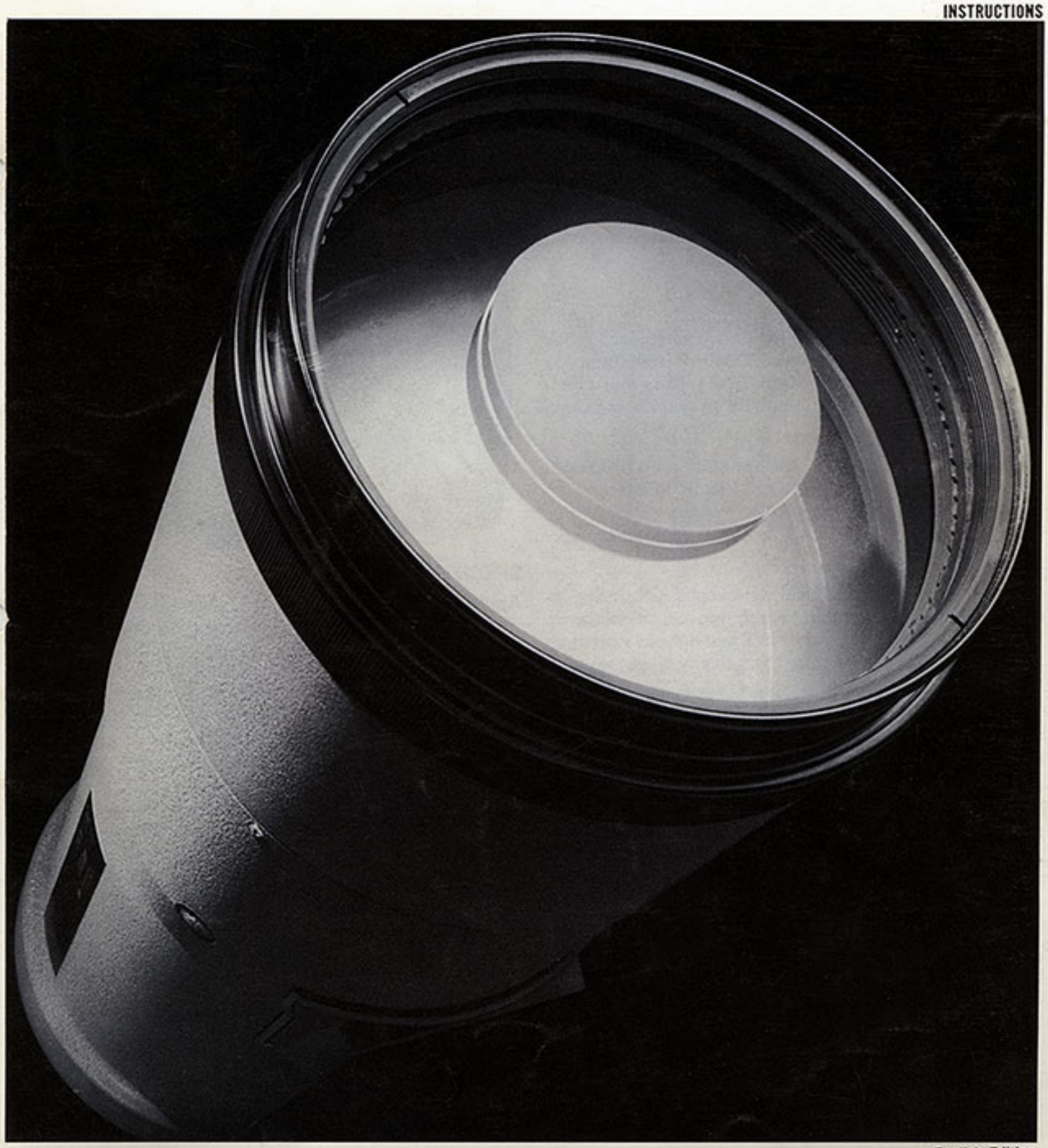
Canon

MIRROR LENSES
800mm 1:3.8
2000mm 1:11
5200mm 1:14

INSTRUCTIONS



English Edition

Outstanding Features of Canon Mirror Lenses

ULTRA LONG FOCAL LENGTH

Canon Mirror Lenses 800mm, 2000mm and 5200mm are ultra long focus lenses designed for use in taking news photographs and photographing extremely distant objects with Canon single-lens reflex cameras and image orthion TV cameras. During the Tokyo Olympics in 1964, many exciting photographs were taken with these mirror lenses regardless of long object distance. For example, the 5200mm lens can take pictures of objects over at 0.6 miles (1000m) away.

CATADIOPTRIC SYSTEM

The optical systems of these mirror lenses are completely different from the conventional telephoto lenses, adopting a new mirror lens system called "catadioptric" which is an excellent combination of refraction and reflection. One of the outstanding features of this optical system is that the overall length of the lens is reduced to less than one third of the focal length of the lens.

LEAST ABERRATION

Compared with a 50mm lens for Canon single-lens reflex cameras, the Canon Mirror lens 5200mm is more than one hundred times in its focal length. This means that spherical and chromatic aberration would increase at the same ratio.

In the case of the 800mm lens, another kind of aberration called astigmatism must be reduced to almost zero in order to obtain sharp and clear images. This is also a big problem which Canon's technical people have succeeded in solving.

Unlike ordinary astronomical telescopes which are installed at a certain spot and rarely moved, these Canon Mirror Lenses are compact in size and light in weight so that individual user may carry them to any place they wish to go.

MULTI-APPLICATION

Canon Mirror Lenses are available with Bellows 800, 2000 and 5200 for attachment to Canon single-lens reflex cameras. They can be used for telecasting with television mounting plates such as PYE, RCA and any special mounting plate.

