



a division of Aplegen, Inc.

## ST-402ME CCD Imaging Camera



Simple, Powerful, and Low Cost.

These were the design goals for the ST-402ME camera: We wanted something simple and easy to use yet powerful enough to carry the "ST" model prefix. The new ST-402ME is seen at right equipped with the optional T-thread to C-mount adapter ring and lens. For use at the telescope, a 1.25" nosepiece screws into the T-threads of the front plate.

The ST-402ME uses the same Microlensed, Blue Enhanced, Full Frame KAF-0402ME CCD as the ST-7XME camera. The array is 765 x 510 pixels at 9 microns square. The same technology that is used to achieve such high quantum efficiency in the KAF-3200ME CCD is also used with the same effectiveness in the KAF-0402ME CCD. With a peak QE of nearly 85%, this camera bows its head to no other when it comes to recording faint detail in dim objects.

A full frame download takes less than a second with the new USB 2.0 electronics. Focus mode updates the computer screen about 2X per second. The small size and light weight makes this camera very easy to handle and set up. A custom internal filter wheel and shutter lets you take dark frames and tri-color images automatically. Best of all, the low noise and extraordinary QE of the KAF-0402ME CCD makes this one of the most sensitive CCD cameras available to amateurs at any price. Simply put, there is nothing that can touch it in its class, except of course the dual sensor, self-guiding ST-7XME camera.

### Full Complement of Software for the PC:

The ST-402ME camera comes with more additional software than any introductory camera from any manufacturer.

#### CCDOPS Version 5

SBIG's own complete camera control software, with image analysis, processing functions, autoguiding, automated image acquisition, filter wheel control, and much more.

#### CCDSOFTV5

Software Bisque's professional astrometric and image processing program including SBIG camera control and image link capability with TheSky and RealSky Palomar Sky Survey data.

#### TheSky Version 5, Level II

Also from Software Bisque. TheSky version 5 is a premier planetarium and star-charting program that includes telescope control for many popular commercial GOTO systems.

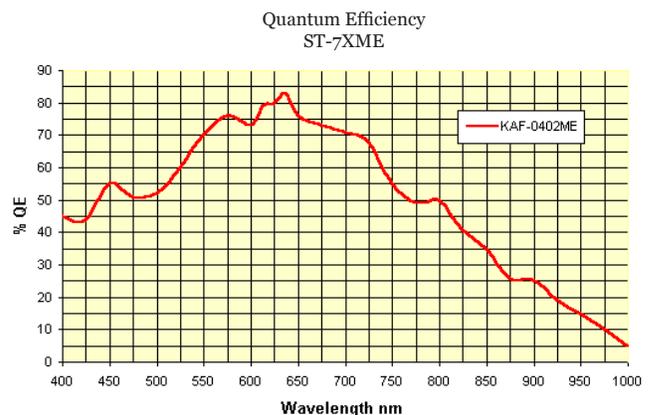
#### Equinox

By Microprojects is for Mac users. It is a planetarium program that includes SBIG Camera control. This will control all SBIG cameras, including older parallel cameras with our E2P adapter. For Mac OS-X only. Send SBIG a copy of your invoice and camera serial number and we will send you a CD at no charge.

### Features

#### Image or Autoguide

The ST-402ME is so sensitive one is virtually guaranteed to find a guide star in the field of view no matter where it is pointed using our small eFinder accessory lens (1" f/4). The ST-402ME can autoguide or image, but like the ST-237A, it cannot do both at the same time. However, using SBIG's patented Track & Accumulate feature, a sequence of images can be captured and automatically aligned and stacked (co-added) as you go. The ST-402ME's internal relays allow the camera to autoguide almost any commercial telescope with an autoguider port. It will also control an external Relay Adapter Box for unusual telescope drives or older ones that need to be isolated electrically from the autoguider.



