Dear DJI,

Firstly, I hope you are having a good day and are well.

Unfortunately, the rest of this email isn't so positive. As I would like to share with you a problem with DJI's FPV system. This can be seen mostly in DJI's O3 FPV system (Airunits and Goggles 2). But, it has existed for the older systems too. I see DJI are also working on an O4 system, which likely still has the problem.

Some of this may get a little technical. But I want to try to keep this easy to understand. Though it would likely be worth discussing this with your technical department, who are responsible for writing the firmware for the DJI FPV goggles.

The main problem

The issue exists around the OSD. To put it simply; the OSD provided in all these DJI FPV systems is not fully compatible with any flight controller firmware that exists. DJI advertise the system as supporting Canvas mode, to allow you to customise the on-screen display information. There are a couple of issues here. Firstly, "Canvas mode" is not the correct term. MSP DisplayPort is the correct term for the OSD. But that's a minor issue. More importantly, the customisation of the OSD does not work correctly. DJI does not specify a particular firmware that it works with. So, it is fair to assume it should work with all firmware (like DJI's competitors do). Though some quad pilots assume that it is made to work with BetaFlight. Either way, there is no official statement on firmware. Plus, as I will demonstrate, it doesn't work fully with any.

BetaFlight example

To demonstrate the issue, here is a screen shot of BetaFlight's OSD configuration page in their Configurator. Underneath shows how the OSD is actually displayed in the goggles.

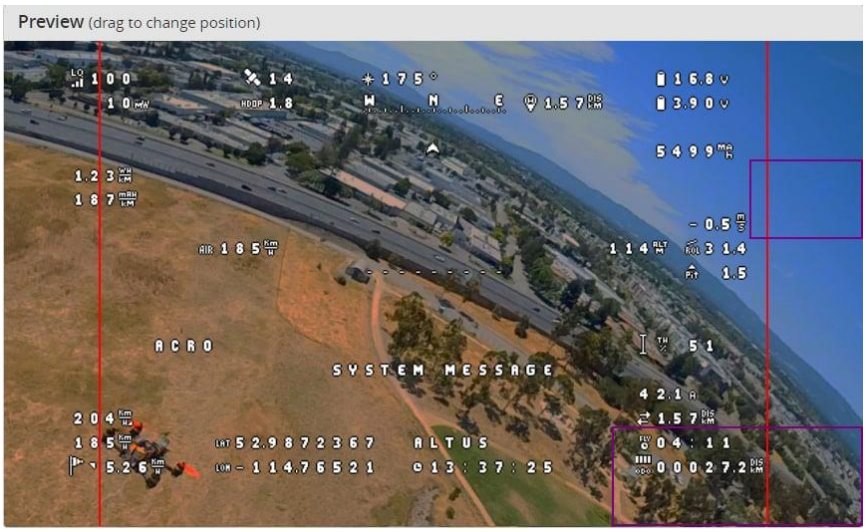


You can see the two issues in this layout highlighted by the red arrows. In the top, just left of centre the *speed* symbol that has been requested as been replaced by an *on hour* symbol by DJI. On the right, the *total distance* symbol has been replaced by a *fly hours* symbol. While looking at the total distance OSD element. Notice the *m* to the right of the numbers. That is to indicate that the

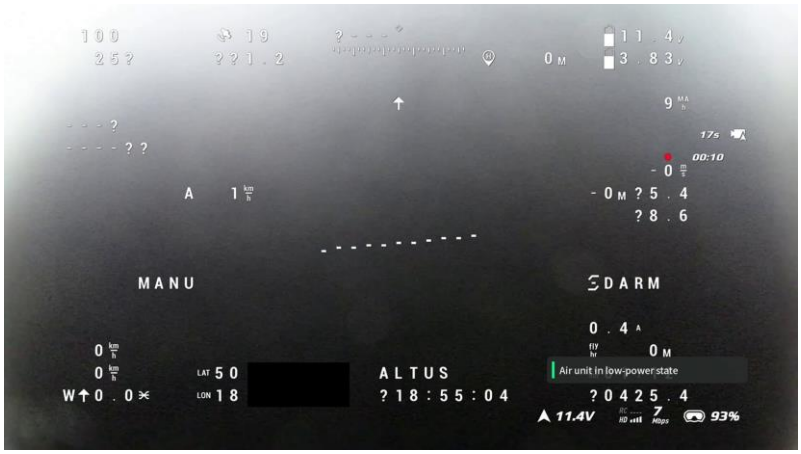
measurement is in metres. When that goes over 999, it switches from metres to kilometres and should show a *km* symbol. But, DJI will actually show nothing, it will be a blank space. This is only 3 of the issues with BetaFlight. There are actually ten issues between what is expected to be displayed, and what is actually displayed. This may not sound too bad, but BetaFlight is the most compatible system. When you look at other systems, they are much, much worse.

