

# Some celestial wonders to see with the Orion<sup>®</sup> StarBlast<sup>™</sup> telescope

By Bob Moler

## About the StarBlast<sup>™</sup> telescope

The StarBlast<sup>™</sup> telescope is a Newtonian reflector, which was actually invented by Isaac Newton. The primary mirror of 4.5 inches or 114 mm diameter form an image 450 mm away from it. It uses a diagonal mirror to reflect the image out the side of the tube where the eyepiece is. This secondary mirror is supported by a four vaned structure called a spider. The four vanes can produce four diffraction spikes on really bright stars like Sirius, and are also seen in Hubble Space Telescope pictures. The zoom eyepiece will give magnifications of from 19 power to 57 power. While that doesn't sound like a lot, the name of the game for astronomical telescopes is light gathering power. This telescope will deliver 265 times the light that the unaided eye can see. Only planets require higher magnification. Along with light gathering power, resolution also increases with the aperture, or diameter of the primary mirror. Resolution is the ability to see fine detail and give a sharper image.

The StarBlast<sup>™</sup> telescope mount is what astronomers call an alt-azimuth mount that would sit on a table or pedestal. It is much easier to set up and move than any other kind of mount. A sturdy picnic table is ideal.

## Jovian (Jupiter's) Satellite Positions

<https://in-the-sky.org/jupiter.php>

The satellite positions are represented graphically for a month at a time as wavy lines. Io's line is orange; Europa's, yellow; Ganymede's Red; Callisto's Blue.

## Best times to see Venus in a telescope

Venus is a featureless, cloud covered planet (worse than Northern Michigan). The best times to see Venus in a telescope is when it is relatively close to the Earth, appears large and exhibits discernible phases. This is around five months before and after inferior conjunction, when it passes between the Earth and the Sun. In the five months before Inferior conjunction Venus appears in the evening sky and will grow in size as it approaches the Earth. And being illuminated by the Sun it will exhibit phases like the Moon, going from gibbous, to half illuminated at its greatest elongation from the Sun, to an ever thinning crescent. After Inferior conjunction Venus is seen in the morning sky and will diminish in size while its phase will grow from crescent to half to gibbous. Below is a table of some of the best times to view Venus with a telescope in the next few years:

Evening Appearance	Greatest Elongation*	Inferior conjunction*	Morning Appearance	Greatest Elongation*
November 2016 to March 2017	January 12, 2017	March 25, 2017	April 2017 to August 2017	June 3, 2017
June 2018 to August 2018	August 27, 2018	October 26, 2018	November 2018 to March 2019	January 27, 2019

<b>Evening Appearance</b>	<b>Greatest Elongation*</b>	<b>Inferior conjunction*</b>	<b>Morning Appearance</b>	<b>Greatest Elongation*</b>
January 2020 to May 2020	March 24, 2020	June 3, 2020	June 2020 to November 2020	August 13, 2020
August 2021 to December 2022	October 29, 2021	January 9, 2022	January 2022 to May 2022	March 20, 2022
January 2023 to May 2023	June 4, 2023	August 13, 2023	March 2023 to July 2023	June 4, 2023

Venus will appear visually for about two months before the stated evening appearance and two months after the stated morning appearance but will appear too small to appear anything but a tiny disc.

\* Source for these dates is *Astronomical Tables of the Sun, Moon and Planets* Third Edition by Jean Meeus © 1983-2015 Willmann-Bell Inc. Richmond, VA

## Finding your way around the sky

Books on constellations, star charts or star atlases may be borrowed from the library or purchased. With them you can learn the constellations and find your way around the sky.

The finder for the StarBlast™ telescope is a red dot finder that places a red dot on the object it's pointed at when you look through it. It doesn't provide magnification or a brightened image. Between the finder, the lowest power set in the telescope, with the eyepiece zoomed out to 24mm focal length giving 19 power magnification, should allow for easy finding of objects.

A monthly star chart for the Grand Traverse Area can be found at <http://epemeris.bjmoler.org> along with a list of planetary events for the month. There are also commercial and free star chart programs on the Internet. Here are some free ones listed in order of ease of use.

