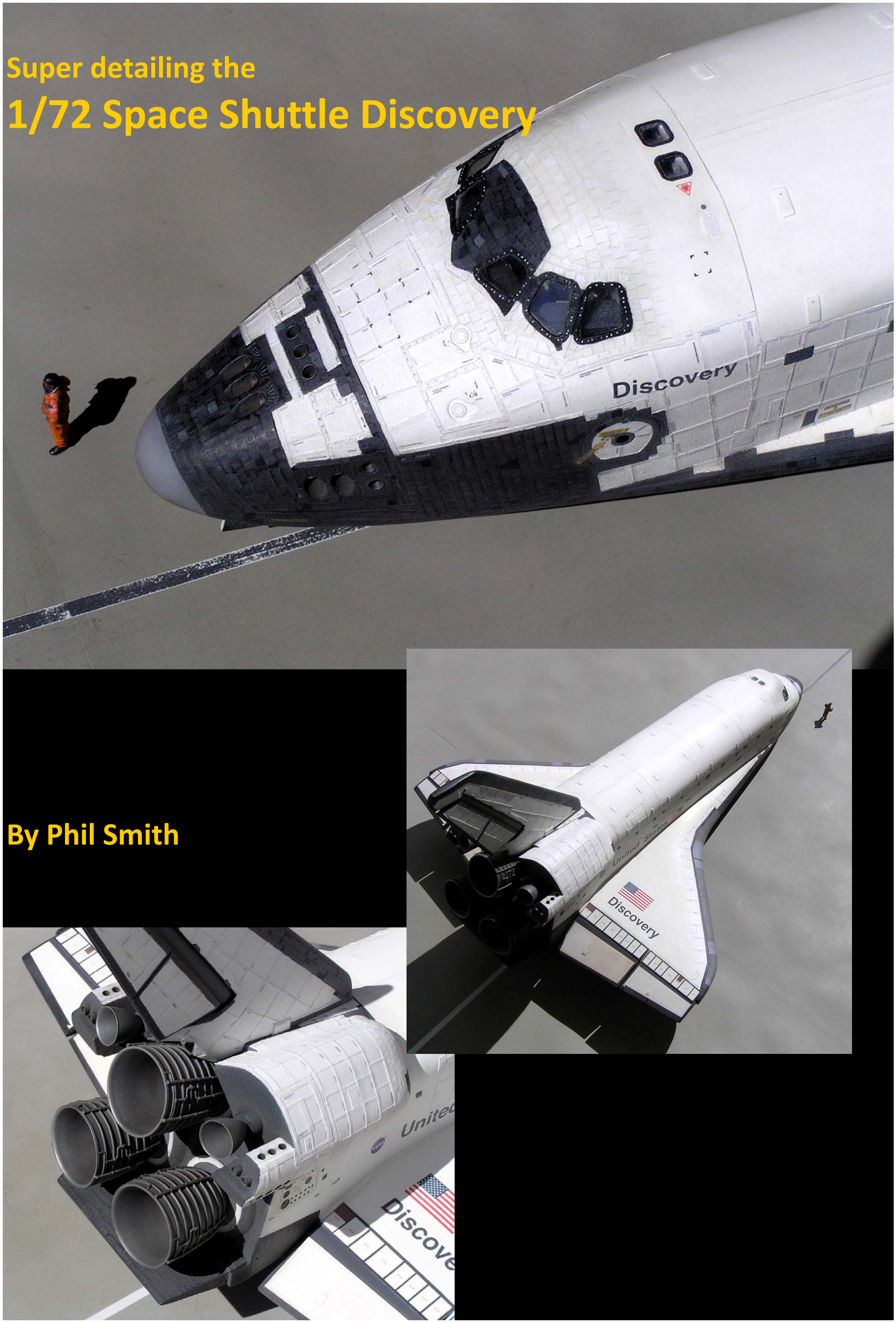
Super detailing the

1/72 Space Shuttle Discovery



By Phil Smith

Introduction
It seems that most modelers out there have a 1/72 Revell or Monogram Space Shuttle model kit in their stash. It remains unbuilt perhaps because the actual construction is not a challenge and the super detailing too tedious to bother. I can confirm that both are true, but that somehow I saw the project to the very end. Since construction of the model is quite straight forward, I will focus instead on the detailing.

