

The Ultimate Flight Training System? Hobbico's New NexSTAR™ Select



Introduction

In the mid-fifties, I went with my uncle to an air show at Mitchell Field in New York. He had flown P-47's in Europe during WW II. After the show, we walked the flight line. We stopped next to a then new Lockheed F-104 Starfighter, bristling with rotary cannon and early Sidewinder missiles. His thoughts must have drifted back to those gray 1944 European skies as one thought slipped into words. "Just two of these for me and my wingman and we could have beaten the entire German Air Force. Alone."

In different form, Hobbico's new NexSTAR Select flight training system gives an instructor similar feelings. "Give us a couple of these and we could teach the World to fly R/C." This is not just a good trainer. This is a total, advanced, ready-to-fly, flight system.

The system includes an advanced airframe, a pre-run and factory adjusted O.S MAX FXi 46™ engine, an installed Futaba SKYSPORT™ 4-channel radio, an on-board, three-axis autopilot, a complete instruction DVD, six instruction manuals and a Real Flight™ 3-D computer flight simulator featuring the NexSTAR. Each part of this Flight System is important enough to look at separately.

Charge the transmitter for several hours before beginning assembly. The flight simulator uses the NexSTAR's transmitter so the batteries need to be charged before flying the simulator.



There is a lot of technology inside this one box

A Truly Advanced Airframe



The autopilot sensor is pre-installed on the bottom of the fuselage. These few parts quickly assemble into a very good-looking airplane. The top and bottom of the fuselage are rounded. The NexSTAR resembles a Cessna 206, not the usual straight-sided trainer.



The NexSTAR 's wing has several advanced features. The outer 30% of the wing has NASA drooped leading edges. NASA developed these leading edges for full-size light planes to prevent accidental spins. The drooped edges increase the lift created by the outer wing panels. The wing's center section [stalls](#), loses lift due to decreased airflow, first, while the outer wing panels keep lifting. The stall becomes gentle and the wing stays level.

The wing also features bolt on speed brakes. The speed brakes look like flaps but have numerous quarter-inch holes. The holes prevent the airbrakes from creating extra lift, as a [flap](#) would, while allowing them to function as excellent drag devices. The excess drag prevents the plane from gaining speed if the nose should drop in a turn.

Assembling the Airframe

How well these devices work will be discussed in the flight report later on. For now, the first assembly step is to bolt the wing halves together. Since the plane's advertisements claim a 20-minute assembly time, we thought it would be interesting to actually time our assembly using a

clock. Each major assembly step is photographed along with the clock.

As photo 3 shows, the wing halves slide into a plastic center section. The right wing half is already assembled and screwed into the center section by the manufacturer. The aileron servo is already mounted and one aileron control rod is connected (photo 3). The left wing half must be slid into the plastic center section after inserting a steel wing spar (photo 4).



Photo 3 Photo 4



Photo 5

But there is also a rear spar pin permanently affixed to the right wing half (photo 5). This spar pin slides into a hole on the right wing half. The NexSTAR features extremely accurate construction with no room for loose tolerances. This is great for flying and durability, but sometimes presents problems during construction. The wood parts of each wing half's center section are coated to make them fuel proof. The tolerances for both the spar holes are so exact that the coating inside the holes prevents the spars from sliding into them.

Use a small, round file to gently remove the coating from each of the three open spar holes (photo 6). Do not remove any wood, just the coating itself. Then test fit the wing halves together without the main spar to be sure the rear spar fits into the hole in the right wing half. The left wing panel should slide completely into the plastic center section.



Photo 6 Photo 7

When the fit is perfect, separate the wing halves, insert the main steel wing spar and slide the wings together completely. Once the wing halves are firmly in the center section, screw the locking bolts into the holes marked on the wing (photo 7). The next step is to connect the last aileron control rod. Finally, bolt the speed brakes on using the holes marked in the wing. Align the inside of the speed brake with the beginning of the aileron on each wing section (photo 8). Total wing assembly time 13 minutes (also photo 8).



