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00:00:00,000 --> 00:00:07,000

On this episode of Mythbusters, a blast from the past.

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00:00:07,000 --> 00:00:13,000

As Adam and Jamie hit the history books.

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00:00:13,000 --> 00:00:17,000

There would be a lot of fire and I could get burned.

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00:00:17,000 --> 00:00:22,000

To explore an explosive myth from the Civil War.

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00:00:23,000 --> 00:00:30,000

Did the Confederate Army build the world's first long range missile?

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00:00:30,000 --> 00:00:34,000

In three, two, one.

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00:00:38,000 --> 00:00:40,000

Who are the Mythbusters?

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00:00:40,000 --> 00:00:45,000

Adam Savage, Jukko, and Jamie Heineman.

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00:00:45,000 --> 00:00:47,000

This is going to kill you.

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00:00:48,000 --> 00:00:52,000

Between them more than 30 years special effects experience.

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00:00:52,000 --> 00:00:54,000

That's what I'm talking about.

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00:00:54,000 --> 00:00:57,000

They don't just tell the myths.

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00:00:57,000 --> 00:01:00,000

They put them to the test.

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00:01:00,000 --> 00:01:16,000

This one, I've been waiting for three whole years to make this one finally happen on the show.

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00:01:16,000 --> 00:01:20,000

It's got danger, gunpowder, so I'm all for it.

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00:01:20,000 --> 00:01:33,000

The myth is that late in the Civil War, the Confederate Army actually built, aimed, and launched a two-stage rocket from Richmond, Virginia to Washington, DC.

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00:01:33,000 --> 00:01:35,000

Almost a hundred miles.

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00:01:35,000 --> 00:01:41,000

Observers claim to have watched this rocket roar skyward, drop its first stage, and disappear from sight.

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00:01:41,000 --> 00:01:43,000

Oh yes.

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00:01:43,000 --> 00:01:46,000

It's a myth of ballistic proportions.

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00:01:47,000 --> 00:01:52,000

The American Civil War was mostly slugged out with rifles and cannons.

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00:01:52,000 --> 00:01:56,000

But did the Confederates have a secret weapon?

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00:01:56,000 --> 00:02:00,000

Could they really have built the world's first long range missile?

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00:02:00,000 --> 00:02:07,000

The Mythbusters and the build team are going to join forces to find out.

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00:02:07,000 --> 00:02:09,000

So where should we start with this?

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00:02:09,000 --> 00:02:20,000

Well, I think we can only begin with an examination of exactly what the state of the art of

rocketry was, if any, at the time this myth is supposed to have happened, roughly 1865.

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00:02:20,000 --> 00:02:27,000

So what you're getting at is that we need to get a bunch of plans for these rockets, build them, and see how well they actually worked.

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00:02:27,000 --> 00:02:29,000

Shoot them off, see what they're capable of.

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00:02:29,000 --> 00:02:30,000

Okay.

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00:02:30,000 --> 00:02:42,000

First, before attempting to make the mythical 100-mile missile, the Mythbusters are building short-range rockets that were used in the Civil War.

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00:02:42,000 --> 00:02:50,000

When complete, they'll launch them to learn whether the long-range Confederate rocket is even plausible.

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00:02:50,000 --> 00:02:54,000

But so far, this build isn't exactly a walk in the park.

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00:02:54,000 --> 00:03:00,000

Sixth. So, sixth larger, that's...

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00:03:01,000 --> 00:03:07,000

With plans dating back over a century, this one is proving to be a bit of a brain drain.

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00:03:07,000 --> 00:03:09,000

2.3A.

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00:03:12,000 --> 00:03:15,000

Until finally, Jamie gets some inspiration.

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00:03:16,000 --> 00:03:26,000

I'm building a replica of what is known as the Hail Rocket, and that type of rocket is generally acknowledged as the state of the art in the Civil War era.

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00:03:27,000 --> 00:03:38,000

A state of the art because over its 2,000-yard range, it had a hint of accuracy, brought about by tail fins that caused it to spiral through the air.

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00:03:39,000 --> 00:03:41,000

My, my, my, my!

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00:03:41,000 --> 00:03:51,000

Armed with dusty plans from the Smithsonian, Jamie sets his sights high, but in case Hail falls flat, Adam's building another retro rocket.

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00:03:51,000 --> 00:03:55,000

And his, like the Myth, is a two-stage ring.

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00:03:56,000 --> 00:03:59,000

The Boxer Rocket is actually a rescue rocket.

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00:03:59,000 --> 00:04:07,000

It was made to fire from one boat to another or from the shore to a boat in need of rescue, carrying a line so that that boat could be pulled to safety.

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00:04:09,000 --> 00:04:12,000

The Boxer Rocket's initial thrust came from the first stage.

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00:04:12,000 --> 00:04:20,000

As that burned out, it fell away, and the second stage fired up and carried the rope over 300 feet to the sinking ship.

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00:04:22,000 --> 00:04:29,000

But for Adam, it's not all plain sailing, because no one seems to have built one for over a hundred years.

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00:04:30,000 --> 00:04:32,000

I have no idea if this is going to work.

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00:04:33,000 --> 00:04:41,000

While the Boxer makes progress, the Hail is out for the count, because Jamie's made an error of schoolboy proportions.

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00:04:42,000 --> 00:04:44,000

And to avoid public humiliation...

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00:04:45,000 --> 00:04:48,000

You know, if I don't talk, you don't, you don't get any good TV.

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00:04:48,000 --> 00:04:50,000

He's run away from the cameraman.

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00:04:52,000 --> 00:04:53,000

What happened?

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00:04:54,000 --> 00:04:55,000

Nothing.

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00:04:55,000 --> 00:04:57,000

Denial is a river in Africa.

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00:04:57,000 --> 00:04:58,000

Come on.

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00:04:59,000 --> 00:05:00,000

What happened?

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00:05:00,000 --> 00:05:04,000

Did you accidentally weld the thing at the end of your pipe that was supposed to be a screw fitting?

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00:05:05,000 --> 00:05:09,000

Overzealous welding has sealed his rocket shut, and he's not happy.

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00:05:13,000 --> 00:05:22,000

We've had about, like, a couple of hours of playing around with the thing, and that's not interesting, but somehow when we screw up, everybody's all over it.

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00:05:23,000 --> 00:05:30,000

While a sulking Jamie has to start from scratch, Tari's busy building the Civil War rocket launcher.

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00:05:32,000 --> 00:05:41,000

It's a pretty simple design. It's just a channel that we're going to load the rockets into, and it's got two legs that support it in the front, and it also allows the angle to change.

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00:05:41,000 --> 00:05:44,000

They're adjustable, so we can have different, you know, angles of trajectory.

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00:05:45,000 --> 00:05:48,000

Time for a test, albeit with a flimsy firework.

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00:05:49,000 --> 00:05:51,000

I'm not really sure what this one's going to do.

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00:05:51,000 --> 00:05:54,000

It might scream. It might explode, but...

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00:05:54,000 --> 00:05:55,000

Okay.

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00:06:02,000 --> 00:06:06,000

You know what? The rocket followed the channel perfectly, and it sent it in the right angle.

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00:06:06,000 --> 00:06:08,000

I just hope it's sturdy enough for the big rocket.

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00:06:08,000 --> 00:06:11,000

I know. That's going to be a lot of thrust.

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00:06:11,000 --> 00:06:14,000

I got some more rockets. I mean, we should light off a couple more.

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00:06:14,000 --> 00:06:16,000

Yeah, like a couple at once.

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00:06:17,000 --> 00:06:25,000

While Pyro Tari gets his kicks, Adam's made a find that changes the boxer and maybe the mythical rocket too.

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00:06:25,000 --> 00:06:31,000

Upon doing some more research, it turns out that nobody's ever seen one of these rockets.

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00:06:31,000 --> 00:06:35,000

No one's seen one in a long time. No one's got one. No one builds them.

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00:06:35,000 --> 00:06:42,000

So there has been some confusion as to whether or not it was a true two-stage rocket or a compound rocket.

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00:06:42,000 --> 00:06:47,000

And it turns out that it's a compound rocket, and indeed, it does not separate in the middle halfway through its ignition.

