

# MONTHLY OBSERVER'S CHALLENGE

## *Las Vegas Astronomical Society*

*Compiled by:*

*Roger Ivester, Boiling Springs, North Carolina*

*&*

*Fred Rayworth, Las Vegas, Nevada*

*With special assistance from:*

*Rob Lambert, Las Vegas, Nevada*

**JANUARY 2016**

### **M78 – NGC-2068 – Bright (Reflection) Nebula In Orion**

M78 is a reflection nebula that lies in the constellation of Orion. It was discovered by Pierre Méchain in 1780. Charles Messier added it to his catalog the same year. It's part of the same complex nebula cloud that includes the Orion Nebula, M42/43. It lies about 1,600 light-years away and shines at a relatively easy mag. 8.3. It's easy in most back yard telescopes. What may be a bit more difficult are the surrounding patches of nebulosity that include the strip called NGC-2067, an extremely faint patch called NGC-2064 and a little further away, the faint but large smudge NCG-2071. All four objects can fit within the field of a decent wide-field eyepiece.

#### **Observations/Drawings/Photos (Contributors listed in alphabetical order)**



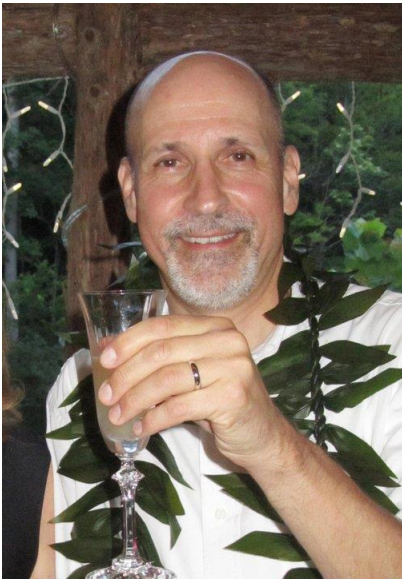
**Glenn Chapple:** LVAS Friend and Author from Massachusetts

I first saw M78 on January 20, 1977, using a 3-inch f/10 reflector at 30X. I noted that it appeared small with what seemed like a concentrated nucleus. I next viewed it on March 24, 1998, this time with a 3-inch f/6 reflector at 57X (see sketch and notes).

Earlier this month, I revisited M78 with my 4.5-inch f/8 reflector and a friend's 18-inch f/5 reflector. It had an eerie appearance – a pair of mag. 10 stars embedded in the nebulosity gave

it an eerie, ghostly appearance. Apparently, I'm not alone in that assessment, as Stephen O'Meara, in his book *The Messier Objects* described them as "bloodless eyes peering back at you through a frosty window." M78 was surprisingly faint, even in the 18-inch, but the the limiting mag. that night was 5.





**James Dire:** LVAS Friend from Hawaii

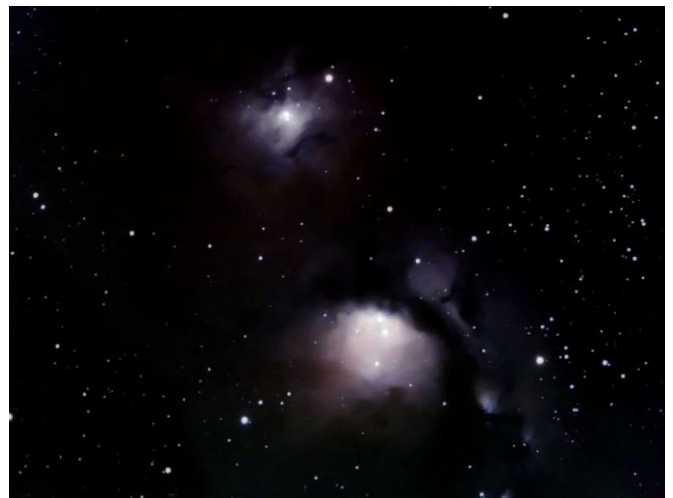
M78 is one of the brightest reflection nebulas in our skies. Most cosmic nebulae that we see are emission nebulas. They glow because the nebular gas is hot and radiates in the visible spectrum. Typically, these nebulas are red due to emissions from hydrogen, the most abundant gas in the galaxy. M78 is different. The light we see is not due to emissions from superheated gas, but from the reflection of starlight scattered off the cloud. Thus, many colors are seen across the spectrum. The dark lanes seen around the nebula are where cold gas and dust blocks the view of the clouds beyond.

