

# IFR Training Notes

## Contents

Archer Vx Speeds.....	3
Requirements .....	3
Required Documents.....	3
Required Airplane Inspections .....	3
Required Equipment .....	3
Minimums .....	3
Personal Minimums.....	4
IFR Checkride Pilot Requirements.....	4
Preflight Planning .....	5
Airspace .....	6
Navigation Aids.....	6
Altitude.....	6
Headings.....	6
Procedures and Approaches .....	6
Departure .....	6
Approaches.....	7
Holds.....	8
Enroute.....	8
Lost Comms .....	8
Lighting .....	9
Compass Errors.....	9
Unusual Flight Recover.....	9
Other .....	9
Weather.....	10
Pressures .....	10
Fronts.....	10
General .....	11
Standards.....	11
Clouds .....	12
Altimeter Temperature Affects .....	12
Weather Forecasts - Sources.....	12
Decode METAR.....	12
Decode TAF.....	13
Decode Winds/Temp.....	13

IFR Checkride - Flight.....	14
Sample Oral Question .....	14
Notes .....	14
Practice.....	14
Knowledge test incorrect subjects .....	15

## Archer Vx Speeds

- **Vso 61 MPH** Stall Flaps down
- **Vs1 68 MPH** Stall flaps up
- **Vr 60 MPH** Rotate
- **Vx 74 MPH** Best Angle of Climb Speed
- **Vy 85 MPH** Best Rate of Climb
- **Vbg 85 MPH** Best Glide
- **vFe 115 MPH** Max Flaps Extended
- **Va 113 MPH** Maneuvering Speed
- **Vno 131 MPH** Normal operating
- **Vne 148 MPH** Never Exceed
  
- **103 MPH** Approach
- **76 MPH** Over the Numbers

## Requirements

### Required Documents

ARROW Airworthiness Certificate, Registration, Radio License, Operation Limitations (POH,AFM, Markings, Placards), W&B

### Required Airplane Inspections

- Annual Inspection by A&P IA
- Airworthiness directives ADs complied with
- VOR – 30 days for IFR only
- 100 hour inspections for commercial
- Altimeter/Pitot static system – 24 months
- Transponder – 24 months
- ELT – 12 calendar months

### Required Equipment

#### IFR

Alternator

Altimeter

Attitude Indicator

Heading Indicator (direction gyro)

Rate of Turn indicator

Ball

Radio

Navigation – GPS need documents: Airplane Flight Manual Supplement or Quick Reference Guide

Clock

**VFR:** Airspeed, Magnetic direction indicator, tachometer, oil reasure gauge, temp gauge, oil temp Gaul, Fuel gauge, landing gear position indicator, anticollision light, safety belt/shoulder harness, ELT,

**VFR Night:** Electrical System, Position Lights, Right/White Anticollision Lights, Spare Fuses

### Minimums

**LIFR** = <500' and/or <1 mile Magenta

**IFR** = 500-1000' and/or 1-3 miles Red

**MVFR** = 1000-3000' and/or 3-5 miles blue

**VFR** = >3000' and >5 miles green

**Alternate Airport Required unless** IAP at destination airport **and** 123 rule; less than 1 hour before, 1 hour after, 2000 ft ceiling, 3mile visibility

**Standard Alternate Minimums** Precision: 600 ft ceiling. Non-Precision: 800 ft ceiling. 2-mile Visibility if no approach at Alternate, need to be able to descent from MEA to land VFR

#### **VFR weather minimums**

Class b – clear of clouds

class c/d/e – 3sm 500 below, 1000 above, 2000 horizontal

Class g – Day - 1sm, Below 1200 = clear of clouds, After 1200 = 500 below, 1000 above, 2000 horizontal

Class g – Night – 3sm 500 below, 1000 above, 2000 horizontal

#### Personal Minimums

##### **IFR Weather**

**Ceilings** 1500 ft AGL

**Visibility** 5sm

**Crosswind** Component 10 knots

**Fuel** Land with 1 hour of Fuel in the tanks

#### IFR Checkride Pilot Requirements

50 hours cross country, long cross country, 40 hours actual or simulated IFR, 15 hours from CFII, 3 hours Check ride prep

