The NOVAC Corona

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FIND YOUR PLACE IN THE UNIVERSE by Al and Lynn Schumann

Well, you finally did it. You joined the big time with a super duper, fork mounted, equatorial marvel with four on the floor and factory air! What next? You can't find anything? Not even with that 2mm Nagler? Relax...we've all been rookies, and we've suffered the same agony of defeat. The old adage goes, "Finding it is half the fun". But how much fun can you stand?

Fact is the fork mounted equatorial is a magnificent device, but it does have limitations. For example, just try sweeping on a diagonal; it will drive you crazy. But if you stop fighting the machine and work with it you will change frustration into fun.

If you can manage the setting circles, stop here and go on to the next article. In our case, we gave the setting circles a whirl, but results were less than satisfying. You see, between us our eyeballs have well above 100 years of hard mileage. We spent more time fiddling with bifocals then we did looking through the telescope. So, here's how we came to grips with our fork and found a method which may help you too. If you can manage a decent polar alignment you're in business. That's a big IF...but who said astronomy was easy?

First, buy some simple sky charts printed with Mercator projection; straight up and down and straight left and right. For once in your life you get a good deal; the up-down-left-rights (UDLR) are tailor made for your equatorial mount. Hold off on the Uranometria 2000.0; you'll be flipping pages like crazy and lose all feel for the big picture. Charts going down to 5th or 6th magnitude will cover the entire sky on only a few pages, and that's the big picture we're looking for. *(Editors Note: Edmund Mag5 is a nice one, but there are others...just keep it simple!)*

Next, put that 1,000 power eyepiece aside for a while and plunk in the lowest power ocular you can find. To locate deep-sky wonders you want the widest possible field of view and all the light you can get. After you have found something you can then raise the power.

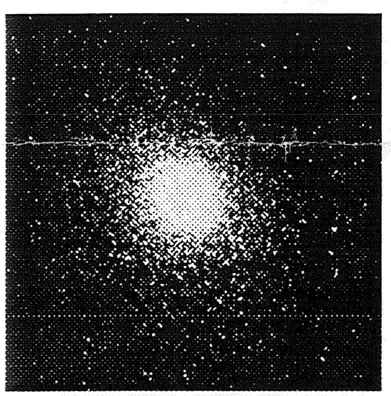
Now spend some time studying your charts with UDLR in mind. See what deep-sky objects are in line with readily identifiable stars in either plane. For example, if you can find Sirius you can locate

M-41. Put Sirius in the field of view, lock the R.A. axis, sweep down a few degrees and, voila, M-41, a lovely galactic cluster. If you can't find Sirius, you've blown a bundle of money for nothing.

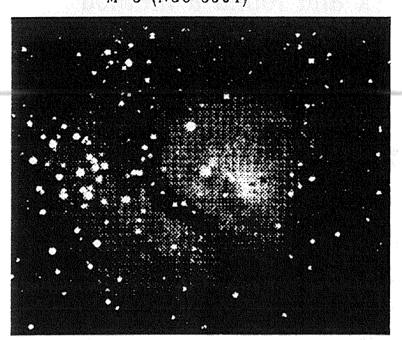
Open up the charts and follow along with us.

Beta Taurus, a 1.6 magnitude star, is the key to M-38. Move half a degree to the left of Beta, lock the R.A. axis and go straight up. From M-38 go half a degree left and sweep down to M-36. Getting the idea?

Out favorite is what we call the Arcturus Adventure. Arc around the handle of the Big Dipper to Arcturus, the principal star in the constellation Bootes. From there, center the telescope on Eta Bootes which is the next bright star to the right of Arcturus. Lock the declination axis and sweep to the right until the globular cluster M-53 comes into view. From M-53, look in the finderscope while sweeping straight up to the next bright grouping of stars. This is Beta Coma Berenices. Lock the declination axis about half a degree above Beta and sweep left. M-3 should appear. If you go back to Beta, lock the R.A. axis and sweep upward, you'll see in your finderscope a group of four stars which are arranged like fingertips. Center on the uppermost star in that field, sweep to the right and you have M-94. Split the top two stars and sweep up, and you'll get M-63. With that little routine, you can knock off two georgeous globulars and two galaxies.



