

# 202mph

## INSIDE THE WORLD'S FASTEST RC CAR

NIC CASE REVEALS HIS RECORD-SETTING TECH

BY NIC CASE WITH PETER VIEIRA PHOTOS: BRYAN BLASER

**"How fast does it go?"** It's the number one question you hear anytime someone sees RC in action, and we're all fascinated by speed—the more, the better. And when it comes to going fast, one man stands out as RC's most prominent overachiever, recognized by the Guinness World Records, no less. That man is Nic Case. He's the builder and driver of the world's fastest RC car: the 202mph RC Bullet. We're pleased to have Nic himself tell us the story of his record-breaking journey and what it takes to push an RC car past 200mph.



"Officially Amazing!" Nic shows off the Guinness World Record certificate that confirms his achievement.



### How It All Began

My family actually got me into RC back in 1990. Raced my first RC car (a gold pan RC10) at Fast Lane (now Hot Rod Hobbies) and I was hooked. My first big win was at the 1991 Thunderdrome in Encino, California. It was there I witnessed the Insane Speed Run—pretty much the coolest thing I had ever seen in RC. After seeing that, I was hooked on going very fast! Fast forward to 2006, to RCCA's World's Fastest RC Car Competition in Fontana, California, that launched my focus on straight-line speed running.

### The Why

To say that this took a lot of work is an understatement. The drive and motivation to devote so much effort into something like this is one of most important parts of the pursuit. My reasons why morphed over time. It started out as a challenge in 2006 at the WFRCCC, where I surprisingly broke the (then current) record of 111mph. Soon after that, my rocket scientist friend, Brad Williams, proved mathematically that 200mph was possible. Years later, I built the RC Bullet in 2012—expectations for some very fast speeds were on high. However, in the first two sessions, run after run, it seemed that the fastest the Bullet would go was 171mph. In March of 2013, I decided to retire the Bullet and straight-line speed running. At this point, I had exhausted all my motivation to continue. On April 13, 2013, my 17-year-old nephew Chris was killed by a hit-and-lie driver. I was devastated. Chris really dug on all this speed-running stuff. I found new motivation in diverting my grief over Chris's death into creative action, celebrating his short life.



## INSIDE THE BULLET

The Bullet's design came mostly from several brainstorming sessions with my good friend John Trino. We agreed to keep the streamliner design layout but completely eliminate the suspension. By doing this, it would prevent the car from squatting in the rear under acceleration and preventing a blowover. Another added benefit of no suspension was the elimination of the CVD. The SR-11 was plagued with CVD's failing. I decided to go with belts instead of a shaft-drive because it was easier to find a reduction ratio that was close to 1.5:1. The Bullet's chassis, drivetrain, and several bodies were all designed via CAD in my spare time.

### SPECIFICATIONS

**Total length:** 36 in.  
**Width:** 7 in.  
**Wheelbase:** 21 in.  
**Weight:** 12 lb.  
**Caster:** 0 degrees  
**Differentials:** Spools, front and rear  
**Motor:** 1875Kv  
**Gearing:** 75 x 34  
**Radio range:** 1600 feet  
**Total horsepower:** 12 (peak estimate)



Steel gears and heavy-duty belts spin the wheels.

#### 1 Industrial Drive Belts

The Bullet's 6mm and 8mm drive belts are typically used for small machinery. I could get these in many different lengths, and generally opted for a bit of overkill on width.

Kinetic Composites cut the Bullet's carbon-fiber parts.

