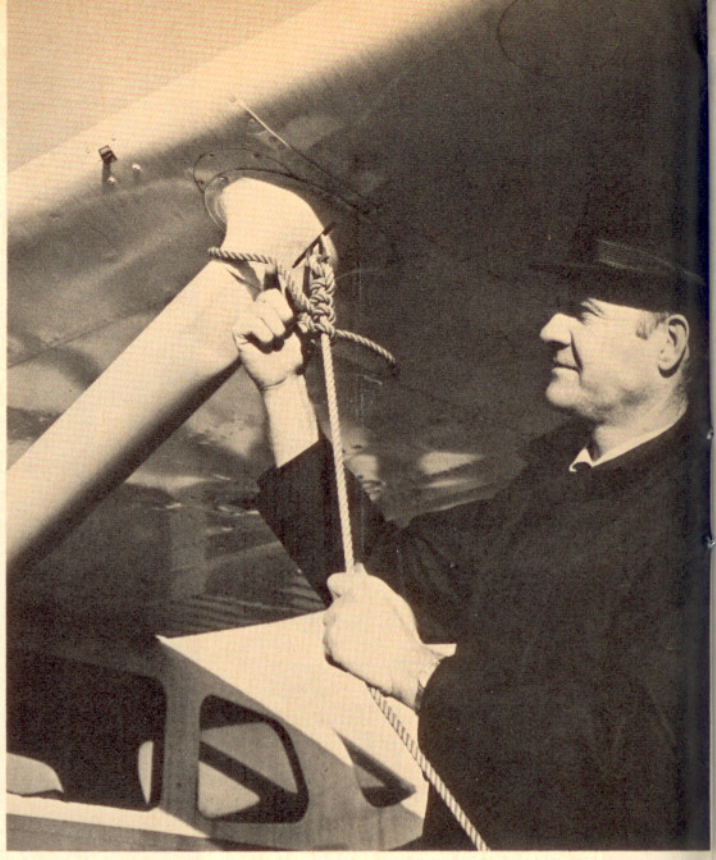
Your shiny, new plane may be saved from a bad mauling or destruction from the wind someday if you have the proper anchoring materials and know how to use them. Here are some tiedown tips you can't afford to overlook

Tiedown Security

by LARRY TRASK / AOPA 283604



Al Carley, A&P mechanic and Columbus, O., aircraft inspector, demonstrates "insurance loop" around strut. If tiedown ring should fail on this Cessna 182, the loop of rope would act as a backup. Slight amount of slack should be left in the loop, as Al points out.

■■ The trees around the entrance road to the local airport are whipping to and fro, the windsock is standing straight out from its mast, and inside the FBO's office, the windspeed gauge is flirting with 50 knots and above.

No day for flying a single engine or light twin!

It's also no day to have your precious bird poorly secured to the ground by a haphazard, understrength, devil-may-care method!

The large majority of pilots are faced with the age-old outdoor tiedown problem. Lack of hangar space at local airports (or lack of funds on the part of the pilot to rent same) finds more airplanes tied down in the elements than offered safe haven in a hangar. And when flights are made to remote areas, and to areas not so remote, the transient aircraft owner has no choice but to tie down and hope for the best.

A visit to any tiedown area on just about any airfield will show you that there's no accepted standard method of tying down an airplane. Also, there's no standard acceptable tiedown material—you'll see all kinds of rope, from clothesline to ship's hawsers, and all manner of chain, cable, and anchoring devices.

It seems incredible that a sane person would invest upwards of $10,000 or $15,000 in an airplane, then tempt the fates by fastening it to the ground with a frayed length of $1.98 clothesline! You see it every day!

While arguments have been known to rage far into the night, most true experts will agree that rope is a superior tiedown material to chain. The reason rope gets the nod is simple and basic: chain has no resiliency or "give" whatsoever. Under wind-induced stress, all

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the force is transmitted directly to struts, main spars, and other critical airframe components. Rope has enough natural elasticity to absorb a good portion of the stress and take the brunt of the strain off the airframe. Also, loose ends of a flapping chain can dent the airplane and damage the paint job.

As one pilot graphically put it, "Chain is dandy for hauling logs and tying dogs, but keep it away from my airplane."

Chain is valuable as a secondary or backup means of security, providing it is installed with more slack than the rope being used as a primary tiedown. The ends of the chain should be well secured, so they cannot strike any part of the airframe.

Manila and nylon ropes will give good service, as will the new synthetics, such as polypropelene. One major airplane manufacturer recommends a rope of 700 pounds tensile strength or better to tie down its single-engine models. Synthetic ropes are usually much higher in tensile strength, for their diameter, than manila or hemp (for example, a half-inch-diameter nylon rope may have a tensile strength of 6,000 pounds), and offer many advantages. Synthetics are water and deterioration resistant, won't rot, and their high strength evolves from the fact that they are woven from continuous strands of material, rather than short strands of manila, sisal or hemp. One disadvantage—a synthetic rope will stretch further under strain and is more sensitive to heat and cold. Also, a synthetic rope requires some "break-in" time, and is difficult to work with when brand-new. Some of this break-in time can be shortened by using the old fire department technique of "prestretching" the rope by hanging it full length with a weight on the end for a period of a few days.

