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JAKE'S WERKSTATT

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CONSTRUCTION OF THE LEOPARD 1A2 TURRET-PART 1

Construction Overview and Re-cap

This project was originally documented in Dave Merriman's Cabal Reports (1-7, found on the Sub-Pirates website) when the turret master was close to being completed, basically covered manufacture of the casting tools, production of the cast turret, main gun, and mantlet. A great deal of work had been done prior to the Cabal Reports and afterward. Here we'll conduct an overview of the process of obtaining a master and what has progressed after the pieces were cast.

Scratch-Building -Rising From the Primordial Kit-Assembler Ooze

Modeling armor outside of 1/35 and 1/72 scale provides relatively few choices, and with the larger scales like 1/16 and above, the subjects are limited. As a result, in order to obtain a desired model of a non-existent kit it is necessary to scratch-build it. The scope of the project can vary from having to scratch-build the whole subject, to only having to scratch out or modifying an existing piece in a kit. The Leopard 1 is a hull-type that had a few generations and variants that utilized the same hull. The Leopard 1 had basically two different turret designs. The Leopard 1 thru 1A2 utilized the earlier turret, with the later turret being introduced and used on both the Leopard 1A3 and 1A4. In 1977, Tamiya offered the Leopard 1A4 in 1/16 scale which is now out of production, but is still easily obtainable both used and still in the box. Here we will cover the different processes of making the earlier turret. Like most modeling articles, the subject is not the most important point of the article, but rather the actual processes utilized. From this, modeler's can increase their own expertise in the directions they desire to go. We are all standing upon the shoulders of those who have done the work before us and were kind enough to pass it on, and so should we. None of these processes are difficult; some take a degree of overhead and are not cheap, especially when desiring to get into production work. Producing a single item however is much easier and cheaper. We'll cover that aspect too. Let's crank up the chainsaws.

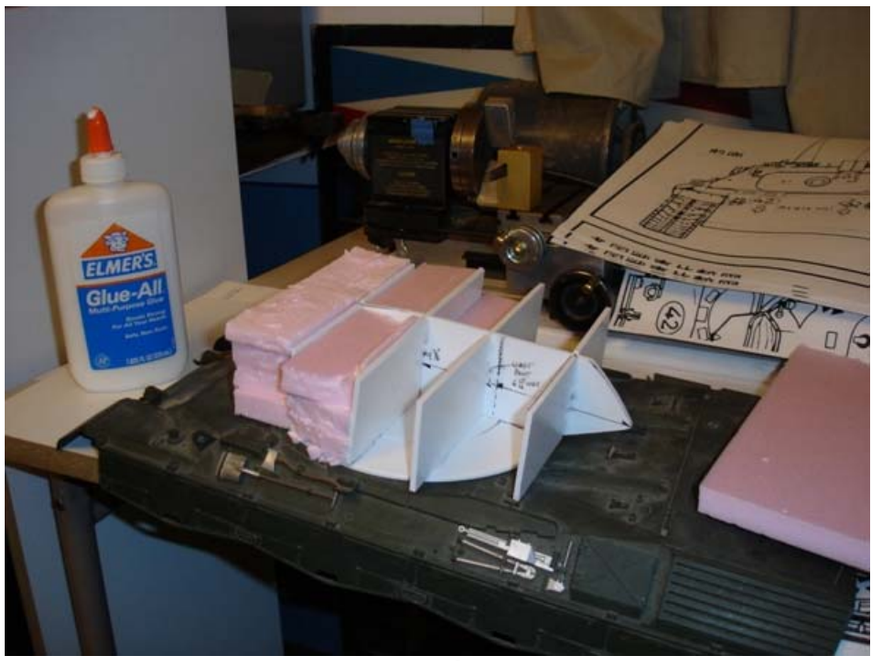
The process conducted for this particular turret can be applied to all turrets or other structures, but it is not the best process for all of them. The first question to ask oneself is 'what is the application for this model'; from here you will be able to deduce what kind of strength the structure will need, or ease of manufacture. Another aspect to consider is choosing a material that will survive the elements during an end-use application, like having it out in the hot sun for instance. If the turret is an angled turret such as one found on a Panzer IV, it is infinitely much easier to construct it out of styrene sheet, or other similar material, as the turret is all flat-sided. Turrets with a lot of contour do not lend themselves to this process, so another way is needed to facilitate the scratch-building process. Whatever the process, the end result and the method getting there are what are important. If the subject like this Leopard turret is going to be cast, then the structure has to be strong enough to withstand the processes utilized to do so, if not, and it is to be a single version, then it is not as important. The subject here we'll construct using a variety of materials including styrene plastic sheet, insulation foam, polyester putty, resin and fiberglass. Other subsequent parts will compose of brass, aluminum, and other casting mediums, in this case Alumilite and casting resin (105/205) from West Systems. A basic overview of the process to make the turret is; build the base and the framing; fill with foam; shape the structure; apply epoxy resin; apply fillers; shape further; and conduct final detailing. If the subject is going to be replicated, then this is all followed by the casting process.

