

# **Stern Star Trek Pop Bumper Cap Modification**

The following document will attempt to walk you through the installation of Pinball-Mods.com's Custom PopBumper Caps so it can be easily installed in a 2013 Stern Star Trek pinball machine. Please note the Author of this document is not responsible for any damage you do to yourself or your property. **Duplication of or Plagiarizing from this document is not permitted without written consent.**

## **Tools/Materials Needed:**

- A collection of Phillips screwdrivers
- 11/32" Nut driver
- Time

## **Optional Materials:**

- A Cordless screwdriver

While this is considered a Bolt-On mod for the stern Star Trek machine; It will take quite a bit of time to completely install this modification. Unfortunately; due to placement of the Engineering and Science caps; you'll have to partially disassemble the USS Vengeance and the Beta Ramp. The following instructions are how \*I\* installed my caps... there may be better or easier ways; so use this as a guide only. My recommendations are in no way to be used in place of common sense. I'd suggest at least 3hrs to complete the installation of this kit. Block off that time so you don't forget how your machine goes back together.

## **Pre-Work:**

Pictures... take lots of pictures during the disassembly so you can reassemble your machine. I'd recommend you have a ziplock bag handy so you can place any screws / loose hardware someplace where they won't go into the Q Continuum behind playfield plastics.

## Chapter 1: The Engineering Cap (under USS Vengeance)

Let's face it... this is probably the worst part of this mod. To get access to the Engineering Pop Bumper; you have to partially disassemble the Vengeance. There really isn't any way around it... so Let's get it out of the way first. **Please note:** I have an LE; not a Pro edition... I'm assuming the Vengeance is similar on the Pro... if not; I apologize. If someone wants to update this document for the Pro and send me some pictures; I'll be happy to share the Word document with you for revision.

**1.1)** If you haven't already done so; remove your Playfield glass so you can get access to the USS Vengeance. Make sure your machine is off. We need to start by removing the top 4 screws under the ship itself. 2 Black oxide screws and 2 zinc screws. To get access to these screws: I used the spring action of the ship to tilt it forward with one hand and a cordless screwdriver to loosen the following screws:

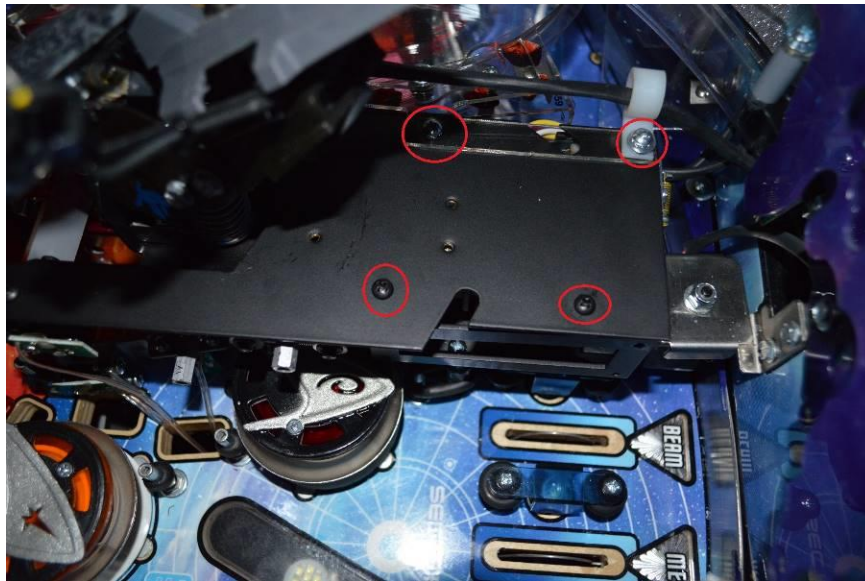
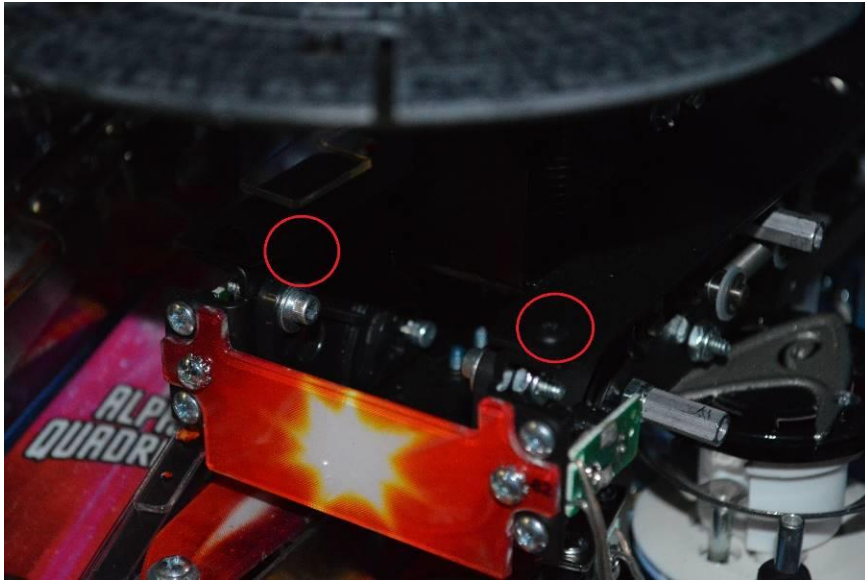


