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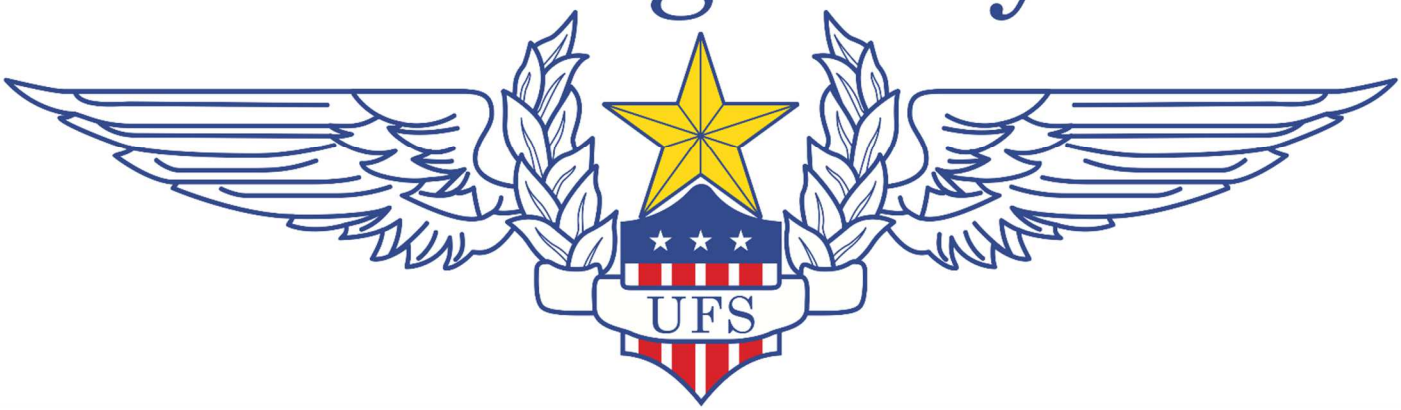

Private, Commercial, Instrument Rating Tasks & Maneuvers Guide

Version 2020.01

Version 2020.01
This guide is designed for Single Engine Pilot Candidates.

Look for these codes throughout this guide to determine if they apply to the training you are undertaking:

Private: PVT
Commercial: COM
Instrument: IR

Your Instructor will provide much further development of this maneuvers and tasks. This guide is simply to help give your training structure and standardization. The desire of United Flight Systems would be a system that you can use from instructor to instructor. UFS realizes that each instructor is unique in personality. However, standardization of procedures allows a flight candidate to use any/all instructors on staff and still have consistency in the training received.

Preflight Action (prior to aircraft walkaround) PVT / COM / IR

- FAA's recommendation P.A.V.E Checks to verify safe conditions
- Pilot / Aircraft / enVironment / External Pressures
  - Pilot:
    - Check yourself, Are you Current and Competent?
      IMSAFE(Illness/Medication/Stress/Alcohol/Fatigue/Emotions)
  - Aircraft:
    - Airworthiness Checks
    - Any inoperable equipment has been legally/appropriately secured.
    - **A.V.1.A.T.E** Maintenance Inspections
      - **A**nnual/**A**D's,
      - **V**OR check,
      - **1**00Hr Inspection,
      - **A**ltimeter/Pitot Static,
      - **T**ransponder,
      - **E**LT
    - Weight & Balance computed / confirmed per design envelope
    - Takeoff & Landing Distance Performance computed
  - enVironment
    - Current Weather Risk Assessment / Risk Mitigation
    - Forecast Weather Risks Risk Assessment / Risk Mitigation
    - NOTAMs
    - TFRs
  - External Pressures
    - Pressure to get home?
    - Passenger Pressures / expectations?
    - Job Pressures?
    - Self evaluation?
- FAR 91.103 Preflight Action (A.D.W.A.R.F)
  - Prior to a flight, the Pilot in Command must be be familiar with:
    - All Pertinent Information related to the flight
    - Delays that potentially or actually exist, applicable to the flight
    - Weather for current and forecast conditions
    - Alternate Airports for IFR Pilots or Alternatives for VFR Pilots
    - Runway lengths of intended use & Takeoff and Landing Performance Data for those runways
    - Fuel Requirements for the designated flight

Preflight Action (prior to aircraft walkaround) (continued) PVT / COM / IR

- What constitutes "**All pertinent information**"?
  - This portion of the regulation places heavy burden on the Pilot in Command, Do not rush or treat your preflight preparation with laxity.
- **Delays**: a good weather briefing from 1800WXBRIEF or an approved FAA Weather Provider reveals NOTAMS that describe potential delays to the Pilot in Command.
- **Weather**: A good weather briefing from 1800WXBRIEF or an approved FAA Weather Provider allows the Pilot in Command to do a Risk Assessment of the flight to make a safe Go/No Go decision
- **Alternate / Alternatives**: The VFR Pilot must always have a Plan B if Plan A can not be completed. IR The IFR Pilot must determine when an Alternate Airport is legally required ("123" Rule)
- **Runway lengths / Takeoff & Landing Performance**: The Pilot in Command must check the airports of intended use to verify that the aircraft can safely takeoff and land via preflight performance calculations.
- **Fuel Requirements**: at a minimum, the Pilot in Command must determine the aircraft has enough fuel to complete the flight and have the VFR reserve of 30 minutes (daytime operations) or 45 minutes (night time operations): if IFR and no alternate airport required, have a reserve of 45 minutes; IR if IFR and an alternate airport is required, be able to get to destination then on to the alternate airport and have a reserve of 45 minutes ***(Best Practices stipulate that all flights have minimum reserve of 60 minutes)***

Time in Tanks Philosophy

Using a dedicated Fuel Timer can ease a pilot's awareness of Available Fuel Status…..

For simplicity, this discussion will use generic volumes and fuel flow. Assume Avgas = 6 lbs./ gal

Regulations require a preflight computed Departure to Destination available reserve of
30 min [Day VFR],
45 min [Night VFR] …..

and the more complex IFR requirement defined by the widely used "1-2-3 Rule"
Departure to Destination + 45 min reserve
or if required, Departure to Destination to Alternate + 45 min reserve.

Realize this is all done on the ground in the preflight performance calculations. The more important process will be the pilot's inflight decision making and situational awareness. Unfortunately, annual statistics continue to reveal poor Aeronautical Decisions regarding fuel starvation accidents.

Pilots must learn practical, safe and conservative skills regarding inflight fuel monitoring, management, and decisions.

Scenario for this discussion:
Available and ***visually verified*** fuel: 30 gal
Fuel flow: 9.5 gph {from the AFM *Cruise* Chart, includes 20% safety allowance
Fuel to climb to 9000 ft: 4 gallons {from the AFM *Time, Speed, Distance to Climb* Chart
Time to climb to 9000 ft: 16 minutes {from the AFM *Time, Speed, Distance to Climb* Chart

Conservative Reserve Qty is simply a Mid-altitude Cruise fuel flow (9.5 gph = 9.5 gal Reserve)

Step 1: Determine available fuel for normal operations ….

Formula:
[Total available fuel on board] - [Conservative Reserve] = Normal Ops available fuel

30 gallons - 9.5 gallons = 20.5 gallons available for Normal Ops

This formula sets aside 1 hour of fuel, this fuel will only be available in an emergency

Normal Ops Fuel + Reserve Fuel = Total Fuel on Board

Step 2: Reduce Available Fuel by the Climb Fuel [computed from the AFM performance charts]

20.5 - 4 = 16.5 gallons
Time to climb: 16 min

This step incorporates the fact that the fuel consumed during climb is at higher rate than cruise fuel flow(larger turboprop/turbojet aircraft have much greater fuel consumption during the climb)

Version 2020.01
Step 3: Available fuel after climb / Fuel flow converted to Time
16.5 / 9.5 gph = 1.8 hrs [1hr 48 min]
Step 4: Available Time [step 3] + Climb Time = Normal Ops Fuel Time

1:48 + :16 = 2:04 Normal Ops Available Time
Step 5: Input Normal Ops Available Time into a Countdown Timer. Start the Countdown clock at Takeoff.

The pilot must land prior the countdown timer expiring! The pilot must continually evaluate a flight's progress in comparison to Remaining Available Time.

The countdown timer tells you the safe remaining available time.

Always treat the Reserve as Emergency Only Fuel (not available except in an emergency)

Land prior to or at the expiration of the computed Normal Ops Time and the aircraft will have 1 hour of Emergency Reserve remaining.

Paradigm:

1. Visually know how much fuel is on board
2. Use AFM, compute Time to Climb and Fuel to Climb for Cruise Altitude
3. Use AFM, compute Cruise Fuel Flow (include 20% Safety Factor),
   Cruise Fuel Flow = 1 Hr Reserve Fuel Qty.
4. Total Fuel on board – Climb Fuel – 1 Hr Reserve Fuel Qty = Normal Ops Fuel Qty.
5. Convert Normal Ops Fuel Qty to Time Available (Normal Ops Qty / Cruise Fuel Flow)
6. ***Time in Tanks*** Formula: Climb Time + Normal Ops Time

Time in Tanks is the safe time in the tanks with 1 HR reserve remaining upon landing

_____ gallons Total Fuel on Board

_____ minutes Time to Climb to Cruise Altitude

_____ gallons Fuel consumed in Climb to Cruise Altitude

_____ Cruise Fuel Flow (increased by 20% safety factor)
==========

_____ - _____ - _____ = _____ Normal Operations Fuel Qty

[_____ / _____] + _____ = _____ Normal Operations Fuel Endurance "Time in Tanks"

Example: C172N Specifics, Cruise Altitude 4000' MSL
40 gallons Usable Topped Off — 40 gallons - 3 gallons - 7.6 gal = 29.4 Gallons

6 minutes Time to Climb to Cruise Altitude (4000' MSL) — [29.4 / 7.6 GPH] + 6 minutes = 4:00 **Time in Tanks**

3 gallons Fuel Consumed in Climb to Cruise Altitude

7.6 GPH Cruise Fuel Flow (includes 20% Safety Factor)

Preflight Walkaround PVT / COM / IR

- Published Checklist to be completed, checklist must be in hand
- Check operation of all exterior lights for ALL operations
- A.R.O.W Documents
  - (Airworthiness Cert, Unexpired Registration, Oper. Limits (AFM, Markings, & Placards), Weight & Balance Info for the unique N numbered aircraft)
- Flaps only to be extended to maximum allowed for a takeoff
- Check tires for Tread condition (no visible chord allowed)
- All Flight Control Actuators checked for allowable play(fused actuators are not unairworthy)
- All control surface counterweights accounted for
- Sumped fuel that is clean is to be returned to the fuel tanks (don't pour on the ground)
- Verify fuel caps are vented
- Verify pneumatic type stall warning indicators work (apply suction), electric stall vane types by manual selecting up position.
- Verify vane type stall warning indicators work with main Battery DC Power On