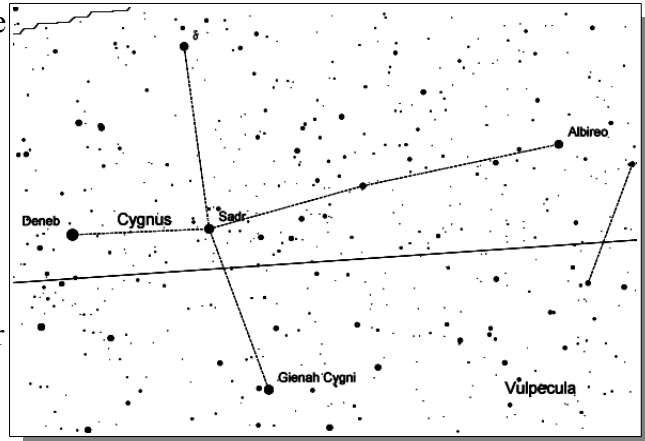
- Stellarium: <http://www.stellarium.org>. For older computers use version 0.12... For newer ones you can use later versions. This program shows a very realistic sky and is very easy to navigate around.
- Sky Charts (Cartes du Ciel): <http://astrosurf.com/astrope/>. This is a good program for use with a laptop out with the telescope, or to print star charts of selected areas. Displays in this document are screen printed from this program. If one has an Internet connection while the program is running, elements for currently visible comets and asteroids can be downloaded for display.
- Hallo Northern Sky: <http://www.hnsky.org/software.htm>. This one looks bare bones but there are a lot of hidden features. It is the hardest to use.

There are also star finding apps for the smart phone, both for the iPhone or Android. One app for Android is very useful. It's called SkEye, and can be installed from the Play Store. It has a function called Virtual DSC. By strapping the smart phone onto the telescope tube and syncing on an object it will track the telescope's pointing position in the sky, allowing it to be a finder for the telescope. There's more information at <http://lavadip.com/skeye/>.

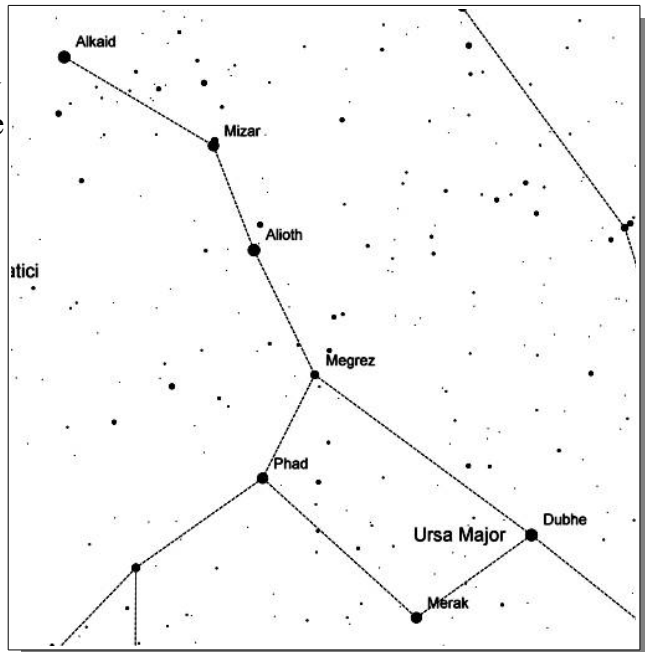
## Some Interesting Stars

**Albireo** ( $\beta$  Cygni) The star in the beak of Cygnus the swan or the foot of the Northern Cross is a blue and Gold binary star. Albireo is visible in the evening from late spring to late autumn.

This is proof, if one had any doubts, that stars come in colors. Star colors are subtle and run from red, orange, yellow, white to blue. Depending on their surface temperatures, cool to hot. Stars have no solid surfaces, it's just the layer of gas within the star from which visible light is emitted.