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00:06:47,000 --> 00:06:54,000

So the boxer is not a true two-stage rocket. The sections don't split, they simply burn through each other.

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00:06:54,000 --> 00:07:00,000

The idea that the mythical Confederate rocket was a two-stage must now be in doubt.

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00:07:02,000 --> 00:07:07,000

As Adam puts the finishing touches to the boxer, Jamie's come out of his corner fighting

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00:07:07,000 --> 00:07:13,000

and is already attaching those revolutionary tail fins that spun the hail rocket for accuracy.

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00:07:13,000 --> 00:07:22,000

There was a price to pay to make these spin. Even with this clever design, it actually reduced the total range of the rocket.

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00:07:22,000 --> 00:07:27,000

Range doesn't mean crap if it can't be accurate. I'll take accuracy over range any day.

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00:07:27,000 --> 00:07:31,000

And that's the same conclusion as Mr. Hale drew.

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00:07:31,000 --> 00:07:38,000

I'm fairly happy with this. It's not a polished, shiny thing, but it looks like it means business.

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00:07:38,000 --> 00:07:44,000

At last, the rockets are ready. They just need the gunpowder fuel.

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00:07:44,000 --> 00:07:50,000

Here we run into kind of a problem. First of all, it's illegal for you and I to pack black powder ourselves.

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00:07:50,000 --> 00:07:59,000

But secondly, the pressures they packed these rockets under was really just monstrous, and that makes it even more dangerous.

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00:07:59,000 --> 00:08:02,000

Sounds like we need to get our old buddy Eric Gates.

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00:08:02,000 --> 00:08:09,000

Yeah, I think we should call Eric, and I think rather than go with black powder, we should ask Eric to supply us with some modern, equivalent motors

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00:08:09,000 --> 00:08:14,000

that replicate the amount of thrust and burn time of the Civil War era rockets.

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00:08:15,000 --> 00:08:22,000

Civil War rockets, but modern fuel. And for the imminent launch, the team head for the hills.

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00:08:23,000 --> 00:08:30,000

The Mythbusters have built rockets that date back to the Civil War.

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00:08:30,000 --> 00:08:39,000

They're going to launch them in the desert to help them learn how to build the mythical Confederate rocket, rumored to have a range of 120 miles.

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00:08:41,000 --> 00:08:47,000

We're here in the Mojave Desert at the Cohen Dry Lakebed near Edwards Forest Base,

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00:08:47,000 --> 00:08:53,000

and we're about to test the authentically recreated Civil War era rockets.

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00:08:55,000 --> 00:09:00,000

Authentically recreated, but because of state laws, contemporarily fueled.

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00:09:00,000 --> 00:09:05,000

Thanks to the rocket expertise of their honorary Mythbuster, Eric Gates.

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00:09:08,000 --> 00:09:13,000

Eric has already helped show that an ancient Chinese entrepreneur failed to get into orbit.

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00:09:18,000 --> 00:09:21,000

And can you do a full 360 on a swing?

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00:09:23,000 --> 00:09:26,000

Well, only if you've got someone like Eric there to help.

101

00:09:28,000 --> 00:09:33,000

Today, the cool of the van has become Civil War mission control.

102

00:09:33,000 --> 00:09:35,000

I got something to show you guys.

103

00:09:37,000 --> 00:09:39,000

This right here is my boxer rocket.

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00:09:39,000 --> 00:09:45,000

Adams is proud as a new father. And like a new baby, the rocket first gets weighed.

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00:09:45,000 --> 00:09:48,000

All right, so 8.4 pounds for this thing.

106

00:09:48,000 --> 00:09:49,000

And measured.

107

00:09:50,000 --> 00:09:52,000

Diameter of the rocket is three inches.

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00:09:52,000 --> 00:09:58,000

This data is then fed into a computer simulation to see whether the rocket stands a chance of flying.

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00:10:00,000 --> 00:10:07,000

Okay, I've put a little set of fins on here to simulate the stick, and it looks like it's going to be stable.

110

00:10:07,000 --> 00:10:08,000

Let's try a motor.

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00:10:08,000 --> 00:10:10,000

Let's put a K550 in it to start out.

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00:10:10,000 --> 00:10:12,000

K550 it is.

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00:10:13,000 --> 00:10:16,000

The computer's fully primed.

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00:10:16,000 --> 00:10:17,000

Go.

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00:10:17,000 --> 00:10:19,000

Flight pack, perfect.

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00:10:20,000 --> 00:10:23,000

Range, 20,000 feet.

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00:10:23,000 --> 00:10:29,000

Remember, these are really rough simulations because your nozzle is not the same as what comes with the motor.

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00:10:29,000 --> 00:10:34,000

So these could be greatly off, but hopefully they're going to be fairly accurate predictions.

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00:10:35,000 --> 00:10:39,000

Jamie's 20-pound rocket is historically more reliable than Adams.

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00:10:40,000 --> 00:10:44,000

So what does the accurate computer make of it?

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00:10:47,000 --> 00:10:52,000

See, right now it's doing about 500 feet and about 50 feet up, 60 feet up.

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00:10:52,000 --> 00:10:56,000

That's not quite the spinning that the hail rocket was famed for.

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00:10:58,000 --> 00:11:03,000

As launch looms, the rockets are ready to be fueled up with ammonium perchlorate motors.

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00:11:04,000 --> 00:11:12,000

These modern motors are the most advanced in amateur rocketry, and may be a little more powerful than Civil War black powder.

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00:11:14,000 --> 00:11:24,000

But as they wrap them to ensure a snug fit in the rockets, Adam and Jamie are wondering if the main myth has historical authenticity, or is it just another tall tale?

126

00:11:25,000 --> 00:11:41,000

Well, you know, now you can find references to the Civil War rocket all over the web, and they're saying that the rocket was about 12 feet long, and it carried a 10-pound gunpowder warhead.

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00:11:42,000 --> 00:11:49,000

Well, the tale first showed up in 1958 in a southern newspaper written by a Vienna correspondent, signing only as C.R. Johnson.

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00:11:49,000 --> 00:11:54,000

Well, our researchers were unable to find C.R. Johnson or the article.

129

00:11:57,000 --> 00:12:05,000

The myth may be nothing more than a mirage, but in this desert, it's team on as 60 seconds for the hail rocket.

130

00:12:06,000 --> 00:12:15,000

We built this according to official plans and specs of the period, and if it worked then, it ought to work now.

131

00:12:15,000 --> 00:12:18,000

What does our percentage maestro think?

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00:12:19,000 --> 00:12:23,000

70% chance the thing spins out and ends up about 200 feet away.

133

00:12:24,000 --> 00:12:30,000

29% chance that it actually flies totally successfully and ends up 3,000 feet away.

134

00:12:30,000 --> 00:12:35,000

There's a 1% chance that it hits the ground and bounces right over to us.

135

00:12:35,000 --> 00:12:40,000

And with those words of wisdom, it's the bit now with the countdown.

136

00:12:40,000 --> 00:12:44,000

3, 2, 1, go!

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00:12:48,000 --> 00:12:49,000

She's up and away!

138

00:12:54,000 --> 00:12:55,000

Congratulations, dude.

139

00:12:55,000 --> 00:12:56,000

Wow!

140

00:12:56,000 --> 00:12:57,000

You think it done, brother?

141

00:12:57,000 --> 00:13:00,000

I was afraid that it was gonna loop, but then it just got the spin.

142

00:13:00,000 --> 00:13:02,000

When the spins were keep going straight, that was great.

143

00:13:02,000 --> 00:13:10,000

Those revolutionary hail tail fins did the trick and kept the rocket on a computer-defying perfect arc.

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00:13:11,000 --> 00:13:17,000

You see it actually go and work, especially kind of having you on the edge of your seat as you're watching it go.

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00:13:17,000 --> 00:13:21,000

And then it just kind of homes in and does its job.

146

00:13:21,000 --> 00:13:22,000

It was cool.

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00:13:22,000 --> 00:13:23,000

It's a cool design.

148

00:13:24,000 --> 00:13:26,000

One down, one to go.

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00:13:26,000 --> 00:13:30,000

I got a box of rocket and I'm gonna fire it.

