Private Pilot Check Ride
Practical Test Standards

Cessna 152 II

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Geoff Hatcher MEI, CFII, ATP, West Wind Type Rating
1915 Biscayne Little Rock, AR  72227  (501) 680-7283
61.103 Private Pilot License Eligibility/ Prerequisites:
  a) To be eligible for a private pilot certificate, a person must:
  b) 17 years of age
  c) read, speak, write, and understand English. medical waivers available from the Administrator
  d) logbook endorsement from an instructor who Certifies that the person is prepared for the required knowledge test on the areas listed in Sec. 61.105
  e) Pass Written knowledge test on the aeronautical knowledge areas listed in Sec. 61.105(b) of this part.
  f) endorsement from an authorized instructor Certifying that the person Receive flight training in the areas of operation listed in Sec. 61.107 and is prepared for the required practical test on those areas.
  g) aeronautical experience requirements of Sec. 61.109
  h) Pass a practical test on the areas of operation listed in Sec. 61.107

61.105 Aeronautical knowledge Ground Training for written test
  1) FAR’s
  2) NTSB
  3) AIM & AC’s
  4) Carts Pilotage, Dead Reaconing Radion Aids to Navigation
  5) Raqdio Communication
  6) Critical Weather ground and in flight, wind shear reports and forecasts
  7) Operation of aircraft, collision avoidance, wake turbulence
  8) Density altitude and take off climb performance
  9) Weight and balance
  10) Aerodynamics, power plants, and aircraft systems
  11) Stalls & spins, awareness entry and recovery
  12) Aeronautical decision making and judgement
  13) Preflight– runway lengths, takeoff and landing performance, weather, fuel requirements, alternatives, and delays (WKRAFT)

61.107 Flight proficiency endorsement for practical test 61.103(f)
I. PREFLIGHT PREPARATION
  A. Certificates and Documents
  B. Airworthiness Requirements
  C. Weather Information
  D. Cross-Country Flight Planning
  E. National Airspace System
  F. Performance and Limitations
  G. Operation of Systems
  H. Aeromedical Factors
II. PREFLIGHT PROCEDURES
  A. Preflight Inspection
  B. Cockpit Management
  C. Engine Starting
  D. Taxiing
  E. Before Takeoff Check
III. AIRPORT AND SEAPLANE BASE OPERATIONS
A. Radio Communications and ATC Light Signals
B. Traffic Patterns
C. Airport/Seaplane Base, Runway, and Taxiway Signs, Markings, and Lighting

IV. TAKEOFFS, LANDINGS, AND GO-AROUNDS
A. Normal and Crosswind Takeoff and Climb
B. Normal and Crosswind Approach and Landing
C. Soft-Field Takeoff and Climb
D. Soft-Field Approach and Landing
E. Short-Field Takeoff and Maximum Performance Climb
F. Short-Field Approach and Landing
G. Forward Slip to a Landing
H. Go-Around/Rejected Landing

V. PERFORMANCE MANEUVER
Steep Turns

VI. GROUND REFERENCE MANEUVERS
A. Rectangular Course
B. S-Turns
C. Turns Around a Point

II. NAVIGATION
A. Pilotage and Dead Reckoning
B. Navigation Systems and Radar Services
C. Diversion
D. Lost Procedures

VIII. SLOW FLIGHT AND STALLS
A. Maneuvering During Slow Flight
B. Power-Off Stalls
C. Power-On Stalls
D. Spin Awareness

IX. BASIC INSTRUMENT MANEUVERS
A. Straight-and-Level Flight
B. Constant Airspeed Climbs
C. Constant Airspeed Descents
D. Turns to Headings
E. Recovery from Unusual Flight Attitudes
F. Radio Communications, Navigation Systems/Facilities, and Radar Services

X. EMERGENCY OPERATIONS
A. Emergency Descent
B. Emergency Approach and Landing (Simulated)
C. Systems and Equipment Malfunctions
D. Emergency Equipment and Survival Gear

XI. NIGHT OPERATION
A. Night Preparation
B. Night Flight

XII. POSTFLIGHT PROCEDURES
A. After Landing, Parking and Securing
61.109 Aeronautical Training experience. Required for private
(a) 40 hours of flight time that includes at least
20 hours of flight training from an authorized instructor and
10 hours of solo flight training in the areas of operation listed in Sec. 61.107(b)(1) of this part,
and the training must include at least--
(1) 3 hours of cross-country dual;
(2) 3 hours of night dual--
   (i) One dual cross-country flight of over 100 nautical miles total distance; and
   (ii) 10 takeoffs and 10 landings to a full stop (with each landing involving a flight in the
        traffic pattern) at an airport.
(3) 3 hrs of instruments training, including
   • straight and level flight,
   • constant airspeed climbs and descents,
   • turns to a heading, recovery from
   • unusual flight attitudes,
   • radio communications, and
   • the use of navigation systems/facilities and
   • radar services appropriate to instrument flight;
(4) 3 hrs of practical test preparation flight training within 60 days preceding the test; and
(5) 10 hours of solo flight time in a single-engine airplane, consisting of at least--
   (i) 5 hours of solo cross-country time;
   (ii) One 150 nautical mile solo cross-country flight, with full-stop landings at three points,
        and one 50 nautical mile segment
   (iii) Three takeoffs and three landings to a full stop (with each landing involving a flight
        in the traffic pattern) at an airport with an operating control tower.
I. AREA OF OPERATION: PREFLIGHT PREPARATION

NOTE: The examiner shall develop a scenario based on real time weather to evaluate TASKs C and D.

A. TASK: CERTIFICATES AND DOCUMENTS

a. private pilot certificate privileges, limitations, and recent flight experience requirements.

Pilot-In-Command Responsibility §91.3
Is directly responsible for, and is the final authority as to, the operation of that aircraft. In an in-flight emergency requiring immediate action, the pilot in command may deviate from any rule of this part to the extent required to meet that emergency.

Pilot Documents §61.3
- While pilot in command, you must have in your personal possession.
  1. medical certificate
  2. pilot certificate
  3. Picture I.D.
- You shall present it upon the request of the Administrator, the National Transportation Safety Board, or any federal, state, or local law enforcement officer.

Change of Address §61.60
The pilot is entitled to exercise the privileges of the pilot certificate for a period of only 30 days after the date of the move.

Type Ratings Required §61.31
- Large Aircraft PIC - type rating - gross weight or more than 12,500 pounds.
- Jets type rating required
- High Performance Aircraft more than 200 horsepower. one time endorsement from a instructor.
- Complex Aircraft
  - Retractable landing gear, flaps and a controllable pitch propeller
  - Required to have a one time endorsement from a instructor.
- Tail Dragger
  - Required to have a one time endorsement from a instructor.

Pressurized Aircraft/ High Altitude

Private Pilot Privileges and Limitations §61.113
1. Cannot act as pilot in command with passengers or property for compensation or hire.
2. Can for compensation or hire, act as pilot in command of an aircraft in connection with any business or employment if:
   a) The flight is only incidental to that business or employment; and
   b) The aircraft does not carry passengers or property for compensation or hire.
3. A private pilot may not pay less than his share of the operating expenses of a flight with passengers, provided the expenses involve only fuel, oil, airport expenditures, or rental fees.
4. May act as pilot in command, without compensation, of an aircraft used in a passenger-
carrying airlift sponsored by an accredited charitable organization, and for which the passengers make a donation to the organization.

5. Reimbursements for Search and location missions sanctioned by local, state, federal, or organizations that conduct search and rescue operations

6. Sales demonstrations provided you have 200 hours flight time.

7. tow gliders

**Glider Towing 61.69**

pilot in command requirements:

100 hours of logged pilot flight time in same cat class type.

Ground and flight training endorsement

3 accompanied tows or three glider flights in last 12 months

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**Acrobatic Flight§91.303**

Acrobatic flight is prohibited over congested area of a city, town or settlement. Must be 1500 ft AGL and Visibility at least 3 miles

**Parachutes§91.307**

Must be packed by a certificated and appropriately rated parachute rigger within the preceding 120 days.

With certain exceptions, each occupant must wear an approved parachute when intentionally pitching the nose up or down more than 30 degrees or exceeding 60 degrees of bank.

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**Recent flight experience requirements**

**Flight Review §61.56** (by the end of the 24th month)

minimum of 1 hour of flight training and 1 hour of ground training.

No person may act as pilot in command of an aircraft unless, since the beginning of the 24th calendar month before the month in which that pilot acts as pilot in command has accomplished a flight review and received the proper logbook endorsements.

**Recent flight experience§61.57**

To fly passengers, the pilot in command must have made 3 takeoffs and landing within 90 day in the same make and model aircraft. To fly passengers at night or in a tail-dragger, the landings must be to full stop.

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**b. medical certificate class and duration.**

**Medical Certificates §61.23 AIM 8-1-1**

- 1st class = ATP = 6 months
- 2nd class = commercial = 12 months
- 3rd class = private = 24 months if over 40 hours; 36 months if under 40 hours.

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**c. pilot logbook or flight records.**

**§ 61.51 Pilot logbooks.**

**The following time must be recorded in a logbook:**

1) Training and aeronautical experience used to meet the requirements for a certificate, rating, or flight review.

2) The aeronautical experience required for meeting the recent flight experience requirements.
Part 61.
enter the following information for each flight or lesson logged:

(1) General—
   (i) Date.
   (ii) Total flight time or lesson time.
   (iii) Location
   (iv) Type and identification of aircraft, flight simulator, or flight training device, as appropriate.
   (v) The name of a safety pilot, if required by § 91.109(b) of this chapter.

(2) Type of pilot experience or training—
   (i) Solo.
   (ii) PIC.
   (iii) SIC.
   (iv) Flight and ground Instruction (Dual) training received from an authorized instructor.
   (v) Training received in a flight simulator or flight training device from an unauthorized instructor.

(3) Conditions of flight—
   (i) Day or night.
   (ii) Actual instrument.
   (iii) Simulated instrument conditions in flight, a flight simulator, or a flight training device.

2. Locating and explaining—

   a. Airworthiness and registration certificates.

AROW.

Airworthiness Certificate § 91.203
- Must be displayed at cabin or cockpit entrance legible to passengers or crew.
- No expiration date. Is valid if Airworthiness Directives (AD's) and required maintenance is completed.

Registration 91.203(2)
An aircraft must be registered with the FAA Civil Aviation Registry.
The Certificate of Aircraft Registration will expire when:
1) the aircraft is registered under the laws of a foreign country
2) registration is canceled at the written request of the holder of the certificate
3) the aircraft is totally destroyed or scrapped
4) the ownership of the aircraft is transferred
5) the holder of the certificate loses United States citizenship
6) 30 days have elapsed since the death of the holder of the certificate

b. Operating limitations, placards, instrument markings, and POH/AFM.

§ 91.9 may be in the form of an FAA-approved Flight Manual/Pilots Operating Handbook, placards, and instrument markings, or any combination of these.

c. Weight and balance data and equipment list.

Weight and Balance information part 21
This is the weight and balance sheet: original in the maintenance log, which specifies the exact weight of the airplane you will be flying. A copy should be in the back of the POH. This info is required to properly determine aircraft performance.
B. TASK: AIRWORTHINESS REQUIREMENTS

a. required instruments and equipment for day/night VFR.

**Required Instruments for day/night VFR flight 91.205**
The regulations Part 91 require that the following equipment be operative for VFR flight.

*Day (acronym: TOMATOFLAMES)*
- Tachometer
- Oil Pressure gauge
- Magnetic direction indicator
- Airspeed Indicator
- Temperature gauge (liquid-cooled engine)
- Oil Temperature gauge (air-cooled engine)
- Fuel gauge indicator
- Landing gear position indicator
- Altimeter
- Manifold Pressure gauge
- ELT
- Seat belts

*Night (acronym: FLAPS)*
- Fuses (or three fuses of each kind)
- Landing Light (if for hire)
- Anti-collision lights (approved aviation red/white)
- Position Lights (navigation lights)
- Source of electrical energy (adequate for all installed)

b. procedures and limitations for determining airworthiness of the airplane with inoperative instruments and equipment with and without an MEL.

**Inop equip 91.213**

**Minimum Equipment List**

MEL The minimum equipment list is specific for a tail number constitutes a supplemental type certificate and allows for operation with inoperative items specifically determined to be nonessential for that aircraft. Common in chartered and agricultural aircraft.

**Inoperative equipment — No MEL**

1. Consult FAR §91.205,91.213, “TOMATO FLAMES”
2. Consult VFR day Type Certificate Data Sheet of your make and model POH weights and balance section)
3. Kinds of operations Equipment list (limitations section of handbook)
4. Consult AD requirements

**The inop equipment must be**

1. Removed or deactivated
2. Placard any non essential inoperable instruments
3. Entry in maintenance log
c. requirements and procedures for obtaining a special flight permit.

Special Flight Permit §21.197/199 §91.715

(a) A 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 the aircraft to a basewhere repairs, alterations, or maintenance are to be performed, or to a point of storage.
2) Delivering or exporting the aircraft.
3) Production flight testing new production aircraft.
4) Evacuating aircraft from areas of impending danger.
5) Conducting customer demonstration flights in new production aircraft that have satisfactorily completed production flight tests.

