Test Report: A Practical Appr

The webcam revolution has opened up many more imaging possibilities to a much larger number of people. Meade has further simplified this rapidly growing segment of the market by producing a camera with all the necessary software. Shevill Mathers presents a way to get the most out of your Meade Lunar Planetary Imager (LPI).

by
Shevill Mathers

Over the past few years, I have experimented with various webcams such as the ToUcam 740K and a modified ToUcam Pro 840K, modified for long exposure. These 640 x 480 CCD webcams work very well indeed – however, they require a collection of third party software such as K3CCD Tools and RegiStax, with a lot of user input to make it all work. This can be a deterrent for some when first starting out in astro-imaging.

The contents of the LPI box-set – including camera, CD, cables and parfocal ring.

Image: Shevill Mathers

Meade has simplified this by producing a camera and all the software required as a complete integrated hardware/software package that is easy-to-use.

Ease, magic and low-cost

The Meade LPI (Lunar Planetary Imager) is a low-cost imaging package designed to introduce amateur astronomers to the magic of astro-imaging of bright objects with short exposure times, whilst keeping in mind ease-of-use and low cost. Many newcomers to astronomy are keen to record what they can see through their telescopes but cannot afford the high cost and steep learning curve associated with traditional cooled CCD cameras.

For less than $250, anyone with a laptop or desktop computer can obtain astro-images for which they can be very proud. The LPI will fit the present-day standard 1.25″ focuser, plus – by unscrewing this sleeve – a 25.4mm (0.96″) fitting is revealed for older small focuser telescopes. Inside this smaller barrel is a

Close-up of the two nosepieces, to suit 1.25″ and .96″ focuser tubes.

Image: Shevill Mathers

oach to Using the Meade LPI

coarse thread, which allows a lens or other fitting to be attached.

Many excellent reviews have been written about the Meade LPI which follows the traditional guidelines – in other words, what's in the box, computer screen shots and descriptions on what is supposed to happen. However, I am always keen to know the bottom line before parting with hard-earned cash. Often, the manufacturer's glossy blurb is just so impressive … it must work for me ... and a purchase is made without ever knowing the true facts. I have written this Test Report with a newcomer in mind – for those who want to know what they will get for their money … and to me the important things are 'did it do the job?' and 'what sort of images did I get?'

Keep the best ones

Using the LPI is very much a 'hands-on' learning experience, with trial and error the teacher. Each user has different equipment, seeing conditions and variations in their computer, imaging and processing skills. My skills did not come overnight.

Remember that you are not using expensive film – so you can take thousands of images and discard the bad ones with a click of the mouse – what could be easier!

The supplied CD contains user manuals for each of the programs and I would suggest that you print these out and put each section in a ring binder for easy reference. In this case, it would be a good idea to read the manual to get an overview of the LPI Basics.

Patience is a virtue …

I am not inclined to go along with the idea that a first time user will get brilliant results on their first night out – I certainly didn't and I have spent a working lifetime using cameras of every type in many scientific applications. So, don't be put off if your first results are not as you would expect. I once watched a fellow enthusiast take the LPI, plug it straight into his telescope, whereupon he was unable to focus the object being viewed and then tossed the LPI to one side with an expletive that I cannot print, yet he was familiar with using a webcam on his scope. So, what suits one person may not suit another and often a slow and patient approach wins out. These devices do provide instant results – but not always instantly!

The heart of the LPI is a CMOS detector, with an image size of 640 x 480, similar to those found in many low-cost surveillance board cameras and webcams. As such, it is less sensitive and has lower resolution than an equivalent sized CCD. The LPI can be used with any make of optical instrument and/or camera lens with a suitable adaptor, including microscopes and almost any optical device that can be focused on the imaging chip. It is not limited to a Meade-brand telescope as an imaging device – a question often asked. A Meade-supplied serial data cable is supplied if you want to use the Meade-supplied Planetarium program on a PC and to download updates from the Internet.

All included

The LPI comes with all the necessary hardware, connecting cables, both serial and USB cables to connect to a PC or laptop, a metal parfocal ring to fit onto a standard 1.25-inch eyepiece and a CD containing an impressive software collection, including the Camera Control Interface, a Planetarium Program and Image-Processing Software – this can be printed out for ease-of-use. I chose to use Images Plus and Adobe Photoshop as my image processing software because I am more familiar with their routines.

