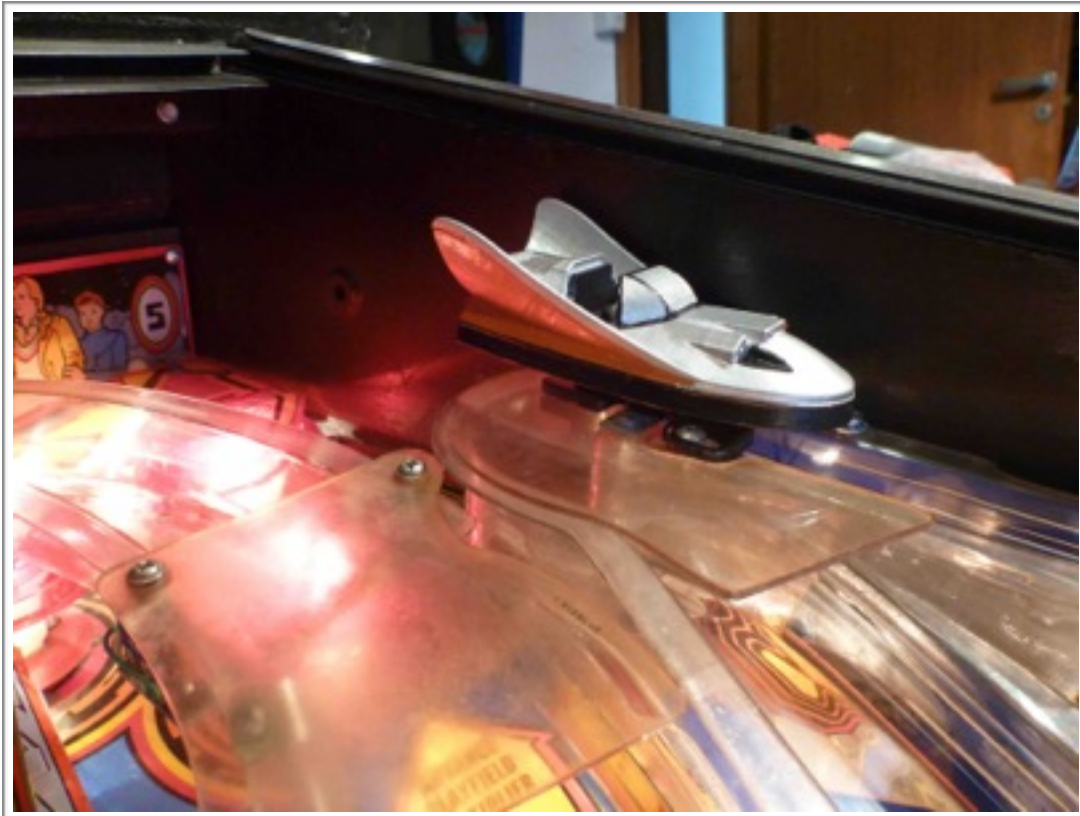


**Bally - 1992  
Doctor Who (DW)**

***Whomobile Mod***

The Doctor Who - Whomobile Mod is a mod that is designed in Australia for a fellow local pinball mate as well for all the other DW owners around the world that love their game and want to capture that classic “Whomobile” look. This mod is also a relative simple one to fit, looks cool and suits the game perfectly and replaces those very bland Whomobile Switch Box Covers.



**Thank you for your support and we hope you will enjoy this mod for many years to come.**

**Proudly Designed by**



## Fitting and Assembly Manual

### **Parts**

Since this is a Do It Yourself type of mod due to the options and some options being expensive this is a guide to purchase the parts, paint & and fit yourself. You will need the following parts from various places:

#### 1. Shapeways

- 2 x Whomobile Mount Brackets (in plastic - choice of colours and material types)
- 2 x Whomobile's (in plastic - choice of colours and material types) - 3 different versions to select from - Star Wars, John Pertwee's Version, TV show version

<https://www.shapeways.com/search?q=swinkswho%3F&sort=newest>

There are a few options so select from the ones stating - Pinball Mod



cut out screen  
version  
coming soon

\* Costs roughly from \$106 to \$178.50 USD for all four parts depending on your plastic type selection.

