Stearman Ground Loop 101

During WW II Bill Strohmeier served as an instructor in Stearmans at the U.S Army Air Corps primary flight school at Haw Field, South Carolina where he amassed 2800 hours of instruction in Stearmans. His views are summarized below:

First of all, it might be well to explain, for the benefit of those who aren't acquainted with the ship and for the benefit of students just starting their Stearman training, that this particular trainer is about the best there is. It's rugged, it teaches positive pressures on the controls, and by the time you can handle it on the ground, you can handle almost anything. There's nothing tricky about the ship in the air and it really isn't tricky on the ground. It's just this: the airplane demands a straight-in-approach and will not tolerate drift in the landing. It has a fairly narrow landing gear which contributes to its galloping capers on the ground. It also has a tail wheel which, when given too much of a side load, will snap out of its steerable clutch and become a full swivelling caster which aids the ground-loop. In short, it's an airplane which teaches you that you're not through flying it until it is in the hangar, and the doors are locked.

Few ground-loops, however, are serious. The aileron usually is bent and occasionally a spar goes. Half the time the paint is scratched and that's all.

DRIFT'S THE THING

The old saying that an ounce of prevention is worth a pound of cure hits right on the head when you start discussing how not to ground loop this or any other plane. Stop the drift and you'll hardly use your rudders on the ground. But come in with a little side motion and you'll use full rudder and some brake, occasionally, to keep her straight.

Drift, therefore, is the thing and it isn't caused by the wind alone. As often as not the drift is artificially made by faulty flying. There are a number of errors which the student can commit which will set up the artificial drift we speak of.

A fault as common as any is the tendency to hold rudder in the final turn into the field. Often the student starts this turn a little late, sees he's not going to get around quickly enough, and does what seems to be the natural thing of applying, or holding, rudder to speed the turn. This causes a skid and a sidewise momentum which is retained even after the ship has been straightened out in the final approach. Thus, even though the tee is lined up true to the wind, the student will be drifting to the side, when he hits the ground.

Another common error is coming in wing-low. There's a natural tendency to fly with the wing a little low on the side out of which you're looking. Since it's customary to look out the left side, the stick sometimes is advertently eased over to the left and drift sets

in. Keep your wings level.

“Screwing around with the ailerons’ is yet another drift maker. Many students, and sometimes instructors, fail to realize the importance of using plenty of rudder in power-off glide work, especially when a dropping wing must be raised. This kind of treatment is accompanied by considerable yawing and, if contact with the ground is made while the nose is oscillating, some paint is going to be scraped.

Langewiesche, in his articles “Straight and Level” several months ago explained why stick and rudder together should be used to pick up a low wing in rough air. This principle applies even more forcibly in the gliding approach. Coordination will pick the wing up much more quickly and keep the nose headed in a constant direction.

Another error is that of subconsciously pressing a little rudder during the final stage of the landing. This tendency can cause a turn so slight that it is hard for the student to notice because of his preoccupation with the levelling off process.

Then there’s the oft found fault of not pulling the stick straight back, due to improper movement. Some students pull the stick back to the left while others slap on a little right aileron as they level off. In the former case the student makes the error of pivoting his forearm at the elbow which produces a circular motion back and to the left. In the latter case he lets his whole arm pivot at the

shoulder which results in bringing the stick back to the right. Since level wings are so important during the moment before contact it is important that the student avoid this error of inadvertently dropping a wing at this critical point.

The points we have just mentioned are those ounces of prevention which are so important. Now for the pounds of cure which students need, so badly.

WHAT ABOUT SLIGHT CROSS-WIND?

Assuming that the student has been taught how to avoid creating artificial drift, how should he be taught to land when there's a slight cross-wind? Such a condition often exists during pre-solo landing instruction at busy airports where the tee can't always be set directly into the wind.

I realize that anyone who ventures into a printed discussion of cross-wind landings has his neck stuck out a mile and with this knowledge I cautiously make the following remarks. Drift is a funny thing; it's hard to explain, it's hard to see. In my opinion the average student cannot see drift unless he's landing on a runway or has some other kind of a line down which he's trying to land. Some instructors will argue that a student shouldn't be soloed if he can't see drift. Others will say that if the airplane is drifting badly enough to cause a ground-loop, the student can see it. I'm not inclined to agree.

The approach to the matter should involve preparing the student's mental attitude properly in the first place and then teaching him a fairly mechanical process where with he can cope with the cross-wind and neutralize its effects. I think that too often instructors hamper the progress of their students by assuming they can see drift. The outburst of emotion through the gosport such as "G. D. it, can't you see you're drifting?" has little effect but confusion on the student. He may see that something is wrong but he is usually too slow to interpret the trouble and then make corrections in time. Proper mental preparation, however, speeds the student's reaction. This involves a thorough understanding of the wind conditions for the day. Is the air rough? Is the wind steady or fluctuating? Is it cross-tee, and, if so, how much? It's appalling how few persons have any wind consciousness about them.

WATCH THE SOCK

I like my students to study the sock carefully for wind trends while they're waiting their turn to fly. But even more important, they must watch that wind sock during every landing approach. This, by the way, is a failing of many military pilots who, trained to land according to the tee, usually ignore the wind sock.

Working on the assumption that the student can't see drift, particularly the very slight drift encountered in the typical situation mentioned above, a method of correction for drift should be taught which will be more or less mechanical. The crab method definitely

calls for perception of drift, since in reality you're doing nothing more than transferring drift from one side of the airplane to the other and then straightening out with a delicately timed application of rudder. Personally, I think this is a little too fancy and tricky for the run-of-the-mill student during the early solo stages.