To this end, I have tried the LPI in imaging Saturn (which was not at its optimum), also Jupiter, the Moon and the Sun (both in white light for sunspots and Hydrogen-Alpha for disc detail and solar prominences). The results reproduced here represent many hours of actual work, both at the telescope and wading through thousands of separate images to select the most suitable for reproduction. The limiting factors to image quality have been the seeing conditions and the position of each object, including low altitude, the haziness of the sky etc.

Initial set-up and cabling

The initial computer installation and set-up did produce some problems with the USB interface. Not all laptops have fast USB 2.0 ports, so check before you start. I found it best to have a computer running Windows XP and Service Pack 2 installed with USB 2.0 drivers. USB 2.0 is 40 times faster than USB 1.1. Many users have experienced problems when running Windows 98 and USB peripherals. I experienced this and upgraded to Windows XP, which still had some basic problems. Download speed becomes an important issue when focusing the image, so if the download time is too long, the wait between focusing adjustments becomes quite a chore. Use a USB 2.0 system if possible.

The supplied USB cable is on the short side and is limiting with a large telescope. I replaced my supplied cable with a top-quality shielded 2-metre USB cable, which I leave attached to the camera. It may also be a good option to purchase a longer high- quality shielded cable. To ensure trouble-free operation I chose to use an active 5-metre shielded USB cable obtained from *http://www.jaycar.com.au/*. This cable allows much greater freedom and enables the swinging of the telescope to different parts of the sky without pulling the cable out of the PC. This gives me a total of seven metres of cable.

As with many electronic devices, only the minimum requirements (such as cables) are included, so do not feel obligated to stick with the supplied USB cable. A point to also bear in mind is that some laptop computers cannot supply the current required by the LPI when running from its internal battery. This is a problem if one wants to use the system in the field away from mains supply. An external power source may be required for the USB connection. I have an older laptop without USB 2.0 and I overcame this with a PCMCIA USB 2.0 and Firewire adaptor with a 12 Volt input to power the external devices (ie the LPI/DSI camera).

When you have successfully installed the software and you plug in the camera for the first time you may well get a variety of messages, such as 'New USB device found', 'looking for software', 'Cannot find the LPI' and so on. Because there are so many variations of computer and operating systems, it is impossible to be specific about how to fix any problems in the initial stages.

However, I strongly suggest that you visit the Meade web site *http://www.meade.com/autostar/update/* and download the latest Autostar Suite Update NEW 1/27/06'. The update includes many 'bug' fixes and new patches.

It is vital that you install the update following installation from the CD. This latest version also contains the new software Envisage V4.0 which allows you to use one LPI and more than one DSI at the same time. It also includes the new NASA software 'Drizzle'. I will go into more detail about 'Drizzle' in my upcoming DSI-C review here in the 'New' SKY & SPACE Magazine. However, for now, an important thing is to not confuse the normal 'track & stack' ▸

▸ image-building technique used by the LPI when in operation, as Drizzle is completely different.

Terrestrial test shots

Let's now assume that everything is installed and working, as it should. My suggestion is now to try your hand at some daytime terrestrial imaging with the LPI to get a feel for how it all works. To start at the telescope in the dark is making life a bit harder than need be. By setting up in daylight and shooting a land-based object, you will get a feel for focusing and the exposure controls. Print out the LPI Camera Program *The Basics* before you start. There are 29 pages, which explain each step clearly, so there is no need for me to go over this here.

For my initial terrestrial tests, I made an adaptor to use the LPI with a range of Pentax 35mm film camera lenses. Pentax lenses are excellent and cheap to buy second-hand, especially the old Pentax screw fitting and my very early Pentax lenses are of excellent quality.

Since doing these tests, I have passed on the details about my adaptor etc to Steven Mogg in NSW: *http://www.moggadapters.com/* There is a good chance that he will add a suitable adaptor to his range, which will allow anyone to fit a 35mm camera lens to their LPI. This will increase the applications for which the LPI can be used. Check out Steven's website to see the wide range of adaptors and other accessories he manufactures for the DSI-C, DSI Pro and other makes of webcams etc. His products and service are excellent – I have purchased several adaptors to allow me to use the Meade DSI with Pentax K and Nikkor camera lenses. In addition, I have purchased his 1.25″ filter holders and a 1.25″ focal reducer lens to use with either camera.

I will be taking a closer look at some of Steven Mogg's accessories in a future review of the Meade DSI and his new Outback Peltier Cooler for the Meade DSI, DSI Pro. (I understand that Steven works '8' days a week to keep up with the world-wide demand for his unique device!)

