* SSE GPS Approach [FTI 412.1]
	+ Configure flaps to approach, set the props full forward, and slow to 130 KIAS anytime after the normal configuration point, but before the FAF. The gear should be left in the “up” position.
	+ During warmer months it may be impossible to maintain level flight and 130 KIAS with the gear down. If at any time you are unable to maintain altitude or airspeed, you should clean up completely to eliminate drag.
	+ Because less power is available when single-engine, it may be desirable to use a slightly higher lead than normal when leveling off at the MDA.
	+ Do not lower the gear and complete the Landing Checklist until the runway environment is in sight and you are in a safe position to descend from the MDA for landing.
	+ During SSE training, ensure the gear is down no later than the 90° position or one mile from the threshold
	+ For actual single-engine approaches in good visibility, utilizing VASI or other optical system is desirable to maintain a “normal” 3° glide-slope. In this situation, the approach may be considered to be precision for configuration purposes.
	+ A common student mistake on single-engine approaches is to rush the procedure and devote total attention to shutting down the engine. If you do this, you will most likely lose track of where you are on the approach
	+ If an engine fails or must be shutdown after the aircraft has already been fully configured:
		- The configuration should be matched with the above guidelines.
		- On a precision approach, additional power on the available engine will be required, but changing the configuration should not be necessary.
		- On a non-precision approach, unless ready to descend from the MDA for transition to land, it is normally necessary to raise the gear immediately and adjust power on the available engine to maintain airspeed.
		- In the event that you are configured on a SSE approach with vertical guidance and the vertical guidance is lost, you must clean up per above guidance unless the field is in sight and you are in a safe position to land, as if you are now on a non-precision approach
			* A good acronym to remember for this scenario is CRAT:
				+ Configuration – Clean UP
				+ RADALT – Reset to localizer AGL
				+ Altitude – Re-brief LOC MDA
				+ Timing – Re-brief LOC timing
* SSE Configuration Point [FTI 412.1]
	+ Precision : ½ dot below glide-slope at glide slope intercept altitude
	+ Non Precision : In safe position to land
	+ PAR : 10 second gear warning
	+ ASR w/ altitudes : 10 second gear warning
	+ ASR w/o altitudes : Safe position to land
* Emergency Voice Reports [FIH A.1]
	+ If under positive radar control (or in an environment that requires a specific squawk) maintain codes as previously set. In situations other than that, switch to Mode 3/A, code 7700
	+ Transmit the following message to any agency on the air-ground frequency in use at the time. If unable to establish communication, attempt contact on any emergency frequency (ex. 121.5/243.0/etc)
	+ Transmit as many of the following elements as necessary:
		- Distress, MAYDAY (3 times) or Urgency, PAN PAN (3 times)
		- Name of station addressed
		- Aircraft identification and type
		- Nature of distress or urgency
		- Weather
		- Pilot’s intention (bailout, ditch, crash, etc.)
		- Pilot’s request (fix, steer, escort, etc)
		- Present position & heading
		- Altitude or Flight Level
		- Fuel in hours and minutes
		- Numbers of persons (souls) on board
		- Any other information that might be helpful
	+ When in DISTRESS CONDITION with bailout, crash landing imminent, transmit the above information (time and circumstances permitting) plus:
		- ELT status
		- Landmarks
		- Aircraft Color
		- Emergency equipment available on board
	+ Set radio for continuous transmission for bailout and for crash landing or ditching (if risk of fire is not a consideration)
	+ DISTRESS – Call MAYDAY when you are threatened by serious and or imminent danger and require immediate assistance (ex. Ditching, crash landing or abandoning aircraft).
	+ URGENCY – Call PAN PAN when a condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight but does not require immediate assistance (ex. Lost, fuel shortage, partial engine failure, etc.)
	+ CANCELLATION – When an aircraft is no longer in distress, a cancellation message shall be immediately transmitted on the same frequency or frequencies used for the distress message.
* Partial Panel Approach [FTI 412.8]
	+ Trouble shoot and transfer the controls to the co-pilot if the system failure affects only the pilots instrument panel.
	+ Remain VMC and land as soon as practical if weather is not a problem and this is an option
	+ Secure all electrical equipment (Big Four) that may influence the wet compass if the malfunction is a heading problem
	+ If the heading indicator should fail, advise the radar controller and request a no-gyro radar approach.