# Preflight Planning

- Weather
  - Weather Reports
    - Surface temps
  - Prognosis Chart
  - Radar
  - METAR
    - Departure: Clouds and Visibility
  - TAF Along the route
    - Destination: Clouds and Visibility
    - Landing minimums
      - Alternate?
  - Winds
  - Freezing Levels
  - Sigmet/Airmets
- Take off Minimums
- AFD
- TFRs/Notams
- Altitude
- IFR Route
- Departure Procedure
- Landing Runway
- Time in Route
- Fuel Requirements
- Weight and Balance Calcs
- Performance
- Radios

## Airspace

Class A – Above 18,000 MSL

Class B – Boston – Surface to 10,000 MSL. Mode C transponder required inside or flying over. “cleared into bravo”

Class C - Bradley – Surface to 4,000 MSL. Mode C transponder required inside or flying over “ ATC responds with tail #”

Class D – Hartford, Westfield – Surface to 2,500 MSL, Tower communication

Class E – Everything else controlled

Class G – uncontrolled

## Navigation Aids

**NDB** – Non directional Beacon - Radio transmitter in a known location

**Tacan** – Westover – Tactical air nav, used by military, bearing and slant distance

**VORTAC** – VOR and DME portion of TACAN for civil use

## Altitude

**Indicated** - Read from altimeter

**True** – Vertical distance over sea level

**Absolute** – Vertical distance over the terrain or AGL

**Pressure** – Indicated with altimeter set to 29.92

**Density** – Pressure altitude corrected for variations from standard temperature

## Airspeeds

Indicated – Shown on gauge

Calibrated – Speed moving through the air. Indicated corrected for gauge errors

True – CAS corrected for nonstandard temp and pressure.

## Headings

**Course** -

**True Course** – course over the ground, relative to true north

**Magnetic Course** – true course corrected for magnetic variation

**Magnetic Heading** – True heading corrected for magnetic variation

**Compass Heading** – Aircrafts magnetic heading corrected for deviation

## Procedures and Approaches

### Departure

**Take off briefing**

**Taking off Runway 02.** Need 2000 ft for takeoff roll, have 4000 ft

**Winds** are from Northeast 060, Light – Right alerion correction

**Departure Procedure** 024 degree to 900MSL, Turn on course 090

**Rotate Speed** is 60 MPH, if not at 40 MPH by taxiway Charlie: Power back, abort takeoff

**Engine Failure before rotate:** Power back, abort takeoff

**Engine Failure after rotate:** land on the runway if available, else in the river, possibly old runway on the right

**Standard Take off Minimums**

Part 91: Zero Ceiling, Zero Visibility.

Part 125/135 Commercial operations: 1 SM visibility for single engine.

Unless publish take off minimums exist for that Runway

**IFR Standard Climb Gradient** is **200** feet per nm = about **246** ft per/min on the VSI

Out of HFD, on a **normal** density altitude **day**, archer climbs out at **580** ft per nm = **725** ft per/min on the VSI

My airplane climbs at 74knts GS / 60 = 1.233 \* 200 feet per nm = 246 ft per/min on the VSI

**Rate of Climb** (GS (kts) / 60) \* Min Rate of Climb (Feet per NM) = ft per/min on the VSI

**T in upside down black triangle** – “Troubled T” Take off minimums not standard, and or DP published

**A in Black triangle** – airport has nonstandard IFR alternate minimums

**A in Black triangle NA** – Alternate Minimums not authorized

### ODP Obstacle Departure Procedure

- Crosses runway at 35 ft AGL, climbs to 400 ft AGL before turning, climbs at least 200 ft per NM