M-5 (NGC 5904)



The Lagoon Nebula, M-8

Go back to the "fingertips", sweep down to Beta and M-53. Move two degrees to the right, lock the R.A. axis and continue moving down about six degrees to Epsilon Virgo. Set you finderscope about one half a degree below Epsilon, lock the declination axis and sweep carefully to the right. The first bright stars you see are Rho and 27 Virgo. You're at the gateway to the Virgo cluster of galaxies. M-59 is directly above Rho. With decent seeing conditions, and a great deal of patience, you should be able to pick your way from one galaxy to another.

Going up from Beta Libra gets you to M-5; going down leads to NGC 5897. Antares begets M-4 and also M-19. M-19 opens the door to M62. Epsilon and Delta Ophiuchus are distinctive close neighbors which pave the way to M-10 and M-14. Lambda is the star at the tip of the sickle in Leo. It is also directly above NGC 2903, a nice galaxy.

We might be getting to sensory overload, but if you're still with us we'll move on to Sagittarius, the "Teapot". A sweep to the right from Epsilon leads one to M-7. If you start from a point about halfway up the spout and sweep right, you should come to M-6, the "Jewel Box". With the "Jewel Box" centered, you can sweep back to the left through the spout and find M-69 and M-70. The "Lagoon" and "Trifid" Nebulae are a short vertical sweep from Gamma. A run straight up from Delta will put you right on M-17, and in the immediate vicinity of several other fine deep-sky objects.

Aquarius is not that well defined in the sky, but if you can locate Beta Aquarius, you will have opened the door to M-2 and M-15 to the north and another nice globular, M-30 to the south.

The foregoing gives you a fairly good cross section of objects around the sky, and we're sure you will pick up many others along the way. The nicest fringe benefit of this technique is that you'll really learn the night sky. Before you know it, you'll be working the setting circles into the equation. Then you'll be ready for one of those sophisticated sky charts pinpointing your place in the universe.

COLD WEATHER OBSERVING TIPS by Bob Ridgley

Many people put their telescopes away when temperatures fall. That's too bad...cold weather brings freedom from the summers haze and the annoyance of insects. The following suggestions may help you to better enjoy winter observing.

You'll never feel warm if your hands and feet are cold. Electric sox are great! They eat up batteries; but when combined with a good pair of insulated boots, your feet will stay warm. Astronomers never have warms hands during the winter; but a pocket hand warmer helps a lot.

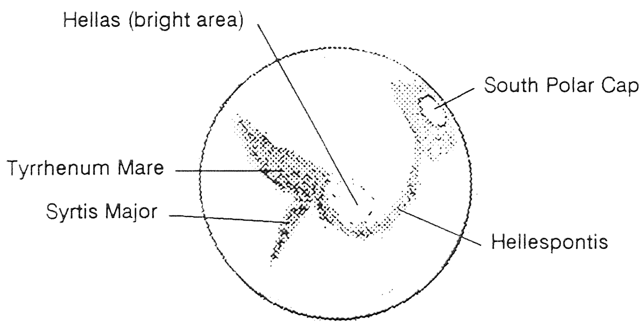
Dressing in layers allows you to add clothing as you cool down or remove it when you overheat. Thermal underwear is a must. Some of the new man-made fibers are highly rated. Consider buying a one piece suit with a detachable hood as an outer garment and a windbreaker. Don't buy it from a ski shop, you'll pay upwards of $300.00. Try a motorcycle shop, they're less expensive. They also have plenty of large outer pockets for gloves and equipment. Be sure to get it large enough to wear over your other clothing and allow freedom of movement. It goes almost without saying that you must wear a hat! I use a sock type in addition to the hood on my insulated suit. While we're on the topic of wind, note that you will lose three times the body heat in a 10 mph wind as on a calm night. Unless you have a sturdy Dobsonian type mounting and a strong constitution don't consider going out when the wind is above 10 mph.

Drink plenty of fluids. A doctor friend once told me that most people are always in a state of mild dehydration. Fluids (hot or cold) are a must for helping your body regulate it's internal temperature. Eating, especially sweets, will keep you alert and help sharpen your concentration while at the eyepiece.

