

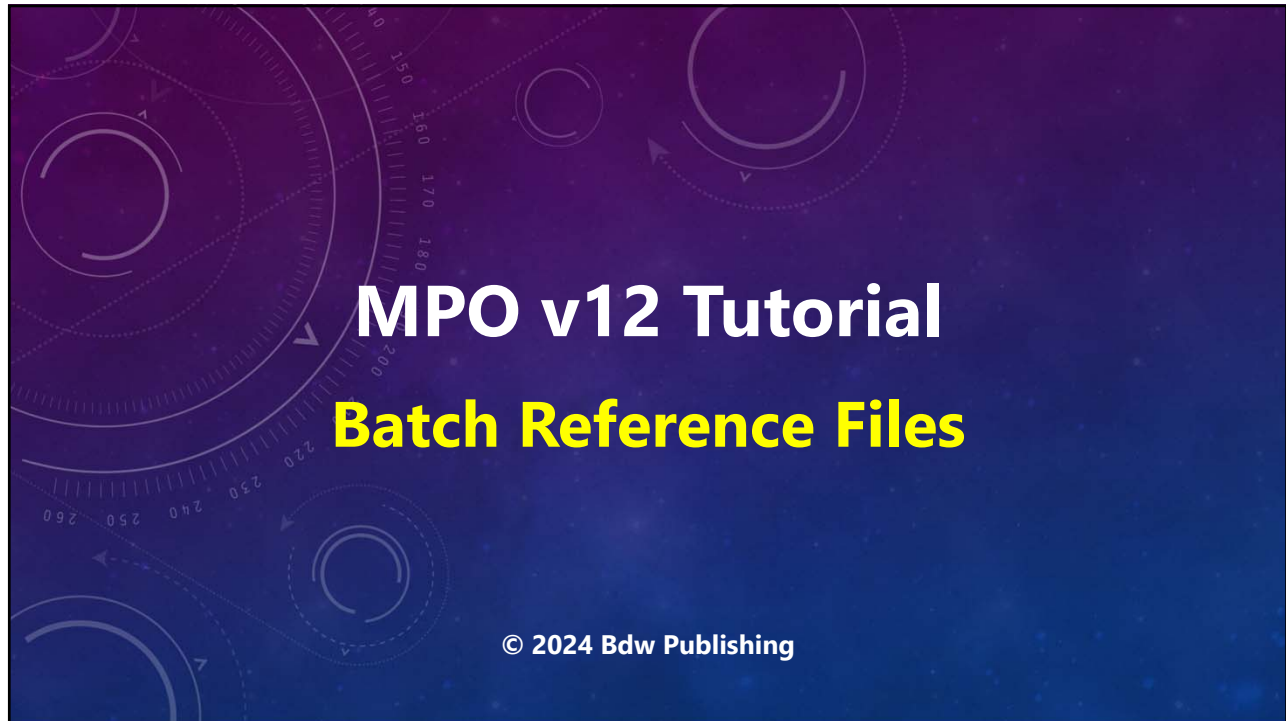
Before Getting Started...

V12 Tutorial: Fixed Formatting

Forced "U.S.-centric" settings

Ini (text) files are used; mixing formats can cause problems.

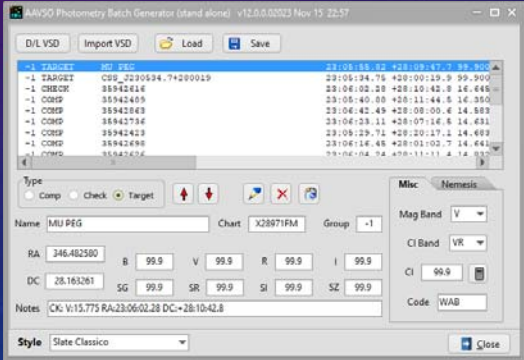
- Time separator `:` colon (also used as RA/Dec separator)
RA: 12:45:22.6 Dec: +05:32:57.9 UT: 04:52:30 (leading zeros/24-hour)
- Date separator `-` dash Date order yyyy-mm-dd
May 12, 2023: 2023-05-12 (leading zeros)
- Decimal point `.` period
Value = -0.45587 (leading zero for $|x| < 1.0$, no thousands grouping)
- Millimeters for focal lengths; meters for apertures (30 cm = 0.30 m)



V12 Tutorial: Batch Reference Files

Data Entry Conventions

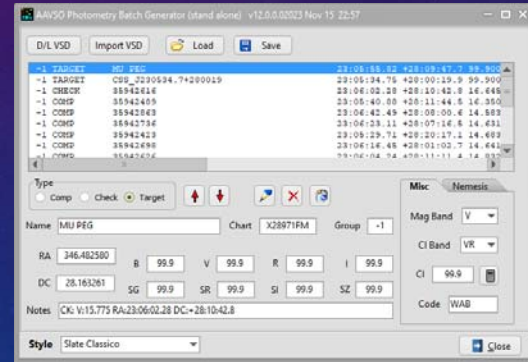
- When entering a value in a string field, e.g., "AF Her", do not include the quotes.
- Click <Caption> means to click on the control with the given caption, e.g., Click <Enter> means click the Enter button. If no caption, an arrow will point to the button.
- Basic Windows knowledge is presumed.



