Key Terms

Stability
Positive static Stability
Positive Dynamic Stability
Maneuverability
Controllability
Longitudinal Axis
Lateral Axis
Vertical Axis
Center of gravity (CG)
Longitudinal Stability
Center of Pressure
Center of Lift
CG Range
Tail Down force
Thrust line
Lateral Stability
Dihedral
Sweepback
Keel effect
Directional Stability
Dutch Roll
Spiral instability
Power off stall
Power on stall
Accelerated stall
Secondary stall
Crossed control Stall
Spin
Erect Spin
Inverted Spin
Flat Spin
Incipient Spin
Fully Developed Spin
Spin Recovery

in climbing flight, one component of weight act perpendicular to the flight path another component of weight act rearward, in the same direction as drag.

Four left turning tendencies associated with propeller driven airplane are torque, gyroscopic precession, asymmetrical slipstream, and spiral slipstream.

During descending flight, one component of weight act forward along the flight path, while another component act perpendicular to the flight path.

The least drag, best glide angle and maximum gliding distance can be obtained by maintaining the angle of attack that corresponds to C/D max

Change in aircraft weight will not affect glide ratio but a higher airspeed will have to be maintained in a heavier aircraft in order to cover the same distance over the ground.

Centripetal force, which is created by the horizontal component of lift is the centripetal force that acts on a turning aeroplane

The effect of adverse yaw can be countered by maintaining a coordinated turn using rudder

Rate of turn increase and radius of turn decrease as angle of bank is increased in a constant airspeed turn. If angle of bank is held constant and airspeed is increased, turn rate will decrease and turn radius will increase.

The ratio of the weight that the wings must support to the actual weight of the aircraft is termed load factor

Accelerated stall occurs when the critical angle of attack is exceeded at an airspeed higher than the one G-stall speed.

The Vg diagram defines the aeroplane's envelope, which is bounded by the stall speed, limit load factor and V_{NE}

Key Terms

Tangent

Symmetric Maneuver

Asymmetric Turn

V-Factor

Glide Angle

Centripetal Force

Centrifugal Force

Adverse Yaw

Overbanking Tendency

Rate of Turn

Spreading Steps/Beam

Maximum Lift to Drag Ratio

Best Glide Speed

Glide Ratio

Radius of Turn

Load Factor

Accelerated Stall

Limit Load Factor

V-g Diagram

Design Maneuvering Speed (V_A)

Chapter 4 The Flight Environment Safety of Flight Section 4

- The Majority of midair collision occur during daylight hrs in VFR conditions and within five miles of an airport.

- During daylight hrs the most effective way to scan is through a series of short regularly spaced eye movement in 10°

You may not notice object in your peripheral vision unless there is some relative motion

If there is no apparent relative motion between another aircraft and yours, you are probably on a collision course

Empty field myopia occurs when you are looking at a featureless sky that is devoid of object contrasting color or pattern and your eyes tend to focus at only 10 to 30 feet

Blind spot make it difficult to see conflicting traffic. In both high wing and low wing design portion of your vision are blocked by the fuselage and wings

Operation light Encourages you to use your landing light during departure + approaches both day + night, especially when operating within 10 miles of an airport or in conditions of reduced visibility.

Clearing turn allows you to see area blocked by blind spots and make it easier to maintain visual contact with other aircraft in the practice area.

An aircraft in distress has the right of way over all other aircraft

3 situations where right of way needs apply: converging with another aircraft, approaching another aircraft head on, overtaking another aircraft.

You must maintain minimum safe altitude at all times except during takeoffs and landings

Maintain flying + flight area operations requires specialized training.

While learning in crucial properties of the aeroplane and elevator control will help you maintain control of the aeroplane.

To ensure that it is clear as to who has control of the aircraft, the FAA has recently added the under 3 steps process when exchanging the flight control.

Key Terms

Collision Avoidance
Visual Flight Rules (VFR)
Instrument Flight Rules (IFR)
Visual Scanning
Empty Field Myopia
Blind Spots
Operation Light On
Clearing Turn
Right of way Rule
Minimum Safe altitude

Chapter 6 The Flight Environment Aerpad Section B

- A two way radio is required for you to operate in the controlled aerpad environment.

- Control of VFR traffic is delegated to an uncontrolled aerpad.

- The numberical at the end of the runway corresponds to the magnetic direction that you are heading when taking off or landing.

- A Standard rectangular pattern with five named legs is used at most aerpads to ensure that air traffic flows in an orderly manner.

- The most common wind direction indicator is the windsock, which is used at both controlled and uncontrolled aerpads. It provides you with the present wind condition near the touchdown zone of the runway.

- A tetrahedron is a landing direction indicator which may swing around with small wind pointing into the wind or may be manually positioned to show landing direction.

Adhering to noise abatement procedures reduces the level of noise over neighborhood + lowers insurance premiums.

- A runway normally is marked only with the runway number and a dashed white centerline. When flying instrument approaches, pilots cannot use additional markings on IFR runways such as threshold marking, touchdown zone marking and aiming point marking.

