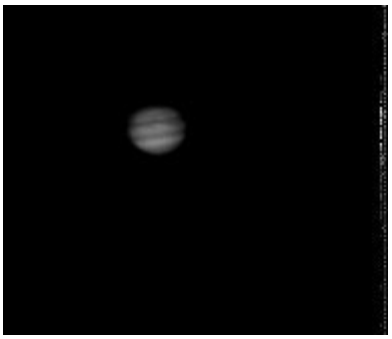
ImCap Image Capture Software for the SBIG ST-4 Camera

Introduction

Frustration with the "CCD" software delivered with the ST-4 Autoguider/Camera prompted me to write this Windows 95/98 system which allows the ST-4 to be used as a camera. The software is very easy to use and allowed me to click off about 60 test images of Jupiter and Saturn in a couple of hours on the first night I set everything up in the backyard for testing (22 Jan 2000.)

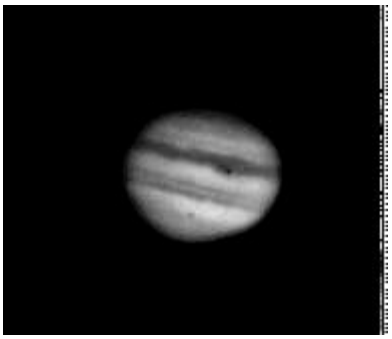
Here are some representative images from the first night:


Jupiter


Saturn


Jupiter Processed in PaintShop Pro

With a 2x barlow lens and after processing with PaintShop Pro:


Jupiter


Saturn

The above images were taken on 1 Oct 00 at about 2340 Hours local.

Io Transit of Jupiter

On 29 December 00, there was a transit of Io across the surface of Jupiter. I set my new ImCap controls to autocenter and autosave the images in Flexible Image Transport System or "FITS" (.fit) file format (AIP4WIN cannot read BMP files.) I then put ImCap into "autoshoot" mode. Over 900 images were taken during the transit. I then used AIP4WIN to automatically apply simple unsharp masking to all 900+ images. I then modified ImCap to provide methods to do wholesale conversions between Windows bitmap images (.bmp) and FTS file format (.fit) images. I then used ImCap to convert all of the FITS files to BMP files so that I could read them with Paint Shop Pro's

Animation Shop 3. I selected every tenth image in order to create the GIF movie which you see below.

Io transit of Jupiter - 29 Dec 00

Download ImCap

Note: the software is currently "freeware", Copyright 2001-2006, Howard C. Anderson. I'm reserving all the rights except you are free to use it for your own personal use. I'm providing it free at the moment for the good of the Astrophotography community. Enjoy...

Version 1.93

ImCap193.exe - Self-installing executable, 612K bytes. Version 1.93 - Update as of 17 Nov 2006.
See notes below for Version 1.93 features.

Version 1.92

ImCap192.exe - Self-installing executable, 357K bytes. Version 1.92 - Update as of 15 Nov 2006.
See notes below for Version 1.92 features.

Version 1.91

ImCap191.exe - Self-installing executable, 487K bytes. Version 1.91 - Update as of 30 April 2002.
See notes below for Version 1.91 features.

Previous version: ImCap180.exe - Self-installing executable, 377K bytes. Version 1.80 - Update as of 1 April 2001.
See notes below for Version 1.80 features. Leaving it here just in case...

After you click on the above, and after you have placed ImCap.exe into a directory of your choice, you should run ImCap.exe. It will self-install the ImCap system into the C:\ImCap directory. There will then be a file, C:\ImCap\imcap.exe, in that directory which is the file you should select and run. A help file is included. The only other file that is created (created when imcap.exe is first run) is C:\windows\imcap.ini which contains the settings that you make so that it "remembers" them.

(Yes, I probably should have used the registry instead of a .ini file, I should have used InstallShield instead of a self-installing executable, etc. My time has been very limited lately. This was the quickest way to get it out there and if you are reading this, you are probably a relatively technically sophisticated astrophotographer who will be able to create a "shortcut" and put it on your desktop, etc...)

Version 1.93

I ran into a Microsoft problem when trying to compile version 1.92. As I upgraded compilers, and transitioned my software to the new version of the compiler, Microsoft forgot to maintain compatibility with respect to static linking. I finally, through much Internet searching discovered that the following line needed to be in the .rc file: #include "afxdb.rc" // Database resources. Adding that line allowed Microsoft's "String Resources" to be available. Those are needed whenever you close a file and the system wants to ask if you want to save the file. Without the string resource, the Microsoft message was blank! Anyway, version 1.93 is identical to 1.92 except that it is statically linked (my normal preference) so that it will work regardless of how screwed up the dlls are on you machine.

