# Instructions for M36B1 Tank Destroyer Re-Build
## Started: Oct 15, 2020 Finished: April 2, 2021
by Paul E. Howald © 2021

**Goal:**

1. Rebuild a Mato all metal M36B1 (Sherman M4A3 based) tank destroyer to (a) display an interior gun turret area w/ 3 crewman, (b) enhance lots of details, and (c) add new electronics, paint, weathering & decals. The Mato model is basically correct but could use some additional details and refining of existing work.

**Notes:**

1. **Read these entire instructions before starting any work. Understand the processes followed.**
2. In general, I tend to build a model by making the inside parts first and adding the outside details last. This keeps the outside details from being broken off during the construction process.
3. Normally I paint and weather all subassemblies and parts before gluing or fixing them in place. In this buildout, I weathered the running gear and lower hull early in the process, and then weathered the upper hull after most of the major work was completed. For this model I used Krylon red primer #51317 over which was sprayed Krylon Camouflage #4293 Olive Drab.
4. The Re-Build process is broken down into 4 main steps: the 1st is addressing the Lower Hull, Suspension and Track (included in this step is configuring the new electronics package); 2nd is adding lots of new details to the inside and out of the Turret; 3rd is addressing the Upper Hull changes and new details; and 4th is full re-assembly, final painting and weathering.

**Total Parts Used:**

| | | |
|---|---|---|
| 1. | Basic Mato Metal model | $364.00 |
| 2. | Tamiya TBU infrared base | $25.00 |
| 3. | Mini Battle Unit | $30.00 |
| 4. | Tamiya Battle Unit | $60.00 |
| 5. | 11.4v Lipo 3 cell battery | $55.00 |
| 6. | IBU2U Electronics Board & Micro Card | $224.55 |
| 7. | 2.4G 4 channel radio and receiver | $40.00 |
| 8. | Cast pewter 50 cal MG by AFV Model #DT-16-009 | $45.00 |
| 9. | Cast brass 50 cal MG ammo belt DT-16-010 | $ 6.45 |
| 10. | 3 1/18 scale 21st Century US Ultimate soldiers | $30.00 |
| 11. | Misc. screws, glues, resin parts, brass sheet, bar, tube, paints, decals | $50.00 |
| 12. | Labor to rebuild model | $300.00 |
| | Total | $1,230.00 |

**Research Materials used:**

1. Squadron Signal: US Tank Destroyers in Action
2. Squadron Signal: Walk Around US Tank Destroyers
3. Images of War: M36/M36B1 Tank Destroyer
4. New Vanguard 57: M10 & M36 Tank Destroyers
5. Osprey Modeling: US Army Tank Destroyers of WWII
6. Tankograd Tech Manual # 6036: M36, M36B1, M36B2 Tank Destroyers (a “must have”)
7. War Dept Tech Manual IM 9-748; 445 pgs; 90 mm Gun Motor Carriage M36B1 (a “must have”)
8. War Dept Tech Manual IM 9-374; 90 mm Gun M3 Mounted in Combat Vehicles (a “must have”)
9. Mato Metal M36B1 Rebuild Article in 2016 by Dr. Phibes on RC Tank Warfare Forum (this article was never finished and final model pictures were never shown).

**Commence Work:**

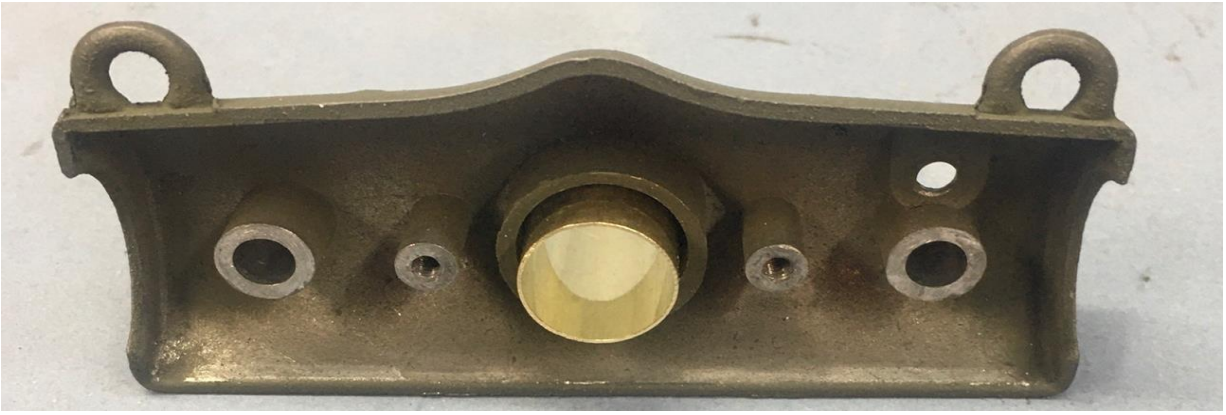
1. I did not like the factory paint job on the model, so I decided to disassemble much of the tank and repaint it. This requires considerable effort and as parts are removed, be sure and put them into labeled plastic bags….especially all the screws and small parts so you know what goes where during reassembly. It also helps to take pictures of subassemblies. Keep all the suspension bogies in the right order so they go back into the Lower Hull slots from which they came.

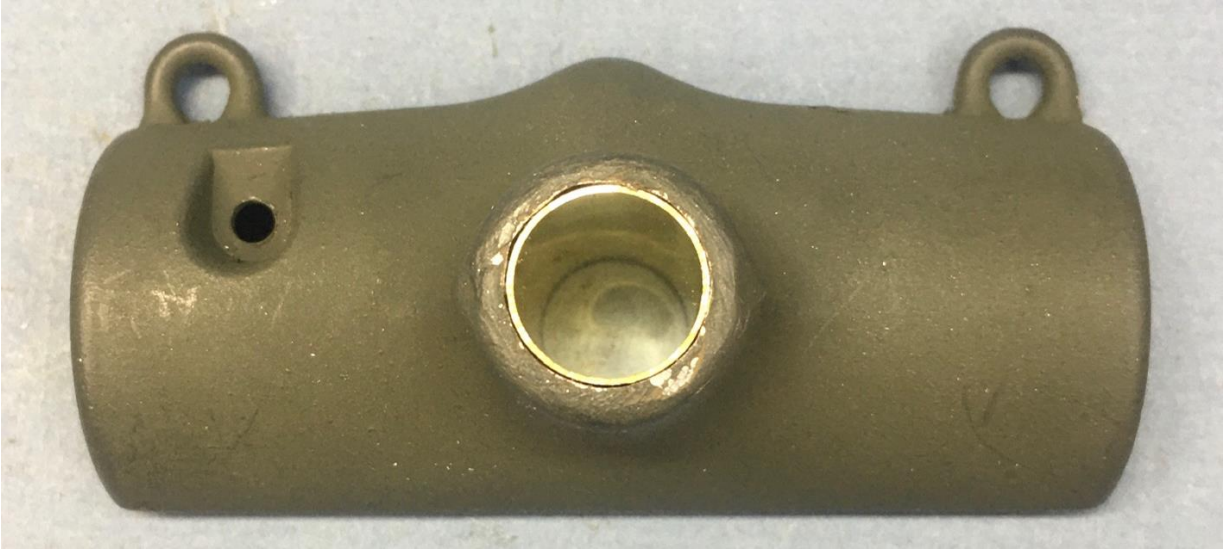
2. I also planned to replace the Mato Electronics with an IBU2 Ultimate board so I removed "everything" inside the Lower Hull….right down to pealing the two sided sticky tape off the bottom. I then painted the inside floor and walls white….since most prototype tanks had the same. I figure some of the white may show thru as you look down into the open Turret.

3. The reference article (#6 above) by Dr. Phibes, went into great detail about changing the rear Lower Hull exhausts to be prototypically correct (because he added a smoke unit), but I did not find Mato's design to be objectionable, and felt that the profile and height of the exhaust vents were acceptable behind the exhaust deflector in the down position. I also was not adding a smoke generator. Although the rear hull hatch/door is still located too high, I did not feel it warranted moving, but on my model the two door hinges were loose so that the door would not stay closed. The hinges cannot be bent to tighten them down (as they will break) so, I just glued the entire door closed.

4. **Muzzle Brake:** I wanted a muzzle brake on the barrel of my model which is typical for some of the later prototype tanks. This required turning the metal barrel on a lathe so the thickness at the end was thin enough to fit inside a plastic muzzle brake from a Tamiya Pershing tank model (of which I happen to have an extra piece).

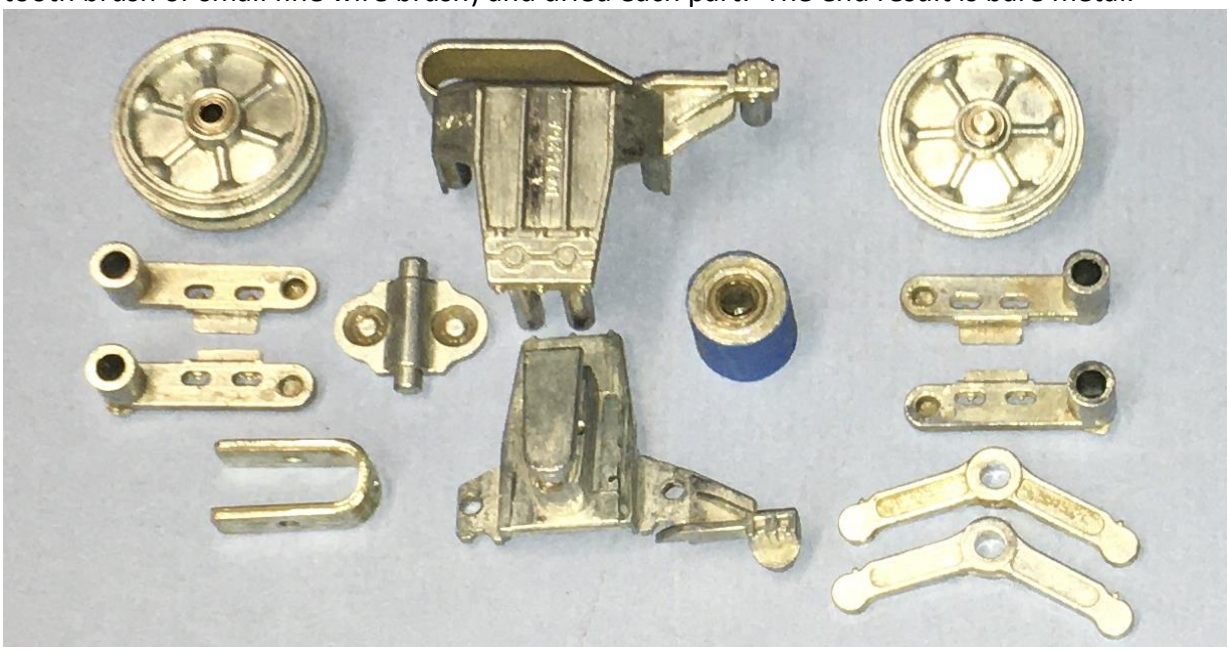
5. **Recoil Problem:** A little later on in the rebuild process I realized that the barrel was not recoiling properly back into the Mantlet when the Cannon was fired, so I ended up modifying it. I will mention the details here since we are now talking about the Barrel. What I had to do was insert a brass tube into the Mantlet which extended back to the inner rotating plate. The tube was a K&S Brass part #8139, and was cut 1.13" long. I had to file out the opening in both the Mantlet and the inner rotating plate so there was no stress (side pressure) on the brass tube. This allowed the barrel to slide smoothly back and forth within it. But the rear section of the barrel (which slides in this tube) has to also be turned down about .010". I used a file and turned the barrel in a drill press, to get the right diameter (mine was .465"). Per K&S, the tube OD is .503" and ID is .488" but my ID was actually .473". Here are pictures of what was done. I did not strip off the old paint from this part and just painted over it.



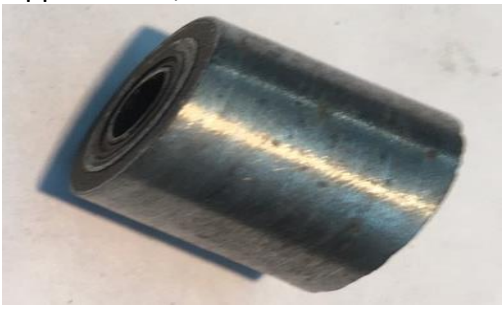


Be sure to add some super glue around the insert and to file this area smooth before painting.

6. After disassembling all of the suspension parts, it is essential to strip all of the old paint off especially for the smaller parts. A typical paint remover worked fine (soaking for a few minutes) after which I dunked the parts in paint thinner and then brushed all residue off (using an old tooth brush or small fine wire brush) and dried each part. The end result is bare metal.



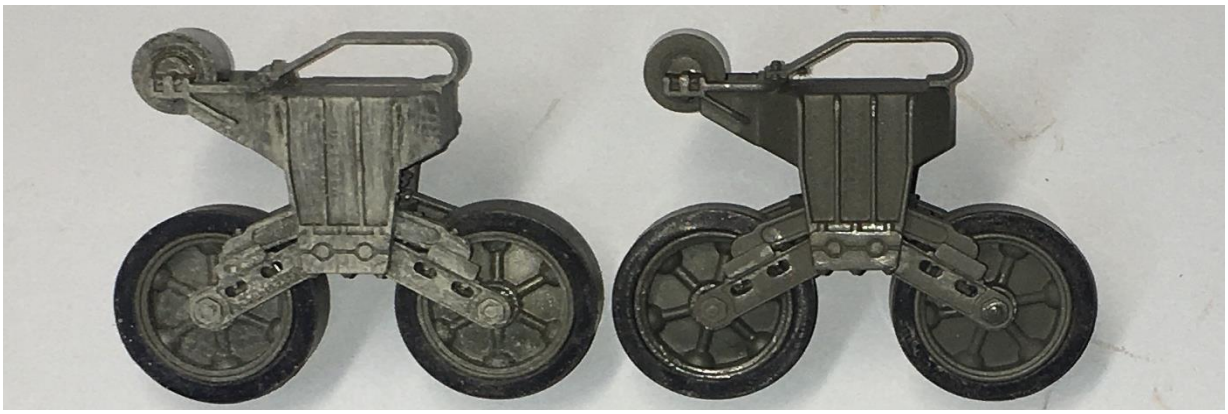
7. In the picture above, I have wrapped blue painter's tape around the cylinder of each track support roller, so that a bare metal color would result after painting the (2) ends.

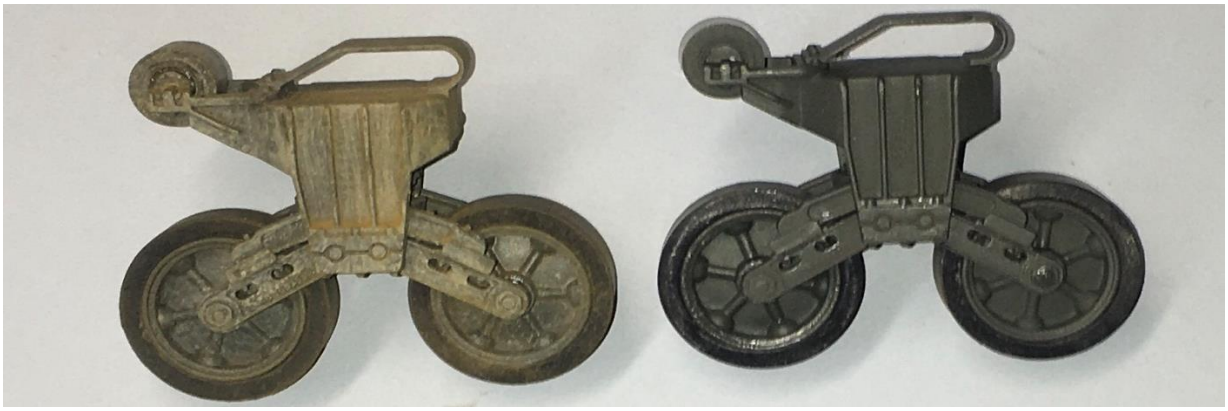


I also elected to grind the word Mato off the outer face of each bogie suspension bracket before repainting. Pretty sure that word is not prototypical !!

Remember to repaint each part first with Krylon red primer #51317 before painting the final color Krylon Camouflage #4293 Olive Drab…..or some other Olive Drab variation you might like. Be sure to let each coat dry thoroughly.

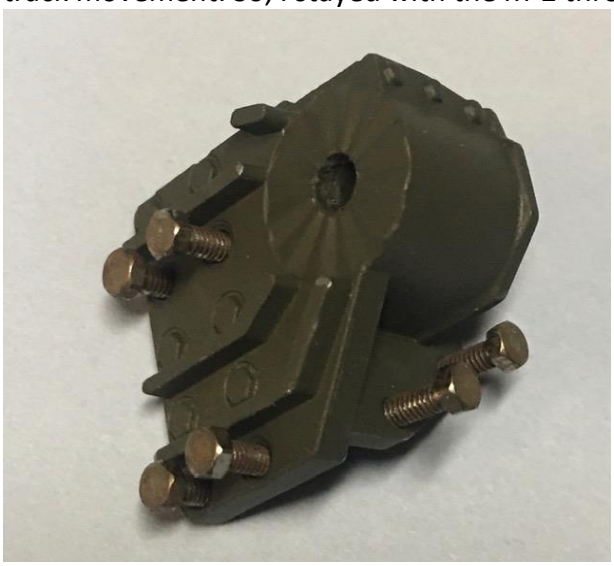
8. **Weather Suspension:** I decided to weather the model with a light/thin coating of dried mud over which has accumulated a brownish dust, with some heavy splotches of mud here and there. As mentioned before, I usually add this treatment to subassemblies and "do not" wait until the model is fully assembled to add weathering. So, after each suspension bogie is repainted and reassembled, I diluted (with water) Vallajo Thick Mud #73.810 till it was watery and then dabbed/splotched a light coat of this all over the entire bogie. I also covered the rubber wheel treads because they too get dirty on a real tank. In the following (2) pictures, the righthand bogie has not been weathered for comparison. The second picture shows the addition of AIM Product #110-3122, which is a Dark Buff powered pigment which gives the brownish dust effect. This is lightly applied with a small brush and a very soft large "blush brush" from the wife's cosmetic drawer.

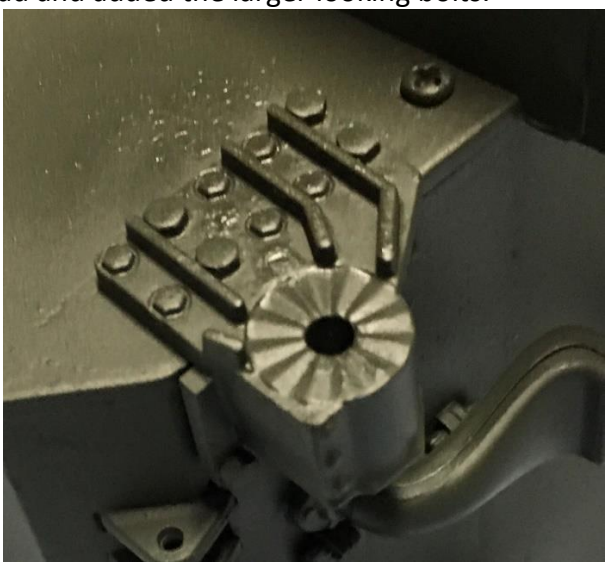




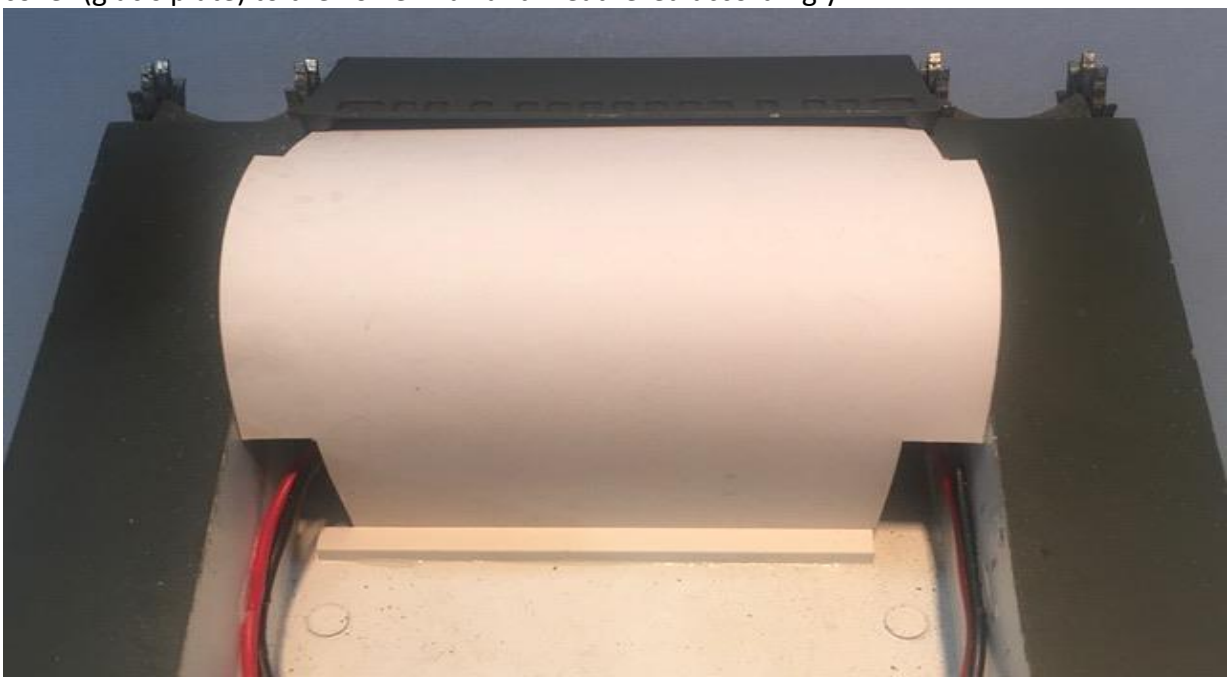
Over top of these two coats, I lightly sprayed Testor's Dull Coat #1260 to seal all the paint and weathering. I used Dull Coat on the entire model. Be careful not to spray this too heavily as it can dilute your weathering effort.

9. **Scale Looking Bolts:** I did not like the looks of the 16 Philips head screws that Mato used to mount the (2) idler wheel brackets. I decided to replaced them with hex head M-2 brass bolts, of which the head shape was still too large compared to what was cast into the bracket, but the bracket was also threaded (like the lower hull) with M2 threads, so I had little choice other than to fill all holes and redrill and tap for smaller bolts (which seemed to be too much work and I worried that the brackets would then not withstand the stress applied to the idler wheel from track movement. So, I stayed with the M-2 thread and added the larger looking bolts.





At this point the Suspension System needs to be mounted back onto the Lower Hull. This means that both Gearboxes need to be re-installed first. Prior to doing so, I had to solder all (4) wires to the motor as mine were not secured. Be sure the (4) Gearbox mounting bolts are tight and add some synthetic grease to the gears. This grease will tend to splatter over time as the motors are run, so if you desire, you can add a very thin sheet of styrene over top the Gearboxes to catch this residue, but the styrene sheet must be removeable. Also remounted the transmission cover (glacis plate) to the Lower Hull and weathered accordingly.



Removeable styrene Gearbox cover.

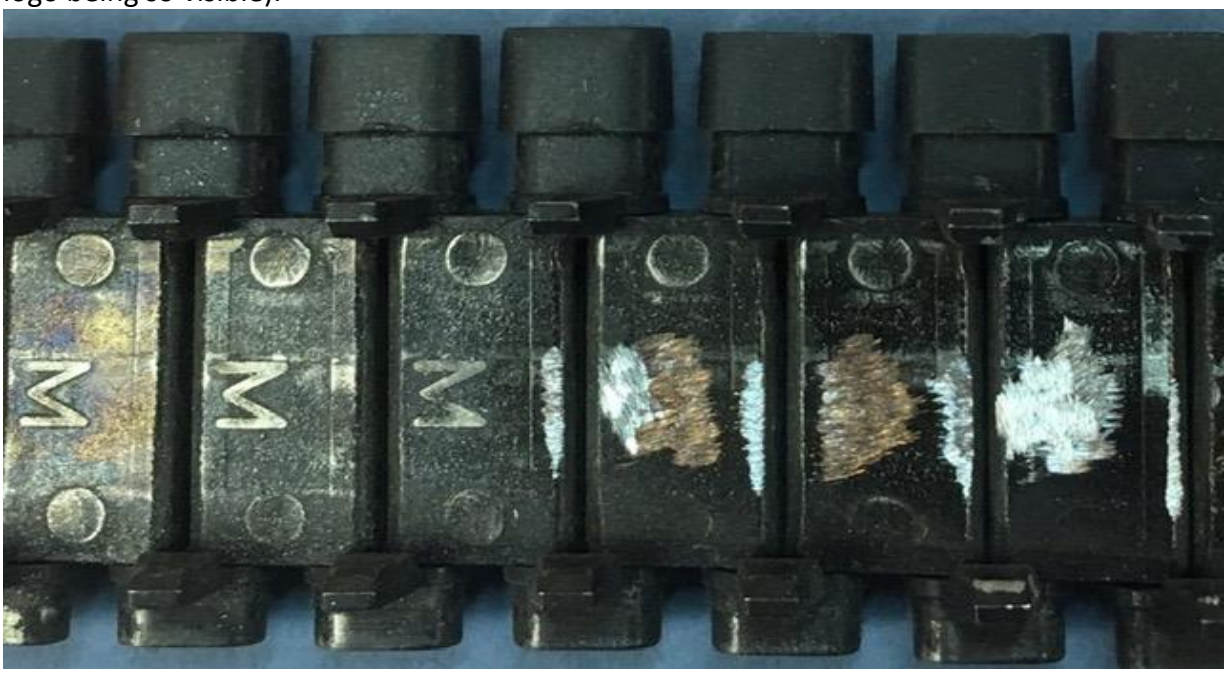
Template for styrene Gearbox cover.

10. Before mounting the Drive Sprockets I scraped a bit of the paint off each tooth to replicate where the tracks would cause bare metal to show.

I also had to scrape off both the primer and final coat from part of the rear bogie bracket so that they would fit back into the 6 lower hull openings. This mounting requires a very tight fit so that the inside “U” bracket fits properly with no wobble (see next (2) pictures.

Don’t forget to weather the Drive Sprockets and Idler Wheels before mounting.

11. **Scape Trademark Off:** The next big effort is to grind off the "M" from the inside of each track link (156 total). This marking was also not prototypical (optional…if you do not mind the Mato logo being so visible).



12. **Weathering Tracks:** Here is how I usually weather tracks: I like the connectors to have a red hew to them, such as a bit of rust would appear. This could also be the primer coat showing thru. The inside flat surface of the link is usually a dark color but also can show mud on it. The outside surface of the link would also be dark but show dirt and mud caked on. The outer part of the link that meets a road surface (if it's metal and not rubber like on some Sherman's), would be a shiny steel color….if its rubber, then the color is dark. The entire track can also have a light coating of dust on it (optional). So, if the track is already dark or a black color, I tape off the section of the track not to be affected, and then lightly spray paint the outer connectors with

red oxide paint. Then add weathering and once dry, spray everything with Testor's Dullcoat. The final step is highlighting with silver paint those areas that would be heavily used or the paint is ground off from use.

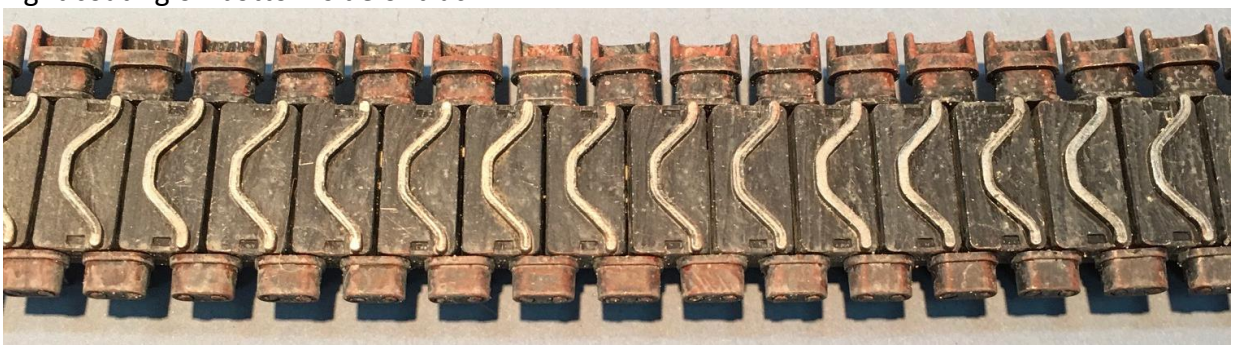
I would also recommend reading the "How to Paint WWII German Late Armor" from Ammo by Mig. Although this magazine shows German Armor as the examples, there are techniques described within that can be applied to any armor subjects. The pictures are outstanding.

Because the Mato M36B1 model comes with T-74 tracks with Duckbill extenders, I chose to downplay the red color effect and decided to "sparingly" brush red oxide on the connectors. But first the inside surface of the track link where the "M" was ground off needs to be painted a dark color to get rid of the shine. This can be done by brush or spray.

Next apply the red highlights mentioned above. Then add a coating of the diluted Vallajo Thick Mud #73.810 on most of the surfaces and also add thicker dabs (undiluted) here and there to show caked mud. Next, lightly brush the AIM Product Dark Buff power to all surfaces and lightly spray Dullcoat overall. Last, add a silver highlight to the raised portion of the outside track (the "V") because paint will have worn off this area from contact with roads and rocks, and also those areas of the track teeth where metal would rub on metal or where the rubber tires would rub off paint. Don't forget to paint your extra track links at the same time, in case you need to replace some later, so they will all match.

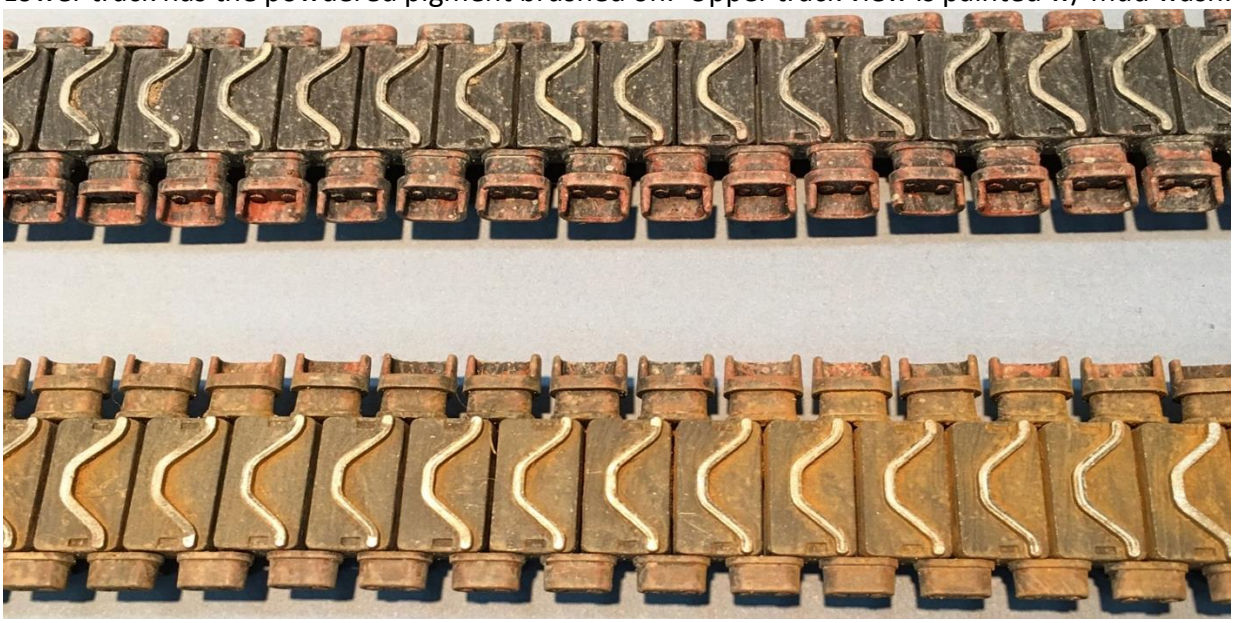
Lower track has light coating of diluted mud on inside of track. Upper track is only painted.

Light coating on bottom side of track.



Lower track has the powered pigment brushed on.  Upper track view is painted w/ mud wash.

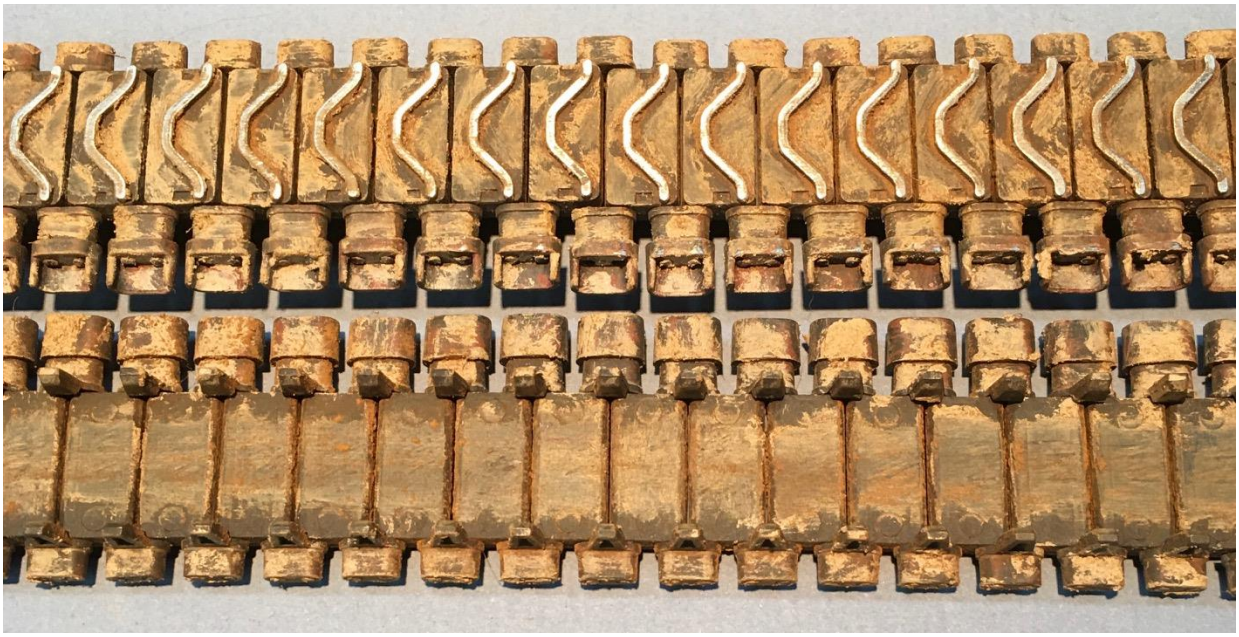
Lower track has the powdered pigment brushed on.  Upper track view is painted w/ mud wash.



Track teeth highlighted silver to depict “worn areas”.  Track sprayed with Dullcoat.

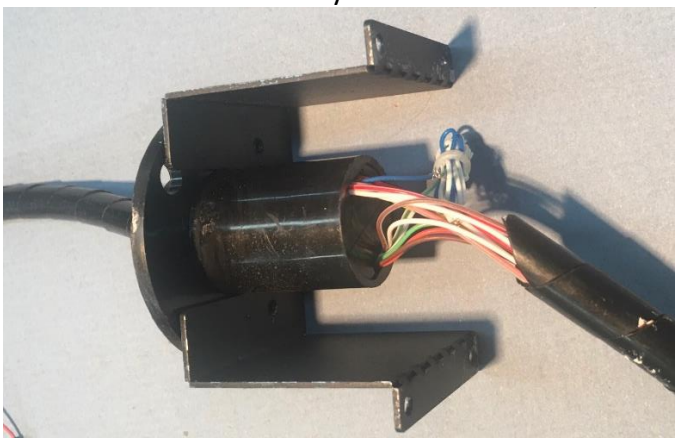
You can stop here if this is to your liking.

But I want some medium thick mud caked on my tracks, so I applied undiluted Vallajo Thick Mud #73.810 with a paintbrush….leaving small globs here and there, then liberally coating with the AIM Product Dark Buff power and "heavily spraying" with Dullcoat so that the powder would be diluted.



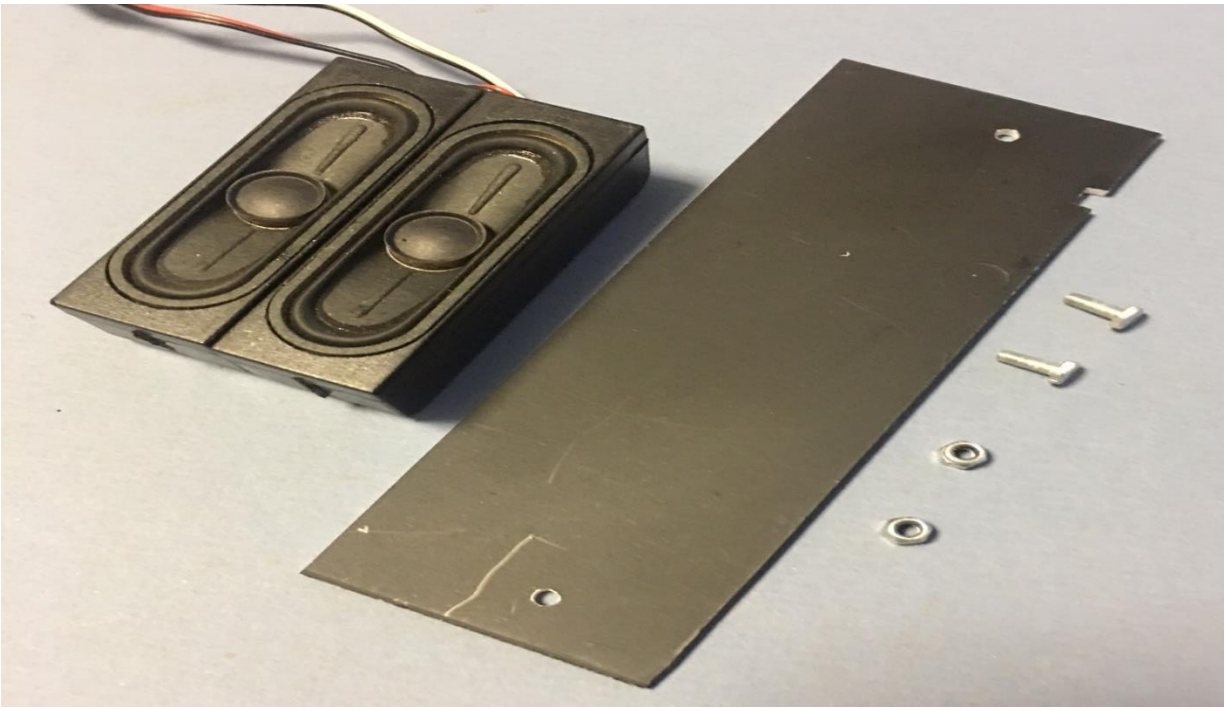
This is the final result of the process I followed.