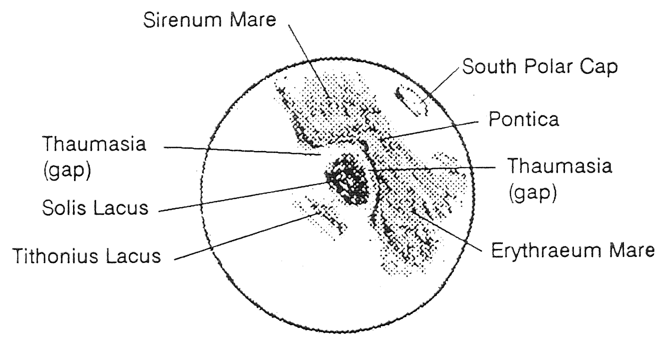
And lastly don't overdo it...take breaks often. Get in your car and warm-up. Remember to save enough energy to pack-up your equipment and make the long drive home. The cold will quickly drain your energy and falling asleep while driving is deadly.

MARS OBSERVED by Bill Burton

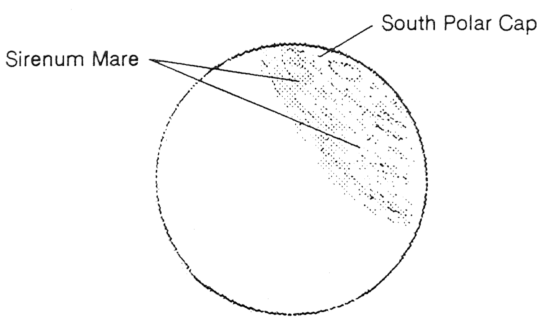
The sketches on the next page were made during the period of August 26, to September 21, 1988. Mars reached opposition on September 27, 1988. With the exception of the September 11th observation, they were made from my back porch in Reston, Virginia using a Meade 8-inch f/6 Newtonian reflector. The September 11th observation was made from Crockett Park (at the NVTM) using a Celestron 11-inch SCT (Note that this is a reversed image!). Features were identified with the help of the May, 1988 issue of Sky & Telescope (pp. 516-519). The article contains a map of surface features and a table to calculate the Martian longitude being seen at any given date and time during the period near opposition. All times are given in Eastern Daylight Savings Time.