150

00:13:31,000 --> 00:13:34,000

Complete with its rescue robe.

151

00:13:35,000 --> 00:13:37,000

You're ready to rock and roll.

152

00:13:37,000 --> 00:13:38,000

Is that it?

153

00:13:38,000 --> 00:13:39,000

That's it.

154

00:13:39,000 --> 00:13:40,000

Is that it?

155

00:13:40,000 --> 00:13:41,000

That is it.

156

00:13:41,000 --> 00:13:42,000

Next, you push the button.

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00:13:42,000 --> 00:13:44,000

Let's try some rockets!

158

00:13:44,000 --> 00:13:48,000

In 3, 2, 1...

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00:13:50,000 --> 00:13:51,000

Whoa!

160

00:13:51,000 --> 00:13:53,000

We have liftoff!

161

00:13:54,000 --> 00:13:56,000

You guys all clear?

162

00:13:56,000 --> 00:13:58,000

That is cool!

163

00:13:58,000 --> 00:14:01,000

It looks like they knew what they were doing back there in the 1800s.

164

00:14:01,000 --> 00:14:02,000

They might have known what they were doing.

165

00:14:02,000 --> 00:14:03,000

Yep.

166

00:14:03,000 --> 00:14:04,000

Looked good.

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00:14:04,000 --> 00:14:06,000

Ain't that the truth?

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00:14:06,000 --> 00:14:08,000

Another near-perfect flight.

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00:14:08,000 --> 00:14:14,000

The rescue robe didn't fare so well, but at least the drowning sailors would have had a spectacle to behold.

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00:14:15,000 --> 00:14:19,000

Adam and Jamie's next task is to build the long-range rocket of the myth.

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00:14:19,000 --> 00:14:24,000

So first, they'll need to find out how far their non-mythical missiles flew.

172

00:14:25,000 --> 00:14:28,000

I don't know, but I think that's one of the rockets.

173

00:14:28,000 --> 00:14:31,000

And judging by the size of the hole, I think it's mine.

174

00:14:31,000 --> 00:14:32,000

I don't know.

175

00:14:32,000 --> 00:14:35,000

I'm gonna see if I can feel the end of it.

176

00:14:37,000 --> 00:14:39,000

I'm still not touching anything.

177

00:14:39,000 --> 00:14:41,000

Oh, back, Ota!

178

00:14:41,000 --> 00:14:44,000

Like a miner in the gold rush, Jamie starts digging.

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00:14:44,000 --> 00:14:46,000

And the lighter boxer rocket?

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00:14:46,000 --> 00:14:49,000

Well, 500 yards further on.

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00:14:54,000 --> 00:14:56,000

That's where I landed.

182

00:14:56,000 --> 00:15:00,000

I'm just terrible at judging distance from here, but I'd say it's at least a mile and a half.

183

00:15:00,000 --> 00:15:06,000

I'm gonna pace it out, calculating each of my steps as about a yard, and we'll see where I get to.

184

00:15:06,000 --> 00:15:12,000

As Adam measures his flight path, Jamie has at last struck gold.

185

00:15:12,000 --> 00:15:14,000

There she is.

186

00:15:14,000 --> 00:15:20,000

We got the end clearly exposed, and I think we should be able to tug it out with it come along pretty well, so...

187

00:15:21,000 --> 00:15:26,000

The heavy hail flew half as far and went over five feet into the ground.

188

00:15:30,000 --> 00:15:34,000

Soft to crash land in, tiring to measure.

189

00:15:34,000 --> 00:15:37,000

1,317 yards.

190

00:15:40,000 --> 00:15:41,000

I'm tired.

191

00:15:42,000 --> 00:15:51,000

The Mythbusters have successfully launched rockets that haven't been seen for 80 years,

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00:15:51,000 --> 00:15:57,000

but now they've got to use what they learned to build the mythical 100-mile range Confederate rocket.

193

00:16:00,000 --> 00:16:09,000

Well, now we have a pretty good idea of what the standard kind of rocket that was used in the Civil War era is capable of,

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00:16:09,000 --> 00:16:14,000

and I gotta say we've got our work cut out for us as far as this mythical rocket,

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00:16:14,000 --> 00:16:18,000

because there's just not a whole lot of information about what it was.

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00:16:18,000 --> 00:16:21,000

Well, you know, we start with what we've got.

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00:16:21,000 --> 00:16:29,000

I mean, they say it was a liquid-fueled rocket, so we should talk to somebody about what kind of technologies that would make a liquid-fueled rocket they had available at the time.

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00:16:29,000 --> 00:16:33,000

Liquid fuel? Well, that is what NASA uses.

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00:16:33,000 --> 00:16:41,000

Of course, they had their teething problems too, but surely this technology is light years ahead of the Confederates.

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00:16:41,000 --> 00:16:45,000

If only we had a rocket scientist.

201

00:16:45,000 --> 00:16:48,000

Hello. How are you doing, guys?

202

00:16:48,000 --> 00:16:49,000

Nice to meet you.

203

00:16:49,000 --> 00:16:51,000

So you're like a rocket scientist, right?

204

00:16:51,000 --> 00:16:56,000

Yeah, exactly. I teach the rocket propulsion class at San Diego State, and I launch my own rockets.

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00:16:56,000 --> 00:16:59,000

Does being a rocket scientist help you pick up chicks?

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00:16:59,000 --> 00:17:04,000

Unfortunately, in the rocket science world, there's not that many women, and they're hunted to extinction.

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00:17:04,000 --> 00:17:07,000

Hunted to extinction.

208

00:17:07,000 --> 00:17:17,000

So have you heard this myth that the Confederate army actually built a liquid-fueled rocket that they fired from Virginia to Washington, D.C.?

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00:17:17,000 --> 00:17:24,000

It was the beginning of the Industrial Revolution. People were doing all kinds of crazy things with steam engines and steam boats. I suppose it's possible.

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00:17:25,000 --> 00:17:29,000

What's not possible is to understand the ensuing discussion.

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00:17:29,000 --> 00:17:40,000

But eventually they thrashed out the characteristics of a plausible Civil War-era two-stage rocket, powered by ethanol and liquid oxygen.

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00:17:40,000 --> 00:17:43,000

And they unearthed some interesting new data.

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00:17:43,000 --> 00:17:53,000

This myth was supposedly made possible by Lord Kelvin, who was persuaded to make liquid oxygen 12 years before it is generally accepted that this first occurred.

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00:17:53,000 --> 00:18:00,000

Apparently, German physicist Ernst Mock contributed a small turbine and a gyroscopic stabilizer.

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00:18:00,000 --> 00:18:06,000

The rocket was launched from a hole in a river bank that was lined with a tube made from naval cannons.

216

00:18:06,000 --> 00:18:13,000

So here are the likely ingredients. Lord Kelvin's liquid oxygen made the rocket fuel burn.

217

00:18:13,000 --> 00:18:17,000

Ernst Mock's gyros gave it stability.

218

00:18:17,000 --> 00:18:24,000

A cannon provided the trajectory, and gun cotton made it explode out of the barrel.

219

00:18:24,000 --> 00:18:31,000

But what was the fuel? It could have been ethanol, made since ancient times by fermenting sugar.

220

00:18:31,000 --> 00:18:41,000

And it is used as a fuel. In today's environmentally conscious age, clean-burning ethanol is widely used as an additive to reduce gasoline emissions.

221

00:18:42,000 --> 00:18:50,000

Clean and green was not the aim of the Nazis when they invented their ethanol-fueled V2 rockets.

222

00:18:50,000 --> 00:18:56,000

It was an oil shortage that drove their search for an alcohol-based rocket fuel.

223

00:18:58,000 --> 00:19:05,000

Nonetheless, the V2 suggests that moonshine could have been used in the Confederate rocket.

224

00:19:06,000 --> 00:19:12,000

Next, it's Lord Kelvin's big O. Liquid oxygen is needed as the fuel oxidizer.

225

00:19:12,000 --> 00:19:16,000

Without it, the ethanol will burn only gently.

226

00:19:16,000 --> 00:19:24,000

But when it's added, the fuel is fully oxidized and virtually explodes, causing a massive amount of thrust.

227

00:19:24,000 --> 00:19:27,000

And it's down to Grant to make it.