13. **Inside Floor:** The next phase of the re-build will deal with placement of the new electronics board, speakers, wiring and a Lipo battery inside the Lower Hull. I am also installing a Tamiya IR base in the Turret and a new Mini Battle Unit from LegoDEI, so the old ones from Mato are not needed. This basically means that I do not need the slip-ring device for all the Mato wires.

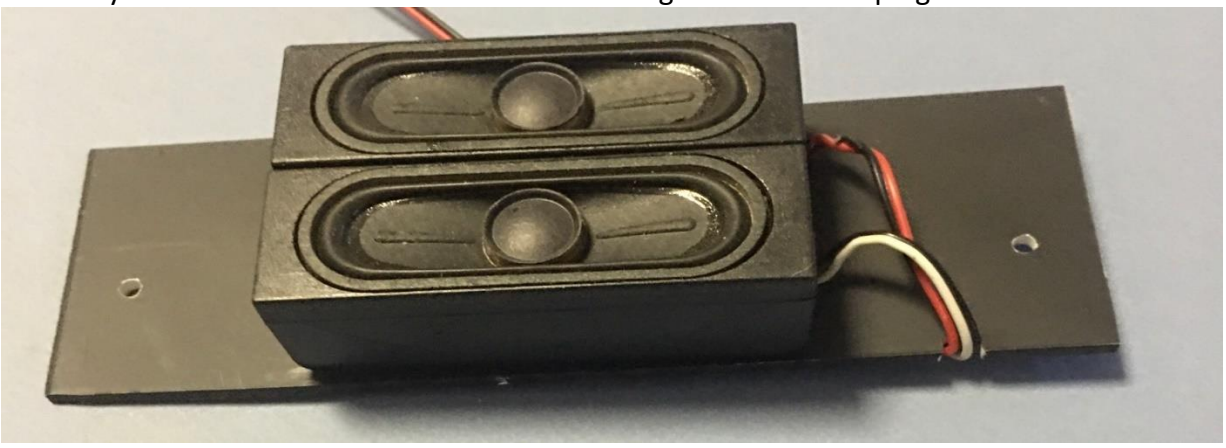


But I do need the 6 wires that operate the barrel recoil and Elevation Servos, so these wires will be cut about 2” from the Servo boxes and then soldered onto new wires with (3) pronged Servo plugs attached. Be sure to mark the (6) wires you cut because you can sell the slip-ring device to someone else who is worried about wires twisting when they rotate their Turret more than 360°. Personally, I think this device was an unnecessary item in the Mato tank because rarely does one rotate their Turret more than 360° or continuously in one direction during an RC tank battle.

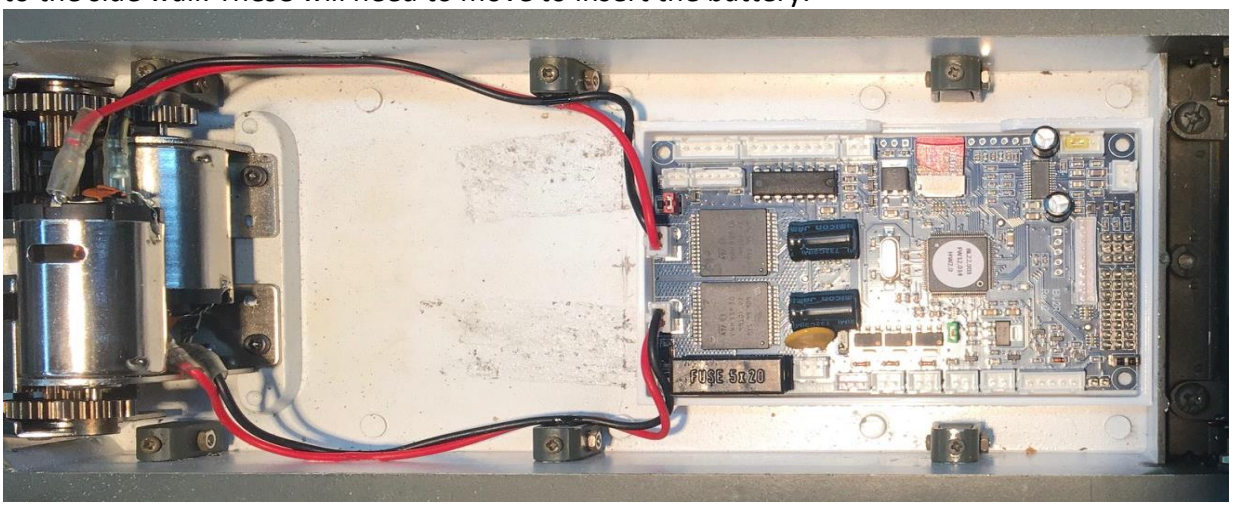
I plan to locate the IBU2U board at the back of the Lower Hull, with the speaker mounted above where the chrome U bracket once set. This U bracket was for locking the Upper Hull to the lower, but the design was impractical because you had to rotate the Turret 90° to be able to open the rear deck doors for access. Instead, I plan to add magnets at the rear of the Upper Hull to lock the Upper Hull to the Lower Hull. So, to mount the speakers up close to the rear deck doors, cut a piece of styrene that is 2” x 5.625” x 1/8” thick. Locate the mounting holes and notch out for the speaker wires as shown below. Don’t forget to paint the bolt heads Olive Drab, as these will be mounted upward from under the side flanges of the Lower Hull, thru the styrene, and capped with the self-locking nuts.



**Speakers:** The speakers are then secured in the middle with double stick tape. When this assembly is mounted the wires should extend straight down to the plug in the IBU2U board.

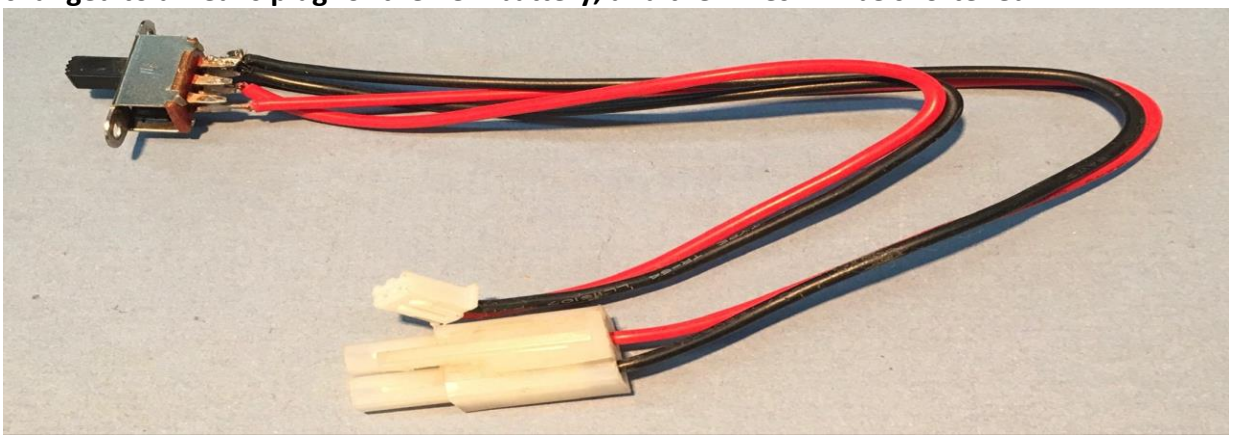


**IBU2 Installation:** Mount the IBU2 3D printed case with double stick tape to the rear floor of the Lower Hull. Insert the IBU2U Board into the case but do not secure it. Make sure the Micro card is on the right side. Insert the (2) motor leads into the board but do not glue those wires to the side wall. These will need to move to insert the battery.

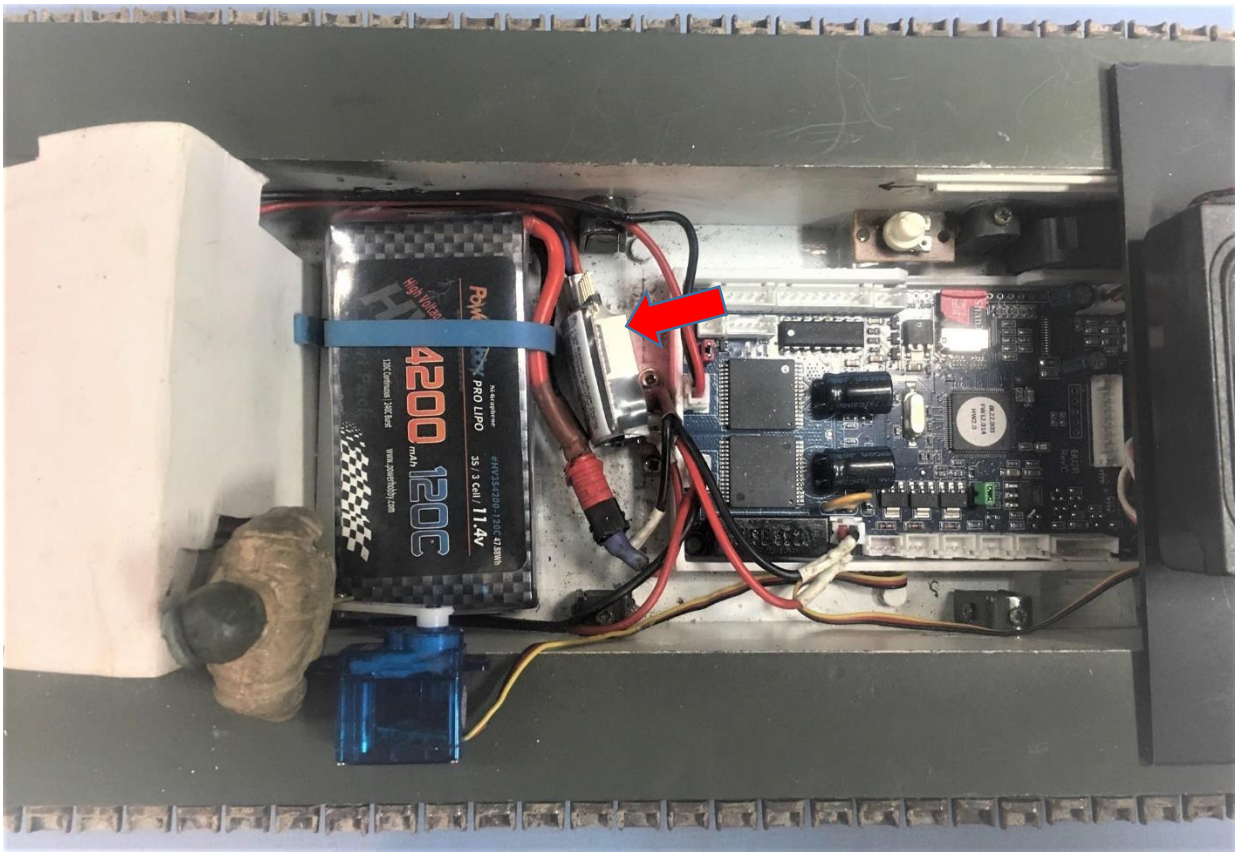



**Battery Installation:** The area in front of the IBU2U Board (for the battery) is approx.. 92mm wide x 73mm long x 25mm high to the top pf the screws securing the U brackets that anchor the rear bogie brackets. I searched for a Lipo Battery with high capacity that would fit in this area, and found a 4200 mah (3) cell 11.4v by Powerhobby (90mm x 42mm x 23mm). It was a bit pricey thru Ebay at $54.99.

**On/Off Switch:** I also decided to relocate the on/off switch from the rear chrome U bracket, and the logical place for it is in front of the IBU2U case next to the battery, protruding thru the floor to the underside. Drill out 6-8 holes in the area as needed and square up with a file. Mount a slide switch like the one shown. I drilled and tapped (2) bolt holes (3-48 NC) to attach it to the floor. The drill size is .0785" (D-47) and the tap is a T-7. **The battery connector will have to be changed to a Deans plug for the new battery, and the wires will be shortened.**

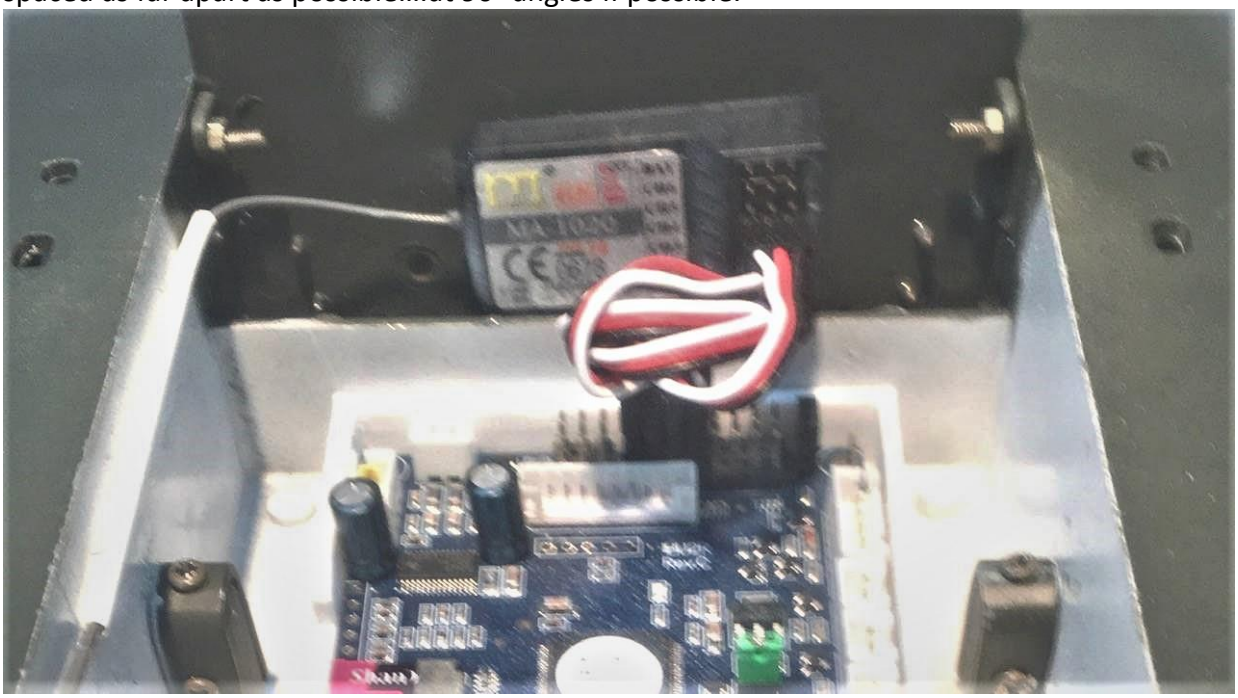


**Cooling Fan:** I also decided to add a small fan to cool the electronics. This is 5v 0.2A Brushless fan and can be plugged into any unused receiver or Servo port on the IBU2U Board. They run at 5v when the board is turned on. I mounted the fan along a side wall by the board. Use a bigger fan if you can find one as this size only produces a little amount of cool air.

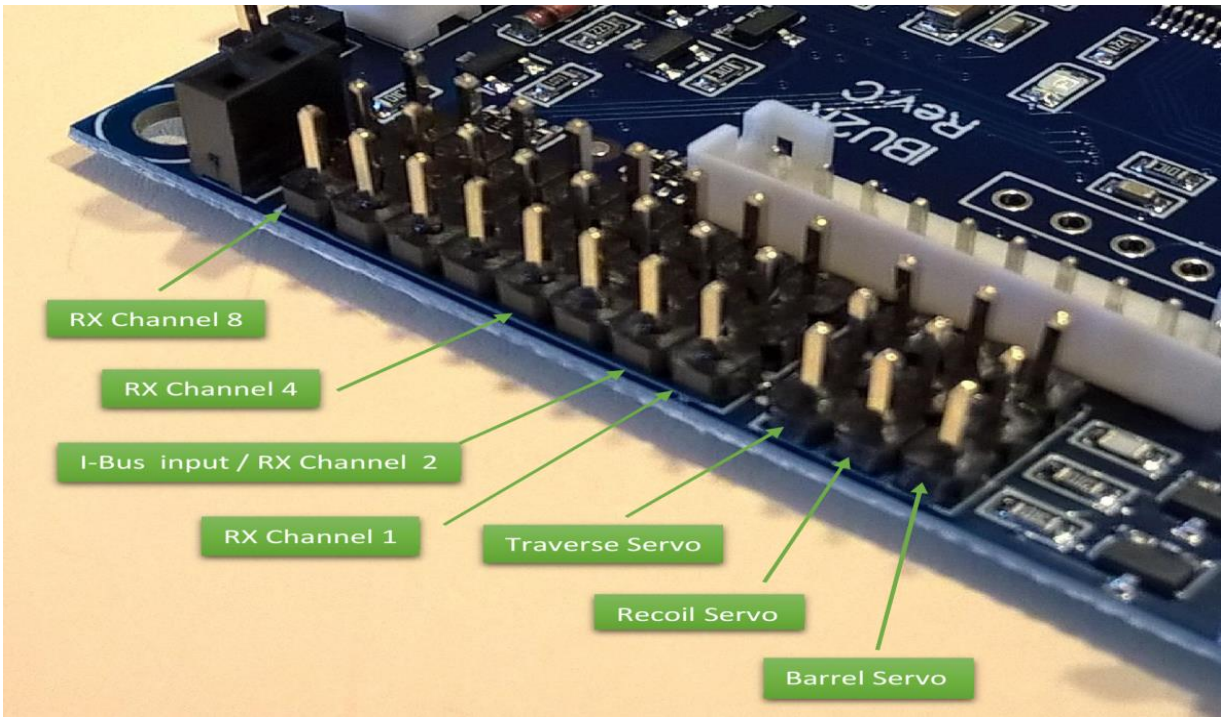


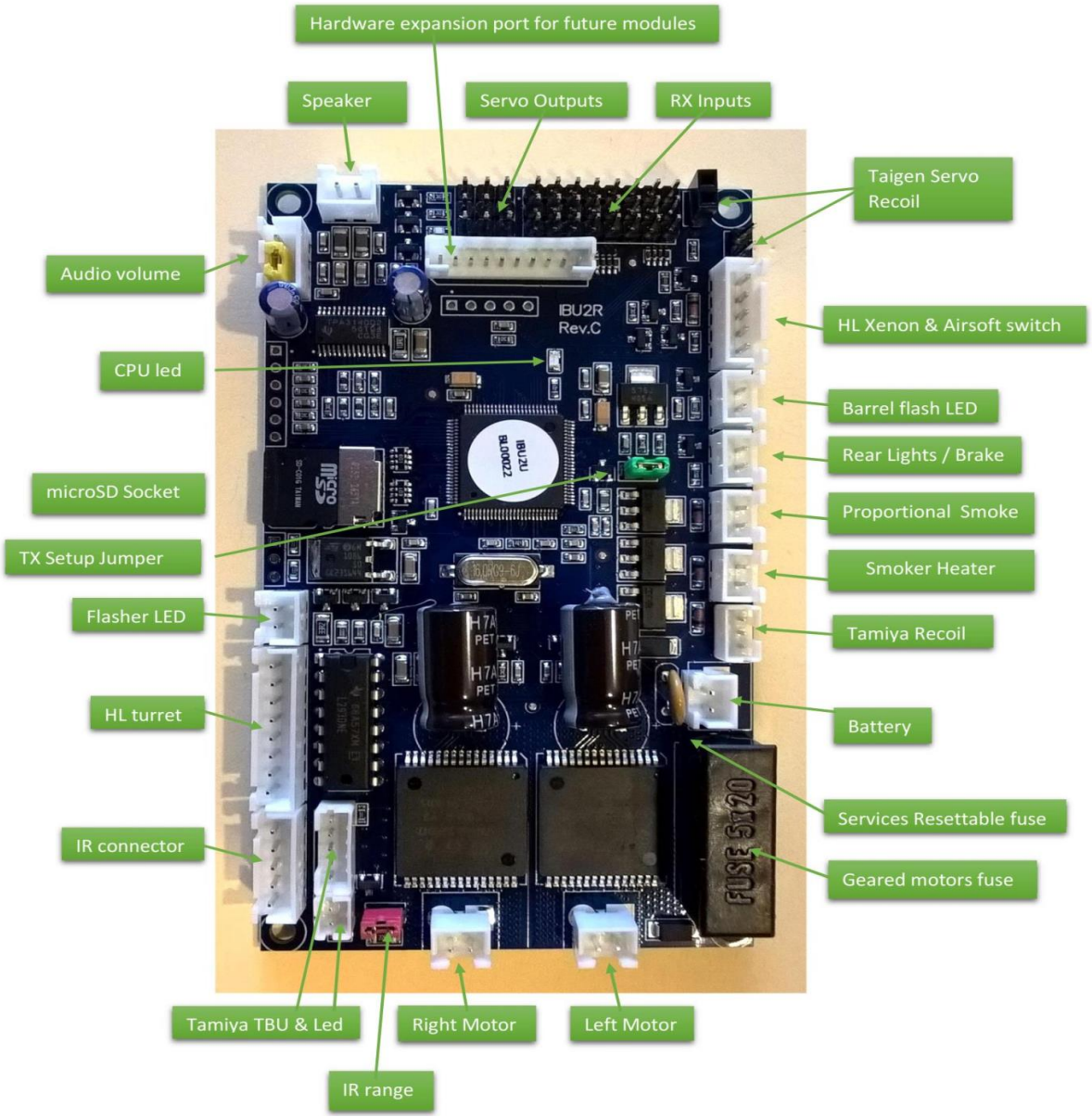
Finished interior of Lower Hull. Note the Voltage Monitor attached to Lipo Battery for safety.

**Radio RX:** A new radio system is needed and I chose a 2.4G FlySky FS-i6 radio. The receiver needs to be located near the IBU2U board and the logical place is in the rear area under the speakers up against the back wall. If you use the original Mato M36B1 receiver (like I did), there is only one aerial and I have secured it in a small heat shrink tube mounted on the side wall to keep it out of the way. But if you use a receiver with the (2) aerial wires, make sure they are spaced as far apart as possible….at 90° angles if possible.

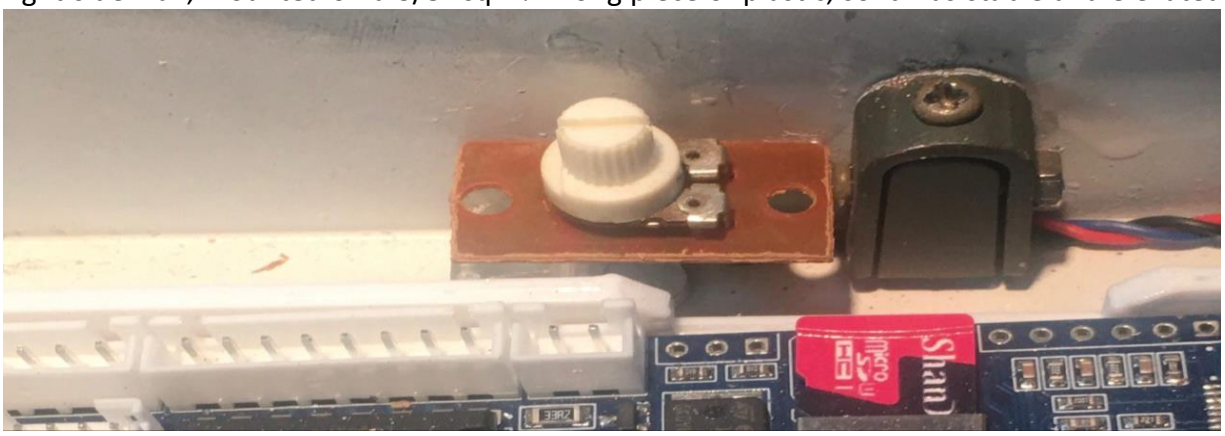


Be sure the Servo wires from the RX to the IBU2U Board are placed into the correct input slots, i.e…... RX Channel 1, 2, 3 & 4


RX Channel 8
RX Channel 4
I-Bus input / RX Channel 2
RX Channel 1
Traverse Servo
Recoil Servo
Barrel Servo


Hardware expansion port for future modules
Speaker
Servo Outputs
RX Inputs
Taigen Servo Recoil
Audio volume
HL Xenon & Airsoft switch
CPU led
Barrel flash LED
Rear Lights / Brake
microSD Socket
Proportional Smoke
TX Setup Jumper
Smoker Heater
Flasher LED
Tamiya Recoil
HL turret
Battery
Services Resettable fuse
IR connector
Geared motors fuse
Tamiya TBU & Led
Right Motor
Left Motor
IR range

**Speaker Volume:** You must also install a Heng Long Audio Volume knob. I glued this one on the right side wall, mounted on a 3/8" sq x ½" long piece of plastic, so it was stable and elevated.



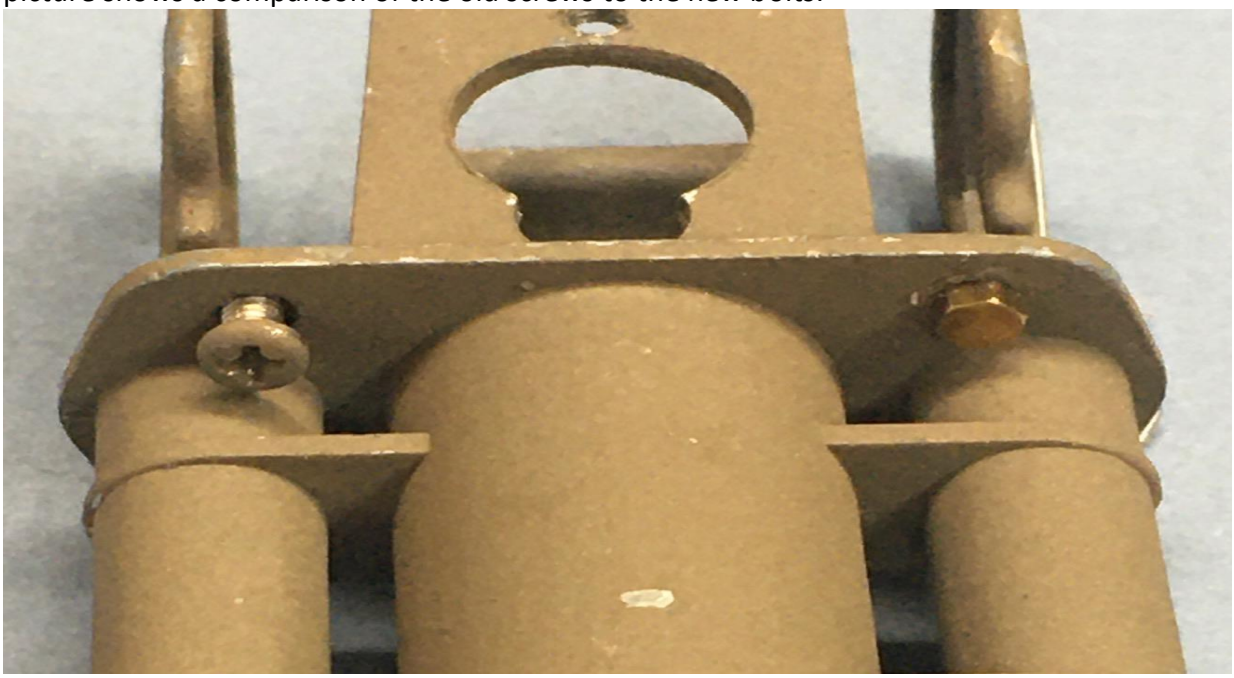
14. At this point the inside area of the Lower Hull is complete and I have reassembled the track onto the running gear. So, it's time to add any additional weathering desired in these areas and any touchup to the Lower Hull. I'm trying to achieve the effect of splattered mud which results from moving tracks. You will also want to apply this mud splattering to the Upper Hull later on (but shown here for clarity).

15. Now let's re-build the Turret starting with the inside:
**NOTE: As you will see from the various pictures that follow, the placement of all the parts is not exactly where they were located on the prototype tank. This is because the opening to the Turret Basket below is not as big it should be (2 of the 3 screws prevent opening it all up),**

**and 2 of the 3 seats for the miniature soldiers have to be positioned too far forward. Thus, not everything is positioned exactly where it should be, but are located close enough to look good. It seems there is always a compromise when detailing "miniature model" tanks.**

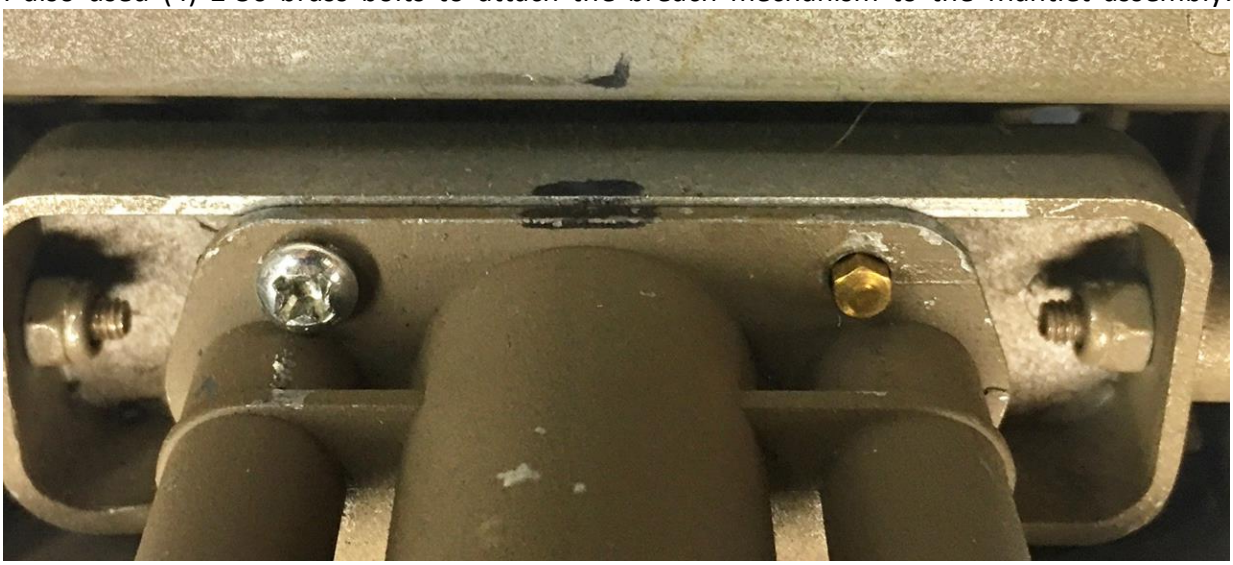
**Gun Breech and Recoil** First take the main assemblies apart. Then rebuild the Gun Breech and Recoil area with more realistic sized bolts and add details.

(a) Replace (4) large screws (which are not prototypical) with 2-56 sized brass bolts. The following picture shows a comparison of the old screws to the new bolts:



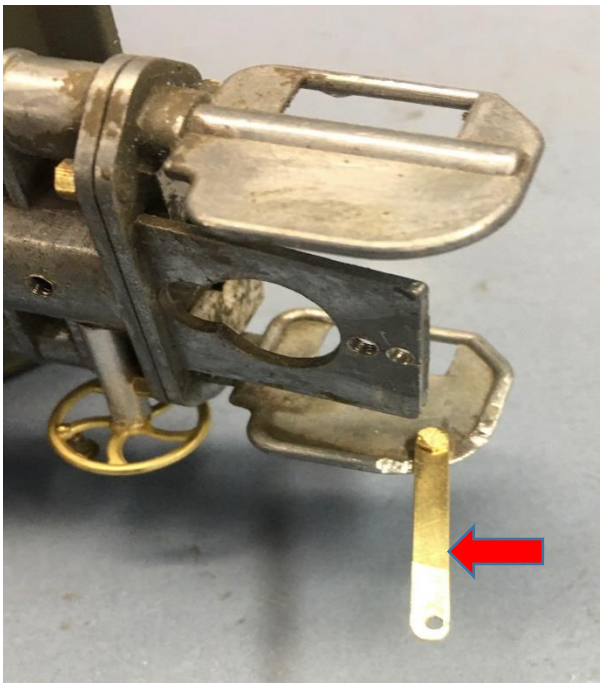
The new bolts are a loose fit so I had to also add superglue (my choice has always been USA Gold CA Glue – thick) to make the bolt tighten down sufficiently.

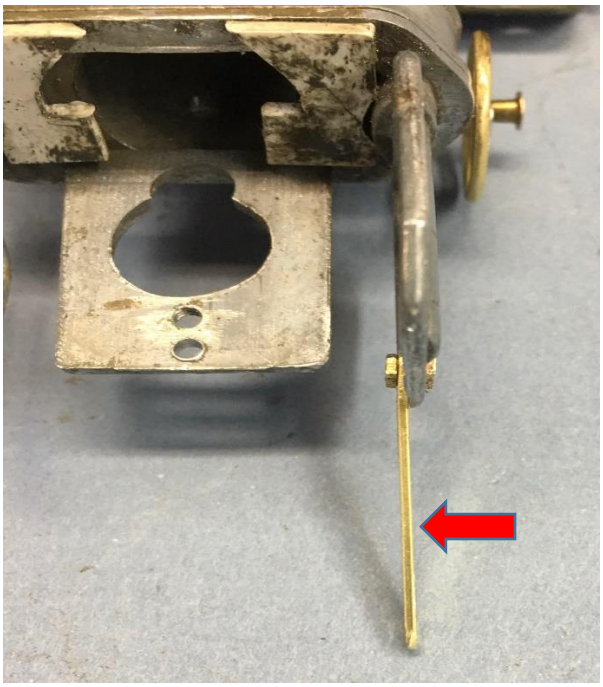
I also used (4) 2-56 brass bolts to attach the breach mechanism to the Mantlet assembly:



And I again used the aid of super glue. In this case I filled the bolt holes entirely, let cure and then drilled new smaller 2-56 size holes, lined with glue and twisted the bolts into place.

I also replaced the socket head bolt and wire which connects to the Elevation Servo. The wire becomes a brass bar stock of a little longer length and the bolt is replaced with a 00-80 brass hex head bolt & nut. A hole is drilled in the lower part of the bar stock to fit a 00-90 hex head brass bolt & nut used to connect to the Servo that is mounted in the turret basket below (red arrow).

