THE INSTRUMENT 'KNOW ALL' HANDOUT

-Logging instrument time:

a. 61.51 g(1) – A person may log instrument time only for that flight time when the person operates the aircraft solely by reference to instruments under actual or simulated instrument flight conditions. (2)-an authorized instructor may log instrument time when conducting instrument flight instruction in actual instrument conditions.
b. 61.51 g(3i-ii)(4) - location and type of each approach, safety pilot if required, flight simulator may be used by a person to log instrument time provided an authorized instructor is present during the simulated flight.

-**To act as pilot in command of a civil aircraft under IFR (**or weather less than the minimum required for VFR flight)
- pilot must have a current medical certificate and current instrument rating

-**Recency experience requirements to act PIC under IFR: 61.57c - within 6 months:**
- conduct 6 instrument approaches, intercept and track navigational courses, and perform holding procedures.
- Have an additional six months after PIC currency expires (6 months) to complete these requirements before an Instrument -- Proficiency Check (IPC) is required (61.57d)
- safety pilot must be rated in the same category and class of aircraft, with a current medical and private pilot cert.
- Passenger currency is the same 90 rule: you may be instrument current, but not to carry passengers if you haven't in the last 90 days performed 3 takeoffs and landings (full stop if tail dragger) in the same aircraft category, class, and type if it's required.
    - Night currency: 3 takeoffs and landings to a full stop, 1 hour after sunset to 1 hour before sunrise in same category, class, and type if it's required.

-WHEN MUST WE FILE AN ALTERNATE:
- Always, except when within 1 hour before ETA to 1 hour after ETA, the weather is forecasted to be 2000' and 3 miles visibility
- If your airport of intended landing has only a GPS approach, you must file an alternate

- WHAT ARE STANDARD ALTERNATE MINIMUMS ?
- precision approach: 600' and 2 miles visibility at ETA
- non precision approach: 800' and 2 miles visibility at ETA
- visual approach: descent from MEA and approach and landing done in VFR conditions (forecasted ceiling greater than MEA)
- NON STANDARD: front pages of NOS, on airport diagrams in JEPP plates

INSTRUMENT PRE-FLIGHT

VFR DAY Inst & Equip. Req's (91.205B) (91.205d)day=VFR day+

T-tachometer
O-oil pressure gauge
approp)
M-magnetic compass
A-air speed indicator
T-temperature gauge (liq cooled)
O-oil temp gauge (air cooled)
F-fuel gauges
L-landing gear position lights
A-altimeter
M-manifold pressure gauges (altitude engine)
day+night+grabcard
E-ELT
S-seat belts

VFR NIGHT (91.205C)

F-fuses (one full set, 3 of each kind)
L-landing light

A-anti collision lights
P-position lights
S-source of electrical power

INSTRUMENT

G-Generator/Alternator
R-radio (2 way comm. and nav

A-altimiter
B-ball
C-clock with second hand
A-attitude indicator
R-rate of turn indicator
D-Directional Gyro
D-DME above 24.000'
*IFR night=VFR

REQUIRED DOCUMENTS

A-Airworthiness Certificate
R-Registration
R-radio license (intern. Flight only)

*__AIRCRAFT AIRWORTHINESS__

A-annual inspection
V-VOR checks every 30 days
I-100 hour inspections (for hire only)

O-operating limitations (placards, POH)
W-weight and balance

A-AD's (one time and re-occurring)
T-Transponder (24 months)
E-ELT (12 months, ½ shelf life of battery, 1 cum hour of use)

S-Static System (groups pitot system and altimeter) (24 months)

***VOR equipment checks for IFR flight:**
- VOT: +/- 4 °. Published in A/FD, tune 108.0MHZ, 180 TO/360 FROM
- Ground checkpoint: +/- 4 °, specific point on airport listed in A/FD
- Airborne checkpoint: +/- 6 °, located over easily identifiable terrain or features on the ground, listed in A/FD
- VOR/VOR: +/- 4 °, dual check in the air
- VOR radial on airway centerline over identifiable ground point: +/- 6°
- Radiated test signal by A & P only

<u>COMPASS ERRORS</u>

V-Variation (True vs. Magnetic)
D-Deviation (magnetic interference)
M-Magnetic dip (pulls towards earth)
O-Oscillation (turbulence, combination)
N-Northerly Turning Errors (UNOS)
A-Acceleration Errors (ANDS)

<u>ACCELERATION ERRORS</u>

A-Accelerate
N-North
D-Decelerate
S-South

<u>N. TURNING ERRORS</u>

U-Undershoot
N-North
O-Overshoot
S-South

<u>LOST PROCEDURES</u>
C-Climb
C-Call/Communicate
C-Confess
C-Comply
C-Conserve

<u>GO AROUND/MISSED APPROACH</u>
C-Cram
C-Climb
C-Clean
C-Cool
C-Call

<u>5 T's: HOLDING</u>
T-Turn
T-Time
T-Twist
T-Throttle
T-Talk

<u>MUST KNOW FOR FLIGHT 91.103</u>
N-NOTAMS
W-Weather
K-Known traffic delays
R-Runway Lengths
A-Alternates if needed
F-Fuel requirements (incl. alternate)
T-Takeoff/Landing Distances

<u>3 ERRORS OF INST SCAN</u>
F-Fixation
O-Omission
E-Emphasis

FUNDAMENTAL SKILLS OF INST FLYING
Instrument Cross Check
Instrument Interpretation
Aircraft Control

<u>TRANS CODES</u>
1200- VFR **7500-**HIJACK
7600-LOST COMM **7700**-EMERG
7777-military int.

