THE ALPHA 40 RTF TRAINER
FROM
HANGAR 9

By George Asteris

The Alpha 40 Trainer is a Ready-To-Fly (RTF) trainer aircraft designed for the newcomer to the sport of RC. It is also an excellent aircraft for the experienced pilot who wants to keep an easy-to-fly trainer on hand for use when introducing others to the sport, but who doesn't want to do a lot of building work.

The on-board radio equipment, control linkages, fuel system and the engine are already installed in the nearly completed airframe. The Alpha 40 comes complete with everything needed except the usual field support equipment. The only required field items are an electric starter, glow plug battery and fueling equipment. Hangar 9 details these support items in their instruction manual.

The Alpha 40 Trainer is designed to make it as easy as possible for a newcomer to get in the air with the least amount of effort. I say this because everything is complete including installation of radio equipment, engine, linkages, push rods, hardware and control horns. All the control surfaces are installed, as are the various control horns. The airplane is designed for assembly without requiring glues, extra hardware, etc. Construction is balsa and light plywood covered with UltraCote covering already applied in an attractive color scheme.

Photo 1 Photo 2

Assembly

Put the on-board battery and transmitter on charge before starting construction. Assembly of the aircraft starts with the wing. The wing comes in two halves joined together by an aluminum wing tube (photo 3).

The hollow tube is very strong, but much lighter than steel rods. All that's needed to do is to slip the wing tube into one wing panel. Then, slide the other wing panel onto the wing tube (photo 4). The small pin already installed near the trailing edge locks the two wing halves together, insuring proper alignment.

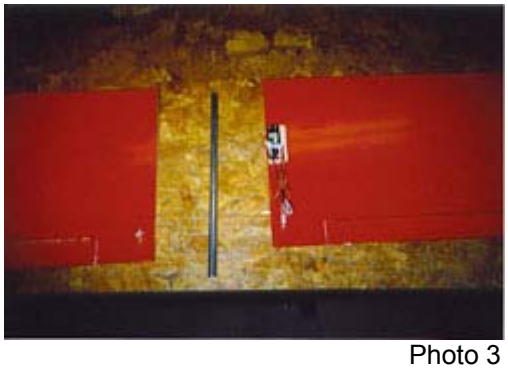

Photo 3

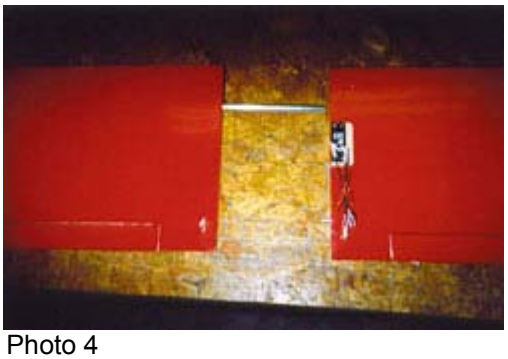

Photo 4

The wing halves are held together with a strip of tape, included in the kit, which is applied along the center section. If you desire, you could glue the two wing panels together, making a permanent bond. But you should still apply the center sealing tape. I did glue the wing halves together with epoxy as I felt the tape might loosen after being subjected to the oil from the fuel. This is not necessary, just my preference. Epoxied together or not, the tape should be checked frequently to insure it is firmly attached.

The next thing to do is to hook up the aileron linkage. Normally, this involves just snapping the one clevis into the aileron control rod (photo 5). The other clevis is factory installed. But this is where I encountered a minor problem. The aileron horn, or wire, is preinstalled along the wing's trailing edge and then into the balsa wood aileron itself. This is the most common RTF aileron control installation.

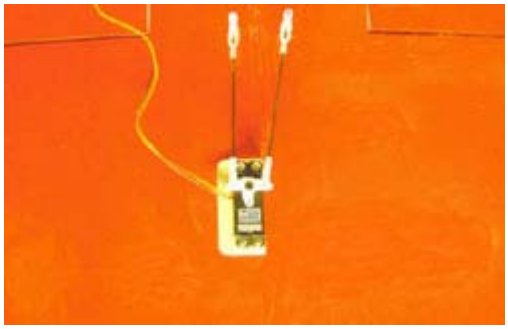

Photo 5

However, as I installed the clevis, I noticed that the aileron moved about one-quarter inch up or down, *without* moving the control rod. Any such movement makes for a very sloppy control surface that could flutter. It was obvious that either the hole in the aileron was drilled too large or, more likely, the hole became enlarged due to shipping or handling stress.