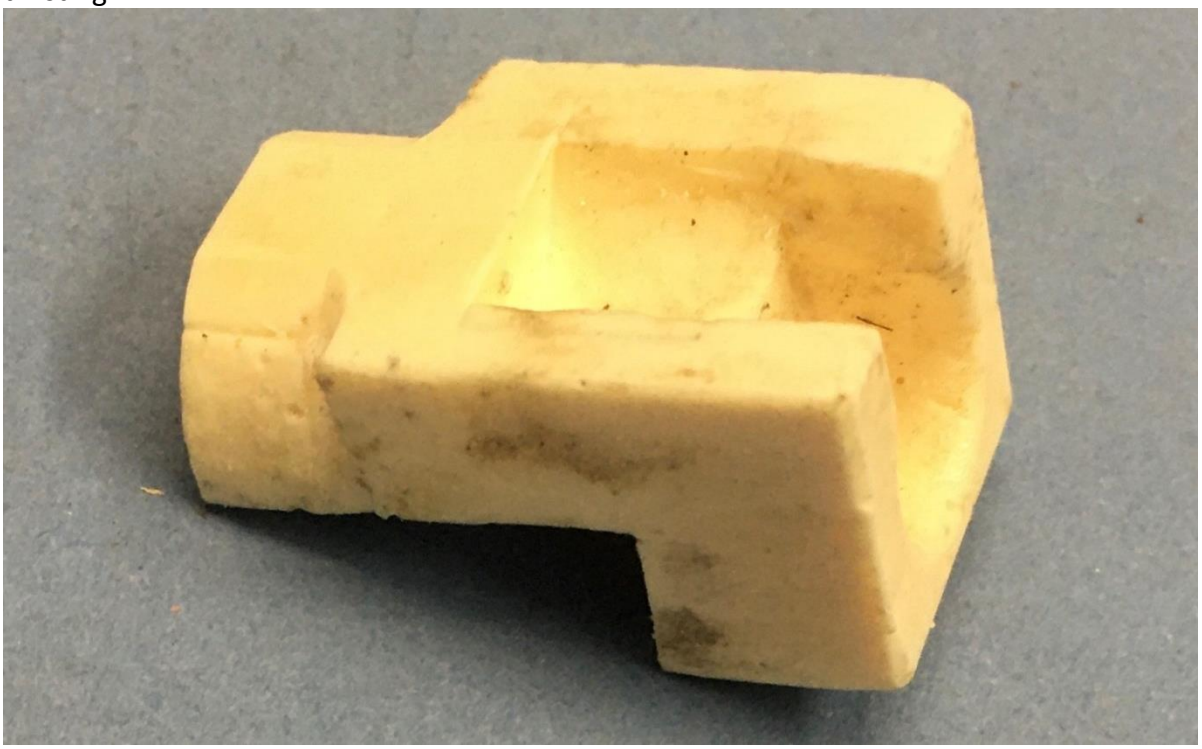


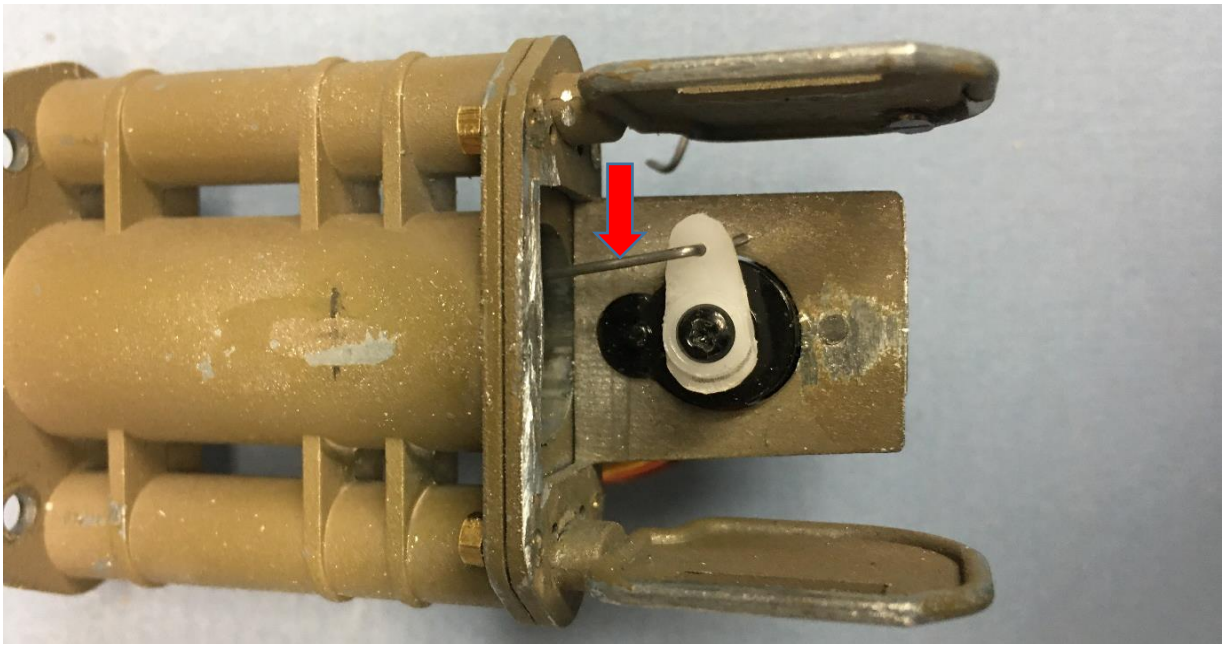


New hex bolt with screw is inserted from other side, and ground down a bit to look smaller.

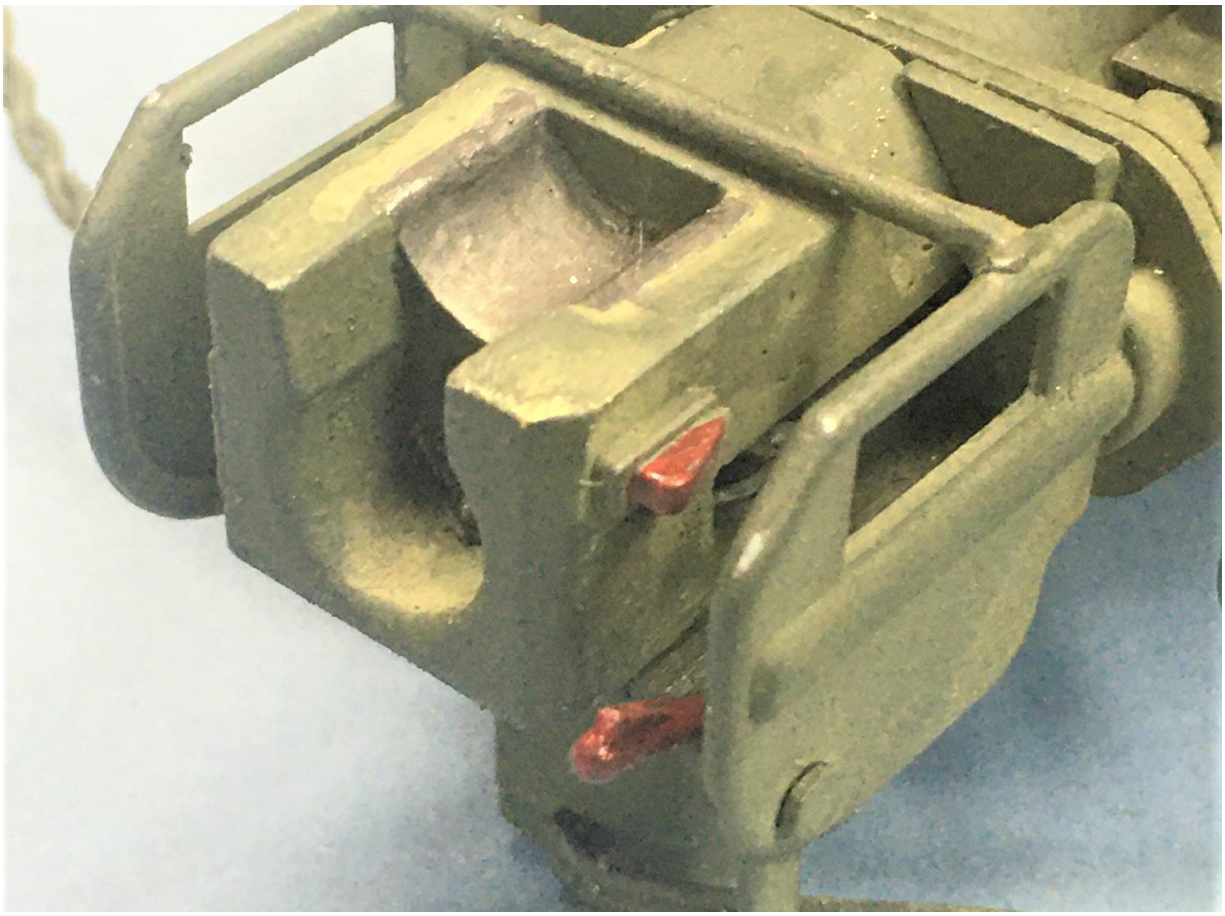
(b) **Breech Block:** Next, I added a Breech Block over top of the flange that holds the Barrel Recoil servo. This was cast in resin from a mold that I had previously made to make an M5 3” AT Gun. The Breech Block was cut out at the rear bottom area to allow for the servo rotation gear and linkage (see red arrow below) to the Barrel to work properly. I also added a Breech Operating Handle to the right lower front and Locking Lever to the upper right front.

Note: See below where I changed the recoil wire linkage to a brass strip to keep the barrel from twisting.

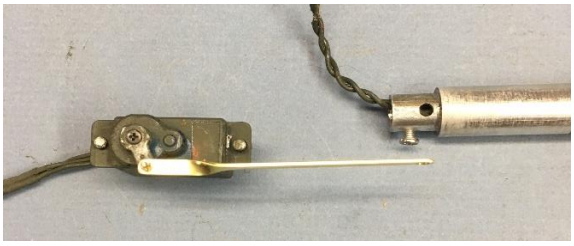


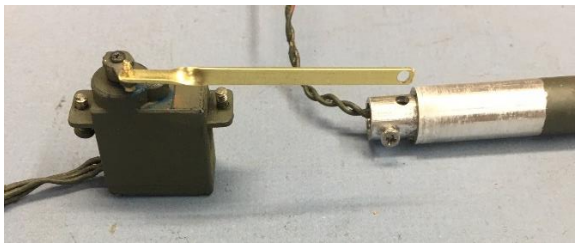


This picture shows the wire linkage to the barrel that was eventually changed to a brass strip.



As stated above, after reassembly I kept seeing the barrel rotate out of position as it was fired and recoiled. I decided to change the wire that connected it to the servo to a brass strip that was .125” wide x .06” thick, to help keep the barrel straight. The length between the screw holes is the same as the wire length. With this change, installation and connecting the linkage to the barrel is actually easier than it was with the wire.  So, I suggest making this change here not later on as I had to do.





(c) **Locking Bracket:** The Gun Breech assembly also lacks a locking bracket on top. This latches to an internal locking pin system which secures the Gun for travel "in addition to" the external Barrel Lock (so the two must line up). Therefore, I built the internal locking pin system later on after the Barrel was fitted into the external Barrel Lock (see step 16(j) & 16(k). But in this step I made the inside triangle shaped bracket which is 9.7 mm long, 3.7 mm high and 2.65 mm thick. The hole is .068 " dia. I also drilled a hole in the bottom of the triangle shaped part for a short brass rod to stick out (.016" diameter x 3 mm long), which was soldered in place (no picture was taken of this unfortunately). The rod glues into a .016" hole drilled into the Gun Breech assembly to help secure it. Make sure it does not restrict the gun barrel recoil.

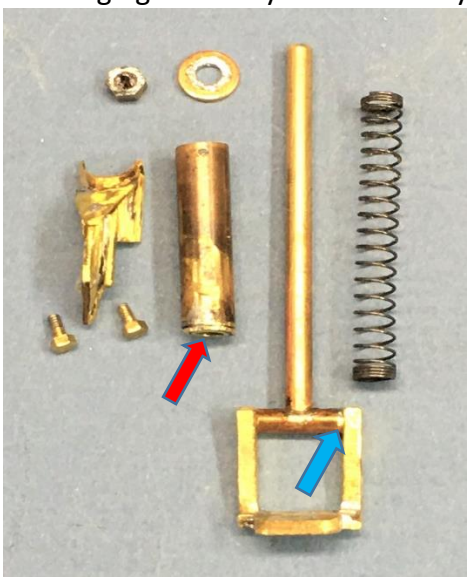
I also added a crank wheel & bracket on the right side of the Gun Breech. This is a brass wheel that I found in the G scale train section of my local hobby shop, to which I glued a small knob. And I added a brass rod across the top of the Gun Recoil Guards. This has to be glued on because it won't solder. By this time I had also stripped the existing paint from the Gun Breech.

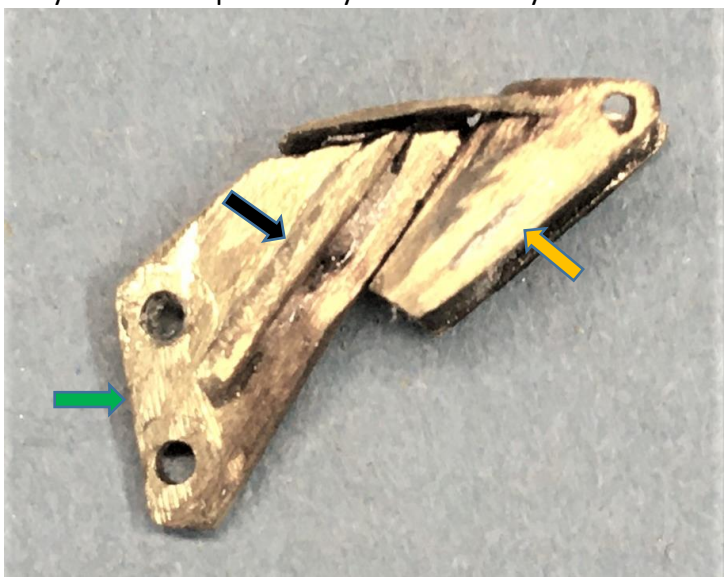
**Elevation Quadrant:** Then I made a part to set on the right top of the Gun Breech to replicate the M9 Elevation Quadrant and M30 Instrument Light. It is very tiny.

(d) **Equilibrator:** Next I added an Equilibrator to the front left side of the Gun Breech. The purpose of the Equilibrator is to help balance the long gun barrel and the Gun Breech so it could move up and down easily. The bottom of the Equilibrator is mounted to the Turret Ring and the upper part is mounted to the Gun Breech near the center pivot point. There are several pictures to use in the Tankograd Tech Manual and the Walk Around Book to fabricate this complex part.

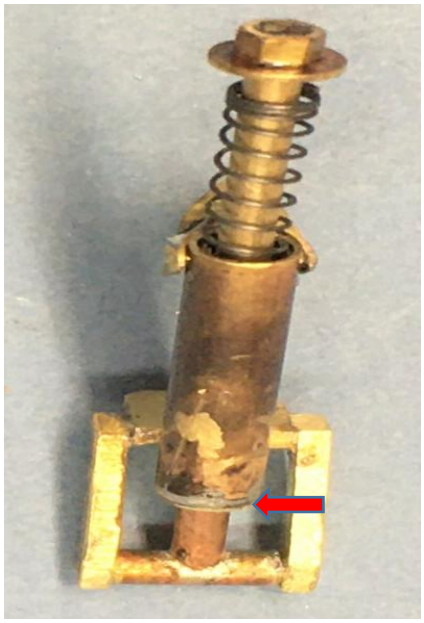
See 1st picture below: The Main Tube is 19mm long x 4.72 mm OD x 4.05 mm ID; The End Piece (see red arrow) on the Main Tube was cut from .005" brass sheet by using a hole punch and filing it down after it was soldered to the bottom of the Main Tube…the hole drilled in it is 2.46 mm dia.; The Spring is 30 mm long x 4 mm OD and came from a cheap ink pen; The Long Brass Stem piece is a 39.6 mm long brass tube x 2.43 mm OD and is soldered to a Cross Piece that is a solid brass rod 9.24 mm long x 2.53 mm OD and the ends are rounded to fit into countersunk holes in the bracket Side Arms (see blue arrow); The Side Arms are 12.2 mm long and made of .063" thick brass bar stock as is the Cross Piece between them. This 3 piece part (call it the Lower Bracket) has to be cut and ground down to the desired shape, and then drill (2) holes in the Cross Piece to fit tiny 00-90 threaded brass screws w/ hex heads x ¼" long. These screws anchor the Lower Bracket to the Turret Ring. The fancy looking part (2nd picture below) is the Upper Bracket that is anchored to the front of the Gun Breech (Note: discoloration is due to soldering heat). It is made of (3) custom cut thin pieces of brass sheet .035" thick and soldered together…… a real challenge to get in the right position. The dimensions of the triangular shaped part is 6.15 mm (see green arrow), then going clockwise 6 mm, then 6.75 mm, then the longest side is 11.9 mm and finally 2.3 mm. The long reinforcing feature (see **black arrow**) is just a 1 mm rod soldered on. The rounded part to the right (see **orange arrow**) is a brass tube cut to shape to fit around the Main Tube and serves as a hinge. The holes are .030" dia. The (2) tiny pins that insert thru these holes and the matching ones in the Main Tube, came from a doll house supply shop (very very tiny). Solder a 2-56 brass hex nut w/ a slightly larger washer to the end of the Long Brass Stem after everything is assembled. This is also a challenge not to

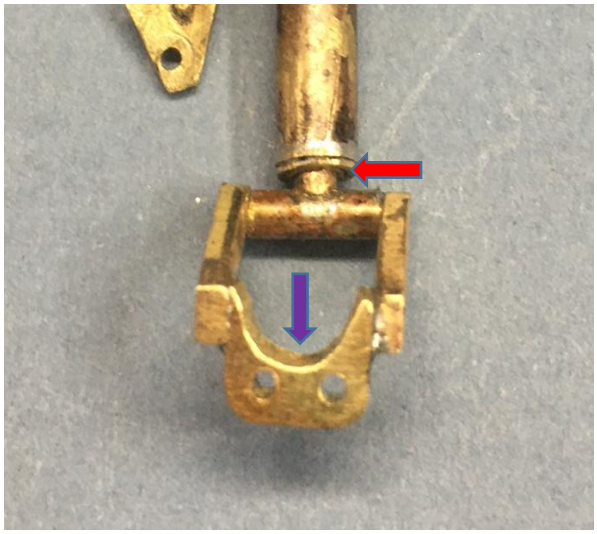
have other soldered parts fall off, so I wrapped anything I didn't want to come lose in a wet tissue to raise the melting point higher than the parts I was working on. All in all this is a very challenging assembly to make and you may want to skip it or maybe make in styrene.

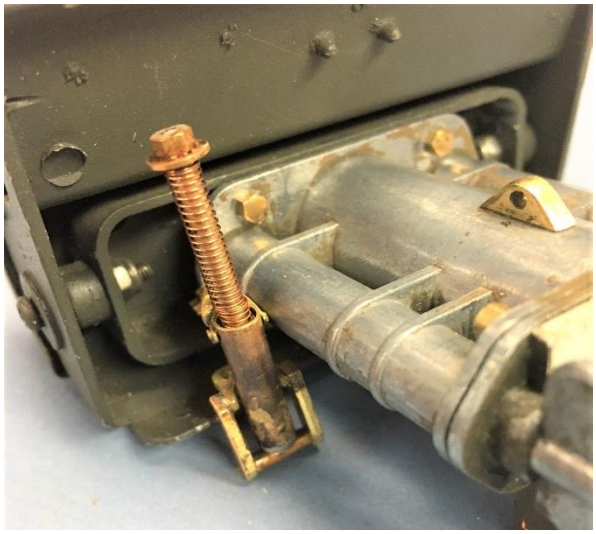




Upper Bracket





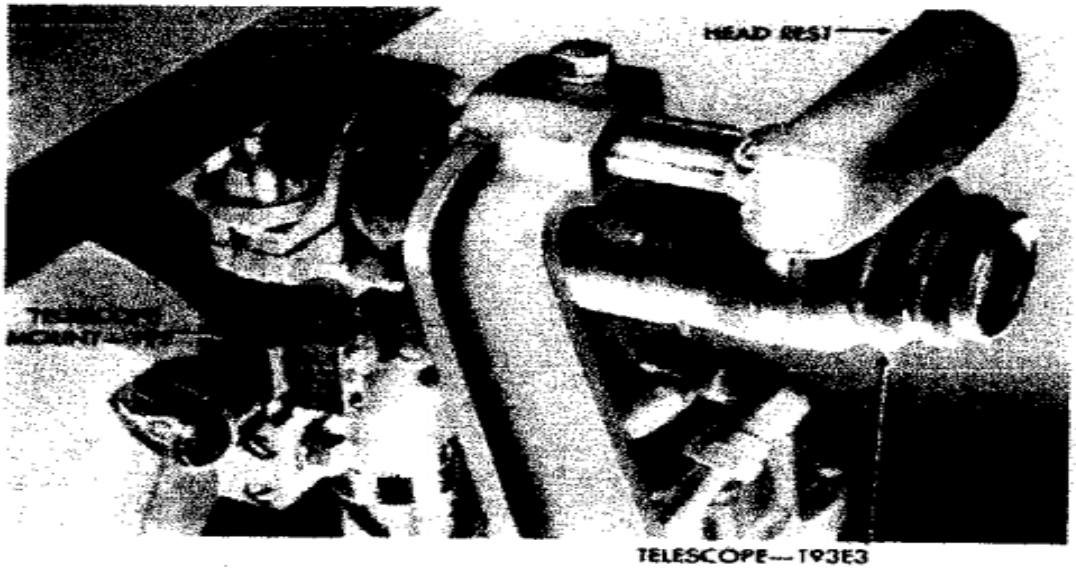


Lower Bracket shown above.

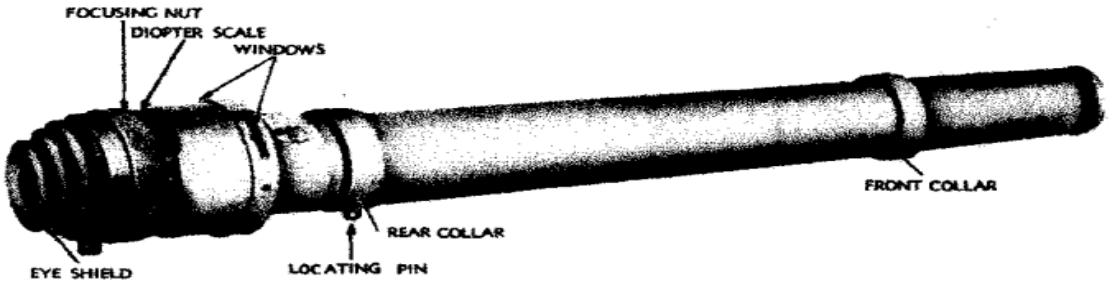
The spring actually collapses about halfway down from what is shown in the second picture above, once the Gun Breech and Mantlet are mounted to the tank in their proper positions. I originally cut out the area (see **purple arrow**) in the Lower Bracket to allow the Main Tube to move up and down freely as the Gun Breech/Barrel are raised and lowered. But it still sometimes caught on the Lower Bracket, so I ended up adding a small styrene piece to the left front of the Gun Breech so the Upper Bracket could be moved rearward about ¼". This allowed the Main Tube to move freely and provided a more secure mounting for the (2) 00-90 screws, so the cut out (**purple arrow**) may not be needed.

(e) **Telescope/Periscope:** Next I wanted both the M76D Horizontal Telescope on T92 Mount and the M12 Panoramic vertical Periscope on M69 Mount to be added to the Turret and Gun Breech. These are delicate and complicated parts to make, and I chose to replicate them using various bits and pieces of brass strip, tubing and bar stock with plastic styrene enhancements, all glued and/or soldered together. The Horizontal Telescope is added to right side of the Gun Breech and the Vertical Periscope is installed close by on the right side of the Turret body. Here are pictures among others that I used to replicate these parts as best as possible.

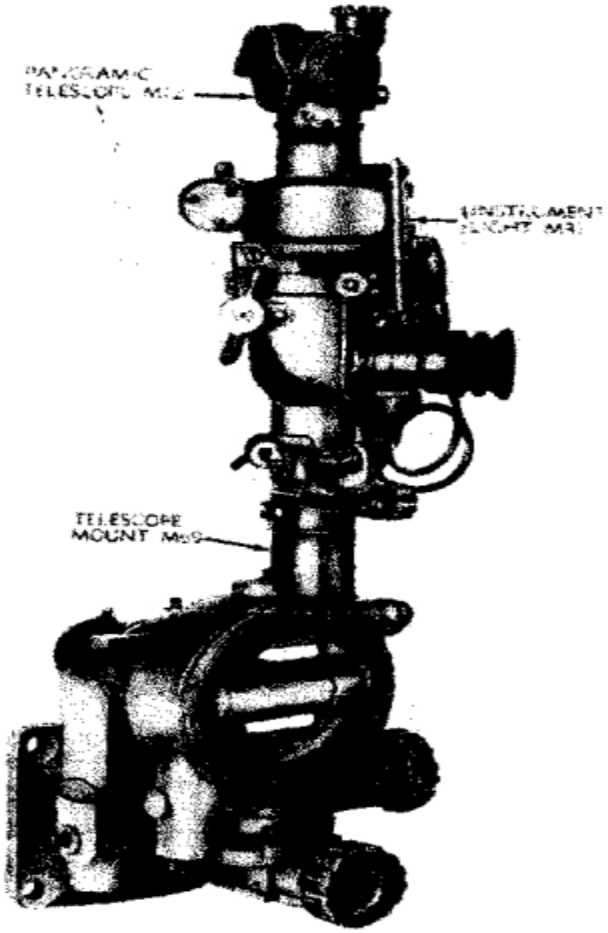
**Telescope Mount M64 (T92).**



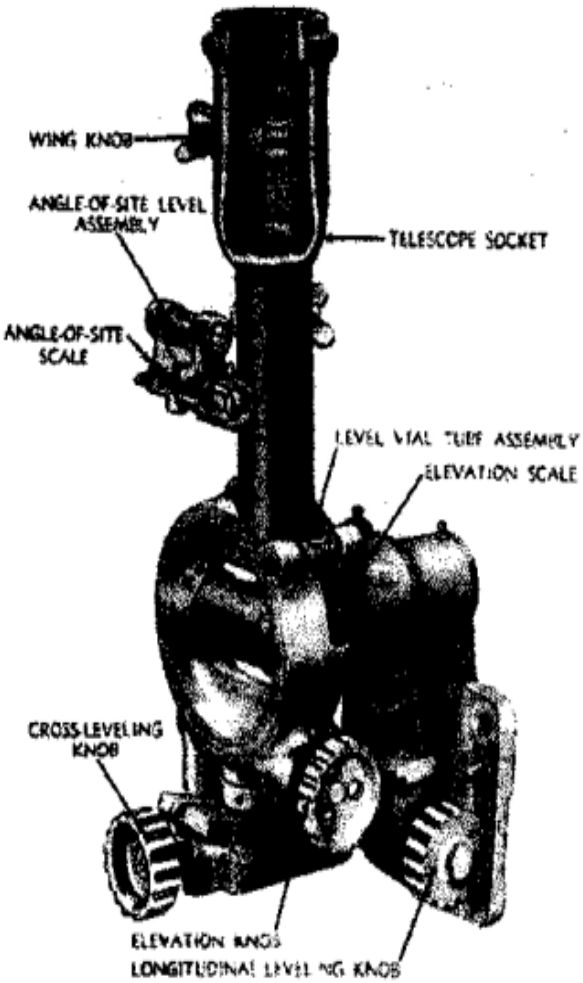

**Telescope Mount T92 with Telescope T93E3 installed.**




**Telescope M76D or M76F (T93E3).**



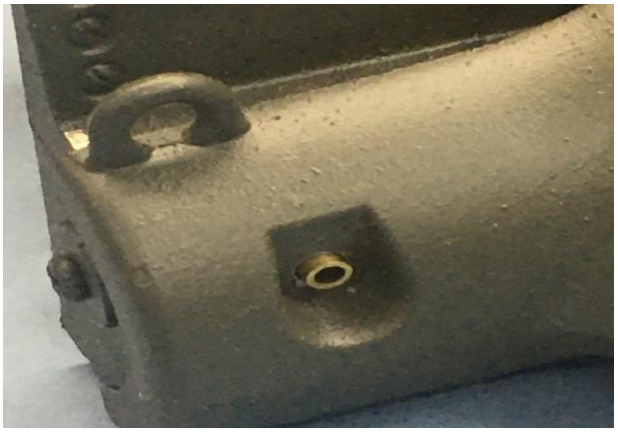

**Telescope Mount M69 with Panoramic Telescope M12 and Instrument Light M31.**



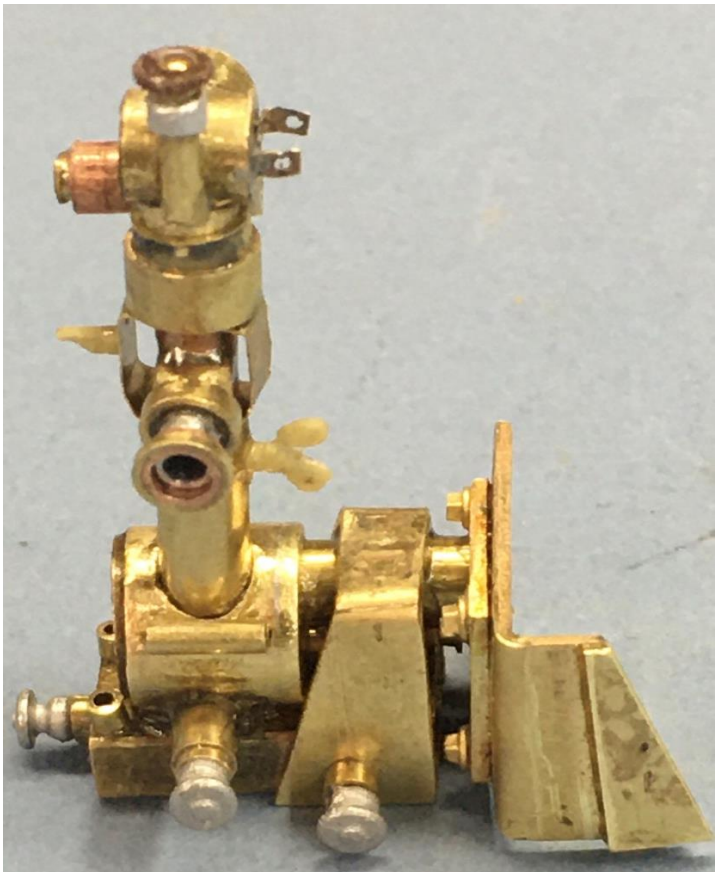

**Telescope Mount M69 (T104E1).**

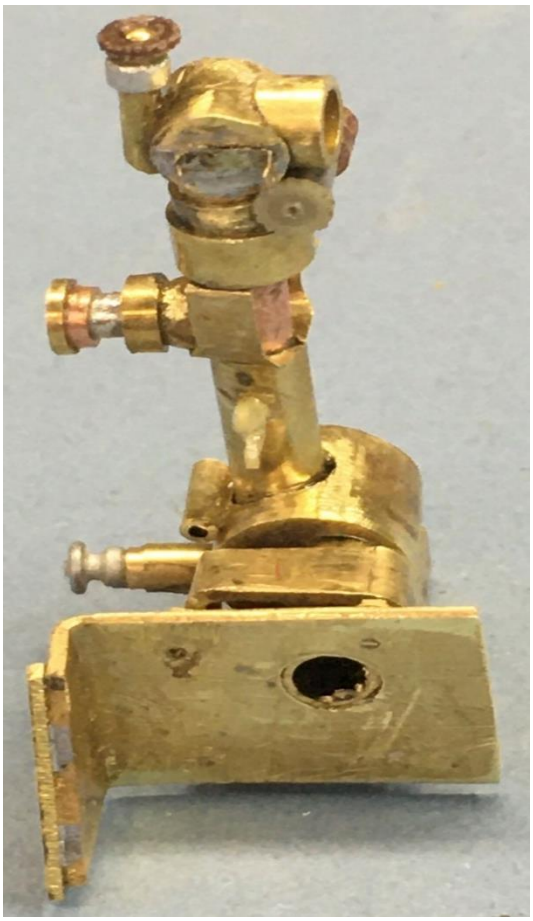
All of these pictures came from the Tankograd Tech Manual. Here are pictures of the finished parts. Some of the enhancements like knobs & bolts, came from brass & plastic G scale train parts.

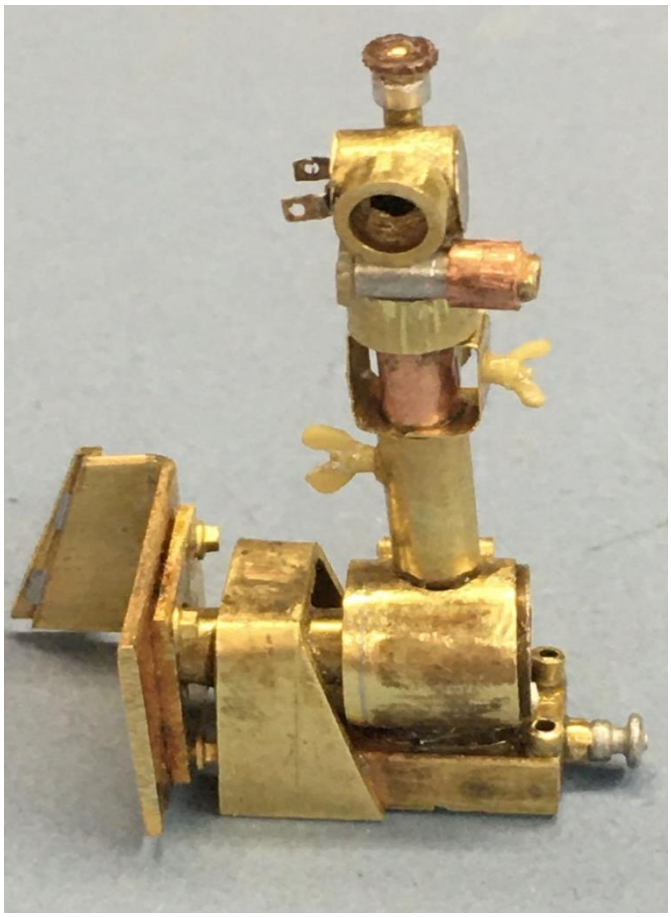
**M76D Horizontal Telescope on T92 Mount:** The tube is 3 mm in dia.

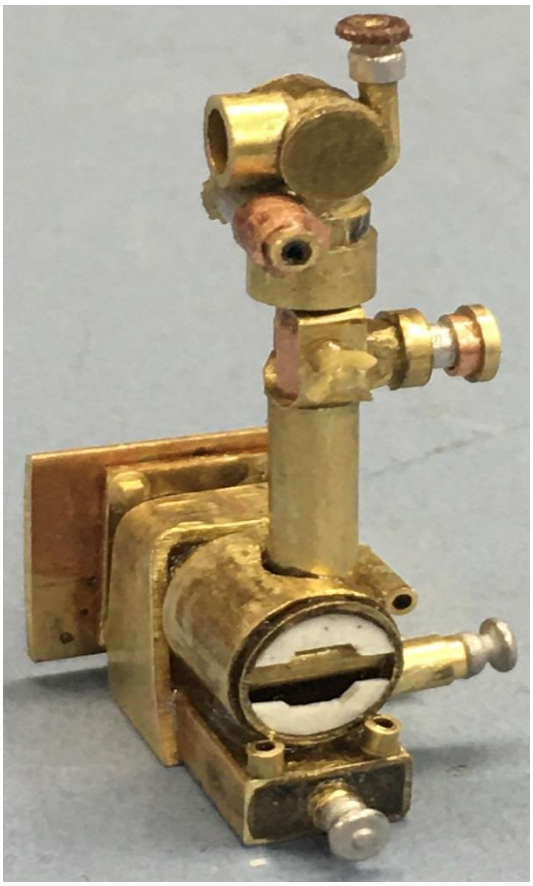


**M12 Panoramic Vertical Periscope on M69 Mount:**

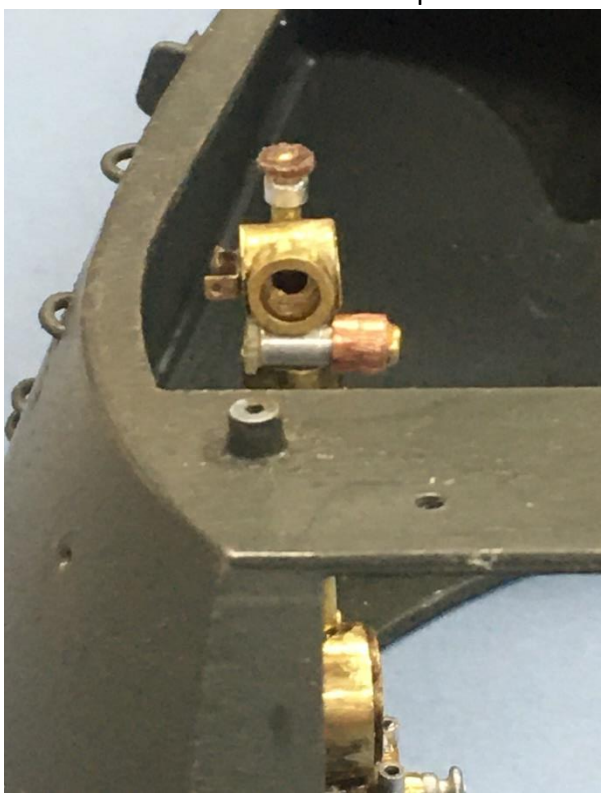


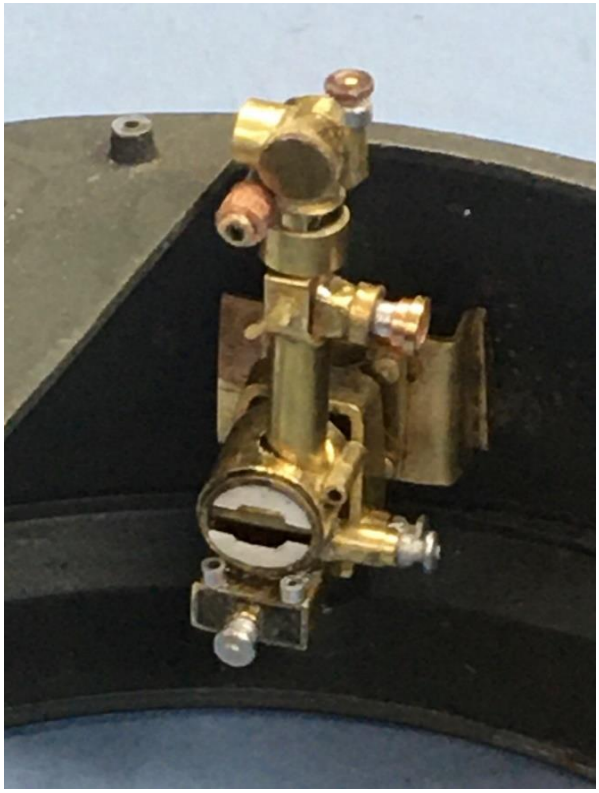






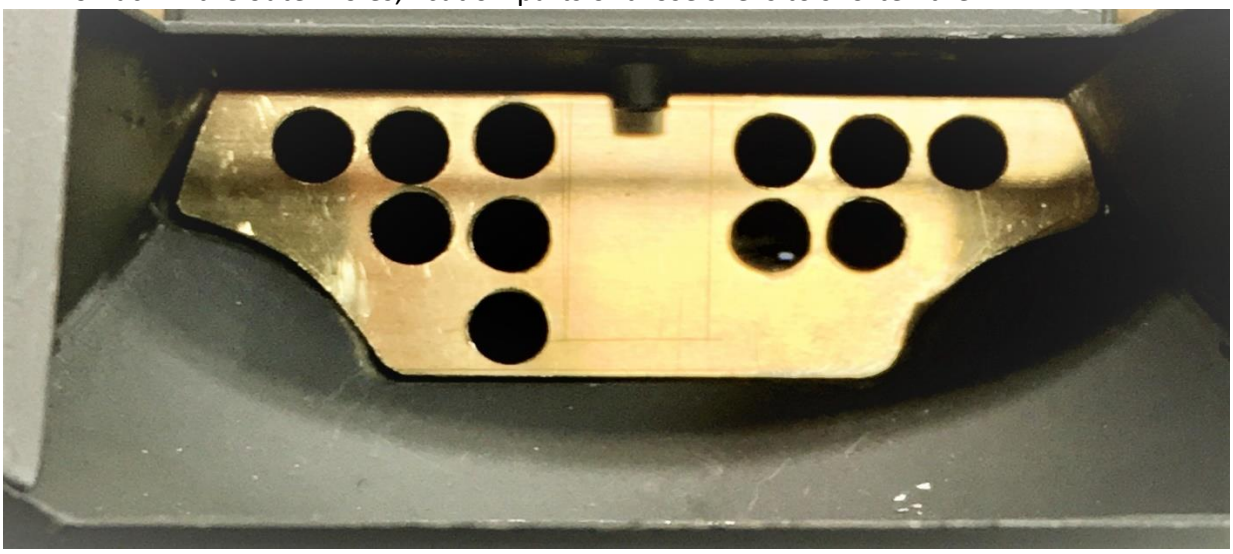
M12 Panoramic Vertical Periscope test fitted to Turret.