Photo 8

The radio, engine and autopilot are already installed (photo 9). The unique wing mounting system is also installed (photo 10). This flexible system allows the wing to shift in the event of a landing that might accidentally “drag” a wing tip against the ground. If the impact is harder, the single nylon wing bolt shears off preventing major wing damage. This is a great system and permits quick field assembly.

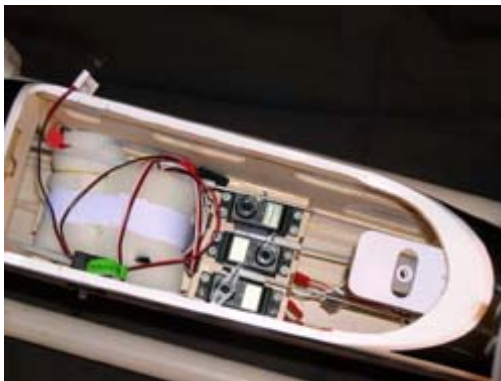


Photo 9 Photo 10

Assembling the Gear and Tail

The next assembly step is to mount the main landing gear. The nose wheel is already attached, as are the wheels to the main gear. The main gears simply slide into the fuselage and lock in place automatically (photo 11). Here again the exact tolerances create a minor difficulty. The plane is so well built that the *coating* thickness is enough to prevent both gears from sliding far enough into the fuselage to lock in place. Use a small file to remove just the coating from the inside edges of each gear leg (photo 12) and slide them into place. Total time so far, 24 minutes (photo 13). (Not bad, but we are starting to run a little late)



Photo 11 Photo 12



Photo 13

The tail surfaces are next. Slide the horizontal stab into the slot in the fuselage and align the two holes in the stab with the corresponding holes in the fuselage. This automatically centers the stab and makes it level with the wing – a VERY NICE feature. The vertical fin has two long bolt extensions that fit through the holes in both the stab and the fuselage. Make sure the bolts are at the angle pictured in the included drawing (photo 14). Ours were already set correctly.

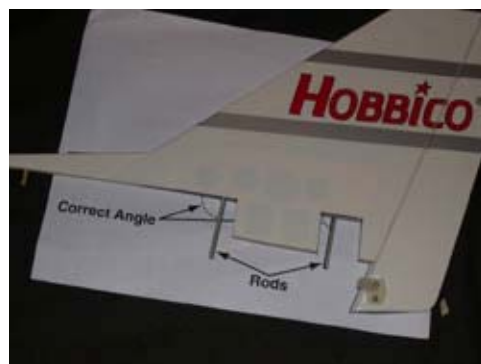


Photo 14

However, we had to bend them forward an additional quarter inch to allow the fin to fit into the slot in the fuselage. Once adjusted, the fit was perfect. The fin was straight and exactly vertical. This perfect fit keeps the “tail feathers” absolutely straight and level. We suggest removing the rudder control horn (photo 15) to ease the fin installation. Two large nylon bolts are screwed onto the bolt extensions from the bottom to hold everything in place.

Reinstall the rudder control horn and connect the installed control rods. Done, with no Glue, no Fuss and everything *straight*. Total time so far – 41 minutes.

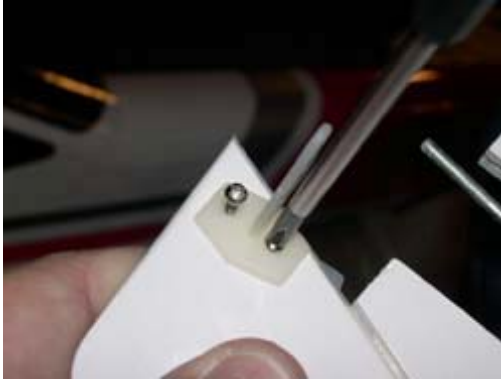


Photo 15



Photo 16

Installing the Muffler

Moving to the front, we have to install the propeller and muffler. The muffler is loosely bolted in place (photo 17) for good reason. Even though the engine is mounted on a special mount that absorbs vibration, some remains. If the muffler were tightened at the factory, the many temperature changes during shipping would cause it to loosen slightly. It would then vibrate loose during the first flight and disappear into the far weeds.



