PlaneWave 12.5" CDK
Corrected Dall-Kirkham Astrograph with 317mm aperture / 2540mm focal lenght

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Personal review PlaneWave 12.5" CDK (all astro-images in this review have been shot and processed with the described instrument by me in person)

M13 – image taken with the PlaneWave CDK 12.5 and a QHY8 one-shot-camera from my balcony observatory in Remseck. (11 x 600 sec) (click here for higher resolution)

Prehistory
Since roughly middle of 2008 I have started a long lasting search for a telescope that is uncompromisingly adapted for astrophotography, has at least 2000 mm focal length, flat field and at least 10” aperture. It was my ambition to enlarge galaxies, globular clusters and planetaries as much as possible on the camera chip. I was already sufficiently equipped for focal lengths around 1000 mm.

After an extended research and consideration of all sorts of devices, I have decided to purchase a 12.5” corrected Dall-Kirkham System (CDK) from Planewave Instruments, an US company.

My shortlist also contained RC Telescopes (Ritchey Chrétien) from a number of different suppliers as well as classic SC-systems (Meade ACF) and astrographs designed according to Newton's principle. Unfortunately each of those instruments had at least one big disadvantage that I did not want to accept. Classic RC's are said to reach high performance only when aligned perfectly. In addition I have been told that it may not be a good idea to purchase a RC of only 10" for quality reasons. Astrographs using the Newton principle did not offer a sufficient focal length and were too constricted in their position of focus. Therefore an off-axis guider with a reasonable optical transmittance was not possible with the Newton telescope.

Given that in that time I have purchased my GM2000 mount from the manufacturer 10micron, now size and weight of the optics became a secondary problem. A good friend suggested me to have a closer look on the instruments from PlaneWave. Reading through the technical details I became more curious. Unfortunately on the internet there were almost no practical field reports. So I decided to ask some owners of this telescope all over the world for their opinion via e-mail. The responses were very positive and for this reason my friend and I decided to move on to ordering.

On our search for a reliable trader we arrived to Baader-Planetarium. After agreeing on the delivery time (approx. 2 months) and on some other details we made the deal. The delivery time could be maintained except for a couple of days of delay.

My friend and I decided to pick up the CDK at the Baader-Planetarium in Mammendorf in person. Still remembering the size of a 10" SC LX200 I was thinking in advance: "ok, the CDK is going to be slightly larger...."

And there we were, the item was standing in front of us in all its beauty, ready to be picked up and my first thought was: Oh my god, why have I not followed the advice of all my astronomy friends saying I should FIRST have a look at the instrument? The CDK was significantly larger than I had imagined.

My second thought was: how on earth should I place this chunk on my mount on my own? At this stage it must be said that I only have a small balcony in my residential zone available for my observations, that I am disabled for dorsal problems and that I would have had to set the whole thing up for every observation and demount it after my observations – more about that later.
Just to tell in advance: it's all no problem if you know how to find a way!

My first impression in short:

- very valuably and solidly elaborated
- only high quality materials like carbon, aluminium, stainless steel – no plastic components
- perfect finish
- many accessories included (Ronchi eyepiece for collimation, spacers, cables, software etc.)
- robust construction
- far larger and heavier than expected
- temperature compensated, continuous dovetail (Losmandy compatible)
- 3x ventilator, temperature-dependent control
- 1x temperature detection on the primary mirror, 1x temperature detection for ambient
- motor-operated, very stable focuser, can be controlled via PC (RS232)
- clamp rings on the focuser and adaptors

Another interesting fact is that the serial number of my telescope is 000016 whilst another acquaintance has the model with the number 000017. In fact the instruments produced by PlaneWave are not mass produced but each optics is individual made to exact standards.

M51 - QHY8 one-shot-camera 11 x 1200 sec / 17. May 2009, R. Geissinger
(click here for higher resolution)