<u>VOR SERVICE VOLUMES and FREQUENCIES:</u>
-VHF Frequencies between 108.0-117.95 MHz
  -Terminal VOR: 1,000'-12,000' 25NM radius
  -Low Altitude VOR: 1,000'-18,000' 40NM radius
  -High Altitude VOR: 1,000'-14,500' 40NM; 14,500'-18,000' 100NM; 18,000'-45,000' 130NM; 45,000'-60,000' 100NM radius

<u>MODE C TRANSPONDER REQUIREMENTS 91.215</u>
- Class A, B, and C airspace
- Within 30 NM of class B
- Above the ceiling within the lateral boundaries of class B or class C up to 10,000' MSL
- ALL airspace at and above 10,000' MSL, excluding that airspace below 2,500' AGL
- ***there are a couple more less obvious ones, but these are the main ones we will deal with on a daily basis

<u>DECIDE MODEL</u>
D-Detect
E-Estimate
C-Choose

<u>I'M SAFE CHECKLIST</u>
I-Illness
M-Medication
S-Stress

I-Identify
D-Do
E-Evaluate

A-Alcohol
F-Fatigue
E-Emotion/Eating

WHAT ARE THE 3 DEFINIATIONS OF NIGHT, AND WHAT THEY ARE USED FOR?

- Sunset (91.209): Beacons go on (plane and airport)
- Evening civil twilight (1.1): Generally 30 minutes after sunset (30 minutes before sunrise), this is used for logging night flight
- 1 hour after sunset to 1 hour before sunrise (61.57b): If not night current, must be on the ground 59 minutes after sunset. This time however is where we can gain our night passenger currency by:
  - 3 takeoffs and landings to a full stop, acting as sole manipulator of the controls, and aircraft was same category, class, and type if type was required

INSTRUMENT DEPARTURES:

- **DP's Departure Procedures**: Either in front of NOS plates or right behind specific approach plates. Provides take off min's and transition from airport to en route. MUST have a textual description as a minimum in order to accept a Departure Procedure. If you don't want a DP, write "NO DP" in remarks section on flight plan.
- If not given a DP, expect vectors from ATC until you are on course
- Because we are Part 91, takeoff minimums do not apply to us…however, if the BOEING aint going, I aint going either.

THE STRUCTURE OF AN INSTRUMENT FLIGHT

- File a flight plan 30 minutes prior to departure
- Once in the plane and we are started and ready to taxi, we call clearance delivery if the field has one, or we call ground if there is no ground.
  - "Tacoma ground, Seminole 3005D at ATP w/ info Z, like to pick up our IFR clearance to KABC"
  - They will respond with a clearance in which case we use the "C-R-A-F-T" model (see below)
  - Read back the clearance in full, then request taxi clearance
- Conduct the run up, and at the conclusion maintain current location because sometimes it takes awhile to received an IFR release, and we don't want to block VFR traffic at the hold short line if they have a no delay departure
  - "Tacoma Tower, Seminole 3005D holding short 17 for IFR release"
  - Wait until released, then depart as instructed: at Tacoma narrows we are usually given the Narrows 1 departure (DP)
- After takeoff, tower will instruct us to contact departure
  - Acknowledge this, and change frequencies while flying the clearance we were given
  - We Say: "Seattle departure, Seminole 3005D is 1200' climbing 2000
  - They Say: "Roger, Seminole 3005D radar contact, climb and maintain…"
  - At this point, the rest of the flight is like having VFR flight following. They give us instructions and we abide, or if we cannot, let them know.
- The enroute structure is simple, just follow instructions given by ATC
- As we approach an airport, get current ATIS/ASOS at intended airport, figure out an approach to shoot, or if one is in effect, set up for that approach
- Notify ATC of your intentions for the approach: what kind of approach, how it will terminate (practice approach to missed vs. full stop)
- At least 15 miles from the airport, brief the approach per the ATP checklist
- As we get closer to the airport, we will get handed off to the tower or to the airport CTAF to notify them of our position and intentions
- REMEMBER: we always have to close/cancel our flight plan.
  - If we are at a controlled field with a tower operator currently working, they will close our flight plan for us.
  - IF WE LAND AT AN UNCONTROLLED FIELD, WE MUST EITHER CANCEL WITH ATC IN THE AIR BEFORE WE LAND, OR ONCE WE ARE ON THE GROUND!!! **DON'T FORGET THIS IT SUCKS!!!**
  - If we wish…if we are operating in VFR conditions which we will encounter for the remainder of our flight, and we are outside of positive control airspace, then we can cancel here as well