Usually a runway has a displaced threshold because of an obstruction off the end of the runway which might prohibit a normal descent and landing on the beginning portion of the pavement.

A blast pad / stopway area is an area where propeller or jet blast can damage property without creating a hazard to others.

Taxiways usually have yellow centerline marking and hold lines wherever they intersect with a runway.

There are 6 basic types of airport lights. navigational, location, direction, obstruction, information and runway distance remaining

Airport beacons are used to guide pilots to lighted airports at night and may indicate when weather conditions are below VFR minimum during the day.

The 2 bar visual approach slope indicator (VASI) shows whether or not you are on a glide path that will take you safely to the touchdown zone of the runway.

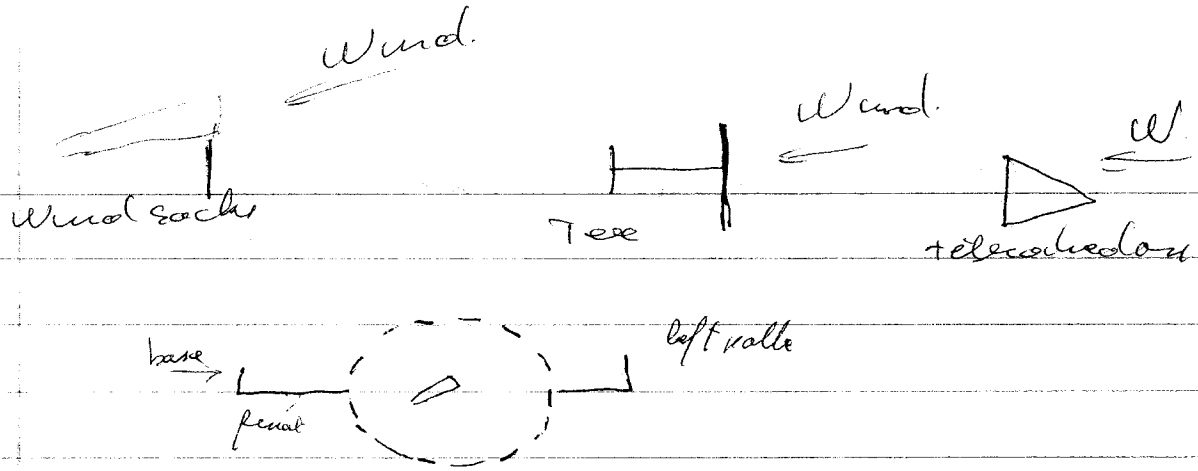
A variety of lighting system, including approach light system, runway edge lights, runway end identifier light (REILs), in runway lighting and taxiway lighting are used at airport to aid pilot in identifying the airport environment at night and in low visibility conditions.

Pitch controlled lighting is the term used to describe system that you can activate by keying the aircraft's microphone on

a specified radio frequency

Key Terms:

Controlled aerport { Runway End Identifier Lights (REILs)
Air Traffic Control (ATC)
Uncontrolled Aerport — Rotating Beacon Lighted
Runway
Traffic Pattern, Wind Sock, Wind Tee { Precision Approach Path Indicator (PLASI)
Tetrahedron, Segmented Circle { Precision Approach Path Indicator (PAPI)
Nose absolement Procedure
Displaced Threshold
Blast Pad / Stopway Area
Taxiway
Hold line, Ramp Area { Approach Lighting System (ALS)
Hand Signal — Runway Edge Light
International Civil Aviation
Organization (ICAO)
Land and Hold Short Operation (LAHSO)
Aerport Beacon
Visual Approach Slope Indicator (VASI)
Tri Color VASI



Note:

RW clearance, construction, change in navigational aids, or instrument approach facilities, radar service availability and/or any info on planned evasive terminal or landing operations can be found in Notice To Airmen NOTAM.

Chapter 6 The flight environment Aeronautical charts Sectional

- Aeronautical charts are maps which provide a detailed pictorial of an area's topography and include aeronautical & navigational info

- There are several reference lines, based on great and small circle, which are used to define locations on the earth surface

You can locate a position on an aeronautical chart by knowing its coordinates of latitude and longitude

Each section chart cover 6° to 8° of longitude & approximately 4° of latitude and is given the name of a prominent city within the coverage

Maximum elevation figure (MEFs) are based on the highest known feature within a quadrangle bounded by lines of latitude and longitude

You should fly no lower than 2000 feet AGL over a special conservation area such as national park or wildlife refuge

World aeronautical chart (WAC's) use a scale of 1:1000000 and are commonly used by pilot of high performance aircraft.

Divided into seven categories, the chart legend describes symbology for airports, airport data, radio aids to navigation and communication boxes, airport traffic service and airspace information obstruction, topographic information and miscellaneous data

Since there is a wide variety of airport type shapes and sizes, several types of airport diagrams are shown on sectional chart to help you picture the actual airport being illustrated

Tick mark extending from an airport diagram indicate that fuel is available and that the field is attended, at least during normal working hours

A star on the airport diagram indicates an airport beacon normally operates from sunset to sunrise.

