Earning My Wings

Primary flying in the PT-17

BY BRUCE MOORE

First Solo, Willard. F. Moore (the author's father), Lafayette Field, Lafayette, LA, 1943.

(Editor's Note: Ever wonder what it was like to be a cadet pilot during World War II? Bruce Moore takes us back in time to what life must have been like at the controls of a Stearman.)

Walking out onto the flightline for the first time with my instructor I am overwhelmed with all the activity. On the concrete ramp are rows of biplanes; some have bright yellow wings and blue fuselages, but most are painted all silver. Everywhere I look something different is going on; planes are starting up and taxiing, parking, or taking off and landing. Here and there students and instructors are walking across the ramp or climbing into airplanes. Fuel trucks are driving by, and linemen are signaling and assisting the starting and movement of airplanes.

The only airplane I had been in before was the J-3 Cub I flew for 10 hours in College Training Detachment. After nine weeks of Army preflight, those months at the university seem years ago. Now I am going to be an Army pilot, and I am finally dressed the part with my flight coveralls and parachute. Although this flight school is a civilian contractor and my instructor is also a civilian pilot, the base is all Army. My instructor is "Sir," and I am called "Mister."

As we approach a PT-17 Kaydet I am awed by the size of the plane. Everything about this plane seems massive, from the size of the seven-cylinder radial to the gigantic tail wheel and rudder. As my instructor shows me the preflight inspection it seems I'm inspecting over my head more than anywhere. I need to climb up on the tire and then balance on the gear leg step to reach the oil cap. The top wing contains the fuel tank and a sight gauge. The prop and most of the engine are also above my head. This plane has something new to me: flying wires. My instructor explains that they are solid steel rods that have been rolled into a streamlined shape. They must be plenty strong since

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they support the plane's weight in flight. There are four "flying wires" that carry the positive *g*-load, and two "landing wires" that support the negative *g*-load (and hold the wings up when on the ground). I am shown how to "pluck" the wires to check for proper tension. There are tail brace wires, too. These vibrate at a higher frequency because they are shorter. My instructor says that in a dive you can tell if one wire is slightly crooked because it will "sing" as it vibrates, and by the sound (high pitch for a tail wire, lower pitch if a wing wire) you know what to squawk on the Form 1A for the mechanics. There seems to be so much to remember.

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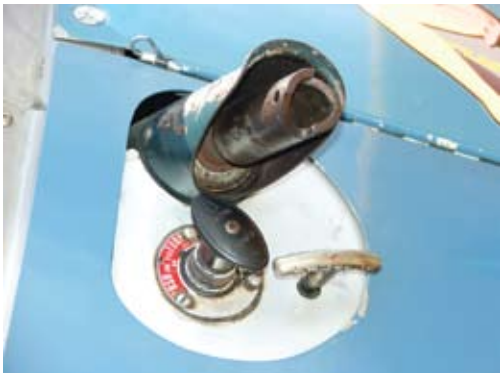
Getting into the Cub I had to duck under the struts and crawl into the small cockpit, trying not to hit my head on the door opening or my knees on the seats and stick. Getting into the Stearman is like climbing onto a horse: Step up onto the trailing edge of the wing and then vault up over the top of the coaming to stand on the seat, then lower myself inside. Compared to the Cub, visibility is great, except looking forward. To the front all I see is wings, the back of my instructor's head, some engine cylinders, and more wings. But to the side and up I am in the open. There's tons of room in the back cockpit with a bucket seat that is made to hold my seat parachute, and a 3-inch-wide seat belt and shoulder belts, too. There is no floor, only two metal strips that line up with the massive rudder pedals. The big green rudder pedals also have toe brakes that work independent hydraulic drum brakes on the main wheels (no more separate pedals for rudders and brakes like on the Cub). The control stick is a solid pole of hardwood the size of a Louisville Slugger, and the big throttle and mixture knobs are mounted in a quadrant on the left side of the cockpit. I'm in the big time now!