Figure 1. 4 Screws Under Vengeance

Take care here... the rear most left screw has a washer that will jump off the screw if you're not careful. The two top screws will allow the clear plastic free. So be prepared and store it safe somewhere. I usually let the cable loop stay on the vengeance cable so I know where it is. The plate under these screws won't move yet. That's the next step.

**1.2)** The goal is to remove the plate pictured above. The plate is still held on by two black oxide screws in the front above the vengeance magnet. I angle the ship to the left undo one screw... then turn the ship the other direction to remove the other. Remove these two screws and that top plate should come loose.



**Figure 2. Front Vengeance screws**

Now with the plate loose - You'll need to remove this plate from your machine to get access inside the compartment. IIRC; you can rotate the back in a clockwise direction and the slot in the plate will allow you to slide the plate out from underneath the ship.

1.3) With the plate removed; you have access to the screws which mount the Vengeance to the Playfield. Two silver screws under the plate. Remove these screws:

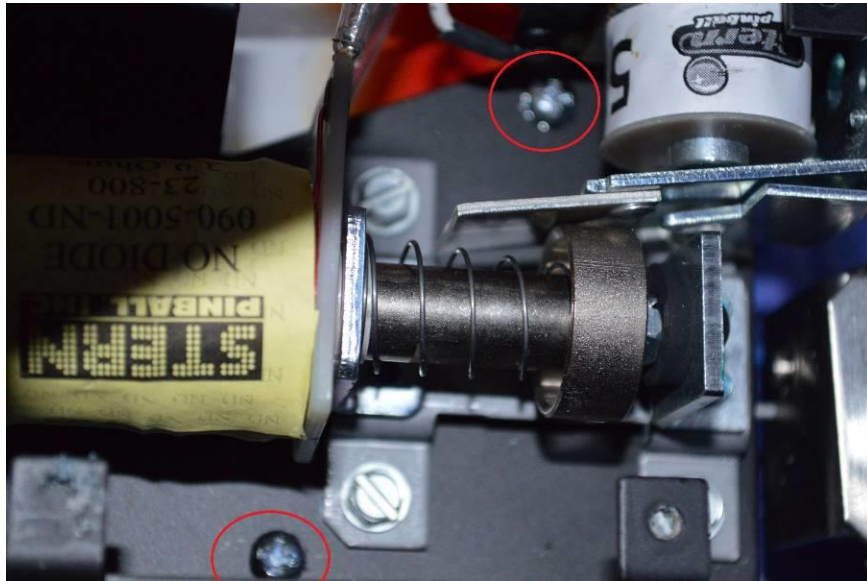


Figure 3. Standoff Screws.

1.4) There is another silver screw on the left side of the ship. Between it and the Alpha ramp. Locate it and remove it. Be wary of the ramp pinching the screw off of your screwdriver.

