OPT for Better Briefings

A low tech, KC-135 cockpit from the author's early history (NATO photo)

Most of us who fly professionally from the front two seats of aircraft carry amongst all our many qualifications the title of instrument-rated pilot. Flying an instrument approach to minimums as a single pilot is a difficult task and requires a special set of skills. You would think that having two pilots for the task greatly simplifies everything. It does, provided the two pilots work as a team. And that teamwork begins with the approach briefing. Are your approach briefings effective? Our industry is at a crossroads when it comes to the mechanics of how to brief an approach. Most of us are doing it incorrectly. If your briefing today is the same as it was ten or twenty years ago, chances are you are not taking advantage of technology and you are doing it incorrectly too. For those of you of more recent pedigree, remember that as cosmic as your current cockpit may seem today, it will be eclipsed by something that makes it look ancient tomorrow. It will help you to see how the march of time changes the humble approach briefing. So, let's wind up the "wayback machine" to 1980.

In the days before computers

Senior Airman James Calkins' reflection on a Precision Approach Radar scope, Scott Air Force Base, 1980 (USAF Photo)

My first crew airplane was the mighty Boeing KC-135A tanker, designed during the Cold War as a war machine of the Strategic Air Command (SAC) and delivered in the late 1950s. By the time I got to it, in 1980, it was pretty much as it was delivered, except we got a barebones flight director added to the cockpit. Its primary purpose was to give us takeoff rotation cues, but it also gave us roll and pitch guidance for an Instrument Landing System (ILS) approach. The ILS was an exception for us, most of our approaches used much cruder Tactical Air Navigation (TACAN) signals or simple spoken directions from a radar controller.

No matter the approach type, it all began with an approach briefing between two pilots and a navigator. Each of us had our very own book of USAF approach plates, clipped to the yokes for the pilots and placed on a table for the navigator. We started the briefing by checking the date of the book, then we read the top line of the particular plate, and then we covered the frequencies, altitudes, and the entire procedure. Here is an extract of just the first 30 seconds:

"Listen up crew, time to brief the approach. Check that you have the 1 April 1980 version of the California approach book and are looking at the High TACAN to Runway 31 at March Air Force Base. Our initial point is at Flight Level 240, 45 DME from the March TACAN. Copilot, make sure you dial in channel 77 as soon as you can free up the receiver from en route navigation. The Morse Code is as depicted, we'll leave the identify and monitor requirement to you, navigator."

And so it went, ending with "Any questions?" We basically covered it all. It often took five minutes to do. All of this made some kind of sense, in that we didn't have an FMS to fly the approach and the autopilot wasn't to be trusted. We had to dial in the frequencies, spin a course needle, fly the headings and altitudes. All of this by hand in an airplane that tended to Dutch Roll and wanted very much to deviate from course and altitude. The thorough briefing was necessary.

In the digital age

A high tech, GVII cockpit with pilots Greg Bongiorno and Ryan Nugent

Over the years, the types and complexities of instrument approaches grew to the point many instrument pilots took to carrying spreadsheets of procedures, trying to remember when to dive and drive, when a vertical path required a "hard altitude" for the automation to call it quits, or when the descent continued until the runway with only the pilot's intervention to stop it. The litany became as complex as the procedures themselves. My straightforward TACAN and ILS gave way to the NDB, VOR, MLS, RNAV, RNAV/VNAV, LPV, RNP, and RNP-AR, formerly known as the RNP-SAAAR. Some approach plates grew to multiple pages and pilots began to fear the hidden air traffic control "gotchas" almost as much as the terrain the approaches were designed to avoid. Fortunately, there was help on the way.

Modern cockpits will not only display the approach plate with a moving map display of the airplane's position, but they will tune the necessary frequencies, set the proper course and altitudes, and even fly the approach from start to end. The approach can end with the wheels safely on the ground, or back in the wheel wells established in a missed approach holding pattern. The pilot is still responsible for making sense of the complicated procedures, but the avionics will lessen the burden by getting everything set up and actually doing the stick, rudder, and thrust lever chores.

An instrument pilot from forty years ago could react to all the automation with the thought, "what is left for the pilot to do?" But give that same pilot a look at the myriad of approach types, the complexity of some of those approaches, and the congested airspace, and the answer will become clear. The pilot's workload is in some ways even higher and so is the need for a good approach briefing. For most of us, however, the approach briefing has never changed. Our industry, however, has taken notice.