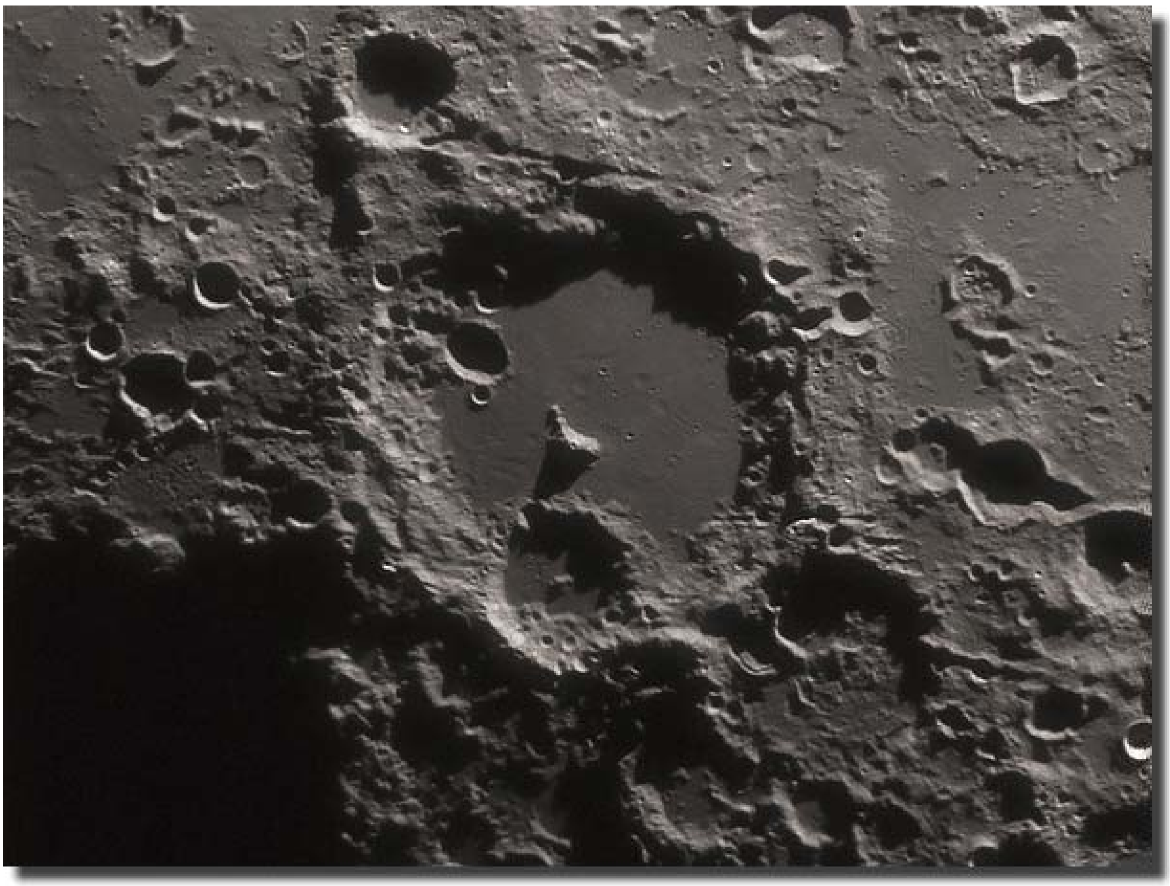
Optical Design:

The big advantage of the PlaneWave CDK is its special optical design. CDK stands for corrected Dall-Kirkham. In principle it is very similar to a classic Cassegrain or RC in it's layout. Purpose of the optical design:

- very large flat field, diameter 52mm
- very small spot size (6µm) in 21mm distance from the optical axis
- no coma or other aberrations
- easy collimation in comparison to RC-systems

For comparison: the optics in a RC-system is usually made up of a hyperbolic primary mirror and a hyperbolic secondary mirror. It is very difficult to produce this special mirror design with the required precision. Furthermore the optical axes of both mirrors have to be exactly aligned to each other in order to achieve the ideal optical performance.
In contrast to this layout, the primary mirror of a Dall-Kirkham system has an elliptic shape and the secondary mirror is grounded to a spherical shape. This means that the secondary mirror can be produced very precisely and at reasonable costs at the same time. Given that a sphere has no optical centre (the curvature is the same at each point) there is more tolerance in adjusting the secondary mirror. In order to achieve a complete field correction over the entire image field there is a built in 2-lens corrector system at the level of the primary mirror.

The primary mirror has been mounted firmly using laser collimation in the production process. It cannot be adjusted in its position. This is not needed at all. The secondary mirror can be collimated with the usual collimation screws. More about that in the section about collimation.



Lunar crater Albategnius - DMK31 videocamera / 2. April 2009, R. Geissinger
(click hier for higher resolution)

Optical Quality:

As it is usual with all US-American manufacturers, also the PlaneWave CDK is delivered without any test-documents. According to Baader the PlaneWave boss Rick Hedrick is especially fussy what concerns the quality of his optical systems. As a customer there is no other possibility than counting on the reliability and quality of the instruments.

After I had taken the first test images however, all my worries could be dispersed. Even the diffraction patterns in the intra-and extrafocal operation seemed to be nearly identical.

Further information about the optical design / spot sizes etc. is available directly here at the PlaneWave homepage.

First Light

On 13.12.2008 it cleared off unexpectedly and we could eventually take a chance and let the CDK catch some starlight. It was shortly after full moon, but that was still better than cloudy skies.

With WE I mean: everybody who is not in physical top form will not be able to balance the 12.5" CDK on its mount alone. So my girlfriend had to help me out to lift the 25kg chunk in its position on the GM2000. For two persons this is relatively easy. You still have to fiddle the dovetail into the clamp.

Phew, finally done.

First time is actually difficult to have a to "go" with this expensive equipment go because everything seems so new, unfamiliar and huge. Hence I had a kind of queasy feeling when I made the CDK head for Venus from its parking position to test my focus. But the GM2000 has no problem with the PlaneWave. Nothing wiggles – everything is imperturbable. However, 25 kg of counterweights are necessary.

Given that the sky didn't look very promising I only had a quick look for collimation of the secondary mirror. In spite of the long transport from the USA to Germany, the shadow of the secondary mirror was positioned almost dead center within the defocused star. For the first time this should be sufficient. The real goal was to only look through it (after 2 months you are dying to do that).

On that evening I could do a brief visual observation of the moon. With some improvisation I was even able to take a test image of the "Bubble nebula". My impression from first light: the CDK promises a big potential and it is going to get very exciting!

