

# CALLBACK

From NASA's Aviation Safety Reporting System



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## RNAV Standard Terminal Arrival Route (STAR) Issues

According to the Aeronautical Information Manual (AIM) Chapter 5, Section 4 (Arrival Procedures), a STAR is an ATC coded IFR arrival route established for application to arriving IFR aircraft destined for certain airports. RNAV STAR/Flight Management System Procedures (FMSP) for arrivals serve the same purpose but are only used by aircraft equipped with FMS or GPS. The purpose of both is to simplify clearance delivery procedures and facilitate transition between en route and instrument approach procedures.

A link to the full text of AIM Section 4 can be found at the end of this *CALLBACK*.

ASRS receives a significant number of reports every month related to difficulties with RNAV arrival procedures. Examples of reported issues include:

- Complexity of RNAV Optimized Profile Descents (OPDs)
- Flight Crew workload
- Aircraft system compatibility or capability
- ATC familiarity with aircraft performance and requirements
- Procedure interruption and phraseology

The following ASRS report excerpts provide insight into some of the complexities surrounding RNAV arrival procedures and in particular, the problems associated with the “descend via” clearance.

### IAD GIBBS1 RNAV Arrival

After having been cleared to “descend via” the GIBBS1 Arrival, the Flight Crew of an ERJ-170 was vectored off the arrival and uncertain as to their cleared altitude. Difficulty communicating with the busy Controller to clarify the altitude forced a level off at an intermediate altitude until a new clearance could be provided.

■ *We were descending on the GIBBS1 RNAV into IAD between BBONE and KILMR when ATC assigned us a 020 heading for traffic. Our descent clearance was “descend via the GIBBS arrival” with no specific altitude given. I told my First Officer to ask ATC what altitude he wanted us at and we got no reply. After two more unsuccessful tries to get an answer (the Controller was busy), I leveled the aircraft at 11,000 feet which was the altitude for the next fix. We finally got a reply to our questions and were told to continue to descend to 6,000 feet.*

*As we had been cleared to “descend via” the STAR and, when vectored off of it, were no longer on the arrival, we had no guidance as to our cleared altitude. I’ve had this happen a couple times, with different altitudes given each time; some the same as the bottom altitude [on the STAR], some different. Anytime an aircraft has been given a “descend via” clearance and is later turned off the arrival, ATC needs to assign an altitude.*

### MEM FNCHR1

A B757 Flight Crew’s concern over their decision to descend to meet the STANI restriction was appropriate and, as they suggested, a clarification was in order. A more complete clearance might have included: a speed reduction to 290 knots, a descent to cross STANI at FL230 and, after STANI, “descend via” the FNCHR arrival.

Another item of interest was the First Officer’s comment, “During all this, the Controller was very busy with other traffic [since] many airplanes were getting vectored, given speed assignments and being rerouted with new STARS.” The purpose of the Optimum Profile Descent is to provide efficient descent profiles minimizing the need for communications and disruptions. Another intent is to reduce workload on ATC and the Flight Crews. Reports such as this suggest that the procedures, as currently constructed, may not be fulfilling those intentions. In many instances the procedures are injecting uncertainty, increased workloads and greater risk of disruptions, deviations and potential separation issues.

■ *We were flight planned for the LTOWN arrival but ATC rerouted us to ARG for the FNCHR Arrival. Approaching ARG from the east, we received radar vectors for spacing, which took us to the north and west of ARG at FL240 and 320 KIAS. At a point about 15 NM to the NW of STANI, we received the following clearance from ATC, “Cleared direct to STANI, ‘descend via’ the FNCHR1 Arrival.”*

*After we executed the new route in the FMC we noted the 290 knot restriction, which was appropriate at STANI, had not been programmed. This was because we did not cross ARG (the point prior on the arrival where the restriction was charted). Thinking we had to be at 290 knots, the Pilot Flying “speed intervened” while the Pilot Monitoring (PM) made the adjustment in the FMS. PM set 4,000 feet in the*

altitude window (final restriction at JAYWA) so as to descend via the FNCHR arrival. The airplane began an immediate descent to make the “at or below FL230” restriction at STANI. This is where I believe an error was made. At the time we left FL240, we were within 10 miles to the northwest of STANI, but not actually on the FNCHR arrival.

The ATC clearance was incomplete. We should have been given more guidance with regard to altitude. Either a clearance to descend to FL230 or a crossing restriction at STANI would have been appropriate.