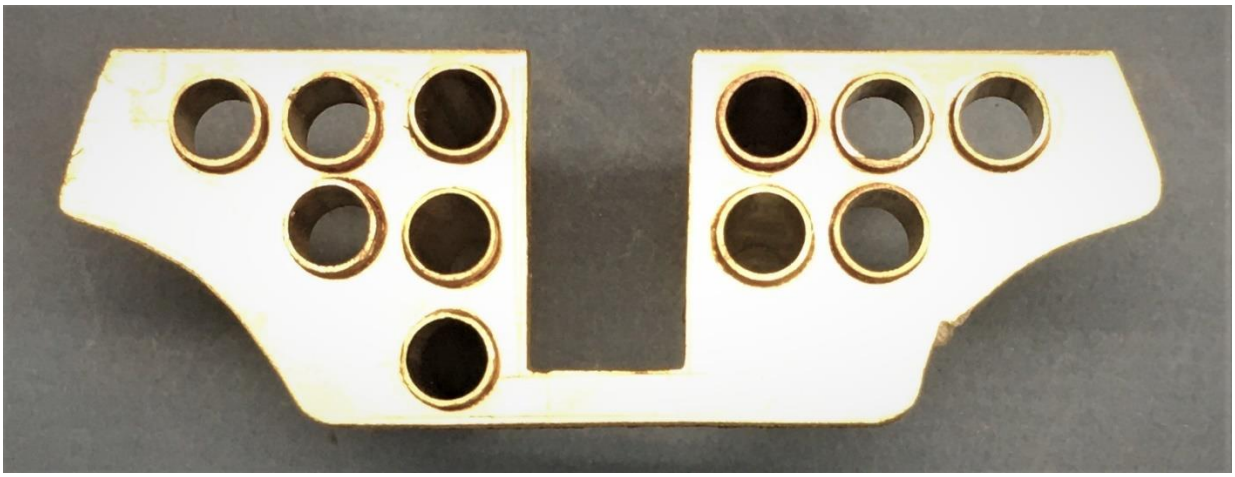


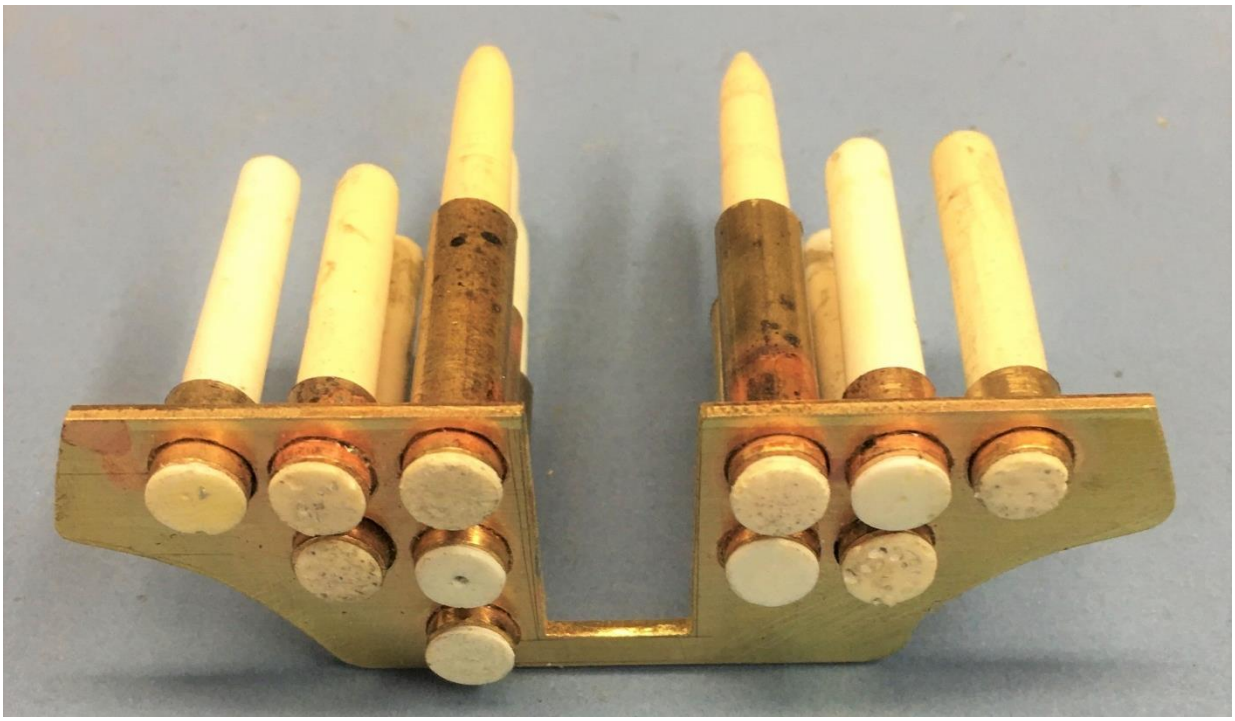


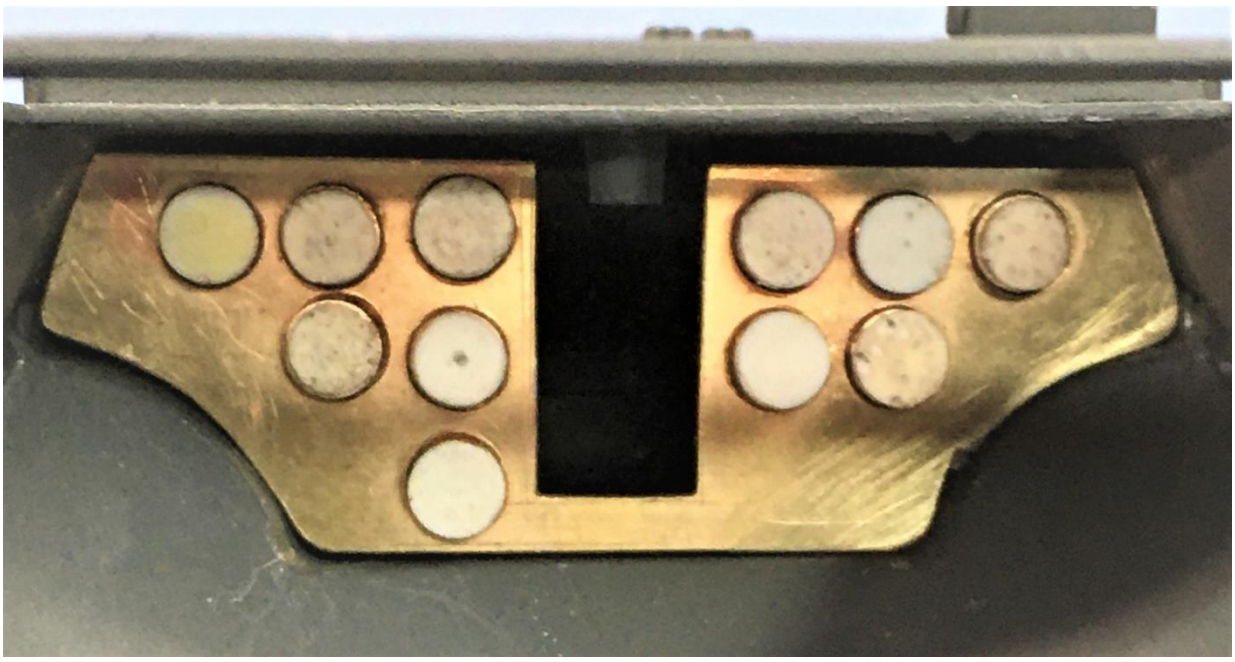
(f) **Ammo Rack:** I elected next to rebuild the Ammo Rack that sets in the rear Turret Bustle area. The one Mato supplied is incorrect. I chose to use a .065” thick brass plate for the Ammo Rack wall, and cut and fit a paper template to the area where it will be glued. This is a trial and error process. I drilled the 11 required holes (.28” dia.) using a drill press for accuracy. Then I cut (5) .276” dia. brass tubes to a length of 1.14” and cut (6) tubes .33” long. The longer tubes are soldered into the center holes in the plate because they will disguise the fact that not all tubes extend fully back into the Turret Bustle area. The M36 uses 90 mm ammo of varying lengths but

I chose to use 2.20” long shells which I cast in resin. Because this length won’t easily fit into the Ammo Rack in the outer holes, I cut off parts of those shells to shorten them.



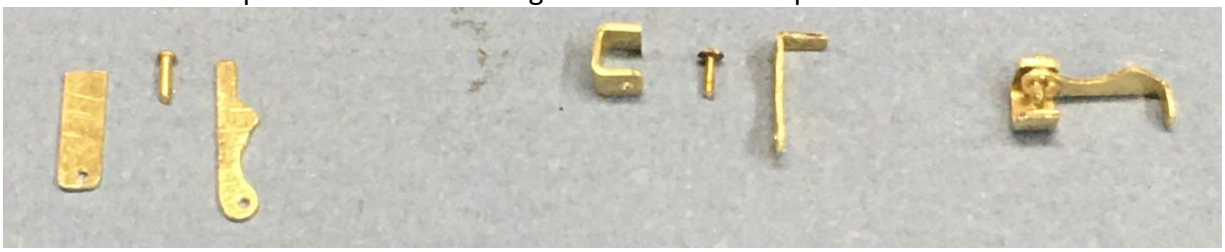






The next step for the Ammo Rack is to fabricate a spring lever flange for each tube and glue these in place. I tried to spot solder theme but that did not work. Good pictures of the Ammo Rack can be found in the Squadron Signal Walk Around book and the Tankograd Tech Manual. I elected “not” to replicate the canvass/zippered covers.

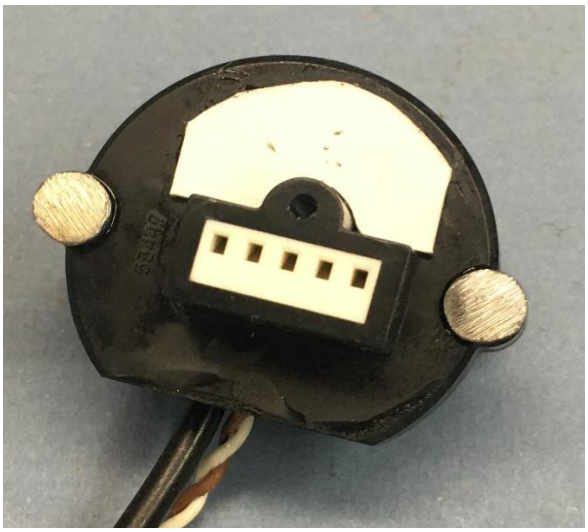
The flat brass bar stock with the hole in it is .016” thick x .3” long x .1” wide. The hole fits the diameter of whatever pin size you use. This piece is bent into a “U” shape as shown in the middle of the picture. Insert the pin, then the “key like” part (with the sculpted lines facing up) which is then glued to the pin on one side. This key like part is .4” long x .016” thick and should be free to rotate up and down. Don’t forget to bend the end part 90° .

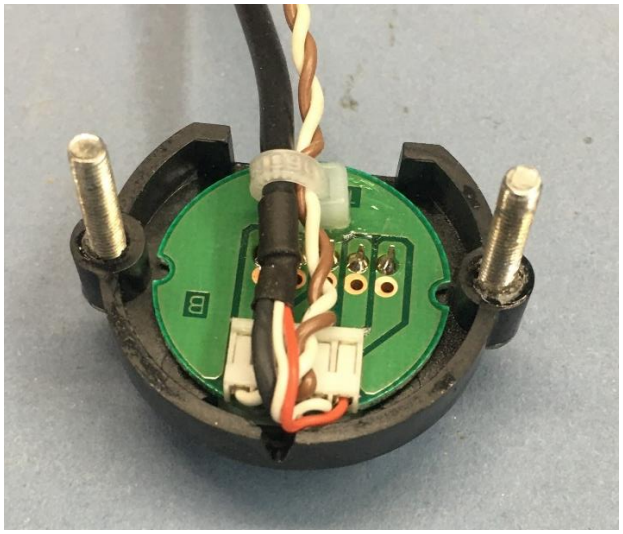


These 11 parts are then glued on as shown below. Make sure the key like part is able to rotate past the U bracket next to it.

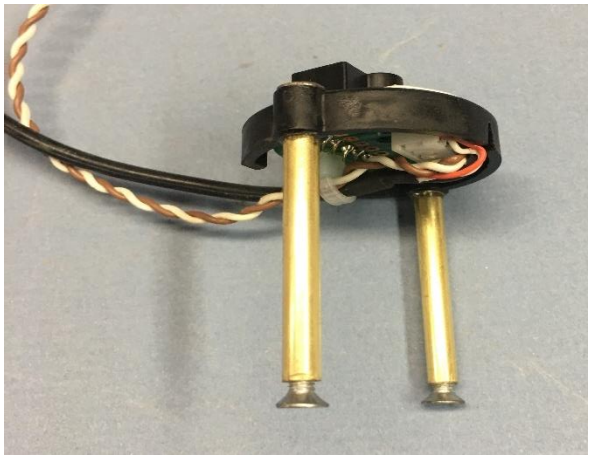
After the part was complete and painted, it was test fit into the rear Turret area. After the various inside detail parts are completed, the Ammo Rack will be glued in place and the seams painted.

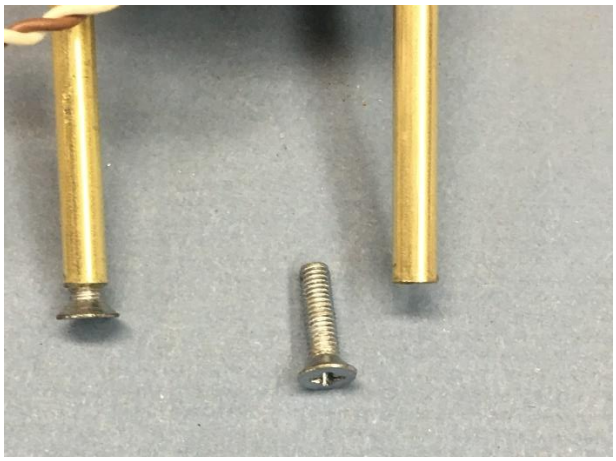
(g) **TBU Mount:** Since this model is to fight using a Tamiya Infrared Battle Unit (TBU), I needed to secure the TBU base to an area of the Turret which is out of the way of the Gun Breech elevation. I chose the rear left corner. To begin, separate the electronics of the TBU base from the larger plastic mounting bracket and cover the exposed circuitry with a piece of styrene. Thread (2) brass screws that are 1” long into the mounting holes and grind off the slot so the screws are flat and look realistic when painted.





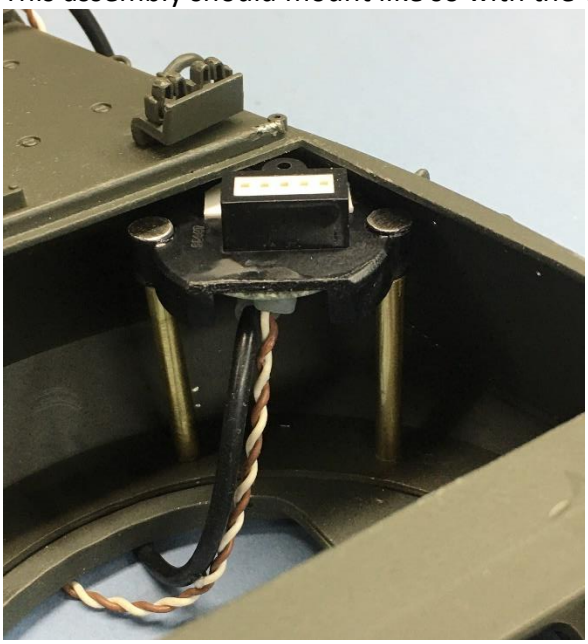
Next cut (2) brass tubes 1.3” long which have an inside diameter large enough for the 1” screws to be inserted (mine were .11” ID).



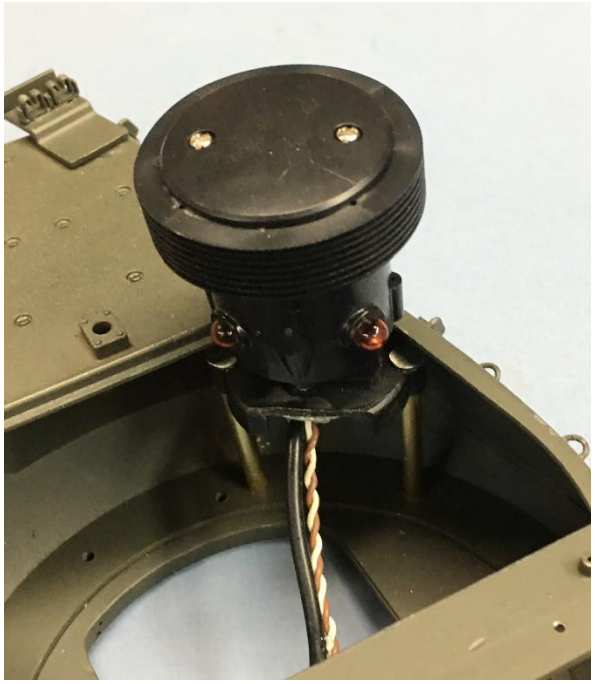


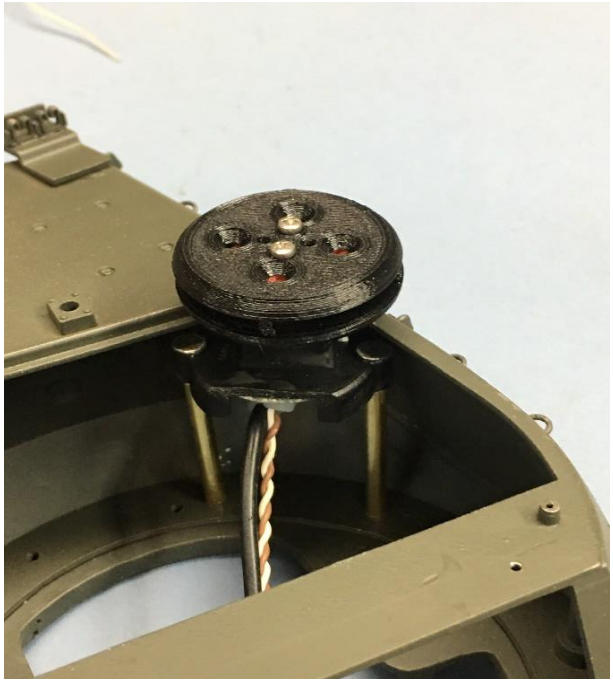
Select (2) screws .5” long and drill out holes located appropriately on the inside bottom of the Turret (my screws were .11” in diameter). Countersink these holes on the bottom of the Turret Ring so that the Turret will turn freely. You may also have to add super glue inside the tubes to hold all (4) screws in place.

This assembly should mount like so with the wires pointing toward the Turret center.



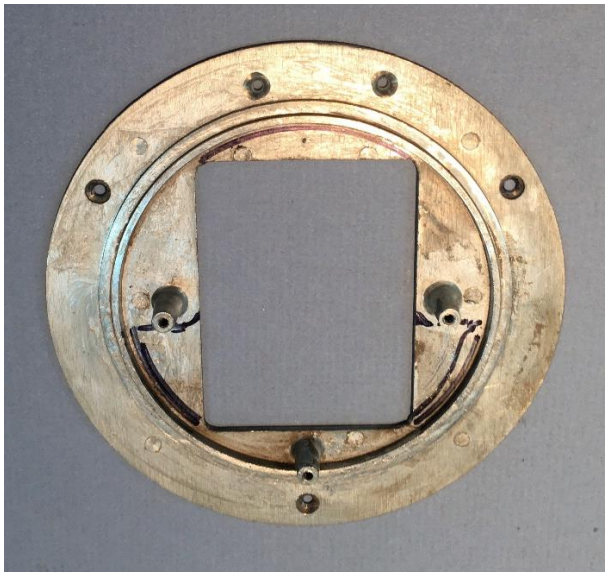
This installation can support either a regular TBU apple or the short Mini sized apple (MBU) (from LegoDEI haojiezhuang95@gmail.com ).

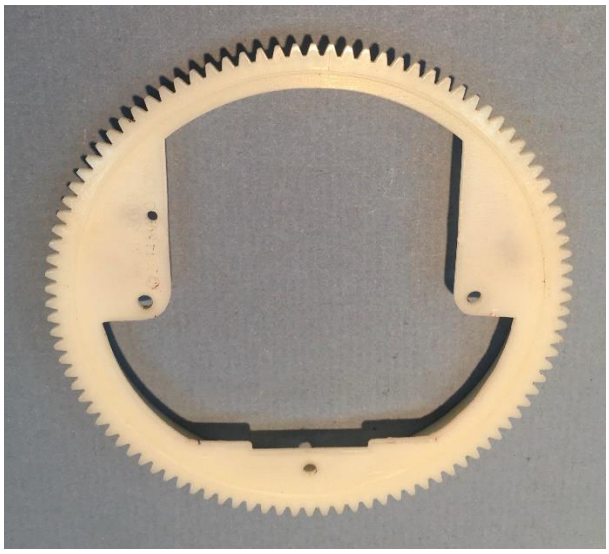




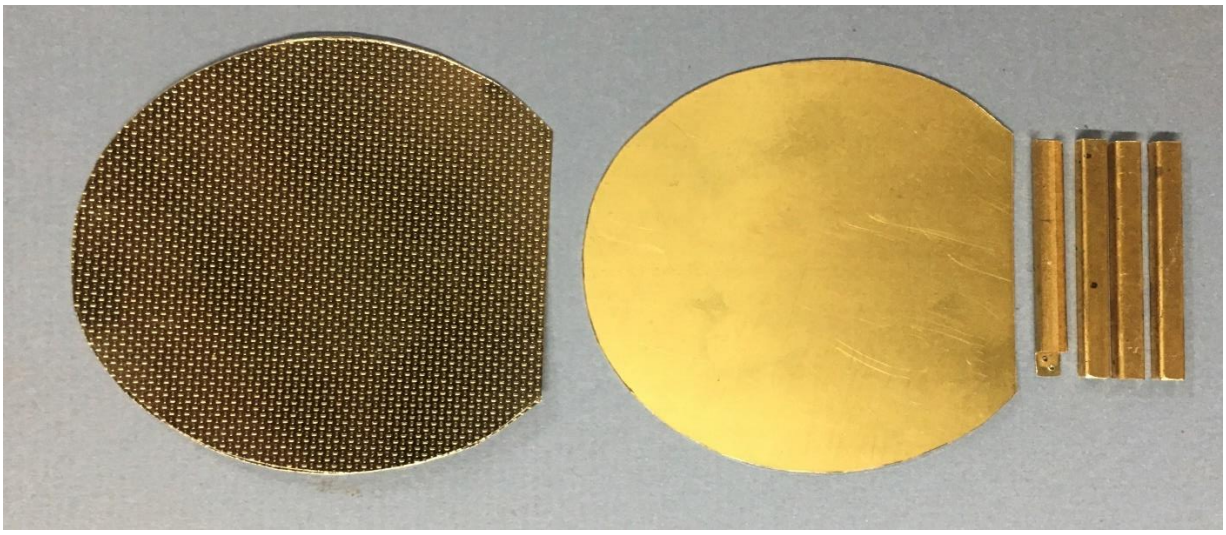
These (2) BU apples will be painted Olive Drab to match the tank's color so they blend in.

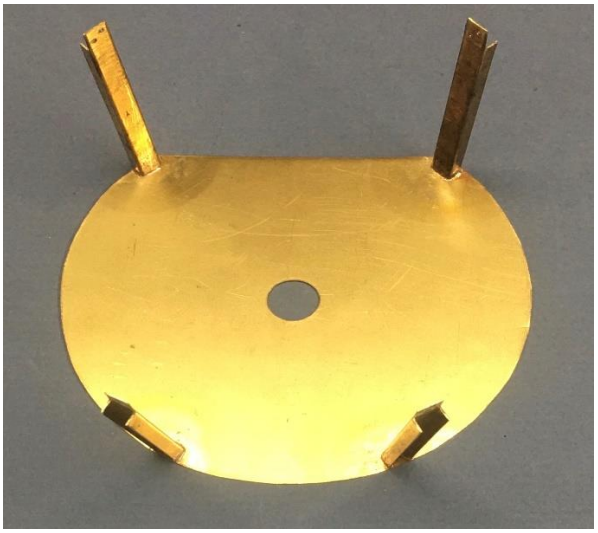
(h) **Turret Basket:** I next built a Turret Basket to hang down from the Turret. To get as much room as possible for soldier legs & feet, the Turret Gear Ring and circular plate (which is screwed onto the bottom of the Turret), were cut and filed to open up the area. The first (2) pictures show what the plate originally looked like and where cutting was to take place. The 3rd picture shows the plate after cutting and with the Turret Basket test fitted. The plastic Turret Gear Ring also has to be cut to match (4th picture).

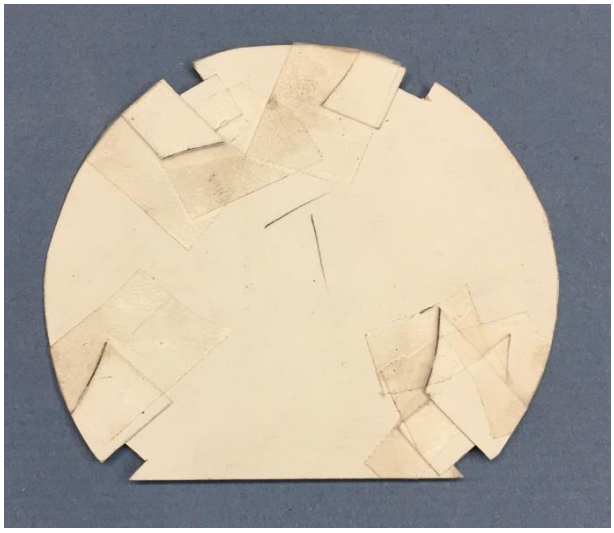




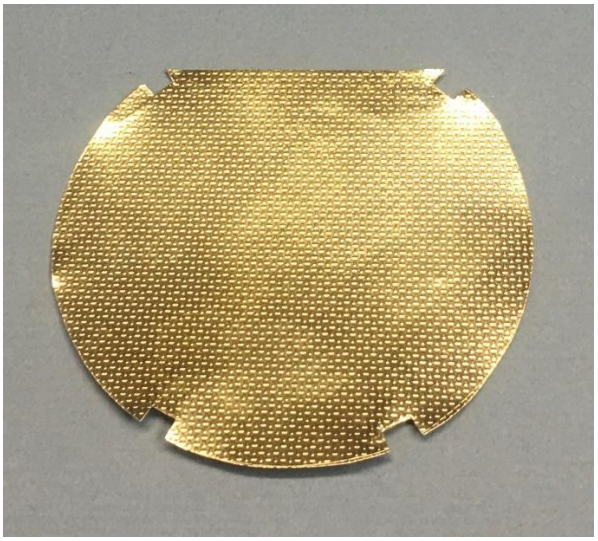
The Turret Basket was made from brass sheet and "U" shaped brass channel, with a layer of brass treadplate (Aber part # 16-099) cut and glued on top. There are (4) legs made from the brass channel which are each 22 mm long, notched at the top to attach to the plastic Turret Ring with a 00-80 brass bolt, drilled and tapped for each leg. The legs are soldered to the lower brass sheet, and then the treadplate is cut and fit around the legs before gluing in place. The diameter of the floor plate is 3¼".



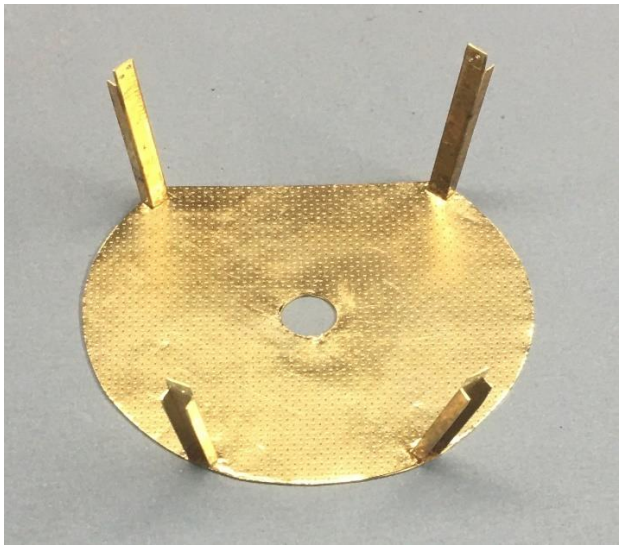




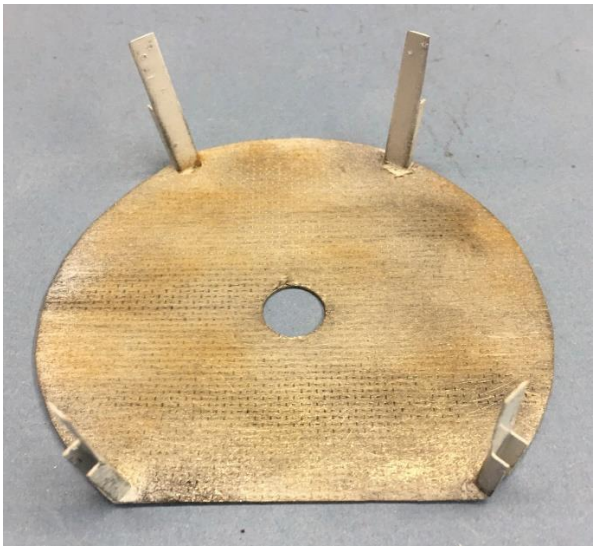
The paper template above was made to know where to notch out for the legs on the treadplate.



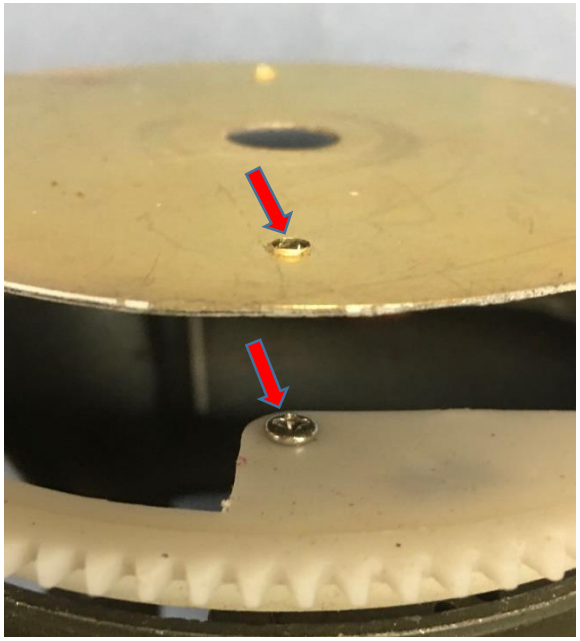
Notched treadplate



Treadplate glued to brass sheet bottom



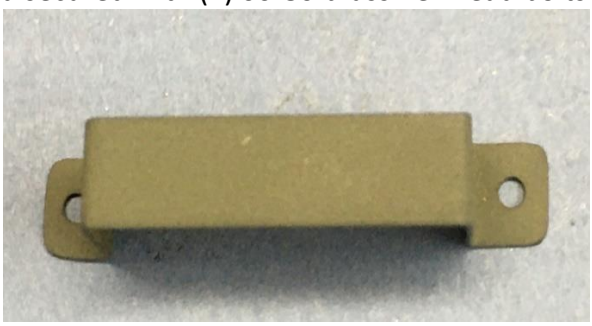
The Turret Basket is attached to the plastic Gear Ring. This permits easier installation of everything once the model is complete. However, it became a challenge to get (2) of the (3) screws thru the Gear Ring into the Turret, so I ended up drilling (2) .10” holes directly above the (2) screws for screw driver access (see red arrows).



The Turret Basket was painted white and scuffed up where shoes would stand on it. This is a picture of the finished and installed basket before any of the internal detail parts were added to it. The hole in the center is 7/16” diameter (you may need a little larger size hole) for all the wires coming down from the Turret Servos and IR battle unit to the IBU2 Board below.

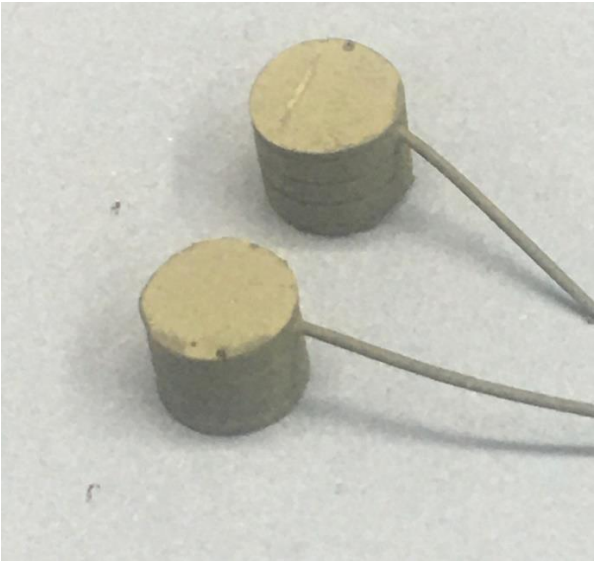
The Turret Basket was finished out with various details to be viewed from above when fully assembled. The Elevatrion Servo was located under the right hand corner of the Turret Ring, making sure to clear the access hole for the mounting screw, and making sure to clear the Turret Rotation Motor mounted to the Upper Hull. Note (2) tiny holes drilled into the plastic case of the Elevation Servo which will be used to anchor additional detail wires.

Because of signficant torque exterted to raise and lower the Gun, a brass flat stock "U" bracket was made to hold the Elevation Servo in place and secured with (2) 00-80 brass hex head bolts.



(2) Radio boxes from Verlinden were positioned at the front of the Turret Basket. Yes they are of a German design, but that's all that could be found. They do the intended job.

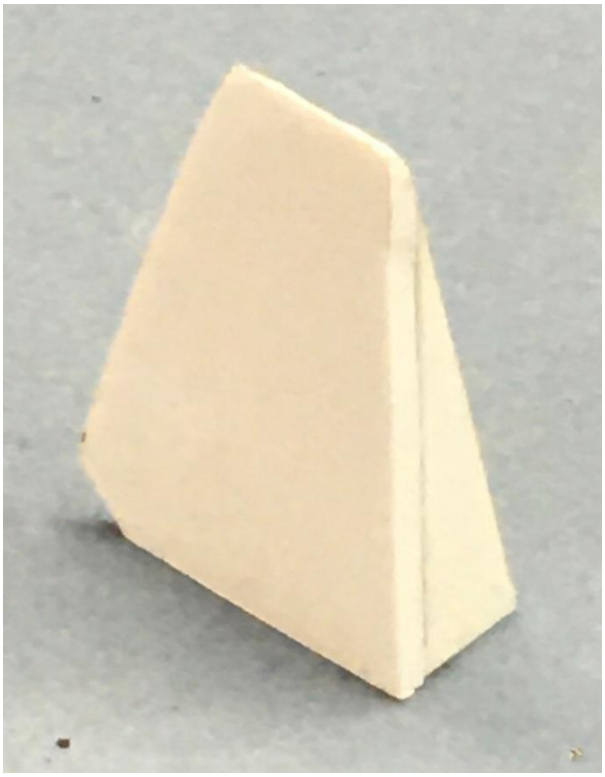
(2) cylinders with (1) wire from each were cast in resin and mounted on top the Servo. The wires are barely glued into the (2) holes in the Elevation Servo case, being careful “not” to bind the gears. These additions help to disguise the non-prototypical look of the Elevation Servo.

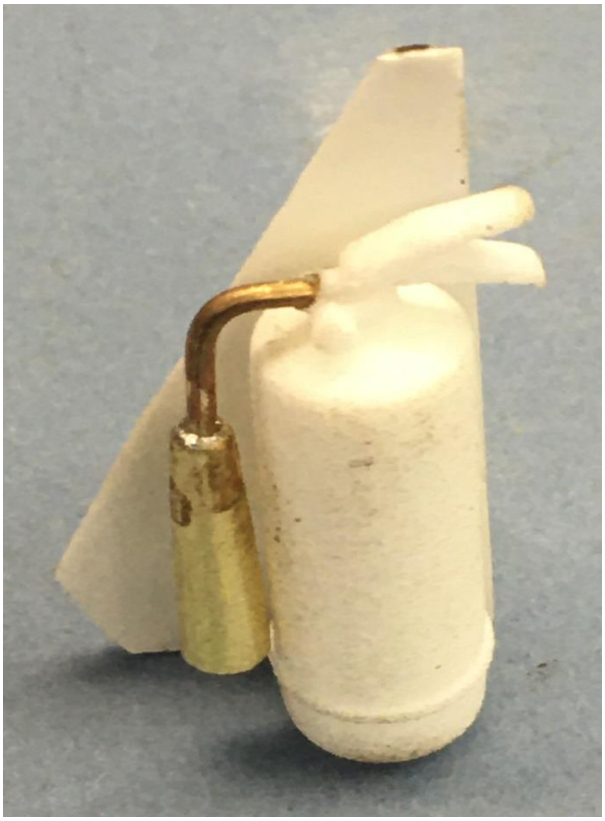


Other details added to the Basket included a representation of a Turret Traverse Motor located under the left hand corner of the Turret Ring and an fictional part to fill an empty area adjacent.

