



## Micro Cessna & Citabria RTF

Author: Bob Aberle | Added: 6/27/2008



The Horizon ParkZone Micro Cessna RTF RC electric model has been on the market for over a year. By now it has been well covered in the various hobby publications and forums. More recently a second airplane was added to this product line, namely the Citabria. Both of these planes use the identical power and RC systems. Even more recently, two more micro indoor aircraft have been added to this same line, the EMBER and the VAPOR. Those new aircraft will separately be reported by SA Editor, Frank Granelli in the near future.

Both airplanes, meet all the aircraft requirements of the Academy of Model Aeronautics' (AMA) Park Pilot Program. They weigh less than 2 pounds (the Program's upper weight limit) and have a level top speed under 60 mph (the Program's upper speed limit). For complete Park Pilot aircraft details, [follow this link](#).

The AMA Park Pilot Program offers non-AMA members the opportunity to become AMA members at a much reduced cost. Park Pilot membership includes a great magazine "Park Pilot", \$500,000 personal liability insurance, \$2.5 million liability insurance for the flying field or indoor site owner ([see insurance details](#)) and membership in the world's largest sport aviation association – the AMA. For complete information and details about Park Pilot membership, just [click here](#).

Having a reputation for being a "detail" person, I'm going to get into all aspects of the Cessna and Citabria. The first will cover the aircraft, their specifications, what you get in the kit box, how long to get ready for the trip to the flying "field" and most important how hard or easy were these airplanes to fly.

But after all that, I decided to remove one of the power/RC systems and get into all the details of how one might use this new micro equipment in other aircraft, once the Cessna or Citabria is retired from active service. Since both aircraft are supplied completely assembled, very few people really know what's inside the fuselage. Stay tuned!

Both micro aircraft arrive ready-to-fly (RTF) in a foam shipping box.



Photo 1

As you can see the entire airplane is factory assembled with the motor, RC system and all the controls in place.



Photo 2

The wings are permanently attached to the fuselage. Included in the same box is the RC transmitter operating on the 2.4 GHz band with spread spectrum modulation. The necessary batteries for the transmitter, charger and aircraft are supplied as well. So when you first open the kit box it will take less than an hour to read the instructions, remove the airplane, install several batteries, charge another battery and go right out to fly. The Citabria is setup basically the same way as the Cessna.



Photo 3



Photo 4

Although both airplanes have the same power system, the Citabria is slightly larger in size and in weight. I'll supply the details in a moment.

Both airplanes are provided with a display stand that also serves as a charger for the Li-Poly aircraft (on-board) battery. The 2.4 GHz RC three-channel transmitter is included as well as 8 AA size alkaline non-rechargeable battery cells. So you will not need to buy anything extra.



Photo 5



Photo 6

The Cessna weighs exactly 17.7 grams as shown on my digital scale. That is equivalent to 0.624 ounce; less than 3/4 of an ounce.



Photo 6A

You will note that considerable detail to scale is presented on this model. In other words, there is no question that it is a Cessna 210 Centurion aircraft. Wingspan is 15 inches and the wing area is 34.2 square inches. Wing loading is a very light 1.69 oz./sq. ft. Overall length is 13 inches.



Photo 7



Photo 8

You will note that the Cessna has a scale-like tri-cycle landing gear (two main wheels and a nose wheel). The radio system provides three-channel control of the rudder, elevator and motor throttle. Each channel is fully proportional with the rudder and elevator using tiny feedback style

motor driven servos. The power system consists of a 6 mm diameter brushed motor that looks similar to the popular 7 mm pager type motors.

It is geared at close to 4 to 1 while the propeller has a 3.7-inch diameter with a 2.3-inch pitch. The receiver is actually a “block” or what some call a “brick” configuration. In other words, on one PC board is the receiver, the two servos and a built-in brushed motor electronic speed controller (ESC) with a Battery Eliminator Circuit (BEC). Using this type configuration eliminates a lot of the wiring which normally adds weight and complexity to tiny aircraft. There are only two wires exiting from the “Block” to the electric motor and two more that go to the tiny single cell 70 mAh Li-Poly battery. The entire power/RC system weighs only 9 grams (part of the 17.7 gram total airplane weight)

The companion Citabria uses the same power and RC system, but is slightly larger in size with a 50 square inch wing and a total weight of 21.2 grams. This yields a wing loading of 2.15 oz/sq. ft. The stand is actually the charger for the on-board Li-Poly battery.



