# *INSTRUCTIONS FOR USING Astrometrica*

## I. INTRODUCTION

***YOU are the key to the success of your citizen scientists in the search for asteroids.***

There are two things you must master, and if you do, your citizen scientists will make important measurements of near-Earth objects and might detect a Main Belt asteroid or two as they participate in an IASC asteroid search campaign. You must:

1. Be able to use *Astrometrica* to conduct a **manual search**.
2. Be able to distinguish between a true and false signature for moving objects.

Once you have *Astrometrica* up and running on your computer, it will take a couple hours of your time to master the above tasks. They are not difficult to do. But, you must prepare yourself ahead of time before receiving image sets in an IASC asteroid search campaign.

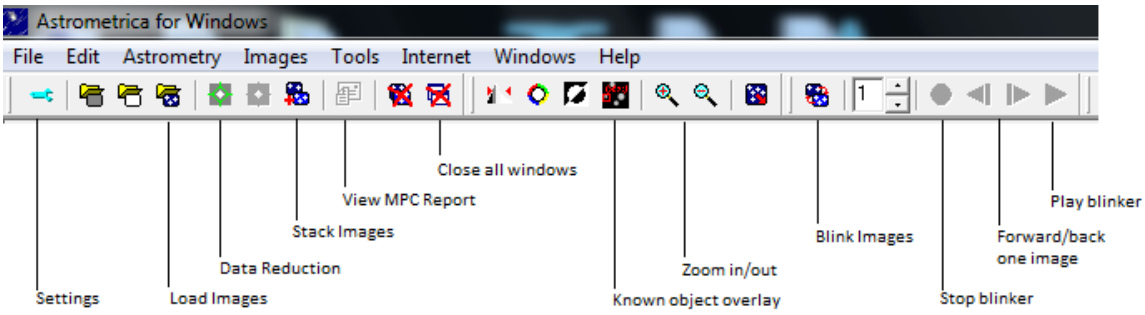
In this document you will find instructions on how to do a **manual search** using *Astrometrica*. You will learn how to measure true signatures and determine if they are unknown objects.

To learn how to distinguish between a true and false signature for a moving object, you need to review the document entitled *Signature Guide*. This is very important. Measuring and reporting false signatures is the most common mistake made by citizen scientists as they first learn to search for asteroids.

Citizen scientists often confuse what appear to be moving objects on the images (e.g., hot pixels, background fluctuations) with asteroids. Not all things that appear to move on the images will actually be asteroids. They must learn to know the difference and only measure asteroids (i.e., true signatures) and not the false signatures.

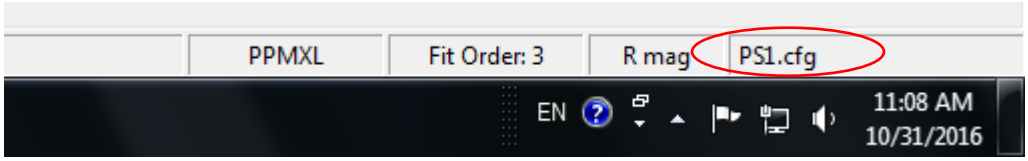
## II. Starting *Astrometrica* – Manual Search

1. Start *Astrometrica* from the **desktop icon**. The following is the *Astrometrica* toolbar with its various functions:




2. *Astrometrica* may ask you to overwrite the MPC report. Click "**Yes**" only if you have completed the MPC report from the previous session (if applicable). Click "**No**" if you have not completed the search on the previous image.

3. Make sure the configuration file is the correct file for the images. The name of the configuration file is found on the bottom right-hand corner of the screen. It should be **PS1.cfg** for all of the images, because our images come from the Pan-STARRS telescope.

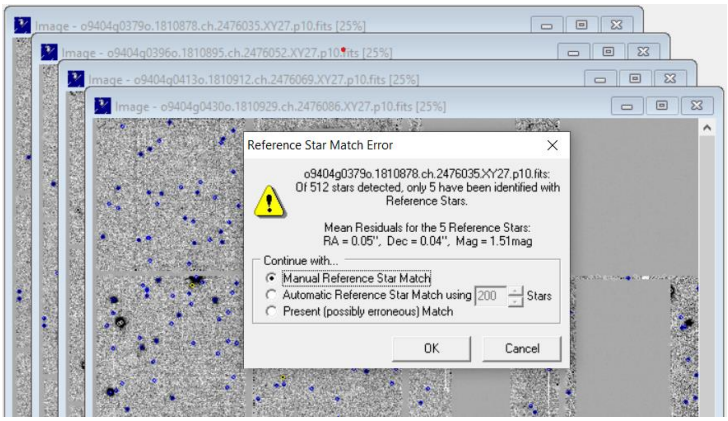



   To change the configuration file, select Settings (blue wrench icon) on the toolbar. Click "**Open**" and select the correct configuration file from the Settings folder, then click "**OK**."
   Make sure your team has downloaded the newest version of the PS1.cfg file from your team page, if you are participating in an asteroid search campaign.