All tiedown rope should be periodically inspected, both inside and out, to make sure it is fit for continued service. Obvious cuts, abrasions, decay, and extreme softness indicate that the rope ought to be put out to pasture. To inspect the inside strands, just give the rope a quarter-twist away from the direction of the twist of the strands, and this will allow you to look inside. Look for broken fibers; fine powder, which indicates the presence of grit, mildew, and mold; and any change in the color of inside fibers.

Particular attention should be given to the point at which the rope loops through the tiedown ring on the strut, and to the end where it is secured to the ground anchor. Constant chafing of the rope at these two points will cause fiber damage and eventual failure under stress. Remember, too, the weakest point of any rope is any point where it is knotted. Tiedown ropes should be free of any knots not required to anchor the airplane. It is a good idea to rotate the stress areas (rings) so that the same part of the rope is not constantly under this additional strain.

Follow the instructions in the owner's manual for the proper method of tying the airplane down. The wings and tail should be tied firmly, but not overly tight. There should be a couple of inches of slack in the rope. The rope should be looped through the rings provided on the strut, and the first knot tied immediately against the ring. To make extra sure, loop the rope around the strut itself, where it joins the wing, and leave enough slack so that you can easily put your finger between the rope and the strut. If a tiedown ring should fail in a high wind, you've got "insurance."

The free end of the rope can be tied, after looping through the rings and around the strut, by a series of simple half-hitches. The free end of the rope is merely brought around the tension end and then brought under itself. This knot tends to tighten against itself when placed under stress. Make sure the free end of the rope is secured so that it won't whip around.

How many times have you flown to a strange field, had to RON, and found there were no tiedowns available? This does not have to be a catastrophe, IF you are equipped with portable take-along tiedown equipment. Portable tiedowns can range in price anywhere from $6 to upwards of $25, depending upon the degree of sophistication. The more expensive sets include deeper anchors, more rope, and a set of wheel chocks. Govern the price of the tiedowns by the value you put on the bird you are planning to secure.

Just about all portable tiedown kits require insertion into the ground by twisting, and this can be a physical challenge in hard, dry, or frozen terra firma. A stout metal rod or pinch bar should be part of the kit, for use in turning the anchor into the ground.

Remember, temporary or portable-type tiedowns are not intended for use as permanent anchors. Due to their shallow seating in the ground, they will eventually work loose with continued use in the same location. Be especially wary of portables during periods of freezing and thawing.

When strong winds are predicted, what's the best assurance that the "sturdy bird" is snug and secure in its

1. Good tiedown procedure begins with a series of knots next to tiedown ring, and series of half-hitches to secure loose end of rope to tension end. Photos by the author
2. Al is careful to secure the end of the tiedown rope. You will note he uses chain as secondary means of security. Chain must be slacker than rope.
3. Carley installs wooden gust lock that he custombuilt for his Cessna 120. A soft wood, such as pine, is suitable. It fastens with bolts and wing nuts at either end. This one is large enough so that it's hard to overlook during preflight.
4. Al demonstrates double caution in securing his own recently rebuilt Cessna 120. He carefully secures both control wheels with seatbelts.
5. Here's how to check internal condition of a tiedown rope: give it a quarter-turn in direction opposite the twist of strands. Outside portion of this rope shows wear, but inside checks out okay.

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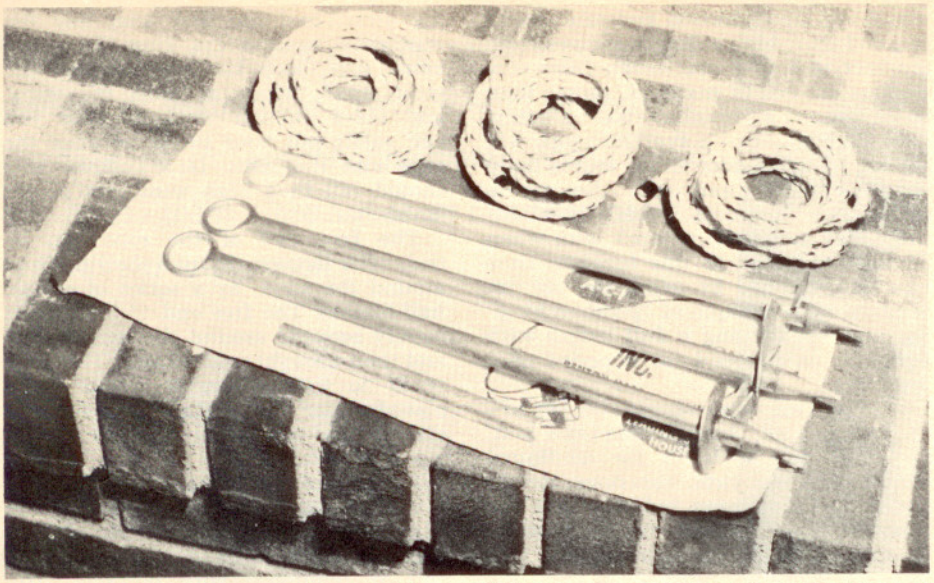