Photo 9

This next photos of the Citabria being held, gives you an idea as to the very small size of these models.



Photo 10

The Citabria, being a tail dragger, does not have a nose wheel, as does the Cessna. But it does have this steerable tail wheel.



Photo 10A



Photo 11

This photo shows both the Cessna at the right and the Citabria, both sitting on their display stands. The Citabria is slightly larger in size and weight.



Photo 12

The transmitter supplied with either aircraft operates on a new, very high frequency band (2.4 GHz) and on Spread Spectrum modulation system. In the past three years, this band and modulation has become extremely popular for our RC hobby. Each RC manufacturer has their own series of digital codes and then the transmitters all have their own discrete code.

That means that no two transmitters can theoretically interfere with one another even within the same brand (manufacturer). When you go to a flying field, or just fly at a schoolyard or gym, you will no longer need a frequency pin nor will you have to be concerned that you could interfere with another flyer. This is the way of the future for our sport.

Each 2.4 GHz RC receiver must be “bound” to a transmitter. This means that the receiver must be “tuned” to the signal and digital code of the companion transmitter. Horizon performs this “Binding” process at the factory for your convenience. The instruction manual tells you how to do the binding if it ever becomes necessary in the future.

For example, if you purchase a second receiver for another airplane, you would have to bind it to your existing transmitter. Occasionally, a receiver will have to be “re-bound” to a transmitter, much like “re-booting” a PC.

The Horizon 2.4 Hz ParkZone transmitter provides three-channel control. There are two control stick assemblies. The stick on the right operates the rudder and elevator. That stick uses a spring return to the neutral position. The left hand stick is for the motor throttle. At the bottom position the motor is off, while at the top it runs at full power. The stick remains where it is, it is not spring loaded to return to the center or neutral position.

Both the rudder and elevator controls have small trim switches that allow you to trim or adjust the aircraft in flight for a level attitude. This works exactly as it does on full-size RC transmitters.

When you turn the transmitter power switch “ON” a red LED will light and two audible beeps are heard. Both aircraft kit boxes contain a total of eight (8) AA size alkaline non-rechargeable battery cells. At the rear of the transmitter case is a covered battery box.



Photo 13

Four of these AA cells are inserted into this battery box. Make sure you observe the proper polarity. The protruding nub at the top of the battery is positive (+), while the flat bottom of the cell is negative (-). The remaining four battery cells will be mentioned in a moment.



Photo 14

You may notice on the front panel of the transmitter a switch marked “MODE” (2 and 1). This has no meaning to the Cessna or Citabria. It is intended for future aircraft application, so just ignore it.



Photo 15

The display stand conveniently contains the charger, which you will use to charge the single Li-Poly cell (that goes inside the aircraft)



Photo 16

The remaining four AA cells supplied with the kit are inserted into the base of the display stand/charger. The manual doesn't tell you to do this, so don't assume you received four extra transmitter batteries.

The airborne battery is a single Li-Poly rechargeable cell that has a rated capacity of 70 mAh with a nominal voltage of 3.7. That battery weighs only 2.4 grams. It costs just \$8.99 (Horizon Catalog No. PKZ3001). So if you want to get in a lot of flying, I suggest you purchase an extra pack and have one on charge while flying with the other. A depleted battery will take only 20 minutes to fully recharge.



Photo 17

The battery gets inserted into a slot located on the top of the display stand base.



Photo 18

Be careful to note the battery polarity (pin wiring). When inserting the battery for charging purposes, the battery label should be facing up as shown in this photo. The battery actually fits into a slot on the charger, which helps prevent improper installation



Photo 18A

Go slowly when pushing the battery into position. If the battery connector is bent upward in any way, it might not engage with the mating half connector on the charger. As soon as proper contact is made, a red LED will glow. The LED will light continuously until the charge level is close to full. At that point, the LED will begin to flash. When the LED blinks at a very slow rate, about once every 20 seconds, the battery is fully charged. Don't leave the battery connected to the charger after full charge is reached. The manual indicates that at approx. a 200 mA charge current, you should be able to obtain about 15 to 20 charges on a set of four AA batteries.

Once the battery is fully charged it can be inserted into the battery box located under the forward fuselage of either aircraft. First plug the battery into the cable exiting from the compartment. Then press the battery into place so that the hook and fastener tape will hold it firm during flight.