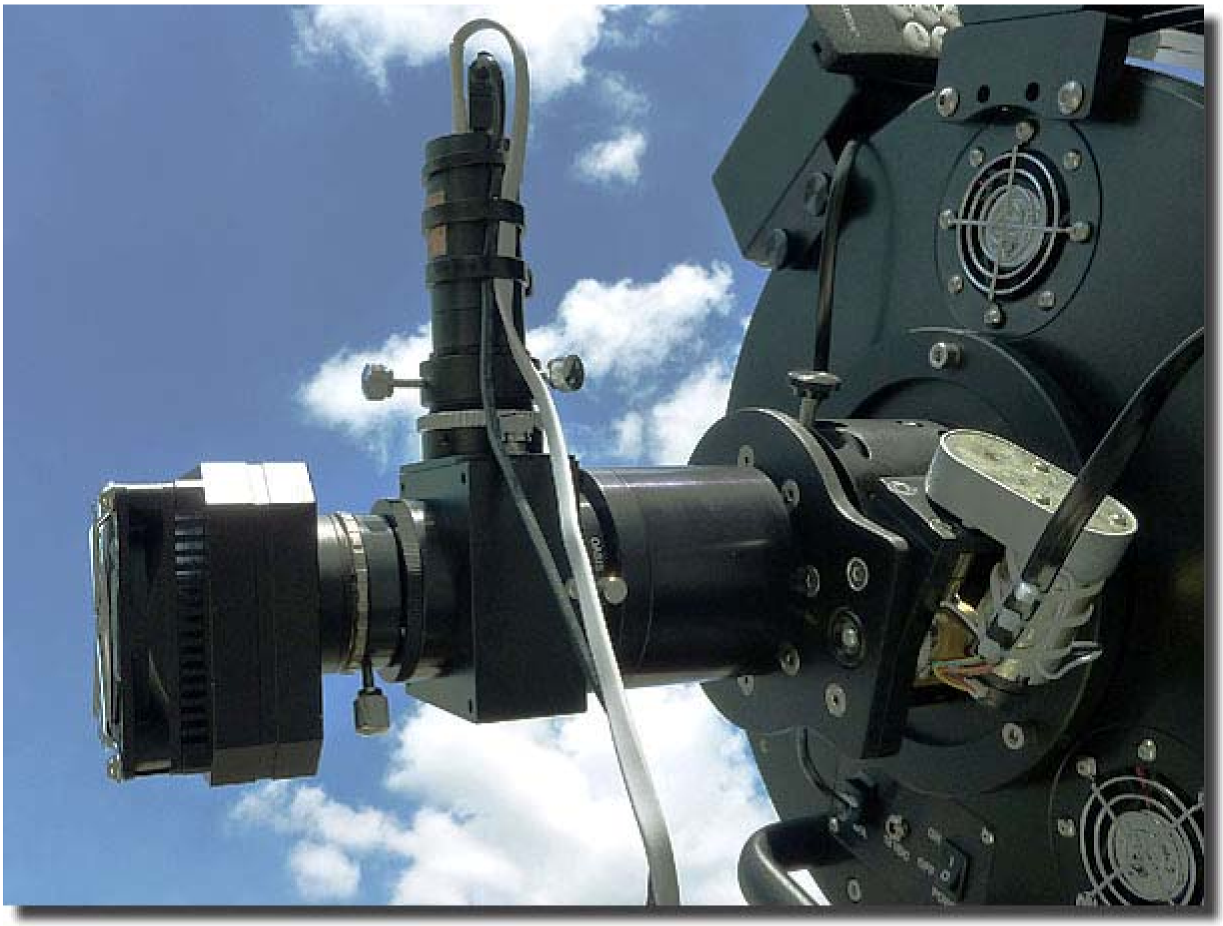
Position of focus:

As described above, primary and secondary mirror of the CDK are mounted firmly. At first view this may seem to be a disadvantage compared to typical SC-systems because the backfocus is fixed (at about 180mm behind the EFA-focuser back end).

As is generally known, the focus of SC-systems can be regulated within a very vast range by just moving the primary mirror and without using any elongation adapters. But it is important to bear in mind that the optimum optical performance requires to keep all optical elements in a defined distance to each other.

Furthermore - the primary mirror flop with most SCs is an annoying problem because the image field can move around while focusing and the collimation is negatively affected by the tilt of the primary mirror and - as a side mention - don´t try to do unguided astrophotography with an SC-optical system – it won´t work... I think that with a CDK with 180mm backfocus most camera setups can be adapted easily. In this way I am sure that the mirror system does always work in its ideal range. For this reason I will gladly accept to provide two or three spacers for firmly attaching a camera.

In practice I neither miss the primary mirror focusing nor an optional secondary mirror focusing like they are necessary for some RC-systems. At the moment I am using a QHY8 (Alccd 6c) one-shot-camera with an off-axis guider. For this purpose I also use a special adapter which can be directly threaded onto the EFA, with the off-axis guider firmly mounted onto the camera.