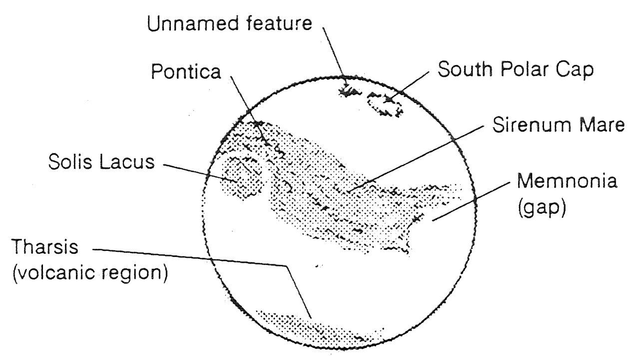
August 26, 5:00 A.M., 457x



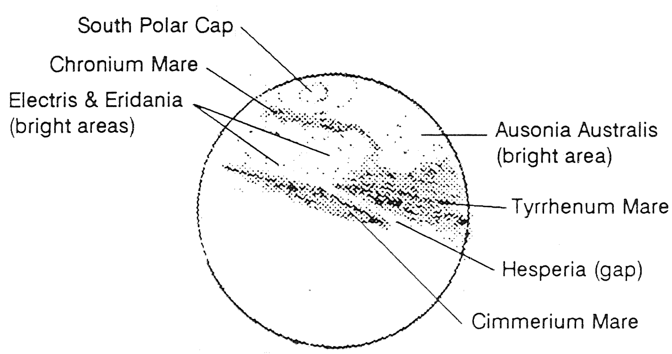
September 11, 1:00 A.M., 310x



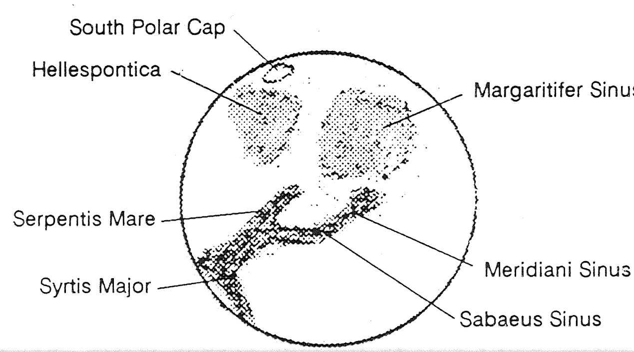
August 30, 10:30 P.M., 313x



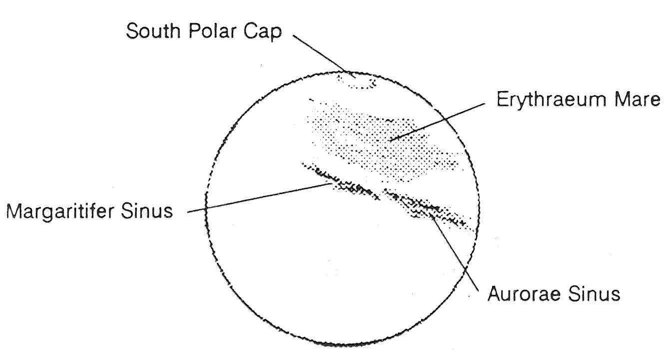
September 13, 11:00 P.M., 313x



August 31, 4:00 A.M., 457x



September 21, Midnight, 313x



September 3, Midnight, 457x

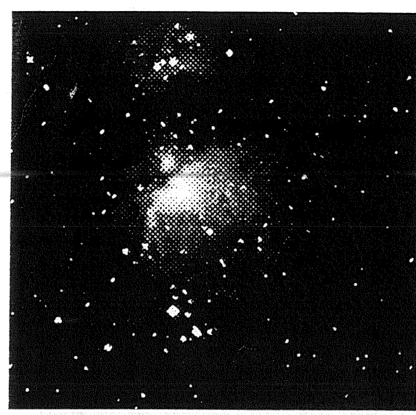
A NIGHT AT BIG MEADOWS by Jim Schaeffer

Observing at a new site is always a thrill; whether you're hoping for the darkest sky you've seen yet, or a more unobstructed horizon than your regular site. Bill Burton, a NOVAC member, teaches "An Introduction to Astronomy" at Northern Virginia Community College. Last month he took his class to Big Meadows on Skyline Drive for an overnight learning and observing session. Bill welcomes any NOVAC member to join the group; another telescope is always welcome. Friday, November 11th was the primary observing night, with the 12th designated as backup. Sure enough as the 11th approached the forecast called for clouds! But this time the forecast turned out to be wrong; it was as clear as could be.

My wife, Jeanette, and I left home at 4:00 P.M. on Friday afternoon expecting light traffic heading west to Skyline Drive. The unexpected crush of Veterans Day (weekend) traffic surprised us. It took 2-1/2 hours to travel only 84 miles! Rush hour had come to the country. Arriving after dark we had difficulty reading the parks little brown directional signs. The deer and other critters were plentiful and the night view of the surrounding towns was beautiful, that alone was worth the drive.

The Big Meadows site is a good 20 miles south of Thornton Gap (Route 211). When we arrived Bill and a few others were already set-up. The air was clear and cold! The night's low of 20 degrees and the steady 20 mph wind would soon test the will of us all.

The sky was impressive. 5th magnitude stars were visible to me as soon as I stepped out of my van. My 17.5-inch Odyssey (Dobsonian) is not bothered a lot by wind, but I sure was! We parked the vans together to act as a windbreak and that helped a lot. The Odyssey takes about two hours to cool down for good viewing and this allows me to set-up and look at the other scopes. Bill Burton has his Meade 8-inch, f/6 reflector. There was also a Meade 6600, a C-90 clone, and a nice pair of giant binoculars. Jeanette and I came prepared for the cold with lots of cloths, electric sox, and a propane heater in the van (with the roof vent open).


The Orion Nebula (M-42)

The seeing was great. Normally a cold clear night is not real steady, but that night was an exception. The Veil Nebula was a curved mass of twisted strands across the field, with a hint of color. I saw Stephan's Quintet for the first time. The faint galaxies in Pegasus, which range in magnitude from 13.7 to 15.3, were a tight little group in the Odyssey, and would be a good test for the Crockett Park site. The deep-sky observing was great and the "new" astronomers enjoyed the wonders of the sky. After Bill and I showed everyone different types of objects he explained what they were and how they were formed.

