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COVER PHOTOGRAPH

Object..Ikeya-Zhang c/2002 C1
Photographer..Lee C. Coombs
Instrument...10 inch F/5 Newtonian
Exposure/Film.........15 minutes/Kodak Ektachrome Professional 200
Date..21 April 2002

VOLUME 38 No. 6
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Features

Departments

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Product Evaluation: SBIG ST-2000XCM Pt2

by

Robert C. Price

The SBIG (Santa Barbara Instrument Group) ST-2000XCM is a CCD camera with integrated electronics and built-in TC-237H CCD for self guiding. The ST-2000XCM CCD can produce a one shot color image or a black and white image. Part one of the ST-2000XCM CCD evaluation was published in the April/May 2007 issue of the ASTROGRAPH and discussed image quality and noise elimination methods. Part 2 of this evaluation will look at the self guide ability of the ST-2000XCM. The self guide testing was done with a Tele Vue NP-101 refractor and a Celestron C-8 SCT. Both instruments were mounted on a Losmandy G-11 German equatorial mount. The self guide test with the NP-101 showed that the ST-2000XCM could guide the NP-101 and G-11 mount about as accurately as guiding done with the mark 1 eyeball and a separate 80mm, 910mm focal length guide scope mounted side by side by means of a Losmandy side by side dovetail plate. This side by side dovetail plate can mount the 80mm guide scope and the author's C-8 or C-11 side by side, but this combination does not work well because the C-8 and C-11 both show star drift caused by mechanical or thermal problems. The NP-101 mounted side by side with the 80mm guide scope shows no drift, even with exposures of 20 minutes. The self guiding test done with the C-8 at F/10 showed unacceptable drift or mis-guiding about half the time with 5 minute exposures. This author suspects the G-11 mount has too much R.A. periodic error and as a result the ST-2000XCM is making too many corrections. The author will upgrade the worm gear to see if there is any improvement and provide an addendum to this article at a later date. Figure 1 below is an example of the poorer self guiding efforts while the image on the top of page 85 is a better example of the ST-2000XCM self guiding. Figures 2 and 3, 4 and 5, and 6 and 7 compare the self guiding capability of the ST-2000XCM with normal guiding done by the author using a separate 80mm guide scope. Figures 4 and 5 are not an exact comparison because a coma corrector/reducer was used, resulting in the C-8 working at F/6.3 (Figure 5), instead of F/10 (Figure 4).

Above, Figure 1: SBIG 2000XCM product evaluation part 2. Shown above is a 5 minute self guided exposure of the Ring Nebula taken with a C-8 at F/10 and G-11 mount. This and about half the 5 minute exposures showed star trails. The image on the top of page 85 was taken the same night under the same conditions and shows better self guiding.

Above, Figure 2: SBIG 2000XCM product evaluation part 2. Shown above is a 5 minute self guided exposure of the Ring Nebula taken with a Tele Vue NP-101 at F/5.4 and G-11 mount. The reason the above image lacks the blue-green color in the nebula's center is that transparency was poor and sky pollution great when this image was taken from the author's backyard 28 miles south of Washington DC. The image below was taken under good transparency conditions.

Above, Figure 3: SBIG 2000XCM product evaluation part 2. Shown above is a 5.5 minute exposure of the Ring Nebula taken with a Hutech modified Canon 350D at 400ASA and a Tele Vue NP-101 at F/5.4. The image was guided using an 80mm guide scope mounted to the G-11 mount by means of a Losmandy side by side dovetail plate.

Above, Figure 4: SBIG 2000XCM product evaluation part 2. Shown above is a 5 minute self guided exposure of the Ring Nebula taken with an 8 inch C-8 at F/10 and G-11 mount. The reason the above image lacks the blue-green color in the nebula's center is that transparency was poor and sky pollution great when this image was taken from the author's backyard 28 miles south of Washington DC. The image below was taken under good transparency conditions from an area just south of Blue Knob, PA. The above image showed good self guiding.

Above, Figure 5: SBIG 2000XCM product evaluation part 2. Shown above is a 5 minute exposure of the Ring Nebula taken with a Hutech modified Canon 350D at 400ASA and a C-8 with a coma corrector/reducer at F/6.3. The image was guided using an 80mm guide scope mounted to the G-11 mount by means of a Losmandy side by side dovetail plate.