(b) A special flight permit may also be issued to authorize the operation of an aircraft at a weight in excess of its maximum certificated takeoff weight for flight beyond the normal range over water, or over land areas where adequate landing facilities or appropriate fuel is not available. The excess weight that may be authorized under this paragraph is limited to the additional fuel, fuel-carrying facilities, and navigation equipment necessary for the flight.

§ 21.199 Issue of special flight permits.

(a) Except as provided in § 21.197(c), an applicant for a special flight permit must submit a statement in a form and manner prescribed by the Administrator, indicating—

1) The purpose of the flight.
2) The proposed itinerary.
3) The crew required to operate the aircraft and its equipment, e.g., pilot, co-pilot, navigator, etc.
4) The ways, if any, in which the aircraft does not comply with the applicable airworthiness requirements.
5) Any restriction the applicant considers necessary for safe operation of the aircraft.
6) Any other information considered necessary by the Administrator for the purpose of prescribing operating limitations.

(b) The Administrator may make, or require the applicant to make appropriate inspections or tests necessary for safety.

2. Locating and explaining—

a. Airworthiness directives.

Airworthiness Directives 91.47, 91.417

- Used to notify aircraft owners and other interested persons of unsafe conditions and to prescribe the conditions under which the product may continue to be operated
- Are regulatory and must be complied with
- It is the owner or operator's responsibility to assure compliance with all pertinent AD's
- Divided into two categories:
  1) Those of an emergency nature requiring immediate compliance upon receipt, and
  2) Those of a less urgent nature requiring compliance within a relatively longer period of time
b. compliance records.

**Compliance Records 43.9, 91.417**

A record must be maintained showing the current status of applicable AD’s. The record must include the following:
1) method of compliance
2) signature and certificate number of the repair station or mechanic who performed the work

c. maintenance/inspection requirements.

**Maintenance**
- Annual; 100 hour (); Airworthiness Directives; MEL’s; and Special Flight Permits.

**Aircraft Inspections 91.409**

**Annual**
- must be done on all aircraft
- must be signed off by an A&P Inspector, not just an A&P mechanic

**100 Hour**
- must be done on all aircraft that are carrying persons for hire or giving flight instruction.
- can be signed off by an A&P mechanic may be flown beyond 100 hours if it is being transported to a place where service can be completed

**Note:** Even though the inspections are the same. If both and Annual and 100 Hour inspections are due at the same time. An Annual can count for both, but a 100 Hour cannot.

**Transponder** 24 month 91.413
**ELT** §91.207 Yearly inspection
**ELT Battery** recharged or replaced after 1 hour of cumulative use or 1/2 useful life.

d. appropriate record keeping.

**§ 91.417 Maintenance records.**

(a) Except for work performed in accordance with §§ 91.411 and 91.413, each registered owner or operator shall keep the following records for the periods specified in paragraph (b) of this section:

1) 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 (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

   (i) A description (or reference to data acceptable to the Administrator) of the work performed; and

   (ii) The date of completion of the work performed; and

   (iii) The signature, and certificate number of the person approving the aircraft for return to service.

2) Records containing the following information:

   (i) The total time in service of the airframe, each engine, each propeller, and each rotor.

   (ii) The current status of life-limited parts of each airframe, engine, propeller, rotor, and appliance.

   (iii) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.

   (iv) The current inspection status of the aircraft, including the time since the last inspection required by the inspection program under which the aircraft and its appliances are maintained.

   (v) The current status of applicable airworthiness directives (AD) including, for each, the method of compliance, the AD number, and revision date. If the AD involves recurring
action, the time and date when the next action is required.
(vi) Copies of the forms prescribed by § 43.9(a) of this chapter for each major alteration to
the airframe and currently installed engines, rotors, propellers, and appliances.
(b) The owner or operator shall retain the following records for the periods prescribed:
(1) The records specified in paragraph (a)(1) of this section shall be retained until the work is
repeated or superseded by other work or for 1 year after the work is performed.

C. TASK: WEATHER INFORMATION
1. Analyzing weather reports, charts, and forecasts from various sources with
emphasis on—
a. METAR, TAF, and FA.

- Provide surface weather conditions at a specified location and is presented in a coded
  format, which is standard internationally.
- Information is of the existing conditions at the time the report was generated.
- Winds reported are referenced to true north. 00000KT = Calm; if the wind direction varies
  60 degrees or more and speed is above six knots direction is separated by a V, if less than
  6 knots “VRB”
- Peak gust are denoted by a number following a “G” after the wind direction and base
  speed.
- Visibility is reported in statute miles, “SM”
- Ceiling is defined as the height above the Earths surface of the lowest broken or overcast
  layer or vertical visibility into an obscuration.

Example:
METAR KASG 2047Z 22010G18KT 10SM SCT250 20/02 A3010=

Type of Report: This is a Routine report (METAR) as opposed to a Special report (SPECI).
Station Designator: Generated at Springdale Arkansas.
Time of Report: 20:47 Zulu
Wind: Direction is from 220 at 10 knots gusting to 18 knots
Weather and Obstruction to
visibility: visibility is 10 statute miles
Sky Conditions: Clouds are scattered at 25,000 feet
Temp/Dew Point: Temperature is 20 degrees/Dew Point is 02 degrees
Altimeter: 30.10 in mercury

TAF (Terminal Aerodrome Forecast) 7-1-30
- TAF (Terminal Aerodrome Forecast); your best sources for an estimate of what the
  weather will be in the future.
- A description of expected conditions at an airport and within a 5 nautical miles radius of a
  runway complex.
- Covers a specified period of time, usually 24 hours
- The descriptors and abbreviations are the same as those used in METAR’s
- Usually valid for a 24-hour period and are scheduled four times a day (0000Z, 0600Z,
  1200Z, 1800Z)
"BECMG" = a gradual change in the weather
"FM" = a rapid change in the forecast is expected.
"TEMPO" = expected to last less than an hour at a time
"PROB" = used when a probability of occurrence is between 30 and 49%
"NSW" means that no significant weather change is forecast to occur. Only appears in BECMG or TEMPO groups.
Cumulonimbus clouds are the only cloud type included. "CB"
"WS" = low-level wind shear not associated with convective activity; WS015/30045kt = wind shear is expected at 1,500 ft with wind from 300 at 45 kts.

**FA (Area Forecast)**
Contains general weather conditions over an area the size of several states.
They are used to determine forecast en route weather and to help in determining weather at airports for which TAF's are not issued.
Issued 3 times a day by the National Aviation Weather Advisory Unit in Kansas City, MO for each of the six areas in the contiguous 48 states.
FA (Aviation Area Forecast): conditions over a wide region (several states) and is a good source of information for enroute weather.
- “OTLK” = the outlook for a specific period of time.
- “SIG CLDS AND WX” = is the section that contains a summary of cloudiness and weather significant to flight operations broken down by states or other geographical areas.
The HAZARDS section lists hazards to aviation, such as turbulence and icing, for selected areas.

**Example:**
DFWC FA 311045
SYNOPSIS AND VFR CLDS/WX
SYNOPSIS VALID UNTIL 010500
CLDS/WX VALID UNTIL 312300...OTLK VALID 312300-010500
OK TX AR TN LA MS AL AND CSTL WTRS.

SEE AIRMET SIERRA FOR IFR CONDS AND MTN OBSCN. TS IMPLY SEV OR GTR TURB SEV ICE LLWS AND IFR CONDS.
NON MSL HGTS DENOTED BY AGL OR CIG.

S CNTRL AND SERN TX
SCT Cl. 16Z AGL FEW040. OTLK...VFR.

AR
N HLF...BKN-SCT100 TOPS FL180. OTLK...VFR.
S HLF...SCT100. OTLK...VFR.

**Communication and product headers:**
DFWC FA 311045 SYNOPSIS AND VFR CLDS/WX SYNOPSIS VALID UNTIL 010500 CLDS/WX VALID UNTIL 312300...OTLK VALID 312300-010500 OK TX AR TN LA MS AL AND CSTL WTRRS

**Precautionary Statements:**
SEE AIRMET SIERRA FOR IFR CONDS AND MTN OBSCN. TS IMPLY SEV OR GTR TURB SEV ICE LLWS AND IFR CONDS. NON MSL HGTS DENOTED BY AGL OR CIG.

**Synopsis (summary of location and movement of fronts, pressure systems, and circulation patterns for an 18-hour period):**
RWF-ABR-ISN LN. CDFNT WILL SLOLY MOV SEWD ALG BAE-FOD-RAP LN 09-12Z AS SECONDARY CDFNT APCHS NRN PLNS/UPR MS VLY ALG INL-GFK-40NW

**VFR Clouds and Weather (contains a 12 hour specific forecast followed by a 6-hour, categorical**
outlook giving a total forecast period of 18- hours):
S CNTRL AND SERN TX
SCT CL 16Z AGL FEW040. OTLK...VFR.

AR
N HLF...BKN-SCT100 TOPS FL180. OTLK...VFR.
S HLF...SCT100. OTLK...VFR.

Categorical Outlooks 7-1-7.
a. Categorical outlook terms, describing general ceiling and visibility conditions for advanced planning purposes are used only in area forecasts and are defined as follows:
1. LIFR (Low IFR). Ceiling less than 500 feet and/or visibility less than 1 mile.
2. IFR. Ceiling 500 to less than 1,000 feet and/or visibility 1 to less than 3 miles.
3. MVFR (Marginal VFR). Ceiling 1,000 to 3,000 feet and/or visibility 3 to 5 miles inclusive.
4. VFR. Ceiling greater than 3,000 feet and visibility greater than 5 miles; includes sky clear.
b. The cause of LIFR, IFR, or MVFR is indicated by either ceiling or visibility restrictions or both. The contraction "CIG" and/or weather and obstruction to vision symbols are used. If winds or gusts of 25 knots or greater are forecast for the outlook period, the word "WIND" is also included for all categories including VFR.

EXAMPLE:
1. LIFR CIG-low IFR due to low ceiling.
2. IFR FG-IFR due to visibility restricted by fog.
3. MVFR CIG HZ FU-margin VFR due to both ceiling and visibility restricted by haze and smoke.
4. IFR CIG RA WIND-IFR due to both low ceiling and visibility restricted by rain; wind expected to be 25 knots or greater.

b. surface analysis chart.

Surface Analysis Chart
This is the basic weather chart
Transmitted every 3 hours.
The valid time of the map corresponds to the time of the plotted observations
Displays weather information such as surface wind direction and speed
Surface Analysis Chart: shows weather conditions as of the valid time shown on the chart
• You can get a picture of atmospheric pressure patterns at the earth's surface.
• Transmitted every three hours
Station Models—round station symbols depict stations where observations are taken by human observers and square symbols indicate automated sites.

c. radar summary chart.

Radar Summary Chart
Identifies general areas and movement of precipitation and thunderstorms.
Generally detects precipitation only; it does not ordinarily detect small water droplets such as fog; therefore the absence of echoes does not guarantee clear weather.
Radar Summary Chart (SDs): data depicts the location, size, shape, intensity, and intensity trend and direction of movement. Also shows echo heights of the tops and bases of precipitation areas.
• Produced 35 minutes past each hour. Conditions that existed at the valid time. Only detects precipitation and does not detect all cloud formations.

d. winds and temperature aloft chart.

Winds and temperature Aloft Chart
Forecast Winds and Temperatures Aloft Chart:
• 12-hour forecast valid at 0000Z and 1200Z daily.

1. **FD** (Winds & Temperatures Aloft Forecasts): wind direction in relation to true north, wind speed in knots, and temperature in degrees Celsius, for nine levels between 3,000 and 39,000 ft.

   • Temperatures are assumed negative above 24,000 ft
   • FD does not include levels within 1,500 ft of the station's elevation, and temperatures are not forecast for the 3,000-foot level or for a level within 2,500 ft of the station's elevation.
   • Winds of 100 to 199 kts have 50 added to the direction.
   • “9900” = light & variable and less than 5 kts.

Made twice daily based on 00Z and 12Z data for use during specified time intervals. Winds aloft are not forecast for the 3,000 ft level or for the level within 2,500 ft of the station elevation.

Wind Direction is referenced to true north and wind speed in knots

- A zero is added to the end of the first two digits giving the direction in increments of 10 degrees and the second two digits give speed in knots.
- If the wind speed is forecast to be 100 to 199 knots the forecaster adds 50 to the direction and subtracts 100 from the speed.

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******** FD Winds Aloft Forecast ********
DATA BASED ON 170000Z REQUESTED
VALID 170600Z FOR USE 0500-0900Z. TEMPS NEG ABV 24000 ALTITUDE
FT 3000  6000  9000  12000  18000  24000  30000  34000  39000
LIT 0318 3312+01 2835-01 2858-04 2781-16 2789-26 711540 771948 772749
SHV 0715 2816+08 2733+05 2741+00 2764-13 2776-24 278938 279748 831650
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e. significant weather prognostic charts.