MASS PRODUCTION

These three kinds of mirror lenses are not hand-made products. In our factory equipped with curve generators, large-scale polishing machines and other precision machining tools we have succeeded in producing them in much larger number than previously.

CANON MIRROR LENS 800mm 1:3.8

This is the fastest telephoto lens in the world in comparison to its long focal length. The lens speed of 1:3.8 is ideal for photographing or telecasting indoor sport events. This lens is quite light in weight because a new optical theory resulting from our intensive research and refinement has been employed. What had been preventing the completion of a telephoto lens with a fast lens speed was the increase of the total weight, and aberration which would deteriorate images.
However, the Cassegrainian optical system applied to this lens has succeeded in minimizing the overall length. The light that enters is reflected twice. Accordingly the overall length is reduced down to one third of the focal length. Aberration is corrected by the main mirror which reflects the light on the rear surface, by the secondary mirror which is slightly convex and by the correction lens which has a large diameter.

SPECIFICATIONS

Applications :	For Canon SLR cameras and image orthicon TV camera.
Image Format Covered :	50.8mm diameter (2")
Focal Length :	800mm (31-1/2")
Angular Fields of View :	2°50′ × 1°45′
Exposure Control :	Light quantity is controlled with the use of built-in ND filters corresponding to 3.8, 5.6, 8, 11, 16, 22
Minimum Object Distance :	20 meters (66 feet)
Ambient Temperatures :	40°C – –15°C (100°F – –5°F)
Optical Construction :	2 mirrors and 5 elements
Optical System :	Catadioptric system
Focusing Operation :	For still camera : By moving Bellows 800 For television camera : By moving the image orthicon
TV Mount :	PYE, RCA
Size :	463mm (deep) × 268 (wide) × 268mm (high) (18-1/4" × 10-9/16" × 10-9/16")
Weight :	15 kg (33 lbs)

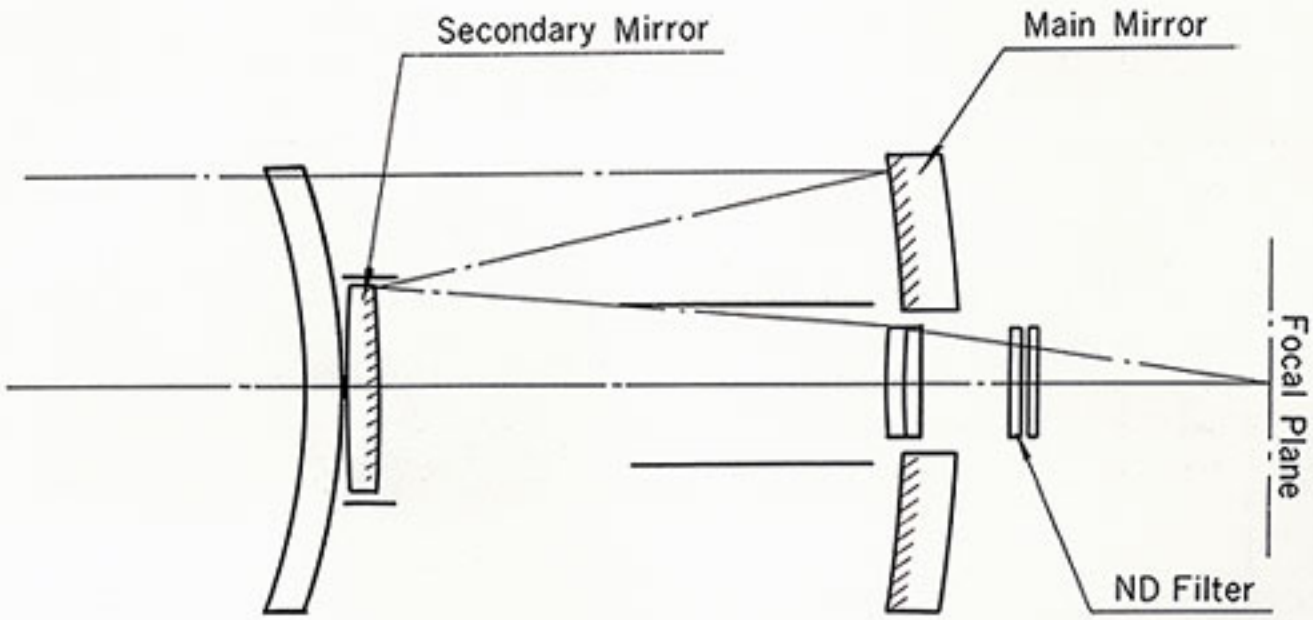
FOCUS ADJUSTMENT

There is no focus adjusting mechanism on the 800mm lens. Make adjustments by moving Bellows 800 on the single-lens reflex camera or the image orthicon on the TV camera. The focusing range between infinity and 20 meters is 33mm by the movement length of the focal plane.

HOOD

The hood must always be used, from the standpoint of reflection optical system characteristics, in order to avoid irregular light rays from outside and to increase the contrast of the image. The hood is of sufficient size to deter various harmful light rays so as to obtain sharp images. Attach the hood onto the barrel with the back end bayonet before attaching the lens body on the camera or TV camera.

OPTICAL SYSTEM



CAP

When the lens is to be put away in the box, the cap is attached to the front frame of the lens body.
When the lens is attached to the camera or TV camera, the cap is to be attached to the front tip of the hood. The back cover is used only when the lens is put away. When used, the back cover is attached to the attachment part on the back end of the lens body or, if necessary, to the back end of the lens mount converter.