Airport with control towers are shown in blue circles. All other are identified by a magenta color.

By referring to the airport data on a sectional chart, you can determine what radio frequencies are for communication at a particular airport. In addition, information such as longest runway length, airport lighting and field elevation can be determined.

For more on flight planning and flight, refer to navigation and communication boxes for information concerning navaids and flight service stations (FSSs) in the area.

Boxes placed near the appropriate navaid, include the name, frequency and Morse code identifier of the navaids. FSS frequencies are printed above the boxes.

With the help of contour lines, spot elevations and the elevation of obstructions, you can choose a safe cruising altitude.

The location of natural and man-made features such as lakes, rivers, railroads, roads and highways are shown on charts as reference points for navigation.

While obstructions can impose hazards to flight they can be good reference to colors key your position.

Key Terms
Aeronautical Charts
Great circle
Small circle
Parallels
Latitude
Meridians
Longitude
Prime Meridian
Projection
Mercator Projection
Lambert Conformal Conic Projection
Sectional Chart
Maximum Elevation Figures (MEF's)
World Aeronautical Chart (WAC)
Legend
Navaids

Chapter 4 – The Flight Environment – Airspace Section D

- In each class of airspace you must maintain specific VFR weather minimums (minimum flight visibility and distance from clouds).

While operating in controlled airspace (Class A, B, C, D, E) you are subject to certain operating rules as well as pilot qualification and aircraft equipment requirements.

ATC does not exercise control of air traffic in uncontrolled or Class G airspace.

Class G airspace typically extends from the surface to 700 or 1200 feet AGL, in some areas, Class G may extend from the surface to 14,500 feet MSL.

A transponder is an electronic device aboard aircraft enhances visibility on an ATC radar screen.

The FARs require that you have an operating transponder with Mode C capability when flying at or above 10000 feet MSL (excluding the airspace at and above 2,500 feet AGL) in Class A, B airspace within 30 nautical mile of Class B primary airport and in and above Class C airspace.

There are no communication requirements to operate within Class E airspace but you can request traffic advisory service which ATC provide on a workload permitting basis.

Federal airways usually 8 nautical miles wides, begin at 1,200 feet AGL and extend up to but not including 18000 feet MSL

You must establish two way radio communication with the power prior to entering class D airspace and maintain radio contact during all operation to from or on that airport.

Prior to entering Class C airspace you must establish two way communication with the ATC facility having jurisdiction and maintain it while you are operating with the airspace. Within a Class C area, ATC provide radar service to all IFR and VFR aircraft.

Located at some of the country major airport Class B airspace has different level which are portrayed as a series of interconnected circular pattern around the airport.

Prior to entering any part of class B airspace you are required to obtain a clearance from ATC

To operate in Class B airspace, you must have at least a private pilot or student pilot with the appropriate logbook endorsement.

Whenever you are flying VFR in or around Class B airspace, VFR terminal area charts will help with orientation and navigation

VFR flyway planning chart, published on the reverse side of some VFR terminal area charts show VFR routes for transitioning around, under and through class B airspace.

To operate with class A airspace, you must be instrument rated and your aircraft must be transponder equipped, operated under an IFR flight plan and controlled directly by ATC.

A special VFR clearance must be obtained from ATC to operate within the surface area of class B C D or E airspace when the ground visibility is less than 3 statute miles and/or the ceiling is less than 1000 feet AGL.

- Since the airspace at lower altitude, especially in airport area is congested the FAA has established aircraft speed restrictions.

Fleet area are shown on aeronautical chart to inform you of unusual types of aerial activities such as parachute jumping and student pilot training

A military operation area (MOA) is a block of airspace in which military training and other military maneuvers are conducted

Warning area extend from 3 nautical miles outward from the coast of the US and contain activity which may be hazardous to nonparticipating aircraft

Restricted area often have unusable hazard to aircraft such as artillery firing, aerial gunnery or guided missiles. Permission to fly through restricted area must be granted by controlling agency.

Prohibited area are established for security or other reason associated with the

national welfare and contains airspace within which flight of aircraft is precluded.

Airports with a control tower are descontinued immediately when a pilot aircraft, ~~ground~~ radar or beacon presence determines an aircraft might be approaching the area.

A prepared ~~airport~~ airspace area extends 10 statute miles from any airport where there is an FSS located on the field and no operating control tower.

Generally military training routes (MTR's) are established below 10000 feet MSL for operation at speed in excess of 250 knots.

Temporary flight restrictions are imposed by the FAA to protect persons or property on the surface or in the air from a specific hazard or restriction.

Emergency air traffic rules are established by the FAA after determining that, without such action, the air traffic control

system could operate at the required level of safety and efficiency.

Air defense identification zone (ADIZ) are established to facilitate identification of aircraft in the vicinity of U.S. or international airspace boundaries.

