

**Triplet Ortho Apochromat**

# **TOA-130**

**INSTRUCTION MANUAL**

**TAKAHASHI**

[F]

## CONTENTS

Warning & Caution .....	2
Specifications .....	3
Tube Assembly Layout .....	4
Photo/Visual Accessories Specifications .....	5
Attaching Finder & Tube Assembly .....	6
Focusing .....	9
Finder Alignment .....	10
Observation .....	12-13
Photo/Visual Accessories .....	14-20
Care & Maintenance .....	21
Additional Precaution .....	21
System Chart .....	22-23

## SPECIFICATIONS

Optical System.....	Air Spaced Triplet
Effective Aperture.....	130mm
Focal Length.....	1000mm
Focal Ratio.....	1: 7.7
Resolving Power.....	0.89"
Limiting Magnitude.....	12.3
Light Gathering Power.....	345x
Diameter of Main Tube.....	156mm
Total Length of Main Tube.....	Type S:1145mm(1015mm with shade retracted)
[W/end cover]	Type F:1145mm(1015mm with shade retracted)
Weight of Main Tube Assembly"	Type S abt. 10.5kg
	Type F abt. 11.4kg
Finder Scope.....	7x50 6.3'

# Tube Assembly Layout

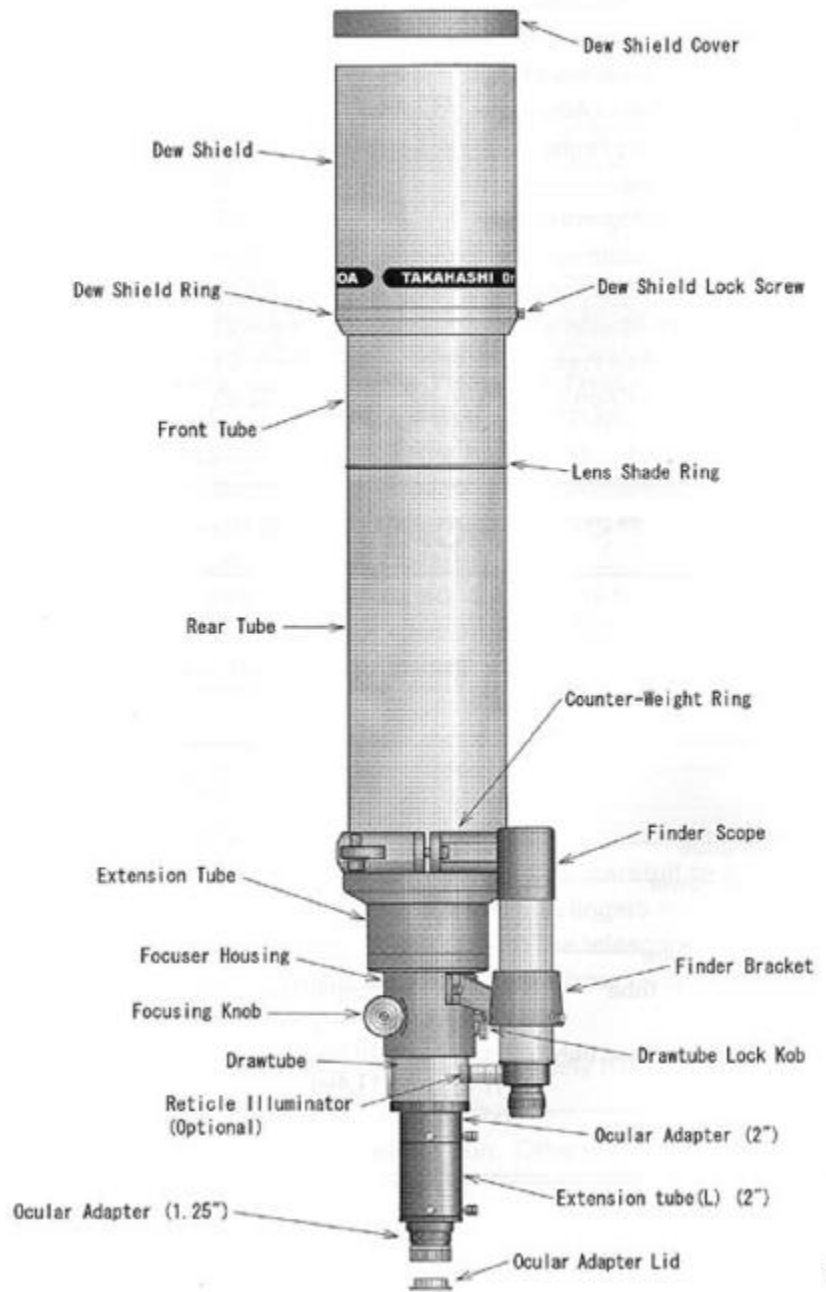


Fig. 1

## Photo/Visual Accessories Specifications

Takahashi has manufactured flatteners, a reducer and a 1.6x corrector/extender for a large number of CCD, photographic and visual applications for the TOA-130.

The TOA-35 & TOA-67 will produce flat field for 35mm, 6x7 or CCD photography. The Reducer changes the focal ratio to f/5.67 and flattens the field for CCD. The Extender TOA extends the focal 1.6x to 1600mm for

lunar, planetary and double star observations.