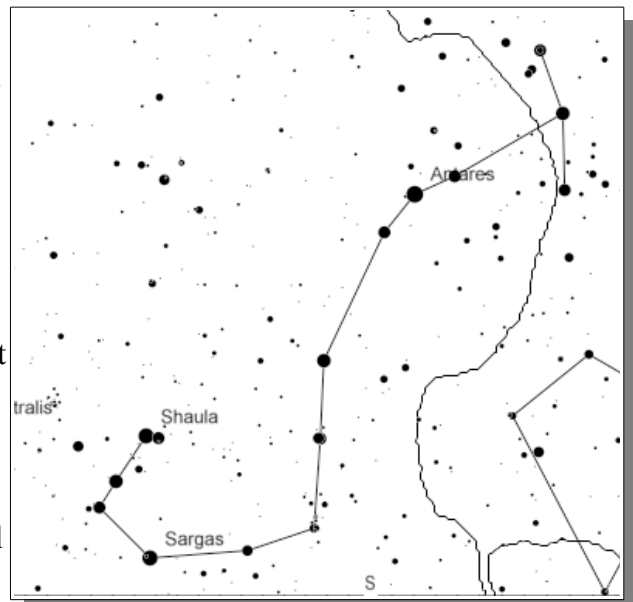


**Mizar** ( $\zeta$  Ursa Majoris) and **Alcor**. Mizar, at the bend in the handle of the Big Dipper has a dim and challenging naked eye companion Alcor. The ability to see the pair was an ancient eye test. In a telescope Mizar has a close companion. These stars are up all year, except are very low in the north in the autumn and early winter



**Antares** ( $\alpha$  Scorpii) is the bright red giant star in Scorpius. It shows a yellow-orange in telescopes. However because it appears close to the horizon a lot the Earth's atmosphere can cause it to sputter all the colors of the rainbow. The worse the seeing the sparklier it gets. It is visible from late spring to late summer.

The planet Saturn will appear above Scorpius during 2016 and 2017. During the summer of 2016 Mars will also appear above and in Scorpius. This is a neat opportunity to see Mars and Antares close together because they have the same color. Indeed the name Antares means "Rival of Mars". Ant for anti and Ares, the Greek god of war whom the Romans called Mars. On the evening of August 24<sup>th</sup>, 2016 Mars will be closest to Antares. Mars cruises past Antares



about every two years or so. The next close encounter between these two will be in February 2018. Antares is red because it is a relatively cool star. Mars is red because it is covered by iron rust dust.

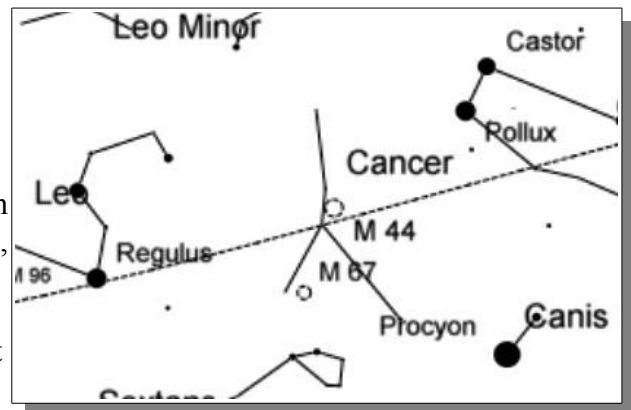
## Some Bright Deep-Sky Objects

Deep sky objects are generally dim objects beyond the solar system among the stars of the Milky Way or beyond. Even the brightest deep-sky objects may not be visible in the EZ View finder, so the telescope is pointed to the object using nearby stars as guides.

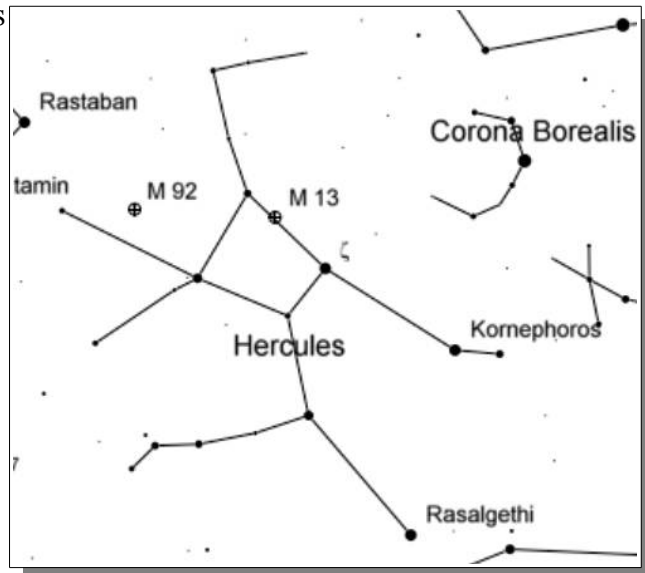
Most of the brighter deep-sky objects are mostly known by their Messier Catalog number. Charles Messier was a French astronomer around the time of the American Revolution, and had a telescope with a smaller diameter than the StarBlast™ telescope. He was searching for comets, which when they first appear look like tiny fuzzy blobs. But comets move. When he found a fuzzy blob that didn't move against the background of the sky, he marked it down with a number and location, so he wouldn't bother with it if he ran across it again. Many of these objects also have nicknames. Messier objects are prefixed by the letter M. Another catalog of bright deep-sky objects is the Caldwell catalog by the late UK astronomer Patrick Moore, which picks up some objects Messier missed.

