the ASTROGRAPH



Volume 36 No. 5 April/May 2005

the ASTROGRAPH

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COVER PHOTOGRAPH

Object.....M33, the Pinwheel galaxy

Photographer.....Lee C. Coombs

Instrument.....10 inch F/5 Newtonian

Exposure\Film.....40 minutes/Kodak Ektachrome P200

Date.....20 October 2000

VOLUME 36 No. 5

EDITOR.....Robert C. Price
CONTRIBUTING EDITOR.....Ralph Proctor
PROOFING CONTRIBUTOR.....Linda Miller
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Mark Collins

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ASTROPHOTOGRAPHY PRODUCT SURVEY

by

Robert C. Price

The last product survey was published in the December 2003/January 2004 issue. As with past surveys this survey is a summary of astrophotography related equipment that has been advertized in the last 12 months in the publications Sky and Telescope and Astronomy. It is intended to help ASTROGRAPH readers locate equipment and suppliers that meet their astrophotographic needs. Although prices have remained fairly constant for most items, one product, the CCD, which has expected to fall in cost for years, still has not. CCDs still seem to be increasing in both cost and capabilities. By comparison, in the last year, two "low cost" digital SLR cameras have been introduced with pixel arreys of over 6 megapixels.

ASTROPHOTOGRAPHY PRODUCT SURVEY

MANUFACTURER	PRODUCT	COST
CAMERA PRODUCTS		
Adorama	Dig-T digital camera adapter	$24.95
	Celestron tele-extender deluxe	$48.95
	Celestron reducer corrector F/6.3	$114.95
	Celestron radial guider	$79.95
	Universal 1.25" T-adapter	$24.95
	T-C 16mm adapter	$26.95
B C & F	T-thread to webcam adapter	$42.99
	Ultra universal camera mount	$37.99
Lumicon	Coma corrector	$199.50
	48mm reducer/corrector	$199.50
	Deluxe piggyback adjustable camera mount	$59.50
Meade	Series 4000 F/6.3 focal reducer/field flattener	$149.95
	Series 4000 F/3.3 focal reducer/field flattener	$149.95
	Camera adapter .965 inch	$27.95
	Camera adapter 1.25 inch	$29.95
	Variable-projection camera adapter 1.25 inch	$39.95
	T-adapter for SCT	$26.95
	#644 1.25 inch flip-mirror system	$149.95
	#644 2 inch flip-mirror system	$249.95
Scopetronix	MaxView digital camera adapter 1.25 inch	$129.00
	MaxView digital camera adapter 2 inch	$189.00
	MaxView DSLR projection eyepiece 1.25 inch	$129.00
	MaxView DSLR projection eyepiece 2 inch	$189.00
	WebCam adapter	$22.95-29.95
	Digi-T digital camera adapter	$59.95-109.95
Sultan Camera and Video	35mm Astro SLR	$220.00
Taurus Technologies	HyperCamera - 35mm film (self hypering)	$199.00
	Piggyback adapter 8 and 10 inch Meade	$40.00
	Piggyback adapter 12 inch Meade	$60.00
	Piggyback adapter 14 inch Meade	$65.00
	Piggyback adapter 8 and 11 inch Celestron	$35.00

FILM PRODUCTS/SERVICES

Lumicon	Model 300 hypersensitizing kit	$375.95
	Model 600 hypersensitizing kit	$475.95
	Model 1200 hypersensitizing kit	$751.95

OFF AXIS GUIDERS

Adorama	Celestron radial guider	$79.95
Lumicon	Newtonian Easy-Guider (1.25 or 2 inch)	$189.95
	Cassegrain Easy-Guider F/6.2 for 8 inch SCT	$249.95
	Giant Easy-Guider (Celestron C11,C14, and 10" Meade)	$399.95
	Newtonian Easy-Guider focal reducer in cell	$79.95
	Coma corrector for Newtonian Easy Guider	$239.95
	Giant Easy-Guider focal reducer	$199.95
Taurus Technologies	Taurus Tracker III off-axis guider	$374.00
Tau Ceti Co.	Mini tracker	$99.00
	XY finder	$235.00
Van Slyke Engineering	Optical manifold 2 inch	$79.95
	Optical manifold 2.7 inch	$149.95

