find them. Also make student aware of weather hazards

CONTENT - Introduction
- Importance of a thorough weather check
- Various sources for obtaining weather information
- Use of weather reports, forecasts and charts
- Use of PIREP’s, SIGMET’s and AIRMET’s
- Recognition of aviation weather hazards including wind shear
- Factors considered in making “go”/“no go” decision

SCHEDULE - Ground Discussion 60

EQUIPMENT - Whiteboard + pens for pre- and post-flight discussions
- Weather print outs
- Weather computer

INSTRUCTOR’S ACTIONS - Discuss lesson objective
- Give homework
- Ask the student questions

STUDENT’S ACTIONS - Discuss lesson objective
- Ask pertinent questions

SUMMARY - Review lesson emphasis on weak areas and danger areas
TYPES OF WEATHER SERVICES

**Flight Service Station (FSS)**
Weather information is received from the weather briefer on 1-800-WX-BRIEF

**Telephone Information Broadcast System (TIBS)**
Weather information is received from an automated weather briefer [recorded message] by telephone from the FSS

**Transcribed Weather Broadcast (TWEB)**
Weather and aeronautical information is broadcast over low-frequency navigational aids and/or VOR’s

**Direct User Access Terminal System (DUATS)**
Weather and aeronautical information is received via the Internet
TYPES OF WEATHER BRIEFINGS

Standard
All information that is necessary for a flight

Abbreviated
Used to update a standard brief

Outlook
For departures planned 6 hours or more into the future

In-Flight Briefing
The FSS can be contacted by radio in-flight to update information
WEATHER INFORMATION

WEATHER REPORTS AND FORECASTS

METAR - Aviation Routine Weather Report

Description: Observed weather at individual airports, human observers or automated reports
Issued: Every hour or as needed (SPECI)
Valid: Until next issuance

TAF - Terminal Aerodrome Forecast

Description: Forecasted weather for an area within 5 statute miles of individual airports
Issued: Every 6 hours
Valid: Until next issuance or as stated in report

Area Forecast (FA)

Description: General description of weather, which covers > 3,000 square miles and is significant to flight. The 48 mainland states are divided into six regions for area forecasts. They give pilots an idea of the general weather scenario over a large area. Can also be used as a forecast for airports without a TAF.
Issued: Every 8 hours
Valid: Covers an 18-hour period

Four sections: 1. Communication and product header

2. Precautionary statement
   - Must use AIRMET Sierra for IFR conditions
   - Thunderstorms imply severe turbulence and icing
   - Non MSL height are denoted AGL or CIG

3. Synopsis
   - Summary of fronts, pressure systems, and circulation patterns for an 18 hour period

4. VFR clouds and weather
   - 12 hour specific forecast
   - 6 hour categorical outlook
Weather Information

Categorical outlooks:

<table>
<thead>
<tr>
<th>Weather type</th>
<th>Visibility</th>
<th>Ceiling</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFR</td>
<td>&gt; 5 SM</td>
<td>&gt; 3,000 ft</td>
</tr>
<tr>
<td>MFR</td>
<td>3-5 SM</td>
<td>3,000 - 1,000 ft</td>
</tr>
<tr>
<td>IFR</td>
<td>1-3 SM</td>
<td>500 - 1,000 ft</td>
</tr>
<tr>
<td>LIFR</td>
<td>&lt; 1 SM</td>
<td>&lt; 500 ft</td>
</tr>
</tbody>
</table>

Wind Aloft (FD)

Description: Forecast winds for all cruise altitudes up to 39,000 ft
Issued: Every 12 hours (00Z and 12Z)
Valid: Until next issuance

PIREP - Pilot Weather Reports

Description: Good source of weather information - reports of actual in-flight conditions
Issued: When reported by pilots
Valid: Actual weather

UA or UUA Type of report
/0V Location
/TM Time
/FL Altitude
/TP Type of aircraft
/SK Sky cover
/WX Weather
/TA Temperature
/VV Wind
/TB Turbulence
/IC Icing
/RM Remarks

UA = Routine PIREP / UUA = Urgent PIREP
In relation to VOR or route segment
Coordinated Universal Time (UTC)
Above mean sea level (MSL)
Example, C172
Cloud bases and tops, amount of coverage
Precipitation, visibility, restrictions to vision
Degrees Celsius
Direction in degrees, speed in knots
Light, moderate, severe as appropriate
Trace, light, moderate, severe as appropriate
To clarify the report or for additional information
AIRMET - Airman’s Meteorological Information (WA)  