### SID Standard Instrument Departure

## Approaches

**STAR** Standard Terminal Arrival

**IF** Intermediate Fix

**IAF** Initial Approach Fix

**Descent rate** (GS (kts) / 60) \* Min Rate of Climb (Feet per NM) = ft per/min on the VSI

**Precision approaches** use decision height. Height above threshold elevation.

**Non-precision approaches** use MDA – Feet MSL

**ILS** - Instrument landing System – Precision -

**LNAV** – Lateral navigation without vertical, MDA Minimum Descent Altitudes

**LP** – Localizer Performance without vertical, MDA Minimum Descent Altitudes

**LNAV/VNAV** – Lateral Navigation /**Vertical** Navigation, can be flown by was, Decision Altitude

**LPV** – Localizer Performance W/ **Vertical** Guidance, Decision Altitude

**LNAV+V** – WAAS – **Vertical** guidance, Decision Altitude

Approach Minima	Lateral Navigation	Vertical Navigation	Vertical Guidance
<b>LNAV</b>	GPS or WAAS	Altitude-based NPA techniques*, Baro-VNAV or WAAS	Advisory
<b>LNAV/VNAV</b>	GPS or WAAS	Baro-VNAV or WAAS	Approved
<b>LPV</b>	WAAS	WAAS	Approved
<b>LP</b>	WAAS	Altitude-based NPA techniques*, Baro-VNAV or WAAS	Advisory

\* “Altitude-based NPA techniques” refers to the step down technique and the constant descent angle technique (e.g. Stabilized Constant Descent Angle (SCDA)).

LNAV+V = Advisory

SDF – Localizer based instrument non precision approach. 6 or 12 degree

LDA – localizer based instrument approach. Localizer antenna not aligned. 5 degree

TCH – Threshold Crossing Height

VDP Visual Descent point – a point on the approach path from which a normal descent from MDA can occur. Don't descend below MDA prior to reaching the VDP. Not VPD on approach because there could be an obstacle

## Marker Beacon

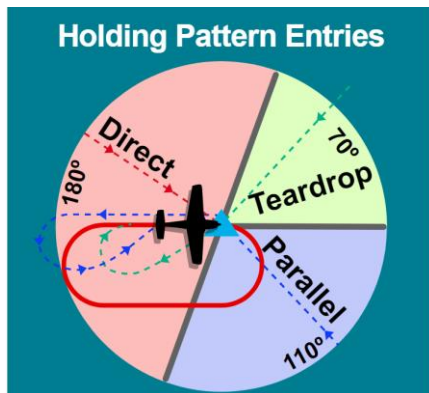
**Outer Marker** Blue – two dashes per second

**Middle Marker** Amber – dots and dashes

**Inner Marker** white

## Holds

VOR VOT check tolerance 4 degrees



Max speed in a hold 200 knots at 5000

## Enroute

**OROCA** Off-Route Obstruction Clearance Altitude

**IFR minimum flight altitude** 2,000 ft over obstacle in mountain area, 1,000 ft elsewhere

**MEA** Minimum Enroute Altitude - Assures acceptable navigational signal coverage (MRA) and meets obstacle clearance requirements. Shown on ifr chart

**MRA** Minimum reception altitude - lowest altitude required to receive adequate signals to determine specific fixes

**MOCA** Minimum Obstacle Clearance Altitude – Nav Signal with 22nm of VOR \* on IFR Chart

**MCA** Minimum Crossing Altitude – lowest attitude to cross when proceeding in direction of higher MEA

**MAA** Maximum Authorized Altitude – Max usable altitude

**Tue Altitude** – Height above sea level MSL

**Absolute Altitude** – Height above ground AGL

**Pressure Altitude** – Altitude indicated when 29.92

**Density Altitude** – Pressure altitude corrected for nonstandard temperatures and pressures

DME distance is certified, Arrow with D is now

## Lost Comms

**7500 hijack** – first impression

**7600 lost coms** – lost coms okay

**7700 all other emergency** – all other emergencies

**Route** – Route assigned by ATC, Radar Vectored, as Filed

**Altitude** – Highest of: last assigned, minimum altitude, Expected altitude

**Leave Clearance Limit** – If clearance limit is an IAF, get there at expected time

Else get to clearance limit and go to IAF and descent to arrive at expected time



## Oxygen Required

Flight Crew 12500-14000 (After 30 min), Required after 14000

Passenger: Available after 15000 ft

## Lighting

**REIL** Runway End Identifier Lights: Pair of synchronized flashing lights located laterally on each side of the runway threshold.

