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How to Find Venus in the Daytime
by Kevin Kell

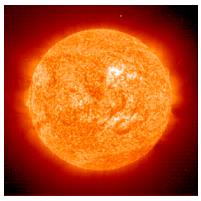
We have had several demonstrations in the field at Starfest, FallNStars and other locations on how to find Venus in the daytime. This article is a step-by-step guide on using data from the Observer's Handbook to find the position of the planet.

So, let's start by pretending today is Saturday March 15th, at approx 1:00pm est. Open up your 2003 Observer's Handbook to page 80 (after finding it that is!)

Some of the data listed is positional information on the sun and planets. We will need the Sun and Venus.

RA=Right Ascension A Full circle around the planet is 24 hours of Right Ascension. These are equivalent to lines of longitude on Earth. Dec=Declination. Up or down (+ or -) from the celestial equator, +90 degrees is the all the way up, -90 degrees is all the way down.

Looking at the RA of the Sun, you will note there is no entry for March 15th, but there is data for March 11 and March 21. We will have to determine how much the sun moves each day, and add it times the number of days, to the position of the 11th .



The Sun
RA March 11 23hours 23minutes
RA March 21 23hours 59minutes
So how much does the sun move in RA in 10 days?

+23hr 59min
-23hr 23min
=======
0hr 36min

How much does it move in one day? 36min/10=3.6 min
How many days between the 15th and the 11th? 4 days
Total amount the sun moves in 4 days = 4*3.6min = 14.4min
Add 14.4min to the position on the 11th
+ 23hr 23min
+ 0 hr 14.4min
=========
23hr 37.4min

Seeing as how your telescope setting circles are not that accurate (usually +- 20 minutes), you can feel safe in rounding the final decimal place, so we have an **RA position of the sun for 23hr 37min**

Now we do the same for the Declination of the sun.

The Sun
Dec March 11 -3deg 59minutes

Dec March 21 -0deg 02minutes
So how much does the sun move in Declination in 10 days?

3 deg 59min
0 deg 02min
=======
3 deg 57min (note: working in negative numbers may be difficult for some, so drop the negative numbers for now and remember that you will need the negative/positive signs later)

How much does it move in one day? 3deg 57min/10=?

In this instance we want to convert the degrees into minutes to make the calculation easier. One degree = 60 minutes so 3 degrees=180 minutes plus the 57 minutes gives us 237 minutes

How much does it move in one day? 237min/10=? 23.7 min/day

How many days between the 15th and the 11th? 4 days
Total amount the sun moves in 4 days = 4*23.7min = 94.8min
Round off to get 95min and add to the position on the 11th
-3deg 59min (Take away a degree and add 60 minutes)
+0deg 95min
=======

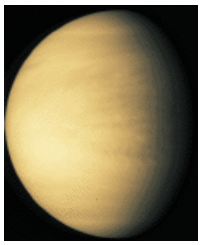
becomes
-2deg 119min
+0deg 95min
=======
-2deg 24min

Seeing as how your telescope setting circles are not that accurate (usually +- 20 minutes), you can feel safe in rounding the final decimal place, so we have a **Dec position of the sun for -2 deg 24 min**

Summary of the Sun:
RA 23 hours 37 minutes
Dec -2 degrees, 24 minutes
Let's do a sanity check on the answers before we go on... look at the summary numbers. They should lie between the numbers given for March 11th and March 21st. Do they? If so continue on, if not, go back and try again!

Now we repeat for Venus!

Venus



RA March 11 20hours 49minutes
RA March 21 21hours 37minutes
So how much does the sun move in RA in 10 days?
+21h37m
-20h49m
======
48m
If you have trouble with this calculation, think of it as a clock problem...add 11 minutes to 8:49 to get 9oclock and then add another 37 minute to get to 9:37 for a total of 11min+37min=48min in 10 days = 4.8min/day
4.8*4=19.2min in 4 days, round off to 19min
add to March 11th position
20hr 49min
+ 0hr 19min

==========
20hr 68min = **21hr 8min**

Venus
Dec March 11 -17 deg 26minutes
Dec March 21 -14 deg 29minutes
So how much does the sun move in Declination in 10 days?
+17d 26m
-14d 29m
========
2deg 57min in 10 days = 120min+57min=177min in 10 days = 17.7min/day * 4 days = 70.8min = 71min (which is also 1 degree 11min) in 4 days, add to March 11th position:
-17deg 26min
+1 deg 11min
==========
-16deg 15min

Summary of Venus:
RA 21 hours 8 minutes
Dec -16 degrees, 15 minutes
Sanity check: do the summary numbers lie between the numbers for March 11th and March 21st?

Interestingly enough, here is a comparison of our figures against those from Starry Night Pro v3

Object	**OH**	**Starry Night**	**Diff**
Sun RA	23hr 37min	23hr 41min	4 min
Sun Dec	-2deg 24min	-2deg 5min	19min
Venus RA	21hr 8 min	21hr 12min	4min
Venus Dec	-16deg 15min	-16deg 7min	8min

I'm not sure what to make from these differences, except to go back and check my work again!

So now we have the numbers. How do we find Venus?

Put your solar filter on and find the sun. Select a relatively low power eyepiece, so that you can see the entire disc of the sun (the sun is about 30min in diameter). When it is centered and you have done your solar observing for the day, set your setting circles to 23hr 37min RA and -2deg 24min DEC.
Lock down the circles, release your scope so it can move freely without disturbing the setting circles, to the position of Venus: 21 hr 8min in RA and -16deg 15min in DEC.
Remove your solar filter, do not adjust your focus (it should be the same for both objects), and you *should* see Venus!

It is important that the time between calibrating to the sun and moving to find Venus is as short as possible (ie don't calibrate on the sun, go in and have lunch , then come back and move to Venus's position... it won't be there! It will have moved in the meantime)

If you don't, try again a couple of times, remembering to put the solar filter back on before you go near the sun.
Try using a lower power eyepiece to get a bigger field of view.
It helps that your scope is polar aligned!

Example problem
After a few of these you should feel confident enough to liberally round off the numbers and do the calculation in your head!

The Sun
RA March 1 22hr 46min
RA March 11 23hr 23min
Dec March 1 -7deg 50min
Dec March 11 -3deg 59min

What is the position of the Sun on March 10th?

Venus
RA March 1 20hr 00min
RA March 11 20hr 49min
Dec March 1 -19deg 34min
Dec March 11 -17deg 26min

What is the position of Venus on March 10th?

Answers:
Sun RA=23hr 19min DEC=-4deg 22min
Venus RA=20hr 44min DEC=-17deg 39min