Photo 17



Photo 18

Unscrew the muffler completely. Check that all the engine-mounting bolts are tight (photo 18). Fill the muffler’s mounting holes with a removable thread locking compound (such as Loctite Blue in photo 19) and then also apply the compound to the mounting bolts (photo 20). Tighten the bolts firmly.



Photo 19 Photo 20

The propeller is bolted in place using a standard modeling 4 in 1 “spanner (Photo 21). Install the spinner back plate first, align the propeller with the spinner nose cone holes and screw the nose cone in place. Total time so far – 1 hour and 22 minutes (photo 22).



Photo 21 Photo 22

The next step is... Wait; there is no next step! The plane is DONE. In 82 minutes? That is truly amazing. An advanced airframe with radio, engine and autopilot completely assembled in 82 minutes. We like this a lot.

There are some things to check, especially control surface alignment before flying. These pre-flight checks are discussed in the NexSTAR's manuals and in more detail in a separate Sport Aviator article, [“Ready-To-Fly? Maybe”](#) in the Flight-Tech section. This NexSTAR needed some rudder adjustments but was otherwise perfect. Connect the on-board receiver battery and the autopilot lead A. All of these wires are labeled for easy assembly, even the charging connector. Charge the transmitter and receiver batteries overnight before flying.

Real Flight Simulator

While the receiver batteries are charging, its time to hit the flight simulator. The “NexSTAR” version of the popular “Real Flight” simulator is an easy-to-use, very accurate experience of flying this plane. Scenery, winds, turbulence, and autopilot are all adjustable (photo 23). There is even a cyber instructor there to help (photo 24).



Photo 23



Photo 24

Keep the autopilot turned on for the first hour or so. After that, turn it off and fly for several more hours. Practice takeoffs and landing. There are several viewing modes available. You may wish to try the one that is labeled "Look at Ground" This view provides the best view of the runway. It's hard to land if you can't see where you are supposed to be landing.

The simulator graphics are excellent, even on my old computer (photo 25). There is a "binocular" view showing a close-up of the plane and the entire scene (photo 26). The airplane is accurately represented in the simulator (photo 27).



Photo 25

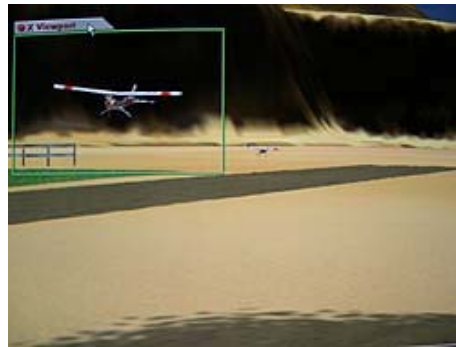


Photo 26



Photo 27

After extensively flying both the simulator and the actual plane, we have only found one difference in their flying abilities. In the simulator, the NexSTAR rolls and flies inverted just like any other trainer. In reality, the first half of the roll is normal, but the second half is very fast as those drooped leading edges try to regain upright flight. The roll rate slows as soon as the plane is level.

Actual inverted flight is difficult as the plane is constantly trying to regain normal upright flight. This is a good trait for a trainer. Besides, why are beginners trying to fly inverted anyway? There is time for that later when the flaps and drooped leading edges are removed. We did mention that they are removable? Did we also mention that the autopilot is adjustable? If not, then maybe it is time we look at just how this plane flies.

Basic Flight Tests

Flying the NexSTAR Select

The NexSTAR Select makes a good appearance at the field. Its round fuselage is very different from most trainers. The flaps (photo 28) and drooped leading edges (photo 29) give it a very different, high-tech look. But how does it fly?