FILM (35mm unless otherwise specified)

Lumicon	Hypersensitized Fuji G 800 24exp	$19.95
	Hypersensitized Kodak 2415 36exp	$19.95
	Hypersensitized Kodak 2415 #120	$19.95
	Hypersensitized Fuji RD100	$14.95
	Hypersensitized Kodak P1600	$24.95

FILTERS

Adorama	Siris MV1 minus violet filter 1.25 inch	$49.95
	Siris MV1 minus violet filter 2 inch	$79.50
	Neb1 nebula filter 1.25 inch	$66.95
	Neb1 nebula filter 2 inch	$99.50
	PC1 planetary contrast filter 1.25 inch	$66.95
	PC1 planetary contrast filter 2 inch	$99.50
	CE1 contrast enhancement filter 1.25 inch	$66.95
	CE1 contrast enhancement filter 2 inch	$99.50
Andover Corporation	Nebula filter	$-unk
	O-III filter	$-unk
	656.3 nm for photography	$-unk
Lumicon	UHC filter 1.25 inch	$99.95
	UHC 48mm or 2 inch dia.	$199.95
	Deep Sky 1.25 inch	$99.95
	Deep Sky 48mm or 2 inch T-threaded	$199.95
	Deep Sky 72mm	$399.95

	H-alpha pass 48mm	$69.95
	H-alpha pass 58mm	$79.95
	H-alpha pass 77mm	$89.95
	H-alpha pass 82mm	$99.95
	Hydrogen beta, 1.25 inch	$99.95
	Hydrogen beta, 2 inch	$199.95
	Hydrogen beta, 48mm	$199.95
	Oxygen III 1.25 inch	$99.95
	Oxygen III 48mm	$199.95
	Minus violet 48mm	$49.95
	Minus violet 58mm	$59.95
	Minus violet 72mm	$69.95
	Comet band filter 1.25 inch	$99.95
	Comet band filter 48mm	$199.95
	Infrared blocking filter 2 inch	$99.95
Meade	Series 4000 nebula broadband 1.25 inch #908B	$79.95
	Series 4000 nebula broadband 36mm for SCT #911B	$99.95
	Series 4000 nebula narrowband 1.25 inch #908N	$89.95
	Series 4000 nebula narrowband 36mm for SCT #911N	$119.95
	Series 4000 Oxygen III, 1.25 inch #908x	$99.95
	Series 4000 Oxygen III, 36mm for SCT #911x	$149.95
Orion Telescope Center	SkyGlow broadband 2 inch	$74.95
	SkyGlow broadband 1.25 inch	$47.95
	UltraBlock narrowband 2 inch	$99.95
	UltraBlock narrowband 1.25 inch	$63.95
Thousand Oaks Optical	LP-1 (nebula broadband) 1.25 inch	$89.00
	LP-1 (nebula broadband) 2 inch	$179.00
	LP-2 (narrowband) 1.25 inch	$89.00
	LP-2 (narrowband) 2 inch	$179.00
	LP-3 (Oxygen III) 1.25 inch	$89.00
	LP-3 (Oxygen III) 2 inch	$179.00
	LP-4 (hydrogen beta) 1.25 inch	$89.00
	LP-4 (hydrogen beta) 2 inch	$179.00

CCD CAMERAS

Astronomics	SBIG ST-7XME	$1995.00
	SAC7B	$499.00
Celestron	Neximage	$149.99
Meade	Deepsky imager	$299.00
Starlight Express Ltd	SXV-M7	$-unk
Woodland Hills Camera	ST-237A	$1395.00
	Meade 216 XT	$695.00
SAC Image	SAC-8	$539.00
SBIG	ST-402MF	$-unk

ILLUMINATED RETICLE GUIDING EYEPIECES

Celestron	Celestron 10mm Plossl 1.25 inch	$84.95
Lumicon	12.5mm Orthoscopic wireless 1.25 inch	$149.95
	Pulse guide illuminator	$42.95
Meade	MA 12mm 1.25 inch	$79.95
	MA 12mm 1.25 inch cordless	$99.95
	Series 4000 Plossl 9mm wireless 1.25 inch	$149.95
University Optics Inc	12mm Kellner illuminated reticle 1.25 inch	$109.95
	10mm Plossl illuminated reticle 1.25 inch	$129.95

