the ASTROGRAPH



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COVER PHOTOGRAPH

Object.....M8, the Lagoon Nebula

Photographer.....Robert C. Price

Instrument.....Tele Vue NP-127 (5 inch F/5.2 refractor)

Exposure/Camera.....three 20 minutes/Hutech modified Canon 40D

Date.....5 May 2008

Location.....south of Blue Knob State Park, PA

VOLUME 39 No. 6
EDITOR.....Robert C. Price
CONTRIBUTING EDITOR.....Ralph Proctor
PROOFING CONTRIBUTOR.....Linda Miller
CONTRIBUTORS.....Lee C. Coombs

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Product Evaluation: Orion Autoguider

by

Robert Price

The Orion AutoGuider is a small compact CMOS digital camera that can be used as an autoguider with either an off-axis guider or separate dedicated guide scope. The Orion AutoGuider sells for $250.00 and requires a computer with a USB 2.0 interface. The CMOS chip consists of 1.3 million pixels in an 1280 by 1024 array. Each pixel is 5.2 microns square for a total chip size of 6.66 by 5.32 mm. The size of the sensor head is 2.5 by 2.35 inches and the sensor head weighs 4.4 ounces. The sensor head has a 1.25 inch nosepiece for attachment to a 1.25 inch eyepiece holder. The nosepiece can be detached to reveal t-threads if attachment to a 2 inch eyepiece holder is required. The Orion AutoGuider comes with a 10 foot USB cable for attaching the sensor head to a computer via a USB 2.0 interface and a 6 foot RJ-12 cable for attaching the sensor head to the mount's hand controller input. Power to the sensor head is provided via the USB cable. The computer controls the sensor head and sends signals to the mount just as the mount's hand controller would. The program that does these control functions is provided with the Orion AutoGuider and is easy to install. The program provides a maximum video frame rate of 15 frames per second and can vary the exposure of the CMOS sensor from .1 to 10 seconds. Once the unit is focused and a guide star selected the computer performs and auto calibration before starting to guide. The Orion AutoGuider has worked well for the author but not 100% of the time. The sensitivity of the mount's correction movement must be matched to the auto calibration process because if the calibration process does not see sufficient mount movement, the calibration will fail and the computer will refuse to initiate the auto guiding process. The author's



Above, Figure 1: The Orion AutoGuider shown with USB cable and a cable that connects to the telescope mount hand controller connector.

Losmandy G-11 mount has a range of sensitivities from .3x to 16x. The Orion AutoGuider usually works best with the 2x sensitivity setting. On one occasion the Orion AutoGuider worked well for the first exposure and then failed to guide for the next exposure even though the display indicated it was guiding. After at least an hour of investigating the author found that the advanced setting had been changed to guide only in declination. This would be a good setting for calibrating the periodic error correction of the mount, but the author did not change any software settings between exposures. On another occasion of very poor seeing the author found that the Orion AutoGuider could not process the bad seeing and the images had a bad guiding error in right ascension. At that point the author resorted to a crosshair eyepiece for manual tracking with better results although the poor seeing did make the star images very bloated. Except for these two occasions the author has found the Orion AutoGuider to work as well as manual guiding. Guide star selection is easy because any star bright enough for good manual guiding is also bright enough for use by the autoguider. Figure 1 shows the author's Orion AutoGuider. Figure 2 shows a typical autoguided exposure. Figure 3 shows the problem the autoguider has with very poor seeing and Figure 4 shows the author's manually guided exposure during this same poor seeing. The Orion AutoGuider is now the author's choice for guiding his 5 inch refractor. Figure 5 and 6 show additional images taken with the Orion AutoGuider.



Above, Figure 2: M101 photographed by the author on 5 May 2008 using a NP-127 refractor and Hutech modified Canon 40D camera. Exposure was 20 minutes at 400ASA. This image is enlarged 100% and shows good guiding by the Orion AutoGuider.



