

**Corrected Dall-Kirkham**

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**Mewlon-300CRS**

**INSTRUCTION MANUAL**

**TAKAHASHI**

Thank you very much for your purchase of Mewlon-300CRS. This telescope is one of Takahashi's originals and is a unique reflector design which combines an elliptical primary mirror and a spherical secondary plus a 3-element corrector.

The Mewlon-300CRS can be used at prime focus [with a corrected field], with the dedicated reducer or extender available optionally. Please read this instruction manual carefully and familiarize yourself with all the functions that your telescope offers. All the instruments are inspected, tested and collimated before shipment by skilled optical craftsmen.

Please inspect the instrument. If there is any problem with the condition of your telescope, please contact your authorized Takahashi dealer to remedy the situation immediately.



## **WARNING**

**NEVER TRY TO OBSERVE THE SUN THROUGH ANY TELESCOPE WITHOUT PROPER FILTER. IT WILL CAUSE PERMANENT BLINDNESS. KEEP CHILDREN AWAY FROM ANY TELESCOPE DURING THE DAY. EVEN A SMALL FINDER SCOPE CAN DELIVER A SUFFICIENT AMOUNT OF ENERGY TO CAUSE INSTANT BLINDNESS.**



## **CAUTION**

- When placing the M-300CRS on a mount, firmly hold the OTA and carefully place it on the tube holder attached to the mount.
- Always lay the tube assembly on a completely flat surface that totally supports it to protect it from damage if it rolls off the table.
- Keep the tube assembly out of the Sun. Otherwise, the tube assembly could heat up, causing possibly a fire at the focal point.
- Flammable materials such as styrofoam are used for packing. So, do not lie the packing material close to an open flame. Keep children away from the large vinyl bag used for packing the OTA and the peanuts also used for packing.

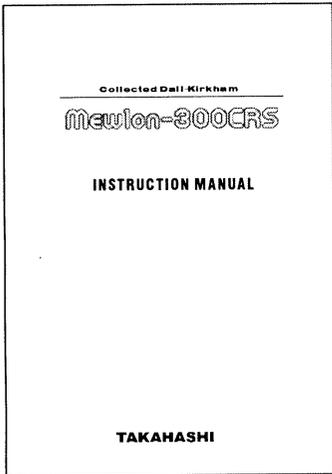
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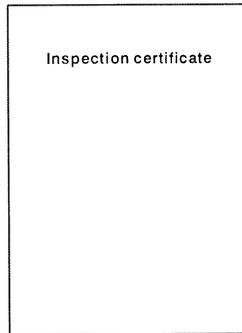
## SPECIFICATIONS

Optical system	Corrected Dall-Kirkham
Effective aperture	300mm
Effective focal length	2960mm
Effective focal ratio	9.9
Secondary mirror	88mm
Resolving power	0.4"
Limiting magnitude	14.2
Light gathering power	1837X
Image circle	ϕ 40mm (60% illuminated)
Metal Back	189.9mm
<With Reducer-CR 0.73X>	
Effective focal length	2160mm
Effective focal ratio	7.2
Image circle	ϕ 35mm (60% illuminated)
Metal back	72.2mm
<With Extender-CR 1.5X>	
Effective focal length	4475mm
Effective focal ratio	14.9
Image circle	ϕ 44mm (60% illuminated)
Metal back	117.5mm
Diameter of main tube	324mm
Total length of main tube	1045mm [41.1" ]
Total weight of main tube	27kg [59.4 lbs] w/7x50 finder
Finder7x50 w/reticle illuminator	

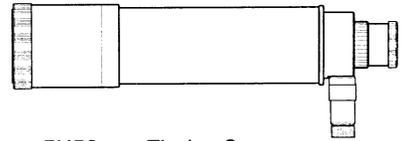
# Standard Accessories



instruction manual



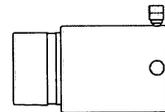
inspection certificate



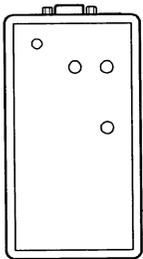
7X50mm Finder Scope



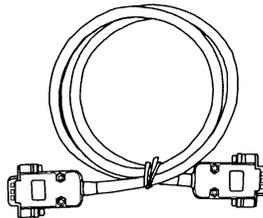
Finder bracket



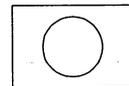
50.8mm (2") extension tube



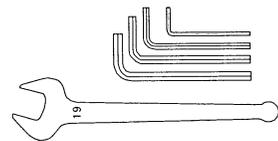
Hand control



control cable

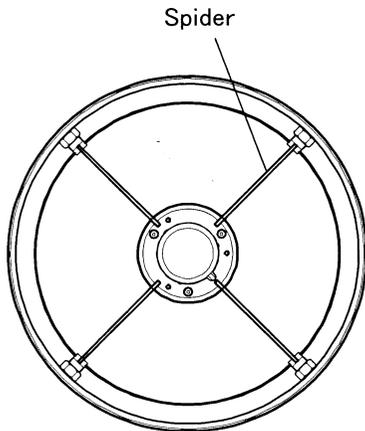
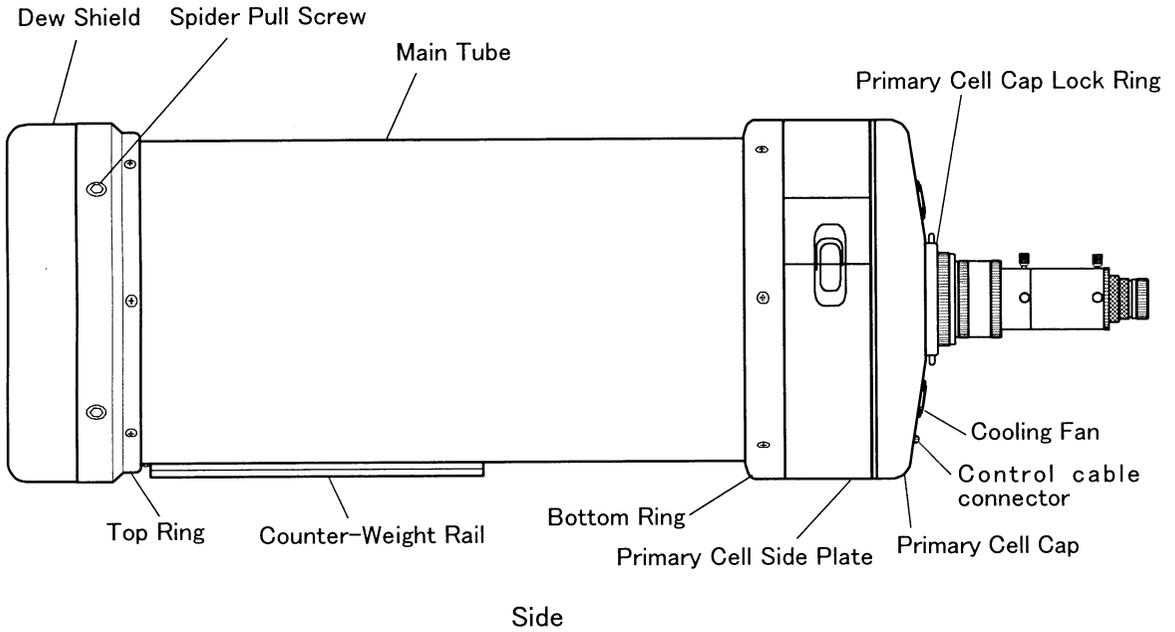


Counter-Weight

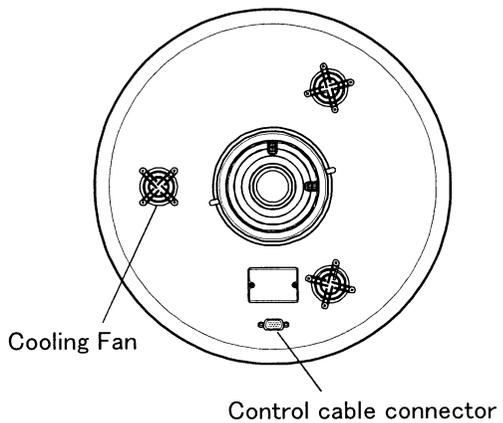


Allen wrenches  
(2.5mm, 4mm, 5mm & 6mm)  
Spanner (19mm)

# Tube Assembly Layout



Front



Rear

# Features

The original Mewlon Dall-Kirkham design produces sharp high contrast images in the center of the field of view with some coma at the edges.

The newly developed Mewlon-300CR corrector corrects the entire field and flattens edge to edge surpassing the Ritchey-Chretien design.

The Mewlon-300CRS incorporates a computer controllable Active Focus system. The newly designed pulse motor, controls the auto and manual focusing. It also incorporates a backlash corrector. The manual focusing is controlled by the hand control provided.

Using the ASCOM driver [ [http://www.takahashijapan.com/support\\_e.html](http://www.takahashijapan.com/support_e.html) ] from this link from Takahashi Japan, the Mewlon-300CRS can be controlled by FocusMax or MaxIm DL for auto focusing. These programs will provide accurate and precise auto focusing for imaging.

These features make the Mewlon-300CRS an up to date Cassegrain optical system.

## ■ Active Focus

The Mewlon-300CRS uses a newly designed 4-vane spider to reduce diffraction spikes when compared to the 3 vane spider of the standard Mewlon-300. The Active focus system provides manual and auto focusing as well as control of the cooling system.

When the Mewlon-300CRS will be auto focused, attach the USB 2.0 cable to the hand control and PC. The secondary is controlled by the Active Focus system with a built in

stepping motor.

The hand control provided can control manual focusing and the on/off operation of the fan system. When auto focusing is needed, connect the PC with a USB 2.0 and USB B connector on the hand control box. Auto focusing can be done with ASCOM compliant focusing software.

## ■ Electric Cooling Fans

The on/off operation of the cooling fans is controlled by the hand control. Three low vibration cooling fans are attached to the rear mirror cover. Each is controlled by three sensors located on the mirror, inside the tube and a third outside the tube. They constantly monitor the ambient temperature and feed this information to the fans to automatically cool the primary mirror to the ambient temperature.

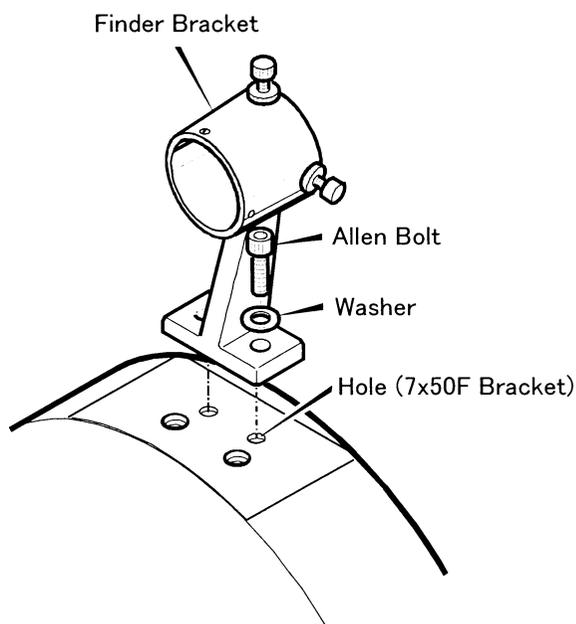
Low vibration fans are used so as not to interfere with imaging or observing. The cooling system operates as soon as the sensors detect a temperature differential between the ambient temperature and the temperature of the primary mirror and turns off when ambient temperature has been equalized.

# Installation

The Mewlon-300CRS is shipped with the finder detached to prevent possible damage during transport. Use the following instructions to attach and align the finder scope.

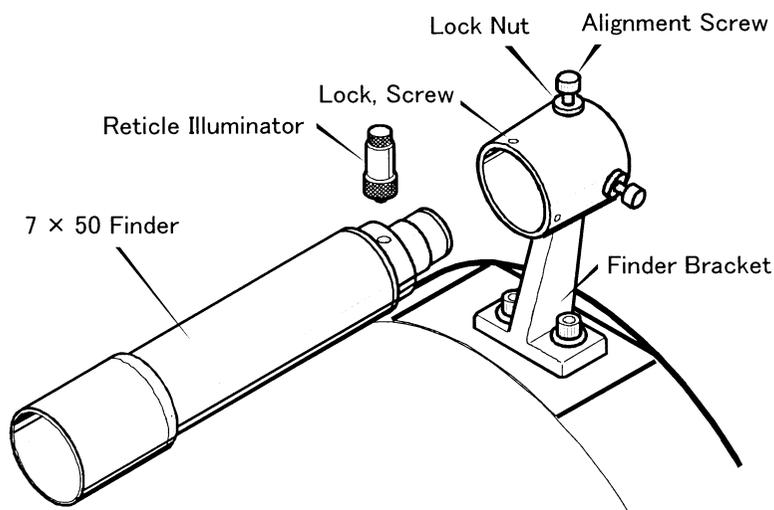
## ■ Attaching Finder Bracket

There are two places on the primary cell to attach the finder scope so that you can select one of them suited for your use. Firmly lock the finder bracket in place with M5X15 bolt.



