Building the Estes Space Transporter America

By John Brohm, NAR #78048

Introduction

By the mid-1970's, America's passion for its Space Program had cooled; the Moon had been conquered, and the largely symbolic Apollo-Soyuz test flight in July 1975 brought to an official end a Space Race that had, as a practical matter, been won some years prior. NASA was moving on to Low Earth Orbit projects – space stations, research for extended space stay durations and so forth – and the thinking was a new kind of vehicle was needed to conduct these missions. Having reached the zenith of space flight at the time, the Mighty Saturn V was to be retired.

Several "re-usable hardware" concepts had been considered for this next phase of space exploration, and ultimately, the winning design was the Space Transportation System, a vehicle commonly known as the Space Shuttle. Yet while the STS/Space Shuttle emerged as the preferred re-usable hardware vehicle, it was not without its competitors, and one such competing concept was the **Single Stage To Orbit** (**SSTO**) spaceplane. **SSTO** was a concept explored from the mid-60's, and it contemplated a single re-usable vehicle that would reach orbit by rocket propulsion but would return to Earth as a controllable aircraft.

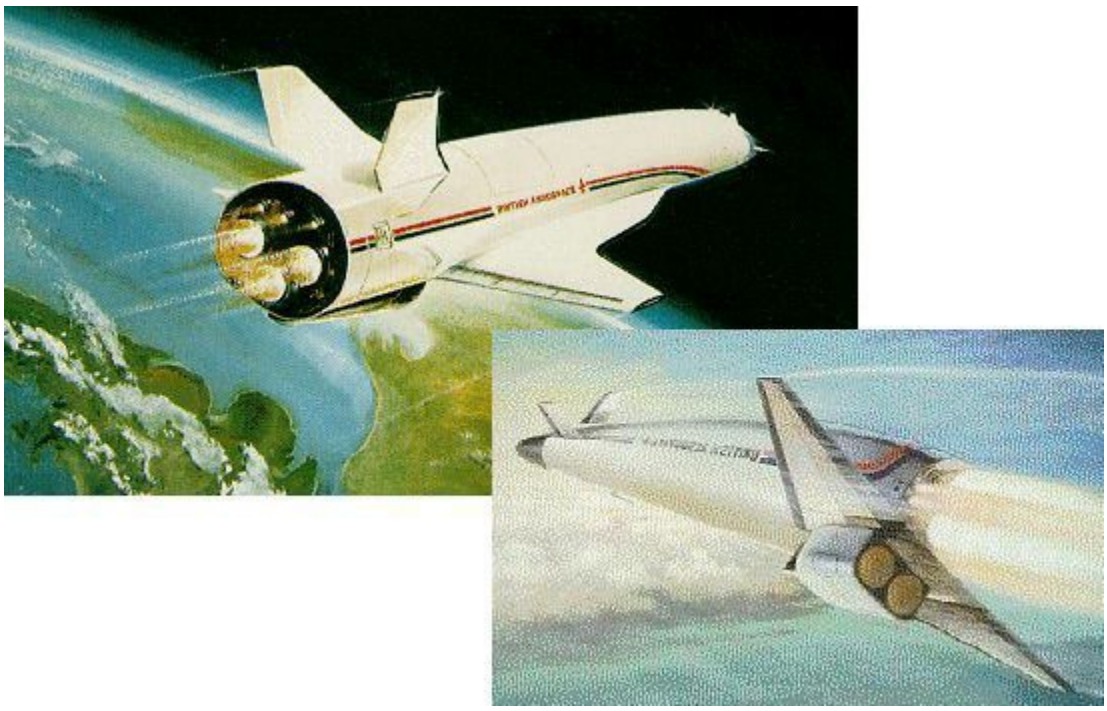

Figure 1: Artist Renderings of SSTO Vehicle Concepts

In the end, NASA ultimately selected the Space Shuttle with its concomitant booster system as the way forward, and so further development of the SSTO concept was stopped.

Over in the model rocketry world, Estes Industries was doing its part to stay current with NASA's prototype developments and introduced its scale kit of the Space Shuttle (#1284) in 1976. But with a nod to the past and to an elegant single stage re-usable space plane concept, Estes would also develop and introduce an SSTO-derived model called the Space Transporter America, kit #1338.

The Space Transporter America was a large BT-60 based model that captured many of the features of the SSTO concept – eight plastic injection molded nozzles representing the rocket engines used for boost, wings with ailerons evoking the mechanisms for controlled atmospheric flight, and a large (faux) payload section, representative of the cargo bay that would be utilized for Low Earth Orbit personnel and equipment deployment.

The kit was launched on pages 40/41 of Estes' 1980 Model Rocketry catalog, but quickly descended into model rocket history with its subsequent passing appearance the following year. The Space Transporter America was a Skill Level 3 Craftsman kit, challenging in its build with multiple fin alignment issues, a paint scheme requiring attention to precise masking detail, and a decal arrangement that presented a suitably complex marking layout. The Space Transporter America has become a fairly rare kit, and one that is seldom seen or modeled.

Figure 2: New for 1980 – the STA, Estes Industries Catalog 801P (1980)

I've had the remnants of a partial Space Transporter America kit collecting dust in the shop for a number of years now, and I thought it would make an interesting challenge to conjure the full model from these remains. In this article, I'll walk you through my build of a unique and somewhat rare model from Estes' past.

Cold Bones

As mentioned, this project found its genesis in the remnants of a partial kit consisting of the injection-molded plastic nose and nozzle parts, kit instructions, and the die-cut fins.