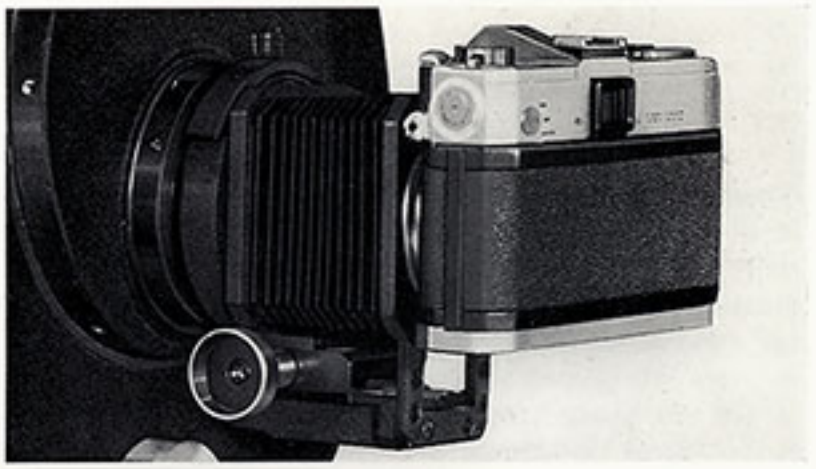
TRIPOD

A specially made tripod for use with 800mm and 2000mm lenses is available. It is very strong and ideal for shooting pictures. There are 3/8" tripod attachment screws on the bottom surface of the 800mm and 2000mm lenses at the center of gravity position (with hood attached).

INSTRUCTIONS FOR USE

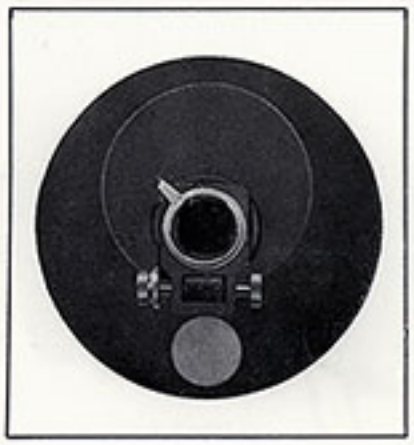
ATTACHING TO SLR CAMERA AND TV CAMERA

1. When attaching to the Canon single-lens reflex camera, first attach Canon Bellows 800 to the lens bayonet and then the camera to the Bellows 800.
2. The PYE mount lens can be attached to the TV camera turret plate in the same manner as ordinary single lenses.
   Before mounting, however, turn knobs A, situated on both sides of the mount plate, fully clockwise. The fork will draw back and the hole for the turret plate tightening bolt will enlarge to make attachment easy. After passing the tightening bolt through the hole, turn knobs A counter-clockwise. The fork will jump out and fix the bolt.
3. The RCA mount lens can not be attached directly onto the turret plate. Mount the lens after removing the turret plate of the TV camera.



ADJUSTMENT OF THE LIGHT QUANTITY

There is no iris in the 800mm. The light quantity is controlled by changing the ND filters built in the lens. The light quantity is adjusted by turning the light quantity adjusting knob. Choose any one of the figures (3.8,5.6,8, 11.....) that indicate light volume.



MOUNTS

R mount with bayonet for single-lens reflex cameras and two kinds of mounts, PYE, RCA for TV cameras are available. The lenses themselves can be used on any of the cameras by just changing the mounts.

PYE MOUNT

Condition when fork is drawn back.

Condition when fork is protruding and bolt is tightened.