Above, Figure 6: SBIG 2000XCM product evaluation part 2. Shown above is a 5 minute self guided exposure of the M51 taken with a Tele Vue NP-101 at F/5.4 and G-11 mount. The reason the above image lacks the galaxy arm detail is that transparency was poor and sky pollution great when this image was taken from the author's backyard 28 miles south of Washington DC. The image below was taken under good transparency conditions from an area just south of Blue Knob, PA.

Above, Figure 7: SBIG 2000XCM product evaluation part 2. Shown above is a 5 minute exposure of the M51 taken with a Hutech modified Canon 350D at 400ASA and a Tele Vue NP-101 at F/5.4. Image was guided using an 80mm guide scope mounted to the G-11 mount by means of a Losmandy side by side dovetail plate.

Above: M8 and M20, the Lagoon and Trifid Nebulae, photographed by Lee C. Coombs on 13 August 1999 using a 70mm f/5.1 TV Pronto. Exposure was 30 minutes on Ektachrome 200 professional film.

Above: The constellation Cygnus and Milky Way photographed by Lee C. Coombs on 16 August 2001 using a 35mm lens at f/3.5. Exposure was 30 minutes on Ektachrome 200 professional film.

Above: Southern part of NGC 7000, the North American Nebula, photographed by Lee C. Coombs on 30 June 2005 using a 10 inch F/5 Newtonian. Exposure was 30 minutes on Ektachrome 200 professional film.

Astrophotography for June and July

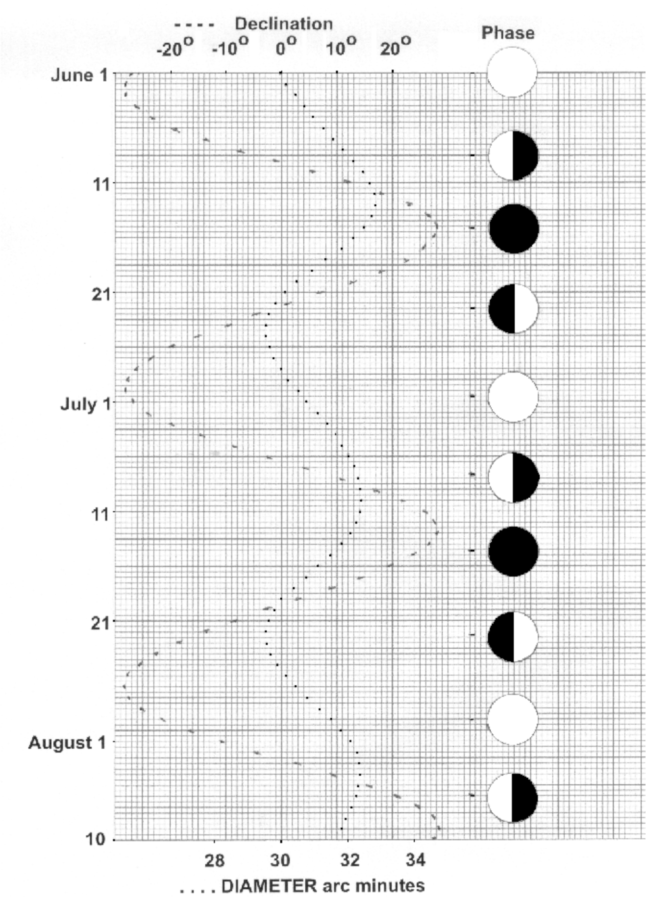
by

Ralph Proctor

Mercury begins June as an evening object high in the western sky and reaches a greatest eastern elongation of 18 degrees on 2 June when it will be good photographic position with a declination of plus 25 degrees. During the remainder of June Mercury moves lower in the western sky and is lost in the Sun's glare during the last week in June. Mercury reaches inferior conjunction with the Sun on 28 June and emerges from the Sun's glare in early July as a morning object low in the eastern sky. Mercury reaches a greatest western elongation of 20 degrees on 20 July when it will be in good photographic position with a declination of plus 21 degrees.