FOCUSING AIDS

STI	Knife-edge focuser for 35mm and CCD cameras	from $179.00

SOLAR FILTERS

Adorama	Solar glass filter, 8 inch	$99.95
	Solar glass filter, 10 inch	$119.95
	Solar glass filter, 11 inch	$129.95
Lumicon	Solar prominence filter 1.5 angstrom, 2 inch cell	$699.95
Thousand Oaks Optical	Type III glass filter ND=4 For photography 2.4 - 14 inch	$69.00-$199.00
Orion	Full aperture 3.5 - 12 inch	from $54.95

EQUATORIAL MOUNTS

Adorama	Celestron G-5 equatorial mount	$369.95
Advanced Optics	Vanguard 2000 heavy duty equatorial mount	$-unk
	Losmandy G-8	$-unk
	Losmandy G-11	$-unk
	CG-5 computerized mount	$699.95
Astro-Physics	900GTO equatorial mount	$-unk
Hutech Borg	Kenko "Sky Memo R" portable equatorial mount	$-unk
Mathis Instruments	German equatorial mount	$-unk
Optical-Craft Machining	Equatorial mount and drive 1 - 4.5 inch dia. steel shaft	$300-12000
	6.6 inch diameter drive	$495.00
	9.0 inch diameter drive	$585.00
Sultan Camera and Video	Vixen Great Polaris equatorial mount	$-unk
Vixen North America	Sphinx equatorial mount up to 22lb payload	$1825.00
Woodland Hills Camera	Losmandy Gemini G-8	$-unk
	Losmandy Gemini G-11	$-unk

LISTING OF MANUFACTURERS

NAME	ADDRESS	PHONE #
Adorama www.adoramacamera.com	42 W. 18th St, New York NY 10011	(800) 223-2500
Advanced Optics www.advanced-optics.com	unk	
Andover Corporation www.andcorp.com	4 Commerce Dr, Salem NH 03079	(888) 893-9992
Astronomics www.astronomics.com	680 SW 24th Ave., Norman OK 73069	(800) 422-7876
Astro-Physics www.astro-physics.com	11250 Forest Hills Rd, Rockford IL 61115	(815) 282-1513
B C & F www.astro-engineering.com	unk	(866) 842-3925
Celestron International www.celestron.com	2835 Columbia Street, Torrance CA 90503	(800) 421-1526
Lumicon www.lumicon.com	2111 Research Dr, Livermore CA 94550	(415) 447-9570
Mathis Instruments www.mathis-instruments.com	unk	(925) 838-1487
Meade Instruments Corp. www.meade.com	1675 Toronto Way, Costa Mesa CA 92626	(714) 556-2291
Oceanside Photo and Camera www.optcorp.com	918 Mission Ave, Oceanside CA 92056	(800) 483-6287
Orion Telescope Center www.telescope.com	421 Soquel Ave Box 1150, Santa Cruz CA 95061	(800) 447-1001
Optical-Craft Machining www.opticcraft.com	33918 Macomb, Farmington MI 48335	(248) 476-5893
SAC Imaging www.sac-imaging.com	PO box 360982, Melbourne FL 32935	(321) 259-6498
Scopetronix www.scopetronic.com	1423 SE 10th Street, Cape Coral FL 33990	(941) 945-6763
Shutan Camera and Video www.shutan.com	312 W. Randolph, Chicago IL 60606	(800) 621-2248
Starlight Express Ltd. www.astrovid.com	unk	(877) 348-8433
STI (Stellar Technologies International) www.stellar-international.com	unk	(800) 232-9416
Tau Ceti Co. www.us-astro.com	Po Box 1101, Conroe Tx 77305	(936) 539-4073
Taurus Technologies www.taurus-tech.com	PO Box 14, Woodstown NJ 08098	(609) 769-4509
Thousand Oaks Optical www.thousandoaksoptical.com	Box 248098, Farmington MI 48322	(313) 353-6825
University Optics Inc. unk	PO box 1205 Ann Arbor MI 48106	(800) 521 2828
VanSlyke Engineering www.observatory.org	12815 Porcupine Ave, Colorado Springs CO 80908	(719) 495-3828
Vixen North America www.vixennamerica.com	32 Erkay Dr., Chester NY 10918	(845) 469-8680
Woodland Hills Camera www.telescopes.net	5348 Topanga Cyn Blvd, Woodland Hills CA 91364	(818) 347-2270



Above: Planetary nebula NGC 6781 photographed by Lee C. Coombs on 25 September 2000 using a 10 inch F/5 Newtonian. Exposure was 35 minutes on Kodak Ektachrome P200 slide film.



