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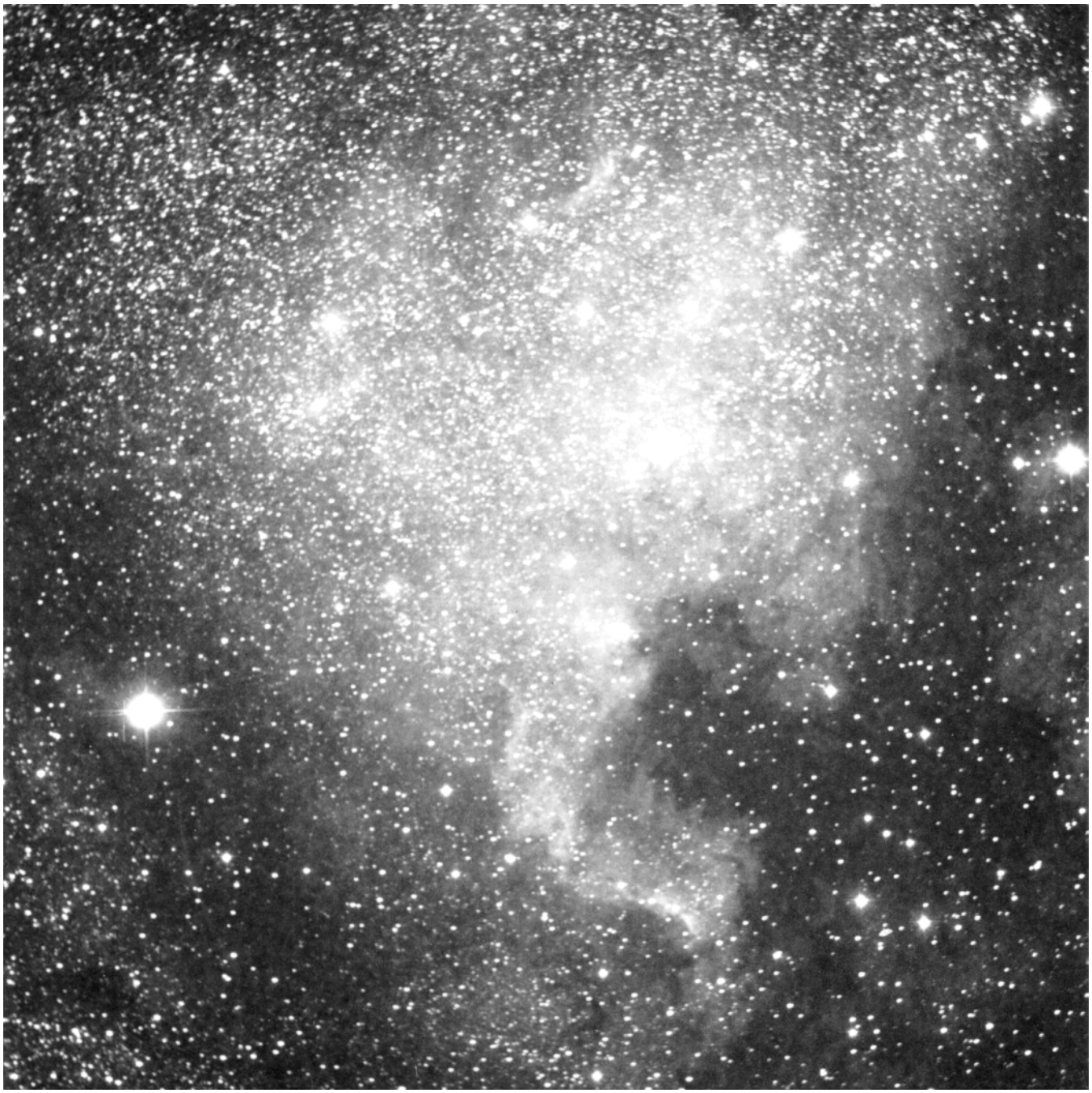

Volume 36 No. 1 **August/September 2004**

the ASTROGRAPH

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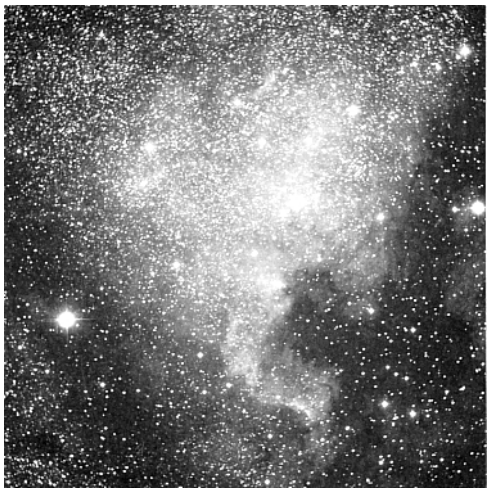

COVER PHOTOGRAPH

Object.....North American Nebula
Photographer.....Lee C. Coombs
Instrument.....4.25 inch F/4 Newtonian at F/4/.6
Film/Exposure.....Hypersensitized Kodak 2415 film/60 minutes
Date.....28 August 2003
Filter/Corrector.....Coma corrector

VOLUME 36 No. 1
EDITOR.....Robert C. Price
CONTRIBUTING EDITOR.....Ralph Proctor
PROOFING CONTRIBUTOR.....Linda Miller
CONTRIBUTORS.....Lee C. Coombs
Mansfield Clinnick
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Martin Germano

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Product Evaluation:
Orion Atlas Equatorial Mount

