Operation Bumblebee

Teaser
On a barrier island off the coast of North Carolina stands this concrete tower – a lonely testament to a top-secret US Navy project. Back in the late 1940s, Navy secret experiments created a new type of propulsion that revolutionized how we protected our Navy ships and eventually how our jets could fly into the supersonic reaches of outer space.

This is the incredible story of Operation Bumblebee. Next on Marking History.

Historical Marker
This is the historical marker for Missile Tests, conducted in secret by the US Navy between 1946 and 1948 on Topsail Beach Island, off the coast of North Carolina. The Navy built eight concrete observation towers and assembly building to fabricate, launch and view as many as 200 experimental rockets, as these scientists perfected the Ramjet rocket. As a result of these secret tests, the foundation of modern rocketry and jet propulsion was laid out here on Topsail Island.

Now let's learn more about the story behind the marker!

USS Savannah and Kamikazis
It was World War Two, September 1943 and the USS Savannah was supporting the Allied landing at Salerno Italy. During an air raid, a high-flying German bomber launched a new type of weapon towards the Allied cruiser, while outside the range of shipboard artillery. The German bomb penetrated the armored top of USS Savannah's Number 3 turret and plunged through three decks to the lower handling room where it exploded. The blast blew a hole in the ship's hull and killed 197 men, including everyone in the turret and handling room. It nearly sank the entire ship.

In October 1944, on the other side of the world, Japanese Kamikaze bombers resorted to crash - dive attacks on our battleships and carriers. Our naval ships did not have the high-speed long-range rockets necessary to stop the threats. They only had conventional anti-aircraft guns.

The Birth of Operation Bumblebee
Obviously, these new enemy tactics were a serious threat to US Navy and maritime shipping. The Navy needed to intercept and destroy these bomb-carrying aircraft before they came close enough to launch their weapons. What they really needed was a *supersonic* surface to air missile!

An analysis of the problem revealed that a new missile would have to be supersonic in order to reach a target before an enemy bomber would be close enough to launch an anti-ship missile. Ramjets were thought to be theoretically capable of meeting the requirements, but a practical ramjet had never been tested before.

Thus was born the Navy's next top secret project, Operation Bumblebee!

Ramjet Missiles
In 1941 researchers at NACA (National Advisory Committee for Aeronautics) used a high-speed wind tunnel to demonstrate the basic principles of operation of the ramjet engine. Most people in the aviation industry believed that jet engines could ***never*** produce as much thrust as a propeller, so this work was ignored until 1943 when U.S. Navy researchers were looking for ways to power missiles.

On December 1, 1944, John Hopkins University Applied Physics Laboratory or APL began a new research contract with the Navy's Bureau of Ordinance to proceed with the development of guided jet-propelled missiles.

The goal was to produce a prototype interceptor missile --- or prove that it couldn't be done. The answer was YES, it could be done, but it called for a vehicle ***that did not yet exist*** – a supersonic jet powered guided missile. It meant creating new means of propulsion, guidance and control. And breaking new ground in aerodynamics.

Enter Dr. Merle Tuve - founding director of Applied Physics Laboratory, and lead scientist on this new top-secret program. In early 1945, Dr. Tuve assigned the code word "Bumblebee" to this top-secret Navy project. He was inspired by this quotation on an office wall.

The Bumblebee Cannot Fly
According to recognized aero-technical tests,
the bumblebee cannot fly because of the
shape and weight of his body in relation
to the total wing area.
BUT, the bumblebee doesn't know this,
so he goes ahead and flies anyway.

The project name "Operation Bumblebee" seemed appropriate because Dr Tuve understood that the new missile program faced similar long odds for success. Why? Because no one had actually built a working ramjet engine before!

The initial research effort was directed to the propulsion system, because essentially no useful data on supersonic ramjets was available at the time.

After the War ended in 1945, the Navy decided to continue the secret project. After several successes at Island Beach New Jersey and Delaware beach, APL and Dr. Tuve's team settled into a permanent secret facility on a barrier island off the coast of North Carolina, in 1946. Today it's called Topsail Island, but back then it was simply called the "sand pit."

The location was perfect because of its isolation, accessibly only by boat, and its close proximity to Camp Davis for housing the 250 team members and their families.