Before Engine Start PVT / COM / IR

- Obtain ATIS and any required airspace/ATC clearances prior to engine start
- S.A.F.E.T.Y Briefing must provided to the passengers
  - Seatbelts [operation and when to use]
  - Airflow / Comfort Systems / Potential for Airsickness [air vents / sick sacks]
  - Fire extinguisher [location and use]
  - Exits [demonstration of opening the exits]
  - Talking Rules / look for Traffic [Sterile cockpit in traffic pattern, seeing traffic]
  - Your Questions
- Published Checklist to be completed, checklist must be in hand
- Cockpit tools/equipment must be organized and easily obtained
- Surrounding Area will be cleared with a verbal announcement

Engine Start PVT / COM / IR

- Use of Throttle During Engine Start (Carburetor equipped powerplants ONLY)
  - The throttle will not be pumped if the propeller is not rotating through.
  - If necessary, the proper procedure for pumping the throttle is to quickly push it to the full open position, then quickly return it to idle position (ONLY up to 2 pumps) as engine is turning through.
  - As engine ignites, throttle to idle position.
  - Set throttle at 800-1000 RPM for warm up.
- Immediately following ignition, the pilot will immediately scan the tachometer for less than 1000 RPM, oil pressure for positive indication and ammeter for charging indication.
- Immediate shut down is required if no oil pressure is indicated or full scale ammeter (pos or neg) indication (possible cause is a starter remaining engaged to the flywheel.
- To minimize spark plug contamination, the mixture will be leaned for taxi.
  - It is a simple procedure - lean mixture to the point of initial engine shut down and then slightly enrichened.
- Do not allow the starter to rotate for more than 5 rotations without any sense of engine ignition occurring. (this over exertion of the starter burns it up and destroys it.)
- It is improper & damaging to initially (first 5 minutes) idle > 1000 RPM.

Pre-Taxi PVT / COM / IR

- The pilot will be familiar with the ATIS / Airport Information
- The pilot sets the altimeter (altimeter setting or field elev), directional gyro/magnetic compass, and the attitude indicator. Check the Six Pack
  - Airspeed indicator reads zero.
  - Attitude indicator is erect within 5 minutes.
  - Altimeter is set & is within 75' of correct field elevation.
  - VSI shows zero or referenced for zero climb.
  - DG set to magnetic compass showing known headings
  - Turn Coordinator - shows no Flag
- All areas forward, left and right of the aircraft will be scanned for aircraft and hazards.

- Pre-Taxi Radio Panel Check
  - The pilot will check communication & navigation radios for operation (using nearest nav aids).
  - Start at the Top of the Radio / Navigation Panel, systematically check Coms/Navs/GPS.
  - Check for coms audio clarity & transmission strength.
  - Check nav's for audio ID of signal & proper CDI movement.
  - Verify GPS database is current, GPS self-tests are satisfactorily complete
- Pilot will announce taxi movements (uncontrolled airports) or receive taxi clearance from ATC.
- On initial taxi movement, the pilot & instructor will engage their individual brakes to ensure correct stopping action.

Taxiing PVT / COM / IR

- The pilot will continuously note wind conditions & apply the correct aileron & elevator corrections.
  - Memory Aid - "Climb into Headwinds" "Dive Away from Tailwinds"
- The pilot will never taxi faster than a speed at which one quickly walks!
- The pilot will verbally announce "Clear Left, Center and Right" (clear of hazards) at all intersections.
- Know the taxi movement / taxi situational awareness at all times, Have the Airport Diagram available during all taxi movements.
- The pilot will systematically check (orally) the Gyro flight instruments and Mag Compass
  - Attitude indicator shows ≤ 5° bank in turns and is erect ≤ 5 minutes.
  - DG set to magnetic compass showing known headings & turns appropriately as A/C turns.
  - Turn Coordinator - Miniature aircraft shows turns in the same direction of airplane; the ball goes opposite.
- Sterile Cockpit: During Taxi, NO un-necessary talking or activities. Maintain Situational Awareness with Airport Diagram and taxiing position.

Pre-Takeoff PVT / COM / IR

- Published Checklist to be completed
- Flow Checks must be verified by the published Approved Flight Manual Checklists
- CIGARR
  - Controls: check flight controls (Top Check: “BOX” the controls: Bottom Check: Rudders)
  - Instruments: check flight instruments / engine instruments
  - Gas: all fuel system items: qty / selectors / pumps
  - Attitude: check all trim indications for safe flight attitudes
  - Runup: perform the pre-takeoff engine runup
  - Radios: Coms / Navs / GPS/ Transponder
- Magneto Check
  - The pilot will verbally call out “Clicks” of ignition key to identify left & right magneto checks (“one”, “two” / “one”, “two” / “one” / “one”).
  - Counting clicks will minimize the chance of turning the magneto key to the “off” position.
  - If you inadvertently turn the key to ”off”, leave it off to prevent a back fire into the carburetor.
- Carburetor Heat (as equipped)
  - The carb heat will be checked for a drop with RPM at recommended run of RPM. The verbal call out will be “drop, no rise, no ice”.
  - The power plant will then be checked at full idle with carb heat on to confirm that the idle setting guarantees engine operation.
- Radio Panel Preparation
  - The pilot will prepare himself/herself for immediate after takeoff communication & navigation requirements.
  - Prepare for Emergency Return Approach Procedures
  - Start at the Top of the Radio / Navigation Panel, systematically set Coms / Navs / GPS /Transponder for the flight (based on ATC clearance and initial navigation expectations)

Pre-Takeoff (continued) PVT / COM / IR

- Takeoff Briefing / Emergency Preparation
  - Review V speeds (V_R, V_Y, Best Glide)
  - When demonstrating a Specialty Takeoff, verbally review the specific type of Takeoff Checklist

  - First Segment Briefing for an Emergency [Prior to V_R] -
    - "Chop throttle & stop aircraft"

  - Second Segment Emergency after [V_R with Runway Remaining]
    - "Pitch down"
    - "Reland"
    - "Chop throttle & stop "
    - "Secure mixture, throttle, master switch, mags, open the doors"

  - Third Segment Emergency with [No Runway Remaining]
    - "Pitch down for best glide"
    - "Turn towards an open landing area" (no 180° turn back below 1000' AGL)
    - "Secure mixture, throttle, magnetos, master, open the doors"
- IFR Takeoff Briefing IR
  - Review ATC Clearance for initial Heading, initial Departure Procedure, initial Altitude

Line Up Check

- The pilot, prior to application of power for takeoff, will perform a line up check. It is as follows: (memory aid: T.H.A.A.T.S.)
  - T - Time off - Start clock
  - H - Heading - Gyro / compass / Appropriate Runway all agree
  - A - Attitude - Gyro erect
  - A - Altitude - Altimeter is correct
  - T - Transponder - Squawking altitude
  - S - Switches - Lights, ice protection, radar, boost pumps

- The clock is used for elapsed flight time and is the primary indicator of available fuel.

- A final GUMPSCC check will be performed:

  - G - Gas - Both/fullest tank/pumps as required
  - U - Under Carriage - Down/green
  - M - Mixture - Set forward for conditions
  - P- Props - Forward
  - S - Safety - Strobes; ice protection, radar
  - C - Cowl flaps - Open
  - C - Carb heat - Off

Normal Takeoff PVT / COM / IR

- Wind Conditions
  - Pilot will apply proper control inputs for takeoff wind conditions.
- Power Application
  - Smooth and continuous application of full throttle.
- Takeoff Oral Callouts Required
  - "All instruments green"
  - "Airspeed alive"
  - "Rotate"
  - "Positive rate of climb, no landing runway remains, gear up" (if appropriate)
- Speed Compliance
  - The pilot will comply with the aircraft's specific V_R, V_X, V_Y, & cruise climb speeds
- Power Adjustments
  - No power adjustments will be made below 500' AGL.
  - Pilot's hand will remain on throttle through 1000' AGL.
- If remaining in the traffic pattern, no crosswind turns until 300 ft below Traffic Pattern Altitude.
- Lower the nose to find 3 ground checkpoints on upwind for tracking purposes. Pilot flies his/her body on that line.
- Collision Avoidance Procedures
  - Prior to any turns, the pilot will orally confirm "Left, center, right clear" of hazards.
  - Pilot will dip nose on regular basis to scan area ahead for traffic hazards.
  - Always maintain situation awareness regarding your position in the traffic pattern with other traffic pattern aircraft. Upwind is always the best leg to extend in order to get appropriate spacing with the preceding aircraft.

Soft Field Takeoff PVT / COM

- Yoke Position
  - Pilot will maintain full AFT stick position for taxi & initial takeoff roll.
- Aircraft Configurations
  - Pilot will configure the aircraft in accordance with the Manufacturer's AFM specified configuration for soft field takeoffs.
- Continuous Taxi Movement
  - The pilot will not allow the aircraft to stop its taxi movement once established from the run up area to the takeoff roll.
- Takeoff Call Outs
  - Same as normal takeoff.
- Soft Field Takeoff
  - Allow aircraft to accelerate in a nose up attitude.
  - Aircraft will lift off into ground effect.
  - Lower angle of attack to accelerate through ground effect.
  - Attain V_X for obstacle or V_Y if no obstacle.
  - Positive rate of climb; clear of obstacles; clean the aircraft of flaps & gear.
  - Accelerate to V_Y & make normal climb out

Short Field Takeoff PVT / COM

- Preflight Action
  - The pilot will perform a complete preflight to include determining the takeoff distance over 50 ft obstacles. The pilot will compare this distance to runway length in use.
- Aircraft Configuration
  - The pilot will configure the aircraft's flaps, propeller, and/or other systems to comply with the Manufacturer's AFM specified configuration.
- Runway Position for Takeoff
  - Following completion of the standard pre takeoff checklist items, the pilot will taxi into position on the very start of the runway (giving the pilot most usable runway).
- Short Field Takeoff Procedures
  - The pilot will hold the brakes
  - Smooth application of full power
  - Pilot will orally call "Engine gauges green"
  - Release brakes and accelerate to V_R
  - Standard takeoff callouts made
  - Rotate & accelerate to V_X
  - Pilot orally confirms "positive rate of climb", "gear up"
  - Maintain V_X to clear the obstacle
  - Accelerate to V_Y after clearing the obstacle, "flaps up"
  - Comply with normal climb procedures

En-route Climb PVT / COM / IR

- Aircraft Configuration
  - The pilot will comply with aircraft operating handbook for climb speeds, flap settings, and power settings.
  - No power settings changes until clearing 500 feet AGL.
  - If no climb speeds are specified, use V_Y + 10 KTS.
- Climb Checklist
  - The pilot will complete the Manufacturer's AFM specified climb checklist.
  - Turn the landing lights off (or as desired by the pilot) outside of the airport area.
  - Lean the mixture if appropriate.
- Vigilance for Traffic
  - The pilot will systematically lower nose to search for traffic.
- Orientation & Navigation
  - The pilot will initiate positional awareness through pilotage & radio navigation.
- Flight Service Flight Plan
  - The pilot will contact F.S.S. & activate the required flight plan.
- Flight Following (ATC)
  - The pilot will establish contact with ATC to participate in radar advisories of traffic.
  - Remember it is always the pilot's responsibility for seeing and avoiding traffic in VFR conditions.