228

00:19:28,000 --> 00:19:41,000

Well, I'm going to replicate Joseph Priestley's landmark experiment of the late 1700s, where he actually discovered oxygen using mercuric oxide, liquid mercury, a magnifying glass, and the sun.

229

00:19:41,000 --> 00:19:50,000

Before making liquid oxygen, he first has to produce oxygen gas by focusing the heat of the sun onto mercuric oxide.

230

00:19:50,000 --> 00:19:53,000

Now for the sun.

231

00:19:54,000 --> 00:19:58,000

As it heats up, oxygen gas should bubble up into the test tube.

232

00:19:59,000 --> 00:20:03,000

It's bubbling. Tiny. Still bubbling.

233

00:20:04,000 --> 00:20:07,000

It's working, but he's going to be here a while longer yet.

234

00:20:07,000 --> 00:20:13,000

And when he's got enough, like Lord Kelvin, Grant's got to liquefy it.

235

00:20:14,000 --> 00:20:20,000

Meanwhile, because the mythical rocket was fired from a naval cannon, Carrie's gone to the fort.

236

00:20:21,000 --> 00:20:25,000

So Jamie and Adam need to know what size the cannons were during the Civil War.

237

00:20:25,000 --> 00:20:29,000

So I've come here to Fort Point to do some measuring of cannons and find out.

238

00:20:29,000 --> 00:20:37,000

These measurements are key to the Mythbusters missile, because there's no written record of the dimensions of the Confederate rocket.

239

00:20:37,000 --> 00:20:40,000

Alright, that's an 11-foot link.

240

00:20:40,000 --> 00:20:47,000

Adam and Jamie do know that it was fired from a cannon, so if Carrie measures the biggest cannons from the Civil War...

241

00:20:47,000 --> 00:20:49,000

10 inches.

242

00:20:49,000 --> 00:20:53,000

Then the Mythbusters can build the biggest rocket possible.

243

00:20:53,000 --> 00:20:56,000

And they'll also have a launch tube they can replicate.

244

00:20:56,000 --> 00:20:58,000

9-foot 2 inches.

245

00:20:58,000 --> 00:21:01,000

It's another ingredient ready.

246

00:21:02,000 --> 00:21:04,000

Launch tube cannon, check.

247

00:21:04,000 --> 00:21:09,000

But the Mythbusters have made a worrying discovery about Lord Kelvin.

248

00:21:10,000 --> 00:21:24,000

Well Adam, as the Myth suggests, William Thompson, a.k.a. Lord Kelvin, did in fact live during the Civil War era, but he never claimed to have made liquid oxygen.

249

00:21:24,000 --> 00:21:29,000

And we're supposed to believe someone whose name was Thompson, but went around saying he was Lord Kelvin.

250

00:21:29,000 --> 00:21:31,000

That's Lord Kelvin, do you?

251

00:21:31,000 --> 00:21:37,000

But in 1852, he did observe that gas expanding in a vacuum decreased in temperature.

252

00:21:37,000 --> 00:21:50,000

And that discovery in turn made it possible in 1877 for two French scientists, Piquet and Calitette, I believe it was, to in fact achieve making liquid oxygen.

253

00:21:50,000 --> 00:21:57,000

Yeah, but their success was only making the tiniest little vapor of liquid oxygen for just a few seconds.

254

00:21:57,000 --> 00:22:03,000

Industrial quantities were not remotely available until the 1890s, and really until the 1900s.

255

00:22:04,000 --> 00:22:07,000

Well, that explains why Grant's been struggling so.

256

00:22:07,000 --> 00:22:14,000

Using Civil War technology, he's been trying to put his oxygen gas under so much pressure that it turns into liquid.

257

00:22:17,000 --> 00:22:19,000

That doesn't sound like 80 psi.

258

00:22:19,000 --> 00:22:22,000

But whatever he tries just ain't working.

259

00:22:22,000 --> 00:22:24,000

I've got a problem with this cylinder.

260

00:22:24,000 --> 00:22:30,000

And that's because M5, like the Civil War times, is just too warm.

261

00:22:30,000 --> 00:22:36,000

As it turns out, it's actually a critical temperature above which you can't liquefy oxygen.

262

00:22:36,000 --> 00:22:38,000

It just simply won't happen.

263

00:22:38,000 --> 00:22:42,000

That temperature is minus 118.6 degrees Celsius.

264

00:22:42,000 --> 00:22:48,000

And unfortunately in Civil War times, they didn't possess the technology to make anything nearly that cold.

265

00:22:48,000 --> 00:22:54,000

And without the liquid oxygen, the Confederate rocket myth is looking busted.

266

00:23:00,000 --> 00:23:05,000

In the American Civil War, did the Confederate Army fire a long-range missile?

267

00:23:05,000 --> 00:23:09,000

The mythbusters are trying to find out.

268

00:23:09,000 --> 00:23:14,000

But Grant has just failed to make a vital rocket ingredient.

269

00:23:14,000 --> 00:23:21,000

Well, you know, Grant's results make it pretty clear that they just did not have the ability to liquefy oxygen during the Civil War,

270

00:23:21,000 --> 00:23:28,000

which for us rules out the possibility of a liquid-fueled rocket that uses liquid fuel and a liquid oxidizer.

271

00:23:28,000 --> 00:23:30,000

I don't really know where we go from here.

272

00:23:30,000 --> 00:23:32,000

Well, I do.

273

00:23:32,000 --> 00:23:35,000

And, you know, I've been doing some reading on this.

274

00:23:35,000 --> 00:23:38,000

I think the design we should use is called a hybrid.

275

00:23:38,000 --> 00:23:40,000

The fuel is wax.

276

00:23:40,000 --> 00:23:43,000

The oxidizer that we would use would be nitrous oxide.

277

00:23:43,000 --> 00:23:48,000

The design doesn't involve any really complicated moving parts or anything.

278

00:23:48,000 --> 00:23:51,000

Number one, all those materials sound really safe to work with.

279

00:23:51,000 --> 00:23:55,000

And number two, the technology for all of them was available during the Civil War.

280

00:23:55,000 --> 00:23:57,000

That sounds like a perfect solution.

281

00:23:57,000 --> 00:24:01,000

So it's Plan B, a hybrid Confederate rocket.

282

00:24:01,000 --> 00:24:09,000

Lord Kelvin's liquid oxygen replaced with liquid nitrous oxide and the ethanol fuel by solid paraffin wax.

283

00:24:09,000 --> 00:24:12,000

It's the last chance for this myth.

284

00:24:14,000 --> 00:24:21,000

And it all depends on whether making liquid nitrous oxide using Civil War technology is even possible.

285

00:24:22,000 --> 00:24:25,000

So, Grant gets another bite at the cherry.

286

00:24:25,000 --> 00:24:32,000

But this time, in an extreme case of please don't try this at home, the recipe has been censored.

287

00:24:32,000 --> 00:24:39,000

The plan here is to heat up with a...

288

00:24:39,000 --> 00:24:43,000

That will actually produce a gas.

289

00:24:43,000 --> 00:24:47,000

We're going to run those through a...

290

00:24:48,000 --> 00:24:52,000

And at the other end should come out nitrous oxide.

291

00:24:52,000 --> 00:24:58,000

So, Grant adds some moo with some meow and starts heating.

292

00:24:58,000 --> 00:25:03,000

With the temperature creeping higher, the gas starts to bubble out.

293

00:25:06,000 --> 00:25:10,000

And Adam can't resist having a sniff.

294

00:25:17,000 --> 00:25:19,000

That burns!

295

00:25:19,000 --> 00:25:23,000

As Adam recovers, more gas bubbles through.

296

00:25:23,000 --> 00:25:25,000

But is it nitrous oxide?

297

00:25:25,000 --> 00:25:28,000

Or to use its common name, laughing gas.

298

00:25:28,000 --> 00:25:33,000

Nitrous oxide is more plausible as an oxidized...

299

00:25:33,000 --> 00:25:36,000

Nitrous oxide is more...

300

00:25:36,000 --> 00:25:38,000

I don't...

301

00:25:38,000 --> 00:25:42,000

Okay, nitrous oxide is more...