The finished Turret Basket looks like this with mud and dirt added where feet would have stood.

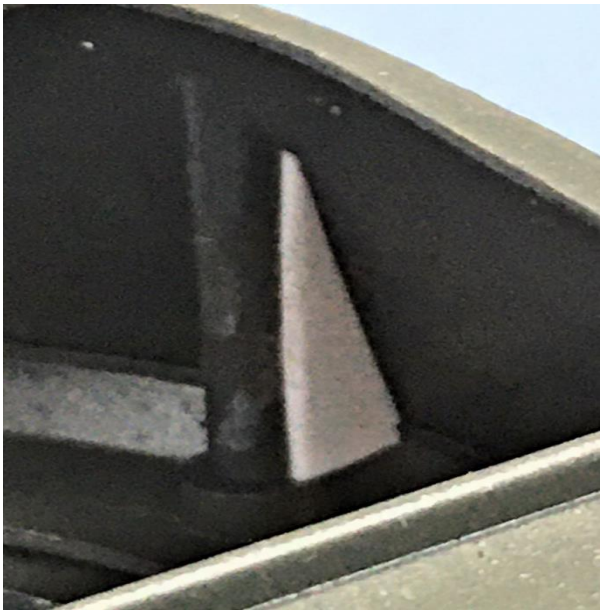
(i) **Fire Extinguisher:** The front left inside corner of the Turret requires a wall for the Fire Extinguisher mount. This was fabrictaed from .080" styrene sheet, and was cut to fit the Turret contours. The edges are beveled which fit up against the Turret wall when glued in. The Fire Extinguisher came from Shapeways 3D Printers by Pinelas Miniatures and I added a brass spray nozzel.





(j) **Bulkheads:** I also decided to add a flat styrene plate to each side of the Turret to close off the gap between the (2) posts and wall (this is a design added by Mato to hold the Turret together that was not in the prototype turret). Although this is not a correct modification, it does improve the looks inside the Turret and will help to disguise the (2) posts once painted.

Left side



Right side

(k) **Seats:** The next part of the Turret that I worked on was to make (3) seats for the gun crew and to locate them on the Turret floor. I chose to cast mine in resin, but you can also make these from styrene. Paint them brown to replicate leather. I then cut and reshaped (3) 1/18th scale Ultimate US Soldiers to fit so that the Gun Breech had free movement up & down. The commander is in the far rear and is able to stand on the Turret Basket floor. To get his arms out of the way of the Gun Breech I chose to make him look thru binoculars. Putty will be used on these soldiers to fill in the joints and reshaped arms, then they will be totally repainted.

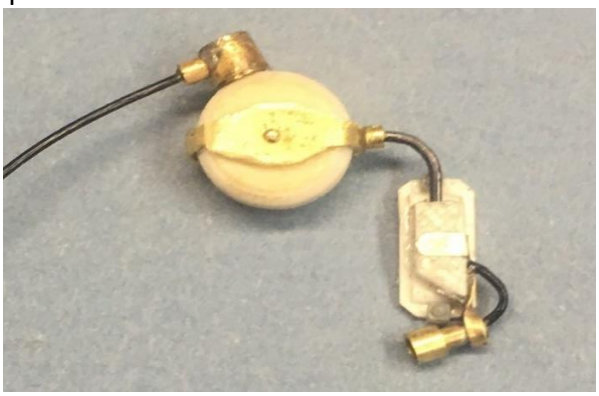
As you can see, these soldiers have a significant portion of their upper legs and rear cut off, as well as arms and legs were trimmed on the side facing the Gun Breech. A metal rod is inserted in the rear in order to anchor them to the seats. The middle one stands in the Turret Basket at the rear and must clear the Gun Breech movement. I put a metal rod into the commander's foot to anchor him to the floor. A brass tube solder under the floor helps keep this rod straight.

(l) **Left Side Parts:** Other details were added to the left inside wall of the Turret which included: (2) 1/18th scale plastic Canteens:

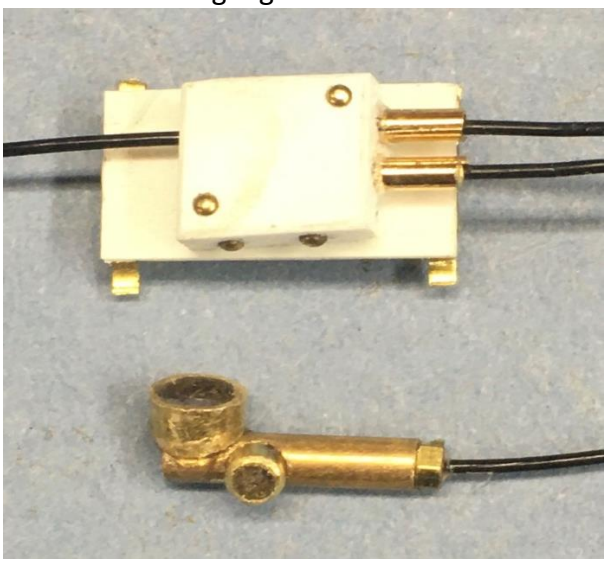
A Flashlight and Holder: Made by soldering brass tube and thin brass bar stock. Microscale Kristal Klear (a flexible clear liquid) was used to create the glass for the lens.

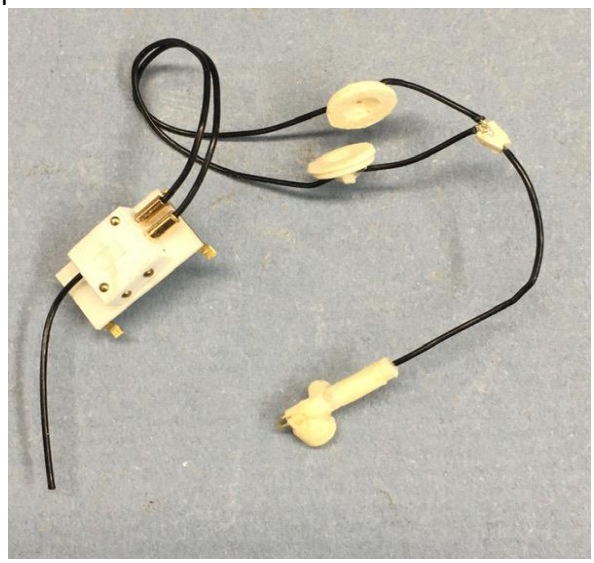
A Decontaminant Canister: Made by soldering brass tube and thin sheet in various shapes. The Decontaminant Canister is .83” long overall. The mounting bracket was made by soldering (2) feet type brackets to a brass bar that was .6” long x .3” wide x .016” thick.

A Cord Reel w/ handle mount for portable headlight: The portable headlight Cord Reel was made by filling a .393“ dia. plastic tube with resin so it was solid, then cutting off a piece that is .20” thick, and filing the edges to a slight bevel. .016” thick brass sheet was used to make the wrap around metal frame (the sunglasses shape) and other tiny bits of brass tube and electric wire was used to make up the rest of the part.



An Intercom Headphone Set with associated wiring: A master was made of the Hand Mic, Ear Cups, Intercom Switch Box, and 3 Wire Plug. Then an RTV mold was made to cast the parts in Resin and small gauge black wire connected the parts.

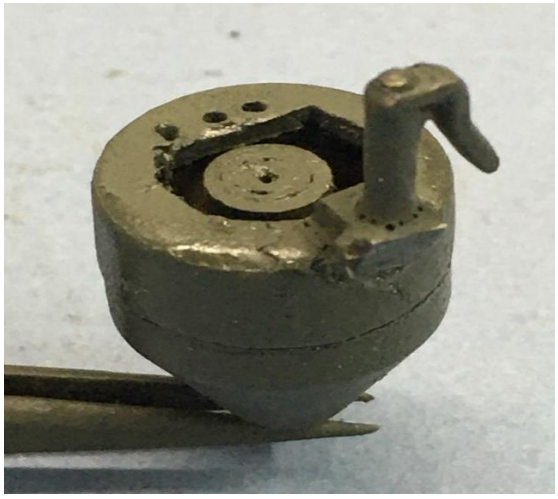




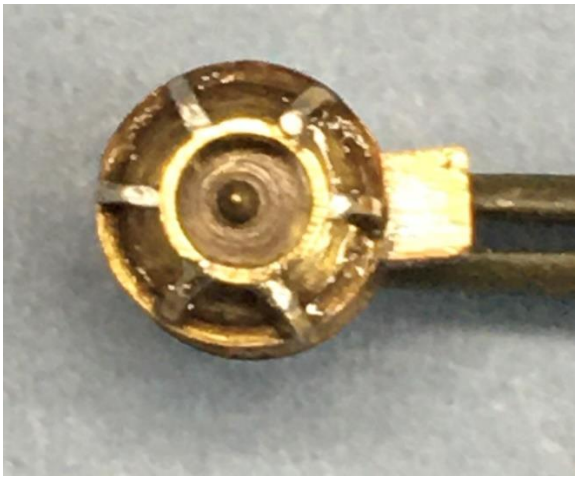
(m) **Right Side Parts:** In addition to the M12 Panoramic Vertical Periscope and mount, the following details were added to the right inside wall of the Turret:

**The Hydraulic Traverse System:** These parts are mostly G Scale cast brass train parts and brass rod for the (2) pipes. I used parts like this that looked appropriate and had the right "feel".

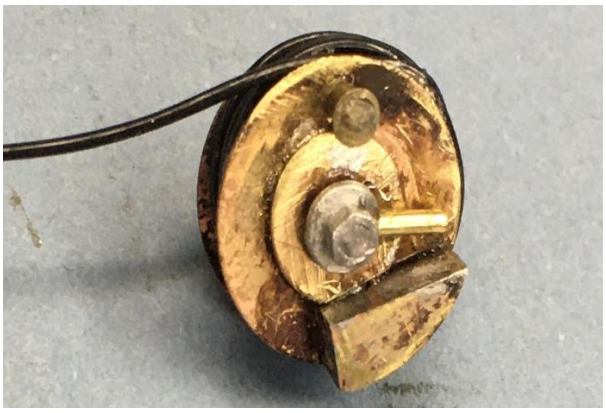
**The Manual Traverse System:** This was just some junk pieces in the box with a brass rod and piece of bar stock shaped like a handle, all glued onto a styrene block added to the top.

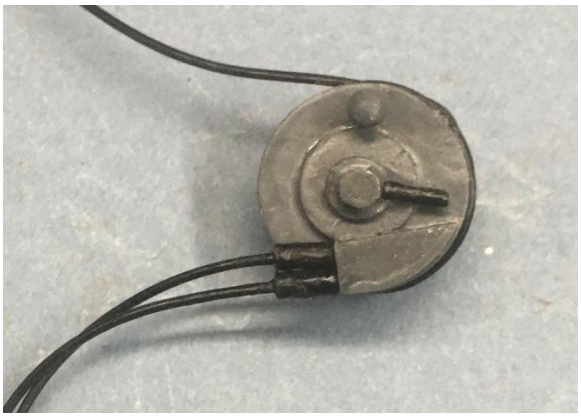


**The Azimuth Indicator**: This part was a lot of tedious work. Tiny brass bar stock was individually soldered to a thin brass washer to form the star shape, then bent and filed to fit onto the top of a G Scale cast brass piston to which was soldered a square piece of brass bar to the rear. The star part was glued onto the top because soldering it would have melted all the prior work.

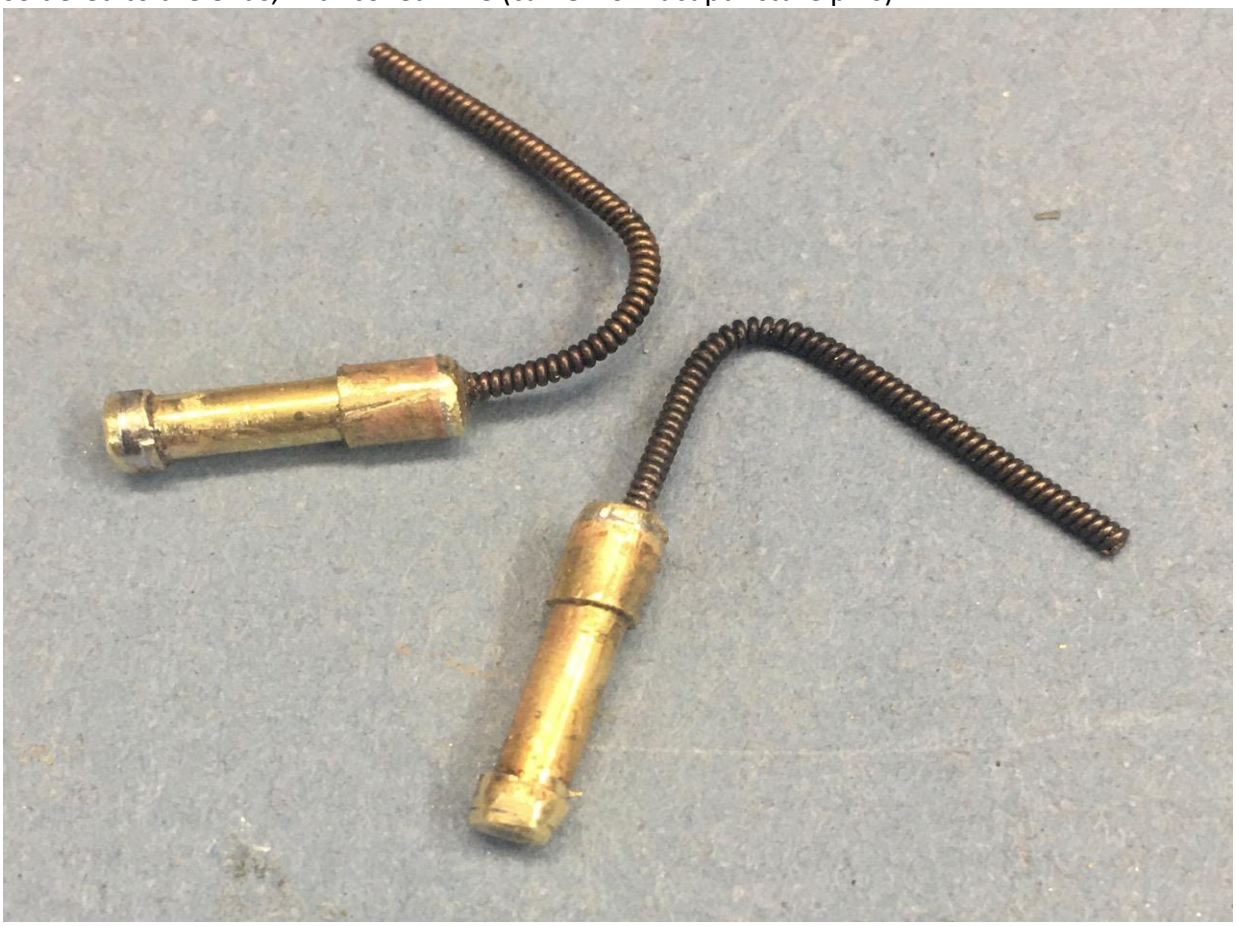


**An Intercom Wire Reel:** This was made by soldering (2) circular brass discs and various brass tidbits together then wrapping small gauge phone wire around it.

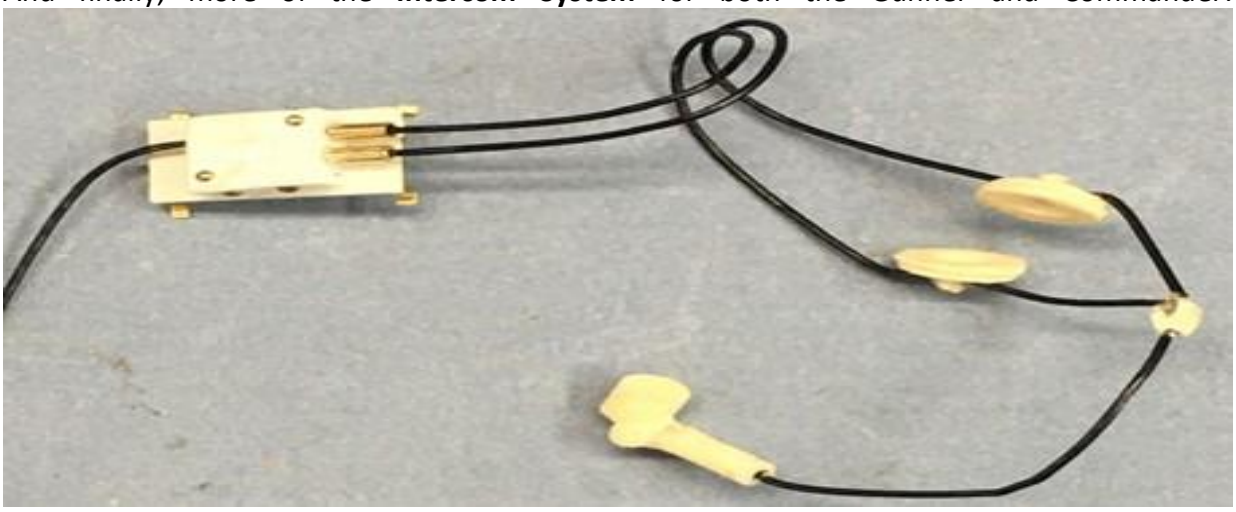




**A Battery Pack** to power the Azimuth Indicator: Made from simple brass tubing and sheet soldered to the ends, with coiled wire (came from acupuncture pins).

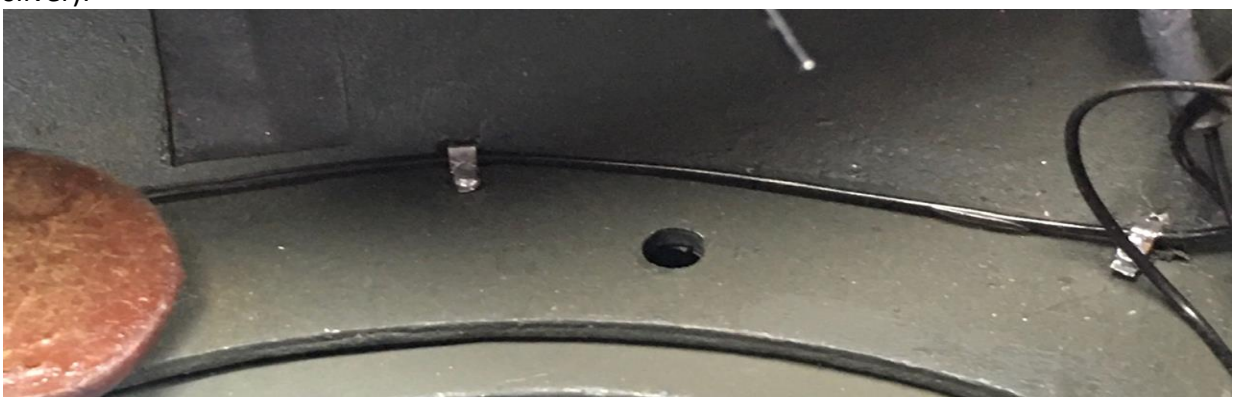


And finally, more of the **Intercom System** for both the Gunner and Commander:



(n) **Rear Area Parts:** Details added to the rear area of the Turret (after the Ammo Rack is glued in place and painted) include:

The wiring system to connect all (3) of the Intercom Head Sets w/ brass clips (parts painted silver):

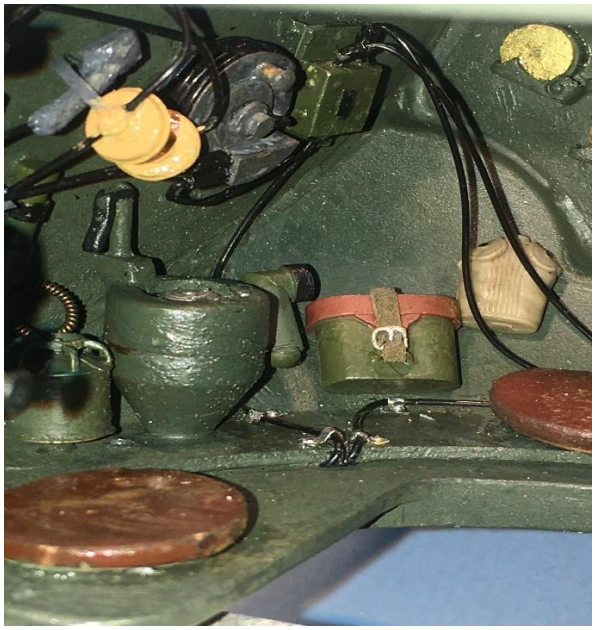


**The Commander's Binocular Case:** Made from formed and soldered brass sheet. The Binocular Case has a leather strap & brass buckle added to the simulated leather top.

Another 1/18th scale plastic **Canteen** and **Flashlight** with Holder:

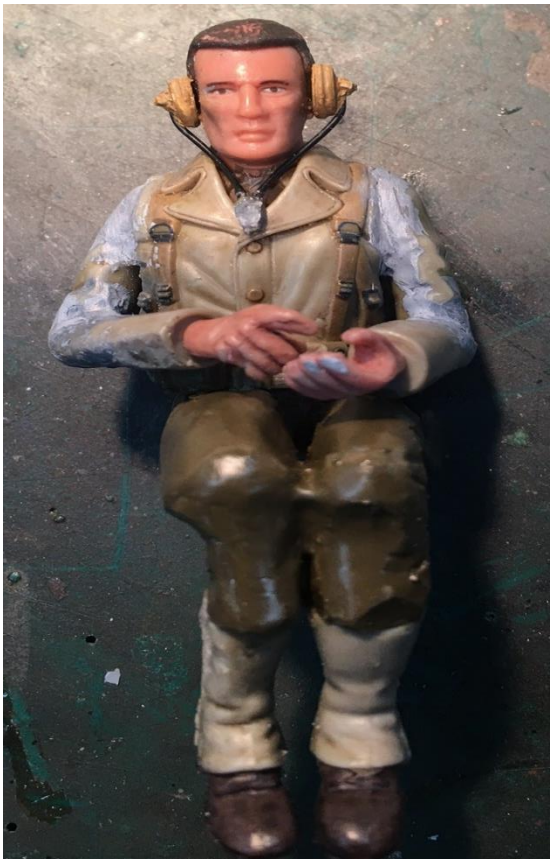
And (2) rubber padding pieces on the back wall at the center the Ammo Rack:

The following pictures are of all the newly made detail parts, painted and installed before the Gun Breech and Soldiers were fixed in place:



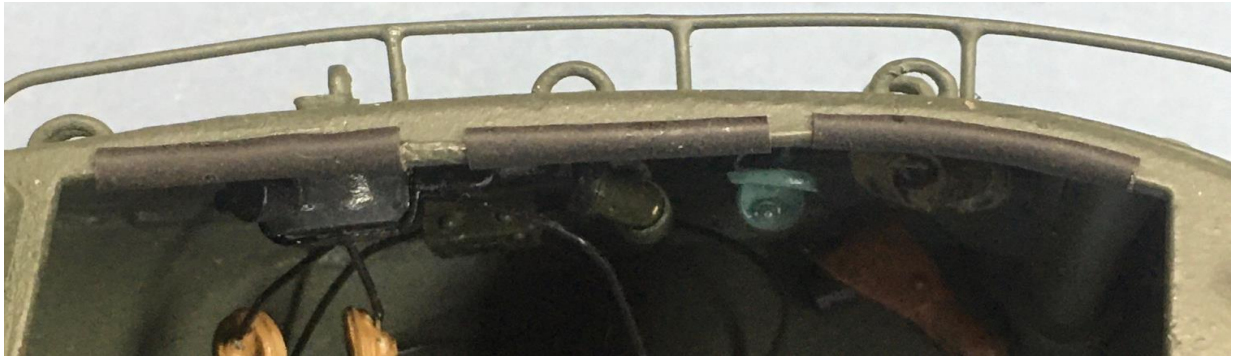
(o) **Soldiers:** The (3) soldier figures have to be completed at this point because they must be inserted (the (2) setting ones are glued in place) before the Gun Breech can be reinstalled. I added Tamiya putty and super glue in many of the joints to round them out and make them

look “whole again”.  Then I repainted them, sprayed with Testor’s Dullcoat, and finaly brushed a very light coating of dirt on them. I like my soldiers to look like they have been in battle. 😊

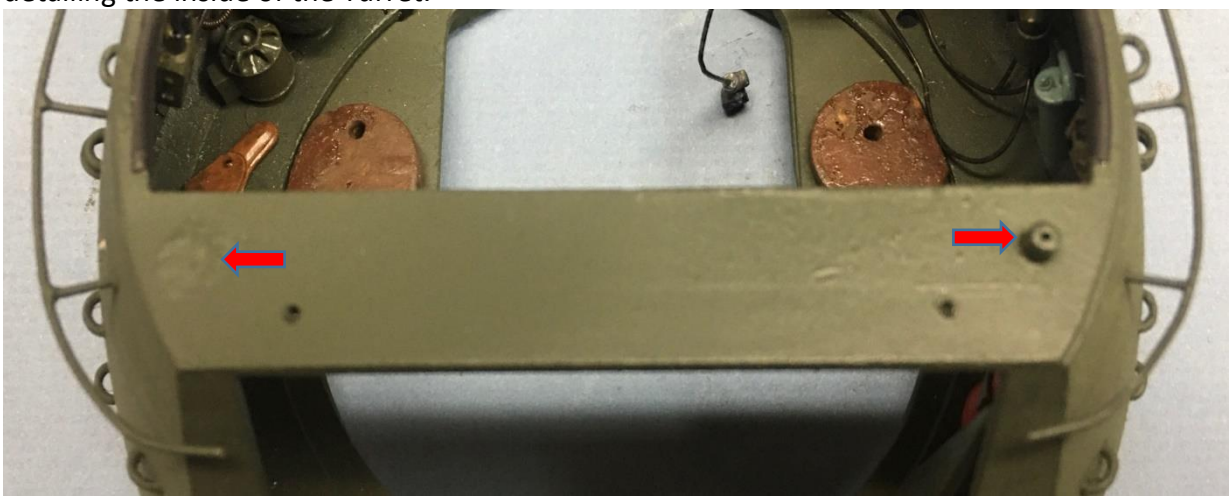


(p) The outside of the Turret was addressed next. A lot of detail parts and stowage items were required:

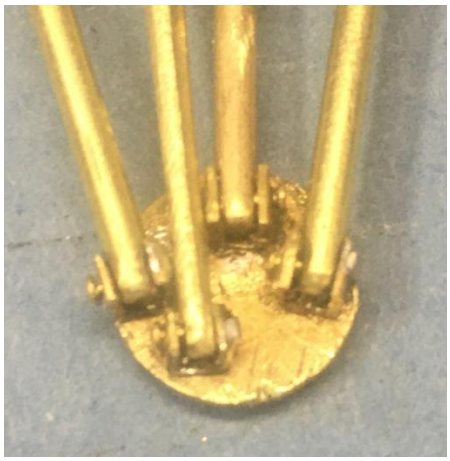
**Rubber Padding:** First, I added 3 rubber padding pieces along both sides of the Turret Top: These were used to protect a soldier's body against bumps and jolts as the tank maneuvered. I also replaced the original side rails with brass wire and soldered new anchor legs in place.

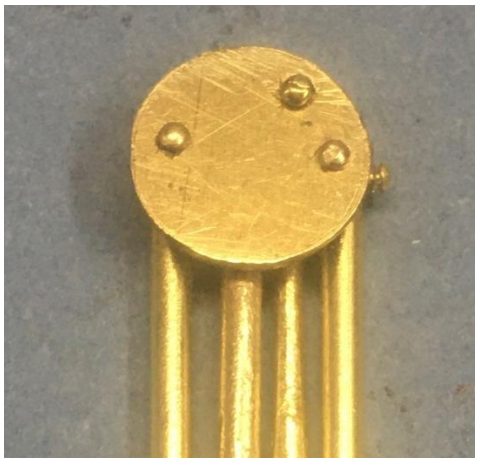


**Foul Weather Poles:** I had wanted to add the Foul Weather Support Poles w/ a leather strap to the top front of the Turret, and as I got into this detail work I realized that the 4 round knobs that had been cast into the top of the Turret to hold these poles, were not correct. So, these needed to be ground off and new ones fabricated. Unfortunately, I had already painted the Turret, so this involved some sanding and paint touch up. If you are adding these support poles, then perform this work before you paint anything, possibly even before you begin any work detailing the inside of the Turret.

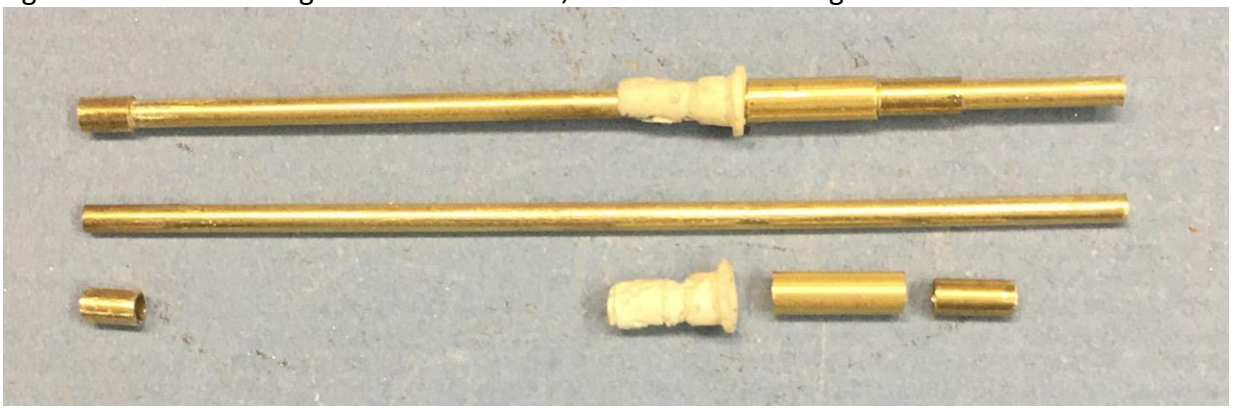


This picture shows the left side knob ground off and repainting has begun, while the right side knob is still present. I had to grind off all (4) knobs and repaint those areas twice.

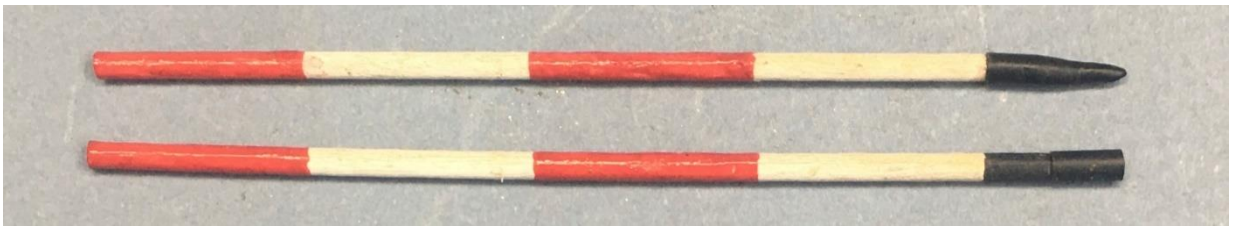




**Extra MG Barrels:** (2) extra 50 cal Machine Gun Barrels are required for the rack. The main barrel is .08” dia. x 2.85” long brass tube. The small brass piece on the front is .10” dia. x .15” long. The resin casting came from a mold of a Tamiya MG (a quick and dirty effort cast in clay which didn’t work too well, but gets hidden later with a leather strap), the brass piece to the right is .115” x .36” long tube and next to it, .10” tube x .22” long.

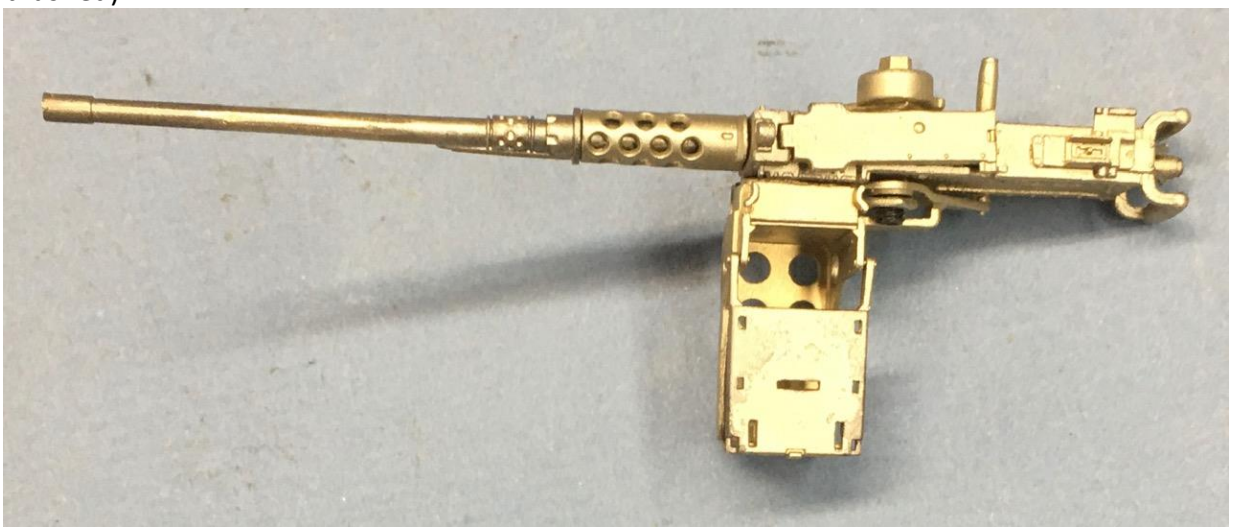


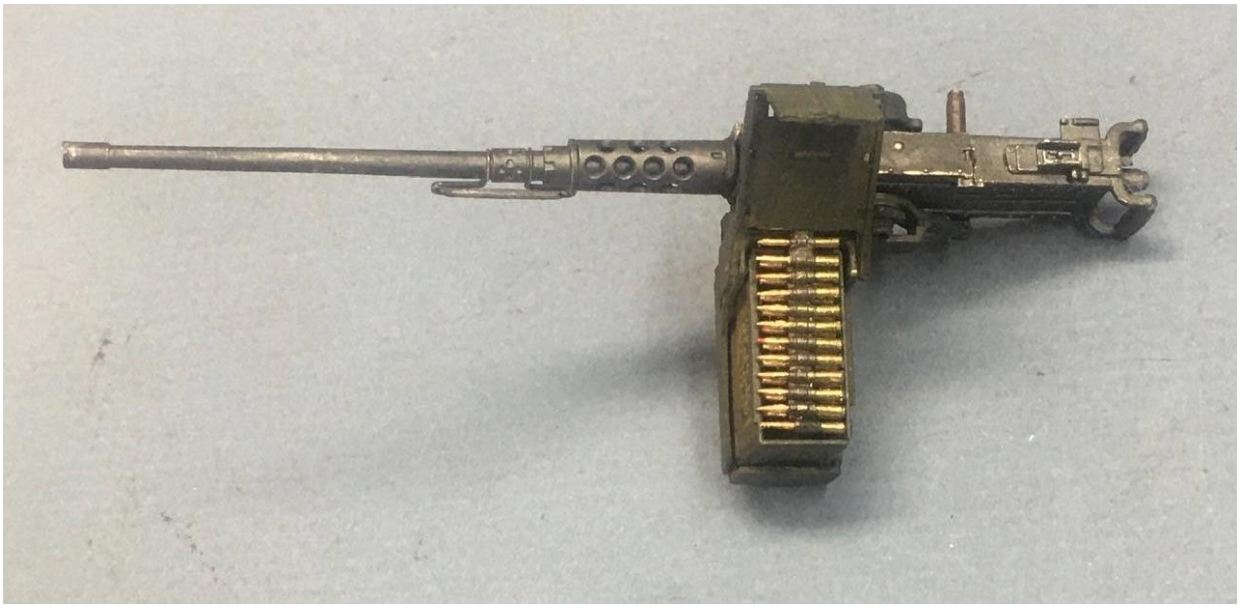
**Artillery Aiming Posts M1A1:** (2) 3.4” long stakes per set with 4 sections each of alternating red and white colors, 1/16th inch diameter wood dowels. Total of (2) sets, one on each side of Turret. The (2) metal ends (in black) are 1/16th diameter brass tube inserted into a whittled down end of each wood dowel (about 3/32” long). The pointed one is filed to shape after soldering a solid brass rod into one end.



These leather straps and buckles are simply tiny wire bent and soldered, thru which leather strips from a craft store are inserted.

**Turret MG:** A highly detailed cast Pewter 50 cal Machine Gun was installed w/ an ammo box and a cartridge belt feeding to the gun. This gun and ammo belt came from a German supplier called AFV-Model.com. The ammo box came from Tamiya, and the locking pins were fabricated out of .020" brass wire and tiny chains. Wear & tear highlights are from silver paint (dry brushed).





