

Gear Up: Avoiding Further Damage

By Walter Atkinson



This article first appeared in the March 2006 issue of ABS Magazine. It is just one example of the tremendous depth of information available in the ABS website archives. To help prevent additional damage during the recovery of future gear-up airplanes, and to highlight the things you can find with a search of the ABS Magazine website archives, with the author's permission we're reprinting this excellent article.

“There are only two groups: those who have and those who haven't – yet.”
In August 2004, I switched groups. Apparently, I'm in good company.
Or at least it's crowded company.

There was a crop duster working off the end of the runway at an uncontrolled field and he kept passing over the runway threshold. I became distracted and as a result made a very soft, flaps up, gear up arrival. It was weird. As I touched down and the prop ticked to a stop I calmly thought to myself, “OK, you've done that; now just keep it straight and don't make it any worse.” Amazingly, it slides a lot farther than you might think. From touchdown to stop was about 1,000 feet on the asphalt.

While the dust welled up around the airplane, I shut off the battery master. I noticed that my good friend Tom Gresham, [then] host of the *Wings to Adventure* television program, was hoofing it across the grass, heading my way. I was glad to see my friend – and distressed. As he approached he hollered, “Hey, wanna do a segment on gear ups?” (No pleasantries are required between good friends, right?) I said, “Why not, it looks like I've created a good opportunity.” Within 10 minutes of me messing up a perfectly good airplane, Tom's camera was rolling. The video of how we got her back on her feet is in episode

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The forward hoist point is directly around the firewall. The aft hoist point is around the station behind the step. Both sides of the hoist straps leave the airframe vertically so as not to place a squeezing force on the airframe.

21 of *Wings to Adventure* and the pictures herein are courtesy of Tom.

The biggest risk to an airplane suffering a gear up isn't the damage from the slide. It's what can happen if the wrong action follows. There have been many airplanes destroyed, or at the least more severely damaged, during the attempt to clear it from the runway.

If at an uncontrolled field, first call Flight Service and NOTAM the runway closed due to vehicles on the runway. That's true. Tell them that you will call them back as soon as the runway is clear.

Remember that *you* are in control. Do not relinquish control unless it is to someone of your choosing. Not the police, not Fire & Rescue, not the airport manager and God-forbid, not the airport know-it-all. *You are in control.* That is true at a towered field as well. You might relinquish control to someone who will destroy your airplane in short order.

In my case, an excitable airport employee called Flight Service and said, "Close the airport, there's been a crash," and hung up. That started a sudden chain of distracting events. I politely told the FSDO gentleman who called that no one was hurt during a simple gear up, and that I didn't have time to talk to him but would call him back when I could. He aggressively insisted that *he* was in charge now and that I *had* to answer all of his questions – *right now.* I immediately confirmed that I was the PIC, and that *I* was in charge and would remain so until the airplane was off of the runway. I politely terminated the phone call. (A supervisor at the FSDO later apologized for his employee's improper approach.)

Now that you're in control, how are you going to get your formerly beautiful airplane back on her legs? Don't make a bad situation worse. Do not push it off of the runway – especially backwards. A gang of folks at one airport, led by an FAA employee and the local airport know-it-all, ran out and in their mob-mentality haste



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Notice that there is no tail stand. A couple of helpers simply balanced the tail in place for the few moments it took to get the gear down and the jacks lowered.

pushed a friend's Bonanza backwards into the rain-soaked grass. As soon as the boarding step dug into the mud it twisted the fuselage and buckled the flaps and flap tracks. That pilot had given up control and had a bigger problem than he'd had 30 seconds before.

Lifting any airplane can be completely non-destructive, or it can ruin the airframe. Your first choice is a set of air bags designed to lift the airplane under the broad surfaces of the wings and tail and spread the stress out over a large area. The airplane is lifted gently to a height that allows the gear to be lowered. The airbags are then deflated – no muss, no fuss. This is the method of choice. Unfortunately, air bags aren't often readily available. But it's worth asking.

Relatively light aircraft have been lifted by a whole host of helpers by reaching under both main wings, toward the spar, a few guys under the tail, and simply lifting. I remain skeptical that this is the method of choice but if it's your only choice, be

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certain that no one lifts on anything that they shouldn't. Be *in charge*; direct all actions. Tell each person, individually, where to be and how to lift. Assume nothing.