That leaves the wing-low method which is something the student can do mechanically and get away with. I merely tell my students to drop the windward wing a couple of degrees and hold it straight with opposite rudder. If they over-correct slightly for the wind drift, that makes little difference since there's little danger that the airplane will ground loop down wind.

Let's take a typical case where the wind is blowing slightly from the left. Before taking off the student is impressed with the fact that the airplane will want to drift to the right in the approach, and, upon contact with the ground, will want to ground loop to the left, into the wind. The student must do two things to prevent that ground loop. First, he must check his drift; second, he must be alert with his right rudder to prevent the ship from swerving to the left on the ground.

EXPECT THE WORST

Just as important as the correction for drift itself, however, is getting the student to realize and visualize thoroughly what will happen if he is drifting slightly when he hits. The student can count on the airplane swerving into the wind, if the drift isn't

completely checked. (For a good, clear understanding of the forces at work on the airplane in a ground-loop, Hank Kurt's excellent article on the ground-loop in the May, 1943 issue of AIR FACTS should be read by students as a supplement to this article). Knowing this, the pilot can mentally prepare himself for the "onslaught" and be alert, therefore, with the leeward rudder. As contact is made the student should suspect his steed of a ground-loop, should be keenly on the lookout for the slightest veering into the wind. A good, strong, healthy jab of downwind rudder should be inserted at the first warning, – no veering, regardless of how slight should be tolerated since even the most minute turning at 60 m.p.h. (landing speed in still air) can build up a terrific centrifugal side load which will kick the tail wheel into full swivel.

This particular factor is very deceptive and is the reason why some PT ground-loops occur after the landing roll has progressed far down the field and everything appears from the side lines to be all right. What happens is that the student tolerates a slight turn which continues until the side load is just too much. A late ground-loop is usually caused by relaxation of the student's attention to his work, a natural result of having "greased" it on smoothly.

While alertness with the leeward rudder is very important, the student must remember also, that holding the corrective rudder too long is as bad as no rudder at all. The rudder should be relaxed promptly as soon as the airplane has resumed its original course

or is heading straight. (At a number of military flying schools students are told, after a ground-loop has been checked, not to try to resume a landing run down the runway, but to bring the airplane to a stop, or under control, in whatever direction they happen to be heading. Thus, if you were to regain control after the airplane had swerved thirty degrees off the runway, maintain your new heading even though it takes you into the “rough”. Trying to return to the original heading could cause a ground-loop in the opposite direction from the one originally started).

THE DRAGGED WING

Many PT-17/N2S pilots, and pilots of other types too, have experienced the odd sensation of a wing dragging the ground but with no apparent tendency of the airplane to return into a ground-loop. This situation is the result of a unique equilibrium of forces caused either by an incipient ground-loop, which has been checked by a little rudder on the down-wind side, or a peculiar gust, or cushion, of wind which may be working on the up-wind side. Best cure for such a condition is a little extra rudder towards the low wing to create a centrifugal force against the high side and stick full forward and into the high-side corner. Regardless of the fact that it’s theoretically impossible to get effect from ailerons at stalling speeds, ailerons will raise dropped wings in landing runs. The forward stick will raise the trailing edge of the wing tip (the part that rubs) a few inches, and in addition will reduce angle of

attack and unload the wing – especially the offending side – with the result that the weight of the airplane will put the high wheel on the ground.

An undesirable by-product of intensive stall practice before solo is the tendency of many students to use opposite rudder to pick up a dropped wing. In a stall, they're told that left rudder will provide increase speed for the right wing, thereby, giving it additional lift which will pick it up. But, if a student finds his right wing about to drag on a landing and gives it left rudder a-la-stall procedure, he's due for a big surprise. The centrifugal force he has set up will tip him still more to the right. There's a big difference between what to do in a stall and what to do on the ground.

We haven't said anything about ground-loops from bounced landings, from which condition many of the best ground-loops are born. The truth is simply this: it is very easy to have a wing drop after a bounce. The student's primary objective in such a situation is to see that his wings are leveled up instantly (with ailerons) and that the nose keeps straight ahead (with rudder). That will get the ship level laterally, but immediately following the pilot will often have to go into a crossed control situation, for drift will have set in again. Here's an example: you've bounced and the right wing has gone down, and you are beginning to drift to the right. With coordinated left aileron and left rudder you pick up the wing, but no sooner is it up than it becomes necessary to use right rudder to

set up a force against the drift (to neutralize it by skidding up-wind). This last touch of right rudder, to off-set the drift and also get headed more downwind with whatever drift is left, makes the ship want to roll to the right, consequently at the last your controls are slightly crossed: left stick to hold the wing up and right rudder to take care of the drift problem.

The big thing for the student to remember in a bounce is not to sit there and wait for whatever is going to happen to happen. This is too often the case: A student comes in, bounces, and then gives up because he's messed up the landing. This tends to make the student less self-reliant and teaches him to relax his efforts, since he knows you'll get him out of the mess. It takes much experience and not a few gray hairs to learn how far you can go in waiting for the student to make his own corrections.

That brings us about to the end of our discussion. Before concluding, however, we might mention briefly the very effective use of "Body English" which most instructors find helpful, particularly on the first solo landing. Both fingers crossed will help, too. All of which proves that there's still some romance and adventure to flying and that it hasn't gotten entirely too scientific nor cut and dried.