At 1/72 scale, both kits produce a large representation of the venerable Orbiter. This means that attention to detail is key to making this model attractive and realistic. Put another way, simply painting the model black, white and gray will produce an end result that looks more like a toy. The Space Shuttle is, from an aesthetic point of view, an intricately detailed vehicle that varies considerably across its surface in terms of texture and subtle variations in gray-scale color. For this project, I broke down the work into three phases: Construction, Texture, and Finishing.

Construction
I decided to kitbash using both kits, mainly because I like that Revell's kit has properly molded cockpit windows. So, most of the body is Revell, while the gears, vertical stabilizer and elevons are Monogram. I decided to depict a Space Shuttle shortly after landing because this presents interesting opportunities for super detailing and weathering. I built the cockpit first, which is quite crude. However, most of this will be hidden from view, so detailing was minimal. Individual clear plastic panes were installed in the window frames and sanded flush with the hull. These were polished and then covered with tape to protect them until the very end. All vent holes along the fuselage were cut out, and doors made of sheet styrene installed (the rectangular doors are hinged at the top and open at the bottom). There are also several ports and circular vents elsewhere on the fuselage, particularly at the base of the vertical stabilizer. Resources like Dennis Jenkins' excellent *Space Shuttle: The History of the National Space Transportation System: The First 100 Missions* and *Return-To-Flight Space Shuttle Discovery (Photo Scrapbook)* help locate these. I also rebuilt the elevons and aft body flap so these drooped a bit, and separated the rudder from the vertical stabilizer, carving a thin groove between the part halves to simulate the dual nature of this unit. Finally, I drilled out all reaction control system thrusters, filling the aft RCS pods with Milliput and pushing a sharpened pencil through the hole to create a conical form. The elongated forward RCS thrusters were also shaped with Milliput, but I decided to use resin nozzles from New Ware's 1/48 Lunar Module Detail Set to add interest. The landing gear wheel bays were left alone. The entire model was then sprayed with Krylon gray primer spray paint to check for flaws and provide a dark base upon which to glue the tiles.

Texture
Here comes the fun part. After some trial and error, I discovered the best way to simulate the tile surface involved Evergreen sheet styrene (.010"), 3/32" strip styrene as a guide, a metal ruler and an X-Acto knife. Scribe the plastic sheet using relatively light pressure with the sharp end of the X-Acto knife (as though you were going to cut the plastic, but not quite), making sure the scribes are parallel using the 3/32 strip as a guide. Then, rotate the sheet 90 degrees and do the same thing, this time cutting through the plastic. In the end, you will have long 3/32 strips of plastic divided in 3/32 squares. At 1/72 scale, 3/32 squares seemed about right. I began with the belly of the beast, gluing strip after strip using super glue (cement will not adhere to the paint), staggering them so I get the characteristic "brick pattern." Jenkin's book contains an excellent set of diagrams showing the layout of the tiles, which I followed for about 95 percent of the tiles applied to the model. Compound curves and such required careful attention, especially in the forward section since many of the tiles are not, in fact, square.

After a considerable amount of time, and this was the period when the project sometimes became uninteresting, all the tile surfaces were covered. The most difficult and time-consuming areas, as you might imagine, were the forward and aft sections. I cleaned up the super glue residue with Golden West Super Solvent, being careful not to saturate the surface so the work gets undone.

.010" styrene stock is on the left, scribed. I flip this around 90 degrees, and cut the strips. The result is a pile of squares on strips. These are applied to the model in staggered fashion (a "brick pattern").

