



# **The Black Box ToolKit**

*Serious about science: Serious about timing*

# **The Black Box ToolKit v3**

# **Addendum**

## Introduction

The BBTK v3 software is virtually identical to the v2 and so the manual for the BBTK v2 remains relevant until it is updated.

The new v3 hardware may look slightly different but functionality remains largely the same with a couple of additions or changes, e.g. the BBTK v3 uses a new design of Opto sensors.

This addendum outlines the major changes which include the use of a new Virtual Communications Port chip for the interface between the BBTK v3 and your PC together with the new Opto sensors and how to set their sensitivity for optimally detecting visual events on screen.

## Installing the FTDI VCOM Drivers and Checking Which COM Port the BBTK v3 is Installed on

### ***Installing VCOM Drivers***

Before you can use the BBTK v3 you need to make sure that you have installed the Virtual COM port (VCP) drivers that cause the USB device to appear as an additional COM port available to the PC.

Before connecting and powering on the BBTK v3 for the first time you should ensure that you are logged on to the local PC with Administrator rights.

If you are connected to the Internet the first time you power on the BBTK v3 and connect it to a USB port Windows should attempt to download and install the drivers automatically.

Should you not be connected to the Internet or if this does not happen you can find a copy of the drivers on the BBTK v3 distribution media under the Drivers folder.

Alternatively you can download the latest Future Technology Devices International VCOM drivers from:

<https://ftdichip.com/drivers/vcp-drivers/>

FTDI are the makers of the interface chip we use to connect the BBTK v3 to your PC.

If the drivers are not automatically installed you should follow the installation instructions provided by FTDI on the link below after choosing the most appropriate drivers from your Operating System:

<https://ftdichip.com/document/installation-guides/>

Unless the drivers have been automatically installed or you have installed them manually you will not have access to a VCOM port and you will not be able to communicate with the BBTK v3.

## Checking Which VCOM Port the BBTK v3 is Connected to

To use the BBTK v3 you will need to tell it which VCOM port it is connected to. Once the drivers are installed, the BBTK v3 is connected and powered on you will need to open the Computer Management console in Windows.

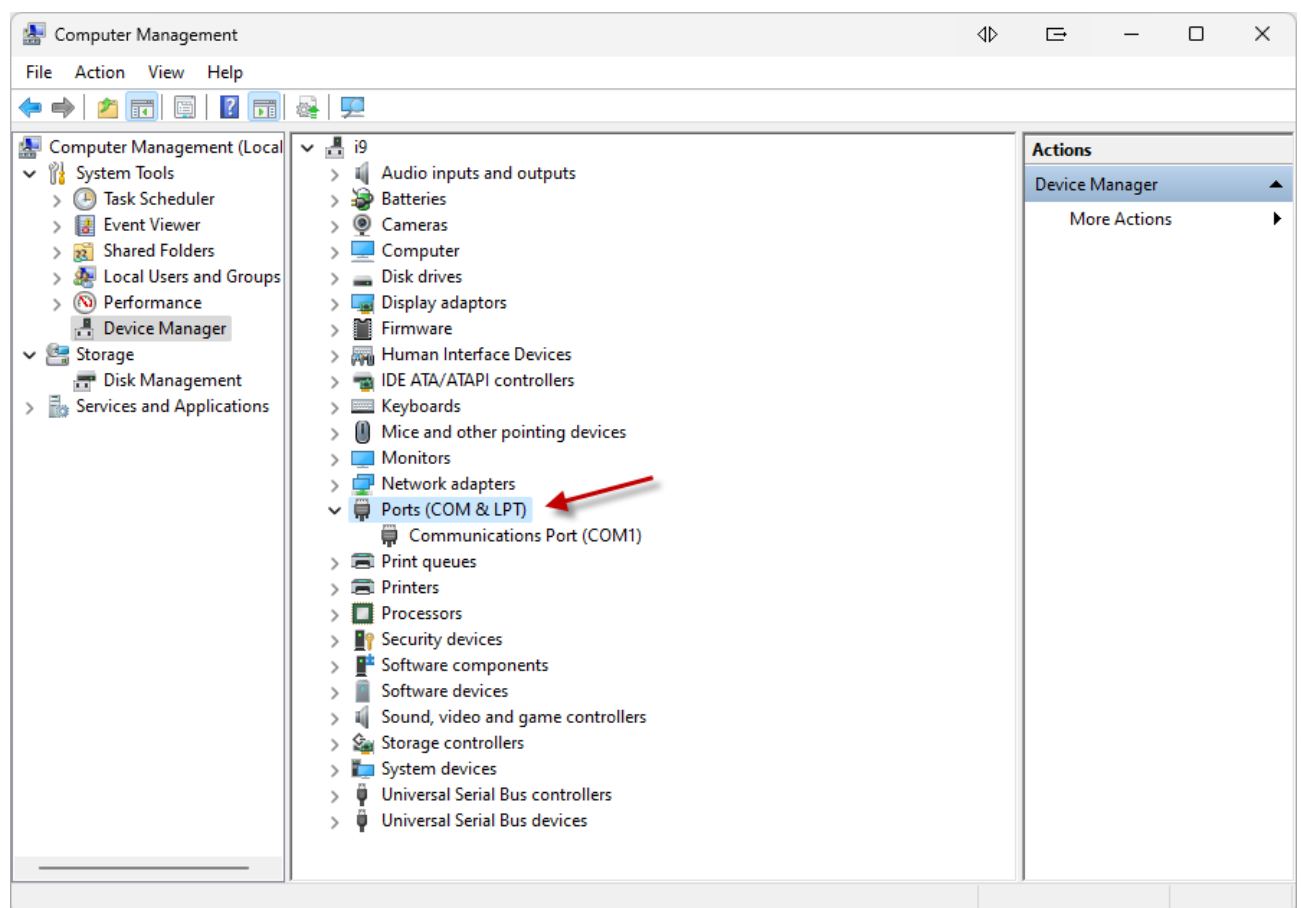
You can do this in multiple ways, e.g.

Press the Windows Key & X together, release and then press G

Or

Press the Windows Key and R and type compmgmt.msc into the Open text box and then click on OK.

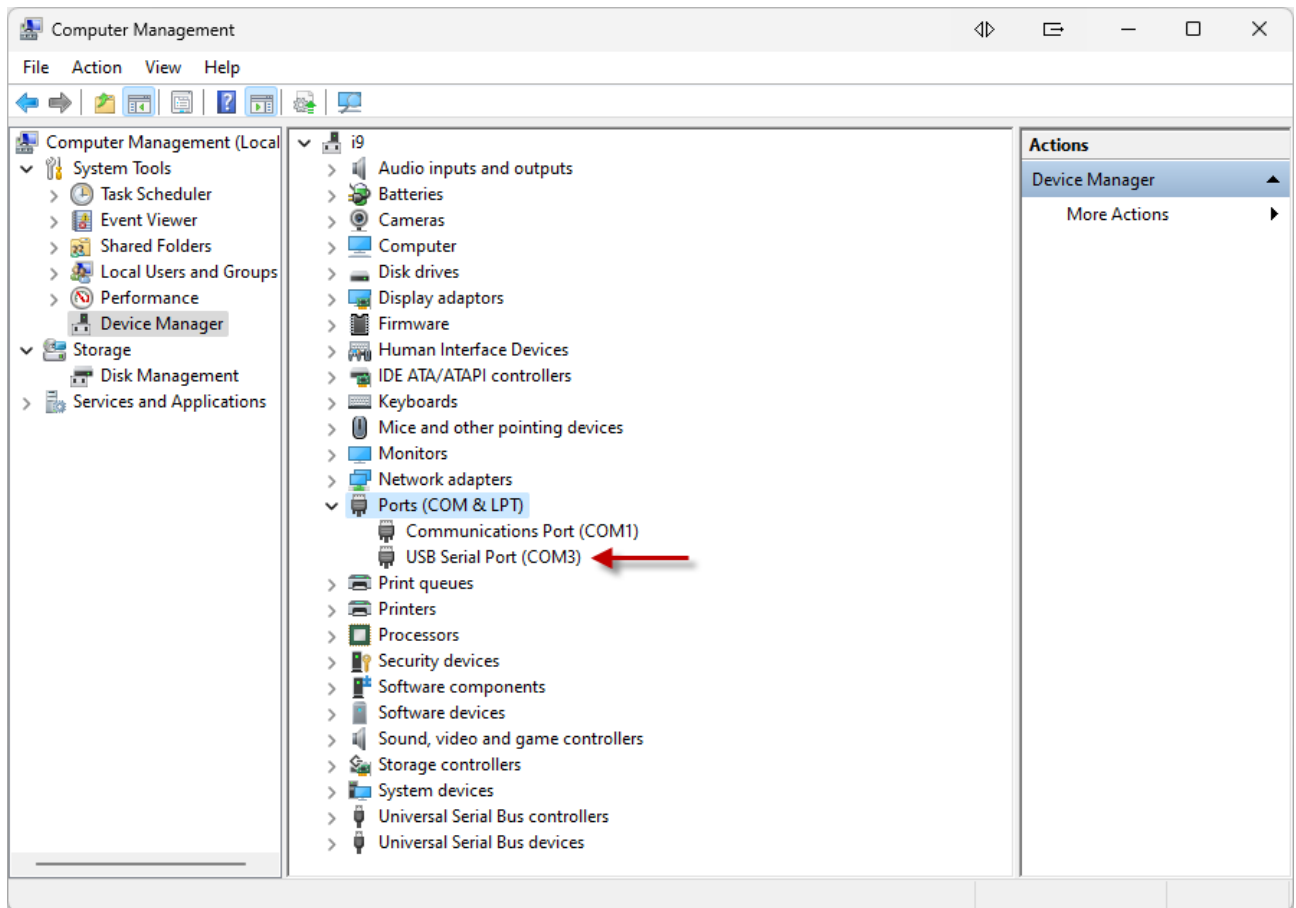
Once the Computer Management console appears expand the Ports (COM & LPT) section so that you can see all Communications Ports as shown below:



Ideally you should do this with your BBTK v3 powered off so that you can identify the VCOM port it is on when you switch it on.

In the example above there is already a COM port , COM 1.

If you switched your BBTK v3 on you should see the COM port it is on appear in the list, e.g.



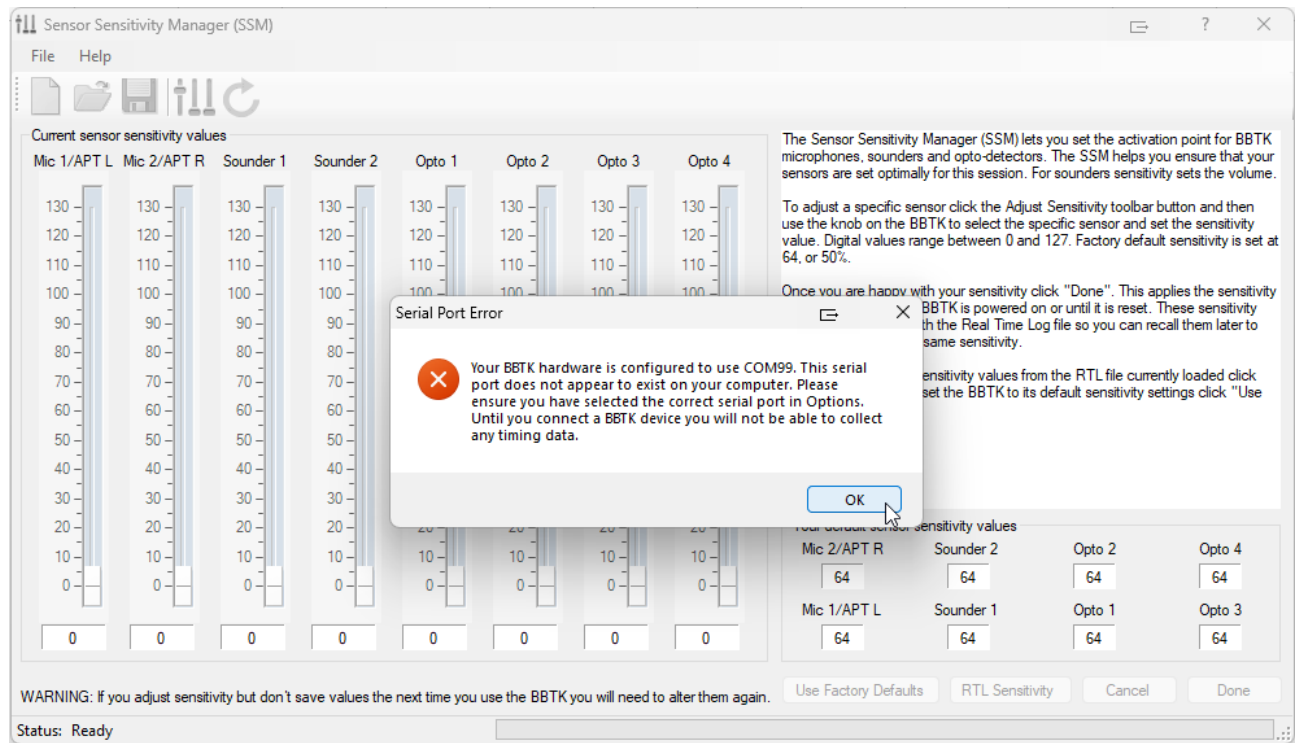
As can be seen above a USB Serial Port (COM3) has appeared when the BBTK v3 is powered on and connected by USB.

Hence you know that your BBTK v3 is connected to COM3.

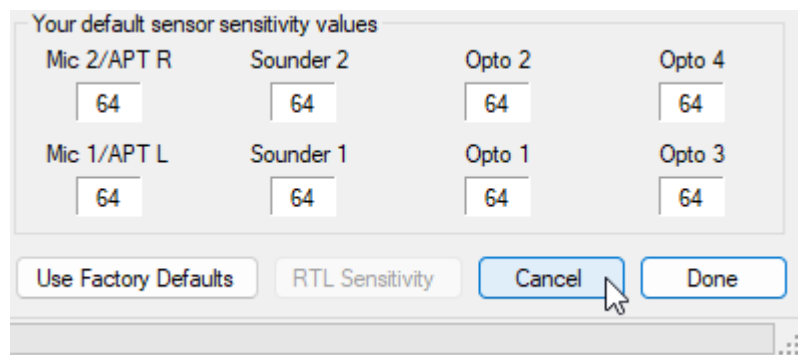
All that remains is for you to tell the BBTK v3 software that you are connected to it via COM 3. To do this install the BBTK v3 software onto the Windows PC you wish to host the BBTK v3 on.

As with installing the VCOM drivers you should do this when logged into the local PC with Administrator rights.