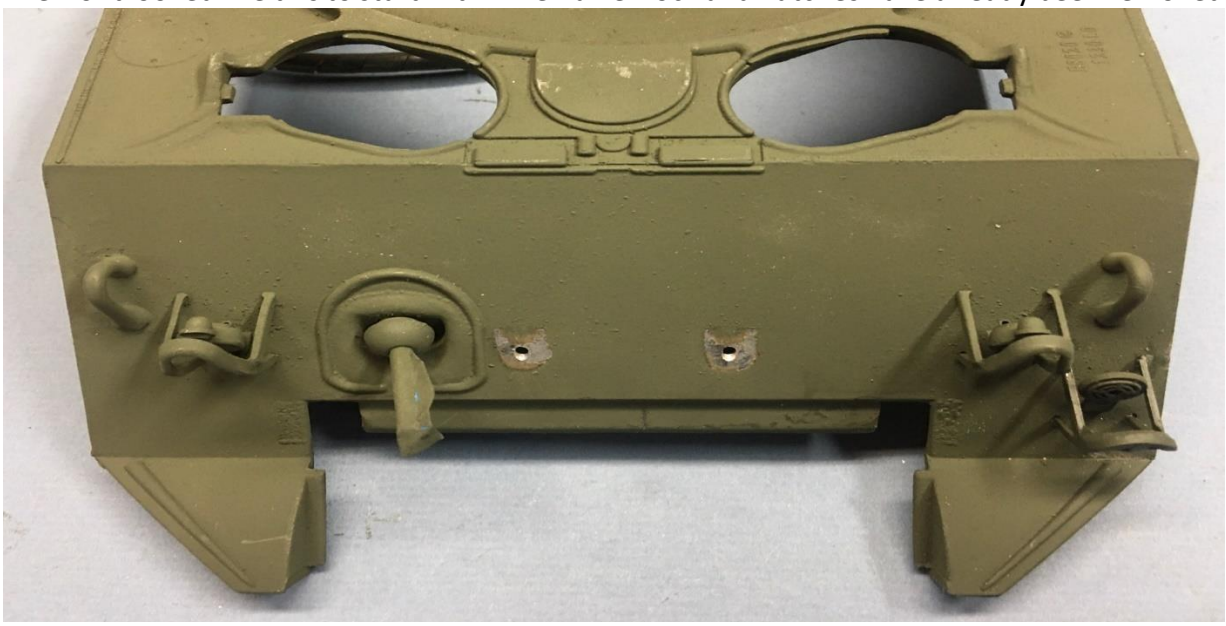
105 CAL.50
API M8 LINKED
REPACKED LOT
DM-L-21243

**MG Mount:** I also had to make a resin mount so the MG set higher off the top of the Turret. This was also cast from a Tamiya part, with a small brass rod used for the clamp handle. The cap and chain were made from tiny brass parts.

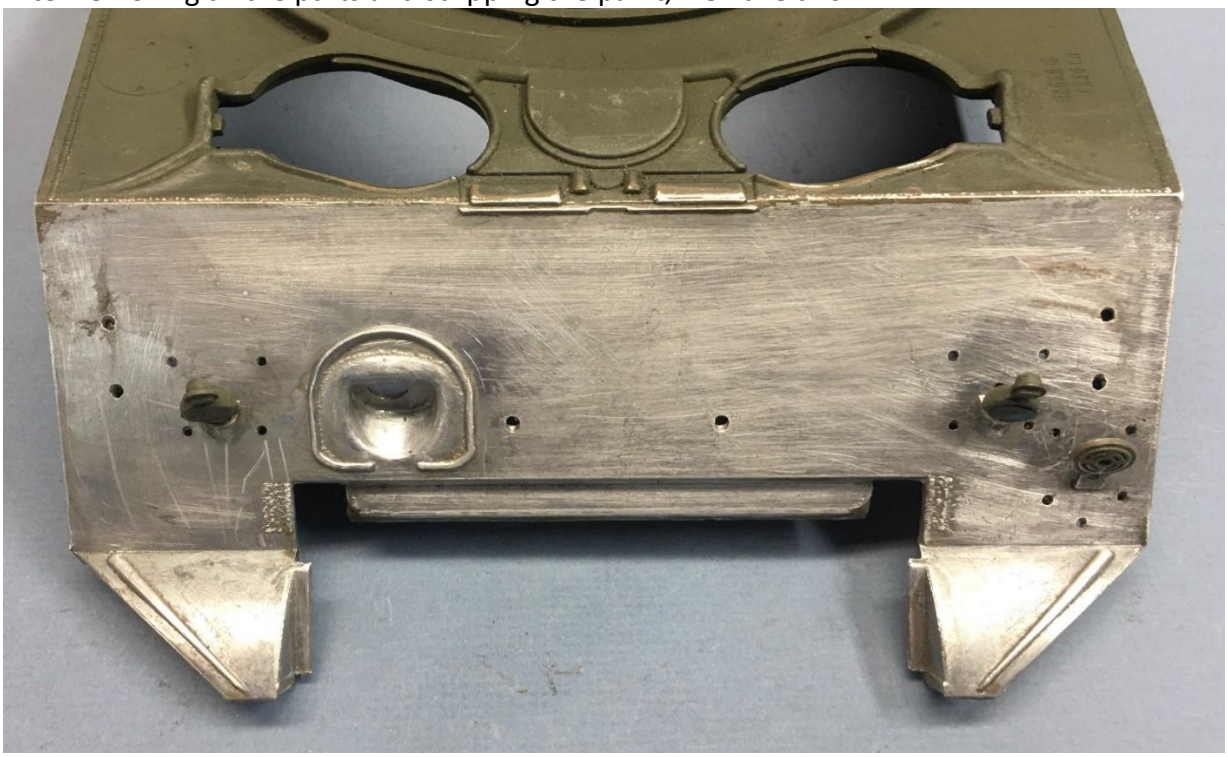
NOTE: Although you can now add stowage items to the side of the Turret at this point, I usually wait until the model is fully assembled (Step 17) to add these delicate items.

16. Now let's address the upper hull: There are a few issues that need to be corrected. The barrel lock should be mounted on the rear deck. There is no aerial mounted in front. The lifting hooks are mounted too far inward. There is no tow cable, and a few other casting details need improved upon.

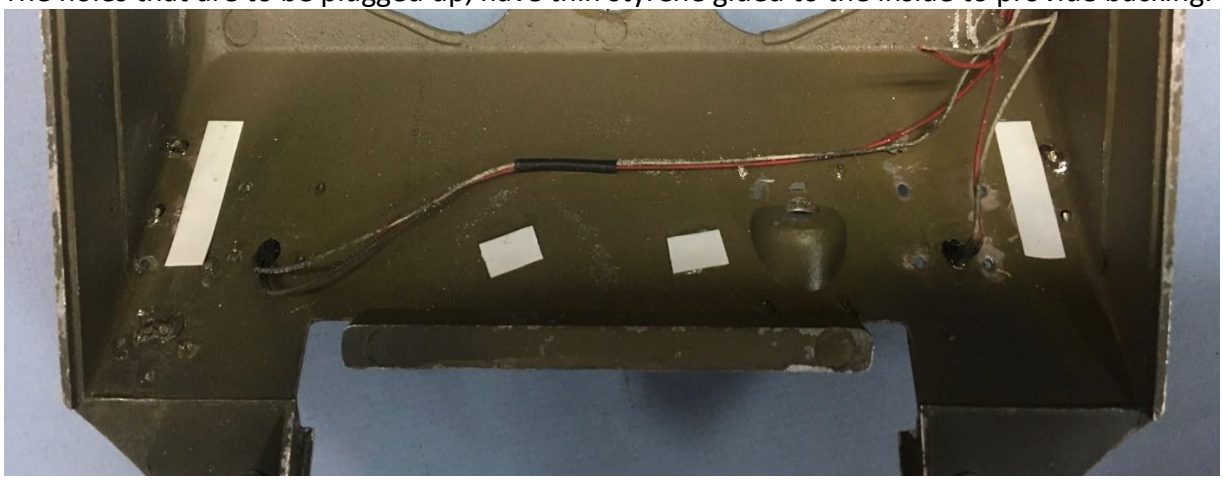
The front looked like this to start with. The Barrel Lock and hatches have already been removed.



After removing all the parts and stripping the paint, we have this.



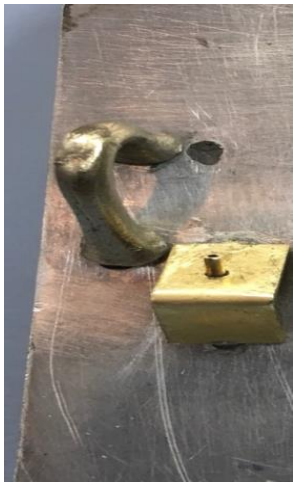
The holes that are to be plugged up, have thin styrene glued to the inside to provide backing.



(a) **Lift Rings:** I started with replacing the (4) lifting hooks w/ brass ones from Schumo, Kit # SH0026. The front ones also had to be relocated to a position that is .18” in from the outer edges. I filled the old holes with super glue and sanded smooth.

Right and Left Rear

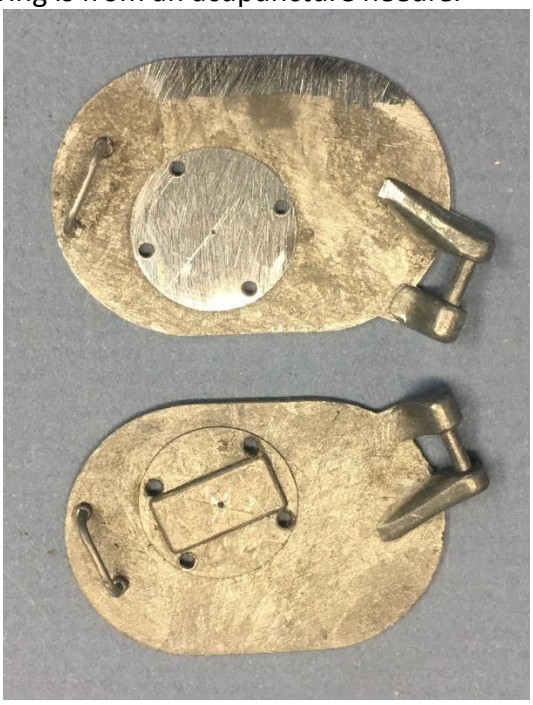
Left Front

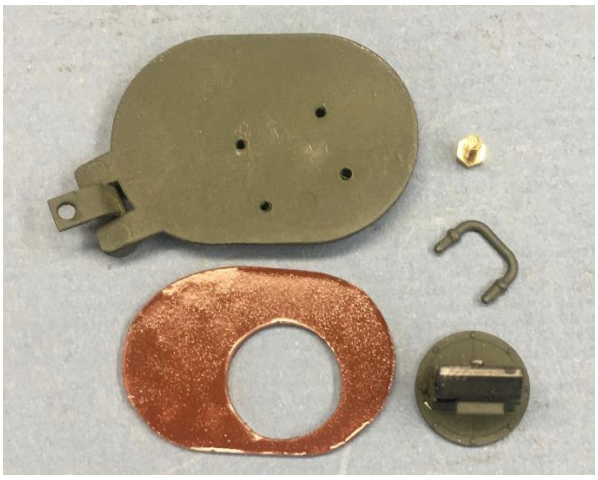
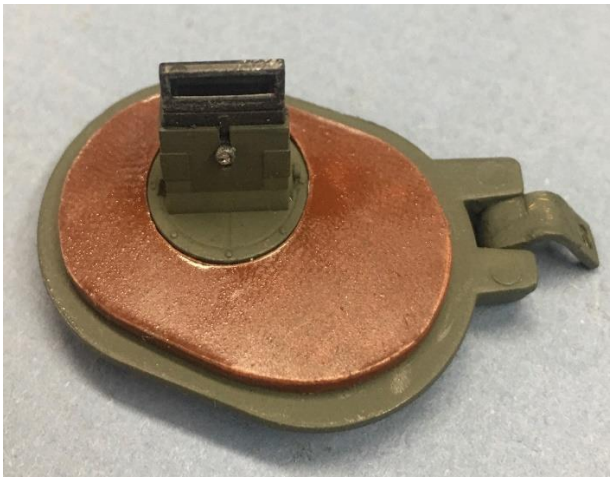
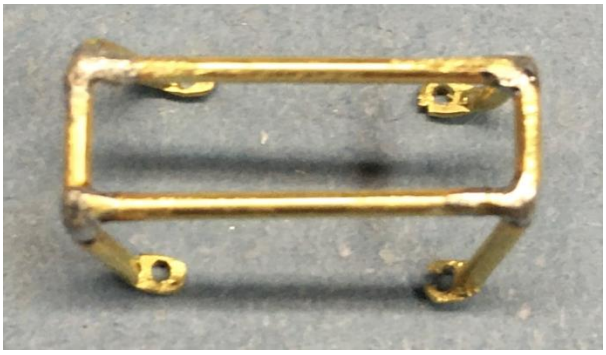
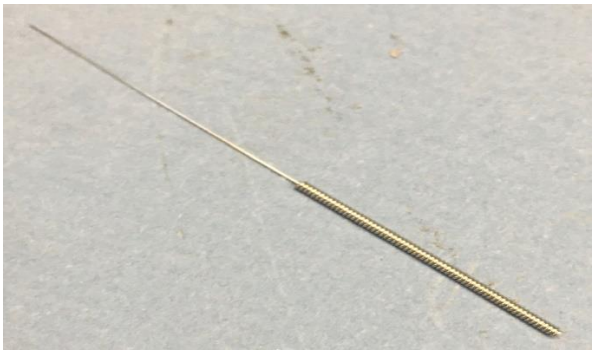


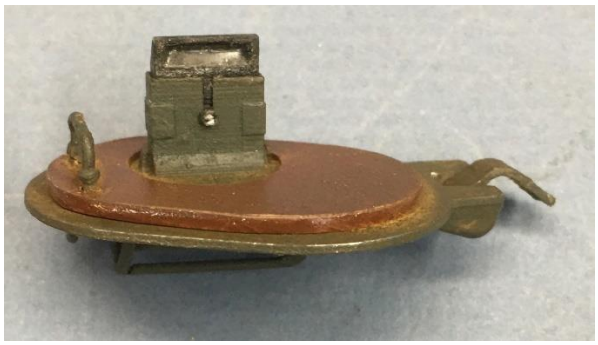
Right Front

(b) **Antenna & Base:** An antenna base was needed in the right front area. I chose to scratch build this because I could not find an Aber Photo Etch part #16054. The Antenna is a resin casting from a mold that I had made years ago for other models. The center spring is from a supply I had of G Scale train coupler springs, and the 6" long aerial (red arrow) is a cut down portion of a metal antenna that comes with many 1/16th RC tank models. I filed the upper 2" portion down to a more pointed shape to make it look more realistic.

(c) **Front Hatches:** I chose to rebuild the two front access hatches and to add periscopes. This entails grinding off portions of the top and bottom hatch casting and replacing with more detailed parts. Then I replaced the hatch hinges with .031" x .16" flat brass bar that I cut and bent to fit, then drilled and tapped a hole to mount to the underside hull with a 2-56 brass hex head bolt. I also added a .060" thick styrene sheet on the underside to simulate the inside padding. An inside door handle was added, and also periscope parts made by ***3dscalemodels*** which were 3D printed at ***Shapeways*** (you need to order 2 sets to get the right configuration… https://www.shapeways.com/product/4JRRCUBAV/1-16-scale-sherman-periscopes?optionId=64613313&li=ostatus) The periscope lenses were created by adding Microscale Kristal Klear to the openings, which when dry looks like glass. Lastly, Schumo Kit # SK0017 was out of stock, so I scratch built the brush guards from 1mm dia. K&S #9861, brass wire, soldered the sections together, and added brass bolt castings for detail. The periscope door is .040" styrene, beveled on all edges and the spring is from an acupuncture needle.

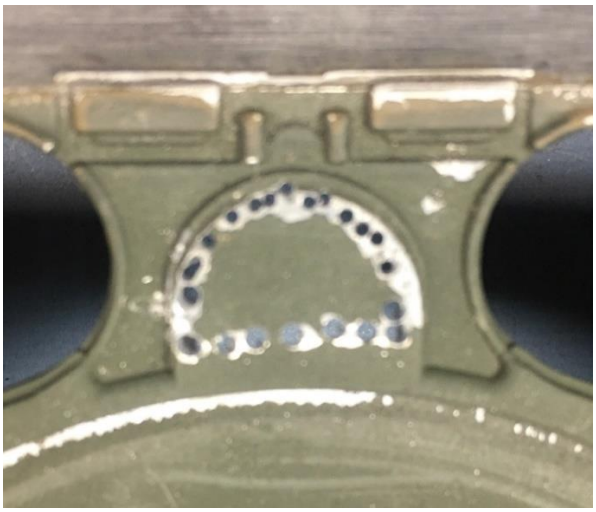


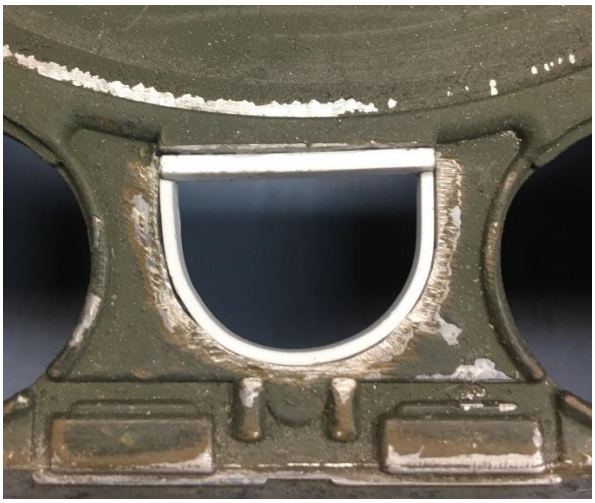





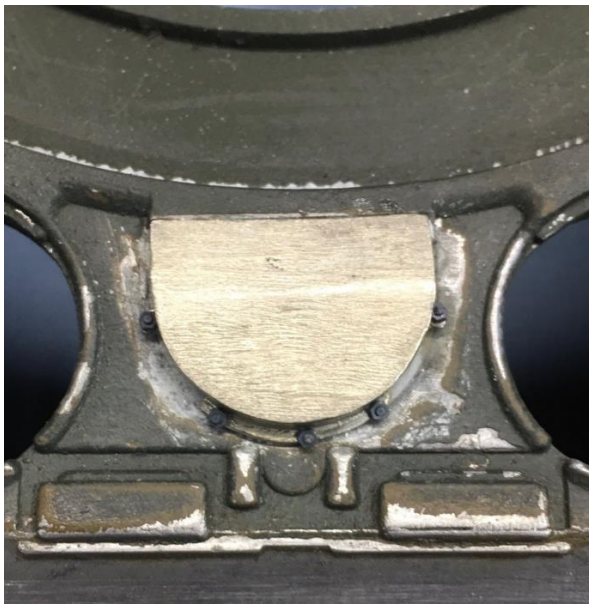


(d) **MG Tie-Down:** Next, I ground off the old cast on tie-down rim around the 30 cal MG opening and installed the one from Schumo Kit #SH0026.

(e) **Ventilator:** I added a ventilator fan cover to center intake area from Schumo Kit #SH0026. This involves a lot of drilling, cutting and grinding of the Mato metal. After which, I added an edge of styrene, filled the gaps with putty, sanded, fitted the new part and drilled holes for the 5 plastic nut castings. Unfortunately, I drilled the 3 lower ones off center ☹.....but it doesn't look too bad.



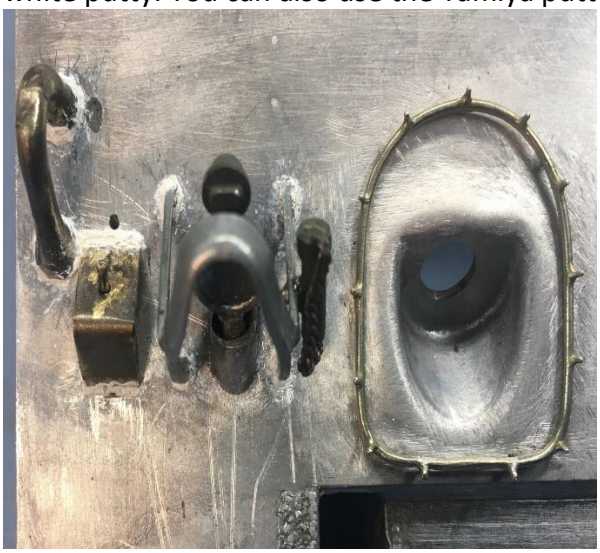




(f) **Headlight Hole Plugs:** I made (2) Headlight Hole Plug Containers and mounted them to the side of each Headlight Brush Guard. These are .125” diameter brass tubes x .40” long with a slightly larger cap on top, to which is soldered a tiny chain draped over the side and glued to the bottom.

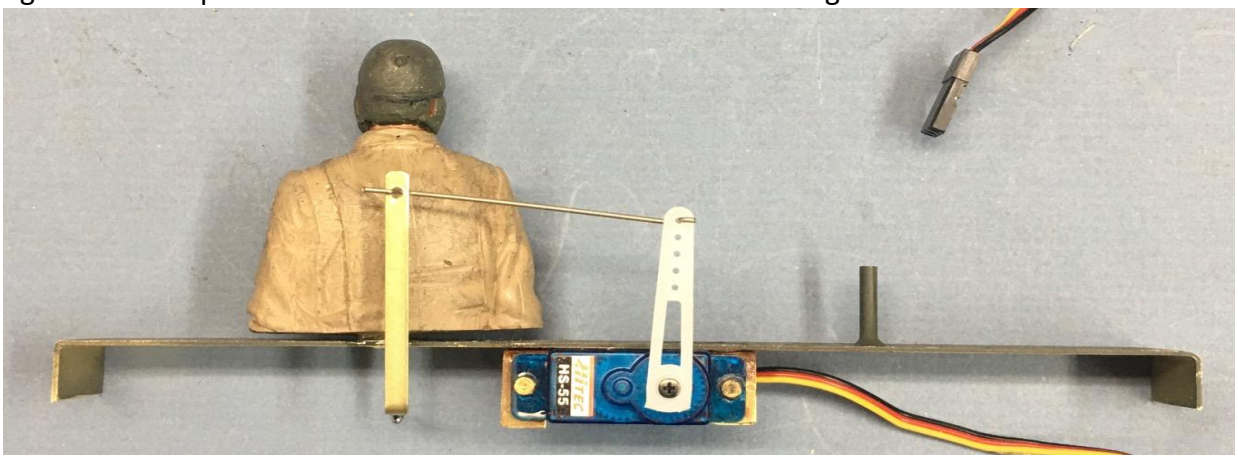
The small brass rod is glued into a hole in the side, then cut down and glued into a hole in the Metal Guard. Note: The contents inside these containers were used to plug the electric socket when the headlight was removed and converted to a handheld spotlight.

(g) **Filling Holes:** I next plugged the holes with super glue that were no longer needed, glued all the headlight and siren brackets back on the front, and added weld lines around them with Tamiya white putty. You can also use the Tamiya putty to fill holes.

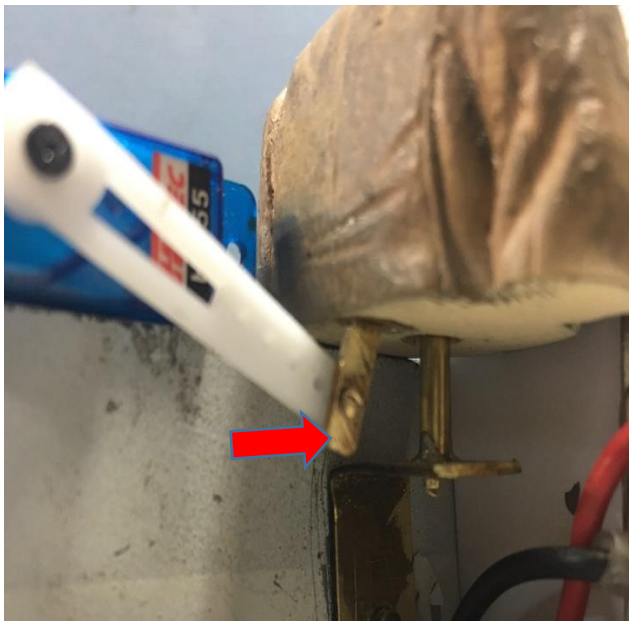


These are 3 large holes filled in the back wall.

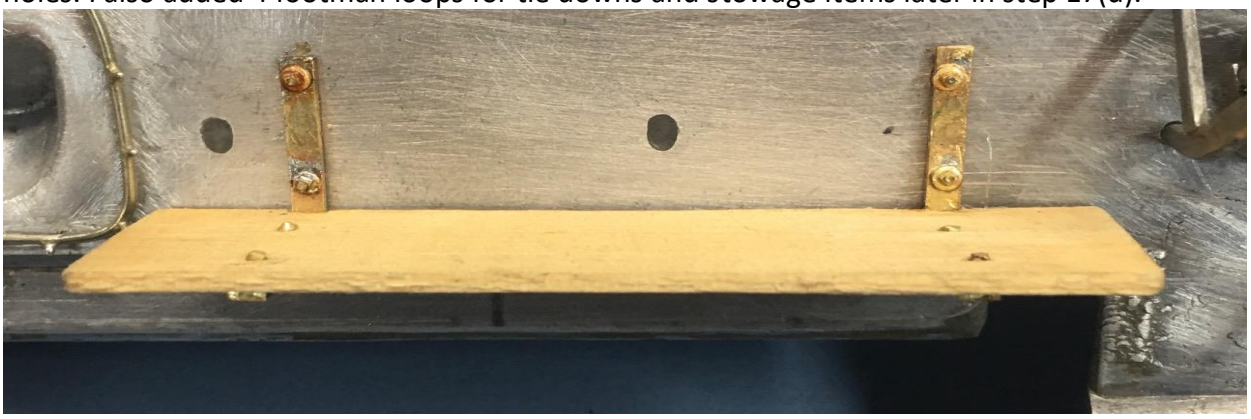
(h) **Driver Figure:** If you want to have a driver figure visible, you need to install a bracket for it to set on. I originally designed one that mounted clear across the full width of the inside of the Upper Hull and featured the driver head swiveling. HOWEVER….after installation I realized that the hatch would be open and affect the swing of the barrel during battle (see first picture below), so I did not pursue this driver's swiveling head idea and redesigned everything so the figure moved up and down and the hatch could be closed during battle.




The new design included a small "L" shaped bracket that was screwed to the inside of the hull, from which a .10" diameter tube was soldered (for the figure to ride up/down on), thru which passes a .06" diameter brass rod that reaches up into the figure's head. Thus, the head is still loose to turn on its own from movement of the tank. A micro servo is mounted on the side plate of the Lower Hull, and the rotating arm lifts and lowers the body. I used a small length of brass bar stock (see red arrow), screwed to the plastic arm, which was inserted into a hole drilled up thru the body, to act as an anchor to keep the body facing straight ahead.



(i) **Wood Cargo Board:** The last thing I did to the front of the Upper Hull was to mount a wood board for stowage between the front left headlight bracket and the MG opening. I installed 2 small brass angles for support and affixed them to the hull with brass bolt castings glued into holes. I also added 4 footman loops for tie downs and stowage items later in step 17(d).



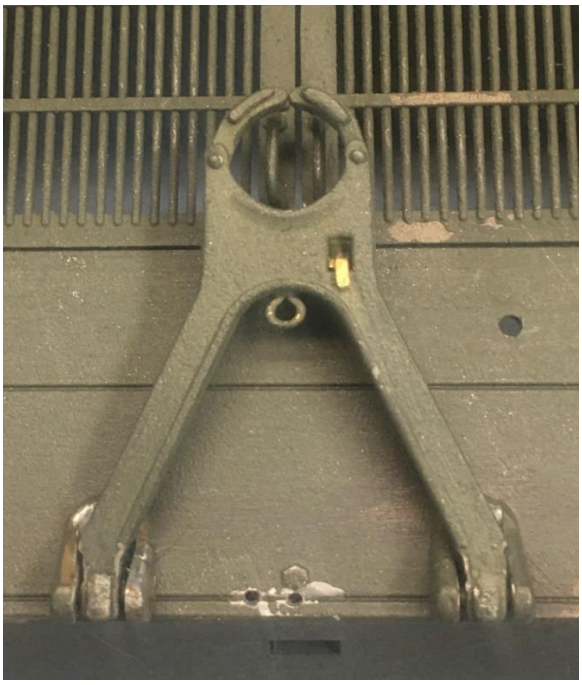
(j) **Barrel Lock:** The Barrel Lock was moved to the back of the Upper Hull and positioned properly on edge the rear deck. Additional detail parts were added. I could not find a Schumo cast Barrel Lock (Kit # SH0030), so I elected to rebuild the original Mato part. This involved cutting off the (2) locking arms and grinding out notches on both sides for (2) new plastic locking arms (made from .040" thick styrene). I did this so I could actually mount the barrel in the lock. A spring release pin (non-functioning) was added under the center arch. I used the (2) Mato pivot brackets but had to reverse them so the lock was far enough away from the edge of the engine compartment doors to allow the Hooking Latch to be installed (to hold the Barrel Lock during travel). The pivot brackets were also ground down a bit in the pivot area, so that the Barrel Lock legs would rotate downward sufficiently enough to engage the Hooking Latch.

Starting point after all parts removed and (2) new holes are drilled for the pivot brackets.

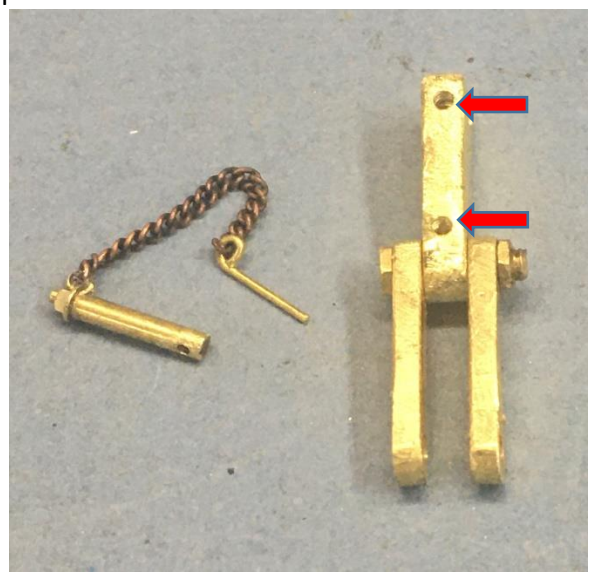
Top arms ground off

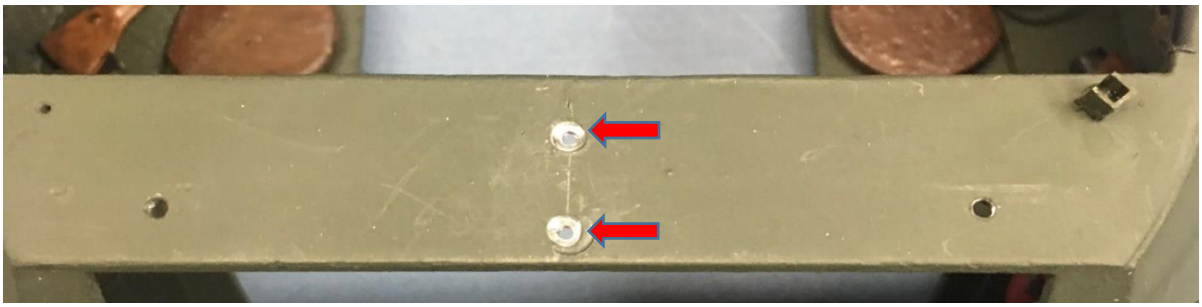
Notches ground into lower bracket

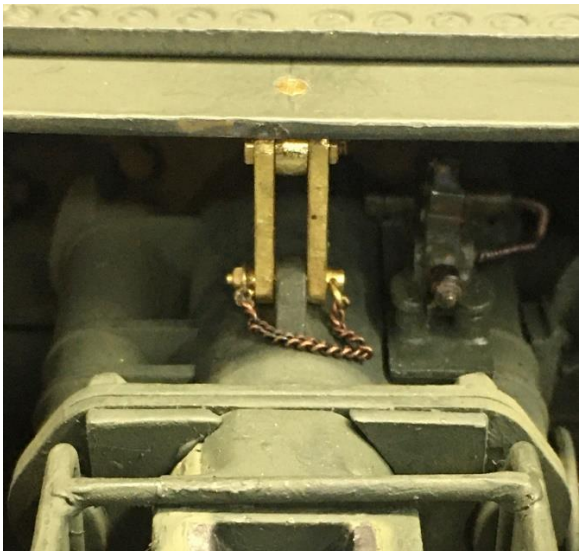
This is the Hooking Latch



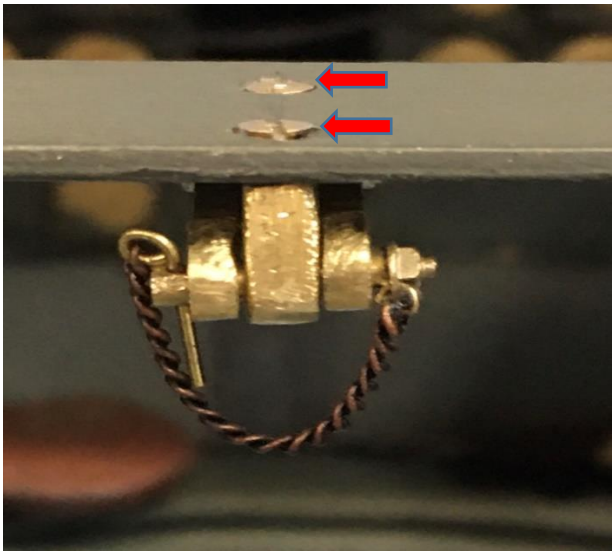
**(k) Turret Internal Locking Pin System:** This is the step that was started in 15(c). After the Barrel Lock was positioned to the rear deck, you can now make the internal pin system. After I positioned the Barrel in the rear external lock. I carefully measured the clearance from the underside of the turret roof to the center of the hole in the triangle piece mounted to the top of the Gun Breech. My dimension was .51" (yours may be different). I made 3 basic pieces from brass: the one that gets screwed to the top of the turret roof is .096" thick and the (2) arms that swing down are .060" thick. Those (2) arms are .58" long and the holes drilled thru each are .068" dia. The pin that slides in and out of the bottom hole (and also goes thru the triangle piece mounted to the Gun Breech), is .060" dia. and I glued a short section of chain to it, with an .010" dia. wire on one end (which serves as a cotter pin to hold the pin in place). The top piece also has (2) holes (see red arrows) tapped for .00-90 flat head screws which are countersunk thru the top of the turret roof to hold everything in place.





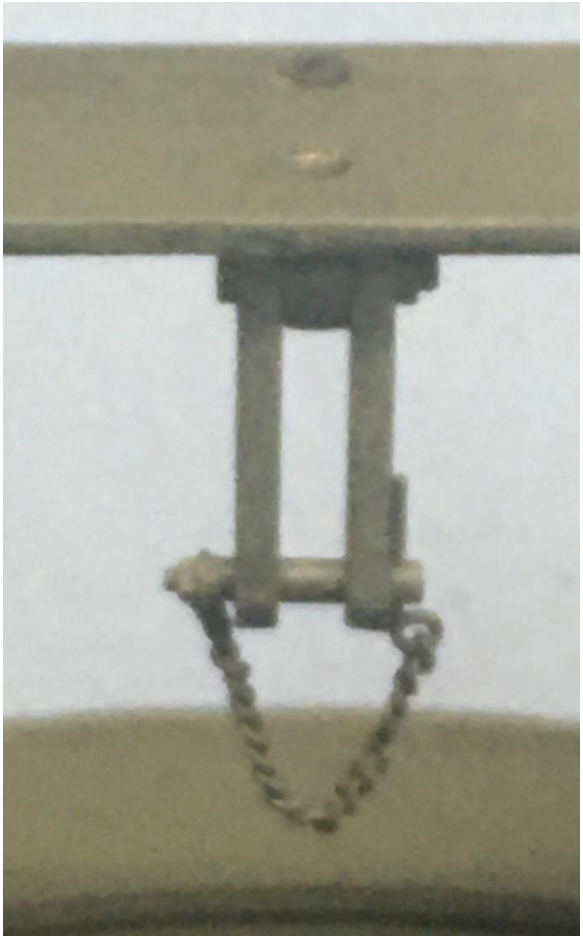


This pic looks from the commander seat and shows the internal lock engaged.

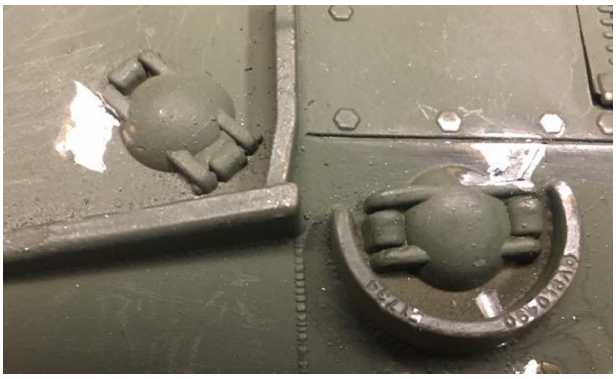


This pic shows the arms locked upright to the underside of the turret roof.

This final pic shows the locking system hanging down and not engaged.

