

HOW TO LAND AN RV

VAN

We've been asked that question many times, and have never had a ready answer other than: "Just like you land any other airplane!" End of discussion!

No, it isn't really the end of this discussion, but hold that thought---there's a lot of truth there.

An RV lands both the same, yet differently, than typical light planes. That sounds like a full-fledged "waffle", but, really, the similarities are much greater than the differences. We feel that a pilot who is truly proficient in typical light planes should have little problem adapting to an RV. Now, it is a matter of defining "proficiency". Part of my definition would be that the pilot has mastered the basics of flight. One would hope, and you probably assume, that this is true of the vast majority of pilots. But, a few weeks after jotting down the simplistic "lands just like any other airplane" premise for this long overdue article, I happened to read the following in the Oct. 20th edition of the AOPA E-letter.

"DO YOU KNOW HOW TO LAND AN AIRPLANE, REALLY?"

Here's what caught my eye: A new, dynamic AOPA Air Safety Foundation seminar called "Ups and Downs of Takeoffs and Landings" features original—and clearly unrehearsed—videos of landing attempts by hundreds of unsuspecting pilots at a large fly-in earlier this year. "Every pilot thinks he or she knows takeoffs and landings," said ASF Executive Director Bruce Landsberg. "But I challenge you to say the same thing after seeing this seminar. The fact is, many of us have been fooling ourselves, and this seminar proves it." Pilots who viewed advance copies of the video used in the program described the landing efforts as "good, bad, and ugly, with lots and lots of ugly."

Apparently there are more than a few pilots out there who are having trouble landing any airplane. Either they did not receive a good training in the basics, or have permitted these basic skills to become rusty through lack of practice and use. I'm sure that many will take exception to this, feeling either that I am acting arrogant or that I am trying to make excuses for my airplanes being difficult to land. After all, don't these pilots have licenses and years of experience? How dare anyone say that they can't really land? I'd rather not have to make and defend this statement, but, when I search for a way to explain the many RV landing accidents, I simply cannot arrive at any other conclusion: It is my firm belief that the reason many pilots have problems landing RVs is that they haven't really mastered landing "other airplanes." The folks at AOPA apparently agree and this opinion is reinforced by the observations of RV Transition Training

Instructor Mike Seager and several other highly experienced pilots I have spoken with.

Now, despite some generalizations and seemingly harsh statements in this article, our purpose is not to pass judgement on any of our reader/pilots. Our intent is to open a discussion of the subject of not only how to land an RV, but how to prepare yourself so that you can easily learn how to land an RV. Whether or not you are satisfied with your ability to land your RV, or anticipate having problems doing so, we hope you will carefully read this multi-part article. We will try to make it a meaningful review of the basic principles as well as a presentation of some of the specific techniques for landing RVs.

First, how can anyone say that a licensed, active pilot cannot "really" land? He's been doing so for years and has not had a "damaged airplane" accident. The best answer we can offer is that our pilot in question has not actually been landing these other aircraft, but to a degree, these airplanes

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have been landing themselves. How can this be? Well, many of the entry level production aircraft such as Cessna 150s and 172s, the smaller Cherokees, even airplanes like the Cessna 210 and Beech Bonanza, have extremely forgiving flying qualities. They

are equipped with energy absorbing tricycle landing gears and gentle stall characteristics. If a pilot can manage to fly one of them to within a few feet of the ground in a stable flight condition and at a speed reasonably close to stall, then by simply holding the controls in position, that aircraft will settle to the ground in an acceptable manner. It may bounce a little, but a less than exacting pilot can consider it an acceptable landing. He can hold back on the elevator controls and drop the airplane in and let it dribble itself onto the runway. Or, he can push the elevator control forward, force the airplane onto the runway, and let it dribble itself onto the runway. Sometimes this "autopilot" landing doesn't work out, and the aircraft's bounces get progressively worse until a go-around is needed, or until some part of the airplane bends. Whatever the result, in none of these examples has the pilot really *controlled* the airplane throughout the landing.

Fortunately, inability to "really land" an airplane is not an incurable disease or irreversible condition. The problem is that there is no magic cure; any more than there's a one-time pill to cure obesity. If I were forced to offer a single remedy, I'd say, "learn to master slow flight—really master slow flight". What does mastery of slow flight have to do with landing? Everything!