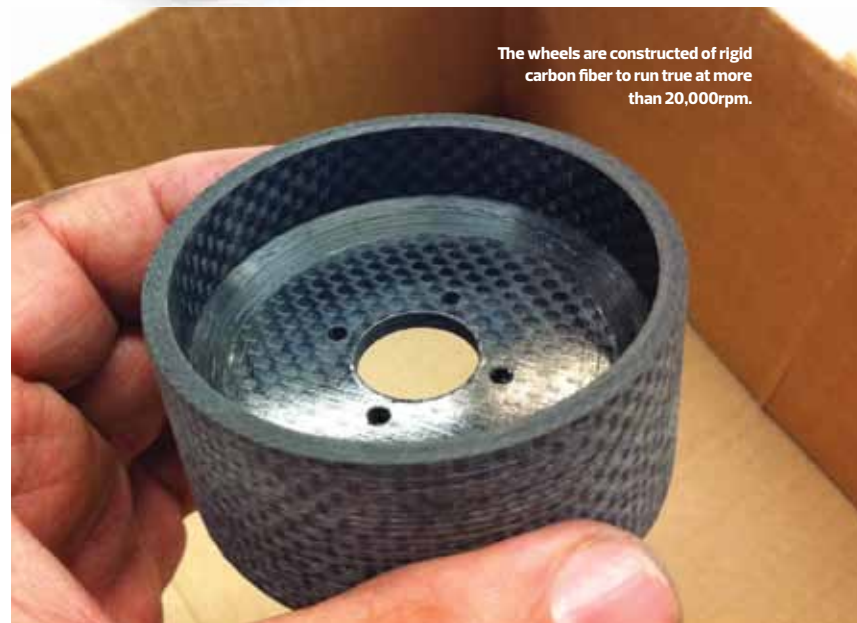


#### 2 Custom Carbon-Fiber Wheels

These wheels spun at roughly 23,000rpm during the 202mph run. Tires and wheels are an area I put considerable effort into. Over time, I tried all kinds of combinations of materials, adhesives, and processes. I use a common purple foam from John's BSR tires, expertly glued by John Foister himself. The 3-inch-diameter tire is on a custom-made carbon wheel, which I fabricated one at a time. The weight-to-strength ratio is superior, and the carbon wheels do not have the negatives of aluminum.

#### 3 Dinogy Lithium Batteries

With some research, I found that Dinogy batteries put out more watts than any other battery. When I changed to Dinogy packs, I went from 171mph to 184mph! I used twelve 5000mAh cells in series to deliver the needed horsepower.



The wheels are constructed of rigid carbon fiber to run true at more than 20,000rpm.

#### 4 Neu Motor

These motors were intended for RC planes and helicopters, but I adapted them for use in my cars. Neu motors are powerful and efficient; these motors never reached anything over 150°F.

#### 5 Carbon-Fiber Chassis

At 12 pounds ready to go, the Bullet requires a very stiff chassis. High-quality 3mm carbon fiber was used for all pieces. Kinetic Composites cut all the carbon fiber; the aluminum parts were cut by Team Tamale; and the front axle and hubs were machined by John Foister at BSR.

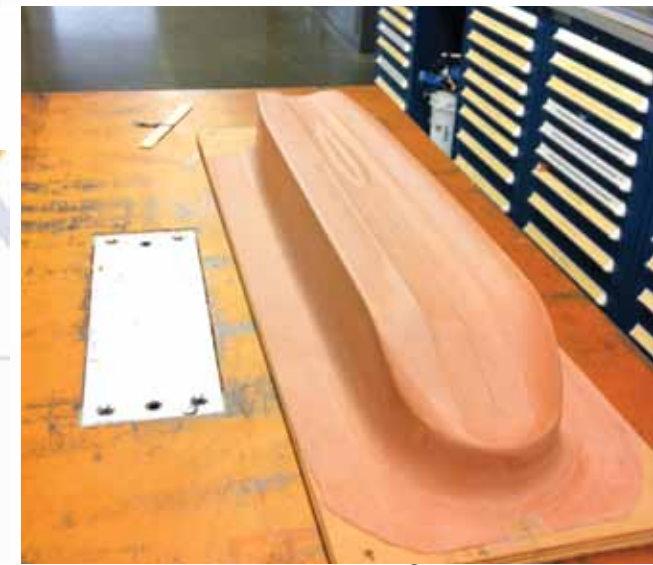
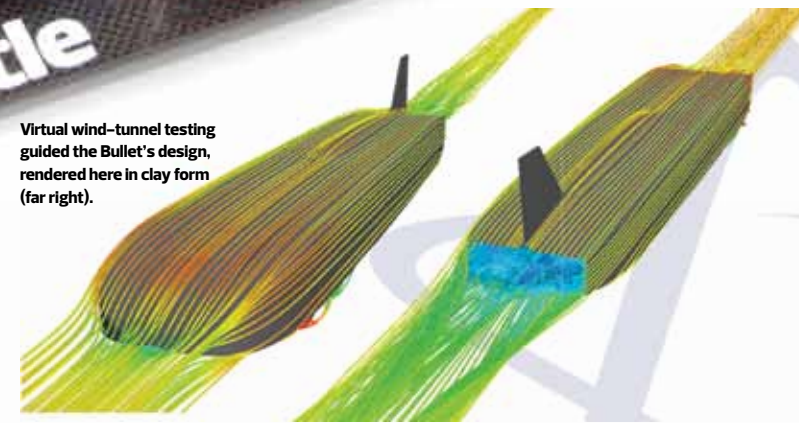
#### 6 Castle Creations Power System (off the shelf, with a twist)

The Bullet's electronic speed control is a Castle Hydra HV 240 with a Phoenix HV 110 control board. Since this is an older version, it has no data logger. I protected it from current ripple with a large capacitor bank. I've also used Castle's Phoenix HV 140's with great success.