by

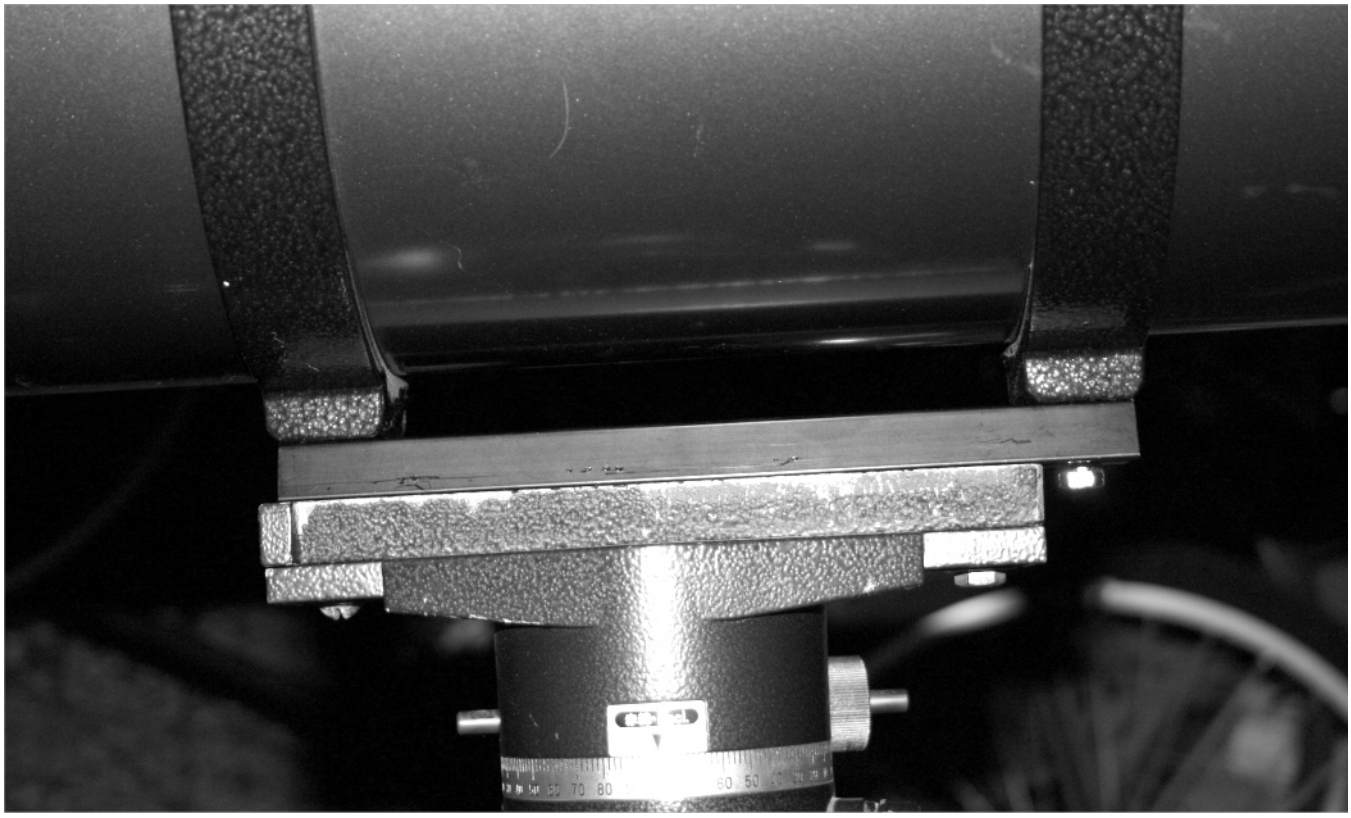
Robert C. Price

The Orion Atlas heavy-duty equatorial mount and photographic guidescope (an optional item) was evaluated for its ability to take long exposure photographs of various astronomical objects using the primary telescope, an 8 inch F/4.9 Newtonian. The Atlas mount and steel tripod weigh 54 pounds. The mount contains a polar axis alignment telescope as well as right ascension and declination drives. The drive's control box attaches to the side of the declination housing as does the 12 volt power source (eight D size batteries). The main optical instrument is an 8 inch F/4.9 Newtonian telescope with a 2 inch low profile focuser equipped with T-threads for a camera T-adapter. The optional astrophotography package consists of an 80mm diameter 910mm focal length refractor with 5mm cordless illuminated cross-hair eyepiece. The guidescope is contained by two mounting rings which are mounted to a mounting plate that is attached to the same mounting rings that mount the Newtonian. The 8 inch Newtonian and mounting rings weigh 19 pounds. The guidescope, mounting rings, and mounting plate weigh 7 pounds. Setting up the telescope is straight forward. The equatorial mount and its metal tripod are massive and provide a very stable platform for the 8 inch Newtonian and the attached guidescope. The mounting rings allow the tube of the Newtonian to be rotated to accommodate differing camera positions. The polar axis alignment telescope in the Atlas mount is easy to use and contains an illuminated reticle that allows visual positioning of Polaris for proper polar axis alignment. The Atlas metal tripod and mount contains locking controls that control the position of the mount so that, after a coarse visual alignment, the mount can be accurately polar axis aligned and locked into place using the polar axis alignment telescope. The Orion Atlas mount's polar axis alignment telescope seemed just as easy to use as the Celestron Super Polaris polar axis alignment telescope the author is accustomed to using. The author's first set up for astrophotography went smoothly. The first test object was M13. After M13 was centered in the field of the Newtonian, a Canon 300D digital camera was mounted and fo-



Above: M57 photographed by Robert Price on 20 June 2004 using an 8 inch F/4.9 Newtonian, Atlas heary-duty equatorial mount, and 80mm guidescope. Exposure was 4 minutes using a Canon 300D digital camera set to 400 ASA. Note elongated images caused by continually having to make right ascension drive corrections.

cused. A suitable guide star was acquired and several exposures were attempted. I was impressed with the quality of the image of the guide star in the 80mm guidescope. Using the 5mm guiding eyepiece yielded a magnification of 182x. The image of the guide star showed an excellent diffraction pattern, a far different picture than this author was accustomed to when guiding using a Lumicon off-axis guider attached to an 8 inch Celestron. Guide stars in off-axis guide devices are notorious for poor quality, partly because they are off-axis and partly because of the central obscuration in SCT optical systems. Guiding the telescope during an exposure was another matter. The Orion Atlas right ascension drive required far more corrections that did the author's Super Polaris mount. At times the right ascension suddenly lurched and the correction button had to be immediately mashed down for about one second to correct these sudden lurches. Inevitably, attempting to correct for such a lurch caused either a significant under correction or over correction. These under or over corrections showed up as poor guiding in the final image. Even when these sudden lurches were accurately corrected, the fact that the right ascension drive required far more correcting resulted in the final image almost always having star images that were elliptical rather than round. The declination drive worked well and had only a minimal lag time after the direction was reversed to respond to input corrections. After several nights with the right ascension drive problem using both a standard Minolta film camera and the Canon 300D digital camera, the author mounted the entire 8 inch Newtonian including rings and dovetail plate, and its 80mm guidescope onto the authors old Super Polaris mount. This arrangement was far less stable than the Atlas mount with its metal tripod. The Super Polaris has a wooden tripod and normally carries an 8 inch Celestron SCT and off-axis guider which weighs 11 to 12 pounds, not the 26 pounds of the 8 inch F/4.9 Newtonian with its 80mm guidescope. The added weight of the Newtonian required the addition of an 11 pound counterweight. Even under what had to be an over-the-design-limit load, the Super Polaris right ascension drive was smooth and required only brief corrections for proper guiding. The resulting images were far better that those obtained using the Atlas mount. The mount has been returned to Orion to correct the right ascension drive problem.



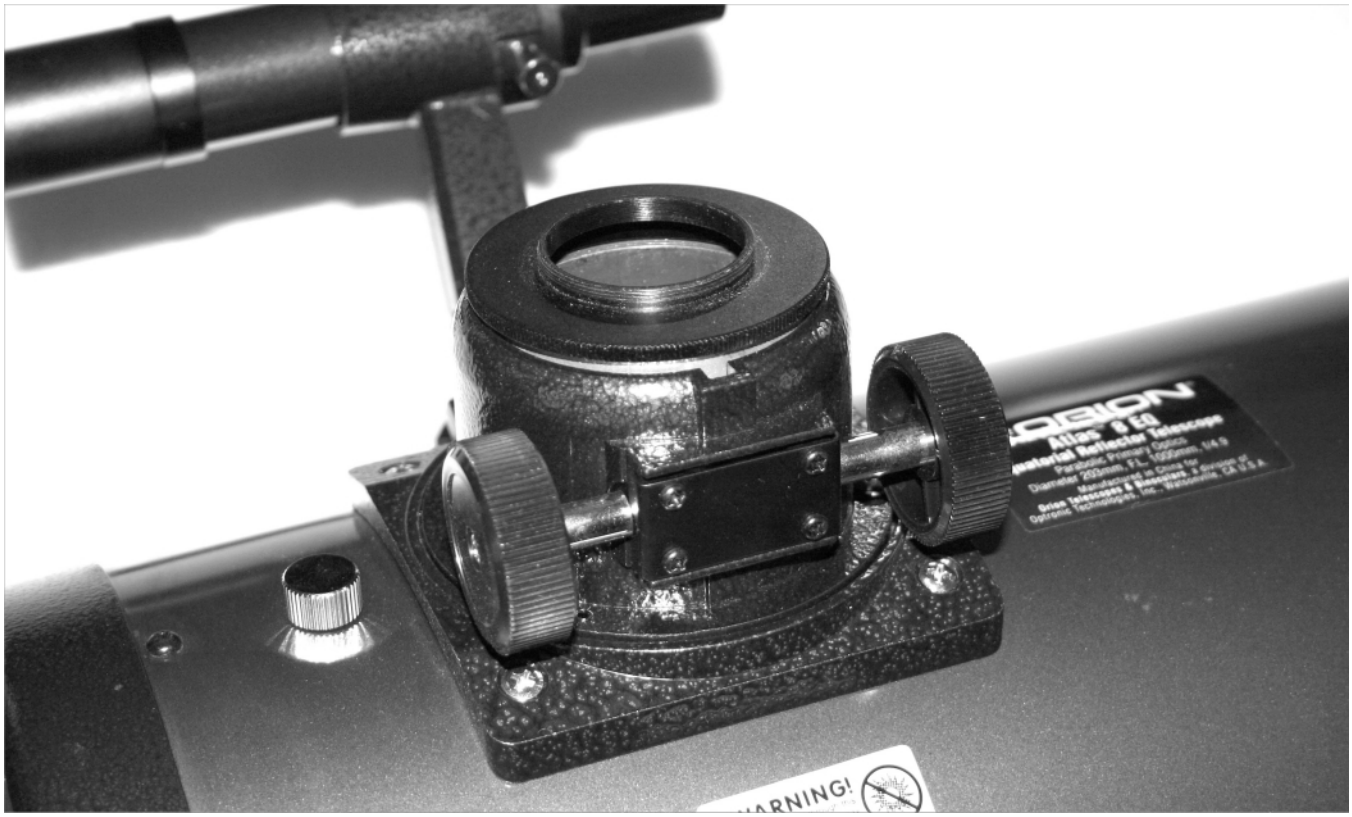
Above: Method used to attach the 8 inch F/4.9 Atlas Newtonian with 80mm guidescope to the Super Polaris mount. The Super Polaris dovetail plate and Atlas heavy duty mount dovetail plate are bolted together. The Newtonian and its rings are still attached to the Atlas dovetail plate which is bolted to the Super Polaris dovetail plate which is bolted to the Super Polaris mount (at bottom).