**Significant Weather Prognostic Chart**
Portray forecast weather to assist in flight planning.

There are low-level and high-level prognostic charts

- There are 4 panels. The two lower panels are the 12 and 24-hour surface progs. The two upper panels are the 12 and 24-hour progs and portray significant weather from the surface up to 400 millibars
- Smooth lines = areas of expected precipitation
- Dashed lines = areas of expected showers or thunderstorms

**U.S. Low-Level Significant Weather Prog Chart**: helps you avoid areas of low visibility and ceilings as well as where turbulence and icing may exist.

- Valid from the surface up to the 400-millibar pressure level (24,000 ft)
- Consists of four panels, is issued at 0000Z, 0600Z, 1200Z, 1800Z; the two lower panels are 12 and 24 hour forecasts of surface weather conditions, the two upper panels are 12 and 24 hour forecasts of weather between the surface and 24,000 ft. (surface Prog Panels)
- The upper panels show areas of non-convective turbulence and freezing levels as well as IFR and Marginal VFR (MVFR) weather
- The lower panels show fronts and pressure centers, and forecast precipitation and thunderstorms.

f. convective outlook chart.

**Severe Weather Outlook Chart**: is a 48-hour forecast of thunderstorm activity

- Issued every morning at about 0800Z
• Left panel depicts the outlook for general and severe thunderstorm activity for the first 24-hours.
Right panel depicts a forecast for the next day beginning at 1200Z.

g. AWOS, ASOS, and ATIS reports.

Automated Weather Observation System 7-1-12b (AWOS): was the first widely installed automated weather data. Consist of various sensors, a processor, a computer-generated voice subsystem and a transmitter to broadcast local, minute by minute weather data directly to the pilot. Classified into 4 basic levels.

AWOS –A = only reports altimeter setting
AWOS-1 = also measures and reports wind speed, direction and gust, temperature, and dew-point, density altitude
AWOS-2 = everything in AWOS-1 plus, visibility
AWOS-3 = everything in AWOS-2 plus, cloud and ceiling data. Transmits a 20 to 30 second weather message updated each minute.

Automated Surface Observation System (ASOS): is the primary surface weather observing system.
Measures everything in AWOS-3 as well as variable cloud height, variable visibility, rapid pressure changes, precipitation type, intensity, accumulation, and beginning and ending times.
Provides continuous minute-by-minute observations and perform the basic observing functions necessary to generate an aviation routine weather report 9(METAR) and other aviation weather information.
Every ASOS contains the following basic set sensors:
1) Cloud height indicator
2) Visibility sensor
3) Precipitation identification sensor
4) Freezing rain sensor
5) Ambient Temperature/Dew Point sensor
6) Wind Direction and speed sensor
7) Rainfall accumulation sensor

ATIS Automatic Terminal Information Service 4-1-13
• A continuous broadcast of recorded information concerning data in selected high-activity terminal areas.

Format Sample

Little Rock ATIS Information Alpha” “2046 Zulu””Weather Clear””Visibility One Zero””Temperature threeThree”(33 degrees) ”Dew Point twoTwo”(22 degrees) ”Wind Three Zero Zero at One Zero” (Wind is blowing from 300° at 10 knots) ”Altimeter Two NinerEight Niner”(29.89) ”ILS Runway Four Right in use””Landing and Departing runway Four” (Using runway 4R) ”Men and equipment working on runway Four Left” ”Advise on initial contact you have Alpha”

2. Makes a competent "go/no-go" decision based on available weather information.
Miscellaneous and notes:

Weather Depiction Chart: chart is derived from aviation routine weather reports (METARs)
- Transmitted every 3 hours, and is valid at the time of the plotted data.
- Pressure patterns and wind information are not provided (areas of adverse weather)
- Station Models—depicted as circles; a bracket ( ] ) to the right indicates an automated station.

Pilot Report (PIREP) 7-1-21

PIREPs (Pilot Weather Reports): confirm information on height of bases and tops of cloud layers, in-flight visibility, icing conditions, wind shear, and turbulence.
weather reports given by pilots to a FSS, containing actual weather information. They are an important part of the National Weather System since they contain actual in-flight weather information.
When a pilot gives a PIREP to a FSS, the FSS personnel will fill out the form below and enter the report into the NWS computer.
Aircraft: "Jonesboro Flight Watch, Katana 910CT"
Flight Watch: "Katana 910CT, Jonesboro Flight Watch"
Aircraft: "Jonesboro Flight Watch, Katana 910CTis over Hot Springs at 4,500ft with a pilot report" Flight Watch "Katana 910CT, go ahead with your report"

Coordinated Universal Time (UTC): to convert the local departure or arrival time to UTC, add the hours of difference from the number on the time conversion table.
- Eastern Standard Time to UTC = adding 5 hours
- Central Standard Time to UTC = adding 6 hours
- Mountain Standard Time to UTC = adding 7 hours
- Pacific Standard Time to UTC = adding 8 hours

Satellite Weather Pictures: two types, Visible and Infrared (IR)
- Both are transmitted every 30 minutes except for nighttime when visible photo are n/a.
- Visible pictures are used to determine the presence of clouds, the shape and texture.
- IR photos depict the heat radiation emitted by the cloud tops and earth’s surface.

In Flight Aviation Weather Advisories 7-1-6
Issued by AWC in Kansas City
AIRMET (Airmen’s Meteorological Information): issued every 6 hours w/ amendments as necessary. After the first issuance of the day, AIRMETs are numbered sequentially.
- Moderate icing, (Airmet ZULU)
- Moderate turbulence, (Airmet TANGO)
- Sustained surface winds of ≥ 30 kts or more at the, (Airmet TANGO)
- Ceilings less than 1,000 ft and/or visibility less than 3 miles affecting over 50 percent of an area at any one time(Airmet SIERRA)
- Extensive mountain obscuration. (Airmet SIERRA)
SIGMET (WSs): issued for hazardous weather (other than convective activity) to all aircraft.
- Severe icing, not associated with thunderstorms
- Severe or extreme turbulence, or Clear Air Turbulence (CAT) not associated with thunderstorms
- Duststorms, sandstorms, lowering visibility below 3 miles
- Volcanic eruption and volcanic ash lowering visibility to less than three miles.
- Use alphanumeric designators November through Yankee

**Convective SIGMET** (WSTs): always imply severe or greater turbulence, severe icing, and low-level wind shear.
- Tornadoes,
- lines of thunderstorms,
- thunderstorms over a wide area,
- embedded thunderstorms,
- hail greater than or equal to 3/4 inch in diameter, and/or
- wind gust to 50 knots or greater.
- Issued for the eastern (E) central (C), and western (W) and are numbered sequentially for each area (01-99) each day. Bulletins are issued 55 minutes past each hour and valid for 2 hours from the time of issuance or until it is superseded by the next hourly issuance.

**TIBS (Telephone Information Briefing Service)**
A continuous recording of weather conditions available by phone through Automated Flight Service Stations (AFSS) *(800)*WX-BRIEF
Each AFSS provides at least 4 route and area briefings

**Example: Jonesboro AFSS**
1) **Area:** 50 NM radius of Little Rock
2) **Route:** Little Rock – Texarkana – Dallas/Ft Worth
3) **Route:** Little Rock – Fayetteville – Ft. Smith – Tulsa
4) **Route:** Little Rock – Jonesboro – St. Louis

Transcribed Weather Broadcast (TWEB): including winds aloft and route forecast for a cross-country flight. Weather information is recorded on tapes and broadcast continuously over selected low-frequency navigational aids and/or VOR’s.
Generally the broadcast contains route oriented data at some locations TEL-TWEB is available, which is telephone access to the TWEB should not be considered a substitute for a briefing with a specialist but to be used for preliminary and in-flight planning.

**Hazardous In-Flight Weather Advisory Service** (HIWAS): such as AIRMETs, SIGMETs, Convective SIGMETs, and urgent PIREP. When a HIWAS is updated, ARTCC and terminal facilities will broadcast an alert on all but emergency frequencies. A continuous broadcast of in-flight weather advisories.
A HIWAS alert is broadcast on all frequencies (except emergency frequency) once upon receipt by ATC.
Availability is shown on IFR Enroute Low Altitude Charts, and VFR Sectionals

**Enroute Flight Advisory Service** (EFAS) 7-1-5 "Flight Watch" 122.0 above 5,000 ft AGL and below 18,000 from 6 A.M to 10 P.M.

Can be contacted on frequency 122.0 for in-flight weather information
Aircraft: "Jonesboro Flight Watch, Cessna 12345 over Hot Springs, en route to Texarkana, request a destination weather update"
ONLINE PREFLIGHT WEATHER SOURCES

- ADDS
  - Airmets /Sigmets
  - Icing Potential
  - Turbulence Potential
  - Prog Charts
  - Metars/ Tafs

- DUATS
- Air nav
- AOPA
- Intellicast
- Wunderground
- Flt Plan

- Flight Service Station (FSS),
- National Weather Service (NWS),

Weather Briefing

- **1-800-WX-BRIEF** (1-800-992-7433) anywhere in the country and you will be in contact with the nearest Flight Service Station. 122.2;
- Airport Advisory/Information (Local Airport Advisory LLA) 123.6;

When you call; state which type of briefing you want and give the briefer the following information:
- Aircraft N-number
- Type of aircraft
- Departure Point
- Time of departure
- Destination
- Cruising Altitude
- ETE (estimated time en route)

There are three types of weather briefings you can receive during your pre-flight preparation for a flight.

**Outlook Briefing**
Given when your departure time is 6 hours or more from the time you are calling. Contains available forecast conditions To be used for planning purposes only

**Standard Briefing**
for when your departure time is less than 6 hours from the time you call should be requested anytime you have not received a previous briefing contains the following information in the following order

**Adverse Conditions** – significant weather that may cause you to alter your proposed flight

**VFR Flight Not Recommended** – This will be stated by the briefer if the conditions do not allow for flight under visual flying rules

**Synopsis** – a brief description of the type, location, and movement of weather systems and/or air masses, which might affect your proposed flight. *Note:* These first 3 parts of the briefing may be combined by the briefer to help describe the conditions more clear.

**Current Conditions** – reported weather conditions that apply to your flight. This will be omitted if your proposed time of departure is beyond 2 hours, unless you specifically request it.

**En Route Forecast** – forecast conditions for your flight given in the order of: departure/climbout, en route, and descent. (heights are MSL)

**Destination Forecast** – the forecast conditions for your destination for your proposed time of arrival.

**Winds Aloft** – forecast winds for 3, 6, 9, and 12 thousand feet MSL. *Note:* Temperature information is given upon request

**Notices to Airmen (NOTAM’s)**

**ATC Delays** – any known ATC delays that may affect your flight

**Abbreviated Briefing**

This is a briefing you can get when you have already received a standard briefing and you need updates on a few items.

**Atmosphere:** 78% nitrogen 21% oxygen 1% other

**Circulation**—refers to the movement of air relative to the earth’s surface.

**Temperature**—every physical process of weather is accompanied by, or is the result of heat exchange

**Atmospheric Pressure**—Isobars reveals pressure gradient

- Isobars spread widely apart, the gradient is considered weak; results in lighter winds v/v
  1. **High** = center of high pressure surrounded on all sides by lower pressure
  2. **Low** = an area of low pressure surrounded on all sides by higher pressure
  3. **Ridge** = elongated area of high pressure
  4. **Trough** = elongated area of low pressure
  5. **Col** = can designate either a neutral area between two highs or two lows.

- **Airflow Rotational patterns:** High pressure areas flow downward clockwise and outward; low pressure areas flow inward, upward and counterclockwise, roughly parallel to the isobars
Unequal heating of the Earth’s surface causes variations in altimeter settings between weather reporting points.

**Coriolis Force**: High always wants to go to low pressure; however, as soon as the air begins to move, it is deflected by a phenomenon known as Coriolis force deviates the air to the right. Caused by the rotation of the earth.

**Frictional Force**: Below 2000 ft AGL friction caused by the earth’s surface slow the moving air and reduces Coriolis force; pressure gradient force is now greater than Coriolis force and wind is diverted from its path along the isobars toward the lower pressure.

**Local Wind Patterns**:
- **Sea Breeze**—since land surfaces warm or cool more rapidly than water surface, land is usually warmer than water during the day; wind blows from cool water to warmer land.
- **Land Breeze**—at night, land cools faster than water and wind blows from the cooler land to the warmer water.
- **Valley Breeze**—as mountain slopes are warmed by the sun during the day, the adjacent air also is heated, since heated air is less dense than the air at the same altitude over the valley an upslope flow is created.
- **Mountain Breeze**—at night, the high terrain cools off and eventually becomes cooler than air over the valley.

**Atmospheric Stability**: is the atmosphere’s resistance to vertical motion.

Cool dry most stable/ warm moist air leaves stable.

- Air that moves upward expands due to lower atmospheric pressure. When air moves downward, it is compressed by the increased pressure at lower altitudes.
- Stability of the air can be measured by its actual lapse rate
- A characteristic of stable air is the presence of stratiform clouds.
- Characteristics of unstable air include turbulence and good surface visibility.
- **The average lapse rate is 2 °C (3.5 °F) per 1,000 ft.**
- **Dry Adiabatic lapse rate 3 °C/5.4 °F per 1000 ft.**
- **Moist adiabatic lapse rate 1.1 C 2.8 °C per 1000 ft.**
- **Temperature Inversions**: When temperature increases with altitude. (Temperature usually decreases with an increase in altitude.)
  1. The most frequent type of ground or surface-based temperature inversion is that which is produced by terrestrial radiation on a clear, relatively still night.
  2. The weather conditions that can be expected beneath a low-level temperature inversion layer when the relative humidity is high are smooth air, poor visibility, fog, haze or low clouds.
  3. A temperature inversion is associated with a stable layer of air.