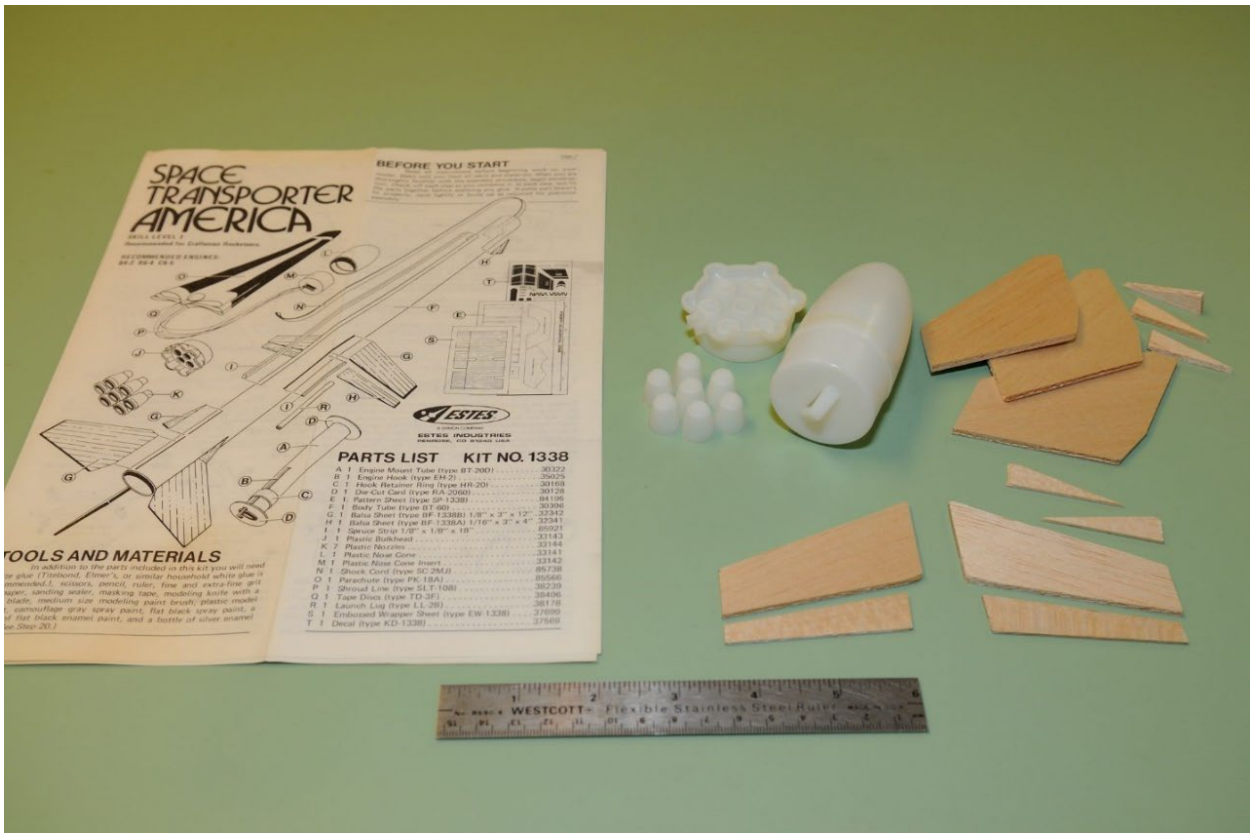

Photo 1: The Partial Kit

Absent from my partial kit was the decal set, and the set of embossed heavy cardstock corrugated body wraps that are to be applied to the airframe. Not having these embossed wraps constrains one's ability to accurately clone the model, and is likely one of the reasons why the Space Transporter America is so seldom cloned.

Examining the aft die-cut fins provided in my partial kit showed there was some significant variation between the parts, so these original parts were set aside and templates were drawn in CAD that would be used to create accurate, consistent parts. The wing and aileron kit parts were used as templates to create new parts for the model.

Parts Preparation

The airframe is a full 18" long standard BT-60 tube; the motor mount tube was cut to the right size from a BT-20 stock tube. Airframe spirals were filled with Bondo® Glazing & Spot Putty, and the motor mount was assembled per standard practice.

Using the CAD templates, the fins, fin extensions and the main wings were cut from 1/8" thick balsa; the ailerons and canards were cut from 1/16" thick balsa. The balsa parts were then pre-finished with K&S Silkspan tissue and three coats of Randolph Nitrate dope. With this, the parts set for the Space Transporter America was ready for assembly.