The flatteners and reducer corrects the field and produce stars that are 2.9 microns at the center and less than 8 microns at 40mm  $\phi$  and less than 20 microns at 80mm  $\phi$ .

TOA-35 Flattener	Focal Length ..... 980mm Focal Ratio ..... F: 7.5 Image Circle ..... $\phi$ 40mm [ 60% illuminated] $\phi$ 25mm [100% illuminated]
TOA-67 Flattener	Focal Length ..... 1000mm Focal Ratio ..... F 7.7 Image Circle ..... $\phi$ 92mm [ 60% illuminated] $\phi$ 70mm [100% illuminated]
Reducer	Focal Length ..... 780mm Focal Ratio ..... F 6.0 Image Circle ..... $\phi$ 52mm [ 60% illuminated] $\phi$ 25mm [100% illuminated]
Extender TOA-1.6x	Focal Length ..... 1600mm Focal Ratio ..... F12.3

Attache the finder bracket to the tapped holes located on the left side of the focuser

## Accessories for Photo/Visual Application

A wide selection of photo/visual accessories are available. Here are the major items and their system charts.

### ■ TOA-35 Flattener

This flattener is specially designed to produce a flat field for use with a 35mm camera, CCD camera and visual use. It is necessary due to the generous back focus to use the a 50.8 extension tube.

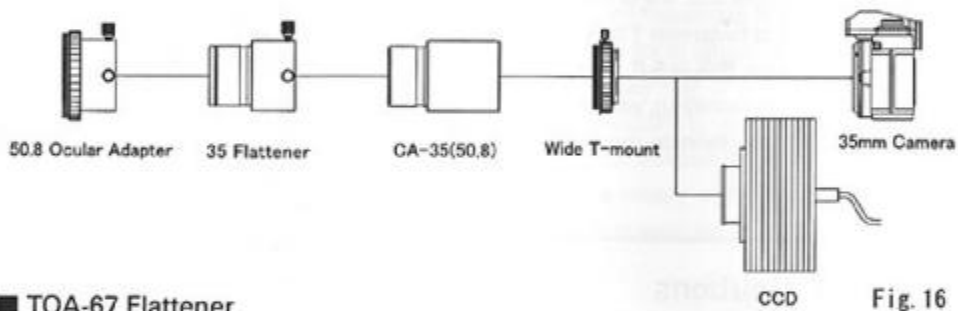


Fig. 16

### ■ TOA-67 Flattener

This is specially designed for the 130F to produce a flat field  $\phi 92\text{mm}$  across with 3-micron stars at the center and 20 microns at the edge of 6x7 film. It also can be used visually with a 50.8 Mirror diagonal and Extender TOA 1.6x which extends the focal length to 1600mm and is flat to the edge.