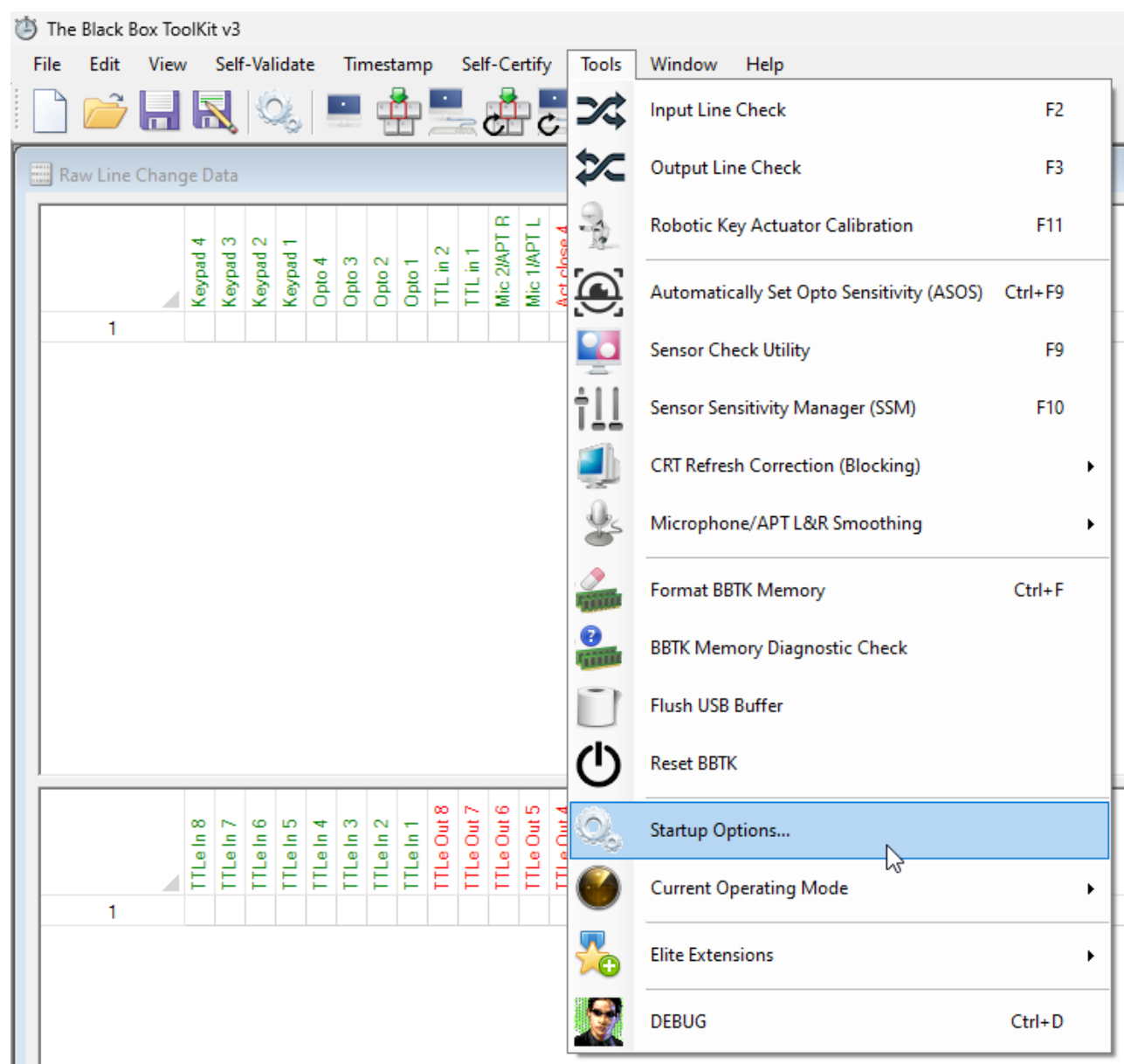
Once the BBTK v3 software is installed and you run it for the first time you will be prompted to choose a VCOM port.



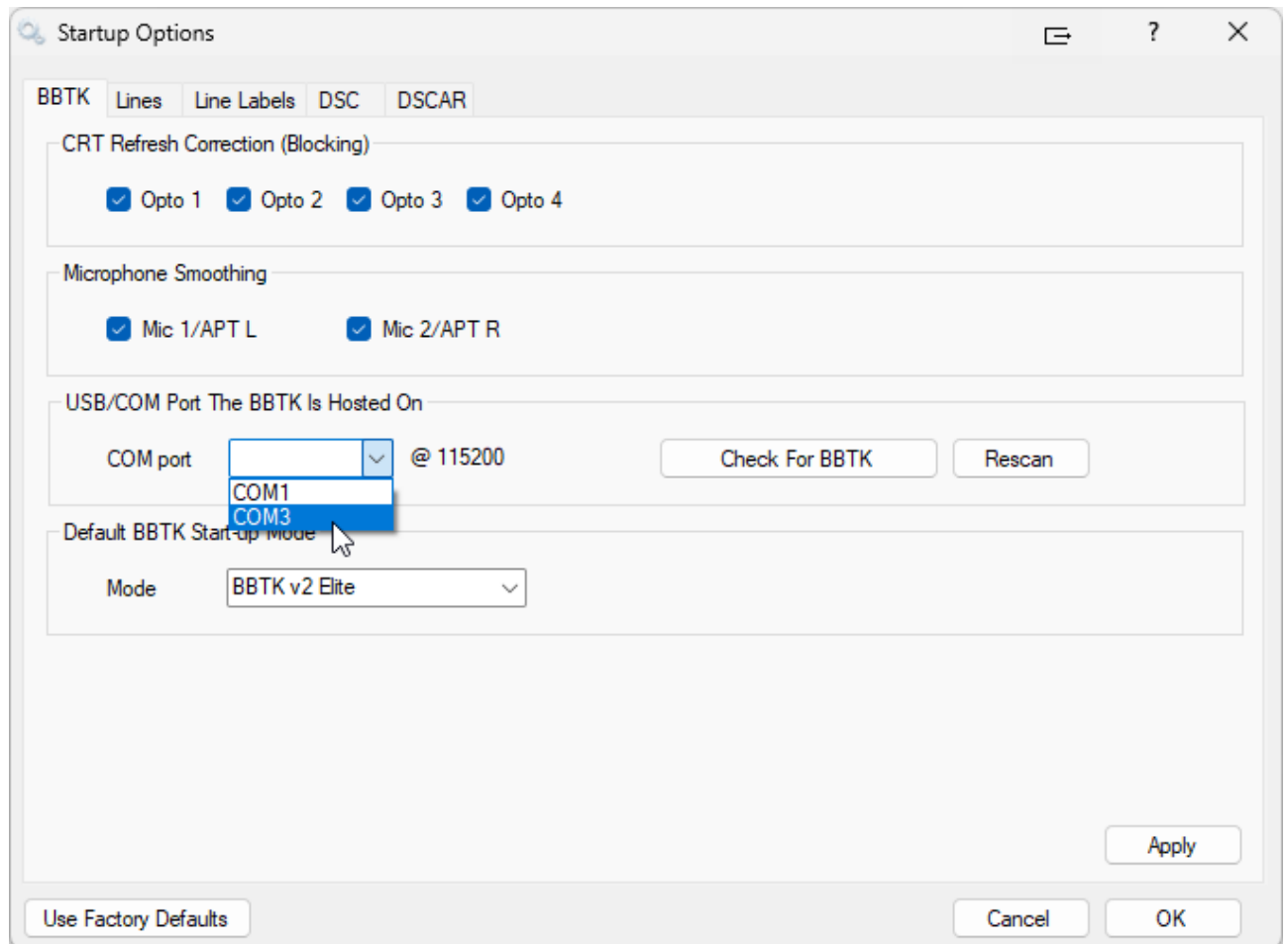
To choose the COM port click on OK and then on Cancel.



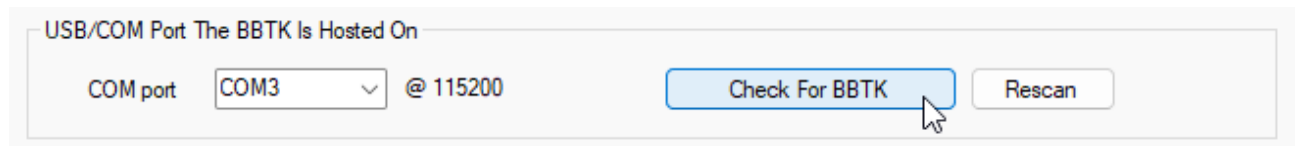
Next choose Startup Options... from the Tools menu.



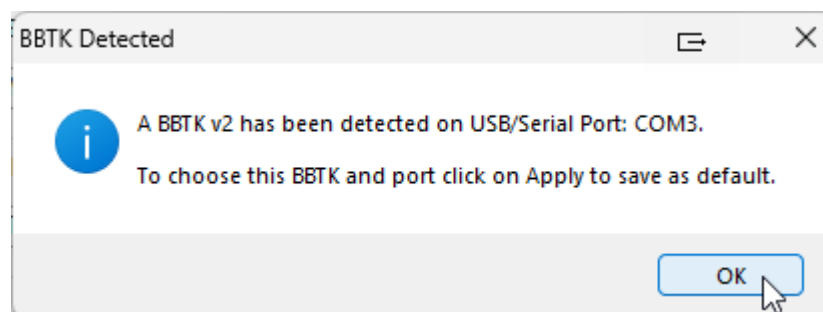
Drop down the combo box to choose the VCOM port you made a note of in the Computer Management console.