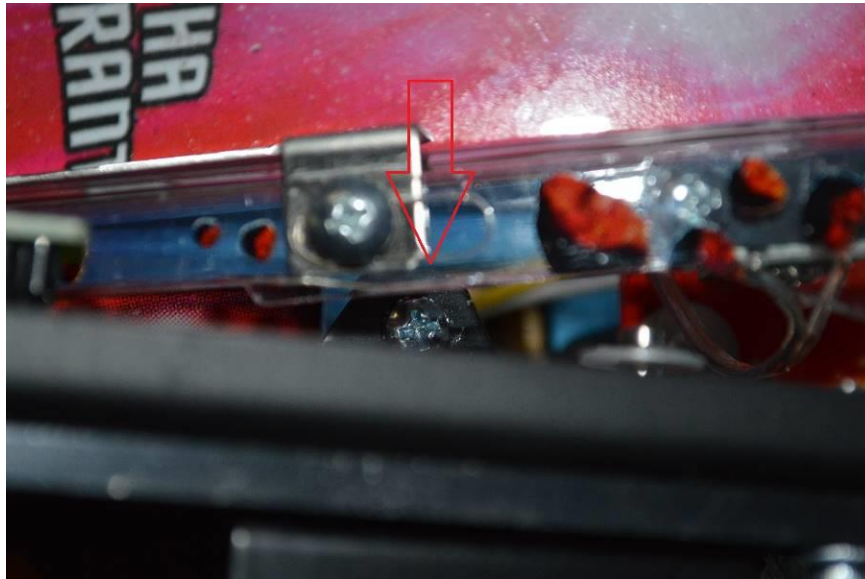
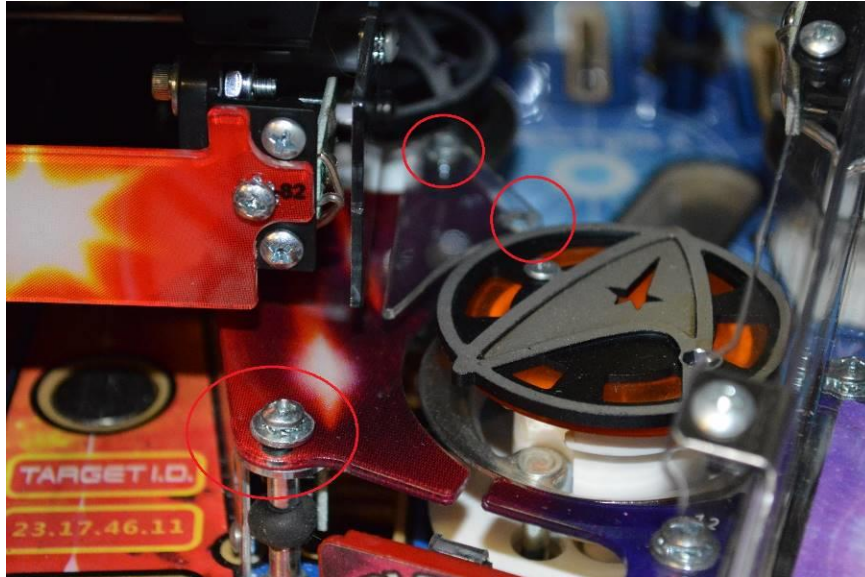


Figure 4. Left Ship screw

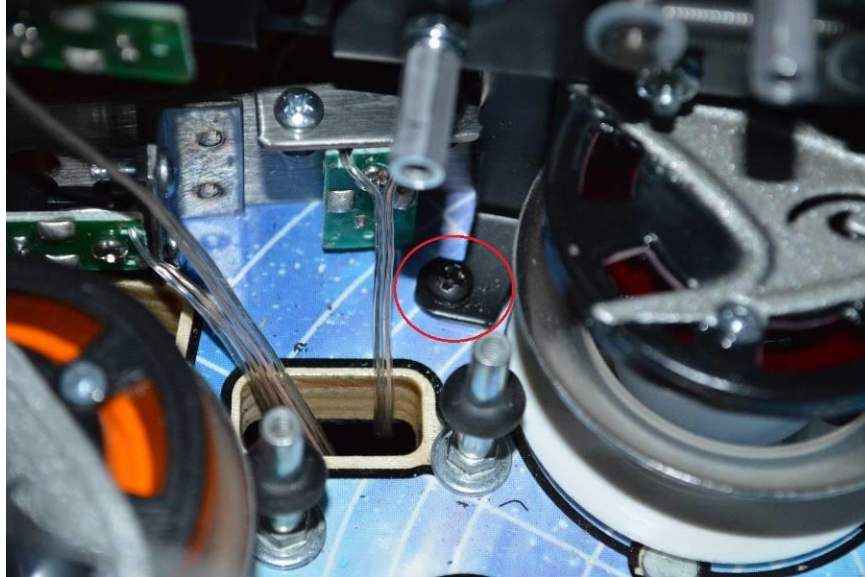
**1.5)** The last black screw is going to be a PITA. To get access to it... first your going to need to remove the red -21 plastic on the right side of the ship. This plastic is between the engineering and the command cap. The plastic is held on by the two posts with black rubber of *Figure 6* below. The screws which attach to these posts are using standoffs to keep the top clear plastic from the red plastic. This means you need to be extra careful to not loose the black plastic standoffs. Yes... this is what happened to my lower standoff - lost somewhere in my machine.