Above: M13 photographed by Robert Price on 20 June 2004 using an 8 inch F/4.9 Newtonian, Atlas heary-duty equatorial mount, and 80mm guidescope. Exposure was 3.4 minutes using a Canon 300D digital camera set to 400 ASA. Note the elongated images caused by continually having to make right ascension drive corrections.



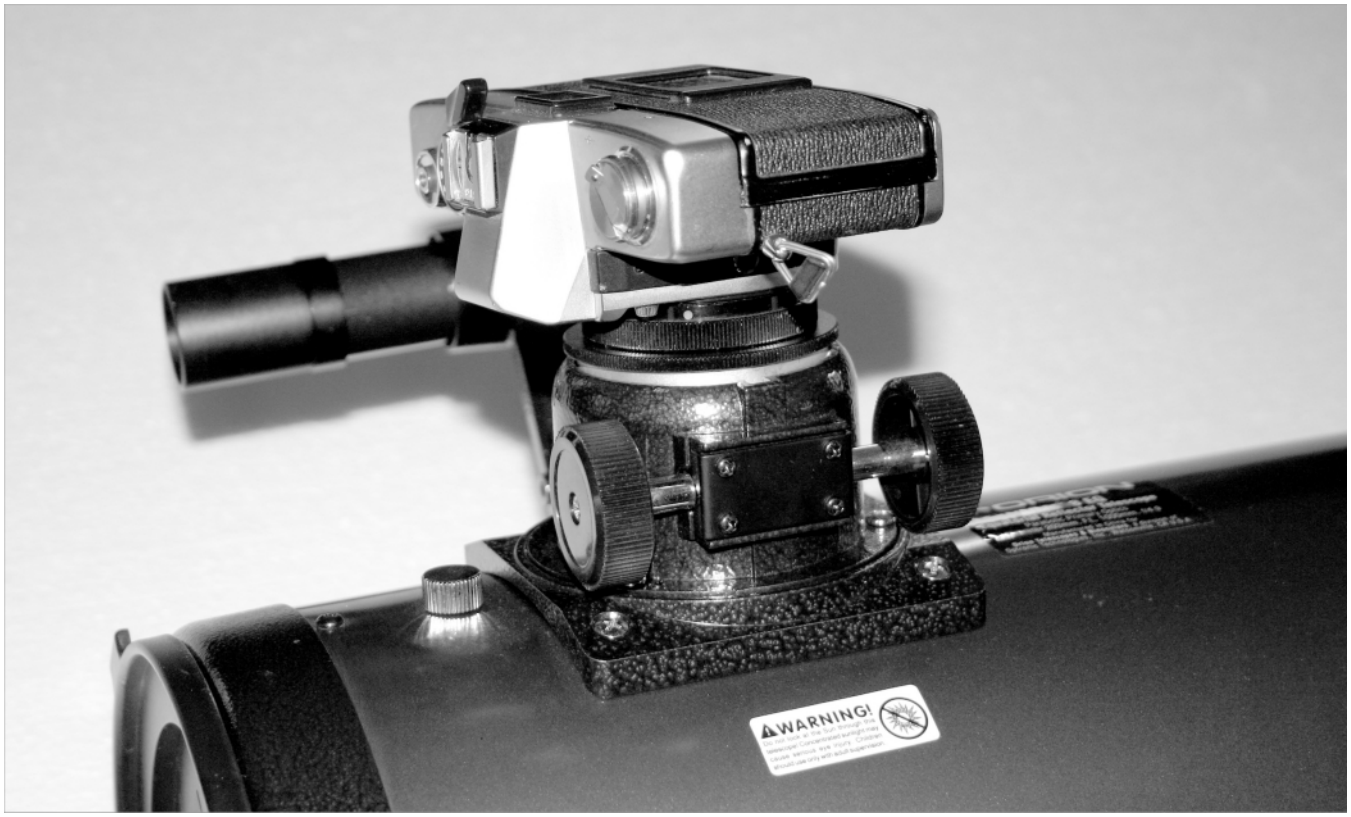
Above: M13 photographed by Robert Price on 29 June 2004 using an 8 inch F/4.9 Newtonian, Super Polaris equatorial mount, and 80mm guidescope. Exposure was 3.6 minutes using a Canon 300D digital camera set to 400 ASA. The apparent difference in color is caused by the gibbous Moon raising the sky background level.