Cruise PVT / COM / IR

- Altitude Choice
  - The pilot will level off at appropriate altitudes to comply with FARs for minimum safe altitudes, magnetic course (direction of flight) & weather conditions.
  - Use the Level Off Technique of beginning the level off at 10% of the VSI rate.
- Checklist
  - The pilot will complete the Manufacturer's AFM specified cruise checklist.
  - The mixture will be adjusted properly at all altitudes.
- Situational Awareness (SA)
  - The pilot will always know the aircraft's position through pilotage & radio navigation.
  - The pilot will maintain continuous awareness of weather conditions through contact with ATC and/or Flight Service.
  - Monitor 121.5 Emergency Frequency in Com2 during Cruise
- Performance Verification
  - The pilot will continually monitor the flight's performance regarding groundspeed, ground track, time between checkpoints. This performance verifications aids in maintaining a safe vigilance of the flight.
- Alternatives & Preparation to Divert
  - The pilot will always prepare for the possibility of alternative courses of action.
  - Never doubt yourself for choosing a diversion to an alternative airport.

Deduced Reckoning Navigation PVT / COM

- Ground Track
  - The pilot will maintain the planned track across ground.
  - "Plan the flight - Fly the plan".
  - "Fly your body" on the drawn line (the planned track).

- Identifying Navigation Points
  - The pilot will be very specific when identifying checkpoints (to the instructor or examiner).
  - Look out to the horizon to locate visual cues as early as possible. Don't just scan the areas nearest the aircraft.

- Data to Collect & Process
  - The pilot will note each checkpoint's time of arrival on flight planning form.
  - The pilot will compute actual ground speeds to be listed on the flight form.
  - The E6B Manual Flight Computer will be used proficiently by all student pilots.
  - The pilot will continually monitor actual time En route (clock was started on takeoff) and compare to allowed safe endurance.

Deduced Reckoning Navigation (continued) PVT / COM

- The pilot will compare his/her actual time en-route to the ETE filed with the Flight Service Station. Updates to the FSS are required if pilot will exceed the planned ETE.

- ATC Communication
  - The pilot will use ATC for “Flight Following” on all Cross Countries
  - The pilot will file, activate, and close flight plans with the FSS on all Cross Countries.

Diversion to an Alternate Airport PVT / COM / IR

- Positional Awareness
  - Pilot will know his/her current position at all times.
  - Local weather & en-route weather must be updated regularly (FSS).
  - Conservative decisions regarding hazardous and / or poor weather will be made by the pilot.

- Decision to Divert Philosophy
  - The pilot will divert to a safe airport due to hazardous weather within 20 nm of route or destination and / or weather at or below minimums.
  - Pilot will divert to safe airport due to the fuel endurance nearing its Maximum Safe Endurance.
  - Any time the you feel uneasy with the current flight situation, you will divert to a safer situation.

Diversion to an Alternate Airport (continued) PVT / COM / IR

- Diversion Checklist (without the use of GPS) PVT / COM
  - 1.Mark your last known position on chart.
  - 2.Note the current time (write it down!)
  - 3.Determine the airport to divert to.
  - 4.Determine magnetic course to the alternate airport.
    - Simply use a pen or pencil to connect last known position to the alternate airport.
    - Slide the pencil or pen in parallel manner to a VOR compass rose.
    - Read the new magnetic course on the compass rose.
  - 5.Turn the aircraft to the new course.
  - 6.Quickly sketch the new course to alternate.
  - 7.Determine the distance to the alternate.
    - Simply use your pen/pencil, connect last position to the alternate
    - Use latitude tickmarks for distance – 1 minute of latitude = 1 nm
  - 8.Determine a ball park estimated time to the alternate
    - Use TAS initially as Ground speed
    - Pilot must be proficient at using the E6B to determine ETE
    - Ground Speed Ratios used to make quick ETE calculations:
      - 60 kts = 1 mile / min, 90 kts = 1.5 miles / min, 120 kts = 2 miles / min
  - 9.Contact the nearest FSS to report the change in destination & ETE.

Lost Procedures PVT / COM / IR

- Remain calm.
- Reset directional gyro to magnetic compass.
- Return to the planned heading.
- Search for large, obvious landmarks and compare them to the sectional chart.
- VOR Cross Radials
  - Locate the 2 nearest VOR's.
  - Determine what radial the aircraft is on from each VOR.
  - Where two radials intersect = your location.
- GPS Location?
- Radar Location
  - Contact ATC to locate you on radar.
  - When all else fails, hail help on frequency 121.5.
- 5 C's

Climb -	Improved radio & navigation aid reception, radar coverage & Safer obstacle avoidance
Confess -	Admit to yourself you are lost
Communicate -	Call ATC or FSS for help /121.5 will always work
Comply -	Do what ATC or FSS says to do
Conserve -	Set power & mixture for best endurance cruise

Steep Turns PVT / COM / IR

- Aerodynamic Knowledge
  - The pilot must be familiar with forces acting upon the aircraft in a turn, centrifugal & load forces, accelerated stall considerations, maneuvering speed, over banking tendencies, adverse yaw, power requirements in turns.
- Outside Visual Preferences
  - Keep your eyes outside of the cockpit for situational awareness
  - Section lines & prominent landmarks are to be used
- Steep Turn Profiles
  - Non-Complex Aircraft Steep Turns
    - 1500 feet AGL minimum
    - "Clear left, center, right" areas
    - Confirm airspeed, altitude, and reference heading
    - Establish attitude (45° – Private ACS, 55°-Com ACS)
    - Maintain attitude / altitude with back pressure on the yoke
      - Trim approx 2 ½ to 3 turns of the wheel, if desired.
    - Add power to overcome induced drag to maintain airspeed
    - Lead the roll out to roll onto proper heading
    - Complete a 360° turn in both directions

  - Complex and Multi-engine Aircraft Steep Turns
    - 1500 feet AGL minimum
    - Clear left, center, right areas
    - Clean GUMPS
    - Confirm airspeed (V_A), altitude, and reference heading
    - Establish attitude (45-55°)
    - Add approximately 2-3 inches MAP for induced drag
    - Maintain attitude/altitude with back pressure on yoke
    - Lead the roll out to roll onto proper heading
    - Complete a 360° turn in both directions

Slow Flight (no longer designated or flown as Minimum Controllable Airspeed)

PVT / COM

- Aerodynamics Knowledge
  - The pilot must have a basic knowledge of Total Drag, Induced Drag, Parasite Drag, Power Required, the Left Turning Tendencies, and Pitch & Power relationships.
- Definition of Slow Flight & Minimum Controllable Airspeed
  - Slow flight – A flight condition that is flown at a slightly lower AOA than the initiation of the audible stall warning system.
  - MCA - Controllable operations at highest flying angle of attack, slowest airspeed, and required power. Any increase in angle of attack leads to stalling the airfoil.

- Possible Realms of Flight Requiring Slow Flight or MCA Proficiency
  - Traffic pattern, landings, balked landing

- Slow Flight Profile
  - Non-Complex Aircraft Slow Flight
    - 3000 feet AGL preferred
    - Clearing turns (left then right)
    - GUMPSC
    - Confirm airspeed, altitude, and reference heading
    - Carb heat ... on (as applicable)
    - Power ... 1500 RPM
    - Decelerate to white arc ... flaps down
    - Establish Slow Flight attitude (Nose High but without Stall Warning Horn sounding)
    - Power ... add appropriate amount to maintain altitude and attitude

  - Recovery
    - Full power & carb heat off
    - Lower nose to horizon
    - As airspeed accelerates ... flaps up in increments
      - back pressure on yoke required to keep nose on horizon as flaps retract.
    - Pitch, power, & trim for cruise flight
    - Perform the Cruise Checklist

Slow Flight (no longer designated or flown as Minimum Controllable Airspeed) (continued) PVT / COM

- Complex Aircraft Minimum Control Airspeed
  - 3000 feet AGL preferred
  - Clearing turns (left then right)
  - Dirty GUMPSC (gear down/props forward)
  - Confirm airspeed, altitude, and reference heading
  - Carb heat ... on (as applicable)
  - Power ... 15" map
  - Decelerate to white arc ... flaps down
  - Establish Slow Flight attitude (Nose High but without Stall Warning Horn sounding)
  - Power ... add appropriate amount to maintain altitude and attitude

- Recovery
  - Full power & carb heat off
  - Lower nose to horizon
  - As airspeed accelerates ... flaps up to approach flaps
  - Call out “Landing gear up with positive rate of climb”
  - Flaps up full
  - Pitch, power, & trim for cruise flight
  - Perform cruise checklist

- Multi-Engine Minimum Control Airspeed
  - 3000 feet AGL mandatory
  - Clearing turns (left then right)
  - Dirty GUMPSC (gear down/props forward)
  - Confirm airspeed, altitude, and reference heading
  - Power ... 15" map
  - Decelerate to white arc ... flaps down
  - Establish Vmc + 5 kts Attitude
  - Power ... add appropriate amount to maintain altitude and attitude

- Recovery
  - Full power
  - Lower nose to horizon
  - As airspeed accelerates ... flaps up to approach flaps
  - Call out “Landing gear up with positive rate of climb”
  - Flaps up full
  - Pitch, power, & trim for cruise flight
  - Perform cruise checklist

Power-On (AKA Departure Stall) Recognition & Recovery PVT / COM

- Aerodynamics Knowledge
  - The pilot must have a basic knowledge of Lift & Drag terminology, Left Turning Tendencies, and spin aerodynamics & recovery procedures.

