# CALLBACK

From NASA's Aviation Safety Reporting System

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# The PURSUIT and PRESUMPTION of Balance

Weight and balance has been a critical issue in aircraft operations since the beginning of aviation. Loading errors can go unnoticed and have potential to cause great harm. Clerical mistakes that account for cargo weight and location can be subtle and equally costly.

This month *CALLBACK* examines several reports that highlight weight and balance errors. In the following accounts, all the aircraft unknowingly departed with uncertain centers of gravity and most departed with an inaccurate gross weight that was assumed correct. Many of the mistakes were not discovered until the aircraft was airborne and some, not until the aircraft landed. Other similarities included unknown cargo weights and freight that was loaded in improper locations. These mistakes might have been prevented. The ASRS report excerpts reiterate the need for attentiveness and accuracy in every aspect of weight and balance procedures.

The first three reports describe incidents where cargo was loaded in the wrong location on the aircraft. The remaining accounts detail various other errors that were experienced in Air Carrier Operations.

## The Usual Suspects

Cargo loaded into the wrong compartment and closeout paperwork that did not specify its location allowed this B737 Flight Crew to launch with an inaccurate Center of Gravity (CG) that was not discovered until after the aircraft landed.

■ *The [destination station] Crew Chief came to the cockpit and inquired about how the aircraft handled during our flight…. He then informed me that according to his paperwork all cargo should have been loaded in the aft compartment but, when opened, he found it completely empty. Upon further inspection he found that all cargo was loaded in the forward compartment. I checked my load planning paperwork and found the plan was for 1,900 pounds of cargo to be loaded in the aft compartment. Closeout paperwork showed 1,100 pounds of cargo with no indication whether forward or aft.*

*I then called Dispatch and was transferred to Load Planning. They checked the computer and said that all cargo should have been loaded in the aft compartment…, but that was not the case. Actual loading was in the forward compartment. We had a light load of only 105 souls on board and a light cargo load. The Load Agent ran the numbers with the actual cargo in the forward compartment and found that we were still within safe CG limits. How much [misloaded] cargo weight would it have taken on this aircraft to create an unsafe situation? Would a full load of passengers have helped or hindered the situation? How about fuel burn on a long flight? Is it the Ground Crew's habit to load cargo in the forward [compartment] on smaller aircraft? Did they fall back on habit or disregard loading documents?*

*The load closeout we receive in the cockpit does not show forward or aft cargo weights. It just shows total weight and a breakdown for live animals and restricted articles. Maybe we should receive that information on closeout. Although that would not have helped in this situation since all the "paperwork" was correct.*

## Trust, but Verify

Non-standard operations resulted in freight being placed in the wrong cargo compartment of this B737-800. The Flight Crew was unable to confirm compliance with loading instructions.

■ *After the parking brake was released for push back, the Ground Crew opened the forward cargo door twice without notifying the Captain. The Captain flew to our destination and other than noting that the aircraft was nose heavy on takeoff, the flight was uneventful. After we parked, the Crew Chief entered the cockpit as the passengers were deplaning. He explained that the cargo had been incorrectly loaded and pointed to his offload report. The report clearly showed that only one bag should have been placed in the forward cargo and the rest should have been in the aft cargo. The Crew Chief reported that the aft cargo was empty and all the bags were in the forward cargo. Obviously this was a very serious issue— one that could have caused aircraft controllability issues, or worse…. Pilots should have the same paperwork used to load the aircraft so we can double check with the load closeout and takeoff performance data and verify proper loading.*

## The Edge of the Envelope

This CRJ-700 Captain directed that ballast be added to the forward cargo compartment, but got a post-flight surprise.

■ *Due to ACARS weight and balance, I directed the Ramp Lead to move the one and only bag from the aft cargo compartment to the front and to add 500 pounds of ballast to the front cargo compartment. On rotation we noticed a slight nose up pitch tendency, but dismissed it as normal for the aft CG limit. On arrival, the First Officer discovered that the 500 pounds of ballast had been placed in the aft cargo compartment.*

## Late Arrivals

Conflicting load numbers that surfaced during preflight planning remained suspect into the flight, nurtured mistrust, and spawned a weight and balance error for this A319 Flight Crew.