INAV example

INAV uses what's known as a two-page font. Meaning it has space for twice as many symbols as BetaFlight and the font stored in the DJI goggles. I'm sure you can appreciate that this leaves huge gaps in the number of OSD elements that can be supported. The INAV developers, myself included, have done the best they can to support DJI. But there is still a huge shortfall in what can be displayed. INAV has had to use question marks where there is no unambiguous symbol or character that can be used to represent the missing symbols.



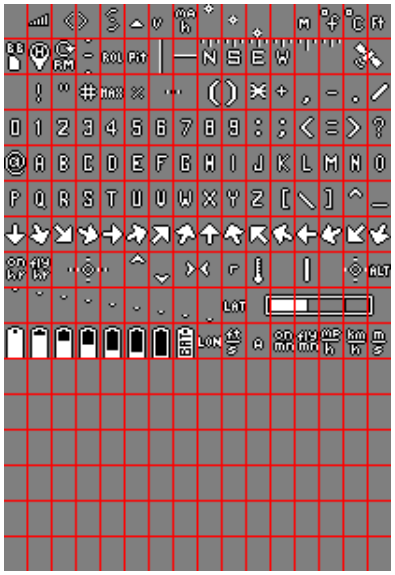
To demonstrate the issue. The image above shows the INAV Configurator OSD page, and what the pilot is expecting to see. The image below shows what the pilot actually sees in the goggles. Please bear in mind that this is only a small percentage of the missing symbols.

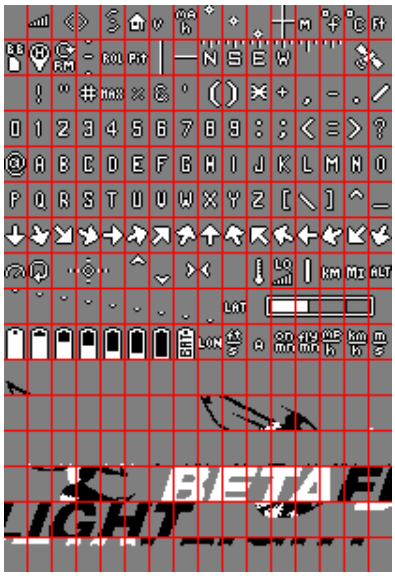


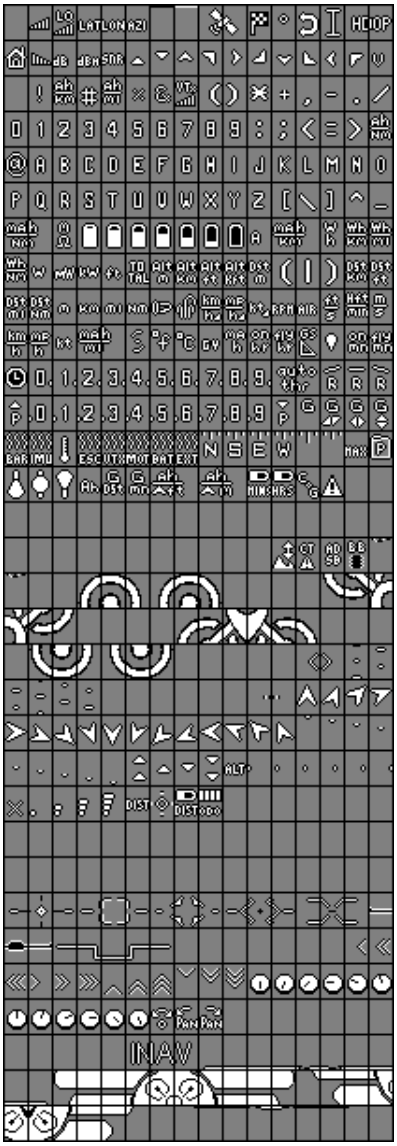
This is just showing two of the available firmware providers for flight controllers. There are others, and the all suffer the same problem.