	+ Perform turns during the transition to final by establishing an AOB on the attitude indicator that will approximate a SRT, not to exceed 30° of bank.
	+ If attitude information is also unavailable, a single needle width deflection of the pilot’s turn needle will indicate a SRT.
	+ On final, do not use more than a ½ SRT.
	+ Initiate turns immediately upon hearing the words “Turn Right” or “Turn Left”; likewise, stop turn on receipt of words “Stop Turn”. Acknowledge controller’s commands until advised not to.
	+ Big Four:
		- Windshield heat
		- Windshield wipers
		- Air Conditioning
		- Forward Vent Blower
* Flight Director Malfunctions
* Autopilot Malfunctions [NATOPS 14.16]
	+ The following conditions will cause the autopilot to disengage automatically:
		- Any interruption or failure of power
		- Vertical gyro failure
		- Vertical gyro fast erect
		- Compass ‘Increase-Decrease’ switch
		- Flight control system power or circuit breaker failure
		- Directional gyro failure
		- Torque limiter failure
	+ If an engine fails, disengage autopilot and re-trim aircraft; autopilot may be reengaged if desired.
	+ If autopilot is used in conjunction with an instrument approach, maintain 120 KIAS for single-engine approach speed until landing is assured.
* Autopilot Disconnect Procedures [NATOPS 14.16]
	+ The autopilot may be intentionally disengaged by any of the following methods:
		- AP/YD disconnect switch (either control wheel)
		- Push autopilot TEST button on controller panel
		- Actuation of GO-AROUND button (left power lever)
		- Pulling FLT DIR/AP POWER circuit breaker
		- Turning OFF BATT/GENS (gangbar) or AVIONICS MASTER switch
		- Turn off inverter
		- Activation of respective vertical gyro FAST ERECT button
		- Actuation of respective compass INCREASE-DECREASE switch
		- Actuate electric elevator trim
* Weather Filing Criteria [OPNAV 3710.7T 4.6.4]
	+ Flight plans shall be filed based on all of the following
		- The actual weather at the point of departure at the time of clearance
		- The existing and forecast weather for the entire route of flight
		- Destination and alternate forecasts for a period 1 hour before ETA until 1 hour after ETA.
	+ For VFR flight plans, the pilot in command shall ascertain that actual and forecast weather meets the criteria specified in [OPNAV 3710.7T] paragraph 5.2.4 prior to filing a VFR flight plan
	+ Regardless of weather, IFR flight plans shall be filed and flown whenever practicable as a means of reducing midair collision potential.
	+ Forecast meteorological conditions must meet the weather criteria for filing IFR flight plans and shall be based on the pilot’s best judgment as to the runway that will be in use upon arrival.
	+ An IFR flight plan may be filed for a destination at which the forecasted weather is below the appropriate minimums provided a suitable alternate airfield is forecast to have at least 3,000-feet ceiling and 3-statute-mile visibility during the period 1 hour before ETA until 1 hour after ETA.
	+ If an alternate airfield is required, it must have published approach compatible with installed operable aircraft navigation equipment that can be flown with out the use of two-way radio communication whenever either one of the following conditions is met:
		- The destination lacks the above described approach
		- The forecasted weather at the alternate is below 3,000-foot ceiling and 3-statute-mile during a period of 1 hour before ETA Until 1 hour after.
	+ Flights shall be planned to circumvent areas of forecast atmospheric icing and thunderstorm conditions whenever practicable.
	+ The National Weather Service Storm Prediction Center issues unscheduled Weather Watch (WW) bulletins as graphical advisories for the Continental United States whenever a high probability exists for severe weather.
		- Provides estimates of the potential for convective activity for a specific time period, will be provided to pilots or certified crewmembers upon request, and are included with all briefings.
		- Except for operational necessity, emergencies, and flights involving all-weather research projects or weather reconnaissance, pilots shall not file into or through areas for which a WW has been issued unless one of the following exceptions apply:
			* Storm development has not progressed as forecast for the planned route. In such situations:
				+ VFR filing is permitted if existing and forecast weather for the planned route permits such flights
				+ IFR flight may be permitted if aircraft radar is installed and operative, thus permitting detection and avoidance of isolated thunderstorms.
				+ IFR flight is permissible in positive control areas if VMC can be maintained, thus enabling aircraft to detect and avoid isolated thunderstorms.
			* Performance characteristics of the aircraft permit an en route flight altitude above existing or developing severe storms.
		- See figure 4-1. IFR Filing Criteria