Above, Figure 3: M104 photographed by the author on 4 May 2008 using a NP-127 refractor and Hutech modified Canon 40D camera. Exposure was 20 minutes at 400ASA. This image is enlarged 100% and shows poor guiding by the Orion AutoGuider caused by very poor seeing conditions.



Above, Figure 4: M104 photographed by the author on 4 May 2008 using a NP-127 refractor and Hutech modified Canon 40D camera. Exposure was 20 minutes at 400ASA. This image is enlarges 100% and shows better guiding using a crosshair eyepiece and manual guiding.



Above, Figure 5: NGC 4565 photographed by the author on 5 May 2008 using a NP-127 refractor and Hutech modified Canon 40D camera. This image is a combination of three exposures of 20 minutes, one at 400ASA and two at 200ASA. Image is enlarged 100% to show good guiding by the Orion AutoGuider.



Above, Figure 6: The Orion Nebula photographed by the author on 12 March 2008 from Blue Knob, PA using a Tele Vue NP-127 IS and Hutech modified Canon 40D. This image is one 20 minute exposure at 100ASA. The image shown is enlarged 100% and shows a slight mis-guide in the declination axis.



Above: M22 and region in Sagittarius photographed by Lee C. Coombs on 18 August 2006 using a 70mm F/5.1 Tele Vue Pronto. Exposure was 30 minutes on Ektachrome 200 professional film.



Above: M11 and B114-8 (dark nebula south of M11) region in Scutum photographed by Lee C. Coombs on 18 August 2006 using a 70mm F/5.1 Tele Vue Pronto. Exposure was 30 minutes on Ektachrome 200 professional film.

Astrophotography for June and July

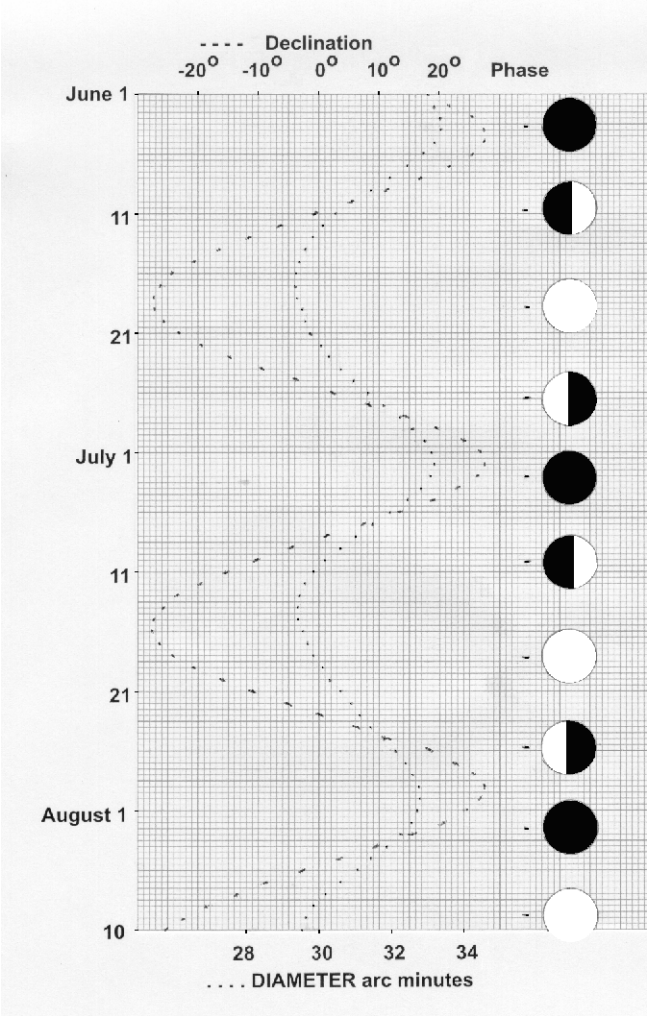
by

Ralph Proctor

Mercury begins June lost in the Sun's glare. Mercury emerges from the Sun's glare in mid-June as a morning object low in the eastern sky. Mercury mover higher in the eastern sky and reaches a greatest western elongation of 22 degrees on 1 July when it will be in excellent photographic position with a declination of plus 20 degrees. During the remainder of July Mercury moves lower in the eastern sky and by the end of the third week in July disappears into the Sun's glare.

