FLIGHT CHECK
Please Keep Your Distance!

Who We Are, What We Do, and How It Matters to You

By Mary Ladner

I have been around general aviation (GA) as a passenger most of my adult life. The extent of my practical knowledge of instrument flight procedures is looking at an overcast sky and asking my pilot friends if we are filing an instrument flight rules (IFR) flight plan, usually concerned about whether I will make it to a beach getaway. After working almost a decade in FAA's Flight Standards Service, I am much more familiar with the regulations for IFR flying than how pilots apply these rules in reality.

It's magical to me that pilots rely on enroute navigational aids (NAVAIDs) and instrument landing systems (ILS) to guide aircraft, of various sizes and seat counts, to their destination and safely to the ground in challenging weather conditions. I never put much thought into the work that makes this capability possible until last summer, when I took a position in the FAA Flight Program Operations organization. Flight Program Operations is part of the FAA's Air Traffic Organization and operates aircraft for several FAA missions, the largest of which is flight inspection, commonly known as "flight check." I quickly learned that there is a method behind their magic and that a lot more goes into ensuring the integrity of our National Airspace System (NAS) infrastructure than I ever imagined. In fact, I have learned a lot of things in my first year with Flight Program Operations, and I want to share these lessons with you.

Lesson 1: Inspecting and Validating System Integrity

The first thing I learned is that flight inspection involves way more than ensuring the accuracy of an ILS. Flight inspection is the airborne inspection of all space and ground-based instrument flight procedures and the validation of the integrity of the electronic signals in space transmitted from navigation systems. "Validating signals in space" is far removed from the origins of our air navigation system. The U.S. Postal Service developed lighted airway beacons (bonfires) and placed them 10 miles apart to aid nighttime navigation in the 1920s. Responsibility for the airway system was then transferred to the Department of Commerce who hired the very first "airway patrol pilots" in the 1930s. Fast forward to the present day, when Flight Program Operations flew approximately 14,521 hours to accomplish 15,456 inspection items in 2021. I can't help but wonder what the airway patrol pilots of the 1930s would think of the modern aircraft that flight inspection pilots fly today and the complex air navigation system that they inspect.

Airway radio station circa 1930s.

What do these flight inspections cover? The list of NAVAIDs that are inspected routinely is long and full of acronyms, including ILS, MLS, VOR, DME, TACAN, GPS, RNP, RNAV, NDB, various ground proximity radars, and airport lighting. These flight inspections also cover instrument flight procedures and the verification of obstacles. The FAA flight inspection pilots fly FAA aircraft to ensure that these air navigation systems meet certain tolerances (often measured in microamps) and support the associated instrument flight procedures that pilots use every day. Before a new procedure is established, flight inspection pilots assess the viability or, more to the point, the "flyability" of the procedure to make sure that all segments can be safely and accurately flown and don't create an undue burden on the pilot flying. When visual flight rule (VFR) charts are updated with new obstacle information, that obstacle has been validated by flight inspection.

When an ILS is NOTAM-ed out until it can be fixed, chances are flight inspection filed that notice to air missions (NOTAM). Flight inspection pilots test and verify new technologies (think satellite navigation like ADS-B, Ground Based Augmentation Systems, and Satellite Based Augmentation Systems) to enhance the NAS before approval for public use. My big takeaway from learning about the vast universe of navigational systems and procedures that must be flight inspected is that the universe continues to expand as technology grows. More importantly, all those times I was in a Cessna 172 that flew from VOR to VOR and took advantage of an ILS, I can thank flight inspection for validating the accuracy of those systems. Also, I can thank the FAA Technical Operations organization, which does an amazing job of establishing and maintaining our NAS infrastructure. Without their work, there would be no air navigation systems to flight inspect.

> **Pilots should be watchful and avoid the flight paths of any aircraft using the call sign "flight check," especially at airports underlying and/or adjacent to Class B airspace.**

Lesson 2: Planning and Scheduling

The second thing I learned is that scheduling is a big deal. Flight Program Operations employs schedulers, and these people have a critical and difficult job. They schedule where flights will originate and terminate, make sure aircraft are available, and staff the flights with the right crewmembers. But the job doesn't stop there. Flight schedulers assign the flight inspection tasks that will be completed on each flight, and they strive for every opportunity to check off the work in the most efficient way possible.

With so many NAVAIDs and procedures to check, how do the schedulers decide? Well, the key to flight inspection scheduling is "periodicity." Different NAVAIDs have different required intervals for periodic inspections. If a NAVAID gets beyond this interval, it may be NOTAM-ed out of service. Schedulers look at the various types of flight inspection tasks and schedule based on an order of priority. Here are just a few of the terms I have learned related to types of flight inspections, in my own words:

- **Periodic –** This is a regularly scheduled check to make sure the system meets standards.
- **Commissioning –** This is a check to support a new NAVAID or service. When a new runway is built, there is a lot of "commissioning" that supports it.
- **Reconfiguration –** This check is specific to a facility that already exists but has been upgraded or has been repaired due to damage.
- **Special –** This is a check outside of the normal periodic interval. Has someone reported a malfunction with a system? Let's call for a "special."
- **RFI (Radio Frequency Interference) –** This is a check to confirm or locate interference with systems that are radio-frequency dependent.
- **After Accident –** This is when someone, usually an accident investigator, requests a check after an accident to verify system performance.