"Threat Forward"

In 2017, the Royal Aeronautical Society published an excellent article called "Briefing Better," making the point that the humble approach briefing needs a facelift. They noted that in the 2013 crash of UPS Flight 1354, bound for Birmingham-Shuttlesworth International Airport (KBHM), Alabama, the crew's arrival briefing prior to their controlled flight into terrain was nearly perfect. Perfect, that is, as defined by their company's standard operating procedures (SOPs). And yet their fatigue contributed to the crew continuing an unstable approach and failing to monitor the aircraft's altitude, leading to a descent below the minimum approach altitude and into terrain. This led to several conclusions:

- The crew did not discuss the relevant threats in the approach to come.
- The crew did not consider countermeasures to address those threats.
- The briefings were from decades-old formats that did not make use of next generation flight decks.
- The briefings were too long.
- The briefings were one-sided affairs with one pilot talking and the other listening.

The article's authors came up with four goals for their briefings.
1. Following the law of primacy, information presented first is better retained, the relevant threats should be discussed first, followed by specific countermeasures.
2. The briefing should be interactive.
3. The briefing should be scalable, you should be able to shorten or lengthen the briefing as needed.
4. The briefing should be cognitive, the concluding item is also well retained.

This led many crews to adopt a "threat forward" technique when making approach briefings, seeking to brief only the threats and countermeasures, reasoning everything else was on the approach plate. I tried this for a while but felt something was missing. My first attempts were laughable:

> "We are set up for the ILS. The threat is low visibility. Our countermeasure is to fly it coupled, make use of our Enhanced Vision System, and employ our superior aviator skills. Any questions?"

After a few attempts we realized we needed more to our briefings and after a while reverted to something closer to the approach briefings from our earlier days. But our approaches were no longer "threat forward," interactive, scalable, or cognitive.

Threat focused

My flight department continued with the threat forward briefings for almost a year until we read, as a group project, Ivan Luciani's excellent book, "Journey Around the World," where he takes us on a Gulfstream G650 trip circling the globe in several legs. We were all impressed by the discipline of Ivan's crew where every approach started with the Pilot Flying (PF) giving a complete approach briefing to the Pilot Monitoring (PM) ending with the questions, "Do you have any questions and can you brief us on the threats for today's arrival?" While it placed the threats second, it allowed the PM to focus on the threats that mattered for that particular approach. It was brilliant. We adopted the new technique immediately.

At my next Gulfstream GVII-G500 recurrent training, I was paired with an excellent FlightSafety instructor as my simulator partner. His excellence goes far beyond the cockpit; he wrote, directed, and starred in several FlightSafety productions that have become my "go to" resources on how to do many things in high tech cockpits. His first approach briefing was extremely thorough and would have won an award from SAC forty years ago. Once again, here is an extract of the first 30 seconds:

"Okay this will be an ILS to Runway 9 at Memphis International Airport. The chart is on page 11-1 and is dated 23 March 2018. The localizer is off 109.5, IMEM, and the final approach course is 093 degrees. Let's take a look at the minimum sector altitudes. . ."

The "Briefing Strip" from a Jeppesen approach chart

And so it went, covering altitudes, courses, headings, and the depicted obstacles. Jeppesen includes what they call a "briefing strip" on the top of many of their approach charts. We covered that and just about everything else on the chart. I flew the aircraft quietly as he talked, and then relinquished control as he flew. His approach was flawless until it was time to go missed approach. He forgot the point at which a turn was required during the missed approach (1,000 feet) and I helpfully decided to show my support by also forgetting. Fortunately, the avionics remembered and we both looked like the fine aviators we are by perfectly executing the procedure.

An hour later it was my turn to fly a different approach at the same airport. My briefing was off the usual script, but common for me for the situation at hand.

"This will be an RNAV (GPS) to Runway 27 circle to Runway 18 Right with a visibility that will make a stable approach impossible. I don't want to fly this approach when there is a perfectly good ILS to Runway 18 Right. Get me the ILS."

There began one of my typical simulator arguments, with the instructor telling me FAR Part 142 requires we fly the approach we would never expect in real life and that I had better get my mind right. Of course, he knew that I knew all this and was just playing my role in this Kabuki Theater to show I was actually thinking about these things. As called for by the syllabus, I flew the requested approach and started with my newly minted threat forward briefing.