The current font sets

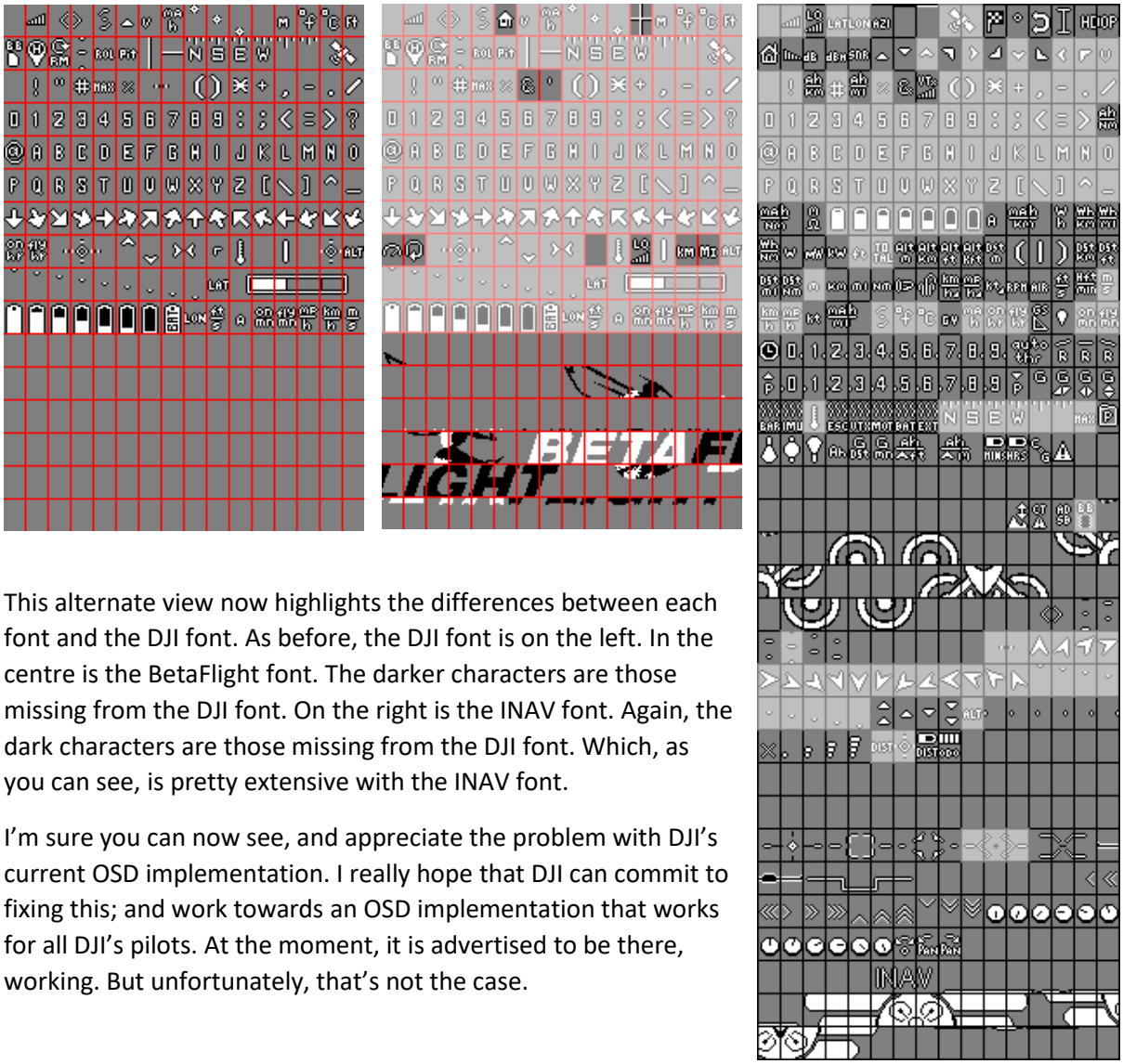
I thought it may be visually more useful to actually share images of the fonts with you. For this demonstration, I'm using analogue fonts because they are easier to source. But the characters and symbols are the same. They just look prettier with the HD fonts.







On the left, you can see the DJI font, that has been stored in all the FPV goggles so far. In the middle is the current, single page version, of the BetaFlight font. On the right is the INAV font. I'm sure that you can now see why it is known as a two-page font. There are 512 character spaces, as opposed to the 256 character spaces on the single page font. It's also worth noting that BetaFlight now use a four-page font as a mechanism to alert pilots to problems. At first glance. It may appear that the DJI and BetaFlight fonts are the same. But this is not the case. See below.



This alternate view now highlights the differences between each font and the DJI font. As before, the DJI font is on the left. In the centre is the BetaFlight font. The darker characters are those missing from the DJI font. On the right is the INAV font. Again, the dark characters are those missing from the DJI font. Which, as you can see, is pretty extensive with the INAV font.

I'm sure you can now see, and appreciate the problem with DJI's current OSD implementation. I really hope that DJI can commit to fixing this; and work towards an OSD implementation that works for all DJI's pilots. At the moment, it is advertised to be there, working. But unfortunately, that's not the case.