302

00:25:42,000 --> 00:25:45,000

They've clearly made laughing gas.

303

00:25:45,000 --> 00:25:48,000

But what is he trying to say?

304

00:25:48,000 --> 00:25:56,000

Nitrous oxide is more plausible as an oxidizer during the Civil War than oxygen because the pressure that you need is a lot less.

305

00:25:56,000 --> 00:26:02,000

You're looking at 50 atmospheres for nitrous oxide versus 400 for oxygen.

306

00:26:02,000 --> 00:26:06,000

So, nitrous oxide needs less pressure to be liquefied.

307

00:26:06,000 --> 00:26:10,000

And better still, it can be done at room temperature.

308

00:26:12,000 --> 00:26:15,000

A time-saving shop-bought bottle later.

309

00:26:15,000 --> 00:26:19,000

And the Confederate hybrid rocket can really happen.

310

00:26:19,000 --> 00:26:23,000

But with one final alteration.

311

00:26:23,000 --> 00:26:30,000

Adam's boxer rocket, like that of the myth, was described as a two-stager.

312

00:26:30,000 --> 00:26:33,000

But further research proved otherwise.

313

00:26:33,000 --> 00:26:35,000

And it turns out that it's a compound rocket.

314

00:26:35,000 --> 00:26:39,000

And indeed, it does not separate in the middle halfway through its ignition.

315

00:26:39,000 --> 00:26:46,000

Given that the launch was so successful, they're going to make their mythical rocket a one-stager

as well.

316

00:26:46,000 --> 00:26:49,000

The final design is set.

317

00:26:49,000 --> 00:26:53,000

The rocket will be the size of the biggest cannon carry found at the fort.

318

00:26:53,000 --> 00:27:02,000

At the top, there'll be a tank full of liquid nitrous oxide joined via a release valve to a tank filled with paraffin wax.

319

00:27:02,000 --> 00:27:08,000

Upon ignition, the burning gases will burst out through a graphite nozzle.

320

00:27:10,000 --> 00:27:12,000

So, first things first.

321

00:27:12,000 --> 00:27:17,000

Jamie goes 21st century shopping for some 19th century parts.

322

00:27:20,000 --> 00:27:26,000

He's looking for some metal piping that Civil War rocketeers might have found at their local suppliers.

323

00:27:29,000 --> 00:27:35,000

They're going to make their best effort and then test it in the shop before trying to make it fly in the desert.

324

00:27:36,000 --> 00:27:39,000

I'm making the nitrous oxide tank for the rocket.

325

00:27:39,000 --> 00:27:45,000

We're using common steel plumbing pipe and fittings because that's easy and quick for us.

326

00:27:45,000 --> 00:27:49,000

And it's not too dissimilar from what they might have had at the time.

327

00:27:50,000 --> 00:27:56,000

Meanwhile, Adam's cooking up the new fuel, the paraffin wax with carbon added for an even burn.

328

00:27:58,000 --> 00:28:03,000

After it solidifies, it should fit perfectly inside the rocket.

329

00:28:04,000 --> 00:28:05,000

No leaking.

330

00:28:05,000 --> 00:28:11,000

As the testing draws nearer, for safety, the team need a rocket resistant bunker.

331

00:28:12,000 --> 00:28:15,000

Also known as a shipping container.

332

00:28:16,000 --> 00:28:18,000

Okay, we're in.

333

00:28:23,000 --> 00:28:24,000

Perfect.

334

00:28:25,000 --> 00:28:28,000

Perfect parking, but how bomb-proof is the bunker?

335

00:28:28,000 --> 00:28:29,000

There we go.

336

00:28:30,000 --> 00:28:32,000

Woo, uh-oh.

337

00:28:32,000 --> 00:28:33,000

Not very.

338

00:28:33,000 --> 00:28:36,000

A lot of daylight coming through the room.

339

00:28:36,000 --> 00:28:39,000

They've bought a holy rust bucket.

340

00:28:39,000 --> 00:28:41,000

Who cut the budget on the bunker?

341

00:28:43,000 --> 00:28:45,000

This seems like something you'd spend the extra cash on.

342

00:28:46,000 --> 00:28:48,000

Yeah, we got lives at stake.

343

00:28:48,000 --> 00:28:49,000

Is that a wasp nest?

344

00:28:51,000 --> 00:28:52,000

Yeah.

345

00:28:54,000 --> 00:28:55,000

Sweet.

346

00:28:55,000 --> 00:28:57,000

To top it off, there's wasps.

347

00:28:58,000 --> 00:28:59,000

But not for long.

348

00:29:03,000 --> 00:29:04,000

Oh, shoot.

349

00:29:04,000 --> 00:29:06,000

That was cool.

350

00:29:07,000 --> 00:29:08,000

Set a bomb off in there.

351

00:29:08,000 --> 00:29:09,000

The whole roof might go up.

352

00:29:09,000 --> 00:29:11,000

So I gotta redo the roof.

353

00:29:11,000 --> 00:29:13,000

I still gotta get the ventilation in.

354

00:29:13,000 --> 00:29:14,000

I gotta get the cinder blocks in.

355

00:29:14,000 --> 00:29:15,000

I gotta sweep this thing out.

356

00:29:15,000 --> 00:29:17,000

I mean, things are a mess.

357

00:29:18,000 --> 00:29:20,000

But hey, we're gonna have a bunker.

358

00:29:20,000 --> 00:29:22,000

As Tari slowly makes it blast-proof,

359

00:29:22,000 --> 00:29:25,000

the Mythbusters have dug up some more mythical musings.

360

00:29:30,000 --> 00:29:33,000

What factoids do you have for us today, J.B.?

361

00:29:33,000 --> 00:29:37,000

The myth specifically states that the launch took place near Richmond

362

00:29:37,000 --> 00:29:42,000

in March of 1865 and was witnessed by Jefferson Davis,

363

00:29:42,000 --> 00:29:46,000

who was the president of the Confederate States of America.

364

00:29:46,000 --> 00:29:48,000

There is an element of truth to this story.

365

00:29:48,000 --> 00:29:53,000

Jefferson Davis was, in fact, in Richmond around March of 1865.

366

00:29:53,000 --> 00:29:56,000

Well, the problem is that there is actually a very good record

367

00:29:56,000 --> 00:30:01,000

of every day of Jefferson Davis' activity during the month of March,

368

00:30:01,000 --> 00:30:05,000

and there is no mention, whatever, of any kind of a two-stage rocket.

369

00:30:05,000 --> 00:30:07,000

But maybe it was a secret launch.

370

00:30:07,000 --> 00:30:09,000

Well, there's always that.

371

00:30:12,000 --> 00:30:14,000

It's no secret launch.

372

00:30:15,000 --> 00:30:19,000

It's no secret that Tari's bunker is becoming ever more beefed up,

373

00:30:19,000 --> 00:30:23,000

and as launch nears, Adam's rocket fuel is all set.

374

00:30:24,000 --> 00:30:27,000

All right, well, the wax is cured overnight.

375

00:30:27,000 --> 00:30:29,000

Let's see what it did.

376

00:30:31,000 --> 00:30:33,000

Oh, yeah!

377

00:30:33,000 --> 00:30:35,000

It's worked perfectly.

378

00:30:38,000 --> 00:30:39,000

Yeah, I'm proud.

379

00:30:40,000 --> 00:30:42,000

And will it fit?

380

00:30:43,000 --> 00:30:45,000

Of course.

381

00:30:45,000 --> 00:30:47,000

But there's no rest for the wicked.

382

00:30:47,000 --> 00:30:50,000

Jamie gets on with sealing the rocket,

383

00:30:50,000 --> 00:30:54,000

but is slightly alarmed at how simple it all seems to be.

384

00:30:54,000 --> 00:30:57,000

It doesn't make any sense that it should be this easy.

385

00:30:57,000 --> 00:31:03,000

This is some laughing gas and some plumbing fixtures.

386

00:31:03,000 --> 00:31:06,000

And if it actually goes someplace,

387

00:31:06,000 --> 00:31:08,000

that's kind of scary.

388

00:31:09,000 --> 00:31:13,000

The mythbusters are not used to things being so painless,

389

00:31:13,000 --> 00:31:17,000

but let's not forget, it's not even past its test yet.

