IMP Concepts 3DR Solo “HERE” & Other GPS Mast Installation

Introduction

The ProfiCNC Here GPS Uses a genuine 1st quality uBlox M8N GPS and adds an external compass to reduce that pesky Magnetic Interference. This document is intended as a guide for those wishing to perform this upgrade themselves. This document covers the MAST Install only, as it can be used for a variety of GPS units (with optional GPS Case). However, this document covers the ProfiCNC Here GPS unit. This is a DIY project and requires some mechanical, fabrication, electrical skills and above all PATIENCE to complete.

We would NOT call it Plug & Play as holes need to be drilled and filed into shape. However, saying that, is it quite straightforward for those with some RC hobby construction skills. Anyone who has built an RC plane or model will have no difficulty in performing this upgrade.

This is just one way (Ours) of doing the MAST installation. It does require a little more drilling than just drilling a hole in the cover and routing the cables round the battery clip. However, it does prevent routing of wires that could cause chafing and shorting. In our install, the wires go directly into the Main Board Bay with no obstructions.

This document is NOT intended to cover the Mission Planner Setup & ArdupCopter Configuration. Please refer to one of the many other installation tutorials that cover this in detail. They can be found in the 3DR Solo Mod Club Facebook Group.

Disclaimer: This upgrade is NOT sanctioned by 3DR and could void the warranty on the 3DR Solo Smart Drone.

This upgrade has been found to increase the amount of satellites acquired and speed up the startup and acquisition of a 3D Fix. However, this is NOT guaranteed as location and a clear sky view plays an important part in GPS Satellite acquisition and locking. IMP Concepts is NOT responsible for any damage caused by the install on the Solo while performing this upgrade.

Important Note: This upgrade does require the installer have good mechanical and electrical skills. Please read this document thoroughly prior to ordering this Kit. Most experienced RC Plane Flyers will have no trouble.

Tools Required:

- Medium Philips Screw Driver to remove the Battery Tray from the Solo
- Drill
- Small Drill bit assortment (~2mm – 5mm)
- Half Round Needle File(s)

Materials & Parts Required:

- 1 x Here GPS Module (Jestersdrones.com & 3Sixty-Solutions.com in the USA), Other GPS Module such as 3DR Solo Rev A, Rev B, or mRo M8N unit (These need the Optional GPS Case available at IMPConcepts.com)
- For GPS units other than the ProfiCNC Here GPS, the Solo OEM Cable with have to be Extended or Spliced
- 1 x Here GPS Extension Cable (Jestersdrones.com & Email: sales@leo-tech.com)
- 1 x Collapsible Here GPS Mast Designed for Solo (IMPConcepts.com)
- Masking Tape
- Clean Flat surface for Drilling (Piece of 2 x 4 Wood is good)
- 3M (Scotch Brand) 30 Pound Extreme Double Sided Tape (Lowes, Home Depot or ACE HardWare in the USA)
- Optional M2 x 12mm or M2 x 14mm self-tapping screws (Optional Additional GPS Mast Platform Support Screws)
- Optional IMP Concepts Battery Cover Drilling Template
- This Document

Please refer to the variety of videos available that show in detail how to remove the Solo’s Battery Tray.
Preparation

You will need to get the basic parts you will require together from the list above based on your installation, we will be focusing on the Here GPS in this example. We will not be going into detailed removal of the Battery Tray and GPS components, as there are many tutorials available to guide you through it. Most of us have done it a few times anyway and are readily versed in doing do.

We recommend you remove the Gimbal and Camera so that you do not dislodge or knock it during the installation of the Mast.