IFR CLEARANCE (this is how we copy and read back our clearance once received)

C-Clearance limit
R-Route of flight
A-Altitude
F-Frequency for Departure
T-Transponder code

Clearance Void Time: Used by ATC when at an uncontrolled field. Somehow we need to get a release/clearance to depart, and if there is no tower, then we must:
- find a frequency that will work on the ground to talk to ATC
- call from a cell phone and get a clearance void time
- PURPOSE: to advise an aircraft that the departure clearance is automatically canceled if takeoff is not made prior to a specified time. The pilot must obtain a new clearance or cancel his/her IFR flight plan if not off by the specified time.

CLIMB GRADIENT:
- Some instrument departures will have a minimum climb gradient you must be able to achieve in order to execute the departure successfully
- This number is generally given in a FOOT/Nautical Mile quantity
- We need to make this number tangible to us, so we will change it to FPM on our VSI
    - To calculate: (Ground Speed / 60) X Foot/NM requirement
        - EX: 100 KIAS / 60 = 1.6 X 300 Foot/NM = 500fpm
- So, in this example, if we cannot obtain a 500'/minute climb on departure, we cannot execute this departure procedure

INSTRUMENT EN-ROUTE PROCEDURES

INSTRUMENT ALTITUDES
- 0-179° = even thousands
- 180-359 ° = odd thousands
- ONE: ODD NORTH EAST

IFR ALTITUDES
- **MEA:** Minimum En-route Altitude is the lowest published altitude between radio fixes that guarantees adequate navigational signal reception and obstruction clearance of 1,000' in non mountainous and 2,000' in mountainous terrain.
- **MOCA:** Minimum Obstruction Clearance Altitude. Ensures reliable navigation only within 22 NM of facility and obstacle clearance
- **MAA:** Maximum Authorized Altitude. Max usable altitude or flight level for an airspace structure or route segment for which adequate reception of navigation aid signals are assured.
- **MRA:** Minimum Reception Altitude. Lowest altitude at which an intersection can be determined.
- **MCA:** Minimum Crossing Altitude. The lowest altitude at certain fixes at which an aircraft must cross when proceeding in the direction of a higher minimum en route IFR altitude.
- **OROCA (NOS):** Off Route Obstacle Clearance Altitude. Provides obstacle clearance of 1,000 and 2,000, but may not provide signal coverage from ground based nav aids, ATC radar, or communications.
- **MSA:** Minimum Safe/Sector Altitudes. Found on approach plates and provides 1000' terrain clearance within 22NM of the airport, used for emergency purposes.

STANDARD LOST COMMUNICATIONS PROCEDURES - 91.185
VFR (91.185b): If the failure occurs in VFR conditions, or if VFR conditions are encountered after the failure, each pilot shall continue the flight under VFR and land as soon as practicable.

IF IFR (91.185c(1&2)):
ALTITUDE-fly the highest of these in this order:
M-Minimum Enroute Altitude
E-Expected altitude
A-Assigned

ROUTE-fly in order of:
A-Assigned
V-Vectored
E-Expected
F-Filed

OXYGEN REQUIREMENTS 91.211
- Cabin pressure altitudes of 12,500' up to and including 14,000' MSL, required minimum flight crew provided and use O2 for that portion of the flight greater than 30 minutes
- Cabin pressure altitudes above 14,000' minimum flight crew provided and use O2 entire flight

- Cabin pressure altitudes above 15,000'

WHAT REPORTS MUST ALWAYS BE MADE TO ATC?

M-Missed Approach
A-Altitude Changes VFR on top
T-True Airspeed change +/- 10 knots or 5%
H-Holding: time and altitude when entering or leaving the holding fix
C-Cannot maintain a 500fpm climb/descent
A-altitude and time when at holding fix or CLEARANCE LIMIT
L-Leaving an assigned altitude
L-Lost comm. nav, equipment
S-Safety of flight, including un-forecasted weather

REPORTS MADE WHEN NOT IN RADAR CONTACT

- Compulsory reporting points
- Inbound at Final Approach Fix (FAF) or Outer Marker (OM)
- ETA error of 3 minutes or more

POSITION REPORTS SHOULD INCLUDE:

I-ID
P-Position
T-Time & Type of flight plan
A-Altitude
N-Name of next fix
E-ETA at that fix
S-Supplemental Information

HOLDING

- This is method of delaying airborne aircraft to help maintain separation and provide a smooth flow of traffic. A holding pattern is a predetermined maneuver designed to keep an aircraft within a specified airspace. Holding pattern procedures are designated to absorb any flight delays that may occur along an airway, during terminal arrival and on missed approach.
- Every time a hold is received, the following information should be known:

NON PUBLISHED HOLDING PATTERN

D- Direction of hold in relation to fix (ex: hold south of the ABC fix) (redundant)
F- Fix
R- Radial of hold
A- Altitude
T- Turns (right or left)
E- EFC time

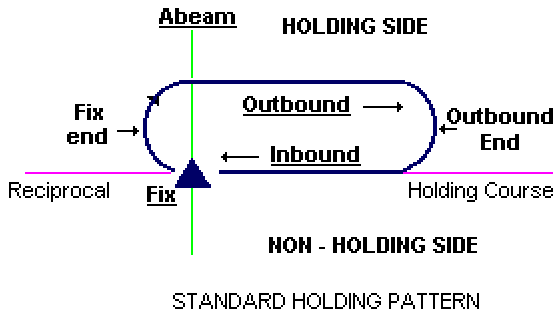
PUBLISHED

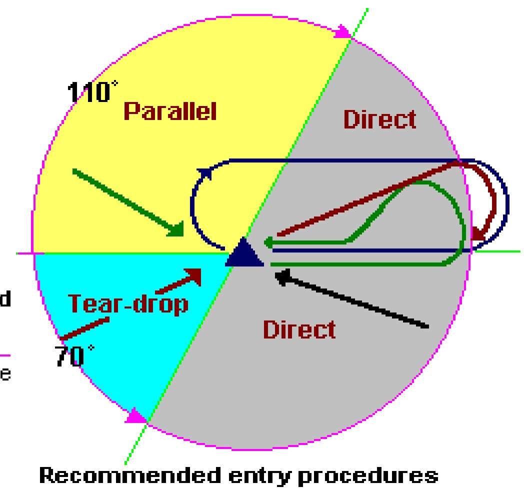
D- Direction of hold in relation to fix
F- Fix
E- EFC time

- A holding pattern provides a protected airspace for a safe operation during the hold. Pilots are expected to remain within the protected airspace (the holding side). One of the elements which causes unnecessary confusion and anxiety is the holding pattern entry. Holding pattern entry procedures are not mandatory, they are merely a recommendation (as long as the airplane remains within the protected airspace). The recommendation is based on three types of entries, depending on the sector from which the airplane arrives at the holding fix. These are the direct, parallel and tear-drop entries.
- When holding, a standard hold requires RIGHT turns. When receiving a clearance and no direction is specified, use standard
  - Conversely: non standard requires LEFT turns, and will always be stated by controller
- When receiving holding instructions, understand that the radial you are given to hold ON represents your outbound course in the hold. In order to find the course you will need to fly inbound to the fix, find the reciprocal of the outbound course (radial).

PLAN VIEW OF HOLDING COURSE, AND ENTRY PROCEDURES

PICTURE #1 PICTURE #2





- ENTRIES:
  - TEARDROP:
    - Proceed direct to the holding fix
    - Upon crossing the fix, turn 30° from the outbound course on the protected side (see picture's #1 & #2)
    - Fly this heading for approximately 1 minute, then make a turn inbound to intercept the inbound course
  - DIRECT:
    - Proceed direct to the fix
    - Upon crossing the fix, make a turn to the outbound heading and join the outbound course
    - Begin timing upon crossing the fix outbound (flag flip), or if not a VOR, upon wings level on heading
  - PARALLEL:
    - Proceed direct to the fix, upon crossing the fix turn to the outbound course to parallel the holding pattern on the unprotected side of the hold
    - Time for one minute, then make a big turn towards the protected side of the hold
    - See picture #2: you will turn close to 270° in order to re-intercept the inbound course to the holding fix

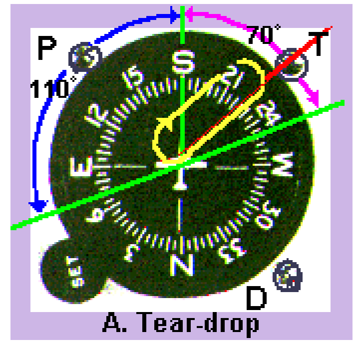
UNDERSTANDING HOLDS IN THE PLANE

- Some difficulties arise once the student understands how to draw holds on the ground, and then gets in the airplane and they receive holding instructions. The following walks through how to visualize a hold while look at your HSI (DG) rather than having to draw it.
- The quickest and most efficient way to make this determination is by super-imposing the hold onto the heading indicator. This results in visualization of the position in which the airplane approaches the holding fix and of the holding pattern itself.
- This is accomplished by dividing the directional gyro card into three sectors. For a standard holding pattern (RIGHT TURNS) one sector is:
  - **Tear Drop**: because it is right turns, we put a 70° zone between the heading of the airplane and 70° to the right of it. (SEE EXAMPLE 'A')
  - **Parallel:** because it is right turns, the tear drop 70° is to the right, this leaves the 110° parallel sector to be between the heading of the airplane and 110° to the left of it. (SEE EXAMPLE 'C')
  - **Direct:** The remainder is the Direct sector which is the 180° sector below the above draw/imaginary lines. (SEE EXAMPLE 'B')
  - On a non standard hold the 110° and 70° are switched. The 70° sector is to the left of the heading while the 110 degree sector is on the right. Direct is always that portion below the tear drop/parallel line.