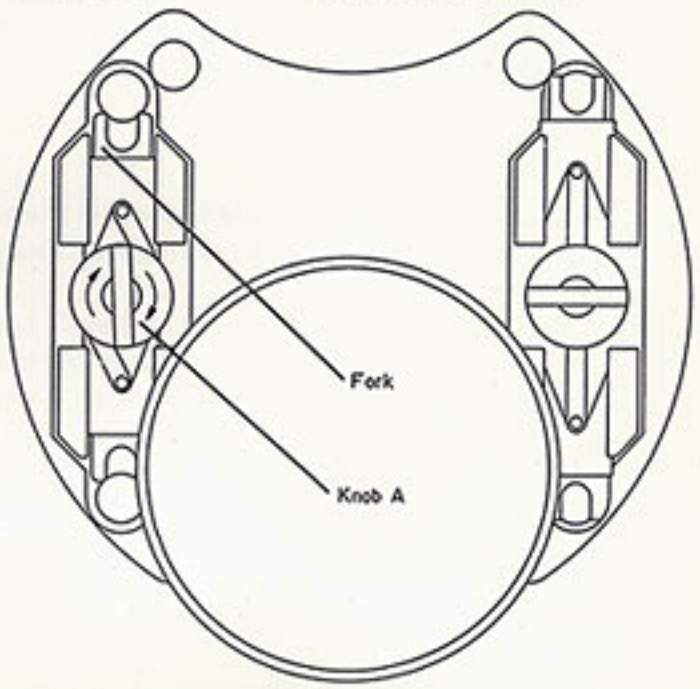
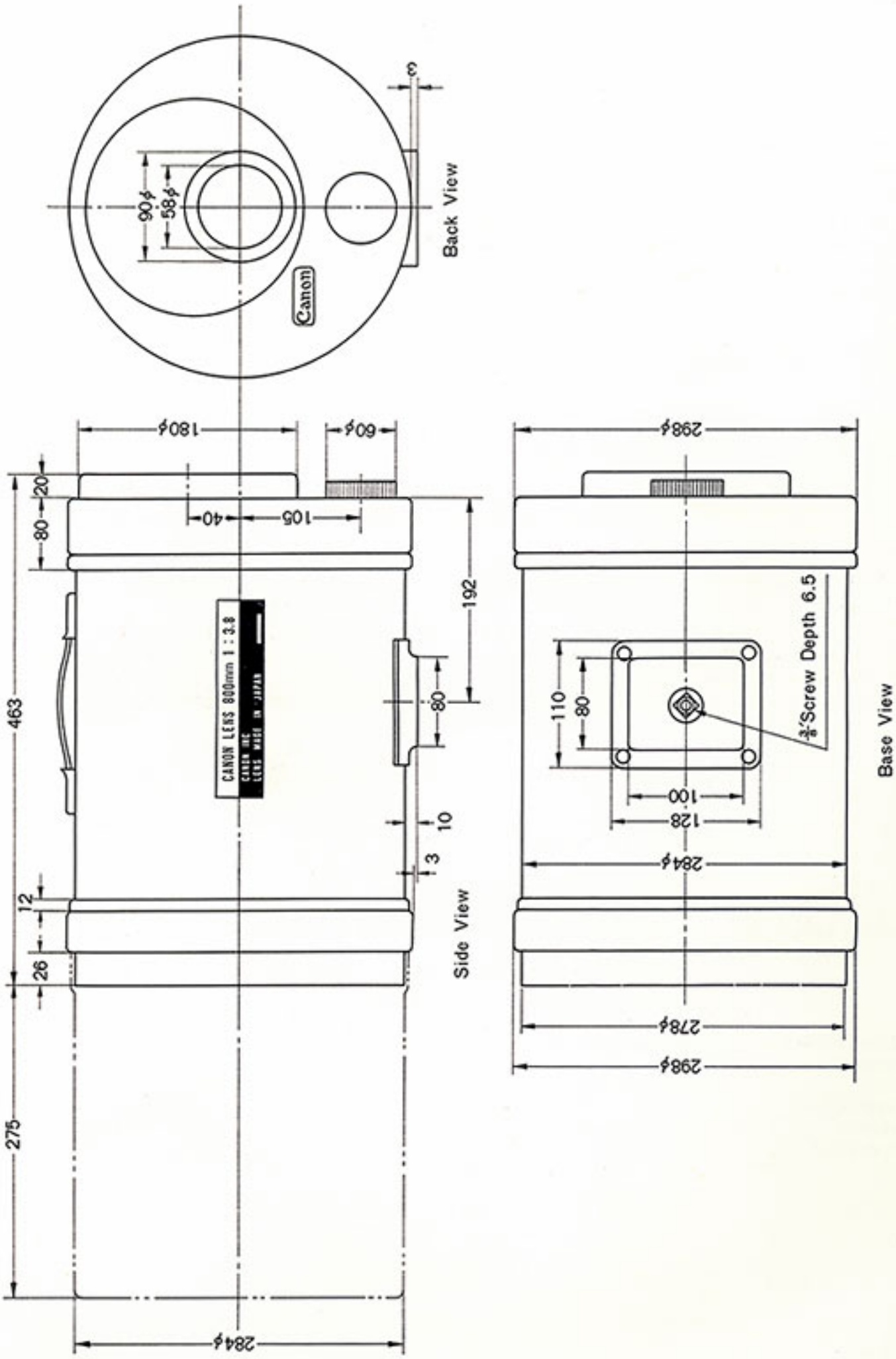


Diagram of Canon Mirror Lens 800mm 1 : 3.8



CANON MIRROR LENS 2000mm 1:11

This is a handy-type telephoto lens which is most suitable for shooting distant objects. One of the excellent features of this lens is its light weight (11 kg/24 lbs). In general telephoto lenses have such a problem that the longer the focal length is, the more aberration they will have. However, this problem has been successfully solved by our long and persistent research. Unlike an astronomical telescope, a telephoto lens is often used for shooting objects at a short object distance of approx. 21 meters (70 ft). This is where the Canon Mirror Lens 2000mm can show its excellent quality. Two kinds of focusing operation—ordinary focusing by moving the secondary mirror and fine focusing by adjusting Bellows 2000 or television camera tube—can easily obtain sharp images of objects at various object distances.

