

WARBIRD NOTES # 2 3 Aug 93 (16)
DECCELERATING APPROACH

This is intended as sort of a "to whom it may concern" or "hangar flying" discussion of a question recently raised. Some comments have been noted that

we should fly a "stabilized" approach in the B-25 as we do in airline and other turbojet operations. Looking at it from a historical perspective, apparently such a good job of training has been done that we now have what could be called an "embarrassment of riches" or "oversuccess". Let me explain briefly (I hope) how we got here and why we do what we do the way we do it. (If you don't want to read through the "why", you can cut to the "way" in the last couple of paragraphs.)

Sometime around the turn of the century (in an aeronautical sense, anyway), actually in the late forties and early fifties, the USAF was the not so proud possessor of an abysmal flight safety record. Jets were new but piston mentalities and methods still predominated, after all, that was what had gotten everyone through the war years and no "deskbound Flying Safety or Ops type can tell me how to fly airplanes"! "Break left - power off - gear, flaps and boards, first one to the club is the hottest pilot"! Sounds great, doesn't it? Made great movies, bar stories and - - really b-a-a-d accident records. Attempts to make pilots realize that no one was attacking their macho in asking for a change in techniques were met with almost universal derision. The message transmitted was "the characteristics of the machine have radically changed", the message was received/perceived as "those old guys can't contend with these jets with their increased speeds and all". USAF flight safety publications of that era are full of what now is recognized as sensible advice. "Loosen up your pattern, get the base leg far enough out to establish a nice, high drag, 'spooled up' final approach, be prepared for a go-around." Naval Aviation News magazine featured "Grampa Pettibone" with his sometimes caustic, but always sensible, first person advice. The jet engines of that era were notoriously slow to "spool up" from to full thrust from idle, taking as long as ten seconds or even more in some cases, an eternity on short final. I've talked to some pilots about this who wish to remain anonymous, even after all these years. I'll cheerfully indulge them in that small favor since I can't do anything now about their first and most fervent wish back then. That would have been for the contractor to have built the runway just a few hundred feet longer - - - **and all on this end!** Many aircraft, such as the B-47, were equipped with releasable "approach drag chutes" to allow a higher RPM to be maintained on final. We flew the T-33 with speedbrakes out on final. Little by little, reason and common sense prevailed when the characteristics finally began to sink in. This change of attitude took years of training and haranguing but, gradually, the broken airplanes and bodies began to intrude enough into the collective consciousness of the pilots to get their attention. Jet engines were different and the stabilized approach finally became the recognized safe way to get a turbojet on the runway safely.

The airlines, being the "Johnny-come-latelys" to jets were the beneficiaries and taught this from their earliest days of jet operations onwards. Those who didn't believe often paid a terrible price, along with their unlucky passengers, for their ignorance and unbelief. High sink rates and unstabilized approaches were "out" and represented one of the quickest ways for a recalcitrant pilot to be abruptly shown the door, cutting short a promising airline flying career. Nowadays, whole generations of pilots have been brought up with this concept and, in fact, probably have no reason to imagine any other way of flying ever existed. Herein lies the reason I think we may be somewhat victims of our own success! Anyone who has spent much time in the airline training business should feel pride in a job well done, an excellent job has been done over the years

convincing everyone that this is the only safe way to do it, and, it is! W - e - l - l, for the jets anyway, it is.

Another change in the machine was occurring in this postwar era. New aircraft designs were required to meet the specifications of the new Transport Category (T-Cat) regulations of the (then) Civil Air Regulations. Wartime twin engine aircraft of the B-25/A-26/B-26 etc., genre were designed to military specifications, engine failure flight characteristics occupied a much lower rung on the design criteria ladder. This deficiency occurred both in the case of an engine loss on takeoff and on final approach. There was a period of time after liftoff where continued flight on one engine would not be possible. This is due to the fact that below safe single engine airspeed (145 MPH on the B-25, for example) the available rudder wasn't adequate to control the aircraft. This would necessitate reducing the power so much on the operating engine to prevent an uncontrollable roll that a positive rate of climb could not be obtained. Once V_{sse} airspeed is obtained, full power is controllable and the aircraft is capable of single engine flight. Problems are also encountered in the approach regime in aircraft exhibiting this type of aeronautical bad manners, more on that below. All aviation is a series of compromises. Give a little of this to get more of that, etc. The genesis for an aircraft that could lose an engine on takeoff, continue, climb out and then land safely goes back to the initial airline requirements specified in a 1932 letter to Douglas Aircraft from Jack Frye of TWA, engendering the DC-1/2/3 series. Further refining of these criteria took a quantum leap during the war years, resulting in the aforementioned T-Cat. These advances greatly benefited the postwar airline fleet and later the business aviation world. Aircraft had to be controllable with engine failure, both on takeoff and approach.

Now, as to why we do it and how we do it. Obviously, we aren't going to be able to do anything to solve the problem of engine failure after liftoff if we want to fly these old military machines. The only thing we can do is to give the best instruction we're capable of for this eventuality, insisting on full rudder and aggressive use of controls in managing the aircraft. The other is to really stress what we told our students back then when we were using B-25s in the USAF Basic Multi-Engine pilot training program. "If an engine loss occurs after takeoff and you don't have 145 MPH safe single engine airspeed, pull back the power on the remaining engine and belly it in sort of straight ahead, better to land under controlled flight than to try to fly and ultimately roll the aircraft and yourself into a ball."

Now then, on to something we can do something about, the approach phase. And remember, in this paragraph we're talking about a normal two-engine approach. We don't need to fly a stabilized, constant speed, high drag approach as we do in a jet because we have a piston engine capable of furnishing instant power when needed. We are free to select a safer way of doing things, i.e. - remain at or above the safe single engine airspeed for a good part of the approach, gradually dissipating this speed along the final approach. Figuring a V_{so} of 83 MPH in the B-25, 1.3 V_{so} would be 108 MPH. If we flew it as we do a jet it would mean we'd slow to this speed several miles out. If 145 MPH is V_{sse} airspeed we'd be operating more than 35 MPH below a safe single engine speed for this entire distance. Nothing would be gained since we have instant power available from the engines but a lot would be lost considering the time exposure at less than a safe speed. The way we want it is to maintain above 145 MPH until on final. Lowering full flaps now will allow us to gradually taper off the speed on a properly flown approach with only a small power reduction being required. We need to cross the threshold around 105-110 MPH. Make no mistake about this however, the approach is

still a precision thing. It's just that the precision is applied to arriving at the threshold at a precise speed with some power on, closing the throttles, then flaring and landing. The approach minimizes as much as possible the time spent below V_{sse} but still puts you at the required speed and point to permit a touchdown at the exact aiming point along the runway.

One final argument we should touch on is advanced by pilots whose sole experience lies in light civilian airplanes with a published "blue line" airspeed. In these airplanes you maintain blue line throughout the final approach until committing to land. Their blue line speeds are usually around 105-110 MPH or very close to their $1.3 V_{so}$ where their normal approach speed would be anyway. We don't have a published "blue line" speed for the B-25 but V_{sse} would be the closest thing to it. If we were to maintain 145 MPH to the threshold we'd never stop on the 4000' runways that a lot of us call home base.

R. L. Sohn © 1993