**Figure 5.** Remove -21 Red Plastic

**1.6)** With the plastic removed; you'll see our victim. To access it you'll need a really long extended reach Philips screw driver. One you can wrench on it without the vengeance assembly getting in your way. This is a standard wood screw; so be mindful of the stripable nature of the screw. Also be aware; this is the last screw holding the ship to the Playfield - It will be free to move about your cabin. I'd recommend using a hand to steady the ship once the screw starts to loosen.

**Note:** I use a long reach screwdriver between the vengeance assembly and the -80 black plastic which is attached to the right side of the vengeance (removed in these pictures). The plastic is there on your ship attached to the upper blurry standoffs in the foreground of *Figure 6*.



**Figure 6.** PITA screw detected... open fire.

**1.7)** Carefully lay the Vengeance on it's side. I temporarily lay it on the warp/alpha ramps; however, It might be wise to use your [HHGTG towel](#) between the ship and the ramp. Regardless try not to torque on the ship too much... or allow it to scratch your playfield parts / ramps. With the ship out of the way; you now have access to the engineering pop bumper. Remove the stock cap by loosening the two screws. Remove the stock LED.



**Figure 7.** Lay the ship Carefully out of the way

**1.8)** Install one of the Comet Pinball LEDs in the lamp socket. You might have to "wrangle" the socket to be near the center of the cap. Mine were quite stubborn. Briefly power on you machine checking to make sure the lamp has good electrical connections to the lamp socket. LED "pins" are quite bendy and tend to move out of the way rather than squeeze between the socket and the plastic #555 base of the LED.



**Figure 8.** Install Comet LED

**1.9)** Install the new Engineering Popcap with the red matte UnderCap using 2qty #4-40 x 1/2" countersunk screws. The easiest way I've found to do this is put one of the screws thru the aluminum cap; feed the Undercap into it's hole; and then "find" the one of the holes with your touch sense. Loosely tighten the caps and adjust the second hole by sight and feed in the last screw.



**Figure 9.** Final Engineering Cap Assembly

**Note:** The Engineering cap is designed with the ledge cut into the top surface of the aluminum cap. This is done to prevent clearance issues between the top of the ENG cap and the bottom of the USS Vengeance assembly. You won't see the ledge with the #80 black plastic in place.

**1.10)** Now's the time to begin reassembly. For me; I start by reversing 1.3 leaving the screws loose. This allows me to "adjust" for screw alignment and help to reduce stripping of screws or wood. I then loosely reverse step 1.4. With those two steps loose; I reverse step 1.6 by carefully aligning the wood screw to it's existing hole. Then using the magnetic long reach screwdriver; I snug up the PITA screw of 1.6. Returning to 1.3 and 1.4 screws; snugging them up. That way the whole assembly is "square", level, and in it's original place on the PF. Then I wrap up the re-assembly by reversing the remaining steps in no particular order.

Congrats; you've completed the installation of the Engineering Cap.

## Chapter 2: The Science Cap (under Beta Ramp)

With the Engineering Cap complete; we should probably tackle the Blue Science Cap as its the second most difficult install. To install this cap; I recommend you remove the Beta Ramp from your game. This gives you access to work around the pop bumper. It is possible with nimble fingers to install this cap with a Philips bit without removing the ramp - But I personally find it easier to just move the ramp out of the way.