Venus begins June as an evening object high in the western sky. During June and July Venus moves higher in the western sky and reaches a greatest eastern elongation of 45 degrees on 9 June.

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 15) and July (July 13), with an apparent declination of up to +28 degrees.

Mars begins June as a morning object low in the eastern sky in the constellation Pisces. Mars moves into the constellation Aries in late June and then into the constellation Taurus in late July. During June and July Mars moves higher in the eastern sky, increases in brightness from magnitude +1.8 to +0.5, and increases in diameter from 5.8 to 7.0 arc seconds.

Jupiter begins June as a morning object high in the eastern sky in the constellation Ophiuchus and reaches opposition with the Sun on 5 June. During June and July Jupiter moves lower in the western sky, decreases in brightness from magnitude -2.6 to -2.4, and decreases in diameter from 45.7 to 42.1 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 +0.5 to +0.6, and decreases in diameter from 17.5 to 16.3 arc seconds.

Uranus begins June as a morning object low in the eastern sky in the constellation Aquarius, having reached conjunction with the Sun on 5 March. 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 3.48 to 3.65 arc seconds. Uranus is located at R.A. 23 hours 19.5 minutes declination -05 degrees 12 minutes on 15 June and at R.A. 23 hours 19.0 minutes declination -05 degrees 16 minutes on 15 July.

Neptune begins June as a morning object low in the eastern sky in the constellation Capricornus, having reached conjunction with the Sun on 8 February. During June and July Neptune moves higher in the eastern sky, increases in brightness from magnitude +7.9 to +7.8, and increases in diameter from 2.30 to 2.34 arc seconds. Neptune is located at R.A.

21 hours 37.5 minutes declination -14 degrees 27 minutes on 15 June and at R.A. 21 hours 35.5 minutes declination -14 degrees 38 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 10 June. During June and July Pluto remains constant in brightness at magnitude +13.9. Pluto is located at R.A. 17 hours 50.2 minutes declination -16 degrees 23 minutes on 15 June and at R.A. 17 hours 47.1 minutes declination -16 degrees 26 minutes on 15 July.

Events:

Antares will be occulted by the Moon on 1 June (01 hours universal time) for the southern portion of South America, part of Antarctica, and the southwestern part of the Indian Ocean; on 28 June (08 hours universal time) for western Oceania, the western tip of Antarctica, and the southern part of South America; and on 25 July (16 hours universal time) for the southern tip of Africa, most of Antarctica, the southern part of Australia, and the southern part of New Zealand.
Venus will be occulted by the Moon on 18 June (15 hours universal time) for western Asia, Europe, the British Isles, Greenland, and northern Canada.
Neptune will be occulted by the Moon on 03 July (19 hours universal time) for the Bellinshausen Sea in Antarctica; and on 31 July (01 hours universal time) for part of Antarctica and the Kerguelen Island.
Saturn will be occulted by the Moon on 19 June (08 hours universal time) for Japan, central Asia, and the eastern part of Europe; and on 16 July (23 hours universal time) for the Hawaiian Islands and the western part of the center of South America.
Regulus will be occulted by the Moon on 20 June (00 hours universal time) for eastern Siberia, all but the northeastern part of North America, the Caribbean, and northwestern South America; and on 17 July (09 hours universal time) for Europe, the British Isles, the southwestern part of Asia, Indonesia, the southern Philippines, and northwestern Australia.

MINOR PLANETS

		position			
		15 June		15 July	
Planet	Magnitude	R.A.	Decl.	R.A.	Decl.
Ceres	09.3 - 09.0	02 hr 15.9 min	+05 deg 09 min	02 hr 52.1 min	+07 deg 42 min
Pallas	10.3 - 09.4	22 hr 51.1 min	+10 deg 44 min	22 hr 54.0 min	+10 deg 42 min
Juno	10.6 - 11.3	13 hr 00.6 min	+04 deg 07 min	13 hr 13.5 min	+02 deg 11 min
Vesta	05.4 - 06.7	16 hr 19.9 min	- 14 deg 48 min	16 hr 06.4 min	- 16 deg 55 min

