How to Plot Variable Star Charts
Using the AAVSO Variable Star Plotter
By Barry Beaman (BBA)
Last Updated: April 24, 2009

1. Open the AAVSO web page at www.aavso.org.

2. In the left column of the web page locate "Plot a Chart" under "Most Popular Pages" and left click on it. The VSP Interface page will appear.

3. At this time, if you don't already have the "One Page Guide," select it and print a copy.

4. For most of us, the next step is to enter the name of the variable star we want to observe. All the VSP is looking for is the abbreviated star name, i.e., r leo, v1339 cyg, or eps aur. No capitals or full names are needed and in some cases will not be recognized. For example, zet gem will produce a chart but zeta gem might not and zeta geminorum most certainly will not be recognized. Capitals will be recognized and produce charts, but are unnecessary. Also there are some stars whose names overlap and create confusion. For example, μ (Mu) Cephei would normally be entered as mu cep; however, there is a twelfth magnitude Cepheid variable in Cepheus that is named MU Cephei. To avoid this overlap, AAVSO has given μ Cephei the name designation of " * mu cep." Please note that there is a space between "*" and "mu." There are a number of these overlapping conditions in the AAVSO Data Base and a list of corrected names is maintained in the AAVSO web page in the Validation page at http://www.aavso.org/observing/aids/080114-namechanges.txt. So, if you request a chart from the plotter and the results seem strange, check this list, you may have just stumbled into a name overlap.

5. There may be occasions when you are trying to study a variable object with a name that the VSP cannot recognize or you may want to center the chart on a point in space to maximize the available comparison stars. When that happens you can enter coordinates for the chart to be centered on. When entering separate the hours and minutes and minutes and seconds with either spaces or colons. The same applies to separating degrees from minutes and minutes from seconds. Please note, if you entered a star name and coordinates, the star name will be ignored and the center of the chart will be assigned to the coordinates.

6. You do not need to enter anything into the Title field. However, a short title can be very useful. Include the star name and chart type such as, "R Leonis A Chart." The big letters are easier to see in the dark and knowing the chart scale may be useful. While the chart size is given at the bottom of the chart (FOV= 3.0°), it is very handy to have it in big letters at the top of the page. And for those who may not know, FOV means Field of View.

7. The Comment field can also be left blank, but if you create a strange chart for a specific purpose that can't be explained in the Title field, this is the place to do it. Comments will be placed at the bottom of the chart.

8. The "Plot a chart of this scale:" drop down menu allows you to set the field of view according to the old finder chart designations. On the menu you will see designations A, AR, B, BR, C, and so forth. An A chart will show you 15 degrees of sky and stars down to 9th magnitude. A B chart will show you 3 degrees of sky and stars down to 11th magnitude. The R means the chart is printed with the field reversed for use with telescopes fitted with an odd number of reflective surfaces (like SCTs). I general terms, all this means is that you need to use a chart, or series of charts, that cover the range of magnitudes of the variable star you are observing. This is also determined by the instrumentation you are using. With small binoculars, A and B charts will serve the purpose. With a small telescope, you may need A, B, C, and maybe even D charts. Also, if you are observing in a densely packed part of the sky, Cygnus for example, you may need an E chart to spread out the stars enough to figure out what you are looking at even if you are only using a small telescope. Just remember that you probably won't be able to see most of the fainter stars. CCD observers will use mostly E, F and occasionally G-scale charts.

9. FOV* field. Please see the Quick Guide. Selecting chart size from the "Plot a chart of this scale:" menu takes care of this automatically. You can enter any FOV you want up to 900 arc minutes, but that's the maximum allowed at the time of this writing. Larger field of views may be available by requesting a chart be made by AAVSO staff (aavso@aavso.org).

10. Resolution*. This refers to the size of the chart as seen on your computer screen. A resolution of 75dpi is the default value for most web pages. Higher resolution will you better quality, but larger images that may not fit on a single printed page.

11. Mag. Limit*. This is also set automatically by selecting chart size from the "Plot a chart of this scale:" menu. You may, on some occasions, choose to make a B chart with a Mag. Limit of 11.3 because the star only goes down to 11.2 or thereabout and you don't want an additional chart. But be careful, if you get exuberant and try to create a B chart down to Mag. 15 in Cygnus, you might get a completely black chart (and it will take a very long time to plot)!