- The Prime Training Concept of **power on stalls** is to recognize the unsatisfactory and unsafe flight situation and recover the aircraft back into a safe flying situation.

- Any stall can be prevented and/or stopped by lowering the angle of attack.

- Power on Stall Profile
  - Non-Complex Aircraft Power on Stall (departure)
    - 3000 feet AGL preferred
    - Clearing turns (left then right)
    - GUMPSC
    - Confirm airspeed, altitude, and reference heading
    - Carb heat ... on(as applicable)
    - Power ... 1500 RPM
    - Decelerate to V_R
    - Full power & carb heat off
    - Raise nose to the stall angle of attack
  - **If nose falls left or right use rudder to correct the aircraft, DO NOT USE AILERONS!**

  - Recovery
    - **Lower the angle of attack** to the horizon
    - Accelerate to Vy or back to cruise airspeed
    - Pitch, power, trim for cruise flight
    - Perform cruise checklist

  - Complex Aircraft Power on Stall (departure)
    - 3000 feet AGL preferred
    - Clearing turns (left then right)
    - Clean GUMPSC (gear up/props forward)
    - Confirm airspeed, altitude, and reference heading
    - Carb heat ... on (if applicable)
    - Power ... 15" map
    - Decelerate to V_R
    - Full power & carb heat off
    - Raise the nose to the stall angle of attack
  - **If nose falls left or right use rudder to correct the aircraft, DO NOT USE AILERONS!**

  - Recovery
    - Lower the angle of attack to horizon
    - Accelerate to Vy or back to cruise airspeed
    - Pitch, power, trim for cruise flight
    - Perform cruise checklist

Power-On (AKA Departure Stall) Recognition & Recovery (continued) PVT / COM

- Multi-engine Aircraft Power on Stall (departure)
  - 3000 feet AGL mandatory
  - Clearing turns (left then right)
  - Clean GUMPSC (gear up/props forward)
  - Confirm airspeed, altitude, and reference heading
  - Power ... 15" map
  - Decelerate to V_R
  - Power set to approx. 18" map
  - Raise nose to stall angle of attack
- **If nose falls left or right use rudder to correct the aircraft, DO NOT USE AILERONS!**

- Recovery
  - Lower angle of attack
  - Full power
  - Accelerate to Vy or back to cruise airspeed
  - Pitch, power, trim for cruise flight
  - Perform cruise checklist

Power-Off (AKA Approach to Landing Stall) Recognition & Recovery PVT / COM

- Aerodynamics Review
  - The pilot must have a basic knowledge of lift terminology, stall terminology, recognizing the kinesthetic (“seat of pants”) indications of imminent / full stalls, spin entry & recovery, slow flight / MCA.

- The Prime Training Concept of **power off stalls** is to recognize the unsatisfactory, soon to be unsafe, flight situation and recover the aircraft back into a safe flying situation.

- Any stall can be prevented and/or stopped by lowering the angle of attack.

- Approach to Landing Stall profile

Power-Off (AKA Approach to Landing Stall) Recognition & Recovery (continued)

PVT / COM

- Non Complex Aircraft Power Off Stall (Approach to Landing)
  - 3000 feet AGL preferred
  - Clearing turns (left then right)
  - GUMPSC
  - Confirm airspeed, altitude, and reference heading
  - Carb heat ... on (as applicable)
  - Power ... 1500 RPM
  - Decelerate to white arc ... flaps down
  - Power ... idle
  - Allow aircraft to descend, stabilized at VREF / Final Approach Speed
  - Raise nose to stall angle of attack.

- **If nose falls left or right use rudder to correct the aircraft, DO NOT USE AILERONS!**

- Recovery
  - Lower the angle of attack, i.e. reduce back pressure on yoke
  - Full power & carb heat off (if applicable)
  - Allow the aircraft to accelerate with nose on horizon
  - As airspeed increases ... flaps up in increments
  - Pitch, power, & trim for cruise flight
  - Perform cruise checklist

- Complex / Multi-engine Aircraft Power Off Stall (Approach to landing)
  - 3000 feet AGL mandatory
  - Clearing turns (left then right)
  - Dirty GUMPSC (gear down/props forward)
  - Confirm airspeed, altitude, and reference heading
  - Power ... 15" map
  - Decelerate to white arc ... flaps down
  - Power ... idle
  - Allow aircraft to descend, stabilized at VREF/ Final Approach Speed
  - Raise nose to stall angle of attack.

- **If nose falls left or right use rudder to correct the aircraft, DO NOT USE AILERONS!**

- Recovery
  - Lower angle of attack, i.e. reduce back pressure on yoke
  - Full Power
  - Allow aircraft to accelerate with the nose on the horizon
  - As airspeed increases ... flaps up to approach flaps
  - Landing gear up with positive rate of climb
  - Pitch, power, & trim for cruise flight
  - Perform cruise checklist

Trim Stall Recognition & Recovery [FOR CFI CANDIDATES ONLY!!!] COM CFI ONLY

- Aerodynamics Review
  - The pilot must have a basic knowledge of lift terminology, stall terminology, recognizing the kinesthetic ("seat of pants") indications of imminent / full stalls, spin entry & recovery, slow flight / MCA.

- The Prime Training Concept of **power off stalls** is to recognize the unsatisfactory, soon to be unsafe, flight situation and recover the aircraft back into a safe flying situation.

- Any stall can be prevented and/or stopped by lowering the angle of attack.

- Trim Stall profile
- Non Complex Aircraft Trim Stall
  - 3000 feet AGL preferred
  - Clearing turns (left then right)
  - GUMPSC
  - Confirm airspeed, altitude, and reference heading
  - Carb heat ... on (as applicable)
  - Power ... 1500 RPM
  - Decelerate to white arc ... flaps down
  - Power ... idle
  - Allow aircraft to descend, stabilized at VREF / Final Approach Speed
  - Simulated ATC Call "Go Around"
  - Apply Full Power and Allow Nose to pitch up to FIRST Indication of a Stall

- **If nose falls left or right use rudder to correct the aircraft, DO NOT USE AILERONS!**

- Recovery
  - Lower the angle of attack, PITCH DOWN BELOW THE HORIZON (Requires strong push)
  - Allow the aircraft to accelerate with nose below the horizon
  - As airspeed increases ... flaps up in increments
  - Pitch, power, & trim for cruise flight
  - Perform cruise checklist

Trim Stall Recognition & Recovery [FOR CFI CANDIDATES ONLY!!!] (continued) COM CFI ONLY

- Complex Trim Stall
  - 3000 feet AGL mandatory
  - Clearing turns (left then right)
  - Dirty GUMPSC (gear down/props forward)
  - Confirm airspeed, altitude, and reference heading
  - Power ... 15" map
  - Decelerate to white arc ... flaps down
  - Power ... idle
  - Allow aircraft to descend, stabilized at VREF / Final Approach Speed
  - Simulated ATC Call “Go Around”
  - Apply Full Power and Allow Nose to pitch up to FIRST Indication of a Stall

- **If nose falls left or right use rudder to correct the aircraft, DO NOT USE AILERONS!**

- Recovery
  - Lower the angle of attack, PITCH DOWN BELOW THE HORIZON (Requires strong push)
  - Allow the aircraft to accelerate with nose below the horizon
  - As airspeed increases ... flaps up 1 notch
  - Landing gear up with positive rate of climb
  - Flaps up full
  - Pitch, power, & trim for cruise flight
  - Perform cruise checklist

Chandelle COM

- Concept Review
  - The pilot must be familiar with slow flight, forces acting on an aircraft in a turn, climbing turns, lift, drag, thrust required, left turning tendencies

- Use of Section Lines for Orientation
  - Use field section lines for maneuver orientation
  - Visualize the lateral axis relationship to the ground section lines

- Chandelle is simply a maximum performance climbing 180° turn

- Chandelle Profile
  - 2000' AGL minimum
  - Clearing turns (left first)
  - Clean GUMPSCC (gear up, props forward, cowl flaps - open)
  - Verbally confirm “Va airspeed, altitude, outside references”
  - Establish 30º bank
  - Full power

  - First 90º
    - Increasing pitch
    - Highest pitch reached at 90º reference
    - Bank of 30º constant

  - Second 90º
    - Pitch is constant (as A/S slows, requires more elevator input)
    - Bank is decreased
    - Wings level at 180º reference
    - Recover at 1.2 Vs

  - Recovery
    - Recover to level cruise flight with minimum loss of altitude
    - Perform cruise checklist

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Lazy 8's COM

- Concept Review
  - The pilot will be familiar with the aerodynamics of climbing & descending turns, left turning tendencies, Va, stall speed vs. Bank angle, positional awareness through visual cues

- Use of Section Lines for Orientation
  - Reference the aircraft's wings (lateral axis) to the field section lines

- The Lazy Eight is named for the "figure 8" that the nose forms along the horizon during the appropriately performed lazy eight

- The Lazy Eight is simply a combination of alternating (R & L) climbing, descending 180º turns developing the pilot's orientation and flying skills

- Lazy Eight Maneuver Profile
  - 3000' preferred
  - Clearing turns (L then R)
  - Clean GUMPSCC (gear up, cowl flaps - closed, props - cruise)
  - Verbally confirm "Va airspeed, altitude, outside references"
  - Lazily begin pitch & bank change simultaneously

- 0º - 45º
  - 15º of bank by 45º reference
  - Highest pitch attitude by 45º reference
  - Airspeed decaying

- 45º - 90º
  - 30º of bank by 90º reference
  - Pitch attitude reduced so the aircraft's nose "slices" horizon at 90º reference

- 90º - 135º
  - 15º of bank by 135º reference
  - Pitch attitude has lowest nose below the horizon attitude by 135º reference
  - Airspeed is increasing

- 135º - 180º
  - 0º of bank by the 180º reference
  - Level pitch attitude by the 180º
  - Airspeed is V_A +/- 10 KTS?; Initial altitude +/- 100'
  - Verbalize airspeed & altitude, outside reference, symmetry check 0º vs. 180º reference points
  - Immediately begin turn in opposite direction, repeat same steps in this new direction

Lazy 8's(continued) COM

- Symmetry Checks
  - Points 0º & 180º, Airspeeds are equal
  - 45º L & 45º R, Altitudes are equal
  - 90º L & 90º R, Attitudes are equal
  - 135º L & 135º R

- Input Changes
  - Pitch, roll, & yaw inputs are continuously varying throughout the Lazy 8
  - Orientation & coordination are paramount skills to develop
  - Coordinated flight is a primary goal