|  |  |
| --- | --- |
| Destination WeatherETA ± 1 hour | Alternate WeatherETA ± 1 hour |
| 0 – 0 up to but not including Published minimums | 3000 – 3 or better |
| Published minimums up to but not including 300 – 3(Single-piloted absolute minimums 200 – 1/2 | **NON-PRECISION** | **ILS** | **PAR** |
| \*Published minimums + 300-1 | Published minimums + 200 – ½  | \*Published minimums + 200 – ½  |
| 3000 – 3 or better | No alternate required |
| \*In the case of single-piloted or other aircraft with only one operable UHF/VHF transceiver, radar approach minimums may not be used as the basis for selection of an alternate airfield. |

* Approach & Landing Minimums [FAR 91.175 / AIM 5.4.20]

Landing Minimums

* + - The rules applicable to landing minimums are contained in the FAR 91.175, however do not apply to US Military aircraft, for the majority.

Approach Minimums

* + - Final approach obstacle clearance is provided from the start of the final segment to the runway or missed approach point, whichever occurs last. Sidestep obstacle protection is provided by increasing the width of the final approach obstacle clearance
		- Circling approach protected areas are defined by the tangential connection of arcs drawn from each runway end. The arc radii distance differs by aircraft approach category.
		- Obstacle clearance is provided at the published minimums (MDA) for the pilot who makes a straight-in, side-steps, or circles. Once below the MDA the pilot must see and avoid obstacles.
		- Straight-In minimums are shown on the IAP when the final approach course is within 30° of the runway alignment (15° for GPS IAPs) and a normal descent can be made from the IFR altitude shown on the IAP to the runway surface.
		- Landing minimums for a side-step maneuver to the adjacent runway will normally be higher than the minimums to the primary runway
		- Approach minimums are published for different aircraft categories and consist of a minimum altitude (DA, DH, MDA) and required visibility.

Definitions

* + - Decision Altitude (DA) is a specified altitude in an instrument approach procedure at which the pilot must decide whether to initiate an immediate missed approach if the pilot does not see the required visual reference, or to continue the approach. Decision Altitude is expressed in feet above mean sea level.
		- Decision height (DH) is a specified height above the ground in an instrument approach procedure at which the pilot must decide whether to initiate an immediate missed approach if the pilot does not see the required visual reference, or to continue the approach. Decision height is expressed in feet above ground level.
		- Minimum Descent Altitude (MDA) is the lowest altitude specified in an instrument approach procedure, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering until the pilot sees the required visual reference for heliport or runway of intended landing.
* SSE GCA Approach [FTI 411.1, 412]
	+ Although not flying an approach with a diagram depicted on an approach plate, have an approach to the same runway up and not only brief the approach minimums, but all other applicable field information
	+ Airport Surveillance Radar (ASR) is a non-precision approach offering course guidance only, without glide-slope.
		- Configure flaps & props and slow to 130 KIAS on dogleg or base
		- Upon contacting the final approach controller give altitude, last assigned heading, request recommended altitudes on final and 10 second gear warning. Configure landing gear and complete landing checklist at the 10 second gear warning. Upon instruction begin descent to MDA. Controller will issue course guidance when required and give range information each mile while on final approach.
		- The controller will inform you when reaching the MAP.
		- If you get well below the recommend altitudes you must clean up the gear until in safe position to land.
		- If not receiving recommended altitudes on final the landing gear should remain in the ‘up’ position until in a safe position to land.
	+ Precision Approach Radar (PAR) is a precision GCA that provides both course and glide-slope guidance.
		- Configure flaps & props and slow to 130 KIAS on dog-leg or base legs. Upon checking in with the final approach controller give altitude, last assigned heading and request 10 second gear warning.
		- Lower landing gear and complete landing checklist at the 10 second gear warning.
		- Descent begins when the controller says “On Glide Path”, upon which the pilot should establish the predetermined rate of descent. (approximately 600-700 FPM in the TC-12B, typically)
		- Avoid excessive power, pitch or bank changes. Normally pitch changes of 1° should be sufficient to correct back to glide path.
		- Make heading changes immediately, using shallow angles of bank not to exceed ½ SRT.