"We'll fly the RNAV (GPS) down to the Category C circle minimum descent altitude of 940 feet, once visual with Runway 27 I will offset 45 degrees right for a base to Runway 18 Right. Once in position to turn to that runway, I will. Do you have any questions and can you brief me on the threats for this arrival?"

The PM was taken aback by the brevity of the briefing and had no threats to offer. Despite my pretend reluctance to fly the approach, it all went off without a hitch and the instructor had no comments about my brief briefing or the approach. (Ever since the Royal Aeronautical Society's threat forward proclamation, anything goes in the world of approach briefings.) Our instructor thought we had both done marvelously and didn't mention the briefings at all. We both filled the square and satisfied the requirement. So which briefing was correct?

High tech vs. low tech

I think my simulator partner, as is true with many of us, has been trapped into doing things the way we've always done them. As with many things in aviation, it feels that more is better. What harm is there in briefing too much? A lot, as it turns out. The longer the briefing, the more apt the listener is to "tune out." It also distracts the PF and PM from other duties. Besides, if the briefing item serves no purpose, why include it?

When I started flying approaches with Wide Area Augmentation System (WAAS), I included the WAAS Channel number because it seemed important. On an ILS approach I briefed the ILS frequency, so it only made sense to me to brief the WAAS Channel. But I finally realized there was no way to set the channel since the avionics were doing that for me. Selecting the Memphis RNAV (GPS) 18 Left approach from the Flight Management System (FMS), for example, tuned the correct channel for me. Technology prevents me from setting the wrong channel. But what of the ILS? My FMS sets that frequency from the same database. So why was I briefing the WAAS or the ILS frequency?

If you are flying an airplane without an FMS or other avionics that take care of many of your housekeeping chores, maybe briefing everything on the approach plate makes sense. But in my airplane, it is a distraction, diverting our attention from where it belongs.

My Take: "OPT" for something better

My next trip after that recurrent training was scheduled for Teterboro Airport (KTEB), New Jersey. The trip was a simple out-and-back with four hours on the ground as our passengers attended a meeting across the Hudson River in New York City. The day before the trip the winds were forecast to be challenging, even by Teterboro standards. The airport would be restricted to taking off and landing on a single runway because of high, gusty crosswinds. Landing aircraft would be required to fly an ILS to Runway 06 and then circle to Runway 01. Departing aircraft would have to wait for a gap in landing traffic to takeoff and that situation was made worse by the occasional arriving aircraft having to go around. I've seen departure delays in excess of four hours under these conditions. We warned our passengers to expect a long day.

The next morning everything was as forecast but the winds for our alternate, White Plains Airport (KHPN), New York, were right down the runway. Looking at our flight tracking software it became apparent Teterboro was already experiencing delays but White Plains was practically operations normal. I called our lead passenger and explained they could trade an extra 45 minutes in a limousine for three or four hours waiting in our airplane to takeoff from Teterboro. The decision was no brainer.

Getting into White Plains was easy. A 35-knot headwind right down the runway makes for a slow approach and a short landing roll. Lunch was at the airport terminal restaurant where we watched the steady flow of airline traffic. I got a phone call from a friend stuck at Teterboro saying the delays had surpassed the "significant" category to a new category that could be named "epic." I asked him where his passengers needed to be and, as it turned out, they were at the same meeting as ours. I then asked why he didn't opt for White Plains instead. "The schedule," he said, as if that was explanation enough.

We made it home a little later than scheduled; our passengers got caught up in the normal New York City exodus traffic, somehow made worse by the winds. But it wasn't four hours later, as happened to many that day. "Why didn't you opt for White Plains?" I had asked. I thought about that for a few days.

In one of my Air Force squadrons we used to joke, "Why do we brief the weather, it's not like we aren't going to go as scheduled!" The mission, in these military squadrons, was paramount. Even in my civilian flying career, I've been trapped within organizations that believed the schedule was the mission. After our Teterboro-turned-White Plains trip I started to think about my purpose in life. Not so existential as that sounds, but my purpose as the pilot in command of a scheduled trip. In the case of our windy day arrival, the purpose was to get our passengers to a meeting in Manhattan. Getting to Teterboro was the means, not the end.

I think I sometimes forget that the objective is framed by the people in back, not us in front. If we as pilots don't keep that in mind, our approach briefings can be so focused on flying that ILS to that runway in that weather, we can forget there are other options. I don't think you can

properly frame the threat until you understand the plan, and you cannot formulate a plan until you understand the objective.

