

REACTION

UPDATE #1 JULY 4, 2003

Happy Independence Day, Fellow Jet Modelers!

This seemed like a fitting day to send out the very first official update on the BTE Reaction 54 turbine model. Once in a while you have to sit back and marvel at the amazing freedoms and privileges we enjoy in the US, including the ability to build and fly our own R/C turbine-powered models. Along with that freedom comes a responsibility to design, construct, and operate them with safety as the overriding consideration throughout. With that in mind, I designed the Reaction 54 to introduce R/C pilots to the world of turbine power with a traditional wood model that is robust and easy to fly.

Many of you receiving this update first saw the prototype at the 2003 Toledo show last April. Since then, I have finished the installation of the engine, radio, and retracts, and flown it five times. That's not much flight time, but it's enough to convince me to go ahead and make it the next BTE kit. I've got some tweaking to do and much more test flying, but the basic design is sound and I gotta tell you, it's a beautiful sight in the air!

Here are some general observations from the first few flights. The takeoff roll is short and straight, on the order of 150' or less. The wide-spaced mains and 3" wheels make for solid ground handling. The R54 climbs with authority at full throttle - those 1450 square inches of wing area really grip the air! With the throttle backed off to just under half, the R54 flies solidly and smoothly in the 80-90 mph range. Sorry, without a radar gun I can only estimate speed at this time. Level speed at full throttle appears to be in the 120-140 mph range. Kind of pokey for a turbine, but that's exactly what I was shooting for. Aerobatics are smooth and precise. It even holds a beautiful knife edge at full throttle. The landing approaches have been super slow without a hint of tip stall. Predictably, it tends to float, so I may experiment with spoilerons. Right now, it's designed without flaps, but I may have to add them to help quicken the deceleration process and make for steeper, more precise landing approaches. One of my goals was to keep this model as simple as possible, but it might be smart to add flaps to maximize the power of that wing.



This is my sister, Susan Valles, just minutes before the maiden flight at the Siskiyou County Airport near Montague, California. Look close and you can see the faint outline of Mt. Shasta in the distance.



My prototype uses a RAM 500 for power. It's given me some fits during startup, but is a reliable runner once it's going. Other suitable turbines for the R54 are the PST J600, Wren 54, FTE T500, and Simjet 1200. Most of the engines in this 11-14lb thrust class are based on a 54mm compressor, so the model's official name, Reaction 54, is meant to reflect the size turbine for which it was designed.



Same angle, but this shot shows the massive hatch opening for easy access to the radio, ECU, nose wheel retract, propane bottle, and batteries. The big metal box behind the engine sits on the ground and is used during engine start to protect the back of the model from any flames that might occur. Once the engine is running, the hot exhaust is well clear of the model and presents no problems.

Now for some details on the design and the prototype. I come from a sport model background and those of you who have built my designs in the past know that I like to keep things simple. Another goal was to keep the model relatively inexpensive, so you will see some things on the R54 that are somewhat out of the norm for the turbine arena. One thing to remember is that this is not your typical turbine model. It's big and light, flies slower than most turbines, and is meant to serve as a stepping stone to bigger, faster jets.

The model is all wood; mostly balsa with some lite-ply and aircraft ply. The wing is built as one-piece. It attaches to the fuselage with dowels in the front and bolts in the back, just like your typical sport R/C model. The airfoil is my own design. It's very close to symmetrical, but it features a flat area on the bottom aft of the main spar to make it super easy to build on your table without needing tabs or jigs. In flight, it behaves like a symmetrical airfoil; inside and outside maneuvers are both easy to perform. The wing even features (gasp!) open rib bays near the tip. Again, not something you typically see on a jet model. The prototype is covered with Monokote, and it's holding up well.

The unique fuselage features 1/4" balsa sides with generous triangle stock in the corners. I guess it's kind of boxy compared to a molded fuse, but you can round the corners enough to give it a pleasing shape. Lite-ply doublers extend from the nose to the end of the fuel tank compartment. Like most of my designs, the doublers feature a bunch of slots, tabs, and lightening holes that lock in the positions of the various bulkheads. The fuel tank compartment is above the wing and is sized for a 50 oz. Dubro fuel tank. I also use a UAT, bringing the fuel capacity to 54 oz. Since the R54 can be flown safely at reduced throttle for much of the flight, you can expect flight times in the 7 to 10 minute range with plenty of safety margin.

The tail surfaces are simple sheet balsa. The linkages to the rudder and elevator are fairly unique. To keep the tail light, the servos are located under the hatch, forward of the fuel tank. Over the years, I've become a fan of using flexible steel cable housed in a plastic tube. I know, that sounds like what's normally used for throttle linkages in sport models, and it is. I like it because of its flexibility in routing and the total lack of slop. The R54 uses a 3/32" diameter cable and 4-40 hardware for both the rudder and elevator, and it works flawlessly. If you're not convinced, there's room to install carbon fiber pushrods or pull-pull cables if you wish. The bottom of the fuselage boom aft of the engine is not entirely sheeted with balsa. That allows easy access to the linkages even after the model has been covered. Once everything is installed and working properly, the bottom is covered with thin stainless steel sheet for heat protection. I have felt this area with my hand while the engine was running and immediately after shutdown and it doesn't feel any warmer than the rest of the model. The jet exhaust stream is very narrow for some distance behind the engine and it doesn't impinge on the structure at all.

I decided early on to include retracts, and settled on Robarts new Mighty Minis with wire struts. I don't think oleo-type struts are necessary for this model considering its gentle landing speeds. Jet wheels are also unnecessary. I'm using 3" Hangar 9 wheels and they show no sign of wear. Fancy brakes are also unnecessary. My prototype has a Kavan electric brake installed on the nose wheel and so far, it's doing the job. There's plenty of room to install pneumatic brakes on the mains if you wish.

There's no timetable for kit introduction. Believe me, I'm extremely eager to get this kit out. But I'm a one-man shop and currently busy trying to catch up on orders for Venture 60s and Super Flyin' Kings. I will work on the R54 as time permits, and probably commit to working on it full time later this summer until the project is complete. I appreciate your understanding and patience. Please let me know if you have any comments or questions.

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