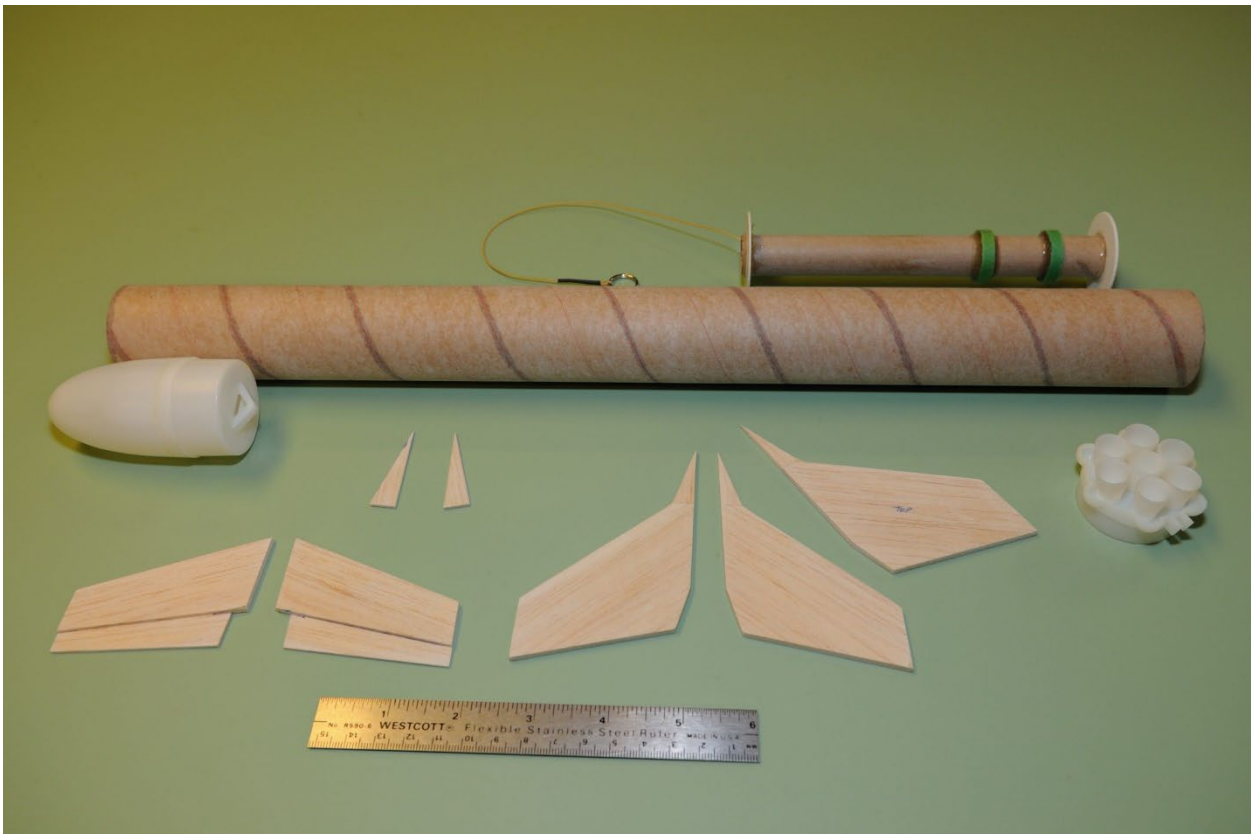

Photo 2: Parts Set

Construction

A critical aspect of this model is the spatial alignment of the fins, wings and canards. The aft fins are radially spaced 120 degrees apart about the airframe; the wings and canards are aligned with each other in the longitudinal axis, each pair are 180 degrees apart about the body, are 90 degrees spaced relative to the aft dorsal fin and sit flat when the model adopts a horizontal attitude. Plenty of opportunity for misalignment errors during construction.

Estes thoughtfully provided a body tube wrapping guide in the kit which the modeler was to use to set alignment marks on the body; further, separate fin and wing alignment guides were also provided as aids to check the radial spacing of the model's aerodynamic surfaces while the glue sets. However, as well-intentioned as these aids are, they aren't sufficient to prevent alignment errors from creeping in during typical hand construction. So, I took the opportunity to create a set of tools to minimize the alignment risks.

To begin, a precise body tube wrapping guide was prepared in CAD; this would ensure that the correct radial spacing of the model's aerodynamic surfaces was properly accounted for on the airframe.

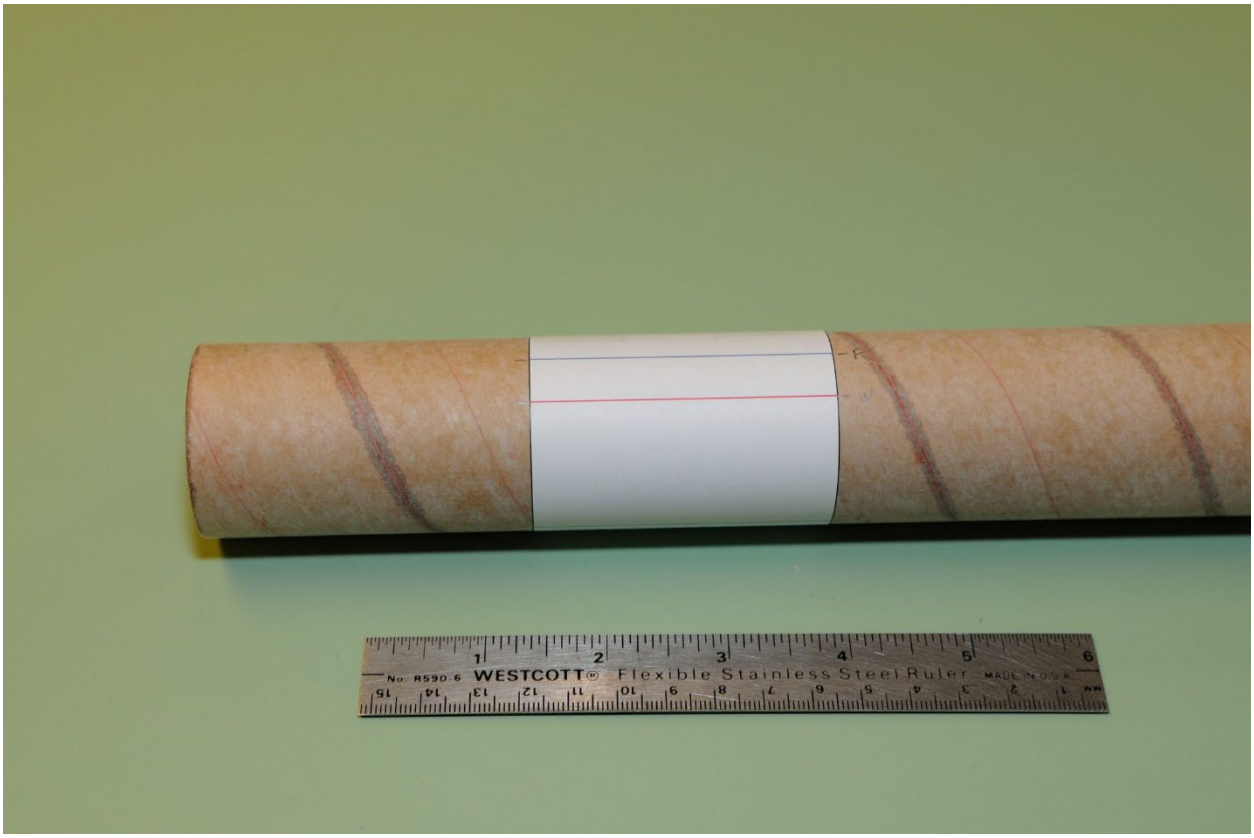

Photo 3: Body Tube Wrapping Guide

Next, a set of solid alignment guides was crafted which would support the aerodynamic surfaces while the model was sitting in a horizontal attitude. These would allow the fins and wings to rest comfortably on their own, with gravity ensuring everything stayed in alignment while the glue set.

The first of these supports was an aft fin guide, constructed from sheet balsa, taking into account fin material thickness and the 120-degree spacing of the fins. This support is shown in the following photo.

Photo 4: Aft Anhedral Fin Support

The wings and canards were supported during the gluing process with a pair of wooden blocks that had been cut square, and at precisely the right height.