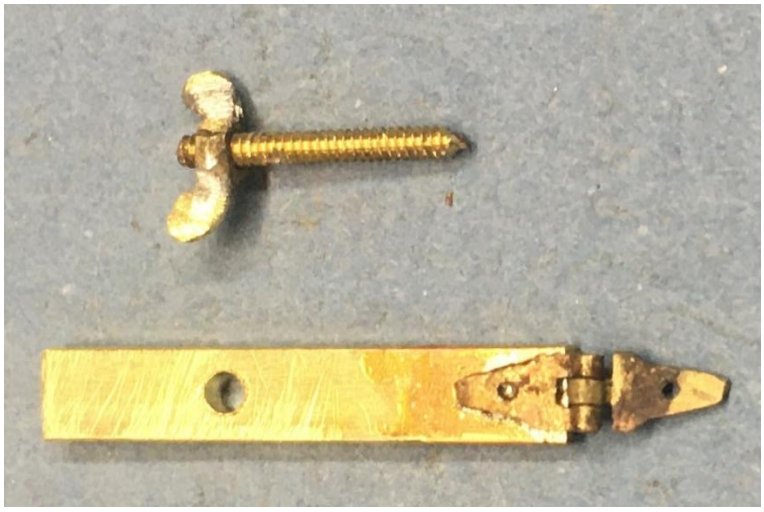


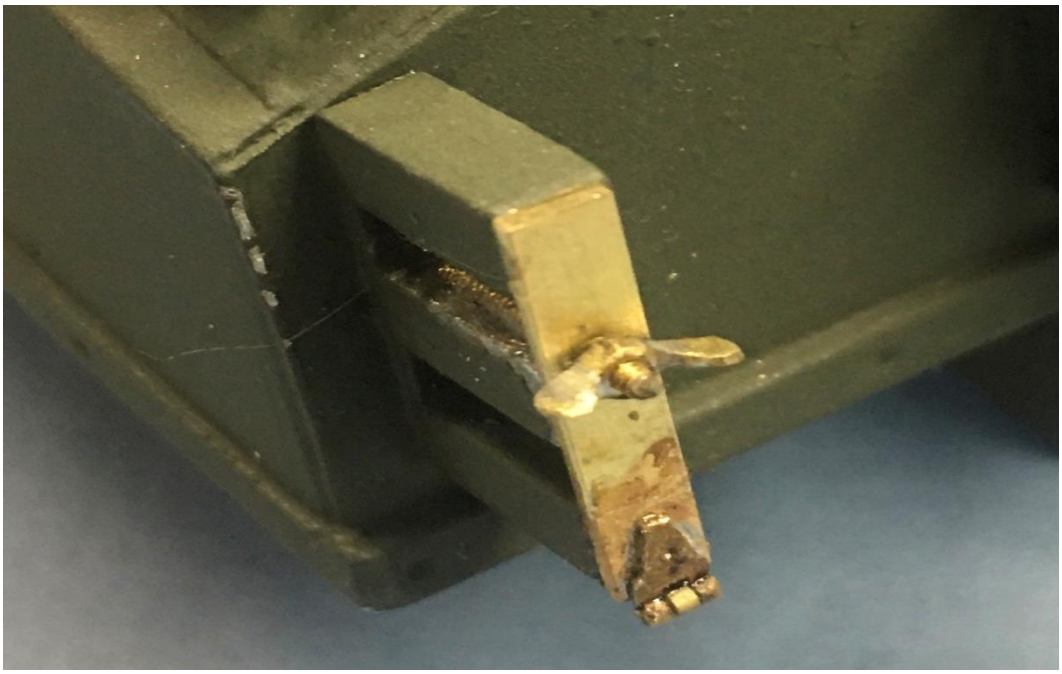
(l) **Fuel Cap Handles & Chains:** I also replaced the (3) “cast on” fuel cap latch handles with brass rod, and added small chain which will be anchored with a pin in a hole in the hull.

(m) 

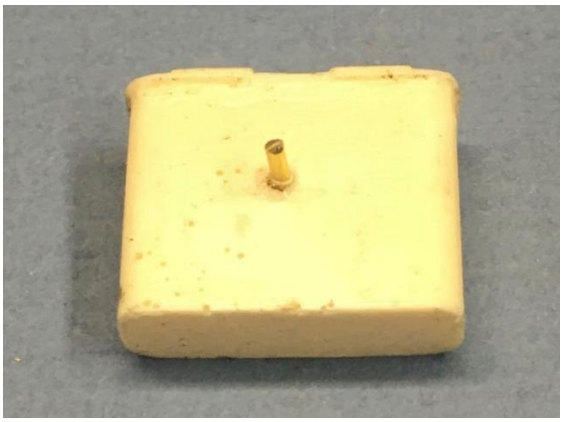
(l) **Extra Track Links:** Next, I worked on the spare track link holders. I cut 12 lengths of brass rod to act as axels (so I did not have to pry all the steel pins apart), soaked them in Birchwood Casey Gun Bluing liquid. This makes them black like the real axel, and none of these were painted.

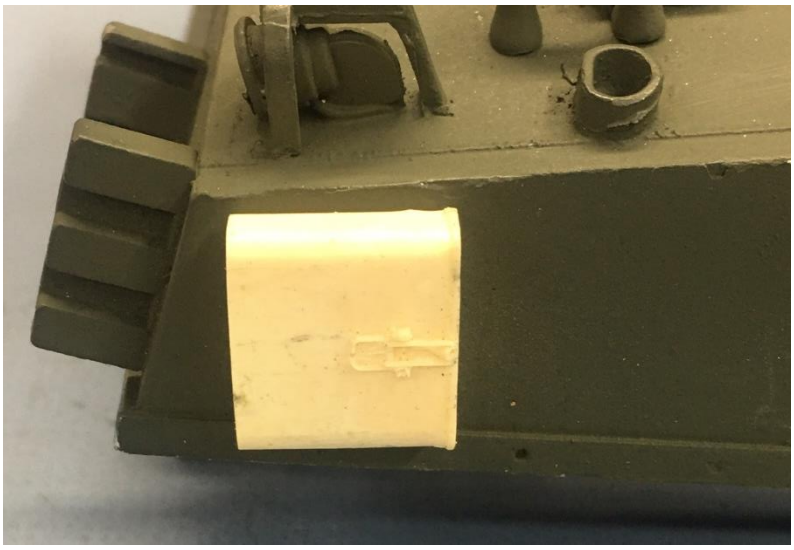
Then I added a locking latch to each of the (4) sides of the bracket. I used .125” wide x .032” thick brass bar stock that was .71” long. I soldered a small hinge onto one end and drilled a hole for a 00-90 threaded brass rod that was .40” long to stick thru. This was glued into one of the slots on the side of the track link bracket, and a wing nut secured the bar stock latch closed. I had to hand make the 00-90 wing nuts by soldering small brass pieces on each side of a 00-90 nut and grinding to a butterfly shape. The wing nut is a bit oversized, but the smallest I could make.



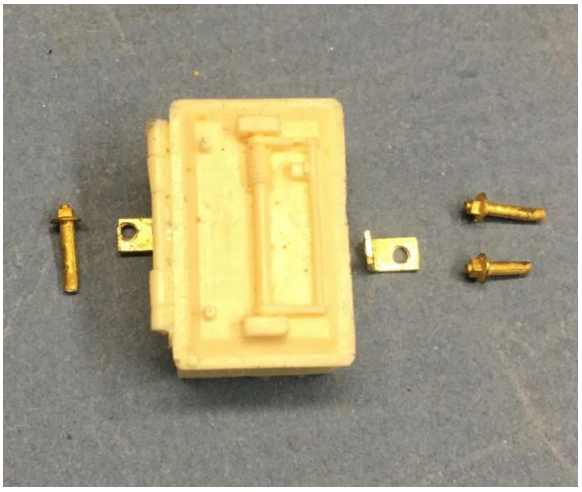


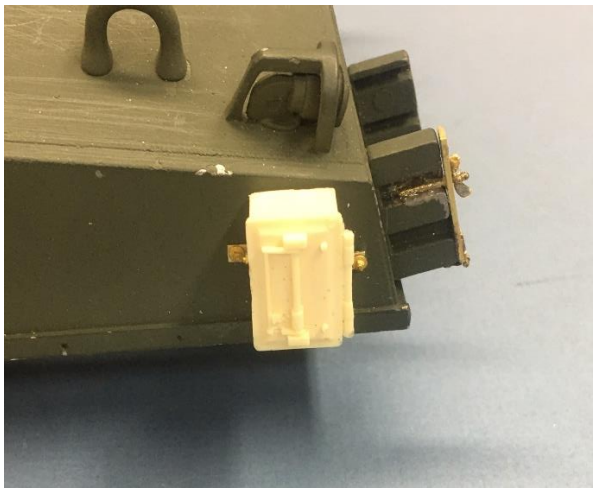
(m) **First Aid:** A first aid canister is glued on the rear right corner of the Upper Hull. This was a resin casting made from an RTV rubber mold of a part taken from a Tamiya Pershing tank kit. I also inserted a brass rod into the underside of the canister and then drilled a corresponding hole into the Upper Hull to help secure the canister in place. Glue alone tends not to hold on a metal tank model.





(n) **Telephone:** I elected to add a telephone box to the rear left corner of the Upper Hull so that ground soldiers could have direct access to the crew inside the Turret. This was a resin casting I had from some other Tamiya kit. I used thin brass bar stock for mounting, with 4 brass bolt castings.



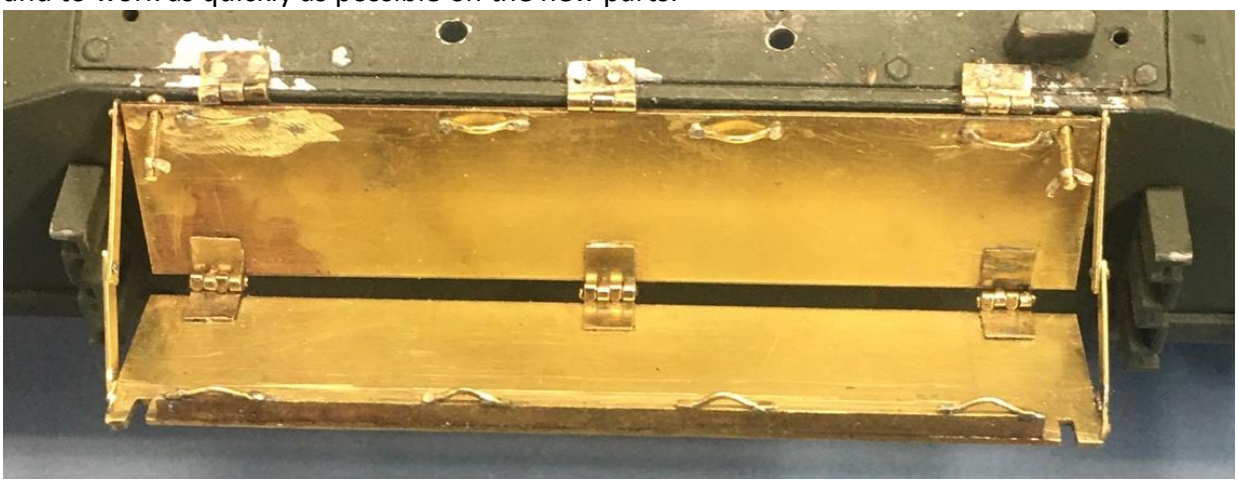


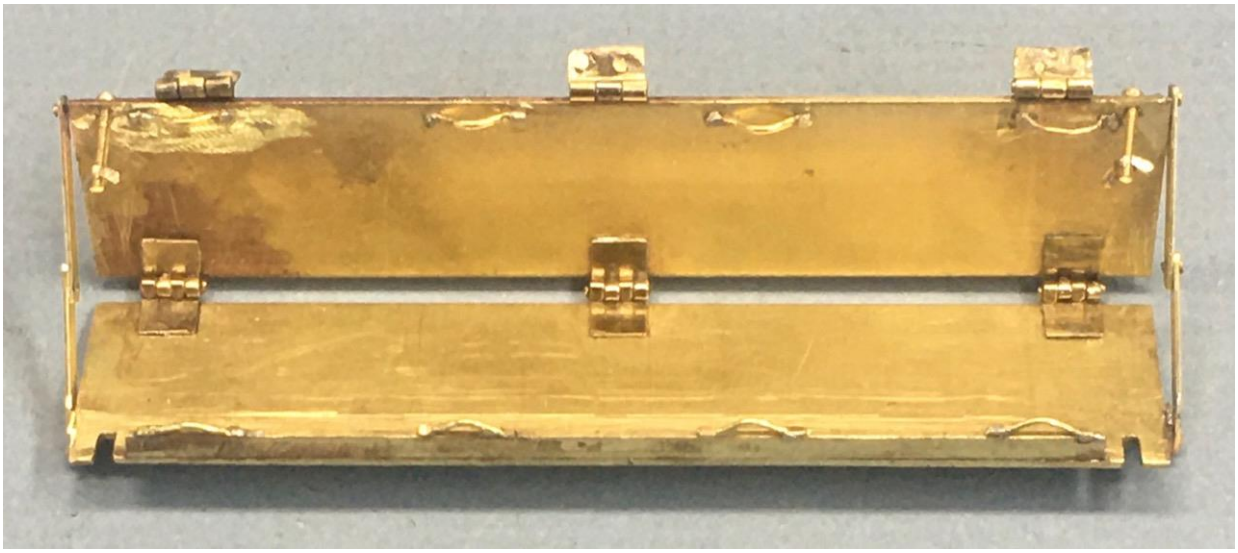
(o) **Rear Stowage Rack:** The Mato Rear Stowage Rack looked too crude and did not fold up, so I decided to scratch build a new one from brass. There are not very many close-up pictures of this Stowage Rack in any reference books nor on the internet, so the precise size is not known but it takes up most of the center area on the rear Upper Hull. I first started with .064" thick brass strip, but this proved to look too bulky and would not bend correctly, so I switched to .032" thick brass material. Both panels of the Rack are ¾" wide x 3.55" long x .032" thick.

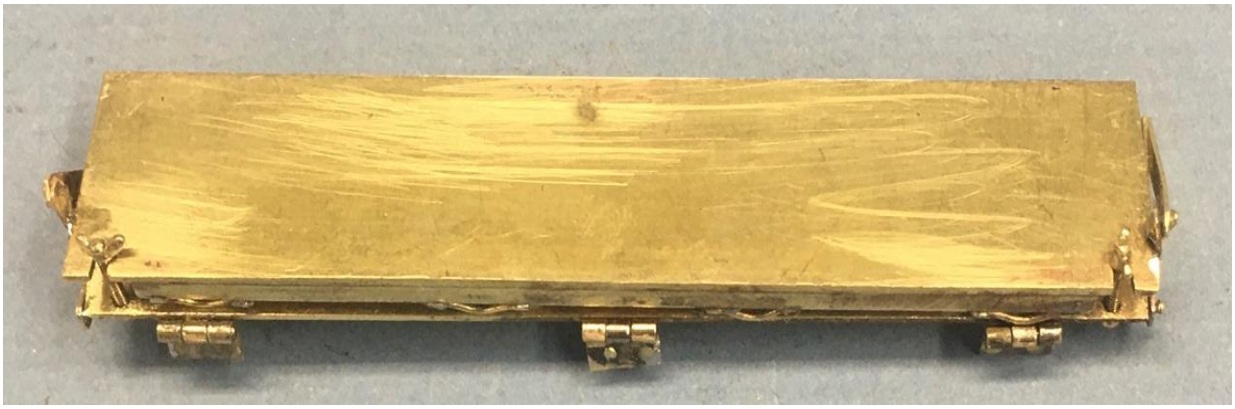
On the prototype, when folded up, the Rack is locked in place by wing nuts located at the upper outside corners. I chose to replicate this by taking (2) of the tiny cast nickel wing nuts I had left over from Schumo kit # SH0027. This was very challenging work, but I was able to grind off the fake threaded rod, drill the center of the wing nut with a .039" drill bit, then tap the hole for a 00-09 threaded rod. The new rod is 3/8" long and had a hex head which I turned in a Dremel tool and filed down to a ball shape. This will allow it to pivot in the hole drilled in the upper corners of the top Rack panel, so that they will lock down in the slots of the bottom Rack panel.

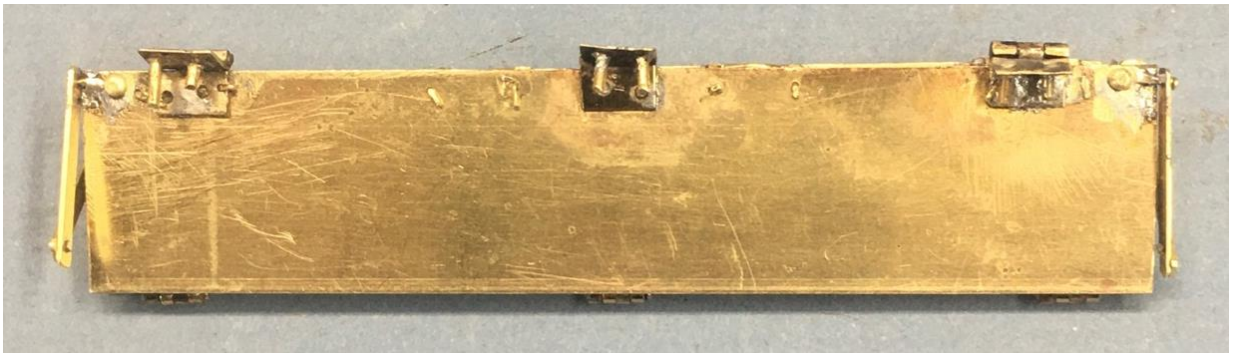
The (2) sets of folding arms are each made up of (2) pieces of .675” x .095” x .016” brass bar stock, plus (1) piece that is .125” long (see red arrow), all drilled for tiny brass pins to be inserted. Be sure to make these arms mirror images of each other because they mount in an opposite manner on the ends of the Rack panels (in order to fold up correctly).

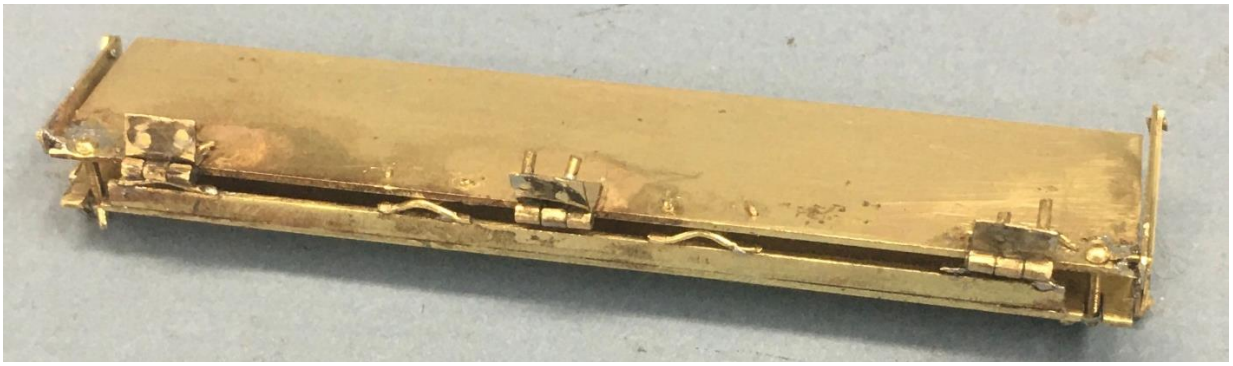
The (2) Rack panels are notched and drilled as shown, and (3) miniature hinges are soldered in in the center and on the top panel. Once these (3) hinges are mounted to the rear Upper Hull, (4) tiny plastic bolt castings will be drilled and mounted to give the proper look. A .10“ x .03” x 3.15” brass strip is soldered on the lower Rack panel to form a lip, and (8) miniature brass “footman loops” are soldered for tie-downs. Note: It is difficult to keep previously soldered tiny parts from coming apart when soldering additional tiny parts, so I have found it helpful to wrap wet (cold) tissue around the previously soldered parts to keep their melting temperature higher and to work as quickly as possible on the new parts.

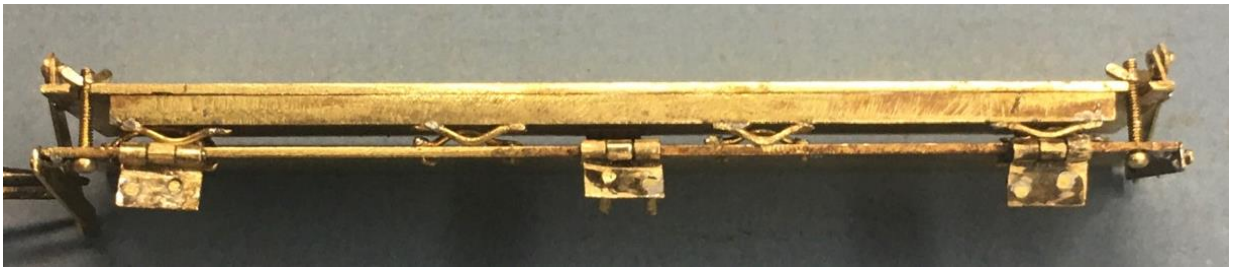


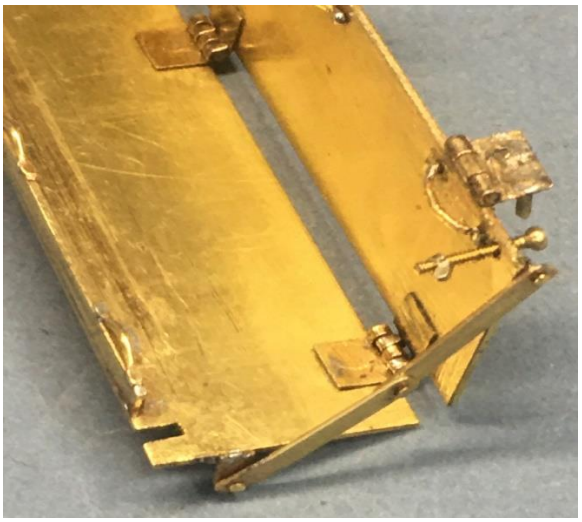


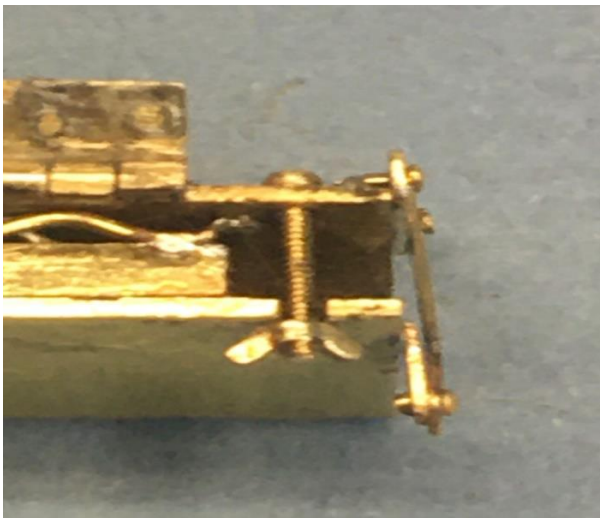


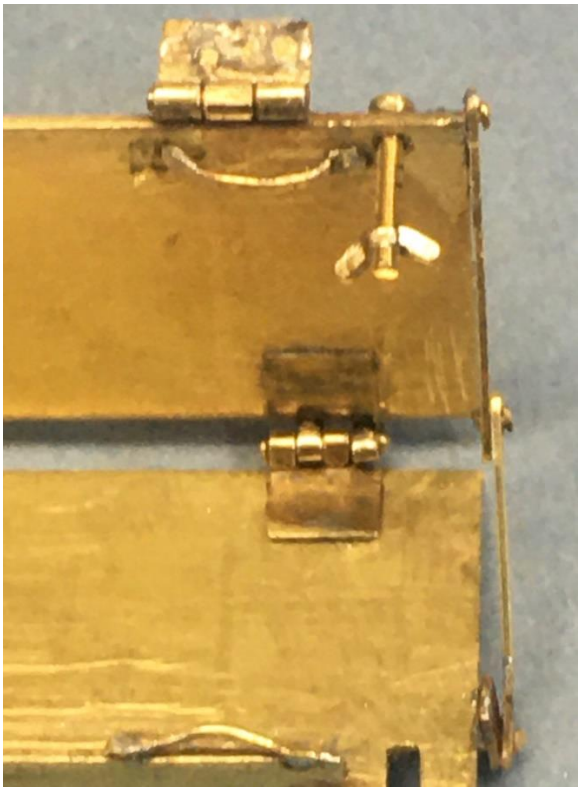


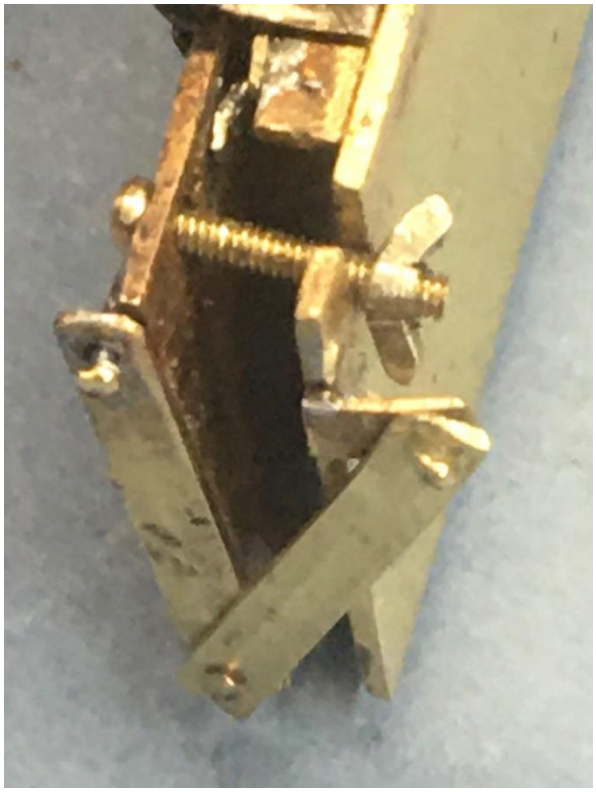




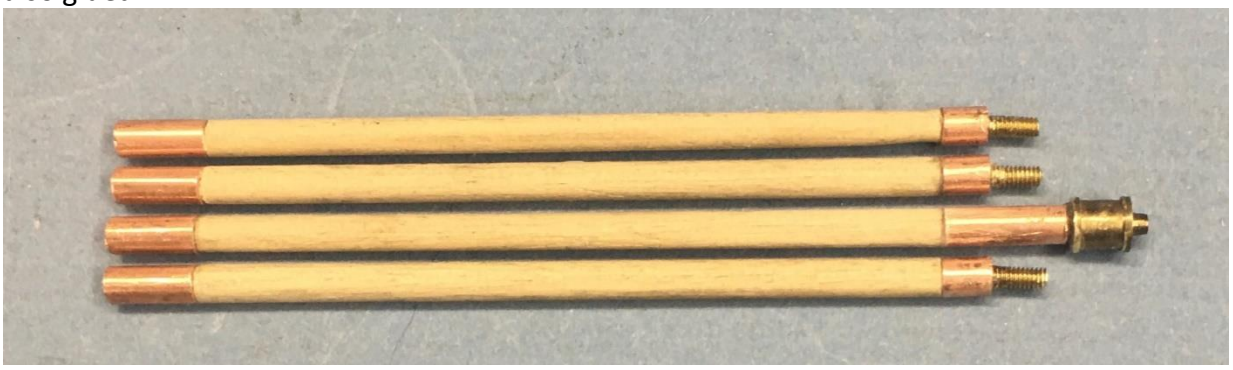




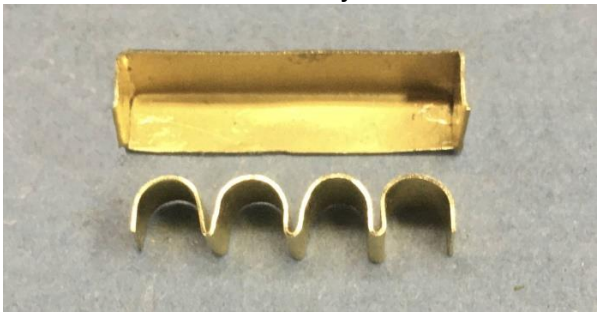


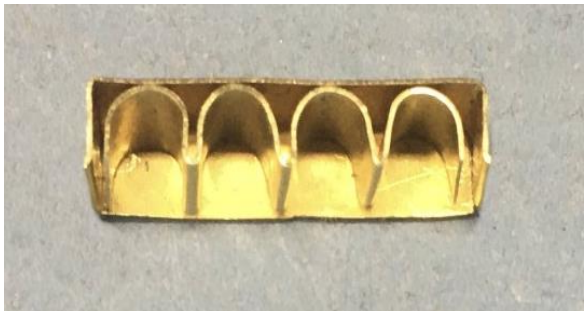


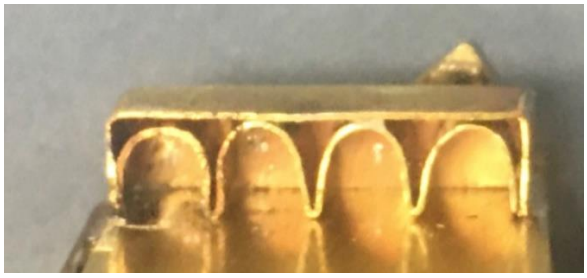
(p) **Gun Cleaning Tool:** (4) sections of the Gun Barrel Cleaning Tool were made along with the holding brackets, which were then installed to the underside of the Rear Stowage Rack. The wood portions are 1/8" dia dowels x 2.5" long, whittled down 1/8" on each end to insert into a brass tube. On one end the tubes are .28" long x 1/8" OD. On the other they are .15" long x 1/8" OD, and have a 1-72 threaded shaft drilled and screwed into the wood. This replicates how the prototype tool was screwed together to form a rod long enough to reach down the entire length of the Gun Barrel. The cleaning brush on the very end is replicated by a G scale train casting of a piston reservoir that I had, which is held in place with a 1/32" dia. brass rod inserted and glued to it and the wood dowel, around which a .38" long x 1/8" OD brass tube is also glued.



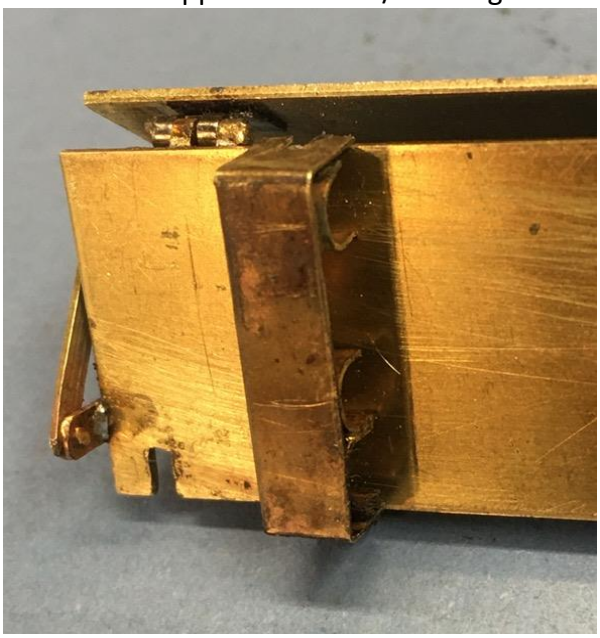
The mounting brackets are made from .12" thick brass sheet; .18" wide x .72" long x .18" high. The arched sections were just formed to fit over the 1/8" wood dowels and soldered together.

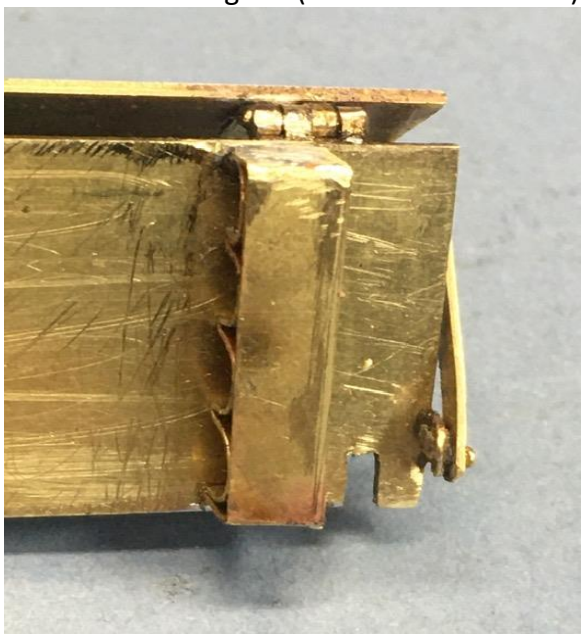


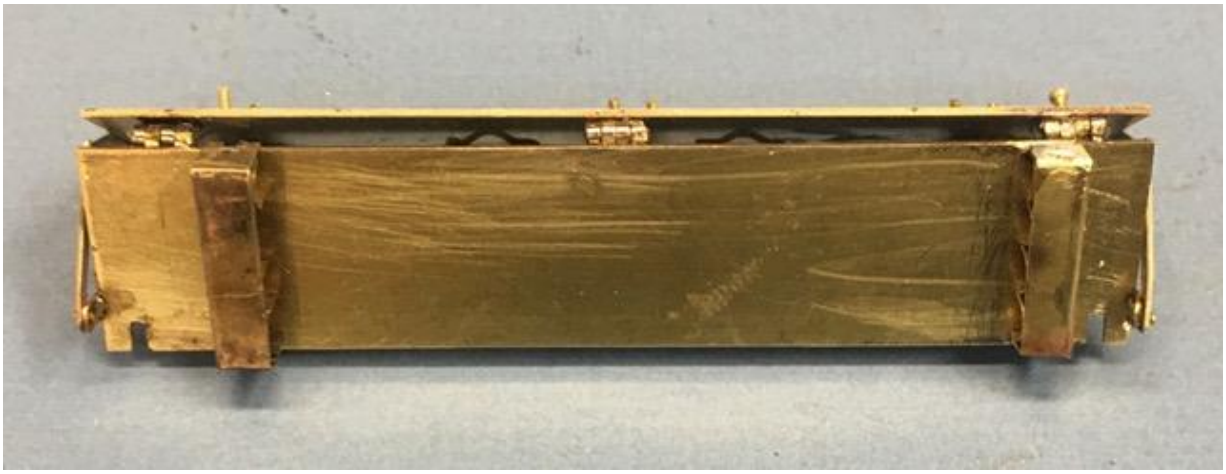


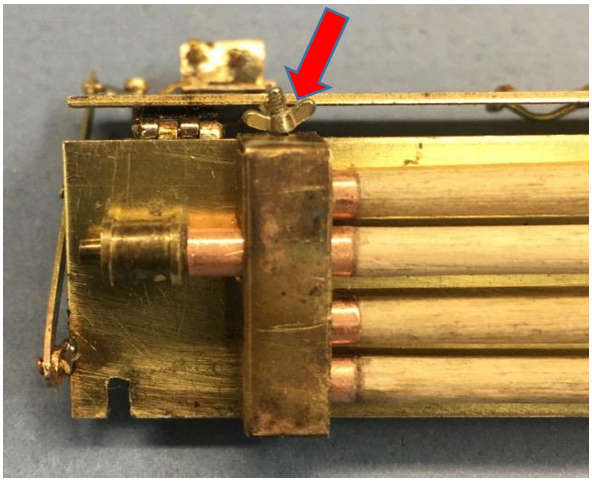


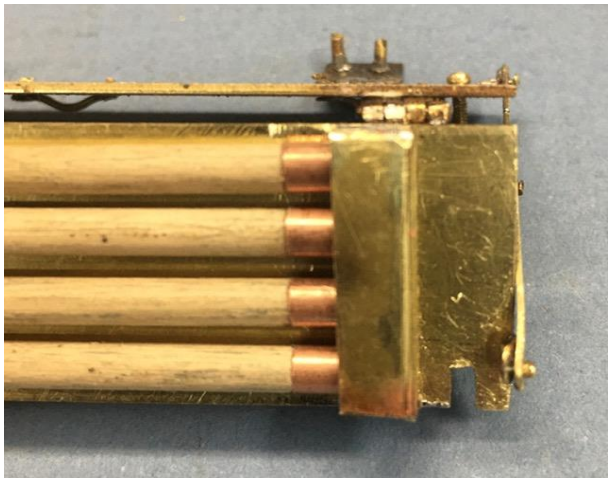
The bracket above has a tiny hinge soldered on so that it can be lifted up to access the wood dowels. The opposite end is 1/32” longer and is notched to fit a wing nut (see red arrow below).