## Spring Objects

**The Beehive Star Cluster, M44** is a nearby star cluster easily visible as a star cluster in binoculars. It is a springtime object. It's a faint fuzzy spot to the naked eye. It's rather large, so it will fill the field of the lowest power eyepiece setting. The Beehive is an open or galactic star cluster that are generally found in the band of the Milky Way, unless they are close to us, or very old. For 2015, the planet Jupiter will be between Cancer and Leo. It was removed from the chart. Also distant star cluster M67 in on the chart. It is small and faint with a lot more stars than the Beehive and will be a challenge to spot.

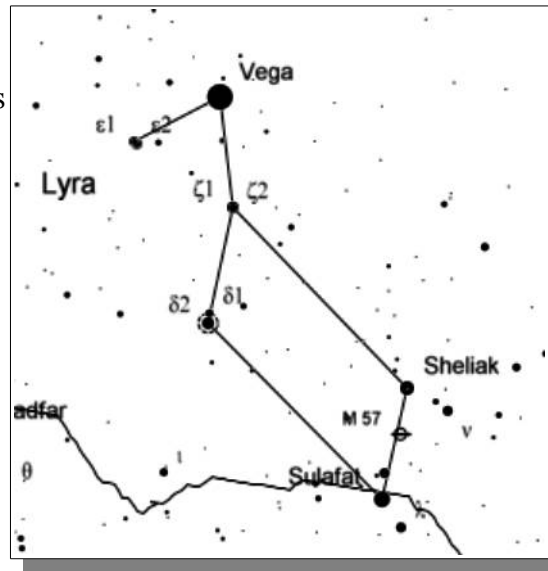


**The Great Hercules Globular Star Cluster, M13** is the finest globular star cluster in the northern hemisphere of the sky. It is visible from late spring to early autumn. Globular star clusters have populations of hundreds of thousands of stars. They date back to the origin of the Milky Way of ten or a bit more billion of years old. There are only about 150 of these that belong to the Milky Way. M13 is visible in binoculars on the western side of the Keystone pattern of stars, about one third the distance from the north star on that side to the south side. It takes a much larger telescope to see individual stars. The star cluster will be a large circular glow. M92 is another star cluster which is dimmer and will be quite a challenge to find.