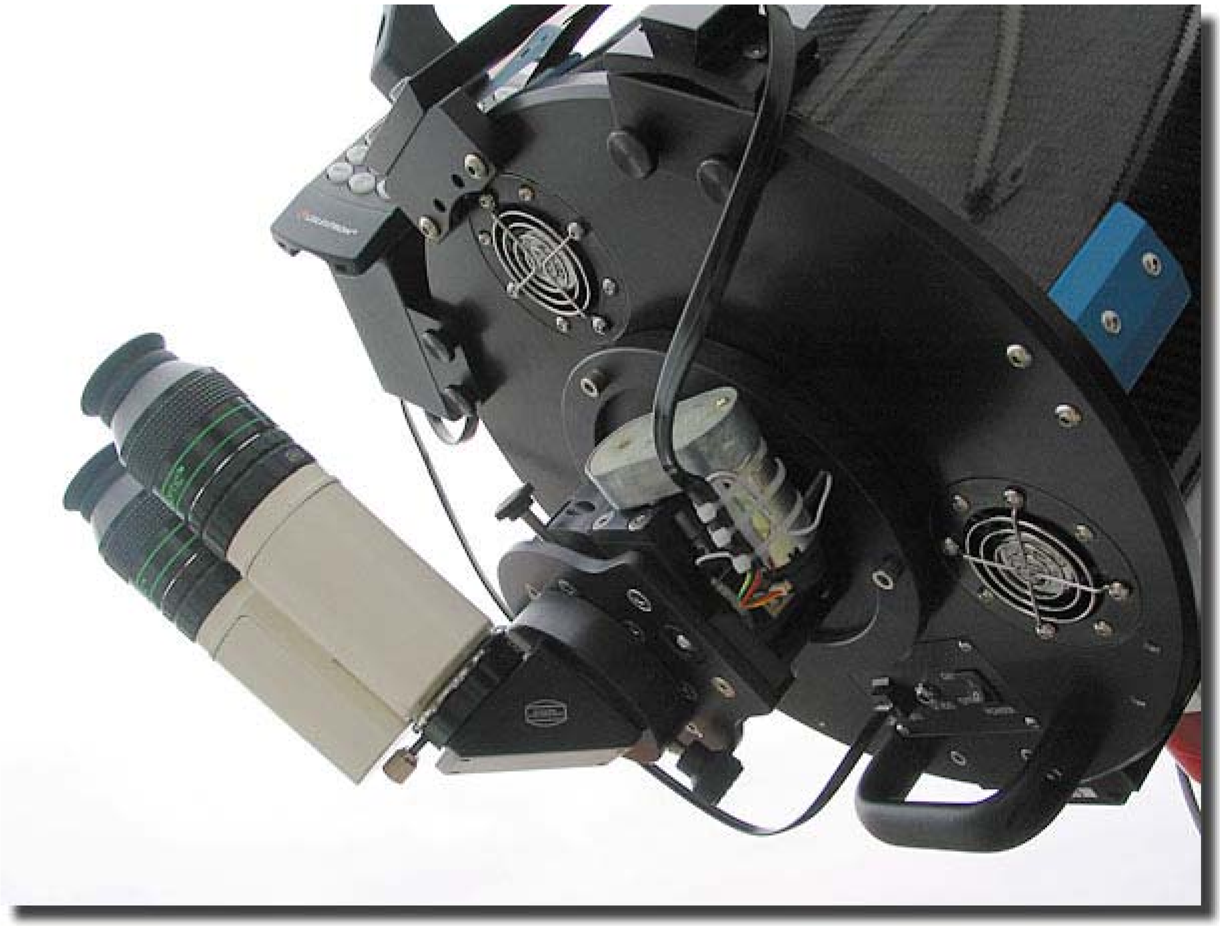


Use for visual observation:

An astrograph is always optimised for photographic work. In order to perfectly illuminate a big image field it is necessary that the secondary mirror is fairly large. Usually this decreases the contrast in the visual use. Of course it is still possible to carry out impressive observations with the CDK. Especially with the binoviewer watching the moon and planets is a pleasure. The image is surprisingly rich in contrast and not slack at all, like you would expect with an obstruction of 41%. After all, this obstruction still is “fairly small” and is within the range of popular SC-systems whereas for many smaller RC-systems even an obstruction of 50% is not uncommon.

It was not possible to use a binoviewer, not even by choosing Baaders short T-2 prism star diagonal and PlaneWave´s standard 2.7” to 2” adapter to bring the image in focus. The PW-adapter that was provided with the scope measures approx. 40mm in length and obviously was too long. With a shorter, self built adapter this problem got solved quite easily (see next image).

Due to the fixed primary mirror, focusing can be carried out only through the focuser. Therefore at bigger distances adequate spacers must be used. PlaneWave offers appropriate accessories for the popular CCD-camera systems and Baader also offers a set of spacers based on their M68 (Zeiss) system of stiff extension tubes.



Accessories:

PlaneWave offers a comprehensive set of accessories with the basic outfit. The standard equipment consists in a special spacer to mount onto the EFA-focuser + Ronchi eyepiece which is of great help to easily and very exactly adjust for the correct distance between primary and secondary mirror. Included in delivery there is also a front cover, complete documentation with instructions for collimation and a reducer-adapter 2.7” to 2”. The included set of hex keys is very handy.

The EFA-kit is strongly suggested as an option. It contains the complete electric and electronic control of the CDK focusing mechanism. That is basically the control unit and a re-programmed Celestron Nexstar handbox. Furthermore when ordering the EFA-kit the drive motor for the focuser is mounted in the factory.