To start the plane we need the help of another student or a ground crewman. When my instructor calls "Ready," the crewman climbs up on the left tire and operates the primer sticking out of the left side of the fuselage behind the engine. My instructor says give a cold engine four pumps. The crewman inserts a crank handle into a receiver above the primer. Then braced on the left tire and gear strut step, he begins to crank the starter flywheel . . . I can hear the flywheel speed up like a faraway siren. When the flywheel is going fast enough, the crewman pulls out the crank, looks around, and says, "CLEAR AND CONTACT," my instructor yells, "CONTACT" and flips on the mags, and then the crewman pulls the starter handle next to the primer. The starter engages, momentarily dropping the siren sound into a lower register before the engine catches. With the engine running the crewman readies to pull the wheel chocks. The sound is a big throaty rumble, not the popping of the Cub's 65-hp Continental. Boy! I'm in a *real* airplane now!



In the Cub we wore no helmets, and to communicate my instructor just yelled. Now I am sitting miles behind the instructor and can hear his voice through the Gosport tubes plugged into the ear cups of my cloth helmet. While the Gosport worked pretty well on the ground, I find it difficult to hear clearly with climb power. My instructor uses a lot of hand signals to direct me. The PT-17 has a more solid feel, and the controls are heavier than I remember in the Cub, especially the ailerons. I soon become comfortable and begin to learn where to look to control the plane. There is so much engine and wing ahead of me, it is easy to put the right part on the horizon to control bank and pitch. In steep turns you need to add some power to keep your speed, and you need to hold some opposite aileron to keep the Stearman from over-banking. I love the feel of the air swirling around me. I can feel a slip or skid as quickly from the

change of the airflow around the cockpit as I can from looking at the ball-bank. My instructor is always telling me to keep my eyes outside, "Look outside at your horizon, Mister. And look to the side and behind and up and down. Any airplane I see, you better see first."

Over the last five hours I've practiced turns, climbs and glides, coordination exercises, ground reference maneuvers, stalls, spins, forced landings, traffic patterns, takeoffs, and landings. Today's lesson is more stalls and spins. I check our altitude, 3,000 feet. Two clearing turns, 45 degrees of bank, and don't forget to look below us. Now, reduce the throttle, ease the nose up . . . I hear my instructor in my mind, "*See* the change in attitude, *hear* the change in the sound, *feel* the loss of speed." The airplane's nose is held above the horizon, the sound of the engine and the wind is diminishing, and the elevator is getting mushy. I feel the tail of the plane buffeting through the stick...and then the nose drops. I push the stick forward and add full throttle, nice and slow with the throttle so the engine doesn't cough. The right wings have dropped more, so I put in left rudder to raise the wings, and then as we get flying I add left aileron to get into a level climb. My instructor is tapping his right ear, and I realize I am not holding enough right rudder for the climb and make a correction. Then I remember to trim and reach below the throttle for the elevator trim lever. I push the short handle forward and can relax on the forward elevator pressure. The Stearman has light elevator forces, and for most maneuvering I tend to leave the trim alone. However my instructor says, "*Always* trim; make the plane do the work." He says you can fly more precisely if you always trim for neutral.

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My instructor calls for a spin next. I carefully scan the horizon as I do two 90-degreer clearing turns and climb up to 3,500 feet. I roll out on a long straight paved road for my reference mark. Okay, nose up more, throttle back, and let it slow...wait for it...now right rudder, full to the stop, and stick back. I use both hands to keep the stick frozen in the center of my safety belt buckle. The nose dips, then yaws, then seems to come up a little before it tightens its turn and settles back down, and then we are fully into the spin. My instructor is counting "ONE" in the Gosport, the earth blurs by, and I look for my road. We count "TWO," and I wait another half-turn before I push on the left rudder, then bring the stick out of my gut to the front of the cockpit. The spin slows and then stops. I release the rudder and pull back slowly to recover from the dive. What was a green and brown blur is again recognizable as fields and roads. The first day we did spins I remember taking deep breaths while climbing back up and swallowing to keep my breakfast from climbing up my throat; now I enjoy the spins.