**Processes by which moisture is added to unsaturated air.**

**Change of State**: Water is present in the atmosphere in three states: Solid, Liquid, and Gas.

1. **Evaporation** = changing of liquid water to invisible water vapor (latent heat of evaporation)
2. **Condensation** = water vapor changes to a liquid (latent heat of condensation, important in cloud development.
3. **Sublimation** = changing of ice directly to water vapor
4. **Deposition** = water vapor to ice
5. **Melting + Freezing**

**Humidity**: refers to moisture in the air.

If the air is very moist, poor, or even severe weather can occur; if the air is dry, the weather
usually will be good.

- **Relative Humidity**, is the actual amount of moisture in the air compared to the total amount that could potentially be present.; the amount of potential moisture depends on air temperature.

- **Dewpoint**: is the temperature to which the air must be cooled in order to become saturated.

- **Frost**: If the temperature of the collecting surface is at or below the dewpoint of the adjacent air, and the dewpoint is below freezing, frost will form. Frost on the wings affects takeoff performance by disrupting the smooth flow of air over the airfoil, adversely affecting its lifting capacity. Frost may prevent the airplane from becoming airborne at normal takeoff speed. Frost is considered a hazard to flight for this reason.

**Clouds**

- Clouds often form at altitudes where temp. and dew-point converge. (per 1,000 ft)
- **Temperature dewpoints convergence 2.4 °C/4.5 °f /1000 ft.**
- **cloud base heights = Dewpoint spread(TDS) ÷ 2.4 )x 1000**
- Clouds, fog or dew will always form when water vapor condenses.
- **Condensation Nuclei**—can be dust, salt from evaporating sea spray or products of combustion.
- **Cloud Types**: clouds are divided into four families according to their height range.
  - Low = surface to 6,500 AGL.     **Middle** = 6,500 to 20,000 (alto)
  - **High** = above 20,000 AGL (cirrus)
- **Clouds w/Vertical Development** (cumulus, towering cumulus, cumulonimbus); associated turbulence can be expected when an unstable air-mass is forced upward.
- **Nimbus** = denotes a rain cloud
- **Stratus** = form when moist, stable air flows upslope.

**Fog**: if the temp./dewpoint spread is small and decreasing, and the temperature is above freezing, fog or low clouds are likely to develop.

- **Radiation fog**—forms as warm, moist air lies over flatland areas on clear, calm nights.
- **Advection fog**—forms when a warm air mass moves inland from the coast in winter.
- **upslope fog**—when moist stable air is forced up a sloping land mass.
- **Steam fog**—occurs as cold dry air moves over warmer water.
- **Precipitation Induced fog**—when warm rain or drizzle falls through cooler air near the surface.

**Precipitation**: defined as any form of particles, whether liquid or solid, that fall from the atmosphere.

1. Snowflakes, raindrops, drizzle, ice pellets, hail, or virga.
2. The presence of ice pellets at the surface is evidence that there is a temperature inversion with freezing rain at a higher altitude.

**Airmasses**: is a large body of air with fairly uniform temperature and moisture content. classified according to the regions where they originate. (stable or unstable)

- **Fronts**: the boundary between two different Air-masses. A change in the wind direction and temperature will always be apparent when flying across a front.

**Cold front**;
**warm front**;
**stationary front**;
**occluded front**. Wedge fronts, three airmasses

**Thunderstorms**: cumulonimbus clouds have the greatest turbulence.

- 3 conditions must be present: **1. lifting action  2. unstable  3. moist air**
• squall line A non-frontal, narrow band of active thunderstorms that often develops ahead of a cold front.
• Life Cycle: 1. cumulus 2. mature 3. dissipating
  lighting is always associated with thunderstorm
• If there is thunderstorm activity in the vicinity of an airport at which you plan to land, you can expect to encounter wind-shear turbulence during the landing approach. and hail
  lighting is always associated with thunderstorm
Turbulence: upon encountering severe turbulence, the pilot should attempt to maintain a level flight attitude.
  Greatest vortex strength occurs from aircraft heavy, clean and slow.
• Taking off or landing
  The wind condition that requires maximum caution on landings is a light, quartering tailwind.
Mechanical Turbulence: when buildings or rough terrain interfere with normal wind flow.
Convective Turbulence: which is also referred to as thermal turbulence. (indicated by towering cumulus)
Mountain Wave Turbulence: Standing lenticular cloud, rotor cloud.
Wind Shear: is a sudden, drastic shift in wind speed and/or direction that may occur at any altitude in a vertical or horizontal plane.
• May be expected in areas of low-level temperature inversion,
  • frontal zones and clear air turbulence, and
  • whenever the wind speed at 2000 to 4000 ft above the surface is at least 25 knots.

Icing: must have visible moisture and freezing temp. two types;
  Induction Icing (carb ice)
  Structural
    • Rime
    • Clear Ice
    • Mixture of the two.

D. TASK: CROSS-COUNTRY FLIGHT PLANNING

1. cross-country flight planning: present and explain a pre-planned VFR cross-country flight, as previously assigned by the examiner. On the day of the practical test, the final flight plan shall be to the first fuel stop, based on maximum allowable passengers, baggage, and/or cargo loads using real-time weather.

• §91.103 Preflight Action You are required to become familiar with all available information concerning your flight. If the flight isn’t in the vicinity of an airport, you must have the following information
  Weather reports and forecasts
  Known traffic delays reported by air traffic control (ATC),
  Runway lengths,
  Alternatives available if the planned flight cannot be completed,
  Fuel requirements,
  Takeoff and landing distances in regard to performance, elevation, slope, gross weight, wind, temp, density altitude.

• runway lengths at airports of intended use and the aircraft’s takeoff and landing distance data.
Planning
Mark Route /Waypoints on map
Measure True courses
Measure Distances

Jonesboro FSS
1-800-992-7433
VFR/ Flight following
N #- (N714WP)
Type of a/c- (152/U)
Tue airspeed- 100kts
Departure time
First Altitude
Route Fixes
Airport First Landing
Ete
Fuel on board
Alternate
Pilot Name
home base
phone number
#SOB
White/Yellow

Request Weather briefing
Adverse conditions, TFR’s, Delays
Briefer’s Judgement
Synopsis
Current condition Metars, Pireps, Rareps
Enroute forcast
Required info for Performance charts

Departure  Altimeter setting
          Temp
          Pressure altitude
          Density altitude
Destination  Altimeter setting
          Temp
          Pressure altitude
          Density altitude

(P.A. = (((29.92 - altimeter setting) x 1000) + Field elevation))

Perform weights and balance calculations

Weights and Balances
Empty weight  1186 lbs
Fuel load  148 lbs
Fuel +plane  1343 lbs
Useful load  485 lbs
payload
Max. Ramp Weight  1675 lbs
Max. Takeoff Weight  1670 lbs
Max. Landing Weight  1670 lbs
Max. Baggage area 1+2  120 lbs
Max. Baggage area 1 Weight  120 lbs
Max. Baggage area 2 Weight  40 lbs

Performance Charts

Take off distance
Climb Speed
Time, fuel, Distance to Climb
Cruise power, TAS, Fuel Flow
Endurance Time
Landing distance
Complete flight log for each leg
MH=TC ± WCA± variation
Ground speed
ETE each leg
Fuel required = 30min + ETE x GPH

**Flight**
1) Record your time off
2) Activate your flight plan as soon as practicable using your actual time off
3) Lean the mixture as appropriate
4) Record time en route and groundspeed to each checkpoint update flight plan if behind schedule
5) Close flight plan after landing

2. Uses appropriate and current aeronautical charts.
   - WAC charts 1"=14 miles
   - Sectional charts 1" = 6.86 miles *Revised every 6 months.* must accompany A/FD published every 56 days
   - VFR Terminal charts TAC 1"=3.43 miles

**Aeronautical Charts**
- Latitude and Longitude;
- in the U.S. latitude increases as you travel north, and longitude increases as you travel west. Each tick mark on the sectional chart represents one minute of latitude or longitude.

Know how to plot a course to opposite side of chart.

3. Properly identifies airspace, obstructions, and terrain features.

4. Selects easily identifiable enroute checkpoints.
   - **Piloting:** navigating by visual landmarks.
   - Selecting Checkpoints, the best checkpoints are those that cannot be confused with anything else.
   - The number of checkpoints needed for a particular flight is up to you.
   - The first check point should be close enough to be easy to locate after takeoff, but far enough that you are clear of the airport traffic pattern.
   - Fold the chart so that only one or two panels are showing and align it with the direction of flight.
   - Always use charts that are current.

5. Selects most favorable altitudes considering weather conditions and equipment capabilities.
   **VFR Cruising Altitudes**
• On an easterly magnetic course (0 to 179) above 3,000 ft AGL, VFR cruising altitude are odd thousands plus 500 ft.
• On a westerly magnetic course (180 to 359), VFR cruising altitudes are even thousand plus 500 ft.

6. Computes headings, flight time, and fuel requirements.

**Dead Reckoning:** involves calculating distance, speed, time, and compass heading as a means of navigation from your departure to your destination. The word "dead" is derived from "ded" or deduced reckoning

**Course:**
- **TC±Var=MC** West is Best and East is Least.
- **TC + Wind correction = TH** + Variation = **MH + deviation = CH**
- **True Course** is the line drawn on the sectional in relationship to true north.
- **True Heading** is true course corrected for wind
- **Magnetic Heading** is True heading corrected for variation, which is the difference between true north that the maps are referenced from and magnetic north where our compass points to.
- **Compass heading** is Mag heading corrected for aircraft mag field (deviation)

**VFR Fuel Planning Requirements [§ 91.151]**
- there must be enough fuel, considering wind and forecast weather conditions, to fly to the first point of intended landing, and, assuming normal cruising speed with a 45 min. night-time reserve/ 30 min. daytime reserve ,

7. Selects appropriate navigation system/facilities and communication frequencies.

Enter your nav frequencies and identification info on the log. Communication freq are in the AF/D and on charts

8. Applies pertinent information from NOTAMs, AF/D, and other flight publications.

**Airport/Facility Directory**
This should be the first to be consulted in your flight planning. It is the source for runway lengths and some of the notams regarding your destination and route
- Reissued every 56 days

**Items in the back of the book to be familiar with:**
- Seaplane bases
- Notices
- LAHSO
- FAA Phone
- ARTCC/FSS
- FSDO
- Routes/Waypoints
- VOR Check
- Parachute
- Chart Bullitin
- Airport Diagrams

**Look up and read the following**
- Brownsville
Sanantonio
Amarillo
Navasoto
nacagdoches
Hotsprings
Abilene
shreveport

**Notices To Airmen (NOTAM's)**
- Notice to Airman Publication (NTAP) issued every 28 days
- Time critical aeronautical information which could affect your decision to make a flight.
- There are 3 categories of NOTAM's

**NOTAM (D) or distant**
contains information on all navigational facilities, all public use airports, seaplane bases, and heliports listed in the Airport/Facility Directory (A/FD). distributed by FSSs until published, then the information is deleted from the system

**NOTAM (L) or local**
Contains information on taxiway closures, personnel and equipment near or crossing runways, airport rotating beacon outages and airport lighting aids that do not affect instrument approach criteria, such as VASI. Distributed locally only, meaning the FSS for the area you will be flying in will only have information for their area. You must specifically request information for other areas from the FSS that has responsibility for that airport

**FDC NOTAM's**
Contains information that is regulatory in nature such as amendments to published IAP's and other current aeronautical charts. They are also used to advertise temporary flight restrictions caused by such things as natural disasters or large-scale public events that may generate a congestion of air traffic. Distributed automatically via Service A telecommunications so placed like FSS can have access to them. Remain Available via Service A for the duration of their validity or until published, then the information is deleted from the system
FSS's are responsible for FDC Notams concerning conditions within 400 miles of their facilities. FDC information concerning conditions that are more than 400 miles from the FSS, or that is already published, must be requested by the pilot

9. Completes a navigation log and simulates filing a VFR flight plan.
**VFR Flight Plan:** is simply a request that the FSS initiate a search for you if they have not heard from you by a certain time
- You must close within 30 minutes after your stated ETA
- You are not required by regulation to file a VFR flight plan but there is really no good reason not to if traveling cross-country
- When you file a flight plan it will be held by the FSS for 1 hour after the proposed departure time and then it will be cancelled unless activated by you.