Photo 19

Just as was the case for the charger, battery polarity must be observed when plugging the battery into the airplane. Note that the battery label is facing upward. The small wing tab on the mating connector is on the bottom. After inserting the battery this "wing tab" will be under the connector. If you force the battery into a reversed polarity situation you will surely "cook" the radio system.



Photo 19A

Besides the trim switches on the transmitter, you can also adjust the rudder and elevator control trim by mechanical means. The wire control rods have “Z” or “S” bends that you can open up or close down to effect slight control surface adjustments. You are advised to do this before using the electronic trim on the transmitter.



Photo 20



Photo 21

Considerable attention to detail can be noted on the Cessna. In this underside photo, you can see air exit holes under the fuselage for cooling air to pass out the rear of the aircraft. Thoughtfully, a strip of reinforcement tape runs along the entire underside of the wing for added strength. The wing is permanently attached to the fuselage. This saves weight and yet, with the small wing span the aircraft is still very easy to transport.



Photo 22

Flying the Cessna and Citabria can be done either one of two ways. Indoor flying is always possible if a facility like a local school gymnasium is available to you. Obviously, indoor flying has

a great advantage since weather conditions don't come into play. Also the smooth surfaces of gym floors will make take offs and landing easy and enjoyable.

The AMA's Park Pilot Program makes getting indoor flying sites easier since the owner of an indoor club site can be covered for up to \$2.5 million dollars. See all the program's details at the main AMA site; [www.modelaircraft.org](http://www.modelaircraft.org)

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For my first flight session I did not have a local gym available to me so I resorted to early morning, calm air, outdoor flying. ParkZone claims you can do both and my flying outdoors have certainly proved them correct. I actually flew both the Cessna and the Citabria in up to 5 mph winds. My honest feeling is that you wouldn't want to go higher than this. In fact, the calmer the wind the easier and better the aircraft will fly.

Before your first flight on either airplane, you should perform a simple ground range check as outlined in the manual. Although both airplanes can be flown by practically a raw beginner, the manual (and I) advise that you seek some help from a local experienced pilot. In many cases your local hobby dealer can refer you to a nearby club where members can assist you until you learn the basics of flying. If nothing else, an experienced RC pilot can trim the airplane for you so your first flights are easier.



Photo 23



Photo 24

AMA Hall of Fame member and the NEAT Fair Director, Tom Hunt, helped fly the Cessna here while I took the flight photos. Obviously, we resorted to hand launching because our grass field would have made it impossible to take off with the small diameter wheels. The airplanes had plenty of power so right after launch, the throttle could be cut back somewhat to slow down the airplane and extend the flying time (the less motor current drawn, the longer the airplane will stay in the air).



Photo 25



Photo 26

Turning maneuvers were easy. Very little trim was required to establish level flight. On occasion, we would bring the airplanes down very close to the ground to obtain a better camera angle. Doing this every once in a while we would actually hit the grass. But keep in mind these airplanes weigh less than 1 ounce. When that happened, we shut down the motor, picked up the airplane and sent it off with another hand launch. They were never damaged!



Photo 27



Photo 28



Photo 29



Photo 30

At all times, the airplanes handled well, flew slowly and were more than just “easy” to fly. They were very easy to fly. Aerobatics are limited to a single loop if the airplane dives first at full throttle. Tight turns, horizontal figure eights and even a sort-of stall turn are also possible. Manage your airspeed and position for these maneuvers.



Photo 31

The Horizon ParkZone manual covers all the basic beginner flying instructions in considerable detail. Make sure you read the booklet several times before heading for that first flight session. Again, if you are a beginner, get some experienced local help. If you must do it on your own, be advised that Horizon sells an entire series of replacement parts for both aircraft.

Now this would normally be the end of my review, but the thought had occurred to me that some of the more experienced modelers might later on want to take the power and RC equipment out of their Cessna or Citabria and install it in another aircraft; either a purchased kit or one of their own design. Since these little planes come ready-to-fly, not many modelers really know what's inside the fuselage. So read on and I will tell you.

I decided to "operate" on the Cessna, only because the selling price of that airplane was recently reduced to \$119.99 (June 2008). The big surprise came when I learned how easy it was to separate the top half of the fuselage, thereby exposing both the electric motor and the block type receiver/servo PC board.