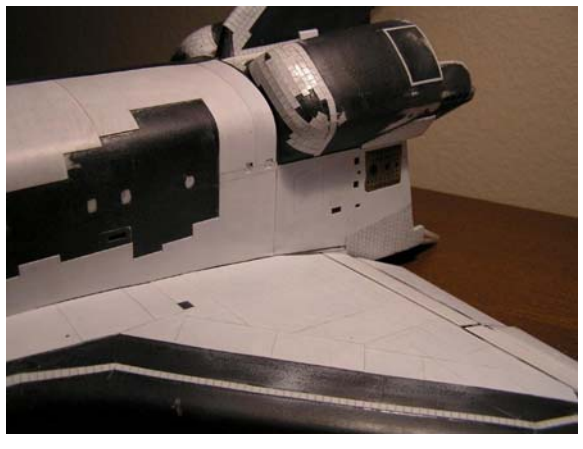


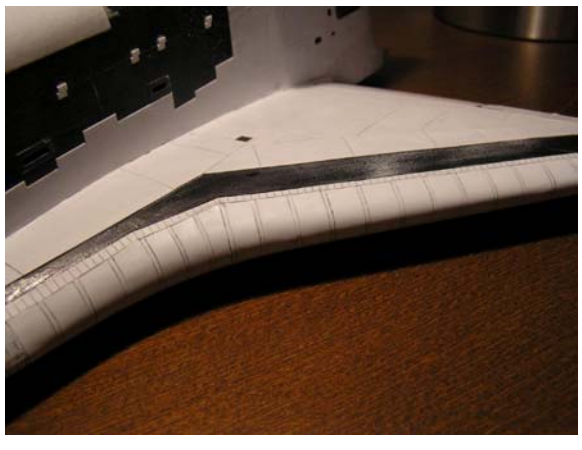


This series of photos shows the application of the strips of tiles. From left to right: Nose, wing, orbital maneuvering engine pod and aft section. Where strips left gaps, I added individual tile pieces. This process is by far the longest and most tedious of the build.

Next, I had to fill in the Flexible Reusable Surface Insulation (FRSI) surfaces using .010" sheet styrene. Think of this as a 3D puzzle. I used photos as a guide, though there was some guesswork. The FRSI pattern on the wings are visible in some photos, which was useful. At the end of this process, all areas that should be covered by thermal blankets and reinforced carbon-carbon (RCC) should be exposed. At this point, I also made the aft umbilical panels using .010" styrene, careful to observe the pattern of connections for starboard and port (they are different, it turns out). The RCC on the leading edge of each wing was done in the same manner as the tiles and FRSI – cut shapes, then glue them on. There are 22 RCC segments on each wing, with 21 thin dividers between them. The RCC nose cap was made using Milliput, shaped and sanded after drying.

These photos show the process of applying .010" styrene to simulate the FRSI and RCC panels after completion of tile application.





The application of canvas tape to the nose section, simulating thermal blankets. Surgical tape can also be used.

I then masked off the “white areas” and sprayed the model with black from a rattle can. I wanted to see how the tiles looked under a coat of paint and take care of the “black areas” knowing that masking off the simulated thermal blankets would be problematic. The tiles looked impressive, though some areas were obscured so I had to lightly re-scribe here and there.

The thermal blankets are simulated using canvas tape cut more or less in large squares, using photo reference for precise shape and application. Needless to say, this part went by much faster than the application of plastic up to that point. There are also thermal blankets around the gimbal plates on the aft section. In the end, the ENTIRE model will have a skin composed of .010” plastic and surgical tape.

Finishing

With the black areas already handled, I masked these off and airbrushed the model with PolyScale Reefer White, including the thermal blankets. When complete, the thermal blankets look awful because of frayed ends and threads and such. I expected that, and planned to go over the thermal blankets with Reefer White using a paint brush, removing threads along the way. The paint acts as a glue, so this is not as bad as you may think. Once that is done, I shot PolyScale Grimy Black on the belly to simulate the lighter nature of this surface relative to the upper black areas. I used Green Zinc Chromate for the small aft opening for the parachute, and Rust for the inboard section of the wing-elevon panels. Once the paining is done, the model was airbrushed with Future. I decided to go with Cutting Edge’s SSME nozzles, which had a nice, crisp look and throats that did not abruptly end at a flat surface. Flash was removed between the nozzles and the piping, and a hole was drilled in the end of each pipe. I painted these with Testor’s Burnt Metal metallizer on the inside and Titanium on the outside. The OMS engines need to be carved significantly since the profiles looked a bit fat.