Airplanes land best at or very near their stall speed. At or below stall speed, they will stay on the ground. Above stall speed, they have enough lift to (sort of) fly again. If you cannot control the airplane precisely at near stall speeds, how can you possibly expect to control the airplane precisely enough to effect a smooth and safe landing?

It's always distressing to hear new RV pilots ask "how do you land an RV smoothly", or complain that "I just can't seem to make a good landing with it". We like pilots to be satisfied and happy with our planes—to love them unconditionally as we do. Because we land our RVs in what we feel to be a conventional manner, basically the same way we land other airplanes, we are at a loss to explain specifically "how to" land an RV. Other than to say that the controls are lighter and respond more quickly, or that the RV landing gears may be "more springy" than those of some other airplanes, we don't have any magic tricks to offer.

Usually, after a more in-depth discussion of how the pilot is making his approach and attempted touch down, we get a few clues as to the source of the problem. And that, usually, is that the pilot does not *really* know how to fly slow.

PRACTICE, PRACTICE, PRACTICE

One of the best things a pilot can do is learn how to fly the airplane, with precision, right down through stall speed. This is not the same thing as practicing a few stalls, where one rapidly decelerates to stall speed, waits for the break, lowers the nose, adds power and recovers. That may be minimally OK for stall avoidance and recovery training, but falls far short of qualifying the pilot as a master of slow flight. Being prepared to make precision landings requires that the pilot be able to fly the airplane precisely, for at least several seconds, in slow flight, accurately controlling attitude, direction, and altitude during those last few feet before contacting the ground. The real "trick" is to contact the ground at a low sink rate and in a straight flight path. It sounds easy enough, but many pilots are apparently not able to do so.

Any pilot who is capable of controlling his airplane for a prolonged time within 5 mph of stall speed should have little trouble landing. That capability does not come automatically. It must be learned and learning requires practice and repetition. Practice stalls by reducing speed slowly, striving for a deceleration rate of 1 mph per second. This approximates the deceleration rate which will be experienced during a normal landing. Thus, the landing approach approximates the approach to the stall. The difference is that in landing, the wheels touch the ground at the time the stall occurs.

Practice flying the airplane at a speed between 5 and 10 mph above stall speed, while maintaining a constant altitude. When you are comfortable with this, include gentle turns. Again, work to maintain coordination and a constant altitude. This does not exactly simulate any portion of a normal landing approach. However, it does teach precise control of the aircraft at a critical flight condition. During the idealized landing, the airplane decelerates and loses altitude in a perfect sequence. At just the right time

the wheels touch the ground and the need for flight control has ended. In the real world, the upsetting effects of wind gusts, and an imperfect, rebounded touch down, requires that pilot make immediate and precise corrective control input adjustments at critically slow flight speeds. That's the reason for practicing prolonged flight at minimum speeds. An advanced method of practicing slow speed control is to fly within 10 mph above stall speed and 5 ft. of the runway for a prolonged distance. This is a good test of whether or not you can demonstrate precise control in the landing condition.

In a broad sense, a good landing is the culmination of a good landing approach, which starts on the downwind leg. You probably remember this from the days of your flight training. Target a certain speed and power setting opposite the numbers; after turning base leg; after turning final; over the numbers, etc. Flaps down, or partially down at given points—approximate altitudes at key points. This can be classified as a planned approach, or perhaps a stabilized approach. Its purpose is to bring the airplane to a certain point, at a certain speed and altitude, so that a good landing can be made with a minimum amount of further control input and/or maneuvering. You might equate this to the flight of a hand launched model airplane glider. Properly trimmed and launched, it will glide at a steady speed and angle until it skims onto the lawn and slides to a stop. Up to the point of touch down, there is a close similarity between the stabilized approach of the real airplane and the glider. Even in an ideal condition, because of speeds and scale factors, the real airplane needs precise control inputs at specific speeds and altitudes, to effect a smooth touchdown. If the flight path of our hand launched glider is disturbed by air turbulence or poor trim, it will crash. So will our real airplane if the pilot does not possess and exercise slow flight skills.

In the next installment we'll talk about the differences between RVs and common light planes. Then I will describe, step by step, how to land an RV -- or at least, how I do it. It will do little good, though, if the pilot is not capable of flying with the precision and finesse required to follow these steps. Grab whatever airplane you have access to, find a few hours of good weather and go practice. Practice. Practice.