Key Terms

VFR Weather minimums

Controlled Airspace

Uncontrolled Airspace

Class G Airspace

Transponder

Class E airspace

Federal airways

Victor Airways

Class D Airspace

Class C Airspace

Class B "

VFR Terminal Area Charts

VFR Flyway Planning Chart

Class A airspace

Special VFR clearance

Special Use Airspace

Alert Areas

Military Operation Area (MOA)

Warning Areas

Restricted Areas

Prohibited Areas

Control Zones

National Security Area (NSA)

Other Airspace Areas

Airport Advisory Area

Local Airport Advisory Service

Military Training Route (MTR)

MTR

Temporary Flight Restrictions

Parachute Jump aircraft Areas

Terminal Radar Service Area (TRSA)

Air Defense Identification Zone

Chapter 5 Communication and Navigation Section A.

Radar (radio detection and ranging) is a system which uses a synchronized radio transmitter and receiver to emit radio waves and process their reflections for displays.

Primary radar is a ground based system used by ATC which transmit radio waves in a narrow beam by a rotating antenna. When the radio waves strike your aircraft they are reflected back to the antenna and processed to provide display on a screen which shows your aircraft location on a radarscope.

The range of your aircraft is determined by measuring the time it takes for the radio wave to reach your aircraft and return to the receiving antenna.

The azimuth or the angle of your aircraft from the radar site is measured clockwise from north in a horizontal plane.

Some of the limitation of primary radar are the bending of radar pulse or anomalous propagation blocking of radar return by precipitation or

heavy cloud and its inability to easily identify an individual aircraft return and display an aircraft altitude.

The ATCRBS. Mode S system is referred to as secondary surveillance radar or simply secondary radar, consist of 3 main component in addition to primary radar, a decoder an interrogator and a transponder.

The FAR require that your transponder be tested and inspected every 24 calendar month for operation in controlled airspace

The Transponder is used by the controller to assign a four digit code, as well as to indicate which transponder function you should select.

Airport surveillance radar (ASR) are designed to provide relatively short range coverage in the airport vicinity and to serve as an expeditious means of handling terminal area traffic.

↙ Automated Radar Terminal System.

ARTS equipment automatically provides a continuous display of an aircraft's position altitude, ground speed and other pertinent information.

The primary responsibility of terminal Radar approach control facilities (TRACONs) is to ensure safe operation of aircraft transitioning from departure to cruise flight and from cruise to a terminal area approach.

Air route surveillance radars (ARSR) & the long range radars equipment used in controlled airspace to manage traffic.

Workload permitting, air route traffic control centers (ARTCCs) will provide traffic advisories and issue guidance or vectors to VFR aircraft on request.

When giving traffic alerts, controllers reference traffic from an aircraft's 12 hour clock.

Safety alert is issued when an aircraft is in unsafe proximity to terrain, obstructions or other aircraft.

Terminal VFR Radar services include basic radar service, terminal radar service area (TSRA) service, Class C service and Class B service.

Terminal VFR radar service includes basic radar service, Terminal radar service area (TRSA) service

Basic radar service for VFR aircraft includes safety alert, traffic advisories and limited radar vectoring. Sequencing also is available at certain terminal locations.

To improve controller effectiveness and reduce frequency congestion, automatic terminal information service (ATIS) is available in selected high activity terminal areas.

Flight service stations (FSS,) are ATC facilities which provide a variety of service to pilots including weather briefing, enroute communications, VFR search and rescue services processing of flight plans and assisting lost aircraft and aircraft in emergency situations

When you file a flight plan with a FSS prior to a given country, a record is made which gives destination, route of flight, arrival terminal time and number of people on board your aircraft.

If you get disoriented while on a cross country flight, an FSS specialist may be able to locate you with a VHF direction finder

Key Terms

Radar / Search and Rescue
Primary Radar / VHF Direction finder (VHF/DF)
Ramp
Azimuth
Air Traffic Control Radar Beacon System (ATCRBS)
Secondary Surveillance Radar
Squawk
Airport Surveillance Radar (ASR)
Terminal Radar Approach control Facility (TRACONs)
Automated Radar Terminal System (ARTS)
Air Route Surveillance Radars (ARSR)
Air Route Traffic Control Centers (ARTCCs)
Radar Traffic Information Service
VFR Radar Advisory Service / Flight Plans
Flight following / Flight Service Station (FSS)
Safety Alert / Automated Terminal information service (ATIS)
Minimum Safe Altitude Warning (MSAW)
Vectors / TRSA / Class C service / Class B service
Terminal VFR Radar Service / Basic Radar Service

☐ You may not use a transponder for operation in a controlled airspace unless it has been tested and inspected within at least the preceding 24 calendar months.

☐ When making a routine transponder code change you should avoid inadvertent selection of 7500, 7600 or 7700.

☐ The standard transponder code for VFR operation is 1200

☐ Controller reference traffic from your aeroplane as if it were a clock. For example if you are flying a heading of 090° and ATC states "Traffic 2 o'clock, 7 miles westbound" you should look for the traffic to the south.

☐ Basic radar service in the terminal radar programs includes traffic advisories and limited vectoring for VFR aircraft.

☐ Automatic terminal information service (ATIS) is the continuous broadcast of non-control aeronautical information at selected high activity terminal areas.