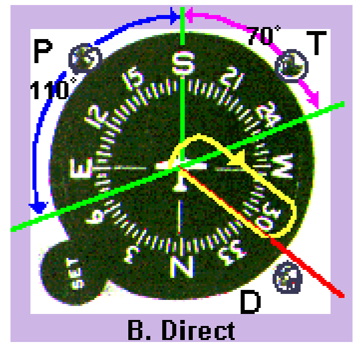
EXAMPLES:

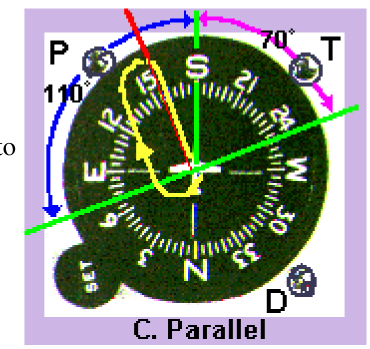
Once a holding instruction is issued and the airplane is proceeding directly to the holding fix, an imaginary line is super-imposed in the direction of the outbound direction. The recommended entry is determined by the sector that includes this imaginary line. In the following three examples an aircraft is on a 180° heading. In **example A**, the outbound leg of the hold is on a 230° direction. **Example B** has an outbound direction of 310° and **example C** is assigned a hold with an outbound direction of 160°.

A. In this example the inbound and outbound legs are 050° and 230° respectively. The airplane approaches the fix at a heading of 180°. The outbound course (red line) falls within 180° and 250° zone which defines the tear-drop sector. Upon crossing the holding fix the airplane should be flown at a heading of 200° (30° from the outbound course) for one minute before making a right turn to intercept the inbound course. (REFER BACK TO PICTURE #2 ABOVE FOR CLARIFICATION)



B. In this example the outbound leg is 310°, the inbound leg is 130° respectively. The airplane approaches the fix at a heading of 180°. The outbound course (red line) falls within 250° and 070° zone which defines the direct sector. Upon crossing the holding fix the airplane should be turned right to a heading of 310° which is the outbound course.





C. In this example the inbound and outbound legs are 340° and 160° respectively. The airplane approaches the fix at a heading of 180°. The outbound course (red line) falls within the 180° and 070° zone which defines the parallel sector. Upon crossing the holding fix the airplane should be turned left to a heading of 160° (paralleling the outbound course on the non protected side) for one minute before making a left turn of 225° to intercept the inbound course (or direct towards the fix if feasible).

http://www.pilotsweb.com/train/pattern.htm

<u>WHAT ARE THE MAXIMUM HOLDING AIRSPEEDS?</u>

- Up to 6000' = 200KIAS
- 6001'-14,000' = 230KIAS
- 14,001'- above = 265KIAS

<u>WIND AND TIME CORRECTION WHEN HOLDING</u>

- When holding, we must correct for wind and time
  - WIND: when holding in windy conditions, always double your wind correction angle when on the outbound leg .
    - By doing this, you are taking into consideration that during your standard rate turn, you are not correcting for the wind.
  - TIME: the goal of a perfect hold is to always make your inbound leg exactly one minute. Deviate your outbound time by the same factor that your inbound was off.
    - EX: inbound leg took 47 seconds. On the proceeding outbound leg, fly that portion for 1 minute and 13 seconds. This should correct your inbound leg to be one minute again.

INSTRUMENT ARRIVAL/APPROACH

STANDARD TERMINAL ARRIVAL ROUTE

STAR- simplifies clearances, provides guidance from en-route to approach to destination.

- Must have at least a textual or graphic depiction in order to perform.
- If you don't want a STAR, write "NO STAR" in remarks section of flight plan.

SEGMENTS OF AN INSTRUMENT APPROACH

- INITIAL: aligns aircraft with approach course, begins at IAF
- INTERMEDIATE: Designed primarily to position your aircraft for the final descent to the airport.
- FINAL: navigate from this point to DH or MDA. Gear down before landing checklist w/in 2 miles of this point (or ½ dot ILS)
- MISSED: Begins at MAP (missed approach point) by: DH, time, Middle Marker, DME, Runway (GPS)

DETERMINING APPROACH CATEGORY

- Approach category's are determined off of the aircrafts approach speed. If none is published, then 1.3 Vso
- If you are ever between two category's, or on the border between them, always use the higher category
- **Timed missed approaches however are based off of ground speed, not approach speed which is indicated**