#### 2. Electronics Store (Jaycar in Australia) - If you are going to put in head lights

- 1 x 1.2m of small gauge twin core wire suitable for powering a small led.
- 4 x white 5mm led.
- 2 x resistor.
- 12 centimetres of heat tubing - 2.5 mm.
- 10 centimetres of heat tubing - 5mm.

\* Costs roughly \$8-9 AUD total.

#### 3. Hardware

- 2 x 4mm dia. x 12mm long black button head socket head screw.
- 1 x 2.5mm metric allen key.
- 1 x 4 x 0.7mm tap.

Note: An alternative for the Hardware is use what you have available to suit the hole which 3.5mm dia. which needs to be threaded.

\* Costs roughly \$1 AUD for items 1 & 2.

Alternatively you can contact Swinks for the hardware parts and we can supply as a complete kit with most of the wiring completed (except the soldering of wire to a socket as they can only be done after the wire is feed through tight spots and depends what function you finish to hook up to. We can supply a kit (Items 2 & 3) with just the electrical & hardware components for \$30 AUD or including the tap for \$37 - 38 AUD (both as a gift payment via paypal). Note: prices do not include post - we would charge at cost only - estimate between \$5-10 AUD to Europe / USA.

Below are the white leds that we selected and worked well, Though you will need a resistor inline to reduce the power from 6.3vdc supply from insert lighting to suit the selected leds.

In addition the resistors required for each led to adjust to the 6.3vdc supply are as follows. Obviously your local electronics shop may vary in leds as well as then the correct corresponding resistor but at least you can use this as a guide to take to them to ask for help if required. If you choose to connect up to 12 vdc or 6.8 vac select the ideal resistor to suit you selected led.

White led ZD-0190 (3.2 v) requires a 150R resistor.

3MM LEDs												
Optical and Electronic Characteristics								Max Continuous Preferred Value Series				
Size (mm)	Viewing Angle (Degrees)	Colour	Lens	Wavelength, Chromatic (nm), Co-ordinates	IF Typical (mA)	VF Typical (V)	IV Typical (mcd)	IF Max (mA)	Resistor (ohms) for			Cat.
								5VDC	9VDC	12VDC		
3	45	Red	Diffused	650	15	2.3	40	15	180	470	680	ZD-0100
3	15	Red	Waterclear	660	20	1.8	1500	30	160	360	510	ZD-0102
3	20	Red	Waterclear	625	20	2.0	2100	50	150	360	510	ZD-0104
3	15	Red	Waterclear	625	20	2.1	7000	30	150	360	510	ZD-0106
3	45	Orange	Diffused	625	20	1.9	35	30	160	360	510	ZD-0119
3	50	Yellow	Diffused	585	20	2.1	10	20	150	360	510	ZD-0110
3	20	Yellow	Waterclear	588	20	2.0	3000	50	150	360	510	ZD-0112
3	15	Yellow	Waterclear	588	20	2.2	6500	50	150	360	510	ZD-0114
3	50	Green	Diffused	573	20	2.3	40	20	130	330	470	ZD-0120
3	20	Green	Waterclear	568	20	2.1	500	30	150	360	510	ZD-0122
3	20	Green	Waterclear	520	20	3.2	6000	20	91	300	470	ZD-0124
3	15	Aqua	Waterclear	505	20	3.5	4000	30	75	270	430	ZD-0126
3	15	Blue	Waterclear	465	20	3.3	1500	20	82	300	430	ZD-0130
3	15	Blue	Waterclear	470	20	3.2	3700	30	91	300	430	ZD-0132
3	15	White	Waterclear	0.31/0.32	20	3.2	1000	20	91	300	430	ZD-0140
3	20	White	Waterclear	0.31/0.32	20	3.2	5000	30	91	300	430	ZD-0142