Today's flight inspection equipment is complex and specially developed to do its job.

In the 1930s, the first airway patrol pilots evaluated the first practical navigation aids after the bonfires, in the low frequency four-course radio range. Each of the airway patrol pilots inspected 3,000-3,500 miles of federal airways. In today's air navigation system, flight inspection pilots evaluate an estimated hundreds of thousands of air miles in support of NAVAIDs and procedures spread across the United States and internationally for the Department of Defense (DOD) and other entities in far flung locations in Asia, Europe, the Middle East, and Antarctica. Our operation relies on tireless schedulers who prioritize and coordinate the work to ensure service for users of the NAS, the DOD, and the traveling public.

Lesson 3: Flight Inspection Maneuvers

The third thing I learned is that flight inspection aircraft maneuvers seems strange to many, but all are all highly calculated (see list on page 11). I have many friends who are air traffic controllers, and when I told them about my new job with Flight Program Operations, most of them commented about how "flight check" complicates traffic flow and makes their life difficult. They're not wrong. Flight inspection aircraft are often observed flying in a non-standard traffic pattern or opposite direction operations at airports. This leaves many wondering why an aircraft would be flying opposite of the traffic flow preferred due to prevailing winds. Flight inspection aircraft can also be seen flying at altitudes other than standard VFR or IFR altitudes. Flight inspection aircraft sometimes fly many, many large orbits or arcs in the sky over empty cornfields and at the world's busiest airports. Flight inspection aircraft have been reported to the authorities many times for making so many low passes at an airport without ever landing, and one was even reported as a UFO in Hawaii. To be fair, all this maneuvering may seem strange to the casual observer who doesn't understand what flight inspectors are trying to accomplish.

> **Pilot vigilance, patience, and cooperation in allowing uninterrupted maneuvering can significantly help expedite flight inspections and minimize costly, repetitive maneuvers.**

It seemed strange to me too until I came to work for Flight Program Operations and began to learn about the mission. Suddenly I was behind the scenes of that aircraft circling over cornfields and making multiple low passes over runways in Kansas. In order to inspect NAVAIDs and procedures, flight inspection aircraft must conduct specific, uninterrupted maneuvers at very specific altitudes. Flight inspection may fly at nonstandard altitudes because they need to fly at true vs. barometric altitudes. There is a "mission specialist" in the back of the aircraft who uses systems to collect and analyze the data the entire time. I sat down with a mission specialist who graciously explained everything that is done and why we do it. (By the way, none of this would be possible without mission specialists, but that is a story for another day.)

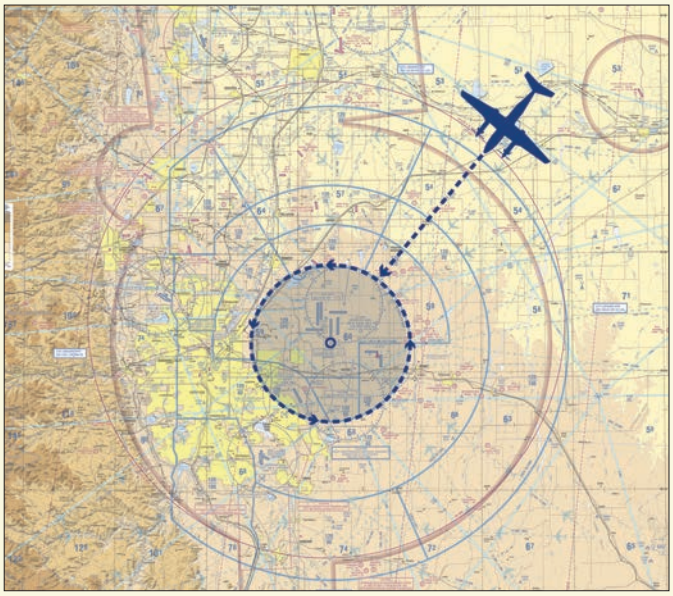
Flight Check Maneuvers Explained

Flight Inspection Arc – This maneuver is specific to measuring the localizer portion of an ILS and is typically conducted 1,500 feet above field elevation, 35 degrees on one side of the localizer course to 35 degrees on the other side (about seven miles on either side of centerline). Crews will reverse course and measure the system in both directions. Of particular importance to other aircraft is that during the recorded portion, aircraft taking off, landing, or taxiing between the localizer antenna and flight inspection aircraft may interfere with the signal and result in a need to repeat the maneuver.

Flight Inspection Holding Pattern – This maneuver is specific to measuring the glideslope portion of an ILS and is typically conducted 1,500 feet above field elevation, from about 1-2 miles from the runway threshold. Of particular importance is that during this portion of the inspection, aircraft in the glideslope critical area during recording may interfere with the signal and result in a need to repeat the maneuver.