Version 1.92

Added Image Menu item "Set Image Display Size..." to allow displayed images to be stretched anywhere from 0.1 to 5 times their original size.

Added "Capture" / "Autoshoot Setup..." check-box item "Create new window for each captured image." The default is to be checked and the default is the way the program has always worked heretofore. However it is UNCHECKED, then all of the images will be displayed in one window.

These two items were requested by a Chemistry Professor at the University of Illinois whose students are using ImCap and an ST-4 camera to image Low Energy Electron Diffraction paterns ala Davisson and Germer's experiment circa 1926. He asked for source code but I do not provide source code. However, I am totally for education so made these modifications to try to help out.

When I was an undergraduate at Colorado State University, the 6-hour Physics lab course I took allowed us to recreate several historical experiments. I am very proud of the fact that I achieved three place accuracy in reenacting the Foucault speed of light experiment (rotating mirror), the Cavendish Balance experiment to measure the gravitational constant, and Millikan's Oil-Drop experiment to measure the charge of an electron. The Oil-Drop experiment was difficult because I had to locate Millikan's original book. Most physics books omit the correction for the viscosity of air! This is crucial if you want to get accurate results. After locating his book and making the correction I then was able to achieve three-place accuracy.

I have always felt that doing these experiments was invaluable to my education. I have actually measured the Gravitational constant, the speed of light and the charge on an electron MYSELF so I have great confidence in the results printed in various textbooks.

Version 1.91

Improved handling of telescope controls if communication not established.

Version 1.90

Version 1.90 contains extensive additions to the LX-200 telescope controls. I am now using an SBIG ST-7 camera for most of my astrophotography. I developed additional LX-200 camera controls in ImCap so that I can adequately control the telescope while using the camera. I believe the telescope controls in ImCap are as good or better than anything else available.

Version 1.80

For Version 1.80, changes were made to the content of the C:\windows\imcap.ini file. You should delete the C:\windows\imcap.ini file. ImCap will recreate it when it runs.

Version 1.80 corrects a problem with the right edge of the image. Incorrect data was being stored there.

ImCap is now able to take advantage of the ST-4's image compression subsystem. If you select "Use compression" on the "Setup Camera" dialog window, the compression mode will be used. This cuts the download time in half for images that benefit from compression. (From 10 seconds to 5 seconds approximately.)

There is now an "Autoshoot setup" dialog window accessible via the "Capture" menu item. The setup will allow you to autosave images taken during the autoshoot session. The images may be saved as .BMP and/or .FITS files.

There is also an option to "autocenter" images. This is useful for planetary images and is what I used to shoot the Jupiter Io transit movie. The movie itself was generated by Paint Shop Pro's "Animation Shop 3" from images I captured with ImCap. The reason for supporting FITS was so that I could use the automated processing features of AIP4WIN that is part of "The Handbook of Astronomical Image Processing" by Berry and Burnell published by Willmann-Bell, ISBN 0-943396-67-0.

There is an image conversion feature that will allow you to convert selected images from BMP to FITS or vice-versa. This feature is under the "Image" menu.

With my ST-4 camera, horizontal line 165, the bottom line of the image is coming out all zero. Appears to be a camera problem. I mention it simply to alert you to the fact. Intensive effort failed to indicate a problem with my software but I am always skeptical when there is a "loose end."

Version 1.70

Version 1.70 corrects a problem with the image averaging during autoshoot mode. (Images were not actually being averaged...) The system now averages images that are judged to be within 10% of the value of the "best" image so far. So if seeing is varying, only the better frames will be included. Note that the averaging operation is still experimental and the methodology whereby one image is determined to be "better" than another is an area of continuing work.

Improvements were made to the download so that it now usually recovers automatically from situations that, heretofore, were causing it to stop occasionally and display a message box.

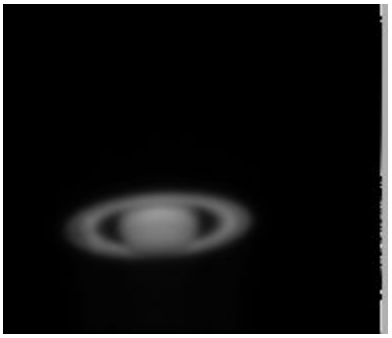
A "Park" mode was added to the LX-200 telescope controls so that one can render the telescope motionless for as long as desired without losing alignment. It is sometimes convenient to leave the telescope set up for days at a time. Before the "Park" mode, the telescope would continue to track and the cords could become wound around the scope. One would have to "unwind" everything twice a day. "Park" mode eliminates this problem and allows you to maintain alignment.