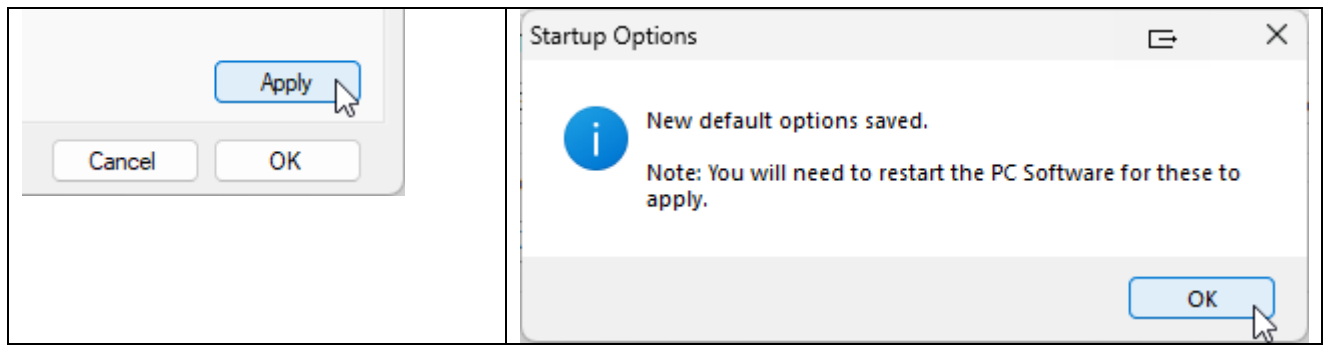
You can check if the BBTK v3 is connected and functioning correctly by clicking on Check for BBTK.



If the BBTK v3 is connected to the correct VCOM port you should see the LCD screen show an about message and a dialog box will appear confirming you are connected.

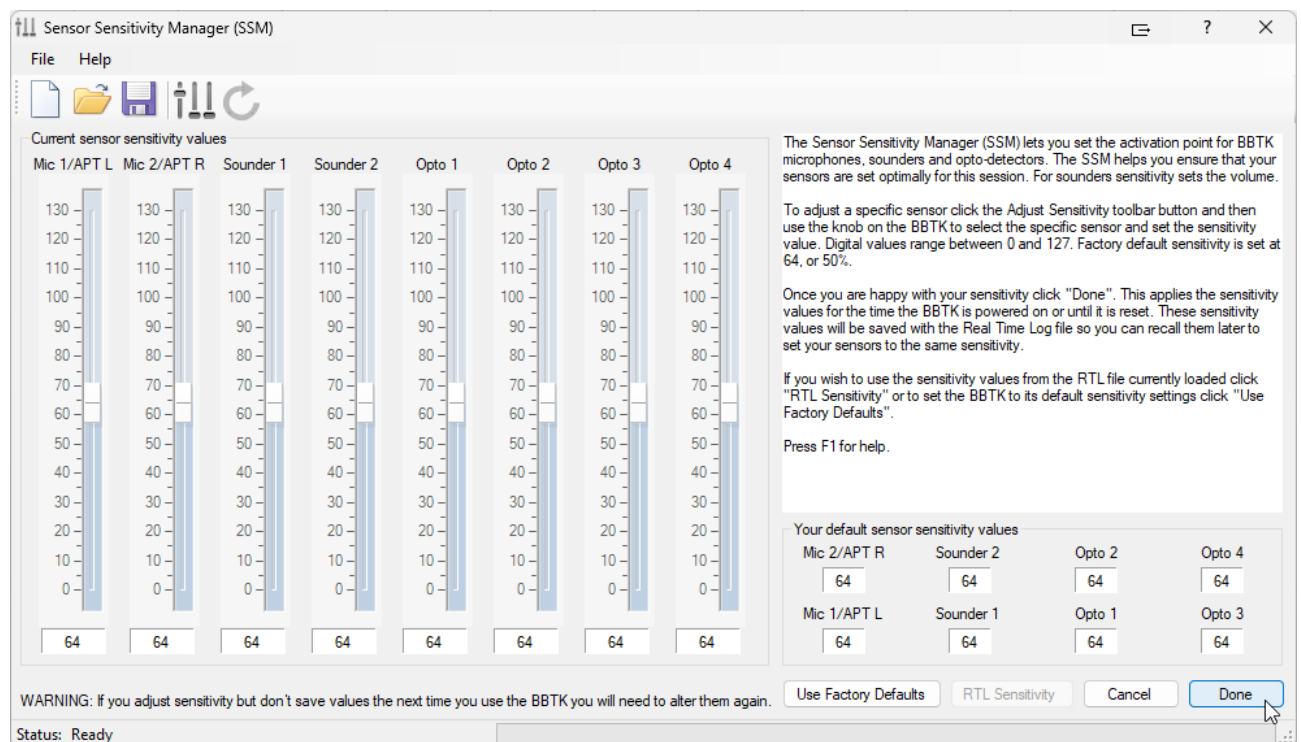


Finally to save the setting you will need to click on OK & then Apply.



Close down the software and restart it to use the new COM port setting you chose.

When you restart the BBTK v3 software the Sensor Sensitivity Manager (SSM) will start, connect to the BBTK and retrieve the current sensor sensitivity values.



You have now successfully connected your BBTK v3 to your POC and are now ready to make use of it.



## Using the New Design Opto-Detectors

### ***Automatically Set Opto Sensitivity (ASOS)***

The new ASOS module helps you automatically set the range over which the Optos operate and at which point they activate when an Opto Marker changes from black to white. The goal is to consistently detect an Opto marker as rapidly as possible on any device.

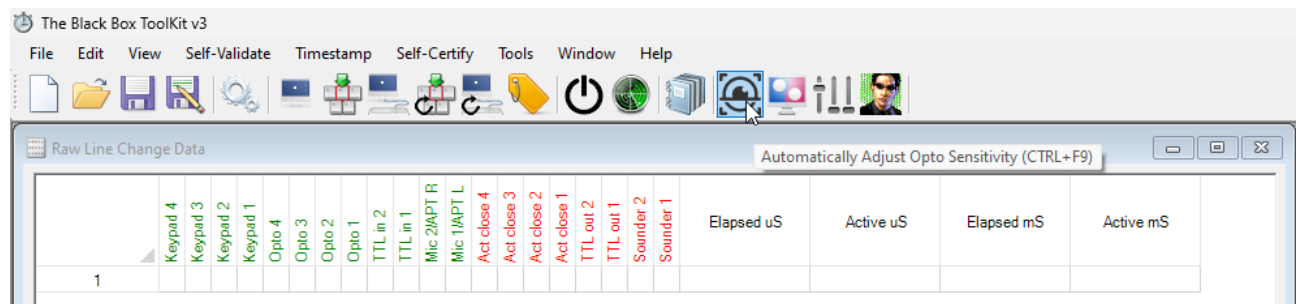
If you are using a Windows PC to run your experiment you can install a second copy of the BBTK v3 software on that PC. This lets you run the ASOS module and calibrate the Opto Sensors using on that screen when using a separate Host PC to run the BBTK v3 software.

Alternatively if you are using another display device/tablet/phone you can run the ASOS Module on the PC Hosting the BBTK v3 and be guided through the process of calibrating each Opto.

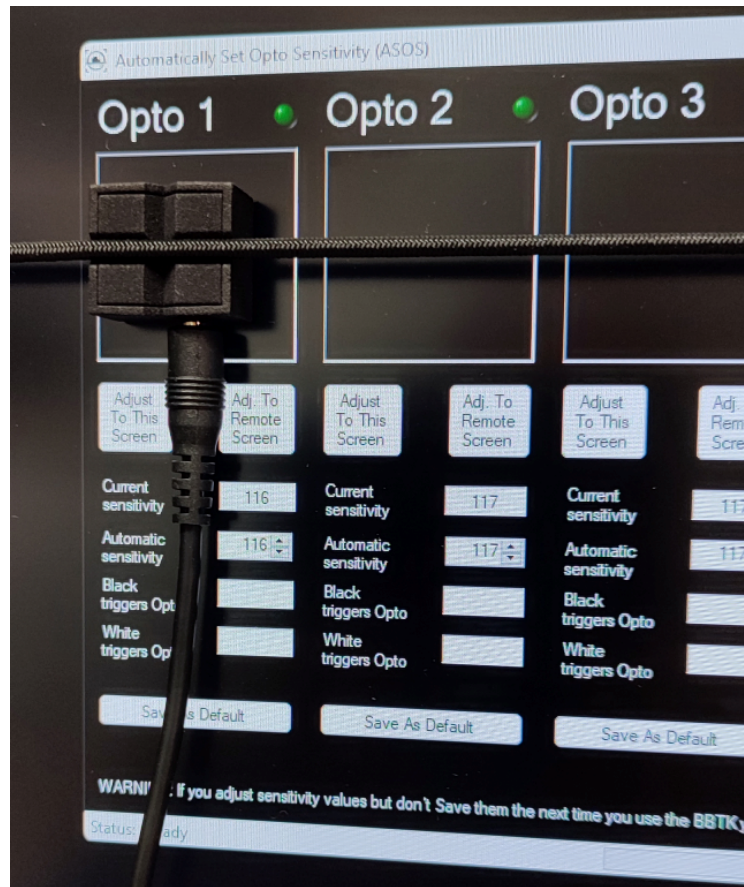
### ***Walkthrough of Calibrating Opto Sensitivity***

You can get a feel for setting the Opto sensitivity by initially setting them for the PC you are hosting the BBTK v3 on.