**Miscellaneous**
**Universal Coordinated Time (Zulu)** – which is the time at the 0 degree line of longitude which passes through Greenwich, England
• To convert Zulu time:
  Eastern Standard Time: Add 5 hours
  Central Standard Time: Add 6 hours
  Mountain Standard Time: Add 7 hours
  Pacific Standard Time: Add 8 hours
  **Note:** for daylight saving time, 1 hour should be subtracted from these times.
• There are 6,076 feet in a Nautical Mile and 5,280 feet in a Statute Miles.
  To convert knots to miles per hour, multiply knots by 1.15

**E. TASK: NATIONAL AIRSPACE SYSTEM**

Class G airspace VFR visibility and cloud clearance requirements
(There are four options)

Day

- Above 10K
- 1 SM vis.
- 1,000 feet
- 2000 feet
- 5000 feet
- 1 SM above
- 1000 feet
- 1 mile
- 1000 feet
- 10000 MSL

Night

- Below 10k night
- Below 10k day
- Below 1200 AGL day
- 1 SM visibility
- Clear of clouds

5 SM vis.
1 mile
1000 feet
1000 feet

1200 AGL
10,000 MSL

Geoff Hatcher  Flight Instructor, AGL, MEI, CFII  1915 Biscayne Little Rock AR 72227  hatcherpottery@verizon.net  www.geoffhatcher.com  501-680-7283
1. Basic VFR weather minimums—for all classes of airspace.

Weather Minimums for controlled and uncontrolled airspace. §91.155

- **Surface areas**—No person may operate an aircraft beneath the ceiling under VFR within the lateral boundaries of controlled airspace designated to the surface for an airport when the ceiling is less than 1,000 ft. and ground visibility at that airport is at least 3 statute miles.

Visibility requirements: most of the airspace you will be flying in while training: 3 sm, except when you are flying in Class G, uncontrolled airspace, during the day< 10,000 ft, then it is 1 sm.

VFR Cloud Clearance/vis requirements §91.155

3 miles $2\frac{1}{5}$ rule: 3 miles vis 2,000 ft horizontal, 1,000 ft above, 500 ft below, (UNLESS—6 exceptions:

- **Class B**- 3 miles vis COC;
- **Class G day < 1,200 agl** 1 mile Clear of Clouds,
- **Class G day >1200 agl <10,000 msl**- 1 mile vis 21/5;
- **Anywhere (E&G)>10,000 ft msl**- 5 miles vis 1 mile horizontal 1000 ft above and below.
- **G night traffic pattern** 1 mile COC
- **SVFR Day** 1 mile COC
- **SVFR night** 1 COC with instrument airplane and pilot
Special VFR Weather Minimums §91.157: operations may only be conducted—
- With an ATC Clearance; Clear or clouds; flight visibility is at least 1sm; between sunrise & sunset
- night pilot and aircraft must be IFR certified.

2. Airspace classes—their operating rules, pilot certification, and airplane equipment requirements for the following—
   a. Class A.
   Dimensions: ≥18,000 ft MSL to FL600, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous states and Alaska.
   Equipment Requirements: Mode C Transponder, Two-way Radio, and IFR Equipment
   Entry Requirements: ATC Clearance, Instrument Flight Plan, Instrument Rating

   b. Class B.
   Dimensions: Individually tailored for each airport. Looks like an upside down wedding cake.
   Equipment Requirements: Mode C Transponder, Two-way radio
   Entry Requirements: ATC Clearance, Private Pilot. (Student pilots may enter Class B with the proper training and endorsements from their instructor.

   c. Class C.
   Dimensions: Individually tailored but usually consists of a 5 NM radius circle extending from the surface up to 4,000 ft above airport elevation and a 10 NM radius circle extending from 1,200 ft to 4,000 ft above the airport elevation.
   Equipment Requirements: Mode C Transponder, Two-way radio
   Entry Requirements: Two-way radio communication, Student Pilot

   d. Class D.
   Dimensions: Surface to 2,500ft above the airport elevation.
   Equipment Requirements: Two-way radio
   Entry Requirements: Two-way radio communication, Student Pilot

   e. Class E.
   Dimensions: Controlled airspace not designated as Class A, B, C, or D. technically Class E airspace has no defined vertical limit but rather it extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace.
   Equipment Requirements: None
   Entry Requirements: None

   f. Class G.
   Dimensions: Uncontrolled airspace located anywhere that Class A, B, C, D, or E has not been designated.
   Equipment Requirements: None
   Entry Requirements: None

3. Special use and other airspace areas.
   Special Use Airspace 3-4-1,2,3,4,5,6,7: Consists of that airspace wherein activities must be confined because of their nature, or where in limitations are imposed upon aircraft operations that are not a part of those activities, or both.
   - Prohibited Areas: Established for security or other reasons associated with the national welfare. Flight is prohibited within these areas.
   - Restricted Areas: Contain unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Flight, while not wholly prohibited, is subject to restrictions. VFR flight is not permitted while the area is active.
   - Warning Areas: Extends from 3 NM outward from the coast of the United States. Contains
activity, which may be hazardous to non-participating aircraft.

- **Military Operations Areas (MOA):** Contain Military aircraft training. VFR flight is permitted but you should exercise extreme caution.
- **Alert Areas:** Contain a high volume of pilot training or an unusual type of aerial activity. VFR flight is permitted but you should exercise extreme caution.
- **Controlled Firing Areas:** Contain activities, which if not conducted in a controlled environment, could be hazardous to non-participating aircraft. CFA activities are not shown on a sectional because their activities are suspended immediately when spotter aircraft, radar, or ground lookouts indicate an aircraft approaching the area.

**Other Airspace Areas PHAK 3-5-1,2,3,4,5,6,7:**

- **Airport Advisory Area:** The area within 10 SM of the airport where a control tower isn't operating but where a Flight Service Station (FSS) is located. The FSS will provide advisory service to aircraft but participation isn't required.
- **Military Training Routes (MTR):** Contain low-altitude, high-speed military training. The routes above 1,500 ft AGL are flown under IFR. The routes below 1,500 ft AGL are flown under VFR. Military Training Routes; when route is a three digit number, the route contains one or more sections above 1500 ft AGL IR training routes aircraft may fly at speeds in excess of 250 knots.
- **Temporary Flight Restrictions:** Airspace restrictions placed temporarily for various reasons as listed here:
  1. Protect persons and property from a hazard associated with an incident on the surface
  2. Provide a safe environment for the operation of disaster relief aircraft
  3. Prevent unsafe congestion of sightseeing aircraft above an incident or event which may generate a high degree of public interest
  4. Protect declared national disasters for humanitarian reasons in Hawaii
  5. Protect the President, Vice President, or other public figures
  6. Provide a safe environment for space agency operations.
- **Parachute Jump Aircraft Operations:** Parachute jump areas are tabulated in the Airport Facility Directory (A/FD)
- **Published VFR Routes:** Used for transitioning around, under and through complex airspace, such as Class B airspace.
- **Terminal Radar Service Area (TRSA):** Not controlled airspace from a regulatory standpoint. The primary airport of a TRSA is Class D airspace. The remaining portion of the TRSA is usually Class E airspace. VFR pilots are encouraged to participate in the TRSA services but not required.
- **National Security Areas:** Established at areas where there is a requirement for increased security and

**ADIZ areas 5-6-1**

- Requires a DVFR flight plan
- Transponder
- Two way radio

**Speed limits FAR 91.117**

- <10000ft & class B airspace 250 kts
- ≤2500 above the surface within 4 nm class C,D airport 200 kts
Right-Of-Way: §91.113 an aircraft in distress has right-of-way over all other aircraft.
- When two aircraft are converging, the aircraft on the right has right-of-way.
- The least maneuverable aircraft has the right-of-way; a glider has right-of-way over an air-
  ship, airplane or rotorcraft.
- An aircraft that is towing or refueling another has the right-of-way over other engine-driven
  aircraft.
- When aircraft are approaching head-on, each shall give way to the right.
- When two or more aircraft are approaching the airport with the intention of landing, the one
  at the lower altitude has the right-of-way.

F. TASK: PERFORMANCE AND LIMITATIONS
1. Exhibits knowledge of the elements related to performance and limitations by
   explaining the use of charts, tables, and data to determine performance and the
   adverse effects of exceeding limitations.

V-Speeds
- VA, Maneuvering Speed
- VSO (stall min controllable airspeed landing configuration),
- VS1 (stall min controllable airspeed clean configuration),
- VFE, max flap extended speed
- VLE, max landing gear extended speed
- VNO, max structural cruise
- VNE, never exceed speed

Climb Performance:
- VX = is the best angle of climb, and it provides the greatest gain in altitude over distance
  during climb after takeoff. Best speed to clear an obstacle.
- VY = is the best rate of climb, and it provides the greatest gain in altitude over time. Best
  Vertical Speed (VSI).
- Cruise Climb = is generally higher than VX and VY, and rate of climb is slower; it improves
  forward visibility and gives better engine cooling.
- Absolute ceiling = when an airplane is unable to climb any further.
- Service Ceiling = refers to the altitude where a single-engine airplane is able to maintain a
  maximum climb of only 100 ft. per minute. As altitude increases, the speed for best angle-
  of-climb increases, and the speed for best rate-of-climb decrease. The point at which these
  two speeds meet is the absolute ceiling of the airplane.

Cruise Performance:
1. Determine the TAS
2. Determine the expected fuel consumption
3. Determine the manifold pressure setting
- Maximum Level Flight Speed: when the force of total drag equals the force of full thrust;
- Maximum Range Speed: lets you travel the greatest distance for a given amount of fuel
- Maximum Endurance Speed: the speed and power setting which allows the airplane to
  remain aloft for the longest possible time.
## PERFORMANCE - SPECIFICATIONS

**SPEED:**
- Maximum at Sea Level: 110 KNOTS
- Cruise, 75% Power at 8000 Ft: 107 KNOTS

**CRUISE:** Recommended lean mixture with fuel allowance for engine start, taxi, takeoff, climb and 45 minutes reserve at 45% power.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Range (NM)</th>
<th>Time (HRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>75% Power at 8000 Ft</td>
<td>350</td>
<td>3.4</td>
</tr>
<tr>
<td>24.5 Gallons Usable Fuel</td>
<td>580</td>
<td>5.5</td>
</tr>
<tr>
<td>24.5 Gallons Usable Fuel</td>
<td>415</td>
<td>5.2</td>
</tr>
<tr>
<td>Maximum Range at 10,000 Ft</td>
<td>690</td>
<td>8.7</td>
</tr>
<tr>
<td>24.5 Gallons Usable Fuel</td>
<td>37.5</td>
<td>715</td>
</tr>
<tr>
<td>Maximum Range at 10,000 Ft</td>
<td>14.700</td>
<td></td>
</tr>
</tbody>
</table>

**RATE OF CLIMB AT SEA LEVEL:**
- 715 FPM
- 14.700 FT

**SERVICE CEILING:**
- 725 FT
- 1340 FT

**TAKEOFF PERFORMANCE:**
- Ground Roll: 475 FT
- Total Distance Over 50-Ft Obstacle: 1200 FT

**LANDING PERFORMANCE:**
- Ground Roll: 475 FT
- Total Distance Over 50-Ft Obstacle: 1200 FT

**STALL SPEED (CAS):**
- Flaps Up, Power Off: 48 KNOTS
- Flaps Down, Power Off: 43 KNOTS

**MAXIMUM WEIGHT:**
- Ramp: 1675 LBS
- Takeoff or Landing: 1670 LBS

**STANDARD EMPTY WEIGHT:**
- 152: 1101 LBS
- 152 II: 1133 LBS

**MAXIMUM USEFUL LOAD:**
- 152: 574 LBS
- 152 II: 549 LBS

**BAHAGE ALLOWANCE:**
- 120 LBS

**WING LOADING:**
- Pounds/Sq Ft: 10.5

**POWER LOADING:**
- Pounds/HP: 15.2

**FUEL CAPACITY:**
- Total:
  - Standard Tanks: 26 GAL.
  - Long Range Tanks: 39 GAL.
- Oil Capacity: 6 QTS
- Engine: Avco Lycoming O-235-L2C
- 110 BHP at 2550 RPM
- Propeller: Fixed Pitch, Diameter: 69 IN.