## ■ Attaching Finder Scope

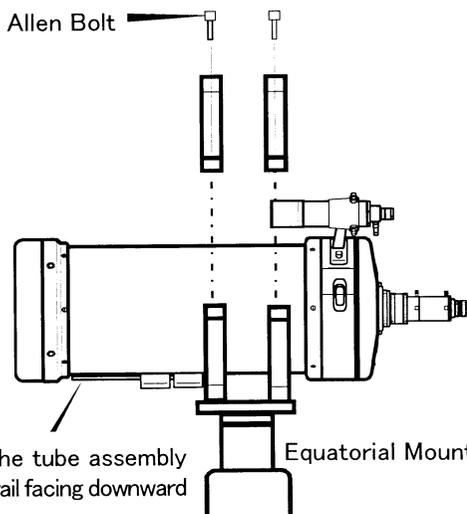
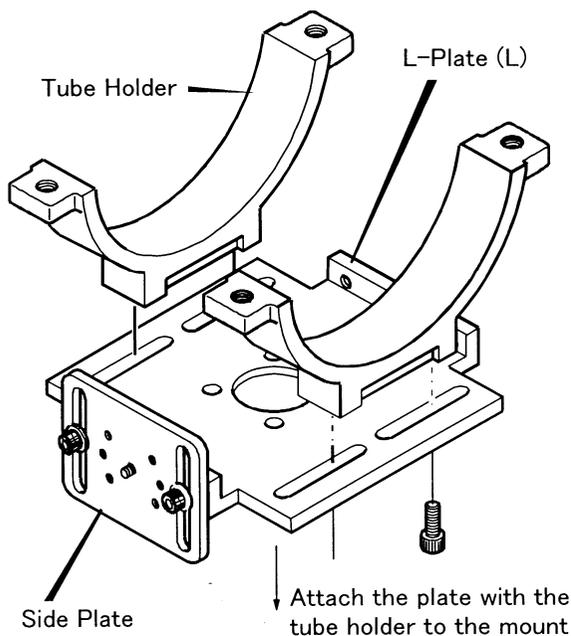
The finder adjuster screws provided on the finder bracket should be adjusted to clear enough for the finder. Insert the finder into the finder bracket and lock the finder with the adjusting screws. Make certain that the sides of the bracket are parallel to the sides of the finder.



## ■ Attaching The Mewlon-300 To An Equatorial Mount

The Takahashi EM-400/500 equatorial mounts are most suited for the Mewlon-300CRS. As shown, at first attach the L-type (L) plate on the tube holder and then attach the package to the mount.

When attaching the tube assembly on the tube holder, it is set so that its counter-weight rail comes toward the tube holder base. To set the tube assembly safely and horizontally on the tube holder, turn the Declination axis of the mount.

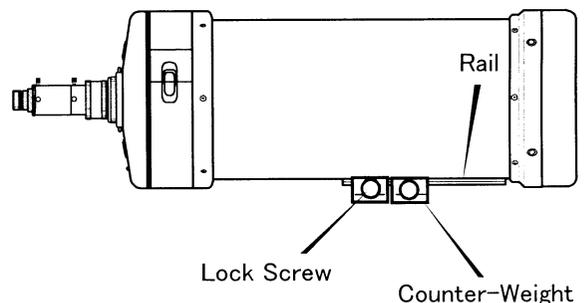
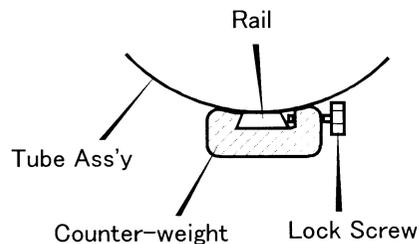


### ⚠ Caution

The tube assembly is rather heavy and the mounting position will be high. So, it is recommendable to attach the tube assembly to the mount by two persons.

## ■ Attaching the counter-weights

Attach the counter-weights on the rail as illustrated. In visual use, the tube assembly is well balanced with the counter-weights being positioned toward the visual back side. When imaging with a heavy camera, these counter-weights should be moved toward the top of the tube assembly to balance, turning the Declination axis.

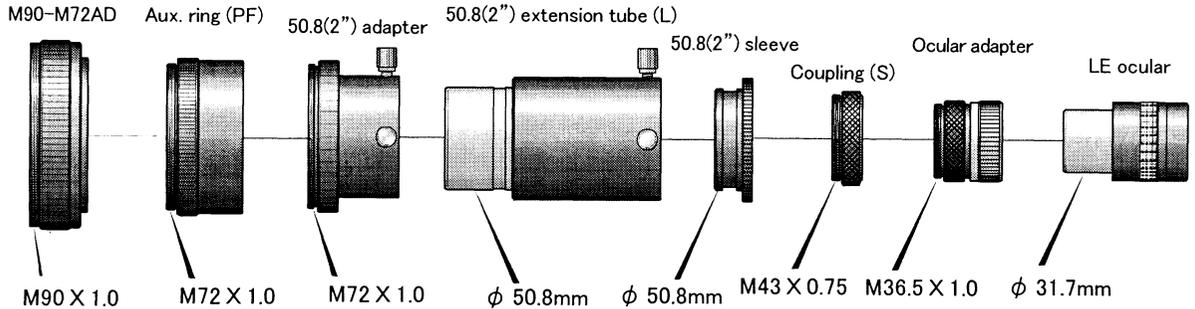


### ⚠ Caution

When moving the counter-weights, do not loose the lock screw too much. Otherwise, they will possibly drop down.

## ■ Visual Back Train

The following train is attached as standard accessories. The 2" adapter is removed and packed separately.

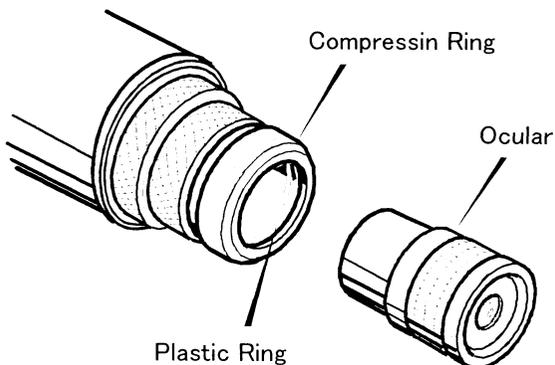


## ■ Takahashi Oculars

Takahashi offers a wide range of oculars from Hi LE-2.8mm to LE-50mm (2" ) which can be used for various visual and imaging applications.

## ■ Compression Ring

Remove the ocular adapter cover after the locking ring has been loosened by turning it counter-clockwise. Then, insert the desired ocular into the 1 1/4" diagonal prism and tighten the ocular ring by turning it clockwise.



## ■ Hand Control

### ● Specifications of the Drive Unit

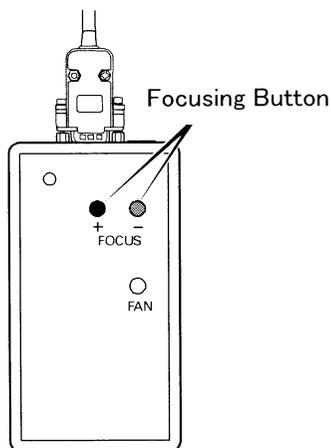
- USB Interface  
(Windows compliant driver)
- Power Source (DC)  
DC 12V (10V ~ 16V)  
Power consumption Max 0.8A  
(during focusing)  
Lower than 0.15A (stand-by)  
Lower than 0.3A (during fan operation)
- Battery: Alkali UM-3 x4  
Power consumption Max 0.7A  
(during focusing)  
125uA (in Sleep) for 15000h  
170mA (stand-by) for 58h  
650mA (during operation) for 30h  
470mA (during fan operation) for 4h  
continuously

(Note)

When no use in a long time, remove the batteries.

### ● Focusing

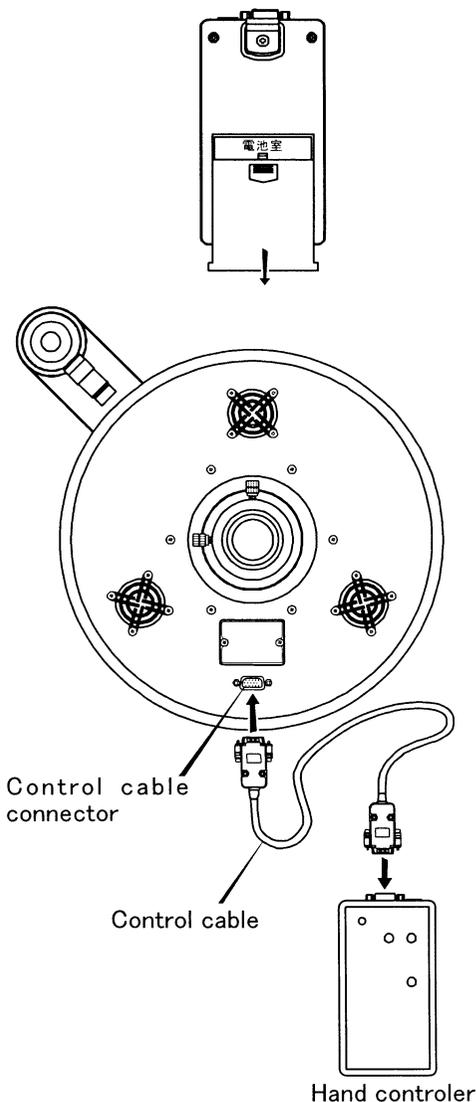
After inserting an ocular into the telescope, it is necessary to achieve the best possible focus. If a star is widely out of focus, you can see nothing in the view field and if an object is not precisely focused, you cannot use your tele-scope at its best capability. It is a key point to achieve pinpoint focusing



when imaging any object. The Mewlon-300CRS is provided with a hand controller, which can achieve precise motorized focusing by moving the secondary.

### ● Attaching the hand control

Remove the cover from the battery compartment and insert 4 AA batteries. Then, connect the cable to the hand controller and lock it with the two screws. Attach other end of the cable into the connector provided on the main tube. This is used for manual focusing and visual application only.



### ● How to use the hand control

Manual focusing: There is no on/off switch on the hand control. Manual focusing is made by pressing the FOCUS button. When FOCUS + (plus) button is pressed, the distance between the primary and the secondary gets wider, moving the focal plane closer to the mirror cell and when FOCUS - (minus) button is pressed, the distance between the primary and secondary narrows, moving the focal plane further behind the mirror cell. Pressing the FOCUS button will move the motor one step and holding on the button will make the focus motor ramp up in speed gradually. Using this procedure will permit the image to be focused precisely.

### ● Cooling Fan

The fans will turn on when the FAN button is pressed and turn off when the button is held down over two seconds.

### ● Use by a dry cell

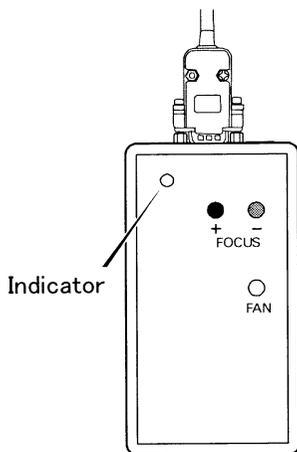
When the battery is used for power source for cooling fan, the fans will stop while the focusing motor is running and when the motor stops, the fans will turn again. To keep the fans turning, more than 5.2V is necessary. When the fans stop for more than 10 seconds, they will be in "sleep" mode, which can restore by + (plus) or - (minus) button.

### ※Note on operation for detecting original position

- \*Do not make button operation while detecting original position. If it is done, emergency stop will work to protect function, leading "Original Position Undetected".
- \*When the emergency stop will work, press + and - buttons together for a while to detect the original position again, watching the change of Power Indicator.
- \*In case the motor is driven by battery, "Sleep" will start for a certain period from the emergency stop. In this case, restoration from "Sleep" will result in same from the emergency stop.
- \*Power Indicator will give priority to "Voltage Insufficient" than "Original Position Undetected".