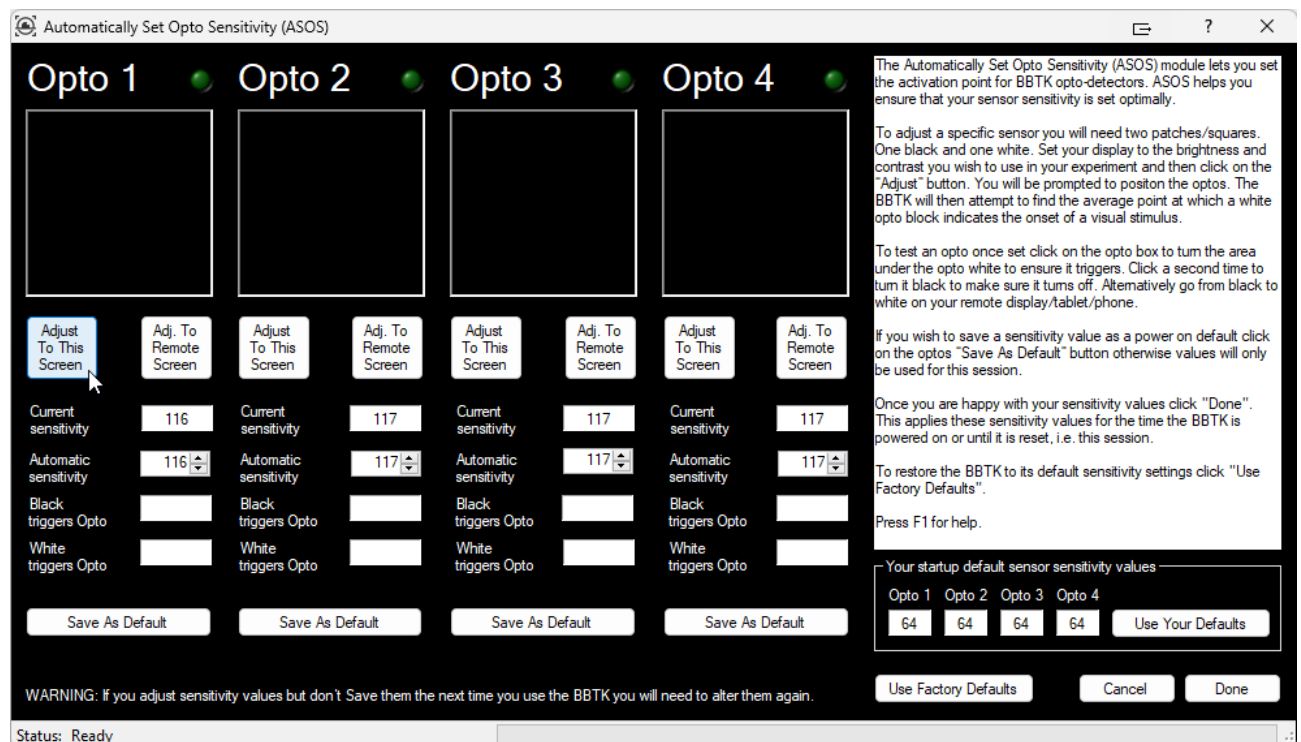
1. Start the ASOS utility by clicking on the toolbar icon or using the dropdown Tools menu.

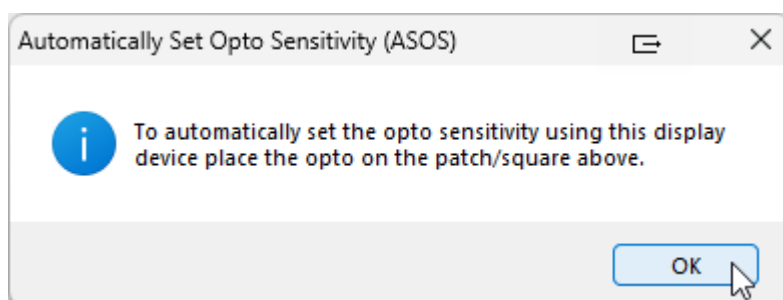


2. Once the ASOS module opens position the Opto using the bungee cord over the Opto patch within the bounding square as shown.

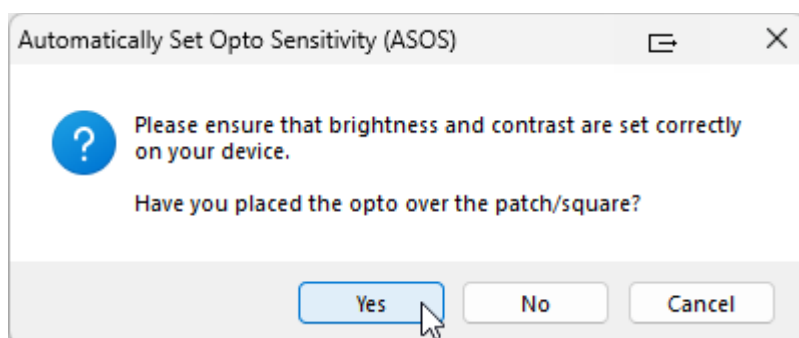


3. To automatically set the sensitivity on the screen you are hosting the BBTK v3 on, click on the "Adjust To This Screen" button.