Basic Parts Set:

- IMP Concepts Here Mast & Custom GPS & Compass Cable for Solo

- Your 3DR Solo Ready for the Upgrade
Preparation Continued

- You’re ProfiCNC Here GPS Module

- Optional IMP Concepts Drilling Template, we have provided the 3D printable drilling & sizing template as a “HereDrillTemplate.STL” print file, so those with 3D Printer can print one off. Those without can get a friend with a printer to make one for them. Contact IMP Concepts if you need one. Remember it is optional.
**Let's Get Started – Cutting the Cable Access Holes**

- Remove the Battery & Gimbal and store them in a safe area so they do not get damaged
- Remove the Battery Tray GPS Front Cover (The shiny bit) by carefully unclipping it and sliding it forward
- Remove the Battery Tray from the Solo by removing the 4 screws from the battery area and the 3 screws from the front that are now accessible after removing the front cover, then remove the battery tray.
- Carefully unclip the OEM GPS cable from the OEM GPS unit and the Solo’s main board
  - If you are using this mast to mount the OEM GPS externally up on the mast, the cable will need to be extended by splicing some extensions into the existing wires, be careful to make sure they are full insulated when done
  - As we are focusing on the Here GPS we will need the cable mentioned above in the parts listing
- Remove the OEM GPS and any shielding material, and if using the Here GPS discard them

Now you have the battery tray removed this is the part we will work on first. There is a clip that locks the battery in place. That is the first item that needs to have a hole cut in it. This clip will then be used as a template to cut the Battery tray and then the GPS cover (The Shiny Bit).

- Remove the battery lock clip. There is a small snap in retainer on the bottom side that hold the locking clip in place. You will need a Flat Head screwdriver or similar to pry it off. Study it carefully so you do not break it, it is on tight. It needs to be pried carefully toward the rear of the tray and pushed out of its seat. That is downwards as shown in the sample photos below. **Note: There is a small spring under the clip’s button, please put it to one side and remember to put it back when you re-assemble the battery tray later on.**

- Now you should have all 3 pieces ready for drilling and filing. The photo below shows some small "pilot" holes in each part, we will get to that later.
Cutting the Cable Access Holes Continued

- If you have the drilling template mentioned previously you can use it in this step, if not you are aiming to get small slot cut into the battery lock clip. This hole is approximately 6mm x 8.5mm with rounded edges. There are sample reference holes on the template so you can see the finished objective. All 3 parts will need cutting this way. Once the battery clip is done it will then be used as a template for the other 2 parts.
  
  - Place the battery lock clip into the template as shown in the photo below, or mark the area where 2 small pilot holes can be drilled. You can see roughly where they need to be by looking at the photo below. We used 2mm Pilot drills, but any similar size would do. Make sure the drills are sharp so they do not catch and crack or damage the clip or other parts.

The clip can be inserted into the template top up or top down, choose a way so you have a flat surface to support the part when drilling. Drill through the 2 holes in the template into the clip. Make sure you hold it steady. We put it on a small piece of 2 x 4 wood and held it tight. The 2 small pilot holes are 2mm.

- Once drilled the clip will look like this:
Cutting the Cable Access Holes Continued

- Re-install the clip into the battery tray and use it to drill 2 similar holes in the tray itself. Notice we removed the clip again. This is a good time to do that. It will need to be removed for the final steps.

- Place the GPS Cover (The Shiny Bit) onto the battery tray and make sure it is firmly in place. From the bottom of the battery tray, using the 2 pilot holes as a template, drill the 2 pilot holes into the GPS cover

- You should now have all 3 pieces with Pilot holes as shown below
Cutting the Cable Access Holes Continued

- Taking each piece one at a time drill some larger holes, making the 2 pilot actually converge with each other making a rough slot. We use a 3mm drill, then a 4mm drill. Be **VERY CAREFUL** as the larger drills can bite into the plastic and force the parts away from your grip. We did the Battery Lock Clip first. It should look like the following photo; the idea is that the largest GPS plug can “just” be passed through it. We finished off the slot with a half round Needle File.

- Once you have the clip done, assemble it back into the battery tray and finish off the slot in the battery tray to match. Remember the to replace the spring you put aside earlier.