From the First Officer’s report on the same incident:

■ We crossed STANI below FL230 and at 290 knots. The problem we believe we made is that we weren’t on a published portion of the approach, so therefore we departed an assigned altitude of FL240 to meet the STANI restriction. We should have clarified our clearance with ATC, whether to cross STANI at FL230 or FL240 and at what airspeed. I initially thought he wanted us to go direct to STANI and descend via the FNCHR, meeting the first restriction at STANI, but then we started to doubt that that was the clearance and thought perhaps he wanted us to proceed to STANI, cross it at FL240 and then “descend via.” A simple clarification would have solved this issue.

During all this, the Controller was very busy with other traffic as many airplanes were getting vectored, assigned speeds and rerouted with new STARS.

## DCA TRUPS1

The Flight Crew of a CRJ-200, cleared to “descend via” the TRUPS1 Arrival, was understandably confused when given a heading change and then told to “continue” the arrival. The First Officer was the Pilot Flying and provides the first report on the incident.

■ We were cleared to “descend via” the TRUPS1 Arrival and a second Controller had cleared us to continue the arrival via the Runway 19 transition. Prior to reaching FRDMM waypoint, the Controller told us to depart FRDMM heading 120 which seemed excessive. The [crossing] restriction at FRDMM is 8,000 feet. The Pilot Not Flying queried the Controller regarding the heading, but due to congestion he couldn’t get a word in edgewise. Finally, the Controller issued new instructions to continue on the arrival. We were now at 8,000 feet and were past FRDMM [and were descending to comply with] the next crossing restriction of 6,000 feet [at STAND].

Shortly thereafter, the Controller issued another heading change and took us off the arrival. Seconds prior, when [we were] on the arrival, we had continued our descent. I asked the

Captain to ask for clarification at which point the Controller replied that we were told to “continue on” the arrival and not to “descend via” the arrival. We quickly returned to 8,000 feet and were cleared for the River Visual shortly thereafter.

The instructions were confusing at best. We were given a heading and, when we asked to confirm the heading, the response was changed to “stay on the arrival.” If the Controller had said, “Stay on the arrival; maintain 8,000” the confusion would not have occurred.

From the Captain’s report on the same incident:

■ After crossing FRDMM, we started to descend to 6,000 feet per the STAR and at the same time the Controller issued a heading change. I asked the First Officer if we should continue the descent since ATC just took us off the arrival and shortly after ATC asked us if we were still at 8,000 feet. I told him we were returning to 8,000 feet but thought we were still cleared to descend [as previously cleared] “via” the arrival. He explained that our new instructions were to “continue,” not to “descend via” the arrival.

## PHX GEELA4

A Controller report highlights the confusion that can occur when runway “transition” clearances are given in conjunction with RNAV arrivals.

■ It was a busy arrival push into PHX this morning. With the GEELA4 RNAV arrival there are quite a few more transmissions that need to be made to ensure the pilot will do what we need him to do. If the pilot is to “descend via” the arrival, well that’s a straight forward clearance. When we have to vector the aircraft for sequencing, the phraseology to put the aircraft back on the arrival is very confusing. An A320 was issued a clearance to cross GEELA at and maintain 12,000 feet and 250 knots. The pilot read this back correctly. The pilot was then issued, “Cleared for the GEELA4 Arrival, Runway 7R transition.” At no point was a “descend via” clearance given or read back. The aircraft then called PHX Approach and said he was descending “via” the arrival.

We need to come up with some type of phraseology that will allow us to clear the aircraft for the arrival and transition without the pilot thinking he is cleared to “descend via” the arrival. It seems the pilots are associating the runway transition with a “descend via” clearance. Maybe we should give the runway transition on initial check in, if that is legal.

The complete AIM Section 4 Arrival Procedures can be found at: [http://www.faa.gov/air\\_traffic/publications/atpubs/aim/aim0504.html](http://www.faa.gov/air_traffic/publications/atpubs/aim/aim0504.html)

ASRS Alerts Issued in April 2013	
Subject of Alert	No. of Alerts
Aircraft or Aircraft Equipment	7
Airport Facility or Procedure	2
ATC Equipment or Procedure	9
<b>TOTAL</b>	<b>18</b>

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April 2013 Report Intake	
Air Carrier/Air Taxi Pilots	4,635
General Aviation Pilots	1,225
Air Traffic Controllers	826
Cabin	363
Dispatcher	298
Mechanics	164
Military/Other	41
<b>TOTAL</b>	<b>7,552</b>