		- Decision Altitude (DA) is the MSL altitude and Decision Height (DH) is the AGL altitude at which a decision must be made on a precision approach. The controller will advise when DH has been reached. In the cockpit, DA is determined by the barometric altimeter or controller, which is reached first.
		- Two NATOPS qualified aviators must be at the controls to utilize minimums lower than 200 feet.
	+ If, at anytime , you are unable to maintain glide-path or airspeed, you should retract the gear or clean up completely to eliminate drag. After re-establishing glide-path and airspeed, reconfigure and complete the Landing Checklist again.
* SSE PAR Configuration Point [FTI 412.2]
	+ On the base or dog-leg, lower the flaps to approach, set the props full forward, and slow to 130 KIAS.
	+ At the 10 second gear warning, lower the landing gear and complete the Landing Checklist.
* SSE ILS Approach
	+ Maintain a clean configuration and 150 KIAS if possible for the initial and intermediate segments of the approach. 140-150 KIAS is allowable.
	+ Flown the same as a regular ILS approach with the exception of landing gear configuration point.
	+ Configure flaps to approach, set props full forward and slow to 130 KIAS anytime after the normal configuration point.
	+ Make sure you add enough power to stay on glide-path
* SSE ILS Configuration Point [FTI 412]
	+ Once established on final and approaching the normal configuration point (1 ½ dots below glide-slope), lower the flaps to approach, set props full forward, and slow to 130 KIAS.
	+ At ½ dot below glide-slope intercept, lower the landing gear & complete the Landing Checklist.
* SSE ASR Configuration Point [FTI 412]
	+ On the base or dog-leg to final, lower the flaps to approach, set the props full forward and slow to 130 KIAS.
	+ With Recommended Altitudes
		- Lower the landing gear and complete the landing checklist at the final controller’s 10 second gear warning.
	+ Without Recommended Altitudes
		- Lower the landing gear and complete the landing checklist at a safe position
* SSE LOC Approach
	+ Maintain a clean configuration and 150 KIAS if possible for the initial and intermediate segments of the approach. 140-150 KIAS is allowable.
	+ Flown the same as a regular localizer approach with the exception of landing gear configuration point.
	+ Configure flaps to approach, set props full forward and slow to 130 KIAS at the normal configuration point, and hold the gear until in a safe position to land
* SSE LOC-BC Approach
	+ Maintain a clean configuration and 150 KIAS if possible for the initial and intermediate segments of the approach. 140-150 KIAS is allowable.
	+ Flown the same as a regular localizer approach with the exception of landing gear configuration point.
	+ Configure flaps to approach, set props full forward and slow to 130 KIAS at the normal configuration point, and hold the gear until in a safe position to land
* Procedure Track
	+ Arc/Radial Combination [Primary Instrument FTI]
		- Arcing is defined as flying at a constant distance from a TACAN or VOR/DME station by reference to DME
		- In practice you do not actually fly a “perfect arc”, but by varying AOB and heading, a close approximation of an arc can be achieved.
		- When turning onto an arc from a radial, the amount of lead should be 0.5% of the aircrafts groundspeed.
			* At 150 KIAS, this is approximately 0.8 NM
		- Turn to place the TACAN or VOR needle on the 90° benchmark
			* If DME is less than the desired arc distance, maintain heading. If excessively inside the arc, turn away from the NAVAID to place the head of the needle just below the 90° benchmark
			* If the DME is more than the desired arc distance, turn toward the NAVAID to place the head of he needle just above the 90° benchmark.
		- Turn off an arc onto a radial: (60/DME) x (5% Groundspeed)
	+ Teardrop
		- Per Advanced FTI:
			* The advantage of the teardrop is that pilots can proceed outbound using course guidance to achieve the proper offset from the PT course so that one continuous turn will establish you inbound
			* Rules of Thumb
				+ 30° teardrop for 1 minute outbound
				+ 20° teardrop for 2 minutes outbound
				+ 10° teardrop for 3 minutes outbound
		- Per Primary FTI
			* IAF 6 Ts
				+ **Time.** Note time
				+ **Turn.** In the shortest distance to parallel the outbound course
				+ **Time.** Start timing for three minutes outbound when wings level or abeam the station
				+ **Transition.** Airspeed, Altitude, Configuration
				+ **Twist.** Set the outbound course in the CDI and intercept
				+ **Talk.** Brief next segment
			* After 2 ½ minutes twist inbound course into CDI
			* At the three minutes (or timing as appropriate to remain within specified distance) turn to the inbound course and set an intercept.
			* When established inbound (half deflection on the CDI for VOR/TACAN approaches, 5 radials for NDB approaches) and 3 NM from FAF, configure and slow to 130 and continue the approach.
* Partial Panel LOC/LOC-BC [FTI B103.2]
	+ Loss of attitude gyro