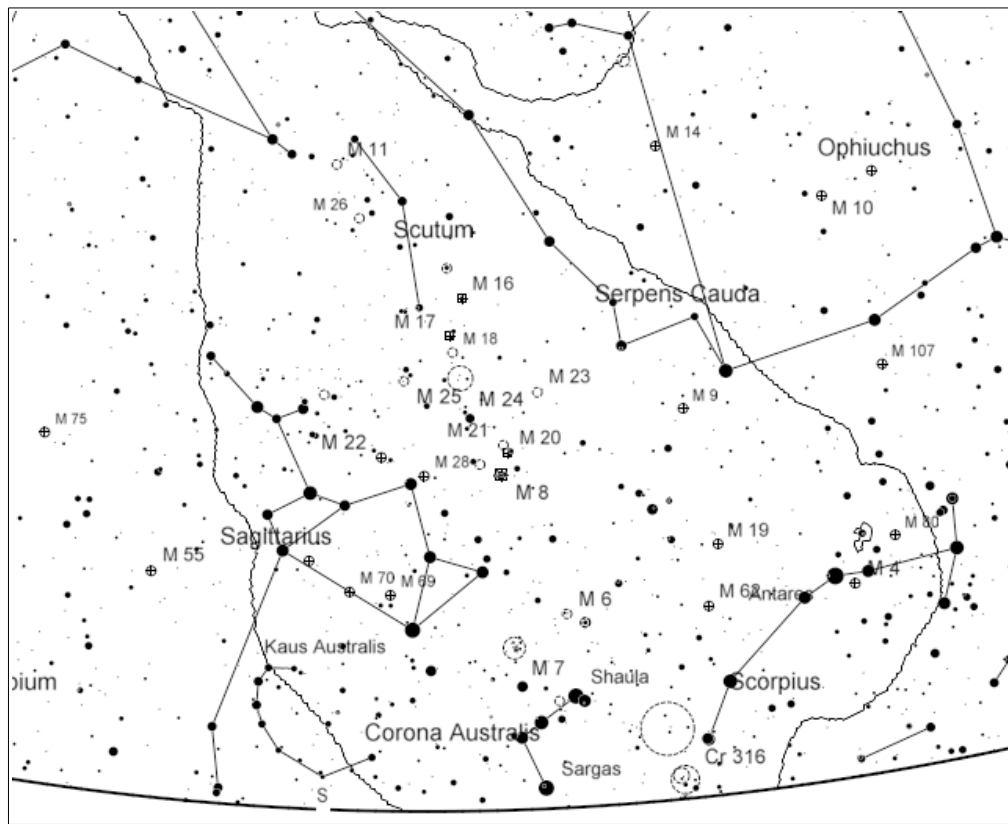


## Summer objects

**The Ring Nebula, M57** is small and cannot be seen with the naked eye or with binoculars, but it is still reasonably easy to find. A nebula is a cloud of gas and/or dust. M57 is in the constellation of Lyra the harp, a constellation visible in summer and early autumn. Point the telescope's finder about half way between the two southern stars of the parallelogram of stars that's the harp's body, Sulafat and Sheliak. Move the telescope in a small spiral enlarging the search pattern by half the field of view at a time. The Ring Nebula will appear a ghostly small circular glow. Once centered, more magnification may be used. The center will be darker than the edge. Inside is a very faint invisible star that blew out its outer layers of gas into a smoke ring near the end of it's life.



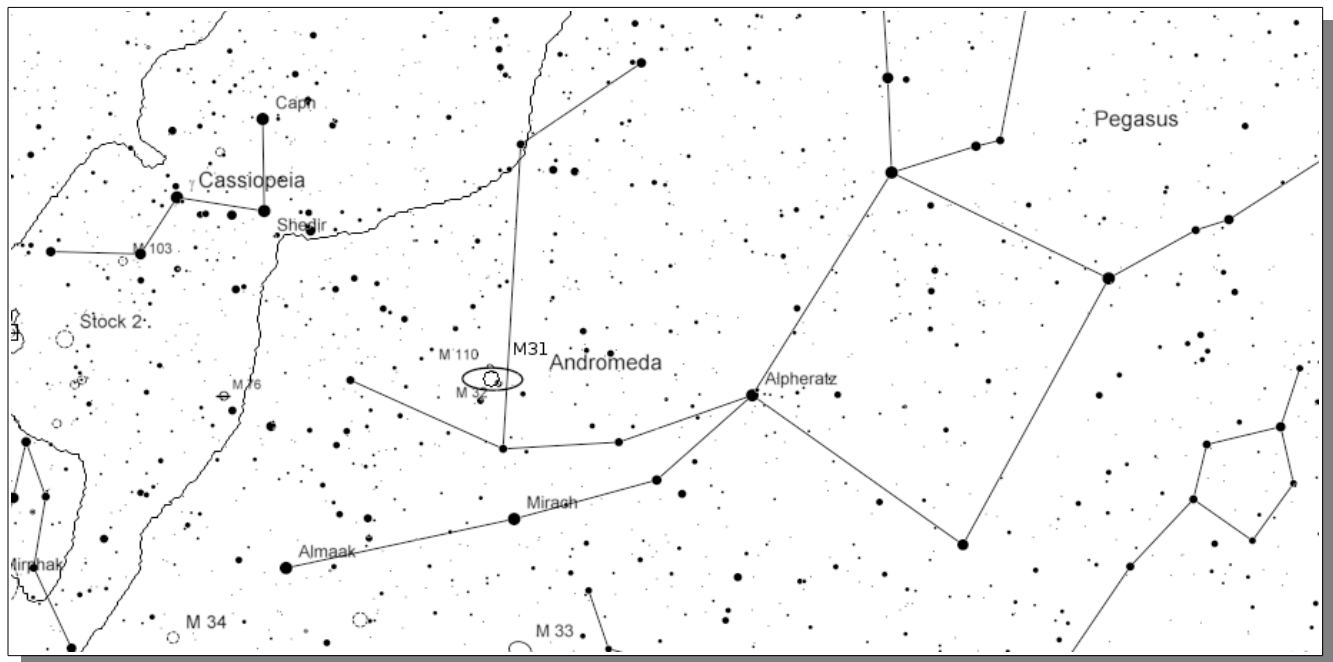
**The Summer Milky Way** contains lots of star clusters and nebulae. The chart below can be used to find the many Messier objects. Or just sweep through this gold mine of objects, most of which are in the next spiral arm in toward the center of the Milky Way. As far as the symbols go, open dotted circles are open or galactic star clusters. Crossed circles are globular star clusters. Squares are nebulae. M8, the Lagoon nebula, and M16 the Eagle nebula also contain star clusters. As far as popular names go: M11 is the Wild Duck Cluster, M17 is the Omega or Swan Nebula, and M20 is the Trifid Nebula.