- When you can slide the GPS plugs through the battery tray with the clip installed. Install the GPS Cover (The Shiny Bit) onto the cover over the clip, press it in place securely, and file the hole out to match the tray and clip. This is the final step in the hole cutting procedure.
Assembling the Mast & Securing it on the GPS Cover

- The Mast comes in 2 or 3 pieces, The Mast Column, The Base, and the Pivot Screw if you ordered that too. The Pivot Screw and nut are easily sourced from your local hardware store. We used a M3 x 35mm Screw and Nut, but you can also use a #4-40 or #4-48 1 3/8” Imperial Screw and Nut. Make sure the pivot hole is reamed out a little if you choose an Imperial Pivot Screw.

- If the mast was ordered with a Pivot screw it will already be assembled, if not assemble the mast at this point as shown. We offer Rear and Forward slanting Mast variants. They are similar with the exception of the Forward or Rear Slanting positions. However, the masts and bases cannot be interchanged between versions. This is the forward slanting mast variant. We will be using this one for our upgrade guide.

- This is the Rear slanting mast variant. (After Installation)
Installing the Mast onto the Battery Tray and Solo

- This is the final section of this guide. We do not go into the connections to the main board or the configurations of the Compass orientation in Mission Planner etc., as these are covered extensively in other texts and videos. Jestersdrones.com has an excellent installation guide that you can review.

- Take the assembled mast and base and apply a strong double-sided tape to the mast and base as shown in the photos below. We recommend 3m Scotch Brand 30lb Extremely Strong MMM414P Exterior Tape. Trim the tape as shown.

![3m Scotch Brand Tape](image1)

- You will notice in the photos below that the GPS cover has 2 holes in it at the rear. These line up with the battery tray internal OEM posts that were used to secure the original GPS to the tray. We are using those as extra retaining screws, but they are optional as the 3M Tape is very strong. In order to drill these in exactly the correct position, you will need a very small drill that clears the postholes so they are not increased in diameter. We used a 1mm drill that slides in and out freely.

Install the GPS cover securely, then, from the underside, drill the 2 rear holes using the 2 rear retaining posts as templates. When you have the 2 holes in the cover, we recommend you drill the cover holes only out to 2mm to clear the optional self-tapping retaining screws.
Now we need to install the cables through the new slots in the battery tray, lock clip and GPS cover. This can be done by either threading the GPS and compass plugs through the Mast first, and then through the cover, then the Battery tray (with clip installed). The GPS cover must be loose and NOT secured on the battery tray at this time. Alternatively you can do the reverse and insert the Here GPS plug through the tray from the bottom, then through the GPS cover and then into the Mast from the bottom and out or the slot in the top rear of the mast. That is what we did. It will look like this when this step is complete.

Remove the cable cover from the Here GPS using the Allen wrench provided and remove the cable that came with it. It holds in place to the GPS PCB by the tradition “Click Mate” system and is easy to remove. The cover plate will come off with the cable. The cable cover comes apart to release the cable grommet. You may keep or discard the grommet as it is a little tricky to get the original cable & plug out of it, but it will come out. The screw and tabs hold the cover in place even without the grommet. We removed the cable and fed our new cable through the grommet, then replaced it into the GPS main dome.

Using the recommended double-sided tape mentioned earlier in this document stick the Here GPS to the Top of the mast making sure the Arrow is pointing forward. Pass the GPS & Compass Plugs through the hole in the rear of the Mast and down through the mast base. Your mast and Here GPS should look like the photos below.
• Pass the Cables through the Solo GPS Cover and using the recommended tape stick the mast to the cover, making sure it is firmly attached as shown below.

You may now Re-Assemble your Solo by connecting the GPS and Compass Cables, installing the battery tray and the 7 x M2 Screws that hold it onto the Solo’s Shell, then carefully clip on the GPS cover with the mast back onto the battery tray. If you drilled the holes for the Optional retaining screws, you may use those also. Make sure the cover is clipped on as if the mast was not installed, and make sure the wires do not get chaffed or damaged when you do so.

Now you can refer to one of the many tutorials available for setting up the Solo with your new GPS and Compass combination. Please use the “Contact Us” link on our website www.impconcepts.com if you need any additional information.

Good luck with your new GPS Upgrade and may the Sats be with you……