Within months the Navy had constructed roads, an assembly building, control tower, eight observation towers, pontoon bridge, launching platform, and bombproof shelter. Their mission was to develop a jet-powered missile that could destroy an air target up to twenty miles away.

Eight observation towers were built, each one housing a radar system, telemetry instruments and cameras to record performance data along the 20 mile sandy coast. Towers were precisely located with distances scientifically derived from zero up to 16 miles away from the launch site. They were rigidly constructed of reinforced concrete, 35 feet tall and built on pilings driven a minimum 20 feet. Triangulation of photo equipment from the towers recorded the flights over 10-20 miles at speeds of 1500 miles per hour, so accuracy of the ramjet data was vital.

Ramjet Description

Basically the ramjet is an air-breathing jet engine that operates with no moving parts. It relies on the missile's forward motion to draw in air and compress it for combustion. Fuel, usually kerosene, is added and injected into combustion chamber to be burned with help of a flame igniter. The high pressure and high temperature gases are passed through the nozzle converting pressure energy into kinetic energy and ***supersonic*** flight.

In order to accelerate to operational ramjet speed, a solid rocket booster is needed. Initially, Operation Bumblebee used high velocity anti-aircraft rockets strapped to the end of the ramjet to give it a kickstart. And because the transistor had NOT been invented yet, sturdy vacuum tubes were utilized for the ramjet guidance systems.

The first missiles were created from the tailpipe of the Thunderbolt airplane. The men called the missiles "flying stovepipes" since they were almost entirely hollow on the inside. The missiles were miniature wonders, powered by vacuum tube electronics, gas generator-powered hydraulic and electrical power units, and radar-based proximity fuses.

An estimated 200 rockets were launched over the course of eighteen months. The tests provided an impetus to the development of jet aircraft engine technology and insights into rocketry incorporated later in NASA's space program.

Three missiles were developed over the years of testing on Topsail Island - the Terrier, the Talos and the Tartar. Each had different applications for the Navy. The *Terrier*, a medium-range antiaircraft missile designed to take down bombers, was quickly installed on Navy ships once the guidance system was perfected. The *Talos*, a long-range antiaircraft missile, was created as the big gun of the Navy. The *Tartar*, a short-range antiaircraft missile, was designed to help defend ships from low-flying aircraft that the Terrier could not hit.

The first working prototype ramjet missile was flown in 1952 and the first tactical Talos missile was introduced into the Naval fleet in the Spring of 1958. This surface to air missile extended Navy ship self-defense from a few miles to over the horizon and the edges of space.

Later Years

In 1948 the Navy decided to close up shop at Topsail Island, North Carolina and shift operations to White Sands, New Mexico, and Cape Canaveral, Florida. They moved the secret guided missile program to take advantage of better weather conditions, less sea traffic and more range over the ocean.

Years later, the booster rockets developed in Operation Bumblebee paved the way to creating the space shuttle. When NASA started building the space shuttle, they used the lessons learned in constructing the Talos boosters to create the much larger solid rocket boosters found on either side of the orange external fuel tank. These rocket boosters were essential to allowing the space shuttle to take off.

Today

Today, you can still see the remnants of Operation Bumblebee. Seven of the eight towers remain; a few remain undisturbed, guarding the North Carolina coastline. Some are used as private houses and one as part of a fishing pier. And then, there is the Assembly Building.

It is appropriate that the Assembly Building has been listed in the National Register of Historic Places by the United States Department of the Interior because of all the technology it has developed in Aviation and Rocketry.

And if you want to learn more about Operation Bumblebee, go no further than next door to the Missiles and More Museum. You can't miss the Talos missile outside the entrance!

Inside, you will see missiles hanging from the ceiling, historic photos hanging on the displays and awesome T-shirts hanging by the entrance.

Close

The government had originally started Operation Bumblebee as a way to test the *possibilities* of guided missiles. In the end, Operation Bumblebee produced the first tactical supersonic missiles which helped launch the US into the 21st century.

The success of the Bumblebee program at Topsail Island, North Carolina can be plainly stated: "Topsail Island is to Jet Flight Development what Kitty Hawk is to Propeller Flight."