HOW TO LAND AN RV

Van

In our *Landing Your RV* series, the first *RVator* of 2003 is-
sue left the reader hanging just
above the runway, anticipating
imminent contact. We had solic-
ited comments regarding other
possible approach and landing
techniques. We received exactly
one response. So, either:

- Everyone agrees with our presentation,
- Only one person read the article,
- Only one reader felt that the article was relevant to his flying,
- Readers are waiting for this final installment before commenting on the questionable qualifications and parentage of the writer.

Whatever the reason, we shall persevere. On to the land-
ing itself, where the rubber meets the runway:

TOUCHDOWN

While the touchdown portion of the landing is vitally important, it may be the most difficult to provide precise written instructions for. Its outcome is primarily the result of pre-touchdown discipline. It isn't enough just to follow the generalized "approach, flare, touchdown" sequence. Knowing the sequential steps is the easy part. The pilot must be able to see forward and downward and must be able to precisely control the airplane in slow flight. (This was discussed in a previous installment where we were discussing stall recognition. Slow flight familiarization and practice also enhances the pilot's ability to "finesse" the airplane during the final seconds preceding touchdown.) The pilot must also have the skills and judgment to accurately and quickly detect minute variations from the desired flight path and to make quick and intuitive control corrections.

Following the landing approach and landing flare, as your RV decelerates, let it sink to within a couple feet above the runway as the speed bleeds off. Hold this altitude until within about 5 mph of stall, and gradually let the aircraft sink onto the runway as the final few mph bleed off. There's nothing new about this method—it is very much like the standard student pilot text. However, you must be aware of all the variations of this theme. If you slow too much, too high, the RV will tend to sink quickly as the speed nears stall. Because of the effect of the short span mentioned earlier, you may not have enough speed and elevator authority to arrest the resulting descent rate. That's why it is desirable to be very close to the runway while dissipating the final few mph. When you see that your airplane is sinking too fast or has ballooned a bit too high, you must be able to recognize this and immediately alter control inputs to get back on the flight path.



ROLL OUT

For tail wheel airplanes, the accepted practice for three-point, tail-low landings is to hold up-elevator (back stick) and keep the tail on the ground. However, there are times when this may not be the most desirable procedure. Many years ago I developed a habit of lifting the tail immediately after touchdown, particularly on runways with uneven surfaces. Lifting the tail usually involves only relaxing the stick backpressure applied for the flare. It is not necessary, or desirable, to jab the stick forward to raise the tail anywhere near the level attitude. Raising the tail a foot or two suffices and serves several purposes:

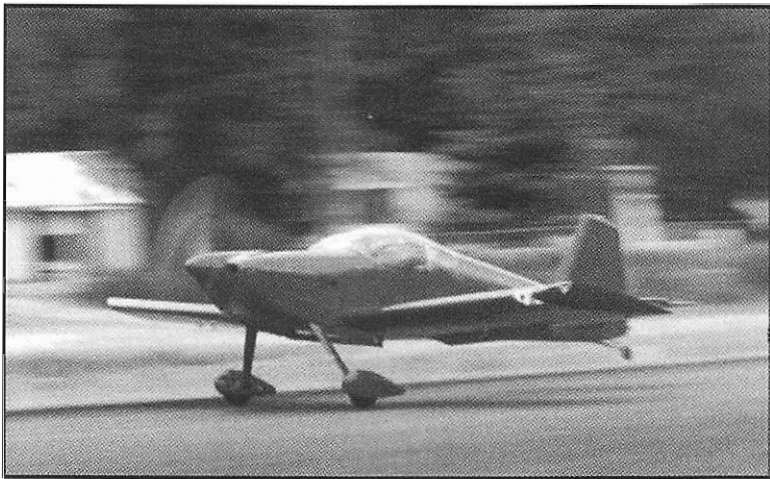
- Provides better forward visibility.
- Transfers more weight to the wheels rather than wings, for better braking.
- Transfers more weight to the main wheels. On undulating turf runways, this serves to minimize the tendency for the airplane to be catapulted back into the air.