### Similarities to the ST-237A

Like the ST-237A, this single sensor camera is designed for light weight, low cost and high performance. The camera uses a monochrome CCD with an optional internal filter wheel and custom filters enabling it to do both high sensitivity B&W imaging and RGB/LRGB color imaging with the same camera. The CCD is centered in the camera body and is correctly spaced for Celestron telescopes having Fastar or Hyperstar optics. The camera body is all metal construction (black hard anodized aluminum). Single stage, regulated, thermoelectric cooling with fan assist is provided on the standard astronomical model. At 4 x 5 inches, the camera head is somewhat wider than the ST-237A, but it is not as deep and has all electrical connections on the side. This gives the camera the shortest possible protrusion from the rear of the telescope to allow maximum clearance when imaging objects in the north with a fork mounted telescope. This size and shape also makes it possible to put the filter wheel inside the camera, even though the KAF-0402ME CCD requires larger filters than the ST-237A. Electronic relays provide typical autoguider output from the RJ-11 jack, so the camera can be used as a highly sensitive autoguider with a larger field of view than most other autoguiders.

### Differences from the ST-237A

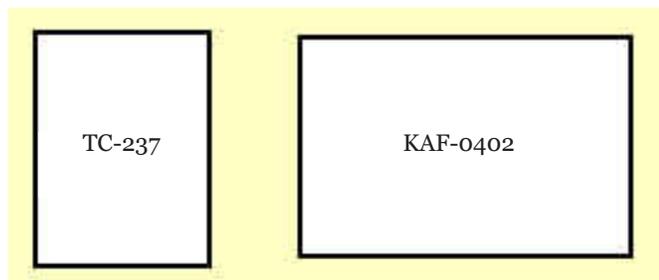
The KAF-0402ME Imaging CCD is about 75% larger than the TC-237. It also has better read noise, lower dark current, significantly greater dynamic range and higher QE than the TC-237. All of these factors combine to make a more sensitive camera with greater field of view. The KAF-0402E/ME CCD is available only in NABG. For fast systems such as the Faster, the KAF-0401LE (ABG) version is also available as an option.

All new electronics are contained entirely in the camera head. There is no separate CPU box. The computer interface is USB 2.0 (USB 1.1 compatible). The high speed readout rate is approximately 2 Megapixels pixels per second. With some overhead, a full frame, high resolution image will download in approximately 0.8 seconds using USB2.

A regulated power supply is built into the camera so you can operate directly from a 12V battery or other unregulated 12VDC source. A wall transformer is also supplied for operation in North America from 110VAC.

### Comparison of ST-237A to ST-402ME

Relative Size of TC-237 and KAF-0402ME.



Camera	Pixel Array	Number of Pixels	Pixel Size	CCD Size (mm)
ST-402ME	765 x 510	390,000	9u	4.6 x 6.9
ST-237A	657 x 495	325,000	7.4u	3.7 x 4.9

Camera	CCD Area (mm <sup>2</sup> )	Diag FOV 11" Fastar (544mm FL)	Dark Current at 0°C	Read Noise
ST-402ME	32	52 arcmin	1e-/p/s	17e-
ST-237A	18	38 arcmin	5e-/p/s	15e-

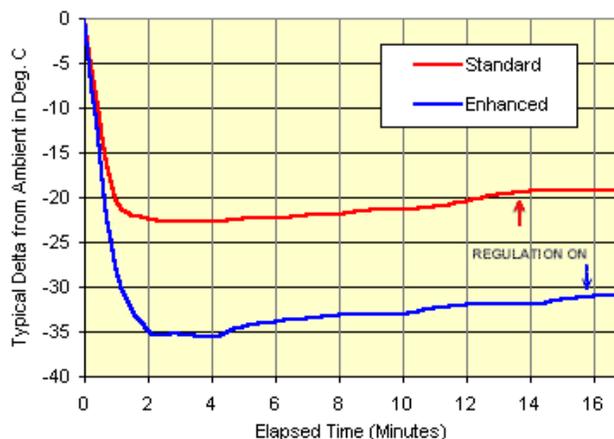
Camera	Full Well Capacity	Peak QE	Computer Interface	Full Frame Transfer
ST-402ME	100,000e-	83%	USB 2.0	0.8 sec
ST-237A	20,000e-	75%	Parallel	15 sec

### Enhanced Cooling

Beginning in March 2006 we made the enhanced cooling package standard on the ST-402ME cameras.