[4] The letters VHF/DF appearing in an Airport / facility Directory assigned listing indicate that the FSS has direction finding equipment

[5] To use VHF/DF facilities for assistance in locating aircraft position, request that VHF transmitter and receiver.

Chapter 5 Communication and flight information Radio broadcast SB

Communication radios in general aviation aircraft use a portion of the very high frequency (VHF) range, which includes the frequencies between 118.00 MHz and 135.975 MHz.

The range of VHF transmissions is limited to line of sight which means that distances such as a building, terrain or the curvature of the earth block radio waves.

An initial call up to ATC or another facility should include who you are, where you are and what type of service you are requesting.

The ICAO has adopted a phonetic alphabet to be used in radio transmissions.

Aviation use the 24-hr clock system and coordinated universal time (UTC) or Zulu time which place the entire world on one time standard.

To increase safety and expedite airborne operations control power, it is important that all radio equipped aircraft transmit and receive traffic information on a common traffic advisory frequency (CTAF)

An aeronautical advisory station or UNICOM is a privately owned air/ground communication station which transmit on a limited number of frequencies.

The purpose of Multicom is to provide an air to air communication frequency for pilot to self announce their position and intentions at airport which do not have a tower, an FSS or UNICOM

Your initial call up to ATC should include the name of the facility you are trying to contact, your full aircraft identification, the type of message to follow or request if it is short.

An air traffic control clearance is an ~~authorized~~ authorization by ATC for pilot to proceed under specified traffic conditions within controlled airspace

Ground control is an ATC function for directing the movement of aircraft and other vehicles on the airport surface.

The Term radar contact means your aircraft has been radar identified and flight following will be provided.

Approach control is the ATC function that provides separation and sequencing of inbound aircraft as well as traffic advisories and safety alerts when necessary

To land at a towered airport, if your communications become inoperative, set your transponder to code 7600 and follow the lost communications procedure

In the event of a radio failure, a tower controller can provide signal to direct your aircraft.

If armed and activated to crash generated locate ELTs are designed to automatically emit a distinctive audio tone on 121.5 MHz (VHF) and 243.0 MHz (UHF)

The FAA requires that the ELT battery must be replaced or recharged (or are) after one half of the battery's useful life or if the transmitter has been used for more than a cumulative hrs.

Key Terms

Very High Frequency (VHF)
Transceiver
Line of sight
Phonetic Alphabet
N-number
Coordinated Universal Time (UTC)
Zulu Time
Common Traffic Advisory Frequency (CTAF)
UNICOM
MULTICOM
Self Announce Procedure
Air traffic Control clearance
Clearance Delivery
Ground control
Departure Time
Departure Control
Radar Contact
Approach Control
Lost Communication procedure
Returns
Urgency
Five C's - Climb, Communicate, Confess, Comply and Converse
Emergency Locator Transmitter (ELT)

☑ The correct method of stating 4,500 feet MSL is "four thousand five hundred".

☑ In the US you add hours to convert local time to Zulu time (also called UTC) coordinated universal time)

☑ Prior to entering an airport advisory area you should contact the local FSS for airport and traffic advisories.

☑ When you are landing at an airport with a part-time tower and the tower is not in operation, you should monitor airport traffic and announce your intentions and position on the designated CTAF.

☑ The recommended communication procedure when entering a CTAF is to transmit your intentions when you are 10 miles out and give position in the traffic pattern.

☑ An IFR traffic clearance is an authorization by ATC for pilot to proceed under specified traffic conditions within controlled airspace

☑ A clearance to "taxi to" your assigned take off runway authorizes you to cross any runways intersecting your taxi route, but not to taxi on the departure runway.

☐ After landing at a controlled airport, you should contact ground control unless instructed to do so by the tower.

☐ If your aircraft radio fails when landing at a controlled airport, you should observe the traffic flow, enter the pattern and look for a light signal from the control tower.

☐ Each color or color combination of light signal has a specific meaning for an aircraft in flight or on the airport surface.

☐ When activated, an emergency locator transmitter (ELT) transmit on 121,5 MHz and 243,0 MHz

☐ ELT false alarm can be minimized by monitoring 121,5 MHz during flight prior to engine shut and after maintenance.

☐ The Battery in an emergency locator transmitter (ELT) must be replaced or recharged if the battery is rechargeable after one half of it useful life

An ELT may be tested during the first five minutes after the hour

S-C

Chapter 5. Communication and flight information Source of Flight Info

The Airport / Facility Directory contains a descriptive listing of all airport heliport and seaplane bases which are open to public.

The Aeronautical Information Manual (AIM) contains basic flight information a detailed description of the national airspace system. ATC procedures, and other items of special interest to pilots, such as medical fact and other flight safety information.

NOTAM(D) are disseminated for all navigational facilities which are part of the US airspace system; all public use airport, seaplane bases and heliport listed in the ~~AF/D~~ A/FD

NOTAM(Ls) which are locally distributed contain information needed as taxiway closures, personnel and equipment near a crossing runways and airport rotating beacon and lighting and outage

FDC ~~NOTAM~~ NOTAM which are issue by the national flight Data Center contain regulatory information such a temporary flight ~~restrict~~

restriction amendments to instrument approach procedures and other current aeronautical chart

The Notices to Airmen publication is issued every 28 days and contains all current NOTAM(D)s and FDC NOTAM (except FDC NOTAMs for Temporary flight restriction) available for publication.

