

INAV Stage Stan Notes

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***** WARNING: THESE STAN NOTES ARE MEANT TO SUPPLEMENT THE FTI. STUDENTS ARE STILL RESPONSIBLE FOR KNOWING FTI, NATOPS, AND OPNAV CONTENT *****

GENERAL NOTES

- First, make sure sometime during your I20 block of sims you come back to the airplane/hangar and refresh yourself on your gear, checklists, preflights, Hollywood script, etc., all the things you have not been doing in a month+. You are just as responsible for these items as you were on the C4290 check flight. Know the differences for the rear cockpit, with ISS mode selector as the most important.
- By now you have been with the T-6 for at least three months. Instead of having your EP/limits just memorized, KNOW your EPs. A simple step of 'intercept ELP' is complex, and you should know everything that is required to do such steps.
- Jet Log Navigation. Keep in mind that your jet log is used for FUEL ANALYSIS only. If you have a navigational mistake on your jet log, it WILL translate to a HUGE error (maybe even safety of flight) if you use the jet log as your sole source of navigation. NAVIGATE OFF YOUR CHARTS, and fuel plan off your jet log.
- Be verbal. There are a lot of procedures and calculations going on during the INAV stage. Telling your instructor what you are doing/thinking will only help the situation. Being silent will only lead the IP to think you are not doing anything.
- With discuss items, be sure to study the SOURCE (OPNAV, FTI, NATOPS, SOP, FIH, etc) of the material thoroughly, not just notes, not just supplementary sources, not just gouge. Notes, gouge, etc are just supplementary and could be incorrect.

THE GENERAL PRIORITIES

- Aviate, Navigate, Communicate, then Checklists is the general order of priorities for all aviators for all phases of flying.
 - AVIATE. The most important for any aviator. KEEP THE PLANE FLYING. Think of aviate as:
 - Actual emergency procedures
 - Safety of flight issues
 - Altitude and airspeed
 - NAVIGATE. Keep the nose pointed in the right direction along the route, either by CDI tracking on victor/jet ways or approaches, point to points, etc.
 - COMMUNICATE. Goes for both in the aircraft with crew and outside with ATC.
 - CHECKLISTS. Many procedures in the aircraft are checklists, such as on deck checks, 10k feet checklists, ops checks, wings level calls, etc.
- Examples of multiple tasks, and correctly prioritizing them:

You have an actual emergency in the aircraft.

- AVIATE. Keep the plane flying, execute the boldface EPs, and get the situation under control. At this point, you shouldn't care too much about navigate (vice turning to the nearest suitable for PELs if needed), communicating with ATC, or any checklist items (except for the EP checklists being executed).
- After the situation is under control, then you pick up the other priorities of navigating to an appropriate recovery airfield, communicating to ATC the problem, then checklists and getting the plane safe on deck.

You get a frequency change just prior to the mark on top turn.

- Roger up the new frequency.
- Aviate. Not much required here, no EPs, no safety of flight issue, and altitudes and airspeed should be good.
- Navigate. Since we need to turn for this MOT, it takes priority over checking in with the new controller. Start the turn, move the heading bug to desired course, set up the NAVAID, and continue.
- Communicate. With navigate complete, now we can communicate. Dial in the new frequency and check in with the new controller.
- Checklists. This is where most students will incorrectly prioritize tasks. Many will want to do the MOT and follow it up with a wings level call, OPS check, and nearest divert all before checking in with the controller. All these items are checklists, which come AFTER communicate in the priorities.

We climb through 10k feet and you are itching to do the climb checklist but our point to point is off.

- Aviate.
- Navigate. Our P2P is bad, fix it.
- Communicate. N/A
- Checklists. Do not start a climb checklist until our heading is fixed and the P2P is improved.

-You will be multitasked throughout every flight you are on. Keep in mind and prioritize with Aviate, Navigate, Communicate, then Checklists.

RADIOS

- You will talk much more on the radios now than in contacts, and there will be much more chatter than the simulator is able to provide. Everyone is different, some learn quicker, some slower. ALWAYS strive to improve.
- You may be the best aviator/NFO/SNFO in the world, but the only thing other people will hear is how professional/unprofessional/stupid you sound on the radio.
- First and foremost, REPLY IMMEDIATELY when ATC tells you something, THEN write down what you need. There are a lot of other planes on that frequency, and we all want to talk to ATC so avoid the dead time.
- Always listen for your callsign. If you hear it, EVERYTHING stops to listen and reply, then continue.