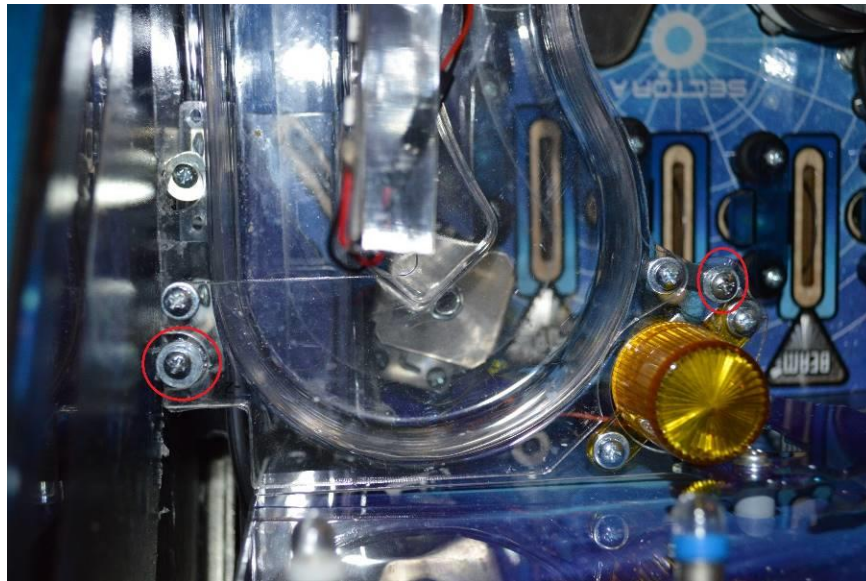
**2.1)** Begin by removing the ramp's counter sunk screws inside the metal flap. Store in a ziplock bag:



**Figure 10.** Beta Ramp Screws

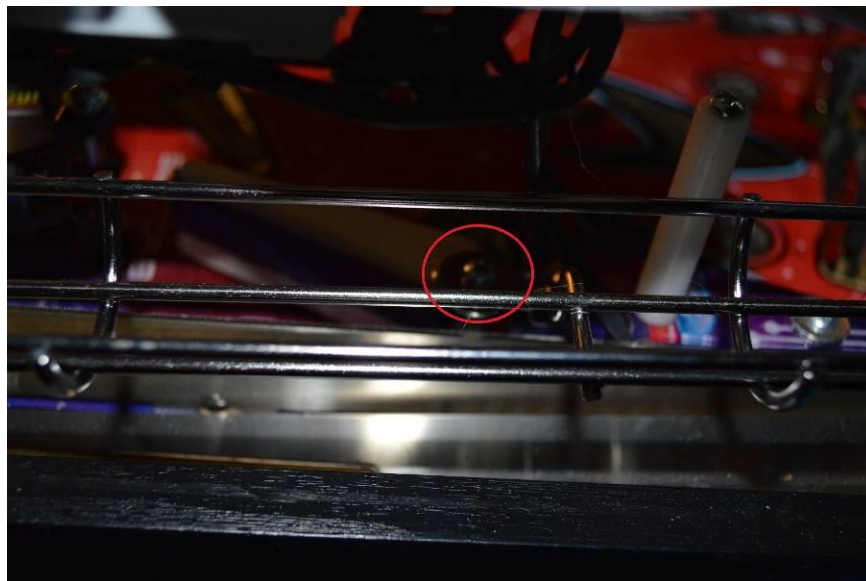


2.2) Now remove the upper ramp screws near the Yellow flash lamp.



**Figure 11.** Upper Beta Ramp Screws

2.3) At this point the beta ramp should be loose; but will be secured by opto cables and the beta wireform. As a result; we want to remove the beta ramp wireform. Start by removing the screw holding the mid-wireform under the USS Enterprise.