Photo 28



Photo 29

The autopilot was disconnected for the first dozen flights so we could get a feel for how the aircraft itself performs. We used Magnum 15% Nitro, 20% oil fuel and started the OS Max .46 FXi. This engine is specifically designed for the NexSTAR. The engine was modified from the .46FX for easier starting. The modification appears to be a slightly more advanced [engine timing](#). Whatever the change, the engine started easily on the first try. The engine was broken in and all the mixture controls set at the factory. We never had to change [idle or high-speed mixture control needles](#). The kit includes a separate mixture limiting control if you wish to use it. Since the high-speed needle was properly set, new pilots should install the needle limiter before going to the field. This insures that the mixture will not be set too [lean](#) for the still new engine.

The propeller is also unique. It is stiff but still flexible enough to bend on rough landings instead of breaking. Still, I suggest ordering a few extra in case one is broken while learning to land. This propeller probably can't be found in many standard hobby shops. It has an eleven-inch diameter with a [pitch](#) of 5 inches. However, the blade is a narrow design to allow for extra engine rpms. The resulting [11x5N](#) propeller allows the engine to turn an amazing 12,400 rpms at full throttle. But the low 5-inch pitch keeps the airplane from flying too fast while still enabling a respectable climb rate. It is a perfect match for this engine/ plane combination.

We pointed the plane into the wind on the grass field and suddenly went to full throttle. There was no tendency to dig in the nose wheel or swing to the right. The plane just quickly accelerated and lifted off (photo 30). Climb out was routine at about 1,900 feet per minute at 25 mph. No right rudder was required to maintain straight flight (photo 31 -- climb out on the 7th flight).



Photo 30 Photo 31

The NexSTAR had a great climb rate at a reasonably slow speed. This is an important ability for a trainer. This performance allows the plane to quickly put space between it and the ground while flying slowly enough to give the student pilot time to plan ahead. Right and left turns required minimal up elevator to maintain altitude. This is another great trainer ability since turning requires so much less work. The plane looked great against the clear blue sky (photo 32).



Photo 32

Advanced Flight Testing

The plane required no trimming for straight and level flight. We pulled up into a few loops and the plane tracked perfectly. There was no wing drop and each loop was superimposed on the previous one's track (there was almost no wind during the first flight). Inverted flight and rolls were very different from most planes. When inverted, the NexSTAR fights hard to regain upright flight (photo 33).



Photo 33

The smallest bank away from level inverted flying quickly results in a fast roll to upright. The airframe has a strong tendency to fly level. This stability is good to have in a true trainer plane. Rolls are also interesting. The first half of the roll is normal until the plane rolls just past inverted.

Then it very quickly completes the roll to upright. This is a very good primary trainer. It will be very hard for a student pilot to keep this plane in a dangerous flight attitude for any length of time.

Next came some landing approaches. Because of the speed brakes, the NexSTAR's approach attitude, the angle of the fuselage to the ground or horizon, is steeper than most trainers. This "negative" attitude is necessary in order to maintain flying speed during the approach. But the attitude is still very gentle (photo 34) and the plane does not gain airspeed at all. The plane maintains the same negative attitude all during the approach (photos 35 and 36) yet still easily [flares](#) for the final touchdown (photo 37).



Photo 34



Photo 35



Photo 36



Photo 37

We tried some landings in a 15 mph crosswind. The NexSTAR held the wind correction all the way to the ground with no change in [glide slope](#) and without wandering (photo 38). Despite, or because of, all the wing gadgets, the plane was more than easy to fly in a heavy wind. It was a real pleasure to wind-fly.



The [Eagle Tree Flight Data Recorder](#) provided some interesting information about the NexSTAR's flight performance:

<u>Flight Data Results*</u>		<u>Aircraft Specifications</u>		
Take Off Speed:	23 mph	Type:	Basic Trainer	
Climb Out Speed:	25 mph	Engine Used:	OS .46 FXi	
Best Training Speed:	32 mph	Propeller:	11 x 5N	
Top Speed:	53 mph	Top RPM:	12,400	
Sustained Climb Rate:	1,900 ft./min.	Idle RPM:	2,500	
Range:	27-30 minutes	Test Weight:	6.5 lbs.	
Dive Speed:	57 mph	CG Location:	At Spar per Directions	
Best Glide Speed:	28-30 mph	Elevator Movement:	Up- 0.5"; Dn- 0.5"	
Gliding Descent Rate:	-1,200 ft./min.	Aileron Movement:	Up-0.6"; Dn- 0.5"	
400' Glide Distance:	842 ft.	Rudder Movement:	0.5"	
Level Stall Speed:	<6 mph	<u>Weather Data</u>		
60-deg. Bank Stall Speed:	12 mph	<u>Temp</u>	<u>Wind</u>	<u>Alt.</u>
Landing App. Speed:	17 mph	45 deg. F.	2-3 mph	250 ft.
Touch Down Speed:	10 mph			
*All results are an average of 3 flight tests				

The NexSTAR had the lowest [stall speeds](#) we have recorded so far, or are ever likely to record, for a standard gas powered trainer. The nearly 69-inch wing has 722 square inches of wing area. This light wing loading, combined with the drooped leading edges, creates a lot of "lift" for a small plane. In fact, there is so much lift that just 20% power during the stall allows the plane to slow to ZERO airspeed without stalling. In this attitude, the ailerons naturally stop working, as there is no airflow over the wing. But the drooped leading edges keep the plane flying level. The NexSTAR does tend to drift right under these artificial conditions but left rudder easily straightens the plane.

The Speed Brakes

The speed brakes' function is easy to understand. By providing a constant extra "air drag", the brakes keep the NexSTAR at a more constant airspeed. If a student pilot allows the nose to drop too far during a turn, most trainers will gain airspeed and lose altitude. Then when the plane is rolled to level flight, the excess airspeed causes the plane to climb. When too little elevator is applied in a turn flying the NexSTAR, there is almost no airspeed gain. Therefore, there is no altitude increase when the plane is rolled to level flight. This constant speed effect also works during landing approaches. It is easier for the new pilot to hold a constant descent rate during the approach since the speed remains constant, even if the nose is raised (up to a point of course), or lowered too much.

But what do those funny drooped leading edges do? Hobbico says they are there to prevent the plane from spinning during a stall because they keep the outer third of the wing "flying" as the remaining wing areas lose lift and stalls. *Not really.* To be honest, almost no modern trainer plane will spin as it stalls. Fortunately, the days are long over when a student pilot has to worry about inadvertent spins. It is nearly impossible to force most of today's trainers into a spin. So what do these strange leading edges really do?

First the drooped leading edges keep the wings LEVEL during a stall and make the stall itself very mild. The nose just drops straight ahead. Since at least a third of the wing is still flying as the other wing areas stall, the nose drop is exceedingly gentle, almost impossible to notice, and recovery to straight flight is almost immediate. The "droops" keep the wing level during repeated stalls caused by not releasing "up" elevator. Very few trainers will keep wings-level on the third or fourth repeated stall (called Deep Stalls). The NexSTAR just has to be given extra points for this great Deep Stall performance.

Second, the drooped edges increase the wings total lift. This extra lift results in a stall speed less than 6 mph. The extra lift allows slower approach and landing speeds as well. The NexSTAR

averages just 17 mph on final approach. The SuperStar, a very similar Hobbico trainer that weighs more than a pound less, flies the final approach at 32 mph and stalls at 17 mph. NexSTAR gives the student pilot extra time to think and respond during the critical final landing approaches.

The Autopilot

That leaves just the Autopilot to discuss. It is last because it is the most controversial. But first, does it work as advertised? *Yes it does.* We flew the NexSTAR on six autopilot flights and it leveled the plane every time we tried something stupid. And we tried lots of stupid things to get it to fail. The autopilot recovered from inverted spins to level flight, from 90-degree vertical stalls, from full power 90-degree vertical dives and even when the plane was spun upright (yes, it can be spun but takes a LOT of work) and then the rudder kept hard over. The autopilot worked the ailerons and elevator to maintain straight, level flight even against full opposite rudder. The NexSTAR flew in a full forward slip, but it still flew!