ST-402ME Enhanced Cooling Data



### Color Imaging

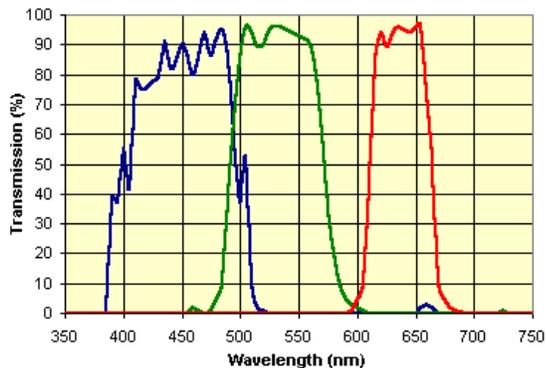
An internal filter wheel with custom RGB+C color filters is available as an option for RGB or LRGB color imaging with the ST-402ME. This filter wheel uses the same custom designed high quality dichroic filters that we developed for the ST-7/8/9/10 "E" and "ME" cameras. The filters are designed specifically to yield a proper balance of both OIII and H-alpha emission line intensity from planetary nebula while at the



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same time giving an accurate while balance from continuum light from solar type stars in the same field. The Mars image above showing a violet haze over the north pole (south is up) and a diffuse yellow dust storm in the southern hemisphere was taken by Ed Grafton of Houston, Texas on October 23, 2005, using an C14 telescope and ST-402ME camera. See more of Ed's work at <http://www.ghg.net/egrafton/>

CFW402 RGB Filter Transmission Characteristics  
(AR coated and IR blocked to 1100nm)



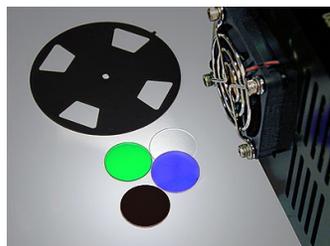
### Carrying and Storage Case

Beginning November 2007, the ST-402ME cameras will come in its own blow-molded black plastic with a custom cut foam insert for the camera, power supply and accessories. The case dimensions are 13.5 x 10 x 5.5 inches. The case may also be purchased separately.

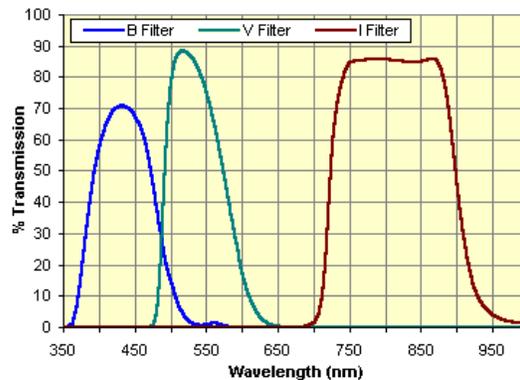


### Photometry

Starting in April 2006 we will also offer custom photometric filters for the ST-402ME cameras.



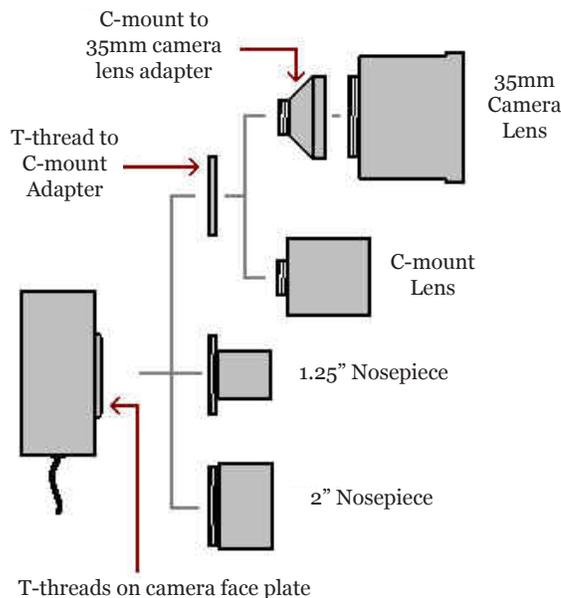
BVI Filter Characteristics



## Accessories

Optional Attachments for the ST-402ME:

- 1.25" nosepiece with t-threads is included
- Internal RGB+C Filter Wheel in optional



## Standard ST-402ME includes:

- Class 2 CCD with no column defects
- Female t-threads on front cover of camera body
- 1.25" t-thread nosepiece
- Internal shutter
- 12V power supply
- USB cable
- Relay cable
- Operating software

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