4. On the IASC website, download your image sets from your team page and **unzip** the images onto the Desktop or folder of your choice. In *Astrometrica,* select **Load Images** on the toolbar and load your unzipped image set (4 images per set) and click "**Open**".

5. Select **Data Reduction** on the toolbar and select **OK** in the box that appears. This function will find reference stars in your images.

**Important**: an error window may appear (below). If this happens, select Option 2, Automatic Reference Star Match. Option 2 will solve most issues.




6. Select **Known Object Overlay** on the toolbar. This will take a few minutes, so be patient. The Known Object Overlay marks all of the already known objects in the image set with a red box.

7. Select the **Blink Images** button and zoom in to enlarge the image. Zooming in twice is usually a good start.

8. **Visually scan** the blinking image for moving objects. Please refer to the "Signature Guide" for how to distinguish between true and false signatures. You may try a grid search method, as the images are split into 4x4 grids.

**MEASURING AN OBJECT**:

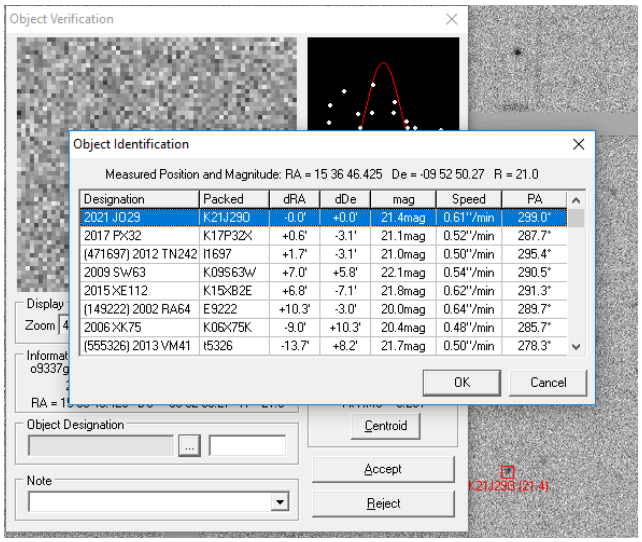
1. When a moving object is detected, select **Stop Blinker** on the toolbar.

2. Begin by forwarding to Image 1 (shown at the top of the blinking image), by clicking on the **Forward** or **Back** buttons.

3. Center the object with the cross-hair and click on the object.

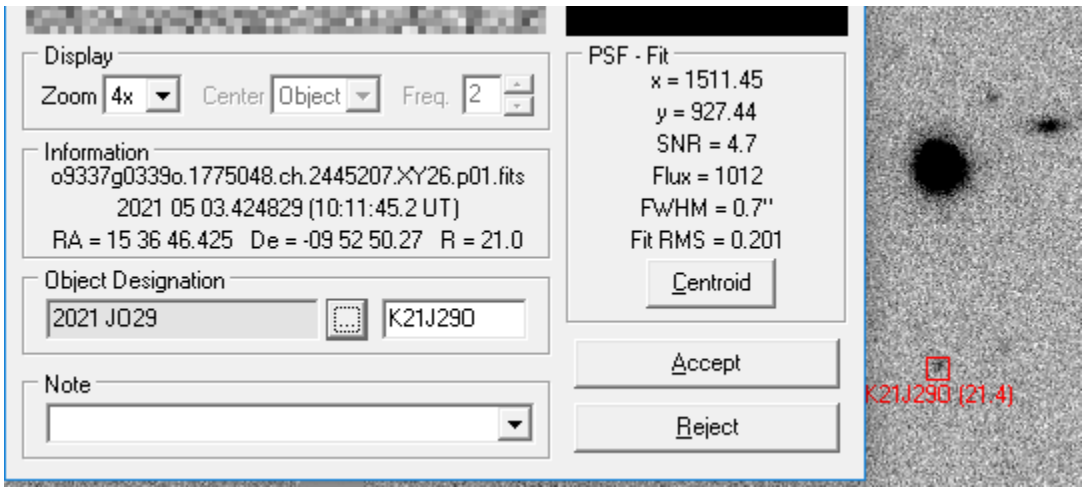
4. Click on the dotted button next to **Object Designation** and check the table of nearby objects. There are two possible outcomes: a) the object you clicked on is in the list, or b) it is not in the list.

    a. **Outcome 1**: The object you clicked on is in the list. The object at the top of the list is the known object that is closest to the spot you measured. If the values in the dRA and dDec columns are close to 0.00 (less than 0.2 is a general limit), then that object is the object you measured. In this case, select the known object and click **OK**.