- A good technique is to have ICS louder than the UHF/VHF radios, therefore we can talk over ATC for instruction/ICS.
- You don't need to reply with every single word ATC tells you. The fewest words with the most important information is usually the best reply.
 - Example - ATC: "KATT 615, turn right 270, climb maintain 12,000, change to Houston Center 123.45." My reply: "KATT 615, 270, 12,000, switching 123.45"
 - Example - Approach "KATT 615, fly heading 050 and intercept the localizer, maintain 1,500 until established, cleared ILS 7L". My reply "KATT 615, 050, 1,500 until established, cleared ILS 7L"
- Use WILCO diligently but not to reply to hard numbers(headings, altitudes, airspeeds).
 - Example - ATC "KATT 615, fly heading 050 and intercept the localizer, maintain 1,500 until established, cleared ILS 7L, keep you speed up until the FAF please". My reply "KATT 615, 050, 1,500 until established, cleared ILS 7L, WILCO"

PHASES OF FLIGHT

- Instrument flying has 3 main phases:
 - Ground OPS, takeoff, departure
 - Enroute
 - Terminal
- The terminal environment takes priority over the other two, meaning you can cut enroute procedures (turnpoint procedures) short if you need to prep for the upcoming terminal area (ATIS, field brief, etc). Do this within reason.
- If you do drop in approaches at an airfield other than the recovery airfield, then essentially you are flying two INAV flights:
 - Ground OPS, takeoff, departure
 - Enroute to the drop in airfield
 - Terminal at the drop in airfield
 - Climbout, departure from the drop in airfield
 - Enroute to the destination
 - Terminal at the destination
- ALWAYS keep in mind that it is very important to stay ahead of the aircraft and prepare early for the terminal areas!!

PHASE 1 - GROUND OPS, TAKEOFF, DEPARTURE

GROUND OPS

- Don't show up to I4001 and not be able to run checklists or know where things are. This will QUICKLY show your IP you are unsafe to fly with and most likely result in a failed flight/ready room UNSAT.
- Checklist items. Now that you are in the back seat, the challenge, action, reply for checklist items is a little different. The Hollywood script is built for standardization of checklists. The replies from the script are the same, but execution is a little different now you are in the

back seat, as the IP gives the first response after the action.

- Ground OPS away from home field.
 - Taxing around foreign/unfamiliar airfields can be confusing for you and the IP, so ALWAYS have the airport diagram out. Whenever you call for taxi (either for takeoff or to go to parking after landing) have the airport diagram already out so you can follow along with all the instructions, such as left on Alpha, right on
- Every Lineup checklist should start with a "clear left, right, above" before moving out on to the runway for departure. Clearing yourself has PRIORITY over every checklist you can think of. If you were standing at a road intersection and I told you it is clear to run across, you would still clear yourself, right?

TAKEOFF

- Takeoffs, missed approaches, and climbouts are essentially executed the same way.
 - Takeoff - SNFO should sound like this, "40 knots- off the peg; 60 knots- 100% torque, fuel flow below 800; 85 knots- rotate; 2 positive rates- gear up; 110 knots- flaps up; gear up/flaps up at XXX knots".
 - Climbout/MA - SNFO should sound like this, "Execute missed approach, full power, climb; 2 positive rates- gear up; 110 knots flaps up; gear up/flaps up at XXX knots, fly heading XXX, climb to XXX" then report climbout to tower.
- Never switch from tower to departure until told to do so. Here at NPA, and some other high traffic fields, the switch to departure is often given by tower on the takeoff clearance, "KATT615, winds 070 at 10, clear to takeoff 7R, switch to Departure". But at many other fields, you need to wait after the takeoff/climbout/missed approach until Tower says "KATT615 switch to Departure".

DEPARTURE

- Once checked in with Departure, expect a climb and new heading or clearance to the first point of your flight plan. Continue to climb, give an OPS check (even if this was a climbout/MA from a drop in) and give the IP the IAS to fly for the IOAT once leveled off.