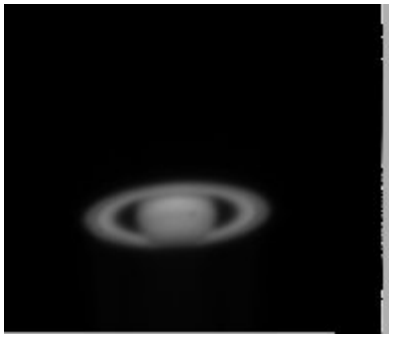
An image processing function, "Center" was added to allow you to center an image. Useful for taking many frames then making a movie from them. Works well for planetary photography. Has not been tested with other types of images.

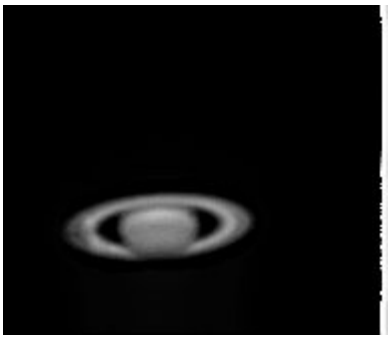
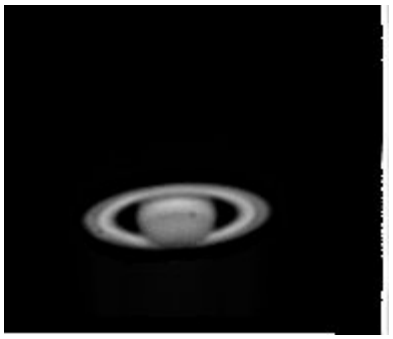
Version 1.60

Version 1.60 contains all of the version 1.0 and 1.5 features listed below. In addition it contains a correction to the LX-200 telescope focussing controls. (In and Out were inadvertently the same so that the motor always went in only one direction.)

Version 1.60 also contains the AutoShoot mode. AutoShoot starts producing images one after another until the escape key is hit. Each image is displayed individually. After the escape key is hit, a composite (average) of all images captured during the AutoShoot operation is produced and displayed. All images used to produce the average are registered automatically using a centroid operation.


One of 25 AutoShoot frames


Automatic average of 25 AutoShoot frames



Same as above after identical "unsharp mask" operations in Paint Shop Pro.

Version 1.50

Version 1.50 contains telescope controls for Meade LX-200 series telescopes. I had been using MegaStar's telescope controls but found some limitations therewith that needed improvement. Also, including the telescope controls makes ImCap more complete and self-contained. An attempt was made to make the telescope controls as similar as possible to actually using Meade's keypad controller. Remote focussing is also supported. RA and DEC use the new and improved format with greater precision that Meade introduced in Version 3.30 and higher ROMs. RA and DEC are both expressed in Meade's "long format" so that RA is HH:MM:SS and DEC is sDD:HH:SS. Earlier formats (HH:MM.T and sDD:MM) were less precise and I had a little trouble centering objects on the camera chip. (Megastar uses the earlier, less precise format unless I missed some option that allows it...) Anyway, you probably need to have Version 3.30 Meade ROMs or better to ensure ImCap's compatibility with your telescope. Version 1.50 of course includes the 1.03 improvements listed below.

Version 1.03

Version 1.03 shows a count-down of seconds remaining during an exposure then beeps once when the image download from the ST-4 to the PC begins. It then beeps twice when the download is complete and the image is about to be displayed.

Version 1.03 also allows you to load a dark frame from a file so that if you do the image processing operations within ImCap, you can cause a particular dark frame to be used for dark frame subtraction. This is useful if you have a favorite camera setting and want to use a previously saved dark frame that is appropriate for your current camera setting.

It was enjoyable to have the Meade 10" LX-200 telescope outside, me inside controlling the telescope via COM2 with MegaStar and controlling the camera with ImCap via COM3. Hardly had to go outside at all. I mean, it was January here when I did my initial testing and cold outside! The temperature was all the way down to 59 degrees that first night! :-)

I was able to direct the scope to Jupiter and Saturn and acquire images without having to go outside at all.

Acknowledgements

I want to thank Matt Considine with whom I have had many E-Mail conversations regarding the operation of the ST-4 and this software. He was kind enough to do some testing of early versions of this software package and act as a "sounding board" during development. Thank you Matt!

Howard,

Tempe Arizona

RETURN TO HOME PAGE