I have eight hours in the Stearman now (nobody calls it the PT-17 anymore). Today we are going to do landings at an auxiliary field. I check the tower for a flashing green light and slowly move the throttle out of idle, remembering the engine isn't fully warmed up yet. I taxi slowly out to the end of the runway. The tail wheel steering through the rudder pedals

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is positive and makes it easy to S-turn to see around the nose.

Approaching the warm-up area I stab the left brake and add a blast of throttle to let the tail wheel break free so we can spin into the wind. I set the throttle for 800 rpm until I see at least 20°C on the oil temp; then I hold the toe brakes, pull the control stick all the way back, and run up full power. Stopped on the ground here near sea level the top rpm we get is 1900. I grasp the big red magneto switch on the left of the instrument panel, switching to "Right," then "Both," then "Left," checking that there is no more than a 50-rpm drop between the mags. The plane vibrates as I hold full power as if it wants to get away, and the sound of the exhaust from the short stack on the right of the collector is loud through my helmet. On mornings when there is dew on the ground I often see the prop form wispy half-circles of cloud as it beats the moisture out of the air. I pull the throttle back to idle and read the rest of the checklist . . . controls, free; elevator trim, set for takeoff; mixture and carburetor heat controls, forward; oil temp and pressure, in the green. I had my seat all the way up for better visibility taxiing; now I lower it until the top of my head is even with the top of the windscreen. My instructor asks if I think it will fly. I look at him in the mirror and give him the "okay" sign and a big grin. I taxi up to the hold-short line and look at the tower while I waggle the ailerons... there is the solid green light. One last look around, especially over my shoulder where any landing traffic might be, and then I pull onto the runway, carefully line up, and advance the throttle.

The Stearman doesn't accelerate quickly, giving me plenty of time to control where the nose points with the rudder . . . don't forget aileron into the wind! I push forward on the stick and realize I am a little early, but then the heavy tail starts to come up and the stick force begins to lighten. I am too busy watching the runway edges on both sides of the big black Continental to look at the airspeed. My instructor has taught me to wait until the elevator stick force is almost neutral, when I don't have to push any more to hold the tail up; that is the time to ease back on the stick . . . and we are off! My heart seems to jump as the plane rises into the new morning. The rumble of the runway under the wheels disappears and is replaced by the silky smooth feeling of the cool air seeming to suck the airplane up into the sky. I wonder if my instructor ever feels this way, or if he can see my smile in the mirror.

Arriving at the north auxiliary field we circle overhead once and note the wind direction. The field is a rectangle of grass with no marked runways, only a small shack with a windsock and a fuel truck in the middle of the field. The instructors sit on the porch of the shack and smoke while the new solo students sweat landings under their gaze.

I look for traffic ahead of me, then run my landing checklist: mixture, rich; carb heat, cold; trim, set. At 90 degrees to the landing spot I reduce my throttle and start a medium banked turn onto base leg, crabbing against the crosswind. I look right to be sure the final leg is clear, checking to see I am above 300 feet as I make my turn to line up with the landing lane. I peer a little left of the nose and seem to be too high. I close the throttle all the way and adjust my glide to hold

70 mph. Without much wind today I am still high, so I ease the stick left and push right rudder to do a slip. The Stearman has a lot of drag when flown a little sideways, and soon I am back on glide path and neutralize the controls to a normal glide. The field boundary passes underneath, and I start raising the nose to break the glide. As I flare I look straight ahead to keep myself straight and dart quick glances left to judge my height. The controls are going soft as the nose rises, and we slow down. I fix my eyes on the back of my instructor's head and try and gauge my track and height with only my peripheral vision. The Stearman's nose rises a little higher than I wanted, and we have not touched yet. Before I can add some throttle the tail wheel touches and the mains plop onto the grass. I keep myself straight with little jabs of the rudder; it doesn't take much to keep us straight. I expect my instructor to critique the landing like he usually does, but he only calls into the Gosport to taxi back for another circuit.