With the hand box the focusing motor can be driven in 9 speed levels. Moreover the three prime ventilators for cooling of the primary mirror can be programmed in different ways (switching on and off according to temperatures, etc.). I think that the integrated temperature display is very informative. One sensor directly measures the temperature of the primary mirror whilst the other one informs about the ambient temperatur. This is very handy because you can clearly see when the primary mirror is cooled to within ambient . This is the case when both the temperature of the mirror and surrounding air roughly have the same readings.

All relevant data and settings can easily be read on the illuminated, dual line display. Above all PlaneWave offers the possibility to control all functions by PC via the installed

serial interface (RS232) of the EFA-kit. The well functioning software and of course all cables are included.
As a further accessory an additional temperature compensated dovetail can be ordered to mount piggyback on top of the tube . I can strongly suggest doing so because it considerably facilitates the handling of the CDK. This dovetail can also be used to fasten a carrying handle or as base for a guide scope.

(The handles on the dovetail have been mounted by myself)

Collimation:

Have you ever tried to really perfectly collimate a Newton telescope? Then you will know that it is easy to become desperate although you exactly know how it should be done in theory.

An Astrograph should in every case be collimated as perfect as possible so that the image is not affected negatively. For this reason I was a bit nervous before I started to collimate the CDK before its first photographic operation.

In order to start you need to set the right distance between primary and secondary mirror. This step has to be carried out only once. I proceeded exactly as described in the instruction manual: First a very bright star needs to be placed in the center of the visual field. I have aimed for Venus although the phase was not full. But that didn't make any difference.

After that the focuser must be run in completely and the 2.7” to 2” reducer-adapter + adequate spacer + Ronchi eyepiece must be attached.
Now the diffraction pattern can be observed through the Ronchi eyepiece. If the pattern is similar to a zebra crossing pattern then the distance is not correct yet. By shifting the Ronchi eyepiece, the number and width of the stripes is altered. When all stripes have disappeared, the distance is perfect.

When I carried out this test I first saw a clean stripe pattern. By shifting the eyepiece backwards it can be observed that the number of stripes increases or decreases. By doing so you can find out in what direction you have to move the mirrors, if the distance is too small or too large. With the help of a little formula from the handbook you can now easily calculate just how much you have to turn the center threaded rod in the holder of the secondary mirror in order to achieve the perfect distance. In this process the distance between primary and secondary mirror should be adjusted so as to keep the error within +/- 1mm.

In my system this was roughly ¾ of a turn. A short look in the eyepiece and the diffraction pattern seemed perfect. No more stripes were visible.

In order to collimate the tilt of the secondary mirror I have used my TIS DMK31 planetary camera as an electronic eye. The same principle as with an SC with “Bobs Knobs” applies. The shadow of the secondary mirror must be collimated to be dead center by using a defocused star. This will take less than 2mins by observing the life image on a monitor. At first view the four non-springloaded collimation screws seem a bit arkward. But if you follow the instructions and always operate two diagonally oriented screws at a time, the collimation of the secondary mirror is absolutely no problem.
The primary mirror is firmly mounted onto the main back end plate while being centered by the primary baffle tube and has been laser collimated during assembly. This is a big advantage because – when there is nothing to collimate, there is no need to worry.

The back end plate, the primary baffle tube and the primary mirror form a unseparable unit. More about that in the section “cleaning of the primary mirror”.

My impression: the collimation of this optical system does not take more time than it took you to read this section. Furthermore the collimation is very stable, even if you frequently set the telescope up and have to unmount it like I need to do.

Mechanical Design:

A relatively thin carbon tube with a diameter of approx. 37mm and a length of approx. 770mm forms the telescope´s hull. The carbon finish is faultless and highgloss polished on the outside. The inside of the tube is perfectly roughened and flat black. At the front end there is a stable aluminium ring which is solidly mounted onto the main tube and therefore gives the whole construction an enormous stiffness.

The vanes of the secondary spider are coated flat black as well and have a thickness of just 0.8mm. The four-armed spider is symmetrical and was perfectly centred ex works. It is a simple but very stable construction. The vanes of the secondary mirror cannot rotate in this construction.

The rear back plate of the tube consists of a massive aluminium disk which is threaded onto the tube via fittings. The massive 2.7" Hedrick focuser is mounted straight onto the back end plate, as well as 3 ventilators and an strong metal handhold. The inner side of the back plate holds the primary baffle tube with the permanently fixed primary mirror.

The mechanical attachment onto the mount is enabled with a massive 3" (Losmandy-compatible) dovetail bar. This bar reaches across the full length of the telescope and does provide added stability. For reduced weight the dovetail is hollow on the inside. This dovetail – but also the optionally available accessory dovetail bar are both temperature compensated. Thus the different coefficients of thermal expansion from aluminium and carbon cancel out. In practice the bars are firmly affixed only onto the back end plate. Both front ends of the dove tail bars are mounted onto the telescope´s front ring with intermediate delrin washers which work as compensating device when the ambient temperature does vary. For this reason of course the front screws must not be fastened too tight. An elongated screw-hole is provided at the front end of the bars. This is a similar construction principle as applied at the expansion gaps on highway bridges. Again – simple is beautiful.

To be honest I would have expected a needle roller bearing instead of the simple nylon plates. However, the temperature compensation seems to work well because I never needed to correct my focus position even during long observation nights. This is a great advantage.