In either case, fixing this situation is fairly simple. I took an ice pick, you could also use a small awl, and punched a hole by the hinge line of the aileron horn (photo 6) and wicked thin CyA into the hole. The thin CyA wicks into the hole, running the full length of the aileron control rod into the aileron. The CyA fills the excess space while also filling and strengthening the balsa wood. This procedure removed all the excess play in the control surface and made it very stiff.

Photo 6

Since we at Sport Aviator have assembled several other Hangar 9 aircraft without encountering this situation, it seems obvious that this was a “one of” problem unique to this particular airplane. Most likely, the control linkage was damaged during shipping even though the contents were well protected. Still, it is always a good idea to check all control linkages for excess play, or movement, prior to flight. Excess play in the control surface can create trim problems and/or control surface flutter.

Just as a precaution, also test the construction of the wing by lightly pulling on the ailerons to make sure that pre-glued hinges are secure. Ours were tight and fast. Then attach the clevis to the aileron control horns and the wing is complete.

The next step in the assembly process is attaching the main landing gear which is pretty much standard wire landing gear with straps to secure to the fuselage. The landing gear is a straightforward installation, which shouldn’t cause any difficulties for the novice builder. The straps that hold the gear in place use four small wood screws. The holes for these screws were predrilled and of the right size. We had no problems and the entire process is clearly outlined in the detailed photo instructions.

Next, we start to install the wing hold-down dowels. Instructions tell you to install the dowels with a twisting motion. The predrilled holes in the fuselage were slightly too small for the dowels even with twisting. I needed to enlarge these holes just enough to accept the dowels. A small drill bit, turned by hand, was the right tool for this job.

The instructions do not suggest gluing the dowels into the fuselage sides. Normally the dowels are held in place by the tight fit of the dowel into the fuselage and the rubber band pressure. However, just for my piece of mind, I applied a few drops of CA at the dowel hole after the dowels were installed to insure that the dowels wouldn’t ever move.

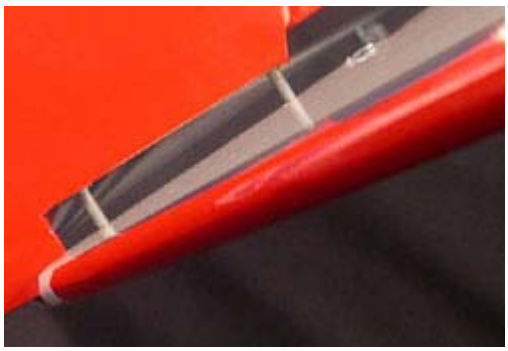

Photo 7

Next step is installing the vertical fin to the horizontal stabilizer. The vertical fin has two studs in the bottom that secure it to the stabilizer. It’s a simple matter of inserting the studs through the horizontal stab using a washer and wing nuts to secure (Photo 7). Hangar 9 supplies thread locking compound with the kit for all nuts or screws that need to be installed. The locking compound should be applied to the studs before applying wing nuts. Now you can install the horizontal stab to the fuselage with two machine screws. Again, make sure you use thread-locking compound on the screws.

The next step is hooking up the elevator and rudder clevis. This is where I encountered another problem. When I hooked the elevator clevis up, I turned the radio on to check control throws and to make sure everything was working properly. I noticed that the elevator servo was straining to move the elevator. I looked inside the open back end of the fuselage and noticed that the studs that attached the vertical fin to the horizontal stab were too long. As photo 8 shows, the studs were hitting the elevator pushrod, causing the binding.


Photo 8


Photo 9

A simple fix: I took the two stabilizer mounting screws out of the rear fuselage, removed the horizontal stab and cut the excess length off the studs using a Dremel tool with a cutting disk (photo 9). I then reinstalled the horizontal stab and reconnected the elevator clevis to the horn. I looked into the back of the fuselage and saw that I now had about 1/8" of a clearance between the elevator rod and vertical fin studs which was more than enough to free the elevator.