We then put an off-axis mask on the Odyssey. The mask turns the fast light bucket into a long focus unobstructed planetary scope, with excellent definition that is hard to match. Jupiter was high in the sky and very bright. The belts were sharp, with ovals and festoons easily observable. We also watched the shadow of Io transit across the planets face. Mars was still high enough to observe, and it also was beautiful.

The simple design of the Odyssey along with a Telrad finder is a foolproof, deep-sky combination

The Horsehead Nebula and Zeta Orionis

that is hard to beat. The Great Nebula in Orion climbed high in the sky and with a low power eyepiece it was spectacular and presented a 3-D appearance. Attesting to the dark skies, a low power eyepiece with an H-Beta filter revealed the Horsehead Nebula to everyone. All the deep-sky objects which I saw were better than I had ever seen them before.

The morning came and so did the deer; they are plentiful in the mountains. They are use to people and come looking for food. The telescopes which were left out all night were covered with frost. Luckily I had put towels over the Telrad and the focuser. I suggest that everyone do the same...it keeps dew off the glass beam splitter in the Telrad and the eyepiece. Saturday was clear but clouded over by evening. Sunday morning brought sleet and a 40 mph wind. The Big Meadows site would be great for a club observing session, maybe in April, before the bugs.

RESOLVING PLANETARY DETAIL - Extracted from an article by Terence Dickinson

The ability of a telescope to deliver high contrast is far more important than light collecting ability when viewing bright, extended surfaces of varying intensity and hue, such as the Sun, Moon, and planets. For a given aperture, maximum contrast ensures the clearest discrimination of detail such as festoons in the belts of Jupiter, subtile mottling on the surface of Mars, structures on the lunar surface, etc. Contrast is only partially related to telescope resolution, yet a telescopes resolving ability is widely regarded as the only important performance criterion for planetary observation.

The wave nature of light causes an optical system having a circular aperture to image a point of light as a small, spurious blur, known as the Airy disk, surrounded by a few diffraction faint rings. Resolving ability is usually quoted in the form of the Dawes' limit which is approximately the angular radius of the Airy disk formed by an optical system. Regardless of the telescope's optical configuration, the smallness of the Airy disk, and consequently the theoretical resolution, varies directly with the aperture (e.g. a telescope of 200 mm aperture has twice the resolution of a 100 mm instrument). Being able to cleanly split two 6th magnitude stars separated by the radius of their Airy disk is usually cited as the practical observational test to determine if a telescope reaches its theoretical resolution limit.

In any optical system the light from every point of an object entering the telescope is distributed between the Airy disk and the surrounding diffraction rings. When the optical system contains obstructions, such as a secondary mirror and supporting vanes of a Newtonian or a Schmidt-Cassegrain secondary mirror, significant additional light is spilled from the Airy disk into the rings. In practice this can make splitting a close double star slightly easier by reducing the brightness and diameter of the individual Airy disks. Since this double star method of testing resolution is widely regarded among amateurs astronomers as the standard for telescope performance on all celestial objects, it is incorrectly assumed that resolution of fine lunar and planetary detail is determined solely by aperture. But such is not the case. It is based on contrast in combination with resolution.

Imagine the disk of a planet, say Jupiter, divided into a grid of adjacent Airy disks. In a 150 mm telescope that resolves to the theoretical limit, the image of Jupiter would be approximately 60 of these resolution elements wide. An analogy that is useful here is a television screen. Its picture these resolution elements wide. An analogy that is useful here is a television screen. Its picture elements, which are visible from close range, have differing intensities and each is a tiny piece of the mosaic which constitutes the picture. However, each picture element spills a small amount of light into the surrounding elements. The best television images are achieved with sets that have minimized this spillover.

In an unobstructed telescope system, the "picture elements" - a multitude of overlapping Airy disks - spill 16% of their light into adjacent elements. Thus each has 84% of the "pure" light intensity and hue from the planetary surface, but is contaminated by 16% from adjacent areas.