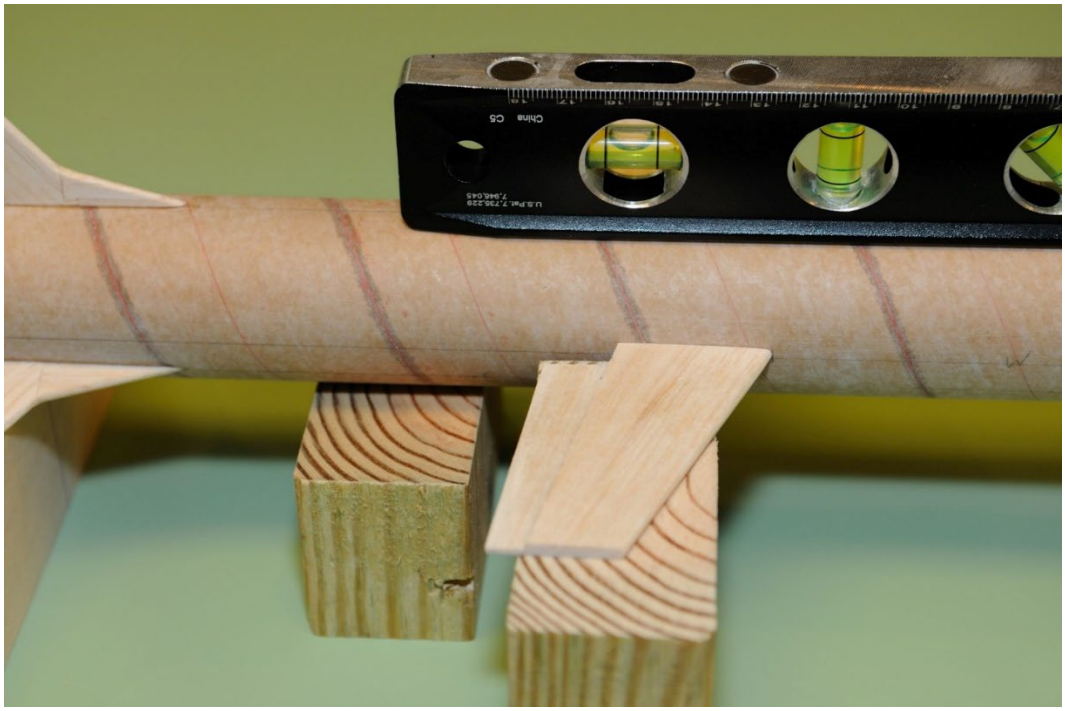

Photo 5: Wing Supports

Using these devices, the fins, wings and canards were tacked in place with Medium CA, and then filleted with Sig-Bond aliphatic glue.

Next, the 1/8" square basswood strip stock, representing the dorsal conduit, was added.

Photo 6: Dorsal Strip Stock Installed

The model was then ready for the application of the corrugated body wraps.

The Corrugated Body Wraps

As mentioned earlier, the kit instructions call out a set of embossed, card-based corrugated body wraps (part EW-1338, P/N 037699) to be applied to the model. Unfortunately, this part was absent in my partial kit, so I was going to have to craft something from scratch. Happily, the documentation set provided for the kit at the "Ye Olde Rocket Plans" website includes the key reference dimensions for the wraps, as indicated on Page 12 of that documentation set. The following is the relevant excerpt from that documentation.

Notes concerning the Embossed Wrapper Sheet, P/N 37699

The Embossed Wrapper Sheet is very difficult to scan in a way that would reveal the embossed corrugations in the wrapper. Accordingly, provided below are the dimensions of the simulated corrugations. These could be easily replicated in 0.010" or 0.015" sheet styrene (take your pick - the embossed sheet measures 0.013" thick).

Main wrapper - 5-1/8"L x 2-5/16"H. The long dimension wraps around the airframe. Corrugations are 1/16" wide and have a 1/16" space between them.

Small wrappers (Qty 3 - these fit between the fins, as per Instructions step #15) - each are 1-1/2"L x 27/32"H. The long dimension wraps around the airframe. Corrugations are 1/16" wide and have a 1/16" space between them.

Figure 3: Wrap Notes from YORF

http://www.oldrocketplans.com/estes/est1338/est1338.pdf

For my model, I chose to fashion the base for the wraps from a sheet of 0.010" thick Styrene; for the corrugations, I chose to use 0.010" x 0.060" Styrene strips.

The corrugation pattern was drawn in CAD and used as a placement guide for the strips. Strips were glued in place with Tamiya Extra Thin Styrene Cement.

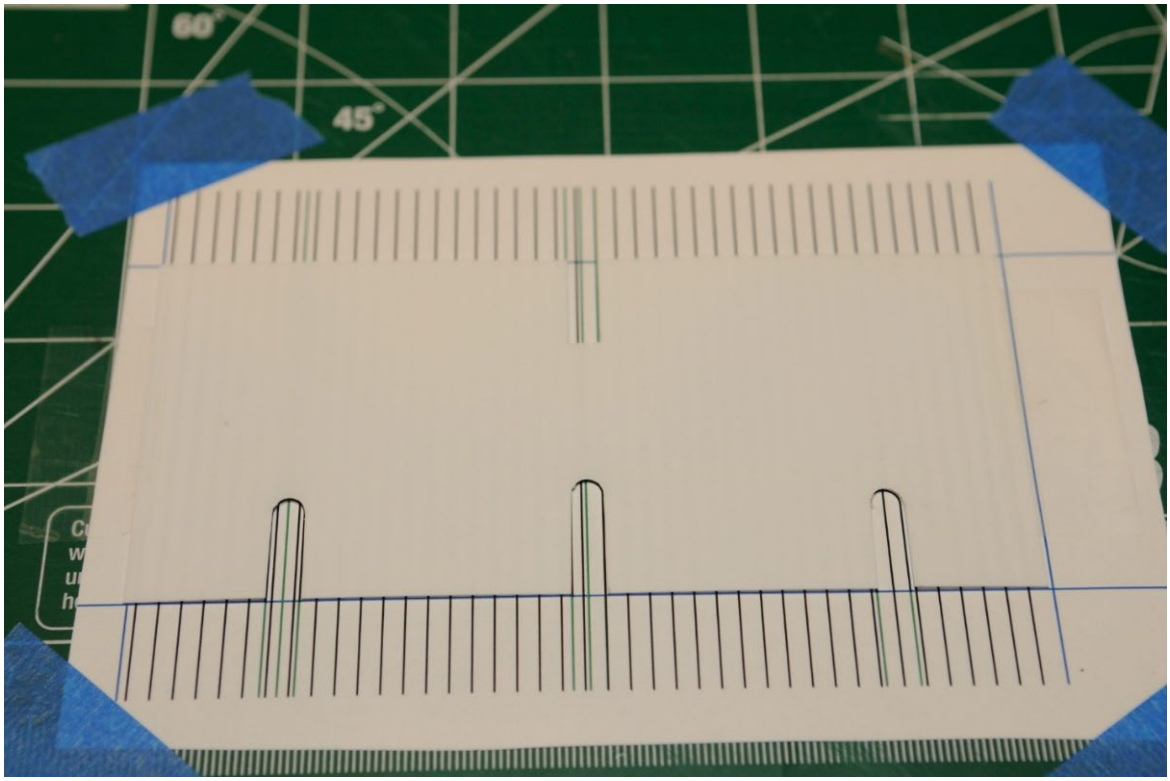

Photo 7: Main Body Wrap Template

Forty-two strips later, we arrive at a main body wrap ready for application.