Above: Spiral galaxy NGC 253 photographed by Lee C. Coombs on 22 November 2003 using a 10 inch F/5 Newtonian. Exposure was 35 minutes on Kodak Ektachrome P200 slide film.

Astrophotography for April and May

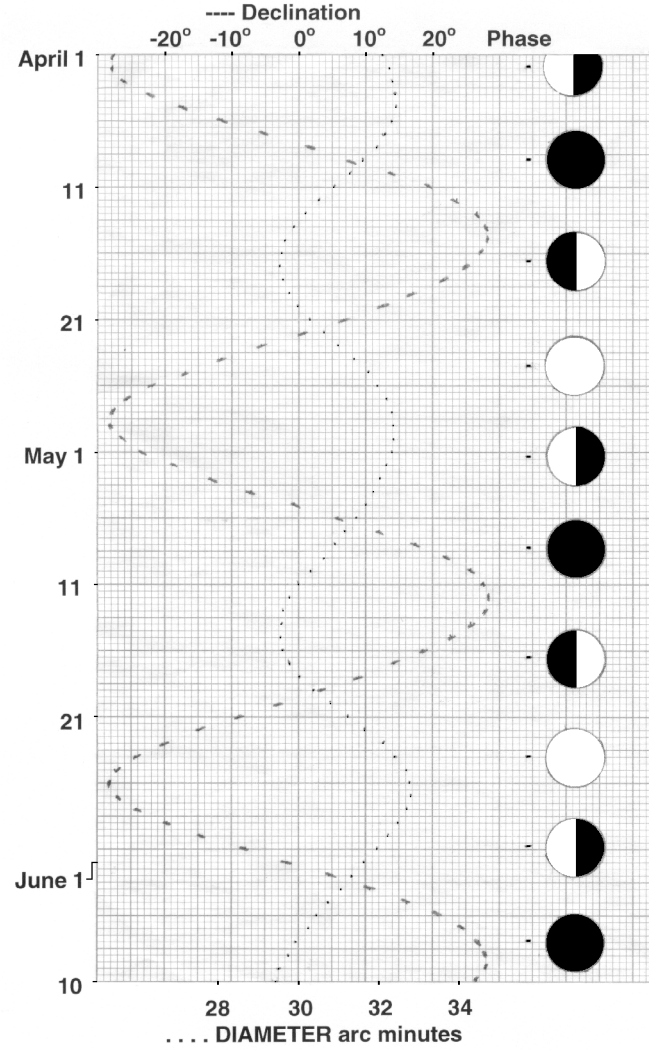
by

Ralph Proctor

Mercury begins April lost in the Sun's glare. Mercury emerges from the Sun's glare in early April as a morning object. Mercury reaches a greatest western elongation of 27 degrees on 26 April when it will be in fair photographic position with a declination of plus 1 degree. During May Mercury moves lower in the eastern sky and disappears into the Sun's glare by the end of May.

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

Lunar Declination and Diameter:



The Moon's waxing quarter phase will be located high on the ecliptic and in excellent photographic position during April (April 15) and May (May 12), with an apparent declination of up to +28 degrees.

Mars begins April as a morning object low in the eastern sky in the constellation Capricornus, but moves into the constellation Aquarius in late April. During April and May Mars moves higher in the eastern sky, increases in brightness from magnitude +0.9 to + 0.3, and increases in diameter from 5.83 to 7.82 arc seconds.

Jupiter begins April as a morning object high in the eastern sky in the constellation Virgo. Jupiter reaches opposition on 3 April. During April and May Jupiter moves lower in the western sky, decreases in brightness from magnitude -2.5 to -2.2, and decreases in diameter from 44.2 to 40.4 arc seconds.

Saturn begins April as an evening object in the western sky in the constellation Gemini, having reached opposition with the Sun on 13 January. During April and May Saturn moves lower in the western sky, decreases in brightness from magnitude +0.1 to +0.2, and decreases in diameter from 18.8 to 17.0 arc seconds.