That completes the assembly of the airplane. Since all the servos, interior linkages and the complete fuel system were factory installed (photo 10), there was no interior work to do unlike in an ARF aircraft. The installed servos are JR's 527 standard sport servos. These 48 in. oz. servos use a steel bushing for output shaft support and are well-known for their reliability and durability. The receiver is JR's 7-channel R700S. While the 3 extra channels are not used with the Alpha 40, they could come in handy on your second aircraft using a different transmitter.

Total construction time was about an hour, including a snack break.

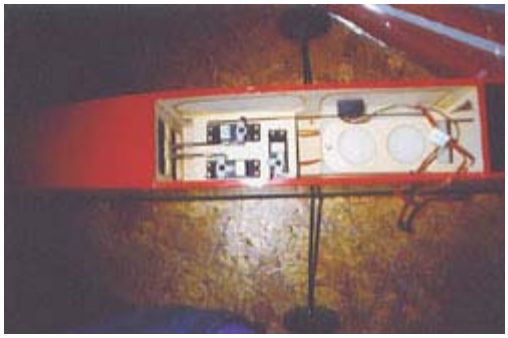
Photo 10

Control Surface Checks

The center of gravity is designed to be 2 ¾ in. to 3 in. back from the leading edge of the wing. This came out correct and you don't need to add any weight. The correct servo directions and movements were factory preset and correct. You are asked to confirm the correct direction of aileron elevator and rudder, which were correct when I checked.

It would be highly unusual if the factory installation produced the wrong control surface movements. If there is a problem, or if a direction problem occurs when installing this radio system into another model aircraft, the transmitter has directions reversing switches for all channels. The Quattro's reversing switches are not readily apparent. They can be found resting peacefully inside the battery case and UNDER the battery itself (photo 11).

The JR Quattro transmitter supplied with the Alpha 40 is a basic 4-channel transmitter with exceptionally smooth control sticks. Both the stick tension and stick height are adjustable. The transmitter includes a "trainer" switch to allow "buddy box" training sessions

Photo 11

Before going to the flying field, make sure that all control surfaces are at 0 degrees deflection. Turning the transmitter and receiver on with transmitter trims in neutral; control surfaces should be at 0 degrees, which is defined as neutral. If not in the neutral position, you need to disconnect the clevis from the horn and adjust in or out to center control surface. Reconnect the clevis into the outer holes of the control horn. Do all the other preflight preparations outlined in "Ready To Fly… Maybe" in Sport Aviator's Flight-Tech section.

Batteries

Initial charge for the batteries should be 24 hours. After a 24-hour initial charge, typically a full charge can be achieved with just a 12-hour charge. Make sure the batteries are fully charged before attempting to fly. Charge the batteries before every flying session, regardless of how few, or many, flights were flown last time. It is nearly impossible to damage the batteries through over-charging using the supplied JR charger.

You are now ready to go to the field to do your pre-flight check.

Preflight Checks

The first thing to do is to make sure that you have a qualified instructor to help with the initial flights and training. It's very unlikely that anyone would be able to perform his or her first flight without help. Even though the Alpha 40 is an excellent trainer and allows the pilot those extra few seconds of "thinking time", an instructor shortens the learning process while ensuring that the Alpha will remain intact during the training.

Next, you want to range check the radio by turning on the transmitter and receiver, making sure that the transmitter antenna is *collapsed*. Then, slowly walk 75-100 feet away from the airplane while moving the transmitter sticks. The control surfaces should function normally at that distance. If range is lost, the control surfaces will start to jitter or stop moving. If this happens, do not attempt to fly because you may lose range in flight. Perform this radio check before *every* flying session, for the rest of your RC modeling career. The aircraft and money you save will always be your own.

As complete as this airplane is, there is some support equipment that you need to purchase; such as fuel, fuel pump, extra glow plugs, glow driver with charger and a starting stick. These items are available at any good hobby store.

The Alpha 40 uses an advanced construction, fiberglass reinforced 3 bladed propeller. It is usually NOT a good idea to hand start any model propeller. It is an especially bad idea to hand-start a 3 bladed one. Use a "chicken stick", actually a padded dowel, or an electric starter.

Evolution Engine

The recommended fuel for the installed Evolution .40 Engine is 10-15% nitro content. One of the unique features of the Evolution Engine is the flywheel that is mounted behind the spinner in order to enhance idle (photo 12). The flywheel helps the engine to idle smoothly at rpms below 2,500. Another unique feature is the factory preset low and high-speed needle valves equipped with limiters so you can't get the engine's mixture too far out of adjustment. These limiters protect the engine against the damage caused by running the fuel/air mixtures too lean.