So what is the controversy? Simply put, TURNS. Turning the NexSTAR with the autopilot on requires the student to hold aileron control throughout the turn. Holding aileron control during a turn with any other plane results in a roll into the usual graveyard spiral. The instructor yells "I got it" and the student pilot is left wondering just what was done incorrectly. But the autopilot works so well while learning landing approaches, when trying simple aerobatics and during those dangerous first solos that it is too important not to use.

So we suggest a compromise. The first NexSTAR flights must to be made without autopilot control to test the plane and to get it trimmed. Making level turns is the first maneuver a student pilot learns. Therefore, learn how to turn during the first few flights (its easy because you already have done hundreds of turns flying the simulator). Then hook up the autopilot and go for all the rest.

However, there are a few times when the autopilot doesn't work well. Very bright sunny days with no cloud cover sometimes confuses the autopilot since it measures the brightness difference between the light sky and the dark ground. When the sun is within 30 degrees of the horizon, it tries to roll the plane inverted and climb. It does the same when the ground is snow-covered. Fortunately, the transmitter inputs over-ride the autopilot and the plane is easily landed.

The manuals point out these problems and say to turn the autopilot off during these times. Actually, we found that just reducing the autopilot "gain" control to 40% *eliminates* these problems while permitting full autopilot function. The plane recovers more slowly, but it does so quickly enough to be practical at all altitudes above 10 feet, another nice feature.

But never, repeat never, try the autopilot over snow-covered ground on a bright sunny day when the sun is 20 degrees above the horizon. We did just for fun, and had a very exciting flight. But even then, the plane remained flyable and was safely landed. This flight proved that following the directions, and there are more than enough with this plane, including a DVD [see sidebar], is the smartest way to fly. Consider this advice, late afternoons on snowy days with bright sun, fly the simulator instead.

The autopilot's gain control allows the student pilot to adjust the amount of control the autopilot has and the speed with which it responds. The better pilot the student becomes, the more the autopilot's control is reduced. Since it responds more slowly, and with less force, as the gain is reduced, the new pilot has time to make the corrections without the autopilot. As the gain control is further reduced and the pilot becomes a still better flier, a point is reached where the student pilot is doing all the flying. It is now time to turn the autopilot off forever, it's teaching job well done, leaving the plane in one piece.

Summary

In the near future, we'll remove the speed brakes and study the NexSTAR's no-brake flying. Then we'll remove the drooped leading edges. The plane is then supposed to become as aerobatic as any other trainer while retaining good flying characteristics. Sport Aviator will report on both these flying configurations in the very near future.

One last feature of special note: Hobbico is guaranteeing that NexSTAR purchasers WILL learn to fly. If the plane is flown at an AMA-Chartered Club field under instruction by a club-designated

instructor and is destroyed, Hobbico will replace the airplane. Guess they have a lot of confidence in this flight system.

The industry's first attempt at a complete flight system is a very big success. Hobbico is to be congratulated for this success and for their creativity. Will there be better systems? Probably, someday in the future. But the NexSTAR Select is here now, complete and is more than good enough. Hobbico has done all the work, even tuned your engine and guaranteed your success. Don't wait, start flying one today.

<u>Aircraft Specifications</u>		<u>Notable Positives</u>
Manufacturer: Hobbico	Length: 56 in.	Excellent slow flight abilities
Cost: \$400.00	Wingspan: 68.75 in.	Very fast assembly
Radio: Futaba SKYSPORT T4YBF	Wing Area: 722 sq. in.	Advanced airframe & autopilot
Servos: 4 x Futaba S-3003	Wing Loading: 21 oz./sq. ft.	Guarantee of success or plane is replaced free.
Engine: O.S. Max 46 FXi	Weight: 6.5 lb.	Pre-Run, factory-adjusted engine
Airfoil: Flat Bottom		Included flight simulator
Special Airframe Features: NASA drooped wing leading edges; Speed Brakes; Autopilot; Soft engine mount; Unique wing mount.		<u>Notable Negatives</u> Minor assembly problems