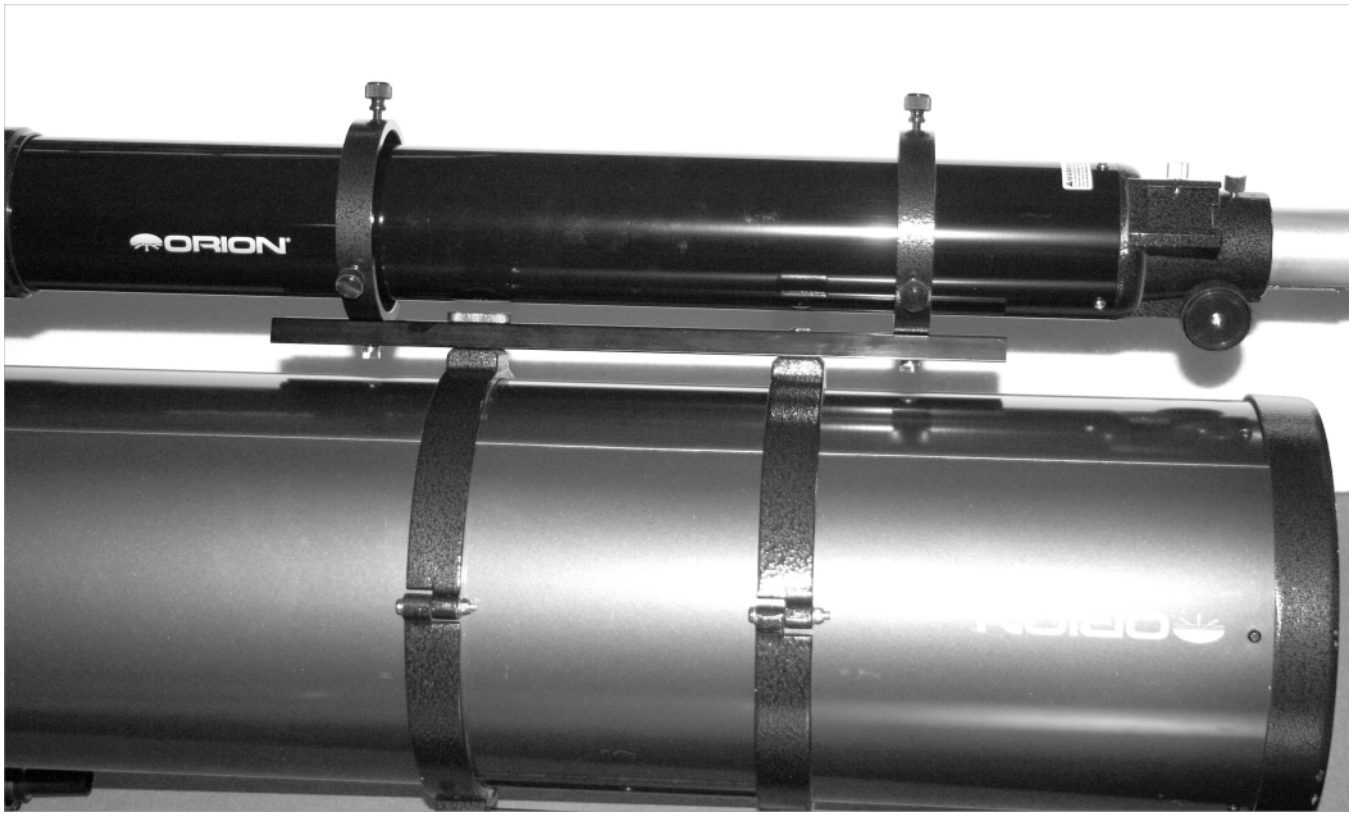
Above: Low profile 2 inch focuser on the Orion Atlas 8 inch F/4.9 Newtonian. Shown here is the camera adapter plate for the 2 inch focuser that contains male T-threads for attaching a camera T-adapter mount.



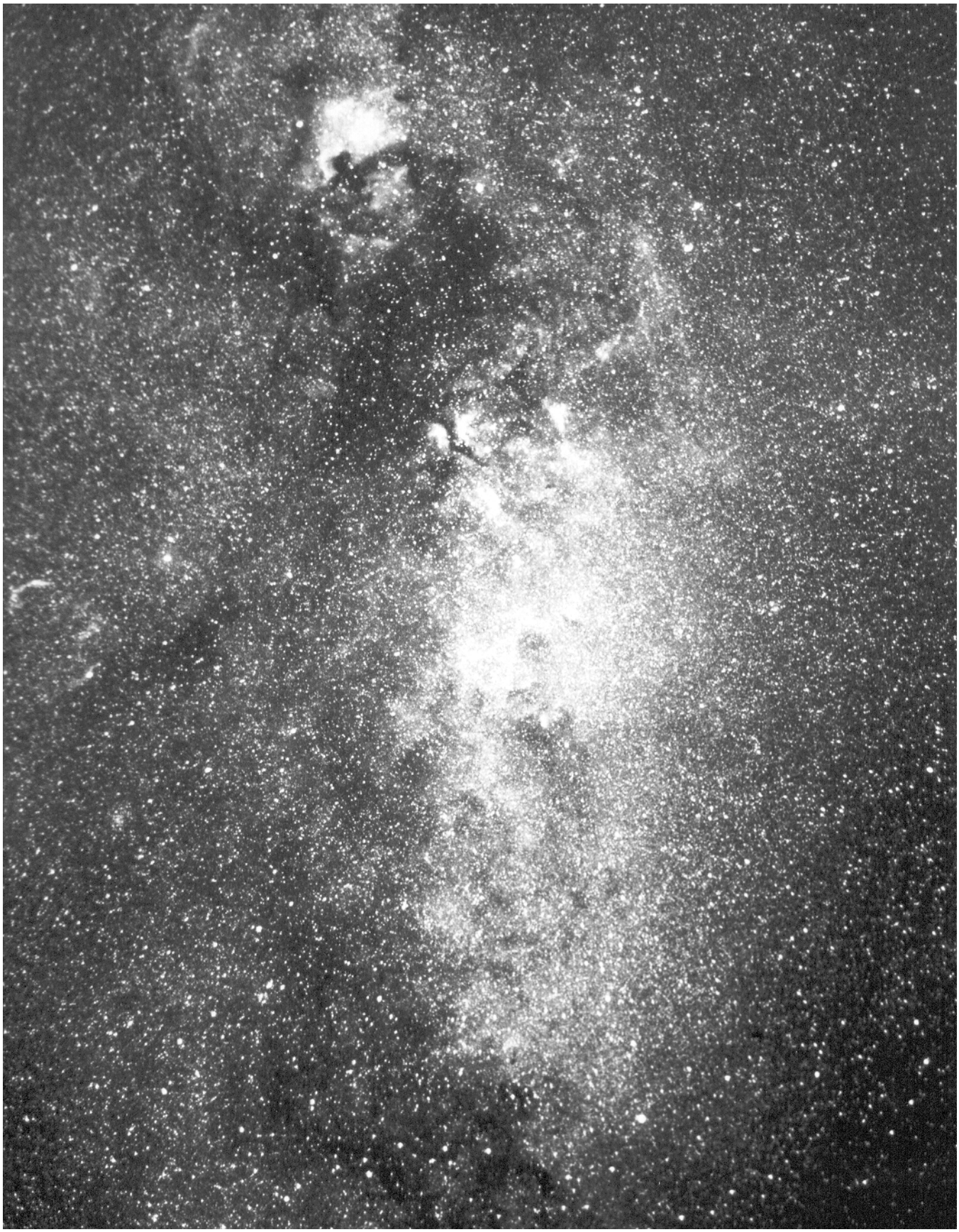
Above: Low profile 2 inch focuser on the Orion Atlas 8 inch F/4.9 Newtonian. Shown here is the T-adapter mount for a Minolta camera attached to the male T-threads that come with the 2 inch focuser camera adapter plate.