## ● How to use the hand control

The Pilot Lamp can indicate how the Active Focuser is running.



○ Light is on constantly when the power is on, the original position is being detected, and during the emergency stop.

☀ 0.5 sec ON/OFF, going on and off, while the original position is being held.

☀ 0.1 sec x 3 ON/ 0.3 sec OFF, going on and off, while the fans are being engaged.

☀ 0.2 sec ON/0.8 sec OFF, going on and off, shows the voltage is insufficient.

※ Please refer to the manual for Focus Infinity for how to use the hand Controller.

※ When you like to remove the control cable connecting the drive unit to the telescope, please do it with the power is shut off, in order to protect the electronics circuit.

※ The required time to complete the original position detected will vary according to the focus position at the previous detection. In case the battery is used to drive, the time to require the detection of the original position will be longer.

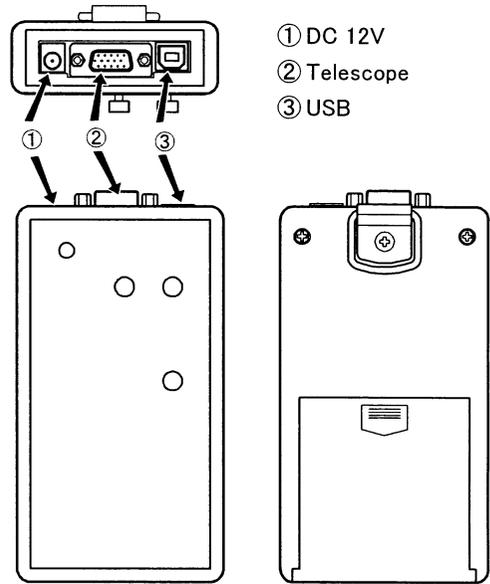
※ Irregular Noises of the motor unit  
During focusing by the Focus button, irregular noises would possibly sound from the motor unit. This is resonance by the motor running at the rated speed with the surrounding metal parts and not a trouble.

## ■ Preparation for Auto Focus by a PC

- \* Set out a PC, a USB cable, and AC adapter.
- \* Install software to control your camera connected to your PC.

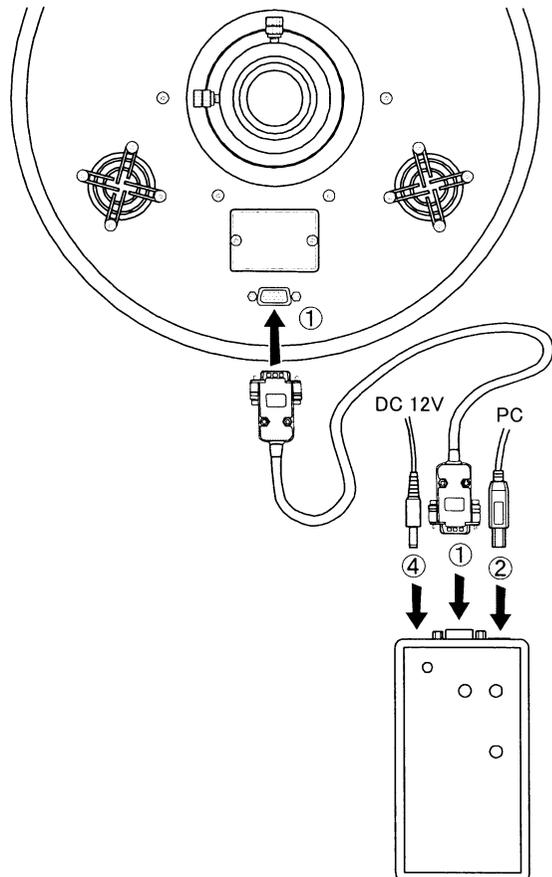
### Procedures

1. Connect the control cable to the hand control box.
2. Connect the hand control box to your PC.
3. Initiate the software to control the camera connected to your PC.
4. Insert the AC adapter into the power source and connect it to the hand control box.



Hand controller

When the correct connections have been made, then the software can be attached to being the Auto Focus procedure.

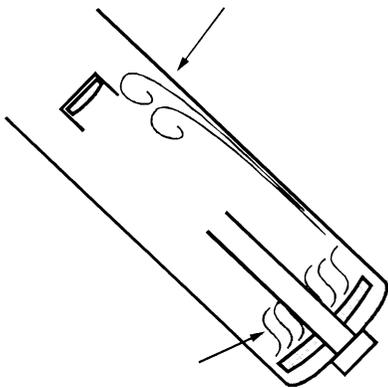


## ■ Mirror Ventilation Cell And Tube Currents

### ● Tube Currents

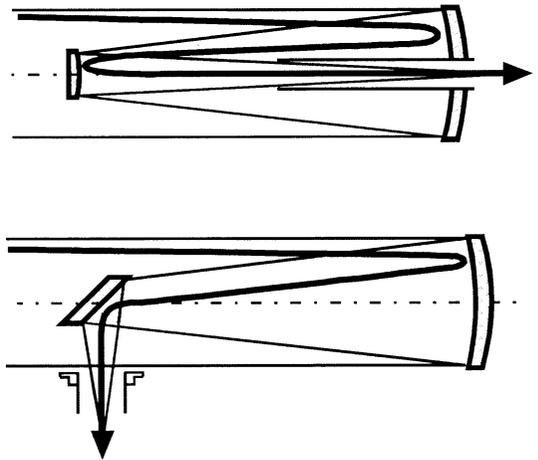
Tube currents are present in Newtonian and Cassegrain telescopes. These tube currents distort the stellar images causing them to scintillate, blur or distort. Now, you must wait until the tube currents go away. How do tube currents develop?

In winter, the tube is kept in the inside, therefore when the tube is taken outside the temperature differential between the outside and inside air will cause severe tube currents because the primary mirror will be substantially warmer than the outside air and it will radiate its heat upwards. These tube currents will persist until the mirror and the outside air are the same temperature. This is called temperature equalization which is necessary for stable high quality images.



Air Current in the tube of Cassegrain telescope

● Air Current In The Cassegrain Telescope  
 Additionally, when the tube is taken out, the tube itself is warm and further radiates and when taken in addition to the mirror currents causes a severe degradation of the stellar images. Therefore, it is a good idea to take the M-300 outside about an hour before an observing session will begin, remove the primary rear cover, and the two vents located must above the primary mirror cell. [This will be discussed presently].



When compared to a Newtonian telescope, the Cassegrain instrument of a similar size will have a shorter tube and when the baffle tube which is also warm is taken into account, the ascending currents will cause a swirl around the baffle tube. Until temperature equalization has been achieved, the stellar images will display these affects.



The airy pillars of the intra and extra focal images will show the opposite image of each other as shown above.

### ● Primary Mirror Ventilation System

The Mewlon-300CRS has been designed to include a mirror ventilation system to enable more rapid temperature equalization of the optics. This design includes a primary mirror cover and two side vents. These features allow the warm air to exit through the front and sides of the instrument as well as the rear of the mirror.

### ◆ Primary Mirror Side Vent

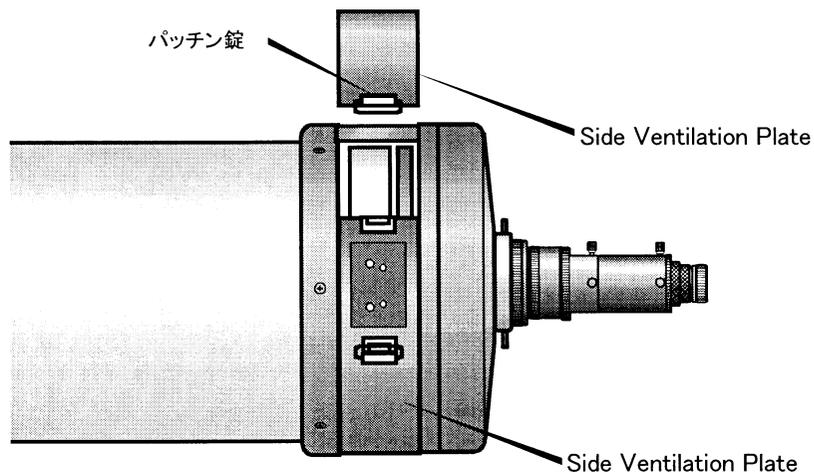
Two vents are provided on the side of the primary mirror and their caps can be locked by snap lock. When the snap lock is unclamped, be careful not to drop the cover.

### ● Primary Cooling Fan

Three cooling fans are provided on the tube assembly of the Mewlon-300CRS. When these fans are turning, the air in the tube will flow to a fixed direction so that irregular air flow will go away. This will make images of stars stabilized. However, dependent on the environmental situations, the effectiveness of the cooling system is not always constant. So, please keep watching by turning the cooling system on and off.

### Caution

1. When humidity is high, do not remove the cap to keep the primary from forming dew on it.
2. When the inside and outside air has been equalized, it would be better to attach the cap. Some heat radiated from the body of people standing by the tube assembly will possibly affect the primary, resulting in star images being distorted.
3. When the fans are turned, attach the cap in place.



## ■ Finder Alignment

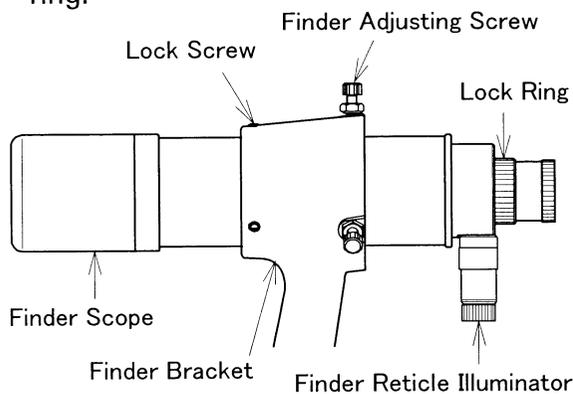
In the view field of a telescope, the magnification is very high and the view field is narrow so it is very hard to center a desired object. When a camera is attached for imaging, the view field is so dark and hard to see the object. Therefore, it is very difficult to make certain if the object is centered in the field.

A finder is a small telescope with wide apparent field and low magnification. So, if it is aligned with the main scope and a desired object is centered by it beforehand, the object in the field of the main scope is also centered. Finder alignment procedures are as follows.

### ● Focusing

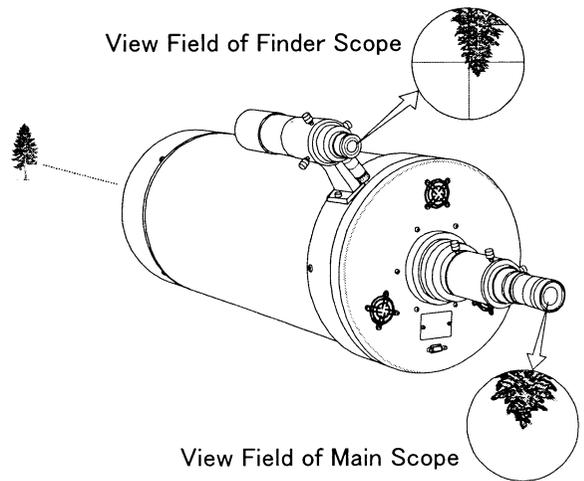
When an object located far away and it is out of focus, proceed the following procedures.

1. Loosen the lock ring.
2. Look for the best focus, turning the eyepiece clockwise and counter clock-wise, viewing the object.
3. When it is focused best, tighten the lock ring.