My image was taken with a 190 mm Maksutov-Newtonian f/5.3 reflector using an SBIG ST-2000XCM CCD camera. The exposure was 2 hours. M78 is the bright region near the lower center of the image surrounded by the arcing dark dust lane. The second bright nebula near the top of the image is NGC 2071.

M78 is located  $2.5^\circ$  north-northeast of the star Alnitak, the easternmost star in the belt of Orion. Note the three belt stars also span about  $2.5^\circ$ .

M78 is about 6 by 8 arc minutes in size and shines at mag. 8.3. NGC 2071 is about half the size and approximately the same magnitude. M78 is illuminated by two early B-type stars, HD 38562A and HD 38563B. These stars are around mag. 10.4. NGC 2071 is illuminated by a similar star, HD 290861 (V1380 Orionis), mag. 10.

These two nebulas are part of a vast region of gas called the Orion Complex, that includes M42 (The Orion Nebula), NGC2023 and NGC 2024 (The Flame Nebula). The gaseous complex lies in the outer spiral arm of the Milky Way some 1500-1600 light years away.



**Brandon Doyle:** LVAS Friend from New York

**NOTE:** We'd like to welcome Brandon Doyle back with us.

There wasn't a decent unclouded evening during January to observe, but I found an

observation from late in 2011 while flipping through my old sketches. I also came up empty for an entry detailing this night in my logbook, which is quite surprising given the crystal conditions. A quick glance through archived GOES 13 satellite data fortifies this claim for my area, as most of the water vapor and clouds appear huddled to the south. If I recall correctly, this object appeared best under lower magnifications. I tried 200X magnification, but it became far too dim.

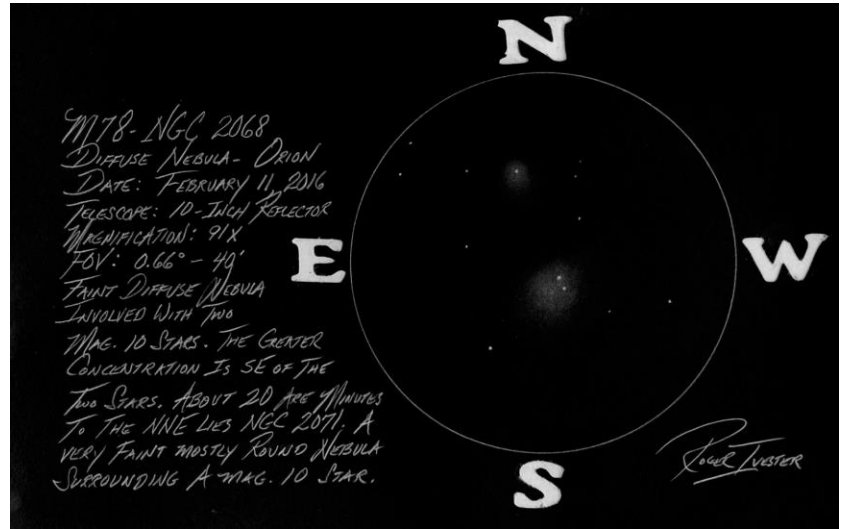
In my description I noted that most of the nebulosity, with the exception of two far-dimmer "blobs" to the south, huddled about the two bright stars at the center. The surrounding star field also appeared strong, which wasn't surprising as it lay so close to the galactic plane in Orion.





**Roger Ivester:** LVAS Member from North Carolina

On February 11, 2016, I observed M78 with my 10-inch f/4.5 Newtonian reflector. The NELM was 5.0 from my backyard despite the two pesky unshielded streetlights in close proximity.