**Description:** Weather, which affects mainly small aircraft (< 12,500 lbs)

**Issued:** Every 6 hours

**Valid:** Until next issuance

**Sierra**  *IFR and mountain obscuration*
- Ceiling less than 1,000 ft and/or visibility less than 3 statute miles affecting more than 50% of the area at one time
- Extensive mountain obscuration

**Tango**  *Turbulence / Winds / LLWS*
- Moderate turbulence
- Sustained surface winds of 30 knots or more
- Low level wind shear

**Zulu**  *Icing*
- Moderate icing
- Freezing level

SIGMET - Significant Meteorological Information (WS)  

**Description:** Weather, which affects all aircraft

**Issued:** When necessary

**Valid:** 4 hours

**Issued for:**
- Severe icing not associated with thunderstorms
- Severe or extreme turbulence (CAT) not associated with thunderstorms
- Dust storms, sand storms, or volcanic ash lowering surface or in-flight visibilities to below 3 statute miles
- Volcanic eruptions
Convective SIGMET - Convective Significant Meteorological Information (WST)  
**AIM 7-1-6**

**Description:** Convective activity affecting all aircraft, for 3 areas [Eastern, Central, Western]  
**Issued:** Hourly at H+55  
**Valid:** Up to 2 hours or next issuance

**Issued for:**
- Severe thunderstorms
  - a. Surface winds greater than or equal to 50 knots  
  - b. Hail at the surface greater than or equal to ¼ inches in diameter  
  - c. Tornadoes
- Embedded thunderstorms  
- A line of thunderstorms  
- Thunderstorms producing precipitation greater than or equal to heavy precipitation affecting 40% or more of an area at least 3,000 square miles

NOTAMS - Notice to Airmen  
**AIM 5-1-3**

**Description:** Changes to airports, facilities, environment, or procedures  
**Issued:** When necessary, published every 28 days  
**Valid:** Until the reason / event is no longer valid

**Four types:**
**NOTAM (L) - Local**  
- Small localized changes to the airport or its environment, that should not effect the usability of the airport  
- Can only be disseminated by the controlling flight service station

**NOTAM (D) - Distant**  
- Changes to the airport or its environment which may effect the usability of the airport  
- Disseminated by all flight service stations

**FDC NOTAM - Flight Data Centre**  
- Regulatory changes to procedures, charts, regulations  
- Will only be disseminated be the FSS if requested by the pilot

**TFR NOTAM - Temporary Flight Restriction**  
- Defines an area restricted to air travel due to a hazardous condition, a special event, or a general warning for the entire FAA airspace
ATTENTION - How can we pre-flight and decide an aircraft is good to go if we do not know anything about the function of the systems.

MOTIVATION - If some system was to behave differently in flight we could judge situations better and know what the best way out is if we know more about how the system functions.

OBJECTIVE - Familiarize the student with the different operating systems and equipment.

CONTENT - Power plant, including controls, indicators, cooling and fire detection
- Main rotor system
- Anti-torque system
- Landing gear, brakes and steering system
- Oil, fuel and hydraulic systems
- Electric system
- Environmental system (heating)
- Pitot/Static/Vacuum system and instruments
- Anti-icing system
- Avionics equipment

SCHEDULE - Ground Discussion 60

EQUIPMENT - Whiteboard + pens for pre- and post-flight discussions

INSTRUCTOR’S ACTIONS - Discuss lesson objective
- Give homework
- Ask the student questions

STUDENT’S ACTIONS - Discuss lesson objective
- Ask pertinent questions

SUMMARY - Review lesson emphasis on weak areas
POWERPLANT

300CB  Textron Lycoming HO-360-C1A
   - Four-cylinder
   - Horizontally mounted (H)
   - Horizontally opposed (O)
   - Air-cooled
   - Carbureted engine with a primer system

300CBi  Textron Lycoming HIO-360-G1A
   - Injected engine of same type

Max. Takeoff  180 SHP at 2,700 RPM
Max. Continuous 180 SHP at 2,700 RPM

Controls

Throttle  Located at the end of the collective lever
  Adjusts the amount of air
  Controls the engine RPM

Mixture  Leaning procedures check POH
  Adjusts the amount of fuel

Engine tachometer

Minimum RPM  2530 RPM
Engine idle  1200-1600 RPM
Clutch engagement  1500-1600 RPM

Overspeed  Momentarily inadvertent engine overspeeds from 2700-2900 RPM do not
  require maintenance action
  Engine overspeeds above 2000 RPM with rotors disengaged require
  maintenance action