Hoist lifting generally ends up being the common option. A set of hoist straps around the wings is guaranteed to ruin the airplane. Don't even think about it. Many mechanics have hoist-lifted airplanes by the crankshaft right behind the spinner. Some have even done so without hurting the airplane. I consider it a sub-optimal approach for Bonanzas for two reasons: *First*, the lifting arm is long, it puts a lot of stress on the engine mount tunnel and firewall, and it can place significant stress on the empennage where the structure is not designed to withstand that rocking angle of force. *Second*, it will almost certainly damage, if not ruin, a Bonanza's nose bowl. To help you resist this apparently obvious, single-hoist method, call [Textron Aviation] and price a replacement Bonanza nose bowl. There are other reasons not to do it this way, but they pale in comparison to the two above.

Use the airframe's strength to your advantage. Two of the strongest parts of the Bonanza fuselage are the C-beam runners that go down the belly from about halfway along the engine mount tunnel all of the way to the station right behind the step at the aft baggage bulkhead. These C-beams, along with others in the center belly, give the structure a lot of its strength. Lift the airplane by using the inherent strength of the structure as the Beech engineers designed it. We decided on lifting at the firewall since it is very strong and the skins would not buckle there, and at the station right behind the step for the same reason. That would anchor all of the lifting forces between the strength of the airframe and balance some of the weight of the engine forward of the firewall strap. This would take stress off the tail and requires two hoists.

The forward straps cover the aft ends of the nose gear doors. We dismissed this as a problem since we planned to put the airplane on jacks as soon as possible to ensure stability. We placed the straps and made certain they would stay put. A line was tied from the step to the aft strap to keep it from slipping aft.

Positioning myself between the hoist operators where both could see me and with each hand indicating *thumbs up* to go up, *thumbs horizontal* to hold position, and *thumbs down* to go down, I signaled each operator what he needed to do. The result was an uneventful and fully coordinated vertical lift.

Lifting halted as soon as the airframe was high enough to place jacks under the jack points. With the main jacks positioned, I stood so both hoist operators could see me and gave the *thumbs down* and the airplane gently came to rest on the main jacks. There's very little force up on a Bonanza tail when the airplane is on a pair of main jacks and it's easy for a couple of guys to balance it. It was not yet high enough to lower the gear, but the airplane was steady and safe. So the straps were removed and the hoists backed away. The jacks were then raised, the gear lowered, and the jacks removed. Since there had been no gear failure and the gear was up in the wheel wells, there was no need to secure the gear to keep it from collapsing. The airplane could now be towed normally. The only damage had been caused by



Place main jacks under the jack points as soon as the airplane is high enough. Now it's solid.

the failed biological interface to the gear lever before the touchdown.

Note: Many gear ups result in the pilot reaching over to lower the gear handle during or right after the touchdown. The result in much more damage and you're better off admitting that you forgot than making matters worse by lowering the switch. Something not yet broken will get broken. If that happens, you will need to secure the gear from potential collapse across its links before you tow it. If you must then ferry the airplane, do so with the gear down and braced into this position.

Call your insurance agent and tell them what happened and that the airplane is safely off the runway. They'll advise you what to do next. If the airplane is to be ferried it will require that the crankshaft be inspected for sudden stoppage damage, a ferry prop placed, and a ferry permit acquired from the FSDO. Go have a beer. Or two.


Gear Up Actions

1. Turn off the master switch
2. NOTAM the runway closed
3. Maintain control
4. Choose lifting method:
 - a. Airbags
 - b. Hoist
 - c. People
5. Secure the gear
6. When clear, NOTAM the runway open
7. Call your insurance claims line
8. Get a Ferry Permit if you must fly the airplane for repairs

A gear-up landing is not considered a reportable event unless there are injuries or major damage beyond that

normally endured [see NTSB 830]. Since you're a stand-up individual, you might as well admit what happened to your pals. They're going to find out anyway, and you can get your story in first! There are things to be learned from these events, and in that regard it may be helpful to tell the FAA what extenuating circumstances may have distracted you. They have the authority and responsibility to check the pilot and aircraft records after such an event if they so choose. Having copies ready for them of the last page or two of your pilot log, a

current Flight Review record, and a current medical along with the aircraft's annual sign-off seems to streamline the interview.

If you are unfortunate enough to have an FAA experience that is sub-optimal, remember that there are Aviation Safety Counselors [now FAA Safety Team representatives] who can be very helpful as an intermediary between you and the FAA. Asking for a session with one of the safety counselors is looked upon favorably and is often quite helpful. Don't be the least bit timid about calling an aviation attorney if you feel like things are getting out of hand. Above all, be nice. 

When this article first appeared, many ABS members made a copy and put it in their airplane for the unlikely event they might ever need it. You can do the same, or if you prefer, can find it by searching for the title in the ABS Magazine online archives.

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