#### 7 Futaba FASST R614FF Receiver

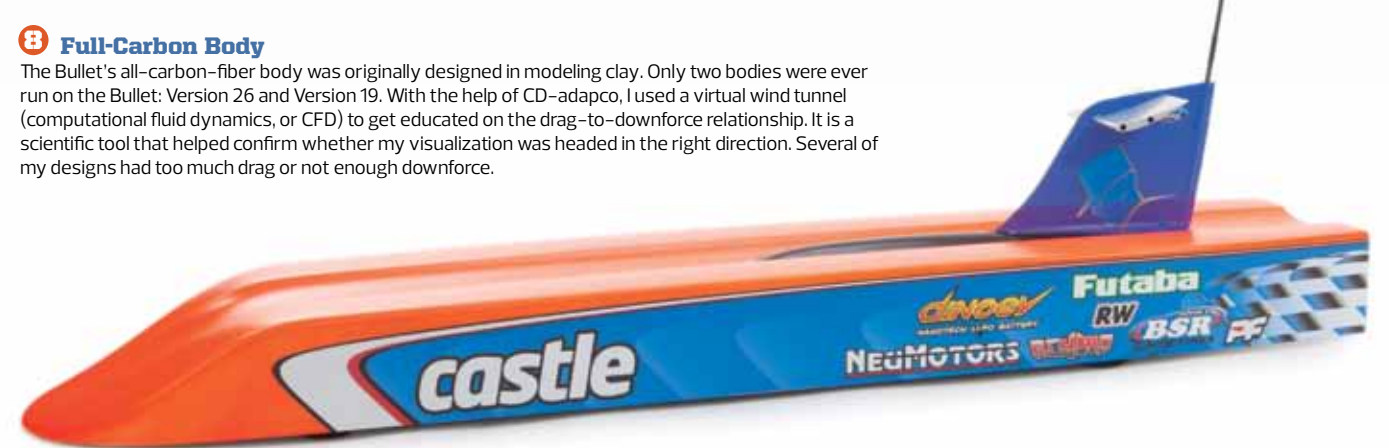
I added a 400mm boat antenna to the receiver, which threads up the back of the tail fin, to ensure that it's as far from the ground as possible.

Virtual wind-tunnel testing guided the Bullet's design, rendered here in clay form (far right).



#### 8 Full-Carbon Body

The Bullet's all-carbon-fiber body was originally designed in modeling clay. Only two bodies were ever run on the Bullet: Version 26 and Version 19. With the help of CD-adapco, I used a virtual wind tunnel (computational fluid dynamics, or CFD) to get educated on the drag-to-downforce relationship. It is a scientific tool that helped confirm whether my visualization was headed in the right direction. Several of my designs had too much drag or not enough downforce.





## Driving a 200mph RC Car

Driving the Bullet is huge responsibility; you have to make sure you are confidently going straight before unleashing the massive power. It's important to be willing to abort in an instant—safety is paramount. Driving the Bullet is an awesome experience; the acceleration is very impressive. It responds in a predictable way when steering, and decelerates hard and confidently. Decelerating is often overlooked on how important it is.



### SPECIAL THANKS

*I'm very grateful to have these outstanding sponsors for this quest. I appreciate the crucial backing from these outstanding companies:*

Castle Creations  
Neu Motors  
BSR Racing Tires  
Dinogy Batteries  
RW Racing Gears  
Futaba  
CD-adapco  
RC4WD  
Team Tamale  
Ford  
Protoform

## THE SCIENCE OF SPEED

When I started this quest, many of the things we take for granted nowadays either weren't developed yet or not defined for speed running. At the time, brushless motors and lithium polymer batteries were just being introduced to the RC car market. Using Neu motors and Castle speed controllers (normally used in RC helicopters) was a giant step in the right direction.