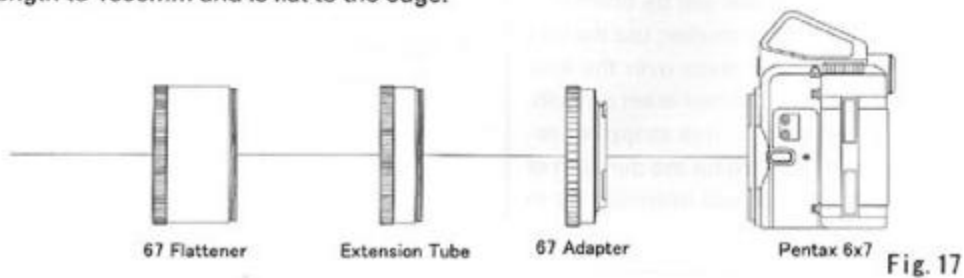


Fig. 17

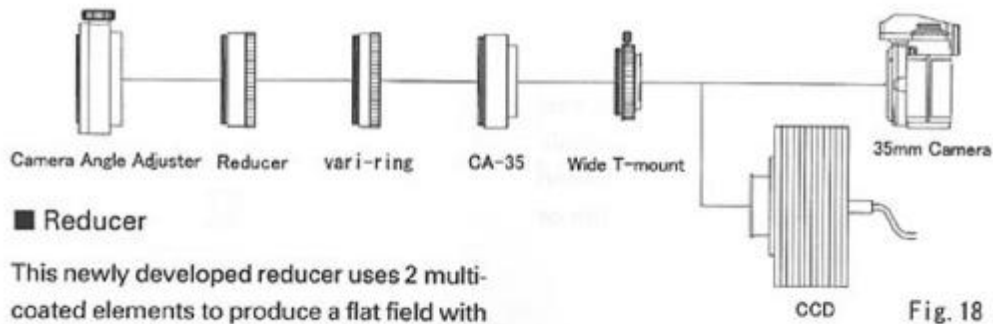


Fig. 18

■ Reducer

This newly developed reducer uses 2 multi-coated elements to produce a flat field with a faster focal ratio than the  $f/7.7$  to  $f/5.6$ . The focal ratio can be further reduced to  $f/5.3$  with the use of extension tubes; the stars still remain under 20 microns, which make it useful for CCD cameras with smaller chips.

■ CA-35

The CA-35 has been designed to be used with the TOA flatteners 35 and 67, the Reducer TOA and the Extender TOA 1.6x. One version can be used with the TOA-35 flattener and Extender TOA and the second for the TOA-67 flattener.

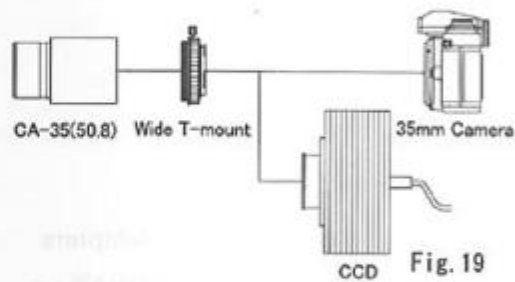


Fig. 19

■ Digital Camera Adapters

The Digital Camera Adapters are designed to allow the eyepiece projection [31.7 or 24.5 ocular] photos of the Moon and planets with your digital camera.