I check the landing traffic as we bump across the grass to the takeoff lane. I check my trim, and we are off again. On climb-out I look over my shoulder to make sure I am tracking straight. At 300 feet I check left and start a turn to crosswind. By the time I am at 500 feet I am ready to turn downwind and throttle back to 1750 rpm. On this landing I know the wind better and do not need to slip. I don't make my flare as quickly, not wanting to touch the tail wheel first, and instead touch on the mains before I am ready. The big oleo struts bounce the nose up, and the aircraft balloons slightly. I cushion the sink with a blast of throttle, then pull off the throttle, and we touch three-point. I over-control the sensitive rudder as the plane rolls out, feeling the Stearman snake through the grass. I should be doing better by now; sweat is getting into my eyes under my goggles, and my face feels flushed and hot. I look up in the mirror to see if my instructor notices. Again, he signals. This time the takeoff, the pattern, and the landing glide feel right. I am rewarded with a three-point touchdown where the wheels slide through the grass and you can feel the weight of the plane slowly lower itself before the roughness of the sod is felt. My instructor calls, "Taxi over to the shack." Sometimes we get out of the plane and talk a little and watch the other planes land while he tells me what each student is doing wrong or doing right. As I park he tells me to keep it running. He climbs out, and I see him securing his seat belts . . . solo!

My instructor stands on the wing-walk and leans into my cockpit and says above the sound of the idling Continental, "You made three okay landings; now make three more and then come back to pick me up. The plane will be ready to fly sooner without my weight and will want to float a little more on landing. Be sure to look around up there; you're not the only plane in the sky!" I nod my head, too excited to talk. I watch him step up onto the porch and turn around to watch me taxi away. I try to focus and concentrate on all I have learned so far. S-turn, I remind myself, and I taxi extra slowly to avoid the Traffic Tee and the fuel truck. I remember to look at the landing pattern before crossing underneath to the takeoff lane. I review my takeoff checks and look one more time to be sure the pattern is clear, and then I am pushing the throttle forward. The Stearman is bumping through the grass and then the tail is up and we are off. As I fly the first pattern I think, "Am I *really* ready for solo or couldn't my instructor wait to get the bottle of Old Grand-Dad that is the customary gift after a student is set free?"

Turning from base to final I have my sight picture and can see my touchdown point holding steady. I am aware of the plane to my right in the taxi lane and the other plane on the downwind to the right-hand pattern on the other side of the

Flight Training

In 1939 the Army had a total of only 4,502 pilots (including 2,007 active-duty officers, 2,187 reserve officers, and 308 National Guard officers). In 1940 the U.S. Army Air Corps planned to train 12,000 pilots per year. By 1941 the Air Corps had become the Army Air Forces (AAF), and it had established 56 contract Primary Flight Schools, 26 Basic Flight Schools, and 44 Advanced and Specialized Schools. There were also 151 College Training Detachments for training aircrews. By 1943 these schools were training 93,600 pilots per year.

Beginning in 1939 the government sponsored the Civilian Pilot Training Program (CPTP) through colleges to prepare a pool of pilots. The CPTP eventually operated at 1,132 colleges and universities and 1,460 flight schools. After the United States entered the war the CPTP was replaced by the War Training Services (WTS), which added the requirement of military service after graduation. From 1939 to 1944 the CPTP and WTS had trained 435,165 pilots, many of whom became AAF pilots and aircrew. By 1944 military flight schools were training enough pilots by themselves and the WTS was discontinued.

Becoming an AAF pilot was not easy. Close to 40 percent washed out due to inability to master the necessary skills, accidents, and physical disqualification. From January of 1941 to August of 1945 312,911 students started AAF flight training, and only 184,000 won their wings: 85,491 (27.3 percent) washed out or died in primary flight training, 28,474 (9.1 percent) washed out or died in basic flight training, and 7,292 (2.3 percent) washed out or died in advanced flight training. After graduating another 7,474 (2.3 percent) washed out or died in transition flight training, and 3,168 (1 percent) washed out or died in flight instructor training.