*“I’ve lost my attitude system, how is yours?”*

*“Check circuit breakers and switch to the opposite inverter”*

*“Are we able to proceed VMC?”*

*“Secure the big three. Are you familiar with wet compass characteristics?”*

*“Call out cardinal headings and headings when requested to the nearest 5 degrees. You have the comms, declare an emergency. Get me [an appropriate instrument approach, such as a no-gyro PAR]”*

* + SSE Full Stop
		- *“Once safely on deck, I will bring both power levers over the detent, reversing with the [left/right] engine, maintaining centerline with opposite rudder and aileron and forward yoke pressure. If rudder effectiveness is lost, I will bring both power levers toward flight idle.”*
* En Route Weather Facilities [AIM 7.1]
	+ PMSV
	+ Automated Flight Service Station (AFSS/FSS) [AIM 7.1.2]
		- The FAA maintains a nationwide network of AFSSs/FSSs to serve the weather needs of pilots.
	+ Hazardous InFlight Weather Advisory Service (HIWAS) [AIM 7.1.10]
		- A continuous broadcast of inflight weather advisories including summarized AWW, SIGMETs, Convective SIGMETs, CWAs, AIRMETs, and urgent PIREPs.
		- In those areas where HIWAS is commissioned, ARTCC, Terminal ATC, and AFSS/FSS facilities have discontinued the broadcast of inflight advisories.
		- HIWAS availability is shown on IFR Enroute Low Altitude Charts and VFR Sectional Charts.
	+ ASOS
	+ En Route Flight Advisory Service (EFAS) [AIM 7.1.5]
		- Called “Flight Watch”, a service specifically designed to provide en route aircraft with timely and meaningful weather advisories pertinent to the type of flight intended, route of flight, and altitude.
		- In conjunction, also a central collection and distribution point for PIREPs.
		- Provides communication capabilities for aircraft flying at 5,000 feet AGL to 17,500 feet MSL on a common frequency of 122.0 MHz. Discrete frequencies have been established to ensure communications coverage from 18,000 thru 45,000 feet MSL
		- Contact Flight Watch by using the name of the ARTCC facility identification serving the area of your location, followed by your aircraft identification, and the name of the nearest VOR to your position.
		- Not intended to be used for filing or closing flight plans, position reporting, getting complete pre0flight briefings, or obtaining rather weather reports and forecasts.
	+ ATIS
	+ TWEB (Alaska Only) [AIM 7.1.9]
	+ PIREP [AIM 7.1.20]
* Standard Terminal Arrivals (STARs) [P/C Glossary, AIM 5.4.1]
	+ A preplanned IFR air traffic control arrival procedure published for pilot use in graphic and/or textual form, STARs provide transition from the en route structure to an outer fix or an instrument approach fix/arrival waypoint in the terminal area.
* Unicom Voice Reports [AIM 4.1.9., P/C Glossary]
	+ UNICOM: A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.
	+ MULTICOM: A mobile service not open to public correspondence used to provide communications essential to conduct the activities being performed by or directed from private aircraft.
	+ Common Traffic Advisory Frequency (CTAF): A frequency designed for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower. The CTAF may be a UNICOM, Multicom, FSS, or tower frequency and is identified in appropriate aeronautical publications.
	+ Recommended communication procedures for airports with UNICOM and no tower or FSS:
		- Outbound: Before taxiing, before taxiing on the runway for departure.
		- Inbound: 10 miles out, entering downwind, entering base, entering final, and leaving the runway.
	+ Pilots conducting practice instrument approaches should be particularly alert for other aircraft that may be departing in the opposite direction. When conducting any practice approach, regardless of it direction relative to other airport operations, pilots should make announcements on he CTAF as follows:
		- Departing the final approach fix, inbound (non-precision approach) or departing the outer marker or fix used in lieu of the outer marker, inbound (precision approach);
		- Established on the final approach segment or immediately upon being released by ATC;
		- Upon completion or termination of the approach; and
		- Upon executing the missed approach procedure
	+ Recommended self-announce phraseologies: It should be noted that aircraft operating to or from another nearby airport may be making self-announce broadcasts on the same UNICOM OR MULTICOM frequency. To help identify one airport from another, the airport name should be spoken at the beginning and end of each self-announce transmission.
		- Example for Practice Instrument Approach:
			* *“Alice traffic, [Navy King Air 301], (position from airport) inbound, descending through (altitude), practice (name of approach) approach runway one three, Alice*
	+ In communicating with a UNICOM station, the following practices will help reduce frequency congestion, facilitate a better understanding of the pilot intentions, help identify the location of aircraft in the traffic pattern, and enhance safety of flight:
		- Select the correct UNICOM frequency
		- State the identification of the UNICOM station you are calling in each transmission
		- Speak slowly and distinctly
		- Report approximately 10 miles from the airport, reporting altitude, and state your aircraft type, aircraft identification, location relative to the airport, state whether landing or overflight, and request wind information and runway in use.
		- Report downwind, base, and final approach
		- Report leaving the runway
* SSE VOR/TAC/NDB Approach Procedures
	+ Same as before with the exception of configuration point.
	+ Non-precision approach, at the normal configuration point lower the flaps to approach, set the props full forward, and hold the gear until in a safe position to land.
* SSE Circling Approach [FTI 412(?)]
	+ The approach should be flown as a SSE non-precision approach
	+ When circling during SSE operations, lower the gear when intercepting the appropriate VFR pattern checkpoint. The landing checklist must be complete no later than the 90° position.
	+ Airspeed may be reduced from 130 KIAS only when intercepting a segment of the VFR pattern.
	+ The circling maneuver, especially single-engine, can be one of the most demanding requirements of a pilot (depending on daylight, weather conditions, etc.); it is critical to maintain precise control of airspeed and altitude while visually aligning the aircraft to the landing runway.
* SSE Missed Approach [NATOPS 15.2]

The decision to wave off must be made as early s possible.

\*1. Power – Maximum Continuous. (PF)

\*2. Flaps – APPROACH (unless already UP). (PF)

Note

* + - * If flaps are full down, it is recommended they be raised in increments; set flaps to APPROACH, allow airspeed to increase to at least VYSE, and ensure a positive rate of climb is established. Single-engine wave off with full flaps will cause a 200 ft. loss in altitude.
			* Ensure a positive rate of climb is established at the required airspeed. If maximum rate or maximum angle of climb is not required, allow the aircraft to accelerate to normal climb speed.
			* Electric trim may not be adequate to relieve the high longitudinal control forces associated with the transition from landing attitude to climb attitude.

\*3. Gear – UP, once rate of descent has been stopped or there is no possibility of touch down. (PF)

\*4. Flaps – UP, minimum of VYSE. (PF)

