

My daughter, Roberta, who lives and works in Brazil, mentioned to me that Brazil's flag depicts the "Southern Cross." Interested, I looked up Brazil's flag. Sure enough, there was a pattern of stars recognizable at first glance as the constellation Crux. Some time later, I read, and I don't recall where, that the great southern globular, Omega Centauri, was also depicted on Brazil's flag. This piqued my curiosity, so I pulled out the June issue of *Sky and Telescope* to compare the flag to the southern constellations. The first thing I noticed was that East and West were reversed on the flag. Epsilon Crucis is shown on the flag as a star to the left of a line connecting the northern and southernmost stars of Crux. In the sky, this star lies to the right of this line. Assuming (wrongly, as it turns out) that the other "stars" were depictions of the constellations around Crux, I compared the chart to the flag. I was unable to find any similarity whatsoever to the surrounding constellations of Centaurus, Circinus, Musca and Carina. The shape of one of the constellations on the lower right (east), with its curved line of stars reminded me of the tail of Scorpius, which is nowhere near Crux in the sky.



The Flag of Brazil

A web search took me to a very informative site, "Astronomy of the Brazilian Flag" at http://fotw.fivestarsflags.com/br_astro.html

There I discovered that the flag is supposed to represent the stars as seen over Rio de Janeiro on the morning of Friday, November 15, 1889, the day the new republic of Brazil was formed.

The site points out that Crux is depicted at its most cross-like, vertical on the meridian. The local time for this was 8:37 a.m. in Rio on the first day of the new Brazilian Republic. At that hour of the morning, Guide 8, my planetarium program, shows that both Scorpius and Canis Major were above the horizon. The dim star at the bottom of the flag's "sky" is sigma Octantis, the southern pole star. The bright star above the white banner is Spica, which was also in the northern part of the sky. So, the flag is based on the stars in the sky the morning of the revolution. No one, however, was able to see these stars at the time Crux was at the meridian, because the sun was already over 47° above the eastern horizon! All of the naked eye planets and Uranus were above the horizon as well as the moon, which at 54% illumination was just before last quarter. A sharp-eyed citizen of the newborn republic might have been able to spot Venus, at magnitude -3.9 about 16° higher above the horizon than the sun.

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If you're down in Rio and want to catch the stars depicted on Brazil's flag, March is a good time. Crux is on the meridian at midnight around March 28th, so the stars should all be visible in the night sky. The following table gives dates and times for Crux on the meridian at night (after evening and before morning astronomical twilight). All times are Brazilian Standard Time

Date	Time Crux is on the Meridian	Astronomical Twilight (Morning)	Astronomical Twilight (Evening)
January 28	4:00 a.m.	4:08 a.m.	8:04 p.m.
February 28	2:00 a.m.	4:33 a.m.	7:38 p.m.
March 28	Midnight	4:46 a.m.	7:10 p.m.
April 28	10:00 p.m.	4:55 a.m.	6:46 p.m.
May 28	08:00 p.m.	5:06 a.m.	6:35 p.m.
June 17	06:40 p.m.	5:14 a.m.	6:36 p.m.

Participants in Rio's nightlife who want to catch sight of Crux on the meridian can step out of their dance club at 4:00 a.m. on January 28th for an eight minute look at the constellations in the dark night sky before the morning sky begins to brighten. June 17 is a good date if you want to catch the sight as early as possible in the evening.

The graphic on page 4 should aid in the identification of the stars in the sky that correspond to those on the flag.

Referring to the table on page 3, the constellations of Crux, Scorpius and Canis Major contain most of the flag's stars. In all, nine constellations are represented, some by only a single star. The two stars that straddle the banner are gamma Hydrae(below) and Spica(above). These stars are far to the north of Crux in the real sky. The bright star above and to the left of Canis Major is Procyon. The dim star south of Crux is sigma Octantis, the south pole star, moved northward toward Crux but shown correctly as much fainter. The small triangle of stars to the lower right of Crux represents the three brightest stars of the constellation Triangulum Australe. To the south of Canis Major, Canopus is the single star of Carina on the flag.

