

Plate Solving

Contents

Description	2
When is this Used	2
Common Issues with Plate Solving	2
Factors that affect Plate Solving.....	2
Focus	2
Sky Conditions.....	2
Field of View.....	2
How Plate Solving Works	3
Small Sensor Camera Issue	4
Barlow Issue	6
Lack of Stars Issue	7
Possible Solutions	8
Get a Camera with a Larger Sensor.....	8
Switching Equipment AFTER Plate Solve.....	9

Description

Plate Solving is the process whereby your controller figures out where your telescope is pointing in the sky by comparing the stars it sees on the camera with pre-defined star maps.

When is this Used

This is used for the following (and possibly more) basic functionality:

- Polar Alignment
- Go-To Mount Navigation
- Auto-Centering Targets
- Camera Frame Rotation
- Mosaic Image Capture

Common Issues with Plate Solving

If everything is setup correctly, plate solving works like magic and you will have an enjoyable session under the stars.

If, however, any factor is out of whack, you will end up cursing your equipment and getting nothing accomplished. The most common symptom of issues with plate solving is when you see the following message:

- Attempting to solve 1, 2, 3, 4, 5, ... 500, ... (where the numbers keep going up forever)

Factors that affect Plate Solving

Focus

This is common sense, if the camera can't see the stars properly, it won't be able to solve the sky location. For more information on focus, refer to [Focusing Notes](#).

Sky Conditions

If the sky is cloudy, you have not waited until the sun has fully set, or it is windy and shaking the telescope you will have issues plate solving because the camera will be unable to get a good picture.

Field of View

This is the most overlooked issue with plate solving and the one that caused me the most frustration. Once you understand how this works it will make perfect sense. The remainder of this document describes this issue.

How Plate Solving Works

The following images are taken from the [Stellarium](#) tool. Above the image I have noted the telescope, camera, and optional lens used. In the bottom left corner, you can see the field of view captured by the camera.

C11/ASI533/No lens



Your controller uses the camera image inside the red square (the field of view, or FOV) to find a match with the stored star charts embedded in its memory. Each controller may use different star charts and some will have more detail (and take up more memory) than others. Depending on the controller and the star charts used, there will be a minimum FOV required to perform plate solving. On my ASIAir Plus the [FOV range requirement](#) is 0.2-33 degrees. As 0.2 degrees is equivalent to 12' the 13.89'x13.64' FOV shown above meets the requirement and has plenty of stars – typically I've found that you need upwards of 25 stars to plate solve.

Small Sensor Camera Issue

If I changed out ASI533 camera and used an ASI585 camera (perhaps to do planetary work) the situation would change to the following. As can be seen below, the FOV is now 13.75'x7.73' which fails the minimum 12'x12' required by my system. This is a scenario where plate solving will fail constantly (even though there are plenty of stars) and cause you endless frustration.

C11/ASI585/No lens



Plate Solving

If I then changed the C11 telescope out to use a C8, the 18.95'x10.66' FOV would probably be close enough (to the 12'x12' minimum) that it would work most of the time, but still fail sometimes.

C8/ASI585/No lens



Barlow Issue

If I then took the previous working configuration (C11 and ASI533) and added a 2x Barlow lens, I would once again end up breaking the plate solving process because the FOV would be reduced to 6.94'x6.82' (well below the 12'x12' minimum.)

C11/ASI533/x2 Barlow



Plate Solving

Lack of Stars Issue

If I then took my previously working configuration (C11 and ASI533) and pointed it to a different star, I could end up with another situation where plate solving failed. In this case it would not be because of insufficient FOV, but rather insufficient stars. As can be seen below there are only 2 ½ stars in the FOV which would also cause plate solving to fail.

C11/ASI533/No lens



Possible Solutions

Get a Camera with a Larger Sensor

As can be seen below using a full frame sensor camera, such as the ASI6200, will overcome the FOV issue in this scenario and you should be able to plate solve on the C11 even when using a 2x Barlow.

However, if you use a 3x Barlow (FOV = 14.73'x9.82') or 5x Barlow (FOV = 8.84'x5.89') you will still fail to plate solve. So, buying a bigger camera only solves part of the problem (and costs a lot of money.)

C11/ASI6200/x2 Barlow



Switching Equipment AFTER Plate Solve

Since plate solve is only required when getting the telescope setup and pointing to your target, you can use one setup (ex: C11 / ASI533 / NO Barlow) to get to the target, and then swap it out for another setup (C11 / ASI585 / 2x Barlow) to take your pictures.

The biggest issue with this option is that it makes it difficult to rotate the frame, and impossible to take Mosaics. However, you are likely in this situation because you are taking planetary shots so these may not be big issues.

Switching Controllers and/or Star Charts

The examples in this document describe the plate solving limitations of the ASIAir Plus controller. This is not the only option to control your telescope and many other options may allow you to plate solve with smaller FOV - usually by employing more detailed star charts.

The drawback to this solution is that the time it takes to plate solve increases dramatically with more detailed star charts. You can, of course, overcome some of this by using a more powerful computer.