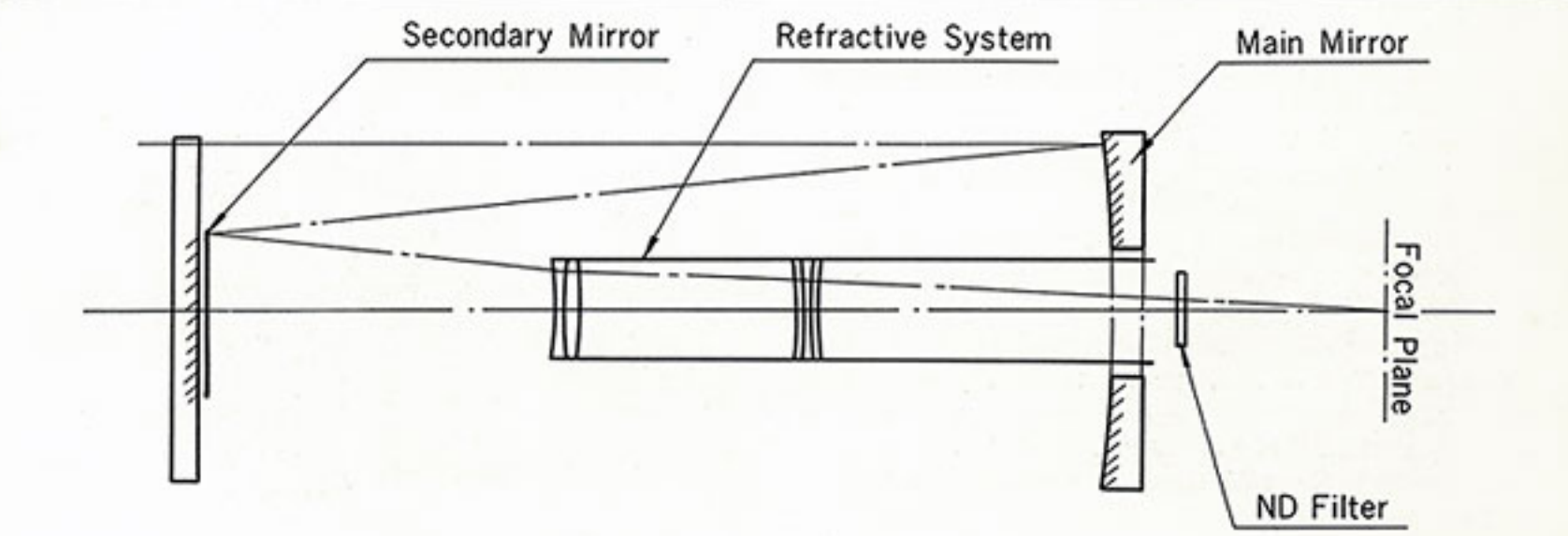
SPECIFICATIONS

Applications :	For Canon single-lens reflex cameras and image orthicon TV camera.
Image Format Covered :	50.8mm diameter (2")
Focal Length :	2000mm (78-3/4")
Angular Field of View :	60′ × 40′
Exposure Control :	Light quantity is controlled with the use of built-in ND filters corresponding to 11, 16, 22, 32
Minimum Object Distance :	20 meters (66 feet)
Ambient Temperatures :	40°C – −15°C (100°F – −5°F)
Optical Construction :	2 mirrors and 5 elements
Optical System :	Catadioptric system
Focusing Operation :	For still cameras : By moving the secondary mirror and Bellows 2000 For television cameras : By moving the secondary mirror and the image orthicon
TV Mount :	PYE, RCA
Size :	603 (deep)×246 (wide)×246mm (high) (23-3/4"×9-11/16"×9-11/16") without hood
Weight :	11kg (24 lbs)

FOCUS ADJUSTMENT

The focusing adjustment for the 2000mm lens is performed by drawing out or pushing back the front frame along the helicoid.
The standard graduations scales are engraved around the front frame. When set, the range in which focusing adjustment is possible by moving the image orthicon is shown in the following chart.

OPTICAL SYSTEM



Standard Graduations	Focusing Range (meters)
∞	∞–58
100	100–47
50	50–32
35	35–25
25	25–20

- The chart is based on the movement length (50mm) of the image orthicon.
- Appropriate friction is given to the helicoid so that the image orthicon can be set at an optional position in accordance with the distance or movement length of the image.

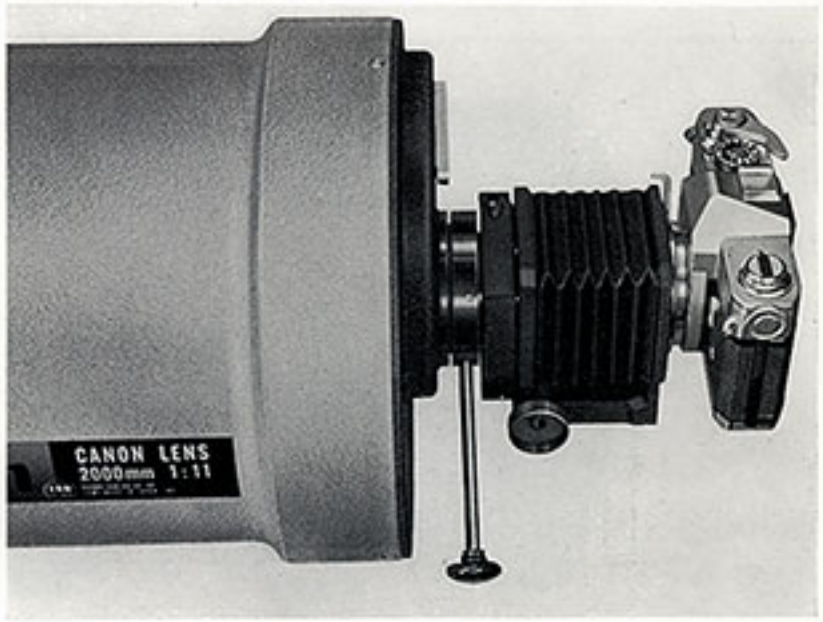
INSTRUCTION FOR USE

ATTACHING ONTO SLR CAMERAS AND TV CAMERA

1. When attaching the Canon single-lens reflex cameras, first attach Canon Bellows 2000 to the lens bayonet and then the camera to the Bellows 2000.
2. When attaching to the TV camera, the lens mount converter to attach onto PYE and RCA TV cameras and the supporter to prevent blurring of the image are needed.
3. Attach the lens mount converter onto the mount part of the TV camera.
4. Next, attach the supporter.
   In the case of PYE mount, attach the supporter on the front side of the universal TV lens holder. In the case of RCA mount, attach the supporter to the turret plate on the front side of the TV camera.
5. Support the lens with the left hand approximately under the center of gravity point. With the right hand, turn the bayonet fixing lever, on the back portion of the lens, up to the upper right stopper. Then, while holding the lever, insert the bayonet into the lens mount converter.
6. After fully inserting the bayonet, lower the bayonet fixing lever. The lens will be fixed onto the TV camera with the lens mount converter in between. When the bayonet fixing lever does not turn lightly, do the attaching over again.
7. Tighten the attachment screw, situated on the bottom surface of the cradle at the tip of the supporter, into the tripod screw hole under the mirror barrel and fix the mirror barrel and the supporter. When there is an aberration in the optical axis of the camera and lens, adjust by retightening this screw.

ADJUSTMENT OF THE LIGHT QUANTITY

There is no iris in the 2000mm. The light quantity is adjusted with the ND filters built in the lens. Choose any one of the figures that indicate light quantity.