V12 Tutorial: Batch Reference Files

What Are Batch Reference Files?

- Used for multi-image variable star photometry.
- Text file that gives positions and magnitudes for the check and comp stars and position of the target.
- After the first session, the comp star selection step is simplified.
- Helps standardize photometry data by using AAVSO comps where possible.
- V10 batch reference files *still work*, but should be updated after loaded the first time to include additional data.



Getting AAVSO Photometry

V12 Tutorial: Batch Reference Files

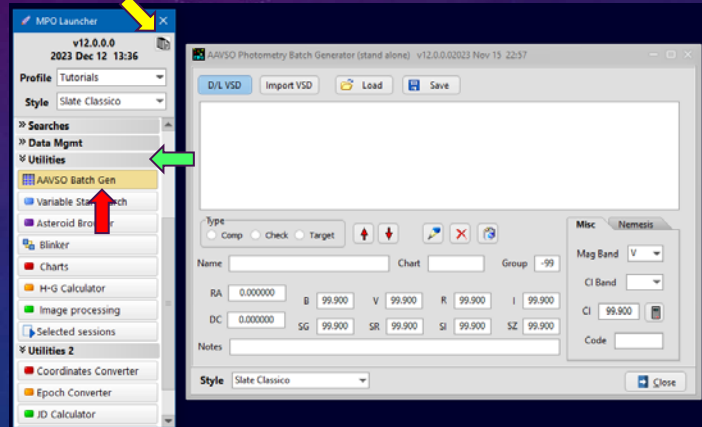
Starting the Stand-alone Batch Reference File Generator

- Start the MPO Launcher
- Click <Utilities> header.
- Click <AAVSO Batch Gen>
- Wait until form appears.
- Launcher can be closed, moved, and/or "rolled-up".

You must have an Internet connection if getting data from the AAVSO site.

The form can be used to edit existing files and v10 txt batch reference files.

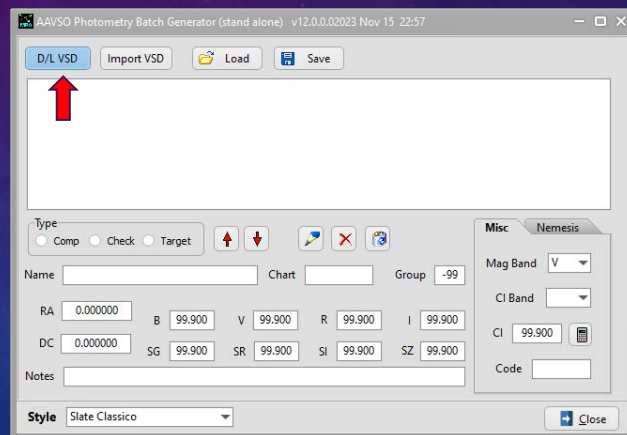
Rollup button



V12 Tutorial: Batch Reference Files

Download AAVSO Data

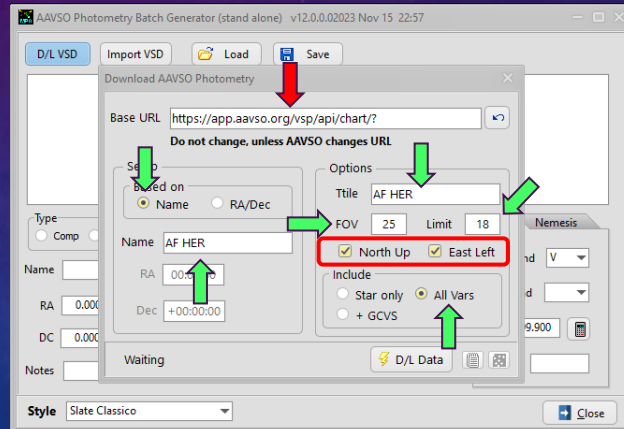
- Click <D/L VSD>
- Wait for Download form to appear.



V12 Tutorial: Batch Reference Files Download Setup

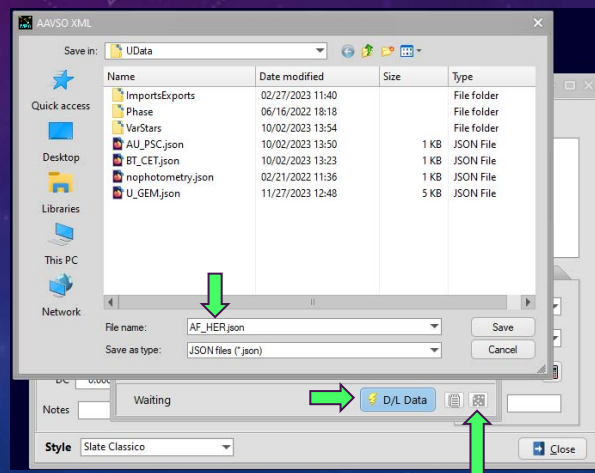
- **Do not** change "Base URL", unless AAVSO changes it.
- Click <Name >.
- Enter "AF HER" in Name field.
- Enter "AF HER" in Title field.
- Set FOV to 25.
- Set Limit to 18.
- Click <North Up> and <East Left>.
- Click <All Vars>.