**MIRL** Medium Intensity Runway Lighting

**HIRL** High Intensity Runway Lighting

## Compass Errors

**Variation Error** – Angular difference between true and magnetic north, reference lines of variation

**Dip Errors:** Acceleration errors On east/west heading, while acceleration, compass shows north. Deceleration = south

**ANDS** Accelerate north, Decelerate South

Northerly turning error - lag in compass card, you going to stop early and undershoot north

Southerly turning error – compass card leads, false excessive turn indication = looks like your going to overshoot south

**UNOS** Undershoot North, Overshoot South

North heading, turn to right = compass initially indicate turn to left

**Standard Rate Turn**  $3^\circ/\text{second} = 120 \text{ seconds Full Turn} = 60 \text{ seconds u turn} = 30 \text{ seconds Right hand turn}$

$10^\circ = 3 \text{ seconds}$

$90^\circ = 30 \text{ seconds}$

$180^\circ = 60 \text{ seconds}$

$360^\circ = 120 \text{ seconds}$

## Unusual Flight Recover

**Nose down** power back, wings level with Rudder, pull back

**Nose up** – Full power, Nose down, Wings level with rudder

## Other

Min to Station = time (seconds) between bearings/Degrees of bearing change

Distance from Station =  $\text{TAS (nm/min)} * \text{Time (min)} \mid 95\text{TAS} / 60 * 18 \text{ minutes} = 28.5\text{NM}$

Vertical limits of a transition area that is designated in conjunction with an airport having a prescribed IAP is 700 feet AGL or more to the base of the overlying controlled airspace

# Weather

Good weather = high pressure because of descending air, favors dissipation of clouds, everything else bad weather.

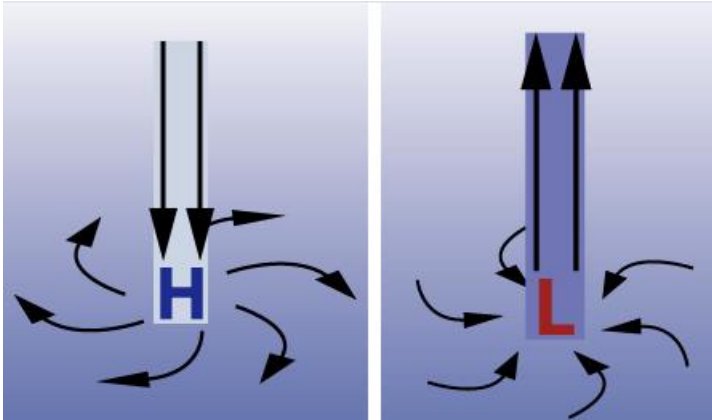
## Pressures

**High pressure** = descending air, favors dissipation of clouds = good weather

**Low pressure** is raising air= cloudiness, perception, bad weather

**High pressure** - generally good weather, down and screw, clockwise, winds blow away from center, Air from higher sinks to fill the space as air is blow outward

**Low Pressure** – unscrew, up, counterclockwise. Wind blows in towards the low pressure and air rises up. As air rises, water condenses, forming clouds and rain



Blow air into Balloon. High density in balloon. High density = high air pressure.

Pressure pushes air on the balloon walls from the inside.

Heat the balloon and pressure gets even higher

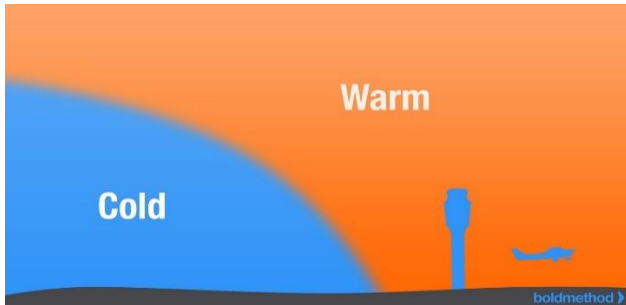
Air pressure decreases as you go up, less air macules, less pressure from the weight of the air

Air pressure depends on the temperature of the air end the density of the air molecules

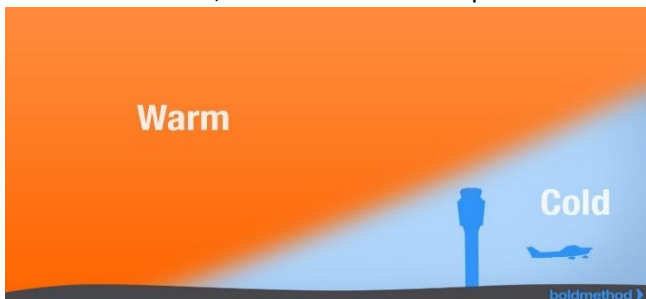
Air pressure increases temperature must increase if air pressure decreases temperature decreases