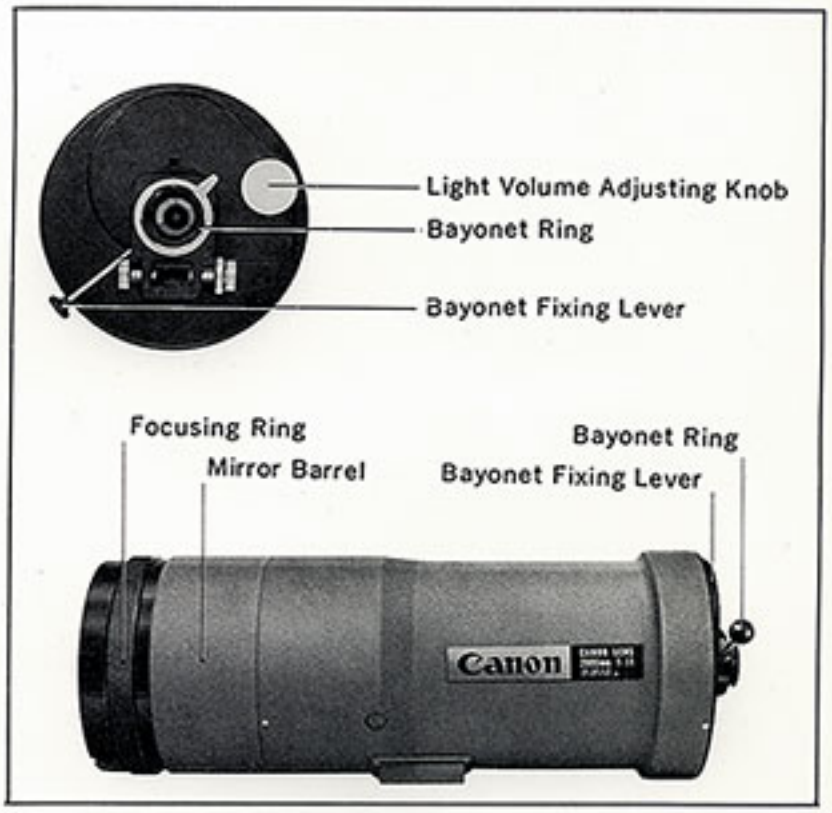
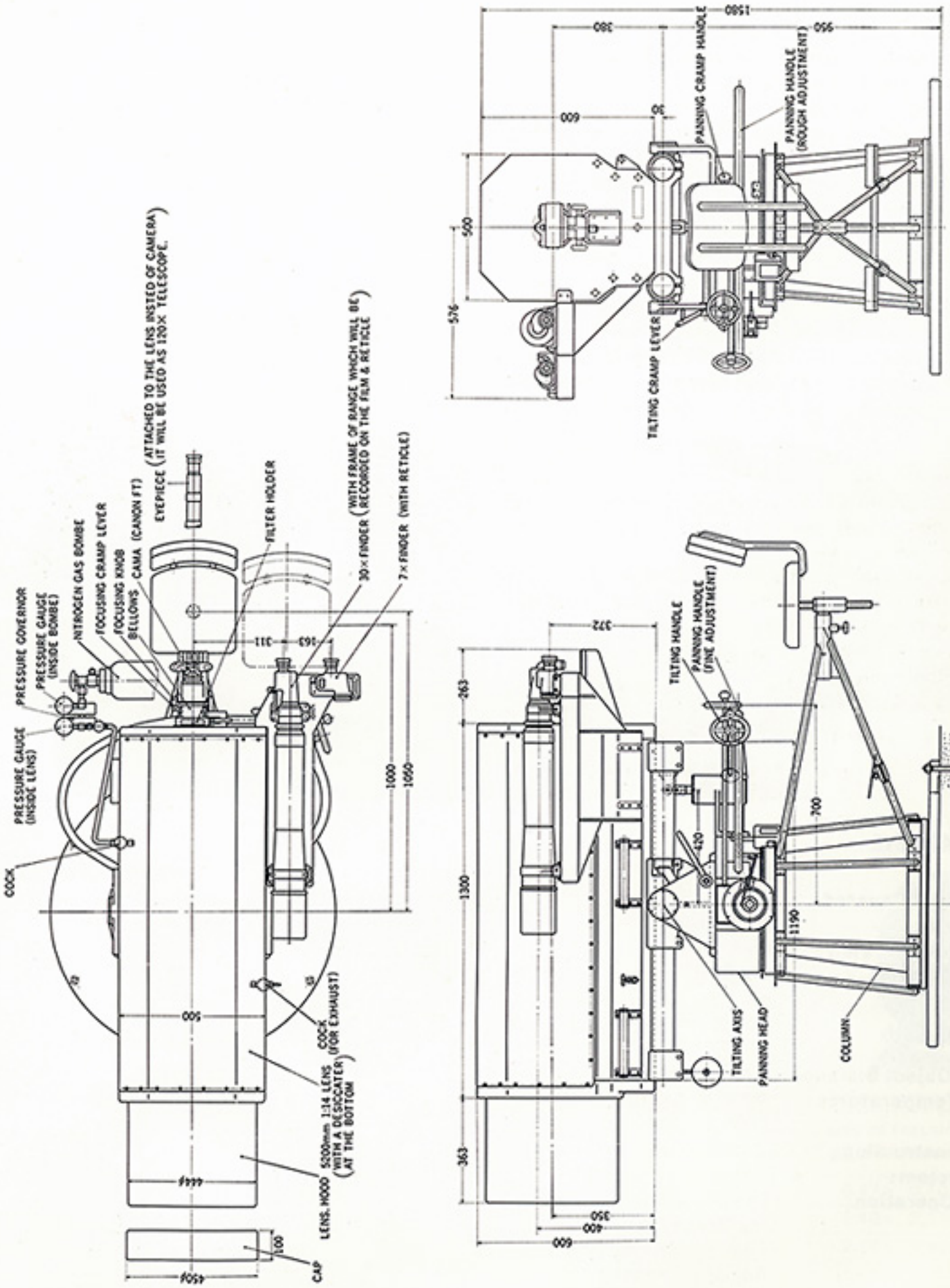
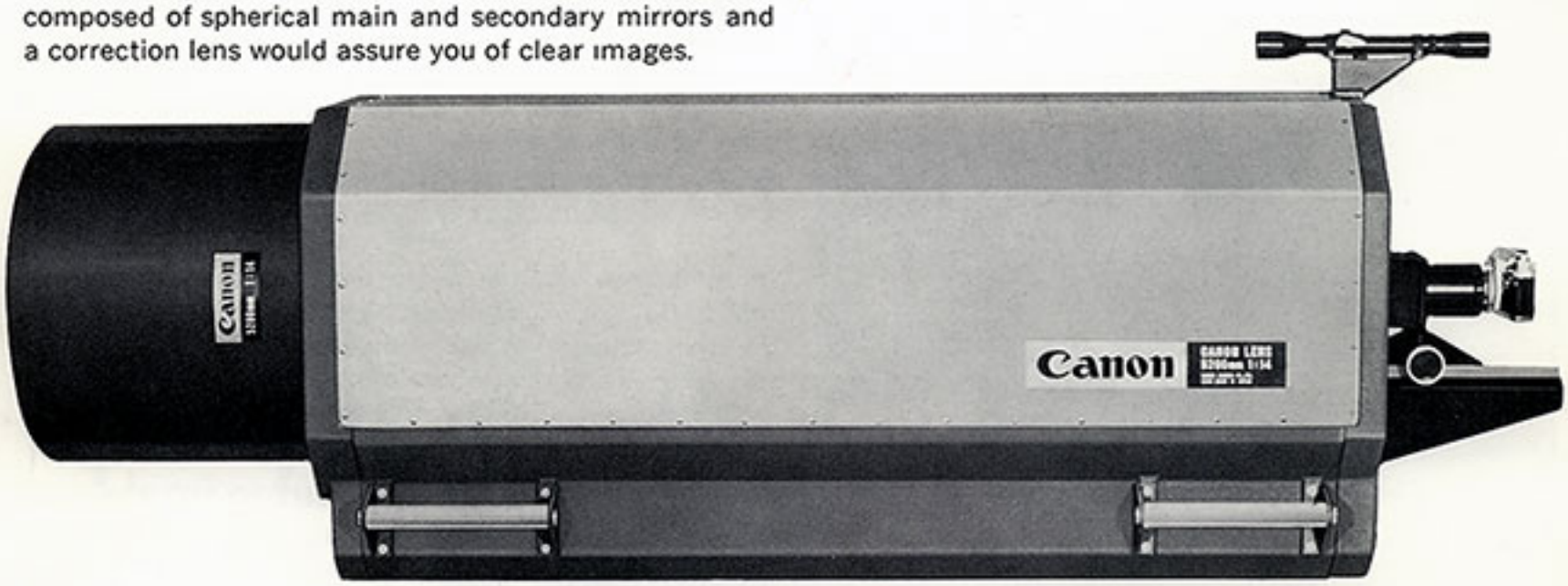