References-A Rock of Gibraltar or Achilles' heel?

No scratch-building process can be started without good references. These can be in the form of prints, photos, or another model of another scale to name a few. The more references obtained, the better, but whichever references are used, they should be checked against not only other references, but also with themselves for validation. Often references have mistakes, and some are abysmally incorrect. There is no substitute for the real item, and when possible the real

subject should be checked out and notes, photos, and measurements should be obtained. Often this is not possible, so photos should be used. Other people's drawings and representations are used last. Sometimes when combining a scratch-built part with an existing model, the existing model is incorrect, so this must be considered. With this project, I went through three sets of prints and each set had gross errors. On one set, the turret wasn't near the same dimensions on one view as it was on another. So bounce your measurements back and forth, and fully 'proof' your prints before starting on a project. To facilitate the scratch-building process, you can use a copier to scale up prints and photos that are of another scale. This knocks out the need to constantly convert dimensions from one scale to another, and gives a good overall view of the subject.

Once a correct reference is obtained it is time to lay down the base of the turret. Styrene of a sufficient thickness to add strength should be used here. The turret utilized styrene that is 1/8" thick for the base and framing. Determine the exact center and mark with a permanent marker on both the top and underside of the base. With a fine permanent marker and ruler draw a line across the base to establish where the turret's center-line frame will go. Like when manufacturing a ship's hull, a benchmark has now been established that all other measurements will be in reference to during the construction. If you get this wrong, the turret will not rotate properly on the hull, be of incorrect proportions etc. From the drawing measure and produce a profile of the turret structure out of the sheet styrene and glue this to the line drawn for the turret's center-line, straddling the line. Next, transfer measurements from the reference to the center frame at regular intervals. What interval it is, is not important as long as they are exactly known distances. Now from the drawing at each interval measure and produce perpendicular framing and install them on their corresponding markings on the turret base. Once done, fill the areas between the framing with builder's insulation foam. The stuff is cheap and easy to work. Glue each piece of foam in solidly with white glue, and let dry (see photo below) thoroughly for at least a day. Be careful with the amount of white glue used, as it will not dry thoroughly if left in puddles as the skin will seal the interior from the air.



The basic outline and overall dimensions of the turret are executed in plastic which will both guide the shape and provide structural strength for the insulation foam. From time to time the construction is evaluated on an old Leopard hull.

With sandpaper (about 60-grit) on a sanding block, start roughing in the overall shape. When doing this, you'll want to provide yourself additional overall benchmarks on each side. The more you have, the more control you'll have when shaping. After getting close to the mark with sanding with 60-grit, crank it down to about 100-grit. Keep this portion of the material removal broad, but measuring overall dimensions, marking with a permanent marker, and removing these large portions. Part of measuring is also drawing and establishing the additional angles that will be used. These are not constant as on an angle-form type of turret, and a lot of measurements and angles will need to be constantly taken, drawn, re-assessed and material removed. In this manner, the turret slowly starts taking shape. It's not going to be exact, but you want it to be close to the final product. The refining of the turret will take place later.