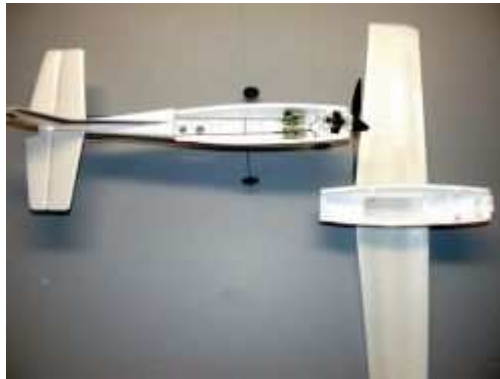


Photo 32

This photo shows the top of the fuselage and the wing removed from the lower portion of the fuselage and the tail feathers

The nice part of this is that you can remove the motor and the receiver/servo block and still be able to re-install the equipment at a later time. Both the motor and receiver/servos are held in place with a white silicone sealer, which works like a cement.



Photo 33

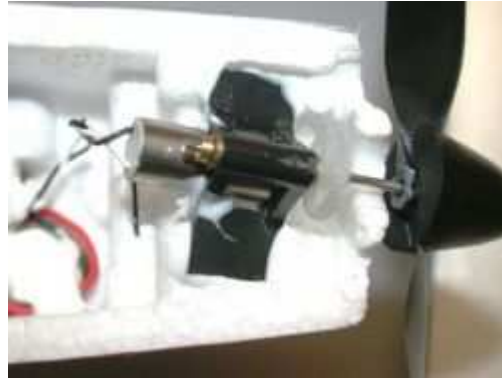


Photo 34

The two servos can be seen at the left, with the control rod connections going aft to the rudder and elevator. The electric motor is to the right. Photo 34 shows a closer look at the geared motor.

Although the manual indicates that the gear ratio is 5.28/1 I actually counted the gear teeth and came up with a ratio closer to 4/1. The prop is a special one for this application with a 3.7-inch diameter and a 2.3-inch pitch. I measured the motor rpm at 5,000.



Photo 34A



Photo 34B

Horizon is now recommending that a light machine oil be placed on both motor gear shaft bushings (front and rear) to provide quieter operation and prevent excess heat build up. New Citabria kits will include this oil with appropriate instructions. I found that I was able to use either the popular 3-In-1 oil or the Singer (sewing machine) machine oil as a substitute.



Photo 34C



Photo 34D

Photo 34C shows the oil application to the rear motor bushing. Photo 34D is lubricating the front gear shaft bushing. Keep in mind, to access the motor to apply this oil; you will have to temporarily remove the top half of the fuselage as just noted. You can do this easily on both the Cessna and the Citabria. It takes little time and is well worth the effort.

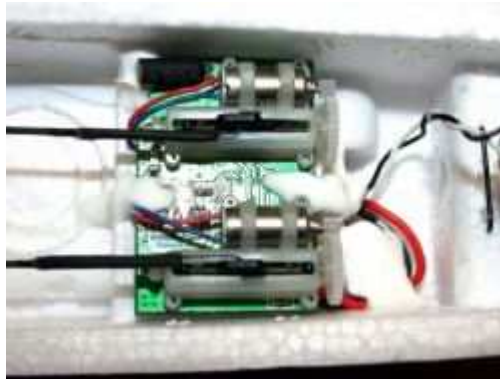


Photo 35

Look closely at the receiver/servo back. You can see the control rod connections a lot clearer in this shot. Both servos are a proportional; feedback type with a linear rack type output



Photo 36

Although it appears a little exaggerated in this photo, a considerable amount of down thrust and some right thrust is built into the motor. The designers felt this was necessary and flight performance tends to prove them correct.

This next photo shows the power and receiver/servo block removed from the Cessna along with the single battery cell.



Photo 37

The next photo is a still closer view of the receiver/servo PC board. The dime gives you a good size comparison. This PC board weighs only 3.3 grams.



Photo 38

Servo resolution isn't exactly as good as found on larger RC systems, but certainly adequate for this application and much better than magnetic actuators. Having the receiver, servos and the ESC all on one board eliminates a lot of extra wiring thereby saving weight.



Photo 39



Photo 40

Photo 39 shows the rear side of the receiver/servo PC board. The 70-mAh Li-Poly battery weighs 2.4 grams)



Photo 41

The entire power, RC system and battery shown in photo 41, weighs only 9 grams; excluding the two control rods.