This take-along portable tiedown kit fits in its own cloth bag and takes up very little space in the luggage compartment. Type shown here is suitable for light single-engine aircraft. It should never be used for permanent mooring. Short steel bar is used to turn the auger-type anchor in hard ground.

tiedown? Many a hangar argument has erupted over the relative merits of tying the plane down with the nose headed into the direction from which the wind is blowing, or turning the tail into the face of the blow.

From personal experience in the gusty, super-flat mid-Ohio area, here are the facts. A taildragger tied down with the tail into the wind will go nowhere but further into the ground, if the underfooting is soft. Wind blowing directly on the exposed surfaces from the rear will tend to drive the airplane downward. A strong wind on the nose of a conventional-gear craft will have the reverse effect.

Remember, a *Champ* or *Cub* will fly at relative wind speeds neighboring on 40 m.p.h., so a wind blowing at that rate on the nose will cause the light airplane to "fly in the ropes." If the tiedowns are too slack, a *Cub* will jump off the ground with the gust and slam back down when the gust diminishes. The ensuing damage potential is too obvious to merit lengthy discussion.

Consider now the tricycle-gear airplane. A strong wind on the tail can do one of two things: cause the bird to flip on its nose or cause it to bang down resoundingly on its tail skid, depending on the position of the elevators. With the elevators in a down position, a strong gust will slacken the tail tiedown and bang the tail down on the ground. When the gust lets up, the airplane will bang down on the nosewheel, playing havoc with the oleo strut and possibly the prop.

With the elevators up, a tailwind will try to force the tri-gear plane over on its nose. If the tiedown on the tail is weak or slack, the aircraft can flip.

Winds from the direct side have essentially the same effect on both taildraggers and tricycles. Since its tail is tied closer to the ground, the taildragger might be considered more secure, everything being equal.

Sidewinds will cause both types of airplanes to gyrate and bounce from gear to gear. If the control surfaces are not secure, the wind will attempt to work them up and down at will. If gust locks are available, or if they came with the airplane, by all means use them. An alternative is to tie the controls with the seatbelt to restrict movement of the ailerons and elevators. The rudder should be secured with a gust lock. These can be made out of soft wood by any pilot, no workshop skills required. Paint them red, and make their removal a part of your preflight—every flight—and a part of your postflight procedure, same frequency.

If any control surfaces are allowed to flap and bang in the breeze, serious damage to surfaces, fairleads, cables, pulleys, and other vital parts of the control system can be the result.

Wheels should be chocked as part of your aircraft security procedure. There are many varieties available, and any chock that does not allow free rolling of the wheel is a good one. Chocks are preferable to a set parking brake if the airplane is to sit for a long period of time.

The care and precision with which you plan and execute a flight should not end when you cut the switches at the end of a flying day or when you reach your trip destination. Granted, it could be a windless, cloudless day when you tied your airplane down, but what about the elapsed time between flights?

Always secure the bird as if a 50-knot wind were slated to start blowing in the next five minutes. This caution will pay off in peace of mind when the big blow does come, and just think how happy your insurance man will be! □

THE AUTHOR

Larry Trask of Dublin, O., has written several articles for The PILOT. *Mr. Trask is eastern manager for Construction Digest, a biweekly news magazine covering highway and heavy construction in the Midwest. He has been flying since 1964.*

WAC Major Heads Maryland Flying Club

Whether on duty or off, one quality for which Maj. Jeane M. Wolcott (AOPA 356949) is recognized is her organizational ability. On duty as an officer of the Women's Army Corps, she is chief, Administration and Operations Office, Command and Staff Training Department, U.S. Army Ordnance Center and School at Aberdeen Proving Ground, Md. During her off-duty time, she presides as president over the safety program and activities of the 125-member Aberdeen Proving Ground Flying Club.

The APG club membership consists of active and retired military personnel, reservists, and Department of Defense civilians. Private pilot instruction is provided by five instructor pilots in the club's six aircraft. In addition, Maj. Wolcott introduced club members to AOPA's Pinch-Hitter Course in 1969. Families of club members who take the course can learn how to land an aircraft safely in the event of pilot incapacitation. Another part of Maj. Wolcott's safety program for the club is the requirement that during the month of each member's birthday, he or she take a checkride with one of the club's instructor pilots.

Fly-ins and spot-landing contests are among the social activities of the club in which Maj. Wolcott also is an active participant. And in her "spare time" on a nice day, she is most likely to be found cruising in her *Bonanza,* just as some people would take a drive, for she believes flying is safer. □

Maj. Jeane M. Wolcott, president of the Aberdeen Proving Ground Flying Club, radios the tower for taxi instructions.