Steep Spiral COM

- Concept Review
  - The pilot will be familiar with the aerodynamics of descending turns, Va, stall speed vs. Bank angle, positional awareness through visual cues, forces acting upon the aircraft in a turn, centrifugal & load forces, accelerated stall considerations, maneuvering speed, over banking tendencies, adverse yaw, radius of turn vs. ground speed, Varying Bank Angle to maintain constant radius of turn
- Emergency Descent
  - This maneuver can be combined with an Emergency Descent into an airport for landing
  - It is best to combine the Spiral with an Emergency Descent into an airport / landing zone
- Best Glide Descent vs. Maneuvering Speed Descent
  - Technique difference is contingent upon scenario presented to the pilot
  - Is a high rate of descent required to meet the extent of the abnormal situation or is a Best Glide descent necessary to make the airport / landing zone of choice?
- Left or Right Turns?
  - Pilot flying in the left seat- make spiral turns to the left and fly left traffic into the landing airport
  - Pilot flying in the right seat – make spiral turns to the right and fly right traffic into the landing airport
- Top & Bottom Altitudes
  - Minimum of 3 turns are required to be demonstrated
  - 4000' AGL offers a good altitude to begin the maneuver
  - 1700 -1500' AGL offers a good altitude to depart the spiral into a downwind entry for the intended runway
- Choosing the Spiral Ground Reference Point
  - Descent in the Spiral using the ground reference point of the departure end of the runway of intended use for the Emergency Descent

Steep Spiral (continued) COM

- Steep Spiral Profile
  - 4000 ft AGL
  - Clearing Turns (Clear the area below the aircraft, airport of intended use is free of traffic)
  - Dirty GUMPS Check (Gear Down, Props Forward)
  - Enter downwind immediately above the spiral ground reference point
  - Power reduced to idle
  - Roll into steep descending turn
  - Trim for Best Glide Speed or VA {in relation to emergency scenario presented to the pilot
  - Vary the bank angle to maintain constant radius of turn in the descent
  - Complete Engine Clearing cycling of power on each upwind portion of turns
  - Roll out of descent at 1700'-1500' AGL to enter a Downwind Pattern for intended runway
  - Complete an Emergency Descent into the intended runway.

Ground Reference Maneuvers PVT / COM
(Rectangular Pattern, Turns around a Point, S Turns across a road)

- Concept Review
  - The pilot will be familiar with: wind triangle, TAS vs. GS, Crab (WCA), radius of turn vs. ground speed, upwind, crosswind, downwind, base, final, minimum safe altitudes, wind direction determination

- Wind Drift Circle
  - The pilot will execute a wind drift circle to determine the direction of the wind
  - Abeam a ground reference, execute a constant 30º bank turn for 360º, longest radius = downwind position: shortest radius = upwind position

- Positional Awareness
  - The pilot will be aware that ground reference maneuvers are executed only over areas free of homes, occupied farm buildings, obstacles
  - Due to being lower than 1000' AGL, the pilot will always remain vigilant for a landing site should a catastrophic engine failure occur!

- Maneuver Profiles
  - Non-complex aircraft - Ground reference maneuvers
    - Locate a suitable reference (possible emergency site, no obstacles)
    - Determine the wind direction
    - Establish Va at 1000 MSL (800 AGL)
    - Verbally confirm "airspeed, altitude and ground reference"
    - Begin the maneuver Downwind

  - Complex A/C - Ground reference maneuvers
    - Locate suitable reference (possible emergency site, no obstacles)
    - Determine wind direction
    - Establish Va at 1000 MSL (800 AGL)
    - Clean GUMPSC (gear up / props cruise)
    - Verbally confirm "airspeed, altitude and ground reference"
    - Begin the maneuver Downwind

  - Note: 8's on Pylons are done at approx. 1500' AGL at cruise power/airspeed

Ground Reference Maneuver (8's On Pylons) COM

- Concept Review
  - The pilot will be familiar with all concepts pertaining to ground reference maneuvers (see previous ground reference maneuvers), pivotal altitude (how to compute on the ground & airborne), aircraft visual references, interpretation of ground reference's relationship to the aircraft's reference

- Maneuver at Cruise Airspeed/Configuration Vs. Va Comparison
  - This maneuver should not require bank angles greater than 45°; therefore, over stressing airframe is not a factor
  - Higher speed = higher pivotal altitudes = improved safety
  - In strong wind conditions, the use of Va (slower than cruise) can have pivotal altitudes as low as 500' AGL

- Maneuver Profile
  - Locate suitable references (possible emergency, no obstacles)
  - Determine wind direction
  - Establish cruise airspeed & configuration at 1500' AGL
  - Clean GUMPSCC (gear up / props cruise)
  - Verbally confirm "airspeed, altitude & outside reference"
  - Begin the maneuver downwind
  - Establish Pivotal Altitude and Complete one 360° turn, roll out 45°to the wind, count 3-5 seconds to locate 2nd reference point
  - Begin opposite turn using 2nd reference point

Emergency Procedures / Abnormal Procedures / Equipment Malfunctions

PVT / COM / IR

- Aircraft System Knowledge (Section 7 POH)
  - The pilot will be thoroughly knowledgeable about all the systems and components of each system
  - System knowledge improves the pilot's ability to handle all malfunctions

- Published Emergency Procedures (Section 3 POH)
  - The pilot will commit to memory all **boldfaced procedures** specified for all emergencies
  - The pilot will be required to exhibit complete procedures on all emergencies and / or equipment malfunctions

- Flow Checks / Patterns
  - Boldfaced emergency procedures can be accomplished by flow checks through the cockpit
  - Flow check patterns aid the pilot in stressful situations
  - If time & circumstances permit, a published checklist will be used to confirm a flow check procedure is complete
  - In most training aircraft, a flow check starting at the fuel selectors moving towards the power quadrant along the instrument panel to the left (side panel) will cover all required controls & panels to meet the extent of an emergency.

Emergency Procedures / Abnormal Procedures / Equipment Malfunctions (continued) PVT / COM / IR

- Multiengine Engine Loss Generic Flow Check
  - Control - Airspeed (Blue Line) and Attitude
  - Power - Power Quadrant all full forward (Mixture, Prop, Throttle)
  - Drag - Flaps and Landing Gear cleaned UP
  - Identify - Dead Foot / Dead Engine
  - Verify - retard suspect throttle to verify
  - Troubleshoot - only if at safe altitude and safe position (flow check)
  - Feather - bring verified dead engine to full feather

- Prioritizing Pilot Actions
  - First & foremost the pilot will fly the aircraft, maintain control!
  - Positional awareness: Know your location & know where to land at all times
  - Abnormal problem Vs. Life threatening problem
  - “Safety window”?

- Safety Window
  - Statistically, most aircraft accidents occur during takeoff, initial climb, approach & landing
  - Area of highest workload and numerous diversions of attention
  - General dimensions of safety window
  - Size is dependent on A/C speed, pilot’s familiarity with area, etc.
  - Any problem/emergency within the safety window needs to be dealt with on its severity (prioritize based on life or death)

  - Equipment malfunction that can be troubleshot:
    - Leave the “window”
    - Fix or troubleshoot the problem
    - Confirm with checklist
    - Return for landing
    - Advise ATC/FSS if problem remains
    - Prepare and brief passengers for possible abnormal landing

- Takeoff Briefings
  - All pilots will brief the instructor (if solo, mentally) on takeoff emergency procedures prior to all takeoffs

- Simulated Emergencies
  - Practiced on all flights
  - Will not be practiced below 500' AGL
  - If advising ATC, use “simulated” in phraseology
  - Practiced to full landing at approved airports only!

Emergency Procedures / Abnormal Procedures / Equipment Malfunctions (continued) PVT / COM / IR

- Examples of Simulated Emergencies to practice
  - Engine failures (on takeoff, climb, cruise, decent in the traffic pattern)
  - Engine fires & electrical fires
  - Gear failures / flat tires
  - Flap failures (up & fixed)
  - Control cable (pitch & bank) failure or binding
  - Electrical failures
  - Radio failures
  - Fuel low scenarios
  - Lost procedures
  - Pilot or passenger illness
  - All emergency / abnormal procedures listed in Section 3 of the A/C Manual ("Emergency Procedures")

Lost Communications PVT / COM / IR

- Airman's Info Manual/Regulations
  - The pilot will be knowledgeable of the AIM & Regulation's Lost Communication Procedures

- Is the Lost Communication Problem Real?
  - As with any abnormal problem, a) fly the aircraft; b) troubleshoot the problem
  - Check the radio volume, headset jacks, audio panel selector switch positions, other radios, hand microphone, change frequencies

- Use backup hand held transceiver if available

- Monitor VOR audible function for possible blind ATC radio calls

- Broadcast in the Blind/Squawk "7600"

- Uncontrolled Airport (VFR)
  - Overfly the airport at a minimum of traffic pattern altitude plus 500 feet
  - Determine wind direction & appropriate runway to use
  - Note the traffic pattern for any other aircraft!
  - Fly so as to enter the appropriate downwind on the standard 45° entry
  - Be vigilant for aircraft
  - Fly the pattern and land

- Controlled Airport (VFR)
  - Broadcast blind/squawk "7600"
  - Climb to 2500' AGL above Class D airspace to circle above the airport
  - Note runway in use and traffic in the pattern
  - Fly so as to enter the appropriate downwind on the standard 45º entry
  - Rock wings & flash lights to draw the control tower's attention
  - Use vigilance for aircraft
  - Comply with light gun signals (see FAR's)

Lost Communications (continued)

- IFR "A.R.C." Method IR
  - If visual conditions are encountered, remain VFR & land. Do Not enter IFR conditions!

  - If in instrument conditions exist
    - Fly the aircraft
    - Maintain positional awareness
    - Ask yourself the "***ARC***" questions
    - **A** - What altitude do you fly?
    - **R** - What route do you fly?
    - **C** - What do you do at your clearance limit?

      - ***A*** - Altitude - Know the appropriate altitude to fly (aid: **M E A**)
        - Highest of
          - **M**- Minimum Enroute Altitude
          - **E**- Expected Altitude
          - **A**ssigned Altitude

      - ***R*** - Route -Know the appropriate route to fly (**A V E F**)
        - In order of expected routing compliance
          - Last **A**ssigned
          - **V**ectored to
          - **E**xpected
          - **F**iled

      - ***C*** - Clearance limit - What to do when you arrive at Clearance Limit or IAF
        - If CL is Destination Airport: Begin your approach at filed ETA or
        - If CL is any fix prior to destination: Hold and Leave hold at EFC, continue to destination

Destination Arrival Preparation for VFR Pilots PVT / COM

- The pilot will use a standardized, consistent procedure for organizing and setting up the aircraft for the arrival at an airport.