Diagram of Canon Mirror Lens 2000mm 1 : 11



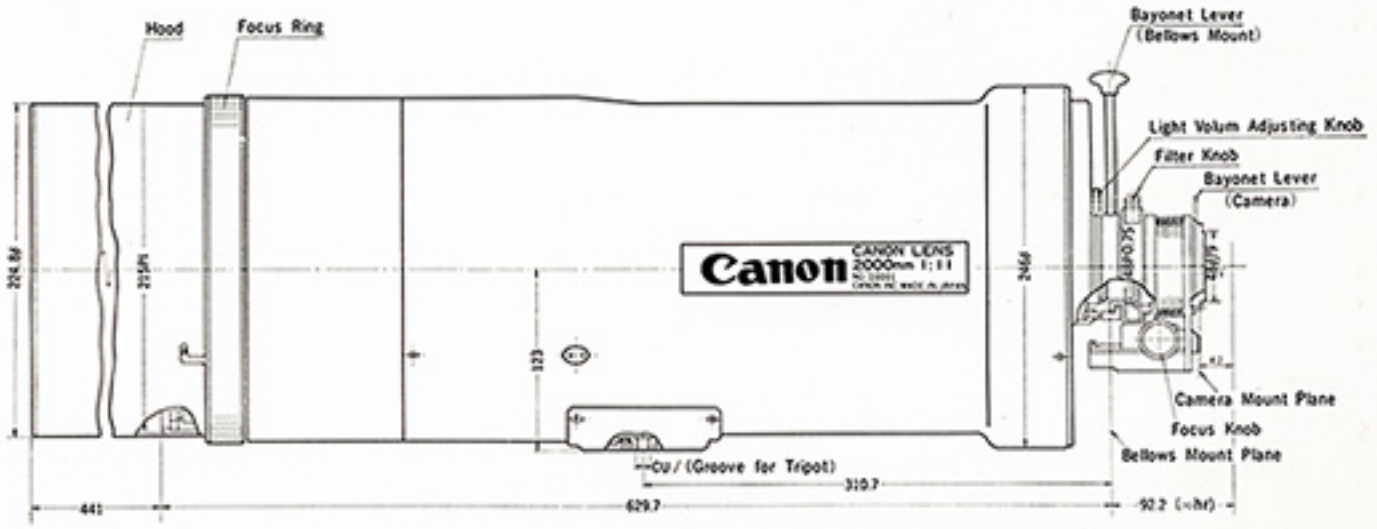
CANON MIRROR LENS 5200mm 1:14

This is the only ultra-telephoto lens in the world capable of taking photographs of objects 18 to 32 miles away. Having a focal length of 5200mm, Canon Mirror Lens 5200mm can obtain one hundred times as large an object image as that of a 50mm lens. For focusing this mounted or fixed lens on an extremely distant object, two aiming telescopes are set on the side of the lens barrel, and the entire lens is placed on a rigid stand which rotates smoothly. Minimizing the overall length had been a big problem in designing this lens. However, the Catadioptric system that is applied to the other two Canon mirror lenses has succeeded in reducing it down to one third of the nominal focal length. In general focal length and optical aberration increase with each other, however, our long and persistent research and development have succeeded in solving this problem. Canon mirror lens 5200mm composed of spherical main and secondary mirrors and a correction lens would assure you of clear images.