Venus begins June lost in the Sun's glare. Venus emerges from the Sun's glare in mid-July as an evening object low in the western sky.

Lunar Declination and Diameter:



The Moon's waxing and waning crescent phases will be located high on the ecliptic and in excellent photographic position during June (June 4-5) and July (July 29), with an apparent declination of up to +28 degrees.

Mars begins June as an evening object in the western sky in the constellation Cancer. Mars moves into the constellation Leo in early July. During June and July Mars moves lower in the western sky, decreases in brightness from magnitude +1.5 to +1.7, and decreases in diameter from 4.9 to 4.1 arc seconds.

Jupiter begins June as a morning object in the eastern sky in the constellation Sagittarius. During June and July Jupiter moves higher in the eastern sky and reaches opposition with the Sun on 9 July. During June and July Jupiter increases in brightness from magnitude -2.6 to -2.7, and increases in diameter from 44.9 to 46.7 arc seconds.

Saturn begins June as an evening object in the western sky in the constellation Leo. During June and July Saturn moves lower in the western sky, decreases in brightness from magnitude +0.7 to +0.8, and decreases in diameter from 17.7 to 16.3 arc seconds.

Uranus begins June as a morning object in the eastern sky in the constellation Aquarius. During June and July Uranus moves higher in the eastern sky, increases in brightness from magnitude +5.9 to + 5.8, and increases in diameter from 3.46 to 3.64 arc seconds. Uranus is located at R.A. 23 hours 34.0 minutes declination -03 degrees 39 minutes on 15 June and at R.A. 23 hours 33.8 minutes declination -03 degrees 41 minutes on 15 July.

Neptune begins June as a morning object in the eastern sky in the constellation Capricornus. During June and July Uranus moves higher in the eastern sky, increases in brightness from magnitude +7.9 to + 7.8, and increases in diameter from 2.30 to 2.35 arc seconds. Neptune is located at R.A. 21 hours 46.3 minutes declination -13 degrees 47 minutes on 15 June and at R.A. 21 hours 44.4 minutes declination -13 degrees 57 minutes on 15 July.

Pluto begins June as a morning object high in the eastern sky in the constellation Sagittarius. During June and July Pluto moves higher in the eastern sky and reaches opposition with the Sun on 20 June. During June and July Pluto increases in brightness from magnitude +14.0 to +13.9. Pluto is located at R.A. 17 hours 59.4 minutes declination -17 degrees 02 minutes on 15 June and at R.A. 17 hours 56.2 minutes declination -17 degrees 06 minutes on 15 July.

Events:

Antares will be occulted by the Moon on 17 June (05 hours universal time) for the southern portion of South America and Polynesia; and on 14 July (12 hours universal time) for the southern half of Australia, New Zealand, and Polynesia.

Neptune will be occulted by the Moon on 23 June (09 hours universal time) for all North America except Alaska, and southern Greenland; on 20 July (13 hours universal time) for eastern Asia, Japan, Alaska, and the northwestern portion of Canada.

Mars will be occulted by the Moon on 8 June (02 hours universal time) for New Zealand.

Ceres will be occulted by the Moon on 31 July (05 hours universal time) for southwestern Australia and Madagascar.

The Sun will undergo a total eclipse on 1 August for the northern and eastern portions of North America, Greenland, northern Europe, and all Asia except Japan. The eclipse begins at 8 hours 04.1 minutes and ends at 12 hours 38.4 minutes universal time. Central eclipse at local apparent noon occurs at 9 hours 47.4 minutes. The shadow of the total eclipse begins in China, travels northwest across Russia, then crosses the northern portion of Greenland, and ends in north central Canada.