## Fronts

**Cold** – cold dense air masses. Pushes warmer air up into atmosphere. Cumulus clouds, Squall lines, thunderstorms, heavy rain, tornado, poor visibility, winds variable, temp/dew point and pressure dropping



**Warm** – warm air, less dense. Pushes up over slow cold fronts. Rain, fog, low ceilings/visibility.



**Occluded** – Not good for flying. Warm air caught between two cold air masses. Warm air rises. Two cool air masses meet in the middle. Warm air is cut off or occluded from the ground and pushed upward. Strong winds heavy precipitation.

**Stationary** – Frontal boundaries tug of war. Weather reflects the dominant air mass. Stratus clouds, drizzle

**Trough** – elongated area of low pressure

Weather associated with a front depends on amount of moisture, degree of stability of air, slope of front, speed of front movement.

## General

Stable atmosphere makes vertical movement difficult. Unstable air means vertical movement

**Stable Air** – Stratiform Clouds, Rain, Smooth Air, Poor Visibility

Cold air over warm surface = Cumuliform Clouds, turbulence, good visibility

The amount of water vapor which air can hold largely depends on **Air temperature**

**Advection fog** – coastal areas, inland

**Temperature Inversion** layer in atmosphere where temperature increases with height. Clear skies, calm, closer to sunset/sunrise, dew present, horizontal smoke pattern, fog

**Frost** forms when temperature of the surface falls below the frost point. Air/surface temp below dew point

**Icing Conditions** Trace, Light, Moderate, Severe

Downdrafts = 6000 ft per minute

## Standards

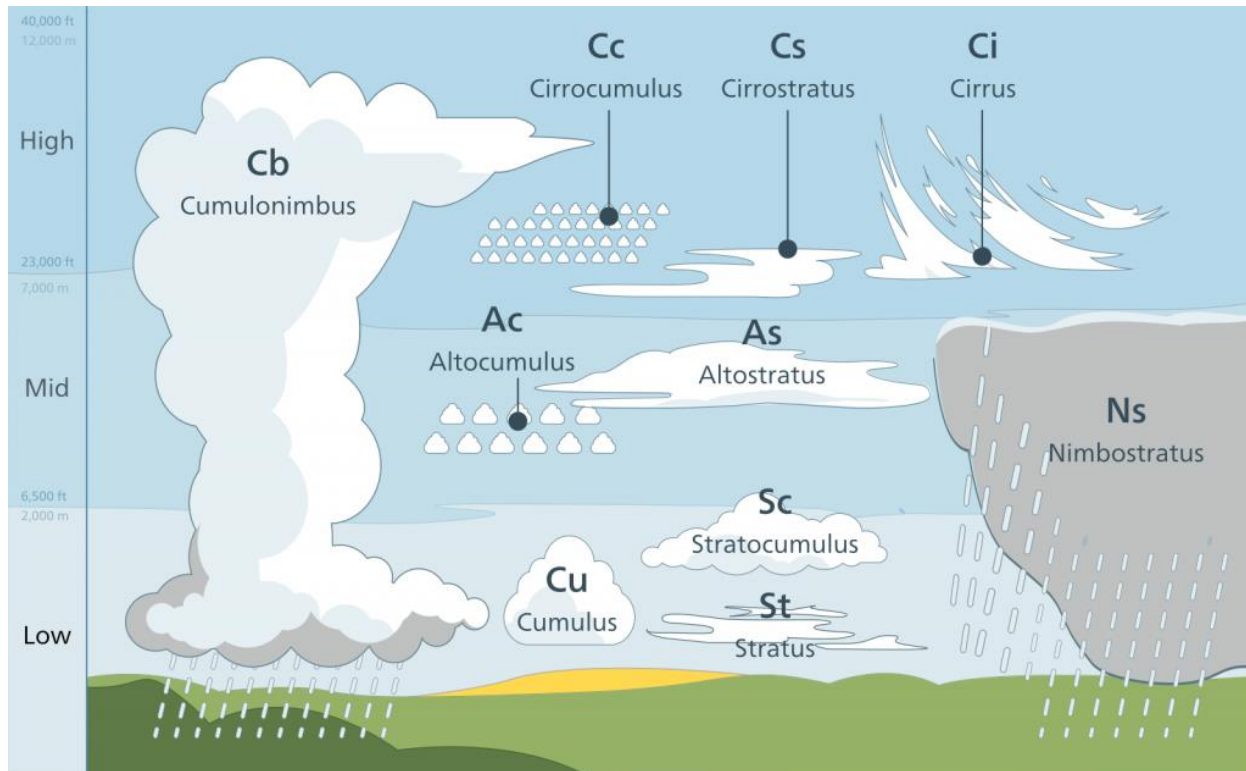
**Standard Temperature** 15c or 59f and **Pressure** 29.92"=1013mb at Sea Level