## Autumn Objects

**The Great Andromeda Galaxy, M31** is the nearest spiral galaxy to our own Milky Way Galaxy. It is actually the farthest object visible to the naked eye at about 2.5 million light years distant. Photographically M31 spans 6 Moon diameters. However visually, only the galaxy's center is bright enough to see. It has a distinctive elliptical shape. There are two small glows nearby, M32 and M110, which are satellite galaxies orbiting M31.

A good way to star-hop to find it is to start with Pegasus, the flying horse, who's flying upside down. It's body is a square of stars. In autumn, this Great Square of Pegasus will be standing on one corner in the east. Later in the night, or in early winter Pegasus will be in the south. From the corner star of the Great Square, Alpheratz. Follow the lower tier of stars in Andromeda, two stars. Then go up two stars to find M31 nearby.



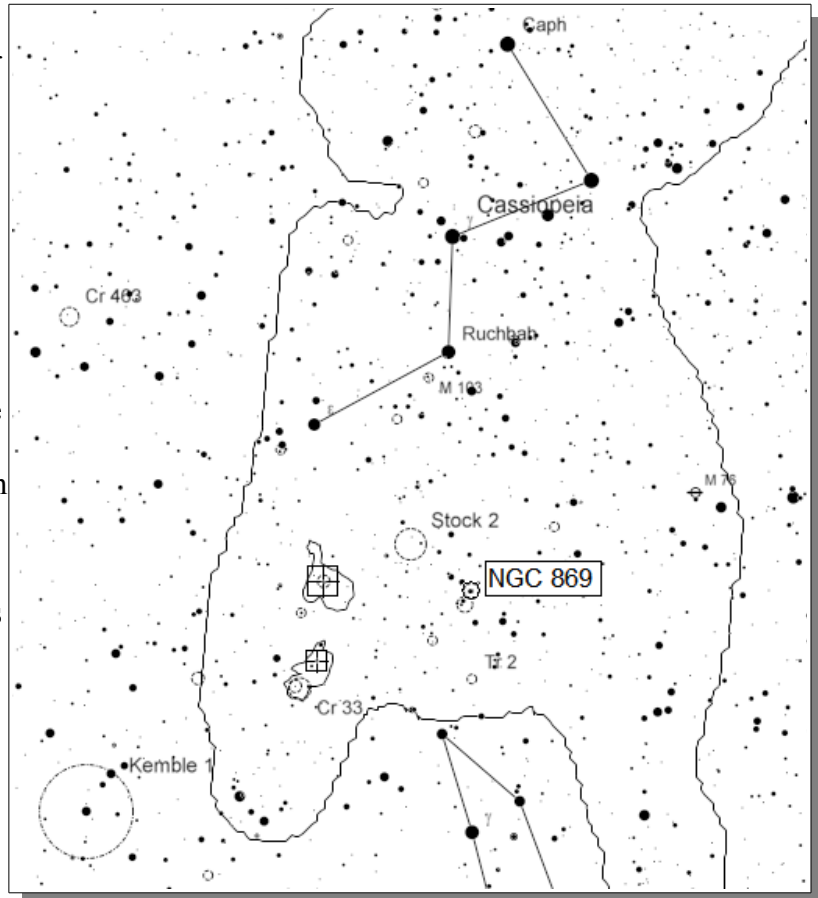
Other objects in the chart above are M103 and M34 which are open star clusters, M33, another nearby galaxy, which has a very low surface brightness, and without a bright center. In photographs, it is a beautiful face-on spiral. Also in the chart is M76, a planetary nebula which is difficult to spot. The star marked Almaak, also spelled Almach with the designation gamma ( $\gamma$ ) Andromedae. In a telescope it is an orange star with a close and dim blue companion star.