Perhaps the most common obstructed system is the 200 mm Schmidt-Cassegrain. The 70 mm secondary mirror blocks about 12% of the area (35% of the diameter) of the main mirror. In these systems the diffraction effect is substantially elevated so that only 64% of the light is in the Airy disk and 37% is spread into the rings. The contrast in this case is less than half that of an unobstructed system because more than twice as much light from each resolution element in the image is diffused into the surrounding region. In such telescopes, a planetary image, even under excellent seeing, has a gauzy appearance, as if it were being observed through a fine ground glass screen. The difference is instantly noticeable in a side by side telescope comparison.

The apochromatic refractor is an unobstructed, nearly aberration free design. The achromatic refractor, by far the dominant form of unobstructed telescope, is only slightly less contrast efficient. Secondary chromatic aberration, noticeable in short focal ratio achromatic refractors or in long focus achromatic refractors over 90 mm aperture, affects contrast by diffusing unfocussed blue and (to a lesser extent) red light over the image. However, this can be largely neutralized with a yellow-green eyepiece filter (#11) that suppresses the red and blue ends of the visible spectrum and enhances image contrast.

Newtonians of f/7 or longer focal ratio can be optimized for planetary work by equipping them with small diagonals obstructing less than 5% of the incoming light, producing refractor like images. In performance per dollar, these telescopes are superior to refractors although they are more subject to temperature effects. The secondary supports for the diagonal mirror in a Newtonian also slightly degrade the contrast. Schmidt-Cassegrain and short focus Newtonians over 200 mm aperture can easily be converted to refractor like performance by using a circular, off-axis aperture stop over the front of the tube, covering all but an unobstructed one-third (approximately) of the aperture.

Editors Note: This article was not presented to criticize the SCT, I own one; but only to show that different types of telescopes excel at different types of observations.

DECEMBER CALENDAR

1 THU: Moon at last quarter (1:49 EST), at descending node (2:00 EST). Mercury at superior conjunction with the Sun, passes into the evening sky (4:00 EST).

2 FRI: NOVAC observations at Greenville Farm. Moon at apogee, distance 63.4 earth radii (1:00 EST). Mars 3 the first craft to soft-land on Mars, 1971. Pioneer 11 flies past Jupiter, 1974.

3 SAT: NOVAC observations at Crockett Park. Mercury at aphelion, 0.4667 a.u. from the Sun (23:00 EST). Hanukkah begins at sunset. Pioneer 10, first Jupiter flyby, 1973.

5 MON: Phoenicid meteors.

6 TUE: Moon 7 degrees south of Venus (19:00 EST).

7 WED: Earliest sunset at about 40 degrees north latitude. [The time, 16:35 EST will vary with latitude and may not be exact!] *

9 FRI: NOVAC observations at Greenville Farm. New Moon, beginning of lunation number 816 (00:36 EST). Puppid-Velid meteors.

10 SAT: NOVAC observations at Crockett Park. Monocerotid and Chi Orionid meteors.

11 SUN: Sigma Hydrid meteors.

13 TUE: St. Lucy's Day, formerly regarded as the middle of winter...Ha!

14 WED: Moon at ascending node (20:00 EST). Birthday of Tycho Brahe (1546-1601). Marnier 2, first successful planetary flyby (Venus), 1962.

15 THU: Moon at perigee, distance 58.1 earth radii (23:00 EST). Venera 7, first craft to soft-land on Venus, 1970.

16 FRI: Moon at first quarter (00:40 EST). Omicron Piscid meteors.

17 SAT: Moon 3 degrees north of Mars (11:00 EST). Sun enters Sagittarius, at longitude 266.17 degrees on the ecliptic (16:00 EST).

19 MON: Saturnalia, ancient Roman festival.

20 TUE: Delta Arietid meteors. Mercury 3 degrees south of Neptune. They are 11 degrees from the Sun in the evening sky, at magnitudes -0.8 & +8.0 (4:00 EST). Moon 6 degrees north of Jupiter (15:00 EST).

21 WED: Winter Solstice (10:28 EST). The Sun is at longitude 270 degrees on the ecliptic and is in the astrological sign of Capricornus, although it has only just entered the astronomical sign of Sagittarius. Apollo 8 launched, first manned craft to leave Earth's gravity, 1968.

22 THU: Ursid meteors. Uranus at conjunction with the Sun, passes into the morning sky (15:00 EST).

23 FRI: Moon full, the "Moon Before Yule" or "Long Night Moon" (00:29 EST) **. Giovanni Cassini discovers Rhea, moon of Saturn, 1672.