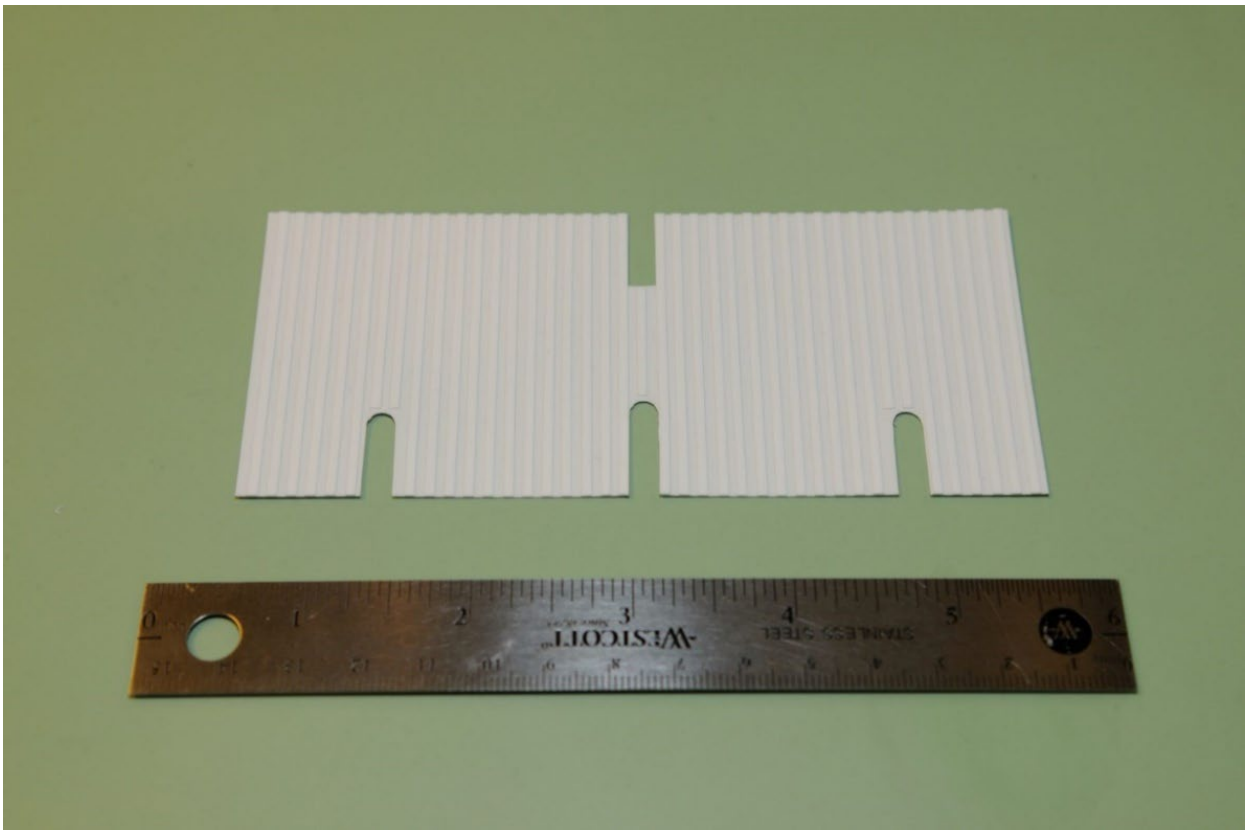

Photo 8: Main Body Wrap

The finished body wrap was then carefully applied to the model with judicious application of Weldwood® Contact Cement. A similar template and application process was used to craft and apply the aft skirt corrugated sections.