**Lapse rate** 2c per 1000ft

Atmospheric pressure decreases about 1" of mercury = 1000 ft, so increasing 29.15 to 29.85 = 700 foot increase

## Clouds

**Types of clouds** Stratus, Cumulus, nimbus, cirrus



## Altimeter Temperature Affects

**Warmer air** – indicated 4000 – true **4250**

**Normal air** – indicated 4000 – true **4000**

**Colder air**- indicated 4000 – true **3750**

## Weather Forecasts - Sources

**Severe Weather Outlook Chart** - used for Advance Planning, 24-hour outlook possible thunderstorms

**Airmet** – IFR, Mountain obstruction, Turbulence, visibility, icing – 6 hour periods

**Sigmet** - Severe Weather Advisory, thunderstorms, ash, dust, etc – 4 hours periods

**Convective Sigmet** Thunderstorms

**CWA Center Weather Advisor** Unscheduled advisory. Valid for 2 hours. Warning to Airmets/Sigmets

**WW** - Severe Weather Watch Bulletins- issued as required

**SAW** – Aviation Watch Message, Alert

**Pireps UA** – Pilot report of flight conditions

**Urgent Pireps UUA** – Hazardous flight. Tornadoes, severe icing, gail

## Decode METAR

**Message Type | Identifier | Wind | Horizontal Visib | Weather | Sky Cov | Temp/dewpoint | Altimeter | More info**

KHFD 240153Z 35004G14KT 10SM CLR 11/01 A2994

Rmk A02 SLP143 T010000006 53017

KHFD| DD -4 from ZTime 953pm|Wind 350 speed 04 g14kt | Visibility 10SM| clouds | Temp11c Dewpoint 1c | Altimeter 29.94

Remarks A02 automated station wRain | Sealevelpreassure 1014.43mb

METAR KBNA 211250Z 33018KT 290V260 1/2SM R31/2700FT +SN BLSNFG VV008 00/M03 A2991  
RMK RAESNB42

BNA| 21day 850am | 330 @ 18kts| | ½ sm visib, rwy31 RVR 2700ft |Snow, Blowing Snow, Fog| |temp00c dewpoint -03c| altimeter 29.91 | Rain End Snow Begin 42 min past hour

### Decode TAF

KBDL 232323z 2400/2506 33011G22kt P6SM SKC  
FM240500 31008KT P6SM SKC  
FM241500 32011G19KT P6SM SKC  
FM242000 30008KT P6SM FEW250  
FM242300 28005KT P6SM FEW250

KBDL DD -4 1923 = 723pm |period 24<sup>th</sup> day 8pm – 25<sup>th</sup> day 2am| 330 11-22Kts| Plus 6 sm visibility| Sky Clear  
From 24<sup>th</sup> day 1am | 310 8 kt |plus 6 sm visib | Sky clear  
From 24<sup>th</sup> day 11am | 320 11-19 kt | plus 6 sm visib | sky clear  
From 24<sup>th</sup> day 4pm | 300 @ 8kt | plus 6 sb visib | few 25,000  
From 24<sup>th</sup> day 7pm | 280 @ 5 kt | plus 6 sm visib | few 25,000 AGL

KMIA 240301Z 2403/2506 VRB05KT P6SM SCT030 SCT050 SCT250  
FM241200 04005KT P6SM SCT020  
PROB30 2412/2414 6SM TSRA BKN020CB  
FM241500 08010KT P6SM VCTS SCT020CB BKN250  
FM241700 08010KT P6SM SCT020  
PROB30 2418/2422 6SM TSRA BKN020CB  
FM242200 07010KT P6SM VCTS SCT020CB BKN250