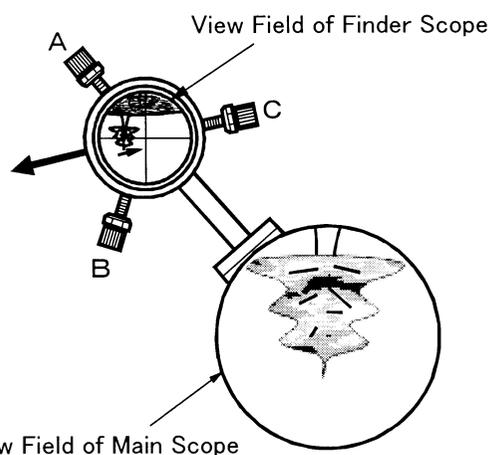


### ● Finder Adjustment

1. Attach a low power ocular to the visual back and center a conspicuous object located far away.

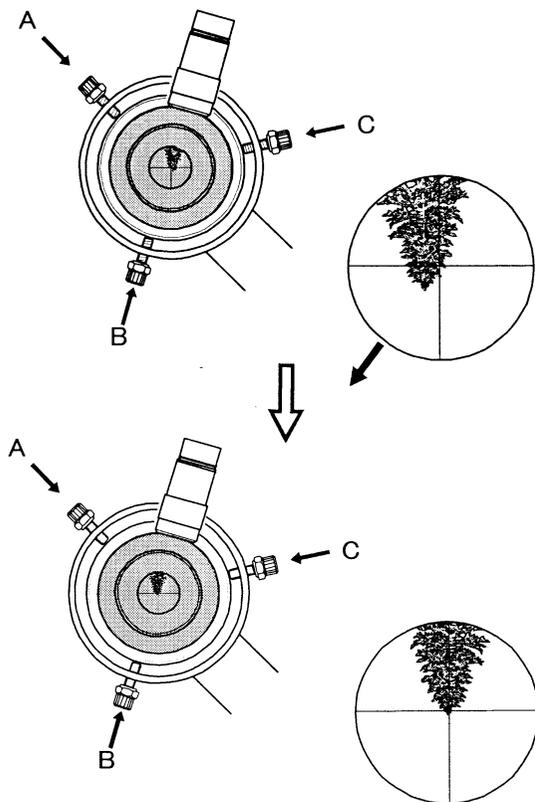


2. Change the eyepiece with high power one and center the object again.
3. If the object is seen different as shown in the illustration, adjust the finder scope so as to center the object with the following manners.
4. Turn all the lock nuts until they reach the head of the alignment screws.
5. In order to move the crosshair in the direction of the arrow, first loosen screw (a) and tighten (push) the finder with screw (c). This procedure will move the crosshair in the desired direction. The top of the finder will move in the opposite direction and the object will move in the direction of the smaller arrow. Refer to the illustration.



6. Similarly, adjust the direction of the finder with 3 sets of adjusting screws.
7. When the optical axes of both finder scope and main scope are paralleled, lock the finder scope with the lock nuts. Learn the relationship between the movement of the three adjusting screws. If the finder cannot be moved in the desired direction, loosen the locking nuts.

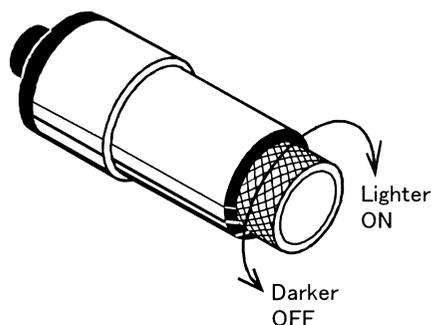
These procedures should be done in the daytime to prepare your observation in the night. Remember that the motor drive should be engaged when the finder is aligned with the main optics, using a bright star at night, because star is moving at the sidereal rate.



### ■ Reticle Illuminator

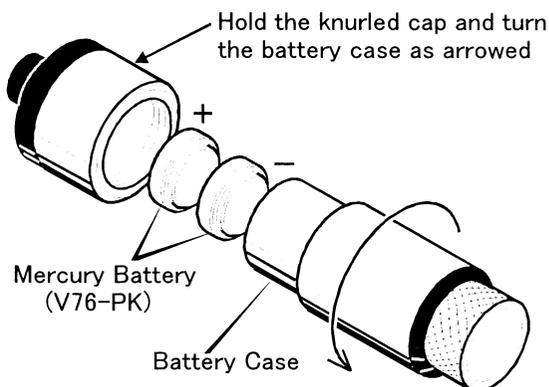
Takahashi 7x50 finder scope will accept the optional reticle illuminator. This illuminates the interrupted crosshair in the finder and

makes the centering objects in the view field easier. The illuminator is inserted into the hole covered by the slotted screw next to the eyepiece end of the finder scope. If you wish to turn the illuminator on, turn the chrome knob clockwise. The Knob will click when it is turned on. This will allow the illuminator to be changed to suit the sky conditions. Turning the knob counter-clockwise will turn the illuminator off. The knob will click once again when it is turned off.



### ■ Replacing Batteries

In case the battery must be replaced, take out the case, turning it counter-clockwise as illustrated. Before replacing the batteries, clean the surface of the batteries and place them into the battery holder, checking the polarity. Use two silver cell 1.5v batteries S76 or equivalent.



# Observation

## ■ Visual Observation

The Mewlon-300CRS is highly capable for a wide range of uses for observing the moon, planets, star clusters, and nebulae, but NOT for solar observation. In order for you to use your telescope at its best performance, you are recommended to operate your telescope on the nights when seeing is fine and after the telescope has been equalized to the ambient temperature of the observing site. The Mewlon-300CRS is equipped with a system of cooling using low vibration cooling fans and temperature sensors to measure the temperature of the mirror, the outside air and the temperature inside the tube.

## ● Magnification

Magnification can be calculated with the following formula.

$$\frac{(\text{focal length of a telescope})}{(\text{focal length of an ocular})}$$

Therefore, the shorter the focal length of an ocular is used, the higher the magnification. On the other hand, the longer the focal length of an ocular that is used, the magnification will be lower. It is general rule that the upper limit of the magnification is 20x to the aperture in "cm" of a telescope and the lower limit is 1.4x to it. The former is the highest effective magnification and later the lowest effective magnification. Therefore, the highest effective magnification of your Mewlon-300CRS will be 600x and the lowest 43x.

## ● Diagonal Prism and Diagonal Mirror

A diagonal prism or a diagonal mirror makes it easy to observe comfortably. These are 90 degree diagonals. A 1 1/4 " diagonal prism and 2" diagonal mirror are available from Takahashi.

## ■ Astro Imaging

The Mewlon-300CRS includes a 3 element ED corrector that flattens the field and corrects the image. This makes the Mewlon-300CRS a highly effective instrument for visual and imaging uses.

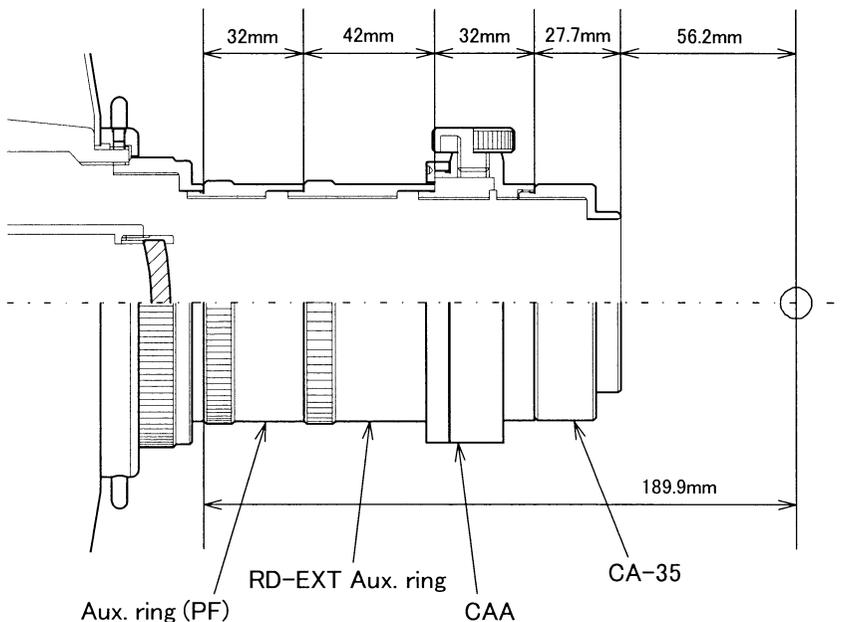
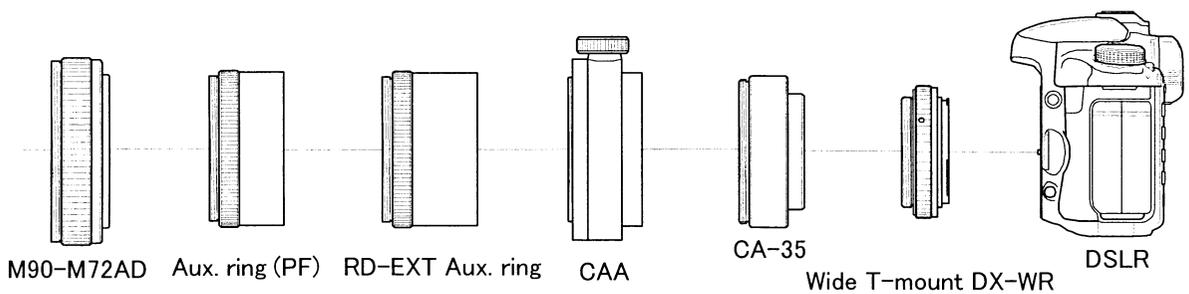
## ● Imaging at prime focus

The flat corrected field of the Mewlon-300CRs is ideal for imaging at the prime focus of 2960mm. This long focal length is perfect for imaging of the Moon, planets and smaller deep sky objects such as galaxies. . A digital SLR camera or a CCD camera is suitable for imaging with the Mewlon-300CRS.

## ● Imaging at prime focus

When you want to image craters on the Moon or the planets, you need to use the TCA-4 eyepiece projection device, because the scale of the image made at prime focus is too small.

When imaging the Moon, it is possible to use different magnifications due to the intensity of the light the Moon produces. It is best to image at the highest usable magnification the seeing conditions will allow. Wide T-mounts and T-mounts are available to attach a DSLR camera and a CCD camera to the Mewlon-300CRS.



### ■ Back Focus

The back focus (the distance from the corrector lens to the focal plane) of Mewlon-300CRS is fixed. The focal plane of the imaging device must be set at the metal back distance of the corrector for best imaging results.

The metal back distance is the distance from the rearmost metal surface of the corrector to the focal plane of the imaging device. This will ensure the best possible image.

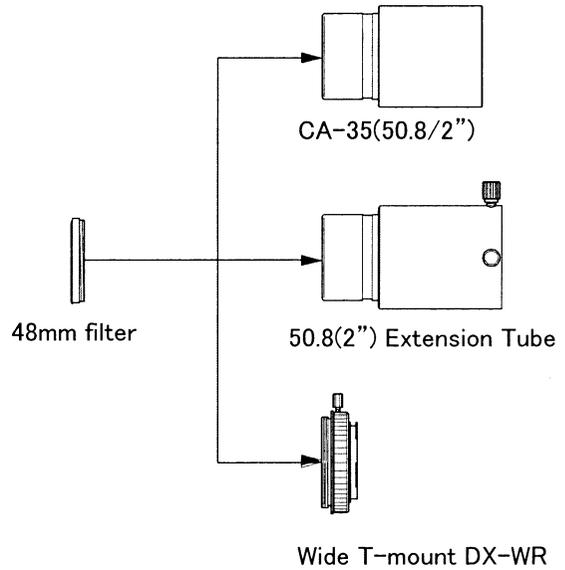
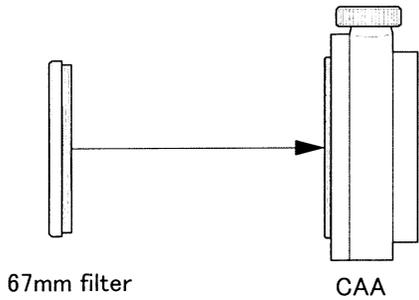
### ■ Focusing

The Mewlon-300CRS uses an ASCOM compliant Activ Focus focusing system that can be controlled with popular focusing software. This software allows the Mewlon-300CRS to use computer controlled focusing. An ASCOM download is available on the Takahashi Japan website as well as Takahashi America website. When an object is set to be imaged, connect your PC with your Mewlon-300CRS and focus by using an ASCOM compliant software focusing software available. For further details, refer to the instruction manual attached with the software that is used.

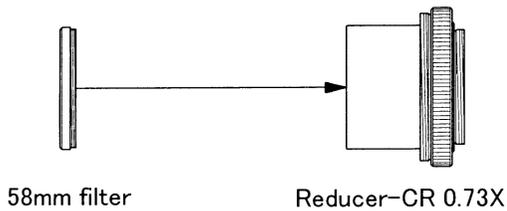
## ■ Filter Application

A number of filters are available in the market that can be attached to the Mewlon-300CRS for various applications.

- A 67mm filter can be attached to the CAA.



- A 58mm filter can be attached to Reducer-CR 0.73X.



- A 48mm filter can be attached to CA-35(50.8/2''), 50.8 (2'') Extension tube, And Wide T-mount DX-WR.

### Caution

When taking high magnification images of the Moon and planets, pay careful attention to balance. Rebalance the telescope each time a different object is imaged.