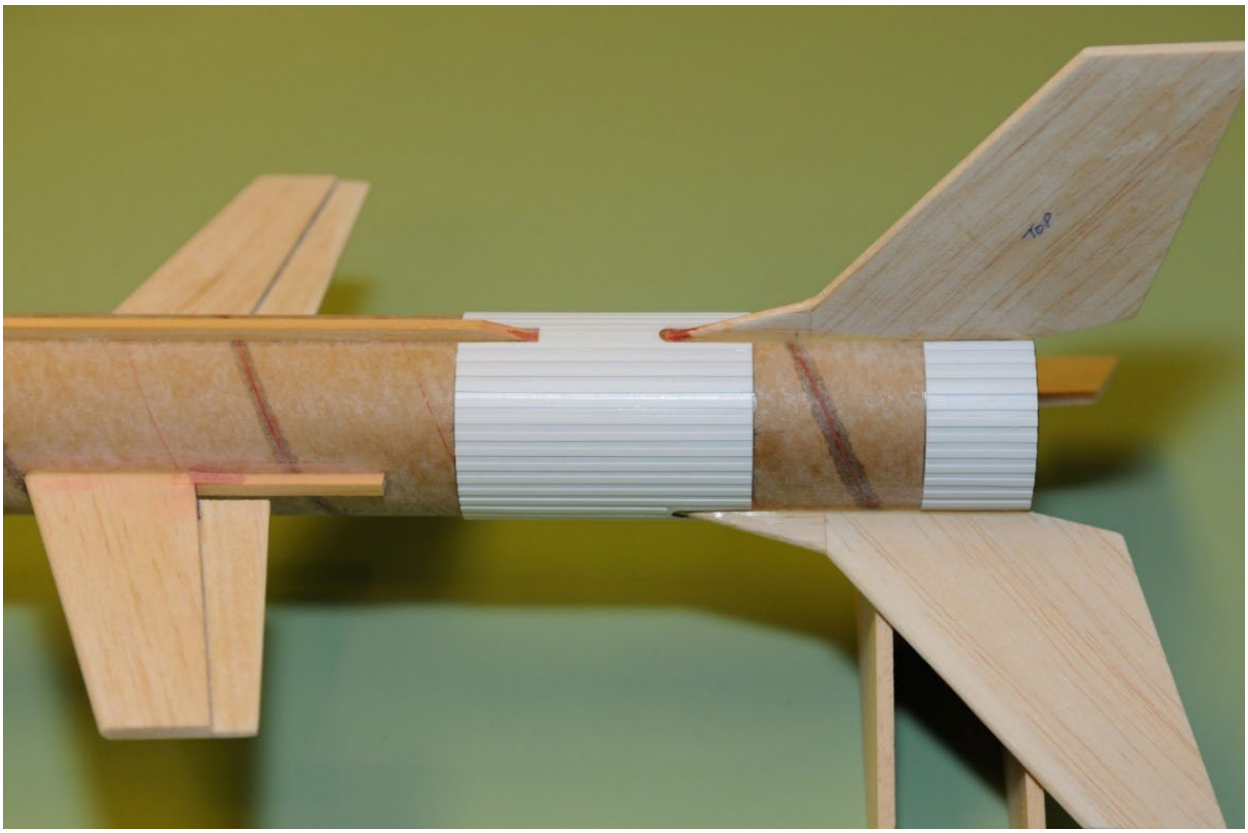

Photo 9: Corrugated Wraps Applied

With the launch lug installed, construction was complete and the model was ready for the finishing process.

Finishing

The model was primed with Rustoleum® Automotive primer and then wet sanded, with remaining nicks and crevices filled with Squadron White Putty. Two coats of Dupli-color Artic White automotive lacquer provided a bright white base to complete the painting process.

The kit instructions call out Pactra Camouflage Gray as the main airframe color. Original Pactra paints are no longer available, as Pactra was bought by Testors Corporation in the 1980's. A Google search for Pactra Camouflage Gray showed that an equivalent color is still available, Federal Standard number FS 36622, Testors as P/N 1933. This was the color selected as the main airframe color for our model.

Photo 10: Camouflage Gray

Once the main airframe color had cured, the model was masked and sprayed with Testors Flat Black, representing the heat shielding on the model's underside. The model was masked so that the leading edges of the fins and wings were also included in the black spray.

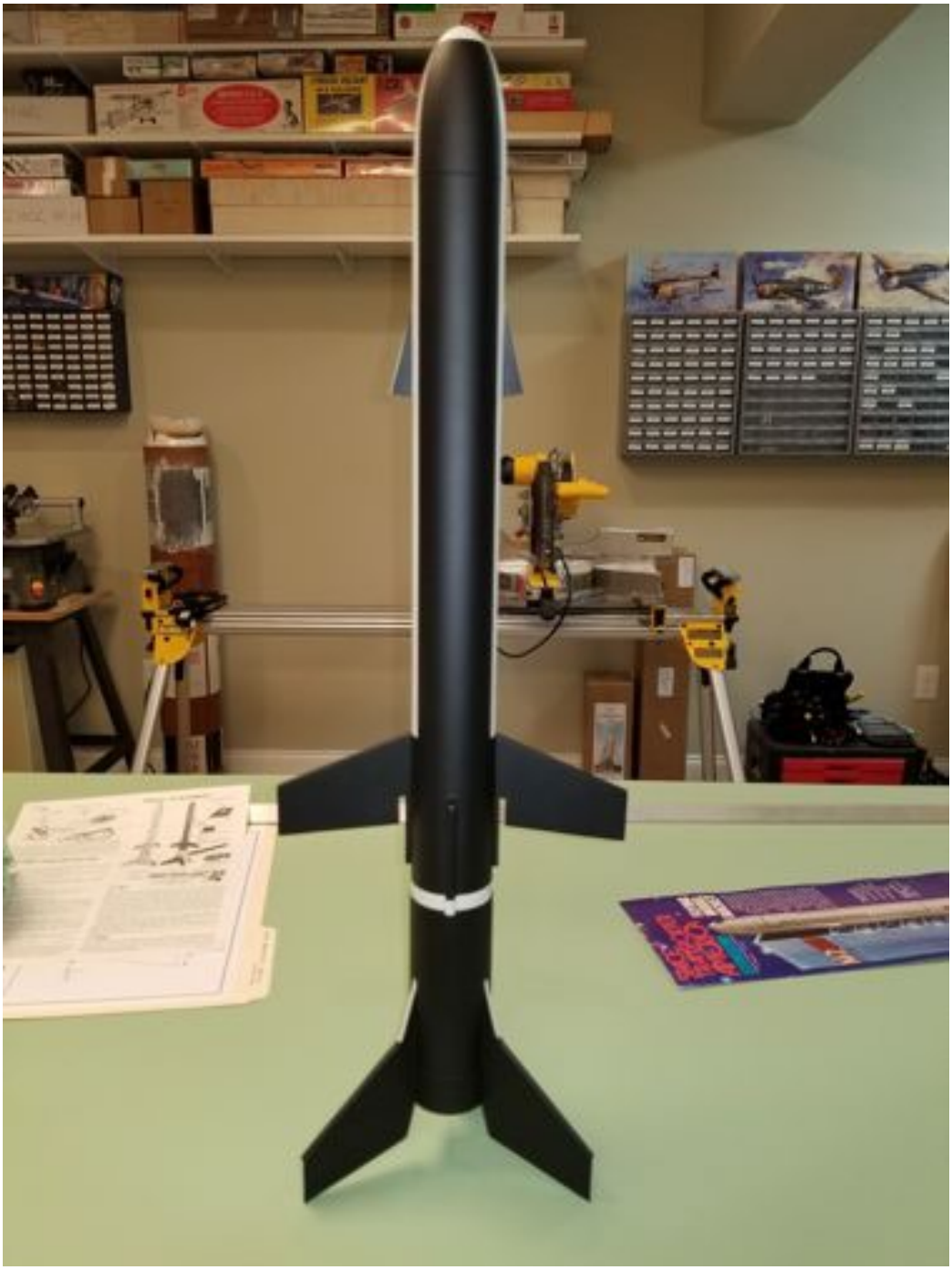

Photo 11: The Heat Shield

You might notice in Photo 11 that I had masked a strip between the fins and wings; there's a red decal strip that gets placed in that area, and not spraying this strip area black ensures there would be no color shifting in the red decal between top side and underside.

Photo 11 also shows that the nose cone was masked to carry the heat shield forward. The nose was also masked to paint the circular radome in front, and the blue windshield marking that you see in Photo 12, below.