Using a magnification of 91X (per the sketch), with a field of view of 0.66° - 40 arc minutes, I saw a faint wispy nebula involved with two mag. 10 stars. The greater concentration of nebula was ESE of the illuminating stars. The shape was mostly irregular with a slight elongation oriented E-W. The texture of the nebula was very even, with diffuse edges.

About 20 arc minutes to the NNE was NGC-2071. It was a very faint, mostly round nebula which surrounded a mag. 10 star.



**Gus Johnson:** Las Vegas Friend from Maryland

In January, 1974 I used a 6-inch reflector @ 59X to observe M-78. I saw two stars involved with a faint triangular-shaped nebulosity.

In March, 1998 I used a 60mm refractor to observe it @21X. It was just a very faint nebula.

**Rob Lambert:** LVAS Webmaster from North Las Vegas

I've tried to capture M78 as what the visual observer would see at the eyepiece, rather than the pretty picture provided by a long-term exposure. In doing so, M78 may be considered rather boring to those that want to see Hubble images from our observations.

M78 is a diffuse reflection nebula located about 2.5° northeast of Alnitak, the bottom left star in Orion's belt. It's part of the Orion Molecular Cloud Complex, a large area of nebulosity that extends through much of Orion's asterism. Unlike the Great Orion Nebula, this object is the result of light being reflected off of dust rather than emitted light from ionized Hydrogen. Three stars, two that look like eyes with a magnitude of about 10 and one with a



magnitude of about 13 provide the reflected light that makes this nebula visible. The lighted cloud takes on the appearance of a ghostly apparition that reminds me of watching Casper the Friendly Ghost back in my youth.

Farther north and east of M78, across an area of almost total darkness is a smaller area of lighted nebulosity that is visible to the left of M78 in the image above.

The image was captured with a DSLR camera through my 127mm Apochromatic refractor. The exposure was 30 seconds at ISO 6400. Magnification is approximately 20X. The scope was mounted on an equatorial mount with no guiding - just normal tracking. One of these days, I'll try my hand at guiding to see what I can do with longer exposures.



**Fred Rayworth:** LVAS AL Coordinator from Las Vegas

I've seen M78 more times than I can count, so I won't even attempt to list all of those observations here. For the Challenge, I observed it at Furnace Creek in Death Valley on February 5, 2016. At an elevation of -190 feet, the site is listed as one of the nation's dark site locations. Despite looking through so much atmosphere, one can sometimes get fantastic viewing.

On this night, the sky was clear but with a bit of high thin clouds moving in from the west and northwest. As it turned out, those clouds messed with transparency throughout the night and killed real deep sky viewing. One of my goals was Herschel galaxies and I had no luck at all, even with some relatively easy ones,

until after midnight, where I found a few holes in the humidity dome. Many bright stars had halos around them.

On the other hand, being super dark, objects like this nebula, M78 showed up quite well, though as I'll explain, certain details that might have come through didn't. At least we didn't have dust or any kind of breeze to worry about (like last time). The temperature plunged as the night wore on and we were on mown grass of a golf course driving range and not pavement. I actually love it there, but there you go.

M78 was a bright fuzzy patch with two eyes. For a long time I kept mistaking it for NGC-2071 and kept looking for M-78 and never finding it because my Megastar chart and the image that comes with it doesn't show any bright stars at all in the nebula. I've never been able to figure that one out because 2071 is distinctly different.

Back to M78. It was almost round, but a little oval shaped with the two "eyes" almost in the middle. Both stars seemed to be around the same magnitude. I saw no other distinctive details at all. Tried the UHC filter and all that did was darken the surroundings a bit but didn't really help much. The O-III actually hurt the view. The best view was with no filter at all.