* Needle Only Approach Procedures [FTI 412.5]
	+ If the CDI fails, or is found to be out of tolerance during an instrument check, the following procedures are available:
		- A VOR approach can be flown using the needles on the RMI, as in all normal NDB approaches.
		- TACAN approaches can be flown using just the bearing pointer on the HSI, you will have to mentally calculate the radial you are on as there is no needle in the aircraft.
			* When intercepting a course inbound, put the heading bug on the inbound course; the pointer will fall to the heading bug when on an intercept heading. The intercept is completed by turning to put the pointer under the upper lubber line.
			* When intercepting a course outbound, the heading bug is put on he reciprocal of the outbound course; again the pointer will fall to the heading bug when on an intercept heading. Complete the intercept by turning away from the pointer so it is on the lower lubber line mark.
* IAF Procedures [FTI 409.4]
	+ A low altitude IAF is any fix that is labeled as an IAF or any PT/HILO PT fix.
	+ Before reaching the IAF, recheck the weather, review/brief the IAP, obtain clearance for the approach, and complete the Approach Checklist (ABCC: ATIS, Brief, Checklist, Clearance)
	+ Normally cross the IAF at 150 KIAS and maintain for the initial and intermediate segments of the approach, although 170 KIAS or other airspeeds may be flown for extended arcs/segments at pilot’s discretion or as directed by ATC.
	+ At the initial approach fix execute the 6 T’s:
		- **Time.** As Required
		- **Turn.** Turn to intercept course
		- **Time.** As Required
		- **Transition.** Reduce power to initiate descent
		- **Twist.** Set the inbound, teardrop, or front course
		- **Talk.** Refer to NATOPS callouts.
	+ Upon reaching the IAF, you have two choices, whether it is a PT or procedure track:
		- If your heading is within 90° of the procedural course, use normal lead points to intercept the course.
		- If your heading is NOT within 90° of the procedural course, overfly the IAF and turn in the shortest direction to intercept the procedural corse
		- **NOTE:** Do not ask for “maneuvering airspace” as this term is not found in the AIM and maneuvering for better alignment is not necessary. **PRIMARY LIED TO YOU!**
	+ Assuming you are cleared for the approach, do not descend until outbound/abeam and on a parallel or intercept heading the PT course.
		- Do not confuse abeam the PT course with abeam the NAVAID or IAF, this may not necessarily be needle through the wing tip.
* Departure Procedures (DPs) [AIM 5.2.8]
	+ Instrument departure procedures are preplanned IFR procedures which provide obstruction clearance from the terminal area to the appropriate en route structure.
	+ If an obstacle penetrates what is called the 40:1 obstacle identification surface, then the procedure designer chooses how to establish obstacle clearance. Obstacles that are located within 1 NM of the DER and penetrate the 40:1 OCS are referred to as “low, close-in obstacles”.
	+ DPs assume normal aircraft performance, and that all engines are operating. Development of contingency procedures, required to cover the case of an engine failure or other emergency in flight that may occur after liftoff, is the responsibility of the operator.
	+ Unless specified otherwise, required obstacle clearance for all departures is based on the pilot crossing the departure end of the runway (DER) at least 35 feet above the DER elevation, climbing to 400 feet above the DER elevation before making the initial turn, and maintaining a minimum climb gradient of 200 feet per nautical mile.
	+ There are two types of DPs
		- Obstacle Departure Procedures (ODP)
			* Printed either textually or graphically
			* Provide obstruction clearance via the least tasking route from the terminal area to the appropriate en route structure.
			* May be flown without ATC clearance unless an alternate departure procedure has been specifically assigned by ATC.
		- Standard Instrument Department (SID)
			* Always printed graphically
			* ATC procedures printed for pilot/controller use in graphic form to provide obstruction clearance and a transition from the terminal area to the appropriate en route structure.
			* Primarily designed for system enhancement and to reduce pilot/controller workload.
			* ATC clearance must be received prior to flying a SID
	+ Diverse Departure
		- If an aircraft may turn in any direction from a runway within the limits of the assessment area and remain clear of obstacles, that runway passes what is called a diverse departure assessment and no ODP will be published.
	+ Visual Climb Over the Airport (VCOA)
		- DPs established solely for obstacle avoidance that require a climb in visual conditions to cross the airport or an on-airport NAVAID in a specified direction, at or above a specified altitude.
	+ Vectors
		- ATC may assume responsibility for obstacle clearance by vectoring the aircraft prior to reaching the minimum vectoring altitude by using a Diverse Vector Area (DVA).
		- ATC may also vector an aircraft off a previously assigned DP
	+ In all cases, the 200 FPNM climb gradient is assumed and obstacle clearance is not provided by ATC until the controller begins to provide navigational guidance in the form of radar vectors.
* Turbulence [NATOPS 17.3]

Even though flight into severe turbulence is to be avoided, turbulent air may be encountered under certain conditions.

During night or instrument flight conditions, it is not always possible to detect individual storm areas or find the in-between areas of low turbulence or calm conditions.

When areas of expected turbulence must be penetrated, be ready to counter rapid changes in attitude and to accept major indicated altitude variation.

Flight through turbulent area presents two basic airspeed problems:

* + - If excessive airspeed is maintained, structural damage may be incurred.
		- If airspeed is too low, the aircraft may stall.

If turbulence encountered in cruise or descent become uncomfortable, reduce speed to turbulent air penetration speed (170 KIAS). This speed gives the best assurance of avoiding excessive stress loads, and at the same time provides margin against inadvertent stalls caused by gusts.

**WARN:**

* + - Because of the comparatively light wing loading, airspeed control in severe turbulence and thunderstorms is critical
		- Since turbulence imposes heavy loads on the aircraft structure, make all necessary changes in aircraft attitude with the least amount of control pressures to avoid excessive loads on the aircraft structure.