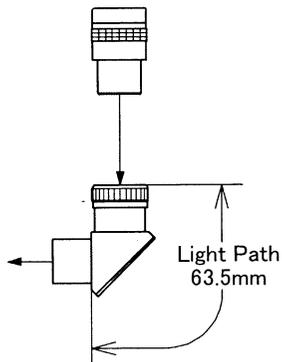
If the telescope is moved to another object, then rebalance it in the position in which the imaging will be done.

# Accessories for visual and imaging applications

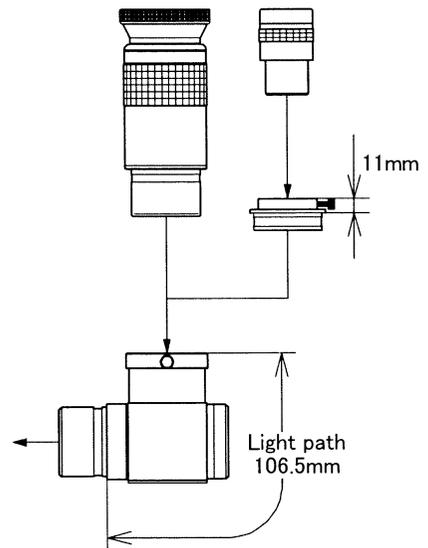
## ■ Diagonal Prism & Diagonal Mirror

When either of these diagonals with an ocular, the light path is longer to set the secondary closer to the primary. To obtain the sharp focus, use these diagonals as indicated in the system chart. Refer to the illustration of the light path length.

When the accessories other than oculars are used, the Diagonal Mirror is recommended to use because the light pass length is same to that of 50.8(2" ) Extension Tube (L) and thus it is almost not necessary to refocus.



Diagonal Prism (31.7mm/1 1/4")

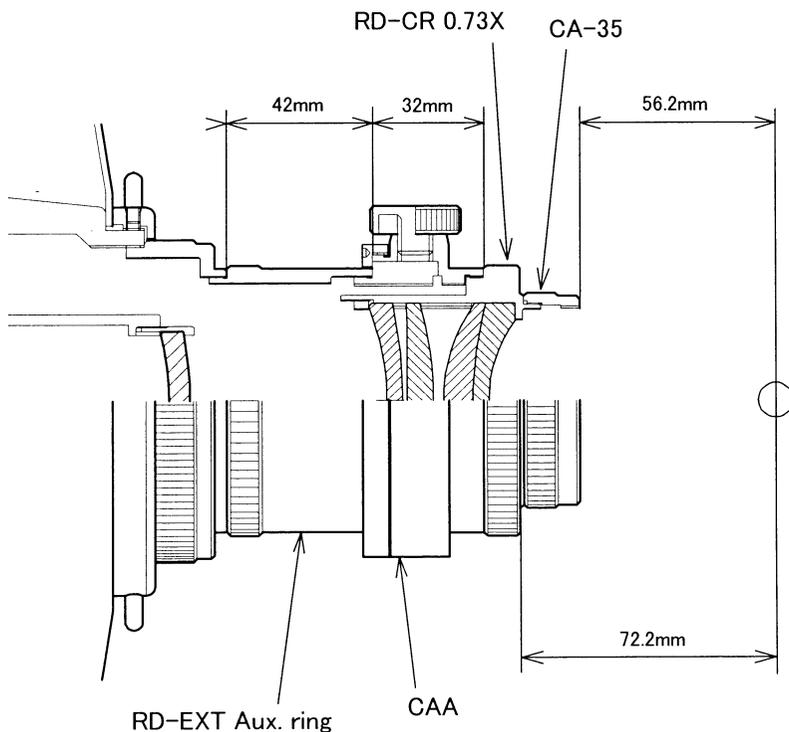
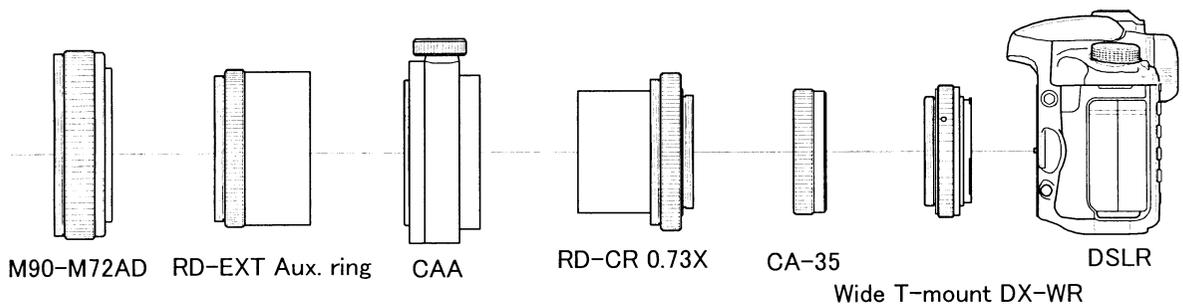


Diagonal Mirror (50.8mm/2")

## ■ Reducer-CR 0.73X

This is the reducer to make the effective focal length shorter by 27% (1825mm f/7.3). The image circle is 35mm APS size image. Refer to the system chart for connection. The reducer can be attached to a digital SLR or CCD camera.

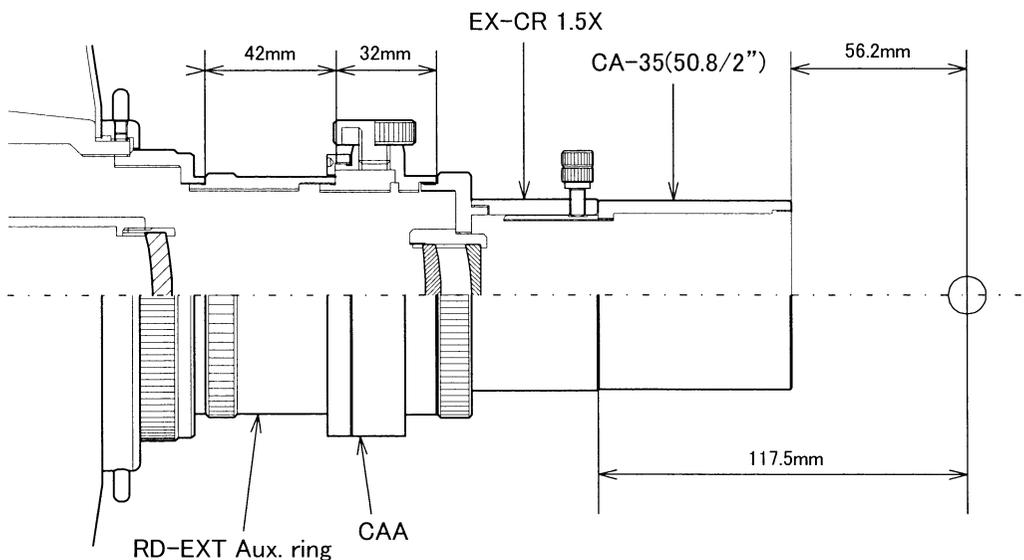
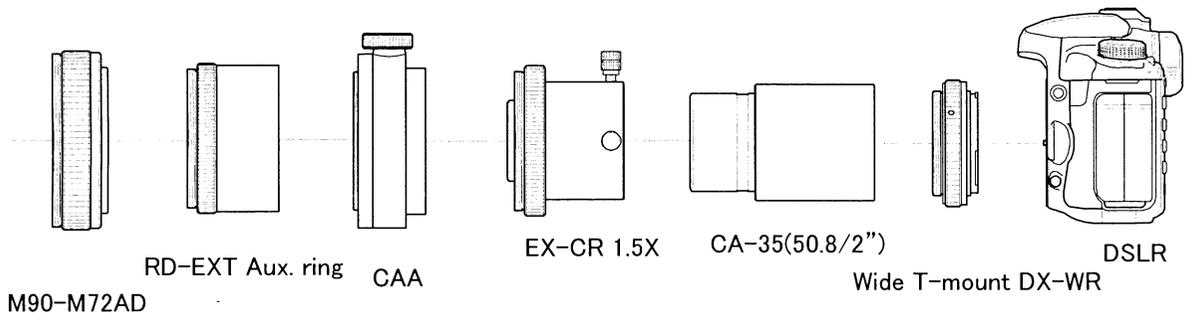
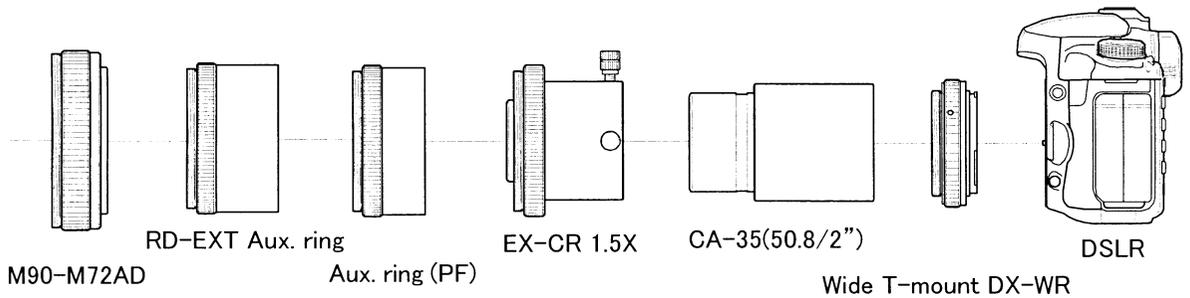
Focal length 2160mm  
Focal ratio f/7.2  
Image circle 35mm (60% illuminated)



## ■ Extender-CR 1.5x

This is the newly designed 2-element ED extender. The Extender-CR increases the effective focal length by 1.5x to 3780mm with sharp images corrected for the 44mm image circle. The Mewlon-250CRS ideal for the lunar and planetary imaging using a DSLR or CCD camera. You can change visual and imaging set-ups very easily because a 2" sleeve adapter is used first in the imaging train.

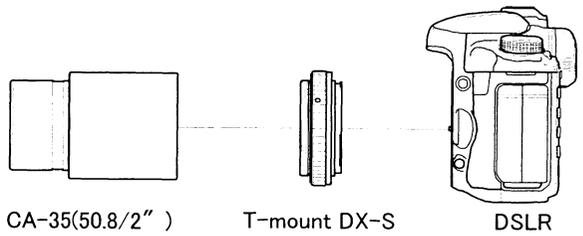
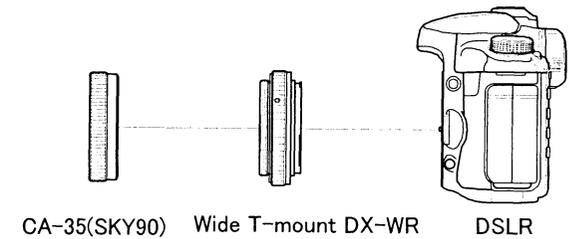
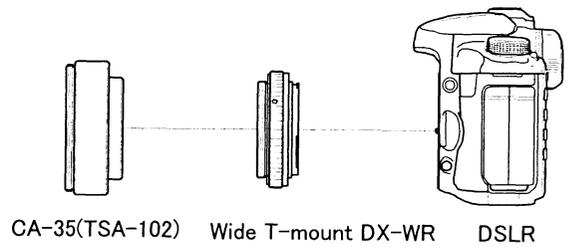
Focal length	3780mm
Focal ratio	f/15.1
Image circle	44mm (60% illuminated)



■ CA-35

To attach a DSLR camera, CA-35 is needed.  
3 types of CA-35 are available for imaging.