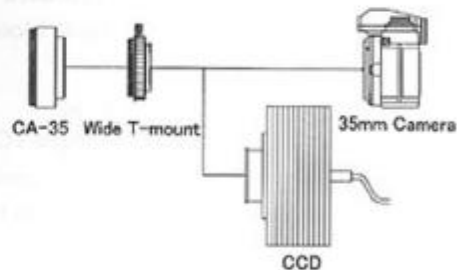


Fig. 20

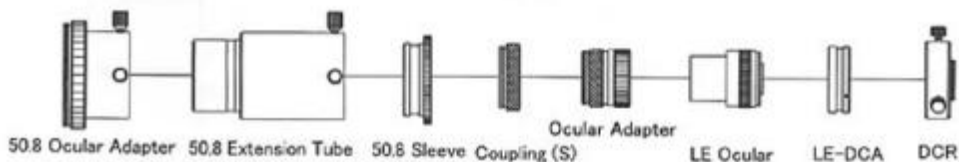


Fig. 21

### ■ TCA-4

This variable eyepiece device attaches easily to the TOA for high quality high magnification photos of the surface of the Moon and planets. It can be used with a film or CCD camera.

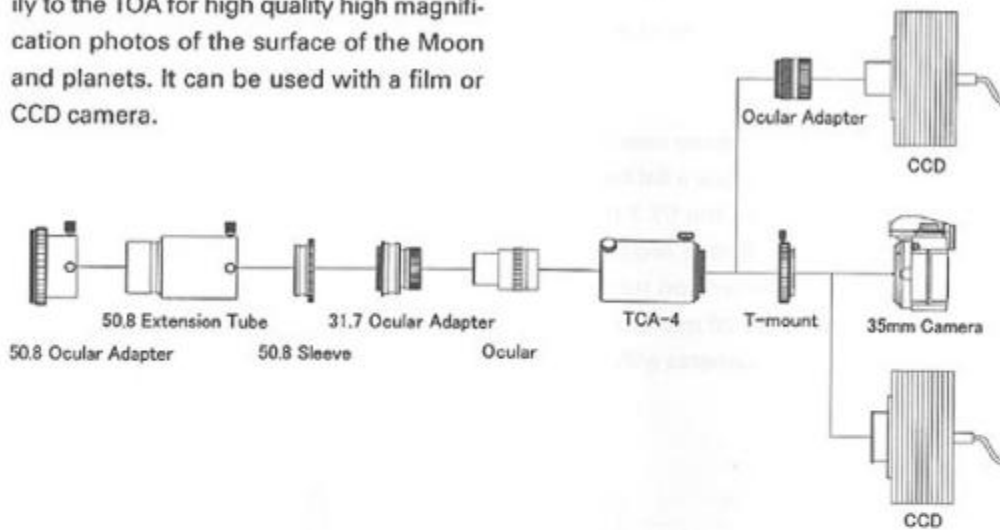


Fig. 22

### ■ T-Mount & Wide Mount T-Adapters

These adapters, one for the standard T-mount and the second for the Wide Mount T-Adapter.

The T-Mount is used to connect to the TCA-4 eyepiece projection adapter for high magnification photos and CCD images of the Moon and planets.

The Wide Mount T-Adapter can be used for prime focus, reducer, flattener or Extender TOA photography.