24 SAT: Mercury at greatest latitude south of the ecliptic plane, 7 degrees (6:00 EST). Venus 6 degrees north of Antares, they are about 24 degrees from the Sun in the morning sky, at magnitudes -4.0 & +1.0 (13:00 EST). The equation of time is equal to 0 (19:00 EST).

25 SUN: Christmas. Birthday of Issac Newton (1643-1727) - almost exactly one year after Galileo's death. Comet du Toit at perihelion (17:00 EST).

26 MON: Saturn at conjunction with the Sun, passes into the morning sky (7:00 EST).

27 TUE: Birthday of Johannes Kepler (1571-1630). Moon 0.2 degree north of Regulus (15:00 EST).

28 WED: Lyncid meteors. Moon at descending node (4:00 EST). Arthur Eddington born in 1882.

29 THU: Moon at apogee, distance 63.4 earth radii (23:00 EST).

30 FRI: Moon at last quarter (23:57 EST).

31 SAT: Neptune at conjunction with the Sun, passes into the morning sky (4:00 EST).

(*) and (**) See "DECEMBER CALENDAR NOTES" on next page.

JANUARY CALENDAR

1 SUN: New Years. Earth at perihelion. Giuseppe Plazzi discovers Ceres (asteroid), 1801.
2 MON: Quadrantid meteors. Luna 1, first craft (unmanned) to leave Earth's gravity, 1959.
3 SUN: Quadrantid meteors. Juno stationary.
4 MON: Antares 0.5 degrees north of Moon, occultation.
5 TUE: Venus 5 degrees north of Moon.
6 FRI: NOVAC observations at Greenville Farm.
7 SAT: NOVAC observations at Crockett Park. New Moon (14:22 EST).
8 SUN: Mercury at greatest eastern elongation, 19 degrees.
9 MON: Mercury 1.7 degrees north of Moon.
10 TUE: Moon at perigee. U.S. Army Signal Crops makes first radar contact with the Moon, 1946.
11 WED: William Herschel discovers Titania and Oberon, moons of Uranus, 1787.
12 THU: Venus 0.5 degree north of Uranus.
13 FRI: NOVAC observations at Greenville Farm. Galeleo discovers Ganymede, moon of Jupiter, 1610.
14 SAT: NOVAC observations at Crockett Park. Moon at first quarter (8:58 EST). Mars 4 degrees south of Moon.
15 SUN: Mercury stationary.
16 MON: Venus 0.6 degree south of Saturn. Jupiter 6 degrees south of Moon. Dr. Martin Luther King, Jr. Birthday (celebrated).
18 WED: Venus 0.9 degrees south of Neptune.
20 FRI: Jupiter stationary.
21 SAT: Moon full (16:33 EST).
23 MON: Regulus 0.03 degree south of Moon, occultation.
24 TUE: Mercury at inferior conjunction. Voyager 2 flies past Uranus, 1986.
26 THU: Moon at apogee.
27 FRI: Fire kills crew of Apollo 1, 1967.
28 SAT: Challenger explodes, killing crew, 1986. Johannes Hevelius born, 1611.
29 SUN: Moon at last quarter (21:02 EST).
31 TUE: Mercury 4 degrees north of Venus. Explorer 1 launched, first orbiting American spacecraft, 1958.

DECEMBER CALENDAR NOTES

* Earliest sunset (16:35 EST) about 40 degrees north latitude. The date, and of course the time will vary with latitude. The sequence is: earliest sunset; shortest day (i.e. solstice, Dec. 21st.); latest sunrise (Jan. 5th.). Thus Dec. 7th. seems to be the shortest day, because most of us experience sunset, and not sunrise; the day then seems to lengthen (very slowley at first) up to Dec. 22nd. when they are really still shortening, and from then until Jan. 5th. seem to lengthen more rapidly then they are really doing.

** The name of "Long Night Moon" is doubly appropriate because the midwinter night is long and the Moon is above the horizon for a long time. It is the full Moon nearest to the winter solstice (sometimes the full Moon in January is nearer: this January's full Moon was nearer than the previous December's). It takes a high trajectory across the sky (for north hemisphere people).

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N.O.V.A.C.
To observe and to help others observe
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NO. VIRGINIA VA
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PRAY FOR PEACE

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