Enter a valid FOV and limiting mag for your system.



V12 Tutorial: Batch Reference Files Hello, AAVSO!

- Click <D/L Data>.
- Select a path and enter a file name in the popup dialog.
- Click <Save> on the dialog form.
- **Do not** change the file extension; the data coming from the AAVSO is in JSON format.
- After closing the dialog, wait for the <Image> button to become enabled.

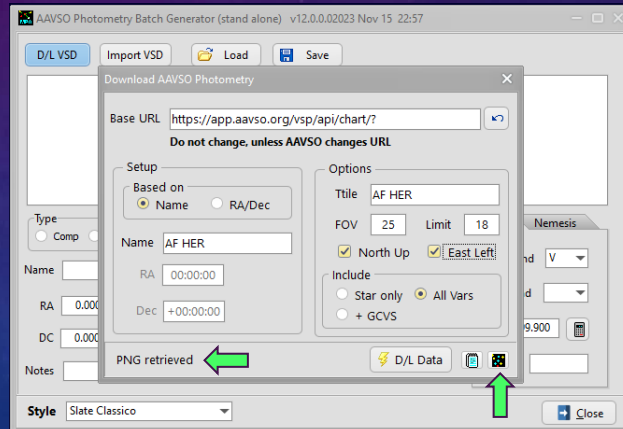


Wait for me!

V12 Tutorial: Batch Reference Files

Hello, AAVSO!

- During download, the message bar will display
 - "Getting CCD Table"
 - "Getting PNG Image"
 - "PNG retrieved"
- If successful, the image icon is enabled.
 - **Reasons for failure**
 - No star found with the value in the Name field.
 - URL changed.
 - Internet error.

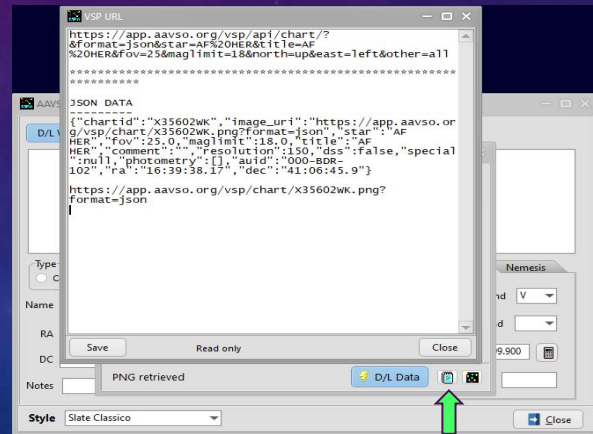


Working with the JSON Data

V12 Tutorial: Batch Reference Files

Reviewing the JSON Data

- Click <Notepad> to display a read-only text editor load with the JSON file.
- Only the target is listed.
 - If enough stars to have check and at least two comps, the file maybe good as-is.
 - If not enough stars, as in this case, manual selection required.
- Click <Close> on the text editor form.