My curiosity was finally satisfied. Omega Centauri is nowhere depicted on Brazil's flag. In fact, none of the stars in the constellation Centaurus appear, even though alpha and beta Centauri are prominent first magnitude stars in the southern sky near Crux.

The stars and constellations on Brazil's flag are properly positioned relative to Crux. However, the distances between the constellations on the flag are not in any way related to their positions in the sky. They may have been moved closer to Crux for artistic reasons.

I was curious about the flag's star sizes and whether they corresponded to the actual brightness of the stars they represented. The table on page 3 indicates that in most cases the depicted brightness corresponds reasonably well with actual magnitude. The basic scheme seems to be that stars brighter than magnitude 1.5 are all size 1; those between magnitude 1.5 and 2.5 are size 2; those between 2.5 and 3.5 are size 3; those between 3.5 and 4.5 are size 4. The lone fifth magnitude star, pole star sigma Octantis, is size 5. There are three exceptions to this binning according to magnitude, namely lines 3, 14 and 19 of the table. Guide 8 lists these three stars as short-period variables with .25, .20 and .19 day periods, respectively. Unfortunately, they all vary by less than .06 magnitude, so that doesn't explain why they don't fit. Perhaps a look at a contemporary star catalog would show different magnitudes for these stars. Not having one available, I must let the matter drop after noting the three exceptions.

Revolutionary Astronomy

The “Distrito Federal,” which corresponds to our “District of Columbia” was moved from Rio de Janeiro to the city of Brasilia in 1960. At the latitude and longitude of Brasilia, the stars on Brazil’s flag would have been in position about nineteen minutes later in the day.

No artist or artists saw the stars in the sky that revolutionary morning. Ah, but moving a few stars and constellations around on Friday, November 15, 1889 in Rio De Janeiro may have seemed quite within the realm of possibility, given that an emperor had just been deposed.

Vida longa para a revolução! (Portuguese for long live the revolution)

	Brazilian State	Constellation	Stars	Star’s Name	Mag.	Flag Size
01	Amazonas	Canis Minor	1	Alpha (Procyon)	+0.46	1
02	Mato Grosso	Canis Major	5	Alpha (Sirius)	-1.08	1
03	Amapá			Beta	+1.96	3
04	Rondônia			Gamma	+4.10	4
05	Roraima			Delta	+1.83	2
06	Tocantins			Epsilon	+1.52	2
07	Pará	Virgo	1	Alpha (Spica)	+1.06	1
08	Piauí	Scorpius	8	Alpha (Antares)	+1.06	1
09	Maranhão			Beta	+2.60	3
10	Ceará			Epsilon	+2.26	2
11	Alagoas			Theta	+1.86	2
12	Sergipe			Iota	+2.99	3
13	Paraíba			Lambda	+1.63	2
14	Rio Grande do Norte			Kappa	+2.39	3
15	Pernambuco			Mu	+3.00	3
16	Mato Grosso do Sul	Hydra	2	Alpha	+1.97	2
17	Acre			Gamma	+2.98	3
18	São Paulo	Crux	5	Alpha	+1.28	1
19	Rio de Janeiro			Beta	+1.31	2
20	Bahia			Gamma	+1.65	2
21	Minas Gerais			Delta	+2.75	3
22	Espírito Santo			Epsilon	+3.57	4
23	Rio Grande do Sul	Triangulum Au.	3	Alpha	+1.88	2
24	Santa Catarina			Beta	+2.82	3
25	Paraná			Gamma	+2.85	3
26	Goiás	Carina	1	Alpha (Canopus)	-0.63	1
27	Distrito Federal	Octans	1	Sigma (Polaris Australis)	+5.45	5

Revolutionary Astronomy



Stars on the Brazilian Flag, reversed to appear as they would in the sky, with constellations' and stars' Names