Objective / Plans / Threats process
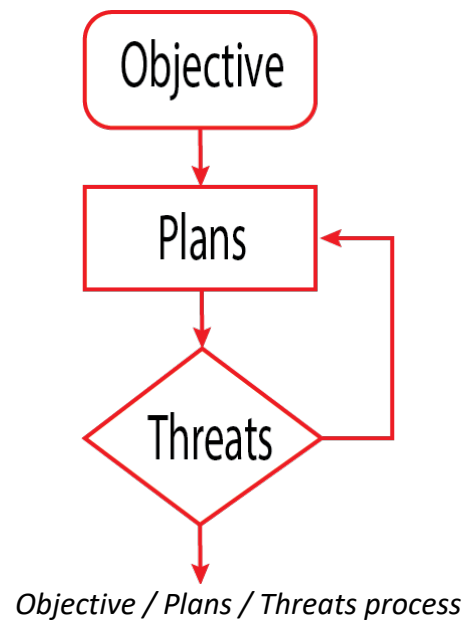
The objective may be to fly the aircraft from Point A to Point B, let's say for maintenance or to pick up passengers. But it is more likely to transport passengers or cargo from Point A to Point B. Your plan is to fly your airplane. (That's why you get paid, after all.) Let's say the airplane has a problem with its anti-ice systems on a day that requires it. If the airplane cannot be fixed, the plan should become to find another means of transportation; it could be the airlines, a charter aircraft, or even a car.

Now that you have a plan, you can better identify the threats. In the case of my windy Teterboro trip, the threat was the wind and the subsequent delays. Our countermeasures were to go to White Plains instead. Let's say my Memphis arrival was in our aircraft and not the simulator. The "Get me the ILS" would have been the logical countermeasure. There is no need to proceed with "Plan A" when you have an entire alphabet of alternate plans available to you.

A New Approach Briefing Idea

After decades of giving the same approach briefing, I realized that most of my scripted briefing was unnecessary. The FMS made most of the briefing not only unnecessary, but distracting. I knew on a primal level that the approach itself was not the objective but having given the detailed briefing I was in danger of losing sight of other options. The Royal Aeronautical Society's "threat forward" technique was an eye opener, though it failed to focus the threat on the plan at hand. Ivan Luciani's plan-first, threat-second idea solved that. Now I have a new approach briefing idea, one that you might want to consider.

1. The PF announces the objective of the approach and an initial plan to accomplish that. "Our objective is to land at our home base in Bedford, Massachusetts where our passengers have their personal vehicles waiting in our hangar. The ILS to Runway 29 is active, so let's plan for that."
2. The PM programs the FMS and checks the programmed procedure against the approach plate. If frequencies and courses need to be manually set, the PM should do that as early as the situation permits.
3. Both pilots should independently (and silently) study the approach plate.
4. Once ready to brief, the PF should cover the procedure using the FMS while the PM verifies using the approach chart. The PF covers only those items that are not automatic, or that he or she thinks bears specific mention. "We are expecting vectors to final and should make sure we stay above the glide slope intercept height until actually on glidepath. I see you have set in our Decision Altitude of 328 feet. If we have the necessary lights at that point we can take it down to 100 feet above the runway and I see you've set that as our alert height. We expect a set of Medium Intensity Approach Lights and a PAPI on the right of the runway. If we have to go missed approach, I see the procedure is in the FMS. Do you have any questions, and can you brief me on the threats?"
5. The PM covers the threats and offers countermeasures if applicable. "No questions about the approach or missed approach. The biggest threat is the low visibility and our fuel state. We have enough fuel to try this approach twice but after that we are better off going to Boston Logan, where the weather is better. If we decide on that, I can text our dispatcher to arrange ground transportation for our passengers so they can pick up their cars."

Back in my regimented days as a SAC copilot we carried checklists for everything, including the approach briefing. Every approach briefing included every item and it became a practiced habit. These days, instrument pilots understand that not every approach is the same and each approach briefing needs to be tailored to the type of approach. We should extend that tailoring to include cockpit technology. But before we get there, we need to remind ourselves why we are flying the approach in the first place. It could be that another approach or airport would serve us better. Once we've done that, we can look at the threats. Those threats may cause us to rethink the approach, or even the destination.