5MM LEDs												
Optical and Electronic Characteristics								Max Continuous Preferred Value Series				
Size (mm)	Viewing Angle (Degrees)	Colour	Lens	Wavelength, Chromatic (nm), Co-ordinates	IF Typical (mA)	VF Typical (V)	IV Typical (mcd)	IF Max (mA)	Resistor (ohms) for			Cat.
								5VDC	9VDC	12VDC		
5	50	Red	Diffused	700	20	2.3	8	30	130	330	470	ZD-0150
5	15	Red	Waterclear	660	20	1.7	500	30	160	360	510	ZD-0152
5	15	Red	Waterclear	625	20	2.0	4000	50	150	360	510	ZD-0154
5	15	Red	Waterclear	625	20	2.1	10000	50	150	360	510	ZD-0156
5	15	Red	Waterclear	624*	30	2.1	23500	30	100	240	330	ZD-0293
5	8	Red	Waterclear	616	50	2.1	35000	50	62	150	200	ZD-1790
5	40	Orange	Diffused	635	20	2.0	10	30	150	360	510	ZD-0169
5	50	Yellow	Diffused	585	20	2.1	8	30	150	360	510	ZD-0160
5	15	Yellow	Waterclear	590	20	2.2	2500	20	150	360	510	ZD-0162
5	15	Yellow	Waterclear	588	20	2.0	5200	50	150	360	510	ZD-0164
5	15	Yellow	Waterclear	588	20	2.3	10500	50	130	330	470	ZD-0166
5	15	Yellow	Waterclear	591*	30	2.1	23500	30	100	230	330	ZD-0295
5	50	Green	Diffused	570	20	2.3	10	30	130	330	470	ZD-0170
5	30	Green	Waterclear	525	20	3.5	7500	30	75	270	430	ZD-0172
5	15	Green	Waterclear	515	20	3.5	8500	30	75	270	430	ZD-0174
5	20	Green	Waterclear	525	20	3.2	12000	20	91	300	430	ZD-0176
5	15	Green	Waterclear	527*	30	3.2	64600	30	62	200	300	ZD-0292
5	15	Aqua	Waterclear	505	20	3.5	8500	30	75	270	430	ZD-0178
5	40	Blue	Diffused	470	20	3.3	350	30	82	300	430	ZD-0185
5	15	Blue	Waterclear	468	20	3.2	2500	30	91	300	430	ZD-0180
5	15	Blue	Waterclear	470	20	3.2	4850	30	91	300	430	ZD-0182
5	15	Blue	Waterclear	470*	30	3.2	23500	30	62	200	300	ZD-0291
5	30	White	Waterclear	0.31/0.31	20	3.2	4000	30	91	300	430	ZD-0190
5	20	White	Waterclear	0.31/0.32	20	3.2	10000	30	91	300	430	ZD-0192
5	15	White	Waterclear	0.31/0.32	20	3.3	20000	30	82	300	430	ZD-0195
5	15	White	Waterclear	0.29/0.29*	30	3.2	45000	30	62	200	300	ZD-0290
5	30	UV	Waterclear	405	20	3.3	60	20	91	300	430	ZD-0260

### **Pre-assembly:**

Since this mod is a DIY type mod there is no pre-assembly unless you got the wiring kit from Swinks as stated on the previous page. Either way please read all of the manual and we are assuming you have to do everything from scratch and become familiar with the various steps and if you do not understand anything please contact us and we will do our best to help you.

### **Step 1 - Prepping Your Shapeways Parts**

- The Whomobile Bracket Mounts do not really need any painting as are simply mounted and covered over with the Whomobile models.
- Tapping the Whomobile Bracket Mounts requires a M4 x 0.7mm tap or an equivalent imperial option. Tap from the top down through. You can use a little bit of wax (bees wax or machining lubricant wax or fluid) on the tap and then hand tap or cordless drill the thread (slowly) and this part is then ready for installation.
- The Whomobile's and brackets are laser sintered 3D printed nylon plastic which will need painting to capture that classic authentic look. Use the following images as a guide to doing the paint job.
- Alternatively a Pinsider - Modfather can paint these for \$35 USD a set. Simply order direct from Shapeways and have them shipped directly to Modfather in the US for painting - contact him to see if he can do this and be very specific on you colour scheme. Alternatively there may be others that can paint these if not paint them yourself.
- Regardless of "who" is painting them I would recommend a light coat of a hobby remote control car undercoat to seal the intended painted surface, followed by a light sand and then add your desired colours.