PHASE 2 - ENROUTE PROCEDURES

- Enroute procedures basically are just 3 things:
 - Turnpoint Procedures
 - Groundspeed/Wind Calculations
 - Point to Points

TURNPOINT PROCEDURES

- 2 MINUTES PRIOR. Identify and give the 2 minute prior call for all points IAW FTI. If you are late, don't call it a 2 minute prior call, call it the 1 minute prior, 30 seconds prior, etc. and adjust the ETA to your next point appropriately.
- MARK ON TOP / LEAD TURN
 - Lead ALL turns except for point to points
 - Radial/victor/jet way tracking out to a certain point/mileage IS

NOT a point to point, so you need to lead it

- Example - Flying from CEW to PIGON on V115, you need to lead PIGON and not fly all the way to 44DME before turning

- Leading also applies in the terminal phase, such as leading the turn onto final approach courses, arcs, or to a procedure turn outbound. LEAD ALL TURNS EXCEPT POINT TO POINTS, PERIOD.

- It's good to tell the IP how much you will lead the turn by. If the turn is minimal (10 degrees or so) it will be okay to say you are not leading it at all. But if you don't verbalize that, the IP will think you just never even thought of lead turns.

- After the lead turn (if applicable), give the MOT call IAW FTI

- WINGS LEVEL CALL. Give the wings level call IAW FTI

- OPS CHECK. Give an OPS check. It's good to have this checklist memorized with HEFOE-P

- H - Hydraulics
- E - Electrical
- F - Fuel
- O - OBOGS
- E - Engine instruments
- P - Pressurization

- If you are flying VERY long legs, you need to do more OPS checks and not just with the turn point procedures. Remember, CTS is an OPS check at least every 20 minutes, regardless of how the route is designed.

- NEAREST DIVERT. Look at the chart and find the nearest divert.

- If you are flying above FL180 and using the high chart, you lose a lot of possibilities because the high chart only has airports with 5000ft or greater paved surfaces, so a good idea is to find the nearest divert with the low chart.

- Consider runway length. IAW SOP we need at least 3000ft (below 3500ft pressure altitude) for emergency, and 4000ft for normal ops.

- Consider weather. If it's a complete VFR day, the airport does not have to have approaches, we can do it all visually.

- So on a VFR day, while flying at FL280, using the low chart and a BROWN airport with just 3000ft of runway is a perfect suitable divert for us.

GROUNDSPEED / WINDS

- After the OPS check/nearest divert on turn point procedures, determine if you have enough time to run a groundspeed check before the next turn. If you do, then do at least a 1min GS check. If you have a lot of time, do a 2min, 3min, or more GS check to be more accurate when flying long legs.

- Be sure you are radial tracking direct to/from a NAVAID (ie you have a good crab angle), in un-accelerated flight, and are outside slant range (14 DME when flying at 14k ft)

- After determining ground speed, determine winds. This can be done by the whiz wheel, or estimated quickly with the EHSI compass card.

- Example - GS checks got me 220 KGS, I am flying 240 TAS,

and I am crabbing right a few degrees. So I have a 20 knot headwind component that is coming from the front right quarter. Look at the EHSI and find a heading in that area that makes sense and wind is probably from that heading around 25-30 knots.

- ALWAYS know what the winds are doing to you throughout the ENTIRE flight, and account for them (ie, if you know the winds are very strong out of the north, when you turn to track a 270 outbound radial, you need to start crabbing right immediately to account for the winds). Therefore, it is always best to get the winds early in the flight so you can use that information to help you throughout.

POINT TO POINTS

- Keep in mind, a perfect pencil method and heading will only point my nose at the desire point, and does not account for winds. PTPs must be updated throughout.
- If you find yourself constantly correcting to the same direction (a little more left, a little more left, a little more left), then that is a good clue that the winds are probably coming from your left. Do another pencil method solution, then add in a few degrees for crab to the left and see how that works out.
- DON'T LET OTHER THINGS SUFFER WHEN YOU ARE SO FOCUSED ON A POINT TO POINT. You still need to aviate, navigate, communicate, and do checklists. Unless there is a safety of flight or actual emergency, navigate (point my nose at the next point on the point to point and keep updating it) is most important.

PHASE 3 - THE TERMINAL ENVIRONMENT

- Your main goals for the terminal phase are:
 - Terminal briefs
 - Set up for the holding/approach
 - Execute proper holding/approach
 - Execute proper climbout/missed approach

TERMINAL BRIEFS

- ATIS / ASOS / WX
 - 100 nm is listed in the FTI, however, getting ATIS early can never hurt. Keep in mind ATIS usually changes at the top of every hour. You want to know early in your flight if you don't want to waste fuel by going to the destination due to poor WX. In fact, you probably don't even want to descend so you can stay high going to your alternate. Therefore, try to get ATIS early and especially BEFORE ATC descends you to lower altitudes with higher fuel flows.
- FIELD BRIEF
 - Follow ATIS up IMMEDIATELY with a field brief IAW FTI
 - After the field brief, discuss with the IP a plan for the type of holding/approaches you want to execute. Don't fly all the way to the approach controller, and have no idea what approaches to request when he/she asks for them.