The Moon will undergo a partial eclipse on 16 August for Antarctica, all Australasia except New Zealand, all but the northeastern portion of Asia, Africa, and all but the northeastern portion of South America. The eclipse begins (Penumbra contact) at 18 hours 23.1 minutes and ends at 23 hours 57.1 minutes universal time. Umbra contact begins at 21 hours 10.1 minutes and ends at 22 hours 44.6 minutes. Mid-eclipse occurs at 21 hours 10.1 minutes universal time.

MINOR PLANETS

		position			
		15 June		15 July	
Planet	Magnitude	R.A.	Decl.	R.A.	Decl.
Ceres	08.7 - 08.7	06 hr 07.8 min	+25 deg 15 min	07 hr 05.4 min	+25 deg 20 min
Pallas	09.8 - 09.4	02 hr 52.3 min	- 00 deg 12 min	03 hr 40.7 min	- 01 deg 26 min
0Juno	10.1 - 10.6	17 hr 25.9 min	- 04 deg 30 min	17 hr 03.7 min	- 05 deg 15 min
Vesta	08.2 - 07.8	01 hr 41.6 min	+03 deg 56 min	02 hr 21.8 min	+06 deg 33 min

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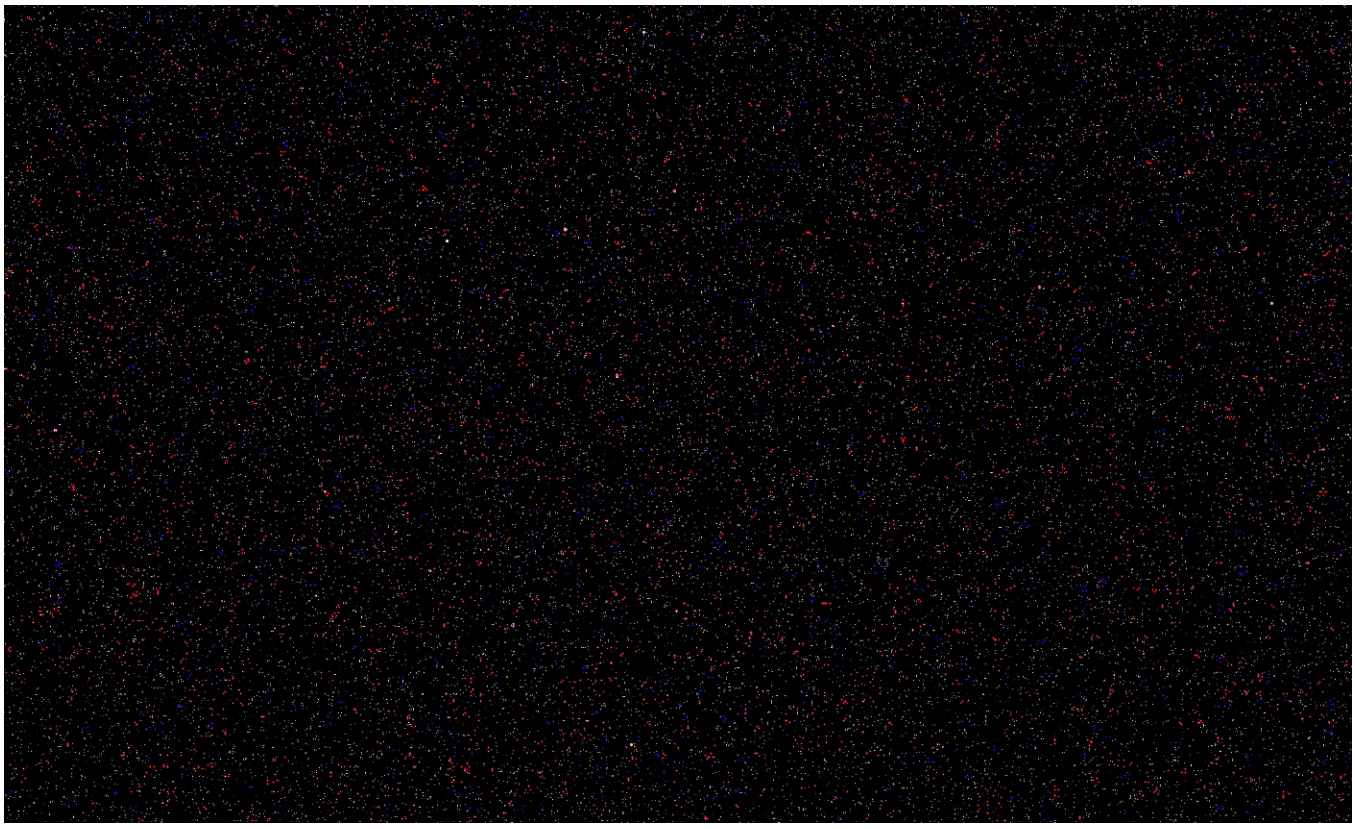
Product Evaluation: Canon 40D part 2