After painting and prior to applying Future.

I used decals from Real Space Models and Cutting Edge, which are excellent. I also made my own red NO STEP decals for the wing-elevon panels, and a slew of random part numbers for each of the thermal blankets. I sprayed the model again with Future, then sprayed with a dull coat.

I weathered the model with chalks, mixed with light sanding on the black surfaces using fine grit paper. The result is a stressed surface with a semi-gloss appearance. I picked out random tiles using various shades of black and gray for the black areas, and whites for the white areas. This added another layer of interest. Pencil lead was used for the odd panels surrounding the elongated RCS nozzles up front.

One of the main landing gears completed. Note the eight brake lines.

Finally, I tackled the landing gears. These required significant modification, since the kit parts were very simple and softly molded. Eight brake lines were added to each main gear, and four to the nose gear. The wheels provided in the kit seemed too thick, so I replaced these with 1/48 Hasegawa F-104 hubs and resin 1/48 F-4 tires. The match was close enough for me. The Shuttle’s wheel wells are covered in what appears to be mylar, so I simulated these with Bare Metal Chrome Foil. I also added all sorts of greebly in there, using what little reference I could find for this area of the vehicle. The gear doors are scratch build, and these of course need tiles as well. I was careful not to weather the landing gears, though I did add scorch marks to the brakes and inside hubs.

I made a simple base for the model using sheet plastic painted to simulate concrete, and added a 1/72 USAF pilot figure modified to look like a Shuttle astronaut in the classic orange pressure suit.

Future applied, and decals being affixed. Needless to say, the miniature serial numbers for the thermal blankets is another tedious process.

In the end, I would say the model took some 1,000 hours of work over three years, since the tiles really wore on me and I abandoned the project a few times. I also moved around the country a few times, which didn’t help. I am pleased with the result, though must confess that I see some mistakes that Shuttle experts will easily find. I’m ok with that, because the modeler, like any artist aims for an impression of the real thing. Sometimes this is ultra realism or totally abstract. On this scale, I hit close to ultra realism, but fall short due to some significant inaccuracies. The landing gears represent the greatest inaccuracy, but others include exaggerated relief for the thermal blankets, a wider than normal spacing between cockpit windows, and a slight asymmetry between the starboard and port RCS thrusters when seen nose on (that really bugged me). But overall, I am quite pleased with the result.

After application of dull coat, the fun begins: weathering! I almost always use chalks and powders for weathering.

References

Jenkins, Dennis. *Space Shuttle: The History of the National Space Transportation System: The First 100 Missions*. Dennis Jenkins, 3rd edition. May 11, 2001.

Jenkins, Dennis. *Return-To-Flight Space Shuttle Discovery (Photo Scrapbook)*. Specialty Press. July 15, 2006.

Drendel, Lou and E. Cumpian. *Walk Around Space Shuttle*. Squadron/Signal Books. 1999.

NASA Human Spaceflight Gallery, http://spaceflight.nasa.gov/gallery/images/shuttle/.

Kits and decals used

Monogram 1/72 Space Shuttle
Revell 1/72 Space Shuttle
Cutting Edge 1/72 Space Shuttle Main Engines and Orbital Maneuvering System nozzles
New Ware 1/48 Lunar Module Detail Set (for the reaction control thruster nozzles)
Contact Rèsine F-4 resin wheels
Hasegawa 1/48 F-104 wheel hubs
Cutting Edge 1/72 Space Shuttle decals
Real Space Models 1/72 Space Shuttle decals