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field. I can hear the sound of the windmilling engine and the sound of the wind wrapping around the cockpit and humming through the wires. I can feel the energy of the airplane through the controls as the live air pushes back against the surfaces as I move them; I can feel the sink rate of the plane through the seat of my pants as we glide into the runway. The cues are there, and I know where to look to gauge my track and height as I raise the nose and settle toward the runway. As the nose comes up I am suddenly aware of the empty cockpit in front of me . . . and then the Stearman is bumping along through the grass. I taxi back and make two more takeoffs and landings, none of them as good as the last dual landing, but each was three-point and rolled out straight. I taxi back to pick up my instructor and feel cocky enough to think I am one step closer to being a fighter pilot.

A barracks-mate washed out today. He ground-looped last week and was still spooked by it.

The Stearman has plenty of aileron and good rudder authority to compensate for crosswinds. We were taught to bank into the wind to stop our drift and then use rudder to point the nose straight with our track. This is especially important when using the paved runways. At the grass auxiliary fields we can usually land directly into the wind, and the grass will let the tires slip a bit if you accidentally touch with some drift.

I was taxiing from the base ramp toward the run-up area that day. I was holding left aileron and neutral elevator for the strong right tail wind and could feel the stick twitching in the gusts. I saw him on his approach; he had his head leaning out to watch the runway and never seemed to fully correct from his crab. On touchdown the tires grabbed the pavement and the nose of the Stearman started to swing into the wind and the upwind wings came up. Then the whole plane spun around with the downwind wingtip scraping across the runway and the tail wheel bouncing up so high I thought he might get the prop. The plane finished facing backward half off the runway into the grass.

The accident meant he would be called to take a "washout" ride with the chief flight instructor. That night in the barracks he told us he thought he would fail it. Now he is packing his duffle and has orders to navigator school. He was one of the cadets who had done the full Civilian Pilot Training Program course in college and got his civilian certificate in an Aeronca Champ. I thought he would do better than the rest of us, but he never did get comfortable in the Stearman. For me, I am completely at home in the big biplane now. I can feel the way it talks to me when we fly, the sound of the slipstream in the rigging, the low-throated rumble of the 670, the feel of the controls as the live air pressure feeds back through the cables to the pedals and stick. It all speaks to me and tells me where the plane is in energy and space. I have even done a loop with my eyes completely shut and knew where I was the whole time just from the sound and feel. I am sorry for him; he was smart enough to succeed but could never be one with his plane.

Solo aerobatics today. I roll 45 degrees to the left and pull gently to hold the nose on the horizon, then look left as I scan for other planes. After 90 degrees of turn I smoothly roll into a right turn and scan back through another 90-degree turn and roll level, happy that I have climbed only 20 feet while not looking at the altimeter. Now I push forward gently and pick up some speed, then ease back on the stick and begin a steep climbing right turn, raising the nose higher and rolling steeper into a big wingover. I need a lot of right rudder for the torque as I float the nose

over into the dive, looking carefully underneath me for any planes I may have missed in the clearing turns. I pull out of the dive and back up into a chandelle to the left, opening the throttle all the way as the plane slows in the climb. The turn is much easier in this direction as the big metal prop tows the nose around to the left as it gets slow, and I even need right rudder at the top when just above stall speed as my wings go level. I glance down at the ball-bank and am pleased to see it agrees with my fanny. I hear my instructor's voice in the back of my mind, "Feel with your whole body and you won't have to divert your attention inside to be coordinated."

Now for some real fun. I pull my safety belt extra tight and check that my helmet strap is fastened. Now I'm ready for a slow roll. The Stearman's ailerons are pretty heavy and the plane does not roll very fast, so I need to do everything right to get a good-looking roll.