Over-controlling in attempting to correct for changes in altitude by applying control pressure abruptly will build up g-forces rapidly and could cause damaging structural stress loads.

Watch particularly the angle of bank, making necessary turns as wide and shallow as possible. Be cautious in applying pressures to keep the aircraft level.

Maintain straight and level attitude in either up or down drafts.
Use trim sparingly to avoid being mistrimmed as the vertical air columns change in velocity and direction.

* Icing [NATOPS 17.1]
	+ Icing occurs because of super cooled water vapor such as fog, clouds, or rain. The most severe formation will generally occur at temperature of approximately 23 °F (-5 °C).
	+ Preflight
		- Remove frost or ice accumulations from aircraft surfaces by spraying with diluted anti-icing, deicing, and defrosting fluid.
		- Test fuel flow drains for free flow
		- Remove all covers and pre-heaters
	+ Taxiing
		- If it is necessary to taxi on ice, snow, slush, or water, allow greater distance for braking action. Skidding may occur when sharp turns are made, or if an extremely strong crosswind condition exists. Taxiing in deep snow is difficult and may also cause freezing of brakes and gear after takeoff.
		- Avoid taxiing through melted snow or slush to prevent icing accumulation on the aircraft surfaces or propellers.
		- Use caution when taxiing in the vicinity of other aircraft. Increase the space between other aircraft to ensure a safe stopping distance. Jet or propeller blast can impair visibility by blowing clouds of dry snow over a large area.
	+ In Flight
		- Flights through icing conditions should be avoided if possible. However, if flight in these conditions is necessary, make use of anti-icing and deicing systems to prevent the formation of ice on the pitot tubes, fuel vents, and propeller blades.
		- Deicer boots are provided to remove ice from the wing and tail leading edges.
		- Windshield anti-ice and defrosters are installed to alleviate conditions resulting from frost or light ice.
		- Flight in freezing rain, freezing drizzle, or mixed icing conditions may result in ice buildup on protected surfaces exceeding the capability of the ice protection system or may result in ice forming aft of protected surfaces. This ice may not shed using the ice protection systems and may seriously degrade the performance and controllability of the aircraft. If severe icing conditions are encountered, proceed as follows:
			* Immediately request priority handling from air traffic control to facilitate a route or an altitude change to exit the severe icing condition
			* Avoid abrupt or excessive maneuvering that may aggravate control difficulties.
			* Do not engage autopilot. If auto pilot is engaged, hold the controls firmly and disengage the autopilot
			* If an unusual roll response or uncommanded roll control movement is observed, reduce angle of attack.
			* Do not extend flaps during extended operation in icing conditions. Operations with the flaps extended can result in reduced wing angle of attack with the possibility of ice forming in the upper surface farther aft on the wing than normal, possibly end of protected area.
			* If flaps are extended, do not retract them until the aircraft is clear of ice.
		- Stalling Airspeeds
			* Ice accumulations will increase aircraft weight and change aerodynamic characteristics because of wing surface airflow changes. Airspeed should be held to a comfortable margin above the normal stall speed to avert a stall not preceded by warning alarms.
			* A minimum of 140 KIAS should be maintained to prevent or minimize ice accumulation on unprotected wing and empennage surfaces.
			* Continuous flight in severe icing conditions **shall** be avoided.

**NOTE**: Stall warning in the form of buffet will occur at higher airspeeds when the aircraft is weighted by ice accumulations, which also increase drag and distorts airflow over the wing and tail surfaces. The buffet warning zone will be narrower than in normal conditions – closer to the onset of stall. Govern approach and landing speed accordingly.