To tell the truth - at the beginning I really was concerned if the single dovetail could support the heavy telescope rigidly and without too much torsion. Normally tubes of this size are fastened with massive tube rings. But my worries soon disappeared when I first had the possibility to jiggle the mounted telescope. From the mechanical point of view – especially regarding astrophotography - there is absolutely no need to worry, provided the mount is designed for this weight.

To add a finder scope or similar accessories on the PlaneWave there is a range of massive aluminium hinges available as an accessory.

NGC5907 - QHY8 one-shot-camera 6 x 1200 sec / 25. May 2009, R. Geissinger
(click here for higher resolution)

Focuser:

The 2.7” Hedrick focuser seems to be a particular product from Planewave. The outer tube holds five ball bearings. The contact pressure of the fifth counter-bearing can be adjusted. The tension of the counter bearing needs to be adjusted from time to time which is a little disadvantage.

The focuser design looks a little rough and does not have the easy elegance of a Starlight Instruments Feathertouch focuser, but this focuser scores due to its huge load capacity. There is no shifting or twisting even under applied load. The payload should support even very heavy camera equipment. The focusing travel is about 33mm.

The focuser is powered by a gear shaft with nearly no backlash. The stepper motor can be driven to defined positions with the handbox. In addition, the PlaneWave-Software can save different focusing positions.

The focusing motor can be run with 9 different speeds. Speed #9 makes a similar noise as a broken food processor and is almost too loud. Starting out from speed 7 or less, the noise starts getting more tolerable. It would have been nicer to shield the motor in a case. It is relatively exposed but that does not turn out as a disadvantage in practice. Regrettably the electric drive system of the focuser does not allow a purely manual use. Focusing always requires a power supply for the EFA-kit.

The focuser can be completely rotated through 360° with no noticeable play. Before attempting to rotate the focuser three screws must be loosened.

A bit of a weak point of the focuser is the ring that serves for clamping of the spacer tubes. Unfortunately it is quite hard to fix the spacers so that they are not at risk to tilt, even though they fit quite neatly. For this reason it is advisable to definitely thread the spacers onto the focuser tube as far as possible.

Handling:

It is necessary that a telescope can be moved from time to time. Given that I am not into heavy loads I have worked out some auxiliary tools. For moving the CDK to the mount on my balcony I have built a roller car. With it I can easily drive it from its "parking position" to the door to my balcony. I have set up the mount relatively near to the balcony door. In order to lift the CDK with as little energy as possible a resident metal worker has mounted a small pivot arm on my house wall. On this "crane" there is a combined pulley with four reels and with an automatic rope brake. The CDK can effortlessly be lifted with one hand only. With some practice and a wooden stick as a crank, the dovetail can be inserted into the mount easily. The whole procedure lasts less than 3 minutes.

On the upper additional bar I have mounted 2 very stable plastic knobs and an ear nut in the barycentre for the pulley. The barycentre is at about 200mm ahead of the back end plate.

Cleaning:

In a tepid night in April that seemed to be free of pollen I have been surprised from a storm of grass pollen without even noticing it at the beginning. When I started to unmount the assembly after my observation and illuminated the telescope with a torch I could not believe my eyes. All the surface of the telescope was covered with a yellow-green layer, also on the inside. Of course also the primary mirror was affected. After a consultation with the company Baader I have been told that it may be the best to remove the pollen as early as possible in order to avoid any deterioration (pollen containes aetheric oils that work like weak acid over time...) of the primary mirror. Based on the experience from dismantling other telescopes I dared to clean the primary mirror myself. For this reason I bought high-purity “infusion water” (NOT isotonic saline solution) at the pharmacy, two bottles of “Optical Wonder” and three packages of original Kleenex tissues. Only eight screws had to be removed to disassemble the back end plate. Now the complete telescopes rear end including primary baffle tube and primary mirror lay separated from the main tube.

Now the primary mirror needs to be put on a table vertically. This is best done by two persons. One holds the mirror and the other one carefully sprinkles some water onto the surface in a very flat angle using a flower sprayer. It is important that no water enters the ventilators.

I felt fortunate that no additional cleaning agent was needed to completely remove the pollen and dust from the mirror. With many Kleenex tissues (don’t try to save money on them) I had “picked up” the remaining drops without applying any pressure or rubbing. The whole procedure lasted less than one hour and the mirror returned into a state to look like new.

You should not forget to clean the inside of the main tube as well. This is best done with a lint roller.

ATTENTION: I don't take over any responsibility or guarantee for this procedure. Please only clean the parts yourself if you have plenty of experience!

Lunar crater Eudoxus - DMK31 Videocamera / 2. April 2009, R. Geissinger
(click here for higher resolution)

Astrophotography:

At the beginning one of my biggest worries was: Will I be able to reasonably use an instrument with 12.5" aperture and more than 2500 mm focal length with the conditions here? Like I told you before, my "observatory" consists of a small, narrow balcony on the west side of the house. Into the bargain - we are surrounded by other houses that give off heat in winter and summer nights. Furthermore I have the light pollution coming from Stuttgart in the South-West and the one from Ludwigsburg in the North-West. As you see: "Ideal" conditions! Exactly THIS is the challenge.

But – it works quite well, except with really faint objects.

It is just not possible to take proper images from planets. The local seeing is too bad for this kind of observations.

I am sure that better results could be expected with virtually ideal conditions and a cooled b/w astro one-shot-camera.

