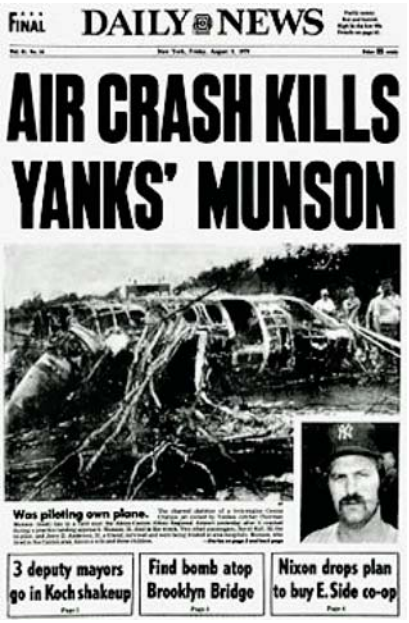
HOME ALONE


FINAL DAILY NEWS

AIR CRASH KILLS YANKS' MUNSON

Was piloting own plane.

3 deputy mayors go in Koch shakeup

Find bomb atop Brooklyn Bridge

Nixon drops plan to buy E. Side co-op

By Michael R. Grüninger
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One of the most salient single-pilot accidents was the crash on August 2, 1979, of a Citation flown by Thurman Munson, a famous New York Yankees catcher and team captain.

After the accident, his wife allegedly said: "It was too powerful, too sophisticated, too much plane for him." This sentence is an indicator for how quickly a person can be overwhelmed by a machine the speed and complexity of which man was not prepared for.

Meaningful statistics on the number of single-pilot (SP) accidents relative to multi-crew accidents are very hard to find. Since most general aviation aircraft are operated by a single pilot it is not surprising that 94% of all aircraft accidents involve single-pilot operated aircraft. This statistic says something about the risk of recreational flying in small, lightly equipped aircraft flown by pilots who occasionally take to the air. It does not allow any conclusion about the level of safety of a single-pilot operation compared to a two-pilot operation.

INEXPERIENCED Former Yankees Captain Thurman Munson may have been overwhelmed by his aircraft.

Although the debate on single vs. dual crews is not new, the proliferation of high-powered very light jets certified for single-pilot operation within the business aviation community is giving this question renewed attention.

Especially considering that estimates of the number of accidents caused by pilot error range from 70-80% the question of the level of safety that can be achieved with single-pilot operations warrants further analysis.

Although you might think that removing one pilot from the flight deck eliminates a potential source of human error and thereby improves flight safety, the opposite is the case. The second pilot, or pilot non-flying, performs a vital monitoring role.

As with all humans, pilots make mistakes. These mistakes are often small and insignificant, but if left uncorrected have the potential to endanger the safety of flight later on in the flight. Early detection and rectification of such frequent, small mistakes is part of the job of the pilot monitoring.

The second pilot also performs a disciplining function. People tend to behave differently when not supervised. Especially violations of rules are much more likely in a single-pilot operation when nobody is watching compared to a multi-crew environment where a violation would be seen and commented on.

Even without considering statistics, informed contributors to discussions on the inherent risks of flying jet (or turboprops) single pilot seem to share the opinion that flying a jet with a single pilot is not more risky than flying it with a dual crew (i.e. a pilot and a co-pilot).

It is still noteworthy that one contributor assessed accident rate of operations in single pilot operations was 3.4 times higher and the fatal accident rate 13 times higher than aircraft that require dual pilot operations.

A generally accepted opinion on this topic did not emerge yet.

Somehow intuitive is the statistical conclusion from recent research done that most common accidents in single-pilot operations are: Approach and Landing Accidents (in particular runway overruns) on contaminated runways, with tailwind, and RWYs shorter than 3500ft or combination thereof.

Of course, at the end of the flight, when the pilot is fatigued, the urge to land is high and the combination of fatigue with difficult environmental conditions add up to being the beginning of a disaster.

All Alone? Workload

An interesting study on "Single-Pilot Workload Management in Entry-Level Jets" by researchers from NASA Ames Research Center's Flight Cognition Lab and the FAA's Flight Deck Human Factors Research Laboratory at the Civil Aerospace Medical Institute has been published.

The study examined task and workload management by single pilots in entry level jets.