V12 Tutorial: Batch Reference Files

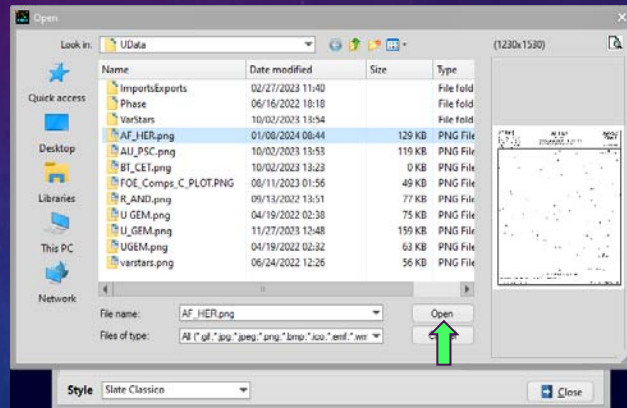
A Good AAVSO JSON File

File for U GEM

```
U_GEM.json - Notepad
File Edit Format View Help
{"chartid":"X35212Y","image_uri":"https://app.aavso.org/vsp/chart/X35212Y.png?format=json","star":"U
GEM","fov":25.0,"maglimit":18.0,"title":"U
GEM","comment":"","resolution":150,"dss":false,"special":null,"photometry":[{"auid":"000-BBN-
875","ra":07:54:37.58,"dec":21:50:21.1,"label":"109","bands":
[{"band":"V","mag":10.947,"error":0.081}, {"band":"B","mag":12.218,"error":0.267},
{"band":"Ic","mag":9.81,"error":0.131}, {"band":"J","mag":9.065,"error":0.029},
{"band":"H","mag":8.539,"error":0.023}, {"band":"K","mag":8.424,"error":0.019}], "comments":""},
{"auid":"000-BBN-886","ra":07:55:07.14,"dec":22:05:14.1,"label":"114","bands":
[{"band":"V","mag":11.414,"error":0.006}, {"band":"B","mag":11.904,"error":0.009},
{"band":"Ic","mag":10.803,"error":0.077}, {"band":"J","mag":10.57,"error":0.0},
{"band":"H","mag":10.322,"error":0.042}, {"band":"K","mag":10.266,"error":0.021}], "comments":""},
{"auid":"000-BBN-890","ra":07:55:12.45,"dec":21:56:00.9,"label":"116","bands":
[{"band":"V","mag":11.6,"error":0.013}, {"band":"B","mag":12.085,"error":0.016},
{"band":"Ic","mag":10.953,"error":0.101}, {"band":"J","mag":10.668,"error":0.02},
{"band":"H","mag":10.443,"error":0.021}, {"band":"K","mag":10.336,"error":0.015}], "comments":""},
{"auid":"000-BBN-895","ra":07:55:23.41,"dec":21:59:57.2,"label":"120","bands":
[{"band":"V","mag":11.98,"error":0.008}, {"band":"B","mag":12.467,"error":0.011},
{"band":"Ic","mag":11.453,"error":0.094}, {"band":"J","mag":11.037,"error":0.018},
{"band":"H","mag":10.813,"error":0.019}, {"band":"K","mag":10.715,"error":0.015}], "comments":""},
{"auid":"000-BBN-894","ra":07:55:22.00,"dec":21:52:54.2,"label":"126","bands":
[{"band":"V","mag":12.611,"error":0.149}, {"band":"Ic","mag":11.525,"error":0.228},
{"band":"J","mag":10.817,"error":0.017}, {"band":"H","mag":10.276,"error":0.019},
{"band":"K","mag":10.186,"error":0.018}], "comments":""}, {"auid":"000-BBN-
888","ra":07:55:11.47,"dec":21:58:02.9,"label":"131","bands":
[{"band":"V","mag":13.096,"error":0.006}, {"band":"U","mag":13.673,"error":0.053},
{"band":"B","mag":13.832,"error":0.008}, {"band":"Rc","mag":12.683,"error":0.031},
{"band":"Ic","mag":12.296,"error":0.033}, {"band":"J","mag":11.791,"error":0.022},
Ln 1, Col 1    100%  Windows (CRLF)  UTF-8
```

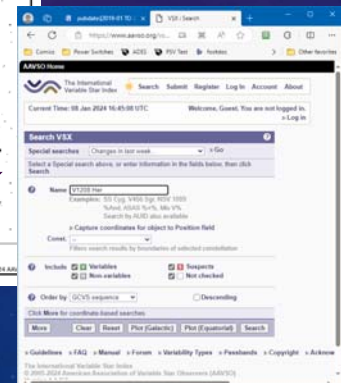
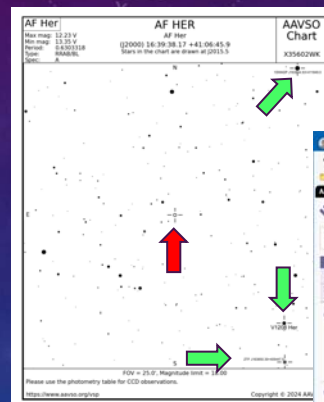

V12 Tutorial: Batch Reference Files Checking the Chart

- Click <Image>
- Navigate to the PNG in the file open dialog (should be in same directory as JSON file).
- Click <Open> on the dialog to start Windows Paint(mspaint.exe).
 - If not installed, use another program that can edit PNG files.



V12 Tutorial: Batch Reference Files Checking for Additional Variables

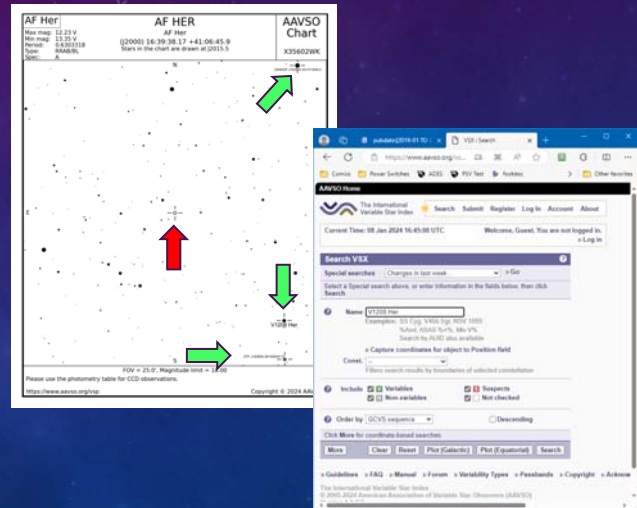
- Three possible extra variables
 - Are they too close to field edge?
 - By changing the FOV center a bit, can one or more be useable?
- Check using the VSX for type, magnitude range, period, etc.
- In this case, only V1208 Her was worth including.
- If the candidate has a VSX AUID, a unique identifier, be sure to record and use that instead of the name.