**The Double Cluster, NGC 869 & NGC 884** are two star clusters Messier somehow missed. They both fit in a low power field of view. These are open or galactic star clusters and are barely visible to the naked eye as a bright glow in the Milky Way between the constellations of Cassiopeia and Perseus below in the northeastern sky, but are gorgeous in a telescope.

As can be seen from the chart there are lots of deep sky objects visible in the area. Just sweep across the region with the lowest telescope power.

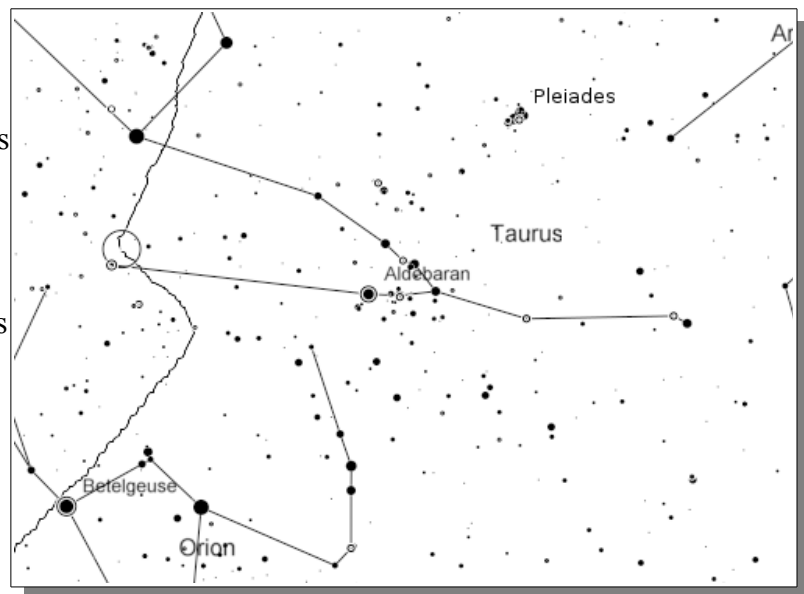
NGC is the New General Catalog, which isn't so new. It's over 100 years old. Star clusters designated Cr are from the Collinder Catalog. Open dotted circles are star clusters.

This is also the area of the sky from where the Perseid meteors, of late July and early August, seem to radiate.



### Winter Objects

**The Pleiades or Seven Sisters, M45** is a nearby open or galactic star cluster. It is easily visible to the naked eye. It is best seen in binoculars or the telescope's lowest power. While up to seven stars are visible to the naked eye a telescope will reveal over 100. In Japan the cluster's name is Subaru, and the logo for the car company of the same name is a stylized chart of the cluster.



**The Great Orion Nebula, M42** is the brightest nebula or cloud of gas in the sky. It is a place where stars are forming. It looks like a glow around a tiny clutch of four stars called the Trapezium, which appears as one of the stars in the center of a line of three stars that is the sword, hanging down from Orion's belt. The Orion Nebula is the nearest of these star forming regions. It is called an emission nebula because it glows by its atoms being energized by the ultra-violet light from the hot stars baby stars of the Trapezium. M43 is also part of the nebula, separated from the rest by the "Dark Bay" a dark cloud just this side of the Orion Nebula.

The small nebula M78 is also seen in the chart above Orion's Belt. The stars of the belt are, from left to right Alnitak, Alnilam and Mintaka. The chart is too clouded to get the name placement right. However, looking around Alnitak, one can see a faint glow that is the Flame Nebula. Below Alnitak is the famous but completely invisible Horse Head Nebula.

