

CALLBACK

From NASA's Aviation Safety Reporting System



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UPSIDE DOWN AND BACKWARDS

One of several versions of the origin of “Murphy’s Law” contends that the Law’s namesake was Captain Ed Murphy, an engineer at Edwards Air Force Base in 1949. Frustration with a transducer which was malfunctioning due to an error in wiring caused him to remark that—if there was any way that something could be done wrong, it would be.

Recent ASRS reports indicate that Captain Murphy’s Law was in full effect when several aircraft components managed to get installed upside down or backwards.

Pernicious Panel Placement

An aircraft Mode Selector Panel that “looks the same” whether right side up or upside down, and that can be readily installed either way, is a good example of a problematic design. Confronted with an inverted panel, this Cessna 560 Captain found out what happens when the wrong button is in the right place.

■ *During the takeoff roll, the First Officer called for rotation and I pulled back on the yoke and focused my attention on the V-bars. Instead of finding the bars above the horizon as expected, they were on it. I reached up and pushed the upper left Selector Panel button again, but the bars did not spring into place as anticipated. I glanced back at the panel and, for the first time, realized that it had been installed upside down. Looking across, I found the First Officer’s side was upside down as well. We returned to the airport and reported the discrepancy to our company.*

Upon reflection, I realized that I’ve become so accustomed to the panel that I may no longer read the writing on the buttons; I just press the place where that button should be. Instead of pressing HDG, I pushed VS on the inverted panel. The faulty installation escaped the attention of two Avionics Technicians, one Quality Control Inspector and, of course, both pilots. The panel looks exactly the same whether right-side up or upside down except for the labels. I find it surprising that it was designed in such a way that it could be installed incorrectly.

Although the aircraft had just come out of maintenance, there seemed no logical reason for giving extra attention

to the Mode Selector Panel since none of the maintenance directly involved avionics repair or installation. We later learned that the panels had been removed during the replacement of the nose fans.

If anyone had asked me if I observe the Mode Selector prior to pushing a button, I would have assured them that I do. Since this incident, I’ve come to notice how often I (and I suspect most people) rely on “standard position placement.” The lesson is obvious; be more observant. I also question the wisdom of manufacturing a part that is capable of being installed incorrectly.

The Downside of Upside Down

Without detailed instructions and clear notation, nearly symmetrical parts can be installed incorrectly. Faced with the replacement of such a part, this CRJ 700 Maintenance Technician wound up with a case of component “misorientation.”

■ *The aircraft returned to the field due to the landing gear not retracting. Previously, the nose landing gear torque links had been replaced to fix a nose wheel shimmy problem. While installing the torque links, the lower assembly was installed upside down. The lower torque link assembly looks similar upside down to the way it does right-side up. The Maintenance Manual does not specify anything about the orientation, nor is there any indication on the part itself. I feel that if there had been a specific note that the part is able to be installed upside down, I would have paid closer attention to the orientation. The operational check of the installation did pass, but it does not require a gear swing. A note should be added in the installation task noting that the part is able to be installed incorrectly and that it looks close to the correct installation.**

Bonanza Blunder

In order to mount a Beech 33’s ailerons on the wrong wings, a resourceful paint shop crew had to mount the ailerons upside down and use incorrect hardware. The achievement may have been dubious, but the confirmation of Murphy’s Law was unambiguous.

■ After the rudder was balanced and reinstalled, I preflighted the aircraft and flew it back from the paint shop to [our base]. The only problem with the flight was that the aircraft wanted to make a shallow left bank when the controls were released.

I looked at this aircraft two days in a row and preflighted it twice. Our Chief of Maintenance walked around it and another Instructor Pilot from the flight school also looked it over and none of us realized that the ailerons were installed incorrectly. A Maintenance Technician noticed that the location of the static wicks was wrong. The wicks were attached to the top surface of both ailerons and should have been mounted on the lower surface. This made it obvious that the ailerons were installed wrong; the left aileron was installed upside down on the right wing and the right aileron was installed on the left wing. Incorrect hardware was also used for the installation. I did not believe you could install the ailerons incorrectly and still be able to control the aircraft properly.*

When All Else Fails...

Placing a maintenance Job Card upside down may seem like a minor example of Murphy's Law, but when it leads to a departure from Allen's Axiom (When all else fails, follow the instructions), the results can be major. In the incident reported by this Maintenance Technician, a large portion of a turbofan engine fell to the hangar floor.

■ I was assigned to work on an engine with another Mechanic who was under training. We started working on a Job Card to remove the HPC (High Pressure Compressor) from the fan case which we finished and then started working on another Job Card to trunnion the HPC. We followed the Step #1 to Step #3 [procedures]. In Step #3, we installed a fixture plate in front of the HPC. During this installation the other Mechanic was working at the 12:00 o'clock position while I was at the 6:00 o'clock position. ... I was sick from a head cold and was wondering if I should talk to my Supervisor or a Safety Representative about this? With these thoughts running through my head, I put the Job Card on the table upside down and walked away for a moment to try to refocus on the job. When I came back, I looked at the Job Card and saw Step #6—to remove the center fixture. The next step (#7) was to trunnion the core, but the eye bolt attached to the front fixture sheared off...

Because I had placed the Job Card upside down from where we had been working, I inadvertently missed the critical Step #4 about handling the HPC safely. As a result the HPC broke off and struck the floor.

Exit Here...Maybe

After an MD-80 had completed several trips, an alert Flight Attendant caught a subtle discrepancy with the overwing exits.

■ After blocking in, the interphone rang. One of the aft Flight Attendants called to report that she had just noticed that both of the aft overwing escape hatch plug doors "looked backwards" because the arm rests were going the wrong way. I went back and confirmed that this was the case. Except for the arm rests, the doors appeared normal in every way. The signage and wording on the doors were normal.

The aircraft made at least three trips with the reversed doors and maintenance later determined that the doors required substantial effort to open.*

"He Yelled at Me to Stop!"

The problem this Maintenance Technician reported provides a dramatic lesson in the need to verify proper setup before going ahead with a job, especially one involving high-pressure jacks.

■ I was assigned to work at jack point "E" at the left-hand, inboard side of the B777 wing. At the site, I found that the jack pad [adapter] was already installed and the jack was seated with 4,000 LBS of pressure on it. When all the jacks were in place, my Lead instructed me to start jacking and he left the site to check on the right wing jacking area. I started jacking by increasing the pneumatic pressure to 7,000 LBS. As the jacking process was going on, my fellow Mechanic, who was on the wing dock at the jack point, heard a cracking noise and saw the panel cracking. He yelled at me, "Stop!" I immediately stopped the jacking process. I went up on the left-hand wing dock and found out that the [wing] panel underneath the jack pad was damaged. Afterwards we learned that the day shift had installed the jack pads backwards.

If a little voice in your head says that something doesn't seem right, pay attention. It could be Captain Murphy warning that you are about to install something upside down or backwards.

*ASRS issued an Alert Bulletin on this issue.

ASRS Alerts Issued in August 2011	
Subject of Alert	No. of Alerts
Aircraft or aircraft equipment	9
Airport facility or procedure	4
ATC equipment or procedure	2
Company policies	2
Maintenance procedure	1
TOTAL	18

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August 2011 Report Intake	
Air Carrier/Air Taxi Pilots	3204
General Aviation Pilots	943
Controllers	697
Cabin	553
Mechanics	142
Dispatcher	75
Military/Other	13
TOTAL	5627