Disadvantages:

- Loss of tail wheel steering. The rudder remains effective, but in a crosswind, the added effect of tail wheel steering is helpful.
- Requires careful timing. If the touchdown is imperfect and the airplane is going through a series of small bounces, the pilot may relax (push forward) the stick at the wrong time and cause an aggravated series of bounces.
- If a pilot is unfamiliar with either the airplane or the technique, he might raise the tail too high and the prop could strike the runway.

So the tail-up roll out is not a "must do" recommendation, but rather an option that a pilot can use if it suits his situation.

When landing one of the tri-gear RVs, hold the nose-wheel off the runway as long as possible. Even when the nose wheel comes down because of reduced speed



Raising the tail—but not too much—after a smooth touchdown will lower the angle of attack and increase the weight on the wheels. Note that the tail is considerably lower than level flight attitude.

and elevator effectiveness, up elevator should be maintained to minimize the load carried by the nose wheel. Reasons for this are:

1. To reduce stress on the nose gear assembly. Weight on the nose gear subjects it to more stress at high speed than at lower speed. The primary reason for having a third wheel on an airplane is for steering. Placing that third wheel up front makes steering and ground handling easier than putting it at the rear of the airplane. The nose gear should be thought of as support for a steering wheel, not as a landing gear. Land on the mains—steer with the nose.

2. Holding up-elevator will increase aerodynamic drag and thus reduce braking effort.

WHEEL LANDINGS

We delayed an explanation of wheel landings until now to avoid confusion. Some pilots are attracted to the idea of making wheel landings as a means of bypassing learning the skills needed for good three point landings. In some airplanes, particularly tri-gears and those with a very soft landing gear, this may be true. These landings might be described as semi-controlled crashes saved only by effective energy absorbing landing gears. In RVs, the ability to make good wheel landings require overall skills comparable to those needed for 3-point landings. A competent pilot should be able to land his RV either way, depending on which he deems best for the existing runway and wind conditions.

For a wheel landing, set the elevator trim so that back-pressure is required to hold and further reduce flying speed. If the trim was set for a neutral stick force at touchdown speed, control pressures would need to vary from pushing to pulling rather than just varying the amount of pull. Fly the same approach you would use for a 3-point landing. Begin a landing flare and then, when within a few feet of the runway surface, ease off on

the back pressure and lower the wheels to the surface at a very low descent rate. When they contact, reduce stick pressure further to place more weight of the airplane on the wheels so the airplane has no tendency to regain flight. As speed decreases, the airflow over the tail will lessen its lift and the tail wheel will settle to the runway.

A typical wheel landing will be done at a speed of 10-15 mph above stall speed. In the truest sense, it is a "partial flare" landing because at this touchdown speed, the tail is much lower than it would be in level flight-cruise. It's only after touchdown that the tail is raised to a more nearly level attitude.

Making good wheel landings is a definite art. The wheels must be lowered very gently onto the runway. Because the wing is still well above stall speed, if the descent rate is too high when the wheels touch, the plane can bounce back into flight. The object is to touch gently and then pin the aircraft down with forward stick. If a bounce, or skip, does occur it is then necessary to re-establish the desired low descent rate and again place the wheels on the runway. The skill needed to do so is greater than that required to ease a plane down 3-point. In the 3-point condition, the speed is so low that very little lift remains to assist in "bouncing" the aircraft back into the air.

CROSSWIND LANDINGS

Crosswind landing techniques for RVs are the same as for other light aircraft. The forward slip is generally preferred over the crab-into-the-wind method for drift correction. Other than that, landing in a crosswind is the same as any other landing. The pilot makes a "minor" adjustment to his approach by remembering that the "forward slip" is now the neutral point of his stabilized approach. After control corrections for turbulence and such, he must return to that cross-control condition rather than to a controls-centered condition.

MIKE SEAGER'S INPUT

In keeping with my penchant for putting the cart before the horse, just as I was finishing this article, I took the opportunity to ask Mike Seager for his comments regarding "How to land RVs". Mike, as you may know, is the world's most experienced RV transition instructor. In general, he agreed with my points. He did note an additional pilot weakness — an inability to maintain directional control on the ground. Many pilots just don't use the rudder properly.

Sometime when writing a "how to" article like this, I wonder if I am "preaching to the choir" of skilled pilots and missing those who really need the help. So, I asked Mike to give an appraisal of the hundreds of transition students he has flown with. He rattled off the following.