Advisory circulars (AC) provide you with a non-regulatory guidance and information in a variety of subjected areas. ACs also explain methods for complying with the FARs

Key Terms
Airport / Facility Directory (A/FD)
Directory legend
Federal Register
Notice of Proposed Rulemaking (NPRM)
~~Records~~ Aeronautical information Manual (AI
NOTAM (D)
NOTAM (L)
FDC NOTAM
Notices to Airmen Publication (NTAP)
Advisory Circulars (ACs)

Continuation of Chap 2 - C.

[redacted]

airspeed indicator = the one displacement using both pitot and static pressure.
The speed is given by comparing ram air pressure with static pressure. The greater the differential the greater the speed.
(see CS 2).

- V_{NE} : (KIAS) - Never Exceed Speed (or damage).
Red line on AST.
→ Yellow Arc → Caution, only in smooth, no turbulence. - 114 to 165.
→ V_{NO} : upper limit of green arc = maximum structural cruising speed. = 114 KIAS
→ Green : Operating speed.
→ V_A : Maximum manoeuvring speed, above this speed V_A - 104 KIAS
→ V_{SO} lower white arc → stall speed, minimum steady flight speed in a landing configuration, power off stall speed small aircraft (flaps down). V_{SO} = 35 KIAS
→ V_{S1} : lower of green arc stalling speed or minimum steady flight stall speed obtained in a specified configuration = V_{S1} = 40 KIAS
→ White Arc - 35 - 85 KIAS.
V_{FE} = Maximum extended flaps - 85.

Different Type of Airspeed

[redacted] (IAS) - From Airspeed indicator
- no correction for standard condition (Alt & T°)
- no correction for instrument & installation error

[redacted] (CAS) From POH
- no correction for standard condition (Alt & T°)
- Correction for instrument & installation error

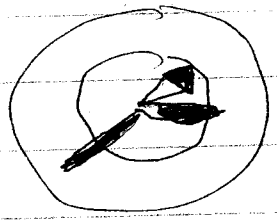
True Airspeed (TAS)
- correction for standard condition (Alt & T°
- correction for instrument & installation error
(alt or T° increase ⇒ air density decrease ⇒ TAS increase, for a given IAS or if ASI shows 138 at sea level it will show for the same pressure 138 at 2000 MSL.

Ground Speed ⇒ GS . 7
True airspeed adjusted for wind
Headwind ⇒ GS decrease
Tailwind ⇒ GS increase,

As altitude increase the IAS at which a given airplane stall in a specific configuration remain the same, it is better for take off & landing etc

Altimeter

- the longest pointer = 100 ft
- the middle = 1000 ft
- the shortest = 10000 ft.



Air pressure affect the accuracy of the Altimeter, so there is an adjustable barometric scale.

10 feet for 0.01 in Hg.

Increase in the setting → ~~decrease~~ increase in the indicated altitude

Decrease in " " → ~~decrease~~ increase " " " " "

Type of Altitude

~~Indicated Altitude~~ is the one measured by your altimeter

~~Pressure altitude~~ is indicated altitude when your set at 29,92 (standard sea level atmospheric pressure)

pressure altitude is the vertical distance above the* theoretical plane where atmospheric pressure is 29,92 (there is ~~no pressure~~ air here (called Standard datum plane

~~Density altitude~~ is pressure altitude adjust for air T°. On a standard day 15°C, density altitude equal pressure altitude

When air T° is > to Standard T° ⇒ Density ↑ Pressure Altitude and aircraft performance is reduced.

☐ Density altitude is the pressure altitude corrected for non-standard T°. Density altitude increases as ambient T° increases.

☐ Pressure altitude is the height above the standard datum plane where 29.92 is set in the altimeter scale.

[redacted] is indicated altitude corrected to compensate for instrument error.

True altitude is the actual height of an object above mean sea level (MSL).

Density height, True, pressure and indicated altitude are all equal if the altimeter is set on 29.92 & 15°.

On the ground True altitude will match indicated altitude (Field elevation) when you set the altimeter to the local pressure setting.

☐ True altitude is the actual vertical distance above mean sea level and is equal to pressure altitude and indicated altitude when standard conditions exist, True altitude is equal to field elevation when the altimeter is set to the local pressure.

Absolute altitude is the height or vertical distance above the surface call AGL.

Effect of Atmospheric conditions

- Air exerts 14,7 lbs/in² at 29,92 mbg, 15°C (59F
- As altitude increases pressure decreases.
- Change in T° change atmospheric pressure
→ lower T° lower atmospheric pressure
Cooler slower molecule then is less the pressure exerted to the surface
- warmer T° increase atmospheric pressure
- International Standard Atmosphere (ISA)
- Pressure x T° decrease with altitude

1,000 in Hg → 1000 ft } Standard Cockpit
1° (3,5F°) → 1000 ft } Rule

Altimeter error.