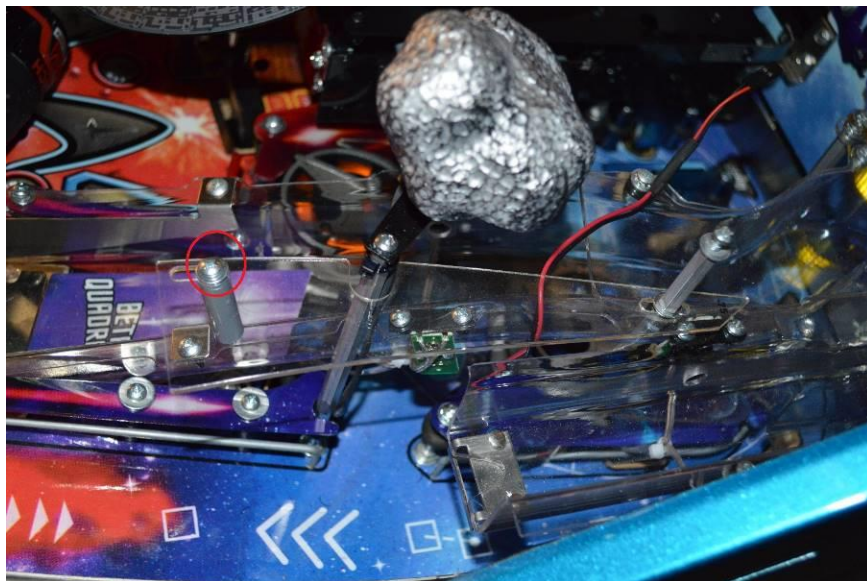
**Figure 12.** Beta Mid Wireform screw

2.4) Finally; remove the 11/32" nut at the end of the Beta Wireform. At this point the wireform can be slid out of the beta ramp. Set the wireform aside.



**Figure 13.** Final Beta Wireform nut

2.5) At this point; the beta ramp is "free"; but it's movement is being constricted by optocables and a plastic. I remove the screw holding the grey standoff and clear plastic

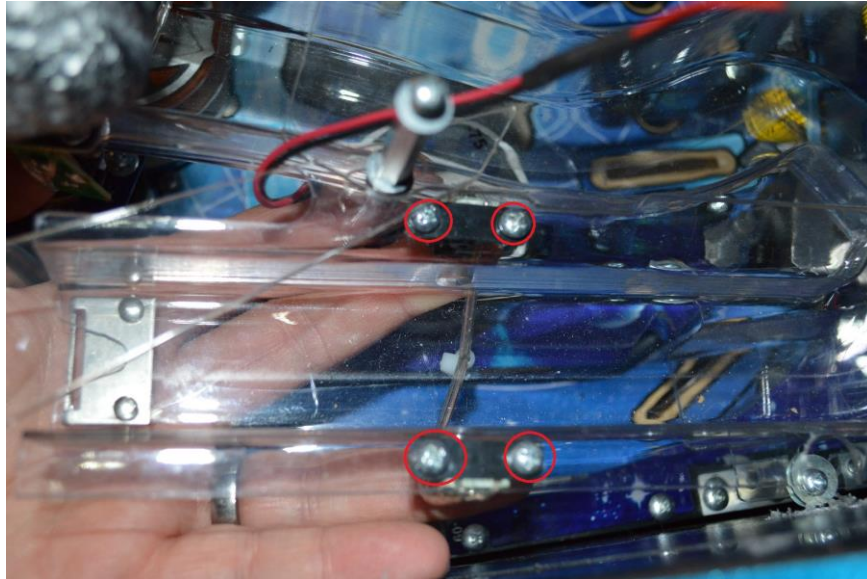


under the Left Potato - I mean Asteroid.

**Figure 14.** Left Asteroid Plastic

There really isn't any need to remove this plastic (IE upper screw) [a Standoff in this picture]. You should be able to rotate the clear plastic to the right and have it easily clear the asteroid standoff.

**2.6)** The beta ramp is easier to move now; but is being constricted by the optos at the exit of the ramp. Now; some may say; disconnect the opto cables under the PF; and feed them back thru the plastics so the ramp is free. I don't subscribe to this - Mainly because re-feeding them back thru the playfield and remember to plug them in properly is too damn much work. So I cheat and unscrew the optos from the plastic. Since the wire holds it's "form" it's easy later to remember which side / opto is which. I hold the bottoms of the optos using a vulcan Live-Long and Prosper salute and unscrew the optos from the plastic. I usually leave the screw in place near the top of plastic -75 as it's usually hard to fish this one out from between the plastic with the standoff/screw in place on that plastic.