- This briefing must be accomplished correctly greater than 10 miles from the destination airport's traffic pattern.

- **W.I.R.E.S**. is an excellent aid

  Weather - obtain local weather , appropriate altimeter setting, the runway in use, NOTAMs
  Instruments - Set DG/compass, attitude indicator altimeter setting
  Radios - Use an organized flowcheck setting All Coms / Navs / GPS based on Airport Facilities / Chart Supplements

  - Com1 … Nav1 … Com2 … Nav2 … GPS … DME … Transponder

  Environment –
  What Runway is in use?
  Orient yourself, how are you arriving into the traffic area?
  your airport diagram available for orientation?

  Speed The pilot must slow the aircraft and set aircraft configuration for the airport and landing. The pilot must know specific aircraft traffic pattern profiles.

- Published AFM Descent / Arrival / Pre-Landing Checklists will be completed

Night Operations PVT / COM / IR

- Concept Review
  - The pilot will be familiar with night vision adaptation period, human physiology, anatomy of the eye, rods/cones, rhodopsin, night vision hypoxia, night aircraft equipment/flashlight, visual cues of night vision, aircraft lights (use & interpretation), airport lighting (runway & environment), pilot-controlled lighting, visual perceptions of night landings (with & without landing lights), importance of weather briefings

- Flashlights / Back up equipment
  - The pilot must have a flashlight containing a minimum of 2 "D" cell batteries or similar battery capacity.
  - If using electronic displays(iPads) for support of Situational Awareness, back up sources of battery must be carried.

Night Operations (continued) PVT / COM / IR

- Position Lights / Beacon
  - The pilot will illuminate both the beacon and position lights prior to engine start (for improved safety on the tarmac).

- Taxi / Landing Lights
  - The pilot will use the taxi/landing lights for all forward movement.
  - As a courtesy to other aircraft, when stopped for extended period (i.e. pre-takeoff run up) turn taxi/landing lights off.

- Strobe Lights
  - The pilot will use strobe lights only for takeoff and flight.
  - Do not use strobes on the ground as a courtesy to other pilots.

- Landing Light & Electrical System Malfunctions
  - The pilot will be proficient at handling landing light failures in safe manner with the outcome of the landing never in doubt.
  - Use your flashlight!
  - Soft field technique for a landing light failure landing is quite useful.

- Radio Navigation / Instrument Proficiency
  - The pilot will be proficient using the radio nav aids (VOR, GPS, ATC) and Instrument Scan/Control for all night operations.
  - Increased Risks to safety exist at night, Risk mitigation / Hazard Avoidance requires the pilot to have exceptional instrument flying skills to fly at night.
  - IFR flying technique should be incorporated for night flights.

- VFR Departures
  - A good practice is to climb in the traffic pattern to the pre-determined / pre-assessed cruising altitude that will provide safe avoidance of terrain and obstacles. A simple request to the Control Tower to climb in the traffic pattern to “X” cruising altitude is usually fully accommodated.

- VFR Arrivals
  - A good practice is to review the arrival airport’s instrument approaches for the intended runway. Multiple free sources of these approach plates can be obtained via the internet. The approach plates that serve the intended runway will display minimum safe altitudes and the distances appropriate to those distances. This practice in no way shall be used in any weather conditions less than SAFE VFR conditions.

  - PAPI or other Visual Approach Path Indicator Light Systems will be utilized and respected. Maintain at or above the glide path all times until over the runway threshold.

Traffic Pattern / Normal Landing PVT / COM

- Traffic Pattern Entry
  - The pilot will follow the Airman's Information Manual recommendations for entry into the traffic pattern
  - All over field flights will cross at greater than traffic pattern altitude plus 500 feet
  - The standard 45º entry to the downwind will be utilized (unless other entries are specified by ATC)

  - Downwind
    - The pilot will establish level flight at traffic pattern altitude
    - Airspeed is set at slow cruise speed
    - Manufacturer's AFM specified Prelanding checklist must be completed
    - GUMPSCC flow completed - gas, undercarriage, mixture, props/power, carburetor heat, cowl flaps
    - (Retractable gear) The pilot's hand must remain on the gear handle (when lowering gear) until safe indication occurs
    - Verbalize "Green gear lights" / "Props to be set on final"

  - Downwind abeam the Landing Zone (first quarter of the runway is the landing zone)
    - Power reduced to 1500 RPM or 15"
    - Flaps set to 10º
    - Descent airspeed is set to 90 KTS
    - The pilot must continuously judge flight path "high/low - fast/slow" to adjust pitch and power appropriately
    - Maximum bank to be used is 30º

  - Base
    - The base should be turned so as to comply with traffic spacing
    - Most importantly, the base should be flown so as to always be positioned for a loss of power and to continue to make the runway (first quarter of runway is target)
    - Power is being reduced incrementally on Base
    - Flaps set to 20º
    - Airspeed is set to 70 - 80 KTS
    - The pilot must continuously judge flight path, "high/low - fast/slow" to adjust pitch & power appropriately
    - The pilot will verbalize "Green gear indications/props to go"
    - Visually scan Final approach for aircraft prior to turning Final
    - Maximum bank angle to be used is 30º
    - Overshooting final approach is unacceptable - GO AROUND

  - Final
    - The aircraft should always be flown so as to land on the runway. If the engine was to fail, low & slow on final is unacceptable
    - High-low/fast-slow? Pitch controls airspeed and power controls altitude
    - Flaps set to 30° or partial flaps due to gusts / turbulence / potential windshear
    - Airspeed set to Published AFM V_{REF} (1.3 Vso) 65 – 75 KTS
    - Power continuously being reduced
    - Verbalize "Green gear lights/**props forward**" (last chance)
    - Flight path should always bring the aircraft to the first 1/4 of the landing runway; too high, too long - go around!

Traffic Pattern / Normal Landing (continued) PVT / COM

- Flare / Touchdown
  - Visual focal point is the departure end of the runway
  - Flare should be started just above ground effect (wing span distance)
  - Aircraft should always touchdown in to the stall attitude
  - Flat / 3 point landings are unacceptable
  - Keep the yoke full AFT until the nose of the aircraft touches pavement on its own accord (prevents nose gear and shimmy dampener damage)

- Roll out
  - Do not retract the flaps or begin the After Landing procedures until the aircraft is down and clear of the runway: (full stop landings)
  - Touch & go landings: prior to retracting flaps the pilot must verbalize “feels like a flap, looks like a flap, flaps up!” (Minimize chance of landing gear retraction)
  - Do not rush the aircraft clean up for takeoff configuration - you have enough time
  - All normal takeoff callouts completed for touch & go’s

- After Landing (Full Stop Landings)
  - Clear runway to the first set of hold short lines
  - Establish radio contact with Ground Control (towered airports)
  - Complete the Manufacturer’s AFM specified “After Landing” checklist at a complete stop
  - Verbalize “feels like a flap, looks like a flap, must be a flap ... flaps up” prior to retracting flaps

Short Field Landing PVT / COM / IR

- Downwind & Base Legs
  - See normal traffic pattern for operations

- Final
  - Establish the airspeed to the V_{REF} / short field landing approach speed published by the manufacturer (see POH)
  - Set the recommended flaps setting (see POH)
  - Verbalize “green gear lights/props forward”
  - High/low / fast/slow? Pitch controls airspeed, power controls altitude
  - 50' obstacle exists 300' prior to the touchdown zone
  - Clear the obstacle - power idle - pitch down - Flare -Land

- Flare & Touchdown
  - Full stall attitude
  - Firm, sticking landing with full AFT yoke for aerodynamic braking
  - Verbalize “feels like a flap, looks like a flap, flaps up” for maximum braking action (weight on tires)
  - Firm braking but DO NOT LOCK UP THE TIRES to a complete stop, on centerline!

Soft Field Landing PVT / COM / IR

- Downwind, Base & Final
  - See normal traffic pattern for operations
  - Soft field approach is identical to normal procedures

- Flare / Touchdown / Roll out
  - Leave a slight amount of power or add a slight amount of power in the Flare for reduced landing force
  - Must be full stall attitude with power
  - Weight of aircraft must be transferred to the main wheels, not on to the nose gear
  - Yoke must be full AFT & power maintained to keep taxi momentum (an actual soft field takes more power than hard surface for normal taxi)

- After Landing
  - Do not stop taxiing movement
  - See normal procedures

Go Around / Balked Landing / Missed Approach PVT / COM / IR

- Concept Review
  - The pilot must be familiar with stall recognition / recovery / avoidance, slow flight, left turning tendencies, lift and drag, POH procedures

- Safety Philosophy
  - The pilot should not hesitate to execute a Go Around in any situation that creates an uneasy, unsafe feeling; when in doubt, GO AROUND!
  - If you overshoot final from the Base turn, level out & GO AROUND!
  - Fail to verbalize the Final Approach call out - GO AROUND!
  - Aircraft pulls out on to the runway - GO AROUND!
  - Too high, too long - GO AROUND!
  - Poor approach, fear, -GO AROUND!

Go Around / Balked Landing / Missed Approach (continued) PVT / COM / IR

- 6 C's Procedures
- Cram it — Mixtures forward
  - Props forward
  - Full power
  - Carb heat off
- Climb it — Put nose of aircraft on the horizon & accelerate
- Clean it — Flaps up to approach (10°)
  - Verbalize "positive rate"
  - Gear up
  - Flaps up
- Cool it — Cowl flaps open
- Call it — Radio report to ATC or traffic pattern
- Comply — Comply with the published or the ATC Missed Approach Procedure or appropriate traffic pattern

- Climb out
  - Completed the 6 C's
  - Establish Vy attitude
  - Side step the runway to watch for departing traffic
  - Complete climb checklist
  - Flow Checks must be verified by the published Approved Flight Manual Checklists

After Landing Procedures PVT / COM / IR

- Do not touch any controls other than the throttle, yoke & brakes until the aircraft is clear of the runway & stopped (minimizing the chance of a gear retraction on the ground)

  - Clear runway & stop at correct side of hold short lines
  - Complete the after landing flow check, Verify with AFM After Landing Checklist
  - Do not retract flaps without verbalizing "feels like a flap, must be a flap, flaps up!"
  - Landing lights off (daylight), as required (night)
  - Strobes off
  - Transponder to VFR 1200
  - Mixture lean
  - Carb heat off
- Flow Checks must be verified by the published Approved Flight Manual Checklists
- Collision Avoidance / Runway Incursion Avoidance
  - The pilot will verbally announce "Clear Left, Center and Right" (clear of hazards) at all intersections.
  - Know the taxi movement / taxi situational awareness at all times, Have the Airport Diagram available during all taxi movements.
- Contact ATC for taxi clearance (Towered airport) & comply with instructions or Advise traffic of taxiing intentions on CTAF(Non towered airport)

Shutdown & Securing the Aircraft / Post-Flight PVT / COM / IR

- Position the aircraft according to ramp handler's hand signals or into the tie down "T" position

- Use the published checklist for shut down. If no checklist exists, use this acronym "S.L.I.M."
  - S - All switches (elec., radios) off
  - L - Lean mixture to idle cut off
  - I - Ignition to off & remove key
  - M - Master switch off

- Secure the aircraft
- Trim wheels set to takeoff position
- Control locks installed
- Seat belts organized for next pilot
- All trash removed for next pilot - leave it nicer than you found it!
- 3 point tiedowns tied & secure

- Maintenance problems explicitly notated
  - Be specific in the problem's description - what, when, how, did it improve, did it get worse, etc.