I push until the airspeed reads 110 mph, then raise the nose very slightly above the horizon and feed in full left aileron, coordinating with lots of left rudder. Watching the horizon rotate around between the wings, I ease off the left rudder and start pushing forward on the stick and begin adding right rudder to hold the nose up. As the plane goes through the second half of the roll, I continue the right rudder and keep pushing the stick forward so the nose stays on the horizon. My body is hanging from the safety belt, and dust and bits of dirt fly by my face and bounce off my goggles. Even with my safety belt extra tight my head is now sticking out a little past the protection of the windscreen, and I feel the slipstream tugging at the top of my helmet. The controls seem farther away, and I reach harder to the left to keep in all the aileron. The last quarter of the slow roll I find the hardest because I need to change back to left rudder pressure and ease off the push so I don't go screaming off-line at the end. The first one was not too bad, and I have only lost 100 feet. The cockpit that felt so big after flying the Cub feels small when I am doing aerobatics. To roll the Stearman you need full aileron, and to get it your knees are in the way. I do one more slow roll, and this one is even better.

Next I get ready for the snap-roll. I do a climbing 180 to clear the sky and then start a shallow dive. I add throttle, and at 100 mph I take a deep breath, raise the nose 20 degrees above the horizon, and start applying full right rudder, rapidly pull the stick back to stall the wings. The nose pitches up and then rapidly rotates right, drawing a little circle as it spins around…I try and spot the horizon when there is 90 degrees of roll left to go, then push full left rudder and let the elevator go slack . . . then I cheat and put in some left aileron to help stop the rotation. My timing is a little late, and the wings go past level before the roll stops. For the next snap I remember to relax the elevator after the snap begins; the nose doesn't drop as much below the horizon, and the roll stops more readily when I give it opposite rudder. I over-rotate only about 5 degrees on recovery and don't need much left aileron to help stop the rotation. I try some more and find that the better and more uniform my entry, the easier it is to stop on the horizon.

I save my favorite maneuver for last: the loop. If rolls are work, then loops are pure joy. I get ready by picking a road that points into the wind and line up over it. Check the throttle, 1900 rpm, and then dive on a 45-degree line, adding left rudder to hold the nose straight while I accelerate to 125 mph. Then I pull, holding the wings level and increasing the *g* until the nose goes above the horizon; with the sound of the engine decreasing I add full power slowly and keep the pull going, looking left to watch the horizon rotate, trying to adjust the back-pressure to keep the rate of turn of the horizon constant…now tilt my head back and here is the horizon again, a little right rudder… and let the nose come over . . . I feel my parachute get soft under my butt as we float over the top. As the plane accelerates I start pulling harder to keep the loop round, remembering to pull back the throttle as the airspeed increases. Now the *g* is pushing me down into the seat, and the nose is coming back up. With all the leftover speed I only need to relax on the stick to let the nose come up, and I trade the speed back into altitude. I do a steep wingover and dive into a loop in the other direction. Going over the top inverted is my favorite part; sometimes I don't try to keep the loop round but try to see how long I can stretch the top out without coming out of my seat or having the engine cough. On top the engine is at full throttle, but the rpm has dropped off and the airspeed has slowed below the beginning of the airspeed indicator. It seems like the world goes all quiet in the middle of the loop, sandwiched between the start and finish that are all screaming slipstream and howling engine. Soon I have lost too much altitude and need to climb again. With the weight of my instructor along on a hot afternoon it means a lot of slow climbing and never getting high enough to get out of the bumpy air. Today I am glad to be alone in the Stearman in the cool morning sky.

Over the last nine weeks I have logged 66 hours of Stearman time, and today I passed my final checkride. My class is moving up to basic training and will be shipping out to a new Army airfield next week. There everyone will be flying the Vultee BT-13. One stopped at our field the other day, and we got to have a good look at it. It was all polished aluminum, sleek and shiny. Its cadet pilot proudly showed us the cockpit full of new instruments and radios all unknown to the primary trainers. Just when you feel you have everything mastered, the next step makes you feel like a freshman all over again.