The study made Cessna Citation 510 (Mustang) pilots execute four high workload events in which the pilot had to (a) set up the automation for an intercept, (b) program a reroute while at cruise, (c) an expedited descent and (d) descend to meet a crossing restriction prior to a waypoint and prepare for the approach while facilitating communication from a lost pilot who was flying too low for ATC controllers to hear. Task (d) required the pilot to simultaneously aviate, navigate and communicate. That's often too much for one human being to take care of.

The report concludes that approximately two thirds of the major tasks in the four events were accomplished by the participants without any difficulties.

No differences in performance were found due to pilot age or pilot type. The successful outcome did not depend on hours of experience, except for the first event involving setting up automation to perform certain navigation tasks.

The use of avionics was at the root of the problem for most participants who had difficulty accomplishing the tasks.

All Alone? Automation

Single pilots require tools to manage periods of high workloads. Automation is the solution, but not without creating new problems.

Automation is often difficult to use, in particular by individuals who do not use it every day. If you do not use it often, you will forget and you will lose the body memory of which button to push and selector to turn, or which part of the screen to touch!

An increasing number of business aircraft are designed to be flown by just one pilot. In particular very light jets and many turboprop aircraft are certificated as Single-Pilot-Aircraft. The design and operational characteristics of such aircraft are comparable with large, multi-crew aircraft. One single pilot handles all decisions and tasks alone: he must Operate, Navigate and Communicate.

This can only be achieved with increasing levels of automation. Often the autopilot has to operate while the single pilot being busy setting up the avionics for navigation. Then the autopilot also takes care of navigation.

The FAA thus requires a more restrictive minimum equipment list for most turbine aircraft that it certifies for single pilot operations. Most importantly, a functioning autopilot is required on all flights. EASA shares the same requirement for complex motor-powered aircraft (NCC.IDE.A.130).

The workload and in particular the mental capacity required to fly a fast and complex aeroplane is very high and the single pilot will not have the capacity to handle the aeroplane without the aid of an autopilot.

All Alone?
Single-Pilot Resource Management

Single-Pilot Resource Management (SRM) is an adaptation of Crew Resource Management (CRM) training specifically tailored to single-pilot operations. The purpose of SRM is to reduce the number of aviation accidents caused by human error by teaching pilots about their own human limitations and how to maximize their performance. The initiative for this training began in 2005 when the NBAA published training guidelines for single-pilot operations of very light jets (VLJs).

The content of SRM is similar to that of CRM training, except the topics relating to multi-pilot crews are excluded. Typical topics included in SRM training are situation awareness, workload management, automation management and aeronautical decision making.

An important element of SP Resource Management is to use available services on the ground and in the aircraft to optimise workload distribution and decision-making.

All Alone? Training

Single pilots must be pay particular attention not to fall behind the aircraft because of the increased speed at which everything happens. Manufacturers of single-pilot aircraft, first of all Cessna with its Citation programme, have developed dedicated training programmes for the pilot transitioning to entry jets from piston or turbo-prop powered aircraft.

Such training programmes focus on areas of greatest risk, such as: wake turbulence encounters, convective weather encounters, microburst/windshear encounters, clear air turbulence and jet stream core or boundary encounters, high-altitude upset, mountain wave encounteres, inadequate knowledge of high-altitude weather, physiological effect of high-altitude operations, jet blast damage behind larger jets during ground operations, low-fuel arrivals trying to stretch range,.

There's also incorrect/less-than-optimum cruise altitude selection, inadequate preparation for high-rate/high-speed climbs, inadequate crosswind take-off/landing preparation, inadequate "land and hold short" preparation, misunderstandings by ATC due to their lack of respect for single pilot operation and associated work load, single pilot adherence to checklists, FMS programming and autoflight vs. manual flight control, inadequate exercise of "command", recognizing single pilot "red flags" (such as inexperience, fatigue, pressure), lack of pilot self-evaluations, winter operations, and finally, decision making.

Safely Alone

The general opinion is that single-pilot operation of any high-performance aircraft has few advantages compared to operation in a well-trained and well-coordinated crew.

The strain on the single-pilot is much higher, when it comes to self-discipline and workload management. The ability to stay ahead of the aircraft even in situations of high workload is one of the keys to ensuring flight safety.

In case of incapacitation or distractions, without a second crew member, the back-up and double-check is missing.

So what are the advantages of single pilot operations: certainly the financial one.

From a safety point of view, a single pilot might lead to a decrease in the level of safety of any flight.

However, with well trained and current pilots who fly routinely, the risk level of single pilot operations is absolutely acceptable.

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SPEED
Single pilots must pay attention not to fall behind the aircraft's position.