Uranus begins April as a morning object low in the eastern sky in the constellation Aquarius, having reached conjunction with the Sun on 25 February. During April and May Uranus increases in brightness from magnitude +5.9 to +5.8, and increases in diameter from 3.37 to 3.52 arc seconds. Uranus is located at R.A. 22 hours 44.8 minutes declination -8 degrees 45 minutes on 15 April and at R.A. 22 hours 48.7 minutes declination -8 degrees 23 minutes on 15 Mary

Neptune begins April as a morning object low in the eastern sky in the constellation Capricornus, having reached conjunction with the Sun on 3 February. During April and May Neptune increases in brightness from magnitude +8.0 to + 7.9, and increases in diameter from 2.23 to 2.26 arc seconds. Neptune is located at R.A. 21 hours 19.0 minutes declination -15 degrees 58 minutes on 15 April and at R.A. 21 hours 20.3 minutes declination -15 degrees 40 minutes on 15 May.

Pluto begins April as a morning object high in the eastern sky, as it moves to a 15 June opposition with the Sun. During April and May Pluto increases in

brightness from magnitude +13.9 to +13.8. Pluto is located at R.A. 17 hours 36.8 minutes declination -15 degrees 04 minutes on 15 April and at R.A. 17 hours 34.7 minutes declination -15 degrees 00 minutes on 15 May.

Events:

Jupiter will be occulted by the Moon on 22 April (18 hours Universal Time) for all but the southern tip of the southern half of Africa, the south Indian Ocean, and part of Antarctica; and on 19 May (22 hours Universal Time) for the Caribbean, the southern part of Central America, northern South America, and the southern part of south Africa.

Antares will be occulted by the Moon on 26 April (23 hours Universal Time) for northeastern Africa, the southeastern British Isles, all Europe except northern Scandinavia; and on 24 May (08 hours Universal Time) for the northeastern Pacific Ocean, all but the northern portion of North America, Central America, the Caribbean, and the northern tip of South America.

Juno will be occulted by the Moon on 5 May (14 hours Universal Time) for the southeastern Pacific Ocean, most of South America, the central Atlantic Ocean, western Africa, and the southern Iberian Peninsula.

Mars will be occulted by the Moon on 31 May (09 hours Universal Time) for part of Antarctica, the southern part of South America, and central west Africa.

The Sun will undergo an annular and total eclipse on 8 April for New Zealand, part of Antarctica, the southern United States, Central America, the Caribbean, and all but the eastern and southern part of South America. The eclipse begins and ends at 17 hours 51.2 minutes and 23 hours 20.4 minutes Universal Time respectively. Central eclipse at local apparent noon occurs at 20 hours 15.6 minutes Universal Time.

The Moon will undergo a penumbral eclipse on 24 April for the western portion of the United States, the western portion of Canada, Alaska, the Hawaiian Islands, the central Pacific Ocean, the eastern portion of Australia, and portions of Antarctica. The Moon enters and leaves the penumbra at 07 hours 49.8 minutes and 11 hours 59.8 minutes Universal Time respectively. Mid-eclipse occurs at 09 hours 54.8 minutes Universal Time.

MINOR PLANETS

position

	Magnitude	15 April R.A.	15 April Decl.	May 15 R.A.	May 15 Decl.
Ceres	07.7 - 07.4	15 hr 30.9 min	-08 deg 43 min	15 hr 05.4 min	-08 deg 20 min
Pallas	07.3 - 08.8	12 hr 12.5 min	+16 deg 35 min	12 hr 08.1 min	+20 deg 32 min
Juno	10.1 - 10.0	00 hr 01.9 min	+00 deg 18 min	01 hr 00.3 min	+04 deg 48 min
Vesta	08.4 - 08.3	02 hr 33.6 min	+10 deg 23 min	03 hr 25.6 min	+14 deg 13 min

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Volume No. 14 issue 1, 2, 3, 4, 5, and 6
Volume No. 15 issue 1, 2, 3, 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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Volume No. 35 issue 1 and 2