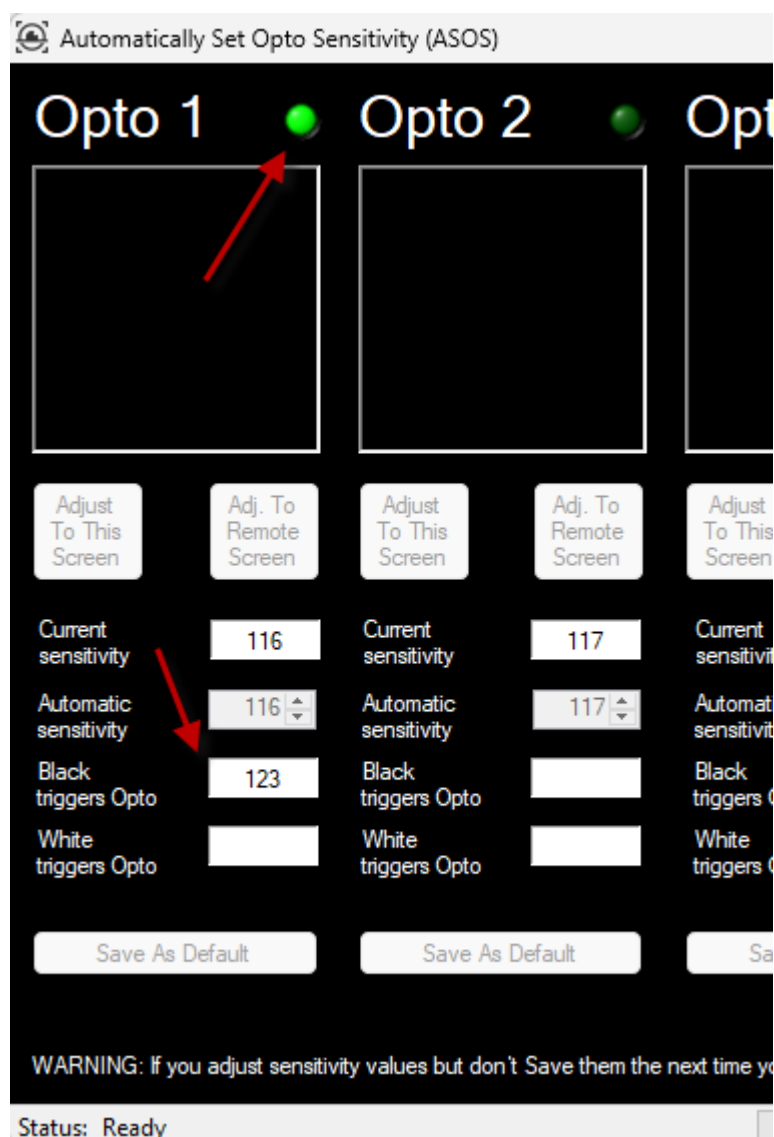


4. You will then be prompted to place the Opto over the patch/square shown in the photo.



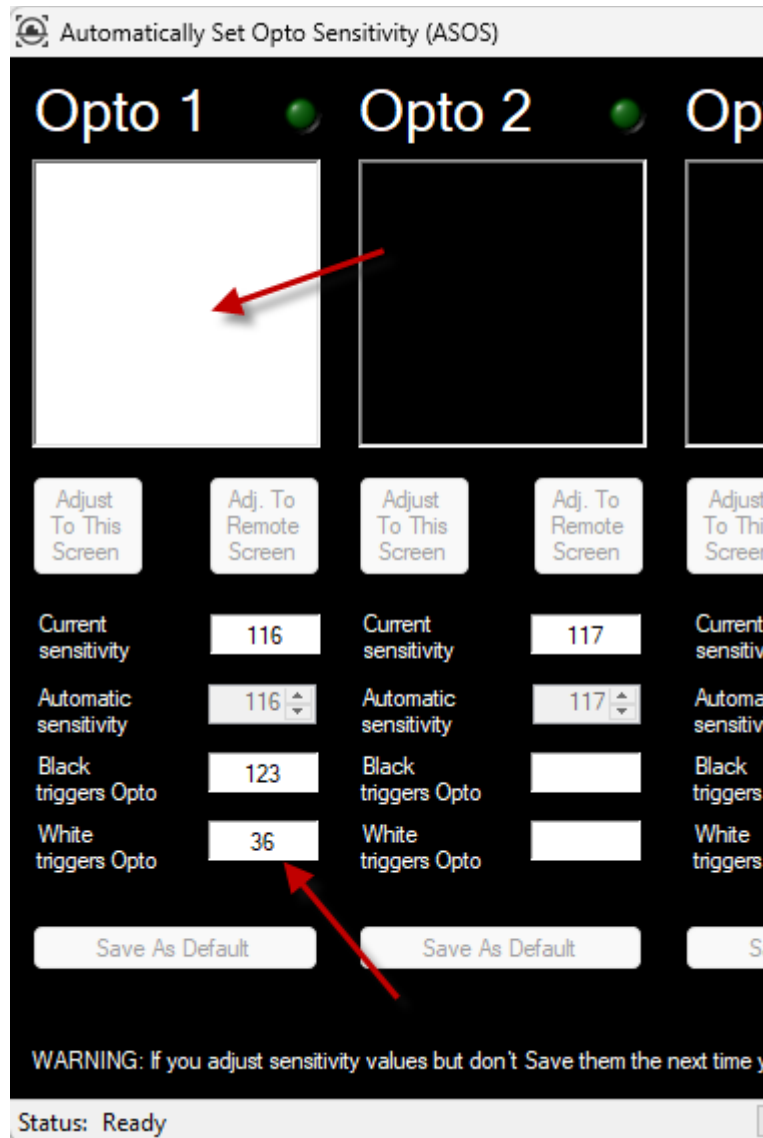
4. You should ensure that you have already adjusted your monitor to the brightness and contrast levels you wish to use in your experiment.

Click on "Yes" when you are ready to begin.



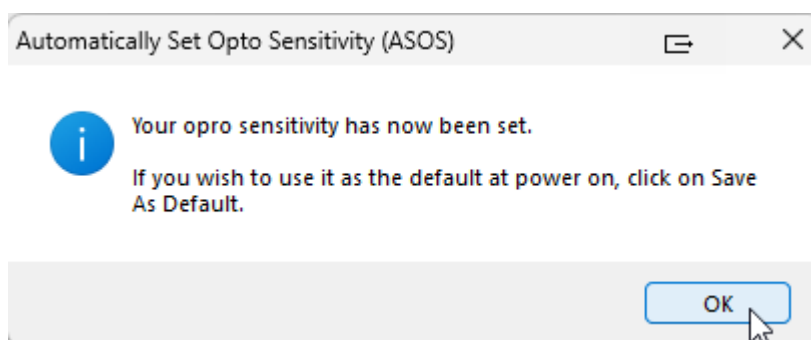
5. ASOS will begin by working out where the black levels should be set by displaying a black patch.

Once set the virtual LED will illuminate and a black value will be shown.

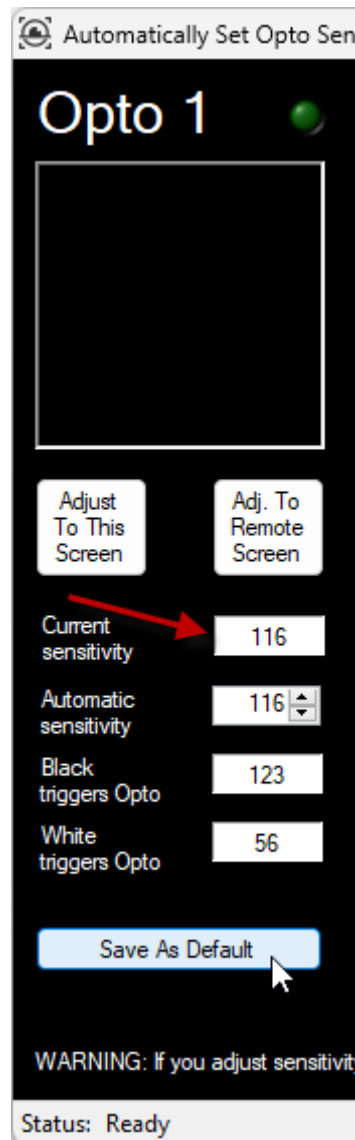


6. Next a white patch will be shown and the sensitivity will be increased until the white Opto Marker is detected.

When the white level has been set the virtual LED will illuminate and a white value will be shown.



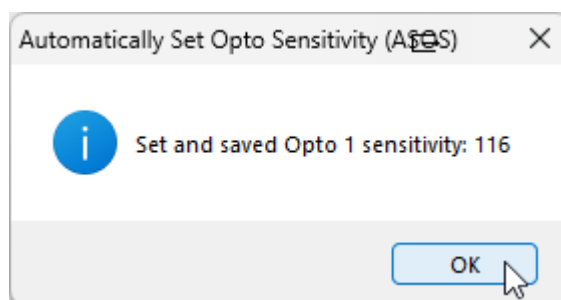
7. Once ASOS has established black and white levels on your display device a message box will appear.



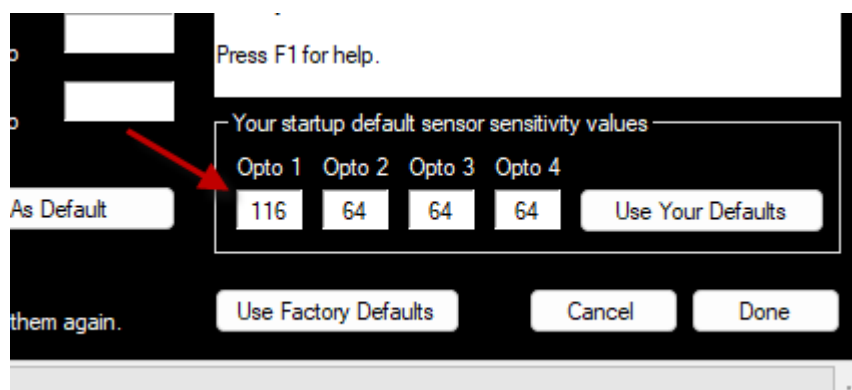
8. In the “Current sensitivity” box the actual sensitivity will be displayed.

If you wish to save the Opto value click on “Save As Default”.