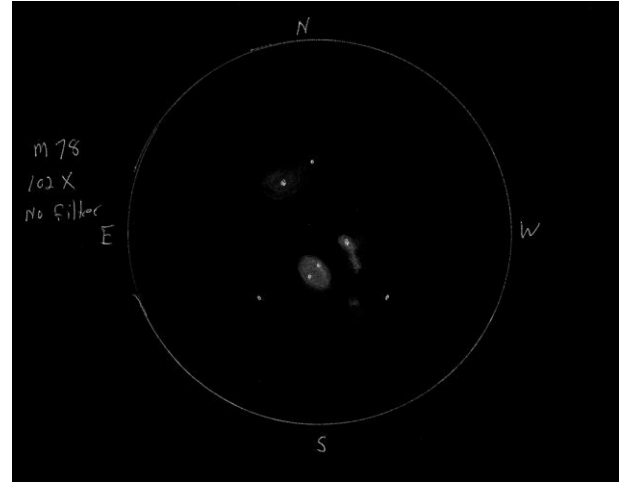
Next to it was the elongated patch, NGC-2067 with a bright star at the head. This one appeared to have a slight bit of mottling at the head, near the star. It trailed off near to the diameter of M78 before it faded.

Between the two and opposite the larger 2071 lay NGC-2064, an extremely faint puffy smudge that I could barely detect with averted vision and only once in a while. I think that might have been due to those high, thin cirrus clouds moving over.

On the other side, the much larger (than 2064) NGC-2071 was almost invisible. In fact, I once again thought M78 was it (because of the star map) but then just within my detection range, I caught a very faint hint of a glow around star GSC 116:1263. By using averted vision and sweeping around, I detected a very faint trace of nebulosity that extended out and around it and faded by the time it reached the nearby star GSC 116:899. Of course, being of similar structure, neither the UHC or O-III filters helped at all.

Another note is that none of the NGC objects associated with M78 have mags. listed. Normally diffuse and reflection nebulae don't anyway. In this case, I can see why. These little fuzzies are faint!

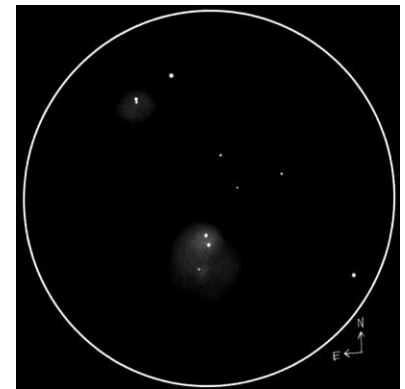
**NOTE:** In the drawing below, NGC-2067 wasn't quite that bright visually. I just couldn't dim it in the drawing like I wanted. Also, I got the orientation of the two stars within M78 wrong. They are sideways and not side-by-side. There is also a third, much fainter star to the south that I saw but didn't pay much attention to that is within the glow of nebulosity.



**Jaakko Saloranta:** LVAS Friend from Finland

M78 is just visible with a pair of 7X50 binoculars, despite an altitude of only 30° (latitude 60° north). Using an 8 inch Dobsonian (magnifications between 50X and 342X), the reflection nebula appeared as a fairly bright, comet-shaped object surrounding two mag. 10 stars [HD 38563A & HD 38563B]. There were a total of 3 stars embedded in the nebulosity and the 3rd star was fairly faint, roughly mag. 13. The nebulosity was brightest surrounding the two mag. 10 stars as well as the NE tip of the object. Another brighter spot might've been visible just south of the mag. 13 star, but this was a threshold object. With high magnification, the nebulosity appeared more irregular than a comet-shaped object. A prominent dark band was visible on the northern side of the nebula, however NGC 2067 and NGC 2064 remained invisible. NGC 2071 was easily visible as a roundish nebula surrounding a mag. 10 star with a faint companion.

Sky conditions: SQM-L 20.80, seeing 7, transparency 7, background brightness 6.



**Jay And Liz Thompson:** LVAS Members from Nevada

We viewed M78 from two locations with a 17-inch Newtonian telescope.

From the dark skies of Meadview, Arizona, and Redstone Picnic Area in Nevada, M78 showed up as nebulosity around a pair of bright stars that were fairly close together when viewed at 95X. There was a prominent dark nebula to the north. Further to the north and following were two bright stars that were embedded in a light glow.

At 227X, the nebulosity around the two main stars was very evident. The dark rift to the north made somewhat of a V-shape. We noted fainter nebulosity at 95X that was also seen at the higher power.