Once you achieve a close representation of what you're modeling, coat the foam with a layer of resin. In this case, I used the West System (105/205), and coated all portions that would subsequently receive a layer of Evercoat polyester glazing putty. If you don't coat the foam, the Evercoat will eat through the foam. Once the resin has dried, coat the structure (except the plastic base of course) with a thin layer of Evercoat, and the best tool to use is your finger. After this has dried, sand off the excess (now using about 220-grit) and start transferring reference points from your drawing to the turret with a permanent marker. This last part is going to be a continuous process, drawing reference points and lines, then adding more Evercoat or removing material, then redrawing the reference lines again. When doing this, only work one area so that all your reference lines are not removed, then after finishing that area, you can quickly re-establish the lines. Early in this process the undercut area under the rear bustle of the turret needs to be done. Drill out an adequately sized hole at the center turret pivot point which will be used for the multiple screeding tools that will be needed. A screeding tool is nothing more here than a sheet of brass soldered to a brass rod which is inserted into the pivot hole. The sheet of brass is angled to conform to a certain angle and at a certain height and rotating this tool across the glazing putty quickly forms the desired symmetrical surface. The bottom plastic of the turret provides the adequate base to achieve the height, so all you need is the angle when making the tool. As the rear of the under-portion of the turret (approximately the rear 180-degree portion) changes angle from the rear to the sides, either multiple tools will need to be made, or a tool that pivots to different positions needs to be constructed. Basically, you divide the turret left and right down the centerline, and each side (approximately 90 deg) you'll want to screed in at least 4 different known surfaces than fair them in to each other.

The basic form of the turret has been set up and is rapidly taking shape, using a large file and sandpaper. You'll want to get this as close as reasonably possible to the final shape as it will save a lot of time with subsequent filling and sanding.

On the underside of the turret master, a male flange (see the completed one in one of the photos below) will need to be built up that will form the mating portion of the turret to the upper hull. To do this, place the turret onto the upper hull in the correct location and with a permanent marker draw the outline of the upper hull onto the turret bottom. This will be the outside limit for the rim of the flange. With a protractor, draw the inside limit of the flange which would be about ¼" inside the outer previously drawn line. Now place a strip of styrene that has a width of the approximate height the flange will be and glue this down into the center between the two lines until the whole circumference is made. There'll be a small gap, but don't sweat this as the Evercoat will fill it in. Now it's time to screed again. Make another brass blade with a cutout of the desired shape of the flange, when doing this one, make sure that the outside of the flange has a slight inward bevel to it. Then solder a brass rod or tube to the blade so that the rod or tube can be inserted into the center hole drilled before for the previous screeding process. Place some Evercoat glazing putty over the styrene strip and screed it until the area starts building up. Keep putting the glazing putty on and screeding continuously until the complete flange comes into shape.

The turret now has been coated with a protective layer of resin and Evercoat polyester glazing putty, and the shape of the turret is now further refined. At this time a brass tube which makes the 'bulge' where the stereo-scopic range finder is modeled-in. Note also that reference lines are now drawn to assist in further refining the shape.