**Figure 15.** Opto removal

2.7) At this point; the beta ramp is free enough for us to get access to the Science Cap underneath. Sometimes the Left Potato gets in the way; so I usually loosen the screw holding the potato's bracket so I can rotate it easily out of the way. I also sometimes remove the long standoff which holds the beta ramp near the yellow flasher. This gives me enough slack/movement to prop the ramp on it's side like so:



Figure 16. Prop the ramp on side

**Take Care:** The metal ramp of the beta ramp MAY scratch your PF's clear coat. Might be a god idea to wedge a paper shop towel under the flap while you work on the pop bumper. ;)

2.8) You now have access to the Blue Science pop bumper. Remove the stock cap and LED. Insert the new Comet Pinball LED and briefly turn on the machine to verify your LED is making good connections with the socket. Wiggle the LED and make sure pop bumper actuations won't cause the lamp to flicker. Then install the blue science UnderCap and the science aluminum cap.

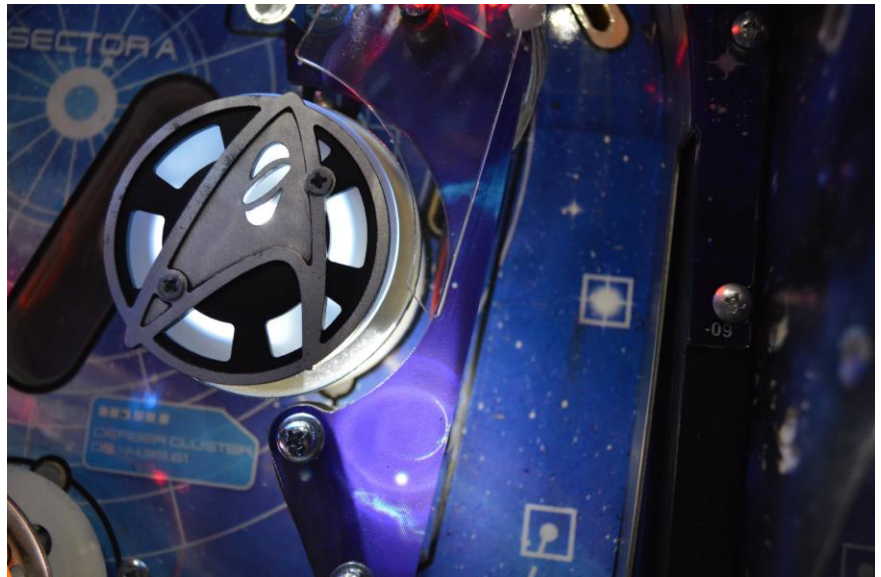


Figure 17. Science Cap installed

2.9) It's not hammertime... it's reassembly time; I usually begin by putting the beta ramp back in place. Re-attaching the Optos from *step 2.6* then opting to thread the upper screws from *step 2.2*. I then go ahead and loosely re-attach the wireform from steps 2.3 and 2.4 again leaving the screw and nut loose. With the ramp in place; I secure the ramp flap to the PF from *step 2.1*. With the ramp entrance secured in it's original holes; I go ahead and make any fine tuned adjustments to the wireform and secure the nut followed by the mid wireform screw under the Enterprise. With entrance and exit secured; the upper screws from *step 2.2* are tightened down. Re attach the clear plastic and other parts and reposition the Left Asteroid and tighten it's screw.

Congrats... the hard work is done as your done with Chapter 2.

## Chapter 3: The Command Cap

3.1) LOL. Does this even need a chapter? This is cake. Just unscrew the stock cap; remove the stock LED. Install the Comet Low Profile LED and install the Yellow Undercap under the Command Insignia. Done. Fanito. Make sure to use the 1/2" countersunk screws.



Figure 18. Install the Command Cap

If you drink; now might be time to crack a cold one... because you are **DONE**. Now it's "HammerTime". :D

Ok. I may have lied... your probably sitting here wondering what are these two little blue plastic nubs? They are (optional) USS Vengeance Nacelle MODs which I've included in the kit. You can get installation instructions here:

<http://pinball-mods.com/blogs/?p=476>