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Volume No. 7 issue 5 and 6
Volume No. 8 issue 11, 3, 4, and 5
Volume No. 9 issue 1, 4, 5, and 6
Volume No. 10 issue 2, 3, 5, and 6
Volume No. 11 issue 1, 2, 3[1], 4, 5, and 6
Volume No. 12 issue 1, 2, 3, 4, 5, and 6
Volume No. 13 issue 1, 2, 3, 4, 5, and 6
Volume No. 14 issue 1, 2, 3, 4, 5, and 6
Volume No. 15 issue 1, 2, 3, 4, 5, and 6
Volume No. 16 issue 1, 2, 3, 4, 5, and 6
Volume No. 17 issue 1, 2, 3[2], 4, 5, and 6
Volume No. 18 issue 1, 4, 5, and 6
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Volume No. 20 issue 1, 2, 3[1], 4, 5, and 6
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Volume No. 23 issue 4 and 5
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Volume No. 29 issue 1, 2, 3, 4, 5, and 6
Volume No. 30 issue 1, 2, 3, 4[1], 5, and 6
Volume No. 31 issue 1, 2, 3, 4, 5, and 6
Volume No. 32 issue 1, 2, 3, 4, 5, and 6
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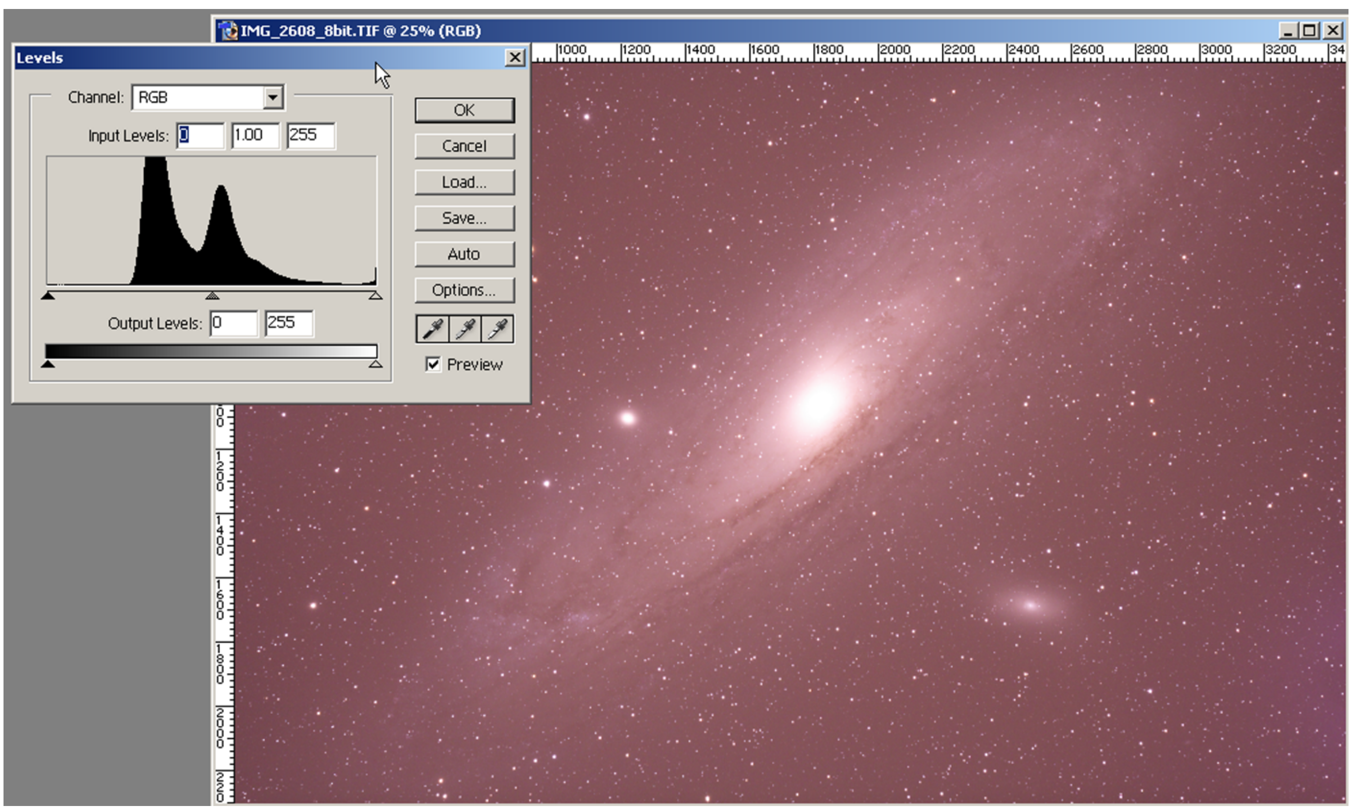
Image Processing: 8 bit verses 16 bit