12. Next we deal with chart orientation. You need to decide if you want North up or down and East right or left. When AAVSO charts were finally standardized in the [1930s] they were optimized for the Newtonian reflector and refractors used without star diagonals. This meant North was down and East was right and that remains the default for the VSP. If a creative observer started using a star diagonal he simply turned the chart over, put his red flashlight under the chart and used the "mirror image" to find and estimate the brightness of the variable. And, if you were observing with binoculars, you just turned your B and C charts upside down. A, AA, and AB charts were drawn with North up. Now that we have the VSP it gives you the option to orient your chart the way you want it. If you observe with binoculars you can select North up and East left for all your charts. If you are observing with a star diagonal in an SCT or refractor, you can select a reversed chart (AR, BR, CR, etc.) or select North down and East left. But please

understand that the default is always North down and East right and this field will revert to that every time you change chart size, even for A charts.

13. The Image field allows you to ask for an actual image of the sky you are charting. The image comes from the Digitized Sky Survey. Visual observers will rarely need this feature. However, CCD observers may find it very useful since it gives output that looks similar to what a CCD image will look like.

14. Field Photometry. Instead of giving you a star chart, this setting will print a table of photometry for the stars in the field of view that exist in our Variable Star Database (VSD). Basically, it is a way to get accurate, multicolor photometry and other information on the sequence stars that would be plotted on a chart. This is most useful for CCD observers who need the photometry for their check and comparison stars.

15. Other Variables allows you to include either GCVS cataloged variables or all known variables in the database to be included on the chart you are plotting. This is a very useful feature, but it needs to be handled with care. If you select the "Mark *all*…" option while plotting an A chart for a star in a Milky Way constellation, it is very likely that the chart will be so cluttered with variable star labels that you can't see the stars. The "Mark GCVS…" option works a little better, but A charts are always a little cluttered with either option. The writer sometimes generates two A charts. One with the "Do not mark…" option to be able to identify the variable and comparison stars. The other chart with one of the other options, usually "Mark GCVS…," to identify the other variables to know what stars may or may not be visible in the field. For B, C, D, and the rest of the chart types this problem is not nearly as severe due to the expansion of the space between the stars. Also, don't expect to be able to observe every star that shows up on your charts when you use the "Mark..." options. Research the stars to be sure they are appropriate for your observing technique. For example, doing visual observations for a star with a .2 magnitude range is not likely to produce valid data for the average observer.

16. Every chart is plotted with a **chart id** in the upper right hand corner. This should be reported with your variable star observation. If you would like to replot a lost chart, type in the chart id here and the chart will be replicated using all the settings you used to plot it the first time. This can also be used to see what charts other people are using to make their own observations.

17. The Reset Fields does just what it says it does. Everything is set to the default setting.

18. Finally, we come to the moment of truth, Plot Chart. You may want to stop and give the form you've just created a careful look. Make sure you've got the right title and comments, right chart type, right orientation, and so forth. Once you click Plot Chart you lose control and whatever you've asked for is what you will get and it will stay forever in the AAVSO files. But if something does go awry don't feel too bad the writer has more than a few charts out there with goofy titles, misspellings, and other errors and he suspects he isn't alone. Note that some charts plot in just a few seconds while others may take close to a minute. Please be patient. In general, the larger the field of the view, the

longer the plot time.

19. Special Charts. Sometimes you may want to create a special chart for a specific purpose. For example, you may want a chart with two or more specific variable stars identified on it. In that case, just find a midpoint between the two stars and make that the center of the chart with a field of view wide enough to include both stars.

20. Chart Errors. All software systems have unintentional human error built into them and the VSP is no exception. Actually, it performs quite well most of the time. But keep a wary eye on your VSP charts because there are bugs lurking about. For example, I produced a chart with the Chart ID of 1071wgr that confused me at the eyepiece. When I sat down and looked at the chart carefully I realized that Betelgeuse and Gamma Orionis are plotted way too far south and almost in line with Orion's Belt. This same problem showed up in Chart ID 1052io. In 1052io Gamma Orionis appears next to Delta Orionis in the Belt. This results in complete confusion because our minds interpret Gamma as one of the Belt stars. From this you can see the value of the Chart ID. We can report the specific problem to the AAVSO Staff by just sending them the Chart ID and they can look at the chart and see for themselves what is wrong. Report these errors using The Chart Error Tracking Tool (CHET), which is available by logging into Blue/Gold. CHET submits your report to the sequence team and also allows you to check on the status of your report and will e-mail you when the report has been addressed.

Well, there you have it. Start making charts and get out under the sky and observe and send your observations in to AAVSO. And, HAVE FUN!