390

00:31:18,000 --> 00:31:20,000

Well, there she is.

391

00:31:20,000 --> 00:31:22,000

Tanks sealed.

392

00:31:22,000 --> 00:31:25,000

We have the ignition valve in place.

393

00:31:25,000 --> 00:31:27,000

We have the combustion chamber.

394

00:31:27,000 --> 00:31:30,000

They're just waiting for the graphite nozzle.

395

00:31:30,000 --> 00:31:32,000

Great!

396

00:31:32,000 --> 00:31:35,000

They're just waiting for the graphite nozzle.

397

00:31:35,000 --> 00:31:39,000

Graphite was the only thing available during the Civil War

398

00:31:39,000 --> 00:31:43,000

that could handle the crazy heat that the rocket's combustion generates.

399

00:31:43,000 --> 00:31:45,000

Oh!

400

00:31:46,000 --> 00:31:48,000

That's a rocket.

401

00:31:48,000 --> 00:31:50,000

Oh, I'm totally psyched about that.

402

00:31:51,000 --> 00:31:53,000

She's fully pried.

403

00:31:53,000 --> 00:31:55,000

With countdown just around the corner,

404

00:31:55,000 --> 00:31:57,000

it's time to take her to the bunker.

405

00:32:03,000 --> 00:32:07,000

The mythbusters are preparing to batten down the hatches

406

00:32:07,000 --> 00:32:10,000

in preparation for a big boom test.

407

00:32:12,000 --> 00:32:17,000

They've built their own Confederate rocket out of Civil War-era technologies.

408

00:32:17,000 --> 00:32:22,000

And because the desert is a long way to drive to find out the motor doesn't work,

409

00:32:22,000 --> 00:32:25,000

they're about to try it in a bunker in their shop.

410

00:32:26,000 --> 00:32:31,000

For safety, Adam secures the rocket so it will burn but not launch.

411

00:32:33,000 --> 00:32:38,000

And Jamie sets up some ventilation in case it's more of a smoke bomb.

412

00:32:39,000 --> 00:32:42,000

With everything ready, they're on to the final checks.

413

00:32:42,000 --> 00:32:44,000

Starting with the quick release,

414

00:32:44,000 --> 00:32:48,000

the valve that will open the nitrous oxide to the fuel.

415

00:32:49,000 --> 00:32:51,000

Okay, go ahead and pull.

416

00:32:51,000 --> 00:32:52,000

Cool.

417

00:32:52,000 --> 00:32:53,000

Check.

418

00:32:53,000 --> 00:32:55,000

Next test is the ignition.

419

00:32:56,000 --> 00:32:58,000

All right, Jamie, I'm ready when you are.

420

00:32:58,000 --> 00:33:02,000

Okay, and three, two, one.

421

00:33:03,000 --> 00:33:05,000

Smoking smells like, there we go.

422

00:33:05,000 --> 00:33:06,000

Check.

423

00:33:06,000 --> 00:33:08,000

Yeah, that took a second.

424

00:33:08,000 --> 00:33:13,000

It's time to vacate the bunker because the Confederate rocket is going to get fired.

425

00:33:15,000 --> 00:33:19,000

They're going to fill the top half of the rocket with liquid nitrous oxide,

426

00:33:19,000 --> 00:33:22,000

ignite the wax, and then open the quick release valve.

427

00:33:23,000 --> 00:33:24,000

There you go.

428

00:33:24,000 --> 00:33:26,000

That's what I'm talking about.

429

00:33:27,000 --> 00:33:30,000

The nitrous oxide tank should be filling up,

430

00:33:30,000 --> 00:33:33,000

but no one is quite sure whether it's working.

431

00:33:34,000 --> 00:33:35,000

I saw something drip.

432

00:33:35,000 --> 00:33:37,000

It's dripping out of the quick release.

433

00:33:37,000 --> 00:33:38,000

Oh, okay.

434

00:33:38,000 --> 00:33:39,000

So that's actually a good sign.

435

00:33:39,000 --> 00:33:42,000

Okay, well, let's kind of stand away from there, guys.

436

00:33:42,000 --> 00:33:44,000

We're getting liquid nitrous oxide.

437

00:33:46,000 --> 00:33:50,000

But 15 minutes later, and the tank is still filling up.

438

00:33:51,000 --> 00:33:52,000

Yes, this is where the danger zone happens.

439

00:33:52,000 --> 00:33:53,000

When nothing happens for a while,

440

00:33:53,000 --> 00:33:55,000

it's like, well, let's get closer.

441

00:33:55,000 --> 00:33:56,000

Let's get closer.

442

00:33:56,000 --> 00:33:57,000

Let's get closer.

443

00:33:57,000 --> 00:33:58,000

Boom!

444

00:33:58,000 --> 00:33:59,000

Whenever it's dead.

445

00:33:59,000 --> 00:34:00,000

Do you want to just go for it?

446

00:34:00,000 --> 00:34:01,000

Yeah, let's do it.

447

00:34:01,000 --> 00:34:02,000

Okay.

448

00:34:02,000 --> 00:34:04,000

They're just going to go for it.

449

00:34:04,000 --> 00:34:05,000

But for safety reasons,

450

00:34:05,000 --> 00:34:09,000

Jamie must first disconnect the nitrous oxide filler tank.

451

00:34:12,000 --> 00:34:13,000

Are you okay?

452

00:34:13,000 --> 00:34:14,000

Yeah, I knew I was going to do that.

453

00:34:14,000 --> 00:34:18,000

Next time you should say that there might be a large caboose.

454

00:34:19,000 --> 00:34:21,000

Because, like, my heart's beating, like,

455

00:34:21,000 --> 00:34:23,000

500 times a minute right now.

456

00:34:23,000 --> 00:34:26,000

Those with a weak heart or a nervous disposition

457

00:34:26,000 --> 00:34:30,000

should look away now, because it's test time.

458

00:34:30,000 --> 00:34:32,000

Okay, I'm in place, Adam.

459

00:34:32,000 --> 00:34:34,000

Fire in the hole.

460

00:34:34,000 --> 00:34:39,000

So, three, two, fans, go!

461

00:34:39,000 --> 00:34:46,000

We clearly have ignition.

462

00:34:46,000 --> 00:34:49,000

But what the hell's going on in there?

463

00:34:49,000 --> 00:34:56,000

Not so much fire in the hole as fire in the hole shop.

464

00:34:56,000 --> 00:34:59,000

The MIFBusters fire team have their work cut out.

465

00:34:59,000 --> 00:35:02,000

And what on earth must the neighbors think?

466

00:35:02,000 --> 00:35:07,000

There's more smoke than a year's worth of cigars.

467

00:35:07,000 --> 00:35:11,000

With the fire under control, the team decide to evacuate

468

00:35:11,000 --> 00:35:13,000

in case the gas is toxic.

469

00:35:13,000 --> 00:35:15,000

Hey, that worked!

470

00:35:15,000 --> 00:35:20,000

I called three, two, one, two, three, two, one, two, three, two,

471

00:35:20,000 --> 00:35:23,000

three, two, one, two, three, two, three, two, three, two,

472

00:35:23,000 --> 00:35:26,000

three, two, one, two, three, two, three, two, three, two,

473

00:35:26,000 --> 00:35:28,000

it worked!

474

00:35:28,000 --> 00:35:30,000

I called three, two, fans, go.

475

00:35:30,000 --> 00:35:32,000

I pushed the igniter.

476

00:35:32,000 --> 00:35:35,000

Jaymie pulled the fuel release, and I heard the thing catch.

477

00:35:35,000 --> 00:35:41,000

I heard it go, boom, boom, boom.

478

00:35:41,000 --> 00:35:44,000

I mean, just like exactly the way all the footage we've seen

479

00:35:44,000 --> 00:35:46,000

of liquid-fueled rockets going should sound.

480

00:35:46,000 --> 00:35:50,000

It put out a diabolical fireball outside the thing.

481

00:35:50,000 --> 00:35:52,000

Looks like it melted the ballistic glass.

482

00:35:52,000 --> 00:35:56,000

I mean, I can't wait to actually see the kind of damage it did in there.