- CA-35(TSA-102) for prime focus imaging
- CA-35(SKY90) for imaging with RD-CR 0.73X
- CA-35(50.8/2" ) for imaging with EX-CR-1.5X



■ T-Mount DX & DX-S

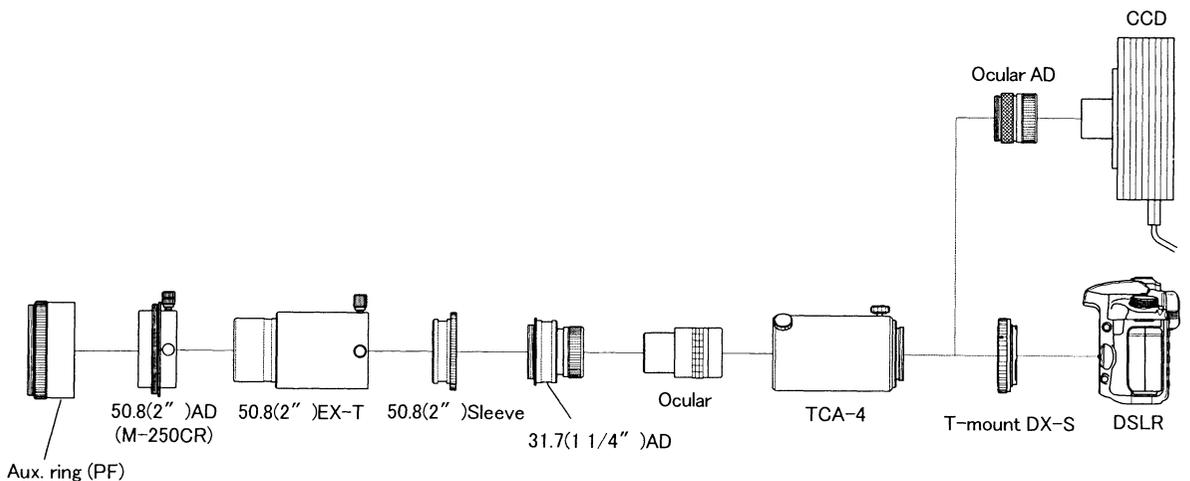
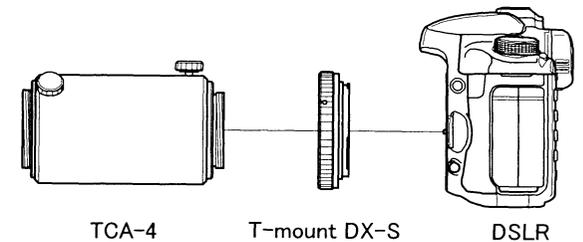
To attach a DSLR camera on your Mewlon-250CRS, you can use T-Mount DX-WR for imaging at the prime focus, with RD-CR 0.73X, and with EX-CR 1.5X.

In case of magnifying imaging with TCA-4, you can use T-Mount DX-S.

These are available for Canon/EOS & Nikon.

■ TCA-4

This variable eyepiece projection device can be attached easily to the M-250CRS for high magnification imaging the surface of the Moon and planets with a DSLR camera or a CCD.



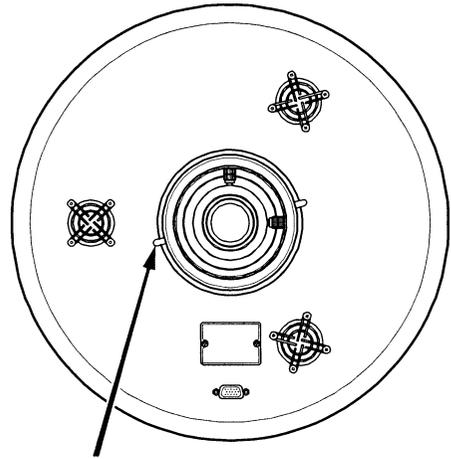
# Care & Maintenance

The cell cap has to be removed when the maintenance works, such as the mirror cleaning or the recollimation are necessary, the wire harness is attached on the cell cap from the motor and the temp sensors so that great care has to be taken when removing the cap.

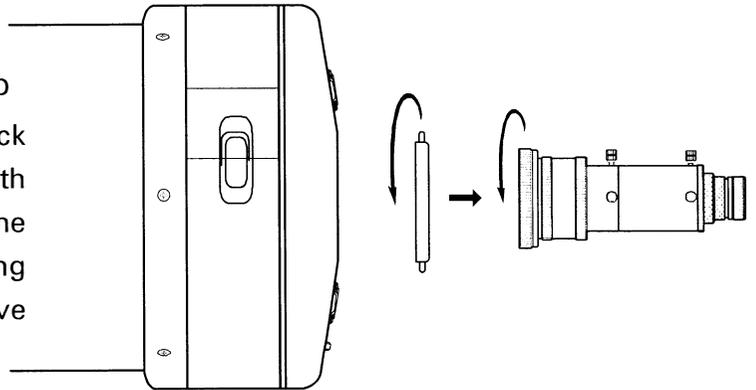
The collimation for the primary mirror is made, viewing the star. There-for, the Active Focus can not be used after the cap has been removed. So, at first, focus with a star before collimation and set the focal point 2 - 3mm outer. This is because the collimation is made by changing eye-pieces, viewing the star.

## ● How to remove the cell cap

At first, remove the visual back adapters. The cell cap is locked with the lock ring at the inner end of the visual back. Turn the ring holding the knobs on the ring and remove it and then the cap.

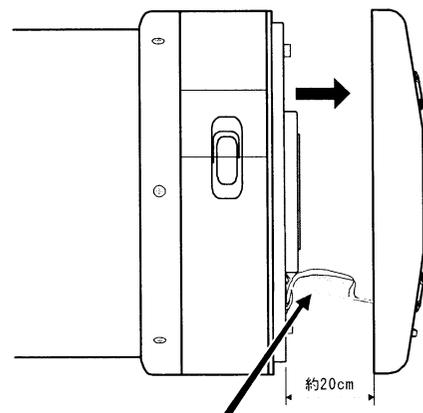


Remove the primary cell cap lock ring.



After all screws have been removed out, take out the cell cap slowly by both hands. The tube and the cell cap are connected with wiring and connectors.

The length of wirings is about 200mm. So be careful not pull these wirings more than total length.



Cable & wires

Tilt the cell cap as shown in the Fig. 1 and remove the wiring and cables from their connectors. Pay careful attention while doing this procedure. So, please read these instructions carefully.

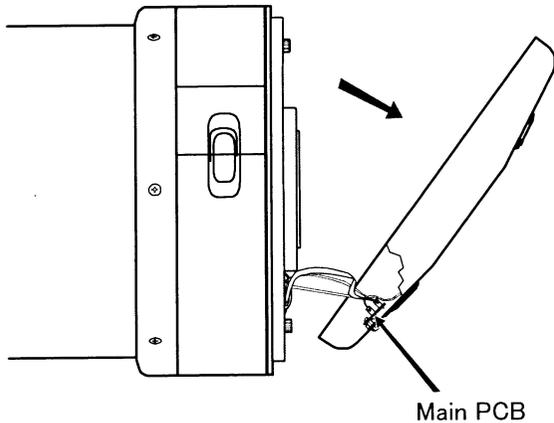


Fig. 1

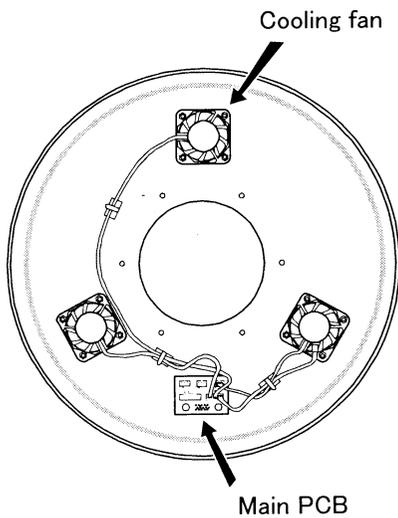


Fig. 2

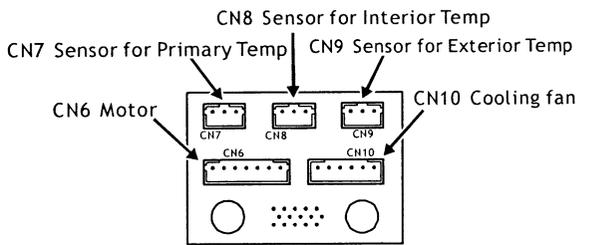


Fig. 3

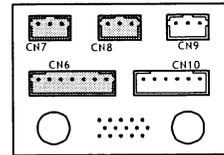


Fig. 4

On the main PC board, the connectors are provided with the layout as shown in the Fig. 3. Remove the wirings from the connectors shown in black. Other wirings remain as they are. When removing the wirings, grip the arrowed part and pull it out. Now collimation is ready.

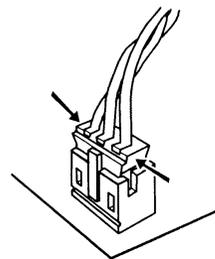


Fig. 5

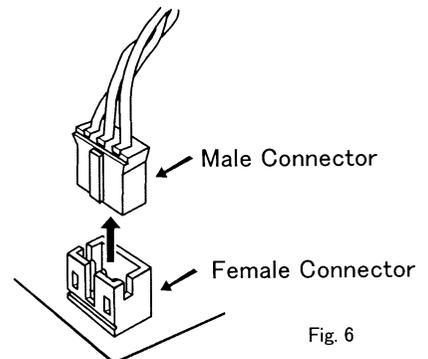
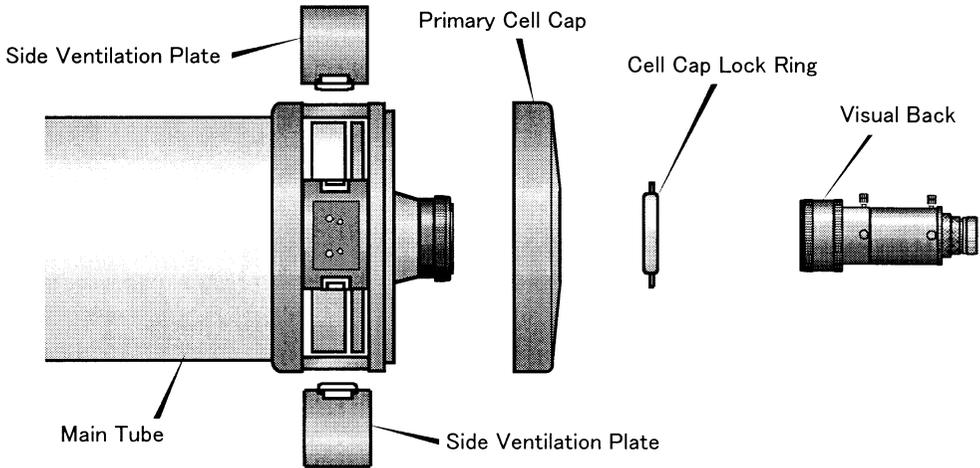


Fig. 6

## ■ Care & Maintenance for the Tube Assembly

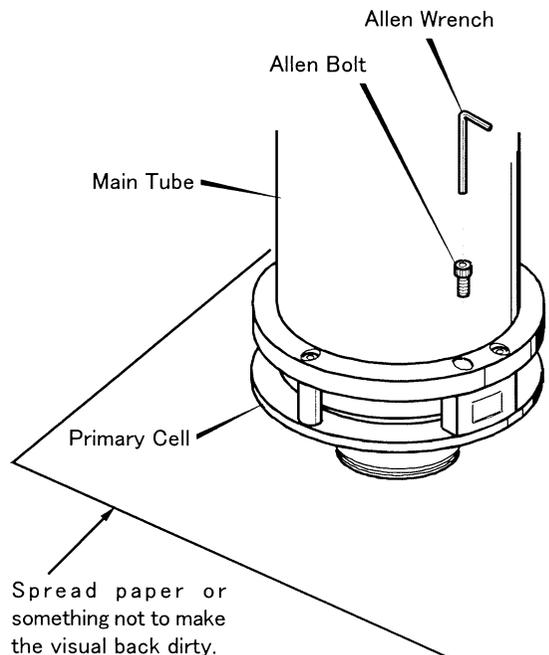
It is possible that after many years of use, the primary mirror of the Mewlon-300CRS may need cleaning. Before attempting this process, contact your local dealer.



1. Remove all of the visual adapters, the cell clamp ring, and the primary cell cover. Next remove the side ventilation plate as shown.

2. Place a clean piece of paper on a hard and flat surface. Put the tube with the rear cell down on to the paper on the flat surface. In this case, flat means really flat with no tilt whatsoever to it. This will prevent the tube from falling over on to the ground or on to your foot. With a wrench, loosen the six 8mm cap bolts, which connect the tube and the primary mirror cell.

3. Carefully lift the tube off of the mounting ring while being careful not to hit to the primary mirror baffle. At this time, make sure that the tube has been lifted completely above and away from the baffle tube.



\*When you are preparing to disassemble the Mewlon-300CRS in order to clean the primary mirror, please contact your local distributor before attempting to do so.