If you save the sensitivity this will be the default for that Opto each time the BBTK v3 is powered on.



9. Once saved a message box will confirm.



10. The BBTK v3 will then confirm by showing what was set and saved as a default.

## ***Setting the sensitivity on a remote display device/tablet/phone***

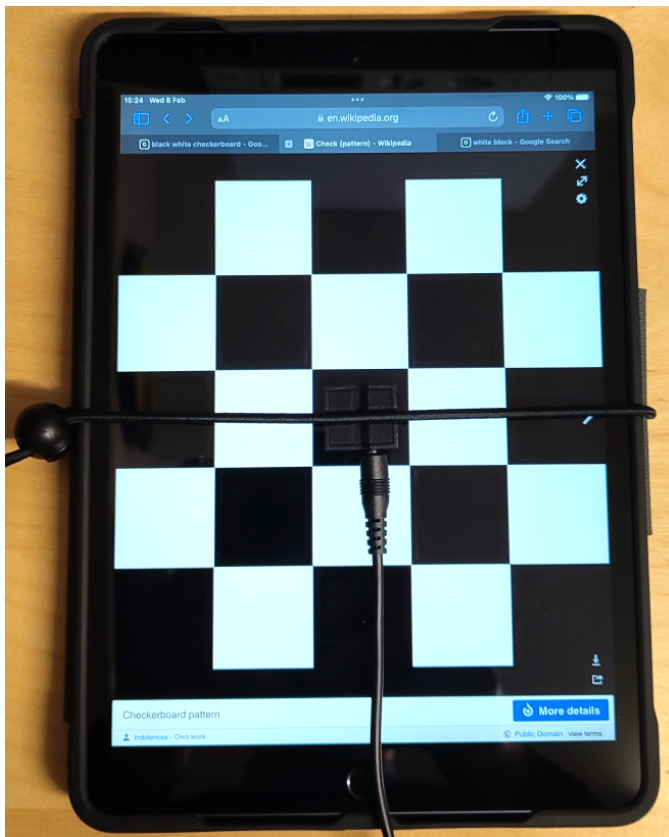
If you are using a second remote PC or other display device/tablet/phone you will need to set the sensitivity tailored to that screen.

In this example we will walkthrough setting the Opto sensitivity using an iPad.

Before you begin you will need a pure black and white patch/square to display on your device to mimic an Opto Marker in your experiment.

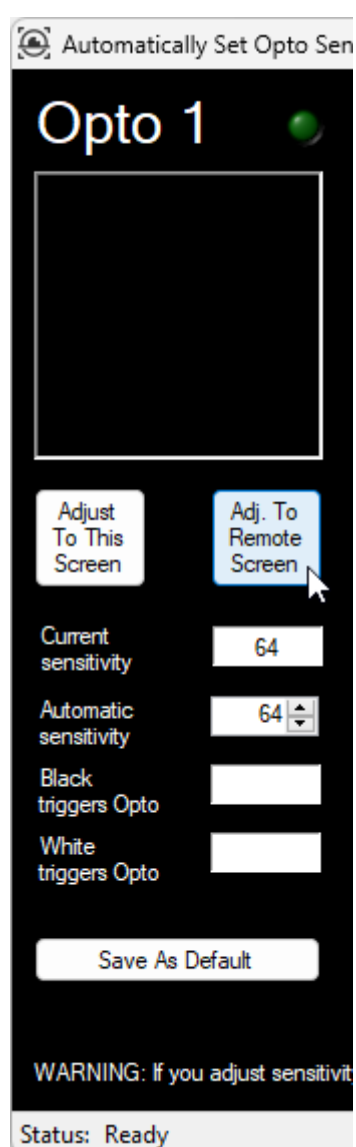
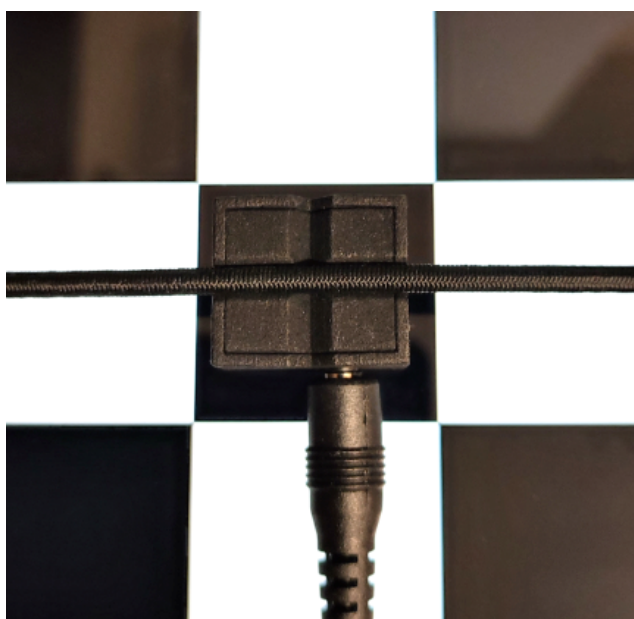
You can search for: “black white checkerboard” to find one or visit Wikipedia using a web browser.

[https://en.wikipedia.org/wiki/Check\\_%28pattern%29#/media/File:Checkerboard\\_pattern.svg](https://en.wikipedia.org/wiki/Check_%28pattern%29#/media/File:Checkerboard_pattern.svg)