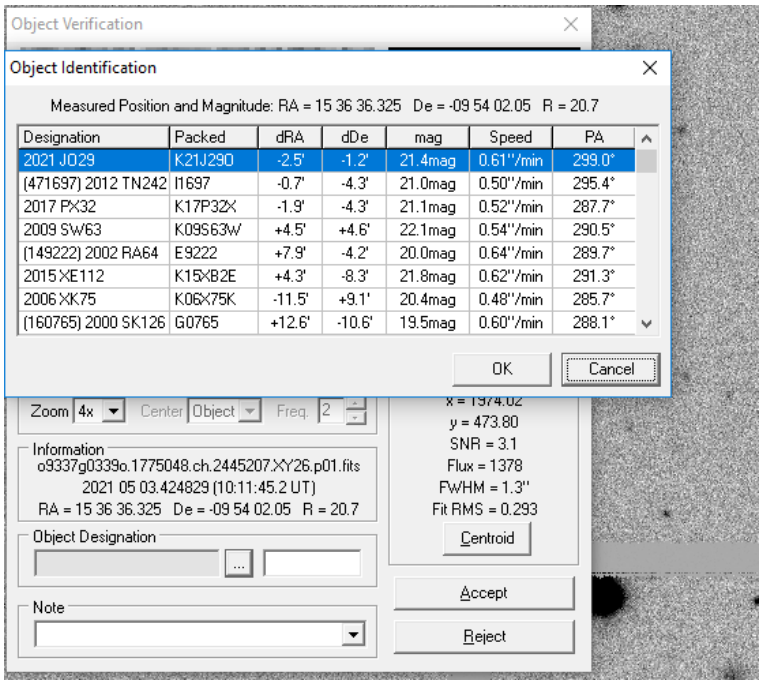



This image shows a known object with dRA and dDec values close to 0.00.
In this case, select the object and click **OK**.

After you click **OK**, the known object name will automatically appear in the name box. **Do not change this.** Then, hit **Accept**.

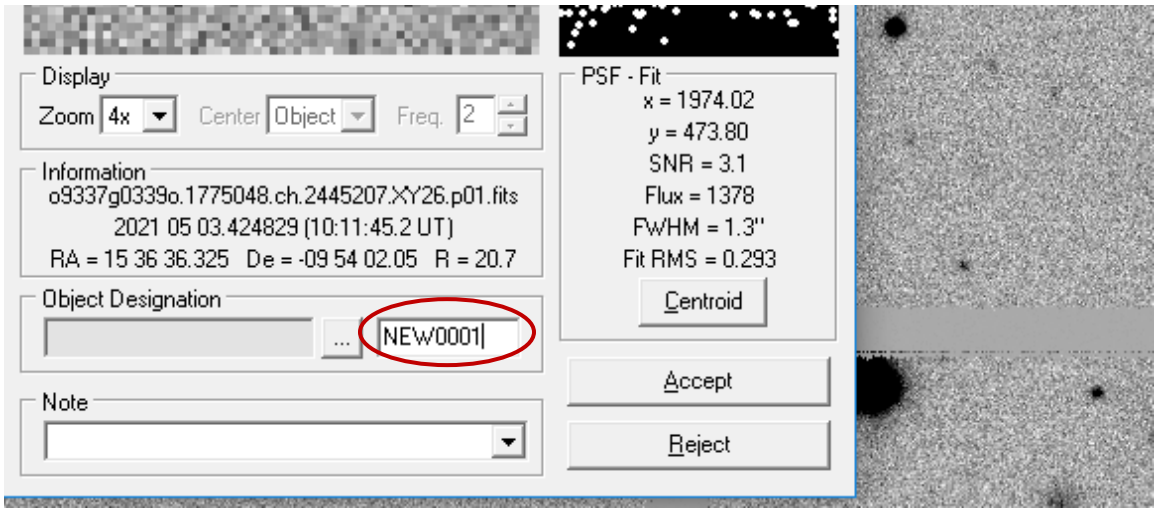


a. **Outcome 2**: The object you clicked on is **not** in the list. The object at the top of the list is the known object that is closest to the spot you measured. If the values in the dRA and dDec columns are not close to 0.00 (greater than 0.2 is a general limit), then the object you measured is not in the list.




This image shows a known object with dRA and dDec values not close enough to 0.00.
In this case, click **Cancel**.

Give the object a name by typing 3 letters (initials to represent your group are commonly used) and a 4 number designation. Then, hit **Accept**.