In order to take test shots, the LPI can be used in concert with a camera lens set-up, or if you have one, a simple 60mm to 80mm refractor scope with a 1.25″ eyepiece fitting can also be used. For my tests, I used a Pentax 200mm lens with a home-made adaptor, along with a 'budget' 80mm achromat telescope. About a kilometre away from me on the Meehan Range is a mobile phone tower, which makes a very useful terrestrial target. This is particularly useful because it can be used as the image object for comparing various lens and camera combinations.

Start the AutoStar Suite, click on Image and select LPI. Select Terrestrial as your target and give your file the name T-Test, for example, and select the directory to save the images. The default is in the LPI directory. I prefer to save images as BMP rather than JPEG, which tends to be a lossy file type for compression of files. For our test purposes this is not important and JPEG will be fine.

Using a static terrestrial target 'seeing' can sometimes be a problem over a long distance on a hot day, as the thermal currents rising off the ground can cause image distortion (creating a sort of 'mirage' effect) in the same way we observe the effects when telescopes are pointed at or near objects on the horizon.

Taking images of static terrestrial objects is very useful. For example, the distant communications tower that I use reveals that the lines are straight and there is very little blue outline (fringe) which indicates the optics have minimal spherical and chromatic aberration, which is not always easy to detect in astronomical images.

A static object allows one to concentrate on the camera and computer during the familiarisation stage.

This is an example of an LPI image taken through the Pentax 200mm lens shown – this mobile phone tower is about a kilometre away so ideal for using when making test shots.

The LPI is seen here attached to a home-made adaptor to enable standard 35mm SLR lenses to be used for either terrestrial or astronomical use.

Images: Stevill Mathers

Another example of an image taken through the 80mm scope with the LPI attached using the same mobile phone tower as before.

The LPI attached to a standard basic 80mm refractor.

Images: Stevill Mathers

The lunar region Mare Crisium is shown in this image as a single BMP (bitmap image format) LPI frame.

This image of Mare Crisium is the result of multiple frames automatically stacked.

Mare Humorum, with the large crater Gassendi well shown.

The Moon's Alpine Valley region with the craters Plato (right) and craters, Eudoxus (upper) and Aristoteles (lower).

All images: Shevill Mathers

Imaging the sky

Once you have mastered the set-up and focusing technique, then you can move on to an astronomical target and perhaps the easiest to use for a first test would be the Moon. It is nice and bright, easy-to-find and focus.

Now here is where the eyepiece focal ring comes into its own. First off, get the scope lined-up on the Moon with an eyepiece and focus the image. Remove the eyepiece and insert the LPI focuser drawtube as far in as it will go. On the computer screen you should have an 'out-of-focus' image of the lunar surface. Slowly operate the focuser in either direction until you see the image starting to sharpen up – as it gets sharper it will also get brighter.

When the focus is at its best, remove the LPI and insert a low-power eyepiece with its focal ring attached. Slide the eyepiece back and forth until the Moon is sharply focused. At this point, move the parfocal ring towards the end of the drawtube until it butts-up neatly and then lock the little screw. This is a 'one-off' procedure.

During this procedure ensure that you DO NOT move the focuser in or out. Now take out the eyepiece and slip in the LPI – if everything is done properly the lunar image should be sharp. In future, when setting up your next target, use this eyepiece to find the object – you can rack the focuser in and out but do not touch the parfocal ring.

Once you have found the target, replace the eyepiece with the LPI and the object will be very close to focus – a slight touch with the focuser will have a sharp image on the screen.

From here it is a matter of experimenting with the various camera controls and the key ones are the exposure setting up/down arrows on the left of the screen plus the Gain and Offset sliders. These are at a default setting when you start the camera program and will be fairly close to what you will use.

A good starting point is to use these and let the software select the best parameters – from there you can then play with the exposure up and down to observe the effect.

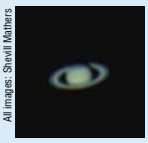
Also, perhaps try adjusting the histogram sliders and observe the changes. Take images at a range of various settings and choose those that suit you. I did not find the magic eye focus to be of much help, as it is either sharp or not sharp on the screen – however, the nearer the two markers come together, the sharper the image becomes.

You can, of course, process your images with the supplied software or if you have any other image processing software that you are used to, then use that. I prefer to save all my images as BMP files as they retain all the information. JPEG files create lossy compression and are best used for sending images to friends via the Internet.