VSX URL: <https://www.aavso.org/vsx/index.php?view=search.top>

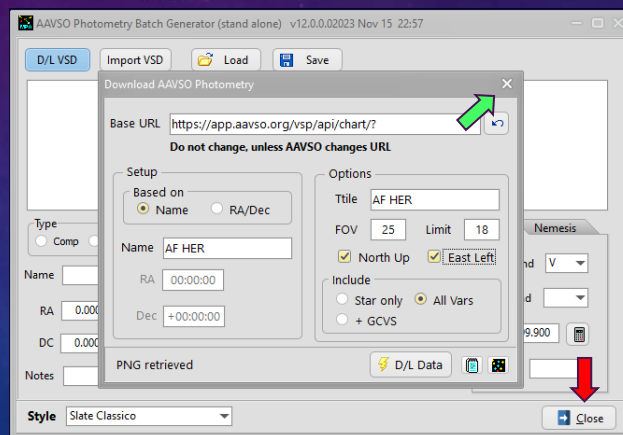
V12 Tutorial: Batch Reference Files Checking for Additional Variables

- Additional stars must be manually included when measuring the first session. They can then be added to existing or new batch reference file.
- Close Paint.



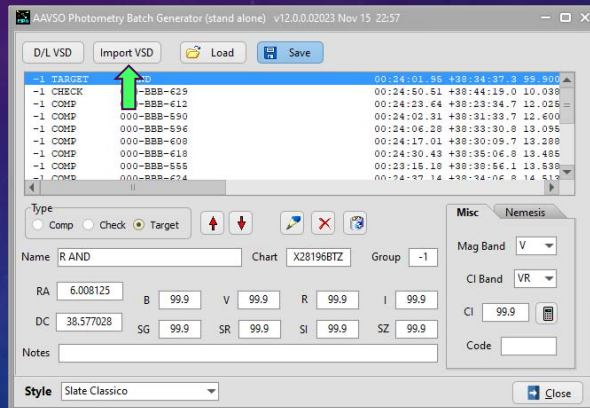
V12 Tutorial: Batch Reference Files Finishing Up: Not Enough Stars

- Close the AAVSO Photometry form: click <X> in upper-right corner).
- Since not enough stars in JSON file, click <Close> on the Batch Reference File form.
- Create a batch reference file when selecting comps in first measuring run.



V12 Tutorial: Batch Reference Files Finishing Up: Good JSON Data (R And)

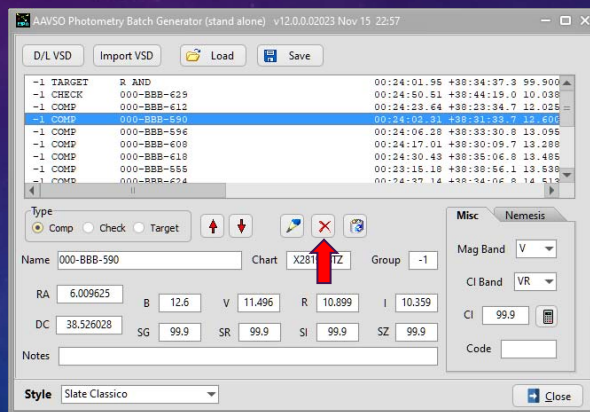
- Click <Import VSD> to display a file open dialog.
- Locate and load the JSON file.
- **Initial and final data must have:**
 - One or more TARGET lines.
 - One and only one CHECK line.
 - At least one COMP line, preferably more (up to 15).
- Click on a line to display its data in the entry fields.



V12 Tutorial: Batch Reference Files Editing a Batch Reference File

- To Delete a Star
 - Click on the star in the list.
 - Click the delete button (under the list with an 'X' icon).
 - Confirm the request to delete.
- **Do not click <trashcan>. That can delete all the stars in the list.**

There is no Undo capability

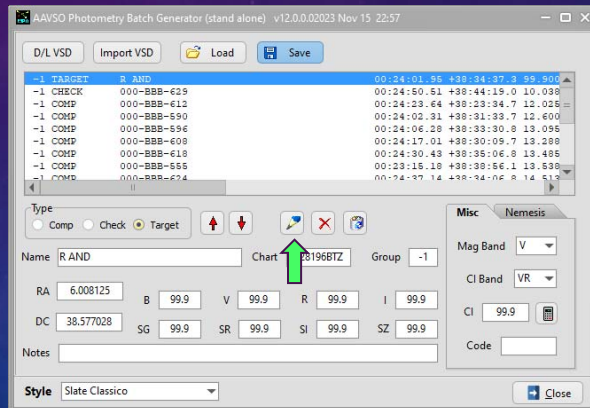


V12 Tutorial: Batch Reference Files Editing a Batch Reference File

- To Edit a Star
 - Click on the star in the list.
 - Make the changes in the entry fields.
 - Click <pencil> (under the list).
- Do not reverse the second two steps. You won't get what you expect, or want.