- Log Hobbs & Tach times for billing & maintenance purposes

Basic Attitude Instrument Flight Skills for Non Instrument Rated Pilots PVT / COM

- Emergency Procedure
  - The non-instrument pilot must understand any flying without reference to the outside (visual) horizon is an EMERGENCY!
  - YOU MUST GET BACK TO VISUAL CONDITIONS

- Scan
  - The pilot must scan, interpret & control SOLELY by the instruments
  - DO NOT TRUST YOUR BODY'S SENSATIONS
  - Look at all instruments with a systematic movement of your eyes (scan)
  - Do not fixate on any instruments

- Control Inputs
  - Do not use large control inputs
  - Use 15 ° or less in bank
  - Use +/- 7 ° pitch control (2 bar widths of the attitude indicator's aircraft's wings)
  - USE FINESE
  - Overcontrol (i.e. large control inputs) leads to Vertigo & Spacial Disorientation

Basic Attitude Instrument Flight Skills for Non Instrument Rated Pilots (continued) PVT / COM

- 180° Turn
  - Usually the quickest maneuver to exit IFR conditions is a 180° turn,
  - Hopefully VFR conditions are behind you, where you came from.
  - SCAN & FLY BY INSTRUMENTS
  - Look at bottom of Directional Gyro for best heading
  - "Say this new heading out loud"(ie VERBALIZE IT !)
  - Scan & initiate a turn to new heading
  - (Use NO MORE THAN 15° OF BANK)
  - Scan & roll out on the new heading; hold this heading you reencounter VFR conditions

- Declaring An Emergency
  - If unable to locate VFR conditions with the 180° turn, you are now in an EMERGENCY situation!
  - Scan & fly the A/C
    - Climb -
      - Improved obstacle clearance
      - Improved radio & radar coverage for ATC or FSS
    - Confess -
      - TELL YOURSELF YOU ARE IN DANGER
    - Communicate -
      - Dial in 121.5 & 7700
      - Contact any FSS or ATC for help
      - "May Day, May Day, May Day"
      - Non-instrument pilot in IFR conditions
      - Request assistance for VFR conditions
    - Comply -
      - Follow ATC instructions & SCAN
    - Conserve -
      - Set power & mixture for cruise

Basic Attitude Instrument Flight Skills (IFR Rating) IR

- Fundamental Skills
  - Scan (cross check)
    - No one procedure works for all pilots
    - Centralized scan based on the attitude indicator
  - Interpretation of instruments
    - Watch the needles and understand what the instruments are revealing
    - Is the aircraft flying the way the pilot wants?
  - Control of aircraft
    - Pilot will positively control the aircraft's pitch, roll, & yaw from scan & interpreting the instruments
- Attitude Indicator
  - This is the most important instrument for setting any attitude or transitioning to a new flight attitude
  - Bank information referenced for 10°, 20°, 30°, 60°, and 90°
  - Pitch information referenced in 5° graduations for + and - pitch attitudes
  - Changing attitude by one width of the reference aircraft's wings = 2° of pitch change. This is an extremely important reference to understand & use wisely.
    - ½ width of wings = 1° pitch change
- Pitch Information
  - Altimeter (primary), Airspeed indicator (supporting), & VSI (supporting
  - Attitude Indicator used solely as a transition to pitch attitudes instrument only
- Bank (Roll) Information
  - Heading indicator (primary)/compass, Turn Coordinator (supporting)
  - Attitude Indicator is solely used as a transition to bank attitudes instrument only
- Yaw Information
  - The ball of the Inclinometer is primary for yaw information
  - "Step on the ball" to coordinate
- Performance information
  - A key concept to understand is angle of attack (pitch) + power = performance
  - Pitch and power are inter-related in getting the desired performance from the aircraft
  - Airspeed Indicator and Tachometer/Manifold Pressure are performance indicators

Basic Attitude Instrument Flight Skills (IFR Rating) (continued) IR

- BAI Rules of Thumb
  - Finesse is paramount, i.e. scan & control so as to catch any problem ASAP, and make the smallest control inputs required
  - Lead altitude level offs by 10% of VSI rate (i.e. 500 FPM to 50 ‘ lead factor)
  - Lead heading roll outs by ½ of the bank angle (i.e. 30° of bank to 15° lead factor)
  - Any altitude deviation within 100', use 1° or less of pitch change for corrections
  - Any heading deviation use a bank angle =/less than ½ of the deviation up to standard rate (i.e. 20° off heading to 10° bank)
  - Any heading deviation within 10°, use the rudder to correct (very useful on a localizer approach)

- Maneuvers Building BAI Skills
  - Patterns A, B, C in the Instrument Flying Handbook
  - Vertical S maneuver

- 5 T’s : Turn, Time, Twist, Throttle, Talk

Unusual Attitude Recoveries PVT / COM / IR

- Scan Instruments
  - The pilot will scan instruments to spot excessive attitude, airspeed, and/or altitude changes

- Nose High Indications
  - Attitude Indicator well into “blue sky”
  - Airspeed decaying rapidly
  - Altitude possibly climbing
  - Directional Gyro possibly turning

- Nose Low Indications
  - Attitude Indicator well into the black (brown) area
  - Airspeed increasing rapidly
  - Altitude decaying rapidly
  - Directional Gyro possibly turning

Unusual Attitude Recoveries (continued) PVT / COM / IR

- Recovery Procedures
  ***Attitude Indicator - (possibly tumbled - possibly unreliable) ***

- Nose High Recovery
  - 1-Full power
  - 2-Reduce the pitch attitude to reverse slow airspeed trend
  - 3-Level wings w/Turn Coordinator to stop DG trend
  - 4-Stabilize back to Cruise Airspeed & control altitude
  - 5-Reduce power to Cruise Setting & complete Cruise Checklist

- Nose Low Recovery
  - 1-Power idle
  - 2-Level wings w/ Turn Coordinator
  - 3-Increase pitch attitude to reverse high airspeed trend
  - 4-Stabilize back to Cruise Airspeed & control altitude
  - 5-Increase power to Cruise Setting & complete Cruise Checklist

VOR Navigation PVT / COM / IR

- 8 Cardinal Compass Points
  - The pilot must know the 8 Cardinal Compass Points for ease of positional awareness.
  - North = 360º
  - Northeast = 045º
  - East = 090º
  - Southeast = 135º
  - South = 180º
  - Southwest = 225º
  - West = 270º
  - Northwest = 315º

- VOR System Knowledge
  - The pilot will know the following terms: VOR, VOR/DME, VORTAC, Magnetic North, Radial, Inbound on a Radial, Outbound a on Radial, Omni Bearing Selector (OBS), Course Deviation Indicator (CDI), To & From Indications, Reciprocals
  - The pilot will know the radio equipment in the aircraft related to VOR navigation

- VOR Orientation
  - Tune & identify the Nav Aid for the proper Morse Code Identifier
  - Rotate the OBS knob until the CDI centers with a “FROM” flag
  - Read the aircraft’s current radial at the top of the OBS compass card
  - Mentally correspond the radial to the 8 card points for “orientation”

VOR Navigation (continued) PVT / COM / IR

- VOR "Cross Check" for Positional Awareness
  - To locate yourself on the chart using two VOR's
  - Simply use the Orientation procedure using 2 VOR's
  - Where the radials intersect = your position

- VOR Radial Interception & Tracking

  - The most important concept to understand is that when tracking inbound on a radial your "desired course" is 180° opposite of the radial. When tracking outbound on a radial your "desired course" is the same as the radial.

    Example:
    - Track inbound on 180º radial
    - Desired course = 360º

    - Track outbound on 315º radial
    - Desired course = 315º

- VOR Intercept Procedures

1. Tune & identify the Nav Aid for the proper Morse Code Identifier
2. Rotate the OBS knob to set the **desired course** (THE MOST IMPORTANT STEP)
3. Note needle deflection, mentally follow the bottom of the CDI needle up to where it intersects the OBS compass card. This deduced heading is the intercept heading.
4. Turn the shortest direction to the intercept heading.
5. Hold the intercept heading, as CDI needle centers, turn back to desired course
6. Hold constant headings & repeat steps 3 - 5, if necessary for wind correction angles.

RMI / NDB ORIENTATION / INTERCEPT / TRACKING IR

- Trans-positioning the ADF Needle
  - The primary skill involving the use of the ADF for navigation is the mental Trans-positioning of the ADF needle on to the directional gyro.

- The "Law of the Needle" applies to the RMI or the ADF.
  - The head falls (toward the bottom of the compass card),
  - The tail rises (toward the top of the compass card)

- Terminology & Concepts to know
  - RMI, ADF, NDB, bearing, magnetic bearing to the station, magnetic bearing from the station, relative bearing, 4 categories of NDBs, AM radio, thunderstorm and shore effects, TDI, DHI

- The RMI Needle points to a VOR station. The ADF Needle points to a NDB station. The RMI needle design is always placed onto a Gyro Heading Indicator. The ADF Needle must be mentally transposed on the heading indicator.

- Orientation
  - The pilot must know the 8 Cardinal Compass Points to gain orientation using the RMI or ADF (See VOR Navigation)
  - The "tail" of the needle reveals the aircraft's position when trans-positioned on to the directional gyro.

- Orientation procedures
  - Tune & ID the navigational signal
  - Verify heading indicator and mag compass are in agreement
  - Look at the needle's position on the heading indicator
  - Locate needle "tail's" position on the heading indicator
  - "Tail" position equals the Orientation

    - Are you:
      - N? NE?
      - S? SE?
      - E? NW?
      - W? SW?