*Speed performance is shown for an airplane equipped with optional speed fairings, which increase the speeds by approximately 2 knots. There is a corresponding difference in range, while all other performance figures are unchanged when speed fairings are installed.*
C-152II V Speeds

<table>
<thead>
<tr>
<th>Speed</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vso</td>
<td>35</td>
</tr>
<tr>
<td>Vs</td>
<td>40</td>
</tr>
<tr>
<td>Vx</td>
<td>55</td>
</tr>
<tr>
<td>Vy</td>
<td>67</td>
</tr>
<tr>
<td>VFE (flaps 10°)</td>
<td>85</td>
</tr>
<tr>
<td>VA (1350 lbs)</td>
<td>93</td>
</tr>
<tr>
<td>VA (1500 lbs)</td>
<td>98</td>
</tr>
<tr>
<td>VA (1670 lbs)</td>
<td>104</td>
</tr>
<tr>
<td>VNO</td>
<td>111</td>
</tr>
<tr>
<td>VNE</td>
<td>149</td>
</tr>
<tr>
<td>Chandelles, Lazy 8, Steep turns</td>
<td>95 kts</td>
</tr>
</tbody>
</table>

C-152 Airspeed markings

- White Arc 35-85
- Green Arc 40-111
- Yellow Arc 111-149
- Red Line 149

C-152 Other speeds

<table>
<thead>
<tr>
<th>Speed</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downwind</td>
<td>80</td>
</tr>
<tr>
<td>Turn to base and final</td>
<td>70</td>
</tr>
<tr>
<td>Final</td>
<td>65</td>
</tr>
<tr>
<td>Landing Approach:</td>
<td></td>
</tr>
<tr>
<td>Normal Flaps UP</td>
<td>60-70 KIAS</td>
</tr>
<tr>
<td>Normal Flaps 30°</td>
<td>55-65 KIAS</td>
</tr>
<tr>
<td>Shortfield Flaps 30°</td>
<td>54 KIAS</td>
</tr>
<tr>
<td>Max. Glide 1670 lbs</td>
<td>65 KIAS 9/1 glide ratio</td>
</tr>
<tr>
<td>Max. Window Open speed</td>
<td>149</td>
</tr>
<tr>
<td>Max. Dem Crosswind</td>
<td>15 KNOTS</td>
</tr>
<tr>
<td>Service Ceiling</td>
<td>14,700 FT</td>
</tr>
<tr>
<td>Endurance/Range w/45 min reserve</td>
<td>3.4 hrs/350 miles</td>
</tr>
</tbody>
</table>

Stall Warning System 152II

Pneumatic type stall warning system consisting of an inlet in the leading edge of the left wing and an air operated horn near the upper left corner of the wind shield. The low pressure above the wing moves forward to the leading edge of the wing creating a differential pressure in the system that sounds the horn 5 to 10 knots above the stall in all flight conditions.

Cold Weather Operation 152II

Prior to starting on cold mornings, it is advisable to pull the propeller through several times by hand to “break loose” or “limber” the oil, thus conserving battery energy.

In extremely cold (-18°C and lower) weather, use an external preheater and external power source are recommended.
2. Computes weight and balance. Determines the computed weight and center of gravity is within the airplane's operating limitations and if the weight and center of gravity will remain within limits during all phases of flight.

Weights and Balances 152II
Empty weight 1186 lbs
Fuel load 148 lbs
Fuel + plane 1343
Useful load 485 lbs
Max. Ramp Weight 1675 lbs
Max. Takeoff Weight 1670 lbs
Max. Landing Weight 1670 lbs
Max. Baggage area 1+2 120 lbs
Max. Baggage area 1 Weight 120 lbs
Max. Baggage area 2 Weight 40 lbs
Load Factor Limits
Normal Category
  Flaps Up: +4.4g -1.72g
  Flaps Down: +3.5g
*Aerobatic maneuvers, including spins, are not approved.

Note: Use the graphs in the POH to figure your calculations
  1) Enter the Basic Empty Weight and its moment for the airplane (this is obtained from the airplanes WT & Balance info)
  2) Enter the weight and moments of the pilot and passengers
  3) Enter the weight and moment of your baggage
  4) Total up the weight and moments that you have (this is your Zero Fuel Weight)
  5) Enter the weight and moments of the fuel (6 lbs/gal)
  6) Total up the Zero-Fuel and the fuel measurements (this shouldn't be over the max allowable Ramp Weight for your airplane)
  7) Subtract the weight and moment for fuel used for start, taxi, and run-up (this shouldn't be over the max allowable Takeoff Weight for your airplane)
  8) Use the graph in the Pilots Operating Handbook to make sure you are within CG limits
  9) Subtract the weight and moment for fuel used for your flight
  10) Use the graph in the POH to make sure you are within CG limits for landing

- Few airplanes can handle a full cabin and full fuel tanks.

Principles of Weight and Balance
- CG = total moment / total weight.
• Moment= weight x station or arm.
• Positive CG values are aft of datum,
• negative CG value are ahead of datum.

Weight Shift Formula
• Use the weight shift formula to determine the new center of gravity when weight is added to or removed from the aircraft:
  \[
  \frac{\text{total moment} + \Delta \text{moment}}{\text{totalweight} + \Delta \text{weight}}
  \]

Effects of Operating at High Total Weight: more weight added means the wings need to generate more lift.

To Far AFT
1. Less stable
2. May be impossible to recover from a stall or spin.
3. Fly Faster

To Far Forward
1. Requires a greater tail down force, this force is equivalent to adding weight.
2. Must fly a higher angle of attack to generate the lift to counteract the greater tail-down force, it is closer to its stalling angle of attack for any given speed.
3. Increase stability
4. The elevator may not have sufficient force to raise the nose for landing
5. Fly Slower

Weight and Balance Terms:
• Datum – an imaginary point from which all horizontal distances are measured for balance reasons
• Arm – distance from the datum to the Center of Gravity (CG) of an object
• Moment – weight of an object multiplied by the arm of the object
• Center of Gravity (CG) – the balancing point of an object.
• Standard Empty Weight – the weight of a standard airplane including unusable fuel, full operating fluids, and full engine oil.
• Basic Empty Weight – the Standard Empty Weight plus the weight of optional equipment (this is the weight of your particular aircraft)
• Useful Load – how much space in terms of weight you have left that you can add to the plane (i.e. passengers, baggage, fuel)

Calculating the Weight & Balance Center of Gravity—which is the imaginary point where the aircraft would balance if suspended.

CG Limits—are the forward and aft center of gravity location within which the aircraft must be operated at a given weight. (Normal + Utility Category)

Reference Datum—is an imaginary vertical plane from which all horizontal distance are measured for balance purposes.

Basic Empty Weight—includes the weight of the standard airplane, optional equipment, unusable fuel, and full operating fluids including full engine oil.

Unusable Fuel—is the small amount of fuel in the tanks that cannot be safely used in flight or drained on the ground.

Licensed Empty Weight—(used in older airplanes) is similar to basic empty weight except that it does not include full engine oil. Only un-drainable oil.

Ramp Weight—airplane loaded for flight prior to engine start. (includes taxi and run-up)

Takeoff Weight—the airplane weights just before you release the brakes to begin the takeoff
38

roll.

**Landing Weight**—is the takeoff weight minus the fuel burned en-route

**Useful Load**—includes the weight of the flight crew and usable fuel, as well as any passengers, baggage, a cargo.

**Payload**—weight of only the passengers baggage and cargo.

**Maximum Ramp Weight**—is the maximum allowed for ground operations, such as taxing.

**Maximum Landing Weight**—is based on the amount of stress the landing gear can handle.

**Usable Fuel**—the fuel available during flight.

**Arm**—the name of a distance from the datum.

**Moment**—weight x arm (expressed as a station). (total force of the weight)

**Zero Fuel Weight**

Basic empty weight

+ **payload**

= zero fuel weight

+ **usable fuel**

= ramp weight

-fuel used for start, taxi, and engine runup

= takeoff weight

-fuel used during flight

= landing weight

3. Demonstrates use of the appropriate performance charts, tables, and data.

**Take off Distance**

**Time, fuel, and distance to climb**

**Cruise performance**

**Landing distance graph and chart**

- Are based on flight tests conducted under normal operating conditions, using average piloting skills, with the airplane and engine in good operating condition.

- Standard Atmospheric conditions such as Standard temperature of 15 degrees Celsius and Standard Pressure of 29.92 inches of mercury at sea level are used in developing performance charts

- The maximum demonstrated crosswind means that the airplane was flight-tested and determined to be satisfactorily controllable with no exceptional degree of skill or alertness on the part of the pilot in a 90-degree crosswind up to a velocity equal to 0.2 Vso.

**Takeoff and Landing Performance**

1. Find the headwind and crosswind components
2. Determine the total distance required to land (Graph and Table)

Determine takeoff distance
## Cessna 152II Performance Charts

### TAKEOFF DISTANCE

**SHORT FIELD**

**CONDITIONS:**
- Flaps 10°
- Full Throttle Prior to Brake Release
- Paved, Level, Dry Runway
- Zero Wind

**NOTES:**
1. Short field technique as specified in Section 4.
2. Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full throttle, static runup.
3. Decrease distances 10% for each 9 knots headwind. For operation with tailwinds up to 10 knots, increase distances by 10% for each 2 knots.
4. For operation on a dry, grass runway, increase distances by 15% of the "ground roll" figure.

<table>
<thead>
<tr>
<th>WEIGHT LBS</th>
<th>TAKEOFF SPEED KIAS</th>
<th>PRESS ALT FT</th>
<th>0°C</th>
<th>10°C</th>
<th>20°C</th>
<th>30°C</th>
<th>40°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LIFT OFF AT 50 FT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1670</td>
<td>50°</td>
<td>54</td>
<td>640</td>
<td>1190</td>
<td>695</td>
<td>1290</td>
<td>755</td>
</tr>
<tr>
<td>1000</td>
<td>706</td>
<td>1210</td>
<td>766</td>
<td>1420</td>
<td>825</td>
<td>1530</td>
<td>890</td>
</tr>
<tr>
<td>2000</td>
<td>776</td>
<td>1446</td>
<td>840</td>
<td>1566</td>
<td>910</td>
<td>1690</td>
<td>980</td>
</tr>
<tr>
<td>3000</td>
<td>855</td>
<td>1680</td>
<td>925</td>
<td>1730</td>
<td>1000</td>
<td>1870</td>
<td>1080</td>
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<tr>
<td>4000</td>
<td>940</td>
<td>1915</td>
<td>1020</td>
<td>1920</td>
<td>1100</td>
<td>2090</td>
<td>1190</td>
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<tr>
<td>5000</td>
<td>1040</td>
<td>2144</td>
<td>1125</td>
<td>2140</td>
<td>1215</td>
<td>2230</td>
<td>1315</td>
</tr>
<tr>
<td>6000</td>
<td>1145</td>
<td>2374</td>
<td>1225</td>
<td>2395</td>
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<td>2825</td>
<td>1525</td>
<td>3090</td>
<td>1665</td>
<td>3385</td>
<td>1795</td>
</tr>
</tbody>
</table>

Figure 5-4. Takeoff Distance

---

**Geoff Hatcher MEL, CFII, ATP, Westwind Type Rating**
1915 Maple Rd. Little Rock, AR 72207
(501) 809-7283
## TIME, FUEL, AND DISTANCE TO CLimb

### MAXIMUM RATE OF CLIMB

**CONDITIONS:**
- Flaps Up
- Full Throttle
- Standard Temperature

**NOTES:**
1. Add 0.8 of a gallon of fuel for engine start, taxi and takeoff allowance.
2. Mixture leaned above 3000 feet for maximum RPM.
3. Increase time, fuel and distance by 10% for each 10°C above standard temperature.
4. Distances shown are based on zero wind.

<table>
<thead>
<tr>
<th>Weight LBS</th>
<th>Pressure Altitude FT</th>
<th>Temp °C</th>
<th>Climb Speed KIAS</th>
<th>Rate of Climb FPM</th>
<th>From Sea Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1670</td>
<td>S.L.</td>
<td>15</td>
<td>67</td>
<td>715</td>
<td>0</td>
</tr>
<tr>
<td>1000</td>
<td>1000</td>
<td>13</td>
<td>66</td>
<td>675</td>
<td>1</td>
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<tr>
<td>2000</td>
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<td>11</td>
<td>66</td>
<td>630</td>
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<td>3000</td>
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<td>9</td>
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<td>380</td>
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<td>9000</td>
<td>9000</td>
<td>-3</td>
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<td>340</td>
<td>18</td>
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<tr>
<td>10,000</td>
<td>10,000</td>
<td>-5</td>
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<td>300</td>
<td>21</td>
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<tr>
<td>11,000</td>
<td>11,000</td>
<td>-7</td>
<td>61</td>
<td>255</td>
<td>25</td>
</tr>
<tr>
<td>12,000</td>
<td>12,000</td>
<td>-9</td>
<td>60</td>
<td>215</td>
<td>29</td>
</tr>
</tbody>
</table>

*Figure 5-6. Time, Fuel, and Distance to Climb*
## CRUISE PERFORMANCE

**CONDITIONS:**
1670 Pounds
Recommended Lean Mixture (See Section 4, Cruise)

**NOTE:**
Cruise speeds are shown for an airplane equipped with speed fairings which increase the speeds by approximately two knots.

<table>
<thead>
<tr>
<th>PRESSURE ALTITUDE FT</th>
<th>RPM</th>
<th>20°C BELOW STANDARD TEMP</th>
<th>STANDARD TEMPERATURE</th>
<th>20°C ABOVE STANDARD TEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>% BHP</td>
<td>KTAS</td>
<td>GPH</td>
</tr>
<tr>
<td>2000</td>
<td>2400</td>
<td>71</td>
<td>97</td>
<td>5.7</td>
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<td></td>
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<td>2200</td>
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<td>87</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>2100</td>
<td>49</td>
<td>81</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>49</td>
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<td>4000</td>
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<td>4.8</td>
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<td>86</td>
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Figure 5-7. Cruise Performance
4. Describes the effects of atmospheric conditions on the airplane's performance.