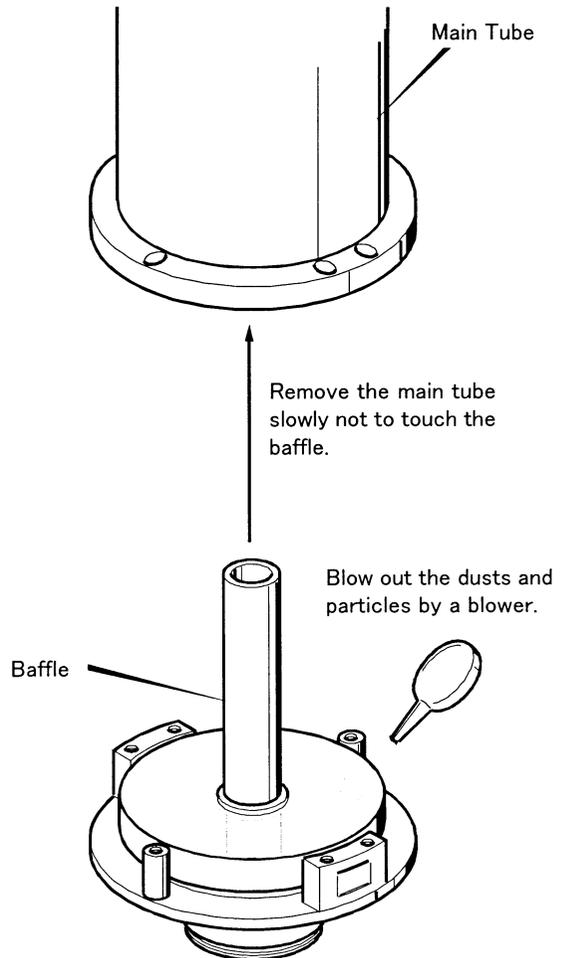
\*Replace the front cover and rear ocular plug after use to help prevent dust from entering into the optical system.

\*When the Mewlon-300CRS is brought into a warm environment from a cold one, dew could form on the primary mirror. If this occurs, do not replace the end covers. Use a hair dryer on the low heat setting to remove the dew from the primary. This same hair dryer can be used during a session under the sky to remove any dew that may form on the primary. The long length of the Mewlon-300CRS helps keep dew away on most nights. Using a hair dryer here will help prevent spots from forming on the mirror surface because the dew has dried.

Under no circumstances should Mewlon-300CRS be closed up while there is dew on the surface of the primary or secondary mirrors.

\*The outside of the tube may be cleaned with auto wax.

\*It is highly unlikely but possible that dew could form on the surface of the secondary, but it does not hurt to check to be certain.



## ■ Collimation

The Mewlon-300CRS is precisely collimated before being shipped. It is possible that the Mewlon-300CRS could be decollimated during shipment. In the event of this unlikely situation, the following is an explanation of the collimation procedure.

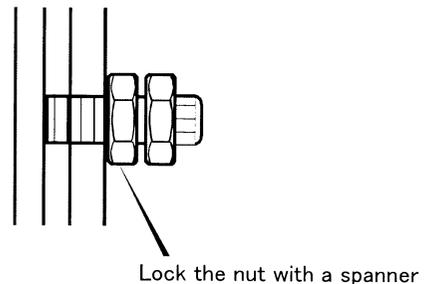
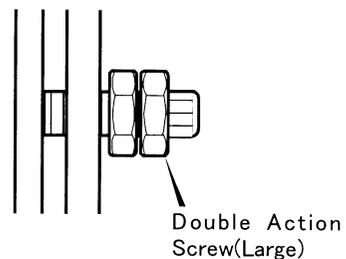
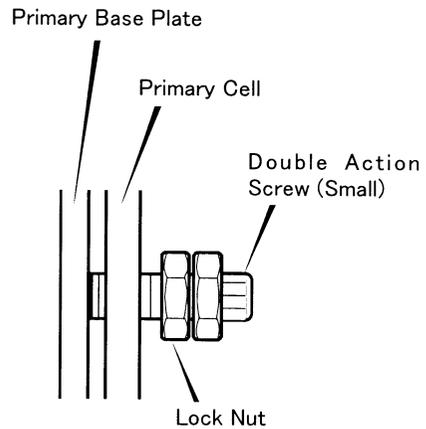
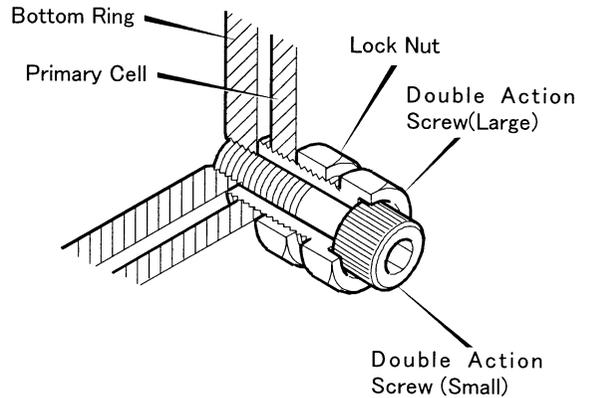
Before proceeding, call your local distributor.

### ● Primary Mirror Collimation

The Mewlon-300CRS uses three push/pull screws to collimate the primary mirror. The mirror can be adjusted using an open end wrench and an Allen wrench.

#### \*Procedure

1. The nut closest to the mirror cell controls the push screw. See the diagram. Remember the socket screw holds the mirror. The mirror can be moved by backing off the socket (pull screw) and then placing the open end wrench over the nut closest to the mirror cell and turning it. Make certain that the Mewlon-300CRS is vertical so that gravity will push against the mirror cell to make it move.
2. By turning the push screw, the primary mirror can be moved back and forth. While looking at the in-outer images, tighten the pull screw to hold the adjustment just made to the primary. By repeating this procedure, the primary can be collimated.
3. After collimating the primary, tighten the lock nuts (these closest to the end of the tube) to jam against the head of the push screw.



## ● Secondary Mirror Collimation

The secondary mirror can be adjusted by turning the three sets of push and Pull screws located on the secondary holder. The illustrations below indicate The direction in which the image will move in the collimating telescope.

“Push” means tightening the push screw AFTER loosening the pull screw.

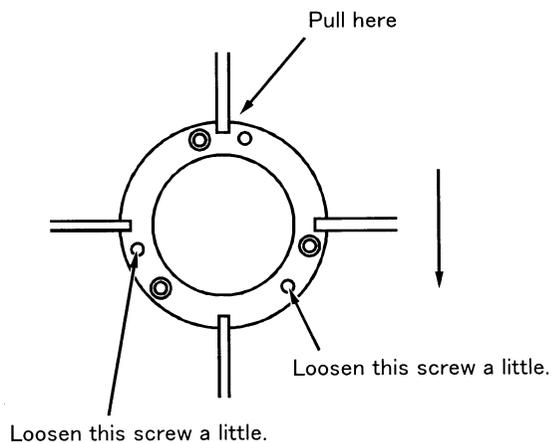
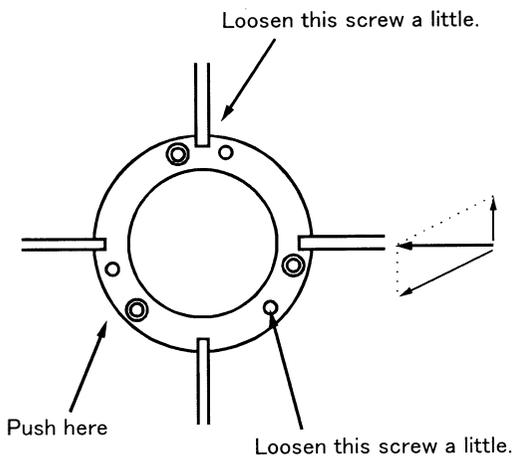
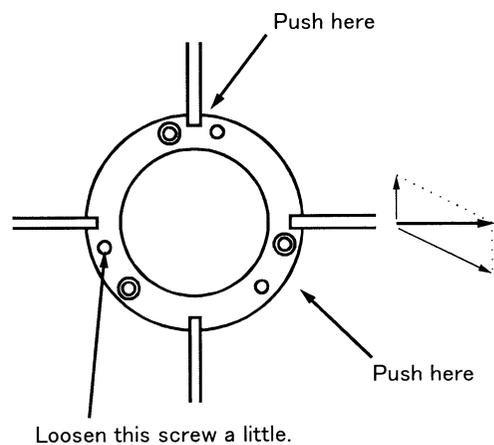
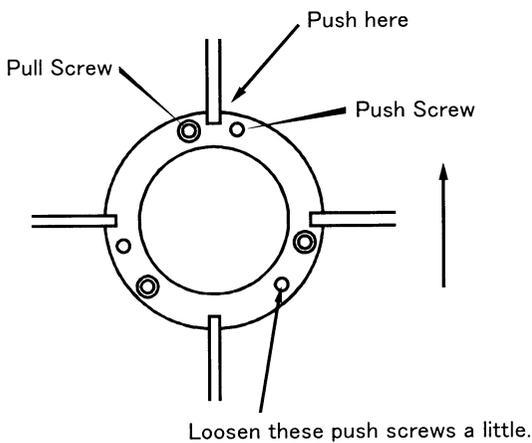
“Pull” means tightening the pull screw AFTER loosening the push screw.

## Caution:

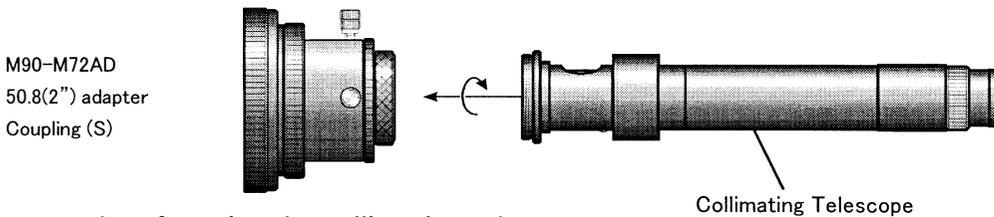
Do not loosen the pull screws too much, since this could cause the secondary to loosen and move, which would totally decollimate the Mewlon-300CRS.

Make the smallest possible adjustments. Keep in mind the very long length for The Mewlon-300CRS will make the secondary move with the smallest of adjustments.

It is best to perform this procedure at night on a star with the help of a friend to make the movements under your direction.



## ■ Collimation with the Collimating Telescope



The procedure for using the collimating telescope is discussed below. The collimating telescope can be used on refractors as well as Cassegrains.

### ● Collimating the secondary Mirror Using the Collimating Telescope

1. The secondary mirror has a center dot to aid in collimation. Slide the tube of the collimating telescope until the reflection of the spider on the primary mirror is visible (Fig.1).
2. From this focusing point, if you slide the focus tube slightly outward, focus will be on the secondary mirror's center dot (Fig.2).
3. If the mirrors are collimated the secondary mirror's center dot and the center of the collimating telescope will overlap and create concentric circles. However, if the secondary is not collimated as shown in Fig.2, then the Secondary mirror must be adjusted.
4. In a case shown in Fig. 2, loosen the push screw (A) and (C) in Fig.3 and tighten the push screws to center the center mark. By sliding the focus tube of the collimating telescope, while checking the spider and center dot's focus and adjusting each screw, find a place where the center dot and the secondary mirror center overlap. Then, the secondary mirror is completely collimated.

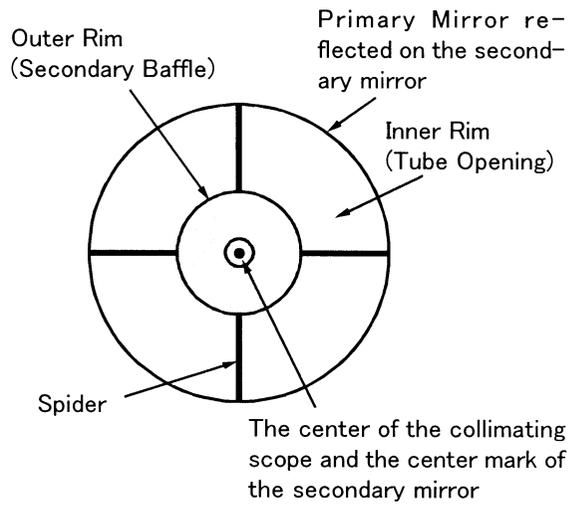


Fig.1

Focus on the center mark of the secondary mirror.

