To Mars observers:

As is evident in recent posts to the Halifax RASC Discussion list, there is growing interest in observing Mars. For observers in mid-northern latitudes, the next few weeks will see the best opposition of Mars that will occur within the next 15 years! Not only are we in a favourable time of year for observing, but as the diagram on p. 220 of the *Observer's Handbook* shows, Mars will not come as close again until 2035. Mars will be nearly as large in 2033, but for us its declination that year (about –28°) is not good.

Using the Astronomical Almanac, I have prepared material to assist Martian observing opportunities during the next few weeks (see below). It has been 22 years since I last assembled a similar table, for the 1999 *Observer's Handbook* and the opposition of Mars that year.

The Mars Table

The table gives crucial information for Mars observers during September through November of 2020. (Data derived from the Astronomical Almanac 2020). The columns give:

The **Date** (0h UT), which for Nova Scotia is at 21:00 the previous evening (20:00 during November and December).

The **Distance** of Mars from Earth in astronomical units.

The **Visual Magnitude** of Mars

The angular **Equatorial Diameter** of Mars

The **Illumination** (% of the Martian disk facing Earth that is in sunlight)

The **Position Angle** of the rotation axis of Mars, measured counter-clockwise from north (clockwise in telescopes having an odd number of reflections).

The **Inclination** of the rotation axis of Mars to the plane of the sky, negative if its north pole is tipped away from Earth, with the south polar cap visible.

L(1) is the Martian longitude of its central meridian facing Earth at 0h UT on that date. L increases westward on Mars (eastward on the celestial sphere), as indicated on the map of Mars on p. 221 of the *Observer's Handbook*.

Δ is the average daily decrease in L(1) until the next line in the table.

MARS 2020

Date 0h UT	Dist. (AU)	Mag.	Equat. Diam.	Illum. (%)	Pos. Angle	Incl.	L(1)	Δ
Jan. 4	2.163	+1.6	4.3″	95	37°	+10°	–	–
Mar. 4	1.688	+1.1	5.6	91	21	–8	–	–
May 3	1.214	+0.4	7.7	86	355	–22	–	–
July 2	0.812	–0.5	11.5	84	332	–23	–	–
Sept. 4	0.485	–1.9	19.4	93	324	–18	169.0	9.12
12	0.457	–2.1	20.5	94	324	–18	96.0	9.02
20	0.435	–2.3	21.6	97	324	–18	23.8	8.91
28	0.421	–2.4	22.3	98	324	–19	312.5	8.82
Oct. 6	0.415	–2.6	**22.6**	100	325	–20	241.9	8.80
14	0.420	–2.6	22.3	100	325	–21	171.5	8.81
22	0.434	–2.4	21.6	100	326	–22	101.0	8.87
30	0.459	–2.2	20.4	98	326	–23	30.0	8.97
Nov. 7	0.493	–1.9	19.0	97	327	–23	318.2	9.09
15	0.536	–1.7	17.5	95	327	–24	245.5	9.20
23	0.586	–1.4	16.0	94	326	–24	171.9	9.31
Dec. 1	0.642	–1.1	14.6	92	326	–24	97.4	9.47
29	0.872	–0.3	10.7	89	323	–23	192.1	

To determine the longitude L of the central meridian of Mars facing your telescope at any moment (and thus orient the map on p. 221 to the view of Mars in your telescope):

Express that moment in UT (the date might advance by one day). Then select L(1) for the nearest preceding date in the table, and from it subtract Δ multiplied by the number of complete days elapsed since that date. Then add 14.6° multiplied by the time in hours elapsed since 0 hours UT. If the result is less than 0°, add 360°; if greater than 360°, subtract 360°. The answer is accurate to within 1°, provided the time of observation is accurate to +/– 2 minutes.

Example:
Michael Gatto's excellent sketch of Mars made September 5 at approximately 04:30 ADT = 07:30 UT (see the attachment).

$$L = 169.0 - (9.12 \times 1) + (14.6 \times 7.5) = 269°$$

Selecting 269° on the map on p. 221 of the Handbook reveals that the prominent dark area in Michael's sketch is Syrtis Major with Mare Tyrrhenum on its east (left) side, plus Mare Cimmerium further east. As the diagram on p. 220 indicates, on the date of Michael's sketch Mars was at the beginning of its "Antarctic" summer. The evaporating south polar cap is obvious (Incl. = –18°). In the Martian northern hemisphere winter was underway. Clouds are present in the vicinity of Nilosyrtis (near 60° north latitude).