PRECISION APPROACH

- Includes both course guidance with a localizer, and altitude guidance with a glide slope, as well as DME.
- DH=Decision height (proceed to land or go missed). This is the missed approach point in an ILS approach
    - **INSTRUMENT LANDING SYSTEM (ILS)**
        - Localizer
            - located opposite the approach end of the runway
            - transmits 108.1-111.95MHz
            - transmits signal 18 NM from antenna up to an altitude of 4500 above antenna site
            - full scale deflection =2.5° (4 times more sensitive than a VOR)
            - width of signal = 3°-6°
        - Glide slope
            - Located 750'-1250' down runway
            - Displaced 400'-600' from centerline
            - Width of signal = 1.4°
        - Outer marker
            - Locate between 4-7 miles from airport.
            - Indicates an aircraft at appropriate altitude on localizer course will intercept glide path
            - Identified by first 2 letters of the airport identifier
        - Middle marker
            - Located about 3500' from threshold on centerline generally where aircraft is at DH
            - Identified by second 2 letters of the airport identifier
        - Approach lights
    - **PARALLEL ILS APPROACHES**
        - Conducted if centerline are at least 2500' apart, aircraft separated by 1.5 miles diagonally

NON PRECISION APPROACH

- Will provide course guidance, but no glide slope or altitude guidance.
- MDA = Minimum Descent altitude. This is the altitude which we can only descend from if requirements of 91.175 are met. This is not the missed approach point like DH is on a precision approach, but the altitude at which the missed approach will be located.
-
    - **LOCALIZER APPROACH**
        - provides course guidance, audibly identified by a three letter designator
        - localizer course width normally 5°, 2.5° each side of centerline for full deflection
        - located opposite the approach end of the runway
        - transmits signal 18 NM from antenna up to an altitude of 4500 above antenna site
        - transmits 108.1-111.95MHz
    - **LOCALIZER BACK COURSE**
        - No glide slope for back course

- When flying with an HSI, there is no difference in how set up our instruments and fly the approach. IF flying with a VOR we can receive reverse sensing. To counter this, set your needle to the inbound course of the localizer front course, and fly the tail of the needle. This will be normal sensing.

- **LOCALIZER TYPE DIRECTIONAL AID (LDA)**
  - Comparable utility and accuracy of a localizer, but not part of an ILS. (some have a glide slope)
  - Course width is between 3°-6°
  - Not aligned with the runway, but straight in minimums may be published where the angle between the runway centerline and LDA course does not exceed 30°
  - Identifier is 3 letters preceded by an I. EX: I-ABC

- **SIMPLIFIED DIRECTIONAL FACILITY (SDF)**
  - Provides course guidance similar to an ILS, however is less precise and may or may not be aligned with the runway
  - Course width is fixed at either 6° or 12°
  - Identified by three letters w/o an I preceding it. EX: ABC
  - Usable off course indications limited to 35° either side of course centerline. If you are more than 35° from course centerline, disregard any instrument indications until within limitations of 35°

- **VOR APPROACH**
  - Full scale deflection = 10° each side of centerline, 20° total
  - Step down fixes defined using DME or radials

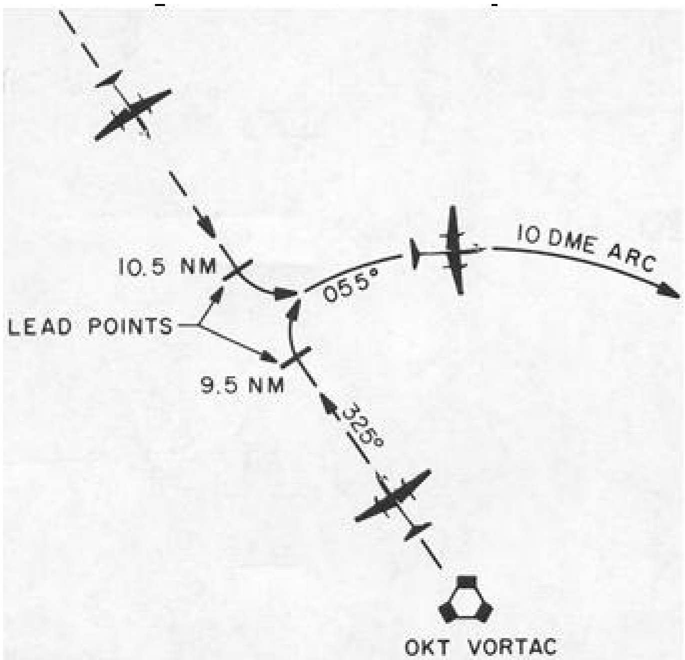
- **GPS APPROACH**
  - Put the GPS in GPS mode (out of VLOC)
  - Receiver Autonomous Integrity Monitoring (RAIM) must be maintained throughout the approach in order to continue, by final approach fix the GPS must sequence into approach mode (APR)
  - Sensitivity of the GPS = 5 miles en-route, 1 mile terminal, and .3 miles in approach mode
  - Can only file to an airport where the only approach is a GPS approach if you have filed for an alternate airport that has something other than GPS.
  - **<u>Constellation:</u>**
    - 24 satellites, minimum of 5 needed for RAIM
    - 4 satellites needed for 3D positioning