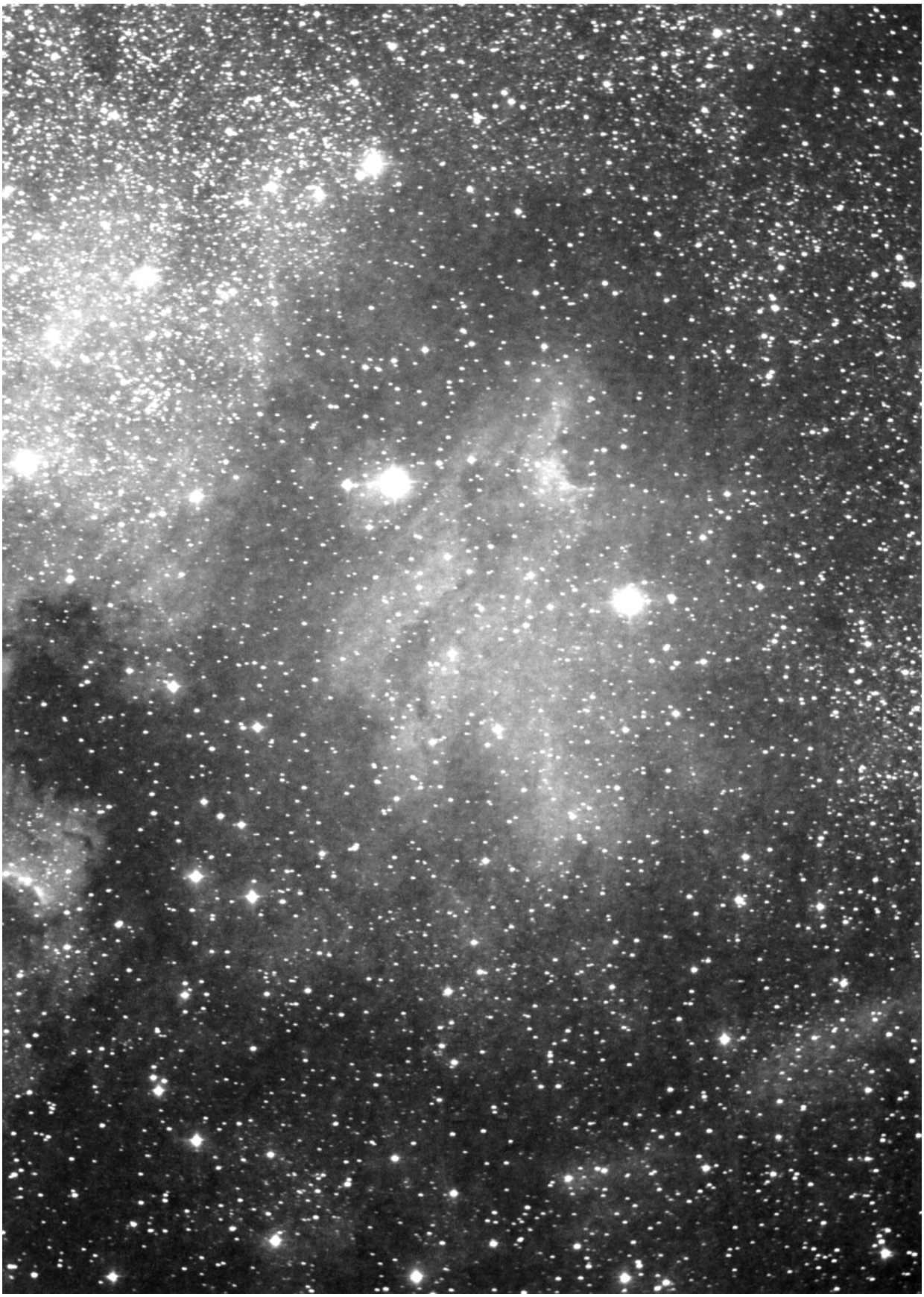
Above: Low profile 2 inch focuser on the Orion Atlas 8 inch F/4.9 Newtonian. Shown here is a Minolta camera attached via a T-adapter. Note how close the camera is mounted to the secondary mirror. Focus position is about .25 inches out from the minimum focus position.



Above: 80mm guidescope method of attachment to the rings that hold the Orion Atlas 8 inch F/4.9 Newtonian telescope.



Above: The Milky Way and North American Nebula in Cygnus photographed by Mansfield Clinnick using a 58mm F/1.2 lens and H alpha filter. Note the Veil Nebula located at the center left edge of the photograph. Exposure was 15 minutes on hypersensitized Kodak 2415 film developed 7 minutes in D-19 at 68°F.



Above: NGC 5067-70, the Pelican Nebula photographed by Lee C. Coombs on 27 August 2003 using a 4.25 inch F/4 Newtonian with coma corrector at F/4.6. Exposure was 60 minutes on hypersensitized Kodak 2415 film developed in D-19 for 9 minutes at 20°C. Enlargement was about 7 times.

Astrophotography for August and September

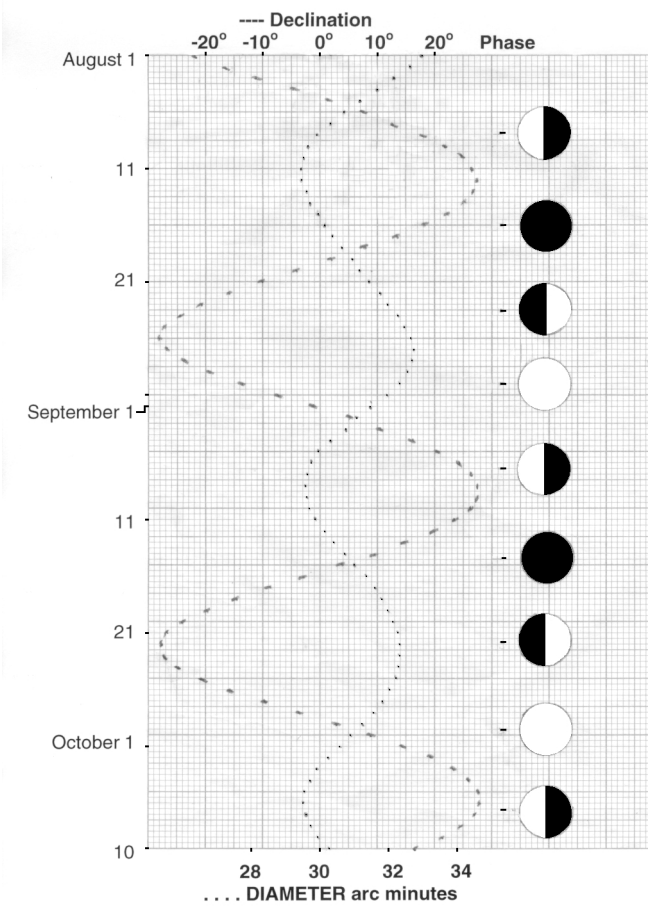
by

Ralph Proctor

Mercury begins August as an evening object high in the western sky, and quickly moves lower in the western sky until it disappears into the Sun's glare during the second week in August. Mercury reaches inferior conjunction with the Sun on 23 August and re-emerges from the Sun's glare as a morning object during the first week in September. Mercury reaches a greatest western elongation of 18 degrees on 9 September when it will be in poor photographic position with a declination of +0 degrees.

Venus begins August as a morning object high in the eastern sky and remains high in the eastern sky during August and September and in excellent photographic position.

Lunar Declination and Diameter:



The Moon's waning crescent phase will be located high on the ecliptic and in excellent photographic position during August (August 12) and September (September 9), with an apparent declination of up to +27 degrees.

Mars begins August as an evening object low in the western sky in the constellation Leo, but is almost immediately lost in the Sun's glare and does not emerge from the Sun's glare until October. Mars reaches conjunction with the Sun on 15 September. During August and September Mars increases in brightness from magnitude +1.8 to + 1.7 and decreases in diameter from to 3.57 to 3.54 arc seconds.

Jupiter begins August as an evening object low in the western sky in the constellation Leo. During August Jupiter moves lower in the western sky and disappears into the Sun's glare in early September, reaching conjunction with the Sun on 22 September. During August and September Jupiter remains constant in brightness at magnitude -1.7, and decreases in diameter from 32.0 to 30.6 arc seconds.

Saturn begins August as a morning object low in the eastern sky in the constellation Gemini. During August and September Saturn moves higher in the eastern sky, remains constant in brightness at magnitude +0.2, and increases in diameter from 16.6 to 17.8 arc seconds.

Uranus begins August as a morning object high in the eastern sky in the constellation Aquarius, reaching opposition with the Sun on 27 August. During August and September Uranus moves higher in the eastern sky, remains constant in brightness at magnitude +5.7, and decreases in diameter from 3.68 to 3.67 arc seconds. Uranus is located at R.A. 22 hours 29.8 minutes declination -10 degrees 18 minutes on 15 August and at R.A. 22 hours 25.1 minutes declination -10 degrees 45 minutes on 15 September.