- 5% or so are ready to just "strap on their new RV and go"
- 70% need transition help.
- 25% of those *really* need help.

- Of that 25%, 5-10% go home "not yet ready". The allotted flying time and/or travel schedule did not permit enough training time to bring those pilots up to the desired level of proficiency.

So, dear reader, which category do you belong in? We can't all be in the top 5%, unless you come from Garrison Kiellor's Lake Wobegon where "all of the children are above average." I certainly don't know, and expect that you don't either. You may think Mike's numbers are discouraging because those who come for training are at the bottom of the pilot pool. Not so; many are airline pilots and otherwise current pilots who are there partially because of insurance requirements, but more out of sincere desire to improve their skills. Included in these



If you are in Mike's "not yet ready" category, be humble and seek more instruction before getting in your new RV....

ranks are many "in need of help." I think that the lesson here is that most of us are not as qualified as we think. The good news is that being in a "needs help" category is not a terminal condition. You need not wait until your RV is finished to start working on your piloting skills. You can apply most of the techniques mentioned above to any airplanes you are now flying. The general skills you acquire now will be a benefit when you do get behind the stick of your RV. When a pilot gets to the point of really understanding the airplanes he is flying, it is something like the following analogy:

A five year old child can pick up his favorite story book and page through, it reciting the entire story. Often, he is simply reciting, from memory, words which he identifies with the pictures on the pages, words which his parents have read to him many times. Another five year old can pick up that book and page through it, actually reading the written words on the pages. With his powerful tool of "words", he can then pick up any number of other books and read them too. Flying airplanes is somewhat the same. A minimally skilled pilot can fly an airplane reasonably well by rote; having learned from repetitive training and practice. He may not thoroughly understand what the airplane is doing or why, but he flies OK by "repeating" control procedures he's been taught. However, the really good pilot is the one who can "read" the airplane. Although it may be a new and different airplane, that pilot can recognize the control inputs as if they were printed words on a page. He (or she) can un-

derstand what the airplane is telling him and can make that airplane do his bidding.

One of the procedures Mike Seager uses to size up his transition students is to have them fly the length of the runway within 5 ft. of the surface and 10 mph of the stall speed. From this demonstration, he knows immediately if the pilot has a mastery of slow flight control. If so, helping him polish his landing techniques will be easy. If not, making a good landing will be more a matter of luck than skill, and the probability of making consistently good landings is slight. He must then spend valuable hours of refreshing basic skills before hoping to achieve success at teaching landings.

Recently, I happened onto a two year old issue of AOPA *Pilot* magazine and an article by Alton Marsh titled "The Quest for the Golden Landing". At one point, he mentioned a chance encounter with legendary pilot Bob Hoover. He asked Bob the secret of making better landings. Bob had a couple of glib suggestions such as landing on wet runways or flying airplanes with short landing struts. When pressed to offer some advice for the average pilot, Bob laughed and offered his real secret. "Work real hard at it."

Heck, I could have told you that. Matter of fact, I believe that I did. My point being that hard work will yield better results than "secret landing tricks." Truth be known, probably most of the great "natural" pilots like Bob Hoover have been "working real hard at it" all of their flying lives.

Now, "working hard" may seem a tough idea to sell. Don't we want to fly for enjoyment, not hard work? Of course! Here's the kicker. The harder you "work at it" now, the easier it will be in the future, and the greater will be your flying enjoyment.

The hard work required yields rewards out of proportion to the input efforts. A little hard work now can enhance your self-esteem, enjoyment, and safety for the rest of your flying career. And, maybe your spouse and friends will even feel confident enough to ride with you.

SUMMATION

The "secret" of making good landings is to practice and gain skills in precise slow flight handling and stall recognition, familiarize yourself with the unique qualities of the RV you are flying, and have a good understanding of the principles of flight. There are no tricks or shortcuts around the need for piloting skills; skills which can be improved with study and practice.

Hopefully, some of the hints and techniques I have offered will help you learn to make better landings in your RVs. I recognize that not all pilots learn the same way, and different techniques and explanations might better suit some of you. Thus, I am soliciting comments from RV pilots who may have found other methods that have helped them make better landings in their RVs. I will review, compile, and present these in future *RVators*.

Happy landings!