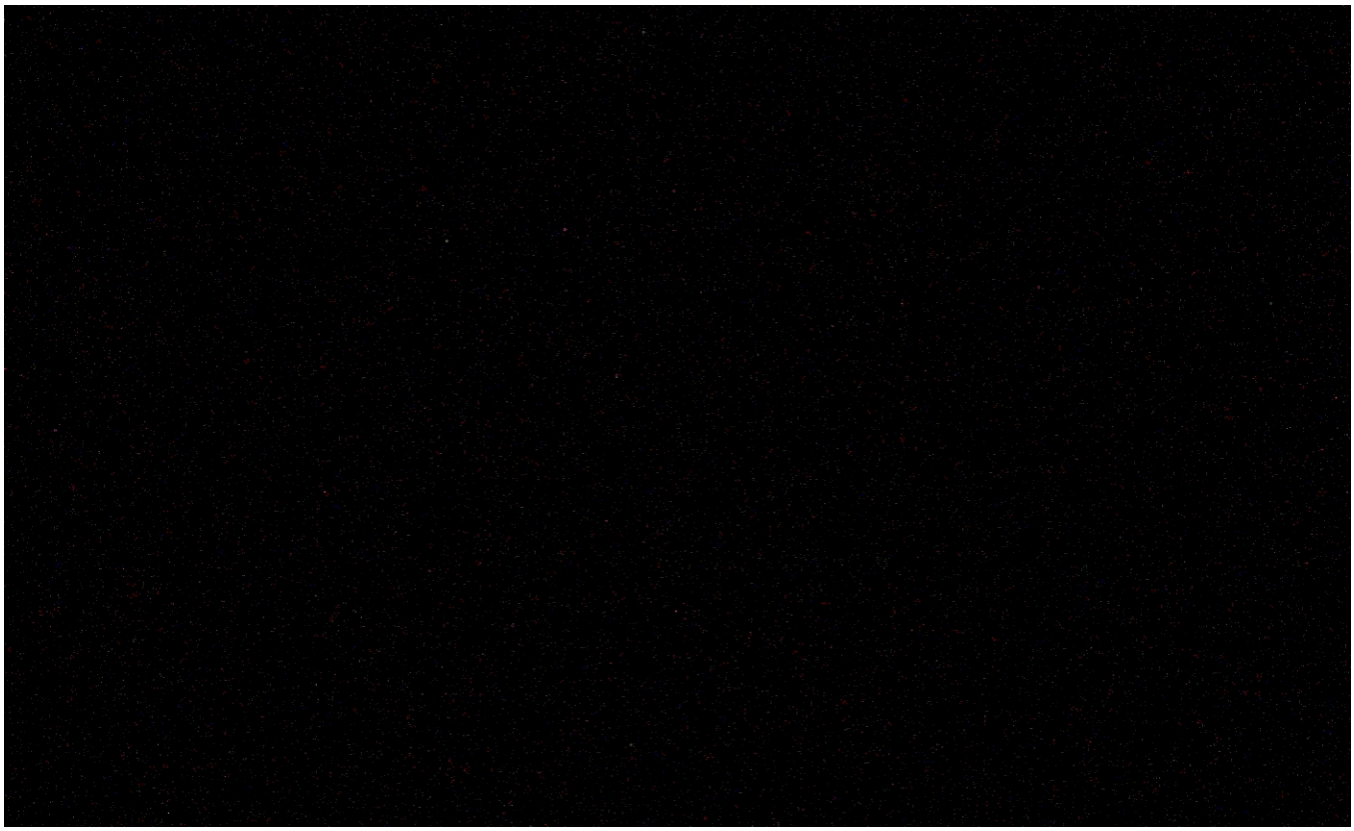
by

Robert C. Price

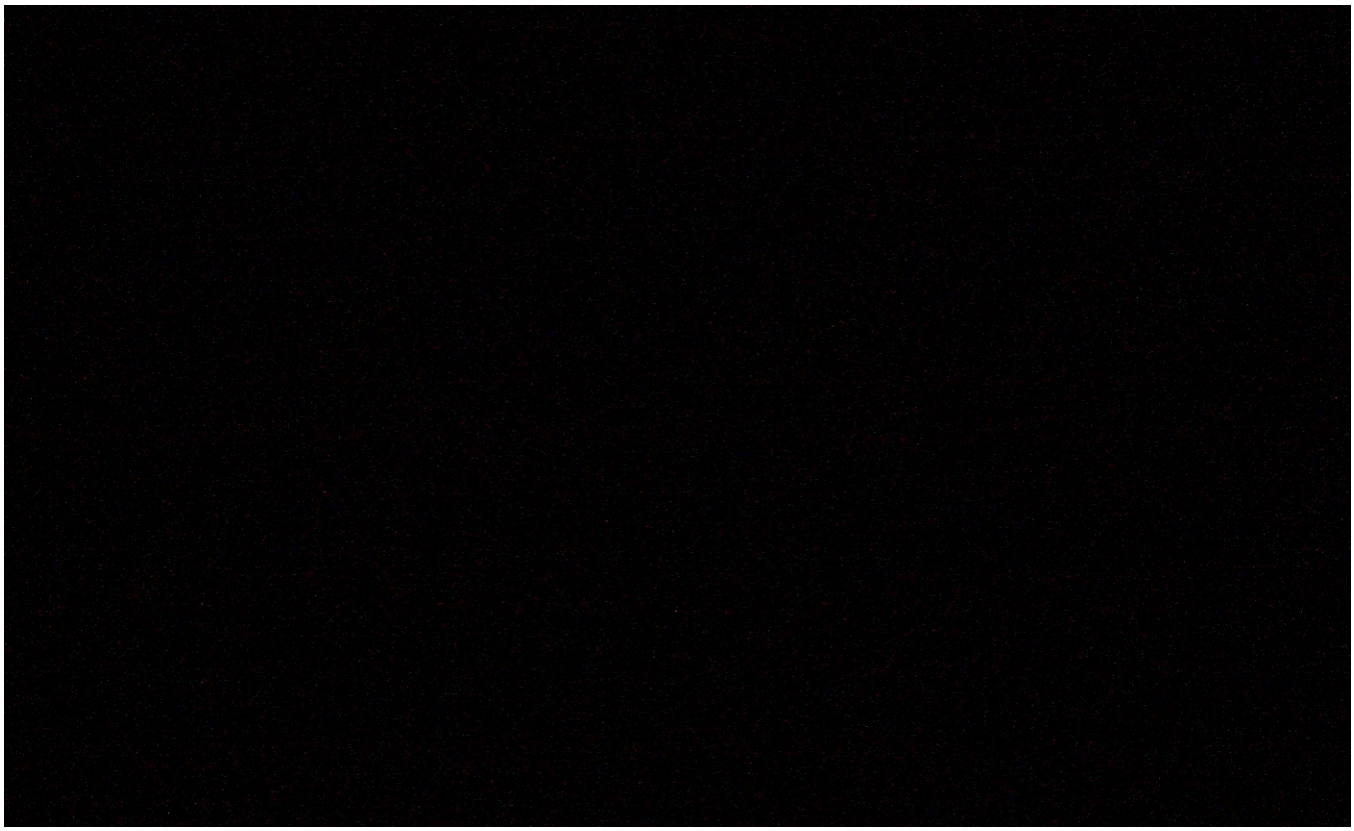
In the December 2007/January 2008 issue of the ASTROGRAPH the author raised a concern about the Canon 40D. The amount of dark frame noise was greater than in an identical dark frame taken with an older Canon 350D. The author took several dark frames using a second Canon 40D. The dark frames indicated the amount of noise was normal for the Canon 40D. Despite several requests for help with this noise question, we have received no help from the manufacturer, Canon U.S.A., as to why the newer Canon 40D has more dark frame noise than the older Canon 350D. The amount of noise at room temperature is shown in Figure 1. This noise can be reduced by taking the image at a lower ASA setting as illustrated in Figure 2, or a reduced exposure time and higher ASA setting as shown in Figure 3. The dark frame noise is not a significant problem at temperatures below 50 degrees Fahrenheit. Numerous images the author has taken this winter have not needed much, if any, processing to reduce the noise. In June the author took images when the outside temperature was above 50 degrees. These images contained numerous single pixels that appear "hot", but are not like the normal "hot pixels" that have a green appearance and extend over several pixels. Some of this type of noise can be reduced by using the noise filters in photoshop, but this noise cannot be eliminated. Figure 4 illustrates this single pixel noise. Figure 5 illustrates the use of the noise filters in photoshop to reduce this type of noise. Taking several exposures at a lower ASA setting and combining the images not only lowers the noise, it also gives a smoother appearance to faint nebula type features. The cover image is an example of combining three 20 minute exposures at 100 ASA instead of taking a single 20 minute exposure at 400 ASA and then having to perform a lot of noise reduction on the image. No noise reduction was performed on the cover image. Figure 6 is another example of combining two 20 minute exposures at 100 ASA without the need for noise reduction. The image in Figure 6 is to the same scale as the images in Figures 1, 2, 3, 4, and 5. The scale of the image is important since any reduction in image scale will minimize the appearance of noise.