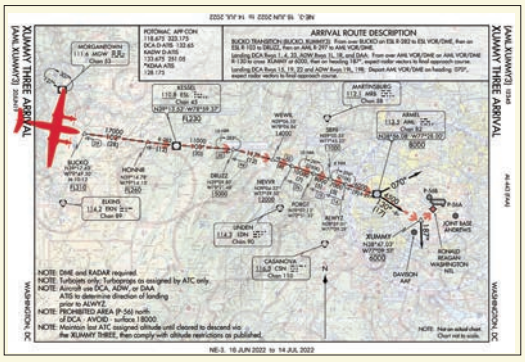
Flight Inspection Low Approach – This is often a test of the RNAV instrument approach procedure and the ILS. It is completed by a low approach 50 feet above the runway all the way to the opposite threshold. This ensures GPS database integrity and ILS signal accuracy. The flight inspection crew also uses this opportunity to inspect the entirety of the approach and runway lighting system.

VOR Orbits and Radial Flight – These maneuvers are conducted on VORs, TACANs, and NDBs to ensure the integrity of the signal at various altitudes. They measure the signal's accuracy, strength, polarization, and modulation. The distance of the orbit is dependent upon the type of inspection being conducted, and some of those orbits can be as far as 70 miles from the facility.



Required Obstacle Check ("ROC" Check) – This is a sweep around the airport circumference looking for new or uncharted obstacles.

Standard Instrument Departures (SID) and Standard Instrument Arrivals (STAR) Procedures – These procedures are evaluated before publication to make sure each can be flown with varying navigation equipment capabilities, is clear of obstacles, and does not cause an undue burden on the flying pilot.



It was intriguing to see the list of flight inspection tasks to be accomplished and to watch the data being collected and analyzed — all visible on screens in front of me. It was daunting to listen to the radios and hear the coordination going on between the pilots, between the pilots and air traffic control (ATC), between the pilots and the mission specialist, and between the mission specialist and technicians on the ground. The skill of these aviation professionals is impressive and I now have a better understanding of flight inspection maneuvers and why they are conducted.

For the data to be usable, flight inspection aircraft must remain on the plotted flight path trajectory. If flight inspection pilots deviate from their course due to traffic, they have to restart the entire maneuver. In fact, flight check aircraft sometimes have to repeat several arcs so that the mission specialists get the data they need. When observers on the ground see our aircraft circling above the terrain over and over, I can't help but wonder what they must think of these activities. I now understand that flight inspection pilots and mission specialists are up there checking off tasks to ensure that navigations systems are accurate and operational for the American public, at airports large and small.

Flight inspection is even conducted in Antarctica, where runways can shift with the movement of the packed snow.

Lesson 4: Flight Check and You

Here is where we get to the fourth thing that I have learned: It is great that I now know more about flight inspection, but we need to increase awareness of this activity among all users of the NAS, especially the GA community. Flight inspection aircraft use the call sign "flight check" to let ATC and pilots know that they are operating in the area. Flight inspection pilots strive to complete their maneuvers as quickly as possible to minimize the impact to ATC and other pilots. When flight inspection is operating in some of the busiest airspace, know that they are checking off tasks or trying to establish a new operational capability for the NAS. Flight inspection aircraft often receive priority handling by ATC and they continuously monitor the proximity of traffic through ATC and TCAS. However, pilots should be especially watchful and avoid the flight paths of any aircraft using the call sign "flight check." This is especially true at airports underlying and/or adjacent to Class B airspace, where there is a heightened alert for aircraft proximity. At non-towered airports, flight check will self-announce their position and intentions on the designated frequency. Pilots should be extra aware when they hear "flight check" on frequency. Pilot vigilance, patience, and cooperation in allowing uninterrupted maneuvering can significantly help expedite flight inspections and minimize costly, repetitive maneuvers. Pilots are encouraged to maintain extra awareness and allow extra distance from flight inspection aircraft when they are conducting the out-of-the-ordinary maneuvers described earlier.

Final Lesson

Finally, the last thing I learned is that flying for Flight Program Operations is a great job to have as a pilot. I have never met a group of public servants more passionate and committed to their craft. When many pilots think of working for the FAA, they think of being an aviation safety inspector who may not regularly fly. Many Flight Program Operations employees are pilots and "flight inspectors." They fly almost every week in unique environments, from the cornfields of the Midwest to the world's busiest airports of Atlanta, Chicago, Los Angeles, and New York, to the far corners of the earth like Guam and Antarctica. This type of flying is much different than commercial or business aviation. Every day is different and presents a new challenge. Whether it be terrain, weather, or traffic congestion, Flight Program Operations pilots train, adapt, and rise to the task. Modern-day flight inspectors traverse the globe to ensure our country's interests are secure at home and abroad. This would make those first six airway patrol pilots so proud (and awe-struck) at the complexity of our air navigation system and our nation's dependency on it.

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LEARN MORE

Flight Program Operations webpage
faa.gov/air_traffic/flight_info/flight_ops/

Flight Inspection History
bit.ly/3uNzhvP