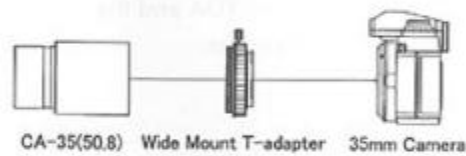


Fig. 22

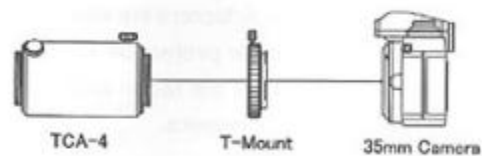


Fig. 23

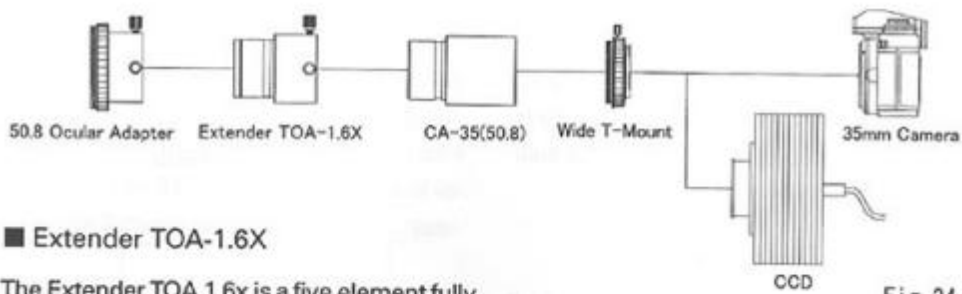


Fig. 24

■ Extender TOA-1.6X

The Extender TOA 1.6x is a five element fully multi-coated 3-group 5-element extender that increases the focal length of the TOA-130 to 1600mm. The longer focal length will produce stunning images of the Moon and planets. A 35mm camera can be attached to the Extender TOA with a 50.8 extension tube and wide mount camera adapter. When used with the flatteners it produces a flat O40mm circle for visual, 35mm or CCD applications.

■ 2X Barlow Lens

This Barlow lens was originally designed for the FS Series and it can be used for the TOA for visual use. This short Barlow can be used with the 31.7 diagonal or mirror diagonal.