- **CIRCLING APPROACH**
  - If approach course is not aligned within 30° of the runway, only circling minimums will be published
  - Will also be published on standard straight in approaches in the case that a circling approach is needed
  - Circling minimums provides 300' AGL obstacle clearance in the circling area. These are MINIMUMS, so if weather allows a higher altitude to be flown that more closely approximates TPA, fly it, it will create a more realistic approach and landing!
  - Circling approach protected area is based off your approach category
  - If you lose sight of the runway at any time, immediately begin a climbing turn toward the airport to intercept the missed approach procedure
- **PAR/ASR**
  - PAR: Precision approach radar – controller provides both azumuth and elevation navigational guidance
  - ASR: Airport Surveillance Radar – provides azimuth guidance only
- **CONTACT VS. VISUAL**
  - <u>CONTACT</u> – cannot be initiated by ATC, but can be request by the pilot to expedite arrival instead of the published procedure if the following is met:
    - The airport has a standard or special istrument approach procedure
    - Reported ground visiblity is at least 1 mile
    - You can remain clear of clouds with 1 mile flight visibility
  - VISUAL – can be initiated by ATC or
    - ATC must ensure that you have the airport or the preceding aircraft in sight
      - once you announce aircraft in sight, you are responsible for aircraft separation
    - Is authorized when ceiling is perorted or expected to be at least 1,000' AGL and 3 miles visibility, and you remain clear of clouds at all times

APPROACH CATEGORY	RADIUS
A	1.3
B	1.5
C	1.7

D	2.3
E	4.5

- **DME ARC APPROACH**
  - Track inbound on a radial that will intercept the DME arc at approximately 90°
  - Begin your turn to intercept the arc with a .5 mile lead, the turn should usually be a 90° turn, and the heading you are turning to will be the reciprocal of the final approach course
  - Spin your bug to the heading you are turning to. Your heading bug and HSI needle should always be a constant 90° separated from each other
  - General rule: TURN 10° TWIST 10°- Every time your HSI needle centers, turn and spin heading bug 10° closer/in direction of the final approach course. Simultaneously spin your HSI needle 10° towards the final approach course.
  - If DME read out is less than desired, you will twist 10° on the HSI, but continue to fly current heading until desired distance is met (at this point your heading (BUG) and needle (HSI) will be separated by more than 90°). If DME readout is more than desired, Spin 10° when HSI centers and turn more than 10° (at this point your heading (BUG) and needle (HSI) will be separated by less than 90°) until desired DME distance is achieved.
  - When your needle centers, and your current heading is within 15° of final approach course, twist HSI inbound to the final approach course, intercept it and track inbound.



<u>TO DESCEND OUT OF DH OR MDA, THE FOLLOWING MUST BE MET: 91.175</u>

- The aircraft is continuously in a position form which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers. (Part 121 and 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing)
- The flight visibility is not less than the visibility prescribed in the standard instrument approach being used.
- At least one of the following 12 visual references for the intended runway is distinctly visible and identifiable to the pilot:
  - The threshold
  - The threshold markings
  - The threshold lights
  - The runway end identifier lights
  - Visual approach slope indicator
  - The touchdown zone
  - The touchdown zone markings
  - The touchdown zone lights
  - The runway
  - The runway markings
  - Runway lights

- Approach lighting system, EXCEPT:
    - Can only descend to 100' above TDZE using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

CLEARANCE LIMIT (91.185c(3)):
Clearance limit defined=The fix, point, or location to which an aircraft is cleared when issued an air traffic clearance. Only leave a clearance limit when:
- If clearance limit is a fix from which an approach begins (AN IAF), commence descent or descent and approach as close as possible to the expect further clearance time if one has been received, or if one has not been received, as close as possible to the estimated time of arrival as calculated from the filed or amended estimated time en route.
- If clearance limit is not a fix from which an approach begins, leave the clearance limit at the EFC time if one has been received, or if none has been received, upon arrival over the clearance oimit, and proceed to a fix from which asn approach begins and commence descent or descne and approach as close as possible the the estimated time of arrival as calculated from the filed or amended estimated time enroute.

WHEN IS A PROCEDURE TURN NOT REQUIRED? AIM 5-4-9
- When there is a "NoPT" remark at the IAP
- Otherwise directed by ATC
- Radar vectored to final
- Timed approaches from a holding fix
- Holding or Teardrop depicted in lieu of PT

HOW CAN WE IDENTIFY A MISSED APPROACH POINT?
- Time from the final approach fix
- DME
- Cross radial
- DH
- Circling when you lose right of the runway

What is a VDP, and how is it calculated?

-A defined point on the final approach course of a non-precision straight in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided the runway environment is clearly visible to the pilot.

-Essentially, it is the decision making point whether we can make a normal safe approach and landing, or if the field is still not in sight, we execute a missed approach because we could not use normal maneuvers to a safe landing.