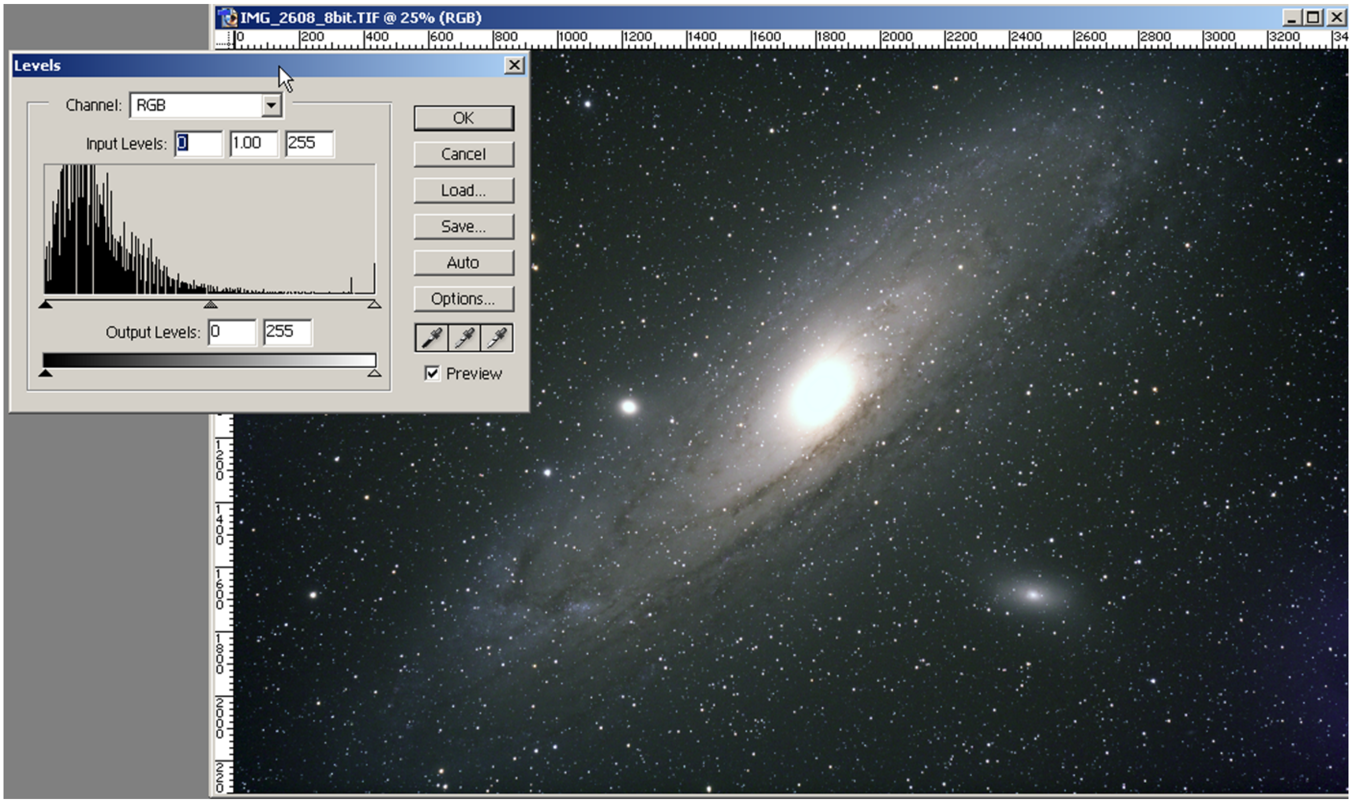
by

Robert Price

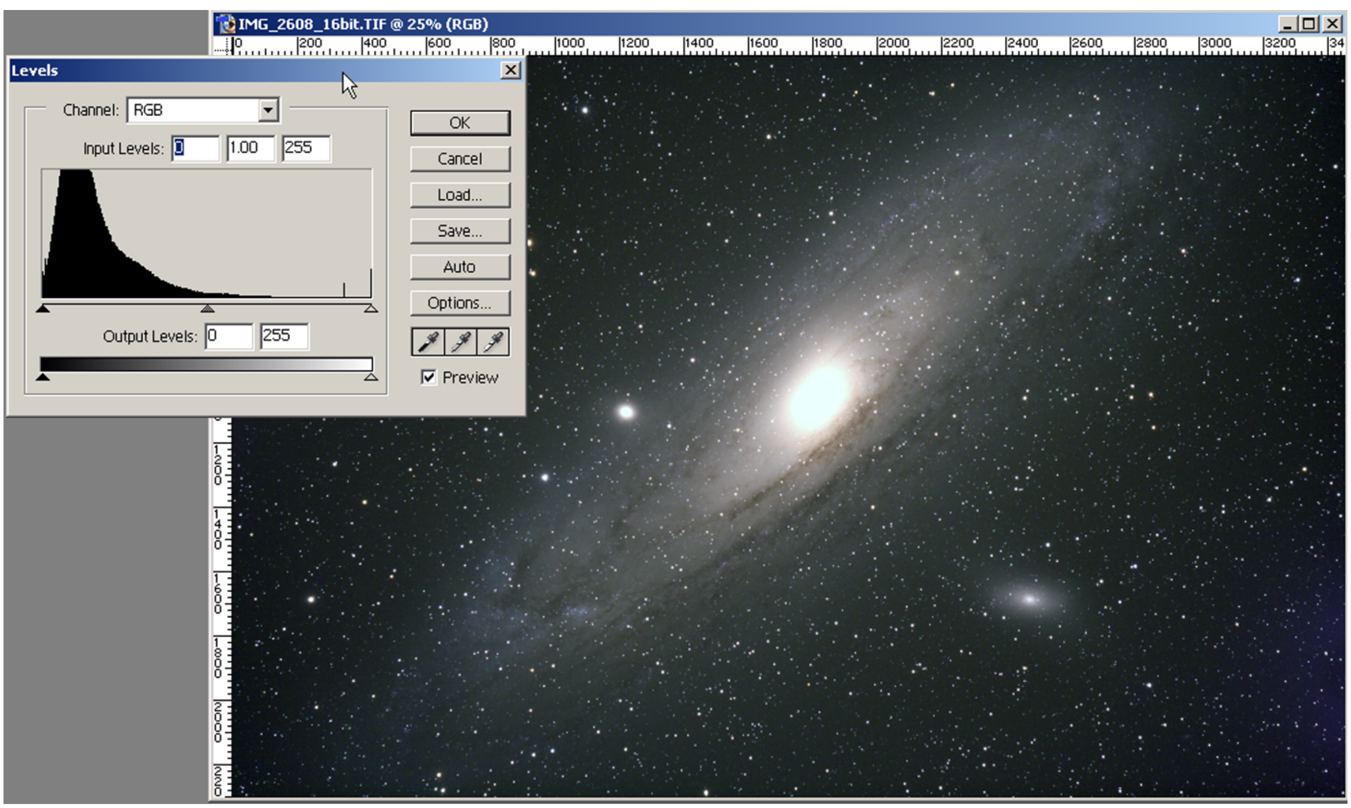
Almost all DSLR (Digital Single Lens Reflex) cameras take pictures in a variety of formats. These cameras also includes a RAW format and computer software to convert the RAW format to TIFF or JPEG files. With the TIFF file format there is usually a choice of an 8 bit or a 16 bit TIFF file format, and sometimes even a 12 bit TIFF format. The immediate difference is that the 16 bit file is twice as large as the 8 bit file. Obviously the 16 bit file contains more information, but is this information necessary and does it make a difference in the resulting picture? With a normal image of a daylight scene the difference is not noticeable because such images usually utilize at least half the 256 color levels that are available in an 8 bit TIFF file. The eye can just detect about 32 shades or color levels. Astronomical images are not normal and in fact are usually "flat" as can be seen in Figure 1, a TIFF file extracted from a Canon 350D RAW image. The image utilizes only about 10 percent of the range of levels available to a normal image. With an 8 bit file this would be about 25 levels, well within the difference between levels that the eye can detect. Both 8 bit and 16 bit TIFF files from Figure 1 were processed using the "auto levels" and "auto color" feature of Adobe Photoshop 7. The resulting images are shown in Figures 2 and 3. At small magnifications levels the eye cannot detect the posterize appearance caused by the lack of original color levels. However, as can be seen in Figures 2 and 3, the levels display of Photoshop clearly shows the lack of a smooth transition between color levels. Figures 4 and 5 show these image files after they have been "tweaked" a little more. Figures 6 and 7 show a portion of these same image files at a greater magnification. The posterize appearance is noticeable in Figure 6 where there are not enough color levels in the 8 bit image to smoothly display the dim features of the outer arms of the galaxy. In the 16 bit image 32,768 levels are available even though this particular 16 bit TIFF image only utilizes about 10 percent of this range of color levels. The levels that are available are more than sufficient to provide a smooth image that contains more color levels that the eye can detect.