Cylinder head temperature

Green arc  230° - 450° F
Yellow arc  450° - 500° F
Red line  500° F

Engine fire

How do we tell?  No detection systems
  We smell it, see it or feel it
  Leave the radio on, for others to inform us of a fire during shutdown
MAIN ROTOR SYSTEM

Three Bladed Fully Articulated Main Rotor
Flap, Feather and Lead-lag
Collective friction control
Cyclic friction control

Dimensions
Main rotor diameter 26.83 ft 8.178 m
Main rotor disk area 565.49 ft² 52.534 m²

Blades
C-shaped aluminum spar
Aluminum skin

Features
Elastometric Drag Dampers

RPM Limitations
Power on 442-471 RPM
Power off 390-504 RPM

M/R Transmission Limitations
Pressure < 2.5 PSI
Temperature > 235° F

ANTI-TORQUE SYSTEM

Two Bladed Tail Rotor
Variable pitch
Delta-Three hinge
Blades are interconnected by high strength tension-torsion strap assembly
Anti-torque pedals control pitch

Dimensions
Tail rotor diameter 4.24 ft 1.295 m
Tail rotor disk area 14.19 ft² 1.318 m²

Blades
Steel alloy spar
Fiberglass skin

Limitations
Power on 2901-3094 RPM
LANDING GEAR

Consists of
- Forward and rear crossbeams
- Left and right stabilizers

Attached through
- Four skid struts
- Landing gear dampers

To
- Left and right landing skids
- Heavy-duty skid shoes
- Ground handling wheels
FUEL, OIL, AND HYDRAULIC

FUEL SYSTEM - 300CB

Two tank types:  
- 33 gallons
- 35.2 gallons

FUEL SYSTEM - 300CBI

Tank type:  
- 33 gallons

If the fuel shut-off valve is pulled, it is a maintenance job to reset it.
OIL SYSTEM

Wet sump
ELECTRICAL SYSTEM

ELECTRICAL SYSTEM - 300CB

RFH 5-8
## PITOT STATIC AND ASSOCIATED INSTRUMENTS

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>ASI</th>
<th>ALT</th>
<th>VSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocked Pitot Tube</td>
<td>Zero</td>
<td>Works</td>
<td>Works</td>
</tr>
<tr>
<td>Blocked Pitot Tube and Drain Hole</td>
<td>Underread in descent</td>
<td>Works</td>
<td>Works</td>
</tr>
<tr>
<td>Blocked Static</td>
<td>Overread in descent</td>
<td>Frozen</td>
<td>Returns to zero</td>
</tr>
<tr>
<td>Using alternate cockpit static source</td>
<td>Overread</td>
<td>Overread</td>
<td>Show a momentarily climb</td>
</tr>
<tr>
<td>Broken VSI Glass</td>
<td>Overread</td>
<td>Overread</td>
<td>Reverse</td>
</tr>
</tbody>
</table>
ANTI-ICING SYSTEMS

CARBURETOR HEAT

Carburetor Heat OFF

Carburetor Heat ON

Carburetor Ice
AVIONICS EQUIPMENTS

BENDIX/KING NAV/COM

TRANSPONDER

GARMIN 430 NAV/COM/GPS
**OBJECTIVE**

- Make the student aware of the different factors that affect aircraft performance, how to determine performance and weight and balance conditions

**PERFORMANCE DATA**

- Standard conditions, ISA, Pressure of 29.92” and temperature of 15° C
- We use the charts and data to determine the actual performance in specific conditions
- Make sure that we operate within the limitations of the aircraft
- Determine how much weight can be carried

**PERFORMANCE FACTORS**

- Density altitude
- Weight
- Wind

**DENSITY**

- Density is defined as the mass of an object divided by its volume
- A measure of the amount of air molecules in a parcel of air

**DENSITY ALTITUDE**

- "That altitude above mean sea level at which a given atmospheric density occurs in the standard atmosphere"
- Pressure altitude corrected for nonstandard temperature
- NOT a physical altitude - but the altitude our helicopter feels like it is at and performs as if it were at

**DENSITY ALTITUDE FACTORS**

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Atmospheric pressure</th>
<th>Temperature</th>
<th>Humidity</th>
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</thead>
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<tr>
<td><img src="image1" alt="Altitude" /></td>
<td><img src="image2" alt="Atmospheric pressure" /></td>
<td><img src="image3" alt="Temperature" /></td>
<td><img src="image4" alt="Humidity" /></td>
</tr>
</tbody>
</table>
PERFORMANCE AND LIMITATIONS