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The Digital SLR Camera

by

Robert C. Price

Compared to regular 35 mm film SLR (Single Lens Reflex) cameras, the digital SLR is not inexpensive. The least costly digital SLR now costs three to four times what an inexpensive 35mm film SLR costs. The more expensive digital SLRs feature a full frame 35mm size sensor and cost starts at four thousand dollars. Both the Canon 300D (known as the Digital Rebel) and the Nikon D70 cost less than one thousand dollars. Both feature sub 35mm frame size sensors. There are many pros and cons to the digital SLR with regular photographic applications, but the main pro is the ability to quickly download images to a computer for viewing, photo adjustments, or printing. When a digital SLR is placed on a telescope just what can be expected compared to the film SLR? Almost all the pros and cons remain unchanged, but there are some differences. The following is a discussion of features and differences the author has observed:

Focus: Once the digital camera is focused, a short exposure can be taken, displayed, and then magnified (10x with the Canon 300D). The image can then be focused again if found to be out of focus, and the processed repeated until good focus is achieved. This process should be repeated between exposures if the telescope is cooling down, or when the telescope has been moved to photograph a new object.

Reciprocity failure: This seems to be nonexistent with digital image sensors. Long exposure images of a gray card/color chart the author has taken with the Canon 300D under moon light show no color balance shift as is the case with most color film.

Grain: Digital SLRs allow ASA speed setting in the manual modes. Camera speed from 100 to 1600 ASA can be set with the Canon 300D and 200 to 1600 ASA with the Nikon D70. The author uses a camera speed of 400 ASA and has not investigated the effects of different camera speed settings with long exposures. Short exposure daylight testing us-



Above: The Canon 300D digital SLR. Seen from the rear showing the ISO button that allows setting the speed to 100, 200, 400, 800, or 1600ASA. Also shown is the "+" preview control that magnifies the preview image up to 10 times.

ing a medium contrast resolution target under cloudy conditions is shown on page 78. In this test a 55mm lens was used at F/5.6 and the exposure varied to keep the same image density for all ASA settings. Noise in the digital image starts to show up at 400 ASA and becomes very noticeable at 1600 ASA. Resolution is only slightly degraded as the ASA setting is increased. For long exposure photography the author chose the 400 ASA film speed setting because reviews of the Canon 300D and similar digital SLRs in several photographic magazines indicate that noise increases significantly at speeds settings higher than 400 ASA. The author's daylight test seems to show this effect. Using a regular film camera with higher speed film results in more film grain and less resolution, while using a digital SLR at higher speed settings results in more noise with some effect on resolution. Whether the electronic noise increase in digital SLRs is as bad as the grain increase in film would depend on the amount of noise increase in the digital sensor. Reviews in photographic magazines would indicate that the digital SLR has an advantage in this area, but the author has not investigated this aspect with long exposure astrophotography and the Canon 300D.

Sensor size: Only the more expensive digital SLR cameras have a sensor that covers the full (24mm by 36mm) frame size of 35mm film. The Canon 300D has a sensor 15.1mm by 22.7mm with 6.3 million active pixels and an image size of 2048 by 3072 pixels. The Nikon D70 has a sensor 15.6mm by 23.7mm with 6.1 million active pixels and an image size of 2000 by 3008 pixels. The difference between a 35mm film camera and a digital SLR will be area coverage. For example, a telescope with a 1000mm focal length and a 35mm film camera will have a coverage of 1.3 by 2.0 degrees. This same 1000mm focal length telescope with a Canon 300D digital SLR will have sky coverage of .82 by 1.26 degrees, which is about 40% of the sky coverage provided by a full 35mm frame.