* + - Engine Ice Vanes
			* The engine ice vanes **shall** be extended when the indicated OAT is 5°C (41°F) or below in visible moisture. Visible moisture includes clouds, ice crystals, snow, rain, sleet, hail, or any combination of these.
			* **WARN:** If ice formation on the intake screen progresses to a critical point, the engine my flame out.
			* **CAUT:** If the ice vanes are not deployed, the probability exists that moisture will collect on the intake screen and freeze or snow will melt and refreeze on the screen. When ice separates from the screen, the engine could sustain Foreign Object Damage (FOD).
			* **NOTE:**
				+ The OAT may be up to 8°C less than indicated.
				+ To avoid exceeding the oil temperature limitations, retract the engine ice vanes when operating in ambient temperatures above 15°C (59°F).
				+ Ice vane deployment increases fuel consumption by approximately 15 percent.
				+ With ice vanes extended, oil temperature may rise to limits with an accompanying drop in oil pressure and/or oil pressure fluctuations. If approaching temperature limits, reduce power or depart icing conditions.
		- Surface Deice
			* When activated, the deicer boots will dislodge ice accumulations from the leading edges of the wings and tail surfaces.
			* Before takeoff on flights in which icing conditions are expected, verify correct pressure reading on the pneumatic pressure gauge, activate both the SINGLE and MANUAL settings of the deice switch, and visually check the boots for inflation and hold down.
			* During icing conditions, monitor ice buildup on aircraft. When ice accumulation is ½ to 1 inch thick, activate the SINGLE mode of deice cycle switch to dislodge leading edge accumulation. Repeat as required.
			* **WARN**: Do not operate boots continuously. Continuous operation tends to balloon ice over the boots.
			* **CAUT**:Operation of the deicer boots in OAT of -40°F or less may crack the boots.
			* **NOTE:** Either engine will supply sufficient air for deice system operation. If the SINGLE mode of the deice cycle switch is ineffective, use the MANUAL mode.
		- Windshield Anti-Ice
			* Before flight into icing conditions, the PILOT and COPILOT WSHLD ANTI-ICE switches should be set at NORMAL position
			* **CAUT:** At low ambient OAT, whether icing conditions exists or not, moving the windshield anti-ice switch from OFF to HI may cause a crack in the windshield. If windshield heat is desired, place the switch first in the normal position for at least 2 minutes prior to selecting HI, if desired.
			* **NOTE:** Select NORMAL if actual or anticipated IOAT is at or below 5°C.
		- Propeller Deice
			* Before flight into icing conditions, the PROP heat switch should be set at AUTO position. This system functions automatically until switched OFF.
			* Propeller imbalance (because of ice loads) should be relieved by increasing propeller rpm briefly, then returning rpm to the desired setting. Repeat as necessary.
			* **CAUT:**
				+ If the propeller ammeter reads above 18 amperes or below 14 amperes, refer to the ELECTROTHERMAL PROPELLER DEICE MALFUNCTION procedures in Chapter 14.
				+ Propeller deice should not be operated when propellers are not turning. Static operation may damage brushes and slipring
		- Pitot Heat **shall** be used any time icing or visible moisture is encountered or anticipated
		- Fuel Vent Heat switches **shall** be ON before flight into icing conditions
		- Stall Warning heat switches **shall** be ON before flight into icing conditions.
		- Alternate Static Air Source

The alternate (emergency) static air source should be used for conditions where the normal static air source has been obstructed.

When the aircraft has bee exposed to moisture and/or icing conditions (especially on the ground), and the possibility of obstructed static ports exists, partial obstructions will result in the rate-of-climb indication being sluggish during a climb or descent.

Verification of obstruction is checked by switching to the ALTERNATE system and noting sudden sustained change in rate of indication. This may be accompanied by abnormal airspeed and altitude indication beyond normal calibration differences.

For airspeed calibration and altimeter corrections, refer to the respective correction charts in Part XI.

* + - Wing Ice Lights
			* Used to illuminate the outboard wing leading edges.
			* The lights circuit is protected and controlled by a circuit breaker-type switch placarded ICE, located on the pilot inboard subpanel
			* **CAUT:** Prolonged use of the ice light during ground operations will generate enough heat to damage the light cover.
* Weight & Balance Form F [NATOPS 26]
	+ Basic Weight is that weight that includes all fixed operating equipment, unusable fuel, and engine oil.
		- The term “basic weight” when qualified with a word indicating the type of mission, such as basic weight for personnel transport, basic weight for ferry, etc., may be used in conjunction with directives stating what the equipment shall be for these missions.
	+ Operating Weight is the basic weight of the aircraft, plus the weight of the crew and all equipment required for the mission, excluding the weight of fuel or payload.
	+ Gross Weight is the total weight of an aircraft and it’s content.
		- The takeoff gross weight is the operating weight plus the variable and expendable load items that vary with the mission.
		- The landing gross weight is the takeoff gross weight minus the expended load items.
	+ Reference Datum is an imaginary vertical plane at or forward of the nose of the aircraft from which all horizontal distances are measured for balance purposes.
	+ Arm is the horizontal distance in inches from the reference datum to the cg of the item.
	+ Moment is the weight of an item multiplied by its arm.
		- Moment divided by a constant is generally used to simplify balance calculations by reducing the number of digits. For the TC-12B, inches and moment/100 have been used.
	+ Average Arm is the arm obtained by adding the weights and adding the moments of a number of items and dividing the total moment by the total weight.
	+ Basic Moment is the sum of moments of all items making up the basic weights.
	+ Center of Gravity (cg) is the point about which and aircraft would balance if suspended.
		- It’s distance from the reference datum is found by dividing the total moment by the gross weight of the aircraft.
	+ Cg Limits are the extremes of acceptable forward or aft cg location.
		- The cg of the loaded aircraft must be within these limits at takeoff, in the air, and on landing.
	+ Form F [NATOPS 26.8]
		- The summary of the actual disposition of load in the aircraft for a particular flight. It records the weight and balance status of the aircraft step-by-step through out the flight.
		- It serves as a worksheet on which the weight and balance technician records the calculations and an corrections that must be made to ensure the aircraft will be within weight and cg limits throughout the flight.
		- If also serves as the record that weight and balance were determined to be acceptable for the flight. It is necessary to complete Form F prior to flight whenever an aircraft is loaded in a manner for which no previous valid Form F is available.