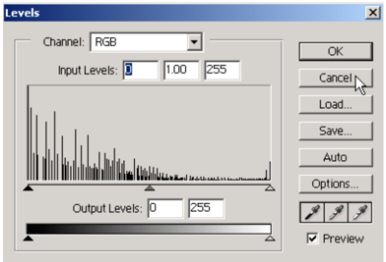
Above, Figure 1: Image Processing. Unprocessed converted TIFF image of M31, the Andromeda Galaxy, photographed by Robert C. Price on 21 November 2006 using a Tele Vue NP-101 at F/5.4. Exposure was 20 minutes with a Hutech modified Canon 350D at 400ASA. Note the levels view in Photoshop indicating a “flat” image. Both 8 bit and 16 bit TIFF image files looked identical, including the levels view in Photoshop.



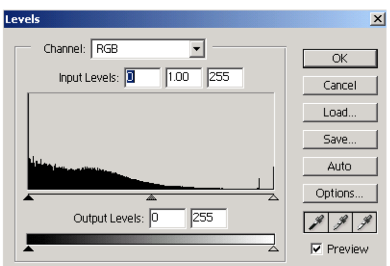
Above, Figure 2: Image Processing. Same 8 bit image shown in Figure 1 but after “auto levels” and “auto color” was applied in Photoshop 7. Note the levels view in Photoshop indicating how the image was stretched.



Above, Figure 3: Image Processing. 16 bit version of the image shown in Figure 1 and 2 but after “auto levels” and “auto color” was applied in Photoshop 7. Note the levels view in Photoshop is smoother than in the 8 bit version, Figure 2.



Above, Figure 4: Image Processing. Final image of the 8 bit version of the image shown in Figure 1 and 2 after additional processing (levels adjusted for darker sky and green level adjusted to eliminate greenish tint) in Photoshop 7. Note the levels view (top left) in Photoshop is not smooth.



Above, Figure 5: Image Processing. Final image of the 16 bit version of the image shown in Figure 1 and 3 after additional processing (levels adjusted for darker sky and green level adjusted to eliminate greenish tint) in Photoshop 7. Note the levels view in Photoshop is smoother than in the 8 bit version.

Above, Figure 6: Image Processing. Enlarged view of the 8 bit version of the image shown in Figure 4. Note the posterize effect in the arms of the galaxy caused by a lack in the number of available color levels.

Above, Figure 7: Image Processing. Enlarged view of the 16 bit version of the image shown in Figure 5. Note the arms of the galaxy appear smoother and less “noisy” than the 8 bit image of the same area in Figure 6.

Above: Total Lunar eclipse of 3 March 2007 Photographed by Robert C. Price with a Tele Vue NP-101 at F/5.4. Exposure was 4 seconds with a Hutech modified Canon 350D at 400ASA.