The correct fix for this issue

As you can see. The problem is that characters are missing from DJI's font. However, the solution is not to just add those characters to a new DJI font, that is hard stored in the goggles. That is only a temporary band aid, and not a complete fix. The flight controller firmware's font can potentially change with each new major version. So, if you hard code current characters into a fixed font in the goggles. That can soon become outdated. DJI would have to keep updating fonts, or end up back in a similar situation to what they are in now.

Also, you can see that the position of characters is different for the different firmware types too. Combine the differences of position with the potential for version mismatches; and there is only one logical solution. For this there are 3 steps.

Step 1 – Make sure that MSP DisplayPort is fully implemented

The method that the airunit communicates with the flight controller is called MSP DisplayPort. This communication tells the goggles, via the airunit, where to position characters on the display and what page the character is on. There is a lot more besides. The API for MSP DisplayPort can be found at https://betaflight.com/docs/development/API/DisplayPort. DJI already partially uses this. I don't

know how much has been implemented. But my advice would be to implement it fully. This will let the goggles know the page and index of the character to be drawn, and the coordinates to draw it. Most of that is already done. The only part that may need implementation is the page number. Which is found in the MSP_DP_WRITE_STRING command's ATTRIBUTE data. Bits 0 and 1 are used to determine if the character is on font page 0 [00], 1 [01], 2 [10], or 3 [11]. With that data, you can select the correct character on the correct page, and display it in the correct position. But to have the correct characters to use, we need step 2.

Step 2 – Allow users to upload fonts

The key for this to work well, and be futureproof. Is to allow users to upload a font for each firmware that they are using. These could be stored on the MicroSD card, or uploaded to the goggles for use without a MicroSD card installed. If you are storing the fonts on the goggles. You will of course need a mechanism to transfer them to the goggles.

How you do this is really down to you. But this really is the key ingredient to making this OSD be the best it can be. I would recommend having the font stored as a PNG file. This allows for alpha transparency and easy editing. The nice thing about this is the pilots have the chance to choose the font they like the look of; and even customise it with their own twists. There are already fonts available that would work with DJI immediately.

You may or may not be aware. But with the original system (Goggles and Goggles V2). There was a group of developers who wrote their own changes to the DJI firmware. WTFOS fully implemented MSP DisplayPort, and allowed the pilots to upload their own fonts. This made the system 100% compatible with all the major flight controller firmware types. I know pilots today who will not upgrade to O3, because they do not want to use the OSD and features provided by WTFOS. I really think DJI should check it out, just to see the great capabilities it added to your system. If you matched that. You would have a lot of happy pilots. No doubt you would also get more people buying your latest systems, if they had the same capabilities.

But, however you implement it. For the DJI FPV system to truly be compatible with all the firmware out there. You must allow users to upload fonts. Plus this has the advantage of being futureproof.

Step 3 – Flight Controller firmware awareness

The final step would be for the system to be aware of what flight controller firmware it is connected to. This is not essential. But would create a much nicer user experience. The firmware type can be discovered through MSP. A code of up to 4 characters is returned to identify the firmware. For example, BTFL for BetaFlight, INAV for INAV, and so on.

With this information, you could store a lookup table in the goggles. This would automatically load the correct font for that firmware. I think a good way to start would be with a blank lookup table. When the system connects to the flight controller, it gets the ID and discovers it's missing from the lookup table. It then asks the user which font they would like to use, and provides a list of all fonts on the SD card (or internal storage). For example, "Which font would you like to use with BTFL?" The user selects the font they want to use and clicks ok. The next time the user connects to a craft with that firmware. The font automatically loads, making the whole thing seamless. There would need to be an option in a menu somewhere to remove a font from the lookup table. So that if they want to use a different font, they can.

Apologies for this being such a long email. I just wanted to take my time and explain the problem to you. I really hope that DJI takes this seriously and implements a solution. Your pilots spend a lot of money with your company, and are extremely loyal. Please don't let them down. The ultimate would

be not only doing this for the O3 system, and the new systems released in the future. But also providing an update to the original FPV system. This will show your customers that you still appreciate and are grateful to them. Even if they still have the older equipment. Too many companies leave their original customers behind.

If you would like any help or have anything you would like to ask. Please feel free to reach out. I would be more than happy to help in bringing this change to light in any way I can.

One thing that I would like to point out is that I am writing this as an open letter. I will be sharing this, but will keep any personal information out. I just don't think it's right for me not to make you aware of this.

Anyway, thank you for your time.

Kind regards

Darren