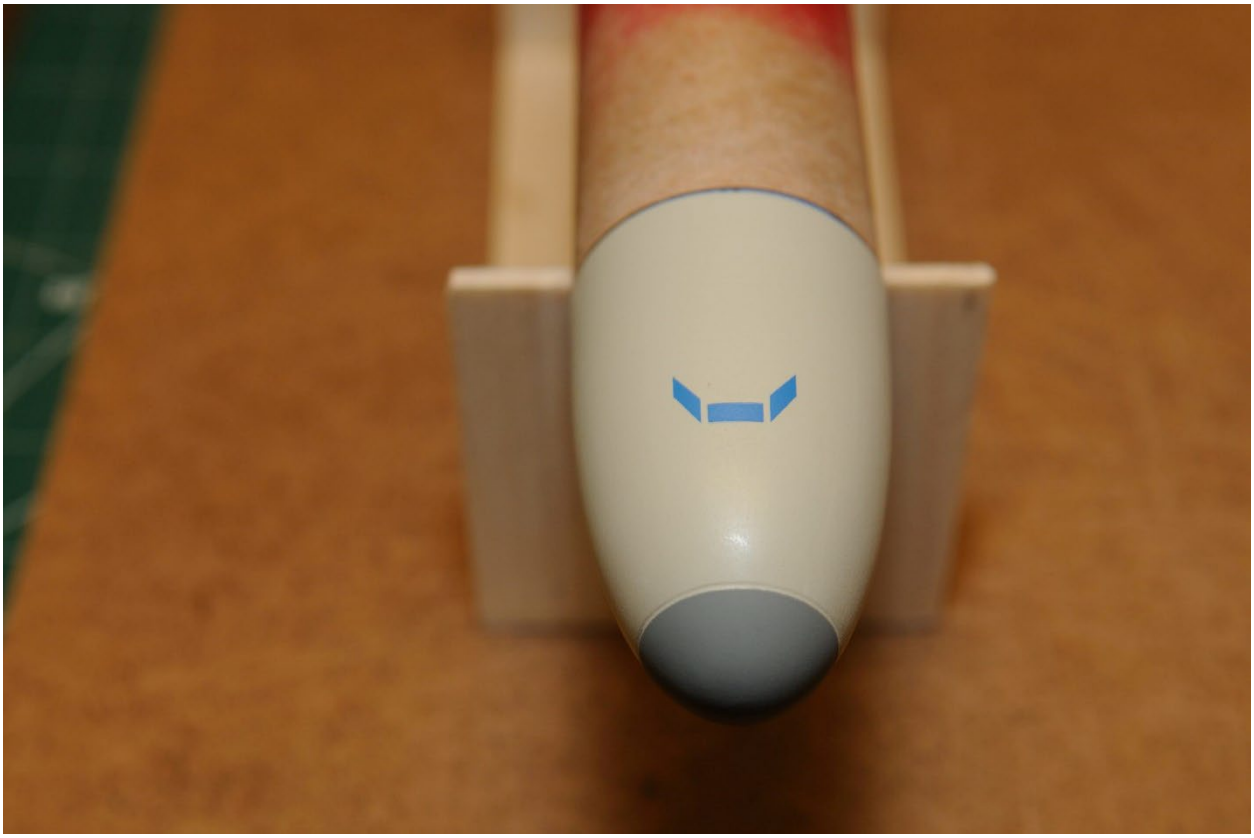

Photo 12: Painted Nose

The model was then sprayed with a clear coat in preparation for the decaling process.

Decals

My partial kit didn't include any decals, so the markings for this model had to be created from scratch. The text markings were prepared in MicroSoft Word; the various graphics were drawn in TurboCad 17.

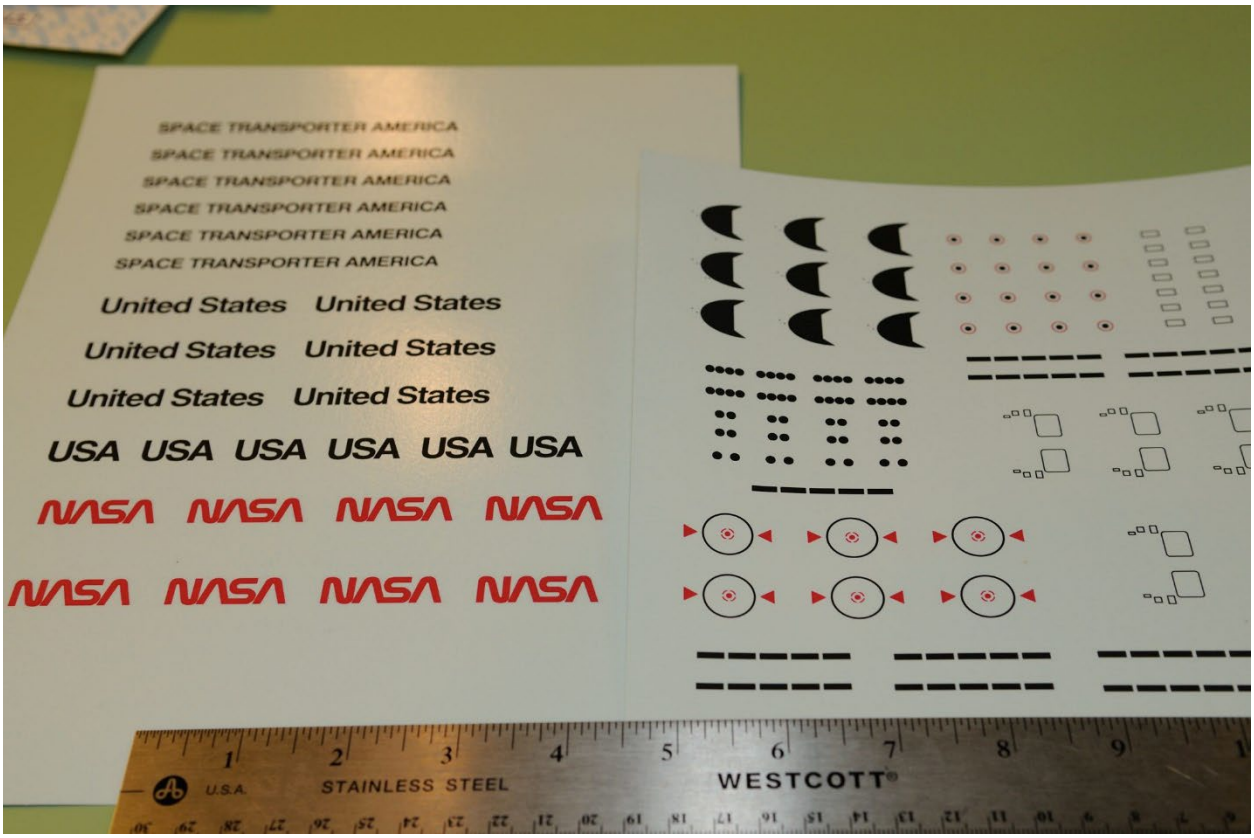

Photo 13: Decals

I printed the markings on Bare Metal Foil's Expert's Choice laser decal film, using an HP Laser Jet printer. The printer worked perfectly once I had it set up for the laser decal film.