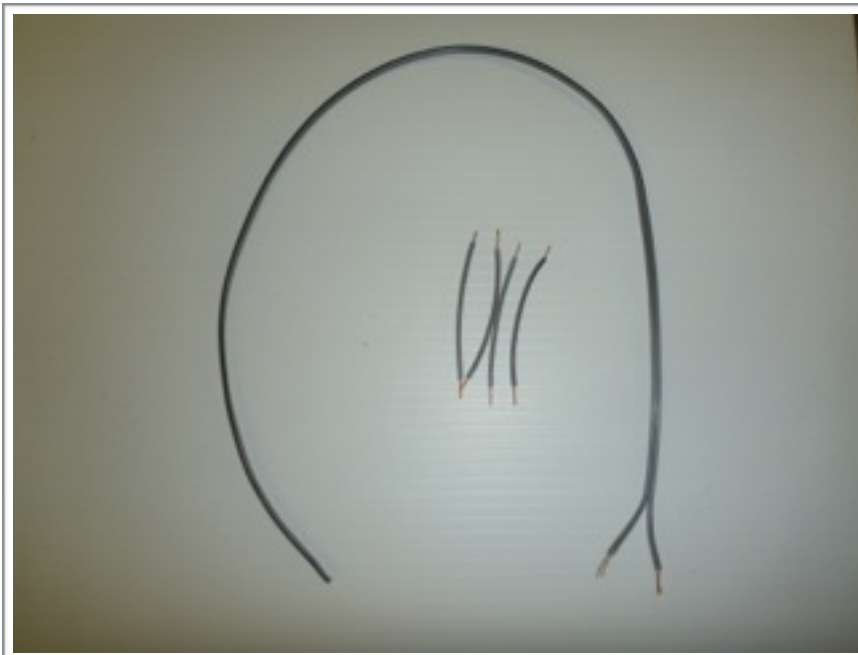


## Step 2 - Making the Lighting / Wiring Harness

- Cut 2 lengths of 500mm from the twin core cable.
- Cut 4 lengths of 65-70mm from the twin core cable.
- The above is enough for both vehicles.
- The below photo is for one vehicle.



- Split 2 x lengths of 65-70mm so they are 4 x singles strands and bare back the ends approx 6mm / 1/4" and tin with solder.



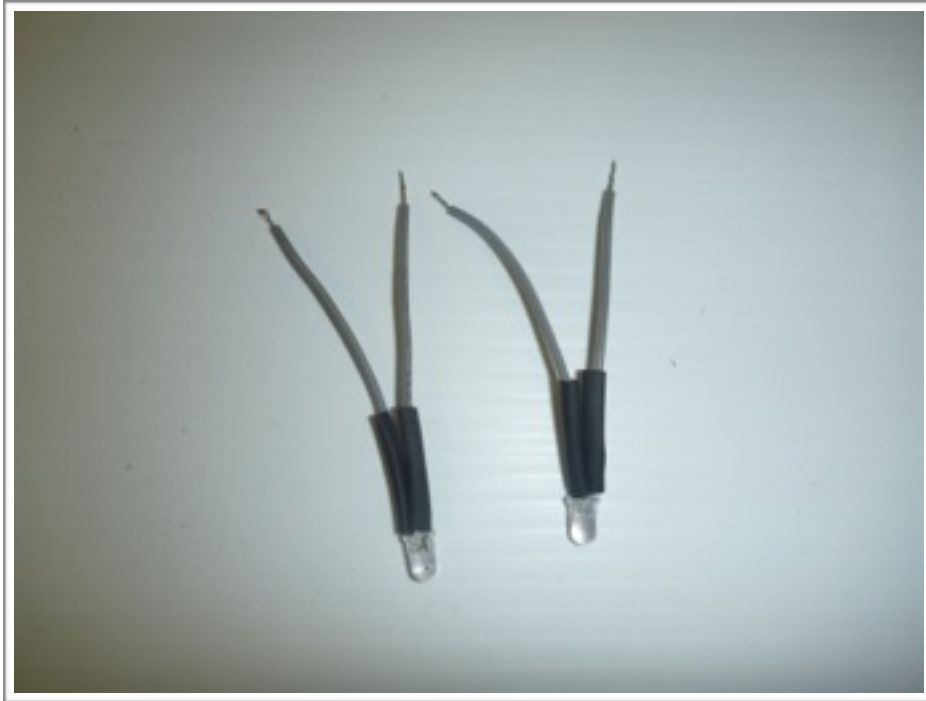
- Trim the positive leg of the led back so it is approximately 10mm long and now select the end of your cable (piece with a black / coloured strip preferably = + = positive wire) and solder the end to the led leg.