Pressure altitude/ Elevation
Temperature (increase density altitude)
Humidity (increase density altitude)
Surface winds
Weight
Runway conditions level, smooth, paved, dry, Vs./ grass, wet, rough
Braking effectiveness
Gradient 2% = 2ft /100ft

Density Altitude: the density of the air is described by referring to a corresponding altitude on a standard temp15°C/ and standard pressure29.92 hg. day.
  - Pressure altitude corrected for non-standard temperature.
  - The single most important factor affecting airplane performance
  - When the air temperature increases, density decreases increasing “density altitude”
  - High temperature, high relative humidity, and low pressure increase density altitude all reduce aircraft takeoff and climb performance
• If the outside air temperature at a given altitude is warmer than standard, the density altitude is higher than pressure altitude.
• Density altitude and pressure altitude are the same value at standard temperature.
• Use the chart to find Density Altitude.
• Indicated V– speed & Approach Airspeed used are the same regardless of Density altitude however ground speeds and true airspeed takeoff and landing distances can change dramatically.

**Humidity**
• water vapor is less dense than air, so any significant amount of water vapor in the air increases density altitude.

**Runway Gradient**: refers to the amount of change in runway height over its length.
• A gradient of 2% means the runway height changes 2 ft. for each 100 ft of runway length.
• A positive gradient indicates the height of the runway increases, while a negative value means it decreases.

**Braking Effectiveness**: refers to how much braking power you can apply without skidding the tires

**Hydroplaning**: happens when a thin layer of water separates the tires from the runway.

**Aerodynamics**

**Relative Wind**: the direction of the airflow produced by an object moving through the air; the actual flight path of the airplane determines the direction of the relative wind.

**Cord line**: the straight line from leading edge to the trailing edge.

**Angle Of Attack**: the angle between the wing chord line and the relative wind.
  1. The angle of attack at which an airplane wing stalls will remain the same regardless of gross weight.
  2. Critical angle of attack is determined by the design of the wing usually between 14 and 20 degrees

**Four Forces Of Flight** in constant airspeed constant direction or straight-and-level flight, lift equals weight, and thrust equals drag.
  1. Lift,
  2. Weight,
  3. Thrust
  4. Drag: acts parallel to and in the same direction as the relative wind

**Parasite Drag: 3 types** is the resistance of the air not connected to lift produced by any part of the airplane. (Parasite drag is proportional to the square of airspeed)
• As airspeed increases, parasite drag increases
• The more streamlined an object, the LESS parasite drag
• The more dense the air, the GREATER parasite drag

**Form Drag**: is the frontal area of the airplane exposed to the airstream.

**Skin Friction Drag**: caused by air passing over the surface increases if rough and dirty

**Interference Drag**: caused by interference of the airflow between adjacent parts of the airplane.

**Induced Drag**: product of AoA Its the rearward component of lift. As airspeed increases, induced drag decreases. (inversely proportional)
**Lift/Drag Ratio:** establishing the proper glide AOA and airspeed is critical to ensure the best possibility of reaching a suitable landing area.

**Horizontal Component of lift:** is what make an airplane turn.

**Load Factor:** is the ratio of the load supported by the airplanes wings to the actual weight of the aircraft and its contents. The amount of potential load that can be imposed on an airplane depends on its speed.

- Turns increase the load factor on an airplane, as compared to straight-and-level flight. At 60 degrees of bank, 2 G’s are required to maintain level flight. To determine how much weight the airplanes wing structure must support, multiply the airplanes weight by the number of G’s.
- **Stall speed increases proportionally to the square root of load factor:** (a load factor of 4gs will double the stall speed:
- During an approach to a stall, or large bank angles an increased load factor will cause the airplane to stall at a higher airspeed. Always be weary of large amounts of back pressure. “Aerodynamic Load is caused by back pressure”

**Maneuvering Speed (VA):** the speed which full abrupt control movement may be applied without causing structural damage to the aircraft.

1. The speed that the aircraft will stall before it over stresses.
2. The speed that you would use in severe turbulence.
3. Is not on the airspeed indictor.
4. As weight decreases, VA decreases.

**Adjusted Va= \sqrt{(total weight/Max gross weight) x Va**

**Vno=** speed at which medium abrupt increases or decreases in angle of attack may over-stress the aircraft.

**Flaps:**

1. high lift/ high drag device that enables the pilot to
2. make steeper approaches to a landing while
3. decreasing landing airspeed
4. and decreased ground roll
5. due to a decreased stall speed

![Diagram of different types of flaps](image-url)
Ground Effect: within a wingspans distance-
- The slower airspeed requirement to lift off may not be enough to clear an obstacle.
- interference of the ground,
- increases pressure below the wing and
- alters the airflow patterns about the wing
- enough to reduce the following:
  1. wing tip vortices
  2. downwash
  3. induced drag
  4. angle of attack
  5. required power
  6. airspeed required for flight

- **Maneuverability:** an aircraft that readily permits changes in pitch, roll, and yaw while withstanding the resulting stresses imposed on it, is considered to be maneuverable.
- **Controllability:** the capability of an aircraft to respond to the pilots inputs, especially with regard to flight path and altitude.
- **Stability:** the tendency of an aircraft to develop forces which restore it to its original condition, when disturbed from a condition of steady flight.
  1. An aircraft that is inherently stable will require less effort to control.
  2. More effort to maneuver.
- Stability detracts from maneuverability.
- No airplane is completely stable but, all airplanes must have desirable handling characteristics.
- **Static Stability:** is the initial tendency that the airplane displays after its equilibrium is disturbed
  - Positive Static Stability –goes back to original condition
  - Neutral Static Stability- stays at its new condition
  - Negative Static Stability
- **Dynamic Stability:** is the overall tendency that the airplane displays after its equilibrium is disturbed.
  - Positive Dynamic Stability
  - Neutral Dynamic Stability
  - Negative Dynamic Stability
- **Longitudinal Stability:** Pitch stability about the lateral axis
  1. The CG being forward of the Center of Lift and the horizontal stabilizer having a negative lift component provides longitudinal stability.
  2. An aft CG reduces stability and can be difficult to recover from a stall condition.
- **Conventional Horizontal Stabilizer is affected by prop wash and flap position more than a T-tail**
  1. when power is reduced, the aircraft pitches nose down because the reduced induced flow on the stabilizer reduces its negative component of lift.
  2. flap extension directs airflow from the wing downward to the stabilizer increasing
the negative angle of attack therefore increasing its negative lift component. (pitch up)

- **Yaw**: the purpose of the rudder is to control yaw about its vertical axis
- **Stalls**: occurs when the critical angle of attack is exceeded
- **Spins**: occurs when, after a full stall, in uncoordinated flight the wing that drops continues in a stalled condition while the rising wing regains and continues to produced some lift, causing the rotation.
- The difference between a spin and a steep spiral is that in a spin, the wings are stalled.

**TURNING Tendencies**

*effect is greatest at low airspeeds, high power setting and high angles of attack*

- **Torque**: based on Newton’s third Law of Action “ Every action has an equal and opposite reaction”. The clockwise rotation (as seen from the rear) of the prop torque rolls the aircraft counterclockwise causing a bank to the left. Requires right stick!
- **Spiraling Slipstream**: is based on the reaction of the air to the rotating propeller blade forces it rearward in a spiraling clockwise direction of flow around the fuse-lage and striking the left side of the vertical stabilizer. Pushes a conventional tail down (yaw left). Requires right rudder.
- **Gyroscopic Precession**: When a force is applied to a spinning object (the rim of the propeller) the result of that force occurs 90 deg. later in the direction of rotation, and in the direction of the applied force.
- the “yaw causes pitch, pitch causes yaw” phenomenon: as the nose of the airplane is raised, a deflective force is applied to the spinning propeller which results in a yawing force known as precession. pitch up=yaw right= pitch down=yaw left= pitch up etc.
- **“P” Factor** (asymmetric propeller loading): occurs when the airplane is flown at a high angle of attack. The downward moving blade which is on the right side of the propeller arc attacks the incoming air flow at higher angle of attack, resulting in greater thrust than the upward moving blade on the left.

**G. TASK: OPERATION OF SYSTEMS**

**REFERENCES**: AC 61-23/FAA-H-8083-25; POH/AFM.

Applicant exhibits knowledge of at least three (3) of the following systems on the airplane provided for the flight test.

1. Primary flight controls and trim.
   **C-152**– cable actuated controls with pullys, Pushrods, control horns and bellcranks

**Stall Warning System**

Pneumatic type stall warning system consisting of an inlet in the leading edge of the left wing and an air operated horn near the upper left corner of the wind shield. The low pressure above the wing moves forward to the leading edge of the wing creating a differential pressure in the system that sounds the horn 5 to 10 knots above the stall in all flight conditions.
2. Flaps, leading edge devices, and spoilers.

152II Flaps System
Fowler flaps
Approved take off range: 0° to 10° Vfe 85 kts
Approved Landing Range: 0° to 30°

Flaps
Plain
Slotted
Split
Fowler

Leading edge devices
Slots unmovable space in leading edge
Slats movable space in leading edge

Spoilers
Similar to split flaps but on top. High drag/ low lift

4. Powerplant and propeller.

Cooling:
- Excessively high engine temperatures will cause loss of power, excessive oil consumption, and possible permanent internal engine damage.
- If the engine oil temperature and cylinder head temperature gauges have exceeded their normal operating range, the pilot may be operating with too much power and the mixture set too lean.
- To aid engine cooling in a climb, the pilot can lower the nose, reduce the rate of climb and increase airspeed.
- To cool an engine that is overheating, the pilot can enrich the fuel mixture.
- Avoid high manifold pressure / low RPMs.

Combustion requirements = Fuel; Air; compression, Spark
- Four Stoke operating cycle
  1. Intake(suck)  2. Compression(squeeze)
  3. Power(bang)  4. Exhaust (blow)

Abnormal Combustion:
1. Detonation occurs when the unburned charge in the cylinders explodes instead of burning normally.
2. If the grade of fuel used in an engine is lower than specified for the engine, it will most likely cause detonation.
3. If a pilot suspects detonation during climb-out, the initial corrective action would be to lower the nose slightly to increase airspeed.
4. pre-ignition- The uncontrolled firing of the fuel/air charge in advance of normal spark ignition timing

Induction system
Carburetor: the operating principle of float-type carburetors is based on the difference in air pressure between the venturi throat and the air inlet.
Float-type carburetors are more susceptible to icing than fuel-injected systems. Carburetor ice occurs due to the effect of fuel vaporization and the decrease in air pressure in
the venturi, which causes a sharp temperature drop in the carburetor.

- Conditions most favorable to icing include an outside air temperature between -7° and 22° C (20° and 70° F) and high humidity.
- In a normally aspirated engine with a fixed-pitch propeller, the first indication of carburetor ice is a loss of RPM

- **Applying carburetor heat will:**
  1. Enrich the fuel/air mixture
  2. Cause a decrease in engine performance
  3. Cause a temporary decrease in RPM, followed by a gradual increase.

---

**Mixture:** the purpose of adjusting the air/fuel mixture is to decrease fuel flow to compensate for decreased air density.

1. Takeoff at high-elevation airports may require leaning the engine during run-up for best power.
2. The mixture must be enriched prior to a descent
3. and low power settings regardless of altitude.

---

**C-152II Engine** Lycoming O-235-L2C, 110 hp @ 2550 RPM, 233.3 cu inch displacement Normally-Aspirated, Direct-Drive, Air-Cooled, Horizontally-Opposed, Carburetor Equipped, Four-Cylinder

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<td>Normal 60-90psi</td>
<td>Min. 25psi</td>
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<td>4 – 6 quarts (fill to five quarts for normal flights of less than 3 hours)</td>
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152II Dual Magneto System
Two engine-driven magnetos, and two spark plugs in each cylinder. The right magneto fires the lower right and upper left spark plugs, and the left magneto fires the lower left and upper right spark plugs.

RPM drop should not exceed 125 RPM on either magneto or show greater than 50 RPM differential between magnetos.
*an absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.
• Magnetos are a self-contained, engine-driven unit that supplies electrical current to the spark plugs and is completely independent of the electrical system. (they run even if a complete electrical failure occurs.
• Two purposes of duel ignition systems on aircraft is to provide for
  1. Improved engine performance.
  2. Redundancy

Propellers: two basic types;
• Fixed-pitch
• Constant-speed, variable pitch;
  1. Permits the pilot to select an RPM for the most efficient performance
  2. Throttle controls power output (manifold pressure)
  3. Propeller selects engine RPM.

152II Propeller
Sensenich two blade, fixed pitch, one piece, annodized, forged aluminum alloy propeller 72 inches in diameter

5. Landing gear.
C-152II Landing Gear
Ground Steering: when rudder pedal is depressed, a spring-loaded steering bungee (which is connected to the nose gear and to the rudder bars) will turn the nose wheel through an arc of approximately 15º each side of center. By applying either left or right brake, the degree of turn may be increased up to 30º each side of center.

Other Types
• Tailwheel Conventional
• Tricycle
• Retractable electrical or hydraulic

6. Fuel, oil, and hydraulic.
• Oil Systems C-152 6 quart capacity; 5 normal; 4 minimum
  • For internal cooling, reciprocating aircraft engines rely on the circulation of lubricating oil.
  • An abnormally high oil temperature indication may be caused by the oil level being too low.
**Fuel System:**
- Boost pump starting engines with an engine driven pump
- Gravity feed system
- Fuel selector

On aircraft equipped with fuel pumps, the practice of running a fuel tank dry before switching tanks is unwise because the engine-driven or electric boost fuel pump may draw air into the fuel system and cause vapor lock.