Resolution and enlargements: In order for a digital image to produce photo quality prints at normal viewing distance, assuming that the image is sharp to begin with, the enlarged image must contain between 240 and 360 pixels per inch of enlargement. This means that a sharp digital image containing 6.3 million pixels should be able to produce a photo quality 8 by 10 inch print, and possibly even a photo quality 11 by 14 inch print. By contrast, photographic reproduction in magazines requires between 150 and 200 pixels per inch and cannot stand close examination without showing the screen structure that reveals that they are halftone reproductions. Images on film that are scanned with 4000 pixels per inch film scanners will produce image files having similar properties to image files produced by digital cameras when it comes to enlargements of a particular object. A scanned image of a 35mm film frame will result in a digital image size of 5669 pixels by 3780 pixels. Using the same criteria (240 to 360 pixels per inch of enlarged image) for enlarging a 4000 DPI film scanned image yields a photo quality enlargement of 11 by 14 inches and possibly even a photo quality enlargement of 16 by 20 inches. However, when both the film scanned image file and digital camera image file are enlarged to the same size enlargement the actual object(s) in the enlargement will not be the same size because of the smaller size of the imaging chip in the digital camera. With a digital camera such as the Canon 300D, the equivalent focal length of any lens or telescope will be 1.6 times more when compared to a 35mm film frame because of the ratio of active frame width (36mm for film and 22.7mm for the Canon 300D). In terms of real object resolution at the film/digital image sensor plane both film and digital sensor are similar assuming the film is scanned at a resolution of 4000 DPI. In the case of the digital sensor the actual resolution on the sensor equates to 135 pixels per millimeter, while in the case of 35mm film scanned with a 4000 DPI scanner the actual resolution at the film plane equates to 157 pixels per millimeter. What is even more interesting is that a full frame 35mm digital camera would need 21.4 million pixels to have the equivalent resolution of a 35mm film image that was scanned at 4000DPI.

Spectral response: Digital camera sensors are inherently very sensitive to red light and the near infrared up to 900 nanometers. The digital SLR camera is a color device that tries to imitate the re-







Above: Canon 300D digital SLR test of image noise verses camera speed (ASA) setting. Test images included a medium contrast three-bar resolution target and were taken under cloudy conditions using a 55mm lens at F/5.6. The camera was tripod mounted to eliminate motion. Upper left: ASA 100, 1/50 second at F/5.6. Middle left: ASA 200, 1/100 second at F/5.6. Lower left: ASA 400, 1/200 second at F/5.6. Upper right: ASA 800, 1/400 second at F/5.6. Middle right: ASA 1600, 1/800 second at F/5.6. Note that there is significantly more noise in the 800 and 1600 ASA images but that there is actually very little reduction in resolution of the three-bar resolution target.

sponse of the human eye so that the pictures it produces look like what the eye sees in real life. In order to achieve this same look the digital camera sensor not only has filters for the three primary colors, but an infrared blocking filter to block light in the red area beyond the response of the human eye. Images of normal scenes taken with the infrared blocking filter removed will look different, especially if there is vegetation in the scene. Plants reflect infrared light to keep from burning up and, thus, will look white or burned out with such a digital camera. This look is similar to how images containing vegetation look on images taken with infrared film. Unfortunately, the particular type of infrared blocking filter used in digital cameras seems to have very little throughput beyond what the eye can see. For normal photographic applications the developers of digital cameras probably do not even care if the red responce of the camera is good or bad at 656.3 nanometers, since the eye has very little responce at this frequency. This particular type of infrared blocking filter makes most digital SLR cameras less sensitive to the red light of H alpha emission (656.3 nanometers) than such films as Kodak 2415 and PPF 400. The Canon 300D is available from Hutech Astronomical Products with the infrared blocking filter removed or modified.

T-mount: The T-mount ring for the Canon 300D type lens is larger than other T-mount rings. This is a problem for users of Lumicom Easy Guiders because the adapter which mounts the Easy Guider to the T-ring adapter is too small for the Canon 300D T-ring adapter. The lens mount for the Canon 300D camera is wider than the lens mount for most cameras. Where the T-mount adapter attaches to the Canon 300D the adapter has an inside diameter of 48mm. By contrast the AE-1 film camera T-mount adapter is smaller and has an inside diameter of 45mm where the adapter attaches to the camera.

Cable release: The Canon 300D has a remote controller for shutter activation and bulb time exposure control that is attached to the camera by wire.



Above: Canon 300D showing T-ring attachment/lens mount and electronic shutter control (bottom left), and AE-1 film camera. At right are the old AE-1 T-ring (top) and the newer Canon 300D T-ring. Note the size difference between new and old type T-rings. The inside diameter where the T-ring adapter mounts to the camera is 48mm verses 45mm.



Above: Emission nebula M-16, the Eagle Nebula, photographed by Mark Collins using an 8 inch Celestron Ultima at F/10 and Lumicon deep sky filter. Exposure was 60 minutes on hypersensitized Kodak 2415 film.