While the print quality was excellent, I found that the decals had to be handled with care. The laser printer toner was impervious to water (which is a good thing!), but with too much handling the toner could flake off the paper; it also scratches easily. I could have overcoated the decals to improve their handling integrity, but I generally avoid overcoats before application, as I like to keep the markings as thin as possible.

It's also good advice to print extra copies of the markings. I often have arguments with my decals during placement that provoke the full use of the English language lexicon, so having a few spares gives one some breathing room. This build was no exception.

The red panel markings that you see on the wing and dorsal fin tips were cut from a sheet of Bare Metal Foil's #015 Insignia Red waterslide Trim Film. The black strips on the fins and wings were cut from MicroScale's TF-2 waterslide Trim Film, FS 17038. But the most challenging markings were the simulated payload bay panel lines; these guys were taken from MicroScale's #91112 Black Striping set. Each line is less than 1/32" wide, so placement required some special care and attention to keep things straight. Photo 14 shows the layout for these strips.

Photo 14: Payload Bay Panel Lines

I then cut and placed the small vertical lines that represent the bay door hinges. I was very happy when this step was over!

Photo 15: Decals Complete

Once all of the markings were applied, the model was overcoated with Testors #1960 Lusterless (Flat) Lacquer to lock down and protect the decals.

You'll notice in Photo 15 that I've left the painting of the corrugated body wrap section till last. As the kit face card shows, this section is to be painted silver, but I chose to defer painting this section till the final flat coat was sprayed onto the model. The reason for this is that most clear coats cause silver (or most metallic enamel paints) to dull and discolor, so I didn't want to paint this ahead of the final clear coat. But, you might say, why not just mask the silver to protect it from the clear coat? Well, the answer to that one is that most silver (and most metallic enamel paints) don't handle masking tape well either; the tape can leave lines, or worse, can pull the paint up.

So, the model was re-masked, only this time I left the main corrugated body wrap exposed so that this area could be spray-painted. I chose Testors flat aluminum enamel, as this would give me a finish more consistent with the overall finish of the model. A 1/32" wide masking strip was placed on the model where the kit face card shows a booster joint, permitting this feature to be represented on the model. Careful burnishing of the masking strip was needed to minimize any paint bleed through around the raised corrugated strips.

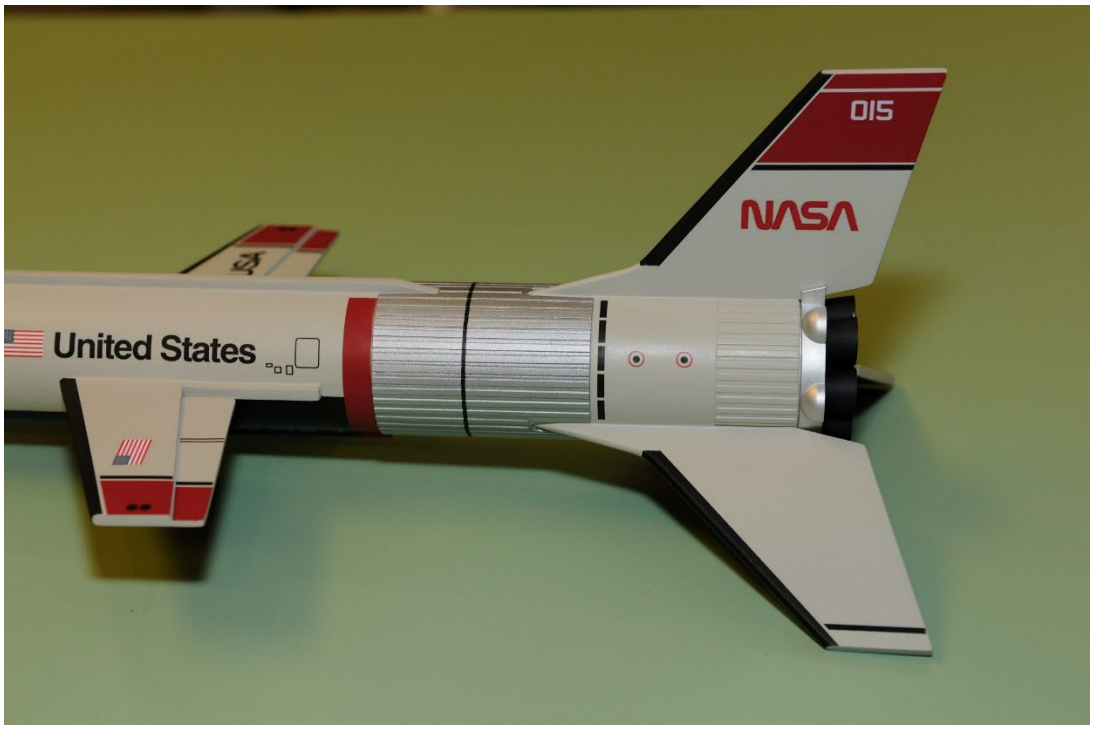

Photo 16: Finished Corrugated Wrap, with Booster Joint

Next, the plastic engine nozzle assembly was painted, and with this the model was finally complete.

Photo 17: Booster Nozzles

Photo 18: Space Transporter America – Port Side

Photo 19: Space Transporter America – Aft View

And there you have it, an Estes Space Transporter America. Something unique and not often seen, and something that captures many of the SSTO concepts considered during the search for NASA's successor to the Moon program. I hope this article is helpful to you and sparks an attempt on your part to craft a Space Transporter America for your Space Program!