Indicated altitude is subjected airtake according to Pressure T°, layer rocks.

The altimeter senses the decrease in pressure as an increase in altitude (and displays an higher reading).

[4]

If you fly from an area of high pressure → low pressure without resetting the altimeter indicated higher than the actual (true). Even low to high, if not altimeter reset, altimeter indicate lower than (true) actual altitude

[5] Amount change on altimeter for equal (100ft) indicated altitude in the same direction

When flying from high to low look out below

eg: 30,00 to 29,50 ⇒ 0,5 in.

⇒ 1000 × 0,50 = 500.

So if you do not reset from 30,000 to 29,50 your altimeter will indicate 500 feet higher than you are actually. If all from 20000 after 1500

[6] When atmospheric T° is higher than standard (15°C), pressure level are raised and your true altitude is higher than your indicated altitude. When T° is colder than standard, pressure levels are lowered and your true altitude is lower than your indicated alt.

Extreme low pressure below 28,00 or high above 31,00 very detrimental for accuracy.

Vertical Speed Indicator VSI

also called Vertical velocity indicator (VVI) are static pressure to display a rate of climb or descent in feet / minute.

VSI determine the vertical speed by measuring how fast the ambient air pressure is increasing or decreasing.

- Trend info shows an increase or decrease in climb or descent
- Rate info shows a static/ge rate of change.

Gyroscopic Instrument

- Turn coordinator
- Attitude indicator
- Heading indicator

Gyroscopic instrument operate on 2 fundamental concept. - Rigidity in space and precession

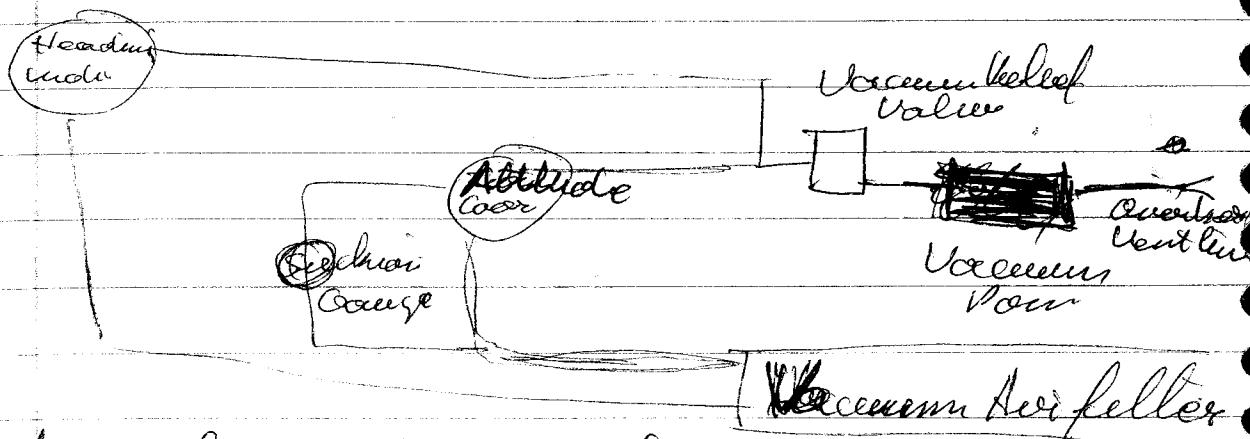
Rigidity : the property of the position of the rotor axis tend to remain rigid in space, meaning the axis of rotation remain parallel to a constant direction

[redacted] is the tumbling or toppling of a gyro in response to pressure. This causes slaved precessing and minor erroneous indications in the gyro instrument.

Source of Power

A source of power is required to keep gyro spinning for safety, aircraft use 2 sources of power

Turn indicators are ~~often~~ electrically Attitude & Heading indicator are power from a vacuum (suction) system.



Monitor the suction of vacuum Heading and Attitude indicator inaccurate.

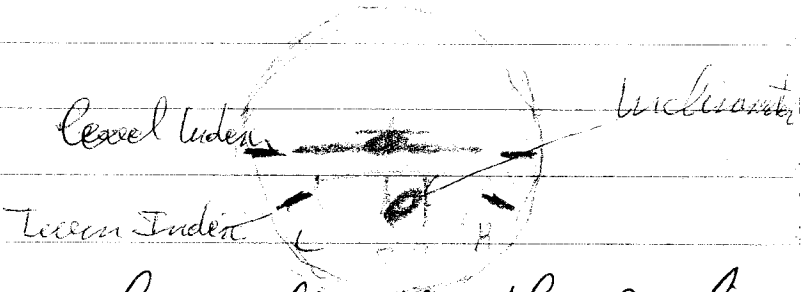
Turn Coordinator shows aircraft yaw and [redacted] Roll movement.

[redacted] the reservoir of Turn & Slip Indi

E- Roll in are out of a Turn, the miniature bank is in the direction of the roll,

A rapid roll rate causes the miniature aeroplane to bank more steeply than a slow rate.