- DESCENT CHECKLIST

- The first descent you get in the terminal environment (meaning the reason for the descent is because ATC is bringing us down for the recovery) is a good time to execute the descent checklist. One exception, it has to be a descent below FL180 because above FL180 we need 29.92 set instead of the local area altimeter.
- If ATC descends you for traffic, or because of your heading to match direction of travel (west for even thousands) then descent checklists are not required.

- HOLDING BRIEF

- After you are checked in with the approach controller, and they give you the holding you want and you are headed to the holding fix, give the holding brief IAW FTI.

- APPROACH BRIEF

- After you are checked in with Approach and they have your request, you may give the approach brief IAW FTI. It is STRONGLY RECOMMENDED to setup your instrument panel for the approach prior to the brief (after being put on vectors, for instance), to ensure you are ready to fly it as soon as the controller clears you.
- Approach brief can be given ANY TIME in holding

- DRAFT REPORT

- Follow the approach brief with a DRAFT report, if required and time allows. If it's not required (because this is a drop in approach), it's still good to be verbal and say "DRAFT report not required because this is a drop in approach".

SETUP FOR HOLDING / APPROACH

- If you are on radar vectors, then the controller has assumed control of our navigation, therefore you can put ANYTHING in the VOR, course knob, etc...
- If a GPS approach is anywhere on your plan for approaches, set up for it early. Even if your request is for a VOR, then ILS, then PAR, then GPS, turn your GPS on and load the approach even before the first approach. You WILL NOT have enough time on the climbout from a previous approach to turn the GPS on and load it all up before the controller clears you direct to the IAF or FAF that should already be loaded.

- EXECUTE PROPER HOLDING / APPROACH

- Stick to the 6 Ts and be VERBAL!! For holding:
 - Time - Noted (comparing to EFC but most importantly is the timing for the outbound/inbound legs, looking for 1 min inbound so you know how much to correct for the next outbound leg)
 - Turn - Turn to the heading
 - Time - Start your clock when wings level, and abeam or past the fix. You cannot start your clock if you are not abeam yet.
 - Transition - 150kts, on altitude
 - Twist - Twist either the radial or inbound course as required
 - Talk - Report established in holding (if requested)

- Be precise. These procedures/calculations/corrections need to be accurate to work out

Techniques for holding:

Entry Orbit

- Fly a good P2P or direct to NAVAID. Slow to 150kts 3-5 min prior (based on 150 KIAS holding speed, typically 7.5 miles prior).

No Wind Orbit

- Be sure to get onto the course (CDI) aggressively, since you want to start every orbit as close to the fix as possible or calculations and corrections will not be accurate.
- The turn from the outbound leg to inbound leg on the no wind orbit will be the BEST indication of what wind is doing.
- The timing inbound will determine if the wind has any headwind or tailwind component (looking for 1 min)

Wind Corrected Orbit

The primary goal for corrections are:

- For the outbound to inbound turn to end up right on course
- Once wings level inbound, timing is exactly 1 minute
- Correct outbound heading for winds.
- Correct outbound timing for what you found on the last inbound leg timing, a simple 1 for 1 exchange (10 seconds early, then extend 10 seconds on next outbound)
- Correcting both heading and timing for each orbit is difficult and timing corrections will not get accurate until you get a good outbound heading that turns you right onto course.
- Keep correcting outbound headings and timing to get it to work out. Most common mistake is to forget your timing on the last outbound leg and correct off the original 1 min
- Example - After no wind orbit, first corrections we calculate is next outbound heading to come left 10 degrees and fly just 50 seconds. Inbound we find that we are still 5 seconds late. Subtract 5 from our previous outbound timing (50sec) so next outbound we will do 45 secs. Many SNFOs will not remember we did 50 seconds the last outbound leg and correct off the original 1 minute which is wrong

-ARCING

- Be sure to lead onto the arc, and lead onto the final course/radial. Simply $\frac{1}{2}$ of 1% of groundspeed and vary that if the turn is not perpendicular. While arcing, put the head of the needle above the 90deg benchmark to get closer to the NAVAID, and put it below the 90deg benchmark to get further from the NAVAID. Winds will affect you during arcing.
- If VOR arcing to an ILS/LOC final, YOU HAVE TO LOOK FOR THE LEAD RADIAL LABELED ON THE APPROACH PLATE IN ORDER TO LEAD ONTO THE COURSE. The lead radial is drawn for the bigger/faster boys (class D/E) airplanes, so you can probably pass the lead radial a little bit, then turn onto the course and switch from VOR to

the LOC freq in the RMU.