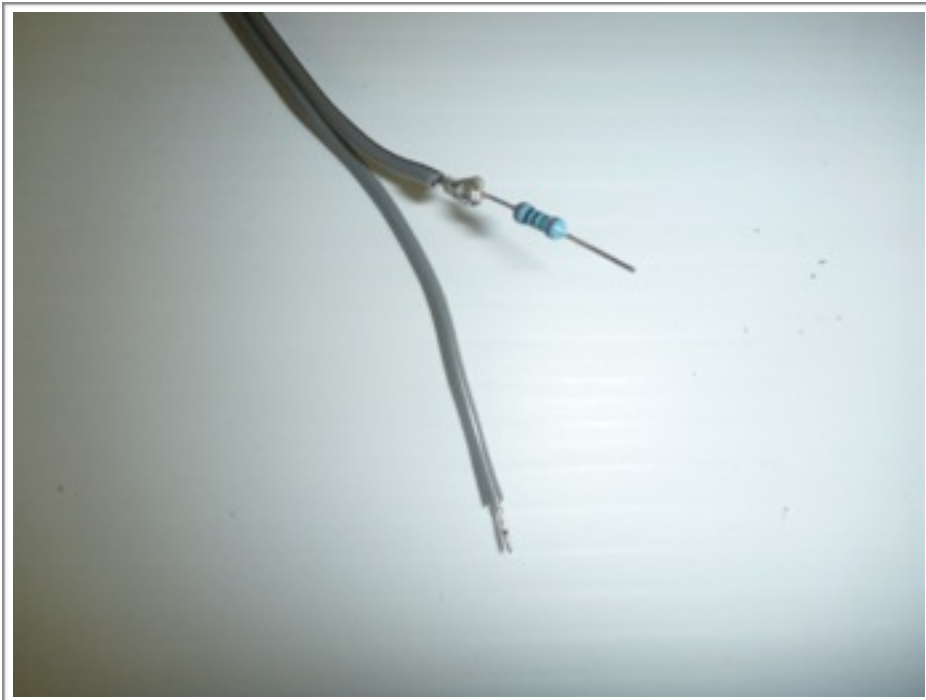
- Now repeat the process with the other remaining wire to the remaining leg of the led. This wire won't have a stripe on it so will be the negative power feed.



- Cut 4 pieces of 20mm long 2.5mm heat shrink and slide over the end of the cable over the tinned wire (only after it has cool down) as far back as possible and shrink in place.



- Now I did choose to experiment and it worked but didn't take a photo to replace the 2nd photo on page 5, that I took the 500mm cable and cut the positive side back approx 35mm to fit just one resistor so the power coming up the main lead is limited and then feeds both leds.



- Now cut 1 x piece of 2.5mm heat shrink as well as a 50mm of about 5mm heat shrink and slide of the cables and then solder the 2 x positive leads from the leds to the resistor, and repeat for the negative leads.



- Now heat shrink and divide the cable as shown ready for installation into the whomobile.





### **Step 3 - Installing Lighting to the Whomobile's**

- Even though I did not do it I would recommend doing a quick led test with a 6 vdc power pack to ensure that your wiring works and then hot glue into the whomobile/s. Therefore any problems you can fix before you install into the vehicle/s.



- Now time to hot glue into the underside of the vehicle and would commend as per the picture below:
  - sit the 5mm led into the headlight pocket and hot glue around to secure in place. It won't sit flush but will direct out the holes and do both sides.
  - next route the wires so that are clear of the centre of the bonnet as the ramp switch needs to fit in the area.
  - next route the wires to the side to the back of the vehicle. The reason to stick to the sides is the centre post of the mount bracket needs to be able to side from side to side. Once happy with the cable place locate and lock in place with some hot glue and you are done.
  - as seen on the previous page the less will through some lights downwards onto the ramp so if you do not want this simply brush on some black paint or cover with some dark tape.



**SAFETY NOTE:** Before you begin with fitting parts to the game, make sure that your machine is powered off and the cord running from your machine to the wall outlet has been disconnected.

Read through these instructions completely before attempting the installation of this enhancement. Although you may know your machine inside and out, there are a few things to consider before proceeding.