To [redacted] (3° per second, 360 in 2min) align the miniature with the [redacted]



The turn coordinator only indicates the rate of turn and does not display a specific angle of bank.

The [redacted] depicts the aeroplane yaw.

Reference : Ball in the middle

In a [redacted], the rate of turn is too slow for the angle of Bank. ⇒ the ball move to the inside of the turn

In a [redacted] the rate of turn is too great for the angle ~~out~~ the ball moves to the outside of the turn

To Correct : Step on the ball ⇒ apply rudder in the side the ball is + or you can increase the angle of bank.

Attitude Indicator

The attitude indicator senses roll & pitch & has an artificial horizon and a miniature airplane to

 As the airplane banks, the relationship between the miniature airplane and the horizon bar depicts the direction of turn.

But then both of the same have percentage of light

Heading Indicator also called Directional Gyro (DG)

It displays Heading.

It is call free gyros, because it has no automatic earth seeking system built into them

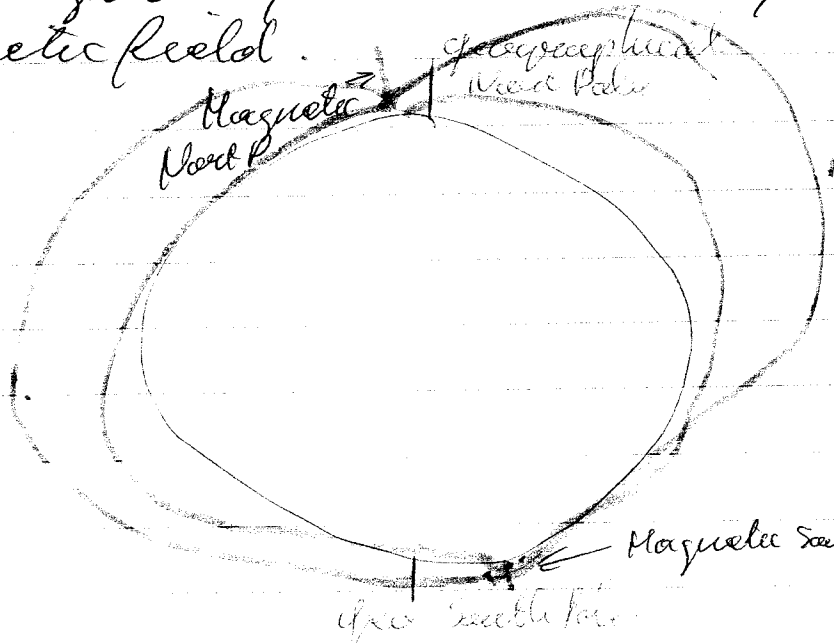
You must align the DG with the Magnetic compass regularly because of precession that makes drift certain heading.

Vacuum powered instrument, like heading indicator may tumble during excessive pitch & roll sequence must realign it.

Magnetic Compass

The compass does not work on gyroscopic principle. It is a self contained unit which does not require electrical or suction power.

To determine direction, the compass user is a simple bar magnet with 2 poles, which ~~is~~ mounted so it can move freely and align itself automatically with the earth magnetic field.



The geographical North & South Pole form the axis of rotation
True North True South

Another term is formed by the magnetic North & South poles - line of magnetic force flow out from each pole in all directions and return to the opposite pole. A freely mounted bar magnet aligns itself with the magnetic meridian (North/South) of the magnetic field of the earth

Chapt 4 - Section D - Airspace

- Controlled airspace = A B C D E
need -> operating rules
-> pilot classification
-> equipment requirement

Uncontrolled airspace - G

- Separated IFR & VFR

If neither below VFR all aircraft must be operated on IFR.
If you are an IFR pilot on an IFR plan you cannot depart to any aerodrome or cloud clearance but received ATC clearance to enter controlled airspace

Lateral distance & visibility: vertical
Floor => Lowest altitude airspace begin.
Ceiling => Upper limit of airspace
(AGL) or MSL or flight level FL.

At 18000 ft MSL and above altitude replaced by FL 350 per floor level 350000.
(omit 2 zero)

Class G airspace extend from the surface to 700 or 1200 feet AGL, in some areas class G may extend from the surface to 14,500 MSL.

An Exception to this rule occurs when 14500 feet MSL is lower than 1200 AGL, in that event Class G airspace continues up to 1200ft above the surface.

From SFC to 1200 (regardless of MSL)
Day: 1 SM Vis - clear of cloud
Night: 3 SM Vis - 500ft below 1000ft Above 2000 horizontal

More 1200 AGL to less 10000 MSL
Day: 1SM Vis - 500ft below 1000ft 2000 Hz
Night 3 SM Vis 500 - 1000 - 2000

More 10000 1200 AGL and Above 10000ft
5 SM - 1000ft below 1000ft Above 1 SM Hz

ATC does not exercise control of air traffic in uncontrolled, class G airspace - You are not required to communicate in class G airspace unless a temporary control Tower has been established - Uncontrolled airspace does in US.