Photo 12

The fuel lines are color-coded exiting the fuel tank; red is the fuel line with green being the pressure line attached to the muffler. Do not run the engine without the pressure line's being attached to the muffler, as this will cause the engine to quit during full throttle operation.

Normal fueling procedures would be to disconnect the red and green fuel lines from the needle valve assembly. Then, fuel the airplane through the red fuel line until fuel comes out the green fuel line. Next, reattach the red fuel line to the needle valve assembly and the green fuel line to the muffler.

We're now ready to start the engine. Turn on the transmitter and receiver switch. I started the engine in just two flips; using a slight prime before flipping. I was impressed with the way the engine ran on the first start. I didn't have to make *any* adjustments other than slightly richening the idle mixture. The high-end needle valve was set perfectly. Very impressive!

Using Magnum 15% fuel, the Evolution .40 turned the 3 bladed propeller at 12,000 rpm. The engine idled reliably at 2,500 rpm. I had a noise level reading of 92-93 dB at nine feet (the standard measuring distance). That is far under what most clubs allow for noise levels. So, the 3 bladed propeller really does lower the sound level.

With the last excuse not to fly now gone, we're just have to fly the airplane.

Photo 13

Photo 14

First Flight

Photo 15

Ground handling was good – not too much movement in the nose wheel, which is a mistake that a lot of people make on their first airplane. Most people think the more nose wheel steering they have, the more control they have. But this makes the airplane very sensitive on the ground and very difficult to take off in a straight line.

I moved the throttle forward and accelerated down the grass runway. The airplane lifted off within 40 feet. It climbed out and only needed a couple clicks of elevator trim. I made a few turns to get the feel of the airplane's ailerons and how stable it is in flight. The one concern I had about the 3 bladed propeller was a possible lack of performance. But I must say, this was not the case. The engine and propeller combination gives more than enough performance. The airplane will perform loops without a sign of slowing down on the uphill climb.

The top speed of the airplane with the 3 bladed propeller is slower than when using a 2 bladed propeller. This is a good feature for the novice flyer. Also, when landing the airplane, the 3 bladed propeller tends to slow the airplane down at a faster rate. I found that you had to add a couple clicks of throttle to ensure that the Alpha 40 reaches the runway. The 3 bladed propeller slows the aircraft that much during the final landing approach. This is a very easy airplane to land.

Photo 15A

The control throws are well thought out in that they are not too sensitive giving the airplane a very soft feel which is something that is needed for the new pilot. Most people tend to over control and the Alpha 40 is designed to prevent this. .

Photo 16 Photo 17

Flight characteristics were excellent --- very stable platform. I intentionally tried to stall the airplane on landing. At about one foot off the ground, the airplane did not fall off either wing tip. It just flopped onto the ground on its main wheels then lowered the nose wheel. This is a very good characteristic for the novice pilot, as most tend to stall the airplane upon landing.

The 3 bladed propeller also offers an in-flight advantage. Learning to make level turns is one of the first tasks a new pilot must conquer. The usual problem is that not enough “up” elevator is inputted during the turn. As a result, the aircraft’s nose drops, the airplane accelerates and then climbs steeply, due to the increased airspeed, once the wings are leveled after the turn is completed. The propeller produces just enough drag to help slow the airplane’s acceleration and therefore reduces, or eliminates entirely, the dive-climb turning problem.

Photo 18

While at the field doing the first test flights, a new club pilot, Dennis Vilimas, *just* soloed using his own airplane. His airplane was the only RC aircraft he ever flew. I handed him the transmitter and asked him to fly the Alpha 40 Trainer (photo 18). He was able to fly it with no assistance. He did three (3) take offs and landings without difficulty. His comment was that the Alpha 40 Trainer is a very easy airplane to fly.

Recommendation

The Alpha Trainer can be put together with a screwdriver and pair of pliers. The whole building process can be accomplished in 1- 2 hours, even for the most inexperienced builder. The Evolution 40 engine ran well with not a lot of adjustments. It was flawless from the beginning and that impressed me.

Other than the few minor assembly problems that I encountered with the loose aileron horn and the long vertical fin bolts, this is a well-engineered kit with the least amount of work required to complete. The instruction manual is very well written with precise explanations and illustrations.

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