Neptune begins August as a morning object high in the eastern sky in the constellation Capricornus, reaching opposition with the Sun on 7 August. During August and September Neptune moves higher in the eastern sky, decreases in brightness from magnitude +7.8 to +7.9, and decreases in

diameter from 2.31 to 2.30 arc seconds. Neptune is located at R.A. 21 hours 05.0 minutes declination -16 degrees 46 minutes on 15 August and at R.A. 21 hours 02.0 minutes declination -16 degrees 59 minutes on 15 September.

Pluto begins August as an evening object high in the western sky. Pluto reached opposition with the Sun on 11 June and is still located in poor photographic position with a declination of minus 14 degrees. During August and September Pluto decreases in brightness from magnitude +13.8 to +13.9. Pluto is located at R.A. 17 hours 17.3 minutes declination -14 degrees 24 minutes on 15 August and at R.A. 17 hours 17.2 minutes declination -14 degrees 35 minutes on 15 September.

Events:

Jupiter will be occulted by the Moon on 9 November (16 hours Universal Time) for central and eastern Canada, the northeastern United States, Greenland, and Iceland.
Venus will be occulted by the Moon on 10 November (02 hours Universal Time) for India, southeast Asia, Australia, and New Zealand.
Mars will be occulted by the Moon on 11 November (04 hours Universal Time) for eastern Africa, the Indian Ocean, Tasmania, and most of New Zealand.
Mercury will be occulted by the Moon on 14 November (03 hours Universal Time) for Antarctica.

Moon will undergo a total eclipse on 25 October for the Arctic region, western Russia, Arabia, Africa, Madagascar, parts of Antarctica, Europe, Greenland, North America, Central America, South America, the eastern Pacific Ocean, and the southern tip of Siberia. The Moon enters and leaves the penumbra at 00 hours 05.5 minutes and 06 hours 02.7 minutes Universal Time respectively. The Moon enters and leaves the umbra at 01 hours 14.3 minutes and 04 hours 53.7 minutes Universal Time respectively. The Moon enters and leaves totality at 02 hours 23.4 minutes and 03 hours 44.6 minutes Universal Time respectively. Mid-eclipse occurs at 03 hours 04.0 minutes Universal Time.

MINOR PLANETS

		Position			
		15 August		15 September	
Planet	Magnitude	R.A.	Decl.	R.A.	Decl.
Ceres	08.7 - 08.5	10 hr 49.7 min	+15 deg 42 min	11 hr 42.9 min	+10 deg 08 min
Pallas	08.9 - 09.0	08 hr 16.0 min	-01 deg 39 min	09 hr 20.7 min	-04 deg 20 min
Juno	09.8 - 10.5	18 hr 38.4 min	-08 deg 08 min	18 hr 38.5 min	-11 deg 12 min
Vesta	06.7 - 06.4	00 hr 06.2 min	-10 deg 16 min	23 hr 43.3 min	-14 deg 16 min

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The Constellation Cygnus

by

Robert C. Price

The constellation Cygnus crosses the meridian at about midnight in early August. Cygnus is a large constellation located just north of the constellation Vulpecula. From east to west it is 2 hours 50 minutes in extent, from right ascension 20 hours 50 minutes to 22 hours 00 minutes. In declination it varies from plus 28 degrees north declination to plus 62 degrees north declination. On the north it borders Cepheus and Draco, on the east Lacerta and Pegasus, and on the west Draco and Lyra. The constellation contains a number of galactic clusters, planetary nebulae, and diffuse nebulae. Cygnus is located in a very rich region of the Milky Way. Some objects of photographic interest are listed in the table on page 15.

Alpha Cygni, Deneb, is one of the largest A-class supergiant stars. It is 60 times the diameter of the Sun and 60,000 times as bright. Deneb is located at a distance of 1600 light years. Deneb is probably the source of illumination for the North American Nebula.

Beta Cygni is a beautiful visual double star that consists of a yellow 3rd magnitude primary and a sapphire 5th magnitude companion separated by 34 arc seconds.

Chi cygni is a beautiful red long-period variable star which varies from 4th magnitude at its brightest to below 12th magnitude at its minimum brightness over a period of about 406 days.

Cygnus X-1 is the brightest source of x-rays in the sky and is the object that first suggested that black holes were a reality since the source of the x-rays varies over a time frame that indicated it is less than 100 miles in diameter and contains a mass of over 10 solar masses.

NGC 7000 is the famous North American Nebula. It is located 3 degrees east of Deneb and consists of large cloud of nebulosity, dust, and stars some 1.5 degrees in diameter shaped like North America.



Above: NGC 6888 photographed by Lee C. Coombs on 21 October 1979 using a 10 inch F/5 Newtonian. Exposure was 15 minutes on Kodak 103a-E film developed in MWP-2 for 9 minutes at 20°C. Enlargement was about 8 times.

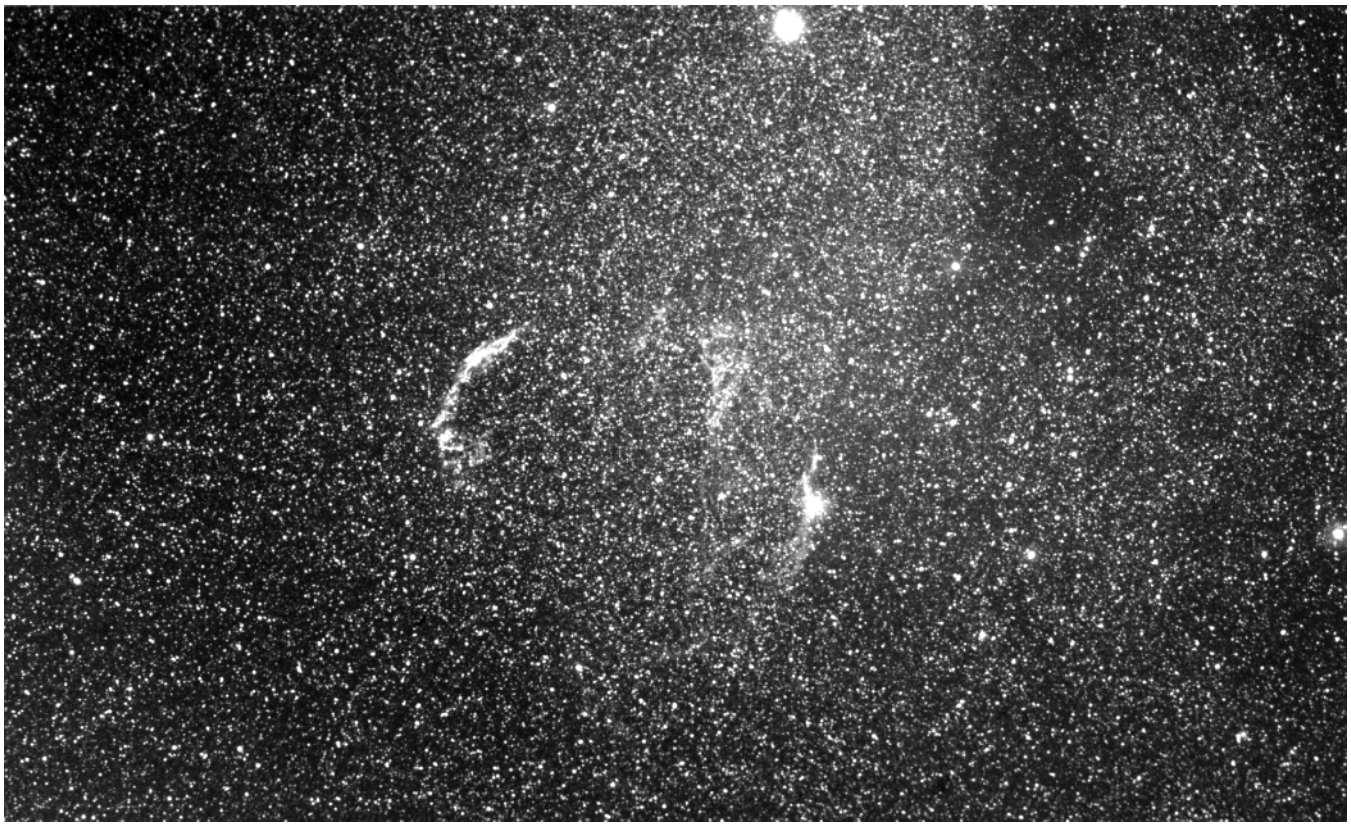
Within the nebula are streamers and both bright and dark nebulosity. A second feature IC 5067, the Pelican Nebula, is part of this nebulosity. The Pelican Nebula consists of numerous fine wisps and streamers. The loose galactic cluster NGC 6997 is located within the nebulosity of the North American Nebula and is located at the same distance, 1600 light years, as Deneb.