The primary field of application for an astrograph is of course the record of celestial bodies. At present I am using a QHY8 (Alccd 6c) one-shot colour camera with an off-axis guider. A specially manufactured spacer gives the right distance to the focus. Due to the enormous focal length of 2541mm, the field of view is relatively restricted, but this is ideal for galaxies, globular clusters and planetaries. Also planets and moon images with high resolutions are possible. It is self-explanatory that the mount must withstand the enormous weight and the long focal length. My astronomy-colleagues use their PlaneWave 12.5” CDK on a Losmandy Titan, an ASA DDM85 or, like I do, on a 10micron GM2000 mount. All nominated combinations work faultlessly. But you should not go below those limits.

The descriptions of the manufacturers sometimes promise much of their products. Given that for painful experience it is hard to believe everything, we were all very anxious to see the first photographic results.

First of all we were interested in the quality of the star images over the whole image field. The moderate chip size of the QHY8 (17.6 x 25.1 mm / diagonal 28.4 mm) should not have any problems with the advertised image field of 52 mm. The first test images approved this.

No problems. Very good star images over the entire image field.
The ultimate test has been carried out recently by Dirk Bautzmann with his full frame chip used in the SBIG STL 11000M b/w camera. The diagonal is approx. 42mm. The test image leaves no room for doubt. Dirk can enjoy a “capillary image” that reaches out to the very rim of the chip.

- M27 full frame SBIG STL11000M
1x 360 sec at -20°C / dark and flat calibration

- processed image of M27
Luminance: 9x 360 sec at -20°C
Many thanks to Dirk Bautzmann for supplying his first test images!

Recent images shot with the CDK + QHY8 Kamera (balcony observatory Remseck)

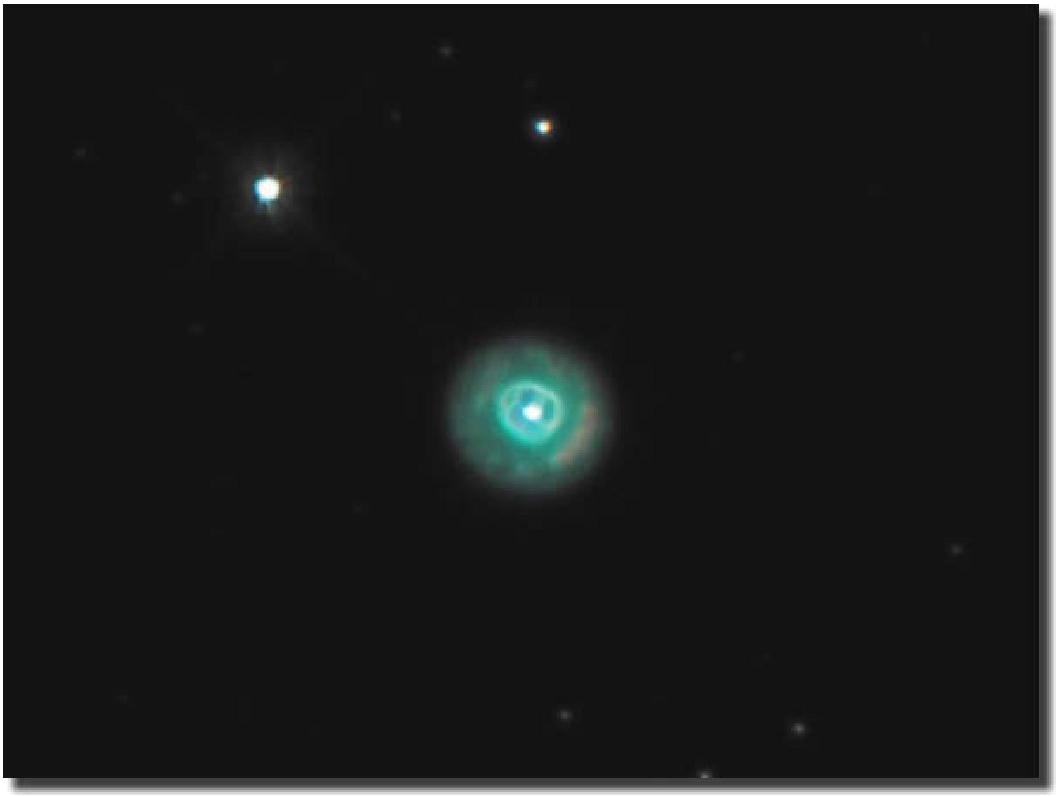
M1 - QHY8 one-shot-camera 110 x 1200 sec / 29. December 2008, R. Geissinger (click here for higher resolution)

NGC4631 - QHY8 one-shot-camera 8 x 1200 sec / 26. May 2009, R. Geissinger (click here for higher resolution)

NGC7635 - QHY8 one-shot-camera 7 x 1200 sec / 30. December 2008, R. Geissinger
(click here for higher resolution)

NGC1514 - QHY8 one-shot-camera 6 x 1800 sec / 28. February 2009, R.Geissinger
(click here for higher resolution)

NGC891 - QHY8 one-shot-camera 11 x 1800 sec / 31. December 2008, R.Geissinger (click here for higher resolution)



NGC2392 - QHY8 one-shot-camera 10 x 900 sec / 20. March 2009, R. Geissinger (no high-res image available)

Auxiliary means and tuning

In order to make the work with the CDK easier I have built on my own or had built by someone else some auxiliary means, which are not offered as accessories.