Above, Figure 1: Canon 40D dark frame taken at 70 ^{o} F. Exposure was 20 minutes at 400ASA. Note numerous hot pixels and noise defects



Above, Figure 2: Canon 40D dark frame taken at 70 ^{o} F. Exposure was 20 minutes at 100ASA. Note that there are less hot pixels and noise defects.



Above, Figure 3: Canon 40D dark frame taken at 70 ^{o} F. Exposure was 1 minute at 1600ASA. Note that there are less hot pixels and noise defects.



Above, Figure 4: M65, M66 (top), and NGC3628 (right) photographed by the author on 1 June 2008 using a Hutech modified Canon 40D and 5 inch refractor at F/5.2 Exposure was 20 minutes at 400ASA. No attempt was made to reduce the hot pixels and other noise defects.



Above, Figure 5: Same image as in Figure 4 but after hot pixel reduction and noise reduction in Photoshop. Objectional noise and hot pixels are still evident in this image.



Above, Figure 6: M27 photographed by the author on 2 June 2008 using a Hutech modified Canon 40D and 5 inch refractor at F/5.2 This image combines two 20 minute exposutes at 100ASA. No attempt was made to reduce hot pixels and other noise defects.



Above: M24 and dark nebula B92 and B93 in Sagittarius photographed by Lee C. Coombs on 21 August 2006 using a 70mm F/5.1 Tele Vue Pronto. Exposure was 45 minutes on Ektachrome 200 professional film. M24 is the bright area north of B92 and is a Milky Way star cloud described by Messier as being 1.5 degrees in extent.