NGC 6960 and 6992 , the Veil Nebula, is a supernova remnant some 2.6 degrees in diameter. Only small segments of the supernova remnant are still detectable. The brightest segment, NGC 6992, consists of filamentary shaped nebulosity whose filaments are colored red, blue, and white. Other segments include NGC 6990, and together make up what is called the Great Cygnus Loop. Distance to the nebula is estimated to be 1500 light years. The supernova that initiated the nebulosity probably occurred 30,000 to 40,00 years ago.

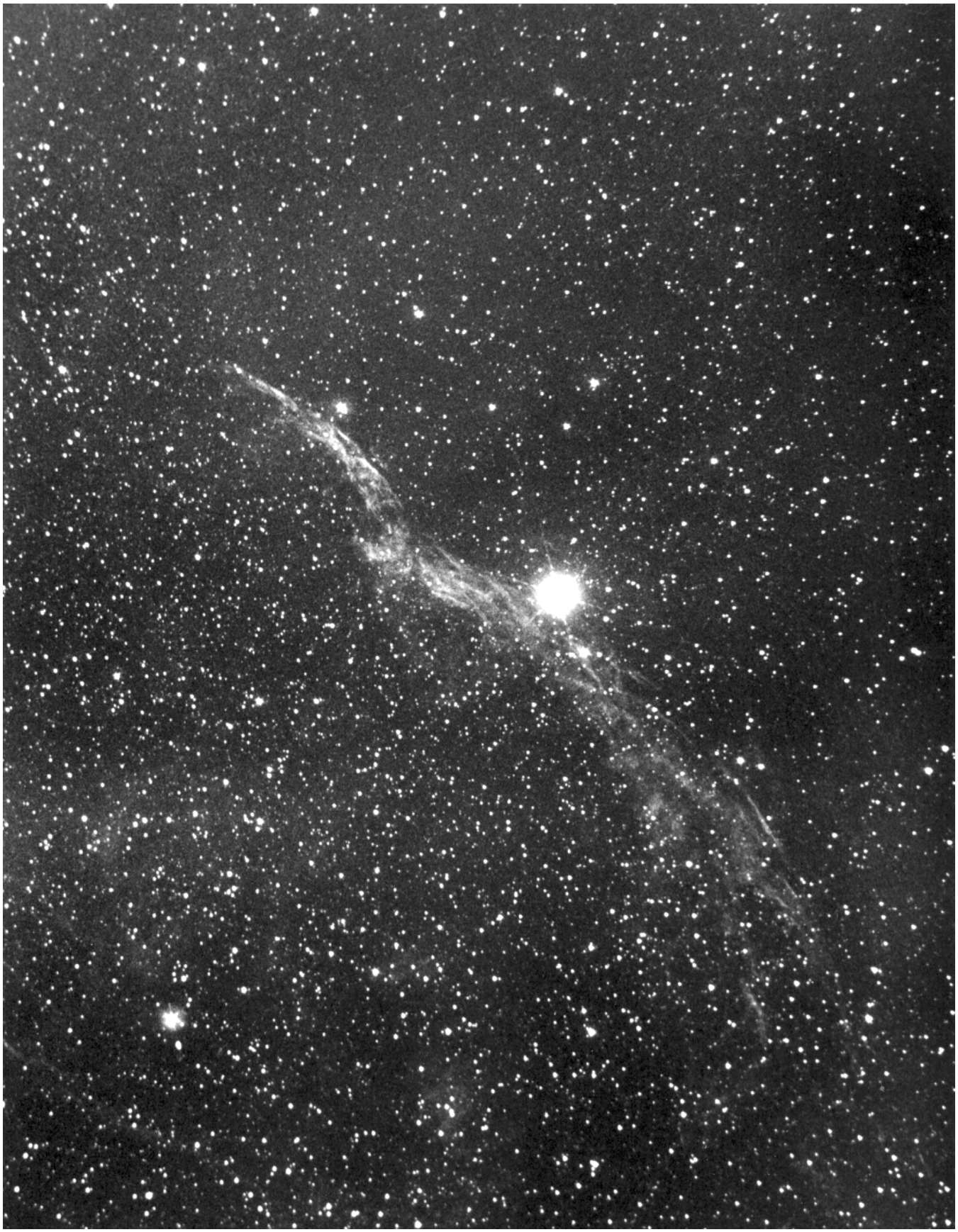
M29 is a small galactic star cluster located in a rich region of the Milky Way. It contains about 25 B-type stars magnitude 8 and 9. Estimated distance to M29 is 7,200 light years.

M39 is a large galactic star cluster with a loose structure. It contains about 30 A and B-type stars magnitude 7 and fainter. Estimated distance to M29 is 800 light years.

Cygnus A is the second strongest source of radio waves in the sky. Its source is associated with an 18th magnitude galaxy. The radio source appears to emanate from two large invisible lobes 50" on either side of the galaxy. The galaxy appears to be ejecting material from its nucleus similar to the violent outburst that is occurring within M82 and M87. The Hubble space telescope recently found that a quasar (Quasi-Stellar Radio Sources) is the source of radio waves from Cygnus A. There is increasing evidence that quasars exist in the core of remote galaxies, and that they are powered by a super massive black hole devouring dust, gas, and stars from the host galaxy. Most quasars existed billions of years ago in the early universe. It is unusual to find one in what can be characterized as a nearby galaxy.