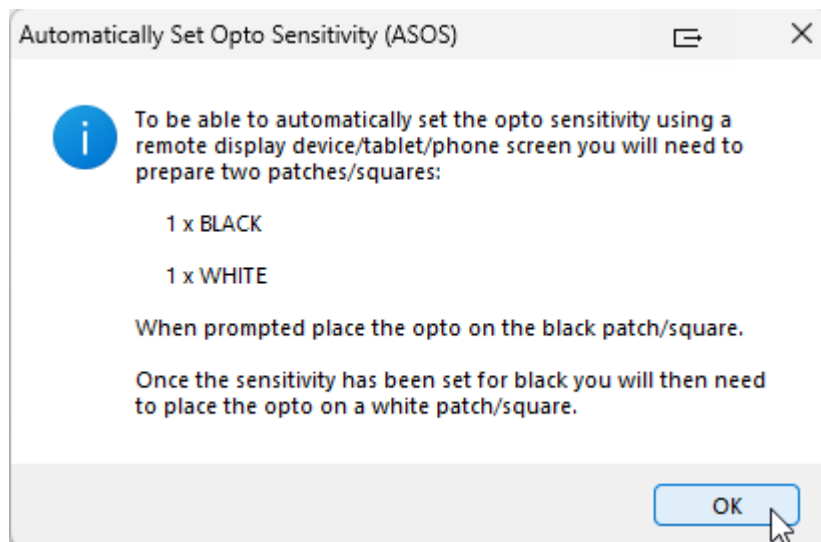


1. Before you begin place the Opto over a black patch on the device you wish to calibrate.

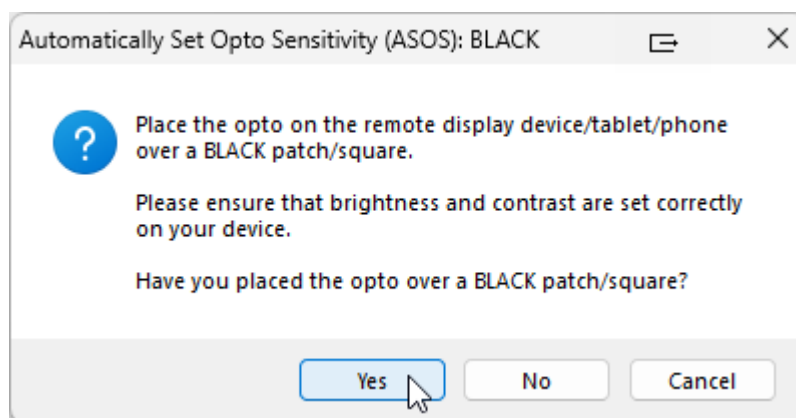




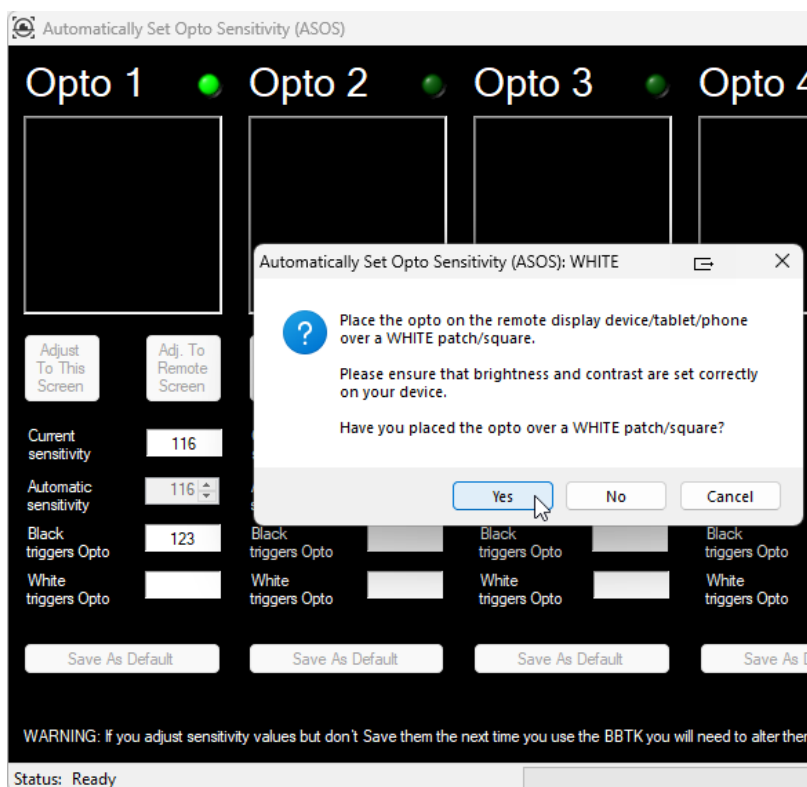
2. Once you are happy with your placement click on the “Adj. To Remote Screen” button.



3. You will be reminded that you will need a black and a white patch on your devices screen in order to set each Optos sensitivity.

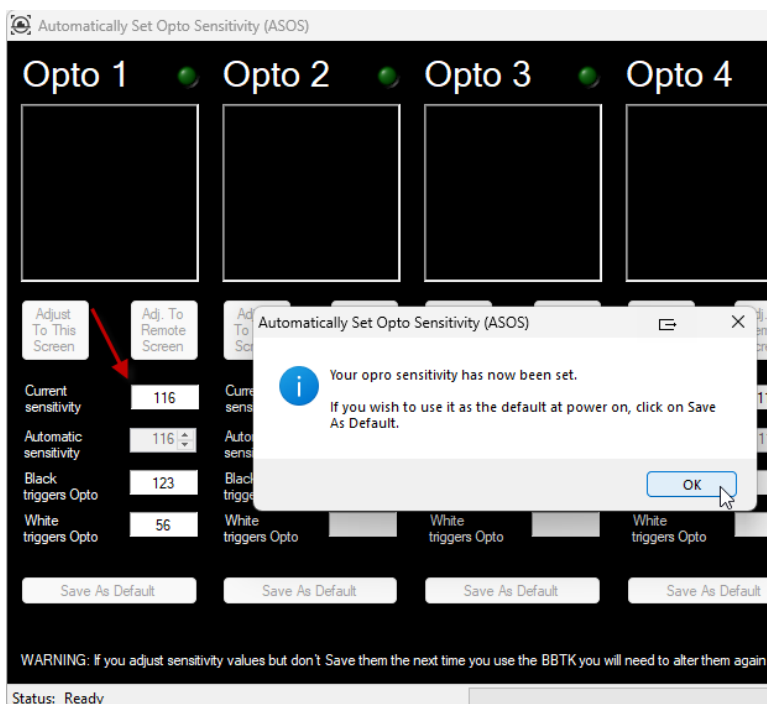
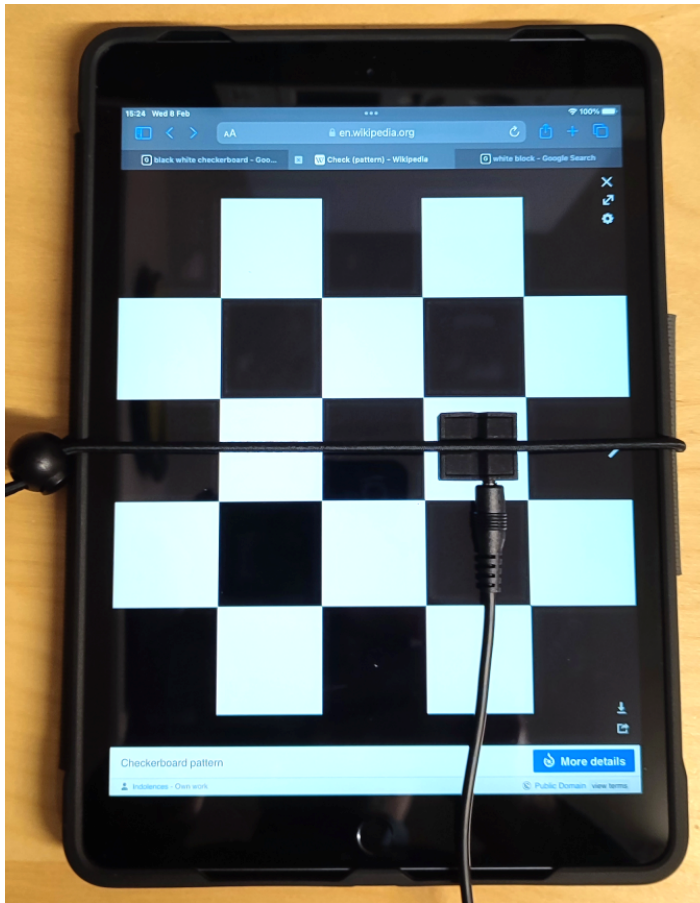


4. When prompted ensure that your Opto is placed over a black patch and then click on Yes.



5. Once the black levels are set you will be prompted to move the Opto on to a white patch/square.

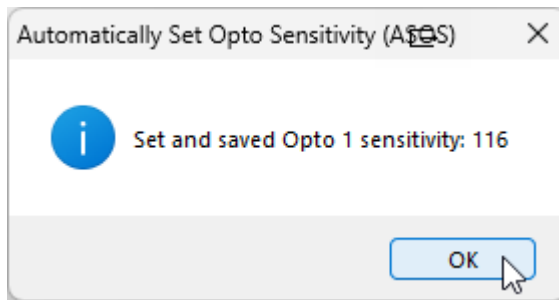




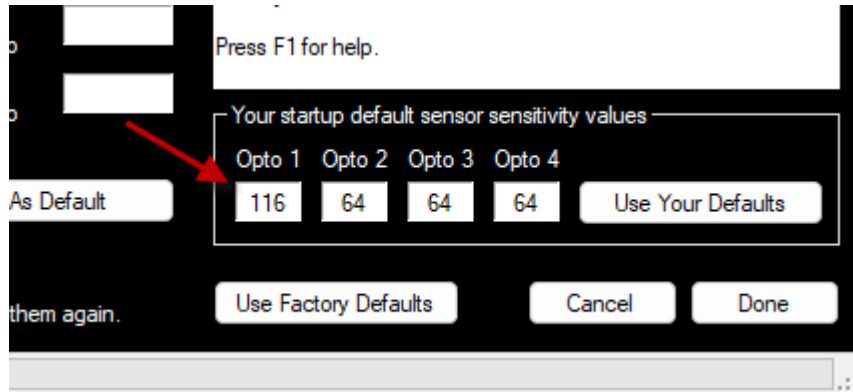
5. In the “Current sensitivity” box the actual sensitivity will be displayed.

If you wish to save the Opto value click on “Save As Default”.

If you save the sensitivity this will be the default for that Opto each time the BBTK v3 is powered on.



6. Once saved a message box will confirm.



7. The BBTK v3 will then confirm by showing what was set and saved as a default.

The next time the BBTK is powered on these values will be used.

If you do not save the Opto, or other sensitivity values, they will only apply to your current session or until the BBTK v3 is reset or powered off.

Remember that these Opto sensitivity values only apply to the device screen which you have calibrated them to and are not a global setting for all displays.

If you use a new display device, or change the brightness or contrast, you should consider rerunning the ASOS module again.