There is no Undo capability

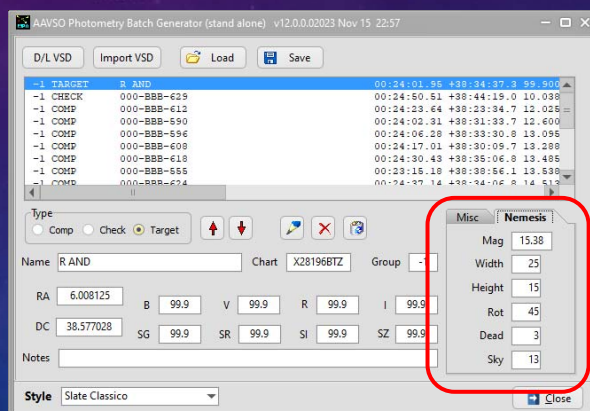
But wait! There's more!



V12 Tutorial: Batch Reference Files Defeating Your Nemesis

- Credit Where Credit is Due
 - Named after Excel spreadsheet by Lew Cook (AAVSO).
 - Formula based on "Astronomical Algorithms" by Meeus.
- "Nemesis star": a companion too close to be excluded by adjusting the measuring aperture.
- Solution: Measure both at the same time and subtract nemesis star contribution.

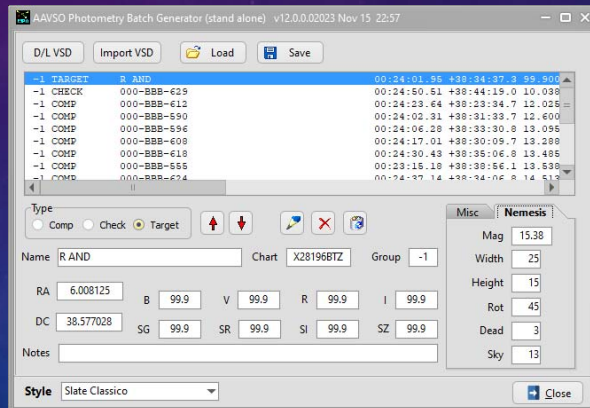
Nemesis magnitude must be known and not variable.



V12 Tutorial: Batch Reference Files Defeating Your Nemesis

Not used for AF Her measurements.

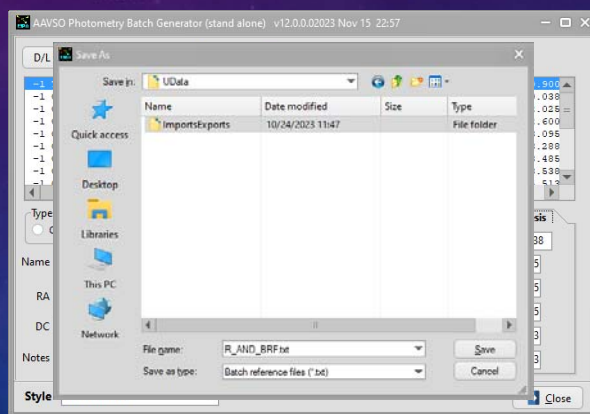
- Enter data **only** if required. Mag = 0 if not.
- Click on a TARGET line. **Do not click on list or Type radio button from here on.**
- Enter the nemesis magnitude to as precise a value as possible.
- Circular aperture not required and probably shouldn't be used.
- Large enough inner aperture to get both stars, including faint wings.
- Adjust dead zone and sky annulus width for best, *consistent* results.



V12 Tutorial: Batch Reference Files Saving the Batch Reference File

Don't for get to save the file!

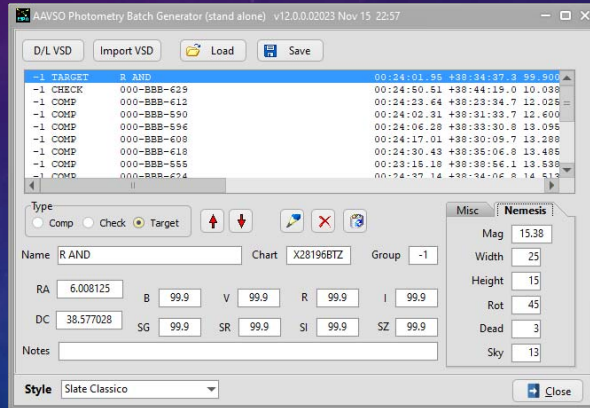
- Click <Save> to display file save dialog.
- Navigate to the directory where file is to be saved.
- Change name if desired.
- File extension is forced to TXT.
- After saving file, click <Close> on Batch Reference form.



V12 Tutorial: Batch Reference Files Now What?

- The file, if used as-is, will be loaded during measuring when selecting comp stars.
- If a target, check, comp stars needs to be found manually or automatically, it can be saved to a batch reference file when selecting the comps for the first session. Then it can be used in that and all following sessions for the target and any other variables.

See the “VariableStarPhotometry” video on the YouTube channel @8734Warner.