**However, I learned very quickly that I needed more than just sheer horsepower.**

### Location, Location, Location

The first issue is having a location that is long, smooth, and safe enough to run on. Seems easy, but nice, flat, paved surfaces that are large enough to achieve 200mph and smooth enough for a car running on 3-inch-diameter tires are hard to find. Road reflectors and parked cars are a danger that I stayed away from.

### Long-Range Required

At 200mph, the RC Bullet covers nearly 300 feet every second, so a

long-range radio is a big deal. I have tested many, and Futaba is at the top. Positioning the receiver antenna high and perpendicular to the ground helps range as well.

### Steel-Fortified Drivetrain

Plastic or aluminum will not hold up against 12hp. Luckily, RW Racing machined hardened-steel 32-pitch pinions and spurs for me.

### Flexproof Body

Preventing body deformation is a

very important factor in going fast. A stiff, reinforced body prevents the extreme forces of the air changing the aerodynamics of your car. I learned this the hard way!

### 200mph-Rated Tires

I've put considerable effort into developing a wheel/tire combination. At 200mph, wheel rpm exceeds 20,000, and the centrifugal force trying to pull the tires off the wheels is tremendous. John's BSR Racing Tires currently markets a wheel/tire

combo specifically for speed-running applications.

### Downforce Is a Must

It's a commonly held belief that downforce equals aero drag. This is not necessarily true. Having a shape that is very slippery often translates into an unstable car that can blow over.

# Nic Case's RC Highlights

**1990** / First car—RC10

**1991** / First big win—Thunderdrome, sportsman modified

**1992** / First Insane Speed Run—**first RC car to go 80mph in competition**

**1994** / Nemesis to production

**2000** / National Champion—Dirt Oval Modified and Paved Oval Modified

**2001** / Kimbrough 400 Champion

**2006** / RCCA Speed Competition Champion @ 134mph (Guinness record)

**2007** / RCCA Speed Competition Champion @ 127mph—**first RC dragster under 1.4 seconds**

**2008** / ISC Speed Competition Champion @ 161mph (Guinness and ROSSA record)



**Nic at a ROSSA event in Camarillo, California, in 2015, running a 2-cell car. Top speed: more than 105mph!**

**2009** / Founder and President of the ISC, ran three events

**2010** / Sponsored by Associated, 143mph with a 4-cell car

**2011** / New York Times article; carbon-fiber wheel

**2012** / The RC Bullet is born, **171mph (Guinness and ROSSA record)**

**2013** / Nic turns 50, decides to retire from speed running; Chris, his 17-year-old nephew, is killed; Nic rethinks his retirement; RC Bullet goes 184mph in run in memory of Chris

**2014** / **Discovered the decommissioned airport in Utah, 202mph (Guinness and ROSSA record)** in memory of Chris

**2015-16** / Retires from speed running; returns to racing; Insane Speed Run at Encino Velodrome, 89mph

## BEFORE THE BULLET

**2006**  
Electrified  
Nitro TC3  
**134 mph**

**2007**  
Front-wheel-drive car,  
prototype  
**140 mph**

**2008**  
Schumacher  
Mi-3 based  
**161 mph**

**2011**  
SR-11,  
Nitro TC3 based  
**173 mph**



**The Castle Hydra 240 speed control is usually found in high-power boats.**

### Futaba 4PK Transmitter

There was no need to modify or boost the 4PK transmitter's output; it is long distance, right out of the box. The performance of all my Futaba radios—3PJ, 4PK, and 4PX included—has just been top-notch, with range upward of 1600 feet. That's over a quarter mile, which allows a full half mile of operating distance when I stand at the midpoint of a run.

### Mission Accomplished

On October 25, 2014, at St. George, Utah, my wife, Tracy, stepdad Mak, and good friend Josh were there to support and witness the RC Bullet achieve 202mph. Not bad for an amateur hobbyist! With good friends, family, great sponsors, and off-the-shelf electronics, we set a new world record and broke the 200mph barrier. There were many people that helped throughout this journey. I appreciate everyone's support immensely. For now,

I consider myself retired from straight-line speed running. Someone will break this record, and I've always been at peace with that. Driving an Insane Speed Run car on the Velodrome is the future for me, along with having some fun racing dirt oval at my adopted home track, Hot Rod Hobbies. 🙏



**Nic set his 2014 record with Futaba's best transmitter of the time: the 4PK.**