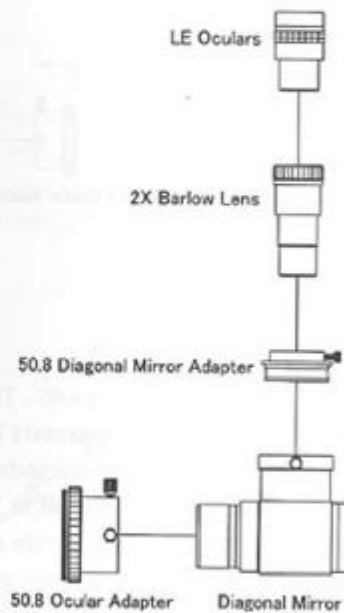


Fig. 25

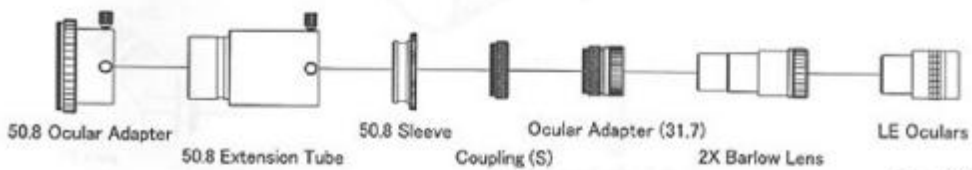
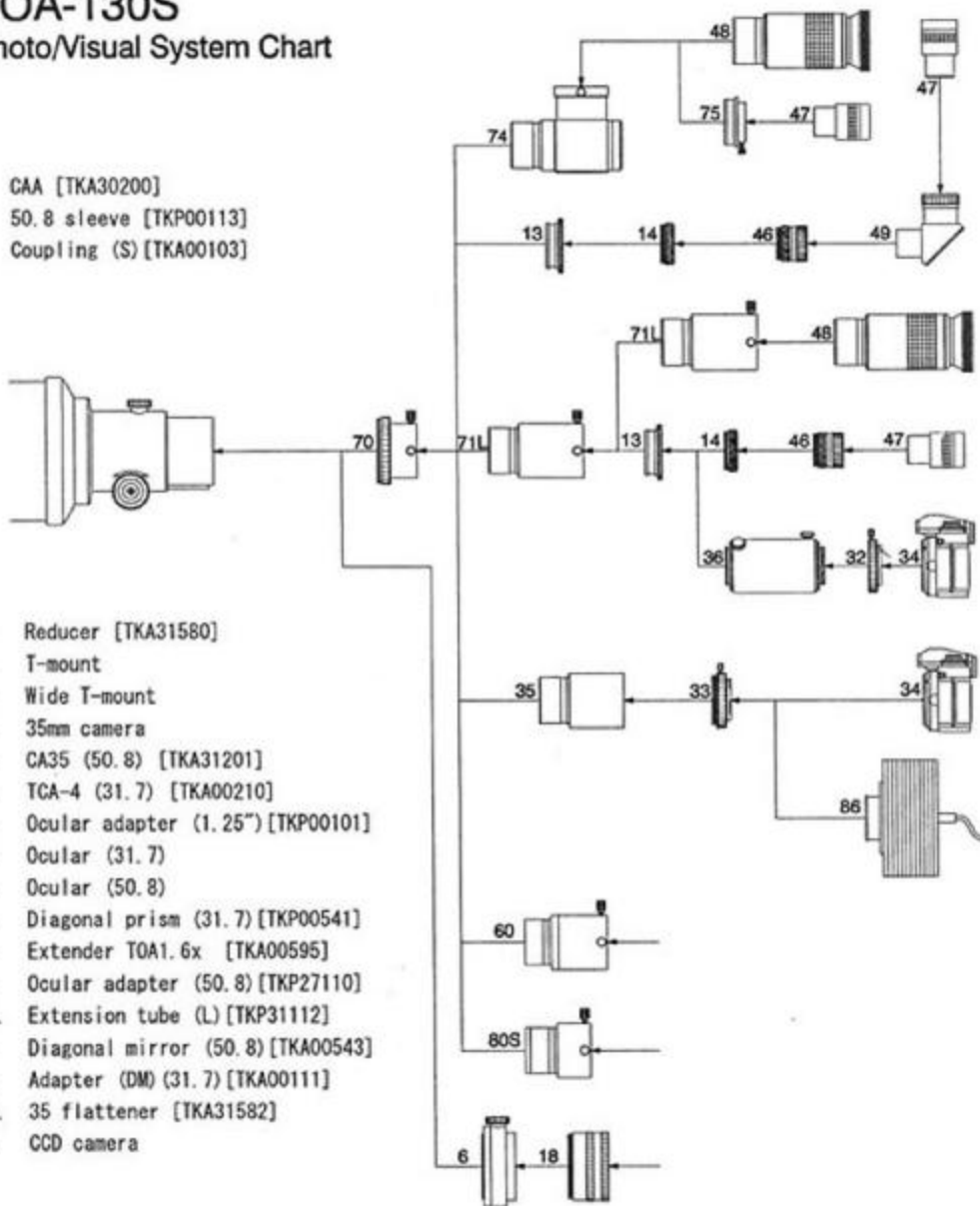


Fig. 26

# System Chart

## TOA-130S Photo/Visual System Chart

- 6. CAA [TKA30200]
- 13. 50.8 sleeve [TKP00113]
- 14. Coupling (S) [TKA00103]