The very last thing I did was to operate the motor and take several measurements, which will be appreciated by the more experienced modeler. Using the supplied 3.7 X 2.3 propeller and the single 70 mAh Li-poly battery cell, I measured 275 mA motor current at 3.5 volts with a power input of 0.96 – say 1 watt even.

The power loading for the Cessna at 17.7 grams total weight worked out to 1.6 watts/oz or 26 watts/lbs. The same power system in the Citabria at 21.2 grams produced a power loading of 1.33 watts/oz or 21.2 watts/lbs. Both of these are very low power loadings, but since the airplanes flew so well, you must assume that the extremely light wing loading makes flight possible. Keep these parameters in mind when designing your own aircraft for this size power system.

With a motor current of 275 mA and a 70 mAh capacity battery you should be able to obtain up to 15 minute motor run times on a charge. That's a lot of time, from such a small battery.

### SUMMARY

Both the Cessna and the Citabria provided excellent flight performance and were easy to fly. But I still would recommend some local help during your first few flights. When you do have mishaps, little damage is incurred. If anything is damaged the parts can be easily replaced.

These micro airplanes are primarily intended for indoor flight but, as pointed out, are capable of being flown outdoors with winds varying from dead calm, upwards to 3-5 mph. The micro RC electric Cessna and Citabria are a wonderful, fun addition, to our sport. Look for an expanded line of these models, including the new EMBER and VAPOR ----- and even beyond that!

For more information on these interesting, easy to fly and revolutionary airplanes, please go to: [http://www.masportaviator.com/activedit/./redirect.asp?website=ArticleLink\\_ParkZone\\_MicroCessna](http://www.masportaviator.com/activedit/./redirect.asp?website=ArticleLink_ParkZone_MicroCessna) for the Cessna and to: <http://www.parkzone.com/Products/Default.aspx?ProdID=PKZ3110> for the Citabria.

Each aircraft are available in several color schemes.

**NOTE:** Both RTF aircraft are currently **on sale for only \$120** instead of \$150.

### Cessna Specifications

<b>Manufacturer:</b> Hangar 9	<b>Length:</b> 15 in.
<b>Cost:</b> \$120.00	<b>Wingspan:</b> 13 in.
<b>Radio:</b> ParkZone 2.4 GHz 3-ch	<b>Wing Area:</b> 34.2 sq. in.
<b>Servos:</b> 2 x Linear Feedback	<b>Wing Loading:</b> 1.69 oz. /sq. ft.
<b>Engine:</b> 6 mm Brushed geared 4 to 1	<b>Weight:</b> 17.7 grams.

**Airfoil:** Reinforced Under Cambered **ESC:** 500 Ma with BEC

**Battery:** 1-cell, 70 mA Li-Poly

**Special Airframe Features:** Complete Ready To Fly Indoor – outdoor featuring 2.4 GHz technology.

### Power Specifications

<b>Prop:</b> 3.7 x 2.3 in.	<b>Max RPM:</b> 5,000
<b>Max Watts:</b> 1 W	<b>Power Loading:</b> 26 W/lb.
<b>Max Voltage:</b> 3.5V	<b>Motor Current:</b> 275 mA
<b>Motor Run Time:</b> 15 Min.	<b>Battery Load:</b> 4C (capacity)

## Citabria Specifications

**Manufacturer:** Hangar 9

**Length:** 16 in.

**Cost:** \$120.00

**Radio:** ParkZone 2.4 GHz 3-ch

**Servos:** 2 x Linear Feedback

**Engine:** 6 mm Brushed geared 4 to 1

**Airfoil:** Reinforced Under Cambered

**Battery:** 1-cell, 70 mA Li-Poly

**Wingspan:** 13 in.

**Wing Area:** 50.0 sq. in.

**Wing Loading:** 2.15 oz. /sq. ft.

**Weight:** 21.2 grams.

**ESC:** 500 Ma with BEC

**Special Airframe Features:** Complete Ready To Fly Indoor – outdoor featuring 2.4 GHz technology.

### Power Specifications

**Prop:** 3.7 x 2.3 in

**Max Watts:** 1 W

**Max Voltage:** 3.5V

**Motor Run Time:** 15 Min. **Battery Load:** 4C (capacity)

**Max RPM:** 5,000

**Power Loading:** 21.2W/lb.

**Motor Current:** 275 mA