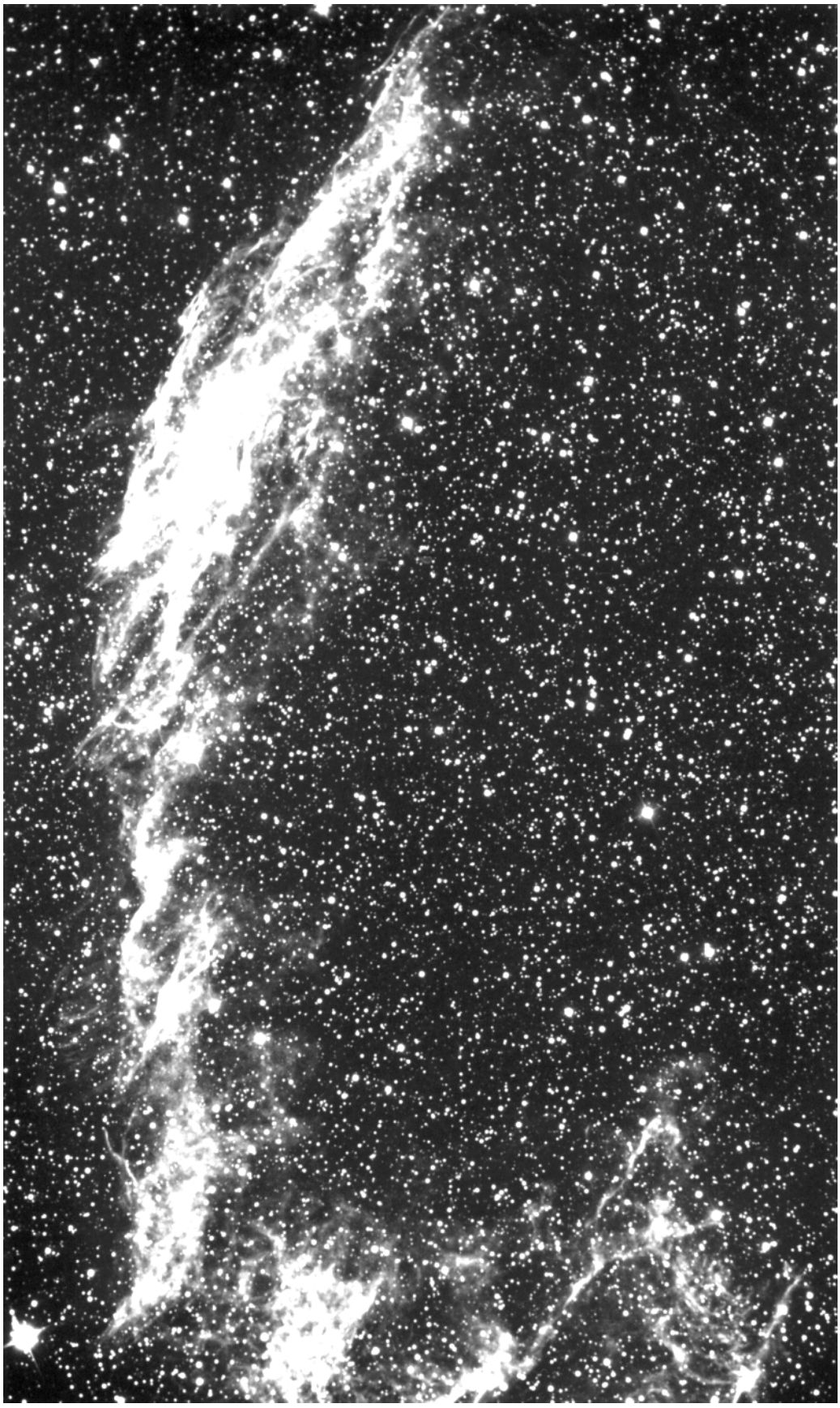
Above: NGC 6960 and NGC 6992-95, the Veil Nebula, photographed by Lee C. Coombs on 11 October 1998 using a 150mm F/4 Takumar lens with a #25A red filter. Exposure was 60 minutes on hypersensitized Kodak 2415 film developed in D-19 for 7 minutes at 20°C.



Above: NGC 6960, the Veil Nebula photographed by J. S. Sussenbael on 20 June 1990 using a 20 cm F/6 Newtonian with H alpha pass filter. Exposure was 60 minutes on hypersensitized Kodak 2415 film.

Objects for Astrophotography in Cygnus

Object	Mag.	Size.	R.A.	Declation	Description
NGC 6811	9	15’ dia	19hr 26.7min	+46deg 27min	Galactic star cluster with 50 stars magnitude 11-14
NGC 6819	10	6’ dia	19hr 39.6min	+40deg 06min	Galactic star cluster with 150 stars magnitude 11-15
NGC 6826	8.8	25"dia	19hr 43.4min	+50deg 24min	Planetary nebula with an 11th mag. O-type central star.
NGC 6833	14	2" dia	19hr 48.5min	+48deg 50min	Very small planetary nebula.
NGC 6857	14	40" dia	20hr 00.0min	+33deg 23min	Planetary nebula with a 14th mag. central star.
NGC 6866	8	8’ dia	20hr 02.1min	+43deg 51min	Galactic star cluster with 50 stars magnitude 10-?
NGC 6884	12.5	7" dia	20hr 08.8min	+46deg 19min	Very small planetary nebula.
NGC 6881	14	5" dia	20hr 09.0min	+37deg 16min	Planetary nebula with a 15th mag. central star.
I.1311		5’ dia	20hr 09.1min	+41deg 02min	Galactic star cluster with 30 faint stars
NGC 6888		18’x12’ dia	20hr 01.7min	+38deg 16min	Crescent-shaped diffuse nebula.
NGC 6894	14	44" dia	20hr 14.4min	+30deg 25min	Ring-shaped planetary nebula with a 17th mag. central star.
NGC 6910	6.5	8’ dia	20hr 21.3min	+40deg 37min	Galactic star cluster with 40 stars magnitude 10-?
NGC 6913	7	7’ dia	20hr 22.2min	+38deg 21min	Galactic star cluster M29 with 20 stars magnitude 8-?
NGC 6914		6’ dia	20hr 23.4min	+42deg 10min	Large irregular diffuse nebula.
NGC 6960		2.6^{o} dia	20hr 43.6min	+30deg 32min	Veil Nebula, diffuse nebula and part of Cygnus Loop.
NGC 6992		2.6^{o} dia	20hr 54.3min	+31deg 30min	Veil Nebula, diffuse nebula and part of Cygnus Loop.
I.5067		80’ dia	20hr 46.9min	+44deg 11min	Large diffuuse nebula, the Pelican Nebula.
I.5076		7’ dia	20hr 54.2min	+47deg 13min	Diffuse nebula.
NGC 6997		90’ dia	20hr 54.7min	+44deg 27min	Large scattered galactic star cluster and part of NGC 7000.
NGC 7000		100’ dia	20hr 57.0min	+44deg 08min	Large bright diffuse nebula, North American Nebula.
NGC 7008	12	85" dia	20hr 59.1min	+54deg 21min	Planetary nebula with a 13th mag. central star.
NGC 7026	12	25" dia	21hr 04.6min	+47deg 39min	Planetary nebula with a 15th mag. central star.
NGC 7027	9	18"x11"	21hr 05.1min	+42deg 02min	Bluish-green planetary nebula .
I.1369		2’ dia	21hr 10.5min	+47deg 33min	Small fine diffuse nebula.
NGC 7048	11	60"x50"	21hr 12.6min	+46deg 04min	Planetary nebula with 18 mag. central star.
NGC 7062		5’ dia	21hr 21.5min	+46deg 10min	Galactic star cluster with 30 stars magnitude 12-?.
NGC 7082			21hr 27.0min	+46deg 50min	Large galactic star cluster with stars magnitude 10-13.
NGC 7086	9	8’ dia	21hr 29.8min	+51deg 22min	Galactic star cluster with 50 stars magnitude 11-16.
NGC 7092	5	30’ dia	21hr 30.4min	+48deg 13min	Galactic star cluster M39 with 25 stars magnitude 7-?.
I.5117	13	2" dia	21hr 30.6min	+44deg 23min	Very small and faint planetary nebula
NGC 7127	10	2’ dia	21hr 42.2min	+54deg 24min	Galactic star cluster with 30 stars magnitude 10-?.
NGC 7128	9	2’dia	21hr 42.4min	+53deg 29min	Galactic star cluster with 65 7th magnitude stars.
I.5146		12’x10’	21hr 51.3min	+47deg 02min	Complex diffuse nebula east of a dark streamer



Above: NGC 6992-5, the Veil Nebula, photographed by Martin Germano on 23 July 1995 from Mt Pinos CA using a 14.5 inch F/5 Newtonian with coma corrector. Exposure was 90 minutes on hypersensitized Kodak 2415 film developed 7 minutes in D-19 at 69°F. Enlargement is approximately 11 times.