#### **Step 4 - Hooking up the Lighting to a Insert Feature**

- Since I don't have a game I can not document this feature as it is really a owner's decision as to what feature he / she wants to connect up to as I merely put in the ability to add lighting but hopefully a few people can add to the Pinside thread (below) of where they routed their lighting cables and with their permission I will add to this the manual revision.

<https://pinside.com/pinball/forum/topic/doctor-who-whomobile-mod>

- Basically feed the wiring down through a suitable void to underneath the playfield and to a insert within reach - though if it won't reach ignore the suggested 500mm length of cable and connect up a longer length of cable at the wiring stage to reach your desired feature at the time of wiring your leds.
- Please note: fasten your Whomobile's (Stage 5) before you lift the playfield so you don't damage your newly painted Whomobiles.
- Once stage 5 has been completed continue on to stage 6 to connect your Whomobile led lighting cables.

### **Step 5 - Assembling the Mod to the Game**

- Remove the original *bland* Whomobile's from your left and right ramps.
- You will notice the wiring and diodes soldered to the switch, you will need to adjust both components to sit closer to the switch so the Whomobile Bracket Mount can be fitted.



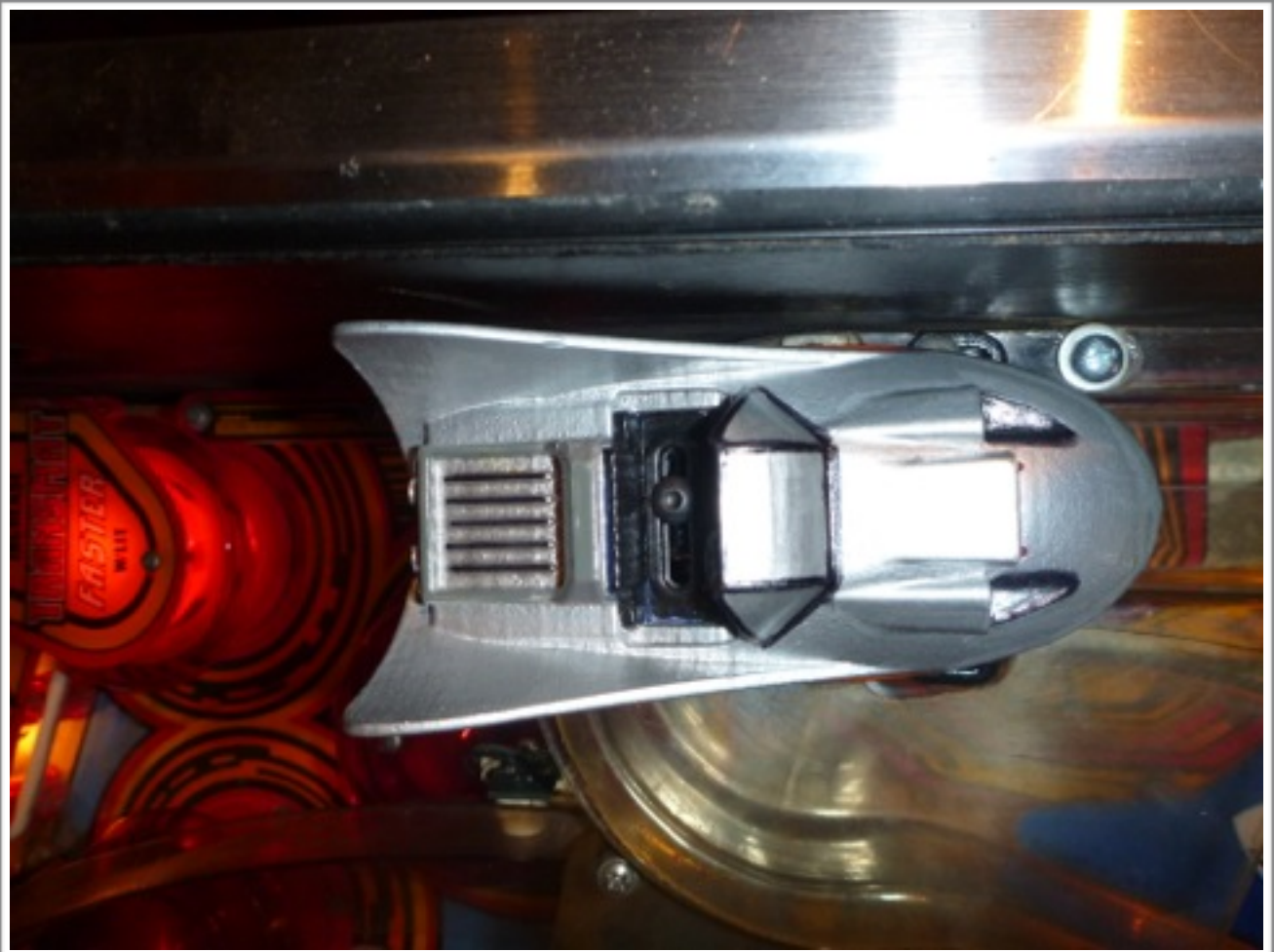
- Depending on the wear of your ramp mount holes the existing screws may not work and you may need to use longer ones or slightly thicker gauge ones.
- Locate the a Whomobile Bracket Mount to the left ramp and adjust until it fits nicely - though remember each game is different so the mount holes are slotted to allow to suit many game variances. see photo below.