RMI / NDB ORIENTATION / INTERCEPT / TRACKING (continued) IR

- Intercepting a Bearing “TO” the Station
  - 1-Tune & ID the navigational signal.
  - 2-Look at the needle’s position on the heading indicator.
  - 3-Locate the **D**esired bearing on DG.
  - 4-Move from desired bearing to the **H**ead of the needle.
  - 5-Continue in same direction past the “Head” , the same number of degrees to an **I**ntercept heading.
  - 6-Turn the aircraft to the Intercept heading
  - 7-As Head of needle falls on the heading indicator to the desired bearing, turn the aircraft to the desired bearing
  - 8-Hold constant headings, watch for the wind to move to A/C off the desired bearing, then use the DHI method on a small scale to obtain the wind correction angle

DHI = (Desired to the Head Plus Intercept)

REMEMBER TO CONSTANTLY TRANSPOSE THE ADF NEEDLE TO THE DG.

- Intercepting a Bearing “from” the Station
  - 1-Tune & ID the navigational signal.
  - 2-Look at the needle’s position on the heading indicator
  - 3-Locate the **T**ail of needle on the DG.
  - 4-Move from the tail to the **D**esired bearing.
  - 5-Continue in the same direction past the desired bearing the same number of degrees to the **I**ntercept heading
  - 6-Turn the aircraft to the intercept heading
  - 7-As tail rises to the desired bearing, turn the aircraft to the desired bearing.
  - 8-Hold constant headings, watch for the wind to move to A/C off the desired bearing, then do the TDI method on a small scale to obtain the wind correction angle.

TDI = (Tail to Desired Plus Intercept)

REMEMBER TO TRANSPOSE THE NEEDLE TO THE DG

Copying an ATC Clearance PVT / COM / IR

- VFR pilots departing an airport within Class B or Class C will obtain a departure clearance from Clearance Delivery. The format is easy to remember by the following acronym "R.A.F.T.".

    - R - Route of Flight
    - A - Altitude to climb to
    - F - Frequency for ATC
    - T - Transponder code

    * Be ready to copy the clearance onto paper.

- IFR pilots will always receive a clearance from Clearance Delivery (where available), Ground Control, or FSS by phone. It always comes in a standard format. An easy memory aid (acronym) for an IFR clearance is "C.R.A.F.T."

    - C - Clearance limit
    - R - Route (including SIDS, STARS, Preferred Routes, After Takeoff Instructions)
    - A - Altitude (initial & expected)
    - F - Frequency for ATC
    - T - Transponder code

- Read back clearance for confirmation or inquire about any questions or problems with the clearance.

- Hold / Void Times
    - If clearance is obtained on phone from FSS, the pilot will understand and comply with any "Hold for Release" and "Void Times".

- Pilot in Command Authority
    - The Pilot In Command is the ultimate authority of the aircraft.
    - Any problems with an ATC clearance should be amended & obtained by the PIC (i.e. vectors toward hazardous wx, requests exceeding a/c parameters).

Copying an ATC Clearance (continued)

- Radio Communication Failure IR
  - In case of total communication failure, the pilot must know what to do with IFR clearance information.

  - If the flight is in VFR conditions, REMAIN in VFR conditions to land at an Airport.

  - "A.R.C." Method

    A - Altitude - Know the appropriate altitude to fly (M E A)
    - Highest of
      - **M**- Minimum Enroute Altitude
      - **E**- Expected Altitude
      - **A-** Assigned Altitude

    R - Route - Know the appropriate route to fly (A V E F)
    - In order of expected compliance
      - **A**ssigned
      - **V**ectored to
      - **E**xpected
      - **F**iled

    C - Clearance limit - What to do when you arrive at Clearance Limit or IAF
    If CL is Destination Airport: Begin your approach at filed ETA or
    If CL is any fix prior to destination: Hold and Leave hold at EFC, continue to destination

Compass Turns IR

- Compass Errors
  - Memory Aid - V.D.M.O.N.A.
  - The pilot will understand the concepts of **V**ariation, **D**eviation, **M**agnetic Dip, **O**scillation, **N**orthern turning errors, **A**cceleration errors

- Reading & Interpreting a Magnetic Compass (Non-Vertical Card)
  - As an aid to orientation, set a moveable OBS card to the compass heading
  - Turn so as to "drag" the desired heading to the compass lubber line (i.e. desired heading is right of lubber line - to turn left)

- Compass Turn Compensation Aids
  - Memory Aid - U.N.O.S.
  - **U**ndershoot **N**orth headings
  - **O**vershoot **S**outh headings
  - Due to magnetic dip, the compass will lag turning north and lead turning south, no error east or west
  - Magnetic dip is a function of the aircraft's latitude
  - Latitude = Undershoot/overshoot factor for north or south
  - (Houston is 29 deg North, Correction Factor is approximately 25 -30 deg)

- Use the GPS "TRK" indication as a help in making Compass Turns easier

Version 2020.01

Holding Patterns / Holding Entries IR

- Concept Review
  - The pilot will be familiar with the AIM's description & requirements for holding patterns, IFR position reporting requirements, orientation relating to fixes (VOR, NDB, intersections), hold entries (direct, teardrop, parallel)

- Entry Sectors
  - "Nose", "Body", "Outside" sectors

- Entry Orientation
  - The type of entry is contingent upon the sector into which the aircraft enters after crossing the fix (this concept differs from the FAA Recommendation)
    - Cross into the "Nose" = Direct entry
    - Cross into the "Body" = Teardrop entry
    - Cross into the "Outside" = Parallel entry

- Cockpit Hold Entry Determination

1. Tune & ID fix
2. Go direct to fix
3. On DG, locate outbound direction (cardinal direction in the clearance)
4. Put finger on the outbound direction and move it to the center of the DG creating your inbound leg (for visualization)
5. Go left or right (with your finger) appropriate to the holding clearance
6. Visualize the holding pattern on the DG
7. Ask yourself, what entry sector will the aircraft cross into
    - Nose - D, Body - TD, Outside - P

- Rules of Thumb
  - The cardinal direction (N, S, E, W, etc.) In the ATC holding clearance always indicates the outbound direction
  - If the outbound direction is in the bottom ½ of the DG, it will be a direct entry; if it is in the top ½ of the DG it is either a teardrop or a parallel entry

Version 2020.01

DME Arc IR

- Concept Review
  - The pilot will be familiar with VOR concepts, DME concepts, orientation & intercepts, wind correction factors, ATC phraseology

- 5 T's - Turn, Time, Twist, Throttle, Talk

- Turning On to the Arc Lead Factor
  - 1% of ground speed = lead factor
    - IE 99 KTS GS - .99 or 1.0 NM lead factor, if inside the 10 DME arc - turn at 9.0 DME, if outside the 10 DME arc - turn at 11.0 DME

- Orientation Tricks
  - Always use VOR in the from status

  - If confused, turn 90° to reference radial then determine left or right correction for wind
  - Use Nav 1 for inbound approach course and use Nav 2 to fly the arc
  - Radial = Orientation

- Flying the Arc (Using the ***Keep Centering the CDI Method***)
  - Tune & ID the VOR & DME
  - Intercept the specified course towards the DME fix (this might be inbound towards the VOR or outbound from the VOR)
  - At a lead distance factor (1% of GS) turn 90° into direction of arc
  -
  - Aircraft should be approximately 90° to the original radial
  - - - - - - - -(This is a repeating process)- - - - - - - - - -
  - Hold heading until CDI moves ½ to ¾ deflection
  - Twist OBS to re-center the CDI {this reflects the new reference radial
  - Turn the Aircraft to be 90° to the new reference radial

- -
  - Watch DME to compensate for wind. WCA will vary throughout the arc if distance is less than desired - turn away from arc (10° - 15°) — Repeating Process
  - Continuously orient yourself (reference radial = position)
  - Watch for inbound course (Nav #1) CDI to come alive and turn so as to intercept this course

IFR Approach Procedures IR

- Concept Review
  - The pilot will be knowledgeable of Jeppesen and/or NOS approach plates (orientation & symbology), aircraft power settings/configurations (profiles), use of checklists, use of memory and flowchecks, continuous orientation skills

- Orientation Skills
  - The pilot must be proficient at knowing his/her location at all times
  - Knowing position allows the pilot to think and prepare ahead of the aircraft
    - NDB orientation (tail on DG = location)
    - VOR orientation (radial = location)
    - GPS orientation

- 5 T's
  - The pilot will verbally call out the 5 T's at all fixes
  - Turn, Time, Twist, Throttle, Talk

    - Turn - Do you turn? To what heading?
    - Time - Do you start clock or note crossing time?
    - Twist - Do you twist OBS to a new course?
    - Throttle - Do you slow down or go down?
    - Talk - Do you make a ATC report?

- Approach Briefing
  - The pilot will use a standardized, consistent procedure for organizing and setting up the aircraft for an approach
  - This briefing must be accomplished correctly prior to being established on any published segment of an approach
  - **W.I.R.E.S**. is an excellent aid
    - **W**eather - obtain local weather & appropriate altimeter setting
    - **I**nstruments - Set DG/compass, attitude indicator altimeter setting
    - **R**adios - Use an organized flowcheck setting All Coms / Navs / GPS based on the designated Approach Plate

      - Com1 … Nav1 … Com2 … Nav2 … GPS … DME … Transponder
      - Set frequencies and courses
      - Identify frequencies

    - **E**nvironment - Where are you?
      - What does ATC expect (vectors or full?)
      - Brief the entire approach plate systematically top to bottom
      - CAT: Identify each Approach Segment's Courses, Altitudes, Times
      - Missed: Identify missed approach fix and procedure
    - **S**peed The pilot must slow the aircraft and set aircraft configuration for the approach. The pilot must know specific aircraft profiles.

IFR Approach Procedures(continued) IR

- Approach Segments Procedures
  - EnRoute/Transition - WIRES Briefing
  - Initial - 5 T's, 2 minutes outbound for procedure turn
  - Intermediate - 5 T's, Prelanding Checklist
  - Final - Verbalize "Gear down, go down, GUMPS, 5T's, Start clock"
    - Descent to Minimums (round up the MDA)
  - Missed - 6 C's (Cram it, Climb it, Clean it, Cool it, Call it, Comply)

Aircraft Configurations

Condition	Airspeed*	Power*	Configuration*
Std Cruise			
MDA Level			
Precision Descent			
Non Precision Descent			
Go Around			

*Fill in the parameters as you learn your aircraft