-AIRSPEEDS

- In the terminal environment, most the time it will be the controller telling you what headings or altitudes to fly, therefore the only thing we get to play with is airspeeds. Tell your IP what airspeeds to fly
- If filed for 270TAS at FL280 and now we are low in the terminal area, we cannot fly 270TAS anymore.
- Rules of thumb:
 - 200 knots while on vectors/low in terminal area
 - Slow to 150 when 3-5 miles from the IAF
 - Slow to 120/BAC when 3-5 miles from the FAFOr if we are doing vectors and the controller has us in a box pattern:
 - 200 knots downwind
 - 150 knots base (180 at NPA per the read-and-initial)
 - 120-BAC on dogleg if 3-5 miles prior to the FAF
- If shooting an ILS/LOC that has no DME associated with it (LOC freq has no DME, no NAVAID to DME hold) then ASK for the GPS needle to ID the FAF (or load in a backup approach). This helps you HUGE for 2 reasons:
 - You can determine quickly when you are 3-5 miles prior to it in order to take BAC
 - You can start timing exactly at the FAF
- Timing from FAF to the MAP
 - As a technique, back yourself up with timing at EVERY FAF. I do it even for GPS approaches, just because it is permanently ingrained in my head to get timing started at EVERY FAF. Sometimes, it may be the ONLY means to determine if you are at the MAP.
- Shifting from ILS to a LOC
 - Shift to a LOC if you lose glideslope, or find yourself 1 dot low on the ILS (but still above MDA for the LOC)

-CIRCLING

- Once you break off from the approach and start the circling maneuver, you MUST remain VMC and visual the entire time. If you go back to IMC conditions, you need to execute missed approach immediately!
- A good technique is to spin the CRS needle to parallel the landing runway heading AFTER starting your circle.

-BACKUP APPROACHES

- Backup approaches are not required nor graded, but are often quite helpful
 - In the real world, you will want a backup if flying an actual instrument approach in case your primary nav aids malfunction
 - A backup approach can add great SA, especially if the approach you are flying does not have DME
 - ONLY try to load a backup approach if you comfortably have the time to do so! Remember, this is not a graded item. Also, a rushed and incorrectly loaded backup can be more harmful than helpful!

- o Be sure to discuss what you are doing with your IP

MISSED APPROACH / CLIMBOUT / WAVEOFF

Differences:

- Missed approach - Means we did not break out from the WX at all, and it is a huge alert to tower and departure that the WX is now below mins.
- Climbout - We had no intent to land, it was practice. This is what we do 99% of the time. If the WX still prevented us from breaking out during a practice approach, you can call it a missed approach, otherwise call it climbout.
- Waveoff/Go Around - This is a safety of flight/landing issue. It means we had the runway environment in sight the whole time and intended to land, but something prevented us from safely doing that.
- You can say missed approach on ICS in the cockpit between crew members, but do not say "missed approach" on the radio to tower/ATC unless the WX was actually bad, we never broke out, and it was a real MA.

Execution:

- Executing a missed approach/climbout is identical and is very similar to a takeoff: SNFO should sound like this, "Execute missed approach, full power, climb, 2 positive rates, gear up, 110 knots flaps up, aircraft clean, fly heading xxx, climb to xxx" then report climbout to tower "Tower, KATT 615 executing climbout".
- Executing a missed approach/climbout if you go IMC when you are conducting a circling maneuver: SNFO should sound like this, "Execute missed approach, full power, climb, turn to airport center, 2 positive rates, gear up, 110 knots flaps up, aircraft clean," report MA to tower "Tower KATT615, executing Missed approach." When at airport center "fly heading xxx, climb to xxx"
- Climbout will result in vectors for additional approaches at the same airfield, or maybe back to the enroute phase if this was a drop in. Be ready for what's next. Many times SNFOs are 100% into the approach and do not think/plan ahead for climbouts. Don't get behind!