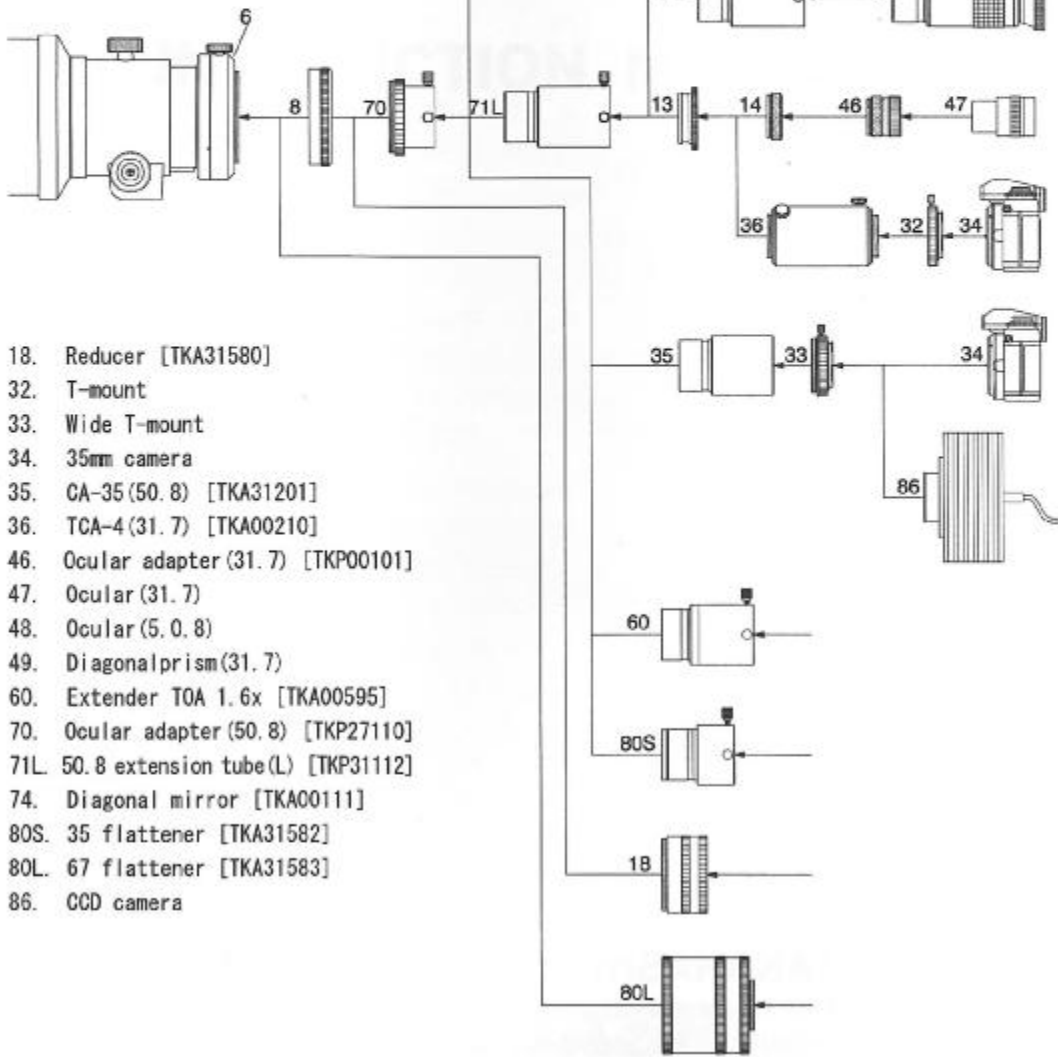


- 18. Reducer [TKA31580]
- 32. T-mount
- 33. Wide T-mount
- 34. 35mm camera
- 35. CA35 (50.8) [TKA31201]
- 36. TCA-4 (31.7) [TKA00210]
- 46. Ocular adapter (1.25") [TKP00101]
- 47. Ocular (31.7)
- 48. Ocular (50.8)
- 49. Diagonal prism (31.7) [TKP00541]
- 60. Extender TOA1.6x [TKA00595]
- 70. Ocular adapter (50.8) [TKP27110]
- 71L. Extension tube (L) [TKP31112]
- 74. Diagonal mirror (50.8) [TKA00543]
- 75. Adapter (DM) (31.7) [TKA00111]
- 80S. 35 flattener [TKA31582]
- 86. CCD camera

# TOA-130F

## Photo/Visual System Chart

- 6. CAA
- 8. Coupling (W) [TKP31003]
- 13. 50.8 sleeve [TKP00113]
- 14. Coupling (S) [TKP00103]



- 18. Reducer [TKA31580]
- 32. T-mount
- 33. Wide T-mount
- 34. 35mm camera
- 35. CA-35 (50.8) [TKA31201]
- 36. TCA-4 (31.7) [TKA00210]
- 46. Ocular adapter (31.7) [TKP00101]
- 47. Ocular (31.7)
- 48. Ocular (5.0.8)
- 49. Diagonal prism (31.7)
- 60. Extender TOA 1.6x [TKA00595]
- 70. Ocular adapter (50.8) [TKP27110]
- 71L. 50.8 extension tube (L) [TKP31112]
- 74. Diagonal mirror [TKA00111]
- 80S. 35 flattener [TKA31582]
- 80L. 67 flattener [TKA31583]
- 86. CCD camera