EFFECTS ON PERFORMANCE

- Density of the air affects
  
  - Lift
  \[ \text{L} = C_L \cdot \frac{1}{2} \rho \cdot V^2 \cdot S \]
  
  - Engine power
  Thinner air and decreased pressure
  Mixture becomes more rich or less power is produced

HIGH OR LOW

- High density altitude
  - High elevation
  - Low atmospheric pressure
  - High temperature
  - High humidity

- Low density altitude
  - Low elevation
  - High atmospheric pressure
  - Low temperature
  - Low humidity

WEIGHT

- Lift is the force that opposes weight
- As weight increases, the power required to produce the lift must also increase
- Therefore weight might limit our maximum operating altitude
- Or the altitude of the take-off or landing site may limit our payload
- Most performance charts include weight as one of the variables
- At higher gross weights, the increased power required to hover produces more torque, which means more anti-torque thrust is required

WIND

- Wind direction and velocity affect hovering, takeoff, and climb performance
- Translational lift occurs anytime there is relative airflow over the rotor disc
- As wind speed increases, translational lift increases, resulting in less power required to hover
- Wind direction is also an important consideration
- Headwinds give the most increase in performance
- Takeoff and climb performance is greatly affected by wind
- Taking off into a headwind, ETL is achieved earlier, resulting in more lift and a steeper climb angle
- Taking off with a tailwind, more distance is required to accelerate through translation lift
- Strong crosswinds and tailwinds may require the use of more tail rotor thrust to maintain directional control
- Increased tail rotor thrust absorbs power from the engine
PERFORMANCE AND LIMITATIONS

**LOSS OF TAIL ROTOR EFFECTIVENESS**
- The unanticipated yaw to the right due to inadequate thrust of the tail rotor
  - Weathercock
  - Tail rotor vortex ring state
  - Main rotor disc interference
  - LTE at altitude

**WEATHERCOCK**
- 120° to 240°
- Helicopter attempt to weathercock its nose into the wind

**TAIL ROTOR VORTEX RING STATE**
- 210° to 330°
- The wind cause a tail rotor vortex ring state

**MAIN ROTOR DISC INTERFERENCE**
- 285° to 315°
- Wind cause the main rotor vortex to be blown into the tail rotor

**LTE AT ALTITUDE**
- At higher altitudes, where the air is thinner, tail rotor thrust and efficiency is reduced
- High altitudes and high gross weights, especially while hovering
- Tail rotor thrust may not be sufficient to maintain directional control
- In this case, the hovering ceiling is limited by tail rotor thrust and not necessarily power available
- Gross weights need to be reduced and/or operations need to be limited to lower density altitudes
PILOTS OPERATING HANDBOOK
- Contains information required regarding performance and limitations

LIMITATIONS
SECTION 2
- Outlines the limitations imposed by the manufacturer on the 300CB
- These must be complied with according to 91.9

PERFORMANCE
SECTION 5
- Contains information regarding performance data
- Chart used for calculation performance on any given day

AIRSPEED CALIBRATION
- Shows a pilot how to find the calibrated airspeed from the indicated airspeed
- The difference being due to instrument errors

HEIGHT/VELOCITY DIAGRAM
- The height/velocity diagram at sea level shows areas of safe operation
- The shaded areas represent flight situations that are dangerous because a safe autorotation may not be possible
- Insufficient airspeed at low altitudes, not enough airspeed to initiate a flare and arrest the rate of descent
- High airspeed at low altitude, not enough time to perform a proper flare, ground impact at high forward speed
- The take-off profile outlined on the diagram shows the safest transition from a hover to forward flight
- Departures should always be made in this area of the diagram
- Applies more to take-off than approaches, where we have a low collective position and are established in a descend

Engine Failure During Take-off

Engine Failure During Approach
PERFORMANCE AND LIMITATIONS

HOVER CEILING
- Used to calculate if the aircraft is able to hover at a certain density altitude when combined with a specific weight
- The temperature, altitude, ambient air pressure and gross weight are all considered in this chart
- It is important to note however that the chart is only for hovering in ground effect

DENSITY ALTITUDE
- Used to calculate density altitude from the pressure altitude and temperature
- Density altitude is a theoretical value (pressure altitude adjusted for non-standard temperature)
- To estimate the performance of an aircraft in specific temperature and pressure conditions

EXAMPLE
- A real life example, where we look at a flight, the atmospheric conditions
- Then we figure out the performance aspects and the weight at balance
- Can we do the flight?