483

00:35:57,000 --> 00:36:01,000

As the smoke begins to clear, the damage is getting easier to see.

484

00:36:01,000 --> 00:36:07,000

Their hybrid rocket has turned M5 into a scene of apocalyptic proportions.

485

00:36:12,000 --> 00:36:16,000

It's a testament to this size of the fireball and the heat that came out.

486

00:36:16,000 --> 00:36:18,000

What happened to my hovercraft?

487

00:36:18,000 --> 00:36:22,000

If it did that to the hovercraft, what was going on inside the bunker?

488

00:36:25,000 --> 00:36:30,000

Well, the heat was so great that the cameras only filmed a giant fireball.

489

00:36:31,000 --> 00:36:34,000

Until that is, they melted.

490

00:36:36,000 --> 00:36:40,000

You know, I don't mind saying that I'm suffering this in a pride here just a little bit.

491

00:36:40,000 --> 00:36:46,000

No one can dispute that through our ingenuity we have achieved a hybrid rocket

492

00:36:46,000 --> 00:36:49,000

engine in two days with just a bunch of plumbing parts.

493

00:36:49,000 --> 00:36:52,000

You mean we've achieved a hybrid rocket engine and system.

494

00:36:52,000 --> 00:36:57,000

We still have yet to put it in a sleek rocket-like exterior and build the cannon to fire it out of.

495

00:36:57,000 --> 00:37:07,000

Exactly. And there's also the problem of tackling this mythical gyroscopic stabilizing system that the myth states.

496

00:37:07,000 --> 00:37:12,000

So I'll tackle the gyroscopic stabilizer. You want to take on the body and the nose cone?

497

00:37:12,000 --> 00:37:13,000

Okay.

498

00:37:14,000 --> 00:37:19,000

After some celebratory ego massaging, the down-to-earth work continues.

499

00:37:20,000 --> 00:37:28,000

For the final refinements, Adam's making the stabilizing system that gives the rocket a smooth and accurate flight path.

500

00:37:28,000 --> 00:37:31,000

But steam-powered this ain't.

501

00:37:32,000 --> 00:37:41,000

We looked at a lot of different ways to add gyroscopic stabilization to this thing and we settled on the design that Hale used when he designed the Hale rocket,

502

00:37:41,000 --> 00:37:51,000

which was fins that affected the exhaust of the rocket only, but that exhaust being made to be rotational, added a rotational stability to the rocket itself.

503

00:37:51,000 --> 00:37:55,000

So we've tried to do the same thing with ours on a much larger scale.

504

00:37:56,000 --> 00:38:02,000

Ernst Mock and his gyro join Lord Kelvin and his liquid oxygen in the busted bin.

505

00:38:03,000 --> 00:38:10,000

Meanwhile, Jamie is making a more efficient string-pulled release valve to let the liquid nitrous oxide into the fuel tank.

506

00:38:11,000 --> 00:38:14,000

For the test, he was standing right next to the bunker.

507

00:38:15,000 --> 00:38:18,000

For the launch, he wants to be a bit further away.

508

00:38:19,000 --> 00:38:31,000

It's important that I not be very close to the rocket when the nitrous oxide is dumped into the combustion chamber when it's lit, because there will be a lot of fire and I could get burned.

509

00:38:32,000 --> 00:38:38,000

With the quick release ready and working, Jamie's rooted around the shop and come up with a naval cannon launching tune.

510

00:38:39,000 --> 00:38:45,000

It's this pipe that the rocket will be propelled out of. Courtesy of the myth's Civil War gun cotton.

511

00:38:47,000 --> 00:38:52,000

Carrie Elizabeth Byron, your mission should you choose to accept it is to make us some gun cotton.

512

00:38:53,000 --> 00:38:55,000

Great. What is it?

513

00:38:56,000 --> 00:39:01,000

Well, it's some kind of cotton and it's probably got some nasty chemical added to it.

514

00:39:01,000 --> 00:39:07,000

It's definitely going to shorten your lifespan, but we need a bunch of it. We need to figure out how to make it and get some over to us.

515

00:39:07,000 --> 00:39:09,000

Sounds like fun.

516

00:39:09,000 --> 00:39:15,000

Oh, by the way, it's quite possibly explosive when you're done making it. So, you know, be careful. Keep that in mind.

517

00:39:16,000 --> 00:39:18,000

Guys always give me the best jobs.

518

00:39:20,000 --> 00:39:27,000

Gun cotton is what apparently gave the rocket its initial thrust. It's an important but dangerous part of this myth.

519

00:39:28,000 --> 00:39:31,000

So the recipe is a myth buster secret.

520

00:39:32,000 --> 00:39:37,000

Okay, we're adding half ounce of to a half ounce of

521

00:39:39,000 --> 00:39:47,000

Slowly when you add donkey to rooster, you get a violent reaction and all that wonderful smoke cannot be good.

522

00:39:49,000 --> 00:39:51,000

So it's in with the cotton wool.

523

00:39:52,000 --> 00:39:58,000

I don't know how much I trust respirators and masks at this point. That stuff looks just disgustingly fatal.

524

00:39:58,000 --> 00:40:07,000

The rest of the fatal process is classified, but after a complicated afternoon, Carrie's gun cotton is all set for a test.

525

00:40:07,000 --> 00:40:08,000

All right.

526

00:40:11,000 --> 00:40:13,000

Three, two, one.

527

00:40:16,000 --> 00:40:17,000

Not bad.

528

00:40:17,000 --> 00:40:19,000

That makes a big difference.

529

00:40:19,000 --> 00:40:27,000

The secret recipe works. The gun cotton is remarkably energetic. But could it propel a rocket out of a cannon?

530

00:40:29,000 --> 00:40:31,000

All right, let's try it at the cannon.

531

00:40:31,000 --> 00:40:32,000

Cool.

532

00:40:32,000 --> 00:40:40,000

This is the crucial part. If the gun cotton is powerful, then they can scale this up to give the hybrid rocket its initial thrust.

533

00:40:42,000 --> 00:40:43,000

You ready?

534

00:40:43,000 --> 00:40:44,000

Okay.

535

00:40:45,000 --> 00:40:50,000

Fire in the hole in three, two, one.

536

00:40:50,000 --> 00:41:03,000

Success. And with more off it, it could just be enough to kickstart the rocket out of its naval cannon launch tube.

537

00:41:05,000 --> 00:41:11,000

The fifth and final mythical ingredient is ready. The gun cotton check.

538

00:41:12,000 --> 00:41:17,000

That just leaves the last details. First, the nose cone.

539

00:41:18,000 --> 00:41:25,000

I don't have a big enough piece of wood for the nose cone, so I'm going to lay that out of foam. I mean, we're not putting an actual warhead on this thing.

540

00:41:27,000 --> 00:41:33,000

Even the mythbusters have to draw the line somewhere. A foam nose cone will have to do.

541

00:41:35,000 --> 00:41:42,000

And second, a paint job. Looking pretty in pink, the mythbusters rocket is finally ready.

542

00:41:48,000 --> 00:41:50,000

This puppy is going to get fired.

543

00:41:56,000 --> 00:41:58,000

Oh, it's got an heavier.

544

00:41:58,000 --> 00:41:59,000

Yeah, I know.

545

00:41:59,000 --> 00:42:06,000

The mythbusters homemade Confederate rocket is about to shoot for the moon. Time to return to the desert.

546

00:42:11,000 --> 00:42:13,000

Where things have started badly.

547

00:42:14,000 --> 00:42:15,000

And we're stuck.

548

00:42:16,000 --> 00:42:22,000

But it's only the biggest vehicle in the fleet that's stuck. So we're using every other vehicle to get it out.

549

00:42:29,000 --> 00:42:34,000

Jamie drove them into this mess, so he's got to dig them out.

550

00:42:34,000 --> 00:42:37,000

What else do we have to stick under there or anything?

551

00:42:38,000 --> 00:42:43,000

But they're not having much luck. And believe me, this is not a fun place to break down.

552

00:42:44,000 --> 00:42:50,000

We're hoping to work for the morning and then go back to the hotel, have a hacienda, work later in the day so we didn't take the heat of the sun.

553

00:42:50,000 --> 00:42:53,000

But no, go ahead and pull.