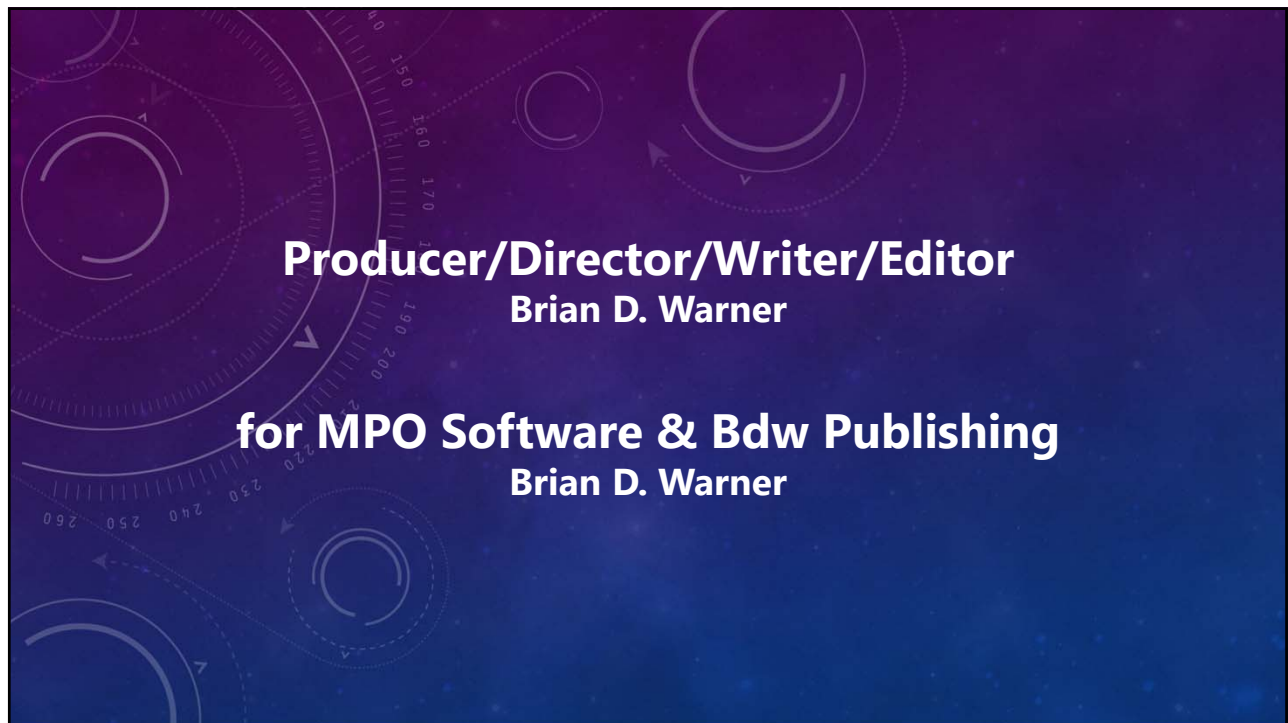
MPO v12 Tutorial Batch Reference Files

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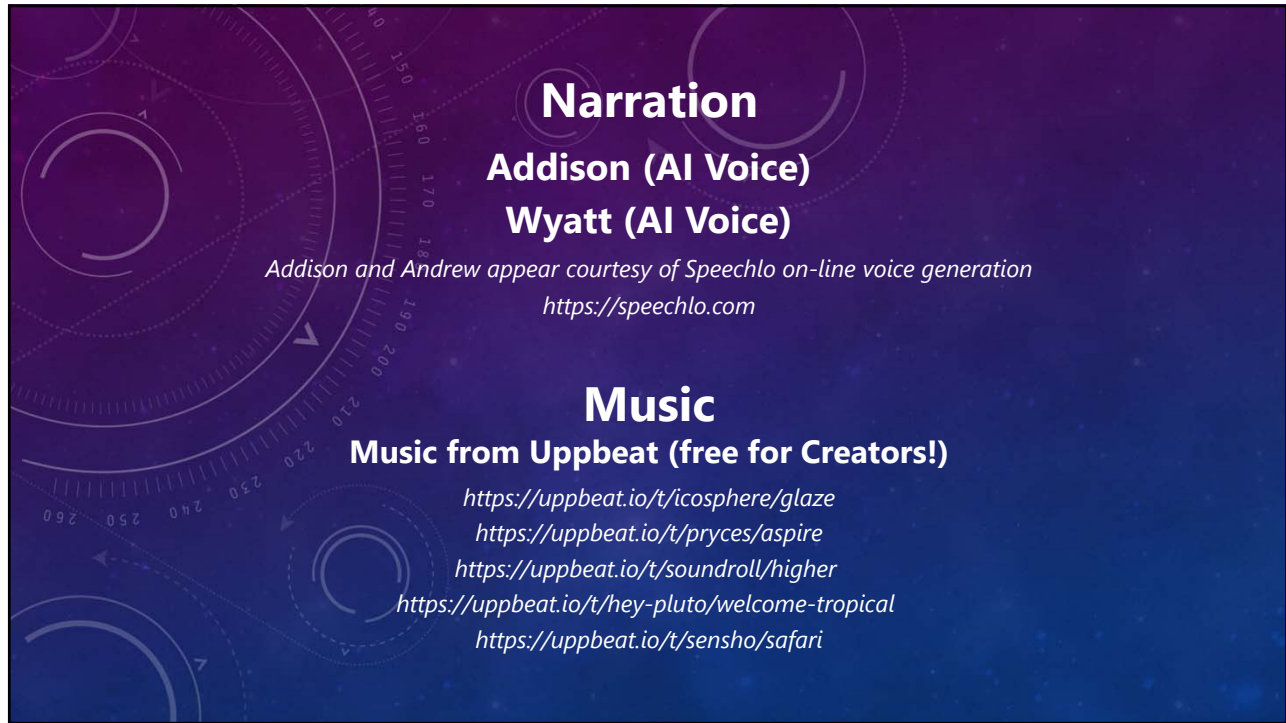
YouTube Channel
<https://youtube.com/@8734Warner>