Improved front cover:

I received the old front cover made of aluminium sheet material. The latter does seal the aperture to some degree but did not fit very firmly onto the main tube. I have already caused a pandaemonium at 3.30 am, when the cover loudly dropped on the floor. For this reason I have ordered the new plastic cover which locks in place on the tube. Regrettably this plastic cover does not seal the tube against dust. Therefore I have simply screwed one cover onto the other and solved both problems at the same time.

Bahtinov-mask:

Perfect focusing is one of the most important factors in astrophotography as well as perfect tracking. The PlaneWave focusing motor works with focus-max or rather with the incorporated auto-focusing-function in Maxim DL, but one cycle through the V-curve can last up to 15mins. If the seeing is not reasonably good the result is not very meaningful. For this reason I had milled an appropriate Bahtinov-mask for the CDK in Pertinax (Dieter Martini). With this mask a sufficiently exact focus can be regulated within less than one minute.

In my opinion this is an absolute must-have!

Animation of diffraction effects while focusing with a Bahtinov-mask

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Flatfield-Box:

Vignetting and dust on the camera chip can best be corrected using a flatfield image. For this purpose I have built a flatfield box from a EL-foil in A2-format (self-luminous foil). Basically it is made up of Plexiglas boards, paper and foils for dimming the light and a foamed plastic part for fastening.

The foamed plastic can be ordered in the needed dimensions on the internet. The gaps can be cut with a very sharp knife. It is advisable not to buy a too soft version of the foamed plastic

Foil for pollen-protection:

Of course an open system has evident disadvantages regarding contamination like mentioned above. Especially in spring the pollen don't only get to us allergic people. Baader-Planetarium offers a protection foil better known as "Turbo-Film". This has similar properties to a common sun filter foil, just without absorbing coating. A wooden frame made of Multiplex forms the frame for the protective film and should keep away pollen next year.

I could not perceive any adverse effect in a test image I have taken with this foil.

Secondary heating:

Unfortunately in some moistly nights I noticed that the secondary mirror is likely to be covered with dew although it has a covered position on the inside of the tube. Through the main tube it is hardly recognisable as a mirror image on the primary mirror. For this reason I sometimes mount a Kendrick heater band on the secondary dew cap for reasons of precaution. By doing so the dew has no chance.

My personal conclusion:

On the highly competitive telescope market it is sometimes indefinitely hard to find the right telescope that best suits the application area and personal preferences. The market is full of cheap articles with dubious quality. Some traders and producers can not keep the promises they make. For this reason it is hugely important to get in contact with people who have practical experience with the items and to find a reliable trader. Baader-Planetarium that also is the representative of many other big brands seemed to be the right partner for us. The decision has turned out to be entirely correct in the end and we could benefit from the big wealth of experience and not least from the excellent customer service.

Pursuant to their own statement, the Baader-Planetarium only represents products to which it is fully committed. An employee has even been convinced by the enthusiasm of the PlaneWave founder in person.

Personally I practice astronomy as a hobby since 2003 but with intensive commitment. I have already owned a number of telescopes and have made more or less good experiences with them. Especially in the area of astrophotography you cannot make a compromise if you are aiming for high quality and at the same time want to spare your nerves. With the CDK it is possible to take very good astro-photographs even when the conditions are not ideal. My balcony observatory is located in the middle of a residential area close to Stuttgart-city. Sometimes I am surprised myself what you can find in the raw data.

At the moment I am just using equipment of high quality and the PlaneWave CDK 12.5" is definitely a part of it!

Therefore my absolute recommendation.

Pros:

- very stable
- at least 52mm of perfect photographic illumination (tested)
- only high quality material used
- pleasant design and finish
- very stable heavy focuser
- can be used for visual purposes, too
- solidly running software
- very easy and definite collimation
- high fun-factor
- only little susceptible for seeing problems despite large aperture
- cooling down relatively fast (open tube)
- focus remains stable all night long. Up to now no noticeable focus-drift.

Cons:

- price
- EFA-kit and upper mounting bar are not included
- heavy weight
- fromt cover not optimal
- secondary mirror fogs up when atmospheric conditions are unfavourable
- dust and pollen can enter the open tube

Technical details:

Manufacturer: PlaneWave Instruments, founded 2006 in USA
Description: PlaneWave 12.5
Optical design: corrected Dall-Kirkham (CDK) Astrograph
Aperture: 12.5” / 317.5 mm at f/8
Focal length: 100" / 2541 mm
Primary mirror: Pyrex, elliptical 13", dimmed to 12.5" at f/3, fixed permanently
Secondary mirror: Pyrex spherical 4.65" / 118 mm
Obstruction: 41%
Corrector: 70 mm diameter, 2 lenses
focuser: 2.75" Hedrick-focuser, motor driven, 33 mm range
Cooling primary mirror: 3 fans, priming, can be programmed with relation in temperature
Backfocus: 7.2" / 182 mm from racked-in focuser
Weight: approx. 21 kg
Length (including focuser): approx. 890 mm
diameter: approx. 390 mm
main tube: carbon fibre
Price in Germany (on July 2009): EUR 12.450, EFA-kit not included