554

00:42:58,000 --> 00:43:00,000

Pull, pull, come on, pull.

555

00:43:03,000 --> 00:43:07,000

At 110 degrees, reinforcements are called.

556

00:43:08,000 --> 00:43:14,000

And with some tow-track talent, she's out.

557

00:43:17,000 --> 00:43:21,000

Freed at last, Jamie swings the track around and...

558

00:43:25,000 --> 00:43:26,000

...get stuck again.

559

00:43:27,000 --> 00:43:32,000

Is there anything I could say that would make this more poignant? I don't think so.

560

00:43:33,000 --> 00:43:41,000

Like rats in a sinking ship, the team abandon their lamentable lorry and take all their rocket equipment with them.

561

00:43:45,000 --> 00:43:51,000

After finally arriving on site, the race is on to get the rocket ready and fired.

562

00:43:52,000 --> 00:43:57,000

And to start, Adam finishes off the cannon-inspired gun barrel.

563

00:43:58,000 --> 00:44:03,000

To get the launch trajectory, Adam's attaching an A-frame to it.

564

00:44:05,000 --> 00:44:08,000

Meanwhile, Jamie's back to pulling strings.

565

00:44:09,000 --> 00:44:22,000

I've run the pull cord, which opens the nitrous valve the entire distance because I want to feel what it feels like and have somebody watching on the other end to make sure that it actually worked.

566

00:44:22,000 --> 00:44:24,000

We're ready for the test, whenever you are.

567

00:44:24,000 --> 00:44:25,000

Yo!

568

00:44:28,000 --> 00:44:29,000

Hey!

569

00:44:29,000 --> 00:44:30,000

That was it, right on the ball.

570

00:44:30,000 --> 00:44:31,000

Hey, that worked!

571

00:44:32,000 --> 00:44:38,000

With the quick release valve working from 500 feet, the team slide the rocket into the cannon.

572

00:44:39,000 --> 00:44:40,000

Favourite, the far side.

573

00:44:41,000 --> 00:44:42,000

Add the wax fuel...

574

00:44:45,000 --> 00:44:46,000

...and then seal her up.

575

00:44:47,000 --> 00:44:50,000

Perfect, lovely, fabulous.

576

00:44:51,000 --> 00:44:53,000

Use the man, stud.

577

00:44:54,000 --> 00:44:57,000

And next up for these studs is the erection.

578

00:44:58,000 --> 00:44:59,000

There you go, Eric.

579

00:45:00,000 --> 00:45:01,000

She's nearly ready.

580

00:45:02,000 --> 00:45:03,000

You like it?

581

00:45:04,000 --> 00:45:05,000

Yeah.

582

00:45:06,000 --> 00:45:09,000

Jamie adds Carrie's gun-cotton propellant to the base of the cannon.

583

00:45:11,000 --> 00:45:16,000

And that just leaves the fuel oxidizer, the liquid nitrous oxide.

584

00:45:17,000 --> 00:45:24,000

As the team make the final preparations, it seems this hybrid rocket has come a long way from the original myth.

585

00:45:25,000 --> 00:45:28,000

So is any part of this parable actually true?

586

00:45:29,000 --> 00:45:33,000

They did have gun-cotton in 1865 and they did have steel.

587

00:45:34,000 --> 00:45:36,000

They did have nitrous oxide.

588

00:45:37,000 --> 00:45:39,000

Buying a rocket from a tube, totally plausible.

589

00:45:40,000 --> 00:45:42,000

Completely within the realm of possibility.

590

00:45:42,000 --> 00:45:44,000

Building the rocket is one thing.

591

00:45:45,000 --> 00:45:56,000

All of the processes that go into actually launching it make it, in my opinion, improbable but not impossible for them to have done in that era.

592

00:45:57,000 --> 00:46:01,000

The Civil War rocket. Improbable but not impossible.

593

00:46:02,000 --> 00:46:09,000

Sure, the mythbusters have made a few changes, but does it really stand a chance of flying the mythical 120 miles?

594

00:46:12,000 --> 00:46:14,000

Alright, here's the percentages.

595

00:46:16,000 --> 00:46:24,000

60% chance that we get a lot of flame and a lot of fuss and bother and the rocket doesn't leave the tube.

596

00:46:25,000 --> 00:46:30,000

5% chance that it blows up in the tube from too much pressure or something like that.

597

00:46:31,000 --> 00:46:32,000

What have I got left? 35?

598

00:46:33,000 --> 00:46:41,000

Yeah, I'll give a 20% chance of a successful launch and 15% chance of something I cannot even remotely predict.

599

00:46:42,000 --> 00:46:48,000

Let's find out. Adam's going to press the button, then Jamie will yank open the quick release valve.

600

00:46:50,000 --> 00:46:58,000

Alright, here goes the big boom, Civil War rocket in 3, 2, 1, ignition.

601

00:47:03,000 --> 00:47:04,000

Something's happening.

602

00:47:06,000 --> 00:47:07,000

Go!

603

00:47:12,000 --> 00:47:13,000

Wow!

604

00:47:17,000 --> 00:47:18,000

Woo!

605

00:47:19,000 --> 00:47:20,000

Yeah!

606

00:47:21,000 --> 00:47:22,000

I forgot to take a picture.

607

00:47:24,000 --> 00:47:25,000

Sir? Good job, everybody.

608

00:47:26,000 --> 00:47:27,000

Got out of the air.

609

00:47:28,000 --> 00:47:30,000

Our first hybrid rocket.

610

00:47:32,000 --> 00:47:33,000

And didn't she do well?

611

00:47:34,000 --> 00:47:39,000

It took a while for the nitrous oxide to mix with the fuel, but then she was off.

612

00:47:40,000 --> 00:47:41,000

Nice, nice work.

613

00:47:42,000 --> 00:47:43,000

Should we go find our rocket?

614

00:47:44,000 --> 00:47:45,000

Yeah.

615

00:47:46,000 --> 00:47:47,000

Is it that thing right that way?

616

00:47:48,000 --> 00:47:49,000

Okay, so I'll paste it off while we walk out.

617

00:47:52,000 --> 00:47:54,000

That was a rocket. There's no two ways about it.

618

00:47:55,000 --> 00:48:02,000

For being made out of some plumbing pipe and pipe caps, it's not half bad. That was heavy.

619

00:48:03,000 --> 00:48:07,000

It weighed over 200 pounds, but how far did it go?

620

00:48:09,000 --> 00:48:10,000

I got it!

621

00:48:14,000 --> 00:48:15,000

Here it is!

622

00:48:17,000 --> 00:48:18,000

There you go.

623

00:48:18,000 --> 00:48:19,000

One, two, three.

624

00:48:20,000 --> 00:48:25,000

Made it about 500 yards in two days. Two days, baby.

625

00:48:26,000 --> 00:48:32,000

Let anybody else do that and get something airborne like this out of plumbing parts in a visit to your local hardware store.

626

00:48:33,000 --> 00:48:34,000

A little hubris from the Heinemann.

627

00:48:35,000 --> 00:48:42,000

And rightly so. After all, they just built a rocket out of plumbing parts in 48 hours.

628

00:48:43,000 --> 00:48:44,000

Want to see it again?

629

00:48:45,000 --> 00:48:52,000

The 200-pound Civil War rocket came straight out of the barrel, but had nowhere near the thrust of modern rockets.

630

00:48:53,000 --> 00:48:57,000

A success, but still 119 miles shorter than the myth.

631

00:48:59,000 --> 00:49:01,000

So there you have it, Confederate rocket.

632

00:49:01,000 --> 00:49:03,000

Is it busted, plausible, or confirmed?

633

00:49:04,000 --> 00:49:13,000

Totally busted. We got airborne with stuff that they could have had, they could have put together, but nowhere near 120 miles.

634

00:49:14,000 --> 00:49:20,000

I agree. They had access to all this technology, but putting it all together didn't happen for another maybe even 100 years.

635

00:49:21,000 --> 00:49:24,000

We made a good effort, and I'm so glad we got a launch, but this one's busted.

636

00:49:25,000 --> 00:49:26,000

Busted.

637

00:49:31,000 --> 00:49:32,000

Busted.