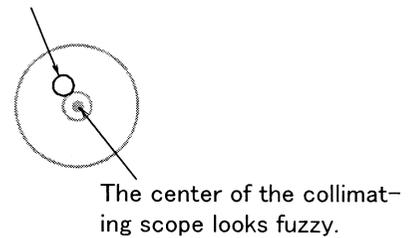


Fig.2

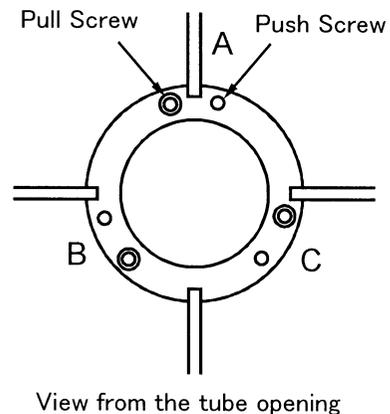


Fig.3

## ■ Collimating the Primary Using the Collimating Telescope

Point the tube at a white background.

1. Focus the collimating telescope on the spider.
2. Slide the focus tube outward until the circle of the mirror is a circle surrounded by a larger black circle. (Fig.4)

Note: If the image is slightly off center as shown in the figure to the right, then the primary is decollimated.

3. If the outside edge of the primary mirror forms an even circle against the black background of the side of the tube as in Fig.6, then it is properly collimated. However, if the position of the outer edge of the primary looks like Fig.4, the primary is out of collimation.

4. If the primary is decollimated, use the push/pull screws located at the rear of the mirror cell to move the primary until the reflection looks like Fig.6.

5. After primary is adjusted to produce a concentric circle when the edge of the mirror cell against the white ring of the outer tube, then the primary is collimated.

\*Moving the collimating screws appreciably will change the focal length of the Instrument. Try to keep these adjustments to a minimum. Fortunately, short of dropping the tube assembly on the ground, this procedure will hold the collimation for an indefinite period of time.

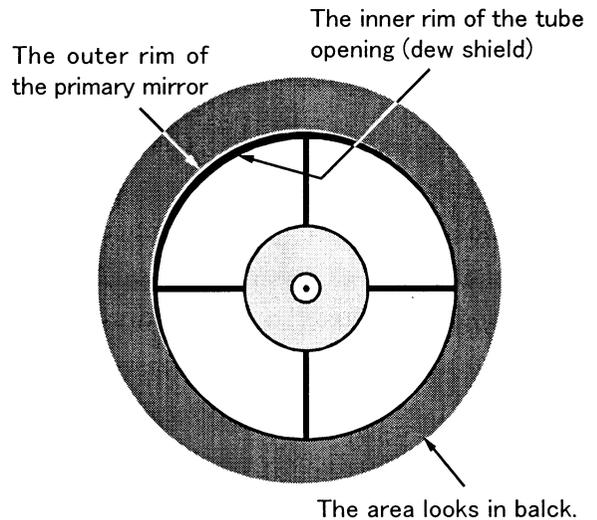


Fig.4

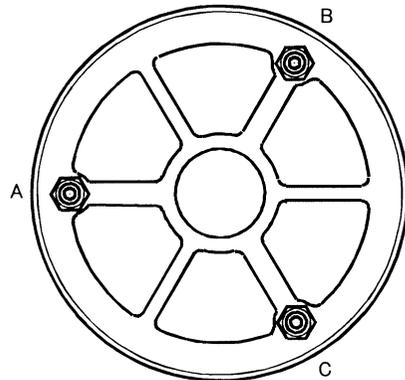


Fig.5

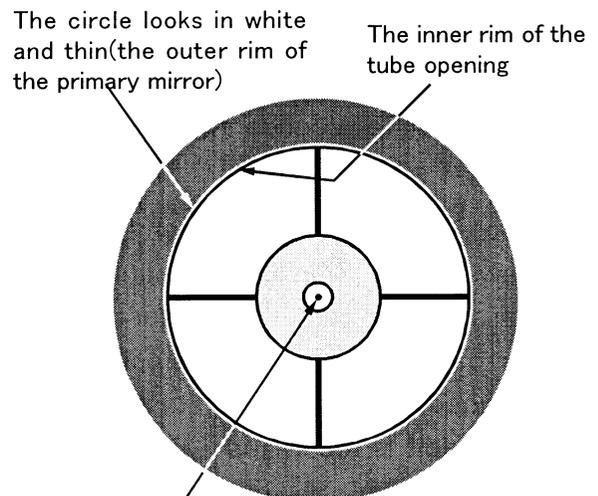


Fig.6

## ■ Confirmation of Collimation

Confirming collimation using a stellar image is done after the optics have been collimated and in preparation for this test, the instrument has been equalized to the ambient temperature for over an hour and the seeing is good.

Chose a bright star (second or third magnitude) and place it in the center of the field of view. Defocus the image and look at the diffraction pattern under high magnification. If the image formed is a series of concentric ring evenly spaced with a dark circle in the center (the shadow of the secondary), then the Mewlon-300CRS is collimated. Do this intra and extra focality. If the rings are not concentric, then the optics are decollimated. Most likely a slight adjustment of the secondary mirror will be sufficient to collimate the instrument. By pressing the focusing button OUT (white), the extra focus can been seen. If the optics are collimated, the concentric rings will appear in both views.

\*The center of the diffraction ring is the shadow of the secondary mirror.

\*If the Mewlon-300CRS is not collimated, then it will not perform to the limit of its capabilities. Defocus the first star observed to confirm collimation.

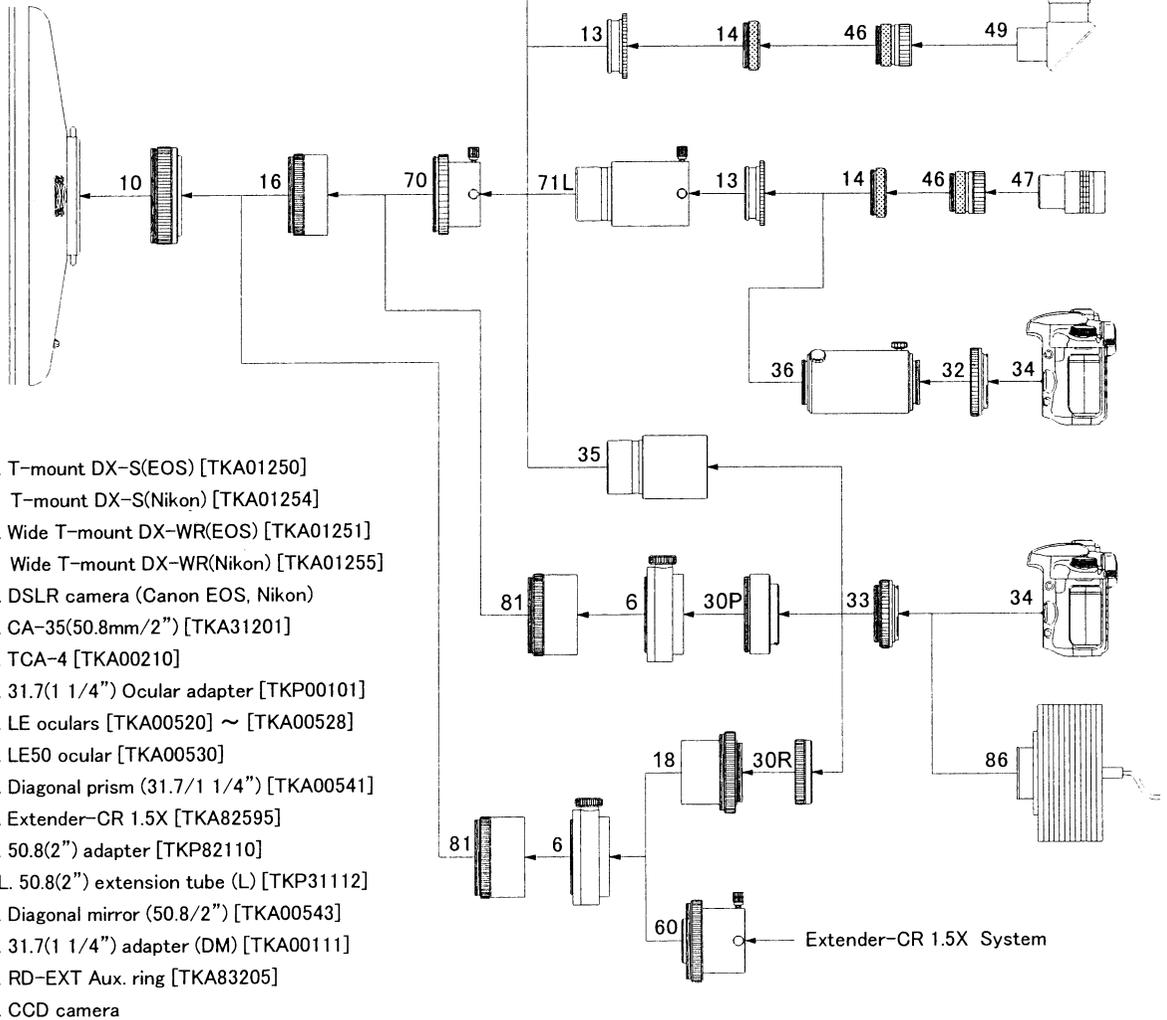
\*When the inner tube currents remain, the optics will appear to be decollimated.

	Inner/Outer Image	Just before after focal point	Focused
Collimated			
Decollimated			

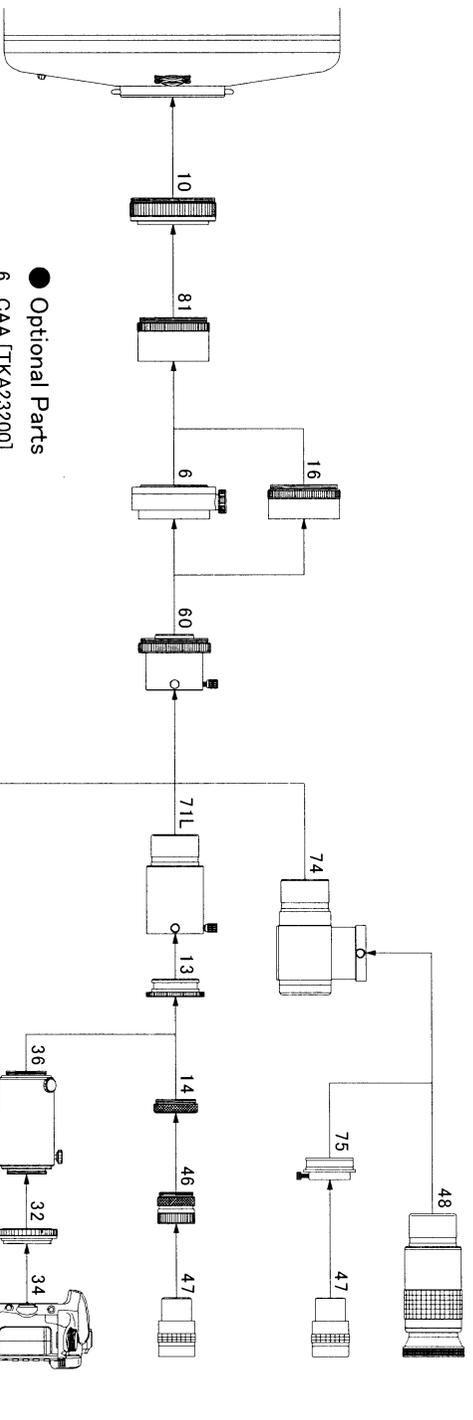
# System Chart

## Visual/Imaging System Chart

- 6. CAA [TKA23200]
- 10. M90-M72AD [TKP84111]
- 13. 50.8(2") sleeve [TKP00113]
- 14. Coupling (S) [TKP00103]
- 16. Adapter(PF) [TKP83002]
- 18S.Reducer-CR 0.73X [TKA82580]
- 30P.CA-35(TSA-102) [TKA23201]
- 30R.CA-35(SKY90) [TKA35201]



# Extender-CR 1.5X System Chart



### Optional Parts

- 6. CAA [TKA23200]
- 32. T-mount DX-S(EOS) [TKA01250]
- T-mount DX-S(Nikon) [TKA01254]
- 33. Wide T-mount DX-WR(EOS) [TKA01251]
- Wide T-mount DX-WR(Nikon) [TKA01255]
- 34. DSLR camera (Canon EOS, Nikon)
- 35. CA-35(50.8mm/2") [TKA31201]
- 36. TCA-4 [TKA00210]
- 47. LE oculars [TKA00520] ~ [TKA00528]
- 48. LE50 ocular [TKA00530]
- 60. Extender-CR 1.5X [TKA82595]
- 74. Diagonal mirror (50.8/2") [TKA00543]
- 75. 31.7(1 1/4") adapter (DM) [TKA00111]
- 81. RD-EXT Aux. ring [TKA83205]
- 86. CCD camera

Note: Some 35mm DSLR cameras cannot be attached to T-rings or to Wide T-rings.

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