KMIA 24<sup>th</sup> day 1101pm | 24<sup>th</sup> day 11pm-25<sup>th</sup> 2am |variable winds 5 kts | plus 6sm visib| scattered 3000, 5000, 25000ft  
from 24<sup>th</sup> 8am | 040 @ 5 kts | plus 6sm visib | scattered 2000 ft  
Prob30% 24<sup>th</sup> day 8am – 24<sup>th</sup> day 10am | 6 plus visib | Thunderstorms, Moderate rain | Broken 2000 Cumulonimbus  
from 24<sup>th</sup> day 11am | 080 @ 10 kts | 6 plus | Vicinity thunderstorms | scattered 2000 cumulonimbus Broken 25000  
from 24<sup>th</sup> day 1pm | 010 @ 10 kts | P6sm | Scattered 2000  
Prob30% 24<sup>th</sup> day 2pm-6pm | 6sm| thunderstorms rain | broken 2000 cumulonimbus  
From 24<sup>th</sup> day 6pm | 070 @ 10kt| P6sm| Vicinity Thunderstorms | scattered 2000 cumulonimbus broken 25000

### Decode Winds/Temp

- First two digits Wind Directions
- Next two Wind Speed
  - If wind speed over 100
    - Add 100 from wind speed
    - Sub 50 to wind direction
  - If wind over 200
    - Windspeed 99
    - Add 50 to wind direction
- If 6 digits, last is temp. C
- 9900 = light and variable less than 5 knots
- At 39000 feet 731960
  - Wind direction 73-50=230 true
  - Speed 19+100=119knots
  - Temp – 60c

## IFR Checkride - Flight

- **2 Non Precision Approaches (VOR, GPS, LOC)**
  - One procedure turn
  - One without Autopilot
  - One without radar vectors
  - One without Vertical Guidance
  - One Straight in or Circling landing
- **1 Precision Approach**
  - ILS
- **Sydney Notes**
  - Hfd Norwich vor and hold
  - VOR approach into windhim
  - ILS into Bradley
  - Rnav into Hartford circle 20
  - Talk outload
  - Unusual Attitude
  - Oral 1.5 hour total
- **DPE**
  - Only in VFR condition. 4000 ft ceilings at least, wont start in low IFR day.
  - Text Written test pic, ftn , email

## Sample Oral Question

Climbing at 90 knots, 36c outside, 90mph climb, Pressure 29.86, Runway33, Wind 285 at 16, Field elevation 270

Can we do the climb at 340nm, need groundspeed 78knots, Density altitude 2781, Pressure altitude 327, Get climb gradient from POH

36 gallons on board, 9gph, Tas 132knots, Heading 150, Winds 340@20

Total distance, hourly, ifr minums

4 hours – 45 = 3.25 of fuel

Ground speed 150 knots, 488 miles

## Notes

get maintenance logs for required ifr inspections

IFR plan example HFD\_ LNS. Take off afternoon come back after dark. 2 passengers

Practice No airspeed landing

get recurring ad from shop

## Practice

Circle to land

## Knowledge test incorrect subjects

IR.I.A.K1 **Certification requirements**, recency of experience, and recordkeeping.

IR.I.B.K3c **Temperature**

IR.I.C.K1 **Route planning**, including consideration of the available navigational facilities, special use airspace, preferred routes, and alternate airports

IR.II.B.K1b Gyroscopic/electric/vacuum **instrument system**: attitude indicator, heading indicator, turn-and-slip indicator/turn coordinator

IR.II.B.K2a VOR, DME, ILS, marker beacon receiver/indicators

IR.II.B.K2b RNAV, GPS, Wide Area Augmentation System (WAAS), FMS, autopilot

IR.III.A.K1 Elements and procedures related to **ATC clearances** and pilot/controller responsibilities for departure, en route, and arrival phases of flight including clearance void times

IR.III.B.K1 Elements related to **holding procedures**, including reporting criteria, appropriate speeds, and recommended entry procedures for standard, nonstandard, published, and nonpublished holding patterns.

IR.IV.A.K1 Elements related to attitude instrument flying during straight and level flight, climbs, turns, and descents while conducting various instrument flight procedures