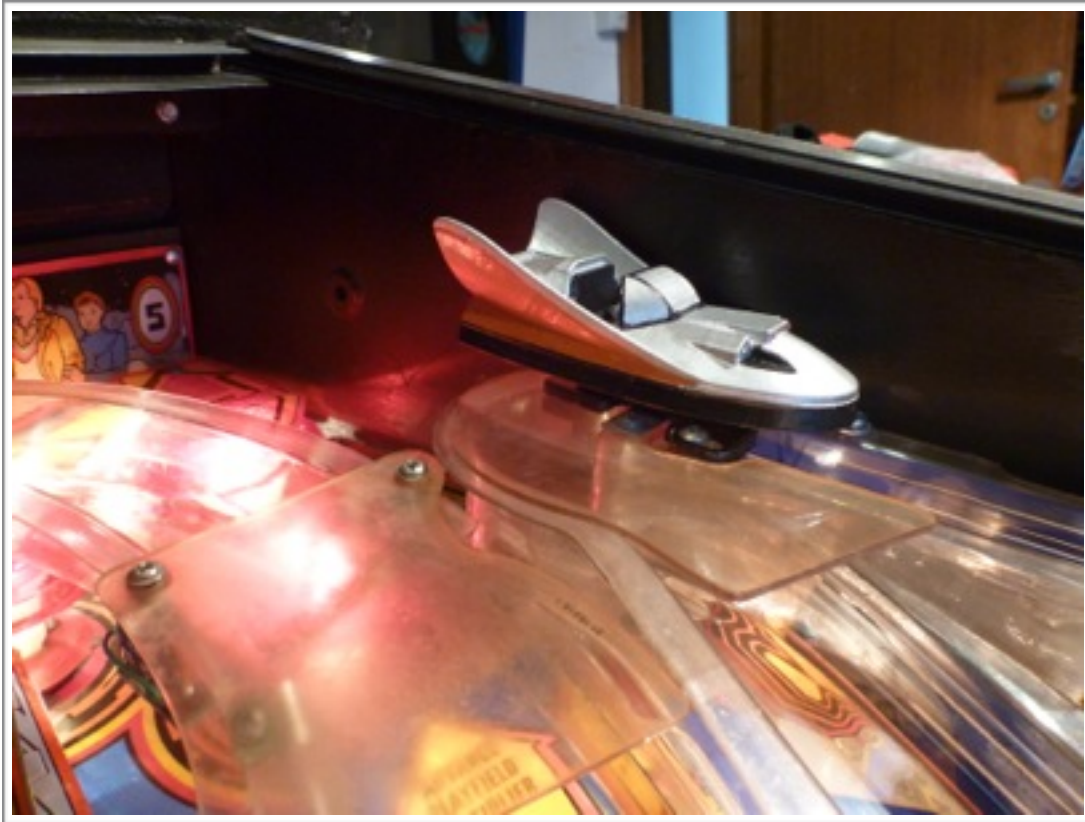
- Locate the a Whomobile Bracket Mount to the right ramp and adjust until it fits nicely - though remember each game is different so the mount holes are slotted to allow to suit many game variances. see photo below.