■ *We received a flow release time from ATC that was 10 minutes from our scheduled push time. At push we had not received the weights so I sent an ACARS [message] because I wanted to make sure we had the weights to make our slot time. I received the response that weights were not available because the ramp had not completed the loading document. We continued to taxi to the active runway where we held for 10 minutes waiting for weights and missed our slot time. I called Station Operations and they said they were talking to Load Planning about the weights. We waited another five minutes and received a Dispatch ACARS message stating our zero fuel weight had gone up 4,000 pounds with new [projected] fuel burn and fuel at touchdown numbers. We acknowledged the increase and accepted the numbers. The weight manifest printed and it showed our weight below the weight I had used to calculate performance numbers. After we departed, we received another weight manifest with an even lower gross weight and numbers closer to the planned weights on the flight plan. While the numbers we were working with resulted in minimal changes in the CG, there was potential for a very serious error to occur.*

## Missing from the Manifest

Upon arrival, this Air Carrier Flight Crew noticed three tires being offloaded, but had no paperwork or knowledge that they were even onboard during the flight.

From the First Officer's report:

■ *The Captain and I, upon receiving the load sheet, asked the Ramp Agent if it was correct. We were told that it was. During the post flight inspection, I noticed Ground Operations removing three main tires from our [aft] baggage compartment. I did not remember seeing this on the load sheet, so I went back up to the cockpit and took [another] look at the load sheet. To my surprise there were no tires listed in the baggage compartment. We departed unaware that we had an extra 300 pounds of cargo in the back of the aircraft.*

From the Captain's report:

■ *During the post flight walk around, the First Officer noticed that three tires were being removed from the [aft] cargo bin. He asked the Ramp Agent if those were on our flight and he replied that they were. The First Officer got the cargo load report from the trash and it showed no cargo [listed] on the airplane other than the standard bags, the heavy checked bag and the gate claim items. Each tire weighs 100 pounds, so 300 pounds were missing from the cargo load report. We both agreed that missing items on the cargo load report was a safety of flight issue.*

## Who's on First?

An ERJ-170 Flight Crew took off with an inaccurate cargo weight. The correct weight would have identified an out of balance condition and an exceedance of structural limitations.

■ *The Ramp personnel asked the First Officer during his walk around if we could accommodate… freight weighing a total of approximately 2,000 pounds. He instructed them to wait on loading until he could confirm that the load could be safely accommodated. When the First Officer returned to the ramp, the cargo was already loaded in the aft compartment and he was told it was approximately 1,000 pounds. When we received the cargo load report, it indicated a total load of 59 standard and 5 heavy bags in forward cargo and 1,000 pounds of freight loaded in the aft cargo compartment. We ran the reported load and after reseating four passengers as a result, we received good takeoff performance numbers. After closing the door, the tug driver said they had made a mistake and that we should add 1 standard bag to the forward compartment and that the actual weight in the rear was 2,200 pounds. I asked twice to clarify these numbers, but I wasn't confident in his count. We ran new numbers anyway and adjusted the passengers, once again, per the ACARS instruction.*

*I called Ops before taxiing to confirm the load numbers. The Ramp Manager told me that the second numbers I had received were, in fact, accurate. Just prior to reaching the runway, we received a message from Dispatch stating to once again add two bags to the forward cargo. After a normal takeoff and being airborne for approximately 30 minutes, Dispatch informed us that the load in the rear cargo compartment was actually 4,000 pounds. The cargo compartment's weight limitation was exceeded…. They [then] informed me that the CG was out of limits and…the decision was made to divert. After a 74,000 pound uneventful landing, Ramp personnel removed and weighed all cargo from both front and rear compartments. The actual contents of both compartments were: 62 standard and 4 heavy [bags] forward, and 3,600 pounds in the rear compartment.*

| ASRS Alerts Issued in April 2016 | |
|---|---|
| **Subject of Alert** | **No. of Alerts** |
| Aircraft or Aircraft Equipment | 4 |
| ATC Equipment or Procedure | 1 |
| Company Policy | 1 |
| Hazard to Flight | 1 |
| **TOTAL** | **7** |

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| April 2016 Report Intake | |
|---|---|
| Air Carrier/Air Taxi Pilots | 4,739 |
| General Aviation Pilots | 1,077 |
| Controllers | 646 |
| Flight Attendants | 509 |
| Military/Other | 401 |
| Mechanics | 184 |
| Dispatchers | 149 |
| **TOTAL** | **7,705** |