Technical Support
<https://groups.io/g/MPOSoftware>



Producer/Director/Writer/Editor
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for MPO Software & Bdw Publishing
Brian D. Warner

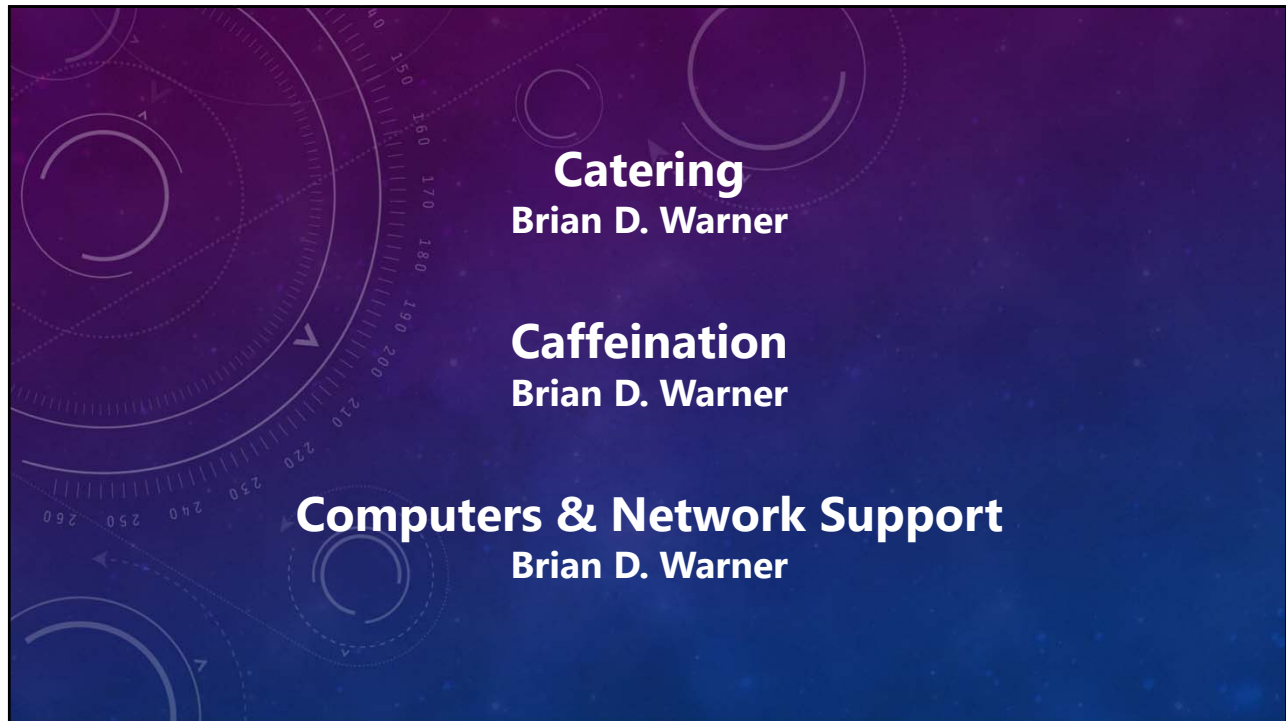


Narration
Addison (AI Voice)
Wyatt (AI Voice)

Addison and Andrew appear courtesy of Speechlo on-line voice generation
<https://speechlo.com>

Music
Music from Uppbeat (free for Creators!)

<https://uppbeat.io/t/icosphere/glaze>
<https://uppbeat.io/t/pryces/aspire>
<https://uppbeat.io/t/soundroll/higher>
<https://uppbeat.io/t/hey-pluto/welcome-tropical>
<https://uppbeat.io/t/sensho/safari>



Catering
Brian D. Warner

Caffeination
Brian D. Warner

Computers & Network Support
Brian D. Warner

**The slides used in this tutorial
are available as a PDF on the
Bdw Publishing web site**

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MPO v12 Tutorial

Batch Reference Files

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