*The name must consist of 3-letters 4-numbers. For example, Hardin-Simmons University might enter HSU0001 for the first discovery, HSU0002 for the second discovery, and so on. This must be a unique name for each discovery during a campaign. No spaces or other special characters are allowed in the name! Only letters and numbers.

5. Repeat the procedure for images 2, 3, and 4 by **forwarding** to Image 2 and then to Image 3, and finally to Image 4, **repeating the same procedure** as with Image 1.

6. Continue searching the image until all asteroids have been measured.

## III. Minor Planet Center (MPC) Report

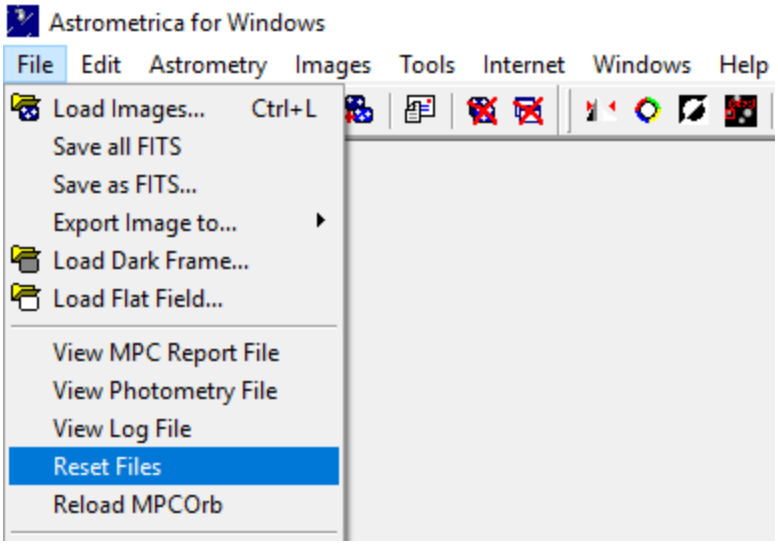
1. **One** MPC report must be prepared for **each** image set and submitted on your IASC team page. If more than one group of citizen scientists analyzes the image set, only submit one report listing up to five people.

2. In *Astrometrica,* select the **View MPC Report** from the File menu. **Copy** the entire MPC report to the clipboard.

3. **Paste** the copied report into the Submission Box on your team page. Make sure the correct image set name is selected in the drop-down menu. Make sure your citizen scientist names are checked. This process can be seen in more detail in the PDF titled *Submitting Reports.*

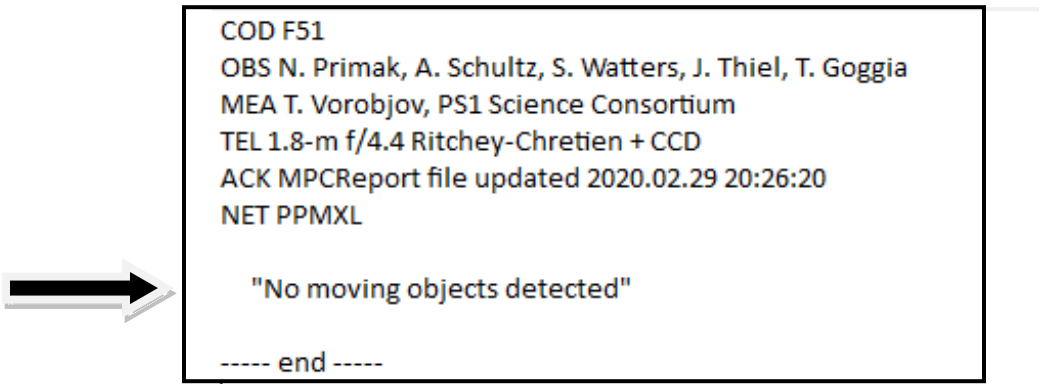
4. When all the information is correct (image set name, citizen scientist names, copied MPC report), click **Submit Report**.

5. When you have submitted the report on the IASC website, return to *Astrometrica* and go to the File menu. Select **Reset Files** to clear the MPC report and get ready for a new image set.



# MPC Report For An Image Set With No Moving Objects Found

If an image set does not have any moving objects detected, an MPC report must still be prepared. To generate the complete heading in *Astrometrica*, you need to click on "something", (any star will do) in the image and take a measurement, assign it a generic designation like xxx0000. This will create the full header in the MPC report. When you copy and paste the report into the Submission Box on your team page, you can delete the single measurement and add the line "No moving objects detected". The report should look similar to the one below.




Submit all completed MPC reports on your team page on the IASC website.
**Do not submit the MPC reports to any other location!!**