**Fuel grade**
Using fuel of a lower than specified grade may cause cylinder head and engine oil temperature gauges to exceed their normal operating ranges. Fuel of the next higher octane can be substituted if the recommended octane is not available.
- red 80
- blue 100LL
- green 100
- clear turbine fuel

Filling the fuel tanks will discourage moisture condensation by eliminating air space in the tanks.

---

**C-152II Fuel System**

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<tr>
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<tr>
<td>Unusable</td>
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<td>Fuel Burn</td>
<td>3.8-6.6 GPH</td>
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*Mixture may be leaned above 3000 feet*

The left fuel tank is vented overboard through a vent line, equipped with a check valve, which protrudes from the bottom surface of the left wing near the wing strut. The right fuel tank filler cap is also vented.

When fuel quantity indicators show an empty tank, approximately 2 gallons remain in the tank as unusable fuel.
7. Electrical

Electrical System:
- **Alternator:** light weight, lower maintenance, uniform output even at low RPMs
  1. Alternators produce alternating current (AC) first, and then convert it to direct current (DC)
  2. Direct current is delivered to a bus bar which distribute the current to various electrical components.
  3. Circuit breakers protect various components from overloads
  4. Ammeter or Load meter
- **Battery**
  5. Main purpose is to start the engine
  6. Also used as a standby or emergency electrical power

Electric 28-Volt, direct-current electrical system
belt-driven 60-Amp alternator

8. Avionics


Pitot-Static Instruments:
- Supplies static ambient air pressure to operate the **altimeter** and **vertical speed indicator**, and both static ambient and ram air pressure to the **airspeed indicator**.
- If the pitot tube becomes clogged, the airspeed indicator is affected; if the static vents are clogged, the altimeter, airspeed indicator, and vertical speed indicator are affected.

Airspeed indicator Markings
- Red line = never exceed speed
- Yellow line = indicates the caution range
- Green line = normal operating range
- White arc = normal flap operating range
- Maneuvering speed
- Indicated
- Calibrated indicated corrected for position error
- True indicated corrected for density altitude (actual speed through the air)
- Ground Speed. True airspeed corrected for winds
- Altimeter setting is the value to which the barometric pressure scale of the altimeter is set so that the altimeter indicated true altitude at field elevation.

Altitude Errors “High to low watch out below”
- Warm days indicate lower altitude than the true altitude. Aircraft will be higher
- Cold days indicate higher altitude than true altitude. Aircraft will be lower
- Higher barometric pressures indicate lower altitude than true altitude. Aircraft will be higher
- Lower barometric pressures indicate higher altitude than true altitude. Aircraft will be lower
- One inch of barometric change causes 1000 ft of altitude change in the same direction if the altimeter is not reset.
- Blocked pitot causes the altimeter indication to remain constant.

Types of Altitude
- True-, above sea level
- Absolute- AGL, height above ground level
- Pressure-, above standard datum plane 29.92
- Density-, pressure altitude corrected for non-standard temperature
- Higher temperature, humidity raises barometric air pressure levels decreasing air density and increasing density altitude
- Indicated-, on the dial height above the pressure level in the kolsman window.

Gyroscopic Instruments:
- Include the turn coordinator, attitude indicator and heading indicator. They operate off of a gyro’s tendency to remain rigid in space.

**Turn Coordinator** Provides an indication of the aircraft’s rate of movement about the yaw and roll axes.

**Attitude Indicator** A pilot determines the direction of bank from the attitude indicator by the relationship of the miniature airplane to the deflected horizon bar.

**Heading Indicator** Must be regularly/periodically realigned with the magnetic compass as the gyro precesses.

**Precession** Tilting or turning of the gyro causing an error due to friction in the bearings

**Magnetic Compass;** contains a bar magnet, which swings freely to align with the Earth’s magnetic field. Points toward Nova scotia and deep into the earth accounting for acceleration and turning errors

- **Deviation;** caused by the magnetic field in the aircraft distorting the lines of magnetic force.
- **Variation;** angular difference between the true and magnetic poles (Isogonic + Agonic)
- **Acceleration Errors (ANDS);** on a East or West heading the compass will show a turn towards the north if accelerated and a turn toward the south if decelerated.
- **Turning Errors (UNOS);** on a North heading a turn to the right will indicate a turn to the left and on a south heading a turn to the right will indicate an accelerated turn to the right.
There are no turning errors on the east west heading.

- “Roll out before indicated north and after indicated south”

10. Environmental.
Heat comes from a shrouded muffler there is the danger of carbon monoxide

11. Deicing and anti-icing.

152II Carburetor Icing
To clear the ice, apply full throttle and pull the carburetor heat knob full out until the engine runs smoothly; If conditions require the continued use of carburetor heat in cruise flight, use the minimum amount of heat necessary and lean the mixture.


Objective. To determine that the applicant exhibits knowledge of the elements related to aeromedical factors by explaining:
1. The symptoms, causes, effects, and corrective actions of at least three (3) of the following—
   a. hypoxia.

   Definition: an oxygen deficiency of the body, sufficient to impair the functions of the brain and other organs.
   - As air pressure decreases, as you gain altitude, the amount of oxygen (even though it still remains 21 percent of the air) is decreased.
   - Certain things can make you more susceptible to Hypoxia such as smoking, some medication, alcohol, etc.
   - It is difficult to recognize because of the gradual dulling of the senses
   - Whereas the symptoms can be different from person to person, the symptoms don’t vary within an individual, so if you experience hypoxia and find out how you react to it you will know better how to identify it.

   Hypoxia: oxygen deficiency in the body that affects normal functions of the brain and other organs of the body
   - Hypoxic Hypoxia—inadequate supply of oxygen (going to high altitudes)
   - Hypemic Hypoxia—inability of the blood to carry oxygen (Carbon Monoxide)
   - Stagnant Hypoxia—inadequate circulation of oxygen (excessive G forces)
   - Histotoxic Hypoxia—inability of the cells to effectively use oxygen (by alcohol or drugs)

   Altitudes of concern:
   - 5,000 MSL Night Vision begins to deteriorate
   - 12,000 to 15,000 MSL Judgment, Memory, Alertness, Coordination, and Ability to make calculations are impaired, Dizziness, Drowsiness or Euphoria (a sense of well-being) can occur
   - 15,000 MSL Pilots performance can deteriorate within 15 minutes
   - Above 15,000 MSL Tunnel vision, fingernails and lips turn blue.
   - 18,000 MSL The ability to take corrective action is lost within 20 to 30 minutes
   - 20,000 MSL The ability to take corrective action is lost within 5 to 12 minutes followed soon thereafter by unconsciousness
§ 91.211 Supplemental oxygen requirements.

**Supplemental Oxygen:** FAR requirements

- **12,501—14,000 ft MSL** = Flight crew must use O2 after 30 minutes
- **14,001—15,000 ft MSL** = Flight crew must use O2
- **15,001—Above** = Flight crew must use O2 and all occupants must be provided with O2

b. hyperventilation.

*Definition:* an abnormal increase in the volume of air breathed in and out of the lungs causing an excessive loss of carbon dioxide. Usually occurs subconsciously when a stressful situation is encountered. Symptoms are lightheadedness, suffocation, drowsiness, tingling in the extremities, and coolness. Can cause incoordination, disorientation, painful muscle spasms, and even unconsciousness. The symptoms can subside within a few minutes after the rate and depth of breathing are consciously brought back under control. Consciously controlling breathing and even breathing into a paper bag will correct the effects of hyperventilation.

c. middle ear and sinus problems.

- During ascent and descent, air pressure in the sinuses equalizes with the aircraft cabin pressure through small openings that connect the sinuses to the nasal passages.
- Pain can be relieved by periodically opening the Eustachian tube is periodically opened to equalize pressure on each side of the eardrum.
- Flying with any upper respiratory infection, such as a cold or sore throat, or a nasal allergic condition can make equalization difficult.

d. spatial disorientation.

- Certain illusions in flight can lead to spatial disorientation. Whereas all of the different illusions won’t be covered here, what will be covered is how to counteract them.
- Spatial disorientation can only be prevented by visual reference to reliable fixed points on the ground or to flight instruments.
- Anytime an attitude is maintained for an extended period of time the ears will try to deceive you into believing the aircraft is in straight-and-level flight.
- Illusions can be prevented by not making sudden, extreme head movements.

e. motion sickness.

- Caused by continued stimulation of the inner ear which controls the sense of balance.
- Symptoms: loss of appetite, saliva in the mouth, perspiration, nausea, disorientation.
- Pilots shouldn’t take over the counter prescription drugs due to the side effects.
- Opening the air vents, using oxygen if available, keeping your eyes focused on a point outside of the airplane, and avoiding unnecessary head movements can help with motion sickness.

f. carbon monoxide poisoning.

- Carbon monoxide is a colorless, odorless, and tasteless gas within the exhaust fumes.
- Can significantly reduce the ability of the blood to carry oxygen, causing hypoxia.
- Symptoms are headache, drowsiness, or dizziness.
- Closing the heater vent and opening the air vents can help to expel the gas and relieve the symptoms.
g. stress and fatigue.
- Stress is the body's response to demands made upon it by everyday living
- Stress overload can cause poor judgment which often leads to poor decision making
- The best way to deal with severe stress is to terminate the flight immediately

h. dehydration.

2. The effects of alcohol, drugs, and over-the-counter medications.
- Alcohol is metabolized at a fixed rate by the human body, which isn't altered by the use of coffee or other popular remedies
- Altitude multiplies the effects of alcohol on the body
- Alcohol numbs the brain in the area where our thinking takes place, then proceeds to the area that controls body movement.
- The regulations about alcohol and flying are as follows: don't fly.
  1) within 8 hours after drinking any alcohol
  2) under the influence of alcohol
  3) having more than .04 blood alcohol content
  4) with passengers that are under the influence of alcohol, except in emergencies

Approved and non approved meds are listed on AOPA web site.

3. The effects of excesses nitrogen during scuba dives upon a pilot or passenger in flight.

Scuba Diving effects and rules 8-1-2

- A person should allow the body sufficient time to rid itself of excess nitrogen absorbed during diving or decompression sickness due to evolved gas can occur during exposure to altitude and create a serious in-flight emergency
- Recommended wait times are:
  1) up to 8,000 ft msl – at least 2 hours after diving and 24 hours if a controlled ascent was required
  2) above 8,000 ft msl – at least 24 hours after any scuba dive

Miscellaneous:

Visual Illusions
- Autokinesis—if you stare at a single point more than a few seconds the light may appear to move.
- False Horizon—occurs when the natural horizon is obscured or not readily apparent.
- Flicker Vertigo—can occur when looking through a slow-moving propeller toward the sun or when the sun is behind you, reflecting off the propeller.

Landing Illusions
- Haze—can cause you to fly a low approach
- Featureless Terrain—can cause you to fly a lower-than-normal approach
- Fog—creates the illusion of pitching up which can cause you to steepen your approach.

Disorientation: is an incorrect mental image of your position, attitude, or movement in relation to what is actually happening to your aircraft.
- Input from three primary sources: Vision, Vestibular, and Kinesthetic Sense.

Spatial Disorientation: is a conflict between the information relayed by your central vision scanning the instruments, and your peripheral vision.
- Pilots are more subject to spatial disorientation if body signals are used to interpret flight atti-
The best way to overcome the effect is to rely on the aircraft instrument indications.

**Aeronautical Decision Making**

**Decision-Making Process**: involves an evaluation of each risk element.
- **Pilot**—your fitness, currency, and flight experience.
- **Aircraft**—performance, limitations, equipment, and airworthiness
- **Environment**—Weather, airport conditions, services
- **Operation**—the purpose of the flight
- **Situation**—maintain awareness

One of the most important decisions that you will make as pilot in command is the **go/no-go decision**. Evaluating each of these risk elements can help you decide whether a flight should be conducted or continued. **DECIDE**: is used by the FAA to describe the basic steps in the decision-making process

- Detect the fact that a change has occurred
- Estimate the need to counter or react to the change
- Choose a desirable outcome for the success of the flight
- Identify actions which could successfully control the change
- Do the necessary action to adapt to the change
- Evaluate the effect of the action

**Self Assessment** (I'm Safe, Checklist) "I am physically and mentally free from..."
- Illness
- Medication
- Stress
- Alcohol
- Fatigue
- Eating

**Hazardous Attitudes**

<table>
<thead>
<tr>
<th>Antidote</th>
<th>Hazardous Attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking Chances is foolish</td>
<td>Macho</td>
</tr>
<tr>
<td>Follow the rules, they are usually right</td>
<td>Anti-Authority</td>
</tr>
<tr>
<td>It could happen to me</td>
<td>Invulnerability</td>
</tr>
<tr>
<td>Not so fast. Think first</td>
<td>Impulsivity</td>
</tr>
<tr>
<td>I'm not helpless. I can make a difference</td>
<td>Resignation</td>
</tr>
</tbody>
</table>