Learning curve

As with any new equipment, there is a learning curve and if you take things in a progressive manner and are patient, you will soon be taking astro-images that will amaze you and you will be 'hooked'. ▶

All images: Shevill Mathers



This image of Saturn was taken under difficult conditions late in the season.

The planet Jupiter in a low-power view to show its four main moons. The planet itself has been purposefully overexposed in order to show the moons clearly.

The planet Jupiter showing three moons and their changed positions.

Size of images

These adjacent images are at the size shown because the specs for high-quality magazine printing demand a 300dpi resolution. However, webcams have a much lower resolution which is fine for viewing on a computer screen but the images cannot be successfully increased in size for high-quality magazine reproduction.

Jupiter imaged through an 8″ Mewlon 210 to show the Great Red Spot and atmospheric features.

Jupiter imaged through a 12″ reflector to show atmospheric detail. One moon isalso revealed nearby.

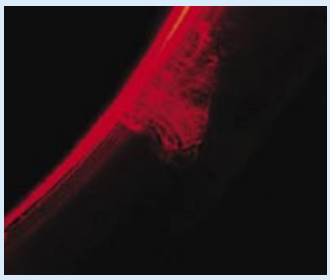
Jupiter imaged with a 12″ scope – revealing a detailed view of this great planet's atmospheric features.

All images: Shevill Mathers

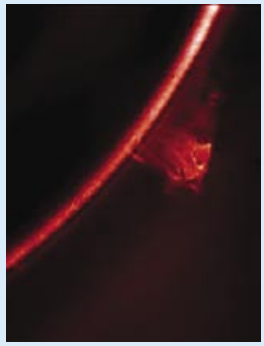
The solar disc imaged through a William Optics 80 SD refractor with a full aperture aluminised glass solar filter. Several sunspot groups are shown across the Sun's surface.

A solar prominence in seen in Hydrogen-Alpha, using a William Optics 80 SD and a Coronado 40mm Solarmax filter system.

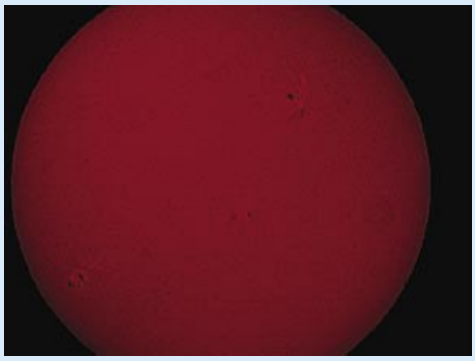
An enlarged view of a large sunspot taken with a Takahashi FS-102 APO refractor, also fitted with a full aperture aluminised solar filter.



Another view is seen – this was captured using the same equipment.

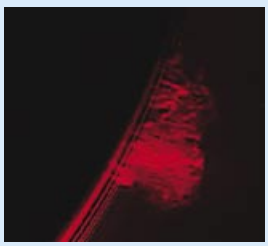


A fine detailed view of this solar prominence is revealed using a Baader Planetarium Mark IV Coronograph fitted to a Synta Skywatcher 102mm f/10 achromat refractor.



The Solar disc imaged in the light of Hydrogen-Alpha, using a William Optics 80 SD and a Coronado 40mm Solarmax filter system. Some details are well shown.

This image also used the same equipment set-up – it shows the rapidly changing characteristics of the prominence over a short time.



▸ With your LPI, you have started on an exciting journey into the world of astronomical photography, once only the domain of a few dedicated amateurs. Enjoy your journey.

In future issues, we will take a look at Meade's recently-released series of Deep Sky Imagers: the 'DSI II One-Shot Colour', 'the DSI PRO II Monochrome Camera' and the 'DSI PRO II w/ CCD Colour Filters'.. You can find some background to this at *http://www.meade.com/dsi/index.html* S&S

All images in this article have been taken by Shevill Mathers.

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Outback Cooler

In a future issue of the 'New' SKY & SPACE Magazine, I will also be taking a look at a recent innovative Australian product – Steven Mogg's revolutionary '*Outback Cooler*'. This product replaces the standard passive cooling back on the DSI-C, DSI-PRO etc and converts these cameras into a unique temperature-controlled cooled deep sky camera. Check it out at: *http://www.moggadapters.com/*

Dealers for Meade Lunar Planetary Imager

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