- Now take your Whomobile's and locate a M4 x 12mm screw or equivalent imperial screw through the seat and centralise on to the Whomobile Bracket Mount. You will notice the hole in the seat is slotted allowing for adjusting the model to your liking: - hiding the switch, pivoting the model to your liking or away from the right hand side of the cabinet or away from the vertically rising expander playfield / target mech. Do this for both sides and if you do not have lighting you are finished. If you do have lighting that was done at Stage 4 of the manual but you will have to go to Stage 6 to connect up.



- Now adjust the Whomobile's to your liking taking note of the side of the cabinet and expander and you are basically done unless you still need to connect up the led head light lighting.







### **Step 6 - Hooking up lighting to a insert feature.**

- First make sure you complete Stage's 1-5 first with the Whomobile's fastened in place.
- Remove all the balls from your game.
- Carefully lift your playfield up and ensure nothing catches and all new features clear all obstacles.
- Feed your left and right led cabling down to the underside of your playfield to the feature/s that you want it to activate one. The wiring I suggested is for 6.3vdc so if you decide to hook up to 6.8 vac make sure you select the correct resistor at the wiring stage as noted on page 3.
- connect up the wiring to your source but note that it will be a 50/50 chance the led will work due to the switch matrix so maybe loosely test and then permanently solder in place.
- cable tie any loose cabling down and now lower the play field and turn the machine on for a test to see that the lighting comes on in attract mode. If your lights work you are all good to enjoy.
- place your balls back in the game and enjoy.

**Please send my your feedback as keen to here what you think and enjoy this unique mod.**

**RETURN POLICY:**

*There is no return policy as this mod is a “do it yourself” mod from Shapeways. Refunds are not given as Shapeways is a separate entity to Swinks.*

**PRODUCT DISCLAIMER:**

*Please remember that this is a “MOD.” We took great effort in designing and testing our system in order to produce a high quality product, but it is not a factory original or an approved part for your pinball machine. There is the risk of unwanted side effects with any modification to a factory game and there are many factors that can cause undesirable side effects after installation of such a modification. As such, we cannot assume responsibility for game malfunction, damage to the game or surroundings, unwanted electrical emissions, personal injury, or other adverse effects caused by the installation of our MOD.*

**PRODUCT QUALITY DISCLAIMER:**

*All parts are made to the highest quality possible. The 4 main components are 3D printed and some sections may have some visible print lines. You may notice these print lines when handling but once the mod is painted and installed they will not be clearly visible from the players perspective. In downloading this manual and purchasing the mod you are accepting the finish quality of this relatively affordable unique mod.*

## **Buyers Feedback**

I am known as Swinks on Pinball Forums like Aussie Pinball as well as Pinside and have a large range of products. I am a Mechanical Engineer by trade so I focus on making a quality well engineering design / product.

Much of my designs are readily available at Shapeways for many different pinballs as well as other items.

<https://www.shapeways.com/search?q=swinks&sort=newest>

Here is some of the feedback from various people who purchased different products from me:

### **Snackbar**

- “Well I received my snack bar mod today and was impressed before I’d even assembled it the aqua moulding and decals look like a factory add on Jady had already won me on this mod just from that”
- “It looks absolutely shit hot, well made and very professional - cannot wait to get it in the machine!!”
- “it looks brilliant mate! Can’t fault you or your product: very professional on all levels”
- “You certainly see the quality and engineering that went in to this.”
- “the quality and the engineering are top rate, very professional. Love the redesign above the scoop too where the original plastic used to bend up (and usually break). A lot of thought, time and effort have obviously gone into this mod to make it look like it should of been there from day one - worth EVERY cent. Every CFTBL should have this mod.”
- “This mod is built like a brick sh%t house! Unbelievable! If you were thinking of getting this.....GET IT! Perfect communication, perfect shipping, and a perfect mod! Easy install and this bad boy is built to last!”
- “Looks great, very nice work on your part man...”
- “remembered as one of the classic mods in the hobby”
- “wow I was impressed with how well its made”
- “Great work very well made!!!”
- “Really nice work and I appreciate your attention to detail, both functionally and aesthetically! Super nice quality.”
- “You are my god”

### **Plunger Knobs**

- “ALL I CAN SAY IS KICK ASS! I MAKE ALOT OF THESE FOR MY MACHINES , HE DID GREAT !”