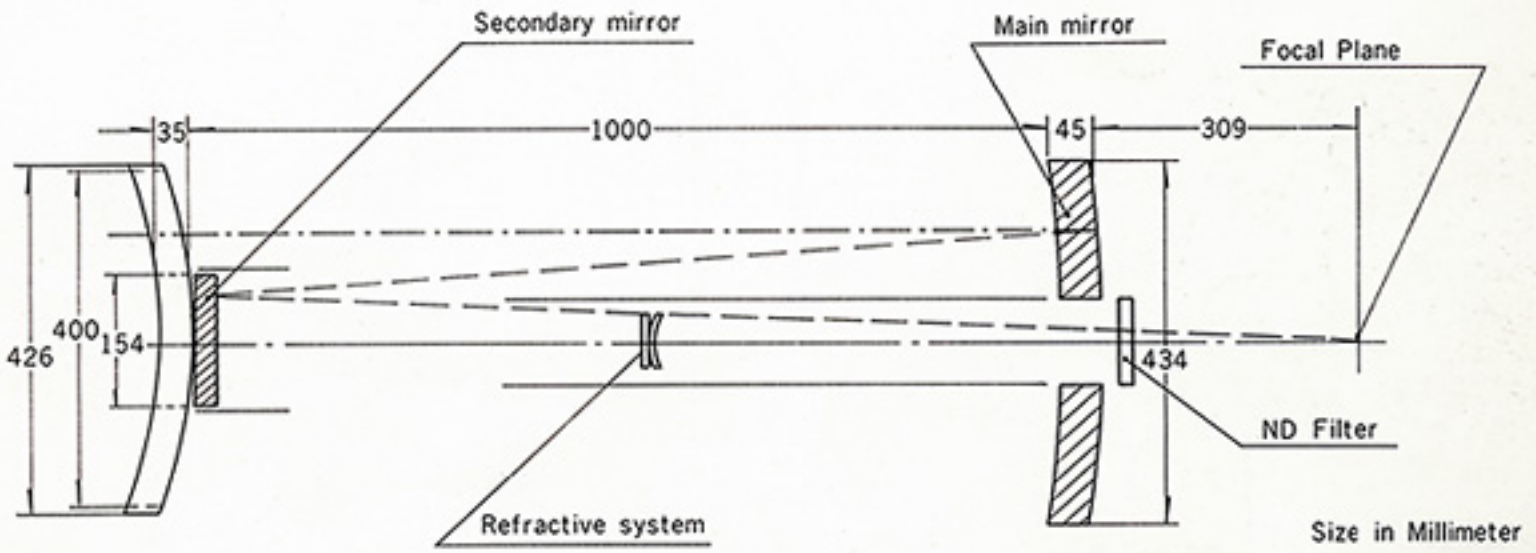


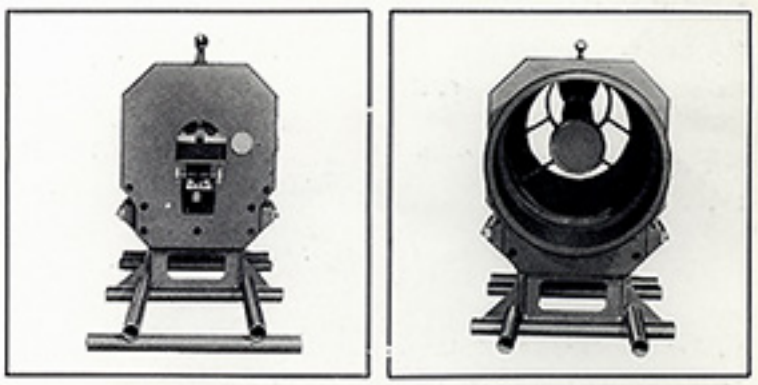
SPECIFICATIONS

Applications:	For Canon SLR cameras
Image Format Covered:	Over 24×36mm
Focal Length:	5,150mm
Angular Fields of View:	Over 36′
Exposure Control:	Light quantity is controlled with the use of built-in ND filters corresponding to 14, 16, 22, 32
Minimum Object Distance:	120 meters
Ambient Temperatures:	40°C – –15°C (100°F – –5°F)
Optical Construction:	2 mirrors and 3 elements
Optical System:	Catadioptric system
Focusing Operation:	For still cameras: By moving Bellows 5200 Film plane movable type: Adjust by moving 27mm at 1000mm—∞. Also capable of adjusting focus to 120m.
Size:	500 (wide)×600(high)×1890mm (deep) (20″×24″×75.6″)
Weight:	100kg (220 lbs) without stand



OPTICAL SYSTEM





Focusing Distance & Area of Focusing
(Taken by Canon FT QL, 24×36mm)

100m	0.47× 0.70m
300m	1.40× 2.10m
500m	2.33× 3.94m
1000m	4.66× 6.99m
2000m	9.32×13.98m
5000m	23.30×34.94m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