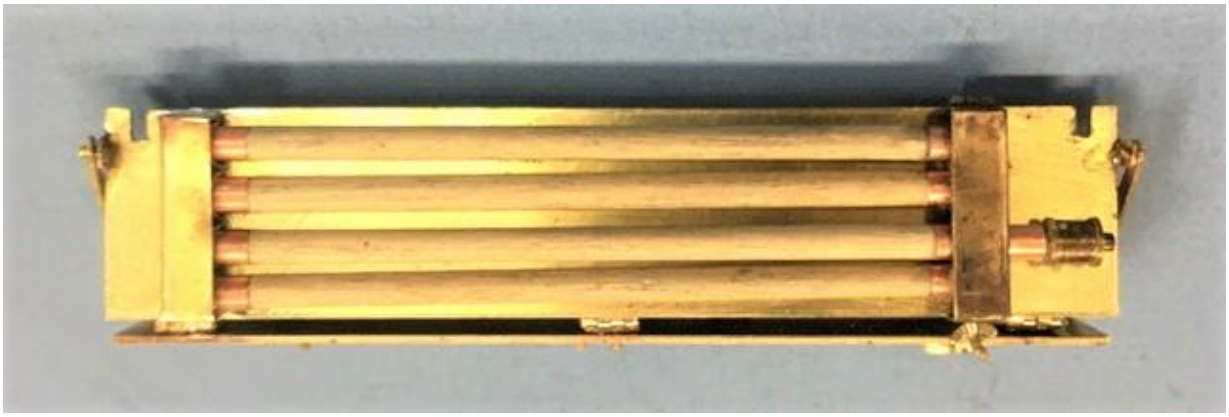


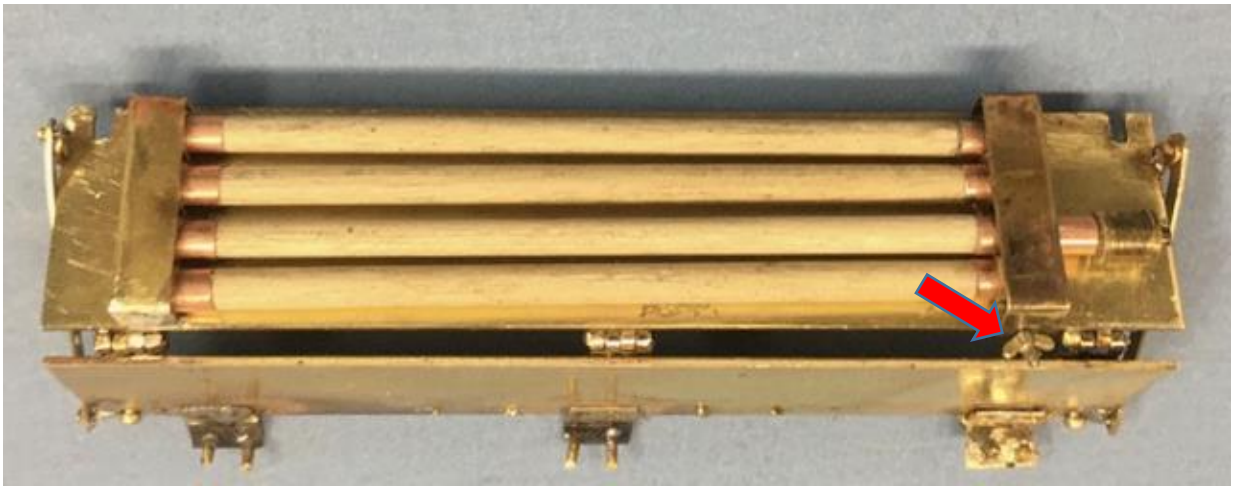






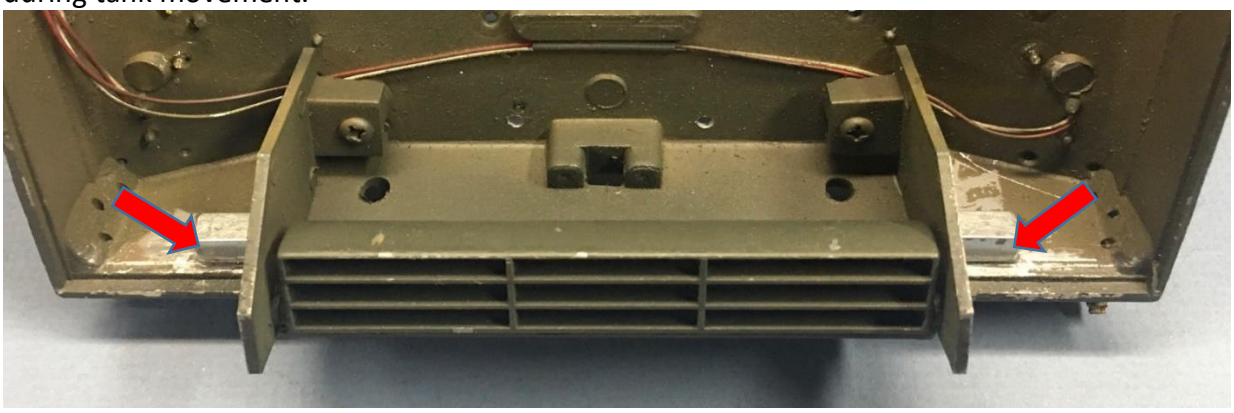




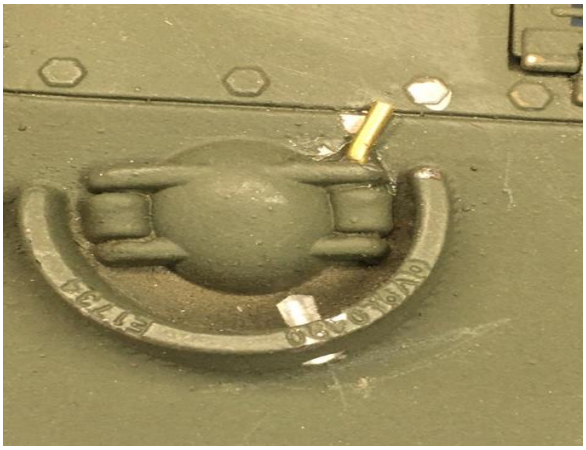


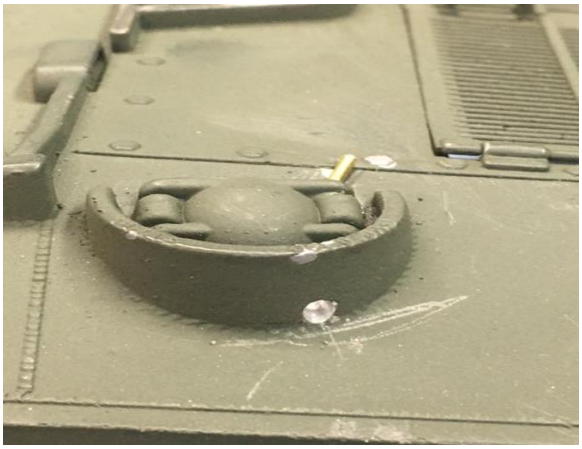
After painting, weathering and loading the Stowage Rack, it looks like this:

(q) **Magnets:** To secure the Upper Hull to the Lower Hull but yet make it easy to access the battery, etc., I glued small magnets to the Upper Hull's back wall and steel strips onto the Lower Hull. **DO NOT lift the tank up by the Upper Hull as the magnets are not strong enough to support the combined weight.** This locking mechanism is only designed to hold the hulls together during tank movement.

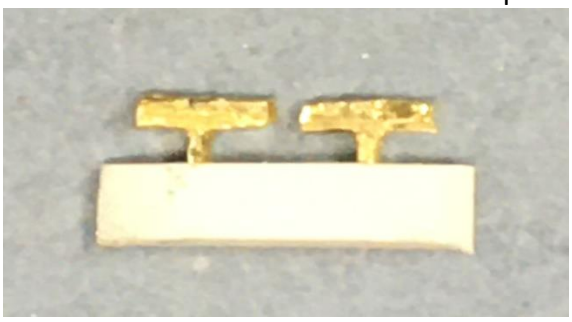


(r) **Drain Vents:** Drill a hole in both fuel encasement to replicate the rain water drain opening.

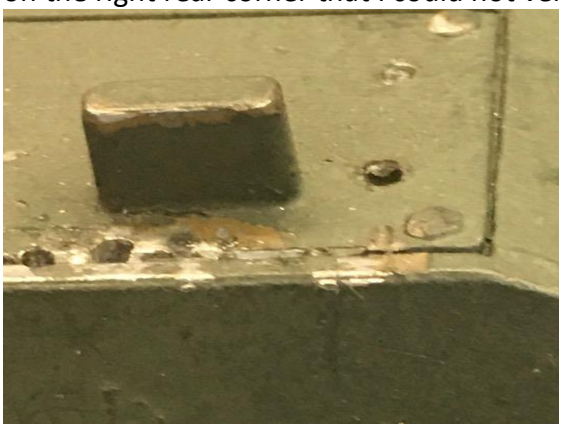




(s) **Fire Extinguisher Handles:** I roughly ground (2) tiny handles to the proper shape out of brass bar stock and glued them into a small piece of styrene that was shaped to fit into the housing on the rear deck. Once the handles are painted red, the styrene will be glued inside the housing.



(t) **Patching Holes:** Don't forget that any existing holes that are no longer needed, should be patched with glue and then sanded down till flush. These (2) holes are from removal of a flange on the right rear corner that I could not verify was accurate. So I removed it.



(u) **Tools:** This is a lot of work but well worth it. I stripped the paint off and repainted them for more accurate colors. I also replaced metal parts with real wood where appropriate and made detailed mounting brackets as shown (removing the cast on version from the Upper Hull). A final detail is to add "U" shaped handles (drilled and glued into the hull) and leather straps for securing the tools. The buckle is made on .020" dia. brass wire shaped and soldered together (this is non-functioning buckle that looks real). See Step 15(p) also.

**U Shaped Handles:** These are used to fasten the leather straps.

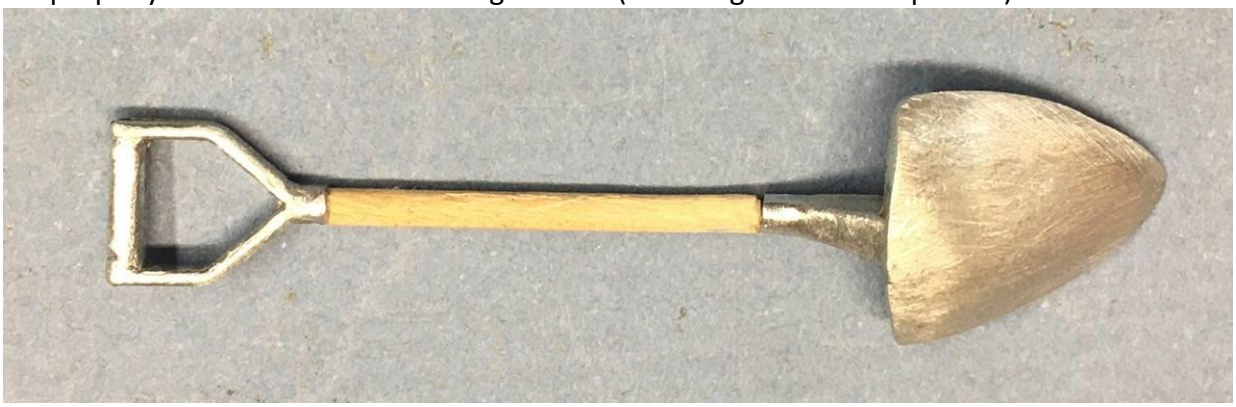
**Torque Wrench (long):** This tool also has a simulated cotter pin w/ chain that sticks thru the round bracket on the left, but it was unmade when the picture was taken.

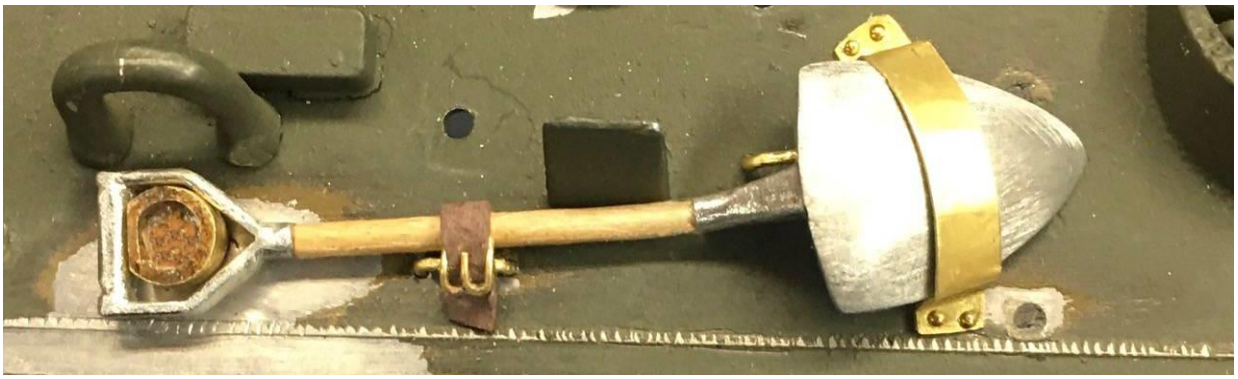
**Sledge Hammer (long):** Change shaft to 1/16th wood dowel. Note brass T shaped bracket on right and U shaped on left.

**Mattock Head:**

**Mattock Handle:** An actual wood piece was used. This was an old paint brush stem that I wacked up with a wire brush. Bracket on left has a piece folded over to form an end wall.

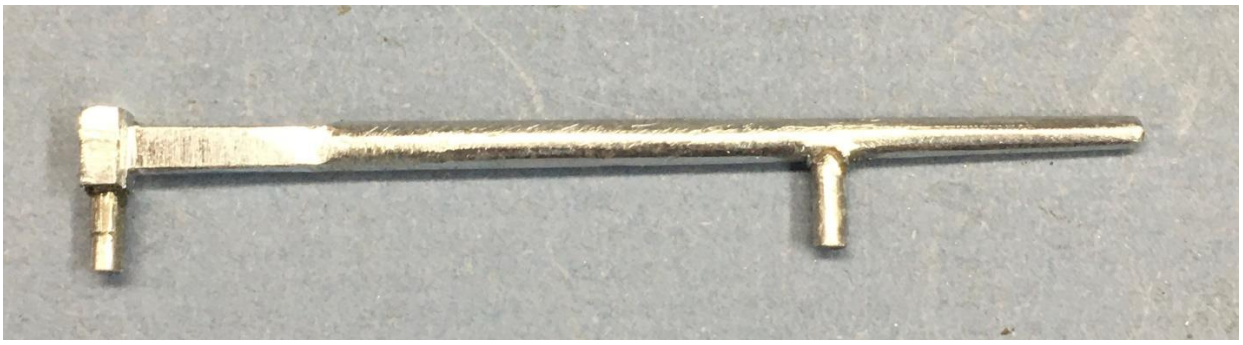
**Shovel:** The shaft was replaced with a 1/16th wood dowel. The "D" shaped bracket around which the handle fits, was replaced because Mato's was positioned wrong to allow the blade to set properly in the new brass retaining bracket (on far right in second picture).

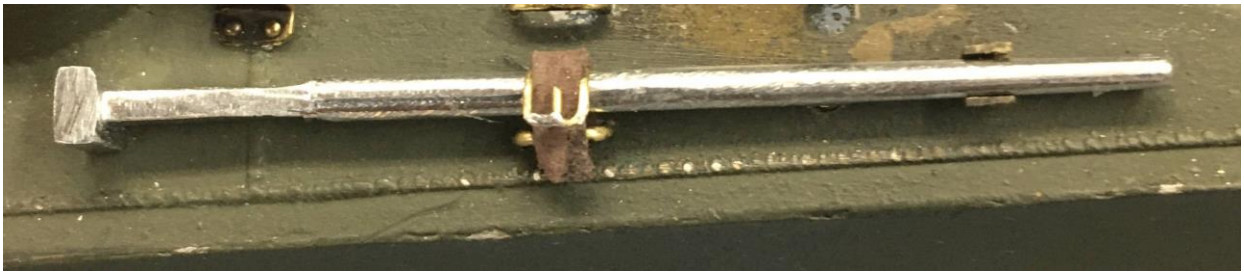




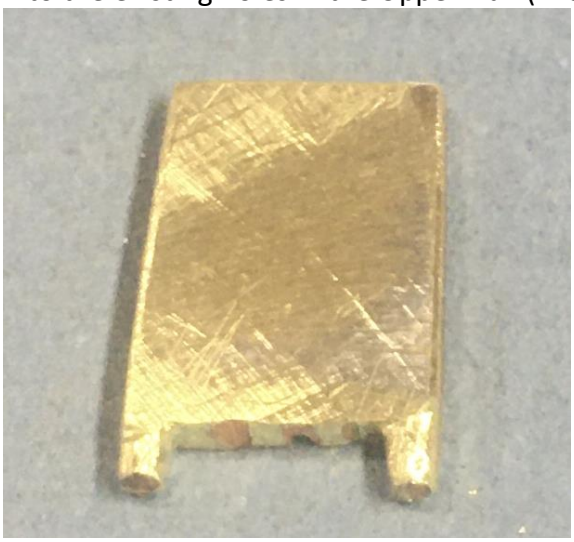
**Axe:** I would have liked to have a properly shape an actual wood handle for this tool, but that proved too hard to make. So I treated this as a metal handle and darkened it with etching liquid. But you still need to file down the handle at the axe head so the handle looks like it is inserted.

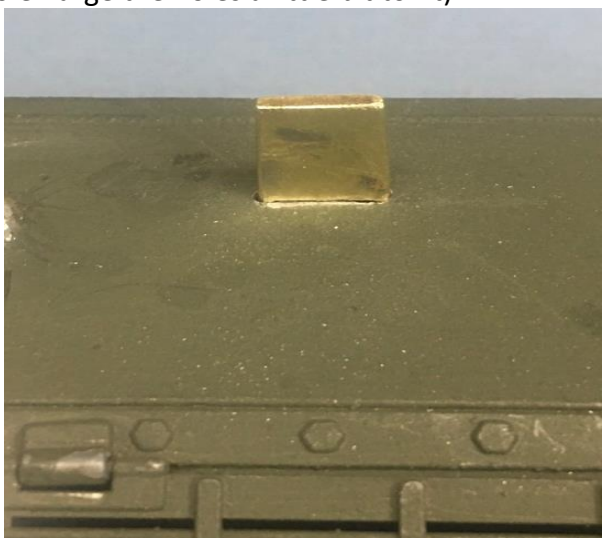
**Pry Bar:** This started out as a metal Mattock handle, but it seemed too long and I wanted real wood for it, so I filed this down to make a metal Pry Bar out of it.



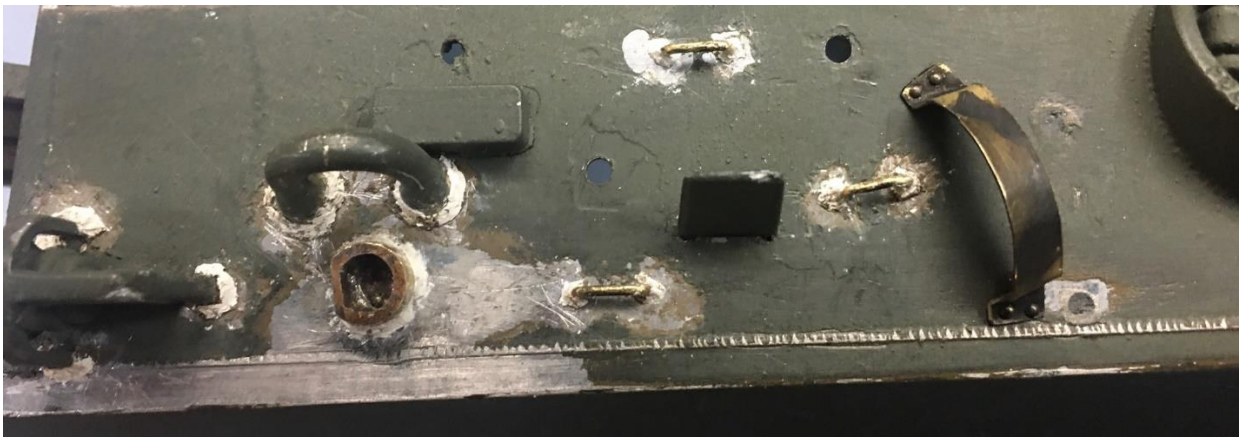


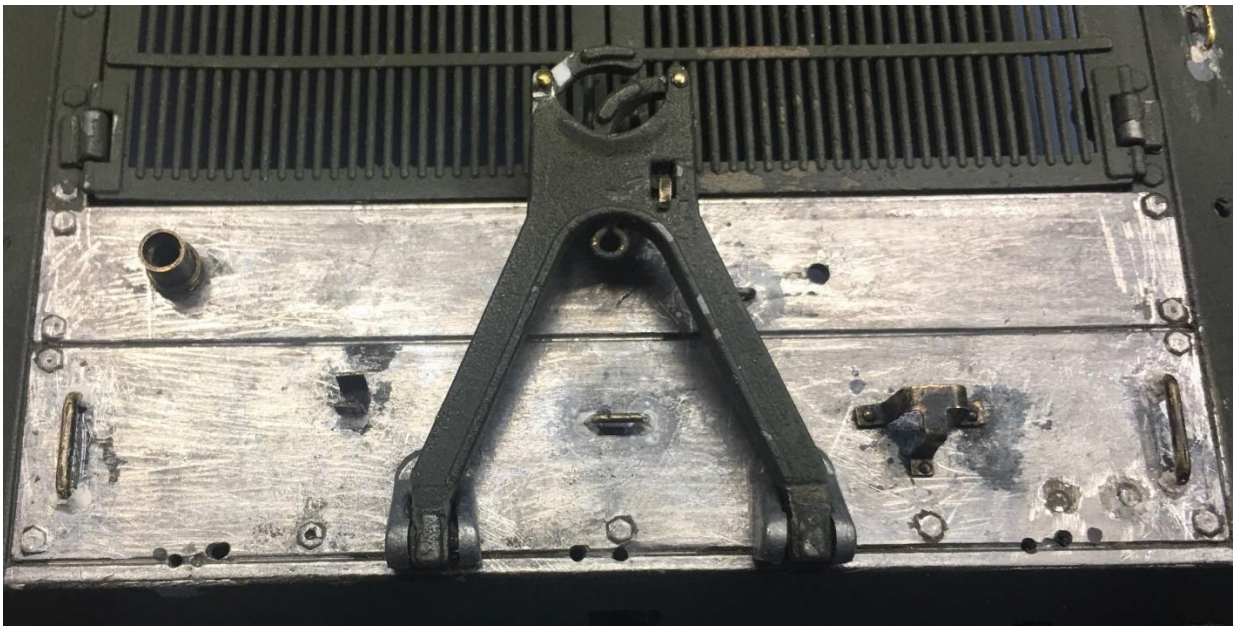
(v) **Engine Compartment Door Stops:** The (2) from Mato are a bit too small and narrow, so I replaced both with brass stock that is .068” thick by .33” wide at the bottom (slightly tapered to .30” at the top) by .42” tall. Be sure to cut the (2) small feet at the bottom to be inserted into the existing holes in the Upper Hull (I had to enlarge the holes a little bit to fit).





(w) **Weld Lines:** This step is very tedious and you may wish to skip it. I used Tamiya white putty to replicate weld lines, which is applied around metal parts with a large syringe (obtained from a large animal veterinarian…I would guess the shaft to have an inside diameter of .020”). Squeeze very small amounts of the putty around the metal parts and let it firm up but not harden (so don’t do all the parts at one time). Then take a small flat blade screwdriver and use the head to push the putty into shape. If the putty gets too hard, I use liquid styrene glue to soften them up. After I was finished with all the work, I coated each weld with the styrene glue as a way of hardening them before painting.





(x) **Tow Cable:** The Mato model lacks a tow cable and brackets, so I finally found a Schumo Kit # SH0027 to install. This included drilling holes for the various brackets and clamps on the left side top of the model's Upper Hull. I chose to keep the end of the cable mounted above the Wood Cargo Board mainly because if it is mounted to the Lower Hull (standard config.) it becomes very difficult to remove the Upper Hull to access the battery. Don't forget to add weld lines to all these brackets.

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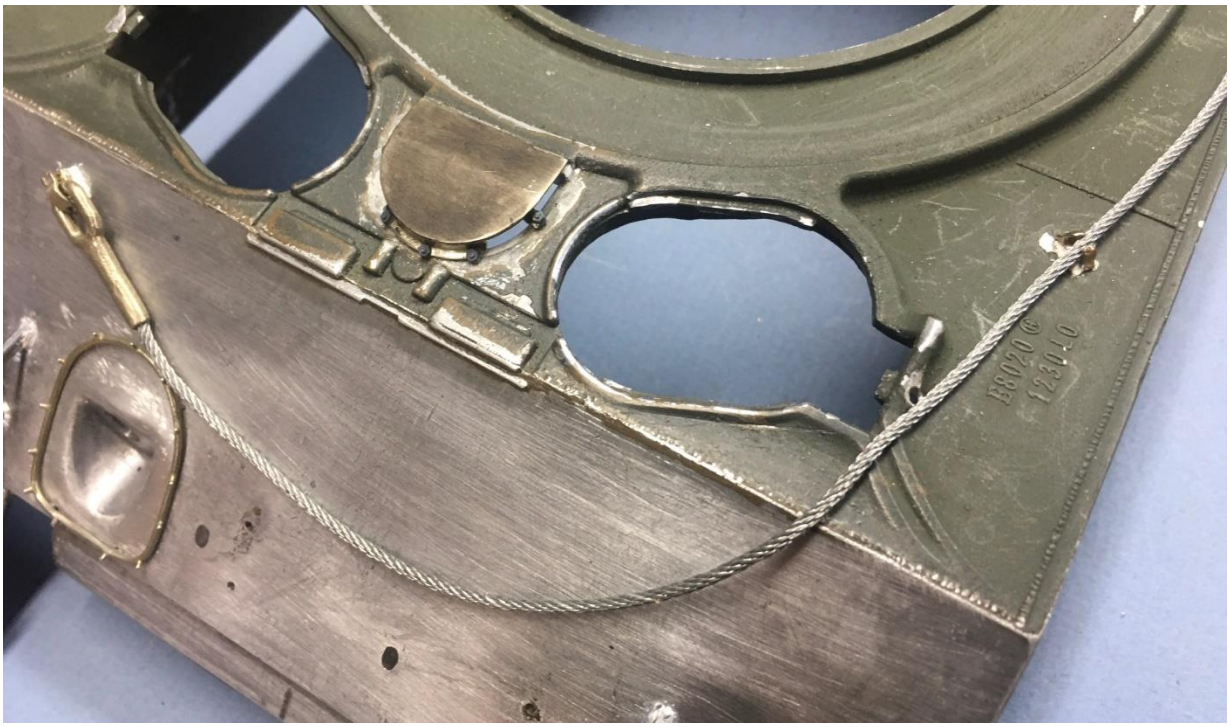
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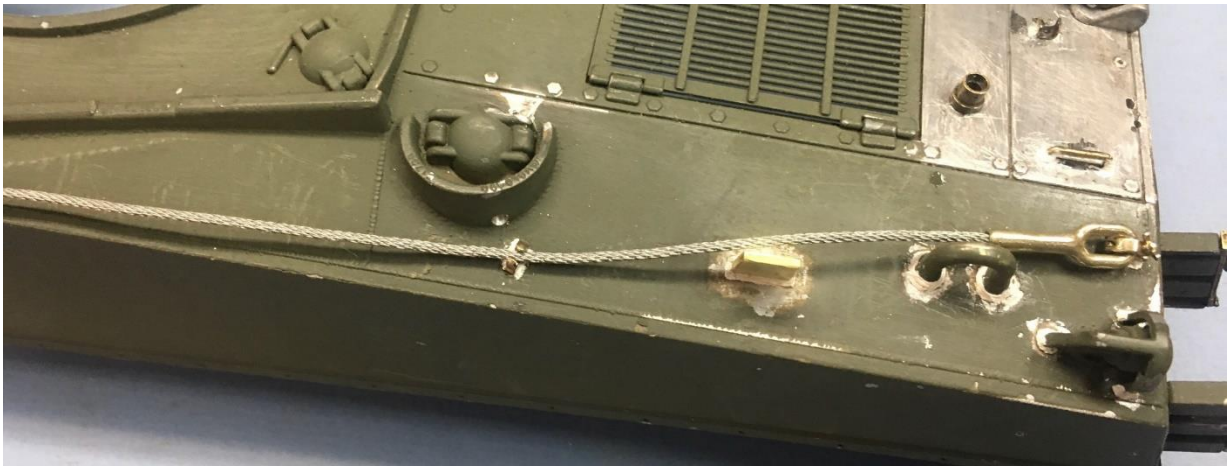
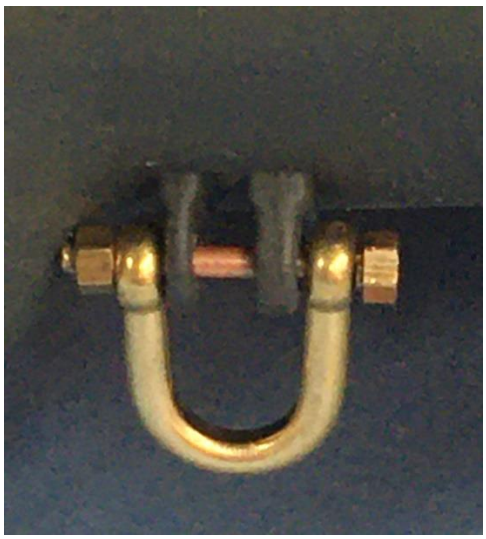
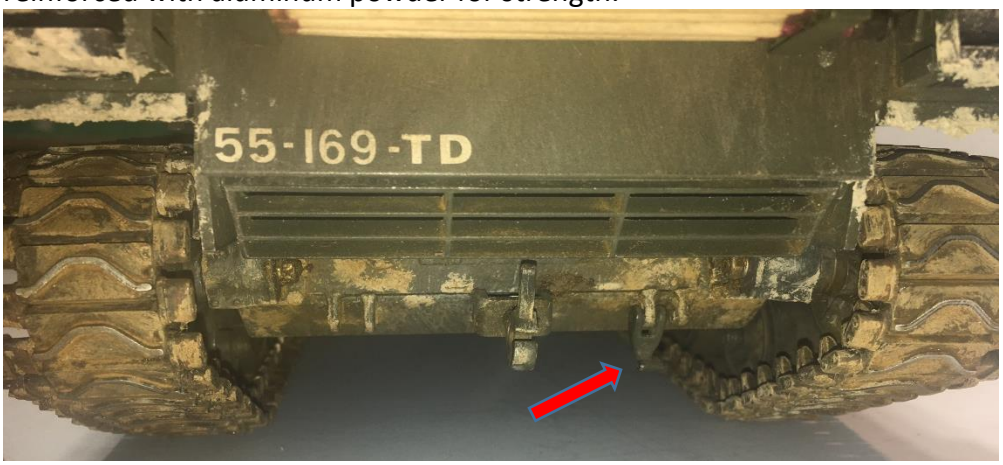


(y) **Tow Shackles & Clevis:** Though not technically on the Upper Hull, I added (2) Tow Shackles to the front and (1) Clevis to the rear. The brass **Tow Shackles** are a bit wide and I do not know where I picked these up, but I had to make a bolt & nut for each. I first took a .061" dia. brass rod and added 1/8" of 1-72 thread onto it. This rod is then cut to just over 1/2" long. I then cut off a 2-56 brass bolt head (this size looked best) and filed it so none of the stem was left. Then I soldered the 1/2" long rod to the bolt head. This rod will then barely slide thru the holes in the two front mounts. The 2-56 brass nut is too large for the threads, but that is OK bc it is very hard to get everything mounted on the tank, and once the head slides onto the rod, just glue it in place.

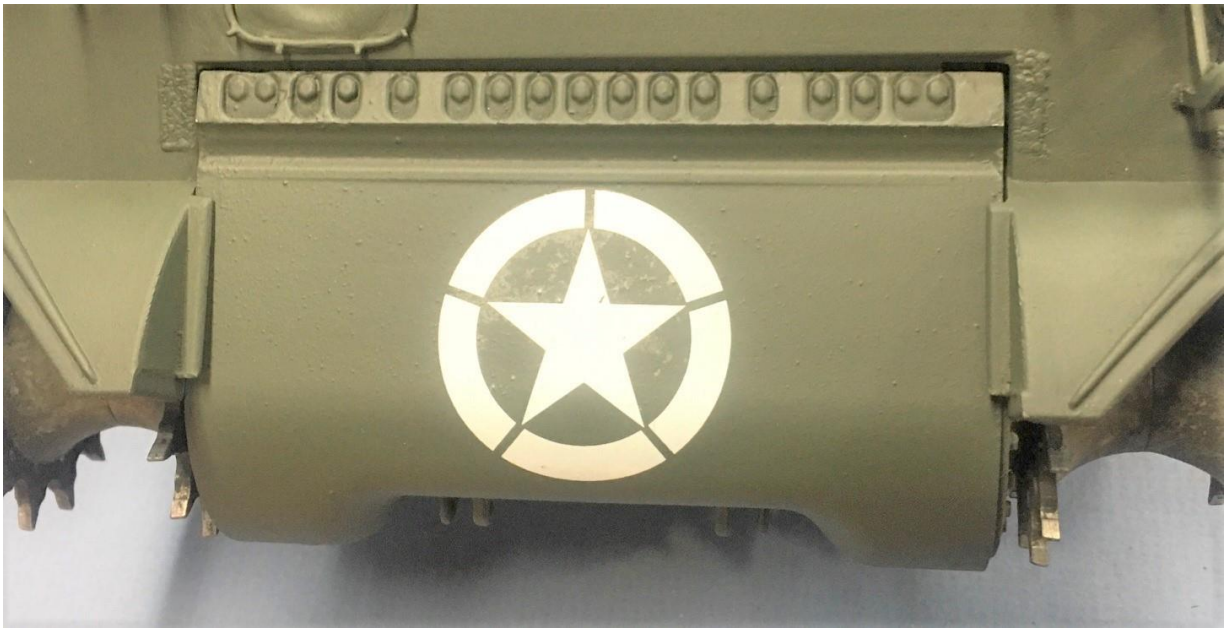


Nut is mounted on the outside of assembly.

**Clevis (1):** I was unable to find any metal ones although they are available from RCTanks.de in Germany. So, I took one from my Pershing tank and made an RTV mold and cast one in resin reinforced with aluminum powder for strength.



(z) **Final Painting**: The **Upper Hull** requires a coat of Krylon Camouflage #4293 Olive Drab and decals installed at this point, and all the **Tools** and **Detail Parts** also need to be painted and weathered before permanent mounting. Don't forget to go back and touch up any areas where paint has chipped or worn off from handling. Please note that there are no standard decals for this model so you have to mix and match. I had a great deal of trouble finding WWII pictures that showed where to place the decals…..there just isn't much to refer to, so I relied on some shown for M36 tanks and ended up taking a "probable" position as to where to put them.



17. The model is now ready to assemble and finish weathering.
    (a) First thing is to make sure that the IBU2 Board and Radio are set up and working correctly. IBU offers a nice manual to help with this process. The Micro SD card has to be programmed to your preferences for various sounds and movement like: MG, cannon, engine start and stop, speed restrictions, speaker volume, etc. I used the basic sounds from a Pershing Ford GAA V8 cylinder engine w/ a 90mm cannon. You may also want to add a small "Lipo low voltage" warning alarm (from Amazon: 5 for $14) to help detect when the Lipo battery reaches a critical low voltage range.

    (b) Now run all the wires from the Turret through the Upper Hull and install the white plastic Turret Ring to secure the Turret to the Hull. The wires run thru the opening and connect to the IBU2 Board. Test all the motor and sound functions before proceeding further. Everything should work correctly to your satisfaction. Be sure that your IR Battle Unit is working correctly. I have also decided to add a clear acetate sheet over top of the IBU2 Board just to keep anything from short circuiting the board if any metal parts happen to fall off from the inside of the Turret.

    (c) Now assemble the Upper and Lower Hulls making sure all the wires are inside and in a non-binding position. The magnets should be firmly holding the two together.

    (d) I usually now add all the stowage to the Turret and Upper Hull, and anything else I want to hang on the tank. Most of these items are cast resin parts that I have secured with scale sized rope or leather straps.

(d) Lastly, add whatever final weathering you prefer to finish the model to your liking….and enjoy your creation.

18. Here are pictures of my finished model:

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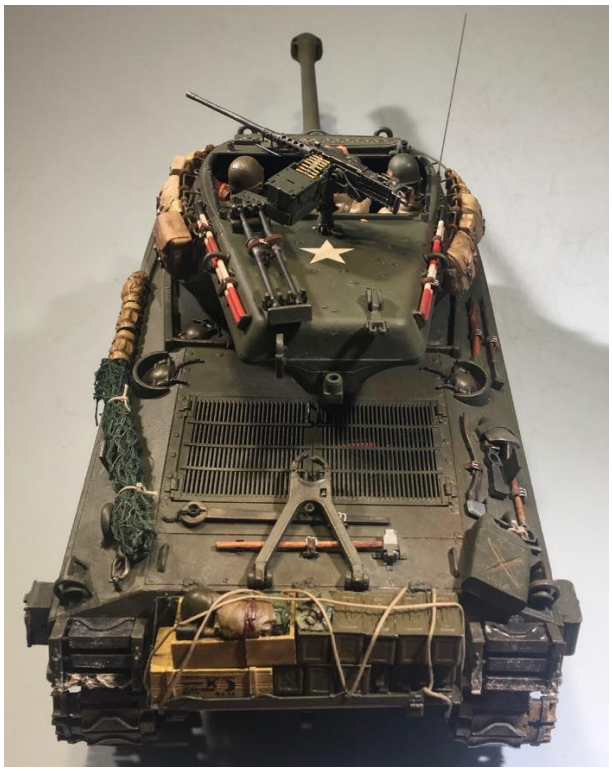
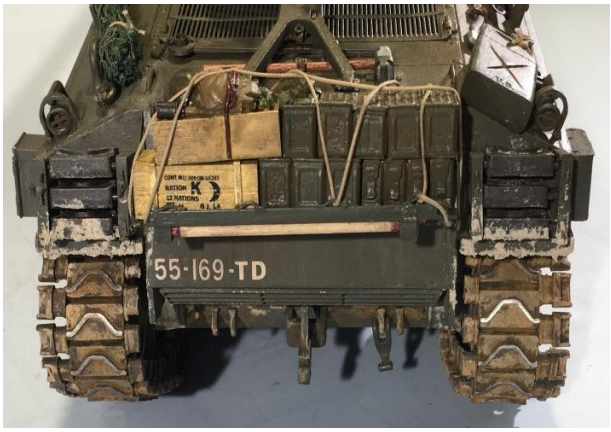
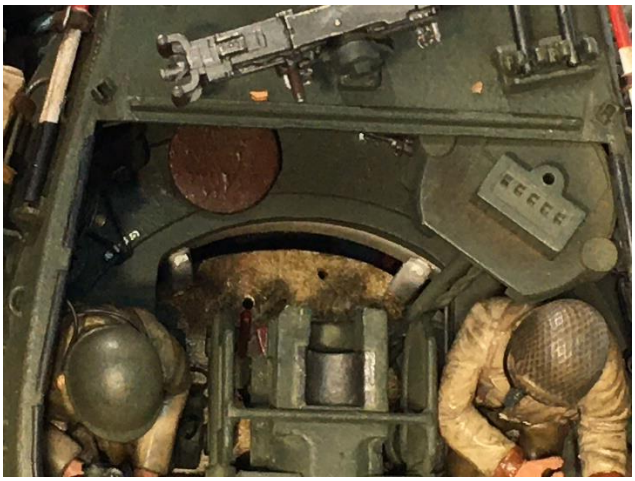
30112110
WarThunder

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