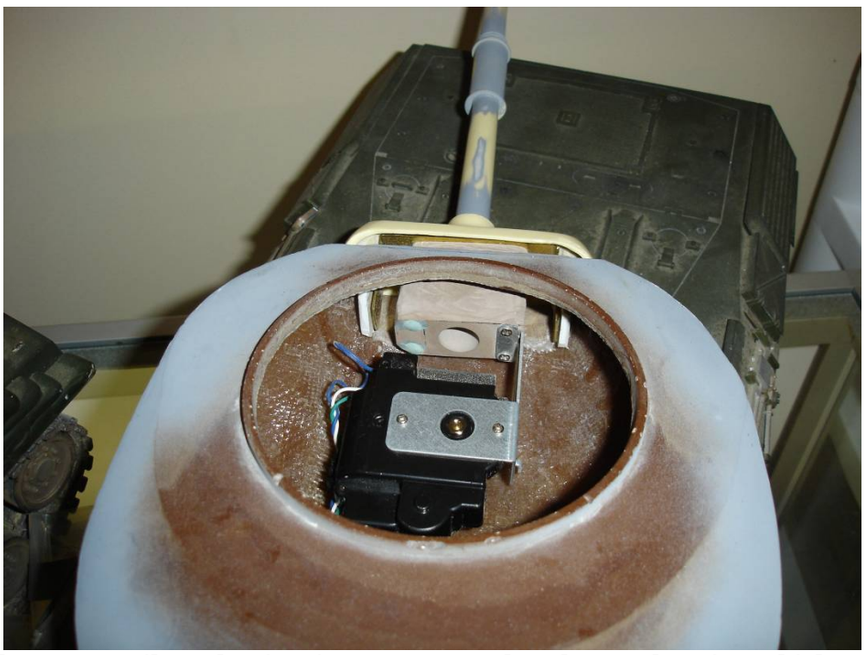
There are some portions on the turret that would be advantageous to model-in vice having to do them separately on each mold casting. I modeled-in the areas for the antenna bases at the rear of the turret, the stereoscopic range finder at the top of the turret, and the shell ejection port on the left side of the turret. For the antenna bases, I drilled overly large holes, placed a boring tool that was cut on a lathe into it after covering it with wax, and glazed over them flat. For the range finders, I placed the turret onto a milling machine, and milled a groove at the proper location, placed a brass tube which had solid ends of brass soldered into it with centering holes drilled into each side. This was all covered with glazing putty except for the ends of the brass tube. Another boring tool that mates up with the holes of the brass tube was cut on a lathe. This was also coated with wax and inserted into the hole and glazing putty placed around it, and once it starts to harden, turning the boring tool and removing it which leaves the desired shape (see final cast turret). This leaves a clean extension of the groove where the range finders will go. For the shell ejection port, a ejection port door was made out of styrene and covered with wax and a wire inserted in the middle. The area where the port would go was grooved out, filled with glazing putty and when dry the door was removed leaving an almost clean representation of the port sans the door. All these areas were then cleaned up quickly with some #220 sandpaper.

This photo and the one below show the turret almost at the point where it's ready to be used as a master for a tool. A piece of styrene has been shaped to create the raised portion of the deck around the dual cupolas.

Reference lines are still being used on the turret to continue assisting in refining the shape. The turret rests on an old Leopard hull acquired off of Ebay that will receive a massive restoration/ overhaul of it's own.

Now the process is to refine the turret into the master that will be used to make the molding tools (see Dave Merriman's Cabal Reports 1-7). Keep taking overall measurements and drawing reference lines, and then remove material or build-up as needed like before. Once the turret looks completed, spread on a thin coat of NitroStan glazing putty over the whole turret, and wet-sand it down with some #400 sandpaper. The purpose of this last coat is to clean up all the scratches that were on the surface that are difficult to see. What you end up with is what's in the photo above. A piece that's ready for casting. Casting was achieved both with Alumlite and West System casting mediums, the latter is shown below, after additional work had been done mounting the main gun elevation and recoil units. The next task is to make the rear stowage cage located on the rear of the turret utilizing brass and the resistance solderer.

The new GRP turret following installation of the mount for the main gun. A partially sacrificial rectangular styrene plastic assembly was installed for initial alignment, then all but the sides were cut out. A brass frame was fashioned which both the mantlet and gun housing are mounted to.



The gun recoil mechanism is now mounted to the gun housing which was constructed of Renshape 40. Additionally, you can see the flange that was constructed on the master that forms the male mating portion that will mate with the mating hole in the upper hull.

The turret as it appears mounting the gun and mantlet. The rear stowage cage and bin are to be produced next.

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