-Calculation: HAT (MDA-TDZE) / 300

EX: 900 / 300 = 3NM. At a DME of 3NM, this is our VDP point

-What is the 3-1 rule, and how is it calculated?
- The 3-1 rule is a tool used for descent planning when you are at altitude
- It is calculated by multiplying how many feet you want to lose (minus the zeros), and multiplying that by 3

EX: Cruise flight at 10,000 and a TPA of 1200
-Need to lose 8800 feet (drop the zero's): so 88 x 3 = approximately 26 miles
-SO, from 26 miles from your destination begin a descent at a rate that you calculate (see below)

-How do you calculate 3° glideslope?

-Airspeed / 2 = FPM (add a zero to the calculated number)

EX: 140 KIAS / 2 = 700 FPM

-**RVR =** runway visual range
-**RVV =** runway visibility value

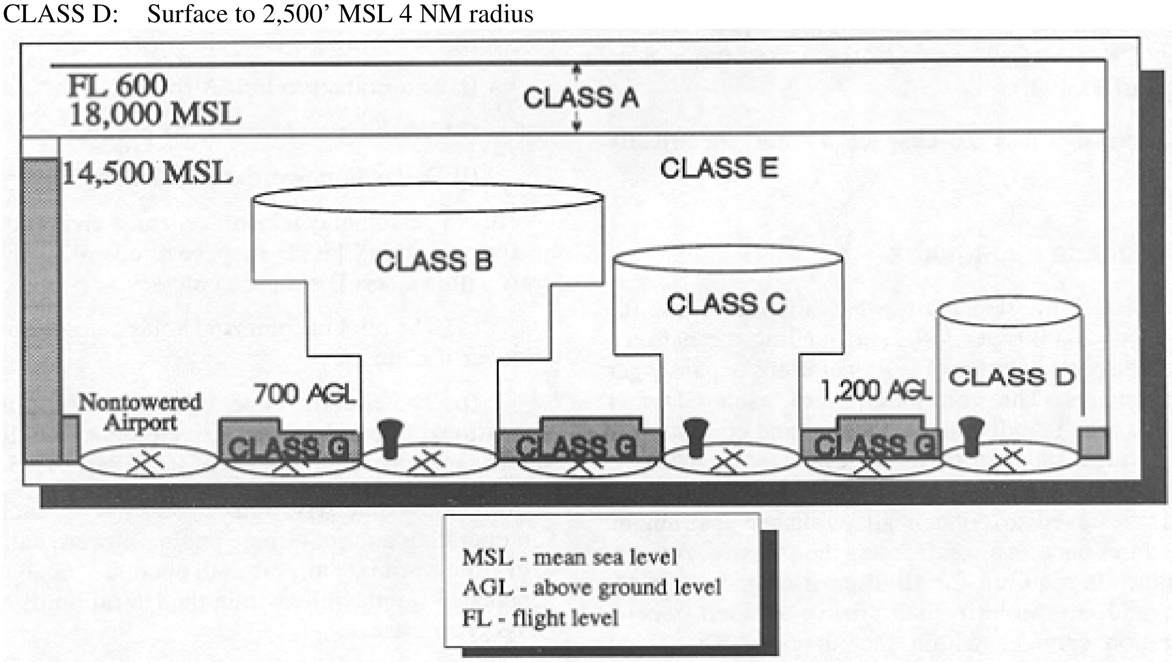
SUPPLEMENTAL INFORMATION

BASIC VRF WEATHER MINIMUMS

AIPSACE	FLIGHT VISIBILITY	DISTANCE FROM CLOUDS
CLASS A	N/A	N/A

CLASS B	3 STATUTE MILES	CLEAR OF CLOUDS
CLASS C	3 STATUTE MILES	1000 ABOVE, 500 BELOW, 2000 HORIZONTAL(152)
CLASS D	3 STATUTE MILES	152
CLASS E LESS THAN 10,000’ MSL MORE THAN 10,000’MSL	 3 STATUTE MILES 5 STATUTE MILES	 152 111
CLASS G <u>1200’ FEET OR LESS AGL</u> DAY NIGHT <u>MORE THAN 1200’, LESS THAN 10,000’MSL</u> DAY NIGHT <u>ABOVE 10,000’MSL</u>	 1 3 1 3 5	 COC 152 152 152 111

<u>DIMENSIONS</u>:
CLASS B: surface-10,000’ MSL, generally two or more layers
CLASS C: surface-4,000’ MSL, surrounding those airports that have an operational control tower, generally 5 NM radius core
CLASS D: Surface to 2,500’ MSL 4 NM radius



Airspace Classes	Communications	Entry Requirements	Separation	Special VFR in Surface Area
A	Required	ATC clearance	All	N/A
B	Required	ATC clearance	All	Yes
C	Required	Two-way communications prior to entry	VFR/IFR	Yes
D	Required	Two-way communication prior to entry	Runway operations	Yes
E	Not required for VFR	None for VFR	None for VFR	Yes
G	Not required	None	None	N/A

COMPASS LOCATOR:

- NDB collocated with an outer or middle marker
- Effective range of a compass locator is 15 NM